CQ Hall of Fame Inductees, p. 34

Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

JULY 2012

CQ

NEW Column! Riley's Ramblings, p.52

- The ON4WW Ultimate Beverage Switchbox, p. 13
- Results, 2012 CQ WPX RTTY Contest, p. 20
- A Pair of CW Filter Kits, p. 62

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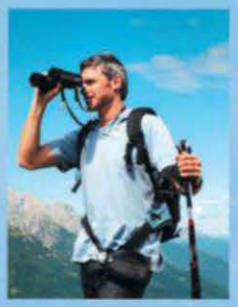
CQ WW VHF Contest July 21–22

On the Cover: Hungarian DXer and DXpeditioner Tomi Pekarik, HA7RY. Details on page 96.



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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!

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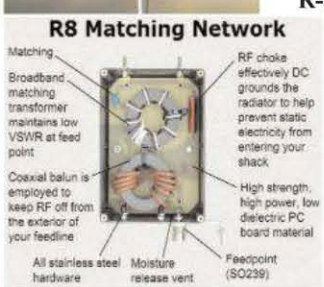
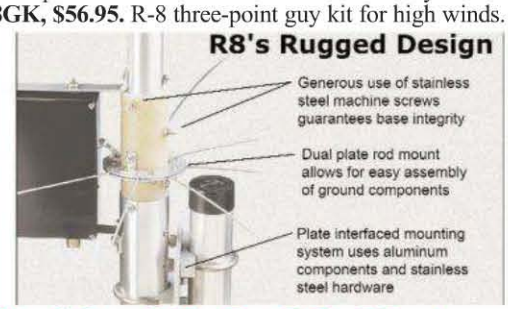
Legal-Limit Power: Heavy-duty components are contest-proven to handle all the power your amplifier can legally deliver and radiating it as RF rather than heat.

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!

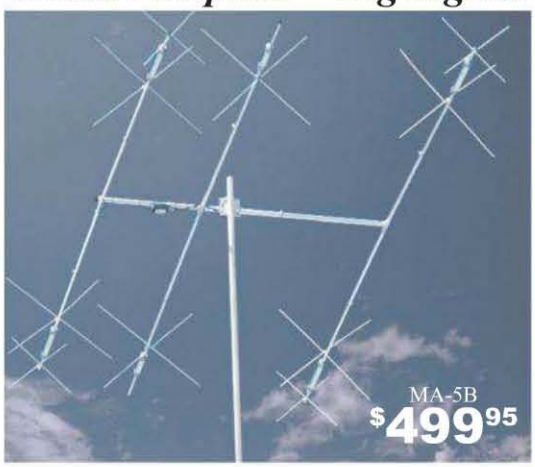
R-8GK, $56.95. R-8 three-point guy kit for high winds.





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 *Ringo* 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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FCC Back at Full Strength

Jessica Rosenworcel and Ajit Pai are the two newest FCC Commissioners, sworn in on May 14 by Commission Chairman Julius Genachowski after receiving Senate confirmation earlier in the month. The two had been nominated last November by President Obama to fill seats vacated by former Commissioners Michael Copps and Meredith Atwell Baker. Senate action on their nominations was blocked by Sen. Charles Grassley (R-IA) over the FCC's approval of LightSquared's wireless network application that threatened massive interference to the GPS navigation system. Grassley received the documentation he was requesting in early May and the Senate quickly approved the nominations of Rosenworcel, a Democrat, and Pai, a Republican.

Vanity Callsigns May Cost 80 Cents More

The FCC's budget plan for the next fiscal year includes an 80-cent increase in the fee for amateur radio vanity callsigns, to $15 for a 10-year term from the current $14.20. Each year, the Commission modifies the vanity call fee as part of its overall budget. According to the ARRL, the fee has ranged from a low of $11.70 in 2007 to a high of $70 at the inception of the vanity call program in 1994. The new fee, once finalized by the FCC, will take effect in the fall.

M-V Island Deleted from CQ Countries List

CQ DX Awards Manager Keith Gilbertson, KØKG, reports that Malyj Vysotskij Island (R1M) has been deleted from the CQ countries list. This follows the Deutscher Amateur Radio Club's (DARC's) decision to drop the island from its WAE (Worked All Europe) list. The ARRL dropped the island from the DXCC list in February, as a result of a new treaty between Russia and Finland that ended the island's separate status. CQ's country list is based on a combination of the DXCC and WAE lists, so M-V Island remained active on the CQ list as long as it remained on the WAE list.

CQ Launches Industry E-Newsletter

CQ magazine publisher CQ Communications, Inc. has launched an e-mail newsletter for the hobby radio industry. The *CQ IndustryInsider* debuted just before the Dayton Hamvention® and reports on news and trends in the amateur radio, scanning and listening marketplace, as well as company news and announcements, marketing tips and an idea exchange for spotlighting concepts for new products and services. Industry members who did not receive initial issues and would like to be added to the mailing list should contact CQ Advertising Manager Chip Margelli at <ads@cq-amateur-radio.com>.

Ham Radio Pulled into Territorial Dispute

Ham radio has been pulled into an ongoing dispute between China and the Philippines over ownership of Scarborough Reef in the South China Sea. A report on Southgate Amateur Radio News says a Chinese website (sina.com) claims that correspondence regarding amateur radio operation from the reef supports Beijing's claim to sovereignty.

According to the website, in 1990, the Philippine ambassador to Germany informed a German ham that the reef was not within Philippine territory, and that that was confirmed by a 1994 exchange of letters between the Philippine Amateur Radio Association and the ARRL. For more, see <http://bit.ly/KCbFto>.

Heathkit Closes Again

Heathkit's highly-promoted return to kit-making, including a possible return to the amateur radio market, appears to have failed. The ARRL and others report that Heathkit Educational Systems seems to have closed its doors. Company officials were not available for comment, although several listed the company as a *former* employer on social media profiles. In addition, listed phone numbers for Heathkit all respond with busy signals and the company website's online store page no longer comes up (even though the main website remains active). One outside sales representative who worked with Heathkit told ARRL that the company has "temporarily closed," but he said he was not optimistic that it would reopen.

Cuban Hams Get New Digital Modes

Cuba's government has approved the use of several new digital modes by the country's ham radio operators, according to a post by CO7WT on Southgate Amateur Radio News. Previously, Cuban hams have been permitted only to use PSK31, QPSK31, AMTOR, packet and RTTY. The new rules now authorize the use of Olivia, MFSK, JT65, most PSK variants and others, and they set up a mechanism for Cuban amateurs to apply for approval of additional modes in the future.

Steve Mendelsohn, W2ML, SK

Newly-inducted CQ Amateur Radio Hall of Fame member Steve Mendelsohn, W2ML, became a Silent Key on May 23 after a long fight against pancreatic cancer. He was 67. Best-known as longtime Communications Director of the New York City Marathon, *The New York Times* published a lengthy news story on his passing and his work with the Marathon. Mendelsohn was also very active with the ARRL, serving as a Vice Director, Director and First Vice President, as well as several local radio clubs in his home state of New Jersey. A broadcast engineer who worked for both CBS and ABC, he was also game-day frequency coordinator for the New York Jets football team. For more on Steve, see "Zero Bias" on page 8 and the CQ Hall of Fame announcement on p. 34.

Progress on John Kanzius's Cancer-Fighting Technology

Pancreatic cancer is one of the types of the disease in the cross-hairs of ongoing development of a method of killing cancer cells with radio waves that was developed by the late John Kanzius, K3TUP, and featured in an interview in the January 2009 issue of *CQ*. WINK-TV News reports that preliminary animal tests at MD Anderson Cancer Center in Houston have been successful in fighting liver and pancreatic cancers, and that preparations are now being made to begin tests on larger animals, such as pigs. If those tests are successful, human trials would follow.

Radio Canada QRT on Shortwave and Satellite

For many hams starting out as shortwave listeners, one of the first and loudest stations logged was often Radio Canada International. Not for much longer. "Newsline" reports that in a cost-cutting move, RCI is planning to shut down all shortwave and satellite broadcasts and abandon its legendary transmitter facility in Sackville, New Brunswick, leaving the WWW as its only means of reaching the world. In addition, Newsline reports, RCI will stop producing its own programming and will shut down its news department.

Six Hams Aboard Space Station

One American and two Russian amateurs have arrived at the International Space Station, joining a crew of three ham-astronauts/cosmonauts already aboard the orbiting outpost. Astronaut Joseph Acaba, KE5ADR, and cosmonauts Gennady Padalka, RN3DT, and Sergei Revin, RN3BS, are the latest crew members to arrive at the station. They were preparing for the arrival of the Dragon cargo ship launched by SpaceX, the first commercial launch to the station. The Dragon was to deliver food, clothing and 15 experiments from the Student Spaceflight Experiments Program, among other supplies. It was to be reloaded with trash and material that was no longer needed aboard the station and sent back to Earth for a planned parachute descent into the Pacific Ocean.

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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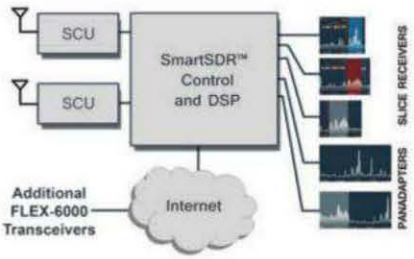

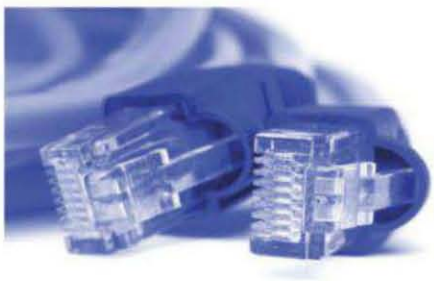

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- Integrates with all popular transceivers
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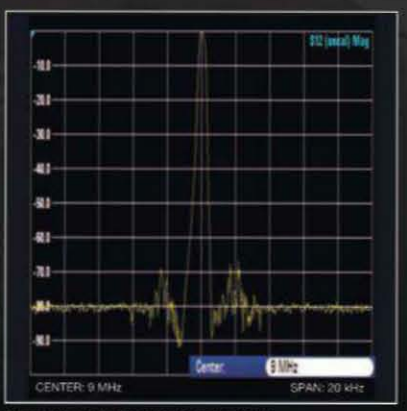
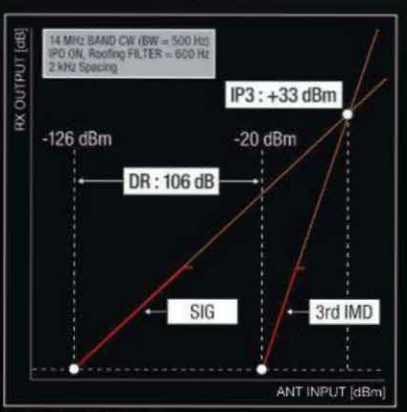


Characteristics of the Crystal Roofing Filter (200 Hz)



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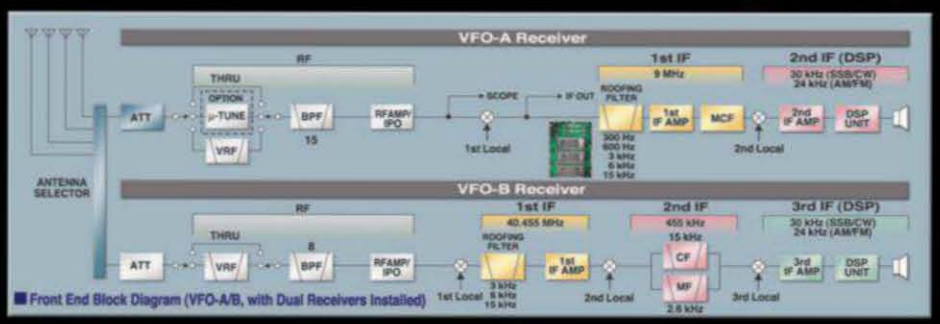
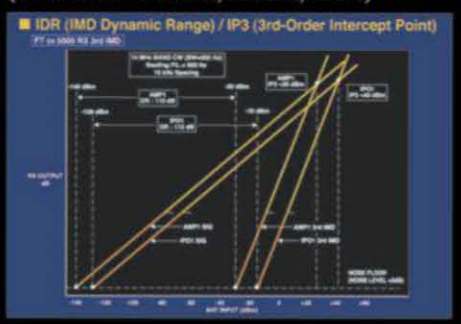
Superb 3rd-Order Dynamic Range and 3rd-Order Intercept Point (IP3)

You will be pleased with the astounding 112 dB dynamic range and superb IP3 + 40 dBm at 10 kHz separation (CW/500 Hz BW). Experience the unmatched close-in dynamic range of 105 dB, IP3 +36 dBm at 2 kHz separation (CW/500 Hz BW)! (VFO-A/Main Receiver, 14 MHz, IPO-1)



Front End Block Diagram (VFO-A/B, with Dual Receivers Installed)



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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Doin' It Wrong and Gettin' It Right

"I didn't know it was impossible when I did it."
(Source unknown)

Back in high school, I had constant battles with math teachers who insisted on marking questions wrong even if I had the right answer because I "didn't solve the problem correctly." Process was more important than results. With all due respect to the math teachers of the world, I disagreed then and I disagree now. In real life, finding a new way to solve an old problem is called creativity or innovation. In high school math, it's called "wrong."

I bring this up because if any of my high school math teachers had been grading my latest radio adventure, it would be marked wrong. If you've been reading this editorial regularly, you know that my latest ham radio interest is QRP (low-power) and portable operating, and that I've been assembling the necessary gear for "trail-friendly radio." The closest I'd gotten to "hitting the trail" by the time this year's Dayton Hamvention® rolled around was one morning in my back yard spent testing the combination of QRP rig, end-fed half-wave antenna, and mini-tuner.

I tossed a length of nylon rope over a tree branch and pulled up the antenna's active element. I laid out the counterpoise in the opposite direction, hooked up a 9-volt transistor radio battery to my MFJ-9200, and started listening on 20 meters. When I later described the setup to my colleague, Richard Fisher, KI6SN, he about had a cow. It seems the counterpoise is supposed to go directly *underneath* the active element, and the 9200's 5-watt transmitter draws far too much current for me to be able to do anything but listen with a transistor-radio battery.

Nine out of ten QRP "experts," KI6SN said later, would tell me that making any contacts with that setup would be impossible (Obviously, Richard is the tenth out of ten!). But, as a person whose name is now lost to history once said, "I didn't know it was impossible when I did it," which is why W4MQC in Florida is now in my log. True, the battery died very quickly, but Alan later confirmed that he had copied enough of my transmission to get the necessary info for a valid QSO.

Ignorance can be a wonderful thing … as long as you recognize it for what it is and use it as a springboard for learning ... and perhaps for doing things the "experts" say cannot be done. And in real life, if not in math class, "gettin' it right" counts even if you're "doin' it wrong." By the way, KI6SN was so impressed with this "doin' it wrong, gettin' it right" QSO that he's writing about it in much more detail in his "Trail-Friendly Radio" column in the July issue of *WorldRadio Online.*

[Dayton purchase: 5 amp-hour gel cell with charger. Next mission: Try a QSO with enough power to make more than two transmissions!]

Dayton

As usual, Dayton was an exhausting but wonderful experience. We got to meet hundreds and hundreds of happy readers. A special thank you to those folks who stopped to tell us how much they're enjoying our digital editions as well as the traditional print versions. And depending on when you stopped by the booth, you got to meet various members of our editorial and business staffs, as well as at least a dozen columnists, award managers, and contest directors. Thanks to all who helped out at our booth.

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

There was not a dry eye in the house, certainly not Gail's, when she received a plaque of appreciation from the CQ WW Contest Directors and Committee for over 30 years of service to the contest community. (Photo courtesy of Ward Silver, NØAX)

Speaking of contest directors, nearly all of them were on hand at the Dayton Contest Dinner to present a special plaque to *CQ* Managing Editor Gail Sheehan, K2RED, recognizing the wonderful work she does, issue after issue, year after year, in taking the contest results information that they provide—often in bits and pieces—and assembling it into the cohesive articles you see in print, as well as coordinating the trophies and certificates sent to the contest winners. Congratulations, Gail! It is well-deserved.

We also made our Hall of Fame announcements and presentations over Dayton weekend (see page 34); congratulations to all the new inductees. And a special welcome to our newest columnist, Riley Hollingsworth, K4ZDH. The first edition of "Riley's Ramblings" appears on page 52 of this issue.

While many of us were at Dayton, *CQ*'s "Ham Notebook" editor Wayne Yoshida, KH6WZ, was waving the flag for ham radio at the original Maker Faire in northern California. He writes about the demonstrations he had planned in his column on page 65 of this issue.

Also at Dayton, we debuted the third edition of the *DX World Guide* by Franz Langner, DJ9ZB. It is the first edition to be published entirely in English and in full color. I saw it for the first time as I was unpacking cartons at the show, and was very impressed. This is a great shack-table reference book (also available on CD) and I highly recommend it.

W2ML

As this issue was going to press, we learned that Steve Mendelsohn, W2ML, had become a Silent Key after a long battle with pancreatic cancer. Steve is probably best-known as Communications Director of the New York City Marathon, a post he held since 1976, and through which he regularly brought ham radio into the national spotlight. He was also an ARRL Director and First Vice President, and was responsible, back in the '80s, for putting together a group of people (this writer included) to prepare ARRL recommendations for a major re-write of the FCC's Part 97 rules. The vast majority of those recommendations are now part of the FCC's amateur radio rules. Steve's contributions to our hobby were recognized earlier this year by the CQ Amateur Radio Hall of Fame committee. I called him just before I left for Dayton to let him know he was being inducted (and he was overjoyed). We were supposed to get together after I got back. Unfortunately, that never happened. 73, "old boy." Rich W2VU

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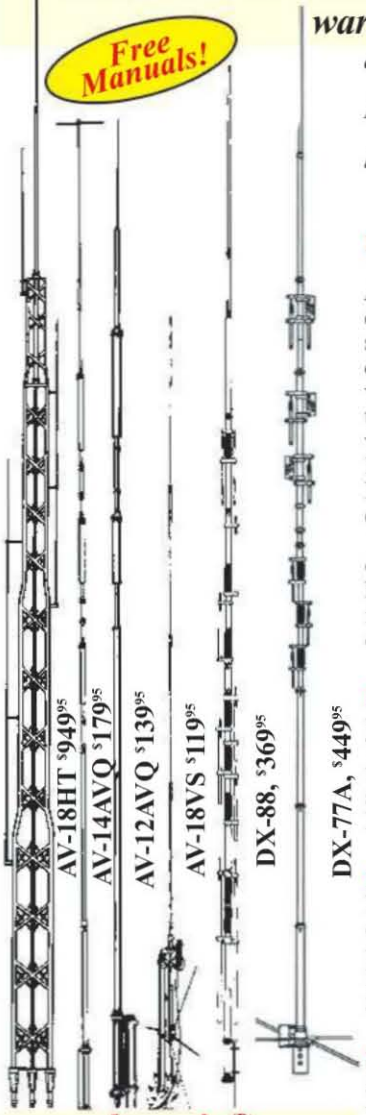

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They offer remarkable DX performance with their extremely low angle of radiation and omnidirectional pattern.

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

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

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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 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

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announcements

• These Special Event stations are scheduled for July and early August:

VINELAND, ONTARIO, CANADA — The Niagara Peninsula Amateur Radio Club special event station **CG3B** 1400–2100 UTC, Sunday, July 1 from Fort George, Niagara on the Lake, to honor the 200th anniversary of friendship and peace between Canada and the U.S. The station will air throughout the month and special QSL cards will be available. Send QSL and a self-addressed envelope with $2 U.S. to Dave Digweed, VE3FOI, 4117 Hazelnut Court, Vineland, ON, Canada L0R 2C0. E-mail: <ve3foi@yahoo.ca>.

RENO, NEVADA — From the **2012 Mensa Annual Gathering**, special event station **N7M**, July 4–6 on HF 15, 20, and maybe 40 meters. Contact KB7RJF for details.

SMITHVILLE, TENNESSEE — DeKalb/Cannon County Amateur Radio Club special event station **K4F** 1400–2200 UTC, July 7 to honor the 41st Annual Smithville Fiddlers' Jamboree & Crafts Festival. Frequencies include 28.425, 21.335, 14.280, 7.275. For QSL, send SASE to Wm. Freddy Curtis, KC4GUG, 288 Dogwood Circle, Smithville, TN 37166-2712; <http://www.dcarc. drivehq.com/>.

SAN JUAN, PUERTO RICO — Puerto Rico Amateur Radio League, special event station **K4O** from July 8–20 to honor the flag bearing of the Puerto Rico Delegation to the 2012 Summer Olympics. Contact: Otis Vicens, NP4G, (787) 633-6847.

HAMILTON, ONTARIO, CANADA — Hamilton Amateur Radio Club, special event station, **XM31812**, July 13–15 to honor the War of 1812. For more information: <http://www.wix.com/xm31812/xm31812>.

CANTON, OHIO — Canton Amateur Radio Club special event station **W8AL**, 1200 –2400 UTC August 4 and 1200–2400 UTC August 5 to salute the Annual Pro Football Hall of Fame Festival in Canton. Frequencies include 28.365, 21.365, 14.265, and 7.265. For a certificate, send QSL and $2 to Roger Gray, W8VE, 3506 21st Street, NW, Canton, Ohio 44708; <http://www.w8al.org>.

• The following hamfests, etc., are slated for July and early August:

LEHMAN, PENNSYLVNIA — Murgas Amateur Radio Club 33rd Annual Wilkes-Barre Hamfest and Computerfest July 1 at the Luzerne County Fair Grounds. Contact: Herb, K2LNS, (570) 829-2695 or Bill, KB3KUJ, (570) 510-1680. E-mail: <murgasarc@gmail.com>. (Talk-in 146.61 [PL 82.5]; exams 10 a.m.)

VANCOUVER, WASHINGTON — Mobile Amateur Radio Awards Club 44th Annual MARAC National Convention, July 4–7 at the Red Lion Hotel Vancouver at the Quay. Contact: Phil Yasson, AB7RW – MARAC #44, 13208 NE 5th Avenue, Vancouver, WA 98685-2679; <http://bit.ly/It6NLz>.

ALLISON PARK, PENNSYLVANIA — North Hills Amateur Radio Club 27th Anniversary Hamfest, July 7 at the Parkwood United Presbyterian Church.Contact: Cathy Heiles, KB3OYS, (412) 486-2785; e-mail: <hamfest@ nharc.org>; <http://www. nharc.org>. (Talk-in 147.09)

KIMBERTON, PENNSYLVANIA — Mid-Atlantic Amateur Radio Club Valley Forge Hamfest and Computer Fair July 8 at the Kimberton Fire Co. Fairgrounds. Contact: MARC, (610) 696-5040; e-mail: <hamfest-info@marc-radio.org>; <http://www. marc-radio.org>.(Exams 10 a.m. , pre-registration encouraged by contacting Bob Lees, (610) 324-5319, <w3zqn@arrl.net>.

SOMERSET, PENNSYLVANIA — Somerset County Amateur Radio Club Somerset County PA Hamfest July 8 at the Somerset County Technology Center. Contact: Stew, AK3J, (814) 444-0637; e-mail: <ak3j@arrl.net>; <http://www.k3smt.org>. (Talk-in 147.195+ [PL 123] or 443.250+ [PL 123]; exams 1 p.m.)

ERIE, PENNSYLVANIA — Wattsburg Wireless Association and the **Union City Wireless Association 11th Annual Northwest PA Hamfest** July 14 at the Greene Township Municipal Building. E-mail: <hamfest@nw-pa-hamfest.com>; <http://bit.ly/HEo03w>. (Exams)

INDIANAPOLIS, INDIANA — Indianapolis Hamfest Association Indianpolis Hamfest July 14 at Camp Sertoma. Contact: (317) 261-6658; <http:// www.indy-hamfest.com>.

MONUMENT, COLORADO — Pikes Peak Radio Amateur Association, Inc. PPRAA Ham Radio Megafest July 14 at Lewis-Palmer High School. Email: <megafest@ppraa.org>; <http://ppraa.org>. (Talk-in 146.970- [CTCSS 100] or 146.520 simplex; exams 10 a.m.).

SOLDOTNA, ALASKA — Moosehorn Amateur Radio Club 7th Annual Kenai Peninsula Hamfest July 14 at the Kenai Peninsula Borough Emergency Response Center. Contact Ed Cole, KL7UW, <kl7uw@arrl.net>. (Talk-in 146.88/28; exams 1 to 2:30 p.m.)

TEXAS CITY, TEXAS — Tidelands Amateur Radio Society 25th Annual Texas City Hamfest July 14 at the Doyle Convention Center. Contact: Tidelands Amateur Radio Society, P.O. Box 703, Texas City, TX 77590; <http://www.tidelands.org>. (Talk in 147.14 [PL 167.9]).

WARRENSBURG, MISSOURI — Warrensburg Area Amateur Radio Club annual **Hamfest** July 14th, at the Y.E.S. (Youth Excited about Sports) Center Contact Sherri, KDØCAT, (660) 441-3998; e-mail: <hamfest@waarci.org>; <http://www.waarci.org/hamfest.htm>. (Talk in 146.880- [Tone 107.2]).

WASHINGTON, MISSOURI — Zero Beaters Amateur Radio Club 50th Annual Hamfest July 15 at the Washington Elks Hall. Contact: Zero Beaters ARC, P.O. Box 1305, Washington, MO 63090. E-mail: <kd0kcf@sbcglobal.net>. (Talk in 147.24+; exams)

EAST GLACIER, MONTANA — 78th Annual Glacier-Waterton International Peace Park Hamfest July 20–22 at the Glacier Meadow RV Park. E-mail: <w7wof@arrl.net>; <http://www.gwhamfest.org>. (Exams)

WILLIAMS, ARIZONA — Amateur Radio Council of Arizona and the **City of Williams 2012 ARCA/Williams Hamfest** July 20–21 at the Williams Rodeo Grounds, 800 Rodeo Road. Contact: ARCA, (602) 881-ARCA (2722); <http://www.arca-az.org>. (Talk-in 146.78– [PL 91.5]; exams).

CARY, NORTH CAROLINA — Cary Amateur Radio Club 40th Annual Cary Mid-Summer Swapfest July 21 at Harold Ritter Park. Contact Cary ARC, P.O. Box 53, Cary, NC 27512; <http://bit.ly/LXQlVk>. (Talk-in 146.88 -0.6; exams 10 a.m.)

(continued on p. 112)

A publication of

CQ Communications, Inc.
25 Newbridge Road
Hicksville, NY 11801 USA.

CQ Amateur Radio (ISSN 0007-893X) Volume 68, No. 7. Published monthly by CQ Communications, Inc., 25 Newbridge Road., Hicksville, NY 11801, Telephone 516-681-2922. E-mail: cq@cq-amateur-radio.com. Fax 516-681-2926. Web site: www.cq-amateur-radio.com. Periodicals Postage Paid at Hicksville, NY 11801 and at additional mailing offices. Subscription prices (all in U.S. dollars): Domestic-one year $38.95, two years $70.95, three years $102.95; Canada/Mexico-one year $51.95, two years $96.95, three years $138.95: Foreign Air Post-one year $63.95, two years $120.95, three years $177.95. U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government including military services, only on a cash with order basis. Requests for quotations, bids, contracts., etc. will be refused and will not be returned or processed. Entire contents copyrighted 2012 by CQ Communications, Inc. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address.

Printed in the U.S.A.
POSTMASTER: Send address changes to:
CQ Amateur Radio, 25 Newbridge Rd., Hicksville, NY 11801

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If you're active on 160 meters, there's a good chance you've worked Mark, ON4WW, in Belgium. One of his station's biggest assets is his array of Beverage receiving antennas. But switching between those antennas was slow and inefficient, until ON5UK came up with a higher tech solution.

The ON4WW Ultimate Beverage Switchbox

BY LUC SMET,* ON5UK

In past years, I have had the opportunity to participate in several low-band contests from different well-known Belgian contest stations. The excellent results yielded by those stations on the low bands are closely related to the use of extensive receive-antenna systems. You can't work them if you can't hear them. Mark Demeuleneere, ON4WW, uses eight Beverage antennas, one every 45 degrees, which is adequate, if not perfect, for contesting purposes. The only catch in his setup was the switching part. How can you move instantly from any one heading to another withouthaving to rotate through all interlaying headings? This question led to the development of a new switching unit, and the details follow.

The Initial Switchbox

Until recently, the switching from one Beverage heading to another was done with an 8-position rotary switch. Not only is this a way of switching that is physically fatiguing when done over a long contesting period, it is also inefficient. To switch from east to west, three intermediate positions have to be passed, which means switching four times. Valuable time can also be lost when trying to find the correct heading for an unknown weak station.

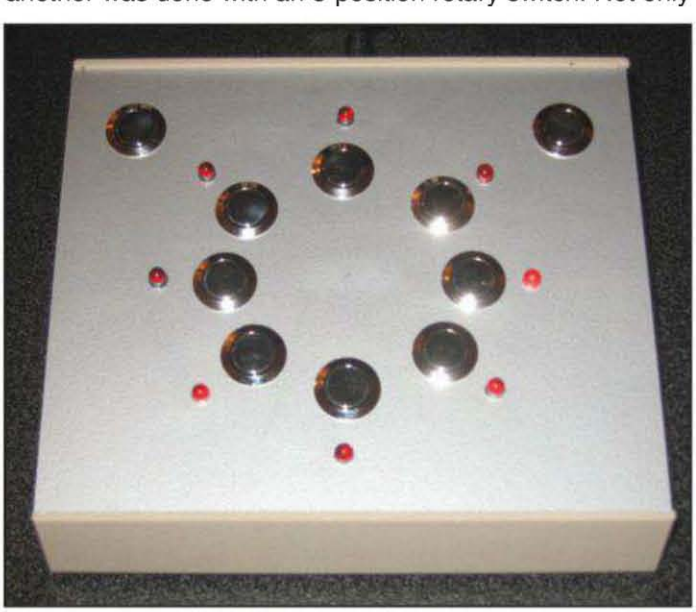

Photo A– The new pushbutton switchbox.

Fig. 1 shows the schematic of the old switchbox. The rotary switch (two layers, eight positions) switches two relays—REL1 and REL2 (outside relays on the Beverage field)—through a diode matrix, and also switches the polarity of the voltage (positive, negative, or none) that is fed through the inner conductor of the coaxial cable, which also transports the received radio signal. The combination of the position of REL1, REL2, and the voltage on the inner conductor of the coax allows you to select one of the eight Beverages through circuits A, B and C (which are also physically outside on the Beverage field).

The table in this article provides an overview of the combinations of the voltages controlling the relays, the voltage on the inner conductor of the coax, and the resulting heading of the Beverage antenna.

The New Switching System: Version 1

The objectives of the new system were clear:

- One push on a button would effectively select any of eight Beverages.
- The existing outside switching arrangement should stay as is.
- When a defect occurs at the new switching system, the old rotary switch must be able to be put back in action instantaneously.
- The operational characteristics of the new circuitry must be able to be altered in a simple way.

The new switching circuitry is built around a 16F877A. This PIC (Programmable IC) offers an advantage: You don't have to take it out of the circuit in order to reprogram it. The choice of antenna heading is made through selection of any of eight pushbutton switches.

With two additional pushbutton switches, you can rotate clockwise or counter-clockwise through all headings. This comes in handy when trying to figure out from which heading a weak signal is coming in. Photo A shows the new switchbox. The schematic is shown in fig. 2.

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A version of this article in Dutch and French was published in the July/August 2011 issue of CQ-QSO, the magazine of UBA, the Belgian national amateur radio association. This English version is published by permission.

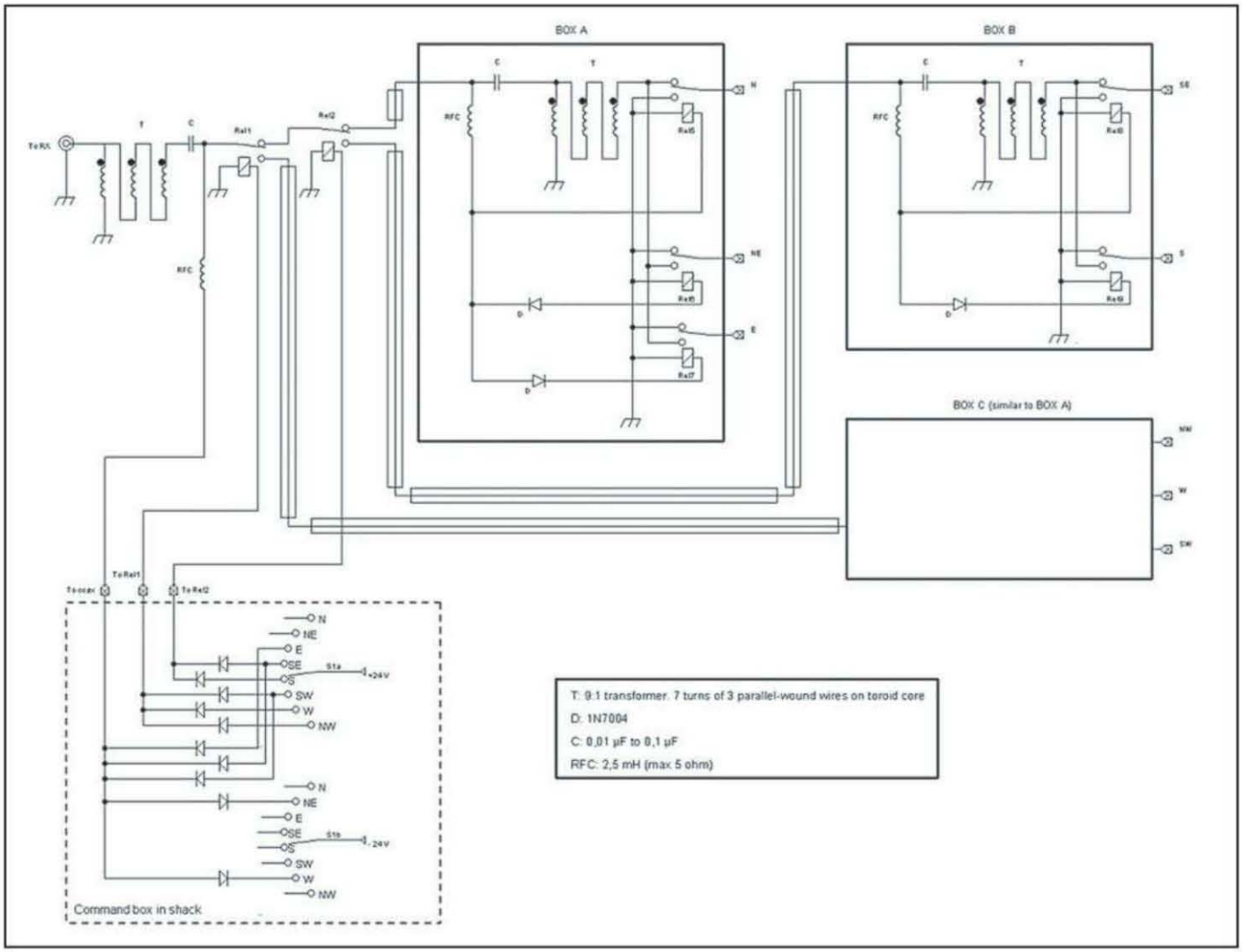

Fig. 1– Through relays REL1, REL2, and the voltage on the center conductor of the coax, we select the correct Beverage antenna through the circuits A, B, and C.

The new switching unit was connected to the existing rotary switchbox. Some minor adjustments were inevitable. The existing arrangement is expanded with switch S2 (2 positions, 3 circuits) and relays REL3 and REL4. S2 gives the option of using the old rotary switch or the new system with pushbuttons. Relays REL3 and REL4 provide the choice of voltage polarity on the coax, within the new switching system. See fig. 3 for the altered schematic of the existing switchbox.

The operation of the PIC program is simple. The state of the inputs of the PIC (inputs connected to the pushbuttons) is constantly monitored/probed. When the PIC notices that one of the inputs gets momentarily "high" (+5V), it chooses the correct antenna by driving transistors T1 through T4, which in turn steer relays REL1, REL2, REL3, and REL4.

The PIC is programmed with JAL (Just Another Language), a programming language resembling Pascal. Information on this language is widely available on the internet.

Here Comes Version 2

This new switching arrangement was a vast improvement over the old one. Enthused by it, Mark quickly came up with some further ideas:

- Replacement of the pushbuttons by touch-button switches.
- A touch-button switch which automatically makes one full revolution east-to-east heading, counter-clockwise.
- This revolution must be done in about 2.2 seconds, the approximate time in between two CQs on the 160-meter band.
- Interruption of this revolution by selecting any heading of choice;
- A touch-button to switch step by step, counter-clockwise.

A search on the internet revealed, professional touch switches are not cheap! One lucky day, Mark's eye caught a 4-LED sensor tap lighting in a local Blokker discount store. It was switched on and off by…oh yes, a touch-switch, and all for a cheapo price of 2.49 Euros! (See photo B.)

	N	NE	E	SE	S	SW	W	NW
REL1	0	0	0	0	0	+	+	+
REL2	0	0	0	+	+	0	0	0
Coax	0	–	+	0	+	+	–	0

Table I– The polarity of the chosen voltages and the corresponding heading of the selected Beverage antenna. Mark and I agreed it was time to develop a more comfortable and efficient switching system.

Would this touch switch be practicle for our project? It appeared the switching circuitry was built around a bistable multivibrator. With some programming, we thought, it should be possible to steer the PIC.

Because the local Blokker discounter had an insufficient number of these units in stock, Mark went on a touch-lamp hunt in all Blokker stores over a wide area—successfully! The printed circuit boards of these units (see photo C) were shortened with a small hacksaw and could then be used in the new version of the switching device. Nothing much changed from the schematic of fig. 2. The pushbutton switches were replaced by the touch-button switches. See fig. 4 for the connections of the touch-button switches.

The programming of the PIC was adjusted. Now it constantly monitors whether the status of the PIC inputs "changes" (from low to high and vice versa). All of Mark's latest wishes were incorporated within this new version (photo D). A video demo with all options can be seen on YouTube (see references). All three versions—the original rotary switch and the two new electronic switches—are within reach at ON4WW (photo E) and are interchangeable if necessary.

The LA4HIA Version

Shortly after publication of the video demo on Youtube, Rune, LA4HIA, asked if it would be possible to build a similar switching arrangement tailored to his specific environment. Rune uses several Beverages that are switched through a RATPAK 8 from Array Solutions. The RATPAK uses a command box that is connected to a central switchbox through a nine-conductor cable (of which one conductor serves as common "return"), which commands eight relays to choose one out of

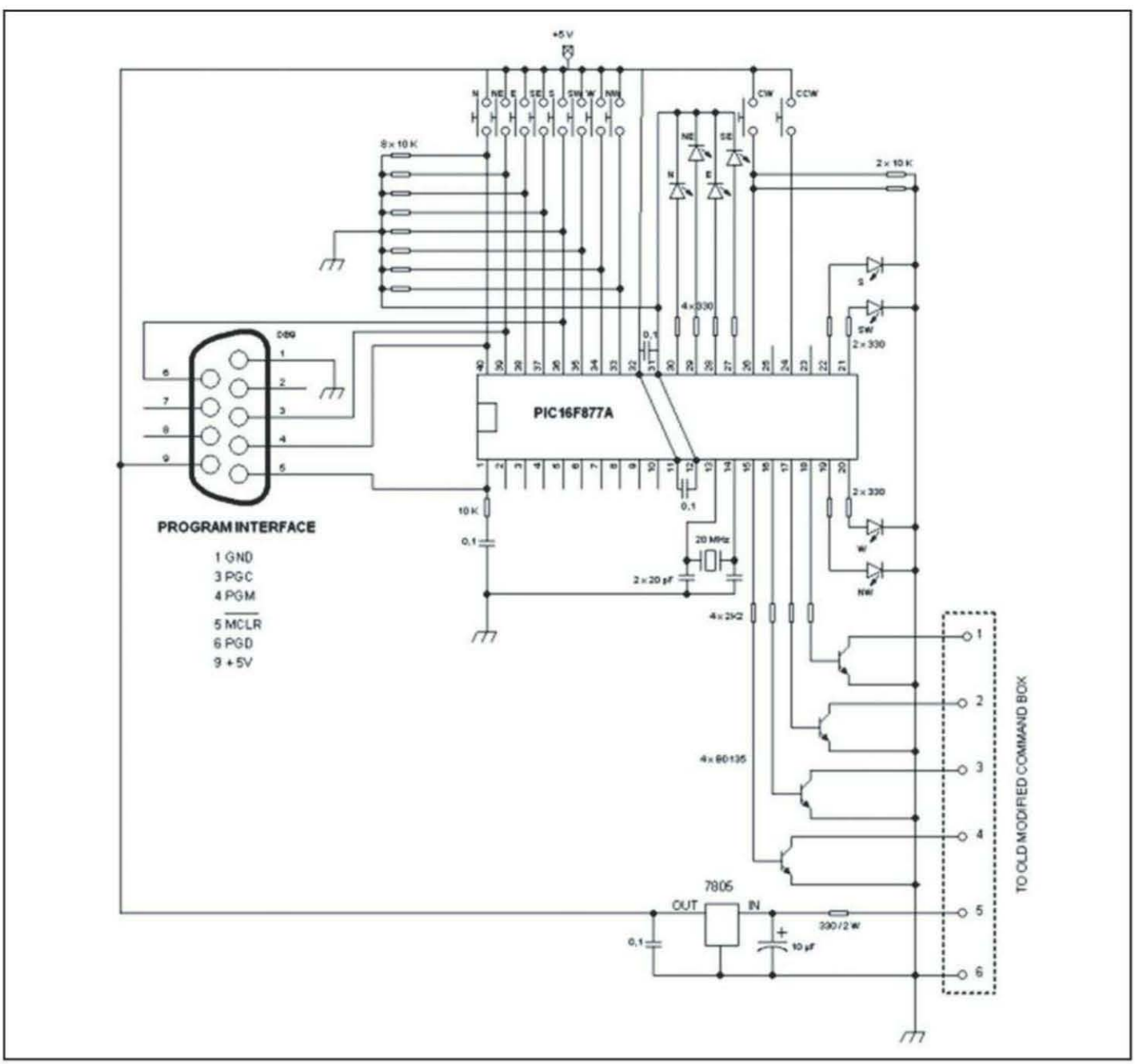

Fig. 2– The schematic for the 16F877A configuration.

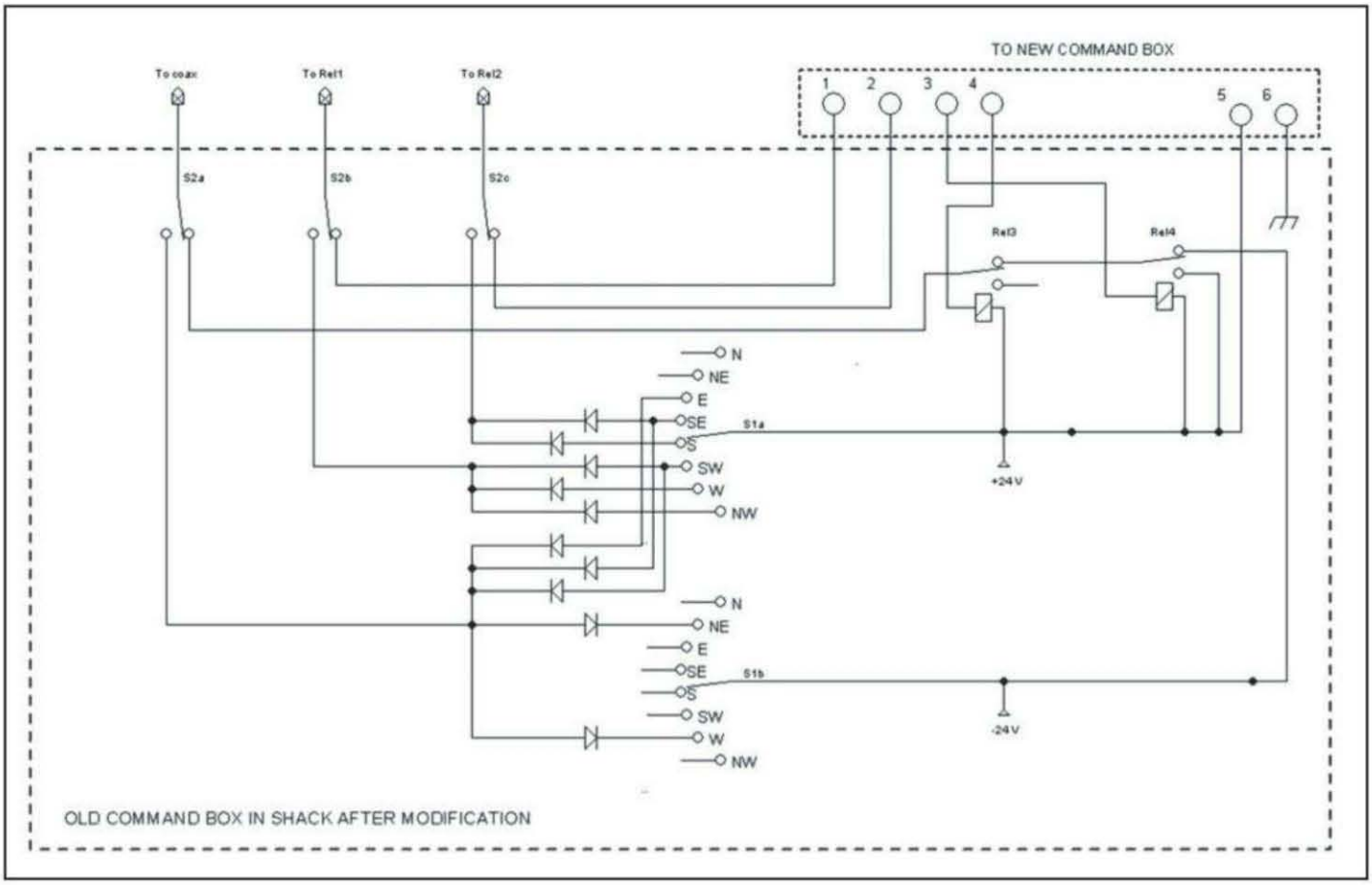

Fig. 3– Schematic of the altered existing switchbox.

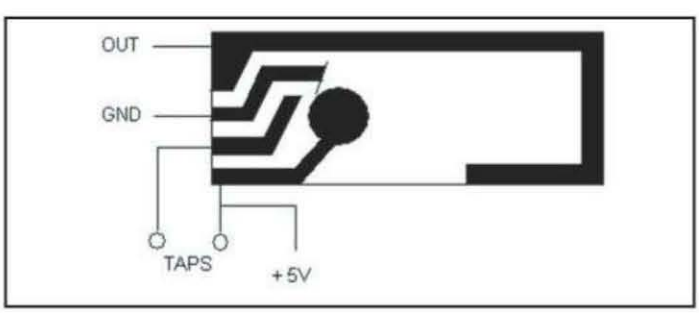

Fig. 4– The connections of the touch-button switch lamp. OUT is connected to the input of the PIC.

eight Beverages. By generating 12 VDC on one of the strands, the appropriate relay is switched.

A good, cheap alternative had to be found for the Blokker touch switches (Mark plundered all stores; no switches to be found anymore!). Some tests revealed that a simple circuit with a Darlington transistor (BC517) yielded excellent results. These types of devices have a very high gain (minimum DC gain is rated at 30,000 times input current) and are very sensitive to any changes at their input. Putting a finger on the touch pads turns on the transistor. When the finger is removed, the transistor switches off. It was also necessary to address the analog inputs of the PIC, because it now needed to steer

Photo B– Article number 17.45.001 from Blokker. This lighting module is for portable use in a tent or camping car and is activated by a touch switch.

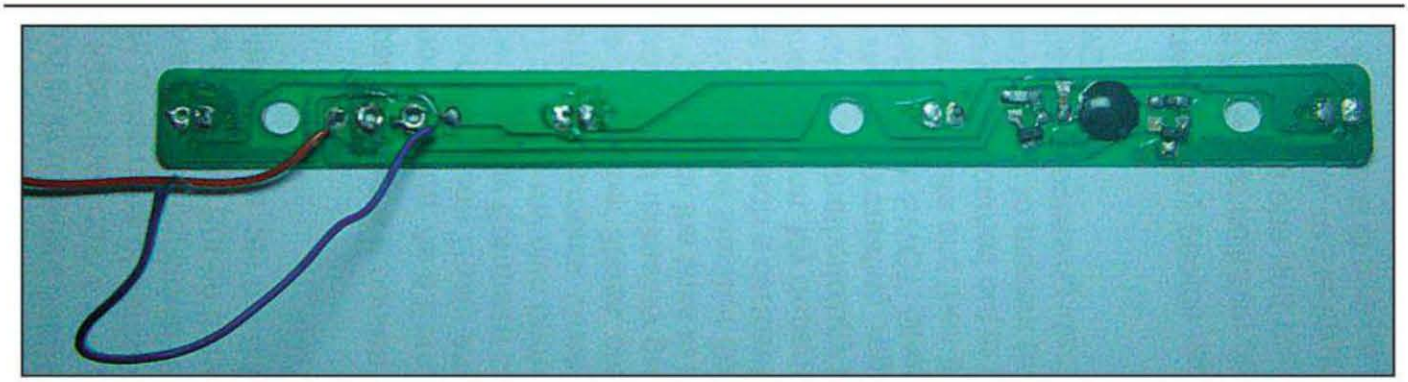

Photo C– The printed circuit board from the Blokker sensor tap lighting.

eight relays. The PIC-program also needed some modifications. Photos and a schematic of the LA4HIA switchbox are linked to this issue's highlights page on the CQ website at http://www.cq-amateur-radio.com. Readers of our digital edition may simply click on the link.

The Next Step

Rag, LA6FJA, recently asked me if it would be possible to build a version suitable for steering two Ameritron RCS-4 units. That will be the next challenge and project.

A Closing Note by ON4WW

Contest experiences with the new switch unit:

My first low-band contest experiences go back some 20 years. I listened in while John Devoldere, ON4UN, operated his 12-Beverage station to win time after time. Soon after, John handed me the key and a new low-band addict was born. Even then, I said to John, "We should be able to switch the Beverages by merely the touch of our fingertips." (Remembering the '80s Acec TVs with touch-button channel selection.)

In 1993, we bought our current home (making sure there were plenty of meadows behind the property), and in the following years I put up Beverages myself. John made the schematics, and I built my first and long-lasting Beverage switchbox with a rotary switch. Now contesting on the low bands from home, the thought of touch-switching the Beverages lingered in my mind. It wasn't until I noticed one of my guest operators struggling with the rotary switch on my Beverage control box that I picked up the thread and talked

about it to Luc, ON5UK. The end result of that conversation is this article.

It is just fantastic to be able to switch instantaneously from one heading to another. However, the icing on the cake is the automatic rotation of a full revolution. When things on 160 meters start to get slow during a contest (and that happens quite often), it is pure luxury to just touch a button and the "dial" takes a spin over all the Beverages in between CQs. Previously it was easy to miss a very weak caller, but with this feature it is hard to miss such a station. Also very handy is the ability to interrupt this automatic rotation and pick any desired heading. In short, this magical box rocks!

References

Hex files: The hex files of the JAL programs are available at: <www.tls.uba.be/Projecten.html>

YouTube: <http://www.youtube.com/watch?v=D9lVU-p3f0I>

Blokker: <http://www.blokker.be>

ON4WW: <http://www.on4ww.be/ON4WWPresent.html>

LA4HIA: <http://www.la4hia.com>

Devoldere, John, ON4UN, *ON4UN's Low Band DXing,* Fifth edition, American Radio Relay League, Newington, CT <http://www.arrl.org>.

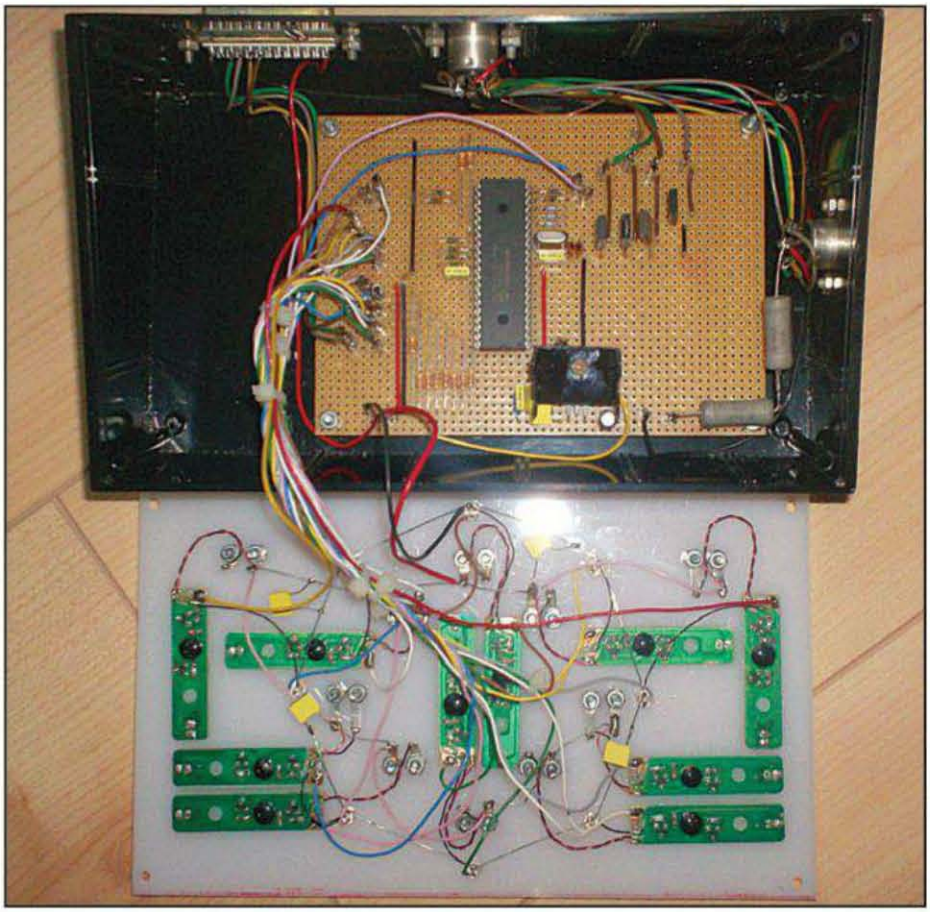

Photo D– Inside the new touch-control switchbox.

Photo E– Overview of the different switchboxes. On top (middle) of the FT-1000MP radio is the old rotary switch version (to the left of that is the homebrew K9AY control box). To the right-hand side of the speaker are the two new versions: first the pushbutton version, followed by the touch-button switchbox.

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Results of the 2012 CQ WPX RTTY Contest

BY ED MUNS,* WØYK

The 18th annual CQ WPX RTTY Contest produced 1,236,594 QSOs, up 25% from 2011. Submitted logs were up 44% to 3546, aided by an aggressive effort from us to request logs. However, the number of active callsigns was down 9% to 10,109. Active prefixes were down a bit at 1999, as were countries at 178. Multi-Multi 9A1A snagged 1168 prefixes, a new world record.

Conditions shifted to the high bands, reducing the potential for double points on 40 and 80 meters. 15 meters produced the most QSOs, and 10 meters was much more productive than it has been in recent years. However, it still didn't produce as it did for the CQ WW RTTY Contest last fall. Here is a comparison of band activity for the past three years of WPX RTTY, showing percent of total QSOs per band:

Band	2010	2011	2012
80	13%	15%	11%
40	27%	28%	23%
20	36%	35%	27%
15	23%	21%	30%
10	0.5%	1%	9%

This is the second year that Single-Op (SO) QRP categories were available and 115 stations entered, up 49% from 2011. Rookie overlays more than doubled to 77, and Tribander/Wires overlays rose from 324 to 475.

The Low Power categories continue to be the most popular, accounting for 62% of the Single-Op entries. All-Band entries dominate 77% of the Single-Op entries. 105 Multi-Op logs were received, and 78 of those were Multi-Single.

Excluding the new QRP categories, fewer records were broken this year compared to 2011: *four* new world records and *thirteen* new continental records. The total number of new records is nevertheless impressive:

	World		Continent	
	New	Avail	New	Avail
SO10	2	3	11	18
SO15	1	3	7	18
SO20	2	3	8	18
SO40	1	3	4	18
SO80	1	3	2	18
SOAB	2	3	7	18
MS	1	1	4	6
M2		1	2	6
MM		1	2	6
Total	10	21	47	126

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

Single-Operator QRP (115 entries)

Single-Operator, All Band (69). Rudolf TM3T broke his own world record with 1.2M points. Fellow countryman Gerard TM9K took second with 1.1M; Dmitry RX1CQ took third with 1M, and fourth place Gerald KØDU set a new North America record with 845K.

Single-Operator, Single Band 3.5 MHz (10). Toth HA1WD once again took top honors, breaking his inaugural world record with 289K. Stanislaw SP6EIY took second with 123K, and Alex UX5UU took third with 113K. All entrants were Europeans, same as last year.

Single-Operator, Single Band 7 MHz (7). Dmitrij UT3N set a new world record with 404K, Gulyas HG6C was second with 208K, and Stefano IK4UXA was third with 138K. Graham VE3GTC set the North America record with 11K. He and Jose CO2KY were the only non-Europeans to enter this category since its initiation last year.

Single-Operator, Single Band 14 MHz (10). Francisco TG9ANF set a new world record with 393K. Giorgio IK3NKL took second with 93K, and fifth place Erardo LU6FT set the new South America record with 2.6K.

Single Band 21 MHz (13). Javier EA4EQD set the new world record with 109.4K, and Hiro JH3DMQ was right on his heels for second place with 108.6K, four times his world record set in 2011.

Mike K1DM driving one of the NG1G (@ W1AN) positions to their Multi-Two North America win.

John W1XX watches Pat NG1G work another one for NG1G (@ W1AN).

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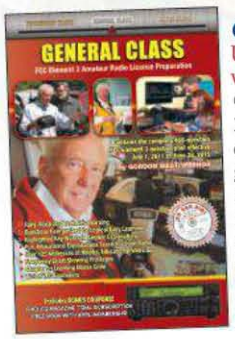
Enhance your learning experience using our practice exam software along with the ***GROL+RADAR*** book. Software includes answer explanations from the book – when you select a wrong answer, the explanation from the book appears to reinforce your learning. **GRSP-09 $79.95**

GENERAL CLASS



***General Class* book**
Upgrade to the HF bands with Gordo & W5YI! Gordo's manual for 2011-2015 reorganizes all the questions into logical topic groups for easier learning. His explanations include highlighted key words to help you remember the material for test success. Companion CD is full of great operating tips! **GWGM-11 $24.95**

General Book & Software Package
Study at your computer and take practice exams. Software includes explanations from Gordo's book, scores your results and highlights areas that need further study. Includes free Part 97 Rule Book. **GUS-11 $34.95**

General Audio Course on CD
General Theory Course recorded by Gordo is full of the sounds that bring ham radio to life! He talks you through the Element 3 theory to help you understand the material and get you ready for your upcoming exam. On 4 audio CDs. **GWGW-11 $29.95**

Ham Operator Software has All Exams

Want to study at your computer without tying up your internet connection? This value pack includes the Tech, General and Extra class exams (Elements 2, 3, and 4) along with a free Part 97 Rule Book. Software includes Gordo's answer explanations from his books! Everything you need to go all the way to the top!

Software only **HOS-12 $29.95**
Software with all 3 West Books **HOSB-12 $89.95**

Learn Morse Code for HF Fun!
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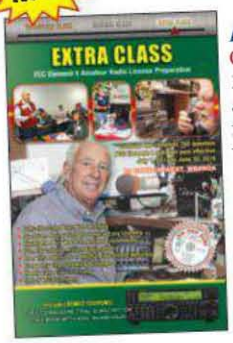
Basic Digital Electronics	BDIG $19.95
Basic Communications Electronics	BCOM $19.95

NEW! EXTRA CLASS



***Extra Class* book**
Go to the top with Gordo! 2012-2016 book includes all Element 4 Q&A reorganized into logical topic groups. Gordo's fun, educational explanations with highlighted keywords, and great memory tricks for those tough theory questions! Wait 'til you meet "Eli the Ice Man!" **GWEM-12 $24.95**

Extra Book & Software Package
Study at your computer and take practice exams as the W5YI software scores your results and highlights areas that need further study. Includes explanations from Gordo's book. Free Part 97 Rule Book. **ECS-12 $39.95**

Extra Audio Course on CD
Extra Class Theory Course recorded by Gordo talks you through the difficult Element 4 theory to help you understand the material and get you ready for your upgrade to the top.
On 6 audio CDs. **GWEW-12 $39.95**

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2012 CQ WPX RTTY CONTEST TROPHY SPONSORS AND WINNERS

Single Operator All Bands High Power

World: Sponsored by Jeff Blaine, AC0C. **Winner: P49X (op: Ed Muns, W0YK)**
Asia: Sponsored by Tyler Stewart, K3MM. **Winner: Vadim Ovsyannikov, R9DX**
Europe: Sponsored by DL-DX RTTY Contest Group. **Winner: UZ2M (op: Roman Tkachenko, UR0MC)**
North America: Sponsored by Jeff Demers, N1NSB. **Winner: Mike Sims, K4GMH**
Canada: Sponsored by Steve Frick, N6QEK/VY1. **Winner: Lee Sawkins, VE7CC**
USA: Sponsored by Glenn Vinson, W6OTC. **Winner: Bud Trench, AA3B**
USA 7th Call Area: Sponsored by Hank Lonberg, KR7X (in memory of Bob Wruble, W7GG). **Winner: KS7AA (op: Jeff Stai, WK6I)**
CONO SUR (CE-CX-LU): Sponsored by LU-CG Contest Group. **Winner: LV5V (op: Jorge Krienke, LU5VV)**

Single Operator All Bands Low Power

World: Sponsored by Mike Sims, K4GMH. **Winner: PJ4R (op: Roger Hoffman, N4RR)**
Asia: Sponsored by Doug Faunt, N6TQS. **Winner: UP7P (op: Artem Loparev, UN7PBY)**
Europe: Sponsored by Trey Garlough, N5KO. **Winner: SO8T (op: Lukasz Ciuba, SP8TJU)**
North America: Sponsored by Wayne King, N2WK. **Winner: Fabi Berttolotto, VA2UP**
Oceania: Sponsored by Doug Faunt, N6TQS. **Winner: Felimon Morano, Jr., DV1JM**
Canada: Sponsored by Mike Donohue, VE3YF. **Winner: Richard Ferch, VE3KI**
USA: Sponsored by Jim Reisert, AD1C. **Winner: WE4M (op: Mark Sihlanick, N2QT)**
CONO SUR (CE-CX-LU): Sponsored by LU-CG Contest Group. **Winner: Sebastian Torti, LU7FTS**

Single Operator All Bands QRP

World: Sponsored by Mississippi Valley DX & Contest Club. **Winner: TM3T (op: Rudolf Ruffer, F5VBT)**

Single Operator Single Band

3.5 MHz World High Power: Sponsored by Sue Cook, AI6YL/P40YL. **Winner: IQ4RA (op: Gianfranco Aviani, I4AVG)**
7 MHz World High Power: Sponsored by Randy Hatt, AA8R. **Winner: Tine Brajnik, S50A**
7 MHz World Low Power: Sponsored by Don Reed, K2OGD. **Winner: Michael Kastelic, OE1MCU**
14 MHz World High Power: Sponsored by Steve "Sid" Caesar, NH7C. **Winner: John Bayne, KK9A**
14 MHz World Low Power: Sponsored by Kenny Young, AB4GG. **Winner: Nemeth Tibor, HG7T**
21 MHz World High Power: Sponsored by Steve Jarrett, K4FJ. **Winner: Will Angenent, KN6DV**
28 MHz World High Power: Sponsored by Steve Hodgson, ZC4LI. **Winner: Rene Giorda, LU7HN**
28 MHz North America Low Power: Wray Dudley, AB4SF. **Winner: Nicolas Queru, FG4NO**
28 MHz Japan Low Power: Sponsored by JA6ZPR GOMAGARA Contest Club. **Winner: Masaki Okano, JH4UYB**

Multi-Op Single Transmitter

World: Sponsored by Steve Merchant, K6AW. **Winner: 5D5A (ops: IW1AYD, IZ1LBG, IK2QEI, IK2SGC, IZ4GWE, CN8WW)**
Europe: Sponsored by CT3 Madeira Contest Team/CT9M/CQ9K. **Winner: ED1R (ops: EA1CJ, EA4AOC, EC1KR, EC4DX, EA4TD)**
North America: Sponsored by Whatcom Amateur Radio Society WA7RS. **Winner: K1SFA (ops: K1MK, K1SFA)**

Multi-Op Two Transmitter

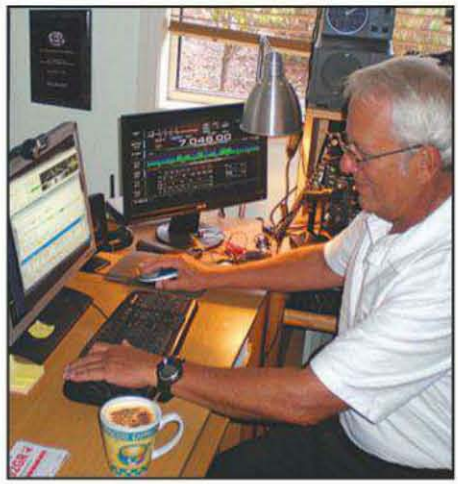
World: Sponsored by Roger Hoffman, N4RR. **Winner: HG1S (ops: HA1TJ, HA1DAC, HA1DAI, HA1SM, HA7PL, H\A1DAE)**
North America: Sponsored by Ed Muns, W0YK. **Winner: NG1G (ops: W1AN, K1DM, K3IU, W1PN, NG1G)**
USA: Sponsored by CTRI Contest Group. **Winner: KF5HHD (ops: KF5HHD, N5RZ)**

Multi-Op Multi-Transmitter

World: Sponsored by Abroham Neal Software by K3NC. **Winner: 9A1A (ops: 9A2DQ, 9A5E,**
9A5W, 9A6A, 9A7IMR, 9A7R, 9A9A)
North America: Sponsored by Fred Dennin, WW4LL. **Winner: NR4M (ops: NR4M, K7SV, K4EU, K4EC, N3ZV, K4GM, N4JOW, N4NW)**
Canada: Sponsored by KA4RRU Contest Group. **Winner: VE7UF (ops: VE7FO, VE7IO, VA7HDJ, UW0CN, VA7FC, VE7NDE, VE7UF)**

Club Competition

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



Steve VK3TDX happily running up his score to win SO HP Oceania.

Third place Papp HA6FQ had 30K, and eighth place Paul N8HM set the new North America record with 8K.

Single-Operator, Single Band 28 MHz (6). Franc S54AA set the world record with 44K, fourth place Glenn NA5NN set the North America record with 5K, and Agus YB1ALL set the Oceania record with 240 points! There were no entries last year, so the six entrants this year had a wide-open field.

Single-Operator Low Power (1934 entries)

Single-Operator, All Band (1480). Roger PJ4R (N4RR) pushed his own world record up 12% to 7.6M. Mohamed 5C5W (CN8KD) raised his own Africa record for second place with 5.5M points. Fabi VA2UP took third and the new North America record with 5M, and Sue P40YL took fourth with 4.8M. Fifth place Artem UP7P set a new Asia record with 3.8M.

Single-Operator, Single Band 3.5 MHz (42). Burkhard DF8XC took first place with 795K, Vinko S53F was second with 638K, and Jacek SP9BNM was third with 585K. Sixth place Daniel VC2E made 448K for a new North America record.

Single-Operator, Single Band 7 MHz (91). Michael OE1MCU was first with 1.8M, Miro YU1AST took second with 1.4M, and Juan YW5T was third with 1.3M and the new South America record.

Single-Operator, Single Band 14 MHz (108). Nemeth HG7T came back to beat his 2011 world record by 26% with a 2012 score of 2.1M. Paco EA3GLB tried 20 meters this year after setting the 40 meter Low Power world record last year and took second with 1.3M points. Alberto EA1OS was third with 1M, Rajcic YT5W (YT2PFR) was fourth with 774K, and Alex RV9CP took fifth with 733K for a new Asia record.

Single-Operator, Single Band 21 MHz (126). Liam EI3GC won with 887K,

2012 CQ WW WPX RTTY TOP SCORES

WORLD
SINGLE OPERATOR HIGH POWER ALL BAND

P49X (WØYK)	11,632,690
R9DX	7,508,149
UZ2M (URØMC)	7,476,480
RG9A	7,196,016
K4GMH	6,969,456

28 MHz

LU7HN	1,507,101
RY9C	641,512
KG6DX	352,089

21 MHz

KN6DV/1	2,253,537
N2WK	2,087,680
9A5Y (9A3NM)	1,987,008
UW4I (US5IQ)	1,648,393

14 MHz

KK9A/4	2,400,510
SO4M (SP4K)	2,200,496
ES4RD	1,130,286

7 MHz

S5ØA	4,918,274
EO4M (UR5MW)	3,952,800
OK3R	2,767,884

3.5 MHz

IQ4RA (I4AVG)	1,488,884
SN2M (SP2XF)	1,380,062
IZØKBR	1,300,604

LOW POWER ALL BAND

*PJ4R (N4RR)	7,600,000
*5C5W (CN8KD)	5,518,968
*VA2UP	5,032,339
*P4ØYL	4,839,181
*UP7P (UN7PBY)	3,795,336

28 MHz

*EA8MT	1,271,430
*KH6ZM	798,222
*FG4NO	348,721

21 MHz

*EI3GC	887,094
*M7W (G3TBK)	696,654
*CT1EEK	635,091

14 MHz

*HG7T	2,130,776
*EA3GLB	1,333,458
*EA1OS	1,013,460

7 MHz

*OE1MCU	1,847,678
*YU1AST (YU2A)	1,395,450
*YW5T (YV5JBI)	1,331,748

3.5 MHz

*DF8XC	795,396
*S53F	637,560
*SP9BNM	584,672

QRP ALL BAND

TM3T (F5VBT)	1,229,088
TM9K	1,075,306
RX1CQ	1,010,240
KØDU	845,500
IZ8JFL/1	663,216

28 MHz

S54AA	44,128
RU7A	19,812
EW1FR	5,560

21 MHz

N7AT (K8IA)	243,726
EA4EQD	109,431
JH3DMQ	108,580

14 MHz

TG9ANF	393,104
IK3NLK	92,684
EA1GFY	11,808

7 MHz

UT3N (UT3NK)	403,788
HG6C (HA6IAM)	207,746
IK4UXA	138,240

3.5 MHz

HA1WD	289,212
SP6EIY (SP6EIY/QRP)	123,000
UX5UU	112,548

MULTI-OPERATOR SINGLE TRANSMITTER

5D5A	15,579,564
ED1R	9,873,600
OM3KFF	7,098,826
S51A	7,069,062
OH8X	6,815,487

MULTI-OPERATOR TWO TRANSMITTER

HG1S	12,643,928
RWØA	10,232,432
F4ERS	10,025,586
LS1D	9,784,614
S55W	9,245,580

MULTI-OPERATOR MULTI-TRANSMITTER

9A1A	22,856,592
NR4M	13,448,106
OH6R	10,278,215
VE7UF	7,584,460
DL1DVE	6,733,432

ROOKIE ALL BAND

OE6MMF	1,082,840
YP6Z (YO6PZZ)	1,071,115
W1PL	536,928
IZ3KUY	279,282
VE7SQ	162,588

21 MHz

JO4CTB	78,210

LOW POWER ALL BAND

*F4GDI	970,288
*LX1C	540,540
*AB1OD	532,560
*CO2IZ	384,256
*PDØDK	298,890

28 MHz

*KD8RKP	36,698
*K6OK	11,780
*OH6K (OH6FSG)	9,633

21 MHz

*IZØUME	145,530
*DO3KMF	100,275
*SQ8KFH	27,146

14 MHz

*SV1MRV	19,488
*IZ7SIA	17,112

7 MHz

*IZ7SLF	10,608
*AK4EM	8,200

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

ST2AR	4,219,919
DL4MCF	4,113,044
GW4SKA	3,239,328
DD2ML	3,091,200
WA2ETU	2,739,429

28 MHz

ED5J (EA5DM)	24,252
UZ5Q (UY5QZ)	270

21 MHz

KN6DV/1	2,253,537
UN4PG	1,057,464
W5AP	992,970

14 MHz

IT9MUO	737,100
RW4WZ	160,064
JHØNOS	142,003

7 MHz

S51CK	1,617,414
W6WRT	746,586
VY2SS	498,688

3.5 MHz

HA3LI	936,768
N2EIK	69,940
WX3SKY (K3RWN)	19,866

LOW POWER ALL BAND

*ZX2B (PY2MNL)	3,548,440
*7Z1SJ	2,288,608
*DL9YAJ	1,997,056
*ON4CT	1,911,576
*HI8PLE/7 (HI8PLE/7)	1,795,311

28 MHz

*ZM3T (W3SE)	94,237
*XQ7UP	78,048
*TG9AJR	55,806

21 MHz

*CT1EEK	635,091
*N2YBB	294,512
*JH8SIT	235,176

14 MHz

*EA1OS	1,013,460
*YT5W (YT2PFR)	774,367
*IW9FDD	432,525

7 MHz

*YU1AST (YU2A)	1,395,450
*OK2RU	957,584
*IW4EGX	943,714

3.5 MHz

*UZ2HZ	577,574
*SP5ECC	277,300
*IKØXBX	129,368

UNITED STATES
SINGLE OPERATOR HIGH POWER ALL BAND

K4GMH	6,969,456
AA3B	6,694,164
K1LZ (N2WQ)	4,576,404
W4PK	3,867,435
AK1W (K5ZD)	3,758,941

28 MHz

K7OX	126,902
N5MOA	7,550
WB1AEL	4,368

21 MHz

KN6DV/1	2,253,537
N2WK	2,087,680
K4FJ	1,646,740

14 MHz

KK9A/4	2,400,510
K7AWB	827,938
NC7J (W7CT)	531,576

7 MHz

NO4S (K9OM)	1,963,648
W4DXX	1,953,928
N5ZM	1,707,804

3.5 MHz

N2EIK	69,940
W6RLL/7	37,572
WA3FRP	28,724

LOW POWER ALL BAND

*WE4M (N2QT)	3,430,000
*NØXR	2,136,111
*K9NR	2,055,760
*AD7JP (K2PO)	1,835,437
*WW3S	1,754,657

28 MHz

*NA4W (K4WI)	111,100
*W7OM	40,334
*KD8RKP	36,698

21 MHz

*WNØL	298,851
*W9ILY	298,185
*N2YBB	294,512

14 MHz

*W1ZD/7	315,595
*W4LC	282,201
*KC1UX	97,185

7 MHz

*WA1FCN/4	768,120
*K8SM	407,824
*AB1J	261,954

3.5 MHz

*KS4S	54,516
*N2AET	32,040
*KC8IMB	31,872

QRP ALL BAND

KØDU	845,500
K2YG	566,040
N6WG	90,643
AI9K	51,534
KB2HSH	20,315

28 MHz

NA5NN (K2FF)	4,664
K3TW/4	945

21 MHz

N7AT (K8IA)	243,726
N8HM/3	7,749
K6VHF	3,840

MULTI-OPERATOR SINGLE TRANSMITTER

K1SFA	6,257,608
WW4LL	4,689,548
NAØCW	3,988,480
ND2T/6	3,241,841
W3MF	2,412,319

MULTI-OPERATOR TWO TRANSMITTER

NG1G	6,963,268
KF5HHD	4,692,510
K9XD	3,906,750
KU6W	1,517,880
WQ2N	929,187

MULTI-OPERATOR MULTI-TRANSMITTER

NR4M	13,448,106
AK7AZ	1,439,152

ROOKIE HIGH POWER ALL BAND

W1PL	536,928
NR9J	325

LOW POWER ALL BAND

*AB1OD	532,560
*KJ4WLN	183,556
*KC2WYL	72,352
*KO4PU	63,315
*N3UE	55,062

28 MHz

*KD8RKP	36,698
*K6OK	11,780

7 MHz

*AK4EM	8,200

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

WA2ETU	2,739,429
K4FX	1,291,290
K9QC	1,172,841
NO2T	1,139,968
WX6V	1,076,850

21 MHz

KN6DV/1	2,253,537
W5AP	992,970
NK6A	107,590

14 MHz

WG7X	141,840

7 MHz

W6WRT	746,586
KØPK	428,040

3.5 MHz

N2EIK	69,940
WX3SKY (K3RWN)	19,866

LOW POWER ALL BAND

*AB4SF	1,003,860
*KB3LIX	623,751
*NJ1H	595,960
*N2WN/4	590,503
*KM1W (W1UE)	486,755

28 MHz

*WB8JUI	7,370
*KD5JHE	5,104

21 MHz

*N2YBB	294,512
*KB9S	22,790
*AA4U	260

14 MHz

*W1ZD/7	315,595

7 MHz

*K8SM	407,824
*AB1J	261,954
*W3NR/4	20,382

3.5 MHz

*N2AET	32,040

EUROPE
SINGLE OPERATOR HIGH POWER ALL BAND

UZ2M (URØMC)	7,476,480
RD3A	6,518,369
LB8IB	5,688,896
SN7Q	5,156,900
S52OP	5,023,877

28 MHz

IO4C (IZ4DPV)	340,272
DL4RCK	89,270
M3I (GØORH)	88,067

21 MHz

9A5Y (9A3NM)	1,987,008
UW4I (US5IQ)	1,648,393
DF9ZP	1,560,706

14 MHz

SO4M (SP4K)	2,200,496
ES4RD	1,130,286
TM57M (F1NGP)	1,082,088

7 MHz

S5ØA	4,918,274
EO4M (UR5MW)	3,952,800
OK3R	2,767,884

3.5 MHz

IQ4RA (I4AVG)	1,488,884
SN2M (SP2XF)	1,380,062
IZØKBR	1,300,604

LOW POWER ALL BAND

*SO8T (SP8TJU)	3,496,521
*SQ9UM	3,291,600
*LY6A	2,733,836
*EF3A (EA3KU)	2,658,720
*OQ6A (ON5MF)	2,345,862

28 MHz

*F4FDA	124,257
*IKØEIE	52,125
*RA9FEL	51,456

21 MHz

*EI3GC	887,094
*M7W (G3TBK)	696,654
*CT1EEK	635,091

14 MHz

*HG7T	2,130,776
*EA3GLB	1,333,458
*EA1OS	1,013,460

7 MHz

*OE1MCU	1,847,678
*YU1AST (YU2A)	1,395,450
*OK2RU	957,584

3.5 MHz

*DF8XC	795,396
*S53F	637,560
*SP9BNM	584,672

QRP ALL BAND

TM3T (F5VBT)	1,229,088
TM9K	1,075,306
RX1CQ	1,010,240
IZ8JFL/1	663,216
IK5RUN	589,268

28 MHz

S54AA	44,128
RU7A	19,812
EW1FR	5,560

21 MHz

EA4EQD	109,431
HA6FQ	30,240
IV3AOL	25,665

14 MHz

IK3NLK	92,684
EA1GFY	11,808
YO3DAC	11,088

7 MHz

UT3N (UT3NK)	403,788
HG6C (HA6IAM)	207,746
IK4UXA	138,240

3.5 MHz

HA1WD	289,212
SP6EIY (SP6EIY/QRP)	123,000
UX5UU	112,548

MULTI-OPERATOR SINGLE TRANSMITTER

ED1R	9,873,600
OM3KFF	7,098,826
S51A	7,069,062
OH8X	6,815,487
OK1KSL	4,594,366

MULTI-OPERATOR TWO TRANSMITTER

HG1S	12,643,928
F4ERS	10,025,586
S55W	9,245,580
DLØCS	8,145,040
SN2B	8,061,808

MULTI-OPERATOR MULTI-TRANSMITTER

9A1A	22,856,592
OH6R	10,278,215
DL1DVE	6,733,432

ROOKIE HIGH POWER ALL BAND

OE6MMF	1,082,840
YP6Z (YO6PZZ)	1,071,115
IZ3KUY	279,282

LOW POWER ALL BAND

*F4GDI	970,288
*LX1C	540,540
*PDØDK	298,890
*EA5HRT	222,640
*SV2HTI	208,980

28 MHz

*OH6K (OH6FSG)	9,633
*IZØINX	3
*IZ1PKV	0

21 MHz

*IZØUME	145,530
*DO3KMF	100,275
*SQ8KFH	27,146

14 MHz

*SV1MRV	19,488
*IZ7SIA	17,112

7 MHz

*IZ7SLF	10,608

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

DL4MCF	4,113,044
GW4SKA	3,239,328
DD2ML	3,091,200
YL9T (YL2TW)	2,385,600
GM8SBH (GMØFGI)	1,867,635

28 MHz

ED5J (EA5DM)	24,252
UZ5Q (UY5QZ)	270

21 MHz

DL3BQA	727,818
G6NHU	699,540
YO3VU	448,825

14 MHz

IT9MUO	737,100
RW4WZ	160,064
S57YK	139,216
YO5OHY	94,392

7 MHz

S51CK	1,617,414
EW4MM	422,408
OK8WW	134,596

3.5 MHz

HA3LI	936,768

LOW POWER ALL BAND

*DL9YAJ	1,997,056
*ON4CT	1,911,576
*DL1QW	1,623,392
*S56A	1,504,256
*DL1YD	1,363,998

28 MHz

*EA3NO	40,600
*YT2B	27,416
*PAØMIR	9,504

21 MHz

*CT1EEK	635,091
*OK2QX	87,156
*RX3AGQ	81,144

14 MHz

*EA1OS	1,013,460
*YT5W (YT2PFR)	774,367
*IW9FDD	432,525

7 MHz

*YU1AST (YU2A)	1,395,450
*OK2RU	957,584
*IW4EGX	943,714

3.5 MHz

*UZ2HZ	577,574
*SP5ECC	277,300
*IKØXBX	129,368

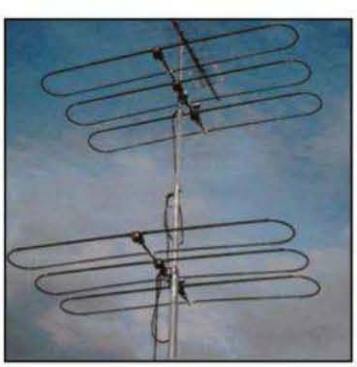
*Low Power

SteppIR™ Antenna Selection Guide

The 2 Element Yagi has the highest value-to-performance of any of our antennas and is the antenna of choice for DXpeditions. It actually performs more like a smaller 3 element Yagi, due to its innovative 57 inch boom. This spacing allows for optimal performance throughout it's frequency range . An optional 40/30m loop dipole is available for this antenna. This is an affordable and stealthy antenna, great for small lots and CC&R neighborhoods while still having excellent performance. The picture shown to the left is the 3Y0X Peter I DXpedition.

The 3 element Yagi is the original Steppir antenna. Using our proven technology, it gives continuous frequency coverage from 20m-6m. The 3 element Yagi with the 40/30 dipole option is our most popular antenna. With a 16 foot boom, the antenna models that are programmed into the controller deliver solid gain and exceptional front-to-rear ratios. Ask any SteppIR owner to "hit the 180" button, and you may be surprised to hear just how good the front-to-rear really is for this antenna. Shown to the left is Antarctic station R1ANP.

The 4 element Yagi has set the standard for performance in HF antennas and with the addition of an optional 40/30M rotatable Dipole you will have unmatchable single antenna performance. With a 32 foot boom and weighing in at reasonable 99 lbs, this antenna is ideal for DXers who want to maximize performance on 20m-6m using a single tower. The 4 element Yagi is configured for maximum gain and solid front-to-rear ratios. The picture to the left is our 4E on a scissor lift at the Dayton Hamvention in 2003!



With the DB11 Yagi, you don't have to give up performance to fit the antenna into a small space! The DB11 is the smallest of our Yagi antennas. All of our DB series antennas utilize looped elements. This is a distinctive advantage, allowing for a 40% smaller size platform with excellent performance. The DB11 uses an integral coax switch to select which one of the three elements are driven to give equal performance in forward and reverse directions. The DB11 has two active elements on 20m and three active elements on 17-6m. This is arguably the highest performance Yagi of this size in the world! The picture on the left is the unique DB11 stack at QTH W6JZH, proving vertical "space" is most important!

The DB18 Yagi antenna uses loop elements for 30 and 40M performance. The DB18 and DB18E are the most popular antennas in the DB line, due to their performance vs. size profile. The loop elements used for 40 and 30m are 40% shorter than a full size element would be, with very little sacrifice in performance (-0.3dB). The DB18 uses an integral coax switch to select which one of the three elements are driven to give equal performance in forward and reverse directions. The DB 18 has two active elements on 40m and 30m and three active elements on 20m-6m. The DB18 picture to the left is the beautiful QTH of EA3PW.

The DB18E Yagi is identical in every way to the DB18, with one exception—the DB18E utilizes three active loop elements on 30m, which provides outstanding performance on the 30m band. The DB18E has two active elements on 40m and three active elements on 30m-6m. The picture to the left is the snowy QTH of HB9CVE.

SteppIR Antennas, Bellevue WA Tel: 425.453.1910 Email: sales@steppir.com

Which Antenna is Right for You?

The DB36 Yagi is unique among the DB series antennas in that it has a single feed line, and no relays inside the EHU's. The DB36 has a 49 ft looped driven element. This patented design allows us to make the end loop elements only 39 feet long, yet the performance is as if all 3 of the loop elements are 49 feet long. The folded dipole loop technology lets the footprint be 40% less than that of the a full sized Yagi, losing only 0.3dB in gain performance. There are 3 active elements on 40/30m and 4 active elements on 20m-6m. The DB36 has a optional 80M dipole that allows for full coverage of the 80M band. The dipole runs parallel to the boom and uses the end elements as capacity hats, creating zero interaction with the rest of the antenna. The picture to the right is of the DB36 with optional 80m dipole at the enviable QTH of JA3AOP!

The DB42 MonstIR Pro is currently the largest of the Dream Beam series of Yagi antennas, with five active elements on 20m-6m and three active elements on 40/30. For those who aspire to the pinnacle of performance, the DB42 provides coverage from 80m through 6m (with optional 80m dipole kit). The dipole runs parallel to the boom and uses the end elements as capacity hats, creating zero interaction with the rest of the antenna. The DB42 has a 49 ft looped driven element. This patented design allows us to make the end loop elements only 39 feet long, yet the performance is as if all 3 of the loop elements are 49 feet long. The folded dipole loop technology lets the footprint be 40% less than that of a full size Yagi, losing only 0.3dB in gain performance. The picture to the right shows the very first DB42 at the QTH of K4SV.

The BigIR and SmallIR verticals are the only **true** ¼ wave continuous coverage antennas available for the HF bands. The SteppIR tuning technology has had a profound impact on improving vertical antenna performance over that of traditional designs - there is no substitute for having a true 1/4 wave vertical on every frequency within the coverage range, without having to "trick" the antenna into being resonant. Being able to adjust the length of the element allows the Steppir vertical to be mounted nearly anywhere and still provide a good match to your transceiver. There are two models—the BigIR stands 32 ft high and covers 40m-6m continuously; The SmallIR stands 18 ft high and covers 20m-6m continuously. Optional coils are available for frequency coverage up to 80m. Radials are necessary with all 1/4 wave verticals. The picture to the right shows a BigIR during a rare Seattle-area snowstorm at the QTH of N7QT.

The 20m-6m dipole is arguably our most portable antenna. The dipole is simple to install, weighs a total of 15 lb and consists of two telescoping poles and an EHU. Length when operating is 36 ft. The dipole is portable and easy to install, but make no mistake—this antenna is a full sized performer! And, there is no substitute for being able to tune the antenna to the exact length needed on all frequencies within it's range. The picture to the right is of a SteppIR dipole mounted on a houseboat—QTH is Lake Powell Utah—owner unknown, scene priceless!

Don't forget to check out our new website at www.steppir.com for the latest information on our products!

2012 WPX RTTY CLUB SCORES

UNITED STATES

Club	# Entrants	Score
POTOMAC VALLEY RADIO CLUB	47	43,127,802
NORTHERN CALIFORNIA CONTEST CLUB	53	38,668,474
YANKEE CLIPPER CONTEST CLUB	35	21,752,767
SOCIETY OF MIDWEST CONTESTERS	21	21,154,676
FRANKFORD RADIO CLUB	15	18,816,311
CTRI CONTEST GROUP	9	10,854,589
ALABAMA CONTEST GROUP	15	8,724,079
ARIZONA OUTLAWS CONTEST CLUB	20	7,975,178
MINNESOTA WIRELESS ASSN	39	7,870,818
GRAND MESA CONTESTERS OF COLORADO	9	7,149,359
TENNESSEE CONTEST GROUP	18	6,698,766
SOUTHERN CALIFORNIA CONTEST CLUB	11	5,227,732
WILLAMETTE VALLEY DX CLUB	14	4,969,269
FLORIDA CONTEST GROUP	12	4,407,044
SPOKANE DX ASSOCIATION	12	4,002,590
CENTRAL TEXAS DX AND CONTEST CLUB	6	3,900,212
WESTERN WASHINGTON DX CLUB	9	3,127,784
ORLEANS COUNTY AMATEUR RADIO CLUB	4	2,754,513
NORTH COAST CONTESTERS	4	2,712,660
BERGEN ARA	5	2,654,752
SOUTHWEST OHIO DX ASSOCIATION	3	2,495,167
LONE STAR DX ASSOCIATION	4	2,017,835
CAROLINA SHINE	5	1,989,212
DELAWARE LEHIGH AMATEUR RADIO CLUB	4	1,797,809
ORDER OF BOILED OWLS OF NEW YORK	6	1,269,388
METRO DX CLUB	8	1,019,162
KANSAS CITY DX CLUB	4	1,011,558
TEXAS DX SOCIETY	4	962,329
BRISTOL (TN/VA) ARC	6	921,593
ALLEGHENY VALLEY RADIO ASSOCIATION	3	904,952
SOUTH EAST CONTEST CLUB	4	746,983
HUDSON VALLEY CONTESTERS AND DXERS	7	709,588
ROCHESTER (NY) DX ASSN	3	650,580
KENTUCKY CONTEST GROUP	5	571,639
LOW COUNTRY CONTEST CLUB	3	571,147
CAROLINA DX ASSOCIATION	4	481,144
MAD RIVER RADIO CLUB	4	465,321
MILFORD OHIO AMATEUR RADIO CLUB	3	374,150
NORTH CAROLINA DX AND CONTEST CLUB	4	218,421
WESTERN NEW YORK DX ASSOCIATION	3	73,753
UTAH DX ASSOCIATION	3	53,282

DX

BAVARIAN CONTEST CLUB	71	56,950,576
RHEIN RUHR DX ASSOCIATION	60	43,911,967
UKRAINIAN CONTEST CLUB	32	35,925,168
SLOVENIA CONTEST CLUB	13	28,278,252
CROATIAN CONTEST CLUB	9	26,874,443
CONTEST CLUB FINLAND	10	19,969,025
HA-DX-CLUB	7	17,474,721
ORCA DX AND CONTEST CLUB	9	16,063,011
URAL CONTEST GROUP	8	14,138,272
CONTEST CLUB ONTARIO	20	12,341,066
BLACK SEA CONTEST CLUB	26	11,201,141
LATVIAN CONTEST CLUB	9	11,055,186
RADIO CLUB HENARES	5	11,047,593
CONTEST GROUP DU QUEBEC	9	10,696,765
SOUTH URAL CONTEST CLUB	4	8,984,514
SP DX CLUB	11	8,675,484
RUSSIAN CONTEST CLUB	13	7,646,100
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	7	6,991,592
ARAUCARIA DX GROUP	11	6,615,676
LA CONTEST CLUB	3	6,371,825
LU CONTEST GROUP	10	5,615,074
TEMIRTAU CONTEST CLUB	5	5,293,106
RTTY CONTESTERS OF JAPAN	15	5,035,831
DONBASS CONTEST CLUB	13	3,769,381
Z37M CONTEST TEAM	3	3,671,143
DL-DX RTTY CONTEST GROUP	12	3,424,737
VK CONTEST CLUB	7	3,410,011
CHILTERN DX CLUB	6	2,949,400
KRIVBASS	3	2,894,574
599 CONTEST CLUB	5	2,828,903
GMDX GROUP	5	2,470,567
YU CONTEST CLUB	4	2,244,477
LITHUANIAN CONTEST GROUP	3	1,619,853
ARIPA DX TEAM	3	1,329,402
LES NOUVELLES DX	5	1,196,804
WORLD WIDE YOUNG CONTESTERS	5	997,622
MARITIME CONTEST CLUB	5	982,680
VYTAUTAS MAGNUS UNIVERSITY RADIO CLUB	3	955,193
ALRS ST PETERSBURG	3	906,271
YO DX CLUB	5	716,353
GRUPO DXXE	4	607,193
CT3 MADEIRA CONTEST TEAM	3	525,627
BOSNIA AND HERZEGOVINA CONTEST CLUB	5	473,250
PERUGIA CONTEST CLUB	5	460,748
ARCK	5	438,870
WEST SERBIA CONTEST CLUB	3	356,736
VU CONTEST GROUP	5	227,468
GERMAN DX FOUNDATION	3	168,152
CSM CLUJ-NAPOCA	3	158,309
VOLYN CONTEST GROUP	3	148,188
RIO DX GROUP	3	83,096
RU-QRP CLUB	4	77,124

The ED1R MS HP team who set the new Europe record. (Left to right standing: EA4AOC, DH1TW; left to right sitting: EC1KR, EA1CJ, EC4DX)

Dave M7W took second with 697K, and Nuno CT1EEK was third with 635K. Anatoly UN6G was fourth and tops in Asia. Seventh place Nur YB8EL set a new Oceania record of 335K.

Single-Operator, Single Band 28 MHz (87). The world record and all six continental records were set or broken in the 2012 contest. Dunia EA8MT broke the prior world record of 50K with an impressive 1.3M this time. Max KH6ZM took second and set the Oceania record at 798K. Third place Nicolas FG4NO was third with 349K and a new North America record. Fifth place Jose PU5ATX broke the South America record with 242K, and sixth place Vino RA9RR broke the Asia record with 208K. Eleventh place David F4FDA broke the Europe record with 124K.

Single-Operator High Power (1063 entries)

Single-Operator, All Band (841). Ed P49X (W0YK) won with 11.6M, down significantly from his prior two years. Vadim R9DX was second with 7.5M, Roman UZ2M was close behind with 7.5M, and Yuri RG9A was fourth with 7.2M. Fifth place Mike K4GMH edged out sixth place and fellow East Coaster Bud AA3B with 7.0M and 6.7M, respectively.

Single-Operator, Single Band 3.5 MHz (34). Scores were considerably down, and Gianfranco IQ4RA prevailed with 1.5M for first place. Mac SN2M was second with 1.4M, Mario IZØK-BR was third with 1.3M, and Bela HA8BE was fourth with 1.2M.

Single-Operator, Single Band 7 MHz (49). Tine S50A narrowly missed the world record, but set a new Europe record with 4.9M for first place. Victor EO4M was second with 4M, Miro OK3R was third with 2.8M, and Venko Z36W took fourth with 2.3M.

Single-Operator, Single Band 14 MHz (47). John KK9A/4 broke his own North America record by 0.5% with 2.4M, and Chris SO4M took second with 2.2M. Third place Anatoli ES4RD had 1.1M, while fourth place Yann TM57M (F1NGP) was close behind, also with 1.1M. Antonio CT3EN won Africa with 500K, and Yasushi JHØNOS won Asia with 142K.

Single-Operator, Single Band 21 MHz (63). Will KN6DV won with 2.3M for the new North America record. Wayne N2WK was second with 2.1M, and third place Jan 9A5Y set the new Europe record with 2M. Anatol UN4PG set a new Asia record with 1.1M.

Single-Operator, Single Band 28 MHz (29). Rene LU7HN won this category again with 1.5M. Second place Serge RY9C had 641K broke the Asia record, and third place Joel KG6DX broke

Rick N6DQ paper logging at ZL1/K6YL.

Joanna ZL1/K6YL enjoying the New Zealand scenery after winning MS Oceania with Rick N6DQ at the ZL1BD station.

the Oceania record with 352K. Fourth place Massimo IO4C won Europe with 340K, fifth Gary K7OX won North America with 127K, and Jose CT3DZ won Africa with 25K.

Multi-Operator (105 entries)

Multi-Operator Single-Transmitter (78). 5D5A at CN8WW (IW1AYD, IZ1LBG, IK2QEI, IK2SGC, IZ4GWE, CN8WW) set a new world record of 15.6M. Second place ED1R (EA1CJ, EA4AOC, EC1KR, EC4DX, EA4TD) set a new Europe record of 9.9M. OM3KFF (OM4CX, OM1ADX, OM0AAG, OM4DW) was third with 7.1M, and S51A followed closely in fourth with 7.1M. K1SFA at K1TTT (K1MK, K1SFA) set a new North America record of 6.3M. Joanna ZL1/K6YL teamed up with Rick N6DQ at Al ZL1BD's QTH for 3.7K to win Oceania!

If you think a contest win is beyond your reach, consider the experience of Joanna and Rick. They were on a trip through New Zealand and were invited by Al ZL1BD to stay at his QTH for a few days. Just as they arrived, Al's linear amplifier failed, and the three of them focused on getting it fixed. However, this occurred on the CQ WPX RTTY weekend and Joanna loves RTTY, so she and Rick couldn't resist getting on for a few QSOs as ZL1/K6YL. They did so by using the internal RTTY capability of Al's Icom-7600, sending calls and serial numbers via the USB keyboard connected to the radio. Logging was by hand. Imagine Joanna's surprise when informed that they won the MS Oceania category for CQ WPX RTTY. Certainly, only a very small number of contest participants can win, but don't assume it isn't possible!

Multi-Operator Two-Transmitter (20). HG1S (HA1TJ, HA1DAC, HA1DAI, HA1SM, HA7PL, HA1DAE) took first place with 12.6M points. RWØA (HA1TJ, HA1DAC, HA1DAI, HA1SM, HA7PL, HA1DAE) took second with 10.2M. F4ERS (HA1TJ, HA1DAC, HA1DAI, HA1SM, HA7PL, HA1DAE) was third with 10M. LS1D (LU3CT, LU3HY, LW1DTZ, LW9EOC) was fourth with 9.8M, for a new South America record.

Multi-Operator Multi-Transmitter (7). 9A1A (9A2DQ, 9A5E, 9A5W, 9A6A, 9A7IMR, 9A7R, 9A9A) won with 22.9M for a new Europe record and the second highest all-time score. NR4M (NR4M, K7SV, K4EU, K4EC, N3ZV, K4GM, N4JOW, N4NW) was second with 13.4M and the new North America record. OH6R (KØSSU, OH3FM, OH3FSW, OH3FZQ,

OH3LQK, OH3MMF, OH6MLC, OH6NMY) was third with 10.3M. Fourth place VE7UF (VE7FO, VE7IO, VA7HDJ, UW0CN, VA7FC, VE7NDE, VE7UF) set a new Canada record of 7.6M.

Club Competition

World. Once again the Bavarian Contest Club took top honors with 57M points from 71 logs, the highest of any club. The Rhein Ruhr DX Association took second with 43.9M from 60 logs.

North America. The Potomac Valley Radio Club was third, winning North America with 43.1M from 47 Logs. Fourth place Northern California Contest Club accumulated 38.7M points from 53 logs.

Log Checking

Besides determining the order-of-finish, log checking provides important feedback to operators on their operating skill. A station's score is a measure of how well it balances speed and accuracy of communication. A LCR (Log Check Report) is generated by the log-check software and is available by request to: <w0yk@cqwpxrtty.com>. Compare your LCR to the average reduction in this contest of 5.7%:

- 0.5% dupes
- 1.3% busted calls
- 2.5% busted exchange
- 1.4% NIL (Not-In-Log)

A goal of zero reductions is both unrealistic and sub-optimum for your score or communication effectiveness. Minimizing your reduction percentage significantly below the contest average and improving your past results would be better goals to seek.

Thanks to the large response from non-contesters who submitted their logs, nearly 86% of all QSOs in the contest were cross-checked between two logs. This increases the reductions a bit, while increasing the LCR accuracy and value.

A number of logs were missing either sent or received serial numbers, or both. Logs that had >50% reductions for this and other reasons were converted to checklogs. Most checklogs, however, were the chosen entry category of the submitter.

Acknowledgements

Thanks to the thousands of stations that converge on the contest weekend to make the event enjoyable for all of us. Special thanks to the many hours of effort by people outside the contest:

- Gail K2RED of *CQ* magazine expertly edits and assembles the output from log checking into this published article, as she does for all *CQ* contests.
- Ken K1EA provides the log-check software and consulting during log-check, along with Randy K5ZD.
- Mark K6UFO laboriously typed in paper logs and fixed problem logs.
- Bob KØRC, Pat KØPC, and Fred AA7BQ prototyped a simple system for us to send mass e-mail requests for missing logs.
- Mike K4GMH manages the CQ RTTY contest plaque program.
- Barry W5GN manages the certificate printing and mailing for this and all the *CQ* contests.
- Randy K5ZD set up the original website as well as the searchable scores database that was populated by Don AA5AU.
- SWL log checking is performed by Dan, I1-12387, using special log-check software written by Marek, SP7DQR.

Summary

For more information about this contest go to <www.cqwpxrtty.com>, and for the expanded results, including full tables, QRM, and ops of multi stations, go to <www-cq-amateur-radio.com> in the contests section.

Good luck in the next CQ WPX RTTY on 9–10 February 2013! See you then!—73, Ed, WØYK *(Scores beginning on p. 105)*

TIMEWAVE TECHNOLOGY INC.

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

PK-232SC Multimode Data Controller*

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

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

New PK-232SC Now shipping!

- Single USB connection to computer
- USB Sound Card built-in
- 3-Way Rig Control built-in - logic level, RS-232 & USB!
- Computer isolated from radio

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

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

Customize your PK-232 with our complete line of upgrades and accessories.

Need Software? Download the new Ham Radio Deluxe to sync with Radio Operating Center!

Signal Processing, Antenna Analysis, Data & Remote Control

DSP-599zx Audio Signal Processor*

Now shipping with new bigger & brighter display!

Noise Reduction, precision highpass, lowpass, bandpass & notch filtering for audio, CW & data.

TZ-900 Antenna Analyzer

Once you use the TZ-900 - you'll never want to use any other!

Sweep and analyze antennas in seconds. Zoom, Compare & Store Data. Sunlight-visible color graphics, handheld, rechargable batteries, no computer required.

ANC-4 Antenna Noise Canceller

See & hear a demo on YouTube!

Kill Noise before it reaches your receiver! Great for supressing power line noise, plasma TV noise & many other local electrical noises.

DSP-232+ Multimode Data Controller*

Sound card interface, USB, Pactor, 1200/9600 Packet

PK-96/100 TNC - 1200/9600 Packet*

Available with USB or RS-232

HamLink™ Wireless and USB Remote Control & Audio

HamLinkUSB™ Rig Control Plus

Logic Level plus PTT

PK-232 RS-232-to-USB Adapter*

Use the PK-232 with your new computer!

HamLinkBT-BTH+™ Bluetooth® Adaptor

Use a standard cellphone Bluetooth® headset to keep your hands free for driving and operating. Includes USB rig control for your station. Audio, VOX & PTT - Fixed & Mobile.

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Announcing:

The 2012 CQ WW RTTY DX Contests

RTTY: September 29–30, 2012

Starts 0000 GMT Saturday Ends 2400 GMT Sunday

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

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

III. TYPE OF COMPETITION (choose only one):

For all categories:

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

2. You must not exceed the total output power limitation of your chosen category. Total output power on any band at any time is measured at the output of the active amplifier.

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

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

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

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

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

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

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

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

11. Remote receivers outside the limitations of Rule III.3 are not allowed. The only *exception* is public remote skimmers which are allowed for the Multi-Operator and Assisted categories.

12. When two or more transmitters are present on a band, a hardware device MUST be used to prevent more than one signal at any one time; interlock king two or more transmitters on a band with alternating CQs (soliciting contacts) is not allowed.

13. Only Baudot mode is permitted.

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

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

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

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

c. Single Operator QRP (SOAB QRP or SOSB QRP): Total output power must not exceed 5 watts on any band at any time.

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

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

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

c. Single Operator QRP Assisted (SOAAB QRP or SOASB QRP): Total output power must not exceed 5 watts on any band at any time.

B. Multi-Operator (all band operation only)**:** any public QSO spotting help is allowed. Any number of operators is allowed. Total output power must not exceed 1500 watts on any band at any time**.**

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

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

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

2. Two Transmitters (M2): A maximum of two transmitted signals at any time on two different bands. Both transmitters may work any station. A station may only be worked once per band regardless of which transmitter is used. The log must indicate which transmitter made each QSO. Each transmitter may make a maximum of 8 band changes in any clock hour.

3. Multi-Transmitter (MM): No limit to the number of transmitters or operators. Five bands may be activated simultaneously.

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

V. MULTIPLIER: Three types of multiplier will be used.

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

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

3. A multiplier of one (1) for each different US "lower-48" state and VE area

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Double Conversion Superheterodyne System
Built-in 15kHz 1st IF Filter (Optional 3kHz/6kHz)
±0.5ppm Frequency Stability
Large Monochrome LCD Display
Built-in Automatic Antenna Tuner
Optional RS-BA1 for IP Remote Control

AD/DA Converter
ADC Signal (Noise+Distortion): 100dB
ADC Dynamic Range, S/N: 113dB
DAC Signal (Noise+Distortion): 97dB
DAC Dynamic Range, S/N: 115dB

DSP Unit
ADSP-21369
Internal Clock Speed: 333MHz
32-bit Floating Point DSP
Max. Performance: 2000MFLOPS

Large Heat Sink
Even during long hours of heavy duty use, the IC-7410 provides stable output power.

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contacted on each band. Stations are permitted to contact their own US state or VE area for multiplier credit. One multiplier for each US state (48) and each Canadian area (14) on each band. Please use only official U.S. Postal Service abbreviations to identify states (e.g., Michigan = MI; Massachusetts = MA, Ohio = OH). Note: The District of Columbia counts as Maryland (MD); Alaska (KL7) and Hawaii (KH6) are counted as country multipliers only and not as state multipliers. Canadian areas (14 total) are as follows: NB (VE1, 9), NS (VE1), QC (VE2), ON (VE3), MB (VE4), SK (VE5), AB (VE6), BC (VE7), NWT (VE8), NF (VO1), LB (VO2), NU (VYØ), YT (VY1), PEI (VY2).

VI. POINTS:

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

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

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

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

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

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

X. CLUB COMPETITON:

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

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

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

XI. LOG INSTRUCTIONS:

1. All times must be in UTC.

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

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

4. Electronic log submission: We want your electronic log. The Committee *requires* an electronic log for any possible high-scoring log. By submitting a log to the CQ WW RTTY Contest, the entrant agrees to have the log open to the public. If possible, we would appreciate complete frequencies in the log. E-mail Required Content: *Please submit your log in the Cabrillo file format created by all major logging programs.* Be sure to put the STATION CALL SIGN in the "Subject:" line of each message. Your e-mail log will automatically be acknowledged by the server. Electronic submission implies a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed. Submit your CQ WW RTTY log to <rtty@cqww.com>.

5. Paper log submission: Use a separate log sheet for each band. Each paper log entry MUST be accompanied by a summary sheet showing all scoring information, category of competition, and contestant's name and address in BLOCK LETTERS. Sample log and summary sheets are available on the CQ website, <www.cq-amateur-radio.com>. If official forms are not available, make up your own, 80 contacts to the page on 8-1/2" × 11" paper or European A4. All paper log entrants are required to submit *cross-check sheets* (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made.

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

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

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

A. *YELLOW card:* One Yellow card: entrant not eligible for an award in the entered contest. An entrant or operator issued a yellow card will be listed at the end of the published results. Two Yellow cards: An entrant receiving two yellow cards in three consecutive CQ WW RTTY contests is a Red card.

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

Further CQ WW RTTY CC actions:

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

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

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

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

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

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

XIII. DEADLINE:

1. All entries must be sent NO LATER than 15 October 2012.

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

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Of course, nothing can clean up and copy a sloppy fist, especially weak signals with lots of QRM/QRN.

The MFJ-461's serial port lets you display CW text full screen on a bright computer monitor -- just use your computer serial port and terminal program.

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Uses 9 Volt battery. Fits in your shirt pocket with room to spare - smaller than a pack of cigarettes. Tiny $2\frac{1}{4}$x$3\frac{1}{4}$x1 inches. $5\frac{1}{2}$ ounces.

Super easy-to-use! Just turn it on -- it starts copying instantly!

MFJ-26B, $9.95. Soft leather protective pouch. Clear plastic overlay for display, push button opening, strong, pocket/belt clip secures MFJ-461.

MFJ-5161, $16.95. MFJ-461 to computer serial port cable (DB-9).

MFJ-5162, $7.95. Receiver cable connects MFJ-461 to your radio's external speaker 3.5 mm jack.

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Plug MFJ's CW Reader with Keyer into your transceiver's phone jack and key jack.

Now you're ready to compete with the world's best hi-speed CW operators -- and *they won't even know you're still learning the code!* Sends and reads 5-99 WPM.

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MFJ *Deluxe Iambic Paddles*™ feature a full range of adjustments in tension and contact spacing. Self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. Works with all MFJ and other electronic keyers.

***Miniature* Travel Iambic Paddle**

MFJ-561, $24.95. $1\frac{3}{4}$Wx$1\frac{3}{4}$D x$\frac{3}{4}$H inches. *Formed* phosphorous bronze spring paddle, stainless steel base. 4 ft. cord, 3.5 mm plug.

MFJ Code Oscillator

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MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base -- stays put on your table! Portable. 9-Volt battery or 110 VAC with MFJ-1312D, $15.95. Earphone jack, tone and volume controls, speaker. Adjustable key. Sturdy. $8\frac{1}{2}$x$2\frac{1}{4}$x$3\frac{3}{4}$ inches.

MFJ-550, $14.95. Telegraph Key Only with adjustable contacts. Handsome black.

MFJ Deluxe CW Keyer

Deluxe MFJ Keyer has all controls on front panel for easy access -- speed, weight, tone, volume knobs, and tune, semi/auto, on/off push-buttons. You get all keyer modes, dot-dash memories, self completing dots/dashes, jam- proof spacing, sidetone, built-in speaker, type A /B keying. RF proof. Solid state keying. 7x2x6 inches.

MFJ-407D
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MFJ-401D, $69.95. Econo Keyer II has front-panel volume/speed controls (8-50 wpm), tune switch. Internal adjust weight, tone. Solid state keying. Tiny 4x2x$3\frac{1}{2}$ inches.

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Best of all CW worlds -- a *deluxe MFJ Curtis*™ *keyer* that fits right on *Bencher paddle*! Adjustable weight and tone, front panel volume and speed controls (8-50 WPM), built-in dot-dash memories, speaker, sidetone, semi-automatic/tune or automatic modes. Use 9V battery or 110 VAC with MFJ-1312D, $15.95. $4\frac{1}{8}$x$2\frac{5}{8}$x$5\frac{1}{4}$ in.

MFJ-422DX, $99.95.

MFJ *Curtis*™ Keyer only, fits on your Bencher paddle or MFJ-564 (chrome) or MFJ-564B (black) paddles above.

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Announcing:

2012 Inductees, CQ Amateur Radio, Contest, and DX Halls of Fame

45th Anniversary of CQ DX Hall of Fame

When Gus Browning, W4BPD, became the first amateur inducted into the newly formed CQ DX Hall of Fame in 1967, no one could have imagined that his induction would mark the beginning of a tradition that has expanded to three halls of fame and that is now closing in on 50 years of recognizing the best of the best in our hobby.

This year, we induct three new members to the DX Hall of Fame, bringing the total number of honorees there to 60; as well as two new members of the CQ Contest Hall of Fame, and 16 inductees to the CQ Amateur Radio Hall of Fame.

CQ DX Hall of Fame

Our three inductees to the CQ DX Hall of Fame this year are **Don Chesser, W4KVX (SK)**; **Glenn Johnson, WØGJ**, and **Carl Smith, N4AA**.

Don Chesser, W4KVX, was the founder of *DX magazine,* which he edited and published between 1957 and 1964. He was also a pioneering DXer and DXpeditioner in the '50s and '60s, and was part of the team that first put 4U1ITU on the air from International Telecommunication Union headquarters in Geneva, Switzerland in 1962. Don was also *CQ*'s DX Editor from 1957–58.

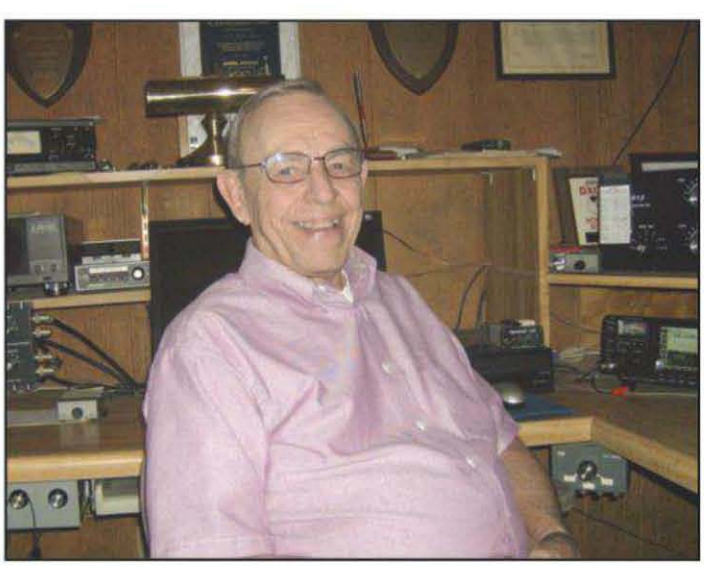
Carl Smith, N4AA, is currently the Editor and Publisher of *The DX Magazine*, as well as *CQ*'s DX Editor, following in W4KVX's footsteps a half-century later. In addition, he produces the weekly "QRZ DX" bulletin, and for the past 15 years has compiled the annual "Most Wanted" survey of DX entities needed by hams around the world. Carl is also a leading force behind the creation of the Southern Appalachian Radio Museum and has been a long-time "Elmer," mentoring many new amateurs in the art of DXing.

Glenn Johnson, WØGJ, is a leading DXpeditioner (in addition to his full-time job as an orthopedic surgeon), having been part of more than two dozen DXpeditions over about as many years. He has been leader or co-leader of many of these trips, most of which have been to locations high on *The DX Magazine*'s "Most Wanted" list. Most notably, Glenn personally was responsible for re-introducing amateur radio to Bhutan in 2000, and has been honored by that country's king as the only non-Bhutanese to hold a "native" callsign, A51B. Glenn is also vice president of the Northern California DX Foundation, which is the leading organization providing financial support to DXpeditions to rare locations.

CQ Contest Hall of Fame

The two newest members of the CQ Contest Hall of Fame are **Jim Reisert, AD1C**, and **Lothar Wilke, DL3TD (SK)**.

Jim Reisert, AD1C, is one of those behind-the-scenes people who is almost never in the spotlight yet does very important work. For the past decade Jim has been the person who maintains and constantly updates the country and prefix files that are depended upon by virtually all of the major contest



Carl Smith, N4AA, an inductee in the CQ DX Hall of Fame 2012.

Lothar "Lar" Wilke, DL3TD (SK; far right in photo, early 1980s) one of the two newest members of the CQ Contest Hall of Fame.

and general logging programs, as well as software for the major DX clusters. Without his work, these programs would likely be inconsistent in their multiplier scoring, as it would be up to each program's author to keep things up to date.

Lothar "Lar" Wilke began contesting in what was then East Germany in the 1970s and built a contesting superstation in Ilmenau that operated over the years as Y24UK, Y34K, DFØHQ, DAØHQ and, of course, DL3TD. Under his leadership, the German national team at DAØHQ won the IARU World Championship 11 times. He also actively encouraged younger amateurs to become contesters. Professionally, Lar held a Ph.D. in biomedical technology and ran his own company for many years. Tragically, Lar died in a house fire in 2011. *[This writer, W2VU, has a prized collection of Lar's QSL cards from various dates and calls between 1981 (Y24UK; see photo) and 2000 (DL3TD) showing the Ilmenau Contest Group as its original members aged and new members joined.]*

CQ Amateur Radio Hall of Fame

The CQ Amateur Radio Hall of Fame honors those amateurs who have made significant contributions to amateur radio or to society at large, as well as those non-amateurs who have had a significant impact on amateur radio. The eleventh "class" of inductees includes people from each group.

First, though, an update. Last year we inducted code champion and telegraph key manufacturer Ted McElroy into the Amateur Radio Hall of Fame, but had not been able to verify an amateur radio callsign for him. Through the work of several readers, to whom we are grateful, we can now verify that Ted at one time held the ham call of W1JYN.

The 2012 inductees to the CQ Amateur Radio Hall of Fame are:

George Badger, W6TC (SK). An expert in tubes and tube circuit designs; Marketing Director of Eimac and later President of Svetlana. Badger was also an active DXer and wrote many technical articles for the amateur media.

Bill Brown, WB8ELK. "Father" of amateur radio high-altitude ballooning. His work has blossomed into "near-space" programs not only among hams, but at many universities around the nation.

Robert Brown, NM7M (SK). Expert on 160-meter propagation, author for *CQ* and other publications; retired UC Berkeley physics professor;

Evelyn Gauzens, W4WYR. Chair of the Miami "Tropical Hamboree" hamfest for 45 years; ARRL Southeastern Division Vice Director, Honorary Vice President; active proponent of improved amateur radio public relations; principal on-site organizer (on behalf of ARRL as host society) of 1976 IARU Region 2 conference in Miami Beach.

Richard Garriott, W5KWQ. Videogame designer, civilian space traveler, very active on amateur radio from International Space Station; younger half of first U.S. father-son team to travel in space. (His father is Owen Garriott, W5LFL, the first astronaut to operate amateur radio from space, and a 2001 Amateur Radio Hall of Fame inductee.)

William W. Hansen (no call, SK). "Father of Microwave Electronics." Iinvented technology such as the cavity resonator and the klystron tube, with made microwave communications possible; collaborator in development of the first linear accelerator and nuclear magnetic resonance, basis for MRI medical imaging.

Richard Kirby, ex-WØLCT/ HB9BOA (SK). Director of the ITU's International Radio Consultative Committee (CCIR), 1974–1995—helped to develop global standards for HDTV, digital audio broadcasting, mobile and satellite communications; previously Director of the Institute of Telecommunication Sciences; Associate Director of the US Dept. of Commerce Office of Telecommunications; Chief of Ionospheric Research, National Bureau of Standards, also Chief of Radio Communications Systems Division.

Fred Maia, W5YI (SK). One of the architects of VE program, first FCC-designated VEC; editor/publisher *W5YI Report*; long-time *CQ* columnist

Steve Mendelsohn, W2ML (SK). Communications Director, New York City Marathon, 1976–present; former ARRL First Vice President, Director—led ARRL Part 97 rewrite effort in late 1980s (most of which was adopted); New York Jets frequency coordinator—uncovered New England Patriots audio "spying" scandal.

Larry Mulvehill, WB2ZPI. Photo journalist who has covered major news events around the world for more than 50 years; *CQ* cover photographer for over 30 years.

Rowley Shears, G8KW (SK). Founder of KW Electronics in the UK; helped re-establish amateur radio in Germany after World War II.

Mike Staal, K6MYC. Antenna expert, co-founder of KLM and M^2 Antennas.

Frederick Terman (ex-6FT, W6AE, W6XH) (SK). Microwave pioneer, partner with William Hansen (see above) in developing microwave communications and linear accelerator.

Patrick Tice, WAØTDA. Manager, Courage HandiHam System, for more than 20 years; through this organization, has helped thousands of people with disabilities become radio amateurs, coordinates nationwide program to provide training and assistance.

Louis Varney, G5RV (SK). Inventor of the G5RV antenna.

William A. Wilson, K6ARO (SK). Appointed by President Reagan as the first U.S. Ambassador to the Vatican after formal diplomatic relations were re-established in 1984 (they had been cut in 1867).

Congratulations to all of our inductees. Formal presentations to Contest and DX Hall of Fame inductees were scheduled for the respective Contest and DX dinners at Dayton in May.

BY IRWIN MATH,* WA2NDM

How Accurate is Your Test Equipment?

Recently we had the task of building a low-cost test fixture to allow our personnel to quickly check the accuracy of the many small digital meters we use in our company. Without incurring the significant cost to have everything individually calibrated, we decided that a simple portable reference would be a good tool to have so we could quickly check each device as needed. As a result, we then came up with a simple test fixture that would do the job adequately but would not break the bank. What we finally designed is something every homebrewer should seriously consider.

The finished unit is shown in fig. 1 and the schematic in fig. 2. The heart of the test fixture is the Analog Devices AD587 Reference IC. This chip is available in several varieties. However, the one we chose is the AD587JNZ, which provided an output of 10 volts, is accurate to ±10mv, and comes in an easy-to-handle 8-pin DIP package. We also added a couple of other low-cost features as you soon will see.

The AD587 takes an input voltage of 15 volts (or more) and produces an output of between 9.990 and 10.010 without calibration. An external pot (10K) can be connected as shown (in dotted lines) to allow the output to be trimmed exactly if a suitable reference for comparison is available. Temperature drift is on the order of 20 parts per million per degrees C, and stability of the output is rated at ±15 parts per million per 1000 hours. What all of this means is that with this chip you can produce a very accurate calibrator for the shack if you wish,

Fig. 1– Photo of calibration standard.

*c/o CQ magazine

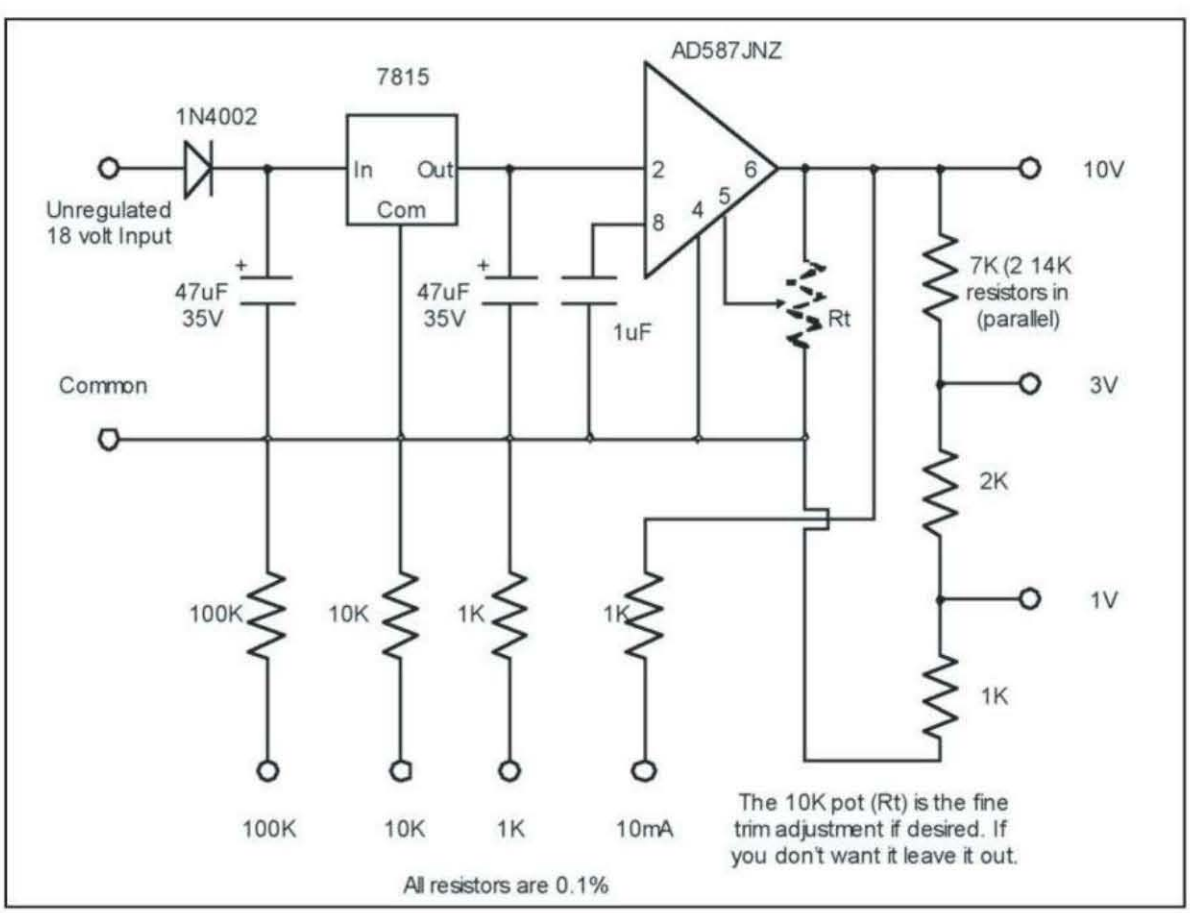


Fig. 2– Low-cost voltage/resistance/current standard.

and one that easily will provide the level of calibration required for the average home brewer.

In our circuit we have added a diode and 15-volt regulator to protect the chip against reverse input polarity and to also allow an unregulated voltage source to be used (such as a surplus 18-volt wall wart). Keep in mind that even a couple of 9-volt transistor-radio batteries in series could also be used for the utmost in portability. You will also notice from the schematic that we have added a number of 0.1% resistors to configure a divider that produces 3.00 volts and 1.00 volt (like the common oscilloscope divider) for voltage range calibration. In addition, 1.001K, 10.01K, and 100.1K resistors (also 0.1%) are provided for ohmmeter calibration purposes. We have even added a 10.00-milliampere current output (derived from the 10.000-volt reference output) via a 1K 0.1% resistor to check the current range. All of this is mounted in a RadioShack "project box" along with binding posts from the same source. Wiring is not critical. However, all connections to precision components should be mechanically sound and properly soldered. Connections to the binding posts should be tight and for best results, soldered as well. You don't want a 1-ohm resistance in series with a 1000.1-ohm resistor due to a poor mechanical connection to a solder lug!

If you want even better accuracy, use the 10K pot, but make sure you have something better than 10.000 volts to use as a reference for comparison. Also keep in mind that this test fixture can only be used (as is) to check DVMs with high-input impedances (usually 10 megohms). Using lower impedance meters will load the resistor divider portion of the circuit and give inaccurate results.

The data sheet for the AD587 describes its operation in more detail and also covers the more accurate versions of the chip. It is available from the Analog Devices website at <www.analog.com>. The AD587JNZ is in stock at DigiKey Corp. (www.digikey.com) and costs less than $7.00, a real bargain considering the accuracy it provides.

For a total cost of less than $25, this is a tool that every home brewer really should have. If there is enough interest we will be glad to investigate the possibility of having someone make a low-cost commercial version of this device available, so please let us know. If you are a "real experimenter," then you should seriously consider actually building one. 73, Irwin, WA2NDM

BY GORDON WEST, * WB6NOA

You're in the Log

I recently discovered the utility of a shirt-pocket-size paper log book that would survive a southern California rainstorm. I found the waterproof pages also work well when I'm out grid-hopping maritime-mobile.

These handy little waterproof log books will do away with shaking the ballpoint pen to make it write on damp paper. Pages are treated to accept almost any writing instrument for easy glide-on creation of permanent log-keeping in all kinds of weather. They come with any number of labels on them, including:

Radio Portable/Mobile Log
Incident Detail Log
GeoCache Log
CERT/First Responder Log
Ship's Deck Log (That's for me!)
Various others, from fishing to bird watching

Each log book has a plastic spiral binding on the top of the pages, and you really need to work at it to yank out a page. This is on purpose; even if the book becomes completely soaked, your pages, as well as inside notations, remain intact. Pages are printed only on one side, giving you plenty of doodle room on the back for additional "I remember that" notes. The front page of each log book is protected by a clear plastic cover. There is a page designed for log initiation with Operator name, call-sign, date, and "Property of…" information in case you and the little waterproof log book get separated. One source is ASA, PO Box 454, Glenwood, NJ 07418; <www.waterprooflogbooks.com>.

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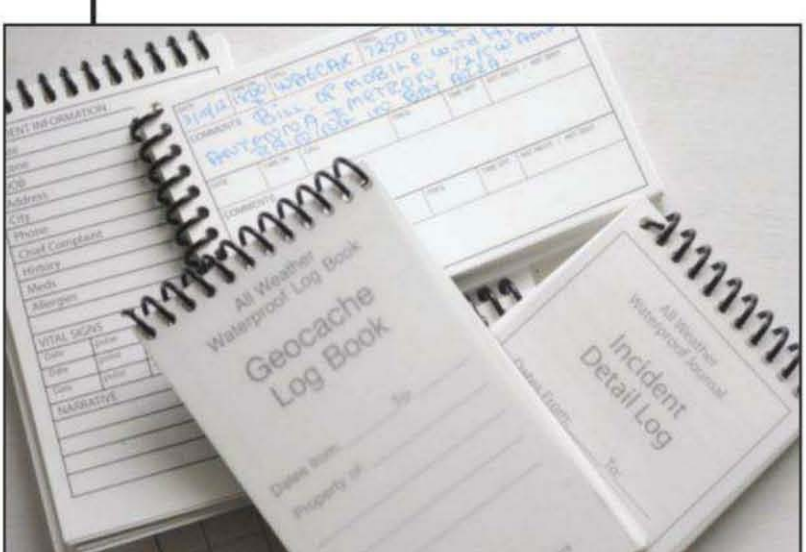
e-mail: <wb6noa@cq-amateur-radio.com>



Waterproof log books are available under several different titles.

LEDs on a Roll

If you are looking to light up your radio room operating desk, or provide outside illumination from your emergency communications unit, take a look at *LEDs on a Roll*. They will amaze you with how easy it is to gain useful light.

Each roll of light emitting diodes is 16 feet long, and features 300 LEDs on a waterproof ultra-flexible strip terminating to red and black wires for a 9-volt or 12-volt connection. If you don't need all 16 feet, but rather only 6 feet, take out your diagonals and cut the strip where you see the scissors mark.

For lighting, either inside the ham shack or outside on your vehicle, you have a choice of several LED strip options:

Very Bright #5050 LEDs, facing out
Bright #3528 LED, small but bright
LED #335, pointing down, called "side view strip"
Submersible LED strip #5050, very bright, for pools.

The 16-foot strips may be ordered with a white, brown, or black background. The light strips may also be ordered in red, green, blue, or even with an additional tiny controller, to sequence through multiple colors. That's what Jim, at Jim's Engraving, uses with his side-lighted etched-glass call-letter desk signs.

At 12 volts, the bright strips pull 0.02 amps for three LEDs. For the ultra-bright #5050 LEDs, three of them draw 0.06 amps at 12 volts.

Here's where it gets interesting. I hooked up a roll of side view, a roll of bright, and a roll of super bright LEDs on a common transistor radio type 9-volt battery, and believe it or not, all three rolls ran *continuously* for three days, giving off a consistent, nice warm glow to accent my darkened radio room. As you feed them less voltage, the current falls off dramatically.

Louis at <www.cablejohn.com> says his biggest light-strip customers are custom RV manufacturers, illuminating the inside of million-dollar RVs, and coach or limo makers enhancing the "atmosphere." Since these LED rolls can be cut to shorter lengths, the individual resistors for 12-volt operation are included all along the 16-foot strip. On the back of each strip is 3M™ double-stick tape for mounting. Peel away the outer protective backing tape, and the strip will hold to almost any kind of surface.

Yes, the current rolls of white LEDs do have that bluish cast, but at next year's Consumer Electronics Show we'll likely find warmer versions of the LEDs.

Another source, LED Post (www.LEDpost.com), offers these LEDs on a roll. Judging by their packaging, they are gearing up to sell them in retail automotive stores.

Both companies offer hundreds of additional mobile LED lighting accessories, such as LED

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#1 Line of Autotuners!

- *5 to 1,000 Watts PEP*
- *RF Sensing*
- *Auto and Semi Tuning Modes*
- *Two-Position Antenna Switch*
- *2,000 Memories per Antenna*
- *1.8 to 54 MHz range*
- *6 to 800 ohm range (15 to 150 on 6M)*

M-1000 Meter sold separately

NEW! AT-1000ProII

Building on the success of the AT-1000Pro, LDG Electronics has refined and expanded its flagship 1KW tuner with optional external 4.5" analog meter. The new AT-1000ProII keeps many of the same features of the previous model, but simplifies the operation. With the two-position antenna switch, there are 2,000 memories that store tuning parameters for almost instantaneous memory recall whenever you transmit on or near a frequency you've used before. Includes six-foot DC power cable.

Suggested Price $539.99; Optional M-1000 external analog meter $129.99

AT-600Pro

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

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

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 six-foot DC power cable.

Suggested Price $229.99

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

AT-200ProII

The AT-200ProII now includes LEDs to show antenna position and if the tuner is in bypass. A two-position antenna switch stores 2,000 memories per switch. Handles up to 250 watts SSB or CW on 1.8 to 30 MHz and 100 watts on 54 MHz. Rugged and easy to read LED bar graphs simultaneously show RF power and SWR. Includes a six-foot DC power cable.

Suggested Price $259.99

Your Favorite Dealer has LDG tuners in stock NOW!
Don't Miss Out — Call or visit them TODAY!

Z-100Plus

Small and simple to use, the Z-100Plus sports 2,000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes six-foot DC power cable.

Suggested Price $159.99

Z-11ProII

Designed from the ground up for battery operation. Only 5" × 7.7" × 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 through 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 six-foot DC power cable. ***Suggested Price $179.99***

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). 2,000 memories cover 160 through 6 meters. Also functions 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.

Suggested Price $129.99

IT-100

Matched in size to the IC-7000 and IC-706, for either manual or automatic tunes, and status LEDs. Control the IT-100 and its 2,000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. For your Icom radio that is AH3 or AH-4 compatible. ***Suggested Price $179.99***

radio not included

AT-897Plus for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment, 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

Visit our website for a complete dealer list www.ldgelectronics.com

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LED lights on a roll can brighten up your shack. They're available in a variety of colors and backgrounds.

dome lights, sidelights, driving lights, and for law enforcement, red, amber, and blue lights that absolutely knock the socks off old-fashioned incandescent light bars.

The suggested retail price for the 16-foot waterproof LED roll is $50 to $100+ for the submersible LEDs. I have seen rolls of LEDs for less, but they were absolutely *not* waterproof, and could only be used in perfectly dry configurations. The waterproof and submersible rolls have a nice feel to them, and work just as well outside in a damp environment as they do inside. (See photos.)

Each company requires a resale license plus a minimum several-hundred-dollar order. They won't sell a single roll direct retail—dealers only—so get together with your local ham dealer and get it to stock up!

Ham Nation, Live

Ham Nation is now celebrating a year on the air on the TWIT network, home of Leo Laporte, W6TWT, also known as "The Tech Guy." Bob Heil, K9EID, is our director-host, and each Tuesday evening a group of us pulls off hour-long live shows about all things ham radio with participation from a live chat room.

We bring in ham radio guests each week as well as our regulars George, Carol, and Amanda, who go live on Skype™. These are podcasts available on your computer at <http://live.TWIT.TV/hn>. Previous shows are viewable on YouTube; just look for Ham Nation.

"Some of the best ideas and questions come from the chat room. We have loads of viewers and listeners who have yet to become licensed ham operators," comments Bob Heil, K9EID. Bob and I regularly hear from these potential hams via e-mail, and we're getting feedback that the shows are drawing more shortwave listeners into our fascinating hobby.

New X

The new Extra Class test question pool is effective July 1, 2012. If you have been practicing for the test and are using study materials that expire on June 30 this year, *don't panic!* There is little change in the new Extra Class test question pool. In fact, some antiquated questions were removed, the entire pool was trimmed down to 702 questions, and anyone taking the new test with the old book should do just fine. Many of the 60+ new questions added to the pool are simply updated old questions.

So if you have been studying the old book and CDs, you will likely do just fine on the upcoming 50-question exam. Up-to-date study materials are available at <www.W5YI.org>.

Have a great summer! More of "Gordo's Short Circuits" coming this fall.

73, Gordo, WB6NOA

These bright LED lights are available in 16-foot rolls that can be trimmed to the length you need. However, they are sold wholesale only, so work with your local ham dealer to get some in stock.

What You've Told Us...

Our April survey asked about your feelings toward low-power, or QRP, operating (since it was our QRP Special). Nearly two-thirds of the readers who responded to the survey (62%) said they consider themselves to be QRP operators, but most of them do so part-time, with 34% reporting that they devote 1–25% of their operating time to QRP, followed by a tie between 100% and 76–99% at 14% each (so that's 28% who operate QRP more than 75% of the time). After those were 26–50% at 10% and 51–75% with 9%. Plus, 19% of respondents said they do not operate QRP at all.

Overall, readers' general attitudes toward QRP operating are positive, with 38% saying "I enjoy it when I do it," followed closely by "Love it!" at 37%. Ten percent said QRP was "great for others, but not for me," followed by 9% who responded, "Life's too short for QRP," and 7% who hadn't given it much thought.

Among our QRP operators, 61% enjoy operating CW; followed by SSB at 32%, digital 16%, FM 14%, and other 2%. Home is the favorite QRP operating spot for 68% of our readers, followed by "remote location 'off the grid'" at 27%, vacation home/hotel at 21%, car or truck 20%, other 6%, and boat/airplane 2%. Types of antennas follow the operating locations: Home antenna 61%, portable (homemade) antenna 38%, portable (purchased) antenna 26%, and mobile antenna 20%.

Finally, 29% of you operate with a commercial QRP rig, followed closely by QRP kits at 28%, "regular" (100w) rigs with the power turned down at 17%, and 4% who operate using QRP rigs built from scratch.

This month's free subscription winner is William J. Good, Jr., W1GS, of Londonderry, NH.

Reader Survey July 2012

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'd like to explore activity on 160 meters, "Top Band."

Please answer by circling the appropriate numbers on the reply card or by going to the following web link <www.surveymonkey.com/s/CQJuly12> [From the digital edition, just click on the link].

1. How often do you operate "Top Band" (160 meters)?
Regularly 1
Occasionally 2
Rarely 3
Never 4

2. What mode or modes do you prefer on 1.8 MHz?
CW only 5
SSB only 6
AM only 7
Mixed CW and phone 8
All authorized modes 9

3. If you don't operate on 1.8 MHz, why not? (Choose all that apply)
I have no room for an appropriate antenna. 10
The QRN level is much too high in my area of the country. 11
There's nothing on 160 that I can't do on 80 meters. Why bother? 12
Not enough activity. 13
I'm a DXer and the challenge is just too great on 1.8 MHz. 14
I've never really given any thought to operating there. 15

4. If you operate on 160, what is the allure? (Choose all that apply)
Propagation at 1.8 MHz is fascinating. There's always a surprise. 16
Operation there is not quite as intense as on other bands. 17
It has historically been a "friendly" band—and continues to be. 18
There is nothing more interesting than a 160-meter contest. 19
It is a band rich in history and nostalgia. I like that. 20

5. If you're a contester, which major 160-meter events are a "must" for you?
January's CQ World-Wide CW 160-Meter Contest 21
February's CQ World-Wide SSB 160-Meter Contest 22
December's ARRL 160-Meter Contest 23
All of the above 24
All of the above, and any other 1.8 MHz contest I hear about. 25

6. As a contester, do you include 160 meters in your strategy for "all band" contests?
Yes 26
No 27
Sometimes 28

7. When was the last time you were on 160 meters?
Today 29
In the last week. 30
In the last month. 31
In the last year. 32
I can't remember. 33
Never, but maybe someday. 34
Never have and never will. *Period.* 35

8. If you've never worked 160, has anyone ever encouraged you to do so?
Yes, but I've never followed up. 36
No, I wish I knew more about it. "Top Band" is a mystery to me. 37
Given some mentoring and I'd gladly give it a try. 38

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

public service

BY RICHARD FISHER,* KI6SN

Hams Tackle Texas-Size Weather Emergency: *EmComm Ops Play a Major Role When Tornadoes Rip Through Dallas-Forth Worth*

The nation took in a collective *gasp* as raw video showed tornado winds hurling large truck trailers hundreds of feet through the air in Dallas, Texas. At least a dozen twisters skipped through this region of more than six-million residents in early April. There was massive destruction, but fewer than twenty injuries. *No deaths.* This can be attributed to daylight, an informed public, and outstanding forecasting, officials said.

As you'll see, radio amateurs played a central role in saving lives—operating as ground forces in support of the National Weather Service and emergency management agencies at all levels.

Jim Pope, N5JCP, of Euless, is ARRL North Texas Section Public Information Coordinator. He took good notes of amateur radio's EmComm response and shares them in this month's "Public Service" column. The orchestration was masterful. The outcome was the best that could have been hoped for.

*(**SEE:** A list of radio amateurs who took part in the EmComm operations across the northern Texas region in the CQ Public Service on the website at <http://www.CQPublicService.blogspot.com>.—KI6SN)*

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

Photo A– In early April, TV viewers nationwide could hardly believe their eyes as large truck trailers from the Flying J Truck Plaza in Dallas became airborne and hurled hundreds of feet by a passing tornado. Watch video at: <http://bit.ly/KSPVdb>. (YouTube screen grab)

Pride and Relief on a Sweep Through the Region

By Jim Pope, N5JCP

As the weather deteriorated on April 3, cities and counties activated their EmComm nets for RACES® (Radio Amateur Civil Emergency Service, <http://bit.ly/Jfxe3U>) and ARES® (Amateur Radio Emergency Service, <http://bit.ly/J7ACQP>) communications.

A slow-moving front, combined with abnormally high temperatures and moist air from the south, brought large hail, numerous funnel clouds, and tornados to northern Texas.

Spotters reported observations to their respective Emergency Operations Centers (EOCs), resulting in at least one case in which emergency sirens were sounded and a tornado warning was issued nine minutes before the National Weather Service announcement.

Due in part to stunning video of those large truck trailers flying through the air (see photo A), the weather drama received national attention (http://bit.ly/KSPVdb). What went on quietly and efficiently in the background was the dedication and commitment of amateur radio. In every case, amateur radio was on the job, on the scene, and leaned upon for support by various EOCs. Damage was extensive, but with the advance warning, there were few injuries and no deaths. What a relief.

Several spotters reported broken windshields and being "rained on" with debris. One spotter's report included a live description of the airborne truck trailers lifted from the Flying J Truck Plaza in Dallas.

Congratulations and thanks go to North Texas amateurs for their dedication and professionalism during this severe weather.

Here are some activity reports to give a snapshot of their remarkable EmComm support:

City of Mesquite

According to Craig Green, KV5E, Mesquite Emergency Coordinator and RACES® Radio Officer, the EOC "was manned shortly after 1 PM and operators were involved until approximately 5:15 PM. Local information regarding the Mesquite Area and support for Dallas SKYWARN operations

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Easily handles 1500 Watts continuous carrier even on 160 Meters . . . High-current edge-wound silver plated Roller Inductor . . . Two 500 pf high capacitance tuning capacitors with 6:1 vernier reduction drives . . . 3 core choke balun . . . Six position antenna switch . . . True peak reading Cross-Needle SWR/Wattmeter . . .

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- ***6 position antenna switch***
- ***True peak reading meter***

AMERITRON's ATR-30 *True Legal Limit*™ roller inductor antenna tuner is ham radio's toughest! It'll handle 1500 Watts *continuous carrier output* on *all* modes and *all* HF bands into most antennas -- even on 160 Meters where most antenna tuners fail.

It's perfect for Ameritron's most powerful amplifiers where the ATR-30 just loafs.

All band coverage lets you operate 1.8-30 MHz including all MARS and WARC bands.

Super High Current Roller Inductor

You'll see Ameritron's new *super high current* air core roller inductor. It's *edge wound* from a thick solid copper strip and silver plated. This produces a large surface area and a massive conductor. It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn ordinary roller inductors.

A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

6:1 vernier reduction drives makes capacitor tuning smooth and easy.

Super Balun, 6 position Antenna Switch

Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

Read *true* Peak Power

Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

Roomy Cabinet maintains High-Q

Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

AMERITRON ATR-20 Antenna Tuner

ATR-20, $459.95 Handles a full 1.2 kW SSB and 600 Watts CW. It's designed to safely handle the full SSB power of Ameritron's AL-811/811H/80B, ALS-500M/600 and other 1.2 kW SSB amplifiers.Has vernier reduction drives.

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AMERITRON's legal limit amplifiers use super heavy duty Peter Dahl Hypersil(R) power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with 3CX1500/8877 ceramic tube

AL-1500

$3795

Eimac(R) tube

AL-1500F

$3195

Imported tube

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the *herculean* 3CX1500/8877 ceramic tube. 65 Watts drive gives you full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 lbs., 17Wx10Hx18½in.

Ameritron's *toughest* Amp

with Eimac(R) 3CX1200A7 toughest tube

AL-1200

$3459

Suggested Retail

TrueLegalLimit™

Get ham radio's *toughest* tube with AL-1200. The *Eimac*(R) 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 17Wx18½Dx10H in.

Ameritron's *classic* Amp

with 2 graphite plate classic (R) 3-500G tubes

AL-82

$2745

Suggested Retail

TrueLegalLimit™

Most linears using 3-500Gs *can't* give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500G amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 17Wx10Hx18½D inches.

Desktop Kilowatt

with classic 3-500G tube

AL-80B, $1495. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk-top linear. 14Wx8½Hx 15½D inches. Plugs into 120 VAC outlet. Graphite plate *genuine* 3-500G tube. Nearly 70% efficiency. Weighs 48 lbs.

AMERITRON *no tune* Solid State Amplifiers

500 Watt Mobile Amp

ALS-500M, $849. 500 Watts PEP/400W CW output, 1.5-22 MHz, instant bandswitching, no tuning, no warm-up. SWR, load fault, thermal overload protected. Remote on/off control. DC amp meter. Extremely quiet fan. 13.8 VDC. 9W x3½Hx15D in., 7 lbs. **ALS-500RC, $49,** Remote Head.

600 Watt FET Amp

ALS-600, $1499. ***No tuning****, no fuss, no worries -- just turn on and operate.* 600 Watts PEP/500W CW, 1.5-22 MHz, instant bandswitching, SWR protected, extremely quiet, SWR/Wattmeter, ALC control. 120/220 VAC. Inrush protected. 9½Wx6Hx12D in. **ALS-600S, $1599,** ALS-600 with 10 lb., very low RF noise switching power supply.

Precision SWR/Wattmeter

AWM-30, $149.95 suggested retail. Active circuit gives *true* peak/average readings on lighted Cross-Needle meter. 3000/300 Watt ranges. Remote sensor.

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was used by the EOC to make emergency decisions. Some reports were taken from Forney and Kaufman Counties and relayed to the NWS through Mesquite EOC."

*(**WATCH and LISTEN:** Dramatic iPhone video shot by Tim Green, KD5YPC, in Forney, shows tornado development and captures audio of EmComm net operations, <http://bit.ly/KItmhp>, see photo B.—N5JCP)*

Storm spotters had tornado experiences of their own, Green said.

• Debris rained on Andy Carstarphen, WY5V's vehicle in Lancaster and "he was in the thick of things while reporting."

• When Samuel Barricklow, K5KJ, got out of his car to search damaged vehicles after a tornado passed through Forney, he was captured live on the local NBC television affiliate, Channel 5.

The Mesquite EOC was staffed by Allyson Brooks and Jimmy Roland, KC5TOP.

"Reports from amateurs in Forney as well as municipal communications between cities resulted in street and

Photo B– This image from an iPhone video shot by Tim Green, KD5YPC, shows the development of a tornado near Forney, Texas. Viewers can also hear EmComm net operations from Green's handheld radio during the footage, <http://bit.ly/KItmhp>. (YouTube screen grab)

Photo C– Texas emergency officials were gathered for an EmComm convention in San Antonio at the time the severe weather struck—an irony not lost on the reporting staff of KENS-TV. Seizing the moment, the officials and equipment vendors partnered to ramp up EmComm from the convention floor. See the full story at: <http://bit.ly/KFhPzB>. (Internet screen grab)

cleaning logistics vehicles and personnel being sent from Mesquite to Forney," Green said. "Mesquite also sent about seven police officers to assist in the first few hours of response.

EmComm was conducted on WJ5J/R FM, 145.310; WJ5J-3 APRS, 145.550; and AK5DX FM, 442.625 MHz. "The SMS messaging worked well," Green said. "We had between 2 minutes and 10 seconds or less latency for the SMS messages asserted through my service provider. I was monitoring radar and providing text updates for the group, as well as getting my wife to safety in her office in Arlington. She was very close to the Arlington damage and I was definitely multitasking here."

Ft. Worth/Tarrant County

"We had an ARES net running for about 45 minutes, until the NWS requested spotters officially at 12:42 p.m.," writes Gerry Dalton, W5MAY, DEC District 4, Fort Worth EC and RACES® Radio Officer. "We notified our spotters and went into RACES mode per our SOP (standard operating procedure) with the City of Fort Worth."

May said the team "stayed in RACES® mode until approximately 4:30 PM (and) had Garry Cooper, K5TXC, as primary net control on 146.940 MHz coordinating spotter reports to the NWS in Fort Worth.

"The City of Arlington requested an operator come to its EOC about 1:15 PM, when the first reports of a (tornado) touch down had been reported in Burleson. Linda McMillian, W5LMC, reported to the Arlington EOC and started monitoring the 146.940 MHz RACES® frequency along with the 147.140 Arlington Amateur Radio Club repeater where spotters were sent to give damage reports or request city services."

The 147.140 net stayed in ARES® mode until about 5 PM.

"The interesting thing about this storm system and its impact was that most of the senior members of the various cities and counties impacted were at the Texas Department of Emergency Management Homeland Security Conference in

Photo D– Federal Emergency Management Agency's John Nelson and Ruby Dailey, of Texas Dept. of Emergency Management, are part of a Preliminary Damage Assessment team in Lancaster following the tornadoes that tore through the area earlier in the week. (Courtesy of FEMA)

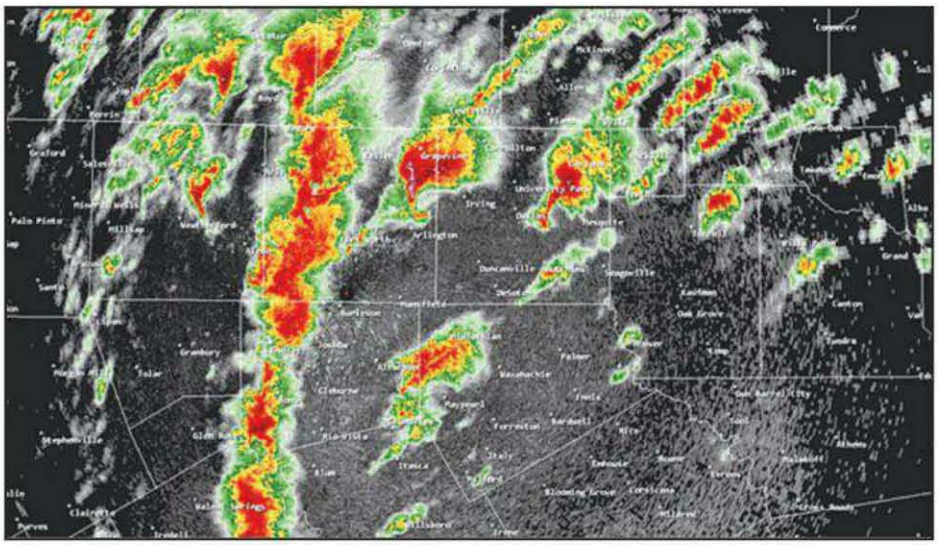

Photo E– National Weather Service animation shows the severe weather system passing through northern Texas on April 3, <http://bit.ly/Jik9qn>. (Courtesy of NWS, Fort Worth)

San Antonio," W5MAY said. "The State Operations center normally would have been activated in Austin, but since so many members of the TDEM staff and County Emergency Management were at the conference, the State of Texas stood up the State Operations Center on the floor of the convention. (See photo C, and <http:// bit.ly/KFhPzB>."

May said convention vendors "used their demonstration equipment to bring up WebEOC, which provides situational awareness for the State Emergency Management officials. Tables were set up and the ICS functions worked from those tables for the next four hours.

"The only problem arose when the (phone) batteries of a large portion of the assembled workers started to run down," Dalton said. "State officials contacted vendor partners AT&T and Verizon and within 30 minutes chargers were brought into the Henry B. Gonzales Convention Center to recharge phones."

Live television feeds were available from the Dallas Fort-Worth area so that officials were able to watch much of the destruction in real time.

City of DeSoto

"An ARES® net on 147.06 MHz was activated at noon on Tuesday and we had about 15 spotters in the southern part of Dallas/Ellis counties," said Paul Dryer, KD5IVP, of Southwest Dallas County Amateur Radio Club.

"A tornado was spotted in Lancaster and closely followed by mobile operators Floyd Rodgers, KC5QBC, and Barry McCoy, K1BSM, from its beginnings in the Ovilla/Red Oak area, all the way to Hutchins," he said.

"I worked the DeSoto EOC, managing the net, along with Fire Marshall Michael Law, KE5GKI, who relieved DeSoto Assistant Chief Jerry Smith, KE5VBZ, when Lancaster requested mutual aid," Dryer said.

Smith expressed his appreciation to operators participating in the weather net. "Thanks to play-by-play accounts from K1BSM and KC5QBC, DeSoto was able to trigger the sirens and alert cities in the storm's path," Dryer said. "This action likely contributed to the fact there were no fatalities from these storms." (See photo D.)

*(**VISIT:** The Southwest Dallas County ARC website, <http://www.swdcarc.org/>.—N5JCP)*

City of Rowlett

From Ian Defranco, KE5FOM, Rowlett RACES® Radio Officer:

"We operated from the Rowlett Police/Fire Dispatch. Based on information from our weather specialist, our spotters and spotters reporting in on 146.88 MHz, emergency sirens were activated about nine minutes before the NWS issued a tornado warning for the same storm we were seeing approach Mesquite/Garland/Rowlett" (photo E).

"Both radio amateurs and non-amateurs supported the RACES® activation. Each was critical to protecting the safety of our citizens." (See photo F.)

City of Carrollton

"We had a high school principal request information," reported Mike Hennifer, KD5ZCF, City of Carrollton ARES® EC and RACES® Radio Officer, "and sent him an operator. He was then able to get information directly from the net that was current and up to date (including) EOC and field operations information, and so on.

"Both the Farmers Branch EOC and the Carrollton EOC were activated and staffed by our RACES® stations. Sixteen radio amateurs participated in 2-meter EmComm and the "overall timeline for amateurs' activation was about 3.25 hours."

The team called up the emergency net and assisted in "deployment of spotters based on the best locations to reference approaching weather."?

City of Irving

For a flavor of the kind of information included in amateurs' weather observations, Billy Geer, KA5OZC, Irving ARES® EC / RACES® Radio Officer, invites readers to consider this actual report:

• Light to moderate rate, pea-size (hail) reported in mapsco 21B (map data).

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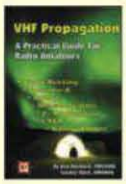

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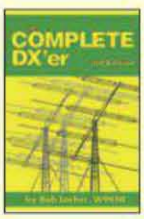

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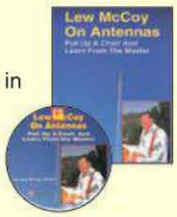

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• Rotation reported in area of 183/Esters mapsco 31, flashes not associated with lightning at 2:15.

• Wind gust of 76 mph (measured) from south in mapsco 31A at 2:15.

• Funnel reported in area of 183/beltline mapsco 31 at 2:16. Was not verified by other spotters.

• Two-inch (golf ball) size hail, heavy reported in 31 (Beltline and 635) at 2:20. Rotation still observed.

• Heavy rain reports started, from 1 to 3 inches per hour reported from 2:35 to 3:10 p.m. in mapsco 31, 31A, 21A, 21 B. This was the last cell that moved through Irving.

• Largest hail reported was 3 inches. Most ranged from pea size to three-quarters-of-an-inch. Hail was heavy at times through many of the areas where spotters were located: mapsco 31, 31A, 21B. One of my spotters got a busted windshield.

Hunt County

The NWS placed Hunt County under a Severe Thunderstorm Watch from 9:20 AM to 5 PM. Weather service officials requested the activation of Hunt County Storm Spotters at about 2:15 p.m.

The Immediate Response Information System (IRIS)—phone, email and text message notification system <http://bit.ly/JfSy9u>—was used to contact Hunt County ARES® members and Sabine Valley Amateur Radio Association members informing them that Hunt County was under a Severe Thunderstorm Watch until 5 PM. Members were advised that "storm spotters were not needed at the present time, but to continue to monitor the weather, and that if a weather net was (needed) that it would be on the 147.16 MHz repeater. *(**VISIT:** The SVARA website, <http://www.k5gvl.org/>.— KI6SN)*

Photo F– Billy Rhodes, member of the FEMA Region 6 Planning staff, briefs Regional Command and general staff on the tornadoes that struck the Dallas Fort Worth area April 3. (Courtesy of FEMA)

ARES® net control advised listeners of NWS updates "and received reports of golf-ball size hail at Highway 34 and Interstate 30. One storm spotter outside of Commerce reported seeing a wall cloud and wind gusts up to 48 mph. At one point outside of the Commerce EOC some rotation was visible."

The ARES® weather net was closed just before 6 PM, after about three-and-one-half hours of operation. The Commerce EOC is also used by Hunt County Emergency Management as its EOC.

"Even though Hunt County had a confirmed hit of a low F-2 tornado, very little damage was done," EmComm operators reported. "The tornado hit in southwest Hunt County around the Rockwall/Hunt counties line. We (had) five residences destroyed and nine others damaged."

A colt, horse and a donkey "were killed by flying debris," they said. "We seemed to have been in on the tail end of the tornado touch down, which mainly occurred in Rockwall County."

Officials said all ARES® communications were on 2-meter FM via the 147.16 MHz and 146.78 MHz repeaters in Greenville, with some traffic being handled on the 147.02 MHz repeater in Commerce. "There were 25 amateur radio operators that were active during the ARES® weather net."

City of Dallas RACES®

"The City of Dallas Office of Emergency Management requested RACES® / SKYWARN® net activation at 1:05 PM," wrote Pat Hykkonnen, N5NPL, City of Dallas RACES® Radio Officer.

He quickly contacted Clay Orchard, KC5MXN, to initiate a net on the Dallas Amateur Radio Club repeater, 146.880 MHz. "The SKYWARN® net for Dallas County was active by 1:15 PM," Hykkonnen said. It "handled traffic to the Fort Worth/Dallas NWS Forecast Office, and EOCs in Dallas, Irving, Garland, Richardson, Sachse, and numerous (other centers) in the DFW Metroplex."

Radio amateurs provided severe-weather reports describing "large, damaging hail, funnels, and very destructive tornados," Hykkonnen said. "NCS operators during the event were John Hazelton, KF5IOU; Megan McGowan, KF9AS; KC5MXN, and N5NPL."

The Dallas County SKYWARN® net was closed at 4:30 PM, after more than three hours of operation.

Elsewhere . . .

Grayson County: Rick Simmons, K5ECX, reported about 25 amateurs participated in the Grayson County Weather Net.

City of Garland: Bob Jones, W5BJ, Garland ARES® EC and RACES® Assistant Radio Officer, reported there were more than two dozen spotters deployed. Ten were mobile, seven provided valuable reports from tall buildings or high terrain, eight made periodic reports "to highly populated groups such as Garland ISD, Raytheon Garland, Fujitsu Richardson," and three were at the Garland EOC.

Collin County: A total of 72 operators checked into the Collin County EmComm net. The primary frequency was 147.18 MHz, with 444.25 MHz as a support channel. Logging was done on Googledocs. NWSchat Live was monitored. The net was conducted from 1:35 to 4:40 PM. "There were only spotty reports of winds as high as 45 mph and half-inch to two-inch hail," the team reported. "One spotter did report losing his windshield."

Officials said there were several served agencies monitoring the net "with liaisons assigned to the cities of Allen, Plano, Frisco, McKinney, Wylie, Lucas, and Collin County EOC."

An EmComm Wrap

That's it for this month. Please keep me posted on your EmComm activities and we'll feature the details and photographs in an upcoming edition of *CQ*. Via e-mail, write to: <ki6sn@cq-amateur-radio.com>. I look forward to hearing from you.

73, Richard, KI6SN

Riley's ramblings

BY RILEY HOLLINGSWORTH,* K4ZDH

Where has All the Enforcement Gone?

To those of you who have the impression that enforcement actions have lessened, that is not the case.

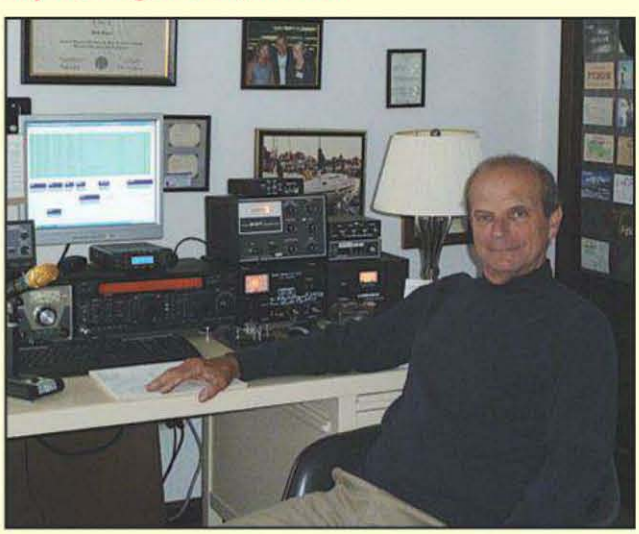
I very much appreciate the opportunity that *CQ* magazine has given me to write a regular column about amateur radio. Writing for this column is a far cry from 1960, when after countless CQs on 80 meters CW a station finally came back to me, and I was so nervous I couldn't figure out what to do next. That station was K4SDS, Earl Savage, in Richmond, Virginia. I never forgot that first contact, and years later I wondered if Earl was a teacher, because he had all the patience in the world that night and took special pains to encourage me. I changed from being very nervous to being the most enthusiastic ham on the planet, all in one contact!

*C/O CQ magazine
e-mail: <k4zdh@cq-amateur-radio.com>

Thirty-eight years later, I looked up Earl and found that he was indeed a teacher. Although he didn't remember that he was my first contact, I always did. That's the wonderful thing about amateur radio: We are constantly blessed with opportunities to positively influence someone's life, and opportunities we never even thought about come our way solely because of amateur radio. Therefore, thank you, *CQ*!

The main thing I want to accomplish in this column is to explain the state of enforcement in the Amateur Radio Service today. I constantly get questions about what is going on with enforcement, because lots of people think that the comparatively low visibility must mean that enforcement has weakened. This is not the case at all. Enforcement is alive and well and active. Laura Smith, my successor, is enthusiastic and a very hard worker. I know so because my agency spies tell me that all the time. I would suggest not underestimating Laura just because she is not yet a licensee. I do not exaggerate when I say I sure wouldn't want her coming after me. That's why I still have my frequency chart right in front of me

Introducing Riley Hollingsworth, K4ZDH



Riley Hollingsworth, K4ZDH, is already well-known to tens of thousands of hams as the man who brought law enforcement back to the amateur bands as Special Counsel for Amateur Radio in the FCC's Enforcement Bureau between 1998 and his retirement in 2008. But there is more to Riley's life and career that most of us don't know.

A native of South Carolina, Hollingsworth holds a Master's degree from the University of South Carolina and a law degree from Wake Forest University. While in law school, he worked as a "Nader's Raider," investigating brown lung disease in cotton textile mills in the Carolinas.

At the FCC, Riley started out as a legal advisor to the Compliance and Information Bureau (formerly the Field Operations Bureau). In 1987, he managed the FCC 800 MHz Lottery Task Force in which new 800-MHz spectrum was assigned in 13 cities. He organized the FCC's program in which underutilized radio channels were recovered for reassignment in major cities.

Hollingsworth also participated as a Member of the Delegation from the U.S. State Department to Bucharest, Romania to discuss radio licensing in the United States and opening foreign markets to American manufacturers. He also served as Co-Chairman of the FCC PCS Broadband and Narrowband Licensing Task Force, a role which earned him a "Hammer Award" for efficiency in government from then-Vice President Al Gore.

Riley's final position before joining the newly formed Enforcement Bureau was as Deputy Chief of Licensing and Assistant Bureau Chief of the Wireless Telecommunications Bureau. As Special Counsel in the Enforcement Bureau, his portfolio included Land Mobile Service interference resolution programs as well as amateur radio enforcement.

A ham since 1960, Riley enjoys working all HF bands and works about half SSB and half CW. He likes DXing, checking into nets, and the occasional contest. Outside of ham radio, Riley enjoys running and sailing. He lives in Gettysburg, Pennsylvania with his wife Pat, who actually thinks the radio tower in the backyard is really cool—and in fact, helped him build it! Please join us in welcoming Riley to the CQ "family."

— Rich, W2VU

at the radio desk, and I operate as if the whole world is listening.

There are two differences in enforcement now compared to, say, five years ago:

(1) **Privacy Act.** You know, the thing you got six notices about last week from the power company, cable TV provider, gas company, bank, and insurance companies—all at a time when we have no privacy anyhow.

(2) **Travel**.

Privacy Act

When amateur radio enforcement resumed at the FCC in 1998, it was decided that all actions we took should be released to the public and that the whole program would be transparent so that all licensees could see what we were doing. Pursuant to that, all letters and orders, even letters of inquiry requiring a licensee to answer a complaint, were made available bi-weekly to amateur radio media.

You may remember seeing in this magazine, and in the ARRL's *Enforcement Log*, or hearing on Bill Pasternak's *Newsline* or Hap Holly's *RAIN Report*, bi-weekly summaries of all enforcement actions. In fact, an FCC employee read the summaries of actions on *RAIN Report*, so there were audio accounts of what we were doing as well, aimed toward sight-impaired people but available to anyone. Just the mere publishing of all our actions was a great enforcement deterrent, as no one wanted his or her name to appear in any of our actions.

As the Privacy Act received greater emphasis over the next ten years, the same number of enforcement actions were taken but a lot less about them was reported. Around 2006 and/or 2007, we stopped releasing anything but *final* actions such as forfeitures, warning letters, or renewal hearing documents. As I understand the current situation, only final actions are made available on the Enforcement Bureau section of the FCC's website, and nothing is routinely sent to the amateur radio media, Enforcement Bureau section.

When you look at that web page, note that to see all of the published actions you have to scroll down the pages. Warning letters are in a separate section. However, notice that no letters of inquiry initiating a case are shown. This is because under the Privacy Act the agency wants to make sure that only those who are the target of final actions have their names on the FCC website in the enforcement area of the web page.

As a result, Laura Smith does not have the advantage I had of being able to show all of her enforcement activity. She cannot even release the statistics regarding the number of open and closed cases. To my astonishment, often the complainant cannot even be told of the status of the case. Laura has a lot of cases, and enforcement is vigorous. It's just that a large part of it is not in the public eye. What you see on the enforcement pages of the FCC website is just the tip of the enforcement iceberg.

Although not a licensed ham herself, Laura has lots of experience with the Amateur Radio Service, having worked in the FCC bureau that handles amateur rulemaking. Laura comes from an enforcement family. Her dad was in enforcement, and her father-in-law was a long-time and well- respected chief of the Field Operations Bureau (now called the Enforcement Bureau). Her husband is a well-respected attorney for the FCC.

Travel

During the enforcement period of 1998 to about 2007, I could travel to any ama-

teur radio event put on by a 501(c)(3) organization (not for profit). That included the vast majority of hamfests and all ARRL conventions. The organization itself had to reimburse me dollar-for-dollar for the travel expenses and lodging. In those days, 99% of amateur events to which I travelled were sponsored by 501(c)(3) organizations. Although I gave up a lot of weekends and was not paid for my time, I did get reimbursed for out-of- pocket expenses. No tax dollars were used for any of that travel. The other 1% were events that the FCC chose to cover. I felt then, and will say now, that every weekend I gave up was absolutely worth it personally, because amateur radio is just plain fun!

In fact, my marching orders in the early days were to get to as many amateur radio events as possible and let the amateur population know that enforcement was no longer missing in action. Our thought was that all the public notices and announcements to radio organizations in the world were no substitute for actually being on-site, explaining to amateurs what we were doing in enforcement and answering their questions.

Around late 2006 or early 2007, the then-chairman changed the agency-wide travel policy to allow travel *only if the agency paid for it.* I would explain the reason if I knew it. That policy still applies today. Now since Laura is in the Enforcement Bureau, her travel expenses would come out of the Enforcement Bureau budget—i.e., the Field Offices. Of course she doesn't want to have to use Field money because the Field Offices are financially strapped as it is. Each Field Office has a huge geographical area to cover, vastly greater than, say, ten years ago, and especially 20 years ago. Also, as in all agencies, due to budget pressures many of those who retire are not being replaced.

I will also add, and this is just my own observation, lots of agencies, except those prosecuting financial fraud, seem to be keeping a low profile in this election year.

So to those of you who have the impression that enforcement actions have lessened, that is not the case. It's just that there is not the degree of publicity of our activities as in the past, and licensees cannot actually "follow" a case unless it is one in a hearing status for revocation or renewal. Fewer appearances by the Enforcement Bureau at radio events naturally creates an impression of lessened enforcement. Keep in mind that in some major situations, such as license renewal hearings, travel is not necessary. Some of the very bad violators over the years seem to have forgotten that sooner or later they would be up for license renewal (another example of knowing all the answers, because they hadn't thought of all the questions [see below]). In cases where a renewal application is designated for a hearing due to enforcement issues, the licensee/applicant has to appear *personally* before an Administrative Law Judge in Washington, DC. Not only that, but the licensee/applicant has the burden of proof to *show* that the license should be renewed. That means he or she must present evidence at the outset to show that a renewal is deserved. The case is not moved to the licensee's location, and the licensee, except for prehearing motions, cannot appear by video or speakerphone.

Now there are some things I'd like to say regarding enforcement in general. First, a very wise rule and policy guy in the Wireless Bureau—I won't tell you who he is, but his initials are W. ("B.") C.—once told me the two most important things I ever learned about enforcement. Bill (ahh, yes, Bill Cross) was one of the best lawyers I ever worked with, and he wasn't even a lawyer! The advice he gave me came during the first meeting we ever had, about three months after I started the Amateur Radio Service enforcement program.

As you may remember, the idea to eliminate the Morse Code requirement had been floating around for years before the actual proposed rulemaking to do so. I had made a trip from my office in Gettysburg, PA down to FCC headquarters in Washington to talk to Bill about policy and enforcement. My theory was that the two are best kept separate, and he agreed. However, I did take the liberty of saying, "Bill, I just want to say this and get it off my chest: If you guys ever eliminate the CW requirement, it will be the craziest thing you ever did. It's a filter to keep out the not- so-serious operators."

I'll never forget what he told me: "Really? Well, you go back and look at the enforcement problems on the bands and when you figure out the ten worst operators, look at their license class and see if they passed a code test or not."

Well, over the next six months I did that, and of the ten worst operators in the United States, all had licenses that required a code exam. I sheepishly called Bill and told him, and he said, "That's right, and you know why?"

I replied, "No, but I have a feeling I am about to find out."

Bill said, "There are two reasons: Nobody has ever figured out a way to regulate stupid, and there is no way to legislate common sense."

That point was brought home to me even more vividly a few months later. I usually travelled to FCC headquarters every week or two, and I would often use the commute time to listen to tape recordings sent in by complainants. On one trip in particular, I was listening to a nasty, slanderous argument on 75 meters over some juvenile topic that was leading to numerous rule violations as well as embarrassing the entire Amateur Radio Service. After a few minutes of lis-

tening to such idiocy, I usually took a break and tuned in to a local repeater.

On the Frederick, Maryland, repeater, W3ICF, there were two new licensees, one age 15 and the other 18. They were discussing the disadvantages of using a battery charger for a power supply. I turned back to the tape recordings to hear a few more minutes of insanity on 75 meters, then to the repeater again, where the same two teenagers now were discussing the difference between radials and counterpoises. Thus, on 75 meters I had the irony of old-time top-class licensees who had passed the code engaging in a ridiculous argument and jamming each other, and on 2 meters, brand new licensees, never having passed the code, talking about very practical, technical radio issues.

Over the years, I *never* had enforcement problems with new licensees. The worst problems were with experienced ops who usually talked on the same frequency every night, complaining about the same things, with 1200 watts to talk across a couple of states, threatened by new ideas and especially new operators. They knew all the answers for sure, but the reason was that they *hadn't thought of all the questions*. They had thousands of dollars of equipment, but were using it as if they were juvenile delinquents.

Now you probably knew people like this in the fourth grade, and most likely they haven't changed very much. In fact, I am almost certain that one person I was listening to *was* in my fourth grade elementary class, and I seem to remember that he drove my teacher, Mrs. Griffin, insane. Every society, profession, neighborhood, group, organization, and, for that matter, a lot of families, have a few people like that. They complain about everything, and if they won the Powerball lottery, would no doubt complain about how it was paid out.

I had a list of those operators in 2005 along with their addresses and phone numbers. I wanted to start a "Whine and Cheese Club" populated mostly by those 75-meter regulars, but I just couldn't get it approved. I guess it would have taken up a lot of time anyhow, what with a club that large. And where would we have met? The Verizon Center in Washington, DC? The Washington Nationals Baseball Stadium? Atlantic City? The dues just to rent the meeting place would have been enormous! So just ignore such operators. The world is ugly enough already. Don't add to it.

You see, then, from the start two things are against any enforcement program: (1) you cannot regulate stupid; and (2) you cannot legislate common sense. Moreover, the amateur rules historically have been kept at a minimum in order to allow for creativity and experimentation. Plus, the rules assume that the operator has common sense. But even if you had 500 pages of rules, they could not—repeat after me (!)—*regulate stupid or legislate common sense*. Couple that with the lower profile enforcement has to take under the Privacy Act, and it just *seems* that there is less enforcement.

Lastly, all the obscenity/indecency policies are before the Supreme Court awaiting a decision so that the uncertainty over where the line will be drawn doesn't help the situation either.

There you have it, and don't learn it the hard way: There isn't really less enforcement, just less publicity.

Please feel free to send me comments and suggestions regarding topics you'd like to see covered here in this column, and go enjoy amateur radio, remembering all the while what I have preached to you over ten long years: *Every gift of lasting value comes with responsibility.* . . . –.– K4ZDH

learning curve

BY RICH ARLAND,* K7SZ

The Wilderness Radio Project

I have been planning this column for many months. For me, homebrewing is an extremely rewarding aspect of the ham radio hobby. It is a chance to build a piece of gear: transmitter, receiver, transceiver, and/or station accessory, to *my* specifications. Unfortunately, there is no tutorial out there in "ham radio land" that demystifies this homebrew stuff. Newcomers to the radio hobby quite often are intimidated by the mere thought of building or modifying a piece of gear. This and the next column are my attempt at shedding some light on homebrewing and kit building/bashing. It's not intimidating; it's fun! The pride in accomplishment is pretty heady stuff, as well!

I often am asked, "Why build when I can buy?" The simple fact is if you build, your enjoyment of the hobby escalates logarithmically! Once you learn the basics of how to solder (see sidebar for beginners' tips), home construction of your station and accessories is a fantastic way to obtain customized gear at reasonable cost. Taking a kit, building it, and then modifying allows you to custom-tailor that specific piece of equipment to your individual needs. However, most of all, homebrewing/kit-bashing is *fun*! Watching a piece of ham gear take shape before your very eyes is extremely exciting, not to mention highly addictive!

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In this and the next column my plan is to take a well-established kit transceiver, build it, debug it (if necessary), and then apply some unique modifications that will enable me to have a rig that I can operate on the road, and help me bring the fun of portable HF operation to my readership. All in all, it should prove to be an interesting ride, so buckle up! We're off and running!

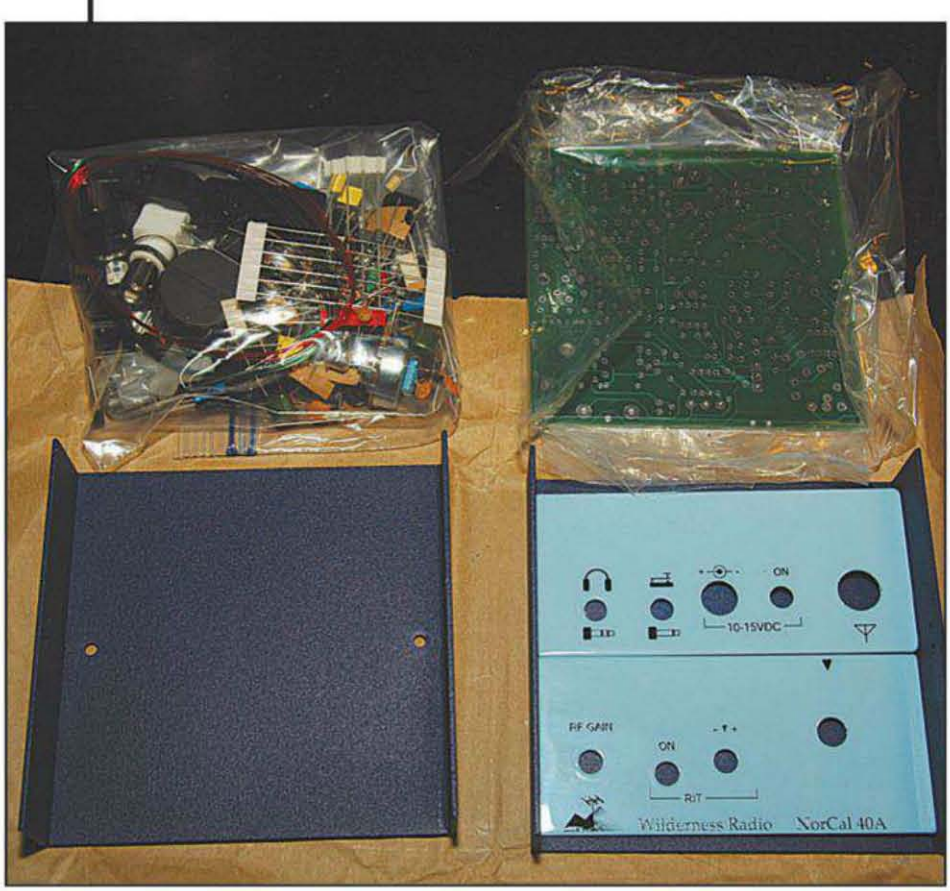
The Venerable NorCal NC-40A

The first order of business is to select a transceiver kit that is: still in production, of a proven design, easy to construct, and a rock-solid performer

Without a doubt, the Wilderness Radio NC-40A transceiver kit fills all of those parameters quite handily. Originally designed on a napkin at one of the first Northern California (NorCal) QRP Club meetings in 1994 by Wayne Burdick, N6KR, of Elecraft fame, the NC-40 has undergone several major revisions in design over the intervening years. The NorCal 40 originally was offered as a kit to NorCal members and other QRP operators as a small, extremely portable, low-current-consumption, mono-band transceiver. Over the years, Wayne refined the design to enhance on-the-air performance as well as reduce overall current requirements even further to provide an excellent rig for backpacking and camping. It soon became the mainstay, along with the Burdick-designed Sierra (a multi-band HF CW rig) of Wilderness Radio, owned by "QRP Bob" Dyer, K6KK <http://www.fix.net/~jparker/wilderness/ nc40a.htm>.

This design has been so well received that it has become an undergraduate engineering project for several colleges across the country. David Rutledge's excellent text *The Electronics of Radio* (ISBN:9780521646451) is a college-level engineering text that dissects the inner workings of the NC-40A in microscopic detail and provides an extremely novel engineering platform for future electrical/RF engineers at the California Institute of Technology. In the words of QRP Bob, "The NorCal 40A has taken on a life of its own!" Man, ain't that the truth!

While the NC-40A is a mono-band CW-only transceiver kit, it is well suited to our homebrew project for reasons stated previously. I have heard comments by some QRPers that the NC-40A is *not* a good deal in this day and



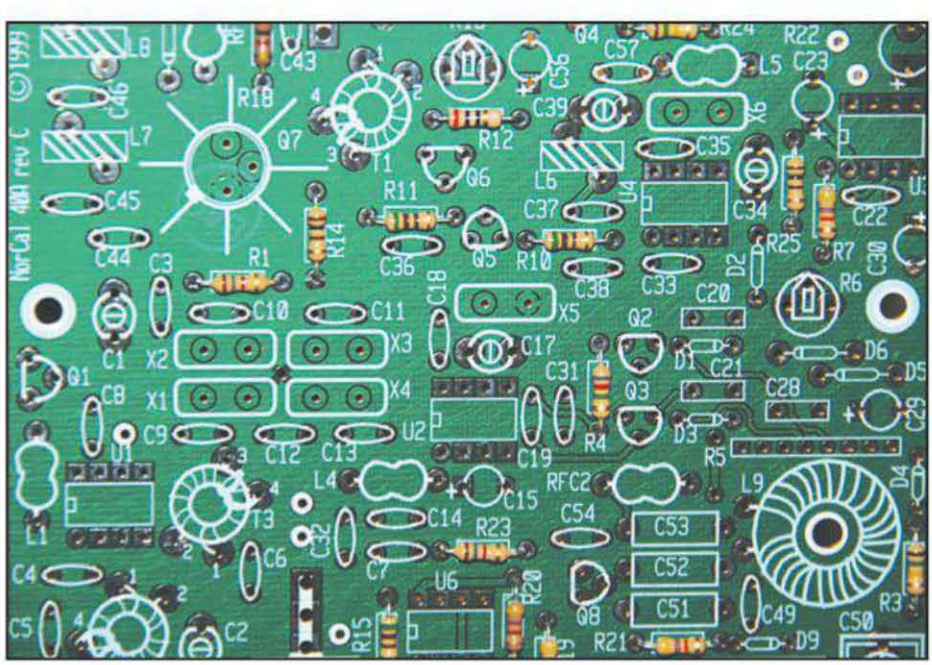
This is a picture of the NC-40A kit as it is unpacked from the box that "QRP Bob" of Wilderness Radio sent me. Everything is there. Now it's up to me to build it!

age, as there are other rigs with better performance parameters for nearly the same amount of money. I cannot subscribe to this line of thinking for several reasons. The most obvious reason that the NC-40A is still a viable kit in today's QRP market in that it is a *complete* kit, including case, knobs, controls, jacks, silk-screened front and rear panels, *and* it is all through-hole construction using parts that are still readily available. It's just what the budding homebrewer needs to cut his/her teeth. Should you take up the Wilderness Radio Project "challenge," you'll not only have a custom-tailored rig you quite literally can take anywhere, you can further enhance your CW skills and start enjoying a new facet of our ham radio hobby.

But First, Some Ground Rules

Before we start actual construction of our NC-40A, I need to establish some ground rules. First and foremost*: build the kit up stock*! This means as it comes in the box. Do *not,* I repeat*, do not* add "modifications" as you build. The reason should be fairly obvious: You need to ensure you have a working stock radio *before* adding mods/refinements to the design. If you decide to modify the radio set as you build and you end up with a non-working set, you really won't have a clue as to where to start troubleshooting to find the problem. Build it up stock, *then* modify. We'll cover some popular mods in part two, next month.

Secondly, *take your time*! Seriously, this is one area that cannot be overstressed: Do not succumb to the siren song to hurry the build to get it on the



A close up of the partially stuffed PC board (PCB). Eventually all those little holes will be filled and the radio will work! I promise!

"Sticky Zipper's" Soldering Tutorial

Often I forget that some of my readership has never held a soldering iron. Therefore, I present this down-and-dirty tutorial (with internet references) so you will gain some experience in soldering *before* you buy your NC-40A kit and plunge ahead homebrewing your shack.

Learning how to solder correctly is not all that hard. Contrary to popular belief, it is not some mystic right of passage that can only be attained at the stroke of midnight during the full moon on Hiram Percy Maxim's birthday!

Learning correct soldering techniques will enable you to build kits, modify electronic equipment, and repair your gear when the inevitable happens. Having said all that, where do we start?

Solder—an alloy mixture of tin, lead, and sometimes silver—has been used for decades to form a fusible junction to join two pieces of wire or to attach wires and/or components to a printed circuit board (PCB). Basically, the solder melts at a lower temperature than the metals it is being used to join/fuse together. The result is an electrical connection that will stand up to a lot of physical abuse and still allow electrons to flow. Solder is sold in various configurations. I prefer to buy my solder in one-pound rolls, which last several years even under heavy use.

Exactly how to we do this soldering thing? Simple: Using a soldering iron or station, capable of 15–40 watts output, heat the iron until it will melt some solder, and then place the tip of the iron on the circuit board and begin heating the area to be soldered. After several seconds, place a small length of solder (from your roll) onto the junction between the iron tip and the wire/component lead and allow the solder to "flow" around the joint. Remove the iron tip and allow the joint to cool. That's all there is to the mystical task of soldering. With some practice you'll soon be soldering like a pro and your kits/projects will reflect your prowess with an iron.

Now for a few refinements: First of all, use a temperature-controlled iron on your electronic circuits/kits if you can. Fixed wattage irons are OK, but a temperature-controlled soldering station allows precise control to make your soldering efforts more professional. The unit should allow temperatures to be set accurately between 190^{O} and 850^{O} F.

I recently purchased a brand new "no-name" temperature-controlled soldering station for $25 at a hamfest in Atlanta and it works fine. I bought this unit to take on the road so I wouldn't have to disconnect and box up the Weller WES-51 soldering station that I use on my workbench. The WES-51 costs $99.00 from Amazon.com (http://www.hmcelectronics.com/product/Weller/WES51). As an alternative, the Weller WLC-100 temperature-controlled soldering station costs only $45 from Amazon.com (http://www.hmcelectronics.com/product/Weller/WLC100?gclid=CNXYmOOj768CFc6R7QodWm5FHw) and will cover the 90-900O F (5–40 watts) temperature range. This latter unit is a very capable soldering station which I used exclusively for many years while teaching vocational electronics for a living.

Solder for electronics purposes should contain a small amount of "flux" in the solder to help meld the joint as the solder melts. *Do not, under any circumstances, use acid core (plumber's) solder on your electronic equipment!* Use only *rosin-core* solder. Your choice of solder should be limited to 60/40 mix (60% tin and 40% lead) in several different diameters. The smaller diameter solder should be used on miniature electronics, while the slightly larger diameter solder is for joining wires (as in antennas and ground systems) and mobile radio applications.

You also should have a damp sponge available on which to wipe off excess solder from the tip of the iron, as well as desoldering "wick" to help remove solder when you inevitably make a mistake, as we all do.

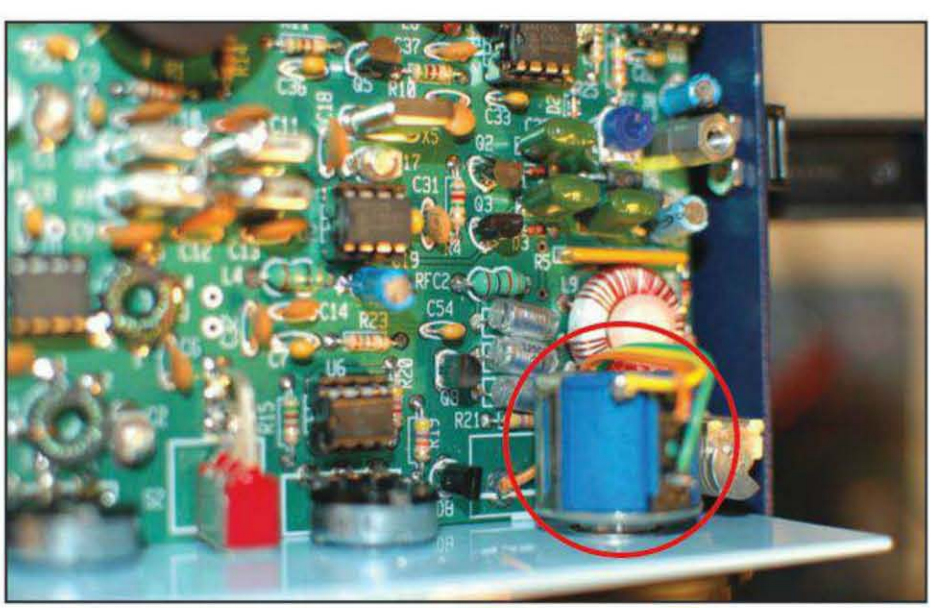
There are several internet sites that offer in-depth coverage on the subject of soldering. Among them are: <http://www.aaroncake.net/electronics/solder.htm>, and for you "You-Tube" folks <http://www.youtube.com/watch?v=xrVCkEoY_8M&feature=related> is one of the best I have seen!

So watch the videos, get help from more experienced friends if you can, and start out by practicing on random parts rather than a kit that you plan to use. You'll quickly get the hang of this soldering "thing" and will be off and running with your kit-building.—*K7SZ*

This is my workbench. It's "sorta' clean," meaning I can see the simulated wood-grain top of the bench! Actually, this is about as neat as it gets. The red pad is an anti-static pad that I use on which I use to build to prevent electro-static discharge (ESD) damage to components and circuit boards. Tools are arranged for easy access, and the yellow manual is on the right side of the building area. The big black "gun"-looking device is a desoldering gun, a must for removing soldered parts on a circuit board.

air and play radio. Take your time, correctly identify components, solder correctly (cold/poor solder joints are the number one cause of problems in kit radios), and be meticulous about checking off your progress in the manual. Keep accurate notes when it comes time to checking out a section of the radio before continuing with the build. It's your rig. Treat it right and it will provide you with hundreds of hours of enjoyment and fun on the bands.

Finally, have an "Elmer" on standby. Find someone in your local club or a nearby fellow amateur who will be willing to help you out should you encounter difficulties. One of the primary reasons I chose the NC-40A transceiver kit is that I have built a total of seven of them over the years, including an original NorCal Club kit, without any problems *whatsoever*! Each one fired up the very first time power was applied and the follow-on alignment was a snap, just like the book said it would be! That is repeatability of design and a prime prerequisite in attempting this project. Wayne designed a darned good radio set and QRP Bob kitted a great rig, so take your time and enjoy the build!



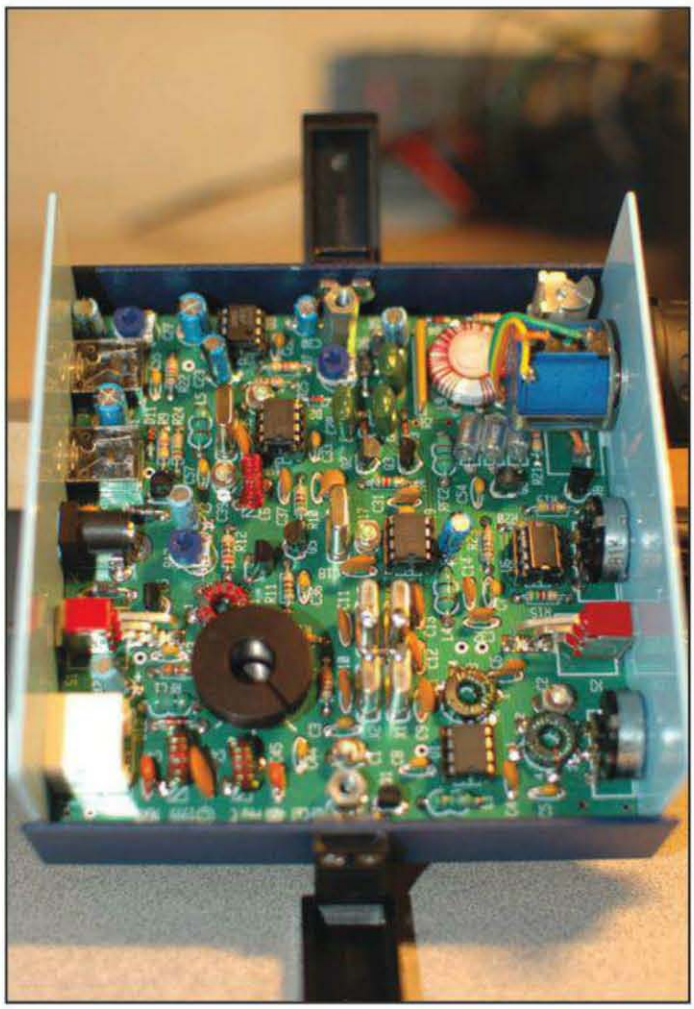
Close-up of the five-turn precision pot used in place of the stock 100K-ohm main tuning control. This precision pot allows precise frequency selection for proper zero-beat of incoming signals.

Don't forget, once you have a working NC-40A (you *did* align it, right? See tips in the next paragraph), take some time before thinking about "mods," and put it on an antenna and have some fun! Nothing like working a few Qs with a new rig to "break it in," if you get my drift!

NC-40A Alignment

Thankfully, when Wayne, N6KR, designed the NorCal 40, he did so with the majority of us QRPers in mind. One thing that he included is the ability to align the radio without an entire test bench full of high-priced test gear. Good on 'ya, Wayne!!

The manual for the NC-40A outlines several methods to align the radio with-



The top of the finished PC board just prior to initial check out. The only modification done at this time was the addition of the precision 5-turn 100K-ohm pot for the main tuning control.

out test gear. Using nothing but a shortwave or ham bands receiver (or transceiver) to spot your VFO frequency, it is a simple matter to align the VFO and then check the tuning range without the use of a frequency counter. Likewise, the receiver can be aligned simply by hooking the rig to a short piece of wire (or one of your antennas) and peaking the proper variable capacitors. The AGC is set "by ear" using a tuning tool or a flat-blade screwdriver as outlined in the manual. Power output can be peaked using an SWR/power meter terminated into a 50-ohm dummy load. Of course, if you have an oscilloscope with at least 10 MHz vertical bandwidth, you can use the scope to sample the RF obtained from the rig when terminated into a dummy load and applying the proper math. Or, by borrowing a long-time method from the Citizens Band folks, hook a #47 pilot lamp across the antenna port, key the transmitter, and tune the lamp for maximum brightness. Now, before all you electrical engineering types get all bent out of shape about this last method, let me gently remind you that this has been a long-established practice as a down-and-dirty way to tune up a transmitter. You will not get an accurate power reading from the lamp, but you *will* know that the transmitter is putting out RF, and then when you can get your hands on a SWR/power meter, you can refine the process a bit and get an actual power reading. Suffice it to say a very bright #47 lamp normally will indicate at least 4 watts output or more. As I said, the NC-40A is the "volksrig" of QRP.

OK, gang, that's a wrap for this session. Now you have time to get a NC-40A kit, assemble it (it takes about 10 hours), and get it running. If you follow directions closely and take your time, your rig will work right out of the gate. That is one of the wonderful things about this radio set. Next month we will go into the modifications for this rig, including sourcing out the mod kits and implementing them into the basic NC-40A platform. In the meantime, have fun and get ready for next month!

73, Rich, K7SZ

The finished NC-40A kit on the ops bench working some QRP contacts. This was the initial ops check of the new kit and it works great!

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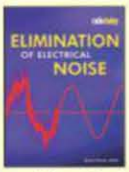

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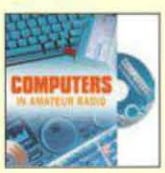

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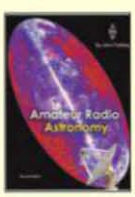

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kit-building

BY JOE EISENBERG,* KØNEB

A Pair of CW Filter Kits

Summer is here, and it affords a chance to take some of the projects we have been working on camping with us. With the summer months, storms often bring dreaded static, and summer contests bring out the QRM. Therefore, it is time to look at a pair of kits that can be of great help. Both of these kits take a unique path to CW copying Nirvana, and neither one is too expensive.

The CW Scrubber Kit

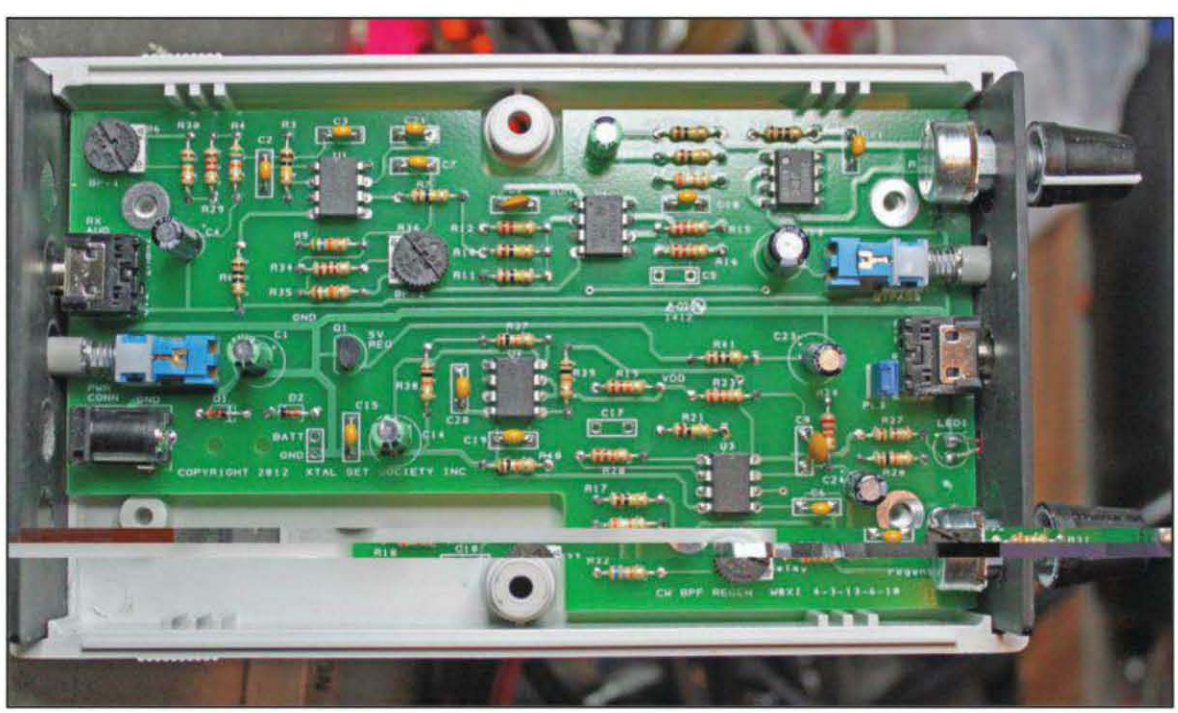
The first filter kit is produced by Midnight Science, also known for its great crystal radio kits. Designed by the founder of Kantronics, Phil Anderson, WØXI, this kit takes a novel approach to the problem of reducing unwanted noise and adjacent signals. Most filters are simply audio amps with the frequency response contoured to produce a limited bandwidth for the desired CW signal to be copied. Uncle Phil's "CW Scrubber" kit is different. This kit is similar to a regenerative receiver and takes the CW signal you have tuned in and reproduces it in your headset or speaker, minus most of the noises around it. By using regeneration and phase cancellation, most of the normal white noise present in most receivers is cancelled out, leaving mostly the CW signal. *(Watch for an article by Phil in an upcoming issue on how he combined 1920's regenerative technology with radio astronomy technology to create the CW Scrubber.—ed.)*

Building this novel CW filter kit is relatively easy and straightforward. Since this is not a stage-by-stage kit, I followed the directions and placed the resistors first, followed by the capacitors, and then the other components as directed. The kit comes with a very nice plastic case with knobs, and the board and the front and rear covers fit quite nicely. Sockets for the 5 ICs are not supplied, but if you want to add them, you will need five 8-pin IC sockets to fill the bill. If you are using sockets, be sure to be careful not to use too much solder, as some sockets are prone to wicking solder up into the pin sockets. When building, you may choose the option for internal or external power supply. The internal supply allows you to use one 9V battery, while the external power option allows you to use your regular 12VDC power supply, or two 9V batteries. All power jacks and plugs are supplied for both options, a real plus for this kit. A 1/8-inch plug is also supplied for use to connect the kit to your radio's audio output.

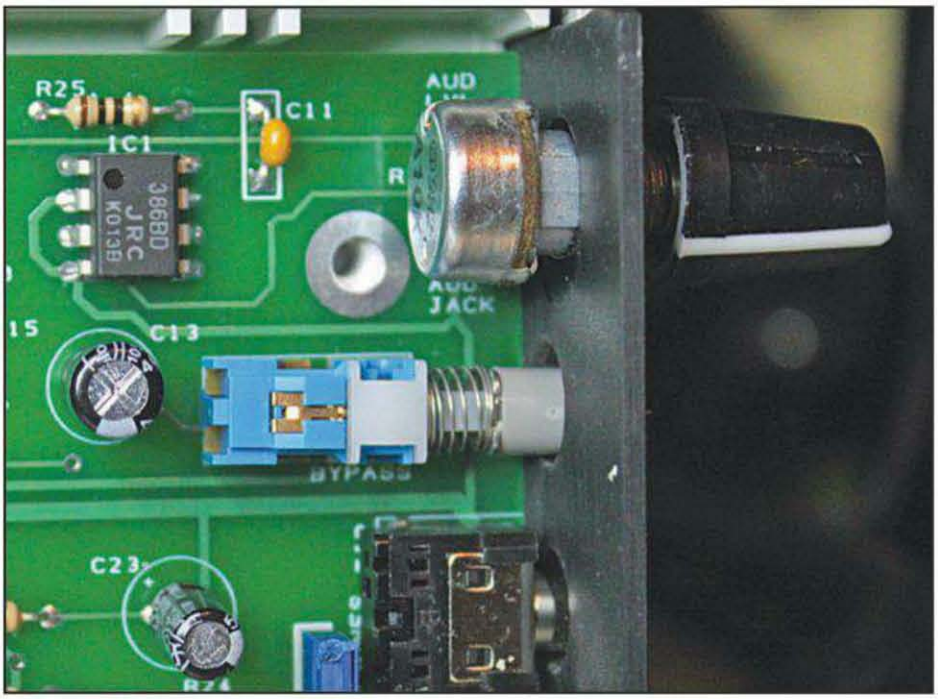
Alignment is a bit more elaborate than in many kits, so I recommend using an audio signal generator, or following the advice in the directions to use your HF rig to produce the 700-Hz tone needed to align the filter. A scope can be very helpful, too. No special tools other than a small screwdriver are needed to perform the alignment. There are three pots to adjust inside the kit and an audio gain and a regen control on the front panel. A bypass switch is provided on the front as well as a power switch on the back. It has a unique sound for a CW filter and is a fun build.

The CW Scrubber kit is available for $69.95 from Midnight Science at <http://www.midnightscience.com> . You can also order it at lower cost without

*7133 Yosemite Drive, Lincoln, NE 68507
e-mail: <k0neb@cq-amateur-radio.com>



CW Scrubber mounted in the case. Notice space available for internal 9V battery if desired.



CW Scrubber controls are all directly mounted on the board—no need for internal wiring.

Front panel of the CW Scrubber before controls are labeled.

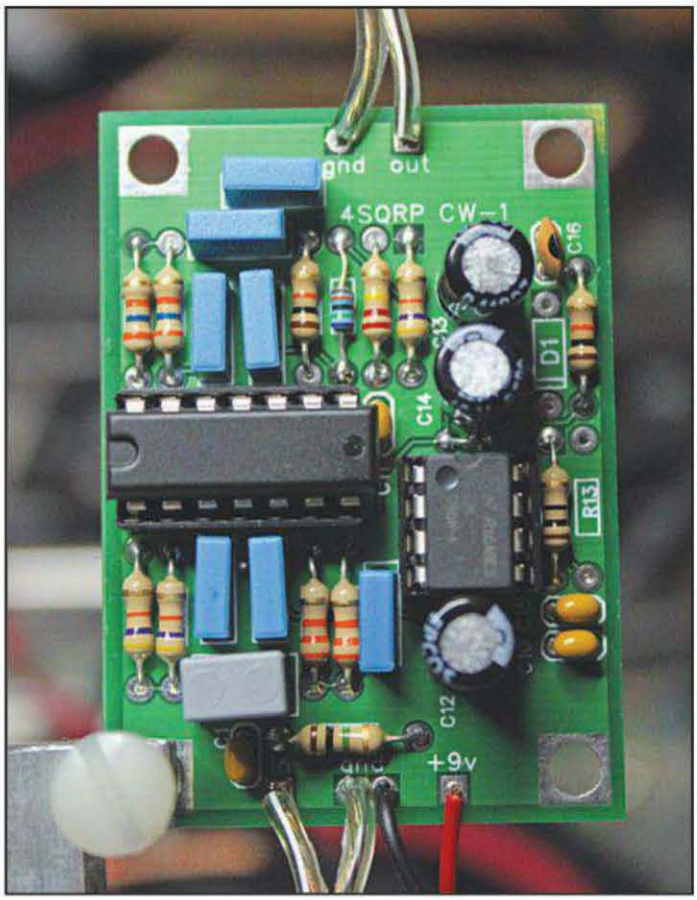
a case, should you want to incorporate it inside another project.

Four States QRP Group Hi-Per-Mite

The second CW filter kit is also quite useful and is designed to have the option to be incorporated into another radio project. This tiny filter is called the Hi-Per-Mite and is produced by the Four States QRP Group. Designed by David Cripe, NMØS, the filter can run on 5–12VDC and fits easily into an Altoids® tin or can be built in to another radio kit. The filter sports a bandwidth of just 200 Hz with no ringing! This kit uses multiple filters that are staggered to produce the desired effect.

Like the CW Scrubber, this filter is also centered on 700 Hz for optimal CW copy. Once again, no surface-mount parts are used and there are no toroids to wind, making this a very easy and fast project, even for a first-time builder. The kit was first introduced at the evening kit-building session at the Four States QRP Group's Ozarkcon 2012 in Branson, MO.

With just a small number of parts, construction of the Hi-Per-Mite goes quickly. The resistors are added first, followed by the capacitors, and then the semiconductors. This kit has a few options, as well. You can select from 0 dB to 50 dB gain for the circuit. This allows you to use the kit as the audio output stage of a homebrew or kit receiver and drive a speaker if desired, or provide just enough output for headphones. Therefore, this small kit can do double



Completed Hi-Per-Mite board.

duty as an audio output amplifier as well as a CW audio filter.

If you are looking for a great low-cost kit as an add-on to a project or for a group building experience, this kit is ideal. The build time is about an hour, and it makes a great addition to your portable kit radios. The Hi-Per-Mite sells for just $19 shipped in the U.S., a real bargain! No case is provided, but an Altoids® tin works nicely. To order this kit or look at the manuals and specs, go to <http://www.4sqrp.com> and click on Four States QRP Kits.

Why Do We Build Kits?

Finally, this question has been asked of me by non-hams who learn of my writing this column. They ask me, "Why do hams still build kits? Didn't that go away a long time ago?" My answer is this: The skills acquired by building kits pay off in a number of ways. The skill of soldering and electronic repair is useful in the vocational world for jobs such as manufacturing maintenance, two-way radio/cellular technical positions, fixing computers, and any number of other vocations. The other reason kits are still popular is because to have a new device commercially built and sold would so increase the cost that most of the fun things we make today from kits would be unaffordable. It is just not cost effective to manufacture things such as a QRSS beacon in the quantities needed for hams. Therefore, for us, a new device can be designed and sold at a very low cost to fellow hams who reap the rewards of both the skills learned and the bargain of lower cost. *(Reason #3: It's fun!—ed.)*

We are all grateful to those who take the time to design, assemble, and market kits to the amateur radio community. Until next month . . .

73 de Joe, KØNEB

SUCH A HAM

Mavis, if you give me any grief
I'll tell everyone on the air how old you are.

Goin' to the Faire

BY WAYNE YOSHIDA,* KH6WZ

Following up on KB3TAN's column last month about Maker Faires, KH6WZ shares his plans for participating in this year's big Maker Faire in California . . .the original and still one of the biggest gatherings of its type.—ed.

About a year or so ago while on a search for information on Arduino microcontrollers, I accidentally discovered something called the "Maker movement." The information on these hardware, software, mechanics, computers, art, music, sculpture, clothing, pyrotechnics—and in many cases—ham radio groups is so interesting, I wrote an article featuring a local "hacker space" in the May 2011 issue.

Oddly, however, just about all references to this Maker phenomenon consider this as something new. But as most of us ham radio folks know, the idea of making things is not at all new. This is very similar to the concept of "networking." An older young lady friend of mine made a great comment about networking once: She said, "Oh. We used to call this 'making friends.'"

The Maker movement is about going away from a "buy it and throw it away" sort of thinking to a "why buy it when we can make it" sort of thinking. this "making" refers to anything you can think of, from clothing and costumes to bicycles and cars, and in our case, radio communications equipment. Just as in ham radio, there is a great drive to make this concept an educational experience for children. This aspect of the Maker movement is something we need to add to the ham radio mix in order to help grow our next generation of hams. This is something that is gathering some traction in the ham radio world, and I am very pleased to see the new "Maker column" by Matt Stultz, KB3TAN in *CQ* magazine.

After examining the information on Makers, I quickly ran into something called the "Maker Faire," sponsored by *Make* magazine. The Maker Faire website describes this event as "A two-day, family-friendly festival of invention, creativity and resourcefulness and a celebration of the Maker movement."

The stars lined up in a strange and wonderful way for me last year: In a happy coincidence, my friend Dennis Kidder, W6DQ, had some free passes to the Bay Area Maker Faire. Unfortunately, the Bay Area Maker Faire crashes against several events I wanted to go to, including the Dayton Hamvention® and the Southern California EggFest (a serious BBQ event). Since the entry tickets were a great bargain, we were off to Silicon Valley for the Maker Faire. We had such a great experience last year that we decided we just had to create our own display booth and become true Makers ourselves. Besides, we got to meet Grant Imahara from the Discovery Channel show "MythBusters," and a famous female hacker named Jerri Ellsworth. The emcee at Maker Faire last year was Adam Savage, also from the MythBusters show. Savage is the emcee once again in 2012.

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Photo. 1– This is a picture of my full-duplex laser communicators under test in my dining room. Visitors will learn about full- versus half-duplex, pulse-width modulation and other concepts.

A Quick Look at Maker Faire 2012

As this is being written, I am under pressure of a tight deadline for this column, a hard disc crash, and trying to recover my data and getting displays and signage ready for the 2012 Bay Area Maker Faire in Santa Clara, California.

However, this also gives me a great opportunity to give you a quick review of my exhibit at Maker Faire. Our entry is called "Maker #7660: Not Your Grandpa's Ham Radio!"

This theme came about more as a form of an expression of my frustration when I mention ham radio to my non-radio friends and family. They always seem to think ham radio is an outdated, dying hobby that no one uses anymore, so this is a great way to show the Makers what ham radio operators are doing in the 21st century.

As I made plans for this display, I thought about the visits and tours I enjoyed when I was a kid, and the most impressive things I recall are the displays at the Museum of Science and Industry. I

remember all of the hands-on displays; it was okay to touch something to see it worked.

By the way, the California Museum of Science and Industry in Los Angeles was replaced by the California Science Center in 1998. It is one of the four institutions selected to receive a Space Shuttle Orbiter (the *Endeavour)* for permanent display.

Remembering how excited I was to see displays that actually did something, rather than those boring models or pictures that did nothing, I decided our exhibit must include things that visitors could touch and operate.

Our display includes a demonstration of an azimuth and elevation antenna-positioning controller using an Apple iPhone interface; an amateur television (ATV) system; GPS-related tracking devices (APRS), and microwave frequency transmitters and receivers (10-GHz-plus, including laser). Most likely that is not something with which your ham radio grandpa may have experimented. Visitors can make two-way contacts with other visitors within our booth as well as other ham radio booths at the Maker Faire, the surrounding community, across the state, and possibly around the world.

Photo 1 is my full-duplex laser communicator built from a kit of separate transmit and receive boards and using a diode laser pointer in the transmitter. It uses pulse-width modulation and its range is about a half mile.

In photo 2 you can see a 10-GHz transverter (in progress) by Dennis Kidder, W6DQ. It is based on a Kuhne Electronic transverter kit and many surplus microwave parts. Dennis's goal for this rig is to make it "modular" to simplify upgrades and repairs.

A 79-GHz transverter, built by Tony Long, KC6QHP, is shown in photos 3 and 4. Tony made this rig from surplus parts and machined many aluminum

"Maker Number 7660, Not Your Grandpa's Ham Radio!"

At the 2012 Bay Area Maker Faire:

Wayne Yoshida, KH6WZ: Full duplex laser communicator, 10-GHz transverter system, 1152-MHz and harmonics generator.

Dennis Kidder, W6DQ: HeNe laser communicator, APRS tracker and display, 10-GHz transverter system, Morse Code display and demonstration.

Brian Yee, W6BY: Apple iPhone controller, Spaceball antenna positioner, 10-GHz transverter system.

Mike Lavelle, K6ML: Vice president, 50 MHz and Up Group, 10 GHz transverter

Tony Long, KC6QHP: 10-GHz, 24-GHz, 47-GHz, and 79-GHz transverter systems.

Michael Pechner, NE6RD, and Michael Wright, K6MFW: Roving and stationary amateur television displays.

Photo 2– Dennis Kidder, W6DQ, is building this 10-GHz transverter system from a kit as well as surplus parts. The unit is "modular" to simplify upgrades and repairs. Frequency multiplication to the microwave bands, filters and transceiver basics will be taught with the microwave gear. (Photo by Dennis Kidder, W6DQ)

Photo 3– A pair of 79-GHz transverters will be shown by Tony Long, KC6QHP. It is housed in a surplus point-to-point wireless link chassis and dish antenna unit. (Photo by Tony Long, KC6QHP)

pieces for the chassis, tripod, and support system, and even precision waveguide passages for the 79-GHz RF.

Brian Yee, W6BY, built the "Spaceball" azimuth and elevation controller in photo 5 from a surplus dish antenna positioner and a home-built microcontroller interface. It is called a "Spaceball" system because the white, odd-ball-shaped mechanism is used for satellite-dish antennas.

An additional "static display" item appears in photo 6. It is a modified frequency synthesizer circuit board, modified to generate 1152 MHz. The frequency 1152 is very useful for

References

Arduino Microcontrollers: <http://www.arduino.cc>

Crash Space, a Los Angeles Area Hacker Group: 10526 Venice Blvd., Culver City, CA 90232; <www.crashspace.org>

"The Ham Notebook: A Different Kind of Place, A Different Sort of Club Meeting," *CQ*, May 2011, p. 70.

Jerri Ellsworth, also known as "Circuit Girl": <http://en.wikipedia.org/wiki/Jeri_Ellsworth>

Grant Imahara, from the Discovery Channel show "MythBusters": <http://en.wikipedia.org/wiki/Grant_Imahara>

Adam Savage, a Host on the "MythBusters": <http://en.wikipedia.org/wiki/Adam_Savage>

Make Magazine, 1005 Gravenstein Highway North, Sebastopol, CA 95472 USA; <http://makezine.com>

The Maker Faire: <http://www.makerfaire.com>

Bay Area Maker Faire 2012, Maker 7660: Not Your Grandpa's Ham Radio!: <http://makerfaire.com/pub/e/7660>

The California Science Center: <http://en.wikipedia.org/wiki/California_Science_Center>; <http://www.californiasciencecenter.org/>; 700 Exposition Park Drive, Los Angeles, CA 90037; Phone: +1-323-SCIENCE (+1-323-724-3623)

Diode Laser Communicator by Ramsey Electronics, LBC6K (two sets are needed for full duplex operation): 590 Fishers Station Dr., Victor, NY 14564; phone 585-924-4560; toll free: 800-446-2295; <http://www.ramseyelectronics.com/cgibin/commerce.exe?preadd=action&key=LBC6K>

Kuhne Electronic GmbH 10 GHz and Other Transverters: Scheibenacker 3, 95180 Berg / Oberfranken; Tel.: +49 09293 800939; Fax: +49 09293 800938; E-mail: <info@kuhne-electronic.com>; < http://www.kuhne-electronic.de/en/home.html>. Kuhne Electronic Products are sold in the USA by SSB Electronic: SSB Electronic USA, Mountaintop, PA 18707; phone: 570-868-5643; Fax: 570-868-6917; <http://www.ssbusa.com>.

Amateur Television by K6MFW:
<http://www.mfwright.com/atvsetup.html>

HamStack Microcontroller Project Platform by Sierra Radio: A ham radio-specific microcontroller interface and experimenters' kit. E-mail: support@hamstack.com; <http://www.hamstack.com/index.html>

The Microwave Group of San Diego (SDMG):
< http://www.ham-radio.com/sbms/sd/mgsd.htm>

San Bernardino Microwave Society (SBMS): One of the oldest ham radio microwave clubs, established in 1955; <http://www.ham-radio.com/sbms/>

The 50 MHz and Up Group: A San Francisco area experimenters' club
<http://www.50mhzandup.org/ >

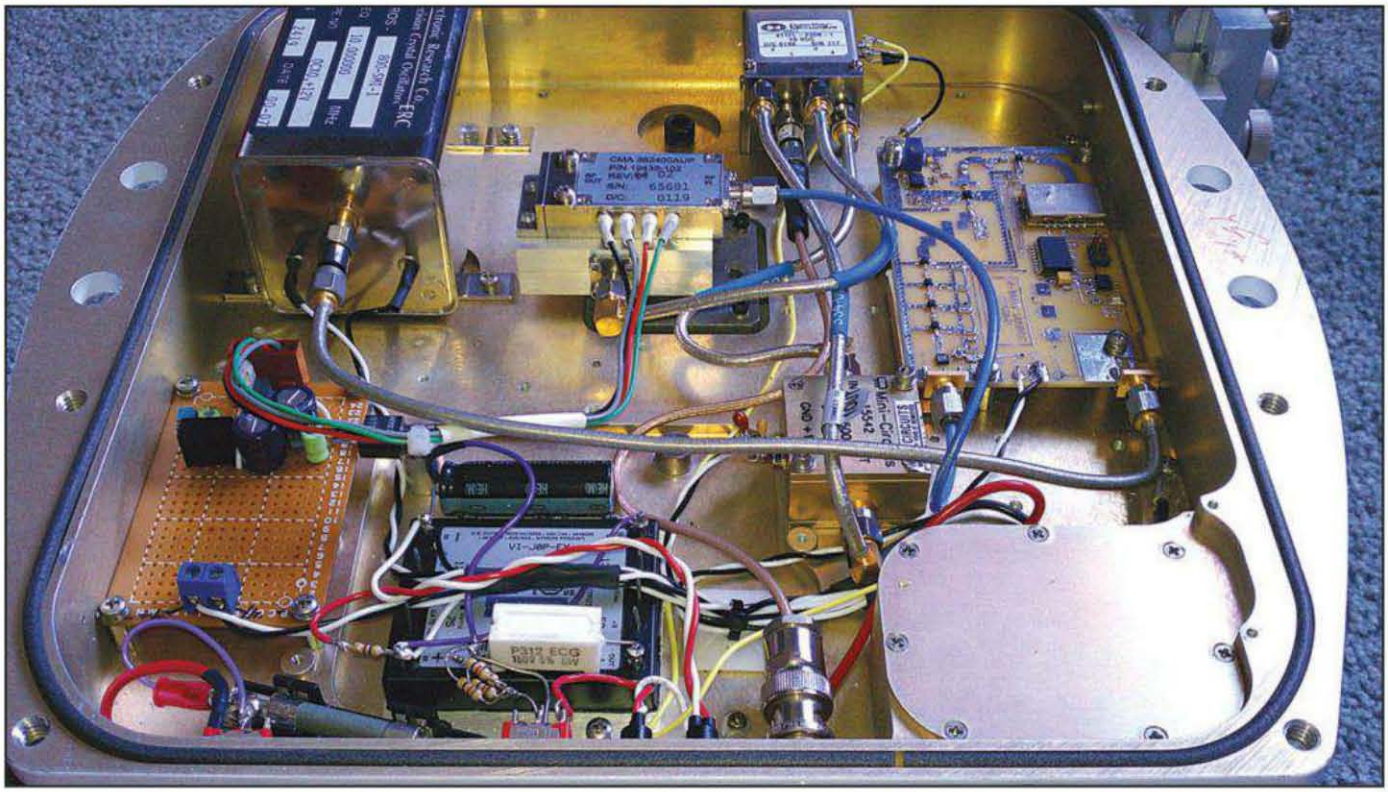

Photo 4– This is a picture of what a 79-GHz transverter looks like on the inside. It certainly does not look like something in grandpa's ham shack! (Photo by Tony Long, KC6QHP)

Photo 5– Brian Yee, W6BY, called his unit the "Spaceball." It is an antenna positioner unit for azimuth and elevation, controlled by an Apple iPhone. (Photo by Brian Yee, W6BY)

Photo 6– One of the few non-interactive displays in our booth. The "Magic 1152 Board" is a modified frequency synthesizer unit, generating 1152 MHz. This demo will describe the importance of and practical uses for harmonic radio energy.

microwave ham radio experimentation, because several harmonics fall into the microwave ham bands, and can be used to test system receivers. The second harmonic is 2304 MHz, the third is 3456 MHz, the fifth is 5760 MHz and the ninth harmonic is 10368 MHz.

In addition, there will be a Morse Code demonstration made by Dennis, W6DQ. Here kids can send and receive a Morse Code message with a straight key and they will earn a certificate to take home with them.

Each of these displays has a poster to describe what is being shown and a simplified explanation of the concepts used to make it work. For example, the 10-GHz rig is a great demonstration of frequency multiplication, local oscillator injection, and so on.

Being part of the Maker movement is an amazing ride. Maker Faire could be described as a giant hands-on playground where science, art, food, clothing, bicycles, fire, steam, electricity, and music all crunch together into one giant gathering. Let's mix this up a little and insert ham radio into this cornucopia of fun in *your* area Maker Faire!

73, Wayne, KH6WZ

The Young People are There

BY JEFF REINHARDT,* AA6JR

Ty Kastendiek is not a ham radio operator—yet. I may talk him into getting licensed someday soon. He might enjoy the hobby, but I have a deeper purpose.

For decades, hams have thought of ways to attract young people to the hobby. "Back in the day" the wonder of radio communications may have been enough by itself, hence the name of this column and its recurring theme. In other words, the "magic" worked on me and maybe it did for you, too. However, today's young people are beyond the "gee-wow" of radio communications. Many of them carry a smart communications device and use it incessantly. Want to send a text or e-mail to a friend in Europe? OK, done. Now what do you want to do?

Over the years, I have written that while ham radio is cool all by itself, it takes on even more charisma when combined with other elements. Some examples include ham radio + GPS = APRS. Or ham radio + disaster recovery = lives saved.

The Gift of Teaching

Ty is a very interesting story. Raised in Southern California, he came from a background where he could have taken any of several paths. One of his passions is sailing, and he's known to be a pretty good hand on a racing yacht. Smart. He has a gift for math. Better yet, he has the ability to teach it. He probably could have caught a job at any of the many school districts in and around L.A., or even at one of the more select private schools. He might have chosen to become an engineer.

Instead, Ty chose one of the toughest jobs there is. He teaches high school students who have been assigned to a special camp as the result of a tangle with the law. They're in custody, but the point of the program is to reshape these young men's lives into something with the promise of redemption and a normal life. Think your job is tough? The mean streets of L.A. have no shortage of troubled kids. Some have emotional issues, some were involved in gangs or drugs. Some were just in the wrong place at the wrong time. How they got to Ty's classroom isn't so much the issue; the issue is, they are there.

Last year, Ty came upon a program that offers Southern California high school kids an opportunity to learn some science, math, electronics, mechanical skills, and solar power and boating. The "Solar Cup" program had been running for eight years, sponsored by the Metropolitan Water District of Southern California. Schools that want to participate need to have a committed faculty advisor, some sponsorship, and a dedicated group of kids willing to devote over six months to the project. They must build a "seaworthy" boat from a kit, install an electric propulsion system powered by batteries, and rig the batteries to be charged by solar panels.

If They Build It, They Will Learn

Over the construction period, there are technical inspections and several checkpoints but the real "noodling" comes in deciding on drive configurations, calculating battery drain, optimizing solar panel output, and much more. On the culminating three days of competition, the boat is subjected to qualifying runs, two 90-minute endurance runs around an oval course, and finally two "sprints" of 200 meters run against the clock. In May, teams from all over Southern California converge on a remote lake to test their designs and skills in a spirited gathering of youthful energy, adult guidance, and camaraderie.

Ty's challenges are beyond those of most teachers. Boys come into and out of his classroom based on their status with the court system. Some boys lose their chance to participate because of misconduct. Other step in and take up the challenge in midstream. The one constant is the drive of their instructor. Some teams buy solar panels off the shelf. Ty's boys build theirs cell by cell, learning to solder and place them on a light-weight mounting board (weight is important). Along the way, they learn how to calculate the volts, amps, watts, series and parallel circuit designs, and more. They learn how to build a watertight craft. To save weight, they don't epoxy the hull; they apply a high-quality marine varnish that has the side benefit of looking pretty good, too. And how to communicate with the craft while it is in the water? Radio, of course. For this purpose, FRS is adequate, but I see it as a portal.

Ty Kastendiek (and an assistant) give direction to the (unseen) students working on moving their battery-powered craft. (All photos by the author)

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

Thirty-nine high schools took the challenge to build electric boats. Some may be the technology leaders of tomorrow.

Think ordinary students aren't interested in learning about technology? Show them a challenge and then give them the keys to finding the answers. This team from Oak Park, California wanted to be sure everyone knew the formulas for success!

Finally, how could the boys get to compete? They require constant supervision, which means probation officers would need to accompany them. Ty found a way to make that happen. The County of Los Angeles saw the benefits of the program, from the education program, the justice system, and even a judge. Finally, even the media cooperated; the boys' images and names could not be used but their story could. And it was quite a story, so much so, *The Los Angeles Times* covered their adventures in a general edition feature. In 2011, Ty's team finished second in the "rookie" division, and but for a failed electronic controller, they had a pretty good shot at first.

The L.A. Redemption

Beyond their maritime adventures, some tough kids were exposed to an entirely different world. They were fully accepted and respected by their fellow competitors. Teams helped competing teams. Kids from wealthy communities shared stories and experiences. Ty's kids went on a hike. They sat around a campfire with other kids their age and sang songs. They ate s'mores. Each of these was a first-time experience. Quite a contrast to life on the mean streets.

Ty's kids not only learn about technology; they are fighting a battle to turn their lives around. To capture tha goal, they designed their own team logo.

Fast forward to 2012. Ty's back with a new group of boys and the experience of the previous year.

No longer considered "rookies," even though Ty had an all new crew, they gave it their best—etter boat, better wiring, better drive configuration, and great solar cells . . . and more s'mores.

Speaking with the students, I asked what their experiences meant. A summary of their comments revealed they were impressed with the way teams helped one another. They were happy to be treated as equals and as friends. They were kids having a great time with other kids, but they were also proud of having learned new skills. One even wondered if he might be able to find a job in the growing solar-cell industry.

Wait 'til Next Year!

Ty's kids didn't finish at the top, but they were pretty competitive and placed very well in the final standings. However, this isn't about ultimate victory, it's bigger—much bigger. And Ty's mind is always working. How can we improve the drive? How can we find the "sweet spot" in the motor's output? Am I using the right batteries?

I have a year to convince him that getting his ham license, along with his students getting theirs, will get him off the crowded FRS frequencies so boat-to-shore communications can be more efficient. All of that connects right in with those power and electrical calculations, too.

Ty has a gift. He doesn't think so, but many others do. I can't add to his talents. I can only try to recognize them. But I think his efforts might be enhanced with a little "Magic In The Sky."

73, Jeff, AA6JR

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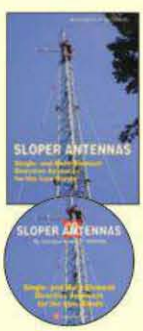

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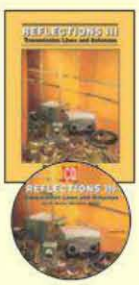

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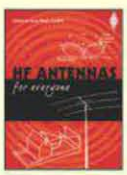

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BY JOHN WOOD,* WV5J

A Plethora of Diversity

It seems there's little logic in this month's list of new products that vary from a powerful new amplifier by our friends at Ten-Tec to new publications from some familiar publishers in our Book Corner. But they all are fascinating in their own way, so let's cut to the chase, 86 the clichés, and take a look at our collection this month of debuting amateur radio related products.

Ten-Tec's Newest Creation

The folks at Sevierville's amateur radio epicenter have apparently been extremely busy putting the final touches on their newest creation, a 160–6-meter solid-state linear amplifier that is capable of generating 100 watts of output power from as little as 5 watts of input, and they call it the Model 418.

According to the Ten-Tec press release the Model 418 "raises the bar for reliable and efficient recreational, emergency and even contest communications. Ten-Tec engineers have utilized state-of-the-art silicon MOSFET technology to create a continuous 100% duty cycle operations in both CW and SSB modes." Additionally, Ten-Tec says the Model 418 is also compliant with AM, FM, AFSK, and PSK modes of operation.

The amp itself has a relatively small footprint at 3.625 × 6.5 × 7.6 inches and weighs in at 5.4 lbs. Ten-Tec points out that the Model 418 will operate from any 13.8VDC (±15%), 20 amp power source.

Designed to interface with the new Ten-Tec Model 539 QRP Transceiver, they say the Model 418 amplifier can also be easily connected to most low power transmitter designs (20 watts or less input). The Model 418 can switch bands automatically or manually. It also has a two-position manual antenna switch. Bypass operation allows low power operation until higher power is needed. Ten-Tec proudly claims that the amplifier's user's manual and Ten-Tec's industry standard Technical Support Department make setup quick and easy.

The Model 418 uses a large LCD front panel readout to convey output power, SWR, operating voltage and operating temperature and is priced at $785. Ten-Tec says it expects to be able to ship Model 418 units by the end of July.

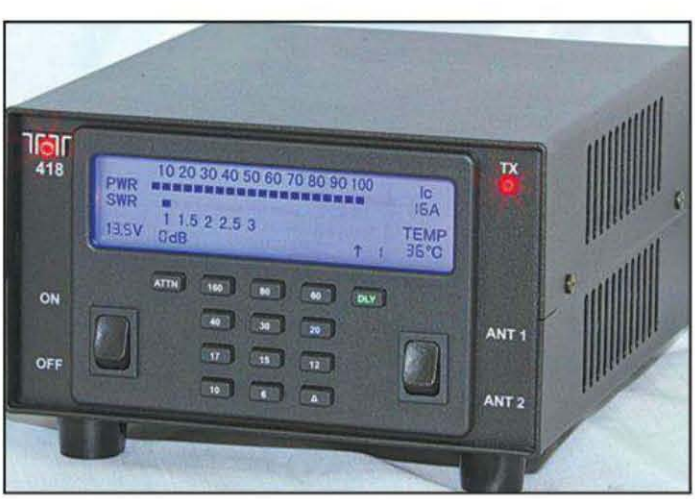


Photo A–The new Ten-Tec Model 418 is a solid-state linear amplifier for 160-6 meters that can be driven with as little as 5 watts. (Photo courtesy Ten-Tec)

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

FCCForms.com Can Help

Moving to a lower price point, <www.fccforms.com> is offering free assistance for amateur license renewals to individuals nationwide (excluding vanity call signs). They ask that applicants send along a $10 check made out to FCC Forms and say that 100% of money collected is donated directly to the organization. But if hams can't afford to make that donation, they will still provide the service.

"The response has been great so far," says fellow ham David Smith, KD7TYF, owner and founder of fccforms.com. "We have donated a lot to the Red Cross and I really enjoy helping fellow amateur radio operators get their paperwork in order and giving to a really great cause."

Smith plans on continuing the program for the foreseeable future. "We found that navigating the FCC's website and obtaining registration can be difficult for some. We saw a need and wanted to help."

Fccforms.com has provided a link for filing assistance on its website at <https://www.fccforms.com>. Hams need only to click on the renewals link, then the link for amateur (hams).

If need be, you may contact Smith by phone at (541) 508-0007 or by email at <david@fccforms.com>.

Pasternak Connectors

Pasternak Enterprises™ Inc., a leading ISO 9001:2008 manufacturer and International supplier of custom and standard RF, microwave and fiber optic products, has expanded its inventory of precision connectors for hand-formable, semi-rigid cable assemblies.

Pasternak Enterprises™ precision connectors are designed to fit onto 086 and 141 type semi-rigid and formable cable. These connectors are available in multiple types including SMA, N, TNC, MCX and MMCX type precision connectors. Frequency ratings for these connectors range from 6 GHz to 18 GHz depending on type and style. Precision connectors in straight and right angle styles are available for each connector type and mate perfectly with Pasternak's 086 type and 141 type formable, semi-rigid cable.

Pasternak's new lines of precision connectors are used to build its formable precision cable assemblies and Pasternak adds that they are 100% VSWR tested to their maximum frequency.

The SMA male connectors have stainless steel coupling nuts while the Type N and TNC connectors have nickel plated brass coupling nuts with a brass body and are 100% Hi-Pot and continuity tested.

Cable assemblies using the new precision connectors may be ordered using 086 and 141 formable semi-rigid cable with or without a black FEP jacket material and are available in standard lengths from 6 to 24 inches. Custom length precision cable assemblies are also available upon request.

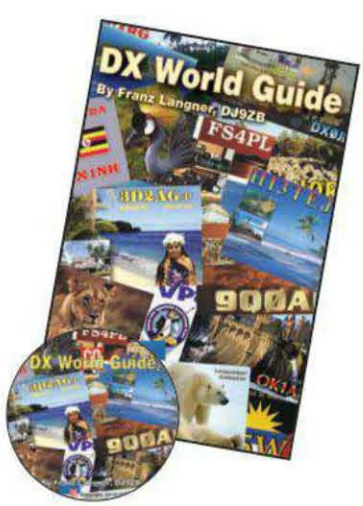
The new precision connectors for formable, semi-rigid cable assemblies from Pasternak are available now. You can view all of the various precision connectors and accompanying specifications on Pasternak's new website or by visiting its online digital catalog directly at <http://bit.ly/KjPf1l>. Pasternak Enterprises Inc. can be contacted at +1 (949) 261-1920.

OM Power

For the first time ever, OM Power amplifiers were to be on display at the 2012 Dayton Hamvention® at the Array Solutions booth cluster and that's because Array Solutions will begin selling the amps in the North American market.

Array Solutions is working closely with OM Power to produce versions of the company's amplifiers suitable for the North American market including FCC certification. All of the products have CE approval in Europe, and the first amplifier that will be offered is the model OM2500A. Array Solutions suggests that you visit the OM Power website at <http://www.om-power.com/ home> to see the many different products they currently manufacture. OM Power makes many other models of amplifiers and Array Solutions will be working with OM Power to make many of them available to the North American market. One of the early amplifiers to be introduced after the OM2500A is the first of a series of solid state VHF and UHF amplifiers, the OM 1002, a 1kW solid state amplifier for 2 meters.

CQ Introduces Full-Color *DX World Guide* In Print and on CD



CQ Communications, Inc., has announced the publication of the third edition of the *DX World Guide*, by Franz Langner, DJ9ZB. This 384-page DXer's guidebook is the first edition using color throughout and the first to be entirely in English.

The book includes entries for well over 300 DX "entities." Information includes geographical information about each country, WAZ and ITU zones, ITU callsign allocations and amateur prefixes. Each listing also includes a map and flag, plus information on the country's licensing agency and national amateur radio society. In addition, as appropriate, listings include call areas, IOTA (Islands on the Air) information and representative QSL cards.

The *DX World Guide,* 3rd edition, is available in both print and digital (CD) formats. It retails for $42.95 in print and $22.95 on CD. Orders are being accepted via the CQ Online Bookstore <http://store.cq-amateur-radio.com/StoreFront.bok> or by phone at (800) 853-9797.

The MFJ-902B Covers 80 through 6 Meters

MFJ seems to be pretty proud of its new MFJ-902B tuner that it describes as the world's smallest, full-power 150-watt 80-6 Meter antenna tuner. Priced at $109.95, it reportedly comes with an extra wide matching range that MFJ says lets you tune nearly any antenna.

"It's no toy, it's got guts!" proclaims the MFJ press release about the new MFJ-902B, probably because it's built with air variable capacitors (600 Volt, 322 pF) and three stacked powder iron toroids to handle respectable power levels of up to 150 watts—not just QRP.

MFJ says hams can use nearly any transceiver at full power with the MFJ-902B with nearly any coax-fed or random wire antenna for portable, home or mobile operation. The company says it's perfect for compact rigs like the Icom IC-706MKIIG, Yaesu FT-100D, Kenwood TS-50, QRP rigs and others with a built-in SWR meter. Consider operating anywhere, anytime, with a quick easy set-up and tune out SWR on your mobile whip from inside your car, or operate in your apartment with a wall-to-wall antenna or from a motel room with a wire dropped from a window or from a mountain top with a wire over a tree limb.

MFJ says its new model 902B antenna tuner is the world's smallest 150-watt tuner for 80-6 meters, and that it's perfect for use with compact rigs from many manufacturers. (Photo courtesy MFJ Enterprises)

MFJ says it's perfect for DXpeditions or Field Day—packs up quickly and takes up little space. Helps you be prepared for emergencies—this tuner and a wire antenna can be packed and set up just about anywhere.

The MFJ-902B is so small and handy, you'll find you rely on it wherever you go—easy to pack in your briefcase, suitcase, backpack, glove compartment, or desk drawer.

MFJ says it's tiny enough to slide in your back hip pocket! At $4^1/_2$W × $2^1/_4$H × $2^3/_4$D inches and a weight less than two pounds, that's probably possible depending on the size of your pocket.

And remember that the MFJ-902B, like all MFJ products, is protected by MFJ's well-known *NoMatterWhat*™ one year limited warranty that says MFJ will repair or replace (at its option) your MFJ tuner *no matter what* for one complete year.

To order an MFJ item, receive a free catalog, or for your nearest dealer, call 1-800-647-1800; write to: MFJ, 300 Industrial Park Road, Starkville, MS 39759; go online to <http://www.mfjenterprises.com>; or fax to: 1-662-323-6551.

DX Engineering Tilt Base Mount

DX Engineering tells us its new Tilt Base mounting plate enables you to raise or lower a vertical antenna in seconds while leaving the base securely attached to the mounting

DX Engineering's new Tilt Base mounting plate lets you raise or lower a vertical antenna in seconds. (Photo courtesy DX Engineering)

post. With the Tilt Base, one person can easily service an antenna which should put an end to climbing ladders, or removing brackets from a support post in order to reach your antenna elements.

Cut from 3/16-in. 304 stainless steel, DX Engineering describes this mounting plate as virtually indestructible. This tilt base conveniently mounts to the same mast that you use for the antenna and radial plate. Repair, tune, or lay your antenna down before bad weather hits with this new DX Engineering Tilt Base. Models of the tilt base now available include: the DXE-TB-3P for Hustler BTV; the DXE-TB-4P for Tilt Base Kit for ground mounted 1/4-wave vertical antennas including most Butternut, GAP, Hy-Gain and DXE verticals (model restrictions apply); and the DXE-TB-6P for Hy-Gain 14AVQ, 18AVQII.

Not sure whether your 1/4-wave vertical is compatible with one of the DX Engineering Tilt Bases? Contact DX Engineering's technical support for advice.

Priced from $62.50–$87.50 (V-clamps for pipe mounting not included), DX Engineering is the sole US supplier of this item. Optional wing nut knobs are available for tool-less quick release at $7.95 @ pair. For more information or to order, visit the website: <http://www.dxengineering.com>.

MFJ's HF/VHF/UHF/1.2-GHz 200/500/800 Watt Triplexers

Designated as the MFJ-4926S and priced at $59.95, this new MFJ product allows you to use HF, 6M, 2M, 440 MHz and 1.2 GHz antennas with a transceiver without a built-in triplexer, or use three different transceivers with one HF/VHF/UHF/1.2 GHZ antenna. It's made with a heavy-duty diecast enclosure that houses low pass networks that separate/combine HF/6M, 144/440-MHz and 1.2-GHz signals.

Ports are 50-ohm impedance and MFJ says these units handle 200, 500, and 800 watts PEP. The MFJ-4926S has SO-239 connectors and handles 800 watts. The MFJ-4926C has 12-inch coaxial PL-259 pigtails while the MFJ-4936S has SO-239 connectors and handles 500 watts. The MFJ-4946SN has both type N and SO-239 connectors. Prices range from $59.95 to $69.95.

A Matching Network for 43-foot Verticals

According to the manufacturer, the MFJ-2910, priced at $299.95, reportedly improves efficiency on 160 and 80 meters for the popular new 43-foot all band vertical antennas by eliminating SWR-related coax and unun mismatch losses.

MFJ reports that when fed with a 1:4 unun, the 43-foot antenna has a reasonable compromise SWR on 60-10 meters. However, at 160/80 meters it is virtually impossible

This illustration shows the process of lowering or raising a vertical antenna using DX Engineering's new Tilt Base mounting plate. (Photo courtesy DX Engineering)

to match this antenna because of the low radiation resistance.

MFJ tells us that if you are using low loss coax, you will lose power in the coax and unun due to bad antenna mismatches. Installed at the base of the 43-foot vertical, the MFJ- 2910 will significantly reduce these losses and put 160 and 80 meters back within the tuning range of the tuner inside the shack.

The MFJ-2910 includes a high-voltage insulated base tube along with a remote power injector with a switch for 160, 80 meters and off positions. It handles 1.5kW. The matching box is mounted in a rugged, weather-resistant PVC housing that measures 3W × 16H × 3D inches.

MFJ also has a new 600 watts 80/160 meter Matching Network, the MFJ-2908 priced at $249.95. It has all features of the MFJ-2910, but handles 600 watts. MFJ-2908 measures 3W × 11H ×x 3D inches.

Like other MFJ products, the MFJ-2910, the MFJ-2908, the MFJ-2910 and the MFJ-4926 series units are protected by MFJ's famous *NoMatterWhat*™ one year limited warranty. MFJ will repair or replace (at its option) your MFJ product *no matter what* for one complete year.

To order, receive a free catalog, or for your nearest dealer, call 1-800-647-1800; or write to: MFJ, 300 Industrial Park Road, Starkville, MS39759; or go online: <http://www.mfjenterprises.com> or fax to: 1 (662) 323-6551.

HAMQTH.com Website of the Month

Recently, *CQ* magazine received a note from Petr Hlozek, OK2CQR, of the Czech Republic letting us know that he had posted a new digital listing of amateur radio callsigns on his website at <www.hamQTH.com>.

Petr asked that we let hams know about this new listing that consists of 1,326,371 callsigns. That sounds impressive, but Petr also says he's added to the website: a CONDX prediction tab where you see the best time and band to contact searched station (made possible thanks to VOACAP online); a profile page you can edit with WAZ, ITU, UTC offset, latitude, longitude and continent fields added (some of them are filled automatically when you save it); a place where you can choose if the map should use latitude/longitude to point to your location or calculate it from you address (UTC offset, latitude, longitude and continent fields added also to an XML interface); a few optimizations to speed up XML search; your own profile editing improved; a new page especially for translators <http://hamqth.com/translate.php>; updated translations; and many more improvements and variations.

Petr adds that <www.HamQTH.com> is available in 14 languages and provides a very nice log search function with graphical statistics that can show you recent activity of stations you may be looking to contact.

It sounds to me that the website is worth a visit. If you agree, go to <http://www.hamqth.com> and see for yourself. To see more about Petr, visit <http://www.hamqth.com/ok2cqr>. A personal note from me to Petr: Thanks for all the work and 73, WV5J.

Book Corner

Some of the latest ham publications coming to market include a group from ARRL Publications and its *ARRL Repeater Directories*, *Hints & Kinks for the Radio Amateur* and *Short Antennas for 160 Meter Radio*.

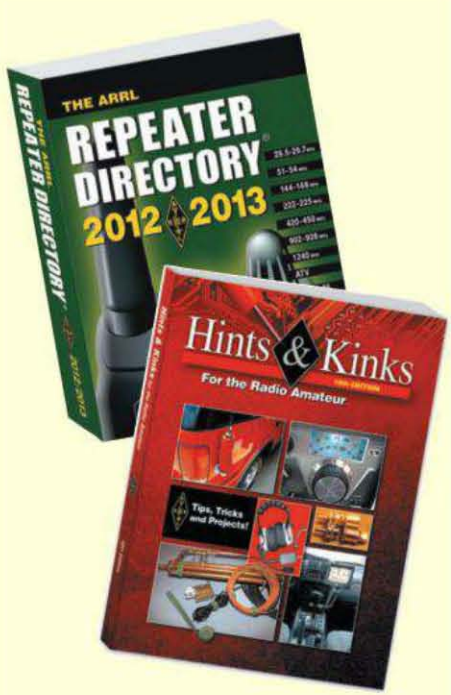
The newest *Hints & Kinks for the Radio Amateur* is the 18th edition ($22.95) and it's filled with some of the best ideas for the ham shack drawn from the monthly column of the same name. If you're looking for an evening or weekend project or a solution to a problem, you might find it in this collection of eight years of problem-solving tips and projects.

If, on the other hand, you're looking for a repeater in Dayton, Ohio, you could use a copy of the *ARRL Repeater Directory* 2012/2013 Edition, now available in one of its two forms—pocket-sized ($12.95) or spiral-bound ($17.95).

Projects are also found in *Short Antennas for 160 Meter Radio* ($22.95). Top-banders are always looking for a short antenna to make operating on 160 meters possible or to improve their signal so they'll be glad to know that inside this book, they'll find easy to follow instructions for building a variety of designs ranging from inverted cone to spiral antennas, all for their favorite frequencies.

All of these publications, as well as all ARRL Publications, are available on the Web at <www.arrl.org> or by calling 1 (860) 594-0200.

That wraps up another "What's New" column, so until next month, thanks for reading and 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.*

Party Up with APRS

BY JOE LYNCH,* N6CL

A vast majority of balloon launches use latex balloons. However, Bob Bruninga, WB4APR, the father of APRS, wanted to try something different for his students' balloon launches: Mylar party balloons. His students are midshipmen at the U.S. Naval Academy in Annapolis, Maryland.

On March 29, Bob and his midshipmen launched the first of their party balloons at sunset. The goal was unbelievable (!): see if the balloons would fly around the world. Unfortunately, within a few hours of launch the 10-meter beacon's signal was lost in the noise.

Undaunted by the limitations of his first launch, on April 27, Bob and his midshipmen launched another party balloon. Insofar as success goes, tracking this one was complete throughout its much shorter lifespan, and the recovery of the payload was accomplished.

Even more important, however, was that this launch considerably advanced the learning curve for future launches using party balloons. Here is a summary of the launch as posted on the Southgate Amateur Radio News website: <http://www.southgatearc.org/news/april2012/amateur_radio_party_balloon_success.htm?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+AmateurRadioNews+%28Southgate+Amateur+Radio+News%29&utm_content=Yahoo%21+Mail>:

The Party-Balloon Launch

By Bob Bruniga, WB4APR

Having now flown two party-balloon missions, I am happy with the results compared to Latex® balloons. The missions are very different profiles, but they meet our educational goals quite well. Here are some thoughts. I am not a balloon expert (this being only my third attempt in 20 years), so take these opinions with your own grains of salt.

A three-inch-diameter party balloon unfilled (on line) costs under $2.00. Therefore, making a five-balloon launch costs about $10 for the balloons.

Mylar® balloons have a high mass to lift ratio, so all of these launches are *low altitude* missions. Even with zero payload, the *maximum* altitude is around 25,000 feet, where the full balloon can only support its own weight no matter how many balloons are used.

Our first mission was an extremely small, a 50-gram payload, with HF oscillator and some CW telemetry, attempting a 10-day around the world flight. Because it went over the Atlantic Ocean, toward Africa, who knows what happened to it. You could hear the 100-milliwatt transmitter only within line-of-sight distance (about 100 miles).

Helium loss through Mylar appeared to be around 1% per day compared to higher rates through latex.

Mylar balloons are an order of magnitude less vulnerable to UV rays, which will almost always burst latex after several hours' exposure at high altitude.

Mylar balloons are fixed volume. They get to a fixed height, where they are over-pressure and remain there (unless they burst).

Below 10,000 feet, temperatures are not an issue with electronics compared to the –60 degrees C temps for the typical high-altitude balloon flights.

I used clear plastic bottles for the enclosure. The temperature inside the bottle remained high due to solar heating. Even at 8000 feet, the temperature never got below about 40 degrees C. We have to use water-proof containers, because of all the bay and waters around our launch site (the U.S. Naval Academy at Annapolis, Maryland).

This second mission used a full APRS system, with GPS and 2.4-GHz wireless camera using the Byonics MT-TT4 all-in-one APRS circuit board. The weight for all components, including water-proof bottle container and chute, came in under 0.6 pounds.

With these Mylar constant-pressure designs, extreme care must be used in under-filling each balloon exactly the same. Any balloon that is slightly higher than the others will rise to a higher pressure and will be the first one to burst.

The jury is still out as to whether a long duration mission is possible. Ours will always go immediately to the Atlantic, and at the low altitude, will take days to reach anyone in Europe. Our last went headed for Africa, where no one was listening.

A ballast release mechanism is required for long duration flights. We attempted a clever block of ice (sublimation mass loss), but do not know if it worked, because no one (that we know of) reported hearing it in Africa.

The amount of over-pressure at equilibrium altitude is equal to the amount of excess lift. Therefore, it is a difficult balance: Too little lift and you need an extremely large launch area. Too much and you are sure to burst.

VHF Plus Calendar

July 1	Moon perigee
July 3	Full Moon
July 11	Last quarter Moon
July 13	Moon apogee
July 19	New Moon
July 20–21	CQ WW VHF Contest. See text for details
July 26	First quarter Moon
July 26-28	Central States VHF Society Conference. See text for details.
July 28	*Southern Delta Aquarids* meteor shower peak
July 29	Moon perigee

—EME conditions courtesy W5LUU

*e-mail: <n6cl@sbcglobal.net>

In fact, with a modest excess-lift on our intentional short duration mission, maybe there will always be a *first to pop*, as in our case. Even so, this situation was perfect. The loss of one balloon gave an almost balanced up and down profile. Therefore, there was no need for a chute.

The bright-red multiple balloons (all full, except the shredded one) make for a highly visible descent and recovery. If we had cut the payload loose, then the chances of finding a clear plastic bottle with nothing around it but a tiny chute would have been one percent of the success of finding four waving balloons!

Observing this aspect of our choice of bright-red Mylar party balloons, we thought about maybe using multiple string cutters for our next mission to control descent by cutting loose balloons. However, cutting loose only eliminates about half the mass as letting one burst. When it bursts, it loses lift, but the mass (nearly half the total lift) remains with the payload making descent better.

Therefore, maybe the plan next time will be to slightly overfill one balloon to assure a first-to-pop, and therefore have an automatic descent! Still, we will have a payload cutter just to make sure we can release before the Atlantic!

Finally, the abuse that these party balloons can tolerate is an order of magnitude greater than Latex. We launched in a 20-mph wind! After walking all five balloons from the classroom, across a road and through a narrow chain-link fence gate in that 20-mph wind (three times!), they survived.

One of those three trips was because just prior to release, I noticed the transmitter was still transmitting all three packets at a 10-second rate! We had to bring it all back indoors, cut loose the payload, go reprogram it, and then reassemble and go do it all again!

With multiple balloons, we fill a spare, so that if one bursts, we can quickly tie in a replacement in the field. If they all survive getting to the launch point, then we release the spare to see exactly where the winds are going so we can find the best spot to clear the 100-foot high light posts surrounding the field.

Photos of this last mission are at: <http://aprs.org/balloons.html page>.

New EME Website

As an outgrowth of the May 15 Swedish EME conference, the following URL has become active: <http://www.moonbouncers.org/>. The purpose of developing this website is explained in the following report from that conference, which is reprinted here:

• To promote EME, and CW EME in particular, it is important that we advertise our activities and hand out appetizers as much and as often as we can.

• Appetizers in the form of putting the Arecibo dish (or similar large arrays) on the moon are of great value but we can also do a lot by announcing different activities in a common meeting place. Today such information is scattered around a number of websites so if we could agree on one common URL where people could go to find out more about EME things would be easier for newcomers.

• Such a website should also host general information about EME; receivers, transmitters, antennas, procedures etc. Plenty of material is certainly available on the web today, but again, on many different URL's. If this some of this material could be used, with permission from the authors, setting up a generic EME website full of excellent information would not be a big challenge.

• Adding an EME Calendar where events, activities and expeditions could easily be presented will help VHF/UHF

columnists around the world to spread the news in their magazines. This is an important factor when promoting EME to a wider audience. We cannot simply rely on email reflectors like Moon or Moon-Net, these channels are too narrow banded as they are mainly contain people who are already well established in EME.

• Another important factor when opening a general website promoting EME is to keep it free from different opinions about operating that have been splitting the community in recent years. The information presented should be free of biasing and the website should not be a forum for discussions.

ONØEME Moon Beacon

The following is from the May 2012 issue of the "432 and Above EME News" (http://www.nitehawk.com/rasmit/eme12_04.txt):

Eddy Jespers, ON7UN, sends news that a new 1296 EME Beacon is now QRV: Many of the active 1296 stations have noticed a signal at 1296 sending "de ONØEME" four times followed by ten seconds of pure carrier and twenty seconds of silence. What they are hearing is an automatic station tracking the Moon. It is QRV when the Moon is >10° at its location.

The idea started in Orebro, Sweden during the EME meeting in May 2011. A discussion was going on how to promote our hobby. One of the ideas was a beacon transmitting a signal to the Moon to encourage people to try receiving EME signals. On our way back, HB9BBD, ON4BCB and I discussed the possibilities. We found that we had a lot of the needed hardware already.

We initiated a search for a suitable location, started the process of obtaining the required high power license, and began to build the station. After about 11 months of intensive work, the baby was born, and ON0EME was transmitting in the direction of the Moon.

ONØEME's total EIRP is about half a megawatt. The antenna is a solid 3.7m dish. The system is completely automatic. The beacon starts when the moon is on the east side +10 degrees, by turning the antenna from the point where it stopped the last Moon pass (Moonset at +10°).

The frequency is GPS locked at 1296.000 with an accuracy of 3×10^{-11}. The timing is also GPS controlled. The beacon will start transmitting at the minute. The amplitude of the signal is constant within ± 0.2 dB. Antenna pointing is updated every 0.4°.

We have complete remote monitoring and control of the beacon with indication of voltages, power and temperatures. Users can check the operational status and beacon parameters at <http://www.on0eme.org>. You can immediately see if the beacon is active. Reports have been received from some small stations receiving the beacon.

Please post reports on "moon" or the "moon-net" reflectors. The beacon is located in the north of Belgium and has good Moon visibility at both high and low declination for the complete Moon pass.

Current Contest

CQ WW VHF Contest: This year's CQ WW VHF Contest will be held 1800 UTC July 21 to 2100 UTC July 22. Complete rules can be found on *CQ*'s website: <http://www.cq-radio-amateur.com>.

Current Conference

This year's **Central States VHF Society Conference** will be held July 26–28, in Cedar Rapids, Iowa, at the Clarion Hotel and Convention Center, which is located at 525 33rd Avenue, SW , Cedar Rapids, IA, US, 52404. For more information, please see: <http://www.csvhfs.org/>.

Meteor Showers

This month there are a number of minor showers. The *Piscis Austrinids* is expected to peak July 27. The δ-*Aquariids* is a southern latitude shower. It has produced in excess of 20 meteors per hour in the past. Its predicted peak is around July 29. The α-*Capricornids* also is expected to peak on July 29.

For more information on the above meteor shower predictions see Tomas Hood, NW7US's Propagation column. Also visit the International Meteor Organization's website:<http://www.imo.net/calendar/2012>.

And Finally . . .

Next month is the EME 2012 Conference in Cambridge, England. More information can be found here: <http://www.eme2012.com/>. The British hosts are planning a great presentation. Hopefully, we will have more about the conference in a future issue of this column.

If you would like to see your story in a future issue, or in an article in *CQ VHF* magazine, please contact me at: <n6cl@sbcglobal.net>.

Until next month . . .

73 de Joe, N6CL

awards

BY TED MELINOSKY,* K1BV

Awards You Can Earn with Ease

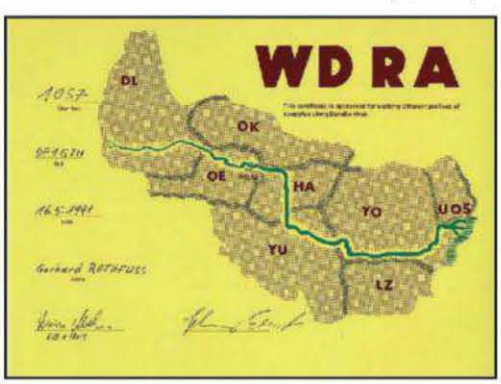
The goal this month is to present a few awards that are not very difficult to achieve and can be earned with even a modest QSL collection. They are attractive certificates, and most are issued by national organizations that will be around in the foreseeable future.

The first is from the Vienna District of the OVSV. This is just one of a very nice series of awards it offers, and you might want to check out the internet link (see below) to look them over. Both the requirements and costs are modest.

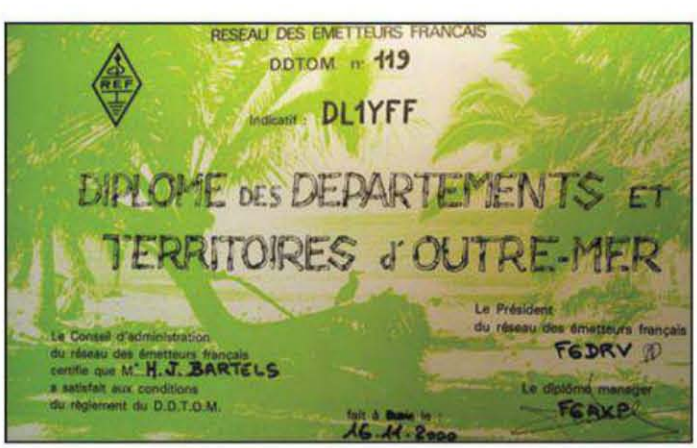
Worked Danube River Award

This award is sponsored by Austria's Vienna District of the OVSV, the national amateur organization of Austria for contacting stations in countries that border the Danube River. Contacts should have been made on or after 1 January 1958. All bands and modes accepted. SWL OK.

Requirements: Fifteen DL, seven OE (one must be OE1), two OM, five HA, three YU, three YO, two LZ, one ER, two UR, and one 9A station—for a total of 41 contacts. The award fee 5 Euros, $US5, or 5 IRCs. GCR list OK. Apply to: OVSV LV-OE1, Diplomreferat, Eisvogelgasse 4, A-1060 Wien, Austria; <http://www.darc.de/distrikte/s/diplome/stadt-pirna-diplom/>.



Sponsored by Austria's Vienna District of the OVSV, the national amateur organization of Austria, this award is for contacting stations in countries that border the Danube River.



The D.D.T.O.M. award is offered by the French National Association (REF) and requires contacts from French Overseas Departments and Territories.

Diplome des Departments et Territories d'Outre-Mer Award

The D.D.T.O.M. award is offered by the French National Association (REF) and requires contacts from French Overseas Departments and Territories. These administrative units are fairly easy to work, except for Reunion, which exists in the extremely tough to contact and operate from French islands such as Glorioso, Europa, Tromelin, Juan de Nova.

Contact (SWL) and receive QSL cards from amateur radio stations located in each of the following French Overseas Departments and Territories (a total of 9 QSLs) starting 1 January 1982:

1. French Overseas Departments

FM Martinique

FG Guadeloupe (including St. Martin, St. Barthelemy)

FY French Guyana

FR Reunion (plus Glorioso, Europa, Tromelin, Juan de Nova)

FP St. Pierre & Miquelon

USA-CA Special Honor Roll

Michael D. Orr, NC4MO
USA-CA All Counties #1224
April 3, 2012.

Ralph W. Wiley, WB4FFV
USA-CA All Counties #1225
April 13, 2012.

USA-CA Honor Roll

500

LZ2RS 3569
NC4MO.....3570
MUØGSY 3571
WB4FFV 3572
LW3DG.....3573
PR7CPK 3574

1000

NC4MO.....1828
WB4FFV 1829

1500

NC4MO.....1538
WB4FFV 1539

2000

NC4MO.....1423
WB4FFV 1424

2500

NC4MO.....1339
WB4FFV 1340

3000

NC4MO.....1250
WB4FFV 1251

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

Gary Beam, K4EXT
USA-CA All Counties #1222

I was first licensed as WN9WZV in 1968 while serving time as a high school sophomore in Indianapolis. Later that same year, I passed my General exam and became WA9WZV. My first station was a Johnson Adventurer 50-watt transmitter and an Army surplus BC-348 receiver. Soon to follow was an EICO 753 AM/SSB/CW transceiver kit. Later rigs included a lot of QRP and QRPp stuff, including the Heathkit HW-8 and Kenwood TS-130V transceivers.

I operated 100% code for nearly 25 years. In the beginning, it was straight-key CW. Later I managed to grasp the swing of a bug. In the 1970s, I built my first electronic keyer using TTL ICs. In the early 1980s, I made my Commodore VIC-20 computer crank out some serious Morse code in between games of Centipede and Gorf.

My original license expired in 1995. I was too busy playing work slave and raising a family, I guess. In 2002, I re-tested again along with both of my sons (Josh/KG4VBJ and Justin/KG4VBK). Soon thereafter I "vanitized" myself back to WA9WZV ... but then later "re-vanitized" myself to K4EXT.

I started serious county hunting in the spring of 2007 with a barefoot Icom 746Pro and a simple wire antenna. Initially I was only working counties on CW, but I eventually realized that getting on SSB would make the process of working all counties a lot quicker.

My son Justin, KG4VBK, installed an Icom 7000 and Tarheel 200A antenna in our SUV so that we could go out and run counties. I still remember operating mobile for the first time in August 2007; being the "hunted" for a change was quite a rush!

We still manage to get out mobile every once in awhile, running counties in northeast Tennessee, western North Carolina, and southwest Virginia. We take our time, park in a county or on a county line. Justin runs it on CW, and then I run it on SSB. We also make a point of enjoying the awesome Appalachian Mountain sights and snapping digital images of the picturesque scenery.

In late 2009, I volunteered to be the Historian for MARAC, the Mobile Amateur Radio Awards Club. I also do a monthly column in the MARAC "Roadrunner" newsletter called "History Happens," whereby I try to shed a little light on past MARAC happenings, county beginnings, and how fellow county hunters got started in ham radio and county hunting.

In late 2011, I was closing in on USA-CA 3077 but had myself convinced it was going to take a long time to get the last counties. However, I ended up working eight of my last ten countries within a five-week span. That left Columbia County, Oregon and Hancock County, Tennessee as the final two needed counties.

Terry, WQ7A, added Columbia, OR to his county list for a scheduled run through Washington state. I was pretty worried about this one working out, though 90 watts and an inverted Vee antenna are not the best gear to be using when the band conditions are far less than ideal. On November 10, 2011 Terry and I worked each other on 17 meters SSB for the next-to-last county. Whew!

Gary Beam, K4EXT, USA-CA All Counties #1222.

For a while I had thoughts of doing something special for county number 3077. Jeffrey, AF3X, from Knoxville, even suggested that a bunch of area mobiles meet in Hancock County, TN to finish me up and then celebrate in person. It was getting close to the snow season in the Tennessee mountains, though, so I eventually decided to keep things simple.

On December 15, 2011 Wes/NX4C from Knoxville made a special trip to get me Hancock County, TN for the proverbial Whole-Ball-of-Wax—i.e, county number 3077. We made contact on 40 meters SSB, with Dan, KM9X, as a witness. It was great to be able to breathe normally again!

Overall, it took about four and a half years to finish, although I did take a couple of six-month time-outs along the way. I managed to pretty much keep up with confirming the counties via QSL or MRC, but keeping all of the cards organized was a different matter. Percy, KA1JPR, lit a fire under me in early March of 2012 to get my cards organized and checked, and my application for the USA-CA top award was soon on its way.

There are lots of folks to acknowledge for their help in allowing me to reach a goal ... way too many to name individually, though. Thus, I simply will say thank you to all of the mobiles, net-control and assistant net-control stations, spotters, and fellow county hunters. It's been quite a ride!

73, Gary, K4EXT

2. French Overseas Territories

FK New Caledonia (including Chesterfield, Pins, Huon, Loyalty)

FH Mayotte

FW Wallis Futina

FO French Polynesia (including Marquesas, Gambier, Tuamutu, Clipperton, Leeward Group, Windward Group, Austral).

Manager's e-mail: <f6job@aliceads.fr>.

DLD Awards

Literally hundreds of awards are available from German clubs and organizations. Germany is probably the most prolific issuer of awards in western Europe. The majority of these are beautiful, well designed, colorful reminders of the history, geography, and industry of the German people. The national organization, the Deutscher Amateur-Radio-Club (DARC), plays a very important role by supporting a network of clubs in each province, including a high-quality QSL Bureau service. Part of this organizational effort is issuing to each affiliated club a District Location Code (DOK) number consisting of a letter for the province and a sequential number (for example, A-04, X-23, etc.). This number plays a key part in applying for DARC awards, as the rules for almost always require contacts with stations that are members of the clubs. German stations are excellent at including this identifier on their QSL cards; look through your card collection.

The DLD Award is an official award of the DARC which is available to all licensed amateurs and SWLs. All members of DARC and its associate club VFDB , as well as club stations of both organizations, are issued a DOK. To qualify for DLD, applicants must submit QSL cards from licensed radio amateurs showing a certain number of DOKs worked—or for SWLs, heard.

A list of DOKs can be found at <http://www.dk8dg.de/dokliste.html>.

DLD Award Classes and Modes:

1. DLD is issued separately for each amateur band.

2. DLD is issued in different classes on each band as follows: DLD 100, DLD 200, DLD 300, DLD 400, DLD 500 (with lapel badge), DLD 600, DLD 700 DLD 800, DLD 900, and DLD 1000 (with engraved badge of honor).

3. For SWLs the awards are known as DLD-SWL 100, DLD-SWL 200, etc ., up to DLD-SWL 1000.

4. All DLD awards may be issued for mixed modes, or may be endorsed for single mode operation, providing this is supported by the necessary QSL cards.

Conditions of Issue:

1. All modes permitted by the applicant's license may be used.

2. The initial award is for 100 different DOKs on a single band. For each additional 100 DOKs on the same band, the applicant may apply for the next class of DLD. Applicants may skip levels, such as going from 100 to 400.

3. A DOK will only count if the station worked/heard is located in the Federal Republic of Germany at time of contact. Stations only have one DOK and give out only the number with which they are registered with the DARC QSL Bureau. Special Event DOKs will be published in *cq-DL Magazine*.

Applications for DLD:All valid DOKs are listed in the official DOK list (see above) and is used as the application form. A computer-generated list will be accepted, providing it uses the same format as the application form issued by DARC. It is recommended that you use a separate list for each band.

Fee for DLD100, 200, 600–900 = 10 Euros or $US10. DLD300–500 with lapel pin = 13 Euros or $US13. DLD1000 with engraved lapel pin = 16 Euros or $US16. Applications must be verified by the applicant's local club or an official Award Manager. Apply to: DARC, DLD-Diplome, Lindenallee 4, D-34225 Baunatal, Germany. Internet: <http://www.darc.de/referate/dx/diplome/dld.en>.

Contact (or hear) and receive a QSL from a station in each of the 10 call areas of Japan. To earn the All Japan Districts Award.

The DLD Award is an official award of the DARC which is available to all licensed amateurs and SWLs.

All Japan Districts Award

Even a modest QSL collection will probably contain cards from each of the ten call areas of Japan, and that's about the only requirement for this very popular JARL award. *Wikipedia* states that Japan has an amateur population of over 1.2 million. That's twice the number of licensees in the United States. Thus, while quite a few of them are low power and "shack on the belt" stations, even a modest effort will find a QSL in your collection.

Contact (or hear) and receive a QSL from a station in each of the 10 call areas of Japan. Available to both amateurs and SWLs. GCR list accepted. Fee of 12 IRCs, and an additional 2 IRCs will be charged for airmail. All contacts must be made with land stations within the same call area, or if no call area exists, within the same country. Apply to: Japan Amateur Radio League – Award Desk, 1-14-5 Sugano, Toshima-ku, Tokyo 170-8073, Japan; e-mail: <oper@jarl.or.jp>; Internet: <http://www.jarl.or.jp/English/4Library/A-4-2_ Awards/Award_Main.htm>.

We are always interested in learning of new awards for publication in this column. Please contact me at the e-mail address on the first page of this column with details and a sample of your certificate. 73, Ted, K1BV

BY CARL SMITH,* N4AA

DX Around the World

Although I had not planned to go to Dayton this year, I found it would be possible to go for at least a short time. I wasn't able to make it into the Hara Arena, but did go to the DX Dinner on Friday evening, and was honored by being inducted into this year's CQ DX Hall of Fame. It doesn't get better than that! I was able to see a lot of you there and had a great time, too.

Then there's the W4DXCC convention September 28–29, and with it being less than 100 miles from my home, I can make that trip without a problem. If you are not familiar with the W4DXCC VIII event, check it out at <http://www.w4dxcc.com/>.

I must also make note of the 60th anniversary of the W9-DXCC Convention in Chicago on September 15th. They always put on a good program and this year will be no exception; see its website at <http://www.w9dxcc.com>.

DXpeditions of Note

The surprise operation by an international group from the Yemen island of Socotra as **7O6T**, from April 30 to May 15, left a lot of folks smiling. The really good news is that the operation was approved on May 5th, along with approval for the 6O3A operation from Somalia. Excellent operators and very good signals on most bands made it possible for a large number of DXers to put 7O in their logs. After barely a week of operation they had logged 75,000 contacts with 21,000 unique callsigns.

In the last issue, following the operation by Darko, J28AA, I mentioned Somalia would be having another operation in November by the Intrepid DX Group. Since then I1YSB released the following:

6OØCW Humanitarian DXpedition 07–18 May 2012. The members of the Italian DXpedition Team, after the donation of an ambulance to the Galkayo Medical Center and an absence of six years from Galkayo, return to the country for helping again the Somali Red Crescent Society. The same team operated from Somalia in 2005 with the callsign 6OØCW and 2006 with the callsign 6OØN, putting in the log about 25,000 QSOs in the first case and about 35,000 QSOs in the second one.

We ask those who have already worked us during one of these DXpeditions to not work us again on the same bands/modes, thus giving more

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e-mail: <n4aa@cq-amateur-radio.com>

The country of Mayotte issued this stamp on December 31, 2011. It probably will be the last stamp issued before the country resumes the use of French stamps. The interesting feature of this stamp is the ship. It is the Antarctic research vessel Marion Dufrense*, which has been used by a number of DXpeditions. (TAAF is the French acronym for the French Southern and Antarctic Territories). Thanks to Steve, K6UM, for providing the picture and information.*

Chip, K7JA (c), with CQ magazine, presents WAZ certificates to Antonio, EA5RM (left) and Paul, N6PSE (right), at the International DX Convention in Visalia in April. (Photo courtesy of Bob, N6TV)

Antennas installed on rooftop on Socotra Island for 7O6T. Photo from <http://www.yemen2012.com>.

opportunities for those who have not previously worked Somalia. Thanks for your cooperation.

See the website: <http://www.i2ysb.com>.

Obviously this will happen even before this is published , so I won't know more until next month.

XX9E, Macau. The website <http://www.adxg. org/xx9/> tells us that a primarily Spanish team of 10 operators will be on the air from 17 to 23 May 2012 from IOTA AS-075 (Coloane Island OL62SC).

The team includes EA5BZ, Ruben Navarro (Team Leader); EA5CEE, Pasqua Navarro; EA5HPX, Eugene Mosiychuk; EA7FTR, Francisco Liañez; EB7DX, David Liañez; EA1ACP, Jose M. Delgado; EA5FX, J. Fernando Conde; EA6DD, Biel Maimó; EB5BBM, Jose M. Molero; and F5VLY, Adrian Green,

They listed "Assistants" as EA1DVY, Carlos Almazan; EA3HCJ, Gerardo Otero; and EA5IK, Miguel Espinosa. The Pilot will be EA2RY, Roberto. QSL via EB7DX and LoTW.

T6 Six-Meter QSO. On April 23, 2012, Eric, K9GY/T6MO reported making his first T6 six-meter QSO. And a *first* it was, too. T6MO logged VK6KP on 50.110 CW followed by an SSB contact. The distance between them was around 5,000 *miles*. Eric says he was just leaving for lunch when he heard some CW and stopped to listen. The QSO resulted, and he didn't mention if he had lunch that day! Eric was using an FT857D at 100 watts and an OCF dipole antenna about 35–40 feet above the ground. He also said he was expecting to be able to make Dayton in May, so perhaps you got to meet him there. Congratulations to both Eric and VK6KP.

STØR. In case you had not heard, the STØR DXpedition to South Sudan was honored as the DXpedition of the Year at the International DX Convention at Visalia in April.

Koji, JI1LET, likes to go to Ogasawara. Here is his antenna farm at home. See QRZ.com for more photos of his impressive setup. (Photo courtesy of JI1LET on QRZ.com)

The WPX Program

CW

3282	VO1CV	3283	JM1RAU

SSB

3125	N2RJ	3127	KB1HNZ
3126	VO1CV	3128	I5REA

Mixed

2200	N2RJ	2201	VO1CV

CW: 400 JM1RAU. 1400 NXØI. 2900 OZ5UR. 3400 W8IQ. 6150 WA2HZR.
SSB: 400 KB1HNZ. 750 N2RJ. 1200 NXØI. 1450 I5REA.
Mixed: 1050 N2RJ. 1900 NXØI.

160 Meters: VO1CV, I5REA
80 Meters: VO1CV, I5REA
20 Meters: N2RJ, VO1CV, I5REA
17 Meters: I5REA
15 Meters: VO1CV, I5REA
12 Meters: I5REA
10 Meters: VO1CV, I5REA

Asia: VO1CV, I5REA
Africa: VO1CV, I5REA
Europe: VO1CV, I5REA
Oceania: VO1CV, I5REA
North America: VO1CV, I5REA
South America: VO1CV, I5REA

Award of Excellence: VO1CV
160 Meter Bar: VO1CV

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, NN1N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, TF8GX, S58MU, UX1AA, AB1J, DM3FZN, AG4W, UA3QNS, RX3AGD, WB5JID, LY3W, LY5W, RW4WZ.

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, DM3FZN, AG4W, UA3QNS, RX3AGD, LY3W, LY5W.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage for airmail) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will now accept prefixes/calls which have been confirmed by eQSL.cc. Other electronic QSL confirmation means are not accepted.

*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are $6.50 each.

5 Band WAZ

As of May 1, 2012, 881 stations have attained the 200 zone level and 1774 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
OE5FIN

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

K8JRK, 199 (26)	K8PT, 199 (26)
UWØLT, 1999 (2 on 40)	N8AA, 199 (23)
N4WW, 199 (26)	IZ1ANU, 199 (1)
W4LI, 199 (26)	IN3ZNR, 199 (1)
K7UR, 199 (34)	IK4CIE, 199 (1)
IK8BQE, 199 (31)	JK1BSM, 199 (2)
JA2IVK, 199 (34 on 40)	EA5RM, 198 (1,19)
IK1AOD, 199 (1)	EA5BCX, 198 (27, 39)
VO1FB, 199 (19)	G3KDB, 198 (1, 12)
KZ4V, 199 (26)	JA1DM, 198 (2, 40)
W6DN, 199 (17)	9A5I, 198 (1, 16)
W3NO, 199 (26)	G3KMQ, 198 (1, 27)
RU3FM, 199 (1)	N2QT, 198 (23, 24)
N3UN, 199 (18)	OK1DWC, 198 (6, 31)
W1FZ, 199 (26)	W4UM, 198 (18, 23)
SM7BIP, 199 (31)	US7MM,198 (2, 6)
N4NX, 199 (26)	K2TK, 198 (23, 24)
EA7GF, 199 (1)	K3JGJ, 198 (24, 26)
JA5IU, 199 (2)	W4DC, 198 (24, 26)
RU3DX, 199 (6)	F5NBU, 198 (19, 31)
N4XR, 199 (27)	W9XY, 198 (22, 26)
HA5AGS, 199 (1)	KZ2I, 198 (24, 26)
N5AW, 199 (17)	W9RN, 198 (26, 19 on 40)
JH7CFX, 199 (2)	W5CWQ,198 (17, 18)
K7LJ, 199 (37)	UA4LY, 198 (6&2 on 10)
RA6AX, 199 (6 on 10)	JA7XBG, 198 (2 on 80&10)
RX4HZ, 199 (13)	JA3GN, 198 (2 on 80&40)
S58Q, 199 (31)	N4GG, 198 (18,24)

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

IØGKP (194 zones)	W7JY (170 zones)
DL5DNO (157 zones)	OE5FIN (200 zones)
ER1LW (170 zones)	UWØLT (199 zones)
VE2TZT (196 zones)	

5 Band WAZ updates:

N7YUS (200 zones)	K8VFV (190 zones)
EA5RM (198 zones)	K8JRK (199 zones)
N4GG (198 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>.

PYØS – St. Peter & St. Paul Rocks logs. Cesar is doing a great service for DXers. He has managed to collect the logs from many of the operations from "the Rocks" and enter them into a computer to upload to LoTW. He reportedly told OPDX: "I just uploaded to the LoTW a portion of the 1991 PYØSR operation. I've received ZYØSA and ZYØSB logs from the 1987 operation and am waiting for PWØPP and PY1RO from the 1978 operation. The latter ones have already been mailed. The two DXpeditions are quite interesting for low-band DXers, as I have noticed 160-meter QSOs in the 1978, 1987, and 2001 operation only."

Nepal & 9NØMM Memorial Club Station

Satish, 9N1AA, has been busy traveling, including a one-week trip to Washington, D.C. in late April to attend a conference. Unfortunately, he did not have much spare time. Equipment being donated to the 9NØMM Memorial station continues to arrive at N4AA. Several accessory items are on hand now, and I'll be collecting more before packing it all up to send along to Nepal. I am pleased to be a part of the effort to help Satish and all of those new licensees in Kathmandu in an effort to get them on the air. A nice 6-meter Yagi antenna was donated and has already been received in Kathmandu. You can look for more, better 6-meter activity from there with the InnovAntennas Yagi.

An update from Sam, 9N7AK (KØYAK), in early May says:

"There's been some recent movement on radio here in Nepal. Around 20 Nepalis have now obtained their licenses this year and I had the privilege of spending time with several of them, as well as Rob Rowlands, NZ6J, doing some

Rob, NZ6J (c), doing some VHF/UHF testing with new licensees Jimee, 9N1GJ (l), and Nisha, 9N1NS (r). (Photo courtesy of Sam, 9N7AK/KØYAK)

VHF/UHF testing. We also did an EchoLink demonstration last night and are talking about establishing an IRLP link. The new hams are also keen to get into HF. Satish and I can help with that.

The attached picture (*see it in this column*) is Rob along with new licensees Jimee, 9N1GJ, and Nisha, 9N1NS. They're about 21 km from the repeater site, talking with Surya, 9N1SS, via the repeater and simplex with various power levels on VHF/UHF.

Satish is just back from a trip to DC. He brought the secretary of the Ministry of Information and Communications on a field trip to HRO in Woodbridge!

The WAZ Program

6 Meters

109 .....SP3RNZ (26 zones)

20 Meters SSB

1206 .....W7JVN
1207 .....JH1OGT
1208 .....AI6Z

10 Meters CW

203.....HA5WA

12 Meters CW

67 .....PY2YP
68.....S55ZZ

15 Meters CW

347 .....JH1OGT

17 Meters CW

87 .....PY2YP

30 Meters CW

109 .....PY2YP

40 Meters CW

287.....SP2FWC
288 .....IV3IYH
289 .....VE2TZT

40 Meters RTTY

001 .....N5ZM

160 Meters

403.....VE3LYC (33 zones)
404 ....F5OHS (40 zones)

160 Meter Updates

K8GG.....(40 zones)

All Band WAZ

Mixed

8901 .....DS5ANY
8902.....RA3AH
8903 .....ER1LW
8904 .....RA9OO
8905.....UT7UV
8906.....K6HRT
8907 .....JA7GZM
8908.....K4JC

SSB

5213 .....W7FYW
5214 .....KD4EUH
5215 .....GM4SSA

CW

682.....HA6IAY
683.....JA5NSR
684 .....K7QBO
685.....W6DR

RTTY

229.....N6BM

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 most exciting news at the moment is that Kathmandu now has a repeater. I've posted details here: <http://9n7ak.wordpress.com/2012/05/08/nepals-first-repeater-9n1ks-145-000434-500/>."

Swain's Island

Plans for the September operation from Swain's Island (NH8S) continue to firm up.

Operators and support team members include: AA4NN + XYL, DJ7JC, DL3DXX, DL9RCF, I8NHJ, K5AB, K6MM, K9CT, K9NW, KB8OCP, N1DG, N2TU, N4HH, N4XP, N6HC, NA6M, ND2T, NI6T, SM5AQD, W4BUW, W6KK, W6XA, W8CAA, W8GEX, W8TN, and WB9Z.

Here are some comments from Joe, W8GEX:

"Swains is a privately owned island and the only way to get there is from American Samoa via ship. The time frame of this operation may not be the best for the low bands, but dates are dictated by transportation and weather. The team of international operators will first gather in Honolulu and then travel to American Samoa together. Landing permission has been granted for the tent and generator operation by the owner for this timeframe.

"The website, <http://www.nh8s.org/>, was developed by team member John, K6MM, who will update it frequently before and during the operation as new information becomes available. There are no communication systems on Swains, but logs will be uploaded daily via satellite phone. Later, the group will also have an OQSL link on the website for easy QSLing.

"All equipment must be sent from the US via cargo ship in June. Location, transportation, island costs, and other logistics make this a costly trip. Therefore, donations are very much appreciated. Just click the "Donate" button on the website for more information.

"We want to thank ICOM, who will be supplying IC7600s for our use. Thanks also to Joe, AA4NN, who will be the QSL manager, and to Carl, N4AA, of *The DX Magazine* who will sponsor the log search."

So until next time, here's hoping you are working all that good DX and Having Fun!! 73, Carl, N4AA

CQ DX Awards Program

SSB

2585.....W4YTB
2586 .....K4JC

CW

1132 .....HA6IAY
1133 .....DL7EDH

RTTY

59.....N4MM

Endorsements

SSB

FG4NO .....150 MHz

CW

HA6IAY ..... 150 & 3.5/7 MHz

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, Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604. We recognize 342 active countries. 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.

The CQ DX Field Award Program

Mixed

124.....W9RPM
125 .....RZ3EC
126.....RA3NAN
127 .....OK1ADM

CW

66 .....HA6IAY

RTTY

57.....AB1J

Endorsements

N5KE.....150
VE3ZZ.....214
HA1RW 239
HA6IAY..100 & 3.5/7MHz

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, Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. Please make all checks payable to the award manager.

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, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604.

Mixed

K2TQC.....273	VE3ZZ.....214	K8OOK 198
W1CU 244	VE3ZZ.....207	N4NX 192
HAØDU 240	JN3SAC.....207	ON4CAS.....191
VE7IG 240	HA5WA 206	HA9PP.....190
HA1RW.....239	F6HMJ 206	BA4DW.....188
VE3XN.....234	KF8UN 205	HB9DDZ 188
HA5AGS 228	OK1AOV.....205	K2AU 183
9A5CY 227	RW4NH.....203	K2SHZ 182
N8PR 224	N4MM 202	K1NU 180
HA1AG.....218	W4UM.....202	W5ODD 177
KØDEQ 216	IV3GOW 201	NØFW 176
K8SIX.....215	NI6T 200	
W6OAT.....215	N5KE 200	

SSB

W1CU.....224	KØDEQ.....192	JN3SAC 177
W4ABW.....202	N4MM.....186	NØFW.....176
VE7SMP.....193	W4UM 184	DL3DXX 175

CW

DL6KVA.....233	JN3SAC 202	N4MM 179
W1CU 233	W4UM.....197	N4NX 177
DL2DXA.....209	OK1AOV 196	N7WO 175
KØDEQ 207	HB9DZZ.....186	
DL3DXX.....203	OK2PO 184	

QSL Information

706T via UA3DX
C91JD via GI4FUM
DL25ØCOAL via DK8VR
EG8WFF via EA8URL
EM5ØISI via UT5SI
EM67QN via UT3QN
EO1HFF via UY1HY
GQ4PYE via MØOXO
GS6PYE via MØVFC
HB6ØRF via HB9DDS
HG3IPA via HA3JB
HZ1NM via IZ3CLM
JD1YBT via JP1IOF
JY8VB via UA4WHX
K4A via N4PJ
KP4ED via EB7DX
LZ9Ø7SKB via LZ1KCP
MQØOXO via MØOXO
OK2RRR via OK2RZ
OZ/DL1BWU via DL1BWU
PY0FM via PY5XX
RP67IB via RK3DXW
RP67KE via RW9QA
RP67S via RV3LZ
RP67SO via RW3ZC
RP67ZZ via UA1ZZ
V63QFL via JH3QFL
YL44WFF via YL2SW
YU/S5ØHH via S5ØHH
ZW7R via PR7ZAJ

(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>.)

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

6469 .....9A2AA	4307...WA5VGI	3628 .SM6DHU	2922 ..OZ1ACB	2116 .....AE5B	1722 ..VE6BMX	1116 ....YU7FW	707 .W1/E74OF	UA3LMR/QRP
6177 .....K2VV	4290 .....I2PJA	3540 ..KC9ARR	2820 .....W3LL	2192 .....N2SS	1667 .....SQ7B	1066 ...JA1CKE	684 .....FG4NO	620.....PI4DHV
5797 .....W1CU	4228 .....N6JV	3515 .....N8BJQ	2544 ....W6OUL	2106 .....KØKG	1655 ....SV1DPI	976 .....KM6HB	682.....AI8P	616.....DL5JH
5303 .....9A2NA	4187 ....KØDEQ	3330 .....9A4W	2530 ....YO9HP	2084 .WD9DZV	1593.....S55SL	964 .....K8ZEE	662.....JA7OXR	600.....IK1RKN
5142 .....EA2IA	4173 .....W9OP	3305...JH8BOE	2499 .....VE6BF	2004 ....W2FKF	1463.....NE6I	815 .....KL7FAP	653 .....KK3Q	600 ...KB9OWD
4785.....N4NO	4129.....S58MU	3238 .....K1BV	2493 .....I5RFD	1954 .....W7CB	1462 ....DL4CW	808 .....W6PN	650 .....N3YZ	
4722.....YU1AB	4074 ..YU7BCD	3231.....W2OO	2476 .....K5UR	1936 .....AG4W	1446 .....DF3JO	781 .....V51YJ	649.....RA9OO	
4413 .....KF2O	4022 .....N9AF	3207 .....W9IL	2445 .....AB1J	1918 .....NXØI	1383 ..IWØHOU	726.....K5IC	647....PAØQRB	
4407 .....S53EO	3967 ..ON4CAS	3180 ....K9UQN	2428 .....N6QQ	1862 .....VE9FX	1337 ....K6UXO	725 .....WK3N	644 .....KWØH	
4344.....VE3XN	3813 .WB2YQH	3116...JN3SAC	2338 .....I2EAY	1818 .....KX1A	1322 .....AA4FU	723 .....KØDAN	636 .....ZS2DL	
4313 .....I2MQP	3773.....IK2ILH	3007 .....W2WC	2304 .....N3XX	1727.....N3RC	1269 ....K5WAF	712 .....ISØEBO	634.....	

SSB

5169.....IØZV	3323 ..OE2EGL	2652.....I3ZSX	2310 .....KI7AO	1935 ..SV1EOS	1612 .....AG4W	1282 .....N3XX	1007 ..VE6BMX	637 .....K5WAF
4663 .....K2VV	3259 ..CT1AHU	2595 .....EA1JG	2275....IK2DZN	1927 .....AE5B	1611 .....W2ME	1258 .....N1KC	978.....EA7HY	600....WA2BEV
4632.....OZ5EV	3108 .....I4CSP	2529 .....W3LL	2209 ...IK2QPR	1889 .....N6QQ	1561.....PT7ZT	1146 .....SQ7B	976.....NE6I	
4606 .....VE1YX	3101 ....KØDEQ	2497.....S58MU	2201 .....NQ3A	1879 .....K3IXD	1550....IK2RPE	1145 ..EA3EQT	965 .....VE6BF	
4584 .....F6DZU	3022.....I8KCI	2459.....W2OO	2159...DL8AAV	1844 ....YO9HP	1534.....AE9DX	1117 .WD9DZV	883.....WA5UA	
4238 .....I2PJA	2903.....IN3QCI	2451 ..EA3GHZ	2131 .....N6FX	1825.....KQ8D	1480 .....AB5C	1089.....IZ8FFA	875 .....K7SAM	
4208 .....9A2NA	2877..YU7BCD	2449 .SM6DHU	2098 .....K5UR	1805.....EA3NP	1464 ..VE7SMP	1083 .....KX1A	758 ....IV3GOW	
4033 .....I2MQP	2857 .....4X6DK	2333 .....W9IL	2094 .....I8LEL	1782....W6OUL	1463 .....I2EAY	1042....IZØBNR	724.....W3TZ	
3825 .....EA2IA	2816...WA5VGI	2326 .....CX6BZ	2093 .....W2WC	1776...JN3SAC	1410.....S55SL	1031 ....IK8OZP	717 .....KØDAN	
3593 .....KF2O	2761 .....KF7RU	2315 ..SV3AQR	2076.....K2XF	1719 ....K9UQN	1386....IK4HPU	1022 .....NW3H	690 .....W6PN	
3557.....N4NO	2711...LU8ESU	2314 .....N8BJQ	1971 ....W2FKF	1623 .....VE9FX	1386 .....NXØI	1012 .....KU4BP	640 .....UA9YF	

CW

5696.....K9QVB	3750 ..VE7CNE	3042 .....I7PXV	2697.....IØNNY	2365.....W2OO	1827 .....AC5K	1223 .....KX1A	1102 ....IT9ELD	732 .....SQ7B
5551 .WA2HZR	3724...WA5VGI	3025 .SM6DHU	2638 ....OZ5UR	2245 .....W9HR	1665 ....YO9HP	1220 .....AA4FU	1049 ....K5WAF	695.....S55SL
5436 .....K2VV	3722 .....9A2NA	2869 .....N8BJQ	2632.....W2ME	2215 .....I2MQP	1548 .WD9DZV	1210 ....DL4CW	821 ....HB9DAX	629 ....IV3GOW
4274.....N4NO	3676.....S58MU	2804 ....K9UQN	2502...JA9CWJ	2010 .....K5UR	1461 .....WO3Z	1186 .....NXØI	813 .....VE9FX	615 ....JH6JMM
4228.....N6JV	3471 ....KØDEQ	2730 ...IK3GER	2434 .....W9IL	1990....W6OUL	1445....EA2CIN	1165 ..VE6BMX	794 ....LA5MDA	600.....IK2SGV
4024 .....LZ1XL	3347 .....KF2O	2723...EA7AZA	2424 .....W2WC	1983..EA7AAW	1424 .....N6QQ	1160 .....AA5JG	753.....F5PBL	
3918.....VE7DP	3266 .....W8IQ	2720.....KA7T	2381 .....N6FX	1945 .....N3XX	1336 .WA2VQV	1145 .....VE1YX	749 .....AE5B	
3864 .....EA2IA	3226 ..YU7BCD	2701...JN3SAC	2373 .....VE6BF	1848 .....I2EAY	1312 ....K6UXO	1125 .....IØWOK	743.....JA5NSR	

DIGITAL

1809.....W3LL	1133.....N6QQ	1056..WD9DZV	1047 ...RW4WZ	1009 ..GUØSUP	886.....KØDEQ	685.....EA2IA
1432 .....N8BJQ	1066.....YO9HP	1054.....KF2O	1049 .....W2OO	894 .....AG4W	866 .....SQ7B	643 .....K9AAN

Planning a Contest DXpedition

BY GEORGE TRANOS,* N2GA

Ever wonder what it would be like to be a big gun and be on the receiving end of a pile-up? Operate in any major DX contest and you'll hear lots of exotic callsigns. Some of these are from countries that are rarely heard on the air. Others may be from more common locations but be the only station in the contest on from that country. In both cases, those calls will be needed multipliers by everyone operating that weekend. It may be easier than you think to be part of one of those operations.

Possibilities

Once you become interested in operating as DX in a contest, you have to choose among a number of possible options. Your first step is to decide when you can get away and which contest you'd like to operate. If your first love is phone operating, then maybe the CQ World-Wide DX Contest in October is a good choice. This is the most popular amateur radio contest worldwide and draws the largest number of operators. It is also the most popular for contest DXpeditioners, so it may be difficult to find an unused location. CW and RTTY operators may want to try operating the CQ WW DX version of their mode instead. There are also many other contests that warrant consideration. The CQ WW WPX Contests are also very popular, as are the ARRL DX contests.

Once you've decided on when you'd like to operate, the next question is where? There are many choice contest locations that have been used in previous years. Some of them may be available. The biggest decision here is whether you want to go to a spot where the antennas are already in place or one where you'll have to erect some or all of them prior to the contest.

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George N2GA, on top of the Grenada Fire Department truck installing a 2-element, 40-meter Yagi as part of the 2006 CQ WW DX SSB Contest DXpedition to Grenada. (All photos by George, N2GA, and Diane, K2DO)

Calendar of Events

All year	**CQ DX Marathon (http://bit.ly/vEKMWD)**
June 23-24	ARRL Field Day (http://www.arrl.org/field-day)
June 23-24	King of Spain SSB Contest (http://bit.ly/xez0um)
June 23-24	Marconi Memorial HF Contest (http://bit.ly/AsRF5u)
July 1	RAC Canada Day Contest (http://bit.ly/zdQ8DM)
July 7-8	DL-DX RTTY Contest (http://bit.ly/xTMWHL)
July 7-8	Venezuelan Ind. Day Contest (http://bit.ly/xZqZWf)
July 14-15	IARU HF Championship (http://www.arrl.org/iaru-hf-championship)
July 21-22	**CQ WW VHF Contest (http://bit.ly/yM7W0M)**
July 21-22	North American RTTY QSO Party (http://bit.ly/GLPfXz)
July 28-29	New Jersey QSO Party (http://bit.ly/H0HCL5)
July 28-29	RSGB IOTA Contest (http://bit.ly/GYeiad)
July 28-29	MARAC 2012 U.S. Counties QSO Party (http://www.marac.org)
Aug. 4	European HF Championship (http://bit.ly/H2eMg5)
Aug. 5	SARL HF Phone Contest (http://bit.ly/H0IqQf)
Aug. 4-5	North American CW QSO Party (http://bit.ly/GLPfXz)
Aug. 4-5	ARRL UHF Contest (http://www.arrl.org/august-uhf)

Basic information on many of these events may be found in *WorldRadio Online*'s Contest Corner at <www.worldradiomagazine.com>. For complete information on any of these contests, see their respective sponsors' web pages.

Existing Contest Stations

Operating at an existing contest station has its advantages. More than likely these places are in a good radio location and much of the equipment needed for the contest is already in place. Some turn-key stations provide everything you need. You just have to show up, sit down, and start operating!

Chances are the hosts will provide all of the details you need to make your stay easier. They will let you know all about the licensing process, obtaining special callsigns, what antennas and radios you can use, and other important information.

Operating Categories

Another decision that needs to be made in advance is if you will participate as a single operator or join a multi-operator group. Both have distinct advan-

tages and disadvantages. If you've never done a DXpedition before, you might be best off teaming up with a group of more seasoned veterans. Hams who have been there before will know things that will make your life easier. This can help for both the contest operating period and the time before and after the contest. Simple things such as ground transportation from the airport, where to stay, and where to find food and drink all become easier. Complex decisions about where to set up antennas and what to set up can be brainstormed. Previous efforts by the group from that location can help guide decision making.

Large groups can also help divide the labor and make setup easier. If you're in a spot where antennas need to be erected, people can be broken down into teams to do specific tasks. One team can run feedlines, another can assemble antennas, a third can build towers. Part of your group could be assembling stations—situating radios and checking amplifiers. Another group could set up the computer network and interface the stations. There is always a lot to do to be ready for a contest. This task list should be identified early on and team leaders could be selected for the more important areas.

Really Rare Contest Sites

For those especially remote locations, generators and fuel will have to be carried along. Operating and sleeping quarters will have to be built. Operating schedules and band plans will have to be made. In short, you'll be building a small city where all the people must be fed, housed, washed, and otherwise pro-

Ann, WA1S (middle), and Ulf, DL5AXX (right), constructing one of the Yagi antennas used in the operation.

Ulf DL5AXX (left), Diane K2DO (middle), and George N2GA (right), assembling tower sections prior to the contest.

vided for. These remote locations will be extremely rare and may attract on-the-air attention even outside of the contest period. These sites are beyond the scope of this article, and books have been written and videos made about some of these operations. Most hams chosen to participate in these undertakings are grizzled veterans of many previous campaigns.

Planning and Scheduling

For the larger multi-operator ventures, you'll definitely need a plan. This plan should include all areas of the operation. You should budget time before departure to discuss and agree on this plan in advance. At the minimum, you should talk about the following areas:

- Determining the goals of the operation
- Selecting team leaders and participants
- Callsigns and licensing issues
- Passports and visas
- Arrival and departure times and locations
- Transfer to/from arrival point (airport or vessel transfers)

Laura (daughter of Ulf, DL5AXX) and George, N2GA, carrying tower sections into position for assembly.

- Ground transportation during your stay
- Sleeping accommodations (hotel/villa/campground/other facilities)
- Plans for food and drink
- Transportation of equipment to and from the operating location
- Primary and backup radios and power supplies
- Headphones, keying interfaces, computers, filtering
- Power availability, generation, fuel
- Amplifier usage, connection and keying
- Coax, audio, and computer cables
- Computer logging programs, setup, support
- Antennas and antenna support structures
- Tools, test equipment, and spare parts
- Tentative schedule for building antennas and assembling and testing stations
- Number of stations and which stations will run what bands
- Propagation prediction and band plan
- Operator schedule, relief operators, sleeping and eating strategy
- Contingency plans in case of emergency, power interruption, antenna problems, etc.
- Antenna and station disassembly after the contest
- Pre and post-contest activities
- Alternate activities for accompanying non-ham spouses
- QSL requests, LoTW

Operating Goals

Determining your operating goals is an important aspect of any multi-operator group. If this is your first time on a contest DXpedition, your primary goal should be to have fun! Enjoy the experience of being on the other end of the pile-up. If your group is competitive, you may want to set operational goals such as so many QSOs and so many points. Whatever you decide, it should be a joint assessment arrived at by consensus of all parties.

Team Leaders

Choosing a strong team leader(s) is very important. This person or persons will drive the operation forward, keep it on track, and help make it fun! The team leader(s) should be experienced operators, natural leaders, and those who will delegate responsibility. The team leaders should listen to the opinions of others and utilize the expertise of the group. All participants should be equally invested in the decisions and plans agreed to.

Callsigns and Licensing

Determine in advance what has to be done to obtain a reciprocal operating license. Some nations have what is known as a "bilateral" operating agreement with other countries. Amateurs from each country have a means of operating from the other country. Note that even a bilateral agreement does not necessarily mean you may simply go to the other country and operate. Some countries require you to apply for a formal permit. You should check the list of specific country requirements for the proper procedures. The European Conference of Postal and Telecommunications Administrations (CEPT) radio-amateur license allows some ama-

Every operation should have a good supply of spare parts. These items are part of the antenna parts supply.

teurs to travel to and operate from most European countries without obtaining an additional licensee or permit. With an International Amateur Radio Permit, operation in certain countries of the Americas is allowed without seeking a special license or permit to enter and operate from that country. In addition to an individual operating license, some countries also allow you to apply for a special contest callsign for a small additional fee to be used only during the designated contest period.

Passports and Visas

You must check in advance to determine whether you need a passport or visa to enter a specific country. This can only be determined based upon your country of citizenship and what its relationship is with the country you plan on visiting. Check with your department of state or the embassy of the country you wish to visit if you have any questions.

Individual Schedules

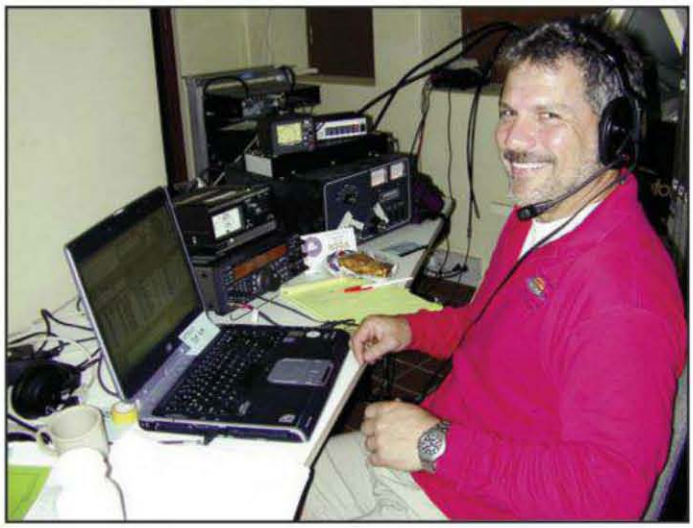
Normally, everyone should be in place when the bulk of the work needs to be done. It may be difficult to coordinate simultaneous arrivals, however. It is unfair for one person to arrive after all the difficult antenna and station building is done and depart before the disassembly takes place. Try to synchronize the arrivals and departures to prevent this from happening.

Ground Transportation and Transfers

Many times, large groups will rent a small number of vehicles for all participants to use. There may be designated drivers and pickup, and delivery from airport or boat can be arranged. The expense can be totaled and shared among the users. Be careful to discuss this in advance. Let the group know when the vehicles will be used and if they are available to individuals for outside excursions or other non-contest related activities.

Sleeping Accommodations

Where participants stay, sleep, and operate largely depends on the country or site selected. Some groups will rent a villa (or villas) with one large parcel being the operating site. It may also house a portion of the group. Other villas could be



George, N2GA, running the 10-meter SSB pile-ups from J3A using his trusty DXpedition radio, a Kenwood TS570DG and an Ameritron amplifier.

used as additional sleeping and eating locations. Transportation to and from these sites would have to be provided. Other possibilities include a local hotel used for sleeping only, with a separate operating site. Even if local housing is utilized, separate arrangements may also be made for sleeping during the contest, especially if the operating location is a distance away. This factor should be discussed in advance. Some people traveling with their spouse may prefer a higher level of housing. If agreed upon in advance and multiple types of housing are available, this component can be left out of the shared group cost so that individuals can choose and pay for their own housing arrangements.

Equipment Transfer

Depending upon the location, antennas, coax, amplifiers, radios, and other supplies may have to be shipped or transported to the operating location in advance. This may be as simple as carrying them as luggage on a plane, to as complicated as shipping them on a boat to arrive before contest setup is to begin. Some sites may have antennas and gear stored at the home of a local ham or a radio club. Arrangements would then have to be made to pick up and transport this gear to the operating site. An assessment would have to be made of the condition of the equipment. Defective or missing parts would have to be repaired or replaced. Parts and tools would have to be on hand to perform these tasks and a team member would have to be qualified to undertake this part of the plan.

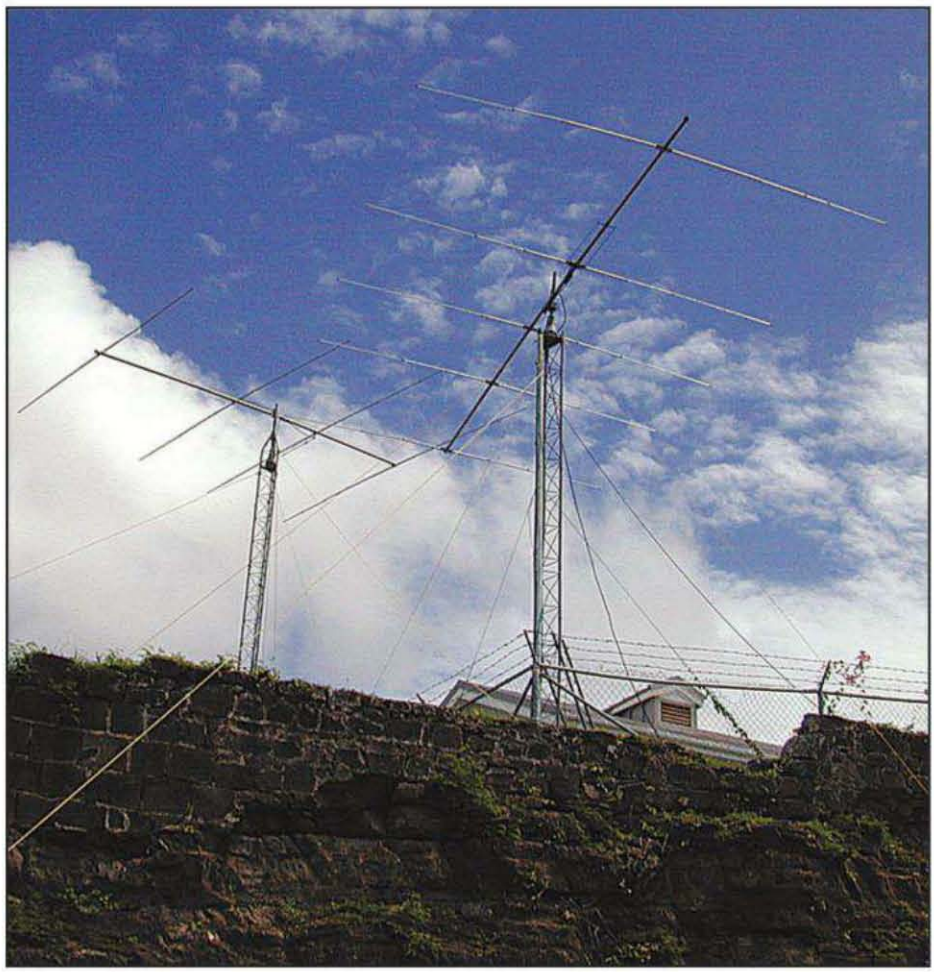
Radios and Power Supplies

Radios to be carried in may have to be declared upon arrival in customs. Try and find out in advance what is required to do this. Normally, this would be okay as long as you take the radio out of the country again when you leave. Check with the specific country for information on this. Make sure you bring your radio operating manual with you just in case! Also, it is always good to have at least one spare radio among your group. Check the operating voltage of the country you are visiting. Determine if your power supply can be switched to operate on that voltage. Bring appropriate adapter plugs for the common AC outlets. Make sure your power supply is set

On the Cover

DXer and DXpeditioner Tamas (Tomi) Pekarik, HA7RY, outside his home station in Hungary. Active on all bands from 160-6 meters, Tomi prefers to operate CW and has been recognized with membership in the ARRL's A1 Operator's Club. He has also been honored with the YASME Excellence Award "for service and dedication to amateur radio." This recognition, shared with his friend George Wallner, AA7JV, was for their 2009 DXpeditions to Mellish Reef, VK9GMW and the Chesterfield Islands, TX3A. According to the YASME Foundation website, "(t)hese expeditions represent a somewhat unique and refreshing approach to DXpeditioning. They show that a small group can exchange time for equipment and mega-funds and come out ahead. By focusing on fewer bands for a longer period, they have been able to log more unique calls from smaller stations. This brings more operators into the HF DX environment and encourages other expeditions to adopt these useful tactics." Tomi is one of only seven amateurs honored with this award since it was established in 2008.

Tomi is also an active contester, with many of his DXpeditions being scheduled to coincide with major contests. The TX3A operation—which was honored as DXpedition of the year in 2009—won Tomi the #1 world score for a contest DXpedition in the CW weekend of the CQ World Wide DX Contest. *(Cover photo by Henryk Kotowski, SMØJHF)*



The 15-meter (left) and 10-meter (right) Yagis used at J3A. All antennas were assembled and put onto towers prior to and taken down right after the contest. The operation took place at the Grenada emergency operation center near Fort Frederick, high overlooking the city of St. George's.

to the correct voltage before plugging it in!

Computers, Networks, Logging Programs

Computers are a necessary part of any top contest station. Make arrangements to either bring or obtain a computer, monitor, keyboard, and mouse. Laptops and netbooks work fine. Just make sure that you have adapter plugs for their power supplies. Test your logging program and networking configuration in advance. You might want to bring a wireless local area network device to avoid running additional network cables to all the stations. Plan this portion of your setup in advance and make sure at least one person is capable of debugging any computer or network problems you might have.

Antennas and Supports

Good antennas will make the difference between success and failure in any contest. Many options exist to develop a good site plan. What you use on a DXpedition depends on many factors. What is available on site? Are there antennas used by a previous group that can be utilized for your operation? Do you have to bring and erect all of the antennas? The answers to these questions will determine what you can do. Simple dipoles and verticals can work well if you have a good location. For good DX, a low angle of radiation is preferred. Any horizontal antennas should be one-half wavelength high to yield low propagation angles. This is not always possible especially on the lower frequencies. Depending on the size of your operation, monoband antennas coupled to individual band filters will increase your chances of being heard when the band is open.

Stations, Bands, and Propagation

The size of your team, the number of radios, amplifiers, and antennas available, and the number of operators all

Team members of the 2006 CQ WW DX SSB Contest DXpedition to Grenada included Diane, K2DO, Harry, AC8G, Ann, WA1S (front row), George, N2GA, Tim, K5AC, and Ulf, DL5AXX (back row)

will determine the number of stations you can put on the air at any one time. If running multi-multi, there could be as many as three or more bands open at any one time. Local sunrise and sunset will be the times when the most bands are available. Plan your operation to maximize that efficiency. Share a station among two or three bands if necessary. Consider running in a different category such as multi-single or multi-two if your group size or number of stations and antennas is small. Make a band plan based upon propagation predictions. Try to plan which bands will have the most activity and have an operator on the air during those times.

Setup, Operating, and Takedown Schedule

Plan your operating time. If the group is large, split up the operating to allow your high-rate run operators to be on the air at the most active times. Have relief operators available if at all possible. Make sure your all of your crew knows when they should be available to set up and take down antennas. Organize into teams and set specific goals for each task. One team can be your antenna assembly team, another could mount the antennas on the towers, etc. Schedule a post-contest dinner to celebrate your achievements!

Pre- and Post-Contest Activities

What else is there to do at this location? If on an island, you might want to do some swimming or snorkeling. Schedule a historic tour of the local area. Try to do some of your contest planning at a group dinner at a local restaurant before the contest. Ask the participants about other things they might want to do.

Alternate Activities

The participation of non-hams spouses is a controversial subject. Some groups enjoy having their spouses and children along with them. This can help turn the trip into a true family vacation. On the other hand, you might be torn between touring with your family and building antennas. This can cause friction within the group and stress for the individual involved. Knowing in advance how much time each person must devote to the contest will help alleviate this tension. If the time commitment is not acceptable, then the team leader should suggest leaving the spouse at home, having the spouse join the group after the contest, or consider inviting another participant instead. If properly planned, alternate activities can allow a fun time for all and provide things to do for the spouse and family during the contest period.

QSL Requests

Plan in advance how requests for QSLs will be handled. Determine if your log will be uploaded to Logbook of The World (LoTW). If possible, provide a website with information about your operation and QSL policy. A logbook lookup feature is always a nice touch.

You Can Do It!

A contest DXpedition can be extremely fun and addicting! You can participate with a little advance research, preparation, and planning. With enough time, money, and participants, a group multi-operator endeavor can be the highlight of any contest club's activity. Operating from another country can be an eye-opening experience. In addition to the on-the-air activity, learning a little something about the culture and customs of another country is an educational and entertaining pursuit. It's nice to be on the receiving end of the pile-up and even more fun to be the only station on from your country! You, too, can enjoy all of this on a contest DXpedition.

73, George, N2GA

We're Rocking with QRP Power

BY TOMAS HOOD,* NW7US

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, April 2012: 55
Twelve-month smoothed, October 2011: 60

10.7 cm Flux
Observed Monthly, April 2012: 113
Twelve-month smoothed, October 2011: 118

***Ap* Index**
Observed Monthly, April 2012: 9
Twelve-month smoothed, October 2011: 8

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, April 2011: 54
Twelve-month smoothed, October 2010: 23

10.7 cm Flux
Observed Monthly, April 2011: 113
Twelve-month smoothed, October 2010: 85

***Ap* Index**
Observed Monthly, April 2011: 9
Twelve-month smoothed, October 2010: 6

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2012

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1, 21-22, 25-26, 28	A	A	B	C
High Normal: 8-13, 18-20, 23-24, 27	A	B	C	C-D
Low Normal: 2, 6, 29	B	C-B	C-D	D-E
Below Normal: 4-5, 7, 17, 31	C	C-D	D-E	E
Disturbed: 3, 14-16, 30	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 3 will be excellent on July 1, fair to good on July 2, poor on July 3, 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.

For a number of years I have been a member of the Straight Key Century Club <http://www.skccgroup.com/>. This club, also known as SKCC, is the fastest growing group of straight key Morse code operators in the world. First organized in January of 2006, the SKCC membership has rapidly grown to include thousands of members from all corners of the globe. The club promotes the use of manual keying devices (or, simply, a 'key') when encoding letters, numbers, and punctuation in International Morse Code.

A manual key, also known as a straight key, is the human interface that allows the operator to make and break an electrical circuit in the dots and dashes known also as 'CW'. The International Morse Code is sometimes referred to as 'CW' in Amateur Radio jargon because a continuous wave (CW) is turned on and off with the long and short elements of the Morse code characters. The SKCC promotes the use of CW in the most original tradition of using only those keying devices that are controlled and powered by the human touch.

Morse code uses a standardized sequence of short and long elements to represent the letters, numerals, punctuation and special characters of a given message. The short and long elements can be formed by sounds, marks, or pulses, in on or off keying and are commonly known as "dots" and "dashes," or "dits" and "dahs." The speed of Morse code is measured in words per minute (WPM) or characters per minute, while fixed-length data forms of telecommunication transmission are usually measured in baud or bps.

Why is it called Morse Code? This character encoding was devised by Samuel F. B. Morse, the creator of the electric telegraph. This Morse Code came in two flavors in the beginning. One was in use by the railroads of America, and is known as American Morse Code. Also, there was a unified, internationally-used version (adopted by radio operators) now known as the International Morse Code. Now when most people refer to Morse Code or "C," they mean International Morse Code.

Because my first love as an amateur radio operator was my manually-controlled Navy Flameproof World War II Signal Key (see <http://cw.hfradio.org/> for a picture of this key), I decided to join this free club. I was assigned my membership number and since have enjoyed spending both casual time operating CW on the amateur radio HF bands, and participating in some of its challenges and contests. The club offers a number of fun events, from short "sprints" (in which you try to work as many other SKCC stations as possible during a time period, often several hours in length), to weekend events that promote "rag chew" QSOs where you have conversations beyond the short exchange of the SKCC number and name, location, and signal report. There are plenty of incentives, too. What is

*e-mail: <nw7us@nw7us.us>

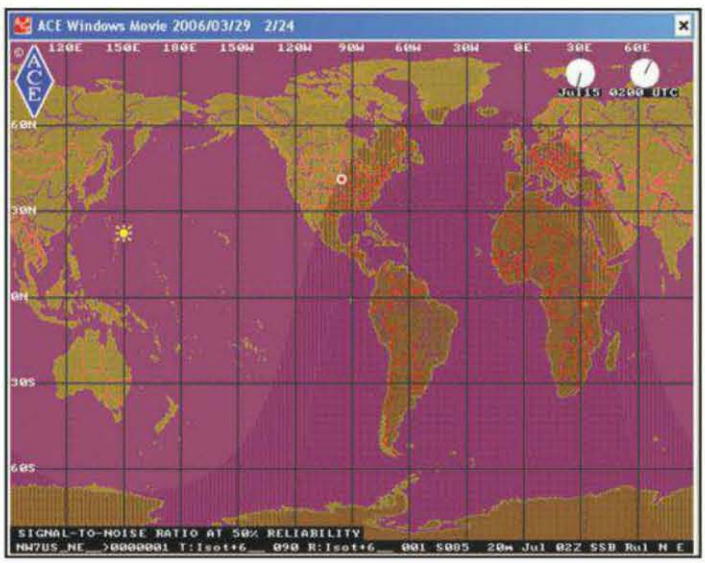


Fig. 1– An area-coverage map generated by the ACE-HF Pro software, showing that there is no expected footprint of a QRP, one-watt SSB signal on 20 meters at 0200 UTC in July, 2012 (with a signal-to-noise ratio at 50-percent reliability). (Source: NW7US, using ACE-HF Pro; <http://hfradio.org/ace-hf/>)

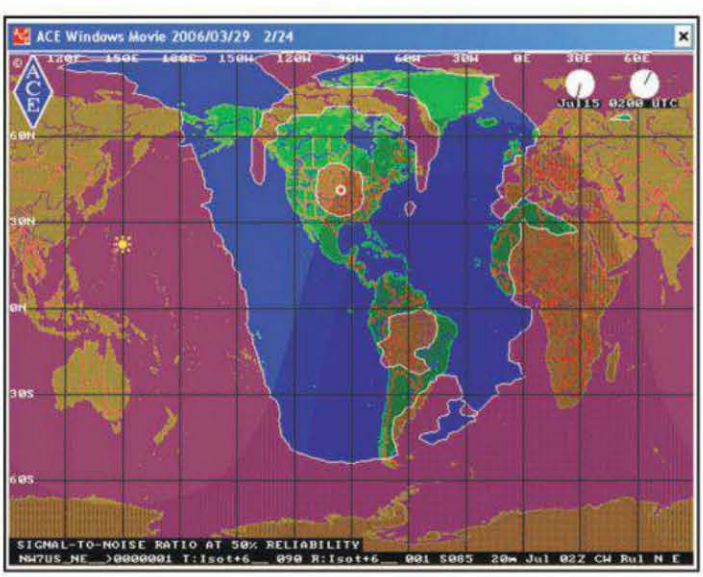


Fig. 2– An area-coverage map showing a significant footprint for a QRP, one-watt CW signal on 20 meters at 0200 UTC in July, 2012 (with all of the same parameters except mode, as in fig. 1). It is clear that switching from the SSB mode to the CW mode, using all of the same parameters including the one-watt power level, results in a drastic improvement (see text). (Source: NW7US, using ACE-HF Pro)

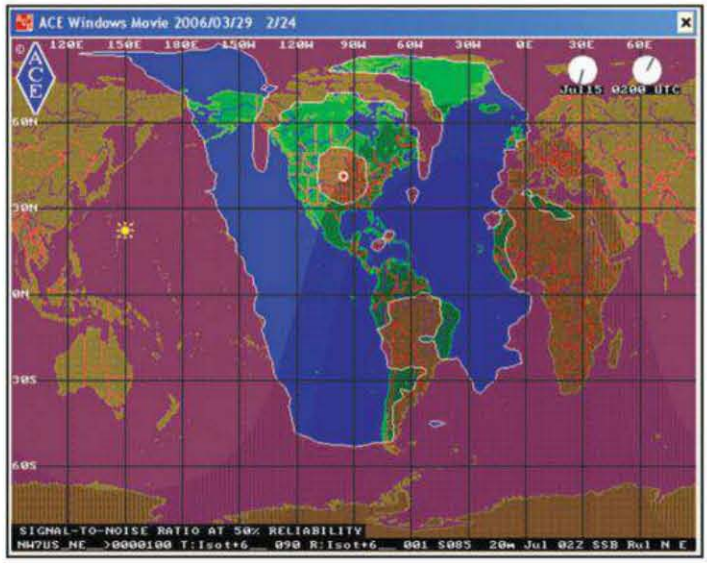


Fig. 3– An area-coverage map showing that it takes a 100-watt SSB transmission to accomplish the same footprint as a QRP, one-watt CW signal on 20 meters at 0200 UTC in July, 2012 (see text). (Source: NW7US, using ACE-HF Pro)

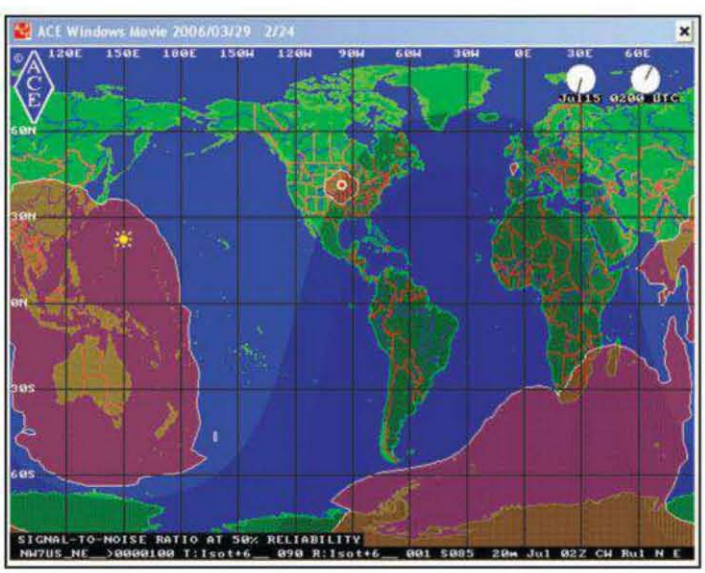


Fig. 4– An area-coverage map showing that a 100-watt CW transmission can accomplish vastly more than a 100-watt SSB signal on 20 meters at 0200 UTC in July, 2012. This is why CW is still highly utilized as the primary DXing as well as DXpedition mode. While SSB is often utilized, CW offers a much greater area coverage for DXing and is always a featured mode in all major DXpeditions. (Source: NW7US, using ACE-HF Pro)

so unique and fun about this is that the SKCC rules ensure that everyone is on a level-playing field. Only manual keys are allowed. No electronic or computer-driven CW. Only "straight" key operation is allowed.

Why would this be fun? I'll give you an analogy. A few years ago, I lived on the Olympic Peninsula in Washington State. One of the nearest towns where I could shop for food and other necessities is Port Townsend, located on the northeastern shore of the Peninsula. This Victorian-styled port town features an active marina, and on sunny, breezy weekend days was the center of boating fun.

The bay was filled with dozens of boats, each piloted by a captain intent on navigating a course around the bay hoping to win a weekend contest. But these were not motorized boats. There were no speedboats; there were only sailboats. Sails-only, these boat owners were using "ancient" wind-powered technology to enjoy their race around the bay. What fun could they possibly have using such old technology when one could use a motorboat and speed around the bay?

The same question gets asked regarding using the "old" technology of a straight key, tapping out Morse code in the CW mode on amateur radio bands. Why would that be fun?

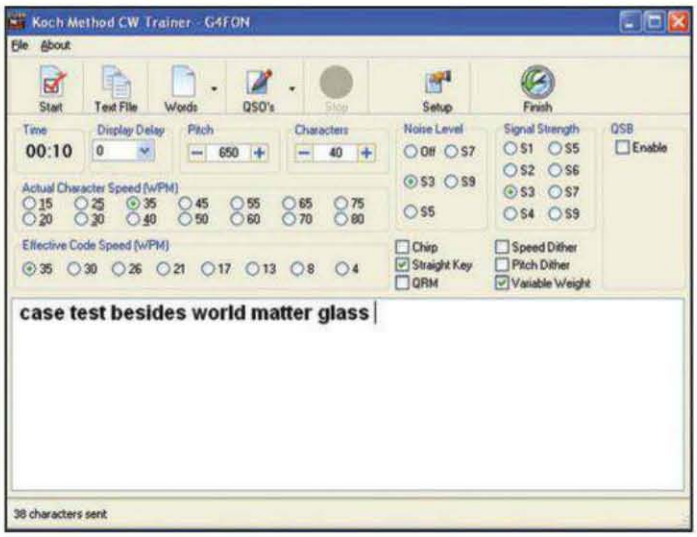


Fig. 5– A screen-capture of the G4FON "Koch Method CW Trainer" software. This software provides an excellent method by which you can learn and improve you Morse code skill. Many DXpeditions, and QRP operators, use CW as the mode of choice, because of its great efficiency over a mode such as SSB. (Source: NW7US, using the "Koch Method CW Trainer" software by G4FON ; <http://www.g4fon.net/>).

It must be, though, if the numbers are any indication. For instance, the report from CQ headquarters is the number of CW logs submitted for the 2008 CQ World-Wide DX contest exceeded the number of phone logs for the first time in more than 20 years. There were a total of 5013 SSB logs and 5272 CW logs submitted for the 2008 running of the event, for a total of 10,285 logs. It is the first time since 1986 that more CW logs have been submitted than SSB logs. The logs contained the callsigns of more than 50,000 different amateur stations making at least one contest contact.

Why use CW now that it is no longer required for obtaining an FCC-issued amateur radio license? Isn't it so antique that it is useless in today's modern world?

One of the many driving goals when getting on the radio is to communicate with a distant station. If you cannot hear the distant station, or if your signal is not heard by the distant station, then radio is useless. The science of radio signal propagation is in part the search for efficient communications between two stations. Often when people talk about radio reception signal strength is touted as the most useful factor in the effort of getting a signal from the transmitter to the receiver. However, since the problem of reception is more complex than a simple power issue (just pump more watts into the antenna), the better way to get a handle on the problem is to use the signal-to-noise ratio (SNR) measurement of a radio circuit. (The radio circuit is the path between, and including, the transmitter and receiver.) The SNR is a real measure of effectiveness. With it we can better understand how effectively a signal can get from point A to point B.

On an abstract numerical basis, the signal-to-noise ratio is inversely proportional to the width of the slice of frequencies in which we are detecting our signal. This slice is also known as the bandwidth that we are receiving, and that bandwidth contains the intelligence we're trying to detect. A slice that is 10 Hz wide (we can also call this a 10-Hz channel) would give a signal-to-noise power advantage of 23 dB (decibels), or is 210 times greater in strength than the level of inherent noise in a 2100-Hz channel (a typical bandwidth for single-sideband (SSB) voice communication).

In simplified terms, that means a signal that is transmitted with 1 watt in a very narrow 10-Hz-wide channel is 210 times more efficient than a 1-watt (fully-modulated) SSB signal. Fig. 1, created by ACE-HF PRO (http://hfradio. org/ace-hf/) illustrates the "footprint" of an SSB signal that originated at my home QTH in Nebraska during one hour of a day in July. Notice how there is no expected signal footprint anywhere beyond my location. A 1-watt SSB signal on the 20-meter band is pretty hopeless. Fig. 2 illustrates the "footprint" of a CW signal with the same output power level (1 watt), the same antenna, and during the same month of analysis. Notice how I could reach a very large area of the world if I switched from SSB to CW using the same power level and antenna. Fig. 3 shows a 100-watt SSB signal, which results in the same

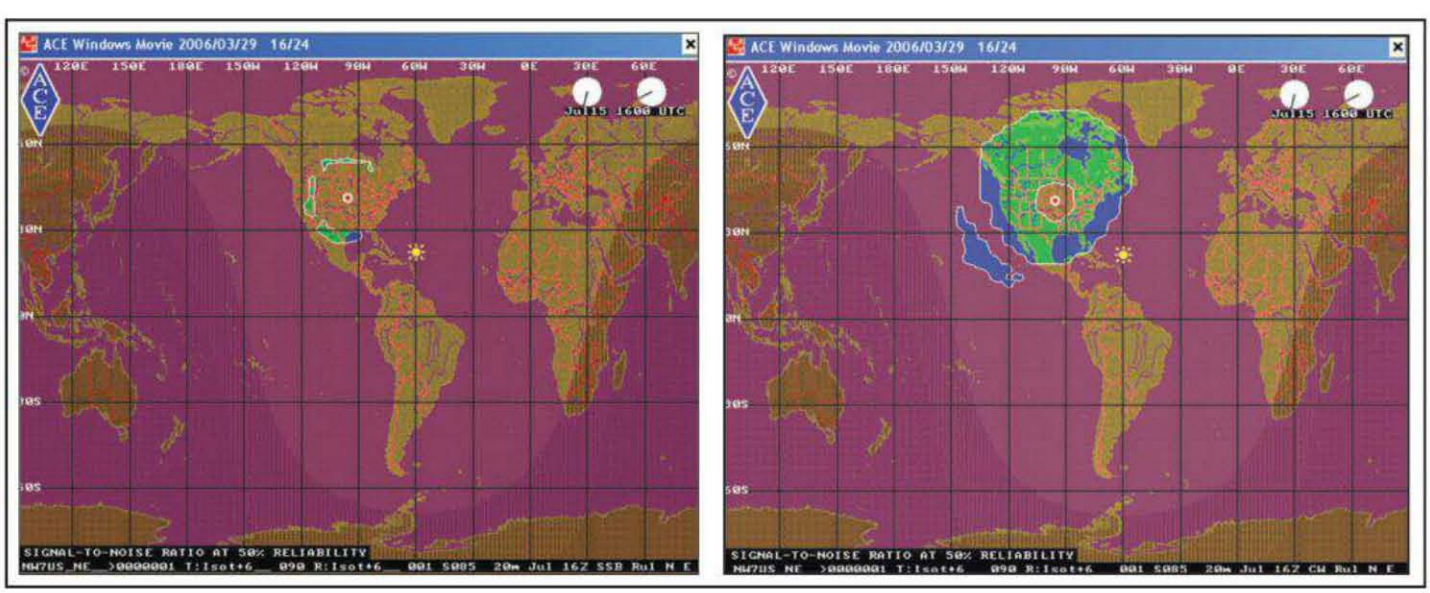


Fig. 6– On the left, an area-coverage map showing that a 1-watt SSB transmission can accomplish on 20 meters at 1600 UTC in July, 2012. On the right, the footprint of a 1-watt CW transmission, again showing the vast improvement of coverage by switching from SSB to CW, all other parameters the same. (Source: NW7US, using ACE-HF Pro (http://hfradio.org/ace-hf/)

coverage as the 1-watt CW signal. However, notice a drastic improvement in area coverage if I used a 100-watt CW signal (fig. 4)!

These four example area coverage maps were based on using a no-gain isotropic antenna at both ends of the circuit. Imagine the improvement you would get on your signal between your radio and a distant radio if you changed your antenna so that you would have a gain of 23 dB. That's like going from 5 watts to just over one kilowatt! The same effect is possible simply by changing the bandwidth of your communications mode.

When we talk about using modes such as CW, we are interested in how effective that mode is compared with other modes. We want to find the most efficient modes possible and concentrate our signal propagation efforts on those modes. Over great distances the signal will experience loss.

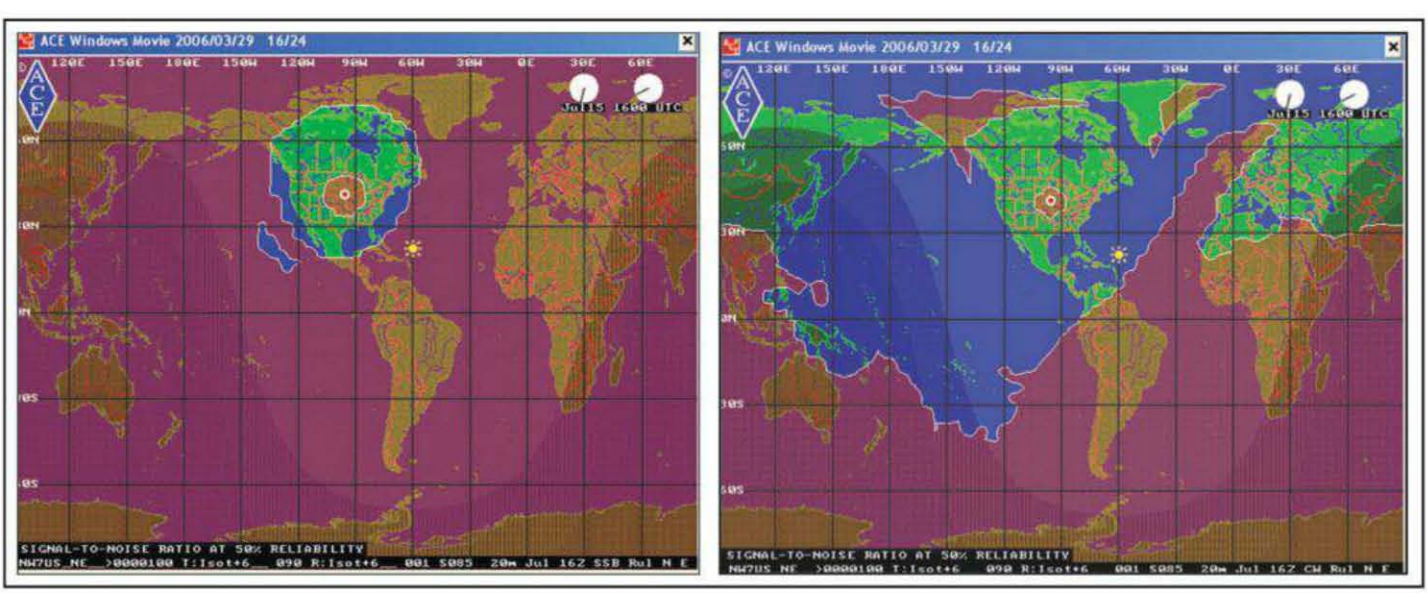


Fig. 7– On the left, an area-coverage map showing that a 100-watt SSB transmission can accomplish on 20 meters at 1600 UTC in July, 2012. On the right, the footprint of a 100-watt CW transmission, showing the vast improvement of coverage by switching from SSB to CW, all other parameters the same. (Source: NW7US, using ACE-HF Pro)

Oops...

2011 DX Marathon – CORRECTION

In the Top Scores listing for Oceania, the score for KH2/N2NL was inadvertently dropped from the listing. KH2/N2NL and VK4CC both had a total score of 303. As VK4CC's last country entry in his log was earlier than that of KH2/N2NL, VK4CC remains the winner of the Oceania Plaque. We sincerely regret the omission and congratulate KH2/N2NL on his excellent Oceania score.

The Oceania Top Score listing should be:

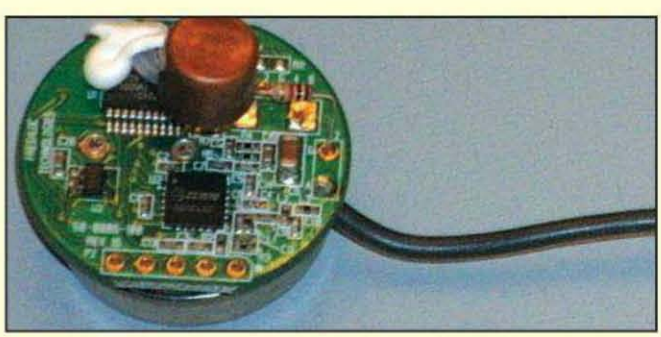
TOP SCORES
BOLD = Plaque Winners

Oceania

Callsign	Score
VK4CC	**303**
KH2/N2NL	303
VK3HJ	301
ZL2IFB	297
VK2MWG	267

Oops...

In Photo B of May's "Antennas" column, we accidentally cropped out the "non-functional 1/4-wave antenna" the photo was supposed to be highlighting. Here is the complete photo, including the antenna. But it still doesn't work!



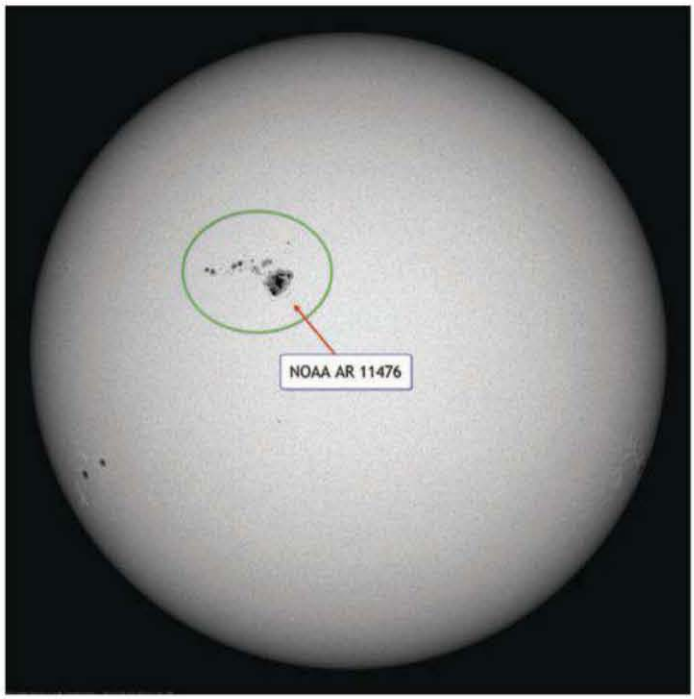


Fig. 8– The "intensitygram" (IGR) of active sunspot region, NOAA AR 11476, as seen by the Solar Dynamics Observatory (SDO) Helioseismic and Magnetic Imager (HMI) on May 10, 2012 at 0711 UTC. This is one of the largest active regions so far in Solar Cycle 24. It produced a number of M-class as well as numerous B- and C-class x-ray flares. It was also the source of a few coronal mass ejections (CMEs) that caused some minor and moderate geomagnetic storms during the month of May. (Source: SDO/HMI)

The more "power" you have, the more chance you will "hear" it on the receive side of that long journey.

There's another advantage of using CW over other modes. The typical amateur radio operator utilizing the CW mode manually copies Morse code "by ear." The bandwidths commonly employed in receivers for CW operation are between 250 Hz and 500 Hz. It has been postulated by research that the human brain acts like a special DSP filter, giving a weak signal detected in a 250-Hz bandwidth an even better SNR than what is purely available at the speaker.

That is why Morse code as a mode of operation will continue to be one of the viable options for weak-signal communications. In addition to the ability for us operators to DSP a CW signal and succeed more efficiently than using a mode such as SSB on that same path with the same power and other operating parameters, there are modes based on CW that utilize the power of computer-processing technology and other hardware advances. There is Coherent CW, High Speed CW, and other narrow-bandwidth digital modes that are proving to greatly increase the signal-to-noise ratio of an already weak-signal transmission.

If you are interested in overcoming the odds inherent in the propagation of your communications, consider learning Morse code and increasing your skill in using CW. How? I strongly recommend using the "Koch" method, a means of CW training developed by German psychologist Ludwig Koch back in the 1930s. The Koch method is not only useful for learning "code" if you have not yet done so, but it is very effective in improving your speed and skill if you are already using CW.

There is a well-tried, highly-recommended training aid that uses the Koch method of learning Morse code. It is the software created by G4FON, Ray Goff, simply called, "Koch Method CW Trainer - G4FON." (See fig. 5 for a screen shot of the software.) Browse to <http://www.g4fon.net/> and look for the menu option that takes you to the "Koch CW Trainer."

For details on how the Koch method works, check out N1IRZ, David Finley's article at <http://cw.hfradio.org/koch_1.html>. Once you have acquired the skill to work CW at 20, 30, or even 40 words per minute (yes, it is very possible for nearly anyone, using the Koch method), then you can apply your skill to your DXing efforts on the weak-signal subbands on VHF and HF.

One more thing: Are you interested in a challenge? Since you can gain an advantage over SSB by using narrow-bandwidth modes such as CW, imagine what you can accomplish with low-power operation. Low-power operation, known as "QRP", is using five watts or less output power. If you have a high-gain antenna and are using CW or another narrow-bandwidth digital mode, you can compete with the typical SSB station running the typical 100 watts of output power. Check out some of these QRP groups: The QRP Amateur Radio Club International at <http://www.qrparci. org/>, and the North American QRP CW Club at <http://naqcc.info/>.

Here in Nebraska, I am a member of the Midwest Home Brewers and QRP Group <http://www.hbqrp.org/>. You may find that there is a local QRP group in your area, too. This is an exciting activity: Using a whisper of power, you can still work the world.

July Propagation

Many DX hunters view July as the least exciting month of the year. With generally lower daytime Maximum Usable Frequencies (MUFs), the highest of the amateur HF bands are mostly unusable for stable long-distance *F*-layer propagation during the summer. Added to this seasonal change is the lower solar activity that we are still observing as we climb out of the solar cycle minimum. With the 10.7-cm flux levels hovering right around 80, it is rare to see the highest amateur HF bands wake up, except on paths between the northern and southern hemispheres.

While *F*-layer propagation of the highest HF frequencies will be poor, radio signals near the Best Usable Frequency (BUF) will be stable over paths that could remain open for longer periods than during the winter and early spring season. In addition, July's sporadic-*E* (*Es*) ionization is near the year's seasonal peak. This should result in a considerable increase in short-skip openings on almost all of the high-frequency amateur bands and on 6 and 2 meters as well.

Twenty meters should continue to be the best band for DX propagation during the month. When conditions are at least "Low Normal" (refer the Last Minute Forecast) the band is expected to open to one area of the world or another between sunrise and the early evening. Peak conditions on 20 meters are expected for a few hours after local sunrise and again during the late afternoon and early evening. When conditions are at least Low Normal, expect 20-meter openings towards South America, the South Pacific, and Oceania until as late as midnight. When conditions are High Normal" or better, the band should also remain open to most other areas of the world until as late as midnight.

Look for some short-skip openings into the Caribbean area and Central America as early as 10 a.m., with a peak expected to all areas of Latin America between 3 and 5 p.m. local daylight time, on 17 and 15 meters. When conditions are High Normal or better, these bands may also open to Africa during the late afternoon from the eastern half of the country, and to Australasia and the South Pacific area during the late afternoon and early evening from the western half of the country. Seventeen meters will act somewhat the same as 15, but openings will be tend to be longer, and signals perhaps stronger and more stable.

Expect short-skip openings on 10 and 12 meters during July toward the Caribbean and possibly Central America as a result of sporadic-*E* ionization. When conditions are High Normal or better, an occasional opening deeper into South America may be possible, especially during the afternoon hours.

Overall, look for frequent short-skip openings on 10, 12, 15, and 17 meters between distances of 500 and 1300 miles. During the afternoon hours skip may extend to beyond 2300 miles as a result of *F*-layer reflection. Short-skip openings should range between 250 and 2300 miles on 20 meters. Peak conditions are most likely to occur during the late morning and again during the late afternoon and early evening hours. Daytime openings on 40 and 30 meters should range between 100 and 600 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the maximum short-skip (one-hop *F*-layer reflection) of 2300 miles during the hours of darkness.

Nighttime openings into many areas

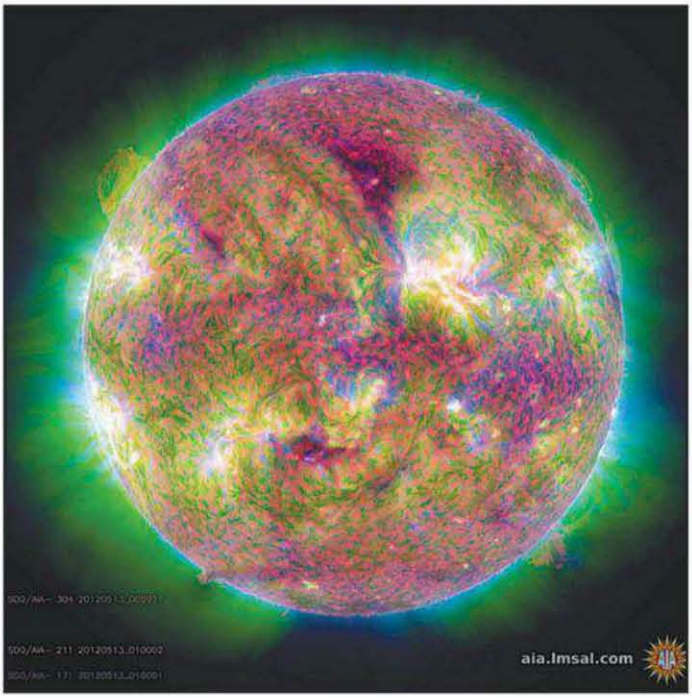


Fig. 9– A combined-wavelength view taken by the Solar Dynamics Observatory (SDO) Atmospheric Imaging Assembly (AIA) of the Sun on May 13, 2012, showing active sunspot region, NOAA AR 11476 (the bright region slightly right of disc center) in three wavelengths; 171, 211, and 304 Ångströms. (Source: SDO/AIA)

of the world are possible on 20, 30, and 40 meters. But seasonally high static levels may often make DX reception difficult on both 30 and 40 meters. High static levels are also expected to result in somewhat poorer DX conditions on 80 meters, although some long-distance openings are forecast during the hours of darkness. 160 meters is virtually shut down due to the high static levels of summer. Best bet for 40, 80, and 160 meter DX openings is an hour or two before midnight for openings toward the north and east, and just before local sunrise for openings toward the south and west. Expect some 160-meter openings between sunset and sunrise for distances up to approximately 1300 miles, if the seasonally-high static llevels permit.

Peak Sporadic-E Propagation

Optimum short-skip propagation conditions are expected during July as a result of a seasonal peak in sporadic-*E* ionization. Expect an increase in the number of short-skip openings on HF, and often on 6 and 2 meters. During the daylight hours, considerable short-skip openings are forecast for 10 and 15 meters over distances ranging between approximately 400 and 1300 miles, with openings occasionally extending out to beyond 2000 miles. Around-the-clock short-skip openings should be possible on most days on 20 meters, with the skip often as short as 300 miles and as long as 2300 miles. Short-skip conditions on 20 meters should peak during the late afternoon and the early evening.

Good daytime openings on 40 and 30 meters should range between 100 and 750 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the one-hop limit of 2300 miles during the hours of darkness. However, these bands could be quite noisy.

While no short-skip openings are likely on 160 meters during the daylight hours of July, expect some openings between sunset and sunrise for distances up to approximately 1300 miles if the static levels are low.

VHF Conditions

Statistical studies show that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August short-skip propagation over distances ranging between approximately 600 and 1300 miles should be possible on 6 meters. Openings may also be possible on 2 meters during periods of intense sporadic-*E* ionization with stations up to 1300 miles away. While sporadic-*E* short-skip openings can take place at just about any time of the day or night, statistics indicate that conditions should peak for a few hours before noon and again during the late afternoon and early evening. During July you can expect 6-meter sporadic-*E* on at least three out of every four days. Openings may last from a few minutes up to hours.

Don't forget to check out *CQ VHF* magazine for more details on VHF propagation and conditions. If you use Twitter.com, you can follow @hfradiospacewx for hourly updates that include the K index numbers. You can 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 April 2012 is 55.2, down from March's 64.2, yet still up from February's 33.1. The lowest daily sunspot value of 9 was recorded for April 9. The highest daily sunspot count was 108 on April 20. The 12-month running smoothed sunspot number centered on October 2011 is 59.9, slightly higher than September's 59.5. A smoothed sunspot count of 76, give or take about 9 points, is expected for July 2012.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 113.1 for April 2012, down from March's 115.1. The 12-month smoothed 10.7-cm flux centered on October 2011 is 118.4, the same as in September. The predicted smoothed 10.7-cm solar flux for July 2012 is 131, give or take about 9 points. Notice that this is a lower prediction than that for June, only because of the way these forecasts are calculated; the forecast is based on statistical methods.

The observed monthly mean planetary *A*-index (*Ap*) for April 2012 is 9, down from March's 14. The 12-month smoothed *Ap* index centered on October 2011 is 8.0, about the same as September. Expect the overall geomagnetic activity to be varying greatly between quiet to stormy during July, much like the months prior, because we're seeing the Sun become ever more active as we move toward the cycle maximum. Refer to the Last Minute Forecast for the outlook on conditions during this month.

In Closing

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. You can directly interact with me on Twitter.com following @NW7US. You can find complete details on my main web page, at <http://NW7US.us>.

Remember, CQ Magazine is on Facebook at <http://www.facebook. com/CQMag>. For space weather and radio propagation information on Facebook, please join this columnist's dedicated page at <http://www.facebook.com/spacewx.hfradio>.

73, Tomas, NW7US

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2012 CQ WPX RTTY RESULTS
SINGLE OPERATOR
NORTH AMERICA

United States

K1LZ	**A**	**4,576,404**	**1930**	**724**
			(OP: N2WQ)	
AK1W	"	3,758,941	1810	703
			(OP: K5ZD)	
W1BV	"	2,079,582	1440	571
K8PO/1	"	1,217,536	983	512
KA2KON/1	"	852,914	769	398
W1BYH	"	800,496	755	408
AE1T	"	625,920	627	384
W1PL	"	536,928	815	336
AJ1E	"	492,115	621	335
NA1QP	"	398,246	465	346
			(OP: W1CTN)	
WA1WPX	"	379,132	463	299
			(OP: W1UJ)	
W1TO	"	275,044	355	266
KA1GEU	"	267,288	410	259
KI1U	"	195,858	351	234
KT1B	"	168,364	286	196
KV1J	"	89,925	266	165
W1EL	"	62,272	178	139
NR1X	"	44,506	157	119
N1KWF	"	34,037	135	101
K1UO	"	32,552	111	104
WB4SON/1	"	32,178	109	93
K1SEZ	"	30,798	149	118
KA1QBO	"	29,799	126	99
W3IZ/1	"	29,072	104	92
W1KQ	"	23,157	99	93
W2JU/1	"	5,096	51	49
KX9X/1	"	2,660	39	38
W1NG	"	666	19	18
WB1AEL	**28**	**4,368**	**50**	**42**
KN6DV/1	**21**	**2,253,537**	**1389**	**663**
K6ND/1	**7**	**59,664**	**130**	**113**
***NJ1H**	**A**	**595,960**	**687**	**376**
*AB1OD	"	532,560	650	336
*KM1W	"	486,755	525	335
			(OP: W1UE)	
*K1PU	"	350,424	493	279
*KA1C	"	348,131	521	287
*WN1E	"	299,475	452	275
*WA1DRQ	"	290,076	446	276
*W1MAW	"	182,493	374	243
*WA1ZYX	"	166,690	343	211
*N1QD	"	149,995	331	229
*K1VU	"	124,800	312	195
*KK1X	"	110,630	294	185
*KS1J	"	101,904	236	176
*WA1N	"	88,722	214	159
*K1SM	"	88,009	212	167
*W1QK	"	78,660	240	171
*N1QDX	"	61,439	175	131
*KX1G	"	43,923	144	121
*AD1L	"	26,016	109	96
*W1MA	"	17,266	121	89
*K1DUQ	"	8,526	68	58
*W1CSM	"	6,318	40	39
*KJ1J	"	5,123	61	47
*W1QH	"	3,698	49	43
*KX1X	"	2,886	40	37
*W1MJ	"	828	25	23
***KC1UX**	**14**	**97,185**	**250**	**209**
***AB1J**	**7**	**261,954**	**389**	**231**
*N1GB	"	208	8	8
W2YC	**A**	**2,766,699**	**1417**	**663**
WA2ETU	"	2,739,429	1493	693
NO2T	"	1,139,968	984	488
K2ZC	"	831,488	747	406
W2GR	"	753,576	785	408
K2MK	"	507,088	610	328
KF2O	"	381,024	395	336
KZ2R	"	305,487	445	273
WS9M/2	"	287,985	504	263
W2LK	"	261,640	366	248
KI2P	"	217,128	380	249
N8CL/2	"	200,600	338	236
KC2LST	"	133,363	316	193
N2SQW	"	129,216	226	192
NG2P	"	89,500	244	179
W2YK	"	72,027	184	159
K2UF	"	42,800	120	107
WO2T	"	29,727	96	81
K2SLZ	"	25,474	128	94
NA2M	"	23,478	99	86
W2LE	"	22,790	100	86
KA2CYN	"	18,509	98	83
K2CDP	"	13,114	84	79
KC2KZJ	"	8,268	61	53
N2CJ	"	8,178	48	47
NJ1F/2	"	4,920	41	40
N2WK	**21**	**2,087,680**	**1304**	**640**
W2IUC	**14**	**36,084**	**138**	**124**
W1TY/2	**7**	**502,656**	**526**	**308**
N2EIK	**3.5**	**69,940**	**235**	**130**
K2CYE	"	15,544	101	67
***WA2LXE**	**A**	**612,896**	**732**	**358**
*AD2TM	"	241,304	411	278
*WA2MCR	"	197,664	396	213
*K2EN	"	160,746	379	219
*WB2OQQ	"	155,584	304	221
*AB2ZY	"	136,915	296	197
*N2MUN	"	130,398	284	211
*AA2MF	"	128,640	327	201
*K2DAR	"	102,243	205	197
*NY6DX/2	"	101,920	297	182
*KS2G	"	94,458	257	182
*KA2FHN	"	73,414	214	142
*KC2WYL	"	72,352	235	152
*W2MXL	"	69,496	218	136
*WB2PJH	"	63,420	205	151
*WB2SXY	"	58,424	199	134
*W2DXE	"	45,234	165	126
*WV2ZOW	"	43,911	172	119
*K2TV	"	42,036	150	124
*KB2NB	"	38,368	145	109
*N2KYX	"	37,260	162	135
*K2DSL	"	34,316	147	92
*W2HIY	"	28,684	130	101
*W2DZ	"	24,288	123	96
*N2JF	"	19,024	100	82
*K2SI	"	18,748	118	86
*K2ZL	"	18,696	116	82
*K2DLS	"	17,204	118	92
*WA3AFS/2	"	16,560	69	69
*N2SO	"	14,504	88	74
*KC2GLG	"	7,056	62	56
*K2PF	"	6,708	56	52
*NC2N	"	4,290	44	39
*WB2TPS	"	4,218	40	37
*KA2ANF	"	3,375	48	45
*WB2ABD	"	3,045	39	35
*N2AMG	"	1,300	26	26
*KC2MBV	"	1,288	24	23
***N2YBB**	**21**	**294,512**	**416**	**316**
***KC2RXS**	**14**	**58,876**	**218**	**164**
***N2AET**	**3.5**	**32,040**	**142**	**90**
AA3B	**A**	**6,694,164**	**2586**	**873**
W3LL	"	2,860,650	1423	650
W3FV	"	2,387,976	1371	584
K3WW	"	1,360,838	956	467
NB3R	"	1,050,720	966	480
K3MD	"	850,522	794	446
NJ3I	"	540,568	608	343
KD3TB	"	461,616	572	354
NE3H	"	259,974	396	286
K3OK	"	237,297	390	249
N3XL	"	190,944	342	234
N3SQD	"	180,166	349	238
WA3AAN	"	177,525	338	225
AI3Q	"	163,894	321	227
N3YEA	"	133,476	320	196
NN3RP	"	118,803	312	199
W2GPS/3	"	106,578	242	191
N3DXX	"	88,976	216	166
W3UL	"	60,350	206	142
WW3QB	"	29,103	121	109
N3IYX	"	26,355	135	105
WI2E/3	"	21,414	99	83
N3NZ	"	21,312	115	96
N3YIM	"	19,580	103	89
W3DAD	"	10,472	63	56
KW3A	"	4,370	42	38
WA3FRP	**3.5**	**28,724**	**135**	**86**
WX3SKY	"	19,866	108	77
			(OP: K3RWN)	
WØBR/3	"	952	23	17
***WW3S**	**A**	**1,754,657**	**1239**	**577**
*KB3LIX	"	623,751	668	353
*WB3FIZ	"	563,304	632	392
*KA3QLF	"	411,897	576	309
*K3TN	"	249,630	410	265
*K3CWF	"	210,795	421	235
*N3QE	"	188,258	334	226
*WA1LWS/3	"	182,040	344	222
*N8NA/3	"	180,360	349	216
*N3WD	"	172,144	372	212
*WD3K	"	167,205	367	213
*W4EE/3	"	161,200	336	200
*KN3A	"	158,006	337	199
*W3BUI	"	156,005	339	205
*N3ALN	"	149,968	340	206
*WB9KPT/3	"	144,401	327	197
*NZ3M	"	144,352	313	208
*AA3LX	"	123,195	258	191
*K3PG	"	99,960	242	168
*W3KB	"	67,536	167	134
*N3UE	"	55,062	173	126
*W3AG	"	49,268	140	109
*K3TXT	"	49,250	149	125
*KZ3X	"	48,576	168	138
*N3CHX	"	47,502	194	126
*NC3P	"	38,841	144	107
*NA3F	"	36,047	160	113
*W3DSX	"	34,768	147	106
*K3FS	"	28,997	131	107
*N3OJL	"	25,542	100	86
*KR1ST/3	"	23,944	98	82
*N5IIT/3	"	21,760	110	85
*W3DQT	"	18,870	94	74
*KB3VNH	"	17,762	113	83
*N3AFT	"	13,858	109	82
*AB3IC	"	12,172	79	68
*WC3O	"	10,857	91	77
*N3ZP	"	8,036	50	49
*W3SFG	"	6,642	64	54
*N3RDV	"	4,200	42	40
*WA2VQV/3	"	3,528	48	42
*AD2L/3	"	2,911	48	41
*N3JNX	"	1,200	28	24
*ND3R	"	684	19	18
***NF3/NH7C**	**28**	**902**	**22**	**22**
			(OP: NH7C)	
***N3GH**	**21**	**107,847**	**252**	**207**
*KO3T	"	32,844	141	119
K4GMH	**A**	**6,969,456**	**2669**	**816**
W4PK	"	3,867,435	1899	715
WB4YDL	"	2,378,688	1570	624
WX4G	"	1,763,556	1180	562
W4GKM	"	1,674,672	1450	556
K4FX	"	1,291,290	1017	473
N4CW	"	1,035,900	821	450
W2YE/4	"	979,484	869	452
KR4LO	"	847,044	775	414
N6AR/4	"	756,105	686	399
AJ4RW	"	714,215	780	415
K4MGE	"	699,209	768	413
WW4R	"	687,834	701	371
			(OP: N4ZZ)	
W4UK	"	620,370	845	366
K4CX	"	602,504	804	371
N4LV	"	589,149	592	363
W6IHG/4	"	589,119	631	359
NB4M	"	549,664	661	356
AD4EB	"	507,186	651	342
AA4DD	"	488,865	661	299
NJ4F	"	376,948	536	286
WY4Y	"	318,900	509	300
			(OP: NS3Q)	
W4XMT	"	268,136	425	242
N4MM	"	239,560	349	265
N4DW	"	238,832	415	253
KT4U	"	206,082	325	214
N4PJ	"	204,856	346	232
K5EK/4	"	189,189	327	231
K7OM/4	"	185,679	398	207
K4SV	"	183,330	288	210
NC4MI	"	176,300	397	205
NS4X	"	168,696	375	213
W4VIC	"	165,726	298	198
NS9I/4	"	162,540	360	215
KC4HW	"	157,920	333	224
K4HAL	"	156,891	395	217
N4BCB	"	155,448	349	204
W1AJT/4	"	140,322	246	182
			(OP: VE3UTT)	
AJ4CG	"	133,380	350	190
W4BQF	"	111,556	215	167
W4CBX	"	109,350	266	162
KJ4DHB	"	104,922	256	201
K3KO/4	"	99,288	192	168
N4QS	"	98,610	214	173
AB4IQ	"	97,405	188	161
W4BCG	"	77,121	218	171
W4WWQ	"	70,179	195	149
W5XB/4	"	66,693	155	129
W4BCU	"	63,504	214	144
ND1Y/4	"	55,266	170	122
KB4C	"	51,456	176	128
			(OP: N4AA)	
AJ4FM	"	40,392	135	108
N3BM/4	"	34,100	121	100
AI4WW	"	32,635	137	107
WB4YDY	"	31,488	132	96
KR4F	"	27,888	112	112
KA1KIX/4	"	24,255	143	105
WJ2D/4	"	19,305	76	65
W4GHD	"	18,772	96	76
NQ1W/4	"	15,770	89	83
WB4MSG	"	11,616	84	66
K4RO	"	7,744	83	64
WA4NMS	"	7,515	48	45
WK4Y	"	5,566	46	46
NN4K	"	5,148	33	33
WA3OFC/4	"	5,136	52	48
KF4LMW	"	4,712	43	38
KB4FB	"	3,900	42	39
K4JGR	"	3,894	37	33
W4JS	"	3,298	35	34
WR4B	"	1,980	23	22
K7CS/4	"	1,512	22	21
N4MRM	"	1,188	22	22
K4FJ	**21**	**1,646,740**	**1128**	**601**
K4WW	"	307,004	389	284
KK9A/4	**14**	**2,400,510**	**1477**	**710**
NO4S	**7**	**1,963,648**	**977**	**529**
			(OP: K9OM)	
W4DXX	"	1,953,928	1005	523
***WE4M**	**A**	**3,430,000**	**1850**	**686**
			(OP: N2QT)	
*AB4SF	"	1,003,860	891	429
*N2WN/4	"	590,503	631	367
*K1GU/4	"	547,485	597	323
*W4GDG	"	535,370	640	341
*K7RE/4	"	512,988	707	372
*AB4GG	"	408,576	572	304
*W6SAI/4	"	358,720	590	295
			(OP: K4CWW)	
*W1CCE/4	"	280,367	486	251
*W4PJW	"	272,837	489	251
*AJ4A	"	266,418	357	246
*K4FPF	"	236,697	357	257
*KU4V	"	236,289	429	237
*KJ4WLN	"	183,556	359	218
*AK4GD	"	179,961	340	223
*AI4GR	"	140,532	307	196
*AA4FU	"	137,750	285	190
*KR4V	"	96,555	226	157
*K4FTO	"	95,312	283	161
*NZ4O	"	94,215	233	165
*KI4EEY	"	81,989	246	163
*WØQQG/4	"	79,704	256	162
*KM4JA	"	76,692	244	154
*KS4YX	"	68,850	251	150
*W7HJ/4	"	66,504	181	136
*KC4SAW	"	63,756	189	132
*KO4PU	"	63,315	248	135
*N4TL	"	59,160	194	145
*N4AU	"	58,499	183	137
*WA4DYD	"	53,444	201	124
*N4UEZ	"	53,406	203	129
*K4MIL	"	44,160	149	115
*NS2X/4	"	39,211	138	113
*NF4A	"	38,148	137	102
*N4ART	"	38,046	142	102
*KG4CUY	"	36,499	167	113
*K4KAY	"	36,288	143	112
*K5WP/4	"	31,770	130	90
*AB4G	"	29,568	142	96
*NA4X	"	29,280	135	96
*K4DZR	"	28,616	135	98
*KK4BJV	"	27,500	120	100
*W4ELP	"	27,072	125	94
*W4TSP	"	25,872	127	98
*N4LF	"	24,156	121	99
*W4BK	"	23,533	137	101
*KB4VC	"	22,440	112	88
*K4EDI	"	20,608	107	92
*KA4OTB	"	19,046	120	89
*K4SKA	"	17,480	118	92
*AD4TJ	"	15,656	101	76
*KC3EF/4	"	15,312	109	87
*KK4EIR	"	12,168	86	72
*KI4SP	"	11,850	97	75
*K4MTX	"	11,573	98	71
*K8ZZU/4	"	11,169	83	73
*WO4O	"	10,452	84	67
*VE3JDF/W4	"	10,430	91	70
*WB4KLJ	"	10,366	80	71
*WA8OJR/4	"	9,522	77	69
*NO4Y	"	9,028	75	61
*K1ZW/4	"	9,016	68	56
*KT4Q	"	8,673	70	59
*KM4RK	"	8,520	69	60
*KC4WQ	"	8,030	70	55
*KT4CB	"	7,070	80	70
*KJ4IZW	"	6,321	50	43
*WC4J	"	6,026	54	46
*AA1AR/4	"	5,778	59	54
*N4KHI	"	5,508	58	51
*KJ4VTH	"	4,859	46	43
*KE4KY	"	3,528	49	42
*KD6AKC/4	"	3,520	46	44
*KJ4WD	"	3,478	41	37
*N3TG/4	"	2,805	36	33
*KD4ICT	"	2,759	34	31
*N9KY/4	"	2,016	30	28
*KE1F/4	"	1,890	31	30
*AA4RP	"	1,173	23	23
*W4OC	"	1,081	24	23
*WB4OMM	"	980	14	14
*AJ4TG	"	576	18	18
*K4TNO	"	434	14	14
*K4VIG	"	108	9	9
*K8LF/4	"	1	1	1
***NA4W**	**28**	**111,100**	**306**	**202**
			(OP: K4WI)	
*KI4AJX	"	18,275	111	85
*KJ4UQS	"	7,296	74	57
			(OP: K4QD)	
*NI4NN	"	70	5	5
***N3CZ/4**	**21**	**29,304**	**116**	**99**
*AA4U	"	260	10	10
***W4LC**	**14**	**282,201**	**409**	**327**
*K4FT	"	5,194	61	53
*W4QQI	"	1,218	29	29
*W3NC/4	"	1,150	27	25
*NG4L	"	1	1	1
***WA1FCN/4**	**7**	**768,120**	**720**	**370**
*NF4GA	"	120,384	271	171
			(OP: KB4KBS)	
*W3NR/4	"	20,382	114	79
*AK4EM	"	8,200	61	50
***KS4S**	**3.5**	**54,516**	**203**	**118**
*NV4B	"	19,456	112	76
NR5M	**A**	**2,681,580**	**1716**	**660**
WA5ZUP	"	2,531,079	1977	639
K7IA/5	"	1,161,786	1190	454
AC4CA/5	"	997,706	1077	466
K6SXA/5	"	481,635	563	315
W5PF	"	387,075	544	325
K5WAF	"	274,386	406	282
KD5JAA	"	246,482	451	251
N5VU	"	191,815	416	227
K5GZR	"	154,822	333	199
AA5VU	"	132,288	338	192
W5MK	"	128,502	324	177
KE3D/5	"	81,344	249	164
KM5PS	"	23,415	128	105
KF5SA	"	15,936	104	83
W5KI	"	11,868	74	69
N5TY	"	6,630	57	51
N5NA	"	4,452	55	42
N5MOA	**28**	**7,550**	**52**	**50**
W5AP	**21**	**992,970**	**910**	**510**
N5ZM	**7**	**1,707,804**	**986**	**502**
***AD5XD**	**A**	**792,880**	**1072**	**374**
*WM5DX	"	571,356	721	354
*N5IJE	"	532,350	691	338
*N5KWN	"	505,506	823	346
*W3DQN/5	"	396,552	568	312
*W5GWH	"	372,771	581	291
*K5DHY	"	301,835	543	265
*WB5TUF	"	286,972	497	259
*NX5O	"	280,060	484	268
*W5JBO	"	260,205	523	249
*AD5LU	"	210,600	411	270
*NK5G	"	166,195	355	215
*WA9AFM/5	"	114,448	291	184
*KC5FP	"	102,949	296	191
*KK5JY	"	94,860	308	180
*AD5CA	"	94,355	258	167
*N5RN	"	79,868	303	164
*W5EK	"	65,142	206	141
*KE5OG	"	53,360	222	145
*W5PJW	"	49,476	208	133
*NX8G/5	"	49,140	210	135
			(OP: NX8G/5)	
*KB5HPL	"	45,540	155	115
*KY5M	"	44,649	183	123
*KE5RON	"	43,125	209	125
*AC5T	"	36,188	143	109
*K5PO	"	34,452	163	108
*W5APS	"	28,016	130	103
*W5PQ	"	23,490	141	87
*W5JNP	"	21,414	105	83
*KD5YUK	"	20,878	90	73
*AA5JG	"	20,152	108	88
*W5TTY	"	19,092	92	74
*AE5MM	"	14,678	108	82
*K5GY	"	14,430	90	74
*N5RMS	"	14,240	100	80
*K5DD	"	13,896	94	72
*N5AW	"	9,256	55	52
*W5WZ	"	5,640	81	60
*AA5CK	"	5,461	57	43
*AB5G	"	4,173	45	39
*K5HDE	"	3,432	45	39
*WA5BDU	"	2,698	47	38
*KB5AI	"	1,566	36	27
*N4YPT/5	"	1,450	25	25
*NM5M	"	324	14	12
*N5UM	"	156	12	12
***KD5JHE**	**28**	**5,104**	**61**	**44**
***K5OMC**	**7**	**24,864**	**114**	**84**
K6TU	**A**	**1,635,271**	**1407**	**517**
WQ6K	"	1,559,280	1519	534
			(OP: N6IE)	
N6QQ	"	1,509,158	1118	578
WX6V	"	1,076,850	970	450
W6SX	"	656,352	991	344
W6GJB	"	616,308	774	406
N2NS/6	"	535,808	724	322
N6ML	"	499,768	563	358
			(OP: @K6LRG)	
NN6NN	"	421,074	707	314
			(OP: W6XK)	
K6EU	"	394,348	582	311
NC6CC	"	366,915	605	305
K6ST	"	351,288	544	306
K6GT	"	348,688	527	296
K6LRN	"	326,906	542	298
WF6C	"	214,490	481	241
			(OP: N6XI)	
K6NV	"	170,912	467	218
W6SFK	"	144,320	384	205
KD6HQ	"	117,304	387	172
N3PV/6	"	117,195	379	195
K6DGW	"	85,671	328	167
W6OTC	"	76,437	272	171
NZ6E	"	71,400	216	140
W6TK	"	57,915	168	135
K6HGF	"	55,233	242	153
NF6A	"	51,837	165	111
			(OP: K6XX)	
K2RD/6	"	45,689	148	107
WB6JJJ	"	31,164	150	106
WB6BFG	"	23,800	104	85
W7UG/6	"	22,932	133	98
W5DQ/6	"	11,772	59	54
AF6SN	"	11,648	107	64
NQ6N	"	4,000	48	40
N6LN	"	1,215	28	27
AE6OU	"	720	18	16
N3FAW/6	"	210	14	14
W6PK	"	3	1	1
NG6S	**21**	**602,048**	**710**	**409**
			(OP: W4UAT)	
NK6A	"	107,590	331	203
W8KA/6	"	26,103	156	113
KG6YHH	**14**	**22,533**	**142**	**111**
W6WRT	**7**	**746,586**	**770**	**333**
***WN6K**	**A**	**655,713**	**929**	**369**
*W6UX	"	524,286	831	378
*W6FFH	"	279,936	501	288
*KO6LU	"	218,964	520	257
*KI6QDH	"	177,410	415	226
*N6DZR	"	159,278	332	217
*N6VH	"	118,125	305	175
*KE6QR	"	97,344	309	169
*KE6SHL	"	89,650	303	163
*K6LE	"	54,144	203	141
*K3FIV/6	"	47,040	158	120
*K6BIR	"	42,375	199	113
*K6TIG	"	38,533	155	113
*KK6TV	"	35,840	149	112
*AF6SA	"	35,310	136	107
*N6BHX	"	33,480	165	108
*N6BM	"	33,480	153	124
*N6DW	"	24,096	128	96
*KØXB/6	"	23,229	116	87
			(OP: KØXB/6)	
*KM6I	"	13,054	84	61
*KI6X	"	12,798	110	81
*AA6VX	"	12,282	93	69
*WT6K	"	11,242	95	73
*K6SIK	"	5,885	60	55
*NA6G	"	4,900	61	49
*NBØO/6	"	4,488	55	44
*N6FC	"	4,165	64	49
*AG6IP	"	1,508	31	26
*WW8L/6	"	544	16	16
*NQ6E	"	306	11	9
***K6OK**	**28**	**11,780**	**93**	**76**
***W6ONV**	**21**	**59,817**	**197**	**157**
KS7AA	**A**	**3,549,960**	**2312**	**692**
			(OP: WK6I)	
KZ7X	"	2,595,216	2061	624
			(OP: K6LL)	
KK7PR	"	1,460,490	1309	534
K7QQ	"	1,435,304	1348	481
W6AEA/7	"	937,359	1081	447
NG7Z	"	826,804	1143	437
K7AR	"	822,424	781	446
WO7V	"	699,744	1081	394
W7WW	"	678,546	848	447
KF7PG	"	645,258	784	366
W7PP	"	453,440	628	320
KY7M	"	447,279	660	361
WU6W/7	"	352,536	679	296
W7LD	"	303,325	681	275
KV7DX	"	272,816	611	272
			(OP: AA7V)	
W7VXS	"	254,856	594	287
KD7MSC	"	215,020	550	260
KS7S	"	192,114	402	234
K7HP	"	186,369	382	219
KO7X	"	183,183	466	231
K7MKL	"	168,103	308	193
NO7T	"	151,424	324	224
K7EIQ	"	130,611	301	197
K7VC	"	108,076	267	164
K7LFY	"	95,592	294	168
W7LKG	"	92,020	263	172
W7PU	"	91,020	352	205
KT7G	"	79,560	209	156
KB7N	"	78,648	278	174
W6NF/7	"	70,905	177	145
N7RO	"	39,729	173	123
N7MQ	"	33,720	130	120
NQ6C/7	"	31,928	127	104
W7YES	"	31,270	128	106
K6UFO/7	"	22,260	94	84
			(OP: @NN7SS)	
KT7E	"	8,122	88	62
N7ZA	"	5,670	45	45
K7LV	"	5,628	46	42
KI7Y	"	5,250	52	42
KK7CG	"	960	27	24
AA7FY	"	850	28	25
W7WHY	"	722	20	19
KD7JG	"	546	15	14
K7OX	**28**	**126,902**	**419**	**214**
K7XC	**21**	**197,955**	**394**	**265**
K7WP	"	8,662	74	61
W7ZRC	"	518	14	14
K7AWB	**14**	**827,938**	**903**	**503**
NC7J	"	531,576	834	414
			(OP: W7CT)	
WG7X	"	141,840	427	240
K7ZO	**7**	**24,360**	**116**	**84**
W6RLL/7	**3.5**	**37,572**	**158**	**101**
***AD7JP**	**A**	**1,835,437**	**1414**	**577**
			(OP: K2PO)	
*WS7V	"	421,120	645	329
*K7VIT	"	322,848	594	288
*K7TQ	"	318,512	560	272
*KW7N	"	316,394	605	283
*WT6P/7	"	295,372	543	274
*W7WEC	"	281,728	478	284
*WB3JFS/7	"	281,165	578	265
*K7GS	"	252,566	494	293
*N7VEA	"	245,024	495	247
*WAØWWW/7	"	183,840	371	240
*K7JE	"	178,000	367	250
*N7ESU	"	172,380	417	221
*KX7L	"	150,489	369	207
*AD7MQ	"	115,639	281	197
*KE7AUB	"	104,155	297	185
*WG7Y	"	78,120	328	180
*WA7SHP	"	59,160	200	136
*W7SUR	"	48,279	246	133
*KF7GNI	"	46,228	198	127

*K6UM/7	"	44,286	168	121
*WA7YAZ	"	40,005	160	127
*KD7PCE	"	38,227	155	127
*W7TSQ	"	36,449	188	127
*K7TM	"	35,280	174	120
*K7AKP	"	33,345	184	117
*W7YAQ	"	32,340	126	110
*K6WSC/7	"	30,690	129	110
*K7VK	"	29,640	130	104
*KX7YT	"	25,038	140	107
*K7HPT	"	22,848	150	102
*WA1PMA/7	"	21,408	109	96
*K7ARJ	"	20,230	104	85
*WB7CYO	"	17,856	122	93
*N6PZ/7	"	17,765	121	85
*WA7BME	"	14,697	102	69
*W4JLS/7	"	13,968	110	72
*N1JM/7	"	6,210	57	45
			(OP: N1JM/7)	
*K7FLI	"	5,760	57	48
*K6IMZ/7	"	4,876	56	46
*KV4K/7	"	3,280	48	41
*AD7OG	"	3,185	53	49
*AC7GP	"	2,982	45	42
*K7BBR	"	2,847	40	39
*WS7I	"	2,508	26	22
*WV7P	"	2,156	34	28
*AC6N/7	"	1,820	28	26
*KX7DX	"	1,728	24	24
*K7CCC	"	968	23	22
*AF7S	"	665	19	19
*W7MEW	"	608	16	16
*K9WZB/7	"	220	12	10
***W7OM**	**28**	**40,334**	**199**	**134**
*KC7V	"	2,079	36	33
*K7ULS	"	60	5	4
***W1ZD/7**	**14**	**315,595**	**560**	**355**
*WA7LNW	"	84,294	342	189
KU1T/8	**A**	**3,229,824**	**1729**	**647**
N8BJQ	"	2,268,125	1360	625
W8JWN	"	1,183,888	1107	488
K8UT	"	833,700	797	397
AA8R	"	759,116	822	404
KE8M	"	668,043	665	373
K3GP/8	"	615,524	657	364
WV8BD	"	406,580	516	290
			(OP: W8AKS)	
ND8L	"	327,957	437	291
K8DV	"	218,300	418	236
KK8U	"	204,300	350	225
			(OP: K8MM)	
K9NW/8	"	197,340	322	230
K8BZ	"	99,372	246	182
N8AGU	"	81,224	176	143
WA8RPK	"	72,160	237	164
AE8U	"	58,280	192	124
K8CR	"	36,630	168	110
W8TA	"	22,932	102	91
K8AO	"	18,445	94	85
AJ8B	"	8,742	51	47
N8DP	"	2,821	33	31
KB8ZYE	"	1,239	24	21
K8ESQ	"	646	19	19
***WB8TLI**	**A**	**261,214**	**367**	**262**
*KK8MM	"	259,435	439	265
*KB8UHN	"	237,744	393	254
*WS6K/8	"	228,420	444	235
*KJ8O	"	132,104	268	196
*W8HY	"	116,375	301	175
*K8SIA	"	104,894	255	179
*AC8DU	"	89,512	269	167
*K8TJM	"	88,183	243	163
*KC8RPV	"	87,450	250	159
*WD8KNC	"	87,285	257	165
*KN8DMK	"	72,380	222	154
*N8GU	"	68,310	216	138
*N8BB	"	50,568	193	129
*N8VV	"	48,444	191	132
*K8QH	"	48,216	169	123
*KE8UM	"	48,076	181	119
*K3JT/8	"	46,364	155	134
*WB8IEA	"	37,343	161	107
*N2OPW/8	"	33,800	136	100
*W8IDM	"	25,245	147	99
*WW8OH	"	20,580	97	84
*WB8MIW	"	17,304	105	84
*W8WTS	"	15,476	101	73
*N8WS	"	15,385	103	85
*K8GT	"	14,413	79	71
*AA8EN	"	13,528	99	76
*K8DXR	"	10,360	95	70
*KD8D	"	7,923	62	57
*K8RJW	"	7,018	70	58
*AF8C	"	6,496	72	58
*NF8M	"	2,592	37	32
*W8HMK	"	391	21	17
***KD8RKP**	**28**	**36,698**	**152**	**118**
*WB8JUI	"	7,370	71	55
***AC8JW**	**21**	**98,980**	**241**	**196**
***WG8Y**	**14**	**27,346**	**122**	**113**
***K8SM**	**7**	**407,824**	**458**	**284**
*K8AJS	"	194,616	383	204
***KC8IMB**	**3.5**	**31,872**	**153**	**96**
AI9T	**A**	**3,179,754**	**1812**	**723**
N2BJ/9	"	2,062,620	1299	630
W9IU	"	1,963,484	1277	548
K9QC	"	1,172,841	1010	501
KE9I	"	1,135,385	1006	485
K9DJ	"	738,924	816	417
AJ9C	"	483,564	595	354
WM9Q	"	466,180	593	326
KT9L	"	322,280	506	280
WB9TFH	"	313,536	498	276
N9AKR	"	290,460	452	309
K9BJM	"	166,428	338	201
N9FN	"	163,200	284	204
WA9IVH	"	103,952	281	178
N9OK	"	97,893	272	149
W9PDS	"	67,098	209	159
WB9B	"	59,780	168	122
NA9A	"	25,454	100	89
W9II	"	7,535	58	55
N7GVV/9	"	7,208	56	53
NR9J	"	325	13	13
W9AKS	**7**	**55,692**	**170**	**119**
***K9NR**	**A**	**2,055,760**	**1319**	**560**
*N9CK	"	510,230	636	370
*KD9MS	"	309,474	492	297
*N9YKE	"	264,940	437	260
*KA9MOM	"	221,358	429	237
*W9VQ	"	209,560	344	260
*W9OA/9	"	173,664	283	216
			(OP: W9OA/9)	
*K9JU	"	145,950	286	210
*N9TF	"	130,845	261	195
*WR9Y	"	120,484	305	182
*N9LYE	"	103,596	278	178
*N9LAH	"	80,640	228	160
*W9LHG	"	79,210	239	178
*KB9OWD	"	76,880	246	155
*K9PY	"	71,484	189	148
*KB9DVC	"	68,080	208	148
*N9LJX	"	61,125	161	125
*N5IE/9	"	55,572	208	132
*WB9WOZ	"	45,312	182	118
*WB0PTO/9	"	36,580	148	118
*KC9RNK	"	35,420	160	110
*N9BT	"	34,521	157	111
*WD9HBA	"	27,248	132	104
*K9PLX	"	21,755	134	95
*ND9Z	"	15,620	96	71
*N9SB	"	12,994	81	73
*AA9UF	"	8,600	51	50
*KU8T/9	"	8,235	74	61
*W9OO	"	6,372	69	59
*NO9A	"	2,310	37	33
*KB9YGD	"	2,250	39	30
*NV9X	"	2,211	33	33
*N0ATQ/9	"	2,178	36	33
*KY9J	"	1,860	33	30
***W9ILY**	**21**	**298,185**	**409**	**309**
*KB9S	"	22,790	131	106
***N9UY**	**14**	**1,952**	**37**	**32**
AB0RX	**A**	**2,354,669**	**1789**	**599**
KØKX	"	1,213,104	838	508
KØALT	"	1,065,764	1077	476
KV1E/Ø	"	768,600	887	427
AC0C	"	725,076	968	396
WØEM	"	603,470	1010	370
KSØAA	"	578,360	733	380
KØCN	"	472,890	658	330
NEØU	"	397,290	549	323
K7SCX/Ø	"	318,060	558	270
AAØAW	"	308,994	529	294
KØRU	"	272,406	496	249
NØAT	"	272,082	495	274
KØTG	"	245,448	523	252
KØJPL	"	225,170	392	230
KØWA	"	200,772	446	234
NØGZ	"	194,215	367	217
NØBK	"	161,200	302	208
KØVG	"	156,699	371	207
WBØN	"	145,416	250	249
WØGM	"	124,600	294	178
WØBH	"	120,365	350	181
WØHW	"	112,658	282	182
W4RK/Ø	"	105,492	297	177
WAØJH	"	101,460	328	190
K5ZG/Ø	"	84,315	291	165
WMØL	"	61,172	237	164
KU1CW/BY4DX	*	57,663	159	129
KDØS	"	55,375	205	125
KØJJR	"	50,697	182	129
KV6O/Ø	"	49,407	216	129
WBØKGN	"	47,580	157	122
WØTY	"	34,561	128	107
WØHBH	"	31,003	114	103
K6XT/Ø	"	23,112	132	108
KØRC	"	21,360	106	89
WAØMHJ	"	20,680	103	88
ACØB	"	19,437	109	93
K4IU/Ø	"	15,309	103	81
KA1HC/Ø	"	8,320	74	64
NIØB	"	5,002	42	41
KØYR	"	4,704	49	42
KØAP	"	544	19	17
KØJE	"	490	16	14
KØPK	**7**	**428,040**	**536**	**290**
***NØXR**	**A**	**2,136,111**	**1708**	**571**
			(OP: @NØNI)	
*NTØF	"	1,176,144	1169	458
*WBØSOK	"	318,864	463	292
*WGØM	"	311,310	566	270
*KØCMA	"	284,250	543	250
*AD1C/Ø	"	251,328	466	272
*KØVM	"	224,158	445	253
*KSØM	"	215,339	381	239
*WØOVM	"	213,063	426	237
*KIØJ	"	166,057	381	211
*KD4POJ/Ø	"	145,040	489	196
*WØCO	"	144,364	328	187
*WTØO	"	133,455	361	217
			(OP: KØTI)	
*WBØQLU	"	115,335	325	165
*NØARU	"	105,020	301	178
*WBØPYF	"	104,562	271	157
*WØRAA	"	102,410	410	190
*NØOK	"	98,943	272	177
*WØSM	"	88,922	326	173
*KFØUR	"	86,112	404	184
*WAØLJM	"	72,960	269	160
*WBØULX	"	64,779	203	143
*NR9A/Ø	"	61,608	188	136
*KAØEIC	"	60,656	225	136
*KSØT	"	58,674	234	154
*KCØJRW	"	52,400	227	131
*ABØYM	"	46,494	205	126
*K1ING/Ø	"	42,768	197	132
*NØIU	"	37,403	137	113
*WCØV	"	35,400	174	118
*WØERP	"	35,369	131	113
*KØAD	"	35,256	206	113
*KDØCVO	"	32,768	182	128
*NØHJZ	"	32,249	177	119
*KOØZ	"	29,886	143	102
*WAØGUD	"	28,968	148	102
*NØAJN	"	27,225	153	99
*NØUX	"	20,295	129	99
*KØMPH	"	20,060	105	85
*WBØWIV	"	18,796	100	74
*KØLAF	"	15,038	106	73
*KQØJ	"	14,490	77	70
*KCØDEB	"	13,532	75	68
*KBØNHW	"	12,045	107	73
*KJØP	"	11,385	81	69
*WØDC	"	8,520	86	60
*WØTUP	"	7,021	68	59
*ACØE	"	6,322	66	58
*NØTK	"	6,006	50	42
*KØFBV	"	5,763	71	51
*KC5ZFZ/Ø	"	3,827	48	43
*WØDYD	"	3,784	53	44
*WØGAF	"	3,744	52	39
*KIØHA	"	3,686	41	38
*KØFYI	"	3,290	35	35
*NØQP	"	2,730	47	39
*ADØDX	"	2,627	46	37
*NØAX	"	1,988	31	28
*KØURN	"	1,643	41	31
***WØSHL**	**28**	**13,984**	**87**	**76**
***WNØL**	**21**	**298,851**	**458**	**321**
*KFØIQ	"	1,152	25	24
*N9DRB/Ø	"	1	1	1
***WØRX**	**14**	**12**	**2**	**2**
***KEØL**	**7**	**29,808**	**130**	**92**
Alaska				
KL7RA	**A**	**1,815,249**	**1393**	**543**
AL9A	"	1,080,200	1012	440
KL5E	"	219,960	394	235
WL7E	"	33,264	130	88
KL2R	**21**	**432,729**	**658**	**297**
			(OP: N1TX)	
***KL8DX**	**A**	**614,570**	**728**	**370**
*AL1G	"	137,922	369	181
*KL7AC	"	32,825	160	101
***WL7BDO**	**21**	**47,117**	**164**	**127**
Canada				
VE9MY	**A**	**52,780**	**127**	**116**
VY2MP	"	25,830	104	90
VY2LI	**21**	**711,552**	**703**	**408**
VY2SS	**7**	**498,688**	**438**	**256**
***VE1ZD**	**A**	**89,838**	**221**	**161**
*VO1OR	"	43,160	145	104
*VE9NC	"	20,400	102	80
***VE1OP**	**21**	**102,680**	**211**	**170**
VA2AM	**A**	**3,402,056**	**1557**	**632**
VE2FXL	"	1,801,086	1087	518
VE2FK	"	1,582,700	987	475
VE2SG	"	170,748	318	204
VE2EZD	"	76,112	201	134
***VA2UP**	**A**	**5,032,339**	**1988**	**743**
*VE2AXO	"	828,704	740	376
*VE2EBK	"	603,480	618	321
*VA2WA	"	276,816	366	237
			(OP: VA2WDQ)	
*VE2QV	"	47,652	157	114
*VE2KY	"	23,352	106	84
*VE2KOT	"	15,096	90	68
*VE2DJC	"	4,485	42	39
***VC2E**	**3.5**	**447,876**	**483**	**234**
			(OP: VE2SB)	
VA3DX	**A**	**3,723,709**	**1669**	**673**
VE3EK	"	1,902,852	1176	567
VE3RZ	"	1,145,016	792	456
VE3MV	"	371,448	514	252
VA3PC	"	135,072	234	201
VA3DZ	"	5,699	46	41
VE3CX	"	4,992	46	39
VA3XH	"	2,754	35	34
***VE3TL**	**14**	**181,302**	**300**	**246**
***VE3KI**	**A**	**1,429,823**	**1016**	**439**
*VE3FH	"	738,704	704	337
*VE3XAT	"	641,190	635	330
*VE3AJ	"	579,942	594	319
*VE3JI	"	556,742	540	331
*VE3DZ	"	368,072	441	278
*VA3MJR	"	240,118	375	211
*VE3RCN	"	152,256	287	183
*VE3CGR	"	134,608	274	179
*VE3FWF	"	57,834	183	119
*VE3FJ	"	56,496	206	132
*VA3WU	"	18,722	84	74
*VE3WA	"	11,343	60	57
*VA3FN	"	3,680	44	40
***VE3IAE**	**14**	**266,760**	**401**	**285**
***VE3YF**	**7**	**80,640**	**135**	**120**
***VE3MGY**	**3.5**	**33,372**	**110**	**81**
VE4EAR	**A**	**2,519,397**	**1383**	**621**
VE5MX	**A**	**1,154,131**	**975**	**439**
VA5LF	"	391,389	585	283
***VE5UO**	**A**	**59,754**	**210**	**138**
VE6CMV	**A**	**23,250**	**124**	**93**
VE6FN	"	11,252	72	58
***VE6SQ**	**A**	**464,400**	**642**	**270**
*VE6AMI	"	10,890	71	66
*VE6AX	"	9,062	58	46
***VE6BMX**	**28**	**183,248**	**441**	**208**
VE7CC	**A**	**4,932,015**	**2248**	**781**
VA7KO	"	1,302,094	1165	458
VA7GEM	"	342,250	579	250
VE7SQ	"	162,588	315	204
VE7AX	"	144,142	297	194
VE7CF	"	121,899	322	179
VA7RN	"	111,655	244	163
VE7HBS	"	12,870	103	65
***VA7ST**	**A**	**858,030**	**818**	**370**
*VE7BSM	"	284,664	529	232
*VE7LGP	"	22,185	104	85
*VE7FCO	"	8,352	65	58
***VE7BC**	**28**	**7,685**	**70**	**53**
N6QEK/VY1	**A**	**93,318**	**285**	**151**
			(OP: N6QEK)	
Cuba				
***CO2IZ**	**A**	**384,256**	**447**	**304**
*CO2GL	"	366,647	553	269
*CO2WL	"	266,770	355	259
*CO2MS	"	244,860	410	220
*CO2OQ	"	105,672	268	148
*CO6HZ	"	66,254	211	157
*CO2JW	"	37,810	124	95
*CO2ZK	"	6,885	49	45
***CO6EC**	**28**	**588**	**17**	**14**
***CO2CW**	**21**	**301,600**	**491**	**290**
*CM3RPN	"	229,750	434	250
*CO6LP	"	30,336	156	96
***CO2AJ**	**14**	**61,950**	**207**	**150**
*CO8TW	"	48,000	195	120
***CO2JD**	**7**	**419,136**	**448**	**236**
*CO2XPR	"	8,448	57	44
Dominican Republic				
HI8PJP	**14**	**107,334**	**287**	**178**
***HI8PLE/7**	**A**	**1,795,311**	**1242**	**531**
			(OP: HI8PLE/7)	
Grenada				
***J39BS**	**28**	**257,217**	**493**	**249**
Guadeloupe				
FG5LA	**21**	**330,300**	**465**	**300**
***FG1PP**	**A**	**3**	**1**	**1**
***FG4NO**	**28**	**348,721**	**534**	**281**
Guatemala				
TG9ADQ	**14**	**14,981**	**108**	**71**
***TG9AJR**	**28**	**55,806**	**193**	**131**
Jamaica				
6Y1X	**A**	**29,204**	**112**	**98**
Martinique				
FM/F6AUS	**A**	**1,575,842**	**1108**	**499**
Mexico				
XE1MM	**A**	**714,951**	**808**	**339**
XE1IB	"	134,550	286	195
XE1V	"	29,568	131	88
XE1EE	**21**	**355,880**	**507**	**310**
XE1GRR	**3.5**	**2,808**	**27**	**27**
***XE2FGC**	**A**	**728,295**	**828**	**345**
*XE1CT	"	125,125	287	175
*XE2AU	"	101,108	254	157
*XE2B	"	90,300	230	150
*XE1SVT	"	15,438	82	62
*XE1HJL	"	14,912	78	64
*XE1GZU	"	3,420	41	38
***XE1ZTW**	**28**	**5,670**	**53**	**45**
***XE2X**	**21**	**25,080**	**134**	**88**
***XE3N**	**7**	**92,004**	**177**	**123**
***XE1L**	**3.5**	**27,792**	**98**	**72**
Puerto Rico				
***KP4JFR**	**A**	**297,600**	**364**	**240**
*WP3GW	"	85,848	179	147
*NP3IR	"	13,090	61	55
***NP3YL**	**28**	**36,960**	**143**	**112**
U.S. Virgin Islands				
***KP2DX**	**A**	**144,536**	**330**	**178**
			(OP: KP2BH)	

AFRICA

Canary Islands				
EA8CNB	**21**	**475,616**	**484**	**334**
EA8ZS	**7**	**224,770**	**235**	**169**
***EC8CQ**	**A**	**1,190,748**	**915**	**442**
*EA8OM	"	709,962	562	341
			(OP: DJ1OJ)	
*EA8AQV	"	421,011	418	279
*EA8BQM	"	186,516	320	198
*EA8CYQ	"	32,825	116	101
***EA8MT**	**28**	**1,271,430**	**937**	**459**
Madeira Islands				
CT3HF	**A**	**124,700**	**235**	**172**
CT3DZ	**28**	**25,347**	**130**	**71**
CT3EN	**14**	**500,202**	**503**	**354**
***CT3KY**	**A**	**78**	**6**	**6**
***CT3BD**	**21**	**137,084**	**283**	**172**
Mauritius				
3B8/SP2FUD	**A**	**432**	**12**	**12**
			(OP: SP2FUD)	
Morocco				
***5C5W**	**A**	**5,518,968**	**1916**	**728**
			(OP: CN8KD)	
*5C2P	"	736,205	685	365
Senegal				
6V7S	**A**	**3,629,730**	**1732**	**681**
			(OP: RK4FF)	
South Africa				
ZS2EZ	**A**	**889,410**	**747**	**345**
ZS1LS	"	543,895	550	319
***ZS1JY**	**A**	**70,112**	**152**	**112**
Sudan				
ST2AR	**A**	**4,219,919**	**1876**	**671**
Tanzania				
5H3EE	**7**	**19,040**	**58**	**56**
Tunisia				
***3V8SS**	**14**	**75,320**	**182**	**140**
			(OP: KF5EYY)	

ASIA

Armenia				
***EK3GM**	**A**	**18,386**	**66**	**58**
Asiatic Russia				
R9DX	**A**	**7,508,149**	**2628**	**773**
RG9A	"	7,196,016	2554	761
RA9SKL	"	1,809,868	995	446
UA9TF	"	1,138,228	873	413
R9SA	"	833,112	647	378
RA9AAA	"	213,044	311	221
RM9T	"	212,859	291	201
RW9MZ	"	154,020	270	204
RN9CM	"	45,468	132	108
R9CD	"	42,600	122	100
RY9C	**28**	**641,512**	**703**	**356**
UA9UR	"	94,860	219	155
RK8I	**21**	**620,080**	**657**	**368**
UA90G	"	466,704	561	336
RA9UN	"	220,575	353	255
RK9AX	**7**	**78,840**	**141**	**108**
***RT9S**	**A**	**2,201,248**	**1229**	**496**
*UA9AL	"	1,321,074	864	414
*UA9AFS	"	1,000,008	788	408
*RU9AZ	"	485,406	504	303
*UA9UDX	"	391,016	476	296
*RA9CUU	"	315,268	403	269
*RK9AK	"	254,380	330	230
*RK9UE	"	224,037	363	219
*R9UG	"	214,674	329	222
*RK9AN	"	201,144	299	204
*RA9DP	"	101,774	219	151
*RX9CNN	"	62,244	155	126
*UA9AX	"	28,620	102	90
*RG8U	"	17,936	81	76
*UA9OV	"	9,774	59	54
***RA9RR**	**28**	**208,373**	**352**	**209**
*RW9C	"	60,515	164	133
***RA9SGV**	**21**	**151,844**	**291**	**203**
*UF8T	"	130,217	256	197
***RV9CP**	**14**	**733,080**	**656**	**410**
*UA9UKL	"	96,624	211	176
*RZ9UF	"	34,736	151	104
*RA9AFZ	"	28,684	111	101
***RK9UM**	**3.5**	**35,392**	**93**	**79**
UAØCA	**A**	**3,581,127**	**1581**	**671**
UAØAGI	"	2,257,760	1248	548
UCØA	"	1,744,980	1119	508
RØFA	"	1,452,575	1041	485
UAØYAY	"	1,077,524	823	406
UAØSR	"	982,114	801	413
RWØAQ	"	960,024	897	408
RAØACM	"	606,060	655	364
RXØAE	"	482,816	548	328
RØQA	"	386,397	491	297
RTØQ	"	360,815	493	305
RUØLL	"	284,756	367	257
UAØAKY	"	256,880	351	247
RWØBG	"	161,247	227	177
RXØAK	"	115,206	249	182
UAØCW	"	1,386	23	21
UAØBA	"	3	1	1
UAØSW	**28**	**6,936**	**66**	**51**
RWØUU	**21**	**210,166**	**398**	**233**
UAØQBR	**14**	**27,072**	**108**	**96**
RXØAT	**3.5**	**84,006**	**132**	**117**
***RWØSR**	**A**	**611,712**	**614**	**354**
*UAØCNX	"	538,335	630	315
*UAØIT	"	109,953	243	171
*RXØSC	"	98,210	213	161
*RDØCD	"	68,040	203	140
*RAØWHE	"	63,000	170	140
*RAØANO	"	2	1	1
***RWØAJ**	**21**	**9,405**	**67**	**57**
***RXØSA**	**14**	**53,793**	**173**	**139**
***RAØAY**	**7**	**21,824**	**68**	**62**
Asiatic Turkey				
TA7AO	**A**	**427,479**	**499**	**291**
***TA7I**	**A**	**1,456,730**	**891**	**418**
***TA1FA/2**	**28**	**570**	**19**	**15**
Azerbaijan				
***4K7Z**	**A**	**88,939**	**199**	**151**
			(OP: 4K6DI)	
China				
BA7IO	**A**	**1,494,384**	**1145**	**489**
BD4QH	"	308,256	513	247
BD1BYV	"	124,440	277	183
BA4EO	"	6,346	50	38
BD7LMD	**21**	**313,302**	**455**	**282**
***BH7PFH**	**A**	**173,271**	**324**	**223**
*BA1PK	"	156,060	261	180
*BD3CB	"	143,399	340	193
*BA5HAM	"	102,145	251	155
*BD7IS	"	91,392	208	168
*BD4LU	"	35,420	137	115
*BD4UN	"	28,350	104	90
*BA4SD	"	27,324	115	92
*BH4SGR	"	24,464	115	88
*BG6CJR	"	19,360	88	80
*BD2IAQ	"	16,302	90	66
*BA5AB	"	13,992	74	66
*BH1LHS	"	12,276	91	62
*BD1LEN	"	8,084	55	43
*BD2UYY	"	5,334	53	42
*BD6OT	"	688	21	16
*BI7JMD	"	420	16	15
*BD6NB	"	310	10	10
***BG8GAM**	**28**	**384**	**12**	**12**
***BD3RQ**	**21**	**170,277**	**343**	**211**
*BH4SHG	"	120,714	294	177
*BD7OXR	"	55,044	198	132
*BA4MY	"	31,724	133	103
*BD6JPV	"	29,890	137	98
*BD6IC	"	29,596	143	98
*BG9ABA	"	8,265	66	57
*BG6KYQ	"	3,960	50	40
***BD6PA**	**14**	**68,524**	**201**	**148**
*BG4QNE	"	13,440	75	70
*BD4QA	"	8,892	88	52
***BD6AHU**	**7**	**11,792**	**61**	**44**
Cyprus				
5B4AIF	**A**	**2,893,968**	**1249**	**567**
***1B1AB**	**A**	**30,780**	**119**	**95**
Georgia				
***4L9QQ**	**3.5**	**54,498**	**104**	**93**
Hong Kong				
VR2XLN	**28**	**107,047**	**275**	**167**
***VR2VIY**	**A**	**5,461**	**53**	**43**
***VR2XMT**	**21**	**882**	**24**	**18**
India				
***VU2NKS**	**A**	**102,237**	**225**	**159**
*VU2RMS	"	73,682	176	133
*VU2PTT	"	45,864	144	117
*VU2ABS	"	2,727	31	27
Israel				
4Z5KU	**A**	**564,436**	**479**	**292**
***4Z5MY**	**A**	**68,666**	**172**	**139**
Japan				
JM1XCW	**A**	**2,402,476**	**1235**	**596**
JA1OVD	"	1,249,424	851	458
JE1LFX	"	1,183,428	853	463
JF1OPL	"	501,696	514	312
JA1AYO	"	386,568	464	273
JG1IEF	"	382,044	429	316
JO1WKO	"	257,465	304	221
JA1IZZ	"	217,782	330	222
JA1PVX	"	179,118	315	214
JA1TMG	"	160,215	275	165
JO1VRV	"	152,523	289	189
JF1RWZ	"	148,580	263	190
JN1RQV	"	123,580	230	185
JA1WPX	"	93,744	198	168
JP1TRJ	"	82,390	188	154
JA1QZC	"	65,330	172	139
JE1HRC	"	46,920	154	120
JA1XS	"	40,948	133	116

JH1EEB	"	39,312	132	112
JH1EIG	"	13,950	66	62
JA1WSK	"	9,576	59	56
JA1XUY	"	9,256	64	52
JA1RZD	"	6,880	49	43
JE1CKA	"	6,250	59	50
7L4IOU	28	39,444	156	114
JI1LET	"	15,549	87	71
JO1COV	21	629,031	598	381
JS1OYN	"	241,171	356	263
JL1SAM	"	79,476	190	148
JA1BPA	"	20,520	102	72
JR1BAS	14	125,600	234	200
JH1RFM	"	70,924	178	149
JA1SJV	7	7,676	40	38
*JA1BJI	A	1,116,098	868	437
*JI1RAK	"	872,256	727	413
*JP1QDH	"	665,260	630	370
*7K4QOK	"	483,520	544	320
*7N2UQC	"	350,460	455	270
*JE1SGH	"	246,240	382	240
*JA1HFY	"	199,056	355	208
*JH1DGQ	"	181,260	299	212
*JA1DDZ	"	165,360	301	208
*JA1BWA	"	153,797	299	173
*JA1MZM	"	137,085	267	195
*JA1IZ	"	131,788	241	188
*JH1FNU	"	122,655	251	185
*JA1XRH	"	121,792	238	173
*JA3MIO/1	"	99,430	213	163
*JG1WNO	"	94,642	193	158
*JA1HOM	"	80,181	195	151
*7M1MCY	"	66,660	179	132
*7K4VPV	"	64,719	171	141
*JA1EMQ	"	55,428	153	124
*JI1SAI	"	50,022	148	126
*JA1AZR	"	42,984	141	108
*JN1MSO	"	42,718	146	106
*JJ1KZZ	"	35,048	122	104
*JA1IE	"	34,476	139	102
*JI1LAT	"	29,694	114	98
*7K1PYG	"	26,709	122	87
*JH1RRP	"	20,640	92	80
*JF1VRU	"	19,039	104	79
*JA1BFN	"	11,592	61	56
*JH1QQN	"	10,759	64	53
*JA1CPZ	"	9,576	59	57
*JP1HUJ	"	8,235	52	45
*JI1EWK	"	7,599	57	51
*JF1VNR	"	6,815	59	47
*7M4OOS	"	5,850	54	45
*JP1GVC	"	4,914	48	42
*JQ1DTT	"	4,840	49	44
*JG1RZH	"	4,092	33	31
*JA1PCM	"	2,175	30	29
*JK1NSR	"	1,302	22	21
*JA1OHP	"	850	17	17
*7K3OZQ	"	800	17	16
*JA1PTO	"	728	17	14
*JA1VRU	"	616	15	14
*7N4QCQ	"	168	8	8
*JI1DSU	"	144	9	8
*JL1BYZ	21	110,340	230	180
*JI1ALP	"	29,280	116	96
*7L3DGP	"	27,448	110	94
*JG1ALA	"	13,724	78	73
*JF1PYJ	"	11,773	69	61
*JG1APX	"	5,848	53	43
*JA1UVO	"	3,135	37	33
*JE1GZB	"	752	17	16
*JF1TEU	14	14,040	84	72
*JS1IFK	"	6,419	53	49
*JK1LUY	"	250	10	10
*JH8SEG/1	7	1,404	19	18

JA2FSM	A	273,535	426	241
JA2VHO	"	193,487	319	211
JH2XYO	"	190,299	316	229
JA2HOL	"	119,660	231	193
JR2PMT	"	95,325	206	155
JF2OZH	"	14,555	76	71
JF2FIU	"	3,636	39	36
JJ2IBN	"	1,083	19	19
JA2AYH	"	816	17	17
JA2CPD	"	10	2	2
JH2FXK	21	5,699	49	41
JF2IWL	3.5	2,576	47	28
*JE2UFF	A	235,172	345	227
*JA2HNP	"	134,524	232	169
*JA2QVP	"	113,399	241	169
*JA2AXB	"	81,375	196	155
*JA2GHP	"	57,728	169	128
*JR2MIN	"	44,694	142	117
*JA2CUS	"	32,655	124	105
*JE2DOD	"	18,542	96	73
*JA2VHG	"	16,350	79	75
*JE2TLZ	"	12,328	67	67
*JG2KFI	"	8,855	64	55
*JK2KNR	"	8,428	62	49
*JA2HBK	"	6,987	52	51
*JR2FWQ	"	3,196	37	34
*JA2IXS	"	2,604	32	31
*JN2TTQ/2	"	2,349	37	29
*JH2MYN	28	10,143	74	63
*JP2MRD	21	38,627	139	107
*JG2NLN	"	11,529	68	61
*JE2BOM	"	3,774	39	37
*JR2AAN/2	"	310	11	10
*JA2RPZ	14	40	4	4
*JA2HYD	7	21,472	72	61
*JR2PAU	"	10,800	47	45
*JJ2DWL	"	6,256	42	34

JS3CTQ	A	904,736	760	392
JA3QOS	"	242,750	329	250
JN3SAC	"	148,213	262	169
JA3AVO	"	15,912	77	72
JO3QVT	"	798	19	19
*JA3IKG	A	256,184	374	248
*JH3CUL	"	251,694	358	237
*JF3NKA	"	185,736	294	218
*JO3PSJ	"	152,168	299	184
*JA3JM	"	125,847	263	177
*JH3BYX	"	87,363	198	153
*JR3BOT	"	85,675	204	149
*JA3PYC	"	56,260	150	116
*JE3UHV	"	44,928	151	108
*JI3MJK	"	33,165	104	99
*JA3HBF	"	30,096	102	88
*JA3JND	"	13,065	82	65
*JH3LBD	"	13,065	76	65
*JA3KKE	"	7,956	53	51
*JK3GWT	"	5,117	49	43
*JL3WSL	"	1,863	27	23
*JG3SVP	"	920	20	20
*JA3IDQ	"	688	16	16
*JL3DGI	"	297	11	11
*JR3RIY	21	376,852	444	313
*JG3FEA	"	199,288	307	232
*JA3MIB	"	112,545	236	183
*JI3FLA	"	46,208	157	128
*JP3BHC	"	27,000	122	90
*JA3AHY	"	15,836	83	74
*JA3IVU	"	4,560	45	40

JH4UTP	A	1,450,246	977	497
JO4CFV	"	239,232	396	224
JH4BTI	"	96,007	221	163
JH4RUF	"	6,080	43	40
JO4CTB	21	78,210	201	158
JM4WUZ	14	2,580	30	30
*JR4VEV	A	322,834	436	254
*JE4MHL	"	31,584	123	94
*JH4UYB	28	103,418	250	166
*JJ4CDW	"	8,788	68	52
*JN4UUS	21	120,015	229	189
*JI4JGD	"	6,576	51	48
*JR4GPA	14	37,468	128	116

JA5BZL	A	8,640	59	54
*JJ5HUD	A	23,305	114	79
*JA5RVN	"	18,634	84	77
*JA5NSR	"	8,370	60	54
*JG5DHX	21	99,180	217	174
*JA5FMT	"	77,420	186	158

JA6GCE	A	1,876,004	1145	559
JA6BZI	"	564,138	520	337
*JA6DIJ	A	467,520	513	320
*JA6CM	"	36,725	122	113
*JH7IPR/6	"	10,915	67	59
*JH6WHN	28	21,331	100	83
*JR6GIM	14	72,000	195	160
*JF6MGC	"	585	16	15
*JA6FGC	7	3,618	29	27

JA7IC	A	925,754	728	433
JA7BME	"	433,440	462	301
JA7VEI	"	116,406	223	174
JR7IWL	"	111,891	230	151
JA7GYP	"	81,400	173	148
JA7ZP	"	72,864	179	138
JH7QXJ	"	19,635	90	77
JH7XGN	28	55,552	178	128
*JAØVTK/7	A	23,698	113	82
*JP7AWQ	"	10,150	62	58
*JL7OTC	"	3,420	42	36
*JH7RTQ	28	20,979	107	81
*JP7CFP	21	10,380	68	60
*JA7FYU	14	11,560	75	68
*JA7LLL	"	7,150	56	50

JA8TR	A	475,500	507	300
JA8MXC	7	4,224	38	32
*JA8EIU	A	191,148	340	204
*JE8KKX	"	2,666	33	31
*JL8MBF	"	448	19	16
*JH8SIT	21	235,176	345	246

JA9FO	A	10,140	63	60
JA9LJS	"	2,976	33	31
JA9CWJ	21	567,000	546	375
*JA9LX	A	108,414	228	171
*JA9EJG	21	14,184	74	72
*JH9VUU	"	3,131	36	31

JHØGHZ	A	15,640	75	68
JAØFVU	21	28,236	128	78
JHØNOS	14	142,003	238	211
*JHØNEC	A	240,084	361	247
*JRØEQQ	"	61,104	161	134
*JRØBUL	28	532	16	14
*JRØWZR	7	252	7	7

Kazakhstan

UN1L	A	3,235,822	1604	566
UP4L	"	2,002,505	1207	535
(OP: UN7LZ)				
UN9PQ	"	198,182	289	197
UN8GV	"	85,228	202	149
UP6P	"	17,028	124	66
(OP: UN6P)				
UN4PG	21	1,057,464	873	456
UN6LN	"	284,620	398	266
*UP7P	A	3,795,336	1803	648
(OP: UN7PBY)				
*UN7CN	"	632,960	609	344
*UN7TDB	"	620,662	536	301
*UN8P	"	225,096	345	249
*UN2G	"	76,734	199	147
*UN7CH	28	36,808	129	107
*UN3M	"	25,315	107	83
*UN5J	"	20,592	95	78
*UN9LU	"	6,909	49	47
*UN6G	21	461,700	519	342
*UN5C	3.5	97,000	140	125

Kyrgyzstan

EX2B	A	73,743	196	141
*EX8AI	14	79,464	196	154

Mongolia

*JT1DA	28	47,841	207	111

Nepal

*9N1II	21	199,341	422	207

Saudi Arabia

*7Z1SJ	A	2,288,608	1189	544
*HZ1PS	"	844,022	636	397
*7Z1HL	"	116,754	217	174
*HZ1DG	28	720	16	16

South Korea

DS5DNO	A	209,032	334	212
HL2WP	"	28,776	126	88
DS5QLJ	"	10,945	65	55
HL9BSA	"	1,971	29	27
HL1/WX8C	14	20,480	112	80
*HL5YI	A	7,304	55	44

Taiwan

BV1EK	A	397,440	513	276
BU2AW	21	139,656	336	184
*BV4VQ	21	19,637	130	73

Tajikistan

EY7AD	A	264,180	389	255

Thailand

*E21YDP	A	760,000	632	400
*HS8JYX	21	3,255	42	35

UK Bases on Cyprus

*ZC4LI	A	2,861,796	1340	588

United Arab Emirates

A65BP	A	3,972,852	1567	653
(OP: RV6LNA)				
A65BR	3.5	8,360	39	38

West Malaysia

*9M2MRS	A	2,720	36	32
*9M2JI	28	748	17	17
*9M2DRL	14	105	7	7

EUROPE

Austria

OE6MMF	A	1,082,840	766	428
OE6MDF	"	523,215	527	315
OE9GHV	"	264,984	343	244
*OE2E	A	1,312,608	877	484
(OP: OE2GEN)				
*OE3RTB	"	1,034,748	733	396
*OE3PRU	"	291,004	395	266
*OE2LRO	"	47,082	151	114
*OE2DBM	"	6,026	48	46
*OE5LAL	"	5,547	45	43
*OE3DXA	"	4,558	47	43
*OE2IJL	"	3,196	38	34
*OE1ZKC	21	20,160	95	80
(OP: JH4RHF)				
*OE1MCU	7	1,847,678	825	487
*OE5PEN	"	154,456	223	172

Azores

*CR2V	A	647,510	678	365

Balearic Islands

*EA6AZ	A	47,900	164	100

Belarus

EV1R	A	973,263	727	439
EW7KR	"	298,304	383	236
EW6FX	21	40,356	150	114
EW4MM	7	422,408	381	266
*EU6AF	A	951,054	736	411
*EW8DD	"	715,284	657	358
*EW8OG	"	705,208	628	343
*EW1NM	"	688,100	688	350
*EW8OF	"	442,500	493	300
*EU6AA	"	408,694	472	286
*EU4CQ	"	401,037	440	273
*EW6EN	"	354,314	460	289
*EW7LE	"	228,160	363	248
*EU1AZ	7	569,160	439	306
*EW6DM	"	88,320	162	138
*EW8DZ	3.5	293,248	329	232

Belgium

OQ5A	A	478,850	498	314
ON4ALY	"	249,660	323	228
ON4KGL	"	183,180	287	215
ON5KQ	7	89,344	171	128
*OQ6A	A	2,345,862	1242	573
(OP: ON5MF)				
*ON4CT	"	1,911,576	1038	552
*ON5GQ	"	831,734	702	394
*OP4A	"	446,682	447	327
*ON6AT	"	253,200	322	240
*ON4CAS	"	239,568	317	248
*OP9T	"	142,545	286	195
*ON4KEB	"	110,442	209	158
*ON7BM	"	70,325	173	145
*ON4VMA	"	54,558	138	126
*ON6FC	"	47,232	140	123
*ON5HY	"	23,848	102	88
*ON7BT	"	12,040	78	70
*ON4AUB	"	10,561	66	59
*ON6OM	"	7,176	49	46
*ON4AXU	"	4,346	44	41
*OP4D	"	3,724	40	38
*OO4B	7	253,380	312	205
(OP: ON4ABL)				
*ON4CBA	3.5	196,116	283	177

Bosnia-Herzegovina

E77DX	A	130,548	230	172
*E73PY	A	238,160	346	229
*E74KC	"	164,835	263	185
*E74A	"	57,834	144	126
*E72MM	21	21,225	105	75
*E74AA	14	98,808	250	179

Bulgaria

LZ2PL	A	392,129	468	317
LZ1QN	"	237,380	332	220
LZ8E	"	204,531	330	237
(OP: LZ2BE)				
LZ14Ø1SET	"	62,624	193	152
(OP: LZ2UW)				
LZ2ZY	"	56,274	130	113
LZ2ZG	3.5	44,352	116	99
*LZ1QV	A	424,612	400	302
*LZ1MC	"	93,024	199	153
*LZ1BY	"	14,400	93	72
*LZ2JA	21	258,888	390	268
*LZ5IL	"	1,890	32	30

Crete

SV9COL	28	8,470	71	55
*SV9BMG	A	642,297	594	347
*SVØXCC/9	"	13,832	93	76
*SV9FBK	7	13,860	55	55

Croatia

9A2Ø2JK	A	466,014	486	303
(OP: 9A2JK)				
9A2CD	28	63,648	176	136
9A5Y	21	1,987,008	1188	632
(OP: 9A3NM)				
9A2Ø6NA	"	19,251	96	69
9A8A	7	335,472	342	241
*9A2BW	A	351,390	417	265
*9A6NDZ	"	49,728	133	111
*9A3KS	"	27,176	99	86
*9A2Ø7DCK	"	6,943	55	53
*9A2Ø2WJ	28	1,364	24	22
(OP: 9A2WJ)				
*9A4R	14	133,984	296	212
*9A2Ø6JOY	"	11,952	80	72
*9A6KZH	7	161,840	242	170

Czech Republic

OK2SFP	A	2,421,072	1318	552
OK2BXW	"	1,418,632	904	463
OK6RW	"	786,784	671	368
OK6DJ	"	402,600	434	305
OK2PF	"	335,070	390	255
OK1KT	"	147,452	247	191
OK2PAD	"	102,357	211	153
OK3C	"	82,134	209	162
(OP: OK2ZC)				
OK1DBE	"	54,180	145	126
OK2BJI	"	7,084	50	46
OK1XC	21	198,024	334	222
OK2PCL	14	160,506	304	222
OK2SWD	"	1,125	26	25
OK3R	7	2,767,884	987	581
OK1EP	"	324,384	306	248
OK8WW	"	134,596	198	161
*OK1VRF	A	883,575	691	385
*OK2CLW	"	704,103	562	339
*OK1DKO	"	681,884	591	343
*OK2EA	"	648,255	593	345
*OK1HEH	"	632,124	588	324
*OK1SI	"	592,016	588	326
*OK2PQS	"	471,822	511	299
*OK1DEZ	"	463,556	436	289
*OK2JNB	"	444,280	480	290
*OK2KV	"	305,750	385	250
*OK1PMA	"	144,192	218	192
*OK1FLC	"	123,172	205	166
*OK1VPO	"	114,545	206	155
*OK2CMW	"	94,381	166	139
*OK1CRM	"	48,548	133	106
*OK1DPU	"	24,087	100	93
*OK2QX	21	87,156	210	162
*OK2PMS	"	33,354	122	102
*OK2RU	7	957,584	592	388
*OK2UHP	"	483,368	423	284
*OK3MO	"	122,774	194	157
*OK2SAR	3.5	475,876	447	271
*OK7T	"	80,860	163	130
(OP: OK1FHI)				
*OK1DX	"	31,790	98	85
*OK1HL	"	810	15	15

Denmark

OV1A	A	1,273,392	919	444
OU4O	"	460,660	465	310
OZ1ADL	"	379,755	411	291
OZ2TF	"	249,210	338	234
OZ4MAX	"	56,033	169	137
*OZ4VW	A	680,512	595	392
*OZ6TL	"	499,093	517	329
*OZ1DUG	"	337,194	411	262
*OZ7DK	"	134,521	291	193
*OZ6AGX	"	85,965	212	165
*OZ1DGQ	"	16,948	90	76
*OZ7AEI	7	6,318	43	39

Dodecanese

*SV5DKL	3.5	2,200	24	22

England

GØVXE	A	420,189	471	321
GØSYP	"	305,054	375	254
GØRPM	"	266,910	389	246
M2G	"	181,158	303	218
(OP: G4RCG)				
MØIKW	"	151,020	291	180
G3XTT	"	84,597	192	163
G7VRK	"	74,166	161	141
GØGFQ	"	50,786	159	134
G8UBJ	"	14,763	71	57
GØMGM	"	6,630	54	51
G6CRF	"	1,848	23	22
M3I	28	88,067	216	161
(OP: GØORH)				
G6NHU	21	699,540	682	393
G3IGU	14	666	19	18
M7T	3.5	114,760	204	151
(OP: G3YYD)				
*GØHDV	A	695,450	648	350
*G4NDM	"	505,856	550	304
*G3SNU	"	472,842	560	327
*G4SGI	"	323,950	422	275
*G4MUL	"	135,216	275	216
*G3KNU	"	133,856	242	188
*G3LHJ	"	117,558	242	189
*MØTQR	"	115,736	248	184
*G4WGE	"	110,838	220	174
*G4GIR	"	78,624	172	144
*G4IUF	"	76,664	194	148
*G3RSD	"	39,690	117	98
*G4DDL	"	35,640	122	99
*G7TWC	"	32,100	121	107
*GØCER	"	27,552	98	84
*G6OKU	"	26,631	112	99
*G4OGB	"	25,146	110	99
*MØRYB	"	22,865	99	85
*GØVOK	"	20,230	90	85
*2EØRKS	"	17,136	75	68
*MØAFZ	"	13,213	77	73
*GØWHO	"	11,448	60	54
*GØRJL	"	11,392	69	64
*MØTAZ	"	11,385	62	55
*G3VAO	"	11,352	71	66
*MØOIC	"	10,920	70	65
*MØDMJ	"	10,452	71	67
*M1BCM	"	10,206	67	63
*G3VQO	"	6,032	53	52
*G4JKZ	"	5,115	34	33
*GØTOC	"	2,880	34	32
*M6ADB	"	2,336	32	32
*G7RTI	"	2,200	28	25
*G8MIA	"	1,160	20	20
*M7W	21	696,654	680	399
(OP: G3TBK)				
*G1VDP	"	15,326	89	79
*GØMTN	14	2,244	33	33
*G8HBA	7	609,600	493	300
*G3RLE	"	69,360	139	120
*MØVFC	"	3,584	29	28
*MXØHTJ	"	1,088	17	17
(OP: MØTZO)				

Estonia

ES2DJ	A	1,499,850	1011	495
ES4RD	14	1,130,286	992	514
*ES1LS	A	386,397	445	297
*ES5KJ	28	3,069	38	31
(OP: ES5RY)				
*ES1WST	"	2,106	28	27
*ES7FU	3.5	126,084	199	158

European Russia

RV1CC	A	113,399	214	169
RU1AB	"	109,983	236	183
UA1OMS	3.5	16,958	70	61
*RO1B	A	847,012	763	428
*RA1ALC	"	682,889	679	383
*RW1AI	"	27,857	101	89
*UA1OJL	"	15,795	92	81
*RD1A	"	300	10	10
*RZ1ZZ	14	500,460	597	380

RD3A	A	6,518,369	2458	869
RT3P	"	2,547,986	1504	574
(OP: UA3PAB)				
RN3ZC	"	1,010,940	821	415
UA3QJJ	"	651,648	677	384
RA3TT	"	555,170	591	385
UA5C	"	494,788	479	287
R3VA	"	466,302	502	327
RW3WX	"	446,600	485	308
RA3NC	"	245,575	344	235
RW3LB	"	236,210	325	230
R3GZ	"	228,864	383	256
UA3DPM	"	170,310	299	210
R3QN	"	100,968	226	168
RA3YC	"	81,015	224	165
RV3IC	"	52,934	165	133
RA3YRA	"	33,496	128	106
UA3QGT	"	16,985	104	79
RV3LZ	"	9,504	62	54
RA3IS	"	4,066	40	38
RZ3VA	28	12,322	81	61
RL2A	21	69,551	191	157
RV3A	14	496,782	597	386
RU5TT	"	470,242	585	382
R3PW	7	974,352	588	383
R3KM	"	327,320	329	245
RM5P	"	37,668	107	86
RV5K	3.5	110,704	195	148
*RX3ASQ	A	1,277,306	1045	466
*RX3ZX	"	936,736	814	401
*UA3AMZ	"	838,188	745	398
*RV3ZN	"	717,804	658	381
*RN3ZIC	"	658,217	615	343
*RQ3M	"	509,736	526	317
*UA3PT	"	460,816	584	332
*R2LA	"	458,415	515	305
*R2AT	"	404,396	468	323
*R3QW	"	385,860	470	295
*R3BB	"	345,117	486	303
*RU3XB	"	309,636	398	282
*RU3FM	"	230,850	345	243
*RX3AEX	"	227,143	369	259
*UA3DCW	"	198,750	372	250
*R3PA	"	140,532	287	196
*RA3GZ	"	137,578	307	217
*RD3AL	"	78,894	204	162
*RU3OZ	"	72,988	172	142
*UA3TN	"	69,165	199	145
*R5ACQ	"	67,496	200	143
*RA3FF	"	61,388	180	149
*RV3LO	"	55,144	166	122
*RU3VV	"	53,802	155	126
*R5DT	"	51,054	152	127
*UA3YFL	"	47,702	145	122
*RW3PF	"	46,800	151	117
*RA3RUF	"	43,320	147	114
*RG5A	"	33,060	111	95
*RL3QCQ	"	32,301	135	111
*RA3ICK	"	32,200	96	92
*RM5D	"	31,065	107	95
*R3QX	"	18,360	82	68
*UA3MON	"	17,538	88	74
*R3OR	"	15,326	88	79
*RN3DHL	"	13,419	79	63
*RZ3DC	"	12,709	77	71
*RK3BA	"	9,381	69	53
*UA3UBT	"	9,263	67	59
*RX3MM	"	6,588	57	54
*RM3DA	"	4,368	47	42
*UA3SAQ	28	19,228	97	76
*UA3GIE	21	246,708	415	267
*RF3A	"	177,310	322	238
(OP: RZ3AV)				
*RX3AGQ	"	81,144	220	168
*R2SA	"	38,918	140	122
*RN3DNG	"	26,631	115	99
*RM2M	14	524,438	586	373
*RN3DHU	"	156,545	312	239

RA4HL	A	1,944,558	1331	549
UA4HBM	"	453,530	515	310
UA4NC	"	81,216	185	144
RW4NN	"	21,500	97	86
UA4CC	28	2,850	35	30
RW4WZ	14	160,064	313	244
*UA4HJ	A	1,218,082	915	454
*RN4HFJ	"	1,110,192	888	458
*RK4S	"	788,970	740	390
*UA4ALI	"	630,252	653	369
*RU4PH	"	410,050	485	278
*RK4R	"	207,060	349	238
*UD4FD	"	205,680	345	240
*R4WT	"	170,476	320	218
*RW4PFF	"	167,348	325	214
*RU4LM	"	165,888	299	216
*UA4UT	"	111,180	223	170
*RW4HM	"	91,656	217	171
*UA4FCO	"	53,632	147	128
*RA4FAU	"	40,228	144	113
*RV4LC	"	38,658	116	102
*UA4LU	"	34,662	143	106
*RN4AM	"	33,888	111	96
*RW4NH	"	27,027	120	99
*UA4WJ	"	22,185	102	85
*RA4WC	"	21,586	103	86
*RV4HL	"	12,331	60	59

*UA4FBG	"	7,112	60	56
*RW4LQ	"	6,672	50	48
*UA4SBZ	"	5,936	54	53
*RA4FP	"	4,346	50	41
*UA4FTA	"	2,550	33	30
*RN4CA	"	480	15	15
*RK4HZ	"	28	4	4
*RW4WA	21	451,572	548	363
*UA4PAY	"	7,488	54	52
*RU4HY	7	1,140	18	15
*RD4HD	3.5	87,492	169	138
R6DX	A	2,120,158	1239	554
RW6CR	"	1,389,375	956	475
R7HF	"	275,400	407	270
UA6AA	"	222,950	354	245
RA6MK	"	118,816	204	158
RX6MR	"	42,448	135	112
R7LP	"	22,327	89	83
UA6LJB	21	272,060	411	305
RA6DE	14	683,991	694	441
UA6AKD	7	462,000	416	280
RA6XV	3.5	29,546	103	79
RZ6AK	"	2,448	25	24
*R7MM	A	1,525,076	1065	502
*UC6A	"	1,238,841	920	459
*RO7M	"	987,072	861	424
*RN6MA	"	497,952	647	342
*R7BN	"	402,300	493	300
*RA6C	"	318,854	438	262
*RA6HSM	"	236,574	368	234
*RY7A	"	193,858	272	227
*RL6LP	"	108,016	232	172
*RV6ACC	"	43,740	156	135
*RN6AI	"	23,276	103	92
*UA6JQ	"	4,716	38	36
*RA6AAW	"	3,534	37	31
*RW6AH	28	12,075	84	69
*R7NA	21	160,746	327	219
*RV6ALI	14	568,260	660	410
*RW6DJ	"	269,952	442	304
*RV6FT	"	19,313	96	89
*RV6LCI	3.5	100,426	188	149
*R8XF	A	713,064	761	407
UA9FGJ	21	140,713	292	223
RC9F	14	27,242	120	106
*RX9FG	A	517,314	604	327
*RA9FRD	"	462,859	561	323
*UA9XL	"	186,480	328	222
*RK9FBE	"	74,253	199	159
*R9FA	"	16,318	94	82
*RA9FEL	28	51,456	188	128
*UA9FFV	"	1,755	29	27

European Turkey

TC1DX	A	543,368	541	313
*TA1BM	A	629,596	655	349
*TA1EE	"	40,950	116	91

Finland

OH4A	A	3,810,152	1764	692
		(OP: OH4KA)		
OH7UE	"	1,938,612	1175	559
OG3ØØJ	"	938,862	852	387
		(OP: OH3OJ)		
OG6N	"	634,848	635	389
OH8KVA	"	467,283	492	327
OH6MW	"	338,525	414	275
OH2GI	"	189,141	264	201
OH9GIT	"	66,781	176	143
OH6BA	"	46,556	136	113
OH2XX	"	7,700	58	55
OH1F	21	265,512	390	276
		(OP: OH1NOA)		
OH2RI	7	1,089,724	659	398
OH2HAN	3.5	773,604	557	342
*OH2LU	A	1,312,900	931	475
*OG8T	"	553,161	584	371
*OH2NT	"	349,590	441	271
*OH8FQS	"	277,020	366	285
*OH2JLN	"	37,485	134	105
*OH6HZH	"	5,180	38	35
*OH3QL	"	133	7	7
*OH6K	28	9,633	65	57
		(OP: OH6FSG)		
*OH1TN	"	5,676	52	43
*OH7MN	21	333,900	479	300
*OH3CV	"	11,220	68	66
*OH6GAZ	"	7,904	60	52
*OH3DP	14	1,050	21	21

France

F/TU5KG	A	4,485,789	1766	693
F1RHS	"	1,330,155	958	501
F5OAM	"	860,668	750	412
F6IIT	"	668,160	626	384
F5POJ	"	388,220	447	295
F5CQ	"	386,295	417	283
F5GFA	"	338,605	426	281
F5AMH	"	275,500	378	250
F6BBO	"	119,856	244	176
F5TVG	"	9,062	60	46
F5SIZ	"	6,292	59	52
F6CBA	"	3,290	36	35
F5PHW	"	2,967	24	23
F5NBX	21	22,532	100	86
TM57M	14	1,082,088	849	532
		(OP: F1NGP)		
TM9FL	"	649,686	685	417
		(OP: F5TJX)		
*TM22P	A	1,615,502	1049	514
		(OP: F6HRP)		
*F4GDI	"	970,288	725	407
*F8CRS	"	429,135	417	305
*F1IWH	"	391,391	458	299
*F6GCI	"	347,076	434	279
*F5RD	"	269,762	338	229
*F4FDR	"	197,574	330	221
*F6DZD	"	160,160	284	208
*TM38O	"	108,720	199	151
		(OP: F5TMJ)		
*F8PMO	"	84,660	206	166
*F4EZJ	"	74,658	167	138
*F6DKQ	"	72,816	177	148
*F5LMJ	"	65,500	170	125
*F6CQU	"	59,670	158	130
*F5TRB	"	34,093	114	103
*F4FSB	"	31,776	117	96
*F4UMJ	"	24,402	111	98
*F5CT	"	23,544	99	72
*F1IRU	"	11,968	76	68
*F5GGL	"	10,260	62	60
*F4EFL	"	2,584	36	34
*F5PVK	"	429	13	13
*F4FDA	28	124,257	262	183
*F1EBN	21	74,576	179	158
*F4GOU	"	4,752	45	44
*F6FTB	7	291,856	324	232

Germany

DL4MCF	A	4,113,044	1616	724
DD2ML	"	3,091,200	1527	640
DF7ZS	"	2,996,910	1331	639
DF5MA	"	1,523,496	989	514
DJ8EW	"	1,490,480	925	496
DK7YY	"	1,388,728	848	473
DK6CQ	"	1,367,856	885	483
DF9GR	"	1,354,612	927	479
DHØGHU	"	1,315,383	825	463
DL5JS	"	1,252,902	841	483
DL1NEO	"	1,228,439	813	443
DK1KC	"	1,097,790	798	430
DJ9MH	"	969,664	734	436
DL5AXX	"	844,600	647	410
DL4ME	"	820,914	693	361
DF2TT	"	769,824	662	396
DJ5IW	"	675,840	560	352
DF6QV	"	644,954	592	334
DL6EZ	"	615,505	576	361
DL9NCR	"	598,230	558	345
DF5BX	"	549,186	526	314
DF2RG	"	517,104	518	336
DFØBV	"	444,565	442	295
		(OP: DL1MAJ)		
DJ6TK	"	429,300	480	324
DK3GI	"	374,814	401	297
DL5YM	"	342,996	411	283
DD7ZT	"	342,936	403	264
DL9NDV	"	301,350	349	245
DL8ZAW	"	238,126	323	233
DJ2YE	"	220,101	316	223
DK1LRS	"	212,826	324	237
DF6RI	"	210,367	304	211
DJ3IW	"	177,670	219	218
DL3APO	"	137,700	239	180
DK8EY	"	136,836	259	189
DL5ST	"	123,015	241	177
DJ1TO	"	122,640	226	168
DF9OO	"	120,848	209	166
DL1YFF	"	109,440	222	180
DK7ZT	"	107,253	191	153
DJ2IA	"	101,840	205	152
DL1OLI	"	90,117	193	153
DF8JK	"	69,920	202	152
DL6OCM	"	57,564	154	123
DL2MDU	"	57,540	160	140
DF5AN	"	56,250	145	125
DL8OH	"	54,936	145	126
DL2OBO	"	43,896	109	93
DJ2SL	"	31,410	105	90
DM3FF	"	30,700	118	100
DG9MDM	"	30,411	100	93
DG2MKV	"	29,754	106	87
DM5TI	"	28,847	98	91
DL7BA	"	24,960	97	78
DK3AX	"	23,852	99	89
DK4IO	"	22,116	104	76
DL5MEV	"	20,480	98	80
DL8RDL	"	13,206	68	62
DL3MR	"	12,672	69	64
DL9GTB	"	8,600	61	50
DG1ATN	"	8,272	49	47
DL6DCD	"	8,007	56	51
DL1YM	"	7,200	51	50
DL7AOJ	"	4,636	40	38
DJ6TB	"	4,292	41	37
DL2SWN	"	1,587	25	23
DL4RCK	28	89,270	212	158
DF9ZP	21	1,560,706	1041	574
DL3BQA	"	727,818	674	403
DJ8ES	"	77,385	180	165
DJ3NG	7	368,468	391	251
DJ2RG	"	205,134	311	191
DL5RMH	"	37,664	97	88
DO4DXA	3.5	268,176	332	222
DL2RTL	"	750	15	15
*DL9YAJ	A	1,997,056	1062	538
*DH6BH	"	1,701,504	983	504
*DL1QW	"	1,623,392	970	523
*DL1YD	"	1,363,998	860	491
*DL6NDW	"	917,730	723	405
*DM6DX	"	850,855	709	379
*DJ4MH	"	835,016	686	364
*DL4ZA	"	781,056	648	384
*DH7LF	"	688,148	590	356
*DK5MB	"	642,969	541	359
*DL6SFR	"	583,416	548	333
*DL5ARM	"	546,951	542	337
*DL1ZBO	"	505,776	504	328
*DL8MAS	"	472,926	496	298
*DA9L	"	460,416	490	327
		(OP: DO1BEN)		
*DL2AL	"	460,245	500	305
*DL1ARJ	"	439,236	490	294
*DL8SCG	"	408,149	424	293
*DO9PL	"	399,094	454	314
*DJ1ER	"	379,236	405	286
*DB2KT	"	361,772	403	298
*DL3KVR	"	339,864	384	289
*DM2GG	"	337,176	396	252
*DF1LX	"	320,528	363	268
*DJ5HB	"	313,182	387	254
*DF3EH	"	273,699	360	279
*DM5JBN	"	246,100	355	230
*DL6ZBN	"	230,175	313	225
*DL1FCU	"	226,100	330	238
*DK4RL	"	221,409	309	219
*DK2AT	"	211,456	327	224
*DL5JBW	"	211,299	340	209
*DL1NHW	"	202,707	311	223
*DK1AUP	"	199,152	306	216
*DL2YCA	"	198,516	326	233
*DL7UXG	"	190,209	300	213
*DL2RUG	"	179,861	267	197
*DJ2MX	"	173,166	267	186
*DL6NWA	"	171,754	315	211
*DK7GH	"	170,126	257	209
*DL5GAC	"	167,256	304	202
*DO6NIK	"	153,924	264	202
*DL3SYA	"	149,836	269	188
*DL3HWD	"	144,963	242	189
*DJ2AX	"	141,290	247	199
*DL4JYT	"	140,094	249	181
*DL3OH	"	139,308	241	188
*DL3ARM	"	136,836	235	181
*DK5IR	"	136,682	257	182
*DL7DZ	"	131,655	234	201
*DF6WE	"	131,250	233	210
*DL9FB	"	130,662	238	183
*DJ5CL	"	127,002	221	183
*DGØKS	"	123,794	234	187
*DJ6JH	"	113,040	225	180
*DL5NEN	"	105,138	198	162
*DL3ARK	"	100,048	198	169
*DO2UDX	"	97,637	185	163
*DF3IS	"	97,461	196	153
*DL4EAX	"	95,940	206	164
*DF7JC	"	94,380	197	165
*DK2AB	"	92,991	179	139
		(OP: @DLØTUD)		
*DJ3EF	"	90,440	199	152
*DL9NEI	"	84,968	194	152
*DK3PM	"	84,864	180	156
*DJ6UP	"	80,852	194	164
*DL7UGO	"	80,780	194	140
*DKØOF	"	79,182	195	159
		(OP: DL5BCF)		
*DL1NRC	"	78,402	201	146
*DO3ME	"	74,444	170	148
*DL8NBJ	"	72,644	175	143
*DLØLG	"	67,584	167	128
		(OP: DF6HZ)		
*DL2LMS	"	65,800	165	140
*DL4AC	"	59,736	166	131
*DH5WB	"	59,160	189	145
*DL4MFF	"	52,390	148	130
*DR65ØBAR	"	49,368	149	102
		(OP: DL9SUB)		
*DG1EZ	"	47,908	138	116
*DL1MDZ	"	47,619	141	117
*DK4VY	"	46,854	137	114
*DL3EBX	"	46,368	138	112
*DF4WC	"	45,140	148	122
*DB3KE	"	44,574	149	114
*DL5KUR	"	43,542	140	123
*DL7URH	"	43,218	117	98
*DA1BT	"	42,876	123	108
		(OP: DL4VCW)		
*DL4FAP	"	41,088	143	107
*DL5ZBA	"	40,182	141	111
*DL5ASK	"	38,913	121	109
*DF1HF	"	37,286	111	103
*DL2GK	"	31,916	125	101
*DH9SB	"	31,114	119	94
*DF2MC	"	30,704	116	101
*DL1LQA	"	25,839	107	87
*DL8ZAJ	"	25,696	98	88
*DL2ARG	"	25,024	102	92
*DMØB	"	24,276	98	84
		(OP: DK9IP)		
*DO1CDE	"	23,941	107	89
*DL5AYI	"	23,000	111	92
*DL1AMH	"	22,632	100	92
*DL1BA	"	22,437	89	81
*DG3FAW	"	22,072	103	89
*DL1DXF	"	21,684	87	78
*DK4WO	"	20,584	99	83
*DL1DBR	"	19,712	89	77
*DL1AQN	"	18,177	85	73
*DJ5QV	"	17,484	70	62
*DJØJG	"	17,250	82	69
*DL3WM	"	15,257	78	73
*DK5DC	"	14,464	73	64
*DM4JK	"	14,420	75	70
*DB1RL	"	11,616	80	66
*DL5HF	"	11,024	61	53
*DJ9FG	"	9,945	69	51
*DF6JF	"	9,018	62	54
*DB3LO	"	6,510	45	42
*DK3WW	"	6,204	50	44
*DB4MZ	"	4,758	41	39
*DO3PKE	"	4,572	37	36
*DM2DK	"	3,914	39	38
*DL6RBH	"	2,592	28	27
*DM4YWL	"	1,406	19	19
*DL4DG	"	1,323	22	21
*DL1CW	"	1,239	21	21
*DF6YC	"	1,155	23	21
*DL5AKF	"	494	13	13
*DK3RA	"	470	11	10
*DK9MH	"	308	12	11
*DL1ET	"	200	10	8
*DL4AO	"	147	7	7
*DL3VZL	"	133	7	7
*DC3RJ	28	17,464	85	74
*DL5SWB	"	7,285	55	47
*DO3KMF	21	100,275	223	175
*DO6SR	"	54,386	175	142
*DO6GZ	"	32,528	121	107
*DL3DRN	"	6,026	49	46
*DL8CA	"	2,945	35	31
*DGØDG	"	1,344	24	24
*DO8AH	"	900	18	18
*DH7SA	14	476,159	572	361
*DL1DTL	"	456,665	543	361
*DL1THB	"	18,304	99	88
*DC2TOM	"	2,686	36	34
*DL1OJ	"	880	21	20
*DL5KUD	7	721,050	541	345
*DM5HF	"	174,148	243	197
*DH5AO	"	97,344	191	144
*DM5WH	"	77,616	179	126
*DK6YM	"	47,700	119	106
*DL2ZA	"	45,084	119	102
*DH5ABC	"	26,208	91	78
*DL7YS	"	8,370	48	45
*DL7AU	"	3,500	28	25
*DK7VW	"	64	5	4
*DF8XC	3.5	795,396	609	357
*DL2SAX	"	61,272	154	111
*DJ1MM	"	49,434	129	107
*DO6PS	"	3,904	32	32

Greece

SV2GJV	A	505,092	591	294
SV1JGX	"	372,368	502	272
SV3GKU	"	44,577	144	117
SX1912K	3.5	30,544	92	83
		(OP: SV2IPF)		
*SV1JG	A	799,112	698	404
*SV2JAO	"	327,275	436	265
*SV2HTI	"	208,980	381	258
*SV1HKD	"	151,500	272	202
*SV7CUD	"	57,918	181	147
*SV2FLQ	"	24,332	98	77
*SV2CLJ	"	18,960	97	79
*SV7BVM	"	8,949	64	57
*SV2HXV	"	5,628	50	42
*SV1BJW	28	21,248	108	83
*SV1MRV	14	19,488	116	87

Guernsey

*GUØSUP	A	701,655	548	435

Hungary

HAØHW	A	157,192	293	196
HA5OO	"	72,125	172	125
HA8FK	"	50,661	144	117
HA6NN	"	920	22	20
HA8UT	28	11,001	67	57
HA5AWT	21	101,790	230	174
HA5NB	14	20,340	99	90
HA8BT	7	636,086	486	319
HA8BE	3.5	1,214,190	737	405
HG1G	"	994,448	685	364
HA3LI	"	936,768	668	357
HA8V	"	191,616	256	192
		(OP: HA8MV)		
*HA5BSW	A	1,559,572	968	511
*HAØMS	"	928,266	742	393
*HG8C	"	556,248	506	344
		(OP: HA8EK)		
*HA5AGS	"	480,025	505	325
*HA8XF	"	281,820	394	231
*HA5VZ	"	211,345	309	215
*HAØRZK	"	48,387	169	127
*HA5OMM	"	42,636	130	114
*HA8AL	"	10,797	72	61
*HG3IPA	21	158,970	293	210
		(OP: HA3JB)		
*HAØML	"	32,883	126	97
*HG7T	14	2,130,776	1314	664
*HA8QZ	"	559,398	659	399
*HA5KN	"	51,520	175	140
*HA8TI	"	28,815	122	113
*HAØHV	"	27,540	119	108
*HA5UY	3.5	14,022	63	57

Iceland

TF3AO	A	836,264	839	442
*TF3PPN	A	230,652	393	258

Ireland

EI2GLB	A	1,503,872	1006	496
EI3GRB	"	293,930	427	266
*EI4DW	A	561,275	522	325
*EI9KC	"	23,688	98	84
*EI8FH	"	7,544	46	46
*EI3GC	21	887,094	781	446

Italy

IZ2FOS	A	2,193,984	1231	586
IK2SND	"	1,709,325	1028	535
IK8UND	"	1,229,877	921	451
IC8POF	"	1,161,738	816	466
IW3HXR	"	883,976	685	376
IK3PQG	"	807,880	673	380
IN3JJI	"	706,275	606	365
I7CSB	"	539,832	498	332
IK2LOL	"	480,519	519	333
IK5FKF	"	428,260	452	322
IK5GQK	"	415,500	464	300
IK2SAI	"	382,220	450	290
IK2DPP	"	326,300	387	260
IK1MEG	"	283,316	373	274
IZ3KUY	"	279,282	380	267
IK7CMY	"	253,238	401	254
IV3JCC	"	220,946	327	242
I2DJX	"	172,484	290	214
IK2GWH	"	134,302	242	181
IKØEFR	"	102,557	202	161
I5JFG	"	95,550	206	175
IKØUTM	"	90,153	202	159
IN3BJS	"	89,088	165	116
IWØSAF	"	87,110	192	155
IV3AVQ	"	60,088	137	116
IK2GZU	"	52,520	158	130
I1WQR	"	39,429	143	117
IK2QIN	"	17,171	81	77
IW1RAX	"	13,600	76	68
IK2YXB	"	10,800	56	50
IW3GXW	"	4,625	41	37
I3JUK	"	4,212	40	39
IZ1OMY	"	3,978	35	34
I3VJW	"	2,000	28	25
I2SVA	"	630	15	15
IO4C	28	340,272	438	306
		(OP: IZ4DPV)		
IK3ASM	"	5,456	49	44
IQ3UD	21	733,608	705	414
IV3TMV	"	487,458	529	354
IZ8EDL	"	6,550	56	50
IQ4RN	14	812,916	771	468
IZØPSC	"	68,103	179	161
IW1PNJ	7	1,314,108	742	422
I2DMI	"	883,858	636	359
IZØPMV	"	825,548	579	358
IZ5MOQ	"	102,396	199	138
IK2WZV	"	91,936	154	136
IQ4RA	3.5	1,488,884	810	449
		(OP: I4AVG)		
IZØKBR	"	1,300,604	765	422
*IW3IFJ	A	1,233,056	802	452
*IK5AMB	"	766,292	604	382
*IW2MXY	"	753,246	672	377
*IK3ORD	"	740,916	660	396
*IZ2EAS	"	723,450	618	371
*IW3IAU	"	681,284	595	362
*I2XLF	"	617,210	532	341
*IV3BCA	"	582,330	547	354
*IK2YSJ	"	581,544	549	328
*IN3BIY	"	515,840	517	320
*IZ2GRG	"	459,483	490	309
*IK1SOW	"	430,688	463	313
*IZ4AFW	"	361,767	455	321
*IW2MYH	"	348,726	408	266
*IK4QJF	"	328,328	453	287
*IK3QAR	"	299,880	378	252
*IØGIA	"	297,432	383	243
*IK8NBE	"	248,832	329	243
*IKØTUM	"	219,438	294	219
*IK4CLF	"	200,970	264	203
*IZ8FFA	"	197,263	299	227
*IZ4RWU	"	181,989	284	219
*IK1DFH	"	177,282	261	189
*IK4ZHH	"	174,932	296	202
*IK7RVY	"	168,181	305	221
*IK5VQK	"	152,460	287	210
*IZ5HQB	"	146,873	290	193
*IW1FZR	"	146,445	237	195
*IKØCHU	"	143,073	249	189
*IV3BXV	"	131,202	248	197
*I1NVU	"	124,824	208	168
*IK3STG	"	122,820	235	178
*IØZUT	"	119,035	224	179
*IK1VEK	"	117,390	231	182
*I2BZN	"	114,048	217	162
*IK2RPE	"	111,072	217	178
*I4UUL	"	109,725	228	165
*IW5ALG	"	105,244	209	166
*IK3XJP	"	97,995	175	141
*I7/IN3IZT	"	93,888	194	163
*IV3XNF	"	91,581	190	147
*IK2AUK	"	90,520	199	155
*IQ4FA	"	83,860	193	140
		(OP: I4JEE)		
*IK2WFN	"	82,950	185	150
*I8IEQ	"	82,597	191	151
*IZ3QCH	"	75,361	163	143
*IV3XZG	"	74,160	155	144
*I2TFJ	"	70,290	185	142
*IZ3GOG	"	67,728	176	136
*IN3EJN	"	63,376	166	136
*I4HRH	"	62,775	171	135
*IQ1TO	"	59,898	154	134
		(OP: IZ1DXS)		
*IZ8DVD	"	57,477	138	119
*IK2WYI	"	51,840	177	128
*IK1/DH2SAQ	"	51,350	165	130
*IW1QLH	"	46,548	134	108
*I2ORX	"	46,138	135	118
*IK7WPD	"	44,118	134	114
*IV3KSE	"	42,066	136	114
*IK7NXU	"	41,000	135	100
*IZ1KGY	"	39,168	115	102
*IZ5CMG	"	38,913	134	119
*IQ7AF	"	37,648	121	104
		(OP: IK7JWX)		
*IN3XWE	"	37,336	124	104
*IK2ANI	"	31,790	124	110
*IK1MTX	"	28,208	98	86
*IK3CST	"	25,585	93	85
*IWØRVQ	"	24,012	104	87
*IZ1GLX	"	21,546	89	81
*IZ2MHT	"	20,150	75	65
*IW6NZY	"	20,097	97	87
*IW1CQ	"	19,662	97	87
*IZ2EWM	"	18,648	85	72
*IZ8CLM	"	18,318	79	71
*IK2GPQ	"	17,136	99	84
*IW2JRV	"	14,430	74	65
*IQ2CJ	"	14,280	89	56
		(OP: IK2JUB)		
*IZ1QXW	"	12,075	75	69
*IZ2PCJ	"	10,088	60	52
*IW5EDI	"	9,288	57	54
*IN3FHE	"	8,928	50	48
*IV3IQY	"	8,460	51	45
*IKØXIH	"	8,415	51	51
*IZ5ILV	"	7,084	52	46
*IZ5IOS	"	6,258	47	42
*IW3SAR	"	4,480	43	40
*IK2IKW	"	4,365	47	45
*IØYQV	"	3,630	37	33
*IWØGYC	"	2,310	32	30
*IZ3TFL	"	2,133	27	27
*IØHJN	"	1,836	27	27
*I1ABT	"	1,742	27	26
*IK3GES	"	1,560	26	24
*IW2NRI	"	1,225	26	25
*IZ7FSY	"	1,092	22	21
*IK5AFJ	"	954	19	18
*IV3XPP	"	576	13	12
*IW3IKZ	"	324	9	9
*IK5BOH/2	"	6	1	1
*IKØEIE	28	52,125	149	125
*IKØPEA	"	45,279	139	117
*IK2AHB	"	24,140	106	85
*IW5EIJ	"	3,536	43	34
*IZØFZM	"	1,218	23	21
*IZØINX	"	3	1	1
*IZ1PKV	"	0	0	0
*IZØUME	21	145,530	284	210
*IK7XNF	"	42,681	153	123
*IZØICM	"	3,360	36	32
*IZ2EBP	"	1,344	24	24
*IZ8IYL	14	455,470	583	370
*IQ2CU	"	220,825	362	275
		(OP: IN3OWY)		
*IN3HUU	"	58,739	179	151
*IZ7SIA	"	17,112	102	92
*IZ2JNN	"	15,215	94	85
*IK4XQT	"	3,237	42	39
*IZ5MMB	"	1,968	28	24
*I1/IK2DKX	"	846	18	18
*IZ2CSX	"	378	14	14
*IW4EGX	7	943,714	589	389
*IW2HUS	"	438,030	382	279
*IV3AZV	"	235,320	294	212
*I2WIJ	"	95,220	161	138
*IZ7SLF	"	10,608	53	52
*IZ2CEF	"	2,150	25	25
*IKØXBX	3.5	129,368	211	157
*IZ3KSO	"	53,714	132	107

Kaliningrad

RA2FB	14	116,541	267	207
*RA2FF	A	451,940	499	295

Latvia

YL9T	A	2,385,600	1341	568
		(OP: YL2TW)		
YL3FP	"	980,496	755	396
YL6W	"	208,848	302	228
YL2IP	14	106,050	243	202
YL2KF	7	237,390	296	193
*YL2QV	A	351,036	406	294
*YL2PJ	28	8,586	59	53
*YL3FW	7	101,500	172	145

Lithuania

LY1R	A	2,582,964	1333	628
LY9Y	"	1,529,868	997	529

LY2FN	*	895,752	710	396
LY16W	*	48,101	130	103
			(OP: LY5W)	
LY2CX	*	44,990	139	110
***LY6A**	**A**	**2,733,836**	**1405**	**599**
*LY2TS	*	327,010	413	265
*LY2SA	*	282,978	343	237
*LY5D	*	235,620	329	220
*LY2BVB	*	89,961	209	157
*LY2CV	*	83,655	211	165
*LY2WN	*	24,415	107	95
*LY2N	*	7,849	49	47
***LY4K**	**21**	**11,340**	**80**	**60**
*LY4OO	*	24	3	3
Luxembourg				
LX1NO	**A**	**891,810**	**693**	**405**
***LX1C**	**A**	**540,540**	**528**	**315**
Macedonia				
Z37M	**21**	**1,172,745**	**908**	**511**
Z36W	**7**	**2,277,580**	**912**	**526**
***Z35X**	**A**	**220,818**	**308**	**247**
*Z30A	*	10,560	70	64
***Z35GL**	**28**	**420**	**12**	**12**
***Z31MM**	**14**	**197,316**	**389**	**252**
***Z32XU**	**3.5**	**135,884**	**213**	**161**
Moldova				
***ER3DX**	**A**	**724,064**	**610**	**374**
*ER3AU	*	217,752	313	211
*ER3ZZ	*	14,384	68	62
***ER3MM**	**3.5**	**9,984**	**52**	**48**
Netherlands				
PA3AJH	**A**	**465,696**	**496**	**294**
PG3N	*	273,024	342	237
PA9DD	*	228,360	293	220
PI4DX	*	112,316	236	172
			(OP: PA3EVV)	
PA3HFX	*	21,504	104	96
PA3EEG	*	16,259	79	71
PA2KW	*	9,064	44	44
PDØRKA	*	9,060	65	60
PA4B	**14**	**72,372**	**201**	**163**
PA2MRT	**7**	**33,034**	**98**	**83**
***PA1RBZ**	**A**	**737,382**	**617**	**354**
*PA3DBS	*	651,807	617	351
*PA3ACA	*	490,782	486	314
*PD5T	*	359,656	401	268
*PA3ANN	*	308,853	385	243
*PDØDK	*	298,890	395	243
*PA2CVD	*	168,100	301	205
*PA63PSK	*	164,298	288	197
			(OP: PA2LP)	
*PD2JAM	*	153,527	235	187
*PD2PKM	*	119,712	218	174
*PD1EJA	*	112,763	224	181
*PBØACU	*	96,333	197	163
*PA3EWG	*	95,151	197	161
*PA3CDN	*	70,752	165	132
*PA3GCU	*	67,450	174	142
*PE1FTV	*	66,378	172	138
*PAØTCA	*	38,038	111	91
*PA2A	*	37,136	106	88
*PD2GSP	*	33,984	114	96
*PE2S	*	32,754	127	103
*PA3GVI	*	27,768	104	89
*PDØMWG	*	27,720	124	105
*PA3GDD	*	25,536	97	84
*PB7XYL	*	24,750	91	75
*PA3CMF	*	24,640	100	80
*PD7BZ	*	22,860	100	90
*PDØJMH	*	22,185	94	87
*PA7PTT	*	21,760	100	80
*PA3HGF	*	21,296	106	88
*PA1JIM	*	21,082	96	83
*PDØWR	*	20,739	105	93
*PDØRON	*	19,890	97	85
*PA3ARM	*	17,845	96	83
*PF5M	*	9,729	74	69
*PA3GMM	*	6,720	50	48
*PDØME	*	1,804	23	22
***PAØMIR**	**28**	**9,504**	**63**	**54**
***PDØGK**	**14**	**28,340**	**126**	**109**
*PD7RB	*	10,106	68	62
Northern Ireland				
***MIØM**	**14**	**436,680**	**559**	**360**
			(OP: MIØSAI)	
Norway				
LB8IB	**A**	**5,688,896**	**2267**	**824**
LA5HPA	*	1,721,932	1134	556
LA9DFA	*	745,125	601	375
LA9TJA	**21**	**134,829**	**281**	**213**
LA1TV	**3.5**	**424,964**	**407**	**262**
LA3WAA	*	25,584	90	78
***LA5LJA**	**A**	**949,620**	**794**	**399**
*LA3BO	*	548,100	561	315
*LA9TY	*	364,780	429	305
*LA1QDA	*	282,795	387	255
*LAØFA	*	147,460	228	202
*LA9DK	*	141,316	297	196
*LA9AU	*	31,866	132	113
*LA9RY	*	9,168	56	48
***LA5QIA**	**14**	**235,173**	**400**	**277**
***LA8OKA**	**7**	**85,008**	**154**	**132**
*LA3BPA	*	47,586	113	103
Poland				
SN7Q	**A**	**5,156,900**	**1963**	**742**
SP3RBG	*	2,134,246	1145	538
SP3GXH	*	1,840,893	1036	519
SO6I	*	1,684,925	1009	557
3Z5W	*	1,432,520	969	472
			(OP: SP5KP)	
SP9JQA	*	586,840	544	340
SQ7B	*	258,609	371	247
SP6NVK	*	214,368	341	224
SP1DMD	*	159,744	260	192
SN9A	*	152,145	243	189
			(OP: SP9FQI)	
SQ7RL	*	26,649	98	81
SP7IIT	*	19,110	76	65
SQ9IWS	*	9,690	61	57
SO4M	**14**	**2,200,496**	**1354**	**664**
			(OP: SP4K)	
SP3ASN	*	285,246	407	299
SP2KPD	*	3,906	44	42
SP3VSE	**7**	**1,738,884**	**828**	**489**

HF8RTTY	*	1,462,800	781	424
			(OP: SQ8GHY)	
SN7F	*	289,224	305	234
			(OP: SP7LFT)	
SP5ELA	*	14,520	65	60
SN2M	**3.5**	**1,380,062**	**789**	**431**
			(OP: SP2XF)	
SP6AXW	*	315,560	353	230
***SO8T**	**A**	**3,496,521**	**1481**	**651**
			(OP: SP8TJU)	
*SQ9UM	*	3,291,600	1535	633
*SP8CGU	*	790,262	614	374
*SQ8JX	*	708,935	601	355
*SP6JZP	*	536,952	533	312
*SP9CTS	*	427,625	459	275
*SP3DOF	*	411,536	475	289
*SP6DNZ	*	384,293	441	287
*SP9CXN	*	348,768	407	252
*SP9BGS	*	348,145	410	245
*SP4CJA	*	328,944	405	264
*HF1Z	*	316,200	383	255
			(OP: SP1EG)	
*SP1NZ	*	305,288	429	248
*SN7O	*	273,735	343	237
			(OP: SP7IVO)	
*SN9I	*	237,442	328	227
			(OP: SP9EMI)	
*SP3DSC	*	230,622	328	238
*SP7DBI	*	227,808	322	224
*SP6MLX	*	189,602	272	203
*SO9G	*	186,456	283	204
			(OP: SP9DTE)	
*SQ8LEC	*	155,652	281	204
*SP1DPA	*	149,760	248	192
*SP2MKZ	*	143,070	294	190
*SP2UUU	*	109,336	210	158
*SP6TRX	*	103,016	200	158
*SP6QKP	*	94,471	214	169
*SP1F	*	59,904	142	117
*SP7QHR	*	51,118	160	122
*SQ7LQJ	*	49,833	143	113
*SQ8KEZ	*	48,026	142	118
*SP3BAY	*	39,675	133	115
*SP5GRM	*	37,758	137	93
*SP9WZP	*	37,170	120	105
*SP2MKT	*	36,575	111	95
*SN1Z	*	28,600	106	88
			(OP: SQ1EIX)	
*SP7LIE	*	26,000	110	80
*SP5GDY	*	25,800	98	86
*SP7SEP	*	24,000	98	75
*SQ6PHP	*	19,188	91	78
*SP9IHP	*	13,530	68	55
*SQ9FCH	*	8,225	51	47
*SQ8GUM	*	6,840	46	45
*SP3GAX	*	5,850	52	45
*SP9OHL	*	5,130	47	45
*SP1I	*	3,808	36	34
*SO8W	*	3,366	40	33
			(OP: SQ8JLN)	
*SP5APW	*	516	13	12
*SP3BJK	*	198	9	9
*SQ8JMC	*	182	7	7
***SP6IHE**	**28**	**10,556**	**65**	**58**
*SP9MZH	*	270	10	9
***SP1MHZ**	**21**	**161,415**	**292**	**211**
*SP2GCJ	*	42,265	141	107
*SP9DNO	*	39,960	140	108
*SQ8KFH	*	27,146	109	98
*SP9CLU	*	2,635	35	31
*SQ1TDJ	*	684	20	19
***SP5CQI**	**14**	**49,320**	**164**	**137**
*SQ1WO	*	46,800	173	130
*SQ4SGA	*	28,270	121	110
*SP3BGD	*	8,400	58	56
***SP3UIW**	**7**	**317,844**	**315**	**243**
*SN7S	*	86,736	160	139
***SP9BNM**	**3.5**	**584,672**	**507**	**302**
*SP5ECC	*	277,300	303	235
Portugal				
***CT2JMR**	**A**	**83,159**	**192**	**137**
*CT1FOQ	*	18,426	92	83
***CT1EEK**	**21**	**635,091**	**658**	**417**
***CS2B**	**7**	**795,648**	**578**	**336**
*CT1AOZ	*	280,296	265	229
Romania				
YO9HP	**A**	**2,684,400**	**1425**	**600**
YQ6A	*	2,290,281	1249	573
			(OP: YO6BHN)	
YP6Z	*	1,071,115	803	445
			(OP: YO6PZZ)	
YO6OAF	*	825,944	697	392
YO7CVL	*	99,354	241	174
YO7LFV	*	79,365	241	165
YO5CUQ	*	19,345	84	73
YO2DFA	*	7,367	56	53
YO3APJ	*	5,664	50	48
YO2MFC	*	4,875	40	39
YO2IS	**28**	**12,567**	**76**	**59**
YO2RR	**21**	**617,022**	**665**	**354**
YO3VU	*	448,825	558	325
YO5OHY	**14**	**94,392**	**230**	**184**
YO5PBF	**3.5**	**422,928**	**409**	**264**
***YO5BYV**	**A**	**530,400**	**529**	**312**
*YO5NY	*	345,184	390	268
*YO8WW	*	292,352	339	256
*YO2GL	*	230,214	291	222
*YO6DBA	*	207,390	311	223
*YR4D	*	192,654	295	198
			(OP: YO4CVV)	
*YO2LXW	*	188,496	319	204
*YO6DBL	*	178,967	290	191
*YO5FMT	*	115,948	208	164
*YO6HSU	*	104,160	210	155
*YO4RST	*	86,036	194	137
*YO8RFS	*	49,005	121	99
*YO2LDU	*	41,382	141	114
*YO8ST	*	27,538	116	98
*YO5TP	*	23,016	98	84
*YO2LSP	*	19,929	77	73
***YO3JF**	**28**	**20,020**	**94**	**77**
***YRØWL**	**21**	**98,090**	**232**	**170**
			(OP: YO9BXC)	
***YO8DDP**	**14**	**272,688**	**473**	**276**
*YO9CWY	*	260,309	422	287
*YO8DFF	*	180,480	374	240
*YO5OLD	*	72,522	215	158
***YO3RU**	**7**	**653,250**	**500**	**325**

Sardinia				
***ISØLFZ**	**A**	**476,410**	**480**	**305**
Scotland				
MMØAMW	**A**	**1,968,791**	**1123**	**583**
GM8SBH	*	1,867,635	1095	539
			(OP: GMØFGI)	
MMØGPZ	*	1,524,593	988	503
GM3W	*	1,097,744	897	437
			(OP: GM3SEK)	
MMØCBL	*	80,400	196	150
GM2V	*	30,943	120	97
			(OP: GM3WOJ)	
***MMØR**	**A**	**165,737**	**289**	**209**
			(OP: MMØRKT)	
*GMØNKX	*	4,494	45	42
***MM3T**	**28**	**4,080**	**43**	**40**
			(OP: GMØELP)	
***GM3C**	**14**	**436,970**	**543**	**370**
			(OP: GMØNBM)	
*MMØDWF	*	155,335	308	235
***MMØEAX**	**7**	**744,276**	**523**	**338**
Serbia				
YT2U	**A**	**1,261,777**	**845**	**457**
YU1CC	*	2,548	30	28
YT3H	**14**	**621,180**	**660**	**420**
***YU1KT**	**A**	**570,064**	**557**	**328**
*YU1RP	*	182,093	299	211
*YT7AW	*	106,572	198	166
*YT8A	*	17,520	90	73
			(OP: YU1EA)	
***YT2B**	**28**	**27,416**	**111**	**92**
***YU8NU**	**21**	**47,244**	**161**	**127**
***YT5W**	**14**	**774,367**	**776**	**451**
			(OP: YT2PFR)	
*YT1RW	*	96,968	247	184
*YU1WS	*	83,424	220	176
***YU1AST**	**7**	**1,395,450**	**747**	**443**
			(OP: YU2A)	
*YU1XX	*	352,824	337	244
***YTØZ**	**3.5**	**176,344**	**239**	**188**
			(OP: YU1ZZ)	
*YU7D	*	94,920	171	140
Sicily				
IT9DFI	**A**	**48,000**	**127**	**120**
IT9BLB	*	40,710	142	115
IT9MUO	**14**	**737,100**	**748**	**455**
***IT9RZU**	**A**	**551,592**	**565**	**376**
*IT9AJP	*	226,026	302	261
*IT9BDR	*	40,293	117	111
*IT9XTP	*	3,589	39	37
***IW9FDD**	**14**	**432,525**	**536**	**365**
*II9P	*	52,200	170	145
			(OP: IT9CHU)	
***IT9BXR**	**7**	**65,052**	**141**	**117**
*IT9AUH	*	3,840	35	30
*IT9JOF	*	1,312	16	16
Slovak Republic				
OM2VL	**A**	**4,382,670**	**1566**	**695**
OM5ZW	*	4,106,375	1581	665
OM6W	*	927,375	732	375
OM7KW	*	63,498	142	114
OM7PY	*	48,384	159	126
OM3TPN	*	8,468	60	58
***OM7OM**	**A**	**1,201,968**	**800**	**408**
*OM7AG	*	624,624	574	338
*OMØDX	*	584,021	562	337
*OM8LA	*	474,672	484	319
*OM3R	*	387,360	423	288
			(OP: OM3CFR)	
*OM4O	*	169,728	304	221
			(OP: OM3NI)	
*OM7LM	*	167,422	252	194
*OM5MX	*	158,912	253	191
*OM3TLE	*	121,550	232	170
*OM7YL	*	103,540	193	155
*OM7YC	*	67,014	165	146
*OM2DT	*	59,055	159	127
*OM3ZBG	*	20,064	88	76
*OM7ANO	*	10,422	70	54
*OM3BY	*	2,625	26	25
*OM3IAG	*	429	15	13
***OM4TC**	**14**	**109,028**	**258**	**194**
***OM3PA**	**7**	**456**	**13**	**12**
Slovenia				
S52OP	**A**	**5,023,877**	**1838**	**769**
S51NM	*	468,900	480	300
S53M	*	365,139	344	261
			(OP: S51FB)	
S57AL	*	302,637	367	281
S57DX	*	74,691	160	129
S57W	*	15,812	78	67
S51DI	*	1,518	24	22
S57YK	**14**	**139,216**	**293**	**226**
S50A	**7**	**4,918,274**	**1418**	**713**
S51CK	*	1,617,414	801	471
***S56A**	**A**	**1,504,256**	**932**	**512**
*S57PR	*	529,530	480	285
*S51DX	*	253,559	293	227
*S51JQ	*	240,792	350	237
*S55Z	*	89,642	175	133
*S55VM	*	32,487	104	91
*S57S	*	27,234	99	89
*S57AJ	*	6,636	49	42
*S53BB	*	630	16	15
***S57YX**	**7**	**211,344**	**260**	**204**
***S53F**	**3.5**	**637,560**	**503**	**315**
Spain				
EA1AKS	**A**	**2,844,576**	**1416**	**581**
ED1A	*	308,195	401	265
			(OP: EA1AST)	
EA1EPM	*	89,472	216	192
EA1CM	*	21,296	96	88
EA1WX	*	2,744	33	28
EA1KY	**28**	**51,216**	**163**	**132**
ED1Q	**21**	**685,619**	**682**	**397**
			(OP: EA1QA)	
EB1IC	*	134,028	261	204
EE1Z	**3.5**	**411,714**	**418**	**257**
			(OP: EB1LA)	
***EA1WW**	**A**	**1,161,105**	**855**	**465**
*EA1EA	*	822,800	655	374
*EA1AAW	*	143,200	256	179
*EA1JO	*	114,739	236	179
*EA1AY	*	98,532	218	161
*EB1GZO	*	36,977	128	103

*EA1AW	*	31,302	127	111
*EA1GWM	*	9,828	56	52
*EA1PF	*	4,232	51	46
*EA1BRD	*	846	20	18
***EA1OS**	**14**	**1,013,460**	**890**	**508**
*EE1V	*	112,770	257	210
			(OP: EA1HLW)	
*EA1IR	*	13,244	82	77
***EA1DR**	**7**	**115,420**	**176**	**145**
***EA2CNS**	**A**	**59,136**	**161**	**132**
*EB2RA	*	11,440	66	55
***EE2W**	**14**	**38,796**	**157**	**122**
			(OP: EB2AM)	
EA3DUM	**A**	**392,815**	**470**	**313**
EE3R	*	102,024	197	156
			(OP: EA3OR)	
EA3BD	*	87,934	191	154
EA3ANE	*	24,024	99	91
EA3CEC	*	3,924	39	36
EE3P	*	2,000	25	25
EE3Y	**28**	**17,680**	**86**	**80**
			(OP: EA3EYD)	
EE3J	**7**	**1,105,748**	**624**	**391**
			(OP: EA3JW)	
***EF3A**	**A**	**2,658,720**	**1320**	**580**
			(OP: EA3KU)	
*EA3GBA	*	487,956	567	314
*EA3FLS	*	45,292	158	134
*EB3JT	*	28,925	105	89
*EA3AYQ	*	22,599	109	93
*EB3MA	*	9,888	52	48
EA3NO	**28**	**40,600**	**135**	**116**
***EA3BCK**	**21**	**1,809**	**27**	**27**
***EA3GLB**	**14**	**1,333,458**	**1015**	**557**
EE2T/4	**A**	**53,136**	**180**	**144**
			(OP: EB2FJN)	
***EC4AIU**	**A**	**218,556**	**382**	**234**
*EA4GB	*	147,573	265	171
*EB4GRT	*	30,272	91	88
*EE4K	*	23,533	110	101
*EA4BNQ	*	1,272	24	24
***EA4ZK**	**28**	**12,726**	**69**	**63**
*EA4AFP	*	3,952	39	38
***EA4SG**	**7**	**23,736**	**70**	**69**
EA5HT	**A**	**1,649,405**	**1116**	**535**
EA5GIE	*	110,716	253	178
ED5J	**28**	**24,252**	**105**	**94**
			(OP: EA5DM)	
EA5BZ	**21**	**33,264**	**133**	**108**
EF5Y	**14**	**96,755**	**253**	**185**
			(OP: EA5GTQ)	
***EA5HAB**	**A**	**1,643,887**	**1164**	**511**
*EB5CS	*	360,888	417	264
*EA5DKU	*	326,914	399	266
*EA5GSW	*	230,230	343	253
*EA5HRT	*	222,640	308	220
*EA5FHC	*	194,902	325	223
*EC5AEZ	*	141,496	243	184
*EA5TT	*	2,418	28	26
***EA5HJO**	**28**	**22,620**	**96**	**87**
***EA5ET**	**14**	**39,038**	**146**	**131**
*ED5K	*	17,820	93	90
			(OP: EA5FHK)	
***EA5XC**	**7**	**510,064**	**436**	**284**
*EA5FDM	*	171,226	241	181
EA9LZ/7	**A**	**896,235**	**888**	**401**
EB7CIN	*	424,612	503	302
EA7TV	*	331,294	439	302
EA7TG	*	132,496	250	182
EA7ZY	**21**	**404,595**	**556**	**333**
EA7HLU/EA1	**3.5**	**41,004**	**122**	**102**
			(OP: EA7HLU/EA1)	
***EA7/OH6XY**	**A**	**347,188**	**437**	**292**
			(OP: OH6XY)	
*EE7A	*	308,914	394	257
			(OP: EA7CIX)	
*EA7CWA	*	156,378	280	201
*EA7IBK	*	115,364	256	191
*EA7AZA	*	61,774	165	134
*EA7VJ	*	8,344	60	56
*EA7IQM	*	7,540	60	52
***EA7KP**	**21**	**188,728**	**324**	**248**
***EA7RM**	**7**	**36,120**	**103**	**86**
Sweden				
8S6E	**A**	**1,933,228**	**1099**	**583**
SK2T	*	1,464,484	979	542
			(OP: SM2LIY)	
SM6NOC	*	1,416,020	989	505
SMØBSO	*	949,968	761	432
SM5D	*	935,066	687	418
			(OP: SM5DJZ)	
SM5EPO	*	682,104	623	388
SM4DQE	*	551,115	564	331
SMØV	*	527,604	553	308
SM5CZQ	*	303,576	387	273
SM6GKT	*	197,155	301	215
SLØW	*	123,080	267	181
			(OP: SMØAJU)	
8SØC	*	20,592	92	88
			(OP: SMØMPV)	
SM6AHU	*	6,721	51	47
SA3V	*	735	16	15
			(OP: SA3ARL)	
SM3LBP	**14**	**344,640**	**487**	**320**
SA1A	*	2,695	35	35
			(OP: SM1TDE)	
SM5QU	**7**	**301,784**	**310**	**238**
***SM6NET**	**A**	**760,420**	**631**	**386**
*7S5S	*	695,098	638	367
			(OP: SM5CSS)	
*8S5ØBQ	*	644,722	632	362
			(OP: SM7BHM)	
*SG5W	*	331,530	388	257
			(OP: SM5IMO)	
*SM7CIL	*	218,542	323	226
*SM2BJS	*	199,134	353	234
*SM2IUF	*	137,711	250	191
*SM2JUR	*	134,140	250	190
*SMØA	*	85,514	224	169
			(OP: SMØAIG)	
*SK6HD	*	82,524	212	156
			(OP: SA6AQP)	
*7S3F	*	52,224	167	128
*SM5ACQ	*	48,037	152	121

*SFØD	*	47,064	131	106
			(OP: SMØDSF)	
*SE5S	*	33,280	125	104
*SM3DXC	*	15,375	79	75
*SA7AOI	*	3,276	39	36
*SM4RLD	*	3,016	30	29
***SM7U**	**7**	**65,212**	**139**	**119**
			(OP: SM7PAF)	
Switzerland				
HB9FBG	**A**	**495**	**15**	**15**
***HB9DHG**	**A**	**716,846**	**613**	**349**
*HB9CNY	*	157,002	267	191
*HB4FL	*	106,833	227	149
			(OP: HB9ADJ)	
*HB9CXK	*	12,480	70	60
***HB9ELD**	**21**	**14,184**	**77**	**72**
***HB9BJL**	**14**	**4,788**	**45**	**38**
***HB9SVT**	**7**	**62,376**	**142**	**113**
***HB9AWS**	**3.5**	**19,026**	**78**	**63**
Ukraine				
UZ2M	**A**	**7,476,480**	**2804**	**885**
			(OP: URØMC)	
UW8I	*	4,585,547	1888	769
			(OP: UT2IZ)	
EO3Q	*	3,457,335	1613	665
			(OP: UR3QCW)	
EM2G	*	3,445,760	1627	673
			(OP: UR7GO)	
UW5U	*	2,399,004	1252	582
UV5U	*	2,292,639	1251	607
			(OP: UX1UA)	
UXØFF	*	980,548	812	428
UT7CA	*	673,095	661	345
UX6IR	*	442,830	468	290
UR4EI	*	419,964	491	316
UT5UKY	*	295,668	401	258
UT2GA	*	263,375	362	245
UR7EU	*	163,894	298	227
UR5QA	*	122,436	227	171
UU4JC	*	103,373	225	167
UVØI	*	90,915	193	145
UU2JQ	*	51,802	147	118
UT5ERV	*	27,416	105	92
US0LW	*	13,340	67	58
UTØRM	*	3,264	36	34
UR3QM	*	663	17	17
UT1IA	**28**	**85,760**	**232**	**160**
UZ5Q	*	270	11	10
			(OP: UY5QZ)	
UW4I	**21**	**1,648,393**	**1204**	**569**
			(OP: US5IQ)	
USØMM	*	461,910	596	346
US5LO	*	17,352	86	72
US7IS	**14**	**298,240**	**434**	**320**
UR5ZMK	*	212,784	366	264
EO4M	**7**	**3,952,800**	**1333**	**648**
			(OP: UR5MW)	
UR5WCQ	*	433,152	348	288
UT2IW	**3.5**	**136,458**	**211**	**171**
***URØHQ**	**A**	**1,805,931**	**1164**	**531**
*UT5EPP	*	1,572,994	1081	457
*UX1UX	*	1,493,505	989	481
*US4LPY	*	1,349,865	1050	505
*UR4U	*	1,328,040	867	465
			(OP: UR4UDI)	
*UT8EL	*	1,266,840	999	460
*UT7I	*	1,171,455	908	435
			(OP: UT2IO)	
*UY7MM	*	1,158,420	910	449
*US6CQ	*	996,730	802	406
*UX1IL	*	821,541	755	399
*USØAK	*	729,162	682	378
*UR5ETN	*	721,440	625	360
*UW7F	*	590,556	581	348
			(OP: UR5FEO)	
*UT3RS	*	563,801	540	337
*UY3MW	*	513,670	561	310
*UX7FD	*	508,160	551	320
*UX6IB	*	420,992	469	286
*UR4MG	*	418,409	470	281
*UR8IF	*	397,575	412	279
*UY5TE	*	391,437	481	279
*UT1IM	*	391,124	407	277
*US7IA	*	381,072	453	272
*UR5LJD	*	350,480	434	260
*UX3IW	*	338,212	374	257
*UT8IT	*	290,909	389	251
*UR5FS	*	280,976	385	272
*UV5EOE	*	280,618	393	251
*UR3CMA	*	244,125	353	225
*UR3ILY	*	225,835	352	235
*UR5EPV	*	218,922	311	214
*US1VS	*	218,538	302	213
*UU1K	*	208,170	384	257
			(OP: UU5JVK)	
*UT3WW	*	202,477	292	233
*UT7IS	*	192,608	291	208
*UR3AC	*	178,602	305	206
*UT5JCE	*	157,206	269	197
*UR5LY	*	132,090	197	170
*UR5IHD	*	129,525	262	165
*UTØFC	*	113,652	246	164
*UR3UT	*	102,080	221	160
*UT4UQ	*	99,699	227	167
*UY5IG	*	91,784	197	149
*UR5ZIW	*	89,176	195	142
*US7IKJ	*	86,112	210	156
*UT7MR	*	78,100	186	142
*UR5EIT	*	69,296	170	142
*UY5AX	*	69,083	172	139
*UX7FC	*	57,456	159	114
*URØIM	*	56,166	161	111
*UR8EQ	*	54,740	169	119
*US8UA	*	36,951	125	109
*UW1WU	*	30,268	112	92
*UX7QV	*	28,704	116	104
*UX2HB	*	26,166	100	89
*UR5IHC	*	23,276	101	92
*UX7FB	*	17,136	98	84
*UTØNN	*	16,013	73	67
*US3ITA	*	14,832	81	72
*US3LX	*	13,702	75	62
*UR5LAK	*	11,594	65	62
*UYØCA	*	8,798	65	53
*UR5FCM	*	8,064	58	48
*UV5QR	*	7,482	46	43
*UR5LBM	*	4,836	41	39
*U5EX	*	3,180	32	30
*UR3LTD	*	2,716	30	28

*UR2MO	"	2,025	27	27
*UR5XFQ	"	928	16	16
*UT2IV	28	36,146	145	106
*UY5ZZ	"	11,564	74	59
*UR8QR	21	142,676	291	212
*UT5PQ	"	93,312	214	162
*US1IV	"	90,272	217	182
*UXØUW	"	83,157	199	159
*UT2EF	"	33,176	139	104
*UR7EC	"	9,480	71	60
*UU9JQ	14	433,985	558	365
*UX1LW	"	120,692	277	211
*US4IPC	"	115,786	282	209
*UR5PG	"	52,540	177	142
*UR7QM	"	48,852	176	138
*USØHZ	7	771,808	515	356
*UY2UQ	"	686,080	508	335
*UU4JIM	"	566,544	422	319
*UR4CU	"	397,120	370	272
*UW2F	"	354,000	346	250
		(OP: UTØFT)		
*UT5ECZ	"	65,550	128	115
*UZ2HZ	3.5	577,574	478	317
*UT5KO	"	299,706	331	239
*UX4FC	"	187,376	265	196
*UR5IFB	"	146,200	228	170
*UT2HM	"	80,920	171	140
*UR5IHQ	"	58,032	146	117
*UT4XD	"	55,912	138	116

Wales

GW4SKA	A	3,239,328	1553	656
GW4BLE	"	174,825	298	189
MW2I	21	49,680	160	120
		(OP: GW5NF)		

OCEANIA

Australia

VK2CA	A	130,152	241	187
*VK2GR	A	13,908	77	61
*VK2KDP	"	2,028	29	26
VK3TDX	A	1,490,832	970	493
*VK3FM	A	167,717	273	193
VK4IU	A	867,200	720	400
VK4UC	"	697,175	616	395
VK4CC	"	1,610	23	23
VK4FNQ	28	1,026	19	18
*VK4BL	A	20,898	94	81
*VK4FJ	21	242,046	344	238
*VK4IMX	14	3,360	35	35
*VK6XX	28	96,822	202	163

East Malaysia

9M6XRO	A	255,354	399	219

Guam

KG6DX	28	352,089	459	261
*KH2/JS6RRR	21	34,080	144	80
		(OP: JS6RRR)		

Hawaii

KH6CW	A	136,843	247	173
*KH6OO	A	97,090	214	146
*AH6NF	"	3,944	42	34
*KH6ZM	28	798,222	779	346
*KH6GMP	21	71,248	197	122

Indonesia

*YB6EN	A	459,510	410	265
*YB1PT	"	150,212	284	188
*YC6EI	"	15,708	75	68
*YBØCOU	"	4,953	43	39
*YB8EL	21	335,352	434	267
*YBØJIV	"	35,123	119	103
*YB1HK	14	66,924	165	143
*YB1AR	7	124,122	167	137
*YC2WBF	"	25,024	70	68
*YC6EO	"	6,800	37	34
*YC2LEV	"	3,536	26	26

New Zealand

*ZM3T	28	94,237	224	143
		(OP: W3SE)		
*ZL2KBR	14	1,408	22	22

Palau

T88ZO	A	304,051	431	211
		(OP: JA1IST)		

Philippines

4H1T	A	47,808	170	96
*DV1JM	A	564,564	594	286

SOUTH AMERICA

Argentina

LV5V	A	3,655,014	1709	701
		(OP: LU5VV)		
LT1F	"	2,971,710	1546	630
		(OP: LU1FAM)		
LU9DPM	"	97,467	227	159
LU1BJW	"	20,202	84	74
LW9ETQ	"	10,340	67	55
LU6QI	"	8,957	60	53
LU7HN	28	1,507,101	1037	493
*LU7FTS	A	477,692	548	307
*LR1F	"	372,027	481	269
		(OP: LU5FD)		
*LU8DCF	"	203,090	324	230
*LU4VEW	"	149,682	287	202
*LU1XT	"	33,280	137	104
*LU8EOT	28	185,409	333	189
		(OP: LU9ESD)		
*LU5FZ	"	130,501	248	181
*LU9EHU	"	5,152	54	46
*LU5FGA	"	2,848	34	32
*LU5MT	21	27,538	104	98
*LU5CAB	14	8,848	74	56

Aruba

P49X	A	11,632,690	3442	862
		(OP: WØYK)		
*P4ØYL	A	4,839,181	1825	661

Bolivia

*CP1FF	14	8,990	65	62

Bonaire

*PJ4R	A	7,600,000	2717	760
		(OP: N4RR)		

Brazil

PY7ZY	A	123,291	245	171
PY2KP	"	38,420	130	113
PT7DX	"	31,719	107	97
PP1CZ	21	125,904	243	183
PY4RGS	"	52,182	153	117
PR7AR	14	48,816	149	113
PY2KJ	7	94,536	142	117
*ZX2B	A	3,548,440	1601	665
		(OP: PY2MNL)		
*PY2NY	"	1,020,908	795	404
*PU5AAD	"	207,708	332	228
*PY5TJ	"	22,050	101	90
*PY2NM	"	11,224	71	61
*PP5ZB	"	6,672	60	48
*PS7DX	"	6,348	51	46
*ZV2C	"	4,640	49	40
*PY3APY	"	1,560	24	24
*PR7ZAJ	"	322	15	14
*PU5ATX	28	241,606	423	214
*PU3LTA	"	15,840	81	72
*PY4XX	"	3,800	40	38
*PU2SGL	"	496	16	16
*PY4EK	21	71,307	183	139
*PY1ZV	"	68,072	192	127
*PY2UN	14	5,612	48	46
*PY2OC	7	8,056	39	38

Chile

CE3FZ	A	409,578	522	267
XR3P	"	374,975	467	283
		(OP: CE3PG)		
CE3EEA	14	132,384	243	197
*3G3O	A	294,480	441	240
		(OP: CE3OPE)		
*XQ7UP	28	78,048	194	144
*XR1V	14	159,644	274	214
		(OP: CE1VCZ)		

Colombia

HK1R	A	44,253	153	99
*5K3R	A	1,262,456	881	398
		(OP: HK3R)		
*HK3JJB	"	634,224	477	292

Curacao

PJ2/WI9WI	A	1,318,275	995	405
		(OP: WI9WI)		

Ecuador

*HC1JQ	21	1,950	26	26

Paraguay

*ZP9EH	A	20,698	99	79
*ZP5DBC	28	205,800	343	210

Suriname

PZ5RA	A	3,993,608	1672	632

Uruguay

*CX8AF	A	15,960	83	70

Venezuela

*YV5KG	A	940,976	781	368
*YV8AD	"	111,020	189	140
*YW5RY	28	44,132	152	118
		(OP: YV5KAJ)		
*YV4BCD	14	70,500	181	141
*YW5T	7	1,331,748	651	354
		(OP: YV5JBI)		
*YV6BTF	"	90,324	135	117

QRP

TM3T	A	1,229,088	884	434
		(OP: F5VBT)		
TM9K	"	1,075,306	771	446
RX1CQ	"	1,010,240	764	440
KØDU	"	845,500	922	445
IZ8JFL/1	"	663,216	647	337
IK5RUN	"	589,268	522	358
K2YG	"	566,040	637	356
UU4JO	"	463,590	503	303
HA7YS	"	362,600	386	259
UX2MF	"	315,435	414	255
SP5XSL	"	261,112	372	254
DF5WW	"	254,270	345	235
DF1MM	"	228,056	335	232
UX8ZA	"	219,350	354	214
UR7CT	"	216,810	350	219
SP7QJB	"	165,787	260	193
S59D	"	152,067	236	173
IZ2JPN	"	148,986	256	186
RT4W	"	142,612	292	202
EA1GT	"	141,752	282	188
		(OP: EA1GT/QRP)		
ON2AD	"	122,525	237	169
HAØGK	"	110,550	216	165
N6WG	"	90,643	304	161
SP4BPH	"	90,500	193	125
YU1LM	"	88,060	186	148
EA3FHP	"	79,474	219	158
UAØA	"	78,343	206	157
IZ3NVR	"	77,265	207	153
SP8LXE	"	73,931	185	143
PE2K	"	73,220	185	140
CO2VE	"	71,374	188	127
DJ3GE	"	61,875	158	125
DL6ABB	"	55,680	152	120
YO8SAI	"	53,966	132	121
AI9K	"	51,534	233	126
CT1ELF	"	50,386	160	122
S51JS	"	44,100	124	105
RV3DBK	"	32,591	139	109
UAØZED	"	28,674	161	81
HB9CEY	"	28,469	99	83
PD1BOX	"	23,920	106	92
RV3DCZ	"	22,356	112	92
SP9DEM	"	22,348	96	74
UN7TAE	"	22,327	108	83
KB2HSH	"	20,315	113	85
IØUZF	"	19,635	99	85
YO4AAC	"	17,710	98	77
UAØSBQ	"	13,124	79	68
G4WNC	"	12,780	73	71
DL8AWK	"	12,696	74	69
IZ5PNL	"	12,040	65	56
SQ6OXD	"	11,651	75	61
F6OBD	"	8,568	64	63
G6CSY	"	8,428	49	49
JK1TCV	"	8,350	58	50
DL1JB	"	7,040	48	44
DL8LR	"	6,854	50	46
W6QU	"	3,686	39	38
		(OP: W8QZA)		
HA3OU	"	3,597	36	33
VE6SKY	"	3,132	42	36
WA8HSB/4	"	2,960	42	37
VU2UR	"	2,958	34	34
KO1H	"	2,448	26	24
RW3AI	"	2,304	35	32
NXØX	"	1,624	29	29
IZ5JLW	"	1,334	24	23
VA3FS	"	780	22	20
AB1HD	"	512	18	16
YO7ARY	"	264	12	12
S54AA	28	44,128	142	112
RU7A	"	19,812	105	78
EW1FR	"	5,560	56	40
NA5NN	"	4,664	55	44
		(OP: K2FF)		
K3TW/4	"	945	26	21
YB1ALL	"	240	11	8
N7AT	21	243,726	420	294
		(OP: K8IA)		
EA4EQD	"	109,431	225	189
JH3DMQ	"	108,580	231	178
HA6FQ	"	30,240	117	96
IV3AOL	"	25,665	113	87
IZ2QKG	"	19,422	102	83
YU/NF5A	"	11,859	84	67
		(OP: YT2T)		
IZØGYP	"	9,240	59	55
N8HM/3	"	7,749	70	63
ON8NT	"	4,560	46	40
K6VHF	"	3,840	57	48
LY2BBF	"	1,298	25	22
JR2LBF	"	540	15	15
TG9ANF	14	393,104	593	311
IK3NLK	"	92,684	235	188
EA1GFY	"	11,808	84	72
YO3DAC	"	11,088	81	72
LU6FT	"	2,618	35	34
GØBWG	"	2,211	33	33
LZ3GW	"	72	6	6
UN7LAS	"	60	6	6
IZ8GBH	"	27	3	3
PD4X	"	6	2	1
UT3N	7	403,788	389	266
		(OP: UT3NK)		
HG6C	"	207,746	257	209
		(OP: HA6IAM)		
IK4UXA	"	138,240	216	180
9A2Ø9L	"	76,472	139	121
		(OP: 9A9L)		
RT5R	"	57,856	126	113
VE3GTC	"	10,904	58	47
CO2KY	"	780	16	15
HA1WD	3.5	289,212	324	231
SP6EIY	"	123,000	199	164
		(OP: SP6EIY/QRP)		
UX5UU	"	112,548	200	166
UTØFF	"	40,850	114	95
SP4GL	"	39,744	108	96
SQ2HNA	"	31,328	105	88
LY4BF	"	13,920	64	58
9A4AA	"	10,682	56	49
UT8UL	"	7,128	46	44
DM9K	"	2,912	30	28
		(OP: DO4DXA)		

ROOKIE

United States

W1PL	A	536,928	815	336
NR9J	"	325	13	13
*AB1OD	A	532,560	650	336
*KJ4WLN	"	183,556	359	218
*KC2WYL	"	72,352	235	152
*KO4PU	"	63,315	248	135
*N3UE	"	55,062	173	126
*KC9RNK	"	35,420	160	110
*AB4G	"	29,568	142	96
*KK4BJV	"	27,500	120	100
*NØAJN	"	27,225	153	99
*WBØWIV	"	18,796	100	74
*KB3VNH	"	17,762	113	83
*KQØJ	"	14,490	77	70
*NØQP	"	2,730	47	39
*NØATQ/9	"	2,178	36	33
*KX7DX	"	1,728	24	24
*KD8RKP	28	36,698	152	118
*K6OK	"	11,780	93	76
*AK4EM	7	8,200	61	50

DX

OE6MMF	A	1,082,840	766	428
YP6Z	"	1,071,115	803	445
		(OP: YO6PZZ)		
IZ3KUY	"	279,282	380	267
VE7SQ	"	162,588	315	204
VK2CA	"	130,152	241	187
S51JS	"	44,100	124	105
6Y1X	"	29,204	112	98
PD1BOX	"	23,920	106	92
JO4CTB	21	78,210	201	158
*F4GDI	A	970,288	725	407
*LX1C	"	540,540	528	315
*CO2IZ	"	384,256	447	304
*PDØDK	"	298,890	395	243
*CO2MS	"	244,860	410	220
*EA5HRT	"	222,640	308	220
*SV2HTI	"	208,980	381	258
*YU1RP	"	182,093	299	211
*LU4VEW	"	149,682	287	202
*IW1FZR	"	146,445	237	195
*PD1EJA	"	112,763	224	181
*CO2OQ	"	105,672	268	148
*UR5ZIW	"	89,176	195	142
*IZ3QCH	"	75,361	163	143
*IN3EJN	"	63,376	166	136
*IK1/DH2SAQ	"	51,350	165	130
*9A6NDZ	"	49,728	133	111
*SQ8KEZ	"	48,026	142	118
*OE2LRO	"	47,082	151	114
*RA3RUF	"	43,320	147	114
*VO1OR	"	43,160	145	104
*IT9BDR	"	40,293	117	111
*RL3QCQ	"	32,301	135	111
*PDØMWG	"	27,720	124	105
*DO1CDE	"	23,941	107	89
*PDØRON	"	19,890	97	85
*2EØRKS	"	17,136	75	68
*DM4JK	"	14,420	75	70
*MØDMJ	"	10,452	71	67
*OM7ANO	"	10,422	70	54
*ON6OM	"	7,176	49	46
*IZ5IOS	"	6,258	47	42
*OH6HZH	"	5,180	38	35
*SP9OHL	"	5,130	47	45
*DB4MZ	"	4,758	41	39
*IZ3TFL	"	2,133	27	27
*DL5AKF	"	494	13	13
*RN4CA	"	480	15	15
*OH6K	28	9,633	65	57
		(OP: OH6FSG)		
*IZØINX	"	3	1	1
*IZ1PKV	"	0	0	0
*IZØUME	21	145,530	284	210
*DO3KMF	"	100,275	223	175
*SQ8KFH	"	27,146	109	98
*RN3DNG	"	26,631	115	99
*SV1MRV	14	19,488	116	87
*IZ7SIA	"	17,112	102	92
*IZ7SLF	7	10,608	53	52

TRIBANDER/SINGLE ELEMENT

United States

WA2ETU	A	2,739,429	1493	693
K4FX	"	1,291,290	1017	473
K9QC	"	1,172,841	1010	501
NO2T	"	1,139,968	984	488
WX6V	"	1,076,850	970	450
KØALT	"	1,065,764	1077	476
NB3R	"	1,050,720	966	480
AC4CA/5	"	997,706	1077	466
W2YE/4	"	979,484	869	452
W6AEA/7	"	937,359	1081	447
K3MD	"	850,522	794	446
W1BYH	"	800,496	755	408
KV1E/Ø	"	768,600	887	427
AA8R	"	759,116	822	404
W6SX	"	656,352	991	344
AE1T	"	625,920	627	384
W4UK	"	620,370	845	366
W6GJB	"	616,308	774	406
WØEM	"	603,470	1010	370
KØCN	"	472,890	658	330
WM9Q	"	466,180	593	326
NA1QP	"	398,246	465	346
		(OP: W1CTN)		
K6EU	"	394,348	582	311
WB9TFH	"	313,536	498	276
W1TO	"	275,044	355	266
KV7DX	"	272,816	611	272
		(OP: AA7V)		
KA1GEU	"	267,288	410	259
N4DW	"	238,832	415	253
KS7S	"	192,114	402	234
K7HP	"	186,369	382	219
KO7X	"	183,183	466	231
WA3AAN	"	177,525	338	225
NC4MI	"	176,300	397	205
NS4X	"	168,696	375	213
KØVG	"	156,699	371	207
W1AJT/4	"	140,322	246	182
		(OP: VE3UTT)		
K7EIQ	"	130,611	301	197
N2SQW	"	129,216	226	192
W2GPS/3	"	106,578	242	191
WA9IVH	"	103,952	281	178
KV1J	"	89,925	266	165
N8AGU	"	81,224	176	143
WA8RPK	"	72,160	237	164
W3UL	"	60,350	206	142
WB9B	"	59,780	168	122
K8CR	"	36,630	168	110
N3IYX	"	26,355	135	105
WB6BFG	"	23,800	104	85
N3NZ	"	21,312	115	96
ACØB	"	19,437	109	93
WA3OFC/4	"	5,136	52	48
KW3A	"	4,370	42	38
WA8HSB/4	"	2,960	42	37
KX9X/1	"	2,660	39	38
NXØX	"	1,624	29	29
KN6DV/1	21	2,253,537	1389	663
W5AP	"	992,970	910	510
NK6A	"	107,590	331	203
WG7X	14	141,840	427	240
W6WRT	7	746,586	770	333
KØPK	"	428,040	536	290
N2EIK	3.5	69,940	235	130
WX3SKY	"	19,866	108	77
		(OP: K3RWN)		
*AB4SF	A	1,003,860	891	429
*KB3LIX	"	623,751	668	353
*NJ1H	"	595,960	687	376
*N2WN/4	"	590,503	631	367
*KM1W	"	486,755	525	335
		(OP: W1UE)		
*WS7V	"	421,120	645	329
*W6SAI/4	"	358,720	590	295
		(OP: K4CWW)		
*KW7N	"	316,394	605	283
*WGØM	"	311,310	566	270
*WT6P/7	"	295,372	543	274
*WB5TUF	"	286,972	497	259
*W6FFH	"	279,936	501	288
*W4PJW	"	272,837	489	251
*AJ4A	"	266,418	357	246
*WB8TLI	"	261,214	367	262
*KK8MM	"	259,435	439	265
*K7GS	"	252,566	494	293
*AD1C/Ø	"	251,328	466	272
*K4FPF	"	236,697	357	257
*KA9MOM	"	221,358	429	237
*WA1LWS/3	"	182,040	344	222
*KI6QDH	"	177,410	415	226
*N3WD	"	172,144	372	212
*KIØJ	"	166,057	381	211
*K2EN	"	160,746	379	219
*N3ALN	"	149,968	340	206
*K9JU	"	145,950	286	210
*AI4GR	"	140,532	307	196
*WTØO	"	133,455	361	217
		(OP: KØTI)		
*N9TF	"	130,845	261	195
*N2MUN	"	130,398	284	211
*K1VU	"	124,800	312	195
*N6VH	"	118,125	305	175
*W8HY	"	116,375	301	175
*AD7MQ	"	115,639	281	197
*KC5FP	"	102,949	296	191
*NØOK	"	98,943	272	177
*KE6QR	"	97,344	309	169
*K4FTO	"	95,312	283	161
*KK5JY	"	94,860	308	180
*KS2G	"	94,458	257	182
*W9LHG	"	79,210	239	178
*N5IE/9	"	55,572	208	132
*W3AG	"	49,268	140	109
*NX8G/5	"	49,140	210	135
		(OP: NX8G/5)		
*K8QH	"	48,216	169	123
*ABØYM	"	46,494	205	126
*K6UM/7	"	44,286	168	121
*KB2NB	"	38,368	145	109
*NF4A	"	38,148	137	102
*KK6TV	"	35,840	149	112
*N6BHX	"	33,480	165	108
*NØHJZ	"	32,249	177	119
*K6WSC/7	"	30,690	129	110
*NA4X	"	29,280	135	96
*AD1L	"	26,016	109	96
*K4EDI	"	20,608	107	92
*WW8OH	"	20,580	97	84
*AA5JG	"	20,152	108	88
*KA4OTB	"	19,046	120	89
*N8WS	"	15,385	103	85
*N2SO	"	14,504	88	74
*N5RMS	"	14,240	100	80
*KCØDEB	"	13,532	75	68
*KM6I	"	13,054	84	61
*KI4SP	"	11,850	97	75
*KT4Q	"	8,673	70	59
*AA9UF	"	8,600	51	50
*KD8D	"	7,923	62	57
*KT4CB	"	7,070	80	70
*AF8C	"	6,496	72	58
*WB2TPS	"	4,218	40	37
*KD6AKC/4	"	3,520	46	44
*WB8JUI	28	7,370	71	55
*KD5JHE	"	5,104	61	44
*N2YBB	21	294,512	416	316
*KB9S	"	22,790	131	106
*AA4U	"	260	10	10
*W1ZD/7	14	315,595	560	355
*K8SM	7	407,824	458	284
*AB1J	"	261,954	389	231
*W3NR/4	"	20,382	114	79
*N2AET	3.5	32,040	142	90

DX

ST2AR	A	4,219,919	1876	671
DL4MCF	"	4,113,044	1616	724
GW4SKA	"	3,239,328	1553	656
DD2ML	"	3,091,200	1527	640
YL9T	"	2,385,600	1341	568
		(OP: YL2TW)		
UP4L	"	2,002,505	1207	535
		(OP: UN7LZ)		
VE3EK	"	1,902,852	1176	567
GM8SBH	"	1,867,635	1095	539
		(OP: GMØFGI)		
VE2FXL	"	1,801,086	1087	518
IK2SND	"	1,709,325	1028	535
MMØGPZ	"	1,524,593	988	503
EI2GLB	"	1,503,872	1006	496
SM6NOC	"	1,416,020	989	505
F1RHS	"	1,330,155	958	501
DL1NEO	"	1,228,439	813	443
JE1LFX	"	1,183,428	853	463
UA9TF	"	1,138,228	873	413
DK1KC	"	1,097,790	798	430
UAØSR	"	982,114	801	413
EV1R	"	973,263	727	439
SMØBSO	"	949,968	761	432
SM5D	"	935,066	687	418
		(OP: SM5DJZ)		
EA9LZ/7	"	896,235	888	401
IK3PQG	"	807,880	673	380
DF2TT	"	769,824	662	396
LA9DFA	"	745,125	601	375
IN3JJI	"	706,275	606	365
SM5EPO	"	682,104	623	388
F6IIT	"	668,160	626	384
4Z5KU	"	564,436	479	292
RA3TT	"	555,170	591	385
DF5BX	"	549,186	526	314
RXØAE	"	482,816	548	328
OH8KVA	"	467,283	492	327
R3VA	"	466,302	502	327
9A2Ø2JK	"	466,014	486	303
		(OP: 9A2JK)		
OU4O	"	460,660	465	310
EB7CIN	"	424,612	503	302
UR4EI	"	419,964	491	316
CE3FZ	"	409,578	522	267
F5CQ	"	386,295	417	283
XR3P	"	374,975	467	283
		(OP: CE3PG)		
VE3MV	"	371,448	514	252
ED1A	"	308,195	401	265
		(OP: EA1AST)		
UT5UKY	"	295,668	401	258
JO4CFV	"	239,232	396	224
UA6AA	"	222,950	354	245
IV3JCC	"	220,946	327	242
UX8ZA	"	219,350	354	214
JA1IZZ	"	217,782	330	222
DF6RI	"	210,367	304	211
UN9PQ	"	198,182	289	197
DJ3IW	"	177,670	219	218
HAØHW	"	157,192	293	196
JN3SAC	"	148,213	262	169
VA3PC	"	135,072	234	201
PY7ZY	"	123,291	245	171
JA7VEI	"	116,406	223	174
RV1CC	"	113,399	214	169
I5JFG	"	95,550	206	175
DL1OLI	"	90,117	193	153
EA3BD	"	87,934	191	154
G3XTT	"	84,597	192	163
IZ3NVR	"	77,265	207	153
G7VRK	"	74,166	161	141
JA1QZC	"	65,330	172	139
DL6OCM	"	57,564	154	123
DL2MDU	"	57,540	160	140
JE1HRC	"	46,920	154	120

SV3GKU	"	**44,577**	**144**	**117**
RV3DCZ	"	22,356	112	92
R7LP	"	22,327	89	83
8SØC	"	20,592	92	88
		(OP: SMØMPV)		
LU1BJW	"	**20,202**	**84**	**74**
YO5CUQ	"	**19,345**	**84**	**73**
UAØSBQ	"	13,124	79	68
LU6QI	"	8,957	60	53
G6CSY	"	8,428	49	49
YO2DFA	"	7,367	56	53
JA9LJS	"	**2,976**	**33**	**31**
I2SVA	"	630	15	15
ED5J	28	**24,252**	**105**	**94**
			(OP: EA5DM)	
UZ5Q	"	**270**	**11**	**10**
			(OP: UY5OZ)	
UN4PG	21	**1,057,464**	**873**	**456**
DL3BQA	"	**727,818**	**674**	**403**
VY2LI	"	**711,552**	**703**	**408**
G6NHU	"	**699,540**	**682**	**393**
JA9CWJ	"	**567,000**	**546**	**375**
YO3VU	"	**448,825**	**558**	**325**
XE1EE	"	**355,880**	**507**	**310**
UA6LJB	"	**272,060**	**411**	**305**
RA9UN	"	**220,575**	**353**	**255**
UA9FGJ	"	**140,713**	**292**	**223**
JA1BPA	"	**20,520**	**102**	**72**
IZ2QKG	"	**19,422**	**102**	**83**
IT9MUO	14	**737,100**	**748**	**455**
RW4WZ	"	**160,064**	**313**	**244**
JHØNOS	"	**142,003**	**238**	**211**
S57YK	"	**139,216**	**293**	**226**
JR1BAS	"	**125,600**	**234**	**200**
HI8PJP	"	**107,334**	**287**	**178**
YO5OHY	"	**94,392**	**230**	**184**
S51CK	7	**1,617,414**	**801**	**471**
VY2SS	"	**498,688**	**438**	**256**
EW4MM	"	**422,408**	**381**	**266**
OK8WW	"	**134,596**	**198**	**161**
RM5P	"	**37,668**	**107**	**86**
HA3LI	3.5	**936,768**	**668**	**357**
***ZX2B**	A	**3,548,440**	**1601**	**665**
			(OP: PY2MNL)	
***7Z1SJ**	"	**2,288,608**	**1189**	**544**
***DL9YAJ**	"	**1,997,056**	**1062**	**538**
***ON4CT**	"	**1,911,576**	**1038**	**552**
***HI8PLE/7**	"	**1,795,311**	**1242**	**531**
			(OP: HI8PLE/7)	
*DL1QW	"	1,623,392	970	523
***S56A**	"	**1,504,256**	**932**	**512**
*DL1YD	"	1,363,998	860	491
***US4LPY**	"	**1,349,865**	**1050**	**505**
*UR4U	"	1,328,040	867	465
			(OP: UR4UDI)	
***5K3R**	"	**1,262,456**	**881**	**398**
			(OP: HK3R)	
***EC8CQ**	"	**1,190,748**	**915**	**442**
***EA1WW**	"	**1,161,105**	**855**	**465**
*DL6NDW	"	917,730	723	405
***OK1VRF**	"	**883,575**	**691**	**385**
***JI1RAK**	"	**872,256**	**727**	**413**
***RO1B**	"	**847,012**	**763**	**428**
*HZ1PS	"	844,022	636	397
*DJ4MH	"	835,016	686	364
*ON5GQ	"	831,734	702	394
***VE2AXO**	"	**828,704**	**740**	**376**
*EA1EA	"	822,800	655	374
*UX1IL	"	821,541	755	399
***IK5AMB**	"	**766,292**	**604**	**382**
*IK3ORD	"	740,916	660	396
***5C2P**	"	**736,205**	**685**	**365**
***SQ8JX**	"	**708,935**	**601**	**355**
*OK2CLW	"	704,103	562	339
*JP1QDH	"	665,260	630	370
***PA3DBS**	"	**651,807**	**617**	**351**
***UN7TDB**	"	**620,662**	**536**	**301**
***KL8DX**	"	**614,570**	**728**	**370**
*VE2EBK	"	603,480	618	321
*DL6SFR	"	583,416	548	333
*IV3BCA	"	582,330	547	354
*IK2YSJ	"	581,544	549	328
*UT3RS	"	563,801	540	337
***VE3JI**	"	**556,742**	**540**	**331**
***OG8T**	"	**553,161**	**584**	**371**
*UY3MW	"	513,670	561	310
***JA6DIJ**	"	**467,520**	**513**	**320**
***VE6SQ**	"	**464,400**	**642**	**270**
***RA9FRD**	"	**462,859**	**561**	**323**
*DA9L	"	460,416	490	327
			(OP: DO1BEN)	
*IZ2GRG	"	459,483	490	309
***R2LA**	"	**458,415**	**515**	**305**
*OP4A	"	446,682	447	327
***F8CRS**	"	**429,135**	**417**	**305**
*US7IA	"	381,072	453	272
*VE3DZ	"	368,072	441	278
*IZ4AFW	"	361,767	455	321
*7N2UQC	"	350,460	455	270
*R3BB	"	345,117	486	303
*UX3IW	"	338,212	374	257
***LY2TS**	"	**327,010**	**413**	**265**
*IK3QAR	"	299,880	378	252
***VE7BSM**	"	**284,664**	**529**	**232**
*LY2SA	"	282,978	343	237
***HA8XF**	"	**281,820**	**394**	**231**
***RK9AK**	"	**254,380**	**330**	**230**
*S51DX	"	253,559	293	227
*JE1SGH	"	246,240	382	240
*S51JQ	"	240,792	350	237
*VA3MJR	"	240,118	375	211
***JHØNEC**	"	**240,084**	**361**	**247**
***E73PY**	"	**238,160**	**346**	**229**
*LY5D	"	235,620	329	220
*DL6ZBN	"	230,175	313	225
***EW7LE**	"	**228,160**	**363**	**248**
***Z35X**	"	**220,818**	**308**	**247**
*HA5VZ	"	211,345	309	215
***LU8DCF**	"	**203,090**	**324**	**230**
*RK9AN	"	201,144	299	204
*IK4CLF	"	200,970	264	203
***JF3NKA**	"	**185,736**	**294**	**218**
*UR3AC	"	178,602	305	206
*IK4ZHH	"	174,932	296	202
*DL6NWA	"	171,754	315	211
*IK7RVY	"	168,181	305	221
*DL5GAC	"	167,256	304	202
*JA1BWA	"	153,797	299	173
*PD2JAM	"	153,527	235	187
*IK5VQK	"	152,460	287	210
*VE3RCN	"	152,256	287	183
*OK1PMA	"	144,192	218	192
*DJ2AX	"	141,290	247	199
*DL4JYT	"	140,094	249	181
*RA3GZ	"	137,578	307	217
*JA1MZM	"	137,085	267	195
*JA1XRH	"	121,792	238	173
*IØZUT	"	119,035	224	179
*EA1JO	"	114,739	236	179
***RL6LP**	"	**108,016**	**232**	**172**
***XE2AU**	"	**101,108**	**254**	**157**
*UT4UQ	"	99,699	227	167
***RXØSC**	"	**98,210**	**213**	**161**
***WP3GW**	"	**85,848**	**179**	**147**
*IQ4FA	"	83,860	193	140
			(OP: I4JEE)	
*F6DKQ	"	72,816	177	148
*DLØLG	"	67,584	167	128
			(OP: DF6HZ)	
*R5ACQ	"	67,496	200	143
***OM7YC**	"	**67,014**	**165**	**146**
*7K4VPV	"	64,719	171	141
*IZ8DVD	"	57,477	138	119
*RU3VV	"	53,802	155	126
*DL1MDZ	"	47,619	141	117
***SFØD**	"	**47,064**	**131**	**106**
			(OP: SMØDSF)	
***VU2PTT**	"	**45,864**	**144**	**117**
***EA3FLS**	"	**45,292**	**158**	**134**
*DF4WC	"	45,140	148	122
*IK7WPD	"	44,118	134	114
*JA1AZR	"	42,984	141	108
*JN1MSO	"	42,718	146	106
*IK7NXU	"	41,000	135	100
*DL5ZBA	"	40,182	141	111
*SP3BAY	"	39,675	133	115
*DL5ASK	"	38,913	121	109
*IZ5CMG	"	38,913	134	119
*JJ1KZZ	"	35,048	122	104
***UA4LU**	"	**34,662**	**143**	**106**
*SE5S	"	33,280	125	104
*IK2ANI	"	31,790	124	110
***JE4MHL**	"	**31,584**	**123**	**94**
*JA3HBF	"	30,096	102	88
*JI1LAT	"	29,694	114	98
*EB3JT	"	28,925	105	89
*S57S	"	27,234	99	89
*DL8ZAJ	"	25,696	98	88
***G4OGB**	"	**25,146**	**110**	**99**
*ON5HY	"	23,848	102	88
*PY5TJ	"	22,050	101	90
*PA7PTT	"	21,760	100	80
***VK4BL**	"	**20,898**	**94**	**81**
*PDØWR	"	20,739	105	93
*IZ2MHT	"	20,150	75	65
***YO2LSP**	"	**19,929**	**77**	**73**
*IK2GPQ	"	17,136	99	84
***CX8AF**	"	**15,960**	**83**	**70**
*XE1HJL	"	14,912	78	64
***HB9CXK**	"	**12,480**	**70**	**60**
*IZ1QXW	"	12,075	75	69
*UR5LAK	"	11,594	65	62
***EB2RA**	"	**11,440**	**66**	**55**
*GØRJL	"	11,392	69	64
*G3VAO	"	11,352	71	66

Khrystyne K1SFA at the K1TTT superstation where she and Mike K1MK set the new North America MS record.

*RK3BA	"	9,381	69	53
***SV7BVM**	"	**8,949**	**64**	**57**
*JP1HUJ	"	8,235	52	45
*LY2N	"	7,849	49	47
***HL5YI**	"	**7,304**	**55**	**44**
*SQ8GUM	"	6,840	46	45
*DK3WW	"	6,204	50	44
*G3VQO	"	6,032	53	52
*UA4SBZ	"	5,936	54	53
*7M4OOS	"	5,850	54	45
*JK3GWT	"	5,117	49	43
*JP1GVC	"	4,914	48	42
*IW3SAR	"	4,480	43	40
*IK2IKW	"	4,365	47	45
*IØYQV	"	3,630	37	33
*VU2ABS	"	2,727	31	27
***JE8KKX**	"	**2,666**	**33**	**31**
***EA5TT**	"	**2,418**	**28**	**26**
*DL1CW	"	1,239	21	21
*IW2NRI	"	1,225	26	25
*DF6YC	"	1,155	23	21
*IK5AFJ	"	954	19	18
*IV3XPP	"	576	13	12
***ZM3T**	28	**94,237**	**224**	**143**
			(OP: W3SE)	
***XQ7UP**	"	**78,048**	**194**	**144**
***TG9AJR**	"	**55,806**	**193**	**131**
***EA3NO**	"	**40,600**	**135**	**116**
***YT2B**	"	**27,416**	**111**	**92**
***UN5J**	"	**20,592**	**95**	**78**
***PAØMIR**	"	**9,504**	**63**	**54**
***VE7BC**	"	**7,685**	**70**	**53**
***LU9EHU**	"	**5,152**	**54**	**46**
***EA4AFP**	"	**3,952**	**39**	**38**
***IZØFZM**	"	**1,218**	**23**	**21**
***CT1EEK**	21	**635,091**	**658**	**417**
***JH8SIT**	"	**235,176**	**345**	**246**
***VE1QP**	"	**102,680**	**211**	**170**
***OK2QX**	"	**87,156**	**210**	**162**
***RX3AGQ**	"	**81,144**	**220**	**168**
*R2SA	"	38,918	140	122
***OE1ZKC**	"	**20,160**	**95**	**80**
			(OP: JH4RHF)	
***JE2BOM**	"	**3,774**	**39**	**37**
***JE1GZB**	"	**752**	**17**	**16**
***EA1OS**	14	**1,013,460**	**890**	**508**
***YT5W**	"	**774,367**	**776**	**451**
			(OP: YT2PFR)	
***IW9FDD**	"	**432,525**	**536**	**365**
***VE3IAE**	"	**266,760**	**401**	**285**
***Z31MM**	"	**197,316**	**389**	**252**
***MMØDWF**	"	**155,335**	**308**	**235**
***EX8AI**	"	**79,464**	**196**	**154**
***3V8SS**	"	**75,320**	**182**	**140**
			(OP: KF5EYY)	
***YO5OLD**	"	**72,522**	**215**	**158**

*YV4BCD	"	70,500	181	141
*HA5KN	"	51,520	175	140
*JR4GPA	"	37,468	128	116
*CP1FF	"	8,990	65	62
*PY2UN	"	5,612	48	46
*IZ5MMB	"	1,968	28	24
*YU1AST	7	1,395,450	747	443
			(OP: YU2A)	
*OK2RU	"	957,584	592	388
*IW4EGX	"	943,714	589	389
*DL5KUD	"	721,050	541	345
*EU1AZ	"	569,160	439	306
*UW2F	"	354,000	346	250
			(OP: UT0FT)	
*LA8OKA	"	85,008	154	132
*VE3YF	"	80,640	135	120
*YC2WBF	"	25,024	70	68
*JA6FGC	"	3,618	29	27
*UZ2HZ	3.5	577,574	478	317
*SP5ECC	"	277,300	303	235
*IKØXBX	"	129,368	211	157
*RV6LCI	"	100,426	188	149
*UT2HM	"	80,920	171	140
*DL2SAX	"	61,272	154	111
*DJ1MM	"	49,434	129	107
*VE3MGY	"	33,372	110	81

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

United States

K1SFA	6,257,608	2401	853
WW4LL	4,689,548	2104	797
NA0CW	3,988,480	2109	760
ND2T/6	3,241,841	1860	673
W3MF	2,412,319	1277	637
WY7SS	2,139,930	1943	585
KQ6ES	1,946,700	1665	540
N1MGO	1,444,896	1241	519
KE1B/6	1,342,152	1278	504
WX7P	1,175,116	1243	482
K4MM	1,160,160	979	480
N2FF	654,515	600	395
WS5J	648,852	981	389
W6DR	442,795	784	295
KA4PKB	435,845	690	305
N4WW	278,334	417	282
KI4UDF	251,370	410	270
WM6A	233,100	519	252
KU5Z	173,964	439	218
N3RN	151,902	290	194
K0TV/1	122,880	207	160
W4CDA	9,796	94	62
N5HR	5,481	72	63
W9CF/7	3,496	44	38

Alaska

KL7IWC	681,996	877	322

Bahamas

C6ANM	1,418,008	1117	491

Canada

VE3FJB	3,400,700	1552	620
VE6AO	2,012,526	1732	486

Puerto Rico

WP4WW	1,238,419	1127	439

AFRICA

Morocco

5D5A	15,579,564	3859	1001

ASIA

Asiatic Russia

RT9J	3,216,714	1492	582
UA9CDV	2,862,423	1442	571

China

BD5DML	14,976	90	72
BY4RWT	7,738	63	53

EUROPE

Belgium

ON4ANL	767,750	657	370

Croatia

9A206B	2,766,818	1264	646
9A			
9A7B	4,576	45	44
9A			

Czech Republic

OK1KSL	4,594,366	1858	749
OK2RVM	921,011	735	377

England

G5D	2,851,188	1432	636

European Russia

RK3DXW	2,747,760	1567	642
RC4HAA	543,360	584	320
RT4F	404,300	548	325

Finland

OH8X	6,815,487	2551	867
OH8F	1,504,854	1079	531
OH2K	104,412	232	154

Germany

DJ6QT	5,664,362	2009	803
DL0ER	1,384,188	920	467

Greece

SZ1A	3,100,103	1703	631

Hungary

HG5C	355,680	421	288

Italy

IV3RAV	5,368,485	1964	773
IQ2LS	1,170,228	829	452
IQ7DV	169,857	343	243

Latvia

YL4U	6,675,680	2337	880

Lithuania

LY2BUU	956,734	738	383

Luxembourg

LX0RL	27,550	109	95

Netherlands

PI4Z	2,046,044	1091	539

Norway

LA1K	3,751	33	31

Poland

HF3A	4,386,564	1749	721

Scotland

GM7R	307,475	357	245

Sicily

IT9HBT	3,048,858	1603	642

Slovak Republic

OM3KFF	7,098,826	2342	833
OM3KWZ	2,034,395	1133	517
OM3RRC	1,663,620	1003	510

Slovenia

S51A	7,069,062	2335	858

Spain

ED1R	9,873,600	2989	968
ED2V	3,072,339	1541	631
ED2Y	2,969,220	1543	615
EE2K	2,777,555	1456	605
EE7T	2,750,484	1633	622
EA1SA	734,808	681	408

Ukraine

UT7E	2,488,260	1480	565
UR4PWC	2,336	35	32

OCEANIA

New Zealand

ZL1/K6YL	3,740	42	34

SOUTH AMERICA

Argentina

LV6D	772,160	711	380

Brazil

ZV2K	1,376,630	903	505

Uruguay

CV5K	1,640,496	1121	478

MULTI-OPERATOR TWO TRANSMITTER NORTH AMERICA

United States

NG1G	6,963,268	2900	884
WQ2N	929,187	873	441
WB8SKP/4	319,600	609	272
KF5HHD	4,692,510	3001	765
KU6W	1,517,880	1400	520
K9XD	3,906,750	2271	750

Belize

V31RU	4,435,200	2286	616

Canada

VB7R	6,002,346	3010	723

ASIA

Asiatic Russia

RWØA	10,232,432	3295	824

China

BD1QXU	861,924	723	372
BA2IB	33,734	155	101

Japan

JA6ZPR	3,378,375	1661	693

EUROPE

France

F4ERS	10,025,586	3187	954

Germany

DLØCS	8,145,040	2810	904

Hungary

HG1S	12,643,928	3541	1012

Norway

LN5O	6,535,749	2472	869

Poland

SN2B	8,061,808	2740	856

Slovenia

S55W	9,245,580	3039	892

Spain

EA2RCF	3,512,709	1745	643

SOUTH AMERICA

Argentina

LS1D	9,784,614	3264	966

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

United States

NR4M	13,448,106	4646	1062
AK7AZ	1,439,152	1654	481

Canada

VE7UF	7,584,460	3329	806

ASIA

Asiatic Russia

UI9I	644,688	576	333

EUROPE

Croatia

9A1A	22,856,592	5658	1168

Finland

OH6R	10,278,215	3330	965

Germany

DL1DVE	6,733,432	2421	844

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Announcements

(continued from p. 10)

PEOTONE, ILLINOIS — Kankakee Area Radio Society Karsfest 2012 July 22 at the Will County Fairgrounds, Peotone Exit 327 (East) off Interstate 57. Contact: Craig Cahan, N9FD, 7 Franklin Drive, Manteo, IL 60950. E-mail: <karsfest@gmail.com>; <http://www.w9az.com>. (Talk-in 146.94- [PL 107.2]; exams)

VAN WERT, OHIO — Van Wert Amateur Radio Club 25th Annual Van Wert Hamfest July 22 at the Van Wert County Fairgrounds. Contact: Louis Thomas, WD8LLO, (419) 238-2812;. <http://www.w8fy.org/hamfest. html>. (Talk-in 146.850)

WEST FRIENDSHIP, MARYLAND — Baltimore Radio Amateur Television Society Maryland Hamfest and Computer Fest July 22 at the Howard County Fairgrounds, 2210 Howard County Fair Road. Contact: BRATS, P.O. Box 5915, Baltimore, MD 21282; e-mail: <hamfest@bratsatv.org>; <http://www.bratsatv.org>. (Exams, pre-registration required by calling 301-572-5124 between 6 and 9 p.m.)

OKLAHOMA CITY, OKLAHOMA — Central Oklahoma Radio Amateurs Ham Holiday 2012 at the Biltmore Hotel/Conference Center. Information: CORA website: <www.HamHoliday.org>. (Talk-in 146.925– offset PL 141.3; exams)

COLFAX, WASHINGTON — Kamiak Butte Amateur Repeater Association Camp Out & Annual Meeting July 27–29 at the Boyer Park & Marina. Contact: Betsy, N7WRQ, (509) 448-5821; e-mail: <n7wrq@aol.com>. (Talk-in 146.74– or 146.520 simplex)

CLEAR LAKE, SOUTH DAKOTA — Deuel County Amateur Radio Club Hamfest 2012 July 28 at the city park in Clear Lake. Contact: Deuel County ARC, P.O. Box 427, Clear Lake, SD 57226; e-mail: <dcarc@w0gc.org>; <http://www.w0gc.org>. (Talk-in 444.950 [PL 136.5] or 444.300 [PL 136.5]; exams)

OKLAHOMA CITY, OKLAHOMA — Central Oklahoma Radio Amateurs, Inc. Ham Holiday 2012 July 27–28 at the Biltmore Hotel and Conference Center, 401 South Meridian Avenue. E-mail: <vicepresident@hamholiday.org>; <http://www.HamHoliday.org>. (Talk-in 146.925– [PL 141.3]; exams)

WAYNESVILLE, NORTH CAROLINA — Western Carolina Amateur Radio Society Hamfest July 28 at the Haywood County Fairgrounds. Contact: WCARS, P.O. Box 1488, Asheville, NC 28802; (828) 298-6685; <http://www.wcars.org>. (Talk-in 146.910- [PL 91.5)] or 147.390+ [PL 94.8]; exams)

ANGOLA, INDIANA — Land of Lakes Amateur Radio Club Angola Hamfest August 4 at the Steuben County 4-H Fairgrounds. Contact Sharon Brown, WD9DSP, (260) 475-5897. (Talk-in 147.18+ [PL 131.8]).

COLUMBUS, OHIO — Voice of Aladdin Amateur Radio Club, W8FEZ & Ohio Section-ARRL Columbus Hamfest & ARRL Ohio State Convention August 4 at the Aladdin Shrine Center, 3850 Stelzer Road. Website: <http://www.aladdinshrine.org/fraternal/hamfest.php> or <http://arrl-ohio.org>. (Talk-in 146.970 [PL 123.0]; exams)

TRUMANSBURG, NEW YORK — Tompkins County Amateur Radio Association Ithaca Hamfest 2012 August 4 at the Trumansburg Fairgrounds. Contact: Bill Klinko, KC2OYN, (607) 738-4694. E-mail: <whk2@cornell.edu>. (Talk-in 146.97- [PL 103.5]; exams)

PEOTONE, ILLINOIS — Hamfesters Amateur Radio Club 78th Annual Hamfest August 5 at the Will County Fairgrounds. Contact Kerry Nelson, AA9SB, (708) 335-4574; e-mail: <kw_nelson@earthlink.net>; <http://bit.ly/J0dEHK>. (Talk-in 146.52 simplex; exams)

PORTLAND, OREGON — Willamette Valley DX Club 2012 Pacific Northwest DX Convention fAugust 3–5 at the Monarch Hotel and Conference Center. Contact Al Rovner, K7AR, <k7ar@arrl.net>; <http://www.wvdxc.org/dxconvention>.

BERRYVILLE, VA — Shenandoah Valley Amateur Radio Club 62nd Annual Berryville Hamfest and Computer Show August 5 at the Clarke County Ruritan Fairgrounds. Contact: Dave Adsit, (540) 303-7055. Email: <hamfest2012@comcast.net>; <http://www.w4rkc.org/hamfest>. (Talk-in 146.82-; exams, noon registration)

QUINCY, ILLINOIS — Western Illinois Amateur Radio Club Ham Radio and Computer Swapfest August 11 at the Eagles Alps, 3737 North 5th Street. Contact: Danny Pease, (217) 430-2046; e-mail: <ng9r@arrl.net>; <http://www.w9awe.org>. (Talk-in 147.030 +600 [CTCSS 103.5]; exams)

SAINT ALBANS, VERMONT — Saint Albans Amateur Radio Club STARC 2012 Summer Hamfest August 11 at the Veterans of Foreign Wars – Post 758, 353 Lake Street. (Exams, Tech only)

ADAMS, MASSACHUSETTS — Northern Berkshire Amateur Radio Club NoBARC Hamfest August 12 at Bowe Field in the Adams Agricultural Fair Grounds off Route 8. E-mail: <hamfest@nobarc.org>. (Talk-in 146.910 [PL 162.2]; exams 9 a.m.)

*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.*

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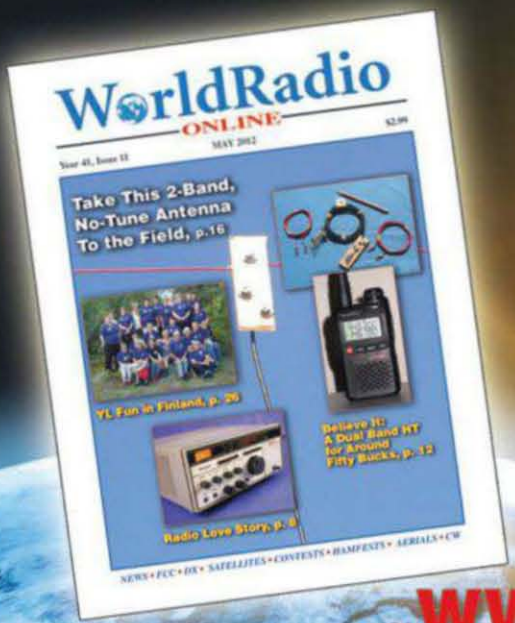

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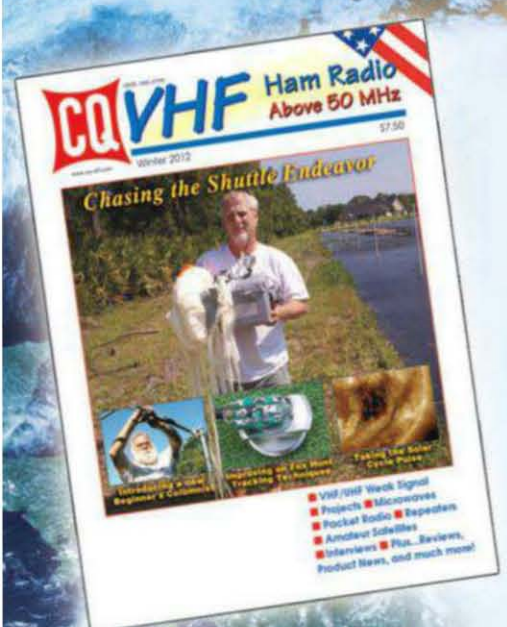

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