Report from Chile, p. 13

Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

MAY 2010

CQ

1945 — Our 65th Anniversary — 2010

- Sunspot Basics, p. 26
- 2009 Results: CQ WW RTTY DX Contest, p. 18
- CQ WW Foxhunting Weekend, p. 34
- Hamming in Hanoi, p. 89
- Solar "Conveyor Belt," p. 102

On the Cover: Dick Metsker, AF4TX, of Hendersonville, Tennessee. Details on page 92.

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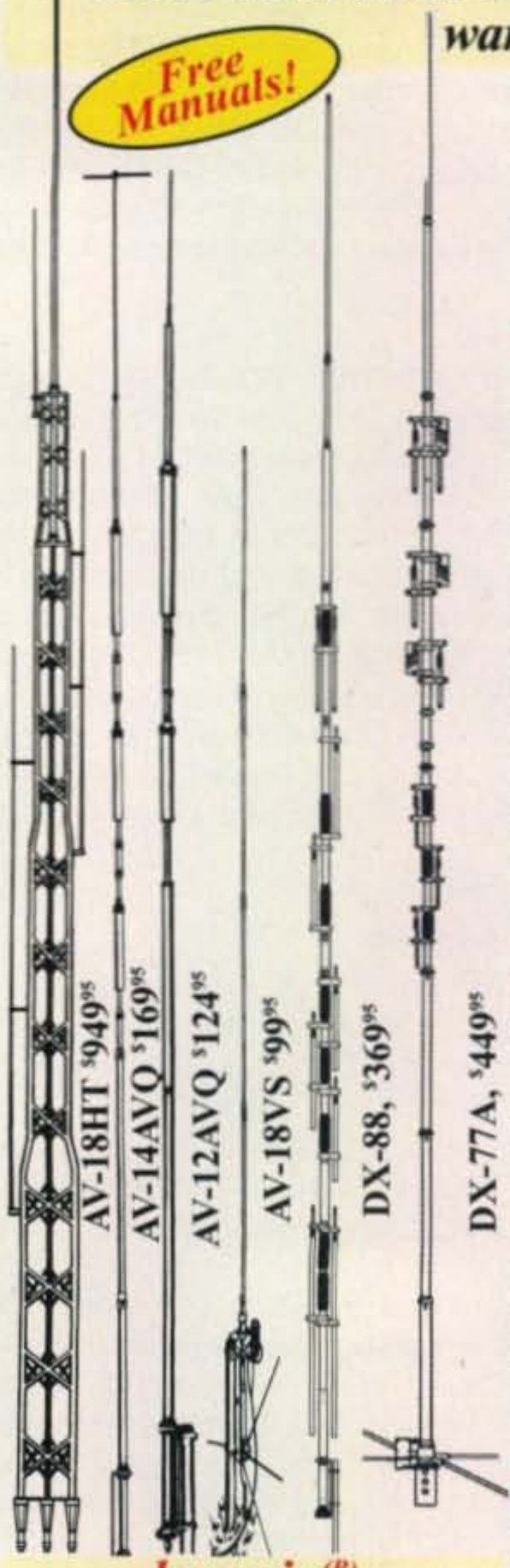

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DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$124.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$99.95**	**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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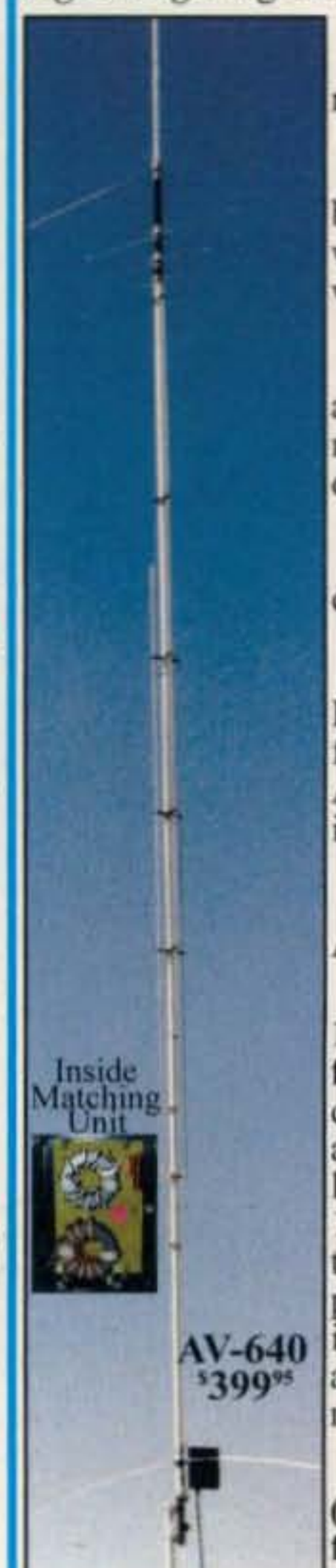

No ground or radials needed

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AV-620, $299.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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CQ Publisher K2MGA Receives Dayton Honor

CQ magazine Publisher Dick Ross, K2MGA, along with Jim Stafford, W4QO, Simon Brown, HB9DRV, and the North Fulton (GA) Amateur Radio League have been named the winners of the 2010 Dayton Hamvention® awards.

Ross is the recipient of the Special Achievement award, recognizing his leadership in the amateur radio industry as he marks his 50th anniversary with *CQ* magazine. Brown was recognized with the Technical Excellence award for his development of the Ham Radio Deluxe software package, and the Amateur of the Year is Jim Stafford, W4QO, of Roswell, Georgia, honored for his half century of dedication to amateur radio, providing support for public-service activities and ongoing recruitment efforts. Stafford is also a past president of the QRP Amateur Radio Club International (QRPARCI).

For the first time, the Dayton Amateur Radio Association also honored a "Club of the Year," the North Fulton Amateur Radio League, serving metropolitan Atlanta. This is a one-time award in keeping with the Hamvention®'s 2010 theme of "Amateur Radio Clubs Worldwide." Honorees will receive their awards during the 2010 Dayton Hamvention® on May 14–16.

FCC Delivers National Broadband Plan to Congress

The FCC has delivered to Congress its blueprint for widely expanding access to broadband internet service over the next ten years. Among other things, the plan calls for connecting an additional 100 million households to "affordable 100-megabits-per-second" service and making 1-gigabit-per-second service available affordably to schools, hospitals, and military installations around the country. It also calls for reallocating an additional 500 MHz of spectrum for both licensed and unlicensed broadband communications use.

ARRL Executive Vice President Dave Sumner, K1ZZ, noted that for hams, the most important part of the new plan is what it does *not* contain—any more than a passing reference to Broadband over Power Lines, or BPL. He told the *ARRL Letter* that, "(i)n short, the FCC sees *no role* for BPL in providing broadband internet connections to more consumers."

CQ's Washington Editor, Fred Maia, W5YI, will examine the plan in detail in his June column.

FCC Permits Law Enforcement Robots on 70 cm

The FCC has issued an order permitting the use of robotic reconnaissance devices in the 430–448 MHz band, which encompasses much of the 70-centimeter amateur band. Amateur radio has a shared secondary allocation on the band, along with certain non-federal radiolocation systems; federal government radiolocation has the primary allocation. The "Recon Scout" device, which was the subject of a waiver request by manufacturer ReconRobotics, is a remote-controlled surveillance robot used in areas that may be too hazardous for people to enter. According to the *ARRL Letter*, the FCC said that due to the device's low power output (1 watt peak), it is unlikely that its use would cause interference to the services with which it shares the band. *(Our concern would be the other way around—that a strong amateur radio signal might unknowingly interfere with proper operation of the Recon Scout in a critical situation.—ed.)*

Haiti Club President Thanks U.S. Hams

The president of the Radio Club d'Haiti is publicly thanking the hams from the United States who accompanied various relief agencies to his country in the wake of January's devastating earthquake there. In a letter to *CQ*, Jean-Robert Gaillard, HH2JR, singles out the University of Miami Hospital/Medishares volunteers for special thanks, noting that "had they not had the foresight to bring along caring ham operators, MARS ops or otherwise, a lot of their success may have been diminished." Individual amateurs whom Gaillard cited for helping from their home stations included KI4MMZ, W3ZU, WA1KRT, and NØDFP. See this month's "Public Service" column for more on the amateur radio response in Haiti.

VU2RBI Meets QE2

Well-known Indian amateur Bhratathi Prasad, VU2RBI, had an opportunity in March to meet Queen Elizabeth II of England and to discuss amateur radio during Commonwealth Observance Day ceremonies. Prasad, who is the Chief Coordinator of India's National Institute of Amateur Radio, spoke on her experiences in amateur radio communication and her contributions in promoting science and technology. According to a post on her website, Bharathi said she later had the opportunity to speak directly with the Queen for several minutes about amateur radio at a tea party hosted by the Royal Commonwealth Society. India is part of the British Commonwealth.

FCC to Propose Changes to Pecuniary Interest Rule

Responding to multiple petitions for rule making to clarify the scope and intent of the FCC rule prohibiting amateurs from making transmissions "on behalf of an employer" (including one petition from *CQ*), the FCC has said that it intends to issue a Notice of Proposed Rule Making (NPRM) proposing changes to Section 97.113(a) of its rules.

The notification came in a Public Notice issued on March 3, seeking comment on a request by the American Hospital Association for a blanket waiver to permit licensed hospital employees to use amateur radio as part of emergency preparedness drills. The current FCC waiver process applies only to government agencies, which must request special permission for specific employees to use ham radio during drills. Comments on the AHA request were due by April 2.

FCC Quietly Goes After High-Power CBers

You won't know it from looking at the "Amateur Actions" page on the website of the FCC's Enforcement Bureau, but over the past year, the Commission has been quietly cracking down on CBers operating with excessive power. Between March of 2009 and February of 2010, FCC Special Counsel Laura Smith has sent letters to more than two dozen CBers believed to be using illegally high power. Many of the letters cite interference ... to other CBers, to hams, and to neighbors' home electronics. The letters have not been posted on the Enforcement Bureau's website, but were dug out by reader Steve Karnes, K9HY, who keeps track of these actions.

(Continued on page 10)

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

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CQ contents

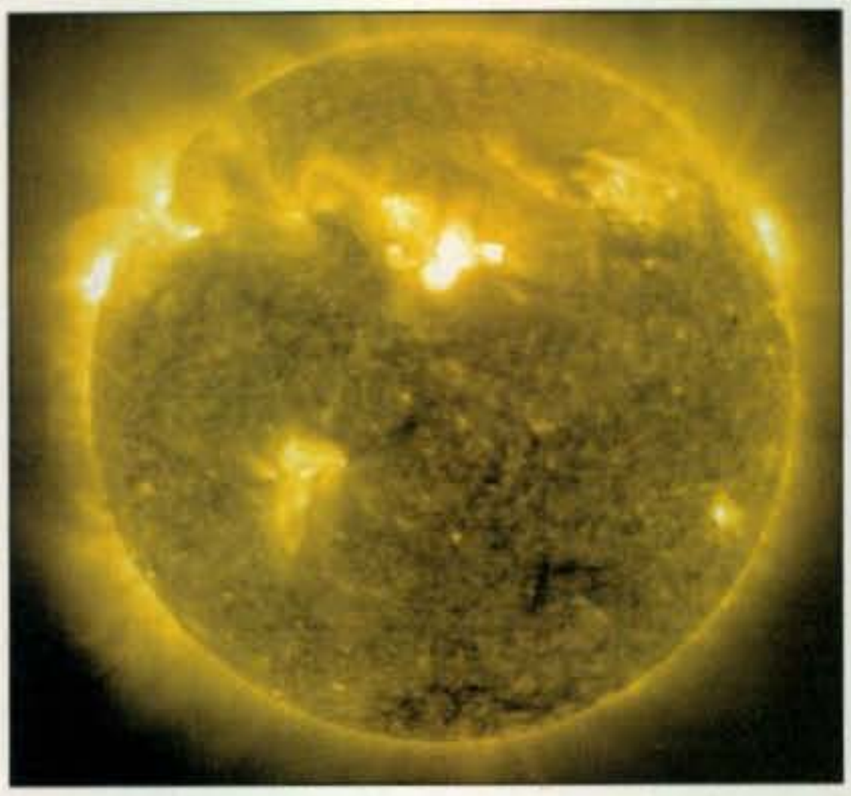
MAY 2010

p. 66

p. 34

features

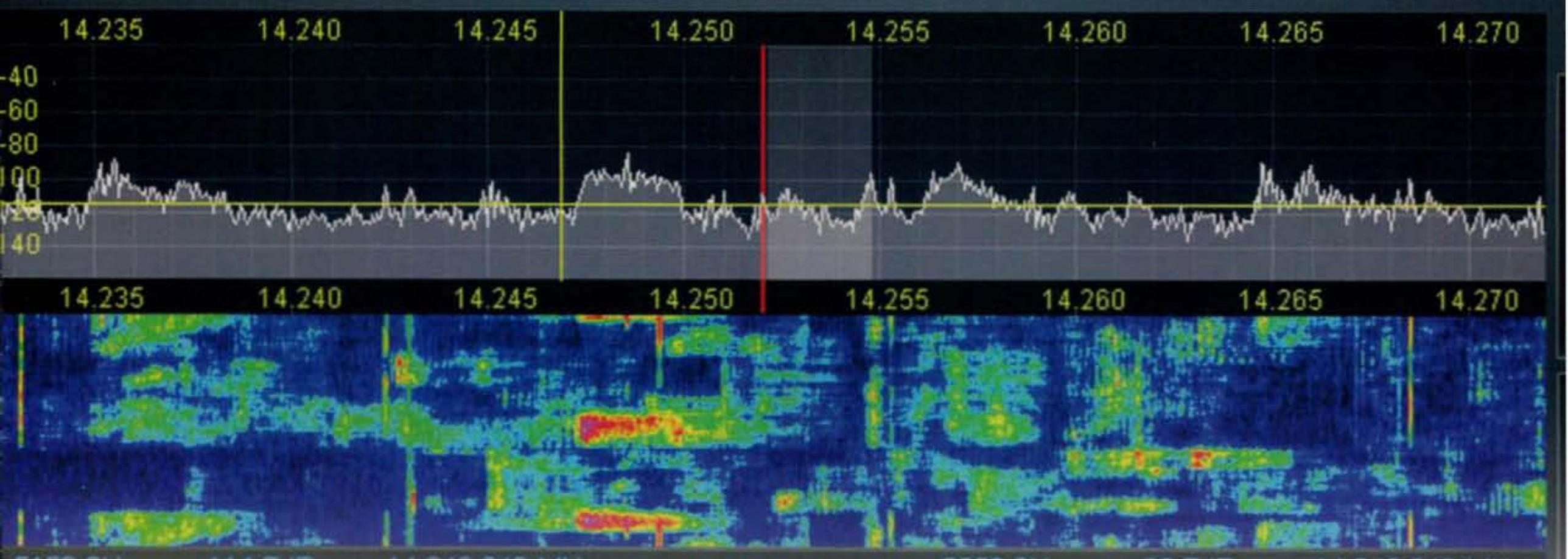
Vol. 66 No. 5



p. 102

p. 18

departments



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Screen Example

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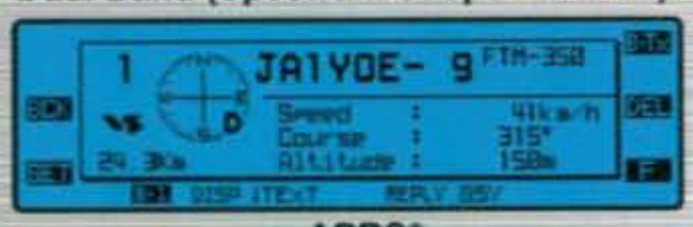
Navigation (with GPS antenna unit attached)

Mono Band (Spectrum Scope function)



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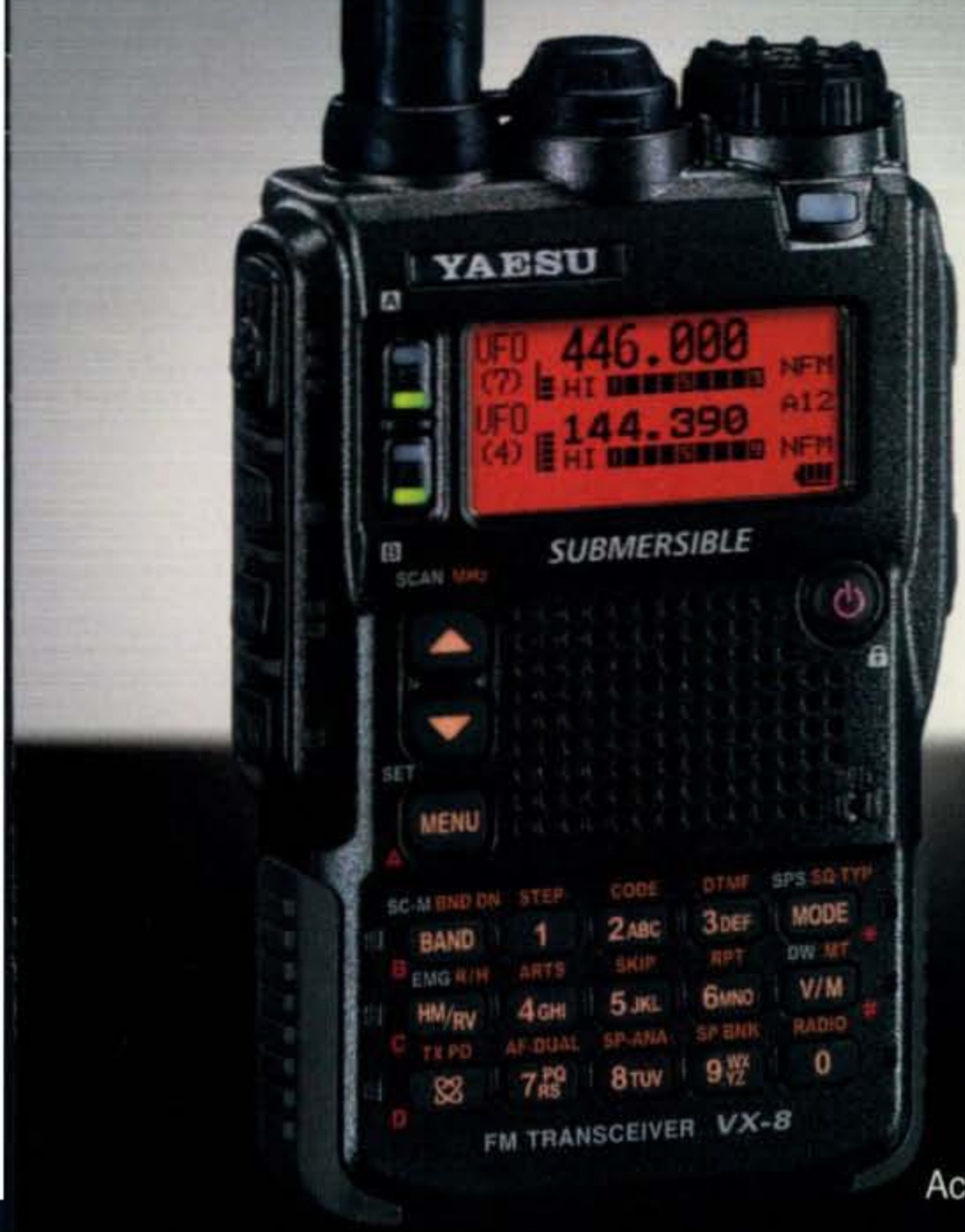

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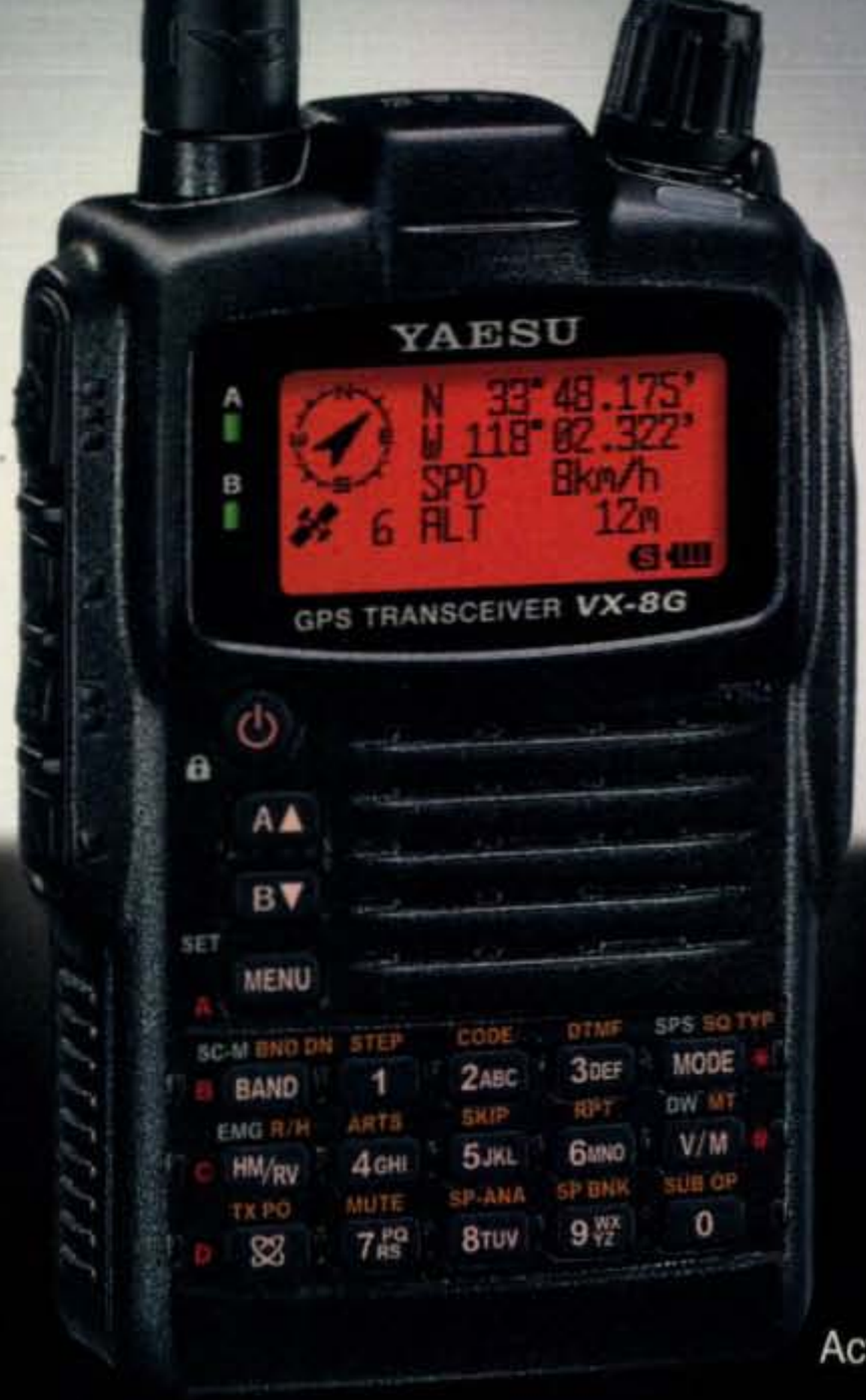

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CQ editorial

BY RICH MOSESON,* W2VU

zero bias – a CQ perspective

Gotta Do This More Often

I have *got* to do this more often … get on the radio, that is. One of the few negatives of my job is that with all the reading and writing *about* ham radio that I need to do for work, I often end up devoting my free time to other interests. Every once in a while, though, I do manage to get on the air, and virtually every time I do, I'm reminded of why I fell in love with ham radio to begin with, and why I've remained so enthused by it that I have made it my job as well as my hobby.

I was reminded of it again this morning, when I had a few free minutes before starting work. I fired up the rig and started tuning around. Would 10 meters be alive this morning? Was 15 awake yet? Judging by the lack of activity on either band, I guessed that today's answer to both of those questions was "no." On 17 meters, I heard only two stations, one in Switzerland, the other in Slovenia. I worked them both easily with my 100 watts and a vertical—one of the joys of 17—and then shut down the rig and headed for the laptop (one of the benefits of telecommuting!). What other hobby can give you that sort of experience? Completely random, no schedules or big preparations needed - just flip a switch and talk to people half a world away—and the ham in Slovenia remembered receiving a QSL card from me five years ago during our 60th anniversary CQ/60 event!

A couple of weekends earlier, I put in a little time during the ARRL DX Contest. Again, nothing major, about 50 QSOs over a few hours, mostly on 15 meters. Starting out with D4C on Cape Verde was nice, but the QSO that I will remember for a long time to come was with P40N in Aruba. After swapping the contest exchange, the voice at the other end asked, "Is that you, Rich? This is Scott, KØDQ. Ed is sitting right next to me." For those of you who have missed our interviews over the past couple of years, KØDQ is retired Rear Admiral Scott Redd, former commander of the U.S. Navy's Fifth Fleet and, among other things, former Director of the National Counterterrorism Center (see interview, February, 2008). Ed is retired Admiral Ed Giambastiani, N4OC, whose last post before retirement was Vice Chairman of the Joint Chiefs of Staff. In Ed's interview with us (October, 2007), he said he looked forward to getting more active on the radio once he retired. Scott, a lifelong contester (he is possibly the only person to win the world, single operator, in all six of the major DX contests —see article, October, 2009 *CQ*), said he had worked for years with Ed professionally but never knew he was a ham until reading his interview in *CQ*. And now, here they were together, two recently-retired admirals, architects of our modern high-tech military, contesting from Aruba as "Papa-Forty-NAVY" and going out of their way to say hi to me! Is this a great hobby or what? I *really* have to do this operating stuff more often!

Getting Social

At the Carolina DX Association dinner in March in Charlotte, I was talking with my tablemates about our tentative first steps into online social networking through the *CQ* Facebook page and discovered that at least one couple was already there and quite active (mostly to keep up on what their grandchildren are doing!). It made me wonder how many more of our readers are members of Facebook and/or other social networking sites (as of mid-March, we had roughly 2000 "fans" on our page), so this month's reader survey asks about your involvement with these online activities. I hope you'll take a few moments to respond and mail in the card.

Of course, social networking is nothing new for us hams. We've been using technology to do social networking for, oh, 100 years or so! After all, what is it we do on the radio? We talk to each other. We make friends. We make connections. Some of us talk with our voices; some talk with our fingers on keyboards, just like on the internet; some talk with our fingers on a Morse code key—try doing *that* on Facebook! Some of us even exchange photos and videos over the air, and use the internet to connect us to each other when the sun and ionosphere aren't cooperating. (Speaking of the sun and the ionosphere, if the whole sunspot cycle and propagation thing is a mystery to you, be sure to check out W5YI's article in this issue on sunspots and why they're important to us hams.)

So, if we have our own social networking space (the ham bands!), why do we need the internet, too? Simple … the only people we can reach on the ham bands are people who are already hams. On a site like Facebook, when we post something interesting on the *CQ* page, it automatically appears on the "newsfeed" pages of each of our 2000 fans. When their non-ham friends visit their pages, they get exposed to ham radio. If each of our 2000 fans has 50 friends who regularly visit their pages, then our one message is seen by 100,000 people, 90,000 of whom probably are not already hams. As word gets out that these ham people are doing fun, interesting and sometimes important things, interest will grow and that will translate into additional growth for ham radio. That is why we need to be there!

Harry Potter and the Dayton Hamvention®??

Speaking of online activities, my colleague Richard Fisher, KI6SN, the new Editor of *WorldRadio Online* (in addition to being *CQ*'s Public Service Editor), is hitting the ground running with several innovative activities befitting an online magazine. First of all, he is hosting a live monthly chat session with WRO readers, and—this is really cool—the May issue of WRO is featuring a link to live streaming video from the Dayton Hamvention®! Think of the newspapers in the Harry Potter movies in which the photos move, and you'll have an idea of what we're talking about here—a magazine page with live video! So if you can't make it to Dayton yourself, be sure to check out the May issue of *WorldRadio Online* frequently during Dayton weekend (May 14–16) for W5KUB's live reports. (Go to the *CQ* webpage at www.cq-amateur-radio.com, click on the WRO link, download the May issue and then find the article—I don't know yet what page it will be on.) Just as a print magazine offers certain benefits that an online magazine can't —like being able to roll it up and put it in your pocket—there are certain features available online that simply are impossible in print. We plan to identify and make use of as many of these features as we can to make sure that both *CQ* and *WRO* provide the best possible product and that you will find both to be essential parts of your monthly ham radio reading.

Finally, on the topic of your monthly ham radio reading, be sure to check out W1FK's report in this issue on Chile, which Stew and his wife visited just weeks before it was struck by a massive earthquake. Much of their time was spent with local hams, many of whom have been heavily involved in the amateur radio response to the quake and have filled in Stew on their activities. He shares their first-hand reports with us, starting on page 13.

— 73, W2VU

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Wind Load capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
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Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
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Effective Moment (in tower)	**2800 ft.-lbs.**

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T-2XD
$1229.95
with DCU-1

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power	1000 in.-lbs.
Brake Power	**9000** in.-lbs.
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	31 lbs.
Effective Moment (in tower)	**3400 ft.-lbs.**

CD-45II

CD-45II
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For antenna arrays up to 8.5 sq. feet mounted inside tower or 5 sq. ft. with mast adapter. Low temperature grease good to -30 F degrees. *New* Test/Calibrate function. Bell rotator design gives total weather protection, dual 58 ball bearing race gives proven support. Die-cast ring gear, stamped steel gear drive, heavy duty, trouble free gear train, North center scale, lighted directional indicator, 8-pin plug/socket on control unit, snap-action control switches, low voltage control, safe operation, takes maximum mast size to $2^{1}/_{16}$ inches. MSLD light duty lower mast support included.

CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power	600 in.-lbs.
Brake Power	**800 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	22 lbs.
Effective Moment (in tower)	**1200 ft.-lbs.**

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For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

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For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. $2^{1}/_{16}$ inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power	350 in.-lbs.
Brake Power	**450 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight	14 lbs.
Effective Moment (in tower)	**300 ft.-lbs.**

HDR-300A

HDR-300A
$1499.95

King-sized antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power	5000 in.-lbs.
Brake Power	**7500 in.-lbs.**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight	61 lbs.
Effective Moment (in tower)	**5000 ft.-lbs.**

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DCU-1
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Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

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AR-35
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For UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

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announcements

Annual International Amateur Radio DXpedition – The Jupiter Tequesta Repeater Group in conjunction with the Palm Beach Maritime Museum, the U.S. Coast Guard, and the ARRL are sponsoring this event May 29 and 30 from 8 AM Saturday to 5:30 PM Sunday on the West Palm Beach's Peanut Island honoring John Fitzgerald Kennedy's birthday. The public is invited to participate in the event, which will include special presentations and displays by vendors, plus entertainment. For more information, contact Albert Moreschi II, AG4BV, Jupiter Tequesta Repeater Group, e-mail: <ag4bv@arrl.net>, phone: 561-746-7421, web: <DXpedition.jtrg.org>.

The following Special Event stations are scheduled for May and early June:

W1ACT/p, from Gay Head Lighthouse, Martha's Vineyard Island, IOTA NA046; Team HAMCOW, Fall River ARC; 2000Z May 1 to 0500Z May 2, and 1300–2000Z May 12; on CW 3.540, 7.035, 14.040, 21.040, 28.040; SSB 3.850, 7.180, 14.280, 21.380, 28.380 MHz. QSL via N1JOY, SASE only; e-mail <n1joy@arrl.net>; <http://hamcow.net>.

K2BSA/Ø, from SCOUTQUEST, Forest Park, St. Louis, Missouri; Greater St. Louis Area Council Boy Scouts of America; 3 PM June 4 to 12 PM June 6 around the following international scouting frequencies: 20 meters (14.290 SSB and 14.060 CW), 40 meters (7.090 and 7.190 SSB; 7.030 CW). For special QSL send QSL and SASE to Richard Grady, NØJYU, 5976 Keith Place, St. Louis, MO 63109-3446.

K2BSA/2, from Boy Scout Troop 1's celebration of 100 years of unbroken charter with the Boy Scouts of America; Unadilla, New York; Chenango Valley ARA; 2010 EDT May 14 to 2010 EDT May 16. QSL info listed on QRZ.com. QSL Manager Tony Masi, N2GVB, 3289 State Hwy 206, Bainbridge, NY 13733-3114. More info e-mail N2GVB at <amasijr@stny.rr.com>. Certificate being issued.

The following hamfests are slated for late Apr. and May:

Apr. 25, **49th Annual Arthur Illinois Hamfest**, Arthur Firehouse, Arthur, Illinois. For information, e-mail: Ralph Zancha, WC9V, <rzancha@one-eleven.net>, phone: 217-254-7574, web: <http://www.qsl.net/mark/>. (Talk-in 146.055/146.655 PL 162.2; exams 10 AM)

May 1, **Valley of the Moon ARC (W6AJF) ARRL Hamfest**, Sonoma Valley Veteran's Memorial Building, Sonoma, California. Contact Darrel, WD6BOR, e-mail: <wd6bor@vom.com>, phone: 707-996-4494, web: <http://vomarc.org/>.

May 1, **Blue Ridge ARS 48th Annual Hamfest**, Piedmont State Fairgrounds, Spartanburg, South Carolina. Information: <www.upstatehamfest.com>.

May 1, **Wexaukee ARC 48th Annual Cadillac Swap**, Cadillac Junior High School, Cadillac, Michigan. Contact Alton McConnmell, NU8L, e-mail: <nu8l@yahoo.com>, phone: 231-867-3774. (Talk-in 146.98 [no PL]; exams)

May 14–16, **Dayton Hamvention®**, Hara Arena, Dayton, Ohio. For information, phone: 937-276-6930, web: <www.hamvention.org>; see the Hamvention® display ad elsewhere in this issue. ***See us at the CQ Booth.***

HAM RADIO NEWS *(continued from page 4)*

Senate Bill on FCC Tech Staff Gets House Companion

California Congressman Jerry McNerny has introduced into the House of Representatives a companion bill to the Senate's S-2881, which would specifically permit each FCC Commissioner to hire a technical specialist for his/her personal staff. The bill (HR-4809 in the House) would require that such a staff member be an electrical engineer or computer scientist. Both bills are in committee and to date, no action has been taken.

Industry: GRE, Alinco, *Passport to World Band Radio*

GRE, Inc. is now the exclusive North American distributor for Alinco brand ham radios. GRE will provide equipment to the Alinco dealer network and offer customer support and both warranty and non-warranty service on Alinco gear, according to *Newsline*.

The publishers of *Passport to World Band Radio*, who ceased publication of their print guide in 2009, are now shutting down their website. "Timing is inexact," according to an announcement on their web page, "but the wire should be snipped late (in March)."

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Thomas Schmenger, the founder and president of OptiBeam antennas, along with his wife Diana, vice president of OptiBeam, will be with Array Solutions in Dayton this year to answer your questions and to consult with you on choosing the best model OptiBeam for your station.

See Us at Dayton

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OptiBeam	
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Green Heron	Booth #531
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Photo A– Chilean and visiting hams at Radio Club de Chile. (Photos A–D by Rogene Gillmor)

A pleasure trip to Chile by the author and his wife took on a new perspective after February's massive earthquake in the country. W1FK received updates from some of his new ham friends there, who are also some of that country's leading amateurs.

Ham Radio in Chile
Answering the Emergency Call

BY C. STEWART GILLMOR,* W1FK

Chile is a beautiful and interesting South American country. It is unique in being 2650 miles in length, from near the equator in the north to the sub-Antarctic in the south, yet averaging only 110 miles west to east, from the Pacific Ocean to the Andes Mountains. Chile has a population of about 17-million and has been active in amateur radio for nearly a century. Its national ham organization is the Radio Club de Chile, which was founded in 1922. Its club call today is CE3AA.

Chile is also a country where amateur radio is likely to be called into national service. Most of the earthquakes in the world occur around the Pacific Rim, and Chile has experienced two of the most severe earthquakes in recorded history: number 1 in 1960 with a Richter scale value of 9.5, and now on February 27, 2010, number 5, Richter scale 8.8. Numerous aftershocks occurred, with one at 6.6 on the Richter scale. The country suffered numerous deaths and severe building, road, bridge, and utilities damage. Due to its geography, Chile has the problem of transportation and communications breakdown in the case of natural disasters. North-south roadways and bridges can be cut and any help from the east has to come over the Andes.

**29 Spencer Rd., Higganum, CT 06441-4034*
e-mail: <sgillmor@wesleyan.edu>

Visiting Chile and its Hams

My wife and I had the pleasure of spending a month in Chile in January and February, visiting several regions of the country and seeing colonial cities, vineyards, fishing villages, glaciers, Easter Island, and especially meeting Chilean ham operators (photo A).

Photo B– Ham license examinations in session.

There were 8000 Chilean hams several years ago and then the population dropped. In 2008 there were about 4000 hams, but this grew to 5000 in 2009 and is continuing to rise. There is an active recruitment system and regular ham license classes and exams are given (photo B). There are four classes of license in Chile, from Aspirant (Beginner) with privileges on 80, 40, 10, and 2 meters, up to Honorary/Superior, with call prefixes XQ, etc., all bands and maximum power of 1200 watts. There are also special event calls XR and 3G.

The Radio Club de Chile has its own building in downtown Santiago. The club recently has leased space on its property to two cell-phone companies, and this gives needed income for the club to continue and expand its operations (photo C). (See sidebar "The Radio Club de Chile and CE3AA" for more about the club, its activities, and its station.)

Emergency radio services are a major part of Chilean ham activities. CE3AA has its emergency service radio operations

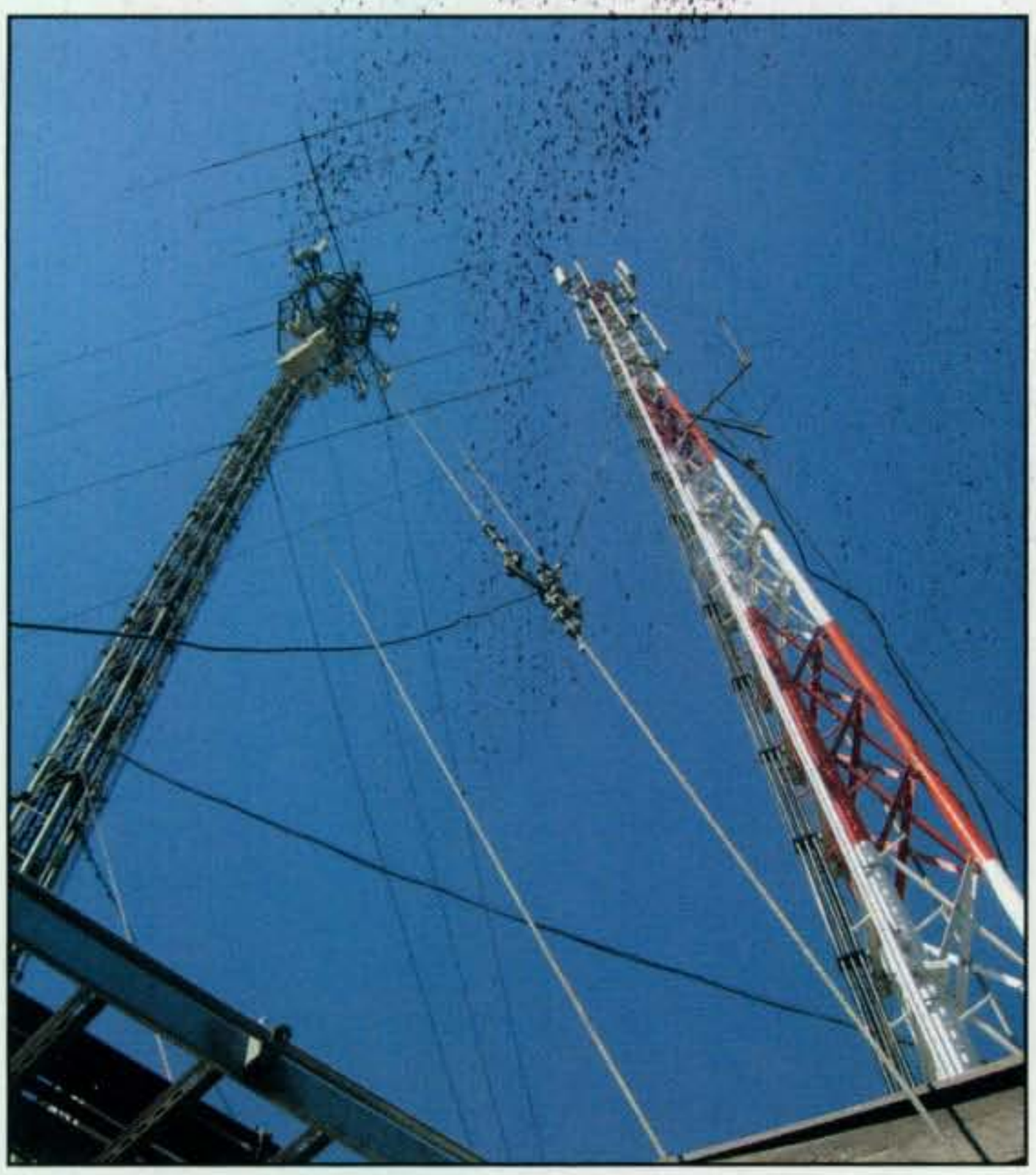

Photo C– CE3AA antennas and leased cell-phone tower.

The Radio Club de Chile and CE3AA

The Radio Club de Chile, based in Santiago, is Chile's national amateur radio association. It has a number of affiliates, runs a QSL bureau, and has weekly training sessions and monthly board meetings. Its station (the Chilean version of W1AW) is CE3AA.

CE3AA has a 14 AVQ vertical, and on its 80-foot tower, a TH6 beam for HF, a 6-meter loop, and a G5RV for 40 and 80 meters, as well as 2-meter and 70-centimeter antennas. The club's regular rigs include a Yaesu FT-767 and a Kenwood TS-850, plus a Drake L4B amplifier. The station is linked to other rigs by the internet. The club also has a 6-meter Motorola 50-watt beacon on 50.130 MHz CW. This is currently the only beacon in Chile, but there is another planned for northern Chile with the aid of the Northern California DX Foundation, and two more beacons are on the drawing board. CE3AA also has Echolink and the first APRS node in Chile. The Radio Club de Chile is very helpful in assisting visiting hams to obtain a reciprocal license; it did so for me. For information, consult the club's comprehensive website (in Spanish) at <http://www.ce3aa.cl> or e-mail the staff at <secretaria@ce3aa.cl>.

Claudia, QSL manager, librarian, and club secretary at the Radio Club de Chile. (Sidebar photos by Rogene Gillmor)

Alexandro, CE3JWF, seated at main operating desk at CE3AA.

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in a separate room from its main station, with a new Yaesu FT-900, a Kenwood TS-830, and an ICOM IC-730. There are 80-meter and 2-meter emergency net drills each morning and evening.

All of this emergency preparation pays off. Just three weeks after our return to the U.S., the 8.8 Richter Scale earthquake struck, with the epicenter on the coast of the Maule Valley, about 200 miles south of Santiago, the capital, and 70 miles north of Concepcion (Chile's second largest city). The Maule Valley is the largest of Chile's eight wine regions, and the damage there and around Concepcion was heavy. For example, the beautiful Caliboro vineyard and Erasmo winery and the local village, which my wife and I visited, lost nearly all adobe houses in the area.

Hams Activate Immediately

Radio Club de Chile President Dino Besomi, CE3PG, reported to me that hams were on the spot immediately after the earthquake, passing emergency traffic and helping locate relatives. Before and after photos (D and E) show the messy, but moderate damage to Dino's own well-equipped shack.

Photo D– The author, W1FK; Bob, AI7F; Loretta, KCØRPR; Gary, ZS5CLI; and Dino, CE3PG; standing in Dino's shack in late January. Dino is President of the Radio Club de Chile.

Esteban, XQ7UP, provided more details of some of the Chilean ham response to the earthquake: Giglio, CE2SQF, worked ceaselessly from his office in La Serena, a coastal town about 300 miles north of Santiago, operating on 40 meters and 2 meters, also using Echolink through the E3AA link in Santiago. Giglio first used his truck's mobile whip, but then erected a temporary 40-meter dipole (photo F). Giglio's wife has also been involved in the operation.

Silvio, CE7UJK, and Mauricio, CE7TXX (photo G), have been working from Coyhaique, an inland town in the far south of Chile, near the Argentine border, using storage batteries, and have been coordinating with CE3SER, the main emergency station in Santiago. Marco, CE3MMT, is the Secretary of the Chilean Amateur Radio Emergency Service, and he and his father Luis, CE3LMA, have been directing local net traffic on VHF as well as on 40 and 80 meters. They have been concentrating

Photo E– Dino's shack just after the earthquake. (Photo courtesy of Dino Besomi, CE3PQ)

Photo F– Truck and temporary 40-meter dipole used in La Serena, Chile, by CE2SQF. (Photos F–I courtesy of Esteban Asenjo, XQ7UP)

on receiving messages from the Santiago region and trying to locate people.

From Lighthouse to Darkness...

Just prior to the earthquake, a group of Chilean hams (CE3FZL, CE3BBC, CE3HDI, CE3PCN, and XQ7UP) began a lighthouse operating weekend for February 26–28 as XR2A from the Punta Angeles Lighthouse museum near Valparaiso (grid locator FF46EX). XR2A had just started up and completed about 300 QSOs, mostly on 20-meters CW, when the earthquake struck. Photo H shows Esteban (XQ7UP) operating from Valparaiso the night of the disaster. Esteban had gone to bed about midnight, since his next shift was for 4:00 AM on SSB. He awoke five minutes before the earthquake, which occurred at 3:34 AM. He stayed in his bed until the quake stopped and then ran to the station. The entire city of Valparaiso was without electricity, but Esteban and others fired up a generator and were back on the air within ten minutes. They operated XR2A for a few hours and then returned to the Santiago area in a ten-hour drive (which usually takes 90 minutes). They then set to operating the emergency equipment at the Radio Club de Chile station CE3AA (photo I). An adjacent building had collapsed onto part of the CE3AA building but fortunately took out only two storerooms and a meeting room and left the ham gear intact.

As of this writing (early March), hams are still in a fully active emergency state helping others, largely due to the inaccessibility of many Chilean locations. The work of Chilean hams, providing emergency communications assistance at HF and VHF, has been—and continues to be—in the best traditions of ham radio.

Photo G– Silvio, CE7UJK, in Coyhaique, southern Chile.

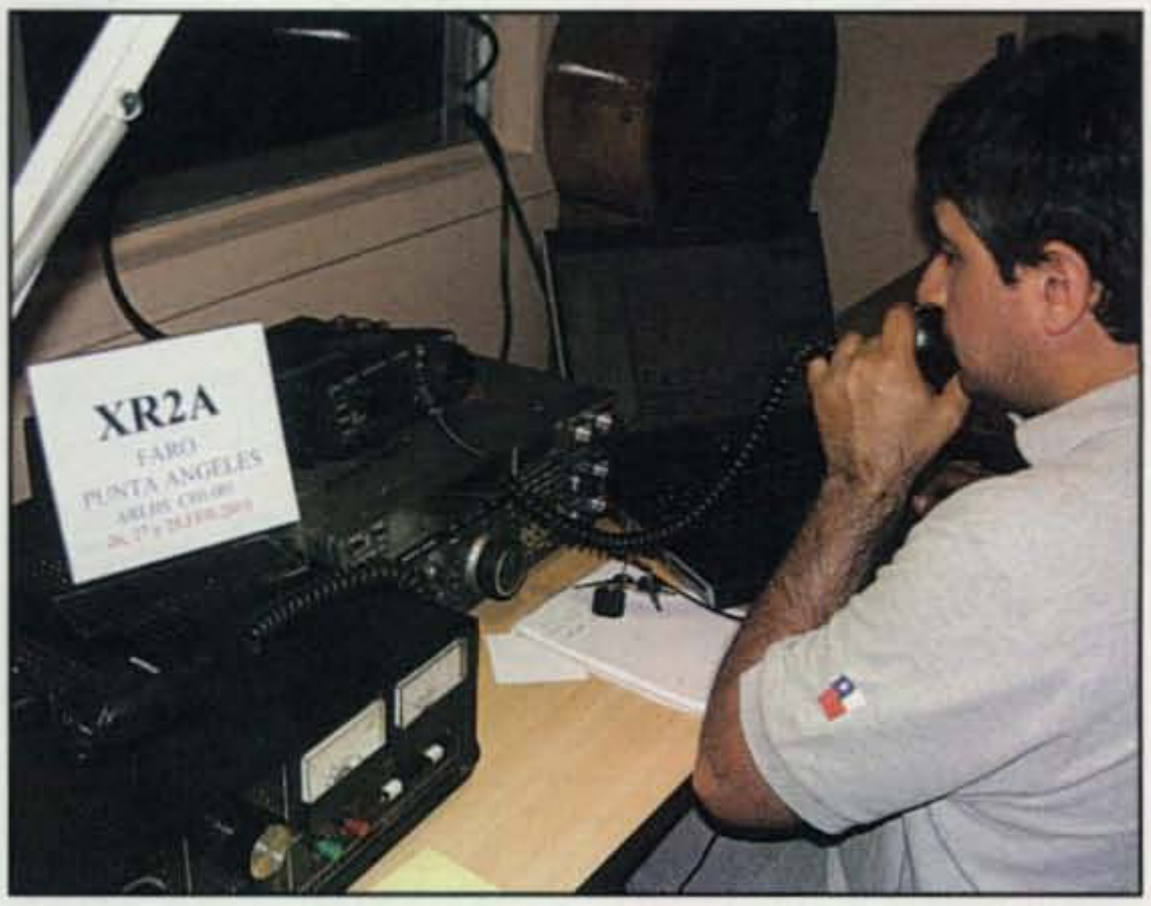


Photo H– Esteban, XQ7UP, operating from XR2A, Valparaiso Lighthouse museum, the night of the earthquake.

Photo I– Marco, CE3MMT, and Esteban, XQ7UP, working from the Radio Club de Chile station, Santiago.

Results of the 2009 CQ WW RTTY DX Contest

BY ED MUNS,* WØYK

The 23rd CQ WW RTTY Contest continued the trend of recent years with an increase in submitted logs of 9% to a record high of 2307. There were over a million QSOs among 13,279 callsigns from 193 countries across all the logs. Despite yet another year at the solar minimum, scores improved substantially and more records were set. This is a result of growth in RTTY contesting in general, and a tribute to the excellent management of CQ WW RTTY by Glenn, W6OTC, and Paulo (SK), I2UIY, over the past decade. Fortunately, Glenn still provides advice and counsel as needed to keep the momentum rolling. It has been a pleasure to come into this role as *CQ*'s RTTY (and RTTY WPX) Contest Director with the contest in such great shape.

Single Operator

Single-Op All Band High Power. EF8M (RD3AF) smashed the world record by 20% with his SO1R (Single Op One Radio) operation from the Canary Islands. Val also bested all categories including the multis, except M2 (Multi-Op Two Transmitters) winner CR3L, and had an impressively low error rate. Chris, GI5K (MIØLLL), greatly outdistanced his European competitors for that title and a new Europe continental record. Dennis, W1UE, got enough past John, K1FWE, for the U.S. title as well as North America.

Single-Op All Band Low Power. The first- and second-place finishers swapped positions from the 2008 contest, with 5C5W (CN8KD) taking the top spot and pushing the score up a bit for a new Africa continental record. Mohamed operates from a modest station in an apartment in the highest part of Rabat, overlooking the Atlantic Ocean. With a very restricted antenna complement five stories high, he puts out a commanding low-power signal to North and South America. Last year's winner, HI3T (HI3TEJ), took second this year as HI3TEJ. Ted is currently at the top of the radio-sport.net Top Twenty Single-Op World Standings due to his consistently high finishes in many CW, SSB, and RTTY contests. Alex, UR7GO, won Europe, while Bob, WA1Z, won the U.S., closely followed by Mark, N2QT, and Don, AA5AU.

Single-Op Assisted. Wanderly, ZX2B (PY2MNL), set a new world record, edging out Rebrov, G6PZ (UT5UDX), who set a new European record, and Fulvio, IK4MGP, in the Assisted category with all three scores less than 5% apart. In fact, all three stations broke the prior world record for Single-Op Assisted. Once again, a low error rate made a difference by swapping first and second place from the raw scores. Mike, K4GMH, beat Bud, AA3B, by just 3% for the U.S. top position.

Single-Op 80M. CT3KY won 80 meters Low Power and set a new world record from CQ9K, the Madeira Contest Team station. Jose used two dipoles, one on NA and one on Europe. He was joined by friends CT3DZ, 15M Low Power, and CE3EN, 20M Assisted, all from CQ3K. High Power was captured by Toly, UX2X, in a close race with several other European stations. Jan, OY3JE, won the Assisted category and established the first world record.

Single-Op 40M. Ray, HQ9R (WQ7R), squeezed past Nick, UT2UZ (Europe winner), to set a new 40 meters Low Power world record, while Tadej, S52X, captured High Power, narrowly missing the world record. Tadej was busy with work and unable to make a contest expedition, as he often does. Moreover, he arrived from his business travel just in time to grab his equipment and bring it to the S53S Radio Club Nova Gorica hilltop station. The station is not yet complete, but has a nice 2-element Yagi on 40 meters, which influenced his decision to go single-band 40 meters. Tadej's sleep reserves were somewhat depleted as he entered the weekend, and this precipitated a short period of exhaustion when he fell asleep on the F1 CQ message key! He sincerely, and sheepishly, apologizes for his inadvertent beacon mode. In the US, Glenn, WØGJ, new to RTTY contesting, won 40 meters U.S. High Power. Andrei, TI5/NP3D, won Assisted and established the first world record in this category on a contest expedition with Fred, TI5/WW4LL, who entered the 20 meters Assisted category. Andrei and Fred are recognized with the I2UIY Memorial Award in this contest.

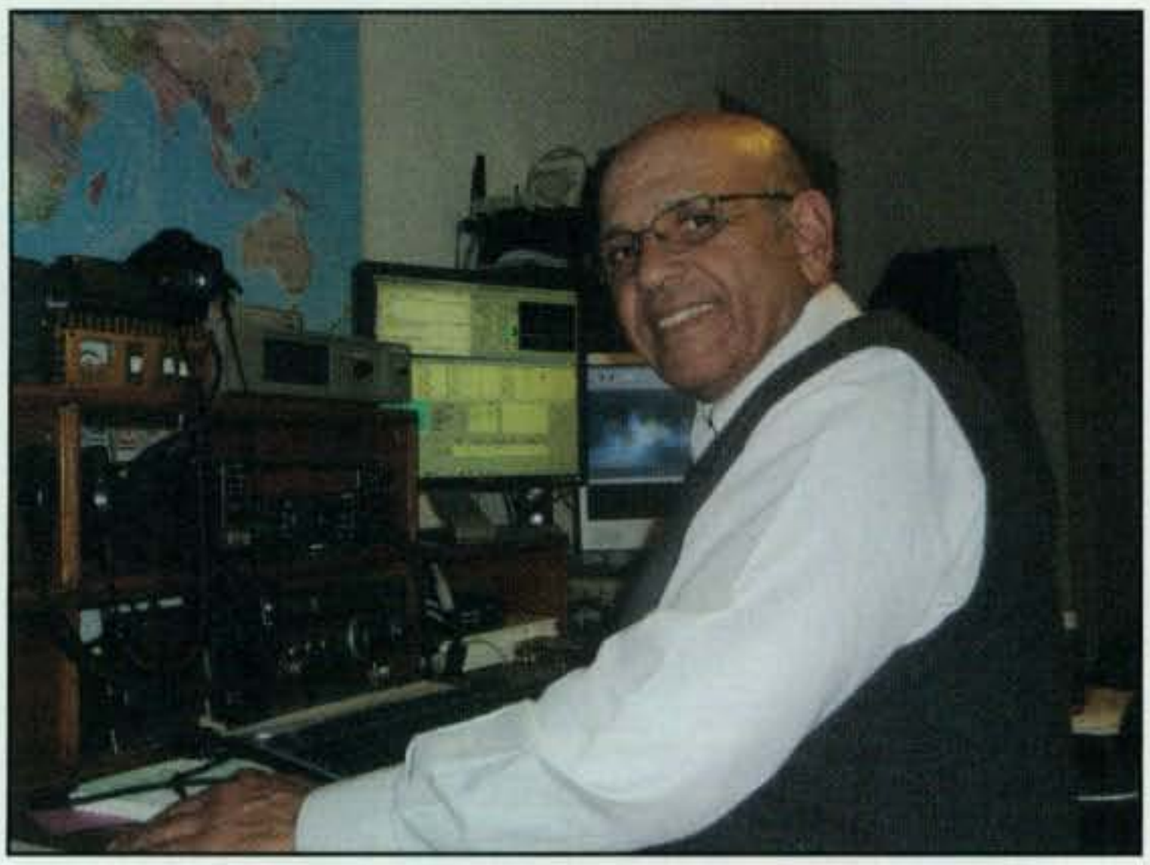
Single-Op 20M. Vlad, UA3PAB, got past Paolo, YW4D, to take 20 meters Low Power from his picture-perfect operating desk (see photo). Sebastien, F8DBF, decisively won 20 meters High Power and set a new world record from F6KHM (TM6M) with its 6-element Yagi. His favorite mode is CW, but he admits that RTTY isn't quite so tiring and allows him to eat at the keyboard! He found good con-

DL7YFF, DJ6QT, DK4QT, and DJ3NG powered the CR3L M2 to within 14% of the world record set by HC8N back in 2002 when there were sunspots. CR3L eclipsed second-place P49X by over 8%. FB job with antennas erected Field Day style just before the contest.

Vlad, UA3PAB, who won 20 meters Low Power from this pristine operating position.

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

The 11-operator Spanish team celebrates their 4th place MM finish from C37NL using special callsign C37URE, commemorating the 60th anniversary of URE and the joint agreement with URA for EA hams to operate in C3. (EA7AJR, EA5BZ, EA5CEE, EA5HAB, EC7AKV, EA1DVY, EA2CRX, EA3HCJ, EA6DD, EA7HHV, EB7ABJ)



Mohamed, 5C5W (CN8KD), took another first in Single-Op Low Power this year from his modest fifth story apartment station overlooking the Atlantic Ocean.

ditions on 20 all weekend with the band open from 04–23Z each day. Bill, AKØA, won US 20 meters Low Power and Tor, N4OGW, took U.S. top honors in 20 meters High Power. Duarte, CT3EN, won 20 meters Assisted by a large margin and established the first world record.

Single-Op 15M. Francesco, YV1FM, narrowly beat Alan, CX5TR, and Fran, EA7ISH (Europe winner), to win 15 meters Low Power and set a new world record. Luis, CX4AAJ, won 15 meters High Power, with the next five finishers closely grouped: Marco, I4IKW (Europe winner), EA3GLB, ZC4LI, F4DXW, and 9A5Y. N4BP won U.S. 15 meters High Power. IT9RGY got past UXØFF for the 15 meters Assisted title and first world record.

Single-Op 10M. Augusto, PY2EB, made 103 QSOs to win 10 meters Low Power and set a new world. World record holder John, LU1HF, not surprisingly won 10 meters High Power again, not requiring sunspots with his six-high stack of homemade Yagis from Argentina. DO4DXA's 18 QSOs bagged the 10 meters Assisted win and first world record!

Multi-Operator

Multi-Single. The UU7J team of UR5EAW, UUØJX, UU3JX, and UU9JQ won MS Low Power. F8KGH was second and EA2CYJ, OM3KWZ, YV5VD, and KP2D were closely bunched in third through

2009 CQ WW RTTY CONTEST PLAQUE WINNERS AND SPONSORS

Single Operator High Power

World: Sponsored by John Orton, WA6BOB. **Winner: EF8M (op: Valery Komarov, RD3AF)**
Europe: Sponsored by Andrei Stchislenok, EW1AR-NP3D (in Memory of EU1MM). **Winner: GI5K (op: Christopher Smith, MIØLLL)**
N. A.: Sponsored by Wayne King, N2WK. **Winner: Dennis Egan, W1UE**
Oceania: Sponsored by Gary Belcher, KH6GMP, Gary Elliott, K7OX, Harley Huntemann, W7HJ. **Winner: Massimo Zenobi, KH6ZM**
S. A.: Sponsored by Radio Club Cordoba, LU4HH. **Winner: LV5V (op: Jorge Krienke, LU5VV)**
Canada: Sponsored Contest Group du Quebec. **Winner: VE3AP (op: Claudio Fernandez, LU7DW)**
Japan: Sponsored by Darrell Penrod, K9MUG. **Winner: Masaki Okano, JH4UYB**
U.S.A.: Sponsored by Joseph Young, W6RLL. **Winner: John Webster, K1FWE**

Single Operator Low Power

World: Sponsored by Don Hill, AA5AU. **Winner: 5C5W (op: Mohamed Kharbouche, CN8KD)**
Asia: Sponsored by Jim Reisert, AD1C. **Winner: Marc Chicoine, 4Z8BB**
Europe: Tyler Stewart, K3MM. **Winner: Alex Nudel, UR7GO**
N.A.: Joseph Young, W6RLL. **Winner: Ted Jimenez, HI3TEJ**
Oceania: Sponsored by Doug Faunt, N6TQS. **Winner: Felimon Morano, Jr., DV1JM**
S.A.: Sponsored by Trey Garlough, N5KO. **Winner: Luis Felipe Arango, HK6P**
Canada: Sponsored by Scott Nichols, VE1OP, and Andy McLellan, VE9DX. **Winner: Fabi Bertolotto, VA2UP**
Japan: Charles Anderson, KK5OQ. **Winner: Hiroyuki Ueno, JI1RXQ**
U.S.A.: Sponsored by George Johnson, W1ZT. **Winner: Bob Raymond, WA1Z**

Single Operator Assisted

World: Sponsored by Mike Sims, K4GMH. **Winner: ZX2B (op: Wanderley Ferreira Gomes, PY2MNL)**
Europe: RCKLog Contest Logger by DL4RCK. **Winner: G6PZ (op: Rebrov Sergiy, UT5UDX)**
N.A.: George Marsloff, K4GM. **Winner: Mike Sims, K4GMH**
U.S.A.: Derek Steele, J39BS. **Winner: Bud Trench, AA3B**

Single Operator Single Band

World 28 MHz: Sponsored by Steve Hodgson, ZC4LI. **Winner: Juan Manuel Morandi, LU1HF**
World 21 MHz: Sponsored by Steve "Sid" Caesar, NH7C. **Winner: Luis Espinosa, CX4AAJ**
World 14 MHz: Sponsored by Kenny Young, AB4GG. **Winner: Sebastien Le Gall, F8DBF**
Europe 14 MHz: Sponsored by Bob Raymond, WA1Z. **Winner: YT5W (op: Markovic Milovan, YU1AU)**
N.A. 14 MHz: Sponsored by Patrick W. Soileau, ND5C. **Winner: Joel Weiner, VE6WQ**
U.S.A. 14 MHz: Sponsored by James (Jamie) Punderson, IV, W2QO. **Winner: Torsten Clay, N4OGW/5**
World 7 MHz: Sponsored Abroham Neal Software by Neal Campbell, K3NC. **Winner: Tadej Arcon, S52X**
N.A. 7 MHz: Sponsored by Don Reed, K2OGD, **Winner: HQ9R (op: Ray Cameron, WQ7R)**
U.S.A. 7 MHz: Sponsored by Charles Morrison, KI5XP. **Winner: Glenn Johnson, WØGJ**
World 3.5 MHz: Sponsored by Glenn Vinson, W6OTC. **Winner: UX2X (op: Toly Melnik, UT2XO)**

Multi-Op Single Transmitter Low Power

World: Sponsored by David Robbins, K1TTT. **Winner: UU7J (ops: UR5EAW, UUØJX, UU3JX, UU9JQ)**

Multi-Op Single Transmitter High Power

World: Sponsored by Kevin Rowett, K6TD. **Winner: OM8A (ops: OM2KW, OM3RM, OM7JG, OM5KM, OM5CM)**
N.A.: Sponsored by James Skjerven, KS7S. **Winner: K4FJ (ops: K3KG, K4FJ)**
U.S.A.: Sponsored by Steve Jarrett, K4FJ. **Winner: WØLSD (ops: WØLSD, WØBV, KØTG)**

Multi-Op Two Transmitter

World: Sponsored by Ed Muns, WØYK, **Winner: CR3L (ops: DJ6QT, DK4QT, DJ3NG, DL1YFF)**
Europe: Sponsored by CT3 Madeira Contest Team/CR3A/CQ9K. **Winner: LX7I (ops: LX2A, LX1DA, DF8QB, DL1STG)**
N.A.: Sponsored by Steve Merchant, K6AW. **Winner: KØIR (ops: KØIR, KØRC, WAØMHJ, KØXV, KØSV, NØUV)**

Multi-Op Multi-Transmitter

World: Sponsored by KA4RRU RTTY Team. **Winner: W2FU (ops: N2WK, WA2TMC, K2TJ, N2ZN, KØSM, N2CU, WB2ABD, K2DB, W2FU)**
Europe: Sponsored by SKY Contest Club, **Winner: OH6R (ops: OH1XY, OH3FM, OH3LQK, OH3MFP, OH3MMF, OH3PP, OH6MLC, OH6NMY, KØSSU)**
N.A.: Sponsored by Cuzco Contest Club, WK1Q. **Winner: K1TTT (ops: AK2D, AK2X, K1MK, K1SFA, K1TTT, KM1P, N1FJ, N1SR, N2KW, N2WQ, W1EQO, W1TO)**
U.S.A.: Sponsored by David Robbins, K1TTT. **Winner: KA4RRU (ops: KA4RRU, PB2T, N4DXS, K3UI, K3KQ, WA4TK, KG4URW)**

Club Competition

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

Paolo Cortese, I2UIY, Memorial Award

Sponsored by *CQ* magazine. **Winner: Andrei Stchislenok, TI5/NP3D, and Fred Dennin, TI5/WW4LL**

sixth places. In the U.S., NØNI (NØNI, NØGZ, NØXR) won Low Power. In High Power, the OM8A team (OM2KW, OM3RM, OM7JG, OM5KM, OM5CM) got by RK9CWA (RW9CF, UA9CGA, RA9DF, RA9DK) by less than 1%. Also, both groups had nearly identical error rates. The RK9CWA station in the Ural Mountains dates back to 1928 when it sported callsign AU4KAL. Since then, the station has transmitted with a number of callsigns: UA9KCA, UK9CAA, UK9ZRW, UK9CVV, RV9WCY, RA9C, RK9C, RW9C, RY9C, and UZ9CWA. The team operates CW, SSB, and, since 1986, RTTY contests. All antennas are homebrew with at least two per band, 160 through 10. In the U.S., K4JF and K3KG used the K4JF callsign to win USA High Power.

Multi-Two. The German powerhouse of DJ6QT, DK4QT, DJ3NG, and DL1YFF (RRDXA Chairman) drove CR3L to a decisive victory over Americans K6AW, W6OTC and WØYK at P49X. The antennas at CR3L were assembled and towers erected in the days just prior to the contest. Despite the solar low, they managed to get within 14% of the world record set by AD1C, N5KO, and K6AW at HC8N at the solar peak in 2002. LX7I (LX2A, LX1DA, DF8QB, DL1STG) barely beat rival Z37M (Z31MM, Z32RY, Z36N, Z36W, Dule Roberto) in Europe. KØIR (KØIR, KØRC, WAØMHJ, KØXV, KØSV, NØUV) more than doubled the score of their nearest competitor to win the U.S.

Multi-Multi. The MM title was closely fought in the U.S. between W2FU (N2WK, WA2TMC, K2TJ, N2ZN, KØSM, N2CU, WB2ABD, K2DB, W2FU) and K1TTT (AK2D, AK2X, K1MK, K1SFA, K1TTT, KM1P, N1FJ, N1SR, N2KW, N2WQ, W1EQO, W1TO) with the New York team coming out on top. Their slightly better error rate increased the small margin they had in raw score. The W2FU team had last done a multi-op contest in 2002 when they set the USA MS record in CQ WW RTTY. This time, they set their sights on the USA MM record and overshot to win the world as well. They were seriously challenged by the K1TTT team, which got all parties fired up and filling the bands with diddles. The OH6R team (OH1XY, OH3FM, OH3LQK, OH3MFP, OH3MMF, OH3PP, OH6MLC, OH6NMY, KØSSU) took top spot in Europe. Close behind OH6R was C37URE, a commemorative callsign celebrating the 60th anniversary of Spain's URE and the joint agreement between Spain and Andorra for EA hams to operate in C3. Eleven Spanish hams, led by Rueben, EA5BZ, organized their operation from the URA headquarter sta-

TOP SCORES

WORLD
SINGLE OPERATOR HIGH POWER ALL BAND
EF8M (RD3AF) 8,850,345
GI5K (MIØLLL) 4,988,640
YO9HP 3,215,446
EO5M (URØMC) 2,996,622
W1UE 2,586,588

28 MHz
LU1HF 146,740
9A7R 19,779
K4WI 3,552
UTØEO 6

21 MHz
CX4AAJ 396,882
I4IKW 343,362
EA3GLB 338,556
ZC4LI 325,760
F4DXW 300,484

14 MHz
F8DBF 1,168,230
YT5W (YU1AU) 793,736
CT3FQ 725,592
VE6WQ 718,924
UT7MA 651,504

7 MHz
S52X 564,960
YT8A (YU1EA) 513,684
YW5T (YV5JBI) 472,863
US5IQ 444,000
UU1AZ 379,354

3.5 MHz
UX2X (UT2XQ) 140,500
IV3HYD 116,012
UT2IU 110,704
IZØKBR 104,082
S57LR 101,004

LOW POWER ALL BAND
*5C5W (CN8KD) 2,695,719
*HI3TEJ 2,413,450
*WA1Z 1,718,496
*UR7GO 1,696,018
*VA2UP 1,611,624

28 MHz
*PY2EB 16,820
*LU8EOT 8,360
*9A2DI 2,604
*YT2T 2,460
*S51MA 1,701

21 MHz
*YV1FM 248,688
*CX5TR 231,553
*EA7ISH 217,140
*USØMM 156,892
*CT3DZ 150,452

14 MHz
*UA3PAB 365,955
*YW4D 323,628
*EA5ET 280,904
*S51OE 255,892
*5B/HG3IPA (HA3JB) 246,700

7 MHz
*HQ9R (WQ7R) 298,900
*UT2UZ 280,476
*HF7ØW 203,907
*HA5LZ 178,435
*YV1JGT 165,500

3.5 MHz
*CT3KY 119,171
*S53NW 66,087
*YU2A 61,446
*IV3YIM 52,948
*IKØXBX 52,895

ASSISTED ALL BAND
ZX2B (PY2MNL) 4,256,850
G6PZ (UT5UDX) 4,174,590
IK4MGP 4,121,390
LZ8E (LZ2BE) 3,590,930
OL6X (OK1DIG) 3,444,472

28 MHz
DO4DXA 570
UZ2HZ 130

21 MHz
IT9RGY 422,750
UXØFF 405,330
DF9ZP 260,752
ZL1BYZ 142,715
EA1ACP 127,070

14 MHz
CT3EN 1,060,814
S5ØR 785,242
TMØC (F/TU5KG) 718,148
RK6AXS (RU6CQ) 627,936
TI5/WW4LL (WW4LL) 576,186

7 MHz
TI5/NP3D (NP3D) 489,810
YL7A 401,134
DKØEE (DL4MDO) 356,807
RL4R (RW4PL) 324,416
DL1REM 185,858

3.5 MHz
OY3JE 125,545
YU7U (YU7BH) 71,415
UT5ZA 14,233
YO8WW 4,725
DN7DX 1,560

MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER ALL BAND
OM8A 4,147,631
RK9CWA 4,101,420
RL3A 3,463,104
YTØA 3,362,315
OL3Z 3,202,640

MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER ALL BAND
*UU7J 1,424,640
*F8KGH 1,142,310
*EA2CYJ 926,716
*OM3KWZ 915,828
*YV5VD 908,769

MULTI-OPERATOR TWO TRANSMITTER ALL BAND
CR3L 9,147,201
P49X 8,436,312
LX7I 5,211,386
Z37M 5,113,332
DQ4W 4,609,238

MULTI-OPERATOR MULTI-TRANSMITTER ALL BAND
W2FU 5,614,917
K1TTT 5,443,872
OH6R 4,845,374
C37URE 4,486,257
KA4RRU 2,940,335

UNITED STATES
SINGLE OPERATOR ALL BAND
W1UE 2,586,588
K1FWE 2,390,680
N1SV 1,755,096
WK6I 1,688,660
AF4OX 1,270,500

28 MHz
K4WI 3,552

21 MHz
N4BP 131,355
W7ZR 32,682

14 MHz
N4OGW/5 451,275
KØKT 339,549
W1NR 335,980
K9OM 330,966
N7NM 277,884

7 MHz
WØGJ 251,100
NA3M 123,533
W6WRT 118,932
W7RY 109,428
AB9H 91,264

3.5 MHz
W9SE 24,864
KI6DY/Ø 11,424

LOW POWER ALL BAND
*WA1Z 1,718,496
*N2QT/4 1,484,121
*AA5AU 1,429,736
*AB4GG 1,031,930
*W3LL 1,021,901

21 MHz
*W9KVR 1,541

14 MHz
*AKØA 187,734
*W4LC 123,504
*K3GW 104,656
*AB1J 78,064
*AA4U 56,650

7 MHz
*KE1F/4 63,952
*KD5LNO 42,735
*KC4HW 41,474
*WB8JUI 21,576
*KI3O/4 17,596

3.5 MHz
*N9BX 15,920
*NQ4K 4,830
*KA5EYH 891

ASSISTED ALL BAND
K4GMH 2,795,680
AA3B 2,706,256
NE3H 1,348,491
W4ZE 1,331,352
W3FV 1,170,092

21 MHz
KK5OQ 104,052

14 MHz
WA1PMA/7 3,861

7 MHz
KN5O 94,976
KE4UW 91,388
AA4VV 44,280
W3/NH7C 13,272
K2PAL 8,512

MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER ALL BAND
K4FJ 2,890,160
WØLSD 2,057,643
NR4M 2,039,650
WQ6O 1,713,948
NC4CS 1,351,224

MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER ALL BAND
*NØNI 484,188
*W4HOD 182,672
*N5KRC 174,307
*W4YCC 161,364
*AA4YL 19,688

MULTI-OPERATOR TWO TRANSMITTER ALL BAND
KØIR 2,443,377
N2BJ/9 1,009,560
WY3P/4 330,573

MULTI-OPERATOR MULTI-TRANSMITTER ALL BAND
W2FU 5,614,917
K1TTT 5,443,872
KA4RRU 2,940,335
KØADX 124,416

EUROPE
SINGLE OPERATOR HIGH POWER ALL BAND
GI5K (MIØLLL) 4,988,640
YO9HP 3,215,446
EO5M (URØMC) 2,996,622
LY9Y 2,380,500
SY1RY (SV1CIB) 2,196,882

28 MHz
9A7R 19,779
UTØEO 6

21 MHz
I4IKW 343,362
EA3GLB 338,556
F4DXW 300,484
9A5Y (9A3NM) 283,968
OG8A 148,330

14 MHz
F8DBF 1,168,230
YT5W (YU1AU) 793,736
UT7MA 651,504
IN3QBR 545,600
IT9STX 533,691

7 MHz
S52X 564,960
YT8A (YU1EA) 513,684
US5IQ 444,000
UU1AZ 379,354
9A5BTP 356,928

3.5 MHz
UX2X (UT2XQ) 140,500
IV3HYD 116,012
UT2IU 110,704
IZØKBR 104,082
S57LR 101,004
UX6IR 25,596

SINGLE OPERATOR LOW POWER ALL BAND
*UR7GO 1,696,018
*LZ9R (LZ3YY) 1,425,804
*OM/SQ9UM (SQ9UM) 1,424,022
*YO3APJ 1,060,200
*HA8BE 1,059,390

28 MHz
*9A2DI 2,604
*YT2T 2,460
*S51MA 1,701

21 MHz
*EA7ISH 217,140
*USØMM 156,892
*CT1EEK 67,731
*YO3JF 61,500
*YL2CV 55,414

14 MHz
*UA3PAB 365,955
*EA5ET 280,904
*S51OE 255,892
*PD1KSA 239,248
*OK3C (OK2ZC) 215,986

7 MHz
*UT2UZ 280,476
*HF7ØW 203,907
*HA5LZ 178,435
*RN6HDX 104,788
*IKØLNN 104,229

3.5 MHz
*S53NW 66,087
*YU2A 61,446
*IV3YIM 52,948
*IKØXBX 52,895
*IK3SSJ 44,080

ASSISTED ALL BAND
G6PZ (UT5UDX) 4,174,590
IK4MGP 4,121,390
LZ8E (LZ2BE) 3,590,930
OL6X (OK1DIG) 3,444,472
UW8I (UT2IZ) 3,288,446

28 MHz
DO4DXA 570
UZ2HZ 130

21 MHz
IT9RGY 422,750
UXØFF 405,330
DF9ZP 260,752
EA1ACP 127,070
YO5BBO 53,088

14 MHz
S5ØR 785,242
TMØC (F/TU5KG) 718,148
RK6AXS (RU6CQ) 627,936
IT9ZMX 548,504
DM5TI 512,265

7 MHz
YL7A 401,134
DKØEE (DL4MDO) 356,807
RL4R (RW4PL) 324,416
DL1REM 185,858
OH7MN 148,369

3.5 MHz
OY3JE 125,545
YU7U (YU7BH) 71,415
UT5ZA 14,233
YO8WW 4,725
DN7DX 1,560

MULTI-OPERATOR SINGLE TRANSMITTER HIGH POWER ALL BAND
OM8A 4,147,631
RL3A 3,463,104
YTØA 3,362,315
OL3Z 3,202,640
EB1LA 2,821,236

MULTI-OPERATOR SINGLE TRANSMITTER LOW POWER ALL BAND
*UU7J 1,424,640
*F8KGH 1,142,310
*EA2CYJ 926,716
*OM3KWZ 915,828
*CS1CRE 758,547

MULTI-OPERATOR TWO TRANSMITTER ALL BAND
LX7I 5,211,386
Z37M 5,113,332
DQ4W 4,609,238
ES5Q 4,323,240
PI4CC 3,417,580

MULTI-OPERATOR MULTI-TRANSMITTER ALL BAND
OH6R 4,845,374
C37URE 4,486,257
3Z7ØRG 395,328
UR3QXX 267,904

**Low Power*

tion of C37NL. Their website tells the story in more detail: <www.c37ure.ure.es>.

Clubs

United States. The Yankee Clipper Contest Club beat rival Potomac Valley Radio Club on the East Coast. Northern California Contest Club on the West Coast took third.

Europe. Typically, the Bavarian Contest Club and the Rhein Ruhr DX Association dominated the Europe club competition with the BCC coming out on top this time. These two clubs, along with

CLUB SCORES

UNITED STATES

Club Name	No. Entries	Total Score
YANKEE CLIPPER CONTEST CLUB	26	18,846,747
POTOMAC VALLEY RADIO CLUB	31	16,487,040
NORTHERN CALIFORNIA CONTEST CLUB	33	15,282,107
FRANKFORD RADIO CLUB	15	8,348,043
MINNESOTA WIRELESS ASSN	32	7,910,091
FLORIDA CONTEST GROUP	13	6,287,123
ROCHESTER (NY) DX ASSN	5	5,753,535
SOCIETY OF MIDWEST CONTESTERS	23	5,750,235
ALABAMA CONTEST GROUP	15	4,366,137
TENNESSEE CONTEST GROUP	16	3,272,502
WILLAMETTE VALLEY DX CLUB	11	2,992,513
WESTERN WASHINGTON DX CLUB	9	2,191,319
CENTRAL ARIZONA DX ASSOCIATION	5	2,182,895
ARIZONA OUTLAWS CONTEST CLUB	14	1,796,246
BERGEN ARA	3	1,441,426
SOUTHERN CALIFORNIA CONTEST CLUB	8	1,245,801
MAD RIVER RADIO CLUB	4	1,004,836
CTRI CONTEST GROUP	5	825,938
GRAND MESA CONTESTERS OF COLORADO	9	798,931
ORDER OF BOILED OWLS OF NEW YORK	4	733,104
DELAWARE LEHIGH AMATEUR RADIO CLUB	7	584,431
SPOKANE DX ASSOCIATION	5	522,211
KANSAS CITY DX CLUB	3	432,882
SOUTH EAST CONTEST CLUB	4	333,905
METRO DX CLUB	3	324,946
KENTUCKY CONTEST GROUP	5	304,269
CENTRAL TEXAS DX AND CONTEST CLUB	3	254,477
OKLAHOMA DX ASSOCIATION	3	33,952

DX

BAVARIAN CONTEST CLUB	73	39,571,369
RHEIN RUHR DX ASSOCIATION	55	28,332,128
UKRAINIAN CONTEST CLUB	32	20,970,134
CONTEST CLUB FINLAND	10	9,963,680
CONTEST CLUB ONTARIO	16	8,346,090
BLACK SEA CONTEST CLUB	29	7,903,507
URAL CONTEST GROUP	7	6,691,852
LATVIAN CONTEST CLUB	11	5,611,375
SP DX CLUB	12	5,534,485
ARAUCARIA DX GROUP	6	5,455,898
DL-DX RTTY CONTEST GROUP	12	5,448,225
YU CONTEST CLUB	7	5,387,156
SKY CONTEST CLUB	4	4,395,375
SOUTH URAL CONTEST CLUB	5	4,157,590
LU CONTEST GROUP	16	4,115,397
WORLD WIDE YOUNG CONTESTERS	7	3,376,298
MARITIME CONTEST CLUB	6	2,776,647
TEMIRTAU CONTEST CLUB	5	2,666,552
KAUNAS UNIV. OF TECHNOLOGY R C	4	2,593,385
BELARUS CONTEST CLUB	3	2,560,191
RADIO AMATEUR ASSN OF WESTERN GREECE	3	2,392,551
BRITISH COLUMBIA DX CLUB	6	2,300,606
GRUPO DXXE	8	2,295,470
CONTEST GROUP DU QUEBEC	5	2,220,984
CANTAREIRA DX GROUP	13	1,731,418
CT3 MADEIRA CONTEST TEAM	3	1,330,437
CROATIAN CONTEST CLUB	6	1,232,233
CSTA BUCURESTI	3	1,180,352
599 CONTEST CLUB	6	1,144,001
SLOVENIA CONTEST CLUB	3	1,035,881
ICELANDIC RADIO AMATEURS	4	1,013,517
KKKK CONTEST CLUB KRASNODARSKOGO KRAYA	6	984,865
RUSSIAN CONTEST CLUB	6	862,372
SHAKHAN CONTEST CLUB	3	657,846
LES NOUVELLES DX	3	554,923
BOSNIA AND HERZEGOVINA CONTEST CLUB	3	424,516
ALRS ST PETERSBURG	6	402,142
VK CONTEST CLUB	4	332,964
CHILTERN DX CLUB	3	164,583

European third-place Ukrainian Contest Club, took the top three places in the world club competition.

I2UIY Memorial Award

In memory of Paolo Cortese, I2UIY, this award recognizes a single-op contest expedition in each of the two annual CQ RTTY contests, CQ WW and CQ WPX. This time we are highlighting a joint contest expedition by two single ops who activated two single-band operations from one station location. This joint single-band contest expedition was made by Andrei Stchislenok, TI5/NP3D (EW1AR), and Fred Dennin, TI5/WW4LL. Andrei and Fred overcame a number of travel and equipment problems to stage 40-meter and 20-meter single-band efforts, respectively, from the QTH of Keko, TI5N. In the spirit similar to the one Paolo himself exhibited on his many contest expeditions, Fred and Andrei enjoyed a festive pre-contest gathering with local hams, including Carlos, TI2KAC, and visitors K4UN and W4KTR, who were preparing for CQ WW SSB at the TI8M station. It is through these social adjuncts to contests that goodwill and cross-cultural understanding is engendered by the great hobby of radio-sport. The jovial I2UIY would have it no other way.

Logs

Coincidently, as I came on board with this position, so did the next generation of log-checking technology developed by Ken, K1EA. This has made log checking much more comprehensive and at the same time far less arduous than what Paolo had to work with. Nearly 80% of all the QSOs in the submitted logs were fully validated with the same QSO in another log. Over 96% of all validated QSOs were good, demonstrating a high degree of accuracy by those submitting logs. The average operating time was 12.4 hours and the average error rate was 4%. Participants can compare their individual error rate with this average by requesting their LCR (Log Check Report) from <w0yk@cqwwrtty.com>. This report breaks down errors into incorrect callsigns, incorrect exchange received, and NIL (Not In the other Log).

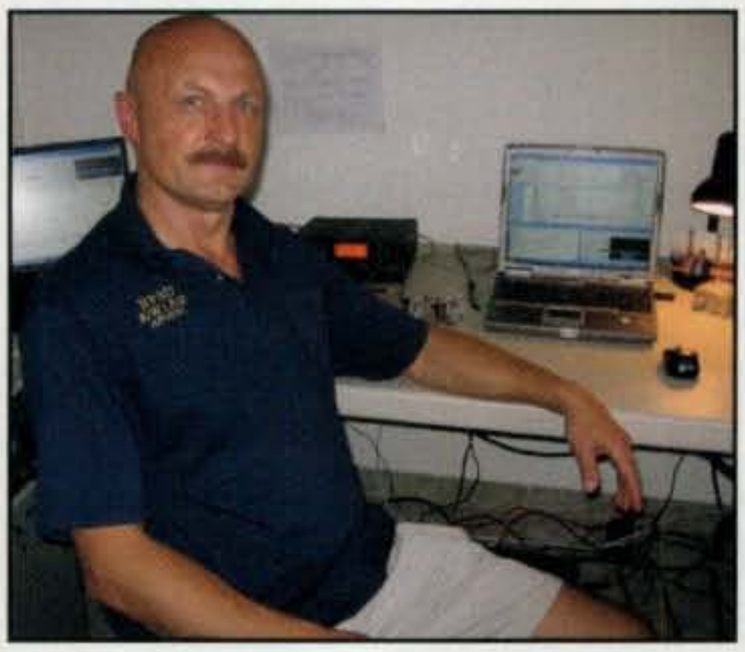
Some scores had large—e.g., greater than 20%—reduction due primarily to two things. One was incomplete QSO information, such as received, or sent, QTH. This is often the result of the submitted Cabrillo file not being properly created by the logging software. It is easy to check Cabrillo files because they are simple text files that can be read with any basic text editor. On the CQ WW RTTY website (www.cqwwrtty.com) the Logs page gives full details on the format of each line in the Cabrillo file. Participants should always open up their Cabrillo file prior to log submittal and make sure it is proper. In particular, the popular MixW RTTY contest software is frequently the source of incorrect Cabrillo logs. This is entirely due to user mistakes and can be avoided by carefully reading the special MixW section on the Logs webpage of the website above.

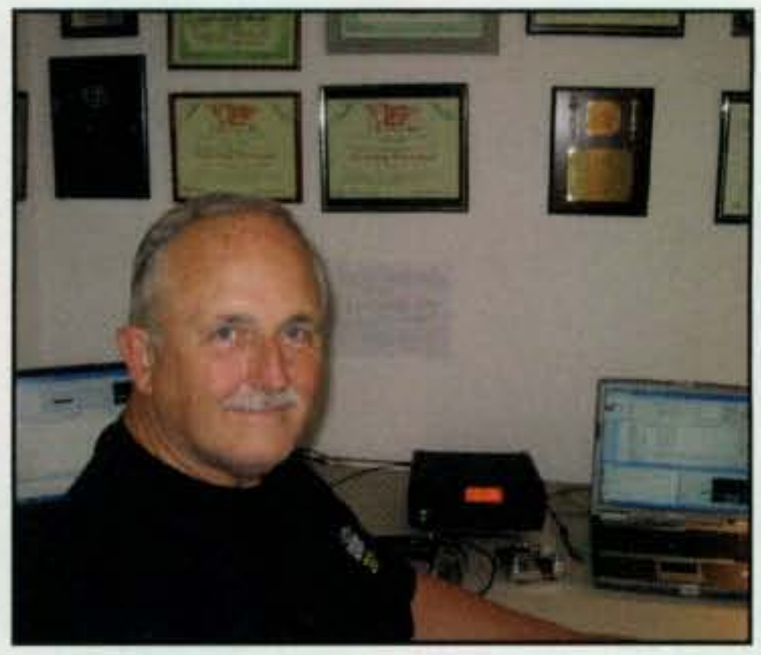
The second major cause of large score reduction is in MS and M2 logs where the band-change rule was violated and all QSOs in the remainder of the clock hour following the violation were not counted.

Be sure to check the website prior to the contest to learn about any rules changes, which are highlighted on the home page. In addition, the rules should be reviewed no matter how familiar you are with the contest. Log submittal deadlines, band-change limits and other details can change from year to year.

Summary

Thanks to all the participants for making the CQ WW RTTY Contest so successful and fun for everyone. The contest results highlight the top scorers, but those logs are filled mostly with QSOs they have with casual participants who are seldom serious contesters. It is this majority of participants that makes the contest possible for everyone involved. And thanks to the many folks behind the scenes who spend countless hours in silent support of this major event. Gail, K2RED, of *CQ* magazine relentlessly edits the words, pictures, and data we provide to produce this professional article. Ken, K1EA, and Randy, K5ZD, provide superb support of the computer tools created by K1EA for the state-of-the-art log checking we now perform on the logs. Don, AA5AU, is getting the entire history of scores into a user-searchable database that dynamically computes records for any category cut of the data. It is possible that this computerized identification of records will discover some we humans have missed over the years. Don and Randy have completed this for CQ WPX RTTY and are in the middle of the same for this contest. Mike, K4GMH, manages the plaque program, seeking donors, fabricating plaques, and making sure it all ties to the results.





Andrei, TI5/NP3D (photo on left), and Fred, TI5/WW4LL (photo on right), are recognized with the I2UIY Memorial Award for their dual single-band contest expedition to Costa Rica. Andrei won 40 meters Assisted and Fred placed 5th in the competitive 20 meters Assisted category.

Barry, W5GN, generates and mails thousands of certificates around the world after sleuthing through the logs' Cabrillo headers trying to make sense of all the mailing addresses. Mark, K6UFO, has tirelessly repaired broken Cabrillo formats in logs so that the log-checking software can use them. When you get a chance, let these people know you appreciate their efforts on everyone's behalf.

Check the CQ website (www.cq-amateur-radio.com) for the expanded QRM, list of ops of multi stations for the 2009 contest, as well as band-by-band breakdowns and top scores by zones. The 2010 CQ WW RTTY Contest will take place on 25–26 September. Consult the contest website, <www.cqwwrtty.com>, for up-to-date information on rules, logs, and other details prior to this year's event. Also, the 2010 rules will be in the July issue of *CQ* and on the *CQ* website.

73, Ed, WØYK

QRM

This was a great contest to operate. Plenty of openings to points of the compass. 15m buzzing with good DX and not the QRM of 20m, which made the multi a lot easier to work. Improved antenna system made for good numbers on the lower bands. Ran my full legal 50w. Many thanks to everyone for the points, and big thanks to those who stuck with it through the heavy QRM. See you all in the next contest. Best 73. ... **2EØZWW**. Nice condx on 15m! ... **3V8SS**. Great conditions to North America. Very pleased to have FT5GA call me! Also surprised to see 10m open to Europe for one hour. Thank you for the QSOs. ... **9M2CNC**. It was great to see all the new callsigns. Best QSO was UAØFAI on 20 meters. Congrats to everyone who worked FT5GA. ... **AD1C**. First time on RTTY since I nuked out my last interface in Feb. 2008. It was done very much on the cheap (money's a little tight at the time). I built isolation cables for the TX and RX lines to and from the computer (total cost was $16). The program used was MultiPSK (a free download). I spent time ironing out the technical kinks, so I didn't set the RTTY world on fire. But I had fun, and that's what matters. ... **AF9J**. Very nice enjoyable time! With a homemade dipole and 80w. ... **CT1EEK**. QRP, 2.5w from FT817, Tuner Z11, Windom antenna FD3. Got some new bandpoints and good DX (WQ6O) with QRP RTTY. Thanks to the Big Guns for their patience listening for my weak signal. ... **DJ3GE**.Nice propagation both on low and high bands! Enjoyed this contest very much. We could even break our own station record by about 1 million points. ... **DQ4W**. Contesting during the height of heavy downpour from tropical storm Ketsana "Ondoy" which submerged and devastated 90% of Metro Manila including nearby provinces in the Philippines! ... **DU1BP**. CQ WW Contests make their own propagation. It's true. 15 and 10 meters were open! ... **EA3ALV**. My eighth CQ WW RTTY DX Contest and the best except on 10m (just 3 QSOs). The propagation was good on all bands. I contacted two new countries (C3 and A7). Thanks to all who worked me. See you again in 2010. ... **F5RD**. More QSOs and about 20% more score than last year. 21 MHz worked well, even a few precious double-mult QSOs on 28 MHz. The "big 2" CQWW autumn contests are definitely now the "big 3." ... **GØMTN**. The continued expansion of RTTY contest participation is great. So many callsigns that only used to be heard on other modes are showing up in RTTY contests! ... **G3TXF**. Great contest. Enjoyed some of the humour in exchanges. ... **G4MKP**. Thanks to everyone for the QSOs. Conditions to NA were the best I've ever heard. European activity was great too, but made it hard to find multipliers in Oceania and the Far East. ... **GM3SEK**. Enjoyed long-lasting opening on 20m the first evening. ... **HA6NN**. This is my first time in the WW RTTY. Very exciting. See you in the next contest. ... **HI8PJP**. It was a nice contest, although on four bands only, because there were no openings on 10m band. ... **IKØWRB**. It was my first time to attend this contest. Fun, thanks. ... **JA1PTJ**.

Important Online Resources

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

Log submissions: rtty@cqww.com
All other correspondence: w0yk@cqwwrtty.com

Thanks contest. ... **JA2AXB**. Great contest but the one that got away was 3W1M! I sure could of used him for a new one on RTTY. Maybe next year. ... **KØBX**. First RTTY contest, very odd rhythm to this thing. ... **K3TN**. Lots of fun. Suprised to work RWØA and several JAs on 40 meters! The quality of RTTY operating just keeps getting better and better. ... **K5ZD**. A DX contest where DX could be worked from the West Coast. What next? Tnx to SV9CVY for looking for NA West Coast. ... **K6TD**. Interesting time, odd how the bands work even in the "off" times. See you next year. ... **K7RFW**.First RTTY contest, just worked off and on 20 meters with 70 watts. I learned a lot on how to work the contest and changes that need to be made to equipment and software. ... **KC8FVE**. Great band conditions but very limited time. I could not believe how packed the 20 meter band was with RTTY signals! Great to see such activity! ... **KL8DX**. After the news of the previous week, a song by the Police was stuck in my head: "There's a little black spot on the Sun today." I was originally going to just see what new DX I could find, but I was having so much fun I couldn't stop. ... **KX7L**. After 10 years of inactivity I join the boys again RTTY. 73 for all. ... **LU6AM**. Nice test as usual. Many stations do it very interesting. Last 7 hours with low power. My old Collins amp was too tired. Best 73 to all. (Jorge, LU5VV/LV5V) ... **LV5V**. Was really a blast this year, lots of DX including FT5GA worked, plus set a personal best in this contest! ... **N2QT**. Surprising conditions, especially 20 and 40 and lots of activity. 15 opened up a bit for some much needed mults. Hard to get a decent score with only a couple of bands to work with. ... **N8BJQ**. Excellent contest! Made lots more QSOs than I thought were even possible. ... **N9WKW**. Still getting our feet wet with RTTY as a group. Kind of a laid-back effort. Everyone had fun and all the equipment held up well. The K3s are a sweet rig on all three primary contesting modes. ... **NR4M**. Sunspots are there finally, good condx, fun, QRP 5 watts here. ... **ON769MS**. This was my first RTTY contest with spare time. It was a great experience! ... **PA1CW**. This is my first WW RTTY contest. I had only 50 watts and magnetic loop antenna. Thank you very much for the interesting contest. All the best and I hope to meet you in the next year. 73! ... **RA3XEV**. This time, I had 1kW and that made all the difference. Saturday was good with up to 80 Q/h. But Sunday very early morning and ongoing most of the day the condition was bad, and most of the stations were marginal copy. Sometimes a Ukrainian station was followed by one from USA, or vice versa, like UW2N/KE3D and KØKT/UR5WCQ. Distance champions were JA2BQX/Japan, DV1JM/Philippines, ZX2B/Brazil, and VR2XLN/Hong Kong. And I got Andorra on 80m, 40m, and 20m. What great fun. Thanks for organizing this great contest. ... **TF3AM**. Yet again, CQWW RTTY proves my favourite contest. Beat last year's record. Looking forward to next year with new antennas! ... **VA5LF**. This was my first RTTY contest in more than a year. I have been off due to ill antennas, but I am slowly getting back on my toes again, and I truly enjoyed this contest, always did and always will! ... **VE3TES**. Best contest ever! Beautiful 15m openings to EU from VK. Thanks to all EU stations who had the patience to work VK through your QRM! ... **VK3TDX**. Had a fabulous time in this contest. I was expecting doom & gloom but condx were great & my low power was being heard, WAC in one weekend! ... **VK4EJ**. A very enjoyable contest with way more participation than I remember from past years. The higher sunspot numbers sure helped. I found 10m open Sunday afternoon and I was able to add some multipliers that I was not expecting. ... **W4ZE**. I really had a fun time. Conditions were not bad and I worked a new one (C3) on RTTY. On Sunday I worked ZC4LI and heard A7 but he faded before I could get him in the log for another RTTY new one. I conquered a severe RFI issue on 80m so I had fun there, too. Thanks to the organizers for another great contest! ... **W9ILY**. This contest showed why I like RTTY. The last hour on 40m was the most exciting in many years. I could not believe the number of EUs calling me with my low power and dipole at 65 feet. Too bad severe storms took me off air Sat. morning. It was reflected with my poor 20m score. Thanks VK5NPR for calling me long path near end of contest. ... **WA1FCN**. Worked with 20 watts and first time with more than 100 contacts! Sunspots de work! ... **WP3GW**. Old people can still do it! ... **XE1V**. This contest is amazing. Great QSOs and a lot of fun. Will return next year for more fun and good time with friends. ... **XE2K**. A great contest this year. Spread of the good new countries allowed me to get my DXCC RTTY award. Thank you all for points and QSOs. ... **XE2WK**. Pleased to run again in this contest after 20 years. Now with an updated setup located in the same noisy downtown. ... **YO2IS**. Terrible noise and propagation both days. Anyway, great fun contest. ... **YV6BXN**. What a surprise! 15m wide open both days, 20m jam-packed for 100 kHz. Amazing! Great contest. ... **ZS2EZ**.

(Continued on page 107)

As the new solar cycle starts to heat up and bring DX back to the higher HF bands, we thought it would be helpful to newer hams for us to cover some of the basics of sunspots, sunspot cycles, and their impact on ham radio communications.

Sunspots

What They Are, What They Do … and Why Space Weather is Important to DX Communications

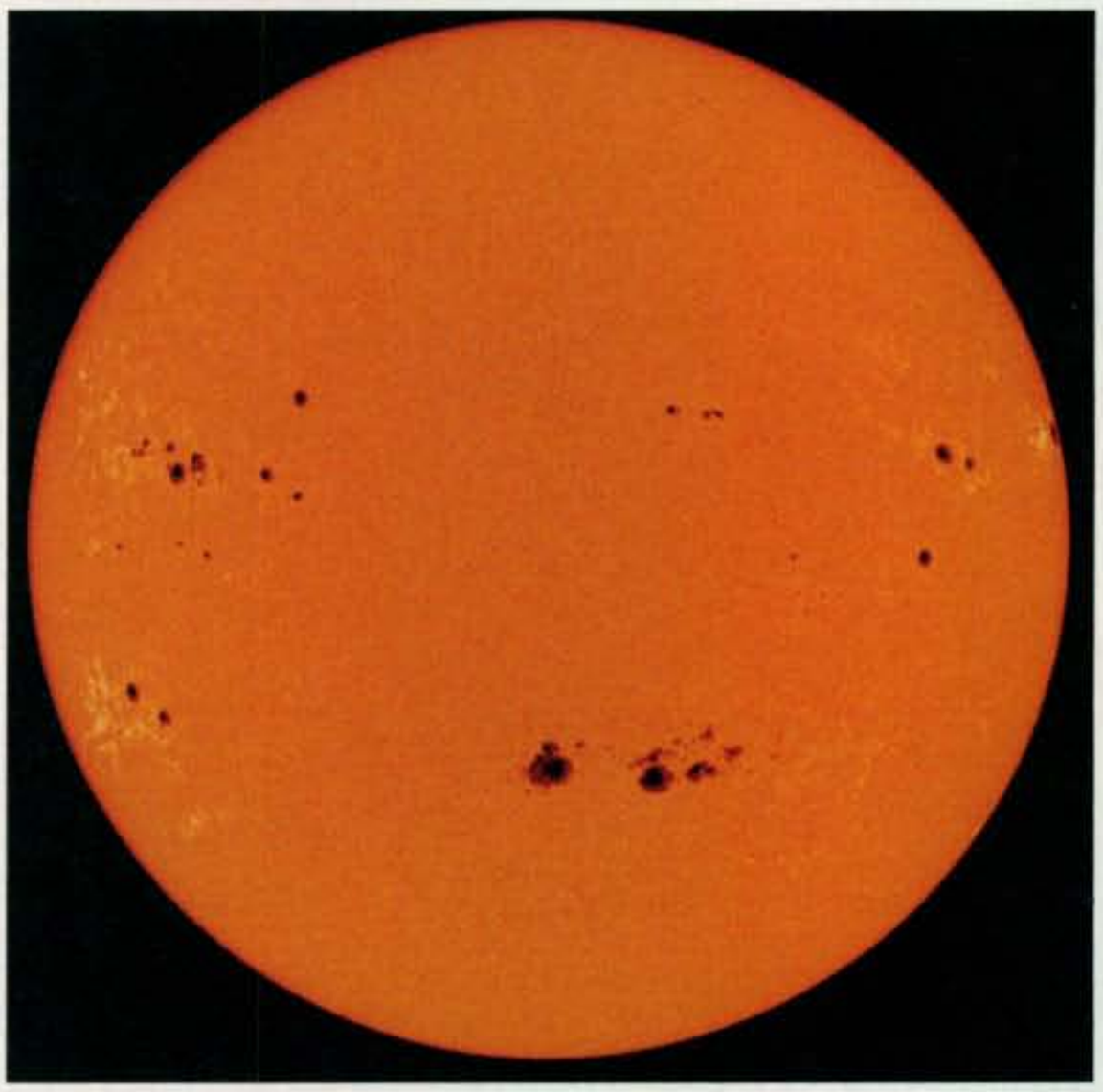
BY FREDERICK O. MAIA,* W5YI

The Sun, our nearest star, is a massive electromagnetic broadcaster which floods the planets of the solar system with heat, light, ultra violet (UV) radiation, and electrically charged atoms called ions. By far the most noticeable blemishes on the surface of the Sun are sunspots. While there are records of sunspots observed by Chinese astronomers as far back as 800 B.C., systematic observation of them goes back only 400 years, to the Italian astronomer Galileo, using a new tool called the telescope.

Sunspots are dark areas on the sun, some as big as 50,000 miles across, larger than planet Earth. They are areas in which convection of solar plasma has been slowed down by intense magnetic activity to a point where they are cooler than surrounding areas and therefore appear darker. Sunspots form and dissipate over periods of days or weeks and typically occur in clusters or groups, bubbling up on the surface of the sun like boiling water and passing some of their magnetic energy into the "solar wind" that streams out from the Sun throughout the solar system.

Solar flares are enormous explosive outbursts of magnetic energy that typically originate in the Sun's atmosphere in an active region of sunspots. The resulting energy increase in the "solar wind" can be so powerful that a single large flare can be equal to billions of one-megaton nuclear bombs. Fortunately for us, solar flares impact Earth only when they occur on the side of the Sun facing Earth, and most of their energy is deflected by Earth's magnetic field. Still, they can cause massive disruptions in communications and even power grids. Our main interest as radio amateurs is in the increased energy levels caused by sunspots that do not reach the disruptive levels of solar flares or other solar "storms."

Perhaps the most distinctive feature of sunspots is that their number increases and decreases in a regular fashion.



Sunspots as observed by NASA's SOHO satellite during the last peak in solar activity, in 2001. (All images courtesy NASA/SOHO)

There are more visible sunspots when the Sun is more active. The Sun goes through approximately 11-year cycles, from peak activity to quiet, and back again. These solar magnetic activity cycles are numbered and the 1755 to1766 cycle is traditionally numbered "1." Sunspot Cycle 24 is just starting.

The sunspot cycle (measured from one solar minimum to the next) actually has varied in length from as short as nine years to as long as fourteen years. The number of sunspots found on the Sun rises from as few as zero during sunspot minimum (as was often the case during the last year or so)

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Note: *This article replaces "Washington Readout" for this issue. Also, a version of this article has appeared on the w5yi.org website.—ed.*

A solar flare erupts from the surface of the Sun. If directed toward Earth, the energy from a flare can cause communication and power outages on our planet.

to a high of over 200. I distinctly remember the sunspot maximum that occurred in the late 1950s. Cycle 19 peaked around 250, the highest of all time.

The Sunspot Cycle and Ham Radio Propagation

Radio-wave propagation can get very technical and complex at times. I'll try to keep this narrative as uncomplicated as I can.

In 1901, Guglielmo Marconi, a young Italian inventor, successfully transmitted radio signals across the Atlantic Ocean. The following year, an English physicist, Sir Oliver Heaviside, suggested that the radio waves found their way around the curved Earth by being reflected from an electrically conducting layer at the top of the atmosphere.

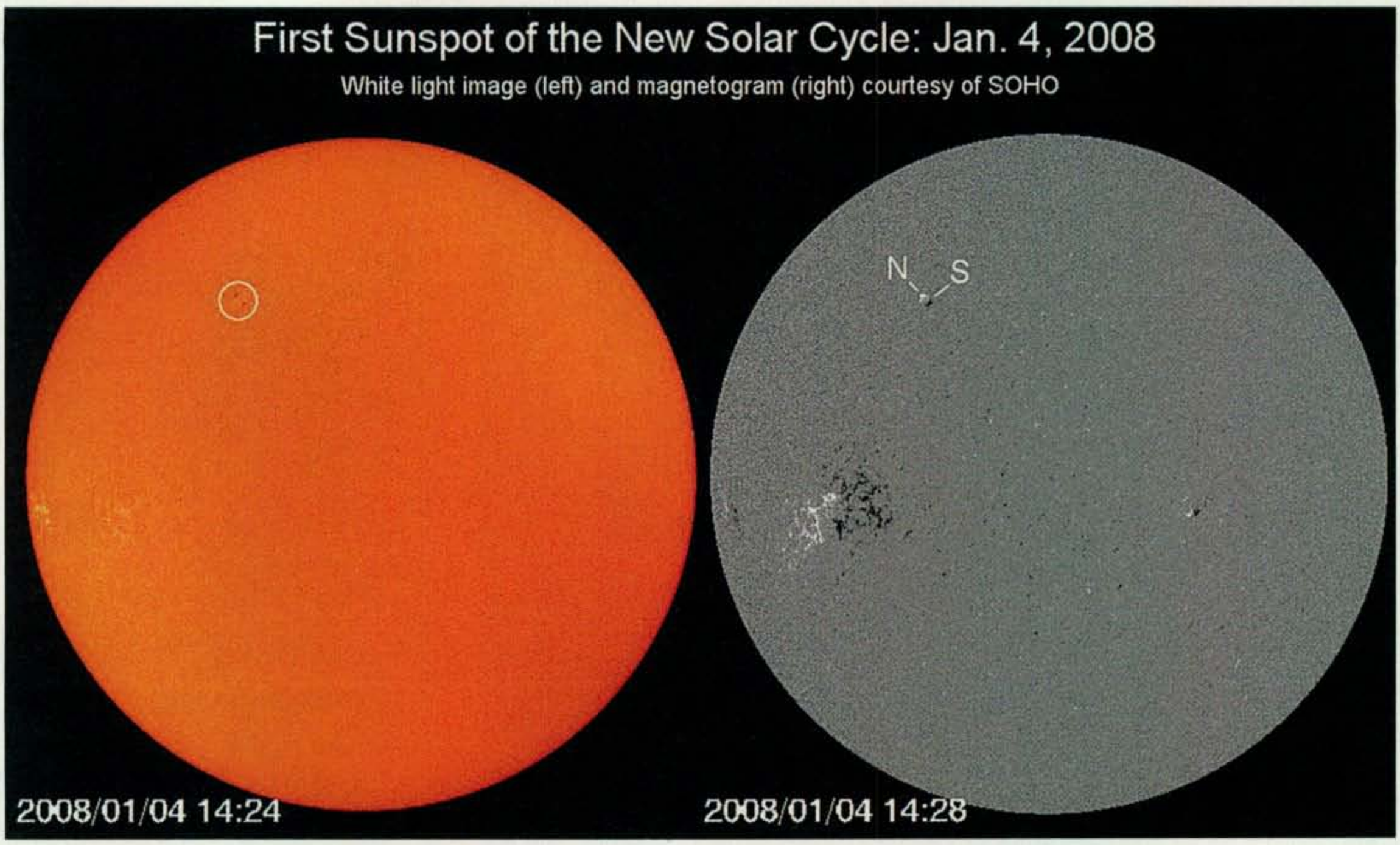
In 1912, ham operators were consigned by congress to the "useless" shortwaves (200 meters and smaller) to make room for commercial broadcasting. Tests on these wavelengths had shown that their range was extremely limited. Signals faded out a few miles from the transmitter. What no one dreamed was that many times they came back in again, often loud and clear, hundreds or thousands of miles away. This led to the discovery of HF radio propagation via the ionosphere in 1923.

The connection between the number of sunspots and long-distance HF radio propagation has long been known. The more sunspots there are, the higher the energy levels are in the radiation from the Sun that reaches Earth. Our upper atmosphere is energized by these bursts of solar radiation which cause atoms and molecules in the Earth's upper atmosphere to become electrically charged, a process called *ionization*. The intensity of this ionization is not uniform; rather, it is more intense at certain altitudes.

The region above the Earth where these ionized layers form, the ionosphere, significantly influences radio-wave propagation of frequencies—mostly in the high-frequency range. These belts of electrically charged atoms generally are considered to lie at an altitude of from 50 to 250 miles.

These ionospheric belts, called the *D*-, *E*-, and *F*-layers, are somewhat predictable and are identified by their height. The *D*-layer forms at about 30 to 50 miles; the *E*-layer between 50 and 90 miles; and the *F*-layer varies from 100 to 300 miles, sometimes splitting into two layers, known as *F1* and *F2*.

The height, thickness, and intensity of these layers vary, depending on factors such as the latitude on Earth, the time of day, time of year, and time during the 11-year sunspot cycle. While, long term, space weather varies with the solar



The first sunspot of Cycle 24, photographed from space. It is distinctive because its magnetic polarity is reversed from Cycle 23 sunspots.

cycle, short-term conditions can be mild one minute and stormy the next.

The importance of the ionosphere lies in its ability to reflect some radio waves back to Earth far beyond their "line of sight" or "ground wave" distance from the transmitter. Actually, the wave is bent, or "refracted," much like a stone thrown across a pond's surface. Also like the stone, the wave can make multiple hops. These refracted waves are known as "sky wave" signals.

The altitude and condition of the *F*-layer is responsible for most long-distance radio-wave propagation that takes place between 3 and 30 MHz and even up into the lower VHF range. DX (long distance) communications are possible when HF radio waves are reflected by the higher *F*-layers of the ionosphere. (The *E*-layer is responsible for some DX on higher HF and lower VHF bands, but this "sporadic-*E*" propagation is not tied to the sunspot cycle, so we will not discuss it in detail here.)

During times of high solar activity, there is more radiation from the Sun, and the resulting higher ionization levels allow higher frequencies to be reflected. For example, around solar maximum, the 10-meter band (28 to 30 MHz) frequently is open for extended periods of time and long distances can be worked with rather low power levels.

Whether a given radio wave is absorbed by, reflected from, or transmitted through the ionosphere depends on the wavelength (radio frequency), the angle at which the wave strikes the ionosphere, and the makeup of ionosphere. That's what makes DXing so enjoyable. You never know exactly where your transmission will land. It all depends on the characteristics of the ionosphere and your radio signal.

There is an upper limit (called the *maximum usable frequency*, or *MUF*) to the radio frequency that may be used efficiently for long-distance communications between stations on Earth. Frequencies higher than the MUF penetrate the ionosphere and become useful for extraterrestrial communications, such as for reaching satellites or communicating with astronauts on the International Space Station (ISS).

The maximum usable frequency depends on the conditions in the ionosphere at a given time and is higher at the peak of the sunspot cycle. This means that communications that ordinarily could be carried out at 20 or 17 meters during periods of high solar radiation can frequently be made in the 15-, 10-, or even 6-meter wavelength bands. In short, the more sunspots, the higher the level of ionization, and the greater the likelihood there is of turning 10 meters into a worldwide DX band.

Sunspot Cycle 24 Arrives!

The last solar cycle, number 23, peaked in 2000–2002 and theoretically should have ended sometime between 2005 and 2007. However, Cycle 23 was slow in leaving; it actually bottomed out from the end of 2008 to late in 2009. Over the past two years, more than 250 days have had no sunspots at all.

A new cycle's emergence is determined by counting the frequency and placement of sunspots visible on the Sun. Sunspots are observed with land-based and Earth-orbiting solar telescopes. A feature that signals the arrival of a new sunspot cycle is the polarity pattern of the magnetic field of the radiation from the Sun, which reverses with each cycle. NASA said there was evidence that Cycle 24 arrived in 2008 as "new cycle" sunspots (based on their polarity) began to outnumber "old cycle" sunspots. This often happens several months before there is any significant rise in overall sunspot numbers, and that has been the case this time, with sunspot numbers not beginning to rise markedly until December of 2009.

Life is a JOURNEY. Enjoy the ride!

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All the mounts attach to van doors, truck side doors, SUV doors, etc... and require no holes. Includes 16' 6" deluxe cable assy w/18" mini RG-1888A/U type coax for weather seal entry.

Choose a mount depending on the antenna size and vehicle mounting location space.

For Small Antennas & Limited Space

MODEL / ANT CONN / COAX CONN	
Maldol EM-5M	SO-239 / PL-259
Footprint:	1.1"x .75"
Max Antenna:	40"

For Medium Size Antennas

MODEL / ANT CONN / COAX CONN	
COMET CP-5M	SO-239 / PL-259
COMET CP-5NMO	NMO / PL-259
Footprint:	3.4" x 1.25"
Max Antenna:	60"

For Tall or Multi-band HF Antennas

MODEL / ANT CONN / COAX CONN	
COMET HD-5M	SO-239 / PL-259
COMET HD- 5 3/8-24	3/8-24 / PL-259
Footprint:	3.75" x 1.1"
Max antenna:	80"

COMET BNC-24 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz
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COMET NEW! CSB790A DUAL-BAND 2M/440MHZ W/FOLD-OVER
Gain & Wave: 146MHz 5.1dBi 7/8 wave center load, 446MHz 7.7dBi 5/8 wave x 3 center load • VSWR: 1.5:1 or less • Length: 62" • Conn: PL-259 • Max Pwr: 150W

Maldol AX-50 DUAL-BAND 2M/440MHz
Gain & Wave: 2M 1/4 wave • 70cm 5.0dBi 9/8 wave • Length: 21" • Conn: PL-259 • Max Power: 60W

Maldol AX-75 DUAL-BAND 2M/440MHz W/FOLD-OVER
Gain & Wave: 2M 1/2 wave center load 3.2dBi • 70cm 5/8 wave x 2 5.7dBi • Length: 30" • Conn: PL-259 • Max

Maldol AX-95 DUAL-BAND 2M/440MHz W/FOLD-OVER
Gain & Wave: 2M 1/2 wave center load 3.3dBi • 70cm 5/8 wave x 2 5.8dBi • Length: 38" • Conn. PL-259 • Max

COMET B-10 / B-10NMO DUAL-BAND 2M/440MHz
Gain & Wave: 146MHz 0dBi 1/4 wave • 446MHz 2.15dBi 1/2 wave • Length: 12"
• Conn: B-10 PL-259 ,B-10NMO - NMO style • Max Pwr: 50W

COMET SBB-2 / SBB-2NMO DUAL-BAND 2M/440MHz
Gain & Wave: 146MHz 2.15dBi 1/4 wave • 446MHz 3.8dBi 5/8 wave center load • VSWR: 1.5:1 or less • Length:
• Conn: SBB-2 PL-259 • SBB-2NMO NMO style • Max Pwr: 60W

Maldol EX-107RB / EX-107RBNMO DUAL-BAND 2M/440MHz
Gain & Wave: 146MHz 2.6dBi 1/2 wave • 446MHz 4.9dBi 5/8 wave x 2 • VSWR: 1.5:1 or less • Length:29"
• Conn: EX-107RB PL-259 • EX-107RBNMO NMO style • Max Pwr: 100W

COMET SBB-5 / SBB-5NMO DUAL-BAND 2M/440MHz W/FOLD-OVER
Gain and wave: 146MHz 3dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39"
• Conn: SBB-5 PL-259, SBB-5NMO - NMO style • Max Pwr: 120W

COMET SBB-7 / SBB-7NMO DUAL-BAND 2M/440MHz W/FOLD-OVER
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58"
• Conn: SBB-7 PL-259, SBB-7NMO - NMO style • Max Pwr: 70W

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The sunspot number, a daily index of sunspot activity, originally was devised back in 1848 by Rudolf Wolf, an astronomer with the Swiss Federal Observatory in Zurich. He developed a system to gauge the number of sunspots by giving extra weight to groupings. He simply counted the total number of spots visible on the face of the Sun and the number of groups into which they clustered. This was because neither quantity alone satisfactorily measured sunspot activity. The daily sunspot number then was determined by multiplying the number of groups seen by ten and adding this number to the total count of individual spots.

The *Wolf Sunspot Number*, as it is now called, remains in use today. The international daily sunspot number is computed as a weighted average of measurements made from a network of about sixty cooperating observatories. (It was also Wolf who began numbering the cycles.)

The *smoothed sunspot number* (SSN) is a moving average of a year's worth of international sunspot numbers, centered on the current month. As a result, at or near sunspot maximum, the SSN is noticeably lower than the Wolf number.

Reporting and Predicting Solar Activity

Analyzing and forecasting radio-wave propagation is an art in which several radio amateurs participate. This is usually done by examining space weather data from various sources and/or using software to help determine whether or not long-distance radio communications are possible, and at what frequencies.

Websites such as <SpaceWeather.com>, <solarstorms.org>, <solarcycle24.com>, and our own Propagation Editor, NW7US's <http://prop.hfradio.org> also publish information on solar winds and flares, sunspot numbers, and carry National Oceanic and Atmospheric Administration (NOAA) space-weather bulletins.

NOAA uses time and frequency stations, WWV (Fort Collins, Colorado) and WWVH (Kauai, Hawaii) to broadcast geophysical alerts. These space-weather messages provide information about current long-distance HF radio propagation conditions. These alerts (updated every 3 hours) are broadcast from WWV at 18 minutes after the hour and from WWVH at 45 minutes after the hour. They can be heard at 2.5, 5, 10, 15, and 20 MHz.

These messages report solar flux, the *A*- and *K*-indices, and observed or expected space-weather storms. Solar flux units range from about 50 to larger than 300. During the early part of the 11-year sunspot cycle, the flux numbers are low, but they rise and fall as the cycle proceeds. The numbers will remain high for extended periods around sunspot maximum.

Two measurements of variations in the Earth's magnetic field are the daily *A*-index and the 3-hour *K*-index. The daily *A*-index (an average of the eight 3-hour *K*-indices) goes from 0 (quiet) to 400 (severe storm). The *K*-index (essentially a compressed version of the *A*-index) goes from 0 (quiet) to 9 (severe storm). Generally, an *A*-index at or below 15 or a *K*-index at or below 3 is best for long-distance HF radio communications.

The nation's official source of space-weather alerts, watches, and warnings is the Space Weather Prediction Center (SWPC), a part of the National Weather Service (NWS). It has a very informative website at <http://www.swpc.noaa.gov>. It is one of nine National Centers for Environmental Prediction.

SWPC provides real-time monitoring and forecasting of solar and geophysical events. Scientists at SWPC have pre-

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dicted that the new solar cycle will be below average in intensity, with a maximum sunspot number of 90—the lowest of any cycle since 1928. Given the predicted date of solar minimum and the predicted maximum intensity, these scientists now expect solar maximum to occur in May 2013.

Not all scientists agree with the Space Weather Prediction Center. The National Center for Atmospheric Research (NCAR), using computer modeling, says the new sunspot cycle will be 30% to 50% stronger than the last one.

NCAR, a non-governmental research institute sponsored by the National Science Foundation, is standing by its prediction of a strong cycle despite the different forecast from the Solar Cycle 24 Prediction Panel. NASA originally predicted that Cycle 24 would be a big one with a maximum sunspot number of 160, but later revised its prediction to roughly half that (85 ± 25). (See October 2009 *CQ*, p. 111.)

In any event, from now on—and for the next three or four years—you should be noticing increases in the maximum usable frequency as the sunspots and better DX conditions return. Remember also that there will be spikes in daily solar activity; the rise to sunspot maximum is not a straight line.

NASA Adds to "Space Weather" Prediction Arsenal

While ham operators generally welcome increases in sunspots, violent magnetic storms triggered by solar activity can pose a radiation threat to astronauts in space, satellite communications, navigation systems, the electrical power grid, and other high-tech systems. Early warning can reduce any damage.

To increase our understanding of solar activity and its impact on Earth, and to improve predictions of solar storms, NASA successfully launched its Solar Dynamics Observatory this past February. The SDO is a science satellite designed to monitor the Sun's activity and provide important forecasts and information regarding potentially disruptive solar storms. It supplements other space-based resources such as SOHO, the Solar and Heliospheric Observatory satellite.

The three-ton, $858-million SDO satellite carries an array of remote sensing instruments to investigate the Sun's atmosphere as well as its interior and surface. It will also measure fluctuations in the amount of ultraviolet radiation emitted. After undergoing various tests, the SDO satellite was supposed to begin sending back scientific data about 60 days after launch, sometime in April.

According to mission parameters, the SDO satellite will reside in a circular, geosynchronous orbit some 22,300 miles above Earth, where it will capture and send a stream of super-high-resolution photographs and videos of the Sun over a ten-year period. It is expected to send down about 1.5 terabytes (200 DVDs!) of data daily, equivalent to downloading half a million songs each day. These images will have about ten times better resolution than an HDTV, and the SDO will take one every ten seconds. Scientists anticipate that over its five-year mission SDO will revolutionize our understanding of the Sun. It carries enough fuel to operate for an additional five years.

Information from SDO will immediately be made available to scientists and the public, and you should be getting more accurate predictions of long-distance radio-wave propagation in the months and years to come. For regular propagation predictions and additional explanations of various solar and ionospheric phenomena, see NW7US's monthly "Propagation" column right here in the pages of *CQ*.

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It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.

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You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation. You can mount it from ground level to roof top and get awesome performance.

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

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You can operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters -- and run *full 1500 Watts* SSB/CW on all HF bands!

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Each HF band uses a separate, efficient end-loading coil wound on fiberglass forms with *Teflon*™ wire, and capacitance hats at each end (no lossy traps). 6 and 2 meters are *full-length* halfwave dipoles.

Built-to-last -- incredibly strong solid rod fiberglass center insulator and 6063 T-6 aircraft strength aluminum tubing radiator. Assembles in an afternoon. Adjusting one band has little effect on other bands.

MFJ-1775W, $249.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ *80/40/20 Meter Rotatable* Dipole

MFJ-1785
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Now you can operate the *low bands* on 80, 40, and 20 Meters with a true rotatable dipole that'll blend in with the sky! Take advantage of excellent low band propagation during this low sunspot cycle. Handles 1500 Watts SSB/CW. 80/40 meter end-loading coils are wound on fiberglass forms with *Teflon*™ wire, and resonated with capacitance hats to ensure extremely low-losses. Full-size on 20 Meters gives incredible DX. Balun included! 33 foot low-profile, inconspicuous. Easily rotatable with a medium duty rotator like Hy-gain's AR-40.

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Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- *gives you highest possible efficiency*.

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning. Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

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MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

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Announcing:

The Thirteenth Annual CQ WW Foxhunting Weekend

May 22–23, 2010

plus

Results of the 2009 CQ WW Foxhunting Weekend

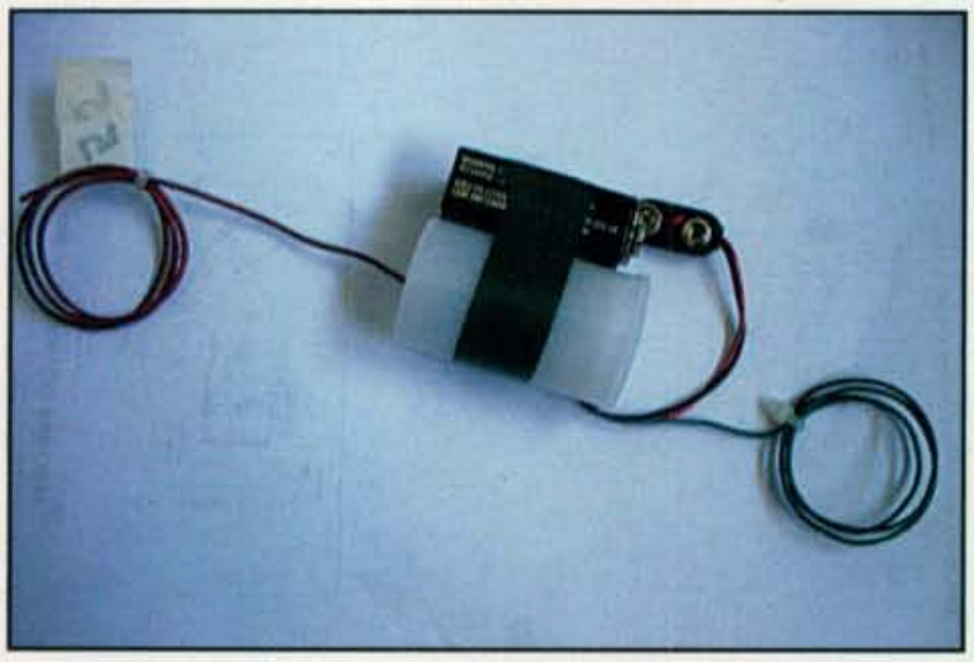
BY JOE MOELL,* KØOV

"Hear ye, hear ye! Announcing the next transmitter hunt! At 7 PM, a signal from an unknown location will emanate on 145.53 for 30 seconds every 5 minutes. Your job, if you think you can handle it, is to find the source of that ether-filling RF."

That was the challenge made by Sheila and Tom Bosscher, K8AJ and K8TB, to members of the Holland Amateur Radio Club of Michigan. Their tongue-in-cheek announcement continued, "You do not have to be a member of the club to participate. However, if you are not and you find the fox first, you have to buy everyone a late dinner!"

HARC is just one of the many ham radio organizations that have discovered the fun of tracking down radio transmitters for sport. They call it many names, including "T-hunting" and "bunny hunting" for vehicular hunts. "Radio-orienteering" and "ARDF" (for Amateur Radio Direction Finding) are monikers for formal all-on-foot events. However, "foxhunting" has become the generic term that describes it all, even though no furry animals are harmed in the process.

Hidden transmitter hunting has gained so much popularity in recent years that *CQ* magazine has added it to the contests that it promotes. The first time was back in 1998 and the obvious choice for a name was the National Foxhunting Weekend. Now it's the annual CQ World-Wide Foxhunting Weekend, renamed because reports come in from all over the globe. This year, it will be May 22–23.



This tiny fox transmitter provided a day of fun for the Ski Country Amateur Radio Club. (Photo submitted by Bob Cutter, KIØG)

As always, the 2009 Foxhunting Weekend announcement brought a big batch of reports about hams having fun. Hunt rules were determined locally, so few events were alike. Most were on 2 meters, where almost every ham has receiving equipment. A directional antenna and an RF attenuation system are all that it takes to join in. Both are easy to build or inexpensive to buy.

A Real Fox Sighting

What is it like to participate in a mobile transmitter hunt? Read the following report from the Xerox Amateur Radio Club to get an idea:

The 13th annual Xerox Spring Foxhunt was Saturday morning May 9 to dovetail with the CQ Foxhunting Weekend. Eleven intrepid hunters gathered at Wegman's Cafe in Webster, New York for sign-in at 9 AM. They didn't know that we (Fred Miller, WO2P, and Judy Stonehill, N2KXS) had placed two foxes in Ellison Park Wetlands Center, approximately 2 miles from the meeting location.

The park is 1.5 miles long, very narrow, and runs along the eastern bank of the backwaters of Irondequoit Creek. It has a very well marked north entrance and a concealed south entrance. A number of hiking and nature trails meander through the park, along the creek's edge and up into the hills. The very steep cliff faces, carved out by glacier action and the flow of the creek for a hundred centuries, very effectively reflect 2-meter fox signals and provide false bearings.

The first fox, running 1 watt, was on a hill overlooking the park entrance. It was intend-

*CQ WW Foxhunt Weekend Moderator
ARRL ARDF Coordinator
P.O. Box 2508, Fullerton, CA 92837
e-mail: <homingin@aol.com>
web: <www.homingin.com>

Neil Robin, WA7NBF, of Port Angeles, Washington hosted an international fox-hunt which included a transmitter that was controlled by the hunters themselves. He is on the left in this photo, taken at the 2-meter starting line of the 2007 USA ARDF Championships near South Lake Tahoe, California. To the right are Scott Moore, KF6IKO, of Santa Barbara, California and Emily DeYoung, K4MLE of Alexandria, Kentucky. (Photo by Joe Moell, KØOV)

Announcing: 2010 CQ WW Foxhunting Weekend May 22–23

CQ Amateur Radio magazine has designated May 22–23 as the 2010 CQ World-Wide Foxhunting Weekend and is encouraging all hams and radio clubs to hold hidden transmitter hunts. Since the primary objective is more hunt participation, we don't insist that your event be on that weekend. Any time in the spring is fine with us!

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

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

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

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

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

73, Joe Moell, KØOV
Foxhunt Weekend Moderator

ed to be straightforward to locate, but proved to be quite elusive. Signal bounces kept most of the teams busy for an hour or more. A note attached to the first fox told the hunters that it had been for practice and instructed them to change frequency to find a second fox, which was at the south end of the park. The trail system would have taken the hunters to the area, but it would have taken a good bit of time. Some of the hunters walked south while other teams went back to their vehicles to get a good bearing and decide whether to drive.

Reflected signals near fox #2 also proved to be a challenge, so only one of the five teams found it. The hunt was extended 20 minutes past the planned ending time of noon to allow the closest team (Brian Donovan, K2AS, and Greg Donovan) to locate the fox and be the clear winner. The post-hunt lunch and awards ceremony was at a restaurant just west of the park entrance. The day's hunting experiences and past hunt stories were eagerly exchanged and good humor and laughter prevailed.

As we walked the path to place the south transmitter early on the morning of the hunt, we came across a very young fox pup playing on the path in front of us! Surprised to see each other, we briefly made eye contact before he jumped off the path into the bushes. When I made a quiet squeaking sound, his curiosity got the best of him and he stepped back into the path. A second pup also showed himself. From a hole in the cliff face, the mama fox briefly appeared to check us out. It occurred to us that we must have picked an excellent hiding spot if it was good enough for a real fox!

Tom Lewis, AB5CK, buried his hidden transmitter in the snow for an early May transmitter hunt in Bozeman, Montana. Apparently he didn't run much power, because the snow didn't melt and give away the secret. (Photo by Tom Lewis, AB5CK)

It was yet another well-concealed transmitter for the Gallatin Ham Radio Club foxhunt in Bozeman, Montana in April 2009. Cyrus Smith, NU7Q, has just pulled the foxbox out of a pile of wood chips. The beautiful aluminum Yagi with flexible element tips was designed by Harley Leach, KI7XF. (Photo by AB5CK)

Chuck Kemmer, AC7QN of Fox Island, Washington looks for fox #7 at the RAC transmitter hunt. Notice the handle on the measuring-tape beam, which is just right for horizontally polarized signals but not for vertical ones. Google satellite maps mounted on cardboard were given to each hunter. (Photo submitted by KR7W)

Another good example of mobile T-hunting is the Portage County Amateur Radio Service in Ohio, which held hunts on the first, third, and fifth Wednesday of each month last summer, beginning at 7 PM from a church in Silver Lake. Beginners with simple equipment were especially welcome. Club members with no RDF gear were encouraged to ride along with competing teams. Rather than declare an ending time in advance, Portage County hams kept their hunts going until all teams had found the fox.

In case you doubt that the CQ WW Foxhunting Weekend is truly worldwide, just surf the web to the North-East Radio Group site in Australia[1] and read about the Victorian Foxhunting Championships last May. It was a "fair dinkum" event with foxes to find on the 160-, 80-, 10-, 6-, 2-, and 3/4-meter bands. Imagine the directional antennas for all those frequencies on each hunt vehicle! The organizers served a hearty lunch, a sumptuous supper, and a tea time in between.

Vehicle-Free Foxhunting

In the Victorian championships, the hunting teams start off in vehicles. When they get close to a fox, all of the team members except the driver jump out of the vehicle and take off on foot to close in with portable RDF sets. Mobile hunts with on-foot "sniffing" at the end are popular here in the states, too, but no-vehicle transmitter tracking is gaining in popularity. In 2009, there were more all-on-foot events than ever, ranging from simple to very challenging.

The Ski Country Amateur Radio Club of Colorado held its second Foxhunting Weekend event as part of a picnic at the home of Pat Fitzgerald, KVØK, in Glenwood Springs. Bob Cutter, KIØG placed a miniature transmitter in a small animal burrow (not a fox's den, he says) and 20 attendees headed out to find it. Chris Fortensky, KCØOCV got to it first, but the "under 16 age scoring factor" gave the prize, a tape-measure antenna, to 14-year-old Liam Kelly, KDØHDF.

There was still some snow in early May in Bozeman, Montana, where Tom Lewis, AB5CK, was fox hider for the Gallatin Ham Radio Club. He put his little rig in a baggie and buried it in shallow drifts in a local park. That's living dangerously, because the transmitter could have gotten soaked or even stepped on! The mud that he put on top of the snow to mark the location looked a lot like

something a dog had left. That was enough to keep anyone from tramping on his rig.

Two weeks later was the official Bozeman Foxhunting Weekend event, with four hidden transmitters to find on foot in a park. "The newer hunters were assisted by those with more experience," AB5CK wrote. "One of the hunters was quite successful with body shielding and a hand-held radio with no directional antenna. We do not keep score because just finding the cleverly hidden transmitters is more than enough fun."

It's a yearly tradition for foxhunters from Port Angeles, Washington and elsewhere in the northwest to get together with their friends from across the Strait of Juan de Fuca in Victoria, BC Canada for a day in the woods. The 2009 event was hosted by Neil Robin, WA7NBF, with three 2-meter transmitters to find. One was unusual because it was controlled by the hunters themselves, all of whom were licensed hams. They could demand a brief fox transmission by sending it a DTMF tone.

WA7NBF figured that the hunters would try to make it hard on one another by bringing up the fox only when they were at an ideal location for a bearing or triangulation. However, it turned out that this fox was commanded on almost continuously during the first 15 minutes. Everyone enjoyed the hunt and the food, agreeing that it was definitely worth the early morning ferry ride.

Neil doesn't do any running when he hunts radio foxes, but his RDF skill was good enough to win a prize at the annual Radio Amateurs of Tacoma event. The site was Fort Steilacoom Park in Lakewood, Washington. Hosts were Alan Ferguson, N7OMS, Chuck Kemmer, AC7QN, and Rich Patrick, KR7W. The park encompasses 340 acres with a large lake in the middle.

There were eight foxes, but only #8 counted for the prize. It was intended to be especially difficult because its antenna was a four-element Yagi aimed toward a large chain-link baseball diamond backstop. The starting point was in the side null of the antenna, but Neil told everyone it was pretty easy for him.

Top Foxhunters Gather near Boston

The annual USA Championships of Amateur Radio Direction Finding bring together the best on-foot foxhunters from all over the states, plus visiting competitors from around the world. Our 2009 national championships took

Larry Jacobs, WA7ZBO, always comes up with a unique transmitter hunt for ham-fests in Utah. In April 2009, he placed 26 Styrofoam™ containers on the lawn, with little transmitters in five of them. Participants had to determine which containers had transmitters in them without touching any of them. (Photo by Larry Jacobs, WA7ZBO)

place at Blue Hills Reservation, a 2000-acre site south of Boston. The organizer was Vadim Afonkin, KB1RLI, who learned ARDF as a youth in his native Russia. It would be hard to find a stateside ham who is more knowledgeable and skilled in the sport.

The roster of competitors included representatives from Australia, Canada, Germany, Japan, Russia, Sweden, United Kingdom and Ukraine. Among the starters were eight Massachusetts residents, none of whom had participated in a large-scale ARDF event before. Five of them were members of the New England Orienteering Club (NEOC). Their experience with map-and-compass navigation gave them a good start in the sport. Beginning in March, Vadim helped them achieve RDF skills by putting on practices and "dry runs."

KB1RLI's world-class 2-meter and 80-meter courses were about 3.5 miles point-to-point from start to each of the five transmitters in optimum order and then to the finish. Actual routes of the competitors were considerably greater than that, of course.

At every USA championships, there is friendly rivalry between the OH-KY-IN (Ohio, Kentucky, and Indiana) group in the Cincinnati area and the foxtailers from California to see who will get the most medals. In 2009, the battle almost ended in a draw with one of each color medal won by each group. For California, Bob Cooley, KF6VSE, took gold in M60 category on 80 meters and bronze on 2 meters. Jay Hennigan, WB6RDV, got silver in M50 on 80 meters. For the Cincinnati group, Dick Arnett, WB4SUV, captured gold in M60 on 2 meters, Matthew Robbins, AA9YH, picked up silver in M40 on 2 meters and Bob Frey, WA6EZV, took home bronze in M60 on 80 meters.

However, there was a new team member from OH-KY-IN. Addison Bosley of Erlanger, Kentucky is the grandson of Dick Arnett. At age 11, he was the youngest competitor present. Addison earned gold medals in the M19 category on both bands. Congratulations!

The USA ARDF Championships led to a resurgence of all kinds of foxhunting activity in the Bay State. On-foot hunts now take place about once a month when the weather is warm. Many of the newcomers are training for this year's USA championships in Ohio[2] and for possible positions of ARDF Team USA 2010 at the World ARDF Championships in Croatia.[3]

Interest in mobile T-hunting has picked up near Boston, too. The Minuteman Repeater Association (MMRA), which was famous for its regular hunts a decade ago, has started them again under the leadership of Bob Evans, N1BE. In July, MMRA joined forces with the Quannapowitt Radio Association for a joint mobile hunt on the MMRA repeater in Weston. Nearly twenty hunters found N1BE at the Concord Field Station of Harvard University within two and a half hours of his first transmission.

Larry Jacobs WA7ZBO, is one of the most creative transmitter hiders in the USA. Remember his "smoked fox" idea in last year's report? This year, he tried something completely different for the Utah State ham convention. "I knew there wouldn't be many attendees bringing their own RDF gear," he wrote, "so I came up with a hunt in which handhelds by themselves would suffice.

"I took 26 Styrofoam™ containers and marked them A through Z on the outside," Larry continued. "Five of them had little transmitters inside, squawking

on different 2-meter frequencies. The other 21 were weighed down with bottles of water inside. Without opening any, hunters had a maximum of 30 minutes to turn in a card with the right letters next to the frequencies. The first to finish with the right answers would win. Charles Johnson, WA7JOS, turned in a perfect card in 12 minutes."

Help Your Fellow Hams

Lest you think that ham radio foxhunting is only about fun (as if that weren't enough reason to do it), you should keep in mind that foxhunters are also learning skills that could be of great service to other hams and to the public. It's far easier to find interference sources after a few practice hunts. Just ask the members of the Genesis Amateur Radio Society (GARS) in the Cape Cod area. According to a report of Eastern Massachusetts Section activities on the ARRL website, an interfering signal locked up the GARS repeater for three days last July. Club members traced the signal to the intersection of Routes 28 and 58 in Wareham, but could not make further progress.

Then Bruce Hayden, NI1X, of the South Shore Foxhunters volunteered the members of his T-hunting group to try to find the QRM after their next Saturday morning hunt. They quickly traced it to one unit of a mobile-home park. The homeowner was contacted and soon the interference disappeared. Afterwards, he told the hunters that some visiting children must have pushed down the transmit lock bar on his desk mic.

A more difficult interference case confronted the experienced T-hunters of southern California last April. Hams in central and northern Orange County began hearing conversations on 146.025 MHz, the output of K6SOA/R, which is owned by the South Orange Amateur Radio Association (SOARA). The transmissions were clearly for business and appeared to be related to construction work. SOARA has regular hidden transmitter hunts, so some members were already equipped to go into action to find the source. Strong signals were reported in the cities of Orange and Costa Mesa. However, the strength and direction of bearings were not the same from one day to the next.

Next came reports of strong signals in the cities of Anaheim and Yorba Linda. The search wasn't simple because the activity wasn't daily, and it was sporadic on the days when it occurred. From the sometimes-salty

conversations, T-hunters concluded that they were listening to the handi-talkies of a concrete supplier at various job sites.

Two weeks after Foxhunting Weekend, one hunter hit pay dirt at a construction site in the city of Yorba Linda. Photos and recordings were sent to the FCC and within a week the interference was gone. The concrete supply firm had obtained its handie-talkies from a commercial two-way radio supplier, which had mistakenly programmed them to transmit and receive on 146.025 MHz instead of 156.025 MHz. With no frequency readout and with tone squelch operational in their receivers, the concrete workers could not hear the SOARA repeater and had no idea that they were using an amateur radio frequency.

Hunt Anytime

Some hams would like to get involved in foxhunting but aren't available on the days and times of the local hunts. Others aren't fans of the local hunt rules, wanting them to be either more stringent or more lenient. Newcomers may stay away because they don't have the self-confidence to compete against the local experts.

For these folks, a no-pressure hunt-anytime option is attractive. From time to time, Barry Fox, W1HFN, puts an unattended 50-milliwatt transmitter in a park or nature area in Massachusetts.[4] It transmits a voice message and ID for 20 seconds every 3 minutes. Batteries last about 10 days, after which Barry picks it up and publishes the log of sign-ins.

In the next-door state of Connecticut, Dean Whitsett, N1SXL, deploys his small 2-meter transmitter in local parks during warm months.[5] His foxbox is normally asleep but can be activated by a hunter's DTMF command, after which it sends a brief CW message every 5minutes for the next hour and a half.

Even more sophisticated is the 50-milliwatt GeoTran by Bob Thornburg, WB6JPI. It sends a 15-second enticement in Bob's voice every 3 minutes, 24 hours a day. A 1.5-watt solar panel provides power, which is stored for cloudy days and nighttime in a 3-ampere-hour pack of Nickel-Cadmium batteries, the inexpensive type sold to radio-controlled car enthusiasts. The panel sits atop a copper-pipe J antenna. Transmitter and batteries are inside a rugged and weatherproof plastic case.

When WB6JPI first put GeoTran on the air, he didn't publish any hunt boundaries. All that anyone was told at first was to listen for an intermittent signal on 146.565 MHz, which is coordinated for transmitter hunting by the Two Meter Area Spectrum Management Association. It wasn't long before the first hunter announced he had found it, adding to the interest.

Bob puts on a fresh GeoTran hunt every few weeks. A commotion ensues on the GeoHunt Internet Forum[6] as everyone tries to figure out where to hear it in southern California. After that, it's an individual effort as they mount their mobile RDF gear, track it down when they can, and sign in. Bob considers GeoHunt a success because it has brought out some new T-hunters and brought back a few who have not been on a regularly scheduled hunt for a long time.

I am eager to read your reports of 2010 foxhunting activities, both scheduled and hunt-when-you can. Happy hunting!

Notes

1. http://www.nerg.asn.au/foxhunt/foxindex.htm
2. http://www.usardf2010.com
3. http://www.ardf2010.com
4. Send e-mail to <foxbw@comcast.net> for current information
5. Send e-mail to <n1sxl56@yahoo.com> for current information
6. http://www.thunter.org/geothunt/

What You've Told Us...

Our February survey—which ran along with our Market Survey article on VHF/UHF mobile rigs—asked about your use of and plans for these radios. Not surprisingly, 92% of the readers who responded own at least one VHF/UHF mobile rig; 28% plan to buy one in the next 12 months. Only 5% neither own nor plan to buy one of these rigs. Among those who do plan to purchase one or more VHF/UHF mobile rigs in the next year, 81% are looking at getting a dual or multiband transceiver, 6% are considering a single-band 2-meter rig and 8% are shopping for a single-band rig for a different VHF/UHF band. In addition, nearly two-thirds of you (63%) use or plan to use our annual Market Survey articles in helping you decide which rig to buy.

More than three-quarters of you (76%) most frequently use your VHF/UHF mobile rig in a passenger vehicle, such as a car, minivan, SUV or pickup, followed by home station use at 64%, and 8% for other vehicles, such as motorcycles, boats, planes or bicycles. The most popular activity with these rigs is general ragchewing on repeaters (71%), followed by simplex communications (53%), public service and emergency communications (46%), and nets (44%). In addition, 9% each use their mobile rigs for APRS and/or long-distance Echolink/IRLP contacts, and 7% each use them for D-STAR and other (non-APRS) packet.

Finally—no surprises here—88% of you regularly operate on 2 meters, followed by 70 centimeters at 43%, 6 meters at 24%, and 1.25 meters (222 MHz) at 14%. In addition, 6% each operate regularly on the 902 MHz and 1200 MHz bands.

This month's free subscription winner is Beth Pearce, KC5RWW, of Seminole, Oklahoma.

Reader Survey
May 2010

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 find out more about your use of social networking sites, such as Facebook.

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

1. Do you have internet access?
- Yes 1
- No 2

2. Do you belong to any social networking sites (see examples below)?
- Yes 3
- No 4

3. If yes, to which one(s) do you belong? (circle all that apply)
- Facebook 5
- LinkedIn 6
- MySpace 7
- Twitter 8
- Other 9

4. How frequently do you log into a social networking site?
- More than once a day 10
- About once a day 11
- A few times a week 12
- A few times a month 13
- Just here and there 14
- Do not belong to any social networking sites 15

5. What sorts of acquaintances do you have on these sites?
- Mostly family 16
- Mostly work people 17
- Mostly non-ham friends 18
- Mostly ham friends 19
- Combination of above 20
- Do not use 21

6. What is your main motivation for using these sites?
- Keeping in touch with family and friends 22
- Networking for work 23
- Meeting & networking with fellow hams 24
- Combination of above 25
- Other 26
- Do not use 27

7. Are you registered as a "fan" of the *CQ* magazine page on Facebook?
- Yes 28
- No 29

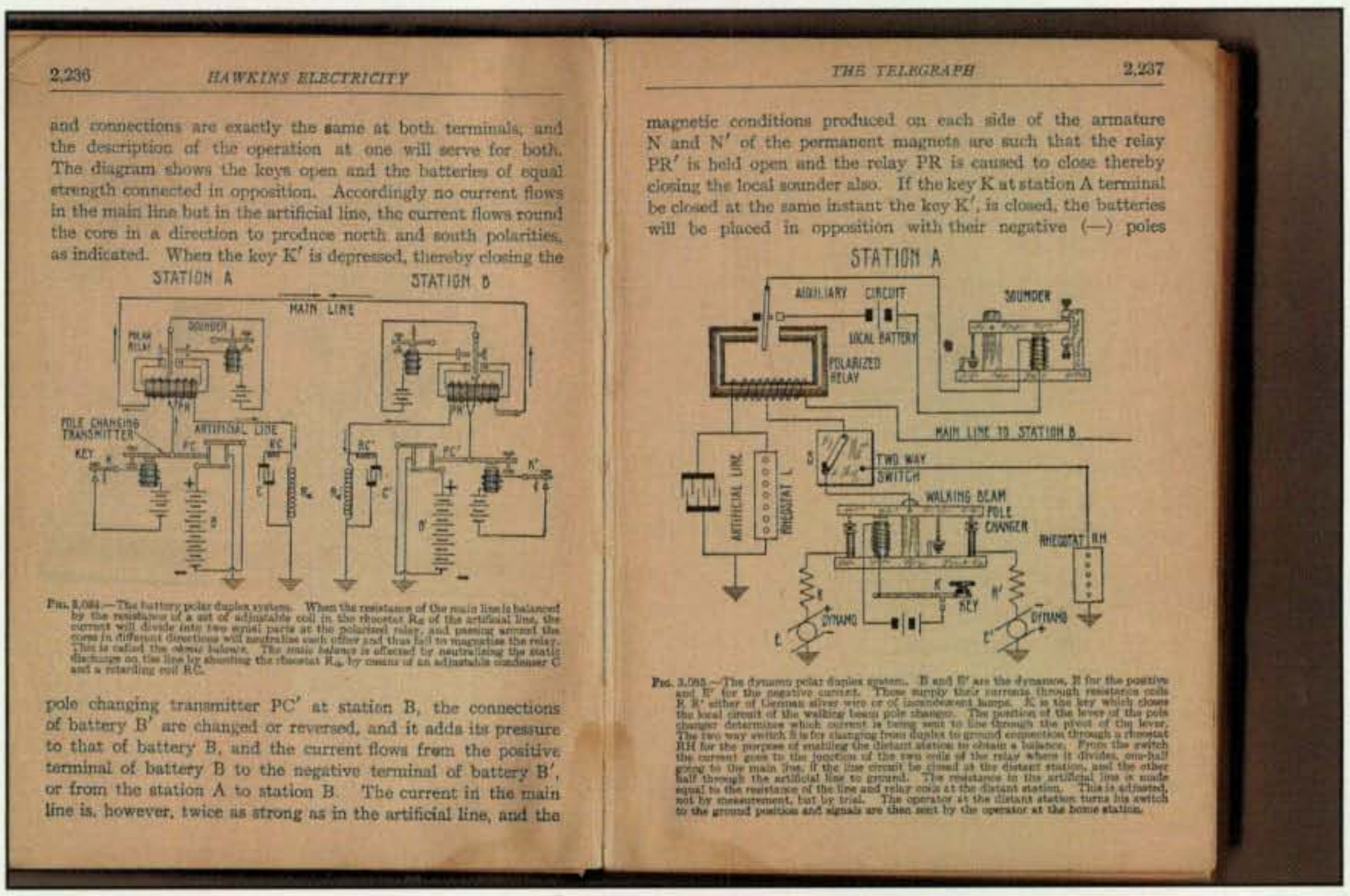
Thank you for your responses. We'll be back with more questions next month.

BY IRWIN MATH,* WA2NDM

The "Real" Good Old Days

Every once in a while we read books that we feel would be of interest to amateurs and report on them here in this column. Recently, we came across another one, at a garage sale to boot, that is really very exciting (at least to me). Unfortunately, you probably will not be able to get this one easily, since it was published in 1914. However, you never know what you might find on sites such as eBay or craigslist. The book is *Hawkins Electrical Guide No. 8,* published by Theo. Audel & Co., New York, and it is a practical guide to, among other things, the telegraph and "wireless." What is unique about this particular book is the actual schematic diagrams and elaborate drawings of the various types of commonly used equipment of the time.

*c/o CQ magazine



2,236 HAWKINS ELECTRICITY

and connections are exactly the same at both terminals, and the description of the operation at one will serve for both. The diagram shows the keys open and the batteries of equal strength connected in opposition. Accordingly no current flows in the main line but in the artificial line, the current flows round the core in a direction to produce north and south polarities, as indicated. When the key K′ is depressed, thereby closing the

Fig. 3,084.—The battery polar duplex system. When the resistance of the main line is balanced by the resistance of a set of adjustable coil in the rheostat R_R of the artificial line, the current will divide into two equal parts at the polarized relay, and passing around the cores in different directions will neutralize each other and thus fail to magnetize the relay. This is called the *ohmic balance*. The *static balance* is effected by neutralizing the static discharge on the line by shunting the rheostat R_R by means of an adjustable condenser C and a retarding coil RC.

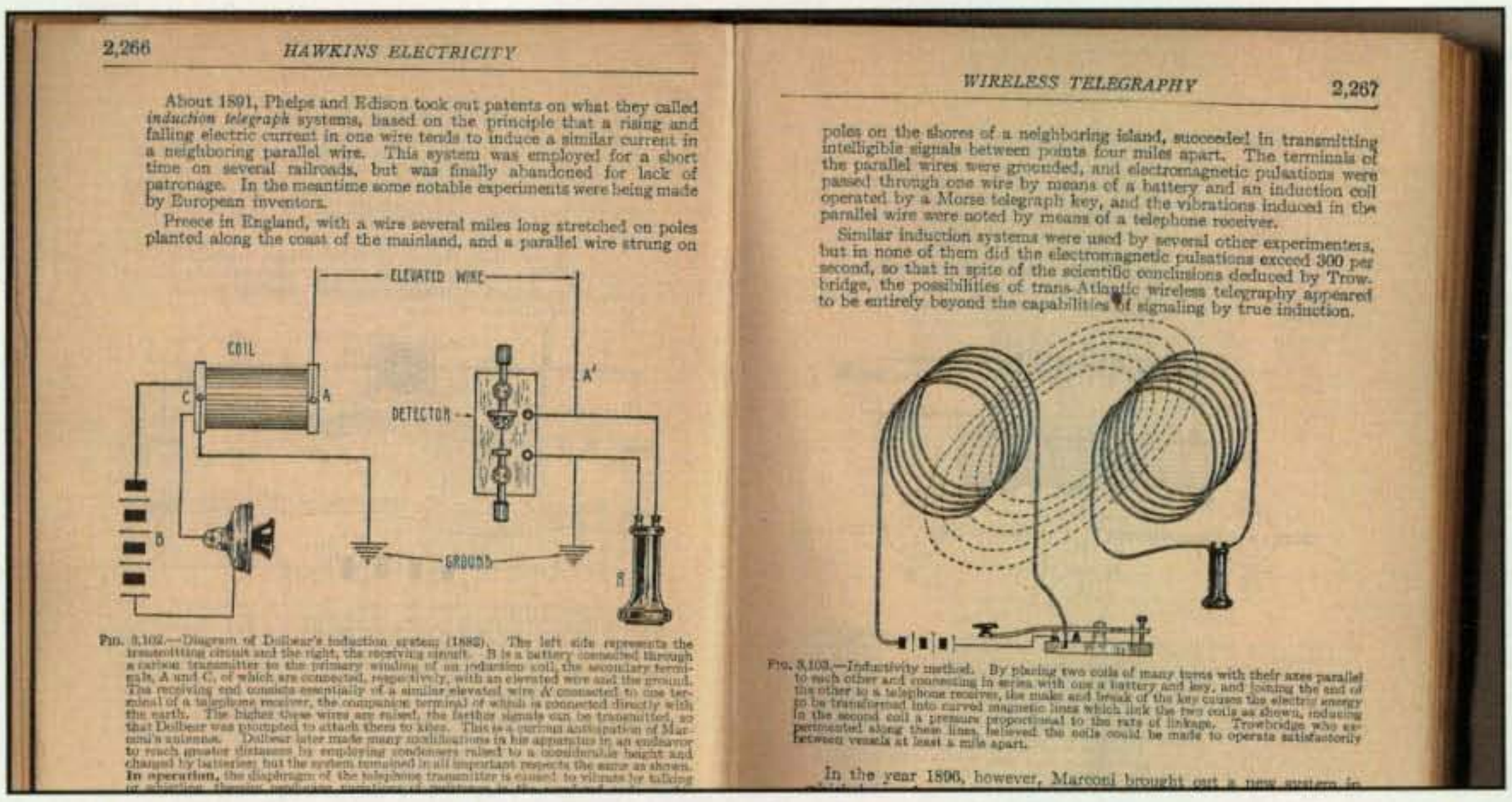
pole changing transmitter PC′ at station B, the connections of battery B′ are changed or reversed, and it adds its pressure to that of battery B, and the current flows from the positive terminal of battery B to the negative terminal of battery B′, or from the station A to station B. The current in the main line is, however, twice as strong as in the artificial line, and the

THE TELEGRAPH 2,237

magnetic conditions produced on each side of the armature N and N′ of the permanent magnets are such that the relay PR′ is held open and the relay PR is caused to close thereby closing the local sounder also. If the key K at station A terminal be closed at the same instant the key K′, is closed, the batteries will be placed in opposition with their negative (—) poles

Fig. 3,085.—The dynamo polar duplex system. E and E′ are the dynamos, E for the positive and E′ for the negative current. These supply their currents through resistance coils R, R′ either of German silver wire or of incandescent lamps. K is the key which closes the local circuit of the walking beam pole changer. The position of the lever of the pole changer determines which current is being sent to line through the pivot of the lever. The two way switch S is for changing from duplex to ground connection through a rheostat RH for the purpose of enabling the distant station to obtain a balance. From the switch the current goes to the junction of the two coils of the relay where it divides, one-half going to the main line, if the line circuit be closed at the distant station, and the other half through the artificial line to ground. The resistance in the artificial line is made equal to the resistance of the line and relay coils at the distant station. This is adjusted, not by measurement, but by trial. The operator at the distant station turns his switch to the ground position and signals are then sent by the operator at the home station.

Fig. 1– Two duplex telegraph systems.



2,266 HAWKINS ELECTRICITY

About 1891, Phelps and Edison took out patents on what they called *induction telegraph* systems, based on the principle that a rising and falling electric current in one wire tends to induce a similar current in a neighboring parallel wire. This system was employed for a short time on several railroads, but was finally abandoned for lack of patronage. In the meantime some notable experiments were being made by European inventors.

Preece in England, with a wire several miles long stretched on poles planted along the coast of the mainland, and a parallel wire strung on

Fig. 3,102.—Diagram of Dolbear's induction system (1882). The left side represents the transmitting circuit and the right, the receiving circuit. B is a battery connected through a carbon transmitter to the primary winding of an induction coil, the secondary terminals, A and C, of which are connected, respectively, with an elevated wire and the ground. The receiving end consists essentially of a similar elevated wire A′ connected to one terminal of a telephone receiver, the companion terminal of which is connected directly with the earth. The higher these wires are raised, the farther signals can be transmitted, so that Dolbear was prompted to attach them to kites. This is a curious anticipation of Marconi's antennæ. Dolbear later made many modifications in his apparatus in an endeavor to reach greater distances by employing condensers raised to a considerable height and charged by batteries; but the system remained in all important respects the same as shown. **In operation,** the diaphragm of the telephone transmitter is caused to vibrate by talking

WIRELESS TELEGRAPHY 2,267

poles on the shores of a neighboring island, succeeded in transmitting intelligible signals between points four miles apart. The terminals of the parallel wires were grounded, and electromagnetic pulsations were passed through one wire by means of a battery and an induction coil operated by a Morse telegraph key, and the vibrations induced in the parallel wire were noted by means of a telephone receiver.

Similar induction systems were used by several other experimenters, but in none of them did the electromagnetic pulsations exceed 300 per second, so that in spite of the scientific conclusions deduced by Trowbridge, the possibilities of trans-Atlantic wireless telegraphy appeared to be entirely beyond the capabilities of signaling by true induction.

Fig. 3,103.—Inductivity method. By placing two coils of many turns with their axes parallel to each other and connecting in series with one a battery and key, and joining the end of the other to a telephone receiver, the make and break of the key causes the electric energy to be transformed into curved magnetic lines which link the two coils as shown, inducing in the second coil a pressure proportional to the rate of linkage. Trowbridge who experimented along these lines, believed the coils could be made to operate satisfactorily between vessels at least a mile apart.

In the year 1896, however, Marconi brought out a new system in

Fig. 2– Two "wireless" induction systems for transmitting voice.

Beginning with the telegraph the book clearly describes various keys, sounders, relays, and both local and long-distance systems, including under-water schemes. The drawings are very clear and very complete, showing all components. Detailed explanations are also given for all components, and one can only marvel at the cleverness of the engineers of the time.

As an example, two duplex systems (without diodes) are shown in fig. 1 (scanned from the book) that apparently were in common use at the time. These allowed two messages to be sent along a single wire at the same time. Such techniques even extended into a quadraplex (two messages in each direction at the same time over one wire) system as well, and this is also shown. Finally, a description and comparison of the Morse code and the Continental code is presented.

Our favorite section of the book, however, is the chapter that describes early "wireless telegraphy" systems, not all using radio waves, by the way. Two clever induction systems are described (see fig. 2), as well as a system for sending signals across a river by means of ground conduction. This leads into a great deal of technical information about Marconi's original equipment, as well as the 1917 versions.

Spark transmitters are covered in depth, as are details about various types of spark gaps, induction coils, etc. There are also discussions concerning various tuning methods, detectors, antennas, and even early voice-transmission systems. Keeping in mind that this was written in 1917, it is quite interesting to see just how our current techniques got their start. While the vacuum tube (or "audion," as it was called) had already been invented, it was early in its life and crystal detectors were still the mainstay. Of course, amateurs were there, and we could not resist scanning a diagram of a typical amateur radio station of the era; this is shown in fig. 3.

The rest of the book covers electric bells and electric lighting (both incandescent and arc lamps) and is also quite interesting. This book truly leaves one with a real appreciation of just how innovative people were "back then" and how much we have progressed in less than 100 years. I apologize for the photos, but scanning them left a lot to be desired. If you are lucky enough to obtain a copy, I am sure you will be very pleased.

73, Irwin, WA2NDM

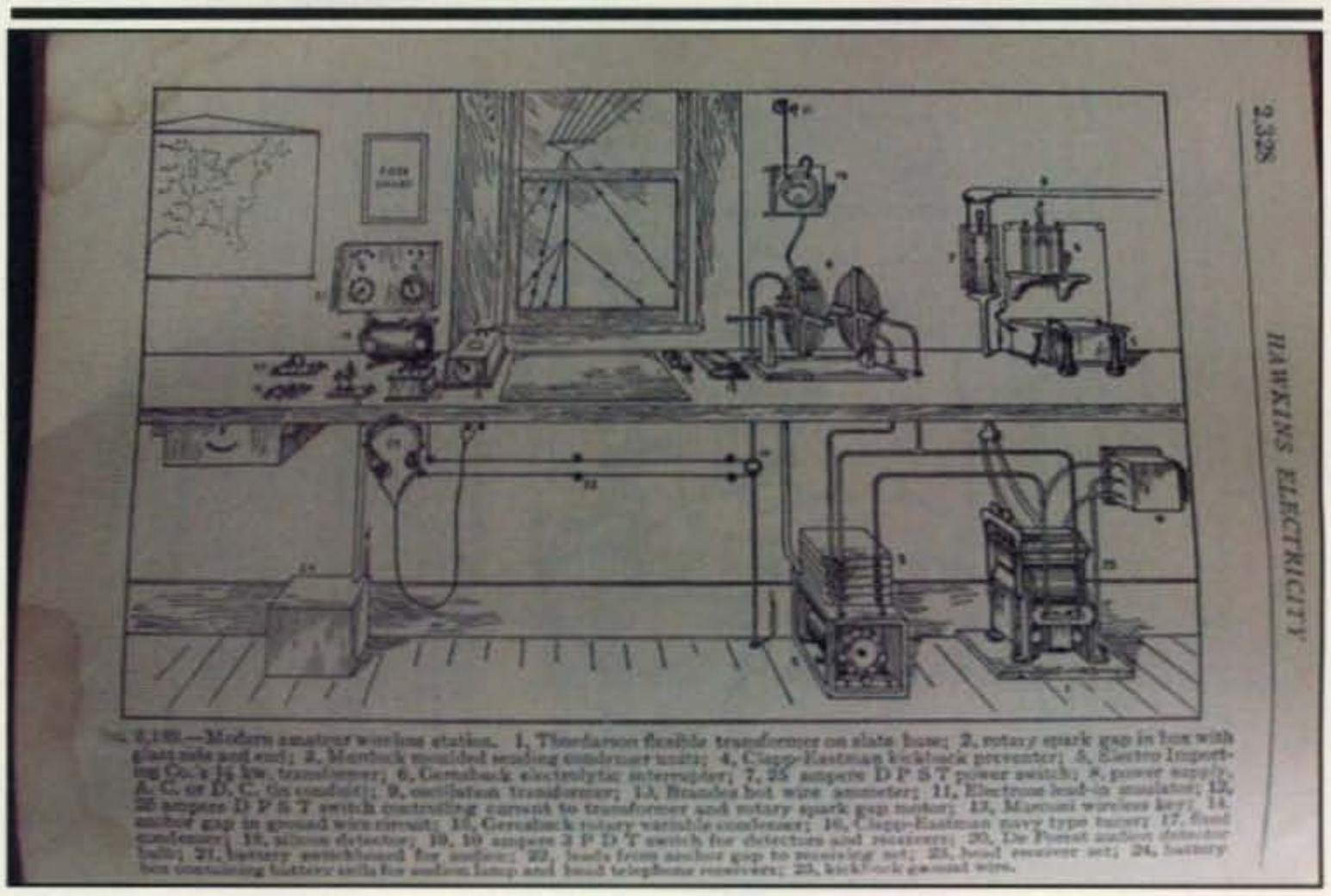


Fig. 3– A "modern" amateur radio station circa 1917.

public service

BY RICHARD FISHER,* KI6SN

More Details Emerge of Radio Amateurs' Role in Haiti Relief

The extent of amateur radio's support and heroics in Haitian earthquake relief efforts is still revealing itself months after a 7.0 earthquake devastated the country. So many selfless volunteers and organizations rushed to the Caribbean, it seems with each passing week we're hearing a new story about those operators who stepped forward in Haiti's time of need.

Frank Metcalfe, AA4AE, of Adams, Tennessee provides another chapter in the saga with his account of amateur radio's support of Southern Baptist Disaster Relief (SBDR), the third largest relief organization in the U.S., "behind American Red Cross and The Salvation Army." SBDR works closely with both the American Red Cross and The Salvation Army. Frank said, ". . . to coordinate disaster response in local and wide-area disasters. Best known for feeding teams, we also provide recovery operations," including rebuild, flood recovery, and chainsaw teams. "To support these activities, we have a communications arm called Southbears (Southern Baptist Emergency Amateur Radio Service)," headed by Terry Jones, W4TL, Metcalfe said.

"Following extensive use of Winlink (e-mail over radio) after Hurricane Katrina, Terry and Steve Waterman, K4CJX/AAA9AC, were successful in securing an MOU (memorandum of understanding)," between Army MARS (Military Auxiliary Radio System) and SBDR in concert with the North American Mission Board (NAMB), "providing us access to the far superior MARS RMS (radio message server) network."

In response to the Haiti earthquake, NAMB, "an arm of Southern Baptists with extensive disaster relief experience, sent an Incident Command team to Port-au-Prince," Metcalfe said, "under the direction of Terry Henderson, KI4VHD, who is employed by NAMB as director of field operations."

Metcalfe, who was MARS/SBDR coordinator in Haiti, served as communications and operations officer with Jim Hadder, KE4ZX. Metcalfe's MARS callsigns are AAR4EM/AAM4TTN.

Arriving in Haiti on February 4, Metcalfe said the team's "first job was to install the equipment we brought and to establish MARS Winlink communications to support our relief operations, which consisted of 10-person medical teams, four-person chaplain/building inspector teams, and a six-man well drilling team from Oklahoma.

"The medical teams set up in churches, tents, and makeshift shelters around Port-au-Prince to deliver treatment to people on-site, many (of whom) could not travel to other medical facilities. Inspection teams visited neighborhoods to determine if homes were suitable for habitation" and to encourage people to sleep inside if the structure was safe.

"We were fortunate to have satellite internet service at our location, so the demand for high-frequency internet was low. But given several aftershocks and the unreliability of even our own generator and battery power, we kept the station on the air.

"We were also available for MARS phone-patches to the U.S., as only international cell phones would work from Haiti. We established VHF contact with the University of Miami Hospital unit at the international airport," where a volunteer team staffed a medical warehouse.

"I left Haiti on February 20," Metcalfe said, "and the station was under the direction of Tom Westerfield, WA4ZVL, and other amateur operator members of the IC team that relieved us."

Metcalfe said two additional locations were

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e-mail: <ki6sn@cq-amateur-radio.com>

Jim Hadder, KE4ZX, left, and Frank Metcalfe, AA4AE/AAR4EM, operate the MARS HF Winlink station at the Southern Baptist Disaster Relief headquarters in Port-au-Prince, Haiti, before internet service was available. The station, consisting of a Pactor III SCS modem and Kenwood TS-2000 feeding a G5RV hung in trees, remains in operation.

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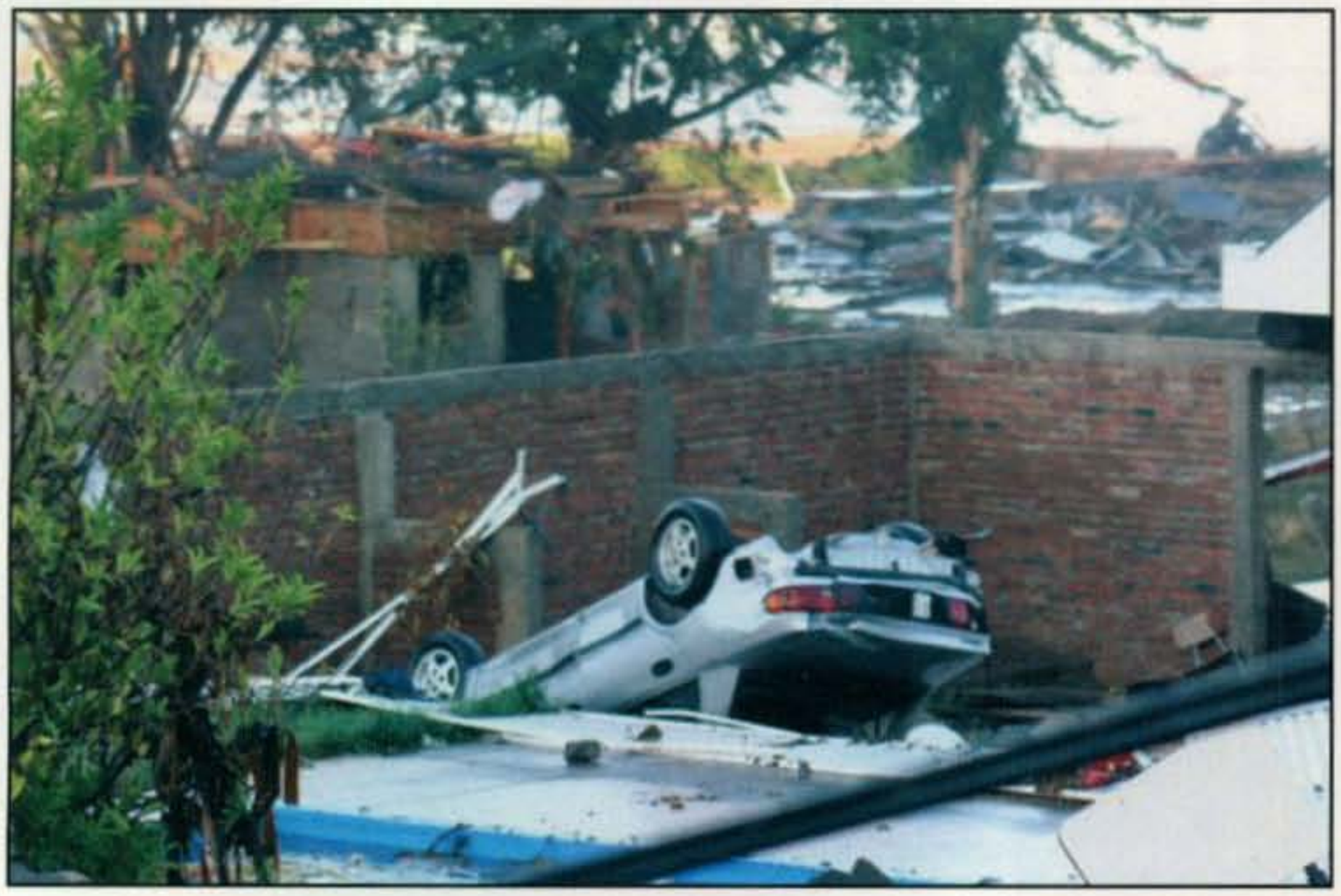

The 8.8-magnitude earthquake that struck Chile on February 27 caused massive destruction. Radio amateurs with the Radio Club de Chile and Red Chilena Nor Austral de Servido carried on net operations to provide health-and-welfare information, report road conditions, and handle emergency traffic. (Photo courtesy of CE7JPA via XQ7UP and W1FK)

being set up "where MARS Winlink will be the only internet connectivity. We would be unable to use these without this system to provide communications between in-country operations and back to the U.S."

Amateur Radio Provides Critical EmComm Links in Chile After 8.8 'Quake

Weeks after an 8.8-magnitude earthquake struck Chile on February 27—prompting a tsunami alert around the Pacific Rim—radio amateurs with the Radio Club de Chile and Red Chilena Nor Austral de Servido carried on net operations to provide health-and-welfare information, report road conditions, and handle emergency traffic, according to published reports. Aftershocks as strong as 6.9 magnitude were being recorded well into March across the region.

Radio Club de Chile President Dr. Galdino Besomi, CE3PG, told IARU Region 2 President Reinaldo Leandro, YV5AMH, by telephone on March 1 that members were "actively working in close coordination with civil and military authorities," according to a report posted online by Amateur Radio Newsline™. "Also requests (regarding) health-and-welfare news about people in the affected areas is one of the main activities occupying the Chilean radio amateurs these days."

The amateur radio community was asked to keep several frequencies clear for emergency traffic: 14.200, 7.050, 7.095, and 3.738 MHz. Apart from net operations, operators were advised to assure any frequency was clear before making a call, especially on 40 meters.

In addition to operations in Chile, about 60 amateur radio operators in Hawaii took part in a tsunami net activated after the earthquake and operated throughout the islands. Dozens of up-to-the-minute reports from observers around Hawaii were relayed to the State Emergency Operating Center and the four County Emergency Operations Centers. *(Editor's note: More details about amateur radio's role in emergency communications in Chile can be found in a story by Stew Gillmor, W1FK, in this issue.)*

North Carolina Amateurs Get Tsunami of Information

Amateur radio operators invited to the National Weather Service office in Wilmington, North Carolina in early March got a quick course on the causes and effects of tsunamis, underscoring the critical value of preparedness and emergency communications when the alert is sounded.

Brian S. Yanagi, from the International Tsunami Information Center in Honolulu, led the session along with Cindi Preller, Geologist/Education and Outreach coordinator from the West Coast and Alaska Tsunami Warning Center. Yanagi "had high praise for the work of amateur radio operators in all areas of emergency communications," said Glenn M. Cox, KE4BMY, an assistant emergency coordinator with SKYWARN from Castle Hayne, North Carolina.

Participants were advised when a tsunami is forecast to "be sure to run at least 100 meters inland and get at least

Comments on AHA Waiver Request Solicited By FCC

A *Public Notice* asking for comments about whether a blanket waiver of FCC Rules Section 97.113(a)(3) should be granted "to permit amateur operators who are hospital employees to participate in emergency drills that are conducted by hospitals for accreditation purposes and that are not government-sponsored" was issued in March by the Commission, according to published reports.

The American Hospital Association in February filed a request with the FCC for a blanket waiver "to permit hospitals seeking (Joint Commission) accreditation to use amateur radio operators who are hospital employees to transmit communications on behalf of the hospital as part of emergency preparedness drills."

The AHA asked that the waiver be granted "until such time as the Commission adopts a final order in response to a forthcoming *Notice of Proposed Rulemaking* that will seek comment on potential changes to Section 97.113(a)(3)," which prohibits amateur stations from transmitting communications "in which the station licensee or control operator has a pecuniary interest, including communications on behalf of an employer," the FCC said.

According to the AHA, "waiver relief should be available for these non-government-sponsored exercises 'because it is in the public interest to ensure that hospital communications operate effectively during emergencies,'" according to a report by the American Radio Relay League. "The FCC noted that in its blanket waiver request, the AHA also stated that requiring separate waiver requests would be administratively burdensome on hospitals and the Commission."

The Wireless Telecommunications Bureau and Public Safety and Homeland Security Bureau have provided a process for requesting a waiver of Section 97.113(a)(3) "to permit named amateur radio operators to participate in specified government-sponsored drills by transmitting messages on behalf of identified employers," according to the ARRL. "The waiver must be requested prior to the drill, and employees may not transmit amateur communications on their employer's behalf unless the waiver request has been granted by the FCC."

The FCC set an April 2 deadline for receiving comments on AHA's request for implementing a blanket waiver.

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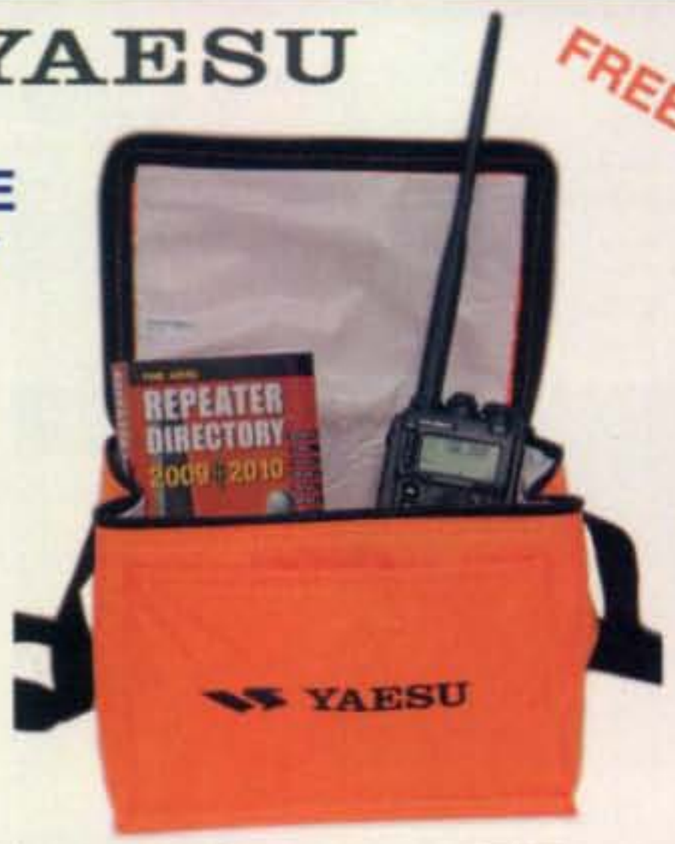

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Taking part in the NWS tsunami preparedness session in Wilmington, North Carolina are, from left: Cindi Preller of the West Coast and Alaska Tsunami Warning Center; Tim Waters, KE4EDU; Bob Fetterman, N1OTL; Steve Pfaff, Warning Coordinator Meterologist; Jim Grant, KA4IGL, of the South Carolina Emergency Management team; Ric Tharrington, KD4JRX; and Brian Yanagi of the International Tsunami Information Center. (Courtesy of KE4BMY)

five meters above ground," Cox said. "This is a rule of thumb. In short, get away from the beach and get to higher ground. Tsunamis can be more forceful than a hurricane. Sometimes the waves can travel as fast as a jet plane, depending on the initial force that starts them."

Attendees were cautioned by Yangi that even if telephones and cell phones remain working, they could be "overwhelmed by the high call volume that would occur and amateur radio (could be) the only way to get messages out of the tsunami-affected areas quickly," Cox said.

Cox suggested that "anyone interested in this class who lives (in) a coastal area (should) check with your local National Weather Service Office to see if (a tsunami session) is being scheduled—or contact, <http://tsunami.gov>. They are members of NOAA and have a lot of information."

"This was one of two classes the National Weather Service Forecast Office has invited (area) amateur radio operators to attend," Cox said. "The first class was on rip currents. I hope for more classes as the amateur radio community will definitely attend."

Haiti Follow-Up:
MARS Concludes EmComm Support to Project Medishare

Emergency communications support provided to the University of Miami Medical Center's Project Medishare in Haiti by amateur radio and Military Auxiliary Radio System (MARS) operators wrapped up in late February "as normal communications links are re-established," according to a press release from David J. Trachtenberg, N4WWL, public information officer with U.S. Air Force MARS.

The volunteer MARS operators who traveled to Haiti after the January earthquake "did soon their own, under the auspices of the humanitarian organizations they supported, and not as part of any official DoD activation of MARS," the release said. "Their efforts were applauded by the medical personnel whose work they facilitated."

Multiple teams of communications specialists—including Army, Navy-Marine Corps, and Air Force MARS members—rotated in and out of Haiti, providing communications links between military and medical units on the scene and U.S. medical facilities in the United States.

"We are immensely proud of the work our joint MARS operators did to support the humanitarian relief effort," Allen Eiermann, Chief of the Air Force MARS program, said.

The earthquake, with its epicenter about 15 miles west-southwest of Port-au-Prince, struck at 21:53:10 (UTC), immediately crippling Haiti's communications infrastructure.

"The lessons learned from this experience will be extremely valuable as MARS fulfills its emergency communi-

cations mission," according to Navy-Marine Corps MARS Chief Bo Lindfors.

"Interoperability across agencies and organizations is critical in a disaster," said Jim Griffin, Chief of Army MARS. "We are grateful to our Joint-Service MARS members for providing the essential links that helped save lives."

In addition to UMH/Project Medishare, MARS-affiliated amateurs helped other relief organizations in Haiti, including a Nassau University Medical Center team from Long Island, New York and members of Southern Baptist Disaster Relief.

(Editor's note: For a snapshot of the EmComm efforts of three MARS-affiliated radio amateurs who volunteered communications support on the ground in Haiti, see "'After Action' Report from Haiti: What Hams on the Scene Face When It's Really a Catastrophe" by Bill Sexton, N1IN/AAR1FP in the May edition of WorldRadio Online *magazine: <http://www.cq-amateur-radio.com/WorldRadio.html>.*

Winlink's EmComm Value Shines in Haiti Relief Effort

Amateurs affiliated with the Military Auxiliary Radio System serving in the Haitian earthquake relief effort report the WinLink 2000 Global Radio E-Mail System "has demonstrated its value for facilitating communications in the wake of a major disaster," according to a MARS press release.

The system was used in Haiti "to augment normal communications channels" and has "enabled volunteer operators from the three MARS services, working with other amateur radio operators, to pass detailed messages for hospitals and aid stations through a series of high frequency radio communication links between a global network of stations. The system has been used during prior disasters and the radio relays are virtually instantaneous," MARS said.

"The successful use of this technology in a real-life emergency demonstrates its value as a communications tool," said Jim Griffin, Army MARS Chief. "Our Army, Navy-Marine Corps and Air Force MARS operators in Haiti all have used the system with excellent results."

"A number of U.S. government agencies and organizations worldwide use Winlink for emergency communications," the release said. "The use of the system by MARS operators in Haiti allows them to be a more effective conduit of information regarding the ongoing humanitarian relief effort and to provide reliable back-up communications to the agencies they support."

A Reader Writes: January's Winlink Report Needs Clarification

Jerry Boyd, N7WR, writes from Baker City, Oregon that "the 'Public Service' column in the January 2010 relative to the Winlink system in North Carolina could be both confusing and misleading.

"What it really discusses is a system operated by MARS (Military Auxiliary Radio Service), not by amateur radio. They are two separate services.

"Yet the article's (headline) and the interweaving of amateur and MARS operations could give—especially to newcomers—the erroneous impression that they are one and the same.

"Some of the attributes of the MARS system (such as encryption) are things that are of questionable legality in the amateur service. If amateurs used the MARS system, that's fine. But they did so as MARS operators, not as hams. To imply that the North Carolina system is an amateur radio system is incorrect." *(N7WR is a past emergency communications editor of WorldRadio. —ed.)*

That's all for this month. See you next time with more on how ham radio serves in the public interest.73, Richard, KI6SN

the ham notebook

BY WAYNE YOSHIDA,* KH6WZ

Are You Ready?

As I write this installment of "The Ham Notebook" in early March, the news is filled with stories of this winter's severe weather. Even in sunny southern California, we are experiencing record-breaking rainfall in many areas. Many towns have flooded and several multi-million-dollar homes built on hillsides are in danger of slipping due to earth erosion. In other areas, power outages are being reported for various reasons.

Haiti is still trying to recover from its earthquake in January, and now an earthquake has been reported in Chile.

It would be a good time to get ready for emergencies like this before one happens in your area (and don't say it can't happen here, as it can). For hams, these are the times we must be ready—ready for "something" to happen. Also, no matter how large or how small our stations are, we must be self-sustaining in case normally essential things such as electricity and potable water are not available.

Next month, June, is ham radio "Field Day," one of the most popular operating events for hams in the U.S. and Canada. It is an emergency-preparedness drill and demonstration day for clubs and individuals. Feel free to use these hints at your event, and let me know if you have any other good ideas for emergency communications.

First Things First

No matter what, always remember that the very first priority is to make sure you and your family members are safe. This includes your pets, too. Have an escape plan in place before you really need one, and make sure everyone knows how to get out of your house safely and where to meet in case of an emergency. Make sure the young ones in your family know their address and telephone number. Take a look at the recommended preparation steps provided by your local police or fire department and practice them. Do a Google search on "72 hour kit" to find useful information on basic survival strategies.

Organized During Chaos

While it is a very good thing for you and your family to be prepared, when it comes to radio communications operations, the best way to assist is to make sure you have some training on how to participate. Also, it is very possible that you may not be needed during a short-duration emergency, especially if the normal infrastructure is still in place. Sometimes people with good intentions actually hinder efficient communications that are already in place. If you're not needed, consider yourself lucky, and take the time to be with your family and loved ones.

Along these lines is getting specific training for disaster communications by joining a local group such as the Amateur Radio Emergency Service (ARES), Radio Amateur Civil Emergency Service (RACES), or other ham radio and public-service club. In addition, the Red Cross recognizes the value of amateur radio and may also be a source of information. The procedures and authorities may be different in your area, so it would be wise to take a look at several organizations in your area and decide of which organization you would like to be a part.

*28181 Rubicon Court, Laguna Niguel , CA 92677
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Photo A– Gel-cell batteries and solar chargers are among the most practical alternative power sources for your ham gear. Many have built-in charge controllers and nice housings for easy installation.

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Photo B– Wind generators are also a good way to supply power. The newer VAWT designs are quiet and eliminate large propellers.

By joining an official emergency response group, you will have access to the proper training and leadership for when you volunteer your communications skills, and this is the only way to go.

Next Things Next: Power Supplies

Hopefully, everyone in the household is accounted for, and now you can focus on how your radio station can help in an emergency. Most often, AC mains power is disrupted in an emergency. An independent source of electricity is mandatory.

Although many people purchase a gasoline-engine-powered generator for backup power, it is not really necessary, since storing and maintaining a generator can be expensive. However, if you are an avid camper or routinely need remote power, a good generator is among the best investments you can make.

Let's consider alternatives to the generator. Batteries and solar power are the most practical choices, and lately solar chargers are becoming more affordable and available just about everywhere (see photo A). Sporting-goods as well as automotive and recreational-vehicle stores have a wide variety of solar charging systems available that are very useful for emergencies. Wind generators are also a good alternative power source, including some newer designs such as the vertical axis wind turbine (VAWT) that are more efficient and eliminate large propellers (see photo B).

With regard to batteries, you should have several smaller batteries rather than one large one to eliminate a single source of failure. Multiple 12-V batteries and chargers will increase versatility.

Your Station

It may be possible that "your station" might change to "your rig" in a disaster, if something happens to your station. Therefore, as you set up your station, no matter where it is located—garage, basement, or bedroom—consider how quickly you can remove a piece of equipment from the operating position and install it in your car or another location.

As an alternative to tearing apart your home station, you may want to have at least one portable radio (handie-talkie) and a set of accessories. Battery packs are the first thing to think about. Get at least one extra pack, and a quick charger. Recently, I purchased a new dual-band HT and a set of accessories to replace a unit I broke (photo C). Although the base-stand charger is AC operated, the input to the charger base requires 12 VDC. This is a great feature, because if AC mains power is not available, you will be able to charge batteries using a 12 V

Photo C– An HT with some accessories can be turned into an effective emergency station for local contacts. The base stand charger at the lower left uses 12 VDC, a very useful feature.

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MFJ-904H, $149.95. Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. 7¼x2¼x2¾ inches.

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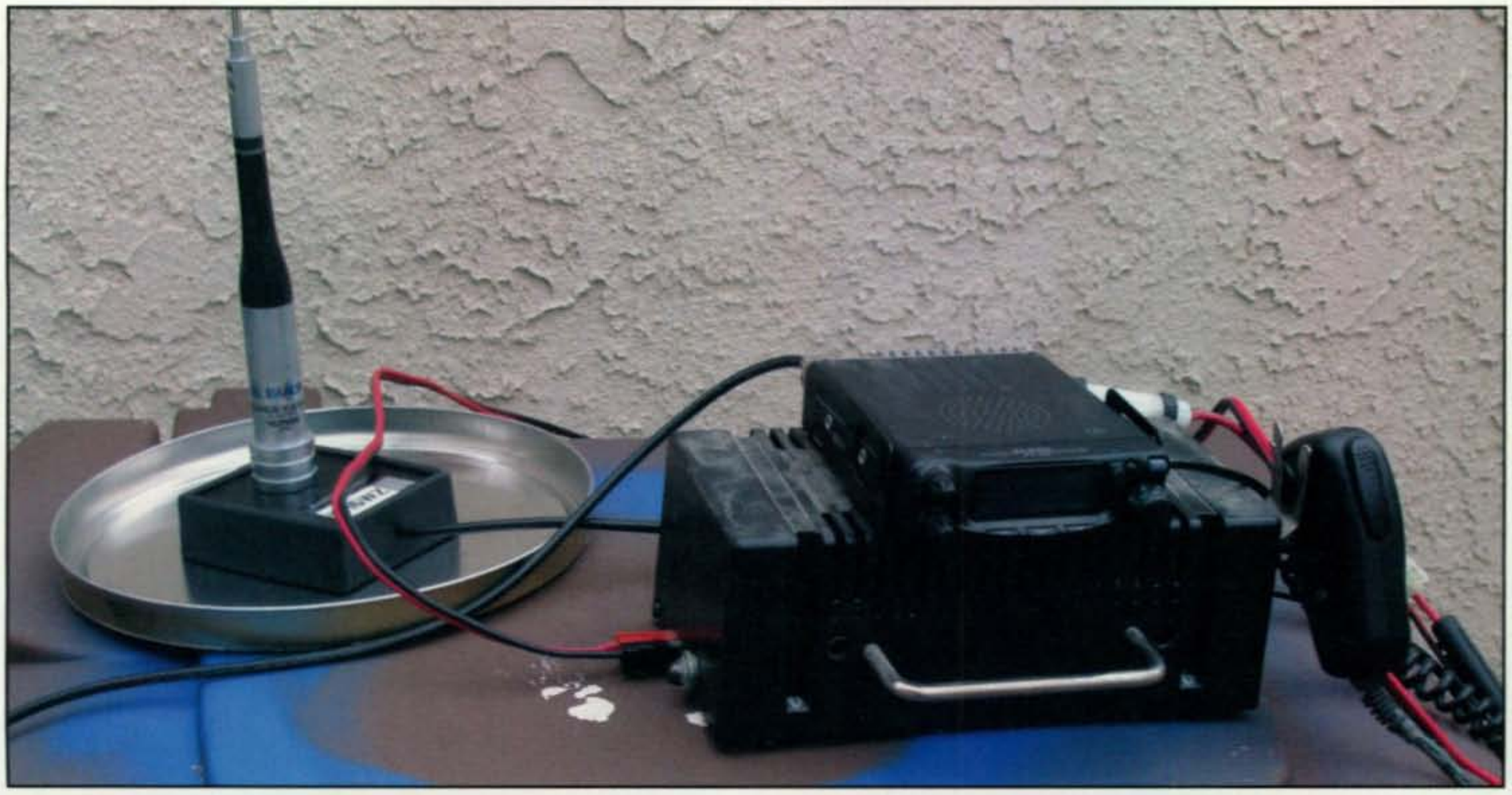

Photo D– A useful trick is to power a small HT or mobile radio with an external gel-cell battery and an external antenna to extend both range and operating time. The black box is a 12-V alarm-system power supply, with battery backup. It is both an AC-operated power supply and a battery charger in my station.

source. I cut the charger cord in half and inserted a DC connector to it so I can use either AC mains or 12 VDC to charge my battery packs.

Frequency-wise, perhaps the most practical transceiver to use during an emergency is a VHF (or UHF, depending on your area) rig, rather than an HF radio. This, of course, depends on how your local emergency communications team is organized. Most emergency groups are organized into a network of many small stations scattered throughout an area and communicate via simplex or repeaters. In many cases, a central station, or net control station (NCS), is established. The NCS can be used as a relay point to extend the range of the other stations reporting in the network. Most NCS are also equipped with more radio capability and facilities to serve over longer distances than the smaller stations in the network. The NCS may have HF capabilities if longer range communication is needed.

Photo E– A squishy ground plane can be a very useful item in your emergency comms kit. Make one for each band on which you operate.

Radio-wise, the VHF units also consume less current and are more portable than most typical HF rigs. Antenna length is also much smaller on the VHF and UHF bands. In addition, a battery-operated HT is very portable and may be used instantly, with no set-up time.

A very useful trick is to use a 12-V gel-cell with an HT that can take an external 12-VDC power source. I call this configuration the "HT mobile," since this concept is similar to operating an HT in the car, using the cigarette lighter (or these days, the 12-V accessory port), and an external mobile antenna.

You can go the opposite way, too, and I call this version the "mobile HT," which is a mobile transceiver operated from a battery and can be carried around or can be used as a compact base station (see photo D). Use the low-power (1-W) transmit setting to maximize battery life.

Antennas

During an emergency, your home antenna may be subject to destruction, so you must be prepared with some alternatives. Again, since most emergency operations are carried out on the VHF or UHF bands, spare antennas are easy to add to your emergency kit.

You can purchase an extra base-station antenna and stash it with your emergency kit, or you can build your own backup antenna such as the one shown in photo E. I call this wire antenna a "squishy ground plane," because it is a quarter-wave ground plane made with solid-copper wire that can be folded or squished into a small ball for storage. It is light-

weight, efficient, and cheap, all good characteristics for a spare or backup antenna.

PVC pipe can be used as a temporary antenna support mast and can be broken up into smaller sections for compact storage. Use couplers between sections. If you add a bungee cord inside the pipe, the folding mast can work just like a self-assembling tent pole. A clamp of some sort makes installation fast and easy (see photo F).

If you want or need more antenna gain, Kent Britian's "Cheap Yagi" antenna designs featured in various issues of *CQ* and *CQ VHF* are great projects and great assets to your emergency kit. (Kent's Cheap Yagi designs are also available on his website; see the References box.)

Very Important: What's to Eat?

Many emergency response groups recommend that you have enough supplies to last for 72 hours, or three days. However, based on other emergency situations this duration may actually be longer, since it seems that many public service agencies are cutting back and scaling down. Having enough supplies for at least five days is even better.

Since no one can function properly without food, it is important to stock up on some good, non-perishable food items that you like, and plenty of potable water. You should select things that do not require refrigeration and can be prepared with little or no water. Don't forget to add a non-electric can opener and utensils, too.

In all of the discussions about making a survival kit, no one mentioned something I have always thought about: You should taste-test your emergency food items in non-emergency times before the expiration dates. As an example of why this is important, I purchased two commercially available "Three-Day Survival Packs" a few years ago. The package shows an impressive array of useful things such as a mylar blanket, and food and water that is supposed to last for three days.

One hot summer day, while stranded in a parking lot with nothing to eat or drink, I dug one of those kits out of my car's trunk. The kit was still sealed in its package, and was still within the "good" date. However, the water came in a thin plastic envelope, and the "three day supply" was not enough to quench my thirst for one day. Now I make sure to keep much more water on-hand with my food kits.

In addition to verifying how much food or drink you really require, you won't waste money by throwing food away.

Photo F– The PVC-pipe mast is equipped with a woodworker's quick clamp for fast and easy mounting on just about any horizontal surface or edge.

LDG ELECTRONICS

NEW! AT-600Pro

The LDG AT-600Pro will handle up to 600 watts SSB and CW, 300 on RTTY (1.8 – 30 MHz), and 250 watts on 54 MHz. It will match 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 the AT-600Pro with longwires, random wires and antennas fed with ladder line just by adding a balun. It has two antenna ports with a front-panel indicator, and separate memory banks for each antenna. Easy to read LED bar-graph meters showing RF power, SWR and tuner status, tactile feedback control buttons and an LED bypass indicator. Operates from 11 – 16 volts DC at 750 mA. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $359.99***

radio not included

Z-817

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

KT-100

LDG's first dedicated autotuner for Kenwood Amateur transceivers. Easy to use - just right for an AT-300 compatible Kenwood transceiver (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. The LEDs on the front panel indicate tuning status, and will show a match in seconds, or even less of you've tuned on or near that frequency before. Has 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. If you have an AT-300 compatible Kenwood radio, you can simply plug the KT-100 into your transceiver with the provided cable; the interface powers the tuner, and the Tune button on the radio begins a tuning cycle. The supplied interface cable makes the KT-100 a dedicated tuner for most modern Kenwood transceivers. ***Suggested Price $199.99***

AT-200Pro

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

NEW! Z-11ProII

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

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Join the LDG Yahoo Group at > http://groups.yahoo.com/group/LDG-auto-tuners/

The #1 Line of Autotuners!

NEW! AT-100ProII

This desktop tuner covers all frequencies from 1.8 – 54 MHz (including 6 meters), and will automatically match your antenna in no time. It features a two-position antenna switch with LEDs, allowing you to switch instantly between two antennas. The AT-100ProII requires just 1 watt for operation, but will handle up to 125 watts. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $229.99***

radio not included

AT-897Plus for the Yaesu FT-897

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

radio not included

FT Meter 2.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu. ***Still Only $49***

FTL Meter For Yaesu FT-857(D) and FT-897(D). 4.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu. ***Suggested Price $79.99***

NEW! M-7600 For IC-7600. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together. ***Suggested Price $79.99***

M-7700 For IC-7700. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together. ***Suggested Price $79.99***

See AT-1000Pro Review in Nov. '08 CQ

AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $599***

YT-100

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

Z-100Plus

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

IT-100

Matched in size to the IC-7000 and IC-706, the new IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. It's the perfect complement to your Icom radio that is AH3 or AH-4 compatible.
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Photo G– As you gather your emergency stash of food, think about what you are buying. In addition to long shelf life, think about taste and convenience. All the canned goods have flip-tops for easy, no tools opening.

References

Vertical Axis Wind Turbine Generators: <http://en.wikipedia.org/wiki/Vertical_axis_wind_turbine>

VAWT Systems: <http://www.vawtsystems.com>

Field Day: <http://www.arrl.org/contests/announcements/fd/>

Amateur Radio Emergency Service (ARES): "Public Service Communications Manual Section I: The Amateur Radio Emergency Service (ARES)"; <http://www.arrl.org/FandES/field/pscm/sec1-ch1.html>

Radio Amateur Civil Emergency Service (RACES): "ARES® vs. RACES FAQ: Two Flavors of Amateur Radio Emergency Operation"; <http://www.arrl.org/FandES/field/regulations/faq-ares-races.html>

"Statement of Understanding Between the American Radio Relay League, Inc. and the American National Red Cross": < http://www.arrl.org/FandES/field/mou/redcro.html>

Just about all cities, states, and county government websites have information on emergency preparedness. Check your local government website for information in your area. Here are some good examples:

Earthquake safety from the Los Angeles Fire Department: <http://www.ci.la.ca.us/LAFD/eqbook.pdf>

72-Hour Family Emergency Kit, Colorado Division of Emergency Management: <http://www.dola.state.co.us/dem/public_information/emergency_kit.htm>

Other emergency preparedness sites:

Ready.gov, a Department of Homeland Security (DHS) website: <http://www.ready.gov/>

"Ground-plane Antennas for 144, 222 and 440 MHz": <http://www.arrl.org/tis/info/pdf/ab18-16.pdf>

"The Cheap Yagi Antenna," by Kent Britian, WA5VJB: <http://www.wa5vjb.com/yagi-pdf/cheapyagi.pdf>

Zig Ziglar's quote: "Expect the best. Prepare for the worst. Capitalize on what comes."

Finally, you may discover that the very convenient, handy, and long shelf-life food in that hermetically sealed metal can is not to your liking. Also, it would be best to find something you will want to eat during emergencies, or when you don't have anything in your fridge or cupboard. This is exactly why I no longer keep those little cans of pink sausage in my meal sack. Remember, everyone has to eat something, so why not make eating a source of pleasure, even during an emergency? (See photo G.)

Your local camping or sporting-goods store will also have some very tasty and usually expensive dehydrated (freeze-dried) meals available. As a backpacker, I've bought and eaten many of these over the years, but the emphasis is on light weight and not necessarily cost. Save money and get your provisions at your grocery store instead.

When it comes to food during a crisis, or meals for remote places, the MRE sometimes comes up. MRE stands for Meal, Ready-to-Eat, and usually refers to military food. Be aware, though, that the term MRE has more than one meaning, and some MREs are not military MREs, but can still be okay. Since I do not have any experience with these items, I cannot make any recommendations for what is good and what is not. The Google search engine reports 489,000 results when searching for information on "MRE, military food." I need to do more research on MREs, but in the meantime, my grocery store is my main source for emergency rations.

Summary

I hope this article gives everyone a kick-start to gather the needed items to prepare your family and home for an emergency. Join an organized group of emergency-minded hams, such as ARES or RACES. As ham radio operators, we are able to lend assistance in the form of a communications link between a disaster site and public safety authorities. As an old fire fighters' version of the Zig Ziglar saying goes, "We must prepare for the worst and expect the best." 73, Wayne, KH6WZ

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learning curve

BY RICH ARLAND,* K7SZ

Work the World with Two Wires

Last month we started looking at the shack from the ground up, quite literally. We left off talking about wire antennas, in particular half-wave dipoles. For those of you who are new to antenna theory, a half-wave dipole is an antenna that is one-half wavelength end-to-end, fed with any one of a number of radio frequency (RF) "pipes" or feedlines. The most popular feedline is coaxial cable, first introduced in WW II as a convenient way to move RF energy around in aircraft and military vehicles; coaxial cable has become a standard in communications.

Normally we hams use 50-ohm coaxial cable (coax), which is a very close match to the center section of the dipole antenna. Some examples of 50-ohm coax are RG-8, RG-213, Belden 9913F7, RG-8X, RG-58, and RG-174. One more thing: Coax is an *unbalanced* feedline, meaning one side (the shield) is connected to the transmitter ground, resulting in an "unbalanced" condition.

Sometimes we elect to use some form of *balanced* feedline such as 300-ohm transmission-quality twinlead, 300-ohm or 450-ohm ladder line or 600-ohm open-wire line. Regardless of which method we use, we connect the balanced feedline to the dipole at the center, which just happens to be a low RF voltage point. As we move away from the center feedpoint of the half-wave dipole, the RF voltage increases until we encounter a very high RF potential at each end of the dipole. This is why you often will hear hams say to keep the ends of the dipole antenna out of the reach of people and pets. A severe RF burn can occur, and believe me, you don't want to get "bitten" by touching the ends of the dipole when someone is transmitting!

If the center of the half-wave dipole is a low RF voltage point, we say that this is the low *impedance* point of the antenna. Impedance is alternating-current (AC) resistance, similar to the *resistance* we encounter in direct-current (DC) circuits. Both are measured in ohms.

If the center is a *low-impedance* point, it stands to reason that this is the place where *high RF currents* will live (low impedance/resistance = maximum current flow). Therefore, let's recap: A dipole center feedpoint is a *low*-impedance point where minimal RF voltage and maximum RF current appear. Are you still with me? I hope so, because now it gets really interesting!

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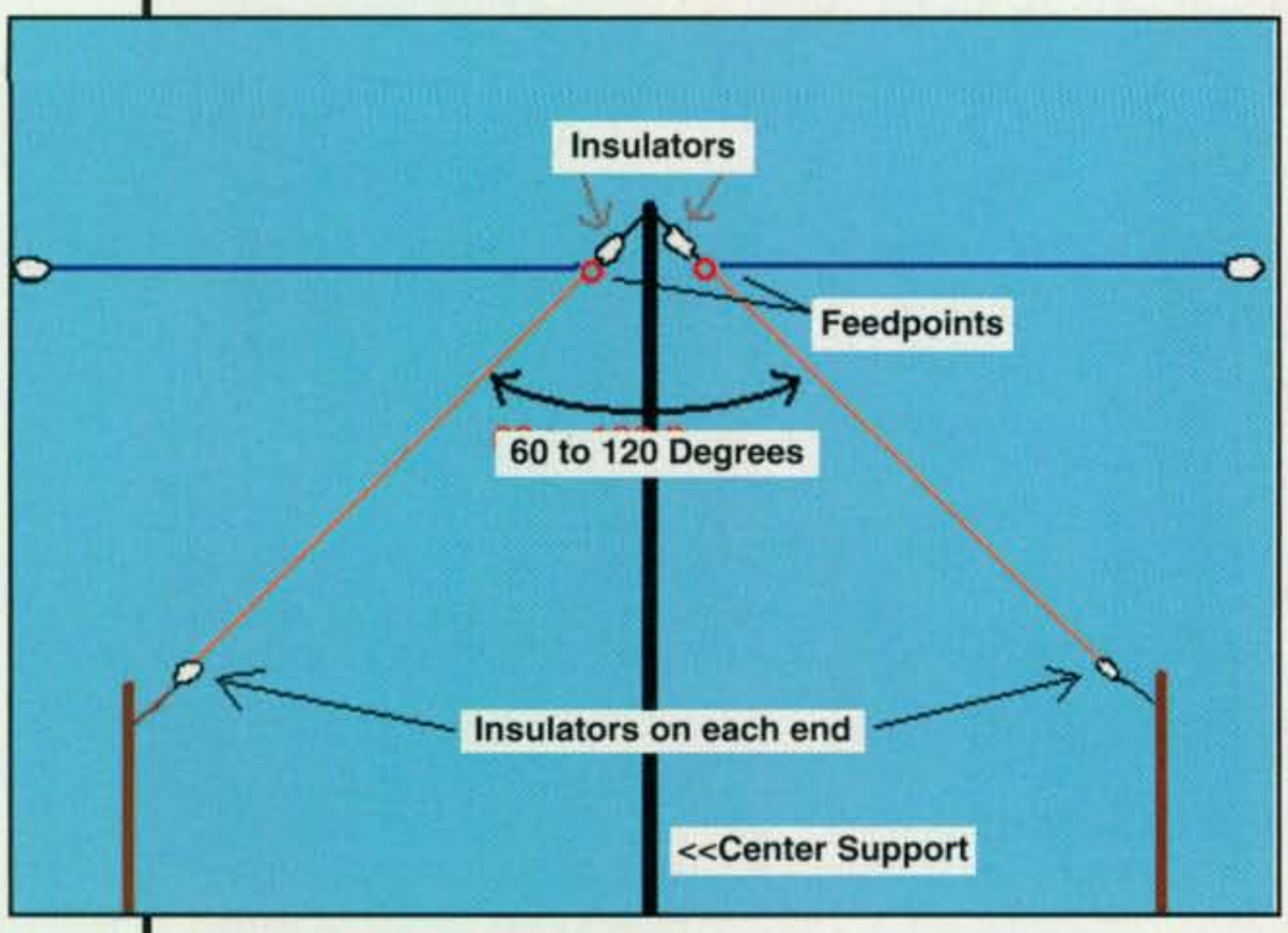
e-mail: <k7sz@arrl.net>



This graphic shows an inverted-Vee configuration (orange wires). The blue wires show a flat-top configuration, where the ends are equal in height to the center feedpoint of the antenna.

Antennas: It's a Numbers Game

One of the handiest numbers you can remember, when it comes to dipole antennas, is 468 (as in "two, *Four*, *Six*, *Eight*," if that helps any). You can find the approximate length of a half-wavelength antenna by taking the number 468 and dividing it by the frequency on which you plan to operate. The only caveat: Make sure that your operating frequency is expressed in megahertz (MHz) and the answer will come out in feet. This "magic number," 468, works for half-wave dipoles from HF through UHF. It's truly an amazing number! Remember, though, the answer you get using 468 as a mathematical constant will only be approximate.

Since the output is in feet, once you get into VHF and above frequencies, it might be handy to multiply everything by 12 to get the conversion from feet to inches. At UHF, for accuracy you might want to convert to millimeters, since it will be easier to work in metric units when it comes to precise cutting of UHF antenna elements. Here is a handy website for conversions from inches to millimeters and much, much more: <http://www.worldwidemetric.com/measurements.html>.

Let's take a working example: You just upgraded to General class and you're really want to operate some HF. You have decided to erect a half-wave length dipole cut for 7.2 MHz, in the middle of the 40-meter phone band. Take your calculator (or slide rule) and enter "468" and divide it by 7.2. The answer: 65 feet. Remember, this is an *approximate* end-to-end measurement, so you might want to cut the wire a bit long (say 12 extra inches on each leg) and adjust the length once the antenna is in the air. The ends of the elements should be trimmed for resonance (lowest SWR), which will vary with each installation due to height above ground, proximity to objects such as trees and/or buildings, and whether the antenna is configured as a "flat-top" or "inverted-Vee" (more on this later).

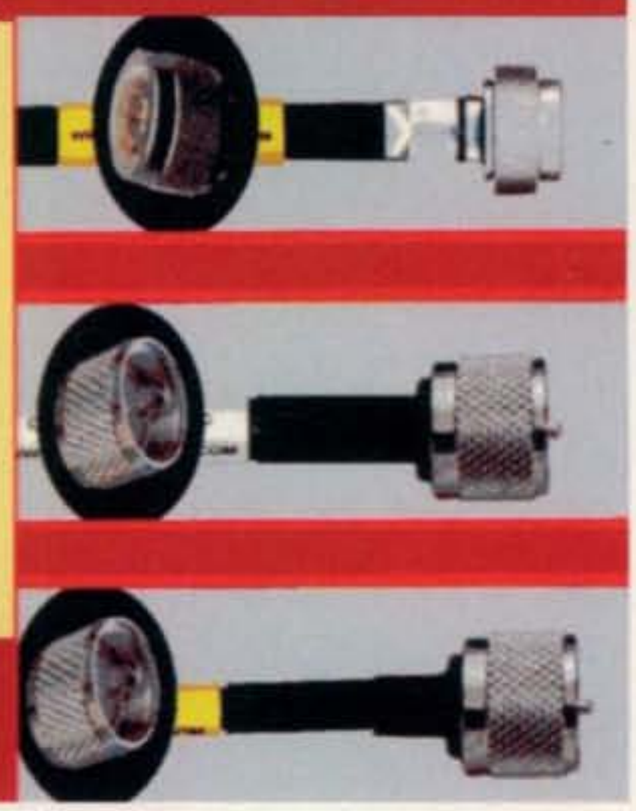
This picture shows a 1:1 balun attached at the feedpoint of a dipole antenna. These baluns can be purchased or made at reasonable cost.

If you want to operate in the CW portion of the band and chase a little DX on 40, then recompute the antenna measurements: 468 divided by 7.025 (that is the heart of the DX portion of 40 meters CW) and you'll find that the antenna now measures 66.6 feet. Whoa! Exactly what happened here?

This is a classic example that I often use to demonstrate the relationship between frequency and the physical length of an antenna. As the frequency goes down (7.2 MHz to 7.025 MHz), the antenna gets *longer* (65 feet to 66.6 feet). In our case we added just over 18 inches to the total length of the dipole we originally configured for the 40-meter phone band. Ergo: The lower the frequency, the longer the wavelength and the longer the physical length of the actual antenna elements. From this information it is relatively easy to comprehend that as we go lower in our operating frequencies (say from 40 to 80 meters), the antenna length gets a whole lot longer—roughly twice as long.

Harmonics are Our Friends

Since some of our HF bands are harmonically related (160, 80, 40, 20, and 10 meters), it is a relatively easy task to compute the approximate length of a half-wave antenna by just knowing one set of numbers for a single band. Since we already have worked out the half wavelength of a 40-meter dipole (about 65–66.6 feet), we can say with certainty that the 80-meter half-wave antenna



will be about 132–134 feet (end-to-end), and a 20-meter version would be about 33 feet end-to-end. It won't be exact, but it will be close enough. Just be sure to leave a little bit of extra wire so you can fine-tune the antenna for the lowest SWR. And you thought this antenna math stuff was difficult! Once you commit the "468" number to memory, most everything else easily falls into place.

A Balancing Act

OK, we have fabricated our 40-meter dipole. What next? What about a balun? Ah, yes, the often misunderstood balun. Balun stands for Balanced-to-Unbalanced (Bal-Un), and it is a decoupling device used to ensure that both dipole elements remain in a balanced condition when connected to a coaxial feedline.

The dipole is a balanced antenna. All this means is that both elements are not connected to a common return path, often referred to as "ground." In free space, the dipole elements radiate equally. All of this changes when you hook up a piece of coaxial cable to the dipole feedpoint and connect it to the radio. One side of the coax (the shield) is at equipment ground, since it is tied directly to the chassis via the RF connector on the back of the radio. That means that one of the dipole elements is also at chassis ground. The balanced dipole has now become an unbalanced antenna. In this condition, we often find RF radiation on the coaxial shield, which is *not* what we want!

What we need is a way to isolate or decouple the antenna from the feedline, and that is where the balun comes into play. The balun isolates the coaxial feedline from the antenna and restores the balanced condition to the antenna. In addition, the balun prevents feedline radiation, which can drastically alter the antenna performance. Now there are some antennas where feedline radiation is desirable, and we will cover those in another segment. For now, though, let's concentrate on our 40-meter dipole antenna and how it will play in the real world.

This is where antenna-modeling software can be a real asset. Unfortunately, learning to manipulate this software correctly takes a long learning curve. The ARRL offers an on-line course in antenna design and modeling. If you are really interested in understanding how antennas can perform prior to actually building them, taking that course would be a good idea. For further information log onto the ARRL website (http://www.arrl.org/) and follow the links to its on-line courses (http://www.arrl.org/cep/calendar/). My personal favorite is EZ-NEC by Roy Lewallen, W7EL. I have used this program for several years with great success. Check out <http://eznec.com/>.

Height is Good

There is an old adage regarding antennas: Get it up as high as possible! High is good; the higher the better. For height, we need to find some trees, a tall roof, the side of an existing tower, a push-up mast, or some other structure that we can use to hang our antenna. In the grand scheme of things, using the feedpoint of the dipole as the tallest point and allowing the ends to slope downward configures the dipole as an "inverted-Vee." This is probably the easiest method of erecting the antenna. It also makes the antenna omni-directional, which means it has little or no directionality, making it good for general communications. If you want some directivity, then erecting the antenna as a flat-top with the ends at equal height to the center feedpoint, will yield a figure-"8" pattern broadside to the axis of the antenna.

Basically, the lowly half-wave dipole antenna can perform quite well in a wide variety of configurations. There are a number of variations on the dipole theme, but there is one that I especially like and have used with very good results—the 40-meter Extended Double Zepp (EDZ) (http://www.g3zps. com/Page4.htm). In our last column we briefly showcased my 40-meter EDZ, so now we will take a closer look at this unique dipole design that seems to work wonders on the low bands. If you have the real estate and only have the option for one HF antenna, I would heartily recommend the EDZ.

This dipole variant has gain and some directivity but only consists of two wire elements approximately 85–90 feet in length each. (Use 599/f MHz for length of *each* dipole element.) This antenna is fed with balanced line such as 450-ohm ladder line, 300-ohm transmission-quality twinlead, or 600-ohm open-wire transmission line. I have made several of these antennas over the last 20 years and the results have been amazing.

In feeding the EDZ you need to use a 4:1 balun on the end of the balanced feedline before it connects to the equipment. Several internet websites show the balanced feedline cut to a specific length where it is terminated in a balun. From the end of the balun into the shack is accomplished via 50-ohm coaxial cable. While I have never tried this configuration, I am sure that there are bands you will not be able to use due to limitations on the tuner, which needs to be incorporated into this antenna system to tame the wild impedance excursions found on specific bands. Therefore, I prefer to use balanced feedline (in this case 450-ohm ladder line) from the feedpoint of the EDZ right into the shack operating position, where it is terminated into a 4:1 balun, or, should you have one, a balanced line tuner (BLT—no, not the sandwich!). By using a BLT, you can do away with the balun and directly tune the feedline, which will reduce losses in the system. Believe me, it is worth the effort to erect this antenna, as it will work on 160–10 meters with excellent results.

As we stated earlier, the 40-meter EDZ is a center-fed dipole consisting of two *collinear* wire elements, .64 wavelengths long, fed in phase. Now don't freak out! All this means is that each wire is a whole lot longer than the normal 33-foot (quarter wavelength) elements that are found on the 40-meter half-wavelength dipole. This extra length gives the EDZ some gain (somewhere around 2.8–3 dBd) on 40 meters. On 160 and 80 meters the EDZ exhibits an omnidirectional pattern. To illustrate how well this 40-meter antenna works on 160 meters, during a 160-meter DX contest several years ago I used a Wilderness Radio Sierra QRP transceiver (http://www.fix.net/~jparker/wilderness/sierra.htm) with 3 watts output into my 40-meter EDZ and managed 87 contacts and 24 states! Not bad, if I do say so myself.

For more detailed info on EDZ construction visit <http://www.dxzone.com/cgi-bin/dir/jump2.cgi?ID=7682> and review the material that Dr. Ace Ratliff, WH2T, put together as a quick reference (thanks, Ace!).

We are going to call it quits for this month's column. Here are two websites that offer huge amounts of data along with a downloadable dipole calculator for your convenience: <http://www.radiobrandy.com/dipole1.html> (a dipole calculator) and <http://www.hamuniverse.com/dipivcal.html> (more info and dipole calculator by N2IMF).

Be sure to come back for the next issue. We will move away from the technical side of ham radio and explore some modes of operation and reveal some operating techniques designed to help you get more enjoyment out of your operating time.

73, Rich, K7SZ

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Antennas

BY KENT BRITAIN,* WA5VJB

Unusual Antennas

This month we will go over some unusual antennas, and hopefully get some feedback on their design from you, our readers.

What we have in photos A and B is basically a pair of stacked Yagis for 2.4 GHz, but with only one driven element between them. It's a neat idea—no power divider, no phasing lines, better bandwidth, and the losses in the power divider and phasing lines are eliminated. This technique of driving two sets of Yagi directors with one driven element has several possible ham applications.

Most Yagi programs such as YagiMax or YO will not model this Yagi configuration. Programs such as HFSS, NEC, NEC2, and NEC4 will model this antenna, but are poor tools to optimize a design. With the second string of directors loading the driven element, it is easy to predict that the driven-element impedance will be pulled very low, and at the same time you want to keep coupling between the first two directors minimized. There is also some question as to just how efficiently the radio waves will go around that bend in the directors. If any of our readers have design experience with this type of antenna, please contact me and we'll see if we can make a ham antenna project out of this stacking technique. I have a bunch of design questions, and what a neat future construction project!

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e-mail: <wa5vjb@cq-amateur-radio.com>

Yagi Bandwidth

When we look at a typical Yagi like the one in photo C, its bandwidth is only a few percent of its design frequency (for example, the bandwidth of an antenna covering the entire 20-meter band would be

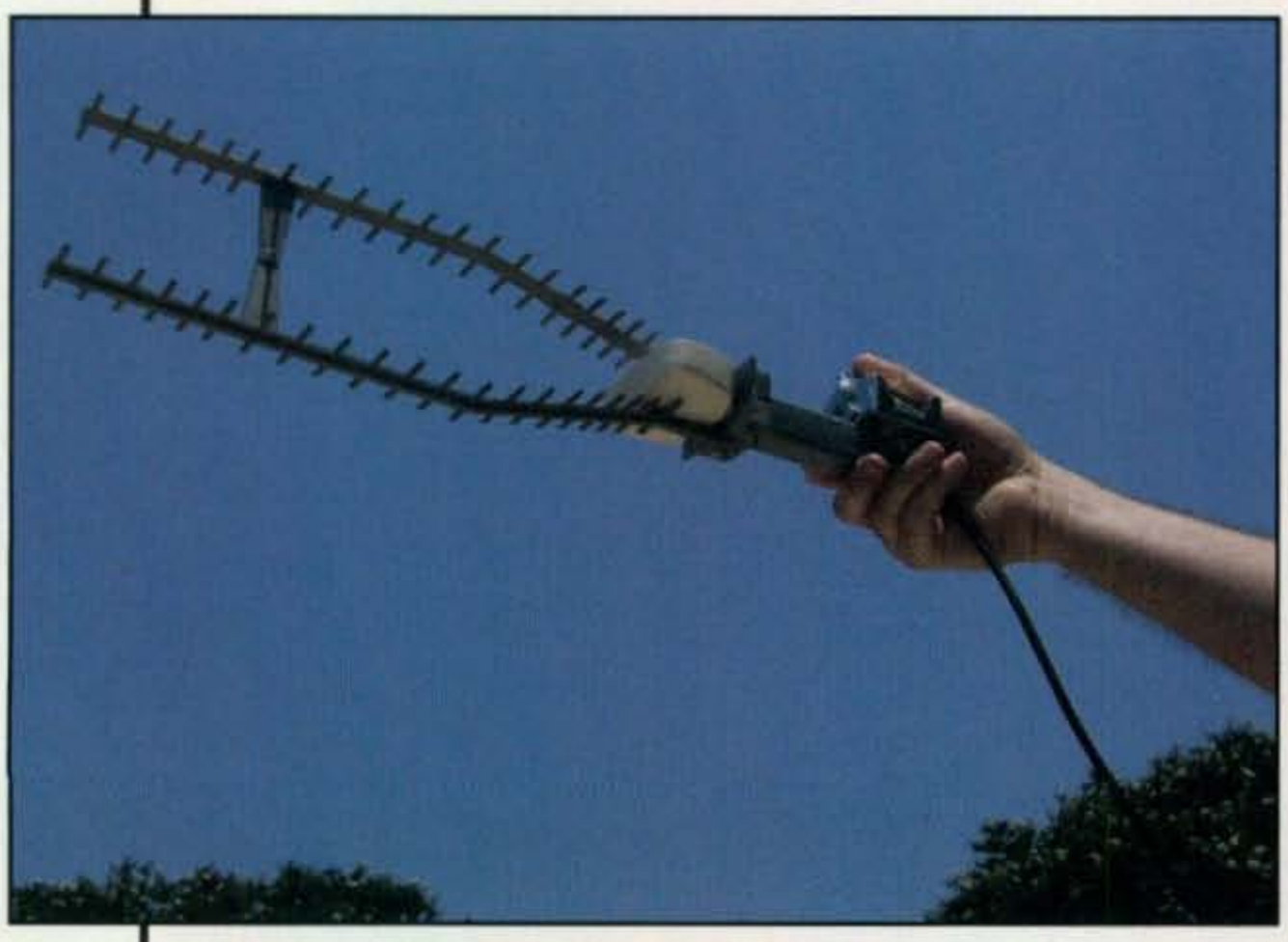

Photo A– 2.4-GHz wireless modem with "stacked" Yagis. Note the single driven element for both antennas.

Photo B– A second view of the 2.4-GHz "stacked" Yagis.

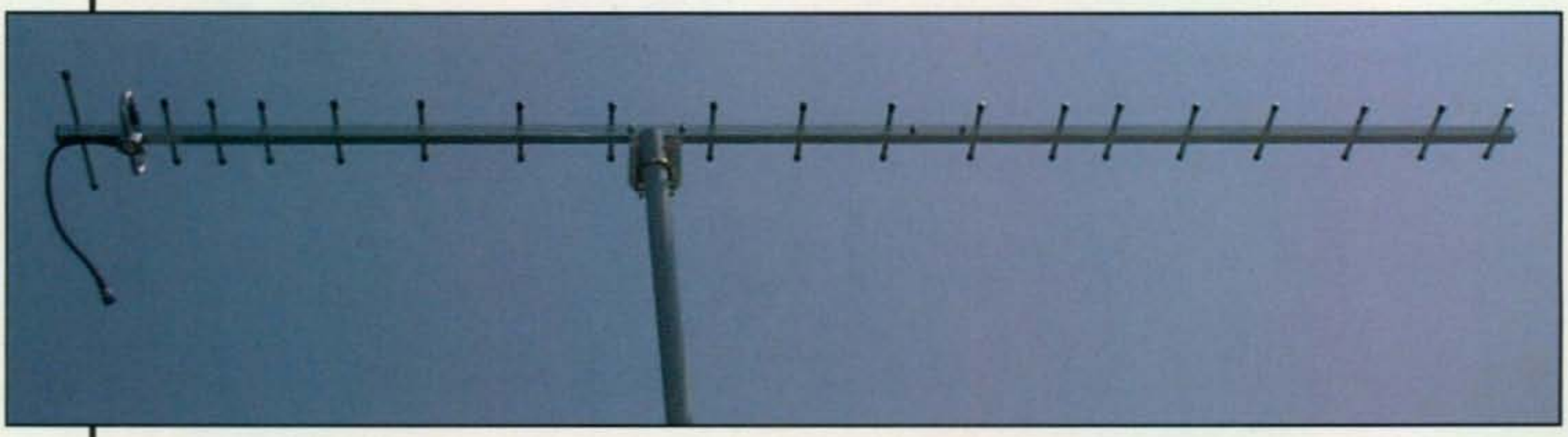

Photo C– A long Yagi with tightly tuned elements results in a narrow bandwidth. Bandwidth may be broadened, but at the cost of losing gain.

WORLD CLASS PRODUCTS

THE NEW 10-30LP12 LOG PERIODIC

The 10-30LP12 removes the concern many share regarding the complexity and cost of other multiband antennas. This Higher Performance log periodic covers every frequency..instantly, from 10 to 30 MHz ! Just one feedline is all you need to access this flawless feature. From moments after it was installed at the M2 test facility on the West Coast, U.S.A., stations in Europe were contacted using just 100W on 17M, 15M and yes, 12M. This antenna is definitely a band opener.

M2 has done everything possible to keep cost down and performance up. This standard version is built for 80 plus MPH winds and years of no maintenance, trouble free performance. For those who don't need 30M, we designed it without the rear element and boom section. It becomes the 13-30LP11 with the same specifications, less 30M on a 37 ft. boom. An optional kit will add the boom and rear element if you need the full coverage.

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Photo D– European UHF TV antenna with three different director strings (see text for details).

2.5%, based on 0.35—the width of the band in megahertz—divided by 14, the frequency in megahertz, equaling 0.025). It is possible to widen a Yagi to 10% bandwidth, which would be just about enough to cover the entire 50–54 MHz 6-meter band, but this would be at the cost of some gain. Also, widening the bandwidth becomes harder and harder the longer the Yagi gets. A highly optimized 432-MHz Yagi with 20 to 30 elements is often less than .5% wide in bandwidth.

Over the years there have been attempts to broaden the bandwidth of Yagi antennas with log-periodic driven elements, bowtie elements, loops, or just advertising claims. However, tackling the bandwidth problem at the driven element has had only a limited effect. The problem is the tightly tuned directors. The directors behave much like the elements in an interdigital filter, making the Yagi a passband filter.

The more elements in the filter, the tighter the passband of the filter. Yes, you can stagger-tune this filter or use directors that quickly taper in length, but gain drops away very quickly.

In photo D and again in photo E, we have a UHF TV antenna from the UK. Each of the three director strings is tuned to a different part of the UHF TV band. Locally they are called "The

Photo E– Slightly smaller European UHF TV antenna with three director strings.

Photo F– Channel 2 TV antenna used at our June 2009 VHF Contest site.

Photo G– "Can you hear me now?"

Spanish Antenna." I'm afraid I have no information on who makes this antenna, or how well it really works, but the design is quite interesting. If any of the local electronics shops had one in stock, I would have been highly tempted to bring one home in the overhead bin. Considering the bandwidth of the UHF TV band, a 145/222-MHz version or even a 915/1290-MHz model could be possible. For our European readers, my UK callsign is 2EØVAA and I do a lot of business with Rapid (a UK parts supplier similar to Mouser or Digi-Key in the US).

So again, if you have any design information on multiple-director string Yagis, I see quite a few future ham projects.

Can You Hear Me Now?

Last summer, we took advantage of television's analog/digital switch and used the local Channel 2 TV transmitting antenna during the June VHF Contest. The 1830-foot high antenna in photo F worked pretty well on 50 MHz, and we even used it on 2 meters, 222 MHz, 432 MHz, and 1296 MHz. As we were closing down, Doug, KA2UPW, connected up his walkie-talkie and started using repeaters all over Texas (photo G). There is something obscene about having a radio that can hide in the palm of your hand connected to an 1830-foot antenna!

The talkie was not connected directly to the antenna. If we had, it is likely that it would have caught fire. With 6 FM transmitters pumping out a total of 180 kilowatts just a few feet away from the TV antenna, we had to use cavity filters on all bands to protect the rigs.

However, this fun didn't last for long. The Daystar Network was paying $12K a month in tower rent for that antenna, so it came down just as soon as they could get a tower crew. Doug certainly had "the mouse that roared," though.

As always, we welcome your e-mails and suggestions for future topics and projects. Just drop me a letter at my Callbook address (also listed on the first page of this column) or send an e-mail to <wa5vjb@cq-amateur-radio.com>. Additional VHF/UHF projects can be found at <www.wa5vjb.com>.

Spring is here. I hope you used the winter to start collecting hardware for those bigger and better antennas. Now go put some antennas in the air!

73, Kent, WA5VJB

mobiling

BY JEFF REINHARDT,* AA6JR

Doubling Your Pleasure

Every so often, I'm reminded of why I was thrilled to be offered authorship of the "Mobiling" column by *CQ* Editor W2VU a few years back. Specifically, the column combines two of my favorite interests, radios and cars, or depending on the day, cars and radios. For me, the combination is right up there with "fresh from the oven" chocolate-chip cookies and cold milk, seeing the Big Dipper in the August sky, or the comfort of sitting by a warm fire with a good book as a winter storm howls through the night.

In past installments of this column we've shared photos and explored installing transceivers in different types of vehicles from high-end SUVs through the normal "everyday driver" car. This time, let's share something a bit more exotic.

Are You a Car Nut?

Many of us have our allegiances (or passions) tied to branding. You may know someone who will own nothing but a particular manufacturer's brand radio. Although less prevalent now, by some there is still brand loyalty to auto manufacturers, although it was quite common in decades past to hear a person say, "I'm a Chevy man," or "I'll only buy a Ford, same as my daddy." Alas, as cars have become more of an appliance, I opine that some of the previous passion about cars has waned. Of course, to support my position, I'm contrasting the ho-hum new model introductions of today against the shrouded, tail-finned wonders that were secretly shipped to dealerships in the 1950s and kept behind papered-over showroom windows until the new models were "officially" introduced on some special evening, often accompanied by searchlights that beckoned the curious from miles away.

I Feel the Need . . .

While many of today's cars look very similar (one said they all now look like a slightly used bar of soap), there is still an American car that is able to conjure up youthful passion, the image of performance, and retain a quickly identified persona on the roads of the 21st century. That car is still America's sweetheart, the iconic Corvette. For many, the Corvette captures the romance of the open road. It's at home and welcome at any summer cruise night at the local hot-dog stand. It's Todd and Buz on an adventure of discovery on TV's *Route 66*, or to unashamedly steal from a billboard ad promoting that brand, for many it's "the only sports car that matters." Unfortunately, you could probably not find a less likely or a more accessory-inhospitable car to merge with ham radio. Ask me, as I've owned two (and still have one). The only activity less likely than ham radio to be associated with a Corvette is perhaps a desire to drive one through a blizzard. OK, there's one other activity that's difficult in a Corvette, but we'll pass on that one for now. Maybe that's why it's referred to as a "driver's car."

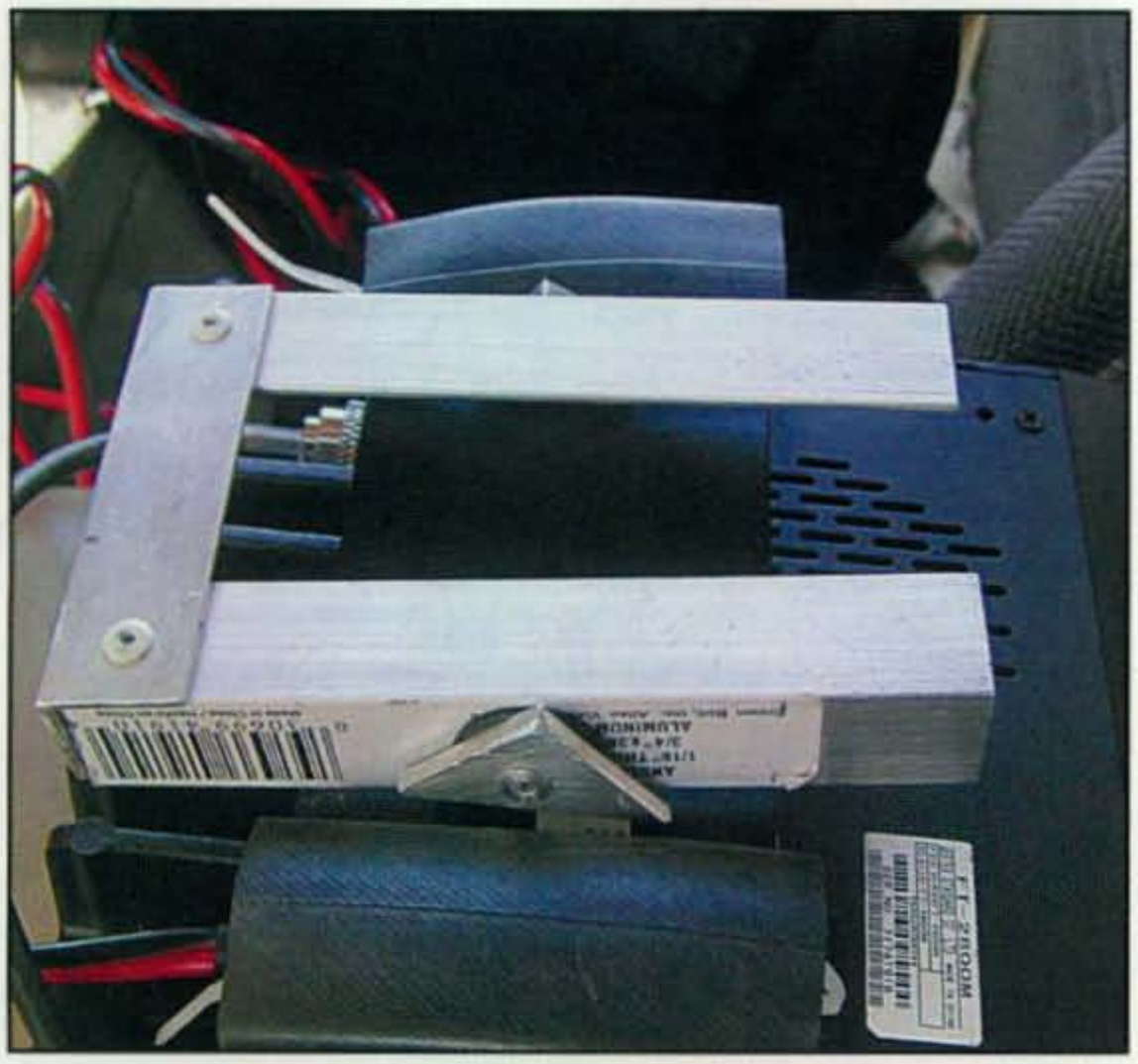
Nevertheless, several hams have taken on the challenge of fitting their radios into the rather snug confines of a two-seat touring car with its own set of challenges. Perhaps the biggest dose of reality rises from the car's fiberglass body, which offers little in the way of ground plane for an antenna and precious few grounding opportunities for a radio of any type; it's even worse when one considers the challenges of HF. Because of the lack of ground-

WA6AY's Corvette seems to invite you aboard. Hmm . . . which to work first, the car or the radio? The Kenwood TM-V7 control head fits perfectly in the space formerly occupied by an ashtray.

*5904 Lake Lindero Drive, Agoura Hills, CA 91301
e-mail: <aa6jr@cq-amateur-radio.com>

The Kenwood transceiver fits neatly into a rear hatch storage compartment. Note the antenna connection through the floor.

Is this the ultimate stealth antenna? It's not high off the ground, but it's good enough to work local repeaters!



AF6SK shares a clever and easy way to mount a rig in his off-road SUV.

ing and metal shielding offered by the firewall, hood, and fenders of a traditional steel-bodied car, vintage Corvettes from the 1960s and '70s were equipped with metal shields around the distributor to reduce static pops in the car's audio system.

Today's models have more sophisticated computer-controlled engine management systems that make the car surprisingly clean and efficient while maintaining meaningful performance. However, combined with all the other electronics—including entertainment, airbag systems, navigation, RF tire-pressure monitoring, On-Star® and more—even the more innovative ham radio enthusiast is hard-pressed to merge a mobile rig with a 'Vette. Newer Corvettes not only have the "plastic" body, they also have balsa composite floors and an interior tightly designed to maximize every cubic centimeter.

What about the Skyhook?

Then there's the issue of the antenna. Even if you could muster up the courage to drill somewhere through that expensive bodywork, the lack of a ground plane is going to hinder radio performance. And really, how would it look? Some hams have tried marine antennas with Corvettes. I was a bit creative using a RadioShack suction-cup mount in the inside of the rear hatch window and rubber duck as the working element, which was okay but not a permanent installation. A Corvette parts and accessory house, Mid America Motorworks (www.mamotorworks.com), has offered a CB antenna kit that is attached to a nifty license-plate frame as another approach to not drilling through the body. It's a bit pricey at $179.99, but at least it's a viable option.

Therefore, I was thrilled to receive the following correspondence from Bob Hill, WA6AYJ:

"I thought you might be able to use my 2008 Corvette radio project in one of your pieces. In over 30 years of being a ham, I've owned a number of new cars and trucks. Drilling and punching multiple holes in a shiny new car was never of concern to me. Within hours of delivery of a new vehicle, it would have antennas on the roof and radios on the dash. But that all changed when I took delivery of a new Corvette a couple of years ago. Although a given is that with any new car it "had" to have a radio installed, the difference this time was the installation would have to be "stealth." I didn't want the radio or antenna to be visible anymore than necessary. Several 2m/440MHz dual-band mobiles were measured to see which would fit with minimal visual impact. I discovered the Kenwood TM-V7 control head fit in the ashtray location as though it was designed for that use. Another challenge was the antenna mounting location. Aside from not wanting it visible, there is almost no reasonable place to mount an antenna on the exterior of the body. Since performance is secondary to the aesthetics of the installation, the underside of the vehicle was inspected as a possible antenna mounting location. There is a storage pocket that protrudes down beneath the rear trunk, and this looked as though it would be a great place to mount the antenna upside-down beneath the car. The pocket also looked like it would provide a great out of the way place to mount the remote radio chassis.

"After much planning and measurement, it was time for the installation to begin. I purchased a replacement ashtray assembly, allowing the control head to be pre-mounted. The dash panel was removed along with the stock ashtray, and the new ashtray with control head was reinstalled and the dash reassembled. Step one completed! Now on to the radio and antenna. The carpeting and trim were removed from the area surrounding the floor pocket. As with most of the rest of

the vehicle body, this pocket is made of a non-metallic fiberglass material. To provide a ground plane for the upside-down antenna, a piece of sheet metal was placed in the bottom of the pocket with a BNC coupling placed through the sheet metal and the bottom of the pocket. A short dual-band antenna with a BNC connector was installed on the coupling. It was necessary to bend the antenna nearly 45 degrees so it wouldn't drag on the ground. This was another compromise in performance, but necessary to preserve the stealth installation. The radio chassis was mounted to the side of the storage box using another piece of sheet metal as a backer plate. Cables were run through the interior trim to the control head, microphone, and speaker. Power cables, both positive and negative, were run to the battery.

"The final installation works surprisingly well, even though SWR is a little higher than I would have liked. That's the compromise between looks and performance, but it's not of concern since main purpose of the radio is for use through the local repeater or car-to-car for caravanning."

The innovative part of Bob's installation is the antenna. I've never seen anything quite like it. It currently takes the lead in the "stealth" antenna category. This is one of those times when you can toss theory out the window and just see how well the thing works. I'm sure Bob is only working local repeaters, and in a metro area it probably works just fine.

Thus, apparently you can "have it all" with a powerful red sports car and a great mobile rig to enjoy two hobbies at the same time. More milk and cookies anyone?

Light, Simple, and Rugged

We'll go from sports cars to the opposite end of the four-wheel world by paying a visit to a rough-and-ready off-road vehicle. Ken Sandberg, AF6SK, wrote to share the functional installation in his Toyota SUV:

"For rough 4WD roads, I have bungee cord which goes under the console to hold the radio in place. All of the controls are easy to access and the position is easy to use. Due to 4WD issues, I use a magnet mount antenna so that if a tree happens by, the antenna and the vehicle are not damaged. The power is connected using a cigarette-lighter plug, but I installed an additional outlet that is switched between on with the ignition, on or off."

Thanks for sharing the photos, Ken. The clever, simple design speaks to function in an "office" that can get pretty busy while the driver and passengers are bouncing around in the off-road mode.

Do you have an installation you'd like to share with your fellow mobileers? Drop me an e-mail at the address shown at the beginning of this column.

A Salute

We'll close this column with a salute to Dave Ingram, K4TWJ (SK). Dave's presence graced the pages of this publication for many years—but not long enough. He was always on top of the latest gear and innovations (mobile, QRP, plus vintage, keys, and otherwise) and he knew our pastime well. Better yet, he was great person to be around and he had that rare gift of sharing something new with you in each conversation. Dave was symbolic of all that's right with ham radio. While he will be missed, the best tribute we all can pay him is to share a great contact with another ham—just because we can.

Until next time, happy mobiling!

73, Jeff, AA6JR

kit-building

BY JOE EISENBERG,* KØNEB

Hamfest Treasures for Kit Builders

With the weather already warmer, it is time to go to hamfests big and small. The granddaddy of them all, the Dayton Hamvention® (http://www.hamvention.org) has the largest flea market and the best selection of things useful to kit builders that I have seen. However, there's a lot to be found at smaller hamfests as well. The treasures that can be found at a hamfest will bring smiles to any kit builder. It is an interesting fact that nearly half of all kits purchased are never built. There are many hams who buy kits and don't know some of the helpful hints we have given in these pages and have put the kits away, thinking they might want to build them later. (Let's hope I have inspired them to get out those out and dig in!) Some of us save them for a "rainy day" when we have more time to assemble them. This has produced a treasure trove of unbuilt kits, some dating back many years, especially old Heathkits. A walk through most hamfest flea markets will often turn up unbuilt kits. Most often they are smaller, simpler kits, but sometimes a real treasure might be found. Look to see if the packaging is still intact so there is less chance a part might be missing. Having a supply of common resistors, capacitors, etc., is helpful as well.

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Perils of Older Kits

Lately I have seen some very old Heathkits from the 1970s and earlier showing up at hamfests still in their original boxes. They can turn out to be very expensive. The main problem with these old kits is that the electrolytic capacitors, especially those in tube-type circuits, can be leaky or not functional. This is due to the electrolyte inside drying out over the years. In this case, you will need to look at the parts list and simply replace every electrolytic capacitor in the kit. Doing so will prevent a whole host of problems that could damage your kit if powered up with old, dried out electrolytic capacitors. Searching through online parts sources, such as Mouser and DigiKey, will help you find the parts you need to replace. Newer kits may not have the large high-voltage electrolytics and the smaller ones are usually OK, but look carefully at the electrolytics to be sure they do not appear swollen or broken open. Some kits you might find in a flea market are from suppliers that are no longer in business. As long as all of the documentation is there, you should be OK,

Photo A– The EAE Sales booth in the Dayton flea market. It's a source for lots of soldering and desoldering tools.

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Photo B– Low-cost soldering irons at another booth in the Dayton flea market. Many larger hamfests have similar dealers.

but also check online to see if anyone else has had experience with that kit.

A Source for Tools and Connectors

Many larger hamfests also often have soldering tool dealers (see photos A and B). The least expensive soldering irons you will see are not really the best for use in kit building due to not being able to control their temperature easily. On the other hand, I have seen some that sell for about $5 that are useful, including one that runs from a 12-volt lighter outlet that would be good for small repairs and soldering connectors while away from home. One in particular is available from Tower Electronics (http://www.pl-259.com), although I would not recommend using it for fine circuit-board work. Tower Electronics is also a great source of plugs, jacks, and connectors. Lately there have been a number of newer soldering stations that do have variable temperature settings and are great for working with kits. Many of these new soldering stations sell for well under $50. Of course, there will be fancier and better ones available as well for a higher cost, and when choosing a soldering station, you might consider getting a better one if you intend to build bigger and more complex kits. Desoldering tools also are often available, as well as things such as solder wick and other helpful items.

Another thing to keep your eye out for is insulated tuning tools. Good-quality tuning tools are often sold for $1.00 or less at hamfests. Buying a variety of sizes will ensure that you have the right size and type available when it is time to build those treasures you have brought home.

Another very useful item that I often find at hamfests is heat-shrink tubing. I have seen it in all sizes and colors and thicknesses. It is often much cheaper to buy at a hamfest than the small assortments you find at retail outlets. When wiring connectors or inside of cases, it is often useful to use heat-shrink tubing to prevent shorts. I use either a lighter or an embossing heat gun to melt it, but you *must* be careful not to melt plastic parts such as jacks and plugs. Using a lighter very quickly can often do the best

Photo C– Don't forget to buy plugs, jacks, and connectors to finish your kits if they do not come with them.

Photo D– A good selection of LEDs is essential for any kit builder to customize creations. These LEDs were at the Microtech electronics booth at Dayton.

job if you are careful. I used a large size of thick heat-shrink tubing to cover the loading coils in my PAC-12 portable HF antenna kit. The small sizes fit well over cable splices and other places you want to prevent shorts.

Stock up on plugs, jacks, and connectors (photo C). Simple things such as 1/8-inch audio plugs, power connectors, or coax connectors can bring a halt to your kit building if you don't have them when you finish your kit. Get coax jumpers and DC power wire and other similar things to put in your parts bins so that you are ready to go. You can never have enough LEDs of all sizes and colors to dress up a project. At the Dayton Hamvention®, Microtech Electronics often has the best selection of LEDs (photo D). A quality variable-voltage power supply is a good item to watch for as well. Wire for making antennas is another thing to think of. Making a simple dipole or end-fed antenna for testing kits will free your other antennas for your other radios and give you something with which to compare the performance of your kit radio and your commercially-built radios.

Learn from Experts

Visit hamfest and convention forums on building and homebrewing to get tips on the best ways to make kits successfully. There are also regional QRP conventions—such as Ozarkcon, Salmoncon, and Lobstercon, as well as the Dayton Hamvention®—where group kit builds are a part of the program and kits and parts are readily available.

I would be remiss if I didn't mention finding a good, used oscilloscope. Scopes used to be very expensive, but I have found many for under $100 that work at hamfest flea markets. It is wise to test before you buy!

Once you get your goodies home, I have found a particular tackle box to be extra useful for storing and building kits. This box is produced by Plano (http://www.planomolding.com), and sold in many colors at many different types of stores. It is most often seen in fishing tackle and outdoorsman stores as the Plano 1364 or 1354. It has four removable trays that have resizable compartments to fit your parts, placing resistors in one place, caps in another, etc. I use each of the four trays to hold parts for a different kit I am working on. You can label each tray with the name of the kit it contains. Larger parts, such as PC boards, cases, knobs, and partially completed kits, etc., fit in the top compartment of the case. I can pull out a tray and the big parts from the top compartment and begin work immediately on my kit as my parts remain sorted and ready to go in the tray. I have also seen this identical case under a different color and number sold in hardware and home-improvement stores, so look in those places as well. It is also great for taking to group kit builds as you can keep all of your parts sorted and safe if you need to take the kit home to finish it. At work, we use the same case to hold parts from different laptops that are under repair.

Meet with friends at hamfests to help you find the stuff you need and make it a team effort, coordinating on your handhelds. It saves a lot of time and money if you have a group looking for everyone's "want list."

I hope to see as many of you as possible at the 2010 Dayton Hamvention®. Just look for the "Cat In The Hat" or ask at the *CQ* booth in the main arena.

73 de, Joe, KØNEB

what's new

BY JOHN WOOD,* WV5J

Ham Radio Products Bloom in May

Wow! New radios, new software applications, and even a new book! Just like Mother Nature in the spring, the amateur radio market is blooming with all types of new products. Would it be because the Dayton Hamvention® is held in May? Maybe. Let's take a few minutes to look over "What's New" and familiarize ourselves with the latest releases from our corporate fellows.

Yaesu VX-8GR

Yaesu is announcing the release of yet another new HT and another derivative of its successful VX-8R line. This one has been officially designated as the VX-8GR (photo A).

The VX-8GR follows closely on the heels of the recently released VX-8DR quad bander which features enhanced APRS capabilities. The VX-8GR, a 2-meter and 440-MHz dual bander, also incorporates the same enhanced APRS features—SmartBeaconing™, an increased station list and APRS message memories, an inclusion of APRS® Packet data in Digipeater routing information, a heads-up compass display, a selectable message-received LED flashing rate, and an increase in the number of Digi-Path route settings from 1 to 7, plus a built-in GPS antenna.

Since it is a dual bander and not a quad bander, the VX-8GR is expected to be priced lower than the VX-8R and VX-8DR. That's good news for folks who have been on the fence about investing in the VX-8R but have a preference for the Yaesu user interface. These same potential customers may also like the fact that the VX-8GR is waterproof and includes a wide-band receiver that can hear from 108–999 MHz (cellular blocked).

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

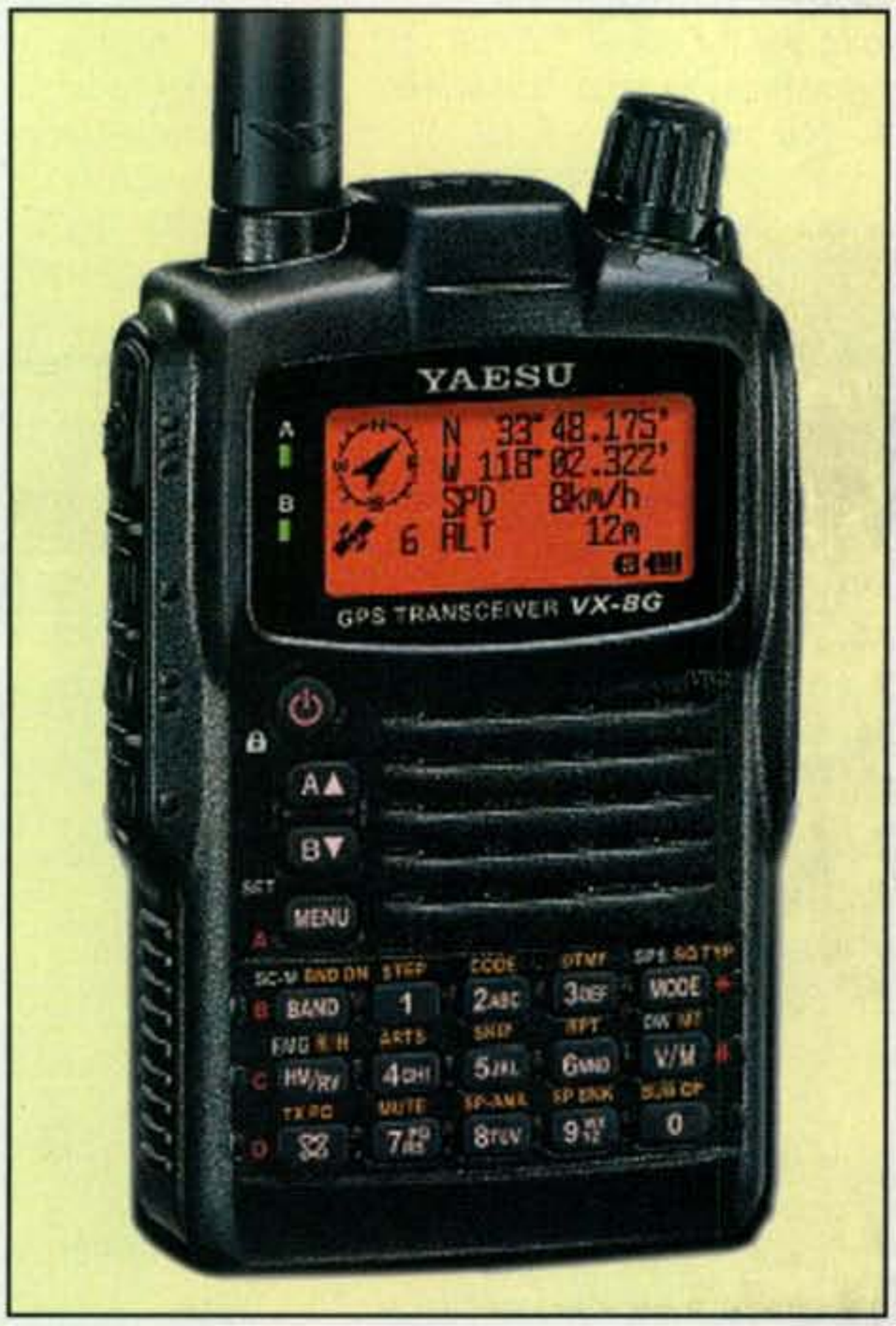


Photo A– Yaesu's newest HT, another rendition of the VX-8R, designated as the VX-8GR, offers 2-meter and 440-MHz operation, advanced APRS capabilities, and a built-in GPS antenna.

AOR Introduces the AR2300 "Black Box"

AOR USA is now marketing the AR2300 (photo B), a new "Black Box" professional-grade receiver with state-of-the-art specifications and a menu of optional additions that allow the operator to configure the receiver for specific custom applications or control it via the internet.

The AR2300 is operated by a Windows® XP or higher GUI-equipped computer through a USB interface using a provided software package that controls all of the receiver's functions. The tuning range for the U.S.A. consumer version is from 40 kHz to 3.15 GHz (cellular blocked) and it receives AM, wide- and narrow-band FM, LSB, USB, and CW modes.

"The AR2300 is an advancement in the new generation of software-controlled or 'black-box' receivers," said Takashi "Taka" Nakayama, executive vice president for AOR. "The AR2300 is designed to give monitoring operators amazing flexibility in configuring the receiver to their individual needs and applications, often with just the click of a mouse."

Up to 2000 memory channels (50 channels × 40 banks) can be stored in the receiver, with data for each channel that includes frequency, alpha-numeric channel labels, mode, selected antenna, a hit counter, and more. Fast Fourier Transform algorithms provide a high level of signal processing which allows the receiver to scan through large frequency segments quickly and accurately. Depending upon operator-selected configuration, up to three frequencies can be received simultaneously. Additional standard features include an adjustable analog 45-MHz IF output with 15-MHz bandwidth, an SD memory card port that can be used to store recorded audio, analog composite video output connector, CTCSS and DCS squelch operation, two selectable Type N antenna input ports, an internal speaker, along with a headset and external speaker port. The professional/govern-

ment version is equipped with a standard voice-inversion monitoring feature.

An optional external IP control unit enables the AR2300 to be fully controlled from a remote location and send received signals to the control point, all via the internet. The AR2300 is powered by 12 volts DC (AC adapter included) and can be operated as a base or mobile unit. Other optional accessories are available.

The AR2300 is available through dealers across the USA and Canada. MSRP is $3,795 (USD) but dealers are free to set their own prices. The government/professional version of the AR2300 is currently available; the USA consumer version will be available by late spring. For more information, visit <www.aorusa.com>.

Depiction 1.2 Mapping Software

Would you like to quickly build custom, interactive maps of disaster responses or race events that allow you to integrate free online maps, APRS data, and imagery with your own proprietary information and then access your created depictions and take them with you, even offline? Now you can with Depiction 1.2 (photo C), desktop mapping, simulation, and collaboration software that empowers you to instantly create a proactive display of an always-fluid situation such as an emergency response effort. From evacuations to disaster simulations, wildfire response efforts to simple security planning, Depiction enables users to imagine, depict and share interactive geospatial scenarios like these and many others.

"People know and care about their community, but have previously lacked the tools to visually explore and share the insights, dreams, and fears that affect it," said Depiction, Inc. Founder and President Mike Geertsen. "With Depiction, you can create and interact with your own scenarios in minutes, creating a living map unlike anything you've seen before."

Depiction 1.2 is an affordable, web-enabled desktop program that incorporates technology from the mapping, simulation, and collaboration industries to create a visual story—or depiction—

Photo B– AOR USA introduces its newest computer-based black-box receiver, the AOR2300, which can receive AM, narrow- and wide-band FM, USB, LSB, and CW signals in a range from 40 kHz to 3.15 GHz (cellular blocked) and a whole lot more.

about a real or potential scenario. Depiction can be a useful tool for individual volunteers or for groups such as the Red Cross, Community Emergency Response Teams (CERT), Amateur Radio Emergency Services (ARES), and more. Both agencies and individuals used it to coordinate responses during Hurricanes Gustav and Ike in the Gulf Coast, wildfires in California, the recent winter storms in the Northeast, and other events across the country.

Depiction 1.2 can be purchased risk-free and downloaded for just $199 at <www.depiction.com>, and requires no subscription or maintenance agreement. Volume discounts and discounts for volunteers are available.

For more information, contact Timothy Goddard at 425-297-1950 or <timg@depiction.com>.

Don Keith, N4KC Publishes 21st Book

Active amateur radio operator and prolific author Don Keith, N4KC, released his 21st book, *War Beneath the Waves* (photo D), in early April. The non-fiction work tells the story of the *USS Billfish*, an American submarine that came under an intense depth-charge attack in the Makassar Strait off Borneo in 1943. The incident brought out the worst but also the best in its crew, and resulted in a story that was not revealed for 60 years.

Keith, an ARRL member and Amateur Extra class licensee, has written extensively about submarines, including three books about the Silent Service in World War II. He also co-wrote *The Ice Diaries* with Captain William Anderson, the story of the *USS Nautilus* and her historic voyage beneath the polar ice pack to the North Pole in 1958. N4KC headed a special event operation to commemorate the 50th anniversary of that achievement in August 2008, using the callsign N9N, and operating from the Submarine Force Museum and historic ship *Nautilus*.

War Beneath the Waves is to be published in hardback by NAL/Caliber, an imprint of Penguin Group USA. Four of Keith's previous books were featured selections of The Military Book Club.

For more information, contact Don Keith N4KC at <don@donkeith.com> or visit his website at <www.donkeith.com>. Keith also maintains a website devoted to his writings on amateur radio at <www.n4kc.com>.

Heavy-Duty Cable Protectors

In many work, office, ham shack, and event sites, wiring, cords, cables, and pipes must often be stretched across the floor to transport RF, electricity, electronic data, water, or compressed air. Damage to these cables can occur, causing disruption or permanent damage of the conduit from foot or vehicle traffic or cause bodily harm to people and liability risks to businesses.

"If you've ever used duct tape to hold down cables, cords, or wires, you know that it's ugly, inefficient, damages the flooring, and can be dangerous when it comes unstuck," notes CableOrganizer.com product specialist Christina Hansen. "It's far more effective to protect valuable cables and wiring along the ground from passers-by with high-capacity cord covers,

Photo C– Depiction 1.2 mapping software offers useful capabilities for CERT, ARES, and other emergency responders to visualize a constantly-changing, fluid situation such as a disaster response effort for a floods, wildfires, or any other type of civil event.

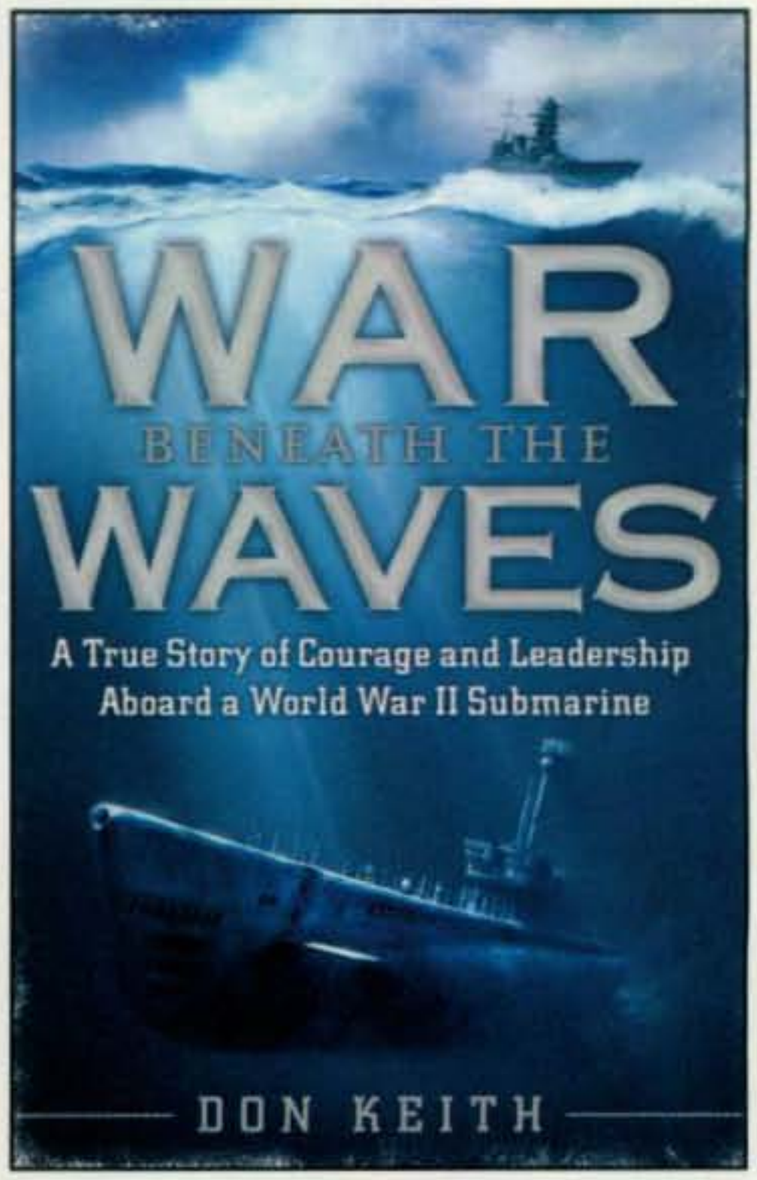


Photo D–Don Keith, N4KC, has released War Beneath the Waves, *the story of the* USS Billfish, *an American submarine. This is the 21st book published by the prolific writer/ham radio operator.*

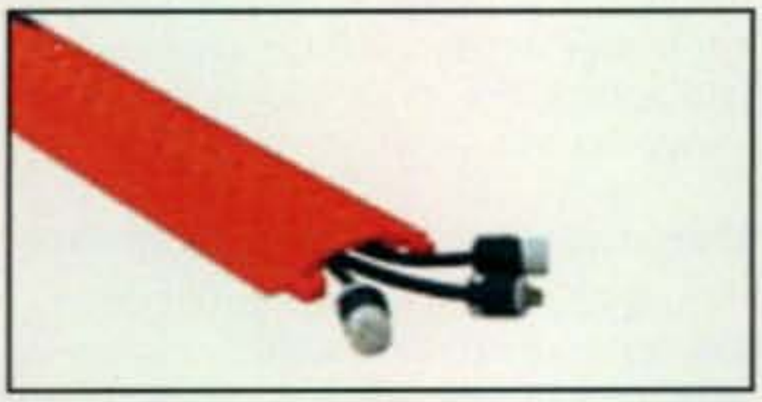


Photo E– Cable Organizers are the folks who make those cable protectors that allow hams and others to safely run cables across an open area without the cables suffering damage from foot traffic or people to suffer trip and fall injuries. (See text for details.)

which are highly abrasion and heavy-traffic resistant—up to a 21,000 pound load per axle. Such cord cover solutions offer a durable, safe, and affordable way to minimize associated hazards."

With this in mind, CableOrganizer.com offers a wide selection of cord covers, cable ramps, and cable protectors to prevent potential damage (photo E). For ham shacks with floor-crossing cables, Cable Organizers offers Rubber Ducts, an easy-to-install and flat-lying cord cover that is perfect for providing those critical cables and cords with rugged protection against foot traffic. Heavy-duty rubber construction gives this product strong resistance to crushing and abrasion at an affordable price.

For more information about cable covers and conduit protection, visit <cableorganizer.com> or call the office toll-free at 1-866-222-0030.

3-D Sun for iPhone

Imagine holding a global view of the entire sun in the palm of your hand. Now you can. A new iPhone application developed by NASA-supported programmers delivers a live global view of the sun directly to your cell phone. Users can fly around the star, zoom in on active regions, and monitor solar activity. The name of the app is 3-D Sun (photo F).

"This is more than cool," says Dick Fisher, director of NASA's Heliophysics Division in Washington, D.C. "It's transformative. For the first time ever, we can monitor the sun as a living, breathing 3-D sphere."

Realtime images used to construct the 3-D sphere are beamed to Earth by the Solar-Terrestrial Relations Observatory (STEREO), a pair of spacecraft with a combined view of 87 percent of the solar surface. STEREO-A is stationed over the western side of the sun, while STEREO-B is stationed over the east.

Telescopes onboard the two spacecraft monitor the sun in the extreme ultraviolet (EUV) portion of the electromagnetic spectrum. "That's why the 3-D sun looks false-color green," explains Lika Guhathakurta, STEREO program

Photo F– If you own an iPhone and want to see what's going on any particular moment with our sun, a new iPhone app, 3-D Sun, can now put a visual image of the sun in the palm of your hand thanks to NASA's STEREO satellites.

scientist at NASA Headquarters. "These are not white-light images."

Solar flares and new sunspots shine brightly at these wavelengths. EUV images also reveal coronal holes, vast dark openings in the sun's atmosphere that spew streams of solar wind into the solar system. Solar wind streams that hit Earth can spark intense displays of Northern Lights.

"Using this app, you can spin the sun, zoom in on sunspots, inspect coronal holes—and when a solar flare erupts, your phone plays a little jingle to alert you," says Guhathakurta.

The app comes alive on its own when the sun grows active or when interesting events are afoot. For example, a recent alert notified users that a comet just discovered by STEREO-A was approaching the sun. When the comet was destroyed by solar heating, the app played a movie of Comet STEREO's last hours.

Another remarkable aspect of the app is that it shows the far side of the sun—the side invisible from Earth. "This means sunspots cannot take us by surprise," Guhathakurta points out.

The new 3-D Sun can be downloaded free of charge at Apple's app store. Just enter "3-D Sun" in the store's search box or visit <http://3dsun.org> for a direct link.

Ham Test Online™ Announces 20/10 Challenge

Ham Test Online™ has announced a new 20/10 challenge for 2010. The 20/10 challenge to non-hams is for them to pay $20 for the online course then study 10 hours to get their Technician ham license. Ham Test Online™ tells us that the average student easily passes the Technician exam after 10 hours with its online course. The 20/10 challenge was created to show prospective hams that it's neither expensive nor difficult to get started in the hobby.

"If you have a friend or family member who's always wanted to be a ham, $20 will get them going," says Ham Test Online Sales Manager Harold "Pi" Pugh, K1RV. "Buy a subscription and give them the gift of ham radio."

Ham Test Online's website at <hamtestonline.com> offers interactive, adaptive online courses that combine study materials, practice tests, and a virtual private tutor to quickly and easily prepare students for the three U.S. (Technician, General, and Extra Class) and both Canadian license exams. The courses are popular with students who have rated them 4.9 out of 5 in more than 100 reviews on eHam.net. The courses are so effective that they come with a money-back guarantee: If you fail the exam, you get a full refund.

For more information, go online to <www.hamtestonline.com> or contact Harold "Pi" Pugh, K1RV, at <k1rv@hamtestonline.com> or call 1-888-857-6164.

Amateur Radio Website of the Month

I'm not certain if this mention of an amateur radio website of the month will become a regular feature of the column, but I thought I would give it a try after a reader requested it. Recently I visited the website <www.AC6V.com> and I was very impressed with the amateur radio information available there. Why not visit it yourself and see what's there?

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.*

BY TED MELINOSKY,* K1BV

County Hunting Q&A and More Short-term Awards

This time we start off with some questions from readers and then move on to two short-term awards from Germany and other DX awards available as well.

County Hunting Q&A

Q: I have the 500 counties basic award and will be applying for the next two levels, through 1500 counties. Should I send the certificate back for you to add the new information and seals?

A: This is optional on your part. Very few certificate holders send the actual certificate back for endorsing. I will mail you the appropriate seals and ribbons. If you make an error, and need a replacement, I will be happy to send it.

Q: My *CQ* subscription expired, but I just renewed and don't have a new label yet. How much should I send for the endorsement?

A: For endorsements, subscribing to *CQ* does not make a difference. The charge is $1.25 for any endorsement, whether you get one seal or all 5 of them to complete the award.

Short-Term Awards 2010

In 2009, my wife and I took a cruise on the Rhine and Mosel rivers in Germany and adjoining countries. This part of the trip, on the Mosel River, was especially interesting, since grapes have been grown on both sides of the river since the Roman era, 2000 years ago. This certificate's design incorporates a wreath of grapes and images of the castles and attractive little towns that cluster along the edges of this historic river. Miles of vineyards line both sides of the river valley and seem to occupy every square foot of the available land.

Germany's 25 Jahre Moselwein-Diplom. DARC Cochem, K45 has been the sponsor of the Mosel Wine Diploma since 1985. On the occasion of its 25th anniversary they are offering a special short-term edition of the award for contacts made from 1 January 2010 to 31 December 2010 with stations from the vineyards along the Mosel River. SWL OK.

Contacts with the following DOKs in cities along the Mosel count for the award:

K05, K10, K25, K28, K32, K47, K48, Q04 and Z11 = 1 point each.

Stations from the Cochem, DOK K45 = 2 points each.

The K45 club stations DFØCOC, DKØMOS, and DNØEMH, which have been assigned a special DOK of 25MWD = 5 points each.

DL stations need 20 points.

Non-DL stations need 10 points.

Contacts on VHF/UHF count double.

Each call counts only one time for each band and mode. All bands and modes except Echolink and packet radio are accepted. Send a GCR list and fee of 5 Euros or US$10 before 30 June 2011 to Rita Gietzen, DL3PF, Dohrer Weg 1, D-56814 Faid, Germany. Internet: <http://www.darc.de/distrikte/k/45/diplome/25-jahre-mwd/>.

Germany's short-term 25 Jahre Moselwein- Diplom is sponsored by DARC Cochem, K45.

USA-CA Special Honor Roll

Scott Petty, KA3QLF
USA-CA All Counties #1196
February 6, 2010

USA-CA Honor Roll

500

VA3NQ 3498
KA3QLF.....3499
KH6BB.....3500

1000

KA3QLF.....1793
KH6BB.....1794
N4GOA.....1795

1500

KA3QLF.....1507
N4GOA.....1508

2000

K1ZN 1393
KA3QLF.....1394

2500

KA3QLF.....1311

3000

KA3QLF.....1222

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>

The Ruhr 2010 Award. The second 2010 short-term award also comes from Germany, but from a totally different area. It was one of Germany's most important coal and steel centers and historically linked to the centuries-old Krupp family iron works. The largest city, Essen, has developed a strong sector of industry and is home to 13 of the 100 largest German corporations.

In 2010, the Ruhr was been named as a European Capital of Culture. On this occasion, Deutsche Amateur Radio Club e.V., Ortsverband Dortmund-West, DOK O 52, offers a short-term award for contacts from 1 January 2010 to 31 December 2010 with several stations in the Ruhr area. Earn at least 2010 points. Point values are as follows:

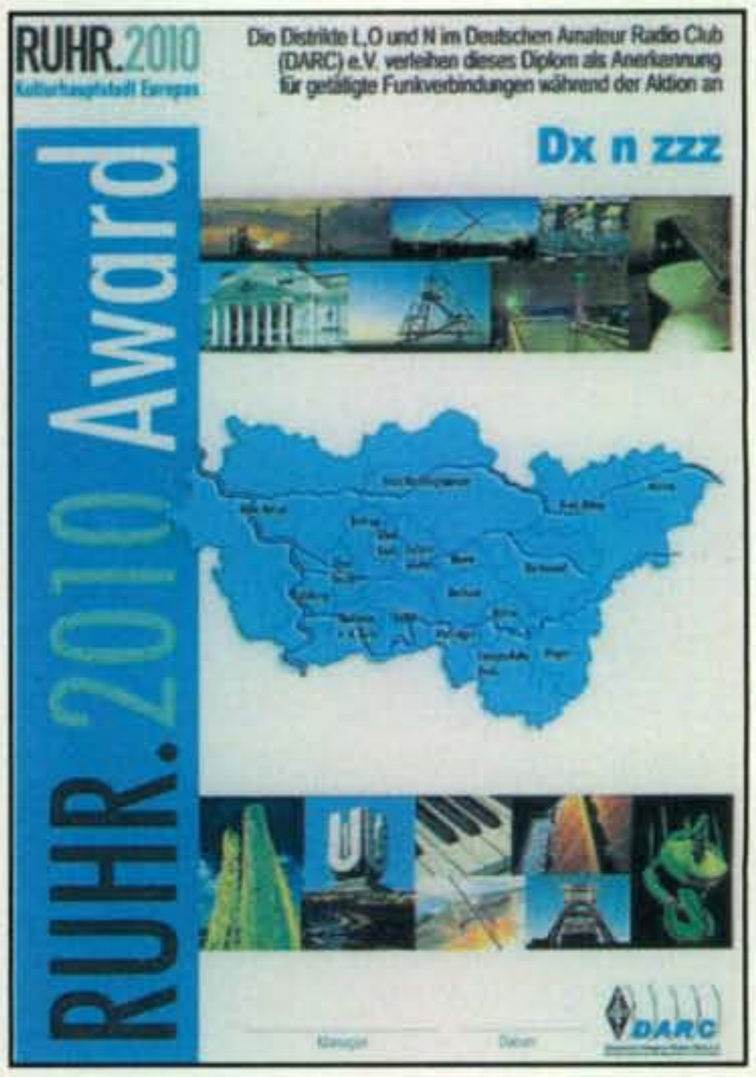
1. Special event stations of Ruhr 2010 (DR2010O, DR2010L, DR2010N) = 150 points.

2. Each club station from the Ruhr = 100 points.

3. Each station member of a local club from the Ruhr = 60 points.

You must contact at least 10 different cities or local associations located in the Ruhr. See the list in Table I. SWL OK. Each callsign may be used one time only. All bands and modes except packet and Echolink may be used. Send a log extract and fee of 5 Euros, stations outside DL 10 Euros or US$15 dollars to: Brigitte Weis- Dittko, DJ5BWD, Ammerbaumweg 44, D-44357 Dortmund, Germany.Internet: <http://www.dr2010o.de/viewpage.php?pageid=1>; e-mail: <dj5bwd@o-52.de>.

The Ruhr 2010 Award, the second 2010 short-term award covered this month, also comes from Germany.



Patricia Mitchell, NØDXE
USA-CA All Counties #1191, November 19, 2009

Hurray! I finally did it! USA-CA! It only took five years, but who's counting? Now for the rest of the story.

I moved to Colorado from Michigan in 1972, having had an opportunity to transfer with my job. I worked as a Federal Civil Service employee at a military base. In the late 1970s I started dating (and later married) a career Air Force officer (Barry, NØKV), who had some unusual hobbies, one being amateur radio. At the time, I didn't even know what amateur/ham radio was. Needless to say, some of our dates were a bit boring, since I often had to listen to all the technical radio gobbledygook. Somehow he "persuaded" me to become a ham, so under the tutelage of none other than NØKV, several of us learned theory and practiced code (I wish I had never learned of Mr. Morse.). In 1979 I became KAØFDW (novice). Shortly thereafter I got my Technician class license. Many years later I got my General class license.

Being a bit mic shy, I pretty much operated on 2 meters talking to the OM. This was before the onslaught of cell phones and ham radio was a good way to communicate when we were both out running errands, etc. And, being in the military and getting transferred every 3–4 years, ham radio proved to be a great way to meet and make new friends, especially by joining the local ham club, etc. I even got out of my comfort zone when we were stationed in the DC area in the early 1980s when I (and of course Barry) helped with communications for the Marine Corps Marathon and participated in a number of Field Days. Next assignment was California, and again ham radio was a regular part of our lives. I even became chief cook and bottle washer for the annual mountaintop June VHF contests.

In 1989 Barry retired from the Air Force and we returned to Colorado, more specifically, Parker (Douglas County). I decided to apply for a new call, NØLFV. I still didn't venture much beyond 2 meters. In 2003 Barry became interested in county hunting and on one of our trips decided to "run" counties on the 20- and 40-meter county hunting nets. I became his official logger. Somehow, after hearing other teams (thanks bunches to AA9JJ/N9QRQ?!), Barry again "persuaded" me to to run as a husband/wife team. I again changed my call, this time to NØDXE (good for bingo, etc.). Also, I started working counties from home and watched the "spots," especially the last six months or so as I was closing in on getting those last elusive counties. Finally, I was down to the last one, so a trip to Texas was in order. I had to give my partner in crime that last one, especially the first time around.

We have attended several of the National MARAC conventions and several mini-conferences. It has been fun to meet and get to know many of the county hunters. We enjoy traveling and county hunting has become an integral part of those travels, having transmitted from 1648 counties. We've had some interesting trips, like the time we ran out of road only to find we had to take a ferry, trailer and all, to get to our next county! And we've enjoyed many an "eyeball" (and some good meals with the likes of K8ZZ, N4AAT, WG6X, KA4TYG, WB4KZW, N4UJK, NV4Z and AA4GT, KØFG, etc.

Patricia Mitchell, NØDXE, USA-CA All Counties #1191, November 19, 2009.

In closing, I want to say *thank you* to all the hams/operators running counties and the net controls. I couldn't have done it without you. Thanks to WØNAC and NØLXJ who not only checked my MRCs in a timely fashion but provided moral support. Also, thanks to *CQ* magazine for sponsoring the USA-CA Award.

So, I guess I'll keep working counties, and who knows? Maybe someday I'll get Bingo, 2nd, etc. Of course, too, we'll continue to run counties in pursuit of "running all counties." I had to say this, as I know the OM is going to read this. See you on the road.

—73, Patricia, NØDXE

This brand-new award is offered by the Redcliffe and District ARC of Queensland, Australia.

Australia's VK9 Award

This is a brand-new award offered by the Redcliffe and District ARC of Queensland, Australia. It requires one contact with each of the little islands of Australia, which are generally available only by special expeditions. Note that as of 1 November 2009 callsigns for the VK9 DX entities will fall in line with the practice for issuing callsigns for all other VK call areas. Therefore, the sponsor expects to see future applications that combine both old contacts under "VK9" and other VK call districts, but no change in the actual countries or entities required. No matter what they call them, this is a difficult achievement.

Contact each of the VK9 DXCC entities using any or all bands and all modes. Band and mode endorsements are available on request. SWL OK, although their applications must show the callsigns of both stations heard.

The VK9 DXCC entities are as follows: Mellish Reef, Christmas Island, Lord Howe Island, Willis Island, Norfolk Island, Cocos Keeling Island.

Send GCR list and fee of 5 AUD, 2 IRCs, or $US5 to James Fleming, VK4TJF, 4 Murchison Ct., Murrumba Downs, 4503 QLD Australia. Internet: <http://www.redclifferadioclub.org.au/>.

Italy's Diploma Imperium Romanum

The Roman Empire at the height of its power was of enormous size and included areas acquired during the

Alpine	Gelsenkirchen	Kamp-Lintfort	Sprockhoevel
Bergkamen	Gevelsberg	Luenen	Unna
Bochum	Gladbeck	Marl	Voerde
Bönen	Hagen	Moers	Waltrop
Bottrop	Haltern	Mülheim adRuhr	Werne
Breckerfeld	Hamm	Neukirchen-Vluyn	Wesel
Castrop-Rauxel	Hamminkeln	Oberhausen	Weather ad Ruhr
Datteln	Hattingen	Oer-Erkenschwick	Witten
Dinslaken	Heiligenhaus	Recklinghausen	Xanten
Dorsten	Herdecke	Rheinsberg	
Dortmund	Herne	Schermbeck	
Duisburg	Herten	Schwelm	
Ennepetal I	Holzwickede	Schwerte	
Essen	Hünxe	Selm	
Fröndenberg/Ruhr	Kamen	Sonsbeck	

Table I– Cities located in the Ruhr area of Germany (for the Ruhr 2010 Award).

The Diploma Imperium Romanum may be earned by making contacts with all of the regions and countries that now exist and in the past were part of the Roman Empire.

leadership of Trajan, Hadrian, Antoninus Pius, and Marcus Aurelius. In all of the territories of the Empire, the Romans built towns, roads, bridges, aqueducts, fortifications, exporting everywhere a pattern of civilization and the power to assimilate populations and civilizations so thoroughly, that even centuries after the end of the Empire those peoples continued to call themselves Roman.

1. ZA Albania	23. DL Germany	45. 4O Montenegro
2. 7X Algeria	24. ZB2 Gibraltar	46. PA Netherlands
3. C3 Andorra	25. JY Jordan	47. E4 Palestine
4. EK Armenia	26. Great Britain	48. SP Poland
5. OE Austria	27. SV Greece	49. CT Portugal
6. 4K Azerbaijan	28. OJ Guernsey	50. YO Romania
7. EA6 Balearic Is	29. EP Iran	51. 1AØ S.M.O.M.
8. ON Belgium	30. YI Iraq	52. T77 S. Marine Rep
9. T9 Bosnia-Herzegovina	31. 4Z Israel	53. ISØ Sardinia Isl
10. LZ Bulgaria	32. I Italy	54. GM Scotland
11. OK Czech Rep.	33. GJ Jersey	55. OM Slovak Rep
12. EA9 Ceuta & Melilla	34. OD Lebanon	56. IT9 Sicily Isl
13. 5B Cyprus Isl	35. 5A Libya	57. YK Syria
14. ZC4 Cyprus UK Base	36. HBØ Liechtenstein	58. S5 Slovenia
15. HV Vatican City	37. LX Luxembourg	59. EA Spain
16. TK Corsica Isl	38. Z3 Macedonia	60. HB Switzerland
17. SV9 Crete Isl	39. 9H Malta Isl	61. 3V Tunisia
18. 9A Croatia	40. GD Isl. of Man	62. TA Turkey
19. SV5 Dodecanese Isl	41. CN Morocco	63. HA Hungary
20. SU Egypt	42. 3A Monaco	64. YU Yugoslavia Serbia
21. F France	43. ER Moldova	65. GW Wales
22. 4L Georgia	44. SV1A Mount Athos	66. IØ - IK-IZ - IW QSO with Rome

Table II– List of countries in the territory of the Roman Empire:

This award may be earned by making contacts with all of the regions and countries that now exist and in the past were part of the Roman Empire (see Table II). Contacts for the award count if made on or after 1 January 1990. SWL OK. All bands and modes OK. Send a log extract with all QSO information and the signed statement that contacts have been made in full compliance with the amateur radio rules. The manager reserves the right, if in doubt, to ask for the appropriate cards. The award fee is 15 Euros. For more information about the award and instructions for electronic payment, e-mail: Manager Gianfranco, IKØIKEE, < ik0ike@libero.it>.

Serbia's Lajkovac Award

Lajkovac is a small town in central Serbia. The local radio club, Radio Club Zeleznicar, YU1GTU, offers this colorful certificate celebrating the 90th anniversary of the railroad coming through the town, which was a big event at the turn of the century. This certificate conveys the relaxed and rural atmosphere of a small town in Eastern Europe, far away from the bustle of the big city. The club doesn't even charge big fees for the award, and for faraway stations (USA), the requirements are very modest—just one QSO with a member. I checked my cards and found that contact, and it's likely you will as well.

Contact Lajkovac stations after 1 September 1998. SWL OK. All bands or modes accepted, but no cross-mode, digipeater, satellite, or repeater contacts count for the award. Each station may be worked one time only. YUs need

Radio Club Zeleznicar, YU1GTU offers the Lajkovac Award celebrating the 90th anniversary of the railroad coming through the town.

3 QSOs , other EUs 2, and all others 1 QSO with members of Radio Club Zeleznicar YU1GTU. YU and EU must work club stations YU1GTU.

Award is free, but YU and EU stations must send 2 IRCs and all others 4 IRCs for postage. Send GCR list and fee for postage to: Radio Club Zeleznicar, PO Box 5, YU-14224 Lajkovac, Yugoslavia. Internet: <http://solair.eunet.rs/~yu1ab/awards/lajkovac.html>

Club members: YU1GTU (special call YT1L), YU1AB (YU4A), YU1CM, YU1SL, YU5B, YT1DL, YT1DOS, YT1GSM, YT1MIT, YT1MBZ, YU2MAX, YT1SEN, YT1SMC, YT1VBR, YT1VVK, and YT1WIN .

We're always interested in hearing from club, special interest group or individuals who sponsor an award. Contact me at the e-mail address shown on the first page of this column.

73, Ted, K1BV

BY JOE LYNCH,* N6CL

Amateur Radio in Hanoi

I first learned about Vu Trong Thu, XV9AA, from Tom Clark, K3IO, at the 40th AMSAT Symposium last October. Thu is a software engineer who is 27 years old and lives in Hanoi. Tom posted a notice about Thu's work on an amateur radio satellite for his country. When I got on Facebook I learned that Thu was also on Facebook. I asked him to be my friend, and he agreed.

I learned that not only is Thu interested in satellite communications, he is also interested in EME communications. Learning that about him prompted me to contact Dave Blaschke, W5UN, to be a mentor of sorts to help Thu get on EME. Dave readily agreed to be Thu's mentor. Hopefully, by the time you read this Thu will have already made his first EME contact.

In following up with Thu and Dave, I learned that Thu has been communicating with Dave via Skype. It was then that I decided to get more socially involved in the worldwide web, so I installed Skype. Shortly after I installed Skype I arranged through Facebook to have a video call with Thu. We spent more than 40 minutes in conversation during which I asked Thu a number of questions. What follows is a summary of our Skype video conversation:

My first questions were related to Thu becoming a ham. Thu told me that he liked experimenting with long-range communications, and amateur radio was a natural hobby for him to pursue to satisfy his interest in communications. Thu has been licensed since January 2009. He said that he had to go to Ho Chi Minh City to take his exam.

Thu pointed out that in Hanoi there are only three active hams. However, in Ho Chi Minh City there are more than 100 active ham radio operators. He said that most of the hams are traditional, in that they operate on the HF bands.

*e-mail: <n6cl@sbcglobal.net>

Vu Trong Thu, XV9AA, holding the Vietnamese amateur radio nanosatellite F-1. (Photo courtesy of XV9AA)

VHF Plus Calendar

May 2	Very poor EME conditions.
May 5	*Eta Aquarids* meteor shower.
May 6	Moon apogee. Last quarter Moon.
May 9	Moderate EME conditions.
May 14	New Moon.
May 14–16	Dayton Hamvention®. (See text for details.)
May 15–16	2 GHz and Up World Wide Club Contest. (See text for details.)
May 16	Poor EME conditions.
May 20	Moon perigee. First quarter Moon.
May 23	Good EME conditions.
May 27	Full Moon.
May 30	Very poor EME conditions.

—EME conditions courtesy W5LUU

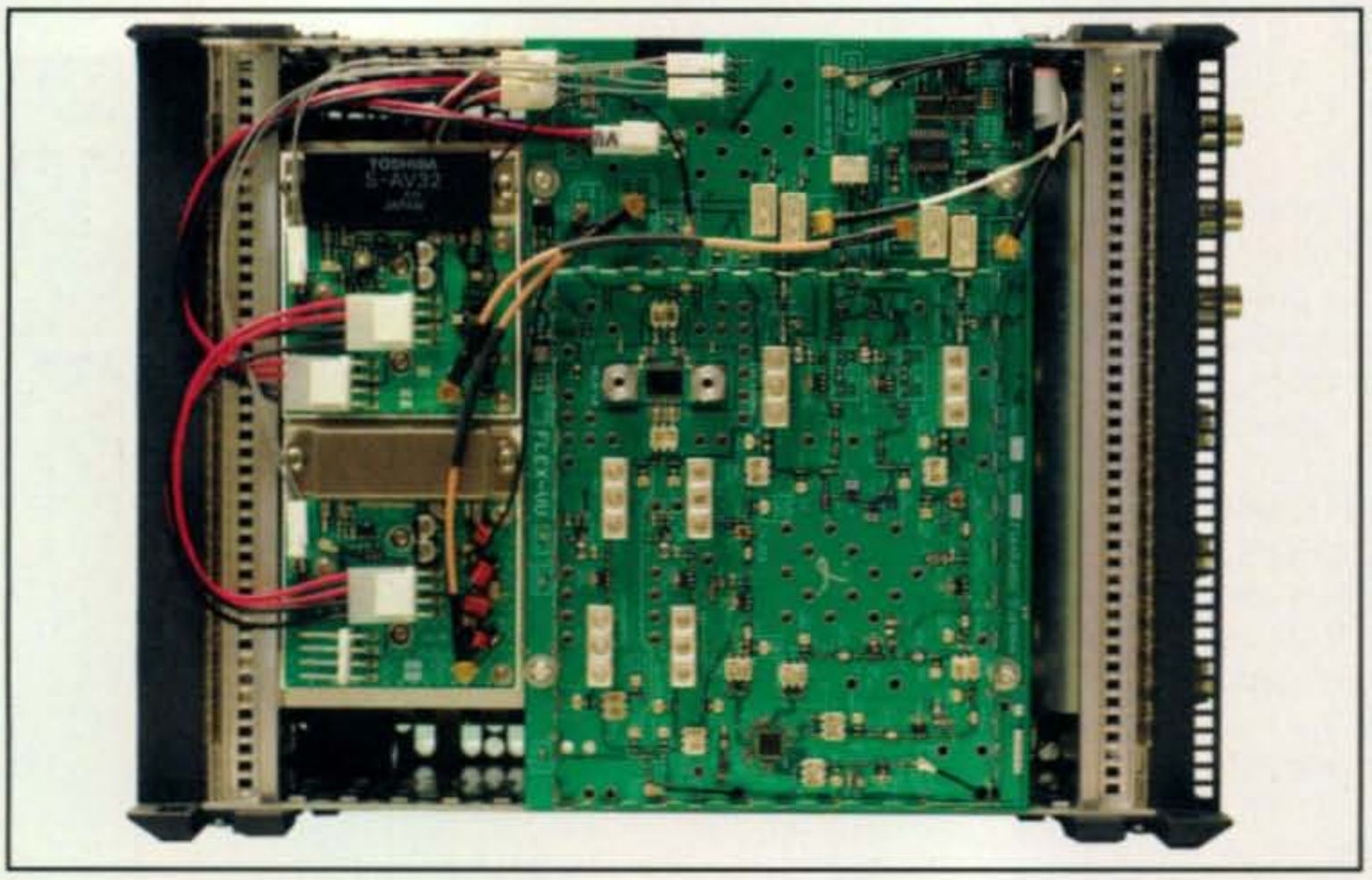
I asked Thu how he first got interested in satellites. He replied that in 1997 when he was in high school, he saw pictures sent back from Mars by the NASA Pathfinder mission. It inspired him to learn about astronomy and space exploration. He built his own telescope and began his own limited space explorations.

I then asked Thu about EME communications. He replied that he has several Japanese friends who are ham radio operators and who work at JAXA, the Japanese national aerospace agency (http://www.jaxa.jp). They introduced him to EME operations. He said that last summer some of his Japanese friends used a big dish for EME operations. He said that he also tried to communicate via EME but was not able to hear anything. He indicated that he would be trying again this year (perhaps last month during the Echoes of Apollo event). He was also looking for a good pre-amp.

Thu commented on Dave Blaschke, W5UN's efforts at mentoring him. He said that Dave advised him to upgrade his coax and learn WSJT before making a serious attempt at getting on EME.

I asked Thu if amateur radio is being introduced to the young people in Vietnam. Thu replied that another hobby of his is astronomy. Because of his interest in astronomy he formed a club that meets monthly. He said that he would go about introducing young people to amateur radio by the same method—starting a small group and then inviting more people. He has gone to the universities and given talks on his satellite development.

Thu is working with his employer, FPT University and the FSpace laboratory under the FPT Research & Innovation Institute, in developing a nanosat, designated F-1. The F-1 will have a 2-meter uplink and a 70-cm downlink. Commenting on his satellite development, he hopes to complete it by the end of this year and launch it next year. His problem is finding a launch provider. Currently, he is exploring the possibility of a piggyback launch with an Indian PSLV (Polar Satellite Launch Vehicle). However, the cost is prohibitive. A more reasonable fee is the $30,000 that NASA charges for launching U.S.-made cubesats. Unfortunately, NASA is unable to offer such launch opportunities



FlexRadio Systems' new FLEX-VU5K, installed in the FLEX-5000A, shown for illustration purposes with the cover off. (Photo courtesy of FlexRadio)

to other nations. Thu has agreed to write an article on the F-1 nanosat for *CQ VHF* magazine.

In all, our conversation lasted for more than 40 minutes. It included a brief discussion about my time in Vietnam as a MARS operator.

It was a pleasure to meet Thu via Skype. He is very enthusiastic about amateur radio, and it appears that the future of amateur radio development in Vietnam is in good hands with the leadership that Thu is providing. Watch for updates on F-1 and other VHF-plus activities in Vietnam via this column.

VHF-Plus Products at Dayton

Below are VHF-plus products to look for while you are wandering around at the Dayton Hamvention®:

FLEX-VU5K™: FlexRadio Systems® has released its latest upgrade for its popular FLEX-5000A™ software-defined-radio transceiver: The FLEX-VU5K. The FLEX-VU5K adds full-featured multi-mode VHF/UHF capability covering the entire 144–148 MHz and 430–450 MHz frequency ranges. The FLEX-VU5K is optimized for weak-signal operations, featuring very low noise figure (1 dB) preamplifier front ends and output power of up to 60 watts per band. There's even a 50-mW low-power mode for driving microwave transverters and a user-selectable IF-gain bypass mode for external pre-amp configurations. The FLEX-VU5K uses the FLEX-5000A's internal 0.5-ppm frequency reference or can be locked to an external 10-MHz reference input.

VHF/UHF operation with the FLEX-5000A and the new FLEX-VU5K takes full advantage of PowerSDR™, FlexRadio's famous software operating environment. Up to 192 kHz of receive bandwidth can be displayed at the same time, making it very easy to "watch" for band openings. Imagine being able to monitor 144.200 MHz while keeping an eye out for beacon activity at 144.380 MHz. By adding a second synchronous receiver to the FLEX-5000A, you can watch both VHF and UHF at the same time. Of course, you can always monitor HF as one of the active bands. Cross-band full-duplex operation is fully supported for satellite operations. The PowerSDR software also allows easy integration to existing third-party software such as SATPC32 and WSJT to add additional operating modes to the FLEX-5000A/FLEX-VU5K combination. The high-power FLEX-VU5K can be factory retrofitted to an existing FLEX-5000A or can be ordered with a new radio. For more information, see FlexRadio Systems website: <http://www.flex-radio.com>, or call: (512) 535-4713.

Elecraft K144XV: With an Elecraft K144XV internal 2-meter module installed, your K3 will make another leap forward in versatility. The K144XV covers the full 144–148 MHz U.S. allocation, so you can do weak-signal CW/SSB work as well as access 2-meter repeaters in your area. The receiver has excellent sensitivity and dynamic range. Maximum transmit power output is 8–10 watts in all modes, with diode switching for silent, relay-free T/R.

The K144XV eliminates the extra weight and system complexity of external transverters, while working seamlessly with K3 firmware and hardware. The VFO displays the actual 2-meter operating frequency, thanks to the built-in transverter band displays. When the 2-meter band is not in use, the K144XV module is turned off, consuming no current. If you have a KRX3 sub-receiver installed, you can tune HF–6 meters with the sub while operating on 2 meters with the main receiver/transmitter.

The K3 includes many features for use with FM and repeaters, including sub-audible tone encoding, programmable repeater splits, noise squelch, adjustable deviation, and both continuous and channel-based scanning. With the sub-receiver installed, you can listen to a repeater's input and output frequencies simultaneously.

The K144XV comes fully assembled and aligned. You can easily install it in the K3 yourself using the supplied hard-

Elecraft's new K144XV internal 2-meter module installed in the K3. The module cover is removed for illustration purposes. (Photo courtesy of Elecraft, Inc.)

ware and interface cables. The professionally written, fully illustrated assembly manual provides step-by-step instructions.

W2 Wattmeter: The Elecraft W2 wattmeter provides the fast, high-brightness LED bar graphs you need to keep track of transmitter and amplifier performance. With four power ranges (2/20/200/2000 watts), the W2 can satisfy the needs of both QRO and QRP operators. The compact, attractive display unit will fit just about anywhere, requiring only 10–14 VDC and sensor cables.

The Elecraft W2 wattmeter covers power up to 2000 watts and the HF–6 meter bands as well as 144–450 MHz. (Photo courtesy of Elecraft, Inc.)

The Elecraft P3 Panadapter provides a stand-alone DSP spectral/waterfall display for the K3. (Photo courtesy of Elecraft, Inc.)

RF sensors for the W2 can be placed near the transmitter's output, minimizing coax length. Two sensors can be connected to the W2, if required, to monitor different transmitters or amplifiers, switch-selected from the front panel. Sensors optimized for 144–450 MHz and HF–6 meters are available, with two different power ranges. The sensors use standard CAT5 shielded or unshielded cables.

The W2 can be configured to generate alarm outputs at a high SWR. It also includes a fully-isolated amplifier keying cutout relay. On any alarm condition, the amp's key line can be broken, preventing possible damage to sensitive equipment.

The W2's built-in RS-232 port allows you to use a computer to read both power and SWR with higher accuracy, as well as to set and check alarms, turn off the LEDs, and other operations. You can use the supplied PC software, or write your own remote-control applications. The W2's RS-232 drive circuitry is intended for short cable lengths (typically 6 ft.), but you can also use the

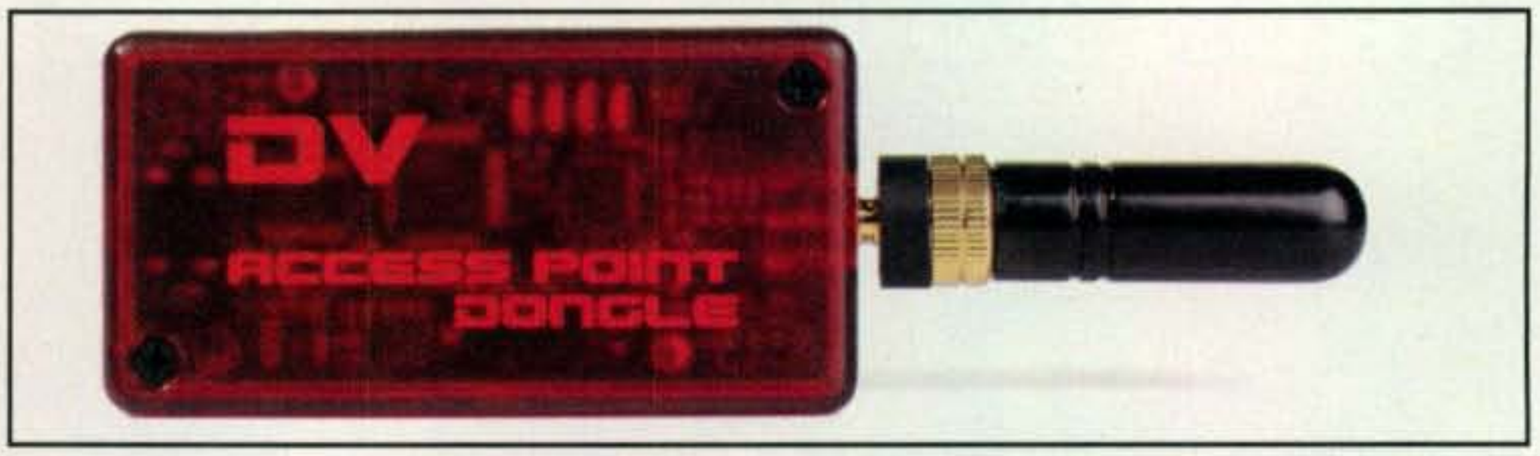
On the Cover

"I have so many hobbies, I don't have time for work," says Dick Metsker, AF4TX, of Hendersonville, Tennessee, who enjoys woodworking and fishing in addition to ham radio. In fact, Dick's shack is part of an addition to his house that is half woodworking shop and half radio room, and he enjoys blending his hobbies. He makes his own fishing lures from wood and experiments with them on Old Hickory Lake, near his house, some 20 miles northeast of Nashville.

Dick also designed and built his radio desk; the whole thing is on wheels and the top hinges forward to give him access to the back of all his gear. The gear on the desk includes a Kenwood TS-950SDX HF transceiver with a TL-922A amplifier, a Vectronics antenna tuner, a Yaesu rotor controller, and an Astron RS-70M power supply. For VHF and UHF, Dick has a Yaesu FT-5100 dualband FM rig, along with a simplex autopatch that allows him to make phone calls via his handheld from any place within range of his antenna.

Dick's 2-meter and 70-centimeter antennas are on top of his tower, which is motorized and controllable from inside the shack. It nests at 20 feet (although taller trees make that impossible in Dick's case) and can be raised to 72 feet. There is an additional 20-foot mast on top, supporting those VHF/ UHF antennas, a Moseley beam for 10–40 meters, and an 80-meter dipole, which is rigged on either end with weights and pulleys to let it move up and down with the tower.

Professionally, Dick is a licensed dispensing optician and currently works as the procurement officer for the Tennessee School for the Deaf. A ham for roughly 15 years, Dick's original—and current—favorite activity is DXing. "DX still fascinates me," he says. "I just love it." *(Cover photo by Larry Mulvehill, WB2ZPI)*



The new DV Acess Point Dongle is available at amateur radio dealers around the U.S. (Photo from the website: <www.dstarinfo.com>)

Elecraft KUSB or other USB to RS-232 adapters, greatly extending the control cable length when required.

You can purchase the W2 assembled and tested, or as an easy-to-build, no-soldering kit at reduced cost. Again, ther professionally written, fully illustrated assembly manual provides step-by-step instructions.

P3 Panadapter: The P3 Panadapter from Elecraft is a stand-alone DSP spectral/waterfall display unit that is a perfect match for the K3. It has a built-in, high-contrast color display (LCD), point-and-click QSY tuning, and better plug and play integration with the K3 than is possible with PC-based panadapters. The P3 features include 2 to 200 kHz of span, signal averaging, peak hold, adjustable gain, and adjustable reference level. It also includes a buffered IF pass-through for support of additional IF processing.

If you have difficulty with any Elecraft product, the company's technical support via telephone and the internet will help get your Elecraft product up and running quickly. You can also get answers to nearly any question day or night from the helpful, tech-savvy hams on its e-mail user group.

D-STAR DV Access Point Dongle: The D-STAR gurus who first brought you the D-STAR DV Dongle, Moe Wheatley, AE4JY, and Robin Cutshaw, AA4RC, have now come out with the D-STAR DV Access Point Dongle (DVAP). The DVAP is a Gaussian Minimum Shift Keying (GMSK) modem with a 2-meter transceiver built into the dongle. The repeater has a maximum power output of about 10 dBm (or 10 milliwatts) which gives it a range of about 100 meters using the included SMA-based antenna.

If your area does not have a D-STAR repeater, you still can have access to the D-STAR network by using the DVAP dongle and a D-STAR compatible handheld radio. While it is designed for use around the house, there are reports of being able to surreptitiously access the unit as far away as three miles.

The DVAP is available in ham radio stores throughout the U.S.

Current Contest

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

Current Convention

Dayton Hamvention®: The Dayton Hamvention® will be held as usual at the Hara Arena in Dayton, Ohio, May 14– 16. For more information, see the website <http://www.hamvention.org>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. The following organizations and/or conference organizers have announced calls for papers for their forthcoming conferences:

Central States VHF Society Conference: Technical papers are solicited for the 44th annual Central States VHF Society Conference to be held in St. Louis, Missouri on July 22–24. Papers, presentations, and posters on all aspects of weak-signal VHF and above amateur radio are requested. You do not need to attend the conference, nor present your paper, to have it published in the *Proceedings.* Posters will be displayed during the two days of the conference. Please contact the folks below if you have any questions about the suitability of a topic. Strong editorial preference will be given to those papers that are written and formatted specifically for publication, rather than as visual presentation aids. Submissions may be made via the following: electronic for-

mats (preferred); via e-mail; uploaded to a website for subsequent downloading; on media (3.5-inch floppy, CD, USB stick/thumb drive). Deadline for submissions: May 1, 2010. For more information, contact CSVHFS President Ron Ocho, KØØZ, at <ko0z@arrl.net>.

ARRL and TAPR Digital Communications Conference: Technical papers are solicited for presentation at the 29th Annual ARRL and TAPR Digital Communications Conference to be held September 24–26 in Portland, Oregon. These papers will also be published in the conference *Proceedings* (you do not need to attend the conference to have your paper included in the *Proceedings*). The submission deadline is July 31, 2010. Send papers to: Maty Weinberg, KB1EIB, ARRL, 225 Main St., Newington, CT 06111; or you can make your submission via e-mail to: <maty@arrl.org>. Papers will be published exactly as submitted and authors will retain all rights.

Meteor Showers

May minor showers include the following and their possible radio peaks: the *ε-Arietids,* May 9, 1400 UTC; May *Arietids,* May 16, 1500 UTC; and *o-Cetids,* May 20, 1400 UTC. For more information on these meteor shower predictions please see Tomas Hood, NW7US's "Propagation" column as well as the International Meteor Organization's website: <http://www.imo.net>.

Lightning Finds its Mark

Have you ever wondered how lightning has targeted your antenna? Here is a URL for a photo that *CQ VHF* magazine ATV columnist Tom Dean, KB1JIJ, posted on his Facebook page: <http://imgbit.com/images/2868c9c9331249519453.gif>. Is your antenna in that lightning strike line of fire?

The Australian Connection: A Follow-Up

Thank you so very much for all of your wonderfully kind e-mails concerning the Apollo 11-Australia connection piece that I ran in March. It was a lot of fun to put together and I am glad that so many of you enjoyed reading it and sharing it with others. The following is a link to John Sarkissian's full article "On Eagle's Wings" online illustrated version: <http://www.parkes.atnf.csiro.au/news_events/apollo11/>. Also available at this site is a pdf version of the article.

And Finally . . .

We are finding our way around these social networks and avenues that have been around for quite some time. Unfortunately, we have been late adopters of some of these opportunities. Even so, we are making up for lost time. Look for an increased effort to get the word about our coverage of this niche of our hobby via these social network resources, such as Facebook, Skype, and Twitter. I am even working on starting a blog.

In spite of the problem that there are more things than there is time to see and do at Dayton, I hope to see as many of you as possible. Again, I will be at the CQ booth and will attend the joint TAPR AMSAT banquet on Friday evening.

Until next month...

73 de Joe, N6CL

contesting

BY JOHN DORR,* K1AR

Making Room for Everyone: Contesting's Bandwidth

May's Contest Tip

Regardless of size and/or type of antenna, pointing your beam towards the south (at least from North America) can often yield amazing QSOs. This past contest season, for example, KL7RA was worked on 15 meters from New England by aiming south in the late afternoon. The same effect was realized to KH6 on 10 meters from K3LR. Whether you live in the eastern U.S. or Timbuktu, you can often work difficult multipliers by pointing your beam in polar directions. Over the years, I've learned a dead band is often not really a dead one at all!

There are very few topics that are more contentious than the challenges that come from the way we utilize our precious frequencies. With conditions finally heating up again, it's time to be thinking about this critically important subject. Perhaps now, more than any other time in the history of our hobby, the amateur spectrum is being threatened by the encroachment of commercial interests and others. The problem is further compounded by the way we sometimes trivialize examples such as the loss of VHF frequencies, which seems to be nothing more that a remote concern for many hams. After all, many of us have never even seen a transceiver display a frequency above 28.900 MHz, right?

I strongly believe that the amateur spectrum is being watched by predatory interests. Having said that, let's take a few minutes to consider our amateur spectrum use from a contesting perspective.

The reality of ham radio operating today is that there are many contest weekends when the operating event dominates almost every ounce of our primary HF amateur bands—albeit usually only on one mode and without any intrusion on the WARC bands. Obvious examples include the CQ WW, CQ WPX, ARRL DX, and ARRL Sweepstakes contests. In contrast, it's also fair to say that even with contests taking place nearly every weekend of the year, the vast majority are not disruptive to "non-contest" operating. Is this acceptable to amateurs? This is one topic that definitely brings opinions out of the woodwork!

Before I go on, I think it's important to point out that contests are not the only area of our hobby that amateurs find disruptive. There are few active hams who can forget the chaos that has originated from some of the major DXpeditions in recent years. Operating practices such as listening on 20 meters SSB from 14.200–14.300 MHz comes to mind. And while I'm not here to judge the value of that approach, it most certainly has an impact on our use of the bands.

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e-mail: <K1AR@contesting.com>

Calendar of Events

All year	**CQ DX Marathon**
Apr. 24–25	10-10 CW Spring Contest
Apr. 24–25	SP DX RTTY Contest
Apr. 24–25	Helvetia Contest
Apr. 24–25	Florida QSO Party
Apr. 24–25	Nebraska QSO Party
May 1–2	7th Area QSO Party
May 1–2	New England QSO Party
May 1–2	ARI DX Contest
May 1–2	Indiana QSO Party
May 8–9	VOLTA WW RTTY Contest
May 8–9	CQ-M Int'l DX Contest
May 15–16	King of Spain CW Contest
May 22–23	Baltic Contest
May 29–30	**CQ WW WPX CW Contest**
June 5–6	SEANET Contest
June 26–27	ARRL Field Day
July 17–18	**CQ WW VHF Contest**

There are still others who feel the increasing growth of net operations is poor use of our bands. Haven't you heard some folks complain about the seemingly inefficient emergency/traffic nets operating at the high end of 20 meters? There was a recent firestorm of e-mail postings related to the Maritime Mobile Service Network, which can be found operating on 14.300 MHz. The MMSN proposed that contest sponsors incorporate a "contest-free zone" of 5 kHz around their operating frequency to accommodate emergency traffic handling. Naturally, contesters found this proposal to be hostile to their interests. The point is that everyone has his or her view on the proper use of our valuable frequency spectrum. DXers and contesters are not going to go away, so the operative strategy better be one of coexistence for all of us.

Probably the most commonly proposed suggestion on contest frequency spectrum use coming from my contest surveys and scores of telephone calls/personal conversations is an expansion of the ideas generated by the MMSN for a truly "contest-free- operating zone." While in theory this idea may have some merit, it really doesn't address the fundamental issue—the growing size of contest participation. From my experience, although contest activity does extend itself all the way to the upper edge of certain bands (e.g., 15 and 20 meters), it dramatically trails off well before that point, particularly as conditions continue to improve and everyone spreads out across the high bands. For example, I am so confident about the availability of a clear channel in upper parts of most bands that I use them myself as a safe haven for passing multipliers. Rarely has there been a time when I could not have a normal QSO with a new multiplier (and casual contester) on any band and at any given time. Of course, I wasn't running a phone patch or trying to copy valuable health-and-welfare traffic, but the

techniques for getting someone to move off my frequency were no different than any other mid-week type of operating scenario.

As I've said, contester's use of frequency spectrum is directly related to the amount of participation. In the 1970s and '80s, it was a rare occurrence to witness someone calling "CQ Contest" on 21.405 MHz. However, the broadening of spectrum use in recent times is not because contesters are inherently inconsiderate. Rather, it has happened because the amount of operating interest and activity has grown, warranting its use.

The beauty of amateur radio is that our use of spectrum is not pre-programmed. We are not like a radio or television station with strict guidelines on what we say and when we can say it (except for the FCC rules regarding amateur radio). Amateur operating activity is defined by what the majority wants at any point in time. When a DX-pedition such as Peter I (3Y) comes on the air, you can bet that the majority at that time will want to call and try to work them. You can count on the fact that during the next CQ WW contest the bands will be filled again with great DX, fine operators, and more participants than ever before.

However, let's close with one final consideration. Setting aside the debate on whether or not the majority vote is spoken for during contest weekends, contesters have an obligation to show courtesy and consideration to their fellow hams. While it's easy to get caught up in the heat of competition, we should view our operating practices by asking two key questions: (1) Would my operating practices be acceptable if I were on the other end (especially the non-contester); and (2) Do my operating methods mirror the way I am on the air outside of contests? If you can honestly answer yes to these two questions, then by my definition you have passed the operating fairness test. Let me know what you think!

Final Comments

In today's economy, when we hear the words "real estate," we immediately think of government bailouts and foreclosures. By being good stewards of the bands (our real estate), the FCC and other authorities won't foreclose on our usage of ham radio's precious real estate!

See you in the next contest!

73, John, K1AR

Timeline of Ham Radio History 1945–2010

To help celebrate CQ's 65th anniversary, we've put together a timeline of significant events in ham radio history from 1945 to the present. Each month this year, we'll present five or six years' worth, and then put the whole list on our website when we're done. (Since this is a timeline and not a textbook, we had to be selective. We apologize in advance if we leave out something of importance to you.)

This month, we'll cover the years 1968–1973:

1968: The FCC authorizes slow-scan television (SSTV), with which hams exchange single-frame images using a narrow enough bandwidth for HF efficiency; *ham radio* magazine begins publication, focusing on the hobby's technical side.

1969: The Inoue FDFM 6-channel 2-meter FM transceiver is the first made-in-Japan ham rig offered in the U.S. market (Inoue is known today as ICOM); the Radio Amateur Satellite Corporation (AMSAT) is incorporated in Maryland, moving the focus of amateur satellite program closer to Washington, DC (the original Project OSCAR was based in California).

1970: *CQ* magazine celebrates its 25th anniversary; Australis-OSCAR V (AO-5) launched, with downlinks (no uplinks) on 2 meters and 10 meters. It is the first HF ham satellite and the first amateur satellite built outside the U.S. Today, hams in nearly a dozen countries have built satellites and had them launched into orbit.

1971: The Amateur Satellite Service is formally recognized at the World Administrative Radio Conference (WARC-71); interest explodes in FM and repeaters, often using surplus public service radios converted to the ham bands; *WorldRadio* magazine begins publication.

1972: FCC allows Novices to use VFOs instead of being limited to crystal control, and extends Technician allocation on 2 meters to cover 145–148 MHz, encouraging the growth of repeaters; FCC also makes first rules for repeaters and relaxes logging rules; ham dealers begin accepting credit cards; *National Contest Journal* begins publication.

1973: A survey by *CQ* shows that 25% of all spending on ham gear is on VHF-FM equipment, just two years after FM and repeaters start gaining popularity; FCC decreases waiting period for upgrading to Extra from two years to one year.

Next month, we'll look at 1974 through 1979, featuring major licensing changes, computers in the ham shack and approval of three new HF ham bands.

dx

BY CARL SMITH,* N4AA

Lots of Island Activities

As I write this in early March, it appears that we are finally going to get away from the cold winter weather in North Carolina, where I live, and other areas as well. The cold weather has had its good side, however, in that propagation has been pretty good with the solar flux moving up and staying in the 80s. That's a number we haven't seen for a long time. The ARRL SSB contest is going now (the weekend of March 6 and 7), and I see a lot of activity on 15 meters, but 10 meters hasn't quite made it as yet. During the past week or two 12 meters has been enjoying lots of action; even I managed several new ones on 12 and heard others I just couldn't work.

DX News

We haven't heard much from Mike, KM9D, and his sailing partner Jan, KF4TUG, but they showed up from **Micronesia** in early March as V63MY and V63TO from Oroluk Island for a ten-day run. For IOTA (Islands On The Air) folks that island is OC-260.

Bill, N7OU/5WØOU, and Bob, W7YAQ/5WØYA got "stuck" on Samoa when their transportation to **Tokelau** was cancelled. They finally were able to secure passage on a ship on March 5th. As of right now there has been no report on how long they might be able to stay on Tokelau, assuming that ship was able to make the trip. As for their operation from Samoa, Bill reported they had logged over 22,000 QSOs in the three weeks they were there.

CYØ, Sable Island. The team of WA4DAN, AA4VK, NØTG, and AI5P announced the trip planned for last year is now on schedule for sometime in September–October. Sable Island is ranked at #65 on *The DX Magazine*'s Most Wanted survey for 2009. Their website is being updated with the latest details, so keep an eye on it at <http://www.cy0dxpedition.com>.

One that is ranked rather high at #28 on the Most Wanted list is **Kermadec**. A team of 12 German DXers and one Polish DXer is going to be there November 19 to December 5 as ZL8X. Details of the operation are on their website at <http://www.kermadec.de/index.php>. The plan calls for seven stations all capable of all-mode operation. They have chartered the famous *Braveheart* with Captain Nigel Jolly for the trip.

Palestine (E4) at #51 is much needed, and an operation from there is in the works by a team of nine. There are five Spanish operators, three French, one Italian, and one Ukrainian op, and they plan to be there May 28 to June 6. Three stations will be on the air 160–6 meters using CW/SSB/RTTY. For the latest details check the website at <http://www.dxfriends.com/e4x/>.

The operation from **northern Iraq** as YI9PSE probably has been wrapped up by the time you see this, as they were scheduled to be there April 2–12. Check the website <http://www.yi9pse.com> for news on this one.

ZS8M from **Marion Island** could be on the air at any time—at least that is the information available at the time of writing this column. Pierre, ZS1HF, has said, "I will be operational from the end of April." From other info I have seen, I believe he will only be operating SSB and perhaps RTTY.

Left to right: Roger, G3LQP, Bharathi, VU2RBI, and Roger, G3KMA. Bharathi was on a short visit to London, and on March 8 she attended a Commonwealth Day Observance Service in the presence of the Queen and the Duke of Edinburgh at Westminster Abbey. She was there to make a short speech at the service. (Photo courtesy of Roger, G3LQP)

The Passau DX Club meeting, February 27, 2010, left to right: Franz, DJ9ZB; Alweena, XYL of Gary, DF2RG; Gary, DF2RG; Alois, DL8RBL; Markus, DL9RCF; Roger, DL5RBW; and Gerold, DL6RBG. DL6RBG, having just achieved Honor Roll, was presented with his Honor Roll plaque. (Photo courtesy of DL9RCF)

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CQ DX Awards Program

CW

1100 ..... G4ZUL

SSB Endorsements

330 ..... K4IQJ/339
330 ..... W2CC/336
300 ..... WD9DZV/301
300 ..... XE1MEX/300
200 ..... W1PX/205

CW Endorsements

330 ..... K4IQJ/338
330 ..... KA7T/336
310 ..... WD9DZV/312
300 ..... KØKG/309

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 339 active countries. Please make all checks payable to the award manager.

There has been no mention of CW activity, but that could change. He will be on the island for a year working as a radio/electronics technician.

It doesn't seem to matter how often someone goes to **Annobon, 3CØ**. It continues to show up in the top 50 or higher on the Most Wanted list. For 2009 it was #35, but it will see some action by the time you read this, as it is scheduled for late April.

A number of folks are waiting to hear what will happen with the **Netherlands Antilles** "break-up" which is supposed to happen near the end of this year, around October. I've heard about a number of "groups" and some individuals who are hoping to be "first" in getting on the air from one of these all-time new ones. The only problem is no one seems to know just what is going to take place or when. With some of the political problems in Europe, the process may not go as many would like. I'm told that folks on these islands aren't even sure how licensing will be handled at this point in time. Far be it for me to tell some of the major DXpeditioners what

The WPX Program

CW

3243 ..... YO9HP
3244 ..... JH8BOE
3245 ..... KØTC

SSB

3067 ..... YO9HP
3068 ..... JH8BOE

Mixed

2092 ..... KK3Q
2093 ..... YO9HP
2094 ..... DL9SEV
2095 ..... RA9OO
2096 ..... AA6XV

Digital

41 ..... YO9HP

CW: 350 KØTC. 600 IZ2CSX, JH8BOE. 800 7N2JZT, 1650 YO9HP. 2500 IØNNY.
SSB: 600 JH8BOE. 900 7N1NXF. 1850 YO9HP. 2850 UT7DX.
Mixed: 450 RA9OO. 650 KK3Q. 700 DL99SEV. 2550 YO9HP. 4300 N9AF.
Digital: 450 KF2O. 1050 YO9HP.

160 Meters: RU3ZX, YO9HP
80 Meters: RU3ZX, YO9HP
40 Meters: RU3ZX, YO9HP
30 Meters: YO9HP
20 Meters: RU3ZX, YO9HP
17 Meters: YO9HP
15 Meters: RU3ZX, YO9HP
12 Meters: YO9HP
10 Meters: RU3ZX, YO9HP
6 Meters: YO9HP

Asia: RU3ZX, IZ2CSX, YO9HP
Africa: RU3ZX, YO9HP, KK3Q
Europe: RU3ZX, YO9HP
Oceania: RU3ZX, YO9HP
N. America: RU3ZX, YO9HP, KK3Q
S. America: RU3ZX, YO9HP
10 Meters: RU3ZX, YO9HP

Award of Excellence: RU3ZX, YO9HP
160 Meter Bar: RU3ZX, YO9HP
30 Meter Bar: YO9HP
17 Meter Bar: YO9HP
12 Meter Bar: YO9HP
6 Meter Bar: YO9HP
Digital Bar: YO9HP

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.

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.

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.

to do, but I think it might be wise to wait a while before booking plane tickets.

Interesting Book and Operating Events

I do a lot of reading (also other that radio-related books). Recently, though, I came across interesting books written by a YL, Nancy Williams, NR4RR. She has written a couple of books that include ham radio as part of the story. Both books share a common "hero" who gets involved in some pretty scary plots dealing with government agencies. The latest book actually is based on a real document that most people are not even aware of. The book is called *The Agenda 21 Conspiracy* and is available from Nancy's website: <http://www.nlwilliamswriter.com/>, Amazon, or other sources. I shared the book with some friends who were as enthusiastic about it as I was. I suggest your not missing this one.

If you're looking for something to pass

5 Band WAZ

As of March 1, 2010, 806 stations have attained the 200 zone level and 1674 stations have attained the 150 zone level.

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

K5ZK, UX4UM, YO9HP, SP7ITB, YV1DIG

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40)
IK1AOD, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
RU3FM, 199 (1)
N3UN, 199 (18)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N6HR/7, 199 (37)
JA5IU, 199 (2)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
VE3XN, 199 (26)
N5AW, 199 (17)
JH7CFX, 199 (2)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10m)
RX4HZ, 199 (13)
KØGM, 199 (17)
S58Q, 199 (31)
KQØB, 199 (2 on 10)
K9OW, 199 (34 on 10)
K4QL, 199 (24)
IN3ZNR, 199 (1)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
F5NBU, 198 (19, 31)
OE2LCM, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W7VJ, 198 (34, 37)
K9MIE, 198 (18, 21)
W9RN, 198 (26, 19 on 40)
W5CWQ,198 (17, 18)
I5KKW, 198 (31&23 on 20)
IV3MUC, 198 (1&31 on 40)
UA4LY, 198 (6&2 on 10)
JA7XBG, 198 (2 on 80&10)
K9UP, 198 (17,21)
IK4CIE, 198 (1, 31)

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

None

5 Band WAZ updates:

YU7GMN (200 zones)
K4QL (200 zones)
KL1V (179 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, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WAZ Program

6 Meters

93 .....YO9HP (26 zones)

10 Meter SSB

589 .....YO9HP

20 Meter SSB

1188 .....N6VS 1189 .....YO9HP

15 Meter CW

336 .....YO9HP

20 Meter CW

592 .....I5KHX

30 Meter CW

95 .....YO9HP

40 Meter CW

278 .....YO9HP

80 Meter CW

80 .....VK3PA

160 Meters

332.....K5ZK (38 zones) 334 ..YO0HP (431 zones)
333 .....SP6AEG (40 zones) 335 ..HB9LCW (38 zones)

All Band WAZ

Diamond Jubilee

014.....N5ZM 022 .....RA6AR
021 .....K3KO 023 .....YO9HP

Mixed

8660.....DS4DBG 8668 .....SM5YOC
8661 .....GØDQS 8669 .....JHØOXS
8662.....IZ4AMS 8670.....F5CQ
8663.....SP6AXW 8671 .....WB6DOQ
8664.....K4IZE 8672 .....YO9HP
8665.....IQ3UD 8673 .....K4ZJ
8666 .....K7CMR 8674 .....K4UQC
8667 .....UX4UM 8675 .....DJ8ES

SSB

5126 .....YO9HP

CW

588 .....YO9HP 590 .....DL9MRF
589.....DL3SXW

RTTY

205 .....YO9HP

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, 17 Green Hollow Rd., Wiggins, MS 39577. 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 time between all those new entities you need, there seems to be a state QSO Party almost every weekend, and there are 50 states! Also, some weekends there are major events such as the CQ WW WPX CW Contest coming up May 30–31. In June we find the annual ARRL Field Day, June 27–28. July comes along with the IARU HF World Championship July 11–12. Scattered among all of these you will find the various QSO Parties, RTTY contests, and VHF contest. Just about anything you might want to take part in is available. Oh, yes . . . then you can work some the new DX entities you need that might be available too.

Don't Forget Dayton!

Dayton, that famous location for the annual Hamvention® will be May 14–16.There is the SWODXA (South

The CQ DX Field Award Program

Mixed

104	VE1WT	106	HA5AGS
105	NKØS	107	HA1AG

SSB

67 ..... NKØS

CW

58 ..... NKØS

Digital

17 ..... NKØS

Mixed Endorsements

225	VE3XN/234	200	9A5CY/219
225	HA5AGS/228	200	HA1AG/218
225	VE7IG/232	100	NKØS/116

SSB Endorsements

100 ..... NKØS/111

CW Endorsements

175 ..... W4UM/192

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio. com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Please make all checks payable to the award manager.

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Billy F. Williams. Mail all updates to P.O. Box 9673, Jacksonville, FL 32208.

Mixed

K2TQC	265	OK1AOV	205
HAØDU	240	N4MM	202
VE3XN	234	W4UM	198
W1CU	228	N4NX	192
VE7IG	227	ON4CAS	191
HA1RW	220	HA9PP	190
N8PR	220	K8OOK	189
KØDEQ	216	BA4DW	188
VE3ZZ	207	9A5CY	187
HA5WA	206	RW4NH	187
F6HMJ	206	K2SHZ	182
JN3SAC	206	K1NU	180
KF8UN	205	W5ODD	177
W6OAT	205	NØFW	176

SSB

W1CU	209	W4UM	182
W4ABW	202	NØFW	176
KØDEQ	192	DL3DXX	175
VE7SMP	190	JN3SAC	175
N4MM	186		

CW

DL6KVA	225	OK1AOV	196
W1CU	220	W4UM	192
DL2DXA	209	OK2PO	184
KØDEQ	207	N4MM	179
DL3DXX	203	N4NX	177
JN3SAC	200		

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

6315 .....9A2AA	4213 .....I2PJA	3735 .WB2YQH	3007 .....W2WC	2499 ..KC9ARR	2192 .....N2SS	1705.....W2EZ	1269 ....K5WAF	680 ....IWØHOU
5758 .....K2VV	4146.....N6JV	3684.....IK2ILH	2998 ....K9UQN	2475....W6OUL	2001 .....AB1J	1662....SV1DPI	1116 ....YU7FW	662.....JA7OXR
5426 .....W1CU	4118.....S53EO	3616.....W9OP	2965 ..OZ1ACB	2440.....K5UR	1951.....KØKG	1643.....N1KC	1016 ..RA1AOB	653 .....KK3Q
5031 ....W2FXA	4082 .....I2MQP	3522 ..ON4CAS	2905 .....N8BJQ	2428 .....N6QQ	1930 ....W2FKF	1593.....S55SL	976 .....KM6HB	650 .....N3YZ
4758 .....EA2IA	4034 .....N9AF	3325 .SM6DHU	2873.....W2ME	2397 .....VE6BF	1905 .....W7CB	1512 .WD9DZV	964 .....K8ZEE	644 .....KWØH
4705 .....9A2NA	4001 ....KØDEQ	3305...JH8BOE	2845...JN3SAC	2378 .....W3LL	1891 .....VE9FX	1446 .....DF3JO	815 .....KL7FAP	636 .....ZS2DL
4618.....N4NO	3908 .....KF2O	3227.....K9BG	2752 .....K1BV	2358 .....I2EAY	1820 .....KX1A	1359.....N3RC	726.....K5IC	600.....IK1RKN
4430.....YU1AB	3831...WA5VGI	3150 .....W9IL	2704.....K2XF	2353.....W2OO	1761 .....AG4W	1337 ....K6UXO	723 .....KØDAN	
4232.....VE3XN	3775 ..YU7BCD	3091 .....9A4W	2530 ....YO9HP	2116 .....AE5B	1741 .....AB5C	1322 .....AA4FU	682.....AI8P	

SSB

5065.....IØZV	3505 .....N4NO	2734..YU7BCD	2300 .SM6DHU	2072.....K5UR	1891 ....W2FKF	1611.....W2ME	1258.....N1KC	787.....WA5UA
4505.....VE1YX	3323..OE2EGL	2711 ..LU8ESU	2297 .....W9IL	2071 .....N6FX	1844 ....YO9HP	1505.....AG4W	1145 ..EA3EQT	741 ...WD9DZV
4377 .....K2VV	3213..CT1AHU	2709.....KF7RU	2209 ...IK2QPR	1986...DL8AAV	1795.....KQ8D	1480.....AB5C	1083.....KX1A	717 .....KØDAN
4371.....F6DZU	3196.....KF2O	2595.....EA1JG	2201.....NQ3A	1945.....KI7AO	1751.....N8BJQ	1464..VE7SMP	1042 ...IZØBNR	637 .....K5WAF
4184.....OZ5EV	3108.....I4CSP	2567 ..WA5VGI	2142 .....W3LL	1935 ..SV1EOS	1729....W6OUL	1463 .....I2EAY	1031....IK8OZP	600 ...WA2BEV
4171.....I2PJA	2957 ....KØDEQ	2471 .....I3ZSX	2140..SV3AQR	1927 .....AE5B	1714....IK2DZN	1410.....S55SL	978.....EA7HY	
3843 .....I2MQP	2860 .....I8KCI	2451 ..EA3GHZ	2094 .....I8LEL	1915 .....W2OO	1678....K9UQN	1386 ...IK4HPU	951.....KU4BP	
3749 .....9A2NA	2857 .....4X6DK	2431 ....G4UOL	2093 .....W2WC	1889 .....N6QQ	1643...JN3SAC	1385.....AE9DX	924 .....VE6BF	
3658 .....EA2IA	2817 ....IN3QCI	2326.....CX6BZ	2076 .....K2XF	1879 .....K3IXD	1623.....VE9FX	1377.....EA3NP	875 .....K7SAM	

CW

5353.....K9QVB	3687 .....EA2IA	2754 .....W8IQ	2483....JN3SAC	2305.....N8BJQ	1848 .....I2EAY	1407 .....WO3Z	1109.....VE1YX	753.....F5PBL
5254 ..WA2HZR	3309....WA5VGI	2723....EA7AZA	2419 ....IK3GER	2223 .....VE6BF	1804...EA7AAW	1403 .....AG4W	1053 .....K5WAF	749 .....AE5B
5107 .....K2VV	3308 .....KØDEQ	2632.....W2ME	2415 .....W2WC	2101 .....I2MQP	1665 .....AC5K	1334 .....RUØLL	1030 .....AA5JG	695.....S55SL
4146.....N6JV	3293 .....9A2NA	2623 ..SM6DHU	2408.....IØNNY	2089.....K2XF	1665 .....YO9HP	1327 ..WA2VQV	987 ....WD9DZV	608.....IK2SGV
4128.....N4NO	2923 .....KF2O	2618 .....K9UQN	2373 .....W9IL	1979.....K5UR	1643.....W2OO	1317 .....K6UXO	915.....N1KC	600 .....IT9ELD
3827.....VE7DP	2923...YU7BCD	2647.....KA7T	2324 .....OZ5UR	1966.....W9HR	1445.....EA2CIN	1223 .....KX1A	824 .....VE9FX	
3760.....LZ1XL	2838 .....I7PXV	2502....JA9CWJ	2308 .....N6FX	1927.....W6OUL	1424 .....N6QQ	1220.....AA4FU	821 .....HB9DAX	

DIGITAL

1284 .....W3LL	1133 .....N6QQ	1066 ....YO9HP	1010 .....N8BJQ	1009..GUØSUP	772 .....KØDEQ	769 .....AG4W	692 ...WD9DZV

Raoul Island, Kermadec. A lot of DXers are in need of this one and a German team will be there in November to make it possible to put this one in the log. Lots of great photos are available on the ZL8X website, too. (Photo from the ZL8X website)

West Ohio DX Association) DX Dinner and the DX Forum. If you don't have tickets for the DX Dinner by now, you may be too late to obtain them, since it usually sells out early and the space is limited. Give it a try, though, anyway. The DX Forum has a great line-up of speakers for you again this year, so don't miss that one. Tom, N4XP, will have the Midway, K4M program; George, AA7JV, will have a program on his activities; Tomi, HA7RY, from Chesterfield as TX3A; and Paul, N6PSE, as YI9PSE from Iraq.

Looking Ahead in DXing

The solar flux is starting to move in a positive direction, and with it the activity on 15, 12, and even 10 meters is starting to liven things up for us. For a few weeks in late February/early March, I was lucky enough to put seven new ones in my log for 12 meters and even a few new ones on 17. I'm not talking about S-meter–breaking signals, but signals that are readable enough to enjoy making the contact and knowing it was a "good one." During the ARRL SSB contest I saw a lot of activity reported by those big-gun multi-multi stations on 15 and 10 meters. Sometimes all you need to do is open your mouth and say something so others know you are there. A simple "CQ" can pay some great dividends, but you have to be there to say "CQ" or to hear someone else say it.

Until next time, enjoy the chase, and Have Fun!

73, Carl, N4AA

QSL Information

9H3DX via PA2AM
9H3DZ via PA2AM
9H3EP via IV3EPO
9H3FD via PA3FHR
9H3GA via DL5GA
9H3HOD via OH2HOD
9H3JR via I2JJR
9H3ME via OH2ME
9H3N via DL1DA
9H3NK via YU1FW
9H3NT via EA3NT
9H3OT via OH2OT
9H3S via PA3HGP
9H4L via W3HNK
9H8C via DL9USA
9I40CA via G3SWH
9J2CA via G3SWH
9J2FM via JA4ATV
9J2YO via YO4ATW
9J3A via S57S
9K/K6PAU via K6PAU
9K2/SP4R via SP4GFG
9K2/T94FC via E73Y
9K2AI via NI5DX
9K2GS via K2PF
9K2HE via DJ9ZB
9K2YM via EA5KB
9K48NDL via 9K2RA
9K48NLD via 9K2RA
9K9A via NI5DX
9L/DJ6QT via DJ6QT
9L1DIR via EA4URE
9L1NH via G3RWF
9L1SL via J6QT
9L5A via G3SXW
9L7NS via AA7A
9M0C via G3SWH
9M2NNM via 9M2MT
9M2QQ via DF5UG
9M2SG via DL1DA
9M2SG/8 via DL1DA
9M2TI via EA4ATI
9M4LHS via 9M6DJC
9M4STA via NI5DX
9M6/KM0O via KM0O
9M6BG via VR2BG
9M6JC via NI5DX
9M6LSC via KM0O

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>; <http://golist.net/>.)

BY TOMAS HOOD,* NW7US

The Solar "Conveyor Belt"

A Quick Look at Current Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, February 2010: 19
Twelve-month smoothed, August 2009: 5

10.7 cm Flux
Observed Monthly, February 2010: 85
Twelve-month smoothed, August 2009: 72

***Ap* Index**
Observed Monthly, February 2010: 4
Twelve-month smoothed, August 2009: 4

One Year Ago: A Quick Look at Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, February 2009: 1
Twelve-month smoothed, August 2008: 3

10.7 cm Flux
Observed Monthly, February 2009: 70
Twelve-month smoothed, August 2008: 69

***Ap* Index**
Observed Monthly, February 2009: 4
Twelve-month smoothed, August 2008: 6

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for May 2010

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 2-3, 6, 9, 12-17, 20, 24-25, 29-30	A	A	B	C
High Normal: 1, 4-5, 7-8, 19, 21-23, 26, 28	A	B	C	C-D
Low Normal: 10-11, 18	B	C-B	C-D	D-E
Below Normal: 27	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 2 will be fair (C) on May 1st through the 3rd, poor to fair (D–C) on the 4th through the 6th, good (B) on the 7th, 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.

Solar Cycle 24 continues to show steady activity. Since last month's report in this column, there were only four days of zero sunspots—March 6 through March 9—which ended 45 days of continuous sunspot activity (January 20 through March 5). Again on March 10 a sunspot emerged, kicking off another period of activity. All of this resulted in a noticeable and much-welcomed increase in DX on most of the high frequencies, even on 10 and 12 meters.

With all of this sunspot activity comes an excited level of discussion regarding the forecast for sunspot Cycle 24. Will it be dismally weak, as some predict, or will it be a record cycle?

This column has explored some of the more "popular" forecasts in past editions. In the May 2006 edition we explored a forecast made by Mausumi Dikpati of the National Center for Atmospheric Research (NCAR). Researcher Dikpati proclaimed that sunspot Cycle 24 "will be 30 percent to 50 percent stronger than the previous one." If this prediction is correct, the solar activity in just a few years will be second only to the historic solar cycle maximum of 1958.

Veteran amateur radio operators remember that cycle. The solar activity was so strong that aurora was sighted three times in Mexico. Propagation on 6 meters was open worldwide and for great lengths of time, not to mention the whole HF spectrum being alive around the clock.

Dikpati's prediction is not very popular now that we've witnessed such a quiet and prolonged sunspot cycle minimum. However, remember that in nearly two centuries since the 11-year sunspot cycle was discovered, scientists have struggled to predict the size of future maxima, and every time for the most part they have failed. The team led by Dikpati postulated that the next cycle maximum would occur in 2012. Could it still be possible?

The key to the mystery is the possible existence of a "conveyor belt" on the sun. Dikpati believes that the data reveals that the sun has a conveyor belt consisting of electrically-conducting gas. Some scientists postulate that we have something similar here on Earth, known as the Great Ocean Conveyor Belt. It is a network of currents that carry water and heat from ocean to ocean. (There are now dissenting opinions on such a simplified model of ocean currents.)

According to Dikpati, the sun's conveyor belt is a current that flows in a loop from the sun's equator to the poles and back again. Just as the Great Ocean Conveyor Belt controls weather on Earth, this solar conveyor belt controls weather on the sun. Specifically, it controls the sunspot cycle.

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e-mail: <nw7us@arrl.net>

Solar physicist David Hathaway of the National Space Science & Technology Center (NSSTC) explains: "First, remember what sunspots are—tangled knots of magnetism generated by the sun's inner dynamo. A typical sunspot exists for just a few weeks. Then it decays, leaving behind a 'corpse' of weak magnetic fields."

Hathaway explained how "the top of sun's conveyor belt skims the surface of the sun, sweeping up the magnetic fields of old, dead sunspots. The 'corpses' are dragged down at the poles to a depth of 200,000 kilometers where the sun's magnetic dynamo can amplify them. Once the corpses (magnetic knots) are reincarnated (amplified), they become buoyant and float back to the surface." That's how we get new sunspots.

All this happens with massive slowness. "It takes about 40 years for the belt to complete one loop," says Hathaway. The speed varies "anywhere from a 50-year pace (slow) to a 30-year pace (fast)."

When the belt is turning "fast," it means that lots of magnetic fields are being swept up, and that a future sunspot cycle is going to be intense. This is a basis for forecasting: "The belt was turning fast in 1986–1996," says Hathaway. "Old magnetic fields swept up then should reappear as big sunspots in 2010–2011."

That prognostication by Hathaway seems to be coming to pass. However, Hathaway had predicted a possible cycle peak by this year! No one expected the quiet period between the last cycle and this new one to last as long as it did. However, the original forecast by Dikpati is still on target. Speculation now suggests that the recent sunspot activity will grow intense within the year, and we'll see a very steep climb in the monthly averages. What seems to be true so far is that this year will be an exciting opportunity to enjoy long-distance radio communications on more of the high-frequency amateur radio bands, perhaps even on 10 meters.

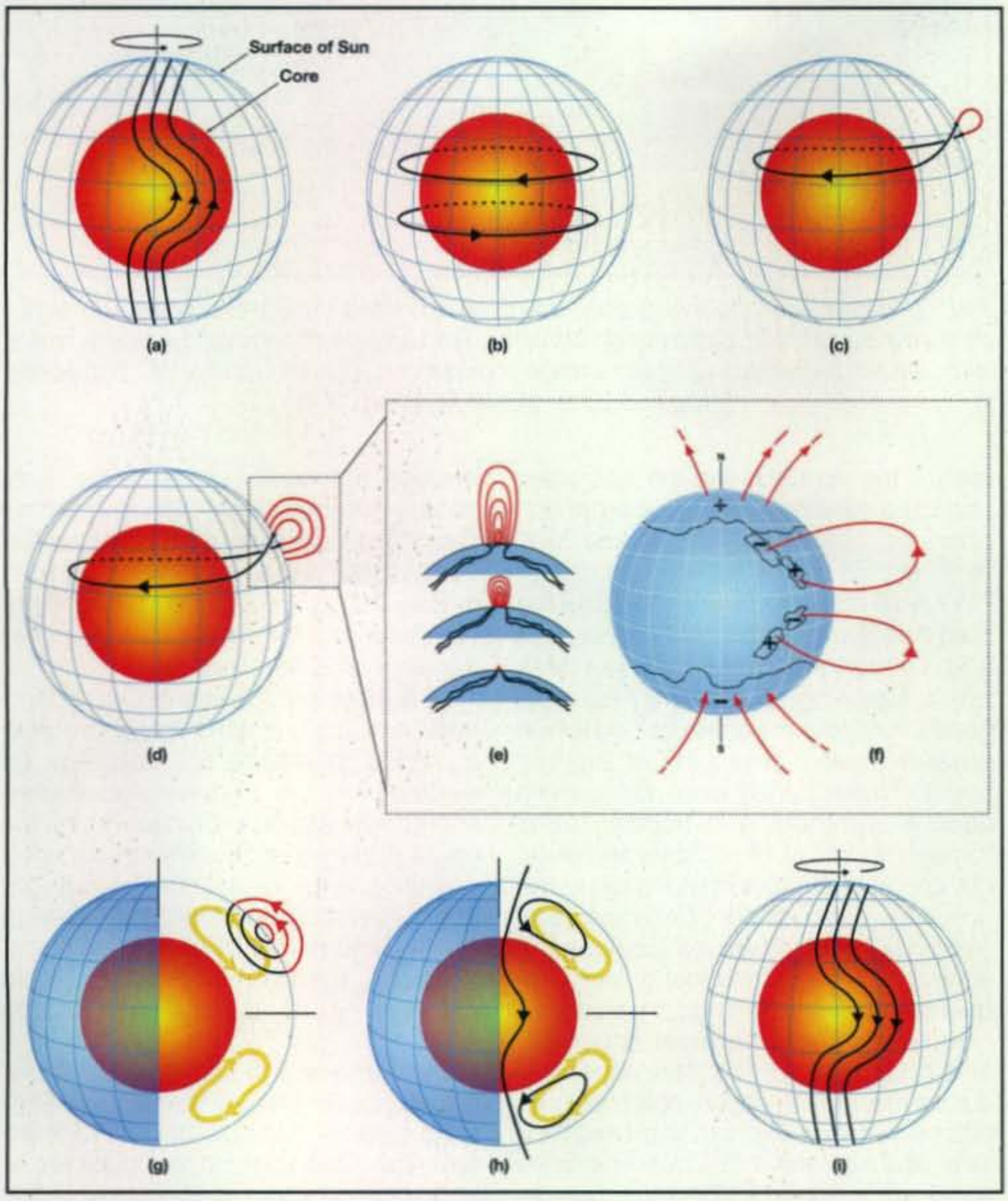

Fig. 1– Physical process in the flux-transport dynamo that simulates and predicts solar cycles. The red inner sphere represents the sun's radiative core and the blue mesh represents the solar surface. In between is the solar convection zone where the dynamo resides. (a) Shearing of the poloidal field by the sun's differential rotation near the bottom of the convection zone. The sun rotates faster at the solar equator than at the poles. (b) Toroidal field produced due to this shearing by the differential rotation. (c) When the toroidal field is strong enough, buoyant loops rise to the surface, twisting as they rise due to rotational influence. Sunspots (two black dots) are formed from these loops. (d, c, f) Additional flux emerges (d, c) and spreads (f) in latitude and longitude from decaying spots. (g) Meridional flow (yellow circulation with arrows) carries surface magnetic flux towards the poles, causing the polar fields to reverse. (h) Some of this flux is then transported downward to the bottom and towards the equator. These poloidal fields have the opposite of those at the beginning of the sequence, in frame (a). (i) This reversed poloidal flux is then sheared again near the bottom by the differential rotation to produce the new toroidal field opposite in sign to that shown in (b). (Credit: Mausumi Dikpati, High Altitude Observatory Division, NCAR, Boulder, Colorado)

May Propagation

The annual summer sporadic-*E* (*Es*) season begins around May 1 (sometimes during the last week of April). The activity is sparse during the first two weeks of May and then it picks up to about 60 percent of the days by the end of May. This is great news for 10-meter enthusiasts. Now is the time to send out your signals in hopes of catching some propagation.

During the first days of May, oxygen ions that are in the *E* region of the ionosphere are being excited more and more by the increasing closeness of the sun. This causes them to recombine with metallic ions that are also present in the *E* region. During this sporadic-*E* season that starts in May and lasts through the summer, thin layers of these energized ions form, making it possible to refract higher HF and low VHF radio waves.

On the Bands

It is spring, and as we move closer to summer, DX signals on the higher bands become weaker and openings sparse, especially now since solar Cycle 24 is just getting started. Long-

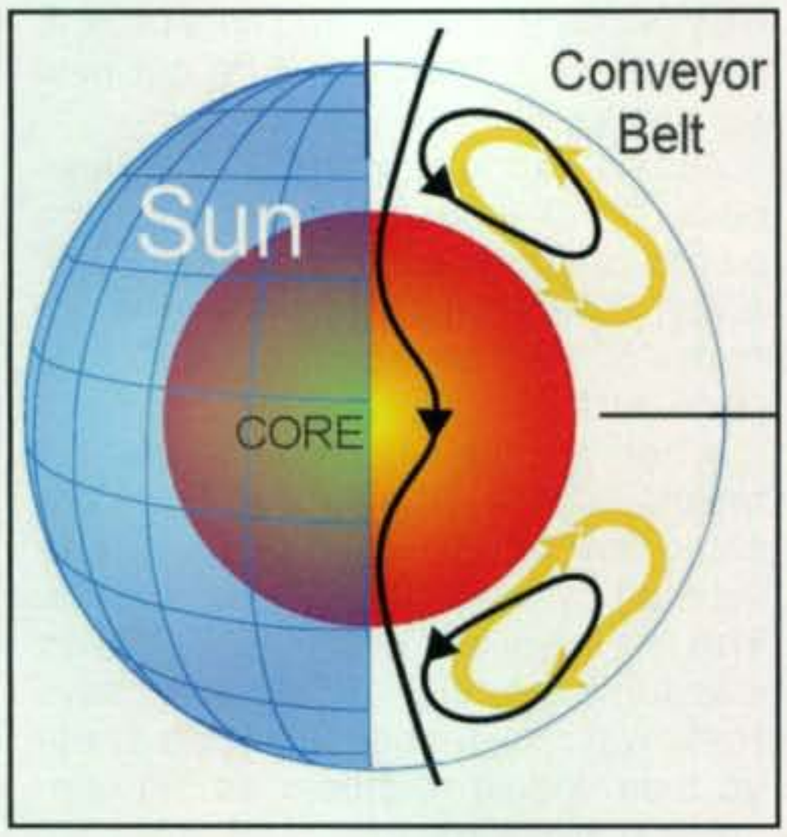

Fig. 2– A simplified model of the sun's "Conveyor Belt." The top of the conveyor belt skims the surface of the sun, sweeping up the magnetic fields of old, dead sunspots. The "corpses" are dragged down at the poles to a depth of 200,000 km where the sun's magnetic dynamo can amplify them. Once the corpses (magnetic knots) are reincarnated (amplified), they become buoyant and float back to the surface. (Credit: NASA)

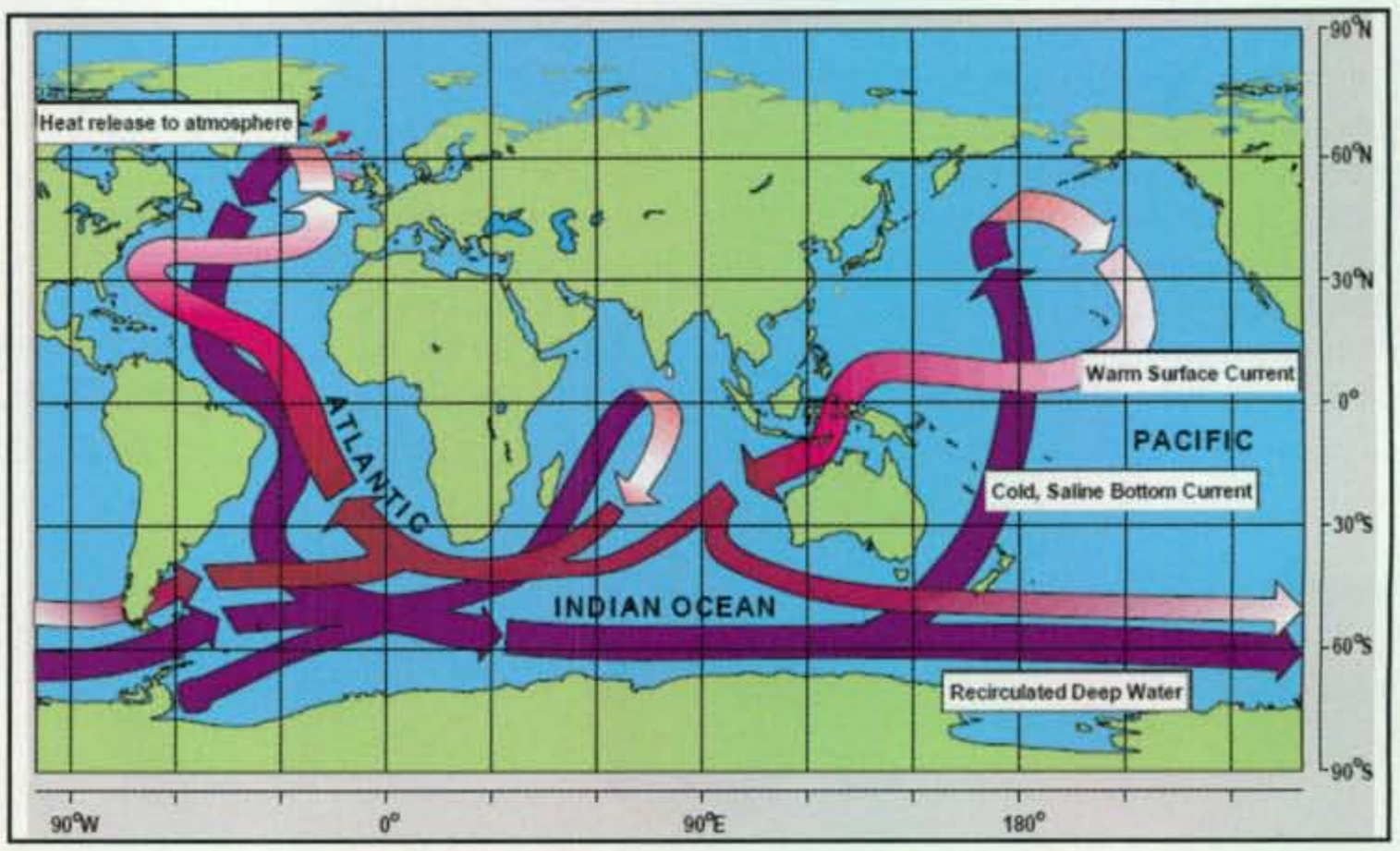

Fig. 3– The thermohaline circulation "conveyor belt" in Earth's oceans. Purple arrows indicate cold, deep ocean currents. Red arrows show shallow, warm water circulation patterns. (Credit: Image courtesy CLIVAR [after W. Broecker, modified by E. Maier-Reimer])

distance *F* layer propagation via 10 meters through 15 meters will continue to suffer due to the lower MUFs caused by an only moderately active sun. Optimum frequencies for DX propagation are lower during most of the daylight hours, but higher during the late afternoon, early evening, and nighttime hours than were observed during the winter months. However, during May, sporadic-*E* propagation may be possible on the highest HF bands and even on 6 meters. Seasonal static is increasing during May, yet perhaps not enough to overly degrade the lowest HF bands.

The following is an overall picture of high-frequency amateur band openings expected during May 2010. For day-to-day propagation conditions expected during the month, see the "Last-Minute Forecast," which appears on the first page of this column.

10 & 12 Meters: Except for an occasional daytime opening to some southern or tropical areas, not many DX openings are forecast for these bands during May. The afternoon hours are the best time to check for DX openings. Frequent short-skip openings between distances of approximately 750 and 1400 miles, however, should be possible.

15 Meters: A seasonal decrease in DX openings is normal for May. Some fairly good openings still are possible toward the south during the late afternoon and evening. Numerous short-skip openings, between about 600 and 2300 miles should be possible almost daily.

17 & 20 Meters: These should be the best bands overall for general-purpose and DX communication during May 2010. Opening shortly after sunrise, good DX conditions are expected to one area or another through the evening hours. These bands may also remain open to southern and tropical areas through much of the nighttime hours. DX conditions should peak around the grey-line terminators (morning and evening), with openings possible to almost all areas of the world. Very frequent short-skip openings are also forecast for distances between about 350 and 2300 miles. Quite often, especially during the late afternoon, optimum conditions may exist for both short and long skip, and stations a few hundred miles away will be heard at the same time as DX stations from several thousand miles away, causing considerable interference (QRM).

30 Meters: This band will play a major role in DX propagation, with somewhat better nighttime propagation than 40, and solid daytime propagation into many areas of the world. Exotic DX can be found here on CW and other digital modes. Check this band often during the course of the day.

40 Meters: Fewer DX openings are expected because of the shorter hours of darkness and the higher level of static. Fairly good openings should still be possible, however, to several areas of the world from shortly before sunset, through the hours of darkness, until shortly after sunrise. Good daytime short-skip openings can be expected over distances of between approximately 150 and 750 miles, with nighttime openings extending up to the one-hop limit of 2300 miles.

60 & 80 Meters: Fewer hours of darkness and higher static levels are also expected to reduce DX openings on these bands, but a few fairly good ones should still be possible. Check during the hours of darkness. Excellent short-skip openings are forecast for the daylight hours over distances ranging between 50 and 250 miles. During the hours of darkness, the short-skip range should increase up to approximately 2300 miles.

160 Meters: Propagation conditions on this band have passed their seasonal peak and should decline until the early fall. Openings up to a distance of 1000 miles or so should be possible this month during the hours of darkness. An occasional opening well beyond this range may also be possible when static levels are exceptionally low.

VHF Conditions

May should see an increase in sporadic-*E*, with some continued trans-equatorial propagation. Solar activity is not expected to be high enough to support *F* layer DX on 6 meters.

Sporadic-*E* ionization is expected to increase moderately during May, so look for short-skip openings, likely to occur over distances of approximately 1000 to 1400 miles. Although sporadic-*E* open-

ings can take place at just about any time, the best time to check is between 10 AM and 2 PM and again between 6 and 10 PM local daylight time.

During periods of intense and widespread sporadic-*E* ionization, two-hop openings considerably beyond 1400 miles should be possible on 6 meters. Short-skip openings between about 1200 and 1400 miles may also be possible on 2 meters.

A seasonal decline in trans-equatorial (TE) propagation is expected during May. An occasional opening may still be

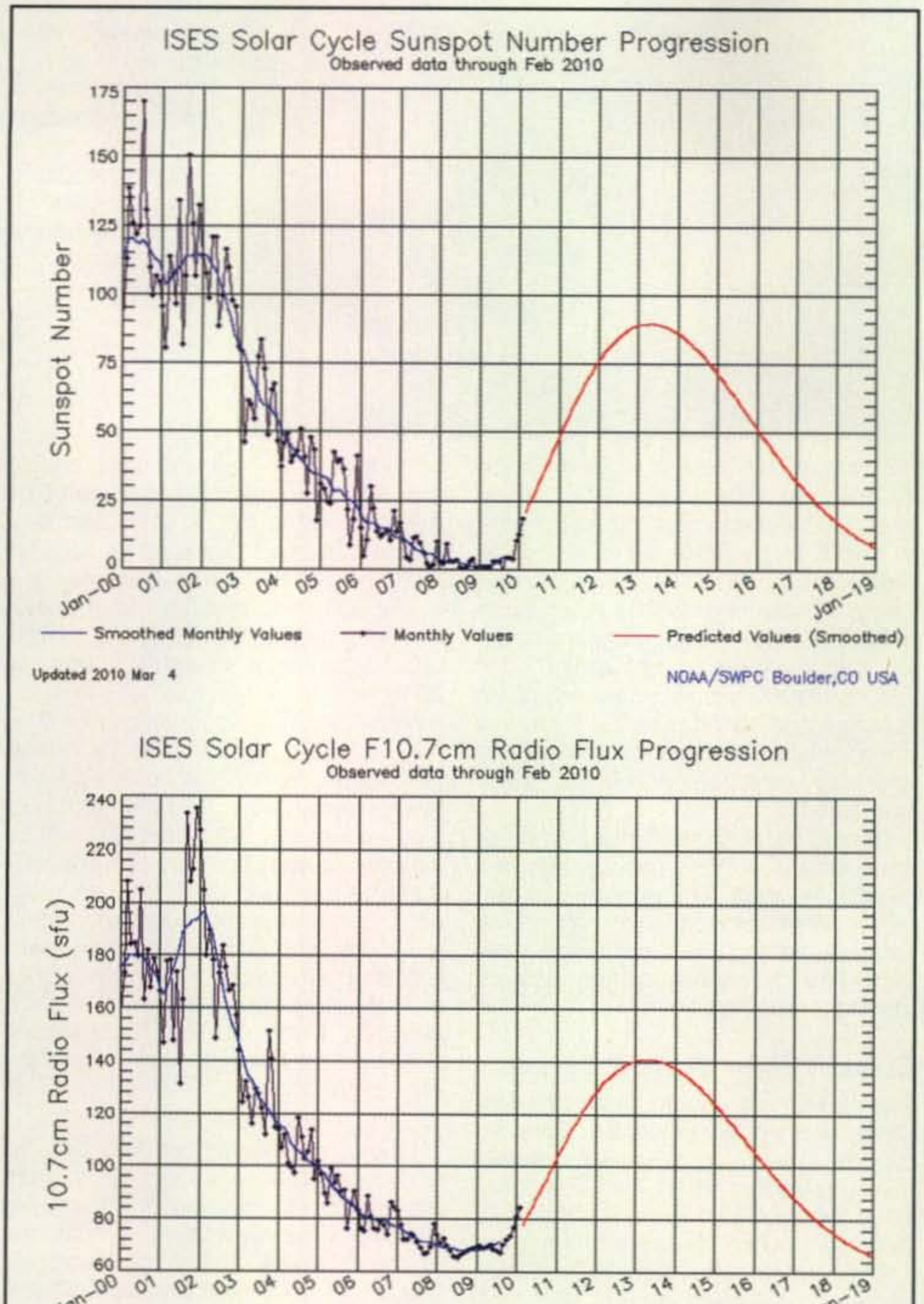

Fig. 4 (A & B)– Sunspot Cycle 24 progression charts showing the continued definite rise in both the monthly observed sunspot counts since the last months of 2009, as well as the rise in the 10.7-cm flux monthly figures. Will Cycle 24 climb rapidly and peak in 2012, as Researcher Dipki prognosticated (see text)? (Source: Space Weather Prediction Center [SWPC]/The National Oceanic and Atmospheric Administration [NOAA])

Fig. 5– The Extreme Ultraviolet Imaging Telescope (EIT) image of the active sunspot regions on March 15, 2010. Cycle 24 sunspot counts continue to climb, resulting in an improvement in radio propagation on the HF amateur bands. (Source: Solar and Heliospheric Observatory [SOHO])

possible on 6 meters toward South America from the southern tier states and the Caribbean area. The best time to check for 6-meter TE openings is between 9 and 11 PM local daylight time. These TE openings will be north-south paths that cross the geomagnetic equator at an approximate right angle.

Auroral activity is generally lower than in March and April due to the change in the orientation and position of the earth and magnetosphere in relation to the solar wind.

Check out *CQ VHF* magazine for more details on VHF propagation and conditions. With Twitter.com you can follow @hfradiospacewx for hourly updates that include the *K* index numbers. You can also check the numbers at <http://prop.hfradio.org>.

Current Solar Cycle Progress

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 84.7 for February 2010, up from 81.1 in January, continuing the certain steady monthly rise. The 12-month smoothed 10.7-cm flux centered on August 2009 is 72.1. The predicted smoothed 10.7-cm solar flux for May 2010 is about 85, give or take about 7 points.

The Royal Observatory of Belgium reports that the mean monthly observed sunspot number for February 2010 is 18.6, a sharp increase over January's 13.1. The lowest daily sunspot value during February 2010 was 8 (not zero!) on both February 4 and 5. The highest daily sunspot count for February was 39 on February 8. The 12-month running smoothed sunspot number centered on August 2009 is 4.8. A smoothed sunspot count of 26 is expected for May 2010, give or take about 8 points.

The observed monthly mean planetary *A*-index (*Ap*) for January 2010 has been adjusted to three (3). February 2010 had an *Ap* of four (4). The 12-month smoothed *Ap* index centered on August 2009 is 3.8. Expect the overall geomagnetic activity to be unsettled to stormy during May. At the time of writing, the forecast holds that May will be a month seeing great variation between quiet periods and days with geomagnetic storminess due to recurring coronal holes, and possible coronal mass ejections (if flaring continues to increase with the expected rise in solar activity). Refer to the "Last-Minute Forecast" for the outlook on what days tthis might occur.

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 bands. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. If you are on Facebook, check out <http://tinyurl.com/fb-spacewx> and <http://tinyurl.com/fb-nw7us>. Speaking of Facebook, check out the *CQ Amateur Radio* magazine fan page at <http://tinyurl.com/fb-cqm>.

Now that the new solar cycle is active, I'll be keeping my ears to the radio, hoping to hear you on the air. Happy DX!

73, Tomas, NW7US

Number groups after callsigns denote the following: Band, Final Score, QSOs, Countries, Zones, US/VE. An asterisk (*) indicates low power. Certificate winners are listed in boldface.

2009 RTTY RESULTS
SINGLE OPERATOR
NORTH AMERICA

United States

W1UE	**A**	**2,586,588**	**2,234**	**243**	**83**	**165**
K1FWE	*	2,390,680	2,153	229	86	157
N1SV	*	1,755,096	1,742	213	70	151
K5ZD/1	*	764,829	929	171	67	113
W1ZK	*	698,940	862	156	64	110
K1IB	*	413,942	623	143	56	79
W1KQ	*	280,720	504	118	47	67
NG1G	*	171,400	373	103	38	59
K1SEZ	*	109,626	405	64	32	55
W1UJ	*	79,352	230	75	37	70
K1DX	*	29,664	112	67	23	6
W1NR	**14**	**335,980**	**864**	**85**	**28**	**44**
NN1N	*	23,840	146	33	18	29
W1NK	**7**	**3,128**	**34**	**19**	**10**	**11**
***WA1Z**	**A**	**1,718,496**	**1,711**	**234**	**75**	**159**
*AE1P	*	691,716	986	152	65	137
*WA1EHK	*	648,174	780	178	68	108
*KA1C	*	237,524	475	110	45	83
*N1SXL	*	108,438	291	77	38	71
*WB1EDI	*	97,734	258	77	37	65
*W1IG	*	90,514	266	69	34	64
*NE1F	*	64,320	199	65	34	61
*K1DUQ	*	63,216	210	65	29	50
*W1RPG	*	58,400	204	56	31	59
*AB1FY	*	45,847	155	64	28	35
*KB1JUF	*	9,042	69	28	16	22
*W2JU/1	*	3,417	40	15	15	21
***AB1J**	**14**	**78,064**	**312**	**61**	**17**	**34**
*KT1I	*	29,667	160	45	17	25
*KG1V	*	27,348	144	44	15	27
WA2ETU	**A**	**1,122,098**	**1,160**	**219**	**73**	**130**
W2LE	*	262,200	453	125	48	57
WS9M/2	*	195,738	425	98	38	66
K2NV	*	125,300	314	91	34	15
AA2NA	*	123,018	286	94	45	64
WA2VYA	*	104,160	237	102	56	66
N2ED	*	94,975	307	50	23	72
WB2JEP	*	46,920	175	62	24	34
K2MK	*	14,560	80	42	19	19
KC2KZJ	*	2,775	26	23	14	0
K2BB	**7**	**44,541**	**244**	**47**	**15**	**39**
***N2ZAK**	**A**	**270,320**	**516**	**126**	**46**	**76**
*WA2MCR	*	151,392	333	96	47	85
*KA2CYN	*	132,600	375	83	41	76
*KB2NB	*	81,696	219	74	44	66
*KA2FHN	*	59,432	179	74	37	41
*N2LK	*	51,744	170	66	35	53
*K9CHP/2	*	42,920	171	54	34	57
*KR2D	*	39,038	137	65	35	49
*N2UM	*	22,577	88	59	27	21
*N2MUN	*	16,848	109	39	13	0
*KA2ANF	*	14,352	81	36	26	30
*N2CK	*	10,640	64	34	21	21
*W2RLK	*	6,370	52	22	21	27
N1WR/3	**A**	**739,904**	**915**	**165**	**64**	**123**
K3WI	*	594,542	733	179	65	94
K3MD	*	194,488	410	102	41	41
N3INJ	*	138,116	317	93	35	44
K3RMB	*	90,255	245	81	36	48
W3BW	*	15,921	74	42	31	14
N3OW	*	8,250	54	32	17	17
AI3Q	**14**	**73,440**	**286**	**59**	**17**	**14**
NA3M	**7**	**123,533**	**470**	**62**	**19**	**50**
***W3LL**	**A**	**1,021,901**	**1,040**	**217**	**84**	**130**
*WA1LWS/3	*	327,646	594	123	49	109
*W3DQN	*	292,400	470	137	55	80
*KW3W	*	279,206	484	122	56	96
*KB3CTX	*	218,000	467	106	44	100
*WØBR/3	*	213,199	565	85	36	108
*N3CHX	*	183,744	390	100	44	88
*N3XL	*	169,506	402	96	38	85
*KB3LIX	*	159,975	317	116	48	73
*KA3FZN	*	131,040	284	96	47	52
*N3QO	*	129,376	318	91	39	78
*K3GMT	*	78,657	238	69	34	54
*N3NZ	*	69,460	225	65	34	52
*WW3S	*	51,620	147	80	40	25
*W3OFD	*	48,312	184	55	25	42
*W3PO	*	43,848	148	73	29	6
*KC3EF	*	31,635	124	55	30	26
*AF3I	*	20,855	123	35	18	44
*W3SFG	*	14,880	89	36	22	35
*WW3DE	*	12,848	82	31	22	35
*KB3RTB	*	10,836	80	23	21	42
					(Op: K3RTB)	
*K3TN	*	8,316	58	29	24	24
*W3DQT	*	7,215	50	26	20	19
*N3RDV	*	4,773	43	23	11	9
*K3PH	*	3,060	34	19	17	15
*K3SV	*	2,520	30	16	14	15
*NV3V	*	2,184	27	16	12	11
*N3UB	*	1,196	18	15	8	3
***K3GW**	**14**	**184,656**	**317**	**80**	**25**	**19**
*WA2EAJ/3	*	8,085	85	26	13	16
*WA3GOS	*	792	15	11	7	0
***WI2E/3**	**7**	**15,762**	**111**	**33**	**13**	**28**
AF4OX	**A**	**1,270,500**	**1,480**	**181**	**63**	**141**
W4PK	*	1,228,725	1,360	193	64	124
N6AR/4	*	1,164,500	1,185	200	77	148
K4FX	*	1,155,648	1,271	195	75	146
AG4W	*	972,363	1,127	185	74	140
NJ2F/4	*	458,351	746	130	61	116
W9WI/4	*	347,214	518	137	62	95
N3JT/4	*	336,540	485	146	64	74
N3UA/4	*	298,350	501	136	53	81
W4GKM	*	275,028	514	101	50	95
WX4TM	*	204,240	476	92	46	92
K4HAL	*	149,513	341	86	49	82
AD4EB	*	131,328	373	68	28	75
W4UK	*	117,132	450	55	23	51
KG4CUY	*	115,048	295	77	39	81
WD4O	*	105,787	296	67	39	57
KD4W	*	69,984	170	97	41	6
AE4EC	*	67,236	202	73	40	43
WC2Z/4	*	60,310	177	71	42	50
W4TVG	*	57,232	185	64	35	47
W4OJC	*	47,085	143	70	40	19
W4GHD	*	38,350	120	68	35	27
N4BCD	*	34,944	121	58	36	34
W2OO/4	*	26,040	119	48	18	18
AI4WW	*	23,900	116	44	24	32
AJ4FM	*	23,475	138	37	14	24
WD8RYC/4	*	17,052	73	47	30	21
KØCOP/4	*	6,642	57	24	15	15
K4WI	**28**	**3,552**	**55**	**10**	**8**	**14**
N4BP	**21**	**131,355**	**452**	**62**	**23**	**50**
K4WW	**14**	**65,400**	**249**	**52**	**20**	**28**
***N2QT/4**	**A**	**1,484,121**	**1,476**	**228**	**84**	**159**
*AB4GG	*	1,031,930	1,429	153	68	149
*WA1FCN/4	*	716,585	1,020	155	70	136
*WB2RHM/4	*	522,357	710	172	70	121
*N4IG	*	504,340	746	146	60	96
*W4UEF	*	261,783	434	129	55	77
*W6HGF/4	*	252,760	467	128	58	98
*K4CX	*	220,896	422	113	47	76
*KG4JGQ	*	174,460	382	95	41	84
*K4MIL	*	160,304	348	103	44	86
*KN4QD	*	146,280	328	97	49	84
*W8KHP/4	*	131,655	304	99	47	55
*WB5NMZ/4	*	110,240	298	81	40	39
*W4TMO	*	108,388	245	99	49	48
*K4DSP	*	101,840	234	96	42	52
*N9MTT/4	*	100,686	247	94	39	61
*K2OGD/4	*	99,450	288	80	38	77
*WØQQG/4	*	77,952	234	70	33	65
*N2WN/4	*	73,904	193	78	39	32
*KE4KY	*	72,220	218	63	32	62
*W4BK	*	62,780	225	55	38	79
*AA4NU	*	50,132	221	53	33	65
*NB4M	*	49,288	153	83	39	0
*KM4JA	*	49,096	177	59	31	46
*W4CZ	*	32,967	118	67	32	0
*AI4G	*	27,305	145	37	33	57
*WO4D	*	22,692	97	52	25	16
*KO4OL	*	15,840	95	33	28	38
*WD4PDZ	*	8,236	56	33	22	16
*N4AU	*	8,176	52	34	17	5
*KU4PY	*	1,292	24	10	10	14
*N1ADY/4	*	728	17	8	8	12
*K3RWN/4	*	368	10	8	5	3
***W4LC**	**14**	**123,504**	**375**	**76**	**21**	**27**
*AA4U	*	56,650	210	60	21	22
*N4ZO	*	49,610	233	53	18	39
*WN4DX	*	608	12	12	6	1
***KE1F/4**	**7**	**63,952**	**403**	**43**	**18**	**51**
*KC4HW	*	41,474	263	33	12	44
*KI3O/4	*	17,596	116	35	13	35
***NQ4K**	**3.5**	**4,830**	**86**	**7**	**7**	**32**
K7IA/5	**A**	**497,237**	**914**	**121**	**55**	**123**
NX5O	*	331,170	727	98	48	103
N5VU	*	161,035	372	94	41	80
W5ZD	*	94,872	284	78	45	54
KD5JAA	*	82,650	214	66	45	63
K5KA	*	19,153	96	40	28	39
N4OGW/5	**14**	**451,275**	**1,162**	**87**	**28**	**50**
WD5K	*	168,554	566	69	28	45
K5AM	**7**	**72,240**	**480**	**43**	**18**	**51**
***AA5AU**	**A**	**1,429,736**	**1,632**	**215**	**82**	**187**
*AD5XD	*	491,075	956	122	60	143
*AE5PW	*	333,207	654	124	60	117
*WB5AAA	*	253,890	466	118	57	104
*AA5VU	*	114,642	312	77	42	79
*WB5TUF	*	110,649	296	83	51	97
*NK5G	*	95,004	280	70	46	87
*AE5MM	*	59,860	220	61	38	47
*KG5OO	*	53,152	194	58	34	59
*KØGEO/5	*	47,576	224	39	28	85
*AB5C	*	45,198	179	49	40	73
*K5DHY	*	35,502	197	44	20	33
*AD5LU	*	10,512	110	16	16	41
*KD5J	*	10,080	64	30	22	20
*N5PU	*	6,016	68	16	14	34
*N5UWY	*	4,539	44	23	14	14
*KE5OG	*	1,782	26	14	6	7
***AA5JG**	**14**	**10,260**	**99**	**21**	**12**	**27**
***KD5LNO**	**7**	**42,735**	**284**	**39**	**19**	**47**
*N5VYS	*	8,235	108	12	10	39
*W5RAW	*	840	21	6	7	11
***KA5EYH**	**3.5**	**891**	**28**	**5**	**6**	**16**
WK6I	**A**	**1,688,660**	**1,945**	**173**	**92**	**195**
N6PE	*	388,944	612	126	76	131
K6BL	*	337,829	604	109	65	119
WE6Z	*	303,520	565	101	65	114
N6CK	*	198,132	502	68	48	112
K6TD	*	179,712	486	69	41	82
WX6V	*	172,260	309	106	71	93
K6MM	*	161,841	360	90	46	83
KJ6RA	*	107,388	278	71	38	48
N6TV	*	102,297	300	54	43	86
KK4E/6	*	86,699	209	79	50	52
WB6JJJ	*	81,718	226	66	48	68
K6SRZ	*	71,445	236	60	38	67
N6AJR	*	60,426	214	51	34	77
KG6ZHC	*	43,470	155	47	36	55
K6RM	*	36,297	142	50	26	33
KE1B/6	*	34,846	185	31	27	73
W6RKC	*	25,530	127	37	28	50
AI6O	*	20,382	96	47	39	0
AF6JP	*	19,256	113	26	24	66
N3FAW/6	*	9,825	84	23	18	34
K6RB	*	6,969	78	12	12	45
K6CDJ	*	5,439	45	29	20	0
					(Op: W6XK)	
W4UAT/6	**14**	**116,714**	**366**	**65**	**25**	**44**
KT6YL	*	103,750	398	62	23	40
W6WRT	**7**	**118,932**	**568**	**52**	**27**	**53**
***K6GEP**	**A**	**182,750**	**415**	**83**	**54**	**113**
*NF6P	*	155,980	440	70	48	102
*WN6K	*	147,825	388	74	47	98
*W6KY	*	58,450	213	45	43	79
*N6PC	*	54,096	217	44	29	74
*N6FD	*	46,169	170	54	40	43
*N3RC/6	*	30,562	162	32	24	62
*K6VUG	*	25,894	138	37	23	47
*K6TU	*	25,300	142	36	25	39
*NI6P	*	11,016	66	29	23	20
					(Op: NI7T)	
*KM6I	*	3,869	52	13	16	24
*W6BT	*	3,780	46	11	12	22
*K6ST	*	2,166	27	14	12	12
***K6UMO**	**14**	**1,610**	**26**	**10**	**10**	**15**
KR7X	**A**	**1,257,696**	**1,542**	**157**	**81**	**158**
W8AEF/7	*	987,264	1,267	156	72	156
K7AR	*	543,474	833	129	65	133
K7ZS	*	489,168	763	122	69	125
W6AEA/7	*	445,089	802	100	53	114
KØJJ/7	*	371,132	617	119	60	113
K6LL/7	*	299,299	678	84	53	116
W7MRC	*	271,659	627	80	45	124
					(Op: NG7Z)	
K7WP	*	208,290	427	94	58	110
K7RSM	*	190,722	549	60	53	126
KS7S	*	182,016	442	92	47	98
W7NNN	*	181,629	568	61	30	98
KO7X	*	144,324	417	74	50	104
N7MQ	*	136,704	336	77	41	74
K7LV	*	120,148	321	81	47	68
W7UG	*	116,336	299	76	46	54
KD7MSC	*	115,330	360	57	33	100
W7WW	*	95,700	314	43	37	85
N6KW/7	*	73,390	235	56	45	78
NI7R	*	29,500	135	41	33	51
WG7X	*	10,200	63	37	23	0
KV7DX	*	6,390	54	22	24	25
					(Op: KN5H)	
W7VS	*	88	4	4	4	0
W7ZR	**21**	**32,682**	**253**	**26**	**17**	**35**
N7NM	**14**	**277,884**	**728**	**86**	**30**	**50**
N7BV	*	99,918	389	48	23	46
W6RLL/7	*	76,260	306	57	21	46
K7RF	*	44,574	171	51	24	27
N7DRK	*	18,023	110	36	17	14
W7RY	**7**	**109,428**	**438**	**56**	**25**	**51**
***AB7R**	**A**	**175,329**	**408**	**74**	**52**	**81**
*K2PO/7	*	117,875	336	66	46	93
					(Op: K2PO/7)	
*N7AT	*	103,194	297	73	48	68
					(Op: K8IA)	
*KW7N	*	99,876	365	44	35	95
*YO7ARY/W1	*	74,260	258	63	32	63
					(Op: YO7ARY/W1)	
*N7UVH	*	62,834	230	49	39	90
*KE7YF	*	59,520	233	46	40	74
*K6KR/7	*	47,565	178	51	36	64
*WE6EZ/7	*	45,724	192	42	37	63
*KØIP/7	*	41,004	142	69	33	0
*W6NF/7	*	36,442	159	43	33	61
*K7RFW	*	32,750	173	28	29	74
*AD7XZ	*	31,868	130	49	35	40
*AD7MQ	*	26,180	145	29	25	65
*WAØWWW/7	*	25,740	117	45	26	28
*NQ7R	*	21,216	113	38	26	32
*AC7JW	*	17,415	98	31	22	28
*KX7L	*	15,698	88	34	31	29
*WA7LNW	*	14,304	88	29	27	40
*AD7OG	*	8,833	79	17	20	36
*K7EIQ	*	7,884	74	20	19	34
*KB7Q	*	3,800	62	7	10	33
*W4LSC/7	*	3,696	38	16	14	18
*N6HI/7	*	3,484	34	18	18	16
*N7DB	*	1,961	25	14	13	10
*KO9G/7	*	204	10	4	6	7
***K7MY**	**14**	**11,952**	**75**	**32**	**17**	**23**
*N3XRU/7	*	299	11	7	6	0
***WB3JFS/7**	**7**	**4,277**	**59**	**13**	**10**	**24**
K1LT/8	**A**	**814,946**	**1,100**	**175**	**68**	**131**
W8TOM	*	188,405	410	99	50	96
W8JGU	*	174,250	347	114	43	48
N8NOE	*	138,944	308	99	46	63
WB8MKH	*	116,436	370	62	34	90
N8IW	*	91,696	244	81	38	67
WA8RPK	*	73,515	302	61	25	1
K8ZZU	*	33,152	111	67	31	14
K8ALM	*	15,958	77	48	22	9
K8TJM	*	7,888	64	22	18	28
***WB8TLI**	**A**	**292,123**	**397**	**161**	**74**	**64**
*N2OPW/8	*	179,011	405	98	47	94
*KB8OCP	*	119,770	304	92	39	72
*K8OT	*	106,680	293	69	35	64
*N8GU	*	95,669	249	84	40	49
*WD9FTZ/8	*	56,780	161	70	37	63
*N8FRT	*	17,280	95	38	21	31
*W8IDM	*	9,044	66	28	17	23
***KC8FVE**	**14**	**3,040**	**33**	**20**	**13**	**7**
***WB8JUI**	**7**	**21,576**	**160**	**32**	**14**	**41**
ND9E	**A**	**134,325**	**339**	**88**	**47**	**90**
N9WKW	*	127,296	299	89	40	75
K9BJM	*	32,400	127	50	28	42
AI9L	*	26,378	103	57	29	23
AI9T	*	6,600	58	16	17	27
K9OM	**14**	**330,966**	**782**	**89**	**29**	**44**
AB9H	**7**	**91,264**	**398**	**54**	**19**	**51**
W9SE	**3.5**	**24,864**	**268**	**15**	**9**	**50**
***W9ILY**	**A**	**285,988**	**490**	**125**	**58**	**101**
*K9NR	*	183,065	432	94	49	92
*KC9IRQ	*	103,664	325	62	33	57
*KD9MS	*	97,734	237	93	43	43
*N9LYE	*	94,956	309	62	39	92
*WR9Y	*	69,285	240	60	30	59
*W9VQ	*	55,986	172	68	32	29
*N7GVV/9	*	44,940	159	62	35	43
*KB9DVC	*	24,926	125	38	28	55
*K9QH	*	24,717	151	32	22	53
*W9FF	*	23,120	119	47	25	13
*N9BT	*	16,536	109	27	25	52
*N9SB	*	13,328	102	29	18	21
*K9PY	*	12,580	68	45	19	4
*W9IP	*	10,660	82	25	21	36
*N9ID	*	9,176	65	29	21	24
*WQ9T	*	6,498	53	24	19	14
*AF9J	*	3,190	46	9	10	36
*NV9X	*	1,872	23	16	13	7
***W9KVR**	**21**	**1,541**	**25**	**13**	**9**	**1**
***N9BX**	**3.5**	**15,920**	**128**	**25**	**12**	**43**
ABØRX	**A**	**753,720**	**1,132**	**142**	**61**	**127**
KSØAA	*	431,664	857	118	51	107
NØKE	*	380,358	588	134	67	105
KØPK	*	335,988	689	106	45	53
KØPC	*	314,025	690	85	41	111
KØJJR	*	311,025	604	119	49	107
NEØU	*	299,368	608	104	41	39
WA7NPX/Ø	*	251,340	620	89	48	99
WØZQ	*	153,419	389	85	41	91
KØAP	*	140,068	353	94	43	57
WNØL	*	60,840	179	83	31	6

KCØRET	*	60,300	252	46	31	73
KØHB	*	53,312	211	44	29	63
WØTY	*	49,720	179	60	29	21
WØEM	*	36,625	184	39	27	59
NSØM	*	35,160	147	48	28	44
NØLEF	*	16,781	115	28	19	50
ABØYM	*	11,664	97	20	18	43
KØKT	**14**	**339,549**	**905**	**86**	**29**	**46**
KTØDX	*	81,554	288	62	26	33
WØGJ	**7**	**251,100**	**782**	**79**	**30**	**53**
KI6DY/Ø	**3.5**	**11,424**	**199**	**5**	**6**	**40**
***NTØF**	**A**	**583,713**	**795**	**136**	**59**	**122**
*K7RE/Ø	*	463,335	1,002	91	41	123
*KØYQ	*	202,788	447	92	55	115
*WAØLPV	*	151,272	379	87	46	65
*NØKBD	*	121,520	350	74	41	81
*WØTUP	*	117,469	398	58	36	87
*KSØM	*	114,885	273	94	41	50
*NØKM	*	112,536	267	82	48	86
*KCØBMF	*	107,858	313	74	43	82
*ACØE	*	105,080	329	60	32	93
*KØOB	*	91,948	292	63	41	77
*WØSM	*	76,281	324	51	30	60
*KØMPH	*	70,642	246	62	32	75
*WAØLJM	*	70,226	222	64	33	49
*WGØM	*	66,834	276	44	30	84
*KØLDS	*	62,624	206	63	39	50
*WBØULX	*	57,528	199	59	34	60
*KØXU	*	51,328	169	63	29	36
*AGØA	*	46,389	161	53	36	52
*KAØEIC	*	44,814	185	47	34	73
*KØRY	*	44,649	190	46	27	50
*NØLLH	*	29,161	141	41	27	53
*NØHJZ	*	22,618	159	34	19	33
*KCØGLA	*	21,484	130	37	17	28
*KØCF	*	13,392	100	23	21	49
*WØRAA	*	12,246	97	24	15	39
*NØEOP	*	10,934	102	19	17	35
*KFØIQ	*	2,064	33	11	14	18
*ACØBI	*	1,677	23	13	12	14
*WBØM	*	285	9	6	7	6
***AKØA**	**14**	**187,734**	**602**	**77**	**23**	**34**
*WØLV	*	34,640	168	58	22	0
*AI1P/Ø	*	28,269	143	44	17	20
*NØOK	*	17,733	102	39	16	14
*NØIBT	*	5,336	71	16	10	20
Alaska						
AL1G	**A**	**144,004**	**500**	**31**	**19**	**89**
KL7RA	*	141,180	393	61	34	61
***KL1SF**	**14**	**34,749**	**200**	**27**	**13**	**41**
Canada						
***VY2SS/1**	**A**	**1,061,788**	**1,198**	**160**	**62**	**142**
*VO1TTY	*	125,712	301	82	36	44
*VE9NC/1	*	104,148	297	60	29	43
*VO1OR	*	59,770	172	67	29	43
*VA1MM	*	6,750	55	18	15	21
*VE1BZI	*	6,419	62	15	9	25
***VA1CHP**	**21**	**17,219**	**105**	**30**	**16**	**21**
***VO1NM**	**14**	**2,250**	**44**	**8**	**5**	**12**
***VY2LU/1**	**7**	**80,892**	**317**	**56**	**15**	**37**
*VE1AOE	*	30,260	156	34	12	39
VE2SB	**A**	**1,421,260**	**1,419**	**182**	**67**	**148**
VA2WDQ	*	349,861	538	111	54	106
VA2AM	*	337,955	518	121	44	92
VE2FXL	*	122,360	313	76	27	49
***VA2UP**	**A**	**1,611,624**	**1,516**	**206**	**69**	**149**
*VE2FK	*	137,067	295	87	36	60
VE3AP	**A**	**2,546,861**	**2,159**	**211**	**77**	**169**
						(Op: LU7DW)
VE3KF	*	862,728	1,016	155	58	136
VA3TTU	**14**	**68,694**	**241**	**64**	**23**	**20**
VA3XH	**7**	**52,736**	**218**	**47**	**16**	**40**
VE3GLA	**3.5**	**37,051**	**234**	**22**	**11**	**46**
***VE3DZ**	**A**	**1,435,338**	**1,368**	**195**	**74**	**145**
*VE3XD	*	605,150	740	155	62	108
*VE3JI	*	468,369	648	127	54	116
*VE3KI	*	390,823	566	134	50	99
*VE3FH	*	288,972	449	123	53	100
*VE3JM	*	117,852	287	70	35	56
*VE3MCF	*	67,716	207	57	26	49
*VE3RCN	*	59,160	170	57	32	56
*VA3WPV	*	3,542	31	22	18	6
*VE3YXO	*	888	14	13	11	0
*VA3RNJ	*	408	10	8	7	2
***VE3FJ**	**14**	**39,130**	**177**	**52**	**17**	**17**
***VE3FDT**	**7**	**10,540**	**76**	**23**	**13**	**26**
VE4EAR	**A**	**986,446**	**1,193**	**149**	**67**	**130**
VE5CPU	**14**	**19,045**	**132**	**24**	**17**	**24**
***VA5LF**	**A**	**51,858**	**192**	**31**	**26**	**72**
VE6YR	**A**	**253,368**	**514**	**85**	**43**	**76**
VE6EPK	*	50,800	205	41	25	34
VE6WQ	**14**	**718,924**	**1,460**	**102**	**33**	**56**
VE7CC	**A**	**1,362,638**	**1,434**	**161**	**82**	**179**
VE7CF	*	401,226	696	93	51	102
VE7HBS	*	42,745	242	20	19	44
***VA7ST**	**A**	**463,034**	**694**	**106**	**54**	**126**
*VA7KO	*	450,630	729	87	54	129
*VA7AM	*	122,366	436	52	23	47
*VE7SQ	*	89,280	226	61	39	60
*VE7IO	*	69,300	223	39	32	69
*VE7UQ	*	30,084	140	31	20	41
*VE7BSM	*	24,985	116	36	23	36
*VA7ALK	*	24,882	110	42	23	22
*VA7HZ	*	4,250	37	17	15	18
***VE7FCO**	**14**	**24,319**	**119**	**37**	**16**	**30**
*VA7CPC	*	8,550	73	19	11	20
Costa Rica						
***TI2JCY**	**A**	**63,792**	**205**	**37**	**31**	**76**
***TI2KAC**	**21**	**58,844**	**286**	**29**	**17**	**48**
Cuba						
***CO2GL**	**A**	**145,435**	**466**	**46**	**22**	**77**
*CO2EL	*	130,096	293	80	40	68
*CO2IZ	*	35,990	137	43	26	49
*CO8CML	*	22,962	105	39	18	29
*CO8ZZ	*	19,908	97	31	15	38
***CO2KY**	**7**	**22,125**	**128**	**27**	**13**	**35**
*CO6WYR	*	15,847	111	39	14	0
Dominica						
***J79ZG**	**A**	**70,278**	**256**	**71**	**31**	**0**
						(Op: DL7AFS)

Dominican Republic						
HI8PLE	**A**	**564,339**	**745**	**130**	**60**	**123**
***HI3TEJ**	**A**	**2,413,450**	**2,057**	**217**	**76**	**177**
***HI8PJP**	**14**	**15,680**	**98**	**26**	**13**	**25**
Grenada						
***J398S**	**A**	**1,012,550**	**1,292**	**114**	**57**	**179**
Guatemala						
***TG9ANF**	**14**	**133,488**	**560**	**42**	**17**	**49**
Honduras						
HQ2W	**A**	**122,740**	**290**	**60**	**38**	**92**
						(Op: HR2DMR)
***HQ9R**	**7**	**298,900**	**914**	**64**	**20**	**56**
						(Op: WQ7R)
Jamaica						
***6YØFF**	**A**	**219,780**	**428**	**84**	**38**	**98**
						(Op: N2FF)
Mexico						
XE2K	**A**	**1,037,970**	**1,287**	**130**	**71**	**141**
XE1V	*	345,744	582	94	48	110
XE1R	*	245,220	458	79	51	114
***XE2AU**	**A**	**252,402**	**643**	**49**	**34**	**103**
*XE2YWH	*	170,088	342	58	47	123
*XE2S	*	101,135	264	44	36	99
***XE1GRR**	**21**	**4,033**	**48**	**11**	**11**	**15**
***XE1L**	**14**	**128,225**	**511**	**38**	**21**	**56**
Puerto Rico						
KP4GC	**A**	**18,492**	**73**	**52**	**29**	**11**
***WP3GW**	**A**	**22,448**	**97**	**42**	**25**	**25**
*KP4ED	*	20,856	99	47	28	4
*NP4G	*	4,186	37	18	14	14
***KP4AH**	**14**	**6,030**	**56**	**19**	**10**	**16**
Turks & Caicos						
***VP5JM**	**14**	**83,460**	**338**	**43**	**18**	**46**
U.S. Virgin Islands						
***KP2DX**	**A**	**132,977**	**302**	**63**	**35**	**95**
						(Op: KP2BH)
AFRICA						
Canary Islands						
EF8M	**A**	**8,850,345**	**4,543**	**332**	**108**	**211**
						(Op: RD3AF)
EA8AJO	**14**	**106,320**	**298**	**67**	**20**	**33**
***EC8AFM**	**A**	**324,520**	**448**	**141**	**54**	**49**
*EA8BQM	*	68,326	181	75	29	23
*EA8AQV	*	1,440	17	16	14	2
***EA8BGO**	**14**	**140,980**	**445**	**65**	**16**	**25**
***EA8ANE**	**7**	**714**	**15**	**12**	**5**	**0**
Chagos Islands						
VQ9LA	**A**	**629,800**	**895**	**136**	**61**	**38**
Madeira Islands						
CT3BD	**A**	**367,965**	**486**	**141**	**54**	**60**
CT3FQ	**14**	**725,592**	**1,443**	**85**	**25**	**58**
***CT3DZ**	**21**	**150,452**	**435**	**62**	**21**	**33**
***CT3KY**	**3.5**	**119,171**	**387**	**54**	**14**	**35**
Morocco						
***5C5W**	**A**	**2,695,719**	**2,201**	**197**	**64**	**148**
						(Op: CN8KD)
Senegal						
***6W7RV**	**A**	**10,030**	**58**	**38**	**19**	**2**
South Africa						
ZS2EZ	**A**	**514,108**	**709**	**123**	**50**	**71**
***ZS2I**	**A**	**58,225**	**230**	**64**	**20**	**1**
***ZS2Y**	**21**	**8,820**	**61**	**25**	**14**	**10**
***ZS1JY**	**14**	**231**	**7**	**7**	**4**	**0**
Tunisia						
***3V8SS**	**21**	**137,200**	**470**	**64**	**20**	**14**
ASIA						
Armenia						
EK6TA	**14**	**407,226**	**1,029**	**70**	**19**	**45**
Asiatic Russia						
RA9SC	**A**	**1,677,344**	**1,707**	**248**	**69**	**27**
RA9FTM	*	1,498,530	1,613	223	70	37
UA9BS	*	545,792	758	178	61	17
RX9TX	*	205,010	459	118	41	7
RA9UN	*	4,588	59	20	11	0
RA9FEU	*	1,539	29	14	5	0
RK9JWR	**14**	**275,028**	**757**	**86**	**26**	**17**
						(Op: RA9JR)
RA9RR	*	232,170	746	73	18	18
RV9CP	*	133,902	548	64	16	6
RK9AX	**7**	**88,476**	**311**	**64**	**22**	**15**
RA9CB	**3.5**	**8,547**	**96**	**27**	**6**	**0**
***UA9AFS**	**A**	**518,404**	**840**	**170**	**48**	**0**
*UA9SP	*	463,688	553	209	65	24
*UA9FFV	*	400,979	617	159	49	21
*RA9SN	*	294,216	552	139	37	8
*RX9DJ	*	199,227	466	121	36	2
*UA9AX	*	167,450	354	126	43	1
*RK9FBE	*	78,039	242	87	25	5
*RW9UW	*	50,952	220	66	22	0
*UA9OV	*	24,219	134	50	19	0
*UA9XBJ	*	6,192	53	31	12	0
*RA9SKL	*	3,276	37	21	15	0
***RU9DD**	**21**	**62,240**	**277**	**62**	**18**	**0**
*UA9QF	*	5,180	66	21	7	0
***RA9FN**	**14**	**159,600**	**494**	**73**	**24**	**17**
*RA9XF	*	100,036	399	60	19	10
*RX9FG	*	96,390	392	71	19	0
*UA9UNG	*	39,368	202	49	14	11
*RA9AFZ	*	18,582	125	44	13	0
*RW9SZ	*	10,700	76	39	11	0
RAØQC	**A**	**382,470**	**729**	**127**	**52**	**30**
UAØDC	*	135,516	408	75	45	18
RUØLL	*	61,875	251	60	30	9
UAØCW	*	42,770	168	62	27	2
RWØLT	*	12,719	56	42	27	10
UAØSW	**21**	**4,563**	**65**	**20**	**7**	**0**
RXØAW	**14**	**233,640**	**704**	**74**	**25**	**21**
UAØFAI	*	228,346	682	63	25	39
UAØYAY	*	57,340	233	49	18	27
UAØAZ	*	54,012	247	60	24	0
***RWØSR**	**A**	**301,366**	**706**	**105**	**40**	**28**
*UAØCNX	*	178,086	567	94	40	0

*RVØAUI	*	81,600	239	100	34	2
*UAØVF	*	80,206	263	84	35	0
*UAØLD	*	33,512	198	44	18	9
*RAØWHE	*	30,051	149	55	23	3
*UAØLKD	*	23,700	129	51	23	1
*RAØAY	*	20,075	118	47	24	2
*RAØSMS	*	19,564	127	42	23	2
*RAØLG	*	4,484	44	24	14	0
*UAØZEO	*	2,910	48	16	14	0
***RAØCL**	**14**	**21,432**	**202**	**29**	**13**	**5**
*UAØSR	*	15,075	88	34	15	18
***RAØSF**	**7**	**13,420**	**135**	**29**	**14**	**1**
Azerbaijan						
***4K9W**	**21**	**9,408**	**99**	**26**	**6**	**0**
China						
BA4T	**7**	**99,813**	**412**	**66**	**22**	**9**
***BG6JEQ**	**A**	**43,020**	**205**	**59**	**31**	**8**
*BD4TR	*	35,854	158	60	31	0
*BD2RJ	*	22,617	151	42	20	1
*BG1QEX	*	7,172	75	26	18	0
*BG6IRO	*	1,534	23	16	10	0
***BD1TCC**	**14**	**86,815**	**356**	**66**	**25**	**6**
*BD7JDG	*	16,992	153	35	13	0
*BD2AO	*	648	15	9	8	1
***BD4SP**	**7**	**23,108**	**189**	**33**	**16**	**4**
Cyprus						
***H2E**	**A**	**951,336**	**1,117**	**201**	**61**	**30**
***5B/HG3IPA**	**14**	**246,700**	**850**	**61**	**21**	**18**
						(Op: HA3JB)
Georgia						
***4L1BR**	**14**	**111,293**	**430**	**54**	**15**	**22**
Hong Kong						
VR2YYW	**21**	**15,369**	**118**	**34**	**13**	**0**
***VR2VIY**	**A**	**1,728**	**34**	**15**	**9**	**0**
***VR2YQU**	**14**	**8,514**	**84**	**28**	**15**	**0**
*VR2ZRE	*	2,716	39	18	10	0
India						
VU2LBW	**A**	**211,410**	**443**	**120**	**47**	**7**
Israel						
***4Z8BB**	**A**	**1,307,536**	**1,592**	**178**	**57**	**49**
*4Z5KZ	*	722	13	12	7	0
***4Z5MY**	**14**	**18,100**	**125**	**34**	**10**	**6**
Japan						
JF1PJK	**A**	**875,520**	**1,007**	**191**	**78**	**51**
JF1OPL	*	515,497	693	145	74	58
JM1XCW	*	418,209	604	117	61	75
JA1SJV	*	170,144	297	109	61	38
JE1LFX	*	155,144	348	71	50	51
JA1HFY	*	123,391	308	87	50	26
JA1AYO	*	97,812	222	81	45	30
JN1RQV	*	95,691	204	89	49	29
JA1IKA	*	72,432	190	74	47	23
JA1ADT	*	64,186	172	73	39	22
JO1WKO	*	50,600	163	69	28	18
JF1NHD	*	43,456	160	36	28	33
JF1NZW	*	17,430	74	56	27	0
JO1SIM	*	7,038	53	29	19	3
JR1NHD	**14**	**67,009**	**212**	**60**	**25**	**28**
JA1PTJ	*	5,616	39	29	16	7
***JI1RXQ**	**A**	**542,568**	**714**	**154**	**72**	**56**
*JA1BNW	*	179,080	378	105	53	27
*JA1BJI	*	93,312	296	69	50	25
*JA1PJS	*	74,536	221	63	35	23
*JA1IZ	*	53,360	164	56	34	25
*JG1IEF	*	40,392	144	53	27	19
*JK1NSR	*	36,935	152	48	26	15
*JA1PTO	*	34,452	138	55	31	13
*JH1FNU	*	32,457	129	53	30	10
*JA1RRA	*	32,175	122	57	30	12
*JA1FRQ	*	18,648	80	31	30	23
*JA1CPZ	*	17,472	78	38	21	19
*JA1AZR	*	17,316	87	36	30	12
*JF1LMB	*	16,848	85	38	29	11
*JA1BHK	*	15,914	102	35	28	10
*JR1UMO	*	13,090	59	35	26	16
*JA1IE	*	12,075	76	37	29	3
*JQ1DTT	*	7,590	43	37	27	2
*JA1MVK	*	7,080	41	28	21	11
*7K1CPT	*	3,800	36	24	16	0
*JK1TCV	*	2,812	28	18	16	4
*JF1HJX	*	1,377	27	14	12	1
*JA1SKE	*	493	10	10	7	0
*JI1UDD	*	266	7	7	7	0
***JI1BBN**	**21**	**3,237**	**32**	**24**	**14**	**1**
*7N4WPY	*	1,275	20	12	13	0
*7K3OZQ	*	765	16	9	8	0
*JR1NKN	*	420	11	8	7	0
***JA1BFN**	**14**	**37,655**	**156**	**44**	**20**	**21**
*7L3DGP	*	2,146	29	14	12	3
*JK1LUY	*	2,106	28	15	8	4
*JA5INF/1	*	55	5	2	3	0
						(Op: JA5INF/1)
***JP1QDH**	**7**	**34,124**	**206**	**40**	**23**	**13**
*JH1APZ	*	32,000	158	49	20	11
*JE4AEJ/1	*	2,314	41	16	10	0
JA2FSM	**A**	**390,750**	**610**	**124**	**65**	**61**
JR2PMT	*	171,990	299	116	63	31
JA2XYO	*	107,724	283	79	41	21
JH2BTM	**21**	**13,629**	**86**	**39**	**19**	**1**
JA2VHO	**14**	**49,231**	**198**	**44**	**23**	**24**
JF2QNM	*	36	3	2	2	0
***JA2AXB**	**A**	**193,826**	**353**	**108**	**54**	**37**
*JA2GHP	*	51,156	170	63	38	15
*JA2QVP	*	47,960	164	56	37	16
*JK2KNR	*	46,816	157	65	36	11
*JM2RUV	*	5,687	44	25	14	8
***JE2SOY**	**28**	**403**	**16**	**8**	**5**	**0**
***JR2AAN/2**	**21**	**20**	**2**	**2**	**2**	**0**
						(Op: JR2AAN/2)
***JR2PAU**	**14**	**25,764**	**123**	**39**	**18**	**19**
*JR2ECF	*	6,160	47	18	11	15
						(Op: JF1EQA)
***JE2UFF**	**7**	**61,100**	**276**	**55**	**24**	**15**
JR3NZC	**A**	**438,750**	**631**	**130**	**55**	**65**
JI3BFC	**14**	**73,902**	**249**	**59**	**27**	**23**
***JA3JM**	**A**	**107,448**	**288**	**83**	**45**	**20**
*JA4XHF/3	*	36,385	136	57	29	9
						(Op: JA4XHF/3)
*JA3MIB	*	21,074	98	46	28	8
*JG3SVP	*	10,692	82	32	22	0
*JR3SZZ/3	*	551	12	10	9	0

***JR3RIY**	**21**	**29,678**	**160**	**46**	**21**	**4**
*JK3GWT	*	26,096	171	42	14	0
***JL3MCM**	**14**	**12,122**	**76**	**35**	**14**	**9**
***JO3PSJ**	**7**	**378**	**18**	**6**	**7**	**1**
JH4UYB	**A**	**2,173,820**	**1,886**	**224**	**87**	**99**
JH4BTI	*	206,040	402	121	58	23
JA4EZA	*	86,700	226	80	48	22
***JI4JGD**	**A**	**1,682**	**30**	**15**	**13**	**1**
*JH4GLG	*	1,612	23	14	15	2
***JA5SUD**	**A**	**119,906**	**272**	**89**	**49**	**29**
JA6BZI	**A**	**294,245**	**427**	**142**	**61**	**42**
JA6ZPR	**14**	**134,809**	**430**	**65**	**26**	**22**
						(Op: JH6JSR)
***JK6JAB**	**A**	**1,344**	**31**	**19**	**12**	**2**
***JA6DIJ**	**14**	**92,344**	**285**	**69**	**27**	**23**
*JQ1AHZ/6	*	2,403	34	13	9	5
*JA6FGC	*	945	21	11	4	0
JA7IC	**A**	**457,300**	**607**	**136**	**71**	**62**
JA7COI	*	353,800	567	117	62	53
JA7KY	*	127,925	264	108	48	19
JH7QXJ	*	64,260	175	73	45	17
JA7WQJ	*	21,870	87	42	32	16
JG7PSJ	**14**	**237,688**	**579**	**78**	**31**	**39**
JA7BME	*	109,680	321	60	24	36
JA7MJ	**7**	**13,197**	**107**	**29**	**18**	**6**
***JA7VEI**	**A**	**64,253**	**166**	**73**	**38**	**26**
***JH7RTQ**	**21**	**55,300**	**208**	**63**	**28**	**9**
JA8TR	**A**	**363,764**	**623**	**110**	**51**	**50**
JA8MXC	**7**	**9,765**	**101**	**24**	**15**	**6**
***JA8EIU**	**A**	**149,644**	**344**	**99**	**56**	**24**
*JA8CDG	*	49,126	149	65	43	13
***JH8SIT**	**14**	**25,916**	**123**	**40**	**18**	**18**
*JE8CLT	*	4,300	34	28	10	5
*JH8DBJ	*	2,610	30	18	6	6
*JE8NTJ	*	595	14	6	6	5
*JA8IJI	*	420	11	9	5	0
JA9CWJ	**A**	**172,172**	**336**	**99**	**49**	**34**
***JA9LX**	**A**	**47,234**	**158**	**58**	**39**	**16**
*JI2TNT/9	*	3,999	38	23	18	2
JHØINP	**A**	**84,001**	**187**	**85**	**54**	**28**
***JHØNEC**	**A**	**8,928**	**51**	**25**	**21**	**16**
*JGØAXT	*	6,519	52	25	20	8
***JRØBUL**	**14**	**551**	**10**	**8**	**9**	**2**
Kazakhstan						
UN1L	**A**	**1,585,686**	**1,992**	**213**	**69**	**0**
UN6P	*	1,457,280	1,568	223	70	37
UN7PL	*	1,090,375	1,383	192	55	28
UN5J	*	226,044	432	130	46	13
***UN7CN**	**A**	**252,860**	**477**	**140**	**44**	**4**
*UN7TW	*	6,900	48	34	16	0
***UN4PG**	**21**	**39,406**	**231**	**47**	**14**	**8**
*UN7TDB	*	38,744	242	43	15	0
***UN7JX**	**14**	**232,188**	**625**	**86**	**27**	**19**
*UN6G	*	119,232	401	67	24	17
***UN9LU**	**7**	**31,020**	**195**	**45**	**10**	**0**
Kyrgyzstan						
***EX8AI**	**14**	**60,450**	**300**	**54**	**19**	**2**
Ogasawara						
JD1BLY	**A**	**86,940**	**433**	**58**	**33**	**1**
						(Op: JI5RPT)
Qatar						
***A71FJ**	**A**	**66,884**	**253**	**68**	**24**	**0**
***A71BU**	**14**	**17,278**	**117**	**37**	**15**	**1**
Saudi Arabia						
***7Z1SJ**	**A**	**1,086,495**	**1,097**	**204**	**65**	**70**
*7Z1HL	*	48,836	142	70	24	22
***HZ1DG**	**14**	**9**	**1**	**1**	**1**	**1**
Singapore						
9V1UV	**A**	**98,264**	**300**	**78**	**52**	**12**
South Korea						
HL5JCB	**A**	**23,994**	**108**	**48**	**27**	**11**
DS5QLJ	*	19,720	112	46	22	0
HL9A	*	2,208	27	18	14	0
HL1/WX8C	**14**	**6,422**	**73**	**25**	**12**	**1**
***HL1VAU**	**A**	**30,176**	**125**	**52**	**35**	**5**
***HL5YI**	**14**	**16,104**	**102**	**31**	**20**	**10**
Taiwan						
BV1EK	**A**	**97,340**	**239**	**98**	**50**	**7**
***BV4VR**	**7**	**10,534**	**98**	**25**	**16**	**4**
Thailand						
***E21YDP**	**A**	**734,648**	**1,031**	**174**	**58**	**30**
***E21EIC**	**14**	**1,274**	**20**	**15**	**11**	**0**
Turkey						
TA1DX	**A**	**378,630**	**617**	**141**	**44**	**25**
***TA7AO**	**A**	**147,846**	**419**	**85**	**24**	**14**
UK Bases on Cyprus						
ZC4LI	**21**	**325,760**	**885**	**83**	**25**	**20**
ZC4VJ	**14**	**230,658**	**709**	**56**	**19**	**36**
United Arab Emirates						
A61BK	**A**	**180,400**	**354**	**102**	**46**	**28**
Uzbekistan						
***UK7AZ**	**A**	**455,712**	**808**	**130**	**50**	**22**
West Malaysia						
9M2CNC	**A**	**1,294,568**	**1,508**	**198**	**71**	**44**
						(Op: G4ZFE)
9M2/WQ2C	**21**	**65,959**	**358**	**55**	**16**	**0**
						(Op: WQ2C)
***9M2TO**	**A**	**228,520**	**577**	**98**	**33**	**14**
EUROPE						
Andorra						
***C31CT**	**A**	**1,920**	**33**	**19**	**11**	**0**
Austria						
***OE2GEN**	**A**	**918,385**	**1,037**	**195**	**65**	**95**
*OE2IGP	*	592,705	787	196	63	64
*OE1TKW	*	51,788	172	62	25	34
*OE1MCU	*	6,776	52	34	20	2

Azores

*CU2AF	A	3,724	42	23	13	2

Belarus

EU1AZ	A	1,408,293	1,583	237	78	72
EW4AA	*	1,031,424	1,131	238	77	69
EV1R	*	740,250	908	211	68	71
EV8D	*	92,110	336	73	22	27
						(Op: EW8CY)
*EU8RZ	A	959,400	1,158	242	69	58
*EU2MM	*	411,648	737	197	59	0
*EU1DX	*	358,072	536	173	59	54
*EW1NA	*	230,520	511	138	40	26
*EW7LE	*	210,396	472	129	44	24
*EW8DA	14	24,840	157	43	15	11

Belgium

*OP4A	A	122,486	299	115	39	28
*ON4ABL	*	27,413	169	55	19	5
*ON3AD	*	8,892	68	36	21	0
*ON5KDX	14	43,043	188	46	17	28
*ON769MS	*	11,660	89	23	9	21
						(Op: ON8NT)
*OT4P	7	26,599	188	49	13	5

Bosnia-Herzegovina

E72W	21	93,708	319	63	23	28
E72MM	14	293,930	884	61	19	53
*E78CB	A	79,674	245	100	39	8
*E79D	7	92,496	444	54	15	25
*E74AA	3.5	38,090	283	47	10	8

Bulgaria

LZ1BJ	A	198,720	482	111	36	37
LZ2ZG	21	4,716	58	25	9	2
LZ2JR	14	435	12	6	5	4
*LZ9R	A	1,425,804	1,636	245	74	74
						(Op: LZ3YY)
*LZ1YE	14	66,833	289	55	18	24
*LZ2NKM	*	8,316	85	34	9	1

Corsica

*TK/DF6ZY	14	63,014	279	50	13	35
						(Op: DF6ZY)

Crete

SV9CVY	A	1,468,452	2,050	242	74	0
SV9AHZ	*	105,230	248	85	40	45
*SV9COL	A	104,267	381	74	25	28

Croatia

9A7R	28	19,779	159	45	12	0
9A5Y	21	283,968	628	102	35	37
						(Op: 9A3NM)
9A5BTP	7	356,928	1,073	76	25	42
9A5MT	*	207,400	659	72	27	37
*9A8W	A	549,585	804	177	60	58
*9A2BW	*	73,830	240	96	34	8
*9A1CMS	*	63,700	293	69	24	7
						(Op: 9A6KZH)
*9A2GA	*	25,026	138	64	21	1
*9A2DI	28	2,604	37	20	8	0

Czech Republic

OK2SFP	A	397,440	749	135	49	56
OL8R	*	237,411	404	137	53	53
OK1EP	*	221,334	424	135	47	40
OK1DBE	*	861	20	15	6	0
OK2PCL	14	165,832	427	78	28	46
OL16BND	*	157,339	467	59	23	51
OK2SAR	7	26,910	179	47	11	11
*OK1FHI	A	413,316	717	169	51	38
*OK2PQS	*	334,488	644	141	48	42
*OK2NMA	*	146,616	390	105	36	23
*OK1HEH	*	139,672	414	114	33	11
*OK2DW	*	138,890	371	116	40	14
*OK1FLC	*	129,087	287	115	46	28
*OK2UHP	*	91,238	301	76	25	32
*OK2PAD	*	69,144	239	93	31	10
*OK2KFK	*	37,800	120	67	29	24
						(Op: OK1MSP)
*OK1LO	*	26,565	101	57	32	16
*OK6AB	*	24,653	109	38	23	28
*OK3C	14	215,986	541	82	27	49
						(Op: OK2ZC)
*OK2SWD	*	5,092	59	20	9	9
*OK1VRF	3.5	37,200	298	48	10	4

Denmark

OV1A	A	483,204	762	166	48	54
5Q2J	*	47,840	288	55	14	11
*5P9X	A	230,208	452	136	47	35
						(Op: OZ9GA)
*OZ8TL	*	94,650	287	100	28	22
*OZ7XE	*	88,365	301	97	32	8
*OZ1NF	*	20,480	147	48	16	0
*OZ7AEI	*	13,806	113	42	14	3
*OZ1DGQ	*	5,040	53	30	15	0

Dodecanese

SX5R	14	128,838	543	69	22	18
						(Op: SV5DKL)

England

G3TXF	A	900,666	1,148	212	73	66
GØHDV	*	202,950	590	111	29	25
GØDAY	*	82,476	318	68	22	26
G3YBY	21	41,194	199	52	20	14
M2X	14	88,356	480	54	20	0
						(Op: G4RCG)
MØOXO	*	77,688	477	54	18	0
M4T	*	19,095	149	42	15	0
						(Op: GØVQR)
*GØMTN	A	974,806	1,287	213	64	66
*GØHVQ	*	460,158	730	176	58	49
*2EØZWW	*	238,924	494	131	42	39
*G3KNU	*	234,972	412	139	52	53
*G9M	*	195,836	529	116	31	26
						(Op: MØPRD)
*G8MIA	*	195,083	399	143	47	27
*GØRPM	*	166,347	407	113	32	38
*G4WGE	*	137,214	324	111	39	39
*GØCMP	*	97,340	286	104	35	16
*G3KMQ	*	95,934	217	95	37	45
*2EØBPP	*	73,360	251	85	28	18
*G4MUL	*	67,539	223	99	31	11
*G3SNU	*	46,420	202	86	24	0
*G3RSD	*	41,625	164	61	23	27
*G3LHJ	*	40,845	156	47	29	29
*2EØTQR	*	34,848	161	67	24	8
*G3VQO	*	34,317	181	71	22	0
*G6CSY	*	24,354	110	64	23	12
*G3VAO	*	21,000	119	41	14	20
*G4RFC	*	18,177	107	62	21	0
*G4LWB	*	16,640	114	38	16	10
*MØPCB	*	8,791	72	41	16	2
*G7RTI	*	5,050	47	33	13	4
*G4KIU	*	9	1	1	1	1
*G4ZOB	21	12,240	107	35	13	0
*G4DBW	14	104,554	359	67	22	33
*G4GSA	*	264	11	9	3	0
*M/YO4RDW	7	43,173	239	52	14	15

Estonia

ES4RD	A	275,209	564	112	40	45
ES2DJ	*	201,985	452	144	44	15
*ES3RF	A	157,500	401	125	36	19
*ES4MM	21	10,010	75	42	13	0

European Russia

RD4W	A	1,783,255	1,906	277	86	52
						(Op: RD4WA)
RN3ZC	*	1,337,219	1,575	242	71	64
RX4HZ	*	1,071,558	1,323	236	73	45
RA3BT	*	845,427	1,001	220	76	67
RW6CR	*	841,794	1,147	172	59	76
UA4HJ	*	433,568	733	191	60	21
RV3WD	*	337,846	610	196	55	0
RN1NU	*	333,222	629	126	46	50
RA6XE	*	232,461	513	147	44	16
RZ6HF	*	151,200	390	99	34	35
RW4FE	*	134,387	257	135	51	23
RZ4FA	*	117,351	323	88	36	29
RZ6AK	*	100,368	312	115	29	9
UA4PN	*	93,600	295	106	38	6
UA4NC	*	74,385	246	113	31	1
RU4CO	*	71,535	358	77	18	0
RD3DT	*	57,150	306	70	20	0
UA3AQB	*	52,394	153	90	44	0
RU1AT	*	48,760	198	79	31	5
UA3TN	*	42,630	193	76	22	0
UA3PW	*	38,640	148	73	30	9
RW4NN	*	37,476	126	64	37	7
RU1AB	*	25,245	109	63	26	10
RA3FD	*	24,816	117	67	23	4
RN1ON	*	7,668	69	40	13	1
RA1AR	*	6,448	49	45	17	0
RN3REY	*	3,780	34	27	16	2
UA4RZ	*	1,530	22	18	10	2
RA4UVK	*	24	2	2	2	0
UA6CE	21	122,094	470	80	24	10
RX6AM	14	264,176	738	79	28	45
RW4WZ	*	261,096	853	85	25	28
RA6DE	*	257,700	725	77	27	46
RZ3TZZ	*	235,893	715	82	27	32
						(Op: RA3TE(REM))
RA1AW	*	224,560	694	73	22	45
RW6BN	*	178,948	495	89	30	35
UA4FCO	*	41,888	197	52	19	17
RW6CF	7	145,669	532	77	26	24
RA4ST	*	62,664	355	63	19	2
RZ3DX	*	30,814	203	50	17	4
RV3IC	*	13,083	137	37	10	2
*RX6LD	A	674,374	1,005	202	60	36
*RV3ZN	*	517,248	821	203	61	24
*RZ6BU	*	513,590	711	208	66	45
*RN6MA	*	355,180	705	172	46	18
*RU3SE	*	303,120	587	179	50	11
*UA3DCW	*	245,916	546	133	49	16
*RW6AH	*	243,738	568	135	41	22
*RV6LCI	*	228,176	507	142	47	19
*RW3SB	*	189,280	495	147	35	0
*RN3QQ	*	179,861	412	140	44	13
*RA3BB	*	174,876	450	109	42	26
*RA3MB	*	152,755	300	158	52	13
*RD3DS	*	147,199	396	117	30	22
*RW3WX	*	146,080	358	108	40	28
*UA3XAC	*	135,736	324	124	44	20
*RN3DFN	*	133,644	350	120	38	14
*RU6YY	*	133,049	214	113	60	56
*UA3QLQ	*	132,880	342	123	35	18
*RA6FUZ	*	131,040	350	120	38	10
*RU3XB	*	119,520	341	121	34	5
*RA6HSM	*	111,888	352	115	33	0
*RU3AT	*	101,374	219	97	46	39
*RZ3PS	*	87,875	193	116	48	21
*RV3YR	*	82,566	247	75	30	34
*UA3PT	*	80,514	298	79	32	15
*UA3MHG	*	75,999	246	105	35	1
*RZ3AIU	*	65,076	296	75	23	4
*RA6XV	*	59,280	220	80	38	2
*UA6GM	*	54,450	267	78	21	0
*RU3XJ	*	52,632	168	88	36	12
*RA6XB	*	49,572	131	97	37	19
*RX6HT	*	47,853	195	84	28	5
*RA4POX	*	45,045	178	83	34	0
*RA4LZ	*	43,248	193	80	26	0
*RV4LC	*	41,364	175	76	26	6
*RU3BU	*	36,974	113	91	37	11
*RV3DBK	*	35,061	179	71	19	3
*RX3MM	*	34,866	117	65	34	18
*RA4HL	*	25,608	107	62	24	11
*RD3AD	*	23,736	119	68	24	0
*RV6AJJ	*	16,280	76	54	34	0
*RK6AQM	*	9,860	81	43	15	0
*RA6AAW	*	9,072	49	40	26	6
*RA3TJX	*	8,910	63	45	21	0
*RX6MR	*	7,680	58	37	21	2
*RA3BQ	*	2,415	25	19	12	4
*RD3AJB	*	2,178	30	23	10	0
*UA3MOC	*	1,800	27	20	9	1
*UA3QIX	*	1,674	31	20	7	0
*RL3FA	*	99	4	4	4	1
*UA4WCM	21	45,698	298	56	17	0
*RZ3AV	*	30,723	172	55	17	5
*RK6CK	*	17,646	159	37	14	0
*RW4LQ	*	6,240	43	36	16	0
*RA3XEV	*	4,290	56	25	8	0
*RA4LK	*	1,325	22	19	6	0
*UA3RAB	*	294	8	7	6	1
*UA3PAB	14	365,955	991	84	27	44
*RX6BS	*	173,313	597	76	26	29
*UA6BJY	*	159,045	627	67	21	27
*UA3WHK	*	58,240	316	54	15	11
*RV1CC	*	57,344	195	50	23	39
*UA4SAW	*	57,340	277	63	17	14
*RU6BR	*	45,300	189	56	20	24
*RW3AI	*	44,016	238	59	17	8
*RA6FZ	*	25,438	143	48	17	14
*UA3UJP	*	24,534	194	45	10	3
*RV6BO	*	24,300	129	49	14	18
*RA3IS	*	13,056	71	25	17	22
*RK4PB	*	8,510	88	36	10	0
*UA4UT	*	3,500	36	20	11	4
*RN6HDX	7	104,788	548	65	15	12
*RN4SN	*	54,945	253	71	24	4
*RD4HD	*	44,928	309	56	13	3
*UA4WAW	*	35,496	252	56	12	0
*RA3QN	*	18,105	176	41	10	0
*UA4SBZ	*	3,325	69	20	5	0
*RA3QH	3.5	24,072	240	44	7	0
*RA3UAG	*	15,705	178	38	7	0

Finland

OH7UE	A	1,570,206	1,614	253	84	70
OH3OJ	*	476,927	962	141	48	38
OH8GBO	*	74,880	263	85	30	13
OH4KA	*	38,947	223	53	18	8
OG8A	21	148,330	456	77	27	26
OH1TN	*	72,216	281	55	24	23
OH7KNM	*	23,104	111	45	22	9
OH6RE	14	16,330	100	44	16	11
OH2BP	7	147,963	617	74	24	13
OH2RI	*	61,056	292	67	23	6
						(Op: OH9RI)
*OH2NT	A	144,095	417	110	33	18
*OH2CI	*	65,847	214	100	33	8
*OH5HBA	*	38,080	109	86	36	18
*OH2LZI	*	3,638	45	21	10	3
*OH4AB	14	12,190	106	33	13	7
						(Op: OH4KLU)
*OH6TN	3.5	80	5	5	3	0

France

F5OAM	A	668,650	960	178	60	73
F5GFA	*	123,900	305	102	41	34
F4DXW	21	300,484	697	100	32	40
F8DBF	14	1,168,230	2,125	114	38	58
TM9FL	*	329,472	921	69	21	53
						(Op: F5TJX)
F4JRC	7	69,936	341	57	16	20
*F6HRP	A	779,538	932	200	64	82
*F5VBT	*	365,726	811	174	39	1
*F5RD	*	241,740	450	136	49	52
*F6FTB	*	226,218	441	131	47	44
*F4FDR	*	102,300	318	108	29	13
*F5LCU	*	56,007	186	78	28	21
*F6DKQ	*	30,870	126	34	21	35
*F5TMJ	*	27,200	113	51	27	22
*F8DZU	*	26,477	141	46	18	19
*F6CZV	*	26,264	117	59	25	14
*F6DZD	*	25,555	110	51	28	16
*F4FSB	*	15,708	87	59	24	1
*F1IWH	*	13,806	83	49	21	8
*F4EFL	*	3,332	48	24	10	0
*F5KKJ	*	408	10	6	6	5
						(Op: F4OHA)
*F1ULJ	14	2,940	37	22	10	3
*F4FKJ	*	2,256	40	16	8	0
*F/VA2SG	*	72	6	4	2	0
						(Op: F/VA2SG/P)

Germany

DD1JN	A	1,125,355	1,192	239	80	88
DD2ML	*	922,658	1,081	221	70	83
DL5KUT	*	903,910	1,069	193	68	88
DL4MCF	*	855,024	978	209	78	89
DR6ØØUL	*	761,854	973	192	64	78
						(Op: DL5YYM)
DK3GI	*	584,970	723	159	66	85
DK6CQ	*	547,626	736	199	63	59
DL4ME	*	321,538	628	161	50	27
DK1KC	*	223,076	462	126	47	44
DF5BX	*	216,648	501	137	44	23
DJ2IA	*	151,008	300	116	53	39
DL3G	*	140,049	329	113	42	34
						(Op: DC3RJ)
DH1TST	*	130,449	274	119	50	32
DJ2YE	*	110,264	281	116	36	27
DK1BX	*	108,290	238	104	44	34
DF9OO	*	107,975	256	100	43	32
DK4RL	*	72,358	220	85	33	25
DL7JAN	*	72,048	194	85	35	32
DL6DCD	*	69,608	172	84	44	26
DL5MEV	*	60,606	188	68	34	24
DL5YM	*	53,868	173	78	33	23
DGØKS	*	53,119	179	67	33	21
DL8DBW	*	47,520	192	85	29	6
DL4RU	*	44,940	200	74	25	8
DJ6TB	*	35,908	188	72	22	0
DK8EY	*	35,638	159	63	22	18
DL5AN	*	25,056	115	40	24	23
DL2IAN	*	3,510	30	24	21	0
DB3LO	*	1,952	23	16	11	5
DN4NER	*	1,064	15	12	12	4
						(Op: DL4NER)
DN1TB	*	4	1	1	1	0
DL1LH	21	81,158	268	73	25	21
DH7SA	14	90,675	327	62	21	34
DF3EH	*	54,264	307	55	21	0
DL3BQA	3.5	98,908	687	57	14	8
DJ3IW	*	84,318	575	55	12	11
*DJ6BQ	A	784,792	885	220	68	85
*DM3HZN	*	673,937	958	188	66	57
*DF4WC	*	603,477	835	182	68	59
*DL5KUD	*	523,160	695	212	69	47
*DH6BH	*	514,504	785	175	57	60
*DM2RG	*	488,133	720	184	59	60
*DR8ØØGRZ	*	287,270	584	143	48	39
						(Op: DL1ARJ)
*DJ8EW	*	285,852	494	146	53	50
*DL1EAL	*	258,593	462	146	43	52
*DL1HTY	*	248,220	431	151	55	46
*DL1TRK	*	242,928	434	146	54	41
*DJ1OJ	*	227,290	400	131	55	52
*DL4NN	*	225,940	436	131	51	38
*DJ8UV	*	222,981	412	146	46	41
*DL8MBS	*	208,494	451	116	38	44
*DF1DX	*	201,600	404	101	45	54
*DL6UMF	*	198,968	518	144	43	0
*DL3WKG	*	195,321	410	142	46	25
*DL1MAJ	*	171,710	330	129	48	46
*DF9DD	*	166,404	390	130	41	25
*DDØDRK	*	158,353	445	118	32	19
						(Op: DL4HTK)
*DL4JYT	*	141,376	317	115	44	29
*DL9NO	*	136,248	393	121	37	10
*DL2AL	*	129,360	358	111	37	17
*DJ5QV	*	125,976	339	120	34	20
*DL5ARM	*	115,593	325	102	32	25
*DF2RG	*	108,414	285	128	43	0
*DH2PL	*	99,345	249	116	39	24
*DGØOM	*	93,150	303	108	32	10
*DK1LRS	*	84,600	285	102	28	11
*DO6SR	*	83,898	363	82	28	8
*DD7ZT	*	71,145	236	83	33	19
*DK3WN	*	70,140	225	90	31	19
*DH1JG	*	61,344	189	83	33	28
*DL5JSP	*	59,770	182	82	35	22
*DH5AO	*	59,492	198	93	35	11
*DG9MDM	*	56,118	167	80	32	29
*DC2KN	*	52,400	176	85	31	15
*DM5JL	*	50,875	179	78	32	15
*DL3DRN	*	50,181	162	73	31	25
*DL7FCQ	*	49,580	154	79	39	16
*DL2ZA	*	48,568	240	77	22	5
*DK5IR	*	46,248	169	73	32	18
*DO9ST	*	44,304	202	68	25	11
*DL1NEO	*	44,016	138	70	35	26
*DF6WE	*	42,824	195	81	25	0
*DO9PL	*	42,585	280	63	18	4
*DL6SFR	*	42,294	170	56	28	22
*DF2HL	*	40,492	165	64	29	13
*DL1DXF	*	39,650	139	65	29	28
*DM5JBN	*	37,389	177	77	22	4
*DL1RTL	*	35,568	126	72	36	9
*DJ5MY	*	31,832	165	65	24	3
*DJ6UP	*	31,525	147	63	24	10
*DL6UAM	*	29,039	216	61	10	0
*DL1ZU	*	26,691	102	41	25	27
*DF2QZ	*	22,900	93	55	29	16
*DK4JPC	*	22,264	114	53	22	13
*DC1NSK	*	21,714	125	45	20	12
*DL1JB	*	21,672	126	63	19	4
*DL3KVR	*	21,546	119	54	21	6
*DF8TI	*	20,833	108	47	19	17
*DO3ME	*	19,637	120	53	18	2
*DO3NO	*	18,836	136	48	17	3
*DL3EBX	*	18,104	120	55	12	6
*DL2ARG	*	16,154	92	61	21	0
*DO1BEN	*	16,147	117	46	17	4
*DL4EAX	*	16,065	88	59	22	4
*DO3PKE	*	15,142	107	46	15	6
*DL5KUR	*	12,675	58	30	24	21
*DG5SBK	*	12,627	105	43	14	4
*DO6GZ	*	7,968	65	27	11	10
*DJ3GE	*	5,671	49	34	15	4
*DK3WW	*	3,916	33	27	17	0
*DL2LAR	*	2,850	33	19	12	7
*DO9DMB	*	1,404	31	17	9	0
*DM2ATN	*	160	6	5	5	0
*DO8AH	21	11,040	66	31	21	8
*DG2JA	*	7,740	67	28	15	0
*DJ6XB	*	544	12	9	7	0
*DO4TP	*	351	10	7	6	0
*DJØMCZ	14	113,649	369	69	24	36
*DL1DTL	*	59,940	209	55	19	34
*DJ2TH	*	35,334	201	51	18	9
*DL1DWL	*	32,163	192	44	15	12
*DJ2GMS	*	12,300	76	24	13	23
*DL8RDL	*	1,620	26	15	8	4
*DLØYE	7	10,780	108	40	9	0
*DM5GI	3.5	34,060	277	47	11	7
*DD9WG	*	18,950	204	42	8	0

Greece

SY1RY	A	2,196,882	2,224	248	78	100
						(Op: SV1CIB)
SY2V	*	325,962	846	116	36	30
						(Op: SV2GJV)
SY2O	*	214,720	555	109	35	32
*J46J	A	535,164	860	172	57	48
						(Op: SV1BJW)
*SV1HKD	*	13,838	74	37	21	16

Guernsey

*GUØSUP	A	369,598	546	175	56	52

Hungary

HA9PP	A	1,477,440	1,480	217	75	113
HA7LW	*	23,808	98	49	25	22
HA1YI	21	80,801	263	72	30	17
HA7TM	14	345,800	943	65	22	53
HG3W	7	123,284	597	66	18	14
						(Op: HA3AUI)
*HA8BE	A	1,059,390	1,122	232	73	90
*HA6NL	*	375,492	693	169	50	30
*HA3OU	*	78,392	190	90	45	29
*HA6IAM	21	6,683	62	26	13	2
*HG3FMZ	14	95,079	324	68	23	32
*HAØML	*	82,038	277	65	24	32
*HA5AWT	*	24,888	154	40	13	15
*HA5LZ	7	178,435	639	77	25	25
*HAØGK	*	20,496	172	45	10	1
						(Op: HAØGK-VIKY)
*HA8BQ	3.5	12,300	148	35	6	0
*HG3FMY	*	645	22	12	3	0

Iceland

TF3AM	A	650,250	1,134	147	42	61
TF3GC	*	51,875	271	42	15	26
*TF3PPN	A	416,962	924	125	32	46
*TF3IGN	*	21,420	166	43	17	0
*TF3G	14	53,176	259	53	13	26

Ireland

EI9ES	A	20,592	96	47	22	19
*EI4GXB	A	33,109	122	68	31	14

Italy

IK2BUF	A	464,210	661	183	61	61
IK5FKF	*	166,064	344	111	46	37
IKØWRB	*	136,374	318	124	40	27
IK4ZHH	*	114,915	286	80	34	49
IZØMGN	*	108,173	310	113	44	0
IQ3FX	*	81,696	264	96	33	9
IZ1OQB	*	33,048	151	72	21	9
IK1MEG	*	31,616	117	47	33	24
IZ2EWM	*	11,286	77	41	19	6
IZ5ILK	*	6,708	64	19	8	16
I4IKW	21	343,362	760	102	31	45
IZ3GOM	*	95,282	309	73	25	24
I5JFG	*	22,820	125	41	19	10
IN3QBR	14	545,600	1,192	88	31	57
IT9STX	*	533,691	1,265	86	28	57
IZ8BGY	*	129,480	478	66	21	33
I5WNN	7	55,692	314	53	14	17
IV3IZU	*	31,310	242	43	14	5
IZ3IBL	*	6,960	86	27	9	4
IV3HYD	3.5	116,012	623	60	14	18
IZØKBR	*	104,082	616	56	13	14
*IKØCHU	A	620,493	831	189	60	72
*IZ8OGR	*	369,200	746	104	41	63
*IK2YSJ	*	253,228	476	145	49	42

*IZ3KSO	*	224,884	506	138	41	30
*I2XLF	*	198,450	386	113	45	52
*IW2MYH	*	198,432	428	154	45	13
*IT9JDH	*	194,010	398	139	46	38
*IW9BCW	*	193,230	389	163	50	13
*IZ3GOG	*	181,984	422	139	49	0
*IT9RZU	*	132,288	407	115	41	3
*IW4EGX	*	129,675	296	121	43	31
*IW4EQI	*	124,568	300	119	41	24
*IK3TZB	*	117,705	280	107	43	27
*I1BAY	*	117,486	291	122	37	24
*IK3ASM	*	107,156	254	116	45	17
*IZ2EEV	*	72,896	237	75	31	28
*IZ1DXS	*	63,855	215	90	39	0
*IK4QJF	*	62,514	193	73	34	31
*IZØFZM	*	59,024	187	57	29	38
*IZ7EUB	*	54,567	137	68	42	31
*I2BZN	*	52,680	198	77	27	16
*IK1WEG	*	52,182	194	78	39	0
*I4HRH	*	50,440	162	73	38	19
*IK2WFN	*	49,750	169	67	34	24
*IZ2PCJ	*	48,112	169	80	25	19
*IW8EHK	*	44,280	157	84	30	9
*IW9HEB	*	43,734	188	76	26	9
*IK2WYI	*	43,363	192	77	25	1
*IK2NCF	*	38,760	165	58	22	22
*IZ8EEL	*	36,400	174	53	23	15
*IK7RVY	*	34,671	175	66	23	2
*IK5PVX	*	29,328	120	68	27	9
*IV3KSE	*	24,064	101	46	25	23
*IZ5HQB	*	23,751	100	39	23	29
*IZ8MBW	*	19,700	78	59	34	7
*IK2AOO	*	19,227	108	65	20	2
*IK1RQT	*	18,900	121	30	13	20
*IW2GRA	*	17,686	115	51	18	5
*IQ3ME	*	17,380	101	46	23	10
*IW6PWC	*	16,037	87	49	20	10
*I2TFJ	*	12,871	94	40	13	8
*IK3CST	*	9,920	76	45	16	3
*IK2REA	*	8,094	67	35	14	8
*IZØGXM	*	7,590	44	34	21	11
*IK2SVF	*	7,259	51	30	19	12
*IK7WPD	*	5,136	45	27	14	7
*IK8YFU	*	4,284	35	27	19	5
*IZ5BSA	*	2,730	39	17	13	0
*IW2JRV	*	2,496	38	21	8	3
*IZ2GMT	*	1,960	31	15	9	4
*IZ2JPN	14	94,878	291	61	24	41
*IZ5OOP	*	66,330	247	57	17	36
*IØYQV	*	54,292	234	55	19	24
*IW2HUS	*	37,442	149	46	20	31
*IZ4OUA	*	27,552	128	37	15	32
*IT9AUH	*	10,752	104	35	9	4
*IZ4AFW	*	8,855	57	20	13	22
*IZ2QKG	*	7,104	90	30	7	0
*I2ORX	*	5,084	52	22	10	9
*IW5ECP	*	800	16	7	7	6
*IZ2GIU	*	663	18	11	6	0
*IZ2CSX	*	150	8	7	3	0
*IKØLNN	7	104,229	440	66	23	22
*IKØRCY	*	101,822	496	62	16	20
*IK3QAR	*	16,512	172	35	8	5
*IV3AOL	*	11,662	116	37	7	5
*IV3YIM	3.5	52,948	429	46	9	7
*IKØXBX	*	52,895	372	51	12	8
*IK3SSJ	*	44,080	392	46	8	4
*I4JEE	*	4,147	76	25	4	0

Kaliningrad

RA2FB	14	65,751	278	61	19	21
*UA2FFW	A	358,456	596	155	53	51

Latvia

YL2CI	A	1,337,634	1,574	228	68	63
YL7X	*	913,710	936	249	78	72
						(Op: YL2LY)
YL2PA	*	586,467	781	206	66	49
YL2NN	*	290,385	546	156	58	25
YL2GC	*	27,750	97	66	29	16
*YL2TB	A	410,540	697	176	47	37
*YL3CU	*	249,993	587	144	36	17
*YL2NK	*	71,680	265	102	26	0
*YL2PJ	*	59,568	198	96	33	7
*YL2MR	*	38,763	250	55	18	0
*YL2VW	*	34,553	132	76	28	5
*YL2CV	21	55,414	210	65	25	13

Lithuania

LY9Y	A	2,380,500	2,107	259	86	115
*LY2CV	A	36,792	207	64	17	3
*LY2FN	*	32,300	139	49	20	26
*LY2CG	14	51,887	254	49	16	24
*LY2WN	7	1,817	39	19	4	0

Luxembourg

*LX1ER	A	232,960	393	161	59	36

Moldova

ER5DX	A	341,640	660	160	46	28
*ERØFED	A	908,255	1,075	243	68	62
						(Op: UR5FEO)
*ER2RM	*	538,160	849	186	53	41
*ER3ZZ	*	74,295	266	93	34	0
*ER3MM	21	41,303	164	68	26	9
*ER3AU	14	27,740	159	47	13	16
*ERØ/UTØFT	7	53,475	335	53	12	10
						(Op: UTØFT)

Netherlands

PA7LV	A	969,212	1,215	193	67	77
PF7M	*	684,724	989	165	56	63
PG3N	*	473,137	793	152	55	56
PA1TX	*	449,445	734	138	57	54
PA2MRT	*	270,708	589	120	45	39
PA3S	*	215,660	394	111	46	48
PA3GCV	*	214,110	400	136	59	39
PA9DD	*	131,544	295	109	42	38
PAØLOU	*	61,350	169	86	39	25
PAØJNH	*	27,178	102	59	31	17
PAØLSK	*	14,679	98	33	12	18
PAØVHA	7	38,024	332	41	11	4
*PA3DBS	A	461,352	729	183	58	41
*PD7BZ	*	277,875	513	133	41	51
*PA3BFH	*	239,400	463	146	46	36
*PD5LO	*	150,880	425	100	35	25
*PA2W	*	101,924	275	105	34	27
*PA8KW	*	86,825	267	111	38	2
*PE2KP	*	83,160	252	78	30	32
*PA2ALF	*	82,052	249	104	35	7
*PA3HGF	*	35,148	154	62	24	15
*PE4BAS	*	21,420	111	49	25	11
*PA3EWG	*	19,173	102	53	26	4
*PD7RB	*	14,691	110	34	15	10
*PA7PYR	*	6,655	55	38	17	0
*PA3FXY	*	2,480	27	23	15	2
*PE1KL	*	1,152	22	15	9	0
*PD1KSA	14	239,248	620	79	27	46
*PD5CW	*	35,190	157	45	17	28
*PA2C	*	26,499	151	34	12	27
*PA4B	*	25,477	150	38	13	22
*PDØMD	*	7,560	97	27	9	0
*PA7HPH	*	4,983	70	23	10	0
*PA4RM	*	1,624	24	19	9	1

Northern Ireland

GI5K	A	4,988,640	3,365	321	106	181
						(Op: MIØLLL)
*MIØM	A	522,054	937	130	39	65
						(Op: MIØSAI)
*GI8HXY	*	17,176	100	50	22	4

Norway

LA8PDA	A	153,594	494	58	22	46
LN9Z	*	127,273	426	94	33	10
						(Op: LB1G)
LA2OKA	*	89,644	282	103	32	11
LA9TY	*	21,735	75	51	37	17
LA9TJA	7	24,108	242	39	8	2
*LA3BO	A	104,544	341	106	32	6
*LA7CL	*	93,434	307	87	28	22
*LA5TFA	*	89,037	346	85	32	0
*LA1IO	*	26,483	179	57	14	0
*LA5YW	*	8,580	62	42	18	0
*LA1QDA	14	3,720	56	21	9	1
*LA6FJA	7	1,420	35	15	5	0

Poland

SN5E	A	196,328	475	126	40	28
						(Op: SP5NHK)
SP9RI	*	38,446	184	65	21	8
SP2IU	*	9,100	74	30	14	8
SP4TXI	14	414,333	929	92	29	50
SP3GXH	7	191,178	668	75	22	32
SN7ØR	*	1,971	35	21	5	1
						(Op: SP2UUU)
SP3RBG	3.5	37,115	280	47	9	9
*SQ3RX	A	450,175	714	172	56	47
*SP7QJB	*	314,750	571	166	51	33
*SP6DNZ	*	303,045	487	166	56	45
*SP3DOF	*	290,160	570	162	57	15
*SP8EEX	*	285,088	534	150	51	35
*SN2U	*	263,117	568	128	44	39
						(Op: SQ2HNA)
*SP4CJA	*	230,243	522	127	42	30
*SQ2BXI	*	189,924	409	136	40	28
*SQ9FCH	*	180,044	383	122	47	37
*SP2EXE	*	167,534	335	122	50	39
*SQ9AOR	*	139,776	320	111	46	25
*SP1MWN	*	121,852	332	114	30	20
*SQ8LEC	*	110,007	323	104	33	16
*SP7FGP	*	103,584	309	111	40	5
*SP6JZP	*	98,226	278	96	36	21
*SP9FT	*	89,964	276	101	30	16
*SP5GMM	*	82,488	214	108	38	22
*SP6BSL	*	80,910	197	105	45	24
*SP5GDY	*	62,205	180	85	43	17
*SP3GAX	*	53,376	174	75	35	18
*SP4MPH	*	52,900	204	68	32	15
*SP4IRS	*	29,682	138	76	25	1
*SP6BEN	*	22,860	98	42	24	24
*SQ9LOJ	*	18,096	105	53	25	0
*SP6JIR	*	15,813	125	50	13	0
*SP6NVK	*	12,818	98	41	16	1
*SP9AJM	*	6,820	51	30	17	8
*SQ7NHT	*	4,320	47	25	14	1
*SQ8JX	*	2,492	33	15	11	2
*SP5OXJ	*	968	17	13	9	0
*SP2JLR	14	209,250	534	85	25	45
*SP8NR	*	164,829	463	73	24	44
*SN3C	*	113,152	359	64	23	41
						(Op: SP3ASN)
*SP2MKZ	*	81,106	314	57	18	32
*SP9CTS	*	64,548	274	56	18	25
*SP6DMI	*	53,508	275	64	20	0
*SP3LAU	*	33,088	152	42	19	27
*HF7ØM	*	28,613	174	49	14	8
						(Op: SP8MI)
*SP2HXY	*	13,908	108	36	15	6
*HF7ØW	7	203,907	880	70	23	18
*SP4BPH	*	22,792	196	44	10	2
*SQ1K	*	22,272	185	44	9	5
*SQ2RGB	3.5	41,272	380	46	9	1
*SP6EIY	*	31,248	246	45	10	8
*SP4GL	*	19,916	192	44	7	1
*SN9I	*	19,431	196	42	7	2
						(Op: SP9EMI)

Portugal

CT1BXT	A	344,799	521	154	55	64
*CT1BYK	A	211,280	457	98	37	55
*CT1EEK	21	67,731	267	68	24	15

Romania

YO9HP	A	3,215,446	2,351	343	112	111
YO7DAA	*	275,663	696	134	42	5
YO7VT	*	70,400	232	71	30	27
YO3VU	14	70,240	389	54	18	8
YO4DFT	7	110,286	513	63	17	19
*YO3APJ	A	1,060,200	1,174	215	74	83
*YO6HSU	*	246,246	478	150	46	35
*YO5BYV	*	102,336	309	119	36	1
*YO8SAI	*	48,118	226	72	26	0
*YO9BXC	*	42,672	140	72	37	18
*YO5AEX	*	42,364	221	74	15	0
*YO8RAA	*	41,070	142	53	26	32
*YO9CYM	*	4,743	41	30	18	3
*YO4BTB	*	3,200	32	26	14	0
*YO3AID	*	442	12	9	8	0
*YO3JF	21	61,500	244	66	26	8
*YO2IS	*	16,932	98	44	18	6
*YO3BL	14	163,856	542	79	26	28
*YO3ZA	*	98,176	400	57	16	31
*YO4UQ	*	21,976	147	46	12	9
*YO5OHY	*	9,600	86	34	16	0
*YP2W	7	117	6	5	3	1

Sardinia

*ISØGQX	A	305,208	613	122	48	46
*ISØLFZ	*	158,564	343	113	37	46
*ISØYEK	*	3,690	32	19	17	5

Scotland

GAØFGI	A	637,870	1,025	179	53	49
						(Op: GMØFGI)
GM3MZX	*	369,600	617	163	50	51
MAØGPZ	*	185,630	430	116	41	33
GM3SEK	7	336,996	1,004	83	27	38
*GAØNBM	A	206,896	491	132	34	27
*MAØBQI	7	12,012	109	37	9	6
						(Op: MMØBQI)

Serbia

YU1KT	A	601,236	889	178	58	57
YT2B	21	127,305	384	81	28	26
YT5W	14	793,736	1,656	101	32	55
						(Op: YU1AU)
YU1JW	*	387,936	1,077	67	24	53
YT8A	7	513,684	1,274	92	31	48
						(Op: YU1EA)
*YU1RP	A	101,388	332	102	29	11
*YU1CC	*	40,906	164	83	30	0
*YT2T	28	2,460	37	23	7	0
*YU1NSK	14	48,552	257	54	17	13
*YT2FA	*	39,468	227	53	17	8
*YU5MOL	7	31,010	205	49	11	10
*YU2A	3.5	61,446	455	48	11	7

Slovakia

OM5ZW	A	241,776	442	108	45	54
OM3TPN	*	206,829	444	126	45	30
OM8LA	*	79,350	272	98	30	10
OM3ZBG	*	9,516	73	41	18	2
OM7PY	7	17,328	178	40	8	0
*OM/SQ9UM	A	1,424,022	1,634	241	81	69
						(Op: SQ9UM)
*OM5TX	*	640,845	931	180	56	67
*OM7OM	*	514,892	815	192	52	40
*OM1VA	*	290,928	561	151	42	35
*OM7AG	*	277,088	567	150	44	30
*OM7AX	*	136,440	337	136	44	0
*OM2WX	*	117,432	300	102	35	31
*OM7RC	*	13,943	75	37	25	11
*OM3TLE	14	8,789	79	26	9	12
*OM7YC	*	8,428	85	33	10	0
*OM4AQP	3.5	4,800	81	25	5	0

Slovenia

S52OP	A	1,246,616	1,308	220	77	97
S55OO	*	63,142	217	86	39	6
S51ZZ	*	44,080	201	50	15	30
S52X	7	564,960	1,358	92	31	53
S53M	*	184,552	556	67	24	45
						(Op: S51FB)
S57LR	3.5	101,004	649	52	10	14
S53F	*	45,201	361	45	9	7
*S56WPF	A	269,297	554	142	49	26
*S57AM	*	246,152	462	146	46	40
*S59KB	*	64,064	289	80	24	0
*S51MA	28	1,701	35	14	7	0
*S51OE	14	255,892	698	75	23	50
*S53NW	3.5	66,087	521	49	9	5

Spain

EA1AKS	A	1,962,004	1,732	246	85	142
AN1A	*	242,200	526	102	36	62
						(Op: EA1AST)
EC1AJV	*	50,040	194	92	28	0
*EA1XT	A	27,664	100	63	27	22
*EA1AW	*	2,280	29	25	11	2
*EA1DFP	*	80	4	4	4	0
*EC1CTV	14	8,200	74	30	11	9
AN2K	A	332,432	511	136	50	77
						(Op: EB2RA)
*EA2BNU	A	170,986	339	125	43	46
*EA2AVM	*	12,350	80	30	18	17
EE3R	A	751,756	976	184	67	75
						(Op: EA3OR)
EE3Y	*	14,110	75	47	26	10
						(Op: EA3EYD)
EA3AGZ	*	3,888	34	25	15	8
EA3GLB	21	338,556	740	96	33	49
EA3DUM	14	298,800	834	72	23	49
*EB3JT	A	215,180	434	125	42	45
*EA3GBA	*	125,658	314	112	37	30
*EA3ALV	*	91,936	249	124	39	6
*EA3FHP	*	66,820	223	74	26	30
*EA3ANE	*	65,160	242	73	26	21
*EA3GYK	*	57,218	189	96	33	5
						(Op: DK7TM)
*EB3FLY	14	77,608	293	53	17	39
*EB3GIH	*	70	5	4	3	0
*EA3EJJ	7	94,764	394	55	18	33
*EA4MA	A	169,776	258	167	62	33
*EC4AIU	*	145,550	494	102	28	12
*EA4BGM	*	1,357	29	16	7	0
*EA4AFP	*	682	12	11	11	0
*EG4M	14	14,016	80	23	14	27
EA5RM	A	1,739,736	1,698	254	77	107
EA5EV	*	179,580	351	132	47	40
EA5IY	*	21,648	126	63	19	0
EA5AX	*	15,795	87	52	19	10
EA5KV	*	5,016	47	20	11	13
EH5J	7	79,701	391	49	16	28
						(Op: EA5DM)
*EA5GSW	A	251,021	370	179	63	41
*EB5CNK	*	144,256	326	122	40	34
*EC5BZR	*	120,842	407	99	29	14
*EA5FHC	*	108,654	258	115	47	20
*EA5XC	*	97,284	356	105	29	0
*EA5HIH	*	73,428	309	88	28	0
*EA5GVZ	*	44,100	156	75	31	20
*EA5ET	14	280,904	800	78	23	47
*EA5TS	*	54,338	222	47	18	36
*EA5ATK	*	48,786	219	46	16	32
*AM5A	*	35,150	219	46	14	14
						(Op: EA5FHK)
*EA7CVF	A	311,714	532	143	48	56
*EA7VJ	*	25,756	113	61	23	10
*EA7KS	*	204	6	6	6	0
*EA7ISH	21	217,140	658	74	26	40
*ED7D	14	61,503	343	48	14	21
						(Op: EA7HEG)

Sweden

SM7BHM	A	578,384	841	194	57	45
SMØBSO	*	189,070	473	134	38	13
SM5CZQ	*	3,995	30	24	23	0
*SM2JUR	A	516,120	915	173	52	28
*SM7BJW	*	178,848	353	120	45	42
*SM5CNQ	*	84,760	231	117	33	13
*SM7CWI	*	26,775	115	67	30	8
*SM6CDN	*	7,488	69	29	16	3
*SE5X	*	3,744	48	26	9	1
*SM6FUD	*	540	11	10	8	2
*SM7U	7	16,390	140	37	11	7
						(Op: SM7PAF)

Switzerland

HB9CAL	A	375,840	568	154	53	63
HB9CRV	*	204,522	548	131	39	8
*HB9BTI	A	351,670	578	141	52	60
*HE8TOC	*	162,158	421	135	43	0
*HE8AWS	*	32,017	149	76	25	0
*HB9HQX	*	12,744	107	48	11	0
*HB9BJL	*	6,765	50	34	21	0
*HB9TJW	*	989	20	15	8	0

Ukraine

EO5M	A	2,996,622	2,404	318	104	104
						(Op: URØMC)
UT4ZG	*	1,062,477	1,312	223	68	60
UV5U	*	1,061,114	1,181	232	75	79
						(Op: UX1UA)
UR7EY	*	602,604	702	214	72	56
UW5U	*	578,934	857	193	66	43
						(Op: UY2UA)
UY7MM	*	395,224	739	195	59	0
UT3N	*	329,625	677	159	44	22
						(Op: UT3NK)
UY8LM	*	309,204	559	189	54	29
UT5EO	*	272,619	623	158	49	0
US7IB	*	240,870	501	156	43	18
UT6IS	*	234,118	549	144	42	16
UR4IOR	*	159,373	345	135	47	15
UX8ZA	*	90,872	276	102	35	11
UY5QO	*	56,704	194	82	36	10
US3LX	*	41,625	143	86	37	2
UXØFY	*	27,489	152	55	22	0
UT5ERV	*	24,012	173	54	15	0
UTØEO	28	6	1	1	1	0
UT8IM	21	43,680	268	51	19	0
UT7MA	14	651,504	1,356	110	35	51
UT4EK	*	161,036	552	73	20	34
UR5ZMK	*	132,999	442	72	26	31
EO5I	*	72,149	399	47	14	16
						(Op: UT2II)
UR7R	*	31,959	220	39	13	15
						(Op: UX1RX)
UT7FP	*	17,875	110	28	9	28
US5IQ	7	444,000	1,211	89	27	44
UU1AZ	*	379,354	1,127	86	27	36
UT4XD	*	81,168	439	61	18	10
UWØK	*	32,640	157	30	15	35
						(Op: USØKW)
UR5WCQ	*	28,361	148	45	17	17
UX2X	3.5	140,500	676	63	18	19
						(Op: UT2XQ)
UT2IU	*	110,704	613	56	14	18
UX6IR	*	25,596	252	45	9	0
URØIQ	*	9,061	121	34	7	0
*UR7GO	A	1,696,018	1,771	267	82	73
*UX1UX	*	800,730	1,198	204	66	40
*UT4HZ	*	709,664	969	231	63	37
*USØHZ	*	684,780	1,040	215	57	31
*UT5EPP	*	632,200	1,025	203	58	29
*UR4U	*	592,176	751	220	75	43
						(Op: UR4UDI)
*US6CQ	*	587,954	895	212	61	25
*UX6IB	*	471,070	724	200	55	34
*UT5UKY	*	455,884	667	171	60	55
*UR7EQ	*	375,468	626	177	56	35
*UR8QR	*	354,663	632	193	49	9
*UT3RS	*	335,792	608	179	54	15
*UR5ETN	*	333,405	651	173	46	20
*UY2UQ	*	241,755	497	141	42	30
*UY5TE	*	223,630	492	155	44	10
*UY7C	*	177,625	485	134	41	0
*UR8EQ	*	170,820	389	138	44	13
*UR5RMD	*	148,335	425	119	33	13
*UT1UW	*	139,446	327	140	43	0
*US8IBS	*	125,685	318	113	36	22
*UT1IM	*	117,288	286	116	45	20
*UT2QQ	*	97,432	301	117	33	2
*UR5KED	*	81,664	289	87	27	14
*UT5ECZ	*	81,176	283	110	29	0
*UX3IW	*	79,552	169	103	51	22
*UX2KA	*	78,870	200	97	45	23
*UR7QM	*	73,920	294	75	27	8
*UR5FEL	*	68,248	218	113	35	4
*UY3MW	*	67,000	239	103	31	0
*UX7FC	*	65,805	257	89	27	7
*UR7EW	*	63,512	214	103	33	0
*UX5IO	*	52,456	313	65	14	0
*UU2JG	*	49,392	142	86	39	19
*UR8IDX	*	46,282	129	94	43	9
*UR5FBM	*	46,256	150	76	42	0
*UX7QV	*	37,296	151	81	31	0
*UR2ML	*	29,256	112	63	34	9
*US5EEK	*	27,242	113	74	28	4
*UT4ZX	*	25,688	109	69	31	4
*US8UA	*	25,676	111	70	28	0
*UR5WCA	*	24,920	183	55	14	1
*UT2AB	*	24,265	86	71	37	7
*UR5XMM	*	19,872	141	51	18	3
*US8ICM	*	19,458	91	61	30	3
*UR2MO	*	5,100	35	23	20	8
*USØYA	*	1,914	21	18	12	3
*UU4JC	*	228	7	6	4	2
*USØMM	21	156,892	590	76	25	21
*UR2VA	*	37,344	152	62	26	8
*US1IV	14	45,815	228	55	17	13
*UT5PQ	*	44,988	201	57	14	21
*US5MPO	*	22,506	144	48	12	6
*UT3UA	*	22,470	133	33	15	22
*US5LAE	*	12,126	131	33	10	0
*UYØIR	*	960	16	10	9	5
*UT2UZ	7	280,476	848	83	26	38
*UR8MH	*	74,385	369	65	20	10
*USØKS	*	71,816	358	62	17	15
*UTØEL	*	18,360	162	45	9	0
*UU1DX	*	10,105	116	32	9	2
*UR3LTD	*	7,332	92	31	8	0
*UT5PH	3.5	38,160	335	48	9	3
*UT5KO	*	32,148	295	47	8	2
*UR5UBR	*	22,525	227	45	8	0
*UT7MR	*	6,698	108	27	7	0

Wales

*MW0CRI	21	27,360	170	53	18	1

OCEANIA

Australia

*VK2ACC	A	594	12	9	9	0
VK3TDX	A	774,717	939	166	67	48
*VK4BL	A	27,550	104	51	33	11
*VK4EJ	14	33,600	139	47	20	17
*VK5NPR	A	165,132	297	86	61	51
*VK5LA	*	35,400	126	39	32	29
*VK7AD	A	22,386	102	28	28	26

East Malaysia

*9M6YBG	A	20,385	154	32	12	1

Guam

KG6DX	A	1,165,775	1,218	174	87	64

Hawaii

KH6ZM	A	1,720,910	1,518	135	77	170
KH6MB	*	1,070,320	1,054	110	69	161
KH6GMP	14	178,262	502	45	26	48
*KH6CO	A	43,758	151	44	30	25
						(Op: KH6OO)

Indonesia

YB4IR	A	524,600	819	145	54	16
YB8FL	7	31,590	164	38	17	10
*YB0EIN	A	108,288	255	100	42	2
*YB8EXL	*	102,573	269	94	37	0
*YC2LEV	*	20,856	92	52	27	0
*YB8EL	21	68,382	266	63	23	1
*YD8AFB	*	4,380	49	21	9	0
*YB0JIV	14	28,785	174	37	17	3
*YB0ECT	*	15,040	128	22	15	3
*YB9BWN	*	612	13	10	8	0
*YG8EL	7	1,769	22	16	12	1

New Zealand

ZL3PAH	A	18,170	79	34	21	24
*ZL3TE	21	9,176	86	11	10	16
						(Op: W3SE)

Papua New Guinea

*P29CW	A	120,274	294	80	49	13
						(Op: VK2GR)

Philippines

DU1BP	A	151,536	388	83	38	11
*DV1JM	A	365,822	611	131	56	15

SOUTH AMERICA

Antarctica

DP1POL	A	70,794	292	55	18	8
						(Op: DL5XL)
*R1ANC	14	74,783	301	20	21	42

Argentina

LV5V	A	2,222,720	1,651	200	77	183
						(Op: LU5VV)
AY8A	*	1,044,208	959	184	77	113
LU1BJW	*	573,330	680	125	59	106
LW9ETQ	*	91,903	236	53	27	53
LU1HF	28	146,740	431	59	19	38
LP2F	21	249,508	630	59	22	52
						(Op: LU1FDU)
AY4D	14	85,500	293	48	17	35
						(Op: LU4DX)
*LTØH	A	812,345	857	145	61	117
						(Op: LU3HY)
*LU9DTC	*	237,795	424	91	44	56
*LW1HR	*	43,554	150	55	25	22
*LU7YZ	*	34,686	146	43	28	11
*LO2F	*	28,170	106	31	20	39
						(Op: LU1FAM)
*LU1IBL	*	1,984	22	20	11	0
*LU8EOT	28	8,360	67	17	10	17
*LU2HC	21	4,620	52	23	7	0
*LT2F	14	136,416	408	45	19	48
						(Op: LU7FNI)
*LR6H	*	45,105	166	45	20	28
						(Op: LU6HDV)
*LU8EGS	*	6,552	56	24	14	4
*LU6EE	7	2,133	29	17	10	0

Brazil

PW2P	A	809,053	954	102	53	132
						(Op: PY2XAT)
PT9PA	*	380,420	563	109	49	72
PY3OG	*	7,752	54	32	19	0
PS7YL	21	34,830	134	43	19	28
PY2KP	7	2,775	28	14	13	10
*PY2NY	A	922,628	936	141	62	129
*PW2B	*	636,185	805	129	52	88
*ZV2C	*	323,128	650	75	32	62
						(Op: PY2CX)
*PU5AAD	*	45,840	138	50	34	36
*PY2SEX	*	31,416	127	30	20	34
*PU2LGR	*	3,549	32	15	13	11
*PY2SRL	*	2,380	33	19	9	0
*PY3FOX	*	2,208	25	19	12	1
*PY2MR	*	1,525	22	12	13	0
*PY2EB	28	16,820	103	23	12	23
*PY2UN	21	74,893	278	55	16	20
*PU8TEP	*	61,115	253	28	18	39
*PY1ME	*	6,811	51	26	14	9
*PY3APY	*	5,375	44	19	12	12
*PY2RDZ	*	4,104	41	23	15	0
*PY2RZD	*	512	11	8	8	0
						(Op: PY2RDZ)
*PR7AR	14	227,682	554	68	21	50
*PT8CWA	*	1,007	19	13	6	0
*ZX7A	7	156,984	426	56	18	50
						(Op: PS7TKS)
*PY2VIM	*	9,152	60	29	11	12

Chile

*CE1KR	7	540	12	9	9	0

Colombia

*HK5P	A	1,110,471	906	189	80	148
*HK3W	*	170,040	294	83	41	71
*HK3/IZ0GYP	*	80,693	198	26	26	85

Paraguay

*ZP9EH	14	12,180	72	30	16	14

Peru

OA4AHW	A	149,940	273	85	50	61

Uruguay

CX9AU	A	534,612	611	131	66	101
CX4AAJ	21	396,882	876	76	24	53
*CX5TR	21	231,553	587	66	22	45

Venezuela

YW4V	21	94,128	304	35	23	48
						(Op: YV4DYJ)
YW5T	7	472,863	978	80	27	56
						(Op: YV5JBI)
*YV4BCD	A	216,216	340	88	43	85
*YV1FM	21	248,688	642	55	21	56
*YW4D	14	323,628	729	72	25	52
*YV5AAX	*	211,044	547	63	18	48
*YV1CTE	*	210,730	544	57	20	53
*YV1JGT	7	165,500	446	56	22	47
*YV6BXN	3.5	5,371	44	12	8	21

ASSISTED

NORTH AMERICA

United States

K4GMH	A	2,795,680	2,328	261	89	155
AA3B	*	2,706,256	2,242	262	87	162
NE3H	*	1,348,491	1,397	209	73	129
W4ZE	*	1,331,352	1,349	217	78	156
W3FV	*	1,170,092	1,249	211	67	128
W3MF	*	1,150,339	1,097	225	78	128
AA7A	*	1,101,564	1,240	196	85	163
K3WW	*	1,092,240	1,174	199	70	100
N8BJQ	*	1,063,372	1,103	200	78	134
W9MU	*	1,026,182	1,059	207	80	102
WA5ZUP	*	1,023,330	1,588	142	68	175
W9IU	*	1,020,637	1,235	165	65	129
N4ZZ	*	904,138	1,230	151	53	130
NO2T	*	863,200	1,109	151	61	120
W1BYH	*	773,660	950	187	71	146
AA8LL	*	761,904	825	208	73	115
K9CT	*	751,937	835	197	76	116
N4WW	*	689,396	823	187	68	131
NS9I	*	668,472	934	161	67	118
AD8P	*	635,426	776	184	74	116
AB0LR	*	546,308	797	145	68	145
AB4SF	*	456,280	607	173	67	100
KQ3F	*	454,872	659	146	53	65
N4KG	*	447,150	606	164	69	97
WD4DDU	*	446,832	545	189	76	83
KA2D	*	444,528	600	155	61	78
K9IUQ	*	405,552	602	154	57	73
W2YE/4	*	404,700	644	135	54	96
K9MUG/4	*	395,295	643	127	55	103
W6EU	*	388,368	657	119	59	101
K8AJS	*	371,552	518	163	61	48
N6ND	*	354,432	540	128	67	117
KA2KON/1	*	336,900	490	163	64	73
K2DSL	*	327,250	562	120	52	103
AD1L	*	318,519	522	132	50	69
K3IU/1	*	288,078	458	139	56	71
K9YC/6	*	287,550	567	107	56	107
K3KO/4	*	284,240	423	149	55	68
K2ZC	*	250,976	430	125	48	75
W7OM	*	242,683	471	105	58	96
N6CCH	*	233,200	388	122	70	73
KE0L	*	226,250	511	101	53	96
NT0V	*	224,952	391	126	64	83
N8AGU	*	199,234	388	114	44	56
WB0N	*	185,724	430	91	45	95
N1IBM/2	*	176,847	324	128	49	56
ND4V	*	176,645	337	115	53	77
W1AN	*	167,508	356	100	47	41
K0BX	*	163,800	323	115	45	35
KV1J	*	157,200	323	105	54	81
K7EG	*	145,436	324	90	47	69
K4FPF	*	144,746	299	105	44	62
N0AT	*	141,828	304	108	43	61
WD4HIM	*	141,300	254	126	55	44
WA0JH	*	133,650	340	88	39	71
K0XB	*	130,208	277	96	44	68
N4DW	*	123,786	271	92	49	66
K7VIT	*	120,280	341	66	46	82
K6TA	*	119,599	293	73	55	71
K5WW	*	108,057	357	73	46	80
K0AD	*	102,384	328	69	34	59
K2SI	*	97,836	254	89	40	57
W2YR	*	96,444	226	95	48	45
K4IU/0	*	85,880	212	82	44	64
K6NV	*	85,833	265	63	45	79
W6SA/7	*	84,036	240	74	46	68
N9MSG	*	82,948	226	84	36	58
K9OR	*	81,435	224	76	40	67
W3AG	*	76,616	175	100	47	10
NN4K	*	71,918	194	80	39	35
K3NK	*	66,660	173	85	45	35
W2RZS	*	64,083	195	73	27	23
						(Op: WB2NVR)
K4EDI	*	63,360	198	66	41	69
W2LK	*	63,294	163	90	33	31
K7ZD	*	58,928	192	68	36	23
N6VH	*	56,316	207	44	31	81
N0BK	*	55,650	192	59	34	66
KE7FBY	*	54,385	175	72	36	41
W5DQ/6	*	52,632	159	64	47	42
K2QMF	*	51,948	162	75	27	9
WB4MAK	*	49,152	142	77	37	14
AD6WL	*	47,908	213	56	22	40
K7SV/4	*	47,355	161	66	30	9
WT9Q/0	*	45,298	160	64	38	40
W4RK/0	*	44,541	169	56	39	52
W3TMS	*	43,878	183	55	20	28
K5HDU	*	42,336	195	46	28	52
W6ONV	*	41,648	158	53	32	52
AD1C/0	*	41,328	210	38	26	59
K9DUR	*	36,110	131	62	30	23
K3TEJ	*	34,840	156	54	30	46
W6TQG	*	30,411	101	65	34	10
K0JUH	*	30,303	132	47	22	22
WX7P	*	29,498	154	39	21	26
AA0AW	*	29,492	142	44	24	33
NN3RP	*	25,480	114	48	28	22
K0YR	*	25,038	119	45	27	35
NG2P	*	23,772	110	42	23	19
WO1N	*	23,520	102	46	37	37
W7WHY	*	19,208	101	34	30	34
KC0NFB	*	18,527	96	39	27	31
W1CTN	*	18,511	109	33	32	42
K6BIR	*	12,240	94	22	19	44
NE1I	*	11,560	61	44	20	4
KN6OP	*	11,388	87	22	22	34
N4VV	*	10,602	61	40	19	3
W0TLE	*	7,598	63	25	12	21
KD7RUS	*	7,440	66	17	20	25
NM1W	*	6,435	42	34	18	3
K3GP/8	*	5,830	46	25	18	12
KS0T	*	4,599	51	15	17	31
K4HTY	*	4,560	35	27	20	1
W4WNT	*	1,749	21	18	15	0
NR0L	*	1,116	20	11	11	9
N1MD/3	*	700	15	10	10	0
K5VIP/4	*	150	5	5	5	0
KK5OQ	21	104,052	366	61	22	33
WA1PMA/7	14	3,861	35	27	10	2
KN5O	7	94,976	400	62	19	47
KE4UW	*	91,388	446	54	16	54
AA4VV	*	44,280	163	66	22	32
W3/NH7C	*	13,272	105	29	14	36
K2PAL	*	8,512	81	20	13	31

Alaska

AL9A	A	124,384	334	49	41	79
KL8DX	*	102,190	435	37	20	53

Canada

VE1OP	A	1,422,798	1,342	200	71	171
VA3DX	*	746,634	757	198	74	134
VA3PL	*	374,136	582	132	50	56
VE3EJ	*	315,210	442	143	60	63
VE7KS	*	253,184	406	96	58	102
VE1ZD	*	187,200	386	91	36	65
VE2LX	*	112,220	288	75	31	49
VE3TES	*	54,127	232	32	21	60
VE3WDM	*	5,940	48	21	16	18

Costa Rica

TI5/WW4LL	14	576,186	1,414	85	26	55
						(Op: WW4LL)
TI5/NP3D	7	489,810	1,121	88	30	56
						(Op: NP3D)

Mexico

XE3RR	A	364,078	771	71	31	107
XE1EE	*	275,336	505	83	46	125
XE1MM	*	140,608	297	74	45	89
XE2WK	*	129,696	359	55	29	84
XE3DX	*	25,110	134	15	15	60
XE3N	21	15,296	111	16	13	35

AFRICA

Madeira Islands

CT3EN	14	1,060,814	1,856	102	32	57

ASIA

Asiatic Russia

RG9A	A	2,948,008	2,143	327	96	65
						(Op: UA9AM)
UA0AGI	*	1,369,980	1,303	259	80	48
RX9SA	*	195,210	307	171	67	3
RX0AT	*	128,132	226	135	55	16
RW0AJ	*	112,404	356	67	26	23
RA9AMO	*	56,910	194	78	25	2
UA0QBR	14	232,212	583	85	28	35
RA9AAA	*	208,458	693	78	24	9
RA0ACM	*	94,976	327	70	24	18
RU0AT	*	8,685	71	29	11	5

China

BG4AHD	A	32,400	131	61	34	5
BD3PCH	*	20,124	220	26	17	0

Hong Kong

VR2XLN	A	292,110	554	133	65	16

India

VU2NKS	A	574,769	815	170	53	24
VU2PTT	*	48,600	153	78	39	3

Israel

4Z5CP	A	1,108,500	1,284	187	64	49

Japan

JA1OVD	A	641,892	807	156	75	67
JA1HGY	*	622,660	700	185	83	58
7N2UQC	*	207,834	423	111	58	32
JA1XRH	*	179,095	309	116	66	33
JA7ZP	*	169,796	337	95	53	39
JA1IZZ	*	129,766	255	102	56	24
JN3SAC	*	100,749	284	77	29	23
JA1BWA	*	97,845	237	90	52	23
7L4IOU	*	90,270	226	83	61	26
JA2KCY	*	69,293	204	73	46	14
JH1GUO/4	*	48,070	184	57	36	17
						(Op: JH1GUO/4)
JG3FEA	*	42,592	132	68	40	13
JL8MBF	*	19,670	125	37	22	11
JA5FNX	*	13,940	97	35	26	7
JS3CTQ	*	8,360	65	31	19	5
JR1BAS	*	8,322	52	22	20	15
JA1KEB	*	6,042	46	26	21	6
JI3OGI	*	3,526	32	21	16	4
JR7MAZ	*	1,196	16	14	12	0
JF2FIU	*	1,122	19	7	8	7
JA8JMG	14	204,102	523	67	26	45
JG1GGU	*	102,265	328	61	24	28
JS1KOQ	*	19,684	99	46	22	6
JA2VHG	*	9,231	67	36	13	2
JH2FXK	*	2,790	33	12	9	9

Kazakhstan

UN8PIM	14	58,800	297	58	17	8
UN9PQ	*	20,691	130	41	12	4

Kyrgyzstan

EX2M	14	187,872	576	64	21	29

South Korea

DS5DNO	A	79,785	229	71	44	20

Tajikistan

EY8MM	A	165,669	375	103	41	17

Vietnam

3W1M	21	69,745	417	51	14	8
						(Op: OM2DX)

EUROPE

Austria

OE2VEL	A	53,508	151	86	37	24
OE9GHV	14	431,927	937	92	31	56

Belarus

EW8OF	A	143,361	446	108	31	14
EW4DX	*	130,848	282	118	39	31
EW6GL	*	20,826	118	52	22	4

Belgium

ON6LEO	A	817,284	952	224	72	76
ON4BHQ	14	113,125	334	55	23	47

Bulgaria

LZ8E	A	3,590,930	2,457	350	113	139
						(Op: LZ2BE)

Croatia

9A3XV	A	73,515	227	91	36	18

Czech Republic

OL6X	A	3,444,472	2,254	330	109	150
						(Op: OK1DIG)
OK2PF	*	199,000	466	140	44	15
OK2PMS	*	29,029	129	51	25	15
OK2PCQ	*	2,870	41	27	8	0

Denmark

OZ1AXG	A	240,236	494	151	54	13
OZ1DSD	*	110,814	326	79	30	29
OZ1FAO	*	78,894	183	84	46	32

England

G6PZ	A	4,174,590	2,909	320	101	158
						(Op: UT5UDX)
G4MKP	*	487,578	778	160	48	65

Estonia

ES2MA	A	158,368	343	126	40	30

European Russia

UA3SAQ	A	2,227,236	1,799	314	100	103
RU4HP	*	1,806,080	1,907	261	84	70
RK3FWA	*	1,728,950	1,586	270	96	92
						(Op: UA3DPX)
RA4FUN	*	586,348	870	203	56	42
RD1AW	*	284,868	489	153	52	41
UA4LA	*	211,335	423	152	45	22
RV3QR	*	75,442	259	104	30	0
UA6GF	*	42,900	175	83	27	0
UA1NFA	*	40,945	200	69	26	0
RW1AI	*	39,785	174	81	28	0
RW3LB	*	34,430	145	70	29	11
UA4FBG	*	32,448	124	55	31	18
RZ3DA	*	22,795	102	64	31	2
RK3ANL	*	11,115	82	48	17	0
RK3PWJ	*	9,460	86	38	17	0
						(Op: RW3PN)
UA6AA	*	5,610	42	28	20	3
UA4NX	*	3,290	34	20	13	2
RU3PU	21	20,520	120	51	19	2
RK6AXS	14	627,936	1,375	100	31	55
						(Op: RU6CQ)
RU4WD	*	186,731	617	81	25	31
RZ1OM	*	185,654	547	87	29	33
RW3PF	*	38,220	218	55	16	7
RL4R	7	324,416	987	91	29	28
						(Op: RW4PL)

Faroe Islands

OY3JE	3.5	125,545	720	60	16	9

Finland

OH2LNH	A	150,228	454	113	33	10
OG4X	*	145,169	328	86	39	54
OH7MN	7	148,369	690	73	24	4

France

F8BNN	A	521,256	759	177	58	61
F5CQ	*	491,064	624	151	65	80
F4FDA	*	191,400	363	151	49	32
F5TLZ	*	98,073	290	92	32	29
TM8C	14	718,148	1,538	91	30	58
						(Op: F/TU5KG)

Germany

DJ8OG	A	1,257,490	1,127	237	96	109
DH0GHU	*	578,493	760	191	64	68
DL1RYD	*	569,723	723	215	78	50
DL1RG	*	431,206	606	177	55	66
DK5MB	*	396,048	571	171	64	61
DL8NBE	*	355,320	578	168	57	45
DL8SCG	*	338,096	488	151	65	56
DD5M	*	310,180	500	157	59	44
						(Op: DJ0ZY)
DC2YY	*	287,488	494	165	56	35
DK1QH	*	283,630	482	113	45	68
DK4YJ	*	266,931	491	112	41	70
DJ1TU	*	260,789	445	153	54	44
DL9NDS	*	246,170	397	133	54	52
DR5X	*	183,169	389	101	45	45
						(Op: DL8LAS)
DJ1AA	*	168,086	318	148	53	28
DL2FK	*	139,392	312	115	45	32
DJ6JH	*	109,115	320	107	35	15
DM3VL	*	104,580	197	118	55	37
DO6HMA	*	91,313	330	83	27	17
DL1DVE	*	76,791	231	86	34	23
DK1AX	*	70,082	248	93	27	14
DL1IAO	*	64,092	190	79	39	29
DF7ZS	*	59,925	177	83	35	23
DP4N	*	47,488	167	54	24	34
						(Op: DL4NER)
DL8ZAJ	*	34,391	121	63	32	24
DL2SWN	*	31,100	109	36	27	37
DL7UMK	*	29,041	105	59	33	21
DL5MX	*	25,630	85	70	39	1
DB9EX	*	16,796	81	32	23	21
DJ9MH	*	11,904	84	37	17	8
DL3BBY	*	10,650	60	49	24	2
DL1ECG	*	10,230	67	33	21	8
DF1HF	*	9,882	81	46	15	0
DL1DBR	*	9,240	72	38	18	0
DK1IP	*	8,418	55	32	23	6
DN6MOE	*	5,764	59	26	13	5
						(Op: DF6WE)
DK2CX	*	5,712	51	26	15	7
DK6AH	*	3,744	43	22	12	5
DL8USA	*	72	4	4	4	0

DO4DXA	**28**	**570**	**18**	**8**	**7**	**0**
DF9ZP	**21**	**260,752**	**594**	**102**	**31**	**39**
DL4LAM	*	25,550	134	39	19	15
DM5TI	**14**	**512,265**	**1,048**	**98**	**30**	**57**
DL4CF	*	279,444	624	93	29	52
DL5JS	*	50,985	212	52	20	27
DKØEE	**7**	**356,807**	**961**	**86**	**28**	**49**
					(Op: DL4MDO)	
DL1REM	*	185,858	660	80	25	29
DN7DX	**3.5**	**1,560**	**47**	**17**	**3**	**0**

Greece

SV2BFN	**A**	**1,203,650**	**1,499**	**201**	**64**	**85**
SV8RX	*	467,891	706	199	60	30
SV1DPI	*	181,831	406	122	45	30

Hungary

HA8IE	**A**	**1,213,584**	**1,374**	**290**	**96**	**0**
HA3LI	*	920,112	1,114	205	66	77

Iceland

TF3AO	**A**	**523,260**	**1,031**	**138**	**38**	**52**

Italy

IK4MGP	**A**	**4,121,390**	**2,529**	**349**	**113**	**175**
I2SVA	*	1,063,656	1,052	236	80	92
IK2SAI	*	510,130	821	162	60	56
IZ4GWE	*	485,750	700	148	62	80
IZ4MJP	*	351,487	555	170	63	38
IZØEHL	*	321,160	495	174	63	43
IK8UND	*	301,644	575	129	45	54
IKØTUM	*	190,688	342	142	55	39
IW1AYD	*	139,680	329	94	42	44
I2DJX	*	115,995	254	101	40	44
IT9JOF	*	37,859	116	74	39	18
IWØGYC	*	11,900	76	50	20	0
IK2GZU	*	5,390	35	26	20	9
IK2WPO	*	4,959	36	33	20	4
IT9RGY	**21**	**422,750**	**972**	**103**	**33**	**42**
IT9ZMX	**14**	**548,504**	**1,235**	**97**	**32**	**55**
IK6VXO	*	506,910	1,087	97	31	55
IV3RLB	*	255,680	700	60	23	53
IZØPSC	*	208,800	533	89	27	44
IK2GWH	*	60,669	236	54	19	34
IZ8DVD	*	24,400	129	43	17	20

Latvia

YL9T	**A**	**1,399,740**	**1,512**	**264**	**84**	**62**
					(Op: YL2TW)	
YL5T	*	266,511	405	161	69	29
					(Op: YL3DQ)	
YL7A	**7**	**401,134**	**1,013**	**97**	**32**	**38**

Lithuania

LY1R	**A**	**2,233,455**	**2,095**	**271**	**90**	**84**

Macedonia

Z35X	**14**	**322**	**18**	**6**	**4**	**4**
					(Op: Z33T)	

Netherlands

PA5KT	**A**	**455,822**	**608**	**164**	**65**	**77**
PA5TT	*	79,218	204	102	41	19
PE1MMZ	*	63,360	205	58	25	37
PA5O	*	35,451	125	67	35	15
PA1CW	*	26,290	91	66	32	12
PA7RA	*	13,192	93	45	22	1

Poland

SO6I	**A**	**912,784**	**1,111**	**218**	**74**	**64**
					(Op: SP6JIU)	
SP1DMD	*	168,726	429	138	45	0
SP1S	*	92,340	211	108	40	32
SQ6MS	*	64,766	302	80	21	5
SP6XP	*	61,701	207	91	40	0

Romania

YQ6A	**A**	**575,424**	**733**	**195**	**73**	**56**
					(Op: YO6BHN)	
YO9CWY	*	262,344	568	150	43	11
YO7LGI	*	146,034	361	127	39	17
YO5CUQ	*	65,100	199	95	33	12
YP2U	*	59,909	182	81	37	21
YP8A	*	22,659	97	59	31	1
					(Op: YO8WW)	
YO5BBO	**21**	**53,088**	**219**	**58**	**25**	**13**
YP3A	**14**	**31,740**	**249**	**44**	**11**	**5**
					(Op: YO3GW)	
YO8WW	**3.5**	**4,725**	**66**	**29**	**6**	**0**

Scotland

GM5A	**A**	**2,068,416**	**1,968**	**233**	**83**	**116**
					(Op: GM4FDM)	

Serbia

YT2U	**A**	**494,224**	**651**	**186**	**67**	**63**
YU1ZZ	*	68,400	218	100	35	9
YU7AE	**14**	**362,557**	**898**	**88**	**29**	**58**
YU7U	**3.5**	**71,415**	**505**	**53**	**10**	**6**
					(Op: YU7BH)	

Slovakia

OM3NI	**A**	**192,920**	**396**	**138**	**45**	**29**

Slovenia

S5ØR	**14**	**785,242**	**1,518**	**105**	**33**	**59**

Spain

EA5DKU	**A**	**428,910**	**649**	**176**	**54**	**66**
EC1KR	*	**421,680**	**606**	**140**	**46**	**94**
EA1EVS	*	140,045	334	106	44	35
EA4/YO8DHC	*	**109,956**	**324**	**110**	**37**	**0**
EA5BY	*	15,756	77	33	20	25
EA1GHT	*	14,960	84	49	22	9
EA3EJI	*	**3,212**	**30**	**27**	**17**	**0**
EA1WX	*	2,808	29	12	12	12
EA1ACP	**21**	**127,070**	**408**	**80**	**26**	**25**
AM1W	**14**	**294,756**	**814**	**82**	**24**	**48**
					(Op: EA1OS)	
EA7ELY	*	**13,668**	**123**	**28**	**9**	**14**
EA4ZK	*	**5,600**	**64**	**24**	**10**	**6**

Sweden

SM6GKT	**A**	**91,080**	**301**	**82**	**27**	**23**
SA1A	*	17,577	70	50	37	6
					(Op: SM1TDE)	

Switzerland

HB9TMW	**A**	**94,188**	**201**	**70**	**41**	**56**

Ukraine

UW8I	**A**	**3,288,446**	**2,422**	**350**	**109**	**115**
					(Op: UT2IZ)	
EO3Q	*	2,684,952	2,096	321	108	105
					(Op: UR3QCW)	
UT7UJ	*	787,710	977	186	71	84
UT8EL	*	632,468	1,049	204	54	26
UT2IO	*	225,984	490	159	47	8
UW7LL	*	101,520	299	77	29	38
UTØRM	*	37,054	151	47	25	25
UXØSX	*	29,667	155	62	24	1
UU2JQ	*	9,108	48	25	24	20
UX4FC	*	4,960	63	23	9	0
UZ2HZ	**28**	**130**	**5**	**5**	**5**	**0**
UXØFF	**21**	**405,330**	**949**	**111**	**32**	**34**
UT1IA	*	3,193	41	20	11	0
URSMBA	**7**	**37,204**	**246**	**53**	**15**	**3**
UT5ZA	**3.5**	**14,233**	**177**	**36**	**7**	**0**

OCEANIA

Australia

VK6IR	**A**	**364,210**	**583**	**110**	**51**	**54**
VK4AN	*	**7,050**	**52**	**24**	**21**	**5**
VK6HZ	**14**	**40,508**	**183**	**47**	**20**	**9**

French Polynesia

FO8RZ	**A**	**150,664**	**346**	**47**	**42**	**59**

Indonesia

YB3MM	**A**	**3,672**	**36**	**18**	**16**	**2**

New Zealand

ZM2A	**A**	**42,672**	**133**	**49**	**33**	**30**
ZL1BYZ	**21**	**142,715**	**419**	**54**	**25**	**36**

SOUTH AMERICA

Argentina

LW5EAE	**A**	**63,778**	**156**	**60**	**41**	**42**
LU6QI	*	2,170	21	20	12	3
LU3DX	**21**	**26,264**	**131**	**24**	**11**	**32**
LU3JV0	*	10,285	65	23	14	18

Brazil

ZX2B	**A**	**4,256,850**	**2,580**	**263**	**91**	**201**
					(Op: PY2MNL)	
PY3KN	*	114,453	255	86	39	32
PX2T	*	65,145	220	73	28	0
					(Op: PY2DN)	
PY2BRZ	*	26,695	99	44	26	25
PU4MAI	*	325	9	3	5	5
PY4XX	**21**	**64,943**	**223**	**45**	**20**	**36**

Chile

CE3PG	**A**	**152,586**	**355**	**61**	**28**	**58**

Uruguay

CX7TT	**A**	**655,741**	**767**	**143**	**60**	**86**
CX1CCC	**14**	**138,383**	**391**	**59**	**18**	**44**
					(Op: CX7BAP)	

Venezuela

YY5LI	**7**	**142,972**	**388**	**63**	**17**	**44**

MULTI-OPERATOR
SINGLE TRANSMITTER LOW POWER
NORTH AMERICA

United States

***NØNI**	**A**	**484,188**	**769**	**137**	**60**	**117**
***W4HOD**	*	**182,672**	**385**	**111**	**48**	**74**
***N5KRC**	*	**174,307**	**426**	**91**	**55**	**113**
*W4YCC	*	161,364	316	108	55	63
*AA4YL	*	19,688	100	42	28	37

Canada

***VE7NSR**	**A**	**148,779**	**359**	**66**	**43**	**74**

U.S. Virgin Islands

***KP2D**	**A**	**883,424**	**1,226**	**134**	**55**	**115**

AFRICA

Ceuta and Melilla

***EE9K**	**A**	**600,225**	**758**	**159**	**52**	**54**

Egypt

***SU1KM**	**A**	**411,774**	**736**	**119**	**37**	**31**

ASIA

Japan

***JQ1YWK**	**A**	**1,680**	**20**	**15**	**12**	**3**

EUROPE

European Russia

***RK3FWI**	**A**	**16,120**	**124**	**47**	**15**	**0**

France

***F8KGH**	**A**	**1,142,310**	**1,139**	**213**	**72**	**105**

Germany

***DFØFFH**	**A**	**196,024**	**423**	**143**	**47**	**24**

Italy

***IQ1NO**	**A**	**385,490**	**522**	**166**	**47**	**42**

Lithuania

***LY1CO**	**A**	**321,321**	**635**	**160**	**50**	**21**

Norway

***LA1UKA**	**A**	**26,840**	**146**	**60**	**21**	**7**

Portugal

***CS1CRE**	**A**	**758,547**	**1,266**	**147**	**47**	**73**

Scotland

***GM6NX**	**A**	**241,868**	**422**	**148**	**48**	**43**

Serbia

***YT6T**	**A**	**545,670**	**855**	**166**	**64**	**52**

Slovakia

***OM3KWZ**	**A**	**915,828**	**1,224**	**205**	**58**	**71**

Spain

***EA2CYJ**	**A**	**926,715**	**1,247**	**186**	**56**	**80**
*EG2NVP	*	2,691	32	24	12	3

Ukraine

***UU7J**	**A**	**1,424,640**	**1,492**	**251**	**82**	**87**
*UU4JWC	*	143,304	398	123	40	5

SOUTH AMERICA

Argentina

***LV6D**	**A**	**643,562**	**730**	**150**	**57**	**95**
*L73D	*	263,514	412	95	51	76

Brazil

***PU5ATX**	**A**	**171,072**	**367**	**91**	**36**	**35**

Venezuela

***YV5VD**	**A**	**908,769**	**1,001**	**131**	**51**	**127**

MULTI-OPERATOR
SINGLE TRANSMITTER HIGH POWER
NORTH AMERICA

United States

K4FJ	**A**	**2,890,160**	**2,158**	**291**	**103**	**166**
WØLSD	*	**2,057,643**	**1,996**	**232**	**95**	**186**
NR4M	*	2,039,650	1,701	262	81	132
WQ6O	*	**1,713,948**	**1,827**	**196**	**87**	**183**
NC4CS	*	1,351,224	1,593	164	65	154
K9SG	*	**1,133,244**	**1,327**	**172**	**74**	**132**
K7BTW	*	**1,011,402**	**1,293**	**164**	**84**	**166**
NQ4U	*	955,213	1,255	177	71	143
W4GAC	*	825,693	1,227	159	70	164
W7CT	*	712,287	1,177	115	63	155
N3BUO/5	*	**393,120**	**723**	**125**	**65**	**125**
W6SX	*	119,424	372	55	37	100
KDØS	*	101,904	334	66	38	72

AFRICA

Glorioso

FT5GA	**A**	**1,018,635**	**1,160**	**173**	**65**	**57**

ASIA

Asiatic Russia

RK9CWA	**A**	**4,101,420**	**2,829**	**340**	**99**	**71**
RWØA	*	**3,094,957**	**2,511**	**301**	**92**	**56**

Hong Kong

VR2ØØ9EAG	**A**	**180,125**	**612**	**79**	**39**	**7**

Kazakhstan

UN8LWF	**A**	**1,312,270**	**1,653**	**205**	**60**	**16**

Qatar

A73A	**A**	**2,458,273**	**2,014**	**264**	**86**	**69**

United Arab Emirates

A61OO	**A**	**901,265**	**1,184**	**171**	**65**	**29**

EUROPE

Czech Republic

OL3Z	**A**	**3,202,640**	**2,251**	**304**	**104**	**152**
OL3A	*	2,503,314	1,904	307	102	129
OK1KMG	*	220,255	448	144	45	28

England

G6MC	**A**	**1,546,428**	**1,528**	**258**	**76**	**97**
GØBRC	*	1,008,685	1,320	196	66	73

European Russia

RL3A	**A**	**3,463,104**	**2,693**	**335**	**105**	**104**
RZ4HZW	*	1,059,200	1,506	221	65	45

Finland

OH8A	**A**	**1,823,767**	**1,840**	**234**	**75**	**98**

France

F5JY	**A**	**1,939,910**	**1,582**	**294**	**89**	**107**

Germany

DP4P	**A**	**2,115,072**	**1,799**	**278**	**86**	**122**
DLØNS	*	1,338,930	1,289	252	84	99
DRØ9ANT	*	679,360	920	179	60	81
DLØER	*	647,188	1,028	159	42	73
DG3FAW	*	390,612	697	155	48	55

Greece

SX1L	**A**	**1,573,792**	**2,041**	**214**	**64**	**74**

Ireland

EIØW	**A**	**1,374,000**	**1,524**	**241**	**76**	**83**

Italy

IY1NGM	**A**	**2,511,441**	**1,960**	**286**	**98**	**135**
IQ4RN	*	1,991,390	1,783	266	92	112
IQ5FI	*	114,573	266	101	41	39

Poland

SO9S	**A**	**2,686,152**	**2,012**	**328**	**101**	**113**
SN4L	*	1,032,746	1,492	174	57	68
SP6PCB	*	1,830	23	17	13	0

San Marino

T7BA	**A**	**2,048,676**	**2,116**	**242**	**76**	**100**

Serbia

YTØA	**A**	**3,362,315**	**2,399**	**326**	**108**	**131**

Slovakia

OM8A	**A**	**4,147,631**	**2,656**	**342**	**107**	**158**
OM3RRC	*	627,022	1,063	143	45	54

Spain

EB1LA	**A**	**2,821,236**	**2,370**	**246**	**83**	**155**
EA1SA	*	1,197,472	1,373	200	59	109
EE2K	*	**403,968**	**669**	**139**	**47**	**70**

Sweden

SK4TL	**A**	**1,793,872**	**1,946**	**227**	**76**	**79**

Ukraine

UZ4E	**A**	**1,673,754**	**1,739**	**262**	**84**	**80**
UTØAZA	*	748,799	1,220	228	61	0
UT7AXA	*	8,007	76	39	12	0
UWØL	*	7,488	71	36	16	0

SOUTH AMERICA

Argentina

LT5X	**A**	**37,655**	**159**	**58**	**24**	**3**
LU4HH	*	11,542	73	26	13	19

MULTI-OPERATOR
TWO TRANSMITTER
NORTH AMERICA

United States

KØIR	**2,443,377**	**2,351**	**240**	**88**	**173**
N2BJ/9	**1,009,560**	**1,370**	**151**	**61**	**146**
WY3P/4	**330,573**	**487**	**146**	**62**	**95**

AFRICA

Madeira Islands

CR3L	**9,147,201**	**4,697**	**340**	**105**	**206**

ASIA

Japan

JJ1ZEJ	**697,376**	**862**	**180**	**77**	**47**

EUROPE

Czech Republic

OL7C	**231,246**	**502**	**78**	**34**	**62**

England

G3V	**1,710,000**	**1,972**	**214**	**66**	**95**

Estonia

ES5Q	**4,323,240**	**3,337**	**323**	**100**	**117**

European Russia

RK4WWQ	**1,000,160**	**1,571**	**224**	**59**	**21**
RK3DXZ	644,480	915	207	63	50

Finland

OH2ET	**2,624,732**	**2,398**	**303**	**90**	**91**

France

F6KPQ	**38,304**	**147**	**73**	**30**	**11**

Germany

DQ4W	**4,609,238**	**3,014**	**358**	**110**	**158**
DR5N	3,381,924	2,529	309	97	140
DLØCS	2,365,830	2,008	285	88	112
DL5AXX	1,345,200	1,361	218	89	93

Italy

IV3TMV	**3,371,064**	**2,565**	**316**	**107**	**129**

Luxembourg

LX7I	**5,211,386**	**3,529**	**335**	**103**	**149**

Macedonia

Z37M	**5,113,332**	**3,625**	**350**	**109**	**132**

Netherlands

PI4CC	**3,417,580**	**2,656**	**311**	**100**	**124**
PI4W	1,813,332	1,920	243	76	92

SOUTH AMERICA

Aruba

P49X	**8,436,312**	**4,378**	**328**	**105**	**223**

MULTI-OPERATOR
MULTI-TRANSMITTER
NORTH AMERICA

United States

W2FU	**5,614,917**	**3,810**	**335**	**113**	**221**
K1TTT	**5,443,872**	**3,723**	**329**	**113**	**230**
KA4RRU	**2,940,335**	**2,547**	**257**	**94**	**190**
KØADX	**124,416**	**372**	**74**	**42**	**100**

Canada

VE5PV	**478,485**	**758**	**89**	**55**	**135**

ASIA

Asiatic Russia

RA9A	**2,172,105**	**1,953**	**273**	**84**	**38**

Japan

JA1ZGP	**538,288**	**763**	**144**	**68**	**60**
JM1NKT	222,300	377	130	62	33

EUROPE

Andorra

C37URE	**4,486,257**	**3,819**	**270**	**81**	**152**

Finland

OH6R	**4,845,374**	**3,522**	**344**	**105**	**129**

Poland

3Z7BRG	**395,328**	**818**	**167**	**52**	**13**

Ukraine

UR3QXX	**267,904**	**547**	**156**	**45**	**23**

CHECK LOGS

The following submitted check logs. Check logs are always appreciated: UA3AGW, HA1SN, UTØEA, ES1LS, HK1X, EA5FL, WB2COY, IZ5MOQ, G3RWL, PYØFF, RA3XDX, HA6NN, SP4TKO, UR3AC, DG7LAE, DF8UO, SP9GKJ, K2QD, SP7HQ, EA1CF, DL5ZB, 4Z5OZ, WS4C, KO4PU, SP3QYQ, RV6ASU, DG1RZH, YR5T, UXØIK, IW5EIJ, PY5IP, DM5DX, SP7HOV, RA4NAJ, EA8TH, KK6T, OK2BHD, LU6AM, RN6FK, YO2KDT, N1WQ/Ø, EA7LS, UT2IV, VE3GYL, RW3DY, OK2SG, SP7VC, EA3NO, DL1DPN, GØVXE, PY2GG, RN9AA, SP1JRF, SP2UUU, RZ3DZI, CU2JT, YV5IAL, SP7AWG, BY1QH.

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LDG Electronics, Inc.	58,59	www.ldgelectronics.com
Log Window from SCO, Inc.	98	www.sco-inc.com
M² Antenna Systems, Inc.	67	www.m2inc.com
MFJ Enterprises, Inc.	33,55	www.mfjenterprises.com
Morse Express	50	www.MorseX.com
National RF, Inc.	113	www.NationalRF.com
Nemal Electronics International, Inc.	105	www.nemal.com
Penny's Stitch n' Print	98	www.pennystitch.com
PowerPort	98	www.powerportstore.com
QCWA	50	www.qcwa.org
QRO Technologies, Inc.	45	www.qrotec.com
QSLs by W4MPY	98	www.qslman.com
R.F. Connection	93	www.therfc.com
RF Concepts, LLC/Alpha	19	www.rfconcepts.com
RF Parts Company	27	www.rfparts.com
RSGB Books	32,106	www.cq-amateur-radio.com
Radio Club of J.H.S. 22	99	www.wb2jkj.org
Radio Works	25	www.radioworks.com
Rig Expert Canada	98	www.rigexpert.net
SteppIR Antennas Inc.	23	www.steppir.com
TG Electronics	73	www.tgelectronics.org
Tarheel Antennas	71	www.tarheelantennas.com
Ted Cohen, N4XX	93	www.AuthorHouse.com
TEN-TEC, Inc.	15	www.tentec.com
Ten-Ten International Net, Inc.	73	www.ten-ten.org
TENNADYNE, L.L.C.	105	www.tennadyne.com
The Xtal Set Society	113	www.midnightscience.com
Timewave Technology Inc.	31	www.timewave.com
TOKYO HY-POWER LABS, INC.–USA	3	www.tokyohypower.com
TransWorld Antennas	83	transworldantennas.com
Universal Radio, Inc.	49	www.universal-radio.com
VIS Amateur Supply	93	www.visradio.com
Vibroplex	63	www.vibroplex.com
W2IHY Technologies	25	www.w2ihy.com
W4RT Electronics	87	www.w4rt.com
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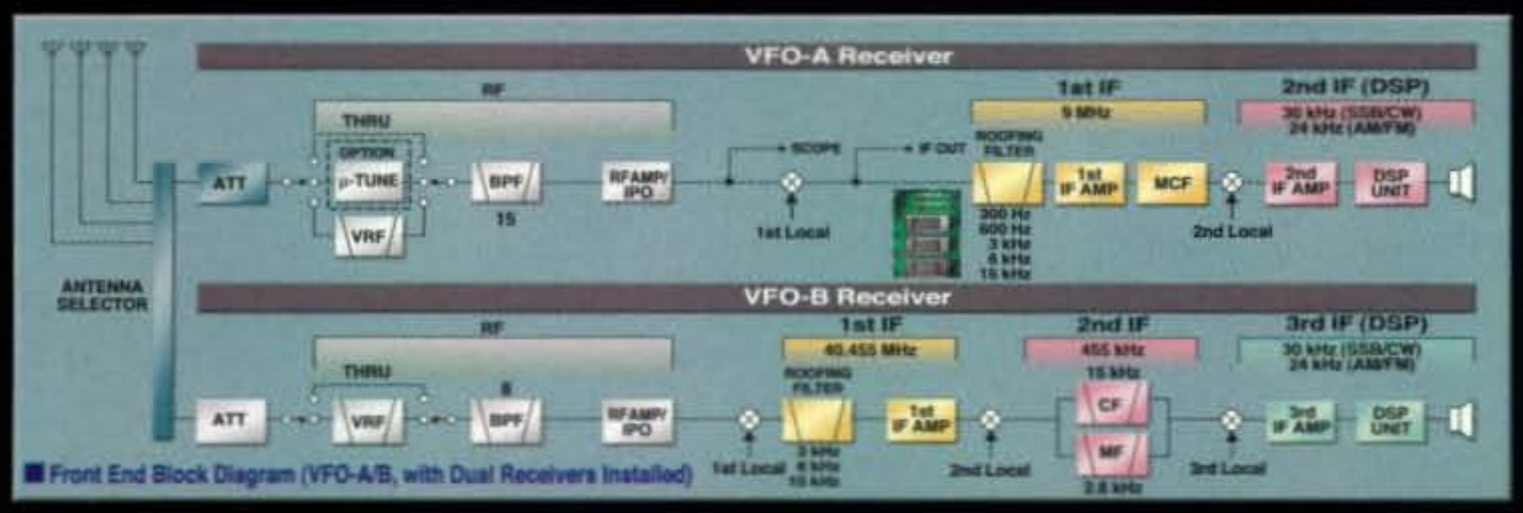

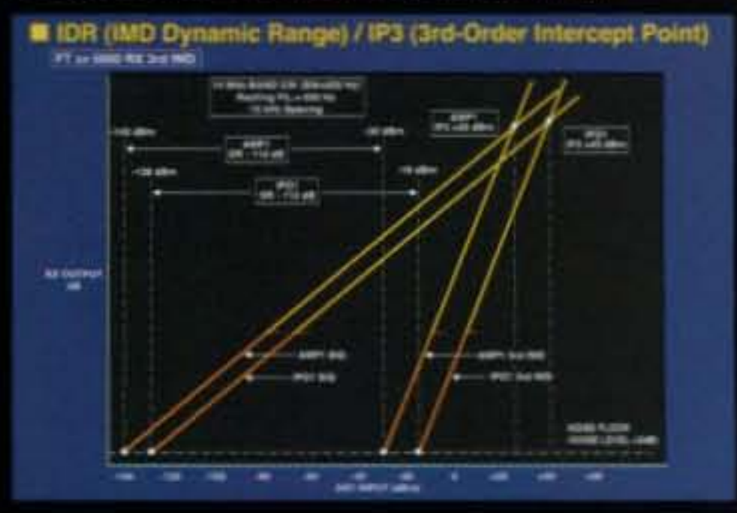

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