Special Report: Japanese Quake & Tsunami, p. 13

Amateur Radio

COMMUNICATIONS & TECHNOLOGY

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CQ

MAY 2011

- **Results, 2010 CQ WW RTTY DX Contest, p. 14**
- **Results, 2010 CQ WW Foxhunting Weekend, p. 26**
- **Fighting TVI in the Digital World, p. 77**

On the Cover: Bob Fulton, KB9MMJ, of Lyons, Wisconsin, with his collection of classic gear. Details on page 98.

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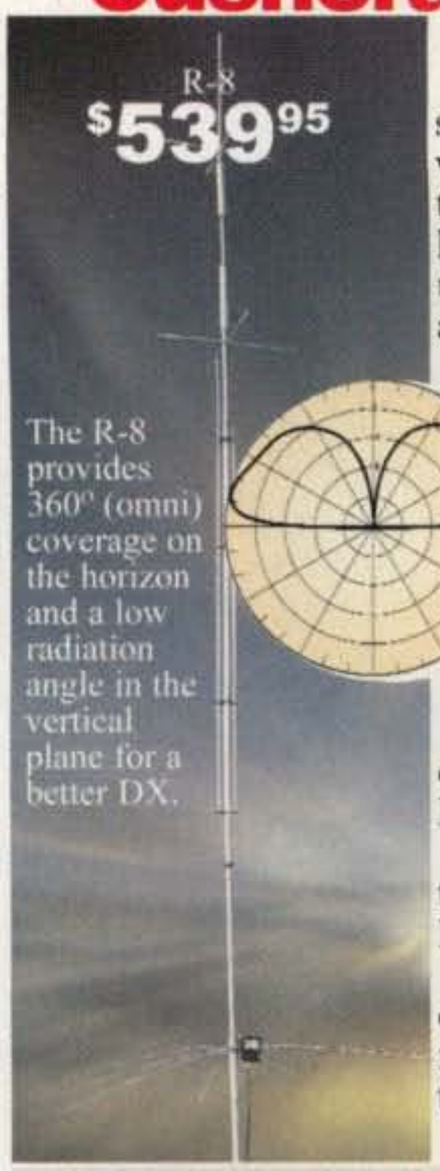
Cushcraft R8 *8-Band Vertical*



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!

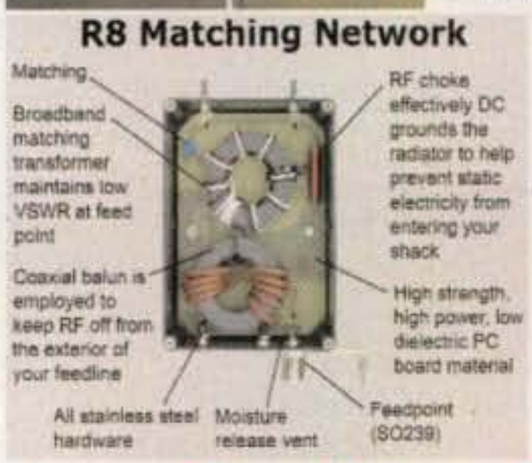
Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

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.



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

Hams "a Lifeline" After Quake, Tsunami in Japan

Japanese amateurs were providing "a lifeline for rescue teams and those at local shelters" in the wake of the disastrous 9.0 earthquake and 30-foot tsunami that struck northeastern Japan on March 11, according to International Amateur Radio Union Region 3 Secretary Ken Yamamoto, JA1CJP. Most ham operations were on UHF, as well as 7.030 MHz SSB. For more detailed coverage of the ham radio response to the disaster in Japan, see our special report on page 13 of this issue.

Meanwhile, ham radio disaster-relief operations in New Zealand were reported to be winding down as commercial services came back online in and around Christchurch, which was hit by an earthquake on February 22. Details on the ham response there are in this month's "Public Service" column on page 44.

Hamvention® Award Winners Announced

The Dayton Amateur Radio Association has named the winners of its prestigious Hamvention® awards for 2011. Shirley Roberts, N8LX, of Dayton, was named Amateur of the Year (see our profile of Shirley on page 44); Roy Lewallen, W7EL, will receive the Technical Excellence Award for his development of EZNEC antenna modeling software. The Special Achievement Award goes to Fred Lloyd, AA7BQ, founder of QRZ.com. The Albemarle Amateur Radio Club of Charlottesville, Virginia, was named Club of the Year. The awards will formally be presented at the Dayton Hamvention® in May.

Russia Joins CEPT

Many hams from the U.S. and Europe visiting Russia should find it easier to operate there, as the Russian Federation has decided to join the CEPT (Council of European Post and Telecommunications administrations) agreement on amateur radio licensing. No effective date has been announced. According to a posting on the Southgate Amateur Radio Club's news page, officials of IARU Region 1 consider the decision "a major step forward to achieve worldwide radio amateur roaming." American hams holding Extra or Advanced Class licenses may operate in CEPT countries without special permission. General Class licensees have restricted privileges. Novices and Technicians have none.

In other DX news, Southgate also reports that the new government of southern Sudan has issued its first amateur license, for a DXpedition scheduled for July. No callsign has yet been issued, as the International Telecommunications Union has yet to assign a prefix for Southern Sudan. Also, *The Daily DX* reports that the planned DXØDX expedition to the Spratly Islands has been postponed again, this time until next April. Team leader VK3FY said the delay was due to circumstances beyond their control and was "in the best interests of the team of operators."

Alleged Pirates Indicted in Deaths of Hams

Thirteen alleged pirates from Somalia and one from Yemen have been indicted by a federal grand jury in Virginia on piracy, kidnapping, and firearms charges. They were captured at sea by the U.S. Navy after allegedly taking over a sailing vessel off the coast of Africa and killing the four crew members on board, three of whom were hams. According to *Newsline*, the four had been delivering Bibles around the world. The suspected pirates will stand trial in Norfolk, Virginia.

FCC Changes Amateur Spread-Spectrum Rules

Responding to a petition filed several years ago by the ARRL, in March the FCC issued new rules for using spread spectrum in the amateur bands. According to *Newsline,* the Report and Order eliminates the requirement for automatic power control to keep transmitted power to the minimum necessary to maintain a communications link. At the same time, however, the order reduced the maximum power output allowed for an amateur spread-spectrum transmitter from 100 watts to 10 watts PEP.

ARISS Achieves New Milestone

AMSAT reports that a ham radio contact between astronaut Cady Coleman, KC5ZTH, aboard the International Space Station, and students from several schools in Poland, marked the 600th school contact for the Amateur Radio on the International Space Station (ARISS) program. The contact took place on March 17.

In other space and satellite news, AMSAT also reports that the ARISSAT-1 satellite, now on board the ISS awaiting a July launch, was scheduled to be turned on from inside the station on April 12 as part of the celebration of the 50th anniversary of the first manned space flight, by Russian cosmonaut Yuri Gagarin in 1961. Two new ham satellites, FASTRAC-1 and FASTRAC-2, successfully separated from one anther on March 15 (they had been launched as a single nanosatellite last November, according to the ARRL), and hams were invited to help track them. FASTRAC is a project of the University of Texas.

As of press time, there is bad news for three other ham satellites: Explorer-1, KySat-1, and Hermes all were lost in a launch failure. According to Southgate News, the three satellites were on board an Orbital Sciences Taurus XL rocket which failed to reach orbit after a March 4 launch.

Senegal Telecom Institute Gets Ham Station

A ham station operating on HF and VHF has been set up at an international telecommunications institute in Dakar, Senegal, and a training module on amateur radio has been added to the programs offered there. According to Southgate News, the station, sponsored by IARU Region 1's "Support to the Amateur Radio Service, or STARS, program, opened recently at Ecole Supérieure Multinationale des Télécommunication, or EMST, which has been designated as the first ITU Centre of Excellence. The facility is used to train future telecom engineers and regulators from 14 African countries.

Bell Labs Develops Tiny Cellular Antenna

A team of researchers at Alcatel-Lucent's Bell Labs has designed and built a cell-site in a two-inch cube, a development that could revolutionize the way cell-phone calls and data are routed. According to a Bell Labs news release and news reports, the lightRadio™ cube consists of three stacked circuit boards—one each for the antenna, the radio, and the network connection—and it would not have to sit on top of a tall tower. It is estimated that wide-scale deployment of these devices could increase network capacity by up to 30 percent and reduce or eliminate the need for controversial cell towers.

Connection to ham radio? The possibility exists for adaptation to the amateur repeater network and the potential for changes in some restrictive antenna ordinances, many of which were enacted in response to the building of cell-site towers. *(News continued on p.10)*

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

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*Two tone third order dynamic range at 2kHz spacing -as measured by ARRL Labs

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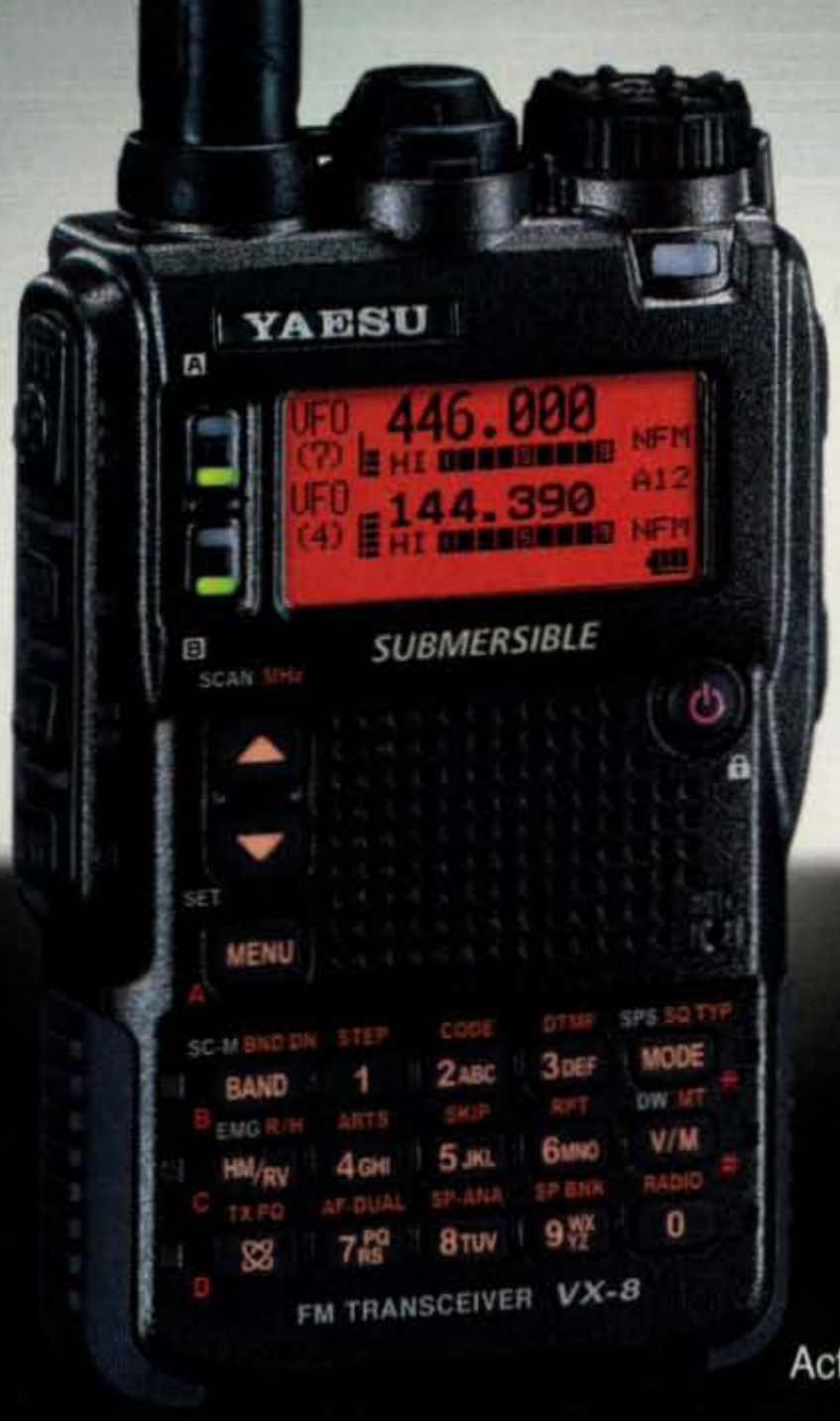
FM 5 W/AM 1W (50 MHz) Triple Band Handheld

VX-8DR * 222 MHz/1.5 W (USA version)

(7.4V 1,100 mAh Lithium Ion battery/FNB-101LI and battery charger/NC-86A included)



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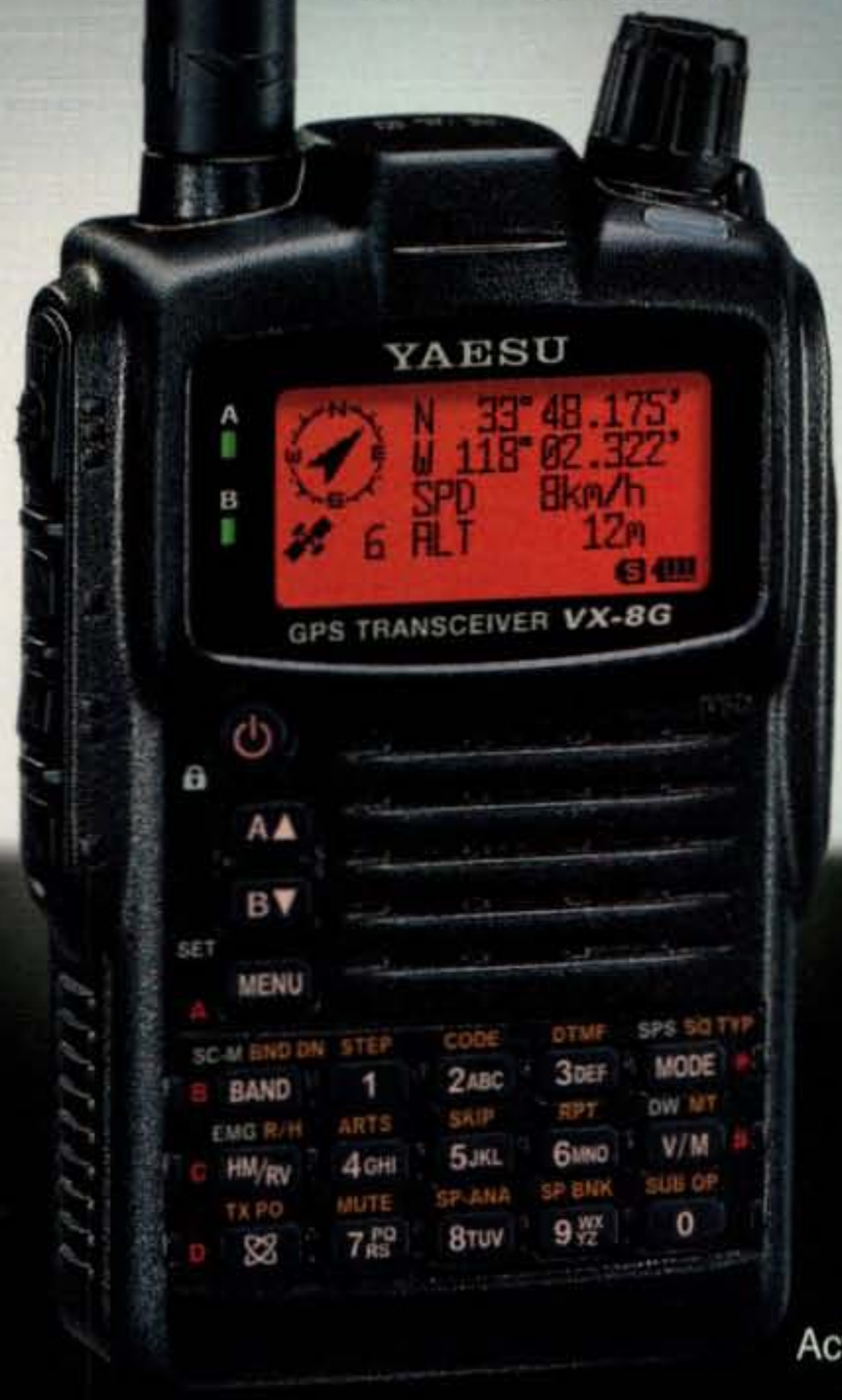
144/430 MHz
FM 5 W Dual Band Handheld

VX-8GR

(7.4V 1,100 mAh Lithium Ion battery/FNB-101LI and battery charger/NC-86A included)



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Waterproof/Submersible IPX 7 rated - 3 ft for 30 minutes

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The optional GPS Antenna Unit FGPS-2 attached to the optional speaker Microphone MH-74A7A

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The new MMB-98 Mounting bracket allows easy installation of the radio control display to your Dashboard by placing the vacuum mount in the desired location and pressing a lever. You may then adjust the display to the optimum viewing angle.

2. Expanded APRS® functions

- Uses the worldwide-accepted GPS NMEA data format
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- Re-allocated often used keys to more convenient positions for easier operation
- Programmable keys on the DTMF Microphone provide direct access to APRS® functions

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Japan and Ham Radio Emergency Communications

While sitting in the airport on March 11, waiting for a flight to Charlotte, North Carolina, my Blackberry® started buzzing with news of a major earthquake in Japan. By the time I landed, we were hearing about the tsunami as well. Of course, at that early stage, no one here had any idea of how massive this natural disaster had been, or that it would be followed by a manmade catastrophe as workers at the damaged Fukushima nuclear power plant tried frantically to prevent a full meltdown. As I write this a week later, the nuclear disaster is still unfolding, and the scope of damage to both the immediately-impacted areas and Japan's economy is becoming manifest. Even offices and factories far from the quake zone have been essentially shut down due to suspension of service on Japan's high-speed rail lines (the country's commuting lifeblood) and rolling power blackouts throughout the country. Ham radio manufacturers were affected to varying degrees, based on the proximity of their factories to the quake zone (see our special report on p. 13).

What I *wasn't* hearing in those early hours, though, were reports of ham radio activity and requests to keep frequencies clear for HF emergency traffic. While Japan is the source for most of our ham radio equipment today, it seems that that country has a different model than we do for amateur radio emergency communications and a different perception of what hams should do in a disaster. Unlike in the US and many other places, hams in Japan do not serve as "communication first-responders," setting up temporary stations capable of operating without commercial power and keeping information flowing while primary public safety and cellular systems get back up to speed. According to *CQ* Advertising Manager Chip Margelli, K7JA, who is very familiar with amateur radio in Japan, one main reason for this is because Japan's commercial and public safety communications infrastructure is very robust and less prone to overload or failure in an emergency than similar systems elsewhere. So the need for ham radio support in the early hours of a disaster is greatly reduced. (Of course, no one was anticipating a 30-foot tsunami.).

It was only after several days—as power began to be restored to affected areas—that hams began setting up stations at shelters and emergency operating centers, and that the Japan Amateur Radio League's headquarters station, JA1RL, began serving as a focal point and clearinghouse for reports from around the country. Ham radio's role of providing backup and supplemental communications is intact in Japan, just not its "first responder" role.

This could be where amateur radio emergency communications in the US eventually ends up, if the planned nationwide interoperable public safety radio service now being promoted by the FCC and Congress ever gets up and running. But it's doubtful that it will. Interoperability is about more than just having radios that can talk to each other, it's also about having people—trained communicators—who can talk to each other in a language that everyone can understand clearly the first time around. We have so many jurisdictions with so many different protocols and even different 10-codes that just putting everyone together on the same frequency will not solve our interoperability problems during large-scale emergencies.

The Incident Command System (ICS) and the National Incident Management System (NIMS) were developed to try to combat this non-technical obstacle to interoperability but their success has been marginal at best and we are starting to hear rumblings that proposed new NIMS guidelines water down already thin requirements for training and coordination. We haven't seen the specifics yet, but our sense is that, here in the United States at least, amateur radio emergency communications—combining personal equipment, frequency agility and trained operators—will continue to be a vitally important part of emergency and disaster response for a long time to come. It's still the only thing proven to work "when all else fails."

Again, we have a special report on page 13 of this issue on the disaster in Japan and the ham radio response. Most of it is culled from reports that *CQ* Public Service Editor Richard Fisher, KI6SN, and I have posted on our new CQ News page on the web (http://CQNewsroom.blogspot.com) as events unfolded. If you haven't checked it out yet, please do. We've got links and photos and other cool stuff. We also posted regular updates on our four magazine Facebook pages and sent out periodic updates to our *CQ* and *WorldRadio Online* e-mail lists. Be sure to check out our news page regularly (you can link from our home page) to keep updated on this and other ham radio stories.

On the Hamfest Trail

The Charlotte Hamfest was my reason for being at the airport when news of the Japanese earthquake broke. With its new location in Concord, there's no longer any chance of sharing space with the woodworking show (longtime readers will recall multiple comparisons between the hamfest and the wood show in this column, by both my predecessor, K2EEK, and me). This year, though, we shared the facility with the North Carolina state high school wrestling championships. A little bit of confusion, but also a great opportunity for the hamfest volunteer posted outside the wrestling entrance to not only direct people looking for the hamfest to the right place, but also to explain to many high schoolers and their families what a hamfest and ham radio are all about.

As with Orlando in February, attendance at Charlotte seemed to be up over last year and it was quite crowded into the afternoon on Saturday. We even managed to do a little bit of business on Sunday! As always, the Carolina DX Association dinner was a highlight of this trip … and the highlight of the dinner for me was two ex-Brooklynites each trying to outdo the other on who was more of a "real" Brooklynite (kind of like being a "real" ham!). It ended in a draw, each reluctantly admitting that the other might indeed actually have come from that storied borough of New York City. Next hamfest for me is Dayton; I hope to see many of you there.

To close on a serious note, we extend our condolences to our industry colleagues, friends and fellow hams who lost loved ones in the quake and tsunami, and our hopes and prayers are with all of those who are struggling to recover. May the spirit of ham radiofriendship help you through these difficult times.

73, W2VU

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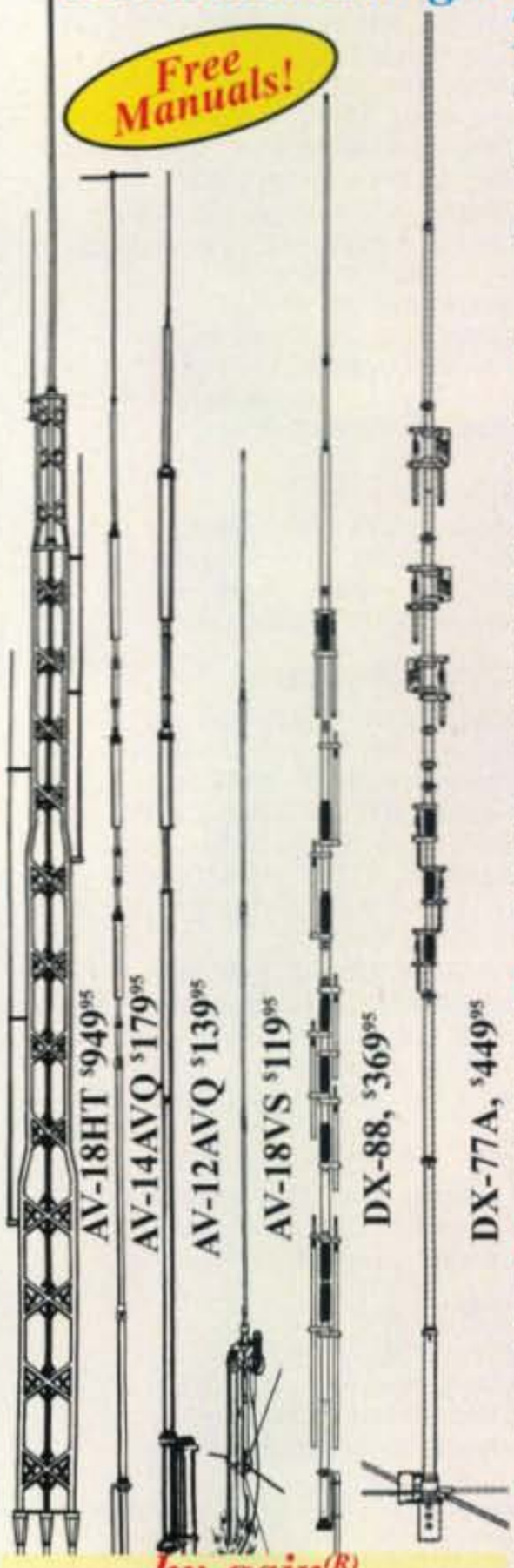

hy-gain(R) Classics

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

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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.

DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs.

All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $199.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

***No** ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

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

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Full 1500 Watts, 43 feet, includes base mount

New! AV-6160 **$399.95** UPS SHIPPABLE

Operate all bands 160-6 Meters at full 1500 Watt with this self-supporting, 43 feet high performance vertical! It assembles in less than an hour and its low profile blends in with the sky and trees -- you can barely see it . . .

Exceptional Performance

The entire length radiates to provide exceptional low angle radiation 160-20 Meters and very good performance on 17-6 Meters. You can shorten it by telescoping it down for more effective low angle radiation on higher bands.

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Just 20 lbs., uses super-strong *6063 aircraft aluminum tubing.* Stainless steel hardware.

Assembles in an hour

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announcements

USS Yorktown Back on the Air – From May 14 1200Z to May 15 0400Z the callsign NWKJ will be back on the air for the first time in 41 years. *Yorktown* will be activated by the South Carolina Navy Marine Corps MARS members as well as operators from Region Four for the annual military cross-band test. They will be operating on the following frequencies: 4010 kHz LSB, 7348 kHz LSB, 14478.5 kHz USB, and 20994 kHz USB. POC: Fred Hambrecht, NNNØGBS, 129 Indian Trace Court, Gilbert, SC 29054 (commercial: 803-657-3602)

• The following hamfests, etc., are scheduled for May:

May 7, **49th Annual Cadillac Swap, Cadilac, Michigan;** Wexaukee Amateur Radio Club; Cadillac Junior High School, 500 Chestnut St. For information and reservations: Alton McConnmell, phone 231-867-3774, e-mail <nu8l@yahoo.com>. Wexaukee Amateur Radio Club, PO Box 163, Cadillac, MI 49601. (Talk-in 146.98 MHz [no PL]; exams)

May 16, **Flea at MIT,** Cambridge, Massachusetts, Albany and Main St., Cambridge, MA. Sponsored by the Harvard Wireless Club (W1AF), the MIT Electronics Research Society, the MIT UHF Repeater Assn. (W1XM), and the MIT Radio Society (W1MX) For space reservations and details go to <www. swapfest.us>. (Talk-in 146.52 and 449.725/ 444.725 W1XM/R, PL 114.8)

May 20–22, **Dayton Hamvention®,** Dayton, Ohio, Hara Arena. Complete details can be found at: <http://www.hamvention.org/ >. ***(See us at the CQ Booth)***

May 20, **Dayton Hamvention® DX Dinner™** sponsored by the Southwest Ohio DX Association (SWODXA). In conjunction with the Dayton Hamvention®. The dinner will be held on Friday, May 20, at the Dayton Marriott, 1414 S. Patterson Boulevard: web <http://www.marriott.com/hotels/travel/dayoh-dayton-marriott>, phone 937223-1000. The "DXpedition of the Year" will be announced. Program details and a list of the prizes available are available at: <http://www.swodxa.org> or <http://www.swodxa. blogspot.com>. Check or money order for tickets, payable to SWODXA, should be sent to Kirk Swallow, W8QID at 3137 Compton Rd, Cincinnati, OH 45251. Be sure to include an SASE for ticket return.

May 29, **Memorial Day Hamfest**, Howard County Fairgrounds, Rt. 144, West Friendship, Maryland. Contact: Maryland F.M. Association, Inc., PO Box 351, Hanover, MD 21076 (e-mail: <wa3mnn@verizon.net). (Talk-in 146.16/ 146.76, 223.16/224.76, 449.0/444.0, PL 107.2

*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 *(Continued from page 2)*

QRM from Plasma TVs

Hams in Ontario, Canada are reporting that they are getting considerable HF interference from plasma-screen televisions and have asked the Radio Amateurs of Canada (RAC) for help. Southgate News reports that RAC has asked its members who own plasma TVs to gather data and report on their own interference problems as well as possible solutions. Specific makes and model numbers are requested along with descriptions of the HF ham station, antenna, and exact nature of the interference. RAC would also like to hear from hams who have plasma TVs but *do not* experience interference problems. Reports should go to Norm Rashleigh, VE3LC, RAC VP/Industrial Liaison, at <ve3lc@rac.ca>.

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Accompanied by volunteer operator Vicki Boriac, Santa Cruz (California) ARES® team member Don Taylor, K6GHA, sits at the controls of the ham station in the county Emergency Operations Center after a tsunami threat was issued March 11 – waves that subsequently damaged parts of the central California coast. *(Courtesy of Craig Smith, W6WL)*

Special Report: Amateurs Join Rescue Effort in Wake of Japan Quake, Tsunami

BY CQ STAFF

At *CQ* press time, radio amateurs, relief agencies and government officials across Japan were providing disaster relief in the wake of the 9.0 magnitude earthquake March 11, the subsequent tsunami that ravaged the nation's Sendai region, and the severe damage that put parts of the nation's nuclear power program in peril.

The latest report from International Amateur Radio Union (IARU) Region 3 Disaster Communications Committee Chairman Jim Linton, VK3PC, indicated the Japan Amateur Radio League (JARL) headquarters station, JA1RL, and other amateur stations were on the air providing emergency communications.

News updates posted to the *CQ Newsroom* <http://www.CQNewsroom.blogspot.com> were assembled from information posted on the Southgate Amateur Radio Club website, the American Radio Relay League (ARRL) and other sources.

"JA1RL continues to operate under instruction to be an emergency traffic center and (is) increasingly receiving help from JARL members in the affected area," Linton said. "It is using 7 MHz SSB, 144 MHz SSB/FM and 430 MHz SSB/FM. Many other stations are active—including some battery powered and others using small generators—and are using various frequencies to exchange rescue and disaster relief operation information with JA1RL and others."

Ken Yamamoto, JA1CJP, Secretary of IARU Region 3, also noted, "In less damaged areas, the electric power supply is being restored gradually and local amateur radio club members have started to establish stations at shelters."

"The radio equipment manufacturers offered hundreds of handheld VHF/UHF transceivers to the JARL for use at refugee centers and local disaster relief centers," Yamamoto said. "These transceivers should help to establish mutual communications between refugee disaster relief centers and to facilitate smooth and appropriate delivery of disaster relief goods."

Yamamoto added that the JARL "talked to the Radio Authority and 300 VHF/UHF transceivers were verbally given their licenses. After each transceiver got its callsign indication, (the radios) were sent out to the disaster area with spare batteries."

At press time there had been no call for foreign radio amateurs to assist in the relief effort.

Readying for a Tsunami in Hawaii and the Mainland

In Hawaii, Ron Hashiro, AH6RH, told the ARRL shortly after the earthquake struck that the region was preparing for the predicted tsunami that was making its way across the Pacific Ocean: "The water level at Kahului Harbor—the main harbor on the Island of Maui—dropped five feet at 3:54 HST (1354 UTC). A quake measuring 4.5 was felt in Hawaii, 150 minutes following the Japan tremor."

Although on a scale nowhere near the destruction in Japan, the most serious damage in Hawaii occurred near Kealakekua Bay and Kailua-Kona on the Big Island. Haleiwa and Keehi Lagoon on Oahu, and areas of Maui and Molokai, were hit, as well.

Along the west coast of the U.S. mainland, Santa Cruz County Amateur Radio Emergency Services®, on California's central coast, reported that after the earthquake, "sirens wailed and reverse 911 (calls) alerted residents in low-lying beach zones of Santa Cruz County" to the impending danger of the tsunami.

According to Bill Conklin, AF6OH, Santa Cruz County ARES® public information officer, early Friday morning operators on the team "activated the Santa Cruz County Tsunami Resource Net in advance of the anticipated 5- to 7-foot wave. It was expected to reach the Santa Cruz Coast around 8 AM.

"More than 30 local ARES® radio operators manned agencies including the Santa Cruz County Emergency Operations Center, evacuation centers, the American Red Cross, Salvation Army Corps Canteen Truck One, Santa Cruz County Harbor Coast Guard Auxiliary and a number of local fire departments," he said in a release. "In addition to the served agencies, a number of hams provided remote observation of the coastline and communications capabilities at the evacuation centers."

(Continued on page 50)

Results of the 2010 CQ WW RTTY DX Contest

BY ED MUNS,* WØYK

Robert, ST2AR, prolifically supplying the ST mult in recent CW and RTTY contests, led Single-Op Low Power and set a new Africa record.

Zik, VE3ZIK/DK8ZZ/YT3ZZ, operating as 9A/VE3ZIL from the 9A3MR QTH on Murter Island took 4th place Single-Op 20M Low Power.

The 24th annual CQ WW RTTY DX Contest (the world's largest RTTY competition) enjoyed the best band conditions we've seen in recent years, enabling over 5,000 participating stations to make 1.2M QSOs, a 20% growth over 2009. Refreshingly, 10-meter activity was significantly up, especially on north-south paths. The number of submitted logs grew 16% to 2681. This set the stage for another round of record-breaking performances by the top stations, with many participants at all levels reporting personal-best results. For the contest 146 countries and all 40 zones were active.

Twelve new world records and 28 new continental records were set by the winners. In several cases, more than one station broke the record! Numerous country and area records were also broken. This is a tribute to increased participation, improved operating skill, and (slowly) improving solar conditions. Here are the highlights:

Single Operator Low Power

Single-Op All Band Low Power. Robert, ST2AR, took first place world and broke the Africa record by 33% with 3.6M points. Robert's error rate was only 20% of the contest average at just 0.7%. The next three places were nearly tied at about 3.0M points: Ted, HI3TEJ, Enrico, 6V7X (IK2FIL), and Filipe, CR6K (CT1ILT). Filipe lifted the European record by 33%. In the U.S., Mark,N2QT, dominated with 2.3M points.

Single-Op 80-Meter Low Power. Jan, OK2ZAW, won with 76K, barely missing the European record.

Single-Op 40-Meter Low Power. Dalibor, E79D, broke the world record by 22% (330K).

Single-Op 20-Meter Low Power. Gennady, EU1DX, won with 364K, just 0.3% short of the European record. Moreover, the next two entrants—Roberto, IT9STX, and Karel, OK2ZI—were nearly tied with Gennady.

Single-Op 15-Meter Low Power. Jack, FY1FL, blew away the world record by 68% with 508K.

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

Sunset highlighting the E76C/E7DX antenna farm.

Single-Op 10-Meter Low Power. Alexandre, PY2SEX, raised the world record by 84% to 116K.

Single-Op High Power

Single-Op All Band High Power. After Val, EF8M (RD3A), smashed the world record by 20% in 2009, Ed, P49X (WØYK), raised it another 20% this year to 10.6M. Arunas, LY5E (LY2IJ), was second with 5.1M, setting a new European record. Dennis, W1UE, took third and broke the North America record by 10% with 4.2M.

Single-Op 80-Meter High Power. Zelimir, 9A2DQ, won with 248K, while Franco, I4AVG, was close by with 238K.

Single-Op 40-Meter High Power. Chris, SO4M (SP4K), broke the world record by 7% for 670K. Rick, KI1G, took third, breaking the U.S. record by 63 % with 473K.

Single-Op 20-Meter High Power. RTTY newcomer John, KK9A, took first place in the world and raised the North America record by 8% with his 776K finish. Sobon, SN7Q, was second with 754K. Jerry, WB9Z, was fourth overall with 610K and broke the U.S. record by 35%, second to KK9A for that area.

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Single Operator High Power

World: Sponsored by John Orton, W5JBO. **Winner: P49X (op: Ed Muns, WØYK)**
Asia: Sponsored by Alex Panoiu, YO9HP. **Winner: Masaki Okano, JH4UYB**
Europe: Sponsored by Andrei Stchislenok, EW1AR/NP3D (in Memory of EU1MM). **Winner: LY5E (op: Arunas Vaglys, LY2IJ)**
North America: Sponsored by PJ2S Group. **Winner: Dennis Egan, W1UE**
South America: Sponsored by Radio Club Cordoba, LU4HH. **Winner: LV5V (op: Jorge Krienke, LU5VV)**
Canada: Sponsored by Contest Group du Quebec. **Winner: Nick Lekic, VE3EY**
Japan: Sponsored by Darrell Penrod, K9MUG. **Winner: Harumi Kukit, JF1PJK**
USA: Sponsored by Joseph Young, W6RLL. **Winner: Larry Brockman, N6AR/4**

Single Operator Low Power

World: Sponsored by Don Hill, AA5AU. **Winner: ST2AR (op: Robert Kasca, S53R)**
Asia: Sponsored by Jim Reisert, AD1C. **Winner: Yuri Kurinyi, RG9A**
Europe: Sponsored by Tyler Stewart, K3MM. **Winner: CR6K (op: Filipe Monteiro Lopes, CT1ILT)**
Oceania: Sponsored by Doug Faunt, N6TQS. **Winner: Felimon Morano, Jr., DV1JM**
North America: Sponsored by Joseph Young, W6RLL. **Winner: Ted Jimenez, HI3TEJ**
South America: Sponsored by Trey Garlough, N5KO. **Winner: Luis Felipe Arango, HK6P**
Canada: Sponsored by Bob Loranger, VE2AXO. **Winner: Fabi Bertolotto, VA2UP**
Japan: Sponsored by Charles Anderson, KK5OQ. **Winner: Nobuo Matsuoka, JA6GCE**
USA: Sponsored by George Johnson, W1ZT. **Winner: Mark Sihlanick, N2QT/4**

Single Operator Assisted

World: Sponsored by Mike Sims, K4GMH. **Winner: 5B/UTØU (op: Serge Rebrov, UT5UDX)**
Asia: Sponsored by Lakshman "Lucky" Bijanki, VU2LBW. **Winner: Vandim Ovsyannikov, R9DX**
Europe: Sponsored by Jeff Demers, N1SNB. **Winner: LZ8E (op: Boyan Petkov, LZ2BE)**
North America: Sponsored by George Marzloff, K4GM. **Winner: Mike Sims, K4GMH**
USA: Sponsored by Derek Steele, J39BS. **Winner: Barry Gardner, W3FV**

Single Operator Single Band

World 28 MHz High Power: Sponsored by Steve Hodgson, ZC4LI. **Winner: Juan "John" Manuel Morandi, LU1HF**
World 21 MHz High Power: Sponsored by Steve "Sid" Caesar, NH7C. **Winner: LP2F (op: Ezequiel Reinaldi, LU1FDU)**
World 14 MHz High Power: Sponsored by Kenneth Young, AB4GG. **Winner: John Bayne, KK9A/4**
Europe 14 MHz High Power: Sponsored by Bob Raymond, WA1Z. **Winner: Sobon Krzysztof, SN7Q**
North America 14 MHz High Power: Sponsored by Patrick W. Soileau, ND5C. **Winner: Jerry Rosalius, WB9Z**
USA 14 MHz High Power: Sponsored by Jamie Punderson, W2QO. **Winner: Richard Strand, KL7RA**
World 7 MHz High Power: Sponsored by Abroham Neal Software by K3NC. **Winner: SO4M (op: Chris Krassowski, SP4K)**
North America 7 MHz High Power: Sponsored by Don Reed, K2OGD. **Winner: Rick Davenport, KI1G**
World 3.5 MHz High Power: Sponsored by Glenn Vinson, W6OTC. **Winner: Zelimir Klasan, 9A2DQ**

Multi-Op Single Transmitter Low Power

World: Sponsored by David Robbins, K1TTT. **Winner: S50A (S50A, S50XX, S57AW)**
North America: Sponsored by Dennis Conklin, AI8P. **Winner: VP9I (ND8L, WW3S)**

Multi-Op Single Transmitter High Power

World: Sponsored by Kevin Rowett, K6TD. **Winner: ES9C (YL2KF, ES5RY, ES5TV, ES2DW, ES5TF, ES1OX, ES4BO, ES5GP, ES5NHC, ES2NA)**
North America: Sponsored by Steve Jarrett, K4FJ. **Winner: K4FJ (K3KG, K4FJ)**

Multi-Op Two Transmitter

World: Sponsored by Ed Muns, WØYK. **Winner: EF8M (RD3AF, RZ3AZ, EA8CAC, OH1RY)**
Europe: Sponsored by CT3 Madeira Contest Team CR3A/CQ9K. **Winner: IT9BLB (IT9BLB, IT9MBZ, IT9MUO, IT9PAD, IT9RGY, IT9VDQ, IT9ZMX)**
North America: Sponsored by Steve Merchant, K6AW. **Winner: NR4M (K3NC, K4EC, K4GM, K4ZW, K7SV, N3ZV, NR4M)**
USA: Sponsored by Fred Dennin, WW4LL. **Winner: KØIR (KØIR, KØJJR, K0RC, WØAW, WØBV, WAØMHD)**

Multi-Op Multi-Transmitter

World: Sponsored by KA4RRU RTTY Team. **Winner: CR3L (DJ6QT, DJ6XV, DK1QH, DK4QT, DL1YFF, DL6TK)**
North America: Sponsored by Cuzco Contest Club, WK1Q. **Winner: K1TTT (AK2D, AK2X, K1MK, K1SFA, K1TTT, KB1SUA, N2JFS, NW2Q, W1EQO, W1TO, WA1ZAM)**
USA: Sponsored by David Robbins, K1TTT. **Winner: KA4RRU (KA4RRU, N4DXS, K3UI, W4DC, K4RG, KD6AKC, KD4BHR, SADIE)**

Club Competition

World: Sponsored by Potomac Valley Radio Club. **Winner: Bavarian Contest Club**
North America: Sponsored by Northern California Contest Club. **Winner: Northern California Contest Club**

CLUB SCORES

UNITED STATES

Club Name	No. Entries	Total Score
NORTHERN CALIFORNIA CONTEST CLUB	32	26,621,146
POTOMAC VALLEY RADIO CLUB	38	26,415,821
YANKEE CLIPPER CONTEST CLUB	33	21,944,141
MINNESOTA WIRELESS ASSN	35	8,666,712
FRANKFORD RADIO CLUB	16	8,580,063
FLORIDA CONTEST GROUP	17	7,967,047
SOCIETY OF MIDWEST CONTESTERS	21	6,205,706
TENNESSEE CONTEST GROUP	13	4,360,042
WESTERN WASHINGTON DX CLUB	10	4,329,163
ARIZONA OUTLAWS CONTEST CLUB	23	3,788,152
GRAND MESA CONTESTERS OF COLORADO	6	3,507,358
CTRI CONTEST GROUP	4	3,455,334
WILLAMETTE VALLEY DX CLUB	13	3,097,197
ALABAMA CONTEST GROUP	8	3,049,470
SOUTH EAST CONTEST CLUB	12	2,030,701
CENTRAL TEXAS DX AND CONTEST CLUB	3	1,732,659
ORDER OF BOILED OWLS OF NEW YORK	7	1,503,047
SOUTHERN CALIFORNIA CONTEST CLUB	13	1,490,355
MAD RIVER RADIO CLUB	8	1,295,814
BERGEN ARA	5	1,292,648
ROCHESTER (NY) DX ASSN	6	1,255,465
SPOKANE DX ASSOCIATION	7	1,079,772
ORLEANS COUNTY AMATEUR RADIO CLUB	3	1,064,321
KANSAS CITY DX CLUB	4	988,540
HUDSON VALLEY CONTESTERS AND DXERS	3	722,597
ALLEGHENY VALLEY RADIO ASSOCIATION	3	547,440
LOW COUNTRY CONTEST CLUB	3	456,353
NORTH CAROLINA DX AND CONTEST CLUB	3	423,358
DELAWARE LEHIGH AMATEUR RADIO CLUB	3	365,893
NORTH TEXAS CONTEST CLUB	3	183,573
METRO DX CLUB	3	181,534

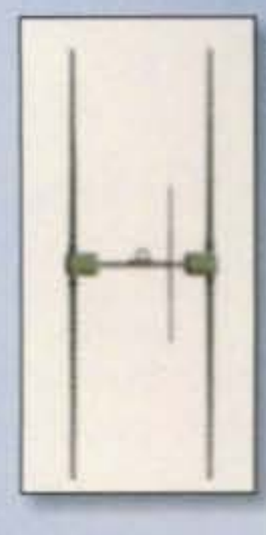
DX

BAVARIAN CONTEST CLUB	72	32,850,470
RHEIN RUHR DX ASSOCIATION	52	31,451,915
UKRAINIAN CONTEST CLUB	29	28,859,194
SLOVENIA CONTEST CLUB	11	15,850,575
LU CONTEST GROUP	16	15,519,822
CONTEST CLUB FINLAND	11	15,312,938
URAL CONTEST GROUP	7	12,064,852
CONTEST CLUB ONTARIO	24	10,363,685
HUNGARIAN DX CLUB	5	10,335,374
ARAUCARIA DX GROUP	9	9,195,203
SP DX CLUB	22	8,178,398
LITHUANIAN CONTEST GROUP	4	7,652,616
BRITISH COLUMBIA DX CLUB	3	7,015,222
CROATIAN CONTEST CLUB	14	6,993,076
BOSNIA AND HERZEGOVINA CONTEST CLUB	5	6,772,943
BLACK SEA CONTEST CLUB	21	5,861,297
MARITIME CONTEST CLUB	7	5,031,921
LATVIAN CONTEST CLUB	8	4,053,585
SOUTH URAL CONTEST CLUB	5	3,996,347
CONTEST GROUP DU QUEBEC	6	3,867,241
BRITISH AMATEUR RADIO TELEDATA GROUP	4	3,247,450
DL-DX RTTY CONTEST GROUP	15	2,710,002
TEMIRTAU CONTEST CLUB	4	2,518,653
GRUPO DXXE	3	2,384,630
GIPANIS CONTEST GROUP	4	2,213,217
RADIO AMATEUR ASSOCIATION OF WESTERN GREECE	5	2,204,477
VK CONTEST CLUB	5	2,167,658
CSTA BUCURESTI	6	2,155,490
VU CONTEST GROUP	5	1,632,755
GMDX GROUP	5	1,273,429
FOX CONTEST CLUB	3	1,244,524
RTTY CONTESTERS OF JAPAN	9	1,230,735
WORLD WIDE YOUNG CONTESTERS	6	1,192,285
MEDITERRANEO DX CLUB	4	1,063,902
DONBASS	4	1,013,648
RUSSIAN CONTEST CLUB	7	996,478
CANTAREIRA DX GROUP	9	912,315
KRIVBASS	3	851,339
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	4	811,750
LA CONTEST CLUB	3	633,332
CHILTERN DX CLUB	4	587,166
DOMODEDOVO	3	472,420
NANAIMO AMATEUR RADIO ASSOCIATION	3	254,346
BALATON RADIOAMATEUR DX CLUB	3	252,543
IVANOVO DX CLUB	4	198,716
YO DX CLUB	3	181,435
ALRS ST PETERSBURG	3	169,845
RIO DX GROUP	4	141,341
YU CONTEST CLUB	4	25,909

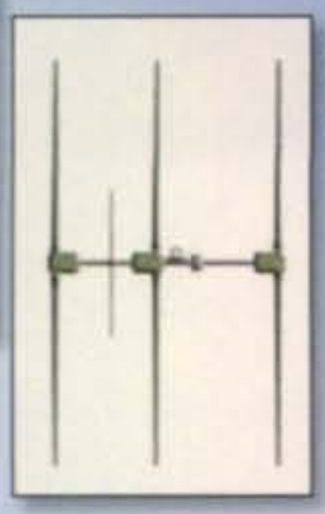
Which SteppIR Product is Best for You?

2, 3, and 4 Element Yagis

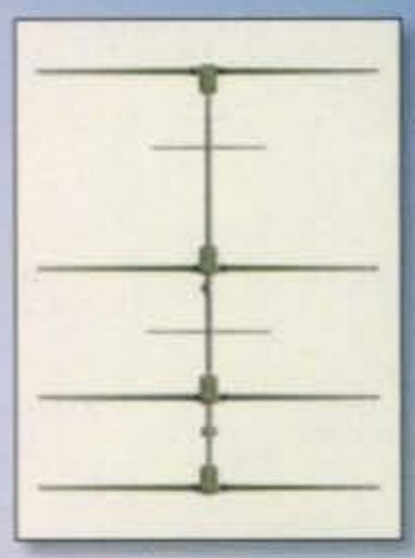
For the hams who are fortunate enough to have towers in their backyards. Gain and directivity is yours with a SteppIR Yagi.



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.



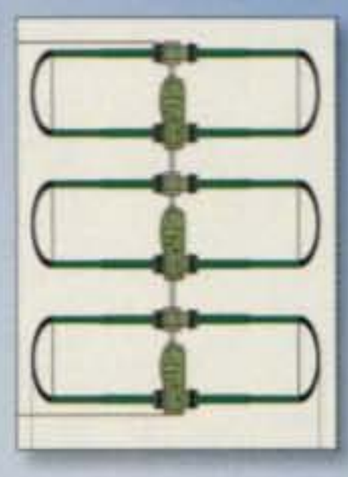
3 Element Yagi 20m-6m
3 element Yagi, 20m-6m continuous coverage; 16 foot boom, 36 ft longest element, 19.7 ft turning radius, 6.1 sq ft wind load, 51 lb; SDA 100 controller included.



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.

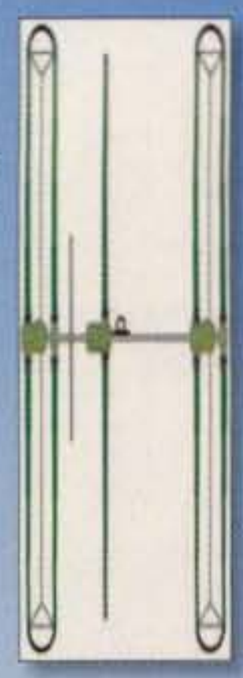
Dream Beam Series Yagi's

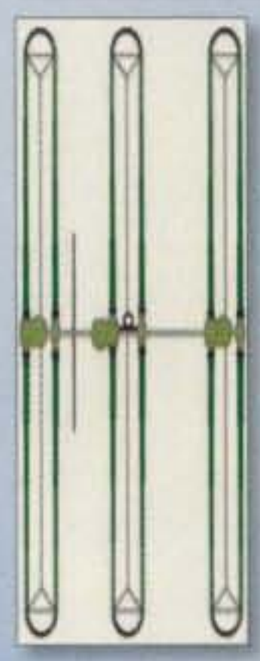
The Dream Beam series offers antennas for both space limited Hams as well as the "Big Guns" who have the space and want the very best.



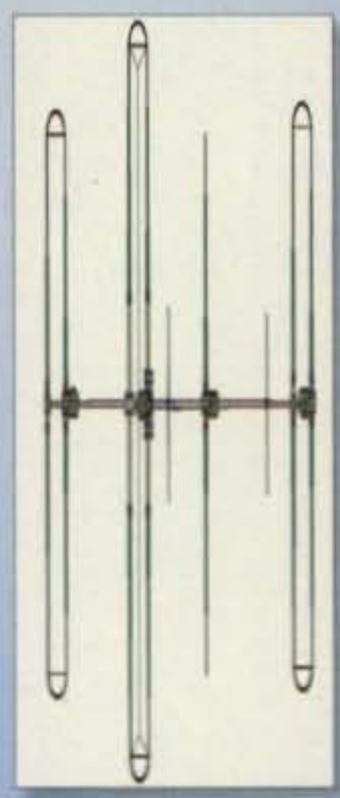
DB11 Yagi Antenna
DB11 Yagi, 18.5 ft element length, 11 ft boom, 10.8 ft turning radius, 61 lb, 5.9 sq ft wind load; 2 active elements on 20m; 3 active elements on 17, 15, 12, 10, 6m.

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.



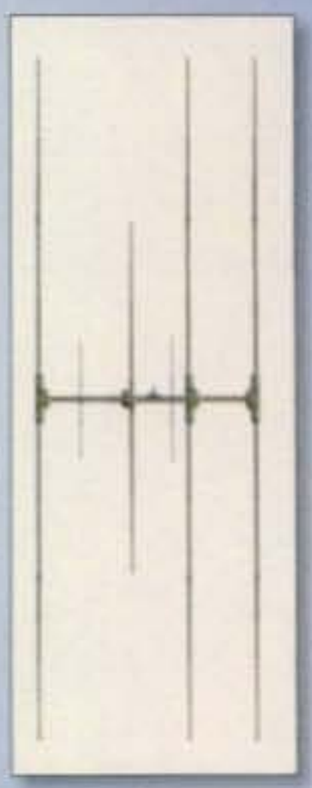


DB18E YAGI
Dreambeam DB18E, 3 el 30m-6m, 2 el 40m, three looped elements, does not include optional 6m passive element kit, 18 foot boom; Includes SDA 100 controller.



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.



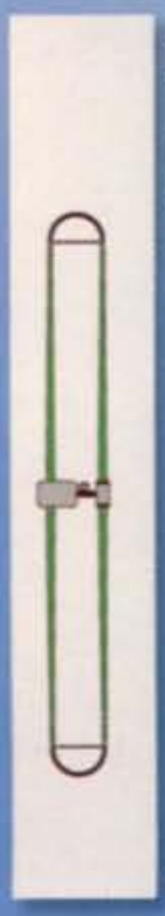
Vertical and Dipoles

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.

SteppIR

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

www.steppir.com

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

Joel, VE6WQ, operating the console at VE6JY for 4th in Single-Op Assisted 20M, breaking the North America record.

Single-Op 15-Meter High Power. The world record was broken by Ezequiel, LP2F (LU1FDU), with 778K. Second and third were close between Jan, 9A5Y (9A3NM), and Emil, 9A9A, with 692K and 676K, respectively. Fourth place went to Joel, KG6DX, who broke the Oceania record by 16% with 592K. Fifth place Max, KH6ZM, also broke the Oceania record.

Single-Op 10-Meter High Power. John, LU1HF, handily won with 551K, though off the current world record he set in 2002. He's the one to watch as this band returns to stardom, hopefully soon.

Single-Op Assisted

Single-Op Assisted All Band. Serge, 5B/UTØU (UT5UDX), decimated this world record by 83% with 7.8M. Second place Wanderley, ZX5B (PY2MNL), also broke the prior world record, which happened to be his own, with 4.7M points, for a new South America record. Third place Vadim, R9DX, raised the Asia record

TOP SCORES

WORLD
SINGLE OPERATOR HIGH POWER ALL BAND

P49X (WØYK)	10,595,903
LY5E (LY2IJ)	5,082,540
W1UE	4,234,020
FM5CD	3,520,598
YO9HP	3,463,356
RG3K	3,245,504
LV5V (LU5VV)	3,112,713
SP9LJD	2,793,672
LTØH (LU3HY)	2,576,176
JH4UYB	2,438,595

28 MHz

LU1HF	551,755
9A7R	30,266
I2VGW	15,600
JA6WJL	14,742
IK3ASM	8,496

21 MHz

LP2F (LU1FDU)	778,216
9A5Y (9A3NM)	691,621
9A9A	676,400
KG6DX	591,514
KH6ZM	519,614

14 MHz

KK9A/4	775,676
SN7Q	754,143
UR5IFX	617,838
WB9Z	609,875
DR1ØTCC	560,382

7 MHz

SO4M (SP4K)	669,963
TMØT	564,499
KI1G	473,280
YT8A	432,450
IZØKBR	387,345

3.5 MHz

9A2DQ	248,214
I4AVG	237,896
DL4MCF	205,620
UX2X (UT2XQ)	187,580
GM1F (GM4FAM)	152,689

LOW POWER ALL BAND

*ST2AR	3,575,296
*HI3TEJ	3,031,380
*6V7X (IK2FIL)	2,956,388
*CR6K (CT1ILT)	2,921,906
*RG9A	2,395,470
*N2QT/4	2,281,132
*VA2UP	2,123,655
*ERØFEO (UR5FEO)	1,692,000
*HK6P	1,632,540
*YV5KG	1,574,030

28 MHz

*PY2SEX	115,720
*HP1RIS	13,056
*LW5EE	10,395
*EA4MA	5,624
*CR2T (CU2AF)	4,672

21 MHz

*FY1FL	507,812
*EA3GLB	431,400
*9A8W	377,400
*PY2CX	342,771
*LU7HN	335,070

14 MHz

*EU1DX	364,188
*IT9STX	362,838
*OK2ZI	358,136
*9A/VE3ZIK	338,676
*F5BEG	299,105

7 MHz

*E79D	329,628
*ER6A (ER1LW)	283,968
*UR7TZ	221,544
*VY2LI	189,174
*S51D	175,674

3.5 MHz

*OK2ZAW	76,302
*SP6EIY	59,432
*4L9QQ	58,520
*OH1TN	50,282
*US5NGH	46,604

ASSISTED ALL BAND

5B/UTØU (UT5UDX)	7,798,700
ZX2B (PY2MNL)	4,734,415
R9DX	4,401,027
K4GMH	4,304,366
LZ8E (LZ2BE)	4,071,258
S5ØR	3,459,925
RZ3AXX (UA8AA)	3,363,027
SN2K (SP2EBG)	3,067,152
W3FV	2,596,214
R7LV	2,447,873

28 MHz

UT1IA	10,010
EC7KW	3,075
UN4PG	2,212
JA1QGT	759
KG6ITP/3	630

21 MHz

CT3FQ	819,333
TK5MH	498,204
DF9ZP	316,316
E77DX	274,816
ZL1BYZ	264,821

14 MHz

E76C	984,144
EO3Q (UR3QCW)	791,910
UW1M (UR5MW)	783,178
VE6WQ	781,440
IZ6TSA	579,386

7 MHz

S52X	646,020
OK3R (OK1DVM)	644,736
YT1VP	547,284
IZ5DKJ	489,402
US5I (US5IQ)	472,052

3.5 MHz

GI6K	210,600
HA3LI	134,664
IZ5MOQ	76,467
EA1DR	75,803
IKØLNN	60,240

MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER

ES9C	5,841,170
IK4MGP	5,796,099
UZ2M	5,222,189
E74KC	5,151,300
EB1LA	4,847,676

MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER

*S5ØA	4,148,732
*YU2A	2,507,862
*UP6P	2,285,807
*VP9I	1,953,904
*F1AEY	1,471,248

MULTI-OPERATOR TWO TRANSMITTER

EF8M	16,850,625
CR3A	11,170,956
HC8/K6AW	10,238,560
IT9BLB	6,740,463
T7ØA	6,626,982

MULTI-OPERATOR MULTI-TRANSMITTER

CR3L	7,736,875
HG1S	6,510,080
K1TTT	6,510,000
LX7I	6,404,653
Z37M	6,198,698

UNITED STATES
SINGLE OPERATOR HIGH POWER ALL BAND

W1UE	4,234,020
N6AR/4	1,882,800
N4ZZ	1,768,824
W4PK	1,714,788
AB4GG	1,632,138
N8BJQ	1,540,080
K5DU	1,464,960
AG4W	1,427,403
K7QQ	1,381,024
WØYR/4	1,197,437

28 MHz

K4WI	6,142

21 MHz

N4BP	364,190
W7ZR	182,924
KT6YL	103,600
KK8X	103,572
K6HGF	22,496

14 MHz

KK9A/4	775,676
WB9Z	609,875
W7WW	276,024
KTØDX	229,194
N7WS	199,386

7 MHz

KI1G	473,280
WØGJ	232,892
AI6YL	231,855
W1TY/2	180,369
W7RY	152,344

3.5 MHz

WQ2N	52,574
AC1O	19,683

SINGLE OPERATOR LOW POWER ALL BAND

*N2QT/4	2,281,132
*W3LL	1,336,485
*K1IMI (N4CW)	1,134,684
*WA1EHK	827,343
*N4IG	763,232
*WB2RHM/4	689,520
*N2ZAK	663,168
*K8AJS	613,800
*K7REØ	589,475
*AD5XD	534,852

28 MHz

*KG9Z/8	403
*K7ULS	279

21 MHz

*W6TK	20,164
*K7MY	14,885
*KFØIQ	12,544
*W9KVR	11,328
*NK6A	10,659

14 MHz

*AKØA	269,880
*W4LC	206,150
*N5ER	138,861
*W1ZD/7	116,582
*WM5DX	98,868

7 MHz

*WA1FCN/4	152,985
*AD4Z	89,208
*AB1J	76,398
*K2PO/7 (K2PO/7)	62,150
*WB8JUI	51,528

3.5 MHz

*N9TF	6,210
*NO4K	2,016
*AB3S	1,537

ASSISTED ALL BAND

K4GMH	4,304,366
W3FV	2,596,214
AI9T	1,959,688
W9MU	1,272,285
N4BAA/1	1,231,230
W9NGA/7	1,211,638
ABØRX	1,198,704
W2YC	1,194,561
KR7X	1,176,654
WA5ZUP	1,157,178

28 MHz

KG6ITP/3	630

21 MHz

WS7I	155,632
K6LL/7	110,789
N4QV	20,732

14 MHz

N7AT (K8IA)	451,360
KI7MT	228,450
N8AGU	50,300
NS9I	40,320
KB4CP	6,930

7 MHz

N5ZM	283,822
WJ2D/4	233,064
NA3M	194,320
KE4UW	129,740
N6MA/7	97,340

3.5 MHz

W8AEF/7	42,592
W3/NH7C	37,521
K6NDV/1	24,300
K4WW	9,996

MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER

K4FJ	3,314,416
WØLSD	2,281,669
W1DX	1,860,904
KF6T	1,678,182
NC4CS	1,619,250

MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER

*KDØAKJ	486,652
*KE4UNA	389,424
*W4UAL	189,774
*ACØE	46,324

MULTI-OPERATOR TWO TRANSMITTER

NR4M	5,323,464
KØIR	3,347,586
W1BV	1,999,283
W1MAT	1,430,520
WY3P/4	917,840

MULTI-OPERATOR MULTI-TRANSMITTER

K1TTT	6,510,000
KA4RRU	3,165,372
N2PA	911,874
KTØR	445,212

EUROPE
SINGLE OPERATOR HIGH POWER ALL BAND

LY5E (LY2IJ)	5,082,540
YO9HP	3,463,356
RG3K	3,245,504
SP9LJD	2,793,672
S51A (S55O)	2,393,703
UA4HOX	2,282,893
UR7GO	2,146,690
DL4MDO	1,788,010
F5VKT	1,708,080
UV5U (UX1UA)	1,694,476

28 MHz

9A7R	30,266
I2VGW	15,600
IK3ASM	8,496

21 MHz

9A5Y (9A3NM)	691,621
9A9A	676,400
OK1FJD	250,158
UR7EY	211,386
DL3BQA	211,356

14 MHz

SN7Q	754,143
UR5IFX	617,838
DR1ØTCC	560,382
UW3E	547,216
LN9Z (LB1G)	479,354

7 MHz

SO4M (SP4K)	669,963
TMØT	564,499
YT8A	432,450
IZØKBR	387,345
GM3W (GM3SEK)	337,659

3.5 MHz

9A2DQ	248,214
I4AVG	237,896
DL4MCF	205,620
UX2X (UT2XQ)	187,580
GM1F (GM4FAM)	152,689

SINGLE OPERATOR LOW POWER ALL BAND

*CR6K (CT1ILT)	2,921,906
*ERØFEO (UR5FEO)	1,692,000
*DL9YAJ	1,554,953
*HA8BE	1,548,120
*HG7T (HA7TM)	1,430,725
*YO3APJ	1,376,110
*UT5EPP	1,074,213
*PA1CC	1,000,800
*SM6BGG	894,628
*IZ7KHR	887,445

28 MHz

*EA4MA	5,624
*CR2T (CU2AF)	4,672
*IKØPEA	4,224
*9A2DI	3,538
*SP1RKR	2,222

21 MHz

*EA3GLB	431,400
*9A8W	377,400
*YO3JF	244,011
*UZ7HO	190,485
*E72W	166,473

14 MHz

*EU1DX	364,188
*IT9STX	362,838
*OK2ZI	358,136
*9A/VE3ZIK	338,676
*F5BEG	299,105

7 MHz

*E79D	329,628
*ER6A (ER1LW)	283,968
*UR7TZ	221,544
*S51D	175,674
*HA5LZ	158,796

3.5 MHz

*OK2ZAW	76,302
*SP6EIY	59,432
*OH1TN	50,282
*US5NGH	46,604
*UT4EK	42,552

ASSISTED ALL BAND

LZ8E (LZ2BE)	4,071,258
S5ØR	3,459,925
RZ3AXX (UA8AA)	3,363,027
SN2K (SP2EBG)	3,067,152
R7LV	2,447,873
LY9Y	2,235,450
SX25JMO (SV1JMO)	2,049,663
UW8I (UT2IZ)	2,013,903
YL9T (YL2TW)	1,946,610
MD2C (MDØCCE)	1,754,280

28 MHz

UT1IA	10,010
EC7KW	3,075
HG3FMY	451
SP9CVY	330
YO3JW	16

21 MHz

TK5MH	498,204
DF9ZP	316,316
E77DX	274,816
DN6NL	242,556
LZ2JA	205,938

14 MHz

E76C	984,144
EO3Q (UR3QCW)	791,910
UW1M (UR5MW)	783,178
IZ6TSA	579,386
DM5TI	507,052

7 MHz

S52X	646,020
OK3R (OK1DVM)	644,736
YT1VP	547,284
IZ5DKJ	489,402
US5I (US5IQ)	472,052

3.5 MHz

GI6K	210,600
HA3LI	134,664
IZ5MOQ	76,467
EA1DR	75,803
IKØLNN	60,240

MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER

*S5ØA	4,148,732
*YU2A	2,507,862
*F1AEY	1,471,248
*9A7T	1,383,381
*LZ9R	1,338,909

MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER

ES9C	5,841,170
IK4MGP	5,796,099
UZ2M	5,222,189
E74KC	5,151,300
EB1LA	4,847,676

MULTI-OPERATOR TWO TRANSMITTER

IT9BLB	6,740,463
T7ØA	6,626,982
IQ1RY	5,443,518
DQ4W	5,335,161
PI4CC	4,442,656

MULTI-OPERATOR MULTI-TRANSMITTER

HG1S	6,610,080
LX7I	6,404,653
Z37M	6,198,698
LZ9W	5,114,672
OH6R	4,527,360

**Low Power*

MFJ-259B World's most popular Antenna Analyzer is super easy-to-use!

MFJ-259B
$289.95

The MFJ-259B is the world's most popular Antenna Analyzer and the easiest to use! Just select a band and mode. Set frequency. Your measurements are instantly displayed!

Handheld Antenna Lab

Owning the MFJ-259B is like having an entire antenna lab in the palm of your hand!

Measure SWR quickly or make sophisticated measurements such as Return Loss, Reflection Coefficient, Resonance, Complex Impedance (R+jX), Impedance Magnitude (Z) plus Phase in degrees. Covers 1.8 to 170 MHz -- no gaps.

Coax Analyzer

Determine coax cable velocity factor (Vf), loss in dB, coax length, distance to open or short plus detect wrong coax impedance.

Frequency Counter

Measure frequency of external signals using the separate BNC counter input.

Signal Generator

Use as a signal source 1.8-170 MHz with digital dial accuracy for testing and alignment.

Inductance and Capacitance

Measure Inductance (uH) and Capacitance (pF) at RF frequencies not at audio frequencies used by most L/C meters.

Digital and *Analog* Meters

A high-contrast backlit LCD gives precision readings and *two* side-by-side *analog meters* make antenna adjustments intuitive.

Smooth, Stable Tuning

Velvet-smooth reduction drive tuning and precision *air-variable capacitor* makes setting frequency easy and stable.

Battery Saver & More

Battery-saver, low-battery warning, battery voltage meter and charger are all built in. Use ten Alkaline, NiCad or NiMH AA batteries (not included) or 110 VAC with MFJ-1312D, $15.95. 4Wx6¾Hx2D inches.

Here's What You Can Do

Find true antenna resonant frequency
Tune *antenna quickly for minimum SWR*
Match complex loads to your feedline
Adjust *mobile whips without stressing finals*
Determine safe 2:1-SWR operating windows
Adjust *tuners without generating QRM*
Find exact location of shorts and opens
Cut *stubs and phasing lines accurately*
Check cable for loss and contamination
Find *value of unknown coils and caps*
Test RF transformers and baluns
Troubleshoot *filters and networks*
Find self-resonance and relative Q
Check *patterns and compare gain*
MFJ-259B does all this and more!

MFJ Analyzer Accessories

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Special foam-filled fabric cushions blows, deflects scrapes and protects knobs and meters from harm. **MFJ-39C, $24.95.** Like MFJ-29C, but for MFJ-269.

MFJ-66, $24.95. Plug-in coils turns any MFJ Antenna Analyzer into a sensitive and accurate *band switched* dip meter. 2 coils.

MFJ-92AA10, $29.95. Ten MFJ *SuperCell*™ Ni-MH AA rechargeable batteries.

MFJ-99B, $88.90. *Save $7!* MFJ-259B Deluxe Accessory Pack: MFJ-29C Pouch, 10 Ni-MH batteries, dip coils, AC adapter. **MFJ-98B, $88.90.** Like MFJ-99B but for MFJ-269.

MFJ-99, $60.85. *Save $5!* Like MFJ-99B, less batteries, for MFJ-259B. **MFJ-98, $60.85.** Like MFJ-99 but for MFJ-269.

MFJ-99C, $40.90. *Save $5!* AC Adapter and 10 Ni-MH batteries for MFJ-259B/269.

MFJ-917, $29.95. Current balun lets you make balanced line antenna measurements on HF with your MFJ Analyzer. **MFJ-7702, $3.95.** MFJ-917 to MFJ Analyzer adapter.

MFJ-731, $99.95. Tunable RF filter allows accurate Antenna Analyzer measurements in presence of strong RF fields. 1.8-30 MHz.

MFJ-5510, $9.95. Cigarette lighter cord.

MFJ-269 ...1.8-170 MHz and 415-470 MHz plus 12-bit A/D!

The MFJ-269 does everything the MFJ-259B does - and much more!

Expanded Frequency Coverage

MFJ-269 adds UHF coverage from 415 to 470 MHz -- right up into the commercial band. With it, you can adjust UHF dipoles, verticals, Yagis, quads and repeater collinear arrays with ease -- plus construct accurate phasing harnesses and timed cables. Also use it as a signal source to check UHF duplexers, diplexers, IMD filters and antenna patterns.

Much Better Accuracy

New *12-bit* A/D converter gives much better accuracy and resolution than common 8-bit A/D converters -- *an MFJ-269 exclusive!*

Complex Impedance Analyzer

Read Complex Impedance (1.8 to 170 MHz)as series equivalent resistance and reactance (Rs+jXs) or as magnitude (Z) and phase (degrees). Also reads *parallel* equivalent resistance and reactance (Rp+jXp) -- *an MFJ-269 exclusive!*

MFJ-269
$389.95

CoaxCalculator™

Lets you calculate coax line length in feet given electrical degrees and vice versa for any frequency and any velocity factor -- *an MFJ-269 exclusive!*

Use any Characteristic Impedance

You can measure SWR and coax loss with *any* characteristic impedance (1.8 to 170 MHz) from 10 to over 600 Ohms, including 50, 51, 52, 53, 73, 75, 93, 95, 300, 450 Ohms -- *an MFJ-269 exclusive!*

Logarithmic Bar Graph

Has easy-to-read LCD *logarithmic* SWR bargraph and SWR meter for quick tuning.

Uses instrumentation grade N-connector to ensure minimum mismatch on all frequencies. Includes N to SO-239 adapter.

MFJ-269PRO™ Analyzer

MFJ-269PRO
$419.95

Like MFJ-269, but has extended commercial frequency coverage in UHF range *(430 to 520 MHz)* and *ruggedized* cabinet that protects LCD display, knobs, meters and connectors from damage in the field/lab.

MFJ-266 ...Wide range 1.5-185 MHz and 300-490 MHz!

New!

MFJ-266
$349.95

The compact MFJ-266 covers HF (1.5-65 MHz) in 6 bands, plus VHF (85-185 MHz) and UHF (300-490 MHz).

In *Antenna Analyzer* mode, you get Frequency, SWR, Complex Impedance (R+jX), and Impedance Magnitude (Z) *all displayed simultaneously* on a high-contrast backlighted LCD (SWR only on UHF).

In *Frequency-Counter* mode, the MFJ-266 functions as a 500-MHz counter with up to 100 Hz resolution and measures relative field strength of a signal and its frequency and can be used for tracking measurement interference.

MFJ-266 also functions as a 10 dBm signal source with digital-frequency readout. It can also measure inductance and capacitance at RF frequencies.

Features include solid-state band switching and electronic varicap tuning with a smooth 10:1 lockable vernier tuning drive.

Use eight AA *alkaline* batteries or 110 VAC with MFJ-1312D, $15.95. Includes N-to-SO-239 adapter. 3¼Wx6½Hx2¾D inches. 1.3 lbs.

Free MFJ Catalog
Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

MFJ ENTERPRISES, INC.
300 Industrial Pk Rd, Starkville, MS 39759 **PH:** (662) 323-5869
Tech Help: (662) 323-0549
FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. ***Add shipping.***

MFJ . . . The World Leader in Amateur Radio!

The perfect combo, without compromise.

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

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!

- 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
- Double Conversion Superheterodyne with Image Rejection Mixer (HF/6m/2m/70cm)
- Type B USB for Rig Control and Audio

USB *Control Audio*

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs, Countries, Zones, US/VE on each band

WORLD TOP SINGLE OP ALL BAND

Station	80	40	20	15	10
P49X	360/51/19/49	1197/75/22/57	1298/71/27/57	1689/92/30/56	403/44/21/48
LY5E	483/61/17/8	612/94/30/39	1258/101/35/55	670/107/36/34	51/35/15/0
W1UE	394/51/15/50	709/64/21/48	1061/87/31/50	721/75/22/26	86/15/11/29
*ST2AR	75/37/8/4	371/51/15/30	398/71/28/31	1183/89/33/47	310/55/13/0
FM5CD	177/48/16/37	462/64/18/52	879/75/28/57	949/72/23/52	45/15/10/11

USA TOP SINGLE OP ALL BAND

Station	80	40	20	15	10
W1UE	394/51/15/50	709/64/21/48	1061/87/31/50	721/75/22/26	86/15/11/29
*N2QT/4	226/33/12/44	524/62/20/50	740/82/30/38	429/76/24/18	33/13/9/3
N6AR/4	208/42/12/42	311/58/18/44	686/84/33/45	292/73/23/25	31/12/10/2
N4ZZ	199/12/7/44	557/49/13/54	759/72/24/44	422/65/22/19	3/3/3/0
W4PK	155/29/9/39	481/59/18/50	630/64/20/39	348/57/22/11	24/8/8/4

WORLD MULTI-OP SINGLE TRANSMITTER HIGH POWER

ES9C	412/66/20/20	874/102/32/40	1382/113/36/54	687/117/34/22	56/38/16/0
IK4MGP	347/62/16/21	648/87/31/48	949/104/33/56	1051/110/36/54	76/52/21/0
UZ2M	254/59/16/9	879/101/31/43	1159/106/37/56	842/114/34/28	33/31/14/0
E74KC	387/56/14/20	663/73/23/42	1107/91/33/54	909/101/34/50	56/49/20/0
EB1LA	328/59/14/32	618/82/24/51	1029/93/35/56	881/103/35/49	22/22/13/0

USA MULTI-OP SINGLE TRANSMITTER HIGH POWER

K4FJ	260/41/14/48	534/71/21/48	995/95/32/49	551/87/28/22	17/15/11/4
WØLSD	217/18/11/46	684/75/30/54	614/85/30/52	386/80/26/33	76/18/11/18
W1DX	39/25/10/13	619/73/23/48	784/86/32/41	230/61/21/12	13/6/5/1
KF6T	111/10/10/42	598/57/26/55	482/85/31/52	394/59/26/39	25/10/11/4
NC4CS	17/14/7/5	570/58/18/49	683/78/24/48	337/73/22/14	9/9/6/0

WORLD MULTI-OP SINGLE TRANSMITTER LOW POWER

*S5ØA	348/59/19/13	719/89/29/48	696/101/34/54	605/108/34/50	39/37/19/0
*YU2A	149/44/8/2	453/67/19/34	722/71/28/49	689/78/27/42	24/17/11/0
*UP6P	96/36/11/0	412/69/21/13	623/77/29/42	683/75/27/0	75/24/9/0
*VP9I	75/8/6/24	674/63/18/55	555/71/20/51	385/67/22/36	18/13/8/2
*F1AEY	166/46/9/3	529/62/16/30	682/70/27/45	183/58/28/5	11/5/4/0

USA MULTI-OP SINGLE TRANSMITTER LOW POWER

*KDØAKI	124/17/10/41	292/42/13/48	256/55/14/39	110/43/18/10	3/3/3/0
*KE4UNA	53/2/3/27	173/27/12/37	177/40/15/31	230/58/22/18	12/6/6/0
*W4UAL	0/0/0/0	76/14/10/31	132/31/18/32	187/53/19/12	18/8/6/0
*ACØE	23/3/4/16	123/6/7/36	37/7/8/16	30/20/13/2	5/5/5/0

WORLD MULTI-OP TWO TRANSMITTER

EF8M	746/68/20/50	1552/87/30/55	1743/102/33/56	2285/114/35/55	570/80/27/5
CR3A	376/60/16/45	1003/70/22/51	1978/90/30/56	1952/99/33/57	82/42/19/2
HC8/K6AW	253/50/14/42	710/68/22/53	1333/83/33/57	1871/93/31/56	623/44/19/54
IT9BLB	435/62/16/22	830/85/27/45	1365/92/34/57	1189/108/37/51	107/49/24/0
T7ØA	838/64/18/19	914/85/28/43	1703/99/34/54	749/90/31/38	71/35/16/0

USA MULTI-OP TWO TRANSMITTER

NR4M	479/47/16/50	904/77/25/57	1197/94/30/48	815/94/31/36	58/14/11/12
KØIR	444/46/17/53	796/75/28/54	916/96/33/48	378/71/29/30	118/15/11/32
W1BV	170/19/9/43	521/59/17/46	882/72/21/44	376/68/23/22	7/3/3/2
W1MAT	114/28/11/28	321/58/17/43	731/81/27/48	260/65/21/19	7/4/4/1
WY3P/4	104/27/10/25	259/49/13/40	296/57/16/34	336/57/15/20	30/10/8/4

WORLD MULTI-OP MULTI-TRANSMITTER

CR3L	404/56/14/33	774/65/17/49	1078/82/27/52	1685/85/26/52	195/50/17/0
HG1S	668/58/15/22	999/90/30/49	1212/107/36/54	827/105/36/44	98/42/17/0
K1TTT	652/64/21/53	1223/84/28/56	1435/98/36/53	799/85/27/39	124/22/13/21
LX7I	610/60/15/23	1043/76/23/50	1449/94/34/55	840/100/32/48	39/24/13/0
Z37M	827/67/21/23	1121/91/28/44	1229/95/33/54	606/101/35/32	117/40/18/0

USA MULTI-OP MULTI-TRANSMITTER

K1TTT	652/64/21/53	1223/84/28/56	1435/98/36/53	799/85/27/39	124/22/13/21
KA4RRU	395/26/10/51	777/69/21/54	987/87/31/48	474/70/23/22	78/14/10/17
N2PA	231/18/8/47	327/47/16/50	386/61/22/33	220/52/21/19	3/3/3/1
KTØR	32/2/3/19	284/29/12/50	430/67/18/38	101/26/16/13	2/2/2/1

by 47% to 4.4M, and fourth place Mike, G4GMH, lifted the North America record 13% to 4.3M.

Single-Op 80M. Robert, GI6K, and Alajos, HA3LI, both broke this world record with 211K and 135K, respectively. Sixth place Paul, W8AEF/7, established the first North America record with 43K.

Single-Op 40M. The first three places all broke the prior world record of 495K: S52X with 646K (31%), Miro, OK3R (OK1DVM), with 645K (30%), and Vladan, YT1VP, with 547K (11%).

Single-Op 20M. Zoran, E76C, won with 984K, breaking the European record by 25%. Ruslan, EO3Q (UR3QCW), also broke the prior European record with 792K for second place. Fourth place Joel, VE6WQ, broke the North America record by 36% with 781K.

Single-Op 15M. Carlos, CT3FQ, nearly doubled the world record with 819K. Fabien, TK5MH, also broke the prior world record with 498K, setting a new European record. John, ZL1BYZ, finished 5th worldwide with 265K and raised the Oceania record 85%. Icko, JA1BPA, finished 6th with 259K to lift the Asia record over 2.5 times.

Single-Op 10M. Vladimir, UT1IA, won and set a new European record with 10K.

Multi-Operator

Multi-Single Low Power. S50A (S50A, S50XX, and& S57AW) broke the world record by 11% with 4.1M. Fourth place VP9I (ND8L, WW3S) won North America with 2M.

Multi-Single High Power. The top seven finishers each broke the European record! ES9C (YL2KF, ES5RY, ES5TV, ES2DW, ES5TF, ES1OX, ES4BO, ES5GP, ES5NHC, and ES2MA) led with 5.84M, followed closely by IK4MGP (I4EWH, I4FYF, I4IFL, I4EWH, IK2QEI, IK3QAR, IK4DCW, IK4HVR, IK4MGP, IK4WMH, IV3TMV, and IV3ZXQ) with 5.80M. Eighth place PJ2S (K3RWN, AB3ER, KG3F, KB3EYY, and K3RMB) won South America with 3.8M and 10th place K4FJ (K3KG and K4FJ) won North America with 3.3M.

Multi-Two. This world record was moved up 58% to 16.9M by the familiar EF8M callsign (RD3A, RZ3AZ, EA8CAC, and OH1RY). Second place CR3A (CT3BD, CT3DL, CT3DZ, CT3EE, CT3EN, CT3IA, CT3KU, and CT3KY) also broke the prior world record, by 5% for a score of 11.2M. Tenth place VE7SV doubled the Canadian record to 3.5M.

Multi-Multi. CR3L (CT3BD, CT3DL, CT3DZ, CT3EE, CT3EN, CT3IA, CT3KU, and CT3KY) came out on top with 7.7M and third place K1TTT set a new North America record with 6.5M. Ninth place VE7UF doubled the Canadian record to 3M.

Clubs

United States. The top three were the same as last year, but in reverse order. The Northern California Contest Club (NCCC) won with 26.6M ever so narrowly over rival Potomac Valley Radio Club (PVRC) with 26.4M. Last year's winner, the Yankee Clipper Contest Club (YCCC), came in third with 21.9M.

Europe. Typically, the Bavarian Contest Club (BCC) and the Rhein Ruhr DX Association (RRDXA) dominated the Europe club competition. The BCC came out on top again with 32.9M to beat RRDXA's 31.5M. Third place Ukranian Contest Club continues to apply pressure with its 28.9M points.

World. These three European clubs also took the top three places in the world club competition. The three US clubs above filled the next three places worldwide.

Logs

The quality of the logs was about the same as in 2009, which is

EUROPE TOP SINGLE OP ALL BAND

Station	80	40	20	15	10
LY5E	483/61/17/8	612/94/30/39	1258/101/35/55	670/107/36/34	51/35/15/0
YO9HP	346/55/14/11	784/82/26/45	827/94/35/48	436/96/33/20	46/24/13/0
RG3K	307/52/13/4	649/81/26/38	900/89/32/50	654/89/28/23	17/11/8/0
*CR6K	142/42/9/7	472/62/18/46	773/76/27/52	747/84/28/49	39/20/12/1
SP9LJD	210/44/11/7	494/67/22/44	832/67/26/55	642/76/32/44	6/5/4/0

EUROPE MULTI-OP SINGLE TRANSMITTER HIGH POWER

ES9C	412/66/20/20	874/102/32/40	1382/113/36/54	687/117/34/22	56/38/16/0
IK4MGP	347/62/16/21	648/87/31/48	949/104/33/56	1051/110/36/54	76/52/21/0
UZ2M	254/59/16/9	879/101/31/43	1159/106/37/56	842/114/34/28	33/31/14/0
E74KC	387/56/14/20	663/73/23/42	1107/91/33/54	909/101/34/50	56/49/20/0
EB1LA	328/59/14/32	618/82/24/51	1029/93/35/56	881/103/35/49	22/22/13/0

EUROPE MULTI-OP SINGLE TRANSMITTER LOW POWER

*S5ØA	348/59/19/13	719/89/29/48	696/101/34/54	605/108/34/50	39/37/19/0
*YU2A	149/44/8/2	453/67/19/34	722/71/28/49	689/78/27/42	24/17/11/0
*F1AEY	166/46/9/3	529/62/16/30	682/70/27/45	183/58/28/5	11/5/4/0
*9A7T	187/47/10/14	332/66/24/30	330/66/26/45	257/76/31/26	36/16/12/0
*LZ9R	253/49/10/6	357/70/22/23	530/70/24/32	219/60/26/12	21/15/10/0

EUROPE MULTI-OP TWO TRANSMITTER

IT9BLB	435/62/16/22	830/85/27/45	1365/92/34/57	1189/108/37/51	107/49/24/0
T7ØA	838/64/18/19	914/85/28/43	1703/99/34/54	749/90/31/38	71/35/16/0
IQ1RY	581/63/17/20	997/87/29/51	1143/93/33/55	703/85/35/50	29/13/11/0
DQ4W	601/64/15/17	800/86/27/42	1144/96/33/55	684/93/33/42	91/42/18/0
PI4CC	523/56/14/23	710/76/22/35	1202/91/34/54	501/92/31/39	74/27/14/0

EUROPE MULTI-OP MULTI-TRANSMITTER

HG1S	668/58/15/22	999/90/30/49	1212/107/36/54	827/105/36/44	98/42/17/0
LX7I	610/60/15/23	1043/76/23/50	1449/94/34/55	840/100/32/48	39/24/13/0
Z37M	827/67/21/23	1121/91/28/44	1229/95/33/54	606/101/35/32	117/40/18/0
LZ9W	270/50/8/1	908/73/26/42	1324/94/33/53	822/85/32/43	226/45/19/0
OH6R	499/55/11/1	1191/95/33/45	1299/99/33/51	353/75/25/11	46/29/13/0

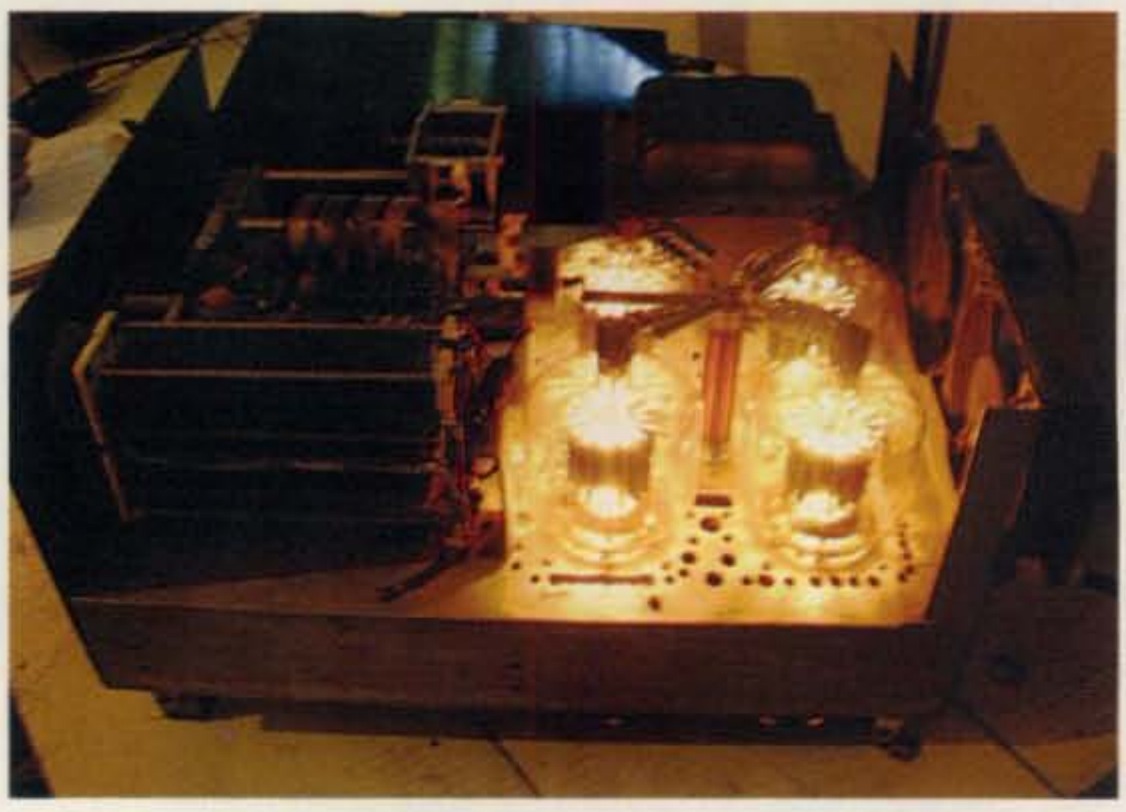
not bad but still has lots of opportunity for improvement. One of the biggest problems was the omission of "DX" in the received QTH field for non-US/VE QSOs. This is easy for the participant to check and fix with a text editor before submitting the log. Another common problem is incorrect, or "busted," callsigns of stations worked. There were 14,449 unique calls that were only worked once across all logs. Virtually all of these are busts of legitimate calls and 65% were validated as such with the QSOs removed from the logs. There were also a number of QSOs that recorded the wrong frequency/band. 79% of all logged QSOs were in both logs and could be cross-checked. Of those cross-checked QSOs, 3.6% were bad and not credited: 1.6% were not in the log of the other station (NILs), 1.4% were busted callsigns, and 0.6% were busted QTHs.

In summary, there were accuracy errors and there were log-format errors. Accuracy errors need to be reduced while operating, but log-format errors should be found and fixed after the contest before submitting the log. The log submittal process uses a "robot" server that receives logs and inspects them for format errors. The participant is notified immediately on the log submittal web page, or via immediate e-mail from the robot. This notification explains what format errors, if any, were found. The participant should make corrections and resubmit. Only the most recently submitted log file is ultimately used in log checking. Participants are encouraged to request their Log Check Report (LCR) from <w0yk@cqwwrtty.com> and review the log errors. Compare your individual results to the overall numbers above and decide how you want to change your operating style to improve in the next contest.

The contest website, <www.cqwwrtty.com>, is a rich source of information about this contest and participants should take

The EF8M team (left to right) Alexandr, RZ3AZ, Val, RD3A/EF8M, Pekka, OH1RY, and Juan, EA8CAC, increased the Multi-Two record by 58 %.

The German team at CR3L precisely assembling antennas for their win in Multi-Multi (neatly dressed in their red jumpsuit uniforms).



The Chispero ("Sparky") amplifier at LP2F occasionally livens up the contest with its arcing crashes.

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

K7QQ	1,381,024
VA7KO	937,664
K7AR	916,584
W6AEA/7	706,192
*VA7ST	631,104

Zone 4

N4ZZ	1,768,824
VE3EY	1,723,496
AB4GG	1,632,138
VE3DZ	1,627,200
N8BJQ	1,540,080

Zone 5

W1UE	4,234,020
*N2QT/4	2,281,132
*VA2UP	2,123,655
N6AR/4	1,882,800
W4PK	1,714,788

Zone 14

*CR6K	2,921,906
DL4MDO	1,788,010
F5VKT	1,708,080
PA7LV	1,559,880
*DL9YAJ	1,554,953

Zone 15

LY5E	5,082,540
SP9LJD	2,793,672
S51A	2,393,703
OM5ZW	1,676,640
*HA8BE	1,548,120

Zone 16

RG3K	3,245,504
UA4HOX	2,282,893
UR7GO	2,146,690
UV5U	1,694,476
*ERØFEO	1,692,000

Zone 20

YO9HP	3,463,356
*YO3APJ	1,376,110
*4Z5CP	1,254,900
*H2E	1,103,368
SV9AHZ	639,450

Zone 25

JH4UYB	2,438,595
*JA6GCE	1,213,576
JF1PJK	1,193,790
JA1OVD	964,899
JA6BZI	792,465

** Low Power*

advantage of it in preparation for the next one on 24–25 September 2011.

Also, for expanded tables, QRM, and multi-station operators, go to the CQ website, <www.cq-amateur-radio.com>, and also to the RTTY contest website mentioned above.

Summary

Thanks again to all participants for making this the most popular RTTY contest of the year. Just like every contest, it is largely dependent on the many casual contest operators who in aggregate account for many of the QSOs in our logs.

Outside the contest itself are a number of people, most of whom are volunteers, who devote countless hours in support of this 48-hour event each year. Ken, K1EA, provides the log checking software and consulting during log check. Mark, K6UFO, stands by for any log checking tasks that he can lend a hand with. Mike, K4GMH, manages the CQ RTTY Contest plaque program. Barry, W5GN, manages the certificate printing and mailing. Both the plaques and certificates take many hours of diligent effort to ensure accuracy. Randy, K5ZD, set up the original website and continues to consult on its evolution as well as the searchable scores database that he set up with Don, AA5AU. This is a remarkable resource that not only archives all the results history of every submitted log since the beginning, but serves as the master database from which records are determined dynamically for most any category and geography the user chooses. And Gail, K2RED, of *CQ* magazine, expertly edits and assembles the output from log checking into this published article, as she does for all of the CQ contests.

Miro, OK3R (OK1DVM), virtually tied for 1st place in Single-Op Assisted 40M, breaking the world record, running SO2R (single-band) with new Elecraft K3s.

Many participants responded to a request for photos. The overwhelming number of received photos is far too much for this article, so all will be posted in a gallery on the contest website. In the next contest, be sure to take photos and send them in with your comments and stories.

I look forward to seeing everyone again in the 25th annual CQ WW RTTY Contest at the end of the summer.

73, Ed, WØYK

(Continued on page 106)

Important Online Resources

CQ WW RTTY website: http://www.cqwwrtty.com/
CQ website: http://www.cq-amateur-radio.com
Cabrillo log file spec: http://www.cqwwrtty.com/logs.htm
Club name list: http://www.cqwwrtty.com/clubnames.htm
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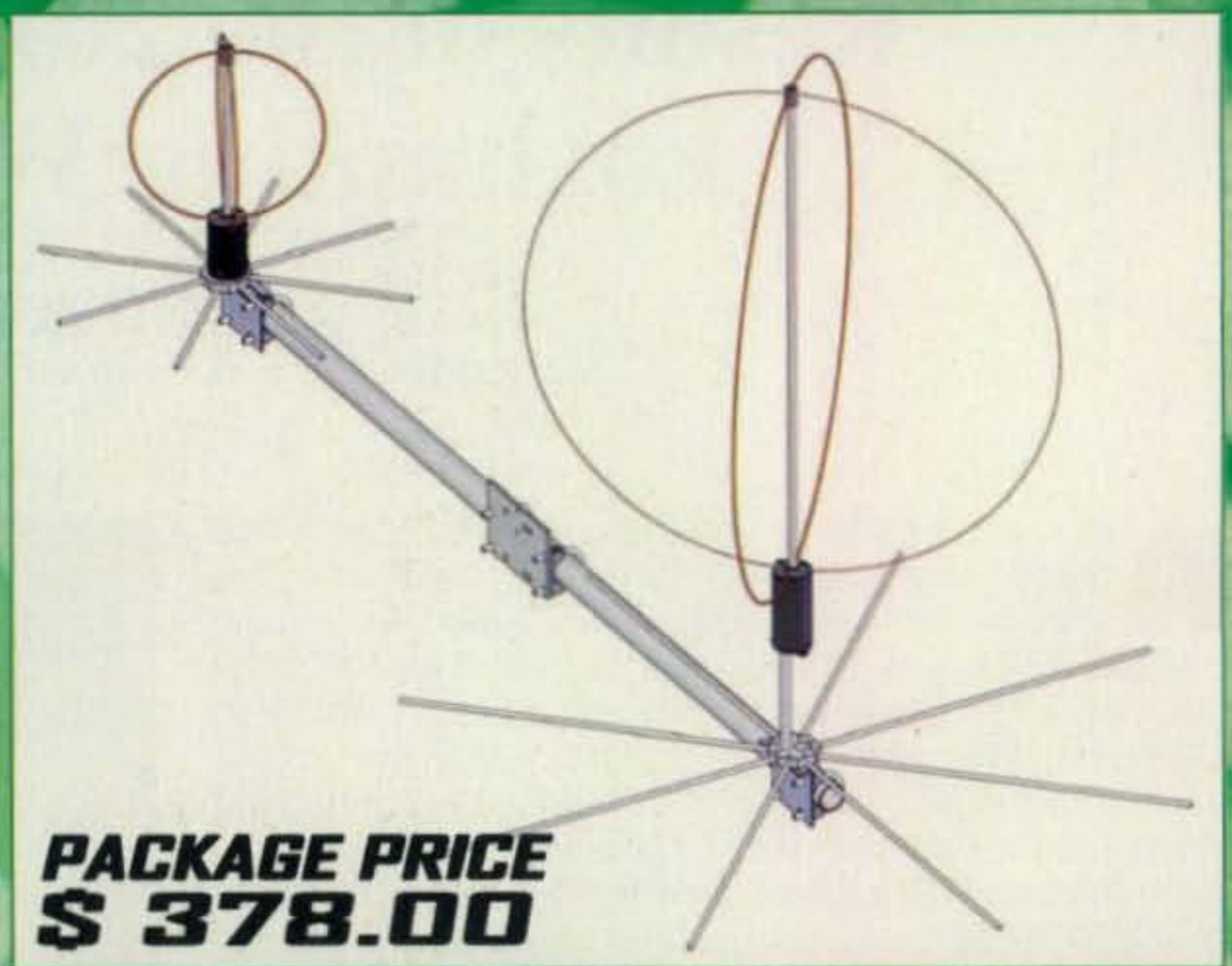

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Gather up the direction-finding gear because it's time again for a weekend of surprises. What do your fellow hams have in store for you?

Announcing:

The 14th Annual CQ WW Foxhunting Weekend May 14–15, 2011

Plus

Results of the 2010 CQ WW Foxhunting Weekend

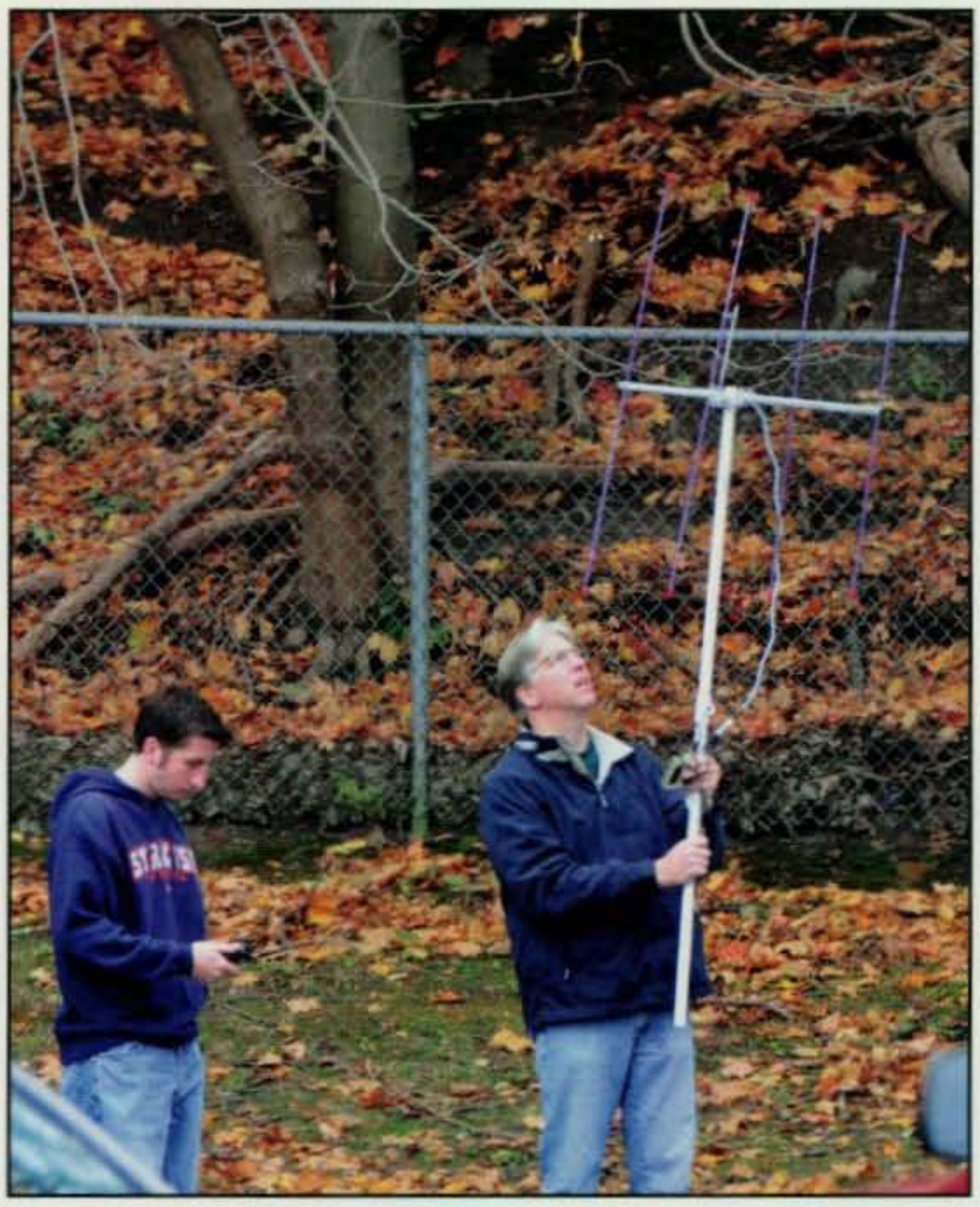
BY JOE MOELL,* KØOV
Moderator, CQ WW Foxhunting Weekend

"After each foxhunt here in west Michigan I find myself driving away thinking, 'What a blast! This was the best hunt yet!'" Those were the enthusiastic words of Mike Hill, W8DER, as he posted the results of a hidden transmitter hunt in the Wolverine State. "And then the next one comes along and it is just a little better yet."

Every year during the CQ World-Wide Foxhunting Weekend hams discover and rediscover the fun of using radio direction finding (RDF) techniques to track down transmitters that their fellow hams have put in unusual places for them to try to find. How this search for radio signals came to be called "foxhunting" is for the historians to fret about, but don't worry, no furry critters are being harmed.

As always, my 2010 Foxhunting Weekend announcement brought a big batch of reports about hams having fun. Rules were determined locally, so few hunts were alike, except for the on-foot radio-orienteering events that follow standard rules of the International Amateur Radio Union. As you prepare for Foxhunting Weekend 2011, read on to find out how groups of your fellow hams had a blast doing transmitter hunting all last year.

Radio foxhunting in cars is often called T-hunting. W8DER was raving about a T-hunt that was put on by Sheila Bosscher, K8AJ. He wrote: "Sheila picked a hiding place that shocked most of us who are used to finding the fox in an obvious ham vehicle in a public park, cemetery, or on a country road. Instead, her lair was a playground park in an upscale residential neighborhood. Surrounded by a row of tall pine trees, a lake, and a metal container, she sat in the back seat



Brian Donovan, K2AS (holding antenna), and his son Greg are regulars at Xerox Amateur Radio Club foxhunts. They were winners on this hunt in 2010. (Photo by Bob Scott)

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of a borrowed car. Although it was adjacent to the residential street, it was only visible for an instant as we passed by. We were tipped off by the smallest of black magnetic antennas on the roof."

Where was Sheila's OM, Tom, K8TB? He was one of the hunters, testing his new Doppler RDF system. The other teams were using 2-meter Yagis or cubical quads on their vehicles. They had started out from a parking lot in Holland, Michigan after writing down their odometer readings. The winner would be the one who had the fewest elapsed miles from there to K8AJ's location. That turned out to be the team of Laryn Lohman, K8TVZ, and Ike DeWitt, K8EMU. Time of arrival didn't matter, except that there was an overall two-hour time limit.

At the start, each hunting team was given a packet of sealed envelopes, each labeled with a time when it could be opened. Inside each was a clue such as the one for 8 PM that read, "Hope you're not heeding Horace Greeley's advice tonight." If any of the teams had indeed been following Greely's urging to "Go west, young man," they would have been in Lake Michigan by then!

Most ham radio foxhunts take place on weekends, but this Michigan group prefers to do it on Tuesday evening, starting at 7 PM and ending in time to get together for supper or dessert at a local restaurant. Often the hider stays with the transmitter and makes regular voice transmissions with taunts and clues. This night, Sheila saved her voice and used a PicCon fox controller board[1] to key the transmitter and send random tones at regular intervals.

Such a controller in an unattended foxbox can add difficulty to the hunt, as it did for the Murgas Amateur Radio Club of Wilkes-Barre, Pennsylvania. Hider John Mehalick, W3MTP, had scouted several locations in advance for Foxhunt Weekend, but he left it to his son Nathan to make the final choice. Nathan's answer was "How about in the hollow log by the river?"

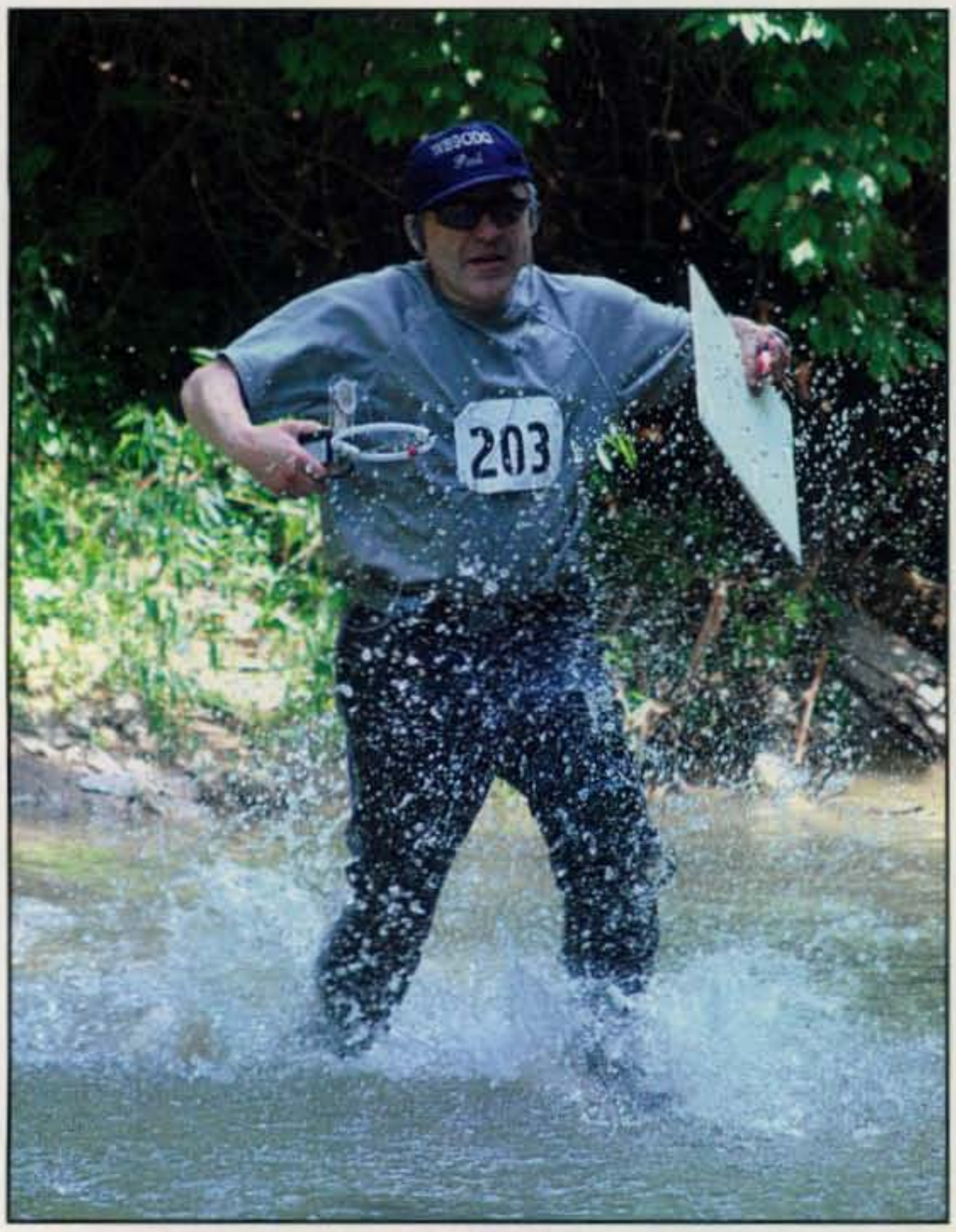
In his report John wrote: "This log is under the Pierce Street Bridge. A big tree had been cut down in 4-foot sections and the center of one section was rotted out. Nathan and I put the box in a tree section that was not facing the road."

W3MTP continued: "The log was off First Avenue near the new boat launch on the Kingston side of the Susquehanna River. The transmitting antenna was a J made from 450-ohm ladder-line. It and the coax were painted hunter green and hung in the weeds next to the tree section. It was quite low and most of the signal was going under the Pierce Street Bridge."

To add to the intrigue, John placed an empty foxbox by the tire of his jeep as a decoy. He left his MFJ Antenna Analyzer transmitting at very low power on the fox frequency in the vehicle, hoping to confuse the RDF equipment of the hunters. Bob Michael, N3FA, was the first to arrive and had to kick the box by the tire to be sure it was not what he was looking for.

Foxhunting, Geocaching, and Blackjack

Xerox Amateur Radio Club (XARC) holds two transmitter hunts each year. The first is in May for Foxhunting Weekend



Paul Gruettner, WB9ODQ, was huntmaster for the foxhunt at the annual AES Superfest in 2010. He also competed in the USA ARDF Championships in Ohio on Foxhunting Weekend, where he had to run through this creek on the way to the finish line in the 80-meter event. (Photo by Joe Moell, KØOV)

2011 CQ WW Foxhunting Weekend
May 14–15

CQ magazine has designated May 14–15 as the CQ World-Wide Foxhunting Weekend and is encouraging all hams and radio clubs to hold hidden transmitter hunts. Since the primary objective is more hunt participation, we don't insist that your event be on that weekend. Any time in the spring is fine with us!

CQ doesn't impose any rules or offer any awards for the World-Wwide Foxhunting Weekend. It's all up to you and the hams in your hometown. For many clubs, Foxhunting Weekend kicks off a season of regular transmitter hunts. For others, it's a special once-a-year event, like Field Day.

Some hams prefer formal transmitter hunts with carefully crafted boundaries, specifications for signal parameters, time limits, and so forth. Others are completely content with just having at least one signal to hunt. No need for any more regulations, they say.

Make your Foxhunting Weekend activities into a magnet for every club member. Better yet, include the whole community, especially young people. Invite a Scout troop to experience on-foot transmitter tracking or to ride along with the mobile hunters. Look for opportunities to incorporate foxhunting into Scout activities such as Camporees, Scout-O-Ramas, and Jamboree-On-The-Air. Seek out other youth groups that might be interested.

Whatever your club's RDF contesting style, be sure to keep safety in mind. Don't put transmitters where someone might be injured getting to them. Make sure that all transmitting and receiving antennas are eye-safe. Always be mindful of your own physical limitations and never take chances behind the wheel.

Afterwards, write up the results and send them to me. The list of information in a complete CQ Foxhunting Weekend report is posted at my web site: <www.homingin. com>. Besides the details of date, location, hiders, and winners, *CQ*'s readers also want to know what was unique about your hunt and what lessons (positive and negative) you learned from it. Don't forget to include some sharp action photos. The higher the resolution, the better.

—73, Joe, KØOV

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Ski Country Amateur Radio Club held its annual picnic and foxhunt at the home of Pat Scully, KØVK, near Glenwood Springs, Colorado. This year's hunt was unusual because after finding this old metal tub, hunters had to determine which of the identical containers inside held the miniature transmitter. Bob Ludtke, K9MWM, and Phil Krichbaum, NØKE, were the winners. (Photo by Bob Cutter, KIØG)

In San Luis Obispo, California, the Cal Poly Amateur Radio Club held an international-rules 2-meter foxhunt on the campus. Before the hunt, members built measuring-tape antennas and offset attenuators in one of the labs. (Photo by Sam Vigil, WA6NGH)

and the second is on a Saturday in October before the weather gets too cold. John Dickason, N2JAC, and Bob Scott won the 2010 spring hunt and set out to put on an unusual and challenging event in the fall. In their announcement, they gave it the following mysterious title "Geofoxblackcachehuntjack."

"While scouting for hiding spots, I forgot to turn off my APRS beacon," John wrote. "So I was worried that someone might have noticed me driving around the finish area weeks before the hunt. Fortunately, nobody did.

"The starting point was Spring Lake Park in Penfield, where everyone practiced close-in hunting of the microfox that Fred Miller, WO2P, brought along. First-time hunter Bill Bukowski, KC2YPJ, got body-fade lessons and a chance to practice his technique, which would prove to be quite valuable later.

"The official hunt began with an index card revealing the first fox frequency and advising hunters to not give away the fox's location once found. Five teams were up to the challenge and within 20 minutes, all had found the first fox transmitter in a tree near the creek in the park. There, each received a card that had coordinates to a geocache, the frequency of the main hidden transmitter, and instructions to take a playing card from each of the two locations to build a blackjack hand.

"As the day got warmer and sunnier, all five teams drove to Durand Eastman Park near the golf course, where they found the geocache and got their first playing card. By design, the second fox signal was not detectable from the start, but from the geocache, all teams heard it and began their second RDF activity. 'Foxhunt adrenaline' adversely affected a couple of teams that day. One hunter left an antenna at the start and had to meet up with the huntmasters to retrieve it, causing a delay of several crucial minutes. Another hunter was closing in on the second fox when he locked his keys in his car.

"Teams then followed their bearings southwest while listening for clues on the XARC repeater every 30 minutes. In Gates Memorial Park, a 7-watt transmitter with a directional antenna was about 15 feet up in a tree. The back entrance to the park was accessible from Fox Run road, a fact that was not lost on the huntmasters, as the final clue was 'look for the fox in the street name.'

"Brian Donovan, K2AS, and his son came in first place with a perfect blackjack hand, an ace from the transmitter, and a king from the cache. Bill the rookie hunter bravely accepted my word in the invitation that the fox could be hunted with just an HT and a rubber-duck antenna. Using just his newly learned body-fade technique, Bill found both transmitters, a feat that not even some of the experienced teams could duplicate that day."

Get Some Fresh Air

Every year brings more reports of Foxhunt Weekend events that are all on foot, no vehicles involved. They are a magnet for young people, because they reward physical ability instead of driving and street navigation skills. The magnet for adults is often food, such as the hot dog cookout after the second Foxhunting Weekend hunt of the Gallatin Ham Radio Club of Bozeman, Montana.

Tom Lewis, AB5CK, reports that there were three hidden transmitters. One was in an underground service compartment for an irrigation system. He says that the signal had the hunters convinced that it was within the concrete and stone structure of the nearby drinking fountain.

Art Jury, KF7GD, put out a series of 2-meter transmitters on the beautiful University of Washington campus in early April. As he looked for them, Neil

Robin, WA7NBF, reminisced about his own college years. "It's been a long time since I had a chance to walk around these grounds on a nice spring day with cherry blossoms blooming," he wrote. "But talk about reflections! All of those tall beautiful stone-faced buildings, probably with steel frames. Most of my time was spent trying to separate direct signals from reflected ones.

"Since most of my hunts use horizontal polarization, I fell into the trap of assuming that all foxes were horizontal. Wrong. Most of these were vertical. I finally started testing the signals in both planes and noticed that the most reliable and stronger ones were vertical. I should have known better, and my advice to newcomers is to check both polarizations with their beams."

Rich Patrick, KR7W, organized a Foxhunting Weekend multi-fox event at Ft. Steilacoom Park southwest of Tacoma, Washington. At about a square mile, it is large enough for a very challenging hunt. According to WA7NBF: "It's a mixture of terrain, hills to more than 300 feet, plus flat land area. You can include Pierce College grounds to the west for a seamless transition. It has a lake which makes it interesting from reflections and finding out that you're on the wrong side! The terrain is a little more arid than the typical dense rain forests we usually have."

A park of that size is large enough for an official international-rules radio-orienteering course. Championship Amateur Radio Direction Finding (ARDF) events take place in large forests with up to five transmitters to be found by each hunter, depending on age and gender. The start and finish are in separate locations. Total distance from the start to each of the five transmitters in optimum order and then to the finish is typically three miles or more. The five transmitters all are on one frequency in a five-minute cycle. First #1 transmits for a minute, then #2 for a minute, and so on, with #1 returning to the air after #5.

Medals in Ohio

USA's 2010 championships of ARDF took place on Foxhunting Weekend near Cincinnati.[2] It attracted radio-orienteers from 15 states plus representatives from Australia, Canada, Germany, and Sweden. Prior to the championship hunts on the weekend, were two days of optional ARDF training in other nearby woods.

Heading up the organizing effort were Bob Frey, WA6EZV, and Dick Arnett, WB4SUV. Both of them have collections of medals earned at previous USA

Special certificates were awarded to winners of the Xerox Amateur Radio Club's Foxhunting Weekend event. (Courtesy John Dickason, N2JAC)

championships and each has represented the USA at the World Championships in 2000, 2002, 2004, and 2006. Assisting were members of the OH-KY-IN Amateur Radio Society, Butler County VHF Association, and Orienteering Cincinnati.

Late in the afternoon before the 2-meter event, torrents of rain and hail buffeted the area for several hours. By starting time in Hueston Woods, the skies were cloudy, the trails were extra muddy, and the humidity was high. Besides mud all over their shoes, competitors crossed the finish line with mud on their knees, backsides, and faces as evidence of the unsure footing.

Sunday's 80-meter event was in the Miami University Natural Area, a patchwork of developed and undeveloped parcels with plenty of trails. The course-setters decided to spice up the contest by placing the finish corridor through Harker's Run, a creek that bisects the mapped area from north to south. The recent rains had doubled the water volume in the creek that day, but it was still crossable and a good way to wash the mud from pants and shoes.

Via the web, I learned of numerous other radio-orienteering events, including one in early May in Crescent Park, South Surrey, British Columbia. This well-attended session was organized by Amel Krdzalic, VA7KBA. Several of the attendees ended up on Team Canada for that country's first appearance in the ARDF World Championships in Croatia in September.[3]

Build Your Own

In foxhunting, 2010 was the year of the antenna workshop. There were more opportunities than ever to build simple direction-finding equipment at hamfests and local hunts. Marvin Johnston, KE6HTS, and I put on three sessions in southern California parks where newcomers assembled kits for measuring-tape 2-meter antennas[4] and offset attenuators.[5] After that, there were beginner-level transmitters to find, plus a full-sized ARDF course.

Other clubs are picking up on the idea, including the Whitman (Massachusetts) Amateur Radio Club, which had a session of its School of Electronic Excellence devoted to building measuring-tape Yagis at the home of Ron Stundze, KB1OEQ. Project instructor was Bill Hayden, N1FRE.

On a sunny Saturday in May, members of the Amador Amateur Radio Club in California met at the American Legion ambulance training room to build and test foxhunting antennas from kits made up by Dave Nicholson, KB6PNT. According to Chuck Bland, NA6BR: "By noon, the antennas were complete. I disappeared with the fox to hide it and then the hunt was on. About 15 minutes later, George Cusack, K6GTC, was first on-scene and started looking on foot.

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Joseph Betz, KF3DI and Anthony Dennis, KB3PKW, are on their way to third and fourth place in the Foxhunting Weekend event of Murgas Amateur Radio Club in Wilkes-Barre, Pennnsylvania. (Photo by John Mehalick, W3MTP)

About 10 minutes after that, others started to trickle in. This ended-up being a bit of a spectator sport, as the transmitter was hidden near the Argonaut High School FFA Pig Pen. Luckily for the hunters, it wasn't inside the fenced area."

Long-time hunter Paul Shinn, K6FRC, helped out and reported that all of the beginners found the hidden transmitter with no hints. He added: "The third team to arrive, screaming loudly as they pulled in the parking lot, were two girls whose names I did not get. They were just thrilled to beat all the boys! Their enthusiasm for their victory was hilarious."

There were also more opportunities last year to find foxes at hamfests and ARRL conventions. Paul Gruettner, WB9ODQ, reported: "For the past six years, AES has asked the Milwaukee Fox Hunt Club to hold a hunt on the back of their property during the Superfest. We typically have up to eight transmitters and give hunters one hour to find as many as they can."

Paul was huntmaster for this year's AES Hamfest hunt, putting out seven hidden transmitters. "What made it a real challenge this year is that several of the transmitters shared the same frequency, although they were not transmitting at the same time," he wrote. "None of the hunters were able to find all of them. At the end of the hour of searching, Brian Jansen, KC9GMW, took first place honors, finding six of the seven. Bernie Gratz, WA9BFH, was a close second, finding four. Some were very difficult to spot, even when you were right on top of them. The one that was left unfound was tucked up inside the louvers of a ventilation fan."

Try Something Different

If your club holds regular foxhunts and everyone has become quite proficient at it, why not provide a new challenge this year? For instance, instead of just one transmitter by one hider, give everyone a chance to hide. One participant starts out by hiding the foxbox. The first person to find it takes it and re-hides it somewhere else. First to arrive at the second fox location hides it a third time, and so forth. This variation goes by several names, including "progressive," "football," and "leapfrog" hunt. It's best to keep it simple by giving each hider only 10 or 15 minutes to find a new hiding spot.

How about a cooperative hunt, where all teams collaborate instead of compete? It's great practice to get ready for the need to rapidly track down interfering signals, either unintentional or malicious. Hold the hunt on a simplex frequency and have everyone exchange bearings and report their progress on a repeater.

Two meters is the most popular band for RDF contesting nowadays, but there are many other options. Loop or ferrite-rod antennas are compact, lightweight performers on 80 meters and are very easy for young people to carry. Kids can also tote a Yagi for the 440-MHz band more easily than one for 2 meters. Six meters or 10 meters might make a good change of pace for your next mobile hunt.

Consider adding some new technology, such as APRS (Automatic Packet Reporting System). This was tried in the San Diego area on a hunt last summer, with several of the hunters' cars equipped to transmit their positions so that the hidden operator could see their progress toward him. Unfortunately, the huntmaster's setup had problems that kept him from receiving the packets well at his location, but the hunters could be seen in progress on the linternet by their families at home.

Hams in the San Francisco Bay area tried a "parrot" hunt with a hidden "sim-

A special Foxhunting Weekend cake by April Moell, WA6OPS, awaited finishers at an on-foot transmitter hunt in Placentia, California. A workshop for building measuring-tape antennas and offset attenuators preceded this hunt. (Photo by KØOV)

plex repeater" that recorded incoming short audio messages and then retransmitted them on the same frequency. This repeater fox was in the car of Linda Ferguson, KE6BEO, on top of Communications Hill in San Jose, about 14 miles from the hunt starting point. Co-conspirator Don Ferguson, KD6IRE, was in Boat Ramp Park with a transmitter and four-element beam, sending transmissions to the parrot fox from 12 miles away. In his report, KD6IRE explained: "The control fox would transmit for 10 seconds and then go off for 30 seconds while the parrot fox repeated the 10-second message and then went off. There would be 10 seconds of silence and the cycle would repeat. Any change in the control fox transmissions would be copied by the parrot fox."

A bunch of vehicles moving erratically with strange antennas on them will attract attention. Don't be surprised if people ask what you're doing. You can use it as an opportunity to tell them about amateur radio. Better yet, consider some local press publicity. OurLosBanos.com had a fine article that included a great series of photos from a hunt of the Los Banos Amateur Radio Club.[6] My favorite is the mast-mounted log-periodic antenna, complete with rotor, attached over the front license plate to the bumper of one hunter's T-bird.

I am eager to read your reports of 2010 foxhunting activities and the new ideas that you come up with. Happy hunting!

Notes

1. <http://www.byonics.com/piccon/>
2. Many more photos and stories of the 2010 USA ARDF Championships are in the "Homing In" column of *CQ VHF* magazine for Summer 2010.
3. Many more photos and stories about ARDF Team USA and the 2010 World ARDF Championships are in the "Homing In" column of *CQ VHF* magazine for Fall 2010.
4. <http://www.homingin.com/equipment. html>
5. <http://www.homingin.com/joek0ov/offatten.html>
6. <http://www.ourlosbanos.com/stories/04142010_fox_hunt_lbarc.html

Math's notes

BY IRWIN MATH,* WA2NDM

Inexpensive SWR Measurements

Occasionally in the past we have presented various methods for making assorted measurements using inexpensive equipment or "bargains" bought on the internet. Continuing in that tradition, this month we would like to offer a couple of ways to achieve proper matching to an antenna without resorting to expensive equipment, a topic we chose based on questions we have received from readers. While simple, these circuits will allow you to not only achieve rough estimates of SWR, they will also allow you to get a reasonable match to an antenna. This should be of particular interest to the amateur on a budget. Although the various circuits are quite inexpensive, they are capable of doing a decent job.

Fig. 1 is a very simple way to assure that an antenna is properly matched without "tuning up" at full power (or measuring SWR directly), thereby disturbing anyone who happens to be on or near the desired operating frequency. The circuit consists of a simple bridge that will indicate when an antenna or antenna/tuner combination is at the proper setting to achieve a 1:1 SWR match (or at least a low SWR match). The circuit relies on a dummy load which dissipates most of the power produced by the transmitter. Loosely coupled to the load (through a 1.5K resistor) is a network of three resistors forming a bridge with the antenna serving as the fourth leg.

In operation the voltage at the junction of the two 100-ohm resistors is exactly half of the input voltage (at the top of the 1.5K resistor). The voltage at the junction of the 50-ohm resistor and the antenna will also be at half the input voltage but only when the impedance of the antenna matches 50 ohms. As a result, at a "prefect match" the voltage across the bridge will be zero. At any other impedance there will be a voltage that is different and the meter will move away from zero. Also note that the meter is in a diode bridge so any offset voltage will deflect the meter in a positive direction.

When building the circuit, be sure to match each resistor in the bridge as closely possible. The two 100-ohm resistors are not especially critical as to absolute value (they can be 5% resistors), but they must match each other as closely as possible (to at least 1%). The 50-ohm resistor, on the other hand, should be a 1% device (or better). You can select one from a bunch you may have on hand ,or parallel two chosen 100-ohm resistors to get closer to 50 ohms. It would also be helpful if each of the resistors has a decent power rating of at least 1/2 watt.

The 1.5K resistor is used as a coupling resistor from the dummy load and should have a rating of between 3 to 5 watts if you intend to apply higher power to the bridge. The 1N34A diodes are germanium types, chosen for their low forward voltage drop. You might be able to get away with 1N4148-volt diodes, but then the power needed to operate the bridge might have to be too high. The 10K pot is used as a sensitivity control and can be replaced with a fixed value of 1K to 10K if the output power of your transmitter can easily be adjusted. The meter can be a low-cost 100-µA full-scale instrument. Also note that the dummy load does not have to be built inside the bridge circuit, but can be connected externally to the input by means of a "T"-type connector.

*c/o CQ magazine

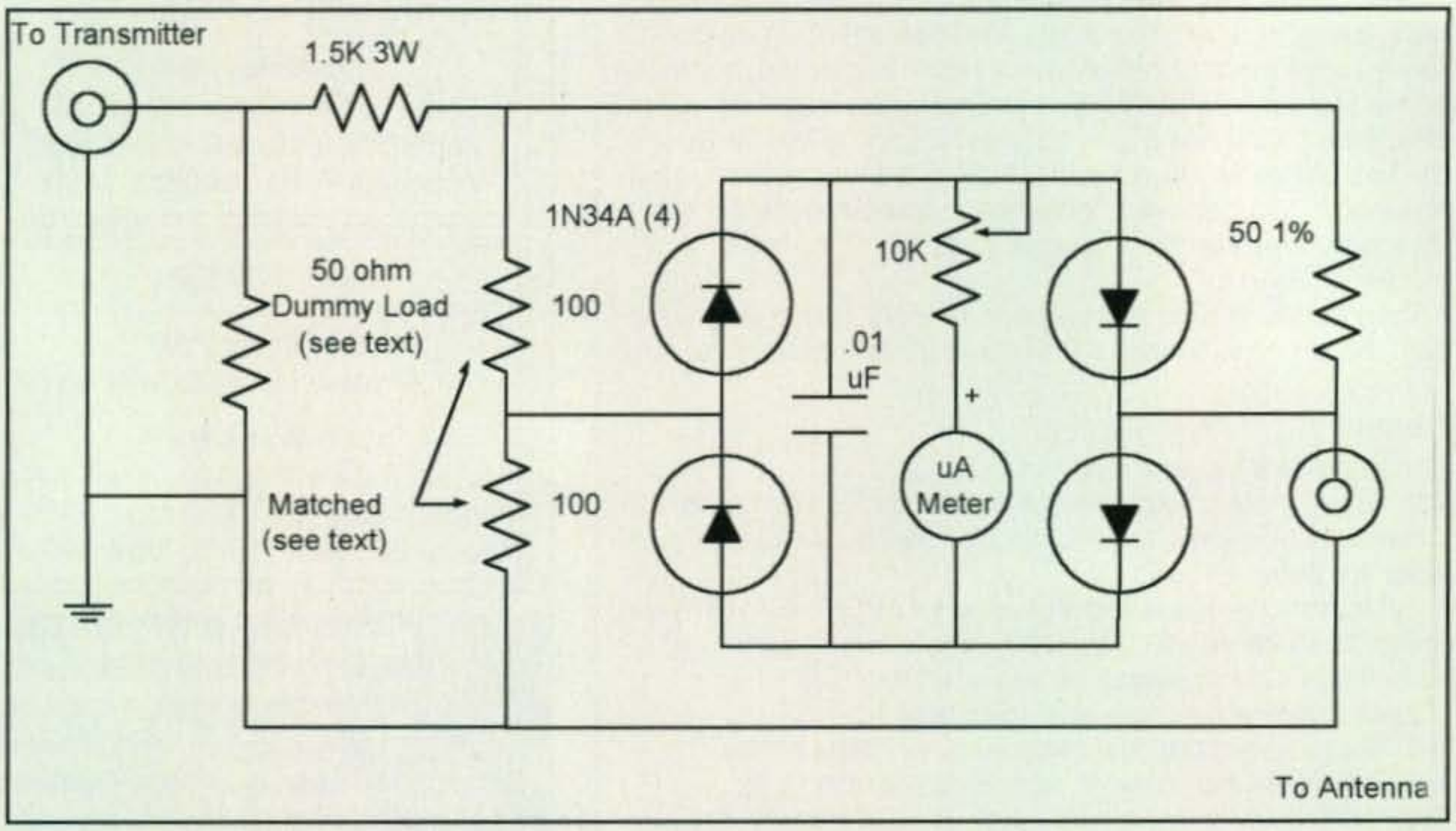

Fig. 1– Simple antenna tuning aid.

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1.250"	$4.15	$5.85
1.375"	$4.45	$6.15
1.500"	$5.25	$6.95
1.625"	$6.05	$7.75
1.750"	$6.85	$8.55
1.875"	$7.65	$9.35
2.000"	$8.45	$10.15
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0.375"	$2.95	N/A
0.500"	$4.15	$6.05
0.625"	$4.75	$6.65
0.750"	$5.35	$7.25
0.875"	$5.65	$7.55
1.000"	$5.95	$7.85
1.125"	$6.55	$8.45
1.250"	$7.75	$9.65
1.375"	$8.45	$10.35
1.500"	$8.95	$10.85
1.625"	$9.75	$11.65
1.750"	$10.65	$12.55
1.875"	$11.55	$13.45
2.000"	$12.45	$14.35
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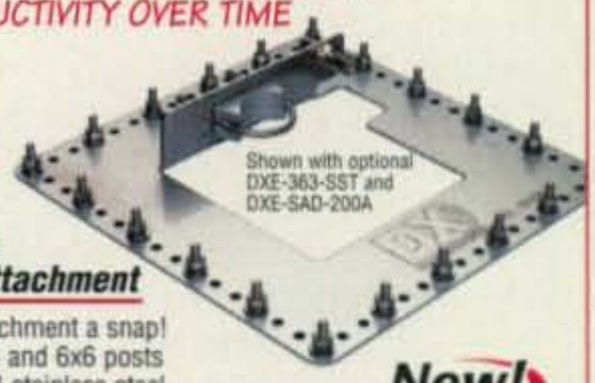

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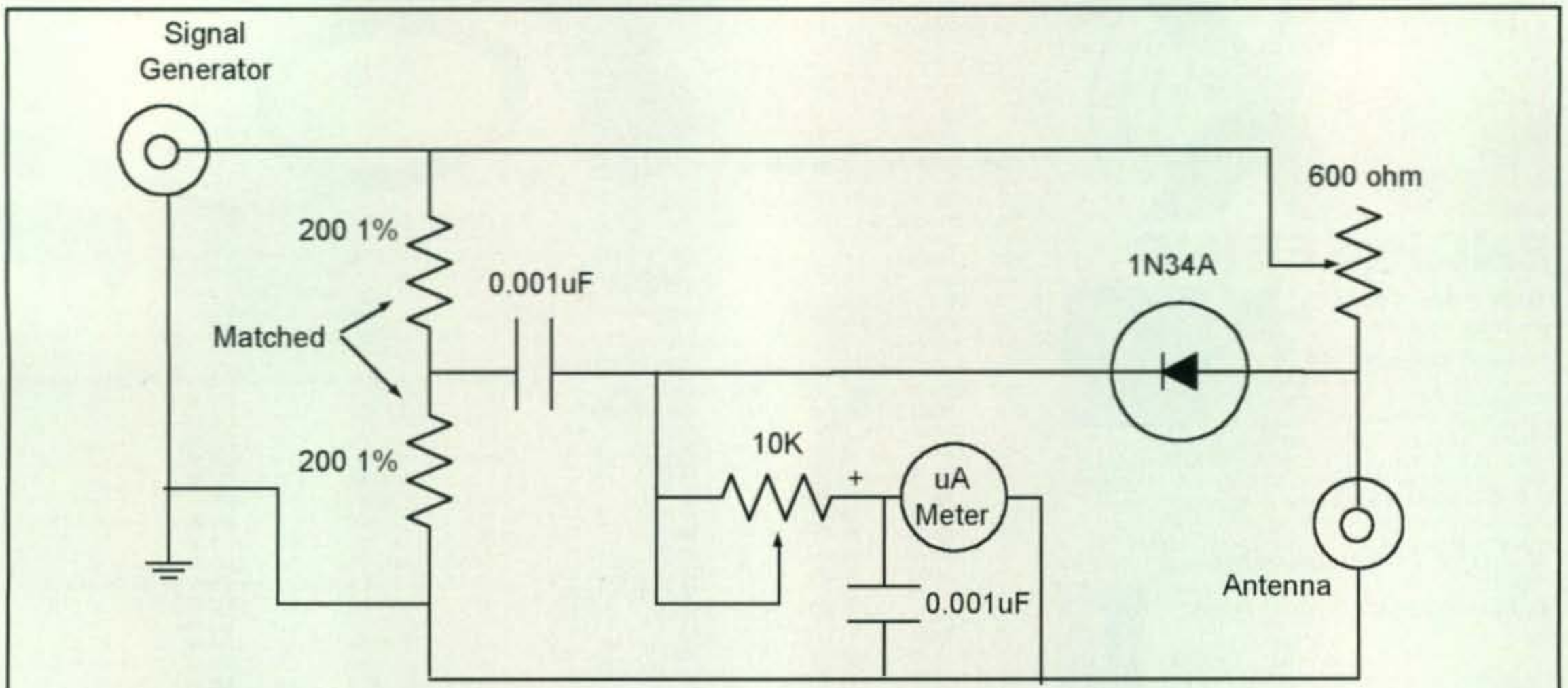

Fog. 2– Antenna impedance meter.

When using the bridge you simply need to connect the transmitter to the dummy load and to the input of the bridge (via the "T"). Then connect the antenna (along with whatever antenna tuner you might have) to the output of the bridge. Slowly adjust the output of the transmitter until you get a reading of about 1/4 to 1/2 scale on the meter. Be careful to not apply too much drive or you may overheat the bridge resistors.

Now adjust your antenna tuner (if you have one) or whatever transmitter matching network you are using for a dip in the meter reading. If the meter pins during this operation, simply reduce the transmitter output. What you are looking for is a clearly noticeable dip (as you adjust the antenna matching), indicating the point of lowest possible SWR. In some cases there will never be a true zero reading, since stray coupling and capacitive and inductive reactance of the antenna will always produce some offset.

If you wish to see what this might be under actual SWR conditions, first replace the antenna with a 50-ohm resistor. The meter should now show no deflection (or at least very little), as the SWR is 1:1. Now replace the 50-ohm resistor with a 75-ohm resistor. This will produce an SWR of 1.5:1 and a subsequent meter reading. Finally, replace the 75-ohm resistor with a 100-ohm resistor. This will produce an SWR of 2:1 and you will get an even higher reading. These three points should enable you to get a reasonable idea of where you are and what to expect from the circuit. Remember, this circuit is not really intended to be a precision SWR bridge, but rather simply a tuning aid. Once the antenna tuner is adjusted properly, remove the bridge and turn the transmitter to full power.

Fig. 2 is a little bit more elaborate at very little additional cost. It is a variation of the old Heathkit antenna bridge and has the advantage of being able to estimate actual antenna impedance values. As you can see, this circuit is also a bridge, but in this case with a variable potentiometer as one leg. As in the circuit of fig. 1, the bridge will balance when the unknown impedance (in this case the antenna and tuner) is equal to the setting of the potentiometer. By providing a scale that matches the resistance of the potentiometer (and a knob with a pointer), you can simply adjust the pot for a null and then read the impedance directly from the scale.

To use this meter you must have an RF signal generator that covers the frequency range you wish to measure. You first set the generator to your desired operating frequency. Next you simply connect the antenna and adjust the potentiometer for a dip. The reading on the potentiometer scale (at the dip) is the impedance of the antenna at the generator's frequency. The accuracy of this device is probably only about 10–20%, but that is good enough for most applications. As in the first case, the 200-ohm resistors should be matched and the potentiometer should be a carbon or conductive film type. Wire-wound potentiometers will have inherent inductance and will compromise the accuracy of the unit. With the values chosen, impedances from 0 to 600 ohms can be determined.

I sincerely hope this is of interest to you and that you will not be afraid to try one of the circuits with your equipment. You will not only save some money, you might actually learn something in the process.

73, Irwin, WA2NDM

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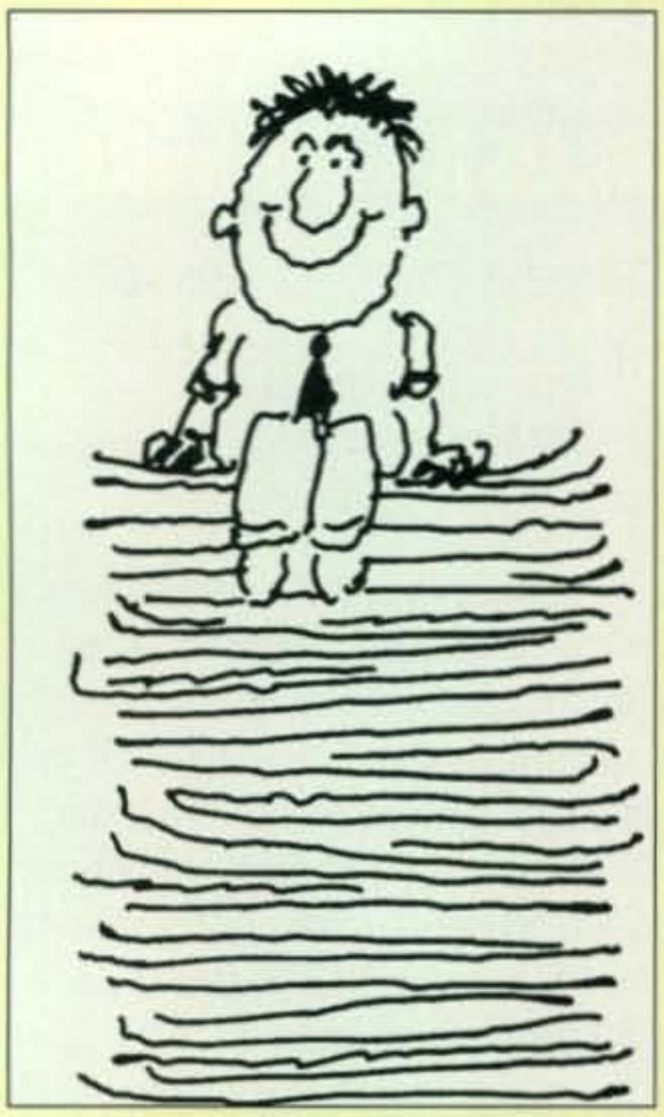

What You've Told Us...

Our February survey asked about how you make your ham radio buying decisions. First of all, over 90% of the readers who responded have purchased at least one piece of ham gear in the past five years—71% within the past year and 21% one-to-five years ago. Only 6% had not bought any ham gear in more than five years.

Nearly one third of you (32%) made your most recent purchase of ham equipment online, while 24% ordered by phone, 22% went to a store and 19% bought their gear at a hamfest. Only 7% bought stuff at another ham's home or someplace else. Dealers continue to be your preferred source (65%) for buying gear, followed by private purchases from another ham (18%), direct from the manufacturer (15%), and other (1%).

Your primary consideration in deciding which radio to buy fell out as features (48%), followed by brand reputation and experience (30%), with price a distant third (16%). Recommedations from others did not play a significant role. Deciding *where* to buy your rig came down to dealer reputation (34%) and price (27%), followed by dealer knowledge about the radio (10%), ease of ordering (8%), dealer friendliness (7%), dealer inventory and service after the sale (5% each). In addition, 3% reported an "other" primary consideration and 2% do not buy from dealers (which means, of course, that 98% do!).

This month's free subscription winner is Harry Jones, N4CWP, of McLean, Virginia.

Reader Survey May 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*.

This month, we're going to repeat our survey from ten years ago on hamfests to see how much the answers change.

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

1. Have you ever attended a hamfest, convention, or similar ham radio gathering (not including operating events or club meetings)?
- Yes 1
- No 2

2. Which of the following have you attended at least once? (Circle all that apply)
- Local club hamfest/swap meet 3
- Regional hamfest 4
- ARRL section, state or division convention 5
- ARRL national convention 6
- The Dayton Hamvention® 7
- Other regional or national conference or convention (e.g., AMSAT or Visalia DX) 8
- None 9

3. Which of the following do *you attend regularly*? (Circle all that apply)
- Local club hamfest / swap meet 10
- Regional hamfest 11
- ARRL section, state or division convention 12
- ARRL national convention 13
- The Dayton Hamvention® 14
- Other regional or national conference or convention (e.g., AMSAT or Visalia DX) 15
- None 16

4. What are your usual reasons for attending hamfests? (Circle all that apply)
- To shop for equipment and accessories 17
- To sell equipment and accessories 18
- To attend forums and talks 19
- As a social event 20
- To help as a volunteer 21
- Do not attend hamfests 22

5. Which *one* statement below best reflects your feelings about hamfests?
- "I go to hamfests to browse, even if there's nothing particular that I need." 23
- "I go to hamfests to buy; I know what I want and go home if I don't find it." 24
- "I go to hamfests to sell, and might bring something new home with me as well." 25
- "I go to hamfests to socialize, and if I happen to see something I like, I'll buy it." 26
- "I go to hamfests mostly for the forums; I'm not really interested in buying or selling." 27
- "I don't go to hamfests." 28

6. How did you feel after leaving the hamfests you've attended recently?
- Generally exceeded expectations 29
- Generally met expectations 30
- Generally did not meet expectations 31

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

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$3195

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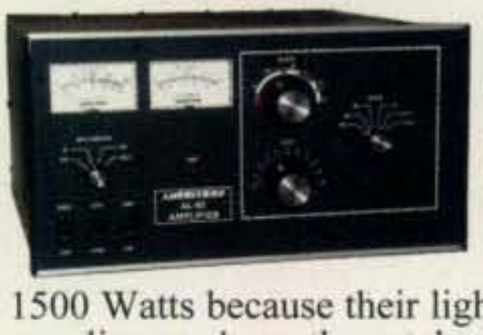

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BY RICHARD FISHER,* KI6SN

Dayton's "Amateur of the Year"–EmComm

Recognizing that a lack of equipment and ability were insurmountable barriers at the time, Shirley Roberts let her license lapse many years ago—dropping out of amateur radio. However, in 1986 the encouragement of friends brought her back. Now, 25 years later, N8LX finds herself the 2011 Dayton Hamvention® Amateur of The Year. EmComm, not surprisingly, played a role in her selection.

"This prestigious award goes to an amateur who has demonstrated significant contribution to amateur radio as well as related public service," the Hamvention® announcement noted. "Shirley exemplifies all of the deepest aspects of this award."

Like so many radio amateurs, while Roberts sees public service as an inherent responsibility, it is not an all-consuming pursuit to her. She eagerly serves when called upon, and N8LX has a portfolio that shows it.

Well more than a decade ago, during a conversation on the Fairfield (Ohio) Amateur Radio Association's 145.19 FM repeater, Roberts noticed the fellow on the other end was having some sort of problem. "He was a trucker and he told me he had a toothache he hadn't done anything about. He was starting to get incoherent and had pulled off the road." *But what road?*

In order to get him help, Roberts, of Dayton, knew she'd need to determine his location. The 145.19 machine was a wide-area repeater, so he could be virtually anywhere in the Dayton-Fairfield-Cincinnati area.

"I had an outside antenna," Roberts recalled, "and could hear him on the repeater's input. From that, and from the vague description of the area he gave me, it meant he wasn't too far away from me."

She called a ham acquaintance who was good at direction finding—DFing. "By the time we were done (talking), he'd decided to go out and try to find this trucker," Roberts recalled. "He got several other (DFers) involved."

By the time the ailing driver was found, "he was losing his faculties," Roberts said. "He'd driven into some bushes along an exit off a main highway," so it was fortunate the DFers were able to find him.

The trucker ended up in the hospital. "He wasn't there very long," Roberts said. However, everyone seemed to think her actions, and those of the DFers, could well have saved his life. "I'm glad I started talking on the repeater with him when I did," she said.

According to her *bio*, Roberts, who is sight impaired, served as a SKYWARN® liaison, as well, handling preliminary check-ins while net control operators were enroute to a communications command center.

"On one occasion, she agreed to be the net control during a flood—a circumstance that she assumed would be brief," her *bio* noted. "The event resulted in many hours over a three-day period. Because this was her first time conducting a net, it was a *hands-on* learning experience."

Shirley Roberts, N8LX, was a two-fisted communicator when this photograph was taken, a handie-talkie in each hand. Her public service and emergency communications experience were part of the criteria on which she was selected the 2011 Dayton Hamvention® Amateur of the Year. (Courtesy of N8LXK)

Roberts was so successful in handling the flood emergency, "she was asked to be an ARES® net control. For her net control activities, she used a Braille PDA (personal digital assistant) to keep track of callsigns and other net information."

She is an active member of the American Council of the Blind Radio Amateurs and a member of QCWA (Quarter Century Wireless Assocation). Additionally, she holds life memberships in the American Radio Relay League and Handihams®.

Roberts graduated from Meadowdale High School in Dayton, going on to earn a Bachelor of Arts degree in social work from Wright State University. She is president of ACB-Diabetics in Action, a national organization providing support and information for blind and visually impaired people with diabetes. Roberts is on the board of directors of the American Council of the Blind of Ohio, as well.

N8LX will receive the Amateur of the Year Award at the 2011 Dayton Hamvention®, which runs from May 20–22 at the Hara Arena.

SKYWARN® Operators on the Storm Front and in the Paper

"In the *Orlando Sentinel* Lake County edition there is a nice article by Kerri Anne Renzulli about ama-

*1940 Wetherly Way, Riverside, CA 92506
e-mail: <ki6sn@cq-amateur-radio.com>

teur radio's involvement in SKYWARN®," wrote Ted Luebbers, K1AYZ, Lake County, Florida Amateur Radio Emergency Service® public information officer.

The February story, focusing on how SKYWARN® assists the National Weather Service, "resulted from a news release that I sent (in January)," he said. "She called me for an interview and we had a discussion about amateur radio and what took place during the SKYWARN® net. I also suggested she get in touch with Scott Spratt of the NWS in Melbourne, which she did. This should help us have a good turnout for the upcoming SKYWARN® classes." *Indeed.*

Headlined "Amateur Radio Spotters Swing Into Action During Weather Emergencies," Renzulli's story told *Sentinel* readers, "the spotters comprise the Lake County ARES®, who volunteered most recently during (a January) storm when 'straight-line winds' gusting from 60 to 70 mph damaged 30 homes in Groveland."

"The NWS in Melbourne is using Doppler radar to look at large areas in the sky," Luebbers was quoted as saying. "They can't see what is going on down my street. . . . From my location, I might be able to spot something they missed or indicate where a front is moving that would allow them to warn a community."

Lake County SKYWARN® has a robust history of jumping into the action when storms rip through this region of central Florida, which is prone to severe weather. The January 25 storm cited in the *Sentinel* story gives a fine example—a giant weather system packed with violent thunderstorms, high winds, heavy rain, hail, and tornadoes.

As the front rolled in, SKYWARN® operators rolled out.

"At 2:10 PM, Emergency Coordinator Strait Hollis, KT4YA, activated the Lake County ARES® radio net, which stayed on the air until 7:20 PM to report adverse weather conditions in Lake County neighborhoods," Luebbers said. Forty-five radio amateurs from Lake County and surrounding areas checked into the VHF net and stood by until the dangerous storm had passed.

The Orlando (Florida) Sentinel *newspaper's website featured a story about SKYWARN® activities after a severe weather front moved through Lake County in the central part of the state in January. (*Orlando Sentinel *web page)*

"It appears that a tornado may have touch down in Groveland," Luebbers said. Scott Spratt, a meteorologist from the National Weather Service, sent investigators to the area to verify the suspicion. "Damage to dwellings and trees had been reported in that area. The SKYWARN® net received reports of heavy rain, high winds, and downed power lines."

"Many of the Lake County amateur radio operators have become trained NWS SKYWARN® Weather Spotters to become qualified to report dangerous weather conditions," Luebbers said. For more information on SKYWARN®, visit the organization's internet site: <http://www.skywarn.org>.

(To see the full Orlando Sentinel *web story "Amateur radio spotters swing into action during weather emergencies," visit: <http://bit.ly/evF7Jo>.—ed.)*

Story: Georgia Hams are "More and More of a Resource"

Under the headline *'Hams' Play Big Part in Tracking Storms,* radio amateurs in Hall County, Georgia, got accolades from the region's fire chief for playing "a key role in many places in Georgia when events such as snowstorms occur."

"Hall County relies on a network of more than 30 amateur radio operators in times like these, according to fire chief David Kimbrell, who also serves as the county's Emergency Management Agency director," the AccessNorthGA.com internet story by Editor Ken Stanford noted on January 11.

"There are 36 spotters located throughout the county with amateur radio operators (who) are keeping us abreast of the weather conditions," Kimbrell was quoted in the story. "They've been around a long time and they're just becoming more and more and more of a resource."

Kimbrell said the radio amateurs, who serve the Gainesville region, "feed information from individual locations to Hall County's Emergency Operations Center, helping track a storm all the way through the county," adding: "They were instrumental in helping track Sunday night's snowstorm (January 9). They alerted the Emergency Operations Center when the snow started in South Hall and relayed messages as it began in other places."

According to its website, Hall County Fire Services "protects 394 square miles, with a population of over 173,000."

(AccessNorthGA.com can be visited at: <http://www.accessnorthga.com> —ed.)

. . . On the Other Hand

This, from Cincinnati.com posted January 31: "Tonight's weather-spotter

Hams Support Christchurch EmComm Effort After 'Quake

Radio amateurs providing disaster communications in Christchurch, New Zealand were "extensively supporting the urban rescue operation" following the devastating earthquake that struck February 22, according to Stuart Smart, ZL4FZ, of the region's Amateur Radio Emergency Communications (AREC).

"There (were) about 250 staff in the field and all of that communication (was) coming back through AREC," Smart reported.

In early March, rescue efforts were shifted to a recovery phase, according to a report from Jim Linton, VK3PC, chairman of the International Amateur Radio Union (IARU) Region 3 Disaster Committee. Christchurch Mayor Bob Chapman announced the change, with a death toll at 161 and 200 people missing, the report, posted on the Southgate Amateur Radio Club website, said.

Under arrangements with New Zealand Civil Defense and Emergency Management, AREC members are trained in disaster response, Linton said. "Operations have been confined to VHF frequencies and avoided use of HF (high frequency) channels identified for that purpose."

"Some 67 percent of affected people have had water supplies restored, and even fewer are reconnected to the sewer, while 27,000 are without power," Linton reported in early March. "The Minister of Civil Defense declared a State of National Emergency which (had) been extended until midnight March 7."

AccessNorthGA.com Editor Ken Stanford wrote an article highlighting how Hall County (Georgia) fire officials were assisted by radio amateurs around Gainesville when a rare snow blanketed the region. (AccessNorthGA.com web page)

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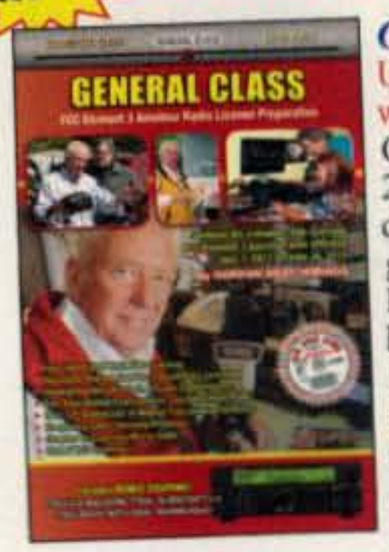

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CQ

An informational booth introducing the three Military Auxiliary Radio System branches—Army, Air Force and Navy-Marine Corps—was quickly put together for the National Guard Bureau's 2011 Domestic Operations Conference outside Washington, DC in January. MARS members, many of whom are radio amateurs, have assisted in emergency communications both in the United States and beyond its borders. For the full story on MARS' participation in the conference, see the April edition of WorldRadio Online *magazine free on the web at: <http://www.WorldRadiomagazine.com>. (Photograph courtesy of N4WWL)*

training class at New Richmond High School has been canceled because of a forecast of bad weather."

At the time, a nasty frontal system was moving through the Ohio Valley, bringing freezing rain to the region, according to meteorologist Mary Jo Parker of the National Weather Service. The school is about 25 miles east of downtown Cincinnati.

"We want to provide our citizens with a safe training program and will reschedule this weather-spotter training class at a later date," Beth Nevel, director of the Clermont Emergency Management Agency, was quoted in the story. " . . . we need our citizens to be careful when traveling and be extra cautious of possible icy road conditions."

(Safety first, spotter classes later—a good plan.—ed.)

Study: Social Media will Play Increasing Role in EmComm

A former contributing editor for *Homeland Protection Professional* and *Science Spectra* magazines and writer for the internet site Homeland1 says EmComm "has become more than a static, one-way link between command elements."

Tweet this: "Emergency communications takes on new partner," by Doug Page and published on the Homeland1 website, cites a study that "looks at the role of the public as a participant in the process of emergency communications through the vehicle of social networking." A secondary headline for his piece notes: "Rise of Twitter and other social media boosts public's role as participant in the emergency communications process."

The study results, "which appeared in a 2010 issue of the *Journal of Homeland Security and Emergency Management*," Page writes, "proposes a four-channel model of communication, incorporating newer mobile technologies such as cell phones and internet-based tools like Twitter, Facebook, Flickr, and Google Maps as a way to build a more robust emergency management communication structure than currently found in command centers for large-scale emergencies."

"Emergency response agencies and emergency managers must begin to view the public and media as partners in providing information for collective problem-solving," Laura Pechta, of the Department of Communication, Wayne State University, said in Page's article.

Pechta noted that "the increasing use of social media in public-to-public communication during crises and disasters puts the public now at the center of a crisis, conveying important information and response needs," Page said.

"The application of new social media or Web 2.0 technologies increases the speed and richness of information shared across groups," Pechta said in Page's story. "Monitoring and use of these approaches by agencies will be necessary to maintain the most up-to-date and robust information to make decisions and respond to ongoing disasters."

(To see Doug Page's full Homeland1 story, visit <http://bit.ly/dQMfdE> on the Homeland1 website.—ed.)

That's it for this time. Do you or your emergency preparedness group have a story to share with *CQ* readers? If so, please contact me at the snail mail or e-mail address listed on the first page of this column. Until next month . . .

73, Richard, KI6SN

As expected, Conklin wrote, "the devastating tsunami waves impacted the coast and did an estimated $15 million damage to Santa Cruz Harbor. More than 100 boats—including fishing vessels, pleasure boats and yachts—were either damaged or sunk as a result of the waves.

"Santa Cruz was not alone in receiving significant damage as a result of the powerful waves," he added. "Crescent City, located approximately 500 miles north of Santa Cruz, also received heavy damage causing California Gov. Jerry Brown to declare these areas disaster zones. One person died as a result of being swept out to sea with the high waves."

In Space: EmComm Help from Above

Meanwhile, the International Space Station digipeater was made available on 145.825 MHz to handle Automatic Packet Reporting System (APRS) traffic in the Japanese disaster area.

"A power outage has affected the Pacific side of some of the northeast region (JA7) of Japan. This has meant APRS mobile activity in this area—such as theWakayama Red Cross JA3FRI-12—cannot be seen," the Southgate ARC website reported.

"Following a request from Japan, (APRS developer) Bob Bruninga, WB4APR, posted a notice to the AMSAT Bulletin Board regarding the availability of the ISS AX.25 Packet Digipeater for APRS use:

"We have advised ... that the ARISS APRS digipeater can be used over Japan. Any APRS operators in the affected area can switch to the ISS digipeater by simply changing frequency to 145.825. ISS is coming over Japan about six times a day in the afternoon.

"We hope the astronauts can be sure to keep APRS digipeater operating over Japan on 145.825. We hope that stations *not* in the disaster area monitor the ISS downlink for emergency traffic and can IGATE the downlink into the APRS Internet System."

Amateur Radio Equipment Manufacturers Report Status

In the wake of the multiple disasters, concern quickly turned toward the status of the employees of amateur radio equipment manufacturers with facilities in Japan, and their families.

ICOM

Ray Novak, N9JA, ICOM America's Division Manager for Amateur and Receiver Products, in a statement said that no one on the company staff was known to have been injured as a result of the earthquake or tsunami.

The company's facilities suffered only minor damage, but interruptions were anticipated from vendors in ICOM's supply chain in the earthquake-tsunami zone and that other issues, such as rolling power blackouts, may slow production.

There was no damage "reported at ICOM's headquarters in Osaka or at either of our two main factories in Wakayama," the statement said. "Both Osaka and Wakayama are located far south of the most severely affected areas. ICOM did suffer some minor damage at our Tokyo and Sendai branch offices."

"Most of ICOM's facilities and systems are ready to get back to normal business," the statement continued. "However, supplier logistics, commuting issues and future power disruptions will affect our company. It is too soon to tell how big an impact the earthquake and its aftermath will have on ICOM."

ICOM's America's internet homepage is: <http://www.icomamerica.com>.

Kenwood

The president of Kenwood USA said the company's staff in Japan was safe and facilities there were undamaged. In addition, Junji Kobayashi said in a statement posted on the company's website <http://www.kenwoodusa.com> that there has been no impact on Kenwood's equipment production since its main factories are located in Malaysia.

A packet digipeater aboard the International Space Station was made available for amateur radio APRS traffic from earthquake-affected areas of Japan when power outages on the ground made usual channels inoperative. (Courtesy of NASA)

Kobayashi said Kenwood's corporate offices are south and west of the quake zone, but "power outages and interruption of mass transit have kept most of Kenwood's staff at home since the earthquake." However, he said, "we expect the infrastructure to improve in the coming week and our operations to fully resume accordingly."

"We appreciate the concern for our employees expressed by all those who have contacted us," Kobayashi added. He promised additional updates as conditions warrant.

Yaesu

On March 16, it was reported that production of Yaesu radios at Vertex Standard's factory in Fukushima, Japan, had been temporarily halted due to earthquake damage. All Vertex Standard employees and their families were said to be safe.

In an open letter to the amateur radio community, Vertex Standard CEO and President Jun Hasegawa expressed his gratitude for the many "kind words and thoughts about us during this difficult time." He reports that all Vertex Standard employees and their families are OK, although the company has not been able to reach its many dealers and subcontractors located near the coast. "We just hope that they are alive," he wrote.

Hasegawa also reported that the Yaesu factory in Fukushima suffered "minimal" damage from the earthquake but had been temporarily shut down nonetheless. He said he "expects it to be back in normal operation within one to two weeks and asks for everyone's understanding and cooperation."

However, some production of Yaesu amateur radio equipment continued, according to Dennis Motschenbacher, K7BV, Executive Vice President of Yaesu Amateur Radio Sales, who said in an item in the *CQ Newsroom* that "Yaesu also has a plant in China that is in full production."

Yaesu's website is: <http://www.yaesu.com>.

(For updates on EmComm activity in Japan and the latest emergency traffic frequencies, visit the CQ Newsroom: <http://www.CQNewsroom.blogspot.com >. Also, watch for the June edition of CQ *for an insight from former Eastern Pennsylvania Section Emergency Coordinator (and former* CQ *"Public Service" Editor) Bob Josuweit, WA3PZO, on whose watch U.S. radio amateurs responded during the Three Mile Island nuclear power plant accident in 1979.—ed.)*

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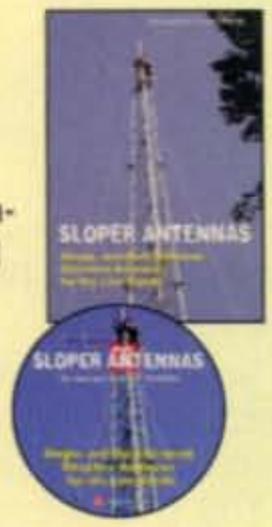

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BY FREDERICK O. MAIA,* W5YI

From the Mailbag:

Answers to Your Amateur Radio Questions

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 once in a while, we include them in one of our "mailbag" columns. It has been a while since we did this, so here goes.

Q: Bob, W8RID (Twinsburg, OH) writes: "If they let Extra Class VEs test Extra Class applicants, why can't General Class VEs administer General exams? Volunteer Examiners should be able to test up to the level of license that they hold."

A: Section 97.509 (b) of the rules specifically states:

"Each administering VE must:

(3) Be a person who holds an amateur operator license of the class specified below:

(i) Amateur Extra, Advanced, or General Class in order to administer a Technician Class operator license examination;

(ii) Amateur Extra or Advanced Class in order to administer a General Class operator license examination.

(iii) Amateur Extra Class in order to administer an Amateur Extra Class operator license examination.

So why does Sec. 97.509(b) allow Extras to test Extras, but Generals can't administer exams to Generals? You can blame Congress, not the FCC.

In the early 1980s, mainly due to budgetary constraints, a general trend towards privatization of government services developed at the FCC. In 1982, President Ronald Reagan signed legislation authorizing amateur radio operator license examinations to be prepared and administered by volunteer ham radio organizations. Up until that point it was illegal for individuals to perform work previously handled by federal employees.

On September 13, 1982, Congress approved an amendment to the Communications Act which provided for the use of volunteer examiners in the Amateur Radio Service. That new Section 4(f)(4)(A-B) reads:

"The Commission, for purposes of preparing or administering any examination for an amateur station operator license, may accept and employ the voluntary and uncompensated services of any individual who holds an amateur station operator license of a higher class than the class of license for which the examination is being prepared or administered. In the case of examinations for the highest class of amateur station operator license, the Commission may accept and employ such services of any individual who holds such class of license."

That enabling legislation is crystal clear. VEs must hold a higher license class—if one exists—to examine applicants for a ham ticket. The FCC couldn't change that even if it wanted to. It requires a change by Congress.

Q: I understand it is unlawful to receive some over-the-air radio transmissions. Which ones are illegal?

A: Section 705 of the Communications Act covers "Unauthorized Publication of Communications." This section primarily deals with divulging and using radio communications and generally does not prohibit the mere interception of radio transmissions.

Section 705 prohibits a person from using an intercepted radio communication for his or her own benefit where there is a reasonable expectation of privacy. To the extent these conversations are radio transmissions, there would be no violation of Section 705 if there were no divulgence or beneficial use of the conversation.

This means that if you inadvertently happen to overhear your neighbor's cordless telephone conversation or listen to radio transmissions on your radio receiver or scanner (such as from police radio or ship-to-shore radio telephone calls), you do not violate the Communications Act.

The Communications Act allows the divulgence of certain types of radio transmissions. The law specifies that there are no restrictions on the divulgence or use of broadcast radio transmitted to the general public. Also all transmissions by amateur or citizens band radio operators may be freely divulged.

The mere interception of some radio transmissions may constitute a criminal violation of other federal or state statutes. For example, interception of cellular calls is illegal. In the case of cellular phone calls, the law equates monitoring of a cellular phone call to divulgence.

This is true even though the transmission can easily be intercepted, since some older cellular radio networks still operate in the analog FM mode. The trend, however, is toward proprietary digital multiplex transmissions, which most radio receivers cannot interpret. You may, however, listen to all other non-encrypted, non-cellular communications.

Some states prohibit equipping a motor vehicle with a radio receiver or radar detector that is capa-

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e-mail: <w5yi@cq-amateur-radio.com>

ble of receiving police activity ... especially if the user is not a licensed amateur radio operator.

Q: I am going on a cruise this summer. May I operate my VHF/UHF handheld radio while on board ship?

A: Not an easy question to answer. Amateur radio operators in international waters are subject to the reciprocal licensing requirements pertaining to the country under which the vessel is flagged. Permission by the vessel's master, or captain, for on-board use of amateur radio equipment is a legal requirement. (See: rule Section 97.11.)

Registering a ship in the United States requires the ship to be built in the United States and staffed with an American crew. However, paying American wages and complying with U.S. employment regulations is extremely expensive compared to using employees from developing countries. Employees from such countries as Jamaica, Haiti, Indonesia, and the Philippines will perform the same work for a fraction of the pay demanded by Americans. As a result, there are very few commercial cruise ships that are American flagged.

Nearly all large cruise ships are staffed with international crews, cruise under a foreign flag, and use ships built in Germany, France, and Italy. The vessels are usually registered in countries imposing less burdensome requirements on employers, such as Liberia, Panama, and the Bahamas. For example, Carnival Cruise Lines (the world's largest), while based in Florida, does not build or register its vessels in the United States.

Liberia, Panama, and the Bahamas all have reciprocal operating arrangements with the United States. Even with the captain's permission, legally you must obtain a reciprocal operating authorization from the country of registry to operate in international waters. You are in international waters once you are more than 12 nautical miles from a U.S. or territory coastline. Also, I would check with the cruise line before leaving to be sure that radio transmitting equipment is not on its "prohibited list."

Q: I am located in 4-land (southeastern U.S.) but there are no "4" calls available with the callsign suffix that I want. May I select a callsign from a different radio district even though I don't live there?

A: Yes, you may. There is no requirement that you reside in your callsign area. You may choose any numeral (Ø through 9). You do need a mailing address in Hawaii, Alaska, and Puerto Rico (or an island territory) if you want a call sign containing a prefix reserved for one of those areas. Still, you don't have to live there.

Q: I understand that there are actually five callsign groups. I only know about A, B, C, and D. The FCC website says "Group X" callsigns are not available as a vanity callsign. What are Group X callsigns?

A: Provisions were made for five types of callsigns—called Group A, B, C, D, and X—when the "Group Call Sign System" was established back in 1978. Each group had certain blocks of prefixes and formats assigned to it.

In the 48 contiguous states, Group A (Extra Class) amateurs qualified for the shortest callsigns: all 1×2 format, most 2×1, and most "A" prefix 2×2 callsigns. Group B (Advanced Class) callsigns contain most K, N, and W prefix 2×2 call signs. Group C (Technician and General Class) contains all 1×3 K, N, and W prefix callsigns. Group D (Novice Class) contain most K and W prefix 2×3 callsigns.

In the non-contiguous states and territories (Hawaii, Alaska, Puerto Rico, and various U.S. island possessions) Group A (Extra Class) contains AH, KH, NH, WH, AL, KL, NL, KP, NP, and WP prefix 2×1 callsigns. Group B (Advanced) contains most AH, AL, and KP prefix 2×2 callsigns. Group C (Technician and General Class) contains KH, NH, WH, KL, NL, WL, NP, and WP prefix 2×2 callsigns. Group D (Novice Class) contains KH, WH, KL, WL, KP, and WP prefix 2×3 callsigns.

Group X callsigns all are 2×3 callsigns with a WC, WK, WM, WR, or WT prefix. They were set aside in the 1970s to be assigned for certain types of amateur radio stations.

The FCC planned to issue WC prefix 2×3 callsigns to RACES (Radio Amateur Civil Emergency Service) stations; WK 2×3 callsigns to club stations; WM 2×3 callsigns to military recreation stations; WR 2×3 callsigns to repeaters; and WT 2×3 callsigns was to go to temporary licenses.

The FCC exempted these 2×3 callsigns from Group D when it programmed its computer in 1978 for the new Group Call Sign System. However, the Commission never followed through with rulemaking assigning Group X callsigns to these types of stations. Now, more than three decades later, Group X callsigns are not assigned to anyone. There were a few WC, WK, WM, WR, and WT 2×3 prefix callsigns assigned—most before 1978—and they may be renewed.

Q: How can I get help about accessing and using the various FCC online services available to amateur radio operators?

A: All FCC services are accessed online by using your personal computer. While still available, the FCC is just about out of the paper business. Everything today is done over the internet.

First of all you need to bookmark this website on your computer: <http://wireless.fcc.gov/services/amateur>. It is the doorway to the FCC's involvement in amateur radio. Here you will find links that will answer nearly all of your licensing, examination program, and callsign-system questions. More links explain how to complete common online electronic filing tasks such as changing your address, checking application status, renewing or replacing a lost license, and obtaining a vanity callsign.

At the bottom left side of this page are links to the Part 97 Rules and the Universal Licensing System. The ULS page has more links to system features and how to submit applications and search for licensing and application information.

You can talk to a live support person by calling the FCC's ULS hotline at toll-free phone (877) 480-3201, Monday through Friday, 8:00 AM to 6:00 PM ET (except federal holidays.) "Help" requests can also be e-mailed to the FCC by filling out an online form located at <https://esupport.fcc.gov/request.htm>.

Q: Former *CQ* Contributing Editor Karl Thurber, W8FX (Millbrook, AL) writes, "I enjoyed your very detailed December 2010 *CQ* article, particularly the information on ULS and CORES. I am still somewhat confused by the relationships between ULS and CORES, especially since my license renewal was last made in 2003 and will be coming up again. Is it best to update CORES and ULS before processing our renewals, or does it make a difference?"

A: There is a lot of confusion about the COmmission REgistration System (CORES) and how ham operators are involved. Managed by the Office of Managing Director (OMD), CORES can be thought of as simply a listing (database) of all people (citizens and aliens) and companies that transact some sort of business with the FCC. Not just ham operators, everyone.

The CORES database includes the name, address, and tax ID number (usually a Social Security Number or Employer ID Number) of anyone filing applications or making payments to the FCC. Once registered, the CORES program generates a 10-digit Federal Registration Number (FRN). These publicly-available FRNs are used to identify entities rather than SSNs or EINs, which are never disclosed.

This number is used in all dealings to uniquely identify the entity in all transactions with the FCC. There are millions of applicants in the CORES database. You can't conduct "business" of any kind with the FCC without an FRN. Most ham operators get their FRN as a result of a batch filing by a VEC as part of the licensing process. The FRN can also be obtained electronically through the FCC webpage: <http://www.fcc.gov/frnreg>.

The Universal Licensing System (ULS) is a Wireless Bureau database containing a listing of all applicants that have some sort of permit, authorization, or license from the FCC. A Radio Service Code indicates the appropriate service. Regular amateur radio license holders are coded "HA," while vanity callsign holders are coded HV. There are more than a hundred different codes covering dozens of different radio services.

Both the CORES and ULS databases must be kept current by the applicant and basically contain the same information (name, address, telephone, etc). However, only CORES con-

tains the TIN (Taxpayer Identification Number.)

Most ham operators believe that once they update their FCC's Universal Licensing System listing they have fulfilled their obligation to keep their address current. This is *not* correct. The CORES database is separate from ULS and also must be updated. Strangely, correcting the ULS database does not update the CORES database. Both databases use the same FRN and password to access them. In reality, practically no one updates their CORES information even though the law requires them to do so.

In 2007, I submitted a petition to the FCC asking it to automatically update CORES when an applicant updates his/her ULS listing. On December 7, 2010, the FCC released a Notice of Proposed Rulemaking (NPRM, MD Docket No. 10-234) seeking to make a number of significant changes to CORES. One of the changes being considered is my proposal. The comment period is now over and radio amateurs may only have to update ULS in the future, instead of both CORES and ULS. For now, though, you must still update both databases if you change your name or address.

Q: Does the amateur radio bill recently introduced into Congress stand a chance of passing?

A: I would like to think that it does, but I am less than hopeful. The Amateur Radio Emergency Communications Enhancement Act, which died in the previous Congress, was reintroduced on January 5 in the 112th Congress as HR 81. The sponsor is Representative Sheila Jackson Lee of Texas. The bill has been referred to the House Committee on Energy and Commerce. Similar legislation was introduced into and approved by the Senate last year, but the House declined to take it up.

The bill had dozens of co-sponsors last year. This year's bill is exactly the same as last year. So far (after one month) the bill has attracted only one co-sponsor.

The objective of the bill is for the Secretary of Homeland Security to study the uses and capabilities of amateur radio communications in emergencies and disaster relief and to identify and make recommendations regarding impediments to amateur radio communications, such as the effects of private land use regulations on residential antenna installations.

Private land uses are regulated by a complex, overlapping set of federal, state, and local regulations, and Congress has shown little inclination to get involved in residential zoning ordinances, community standards, and contractual deed restrictions that were previously agreed to or known. CC&R's (Covenants, Conditions and Restrictions) are difficult to repeal when there are a large number of neighbors. Even if the bill is approved, the legislation only mandates that a study be completed.

Q: What are CEPT and IARP amateur radio licenses?

A: In addition to the primary amateur radio operator license issued to an individual, there are two bilateral licenses that may be issued to non-U.S. citizens by foreign countries that are recognized by the U.S. The CEPT radio amateur license is issued by a country belonging to the European Conference of Postal and Telecommunications Administrations. An IARP (International Amateur Radio Permit) is issued by a (Caribbean, Central or South American) country that is a member of the Inter-American Convention (CITEL).

U.S. citizens holding a General, Advanced, or Amateur Extra Class amateur radio operator license may also operate temporarily in most European countries that are members of CEPT. There are also a few non-European nations that are members of CEPT—e.g., Australia, Canada, New Zealand, Peru, and South Africa.

All you need is a copy of the FCC's Public Notice, proof of U.S. citizenship, and a copy of your FCC license. These documents must be shown to proper authorities upon request. The Public Notice (printed in three languages: English, French, and German) and additional information on CEPT licensing can be found on the FCC's Amateur Service website.

U.S. citizens may operate temporarily in ten North and South American treaty countries under an IARP without further licensing. According to the CITEL agreement, an IARP is issued by a member-society of the International Amateur Radio Union (IARU). Applications are available from the ARRL, which also issues the permit. The permit describes its authority in four different languages.

There are two classes of IARPs. Class 1 carries all operating privileges. Class 2 IARPs are equivalent to our current Technician Class operator license.

Participating IARP countries are Argentina, Brazil, Canada, El Salvador, Panama, Peru, Trinidad and Tobago, the United States of America, Uruguay, and Venezuela. 73, Fred, W5YI

mobiling

BY JEFF REINHARDT,* AA6JR

May is Mobile Month

Ham radio mobile operations are alive and well, from the robust "hilltopper" trucks to the most discreet "stealth" installation and everything in between. Ham gear and a vehicle go together like warm cookies and a glass of cold milk.

Don't think, either, that mobile operations pertain just to wheeled vehicles. Marine mobile operations are not only popular but have added benefits in the form of operator safety and a great mobile platform usually with no nearby obstacles, not to mention a great ground plane. Also, with a gracious private pilot's permission, I've had the thrill of operating aeronautical mobile, actually speaking with unsuspecting members of the family who I spotted driving along while I was floating above. I have also made a contact while riding the rails.

Other non-conventional platforms include a friend who chats while "bicycle mobile," another who operates "motorcycle mobile," but I have yet to bag a coveted contact with a unicycle or a skateboarder. After all, one has to have goals.

There's another form of mobile operations I find interesting and that is from unmanned conveyances such as ATV transmissions from model aircraft, electric trains, and remote-control cars. Those pictures are now easier than ever to enjoy, as minicams and transmitters keep getting smaller and smaller. The first time I saw a model train camera I was blown away at the model scenery coming alive as the camera-equipped locomotive travelled along its route. I know those transmissions are technically "remote," but hey, if it moves, I consider it "mobile." Amateur radio is an amazing pursuit when you consider the many permutations and opportunities it offers.

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

Coincidence?

The month of May is also "Dayton Month," which is a happy coincidence. If you can make it to the annual festivities at the Dayton Hamvention® (mobiling there, of course) you will be treated to the latest and greatest in terms of rigs, antennas, and accessories that will add to your operating enjoyment. However, if you cannot make the trip, you can still enjoy some of the benefits.

An increasing number of Dayton forums and activities are now available on the web, so be sure to check out that source. Also, many of the manufacturers and dealers celebrate the time of the Hamvention® by running "Dayton specials" with reduced prices at their stores nationwide, not just

Motorcycle mobile using VHF is one thing, but how about a motorcycle mobile HF contact? The Yaesu crew at Dayton can tell you how it's done! (AA6JR photo)

for the fortunate few (thousand) at the Hara Arena. If you're considering a purchase, now would be the best time to ask your favorite vendor if there are any special "coupons" or promotions you should know about.

By checking the ads and articles in this publication, you'll probably see that there are several new products of interest to the mobile operator. Rigs are getting smaller, but the list of standard features continues to grow. Every major manufacturer offers rigs that have detachable control panels and displays, offering excellent flexibility in mounting your gear in today's vehicles.

As mentioned in previous columns, several vehicles now place the car's 12-volt battery in the trunk, making direct access to that power source easier and less complex than running cables through the firewall into the engine compartment. Combine that with a remote-head radio and a trunk-mount antenna, and you have a nice compact package with minimal wiring.

What's New with Car Manufacturers?

Last time around I mentioned we'd try to get updates from the car manufacturers on their policies for mounting mobile radios in their respective vehicles. I must admit I fell a bit behind on my communications with them, but I have since addressed that—on my end. Hopefully, we'll get replies from all or most of the major auto makers, but my early efforts have not been promising. It would seem

On one of my trips to Dayton I thought I might become a storm chaser, but instead I became the "chasee!" Be sure to inspect your antenna (and perhaps your underclothing) after an encounter with severe hail. (AA6JR photo)

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AT-100ProII

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 Icom interface cable, DC power cable and coax jumper. ***Suggested Price $229.99***

Z-11ProII

Meet the Z-11ProII, everything you always wanted in a small, portable tuner. Designed from the ground up for battery operation. Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 - 6 meters. The Z-11ProII uses LDG's state-of-the-art processor-controlled Switched-L tuning network. It will match dipoles, verticals, inverted-Vs or virtually any coax-fed antenna. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line. Includes Icom interface cable, DC power cable and coax jumper.
Suggested Price $179.99

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). Tuning is simple; one button push on the tuner is all that is needed - the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the tune button on the tuner. Powered by four AA internal Alkaline batteries (not included), so there are no additional cables required. A coax jumper cable is also induced for fast hook up.
Suggested Price $129.99.

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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 Icom interface cable, DC power cable and coax jumper. ***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 Icom interface cable, DC power cable and coax jumper.
Suggested Price $159.99

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AT-1000Pro

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- ***RF Sensing***
- ***Tunes Automatically***
- ***No Interface Cables Needed***

AT-200Pro

The AT-200Pro features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MHz (including 6 meters). Rugged and easy-to-read LED bar graphs show power and SWR, and a function key on the front panel allows you to access data such as mode and status. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $249***

NEW! 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 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!
Suggested Price $249.99

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.
Suggested Price $179.99

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.
Suggested Price $199.99

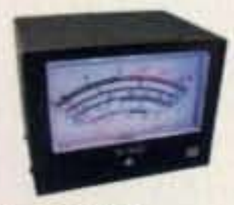
YT-100

An autotuner for several popular Yaesu Radios. An included cable interfaces with your FT-857, FT-897 and FT-100 (and all D models) making it an integrated tuner, powered by the interface. Just press the tune button on the tuner, and everything else happens automatically: mode and power are set, a tune cycle runs, and the radio is returned to its original settings. It's the perfect complement to your Yaesu radio.
Suggested Price $199.99

Meters!

FT Meter 2.5" face with calibrated scales for 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). 4.5" face with calibrated scales for 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. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together.
Suggested Price $79.99

NEW! 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. Also includes coax jumper cable. ***Suggested Price $249.99***

Visit our website for a complete dealer list.

Call or visit your favorite dealer today! **www.ldgelectronics.com**

LDG

the RF engineers are not well known to the folks in the PR section.

Nevertheless, we'll press for answers, because mobile radios are important to many fleet buyers (police, taxi, and fire vehicle purchasers), so it's reasonable to think that supporting mobile two-way radio operation is not unheard of to companies that court these large-volume buyers. One example includes a rather well-known manufacturer at a time when it seems that nearly every police agency in the country uses one of its makes as a radio platform. So far it has taken its Media Relations group two-and-a-half months to process my request for information—after having received an acknowledgement they'd get on the request "ASAP."

Info from the manufacturer is important in that more and more RF devices are going into cars, including RFID "keys" that aren't keys in the traditional sense. Sensors for those "keys" are located in several positions around the vehicle. RFID, satellite-radio, and broadcast-radio antennas are being embedded in spoilers, outside rearview mirrors, and in front, rear, and now side windows—and that's just a beginning. In order to avoid a costly mistake that either voids the warranty or damages the vehicle, mobile-radio installers and operators need to be aware of sensitive areas and if there are any transmit power limitations or optimal antenna locations.

There are many new and exciting vehicles on the road and more new models coming soon. In the meantime, if you intend to install a mobile transceiver in a new car, be sure to check with your dealer to determine if there are cautions, restrictions, or guidelines *before* you buy. Most dealers have a "hotline" to their respective manufacturers for technical questions. Perhaps a short cut would be to ask if they have a tech advisory sheet on how to install a mobile radio in a fleet vehicle. Hopefully, you won't experience the strange reaction one of my previous cars had: Each time I transmitted on 40 meters the windshield wipers would cycle one time. I eventually cured the problem. I sold the car.

Easy Installation! Well, Maybe

From the standpoint of available space, about the easiest vehicle in which to install mobile radios is an RV such as a motorhome. It's also nice to set up gear in a fifth-wheel rig or travel trailer, but that doesn't mean you're off the hook with planning, avoiding existing wiring and entertainment devices—and don't forget grounding. It's important to bond the metal elements, body to frame, etc. RF has funny traits and it turns up in some of the strangest ways.

I'd love to share with our readers photos of some of the attractive and creative RV installations hams have achieved. Please e-mail your photos along with your tips and advice to my e-mail address shown on the first page of this column.

RVs come in all shapes and sizes, from campers on mini pickups to those well into six-figure diesel pusher rigs. Just recently, Volkswagen announced it was introducing a new version of the VW mini bus, the previous version of which also served as a camper. No doubt that will bring back many memories for Grateful Dead fans. Alas, there's no more band to follow. Perhaps a robust audio system will help fill that gap, but I digress. Forgive my preoccupation with the original VW bus. I had to follow too many along California Highway 1 and up steep mountain grades. Perhaps the new model will have a few more horses in the stable.

The Skyhook

As sure as spring follows a long, hard winter, we'll pass along the annual reminder to check the condition of your mobile antennas, their mounts, and the coax connections. Winter's freeze-thaw cycles, endless moisture, road salt, and ice can combine to degrade your antenna's performance. Remove the antenna, give it a close inspection, and clean up the electrical contacts; this goes double for trunk-lip antenna mounts. Take a good look at the base, ground connections, and the condition of the coax. The best radio in the world can have its performance suffer from a poor antenna system. An investment of a few minutes can keep your rig performing at its best.

Photos

I've received promises from a few e-mail correspondents who said they'd share photos of their installation experiences. Right now, the photo supply is lower than a snake's belly in Death Valley, so I'm hoping some of you can come through with some photos you are willing to share with other mobile operators and readers of this column.

Enjoy those motor trips (especially to and from Dayton) and those QSOs that make travel even more fun.

73, Jeff AA6JR

BY JOE EISENBERG,* KØNEB

Several New Kits to Debut at Dayton

With the Dayton Hamvention® fast approaching, I thought it would be good to look at a kit that has been seen there many times. This kit is the Basic-7, a 40-meter CW transceiver made by Marconi of Japan. It features a rather heavy-duty case, a VFO, and a single-sided board. All the knobs, connectors, and case parts are included. Connections to the board are made by terminal posts, something I have not seen in a long time. This makes it easy to remove connections when servicing the board.

The instructions can be downloaded as PDF files and are available in English and Japanese. The directions are written in English, and they suggest printing sheets that have the parts outlined on them for inventory purposes. These parts identification sheets are designed for the builder to tape each part to its outlined spot on the paper. It is a great idea for sorting the parts and checking for missing parts, but also time consuming if the parts are taped to the sheets as suggested. I simply laid the parts onto the sheets to inventory them and then placed them into my usual tackle-box sorting bins. Taping the parts to the sheets does keep them from being lost, but also makes for a very time-consuming building process and can easily tear the paper when they are removed. Instead of part-by-part assembly instructions, the company simply shows you a photo of a completed stage plus the schematic for that stage to identify which parts are placed where on the board. The builder builds it a stage at a time, completing tests after each stage, a real good idea.

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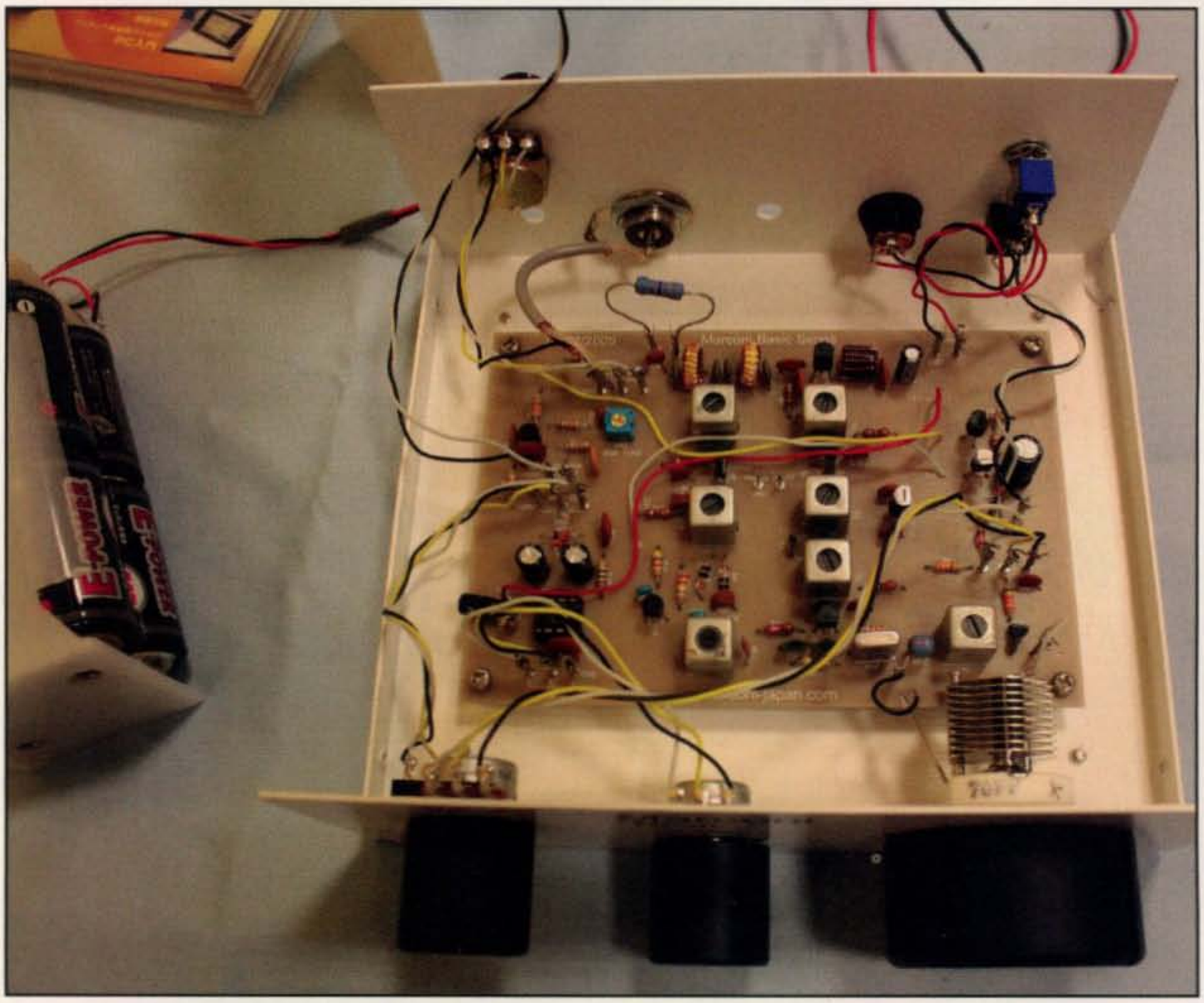
e-mail: <k0neb@cq-amateur-radio.com>



Top view of the Marconi Basic-7 kit, a 40-meter CW transceiver kit from Marconi of Japan.

The Basic-7 assembled and ready for placement in the case.

An interesting feature of this kit is that it includes the parts to make an RF probe and a dummy load to assist in checking out the kit after assembly. The instructions also have the builder go through a number of tests as each stage of the radio is added, from the very beginning when you verify the power supply is connected correctly to the keying circuits and the others as they follow. Be sure to use the dummy load as directed to protect the output transistor during testing.

Once all of the parts are assembled, the controls already have the leads cut for the parts to fit in the case, so the board mounts in the case and all of the controls and jacks fit into their mounting holes. A bit unusual is the fact that two of the controls, an attenuator and the main power switch, are located on the rear panel. The knobs in front are quite large and easy to use, but no markings are provided to calibrate the VFO, a task that can be remedied with a label maker.

The Basic-7 kit is available at the following site, <http://marconi-japan.com/Basic7Kite.aspx>, or see the booth at Dayton near the ARRL Expo area.

The 4SQRP Hamcan transceiver from the Four States QRP Group has only 26 parts.

A Rig with Only 26 Parts!

The Four State QRP Group has released its new kit for 2011. It is a 40-meter CW transceiver with a parts count of only 26! It is built on a round board, similar to the tuna-tin series of kits, but smaller and sized to fit in a "deviled ham" can. The transceiver features a regenerative receiver and puts out 1/2 to 1 watt of RF. With just three toroids to wind, it makes for a great group kit-building project you can get on the air within a short time. Be sure to have a dummy load handy for testing it as well as a set of earbuds for the receive audio. Check it out at <http://www.4sqrp.com>.

New Goodies from KI6DS

Doug Hendricks, KI6DS, has quite a few new kits ready to be unveiled at Dayton this year. First, he is introducing a 30-meter version of the already popular NADC-40, which is a 40-meter CW transceiver with VFO and digital display. Another introduction is the Digital Tenna Dipper, a device to test antenna tuning without using your radio. Related to that kit is a digital antenna analyzer with digital display of SWR, impedance, etc. This kit will be competitive with the MFJ antenna analyzers. It promises a 2 × 16 character LCD display, long battery life, a custom case, and many useful functions, and is designed by Dan Tayloe, N7VE.

Doug also has a kit introduced around the beginning of the year that is ideal for first-time kit builders and clubs looking for a group building project. The $18 Code Practice Oscillator kit even comes with a key you assemble yourself. The battery is also included and the kit is available now. It assembles quickly and is a great tool to teach both kit-building and

Morse code. When building this as a group project, be sure to have a drill handy to make the holes needed to mount this kit properly. I would highly recommend this kit for its simplicity and the ability to begin a code class once the kits are assembled. Morse code instruction goes great when every student has their own key and oscillator they built themselves!

Another kit Hendricks will introduce at Dayton is the Weber 3-band CW transceiver kit. This kit allows the builder to choose three HF bands and offers digital display of the operating frequency, making it a great addition to any QRP shack! Look for Doug at Dayton in the North Hall, or at <http://www.qrpkits.com>.

Hamfest Bargains

Good things to watch out for at spring hamfests are soldering irons and soldering accessories. A solder-roll holder can be quite useful in keeping your pound rolls of solder from getting in the way and will also allow you to better control the solder as it is fed from the roll. When buying a used soldering station at a hamfest, be careful that you can find spare parts for it, such as tips and heating elements. This can be difficult for some discontinued irons, while others, if they are common models, can have parts available for a long time to come. Also be on the lookout for inexpensive irons that you can use with last month's soldering-iron controller I described here in this column.

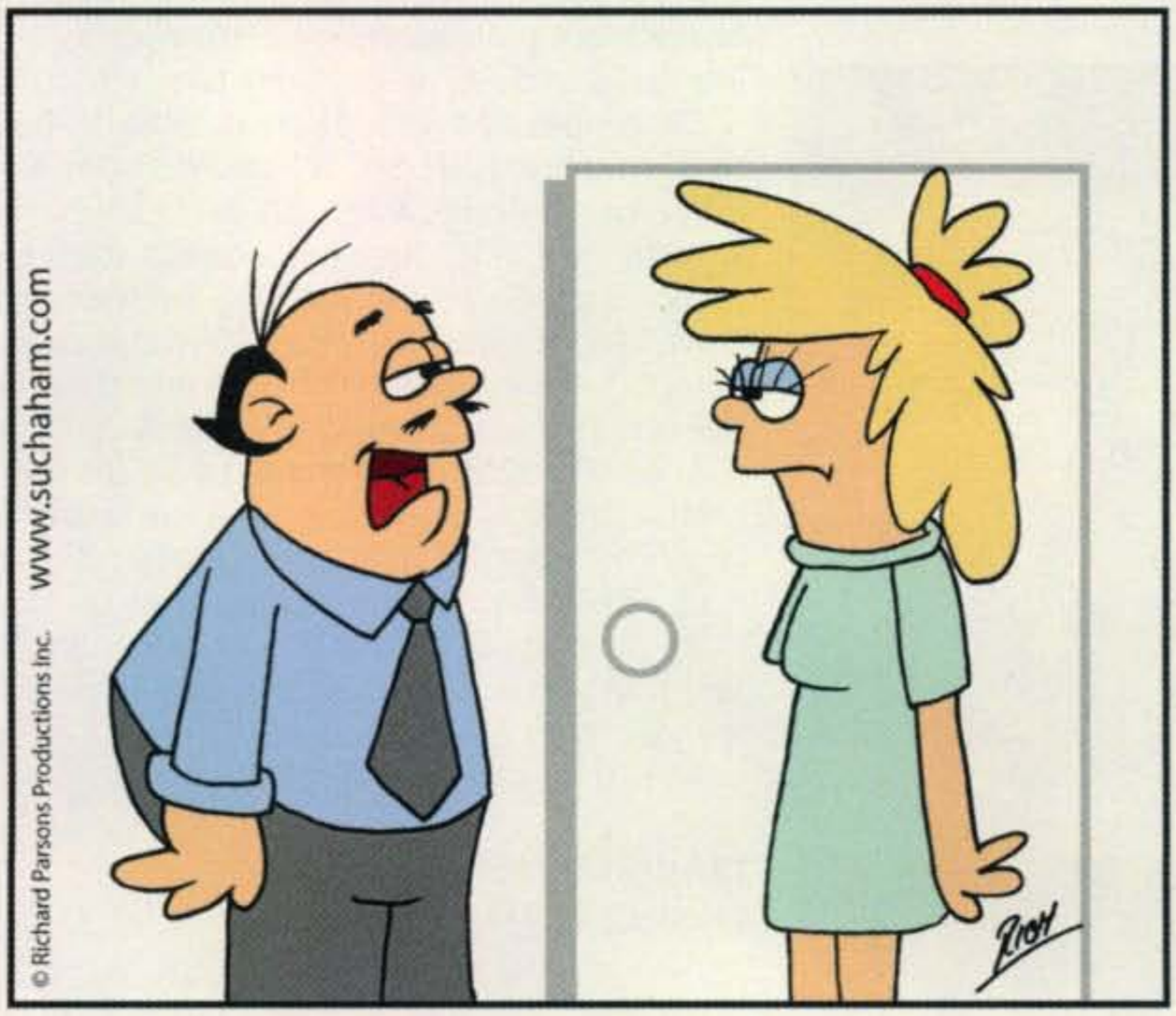
A small 12-volt mini component fan can cost as little as 50 cents and can keep away the solder smoke. They can be as small as 1–2 inches across, and not very thick. This size of fan is often found in a parts bin or large Styrofoam® bulk packaging in the fleamarket.

Bulk buys on parts, such as rails of IC sockets of various sizes and styles, are also great fleamarket bargains. Keep an eye out for popular values of components, such as resistors, capacitors, transistors, ICs, and other parts being sold in bulk at reasonable prices. I often find myself buying 100 parts for the same price that I pay for one or two at a retail outlet. I simply sort them and store them and puit them in parts bins for when they are needed in the future to replace a missing kit part or to perform repairs or modifications to kits.

Look for the "Cat In The Hat" at Dayton and be sure to say hi!

73 de Joe, KØNEB

SUCH A HAM



I'll be up in the shack for 5 minutes, Mavis.
See you tonight.

what's new

BY JOHN WOOD,* WV5J

QRP in Your Pocket and 100 Watts in Your Car

It seems to me that the month or two prior to the Dayton Hamvention®, some manufacturers hold on to their new creations and look forward to launching new apps, radios, or radio accessories before the estimated audience of more than 20,000 ham radio aficionados who attend this annual gathering. That's understandable. After all, they want to have something new to talk about when hams come by their booths and ask, "What's New?"

I ask the same question here each and every month, and this month we have some interesting answers, particularly from our Starkville, Mississippi friends at MFJ. For this month in "What's New," we present a quick overview of two very new items from MFJ—the MFJ-9200 QR-Pocket Six-Band CW Transceiver and the MFJ-266 Antenna Analyzer—along with a look at a Yaesu rig that has received a makeover, a quick mention of a new version of a friendly logging application, a look at a new book, and some thoughts about what gear may be coming our way from China.

However, I believe I will have much more to present to you in the days and weeks following this year's Dayton Hamvention®, May 20–22, at the Hara Arena. If you plan to attend, look for me. I'll be easy to spot, since I'll be the one going from booth to booth asking the question "What New?"

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Photo A– MFJ chose the Charlotte Hamfest in March to preview its new MFJ-9200 QR-Pocket™ Six Band CW QRP Transceiver.

MFJ-9200 QR-Pocket™ Six Band Transceiver

From what is being described by the folks at MFJ as nothing short of a "quantum leap over traditional designs," company officials recently previewed at the Charlotte Hamfest the MFJ-9200 (photo A)—a compact, six-band QRP CW transceiver that MFJ says provides "an unprecedented number of features for a very affordable price."

MFJ credits direct-digital synthesis and microprocessor technology for making the MFJ-9200 so compact (4.8" × 3.15" × 1.34") and lightweight (7.4 ounces). According to MFJ, this makes the MFJ-9200 QR-Pocket Radio the smallest and lightest backpack transceiver currently available.

I have to agree with MFJ that the MFJ-9200 qualifies as a bold new addition to its line of QRP transceivers. The MFJ-9200 covers 80 through 15 meters using computer-modeled plug-in filter modules that yield no-compromise receiver performance and solid QRP+ transmit power on every band. There's also built-in iambic keying with a manual-key sensor, a programmable CQ message, and seamless QSK T/R switching. DDS frequency control delivers rock-solid stability, precise 100-Hz readout, and eight memory channels per band. Plus, you get a choice of three main-dial tuning rates and RIT with 10-Hz tuning resolution.

Other features include selectable IF-bandwidth for monitoring SSB or CW, a 20-dB front-end attenuator for overload protection, and a switched backlight for the LCD display. There's also plenty of receiver overlap for monitoring international shortwave broadcasts. The MFJ-9200 runs on any power source between 8 and 15 VDC and draws only 40 mA on receive with the display backlight turned off.

The MFJ-9200 is protected by MFJ's famous No Matter What™ one-year limited warranty. MFJ will repair or replace (at its option) your MFJ products no matter what for one complete year.

Be sure to check out this unit at the next hamfest that you and MFJ attend. But if you can't wait for that, give MFJ a call at 1-800-647-1800 or go online to <www.mfjenterprises.com>.

MFJ-266 HF/VHF/UHF Digital SWR Analyzer

Put simply, the MFJ-266 (photo B) covers 1.5–185 MHz plus 300–490 MHz and can display SWR, complex impedance, and impedance magnitude simultaneously—all on the same green LCD screen.

Photo B– MFJ has officially released its newest antenna analyzer, the MFJ-266, so expect it to be a feature item at the MFJ booth at upcoming hamfests. Price information on this newest item from MFJ had not been released as of this writing, but suffice to say this handheld unit has the capability of performing a lot of tasks in the shack or out in the field that pertain to antennas and much, much more.

The big news about this new antenna analyzer, though, is its small size, which makes it easier to use since it fits comfortably in one hand. That makes measurements easier to take whether you are working in the shack or hanging off a tower.

When compared to other MFJ antenna analyzers such as the MFJ-269, the smaller size is due to the sacrifice of two analog meters on the front of the unit, resulting in the MFJ-266 measuring $3^3/4$ inches wide. Height and depth remain the same as the other MFJ units at $6^1/2$" and $2^3/4$", respectively, but weight comes in at a seemingly lighter 1.32 lbs.

What this meter can measure is impressive, because you can use it to calculate capacitance, inductance, field strength, frequency, plus generate test signals. You can also fine-tune stubs, analyze coax, baluns, and transformers, and perform many other RF-related tasks in the shack or on the road. It's a powerful wide-range signal source, L/C meter, network analyzer, RF field-strength meter, and a 500-MHz frequency counter all in one small package.

To some, it may read as a laundry list of capabilities, but the MFJ-266 truly

Photo C– Yaesu seems appropriately proud of the new version of the FT-450, this one designated the FT-450D. It's a compact unit that is filled with some very nice features, including an automatic antenna tuner and a large and informative front-panel display.

covers all bases—from 160 meters through 6 meters, the FM broadcast band, the aircraft band, 2 meters, 70 cm, plus VHF/UHF commercial two-way frequencies. To be more specific, 1.5–2.7 MHz, 2.5–4.8 MHz, 4.6–9.6 MHz, 8.5–18.7 MHz, 17.3–39 MHz, 38.7–71 MHz, 85–185 MHz, and 300–490 MHz.

Tuning is accomplished through the use of a 10:1 vernier drive and a built-in dial lock that prevents any accidental frequency change while making measurements. MFJ tells us that reading the LCD screen is easy in any light with switched backlighting supplied.

In its Frequency Counter Mode, the MFJ-266 can track down powerful signals that can disrupt accurate SWR readings. 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 the MFJ-266 can detect the presence of an

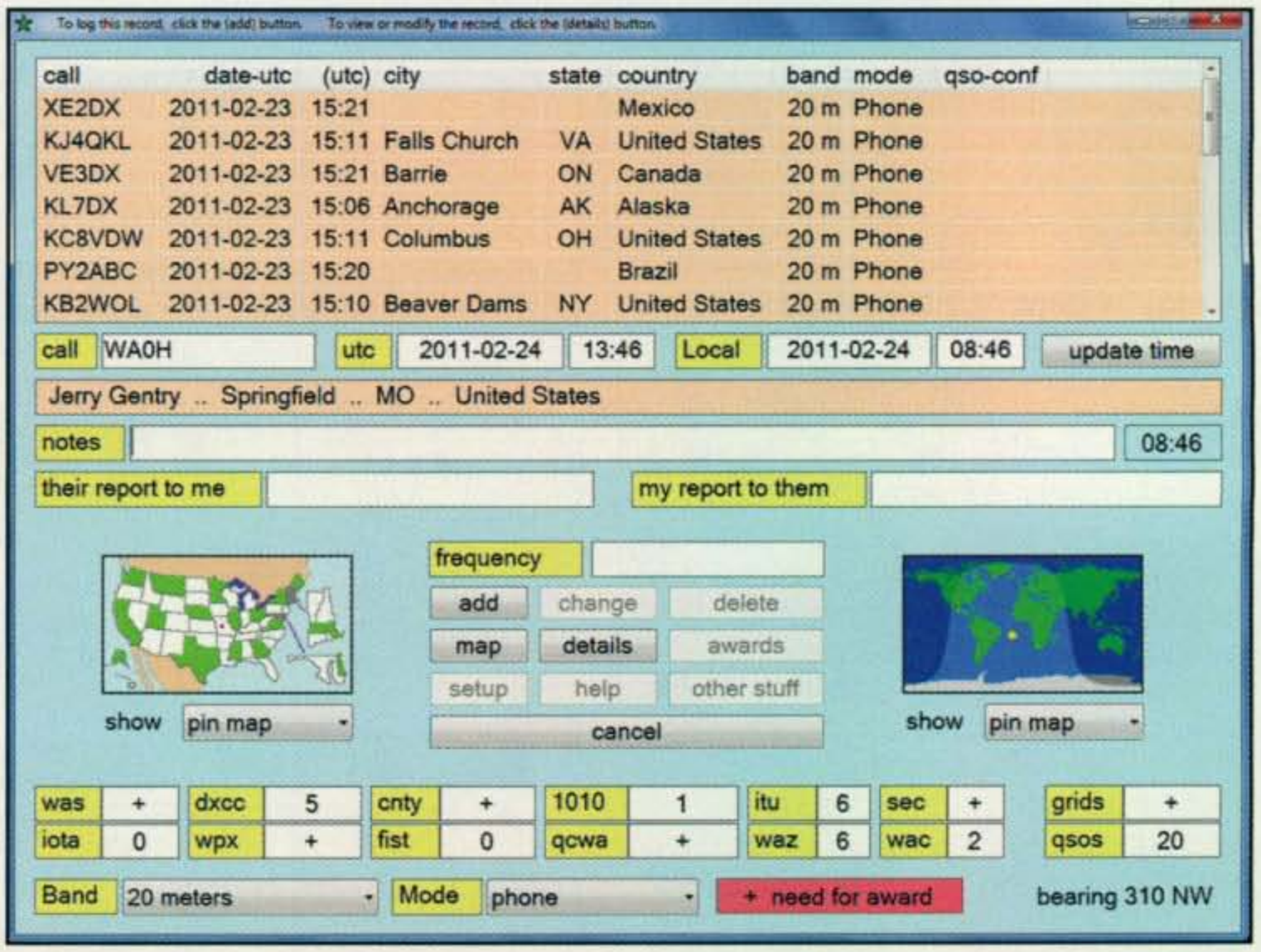

Photo D– Here is a screen shot from the latest version of MicroLog. This should give you an idea of the information that can be readily handled by this ever-evolving application.

offending signal, display severity, and identify the frequency.

The MFJ-266's internal stimulus generator also functions as a steady tunable signal source, supplying a +2 dBm (or 2 mW) CW carrier across the entire tuning range. You can use this signal to drive mixers, low-power amplifier stages, or filters, and use it as a source for checking antenna patterns on a range. Add a step attenuator and it becomes a low-level signal source for testing receivers and pre-amplifiers. Also, push-button band switching lets you toggle across the spectrum with ease.

The MFJ-266 can be powered from eight internal AA alkaline batteries or from the optional 12-VDC/110-VAC adapter, MFJ-1312D ($15.95). With the long storage life of alkaline batteries, your analyzer will always be ready to go when you are. Current consumption is approximately 30 mA in counter mode and 140 mA in analyzer mode.

As with the MFJ-9200, the MFJ-266 is protected by MFJ's famous No Matter What™ one-year limited warranty.

To place an order with MFJ, get a free catalog, or for your nearest dealer, call 1-800-647-1800, fax 1-662-323-6551, or write to MFJ, 300 Industrial Park Road, Starkville, MS 39759. You can also go online to the company's website: <http://www. mfjenterprises.com>.

Yaesu/Vertex Standard FT-450D Transceiver

With an LCD multi-function display, a strong assortment of illuminated keys, and a fast 400-MHz built-in IF DSP, the new FT-450D transceiver (photo C) from Yaesu has earned a spot on the consideration list of anyone looking for a take-anywhere HF/50-MHz amateur transceiver.

Weighing in at 7.9 pounds and measuring 9"W × 3.3"H × 8.5"D, the FT-450D easily fits the definition of compact, which means it's ready to go on a Field Day trip, to serve as a primary HF station for an emergency operation, or to stay at home and be your favorite contesting station.

What makes this radio so versatile? Yaesu starts with a rugged aluminum die-cast chassis, adds in a 100-watt power amplifier, and cools it with a thermostatically controlled fan. Next comes features such as the 10-kHz roofing filter; speech processor; built-in electronic keyer; 300-Hz, 500-Hz, and 2.4-kHz IF CW filters; a 20-second digital voice recorder; a digital microphone equalizer; and a built-in automatic antenna tuner. Add in the large informative display, the IF digital signal processor, and a street price of under $900, and you have a rig that most any ham would love to operate.

For more details visit <http://www. vertexstandard.com> on the web.

New Version of MicroLog

Software author Jerry Gentry, WAØH, tells me he has added so many new features to his popular MicroLog program that it constitutes an entirely new release of the product, which runs under Windows® XP, Windows® Vista, and Windows® 7 (both 32- and 64-bit versions). (See photo D.)

Since its first release in March of 2004, Jerry has consistently improved his logging application and has written into his latest version numerous features such as multiple ways to search the U.S. Canadian Callbook, including by county, giving the operator the choice of date formats, a choice of which fields to display in the log table on the main screen, and a choice of from over 50 modes of communication, such as Echolink, D-STAR, and PSK-31.

Purchase of this new version will also

allow you the option of replacing the U.S. map on the main screen with DX spots from the OH8X Summit; the use of QCWA, 10-10, and FISTS numbers; and the capability of updating the built-in U.S./Canadian Callbook for up to one year. Jerry has also made available a new Field Day module if needed.

The revised MicroLog application on CD sells for $10 plus $2 shipping and can be purchased at the <www.wa0h.com> website. A free trial version of the application may also be downloaded from the same website.

Rumors from China

Recently in this column we took a look at a couple of radios from China, in particular the Wouxun (pronounced *O-Shing*) KG-UVD1P dual-band portable and the GRECOM PSR-700 EZ Scan-SD scanner. At the time, there was a vague reference made to a dual-band mobile also anticipated to be coming from China. Since then, we've found out that a new HT, the UVD3, is now on the market and that the dual-band mobile is expected to receive the designation KG-UV920R and was scheduled to be released in early 2011. Well, so far, not much has been heard or seen of this ham rig even though you may catch a few rare photos of the unit scattered around the World Wide Web. There's also one website where you can "make a reservation" for the mobile rig when it does finally arrive on the U.S. market.

Another piece of information found on the web claims that the dual bander will operate on 2 meters with power settings of 50 watts, 25 watts, and 5 watts; and the UHF ham band with 40 watts, 20 watts, and 5 watts; and will be able to receive commercial AM and FM broadcasts.

It will be interesting if the information we've gleaned so far about this dual-bander becomes fact upon the release of the actual radio, but you can be sure that when it does hit the U.S. market, we'll try to be among the first to let you know about it.

Book Corner

Extra Class License Manual. The ARRL has just released its ninth edition of the *Extra Class License Manual* (photo E), which includes all of the exam questions with the answer key for use from July 1, 2008 to June 30, 2012.

For all of you who have been enjoying the privileges of your ticket but have yet to upgrade, this book is your path to gaining all of the additional frequencies and operating capabilities granted by the ultimate amateur radio license, the Extra Class. The book covers operating practices, rules and regulations, electrical principles, electronic circuits, radio signals and measurements, radio modes and equipment, antennas and feedlines, radio propagation, and safety. At the end of the book, you'll find the Extra Class license question pool and attached to the last page, there is an ARRL Exam Review CD-ROM which will enable you to review the study material and take randomly generated practice exams using questions from the actual examination question pool.

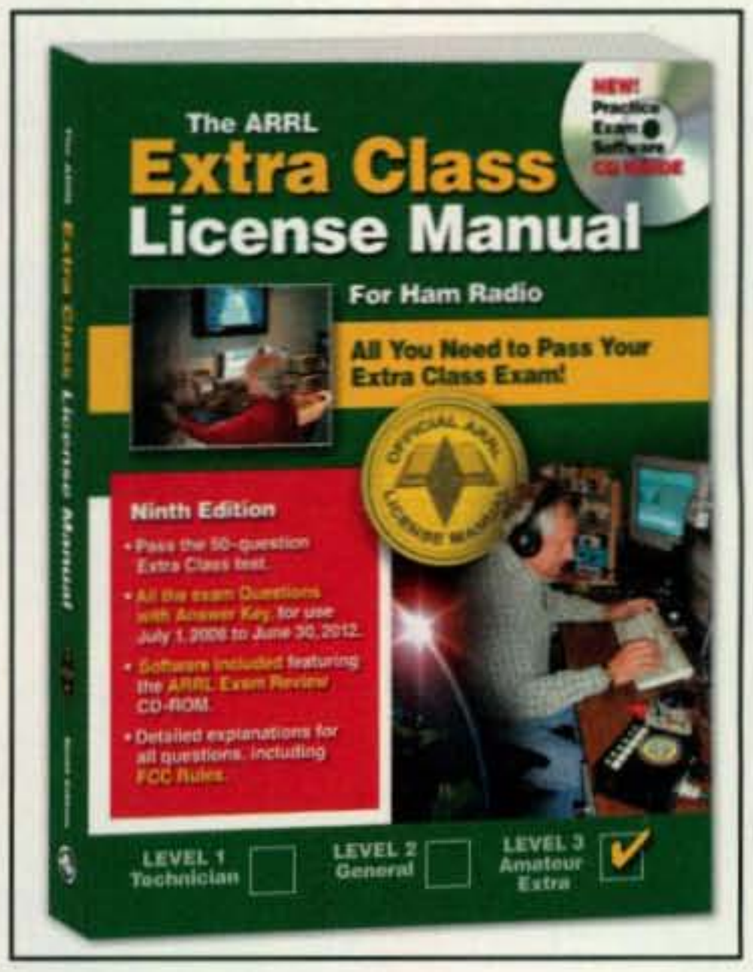

Photo E– The ARRL has just released the ninth edition of its Extra Class License Manual. *For all of you who have decided to upgrade to Extra, here's a comprehensive way to do it.*

So why put it off any longer? Earn the license that gives you access to the entire amateur radio frequency spectrum. The ARRL's *Extra Class License Manual* sells for $29.95 and is available at the ARRL website: <www.arrl.org>.

Website of the Month

Have you been out cruising on the internet and stopped by <WWW.smeter.net>? If so, then you've probably listened to the Salt Lake City, Pahrump, and Dallas receivers on cell phones, smartphones, pocket PCs, or PDAs that have Windows® operating systems. There's a lot on this site for anyone, especially a ham, to explore and read, so take your time, read, and be sure to poke around in the corners.

That's about it for the month of May. With the 60th annual Dayton Hamvention® just around the corner, we should have a lot of new products to look at in the near future, so look forward to it. I know I will! 73, John, WV5J

Note: *Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

MFJ *giant* 6.5 inch SWR/Wattmeter

World's *largest HF SWR/Wattmeter has giant 6½ inch meter!*

This one you can SEE! Extra-long scales gives you highly accurate SWR and power measurements. Huge numbers makes reading easy across your shack.

Like your analog watch, one glance at the meter needle gives you fast and accurate readings without actually reading the scale.

MFJ's exclusive *TrueActive*™ peak reading circuit captures *true* peak or average forward and reflected power readings.

Has 20/200/2000 Watt ranges for accurate

MFJ-868
$149.95

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BY WAYNE YOSHIDA,* KH6WZ

A New Kind of Place . . .
A Different Sort of Club Meeting

I received an Arduino Uno microcontroller kit for Christmas. I wondered what to do with this thing, so I used my favorite internet search engine to find as much information as I could about the Arduino microcontroller family. References for this interesting piece of technology and what people are doing with it are everywhere, and the "References" section at the end of this column names just a few. Plus, fellow *CQ* columnist Don Rotolo, N2IRZ, introduced us to the Arduino Uno in the February 2011 issue of *CQ*, on page 79.

As I bookmarked certain web pages for further study, I came across a blog site for a hardware hacker group in the Los Angeles, California area called Crash Space. They even have a section for ham radio ("Radio Mondays"). I think the home page provides a great short description of what kind of place Crash Space is: ". . . We are a collection of hackers, programmers, builders, makers, artists and people who generally like to break things and see what new things we can build with the pieces."

The ham radio Crashers are designing a robot that will have a variety of radio gear on it.

The ham radio Crashers are designing a robot that will have a variety of radio gear on it. They are also discussing radar systems and radiolocation theory, and will examine specific examples of small radar equipment that hackers can get and modify easily, such as the Mattel Hot Wheels® radar speed gun. Next on their schedule are experiments on X-Bee low-power digital radios.

Radio Mondays are held every Monday at 8 PM and are open to walk-in visitors. Justin Corwin from the group said, "A good 10 percent of our members have been people who just heard about one of our public events and came out looking for their specific interest. Radio Mondays, the Mega Take Apart, and Hand Made Music are probably the top three for walk-ins."

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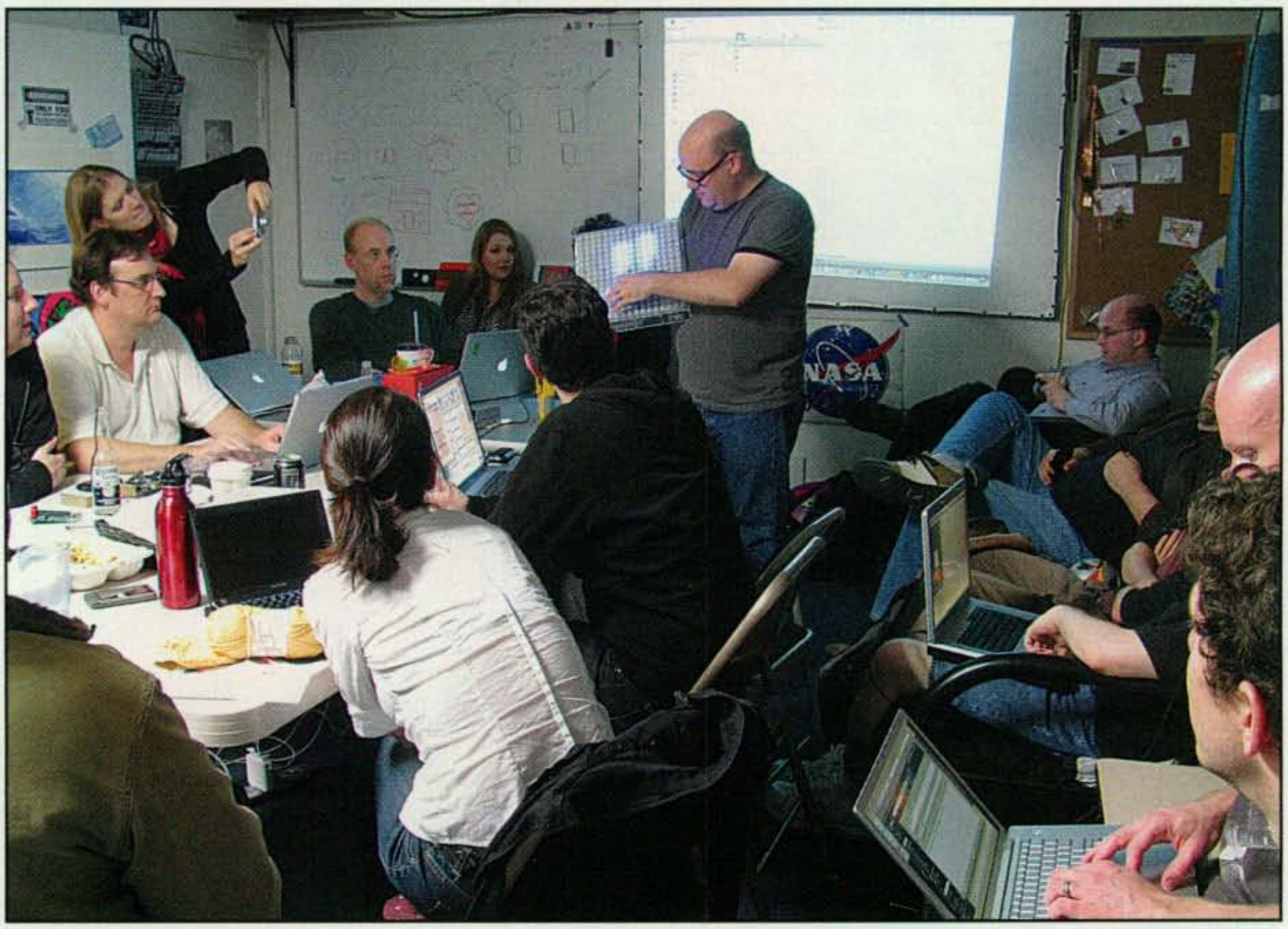

Photo 1– "Show and Tell" at a Crash Space meeting. It is interesting to compare what's different between a Crash Space gathering and a typical ham radio club meeting. Here, Crash Space member Theron Trowbridge demonstrates his extra-large monome. (See text for more details.)

I had to go there to see what kind of place this is. I decided to go on "Public Night" when guests can stop by to see what the group is about and meet the members. Fortunately, the Crash Space is not too far away from my office and was an easy drive, even in traffic.

I have been aware of places like this from reading magazines such as *Make* and watching the occasional public television shows that cover amateur science events. There's "The Crucible" in Oakland, California and "Make: NYC" in New York City.

Taking a Tour

I became fascinated by the various blog entries by the members and their projects and activities. One thing that really stood out was the very interesting and eclectic collection of people in the group, which included young men and women. The second thing I noticed is the very interesting concept of the Crash Space itself: It is a collection of hardware hackers, artists, and technologists with interests in computer hardware and software, rocketry and aerodynamics, machining and metal working, and other things. They have

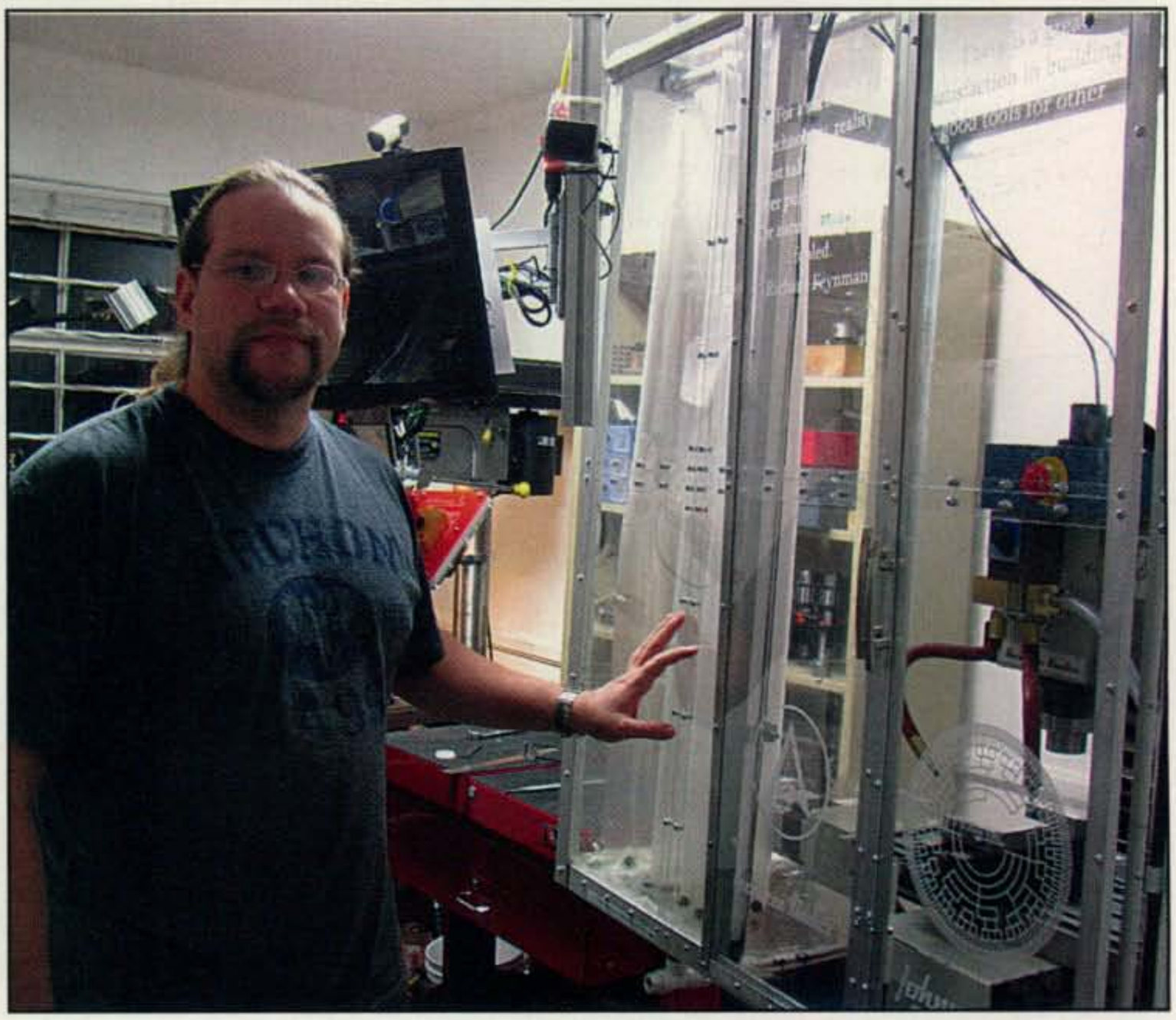

Photo 2– Justin Corwin in front of Johnny 5, the rebuilt and modified CNC milling machine at Crash Space.

meetings every night, and have group activities such as building projects, including a capacitance-meter kit.

During my visit on Public Night, Theron Trowbridge demonstrated a large monome he constructed (see photo 1). A monome is an adaptive computer interface, but is a little difficult to explain. Check the monome community website for more information. The buttons light up and change functions according to custom programming. Theron used the laser cutter to build a custom case for each module, and put together several modules to form one unit. You can make these instruments from kits (refer to the "References" section for more information).

The group exists solely on donations from local companies and the members. It has a pretty impressive machine shop, which includes a CNC mill, with an interesting modification: A modified computer-game joystick can be used to control the X- and Y-movements of the cutter head. The controller is wireless, of course, so the operator can move around the machine as the material is being worked (photo 2).

Another interesting machine in their shop is a small laser cutting/marking machine and a 3-D printer. The 3-D printer is an interesting piece of equipment. It interfaces with a computer and just about any three-dimensional drawing can be turned into a plastic object (see photos 3 and 4).

I noticed a laptop computer mounted on one of the walls (photo 5). More than a strange wall decoration, the computer is called the Space Presence Monitor. Members check-in on the computer then push the big button. The button is backlit with LEDs, and different colors indicate which people are in the Space. The main purpose of this monitor is to let others remotely check to see if anyone is "home." They can go to a web page, poll the Presence Monitor, and see who is there so they can get into the building.

Can Ham Radio Clubs Adapt and Evolve?

After my visit, I thought about the new people I had met and the exciting projects they were working on. I thought about the enthusiasm of the group and was impressed with the way everyone interacted with each other, imparting knowledge to others and contributing to the Space. There is definitely a "buzz" going on at Crash Space. It has a pull, or an attrac-

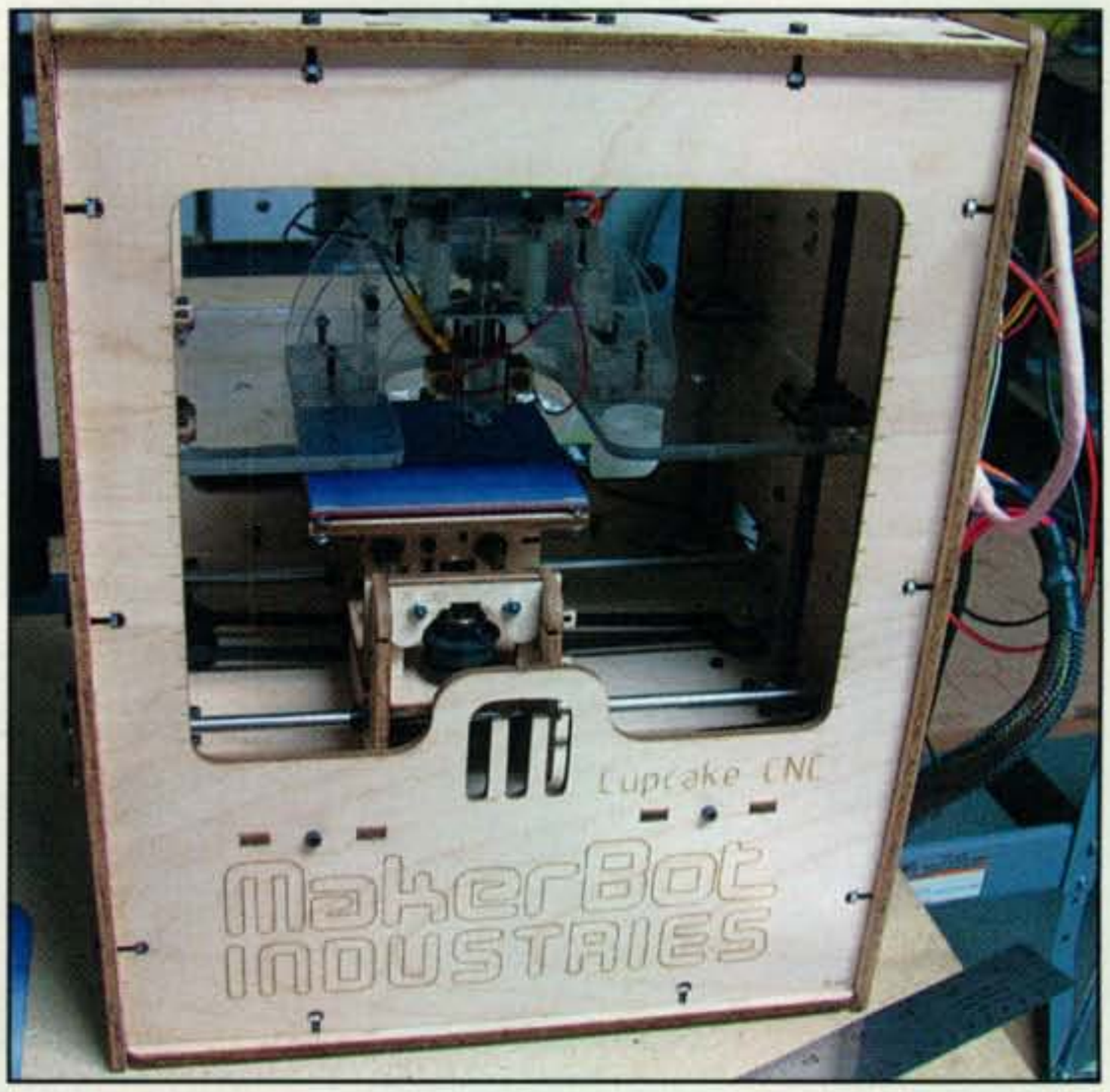

Photo 3– Here is a front view of the MakerBot Cupcake CNC (Computer Numerical Controlled) 3-D printer. It uses plastic filament to print objects from your computer.

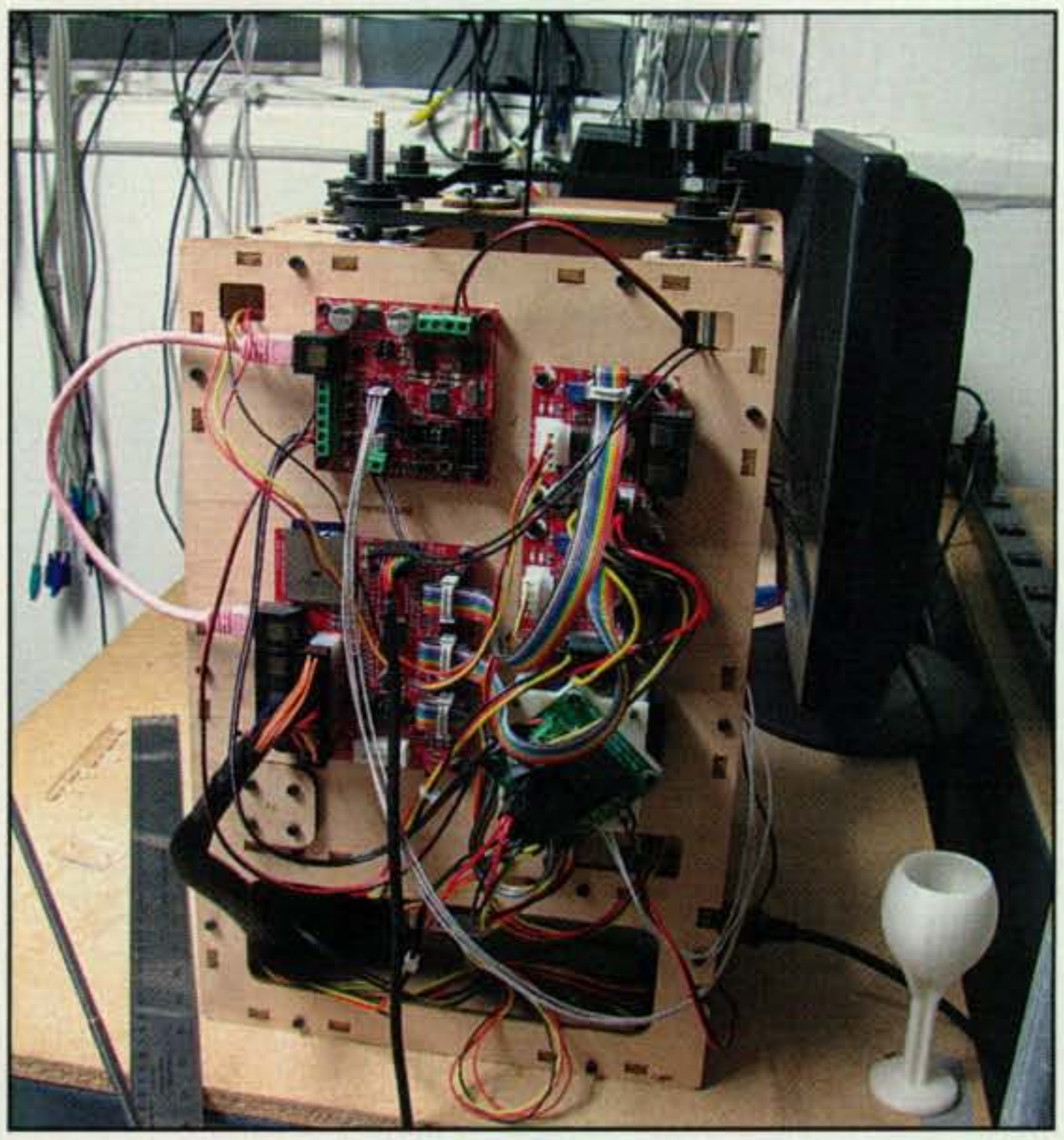

Photo 4– A side view of the MakerBot 3-D printer.

tion, to it, very much like the way a moth is drawn toward a light at night.

I compared what I saw and experienced at Crash Space to every ham radio club I have ever visited or joined. The differences are amazing. The two groups are almost complete opposites. I feel that if our typical ham radio clubs fail to consider adopting a different concept, memberships may continue to decline.

I am not saying that all ham radio clubs are boring, are full of old and old-fashioned people, and do not have exciting projects going on, but I am saying that our "radio-only" clubs may need to consider including other related activities as part of their clubs so that younger and non-radio technology people may be encouraged to take an interest in ham radio.

For example, Crash Space has "How to Solder" classes and group-build projects. It has a "show and tell" where everyone takes a turn to talk about his or her current project. Any radio club could hold an event like this, but this is only a beginning. Another example could be more advanced classes, such as how to use a network analyzer or transistor curve tracer.

Something Different, Fresh, and Exciting to Consider

The Crash Space structure may be an interesting way to form a new sort of ham radio club. In other words, it would be a club that is not limited to only ham radio. It would include mul-

Photo 5– The notebook computer on the wall is not a decoration. It is something called the "presence monitor." (Photo courtesy of JustinCorwin. See text for details.)

tiple, yet related interests and meet at one location so that all groups can interact and exchange ideas.

For example, a ham radio club that includes amateur astronomers may include satellite operation and Earth-Moon-Earth activities. Another example might be a public service ham radio organization such as RACES or ARES working with CERT and the Red Cross and NOAA (some groups already do this). How about a ham radio club with APRS and T-hunting activities combined with geo-caching and backpacking or camping?

As I think a bit more about this concept, I recall my experience as an Explorer Scout many years ago. Our post was sponsored by a local aerospace company, and we were involved in rocketry, electronics, and computers. I got involved in the electronics section, but also did some things with the rocket guys and a little bit with the computer group.

It was organized the way the sponsoring company worked, and we designed and built projects following its procedures. We had a design team, a documentation team, a manufacturing team, and so on.

The main lesson we learned, though, was that our teams worked together, and broke big projects into small sections that finally mated together and formed a single completed unit. It was a fascinating experience. Some of the most interesting projects happened when several unrelated groups got together and interacted. For example, the rocketry group made a fleet of rockets. The electronics group made the launcher. The computer team tracked the rocket and calculated the altitude achieved.

Another thing our ham radio clubs can consider is the use of social networking to publicize their activities so others may enjoy learning about them and may become interested enough to join the fun. The younger generation is very "connected," and their messages are spread instantly and widely through blogs, Facebook, Twitter, Fickr, and so on. So if more of our projects and activities get publicized this way, we might get more people interested in what we are doing. *(Among CQ's 5000+ Facebook "fans," 40% are under age 45, and nearly 80% are younger than 55. How does that compare with your club's membership?—ed.)*

This story started out as a quest to learn more about an interesting Christmas gift, and turned into a new philosophy of what ham radio clubs could become. All of us should think about where our next generation of hams will come from. We must expose youngsters to ham radio, so they can be aware such a thing exists. We must make it interesting enough to capture their curiosity, and publicize how much fun it can be.

Imagine a club like this in your neighborhood. Where else can one learn how to barbecue smoke a rack of spare ribs properly, program an Arduino Uno to do something useful or entertaining, meet other people with varying yet common interests, have access to CNC machines, learn from real rocket scientists, learn how to make clothing out of fiberoptic fabrics, and oh yes, talk about ham radio? 73, Wayne, KH6WZ

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Crash Space: 10526 Venice Blvd., Culver City CA 90232; <www.crashspace.org>
The Crucible: 1260 7th St., Oakland, CA 94607; <http://thecrucible.org>
Make Magazine: 1005 Gravenstein Highway North, Sebastopol, CA 95472; <http://makezine.com>
Make: NYC: Bug Labs, 598 Broadway at Houston, 4th floor. New York, NY 10012; <http://www.makenyc.org>
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The Monome: <http://monome.org>
Geocaching - The Official Global GPS Cache Hunt Site: <http://www.geocaching.com>
Flickr (photo and story sharing): <http://www.flickr.com>
Twitter (A real-time information network): <http://twitter.com/>
Instant Messaging and Chat: A simple tutorial on IM can be found here; <http://communication.howstuffworks.com/instant-messaging.htm>

Fighting TVI in the Digital World

BY KENT BRITAIN,* WA5VJB

Ah, the good old days of TVI. Squawking noises coming out of the speaker and a hypnotic pattern of black bars across the screen. Today, with digital TV (photo A), just a few video blocks and then the TV freezes up. The good news is that now the neighbors (or family members) can't recognize your voice.The bad news: TVI filters such as the ones in photo B are as rare as a good 6146, and if you are lucky enough to find one, it is probably for 300-ohm twin lead.

Again, back in the good old days the rotary TV tuner had tuned circuits such as the one in photo C that tuned the tuner to each channel as you changed channels. I would like to thank Roger, N5PGH, for digging deep into his junk box for those tuners. The digital tuners have very little filtering, and in the case of the $40 converters in photo A, no filtering at all. The front ends are wide open. Now it's not your rig's harmonics that tear up the TV, but basic fundamental overload.

Build Your Own Filter

A low-pass filter such as the Johnson or Drake low-pass filters on your rig are not going to help with overload. And again, high-pass TVI filters are very hard to come by these days. Therefore, here is how we can build some.

All inductors are just two turns of solid wire 18-22 gauge wound on a pencil (photo D). No, I'm ahead of you on this one. I got enough feedback on an AMSAT diplexer built this way; *it doesn't matter if you use a #2 or a #3 pencil!*

First, we have the single-stage filter in fig. 1 and photo E—just two connectors, a pair of 10-pF capacitors, and that two-turn coil wound on a pencil. From the analyzer sweep in Plot 1, you can see that first marker is at 30 MHz. Thus, we have more than 45 dB attenuation of HF signals and about a dozen dB of attenuation of the FM broadcast band. Filter loss is in the 1–1.5 dB range out to 800 MHz. This filter will help will most fundamental overload TVI problems.

For those who like to go one step more, we have a two-stage filter in fig. 2 and photo F. An extra coil and a 5-pF cap are the only additional parts. Again, as I will show, we have a pretty wide window for our filter, so don't be afraid to use 4.7- or 5.6-pF caps. And if you get desperate, the 5 pF can be two 10-pF caps in series.

Now in the analyzer sweep in Plot 2, you can see the HF band is in the analyzer noise, >55 dB down. If you are having overload problems on 6 meters, you might want to consider this two-stage filter and the 45 dB or so of filtering it will give you. Also, that pesky FM band is about 35 dB down; again about 1–1.5 dB of filter loss between 170 MHz and 800 MHz.

Tuning

Coming up with a filter that didn't need tuning was one of my initial hang-ups for this project. Back in the days when you wanted the TVI filter to block everything below 52 MHz, yet pass the Channel 2 video carrier at 55.25 MHz, making that happen took a bit of adjusting on special test equipment.

In this digital TV era there are very few DTV stations actually using Channels 2 through 6, and as

Photo A– A $40 HDTV converter and its simple tuner.

Photo B– Vintage 52-MHz high-pass TVI filters.

*1626 Vineyard, Grand Prairie, TX 75052
e-mail: <wa5vjb@cq-amateur-radio.com>

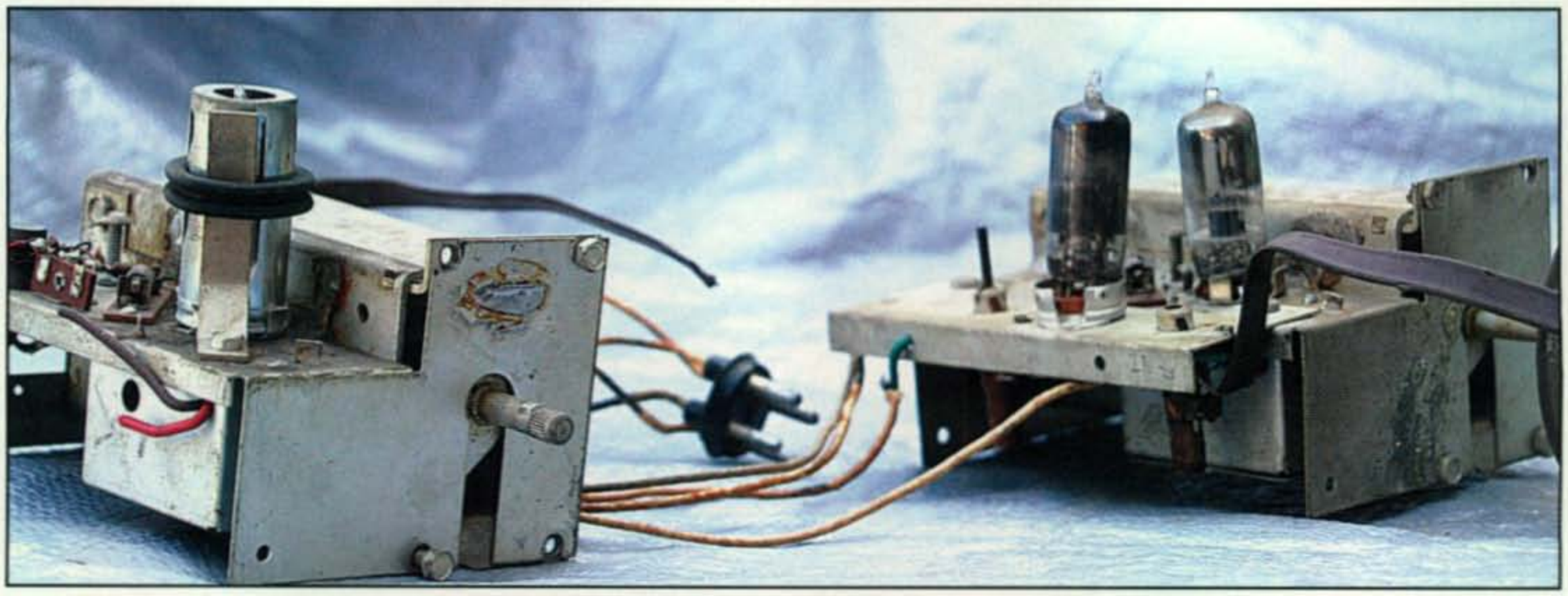


Photo C– Vintage TV tuners.

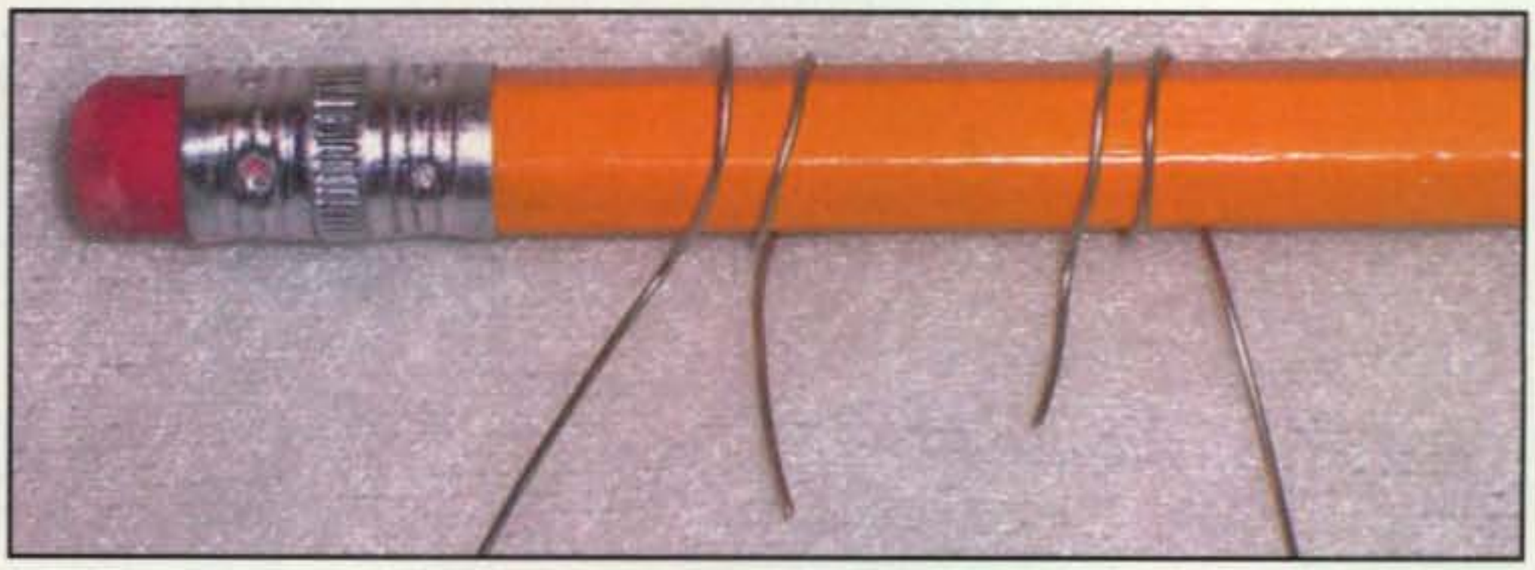


Photo D– Winding the coils for the high-pass filter.

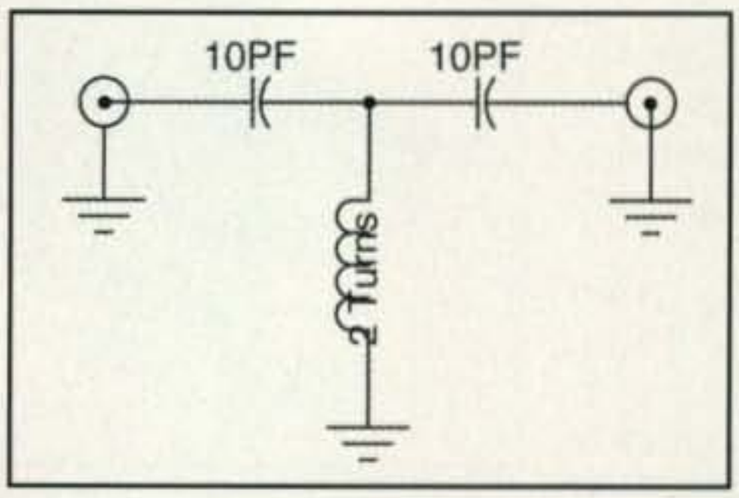


Fig. 1– Schematic of the single-stage TVI filter.

I will explain shortly, we really want to filter out the FM broadcast band as well. This means we need a high-pass filter that cuts off somewhere between 110 MHz and 170 MHz. That's a pretty big target, so we can have a simple filter that doesn't need precision parts and has a lot of wiggle room for component tolerance.

Of course if you have a sweeper, network analyzer, or spectrum analyzer with a tracking generator, then by all means adjust the filter for best response.

Note that I said actually using TV Channels 2–6. When the analog stations got their DTV assignments, most of the assignments were in the UHF band. A few—not many, but a few—moved back to their old analog channels. To keep the viewers happy, the TV set may show Channel 4, but the set is really on a UHF channel. You might want to check <www.tvfool.com> or <www.antennaweb.org> and see what channels are actually used in your area. If your favorite station is still using a channel between 2 and 6, you're back to looking for one of those vintage 52-MHz high-pass filters.

FM Broadcast Overload

Back in the analog days, if you put up an antenna in the air and measured all the RF power hitting the antenna, this is what you would get: About half of the RF energy was your local TV channels and about half was the FM stations. The FM stations run just about the same power as the VHF TV stations and about equal numbers in most areas. There is a lot of variability, of course, but these numbers were typical for most urban areas.

Now we go to digital. The digital TV stations are running 10 dB less power on VHF and 7 dB less power on UHF.

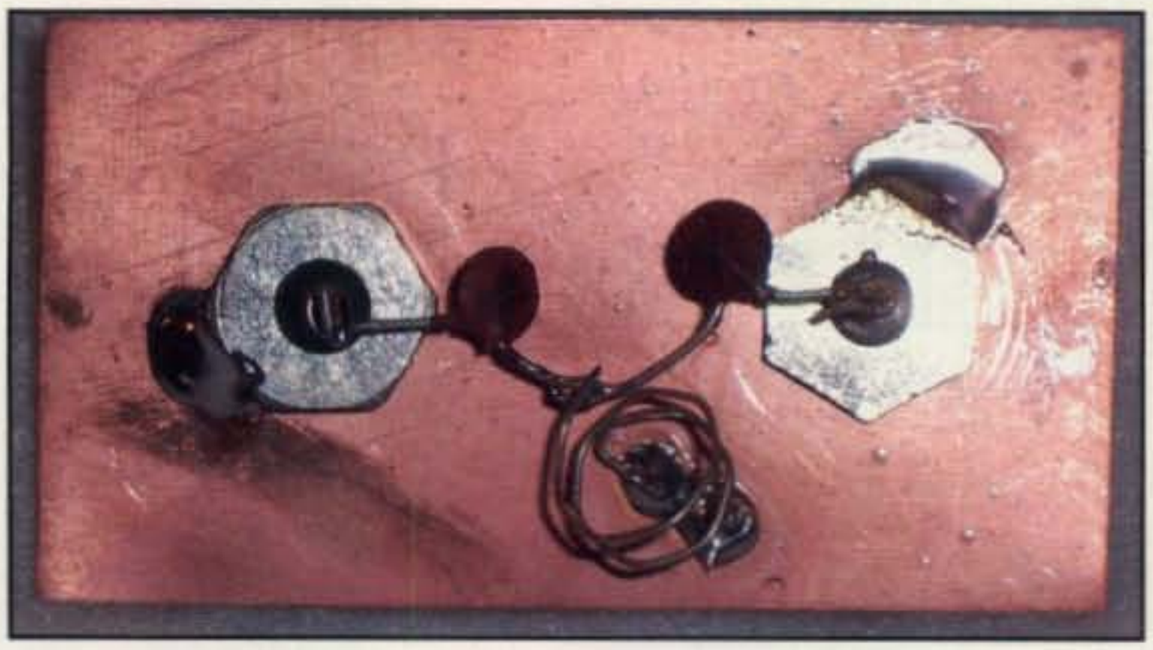


Photo E– Single-stage TVI filter.

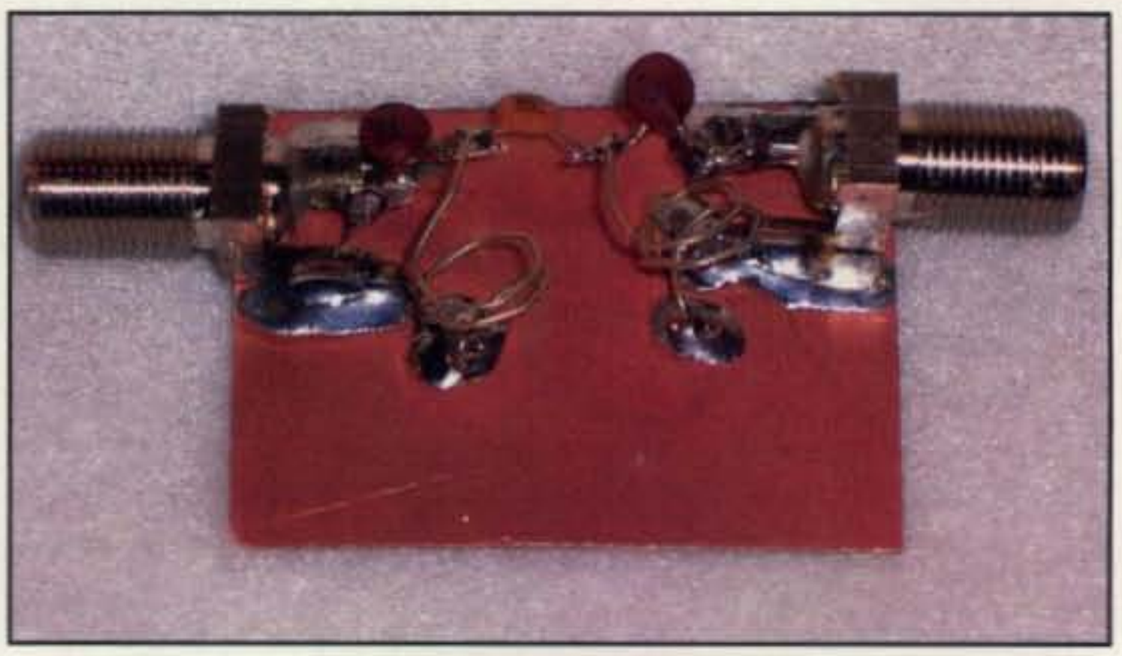


Photo F– Two-stage filter

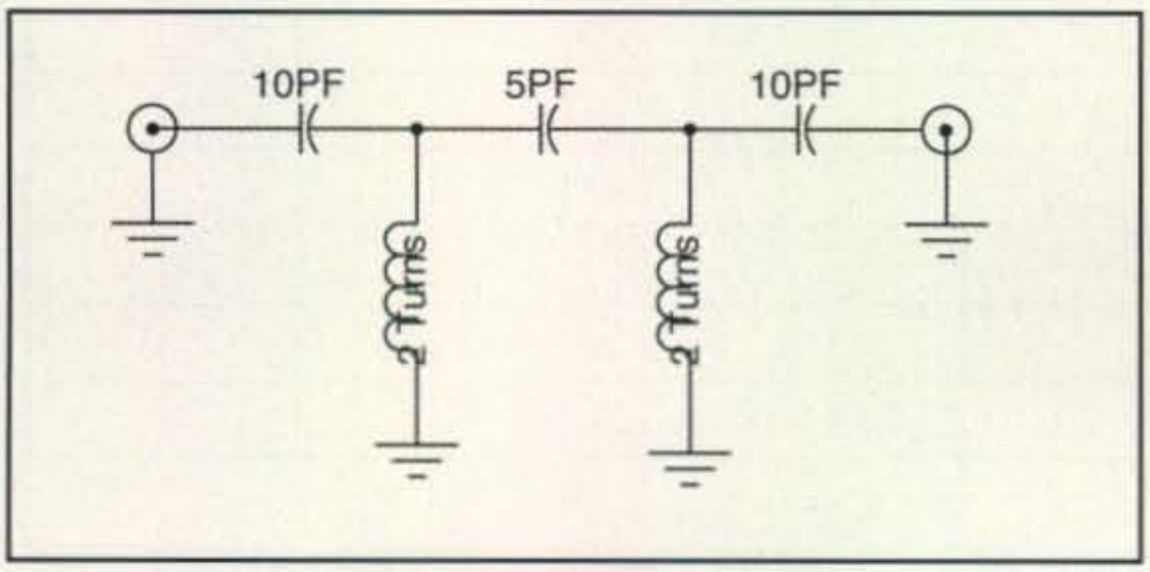


Fig. 2– Schematic of the two-stage TVI filter.

Photo G– FM trap filter.

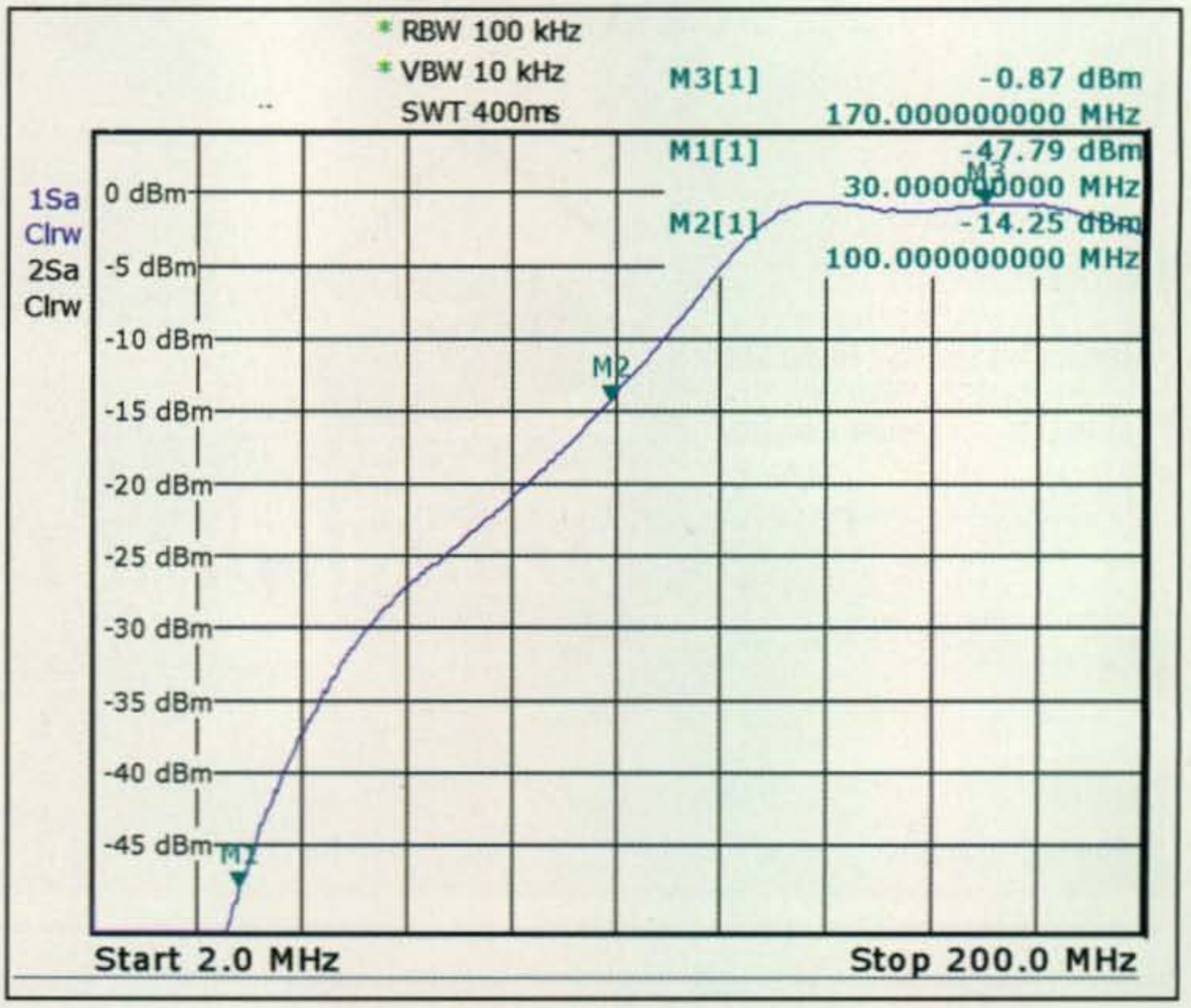
At the same time the FM stations have added secondary transmitters transmitting their HD music in addition to the analog music. Now that outside antenna or even that pair of rabbit ears on top of the TV has around 80% of its energy coming from the FM stations. The FM signals are *blasting* a tuner with no rejection. Having trouble picking up a HDTV station transmitting between channels 8 and 13? These HDTV channels are the second harmonic of the FM band. In many cities, the TV stations using 8 though 13 are giving away FM trap filters such as the one shown in photo G. I have to use FM traps on my HDTVs in this area.

Building your filter in a shielded box would be better, but a lot harder to photograph. However, even this "deadbug" filter works pretty well.

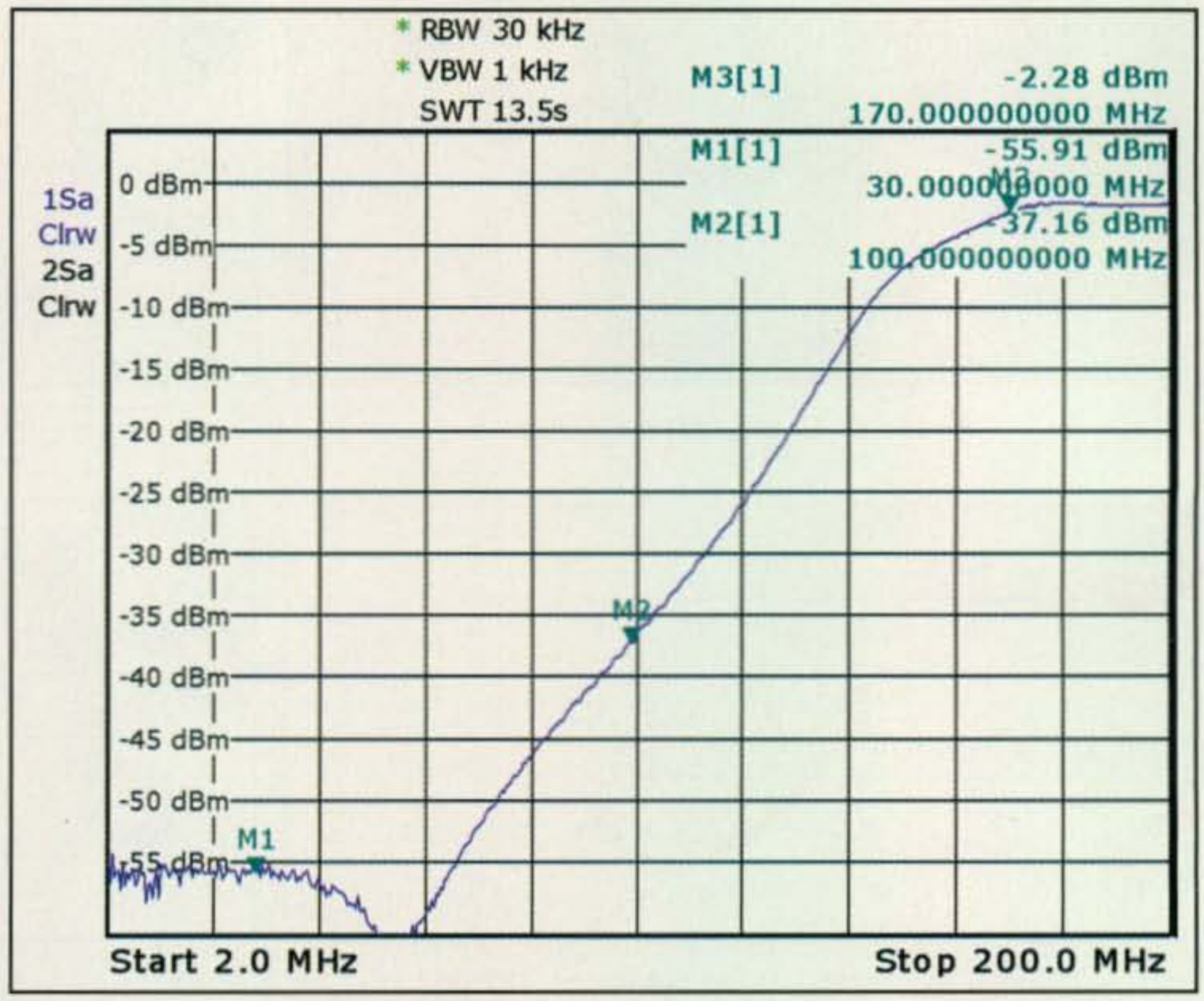
As always we welcome your technical questions and topic suggestions. Just drop a snail mail to my QRZ.com address or an e-mail to <wa5vjb@cq-amateur-radio.com>. For other antenna articles and projects, you are welcome to visit <www.wa5vjb.com>.

Spring is in the air. Now go get some more antennas up before it gets too hot!

73, Kent, WA5VJB



Plot 1– Frequency response of the single-stage TVI filter.



Plot 2– Frequency response of the two-stage TVI filter.

An Interesting Coax Tip from "Papa Bear's CB Shop"

When making coax jumpers for RG-58 and RG-8, quite often one of those fine shield wires gets out of place and shorts out the coax jumper. A continuity check shows a short between the center conductor and shield. Bummer!

Cut off an end, usually the wrong end, and try again.

Papa Bear always did his continuity check with a 12-volt, 30-amp power supply. "A few would make a pop noise, but I never found a shorted one."

learning curve

BY RICH ARLAND,* K7SZ

The Other Side of 2 Meters

Okay, you are a relative newcomer to ham radio. You've had your license for a while and have your "shack-on-the-belt" rig. What else is there? Well, Bucky, cinch up your seat belt, cause we're gonna take a ride!

For one thing, we in North and South America have a real "gift," that of a full 4 megahertz of 2 meters. That's right . . . our band here in the International Telecommunications Union's "Region 2" covers 144 through 148 MHz, whereas the rest of the world only has 2 MHz of the spectrum (144–146 MHz). We enjoy a *huge* amount of 2-meter spectrum and that's a very good thing!

The lower end of 2 meters has a plethora of activity that is often overlooked by the ham radio newcomer. There is so much emphasis placed on the FM portion of the band that it's easy to lose sight of the lower end of 2 meters where we can find weak-signal stations on single sideband (SSB) and Morse code (CW), plus beacons, moonbounce (also called Earth-Moon-Earth, or EME), and satellite communications. There is literally a whole new world of ham radio below 145 MHz.

Starting Out on the "High Bands"

It is no secret that assembling a station, whether it is an HF or VHF/UHF (also called "VHF+") station, can be a costly and very time-consuming task. However, with a little homework and some frugal purchases it will be possible to get on the air without taking out a second mortgage or hocking the family jewels.

If you are newcomer to the ham radio hobby, having just received your newly minted license, or even if you've been around the block a couple of times in our hobby, it soon becomes apparent that one of the least expensive trinkets you procure is your transceiver! I know that 's hard to believe, but buying a good used VHF+ transceiver—or one of the new generation of "do-it-all" black boxes (such as the Yaesu FT-857 or 897) that cover all of the HF spectrum plus 6 meters, 2 meters, and 70 centimeters—is only a small part of the overall expense of assembling a station.

If you shop around on the internet, or at hamfests, you will find a bargain or two that will go a long way toward getting on the air. Many hams have a substantial investment ($400 to $600, depending on options and buying used) in their rig, but are still not on the air! The radio is only one part of the station equation. Now you need to start seriously looking at antennas, rotors, towers/masts, power supplies, linear amplifiers, preamplifiers, coaxial or hardline cable, antenna switches, VSWR/power meters, and the list goes on, seemingly forever. So as you can plainly see, the transceiver is only a relatively small expenditure compared to the entire station full of gear that will allow you to communicate effectively.

This column will explore how to set up a VHF+ station using some common sense, some homework, and frugal buying practices. With the economy in such turmoil and the dollar taking a beating everywhere, saving money on the essentials for a good VHF+ station should be a top priority.

First of all, you must understand that you *really* don't need the biggest, latest and greatest transceiver on the market. Buying a used multi-mode VHF/UHF transceiver will save you money that you can use on other station accessories to personalize your new station. Let's get to it, shall we?

First of all, I like older, well-made used gear over some of the latest offerings. Why? Even though they might be 20 to 25 years old, they are solidly made. Most of them originally sold for many hundreds of dollars, and you can now pick them up on internet auction sites or at hamfests for pennies on the dollar. Now, that makes a lot of sense in today's economy!

Secondly, these older radios can easily be upgraded (if they need it) by adding external preamps and linear "brick" amplifiers. These add-ons can also be had for a song on the internet or at hamfest fleamarkets.

What are my personal picks for a good starter radio for the high bands? Glad you asked. One of my all-time favorite radios is the Kenwood TS-700A, an early 1980s 2-meter multimode rig with about 10–12 watts of RF output. The Yaesu FT-

My VHF+ workhorse, the Yaesu FT-726R. This is an "oldie-but-goodie" that has three bands in one box. Currently I have 144-MHz and 432-MHz modules installed (one of these days I'll find a 6-meter module!). I bought this rig about three years ago for $400 including shipping thanks to an internet auction site. Not a bad deal! It has the satellite board installed that gives me full duplex on both bands so I can hear my downlink signal while transmitting on the satellite uplink.

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e-mail: <k7sz@live.com>

221R is another oldie but goodie that is a solid performer from the same period. Both of these are 2-meter radio sets, and we'll concentrate on that band for now. Recently I picked up a KLM 2000, a dynamite 2-meter multimode from the late 1970s, for $50 plus shipping from an auction site. I presented this prize to a good friend as a wedding present, since both he and his new wife were hams and neither had a 2-meter rig with which to play on the lower end of 2 meters.

Of course you can opt for newer gear at an increase in initial cost. However, if you are doing this on a restricted budget, you won't have as much money to spend on other things for the station. My personal VHF+ station has a Yaesu FT-726R tri-band VHF/UHF transceiver that uses plug-in modules to cover the various bands. It has a full-duplex satellite board that allows you to listen to your downlink signal from the "bird" while you are transmitting on the uplink. It has a digital VFO and readout and cost me approximately $400 on the internet. Add about $200 for its successor, the FT-736, a quad-band transceiver. Power output on my 726 is about 10–12 watts on 6 meters, 2 meters, and 70 cm. The 736 has a higher power output and a better receiver section. However, for my initial $400 investment, I have received countless hours of fun on the high bands at reasonable cost.

A quick look through older issues of *CQ, QST, ham radio* magazine, and *73 magazine* should yield ads and product reviews on most of this older gear. As a matter of fact, the ARRL published a set of books a few years back (*The ARRL Radio Buyer's Source Book, Vols. 1 & 2*) that is a compilation of *QST* product reviews that take in everything from HF radios to VHF/UHF rigs, accessories, antenna rotors, etc. Therefore, if you are really into doing some research, hit the ham radio fleamarkets and locate copies of these out-of-print books and use them for reference. They are a gold mine of information for someone wanting to buy a used rig. Of course, if you are an ARRL member, you can peruse the back issues of *QST* online and glean a lot of good info on your prospective piece of VHF hardware that way.

Don't forget the members of your local ham radio club. Put the word out at a meeting or on the club website that you are interested in starting to explore the weak-signal end of the VHF/UHF bands and need some guidance. The weak-signal crowd is a great bunch and always stands ready to help a newcomer to their special facet of the ham radio hobby. You never can tell; maybe one of the experienced club members has an older VHF+ rig that he/she might loan you for a trial run, or possibly sell you outright. Either way you are on the road to having a great time in ham radio!

This Mirage 2-meter mast-head preamp is one very nice piece of VHF+ gear at a reasonable list price of $199.95. Sure it sounds like a lot of money, but it really improves your 2-meter reception while keeping the overall noise to a bare minimum.

Gain vs. Noise ... Life at VHF

The first thing that anyone who's been in the VHF+ business for a while will tell you is that "noise" is bad! The second thing they will tell you is that you need all the receiver gain you can handle and then some. They are right on both counts, within reason. The old adage "you can't work 'em if you can't hear 'em" is oh so true. However, misapplied receiver gain can be a bad thing. To fully understand where we are going with this we need to lay some ground work regarding *noise, gain,* and *noise figure* (NF), and define some terms.

All receiving systems (starting at the antenna and ending at the speaker or headphones) generate noise. This noise is a product of electrons moving within a solid-state device (transistor, FET, etc.), mixing products within the IF (intermediate frequency circuits), synthesizer phase noise, atmospheric noise, and a host of other factors, including oxidized connections on your antenna boom to element clamps, and poor solder connections on your coaxial cables, just to name a couple. This noise is cumulative. This total system noise needs to be kept to an absolute minimum to be sure you can work the weak ones on the bands. Your system noise initially is set at the antenna and increases as you progress toward the receiver. That is why experienced VHF+ operators insist on placing any receiver preamps as close to the antenna as possible. That way the noise factor (that little number in dB that is specified by the manufacturer) of the preamp is factored in prior to any additional noise generated by the rest of the system. If your preamp is capable of 20 dB of gain, and is placed close to the radio as opposed to at the antenna, any noise generated in the system is also amplified by the gain of the preamp!

The reason is relatively simple to understand if you look at the situation from a noise point of view rather than a signal (S-meter) standpoint. Let's say your super-hot preamp has a gain factor of 20 dB. *That's a lot of gain!* The noise factor (NF) is the amount of noise generated internally inside the preamp and must be factored into the entire equation. Normally the NF of a preamp is around .8 to 3.0 dB, depending upon manufacturer, circuit layout, and the solid-state devices employed. What this means, in effect, is that along with 20 dB of gain, the preamp will inject between .8 and 3.0 dB of noise into the system. The normal ears can hear a 1-dB change. While it might be hard to distinguish a noise increase of .8 dB, most people will definitely hear a 3.0-dB change. Therefore, you may be able to actually hear a change in back-

ground noise when you switch in the preamp.

By placing the preamp at or near the antenna feed point (these are called "mast-head preamps") you can keep the overall system noise in check *and* provide gain at the same time. The gain of the preamp is secondary to the NF. If you are going to sacrifice anything, sacrifice gain in favor of noise. In other words, drop a few dB of signal gain in favor of a decreased NF. This will allow you to hear the weaker stations and not cover them up with the system noise of your station.

Mirage and Applied Receiver Research both market very well-designed mast-head preamps for a number of bands. They are not cheap, but you get what you pay for. I have used the 2-meter and 70-cm Mirage preamps with great results. And at my location, with my limited antennas, I need all the help I can get!

This is the back end of the Mirage control box. Notice that it takes 12 VDC and this is applied to the coaxial cable going to the mast-head preamp to provide working voltages for the preamp circuitry. Nice, neat and clean.

Thick as a Brick

Among the many things one can acquire at hamfest fleamarkets is a "brick" amplifier. They get the "brick" pseudonym since they are normally a compact solid-state amp with an extremely large heat sink attached. The shape and weight equate to a "brick." Now you know!

Normally these amps take between 2 to 15 watts input and yield somewhere between 10 to 85 watts output on your favorite VHF+ band. Recently I procured an old Tokyo Hy-Power 85-watt (CW/SSB) linear power amp that features a 15-dB receiver preamp. Total cost—$20! I really didn't expect the amp to work, especially at that price. However, after firing it up on the bench I was rewarded with about 80 watts output on 2 meters while driving the amp with the FT-726 in the CW mode running about 10 watts key-down output. Hmm … that was about right! The receiver preamp worked, too, so I was really ahead of the power curve on this particular purchase. Twenty bucks for a 60-watt increase in RF output (about 9 dB of gain): is not bad! Moral of the story: There are real good deals out there; you just have to look for them.

That's it for this month, gang. We will return to the VHF+ topic again and continue our quest to build a quality, high-band station on a budget. In the interim, don't forget to drop me an e-mail with feedback regarding the "Learning Curve."

73, Rich, K7SZ

vhf plus

BY JOE LYNCH,* N6CL

Sporadic-*E* Propagation and the VHF+ Bands

From the middle of this month through the end of July, and again in late November to early January, sporadic-*E* propagation appears more frequently on the VHF+ frequencies in the Northern Hemisphere.

This type of propagation occurs when there's a sporadic ionization of the *E*-layer (the layer between 90 and 160 km above the Earth). The ionization takes the form of clouds of ionized gases that move, growing larger and more intense, and then shrink and dissipate. These ionized clouds appear in the late morning and late afternoon local time. Late-afternoon ionization can last until well after sundown.

For example, one evening I was listening to a local net on a 2-meter repeater. A new ham checked in at nearly 2300 local time to exclaim that 10 meters was "just hopping with signals." I picked up the clue and immediately turned on my 6-meter radio. The last of the signals on that band faded around 0100 local time. I then switched to 10 meters, where propagation continued for another hour or so.

Sporadic-*E* ionization propagation has properties similar to other forms of E-layer propagation. Depending on the density of the ionization, there's a critical frequency (CF), a lowest optimum frequency (LOF), and a maximum usable frequency (MUF); over this range of frequencies usable signals are refracted back to Earth. The CF frequency refracts signals sent straight up straight back down. The LOF is the lowest frequency that will sustain propagation. The MUF is the maximum frequency that can sustain propagation. The MUF is usually about five times the CF. Although the LOF of a sporadic-*E* event has been detected as low as 14 MHz, interest in the low end hasn't been as strong as interest in the MUF of a particular opening. This is partly because it's very difficult to distinguish sporadic-*E* propagation from other forms of propagation happening at the same time.

As VHF+ operators, we're interested in knowing how high in frequency we can use this mode of propagation. Obviously, 50 MHz is the VHF+ band that benefits most from sporadic-*E*. However, 144 MHz and, on very rare occasions, 222 MHz have experienced sporadic-*E* propagation. The historic 220-MHz contact between Bill Duval, K5UGM (in Irving, Texas), and John Moore, W5HUQ/4 (near Jacksonville, Florida), on June 14, 1987 at 1544 UTC is the first known documented sporadic-*E* contact ever made on that band.

Sometimes clouds of ionization may be in just the right places to cause double-hop sporadic-*E* propagation. Clouds are less often in enough of the right places to induce triple-hop, or greater, sporadic-*E*. For example, almost every summer hams living on the upper eastern coast of the United States experience a few days of multiple-hop sporadic-*E* into Europe. Sometimes this propagation extends as far south as the Carolinas. Occasionally, there are openings between the West Coast and the Far East. Once in a while, stations in parts of the United States are able to complete their WAS (Worked All States) award when either Hawaii or Alaska stations come in via a multiple-hop sporadic-*E* path.

For the 6-meter operator, the most popular propagation mode is sporadic-*E*. It affords regulars to the band opportunities to talk across the country and, on occasion, to foreign countries. It's the most ready-avenue (and probably the first introduction to) DX for the VHF+ operator. Because of its nature, it doesn't take much power to work stations.

What causes sporadic-*E*? No one seems to know, exactly. Wind shear gets most of the blame because it seems to cause a bunching up of ions, creating a cloud of ionization. However, the wind-shear theory looks questionable when sporadic-*E* is present without it. The "old wives' tales" of amateur radio that associates sporadic-*E* propagation with thunderstorms has been given new emphasis with the research work of the Fermi satellite (see below). There is some correlation between *E*-layer propagation and aurora (more commonly known as auroral-*E*), as well as meteor showers.

Will sporadic-*E* occur in your neck of the woods? It depends on where you live. Sporadic-*E* seems to be most prevalent in the southwestern part of the United States.

How can you learn to depend on sporadic-*E* propagation? Start by listening to 10 meters. If you hear exceptionally loud signals from an area that's not too far from you geographically, you may want to turn on your 6-meter radio—especially if the "skip" starts to shorten considerably. Once on 6 meters, you can begin listening to see when the skip shortens on the band. You might even find some propagation on 2 meters. Of course, such propagation doesn't always occur. In fact, it only occurs about 10 percent (or less) of the time that it occurs on 6 meters.

Some hams keep an ear on a clear frequency near the highest frequency on the commercial FM

VHF Plus Calendar

April 30–May 1	SBMS 2 GHz and Up Club Contest. Third weekend of DUBUS EME contest.
May 3	New Moon
May 5	The η *Aquarids* meteor shower peak
May 7-8	Fourth weekend of DUBUS EME contest
May 10	First quarter Moon
May 15	Moon perigee
May 17	Full Moon
May 20-22	Dayton HamVention®
May 24	Last quarter Moon
May 27	Moon apogee

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spectrum (108 MHz). When signals start coming in from a distance, it would be wise to immediately turn on your 2-meter radio and start transmitting. Sometimes we can "create" our own opening. When listening to the 2-meter band, you can detect all sorts of propagation, from sporadic-*E*, to tropo, to meteor showers, by listening to a clear frequency on that band.

During high sunspot activity, when *F2* type propagation is present more often, sporadic-*E* has been known to contribute to the lengthening of a path of a propagated signal. For example, frequently DX contacts appear to have been assisted by sporadic-*E*. Stations in a DX location, such as New Zealand, could be working stations in Arizona when a path opens to Oklahoma for the ZLs, because at the same time a sporadic-*E* path exists between Arizona and Oklahoma. It appears that the signal took a ride on *F2* to Arizona and then hopped a ride the rest of the way via sporadic-*E*.

Sporadic-*E* propagation presents an opportunity to communicate with faraway amateur radio operators, while running marginally equipped stations using very low power. Sometimes you'll find that the signal strength of the station you're working is so intense that you would think it was local. However, you need to work that station quickly, because sometimes an opening closes as soon as it appears. Such is the nature of the clouds that make up sporadic-*E* propagation.

Thunderstorms and Sporadic-*E*

I led my March column with a brief report on NASA's Fermi Gamma-ray Space Telescope's discovery concerning some of the high-energy gamma-ray photons from the terrestrial gamma-ray flashes (TGFs) that were being converted into pairs of electrons and positrons. There also was a NASA sidebar that showed a plume of gamma rays that extended upward as high as 600 km. At the following site is a NASA video that illustrates what happens during some thunderstorms: <http://www.nasa.gov/multimedia/videogallery/index.html?media_id=49435631>.

Once you watch the video, you may ask yourself this question: Is there a positive correlation between thunderstorms and sporadic-*E* propagation? The video shows how a plume of gamma rays leaves a thunderstorm and focuses upward, as high as 600 km. At this height, the plume passes through the *E*-layer, which is between 90 and 160 km. Does *E*-layer ionization occur when this plume passes through the *E*-layer?

Ham Radio Satellites Separate

The following is from Southgate ARC:

Sebastian Munoz, KE5FKV, reports that the two Amateur Radio FASTRAC AX.25 satellites, Sara Lily (437.345 MHz FM) and Emma (145.825 MHz FM), have successfully separated in space.

Sebastian writes: First of all I wanted to thank the HAM radio community all over the world for supporting our project; your support has been incredible and we really value it.

On Monday, March 14, 2011, after a few months of initial operations, we started one of the most exciting phases of our project by separating both of our girls so that they can compute on-orbit real-time relative navigation solutions while both of them are freely drifting from one another.

We sent the command to separate them at 21:56:11 UTC, and over the next few passes we will be checking to confirm their separation. We will continue to update the satellites' TLEs on our website: <http://fastrac.ae.utexas.edu/for_radio_operators/users/phpBB3/predictedorbit.

php>. We really appreciate all of your help so far and we hope that we can continue to count on it.

Thanks again. *73, Sebastian Munoz, KE5FKV, FASTRAC Student Program Manager*

A Reoccurring 2-Meter Activity Night

The following is from Todd Sprinkmann, KC9BQA via the VHF reflector:

Widespread 144 MHz activity occurs every Wednesday night across a large part of the USA. This has been going on for years now, and it keeps expanding and getting better.

When operators check into our nets, we encourage them to slide down on 144.220 and lower, and to call CQ and create their own activity. If dozens of ops in different states and grids do this, then weak-signal 2-meter activity will be able to come alive. Get on board and start enjoying 2 meters on Wednesday nights.

The net controls are: (1) WB9LYH, EN54cl, middle of WI; 144.240 MHz, starting at 0000 UTC. Mark starts by looking north-east and then goes clockwise a full 360 over the next 60-90 minutes. When WB9LYH isn't available, I take over from EN63ao. (2) K8TQK, EM89je, south-central OH; 144.250 MHz, starting at 0030 UTC. Bob starts out looking north, and then goes clockwise a full 360 over the next hour or so. (3) KAØKYZ, EN33qw, far southeast MN; 144.230 MHz, starting at 0200 UTC. Terry starts out looking east, and then goes clockwise in a 360 over the next 30–60 minutes. Terry is often on for a few hours on Wednesday nights. I suspect this net will become very popular as the word gets out about reliable late-evening activity on 2 meters. You night owls, help promote this option.

Additionally, there are also SWOT nets (www.swotrc.net) out of EL99 (0000 UTC) and EM12 (0200 UTC) on 144.250 MHz every Wednesday night. Most of the eastern half of the USA is within range of one of these five nets.

If you have a computer near your rig, register for and log onto the free, real-time VHF ON4KST.com chat that is available anytime, day or night. Post who you're hearing and where you are calling CQ in that chat, and start making more contacts. Check into the IARU Region 2 Chat for 144–432 MHz. The chat celebrated its one-year anniversary on March 11, 2011. If you are unsure of how to register, click on this link for instructions: <http://kc9bqa.com/?p=3765>. Please help spread the word and improve VHF. Websites: <http://www.kc9bqa.com> for frequent VHF/UHF updates and <http://www.wivuch.com> for Wisconsin VHF/UHF County Hunters Award. *73 de Todd Sprinkmann, KC9BQA, EN63ao, 40 miles north of Milwaukee.*

Current Contests

European Worldwide EME Contest 2011: Sponsored by DUBUS and REF,

the EU WW EME contest is intended to encourage worldwide activity on moonbounce. Information for this contest is available at the following website: <http://www.marsport.org.uk/dubus/EMEContest2011.pdf>.

Spring Sprints: These short duration (usually four hours) VHF+ contests are held on various dates (for each band) during the months of April and May. Please check my "VHF Plus" column in *CQ* magazine for a future announcement.

2 GHz and Up World Wide Club Contest: Sponsored by the San Bernardino Microwave Society, this contest runs the second weekend of May. Rules are available at the following URL: <http://www.ham-radio.com/sbms/2011_2ghz-up_test.pdf>.

The **June VHF QSO Party** will be held June 11–13.

Conference and Convention

Southeast VHF Society: Ther 15th annual conference will be hosted in Huntsville, Alabama, April 29–30. For information on registering for the conference, please check the society's website at <http://www.svhfs.org/>.

Dayton HamVention®: The Dayton HamVention® will be held as usual at the Hara Arena in Dayton, Ohio May 20–22. For details, please see the website <http://www.hamvention.org>. As usual, TAPR and AMSAT are sponsoring a joint banquet on Friday evening. For more information, see the AMSAT website: <http://www.amsat.org>. At the same time, the Weak Signal Group is sponsoring a banquet. For more information, contact Tony Emanuele, WA8RJF, at: <wa8rjf@arrl.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 organizations and/or conference organizers have announced calls for papers for their forthcoming conferences:

Central States VHF Society Conference: Technical papers are solicited for the 45th annual Central States VHF Society Conference to be held in the Dallas-Ft. Worth, Texas area. Paper submission due date is May 1. For more information please contact Kent Britain, WA5VJB, at <wa5vjb@flash.net>. Also, see the society's website: <http://www.csvhfs.org/2011conference/callforpapers.html>.

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 and should be submitted 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 and check <http://www.arrl.org>.

Meteor Showers

May minor showers include the following and their possible radio peaks: May 6; *η-Lyrids*, May 9; *ε-Arietids*, May 9; May *Arietids*, May 16; and *o-Cetids*, May 20.

For more information on the above meteor shower predictions, as well as sporadic-*E*, please see Tomas Hood, NW7US's "Propagation" column, and visit the International Meteor Organization's website: <http://www.imo.net>.

PZ5RA Confirmations

WØWOI suggests 6-meter DXers wishing paper QSL verification of PZ5RA QSOs dispense with mailing SAE and cash to PZ5RA. Multiple attempts to QSL by mail have proven useless. Ramon tells that WØWOI mail delivery from the USA is unreliable, and he does not accept registered mail. Ramon periodically uploads to LoTW for DXCC credit purpose.

And Finally . . .

In this issue I have once again approached the subject of sporadic-*E* and thunderstorms. If you have not done so already, please take a look at the NASA video that I mentioned earlier in this column. It may give you something interesting to think about. Hopefully, I will have more to write about this controversial subject in a future column.

As usual, there will be lots of exciting things happening at the Dayton Hamvention®. Perhaps you will find something in the swapmeet that you can make into a project you think might be of interest to this column's readers. If so, please let me know so that I can include your story in a future column.

Again, thank you very much for your support of this, your column.

Until next month…73 de Joe, N6CL

awards

BY TED MELINOSKY,* K1BV

Honoring Madame Curie's Nobel Prize

Maria Sklodowska-Curie (07/11/1867–04/07/1934) was born in Warsaw, Poland. She studied in Paris, where she obtained advanced degrees in physics and conducted her subsequent scientific work. She was a pioneer in the field of radioactivity, and the first person honored with two Nobel Prizes—in physics and chemistry. Maria Sklodowska-Curie was awarded the Nobel Prize in Physics in 1903 in recognition of her research in the field of radioactivity. She was the first woman to win a Nobel Prize. She created theory of radioactivity and techniques for isolating radioactive isotopes, and she also discovered two new elements, polonium and radium. Madam Curie, as she was known, was the sole winner of the Nobel Prize for Chemistry in 1911. As one of the most famous female scientists to date, Madam Curie is an icon in the scientific world. The following award from Poland honors her.

Maria Sklodowska-Curie Award

The award is issued to commemorate Maria Sklodowska-Curie on the 100th anniversary of her being awarded her second Nobel Prize, in chemistry. The award will be granted for making QSOs with Polish stations only in the calendar year 2011, and requires you to earn a total of 100 points. Each QSO with a Polish amateur station = 1 point, and with every special event station (e.g., HF100MSC, SO100MSC, SN100MSC, SP100MSC) = 5 points. At least one QSO with a special event station is mandatory. The award will be also granted for QSOs with five special event stations.

Any bands and modes may be used, and any duplicate QSO with the same station is valid when made on another band or on another mode. Award applications will be accepted March 31, 2012.

Award applications are accepted in any form (abstracts of electronic logs as well as all kinds of paper forms). Send the application along with the 5 Euro fee (via Registered Mail) to the following address: Polski Zwiazek Krótkofalowców, Award Manager PZK, P.O. Box 54, 85-613 Bydgoszcz 13, Poland. E-mail: <sq7b@pzk.org.pl>; Internet: <http://awards.pzk.org.pl/html/Sklodowska.htm>.

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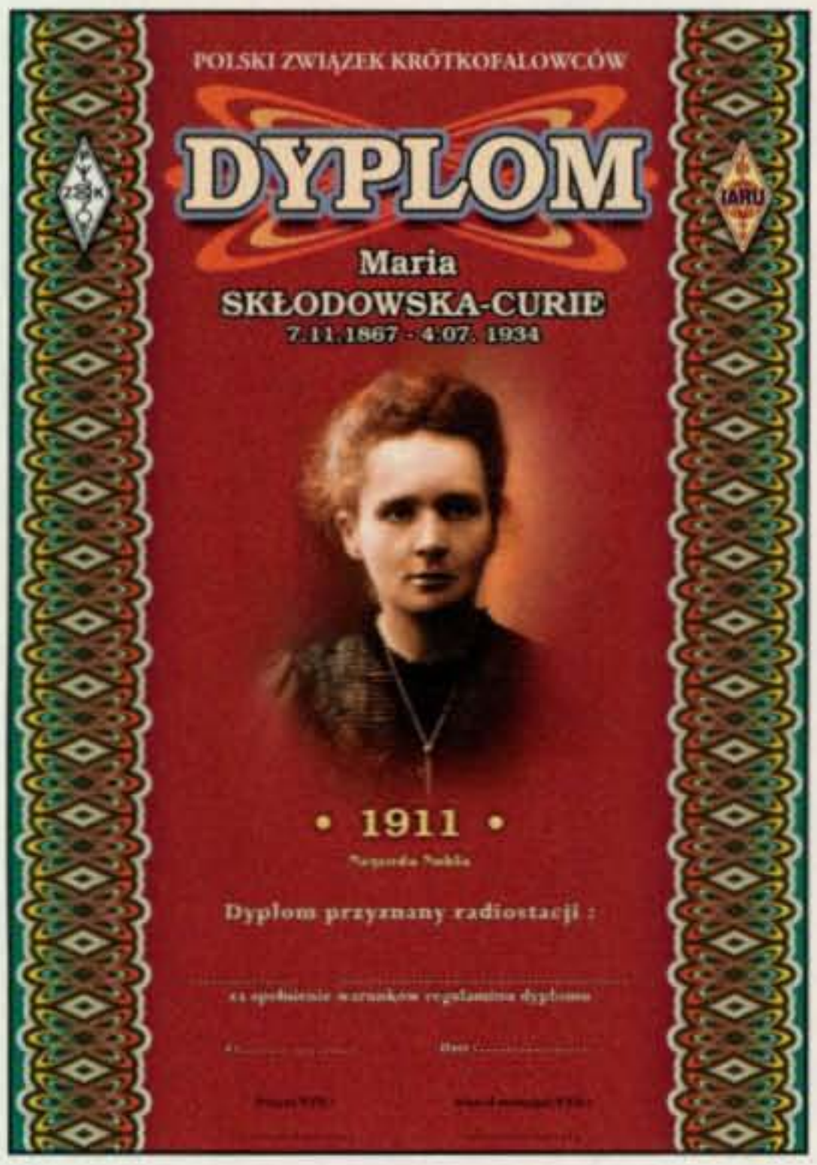


The Maria Sklodowska-Curie Award is being issued in honor of the 100th anniversary of her being awarded her second Nobel Prize, in chemistry. The award will be granted for making QSOs with Polish stations only in the calendar year 2011.

Awards from Colombia

These featured awards are those from our south-

USA-CA Special Honor Roll

Jerry Nowicki, KG8N
USA-CA All Counties #1212
February 9, 2011

Thomas A. Coulson, K8YJ
USA-CA All Counties #1213
February 12, 2011

Sandra Tennyson, NØXYL
USA-CA All Counties #1214
February 17, 2011

USA-CA Honor Roll

500

SM5EDX	3532
KG8N	3533
K8YJ	3534
NØXYL	3535

1000

KG8N	1809
K8YJ	1810
RW2A	1811
NØXYL	1812

1500

KG8N	1519
K8YJ	1520
NØXYL	1521
K7ZYV	1522

2000

KG8N	1408
K8YJ	1409
NØXYL	1410
K7ZYV	1411

2500

KG8N	1325
K8YJ	1326
NØXYL	1327

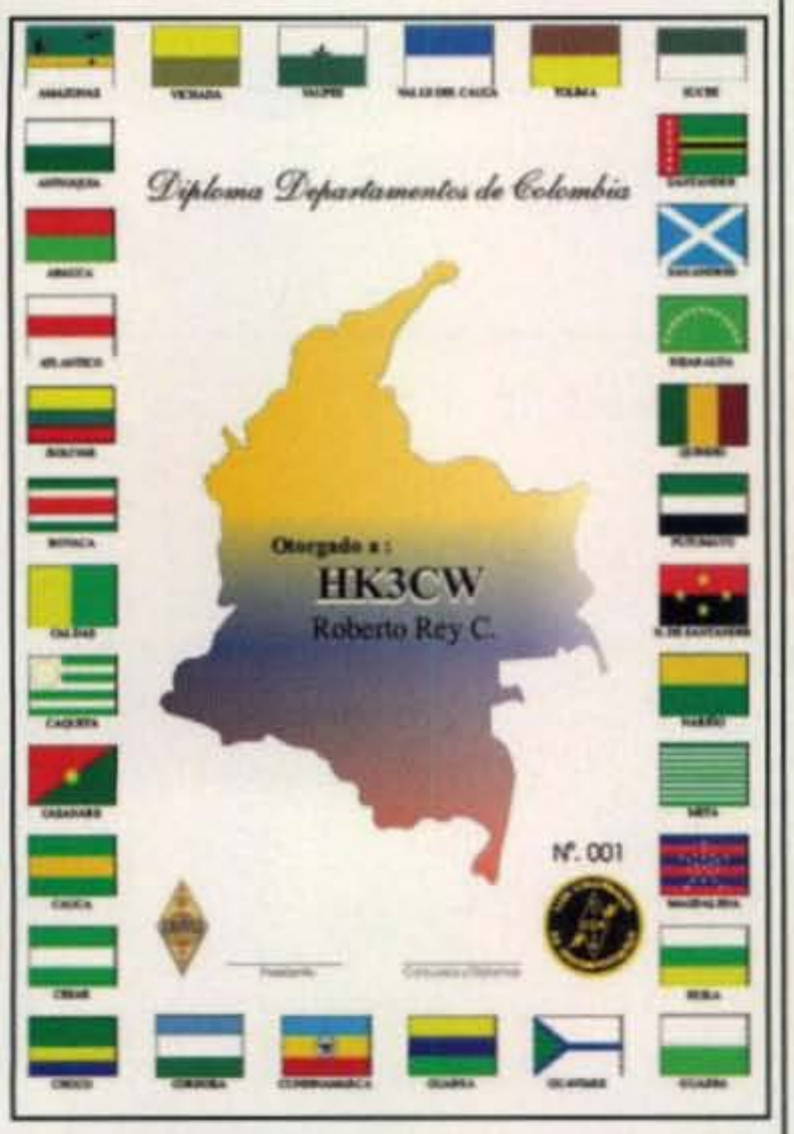
3000

KG8N	1237
K8YJ	1238
N9XYL	1239

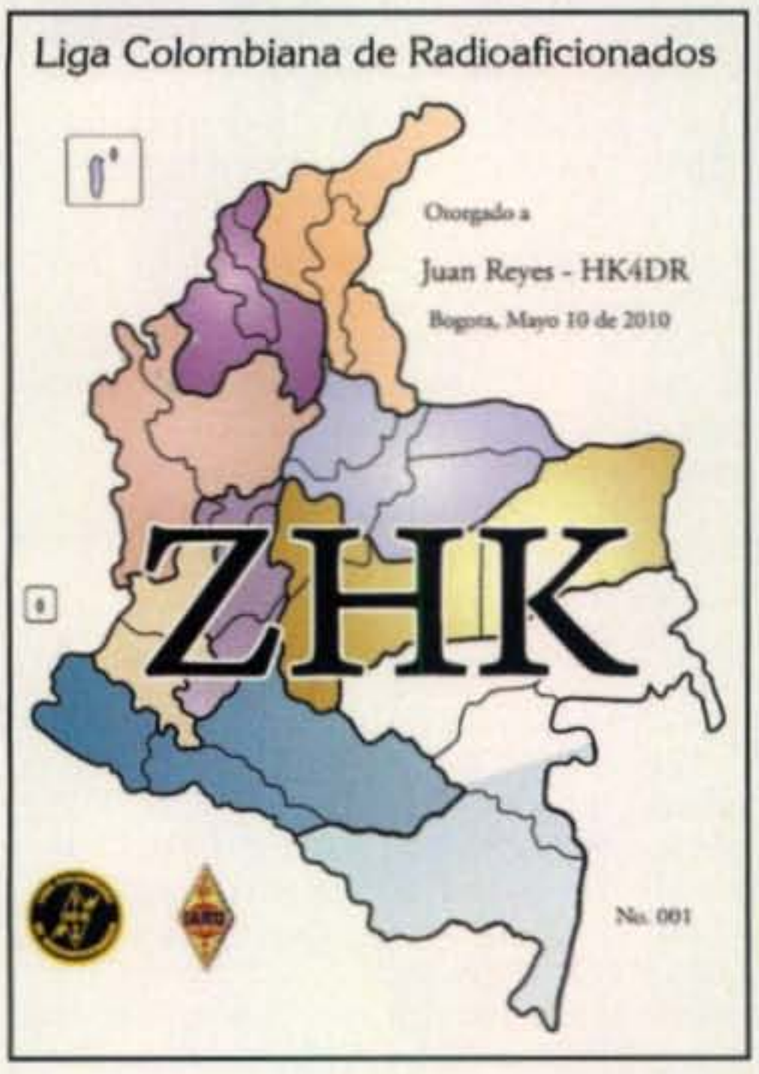
The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application 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.

ern neighbor, Colombia, and specifically the Colombian League of Amateur Radio (LCRA). The award requirements are fairly stiff, but the active operator should have a fairly good chance of earning ZHK award, which requires contacting all ten of the HK call areas.

General Requirements: The awards are available to any amateur in the world



Make two-way contact with each of the 32 departments of Colombia to earn the Worked Colombian Departments Award.



For the Diploma ZHK, contact stations in each of the 10 zones (call areas) of Colombia.

who meets the requirements. They may be endorsed for all Phone/ SSB, CW, Digital, and Mixed Modes. Colombian stations must submit QSL cards when applying for an award, along with a list of contacts, includ-ing callsign of station contacted, department name, UTC, date, and mode. Foreign stations must send a list (no QSL cards) with the stamp of an IARU member society. Apply to: Liga Amateur Radio Colombiana, Contests and Diplomas, Apartado Aereo No. 584, Santa fé de Bogotá, Colombia. Internet: <http://www.lcra.org.co/seccion.php?ids=40&nombre=concursos_y_diplomas>

Worked Colombian Departments. Make two-way contact with each of the 32 departments of Colombia. Contacts on or after January 1, 1970 count towards the award.

The Departments of the Republic of Colombia are: Amazonas, Antioquia, Arauca, Atlantic, Bolivar, Boyacá, Caldas, Caquetá, Casanare, Cauca, Cesar, Chocó, Córdoba, Cundinamarca, Guainia, Guaviare, Huila, La Guajira, Magdalena, Meta, Nariño, Norte de Santander, Putumayo, Quindío, Risaralda, San Andrés y Providencia, Santander, Sucre, Tolima, Valle del Cauca, Vaupés, and Vichada.

The cost of the award of the departments of Colombia is $20col for HK and $US15 for all others.

Diploma ZHK. Contact stations in each of the 10 zones (call areas) of Colombia on or after January 1, 1970.

The 10 zones of Colombia are:

Zone 1: Atlantic, Bolivar Córdoba y Sucre Córdoba, and Sucre.

Zone 2: Guajira, Magdalena, Cesar, and Norte de Santander.

The First USA-CA All Counties Recipient in the Czech Republic
Antonin Blaha, OK1APV
USA-CA All Counties #1210, December 17, 2010

The USA-CA Award for non-American stations is one of the most difficult awards. I started in 1967 and I got the last county in 2010. In the past my activity varied in accordance with the propagation, and sometimes was very little due to my occupation.

I got my callsign, OK1APV, in 1966. At the beginning I was allowed to work only on 160 and 80 meters with 10 watts. Later I was allowed to work with 50 watts, and then gradually with 200 watts on all bands. The best band for me was 40 meters. I used 200 watts and an G5RV antenna, all homemade. I think that my signals were very good and I could work all continents, but I preferred to work the U.S. stations, including the mobile stations.

The first information for me concerning the USA-CA was in 1969. It interested me very much and I started to hunt everybody I heard. There was a lack of information about who would travel and where, as there were not many OK stations that could give me some help, so I had to find some information on the bands. The Czech ham magazines did not publish anything about it and I was not able to get the U.S. magazines. All the necessery information I had to find out on the bands.

A great help was to participate in U.S. contests, QSO parties, and County Hunter activities. I even got some awards for first place in the DX category. I got some new counties. Later I was on the County Hunters Net and that helped me very much. The perfect organization and fb net controls. I got information about lists of the /M stations and information about the dates of their activities. Some of the callsigns I can remember even now. Without their help it wouldn't have been possible to get the award. Some of them were: N9AG, KVØE, NGØT, WA6VJP, W1TEE, N5QQ, NØCYB, WØGXQ, and many other excellent operators. Apologies to those I forgot to name here. Many thanks, friends.

Most of my Qs were on CW because I did not have any commercial equipment. I got only about 66 counties on SSB. The big problem was to copy the callsigns and the names of the counties. Some signals were very weak. Improvement came with the internet, where there was a lot of information about activities, sometimes a long time before the start of an activity. I have been using a PC since 2006. Others were using the PC much earlier. A big help was the USA Road Atlas. I had chance to follow the routes to where the expedion travelled. Sometimes I waited in a queue and when it was my turn the propagation had ended. I had to wait for a new expedition.

It was very exciting to get a new county. When the propagation was good I was on the band almost every night. I worked the next to last county I needed on September 18, 2010 at 16:48 GMT. I worked Eddy and Barbara, W5/G4KHG, from Carton County, NM. After that QSO I was very happy, and I thank my XYL Eva, who has tolerated my hobby for many years. (Thanks a lot, Eva!)

The First USA-CA All Counties Recipient in the Czech Republic, Antonin Blaha, OK1APV, USA-CA All Counties #1210.

At the end, though, I had found that as of November 15, 2001 there was a new county, Broomfield, CO, and that there was only one station there, WØQE. I checked my logs and found my QSO with him. I worked him on May 4, 2003. Immediately I sent him my QSL card direct and it was the last county, #3077.

I received these endorsements:

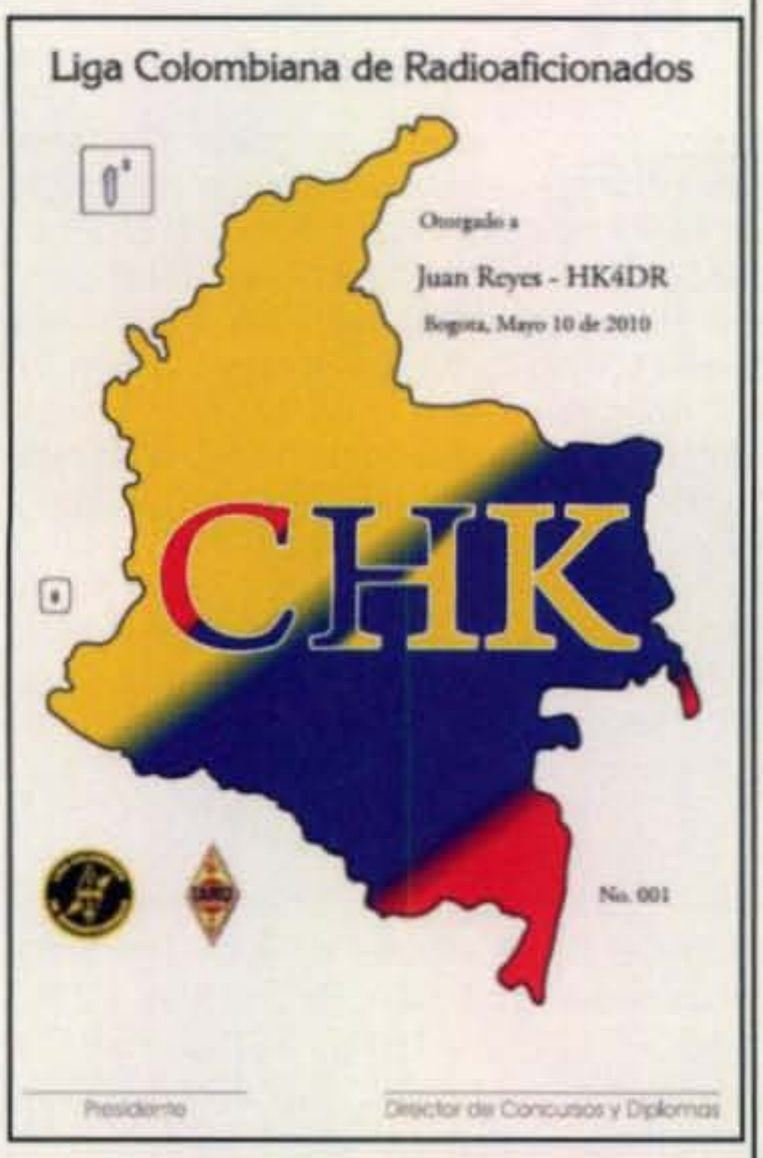
Sept. 20, 1980, USA-CA 500, #1517, All CW
Sept. 20, 1980, 1000, #623, CW
Sept. 13, 1982, 1500, #607, CW
Feb 25, 1984, 2000, # 609, CW
Apr. 23, 1985, 2500, #583, CW, #1 in OK
Dec. 17, 2010, 3000, #1235, CW/SSB
Dec 17, 2010, 3077, #1210, CW/SSB, first in OK

My station is all homemade: antennas are LW, G5RV 3-el Yagi, quad, and dipoles. I bought an old Kenwood TS-520 in 1998. I have had a Kenwood TS-830 + SB-200 since 1998. I also have a Yaesu FT1000 MP + ACOM 1010.

There are about 115,000 QSOs in my logs.

I would like to thank all the U.S. operators who helped me with the outstanding success of getting the USA-CA All Counties award as a first in OK country. A lot of thanks to all the operators who congratulated me on that success and who still remember my callsign, OK1APV. I wish good luck to all USA-CA County Hunters.

—73, Tonda, OK1APV



The Diploma CHK will be awarded to any licensed amateur radio operator who proves two-way contact with at least 100 amateur radio stations in Colombia.

Zone 3: Cundinamarca, Meta, and Vichada.

Zone 4: Antioquia and Choco.

Zone 5: Valle del Cauca and Cauca.

Zone 6: Caldas, Tolima, Risaralda, Quindío, and Huila.

Zone 7: Santander, Boyacá, Arauca, and Casanare.

Zone 8: Nariño, Putumayo, and Caqueta.

Zone 9: Amazonas, Vaupés, Guainía, and Guaviare.

Zone 10: Island territories San Andrés/Providencia and Malpelo.

The cost of the Diploma ZHK is $20col for HK and $US10 for all others.

Diploma CHK. The diploma will be awarded to any licensed amateur radio operator who proves two-way contact with at least 100 amateur radio stations in Colombia on or after January 1, 1960. Valid prefixes for the CHK diploma are HK, HJ, 5K, and 5J. Provide complete contact information including station contacted, UTC, date, and mode. The cost of the Diploma CHK is $20col for HK and $US10 for all others.

We're always looking for new awards from your group or club to publicize in this column. Please contact me via e-mail: <k1bv@cq-amateur-radio.com>.

73, Ted, K1BV

dx

BY CARL SMITH,* N4AA

The Sunspots Are Back!

Ah, signs of spring are in the air (as I write this in early March), and are we ever happy to see/feel them. A huge surprise in the way of solar activity came about for both weekends of the ARRL DX contest. The CW weekend (February 19–20) was good, but the SSB weekend (March 5–6) was *very* good. A solar flux of nearly 150 was reported for Sunday, with a couple of reports showing long-path openings from Florida to BV, and K3LR reporting an opening to JA at 1330Z. Considering all we have been through for the past few years, these reports are outstanding. Now keep hoping for it to continue, please!

DXpeditions of Note

CYØ, Sable Island was finally put on the air in early March. After all the headaches and delays, Randy, NØTG, and friends were able to reach the island on Saturday, March 5th. I'll have more on their activity next time.

In the past month we had two very good DXpeditions: S9DX from Sao Tome and TJ9PF from Cameroon.

The **S9DX** team consisted of Rene, DL2JRM; Sid, DM2AYO; Rolf, DL7VEE; Ulli, DD2ML; Klaus, DK1AX; Jurgen, DF1AL; Robin, DO2XX; and Harry, DM5TI. These eight ops did a super job as evidenced by the wrap-up report on their website:

> All good things must come to an end, and after 13 days of operation the S9DX DXpedition has come to its final QSOs. Overall, around 66,697 contacts were made. It was achieved by a small team of eight operators ranging in age from 21 to 71 years old with different backgrounds and different amateur radio experience. Detailed planning and preparations started long before we made the first QSO and in the end allowed us to achieve our goals. The three stations consisted of Elecraft K3 transceivers, Tokyo Hy-Power THP HL-550fx amplifiers, MicroHam MK II interfaces, and SteppIR antennas. It has been great fun for us to please the ham radio community worldwide with the ability to work a new country, on a new band or mode. There may, as always, have been something that could be improved, but we tried our best to provide a contact. We realize that many wishes were fulfilled and as a whole the amateur community was well behaved when it came to the pile-ups. We should never forget that amateur radio is a hobby. Thanks to all of you who made our DXpedition a success and we apologize for those who did not make it into the log.
>
> *For the team of S9DX, Harry, DM5TI*

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

These eight German ops posted an outstanding 67,000 QSOs from Sao Tome as S9DX in February. (Photo from the S9DX website, <http://s9dx.hkmann.de/>)

The **TJ9PF** Cameroon operation was sponsored by F6KOP (Radio Club Provins). The team was large, consisting of F4AJQ, F5UFX, F2JD, F6ENO, F5EOT, F8BJI, F1HRE, F6BIV, F5PED, F1NGP, F5VHQ, FM5CD, DJ7JC, I2VGW, ON7RN, and three from the USA—K4SV, N2WB, and N6OX. These 18 ops did an outstanding job from February 11–20, providing a total of 67,570 QSOs with 18,267 unique callsigns.

The last posting on their website says:

> The last QSO has been logged at 1200Z. The first target of 80,000 QSO wasn't reached, but despite all of the problems they suffered with electricity, static, and propagation they finally stopped at about 67,611 QSOs.
>
> One of the most important things is they have once again broken the RTTY QSOs number world record in a DXpedition, with more than 17,000. They kept the previous record since they broke it for the first time in 2009 during the TS7C expedition. They also keep the Digital DXpedition QSO World record. Yann, F1NGP, has uploaded the complete logbook on the "Club_log" website at: <http://www.clublog.org/charts/?c=TJ9PF&a=embed>. The corrections to be made will be considered when Yann will be back home. They are all occupied dismantling and packing the gear. They have no more time, for the bus will pick up them at the hotel at 1700 for driving to the airport. Many thanks to all of you who made TJ9PF a success.
>
> *73, from the TJ9PF team*
> *Forwarded by Maurice, F5NQL*

Club Log Charts

A number of DXers have started making a challenge of the Club Log charts on these DXpeditions. If you are not familiar with the Club Log website, you might want to take a look at <http://www.clublog.org/> . Fig. 1 is a sample of the Log Chart for TJ9PF showing all of the QSOs I had with the team. The boxes change from red to green when the DXpedition logs are uploaded and a QSO with your call is shown for the respective band/mode. It's great fun to challenge your local DXing friends to see who can fill in the most boxes.

There are some other "fun" links that will show where you "rank" in your particular CQ Zone

and/or in your continent based on the number of green boxes you have. Many DXpeditions are making use of Club Log for their log search, and it can be quite useful and a lot of fun.

Getting New Ones by Working Contests

Working contests can be a very useful tool in your quest to work new ones. Some places that see little "normal" activity are the places that folks go to just for a contest. The Caribbean is especially active during contests, but you will also find some Pacific islands and others that see activity just for a contest.

5 Band WAZ

As of March 1, 2011, 836 stations have attained the 200 zone level and 1713 stations have attained the 150 zone level.

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

OZ8BZ IT9PKO

The top contenders for 5 Band WAZ (zones needed, 80 or 40 meters):

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)
N4MM, 199 (26)
EA7GF, 199 (1)
N6HR/7, 199 (37)
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)
KQ0B, 199 (2 on 10)
K9OW, 199 (34 on 10)
G3NKC, 199 (31 on 10)
K8PT, 199 (26)
K9UP, 199 (21)
IN3ZNR, 199 (1)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
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)
IV3MUC, 198 (1&31 on 40)
UA4LY, 198 (6&2 on 10)
IK4CIE, 198 (1, 31)
JA7XBG, 198 (2 on 80&10)
HB9ALO, 198 (1, 31)
JA3GN, 198 (2 on 80&40)

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

VE2BR (200 zones) IT9PKO (200 zones)

5 Band WAZ updates:

K9UP (200 zones)
W2LK (187 zones)
K6FW (180 zones)
N6UK (179 zones)
K6ZZ (190 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 WPX Program

CW

3261.....DK8MCT
3262.....UU2JFX
3263.....WB3LHD

SSB

3090.....DK8MCT
3091.....WB3LHD

Mixed

2142.....DK8MCT
2143.....KF6A
2144.....WB3LHD
2145.....K1UR
2146.....K9OHI
2147.....K4WY
2148.....N3ALN

CW: 450 WB3LHD. 700 DK8MCT. 750 JE3CYH. 3150 W8IQ.
SSB: 450 WB3LHD. 550 N3ALN. 600 DK8MCT. 4550 I2PJA.
Mixed: 600 KF6A, N3ALN. 650 K4WY. 950 WB3LHD. 1000 DK8MCT. 1300 AA1VX. 1400 DH5MM. 4050 JH8BOE. 4150 WA5VGI. 4600 I2PJA.

15 meters: WB3LHD

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

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.

A few of the operators at TJ9PF: Yann, F1NGP; Bob, N6OX; and Jean-Paul, F8BJI. (Photo courtesy of Dave, K4SV)

When planning a two-week trip to a far-off place with no RadioShack around the corner, you have to be sure and take everything you might need. Here are the bags packed and ready to transport to Cameroon for the TJ9PF operation. (Photo from the TJ9PF website <http://www.tj9pf.fr/>)

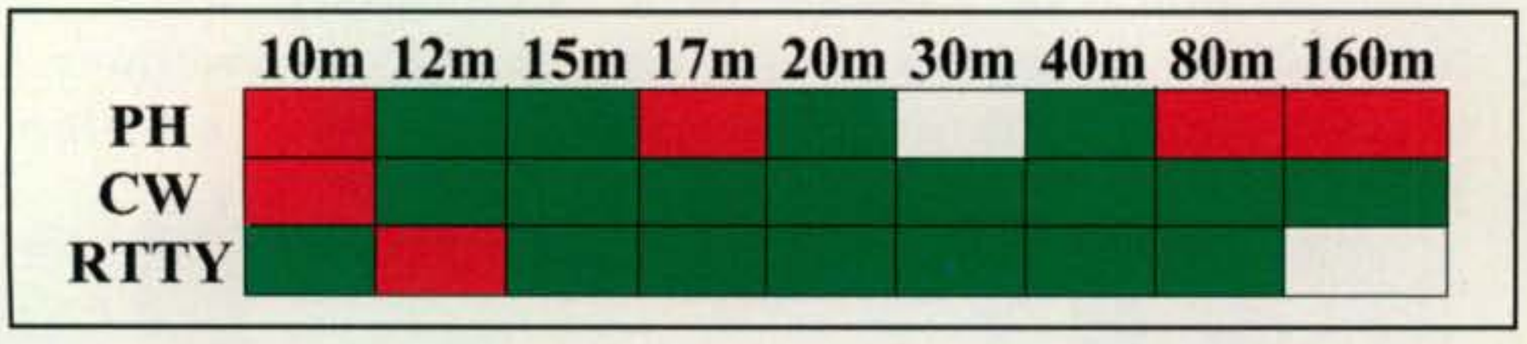


Fig. 1– N4AA's sample of Log Chart for Qs with TJ9PF.

You don't have to go "full bore" in a contest. You can S&P (search and pounce) just looking for new ones. If you are able, you can use the Cluster network to spot the ones that you need and just work those. Just in case you are not "up to speed" with your CW, you can really increase your ability by working CW contests, both sending and receiving.

Morse Code Use Increasing

Speaking of CW, I was reminded of an item I recently saw about the use of Morse Code. Take note of the following:

An analysis by *WorldRadio Online* columnist Randall Noon, KCØCCR, suggests that levels of on-air ham activity and Morse Code usage both have increased since the FCC dropped the requirement for Morse Code testing in early 2007. Noon is the magazine's FISTS columnist. FISTS is an organization that promotes the use of Morse Code among hams.

Bob, W7YAQ/T30YA (left), and Bill, N7OU/T30OU, planted their 160-meter vertical in the water of the lagoon on Tarawa. Are those cans in their hands? Well, they say the cans were "XXXX beer from VK4." They spent 13-plus days on Tarawa in February making 22,826 QSOs, including 1098 on RTTY. The rest were on CW. (Photo courtesy of Bill, N7OU)

The WAZ Program

6 Meters

100 .....OK1RD (25 zones)

10 Meters SSB

591 .....IT9PKO

15 Meters SSB

646.....IT9PKO

40 Meters SSB

111 .....IT9PKO

17 Meters CW

76 .....K8VFV

160 Meters

369 .....OZ8BZ (34 zones) 370 .....S53R (40 zones)

All Band WAZ

Diamond Jubilee

104 .....JR6IKD
105 .....JH8CZB
106.....LY3BM
107.....DL3DXF
108 .....JA7MSQ

Mixed

8780 .....WD6FF
8781 .....DC9ZP
8782 .....VE5TLW
8783.....LA6JKA
8784 .....SM5CAR
8785 .....VK3HJ
8786 .....RK3ZZ
8787 .....IWØHQE

SSB

5154.....KDØHUC 5155.....IZ2ACD

CW

617 .....UR5AO
618.....JR1AHP
619.....OH1LFF
620.....DF3DK
621.....DJ5FZ

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>.

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	1512...WD9DZV	976.....KM6HB	653.....KK3Q
5919.....K2VV	4250.....S53EO	3892...YU7BCD	3104.....K9UQN	2511.....W6OUL	2001.....KØKG	1463.....N3RC	964.....K8ZEE	650.....N3YZ
5575.....W1CU	4158.....N6JV	3773.....IK2ILH	3091.....9A4W	2499.....VE6BF	1971.....W2FKF	1462.....DL4CW	815.....KL7FAP	649.....RA9OO
5013.....EA2IA	4129.....S58MU	3770.....W9OP	3007.....W2WC	2493.....I5RFD	1936.....AG4W	1446.....DF3JO	781.....V51YJ	644.....KWØH
4979.....9A2NA	4078.....KØDEQ	3712..WB2YQH	3003....JN3SAC	2440.....K5UR	1905.....W7CB	1337.....K6UXO	726.....K5IC	636.....ZS2DL
4949.....W2FXA	4057.....I2MQP	3474...SM6DHU	3001.....K1BV	2428.....N6QQ	1862.....VE9FX	1322.....AA4FU	723.....KØDAN	616.....DL5JH
4676.....N4NO	4044.....KF2O	3305....JH8BOE	2922...OZ1ACB	2338.....I2EAY	1818.....KX1A	1269.....K5WAF	707..W1/E74OF	600.....IK1RKN
4399.....YU1AB	4022.....N9AF	3242.....N8BJQ	2724.....W2OO	2233.....AB1J	1655.....SV1DPI	1116.....YU7FW	682.....AI8P	600....KB9OWD
4344.....VE3XN	4019....WA5VGI	3207.....W9IL	2559.....W3LL	2116.....AE5B	1593.....S55SL	982.....IWØHOU	662.....JA7OXR	

SSB

5122.....IØZV	3536.....N4NO	2779..YU7BCD	2333.....W9IL	2094.....I8LEL	1927.....AE5B	1612.....AG4W	1377.....EA3NP	978.....EA7HY
4520.....K2VV	3323...OE2EGL	2761.....KF7RU	2326.....CX6BZ	2093.....W2WC	1889.....N6QQ	1611.....W2ME	1258.....N1KC	965.....VE6BF
4505.....VE1YX	3296.....KF2O	2711...LU8ESU	2288.....W3LL	2076.....K2XF	1879.....K3IXD	1534.....AE9DX	1145...EA3EQT	883.....WA5UA
4422.....OZ5EV	3229...CT1AHU	2689...WA5VGI	2210..SV3AQR	2072.....K5UR	1844.....YO9HP	1480.....AB5C	1089.....IZ8FFA	875.....K7SAM
4371.....F6DZU	3108.....I4CSP	2595.....EA1JG	2209....IK2QPR	2066....IK2DZN	1825.....KQ8D	1464..VE7SMP	1083.....KX1A	758.....IV3GOW
4238.....I2PJA	3047.....KØDEQ	2497.....S58MU	2201.....NQ3A	2041.....N8BJQ	1758....W6OUL	1463.....I2EAY	1042....IZØBNR	741....WD9DZV
4003.....9A2NA	3022.....I8KCI	2471.....I3ZSX	2157.....W2OO	1986...DL8AAV	1719.....K9UQN	1410.....S55SL	1031....IK8OZP	717.....KØDAN
3843.....I2MQP	2903.....IN3QCI	2451...EA3GHZ	2107.....N6FX	1971.....W2FKF	1711...JN3SAC	1395.....PT7ZT	1022.....NW3H	637.....K5WAF
3741.....EA2IA	2857.....4X6DK	2417..SM6DHU	2099.....KI7AO	1935...SV1EOS	1623.....VE9FX	1386....IK4HPU	1012.....KU4BP	600....WA2BEV

CW

5464.....K9QVB	3750...VE7CNE	2914..SM6DHU	2529....IK3GER	2101.....I2MQP	1665.....YO9HP	1210.....DL4CW	813.....VE9FX
5413..WA2HZR	3676.....S58MU	2884.....I7PXV	2503.....IØNNY	2101.....W9HR	1445....EA2CIN	1160.....AA5JG	794.....LA5MDA
5277.....K2VV	3506.....9A2NA	2723...EA7AZA	2502...JA9CWJ	1983..EA7AAW	1429.....WO3Z	1147..WD9DZV	753.....F5PBL
4215.....N4NO	3483...WA5VGI	2721.....K9UQN	2473.....OZ5UR	1979.....K5UR	1424.....N6QQ	1125.....IØWOK	749.....AE5B
4182.....N6JV	3379.....KØDEQ	2670.....KA7T	2434.....W9IL	1959....W6OUL	1336..WA2VQV	1109.....VE1YX	695.....S55SL
4024.....LZ1XL	3046...YU7BCD	2632.....W2ME	2424.....W2WC	1917.....W2OO	1312.....K6UXO	1102.....IT9ELD	629.....IV3GOW
3918.....VE7DP	3034.....KF2O	2631.....N8BJQ	2373.....VE6BF	1848.....I2EAY	1223.....KX1A	1049.....K5WAF	615.....JH6JMM
3780.....EA2IA	3018.....W8IQ	2617...JN3SAC	2342.....N6FX	1768.....AC5K	1220.....AA4FU	821.....HB9DAX	600.....IK2SGV

DIGITAL

1534.....W3LL	1133.....N6QQ	1009..GUØSUP	836.....KØDEQ	641.....KF2O
1291.....N8BJQ	1066.....YO9HP	894.....AG4W	692....WD9DZV	629.....W2OO

Writing in the February issue of *WorldRadio Online*, Noon based his analysis on a combination of FCC licensing statistics and published results of ARRL Field Day activity from 2005 to 2009. He used Field Day data on the assumption that "people who participate in Field Day are at least minimally active hams."

Comparing statistics for Field Day activity with the total number of licensees, Noon determined that both the raw number and the percentage of licensed hams operating in Field Day had increased since 2007. In addition, he found that the number of Morse code (CW) contacts during Field Day had increased as well, hitting an all-time peak in 2009. This is significant, he says, "because it is assumed that hams will use the same modes on Field Day that they do when operating at other times."

Since the FCC stopped requiring code tests, Noon concluded, "it appears that CW has gained in absolute usage because the newer hams licensed since 2007 appear to be more active-

The CQ DX Field Award Program

CW

62.....RN3AKK

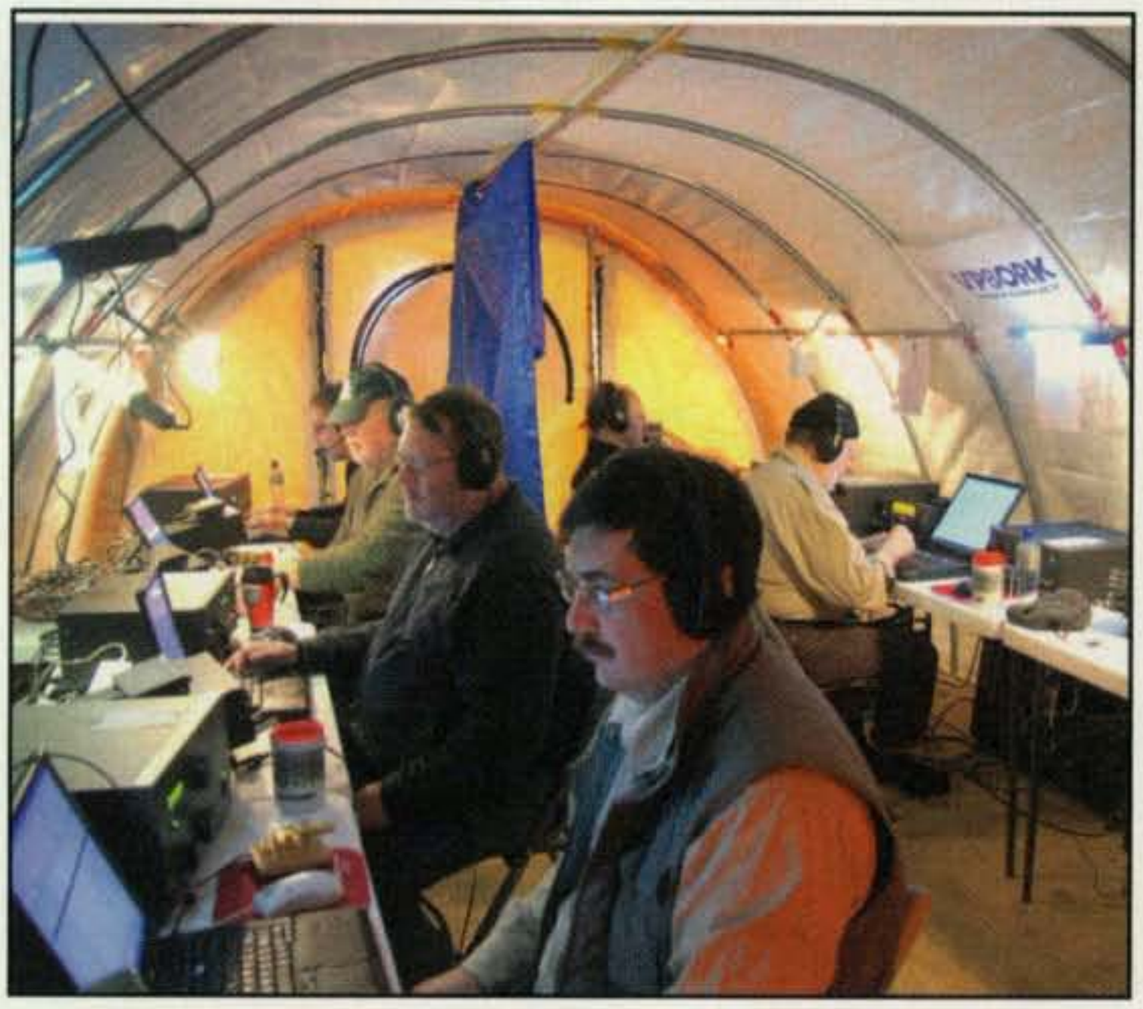
Mixed Endorsements

250.....K2TQC/268	200.....9A5CY/223
225.....VE7IG/239	150.....GØDEZ/150

CW Endorsements

100.....RN3AKK

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.



VP8ORK in action. Here are six of the ops handing out those Qs to the deserving. (Photo courtesy of Chaz, W4GKF)

CQ DX Awards Program

SSB

2565 .....RNN3AKK

CW

1120.....RN3AKK

SSB Endorsements

340.....IN3DEI/341
340.....N7BK/341
340.....N5FG/341
340 .....K4MQG/341
340 .....K3JGJ/341
340 .....KE5K/341
340 .....K4JLD/341
340.....K9MM/341
340 .....K4JLD/340
340 .....K9BWQ/340
340 .....K7LAY/340
340 .....K8LJG/340
330 .....K9IW/339
330.....N1ALR/330
320.....WØROB/323
300 .....AD7J/306
275 .....AE99DX/291

CW Endorsements

340.....N5FG/340
340 .....K4MQG/340
340.....N7FU/340
340.....W8XD/340
340.....K9MM/340
330 .....K4LJG/339
330.....N4MM/339
330 .....K9BWQ/339
330 .....K9IW/339
330 .....K4JLD/339
330 .....K3JGJ/338
330 .....K7LAY/338
330 .....KA7T/338
275.....WA2VQV/276
200.....RN3AKK/210
3.5/7 MHz RN3AKK

RTTY Endorsements

330 .....NI4H/338
330.....N5FG/336

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.

ly engaged in the hobby, as evidenced by the higher levels of participation in Field Day.

*(*WorldRadio Online *is available online only, in PDF format. View or download the issues at <http://www.worldradiomagazine.com>.—ed.)*

I hear some newer licensees talking about "code readers" and I have to wonder why. I tried a few of the devices a number of years ago and found them to be pretty unreliable overall. If I had a strong, stable signal (no QSB and no interference), they would usually copy that signal. If there was any fading or interference, forget it. Now I will admit I have not tried any of today's "gadgets," but I doubt that much has changed over the years. Sure a computer can send code, but I personally don't think there will ever be a substitute for the human ear in distinguishing those dits and dahs through the noise, especially in a contest environment.

As I write this, I still have a few hours to operate in the ARRL SSB contest, so I'll do that and be back next time with more DX news. Until then, enjoy the chase, and do Have Fun! 73, Carl, N4A

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.....268
HAØDU.....240
VE7IG.....237
W1CU.....235
VE3XN 234
HA5AGS.....228
N8PR.....223
9A5CY.....223
HA1RW 220
HA1AG.....218
KØDEQ.....216
K8SIX.....215
W6OAT 212
VE3ZZ.....207
HA5WA 206
F6HMJ.....206
JN3SAC 206
KF8UN 205
OK1AOV 205
RW4NH.....203
\N4MM.....202
W4UM 202
K8OOK.....195
N4NX.....192
ON4CAS 191
HA9PP 190
BA4DW 188
HB9DDZ.....188
IV3GOW.....184
K2SHZ.....182
K1NU.....180
W5ODD.....177
NØFW.....176

SSB

W1CU.....213
W4ABW.....202
KØDEQ.....192
VE7SMP.....190
N4MM.....186
W4UM 184
NØFW.....176
DL3DXX 175
JN3SAC 175

CW

DL6KVA 233
W1CU.....229
DL2DXA 209
KØDEQ.....207
DL3DXX 203
JN3SAC 200
W4UM 197
OK1AOV 196
HB9DZZ 186
OK2PO.....184
N4MM.....179
N4NX.....177
N7WO 175

QSL Information

E5NOU via N7OU
E51PMR via PA3LEO
E51SIX via W5GJ
E51SNL via PA3LEO
E51WET via SM6WET
E51WWA via AD7AF
E51XBG via HB9XBG
E51XIW via PA3LEO
E7/N4EXA via K2PF
E709WRC via E77E
E70R via E77E
E73A via 9A2AA
E73DX via DJ2MX
E73ENS via E73Y
E73J via E77E
E73M via E73Y
E73MMM via E73Y
E73TW via E73Y
E73W via E73Y
E74A via K2PF
E74AW via E77E
E74EBL via E77E
E74KC via E73Y
E74X via E77E
E75A via E77E
E75DX via E77E
E76AQ via E73Y
E76C via E77E
E77A via 9A2AA
E77DX via E77E
E77XZ via DK6XZ
E78A via E73Y
E78G via E77E
E78MS via E77E
E7DX via E77E
E7HQ via E77E
EA/DL1DA via DL1DA
EAØJC via EA4URE
EA3/F5GPE via F5GPE
EA3APX via EA4UV
EA5/GØKOM via GØKOM
EA5/ON7VMR via ON7VMR
EA5/UT2XD via UT2XD
EA5/YO4RFV via YO4RFV
EA5HQ via EA4URE

(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/>.)

Identify!

May's Contest Tip

Make sure to participate in this month's big contest, the CQ WPX CW Contest, May 28–29, where everyone is a multiplier! Your callsign prefix may make you a rare station and you can work anyone, anywhere.

Calendar of Events

All year	**CQ DX Marathon**
May 7–8	7th Area QSO Party
May 7–8	New England QSO Party
May 7–8	ARI DX Contest
May 7–8	Indiana QSO Party
May 7–8	10-10 Spring CW Contest
May 7–8	CQ-M Int'l DX Contest
May 14–15	Volta WW RTTY Contest
May 14–15	**CQ WW Foxhunting Weekend**
May 21–22	King of Spain CW Contest
May 28–29	**CQ WW WPX CW Contest**
Jun. 4–5	Alabama QSO Party
Jun. 4–5	SEANET Contest
Jun. 4-5	10-10 PSK Contest
July 16–17	**CQ WW VHF Contest**

You're tuning the bands searching for a contact when you come across a large pile-up. Many stations are calling and you hear someone answering. "59 100" is sent and the calling stations respond with their exchange. "Thanks" and the pile-up resumes. You listen for a while and this repeats a number of times. The calling stations are sending their calls, but all you ever hear from the responder is "thanks" or "QRZ?" After ten contacts, you wonder if the person on the receiving end will ever identify. Right then, he sends his call, but part of it is wiped out by another station. The calling resumes and the pattern repeats. What is wrong with this picture?

Many factors can create scenarios like the one above. DX spotting networks can promulgate worldwide the location of an unusual station. Constant calling by DXers or contesters looking to snag that rare one can create a cacophony of sound. Operations from normally inactive entities can create substantial demand while putting a heavy burden on the operator who may not be used to dealing with such large, unruly pile-ups. Let's look at this situation from two different perspectives: first from that of the station responding to the call and then from the viewpoint of the calling station.

Simply put, for any contact to be successful, there must be a calling station and an answering one. In the good old days when radios were crystal-controlled and shacks were warmed by the glow of tubes, someone would call CQ and then tune the entire band to find someone answering him. Of course with today's modern equipment, our listening bandwidth has constricted significantly. The use of narrow bandpass filters sometimes causes us to miss a caller who is just a hundred Hertz off. Regardless of the listening window, it is important for us to know who we are calling and for the calling station to know who is responding.

For the station who is scanning the band and searching for stations to contact, the most important piece of information needed is the other station's callsign. This allows the "search and pounce" operator to determine if he or she has already worked that person. If so, it's time to move on to the next caller. Once a station's needed status is determined, a multiplier check can be performed. Will this contact result in a score multiplication because they are a new multiplier (country, state, section, prefix, etc.) based on the contest rules? Sometimes a new multiplier can be identified just from a callsign, but other times the exchange itself must be heard before this can be determined. Obviously, stations searching the band are waiting to hear a callsign. If they hear a station making contacts but not giving a callsign, they have three choices: to wait and continue to listen for the callsign, to call without knowing the callsign, or to bypass the station and move on to someone else. Which of these choices do you make when someone doesn't give his/her callsign?

For the calling station, maximizing "run rate" (the number of valid contacts per hour) is of foremost importance. To improve your score in any contest, you should try to contact the most stations in as many places as possible. The calling station wants to make many contacts quickly. Once you find an open frequency and call CQ, the first thing you need to do is to get someone else's attention. Your CQ message should do that. There are many ways to call CQ and some depend on the mode being used (CW, RTTY, SSB). For our purposes, we will confine ourselves to CW and SSB operating. Many things can factor into your exact CQ call and you should be flexible depending upon conditions. A longer CQ might be necessary under poor band conditions, if you are running low power or QRP, or when rates are low. A shorter CQ might be better when activity is high; you're at a big gun station or are operating from a rare location. In all cases, though, the most important thing provided in the CQ message should be your callsign! That's what the answering station needs to know to determine if you're a needed contact.

I took a small survey at my local contest club, the Order of Boiled Owls of New York, to get members' opinions on calling CQ. Tom, KA2D, uses two different CQ messages. His primary one is "CQ TEST KA2D KA2D CQ," or when band is hot, "KA2D TEST." Ted, K2QMF, uses "CQ TEST K2QMF K2QMF TEST." Ted, primarily a CW operator, says "short and sweet! You don't need 'de' (from). Also, the last "TEST" is sent faster." Tony, N2UN, uses "TEST N2UN N2UN" and says to

*P.O. Box 657, Copiague, NY 11726
e-mail: <n2ga@cq-amateur-radio.com>

On the Cover

When people comment on the large collection of old radios and accessories in his ham shack, Bob Fulton, KB9MMJ, says he tells them, "you should see what the basement, the garage and the attic look like!" Most of Bob's radios are in working order, he says, but some, "I haven't even had time to fire up."

Bob keeps busy between his job at a musical instrument manufacturing company, being a volunteer firefighter for more than 40 years and scouring hamfests and garage sales for still more old radios.

"I started playing with radios when I was young," notes Bob, who lives in Lyons, Wisconsin, about 35 miles southwest of Milwaukee. "I started out listening to AM, then shortwave ... when I was 14, I made money by fixing old black and white TVs." Bob says he's been an avid shortwave listener for decades and, although he's been inactive in that area for the past several years, "I got an (ICOM) R-75 (receiver) last year, so I think I'll be doing a lot more of that."

When he joined the fire department, Bob's radio interests expanded to scanners and CB, and ultimately to ham radio. "I've been an avid hamfester for more than 35 years," he noted, "but I've only had my ham license since January, 1996." He currently operates exclusively on VHF and UHF, mostly on 2-meter FM.

Bob's collecting began by thinking "I'd like to have an old CB like I had; and I'd like to get an old monitor radio like I had..." And for the past ten to 15 years, as time has allowed, Bob has slowly been picking up good deals at hamfests and garage sales and on eBay. Overall, Bob estimates that he has more than 600 items in his collection, but notes that "I lost count after 500." *(Cover photo by Larry Mulvehill, WB2ZPI)*

Vadim, R9DX, took third place Single-Op Assisted in last year's CQ WW RTTY Contest and set a new Asia record from this clean operating position. (For details of the 2010 CQ WW RTTY Contest, see the results elsewhere in this issue.)

"make the message as short as possible. There is no ambiguity in this message." Frank, N2FF, uses a short "CQ TEST N2FF" call. Mike, N2YBB, states he uses "CQ [contest-name] CQ [contest-name] de Norway Two Yokohama Bravo Bravo (repeat) – Contest." He says he "uses non-accepted phonetics because for some strange reason no one ever gets 'YANKEE'." It comes back as every other letter." Les, W2LK, uses "CQ (test or SS or other abbreviation) W2LK CQ." He opines that it is "fast and clearly identifies the caller. Ending in CQ lets a late tuner know I am running." Bill, NA2M, uses on SSB: "CQ Contest November Alpha 2 Mike." On CW, Bill uses: "CQ test NA2M." Mel, KS2G, says, "My theory is that the CQ message should be long enough to

Max, KH6ZM, is a familiar callsign in most recent contest logs and placed fifth Single Op, 15 meters, High Power, breaking the Oceania record in last year's CQ RTTY Contest in September 2010.

'establish a presence' so that it will be evident to S&P stations tuning the band, but short enough to not make them wait too long to respond." Mel says that it "should include clear phonetics on phone." He uses "CQ CQ CQ CONTEST, CQ CQ CQ (CONTEST NAME) FROM KS2G KILOWATT SIERA TWO GERMANY CONTEST." Phil, N2MUN, likes "CQ CQ CONTEST, THIS IS N2MUN N2MUN." Diane, K2DO, says "it depends on the contest." Most often, Diane uses "CQ Contest, CQ Contest K2DO K2DO calling CQ Contest." Diane encourages callers to "use internationally recognized phonetics." On CW, I personally use "CQ TEST N2GA N2GA," when it's slow and "N2GA TEST" when it's hot.

How often should you sign your call? This question is a hot topic of debate among contesters. With the advent of spotting assistance, many stations do not wait to hear the spotted station's callsign before responding. Do you think this is a good idea? I also asked this question of some of my contest club members and they had many similar opinions. Ted, K2QMF, stated, "Packet Cluster spots sometimes have the station callsign wrong! You should wait on frequency until the station signs his call to be sure you have it correct!" Tom, KA2D, says, "Spotted stations need to ID more frequently ... if a spotted station does not ID, I will move on. To those who spot, before posting, check to make sure the station's call is correct and you typed the correct call. Sunday spots are terrible, why?" Tony, N2UN, says "The accuracy of packet spots is terrible. Make sure you have all the information correct before spotting any station. Don't repeat recent spots. Don't spot common stations/multipliers.

I favor a rule which would prohibit spots of stations in your own country (state, etc.). Absolutely, never spot yourself—a prohibited practice in some contests."

As far as signing your callsign after a completed exchange, there is a great divergence of opinion as whether it is necessary after each QSO. Tony, N2UN, says, "Sending your callsign during *every* QSO is the best practice. It is extremely inconsiderate not to send your call, because it creates wasted time for many stations." Les, W2LK, adds, "Nothing is more frustrating than finding out the station you are waiting for has already been worked. It also helps the running station to prevent dupes due to busted spots." Mel, KS2G, says, "Stations should give their callsign EVERY time. Despite what many ops

think, there is no substantial time saving in *not* giving their callsign, particularly since they inevitably have to contend with stations who make dupe contacts, not knowing who they're calling, and with contacts in which they have to break the flow of their run to give their callsign to stations who work them and then ask for their callsign." Diane, K2DO, agrees and says, "Every time. Because it takes very little time and is good operating practice."

Others disagree slightly, such as Tom, KA2D, who states, "I would prefer after each QSO, but if stations keep calling, after every five or so QSOs." Frank, N2FF, says, "This practice is changing. Five years ago the answer was after every call. That is changing with packet and telnet usage increasing. In many cases, the station have already been posted many times. But those listening to the pile-up need to be able to check that the call is correct as posted. So it is probably a good idea for the station running to send the call every three to five stations worked." Ted, K2QMF, says "If I have a pile-up, I only give my call every third or fourth QSO. If you have a pile-up, the callers already know who you are."

Regardless of which camp you are in, it is evident that most contesters think you need to sign your callsign at least once every three to five contacts. Going more than that is unacceptable. You should try to be conscious of people asking for your call, either by "?"' or "CL?" in CW or "What's your call?" in SSB. You should identify more often if you hear a lot of that or if band conditions are poor. On sideband, try to use the standard international phonetic alphabet if at all possible.

What should you do if you have many stations calling you? Les, W2LK, says, "I usually speed up a bit to run them faster but not past the point where I can operate effectively, keeping my error rate as low as possible and not losing any callers. I am, of course, thinking of CW, but phone needs to be spoken as tersely as possible for maximum speed, too." Frank, N2FF, agrees: "Send faster in CW contests. Increasing the keyer speed to 35 or 38 wpm seems to scare off some of the less-experienced stations calling and decrease the size of the pile-up. Use the clarifier to listen slightly off frequency. If I was a rare DX stations with a very big pile-up, I would direct the calling stations to go 'Up 1.'" Ted, K2QMF, adds, "Use the narrowest RX filter. Listen off to the sides of the pile-up. Go back to a station with only part of his call. Get the rest of it when he comes back to you and the pile-up has stopped calling." Tom, KA2D, suggests, "Go split up or down, zone calling. As I have limited CW skills, I could not increase my sending speed." Phil, N2MUN, would "try taking last two or call areas or just stay calm and work through it." Tony, N2UN, adds in jest, "Record it and play the recording at the next club meeting!" Mike, N2YBB, agrees: "Put a big smile on my face. (I should be so lucky!)"

The next time you tune the bands and come across a contest pile-up, I hope you run into one of the better operators. Listen to the method he or she uses to thin the pile. Notice the cadence of the operating, the smoothness, and the rhythm. Be aware of how and when they sign their callsign. Take the time to notice if they are answering callers who are exactly on frequency or if they are listening a little up or down? The best operators each have their own style; however, they all have commonalities that make them effective. Use that information to find your own style and improve your contest operating.

73, George, N2GA

More Sunspot Cycle 24 History Has Been Made!

BY TOMAS HOOD,* NW7US

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, February 2011: 29
Twelve-month smoothed, August 2010: 17

10.7 cm Flux
Observed Monthly, February 2011: 95
Twelve-month smoothed, August 2010: 81

***Ap* Index**
Observed Monthly, February 2011: 5
Twelve-month smoothed, August 2010: 6

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, February 2010: 19
Twelve-month smoothed, August 2009: 5

10.7 cm Flux
Observed Monthly, February 2010: 85
Twelve-month smoothed, August 2009: 72

***Ap* Index**
Observed Monthly, February 2010: 4
Twelve-month smoothed, August 2009: 4

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for May 2011

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2-3, 7-10, 12-21, 26-27, 29-30	**A**	**A**	**B**	**C**
High Normal: 1, 6, 24-25, 28	**A**	**B**	**C**	**C-D**
Low Normal: 4, 11, 23, 31	**B**	**C-B**	**C-D**	**D-E**
Below Normal: 5, 22	**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 fair (C) on may 1st, good (B) on the 2nd and 3rd, poor (D) to fair (C) on the 4th, with no opening possible on the 5th, 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.

Last month this column reported how February 2011 saw the end of a year-long stall in the rise of sunspot activity in new sunspot Cycle 24. It was not an anomaly; the slumber is over and the change has been noticed by any amateur radio operator venturing onto the day-time DX ham bands. Reports from around the world during the 2011 ARRL DX Contest Phone weekend (March 5–6) expressed surprised exhilaration that the 10-meter band was alive with activity equal to that of as long ago as 2004! In the week that followed, the DX clusters were flowing with the evidence of worldwide path openings on most of the higher amateur radio bands, with the openings on 20, 17, and 15 meters staying open much longer than expected.

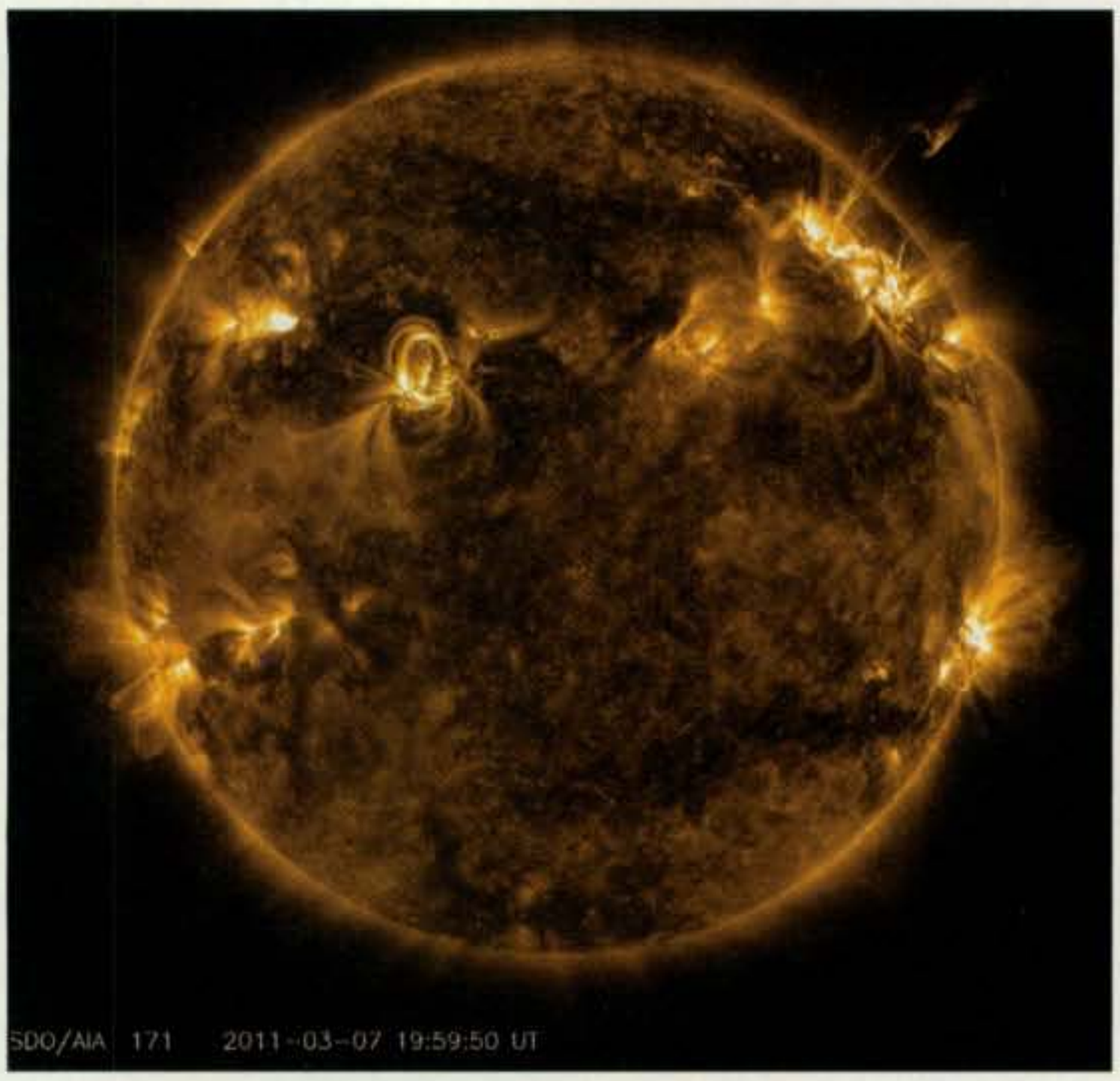
What sparked all of this excitement? The month of March began with the 10.7-cm flux already at a record high for sunspot Cycle 24, with the daily radio flux reported as 111! As the ARRL contest weekend commenced, the radio flux had risen to 114. This level of energy had not been seen since 2005, six long years ago!

Finally, by March 8 the daily 10.7-cm radio flux reading reached a new record for the new cycle—a very welcomed 155! This was the highest level of solar energy since July 23, 2004, when the daily radio flux reached 165. That is a very long seven years since we've witnessed this level of solar energy ionizing the *F*-region, enabling worldwide DX!

Other records were broken during the same week: On the same day, March 8, the total smoothed observed sunspot count was 137. The highest previous count was six years earlier, back on July 7, 2005, when the daily number was 149. Interestingly, the total combined sunspot area reached an incredibly huge size of 1650 "solar hemisphere" units (the units of sunspot area is millionths of the Sun's visible hemisphere). The last time the Sun was that covered by sunspots was January 18, 2005, when the combined size of that day's sunspots (109) also equaled 1650.

What does all of this mean? This author believes that it is safe to state that the new sunspot Cycle 24 is finally showing a steady and more rapid rise in overall level of activity and energy. The trend numbers of this cycle do show this. The good news is that the Provisional International monthly mean sunspot number for February 2011 is 29.4; that's the highest so far in Cycle 24, starting with August 2009 when the monthly count was zero.

*e-mail: <nw7us@nw7us.us>



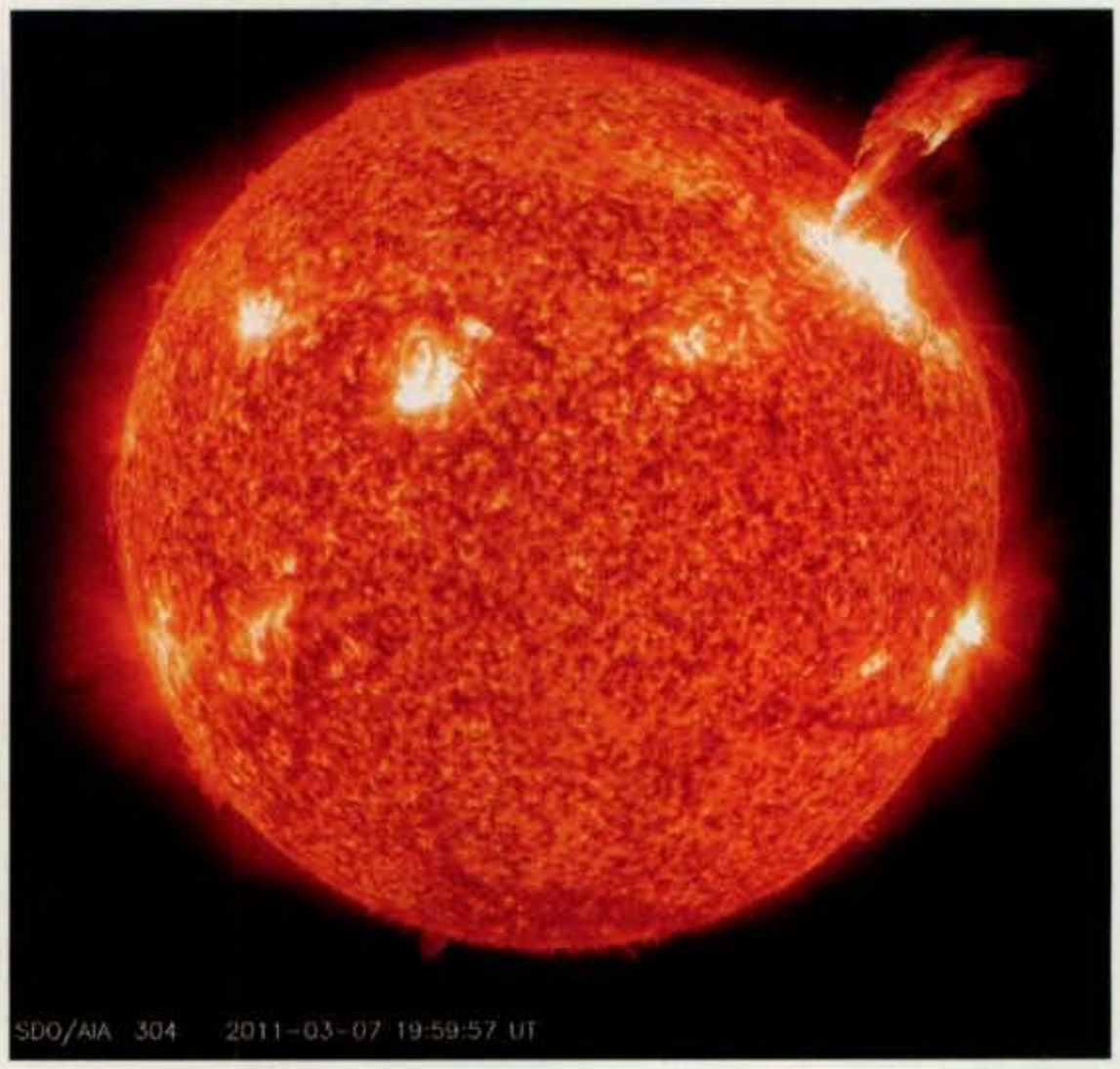


Fig. 1– With numerous active regions populating the Sun's surface during the first weeks of March 2011, it is no surprise that over about two days (Mar. 6–8, 2011) the Solar Dynamics Observatory spacecraft saw X-ray flares and coronal mass ejections popping off in many directions. These two images were taken in extreme ultraviolet light; the yellow is at the 171-Angstrom wavelenth and the red image is at the 304-Angstrom wavelength as seen by the SDO Atmospheric Imaging Assembly (AIA), an array of four telescopes that observes the surface and atmosphere of the Sun. Besides the many storms, the Sun was alive with arcing loops revealing magnetic field lines interacting above the active regions. It was quite a dynamic display and further evidence that the Sun is really coming out of its long solar minimum period of reduced activity. (Credit: SDO/AIA)

Just like February, March also had quite a few X-ray flares, including another X-class eruption. Some of the M-class flares were associated with CMEs (coronal mass ejections) that were directed toward Earth, so within three days of those eruptions minor geomagnetic storm conditions developed, causing some degradation of ionospheric radio propagation. During one passage of a CME, a proton storm ensued, making trans-polar radio DXing impossible. Of course, on the sunlit side of the Earth each flare caused a short-term sudden ionospheric disturbance (also known as a radio blackout). These chaotic conditions come with the increased and welcomed sunspot activity; we have to accept the occasional bad with the overall great conditions when the Sun's energy is on the rise.

As this column goes to press, the sunspot activity has somewhat decreased, but it is clear by close examination of the STEREO Behind and Ahead images that now allow us to see completely around the entire Sun, that there is plenty of sunspot activity coming our way. This will be a very active month for HF communications!

May Conditions

Not only are we expecting the exciting return of *F*-region propagation on higher amateur radio bands such as 10 and 15 meters for long-range DXing, but we also expect the annual summer sporadic-*E* (*Es*) season to begin around May 1 (sometimes during the last week of April). The *Es* activity is sparse during the first two weeks of May and then it picks up to about 60 percent of the days by the end of May. This is great news for 10-meter enthusiasts, because we will see a mix of both short-range communications via the *E*-region propagation, but an enhancement from the *F*-region when the 10.7-cm radio flux rises above 110. Certainly, this is the

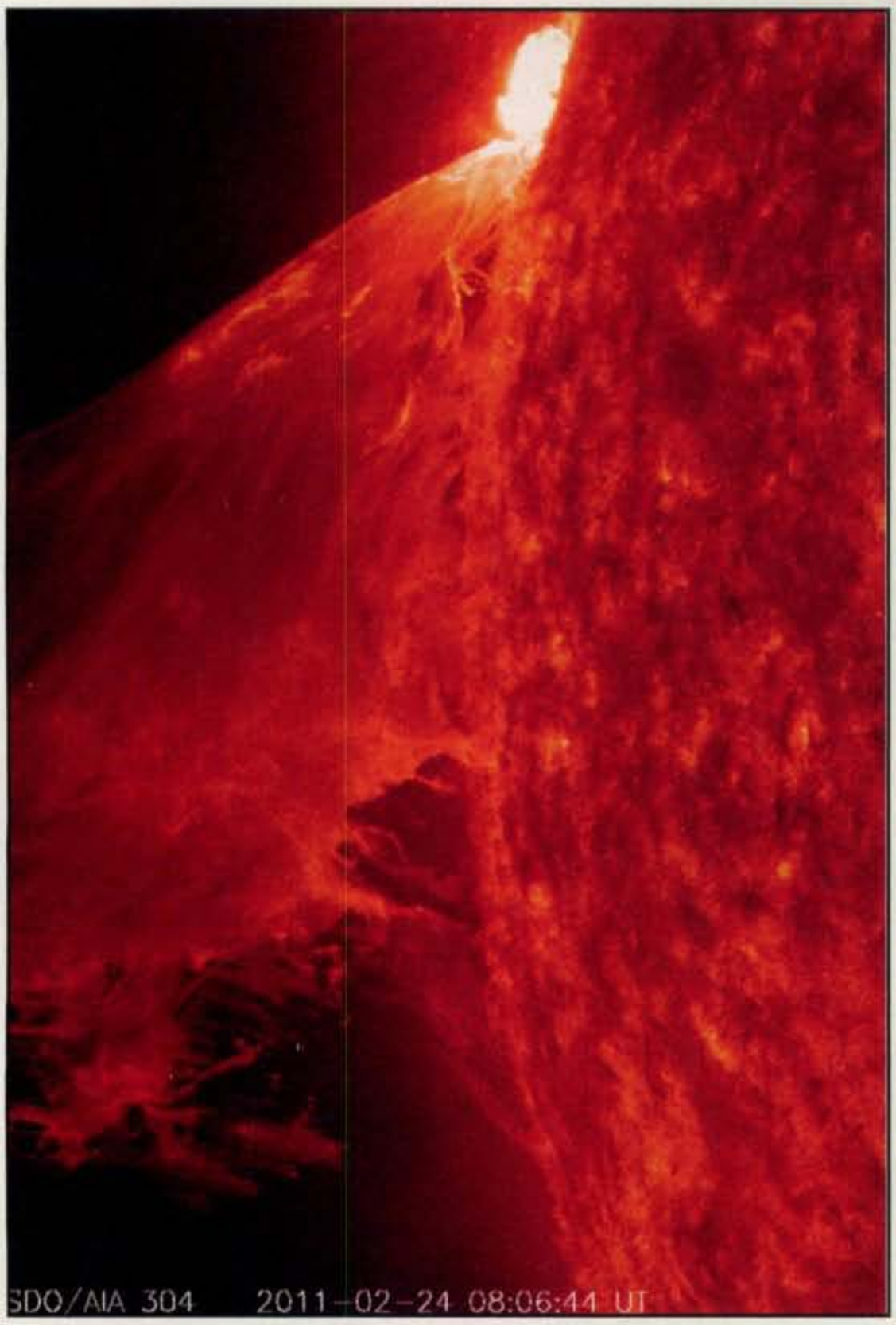


Fig. 2– Monster Prominence. When a rather large-size (an M3.6 class) X-ray flare exploded near the eastern edge of the Sun, it blew out a spectacular, waving mass of erupting plasma that swirled and twisted over a 90-minute period (Feb. 24, 2011). This event was captured in extreme ultraviolet light by NASA's Solar Dynamics Observatory spacecraft (at the 304-Angstrom wavelength in this image). Some of the material blew out into space and other portions fell back to the surface. A solar prominence (also known as a filament when viewed against the solar disk) is a large, bright feature extending outward from the Sun's surface. Prominences are anchored to the Sun's surface in the photosphere, and extend outwards into the Sun's hot outer atmosphere, called the corona. A prominence forms over time scales of about a day, and stable prominences may persist in the corona for several months, looping hundreds of thousands of miles into space. Scientists are still researching how and why prominences are formed. The red-glowing looped material is plasma, a hot gas comprised of electrically charged hydrogen and helium. The prominence plasma flows along a tangled and twisted structure of magnetic fields generated by the Sun's internal dynamo. An erupting prominence occurs when such a structure becomes unstable and bursts outward, releasing the plasma. When a prominence erupts, the released material is part of a larger magnetic structure called a coronal mass ejection (CME). When directed toward Earth, CMEs can interact with our magnetic field and trigger a geomagnetic storm, with bright auroras and the potential for disturbance in communications and electrical power networks. (Credit: SDO/AIA)

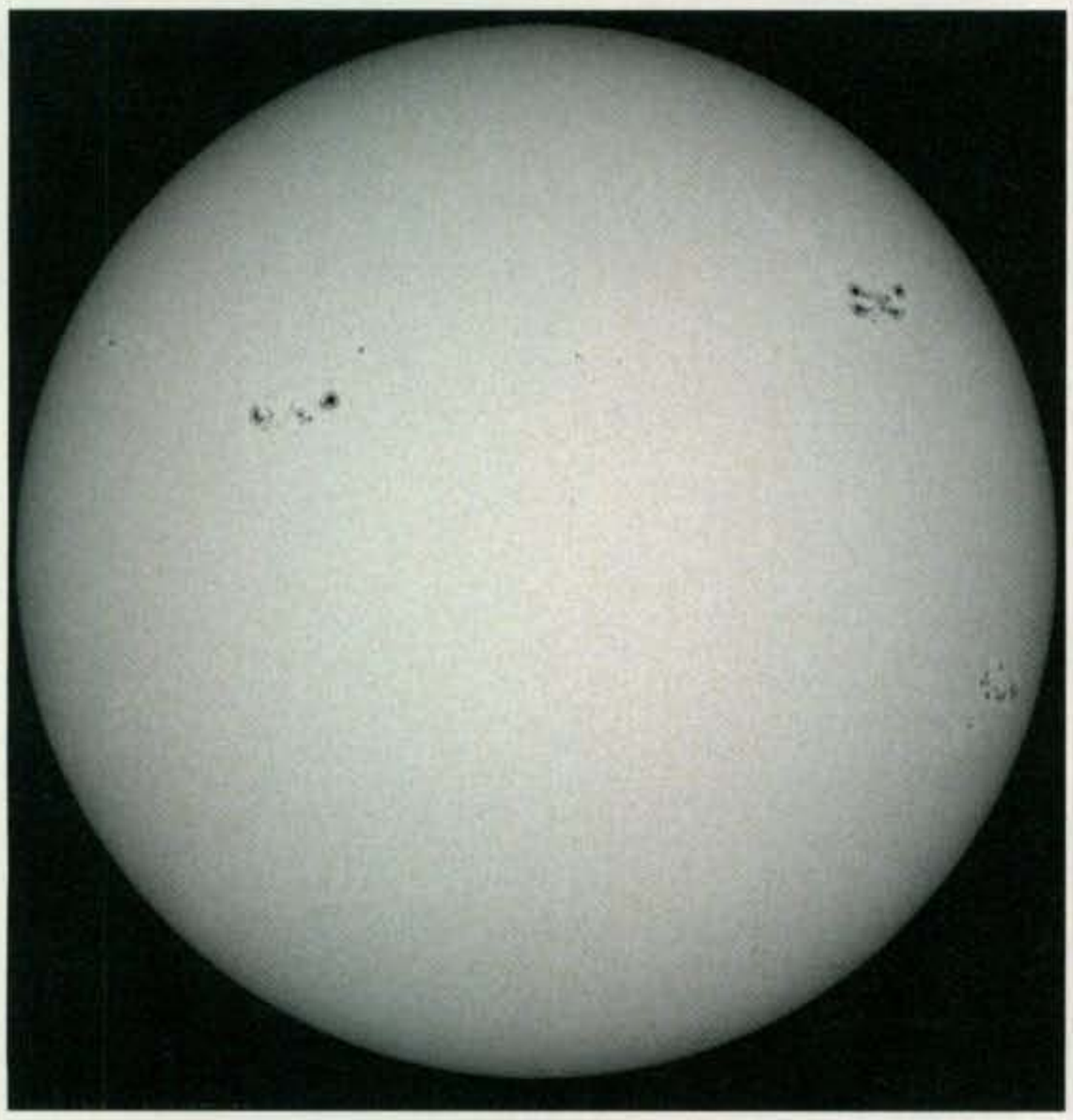


Fig. 3–The Sun as seen by the Solar Dynamics Observatory's Helioseismic and Magnetic Imager (HMI) on March 7, 2011. Records were broken during this week of March, when sunspot nu bers and the 10.7-cm radio flux levels reached the highest yet in new sunspot Cycle 24 (see text). These sunspots are huge; and the largest sunspot regions are very complex, resulting in many moderately-strong X-ray flares erupting back-to-back, day after day as these sunspots rotated across the visible solar disc. This level of solar ene gy has not been seen since 2004 and early 2005, and the results were spe tacular on the shortwave amateur radio bands, as DX was alive and well even on 10 meters. (Credit: SDO/HMI)

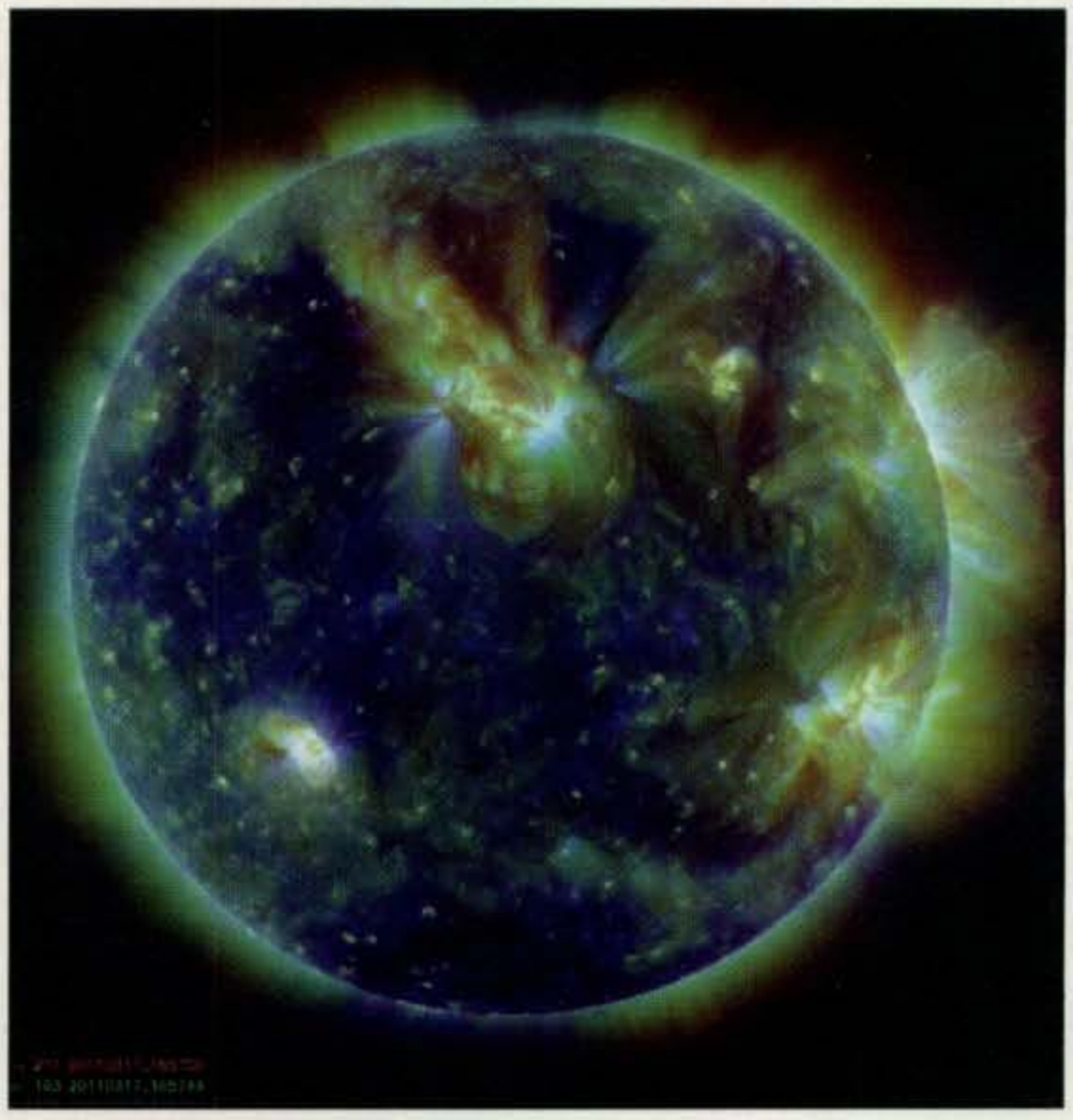


Fig. 4– Even after the intense energy seen in early March 2011, the Sun continued to provide the energy needed for 20-meter DX. This image is a combined view at the 171, 193, and 211 Angstrom wavelengths as seen by SDO/AIA, and reveals beautiful magnetic loops and plasma arches above active regions. It is an exciting time as we witness the rise of the new sunspot cycle. (Credit: SDO/AIA)

season to get those antennas and radios working on this author's favorite DX band.

On 15 meters, fairly good openings are possible toward the south during the late afternoon and evening. Numerous short-skip openings between about 600 and 2300 miles should be possible almost daily. Expect the same conditions, but with longer openings, on 17 meters.

The real day-time work band during May is 20 meters. Opening shortly after sunrise, good DX conditions are expected to one area or another through the evening hours. Expect the band to stay open to southern and tropical areas through much of the nighttime hours, especially for stations at low to mid latitudes. DX conditions should peak around the grey-line terminators (morning and evening), with openings possible to almost all areas of the world. Very frequent short-skip openings are also forecast for distances between about 350 and 2300 miles. Quite often, especially during the late afternoon, optimum conditions may exist for both short and long skip, and stations a few hundred miles away will be heard at the same time as DX stations from several thousand miles away, causing considerable interference (QRM).

Want a band that could well be your wild-card player when geomagnetic conditions get rough after major coronal mass ejections pound the Earth's magnetosphere? Try 30 meters. Using JT65A or Morse Code, this band will play a major role in DX propagation, with somewhat better nighttime propagation than 40, and solid daytime propagation into many areas of the world. Exotic DX can be found here on any of the authorized and popular modes. Check this band often during the course of the day.

Because the hours of darkness are growing less as we move closer to the summer season, fewer DX openings are expected on the lower HF bands. The higher level of static that plagues the high frequencies (because of the summer-time electrical storms and the propagation of this noise) makes it more difficult to receive the weaker DX signals. On 40 meters, we still expect fairly good openings to several areas of the world from shortly before sunset, through the hours of darkness, until shortly after sunrise. Good daytime short-skip openings can be expected over distances of between approximately 150 and 750 miles, with nighttime openings extending up to the one-hop limit of 2300 miles. On the lower bands, though, long-range DX is becoming less likely. Do take advantage of the excellent short-skip openings that are forecast for the daylight hours over distances ranging between 50 and 250 miles. During the hours of darkness, the short-skip range should increase up to approximately 2300 miles.

VHF Conditions

As expected on 10 meters, we should see the opportunity for short- to medium-distance DX on 6 meters by way of sporadic-*E* propagation with short-skip openings likely to occur over distances of approximately 1000 to 1400 miles. Although sporadic-*E* openings can take place at just about any time, the best time to check is between 10 AM and 2 PM and again between 6 and 10 PM local daylight time. During periods of intense and widespread sporadic-*E* ionization, two-hop

openings considerably beyond 1400 miles should be possible on 6 meters. Short-skip openings between about 1200 and 1400 miles may also be possible on 2 meters.

At the same time, however, the forecast does not call for the *F*-region to become energized nearly enough to support worldwide DX. It is possible that we could see occasional trans-equatorial propagation. A seasonal decline in trans-equatorial (TE) propagation is expected during May. An occasional opening may still be possible on 6 meters toward South America from the southern tier states and the Caribbean area. The best time to check for 6-meter TE openings is between 9 and 11 PM local daylight time. These TE openings will be north-south paths that cross the geomagnetic equator at an approximate right angle.

Don't forget to check out *CQ VHF* magazine for more details on VHF propagation and conditions. If you use Twitter.com, follow @hfradiospacewx for hourly updates that include the *K*-index numbers. Also check the numbers at <http://sunspotwatch.com>.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for February 2011 is 29.4, over a 10-point jump up from January's 19.0, and the highest yet in new sunspot Cycle 24. The lowest daily sunspot value of 9 was recorded on February 6 and 7. The highest daily sunspot count was 53 on February 14. The 12-month running smoothed sunspot number centered on August 2010 is 17.4, up from July's 16.8. A smoothed sunspot count of 50, give or take about 9 points, is expected for May 2011.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 94.5 for February 2011, up significantly from January's 83.7. The 12-month smoothed 10.7-cm flux centered on August 2010 is 80.7. The predicted smoothed 10.7-cm solar flux for May 2011 is 107, give or take about 9 points. If we do see this high a flux in May, expect openings on 12 and 12 meters primarily on paths between the Northern and Southern Hemispheres; expect even more activity on 15 and 17 meters.

The observed monthly mean planetary *A*-index (*Ap*) for February 2011 is 5 (January's adjusted is now 6). These figures still indicate very quiet geomagnetic conditions overall. However, this is slowly changing now that we are seeing a rise in solar energy and sunspot activity. The 12-month smoothed *Ap*-index centered on August 2010 is 6.2, about the same as for July. Expect the overall geomagnetic activity to vary greatly between quiet to minor storm level during May; expect more geomagnetic activity as we continue into the new sunspot cycle. Refer to the Last-Minute Forecast on the first page of this column 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://hfradio.org/forums/>. If you are on Facebook, check out <http://tinyurl.com/fbswx> and <http://tinyurl.com/fb-nw7us>. Speaking of Facebook, check out the CQ Amateur Radio Magazine fan page at <http://tinyurl.com/fb-cqm>.

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

Number groups after callsigns denote the following: Band, Final Score, QSOs, Countries, Zones, US/VE. An asterisk (*) indicates low power. Certificate winners are listed in boldface.

2010 RTTY RESULTS
SINGLE OPERATOR
NORTH AMERICA

United States

W1UE	**A**	**4,234,020**	**2,971**	**292**	**100**	**203**
W1ZK	*	619,820	787	164	64	112
W1RY	*	553,014	749	166	58	118
AE1P	*	552,896	823	149	61	116
W1ZT	*	517,440	617	181	69	86
K1FWE	*	445,155	683	147	52	96
K3IU/1	*	358,160	504	151	59	86
NR1X	*	239,364	503	109	47	88
W1UJ	*	106,774	248	100	40	57
K5ZD/1	*	103,930	217	111	44	35
W5MPC/1	*	54,808	165	79	33	12
W2QQ/1	*	46,311	166	60	30	39
K1GE	*	26,829	97	63	27	9
AE1T	**14**	**163,116**	**489**	**68**	**24**	**46**
KI1G	**7**	**473,280**	**1,247**	**86**	**30**	**54**
W1NK	*	2,457	33	14	10	15
AC1O	**3.5**	**19,683**	**141**	**33**	**12**	**36**
***K1IMI**	**A**	**1,134,684**	**1,208**	**202**	**66**	**119**
					(OP: N4CW)	
*WA1EHK	*	827,343	910	211	76	124
*NJ1H	*	415,233	553	171	70	110
*K1IB	*	262,818	398	144	56	79
*KA1C	*	260,848	460	136	55	81
*W1CCE	*	256,074	413	149	55	69
*W2JU/1	*	155,475	311	114	46	65
*KB1IKD	*	124,678	310	93	35	65
*KK1X	*	111,090	306	78	46	86
*KF1D	*	88,146	237	86	39	52
*W1MIG	*	84,346	232	74	42	65
*KB1JUF	*	81,500	252	71	32	60
*N1QD	*	73,112	225	70	29	53
*NX1T	*	69,375	186	80	49	56
*AA1AR	*	46,810	138	74	38	39
*W1MAW	*	46,767	195	52	30	49
*W1FA	*	44,640	159	59	30	55
*KB1GKN	*	32,226	123	58	31	34
*AB1HL	*	31,372	118	65	28	31
*NE1B	*	30,780	109	62	28	18
*AJ1E	*	18,800	92	43	19	32
*W1TO	*	16,732	73	50	28	16
*KJ1J	*	6,600	63	22	13	31
*W1QH	*	6,432	51	24	17	26
*W1MJ	*	4,602	50	20	8	11
*KX9X/1	*	480	10	9	9	2
					(OP: KX9X/1)	
***AB1J**	**7**	**76,398**	**372**	**57**	**18**	**44**
NO2T	**A**	**877,560**	**1,046**	**171**	**65**	**119**
N8CL/2	*	509,796	815	133	53	120
W2LE	*	280,896	457	137	45	49
N2EIK	*	262,625	579	99	33	59
NX2X	*	232,826	455	106	37	66
WS9M/2	*	151,683	348	102	47	68
K2NV	*	122,325	270	95	43	37
N2ZN	*	57,086	184	62	31	53
N2WLS	*	37,389	140	61	29	31
W2HIY	*	12,194	79	30	23	38
K2EN	**21**	**13,340**	**103**	**35**	**13**	**10**
K2ZC	**14**	**108,324**	**391**	**64**	**15**	**29**
W2IUC	*	28,620	157	46	19	25
W1TY/2	**7**	**180,369**	**671**	**71**	**22**	**54**
WQ2N	**3.5**	**52,574**	**321**	**42**	**12**	**43**
***N2ZAK**	**A**	**663,168**	**833**	**187**	**73**	**124**
*K2DBK	*	317,438	522	142	54	111
*KA2CYN	*	237,446	493	122	47	82
*K2DSL	*	230,651	480	112	51	100
*WA2MCR	*	227,146	403	128	53	93
*KA2D	*	226,632	388	125	51	52
*N2LK	*	142,544	303	106	50	80
*KC2RXS	*	106,344	266	94	46	71
*KA2FHN	*	95,256	244	99	43	47
*AD2TM	*	91,492	239	79	34	65
*KS2G	*	88,725	270	70	33	72
*K2TWI	*	63,450	165	92	32	11
*WB2SXY	*	53,098	175	70	32	37
*KB2NB	*	53,010	170	71	32	52
*WB2PJH	*	48,490	168	64	28	38
*K3UK/2	*	37,929	161	50	35	56
*KC2GLG	*	36,663	147	52	27	42
*WB2ABD	*	21,460	118	35	27	54
*KA2ANF	*	18,018	81	46	27	26
*K2DB	*	14,601	70	46	24	23
*WA2LXE	*	12,663	86	34	15	18
*WB2TPS	*	3,741	32	27	13	3
*N1IA/2	*	836	14	14	7	1
***KR2Q**	**14**	**7,239**	**44**	**44**	**13**	**0**
K3OK	**A**	**273,996**	**448**	**143**	**49**	**66**
N3DXX	*	225,568	350	142	60	64
N3TR	*	129,168	240	124	55	37
K3GMT	*	123,578	290	98	35	49
N3XL	*	120,059	306	85	46	80
N3NZ	*	116,997	323	76	35	66
N3INJ	*	104,760	266	92	33	55
N3BNA	*	83,424	204	95	48	33
WA3FRP	*	28,520	94	65	39	20
W3RAR	*	21,115	95	44	26	33
N3MX	*	5,828	44	28	18	16
AI3Q	**14**	**70,110**	**274**	**55**	**17**	**23**
***W3LL**	**A**	**1,336,485**	**1,272**	**229**	**80**	**108**
*KB3LIX	*	441,540	630	169	56	105
*KW3W	*	396,585	555	161	62	92
*WØBR/3	*	315,986	602	126	48	97
*N3WZR	*	269,458	528	116	48	102
*N3CHX	*	222,135	445	120	45	86
*KB3CTX	*	137,555	358	84	41	80
*N8NA/3	*	130,248	260	106	50	60
*W3AG	*	115,218	243	109	47	17
*K3TN	*	102,666	225	102	49	62
*AB3IC	*	97,760	213	102	41	45
*W3BUI	*	95,728	227	91	43	59
*WB9KPT/3	*	87,507	227	88	41	60
*KN3A	*	67,971	190	82	30	51
*K3NK	*	57,524	159	78	37	31
*W3SFG	*	16,320	100	33	22	41
*N3JNX	*	2,856	34	19	13	10
***AB3S**	**3.5**	**1,537**	**38**	**8**	**4**	**17**
N6AR/4	**A**	**1,882,800**	**1,528**	**269**	**96**	**158**
N4ZZ	*	1,768,824	1,940	201	69	161
W4PK	*	1,714,788	1,638	217	77	143
AB4GG	*	1,632,138	1,784	199	69	149
AG4W	*	1,427,403	1,477	215	86	152
WØYR/4	*	1,197,437	1,337	175	68	118
W4VIC	*	572,082	733	177	62	79
K4HMB	*	548,604	727	155	63	93
NJ2F/4	*	547,740	713	172	72	114
K4EU	*	547,049	717	159	65	87
W2YE/4	*	513,912	707	160	63	99
K4ADR	*	487,306	709	158	60	116
K4HAL	*	471,968	726	142	54	105
WY4Y	*	414,201	687	139	62	102
					(OP: NS3Q)	
WB4MSG	*	371,112	614	131	53	98
K4CX	*	308,880	628	119	53	114
AI4WW	*	276,399	507	130	47	84
W1AJT/4	*	223,270	374	140	58	71
K4SKB	*	221,343	382	137	50	80
W7DO/4	*	216,428	341	136	55	53
W4UK	*	157,437	496	76	28	49
W4KLY	*	126,485	307	90	45	70
N4PSE	*	108,665	363	52	39	120
N5WR/4	*	86,520	242	79	27	62
NT4TS	*	75,601	192	85	39	49
N4FY	*	68,992	202	65	45	66
AJ4FM	*	67,792	204	77	29	46
W4PHS	*	59,823	229	56	26	71
W7HJ/4	*	59,500	176	70	42	63
WA8OJR/4	*	58,904	212	61	33	54
WA4ZXV	*	51,745	152	82	39	10
W5XB/4	*	49,920	157	64	48	44
N3UA/4	*	42,510	136	69	35	26
*N3CZ/4	*	92,130	237	90	40	36
*WB8SKP/4	*	81,060	214	81	52	60
*KM4JA	*	79,130	222	72	47	74
*KM4RK	*	78,507	209	83	45	55
*KE1F/4	*	77,976	443	48	15	51
*N2WN/4	*	75,152	226	66	36	74
*W4TIJ	*	69,801	211	78	35	46
*N4MM	*	63,072	169	81	35	28
*KU8E/4	*	55,115	185	60	34	57
*ND1Y/4	*	54,670	199	59	32	63
*K4FTO	*	52,773	175	67	32	48
*KJ4VVR	*	44,063	170	57	32	50
*N4WO	*	40,004	176	50	30	57
*KX4O	*	32,725	123	56	31	32
*N4AU	*	32,264	118	59	25	25
*KB4KBS	*	30,380	120	57	28	39
*KTØP/4	*	24,400	102	51	25	24
*KV4CN	*	22,264	99	49	22	21
*AA4U	*	21,146	97	47	23	27
*W4GAC	*	21,014	104	48	23	8
					(OP: KP2N)	
*K4PBY	*	20,165	104	40	26	43
*NR4C	*	19,980	98	39	21	30
*KI4SP	*	19,504	98	41	28	37
*K4EDI	*	17,922	109	29	24	50
*W5NYC/4	*	15,252	106	30	19	33
*N4JIK	*	13,932	83	33	24	29
*W4OTN	*	11,135	67	33	23	29
*K1GU/4	*	10,790	78	30	11	24
*W4BK	*	10,184	82	24	17	35

Russlan, EO3Q (UR3QCW), was 2nd place in SOHP 20 meters from this neat station in the Ukraine.

Ali, HA3LI, used an ICOM IC-756Pro, homebrew linear, MixW, and a delta loop to grab 2nd place in SOHP 80 meters.

N4TL	*	34,798	122	59	31	37
N3KKM/4	*	29,719	134	47	22	44
W6IHG/4	*	22,035	105	40	29	44
KB4FB	*	19,982	80	52	29	22
KR4LO	*	19,680	114	38	23	35
N4ZY	*	16,351	73	54	29	0
WD8RYC/4	*	15,770	68	47	31	17
AF4OX	*	9,316	56	35	18	15
K4WI	**28**	**6,142**	**68**	**15**	**10**	**12**
N4BP	**21**	**364,190**	**957**	**82**	**29**	**47**
KK9A/4	**14**	**775,676**	**1,680**	**99**	**34**	**54**
W4BQF	*	91,962	413	52	20	45
AA4VV	**7**	**6,760**	**56**	**26**	**11**	**15**
***N2QT/4**	**A**	**2,281,132**	**1,952**	**266**	**95**	**153**
*N4IG	*	763,232	851	195	79	117
*WB2RHM/4	*	689,520	821	203	75	130
*W4TMO	*	522,240	675	173	60	87
*KR1ST/4	*	395,438	562	159	59	108
*KG4JGQ	*	322,660	458	156	60	76
*K4CC	*	306,386	489	144	66	97
*KN4QD	*	283,568	452	151	60	85
*K4OD	*	235,914	442	120	62	105
*NV4B	*	200,760	342	124	60	96
*KF4VTT	*	156,240	260	137	65	38
*AA4FU	*	139,974	270	119	55	72
*WØQQG/4	*	131,400	310	98	42	79
*WB4OMM	*	111,230	216	111	58	58
*NB4M	*	110,780	287	87	45	59
*WB5NMZ/4	*	103,930	251	91	44	55
*KU4A	*	94,188	278	73	35	80
*K4MIL	*	9,870	57	37	19	14
*AI4GR	*	8,568	64	25	18	25
*K8LF/4	*	4,956	54	18	14	27
*KO4OL	*	4,730	55	17	16	22
*NG4L	*	4,648	59	15	12	29
*W3NR/4	*	3,417	40	14	12	25
*KJ4NPR	*	2,405	33	15	8	14
*KW4G	*	1,200	21	11	11	8
*N1HO/4	*	1,120	18	13	10	5
*KA3EHL/4	*	483	20	3	4	14
***W4LC**	**14**	**206,150**	**530**	**86**	**30**	**39**
*KT6D/4	*	33,120	172	48	18	30
***WA1FCN/4**	**7**	**152,985**	**664**	**64**	**22**	**55**
*AD4Z	*	89,208	378	61	18	47
***NQ4K**	**3.5**	**2,016**	**65**	**3**	**3**	**22**
K5DU	**A**	**1,464,960**	**1,845**	**175**	**81**	**164**
NX5O	*	1,043,532	1,333	175	76	153
K5CM	*	903,344	1,220	163	72	109
K7IA/5	*	530,712	906	140	63	148
KE3D/5	*	235,106	391	131	57	81
AA5VU	*	189,225	400	101	53	107
KD5JAA	*	161,945	330	84	53	108
K5WA	*	106,380	342	68	30	82
W5OV	*	23,192	141	32	28	44
N5RZ	**14**	**12,978**	**152**	**15**	**10**	**38**
***AD5XD**	**A**	**534,852**	**969**	**136**	**69**	**153**
*K5DHY	*	326,304	505	143	65	101
*WB5AAA	*	286,442	451	142	63	94
*N5KWN	*	238,952	562	98	55	98
*AD5LU	*	149,872	387	86	52	94
*NN5T	*	147,403	318	98	52	73
*K5DD	*	85,840	239	87	43	55
*W5JBO	*	83,013	295	56	32	89
*N5MOA	*	64,792	174	76	55	51
*NK5G	*	55,428	199	64	34	51
*N5PU	*	53,144	168	67	37	42
*N5UWY	*	46,916	177	54	45	49
*WA9AFM/5	*	25,410	117	44	34	43
*K5NDC	*	1,271	25	10	11	10
***N5ER**	**14**	**138,861**	**443**	**71**	**27**	**41**
*WM5DX	*	98,868	401	61	26	45
*AE5MM	*	8,494	73	27	14	21
K6LRN	**A**	**520,785**	**756**	**136**	**74**	**145**
NN6XX	*	404,735	707	119	66	120
W6SX	*	276,148	761	61	47	154
K6DGW	*	218,920	619	67	51	142
W4UAT/6	*	218,124	412	90	63	96
WU6W	*	71,553	229	57	42	84
N5KO/6	*	66,898	197	59	48	59
K6TD	*	62,823	217	48	33	48
N6PE	*	59,032	184	67	45	45
N6RI	*	49,704	176	56	43	53
K6IP	*	44,198	158	51	39	64
WB6JJJ	*	43,248	156	53	42	64
N6BM	*	39,325	152	48	33	62
K6XX	*	22,632	115	30	29	23
NY6I	*	13,483	77	30	29	38
					(OP: N6AJR)	
AF6SN	*	7,140	87	12	13	35
N6AJR	*	700	21	5	6	14
N6AN	*	660	13	8	10	4
KT6YL	**21**	**103,600**	**516**	**47**	**24**	**41**
K6HGF	*	22,496	187	25	18	31
W6WRT	**14**	**127,568**	**503**	**58**	**27**	**51**
N6ND	*	115,209	327	79	29	45
W6ONV	*	53,680	322	41	20	49
AI6YL	**7**	**231,855**	**822**	**63**	**29**	**53**
***WN6K**	**A**	**383,500**	**772**	**86**	**59**	**150**
*K6GEP	*	254,492	500	99	65	134
*N6RV	*	246,463	441	107	66	84
*W6FFH	*	153,999	421	76	47	90
*W6KY	*	108,054	308	57	52	98
*NF6P	*	106,858	302	67	51	84
*KQ6ES	*	100,815	325	57	47	91
*KE6SHL	*	77,786	306	48	39	91
*K6GFJ	*	63,672	196	62	43	63
*WA6L	*	50,750	205	43	37	65
*KF6RY	*	41,035	168	39	37	69
					(OP: W6ZL)	
*K6BIR	*	37,204	171	33	36	73
*K2RDX/6	*	27,348	133	31	28	70
*N3FAW/6	*	11,811	96	19	20	54
*N2NS/6	*	5,452	45	22	22	14
*N6MSY	*	2,318	50	6	7	25
***W6TK**	**21**	**20,164**	**128**	**26**	**21**	**24**
*NK6A	*	10,659	98	18	16	23
***N6BHX**	**14**	**8,060**	**90**	**13**	**13**	**36**
K7QQ	**A**	**1,381,024**	**1,635**	**175**	**76**	**161**
K7AR	*	916,584	1,132	172	88	162
W6AEA/7	*	706,192	993	138	79	151
KØJJ/7	*	485,430	886	117	66	147
N7BT	*	405,450	794	94	52	109
K7RF	*	385,392	613	120	68	108
W7MRC	*	351,480	749	89	60	154
					(OP: NG7Z)	
W7NNN	*	350,132	727	88	56	127
NK7C	*	151,916	331	96	56	81
KE7YF	*	134,470	360	69	53	104
KV7DX	*	132,200	390	55	46	99
					(OP: KN5H)	
KD7MSC	*	108,852	374	52	47	94
NI7R	*	87,271	272	60	49	88
NO7T	*	86,460	254	72	38	55
K7ABL	*	58,560	299	48	23	51
W7PU	*	55,100	240	46	23	47
AD7XZ	*	54,165	257	34	29	94
WG7X	*	53,792	194	51	38	75
K7KAR	*	32,110	118	52	37	41
NG7M	*	6,188	60	19	19	30
N6KW/7	*	1,170	23	9	10	11
W7ABC	*	529	12	9	10	4
KK7CG	*	308	12	5	6	11
W7ZR	**21**	**182,924**	**708**	**64**	**27**	**48**
W7WW	**14**	**276,024**	**974**	**74**	**28**	**57**
N7WS	*	199,386	705	75	29	55
K7AMS	*	72,820	364	37	23	50
W7RY	**7**	**152,344**	**609**	**59**	**25**	**53**
K7WP	*	133,840	552	65	23	52
***AB7R**	**A**	**467,654**	**904**	**100**	**62**	**157**
*NQ7R	*	201,664	400	97	66	111
*K7JE	*	139,920	298	96	56	60
*KD7RUS	*	136,188	420	46	43	105
*KS5A/7	*	134,368	373	65	56	100
*KW7N	*	111,370	347	57	49	109
*WE6EZ/7	*	109,214	326	60	50	93
*KE7XM	*	76,590	225	61	48	76
*W7RV	*	66,165	207	60	43	62
*N7ESU	*	64,094	313	32	29	85
*K7XC	*	61,236	187	64	42	56
*AC7JW	*	51,830	188	46	44	56
*KC7V	*	51,357	211	44	36	79
*N7MQ	*	51,100	205	56	29	61
*K7HBN	*	48,657	200	41	37	69
*AE7AP	*	47,656	234	35	31	95
*KX7L	*	42,560	186	41	36	75
*WAØWWW/7	*	39,336	182	38	32	62
*W7LD	*	39,116	144	54	38	62
*WA7SHP	*	35,868	175	26	30	66
*W7JDE	*	35,475	197	25	28	76
*KY7K	*	30,996	161	32	28	66
*N6PZ/7	*	30,840	153	31	31	58
*N1JM/7	*	27,467	155	29	29	63
*K7MKL	*	25,606	127	41	28	49
*KB7Q	*	21,100	167	16	19	65
*W7ZRC	*	14,896	81	39	21	16
*K7CAT	*	5,700	59	15	18	24
*KE7VZW	*	3,901	56	10	12	25
*AD7OG	*	3,456	42	14	19	21
*W4JLS/7	*	3,283	60	6	8	35
*W7JAZ	*	2,340	33	9	14	22
*N7AM	*	110	7	3	3	5
***K7ULS**	**28**	**279**	**11**	**4**	**4**	**1**
***K7MY**	**21**	**14,885**	**95**	**31**	**19**	**15**
*N6HI/7	*	323	9	7	8	2
***W1ZD/7**	**14**	**116,582**	**469**	**64**	**28**	**50**
*WA7BME	*	5,782	69	13	11	25
*K7EKM	*	5,661	73	12	10	29
*W7LKG	*	1,591	35	6	7	24
*W7CAR	*	1,190	25	8	9	17
					(OP:@W7CAR)	

*K2PO/7	7	62,150	348	38	22	53
(OP: K2PO/7)						
*W9PL/7	*	3,627	63	8	9	22
N8BJQ	A	1,540,080	1,451	228	89	148
K3GP/8	*	547,212	617	195	78	99
KU1T/8	*	412,395	585	146	59	80
K8NWD	*	227,076	438	114	48	92
W8JWN	*	166,254	308	115	54	73
WB8MKH	*	136,059	389	75	42	100
N8NOE	*	78,474	248	74	32	68
K8TJM	*	56,474	199	65	33	53
N8IW	*	28,194	124	51	23	37
K8ALM	*	20,553	81	57	27	9
KK8X	21	103,572	353	78	26	22
N8XI	14	89,798	299	68	19	31
W8OHT	7	1,650	27	14	8	8
*K8AJS	A	613,800	900	147	63	120
*WB8TLI	*	343,735	458	162	68	75
*KK8MM	*	318,240	507	149	63	94
*AA8IA	*	203,280	412	116	55	93
*N2OPW/8	*	192,024	425	108	48	96
*WG8Y	*	151,863	326	109	48	66
*KJ8O	*	109,956	323	82	39	83
*KN8DMK	*	89,679	230	88	38	53
*NX8G	*	84,466	339	50	27	80
*KK8Y	*	83,886	181	110	44	32
*N8VV	*	63,666	210	61	39	62
*W8IDM	*	59,210	230	56	33	66
*KD8LZT	*	42,316	159	54	38	50
*K8DXR	*	15,903	102	28	22	43
*KG9Z/8	28	403	11	7	5	1
*K8SM	14	84,840	280	73	25	22
*WB8JUI	7	51,528	286	49	15	49
K9OM	A	337,523	810	92	32	49
K9CT	*	264,385	493	113	62	78
N9WKW	*	197,115	399	111	51	93
W9ZP	*	166,896	311	122	51	55
WI9WI	*	27,000	98	54	40	31
WB9Z	14	609,875	1,407	91	34	50
*KT9L	A	139,800	330	97	44	92
*N9CK	*	130,065	314	88	40	67
*N9LYE	*	113,420	268	91	49	72
*W9VQ	*	99,216	206	105	53	50
*W9OA/9	*	84,132	216	82	43	46
(OP: W9OA/9)						
*K9PY	*	56,898	150	82	46	46
*WR9Y	*	55,902	198	57	31	66
*W9AKS	*	49,876	190	56	31	61
*W9ILY	*	40,504	151	64	33	25
*WQ9T	*	37,084	160	50	31	46
*K9OR	*	34,701	109	74	34	21
*W9HLY	*	32,100	135	52	21	34
*W9TTT	*	26,660	111	47	33	44
*K9KJ	*	20,384	98	46	26	32
*AI9K	*	14,240	105	26	19	44
*AJ9C	*	12,516	58	47	29	8
*KC9GHA	*	812	14	11	11	6
*AF9T	*	400	15	5	6	9
*W9KVR	21	11,328	94	33	19	7
*KD9MS	7	37,151	250	39	15	43
*K9WX	*	26,622	215	30	12	45
*N9TF	3.5	6,210	110	6	6	34
ACØC	A	513,304	972	139	62	106
NTØV	*	416,185	660	150	69	110
KØPK	*	237,656	506	90	53	101
WBØN	*	189,992	423	102	57	95
KØAP	*	159,032	313	112	51	30
KØVG	*	133,380	341	85	45	98
WØZQ	*	128,475	336	76	45	104
NØOK	*	113,424	265	88	57	59
NSØM	*	71,857	218	65	45	71
KØCN	*	60,368	191	66	33	55
WØTY	*	42,312	154	63	35	31
WT9Q/Ø	*	30,576	248	22	18	58
KØJJR	*	15,456	114	25	20	47
NØLEF	*	11,266	85	24	22	40
KTØDX	14	229,194	763	77	27	49
WØGJ	7	232,892	786	76	28	54
ABØLR	*	23,288	196	23	16	43
*K7RE/Ø	A	589,475	1,081	125	58	140
*NØBUI	*	258,266	575	99	51	113
*KØMPH	*	229,230	453	106	55	109
*KCØBMF	*	182,118	396	97	56	86
*WØPC	*	143,208	365	88	44	89
*WØRAA	*	123,264	423	76	47	69
*KØJUH	*	112,662	228	104	50	44
*WØEM	*	76,350	361	45	28	77
*KØAD	*	65,832	286	50	29	77
*WØSM	*	39,864	170	49	35	48
*KAØEIC	*	39,600	153	52	34	58
*WØPI	*	38,216	172	45	33	58
*WBØQLU	*	36,820	176	42	28	70
*KJØP	*	32,289	147	45	33	63
*KØTI	*	28,122	137	46	24	39
*KØLDS	*	22,220	109	36	31	43
*AAØK	*	18,576	126	25	22	61
*KAØVXK	*	16,188	81	49	27	0
*KIØHA	*	9,492	66	28	28	28
*KØVM	*	8,023	62	25	19	27
*KØALT	*	4,788	47	19	18	20
*KCØNFB	*	3,127	36	17	17	19
*NØIBT	*	2,664	57	8	9	19
*KFØIQ	21	12,544	86	39	18	7
*AI1P/Ø	*	5,676	62	22	15	6
*AKØA	14	269,880	830	80	29	47
*WNØL	*	69,920	276	62	21	32
*NØUJJ	*	2,268	48	8	9	19
*KØPC	*	1,998	27	17	6	4
*KC5ZFZ/Ø	*	1,736	45	5	6	20
*ABØYM	7	4,859	96	7	7	29

Alaska

KL7IWC	A	347,655	640	88	50	93
KL7RA	14	426,240	1,051	75	30	55
*AL7L	A	43,050	182	25	25	55

Canada

VE9AA	A	335,824	476	140	56	82
*VY2SS	A	1,047,333	1,165	180	59	132
*VY2MP	*	106,074	272	71	30	65
*VE1BZI	*	60,095	203	57	20	42
*VE1ZD	*	59,976	174	74	27	35
*VO1NM	14	1,650	25	11	7	12
*VY2LI	7	189,174	637	61	15	47
*VE1AOE	*	71,642	267	57	14	42
VA2WDQ	A	533,010	659	157	61	108
VE2FK	*	498,012	692	144	47	91
VE2FXL	*	2,442	31	13	11	13
*VA2UP	A	2,123,655	1,865	228	76	161
*VE2AXO	*	702,202	848	158	58	107
*VE2QV	*	7,920	51	23	20	23
(OP: VE2FFE)						
VE3EY	A	1,723,496	1,658	187	70	131
VE3DZ	*	1,627,200	1,438	223	79	150
VA3XH	*	682,312	795	172	61	113
VE3GLA	*	33,475	120	57	24	22
VE3MV	*	27,391	140	29	13	49
VA3TTU	14	94,488	282	71	26	30
*VA3SB	A	584,100	712	161	57	112
*VE3FH	*	567,273	673	174	66	117
*VE3KI	*	530,910	713	145	52	109
*VE3XAT	*	397,839	536	149	59	95
*VE3YF	*	339,227	442	160	57	84
*VE3FDT	*	330,498	447	146	62	93
*VA3PL	*	179,068	387	86	39	53
*VE3MCF	*	153,857	312	98	40	59
*VE3AJ	*	139,256	284	90	48	68
*VE3HG	*	116,725	254	89	39	47
*VE3FJ	*	84,966	233	76	36	35
*VE3GYL	*	74,676	212	69	32	46
*VE3RCN	*	27,904	114	34	23	52
*VA3FN	*	9,425	64	24	13	28
*VE3IAE	7	68,970	274	51	16	43
*VE3CV	3.5	40,500	254	18	13	50
*VA3WPV	*	7,344	69	20	8	20
*VA5SAM	A	1,888	21	17	15	0
*VA5LF	14	104,260	338	64	25	41
*VE6MO	A	24,395	123	29	18	38
*VE6RRD	*	840	15	10	8	3
VA7KO	A	937,664	1,109	134	76	158
VE7CF	*	78,246	256	41	29	68
VE7HBS	14	32,704	256	12	11	41
*VA7ST	A	631,104	789	128	63	155
*VE7BC	*	496,782	834	85	53	148
*VE7BSM	*	217,125	441	73	42	110
*VE7FCO	*	32,136	127	44	24	36
*VA7CPC	*	29,376	125	35	26	47
*VA7HZ	*	19,285	99	23	24	48
*VE7BGP	*	5,085	44	18	18	9
*VA7DXC	*	2,205	28	11	11	13

Cuba

CM2QM	A	9,685	57	38	27	0
CO2GL	*	1,530	23	9	7	14
CO2EL	21	37,900	164	46	20	34
*CO3JN	A	612,095	686	182	65	112
*CO3CJ	*	385,728	555	132	56	106
*CM3RPN	*	358,540	575	131	49	80
*CO2NO	*	96,237	276	58	25	70
*CO8CML	*	51,660	161	62	26	38
*CO3LC	*	27,248	109	50	21	33
*CO2VE	*	18,841	96	35	17	31
*CM2RVA	*	4,743	39	17	18	16
*CO8TW	21	28,405	208	18	11	36
*CO8ZZ	7	49,543	212	44	16	43
*CO2OT	*	46,300	190	49	13	38
*CM2IR	*	17,085	110	28	10	29
*CO6WYR	*	14,728	96	43	13	0

Dominican Republic

HI8PJP	14	118,293	381	61	21	47
*HI3TEJ	A	3,031,380	2,437	227	70	198
*HI8PLE/7	*	21,280	106	39	15	26

Guadeloupe

*FG5LA	A	386,740	618	115	41	88
*FG1PP	*	107,445	234	79	43	73

Martinique

FM5CD	A	3,520,598	2,512	274	95	209

Mexico

XE2K	A	1,892,900	1,740	182	90	188
XE1V	*	30,326	103	52	35	31
*XE3N	A	691,600	845	141	66	143
*XE1MM	*	498,946	690	118	60	136
*XE2FGC	*	303,552	553	66	57	125
*XE2AI	*	148,390	317	78	46	85
*4B1GZU	*	93,620	299	32	30	89
*XE2YWH	21	32,045	163	32	16	37

Panama

*HP1ALX	A	12,561	64	34	24	21
*HP1RIS	28	13,056	116	12	12	27
*HP1DCP	21	25,813	134	33	18	32

Puerto Rico

*WP3GW	A	29,133	95	60	38	19
*NP3YL	28	2,576	41	6	5	17

AFRICA

African Italy

*IH9YMC	21	18,146	141	30	11	2

Canary Islands

EA8CNB	14	62,858	199	42	19	45
*EA8AJO	A	277,032	394	150	52	36
*EC8AFM	*	274,468	393	146	51	39
*EA8BQM	*	56,376	162	75	29	12
*EA8CNR	*	8,236	48	35	20	3
*EA8ARG	14	21,580	112	44	14	7

Chagos Islands

VQ9LA	A	1,561,290	1,471	206	73	76

Djibouti

*J28AA	14	26,427	129	45	19	5
(OP: E7ØA)						

Egypt

*SU/HA3JB	14	137,256	547	64	20	0
(OP: HA3JB)						

Madeira Islands

*CT3HF	A	35,190	171	50	19	0

Nigeria

5N7M	A	541,499	608	174	70	57
(OP: OM3CGN)						

Senegal

*6V7X	A	2,956,388	2,065	256	70	153
(OP: IK2FIL)						

South Africa

ZS2DL	A	570,412	811	145	62	29
*ZS2I	A	139,731	333	102	36	3
*ZS1JY	*	50,384	129	69	41	24
*ZS6BB	*	1,586	21	10	7	9

Sudan

*ST2AR	A	3,575,296	2,337	303	97	112

ASIA

Asiatic Russia

R8TX	A	135,592	372	94	38	4
RT8O	14	22,848	156	36	15	0
*RA8T	A	1,041,998	1,126	221	74	28
(OP: UA9TZ)						
*R8XF	21	2,075	32	18	7	0
*UF8T	14	1,200	21	14	10	0
RA9AU	A	898,899	1,086	205	66	20
UA9OG	*	457,173	714	149	62	26
RA9ULK	*	228,701	468	136	49	2
UA9BS	*	203,312	373	135	47	12
RW9UW	*	183,180	510	99	30	0
RL9I	*	112,590	311	81	36	22
RA9UN	*	26,908	167	43	19	0
UA9OLO	*	14,413	78	46	25	0
R9CD	*	3,276	34	23	13	0
UA9UR	28	3,828	50	21	12	0
R9CB	3.5	29,952	206	43	9	0
*RG9A	A	2,395,470	2,151	267	87	31
*RW9C	*	714,082	831	212	73	22
*UA9AFS	*	654,123	928	191	55	3
*RA9JB	*	329,491	697	118	38	11
*RV9CP	*	163,761	340	115	46	8
*RM9X	*	153,600	286	136	46	10
*RU9AZ/9	*	113,850	297	111	39	0
(OP: RU9AZ/9)						
*R9UG	*	81,087	205	100	47	4
*RK9FBE	*	80,948	247	85	29	4
*UA9AX	*	47,652	158	79	35	0
*RA9SN	*	31,365	128	66	19	0
*UA9FM	*	13,585	72	47	16	2
*RA9RR	21	97,334	415	61	21	0
*RX9FG	14	128,913	469	73	23	1
*RA9AFZ	*	36,126	164	60	17	4
UAØYAY	A	524,841	801	154	67	30
RAØFLP	*	397,271	767	103	54	46
UAØCW	21	19,497	104	51	16	0
RDØC	14	558,756	1,105	98	35	54
(OP: UAØCA)						
UAØAGI	*	317,361	722	84	33	46
UAØSR	*	89,815	293	65	27	23
*RWØSR	A	504,108	877	140	56	32
*UAØCDC	*	125,652	363	92	50	6
*UAØCNX	*	116,883	481	68	43	0
*RAØLG	*	99,207	254	92	44	15
*RWØAA	*	88,425	280	87	44	0
*RAØAUQ	*	50,150	171	69	40	9
*UAØLD	*	37,323	159	56	27	4
*RAØAY	*	26,370	121	57	32	1
*UAØZC	*	9,230	50	40	28	3
*UAØIT	*	3,596	46	15	15	1
*RUØANW	21	85,695	382	63	24	0
*RAØSF	*	40,275	217	55	20	0
*RNØSS	*	11,037	128	23	16	0
*RNØCF	14	37,740	241	39	21	8
*RAØWHE	*	8,742	71	31	12	4
*RMØW	*	3,219	46	21	8	0

Asiatic Turkey

TA2MW	A	42,416	163	65	23	0
*TA7AO	21	114,070	652	47	14	0

Azerbaijan

*4K3FF	A	488,280	874	140	42	13
*4K9W	*	190,365	585	87	23	1

China

BA7CK	21	59,126	314	53	21	0
*BG1TPD	A	48,800	189	59	32	9
*BA1GM	*	28,620	212	39	15	0
*BD7MTJ	*	6,307	45	31	22	0
*BD4CB	*	5,236	47	23	17	4
*BD4CD	*	2,080	23	21	11	0
*BD3PCH	*	2,044	34	15	13	0
*BD6JJX	21	80,240	383	60	25	0
*BA6IV	*	19,200	209	27	13	0
*BD5DML	*	3,201	33	23	10	0
*BG6JPV	*	1,863	33	14	9	0
*BG2TXV	14	39,366	180	52	22	7
*BD1TCC	*	32,760	177	52	18	0
*BG7NFM	*	1,650	34	12	10	0
*BD4SP	7	20,412	164	34	16	4
*BA4SCP	*	65	7	3	2	0

Cyprus

*H2E	A	1,103,368	1,171	216	76	31

Georgia

*4L1BR	A	381,367	737	134	41	6
*4L9QQ	3.5	58,520	355	46	9	1

Hong Kong

*VR2PX	A	388,194	789	119	58	17
*VR2VIY	*	8,400	69	27	23	0
*VR2YQU	21	28,689	151	49	22	2

India

VU2LBW	A	798,342	1,010	186	72	24
VU2RMS	*	87,084	250	92	31	0
*VU2PTT	A	223,275	351	146	65	18
*VU2ABS	*	41,261	124	77	40	4
*VU3DJQ	14	15,759	120	33	15	3

Israel

4Z4TL	A	346,480	493	164	62	18
*4Z5CP	A	1,254,900	1,450	197	71	32
*4Z5MY	14	17,556	135	37	7	0

Japan

JF1PJK	A	1,193,790	1,104	214	95	81
JA1OVD	*	964,899	1,052	185	90	76
JO1WKO	*	191,744	324	128	60	26
JN1RQV	*	175,694	294	115	63	36
JA1IKA	*	174,497	315	110	70	31
JA1ADT	*	68,226	197	72	43	22
JF1NZW	*	15,387	81	46	23	0
JO1SIM	*	1,100	19	13	12	0
JN1BMX	28	1,674	26	14	13	0
7K4QOK	14	10,374	87	32	10	0
*JI1RXQ	A	635,712	764	159	83	66
*JA1BJI	*	386,692	549	149	77	51
*JS1OYN	*	372,163	583	140	75	38
*JA1FRQ	*	182,722	334	110	62	34
*JA1PJS	*	172,575	320	106	53	36
*JA1HFY	*	134,225	304	96	61	18
*JA1BNW	*	109,221	273	90	39	18
*JA1IZ	*	94,544	226	80	48	24
*JE1SCJ	*	81,954	195	84	54	19
*JA1AZR	*	76,664	214	76	54	18
*JH1EEB	*	63,882	181	71	38	17
*JL7XBN/1	*	61,976	178	74	41	12
*JA1SKE	*	58,797	150	75	48	18
*JF1LMB	*	52,542	141	75	49	15
*JA1DDZ	*	40,002	125	58	44	16
*JA1RQT	*	39,440	132	62	41	13
*JA1OHP	*	30,996	105	53	41	14
*JF1MAD	*	26,574	94	51	40	12
*JA1BHK	*	19,008	100	43	37	8
*JE1RRK	*	17,064	89	43	29	0
*JA1CPZ	*	14,742	65	38	28	12
*JN1MSO	*	12,006	66	34	25	10
*JK1TCV	*	10,656	53	32	30	10
*JF1VRU	*	10,074	57	31	26	12
*JA1KEB	*	9,504	52	28	27	11
*JH8KYU/1	*	8,618	53	33	26	3
*JF1HJX	*	5,412	48	22	18	4
*7K1PYG	*	5,252	41	24	23	5
*JA5INF/1	*	4,876	43	19	18	9
(OP: JA5INF/1)						
*JF1DAJ	*	3,731	38	19	17	5
*JI1UDD	*	2,450	25	19	14	2
*JA1XS	*	2,409	25	11	11	11
*JJ1WWL/1	*	2,144	24	16	15	1
*7L3DGP	*	1,568	22	13	12	3
*7K3OZQ	*	1,081	17	12	10	1
*7K1CPT	*	500	9	7	8	5
*JR1NKN	21	23,584	130	40	19	8
*JF1PYJ	*	16,988	96	34	17	11
*JI1SAI	*	10,266	66	34	20	5
*JI1AQY	*	5,031	50	23	14	2
*JI1EWK	*	3,880	36	22	15	3
*7N4QCQ	*	1,113	20	12	9	0
*JR1KDA	*	162	7	5	4	0
*JG1IEF	14	74,229	257	59	27	23
*JH1DGQ	*	55,965	189	56	25	24
*JA1BFN	*	27,454	137	41	20	13
*JF1TEU	*	6,768	54	21	16	10
*JK1LUY	*	98	5	4	3	0
*JH1APZ	7	42,398	183	48	22	16
JA2VHO	A	112,005	244	87	49	35
JA2XYO	*	67,760	217	75	28	7
JA2CPD	*	15,488	65	44	35	9
JH2MYN	28	1,320	25	12	10	0
JH2BTM	21	31,464	150	44	20	12
*JA2AXB	A	175,437	329	103	56	34
*JA2CUS	*	113,816	247	94	50	20
*JA2QVP	*	86,193	201	83	51	23
*JA2HOL	*	48,763	143	68	43	10
*JA2GHP	*	38,184	130	61	40	10
*JL2CZY	*	32,852	148	56	27	3
*JJ2DWL	*	209	11	6	4	1
*JE2UFF	28	1,764	28	14	14	0
*JF2WXS	21	26,100	122	48	21	6
*JP2MRD	*	9,936	68	30	18	6
*JE2DJC	14	13,140	81	32	19	9
*JR2PAU	7	3,060	30	19	11	6
*JR2AAN/2	*	351	10	6	6	1
JR3UIC	A	86,920	195	96	56	12
JF3SAD	*	2,074	22	17	14	3
JF3LOP	21	3,686	35	28	10	0
JI3BFC	14	55,370	207	53	24	21
JA3LEB	7	96,717	373	54	24	25
*JH3CUL	A	521,675	733	152	80	39
*JF3NKA	*	230,635	457	110	55	28
*JG3SVP	*	130,971	340	88	46	15
*JA4XHF/3	*	56,974	169	71	38	13
(OP: JA4XHF/3)						
*JA3JND	*	49,395	165	67	36	8
*JF3AYR	*	40,138	166	58	33	3
*JE3UHV	*	26,790	123	51	39	5
*JO3EVM	*	23,375	101	48	28	9
*JR3SZZ/3	*	11,346	78	35	27	0
*JN3DSH	*	2,772	27	24	12	0
*JI3OGI	*	1,475	21	11	9	5
*JO3MXH	*	150	5	4	3	3
*JL3TMH	21	158,238	484	71	30	17
*JR3RIY	*	149,994	456	73	26	18
*JO3PSJ/3	*	27,454	139	47	20	7
*JK3GWT	*	21,060	117	41	18	6
*JE3EVI	*	2,232	29	16	12	3
*JA3MIB	14	39,360	189	48	22	10
*JL3MCM	7	11,660	78	30	17	8
JH4UYB	A	2,438,595	2,031	223	94	106
JH4BTI	*	72,668	182	81	48	19
*JE4MHL	A	212,443	378	122	68	27
*JH4GLG	*	8,631	51	32	25	6
*JF4RKC	*	8,265	51	34	18	5
*JI4JGD	*	4,464	60	20	13	3
*JJ4CDW/4	21	34,452	137	45	23	19
*JR4GPA	14	46,065	210	52	22	9
*JR4VEV	7	8,673	79	26	17	6
JA5SUD	A	589,868	758	165	73	46
*JG5DHX	A	45,870	164	72	34	4
JA6BZI	A	792,465	808	202	88	55
JA6BWH	*	55,695	147	78	47	16
JH6QFJ	*	10,731	76	36	13	0
JA6WJL	28	14,742	114	38	25	0
*JA6GCE	A	1,213,576	1,189	201	95	68
*JR6GHN	*	76,368	212	75	39	15
*JH6WHN	28	2,618	35	18	16	0
*JA6FGC	7	253	10	7	4	0
JA7BME	A	692,328	795	168	84	65
JA7COI	*	311,696	458	123	72	58
JA7IC	*	204,618	364	94	53	54
JH7QXJ	*	75,980	210	71	52	22
JA7WQJ	*	20,737	82	42	35	12
JA7MJ	7	26,800	166	33	21	13
*JA7VEI	A	51,830	130	72	55	19
*JH7RTQ	21	146,900	414	75	32	23
*JO7GVC	*	26,880	123	53	23	4
*JA7KQC	*	2,652	27	21	10	3
*JE7HYK	14	11,232	82	32	17	5
JA8TR	A	417,882	611	131	68	58
JA8JMG	14	209,380	539	72	32	41
JA8MXC	7	7,826	87	19	16	8
*JA8EIU	A	240,624	438	120	64	32
*JA8CEA	*	19,982	71	54	33	10
*JE8KKX	*	1,888	23	13	12	7
*JA8IJI	*	1,560	20	16	11	3

*JH8SIT	14	57,166	209	55	25	21
*JG8IBY	7	216	18	5	4	0
JA9CWJ	A	232,128	393	115	54	39
JF9KVT	"	171,769	348	95	52	34
*JA9LX	A	99,981	229	85	54	22
*JH9VUU	14	8,878	73	27	14	5
JHØINP	A	483,000	653	147	81	52
JAØFVU	"	413,899	587	145	74	32
JHØNOS	"	30,115	112	59	29	7
JAØUMV	21	36,624	157	55	24	5
Jordan						
*JY4NE	A	403,880	744	132	38	14
Kazakhstan						
UN5J	A	25,721	108	46	32	11
UN7PL	14	157,464	497	56	24	28
UN1L	7	235,260	914	71	19	0
*UN6G	A	263,576	535	137	45	6
*UN7TW	"	102,725	208	127	47	1
*UN9LU	21	21,516	121	49	17	0
*UN7JX	14	267,220	631	90	34	31
*UN5C	"	132,020	502	64	23	5
*UN8PT	"	23,432	147	40	16	2
Kyrgyzstan						
*EX2U	A	70,305	239	78	31	0
Lebanon						
*OD5O	A	99,498	241	90	28	20
					(OP: OD5NJ)	
Mongolia						
JT5DX	A	1,076,625	1,578	182	68	11
					(OP: JT1DN)	
*JT1DA	A	158,946	627	77	41	0
Qatar						
*A71CV	21	298,248	785	86	28	15
Saudi Arabia						
*7Z1SJ	A	553,014	714	166	64	36
*HZ1DG	14	1,575	21	10	7	8
Singapore						
9V1YC	A	15,544	122	33	25	0
South Korea						
DS5QLJ	A	105,105	302	90	47	6
HL5JCB	"	26,772	113	52	34	6
*6K5AQY	A	61,364	208	60	39	17
*HL1VAU	"	58,653	181	75	50	8
*HL5YI	"	37,950	135	59	40	11
*DS3BNU	"	17,834	90	42	28	4
Taiwan						
BU2AU	A	26,025	144	45	30	0
*BV1EK	A	63,042	180	75	49	9
*BU2AV	14	1,224	32	9	9	0
Tajikistan						
EY7AD	A	395,370	704	148	59	0
Thailand						
*E21YDP	A	808,500	991	206	76	18
UK Bases on Cyprus						
ZC4LI	21	389,424	1,025	81	30	22
United Arab Emirates						
A61BK	A	1,519,336	1,432	244	82	38
*A65BR	A	4,089	32	28	19	0
Uzbekistan						
*UK7AZ	21	70,746	333	60	18	0
West Malaysia						
9M2CNC	A	1,608,616	1,615	235	88	38
*9M2TO	A	224,841	552	97	36	16

EUROPE

Aland Islands						
*OHØAL	14	6,235	68	34	9	0
Andorra						
*C31CT	A	27,302	177	58	15	0
Austria						
OE6MDF	A	1,005,256	1,055	252	85	69
OE9SLH	"	65,988	179	88	39	29
*OE5JKL	A	184,527	404	128	46	29
*OE6MMF	"	165,528	369	141	57	0
*OE5PEN	"	67,971	224	106	33	0
Azores						
*CR2T	28	4,672	59	22	10	0
					(OP: CU2AF)	
Belarus						
EU1AZ	A	1,401,094	1,534	241	89	71
EW4AA	"	1,325,184	1,238	286	98	64
EW7EW	"	381,133	759	153	57	17
EW8OM	"	145,992	400	124	41	3
*EU8RZ	A	390,528	593	187	55	46
*EW7KF	"	346,840	595	173	61	26
*EW1NA	"	303,056	533	161	57	30
*EW8OG	"	251,498	503	153	51	17
*EW7LE	"	159,612	362	127	47	14
*EU1DX	14	364,188	864	101	35	42
Belgium						
OQ5M	21	12,660	83	28	14	18
					(OP: ON5ZO)	
OR2A	14	70,686	228	66	23	37
					(OP: ON7YX)	
*ON4CAS	A	416,806	564	163	64	72
*OR6C	"	286,520	471	156	57	47
*ON6FC	"	231,748	390	161	55	37
*ON4VMA	"	169,911	410	133	32	24
*ON6UD	"	62,357	204	64	26	37
					(OP: ON5SD)	
*ON7BT	"	56,628	193	83	32	17
*ON4CT	7	93,955	367	66	24	25
*ON4ABL	"	51,008	392	46	8	10
Bosnia-Herzegovina						
E74AA	14	53,280	306	52	17	11
*E72W	21	166,473	393	89	33	37
*E72MM	14	99,296	418	58	19	30
*E79D	7	329,628	914	87	27	42
*E73X	"	10,890	115	35	10	0
*E73ECJ	"	555	18	10	5	0
					(OP: E73ZR)	
Bulgaria						
LZ2ZG	21	55,319	196	67	29	11
LZ8A	14	10,019	108	32	11	0
*LZ2XF	A	102,684	269	109	44	19
*LZ2DF	"	26,038	129	69	25	0
*LZ3FF	14	116,840	447	61	26	28
*LZ1QV	7	16,280	143	42	11	2
Corsica						
*TK/OK1HGM	21	21,896	174	34	13	9
					(OP: TK/OK1HGM/P)	
Crete						
SV9AHZ	A	639,450	854	188	70	57
*SV9COL	A	118,260	333	101	42	19
*SV9FBK	"	96,066	273	119	40	3
*SV9/YL2VW	"	18,080	101	48	20	12
					(OP: YL2PJ)	
Croatia						
9A7R	28	30,266	176	55	19	0
9A5Y	21	691,621	1,290	113	36	54
					(OP: 9A3NM)	
9A9A	"	676,400	1,304	111	36	53
9A2DQ	3.5	248,214	934	71	21	31
*9A4AA	A	127,776	320	113	39	24
*9A2BW	"	67,596	229	79	31	19
*9A2DI	28	3,538	46	18	11	0
*9A8W	21	377,400	771	106	34	45
*9A4W	"	15,665	95	42	23	0
*9A/VE3ZIK	14	338,676	850	91	31	47
Czech Republic						
OK2PCL	A	406,565	499	162	74	69
OK1FRO	"	63,754	235	88	29	10
OK1IGK	"	57,424	140	65	40	43
OK1MSP	"	55,772	145	73	44	29
OK2SFP	"	22,950	147	51	16	8
OK2EQ	"	18,786	72	51	37	13
OK1FJD	21	250,158	538	106	33	34
OK1KMG	"	5,175	43	24	16	5
					(OP: OK1ULE)	
OK4RQ	7	141,645	432	77	23	33
					(OP: OK1DRQ)	
OK1EP	"	119,416	445	64	19	35
OK2SG	3.5	23,874	162	47	14	8
*OK1VRF	A	529,540	703	193	69	57
*OK1DBE	"	512,064	809	174	59	55
*OK2UHP	"	249,964	540	136	39	34
*OK2EA	"	221,847	440	136	48	35
*OK1FLC	"	215,712	445	145	53	16
*OK1UDJ	"	194,312	392	136	48	30
*OK2PAD	"	169,344	396	130	51	15
*OK1FHI	"	134,470	352	109	39	22
*OK2JNB	"	121,329	279	107	43	33
*OK3MO	"	37,350	196	62	19	9
*OK2BJ	"	18,142	71	40	33	21
*OK2ZI	14	358,136	815	94	30	54
*OK2DW	"	74,144	279	61	21	30
*OK2SWD	"	18,939	139	31	11	17
*OK2BWK	"	9,672	67	42	16	4
*OK2ZAW	3.5	76,302	457	58	13	10
*OK1DX	"	20,250	188	45	8	1
Denmark						
OZ2TF	A	205,274	461	113	43	41
OZ1JTE	"	54,891	125	102	62	7
OZ6TL	7	24,570	175	44	11	10
*5P9X	A	498,775	808	187	56	38
					(OP: OZ9GA)	
*OZ4VW	"	270,912	394	153	70	49
*OZ7AEI	"	6,440	68	34	12	0
*OZ1DGQ	"	4,416	41	29	17	0
*OZ1JVX	7	12,558	145	32	7	3
England						
G3TBK	A	912,176	1,038	210	77	89
MØWLF	"	635,734	1,085	127	37	78
GØHDV	"	497,596	878	169	41	53
M5AEX	"	168,270	353	144	42	27
G4RFC	"	86,432	283	106	27	13
G8UBJ	"	19,800	80	51	30	18
GØVXE	"	11,808	59	33	25	14
MØB	21	140,298	430	77	25	32
					(OP: G3ZVW)	
G1N	7	56,908	322	50	11	21
					(OP: G3MZV)	
G3TXF	3.5	51,920	315	55	12	13
*GØHVQ	A	584,172	795	199	63	62
*G4DBW	"	571,025	773	198	65	62
*G3VAO	"	422,343	639	162	56	63
*GØCER	"	295,251	496	150	54	49
*G3KMQ	"	231,842	406	144	46	51
*G8MIA	"	221,932	435	146	49	31
*G3RSD	"	207,137	389	141	48	44
*G3LDI	"	193,200	349	127	48	55
*GØUGO	"	153,296	409	117	35	24
*G4KIU	"	145,469	330	132	42	25
*GØGFQ	"	140,400	305	92	35	53
*G3SNU	"	73,130	241	105	34	3
*2EØTQR	"	59,008	208	83	26	19
*G6CSY	"	48,504	175	90	28	11
*MØMDR	"	37,878	138	66	26	26
*G3UMT	"	11,960	124	36	10	0
*G4IUF	"	9,344	50	40	24	9
*MØBGR	"	4,950	47	35	14	1
*MØJEK	"	3,800	47	27	11	0
*G7RTI	"	3,510	42	27	10	2
*G7TWC	28	270	10	5	5	0
*G4ZOB	21	53,000	219	60	23	17
*G3KNU	"	32,385	153	50	20	15
*GØORH	"	30,816	170	29	15	28
*M/YO4RDW	14	93,810	384	56	19	31
*M4T	"	30,646	172	44	14	19
					(OP: GØVQR)	
*G4GSA	"	2,700	35	26	7	3
*GØWAT	"	2,482	31	19	10	5
Estonia						
ES2DJ	A	926,952	1,357	212	74	26
ES4RD	14	431,892	1,131	86	30	46
*ES1LS	A	222,810	483	144	46	20
*ES1WST	"	165	7	6	5	0
*ES4MM	21	24,648	125	54	23	2
*ES7FU	7	4,864	61	31	7	0
European Russia						
RG3K	A	3,245,504	2,527	322	107	115
UA4HOX	"	2,282,893	2,592	264	87	50
RW4W	"	1,515,138	1,689	272	95	35
RM3F	"	1,500,408	1,416	295	103	70
					(OP: UA4LCQ)	
UA3PAB	"	1,414,875	1,682	242	78	55
RW6CR	"	1,000,025	1,306	191	66	68
UA3QGT	"	761,120	977	215	73	47
RD3DT	"	316,710	593	133	52	45
R3PA	"	316,216	576	166	57	9
RM3Q	"	270,884	511	155	64	22
					(OP: RN3QO)	
RT4W	"	211,990	463	156	51	8
UA3SAQ	"	145,275	293	106	51	38
RU4CO	"	113,059	304	131	36	0
UA6HAZ	"	99,200	295	123	37	0
RA3FD	"	91,091	246	116	41	12
R3KM	"	81,300	232	87	40	23
UA4NC	"	63,027	216	111	30	0
RU6YK	"	58,656	286	61	19	14
RN3A	"	49,335	193	79	35	1
UA3DPM	"	38,520	147	70	34	3
RW2L	"	29,760	162	49	23	8
RK2T	"	28,560	123	67	30	5
					(OP: RK3TD)	
UA3TCJ	"	27,639	150	49	22	12
RX6MR	"	27,176	142	63	19	4
R6LA	"	26,040	106	74	31	0
R5ACQ	"	2,508	27	23	15	0
RX6AM	21	169,592	516	90	31	15
R7HF	"	16,218	121	36	17	0
RK3DXZ	"	6,110	56	33	14	0
					(OP: RA3DM)	
RW4WZ	14	283,008	956	88	30	16
RN3T	"	226,187	732	80	29	28
					(OP: RN3TE)	
RY6Y	"	7,696	109	29	8	0
RT2T	"	7,650	72	36	12	2
					(OP: RA3TT)	
RX3F	7	149,600	617	76	25	9
RU6YJ	"	7,850	76	39	10	1
R3CM	3.5	25,599	243	43	10	0
RA6YDX	"	17,641	147	45	11	3
*RO7M	A	694,152	1,016	212	69	30
*UC6A	"	633,750	878	220	70	35
*UA4FBG	"	540,981	826	179	69	31
*UA4ALI	"	431,935	674	198	68	21
*UA4HJ	"	427,096	730	198	59	14
*RN4SN	"	299,854	414	225	70	18
*RX4W	"	284,082	579	163	54	9
*RV3LQ	"	282,020	537	176	53	10
*RA6XE	"	278,160	510	166	60	14
*RW3PF	"	275,185	536	174	54	7
*R3BB	"	267,300	532	135	54	31
*RW6CW	"	253,188	469	153	55	26
*RW4FX	"	232,804	438	179	58	5
*RD1AW	"	223,232	470	151	51	16
*RO3DX	"	203,688	353	157	63	26
*R3PW	"	196,245	303	136	66	43
*RA3VMD	"	192,643	414	157	48	6
*RA4HL	"	191,744	399	152	52	10
*RQ3M	"	172,326	333	169	53	9
*RA6HSM	"	171,456	406	143	45	0
*RW6AH	"	170,587	443	132	35	12
*RZ3AV	"	127,796	326	129	43	0
*RN6DR	"	117,400	251	140	52	8
*R4WT	"	116,280	352	116	37	0
*RM2T	"	111,048	298	122	43	3
*RD3AJB	"	107,417	309	123	39	1
*R3LM	"	107,184	305	126	37	5
*R3AA	"	103,152	267	121	44	3
*RU4LM	"	100,868	263	118	42	7
*RU3XB	"	97,580	273	118	43	3
*RK4HZ/3	"	94,544	292	111	33	8
*RX3AGQ	"	82,615	245	113	38	4
*RW3XZ	"	76,505	229	88	40	15
*UA3TN	"	74,658	246	104	34	0
*RK4PB	"	70,200	239	97	37	1
*RA6FUZ	"	70,060	195	109	38	8
*RK4YJ	"	64,930	204	108	39	4
*UA6HO	"	62,928	156	91	48	13
*RA3XDV	"	58,421	253	86	27	0
*RW3DY	"	56,854	201	93	33	5
*RV3QX	"	56,160	195	100	33	2
*RV3DBK	"	55,728	245	90	17	1
*RX3RZ	"	52,920	198	81	29	10
*R3PI	"	50,930	201	72	38	0
*RA1ALC	"	44,574	207	75	27	0
*RA3YBU	"	41,000	130	81	34	10
*RN3N	"	38,913	155	79	28	2
*UA1OMS	"	35,520	136	89	30	1
*R3QX	"	30,130	118	76	38	1
*UA3RW	"	29,988	138	64	28	6
*RV4LC	"	29,200	136	73	27	0
*RZ3ATG	"	28,728	104	68	39	7
*UA4FCO	"	27,209	114	59	29	3
*RY7A	"	27,200	148	54	16	10
*RA3FH	"	24,000	112	63	24	9
*RA3FF	"	21,008	83	62	29	13
*RW4LQ	"	20,685	74	59	39	7
*RN3DFS	"	20,412	119	60	20	1
*RV4LS	"	16,684	64	53	41	3
*RV3DZ	"	16,315	118	48	17	0
*RA6AAW	"	14,378	62	47	36	8
*RX3AFE	"	12,462	95	47	15	0
*UA3UHZ	"	9,928	62	48	20	0
*RX3MM	"	9,699	68	37	16	8
*RU4F	"	8,250	57	43	23	0
*R3AT	"	5,415	41	37	19	1
*RN6AI	"	187	8	7	4	0
*RA3BQ	"	154	6	6	5	0
*RA4WC	21	120,330	525	79	26	0
*UA3QUP	"	35,412	180	49	23	6
*RN6MA	"	19,552	179	32	15	0
*RN3BW	"	11,658	69	49	18	0
*UA1OJL	"	4,284	42	29	13	0
*RA4LK	"	3,280	28	24	17	0
*UA6LPY	"	187	6	6	5	0
*UC7F	14	199,410	815	71	21	23
*RA1AW	"	147,328	504	68	24	36
*RA3UAG	"	105,492	395	76	26	16
*UA2FFX/1	"	105,237	494	59	20	20
*R4WAA	"	86,900	403	71	24	5
*RZ6LG	"	62,049	227	61	22	28
*UA3UJP	"	44,800	265	57	18	5
*RV3YR	"	28,294	137	47	20	19
*UA4FEN	"	23,855	179	49	11	5
*RW3AI	"	17,980	131	45	14	3
*RZ3AIU	"	14,350	135	40	10	0
*UA6ARR	"	11,562	101	36	11	0
*RV3LO	"	9,282	63	13	10	28
*RA3XEV	"	2,875	48	17	8	0
*RV6LCI	7	79,948	420	64	17	11
*RD4HD	"	40,968	281	59	13	0
*RN3DKE	"	5,054	66	30	7	1
Finland						
OG4X	A	1,087,450	1,292	195	74	81
OH2RI	"	310,236	563	178	53	20
OH7JJT	"	78,892	211	108	41	14
OH2BBT	"	32,205	117	61	37	15
OH3OJ	14	129,129	625	54	23	14
*OH2NT	A	232,628	594	140	40	7
*OH8TV	"	191,649	462	131	48	14
*OH4AB	"	64,357	217	105	31	3
					(OP: OH4KLU)	
*OH1LWZ	"	63,736	249	96	27	1
*OH1F	"	63,128	282	63	21	20
					(OP: OH2GSA)	
*OH2NFN	"	56,810	236	87	25	3
*OH2LZI	"	26,350	140	54	21	10
*OH6BA	14	44,968	229	57	19	12
*OH1TN	3.5	50,282	400	52	9	1
France						
F5VKT	A	1,708,080	1,615	240	79	121
F5OAM	"	822,364	1,080	183	61	88
F5CQ	"	465,696	551	144	55	109
F8BNN	"	260,148	500	148	53	27
F5GFA	"	142,158	371	110	39	25
F5TMJ	"	56,742	157	82	36	29
F1RHS	"	45,570	219	66	27	0
F4FFZ	"	21,097	114	30	15	28
TMØT	7	564,499	1,379	91	30	52
F5AMH	"	65,554	435	45	12	16
*F4FDA	A	632,910	750	221	73	71
*F6FTB	"	539,964	756	189	64	65
*TM3T	"	495,976	959	186	53	8
					(OP: F5VBT)	
*F5RD	"	362,234	565	162	56	60
*F5LCU	"	223,886	434	127	42	49
*F1IWH	"	140,868	365	111	38	23
*F5LMJ	"	38,864	155	80	32	0
*F5MA	"	37,152	163	75	26	7
*F8KKH	"	35,464	163	80	24	0
					(OP: F4GBW)	
*F4FEP	"	17,280	98	49	23	8
*F4FSB	"	10,187	76	42	15	4
*F5GGL	"	5,858	50	43	15	0
*F2FZ	"	3,160	29	19	16	5
*F6AUS	21	6,681	47	22	15	14
*F5BEG	14	299,105	728	81	29	53
*F1EBN	"	54,868	179	58	20	38
Germany						
DL4MDO	A	1,788,010	1,435	275	89	126
DD1JN	"	1,236,407	1,332	238	83	88
DL1RYD	"	594,567	688	226	77	58
DK9WI	"	559,932	688	208	72	68
DK3GI	"	543,462	683	164	62	92
DJ1TU	"	533,572	685	206	69	56
DC9ZP	"	355,019	530	183	65	39
DK1AX	"	344,799	556	164	52	57
DF5BX	"	334,369	584	166	51	42
DL4ME	"	323,155	620	162	59	24
DM2BPG	"	283,008	485	161	60	43
DL5MEV	"	234,225	395	109	51	65
DL2FK	"	226,092	398	171	56	22
DF2MC	"	209,605	437	97	46	42
DF2TT	"	166,135	306	137	54	32
DD2ML	"	161,655	334	91	42	62
DL5YM	"	146,858	330	119	39	36
DL1DTC	"	119,568	272	112	42	34
DJ2IA	"	115,640	263	141	55	0
DF6RI	"	110,000	244	89	38	49
DL4PY	"	107,952	288	76	32	48
DG9MDM	"	105,651	224	110	51	28
DK6CQ	"	99,651	225	102	35	40
DC3RJ	"	96,526	216	82	52	33
DK3KN	"	64,090	176	77	38	30
DL6UNF	"	60,610	268	86	24	0
DF2QZ	"	54,626	157	87	35	21
DJ2YE	"	50,964	171	71	25	28
DL2ZA	"	42,444	196	78	24	6
DL5JAN	"	34,656	140	75	35	4
DL5SE	"	31,525	146	65	24	8
DL8RDL	"	27,825	114	57	31	17
DL9GTB	"	20,402	75	53	35	13
DR888PL	"	7,500	82	36	13	1
DJ6TB	"	6,612	47	35	22	0
DL3BQA	21	211,356	469	106	34	31
DL1LH	"	149,380	374	92	31	31
DJ3IW	"	148,208	332	92	31	34
DL4LBK	"	121,716	315	91	30	26
DL3JGN	"	960	16	11	8	1
DR1ØTCC	14	560,382	1,265	87	33	57
DH7SA	"	107,640	385	64	21	35
DL2SAX	7	43,960	320	50	12	8
DL1SWB	"	15,532	185	37	7	0
DL4MCF	3.5	205,620	885	66	19	30
*DL9YAJ	A	1,554,953	1,439	261	89	111
*DH6BH	"	610,216	811	195	66	71
*DK5OS	"	591,500	760	200	66	72
*DL1ZBO	"	536,022	805	195	65	47
*DL5JS	"	522,144	675	198	67	68
*DJ8EW	"	450,180	636	188	55	62
*DL1TRK	"	437,544	589	193	70	46
*DH2PL	"	428,810	573	185	62	66
*DL4ZA	"	422,004	693	166	52	58
*DJ1OJ	"	332,910	514	166	63	45
*DL6SFR	"	307,580	515	169	54	37
*DL6UMF	"	295,864	550	161	49	38
*DL5ARM	"	289,484	534	166	48	33
*DF5WW	"	282,624	476	157	47	52
*DL1DXF	"	259,283	449	150	55	46
*DL2AL	"	234,549	502	146	39	34
*DL3OH	"	222,893	358	149	60	44
*DC8QT	"	219,704	415	149	52	31
*DL4JYT	"	209,066	415	142	43	36
*DL1KUR	"	202,554	347	147	64	31
*DK1AUP	"	187,935	429	136	39	26
*DL4NN	"	184,705	354	105	51	49
*DL3VTA	"	170,352	300	123	60	51
*DR2Ø1ØL	"	168,216	450	104	34	34
*DL1EAL	"	167,056	327	117	46	49
*DF7JC	"	152,880	391	120	41	21
*DG7LAE	"	137,258	315	111	47	29
*DL6NWA	"	129,525	346	105	34	26
*DF1MM	"	125,450	261	109	49	35
*DL1TPY	"	123,152	316	113	42	24
*DJ4WM	"	122,298	307	123	43	21
*DF6AD	"	121,068	312	114	41	22
*DH9SB	"	121,004	344	113	35	21
*DRØY	"	110,292	251	106	46	30
					(OP: DJ6JH)	
*DH4FAW	"	107,244	304	110	40	12
*DO3PKE	"	103,410	357	86	34	15
*DK7UM	"	98,049	276	108	36	17
*DL5SZB	"	87,165	241	85	32	32

*DO9PL	"	83,172	360	79	23	14
*DJ2AX	"	79,500	243	110	38	2
*DF9DD	"	79,360	219	96	41	18
*DL7UM	"	77,672	250	101	32	13
*DGØDG	"	77,506	238	88	34	21
*DO9BC	"	76,517	317	78	29	12
*DL5SWB	"	72,570	277	91	27	5
*DL5JH	"	72,215	213	82	30	31
*DL6NDW	"	71,685	250	97	26	12
*DC2KN	"	71,592	203	89	37	26
*DL1HSI	"	68,705	204	102	38	11
*DK4IO	"	66,885	197	93	38	16
*DL8ZVG	"	65,330	213	97	30	12
*DK1LRS	"	61,750	239	92	29	4
*DM4YWL	"	60,970	219	91	27	12
*DM5WH	"	57,566	288	86	21	0
*DL3EBX	"	57,330	244	92	20	5
*DJ6UP	"	53,312	197	76	32	11
*DDØDRK	"	53,025	233	71	23	11
(OP: DL4HTK)						
*DL7UMK	"	52,785	164	79	36	20
*DF8UO	"	48,462	179	90	30	3
*DLØBIT	"	45,474	136	85	43	15
(OP: LX1ER)						
*DL1LQA	"	39,984	152	82	24	13
*DJ3GE	"	39,491	190	73	20	8
*DG3RCE	"	35,720	179	71	24	0
*DK4JPC	"	33,784	131	60	30	13
*DL5ASK	"	33,335	120	64	28	21
*DL1JB	"	27,839	139	67	22	8
*DH5MM	"	27,750	96	60	30	21
*DO1CDE	"	23,322	116	46	23	9
*DJ8QP	"	22,344	118	50	25	9
*DO1BEN	"	21,844	103	58	28	0
*DK6NF	"	21,082	100	45	22	16
*DL6UAM	"	17,040	150	51	9	0
*DL2JRM	"	15,688	99	51	18	5
*DO6GZ	"	14,160	94	38	14	7
*DF6WE	"	14,112	93	52	20	0
*DL3DXF	"	12,008	62	46	30	0
*DK9MH	"	11,970	92	47	16	0
*DL2AJB	"	10,478	77	42	16	4
*DD1UDW	"	8,004	64	39	19	0
*DK4EF	"	6,240	56	33	17	2
*DL7UGO	"	6,027	50	30	15	4
*DK3PM	"	5,643	43	37	18	2
*DL6UAA	"	4,095	41	30	15	0
*DLØEJ	"	3,900	49	28	11	0
(OP: DJ2IA)						
*DL2DWP	"	3,120	41	27	12	1
*DL4ALI	"	2,250	35	19	11	0
*DLØMFL	"	1,200	25	16	6	2
(OP: DL2JRM)						
*DL5HF	"	836	19	16	6	0
*DL6UMR	"	390	12	8	5	0
*DL5KUD	21	76,506	235	74	30	19
*DJØMCZ	"	69,716	236	69	23	24
*DL3FBB	"	46,942	185	62	25	11
*DJ6TK	"	24,095	112	47	20	12
*DL3ARK	"	23,028	109	41	19	16
*DO6SR	"	9,588	81	30	17	0
*DO7UB	"	6,732	55	26	17	1
*DO4TP	"	6,466	45	30	15	8
*DL6DCD	"	3,960	36	22	16	2
*DM2TO	14	30,360	144	49	15	24
*DK2CF	7	50,540	368	54	14	2
*DFØSX	"	3,480	56	24	6	0
(OP: DL1CW)						
*DB4MZ	"	608	19	13	3	0
*DF4WC	3.5	19,916	207	42	9	1
*DO2XX	"	3,584	58	27	5	0

Greece

SV2GJV	A	555,970	971	169	58	38
SV2FLQ	"	264,872	507	131	47	48
*SV1BDO/3	14	263,822	802	78	28	40
(OP: SV1BDO/3)						
*SV1BJW	"	38,056	252	47	16	8

Guernsey

*GUØSUP	A	403,989	560	198	69	44

Hungary

*HA8BE	A	1,548,120	1,575	238	87	95
*HG7T	"	1,430,725	1,515	195	68	116
(OP: HA7TM)						
*HA6NL	"	371,254	625	157	55	50
*HA1BC	"	349,380	571	163	53	54
(OP: DL1MAJ)						
*HA6NN	"	132,060	299	108	46	32
*HAØGK	"	81,024	286	93	30	5
*HA5OMM	"	71,556	242	85	28	21
*HA3OU	"	12,096	63	38	29	5
*HA5AWT	21	34,144	149	50	24	14
*HA2MN	14	45,270	221	54	20	16
*HA7MW	"	13,824	82	52	20	0
*HA5LZ	7	158,796	544	81	25	26

Iceland

TF3AM	A	647,752	1,122	165	43	61
TF3IG	"	496,052	948	155	44	45
TF8SM	"	314,703	634	127	38	54

Ireland

EI9ES	A	29,848	120	56	21	27
*EI1DG	A	102,870	295	112	36	14
*EI4HQ	"	99,604	281	81	29	38
*EI8FH	"	22,311	85	70	30	11

Italy

IZ1PKV	A	1,447,536	1,421	237	83	104
IK8UND	"	542,850	732	198	66	66
IK5RUN	"	316,140	379	202	75	53
IK2BUF	"	271,694	430	154	55	53
IW3HXR	"	270,160	546	127	52	41
IK1JJM	"	242,792	403	136	51	61
IZ8EDL	"	197,286	341	161	56	34
IWØSAF	"	196,690	393	132	56	33
IKØFMB	"	174,070	481	109	40	20
IZ8EEL	"	124,083	369	93	34	26
IZ8HUJ	"	87,690	231	94	42	22
IK1MEG	"	80,181	206	68	31	52
IZ5ILK	"	69,608	170	71	45	38
IK2SGF	"	67,222	207	48	24	50
IZ1JJB	"	61,102	206	97	34	6
I5JFG	"	43,262	166	52	27	18
IW5EDI	"	30,508	109	66	33	17
IKØUTM	"	24,564	119	55	28	9
IK2SAI	"	18,880	161	40	15	4
IZØGYP	"	3,936	33	22	18	1
IZØFVD	"	493	11	9	7	1
IZØGXM	"	490	12	7	7	0
IZ8JAI	"	432	9	9	9	0
I2VGW	28	15,600	98	45	20	0
IK3ASM	"	8,496	70	32	16	0
IZ8CCW	21	6,355	68	29	11	1
IZØKBR	7	387,345	1,122	76	27	44
IV3XPP	"	73,440	519	51	14	7
I5WNN	"	73,350	393	59	16	15
I4AVG	3.5	237,896	851	72	24	35
*IZ7KHR	A	887,445	1,036	202	80	87
*IKØCHU	"	587,898	734	199	73	70
*IK2YSJ	"	408,320	619	182	60	48
*IZ3ETU	"	337,425	523	167	60	48
*IK5FKF	"	331,676	499	172	63	48
*IW2MYH	"	307,932	480	166	61	41
*IW7EBE	"	305,900	528	172	65	29
*IW2MXY	"	293,447	466	140	53	66
*IK4QJF	"	269,568	563	125	42	49
*IW5ALG	"	244,343	444	129	52	48
*IØYQV	"	235,926	362	150	67	40
*IK1RKU	"	234,465	433	132	55	44
*I2XLF	"	220,881	453	129	44	40
*IK7RVY	"	203,944	399	126	50	36
*IZØHAP	"	195,360	355	125	55	42
*IZ2EWM	"	190,400	427	127	44	29
*IW2NRI	"	126,616	284	122	47	27
*IZ4AFW	"	122,555	254	100	39	54
*IZ1ANZ	"	113,035	255	101	47	37
*IZ8OGR	"	108,605	321	72	38	35
*I2TFJ	"	82,350	241	94	36	20
*I3VJW	"	76,760	204	90	41	21
*IV3KSE	"	72,600	211	90	36	24
*IK5ZTT	"	71,248	210	89	32	25
*IK2NCF	"	68,150	204	89	32	24
*IZ1JLN	"	64,200	177	76	39	35
*IK2DKX	"	62,720	201	88	30	22
*IW1QLH	"	57,256	170	74	33	29
*IZ1DXS	"	53,397	135	74	42	37
*IØZUT	"	47,760	173	71	24	25
*IV3ARJ	"	46,657	232	74	16	7
*IK8MYM	"	42,742	131	89	44	9
*IK1ZOE	"	41,250	163	67	27	16
*IK2AHB	"	37,823	126	48	30	31
*I2BZN	"	36,040	149	68	25	13
*IK2WFN	"	33,463	130	56	30	23
*IZ7EUB	"	32,574	98	65	46	11
*IK8NSI	"	31,302	122	65	25	21
*IZ8CLM	"	30,422	112	64	36	6
*IV3XNF	"	28,684	128	54	26	21
*IZØFYW	"	28,405	140	68	27	0
*IK3CST	"	27,209	142	65	22	4
*IW4EQI	"	27,195	98	56	37	18
*IZ2PCJ	"	26,992	89	51	36	25
*IK4ZHH	"	24,341	103	51	29	21
*IZ2OBS	"	23,871	85	69	40	0
*IZ2GIU	"	21,142	158	45	11	6
*IK7WPD	"	20,124	97	53	28	5
*IK4XQT	"	13,224	109	43	15	0
*IK2GWH	"	12,870	79	55	17	6
*IZ3GNG	"	12,859	70	42	18	17
*IK2AUK	"	11,620	76	47	18	5
*IK2IKW	"	11,277	87	43	20	0
*IV3DYS	"	10,530	98	43	11	0
*IZ5OQX	"	10,458	74	39	17	7
*IWØGVG	"	9,271	45	43	30	0
*IZ8DGR	"	8,216	77	38	11	3
*IZ8FTW	"	6,496	40	30	25	3
*IZ8MBW	"	5,428	36	31	21	7
*IZ5PNL	"	4,446	50	25	10	4
*IZ3PZL/3	"	3,526	28	15	17	11
*IZ8LLH	"	2,664	31	21	14	2
*IW2JRV	"	2,278	33	23	11	0
*IZ1MHY	"	1,734	20	19	15	0
*IZ2MHT	"	63	3	3	3	1
*IKØPEA	28	4,224	52	21	11	0
*IW4EGX	21	102,165	281	80	31	28
*IZ1GLX	"	19,832	107	43	20	11
*IZ8FDG	"	12,455	94	21	13	19
*IC8TEM	14	164,450	560	69	22	39
*IZ2JPN	"	108,256	322	68	28	40
*IV3IXN	"	75,851	321	52	15	34
*I3PXN	"	68,191	306	56	16	25
*IK8NBE	"	54,023	279	55	21	13
*IØGIA	"	31,450	181	42	13	19
*IN3OWY/I2	"	29,760	164	49	14	17
*IZ6DWH	"	24,990	160	41	14	15
*IZ2QKG	"	18,360	162	38	10	6
*IK8MIG	"	8,428	87	32	11	0
*IZ2JNN	"	4,590	63	27	7	0
*IZ3JDL	"	2,754	34	17	9	8
*IZ2CSX	"	880	19	17	5	0
*IK2DZN	7	102,069	496	62	18	19
*IK5AMB	"	14,640	112	41	10	10
*IK1DFH	3.5	41,276	305	51	11	6
*I4UUL	"	9	2	2	1	0

Kaliningrad

RA2FB	14	54,280	261	56	19	17

Latvia

YL2PA	A	467,934	611	212	77	45
YL5T	"	258,028	396	146	61	50
(OP: YL3DQ)						
YL2NN	14	224,653	669	81	26	36
*YL3CU	A	499,344	714	200	65	44
*YL2QV	"	150,656	312	150	47	17
*YL2CV	21	57,960	189	72	26	17

Lithuania

LY5E	A	5,082,540	3,074	398	133	136
(OP: LY2IJ)						
LY1R	14	476,190	1,157	85	29	51
*LY2BVB	A	313,650	531	165	61	29
*LY3BY	"	210,648	489	148	44	9
*LY2TS	"	161,973	373	115	46	28
*LY1CT	21	33,528	151	56	23	9
*LY2CV	14	20,976	133	45	15	9

Luxembourg

LX1EA	A	329,073	587	114	43	72

Macedonia

*Z33T	A	1,276	20	14	11	4

Moldova

ER5DX	A	75,048	181	92	45	22
ERØFT	7	47,310	263	54	14	15
(OP: UTØFT)						
*ERØFEO	A	1,692,000	1,509	306	99	75
(OP: UR5FEO)						
*ER3ZZ	"	208,403	403	140	59	22
*ER3AU	"	132,444	383	108	42	6
*ER5LL	"	125,388	420	72	32	25
*ER3MM	21	32,384	132	55	25	12
*ER6A	7	283,968	897	84	28	32
(OP: ER1LW)						

Netherlands

PA7LV	A	1,559,880	1,531	239	78	103
PG3N	"	661,608	895	185	62	77
PA3EBP	"	490,960	712	189	56	59
PA3S	"	233,200	443	121	51	48
PA3EVY	"	119,279	270	96	40	45
PAØLOU	"	117,012	249	107	44	45
PA2ALF	"	74,295	254	84	32	11
PA4B	"	38,907	150	41	22	36
PAØLSK	"	20,128	116	37	14	23
PAØVST	"	8,580	48	26	22	18
PA1CW	21	17,490	99	39	19	8
PA5A	"	2,176	23	17	12	5
PAØVHA	7	22,654	240	39	8	0
PA3BWD	3.5	70,389	414	48	12	21
*PA1CC	A	1,000,800	999	245	83	89
*PA3DBS	"	643,761	847	215	68	56
*PA3BFH	"	545,340	804	184	57	57
*PD7BZ	"	286,549	511	139	52	50
*PD5LO	"	278,586	613	106	33	59
*PE1OYB	"	243,980	474	134	49	37
*PA3T	"	218,440	465	160	55	0
*PA9DD	"	197,208	405	137	45	34
*PA2W	"	149,422	373	124	35	23
*PA2CVD	"	149,100	373	104	33	38
*PA1RBZ	"	142,101	396	118	33	20
*PA3ANN	"	134,560	395	110	32	18
*PG7V	"	131,144	305	127	37	30
*PA3EWG	"	128,744	403	109	32	13
*PAØTCA	"	115,368	254	105	41	38
*PA8KW	"	78,568	208	97	36	28
*PA3GXT	"	78,242	253	98	32	12
*PD6W	"	59,730	257	69	21	20
(OP: PDØEMR)						
*PA4JJ	"	57,912	198	70	33	24
*PD3EM	"	48,048	187	63	24	25
*PAØFLE	"	47,652	199	80	26	8
*PA3ARM	"	38,164	146	71	24	21
*PA3AQL	"	32,960	152	72	24	7
*PA7RA	"	19,035	100	40	25	16
*PA3GMM	"	13,419	85	51	20	0
*PA3GVI	"	8,262	75	38	14	2
*PA3GEO	"	2,145	31	22	10	1
*PA3CMF	"	1,375	25	14	8	3
*PC5F	21	551	10	10	9	0
*PD1DX	14	246,015	586	84	31	50
*PD1KSA	"	209,457	561	80	28	45
*PE2KP	"	87,984	317	63	25	29
*PA1VC	"	14,674	112	34	11	13
*PDØMD	"	11,016	102	36	10	5
*PA5PR	"	8,722	83	31	10	8

Northern Ireland

*MIØM	A	368,550	693	133	38	63
(OP: MIØSAI)						
*GI4SJQ	"	74,592	204	71	34	43
*GI4JTF	"	61,462	177	111	30	17
*2IØGWA	21	71,710	313	57	18	26

Norway

LA5TFA	A	216,942	599	139	34	0
LA1BFA	"	100,350	306	103	34	13
LA7SI	"	28,044	103	80	34	0
LA9TJA	21	6,435	76	30	9	0
LN9Z	14	479,354	1,066	92	31	55
(OP: LB1G)						
LA9BM	7	42,280	372	46	10	0
LA3WAA	"	39,144	339	44	12	0
*LA5LJA	A	117,024	276	124	43	17
*LA7CL	"	100,392	321	90	31	20
*LA1YE	"	14,141	78	50	23	6
*LA8AW	"	11,316	63	31	20	18
*LA2OKA	"	10,112	75	49	15	0
*LA9AU	"	9,280	68	41	18	5
*LA1PHA	"	4,662	53	29	10	3
*LA8OKA	"	4,224	40	35	12	1
*LA2IJ	7	55,920	335	59	15	6
*LA6FJA	"	48,546	240	63	17	13

Poland

SP9LJD	A	2,793,672	2,184	259	95	150
SP8TDV	"	309,132	463	170	67	42
SP6AXW	"	258,318	515	141	52	33
SQ7B	"	244,615	564	154	49	0
SN4F	"	192,924	401	133	51	23
SP5GMM	"	185,130	233	188	87	31
SP2GJV	"	165,300	303	148	57	23
SN7F	"	146,322	304	118	52	28
(OP: SP7LFT)						
SP3CFM	"	31,620	93	65	41	18
SN2M	"	15,456	70	49	35	0
SO7O	21	40,352	154	58	25	14
(OP: SP7DQR)						
SN7Q	14	754,143	1,587	94	34	55
SO4M	7	669,963	1,557	101	33	49
(OP: SP4K)						
SP4TXI	"	191,104	660	75	25	28
SP3VSE	"	181,102	654	71	27	29
SP5ELA	"	32,604	197	48	13	15
SP1DTG	3.5	16,836	188	38	8	0
*SP8EEX	A	469,648	689	189	59	50
*SP9NWN	"	331,266	500	161	64	49
*SP2GJI	"	266,430	456	155	54	40
*SP6DMI	"	230,076	445	160	58	13
*SP9AUV	"	202,939	450	142	48	19
*SP2IU	"	201,331	390	148	52	21
*SQ8LEC	"	195,104	416	136	50	22
*SP3DOF	"	182,816	437	139	46	12
*SP4BPH	"	168,044	453	128	35	9
*SP7QHR	"	147,356	303	112	49	36
*SN1Z	"	143,166	291	146	54	14
(OP: SQ1EIX)						
*SP9CXN	"	138,780	363	134	36	10
*SP6QKP	"	133,434	292	112	44	33
*SP9CQ	"	124,548	236	142	51	21
*SP7EBM	"	116,466	281	118	48	11
*SP2EWQ	"	109,040	253	127	49	12
*SN9P	"	107,915	212	100	52	39
(OP: SQ9GAI)						
*SP7QJB	"	104,145	316	122	37	0
*SP2MKZ	"	97,272	241	108	43	17
*SO8O	"	75,582	210	103	44	6
*SN5E	"	67,788	255	92	28	6
*SP3DSC	"	65,408	200	93	39	14
*SP2IW	"	65,208	211	81	32	19
*SP6QNU	"	61,480	191	95	38	12
*SP6NVK	"	58,680	207	74	32	14
*SQ7LQJ	"	54,150	213	71	29	14
*SP9WZP	"	47,824	179	82	30	10
*SP5XOV	"	47,747	162	85	34	14
*SP2FUD	"	44,988	184	38	18	36
*SQ6NEG	"	44,982	155	63	32	24
*SQ2HNA	"	37,044	188	70	25	3
*SP9FT	"	34,125	110	46	33	26
*SP7CCB	"	32,832	164	65	25	6
*SP2SGN	"	31,824	135	67	24	13
*SQ6FHP	"	26,341	187	57	14	0
*SP7FDV	"	26,226	126	62	24	8
*SP9CCA	"	22,842	111	66	28	0
*SP6BEN	"	21,330	94	50	27	13
*SP9ERL	"	18,676	86	56	27	9
*SP8LXE	"	13,090	79	44	20	6
*SP6BSL	"	12,432	61	42	27	5
*SP4PBI	"	8,976	59	45	19	4
*SP7FBQ	"	8,378	61	37	18	4
*SP5BUJ	"	7,380	56	38	19	3
*SQ8JLN	"	4,472	38	31	21	0
*SP3UQG	"	3,569	29	19	15	9
*SQ3LVF	"	2,640	40	24	9	0
*SP5APW	"	1,829	20	11	11	9
*SP1RKR	28	2,222	40	14	8	0
*SP4DM	"	1,288	20	13	10	0
*SP3HC	21	48,256	168	62	26	16
*SN1T	"	33,449	155	48	22	13
(OP: SQ1RET)						
*SP5CJQ	"	22,344	102	61	23	0
*SQ9AOR	"	6,909	49	27	16	6
*SP9CLU	"	4,598	44	21	14	3
*SP2FOV	14	87,472	328	63	24	25
*SP5ECC	"	50,313	233	60	22	11
*SN3C	"	44,945	200	38	16	35
(OP: SP3ASN)						
*SP9CTS	"	25,875	150	40	17	18
*SP2MKI	"	3,900	39	15	12	12
*SP6EIY	3.5	59,432	389	51	12	13
*SQ8JX	"	32,395	298	45	8	2

Portugal

*CR6K	A	2,921,906	2,173	284	94	155
(OP: CT1ILT)						
*CT1BXE	"	736,501	1,188	160	49	72
*CT1BXT	"	423,514	490	192	75	71
*CT1EEK	14	186,588	575	79	24	39
*CT2IRY	"	104,808	341	74	22	36
*CT1FUH	"	58,368	275	56	17	23
*CR5A	"	1,344	26	17	5	2
(OP: CT1FFU)						

Romania

YO9HP	A	3,463,356	2,439	351	121	124
YO5OEF	"	388,077	603	167	62	48
YO9CWY	14	90,949	390	63	21	19
YP2U	7	4,026	59	26	7	0
*YO3APJ	A	1,376,110	1,204	293	94	95
*YO3FOM	"	456,783	584	193	76	52
*YO8RFS	"	257,712	476	156	50	30
*YO6HSU	"	161,200	330	130	61	17
*YO8WW	"	143,592	333	105	50	31
*YO6DBL	"	120,560	309	121	32	23
*YO4AAC	"	102,805	317	103	35	7
*YO3CEN	"	86,005	214	99	46	22
*YO4UQ	"	68,370	242	91	31	7
*YO2LXW	"	50,692	199	84	32	0
*YO8RAA	"	35,638	143	58	29	16
*YP7P	"	26,070	148	54	23	2
(OP: YO7LFV)						
*YO4SI	"	21,620	104	59	28	5
*YO2MJI	"	2,418	43	19	7	0
*YO4RST	"	2,242	23	20	13	5
*YO4BTB	"	840	16	11	10	0
*YO3JF	21	244,011	589	98	33	32
*YO2IS	"	40,352	156	54	24	19
*YO3CBZ	14	132,601	420	74	24	35
*YO3ZA	"	121,338	514	59	22	26
*YO9GSB	"	97,798	411	66	22	19
*YO9BXC	"	81,918	313	58	22	31
*YP2W	7	22,976	168	46	12	6
*YO3GW	"	288	12	9	3	0

Sardinia

*ISØLFZ	A	241,621	456	147	46	38

Scotland

GMØFGI	A	868,185	1,224	208	57	62
GM2V	21	50,700	215	69	22	9
(OP: GM3WOJ)						
GM3W	7	337,659	1,020	81	27	39
(OP: GM3SEK)						
GM1F	3.5	152,689	663	65	18	24
(OP: GM4FAM)						
*MMØR	A	134,310	319	117	34	34
(OP: MMØRKT)						
*GM3C	14	185,760	644	70	24	35
(OP: GMØNBM)						
*GM1J	3.5	10,965	104	39	7	5
(OP: MMØBQI)						

Serbia

YU1KT	A	685,354	977	207	69	41
YU1LM	"	85,020	244	95	41	20
(OP: YU1LM/QRP)						
YT3H	"	69,900	198	90	41	19
YT8A	7	432,450	1,225	81	25	44
YT4T	3.5	126,720	674	58	15	17
*YT2PFR	A	463,975	748	178	59	40
*YT2B	21	13,150	99	32	18	0
*YT2U	14	10,920	62	39	19	12
*YU5MOL	7	41,760	242	51	15	14

Sicily

*IW9BCW	A	361,400	605	166	64	30
*IW9HEB	"	12,416	93	45	19	0
*IT9YAO	21	47,040	262	49	26	5
*IT9STX	14	362,838	974	78	29	52
*IT9IMJ	3.5	6,960	86	34	6	0

Slovakia

OM5ZW	A	1,676,640	1,312	274	102	123
OM3TPN	"	357,679	620	164	55	40
OM8LA	"	312,040	583	149	45	38
*OM7OM	A	692,259	955	216	65	46
*OM3KWT	"	504,504	710	183	70	55
(OP: OM5TX)						
*OM6RK	"	316,883	643	148	38	37
*OM7AG	"	257,868	508	149	49	30
*OM7KW	"	158,916	341	126	48	30
*OM3IAG	"	106,439	271	100	45	18
*OM7YC	"	76,587	234	105	42	0
*OM3TLE	"	72,645	228	96	30	19
*OM3PQ	"	72,443	244	74	27	30
*OM7YL	"	68,856	203	101	43	7
*OM7ANO	"	14,742	104	43	20	0

*OM3ZBG	"	7,452	66	39	15	0
*OM3PR	"	5,763	50	34	17	0
*OM5MX	14	13,108	93	30	14	14

Slovenia

S51A	A	2,393,703	1,876	296	104	133
						(OP: S55O)
S51TC	"	537,460	783	203	76	29
S53MJ	21	210,388	541	82	31	36
S57LR	3.5	129,851	698	59	15	15
*S57U	A	671,637	716	225	80	88
*S57AM	"	472,225	621	194	66	65
*S5ØLD	"	1,271	21	20	11	0
*S51D	7	175,674	543	72	22	40

Spain

EB1IC	A	35,192	120	59	35	12
AM1Q	21	137,692	480	55	24	37
						(OP: EA1QA)
*EA1DFP	A	37,488	119	83	42	7
*EA1HRR	"	19,754	103	46	21	16
*EA1GFY	"	7,021	54	42	14	3
*EA1EPM	"	5,889	73	31	7	1
*EA1SB	"	360	8	8	7	0
*EA1BAF	21	49,368	192	54	20	28
*EA2AAZ	A	107,865	308	75	30	36
*EA2SS	"	35,770	175	81	17	0
*EA2AVM	"	21,983	95	40	21	28
*EA2KY	"	1,650	27	15	9	1
*EA2BNU	7	35,412	206	49	11	18
EA3AGZ	A	66,411	171	94	41	22
EA3DUM	14	255,541	759	71	26	46
EE3Y	"	166,180	483	68	24	48
*EB3JT	A	351,780	581	146	54	60
*EA3FHP	"	139,039	399	104	33	26
*EA3GUM	"	84,546	238	90	36	28
*EA3FF	"	19,184	90	47	24	17
*EA3GBA	"	17,850	110	37	17	16
*EA3KN	"	3,116	26	24	16	1
*EA3AHU	"	1,530	24	21	9	0
*EA3GLB	21	431,400	818	112	37	51
*EA3CS	"	17,136	94	42	20	10
*EA3EJJ	14	77,990	285	49	17	44
*EB3FLY	"	49,712	200	55	18	31
*EA3ANE	"	13,846	145	37	9	0
*EA4ZQ	A	13,760	59	46	31	9
*EA4BNQ	"	434	13	9	5	0
*EA4MA	28	5,624	52	23	14	0
EA5BZ	A	229,152	447	107	42	68
EA5RD	"	1,376	16	16	16	0
*EE5V	A	147,288	301	131	49	24
						(OP: EA5GSW)
*EB5CS	"	82,050	235	90	28	32
*EA5IK	"	81,530	203	81	41	33
*EA5XC	14	20,829	186	41	12	0
EA7RU	A	332,753	507	159	61	49
EE7X	21	134,862	502	66	27	21
*EA7CIX	A	292,392	462	158	54	50
*EA7VJ	"	64,779	170	88	37	26

Sweden

SMØBSO	A	297,242	593	155	54	20
SLØW	"	127,296	328	79	33	44
						(OP: SMØAJU)
SM5GMZ	"	69,230	178	102	43	16
*SM6BGG	A	894,628	1,033	205	76	75
*SM5FQQ	"	535,500	744	201	71	43
*SM5CSS	"	452,925	741	184	54	37
*SMØGYX	"	396,525	704	171	54	30
*SM6BSK	"	295,274	492	167	57	38
*SM5D	"	257,119	528	156	48	19
						(OP: SM5DJZ)
*SM6EQO	"	163,785	427	141	35	3
*SM5DQE	"	111,900	353	116	30	4
*SM7CIL	"	84,774	249	82	37	23
*SA3V	"	70,218	189	120	38	8
						(OP: SA3ARL)
*SE5S	"	56,625	198	76	32	17
*SM6AHU	"	52,338	195	79	30	13
*SF5D	"	45,942	187	80	21	13
						(OP: SMØDSF)
*SE5E	"	43,672	204	75	24	4
						(OP: SM5AJV)
*SM3YBP	"	31,540	152	72	23	0
*SM6IQD	"	22,752	109	67	26	3
*SM3AF	"	17,822	123	43	19	5
*SM4RLD	"	5,408	48	31	18	3
*SM7BHH	"	850	13	13	11	1

Switzerland

HB9CAL	A	197,967	332	131	57	43
HB9DHG	14	125,545	419	58	17	44
*HB9TOC	A	562,800	703	186	64	86
*HB9SVT	"	450,984	733	181	51	44
*HB9BTI	"	260,036	420	141	52	58
*HB9CSM	"	41,300	194	77	23	0
*HB9TSU	"	41,104	148	57	29	26
*HB3YFQ	"	16,472	96	40	19	12
*HB9BGF	"	6,960	46	33	19	8
*HB9HQX	"	4,403	57	28	9	0
*HB9AWS	3.5	12,243	110	39	9	5

Ukraine

UR7GO	A	2,146,690	1,899	304	101	85
UV5U	"	1,694,476	1,342	299	105	107
						(OP: UX1UA)
UW5U	"	1,654,065	1,610	270	95	80
						(OP: UY2UA)
US6IQ	"	1,150,506	1,232	269	98	47
UWØK	"	1,141,752	1,173	250	87	84
						(OP: USØKW)
UY7MM	"	1,022,970	1,181	264	90	36
UT6IS	"	610,242	939	214	63	26
UT5EO	"	591,894	946	200	63	28
UW5ZM	"	495,075	731	167	69	51
UR7QM	"	274,348	583	143	51	20
UZØU	"	165,725	430	98	44	33
						(OP: UY5ZZ)
UX8ZA	"	118,193	296	127	39	15
UR8EQ	"	109,536	283	119	42	7
USØLW	"	31,488	111	83	39	6
UTØEO	"	432	13	9	7	0
UR7EY	21	211,386	581	96	30	21
UXØFY	"	50,886	198	65	29	5
US7IB	"	28,348	162	57	19	0
UR5IFX	14	617,838	1,430	91	34	53
UW3E	"	547,216	1,256	102	36	46
UY5QO	"	83,361	323	66	23	22
UR5ZMK	"	35,100	209	55	19	1
UR5WCQ	7	151,983	587	71	19	27
UT4XD	"	99,322	437	68	18	20
UX2X	3.5	187,580	802	73	21	19
						(OP: UT2XQ)
UT2IU	"	37,386	302	47	10	5
*UT5EPP	A	1,074,213	1,377	236	72	49
*EN7U	"	881,650	1,002	250	87	48
						(OP: UR4UDI)
*USØHZ	"	830,620	1,055	243	75	31
*URØHQ	"	825,300	1,024	217	84	49
*US6CQ	"	701,778	904	227	70	44
*UT8IM	"	426,085	631	216	67	22
*UR8MH	"	421,872	704	167	61	36
*UR5ETN	"	366,016	637	191	57	18
*UX6IB	"	351,648	541	196	62	30
*US5E	"	299,294	497	171	54	38
						(OP: UR7EQ)
*UY2UQ	"	292,204	586	171	58	0
*UR5LAK	"	286,296	513	170	59	8
*UY5TE	"	272,221	516	171	51	17
*US7IID	"	234,624	535	151	39	18
*UR5IHC	"	218,240	428	154	50	16
*UR8IDX	"	178,104	316	171	62	13
*UY5AA	"	161,000	262	134	71	25
*UR4MH	"	154,760	329	159	53	0
*UXØSX	"	111,055	292	112	43	12
*UT4NZ	"	108,942	224	124	50	27
*UX6IR	"	107,238	257	131	43	9
*UT7MR	"	84,597	196	103	42	28
*UT2AA	"	83,468	247	113	40	1
*UR7EC	"	78,568	207	104	42	15
*UR3UT	"	74,784	215	107	41	4
*UT7EJ	"	66,456	199	92	35	15
*UR5EIT	"	61,612	183	104	36	6
*UT2QQ	"	60,918	195	105	33	5
*UX4FC	"	51,884	193	79	28	12
*UT3UX	"	51,238	156	83	36	18
*UT1IM	"	50,050	176	90	36	4
*UT2AB	"	47,916	165	71	30	20
*UX1MW	"	33,120	181	72	18	0
*UT7Y	"	25,359	130	51	26	2
						(OP: USØYW)
*UW2ZW	"	20,292	111	69	20	0
*US5EEK	"	15,884	86	47	25	4
*UX7QV	"	14,076	76	42	26	0
*UR5XMM	"	12,730	81	37	18	12
*UR2MO	"	12,464	56	39	32	11
*UT5CL	"	10,230	69	36	14	12
*UR5KED	"	7,987	81	34	13	2
*UR3LPM	"	3,230	46	28	6	0
*UU9JQ	"	1,482	22	14	12	0
*US7IA	28	1,708	26	17	11	0
*UZ7HO	21	190,485	510	94	31	28
*UT2IV	"	70,596	265	80	26	5
*UU7JN	"	9,702	59	43	19	1
*UR8QR	14	91,740	360	70	24	16
*UR3AC	"	45,018	235	54	18	10
*UXØUW	"	22,561	123	47	17	13
*UT5UML	"	21,018	154	42	15	5
*US5MPO	"	16,128	120	41	14	1
*UT5PQ	"	15,840	82	40	18	14
*UR7TZ	7	221,544	740	86	25	25
*UT5KO	"	63,495	354	53	14	18
*UT5KL	"	42,042	264	51	16	10
*UTØEL	"	27,939	194	48	12	7
*UR3LTD	"	3,304	60	22	6	0
*US5NGH	3.5	46,604	393	51	9	1
*UT4EK	"	42,552	294	54	13	5
*UR5UBR	"	28,105	268	45	9	1
*URØIQ	"	15,792	177	38	9	0

Wales

GW4SKA	A	1,422,060	1,449	228	74	109
GW4BLE	"	204,417	373	81	39	81
*GW3YVC	A	1,275	25	18	7	0
*MWØCRI	21	25,900	172	46	19	5

OCEANIA

Australia

VK3TDX	A	1,385,172	1,326	186	77	90
*VK3FM	A	202,554	353	96	56	46
VK4FJ	21	68,080	252	48	24	20
*VK4AN	A	485,640	585	148	76	60
*VK4BL	"	75,392	175	66	53	33
*VK4LDX	21	85,936	358	57	25	0
*VK4EJ	14	40,568	158	59	23	6
VK7AD	A	74,936	189	58	38	40
VK7XX	"	24,360	100	44	27	13
VK7GN	14	142,830	357	71	29	35

Guam

KG6DX	21	591,514	1,195	90	34	43

Hawaii

AH7C	A	556,095	664	88	59	136
KH6GMP	"	436,406	653	79	55	92
KH6ZM	21	519,614	1,198	57	32	57
*KH6CO	A	103,635	243	61	43	43
						(OP: KH6OO)

Indonesia

YBØPAH	A	1,142,407	1,315	176	76	41
YB4IR	"	269,115	549	108	45	12
*YB8FL	A	121,204	265	105	52	0
*YB1ALL	21	300,324	871	82	32	2
*YB8EL	"	194,084	541	75	28	18
*YD2NDX	"	17,751	101	43	18	0
*YB8EXL	14	38,710	169	52	21	6
*YBØJIV	"	11,448	74	32	18	3

New Zealand

ZL3TE	21	104,742	358	32	25	42
						(OP: W3SE)
*ZL4NX	A	62,557	175	48	31	42
						(OP: JM1CAX)
*ZL3AB	"	18,174	80	37	29	12
*ZL3NB	"	15,246	80	28	23	15

Philippines

DU1IVT	A	442,176	775	120	47	25
*DV1JM	A	592,862	801	156	70	25
*DV1/JO7KMB	14	6,290	60	23	13	1

SOUTH AMERICA

Antarctica

R1ANP	A	8,424	52	32	22	0
						(OP: RW1AI)

Argentina

LV5V	A	3,112,713	2,114	220	81	200
						(OP: LU5VV)
LTØH	"	2,576,176	1,857	216	86	170
						(OP: LU3HY)
LU4DX	"	1,985,127	1,514	216	81	150
LU5FF	"	1,949,814	1,482	222	90	135
LW9ETQ	"	187,374	348	44	35	108
LU1HF	28	551,755	1,141	82	26	55
LP2F	21	778,216	1,469	90	31	57
						(OP: LU1FDU)
*LW1HR	A	199,308	340	72	49	83
*LU5CAB	"	77,700	194	61	39	48
*LU1WI	"	76,139	173	55	32	62
*LU6AM	"	25,632	93	47	26	23
*LW5EE	28	10,395	78	26	10	9
*LU7HN	21	335,070	742	78	27	48
*LR6H	14	43,359	153	42	24	31
*LU7DW	7	738	18	8	6	4

Aruba

P49X	A	10,595,903	4,947	333	119	267
						(OP: WØYK)

Brazil

PY2SHF	A	862,379	847	174	77	98
PV8DX	"	86,319	211	95	44	0
PT7DX	"	27,920	122	47	20	13
*PY2NY	A	1,404,885	1,299	157	68	140
*PY2MTV	"	384,769	621	116	48	45
*PY2EB	"	324,786	478	111	46	74
*PY2SRB	"	44,688	143	55	31	26
*PW2P	"	41,580	139	37	31	37
						(OP: PY2XAT)
*PY2DEZ	"	15,120	78	30	20	22
*PY3FOX	"	3,003	29	16	14	9
*PY2SRL	"	448	12	9	7	0
*PU4HUD	"	208	13	4	4	0
*PY2SEX	28	115,720	355	49	20	41
*PY2CX	21	342,771	808	67	23	53
*PY4XX	"	25,404	125	34	16	23
*PU2WDX	"	24,050	125	25	11	29
*PY2OC	"	15,048	79	31	15	20
*PR7AR	14	47,124	193	25	15	44
*PY1ME	"	9	1	1	1	1
*PU8TEP	7	46,128	167	42	14	37

Chile

*CE2WZ	A	376,492	524	98	48	98
*CE1TT	"	338,316	506	74	53	106
*CE3DNP	"	270,309	388	94	50	95

Colombia

*HK6P	A	1,632,540	1,213	205	77	173
*HK3W	21	2	1	1	1	0

Ecuador

*HC1JQ	14	204,622	491	62	25	55

French Guiana

*FY1FL	21	507,812	1,080	80	26	52

Paraguay

*ZP5CGL	A	35,022	154	53	25	0

Suriname

PZ5RA	A	13,248	97	36	10	0

Uruguay

CX5TR	A	80,940	239	60	26	28
*CX9AU	7	17,485	94	33	15	17

Venezuela

YW4V	7	40,885	164	41	13	31
						(OP: YV4DYJ)
*YV5KG	A	1,574,030	1,346	161	71	162
*YV5AAX	14	185,472	451	67	21	50
*YV4BCD	7	63,657	218	46	14	39
*YY5AEA	"	13,035	79	27	11	17

ASSISTED

NORTH AMERICA

United States

K4GMH	A	4,304,366	3,106	302	101	175
W3FV	"	2,596,214	2,052	269	88	157
AI9T	"	1,959,688	1,782	256	92	155
W9MU	"	1,272,285	1,167	239	88	114
N4BAA/1	"	1,231,230	1,073	253	84	125
W9NGA/7	"	1,211,638	1,498	183	87	151
ABØRX	"	1,198,704	1,320	215	86	151
W2YC	"	1,194,561	1,134	227	89	137
KR7X	"	1,176,654	1,630	154	78	170
WA5ZUP	"	1,157,178	1,724	153	66	175
K3WW	"	1,154,434	1,169	201	74	104
KØKX	"	1,136,520	1,132	234	90	138
AA3B	"	1,059,522	1,135	207	63	84
NØKE	"	990,711	1,068	193	93	167
KA2KON/1	"	956,826	1,002	205	75	97
W4TTY	"	929,016	892	234	80	100
W6EU	"	866,656	1,129	182	88	154
W3MF	"	837,088	830	229	81	94
AA8LL	"	786,010	845	221	82	112
N6QQ	"	766,265	764	225	91	147
W1BYH	"	762,990	800	235	78	122
KY7M	"	703,836	950	164	81	133
NØAT	"	660,654	908	169	78	134
WE6Z	"	636,925	989	135	74	156
W9IU	"	624,457	863	168	60	125
WA7LNW	"	622,126	998	146	75	173
N2FF	"	616,254	732	199	72	108
W8KEN	"	564,348	661	185	72	102
KSØAA	"	550,264	1,013	141	71	126
W4CU	"	546,328	699	189	69	118
N2WK	"	541,185	767	170	54	107
N4KG	"	501,420	543	209	76	81
K8UT	"	454,212	609	162	68	111
KE1FO	"	433,228	663	159	54	64
N8BM	"	421,820	553	174	70	78
K3PU	"	397,371	534	175	58	66
AA4V	"	368,530	581	129	46	94
WA9IVH	"	352,818	588	139	61	106
N3YEA	"	329,376	606	130	54	108
K5VIP/4	"	315,136	499	141	49	66
KF2O	"	285,426	364	174	75	65
K2GN	"	262,006	405	141	59	69
KD3TB	"	259,000	487	113	47	99
N5RN	"	255,255	731	91	34	96
K2MK	"	251,940	440	122	46	60
AE5PW	"	236,115	531	110	52	103
K6UFO/7	"	228,732	337	157	72	65
						(OP:@NN7SS)
NN4K	"	221,904	349	149	59	60
N3ND/4	"	217,580	412	118	53	82
NØBK	"	215,325	392	120	61	80
WØBM	"	213,792	356	136	60	76
K8KI/4	"	212,121	406	120	51	88
NI6T	"	210,567	351	116	66	89
ND4V	"	210,400	352	135	59	69
WGØM	"	200,070	534	85	49	113
NA2M	"	197,680	386	121	57	102
K5WW	"	193,284	498	83	58	111
AD1L	"	186,921	351	125	44	38
W2RZS	"	185,928	319	133	50	61
						(OP: WB2NVR)
NN6NN	"	178,220	338	109	64	93
						(OP: W6XK)
N4QS	"	175,823	371	104	54	35
KT7G	"	172,186	347	93	62	96
W4RKØ	"	170,912	448	90	48	80
K2QMF	"	170,720	303	128	50	42
K3KO/4	"	163,821	293	132	46	25
N2MUN	"	157,740	325	100	44	76
KØYR	"	153,147	402	74	42	97
K8GT	"	152,640	300	115	52	45
N4DW	"	134,550	269	105	64	65
W4BCG	"	128,709	287	95	47	85
K4FPF	"	124,292	275	109	31	21
K7VIT	"	119,568	345	67	49	96
K7LV	"	118,104	318	72	55	95
WBØSOK	"	117,334	297	79	47	77
W3KB	"	103,530	258	83	46	81
WX7P	"	100,464	333	59	31	71
W7WHY	"	96,288	304	60	47	97
WVØT	"	96,036	332	71	32	56
K5WBM	"	93,063	195	108	51	42
KØXB	"	93,034	213	97	46	38
NØHJZ	"	91,140	300	80	39	36
K2RD/6	"	91,002	241	79	47	48
K3SV	"	74,202	196	87	32	47
W8TE	"	73,080	155	114	42	12
WB1EDI	"	71,100	192	81	40	59
NA2U/7	"	70,168	253	50	43	86
WB5TUF	"	67,000	202	63	49	88
W2GPS/3	"	66,576	189	72	35	45
AB3GY	"	64,940	176	87	38	45
AAØAW	"	61,663	219	66	35	60
WD4HIM	"	59,094	178	69	31	47
N3BM/4	"	52,992	141	88	36	20
N7GVV/9	"	50,490	157	68	38	59
WØHBH	"	48,951	141	80	37	30
N1API	"	48,811	161	63	38	32
K7EIQ	"	47,655	198	48	31	56
N2YBB	"	45,296	145	67	37	45
NE1F	"	44,676	148	65	34	47
KØCOP/4	"	41,814	125	76	36	26
NP3D/W2	"	40,528	122	73	45	31
						(OP: NP3D)
WB3JFS/7	"	39,345	143	67	44	18
K2SI	"	38,437	158	56	29	48
N6VH	"	35,815	153	36	36	73
W6SA/7	"	31,605	120	51	42	36
K7GS	"	24,832	122	38	27	32
WG9L	"	20,790	102	43	25	37
AA3K	"	19,184	83	50	31	28
K6VAR	"	16,564	95	29	29	43
W6GX/7	"	16,320	73	46	32	7
WØLM	"	14,552	88	29	28	50
W4JHC/5	"	13,590	87	28	24	38
KØFJ	"	13,505	98	29	14	30
W4BNO	"	10,366	69	34	21	16
W6TQG	"	7,860	46	36	22	2
KEØL	"	4,002	55	12	14	32
WØDET	"	3,036	44	13	10	21
KA9O	"	2,058	21	20	16	6
NØKBD	"	1,628	34	8	9	20
KG6ITP/3	28	630	15	8	6	1
WS7I	21	155,632	600	66	26	45
K6LL/7	"	110,789	426	65	26	42
N4QV	"	20,732	100	48	23	2
N7AT	14	451,360	1,219	94	33	55
						(OP: K8IA)
KI7MT	"	228,450	905	69	26	55
N8AGU	"	50,300	191	63	19	18
NS9I	"	40,320	190	54	20	31
KB4CP	"	6,930	49	31	15	9
N5ZM	7	283,822	1,023	74	24	56
WJ2D/4	"	233,064	843	76	26	54
NA3M	"	194,320	653	69	18	53
KE4UW	"	129,740	527	65	21	44
N6MA/7	"	97,340	436	51	22	51
K6ND/1	"	780	15	11	5	4
W8AEF/7	3.5	42,592	413	19	14	55
W3/NH7C	"	37,521	257	37	14	48
K6NDV/1	"	24,300	180	31	10	40
K4WW	"	9,996	108	17	11	40

Alaska

AL9A	A	25,454	125	33	21	35

Canada

VA1CHP	A	1,833,068	1,469	255	84	148
VE1OP	"	1,460,472	1,261	226	83	144
VA3DX	"	1,172,197	973	243	83	155
VA2AM	"	1,035,096	990	212	72	124
VE4EAR	"	809,187	900	166	86	141
VE3XD	"	705,755	790	187	65	109
VA3PC	"	636,056	702	191	69	84
VA7RY	"	413,316	670	98	50	119
VE3TES	"	367,120	610	111	43	106
VE5MX	"	320,059	512	109	62	110
VE3RZ	"	195,048	304	129	57	66
VE6LB	"	55,420	150	53	48	62
VA7DZ	"	5,643	42	21	18	18
VE6WQ	14	781,440	1,615	101	36	55
N2WQ/VE3	7	285,948	780	77	24	55
						(OP: N2WQ)
VE3QRA	"	12,444	96	22	9	30
VE3MGY	3.5	16,848	173	2	4	46

Mexico

4B1EE	14	218,881	665	68	26	55
						(OP: XE1EE)
XE2WK	7	79,825	353	40	15	48

U.S. Virgin Islands

KP2DX	A	410,688	651	103	48	128
						(OP: KP2BH)

AFRICA

Canary Islands

EA8AQV	A	816	12	11	10	3

Madeira Islands

CT3FQ	21	*819,333*	*1,546*	*95*	*30*	*52*

ASIA

Asiatic Russia

R9DX	**A**	**4,401,027**	**3,063**	**335**	**111**	**67**
RXØAT	*	**1,616,576**	**1,435**	**276**	**90**	**50**
RN9CM	*	1,215,071	1,142	264	87	26
RXØAW	*	967,554	1,194	193	66	35
RM9RZ	*	363,050	495	187	69	9
R9SA	*	339,355	369	239	84	12
RA9AC	*	288,768	399	179	65	12
RA9JP	*	214,272	738	83	25	0
RK9KWI	*	184,260	410	120	43	3
RA9DZ	*	111,071	360	79	30	0
RAØANO	*	68,960	158	108	46	6
UI9I	*	61,800	198	60	39	21
					(OP: RM9I)	
UAØQBR	*	41,088	151	67	27	2
RUØLI	*	38,115	143	65	30	4
UA9OZ	*	32,076	143	61	20	0
RAØSMS	*	7,785	84	26	17	2
RAØAM	**14**	**209,984**	**576**	**73**	**26**	**37**
RUØAT	*	14,952	96	30	14	12
RK9AX	**7**	**209,898**	**638**	**81**	**27**	**9**

China

BD4SQ	**A**	**90,678**	**312**	**74**	**49**	**4**
BD9BKC	*	16,683	103	39	25	3
BD2BT	*	3,120	29	25	14	0
BG7IBS	**21**	**104,370**	**398**	**69**	**25**	**4**

Cyprus

5B/UTBU	**A**	**7,798,700**	**4,149**	**363**	**129**	**158**
					(OP: UT5UDX)	

Hong Kong

VR2XLN	**A**	**764,106**	**959**	**294**	**97**	**21**

India

VU2NKS	**A**	**508,295**	**632**	**201**	**70**	**6**

Japan

JM1XCW	**A**	**1,713,710**	**1,488**	**205**	**98**	**116**
JH4UTP	*	**1,055,808**	**1,118**	**210**	**99**	**42**
JA2BQX	*	**586,450**	**672**	**162**	**91**	**64**
JA1WSK	*	459,610	576	158	77	60
JA2FSM	*	329,630	529	116	70	52
JA1IZZ	*	304,128	427	134	76	46
JA6DIJ	*	**241,995**	**432**	**122**	**55**	**25**
7N2UQC	*	235,004	431	107	69	42
JH2FXK	*	191,100	316	111	60	39
JN3SAC	*	**146,608**	**289**	**112**	**56**	**19**
JA7ZP	*	**130,660**	**262**	**96**	**55**	**37**
JR2PMT	*	115,101	215	103	60	26
JHØMHR	*	**111,186**	**230**	**89**	**56**	**29**
JO4CFV	*	102,070	258	79	63	31
JA1XRH	*	95,025	216	78	60	37
JA1EMQ	*	86,618	197	79	54	28
JH1ECF	*	57,600	173	71	36	13
JA2KCY	*	55,044	166	69	43	20
JA1BWA	*	53,992	162	69	52	15
JF2OZH	*	38,493	121	64	40	13
JL8MBF	*	**32,980**	**143**	**57**	**35**	**5**
7M4OOS	*	21,168	94	41	31	12
JA1SJV	*	11,529	77	30	19	12
JR1UMO	*	2,310	24	20	12	1
JL1DLQ	*	1,534	21	16	10	0
JA7KY	*	858	13	5	8	9
JA1QGT	**28**	**759**	**14**	**12**	**11**	**0**
JA1BPA	**21**	**259,022**	**691**	**78**	**31**	**25**
JH9KVF	*	**168,664**	**515**	**70**	**29**	**17**
JR1NHD	*	147,712	424	72	31	25
JS1KQQ	*	21,097	106	45	22	6
JM2RUV	*	**11,590**	**69**	**35**	**19**	**7**
JA2VHG	**14**	**3,432**	**37**	**21**	**11**	**1**
JJØMPI	*	**2,268**	**32**	**12**	**11**	**5**
7L4IOU	**7**	**30,710**	**180**	**37**	**21**	**16**
JF1RYU	*	26,640	162	30	22	20
7L2OHM	*	1,377	20	11	11	5

Kazakhstan

UN4PG	**28**	**2,212**	**30**	**19**	**9**	**0**
UN9PQ	**14**	**73,170**	**295**	**59**	**20**	**11**

Kuwait

9K2HN	**A**	**263,484**	**575**	**105**	**30**	**21**

Saudi Arabia

HZ1PS	**A**	**705,165**	**902**	**161**	**58**	**46**

South Korea

DS5DNO	**A**	**177,174**	**361**	**98**	**63**	**32**
HL2DYS	**14**	**4,000**	**36**	**26**	**14**	**0**

Tajikistan

EY8MM	**A**	**993,114**	**1,112**	**216**	**79**	**23**

EUROPE

Austria

OE5ØVIE	**A**	**103,341**	**313**	**101**	**42**	**4**

Belarus

EW8DD	**A**	**995,982**	**1,240**	**210**	**73**	**56**
EV1P/7	*	72,450	277	73	32	10
EW8OF	*	16,692	149	36	12	4

Belgium

ON6NL	**21**	**242,556**	**528**	**105**	**32**	**37**
OP4A	**14**	**90,152**	**323**	**63**	**22**	**33**
ON4BHQ	*	82,340	290	54	20	41

Bosnia-Herzegovina

E71DX	**A**	**30,385**	**137**	**72**	**25**	**6**
E77DX	**21**	**274,816**	**695**	**77**	**28**	**47**
E76C	**14**	**984,144**	**1,927**	**109**	**37**	**57**
E7DT	**7**	**336,256**	**980**	**87**	**27**	**34**

Bulgaria

LZ8E	**A**	**4,071,258**	**2,570**	**393**	**138**	**135**
					(OP: LZ2BE)	
LZ2JA	**21**	**205,938**	**518**	**84**	**32**	**37**

Corsica

TK5MH	**21**	**498,204**	**987**	**103**	**34**	**52**

Croatia

9A5X	**A**	**867,588**	**923**	**206**	**83**	**78**
9A5CW	*	19,950	99	28	16	29
9A3XV	**7**	**1,166**	**23**	**12**	**7**	**3**

Czech Republic

OK1DO	**A**	**1,247,771**	**1,263**	**233**	**87**	**77**
OK3R	**7**	**644,736**	**1,478**	**102**	**34**	**48**
					(OP: OK1DVM)	
OK1LO	*	30,240	267	47	9	0

Denmark

OZ1FAO	**A**	**53,430**	**160**	**79**	**36**	**22**

Dodecanese

SV5DKL	**21**	**102,231**	**406**	**68**	**28**	**15**

England

M7T	**A**	**1,616,688**	**1,762**	**239**	**74**	**99**
					(OP: G3YYD)	
MØAFZ	*	243,165	511	136	45	34
MØVBY	*	106,930	282	112	35	23
M2G	*	68,643	341	51	19	17
					(OP: G4RCG)	
MØTJU	*	44,671	154	87	29	15
G3IGU	*	12,851	87	54	17	0
G1RNZ	*	9,180	78	38	14	2
MØUNI	**14**	**98,698**	**346**	**68**	**24**	**30**

European Russia

RZ3AXX	**A**	**3,363,027**	**2,290**	**372**	**125**	**122**
					(OP: UA8AA)	
R7LV	*	2,447,873	1,705	368	134	99
RA6XV	*	882,833	1,311	181	68	52
RA4FUN	*	648,096	839	231	80	33
R2AT	*	577,369	885	199	66	34
RK4S	*	432,816	701	197	65	22
RK3BX	*	316,050	586	163	53	29
UA1NFA	*	257,730	515	136	48	29
RW3LB	*	251,904	457	165	52	29
UA3PT	*	201,505	477	142	46	3
RX3AEX	*	99,067	289	113	41	3
UA6LLE	*	53,100	159	103	41	6
RV3UP	*	38,496	192	75	20	1
RD1A	*	20,034	85	76	28	2
RA4UDC	*	15,622	97	54	18	1
UA3FX	*	770	12	11	10	1
RU3PU	**21**	**31,328**	**142**	**60**	**25**	**4**
RA3SL	**7**	**36,244**	**252**	**52**	**13**	**3**
RL3Q	*	5,280	55	35	9	0

Faroe Islands

OY3JE	**A**	**591,052**	**1,006**	**181**	**55**	**30**

Finland

OH2XX	**A**	**141,574**	**418**	**72**	**33**	**37**
OH2LNH	*	138,573	379	128	36	9
OH8JJ	*	90,694	313	103	29	5
OH2BCK	*	81,472	181	45	34	73
OH1TM	*	3,094	46	24	10	0
OH5VG	**3.5**	**5,921**	**93**	**26**	**5**	**0**

France

F8CRS	**A**	**240,713**	**338**	**150**	**59**	**68**
F4GGD	*	178,200	509	119	46	0
F4GDI	**14**	**33,180**	**121**	**53**	**24**	**28**
F8BDQ	**7**	**116,168**	**524**	**62**	**17**	**25**

Germany

DL1QW	**A**	**964,689**	**871**	**260**	**93**	**98**
DHØGHU	*	816,408	877	229	74	88
DL8DH	*	690,654	809	184	78	92
DL1NEO	*	601,640	746	219	75	62
DL8SCG	*	560,880	596	201	92	76
DL6JZ	*	541,632	593	212	81	79
DK1FW	*	531,600	515	247	91	62
DL4LAM	*	314,140	490	177	58	43
DL2IAN	*	284,748	474	135	53	56
DK1BX	*	268,736	421	177	69	26
DL5KUT	*	247,506	439	101	42	70
DL5GAC	*	231,768	436	130	44	48
DJ1AA	*	220,704	396	140	56	46
DKØAE	*	216,900	392	140	56	45
					(OP: DJ1AA)	
DF2LH	*	177,876	307	148	62	33
DL9NDV	*	168,480	300	151	58	31
DK5IR	*	159,963	317	126	45	42
DH7LF	*	155,376	320	130	48	30
DD7ZT	*	154,842	364	130	42	25
DL1DVE	*	147,084	328	131	50	25
DL5ST	*	144,022	275	150	57	7
DK1KC	*	124,773	239	114	50	45
DB9EX	*	122,304	254	115	46	35
DK1IP	*	121,152	274	115	49	28
DL9NCR	*	120,060	293	109	43	28
DL5AN	*	104,076	204	98	53	45
DJ9RR	*	80,676	213	105	42	19
DL1DBR	*	71,102	220	94	32	20
DJ5QV	*	69,888	192	95	36	25
DF1HF	*	64,722	175	100	42	19
DF2AP	*	59,764	208	90	31	13
DL5ZB	*	56,405	138	59	41	45
DL8ZAJ	*	52,984	157	84	38	26
DL3DRN	*	40,959	129	67	37	19
DL7VEE	*	28,098	81	74	52	0
DM6DX	*	21,344	94	43	28	21
DL2SWN	*	12,956	58	48	33	1
DJ9MH	*	8,874	60	13	12	26
DL1THB	*	8,750	78	30	14	6
DK8NX	*	6,014	40	38	24	0
DF2AJ	*	5,432	42	35	21	0
DF9ZP	**21**	**316,316**	**650**	**106**	**33**	**43**
DJ8ES	*	40,000	150	71	26	3
DO4DXA	*	35,438	147	54	25	15
DM5TI	**14**	**507,052**	**1,031**	**105**	**35**	**56**
DL4RCK	**7**	**33,534**	**253**	**51**	**15**	**3**
DGØOM	*	26,230	223	46	11	4
DL1OJ	*	209	9	8	3	0
DN7DX	**3.5**	**198**	**10**	**7**	**4**	**0**

Greece

SX25JMO	**A**	**2,049,663**	**1,923**	**282**	**91**	**94**
					(OP: SV1JMO)	
SV8RX	*	460,480	598	207	78	35
SX25DPI	*	93,987	226	99	49	29
					(OP: SV1DPI)	
SX25HKD	*	17,052	93	57	27	0
					(OP: SV1HKD)	
SX25CIB	**21**	**5,719**	**60**	**28**	**15**	**0**
					(OP: SV1CIB)	

Hungary

HA1TNX	**A**	**1,202,094**	**1,322**	**228**	**74**	**92**
HA1DAE	*	585,600	671	220	79	67
HA9PP	*	439,231	589	162	65	72
HG8C	*	389,480	573	160	62	58
					(OP: HA8EK)	
HA7MB	*	293,986	506	155	58	40
HA2EOA	*	91,091	187	64	50	55
HA5NB	*	17,415	104	55	21	5
HG3FMY	**28**	**451**	**14**	**6**	**5**	**0**
HA5UK	**21**	**50,295**	**171**	**56**	**26**	**23**
HG3FMZ	**14**	**117,428**	**403**	**69**	**24**	**31**
HA3LI	**3.5**	**134,664**	**702**	**63**	**16**	**14**

Iceland

TF3AO	**A**	**405,328**	**952**	**118**	**33**	**45**
TF3PPN	*	252,822	687	112	31	31

Isle of Man

MD2C	**A**	**1,754,280**	**1,638**	**244**	**80**	**116**
					(OP: MDØCCE)	

Italy

IV3JCC	**A**	**1,378,972**	**1,189**	**268**	**103**	**105**
IZ4GWE	*	1,371,000	1,148	291	103	106
IK1SOW	*	424,463	565	193	65	59
IKØTUM	*	260,160	406	176	67	28
IK5ZUB	*	111,420	260	104	42	34
IW5EIJ	*	105,000	240	98	51	26
I4HRH	*	93,960	244	93	41	28
IV3XZG	*	67,816	169	109	47	17
IWØGYC	*	65,250	203	108	37	0
IK2LOL	*	57,404	194	47	21	45
IZ2GNQ	*	42,366	132	89	49	0
IW2MZX	*	41,790	164	53	25	27
IK2GZU	*	40,256	122	77	39	20
IZ5IOM/5	*	35,400	137	82	32	6
IØMOM	*	34,632	109	57	42	12
IK2WPO	*	4,029	31	29	18	4
IN3FHE	*	2,204	21	15	15	8
I2ORX	*	774	17	6	6	6
IKØEIE	**21**	**190,008**	**439**	**101**	**34**	**33**
IZ8BGY	*	109,746	386	75	28	14
IZ6TSA	**14**	**579,386**	**1,213**	**102**	**35**	**56**
IZ8DVD	*	168,368	544	71	26	39
IKØXBX	*	147,798	379	87	32	42
IZ5DKJ	**7**	**489,402**	**1,226**	**94**	**32**	**45**
IZ5MOQ	**3.5**	**76,467**	**550**	**53**	**10**	**8**
IKØLNN	*	60,240	364	53	13	14
IK8YFU	*	2,592	51	23	4	0

Latvia

YL9T	**A**	**1,946,610**	**1,706**	**316**	**108**	**79**
					(OP: YL2TW)	

Lithuania

LY9Y	**A**	**2,235,450**	**1,779**	**315**	**107**	**103**
LY2SA	*	140,059	252	129	62	36
LY5W	**3.5**	**11,562**	**140**	**36**	**5**	**0**

Moldova

ER3DX	**A**	**249,600**	**320**	**184**	**77**	**39**

Netherlands

PAØWRS	**A**	**1,097,928**	**986**	**281**	**101**	**86**
PA1TX	*	401,710	587	173	63	53
PD4DX	*	354,624	850	119	37	36
PA3HGF	*	76,145	198	83	38	36
PE4BAS	*	72,224	213	90	33	25
PA5TT	*	65,565	166	90	45	20
PA5O	**21**	**21,294**	**106**	**50**	**23**	**5**
PA3EWP	**14**	**102,729**	**324**	**49**	**19**	**53**
PD4X	*	14,091	98	30	11	20
PI4COM	**7**	**255,398**	**818**	**83**	**27**	**33**
					(OP: PA3EWP)	

Northern Ireland

GI6K	**3.5**	**210,600**	**777**	**65**	**18**	**37**

Norway

LA9TY	**A**	**171,566**	**348**	**148**	**53**	**17**
LA8AJA	*	147,543	345	105	46	36
LA4RT	*	51,393	221	80	25	6

Poland

SN2K	**A**	**3,067,152**	**2,453**	**314**	**110**	**104**
					(OP: SP2EBG)	
SO6I	*	830,736	786	274	98	60
					(OP: SP6JIU)	
SP3GXH	*	709,925	792	206	77	82
SP3BJK	*	661,881	855	216	72	53
SN14ØMPR	*	183,819	384	136	46	31
					(OP: SQ9FMU)	
SP6JZP	*	159,030	396	133	37	16
SP3GAX	*	148,122	284	129	55	27
SO4R	*	86,375	335	84	27	14
					(OP: SP4ELF)	
SP5OXJ	*	34,020	138	62	25	18
SP1S	*	26,656	95	63	38	11
SP9CVY	**28**	**330**	**10**	**6**	**5**	**0**
SP8ONZ	**14**	**329,718**	**733**	**97**	**32**	**50**
SP1CQZ	**7**	**59,968**	**460**	**47**	**11**	**6**
SP1MHZ	**3.5**	**42,273**	**355**	**50**	**9**	**2**

Portugal

CT1HMN	**A**	**374,010**	**569**	**148**	**55**	**70**

Romania

YQ6A	**A**	**1,070,040**	**1,009**	**264**	**105**	**75**
					(OP: YO6BHN)	
YO7DAA	*	541,170	753	228	80	7
YO3BL	*	53,350	201	78	32	0
YO3JW	28	16	2	2	2	0
YO5BBO	21	76,388	263	65	29	19

Scotland

MMØEAX	**A**	**789,705**	**995**	**205**	**71**	**69**

Serbia

YU8NU	**A**	**936**	**15**	**10**	**9**	**7**
YT7W	**14**	**306,566**	**783**	**85**	**31**	**46**
YT1VP	**7**	**547,284**	**1,280**	**97**	**31**	**49**
YU7U	*	186,060	582	82	26	32
YU5A	**3.5**	**903**	**22**	**17**	**4**	**0**
						(OP: YU1EW)

Sicily

IT9JOF	**A**	**400,680**	**633**	**155**	**61**	**54**
IW9FRA	*	295,200	395	171	72	57
IT9FGA	*	3,476	28	23	21	0
IT9JDH	**3.5**	**39,375**	**305**	**58**	**9**	**4**

Slovakia

OM3NI	**A**	**299,520**	**499**	**157**	**58**	**41**

Slovenia

S5ØR	**A**	**3,459,925**	**2,294**	**323**	**121**	**151**
S59AA	*	336,540	500	171	63	50
S52OT	*	38,860	108	67	45	22
S51CK	**14**	**448,740**	**986**	**96**	**33**	**51**
S57EA	*	116,375	364	70	27	36
S52X	**7**	**646,020**	**1,451**	**100**	**34**	**51**

Spain

EA5DKU	**A**	**845,840**	**895**	**219**	**78**	**91**
EA1OS	*	**409,129**	**602**	**148**	**46**	**83**
AN2K	*	**164,703**	**293**	**104**	**51**	**62**
					(OP: EB2RA)	
EH5I	*	163,175	740	82	25	0
					(OP: EA5KB)	
EA3GYK	*	**94,168**	**256**	**97**	**37**	**24**
					(OP: DK7TM)	
EA3ALV	*	80,750	206	108	44	18
EA4GB	*	**51,920**	**175**	**77**	**41**	**0**
EA7HNN	*	**41,750**	**145**	**80**	**27**	**18**
EB1DMQ	*	9,604	93	33	10	6
EA1AOM	*	1,539	26	16	8	3
EC7KW	**28**	**3,875**	**42**	**15**	**10**	**0**
ED5J	**21**	**77,220**	**267**	**66**	**26**	**25**
					(OP: EA5DM)	
EA2TA	*	**4,326**	**38**	**20**	**19**	**3**
AN5E	**14**	**244,120**	**817**	**75**	**27**	**33**
					(OP: EA5HAB)	
EH7Z	*	**70,224**	**440**	**51**	**18**	**8**
					(OP: EA7ZY)	
AN1A	**7**	**149,296**	**536**	**70**	**22**	**32**
					(OP: EA1AST)	
EC1KR	*	47,168	217	45	14	29
EB3CML	*	**4,329**	**44**	**19**	**8**	**12**
EA1DR	**3.5**	**75,803**	**395**	**61**	**16**	**14**

Sweden

SM6U	**A**	**857,025**	**1,089**	**178**	**70**	**77**
SM7BHM	*	264,480	487	140	47	45
SE6Y	*	192,807	470	130	46	17
SA1A	*	64,665	211	79	37	19
					(OP: SM1TDE)	
SM6GKT	*	32,320	149	70	21	10
SM5CZQ	*	4,664	32	27	24	2

Switzerland

HB9CRV	**A**	**400,074**	**669**	**162**	**60**	**40**

Ukraine

UW8I	**A**	**2,013,903**	**1,584**	**316**	**115**	**98**
					(OP: UT2IZ)	
UT4ZG	*	1,327,728	1,366	254	93	70
UX1UX	*	1,034,676	1,254	233	74	62
UT8EL	*	713,864	878	253	78	31
UT1PA	*	354,835	601	166	53	46
UY7C	*	347,750	625	162	50	38
UT4ZX	*	220,320	327	191	77	20
UT9FJ	*	162,150	287	139	63	28
UTØRM	*	52,716	163	80	39	19
UXØFF	*	34,860	135	58	32	15
UR4IOR	*	5,831	49	29	20	0
UT1IA	**28**	**10,010**	**82**	**38**	**17**	**0**
UT5ERP	**21**	**10,608**	**89**	**36**	**13**	**2**
EO3Q	**14**	**791,910**	**1,721**	**99**	**34**	**56**
					(OP: UR3QCW)	
UW1M	*	783,178	1,664	107	34	53
					(OP: UR5MW)	
US5I	**7**	**472,052**	**1,249**	**90**	**26**	**45**
					(OP: US5IQ)	
UW7LL	*	75,816	281	70	22	25
UT5ZA	**3.5**	**4,144**	**59**	**28**	**9**	**0**

OCEANIA

French Polynesia

FO8RZ	**A**	**341,578**	**501**	**69**	**62**	**102**

Guam

KH2/N2NL	A	2,259,180	1,656	235	123	104

Hawaii

KH7B	14	122,880	324	52	27	49

(OP: AH6RR)

Indonesia

YB2ECG	A	59,452	227	51	33	5
YC2LEV	21	42,600	194	53	22	0

New Zealand

ZL1T	A	60,032	161	51	45	32
ZL1BYZ	21	264,821	653	61	30	46
ZL3PAH	7	36,990	139	45	18	27

SOUTH AMERICA

Argentina

AY8A	A	1,014,585	956	169	74	120

(OP: LU8ADX)

LW5EAE	*	226,765	370	104	51	54
LU3JVO	*	37,714	118	43	30	36

Brazil

ZX2B	A	4,734,415	2,679	291	105	199

(OP: PY2MNL)

PY2NQ	*	929,160	888	169	71	116
PW2B	*	32,475	151	43	21	11
PY4EK	21	58,289	258	47	14	16
PY7ZY	*	10,638	69	28	15	11
PY2LCD	*	9,682	81	31	16	0
PT9PA	*	6,478	53	25	11	5

Chile

3G3P	A	81,730	254	69	36	5

(OP: CE3PG)

Colombia

HK1R	A	279,840	534	67	35	74

Paraguay

ZP9EH	A	104,652	234	66	33	54

Venezuela

YW5T	A	840,584	804	150	65	143

(OP: YV5JBI)

YY4ALK	21	24	2	2	2	0

MULTI-OPERATOR
SINGLE TRANSMITTER LOW POWER
NORTH AMERICA

United States

*KDØAKI	A	486,652	785	160	58	138
*KE4UNA	"	389,424	645	133	58	113
*W4UAL	*	189,774	413	106	53	75
*ACØE	*	46,324	218	41	37	70

Bermuda

*VP9I	A	1,953,904	1,707	222	74	168

Canada

*VE7NSR	A	8,330	52	24	21	25

Mexico

*XE1TD	A	3,344	42	7	10	21

U.S. Virgin Islands

*KP2D	A	1,283,136	1,161	235	89	165

AFRICA

Ceuta and Melilla

*EF9K	A	496,989	713	154	42	37

ASIA

Asiatic Russia

*UAØAYA	A	200,970	439	102	39	24

Japan

*JM1NKT	A	149,917	308	116	64	17

Kazakhstan

*UP6P	A	2,285,807	1,889	281	97	55

EUROPE

Belgium

*ON4ANL	A	464,984	796	162	50	51

Bulgaria

*LZ9R	A	1,338,909	1,380	264	92	73

Croatia

*9A7T	A	1,383,381	1,142	271	103	115

Finland

*OH6K	A	149,687	367	126	40	15

France

*F1AEY	A	1,471,248	1,571	241	84	83

Germany

*DJ7JC	A	92,169	246	112	43	16

Kaliningrad

*RK2FWG	A	9,912	74	42	17	0

Poland

*SQ2ØØFC	A	937,296	1,146	229	86	53
*SP1KRF	*	314,000	565	157	53	40
*SN9ØHRS	*	44,343	168	68	30	19

Serbia

*YU2A	A	2,507,862	2,037	277	93	127

Slovakia

*OM3KWZ	A	961,632	1,121	232	78	68

Slovenia

*S5ØA	A	4,148,732	2,407	394	135	165

Spain

*ED2V	A	1,039,272	1,432	168	50	94
*EB5AL	"	584,354	810	193	61	60

Sweden

*SK6HD	A	85,995	256	90	34	23

Ukraine

*UT2MA	A	43,901	125	101	39	3
*UU4JWC	*	25,500	127	74	25	1

OCEANIA

Australia

*VK3HR	A	23,779	105	36	18	25

SOUTH AMERICA

Argentina

*LV6D	A	820,556	753	180	81	113
*LU3DY	*	249,400	378	97	52	83

Brazil

*PU5ATX	A	349,877	633	81	37	69

MULTI-OPERATOR
SINGLE TRANSMITTER HIGH POWER
NORTH AMERICA

United States

K4FJ	A	3,314,416	2,357	309	106	171
WØLSD	"	2,281,669	1,977	276	108	203
W1DX	"	1,860,904	1,685	251	91	115
KF6T	"	1,678,182	1,610	221	104	192
NC4CS	*	1,619,250	1,616	232	77	116
W2WHP	"	1,583,031	1,557	235	85	151
K7BTW	"	1,285,568	1,651	171	86	167
N1MGO	*	1,158,192	1,318	207	77	148
N2BJ/9	"	1,009,562	1,237	172	80	139

AD8P	"	921,492	995	222	89	118
WY7SS	*	857,157	1,545	126	72	159
KC4D	*	450,258	615	152	57	94
AA4YL	*	291,054	525	138	51	82
N2NGW	*	164,472	359	101	43	87
KDØS	*	67,896	199	63	51	70
KB9DVC	*	23,861	94	55	33	19

Canada

VE3FJB	A	340,080	556	148	62	8

Mexico

4B2AU	A	491,728	745	95	61	136

ASIA

Asiatic Russia

RY9C	A	2,613,336	2,000	297	99	60
RC9JWR	*	849,134	1,098	196	60	30
RKØLWW	"	16,388	84	46	20	2

Hong Kong

VR2DXA	A	191,142	627	82	38	6

Kazakhstan

UO5L	A	1,736,670	1,575	269	90	31

EUROPE

Aland Islands

OHØZ	A	3,117,222	2,438	325	109	115

Austria

OE9R	A	3,034,812	2,284	322	110	122

Bosnia-Herzegovina

E74KC	A	5,151,300	3,122	370	124	166

Croatia

9A5D	A	2,509,370	2,138	273	99	121

Czech Republic

OK1KSL	A	2,105,520	1,714	268	88	140
OL2X	*	752,028	925	201	76	71
OK5SWL	*	4,876	52	31	13	2

Denmark

OZ1ADL	A	2,497,947	1,958	290	103	126

Estonia

ES9C	A	5,841,170	3,411	436	138	136

European Russia

RK3AWL	A	4,756,377	3,045	413	134	120
RU6LWZ	*	1,280,770	1,359	274	88	60
RK3DXW	*	1,271,571	1,377	259	90	52

Finland

OH8X	A	3,690,240	2,412	376	135	129
OH8A	*	2,401,294	2,245	262	94	102

France

F5JY	A	2,847,744	1,997	333	115	128
F8KGH	*	1,976,439	1,796	241	86	126

Germany

DKØCU	A	1,001,053	1,220	197	65	99
DK7FP	*	976,400	1,062	224	80	96
DKØED	*	123,369	291	90	40	47

Italy

IK4MGP	A	5,796,099	3,071	415	137	179
IV3RAV	*	2,257,920	1,643	322	122	116
IN3JJI	*	851,526	1,063	195	62	94
IQ8PQ	*	458,172	795	150	51	66

Netherlands

PI4DX	A	20,736	107	41	16	24

Norway

LA1J	A	1,206,959	1,229	254	89	66

Poland

SO9Q	A	3,056,664	2,014	366	119	121
SN2J	*	2,439,795	1,901	296	113	114

Romania

YO7BGA	A	17,160	83	44	29	5

Scotland

GM6NX	A	177,707	411	137	39	23

Slovakia

OM3RRC	A	885,248	1,318	184	59	61

Slovenia

S5ØPTUJ	A	2,932,104	2,042	292	112	159

Spain

EB1LA	A	4,847,676	2,878	359	121	188
EB2BXL	"	1,191,320	1,334	188	65	124

Svalbard

JW5X	A	122,451	318	75	36	36

Ukraine

UZ2M	A	5,222,189	3,167	411	132	136
UWØL	*	335,170	621	173	56	13

Wales

MW2I	A	2,274,030	1,997	266	96	133

SOUTH AMERICA

Argentina

LS1D	A	4,516,698	2,428	313	112	206
L73D	*	445,632	584	105	51	108

Brazil

ZW5B	A	1,107,045	1,109	177	71	89
PY2KJ	*	271,411	452	97	45	61

Netherlands Antilles

PJ2S	A	3,807,468	2,459	216	86	219

Uruguay

CV5D	A	1,935,450	1,451	207	80	163

MULTI-OPERATOR
TWO TRANSMITTER
NORTH AMERICA

United States

NR4M		5,323,464	3,453	326	113	203

KØIR		3,347,586	2,652	303	118	217
W1BV		1,999,283	1,956	221	73	157
W1MAT		1,430,520	1,433	236	80	139
WY3P/4		917,840	1,025	200	62	123
W8BI		515,488	725	172	68	116

Canada

VE7SV		3,477,010	2,548	259	108	198

AFRICA

Canary Islands

EF8M		16,850,625	6,896	451	145	221

Madeira Islands

CR3A		11,170,956	5,391	361	120	211

ASIA

Asiatic Russia

RA9A		2,927,623	2,228	319	110	38

Japan

JA1ZGP		518,232	759	140	71	53

EUROPE

England

G5D		2,542,452	2,195	266	89	129
G3V		2,364,078	2,196	260	86	117

European Russia

RF3T		131,222	308	126	52	4

Finland

OH2ET		2,963,240	2,489	334	103	95

Germany

DQ4W		5,335,161	3,320	381	126	156
DL3TD		3,106,512	2,222	306	108	150
DLØCS		2,729,905	2,101	305	100	140

Italy

IQ1RY		5,443,518	3,453	341	125	176

Netherlands

PI4CC		4,442,656	3,010	342	115	151
PI4W		1,781,450	1,909	236	75	99

Norway

LA1K		264,936	525	158	46	24

San Marino

T7ØA		6,626,982	4,275	373	127	154

Sicily

IT9BLB		6,740,463	3,926	396	138	175

Spain

AO7H		1,386,055	1,513	213	71	111
AM5A		1,326,555	1,609	202	75	92

SOUTH AMERICA

Galapagos Islands

HC8/K6AW		10,238,560	4,790	338	119	262

MULTI-OPERATOR
MULTI-TRANSMITTER
NORTH AMERICA

United States

K1TTT		6,510,000	4,233	353	125	222
KA4RRU		3,165,372	2,711	266	95	192
N2PA		911,874	1,167	181	70	150
KTØR		445,212	849	126	51	121

Canada

VE7UF		3,041,430	2,750	192	87	211

Puerto Rico

KP4JFR		506,592	719	134	45	109

AFRICA

Madeira Islands

CR3L		7,736,875	4,136	338	101	186

EUROPE

Bulgaria

LZ9W		5,114,672	3,550	347	118	139

Finland

OH6R		4,527,360	3,388	353	115	108

France

F5KEQ		562,024	750	193	66	67

Hungary

HG1S		6,610,080	3,804	402	134	169

Luxembourg

LX7I		6,404,653	3,981	354	117	176

Macedonia

Z37M		6,198,698	3,900	394	135	153

Ukraine

UR3QXX		317,652	554	181	55	21

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MOS FET RD100HHF1

More features to support your HF operation

●10 kHz Roofing filter ●20 dB ATT/IPO ●Built-in TCXO for incredible ±1 ppm/hour (@+77°F, after warm-up) stability ●CAT System (D-sub9 pin): Computer programming and Cloning capability ●Large, Easy-to-See digital S-meter with peak hold function ●Speech Processor ●QUICK SPLIT to automatically Offset transmit frequency (+5 kHz default) ●TXW to monitor the transmit frequency when split frequency operation is engaged ●Clarifier ●Built-In Electronic Keyer ●CW Beacon (Up to 118 characters using the CW message keyer's 3 memory banks) ●CW Pitch Adjustment (from 400 to 800 Hz, in 100 Hz steps) ●CW Spotting (Zero-Beating) ●CW Training Feature ●CW Keying using the Up/Down keys on the microphone ●Two Voice Memories (SSB/AM/FM), store up to 10 seconds each ●20 second Digital Voice Recorder ●Dedicated Data Jack for FSK- RTTY operation ●Versatile Memory System, up to 500 memory channels that may be separated into as many as 13 Memory Groups ●CTCSS Operation (FM) ●My Band / My Mode functions, to recall your favorite operating set-ups ● Lock Function ●C.S. Switch to recall a favorite Menu Selection directly ●Dynamic Microphone included ●IMPORTANT FEATURES FOR THE VISUALLY IMPAIRED OPERATOR – Digital Voice Announcement of the Frequency, Mode or S-meter reading

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http://www.vertexstandard.com

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

YAESU
Choice of the World's top DXers

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