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Amateur Radio

COMMUNICATIONS & TECHNOLOGY

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CQ

MARCH 2011

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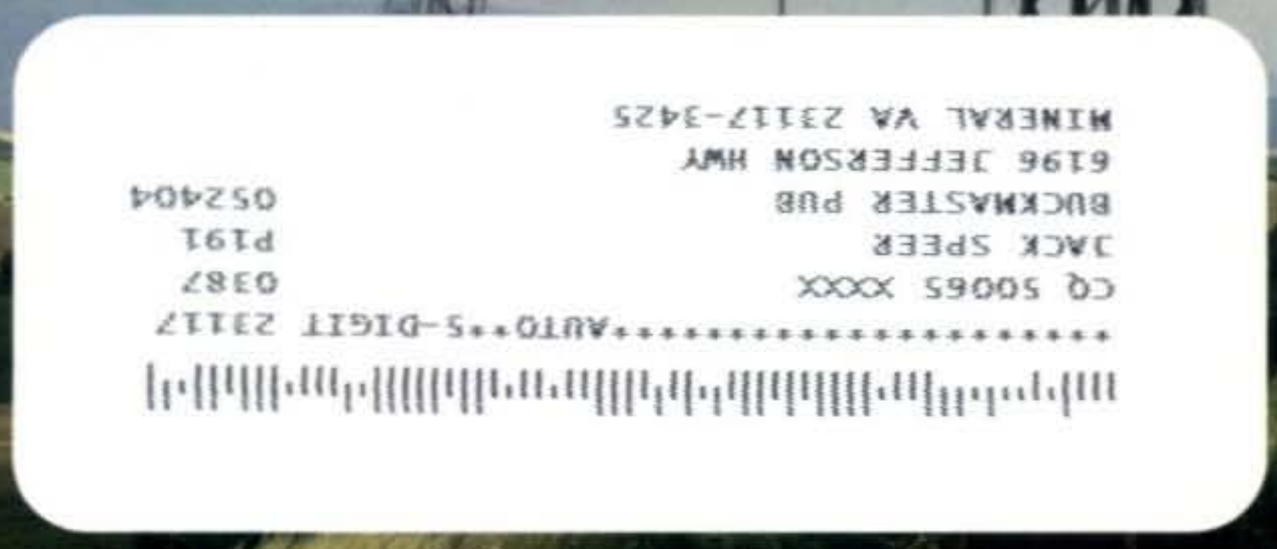
On the Cover:
The OM7M Contest Station in Slovakia. Details on page 92.



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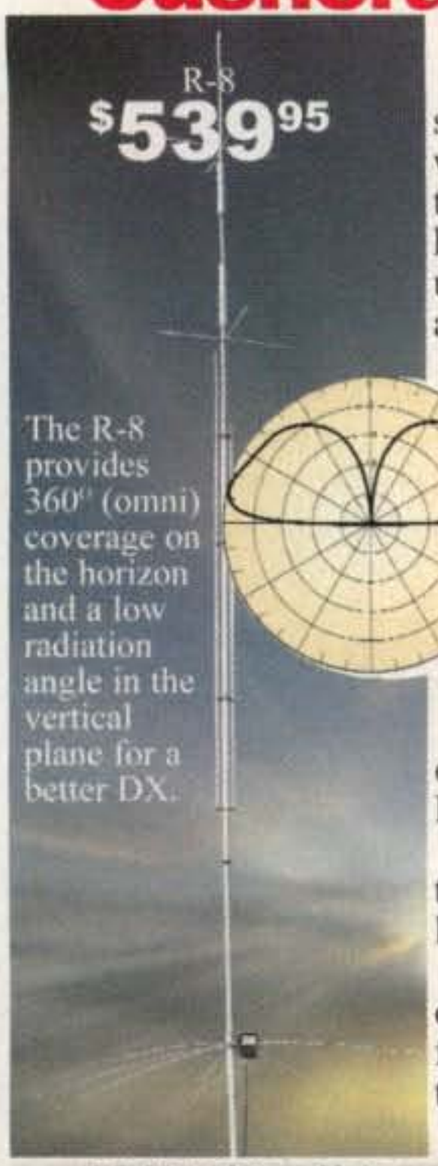
Cushcraft R8 *8-Band Vertical*



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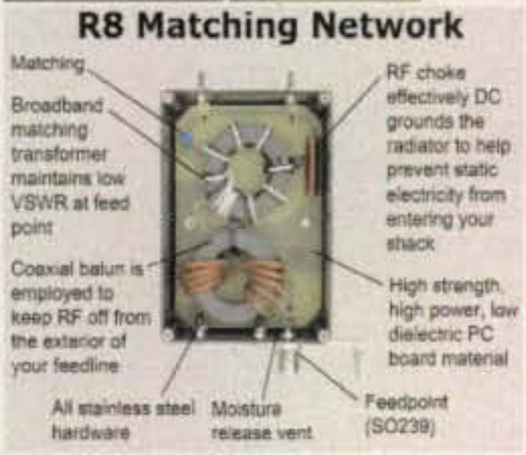
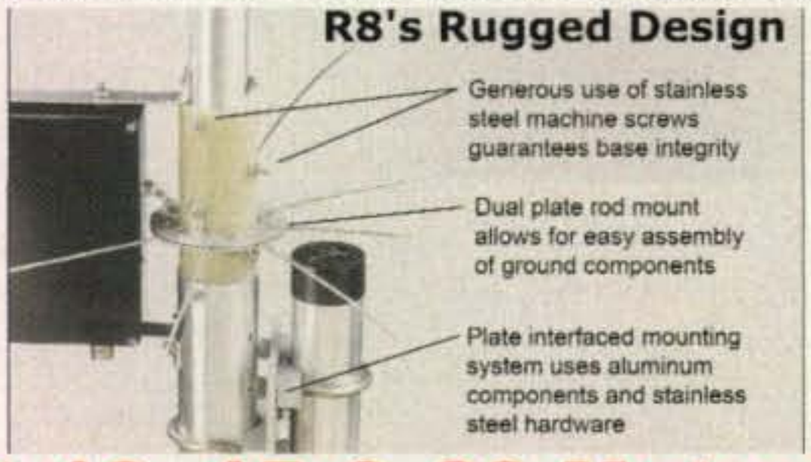
The sunspot count is climbing and long-awaited band openings are finally becoming a reality. Now is the perfect time to discover why Cushcraft's R8 multi-band vertical is the premier choice of DX-wise hams everywhere!

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

R8 Matching Network



R8's Rugged Design



MA-5B *5-Band Beam*

Small Footprint -- Big Signal

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

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

Cushcraft 10, 15 & 20 Meter Tribander Beams

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

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

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

Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios

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

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Return of the Woodpecker?

Hams who were active on the HF bands in the 1970s and '80s will likely remember the so-called Russian Woodpecker, an over-the-horizon (OTH) radar signal originating from the Ukraine that caused massive interference across the HF radio spectrum. The woodpecker has been silent since the collapse of the Soviet Union in 1989, but the IARU (International Amateur Radio Union) Monitoring System is now reporting QRM from two OTH radar signals—one originating in Russia and operating on the 40-meter (7-MHz) ham band, and another based in Cyprus that has been obliterating the 30-meter (10-MHz) band in Europe every afternoon. Details are in the IARU Monitoring System's December 2010 newsletter at <http://www.iarums-r1.org/iarums/news2010/news1012.pdf>.

On the topic of QRM in Europe, "Newsline" is reporting that one of three Italian repeaters allegedly causing interference to the ham radio downlink from the International Space Station has voluntarily gone off 2 meters. Owners of the IR2UEF D-STAR repeater noted that they were operating legally but were shutting down their 2-meter port "in the name of cooperation and ham radio spirit."

DXØDX DXpedition on Long-Term Hold

Organizers of the DXØDX Spratly Island DXpedition say the operation is on indefinite hold due to paperwork and bureaucracy problems. They hope to work things out and get on the air sometime this year. For more information, see this month's "DX" column on page 91.

New Rates, Formula for ARRL Outgoing QSL Bureau

For the first time in four years, the ARRL has raised its rates for sending members' QSL cards to hams around the world. It also refined the formula for determining how much a packet of QSLs bound for the Outgoing QSL Bureau would cost. According to the *ARRL Letter,* the new rates, which took effect January 17, are as follow: $2 for 10 or fewer cards in one envelope; $3 for 11–20 cards in one envelope; $0.75 per ounce for packages containing more than 20 cards.

The ARRL Outgoing QSL Bureau is available only to ARRL members.

NASA Seeks Hams' Help Monitoring Satellite—Gets It Down the Hall

NASA put out a request to hams on January 19th asking them to listen for the 70-centimeter beacon of the just-deployed NanoSail-D nanosatellite. The tiny satellite, whose control team is based at the Marshall Space Flight Center in Huntsville, Alabama, was supposed to deploy a solar sail as part of a solar propulsion experiment.

The first hams to report hearing the satellite's 437.270-MHz beacon, according to the Huntsville *Times* newspaper, were members of the Marshall Space Flight Center's own ham radio club. The news was posted on the club's website and immediately passed along to Principal Investigator Dean Alhorn, who had put out the request. According to the website, Alhorn "nearly exploded with joy" and club members "thought we were going to need to scrape Dean off the ceiling."

Split in IEEE over BPL Standard

There is discontent in the Institute of Electrical and Electronics Engineers (IEEE) over the body's recommended standards for testing and measurement of power-line communication equipment (also known as Broadband over Power Lines, or BPL) for electromagnetic compatibility (EMC). According to the *ARRL Letter,* the IEEE EMC Society Standards Development Committee (SDCom) withdrew as a co-sponsor of the new standard, complaining that its concerns about certain technical content had been ignored by the IEEE Standards Board. Committee member and ARRL Lab Manager Ed Hare, W1RFI, questioned the value of an IEEE EMC standard that does not have the support of the organization's own EMC Standards Committee.

In other BPL news, the ARRL filed a complaint with the FCC in late December, charging that three BPL systems in Pennsylvania, Virginia, and Indiana—all operated by IBEC, are not properly notching out the amateur bands and are causing harmful interference to area hams. The *ARRL Letter* says the League filing called on the FCC to launch an enforcement proceeding against IBEC and to shut the systems down until they are in full compliance with FCC rules.

Logbook of The World Now Supports Grid-Square Based Awards

The ARRL reports that its online QSO confirmation service, Logbook of The World (LoTW), will now support ARRL awards based on Maidenhead grid squares, including the VHF/UHF Century Club (VUCC) and the Fred Fish Memorial Award. With this upgrade, LoTW now supports all ARRL awards. *CQ* is continuing to work with the ARRL to eventually support *CQ*-sponsored awards.

FCC Sets K1MAN License Renewal for Hearing

The FCC has formally designated the license renewal application of controversial ham Glenn Baxter, K1MAN, for a hearing before an Administrative Law Judge. Baxter's license expired five years ago but has remained valid during enforcement proceedings. The FCC has cited him for multiple instances of alleged interference to ongoing communications, transmitting communications in which he allegedly had a pecuniary interest, and other matters. The Commission now has a case in federal court, trying to collect fines that it assessed but which Baxter has not paid.

Baxter says he is pleased to finally be getting a hearing on his license renewal after five years, but notes that since the matters that will be considered by the Administrative Law Judge are essentially identical to those before the federal court, the FCC will likely have to wait until the court case is completed before proceeding with the hearing. "This is going to be fun," he notes, adding, "This is like a double-header. Your tax money hard at work."

Ham Radio Study Bill Re-introduced in New Congress

Representative Sheila Jackson Lee (D-TX) has reintroduced the Amateur Radio Emergency Communications Enhancement Act, which passed the Senate during the last Congress but was never taken up the by House of Representatives. According to the ARRL, the bill has the new number of HR 81, and has been referred to the House Committee on Energy and Commerce.

The bill calls on the Secretary of Homeland Security to study the uses and capabilities of amateur radio in emergencies and disasters, and to make recommendations regarding impediments to amateur radio communication, such as the effects of antenna restrictions in private land use regulations. The FCC has said repeatedly that it will not challenge these private regulations, often known as CC&Rs, without a specific mandate from Congress.

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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departments

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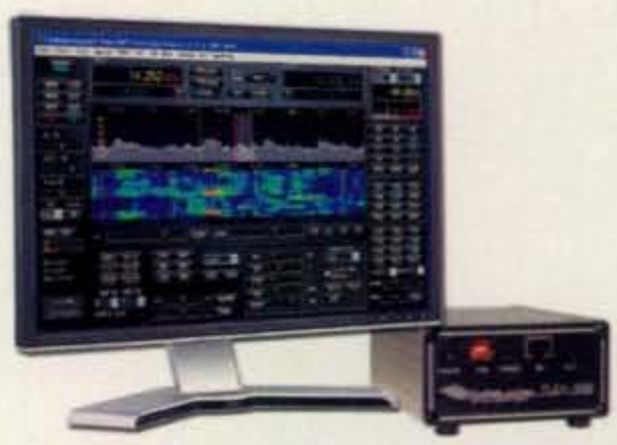

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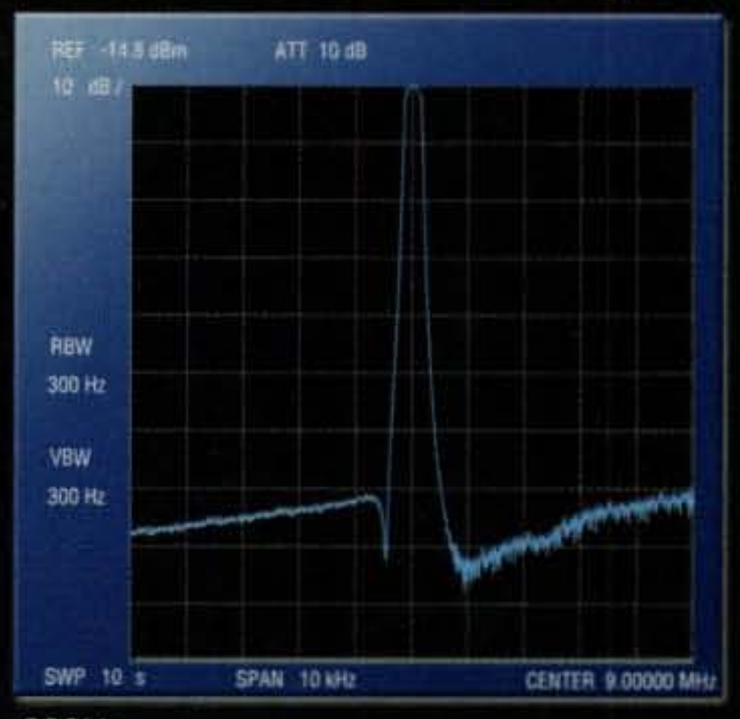
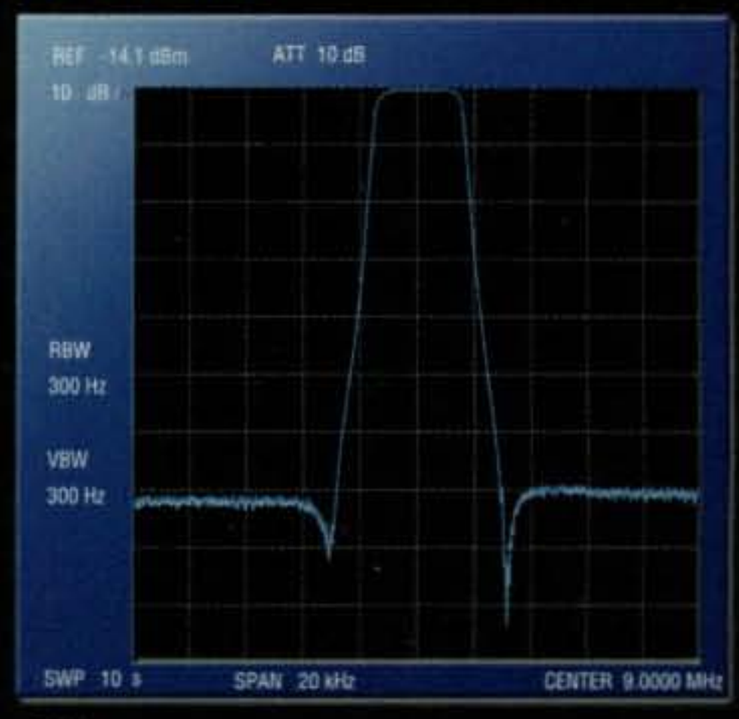


300Hz



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- 3 kHz Roofing Filter included

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zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Appliance Operators?

Last month in this space, I set out to bust a few ham radio myths, one of which was that "hams don't build anything anymore." This belief, I said, is even older than the "ham radio is dying" myth. And indeed, it is a belief that has been addressed in this column before. For example:

It seems that many folks think that amateur radio, as a scientific service, has stagnated, and in support of their beliefs, they bring up the trend toward all-commercial stations, commercial antennas and other accessories. We can't dispute this trend, but we would rather interpret it a bit differently. We feel that the availability of high quality commercial gear has simply *eased* the job of the amateur in the development of communications techniques, instead of eliminating it…

The point is this. Amateur radio has come quite a ways from the days of the first commercial equipment, and we must realize that each new technique development has been made possible by that same equipment. To condemn it is foolish. It just isn't possible to turn back the clock to the days when a good ham built all his equipment, from key to antenna. To encourage this is to negate the progress of 50 years of amateur radio … and many a new development has come from the shack of an appliance operator.

How long ago was this written? Five years ago? Ten? Well, that last line might give you a hint … "To encourage this is to negate the progress of 50 years of amateur radio." Next year will be the centennial of the Radio Act of 1912, which formalized callsigns and licensing, and hams were active for several years before that. So when was this written? Try August 1964, penned by Dick Ross, K2MGA, who is now *CQ*'s Publisher, but was Editor back then.

Yes, even 47 years ago hams were griping that nobody built anything anymore and that we were becoming a hobby of appliance operators. Yes, even 47 years ago, hams were using the term "appliance operators." But as Dick pointed out then, and as is just as true today, the advent of commercial gear has not put an end to hams' innovation; rather it has provided a platform for even greater innovation moving forward.

But what about the underlying assumption, whether in 1964 or 2011, that hams aren't builders anymore? Well, last October we asked you, our readers, about your own building activities. The results are on page 40 of this issue and frankly, they amazed even us.

Ninety-four percent—yes, 94%—of the readers who responded to the survey said they had built at least one piece of radio equipment! And we're not talking about building a dipole here … 58% have built a receiver, 57% a transmitter, and 41% a transceiver. Also, we're not talking about building a rig a half century ago (or a half century before that!) … 68% of the respondents said their most recent ham radio project was completed within the past year (30%) or is in progress right now (38%). Only 14% said it's been ten years or longer since they've built anything.

Now I realize that these surveys are not scientific, but they do provide a reasonable snapshot of our readers' interests and activities, even if they are off by a few percentage points. Clearly, *CQ* readers are also builders, and in large numbers, and that's what really matters.

So what about a half-century of complaints that fewer and fewer hams are building anything? Could it be that the ranks of builders hit bottom and are now on the increase? It's possible. There's evidence everywhere that CW usage has been increasing since the FCC eliminated the code test requirement. Perhaps there is a resurgence of building among hams.

It's also possible that the complaints were just plain wrong, both a half century ago and today. Just like the "ham radio is dying" myth that hams keep retelling. Here we are at our all-time licensing peak—over 696,000 at the end of 2010. Yet, a telling point, a story last weekend in a Chicago newspaper was entitled "Ham Radio Buffs Say Fading Hobby Serves Purpose." Sometimes, you just can't win.

Now It's Your Turn …

We know you're building things, and many of you are building things of your own design (47%, according to the survey). Share! Let's see some fun, practical, project articles. We don't have the space to publish long and complex projects at this point, but we'd love to see what you have to offer in the way of practical projects that are fun to build and can be put together in a weekend (kind of like AD5X's "Weekender" column that ran until Phil needed to step down and KØNEB reconfigured it into our current "Kit-building" column). Take pictures, draw schematics, and write up a brief description of what it is, how it works, why someone else might want to build and use it, and clear, step-by-step instructions for assembling the project. Please read our writers' guidelines (www.cq-amateur-radio.com/guide.html), and then send along the article to me at <w2vu@cq-amateur-radio.com> or by postal mail to the CQ office. We'll pick out the best of the best and get them into future issues. Meanwhile, keep those soldering irons warm!

Welcome, N2GA

I'd like to welcome George Tranos, N2GA, as our new "Contesting" Editor. As we reported last month, John Dorr, K1AR, decided to step aside after nearly 22 years of writing the *CQ* contesting column. George is an accomplished contester, often putting in top-tier performances from the Caribbean, and is respected for his objectivity, having served as a referee in three World Radio Teamsport Championship (WRTC) competitions. You'll find a more complete introduction in this month's "Contesting" column on page 97. Please give George your support and feedback.

73, Rich W2VU

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

TH-2MK3, $369.95. 2-element, 1.5 kW PEP, 10,15,20 Meters

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

For just $339.95 you can greatly increase your effective radiated power and hear far better!

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

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

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

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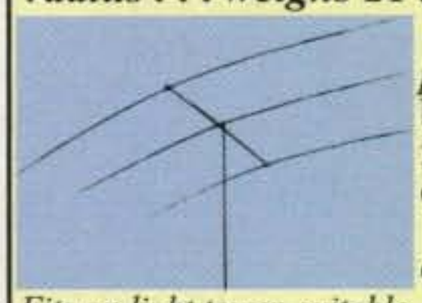

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Model No.	No. of elements	avg gain dBd	avg F/B dB	MaxPwr watts PEP	Bands Covered	Wind sq.ft. area	Wind (mph) Survival	boom feet	Longest Elem. (ft)	Turning radius(ft)	Weight (lbs.)	Mast dia O.D.(in.)	Recom. Rotator	Sugg. Retail
TH-11DX	11	*For Gain and F/B ratio--See...* • www.hy-gain.com • Hy-Gain catalog • Call toll-free 800-973-6572		4000	10,12,15,17,20	12.5	100	24	37	22	88	1.9-2.5	T2X	$1159.95
TH-7DX	**7**			**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$869.95**
TH-5MK2	5			1500	10, 15, 20	7.4	100	19	31.5	18.42	57	1.5-2.5	HAM-IV	$759.95
TH-3MK4	**3**			**1500**	**10, 15, 20**	**4.6**	**95**	**14**	**27.42**	**15.33**	**35**	**1.9-2.5**	**CD-45II**	**$469.95**
TH-3JRS	3			600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$359.95
TH-2MK3	**2**			**1500**	**10, 15, 20**	**3.25**	**80**	**6**	**27.3**	**14.25**	**20**	**1.9-2.5**	**CD-45II**	**$369.95**
EXP-14	4			1500	10,15,20 opt. 30/40	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$599.95

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

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announcements

SWODXA Ohio DX Association Dinner, Dayton Hamvention® 2011 – The annual DX Dinner™ will be held this year On Friday, May 20 at a new location, the Dayton Marriott, 1414 Patterson Blvd., Dayton, OH 45409. Details are avialable at <www.swodxa.org>. They are attempting to honor seating requests (tables fo 10), and so please contact (with check or money order &40 payable in U.S. funds), Kirk Swallow, W8QID, 3137 Compton Rd., Cincinnati, OH 45251 (be sure to include SASE for return ticket).

SKYWARN CLASSES: The Lake County ARES, Lake ARA, and National Weather Service will sponsor two SKY-WARN classes to become trained weather spotters at the Leesburg Library, Leesburg, FL on March 5. For more information go to: <www.skywarn.org>, www.k4fc.org>, and www.n4fla.org>.

• The following Special Event Stations are scheduled for late February and March:

K5B, from the 22nd Annual Bataan Memorial Death March Marathon, Las Cruces, New Mexico; Mesilla Valley Radio Club; March 27 from 1000Z to 2300Z on 3.893, 7.225, 14.330, 21.337 MHz. For QSL, write to: Special Event Station K5B, c/o Mesilla Valley Radio Club, PO Box 1443, Las Cruces, NM 88004-1443. For more information go to: <http://www.n5bl.org/bataan>.

WS7G, from celebration of George Washington's birthday, near the town of George in Washington State; 0001Z February 21 through 0400Z February 23 on 14.250, 18.135, 3.880, and 7.230 MHz (±QRM). QSL via WS7G.

W8FT, celebrating 90 years of existence of the Findlay Radio Club, Findlay, Ohio; from 1300Z March 20 to 0100Z March 21on 3.555, 3.855, 7.055, 7.260, 14.055, 14.255, 21.055, and 21.285 MHz. All contacts will receive a special QSL card from the club honoring the event.

• The following hamfests, etc., are slated for March:

March 12, **2011 Charlotte (NC) Hamfest**, Cabarrus Arena & Events Center, Concord, North Carolina; sponsored by the Mecklenburg ARS. Contact Tom Hunt, e-mail: <dealers@w4bfb.org>; phone 704-948-7373; <www.w4bfb.org/hamfest>. (Exams) ***See us at the CQ Booth.***

March 19, **Charleston, West Virginia Hamfest (**ARRL affiliated), Coonskin Armory, Charleston, West Virginia. For more information and details, contact Jim Damron, N8TMW, <n8tmw@arrl.net> or call 304-965-5349; <http://www.w8gk.org>. (Exams 12:30 PM)

March 26, **Orange County ARC Spring Hamfest**, Town of Wallkill Community Center, Middletown, New York. Contact Neil Shubert, AC2O, e-mail: <cermic7@gmail.com>, cell 914-490-2001 (between 6 and 9 PM). (Talk-in 146.76 PL 100; exams)

March 26, **Columbus (IN) ARC Hamfest**, Bartholomew County 4H Fairgrounds, Community Building, Columbus, Indiana. Contact Russ Holderness, KA9MZV, e-mail: <rholder433@live.com>, phone 812-372-7422, cell 317-692-3345. (Talk-in 146.790/146.190w/PL100; exams 11AM [walk-ins OK] contact Rhonda, WS9H, e-mail: <KS9H@comcast.net, phone 317-654-0007)

March 26, **HAM-EX™ 2011**, Brampton Fall Fairgrounds, Mississauga, Canada. Contact the Mississauga Amateur Radio Club, VE3MIS. (Talk-in VE3PRC 146.880– [no tone], VE3MIS 145.430– [103.5 tone]; exams for Basic, Advanced, and CW Qualification [see <www.ham-ex.ca])

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

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Bill Baker helped shape the landscape of both commercial and public television in America and now teaches at five different universities. He can be found early most mornings on 80 meters.

CQ Interviews:

TV Executive Bill Baker, W1BKR

BY RICH MOSESON,* W2VU

Okay, everybody, raise your hand if you have your own atomic clock. Keep it raised if you have two or have been to both the North *and* South Poles, or have operated ham radio from Antarctic cruise ships, the *Queen Elizabeth II* and the *USS Intrepid*.

That's what I thought. Bill, you can put your hand down now. ...

Welcome to the latest in *CQ*'s series of interviews with chronic ham radio underachievers: Dr. William F. Baker, President Emeritus of WNET.ORG, or as he's better known on 80 meters, Bill, W1BKR.

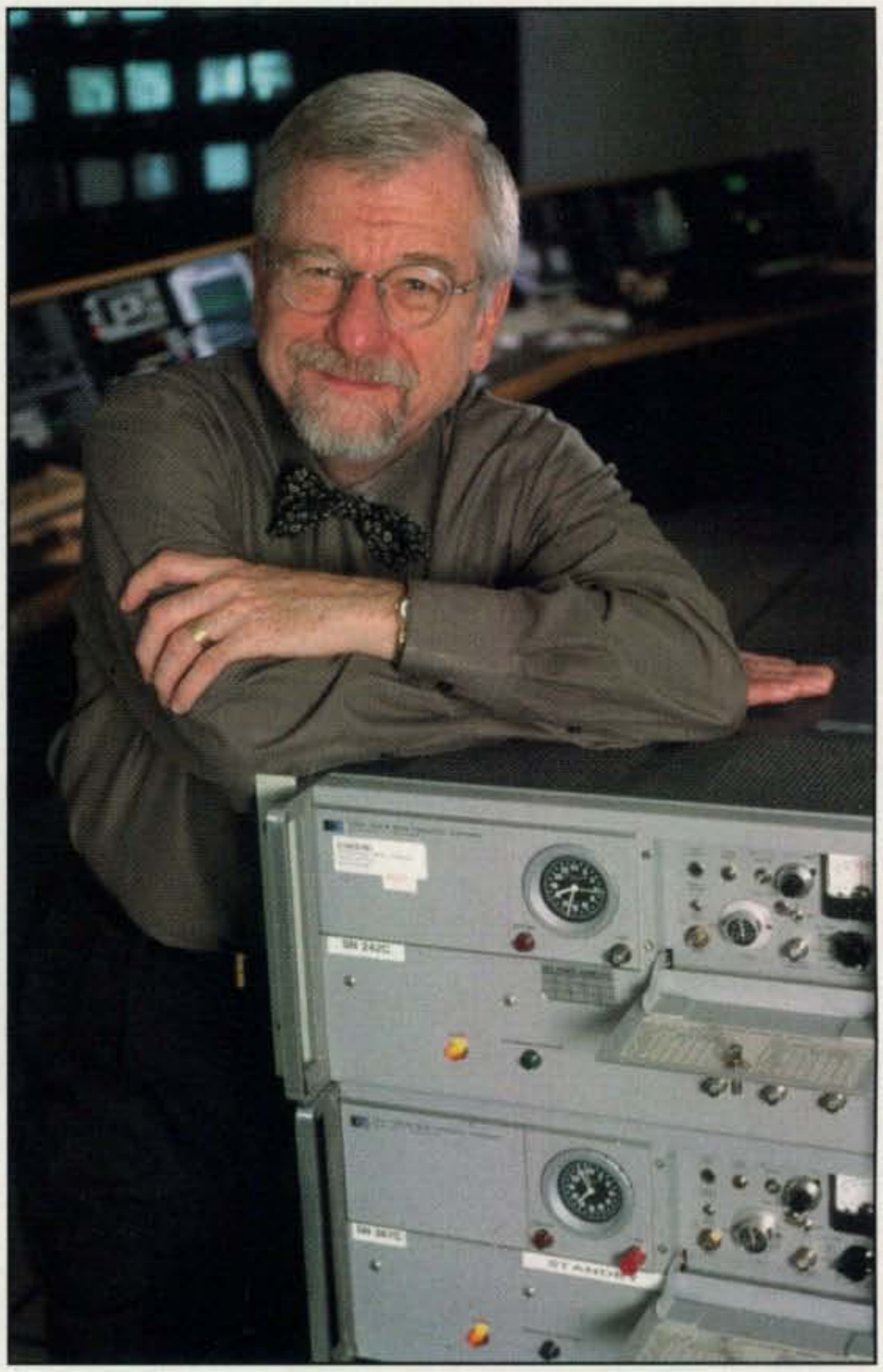
WNET.ORG is the parent company of both WNET-TV, New York City's Channel 13, and WLIW, Long Island public TV channel 21. WNET calls itself the nation's flagship public TV station, says it is the most-watched public television station in America (WLIW is #3), and the most prolific public TV program producer. Bill and I met and talked at the stations' combined studio and production facility in midtown Manhattan.

Starting with Shortwave

Bill has had a wide-ranging and fascinating career. He is a polar explorer, a broadcast executive who helped shape the modern television industry—both commercial and public—and now, after "retirement," is an independent TV producer and a college professor. A relative latecomer to ham radio as a licensee, he says he nonetheless has been influenced by hams and ham radio throughout his career.

"I started out interested in shortwave as a kid," Bill explained, recalling that his parents had taken him to visit a ham in Ohio when he was a young teen. This ham, he said, had a shortwave radio. "I never forgot it, because my parents bought me his radio for Christmas. It was a Hallicrafters S53-A, and that was my first radio when I was about 13 or 14 years old, something like that. I was a shortwave listener well into my adult life."

Baker's interest in broadcasting began around the same time, starting out "talking into the back of vacuum cleaners when I was 13 years old, pretending they were microphones." He quickly landed a job as a technician at a radio station in



Bill Baker, W1BKR, in the Master Control room for WNET/WLIW-TV in New York City. Bill is standing with the station's two atomic clocks, whose donation he arranged from the U.S. Naval Observatory. (Photo by Joseph Sinnott, ©WNET.ORG; Courtesy WNET.ORG)

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

Fund-Raising ... and DXing

Creative *fund*-raising activities for public television also provided Bill with creative *fun*-raising opportunities for ham radio—namely, DXpeditions!

"When I got into this public television world," Bill explained, "I started lecturing on those expedition ships that make trips to the Antarctic, and we did that as a way to raise money for public television and invite people who could afford a trip like that on a great adventure. It's not like going to the pole, but you get to see the prettier parts of Antarctica. So I took ham radio equipment on those adventures, and ... I had some of the best DXpedition trips ever.

"My family still laughs at me, (recalling my) calling CQ from outside on the back of the ship with the waves crashing around, and I'm wearing gloves so I could barely push the push-to-talk button, and I'm saying, 'We're here in a storm in Antarctica, I don't know how much longer I can transmit. ... I'm hooked up to a battery from one of the Zodiacs.' Meanwhile, they're delivering me a hamburger on a silver tray from the galley of the ship! So you know, I wasn't lying, but it wasn't quite as dramatic as the early polar explorers had it, believe me!

"Then I did the maiden Arctic voyage on the *QEII*, and we went up all through Spitsbergen and Iceland ... north of Norway and then down the Norwegian coast. They had a ham radio on that ship. I remember—it was interesting—a little Kenwood TS-50, and they let me use that in the radio room, which was this monstrous radio room back then, and so I did a DXpedition from the *QEII*, which was a lot of fun, too."

Bill has continued mounting DXpeditions from closer to home as well, including his family's summer home on Henry Island, Nova Scotia, and on board the *U.S.S. Intrepid* museum ship docked in the Hudson River in New York City. "I was on the board for many years, and I had a ham station there," Bill explained, "until the ship had to be moved and they dismantled my ham station. I tried to get a group of hams in there, the group that was kind of moved out of the science museum here in New York (*the Hall of Science Amateur Radio Club—ed.*), and we never could make the connection. I'm still not going to give up on that."

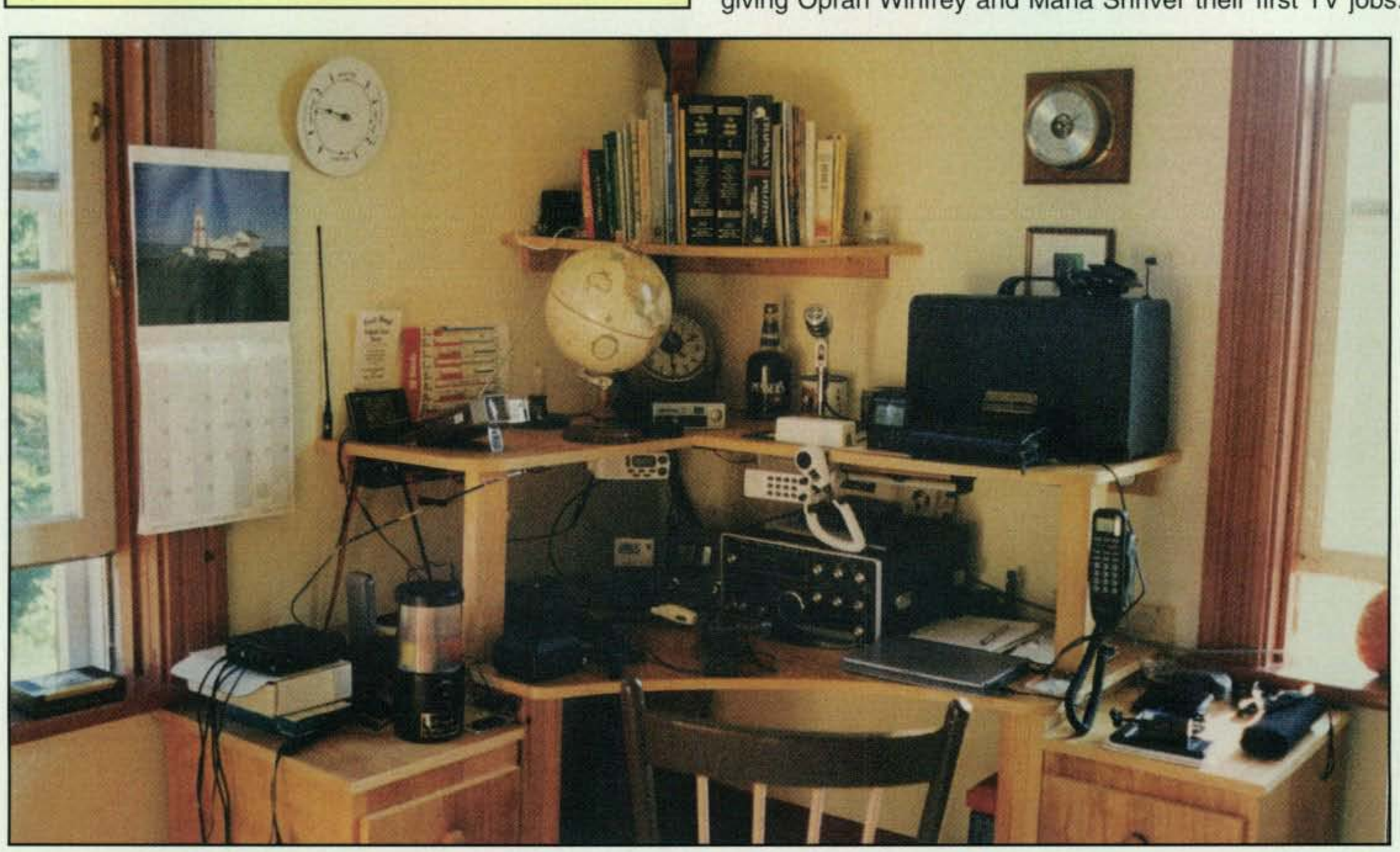
his hometown of Cleveland, and was working there full-time, both behind and in front of the mic, by the time he was in high school.

Starting a TV Career

That early exposure to the technical side of broadcasting helped direct Bill's college goals, at least in the beginning, at Case Western Reserve University, where he planned to become an electrical engineer. "I got through differential calculus, and that just about broke my pick," he recalled.`"I made it through because I had two incredibly smart friends who later went on to become Ph.D. engineers. ... But anyway, I decided kind of halfway through electrical engineering that I really wasn't smart enough to be one, and so I shifted over into communications because I'd already been working in that field. ... So I stayed and got my B.A., but by the time I got my B.A., I was a radio producer of a talk show in Cleveland and doing stuff for NBC radio nationally."

Bill's next move was into television, but he wasn't sure it would last. He kept his TV job but went back to Case for graduate studies. "I've always been interested in psychology and organizational systems," he said, "so I decided to get graduate degrees in industrial psych and organizational behavior. By the time I got my Ph.D., I was already station manager of (the) ABC station in Cleveland, WEWS, and so I just put Ph.D. after my name and kept the job. It didn't seem like I should quit."

Bill was always a hands-on manager. In 1974, he organized and led a TV expedition to Antarctica. Then, when he became manager of the Westinghouse station in Baltimore, became the first manager there to climb up the station's 1000-foot candelabra tower, recalling that you went up in a "teeny little basket" and that he felt very brave ... "until I got about halfway up." Among his other accomplishments there were giving Oprah Winfrey and Maria Shriver their first TV jobs.



Bill's ham station at his family's house on Henry Island, Nova Scotia (from the book, Lighthouse Island*). (Courtesy W1BKR)*

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He later organized an expedition to the North Pole, becoming one of the few people ever to visit both the North and South Poles.

Going Bicoastal ... and then "Going Public"

After several years in Baltimore, Bill moved up in the Westinghouse organization, eventually becoming president of all of the company's TV stations and chairman of its cable programming businesses. During his tenure, he oversaw the startups of the Discovery Channel, the Disney Channel, and the Travel Channel.

"Then, 20 years ago, (I) was asked by a hero of mine, Dr. Frank Stanton, who was president of CBS, if I would come and be president of public television in New York. I thought, 'Boy, what an honor that is; but does it make sense to take an 80% pay cut?' " he said with a chuckle. "My wife persuaded me that that's what I really *should* be doing. So I thought I would do that for a couple of years and then go back to making money. But ... if you really get into the purposes and the goals of public media, the mission is so high and great that you really can't leave it. So I didn't, and that lasted 20 years and now I'm a professor."

Of course, Bill did manage to accomplish a few things during his two decades at WNET, such as raising more than $1 billion to support public broadcasting, building the largest endowment in the history of public television, overseeing the merger of Channels 13 and 21, their transition to digital broadcasting, their move to a new state-of-the-art studio and production facility, and the introduction of six new digital channels as well as V-me, the first public TV station in the U.S. aimed at Latino viewers. He has also been Executive Producer and/or on-the-air host of various public TV programs, including Thirteen's most-watched program ever (which he hosted), the July 4, 1992 broadcast of the Tall Ships Parade in New York City.

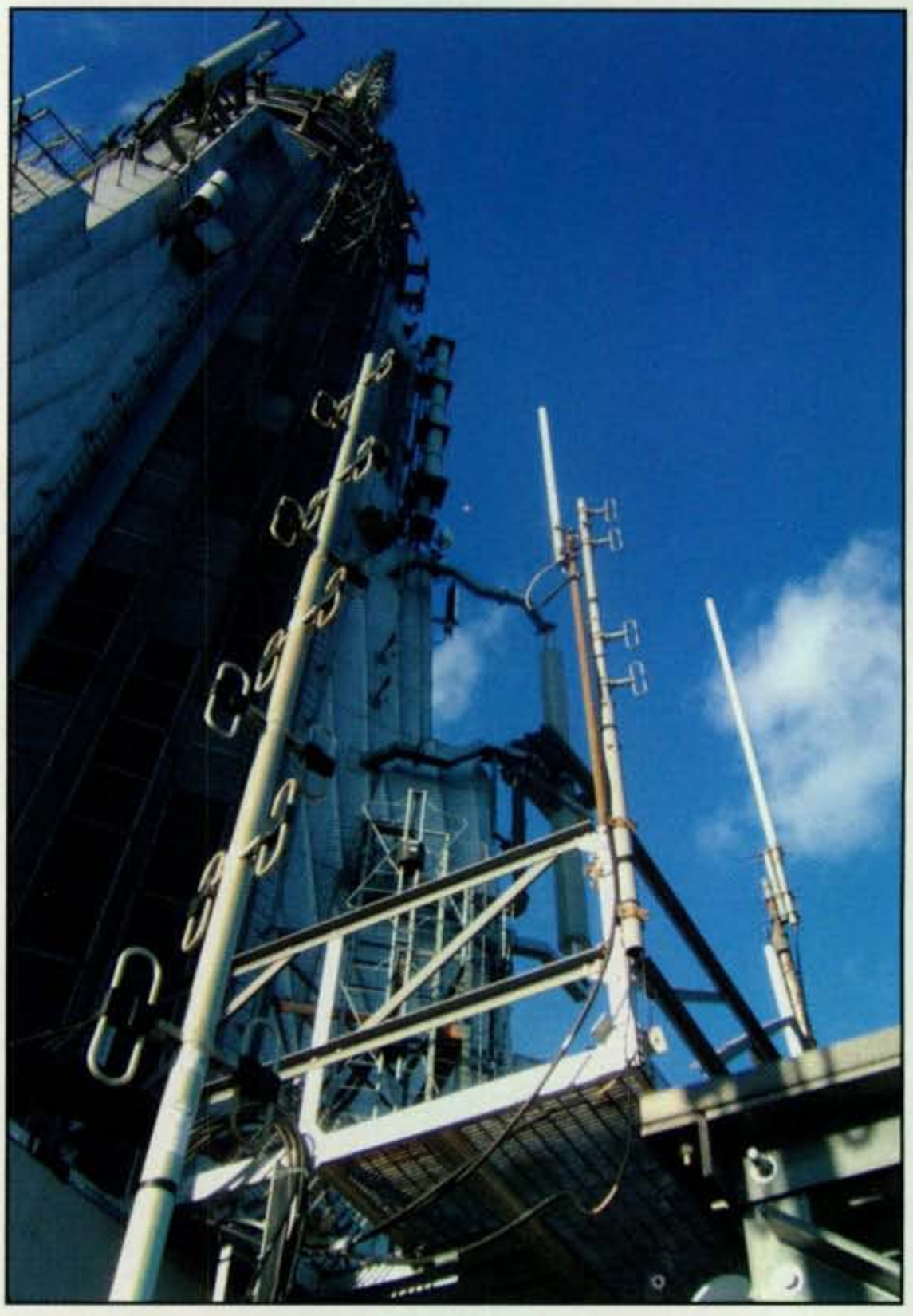
Bill has been honored with various broadcasting awards and is a member of Broadcasting & Cable's Hall of Fame (inducted 2004), the New York State Broadcasters Association Hall of Fame (2005), the National Academy of Television Arts and Sciences Management Hall of Fame (2007), and even the CQ Amateur Radio Hall of Fame (2009).

Capstone Achievement

What, I asked Bill, did he consider the highlight of his many-faceted career? His answer might surprise you: "Perhaps the highlight of my career was in many ways at the most frightening and scary time, but it showed the real value of electronic media, and it showed the greater value of the industry rather than any kind of personal achievement, and that was September 11th," he said, referring to the terrorist attacks on New York City. "When it all happened, what I said to my people was, 'Don't worry about money, don't worry about anything ... just think of only one thing—serving the people of our community. Whatever it takes to really do that... and let's be creative about how we can do this.' "

"The commercial media did a brilliant job," Bill continued. "Public television decided we couldn't do the same thing because we didn't have the capacity they had with mobile units and everything, so we decided to put all this in context. We did programs, we had religious leaders from all of the faiths sitting in the studio with Bill Moyers, and I was one of the people, so for me personally, it was quite an experience, interviewing during that time on worldwide television."

There was more that went on behind the scenes: "One of the people in our station said, 'You know, we've got the biggest phone system in New York, because of the telephone pledge drive.' And they said, 'Why don't we make that available to the Red Cross?' So the whole Red Cross and part of the Office of Emergency Management all moved into our facility. We set up tables and everything for them there. It was really quite a moment in my career and I think the career of electronic media—in the *life* of electronic media in America.



Channel 13's antenna (left foreground) is mounted just above the 87th floor rooftop area of the Empire State Building. (See more photos from the Empire State Building in our web supplement.)

All of this, of course, occurred over a background of personal loss. Many people at Channel 13 had relatives or friends who were killed or injured in the attacks, along with one colleague—transmitter engineer Rod Coppola, KA2KET, who was at work that fateful morning at the station's transmitter in one of the World Trade Center towers. He is now memorialized by a plaque in the Channel 13 lobby.

A Life of Leisure in Retirement (Not)

Retirement has not slowed Bill down in the least. He is currently teaching at five different universities ("I'm finally using my Ph.D. after all these years," he quipped), continuing to work as an independent TV producer and is a tireless advocate for our national parks (he is the former chairman of the National Park Service Advisory Committee.). He also collects microphones and clocks, and has written several books, including *Lighthouse Island* (about the island in Canada that his family owns!). And then, of course, there's ham radio,

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"Instead of the Junkyard, It Goes to My Office"

In an industry dominated by the clock, it might not be too surprising to know that one of Bill Baker's passions has been collecting clocks—not just any clocks, but specifically electromechanical clocks from broadcast stations. Actually, he says, his fascination with clocks goes back further than he can remember. He says his mother told him that his first words were "light" and "clock."

Bill's most prized acquisition is the old master clock from CBS in Hollywood. "I used to have an office at CBS in Hollywood when I was head of the (Westinghouse) production company there, and I used to go to the big control room and sit there and just kind of drool over this master clock." It is a high-accuracy Favag pendulum clock, he explained, with an escapement, or a special mechanism that regulates its movement and keeps it on time. Later, said Bill, "Westinghouse bought CBS, and ... they wanted to give me a present when they signed our big contract. I said, 'I'd like that master clock that you had in Hollywood.' Luckily for Bill, the clock had been replaced by an atomic clock and the old one, still in storage, ended up in his office. He took it with him wherever he went after that, and recently donated it to the American Clock and Watch Museum in Bristol, Connecticut.

Now, about those two atomic clocks we mentioned at the beginning of this article. They actually belong to Channel 13 and sit in the master control room, although Bill notes, "I had one at home for a while." Bill had arranged their donation by the U.S. Naval Observatory, for a time giving the public TV station the most accurate time standard of any of the broadcasters in New York City.

Bill also collects broadcast microphones, including a large number of RCA ribbon mics, although he confesses a preference for German-built Neumann microphones and even visited their factory on a trip to Europe.

"It was fun being the boss of these broadcasting companies," recalled Baker with a chuckle, noting that whenever he saw station clocks or microphones being updated, he would tell the staff, "You're not to throw it out. If it's going to go to the junkyard, instead of the junkyard, it goes to my office. So I wound up collecting a nice bunch of things. ..."

which Bill says influenced his career long before he became a ham himself in the late 1980s.

"I always admired hams," says Baker. "At virtually every station that I ran or the broadcasting company that I headed, I always sought out hams and listened to their advice about things that were technical, and always got the best and most honest advice from them ... because they were probably a bit more clever and used to doing things in a nontraditional way. I was never, ever disappointed; never, ever disappointed."

It was one of those hams who finally persuaded Bill that he could, indeed, become a ham himself. "It took a guy here, when I came to Channel 13, 22 years ago," said Bill, "our chief transmitter operator whose name was Saul Slonim, W2PD [now a Silent Key]. Saul was president of the little ham club they had at the television station, the engineers, and they kind of shamed me into becoming a ham, in the sense of saying, 'Whaddaya mean, you can't pass the test? Why do we want to work for somebody who can't pass the ham test?' ... So he and the guys all helped me, and I passed the test, and that was really a thing of great joy, and I really started getting into it in a big way."

Bill says he has continued to rely on fellow hams for help and advice. "We could never have gotten on the air out of this new location and we certainly couldn't have kept Channel 21 on the air," noted Bill, "if it weren't for Eric Spiegel." Calling Eric, who is KE2EJ, "a genius ham radio operator and a genius broadcast engineer," Baker continued, "Whenever I would get into trouble ... I would always go to Eric and say, 'Eric, how do we get a satellite hookup from this piece of Antarctica? Or can you invent a piece of equipment to solve this problem? Or why isn't this working?' It was always Eric Spiegel I went to, my ham radio genius, and I mean I really put him in that category, to do that."

Bill also didn't hesitate to tap the expertise of hams outside his organization. He recalled one time, when he was chairman of the industry committee of all the TV stations in New York, the group was having trouble dealing with some very complicated RF issues. "I wound up calling Dick (Knadle), K2RIW, head of TechNet (on the Long Island Mobile Amateur Radio Club repeater)," Bill explained, "because I used to listen to TechNet every week, so I figured Dick knows more than anybody I've ever met in the commercial broadcasting business. I'm going to get the TechNet guys on this problem. He worked up models and tried to solve whatever the problem was for me. So ham radio has been actually, even before I was a ham, always been very much a part of my life."

Still, says Bill, beneath all the technology, ham radio is about people. He says one of the constants of his ham radio life over the past 30+ years has been a daily net on 80 meters. "I still am on that net. I'm on that net nearly seven days a week, at 7 o'clock in the morning," Bill continued. "I love ham radio because the range of people. Even if you've had interesting jobs of the kind I've had over the years and touch a lot of people, you don't touch a wide variety of people, from all walks of life, the way you do in ham radio, and the joys of that are, what you get out of that, is amazing."

Ham Radio and Young People

I mentioned to Bill that most of our previous interview subjects believe that our country is facing a crisis today in terms of getting young people involved in science and technology, and most of them also believe that activities such as ham radio can play a role in helping to face

that crisis. I asked Bill—as a technology executive and college professor—for his take on this situation.

"I absolutely agree that that's a major, major issue in this country, and it's a frightening one," he replied. "It's a frightening one for this country. Ham radio can play a role and should play a role, and I don't know why the education community, the science centers of America, and other places haven't been more embracing to ham radio. It just puzzles the heck out of me. I don't think education departments at schools, other places, have taken full advantage of that. I'm now housed at Fordham in the Graduate School of Education, and one of my goals, not yet even started ... is to figure out how to bring ham radio into the education of some of these future science teachers who are going to ultimately get the word out.

"But it's a major issue. It's one in which we're clearly behind. ... I've been fortunate enough to get a bunch of honorary doctorate degrees, and you sit up there on the podium and these big schools are issuing doctorates. Almost all of the Ph.Ds in scientific fields are going to non-Americans, usually Asians. What does that say?" He paused, then concluded with a smile, "Unless they're working for Kenwood or ICOM, I'm troubled by that."

A Transmitter Room with a View...

When I was first arranging our interview with Bill, his assistant called me to work out the details. "And of course, you'll want the transmitter tour?" she asked. It was quite matter-of-fact (as it should be when dealing with a ham!), despite the fact that the WNET-TV transmitter is on the 78th floor of the Empire State Building.

After the studio tour (on which we met several more hams, of course), interview, and lunch, Bill and I walked several blocks to the Empire State Building. We got our visitor passes and headed upstairs, where we were \met by Channel 13 transmitter engineer Tom Kotta, KB2UHG. We could see back to the studios through one of the small windows in the transmitter area, which is why most of that window is taken up by a microwave dish on a tripod, the main studio-transmitter link across the unobstructed path. The transmitter room itself is filled with patch panels, scopes, monitors and a rack full of RF power amplifier modules—14 modules ganged together, each producing 200 watts—that feed into a room full of what looks like shiny copper plumbing (it's actually hard line), whose output runs nine stories up to the 87th floor to yet another room full of even more hard line, feeding into combiners and filters that permit multiple TV and FM radio stations to transmit from the same location with causing mutual interference.

"Outside" was the next stop on our tour. We climbed through a little door onto the rooftop, where we were surrounded by various antennas, weather instruments, a pretty small railing for such a height, and probably the best view in all of New York City. Luckily, it wasn't very windy! It was, without question, the highlight of my day. (A more complete photo tour is in our web supplement to this article, "Digging Deeper with Bill Baker, W1BKR," on the CQ website at <http://www.cq-amateur-radio.com>.)

Relaxation and Inspiration

When all is said and done, the bottom line for Bill is that ham radio has always been, and continues to be, a place to turn for a new perspective or just a break. ... "Ham radio has seemed to follow me," he noted. "I mean, it's such a thing of pleasure and joy. I have a lot of worries in my life. I've always been, for the last 50 years, under a huge amount of pressure in these media jobs, but a source of a great kind of relaxation, and inspiration, has been ham radio and my ham radio buddies."

Results of the 2010 CQ WW WPX CW Contest

BY RANDY THOMPSON,* K5ZD

Few things match the hope and optimism present at the beginning of a major DX contest. Participants anxiously watch the seconds tick down. Will the new antennas work? Will conditions be good? Can I win my region or break a record? What contacts or openings will I experience and tell stories about?

For the first 6 hours or so of May 29–30, 2010, the 31st edition of the CQ WPX CW Contest was providing plenty of hope. CR6K in Portugal started the contest running USA stations on 15 meters. At the same time, USA stations were working into Japan and the Pacific. Then a solar event bombarded the ionosphere and the party was over.

To be charitable, conditions for the remainder of the weekend were challenging. Any path over the northern polar region was gone. The Europeans complained of not being able to work North America. The western USA couldn't work Europe. The eastern USA couldn't work Japan. The contest became separate QSO parties where each continent worked the locals, but at a loss of valuable DX QSO points and multipliers.

Yet, sporadic-*E* on 10 meters provided some entertainment. Europe enjoyed good openings on both days. There were even reports of QSOs from southern Europe to China and the USA. YT2T and 9A1CCY made 1348 and 1273 QSOs, respectively, on the band! The USA also saw *E*-skip openings. WN1GIV in south Florida made over 700 contacts on 10 meters.

In spite of the terrible conditions, and the usual conflict with the Memorial Day holiday in the USA, the WPX CW event once again broke records for log submissions, with 3649 logs received. To twist a phrase, for many amateur radio operators even a bad day of contesting is better than a good day fishing, or mowing the yard, or any of the other things people do on a weekend in late spring!

A Haiku poetry contest on the CQ WPX fan page on Facebook produced this commentary.

As I sit in chair
I admire my iron pants
So very stylish.
—Khrystyne Keane, K1SFA

And for those operators with iron pants who were willing to stay in the chair despite the poor conditions, that style was rewarded. There were seven new world or continental records (see records table elsewhere in this issue). Yes, all came from areas south of the major population centers, but it still takes a great deal of effort and skill to set one of these top-level records. Many comments included in the logs pointed to personal best scores or new countries to be found. By the way, there were 160 different countries reported active during the weekend.

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The team at CQ3L set a new Africa record in the Multi-Two category. Left to right back: Diethelm, DJ2YE; Joerg, DL3QQ; Norbert, DJ7JC; Wil, PAØBWL; Dieter, DJ8DS; Hape, DL1XW; Uli, DJ9IE. Front: Deti, DK3QZ, and Kai, DL3HAH.

Countries are nice, but it's prefixes we want. The multi-multi team at DR1A repeated their accomplishment in the SSB contest by having the highest prefix multiplier in the contest with 1255, not quite up to their record of 1313 prefixes set in 2008. Close behind were LZ9W with 1231 and ZW5B with 1223. The top single operator prefix hunter was EF8M with 1026. In all, there were 28 stations that recorded over 1000 prefix multipliers. Some of the more unusual callsigns that submitted logs included 3Z9TA, 4U1ØNPT, BXØWPX, CD1R, DL6ØDARC, HF1ØØHP, HG6ØVOTT, LZ18ØFT, OL26LP, PC6ØØP, PDØ5CW, SP2Ø1ØCY, TM77M, and V55X.

Single Operator All Band High Power

The world champion in the Single Operator All Band High Power category was again from the station of EF8M, but this time with Alex, RZ3AZ, at the key. Alex broke the world record set just a year earlier from the same station. In second place was John, K4BAI, operating from PJ4A. John broke the all time single-op record for South America that has stood since 1994! Andy, UUØJM, once again travelled to 4LØA to take third place. Just a few contacts behind in fourth was Jeff, K1ZM, operating from his VY2ZM station on Prince Edward Island in eastern Canada. Pertti, OH2PM, piloted TC4X to fifth place without making a contact on 160 or 80 meters.

In the USA, it was Alex LZ4AX, taking a break from his advanced studies at Penn State University to operate under the KC3R callsign. How bad were conditions? Alex's winning score this time was 30% below his winning score in 2009. Ouch! Bud, AA3B, took second place by just 15K points over Paul, K8PO, operating as AJ1I. Dick, WC1M, was right behind them in fourth. All of these operators are extremely accurate, and it was log checking that helped settle the final order of finish.

The competition in Europe was intense as always. CR6K, operated by Filipe, CT1ILT, took advantage of his southern location to take the win. Ranko, 4O3A, was only 15 contacts behind in second place. The difference was Felipe's 57 additional multipliers. Continuing the dominance of southern Europe was UW2M in third, operated by Roman, URØMC. Serge, RA3CW, operating

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TROPHY WINNERS AND DONORS

SINGLE OPERATOR ALL BAND

WORLD: Steve Bolia, N8BJQ Trophy. Won by: **EF8M operated by Alexandr Gimanov, RZ3AZ**
WORLD Low Power: Caribbean Contesting Consortium Trophy. Won by: **P49Y operated by Andrew L. Faber, AE6Y**
WORLD QRP: Bill Parker, W8QZA Trophy. Won by: **TM77M operated by Laurent Fontaine, F5MUX**
USA: Dennis Motschenbacher, K7BV Trophy. Won by: **KC3R operated by Alexander Avramov, LZ4AX**
USA Low Power: Ken Boasi, N2ZN Trophy. Won by: **NN5J operated by Kevin Stockton, N5DX**
USA QRP: John T. Laney, K4BAI Trophy. Won by: **Gary Hembree, N7IR**
USA Zone 3 High Power: Northern California Contest Club Trophy. Won by: **KR7X operated by** Denis Pochuev, **K7GK**
USA Zone 3 Low Power: Arizona Outlaws Contest Club Trophy. Won by: **John Arthurs, K7WP**
USA Zone 4 High Power: Society of Midwest Contesters Trophy. Won by: **NN4US operated by Erik Martin, N5WR**
USA Zone 4 Low Power: Society of Midwest Contesters Trophy. Won by: **KS9K operated by Terry Zivney, N4TZ**
EUROPE: Ivo Pezer, 5B4ADA/9A3A Trophy. Won by: **CR6K operated by Filipe Monteiro Lopes, CT1ILT**
EUROPE Low Power: Vitor Santos, PY2NY Trophy. Won by: **OL6P operated by Petr Prokop, OK2PP**
EUROPE QRP: Julius Fazekas, N2WN Trophy. Awarded to: **Miroslav Vohlidal, OK1DVM**
AFRICA: Chris Terkla, N1XS Trophy. Won by: **ST2AR operated by Robert Kasca, S53R**
ASIA: Rick Tavan, N6XI Trophy. Won by: **4LØA operated by Andy Kazantsev, UUØJM**
NORTH AMERICA: Louisiana Contest Club Trophy. Won by: **V26E operated by Darrell Neron, AB2E**
NORTH AMERICA QRP: Dale Martin, KG5U Trophy. Won by: *no entry*
OCEANIA: Lloyd Cabral, KH6LC Trophy. Won by: **John Loftus, VK4EMM**
SOUTH AMERICA: David Kopacz, KY1V Trophy. Won by: **PJ4A operated by John T. Laney III, K4BAI**
SOUTHERN CONE (CE,CX,LU): Tom Morton, K6CT Trophy. Won by: **CW5W operated by Jorge Diez, CX6VM**
CANADA: Radio Amateurs of Canada (RAC) Trophy. Won by: **VY2ZM operated by Jeffrey T. Briggs, K1ZM**
CANADA Low Power: Contest Club Ontario Trophy. Won by: **Nick Lekic, VE3EY**
JAPAN: Simone Candotto, IV3NVN Trophy. Won by: **Masaki Okano, JH4UYB**

SINGLE OPERATOR, SINGLE BAND

WORLD 28 MHz: Steve Hodgson, ZC4LI Trophy. Won by: **Juan Morandi, LU1HF**
WORLD 21 MHz: Andrei Stchislenok, NP3D Trophy. Won by: **ZX5J operated by Rafael Oliveira Martins, PY2NDX**
WORLD 14 MHz: Gene Walsh, N2AA Trophy. Won by: **CT1JLZ operated by Jiri Pesta, OK1RF**
WORLD 7 MHz: 6Y1V Contest Station Trophy. Won by: **3V8CB operated by Dragan Acimovic, YT3W**
WORLD 7 MHz Low Power: Neal Campbell, K3NC Trophy. Won by: **Slavko Celarc, S57DX**
WORLD 3.5 MHz: Ranko Boca, 4O3A Trophy. Won by: **Emil Tafro, E71A**
WORLD 1.8 MHz: Dusko Dumanovic, ZL3WW Trophy. Won by: **Vemic Miroslav, YT4A**
USA 28 MHz: Paul Beringer, NG7Z Trophy. Won by: **WN1GIV/4 operated by Bob Patten, N4BP**
USA 21 MHz: Charlie Wooten, NF4A Trophy. Won by: **NR5M operated by Eric Silverthorn, NM5M**
USA 14 MHz: Kansas City DX Club Trophy. Won by: **Dave Patton, NN1N**
USA 7 MHz: Darin Divinia, WG5J Trophy. Won by: **Richard Lee, W2EG**
USA 3.5 MHz: Wes Printz, W3SE / ZL3TE Trophy. Won by: **Madison Jones, W5MJ**
EUROPE 28 MHz High Power: SKY Contest Club Trophy. Won by: **9A1CCY operated by Sasa Pokorni, 9A3NM**
EUROPE 21 MHz High Power: SKY Contest Club Trophy. Won by: **Vladeta Krkic, YU1KX**
EUROPE 14 MHz High Power: SKY Contest Club Trophy. Won by: **Marko Munih, S50K**
EUROPE 7 MHz High Power: SKY Contest Club Trophy. Won by: **YTØA operated by Ivan Cakarevic, YT1CI**
EUROPE 3.5 MHz High Power: SKY Contest Club Trophy. Awarded to: **Patrick Bittiger, F2DX**
EUROPE 1.8 MHz High Power: SKY Contest Club Trophy. Awarded to: **Nemeth Nicolae Iuliu, YO5AJR**

SINGLE OPERATOR ASSISTED

WORLD: D4C Station Trophy. Won by: **KP2M operated by John L. Bednar, K3TEJ**
USA: Ron Sigismonti, N3RS Trophy. Won by: **Gene Shablygin, WU3A/1**
EUROPE: Martin Huml, OL5Y Trophy. Won by: **ERØWW operated by Sergey Rebrov, UT5UDX**

OVERLAY CATEGORIES

WORLD Tribander/Single Element: Helmut Mueller, DF7ZS Trophy. Won by: **TC4X operated by Pertti Simovaara, OH2PM**
USA Tribander/ Single Element: Paul Newberry, N4PN Trophy. Won by: **NXØX/4 operated by Paul Newberry, N4PN**
EUROPE Tribander/ Single Element: WPX Contest Committee Trophy. Won by: **Matija Brodnik, S53MM**
WORLD Rookie: Val Edwards W8KIC Memorial (K3LR sponsor) Trophy. Won by: **OF50RR operated by Mikko Silvola, OH8FKU**
NORTH AMERICA Rookie: Chris Kantarjiev, K6DBG Trophy. Won by: **David Levine, K2DSL**

MULTI-OPERATOR SINGLE-TRANSMITTER

WORLD: Steve Miller, NØSM Trophy. Won by: **P33W operated by RW4WR, RV1AW, RA3AUU**
USA: Phil Allardice, KT3Y Trophy. Won by: **NY4A operated by AA4FU, N4AF**
AFRICA: Rhein Ruhr DX Association Trophy. Won by: *no entry*
ASIA: W2MIG Memorial (NX7TT Sponsor) Trophy. Won by: **C4N operated by 5B8AD, RV6LNA, UA6LP, RA6LFO, RW3QC**
EUROPE: Andy Ruse, YO3JR/YR1A Trophy. Won by: **RT4F operated by UA4FMV, UA4FER, RW4FO, RK4FD, RK4FQ, RK4FW, RZ4FA**
NORTH AMERICA: Jim George, N3BB Trophy. Won by: *no entry*

MULTI-OPERATOR TWO-TRANSMITTER

WORLD: UA1DZ Memorial (W3UA Sponsor) Trophy. Won by: **C4I operated by LZ1UK, LZ2HM, LZ3CQ, LZ3NY**
USA: Florida Contest Group Trophy. Won by: **K1LZ operated by KØDXC, K1LZ, KQ2M, K3JO, NU5Y, N8BO, LZ1MS**
AFRICA: Walter Skudlarek, DJ6QT Trophy. Won by: **EA8URL operated by RD3AF, EA8ZS, EA8DP, EA8BQM, EA8AJW, EA8BEX, EA8AGF, EA8CAC, EA8RY, EA8AVK**
EUROPE: Tom Georgens, W2SC Trophy. Awarded to: **OM7M operated by OK2BFN, OM2IB, OM3PA, OM5MF, OM5RM, OM5RW, OM5ZW**

MULTI-OPERATOR MULTI-TRANSMITTER

WORLD: Steve Merchant, K6AW Trophy. Won by: **CQ3L operated by DJ2YE, DJ7JC, DJ8DS, DJ9IE, DK3QZ, DL1XW, DL3HAH, DL3QQ, PAØBWL**
USA: Jim Reisert, AD1C Trophy. Awarded to: **KM3T/1 operated by KM3T, WA1Z, K1GQ, W1FV, N1KWF**
EUROPE: David Robbins, K1TTT Trophy. Won by: **LZ9W operated by LZ1ZD, LZ1ANA, LZ1GL, LZ1PJ, LZ1PM, LZ1UQ, LZ2CJ, LZ2HQ, LZ2GL, LZ2TU, LZ2UU, LZ2PO, LZ2UZ, LZ3FM, LZ3UM**

CONTEST EXPEDITION

WORLD: Phil Goetz, N6ZZ Memorial Trophy. Won by: **Hal Offutt, MJ/W1NN**

COMBINED SSB/CW

WORLD Single Operator: Yuri Blanarovich, K3BU Trophy. Won by: **KH7XS/KH7B operated by Bill Kollenbaum, K4XS**
USA Single Operator: Bill Fisher W4AN Memorial (KM3T Sponsor). Won by: **KC3R operated by Alexander Avramov, LZ4AX**
WORLD Club Score: CQ Magazine trophy. Won by: **Bavarian Contest Club**

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RS3A, was the only one from central or northern Europe to crack the European top ten.

Single Operator All Band Low Power

The poor conditions were not as friendly to the low power operators. There are no new records to brag about, but there were still some great scores! Andy, P49Y (AE6Y), backed up his world high finish on SSB with one on CW. As the contest started for everyone else, the electrical power was out for the whole island of Aruba. When the lights came back on at 0705Z, all Andy could do was push as hard as possible and be happy the rules required everyone to take 12 hours off sometime during the weekend. A remarkable effort to achieve the win! Second place went to Vitor, PY2NY, operating from PS2T. Eric, K9GY, once again travelled to Nicaragua and made his best score ever from YN2GY to finish in third. Bill, K4XS, used the call KH7B and dropped down to low power this year to chase the Oceania record. His 4.4-million points easily surpassed the existing record of 3.3 Meg set back in 2001. Olli, OHØXX, visited the station of TI5N and claimed fifth place.

The top low power score for the USA was made by Kevin, N5DX, operating under the callsign NN5J. Another example of a great op taking advantage of the conditions that seemed to favor stations more to the south. Less than 200K points behind was Maury, W3EF, showing you don't need a rare prefix to do well in the contest. Perennial top ten finisher NV1N (Ed, N1UR op) complained that these were "definitely the worst WPX contest conditions ever experienced from this QTH in Vermont." Another regular was Will, WJ9B, operating from Florida, who finished well behind his score of 2009. Terry, N4TZ, deserves credit for putting in a full effort from KS9K in Indiana to make the top five.

The race for first place low power in Europe came down to log checking. Petr, OK2PP, used the call OL6P. Franco, TK/S59AA, did a DXpedition to Corsica and operated from a camp site using a TH33jr tribander only 30 feet above ground. Franco had more QSOs, while Petr had more multipliers. It was a lower error rate that gave Petr the victory! Of course, we should mention that Franco only operated 30 hours, so a bit more operating time might have made the difference. Very close behind was Nasko, LZ3YY, operating as LZ9R, who lost several hours of operation due to thunderstorms.

Single Operator Single Band

If one is the loneliest number, then one-sixty is surely the loneliest band in WPX CW. Even so, there are hardy souls who take up the challenge of summertime QRN. The top high power score was made by Mike, YO5AJR. In an unusual twist, the world high score was done with low power by Vemic, YT4A. Richard, K5NA, took the USA honors and broke a 25-year-old record for the W5 call area.

After losing by just a few points on SSB, Emil, E71A, returned to 80 meters for the CW contest and ended up with the world high

score. Very close behind was Patrick, F2DX, who complained of operating only 24 hours because there were no signals on the band during the day! Madison, W5MJ, stuck it out for top USA score on 80. Vyacheslav, UA2FL, had the world high score on low power.

Many entrants commented that 40 meters had the best of the bad conditions. Dragan, YT3W, took advantage by setting a new world record from 3V8CB. Laurent, FM5BH, finished second. Steve, ZC4LI, made a last-minute decision to change from single band on 15 meters to single band on 40 and was rewarded with a new all-time record score for Asia. In the USA, it was Richard, W2EG, running low power who had the highest score. There was a fierce competition on low power in Europe. Slavko, S57DX, just got by Franci, S51F, and Slawa, ER6A.

When conditions are bad there is always 20 meters. The competition this year was intense with only a few points separating the top three. The overall winner was CT1JLZ operated by Jiri, OK1RF. Jiri always has one of the biggest signals from Europe. Willy, UA9BA, returned to UP2L to defend his title from the previous year. He said of conditions, "Never saw 20 meter band in such poor shape for the *whole* weekend in a major contest!" Third place was Pedro, HK1X, operating from the new super station of the DX Colombia ARC. The new antennas work, as Pedro broke the South America record set back in 1991! Dave, NN1N, avoided the siren call of the beautiful weather outside and stayed on the radio long enough to win the USA. Close behind was Bill, K5GA, operating as NM5M from the NR5M station outside Houston. Bill had 250 more contacts, but Dave had more QSO points. On low power, it was a close race in Europe between Eugeniusz, SP4JCQ, and Zoltan, HG4F.

It wouldn't be 15 meters if we didn't mention ZX5J. This time it was Rafael, PY2NDX, who had the honor of driving the ZX5J station to a first -place finish. He had some competition from LP2F, operated by Sebastian, LU4FPZ. Jorge, HK1KYR, another of the DX Colombia operators, was third. The top USA score was made by Eric, NM5M, operating as NR5M. If that sounds like déjà vu, go back and read the 20-meter paragraph above! Chasing Eric was Mark, W4SVO. In Europe it was Vlada, YU1KX, who took the win over Remi, LY8O. Once again it was advantage south over north with the disturbed conditions. The top low power score was achieved by 17-year-old Alex, YO8TOH, operating from the YR8B club station.

Juan, LU1HF, dominated everyone on 10 meters. His score of 2.2-million points was more than double anyone else! Two Europeans battled for second place. Sasa, 9A3NM, operated 9A1CCY ahead of Marko, YT2T. Third place was David, HK1A, another single band operation from the new DX Columbia club station. Bob, N4BP, operated WN1GIV to first place in the USA. The world winner on low power was Matija, 9A3VM.

Single Operator QRP

There were 236 entries in the single operator QRP category. The top all-band score was TM77M, operated by Laurent, F5MUX. His 1501 QSOs was impressive given the conditions. The next three scores were all from the Czech Republic. Miroslav,

WORLD TOP SCORES

SINGLE OPERATOR HIGH POWER ALL BAND

EF8M (RZ3AZ)	18,395,154
PJ4A (K4BAI)	14,688,993
4LØA (UUØJM)	10,564,020
VY2ZM (K1ZM)	10,232,376
TC4X (OH2PM)	8,965,635

28 MHz

LU1HF	2,211,832
9A1CCY (9A3NM)	978,924
YT2T	908,600

21 MHz

ZX5J (PY2NDX)	6,673,540
LP2F (LU4FPZ)	5,140,625
HK1KYR	3,828,006

14 MHz

CT1JLZ (OK1RF)	4,875,330
UP2L (UA9BA)	4,707,755
HK1X	4,667,505

7 MHz

3V8CB (YT3W)	10,758,020
FM5BH	6,030,288
ZC4LI	4,770,336

3.5 MHz

E71A	1,659,024
F2DX	1,433,964
SP3GEM (SP3HLM)	1,256,000

1.8 MHz

YO5AJR	128,752
LY2OU	95,570
OG4T	52,471

SINGLE OPERATOR LOW POWER ALL BAND

*P49Y (AE6Y)	8,644,584
*PS2T (PY2NY)	5,296,600
*YN2GY (K9GY)	5,127,936
*KH7B	4,433,494
*TI5N (OHØXX)	3,997,952

28 MHz

*9A3VM	429,450
*PY2MTS	321,180
*YO8AXP	318,801

21 MHz

*YR8B (YO8TOH)	816,945
*HG6ØVOTT (HA3UU)	695,956
*OL2N (OK1FDR)	470,984

14 MHz

*SP4JCQ	1,065,285
*HG4F	1,014,072
*SN2K (SP2FWC)	671,316

7 MHz

*S57DX	2,056,256
*S51F	1,930,480
*ER6A	1,725,584

3.5 MHz

*UA2FL	711,350
*OM3ZWA	602,160
*LY2GW	487,976

1.8 MHz

*YT4A	151,646
*UX5NO	115,978
*OK6Y (OK2PTZ)	110,544

SINGLE OPERATOR QRP ALL BAND

TM77M (F5MUX)	1,951,964
OK1DVM	1,756,188
OK2BYW	1,369,887
OK7CM	1,297,322
TM3T (F5VBT)	808,152

28 MHz

YO8DDP	135,182
4X1VF	67,952
LZ1MG	48,151

21 MHz

HG3IPA (HA3JB)	249,568
CX2AQ	145,848
RZ6HX	117,660

14 MHz

IØUZF	410,130
UA6LCJ	223,431
HA6IAM	215,376

7 MHz

DL1DQY	469,800
YU1WC	400,510
S57T	229,356

3.5 MHz

LY5G	327,285
OK1FKD	192,468
SP4GL	155,877

1.8 MHz

HA8BE	59,343
LY4BF	17,372
DJ3GE	612

SINGLE OPERATOR ASSISTED HIGH POWER ALL BAND

KP2M (K3TEJ)	8,679,960
UA9PC	8,657,730
ERØWW (UT5UDX)	8,078,556
TC7M (RW3GU)	7,524,468
LZ8E (LZ2BE)	6,903,472

28 MHz

II7M (IK7JWY)	576,650
IT9VDQ	529,686
S53O	522,309

21 MHz

IT9BLB	1,489,644
IQ2CJ (IK2PFL)	1,194,248
OL8R	1,005,024

14 MHz

4L8A	3,962,794
R7LV	3,554,109
IR2C (IK2JUB)	2,790,264

7 MHz

YU1LA	4,406,565
UT5UGR	3,398,725
UP7A (UN7AL)	3,219,984

3.5 MHz

LY7M	1,043,289
EU1UN	988,097
II1H (I1HJT)	910,860

1.8 MHz

LY2IJ	333,402
OL7M (OK1CW)	284,598
YR5N (YO5PBF)	112,308

SINGLE OPERATOR ASSISTED LOW POWER ALL BAND

*RG9A (UA9AM)	4,380,350
*UA9SP	3,031,938
*YT3M (YU1YV)	2,947,680
*LU5FF	2,307,497
*RN4WA	2,095,712

28 MHz

*UR2VA	173,121
*UR5LO	169,443
*UA6AK	148,608

21 MHz

*UU1AZ	1,082,640
*RC8I (RZ9HG)	539,392
*UK8AR	460,360

14 MHz

*S53F	1,198,891
*PY7ZY	819,624
*YT2AAA	587,010

7 MHz

*M5E (GØCKV)	1,621,069
*OK1UG	811,632
*EU1AZ	719,468

3.5 MHz

*LY3CW	399,500
*SP6EIY	327,816
*UT3L	232,200

1.8 MHz

*YO2AQB	7,808
*IC8POF	1,914

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

TC4X (OH2PM)	8,965,635
S53MM	4,722,668
S5ØC (S53CC)	4,171,825
IKØYVV	3,769,880
M9X (G4MKP)	3,258,405

28 MHz

9A2U (9A3ZA)	482,664
WN1GIV/4 (N4BP)	320,306
OH3BU	289,161

21 MHz

EA5FID	641,538
UN4PG	599,148
OI6X (OH6NJ)	333,000

14 MHz

C4M	2,777,625
EU1FC	1,209,663
OR2A (ON7YX)	840,155

7 MHz

ZC4LI	4,770,336
LU5OM	700,494
YU2A	551,688

3.5 MHz

HA3LI	789,360

1.8 MHz

DD9WG	30,120

TRIBANDER/SINGLE ELEMENT LOW POWER ALL BAND

*UA9SP	3,031,938
*TK/S59AA (S59AA)	2,424,200
*LU5FF	2,307,497
*OM5X (OM5XX)	1,888,020
*CE3AA (XQ4CW)	1,771,761

28 MHz

*UT8EU	179,655
*UA3QG	168,128
*RU3PU	34,020

21 MHz

*DH8BQA	301,824
*UA3ABJ	234,432
*WA7LNW	115,291

14 MHz

*S54A	613,725
*Z35F	419,133
*UA1AFT	382,630

7 MHz

*M5E (GØCKV)	1,621,069
*IV3NVN	852,093
*EU1AZ	719,468

3.5 MHz

*SN5Q (SQ5RDX)	300,196
*AB1J	48,000
*W8AEF/7	44,250

1.8 MHz

*YT4A	151,646

ROOKIE HIGH POWER ALL BAND

PY2LSM	173,124

21 MHz

IT9IMJ	13,578

ROOKIE LOW POWER ALL BAND

*OF5ØRR (OH8FKU)	686,070
*OH7FKV	558,999
*K2DSL	67,500
*AF6EV	59,840
*RN3DKE	55,596

28 MHz

*SQ5STS	2,604
*EA4FLY	2,356

21 MHz

*PU8TEP	28,531
*RA3MAV	19,376
*JO3RCK	1,404

14 MHz

*SV2HWR	336,259
*UR5EFL	60,610
*BG4FFM	17,766

7 MHz

*UW1WU	336,922
*F4FEP	5,382

MULTI-OPERATOR SINGLE-TRANSMITTER

P33W	18,656,465
C4N	12,092,345
RK9CWA	10,729,320
RT4F	9,460,550
LS1D	8,950,139

MULTI-OPERATOR TWO-TRANSMITTER

C4I	23,491,776
PW7T	20,892,576
PJ2T	18,044,546
K1LZ	14,081,100
OM7M	12,611,960

MULTI-OPERATOR MULTI-TRANSMITTER

CQ3L	28,736,154
ZW5B	25,207,253
LZ9W	19,955,741
DR1A	19,565,450
RW2F	16,508,788

USA TOP SCORES

SINGLE OPERATOR HIGH POWER ALL BAND
KC3R (LZ4AX).....6,532,302
AA3B.....5,532,196
AJ1I (K8PO).....5,517,941
WC1M.....5,361,419
K3ZO.....3,964,797

28 MHz
WN1GIV/4 (N4BP).....320,306
K5DU.....150,894
AB7E.....35,483

21 MHz
NR5M (NM5M).....713,094
W4SVO.....602,490
K8IA/7.....323,360

14 MHz
NN1N.....2,216,760
NM5M (K5GA).....2,014,517
KT3M.....1,548,063

7 MHz
NG5A (N1XS).....474,897
WØEWD.....431,208
AB9H.....400,327

3.5 MHz
W5MJ (W5MJ@W5PR).....65,567

1.8 MHz
KT2Z/5 (K5NA).....28,676
KQ8M.....12,728

SINGLE OPERATOR LOW POWER ALL BAND
*NN5J (N5DX).....2,626,140
*W3EF.....2,437,827
*NV1N (N1UR).....2,062,368
*WJ9B/4.....1,897,920
*KS9K (N4TZ).....1,474,998

28 MHz
*KN4Y.....28,350
*NA4W (K4WI).....21,109
*N9TF.....2,331

21 MHz
*WB4TDH.....124,509
*K8AJS.....61,770
*WA7NWL.....7,504

14 MHz
*KM6Z.....157,530
*NJ3K.....130,255
*W2AW (N2GM).....128,594

7 MHz
*W2EG.....841,759
*K9UIY.....216,500
*KZ3M.....209,729

3.5 MHz
*AB1J.....48,000
*ACØDS.....35,250
*WB8JUI.....18,382

1.8 MHz
*K4WI.....351

SINGLE OPERATOR QRP ALL BAND
N7IR.....403,170
W4QO.....400,830
W6QU/Ø (W8QZA).....352,401
N5DO.....293,728
AA1CA.....270,458

28 MHz
W5GAI.....32,250
AB8FJ.....156
N1VVV.....80

21 MHz
WA6FGV.....22,032
N6WG.....14,952

14 MHz
N8HP.....59,168
W7JI/Ø.....46,359
NT2DR.....18,600

7 MHz
NE6M.....50,673
K3TW.....32,700
N2JNZ.....15,824

SINGLE OPERATOR ASSISTED HIGH POWER ALL BAND
WU3A/1.....4,139,520
K3WW.....3,769,519
WK1Q (K1MK).....3,147,290
NS1S/4 (K1ZZI).....2,492,952
W5MX/4.....2,271,132

21 MHz
WZ7ZR (W7ZR).....158,063

14 MHz
KØLUZ/4.....1,363,716
N2MM.....1,233,940
WO4O.....1,100,840

7 MHz
N3GJ.....9,840

3.5 MHz
W4PK.....177,946

SINGLE OPERATOR ASSISTED LOW POWER ALL BAND
*W1FA.....423,108
*AA4LR.....421,935
*NV4B.....288,090
*NØSXX.....274,596
*N3CZ/4.....268,920

28 MHz
*ND6S.....1,677
*WD4DDU.....322

21 MHz
*WA7LNW.....115,291

14 MHz
*NW4V.....125,255
*WB2AA.....96,555
*K7FA.....43,492

7 MHz
*N4NX.....298,480
*N7MAL.....81,065
*KN6VVH/7 (W6NF).....27,700

3.5 MHz
*W8AEF/7.....44,250

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND
NXØX/4 (N4PN).....3,086,655
AB3CX/2.....2,067,440
N1WR/3.....1,736,640
KR4F.....1,404,718
K3MD.....1,389,584

28 MHz
WN1GIV/4 (N4BP).....320,306
AB7E.....35,483

21 MHz
WZ7ZR (W7ZR).....158,063
N4NM.....16,376

14 MHz
W4CU.....440,360
W6AEA/7.....310,500
NQ5D (K5NZ).....280,908

7 MHz
K4XD.....10,335

TRIBANDER/SINGLE ELEMENT LOW POWER ALL BAND
*NA4K.....1,247,076
*KV8Q.....798,391
*KW2G/1 (W1WBB).....795,476
*KZ9O (KB9OWD).....646,815
*K2PO/7.....562,650

28 MHz
*N9TF.....2,331
*W5KI.....15

21 MHz
*WA7LNW.....115,291
*WA7NWL.....7,504
*W4JHC/5.....3

14 MHz
*NW4V.....125,255
*K7FA.....43,492
*NI5L/7.....31,624

7 MHz
*KS5A/7.....182,206
*KØPK.....84,796
*N7MAL.....81,065

3.5 MHz
*AB1J.....48,000
*W8AEF/7.....44,250
*WW1M.....3,395

ROOKIE LOW POWER ALL BAND
*K2DSL.....67,500
*AF6EV.....59,840
*K6MEE.....28,980
*KF7ADB/4.....19,929
*WI4R.....13,050

MULTI-OPERATOR SINGLE-TRANSMITTER
NY4A.....5,841,118
NJ4M.....4,844,296
KX7M/6.....3,975,669
NG7M.....2,391,264
W7VJ.....1,918,080

MULTI-OPERATOR TWO-TRANSMITTER
K1LZ.....14,081,100
KD4D/3.....11,223,000
NY6N.....6,573,159
WX3B.....5,128,932
ND2T/6.....5,079,270

MULTI-OPERATOR MULTI-TRANSMITTER
KM3T/1.....14,733,230
NQ4I.....10,921,286
NR4M.....10,876,056
NR6O.....5,612,130
NI6T.....1,885,520

OK1DVM, took the win over fellow countrymen Milan, OK2BYW, and Antonin, OK7CM. Gary, N7IR, took first place in the USA and tenth place overall. Jim, W4QO, finished just 2k points behind Gary.

Arsene, YO8DDP, had an excellent score to finish well ahead of the competition on 10 meters. Gab, HA3JB, operated from the International Police Association club station HG3IPA, to win 15 meters. Twenty meters was led by Francesco, IØUZF. The highest QRP single band score was on 40 meters by Klaus, DL1DQY, who faced strong competition from Vladimir, YU1WC. The biggest score on 80 meters by far was from Vitas, LY5G. Bela, HA8BE, did an amazing job to make 196 contacts in winning 160 meters

Single-Operator Assisted

If you operated the contest and used any help other than your own two ears to find and work stations, then you must be in the Assisted category. It's a fun category that is enjoyed by casual participants chasing new countries or prefixes, as well as serious competitors who want extra information about what is happening on the bands. The High Power All Band category was a very close race with John, K3TEJ, at KP2M finishing only 20k points ahead of Anatoly, UA9PC. Sergey, UT5UDX, visited ERØWW for third place. It was Gene, WU3A, who backed up his USA win on SSB with one on CW.

The Low Power All Band category was a race between two Asiatic Russians. Yuri, UA9AM, used his RG9A contest call to set a new world record for the category and finish ahead of Yuri, UA9SP. YT3M, operated by Acim, YU1YV, was the top European score in third place overall. Less than 2000 points separated the top two USA scores. Kirk, W1FA, just got by Bill, AA4LR.

Serge, UR2VA, bested fellow countryman Alex, UR5LO, on 10 meters. Dmytro, UU1AZ, set a new world record in winning 15 meters. Vinko, S53F, took the 20 meter title. Cicero, PY7ZY, set a new South American record, finishing second. Forty meters was dominated by Olof, GØCKV, operating as M5E. Alozyas, LY3CW, was the champion on 80 meters. Bill, N4NX, set a new USA record on 40 meters and Paul, W8AEF, did the same on 80 meters.

Overlay Categories

The overlay categories were made available to all single operator entrants this year, and 601 operators took advantage of the opportunity to compete in these separate contests-within-a-contest. For the overlay categories, we combine all entries into high or low power. Winner of the Tribander/Single Element category for high power was Pertti, OH2PM, at TC4X. Matija, S53MM, took second just

Logging Accuracy

We received a record 3567 logs for the WPX CW contest this year. The poor conditions resulted in a 10% decline in total QSOs to 2,080,844. The log-checking process continues to improve and we were able to cross check 82.5% of all QSOs against another log. It is interesting to note that 58.4% of the unique calls (calls worked by only one station) were found to be errors. Since a broken callsign loses the contact plus a penalty of additional QSO points, it pays to get the calls correct.

It is not always easy for the operators who activate unusual prefixes, as many people do struggle copying their call. The callsigns that caused the most logging errors were LZ65P, OL26LP, and PA44N. Petr, OK1CZ, was the operator at OL26LP and offered this advice: "Do not use a two-figure prefix ending with number 4 or 6, as this can be copied as V or B." Even well-known contest calls such as HG1S and ES9C were often copied incorrectly.

Even with the deep log checking, there were still 143 stations that produced logs with no score reductions. The top "golden" logs (with number of QSOs) were: WT5R (369), RU3VV (222), RA3BT (184), OZ5UR (175), RK6ASY (173), and RAØAY (173).

The average score reduction for all single operator entries was 12.9%. For the top 20 Single Operator All Band scores, the average reduction was 5.8%. Detailed log-checking reports are available for every submitted log and may be requested by sending an e-mail to <k5zd@cqwpx.com>.

Universal Radio — Quality equipment since 1942.

YAESU FTM-350AR

The **Yaesu FTM-350AR** dual band mobile transceiver provides a full 50 watts of reliable power on both 2 meters and 440. It has two separate receivers with dual speakers on the rear of the control head. On the left receiver enjoy the AM, FM and stereo FM broadcast bands with extended receive: 0.5-1.7, 76-108, 108-250, 300-1000 MHz (less cellular). The right receiver covers 108-250, 300-1000 MHz (less cellular). There is a total of 1000 channel memories plus 9 DTMF memories. The radio even has stereo line inputs. This radio is APRS® compatible with optional FGPS-1 GPS unit. The front panel is easily remoteable with supplied cable. This latest **"A"** version adds: GPS standard format NMEA ready, way point data out, new MMB-98 vacuum bracket, APRS® will operate in the background, on single band, additional voice alert function, reallocated keys for easier operation, ability to program direct APRS® onto programmable key on the DTMF microphone.

YAESU VR-5000

The **Yaesu VR-5000** provides sophisticated wideband reception. Coverage is from 100 kHz to 2600 MHz (2.6 GHz) less cellular, in AM, FM-N, FM-W, LSB, USB and CW. This radio features a real-time bandscope that can display: 0.1, 0.2, 0.3, 0.5, 1.0, 2.0, 2.5, 5.0 or 10.0 MHz of spectrum and you get 2000 alphanumeric memories grouped into 100 banks. Optional aids such as a DSP unit and digital voice recorder are available. Jacks on the back panel include: mute, 13.8 VDC input, external speaker, 10.7 MHz IF output, antenna input A (SO-239 50 ohm) & B (Hi Z 450 ohm), CAT interface jack (4800/9600/57600 bps). The VR-5000 comes with the PA28B 117 VAC adapter and a DC power cord. This radio is only 7.1 x 2.75 x 8 inches 4.2 Lbs.

Please visit **www.universal-radio.com** for specifications, color photos, accessories and price.

YAESU VX-8DR/GR

The **Yaesu VX-8DR** HT provides 5 watts FM on 50/144/430 MHz plus 1.5 watts on 222 MHz. It supports Blue Tooth hands-free operation with the optional BU-1 and BH-1A or BH-2A accessories. There is also an optional GPS unit and antenna with loads of features. This radio supports APRS® 1200/9600 bps data communication (B band only) and is WiRES compatible. In fact, this latest "D" version adds these APRS enhancements:

- ✔ Smart Beaconing™ Function,
- ✔ Station List memories raised from 40 to 50.
- ✔ APRS® Msg mems raised from 20 to 30.
- ✔ New DIGI-PATH route indication function.
- ✔ Heads up compass display.
- ✔ Msg LED flashing rate is selectable.
- ✔ DIGI-PATH route settings raised to 7.

The VX-8DR is submersible to IPX57 specs. A 7.4 V 1100 mAh Li-Ion battery is included. It supports simultaneous independent 2-signal dual receive function with both V+V or U+U. It has weather alert and a barometric sensor is included. The dot matrix LCD provides memory tags (to 16 characters). You even get a high-resolution spectrum analyzer with ±60 channels indication with wave monitoring of received/modulated signal! DCS and CTCSS encode/decode are standard. 2.36 x 3.74 x 0.92".

The **Yaesu VX-8GR** HT provides 5 watts FM on 144/430 MHz. Receive is 108-999 MHz in NFM/FM modes. Unlike the VX-8DR, this radio is not BlueTooth capable, does not have the SU-1 built in and is not submersible. It is however APRS capable (B band only) and even has a GPS built-in. Details at **www.RFfun.com**

YAESU

FREE Yaesu orange mug with FT-857D/897D.

FT-857D

The **Yaesu FT-857D** is the world's smallest HF/VHF/UHF multimode amateur transceiver covering 160 m to 70 cm with 100 watts on HF. Now with 60 meters and DSP2 built-in.

FT-897D

The **Yaesu FT-897D** is a multi-mode high-power base/mobile transceiver covering 160 m to 70 cm including 60 meters. Now with TCXO.

FREE Yaesu canvas urban case with FT-817ND.

FT-817ND

The **Yaesu FT-817ND** is an improved, deluxe version of the hugely popular FT-817. It includes 60 meter coverage plus the new high capacity FNB-85 battery. This radio has an excellent shortwave receiver built-in and is a fully self-contained, battery-powered, low power amateur MF/HF/VHF/UHF QRP transceiver.

universal radio inc.

Universal Radio, Inc.
6830 Americana Pkwy.
Reynoldsburg, Ohio
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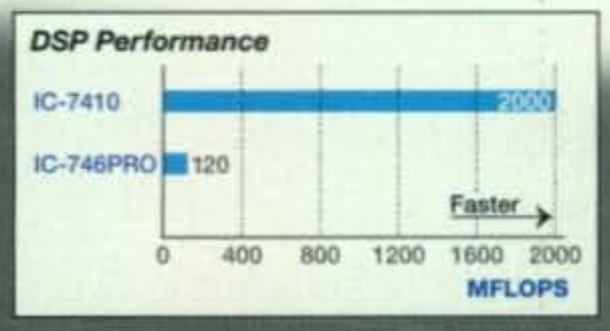
- Special offers are subject to change.
- Returns subject to a 15% restocking fee.
- Prices shown do not include shipping.

Bringing the latest in DSP technology

NEW IC-7410
HF/50MHz Transceiver

Icom continues to lead in high performance digital technology. The IC-7410 is a familiar-looking yet new HF/50MHz rig for everyday use that takes advantage of our digital know-how. A high grade DSP unit and double conversion super-heterodyne system developed for our higher grade IC-7800/7700/7600 series are used. In addition, the IC-7410 comes with a built-in 15kHz 1st IF Filter and can accept up to two optional filters (3kHz/6kHz). When used with these 1st IF Filters, narrow mode signals such as the CW and SSB modes are protected from adjacent strong signals. Experience the latest tech in your everyday use!



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

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

Features:

+30dBm 3rd Order Intercept Point (144MHz)

Double Conversion Superheterodyne System

32-bit Floating Point DSP Unit

Built-in 15kHz 1st IF Filter (Optional 3kHz/6kHz)

Large Monochrome LCD Display

±0.5ppm Frequency Stability

Built-in Simple Band Scope

Built-in Automatic Antenna Tuner

All Mode (SSB, CW, RTTY, AM, FM)

Optional RS-BA1 for IP Remote Control

Icom's HF Family

IC-7800
The Ultimate Rig

IC-7700
The Contester's Rig

IC-7600
The DX'ers Choice

to your everyday communications.

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

USB
Control and Audio

USB connector for PC control
A standard type B USB connector is located on the back panel. Use it to control your IC-7410 via PC.

IC-7200
The Rugged HF Rig

IC-718
The "Get-into-HF" Rig

IC-7000
The "Go Anywhere" Rig

30562

ICOM

ahead of Boris, S5ØC. On low power, it was Yuri, UA9SP, ahead of the Corsican camping expedition of Franc, TK/S59AA.

The Rookie category does not attract the same attention on CW as it does on SSB, but we were very pleased to have 32 entries. Mikko, OH8FKU, gave everyone a new prefix with the call OF5ØRR and finished ahead of Sebastian, OH7FKV. Keep an eye on these two in the future! David, K2DSL, just beat out last year's winner David, AF6EV, for the top USA score.

Multi-Operator

The winning Multi-Operator Single-Transmitter score was gained by P33W operated by RW4WR, RV1AW, and RA3AUU. They used a WRTC-style lockout system to maximize their score while only allowing one transmitted signal at a time. It was another Cyprus station, C4N, finishing in second. A seven-operator team drove RT4F to the top spot in Europe. Take a look at how close the scores were between LS1D, ES9C, and E7DX. In the USA, it was NY4A getting past NJ4M on the basis of a much higher points per QSO.

A four-operator team from Bulgaria visited C4I in Cyprus for first place in the Two-Transmitter category. The second-place team at PW7T employed CW Skimmer technology for the first time instead of traditional DX Cluster. There were only two ops covering the bands at third-place finisher PJ2T. K1LZ dominated the competition in the USA.

The Multi-Multi stations provide a reference point to show us what is truly possible across all bands. The team at CQ3L had the highest score in the contest and set a new record for Africa. It was a bit of a confusing callsign, as some people simply logged it as "3L." LZ9W and DR1A continued their friendly rivalry for top score in Europe. This year it was LZ9W winning the plaque. USA winner KM3T operated from the station of KC1XX and used the contest to test new logging software.

Club Competition

There were 151 clubs from around the world that met the requirement of three or more logs to be listed in the results. Once again, the highest club score came from the Bavarian Contest Club (BCC) in southern Germany. The Northern California Contest Club scored an impressive win over the 52 USA clubs that submitted three or more member logs.

Final Thoughts

We were saddened to hear the news that long-time WPX Award manager Norm Koch, WN5N (ex-K6ZDL), became a Silent Key in November 2010. Norm was CQ WPX Award Manager for nearly a quarter century, from December 1981 to August 2006. To honor his memory, Gail, K2RED, is sponsoring a new plaque for 2011 that is focused on Norm's interest in prefixes – Single-Operator Highest Combined SSB/CW Prefix Total. Please contact Doug, K1DG, if you have an interest in sponsoring a plaque for the WPX Contest.

There are a lot of people who work to help make the WPX contest such a success. Thanks to AL1G, DL8MBS, ES5JR, GØSYP, KØHB, K1PX, K2DSL, K8PO, N1XS, N5IE, N8RA, NJ1F, UA4FER, W2JU, W7ZR, and W8AEF for their help in typing in all of the paper logs. F6BEE maintains the club name database. Thanks to Barry, W5GN, for han-

EUROPE TOP SCORES

SINGLE OPERATOR HIGH POWER ALL BAND

CR6K (CT1ILT) 6,922,045
4O3A 6,493,360
UW2M (URØMC) 5,807,730
RS3A (RA3CW) 5,548,400
LZ3FN 5,353,144

28 MHz

9A1CCY (9A3NM) 978,924
YT2T 908,600
AO3T (EA3AKY) 601,145

21 MHz

YU1KX 1,420,710
LY8O 1,089,622
YL2SM 798,970

14 MHz

CT1JLZ (OK1RF) 4,875,330
S5ØK 2,704,130
S55T (S57AL) 2,525,910

7 MHz

YTØA (YT1CI) 4,036,702
OK1Z (OK1DKZ) 3,354,720
OK1FPS 2,568,660

3.5 MHz

E71A 1,659,024
F2DX 1,433,964
SP3GEM (SP3HLM) 1,256,000

1.8 MHz

YO5AJR 128,752
LY2OU 95,570
OG4T 52,471

SINGLE OPERATOR LOW POWER ALL BAND

*OL6P (OK2PP) 2,443,150
*TK/S59AA 2,424,200
*LZ9R (LZ3YY) 2,141,988
*DD5M (DJØZY) 1,830,045
*RM7M 1,849,907

28 MHz

*9A3VM 429,450
*YO8AXP 318,801
*EF5K (EA5DWS) 301,290

21 MHz

*YR8B (YO8TOH) 816,945
*HG6ØVOTT (HA3UU) 695,956
*OL2N (OK1FDR) 470,984

14 MHz

*SP4JCQ 1,065,285
*HG4F 1,014,072
*SN2K (SP2FWC) 671,316

7 MHz

*S57DX 2,056,256
*S51F 1,930,480
*ER6A 1,725,584

3.5 MHz

*UA2FL 711,350
*OM3ZWA 602,160
*LY2GW 487,976

1.8 MHz

*YT4A 151,646
*UX5NQ 115,978
*OK6Y (OK2PTZ) 110,544

SINGLE OPERATOR QRP ALL BAND

TM77M (F5MUX) 1,951,964
OK1DVM 1,756,188
OK2BYW 1,369,887
OK7CM 1,297,322
TM3T (F5VBT) 808,152

28 MHz

YO8DDP 135,182
LZ1MG 48,151
HA7VK 37,848

21 MHz

HG3IPA (HA3JB) 249,568
RZ6HX 117,660
SP4GFG 80,456

14 MHz

IØUZF 410,130
UA6LCJ 223,431
HA6IAM 215,376

7 MHz

DL1DQY 469,800
YU1WC 400,510
S57T 229,356

3.5 MHz

LY5G 327,285
OK1FKD 192,468
SP4GL 155,877

1.8 MHz

HA8BE 59,343
LY4BF 17,372
DJ3GE 612

SINGLE OPERATOR ASSISTED HIGH POWER ALL BAND

ERØWW (UT5UDX) 8,078,556
LZ8E (LZ2BE) 6,903,472
G6PZ (GIØRTN) 5,607,756
DL3TD 5,418,000
YQ9W (YO9GDN) 4,933,055

28 MHz

II7M (IK7JWY) 576,650
IT9VDQ 529,686
S53O 522,309

21 MHz

IT9BLB 1,489,644
IQ2CJ (IK2PFL) 1,194,248
OL8R 1,005,024

14 MHz

IR2C (IK2JUB) 2,790,264
OL3Z (OK1HMP) 2,278,748
YT4W (YU1DW) 2,194,943

7 MHz

YU1LA 4,406,565
UT5UGR 3,398,725
9A5MT 3,102,870

3.5 MHz

LY7M 1,043,289
EU1UN 988,097
II1H (I1HJT) 910,860

1.8 MHz

LY2IJ 333,402
OL7M (OK1CW) 284,598
YR5N (YO5PBF) 112,308

SINGLE OPERATOR ASSISTED LOW POWER ALL BAND

*YT3M (YU1YV) 2,947,680
*RN4WA 2,095,712
*OM5X (OM5XX) 1,888,020
*YQ5Q (YO5OHO) 1,558,540
*OK1TA 1,509,680

28 MHz

*UR2VA 173,121
*UR5LO 169,443
*UA6AK 148,608

21 MHz

*UU1AZ 1,082,640
*DH8BQA 301,824
*UA3AO 203,490

14 MHz

*S53F 1,198,891
*YT2AAA 587,010
*YU1R (YT1NP) 554,830

7 MHz

*M5E (GØCKV) 1,621,069
*OK1UG 811,632
*EU1AZ 719,468

3.5 MHz

*LY3CW 399,500
*SP6EIY 327,816
*UT3L 232,200

1.8 MHz

*YO2AQB 7,808
*IC8POF 1,914

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

S53MM 4,722,668
S5ØC (S53CC) 4,171,825
IKØYVV 3,769,880
M9X (G4MKP) 3,258,405
MJ/W1NN (W1NN) 2,973,225

28 MHz

9A2U (9A3ZA) 482,664
OH3BU 289,161
UA6AA 183,586

21 MHz

EA5FID 641,538
OI6X (OH6NJ) 333,000
G7N (GØORH) 292,600

14 MHz

EU1FC 1,209,663
OR2A (ON7YX) 840,155
UY7C (UR3CMA) 742,368

7 MHz

YU2A 551,688
G3MZV 425,568
UY2ZZ 229,152

3.5 MHz

HA3LI 789,360

1.8 MHz

DD9WG 30,120

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

*TK/S59AA 2,424,200
*OM5X (OM5XX) 1,888,020
*YO3APJ 1,615,768
*EF3A (EA3KU) 1,546,230
*OK1TA 1,509,680

28 MHz

*UT8EU 179,655
*UA3QG 168,128
*RU3PU 34,020

21 MHz

*DH8BQA 301,824
*UA3ABJ 234,432
*CT1BWW 97,812

14 MHz

*S54A 613,725
*Z35F 419,133
*UA1AFT 382,630

7 MHz

*M5E (GØCKV) 1,621,069
*IV3NVN 852,093
*EU1AZ 719,468

3.5 MHz

*SN5Q (SQ5RDX) 300,196
*PC6ØØP (PAØMIR) 11,323

1.8 MHz

*YT4A 151,646

ROOKIE ALL BAND

*OF5ØRR (OH8FKU) 686,070
*OH7FKV 558,999
*RN3DKE 55,596
*URØEG 23,808
*DO3QQ 11,139

28 MHz

*SQ5STS 2,604
*EA4FLY 2,356

21 MHz

*RA3MAV 19,376
IT9IMJ 13,578

14 MHz

*SV2HWR 336,259
*UR5EFL 60,610

7 MHz

*UW1WU 336,922
*F4FEP 5,382

MULTI-OPERATOR SINGLE-TRANSMITTER

RT4F 9,460,550
ES9C 8,946,126
E7DX 8,917,915
E73M 8,564,307
RU1A 8,331,312

MULTI-OPERATOR TWO-TRANSMITTER

OM7M 12,611,960
LX7I 11,283,975
DQ4W 10,803,466
DM9K 10,527,160
HG1S 10,033,401

MULTI-OPERATOR MULTI-TRANSMITTER

LZ9W 19,955,741
DR1A 19,565,450
RW2F 16,508,788
LY7A 9,729,286
OP4K 3,420,075

SSB & CW COMBINED CLUB SCORES

UNITED STATES

Club	Entries	Score
NORTHERN CALIFORNIA CONTEST CLUB	110	190,075,001
YANKEE CLIPPER CONTEST CLUB	85	151,862,440
POTOMAC VALLEY RADIO CLUB	101	145,303,572
SOUTH EAST CONTEST CLUB	37	71,880,356
FRANKFORD RADIO CLUB	42	67,718,641
SOCIETY OF MIDWEST CONTESTERS	77	60,293,481
FLORIDA CONTEST GROUP	54	56,496,877
SOUTHERN CALIFORNIA CONTEST CLUB	40	55,344,263
CENTRAL TEXAS DX AND CONTEST CLUB	35	34,262,712
WILLAMETTE VALLEY DX CLUB	35	32,732,770
TENNESSEE CONTEST GROUP	43	30,950,589
MAD RIVER RADIO CLUB	28	21,602,677
HUDSON VALLEY CONTESTERS AND DXERS	21	20,096,632
NORTH COAST CONTESTERS	9	19,892,831
WESTERN WASHINGTON DX CLUB	26	18,410,387
MINNESOTA WIRELESS ASSN	26	17,932,306
ALABAMA CONTEST GROUP	27	15,245,641
GRAND MESA CONTESTERS OF COLORADO	21	11,298,874
ARIZONA OUTLAWS CONTEST CLUB	66	9,852,537
NORTH TEXAS CONTEST CLUB	13	8,048,162
LOUISIANA CONTEST CLUB	13	7,786,625
SOUTHWEST OHIO DX ASSOCIATION	5	7,503,944
KANSAS CITY DX CLUB	12	7,106,155
EMPIRE CONTEST CLUB	4	5,982,375
SPOKANE DX ASSOCIATION	16	5,663,782
ORDER OF BOILED OWLS OF NEW YORK	8	2,574,901
CTRI CONTEST GROUP	9	2,568,294
ROCHESTER (NY) DX ASSN	12	1,748,342
NORTHEAST WISCONSIN DX ASSN	4	1,377,480
NORTHERN ARIZONA DX ASSN	5	1,342,363
IOWA DX AND CONTEST CLUB	4	1,317,492
CAROLINA DX ASSOCIATION	8	1,124,496
TEXAS DX SOCIETY	6	1,033,415
MISSOURI DX/CONTEST CLUB	4	945,639
BERGEN ARA	7	927,744
MOTHER LODE DX/CONTEST CLUB	6	912,670
ALLEGHENY VALLEY RADIO ASSOCIATION	4	900,602
UTAH DX ASSOCIATION	9	857,927
NORTHERN ROCKIES DX ASSOCIATION	3	840,677
PORTAGE COUNTY AMATEUR RADIO SERVICE	9	744,564
KENTUCKY CONTEST GROUP	5	643,405
STERLING PARK AMATEUR RADIO CLUB	5	583,372
MAGNOLIA DX ASSOCIATION	4	533,861
SKYVIEW RADIO SOCIETY	7	407,842
WESTERN NEW YORK DX ASSOCIATION	7	407,474
GREAT SOUTH BAY AMATEUR RADIO CLUB	4	279,936
WEST PARK RADIOPS	6	269,260
MERIDEN ARC	6	262,048
METRO DX CLUB	3	257,287
MIDLAND AMATEUR RADIO CLUB	4	256,126
DELAWARE LEHIGH AMATEUR RADIO CLUB	5	229,440
MISSISSIPPI VALLEY DX/CONTEST CLUB	4	172,669

DX

Club	Entries	Score
BAVARIAN CONTEST CLUB	197	289,001,968
RHEIN RUHR DX ASSOCIATION	150	234,973,333
ARAUCARIA DX GROUP	43	173,845,851
LU CONTEST GROUP	51	158,826,567
CONTEST CLUB ONTARIO	67	107,583,924
BLACK SEA CONTEST CLUB	76	100,909,181
SLOVENIA CONTEST CLUB	39	99,389,261
UKRAINIAN CONTEST CLUB	95	89,314,658
URAL CONTEST GROUP	39	81,963,094
LZ CONTEST TEAM	3	69,444,551
BOSNIA AND HERZEGOVINA CONTEST CLUB	13	61,151,552
CONTEST CLUB FINLAND	35	59,476,474
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	45	55,021,914
SP DX CLUB	74	51,466,052
HUNGARIAN DX CLUB	12	47,782,323
VYTAUTAS MAGNUS UNIVERSITY RADIO CLUB	13	44,120,975
RUSSIAN CONTEST CLUB*	30	43,098,221
CARIBBEAN CONTESTING CONSORTIUM*	3	38,658,165
CROATIAN CONTEST CLUB	35	38,580,958
VK CONTEST CLUB*	16	38,198,380
LATVIAN CONTEST CLUB	34	37,779,130
WEST SERBIA CONTEST CLUB	5	32,843,746
ALRS ST PETERSBURG	18	29,090,036
SKY CONTEST CLUB	8	24,663,522
BRITISH COLUMBIA DX CLUB	12	23,765,853
LES NOUVELLES DX	11	22,036,471
CANTAREIRA DX GROUP	17	20,274,696
LA CONTEST CLUB	9	19,445,456
YU CONTEST CLUB	18	19,239,437
UA2 CONTEST CLUB	7	18,123,689
LITHUANIAN CONTEST GROUP	13	17,731,478
BELARUS CONTEST CLUB	14	16,570,518
ARIPA DX TEAM	3	15,880,714
CE CONTEST GROUP	7	15,807,221
AUSTRIAN CONTEST CLUB	7	15,030,244
MARITIME CONTEST CLUB	18	14,984,644
RIO DX GROUP	28	14,568,799
DXCOLOMBIA AMATEUR RADIO CLUB	6	13,455,822
WORLD WIDE YOUNG CONTESTERS*	16	12,373,129
BELOKRANJEC CONTEST CLUB	7	12,057,787
YO DX CLUB	35	12,030,486
SOUTH URAL CONTEST CLUB	15	11,166,306
FOX CONTEST CLUB	8	10,608,470
CENTRAL SIBERIA DX CLUB	10	10,470,136
TARTU CONTEST TEAM	3	10,420,261
CONTEST GROUP DU QUEBEC	11	9,843,765
ATCC*	13	8,664,000
RADIOAMPT	3	8,620,145
ANTWERP CONTEST CLUB	4	8,604,404
CHILTERN DX CLUB	16	8,591,315
RADIO CLUB HENARES	5	8,323,224
GIPANIS CONTEST GROUP	11	7,742,853
MICHURINSK CONTEST GROUP	6	6,921,989
VRHNIKA CONTESTERS	15	6,269,682
GUARA DX GROUP	15	6,106,570
B1Z CLUB	3	5,864,614
CS PETROLUL PLOIESTI	5	5,480,911
BRIMHAM CONTEST GROUP	4	5,077,638
STAVROPOL REGION CONTEST CLUB	6	5,032,213
MOSCOW RADIO CLUB	8	4,058,091
CICEVAC CONTEST CLUB	3	3,767,299
SP CONTEST CLUB	7	3,757,106
BASHKORTOSTAN DX CLUB	10	3,602,473
TEMIRTAU CONTEST CLUB	7	3,591,541
NICOSIA CONTEST GROUP	3	3,581,957
CSM CRAIOVA	4	3,413,834
TOP OF EUROPE CONTESTERS	8	3,252,700
GRUPO DXXE	7	3,244,847
SIAM DX GROUP	6	3,218,297
SAMARA RADIO CLUB	5	3,061,397
SK7OA SWEDISH SOUTHCOAST RADIOAMATEUR SOCIETY	6	3,014,038
DOMODEDOVO	4	2,897,578
CSTA BUCURESTI	4	2,844,514
RADIO CLUB PARMA	6	2,788,596
LYNX DX GROUP	3	2,623,500
ORENBURG CONTEST CLUB	4	2,562,335
FOSHAN AMATEUR RADIO CLUB	3	2,546,717
ARCK	10	2,546,475
LOMA DEL TORO CONTEST CLUB	3	2,459,641
BALATON RADIOAMATEUR DX CLUB	3	2,296,620
VERENIGING VAN RADIO ZEND AMATEURS	4	2,268,915
IRKUTSK RADIO CLUB	3	2,036,952
SARATOVSKAYA OBLAST RADIO CLUB	5	1,995,282
YAROSLAVL CONTEST CLUB	6	1,827,414
BALKAN CONTEST CLUB	3	1,636,587
ARKTIKA	6	1,613,265
DANISH DX GROUP	5	1,602,810
SK6AW HISINGENS RADIOKLUBB	3	1,543,492
RU-QRP CLUB	14	1,518,719
KKKK CONTEST CLUB KRASNODARSKOGO KRAYA	3	1,499,020
FRO-NORRTELJE	5	1,405,293
RADIOCLUBUL RADU BRATU	3	1,385,200
ARGO	6	1,296,052
DONBASS	9	1,292,275
SK7DX SOUTHWEST SCANIA RADIOAMATEURS CLUB	8	1,289,157
INSUBRIA RADIO CLUB	4	1,249,705
ROSTOV RADIO CLUB	3	1,226,365
AGB ACTIVITY GROUP OF BELARUS*	3	1,210,036
599 CONTEST CLUB	7	1,205,955
NANAIMO AMATEUR RADIO ASSOCIATION	3	1,196,734
MAYCOPSKIJ RADIO CLUB	5	1,189,774
SK5AA VASTERAS RADIOKLUBB	5	1,130,514
VU CONTEST GROUP	10	1,007,053
VOLYN CONTEST GROUP	4	993,355
ZENIT-RADIO	3	958,691
DNEPR CONTEST GROUP	5	950,342
UKRAINIAN DX CLUB	3	930,394
GERMAN DX FOUNDATION	4	910,628
VLADIMIR RADIO CLUB	10	879,991
SASKATCHEWAN CONTEST CLUB	4	846,877
OBNINSK QRU CLUB	5	842,839
SPEKTR	3	789,532
CZECH CONTEST CLUB	4	750,741
NOR NIZHEGORODSKOE AMATEUR RADIO COMMUNITY	3	699,425
UPPSALA RADIOKLUB	3	698,637
CSR ISTRITA BUZAU	3	618,544
MARCONI CONTEST CLUB	3	582,594
NOVOSIBIRSK CONTEST CLUB	3	567,252
NOVOKUZNETSK RADIO CLUB	7	545,303
RTTY CONTESTERS OF JAPAN	4	525,247
OK QRP KLUB	3	518,948
SHAKHAN CONTEST CLUB	5	496,330
FALKOPINGS RADIOCLUB	7	474,573
IZMAIL RADIO CLUB	4	471,340
HAROS RADIO CLUB	4	469,061
ARA AMIGOS RADIO ALTOARAGON	3	440,582
BEIJING SUNNY HAM CLUB	4	414,182
VORONEZH RADIO CLUB	3	396,926
UNION FRANCAISE DES TELEGRAPHISTES	3	378,162
PALATUL COPIILOR SI ELEVILOR ORADEA	4	336,659
GRIMSBY AMATEUR RADIO SOCIETY	3	318,032
SPORT CLUB MIERCUREA-CIUC	3	304,516
HONDA R AND D HAM CLUB TOCHIGI	3	302,553
ACTIVITY SMOLENSK GROUP	3	296,352
RADIOCLUBUL NOSTRU DIN CONSTANTA	3	263,805
PODOLSK	6	260,524
RADIO AMATEUR ASSOCIATION OF WESTERN GREECE	3	219,437
BITTERN DX GROUP	3	212,330
EDIT14	3	196,632
CSM BAIA MARE	3	184,353
GRUPO ARGENTINO DE CW	3	162,351
DL-DX RTTY CONTEST GROUP	3	144,220
GMDX GROUP	3	141,219
KALININGRAD RADIO CLUB	5	138,496
CWJF GROUP*	4	135,420
WATERLAND	5	135,090
CS SILVER FOX DEVA	3	134,982
WAIKIKI AMATEUR RADIO CLUB	3	83,996
KRIVBASS	3	82,723
KRISTIANSTADS RADIOAMATORER	3	50,360
TURKISH SPECIAL WIRELESS ACTIVITY TEAM	3	30,163

** Club entry does not meet all rules.*

dling the printing and mailing of over 1400 certificates. K1DG does a great job with the 63 different award plaques that are available. Thanks to Ken, K1EA, for continuing improvements in the log-checking software. We also appreciate the efforts of the CQ WW Contest Committee for their development of new log-checking methods.

For expanded results of the contest, including the QRM, operators of multi stations, and the full tables, go to the CQ website (www.cq-amateur-radio.com).

The 2011 WPX CW Contest will be held on May 28 and 29. There are some small rule changes for the 2011 contest, so please read the rules very carefully (in the February issue of *CQ* magazine, on the *CQ* website , and on the WPX Contest website. Visit the frequently asked questions page on the CQ WPX Contest website (**www.cqwpx.com**). Please submit your WPX CW logs by e-mail to **<cw@cqwpx.com>** before June 27, 2011.

See you in the next contest!

73, Randy, K5ZD

(Continued on page105)

CQ WW WPX CW CONTEST
ALL-TIME RECORDS

The contest is held each year on the last full weekend of May. The All-Time Records are updated and published annually. Data shown below is: callsign, year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS
Single Operator

1.8	IH9/OL5Y('98)	341,068	182
3.5	TM5Y ('08)	1,983,366	567
7.0	3V8CB('10)	10,758,020	805
14	UP2L('09)	7,928,886	1043
21	ZX5J('05)	7,061,000	920
28	ZX5J ('02	6,787,440	857
AB	EF8M('10)	18,395,154	1026
Assisted	CN3A('09)	12,900,240	943

Multi-Operator Single Transmitter

CT9M('08)		24,125,802	1182

Multi-Operator Two Transmitters

EF8M('07)		33,324,192	1256

Multi-Operator Multi-Transmitter

HC8N('99)		54,697,072	1264

U.S.A. RECORD HOLDERS
Single Operator

1.8	K1ZM('95)	40,446	107
3.5	W3BGN('08)	641,092	332
7.0	KG1D('05)	3,594,822	651
14	N2NC('06)	5,418,630	915
21	NU5A('99)	4,411,299	789
28	WW4M('01)	2,547,046	674
AB	KC3R('09)	9,597,400	806
Assisted	K3WW('04)	5,997,446	806

Multi-Operator Single Transmitter

K1LZ('09)		10,691,724	964

Multi-Operator Two Transmitters

KM4M('04)		16,283,745	1095

Multi-Operator Multi-Transmitter

WE3C('09)		21,910,252	1274

CLUB RECORD
Northern Calif. Contest Club('02).....253,543,497

WPX (Prefix) RECORD
DR1A('08).....1313

QRP/p RECORD
P4ØW('97).....4,018,208

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	IH9/OL5Y('98)	341,068	182
3.5	7XØRY ('08)	1,701,260	407
7.0	3V8CB('10)	10,758,020	805
14	6W1SJ('09)	6,755,364	924
21	5X1Z('01)	6,362,352	782
28	ZS4TX('01)	4,602,028	722
AB	EF8M('10)	18,395,154	1026

ASIA

1.8	4X4NJ('96)	259,420	170
3.5	TAØ/Z33F('02)	1,452,552	348
7.0	ZC4LI('10)	4,770,336	632
14	UP2L('09)	7,928,886	1043
21	A45XR('99)	6,557,697	843
28	HZ1AB('02)	3,669,994	659
AB	4LØA('09)	12,560,363	967

EUROPE

1.8	SN7Q('08)	339,542	307
3.5	TM5Y('08)	1,983,366	567
7.0	CT1JLZ('09)	6,075,936	816
14	4O3T('06)	5,313,554	986
21	9HØA('02)	5,389,008	933
28	9HØA('01)	3,965,315	841
AB	CU2X('09)	10,208,016	1066

NORTH AMERICA

1.8	VA1A('99)	103,680	120
3.5	FM5BH('97)	833,490	315
7.0	V26BA('97)	6,227,550	659
14	N2NC('06)	5,418,630	915
21	ZF1A('99)	5,330,129	799
28	FM5GU('01)	2,849,769	621
AB	VY2TT('09)	12,878,826	1054

OCEANIA

1.8	KH6ND('07)	22,100	50
3.5	KH6ND('09)	596,673	231
7.0	ZM3A('09)	6,437,695	737
14	KH6ND('03)	4,126,690	730
21	KH6ND('99)	6,107,256	813
28	KH6ND('00)	1,523,008	424
AB	KH7XS('09)	9,124,899	879

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	LU1IV('97)	7,671,456	702
14	HK1X('10)	4,667,505	815
21	ZX5J('05)	7,061,000	920
28	ZX5J('02)	6,787,440	857
AB	P4A('10)	14,688,993	957

MULTI-OPERATOR SINGLE TRANSMITTER

AF	CT9M('08)	24,125,802	1182
AS	P33W('08)	21,314,175	1145
EU	RU1A('09)	13,838,256	1236
NA	8P4A('02)	18,516,960	1056
OC	AH2R('01)	11,541,420	957
SA	P49V('01)	19,760,744	1034

MULTI-OPERATOR TWO TRANSMITTER

AF	EF8M('07)	33,324,192	1256
AS	C4I ('09)	14,632,800	1005
EU	ES9C('08)	18,557,028	1266
NA	6Y1V('08)	20,507,972	1108
OC	ZL6QH('05)	13,312,768	952
SA	HC8N ('03)	30,928,268	1187

MULTI-OPERATOR MULTI-TRANSMITTER

AF	CQ3L('10)	28,736,154	1173
AS	A61AJ('02)	42,766,232	1244
EU	DR1A('08)	24,285,248	1313
NA	6Y2A('02)	38,821,328	1274
OC	ZL6QH('04)	16,143,840	1010
SA	HC8N('99)	54,697,072	1264

QRPp

AF	5Y4FO('92)	649,057	311
AS	ZC4BS('02)	2,515,388	521
EU	LY5A('01)	2,331,414	646
NA	TI5X('01)	2,568,470	615
OC	FO8JP('86)	572,131	259
SA	P4ØW('97)	4,018,208	632

math's notes

BY IRWIN MATH,* WA2NDM

Potpourri

This month we would like to cover a few topics we have been specifically asked for from our various readers. Hopefully these will "ring a bell" with others of you as well.

The first is a way to produce a switch system where two push buttons can produce a latched output, kind of like many industrial controls. For example, pushing an "ON" button will turn a circuit on, and pushing an "OFF" button will turn it off. This is basically a latching relay and the implementation could not be easier. Referring to fig. 1, the "ON" button is a normally open push button. When it is pushed, it connects DC directly to the relay coil. The relay then pulls in and latches itself through the normally open contacts. DC is then available from the same contact for the rest of the circuit. If a multi-contact relay is employed, the other contacts can be used for other functions. To turn off (or "delatch") the relay, simply push the "OFF" button. This breaks the circuit to the relay and it drops out. This scheme can be extended to whatever voltage you have available, including, I might add, AC. Of course, if you do so, you will need an AC relay.

A variation of the above power switch is one where the push of a button energizes a circuit which then turns itself off after a predetermined time interval. Such a circuit, shown in fig. 2, is very handy for portable battery-powered equipment, particularly those that you might normally forget to turn off. In operation, Q1 is biased on by means of R1, but the relay does not pull in because S1 is open and Q2 is cut off so there is no complete circuit. Pressing S1 forces the relay to close and its contacts latch it on. At the same time Vcc is applied to R2. Now C1 slowly charges until its voltage reaches the conduction point of the sum of the diode and base drops of Q2, roughly 1.5 volts. Once this point is reached, Q2 conducts, shorting the base of Q1, which causes Q1 to turn off, dropping out the relay. The time duration is a function of the values of R2 and C1 as well as the drop of D1 and the base of the transistor. Adding additional diodes in series with D1 can lengthen the time interval, as can experimenting with the values of R2 and C1. We have successfully used this circuit for time intervals of a couple of minutes. If the circuit "times out" too quickly, simply push S1 again.

Occasionally, we are asked how to simply implement a balanced or unbalanced audio input without exotic circuitry, usually to add to an existing product. Fig. 3 is a very simple approach. T1 is a 1:1 audio transformer. If you use the windings alone, you have a balanced input. If you ground one side of a winding, you have an unbalanced

*c/o CQ magazine

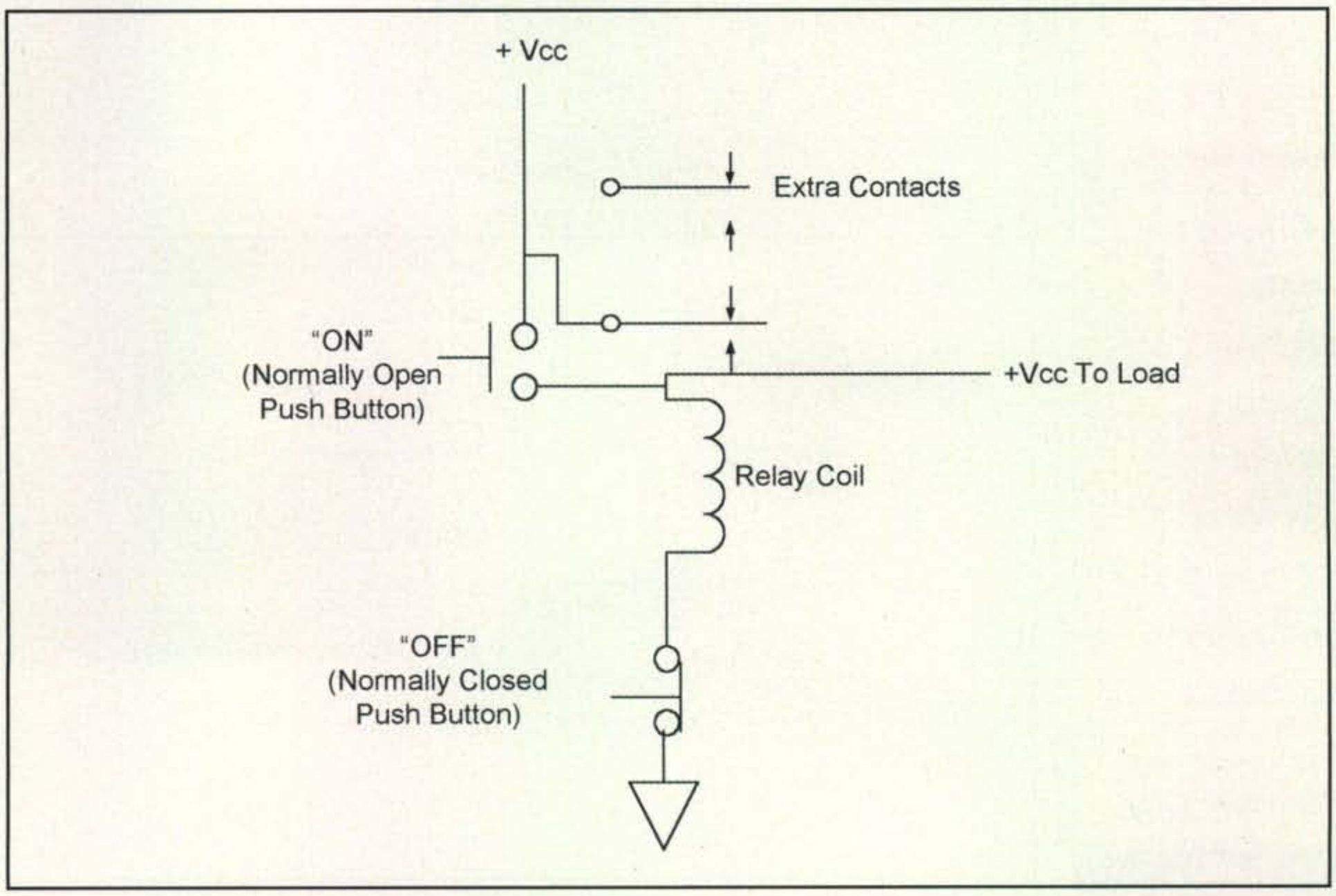


Fig. 1– Latching relay circuit described in the text.

input. It could not be simpler. The impedance of the transformer should be chosen for the particular application. For a line-level audio system, 600-ohm transformers would be ideal. Mouser Electronics has a range of low-cost audio transformers that would be suitable for this application, and a quick visit to its website (www.mouser.com) should enable you to find what you need fairly quickly. Note that this scheme can be used for outputs as well, as long as the power-handling capability of the transformer is considered.

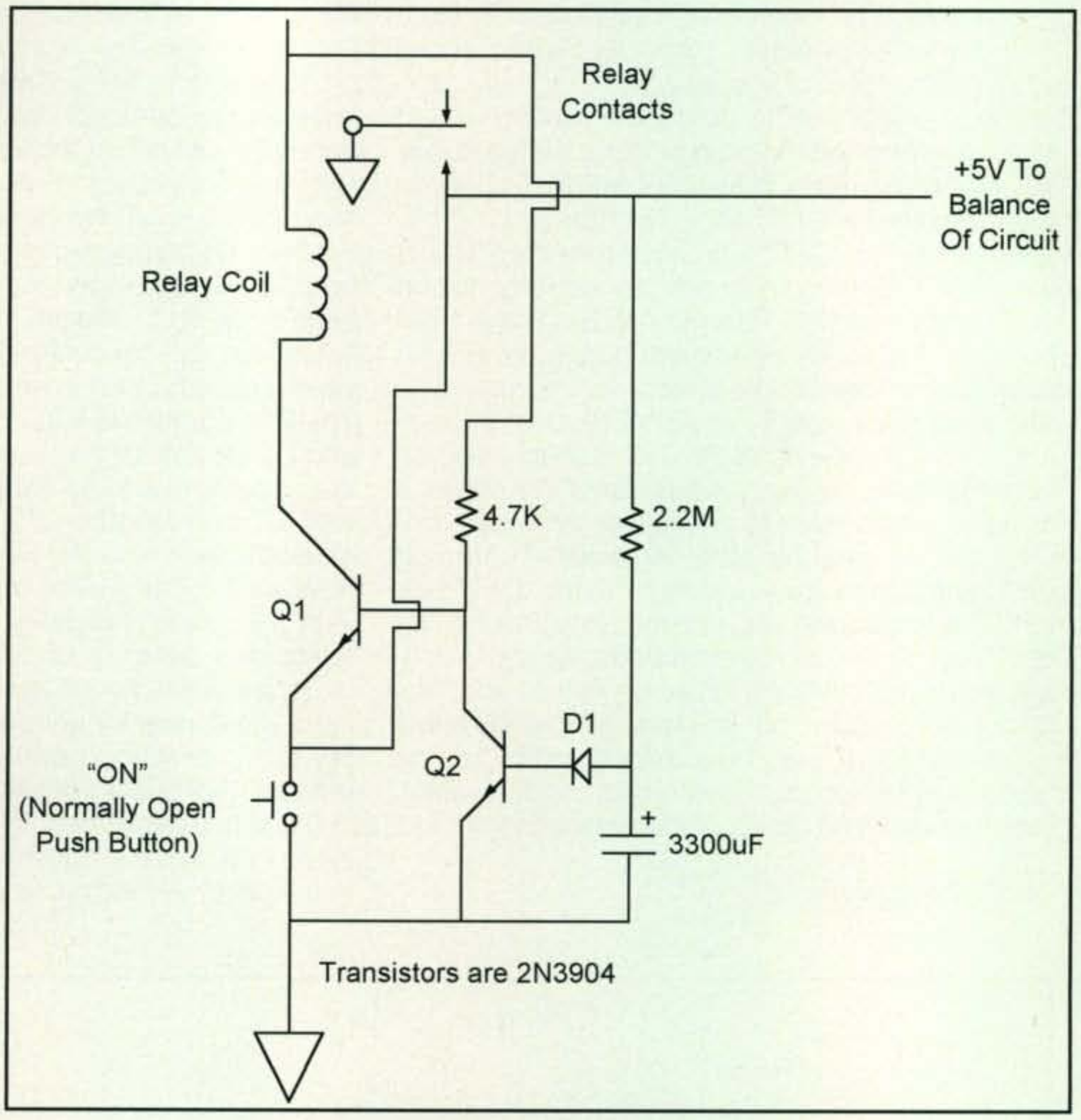


Fig. 2– Timed turn-off circuit.

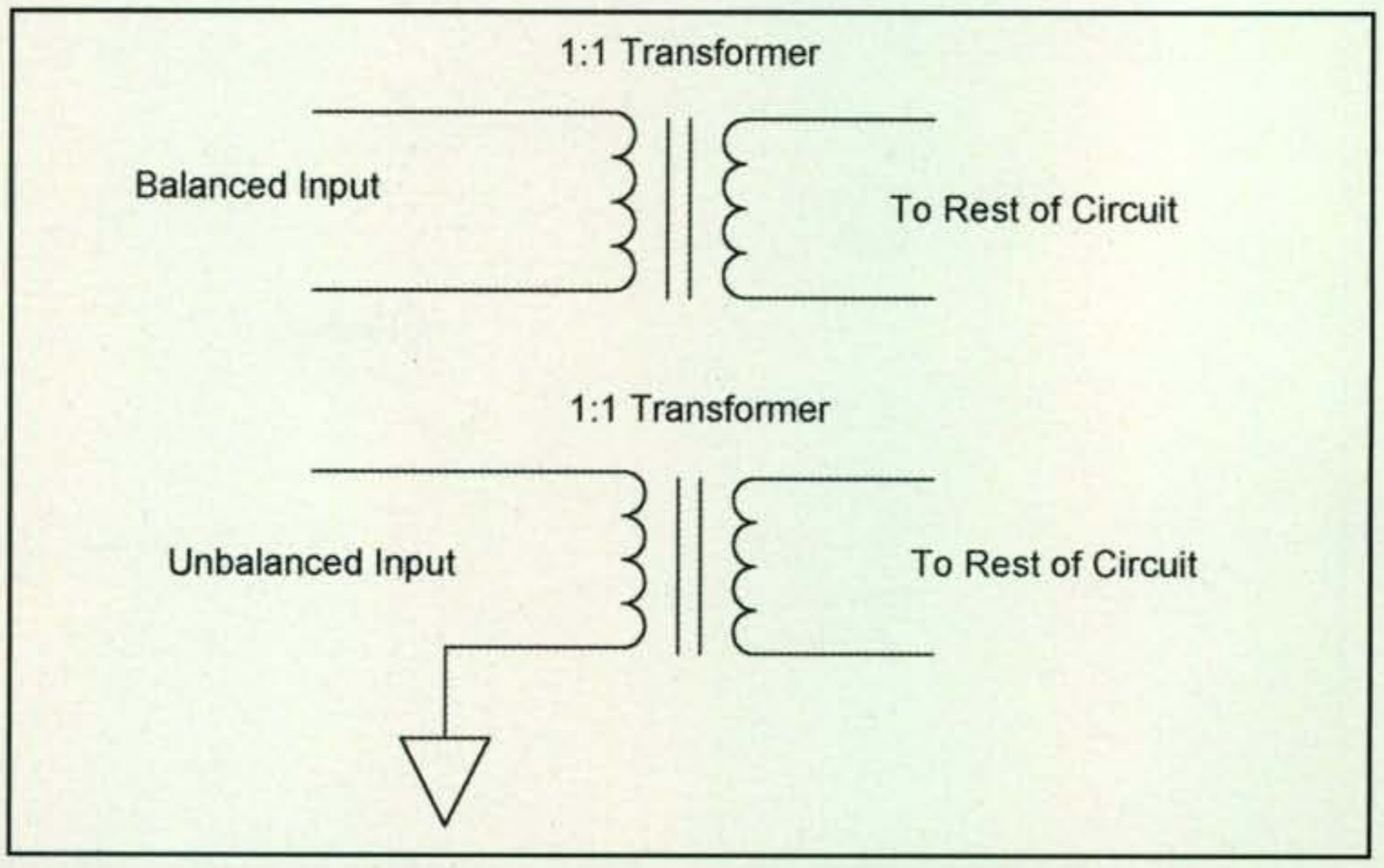


Fig. 3– Simple balanced or unbalanced input/output scheme.

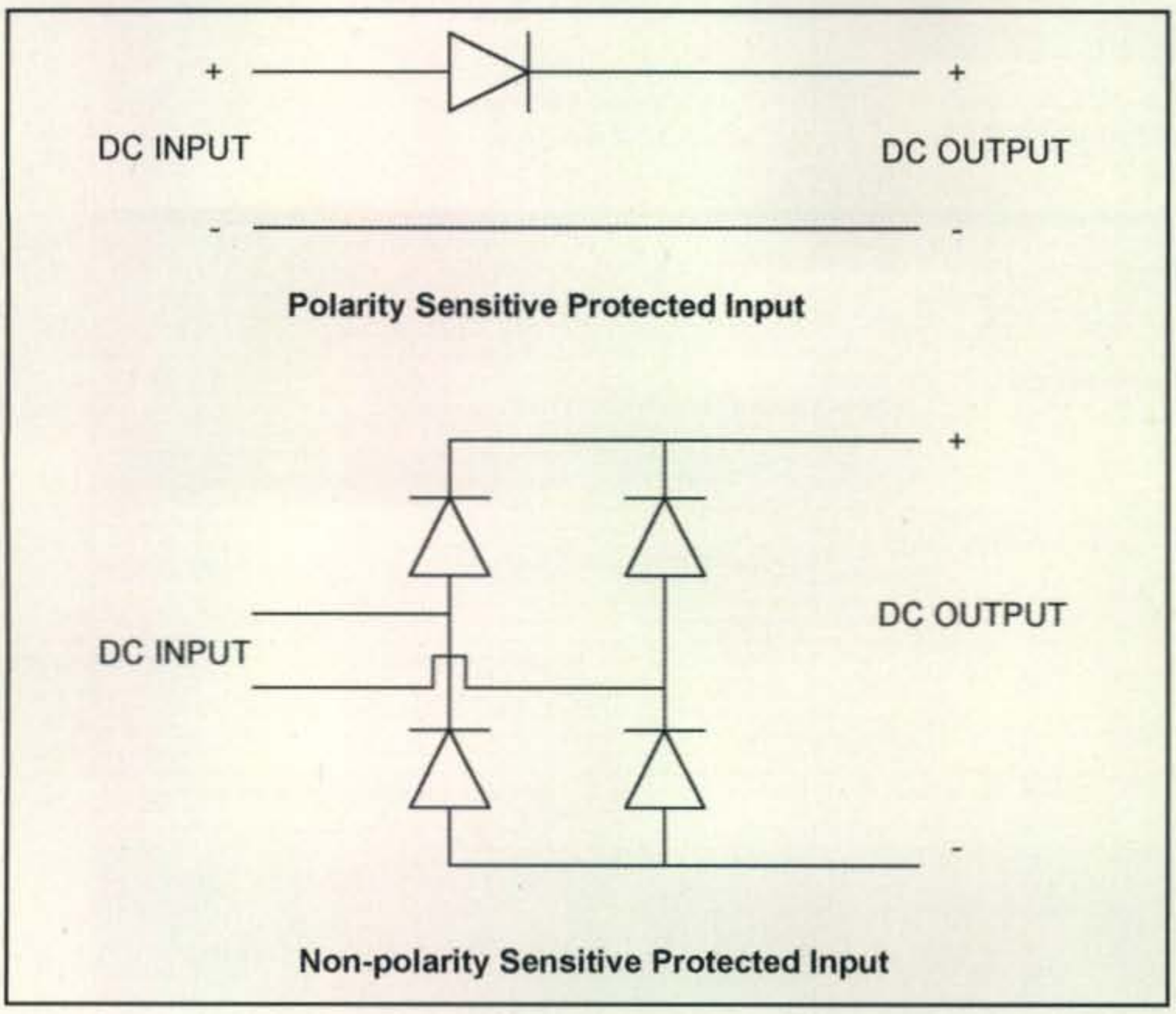


Fig. 4– Use of diodes to protect a DC input.

Many times batteries are connected with the wrong polarity in a homebrew design, destroying the succeeding circuitry. Simply adding a diode in series with the positive lead will protect against this. Depending on the current required, this diode can vary from a simple 1N4004 (1 ampere) to one of the high-power devices available. Keep in mind that this scheme will result in a voltage drop across the diode in the neighborhood of 0.7 to 1.2 volts or so. If this is a problem, consider the use of a Schottky diode, as these have a much lower forward dropping voltage. For the ultimate in protection, simply add a bridge. Now the diodes of the bridge will steer the polarity as it should be. You will have additional voltage drops, however, so take these into account. For those who need further guidance, fig. 4 shows both methods.

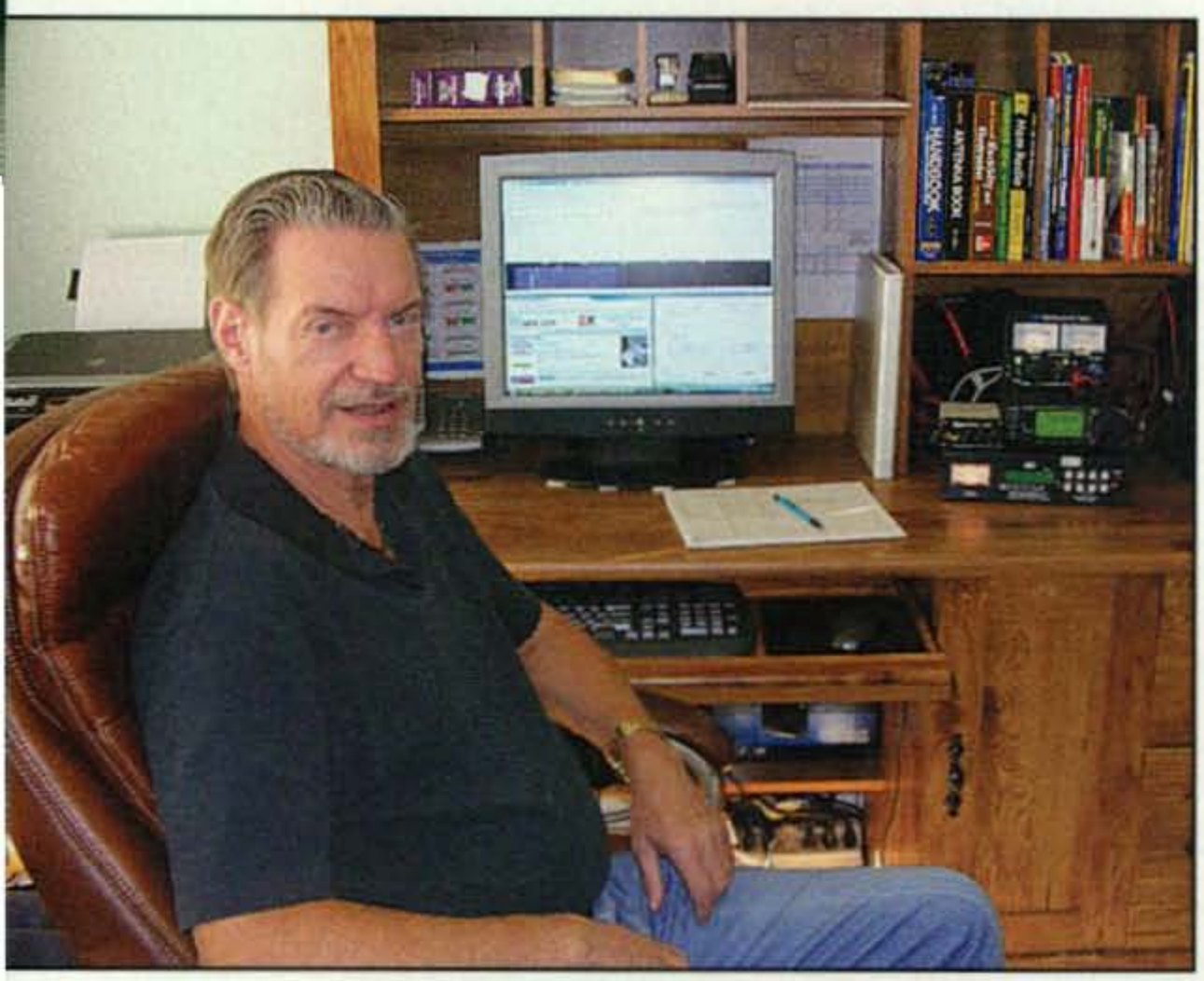
I hope the above is of interest to you and that you will write to me with your questions. I do take the time to answer them as time permits.

73, Irwin, WA2NDM

Antenna restrictions almost pushed K4SBZ out of ham radio, for the second time, until he discovered PSK-31.

PSK-31 in the Attic

BY STAN ZAWROTNY,* K4SBZ



The author in his shack, where he racks up DX, despite antenna restrictions, using PSK-31 and a dipole in the attic.

Like many amateur radio operators today, I am plagued by the dreaded CC&Rs—covenants, conditions, and restrictions. These restrictive covenants prevent thousands of us from enjoying our hobby to its fullest extent by not allowing us to have antennas visible outside our homes.

Originally licensed in 1959, I had to drop out of the hobby for occupational reasons in 1964. I was relicensed in 2007 as an Extra Class, but was confined to chatting on the local VHF repeaters when I found that I was barely able to get out of my backyard on HF. I was almost ready to drop the hobby again out of frustration.

PSK-31 to the Rescue

Then, in early 2009, I read an article about PSK-31. The thing that struck me most about it was that because of its narrow bandwidth, this relatively new digital mode was able to get through better than many other modes such as SSB.

The second thing that I noted about PSK-31 is that one of its most popular operating bands is 20 meters. Some quick calculations told me that a 20-meter dipole was only about

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e-mail: <K4SBZ@arrl.net>

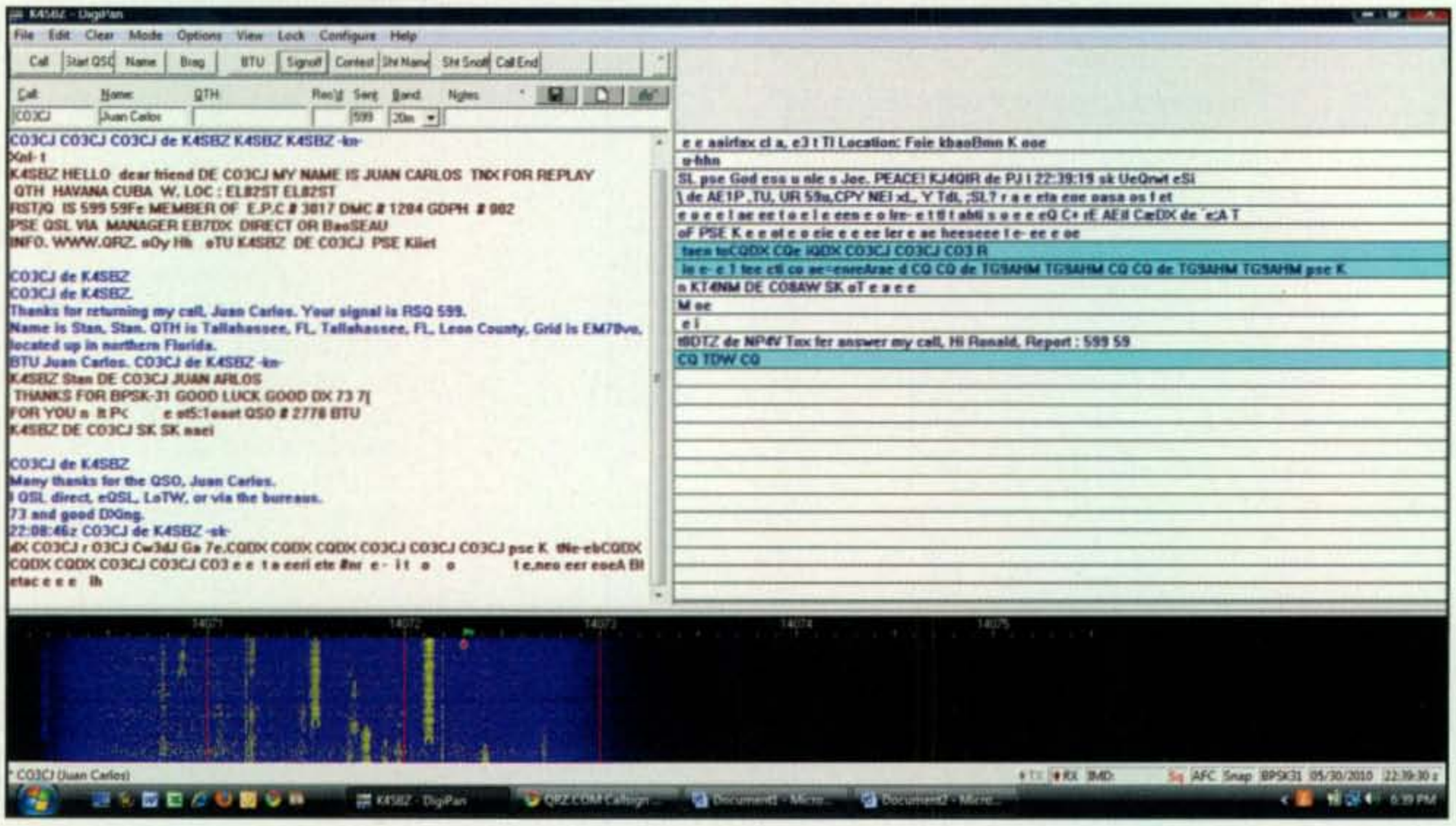

Fig. 1– Typical DigiPan 2.0 QSO. Note CQ calls in blue.

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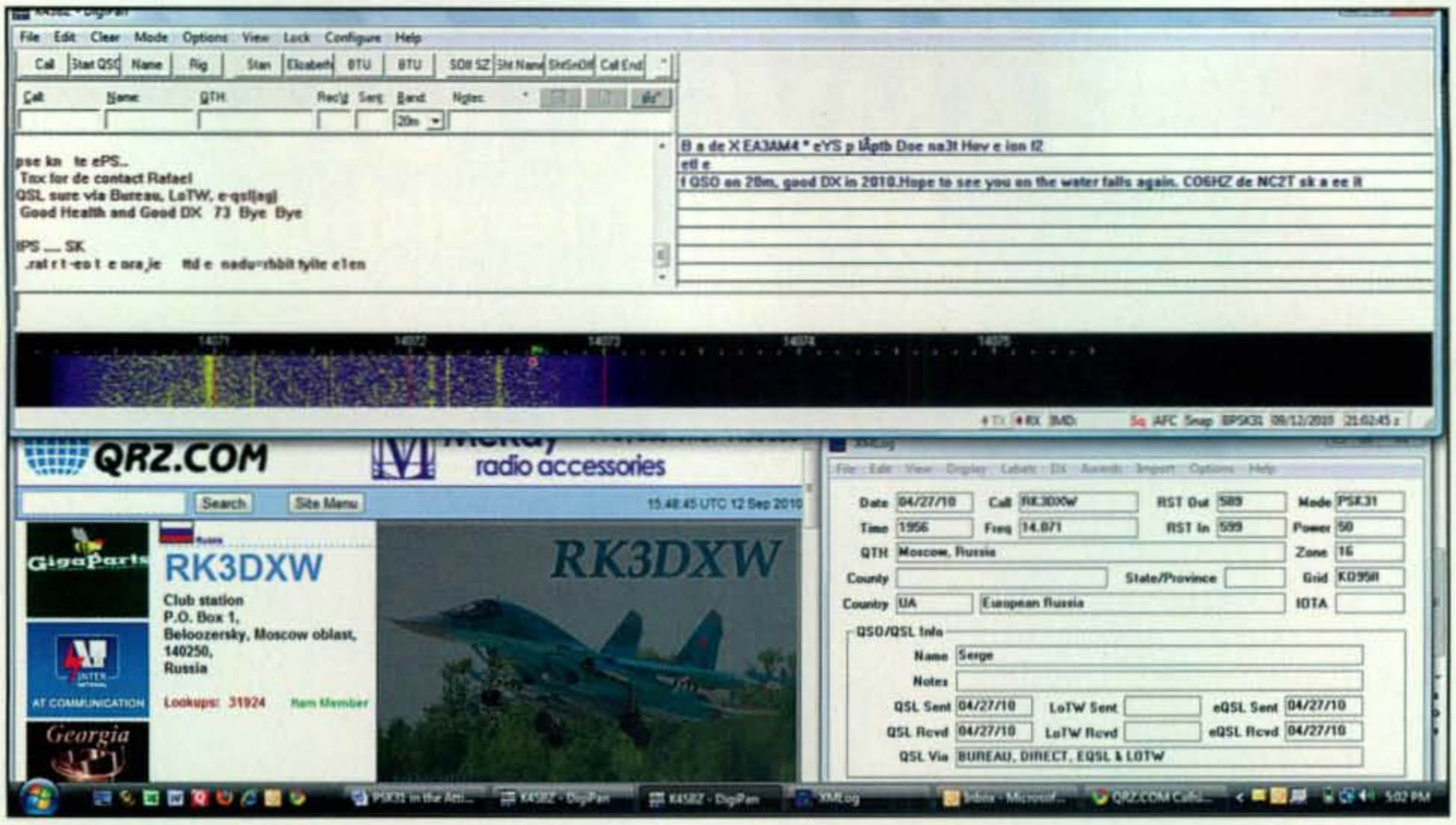


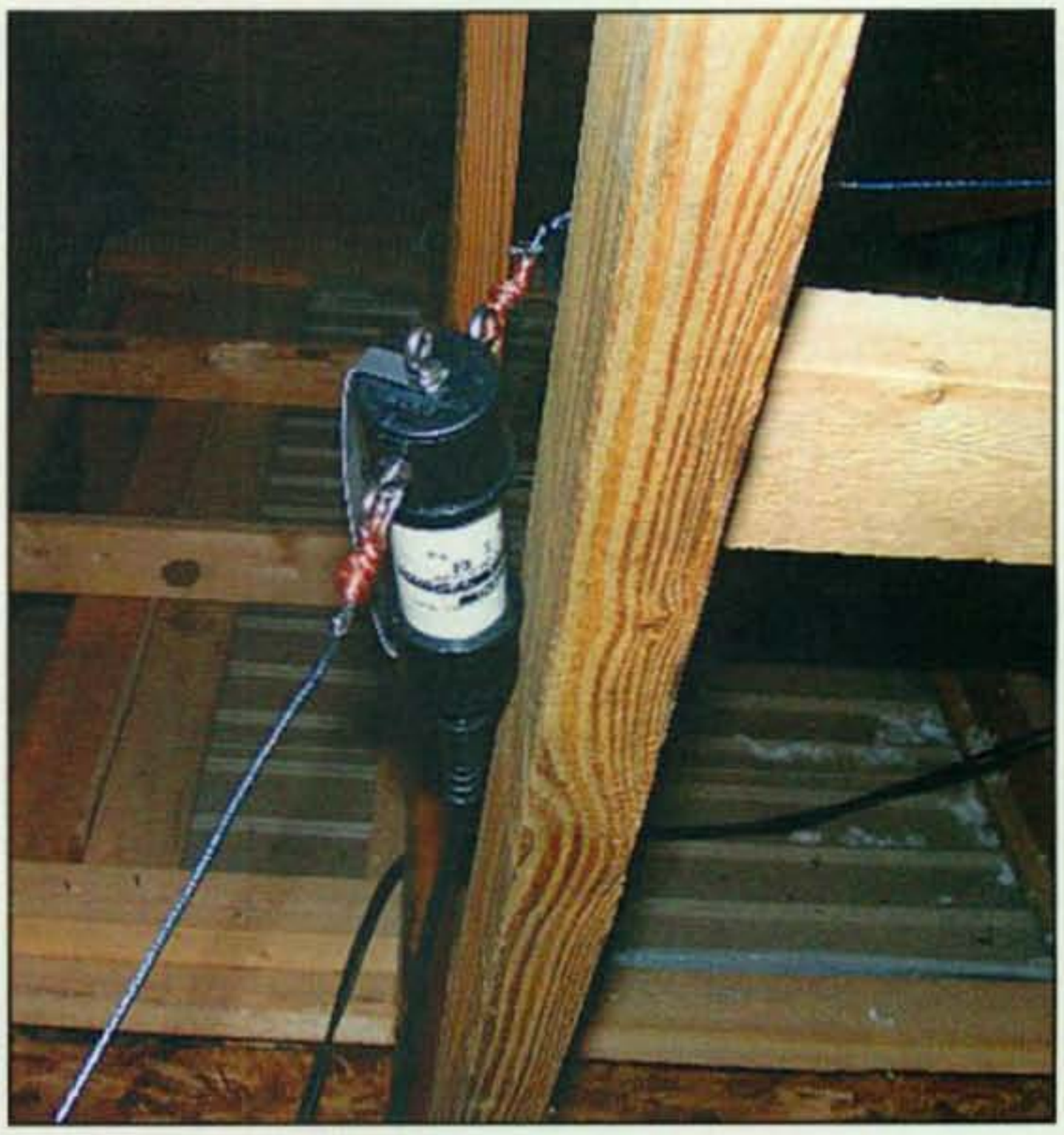
Fig. 2– DigiPan, QRZ.com, and XMLog positioned on the computer screen.

33 feet long and would easily fit in my attic, out of sight of the CC&R police!

After a bit more research, I was able to convince my XYL that the investment was not going to be very substantial. Unlink older digital modes that require an expensive TNC, I only needed to add a fairly inexpensive soundcard interface (RigBlaster, SignaLink, etc.) to my already existing gear, along with the 20-meter dipole.

Free Software Interface

A substantial savings is that one of the most popular PSK-31 software interfaces, DigiPan 2.0, is downloadable for free. See fig. 1 for a typical PSK-31 QSO using DigiPan. (Some of the other popular Windows® PSK-31 software include



The attic dipole uses insulated copper wire and a 1:1 balun as the center nsulator.

Plastic "egg" insulators secure the ends of the dipole, which kind of snakes its way through the author's attic.

WinPSK, MixW, DM780, Hamscope, MultiPSK, WinWarbler, and Zakanaka.)

I prefer DigiPan because it can simultaneously display multiple channels of conversations in addition to the traditional waterfall display of the spectrum. Using the Multichannel Coloring Effect option in the Color configuration, I color all channels containing CQ blue so that I can spot them immediately. I also color any channel containing my own callsign red so that I don't miss any calls. With DigiPan, all you have to do is click on the line with the text to tune to that frequency. How much easier can it get?

I position DigiPan in the top half of the computer window as shown in fig. 2. With DigiPan, you can click on a callsign in the received text window and it will fill in the Call field. There is a macro available that provides an automatic lookup of the callsign in the Call field using QRZ.com. In the lower left corner, I load QRZ.com (reduced) so that I can quickly identify any stations calling CQ or that respond to my CQ. In the fourth quadrant of the computer screen, I place my logging software, XMLOG.

A Simple 20-Meter Dipole

Plans for a dipole can be found in just about any antenna book. However, it's basically two pieces of wire strung in opposite directions from a center insulator. Because the PSK-31 band on 20 meters starts at 14.070 MHz, the specific measurement for the dipole is 32.9 feet total, or 16.45 feet for each leg.

I used insulated copper wire (14 or 16 gauge is fine) for the antenna. This enabled me to route the antenna through the attic without too much concern about touching the rafters, although I also used standard stand-off insulators where possible. My routing was not totally direct. I used whatever worked for me, but it is relatively straight. I used a 1:1 balun for the center insulator, with a run of coax to my rig. I have to admit that the installation was not elegant.

Elegant Results

Elegant or not, though, my first contact was in Germany (from Florida), running my IC-706MKIIG at less than half power, as you are expected to do with PSK-31. Since then I have worked DX from Moscow to Hawaii, and all ideas of giving up my ticket have long passed. As a matter of fact, my XYL just got her General so that she can join in the fun!

Sources

SignaLink USB: <http://www.tigertronicscom/>
RigBlaster products: <http://www.westmountainradio.com/>
DigiPan download page: <http://www.digipan.net/>
XMLOG: <http://www.xmlog.com/>

What You've Told Us...

Our October survey asked about your experience with building your own radio gear, a skill that many hams believe is in sharp decline. Not among *CQ* readers. In fact, 94% of those who responded to October's survey said they have built at least one piece of radio equipment.

Asked to be more specific, 91% have built an antenna, 84% have built a station accessory, and 76% have built cables and boxes for wiring together station equipment. In addition, 58% have built a receiver, 57% a transmitter and 41% a transceiver. Plus, 44% have restored a piece of vintage gear. Ninety-two per cent report having built a project from a kit, while 68% have used published or online plans and 47% have built gear from their own designs.

Types of components used were broad, with 78% building projects using vacuum tubes, 77% with discrete components on a circuit board, 67% with discrete components and *no* circuit board, 57% used ICs or microprocessors, and 32% have built gear using surface-mount components.

Building projects have not been limited to radio gear, as 62% have also built station furniture, 52% have built equipment enclosures, 37% a portable or mobile operating kit and 21% have built another related project.

Finally, we asked our readers how recently they had built a ham radio project. The answers were surprising, as 38% reported that they were working on one now, followed by 30% within the past year, 16% one-to-five years ago; 10% five-to-ten years ago, and 14% more than ten years ago. Only 4% said they'd never built anything.

This month's free subscription winner is Dale Schnuckel, KN7S, of Snohomish, Washington.

Reader Survey March 2011

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

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

Since hams tend to be early adopters of all sorts of new technology, we thought we'd snoop this month about e-readers (tablets) and smart phones.

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

1. Do you own an e-reader (tablet) or plan to buy one this year?

Yes, own 1
Yes, plan to buy 2
No 3

2. If you answered yes to question 1, what type of e-reader do you own or plan to buy?

Apple iPad 4
Apple iPod Touch 5
Amazon Kindle 6
Barnes & Noble Nook 7
Other 8
Undecided 9

3. Do you own a "smart phone" or plan to buy one this year?

Yes, own 10
Yes, plan to buy 11
No 12

4. If you answered yes to question 3, what type of smart phone do you own or plan to buy?

Android 13
Blackberry 14
iPhone 15
Other 16
Undecided 17

5. *CQ* will soon introduce a digital edition as well as its traditional print edition. When this happens, would you be likely to subscribe to a digital edition of *CQ*?

Yes, in addition to my print subscription 18
Yes, instead of my print subscription 19
Would have to see the details first 20
No, I'll stick with print 21
Don't know 22

6. If you were to purchase a digital edition of *CQ*, on which type of device would you be *most* interested in being able to read it?

Computer 23
E-reader (Kindle, etc.) 24
Smart phone (iPhone, etc.) 25
Multiple device types 26
Don't know 27

7. What is the most you would be willing to pay for a 1-year subscription to a digital edition of *CQ*?

Under $15 28
$15–$25 29
Over $25 30
Would not purchase a digital subscription 31

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

A Big Birthday for a Ham Radio Legend
Leo Meyerson, WØGFQ, Celebrates His 100th Birthday!

An autographed photo of Leo Meyerson, then W9GFQ, from 1943. (Photos courtesy QCWA Chapter 154)

Leo Meyerson, W9GFQ and later WØGFQ, owned and operated World Radio Laboratories (WRL) from his factory in Council Bluffs, Iowa. His more famous products included the Globe Scout, Globe Champion, and Globe King lines. For many beginning hams, the Globe Scout was their first transmitter. He was, and still is, respected and beloved by his worldwide customers and competitors alike.

Leo is celebrating his 100th birthday, and a big party at his winter home in Rancho Mirage, California, was scheduled for February 24, 2011. The celebration was to include a special event station, WØG, on 14.260 MHz (±) between 1800Z and 2400Z.

"Leo may not be able to talk to everyone who QSOs, but he will be nearby," said Gene Pentecost, W4IMT, President of the Quarter Century Wireless Association (QCWA) Chapter 154, which is sponsoring the special event station. "For the many who have fond memories of Leo and his radios, here's a chance to give him a shout." QSLs should be sent to the operator you contact, so be sure to make a note of who's behind the mic.

Happy birthday, Leo, from all of us at *CQ*!

Leo still looks great today, as he approaches his 100th birthday.

Getting Started in Amateur Radio:

What You Need to Know to Get Your License

BY FREDERICK O. MAIA,* W5YI

From time to time, we get inquiries from individuals asking about amateur radio and how they can become a ham radio operator. We also get questions about the amateur radio licensing system in the United States. This month let's cover the basics of U.S. ham radio and what you need to know, and do, to take part in one of the world's greatest hobbies.

Amateur radio, often called ham radio, is both a hobby and a service in which licensed participants communicate with other radio amateurs for public service, recreation, and self-training. Its origin can be traced to the early 1900s when wireless communication was first developed. Thus, amateur radio is as old as radio itself.

Coordinated by the Geneva-based International Telecommunication Union (ITU), amateur radio operation is available to people in just every country in the world. More than two-million people located in all areas of the globe communicate with each other directly or through relay systems and amateur satellites. There are approximately 695,000 licensed amateur radio operators in the United States.

Radio amateurs must be licensed by their respective governments. In the United States, the Federal Radio Commission began regulating Amateur Radio in 1912. The agency, renamed the Federal Communications Commission (FCC) in 1934, is charged with regulating all U.S. non-federal government use of the radio.

The term "amateur" does not imply a lack of skill or quality, but rather that ham radio operators are not paid for communicating by radio. It is a non-commercial radio service.

Anyone can be an FCC-licensed amateur radio operator no matter what age, gender, or physical ability. You don't even have to be a U.S. citizen. There are hams under age 8 and seniors over 80. Hams can communicate from anywhere while walking around, from their car, or from their home base station.

Amateur radio is allocated a variety of frequency bands and transmitting modes on which to communicate. These bands, scattered across the radio spectrum, are basically the same in every country, allowing hams to communicate worldwide.

Different frequency bands have different propagation characteristics. Some bands are better for local communications, while others accommodate long-distance (DX) transmissions by "bouncing" signals off the ionosphere (skywave). VHF, UHF, and microwave frequencies pierce the ionosphere, allowing transmissions to be returned from satellites in space.

Although voice transmissions are the most popular mode, many ham radio operators still use Morse code. Hams can even transmit television or talk through orbiting amateur satellites. There are also many digital modes.

The Amateur Radio Service is appropriately named. In times of disaster, when regular communications methods fail, hams assist with emergency and public-service communications. When tragedy is imminent, ham networks spring into action.

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

Getting Started

You must be individually licensed by the FCC to be an amateur radio operator. The purpose of FCC licensing is to be certain that you are aware of the rules and safety concerns of ham radio. There are all sorts of "dos and don'ts" that you need to know. The "on air" privileges of amateur radio are immense and you can get into all sorts of trouble if you don't know what you are doing. You qualify for an amateur radio license by passing an examination consisting of multiple-choice questions that are oriented towards operating a ham station legally and safely.

Most people get into ham radio through the efforts of an already-licensed friend or family member, called an "Elmer." You alone can also learn what you need to know by getting study material from the W5YI Group (see ad in this publication) or the American Radio Relay League. The ARRL is the national association for amateur radio in the United States.

Amateur radio clubs are located all over the U.S., and members are eager to help a newcomer get started. Many offer licensing classes. The ARRL has an online list of over 2000 ham clubs at <http://www.arrl.org/find-a-club>. Just enter your zip code and the nearest club pops up. There's bound to be one near you.

Getting Licensed

All amateur radio licenses are granted for a ten-year term. There is an additional two-year "grace period" during which a license may be renewed without having to retake the examinations. Unless you specifically selected your own callsign, there is no cost to renew a license.

There are basically two types of amateur radio licenses: individual and club station. A club station license allows members of an amateur radio club to have a station operating under a club callsign. The license is granted only to the trustee of the club. It conveys no operating privileges.

There are currently three levels of individual amateur radio operator licenses issued by the FCC: Technician, General, and, the top-of-the-line, Amateur Extra Class. Each authorizes varying levels of privileges.

Most new amateur operators start at the Technician Class and then advance to the General Class or Amateur Extra Class operator license. Some newcomers, however, begin at the General

Class by passing two exams. A few even begin at the Amateur Extra Class.

Operator License Classes

Technician: The privileges of a Technician Class operator license include operating an amateur station that may transmit on channels in any of 17 frequency bands above 50 MHz with up to 1500 watts of power. Technician Class licensees also have operating privileges in four amateur service bands in the worldwide HF range: 10 meter voice plus CW (Morse code) on 80, 40, 15, and 10 meters.

General: The General Class operator license requires passage of the Technician test, as well as the General exam. It is the most sought-after license class, since it authorizes privileges in all 27 amateur service bands. Hundreds of digital, analog, pulse, and spread-spectrum emission types may be transmitted. Upon accreditation by a Volunteer Examiner Coordinator (VEC), a General class ham can help administer Technician Class examinations.

Amateur Extra: The Extra Class is the highest amateur radio license you can obtain, and the written test is the most difficult of all the license exams. The privileges of an Amateur Extra Class operator license include additional spectrum in the HF bands. Extra Class hams get all amateur radio frequencies and can apply for the desirable shorter (1-by-2 and 2-by-1) "vanity" station callsigns.

Grandfathered license classes: Up until a decade ago, there were six operator license classes. However, as of 2000, new Novice, Technician Plus, and Advanced Class licenses are no longer issued by the FCC. There are still some amateurs around who hold these licenses, though, and they may be renewed indefinitely. (Technician Plus class operator licenses were converted to Technician Class licenses when they were renewed.)

License Examinations

In 2003, the ITU ratified changes to the International Radio Regulations to allow each country to determine whether it would require a person seeking an amateur radio operator license to demonstrate the ability to send and receive Morse code. This revision eliminated the requirement that a ham operator be Morse proficient when transmitting on frequencies below 30 MHz. As of 2007, Morse code examinations are no longer administered to prospective ham operators in the United States.

The class for which each operator is qualified is determined by the degree of knowledge in operating a station demonstrated during a written examination administered by a team of three volunteer examiners (VEs). The efforts of VE teams are supervised by Volunteer Examiner Coordinators (VECs) who develop the examination materials and question pools.

Volunteer Examiners (VEs) are General and higher class radio operators (18 years of age or older) who volunteer their time to administer amateur radio operator license examinations. There is a fee (about $15, determined by the VEC) to take the exam which goes to offset the costs incurred by the examination program.

There are thousands of VE teams, one located in just about every community. You can find ARRL and W5YI VE teams online at <http://www.arrl.org/find-an-amateur-radiolicense-exam-session> or <http://www.w5yi.org/exam_locations_ama.php>.

The National Conference of Volunteer Examiner Coordinators (NCVEC) maintains a common question pool for each written examination element. Each exam question (and its multiple-choice answers) are taken word-for-word from these pools. There are three written examination elements: Elements 2, 3, and 4. Each pool contains at least ten times the number of questions required for a single examination.

The VEs prepare the written examinations from these question pools according to a selection formula. There are about 400 Technician (Element 2) questions, 500 General (Element 3), and 750 Extra Class (Element 4) questions in the various question banks. All questions and answers are publicly known and widely published. You can find all of these pools, complete with answers. on the NCVEC website at: <http://www.ncvec.org/>.

You must pass Element 2 to qualify for the Technician Class license. The General Class level requires passing an additional Element 3 exam. Elements 2 and 3 are each 35-question multiple-choice tests; passing score is 26 correct answers. The Extra Class exam (Element 4) is 50 questions, and passing score is 37.

Some clubs offer weekend licensing classes and testing. It should take you a couple of weeks to prepare for your exam if you study on your own. Both the ARRL and W5YI Group have excellent license manuals which include software for exam study and practice.

There are also several online practice exams you can take. They are free and are an excellent method to determine if you're ready for the test. You will find them on the internet at: <http://www.hamtestonline.com>,<http://hamexam.org/>,<http://www.eham.net/exams/>,<http://aa9pw.com/>, and <http://www.qrz.com/testing.html>. Many of the exam questions are about FCC regulations, so be sure to read the Part 97 amateur radio rules (also available on the NCVEC website).

Once you score a passing grade on an exam, the VE team issues the applicant a Certificate of Successful Completion of Examination (CSCE) and forwards the session paperwork to its VEC. After screening, the VEC files the application over the internet with the FCC. It normally takes a couple of weeks for your license and callsign to be issued by the FCC. If you fail the test, you can take the test again right away by paying another exam fee.

Station Callsigns

There are three different types of amateur radio station callsigns: Sequential, Vanity, and Special Event. Your first callsign will automatically be

assigned to you by the FCC during the processing of your license. Each initial callsign is sequentially selected from the alphabetized regional-group list based on your license class and mailing address.

A station is always reassigned the same callsign upon renewal or license class upgrade, unless a change to a new sequentially assigned callsign is requested. Once assigned, you are never required to change your station callsign.

Every U.S. ham station callsign has a one-letter prefix (K, N, W) or a two-letter prefix (AA–AL, KA–KZ, NA–NZ, WA–WZ) and a one-, two-, or three-letter suffix separated by a numeral (Ø–9) indicating the geographic region. Certain combinations of letters are not used. When the callsigns in any regional-group list are exhausted, the selection is made from the next lower group.

There are four different callsign groups: A, B, C, and D. Amateur Extra Class operators qualify for the shortest Group "A" callsigns. Technician and General Class operators qualify for Group "C" (1-by-3) callsigns. Any radio amateur may hold a callsign from a lower group.

Once you pass the Technician or General Class requirement, your first FCC-assigned callsign will be from the Group "D" (2-by-3 format) block with the first character being a "K." This is because all of the "N" prefix (by 3-letter suffix) were allocated and "K" and "W" prefixes are not assigned by the FCC as an initial callsign.

Your 2-by-3 format may later be changed to a 1-by-3 Group "C" call under the Vanity callsign program if you wish. Stations outside the lower 48 states qualify for special prefixes. We covered station callsigns last month, so we won't go into further detail here.

A "Vanity" callsign is one specifically selected by the operator. You must hold an unexpired amateur license grant of the appropriate operator class to request a vanity callsign for your primary station. In other words, a "Vanity" callsign may not be your first station callsign. A vacant callsign is normally assignable two years plus one day following license expiration or callsign cancellation, whichever is sooner.

A "Special Event" callsign is a 1-by-1 format callsign selected by any amateur to commemorate some event of special significance.

Dos and Don'ts of Ham Radio

There are certain things you can and can't do on the amateur radio bands. Ham operators may transmit two-way communications and messages with other hams worldwide. Unless specifically prohibited, any type of content is permissible.

No amateur station may transmit messages internationally for a third party (i.e., someone other than the sending and receiving ham operator) unless the foreign government has made arrangements with the United States to allow third-party traffic. The FCC periodically issues a Public Notice listing arrangements for international communications.

All amateur radio frequencies are shared and no frequency is assigned for the exclusive use of any amateur station. This applies to all ham radio transmissions, including those of network roundtables and information bulletin stations.

Station control operators must cooperate in selecting transmitting channels to make the most effective use of the frequencies. You may not intentionally interfere with the communications of another station.

Ham stations must identify their transmissions with their station callsign at the end of each communication and at least every 10 minutes during a communication.

Certain one-way communications are permitted, such as beacon stations, Morse code practice, information bulletins, telemetry, and brief transmissions necessary to make adjustments to the station.

You may not transmit secret messages, and all communications must be made in plain language. Communications intended to facilitate a criminal act, indecent or obscene language, or false or deceptive messages, signals, or identification are expressly prohibited.

You also may not transmit (broadcast) to the general public, play music over the ham bands, or transmit communications for compensation. You may, however, notify other amateur operators of the availability for sale or trade of ham radio equipment provided that such activity is not conducted on a regular basis.

Getting on the Air

Most beginners start with a low-power VHF or UHF handheld or mobile transceiver. This allows them to enjoy clear two-way FM communications using repeaters and to chat with other amateur radio operators in their local area. Cost of these radios can be anywhere from $100 to $400 and higher depending on the features.

Desktop, multi-band base-station transceivers are more complicated to operate and cost more—up to $2000 and higher. However, less-expensive used, older equipment may be available from a local ham radio equipment dealer, another radio amateur or from an internet site . Many ham radio flea markets are held all over the country that sell good used equipment for less as well.

Ham operators may design, construct, modify, and repair their stations if they are qualified to do so. Unlike all other radio services, the FCC equipment authorization program does not generally apply to amateur station transmitters.

Authority to Operate

Your operating authority begins when your license information appears in the Amateur Radio Service's Universal Licensing System (ULS) database located on the FCC's website. ULS is a (free to use) consolidated licensing system that handles all FCC applications, not just those of the Amateur Radio Service.

You need a PC to access ULS at <http://wireless.fcc.gov/uls>. (Click on the "Licenses" button, select "By Name" from the drop-down box, and enter your name, last name first, then a comma, and then your first name. Or you can enter your callsign if you already know what it is.) Your FCC license record will be displayed. Click on your callsign for additional information. You can update your address and other information and renew or get a replacement license using ULS.

In order to access ULS, you need your FCC Registration Number (FRN) and FCC password. New amateurs are usually automatically registered in the COmission REgistration System (CORES) by the VEC as part of the licensing process. The FCC sends every new ham a letter indicating their FRN and ULS password by mail shortly after they are licensed.

Once your license application is processed, the FCC will send you a hard (paper) copy of your license. There is no requirement that you actually have the license document in your possession before you begin operating. You are fully licensed and may begin operating on the ham bands once your name, callsign, and license class are listed in ULS.

73, Fred, W5YI

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40 Amp Continuous

MFJ-4245MV

$149.95

40 Amps continuous, 45 Amps max. Adjustable 9-15 VDC output. Volt/Amp meters, cigarette lighter plug, front 5-way binding posts, two rear quick connects. 5.5 lbs. 7½Wx 4¾Hx9D inches. Use 85-135 VAC or 170-260 VAC input. Replaceable fuse.

75 Amp Continuous

MFJ-4175

$359.95

75 Amps continuous. Adjustable 13.8-14.2 VDC output. Reverse polarity, over-current/temperature, brown-out input protection, 7.8 lbs. 6½Wx3½Hx10D in. 108-132 VAC. Great for Ameritron's ALS-500M mobile amplifier!

High Current Multiple DC Power Outlets

Power multiple Transceivers/accessories from a single DC power supply . . . Keeps you neat, organized and safe . . .Prevents fire hazard . . . Keeps wires from tangling up and shorting . . . Fused and RF bypassed . . . 6 foot, 8 gauge color coded cable . . .

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MFJ-1118, $84.95. Power two HF and/or VHF rigs and six accessories from your main 12 VDC supply. *Built-in 0-25 VDC voltmeter*. Two pairs 35 amp 5-way binding posts, fused and RF bypassed for transceivers. Six pairs RF bypassed binding posts provide 15 Amps for accessories. Master fuse, ON/OFF switch,"ON" LED. 12½x2¾x2½ in.

MFJ-1116 **$59.95**

MFJ-1116, $59.95. 8 pairs binding posts, 15A total.Voltmeter, on/off switch.

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

MFJ-1117 **$64.95**

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

All PowerPoles™

MFJ-1128 **$104.95**

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

MFJ-1126 **$84.95**

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

PowerPoles™ AND 5-Way Binding Posts

MFJ-1129 **$114.95**

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

MFJ-1124 **$64.95**

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

15 Amp Continuous

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15 Amps continuous, 17 Amps max at 13.8 VDC. Over-voltage, over-current protection. 5-way binding posts. Load fault indicator and automatic shutdown. 90-130 VAC input. 1½ lbs. Tiny 3¾Wx2¼Hx3¾D inches fits easily in an overnight bag.

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Linear with 19.2 lb.Transformer

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public service

BY RICHARD FISHER,* KI6SN

Smooth Sailing on SKYWARN Recognition Day

Weather watchers were raining down from around the world on a wide swath of frequencies in December 2010 to commemorate SKYWARN™ Recognition Day (SRD), with radio amateurs operating from more than a hundred National Weather Service offices across the United States. It was the 12th year of the annual event which "celebrates the contributions that volunteer SKYWARN™ radio operators make to the National Weather Service," the organizations said.

Providing data on conditions from hail size, rainfall amounts and tornado activity, to snow depth, ice accumulation, and damage assessment during major storms, radio amateurs have played an important role in supporting the NWS with real-time weather reporting. The depth of their value was demonstrated, for example, when a deadly EF4 intensity tornado touched down last June in northwestern Ohio. SKYWARN™ operators from across the region quickly stepped forward to provide vital weather and damage information. *(See "In the Darkeness, Ohio EmComm Operators Face Tornado Terror," CQ "Public Service," August 2010—ed.)*

SRD 2010 had a lot less intensity than a real-life emergency, but no less drama. Many hundreds of weather-report exchanges were made, reuniting old friends, kindling new friendships, and giving newcomers a taste of what SKYWARN™ is all about.

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

SRD Overview: WX4NC

A snapshot of activities involving Central Carolina SKYWARN™ (CCS), and the Raleigh National Weather Service office using the callsign WX4NC captures the atmosphere and magnitude of the two-day multi-band, multi-mode operation.

According to Virginia Enzor, NC4VA, CCS Emergency Coordinator, the radio amateurs "enthusiastically teamed up with the Raleigh NWS . . . operating from 7 to 9 PM Friday and from 9 AM to 5 PM Saturday" on North Carolina State University's Centennial campus. There are more than 5,000 trained weather spotters in Central North Carolina, 750 of whom are radio amateurs.

At WX4NC, "We divided up the coordination of duties to make things go efficiently," Enzor said. "Dave Roy, W4DNA, supervised the temporary antenna setup and an HF (high frequency) rig. Bob Woodson, WX4MMM, oversaw the IRLP station and Scott Lewis, KJ4BPV, was in charge of the NWS HF radio operation." Enzor managed operations of another HF rig and coordinated overall SRD activities.

"For VHF/UHF we used two permanently installed dual-band Kenwood TM-D7 radios with Diamond dual-band vertical antennas that are mounted on the roof of the building housing the National Weather Service."

"There were three HF radios," she said. "First was the NWS radio—a Kenwood TS-570S. With it we used a brand new Moxon antenna specially designed and permanently installed this year by Tom Brown, N4TAB. This was the first real workout of this antenna, and it performed like a champ. We also used Dave Roy's Yaesu FT-897 and LDG AT-897 tuner with a Carolina Windom 80 antenna and my Alinco DX-70 with an inverted-V antenna on 20 meters," Enzor reported.

For logging, the WX4NC team used paper and N3FJP logging software. Operators found the logging software quick to learn and easy to use, she said.

"On Friday night, NWS forecasters predicted the possibility of light snow on Saturday with some uncertainty as to when it might start," Enzor said. "I predicted it would be snowing at 5 PM, because that is when we would take down our temporary antennas.

"In my recollection of the past seven SRDs, it often has rained during antenna installation or take down," she recalled. "Sure enough, it began snowing in the afternoon and was still lightly snowing when we took down the antennas.

"We Southerners get excited at the first flake. Several of us immediately trotted outside to take some photos. Back inside, we delighted in chang-

Elizabeth St. Vincent, K4KTG, "made a bunch of HF contacts during the event," according to SKYWARN™ officials at K4OHX in the NWS office in Old Hickory, Tennessee. (Courtesy of K4OHX)

Michael Kelley, KJ4YDX, seated, joins Julio Ripoll, WD4R, during SKYWARN™ Recognition Day at WX4NHC from the National Hurricane Center. (Courtesy of WD4R)

ing our weather report from cloudy to light snow during the SRD exchange. The snow increased our contacts locally as excited folks wanted to share their weather reports. In fact, 69 of our SRD contacts were from local spotters. Snowfall accumulations ranged from a trace to up to 3 inches across central North Carolina."

A breakdown of WX4NC's 164 SRD 2010 contacts included 37 QSOs combined on 80, 40, and 20 meters; 60 QSOs on VHF; 9 on UHF; and 58 via EchoLink.

"We made contacts with 33 NWS offices," Enzor said, "earning us the Whole Gale Certificate." Thirty-seven states were contacted. WX4NC's longest range contacts were with Puerto Rico, "where it was a sunny 86 degrees (Fahrenheit), and Estonia where it was a bitter minus 5.9 degrees Celsius (21.4° F). What a contrast!"

Raleigh NWS set up a grill and treated the SKYWARN™ team to lunch.

"Plans for next year include different antenna placement and expanded hours of operation on Friday night," Enzor said. "We want to look at ways to decrease the amount of time spent on putting up antennas and increase the amount of time on the air. The opportunity to get on the air, the companionship of friends, good food, and the first snow of the season . . . it doesn't get any better than that for SRD in the South."

To close the event, NWS Warning Coordination Meteorologist Jeff Orrock,

From a workman's basket atop a portable support, G5RV and New Carolina Windom antennas were put up at WX9IWX for operations during SRD 2010. (Courtesy of KA9RSL)

KI4KKX, expressed his appreciation: "It was really a great day and everyone worked so hard. I cannot tell you how incredible it is to have such great volunteers such as yourselves who all work so hard. Thanks again, and here is looking forward to next year."

Other WX4NC volunteers during SRD 2010 included CCS Net Control Jim McRight, KB4BZ; CCS Net Control and NCSU meteorology student Kevin Smith, K4BGM; and spotters Chris Benson, KJ4LKE; Cassie Mentha, KJ4GKP; and Kristina Benson, who is "not a ham, at least *yet*," Enzor said.

SRD Snapshot: WX4NHC

Julio Ripoll, WD4R, reported the amateur radio station at the National Hurricane Center in Miami, Florida, WX4NHC, "had another successful SKYWARN™ Recognition Day," with operators on duty "for nine hours on Saturday.

"We made contacts with many NWS stations and SKYWARN™ operators from around the continental United States, the Caribbean, Canada, Alaska, Hawaii, and even as far as Estonia." WX4NHC's lowest temperature report was 20° F from Edmonton, Alberta, Canada, while the highest was 83° F from Kailua, Hawaii.

"We especially enjoyed the well-organized support from the EchoLink Hurricane Net with Rob Macedo, KD1CY, and his dedicated SKYWARN™ group from the Taunton NWS office in Massachusetts," Ripoll said.

"Our VIP (very important person) operator was Mike Kelley, KJ4YDX, Vice Chairman of Administration for University of Miami Medical and Chief Operating Officer of the UM/Medishare Haiti Field Hospital," he reported. "Mike got to see first-hand in Haiti what ham radio communications can do after a major natural disaster, where we were one of the reliable communications links between Haiti, the U.S. Navy ship *Comfort*, University of Miami, and the rest of the world for many weeks following the earthquake," Ripoll said. "Mike recently got his Tech license and is now studying for his General Class and plans to become one of our regular WX4NHC operators by next season."

Robert Molleda, NWS Warning Coordination Meteorologist, "had a very well-attended SKYWARN™ Educational tour, of which almost half were hams," WD4R added. "Some drove from as far as Naples, Florida to attend his conference and tour."

"This year's hurricane season completes our 30th year of volunteering at NHC," Ripoll said. "We are grateful for the opportunity given to us by NHC to help those in need."

The SRD 2010 team at WX4NC in Raleigh, North Carolina included (first row): Raleigh NWS Warning Coordination Meteorologist Jeff Orrock, KI4KKX; CCS AEC Scott Lewis, KJ4BPV; and CCS EC Virginia Enzor, NC4VA. Second row: Kristina Benson, and Kevin Smith, K4BGM. Third row: ARES NC SEC Tom Brown, N4TAB; Cassie Mentha, KJ4GKP; CCS AEC Dave Roy, W4DNA; Jim McRight, KB4BZ; AEC Bob Woodson, WX4MMM; and Chris Benson, KJ4LKE. (Courtesy of Mike Moneypenny)

SRD Snapshot: K4OHX

Beginning at 6 PM on Friday, December 3, 2010,and continuing non-stop for 24 hours, a team of radio amateurs from around middle Tennessee, 28 strong, came to the NWS office in Old Hickory to participate in SRD 2010.

According to an NWS web report, "The Dickson County, Davidson County, Robertson/Sumner County, Heart of Tennessee ARES®, Hickman County, and Nashville Amateur Radio Club groups all were represented."

Using the NWS Old Hickory callsign K4OHX, "a total 49 NWS offices were contacted." The SRD log showed contacts with 46 states and three countries. "Thirty-nine counties in Tennessee were also worked."

The NWS web page for SKYWARN™ Recognition Day can be found at: <http://hamradio.noaa.gov>.

SRD Snapshot: WX9IWX

Sometimes, weather can throw a wrench into SRD, as Patrick Murphy, WX9PAT, learned. "I am sorry, but with the lake effect snow I have not had a chance to review the logs closely," he said when asked how WX9IWX's SRD 2010 went in northern Indiana. As lead meteorologist of NWS Northern Indiana, he subsequently reported more than 170 contacts made "that will be sent in for certificates."

In Field Day spirit, a couple of HF antennas were erected from a portable workman's tower in the NWS office parking lot. "At the top was a G5RV cut for 80 through 10 meters. The lower antenna was a New Carolina Windom <http://bit.ly/exytlh> for 40 through 10 meters," according to a report from Keith Miller, KA9RSL. "The G5RV that we used for SSB was hung at about 42 feet. The Windom used for PSK-31 was about 10 feet below the G5RV.

"By the way, the 100-foot permanent tower [in the background of the accompanying photograph] includes several antennas: a NOAA Weather Radio WWG-45 162.500-MHz transmit, 800-MHz State of Ohio DHS, three 2-meter Diamond F22A omnis (two for voice SKYWARN™; one for packet), and a 2-meter/70-cm Cushcraft three-element A2706S beam for voice SKYWARN™."

Miller added that "our office is on a continental divide but at a little over 900-feet msl (mean sea level). The Saint Lawrence Continental divide is just not as impressive as the Rockies <http://bit.ly/hVkkXM>.

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The 6M9KHW has countless hours of computer aided optimization, range confirmation and on the air testing, resulting in a truly remarkable antenna. The 6M9KHW is capable of producing moon echoes when pointed at rising or setting moon and running the legal power limit. If you can hear your own moon echoes over a one half million mile path, just think what it could do for your signal on long haul tropo, meteor scatter or just an ordinary E or F2 opening. And for the adventurous, just imagine what four of them would do.

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The 6M-1000 represents the culmination of many years of solid state amplifiers designed by Ken Holladay, K6HCP (KLM, Mirage and RF Concepts). Physical size and weight are the smallest ever for this kW amp. When combined with a lightweight switching power supply at 7-10 lbs, the 6M-1000 is perfect for DXpeditions and field day operations. It will make a great addition to any home station as well. EME and Meteor scatter usage are capable with either CW or the very popular JT6M & JT65A. Full power output of 1 kW for 50 seconds using JT65A should be possible for hours. Two temperature controlled whisper fans cool the finned heat sink and will cycle on and off as needed. If external preamp and relays are used, the amp supplies 12VDC and also sequences a N.O. key line.

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Don Whiteman, KK9H, sets up the 220 MHz link to net control for the Bank of America Chicago Marathon. (Photos courtesy of K9RST)

Visit NWS Northern Indiana: <http://weather.gov/iwx>.

Ham Radio Supports 38,000 Runners in Chicago Marathon

More than 100 radio amateurs were among the 1,000+ volunteers supporting 38,000 runners in the 2010 Bank of America Chicago Marathon late last year. A dozen area radio clubs helped provide communications for field medical and medical transport teams in 21 aid stations along the 26.2-mile route.

"The Bank of America Chicago Marathon is one of the five World Marathon Majors, setting the standard for global marathon competitions," said Rob Orr, K9RST, president of the North Shore Radio Club. "Runners from all 50 states and more than 100 countries set out each fall to achieve their personal goals." Other cities on the World Marathon Majors circuit include Berlin, Boston, London, and New York City.

Some of the amateur radio organizations taking part were North Shore Radio Club, York Radio Club, Bolingbrook Radio Club, Chicago FM Club, Wheaton Ham Club, Suburban Amateur Radio Club, ARES® teams from Peoria and Milwaukee, the Salvation Army, Palatine Emergency Management Agency, Lake County RACES, and NORA Repeater Club, he reported.

The operators "provided information to assist emergency dispatch and medical logistic information, helping coordinate transportation for runners who may have become ill or dropped out prior to reaching the finish line," K9RST said.

Two 2-meter repeaters were used course-wide for medical emergency communications, Orr said. Three 440 MHz repeaters were designated for non-emergency transportation and to supply dispatch for different sections of the course—north, west, south, and back-ups—and for tracking runners who dropped out of the race and needed a ride back to Grant Park.

Communication around the Event Command area was via 220-MHz FM simplex, "and to our remote headquarters set up outside of Grant Park in case something happened to the Event Command area. Then we would be able to maintain communication with the other stations through this remote base. They were set up on the near west side of Chicago at an aid station APRS for lead runners and course end car," K9RST said. "During large scale public events, a marathon runners, as well as spectators, may experience medical issues," he said. "In order to provide timely aid (in Chicago) medical tents are located every one to two miles along the marathon route."

"Each tent has a licensed physician, multiple nurses, and other medical staff present, including ambulance service," Orr said. "Participants in need are either treated in the on-course medical tents or are transported by ambulance to the marathon's central medical location, or to a local hospital."

The radio amateur volunteers "are seated immediately adjacent to ambulance dispatchers and are paired with medical staff in and outside the tents," K9RST said. "They communicate requests and status reports to the central medical location in Grant Park using up to seven radio networks to ensure complete course coverage and redundancy in case of equipment problems. Hams also reported on the status of runners who dropped out of the event, and required transportation back to Grant Park."

Orr said the radio amateurs' support "is critical, but we are part of a large overlapping network. The ham radio operators support the 800 medical support volunteers set up throughout the course."

"Yes, several ambulances were dispatched through our network and we did help many dropped runners find trans-

Fritz Bock, WD9FMB, and the team get ready to handle traffic at Aid Station No. 10.

During the marathon, Craig Dieckman, KC9HWK, served as amateur radio liaison to the Chicago fire and police departments.

portation through the bus network that the Event Management runs for this purpose," Orr said. "This year, because of the heat, the EMS people were looking for us to provide a real-time measure of how the medical teams in the 21 aid station were keeping up with responses."

"We found ourselves having to report medical response conditions at the last five aid stations of the course: How many patients, how many dropped runners? Are more ambulances or supplies needed? They used this information to stage more ambulances for the back half of the course," K9RST said.

"Of course, there are many heroics that have nothing to do with radio," Orr reported. "We had hams who solved problems. One aid station ran out of lancets for testing blood and a couple of the hams ran across the course to a closing aid station to get their medical supplies. When one of the medical doctors ran down the street to attend to a fallen runner, one of our ham radio operators followed with him and provided radio support.

"Hams were dispatched to change the Emergency Action signs—colored flags (green, yellow, red) placed along the entire course to inform runners about course conditions. Because of the hams, we could change the flags along the entire course within minutes."

Orr said it was important for radio amateurs "to keep lines of communication open between doctors in the field and the medical director at the main hospital at Grant Park. We also dispatched ambulances and helped to manage the number of runners who drop out of the event for medical reasons. At one critical point, we had our top doctor talk directly over the radio to his colleague in the field to discuss adjustments that might be needed for the changing conditions."

"Mostly, we were prepared for the extraordinary," K9RST said. "Contingency plans were prepared for an alternative race route if needed and event emergency shelters if required.

"We had our back-up headquarters ready to roll if needed," Orr said. "Frankly, we do our job best when people don't know we are there!"

Matt Mason, N2ZQO, left, and Dan Elekman, AA9NK (now WD9E), work at Aid Station No. 5 during the race.

Additional Photos on the Web

More photos of radio amateurs in action from 2010 SKYWARN™ Recognition Day and the Chicago Marathon are posted on the CQ Public Service website: <http://www.CQPublicService.blogspot.com>

EmComm in Action: Send Us Your Stories

SKYWARN™ Recognition Day 2010 and radio amateurs' support of the Bank of America Chicago Marathon are great examples of how seriously radio amateurs take their obligations as public servants. Do you know of other organizations or operators who have taken action in the EmComm arena? Let us know, and we'll feature their stories in an upcoming column.

Please drop an e-mail to: <ki6sn@cq-amateur-radio.com>.

73, Richard, KI5SN

Correction

In the section of December's Public Service column headlined "North Carolina Amateurs Help Program Weather Radios," Mike Hamby, KG4SRW's, name was misspelled.

kit-building

BY JOE EISENBERG,* KØNEB

Soldering Iron Tips

Many kit builders do not own a variable-heat soldering station, which can be quite useful. By being able to control the heat your soldering iron produces, you can avoid overheating and damaging your board and components. In addition, the tip on your soldering iron will last a lot longer if it is not allowed to overheat. Lack of temperature control is the biggest drawback to using inexpensive soldering irons. However, most builders start out with an iron of this type, so this time I am presenting a way to utilize your soldering iron and get the best results for low cost.

A visit to RadioShack will reveal a number of affordable soldering irons along with replacement tips, with many of the irons under $15. If choosing an iron of this type, find one that also has spare tips available at the store for easy replacement. It is always a good idea to buy a spare or two. For about $7 you can make a simple way to adjust the heat of your soldering iron.

Soldering irons are basically similar to incandescent light bulbs in that they have an element that uses its resistance to current flow to generate heat. This heat is conducted to the tip, where it is used to melt the solder. In more expensive soldering stations, mechanical or digital means are used to sense the tip temperature and regulate the heat. In our circuit, we will use a simple incandescent-lamp dimmer to do almost the same thing. Since we have no way to measure and respond to changes in the tip temperature, we simply will vary the current available to the iron to produce varying levels of heat, just like dimming a light bulb.

The interesting thing about using this circuit is that if you measure the output voltage with a digital meter, you might be surprised to see little if any change in the AC output voltage as measured by the meter while adjusting the dimmer. The reason is that most modern light-dimmer circuits vary the duty cycle of the AC voltage, leaving the voltage intact. Just the amount of time the AC voltage reaches its peak is changed, thus reducing the energy available to light the bulb or heat your soldering iron. Plugging an incandescent lamp into it will reveal the varying power available. Because this process can sometimes produce some unwanted RF noise, many dimmers are now also equipped with built-in RFI filtering. If the RF is still an issue, there are other ways to deal with it as well.

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

A Fun Project

The fun part of this little project is that it is not only a good beginner's project, it also can be assembled quickly, is very affordable and useful, and teaches the builder about the standards used in household electrical wiring.

As a group, the Midwest Home Brewers and QRP group built this helpful gadget at a recent meeting and this really makes for a great club project. The parts for the project are easily found at any hardware store, "big box" home improvement store, and many discount stores. You can spend more if you want to use different parts, but the result will be the same.

The first part of this project is a quad electrical box. It can be made of plastic or metal. Either kind has numerous holes that can be knocked out to allow the power cord into the box.

The second part is a plastic or metal faceplate. This needs to have a single switch hole on one side and standard duplex AC outlet holes on the other side to accommodate the two electrical parts, the dimmer switch and a standard duplex AC outlet. The outlets usually sell for as low as 39 cents, and the dimmers for about $4, making this an affordable project indeed! The dimmer switch often comes with two or three wire nuts which will be used to tie together this whole project, as well as a knob or two if you want to choose the color. Choose a dimmer switch that is for a single-switch configuration, not a two-way. They also come in versions designed for places where you have more than one switch, but we won't be using those versions. In household wiring, connections are never made by soldering. They are made by twisting wires together inside a cone-shaped wire nut.

Finally, an electrical cord is needed, and so we turned to the three-prong common power cord used with most personal computers. Many people have a few of these cords lying around (never throw one away!), making them perfect for this application. I customarily cut off the computer end of the

Here are the parts needed to build the soldering iron controller.

Ameritron *1200 Watts* Solid State Amplifier

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Super Reliable!

Eight conservatively rated MRF-150 FETs mounted on two *huge* heat sinks spreads heat evenly. *Four* whisper quiet temperature controlled fans keep the FETs at a safe temperature. You get *unparalleled* Ameritron reliability and trouble-free service. Competing amplifiers using a single expensive device concentrate heat at a single hotspot that greatly reduces reliability.

50-Volt operation gives you highly linear operation with a superbly clean signal.

Put out-of-the-way and Remote Control

The ALS-1300 amplifier and its matching power supply can be placed out-of-the-way and controlled remotely. *Remote Control Head*, **ALS-500RC, $49.95**, lets you monitor data and manually switch bands. *Radio Interface*, **ARI-500, $119.95**, reads band data from your transceiver and automatically bandswitches the ALS-1300 as you change bands on your transceiver.

Features Galore!

An Operate/Standby switch lets you run "barefoot" and *instantly* switch to full power when you need it.

Fast 5 millisecond T/R relays (10 million operation lifetime specs) give you full QSK operation. The T/R relay sub-board is easily replaced if the relays ever fail.

Ameritron's *exclusive* front-panel ALC control prevents overdriving your transceiver.

The ALS-1300 can be keyed by any transceiver that can sink 15 mA at 12 VDC without requiring a special interface.

Super-clean modular construction makes service quick and easy.

Fully Protected!

The ALS-1300 is fully protected to prevent amplifier damage if you: switch to a band different from your transceiver, use the wrong antenna or have overly high SWR, if the heat sink temperature exceeds a safe level, if the dual 600 Watt modules are significantly RF unbalanced. Whenever the amplifier faults, it is automatically bypassed.

If output forward or reflected power exceeds a safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to the transmitter.

Fully Metered!

Two accurate Cross-Needle meters use *LEDs* with adjustable brightness for backlighting -- no more burned-out meter lamps.

The left meter continuously monitors DC current of both 600 watt amplifier modules.

The right meter is a multi-meter. Read antenna SWR, forward, reflected output power simultaneously (has adjustable PEP meter hold time) . . . amplifier balance . . . ALC between amplifier and transceiver . . . DC drain voltage of each power amplifier.

LEDs show which band is selected (manually bandswitched or automatically with optional ARI-500 Radio Interface) . . . ALC activity . . . when the amplifier is keyed . . . high SWR . . . power amplifier fault.

The desktop size amplifier is a compact 10½Wx6¾Hx19D in. Weighs just 23 lbs.

Hash-Free Switching Power Supply!

The *hash-free* fully regulated 50 VDC, 50 Amp switching power supply is wired for 220 VAC but can be rewired for 110 VAC. Includes six foot cable to ALS-1300. Draws 12 Amps at 220 VAC, 25 Amps at 110 VAC. Has inrush current protection, current-limited outputs, exceptional filtering and RFI suppression. Works on 50-400 Hz, 200-260/ 100-135 VAC making it ideal for remote DX-peditions. 10Wx6½Hx9½D inches. 12 pounds.

Options

MOD-10MK $39.95, low-pass filter assembly gives you 12 and 10 Meter operation. Requires FCC ham license.

QSK-5, $359.95, pin-diode T/R switch gives lightning fast silent QSK operation.

Here's what they say . . .

I have had my amp now for a few days and WOW! I picked the amp up at the factory and Mike was very helpful in showing me the ins & outs of the amp. Mine is S/N 8 and these amps are in high demand. It will truly talk 1200 watts all night long and never get warm. Thanks to Ameritron for the way they treat their customers and taking time that I was satisfied. N5SBZ

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

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

Inside the ALS-1300 Solid State Amplifier

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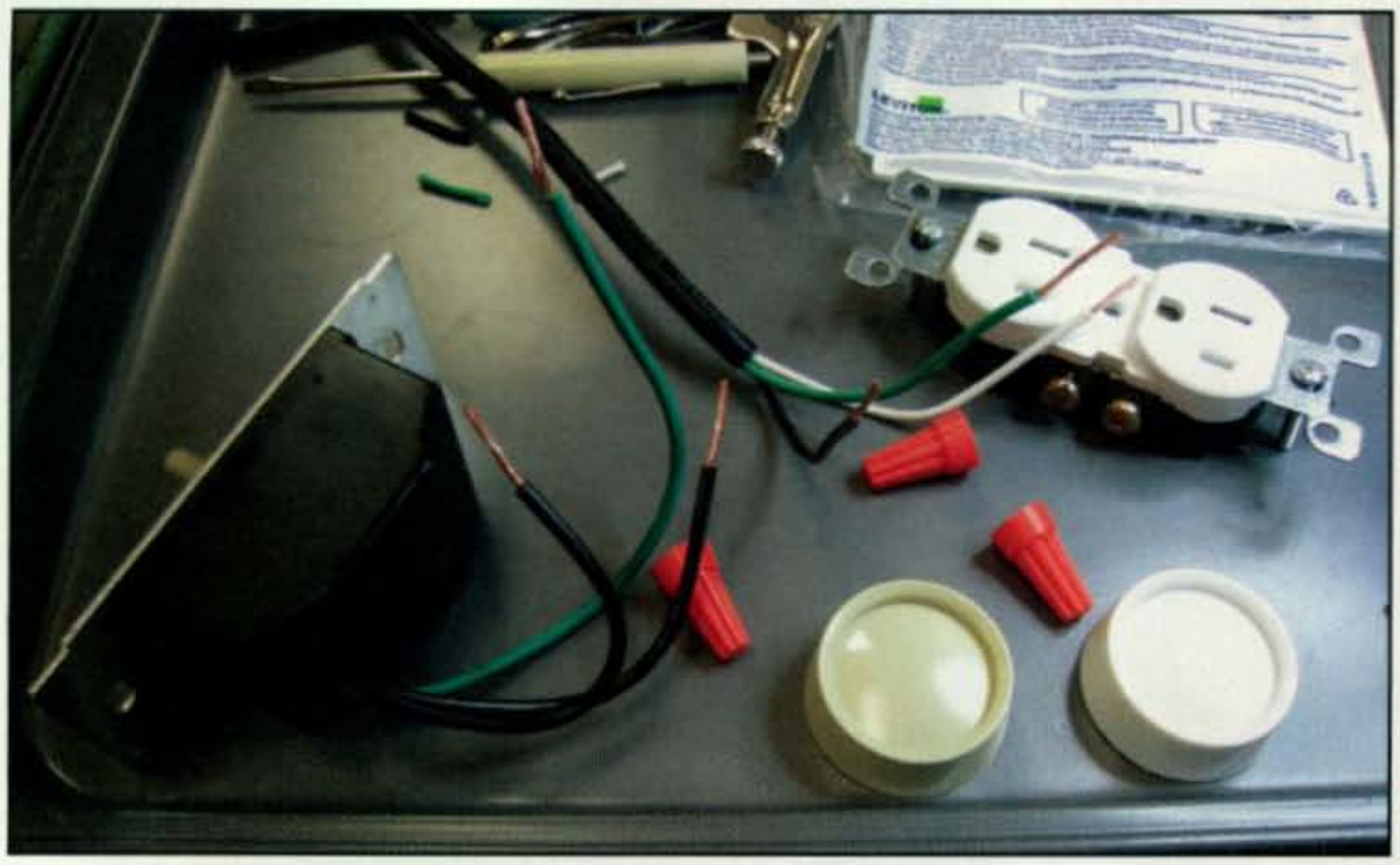


The dimmer and the outlet with wires prepared.

cord leaving the rest of the wire and the three-prong wall plug.

Carefully stripping the insulation from the outside of this cord reveals three colored wires. They are green, black, and white. In American house wiring, the green is the ground wire, the white is the AC neutral, and the black is the AC hot lead. The dimmer usually has a green wire as well as two black wires. The wall outlet has terminals for a green, white, and black wire. In addition, there is a quick modification you can make to the outlet to allow for an unswitched undimmed outlet to be available on your bench at the same time, a great convenience when building kits.

Assembling this project usually takes less than 30 minutes and utilizes a screwdriver, wire cutters, and strippers. If there is an electrician in your club, he can be of great help.

The first thing to do is to unpack all of the parts and then poke out a knockout hole in the outlet box. Often a stout screwdriver will do the trick. Then pass the cut end of the power cord through the hole into the box and pull enough cord through to give enough to work with. Strip the outer jacket of the power cord about 7 inches down and then cut the exposed wires to have a 4-inch piece of each wire plus 3 inches left on the cord. Then strip the insulation off each end of the 4-inch wires as well as the remaining 3-inch wires on the end of the cord, exposing about 1/2 inch of bare wire on all leads. Then wrap one end of the 4-inch green wire around the green screw on the outlet and tighten it. Take the green wires from the outlet, the dimmer, and the power cord and twist the three wires together and place a wire nut over that and tighten it snugly. Now we have the grounds all connected.

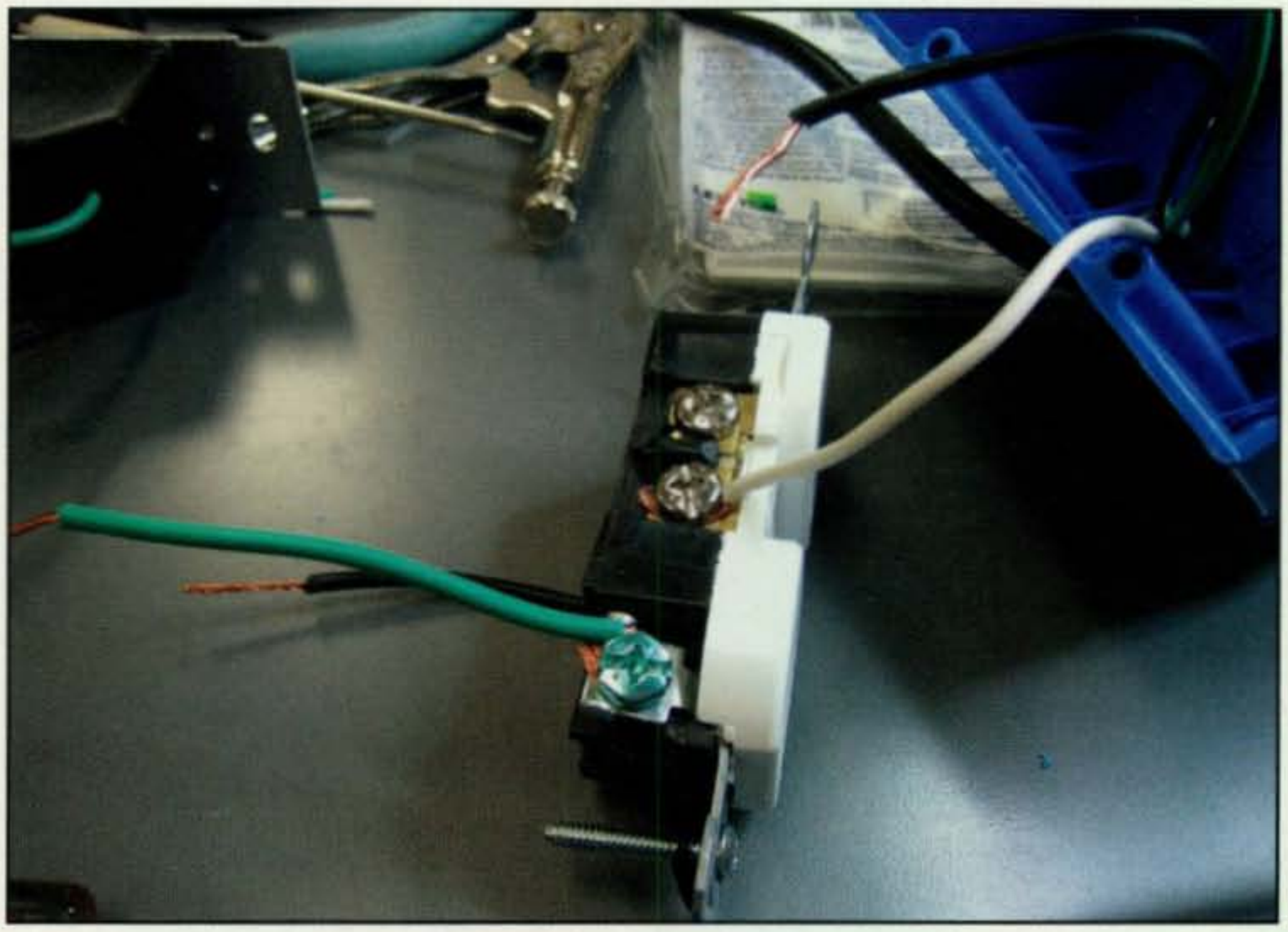
Next take the white wire from the power cord and screw it onto the outlet terminal that has the silver screws. Take the black wire from the power cord and twist it together with one of the two black wires coming from the dimmer. Connect the other black dimmer wire to the outlet on the side that has the gold screws. Save the spare 4-inch black and white wires for a later modification that will give you a second outlet that is always on. Screw the dimmer and outlet into the box using the two screws attached to each one, and then place the switch cover plate over the dimmer and outlet and attach it with the screws provided with the plate.

Part of the beauty of this project is that the extra parts, such as the screws and wire nuts, are already provided with the main parts. Be sure to double-check your wiring before placing the cover over your assembly. Also, some of the plastic outlet boxes have "dog ears" with nails so that the box can be attached to wall studs. Those can easily be removed with a hacksaw or rotary tool.

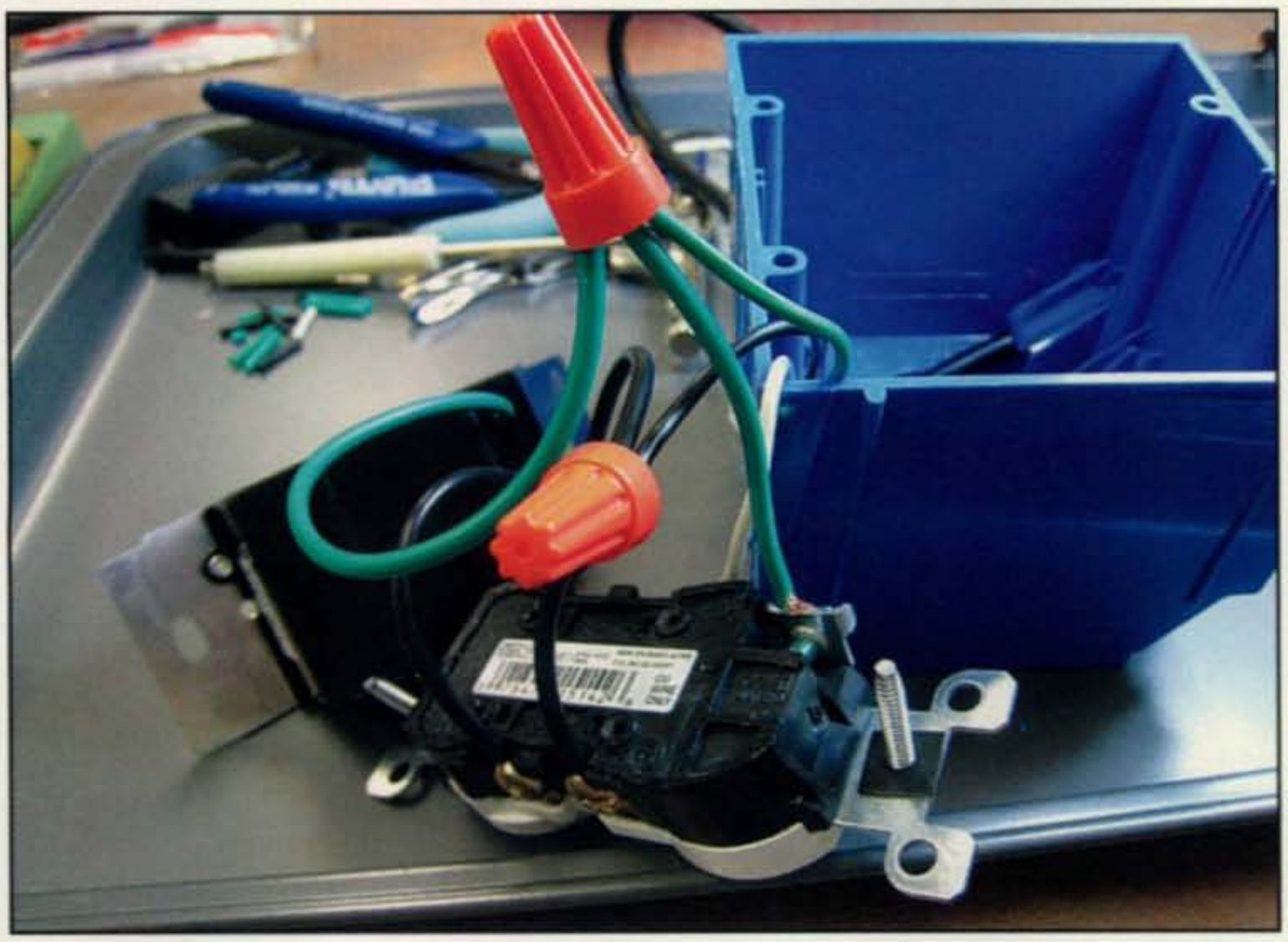
To use it is simple. Just plug in your assembled project and then plug your soldering iron into the wall outlet next to the dimmer and turn the dimmer up all the way to give it maximum power. Then, after your iron warms up, dial the dimmer down so that it does not overheat when not in use, and turn it up when soldering. Feel free to use a pencil or marker to put marks on the faceplate to show where your ideal dial positions are after trying it out. Be sure to keep your soldering-iron tip clean and enjoy your new adjustable soldering iron!

A Modification

An easy modification to this useful device is to break the copper link between the two gold screws on the side of the outlet where you have attached the black wire. It usually breaks quite easily using pliers to bend it. This separates the hot side of the two outlets. Now attach one end of a 4-inch black wire to the unused screw terminal next to the one that already has the black



Outlet with ground, neutral, and hot wires attached.



Dimmer and outlet completely wired to power cord using only two wire nuts and wired to allow for one unswitched outlet.

wire. Then attach the other end of the 4-inch black wire to the wire nut connection that has the black wire that comes from the power cord and connects to one of the black dimmer wires, making a connection of three black wires in the wire nut. Now you have one outlet that is variable and another which is always hot at full power no matter the setting of the dimmer switch. This can be useful to connect test equipment, a desoldering tool, or the finished kit you are working on if it requires AC power. Be sure to label your two outlets so you can remember which one is variable and which is always hot!

I want to thank Ray McNally, N5SEZ, for putting together the kits we used at our HBQRP meeting and for doing the legwork to put this nice project together for HBQRP and the 4-State QRP group. Until next time . . .

73 de Joe, KØNEB

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

AT-100ProII

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

Z-11ProII

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

radio not included

Z-817

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

Did you know that we have tuner that will work for you?

Some people don't know that we make tuners that will work with any transceiver. Don't know which one is right for you? Give us a call or see the Tuner Comparison Chart on our web site for more selection help!

radio not included

AT-897Plus for the Yaesu FT-897

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

AT-600Pro

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

Z-100Plus

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

LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685 ***Phone 410-586-2177 • Fax 410-586-8475***

The #1 Line of Autotuners!

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***

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

AT-200Pro

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

NEW! YT-450

LDG's newest tuner is specially designed for Yaesu's newest 100 watt radios. The YT-450 interfaces directly with the Yaesu FT-450 and FT-950 radios, making integration easier than ever. Simply connect the tuner to the radio with the supplied cables and you are ready to operate. DC power and all control is done through the interface cable. Just press the tune button on the tuner and the rest happens automatically: mode and power are set, a tune cycle runs and the radio is returned to its original settings. It will quickly match nearly any kind of coax fed antenna with an SWR of up to 10:1. 2000 memories recall settings in an instant! An extra CAT port on the back allows seamless connection to a PC. You have the newest radio, now get the newest tuner to go with it!
Suggested Price $249.99

IT-100

Matched in size to the IC-7000 and IC-706, the new IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. It's the perfect complement to your Icom radio that is AH3 or AH-4 compatible.
Suggested Price $179.99

KT-100

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

YT-100

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

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LDG

antennas

BY KENT BRITAIN,* WA5VJB

More on Ground Radials plus Log Periodics

This month the column might be used as evidence of ADD (attention deficit disorder) in this columnist, but we are going to be visiting a variety of topics.

The letter in the last column about ground radials brought up a whole new batch of comments and questions. First was the concept of a 1/4-wave radial. A 1/4-wave radial is a lot harder to determine than some of our readers seem to think. As an example, let's start with a 1/4-wave radial at 7.1 MHz. Seems simple enough. At 7.1 MHz a radio wave is 299,792,458 meters/sec., or 7,100,000 cycles/sec., or 42.224 meters.

At this point I wish to apologize to any long-time readers. I hate taking math to this level and think anyone who published that their antenna elements should be measured to .0001 inch needs to have his or her scientific calculator taken away and whacked firmly over the head with a pocket slide rule! I had planned to get out there with my TDR (time domain reflectometer) and actually measure some ground radials, but I wimped out in the freezing weather. Heck, the dielectric constant of water changes from Er = 80 to Er = 9 when it freezes. How about that for an excuse?

So does my 1/4-wave radial or antenna element need to be 42.224/4, or 10.55 meters long? No! A thin wire has inductance, and this inductance along even a straight wire slows down the wave. This slowing down, or velocity factor of the wire, varies with the gauge of the wire, but is about 95%. If you have ever tried to work out the classic equation for a half-wave dipole using your high school physics book, that 468/MHz equation doesn't quite work out. That 95% fudge factor is already calculated in, and even the 468 is just an approximation.

The classic formula will get you close, but again, the gauge of the wire, insulation on the wire, and mounting height will change the final frequency. That's why we have SWR meters and can tweak the antenna for our favorite frequency.

However, now back to our 10.55-meter long, 1/4-wave radial at 7.1 MHz.

At this point I want to apologize for the diagrams. The only program I had that would do a good job of looking at a buried radial as a transmission line is written in DOS and thinks it is outputting to a dot matrix printer.

Fig. 1 shows a network analyzer response for an elevated radial 10.55 meters long and 2 feet off the ground. It is a tuned radial with a nice resonance at 7.1 MHz.

In fig. 2, the radial is lying on top of the ground. Can you imagine a section of coax using dirt as the center insulator as shown in fig. 3? What are the conductivity, dielectric constant, and loss tangent of this coax separator? Also, the electrical properties of dirt vary wildly across the U.S. and even vary with the seasons. The dielectric properties of the dirt has changed the velocity factor of the wire from .95 to about .80, and the resonant frequency of the radial is now down near 6 MHz just by lowering the wire to the ground. Also note the width of the low SWR curve—quite a lot of bandwidth.

Here's why the idea of resonant buried radials really doesn't matter! In fig. 4, the radial is buried two inches underground. Now the velocity factor of this very dirty transmission line is about .6 and the same 10.55-meter radial is now sort of reso-

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

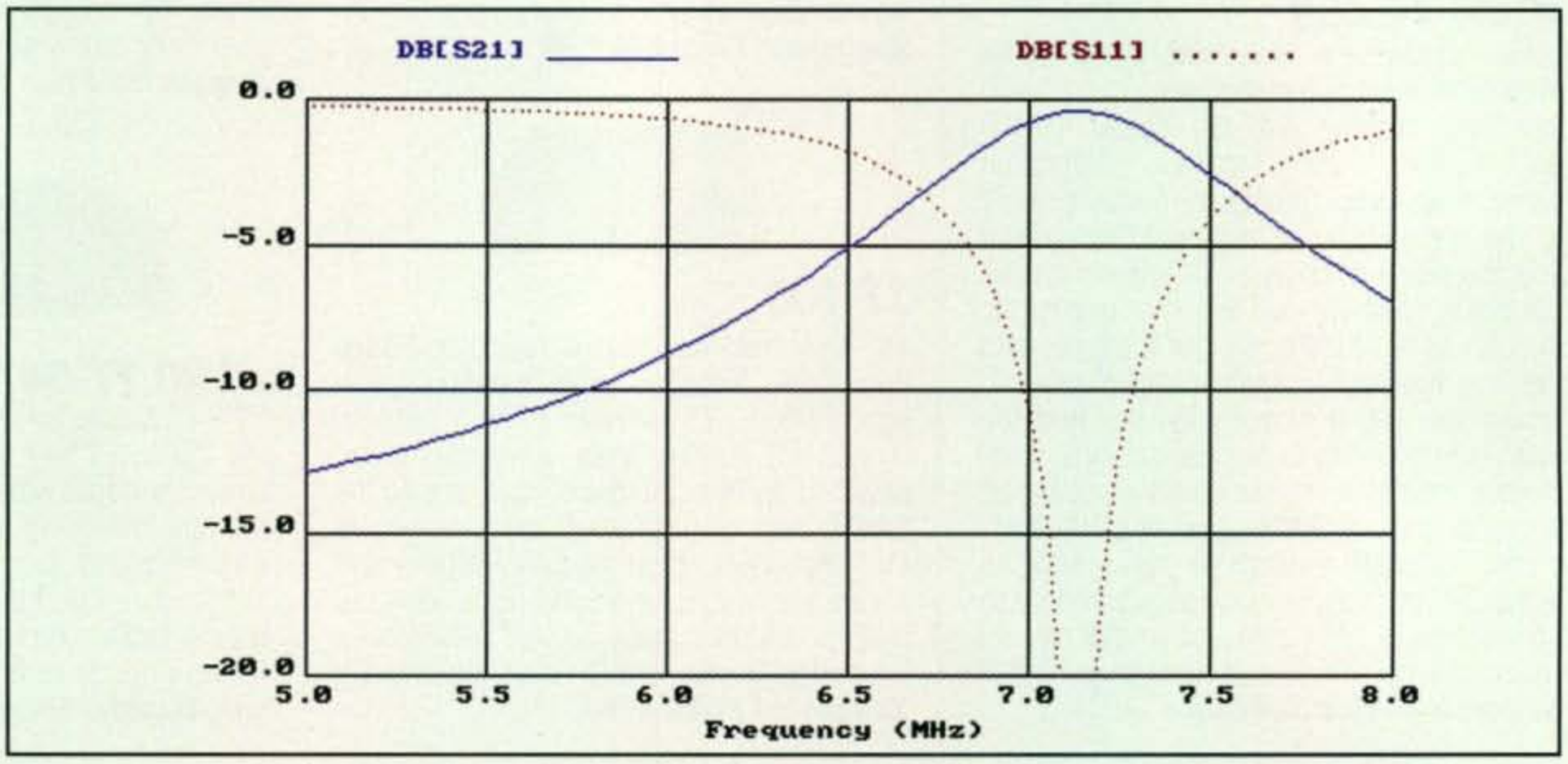

Fig. 1– Tuned radial response (for an elevated radial).

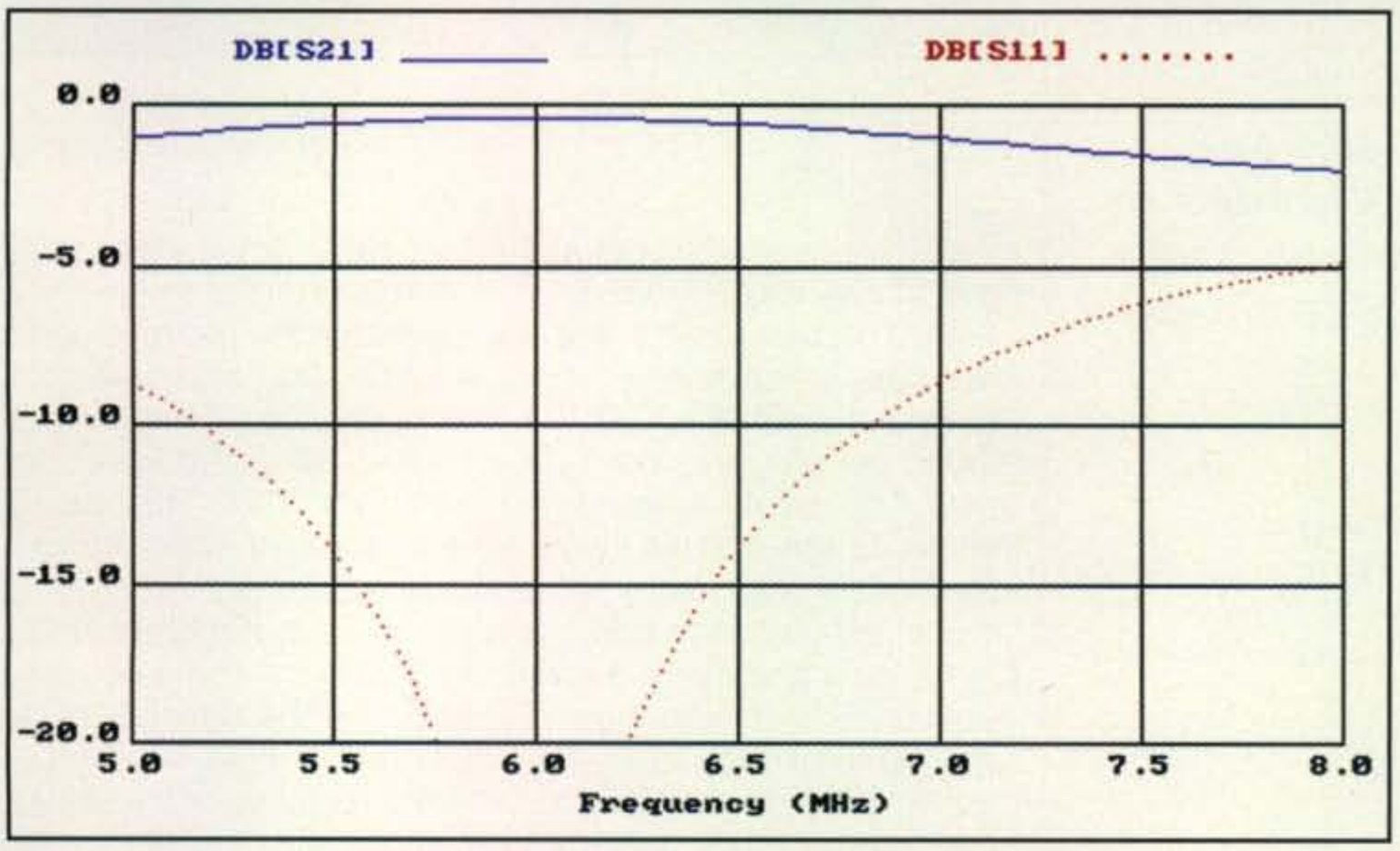

Fig. 2– Response of a ground radial on the dirt.

nant at 5 MHz. However, look at the resonance curve; there really just isn't any.

The radial is so lossy that it has no chance to build up a resonance. Like putting your 2-meter antenna at the end of 500 feet of RG-58, it always has a good SWR no matter what you do to the antenna.

In the AM broadcast community, I have never heard the idea of resonant earth radials ever mentioned or tested for. At one AM station I worked for, we did have some water sprinklers out there and had been known to turn on the water until the antenna current meter came up to full power.

A modest number of buried radials close to 1/4-wave on the lowest band you plan to work will also work fine on all the higher bands. More radials are

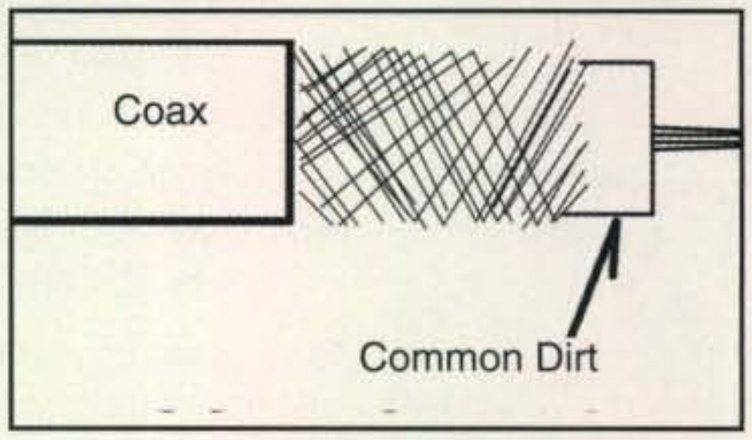

Fig. 3– Dirty coax.

better, longer is better, but their exact length is not important.

Grounds and Resonant Frequency

Some years ago, I ran a 75-meter net and really got carried away adding radials to my vertical. I ended up with somewhere between 300 and 400 radials out there. Most were short, but at least two were 200 feet long. As I added more ground radials, I noticed that the SWR dip of the vertical would move down in frequency several kHz. Have others seen this as well?

Metallic Ions

As ground wires age in the soil, there are two factors at work. First is the metallic ion migration from the wire into

the soil as shown in fig. 5. Over a period of years this migration improves the conductivity of the soil. At the same time, though, oxides form on the wire, reducing the conductivity between the wire and the soil. Most of my ground radials are insulated. Insulated wire works just fine.

There is a lot of capacitance between the wire and the soil, so RF-wise, the wires all are grounded. I do believe in having a few non-insulated wires just to give the vertical a good DC ground for static and lightning issues.

Log Periodics and the 4-meter Band in Europe

I got a pretty good deal last week on a used 90–1500 MHz log-periodic antenna … and a whole bunch of material for more columns.

With a log periodic, and a Yagi for that matter, the phase of the RF current reverses in each element as shown in fig. 6. It's not exactly 180 degrees, but close. How well this current and its phase are controlled in the elements is how modern computer programs can calculate gain and patterns. Adjusting these factors is how the gain or pattern of an antenna can be optimized.

In the antenna books, the connections between log-periodic elements often are drawn as shown in fig. 7 to make this phase reversal between elements very clear. While the back elements were correctly assembled on my "good deal" antenna, the front elements are shown in photo A. To put it politely, this antenna had never worked above 400 MHz or so. Well, it has "worked," but more as a bent coat hanger than a beam antenna. I mention this because I have seen this assembly

Photo A– "Good deal" log-periodic elements.

Photo B– Properly phased log-periodic elements.

mistake several times before. For log periodics, the elements have to alternate phase, like the one in photo B.

While on the subject, with log periodics the center booms are a parallel transmission line, much like 300-ohm twin lead, but typically with a 100–120-ohm impedance. In this case, if the log periodic was being used at 146 MHz, the lower frequency elements between 200 MHz and 1500 MHz would look capacitive and the elements would bring the boom/transmission line down from 120 ohms to 50 ohms.

Now, my plan is to add a few elements to the back of this log periodic and move it down to 70 MHz for some possible 4-meter *F*-layer openings to Europe as the sunspot cycle picks up. Using my 2EØVAA call, I have worked 4 meters in the UK, but 2EØVAA/W5 on 70.1 MHz might raise a few eyebrows at the FCC—then again, maybe not. There is a big push to allow "unused" TV channels to become data services. These are known as "white spaces." Depending on how the FCC rules are written, it may be possible for hams to share TV Channel 4 in areas that do not have a TV Channel 4. This would be very similar to our shared use of the 902-, 2400-, and 5800-MHz bands with RFID, WiFi, and other data services.

I was involved in some early tests putting TV antennas inside laptop computers to pick up HDTV, and the results were very poor. The computers were jamming the TV signals, *but they pass FCC testing*! FCC compliance testing says that the emissions from the device will not unduly interfere

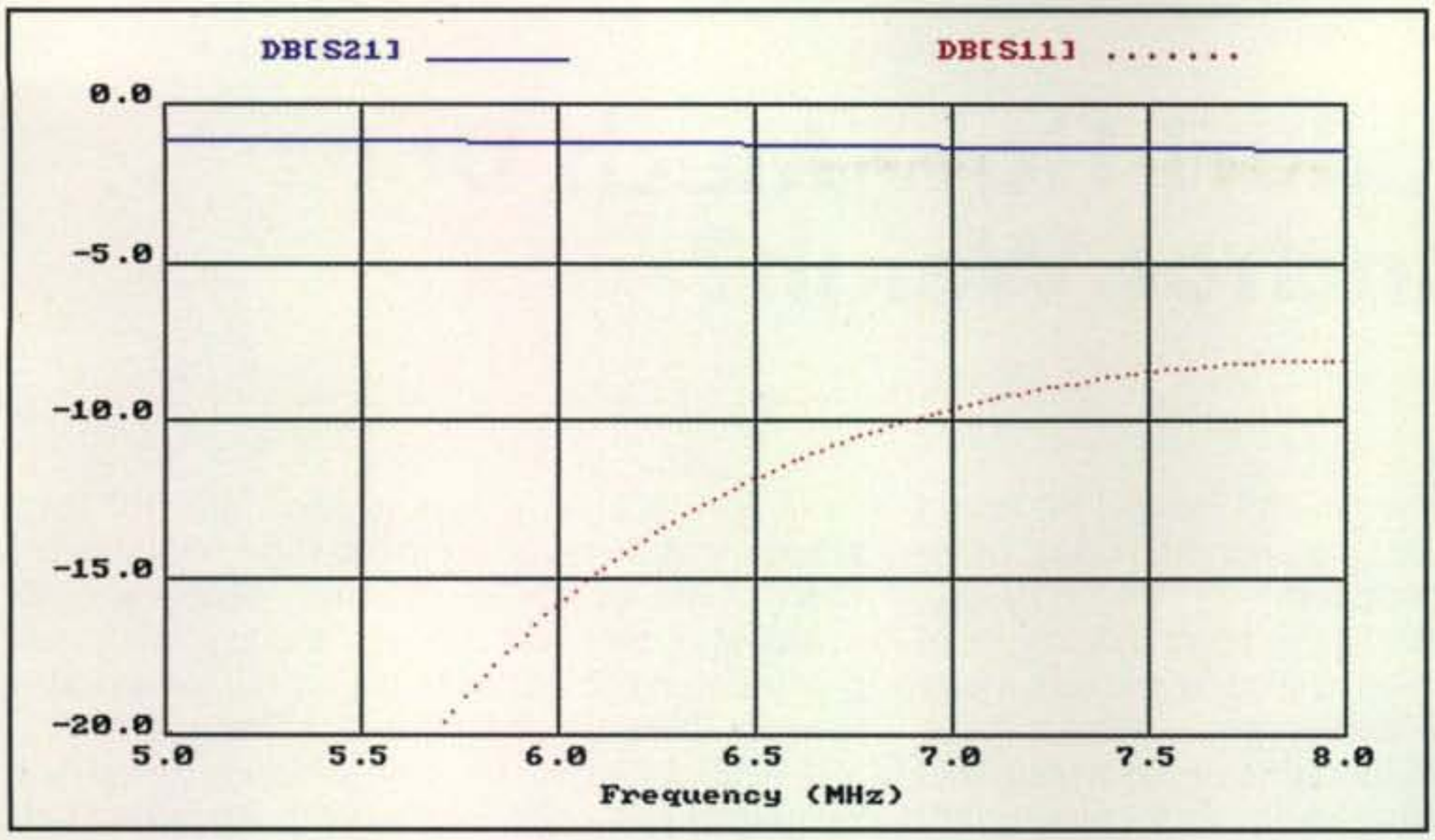

Fig. 4– Response of a buried ground radial.

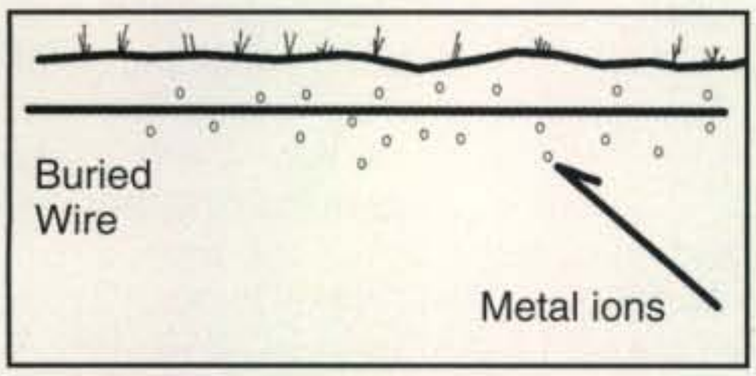

Fig. 5– Metallic-ion migration.

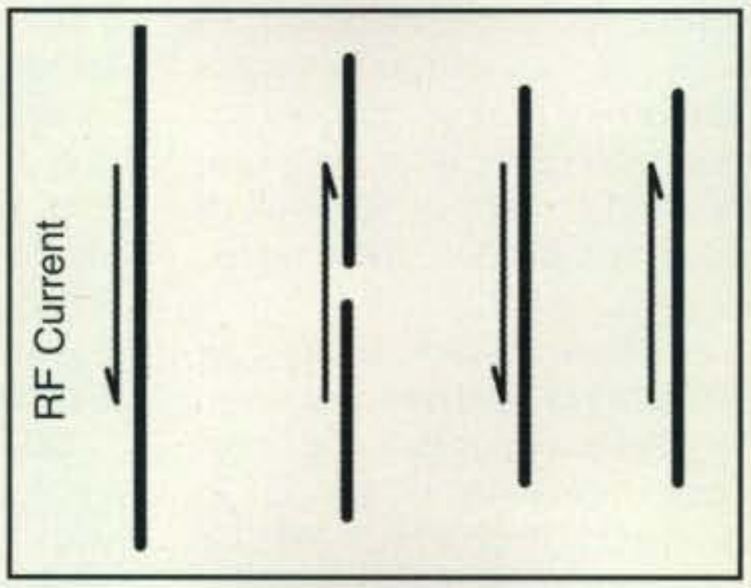

Fig. 6– Current phase-reversal in log periodic and Yagi elements.

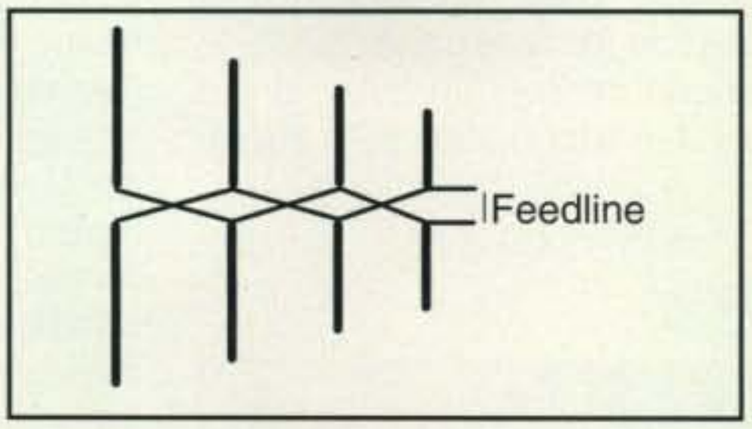

Fig. 7– Log-periodic elements.

with a TV set 3 meters away. The problem is very different when the TV antenna is inside the computer.

You have lots of clock oscillators with spurs all over the place. However, the big culprit is the RAM memory, with billions and billions of little capacitors that are constantly being refreshed. The result is broadband white noise from 400 MHz to 1000 MHz.

In short, the laptop computers can't tell if there is a TV transmitter on that frequency or not. It looks like users will have to use a geographical lookup table with their white-space data services.

Back to the Mailbag...

From Everett, we received a question about using an ohmmeter to find water in coax.

Yes, pure water is an insulator that does not conduct electricity, but it is very difficult to find water that pure in the world. Any time water comes in contact with air, it picks up a little bit of CO^2. Now you have a weak solution of carbonic acid that will conduct electricity. If you have a coaxial cable with a solid extruded insulation, such as RG-8 or RG-58, there is very little conductivity between the shield and the center conductor, even when wet. The weak link is at the connectors, which is where the water can get between two metallic conductors. That weak solution of acid will show conductivity with an ohmmeter.

As always we welcome your questions and topic suggestions. Just drop a snail mail to my QRZ.com address or an e-mail to <wa5vjb@cq-amateur-radio.com>. As for that loading-coil suggestion from California, it looks like we will need to wait until room-temperature superconducting wire is available. For other antenna articles and projects you are welcome to visit <www.wa5vjb.com>.

73, Kent, WA5VJB

learning curve

BY RICH ARLAND,* K7SZ

Hey, Sailor! How Much Does Your Anchor Weigh?

Ah, a nautical theme, eh? Hardly! Welcome to the world of *boatanchors* (BAs), more accurately described as *really* heavy, tube-type radio gear. That's right; this series of columns will cover the mystical world and allure of antique communications gear. I actually have been having second thoughts about writing this column. After all, who wants to receive death threats from a radio aficionado's mate! Seriously, what we are about to embark upon is a boatanchor restoration project (actually several BA restorations), and while it is fun, let me forewarn you that collecting, restoring, and using boatanchors can be extremely addictive, ultimately culminating in a garage or basement (attic?) full of old, rusty radios awaiting restoration. It happens. . . . Don't say I didn't warn you!

Over the last 15 to 20 years there has been an upsurge in collecting, restoring, and using antique radio gear from the bygone era of early radio communications. What cost hundreds of dollars in 1963 can be found for mere pennies on the dollar today. As hams upgrade their equipment, the older vacuum-tube or early transistor pieces of radio gear many times find their way to hamfest flea-markets or to internet auction houses. Today it is possible to gather the gear to replicate a 1950s–60s Novice station for well under $200!

Many of us "old pharts" who have been in the hobby for a long time have a love affair with equipment from our early days in ham radio/SWLing. When I was first starting in the radio hobby until I was well into my 40s, discretionary income was not available at the Arland household to allow me to procure some of the "treasures" of my radio past—the gear that I lusted for but could never afford.

In 1963, the year I became a Novice class ham, we ham radio newbies were relegated to very narrow slices of 80, 40, and 15 meters, and 2 meters. Our gear could not generate more than 75 watts of input power and had to be crystal (xtal) controlled plus CW only on HF and CW/AM phone on 2 meters. Commercial equipment manufacturers such as E.F. Johnson, Heathkit, World Radio Labs, Eico, etc., offered several transmitters that fit the bill and, of course, receivers galore.

Being a frugal (read that "broke") young lad of 16, I started out with a borrowed BC-453 (ARC-5 Command Set) receiver loaned to me by Mel Sims, W7CIS, one of the local Elmers in my home town of Palouse, Washington. The BC-453 was a military aircraft receiver that was powered by a dynamotor (to get high voltages for the vacuum tubes) from a DC input. A dynamotor was basically a motor/generator device that took a 12- or 24-VDC input and provided several hundred volts of DC on the output to power the vacuum tubes inside the ARC-5 receiver. There is a certain tantalizing ambiance regarding the sound of dynamotors spinning and CW spilling from the speaker of a BC-453. Mom didn't think radios should have motors … little did she know! This 80-meter ARC-5 receiver gave way to a Heathkit HR-10 hambands-only receiver, which I built during Christmas break in 1963. The HR-10 was my first real communications receiver and I was really proud of it. After all, I'd built it myself!

I don't know what happened to my original HR-10. I went off to college after high school and then on to the USAF for 20 years, so the original rig got lost. However, I had the good fortune to find one in very good shape on a table at a ham radio flea-market about 15 years ago. The price, $30, was right, so the old gal came home with me to a place of honor inside my shack!

Before we get into the actual restoration of this rig, let's go over some of the basics fundamentals of receivers. After all, that is what this column is all about—learning about the radio hobby. First, a little history:

A 24-year-old Columbia University undergrad by the name of Ed was the first person to take the Lee DeForest Audion tube and make it do something useful. Although DeForest "invented" the triode tube in 1906, he had really no idea what to

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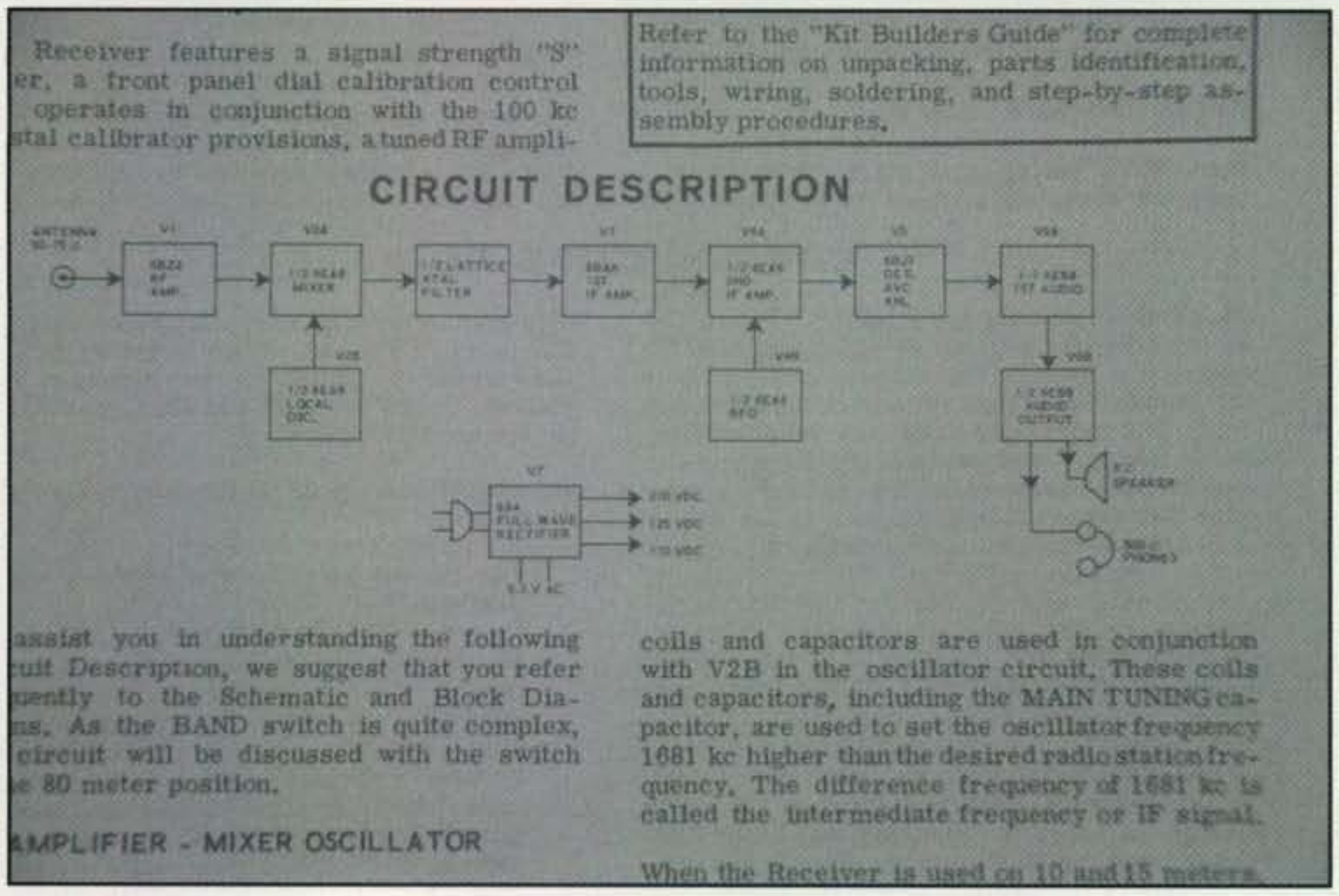
e-mail: <k7sz@live.com>

The Heathkit HR-10 is a nice-looking receiver and, for the time, a good value for the money. This single-conversion superhet was a mainstay for Novice class operators in the mid 1960s.



Receiver features a signal strength "S" er, a front panel dial calibration control operates in conjunction with the 100 kc tal calibrator provisions, a tuned RF ampli-

Refer to the "Kit Builders Guide" for complete information on unpacking, parts identification, tools, wiring, soldering, and step-by-step assembly procedures.

CIRCUIT DESCRIPTION

assist you in understanding the following uit Description, we suggest that you refer ently to the Schematic and Block Diams. As the BAND switch is quite complex, circuit will be discussed with the switch e 80 meter position.

AMPLIFIER - MIXER OSCILLATOR

coils and capacitors are used in conjunction with V2B in the oscillator circuit. These coils and capacitors, including the MAIN TUNING capacitor, are used to set the oscillator frequency 1681 kc higher than the desired radio station frequency. The difference frequency of 1681 kc is called the intermediate frequency or IF signal.

When the Receiver is used on 10 and 15 meters,

The block diagram of the HR-10 receiver. Go to the text for a brief descripiton of each stage.

use it for. Enter Ed; one of the founding fathers of modern radio. The young college student had his "lab" set up in his bedroom, and one evening while experimenting with the Audion triode, he managed to stumble upon a feedback circuit that took power from the output of the tube and fed it back in phase into the input of the tube, which made the tube oscillate! This increased the gain of the tube by several thousand times and became the basis for the regenerative receiver. Here you have a kid, working in his bedroom, making a discovery that ranks right up there with that of the wheel! As he grew older, Ed continued to experiment and gave us the following: the regenerative receiver (1914), the super-regenerative receiver (1922), mixers, superheterodyne receivers (1918), and the real biggie: *frequency modulation* (1933)! Ed's full name was Edwin Howard Armstrong (1890–1954), Major, U.S. Army. Ed worked with David Sarnoff, President of RCA, over the intervening years and produced many valuable patents for that company while simultaneously advancing the state of electronic communications.

We owe a lot to Ed. Even today, virtually every receiver in use from the lowly AM/FM unit in your automobile to satellite and microwave receivers is most certainly a superhetrodyne (superhet) receiver. Talk about a lasting legacy.

Superhet Receiver Stages

Before we delve into the lexicon of terms regarding receivers, we need to list the various receiver stages and describe how they work together. There are at least five major receiver stages in a

superhet radio: a radio frequency (RF) stage, mixer/IF stage(s), local oscillator (LO) stage(s), demodulator stage, and finally an audio frequency (AF) stage. If the receiver is a communications receiver, then there is another stage added: a beat frequency oscillator (BFO) stage. We will examine each of these receiver building blocks as we proceed.

Superhet Stages and What They Do

Radio signals from the antenna are fed via the coaxial cable or feed line into the first receiver stage; the RF amplifier. The RF stage is tuned to the desired input signal and does a couple of things: It amplifies the desired signals and it rejects the ones you don't want to hear. Keeping this stage as a low-noise stage is critical, since noise injected by the RF amp itself will be amplified all along the mixer/IF chain and ultimately by the audio (AF) amp. Low noise: good. High noise: bad! Your main tuning dial is directly connected to the RF stage. Twirl the dial and you change the input frequency to which the RF amp is tuned.

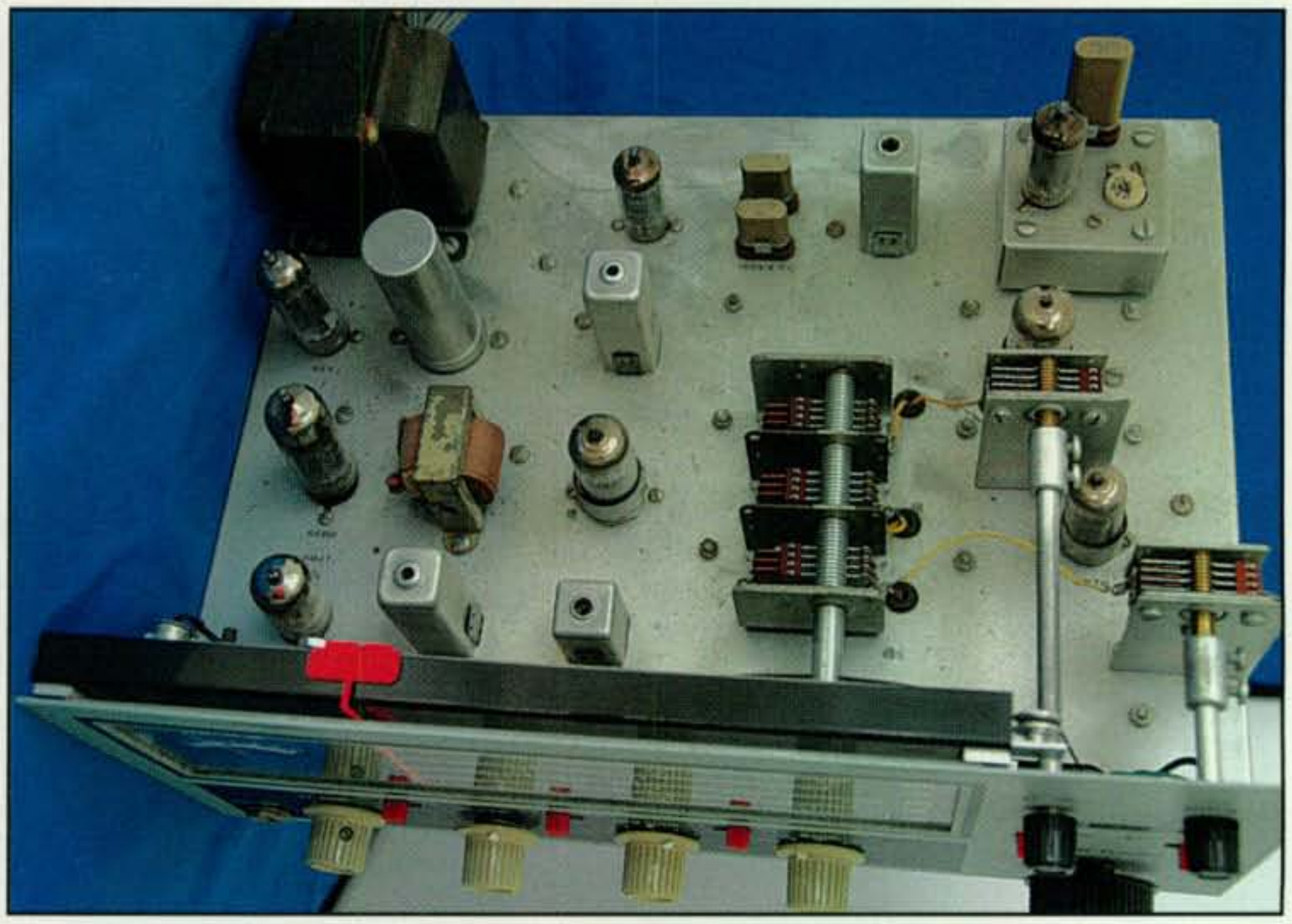
The output of the RF stage is fed into the first mixer stage. Mixers are just that—a stage, be it a vacuum tube, transistor, FET, diode-ring, or integrated circuit (IC), that takes two signals, combines them, and produces an output. The second signal, in this case, is generated by the radio's local oscillator circuit specifically to mix with the incoming RF signal. The really neat thing is that the output consists of the original two input signals and the sum and difference of these two signals. It is very important to remember at this point that all four of these output signals are identical to the original RF input signal; it's just that they are at different frequencies. By careful filtering (crystal, ceramic, or software-defined) you can pick the output you want and amplify it in the IF chain. This is the basis of every superhet receiver in existence.

IF stages can easily be lumped in with the mixer stage since the two are an integral part of the receiving system. The IF amplifiers are designed for medium to high gain at a given frequency and are very linear (the output is exactly like the input signal).

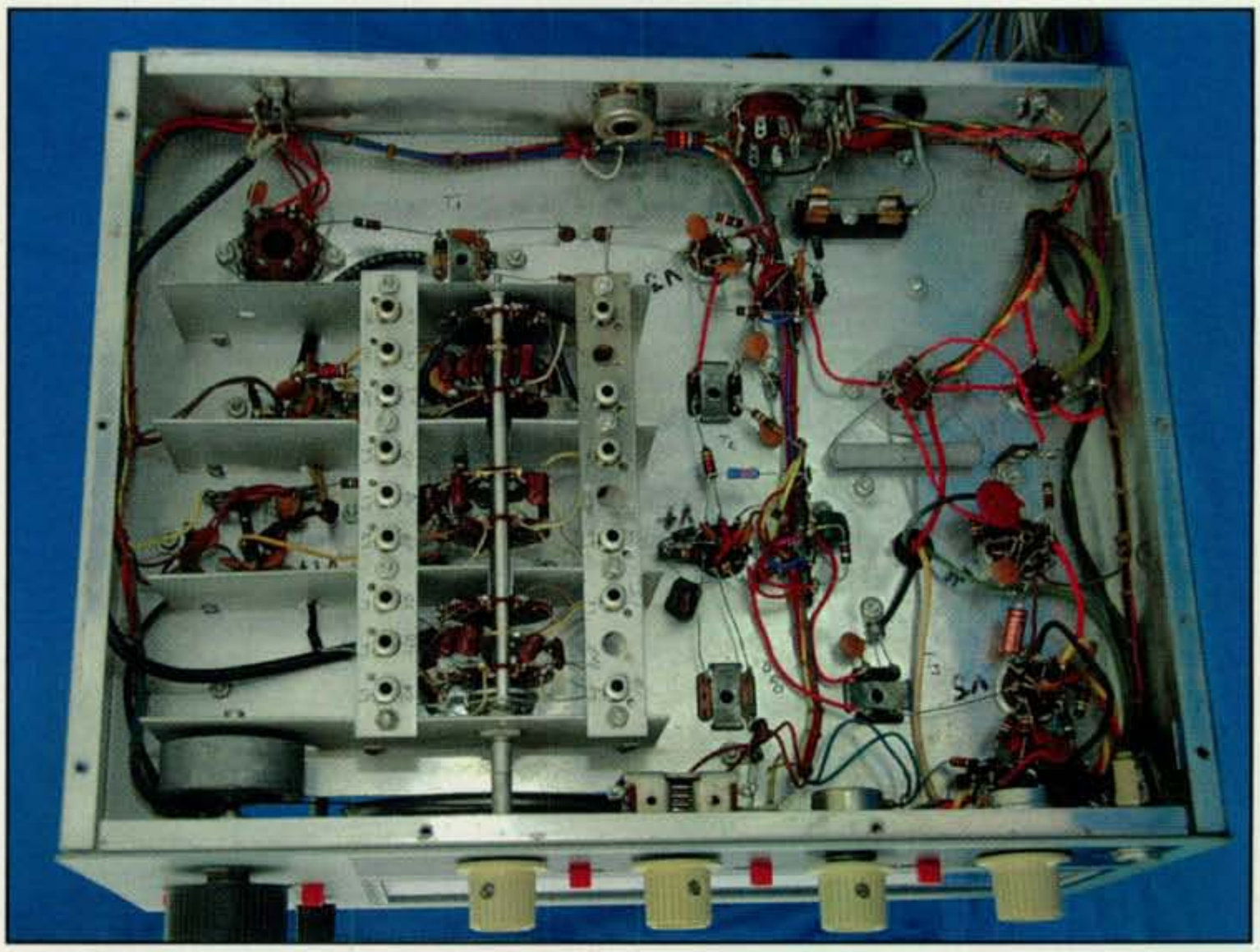
If a receiver has a single mixer it is termed a *single-conversion* superhet, like what is found in the simple all-American five-tube AM radios of the 1940s and '50s along with the low-end entry-level communications receivers on the market in the mid '60s.

If the receiver has two stages of mixers and IF amplifiers, it is then called a *dual-conversion* superhet. Add a third mixing/IF stage and you have a *triple-conversion* receiver. Most of the good receivers on today's market are dual- or triple-conversion units specifically designed to keep the mixing schemes out of the target passband of the receiver. This can sometimes be a lot more difficult than it sounds.

From here the amplified output of the IF stage is fed into the demodulator stage where the information (intelligence?) is retrieved. It is here, also, that the BFO injection is added to receive CW and SSB signals. Since the same intelligence exists on the original RF input signal and the down (or up-converted) IF signal, it is a rather simple process to remove this intelligence so we can understand what is being transmitted. The demod circuitry can be something as simple as a single diode and as complicated as a quadrature



The topside of the HR-10 chassis is uncluttered and well laid out. This receiver is a pleasure to work on.



The underside of the HR-10 shows a clean chassis with a lot of space for modifications and additions.

detector used in FM (yes, superhet receivers are also used in FM modes). Once the demodulation process is done, what is left is audio.

From the output of the demod, the audio signal is fed into the AF amplifier where it is increased to sufficient volume to drive a speaker or headphones. The AF amps are designed for linear operation so minimal distortion is present in the recovered signal.

See, that wasn't too hard to understand, now, was it? Receivers are at the heart of the radio hobby. Designing a good one is complicated. Designing a really good one is very complicated. All these "mixing products" (the signals at the output of each mixer in a receiver) have to be carefully chosen so as not to inject an interfering signal onto the desired band you want to use. So there you have it, the down and dirty on how a superhet works.

There are a number of good texts around on the subject of superhet receivers, so don't be shy, dig in and learn something! Now, on with our Heathkit HR-10 restoration.

The HR-10 Saga Continues

My newly acquired HR-10 was in good cosmetic shape. All the knobs were original, the switches all worked, the radio had the coveted optional 100-kc (kHz) crystal calibrator, the dial cord was still properly strung, and the dial pointer moved freely. All the tubes checked good except one, and I had a replacement on hand from a previous vacuum-tube project.

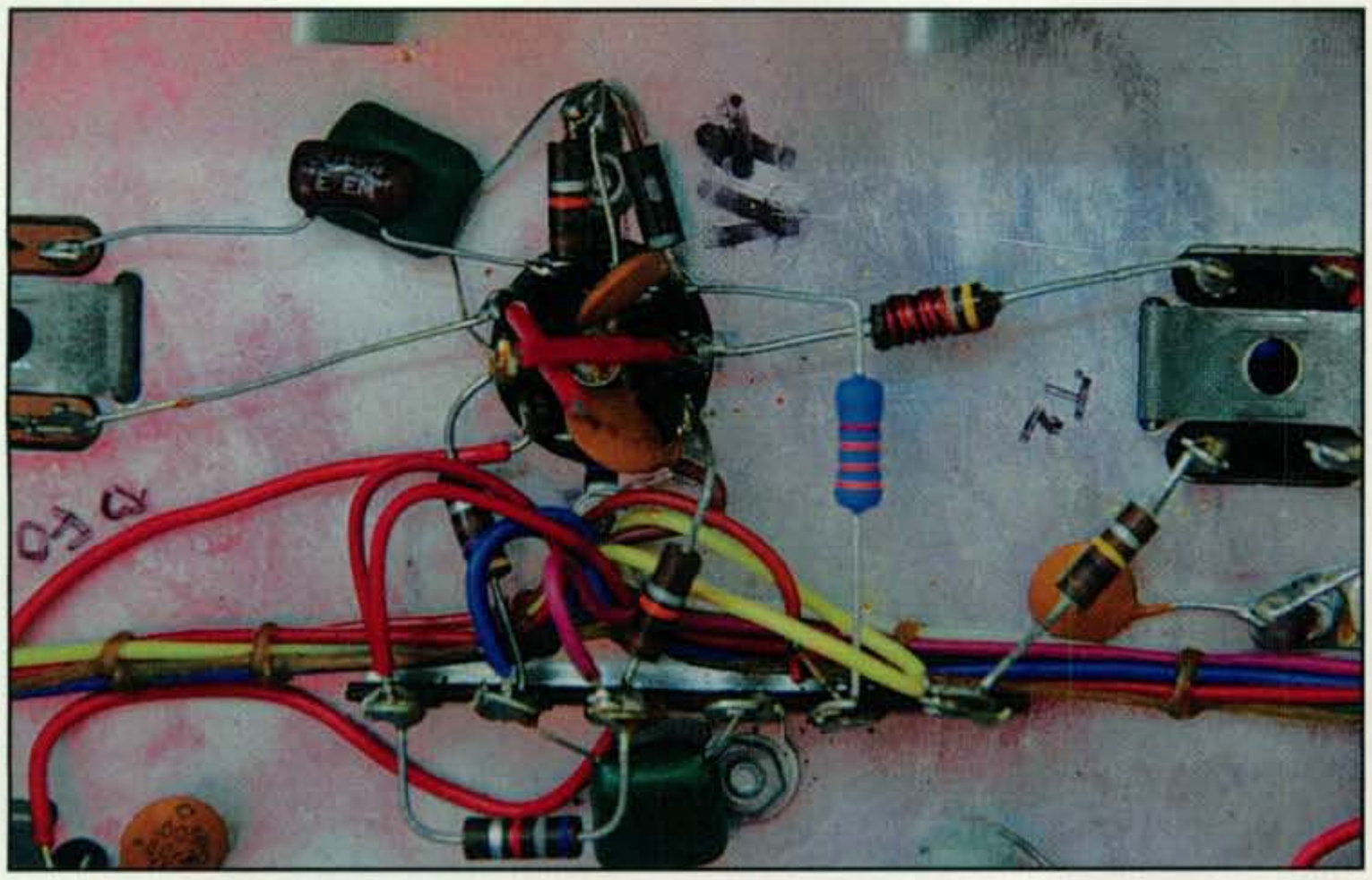
A good overall cleanup was followed by disassembling the entire receiver, pulling all the tubes, removing the knobs, etc. Once fully cleaned (I use a wash of Simple Green and water, which works in about 90% of the cases), it was time to start putting things back together. However, before reassembly, I wanted to do a visual inspection of the underside of the chassis, paying particular attention to bad/poor solder connections, any discolored components, especially resistors, and any bulging electrolytic capacitors, burnt wiring, etc. Often a simple visual inspection using a magnifying glass and a high-intensity lamp can reveal problems that wouldn't be apparent until you powered up the rig. Now is the time to find these anomalies, *not after* you see sparks flying when you flip the switch to the "ON" position!

Carbon Dating, Anyone?

This vintage receiver used carbon-composition resistors which are notorious for going out of tolerance over time. While carbon-comps were the industry standard 50 years ago, they have been virtually eliminated by the carbon-film resistors we use today. This HR-10 was no different, and I ended up replacing several suspect resistors.

To further elaborate on this point, a few years ago I had a Hallicrafters SX-71 SW/ham bands receiver on my bench. The SX-71 was a favorite of mine from the SW radio heyday of the 1950s, and this one had seen some hard use over the years. While the SX-71 was working, it was not working well.

In checking the old carbon-composition resistors with a digital multi-meter, I noticed that fully 95% of them were way out of tolerance! This necessitated removing each offending resistor and installing a new carbon-film resistor in its place. As you can imagine, this took quite a while, but when I fired up the receiver and put it on the HP test generator, the alignment was almost perfect without touching a single adjustment! That is what a little work can do. I was totally amazed at how accurate



The underside of tube V4 shows the Zener diode in place to regulate the B+ voltage.

the 60-year-old SX-71 dial was without any alignment. I love it when a plan comes together!

The HR-10, being a low-end, entry-level radio, suffered from some "warts." Then, as now, there is always a trade-off—performance vs. cost. One of the biggest problems was tuning in a CW/SSB signal accurately without the receiver "blocking" or "pulling" (moving off frequency). Since these old tube rigs are prone to drifting, a little preventive maintenance was in order. I ordered some Zener diodes (these are voltage-stabilization devices) and soldered them into the HV PSU (high-voltage power-supply unit) B+ line to ground to keep the plate and screen voltages from varying and causing the receiver to drift. In my instance I used a 125V/5W Zener to stabilize the B+ line. A 30V/5W Zener was soldered from the cathode (pin 1) of V4 (IF amp/BFO) to ground. In addition, R39 (the BFO plate load resistor) was changed to a 33K-ohm/1W resistor which tamed the BFO circuitry. This worked great! All these remedies, by the way, are well-documented on this particular radio and are available in an internet search. The improvement in performance was quite noticeable. Another trick to improved CW and SSB performance is to turn off the automatic volume control (AVC) or automatic gain control (AGC) and back down the RF gain control from maximum to about 3/4 scale. This prevents strong incoming CW/SSB signals from pulling the receiver off frequency. It also makes listening to CW and SSB signals a lot easier.

You'll lose the S-meter reading, but who cares? You can "guestimate" the received signal for the other station's RST report without consulting your S-meter. Setting the audio (AF) gain control and using the RF gain control to actually control the volume of the receiver is another old-timer trick from the days before stable BFOs and product detectors.

The BFO should be very stable, but some of the early low-end radios were plagued by low BFO injection voltage, and the Heathkit HR-10 is no exception. Increasing the injection of the BFO in order to properly demodulate the CW/SSB signals can be done a number of ways, but the most expedient is to tack-solder a small, 3pF-to-10pF disc ceramic capacitor from the output of the BFO to the input of the final IF amplifier stage (between pins 2 and 9 of V4 on the HR-10). This will ensure that enough BFO signal is present to properly demodulate the target signal. Selecting the value of this small capacitor is done via trial-and-error, so you might end up with a larger value than I used in some cases. All that really matters is that there is ample BFO injection voltage available to do the job of demodulating the CW/SSB intelligence.

That is a wrap for this time, gang. Next month we will take an in-depth look at the Heathkit HR-10 ham bands receiver circa 1963 and provide some tips on restoring it or any other vintage boatanchor receiver.

Vy 73, Rich, K7SZ

SUCH A HAM

If it wasn't for our mutual intolerance for each other, Stan, your ham radio hobby would never have worked out.

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kids' korner

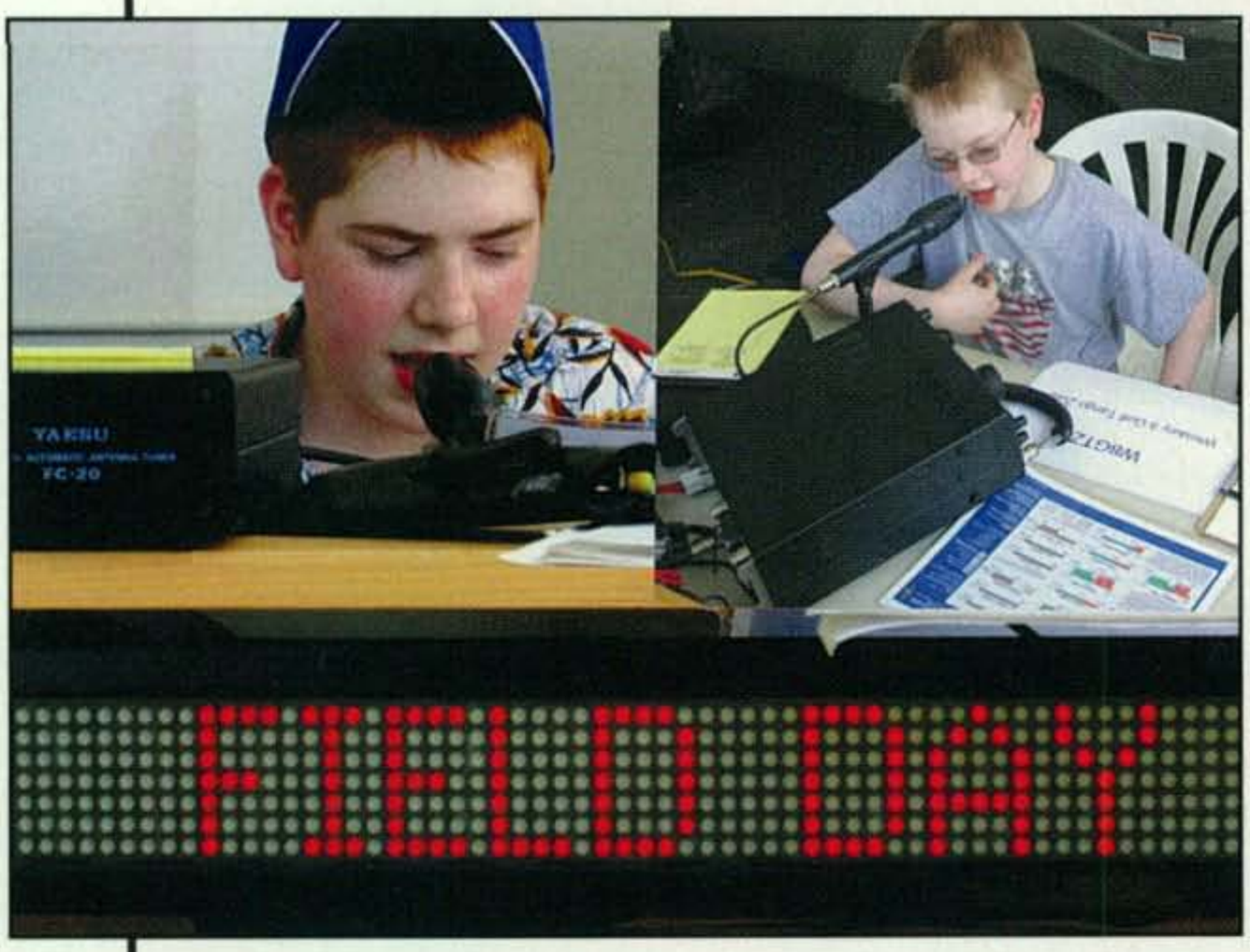
BY BRITTANY DECKER,* KB1OGL

Introducing the WK1RK Kids Club

To kick off the first "Kids' Korner" column of 2011, I thought I'd take a look at a different kind of amateur radio club. In the past, I've looked into various clubs—scouting clubs, kids' clubs that reach internationally, and clubs that are prospering and growing in membership. However, I thought it would be interesting to look at how a club, especially a kids' club, grows into being many members strong and well-known, such as the YACHT Club. The WK1RK Kids Club is only three months old. For a club in its earliest stages, I was really taken by surprise at the great ideas that they have.

Phillip Nichols, N8AYE, an experienced and devoted amateur radio operator, is the founder of the WK1RK club. Phillip, being introduced to radio by a friend of his when he was young but not taking interest, didn't get his start in radio until he had his first child. He had always been interested in radio and computers, too, but didn't get the drive to get his license until that time. He set out to get his Tech Plus, which led to his General, to his Advanced, and with the inspiration of his son, he got his Extra as well. Not only is Phillip licensed, but his four kids are, too! It is immediately apparent how he got them all interested: Ham radio has been present for his enjoyment right when he needs it!

*c/o CQ magazine



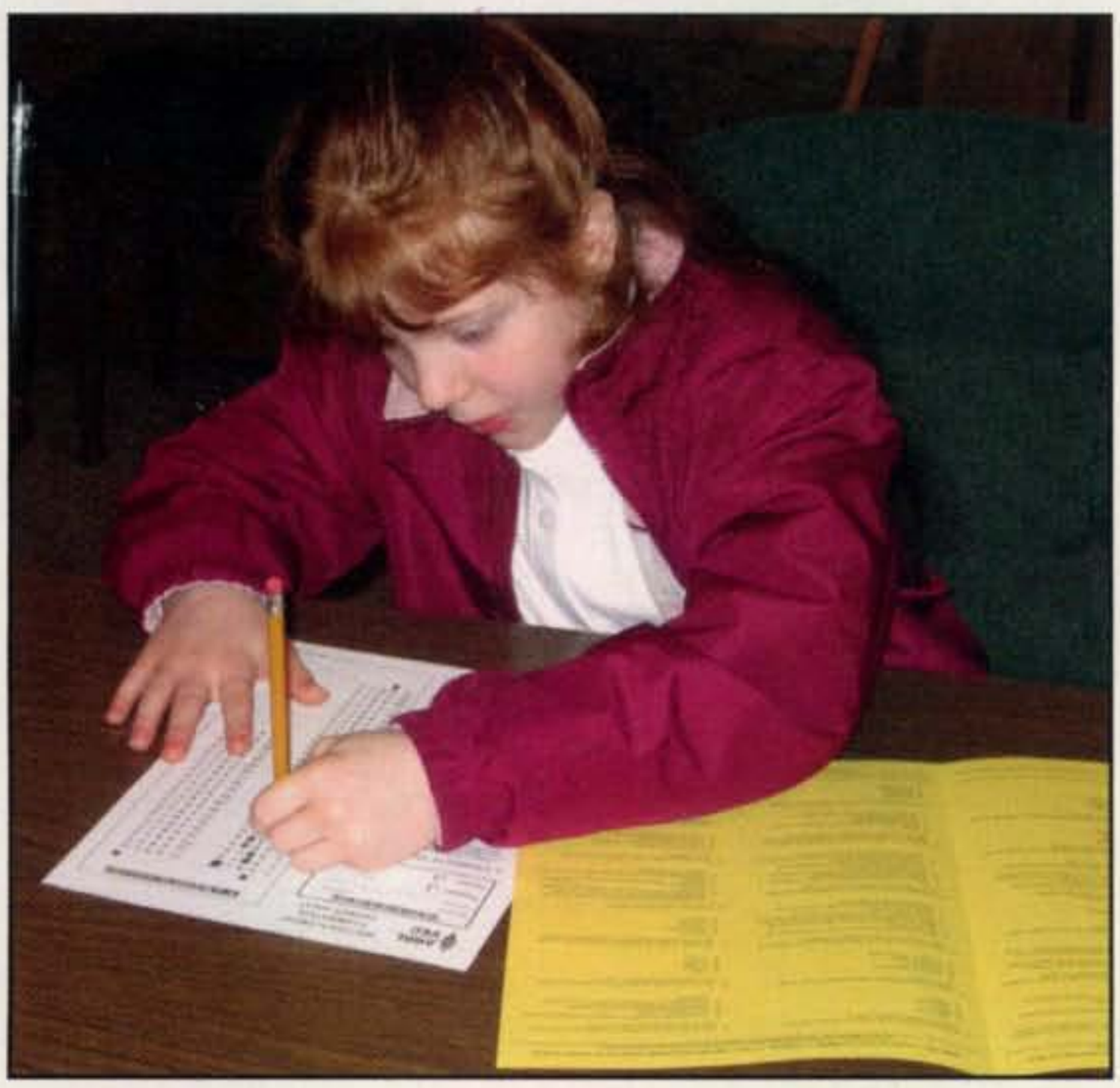
The two youngest Nichols boys, 14-year-old Joseph, KD8NYC (left), and 11-year-old Michael, KD8OEV (right), operating Field Day last June.

"Well, in the winter of 1996 when my second son was born, we needed extra income," Phillip explained. "I had already spent years working at a dealership as a mechanic and driver, and later on a CDL (commercial driver's license) allowed me to drive a school bus. I like driving for relaxation and entertainment. I got a temporary job driving for a transport company until my main job resumed. I had a Yaesu FT-11 and a mag-mount antenna. These went with me from Detroit to Lansing to Ypsilanti—five days a week. I set up a string of repeaters and passed away the hours making friends. It made those hours of constant driving in winter wonderland enjoyable!

"My favorite was once in the summer of 1996 (before the previous story) when two friends from church invited me to the Michigan International Speedway for some major event. My oldest son Joshua (now KD8GOF) was with me. He was five years old and thought cars were just cool! I had no cell phone in those days (most of us did not) and so my HT plus phone patch was my casual and emergency communication. I enjoyed my radio for scanning as well as communication. I always have a string of public-safety frequencies in memory and added racing as well on this day. I have not been a Scout in a long time, but "Be Prepared" is just in my nature! I programmed repeaters along the way and brought a repeater directory in the shoulder bag with all those goodies required by a 5-year-old on a day trip. Good thing, because my friends got *lost*! (Not that they would admit it. They knew where *they* were but not where the speedway was.) APRS would have been handy. I reached out with the mag mount and called the local repeater. Someone answered my call and gave great directions to the speedway, and we had a good time of it there."

Not only has Phillip formed his own ham family, but his four kids—Joshua, KD8GOF (18); Joseph, KD8NYC (14); Michael, KD8OEV (12); and Kathleen, KD8OTM (10)—have helped to form the WK1RK Kids Club. They had been talking to their local club and on local repeaters with parents who began to wish that their own children enjoyed radio as much as Phillip's children did. They decided that a kids' net would really help to generate interest in local kids, and a kids' club would do even better! With the right kind of support, they could start getting all kinds of young people interested in radio. Phillip began to form the WK1RK Kids Club the traditional way, by writing a mission statement, and later asking anyone and everyone for donations and spreading the news about the club and the nets. He finds that it is a challenge getting people on board so far, but is still hopeful.

"I spent many quarters at arcades while they last-



Philip Nichols' daughter Kathleen, then age 9, taking her Technician exam last September. She is now KD8OTM.

ed, but never something this big," Phillip said. "*That* is where children change things. I have sent more e-mails of requests and ads for the kids and their net. I have even called the major radio companies (no help there). All I want is to give these kids and those who follow an alternative to (as my kids put it) videos games and prepackaged media."

Phillip has already begun molding the club with activities and traditions that make each club unique. Within the club, kid members are called Hamlets. The Hamlets are encouraged to help form their own Hamilies—ham radio families. As far as activities, the club already has its own 2-meter repeater net and a global net using IRLP and Echolink.

To help the club grow, Phillip has a few new ideas. The idea that I found the most innovative is one of not only a traditional library of books, but an actual radio library. Members of the WK1RK Kids Club who recently got their licenses may find themselves without money—as kids—and therefore without radios. With generous or humble donations of radios from hams with equipment to spare, the WK1RK Kids Club could lend out these radios to the kids so they could get some on-air experience.

"There are hams out there with unused equipment, such as mobile or HT radios and even ones with APRS ability, and they are not even using them!" exclaims Phillip. "Why not donate them to some kids who would?"

The WK1RK club started with a distinct belief and purpose. Its mission statement says it all: They wish to provide a fun and safe environment for kids to interact socially. They also strongly believe that there needs to be an alternative to the omnipresent "instant" media. Even the members of the WK1RK club agree that their friends are way too interested in the self-focused technology of today (i.e., iPods, Xbox, Nintendo d.s.) to find it interesting to talk to people from other parts of the world. Amateur radio is such a different technology from the current novelties in that it allows you to connect and learn about other people, cultures, and from my experi-

Talk about operating portable, here is Phillip's home setup tied to a chair for easy transport!

ences, languages. An iPod or Xbox will most likely not allow you to talk to someone from Romania and learn that "salut" means "hello" in Romanian. An iPod could never give you a scratchy, vintage-sounding Indian radio show late at night. These are the things that the WK1RK wants to show kids.

In order for the WK1RK Kids Club to grow, it needs a lot of support. The question of how to get more kids involved in amateur radio always comes up, and now, right in front of us, is the opportunity to do something to help. With donations or even support by referring kids to the club or checking into the net yourself or with your own kids, the WK1RK Kids Club could make a lifelong impression of amateur radio on a young ham. Young amateurs who get a good experience as kids are more likely to carry it into their adult lives as a cherished hobby and hopefully pass it on to their own children. As Phillip puts it, "Kids are the future of ham radio!"

To support the WK1RK kids club, contact Phillip Nichols by e-mail at: <wk1rk @cmrk.net> or by snail mail at: WK1RK, c/o Phillip Nichols, 15240 Marlow St., Oak Park, MI 48237. For more information about nets, visit the club website at: <www.cmrk.net/wk1rk>.

73, Brittany, KB1OGL

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BY WAYNE YOSHIDA,* KH6WZ

A Look at Portable Station Operation: A VHF/UHF Rover

One of the most enjoyable aspects of ham radio is our ability to operate our stations just about anywhere we want to go. This is especially useful when your home installation is limited because of antenna restrictions, unfriendly neighbors, or other reasons. The upcoming VHF-and-up contest season combines the interesting propagation modes found on VHF and UHF with nice weather in the spring and summer months. Right now is an excellent time to consider operating VHF and above while out and about.

Recognizing this challenge, and to encourage participation, many VHF radio contests include a mobile, portable, or roving category. For example, the CQ World-Wide VHF Contest in mid-July includes a "rover" and a "hilltopper" category. A rover station is manned by no more than two operators, travels to more than one grid square location, and signs "Rover" or "/R" with just one call-sign. The hilltopper is a single operator, low-power portable category for an all-band entry that operates for a maximum of six hours. The ARRL has several VHF and above contests from June through September.

Operating a roving station can be an enjoyable challenge, and many hams take this to the limit. Photo 1 is a picture of a serious roving VHF contest station from Southern California.

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e-mail: <kh6wz@cq-amateur-radio.com>

The Very First Rule

I have a basic and universal rule for doing projects: Everything that is created or set up must be taken down and put away later. A great example of this rule in action is the yearly display of Christmas lights and decorations that seem to pop up immediately after Thanksgiving and sometimes as early as just after Halloween. I enjoy watching my neighbors go crazy each year as they set up very elaborate lights and special effects in front of their homes for everyone to enjoy. Although I also decorate my house for the holiday

Photo 1– Dave Glenn, N6TEB, likes to operate VHF contests in the rover category. The large vehicle is capable of operating on all bands from 6 meters to 10 GHz. (Photo by Glenn Allen KE6HPZ)

Photo 2– Cramped but efficient, here is the operating position at N6TEB/R. This console is located in the mid-section of the SUV and is usually operated while safely parked on a hilltop. A platform is made from plywood, and is supported by plumbing hardware.

season, I have developed a fast but nice display that takes less than ten minutes to set up and even less to take down and put away.

Therefore, applying the first rule to portable operation equipment, the proper transceiver would maximize the number of bands in one unit. Thus, one of the modern multi-mode, multi-band transceivers that receive and transmit from 160 meters to 70 cm would be an ideal main rig for roving stations. These units usually have enough power to drive an external power amplifier. As a bonus, just about all of these multi-band wonder boxes are amazingly compact and operate from a 12-volt power supply.

Speaking of amplifiers, and our quest to simplify things, we may want to consider amplifiers as optional equipment, best left at home (or at the store). Instead, I suggest that a better investment for nomadic operation would be to get a bigger antenna with higher gain. Remember, an amplifier boosts your transmit capability, but a bigger antenna improves both receive and transmit capability.

Photo 3– This is a rear view of the operating console. Wires and radios, radios and wires, oh my. The units are securely strapped down to each other and to the seat.

While a lot of roving stations use rotators for their vehicle-mounted antennas, an equal number of stations just point their vehicles in the desired signal direction. However, sometimes turning the vehicle is not always safe or practical, so rotating the antennas by hand should always be an option.

Safety First!

Moving antennas by hand takes us to the second rule for portable operation: Safety considerations. Many times, a desirable grid square can be found in precarious locations, such as along a busy highway or a steep cliff. Although it is tempting to make a few more points from places like this, don't be stupid. Stop and think about the difference between one or two points in the contest versus getting injured or getting a traffic ticket. It really should be a no-brainer decision.

Which brings us to another safety factor: Bring a partner to help you while roving. Roving with a partner is safer and more enjoyable.

It is much safer when you have someone in place to guard your equipment while you respond to a "nature call" and must run to the nearest tree or other suitable place. Having a person to navigate while you drive the vehicle is another asset, even if you have a GPS unit by your side.

Station Setups in Compact Quarters

Even when using a multi-mode, multi-band transceiver, there are plenty of other bands to operate during a contest. This means additional equipment, usually in the form of transverters to enable operations on the "even higher" bands past 70 cm.

Take a look at photos 2 and 3, showing views of the N6TEB roving station equipment setup. Small but efficient, there is an operating platform built from pipes and lumber in the mid-section of Dave's vehicle. Almost all of the contacts from the N6TEB roving station are done when safely parked on a hilltop or other location, but sometimes the station can be operated while in motion, when a "co-pilot" is in the vehicle.

Roving stations must also deal with the problem of powering all the equipment safely and must also have a system reliable enough to prevent killing the vehicle starting battery. Many stations bring portable gasoline generators, some use auxiliary automotive batteries, and some guys who like to gamble take power from their vehicles.

The "What Are We Doing?" Hand-Out

An electronic copy of the "What Are We Doing?" hand-out is posted on the San Bernardino Microwave Society (SBMS) website: <http://www.ham-radio.com/sbms/>

What Are We Doing?

Thank you for your interest in our operation. We are radio communications experimenters participating in a nationwide competition on the microwave Amateur Radio (ham) frequencies.

Who are we?

We are licensed amateur radio operators ("hams") and members of the San Bernardino Microwave Society (SBMS). The goal of this contest is to talk to as many other ham radio stations with similar equipment as far away as possible.

Is this legal?

Yes. The Amateur Radio service was created to encourage development of radio communication technology and establish a public service communications force at no charge to citizens or the government.

Is this like CB?

Yes and no. Ham radio is similar in that we use two-way radios and antennas to talk with each other, but hams can communicate using Morse code and computers in addition to voice, and we even have our own satellites. Ham radio requires a license issued by the Federal Communications Commission (FCC) and licensees are required to successfully pass a written test involving electronics theory, radio regulations and operating procedures.

How far can you talk?

We can communicate with other ham stations around the corner or across the globe, depending on a variety of factors that affect the way radio waves travel. The equipment we are using here operates on frequencies that generally follow line-of-sight paths. However, through experimentation, we find that signals can be reflected against objects such as buildings, trees, islands and mountains, to extend the range. Using these techniques, we are able to contact other stations hundreds of miles away.

What kind of radios are you using?

We are builders and experimenters in microwave radio communications. No commercially-built, "off-the-shelf" equipment for these frequencies exists, so we must build our own equipment, or modify commercially-made equipment meant for other communications services, such as cell phone and long-distance telephone.

How much does this equipment cost?

Like any other hobby, people spend as much or as little as they can afford. Most people involved in ham radio spend as much as any serious stereo enthusiast, amateur photographer or woodworker.

Where can I get more information?

More information on ham radio is available from the American Radio Relay League (ARRL): http://www.arrl.org

If you are a licensed ham operator already, and want to try a new challenge, visit the San Bernardino Microwave Society (SBMS). Meetings are held the first Thursday of each month in Corona, California. For more SBMS information, go to: http://www. ham-radio.com/sbms/

I know several rovers who use vehicle power, and they usually run their vehicle continuously when operating the radio gear. I do not recommend this practice, since running the engine at idle for long periods of time will affect the catalytic converter. I have done this in the past, at the expense of replacing the catalytic converter in my car.

Regardless of how you get power for your rigs, it is a good practice to keep an extra starting battery on hand in case something bad happens. Most rare grid squares are in remote places (that's why they're rare!), and you do not want to divert your contest operating time (or someone else's time) to rescue you or jump-start your vehicle during a contest.

Hey Man, What's All that Stuff on Your Truck?

A roving contest station looks like a storm-chasing vehicle, which may or may not be a bad thing. Attracting attention while doing a contest can become a chance to let people know more about ham radio. It can also be an irritating distraction, taking your attention away from the task at hand: Making contest points. Wearing a pair of headphones helps you concentrate and can also help you to ignore the curious on-lookers.

I have mentioned this idea before when discussing operating ham radio in public view, but it is a piece of timeless advice. I always carry a hand-out of printed information on ham radio and what we are doing. This can save a lot of time and is a polite way of moving people away while operating. See the sidebar for a copy of the hand-out. You should change it to include the name and contact information of your radio club.

Keep a copy of your ham license with you along with the hand-out, as well as copies of the rules or even a few copies of your favorite ham radio magazine so you can show it to the local law-enforcement officer when he or she makes an

appearance at your operating site. Make sure you are legally parked, you are not in violation of trespassing or other posted signage, and you are in a safe place well away from traffic. Many cops happen to be hams, too, so don't be surprised if they come to visit you just because they want to know more about your equipment and the contest. *(If a permit is required for using your operating location, be sure to take care of all that well in advance.—ed.)*

Most antenna farms on roving vehicles look like Dave's installation. Basically, there are a lot of antennas in a small bit of space. Mind your local vehicle codes regarding overhead clearance and obstructions. Make double-sure that all of your vehicle head-lights and tail-lights and indicators are in working condition. Obey all traffic laws, including the "basic speed law,"which in many locations means that you must drive below, and not at, the posted speed limit.

As seen in photo 4, the antenna support frame is made of very sturdy steel Uni-Strut and various other masts and fittings. Dave reports that his frame is very sturdy and does not wobble too much at highway speeds, but it takes about eight hours to set up.

In the same photo, part of Paul St. John, N6DN's vehicle can be seen. Paul's antenna support frame is made of Schedule 40 PVC pipe and fittings. While not as sturdy as Dave's all-steel assembly, Paul's setup stays fully assembled in his garage. When it is time to go roving, the entire unit is lifted and put into place on the vehicle roof. It takes only a few minutes to get the antenna system up and ready. Another advantage is the cost and availability of replacement parts; most hardware stores have the proper PVC connectors and pipes for a quick repair. One disadvantage, however, is its inability to survive a contact with low-hanging tree branches.

I hope I have inspired you to consider participating in a VHF contest as a rover. With the upcoming better weather months ahead, this gives you enough time to find a partner, make your plans, and organize your equipment for a fresh ham radio adventure.

73, Wayne, KH6WZ

Photo 4– Dave Glenn, N6TEB, is on the left setting up something on the tripod. Behind him is his rover station, showing the steel antenna support frame. To the right is Paul St. John, N6DN, and his rover antenna system and frame made with PVC plumbing parts.

what's new

BY JOHN WOOD,* WV5J

New Products for Outdoors and Indoors

What's New for March includes a look at a variety of new ham gear, so as always, this time of the year in the Northern Hemisphere begs the question indoors or outdoors? Do you brave the wind chill and head outside to build antennas or take to the hiking trails or sit inside your nice warm ham shack and update your operating position while sipping hot chocolate? Take your choice, but first take a look at "What's New" and some of the indoor and outdoor ham gear that's now available.

Kenwood TH-D72A

First shown as a prototype at the 2010 Dayton Hamvention®, Kenwood has now officially released its TH-D72A amateur handie-talkie (photo A), but in the interim since May, has added to the HT a few cosmetic changes and a load of technology.

The list of electronic features starts with a SiRFstar III high-performance GPS receiver that makes Kenwood's TH-D72A dual-band transceiver compatible with APRS® data communications. Offering position and weather information, the TH-D72A seems tailored for the outdoor enthusiast who enjoys activities such as hiking and trekking.

Additional features of the TH-D72A include: APRS® firmware equipped as standard, USB (Mini-B) port (USB PC programming cable included), Kenwood MCP-4A PC programming software that converts log data to KML file format, Kenwood Sky Command System II compatibility, 5-watt output, compatibility with the ARRL's Travel Plus for Repeaters PC application, simple node access with EchoLink® memory, DX cluster tune (packet cluster), built-in 1200/9600 bps TNC compliant with AX.25 protocol, long operating hours thanks to a high-capacity 1800-mAh lithium-ion rechargeable battery (PB-45L), 1000 memory channels, a stand-alone digipeater, enhanced operating ease and visibility, MIL-STD810 and IP54 weatherproofing, weather alert/RX (US only), power-on message, and cross-tone.

Photo A– The Kenwood TH-D72A dual-band (2 meter and 440 MHz) transceiver is now on the market, and it's loaded with technology.

This advanced package from Kenwood also comes with the option of a GPS-only mode that turns off the transceiver functions and enables the GPS and logging functions to be used for up to 35 hours. It also can save track data in three ways: interval, travel distance, or APRS beacon.

Selling for under $500, you can get a look at the new TH-D72A, its features, and the downloads available from the manufacturer with a visit to <www.kenwoodusa.com>.

New SWR/Wattmeter from Daiwa

Daiwa is now marketing a new 1.8- to 200-MHz cross-needle SWR/power meter that is just as comfortable at a repeater, Field Day, or DXpedition site as it is in the home ham shack. Made to travel and look good doing it is the Daiwa CN-801 HP3 meter (photo B) which can measure average and true PEP readings of up to 3 kilowatts of forward power on a large, easy-to-read mirrored scale while all the time being surrounded and protected by rubber edge guards that are incorporated into its design.

The Daiwa CN-801 HP3 also comes with SO-239 connectors, a power selector (30 watts, 300 watts, and 3 kW), an LED light with on/off switch, and an average or PEP selector switch. This new meter is expected to be available through your favorite ham radio dealer beginning March 1st and its suggested retail price is $209.

Vortex Antennas

Amateurs located around the world, and especially those in the United Kingdom, have a new source for

Photo B– Front view of the new Daiwa CN-801 HP3, a 1.8- to 200-MHz cross-needle SWP/power meter.

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

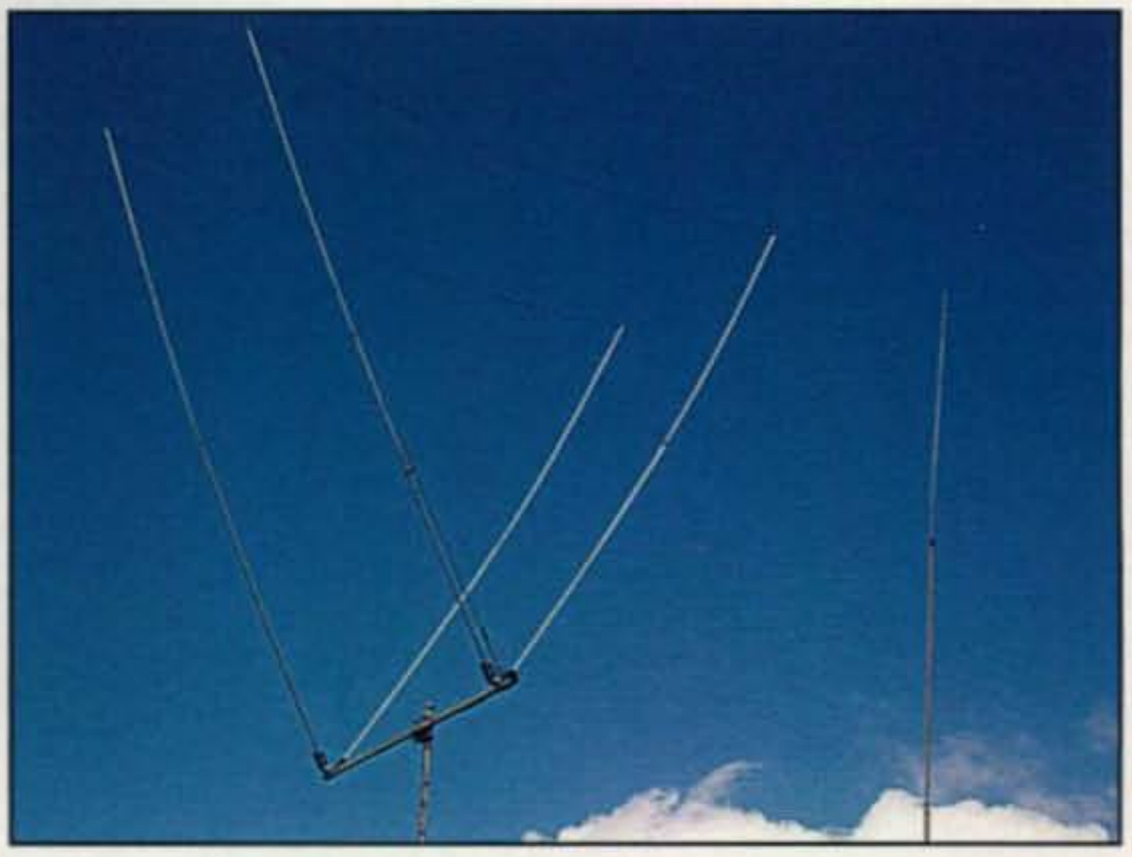


Photo C– Here are a couple of photos of Vortex Antennas Whirlwind series—a two-element delta loop for 10 meters, and a wide spaced, three-element delta loop for 6 meters.

HF antennas in 2011 with the announcement that Vortex Antennas has officially started retail sales of its multiband and monoband antennas and antenna hardware.

Vortex Antennas is owned and operated by Islands On The Air (IOTA) enthusiast Steve Lawman, GØUIH, VK1IAY, and 3D2FI, with an assist from Steve's wife Gail. The antenna products will originate from Steve's workshop near Peterborough, England, and be available on the web at <www.vortex-antennas.co.uk>.

"Following an extended period of R&D, we're very proud to announce the launch of Vortex Antenna Systems to the radio community," Lawman told *CQ*. "At Vortex, we've set out to produce a line-up that will stand the test of time. We've searched many hundreds of potential suppliers and products in the quest for premium-quality hardware and components, which, when combined, are the building blocks of antennas and antenna parts that you can be proud of."

Initially, Lawman plans to produce two main antenna types, the Tornado Yagi and the Whirlwind delta loop (photo C), both in heavy-duty versions. He also hopes to produce some higher frequency models soon and make them available as lightweight versions.

For now, though, the majority of systems will be monobanders from 4 to 30 meters, along with a small selection of multi-band models. Lawman also hopes to expand the multi-band offerings during the next few months.

Lawman further plans to sell his select antenna hardware parts and accessories as a service to hams who like to build their own antennas. His 18-month search for sources of quality materials has enabled him to make available five different diameters of aluminum tubing "that exceed the strength of high-end, aircraft-quality aluminum but still retain excellent corrosion resistance," Lawman said. He added that element clamps have been selected from parts used in the oil and gas industry, and that other clamps—element-to-boom clamps, u-bolts, and saddles—are all Vortex designs made of stainless steel.

For additional information about Vortex Antennas, call Steve Lawman at 07943 871 893, drop him an e-mail at <enquiries@vortexantennas.co.uk>, or visit <www.vortexantennas.co.uk>, where you can also view photos of some of Lawman's current creations.

Aether 1.5 is Now Available

Impatient Mac OS X hams can breathe a sigh of relief, as Open Reel Software has announced that Aether 1.5 logging software for Mac OS X (photo D) is now available.

According to Andrew Madsen, owner and founder of Open Reel Software, the company is dedicated to making Mac applications that provide a great user experience.

"We think software should not only be useful but also a pleasure to use," Madsen told *CQ*. "With our first application, Aether, we have given ham radio operators a logging application with a clean, intuitive interface and features to make logging their contacts convenient and easy without sacrificing power."

Masden calls Aether 1.5 a major update to its popular ham radio logging software for Mac OS X. The application reportedly helps amateur radio operators quickly and easily log contacts while on the air, as well as organize, search, and track contacts later. Aether features an attractive, easy-to-use interface with a number of logging and operating features. Notable new features in Aether 1.5 include LoTW (Logbook of The World) and eQSL.cc integration, and awards tracking. Version 1.5 also sports major new features including the ability to send and receive online QSL cards via LoTW and eQSL.cc with just one click. Also new are features to help operators keep track of their progress towards operating awards and the ability to export a Google Earth KML file to easily view a 3-D map of all the other stations they've contacted on the air.

New QSL management features are also a highlight of Aether 1.5 as well as the instant search of logbooks, automatic callbook lookup, RS-232 based rig control, QSL label printing, full ADIF and Cabrillo import/export support, Google Maps and QRZ.com integration, auto dupe checking, distance and beam-heading calculation and spotlight, mail, address book, and AppleScript support.

Aether 1.5 is designed to function properly on a Mac computer with a G4, G5, or Intel CPU and running Mac OS X version 10.4 Tiger or higher. A serial rig control requires a USB-to-serial adapter.

Aether 1.5 is a free update for existing customers. New licenses are $39 and may be purchased at <www.aetherlog.com>. A fully functional, free demo version of Aether is also available at <www.aetherlog.com>.

The Coherer

At some point, I feel I may regret opening this can of worms, but where my readers are concerned, I'll brave high RF fields, large hamfests, and even occasional editing dilemmas.

So here is the most recent dilemma: If you read the December 2010, "What's New" column, you may have seen a segment where I discussed Piero Begali's coherer (photo E). The segment included a photo. Okay, it was the wrong photo. Glenn Geist, N4HO, called it to my attention in an e-mail (sorry, no prize Glenn for being the first, hi) and *CQ* Editor Rich Moseson accepted the blame.

Then Rich suggested that a portion of a future "What's New" could be used to expound on this little-known device. That was obviously a subtle device that smart editors use to indirectly assign someone, in this case me, to write such a segment.

Okay, Rich, here is what I have been able to determine about the coherer.

As per Glenn Geist's e-mail and the *Encyclopedia Britannica,* the first coherer was invented by a French electrical engineer, Edouard Branly, in 1890, and later improved by Englishman Oliver Lodge before Guglielmo Marconi came up with the idea to use a version of the coherer to, among other things, prove the existence of invisible radio waves to a doubting public.

Now Piero Begali is making a contemporary version of Branly's coherer available to hams and the public through his website at <www.i2rtf.com>. The latter was basically all I was

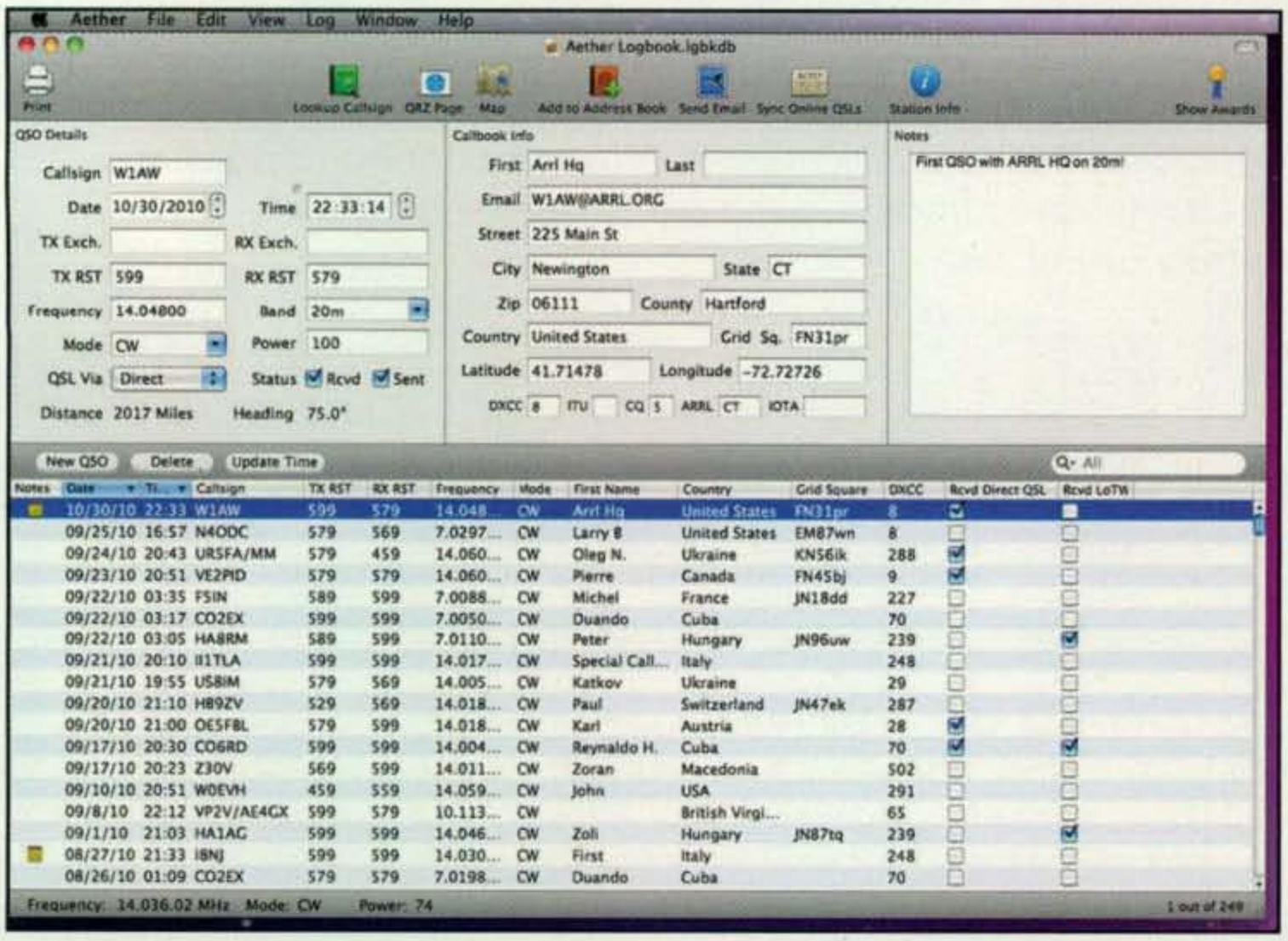


Photo D– Here is a screen shot of Aether, a logging software product from Open Reel Software for Mac OS X users. Open Reel is making its new Aether 1.5 upgrade available through its website at <www.aetherlog.com>.

Photo E– CQ Editor W2VU captured this image of Piero Begali's version of the Coherer at the 2010 Dayton Hamvention®. See text for the full story.

attempting to convey to the readers of "What's New." So if now you are at all curious about the coherer and what it looks like, visit the Begali website <www.i2rtf.com> and click on "Accessories" and also see the correct photo included here with this column (above). Rich, thank you for your help. And to Glenn, N4HO, thanks for your e-mail and for being a reader of "What's New."

One More Thing To Do

Before wrapping up this edition of "What's New," I need to address an e-mail from George Varvitsiotes, K6SV, and vice president of Ham Radio Outlet.

We honored HRO's new website, <www.hamradio.com>, as Website of the Month in our January edition of this column, but gave the wrong web address for the new site in the subhead for the segment. With this, I hope we have corrected that error and just to make sure, we'll honor <www.hamradio.com> again and declare it to be our Website of the Month for March. When you get a spare moment, you should definitely check out this website.

Closing Thoughts

That should do it for this March edition of "What's New." Keep in mind that better weather should be on the way soon, which means conditions should be favorable for repairing or installing ham antennas. If you have antenna projects in mind, please be careful and be sure to enlist some help from a ham buddy or two. And don't forget, *safety first.* That way you'll be around to read my next edition of this column in April. Until then, thanks and . . .

73, John, WV5J

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

vhf plus

BY JOE LYNCH,* N6CL

Thunderstorm Sporadic-*E* Connection Mystery Solved?

For nearly as long as sporadic-*E* has been known as a mode of propagation, there have been hams declaring that thunderstorms cause sporadic-*E* propagation. While some critics have declared that there is no evidence to support such a hypothesis, others have been equally adamant about their experiences of having worked sporadic-*E* during an intense thunderstorm. Maybe the missing link has been unwittingly discovered.

Astrophysicists working with NASA's Fermi Gamma-ray Space Telescope discovered that some of the high-energy gamma-ray photons from the terrestrial gamma-ray flashes (TGFs) were being converted into pairs of electrons and positrons. While their focus is on the antimatter that is being produced during thunderstorms, the resultant electron/positron beam reaches tremendous altitudes. It is my hypothesis that this beam may be what ionizes the ionosphere and results in the highly localized sporadic-*E* propagation.

I am coming to believe that there is more than one source of sporadic-*E* propagation. Even so, this discovery of TGFs may be the key that unlocks the door to the thunderstorm sporadic-*E* connection. For more information on the antimatter story, see: <http://science.nasa.gov/science-news/science-at-nasa/2010/11jan_antimatter/>.

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

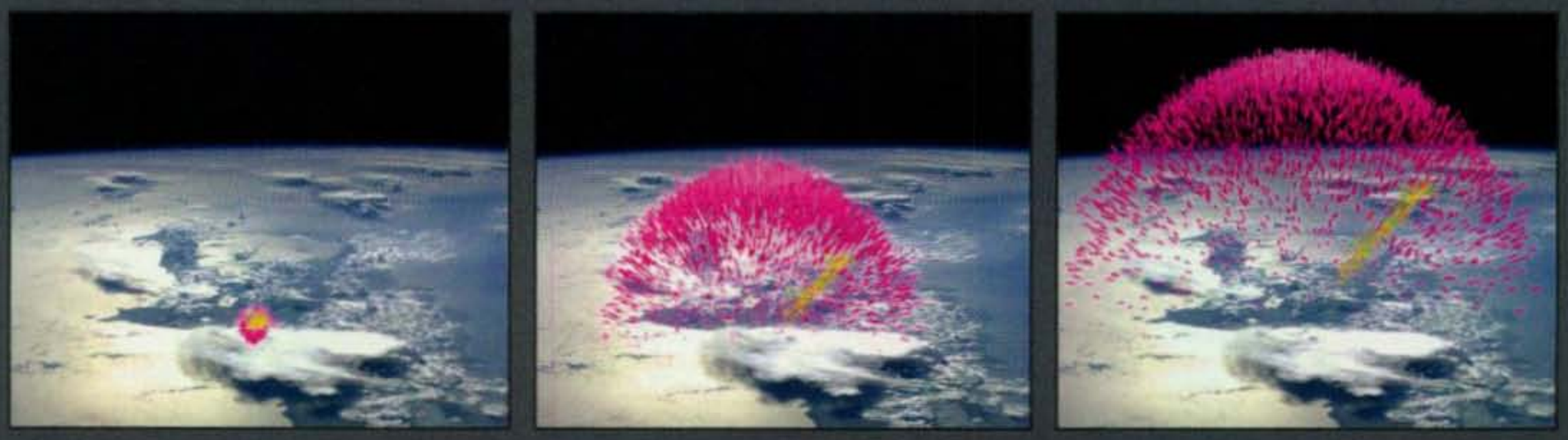
March 4	New Moon
March 6	Moon apogee
March 12	First quarter Moon
March 12–13	First weekend of DUBUS EME contest
March 19	Full Moon
March 19	Moon perigee
March 26	Last quarter Moon

OK1DFC 1296-MHz Meteor-Scatter Experiment and Comments

Earlier this year Zdenek Samek, OK1DFC, ran an experiment with Fedyun Nikolaj, RW6AG, concerning the potential for meteor-scatter (M/S) propagation on 1296 MHz. The following is from Zdenek Samek, OK1DFC:

I have tested WSJT9. FSK441 today with RW7A (RW6AG, Nikolaj) on M/S. Looks that between two big

How thunderstorms launch particle beams into space



1. Electric fields near the top of the storm create an upward-moving avalanche of electrons. When their paths are deflected by molecules in the air, these electrons emit gamma rays, the highest-energy form of light.

These images are based on a TGF simulation by Joseph Dwyer at the Florida Institute of Technology. This frame tracks the gamma rays and particles from a 0.2-millisecond-old TGF that began at an altitude of 9.3 miles (15 km).

2. When gamma-ray energy collides with electrons, they accelerate to near the speed of light. Some gamma rays pass near the nuclei of atoms. When this happens, the gamma ray transforms into an electron and its antiparticle, a positron.

These high-energy electrons and positrons escape into space by spiraling along Earth's magnetic field. In this frame, the TGF is 1.4 milliseconds old.

3. Here the TGF is 1.98 milliseconds old, and its electron/positron beam is reaching altitudes where it may intercept spacecraft, such as NASA's Fermi Gamma-ray Space Telescope.

Fermi's Gamma-ray Burst Monitor detected a signal charateristic of positron annihilation. When a positron collided with an electron on the spacecraft, the two particles transformed into gamma rays.

Credit: NASA/Goddard Space Flight Center/J. Dwyer, Florida Inst. of Technology

This sidebar from the NASA article cited in the text illustrates how the electrons are related upward and downward. (Courtesy of NASA)

guns will be possible M/S on 1296 MHz that works. RW7A has 300W and a 3-meter dish, while I was running 1.5kW and 10-meter dish. We did not work during the peak, because Nick was busy with skeds on 432 MHz. But there we tested short tests with aproximately 15 minutes, and he had 160/1 ping, I had twice 40/1 pings and one 60/1 ping. Necessary is setup on exactly the date and work in the peak of shower.

So I hope to find in the next M/S window any station for testing. I have measured today also Sun noise during an eclipse. With proximately 80% of Moon shadow on the dish I had drop down 5.5 dB. More details soon on my website, because Franta, OK1CA, measured the same time on 2320 MHz.

The following is from Hannes, OE5JFL:

Many years ago I made a test with EA3UM on 1296 during the *Perseids*, but with NIL reflections on both sides. It was also very interesting for me to read about your results about the Sun noise drop during the partial eclipse today morning. It is comparable to the measurements OE5EYM and I made back in 1999 during a total eclipse: <http://www.qsl.net/oe5jfl/eclipse.htm>. So 80% coverage resulted in a 5.5-dB drop and 100% coverage in a 10-dB drop. I look forward to see what OK1CA measured on 13 cm, probably even a deeper dip.

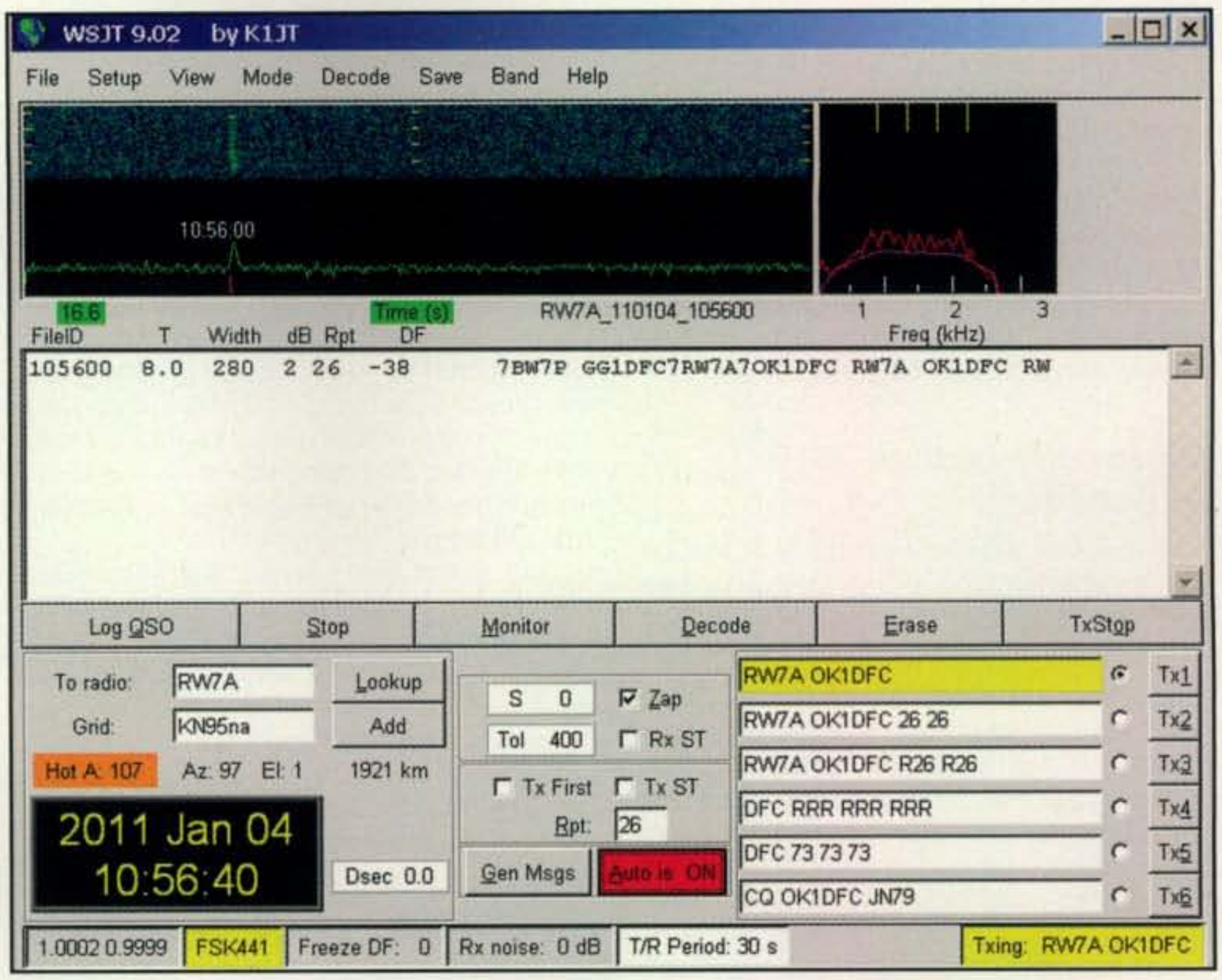
This is from Vladimir Petrzilka, OK1VPZ:

MS QSO on 23 cm would be feasible, I think. Even if it was already the second time, when such MS pings were detected in OK on 23 cm. The first was OK2POI, when he tested MS QSO with F6FHP (QRB 1487 km) last August. On both sides a few hundred watts and about 2-meter dishes with LNA. See: <http://www.ok2kkw.com/ok2poi_f6fhp_23cm_pers2010.png>.

Congrats to Zdenek for such brilliant success. More info about MS reflections on UHF and SHF can be read here: <http://www.ll.mit.edu/publications/journal/pdf/vol12_no1/12_1meteorshower.pdf>. Really mysterious 70 cm QSO (albeit uncompleted) was reported between OK1AIY and ZS6LW (8653 km QRB) in1981. Pavel, OK1AIY, listened about 20 seconds and heard quite loudly ZS6LW on SSB, then the sigs fell down into noise. ZS6LW sigs were as well detected by OK1MWD some 30 km away. The QRB to ZS is even too far for satellite reflection. ... It was probably not TEP propagation, because no typical distortion was observed and it did not happen within sunset time.

The following is from Steve Gross, N4PZ:

I had a 432-MHz MS contact with KØRZ 15 years ago with 20/9 signals on SSB that lasted 45 seconds. The more I think about it the more I think is was not a meteor at all but maybe satellite reflection. 1500 km is way



Screen shot of WSJT showing OK1DFC copying the RW7A callsign.

too far for aircraft scatter. All other 432 MS bursts I have ever heard were no more than pings or very short bursts. Anybody interested in 432 MS schedules on SSB or CW? I have 1500W and 4 big Yagis. That OK-ZS 70-cm propagation almost had to be TEP *(transequatorial propapgation—ed.)* unless it's some unknown means of propagation. Don't laugh. We didn't discover TEP on 144 and 432 until about 30 years ago. Nobody would have ever predicted that either.

Microwave Update 2010 A Success!

The following is excerpted from Gordon West, WB6NOA's article in the Winter 2011 issue of *CQ VHF* magazine:

Last year's MUD (Microwave Update) was held in Cerritos, CA, with well-known microwave enthusiast Pat Coker, N6RMJ. "What a success. More than four countries were represented, 300+ registered attendees, and two days of action-packed seminars in our spacious hotel facility," commented Pat.

The banquet's guest speaker was newly licensed ham Dr. Kate Hutton, K6HTN, with the California Institute of Technology, along with Dr. Peter Lyman, K6PTL, former JPL Director of Interplanetary Communications Group. This was a fitting time for Dr. Hutton's talk, since during daytime that Saturday, Southern California presented its yearly earthquake preparation drill, the Great ShakeOut.

The Don Hilliard Award went to Will, WØOEM, for technical achievement. A second Hilliard Award went to Dick Kolbly, K6HIJ (SK), who was the local legend in helping microwave experts and beginners (like me) over the years. Dick's award was received by Phyllis and Kenneth Kolbly. Phyllis, who performed the huge job of on-site registration, was standing strong and tall, greeting each and every ham when they first hit the registration table. Thanks to Linda and Judy for also being those smiling faces when hams came up to get their registration SBMS badges.

One of the best parts of the Microwave Update for me was to meet the folks I had only heard at the other end of a 10-Gigahertz circuit. The Sunday parking lot trials also gave us all a close look at why certain signals were always so loud over some fairly long paths! Just when you think you may have the ideal microwave setup, looking at some of the other homebrew arrangements leads to some great ideas.

The 216 page *Proceedings* of Microwave Update 2010 is available from the American Radio Relay League. Nearly every page is illustrated, along with almost every single page containing with detailed photographs.

"A special thanks to the ladies for putting on the family programs, and thanks to everyone, including SBMS and the San Diego Microwave group, for making this 25th year MUD as successful as it was," said Pat, still looking good after multiple days of working the conference.

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:

Southeastern VHF Society Conference: Technical papers are solicited for the 15th annual Southeastern VHF Society Conference to be held in Huntsville, Alabama on April 29–30, 2011. Papers and presentations are solicited on both the technical and operational aspects of VHF, UHF, and microwave weak-signal amateur radio. In general, papers and presentations on non -weak-signal related topics such as FM repeaters and packet will not be accepted, but exceptions may be made if the topic is related to weak signal. For example, a paper or presentation on the use of APRS to track rovers during contests would be considered.

The deadline for the submission of papers and presentations is March 11, 2011. All submissions should be in Microsoft Word (.doc) or alternatively Adobe Acrobat (.pdf) files. Pages should be 8 1/2 by 11 inches with a 1-inch margin on the bottom and 1/4-inch margin on the other three sides. All text, drawings, photos, etc., should be black and white only (no color). Submissions for presentation at the conference should be in PowerPoint (.ppt) format, and delivered on either a USB memory stick or CDROM or posted for download on a website of your choice.

Please indicate when you submit your paper or presentation if you plan to attend the conference and present there or if you are submitting just for publication. Papers and presentations will be published in the conference *Proceedings*. Send all questions, comments to the program co-chair, Robin Midgett, K4IDC, via <K4IDC@comcast.net>. Send all presentations to Steve Kostro, N2CEI via <SVHFS2011@downeastmicrowave.com>. For further information about the conference please, see the society's website: <http://www.svhfs.org>.

Central States VHF Society Conference: Technical papers are solicited for the 45th annual Central States VHF Society Conference to be held in the Dallas-Ft. Worth, Texas area. For more information please see the society's website: <http://www.csvhfs.org>.

Current Meteor Showers

The *γ-Normids* shower is expected to peak on March 14. For more information on the above meteor shower predictions please see Tomas Hood, NW7US's "VHF Propagation" column elsewhere in this issue, as well as visit the International Meteor Organization's website: <http://www.imo.net>.

And Finally . . .

Well, we are now looking towards spring in the Northern Hemisphere. Make sure you get on the VHF-plus bands, look into working sporadic-E, meteor-scatter, and all the other many aspects of our wonderful hobby. The weather will be more conducive to working on your antennas, satellites dishes, etc.

Also, whenever you can, be sure to involve young people. They are our future, and being a mentor, a teacher, or just reaching out to them in any way you can will help ensure the future of our hobby.

Until next time . . .

73 de Joe, N6CL

March Madness at the CQ Store

FREE shipping on orders of $100 or more!

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Edited by Andy Barter, G8ATD
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Guides you through the theory and practice of VHF/UHF operating and transmission lines. Includes information on getting started, antennas, constructing your own equipment, satellite ops, local nets and specialized modes.

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The Short Vertical Antenna and Ground Radial

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By Weigl, OE5CWL

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awards

BY TED MELINOSKY,* K1BV

Short-Term and Urainian Awards

In mid-December, I was very happy to receive a USA-CA All Counties award application from Antonin Blaha, OK1APV, who is the first station from the Czech Republic to complete and apply for the highest level USA-CA award. His first application was sent in 31 years ago, in 1980, for the 500 and 1000 levels. In 1982, 1984, and 1985 he brought that up to 2500 counties. After a few sunspot cycles, Antonin finally submitted the 3000 and 3077 list to finish. Congratulations!

Short Term Award

This following award publicizes the 150th anniversary of the Italian Navy. Yes, for centuries Italy has been a naval power in the Mediterranean, but this award celebrates its navy in the modern era.

150th Anniversary of the Italian Navy (1861–2011). The award is sponsored by the ARMI, a group of amateurs supporting the Italian Navy. The diploma is available to all licensed amateurs and SWLs of the world.

1. Period: The diploma period began 1 January 2011 at 0800(UTC and will conclude on 31 December 2011 at 2300 UTC.

2. Stations: The following special stations will be active using suffixes dedicated to the Italian Navy and will be valid for the award:

IA7MM via IZ7AUH
IU3MM via IZ3DBA
IP1NAVYvia IZ1GJK
IQ9MQ via IT9MRM

3. Modes: CW, SSB, PSK-31, RTTY

4. Bands: HF bands 10, 15, 20, 40, 80 meters, excluding the WARC bands, according to the IARU Band Plan.

5. Points per QSO:

a. All special stations listed above = 10 points.

b. QSOs (HRD) with all the stations pertaining to ARMI members = 4 points (CW).

c. QSOs (HRD) with all the stations pertaining to the ARMI members = 3 points (PSK-31/RTTY).

d. QSOs (HRD) with all the stations pertaining to ARMI members = 2 points (SSB).

e. QSOs (HRD) with all other stations supporting navy interests = 1 point (CW/PSK-31/RTTY/SSB).

6. All the special stations and all stations ARMI/navy may be contacted only once for each band and mode.

7. Points required:

a. Italian stations: 50 points;

b. Other European stations: 30 points;

c. Extra European stations: 15 points.

8. Call: Look for stations calling as follows:

a. CW/PSK-31/RTTY: CQ CQ DE IQ9MQ 150 anniversary Italian Navy K

b. SSB/FM: CQ CQ from IQ9MQ—called for the diploma for the 150 anniversary of the Italian Navy

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Don Lefavour, WA8OWR
USA-CA All Counties #1209
December 3, 2010

Antonin Blaha, OK1APV
USA-CA All Counties #1210
December 17, 2010

Kirby Giampa, W8DCD
USA-CA All Counties #1211
December 21, 2010

USA-CA Honor Roll

500
WA8OWR.....3525
OZ5NJ.....3526
KK7AC.....352
W8DCD.....3528

1000
WA8OWR.....1807
W8DCD.....1808

1500
WA8OWR.....1518
W8DCD.....1519

2000
WA8OWR.....1406
W8DCD.....1407

2500
WA8OWR.....1323
W8DCD.....1324

3000
WA8OWR.....1234
OK1APV.....1235
W8DCD.....1236

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.

This short-term award publicizes the 150th anniversary of the Italian Navy and is sponsored by the ARMI.

The award will be issued in PDF format to all participants. Logs must be sent in digital format or excel spreadsheet. Apply to: IT9MRM, Alberto Mattei, Via and. Millo, 20, I-96011 Augusta (SR), Italy. Award fee is 10 Euros through POSTEPAY no. 4023 6005 7341 7690 registered to Mattei Alberto, or through PayPal to the following address of credit: <alberto.mattei@libero.it>. All applications must be submitted on or before 15 February 2012. E-mail: <it9mrm@gmail.com>; internet: <http://ia7mm.iz7auh.net/>.

Awards from the Ukraine

The Ukraine is just about as large as the State of Texas, and through much of its turbulent history has been tied to other countries which controlled its agricultural and mineral resources. After the fall of the Soviet Union, Ukraine resumed its current status as an independent country. Any amateur station who participates in HF communication, especially contesting, knows that the country is teeming with ham radio activity. This month we feature some of the top awards sponsored by the Ukranian Amateur Radio League (UARL). There are four principal awards offered by the UARL, and they rank among the most beautiful certificates in the world. The certificates reflect the bright peasant art and love of colorful details, including regional coats of arms and frames for the borders, which are both beautiful and complex.

General Requirements: SWL OK. Fee for each award for Ukrainian stations is UAH 15, for amateurs of the CIS countries $5, and for all others $US10, and should be sent to the award manager of the UARL together with a certified GCR list of the needed contacts: Vladimir A. Stepanenko, UZ1RR, PO Box 1928, Chernihiv-postamt, 14000, Ukraine. While the fee is somewhat high, the UARL promises to send the certificates via Registered Mail for the greatest security and safety.

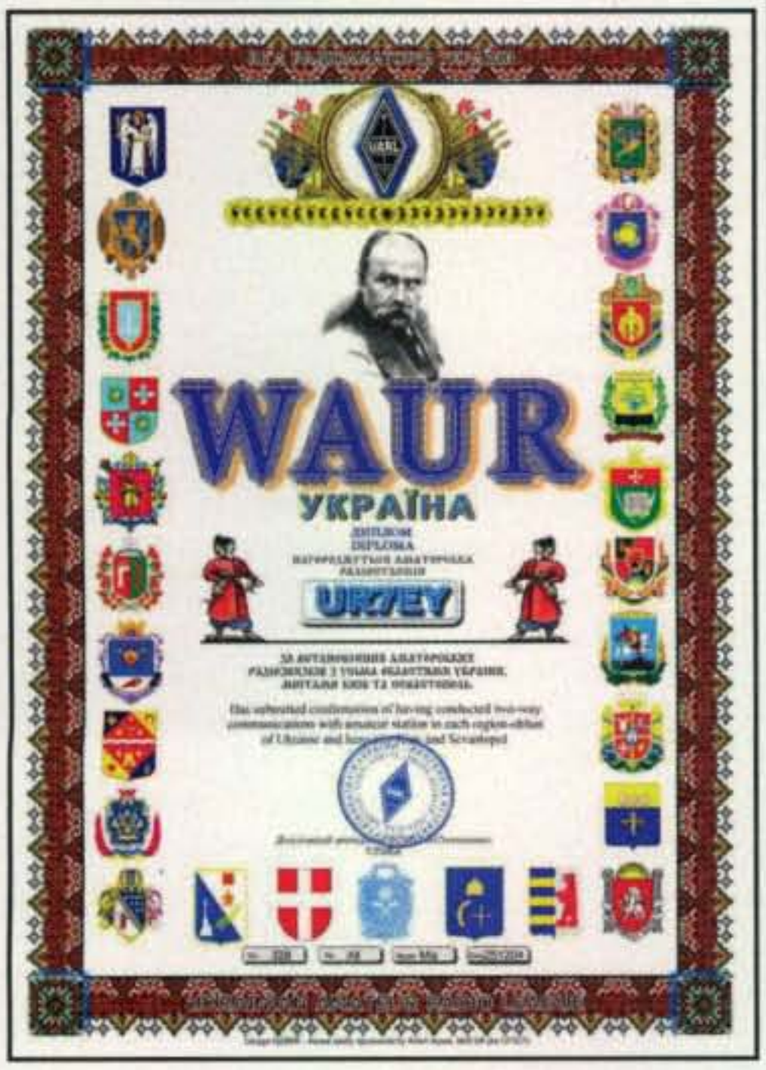
Internet: <http://uarl.com.ua/index.htm>. This site allows the user to choose pages to view in 32 different languages. However, the translation form used is not perfect. E-mail: <uz1rr@ukr.net> or <uz1rr@mail.ru>.

Worked All Ukrainian Regions (WAUR). The Ukraine is divided into 24 regions, the Autonomous Republic of Crimea, Kyiv, and Sevastopol for a total of 27 large units. They are identified as per the URDA Listing. The first letter of the suffix of the station identifies the region except for Crimea, Kyiv, and Sevastopol cities with expanded identifiers. A Sumy, P Volyn, B Ternopil, Q Zaporizhzhia, C Cherkasy, R Chernihiv, D Zakarpatska, S Ivano-Frankivs'k, E Dnipropetrovs'k, T Khmel'nyts'kyi, F Odesa, U Kyiv, G Kherson, V Kirovohrad, H Poltava, W Lviv, I Donets'k, X Zhytomyr, K Rivne, Y Chernivtsil, L Kharkiv, Z Mykolayiv, M Luhans'k, UU1–Ø Crimean Republic, N Vinnytsia, UU9 Sevastopol City, UR5U Kyiv City.

Contact each of the regions, Crimean Republic, and cities of Sevastopol and Kyiv.

The award may be endorsed for any one band or mode.

Ukrainian District Award (URDA). The 27 units mentioned above are further sub-divided into 758 "administrative areas," generally encompassing the boundaries of a city or town within the district. The basic certificate is awarded for proving contact with 100 of



The Worked All Ukrainian Regions Award is for contacting the 24 regions of the Ukraine, plus the Republic of Crimea and the cities of Kyiv and Sevastopol.

these districts. There are awards for contacting 200, 300, 400, 500, 600, 700 districts, and a special plaque for all of them.

Contacts must be made on or after 24 August 1991. Endorsements are also available if all of the contacts are made using one mode or band. A list of the districts is available on the website (http://uarl.com.ua/index. htm), which you can download for recordkeeping.

Worked Ukrainian Cities Award (WURCA). The basic award requires that you contact at least 100 cities of the Ukraine. Separate awards are available at the 200, 300, and 400 cities levels. A plaque is awarded to those who contact all 458 cities in the Ukraine. A list of the cities is also available on the website.

Worked Members of the UARL. Contact members of the UARL. The basic award is offered for proving contact with 25 members, and there are separate certificates for 50, 100, and even 500 members. A list of members is on the UARL website.

We're always looking for new awards from your group or club. Feel free to contact me via e-mail at <k1bv@cq-amateur-radio.com>.

73, Ted, K1BV

The Ukrainian District Award is given on several levels for contacting the "administrative areas" of the Ukraine.

For the Worked All Ukrainian Cities Award you must contact at least 100 cities of the Ukraine.

H. Stephen Miller, NØSM
USA-CA All Counties #1207, November 15, 2010

Ham radio has to be *the* single most fascinating hobby, with so many facets one can never hope to enjoy all of them. I still find myself like a kid in a toy store and enjoy contesting, DXing, traffic handling, VHF work, QRP, building both kits and from-scratch, and I've had a ball county hunting. Chasing counties is more an exercise of persistence than of great skill. Nevertheless, you have to keep on top of who is going where, when they'll be there, and have everything ready. Missing a rare and needed county often means a long wait for someone else to go there.

The earliest memory I have of an interest in radio was when I was in the fifth grade. My dad had brought home a couple of military handhelds (huge things), and my brother and I had fun running down the batteries talking from one end of the house to the other. In ninth grade, I had changed schools and the father of a new friend was a ham and later became my Elmer. Orris Wise, KØMVR, led me into the Novice Class license and then built a two-tube transmitter to go along with the Hallicrafters S-38E that I had purchased at my dad's summer camp PX after working as a civilian orderly cleaning officers' barracks half days for two weeks.

I didn't upgrade to General until the fall of 1967, after I was married. My wife wanted me to stay home. Well what else could I do that would have me at home and be away at the same time but amateur radio?

I can't tell you the exact date I began hunting counties, but it was in the very early 1970s. My wife had gotten Hodgkin's Disease ,and I was making regular trips from Ottumwa, Iowa, to the Mayo Clinic in Rochester, Minnesota, to visit her each weekend. If memory serves me right, we were on 3945 kHz during that time, and I was running a Galaxy V Mark II with Hustler antennas.

One of the members of our local club was Loren (Mac) McGinnis, WAØJCE, and either his wife or his brother would go on wild trips all over everywhere running counties, and had told me about it. I don't know how many counties I put out on those trips, but I worked all over the U.S. and had a ball. It was a real blessing and made the trip times fly by.

After a time, my wife recovered and I was no longer on the road. Occasionally, I would work a few counties, but my family came along and my radio time was severely limited. I'd had a lot of fun but gave no thought to working 3000+ counties at the time.

In the late 90s, I started working counties in earnest, but still with little thought to really ever working all of them. Primarily, there were two things that drew me to county hunting: (1) What a great and thoughtful group of hams who would go the limit to help anybody. Their enjoyment of it was infectious. (2) The other thing that fascinated me was propagation. I've always enjoyed following propagation across the U.S. while chasing DX, and that was still a draw. But more interesting were the close-in contacts I was making on 20 meters. My little Iowa station was working stations in Illinois, Missouri, Wisconsin, and even Iowa. No, the signals weren't very strong, but they were hearing me as well as my hearing them. That's definitely changed now with the low sunspot count, but there are still days when propagation defies understanding.

Around 2002, I began to feel that it might be possible to work all counties. Going through my QSL cards, I found around 700 counties confirmed. Next I looked at the software to see where I stood and found I was close to the 2000 mark in contacts. The rest is pretty much history. I retired in 2005 and spent a great deal of time chasing counties that summer and fall. I got down to 500 needed and figured it would take forever to finish up, but it wasn't long until that number was 400, then 300, and eventually I finished up when WAØJCE, my mentor, delivered Kearney County, Nebraska.

The story only begins there. It took nearly three years to get the cards checked. One ham was called back to work, another had a serious bout with depression, and a third had a heart blockage. Finally, WAØITP and NØJL performed the card checking and I prepared the cards K1BV had requested. In late August of 2010, I posted the booklet with signatures, check, and cards to Ted. After not hearing from him for almost a month and a half, I contacted Ted only to learn that the post office had temporarily lost the package.

I want to thank all of the county hunters for their patience, for all of the counties, and for the fine job they've done as net controls. These folks are all first-class operators and I admire each and every one of them. They made this possible.—*NØSM*

Spratly and More DX News

BY CARL SMITH,* N4AA

Last month, I mentioned it was snowing as I wrote the colum. Well, it's doing it again as I write this one in almost mid-January, but this time it's a lot more than it was before. Now some folks would consider a snow depth of 8 to 10 inches nothing to worry about. Those folks don't live in the southern parts of the United States, where we usually just don't see these kind of snow depths very often. So, I'm just going to sit here for the next week until the sun finally shows up and maybe the temperature will rise enough to get rid of all this stuff so I can get out of my own driveway! Until that happens, and as long as the power doesn't fail us, I'll be happy to play radio or play solitaire on the computer … you know, anything to pass the time.

Now let's get on with the purpose of this column—DXing!

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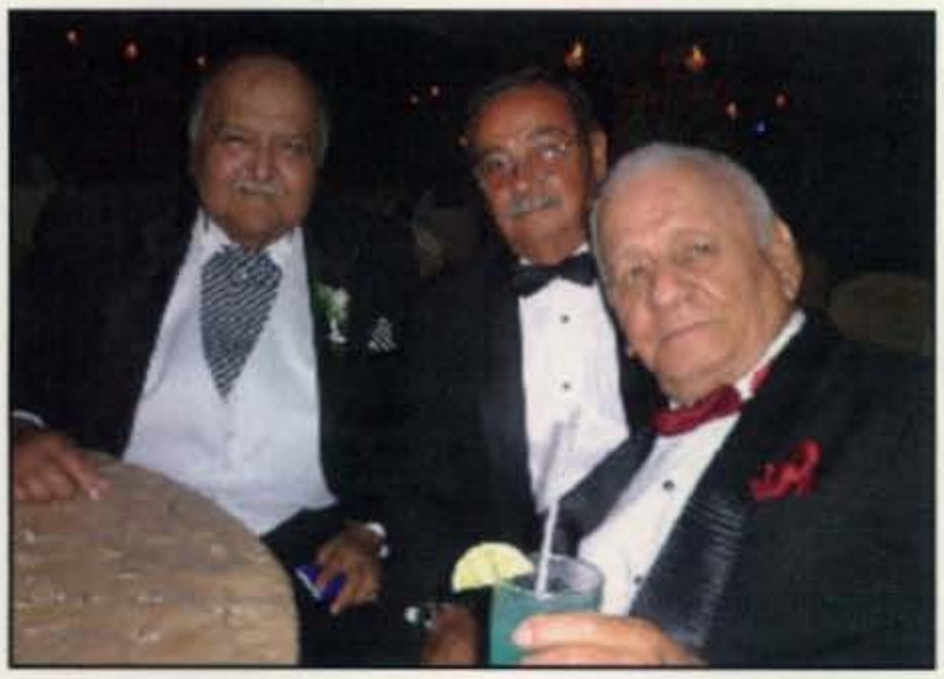
e-mail: <n4aa@cq-amateur-radio.com>



Enjoying a night out, we find (left to right) Roberto Marcos, HC2GT; Alberto Pincay, HC2AQ; and Alfredo Solines, HC2SL (otherwise known as "Sapo Loco—The Crazy Frog). (Photo courtesy of Rick, NE8Z/HC1MD)

Spratly DXpedition

The much-anticipated operation from Spratly hit a snag. The operation was cancelled/postponed with all of the team in the Philippines ready to board the airplane. Here is the official announcement:

DXØDX Postponement
January 12, 2011, 0506 GMT

To the DX Community at large, It's with regret that as Team Leader, I have to announce the postponement of the DXØDX Spratly Islands DXpedition 2011, due to circumstances beyond the control of the DXØDX Team.

Our situation began when our original mode of transport by ship was terminally damaged back in late October 2010. We then went to our contingency plan, which was to fly in, as there were no ships available deemed to be safe and provided facilities for safe passage to Pag-Asa.

We had landing permission and booked the correct-size aircraft and with the security-cleared pilots. To simplify it, there were conflicting agreements and hence the aircraft could not get approval of its flight plan.

The Southern Cross DX Net meets daily at 1230Z on 14238.5 kHz. This picture was taken during a visit to the U.S. by Neville Green, VK6JDW, at a luncheon held in his honor and hosted by Al Moe, K4AWM. Bottom row: N4RZP, Russell; W1FDY, Jack (primary net control); W4DPL, Dan. Middle row: VK6JDW, Neville; W4VES, Larry (alternate net control). Top row: W2GNC, Al; W4FZ, Will; K4AWM, Al Moe (alternate net control); and K3LEN, Carl. (Photo courtesy of Will, W4FZ)

These keys are on the desk at W6SL. John identifies them as follows (left to right): Scheunemann Dirigent Morsetasten Iambic; Begali Iambic; Kent Single Paddle; Vibroplex 1963 Single Paddle; Kent KT1 Straight Key; Wm. Nye straight key (discontinued); Chinese Army Key D-117. The straight keys are hooked in parallel. All of the paddles go to a Daiwa D-210 keyer. (Photo courtesy of John, W6SL)

On the Cover:

The OM7M Contest Station

It all started in March 1949 when a radio club was set up in the small industrial town of Partizanske in the middle of Czechoslovakia. Four years later, the callsign OK3KAP was assigned and true radio activity commenced. Radio clubs in the Soviet bloc were often sponsored by state-owned factories and were encouraged to use VHF.

In 1993, Czechoslovakia was peacefully divided into two countries and the OM prefix is used in Slovakia, the eastern part of the former republic. The spirit of radio contesting is very strong in Eastern Europe and many groups continue as private clubs. The team of OM3KAP found an excellent location in the outskirts of town and started building a competitive shortwave station in the 1990s, emphasizing the low bands. In 1995, they acquired a shorter callsign, OM7M, and an adequate name—The Low Bands Contest Club.

The guardian angel of the club is Peter, OM3PA. Peter keeps the archives of the club, spanning over 60 years, with records of activities by well over 200 members. He has been in the club for *only* some 50 years. Today the core group consists of around 10 persons. Then, there are always a few guest operators, and a small bunch of apprentices—young members.

The OM7M station is located on a hill with a small cabin and impressive towers with huge, homemade antennas. The club has a website at <www.om7m.org> where contest results of the past decade are proudly displayed.

(Cover photo and "On the Cover" by Henryk Kotowski, SMØJHF)

The WPX Program

CW

3255.....KZ8E
3256.....RN3QQ
3257.....IV3GOW
3258.....SP5EOT

SSB

3082.....AD2AM
3083.....KZ8E
3084.....KB8UUZ
3085.....N2HO
3086.....IV3GOW
3087.....SP5EOT
3088.....S58MU

Mixed

2132.....N2HO
2133.....K7LV
2134.....W5QP
2135.....SP5EOT

Digital

49.....IV3GOW

CW: 350 RN3QQ. 600 JA7OXR, IV3GOW. 650 KZ8E. 750 JH6JMM, SP5EOT. 1100 IT9ELD. 2800 S51NR. 3100 W8IQ. 3900 S58MU. 4550 N6JV.
SSB: 600 JA7OXR. 700 KZ8E. 750 KB8UUZ, IV3GOW, W8KNO. 800 IK4THK. 1050 IZ8FFA. 2250 W3LL. 2600 S58MU.
Mixed: 500 K7LV. 550 N2HO. 850 SP5EOT. 1000 JA7OXR. 1100 KZ8E. 1700 W9BOK. 2550 W3LL. 4500 S58MU.
Digital: 650 EA2IA. 800 KØDEQ. 1535 W3LL.

160 meters: KZ8E, KB8UUZ, SP5EOT, S58MU
80 meters: KZ8E, JA7OXR, SP5EOT, S58MU
40 meters: KZ8E, JA7OXR, IZ8FFA, SP5EOT, S58MU
30 meters: JA7OXR
20 meters: KB8UUZ, JA7OXR, IZ8FFA, SP5EOT, S58MU
17 meters: JA7OXR
15 meters: KZ8E, JA7OXR, IZ8FFA, SP5EOT, S58MU
10 meters: KZ8E, KB8UUZ, S58MU

Asia: SP5EOT
Africa: KZ8E, S58MU
Europe: KB8UUZ, SP5EOT
Oceania: S58MU
N. America: KB8UUZ, S58MU
S. America: KB8UUZ, S58MU

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, NN1N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, TF8GX..

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, N3XX, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, NN1N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UR5FEO, N3RC, UT3IZ RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE.

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.

The bottom line is this: We have a licence, we have authority to land via ship, hence when the ship becomes available in the near future, it is my intention to activate this entity in 2011.

The team has worked tirelessly to remove the hurdles that were placed before the team at the last minute.

As time was running out for this window of opportunity, and before more operators became stuck here in Palawan, the decision was made to postpone the activation.

A call was placed to PARA advising them that a postponement of the activation would be sought to a date in the near future, where the activation will look at again taking place.

All equipment will need to be exported out of the Philippines to comply with the current Philippine Customs Law in which it was brought into the country.

The plan is to be re-assessed so the current operators have the first opportunity to be on this future trip.

Once more information is at hand, I will advise the DX Community.

Regards, Chris, VK3FY, Team Leader DXØDX"

The "PJ" Story Continues

Remember those New Ones we all worked back in October—the "PJ" story? Well, hopefully by the time you

The CQ DX Field Award Program

Mixed

115.....K9OHI

CW

61.....YO6HSU

Mixed Endorsements

200.....K8SIX/215
200.....RW4NH/203
200.....W4UM/202

SSB Endorsements

175.....W4UM/184

CW Endorsements

150.....N7WO/175
200.....W4UM/197

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 Awards Program

SSB

2561.....N0AZZ

SSB Endorsements

340.....N4JF/341
330.....N7BK/338
330.....WK3N/337
320.....F6HMJ/329
200.....N0AZZ/201

CW Endorsements

340.....N4JF/340
330.....F3TH/336
330.....WK3N/336
320.....F6HMJ/326

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. As of October 12, we recognize 341 active countries, pending a final decision on the former Netherlands Antilles. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.

read this, the ARRL will have wrapped up all the year-end work that occurs when so many DXers submit their applications at the last minute to meet the December 31st deadline. An announcement came in response to questions about when the LoTW confirmations would be issued for all those new PJ calls. Here's what they had to say on January 4th:

At this time, there will be no new PJ certificates or credits being accepted for the new PJ DXCC entities by LoTW. This is due to the large backlog of DXCC applications that were received for the December 31, 2010 deadline.

It is anticipated that the backlog should be completed by mid to late February.

We should be accepting new PJ certificates and credits for LoTW by March 1, 2011.

We understand the anticipation for certificates and credits for the new PJ DXCC entities and are working hard to make this available as soon as possible.

73, Kathy Allison, KA1RWY, LoTW Specialist

Activities for DXers

There are lots of other activities to keep us busy, and contests abound. There was the ARRL RTTY Roundup, NA QSO Party on CW & SSB, ARRL

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	4182 .....N6JV	3775...YU7BCD	3007 .....W2WC	2499...KC9ARR	1936.....AG4W	1463 .....N3RC	815.....KL7FAP	644.....KW0H
5890 .....K2VV	4136.....S53EO	3737..WB2YQH	3003 ...JN3SAC	2499.....VE6BF	1905.....W7CB	1446.....DF3JO	781.....V51YJ	636 .....ZS2DL
5610.....W1CU	4129 .....S58MU	3693.....W9OP	3001 .....K1BV	2440.....K5UR	1891.....VE9FX	1337.....K6UXO	726 .....K5IC	616 .....DL5JH
5013 .....EA2IA	4092.....K0DEQ	3474 ..SM6DHU	2965...OZ1ACB	2428 .....N6QQ	1820 .....KX1A	1322.....AA4FU	723 .....K0DAN	600 .....IK1RKN
5012.....9A2NA	4069 .....I2MQP	3305 ...JH8BOE	2873 .....W2ME	2338 .....I2EAY	1741 .....AB5C	1269.....K5WAF	707 .W1/E74OF	600....KB9OWD
4989.....W2FXA	4034 .....N9AF	3227.....K9BG	2724 .....W2OO	2233.....AB1J	1705 .....W2EZ	1116.....YU7FW	682 .....AI8P	
4701 .....N4NO	4006 ...WA5VGI	3207.....W9IL	2704 .....K2XF	2116.....AE5B	1662 ....SV1DPI	1016...RA1AOB	662 .....JA7OXR	
4414 .....YU1AB	3990 ..ON4CAS	3195.....N8BJQ	2559.....W3LL	2192.....N2SS	1643.....N1KC	982.....IW0HOU	653.....KK3Q	
4361 .....VE3XN	3908.....KF2O	3104.....K9UQN	2530 .....YO9HP	2001 .....K0KG	1593 .....S55SL	976.....KM6HB	650 .....N3YZ	
4211.....I2PJA	3798 .....IK2ILH	3091 .....9A4W	2511 ....W6OUL	1971 .....W2FKF	1512..WD9DZV	964.....K8ZEE	649.....RA9OO	

SSB

5122 .....I0ZV	3323...OE2EGL	2711 ...LU8ESU	2288.....W3LL	2072 .....K5UR	1758 ....W6OUL	1463.....I2EAY	1031 ....IK8OZP	637.....K5WAF
4520.....K2VV	3229...CT1AHU	2677 ...WA5VGI	2210 ..SV3AQR	2021 .....N8BJQ	1719.....K9UQN	1410 .....S55SL	1022 .....NW3H	600....WA2BEV
4505 .....VE1YX	3196.....KF2O	2595.....EA1JG	2209....IK2QPR	1986 ...DL8AAV	1714 ....IK2DZN	1395.....PT7ZT	1012 .....KU4BP	
4422 .....OZ5EV	3108.....I4CSP	2497 .....S58MU	2201 .....NQ3A	1971.....W2FKF	1711 ...JN3SAC	1386....IK4HPU	978 .....EA7HY	
4371 .....F6DZU	3047.....K0DEQ	2471 .....I3ZSX	2157.....W2OO	1935...SV1EOS	1623.....VE9FX	1377 .....EA3NP	965.....VE6BF	
4171 .....I2PJA	3022 .....I8KCI	2451...EA3GHZ	2107.....N6FX	1927.....AE5B	1612 .....AG4W	1258 .....N1KC	883 .....WA5UA	
4003.....9A2NA	2903 .....IN3QCI	2431 .....G4UOL	2099 .....KI7AO	1889.....N6QQ	1611 .....W2ME	1145...EA3EQT	875.....K7SAM	
3843.....I2MQP	2857.....4X6DK	2417 ..SM6DHU	2094.....I8LEL	1879.....K3IXD	1534 .....AE9DX	1089 .....IZ8FFA	758.....IV3GOW	
3741.....EA2IA	2761 .....KF7RU	2333.....W9IL	2093.....W2WC	1844.....YO9HP	1480.....AB5C	1083.....KX1A	741 ....WD9DZV	
3536 .....N4NO	2734 ..YU7BCD	2326 .....CX6BZ	2076.....K2XF	1825 .....KQ8D	1464 ..VE7SMP	1042....IZ0BNR	717.....K0DAN	

CW

5413..WA2HZR	3750...VE7CNE	2914..SM6DHU	2529....IK3GER	2101 .....I2MQP	1769.....AC5K	1223.....KX1A	915 .....N1KC	615.....JH6JMM
5353 .....K9QVB	3676 .....S58MU	2884.....I7PXV	2503 .....I0NNY	2101 .....W9HR	1665.....YO9HP	1220 .....AA4FU	824.....VE9FX	608 .....IK2SGV
5242.....K2VV	3506.....9A2NA	2723 ...EA7AZA	2502 ...JA9CWJ	2089.....K2XF	1445 ....EA2CIN	1147..WD9DZV	821.....HB9DAX	
4215.....N4NO	3464 ...WA5VGI	2721.....K9UQN	2473.....OZ5UR	1979 .....K5UR	1429.....WO3Z	1125 .....I0WOK	794.....LA5MDA	
4182 .....N6JV	3379.....K0DEQ	2670.....KA7T	2434.....W9IL	1961 ....W6OUL	1424.....N6QQ	1109 .....VE1YX	753.....F5PBL	
4024 .....LZ1XL	2971 .....W8IQ	2632 .....W2ME	2415.....W2WC	1918 .....W2OO	1344..WA2VQV	1102.....IT9ELD	749.....AE5B	
3918 .....VE7DP	2923.....KF2O	2617 ...JN3SAC	2373.....VE6BF	1848.....I2EAY	1334.....RU0LL	1053.....K5WAF	695 .....S55SL	
3780.....EA2IA	2923 ..YU7BCD	2599 .....N8BJQ	2342.....N6FX	1804 ..EA7AAW	1317.....K6UXO	1030.....AA5JG	629.....IV3GOW	

DIGITAL

1534 .....W3LL	1262.....N8BJQ	1133 .....N6QQ	1066 .....YO9HP	1009 ..GU0SUP	894.....AG4W	836.....K0DEQ	692 ....WD9DZV	629 .....W2OO

January VHF Sweepstakes, CQ WW 160 CW contest the end of january, CQ WPX RTTY Contest, ARRL DX Contest on CW (the SSB leg is March 4–6), CQ WW 160 Contest on SSB the end of February. and the list goes on. Surely you found something in that list that caught your interest. There also are more contests and activities coming up soon.

I'm not trying to steal any "thunder" from our Contesting editor, just commenting that there's a lot of "stuff" going on while we wait for these DXpeditions to come on the air. There's always something to do—RTTY, PSK-31 or 63, or some other digital mode to try. I know, as I've been trying them myself and it can be a lot of fun and educational as well.

DXpeditions and More

I can't say much more about the South Orkney DXpedition, since it isn't due until the end of January, but I'm sure we'll have a great time working that team. There are some others coming up as well. The three-times postponed operation from Sable Island will try again in March; an operation from Cocos Keeling, VK9C, is due in late February to early March; operations from other Pacific islands are scheduled for later in the year.

A team made up of mostly French ops from the Provins ARC (F6KOP) will be going to Cameroon February 10 to the 20. Some American ops will be going too, including my friends Dave, K4SV; Bill, N2WB ;and Bob, N6OX. Also included are Michel, FM5CD; Eric, ON7RN; and Gabriele, I2VGW. Their announced target is 80,000 QSOs with emphasis on working the low bands.

March 5 to 15, ON4AFU will be in Cambodia as XU7AFU.

Frosty, K5LBU, will be heading up another group going to Africa. This time it will be Lesotho (7P) March 11–20.

From March 15 to April 4 a group of op from the Netherlands will be going to Sierra Leone to operate as 9L5MS.

There will be lots of contest operations during the month of March, too,

QSL Information

DA0CA via DL1REM
DA0GF via DL3OCH
DA0HQ via DL5AXX
DA0MF via DL3OCH
DA1AD via DL1DA
DA2009LH via DH3WO
DD0D via DK5AN
DF0HQ via DL5AXX
DF0IT via DG7TG
DK1CE/H44 via DJ9ZB
DK1CE/KH900 via DJ9ZB
DK5LM/HI7 via DK5LM
DL/A61B via A61B
DL/HA0HW via HA0HW
DL/HB9LH via HB9DLO
DL/OE3CHC via OE3CHC
DL/OE3MDC via OE3MDC
DL/OK2QA/P via OK2QA
DL0OMR via DL2DN
DL1AGH via JL1AGH
DL1DA/TI7 via DL1DA
DL1DAA via DL1DA
DL3VNL via DM2NL
DL4/HB9LH via HB9LH
DL50DRA via DF6LI
DL60CHILD via DL5SE
DL6UCW via DM3CW
DL75ERL via DL4NN
DL9SEP/P via DL9SEP
DM50BER via DL2BWO
DP3D via DK3KD
DP3SSKW via DK7FK
DQ0A via DJ5BWD
DQ0Q via DL5AXX
DQ11APOLLO via DF3JO
DQ750UEM via DL2VC
DQ80IARU via DL5AXX
DR09ANT via DL5MHQ
DR12IAA via DL7AHF
DR20DLY via DL1AB
DR3M/LH via DG7TG
DR400PG via DM3ZF
DR60GER via DK3DM
DR775TMG via DJ8QP
DR800GRZ via DL1ARJ

(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/>.)

5 Band WAZ

As of January 1 1, 2011, 832 stations have attained the 200 zone level and 1705 stations have attained the 150 zone level.

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

None

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40)
IK1AOD, 199 (1)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
RU3FM, 199 (1)
N3UN, 199 (18)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N6HR/7, 199 (37)
JA5IU, 199 (2)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
VE3XN, 199 (26)
N5AW, 199 (17)
JH7CFX, 199 (2)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10m)
RX4HZ, 199 (13)
KØGM, 199 (17)
S58Q, 199 (31)
KQØB, 199 (2 on 10)
K9OW, 199 (34 on 10)
G3NKC, 199 (31 on 10)
K8PT, 199 (26)
IN3ZNR, 199 (1)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
F5NBU, 198 (19, 31)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W7VJ, 198 (34, 37)
W9RN, 198 (26, 19 on 40)
W5CWQ,198 (17, 18)
I5KKW, 198 (31&23 on 20)
IV3MUC, 198 (1&31 on 40)
UA4LY, 198 (6&2 on 10)
IK4CIE, 198 (1, 31)
JA7XBG, 198 (2 on 80&10)
HB9ALO, 198 (1, 31)
JA3GN, 198 (2 on 80&40)

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

JA7OXR (150 zones)
WØDJC (192 zones)

5 Band WAZ updates:

N2NL (200 zones)
WC5M (170 zones)
K6FG (197 zones)

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WAZ Program

17 Meters CW

75 .....WB6RSE

30 Meters CW

98 .....WB6RSE

160 Meters

363....SP7GAQ (30 zones)
364 ...WB6RSE (34 zones)
365.....K9EL (32 zones)
366 .....K6FG (30 zones)

All Band WAZ

Diamond Jubilee

082 .....K5VIP
083 .....KØMD
084.....DJ9ZB
085 .....MØNDZ
086.....K6YKJ
087.....NI5W
088.....K4YMQ
079 .....N6MA
090.....W1JR
091 .....AA6K
092.....JA7DOT

Mixed

8759 .....UR7FM
8760 .....WA6KHK
8761 .....PA9JO
8762.....N7FF
8763.....OZ1IKY
8764.....RX3AGD
8765 .....ON6KE
8766.....SV1GYG
8767 .....SV9AHZ
8768 .....KØNO
8769.....WØDJC

SSB

5149.....EB3CW
5150 .....PA9JO

CW

616.....N7FF

RTTY

213.....S55ZZ

EME

005.....DL9MS (40 zones)

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

with the ARRL SSB Contest March 5–6 and the CQ WW WPX SSB Contest March 26–27.

In April, there are several operations announced for places in the Pacific such as Papua New Guinea (P29), and a large group will be going to Central Kiribati (T31), too.

In May, an operation is scheduled to take place from Afghanistan (T6PSE), but the dates won't be announced early for security concerns.

In early July an operation is scheduled for Rotuma (3D2R) by a group of Australian DXers.

Looking further down the calendar, the FIVE STAR DXers will be going to East Kiribati (T32) the end of September for a whole month. They always do a super job no matter where they go.

In October Hrane, YT1AD, will head up a group operating from Conway Reef for about ten days.

Therefore, fellow DXers, you can see there is a lot of planning going on for the months ahead of us. With these, plus the usual run of contests, there won't be a lack of operations to keep us occupied this year.

DXpedition Funding

I mentioned last month about the funding for DXpeditions. Here are some details from just a few of the major organizations:

INDEXA provided significant funding for the following in 2010: YI9PSE, Iraq in April; E4X, Palestine in May; T31X, Canton Is. and ZK3X Tokelau in June; 3CØA, Annobon & 3C9B Eq. Guinea in

Looking Ahead in

CQ

Here are some of the articles we're working on for upcoming issues of *CQ*:

- Professor Heisseluft's annual visit
- Ham Friendships, Ham Hospitality
- A Multimedia Social Net
- Hunting for Foxes, Ham Radio-Style

Do you have a ham radio story to tell? See our writers' guidelines on the *CQ* website at <http://www.cq-amateur-radio. com/guide.html>.

June; 5V7TT, Togo in October; PJ7E, St. Maartin in October; and ZL8X, Kermadec in November.

For 2011 they are funding VP8O, S. Orkney in January; DXØDX, Spratly Is. (pending); CYØ, Sable Island in March 2011 (carried over from 2009); and T6, Afghanistan in May.

See the INDEXA website: <http://www.indexa.org/>.

NCDXF has provided funding for 3D20CR, Conway Reef; T31A, Central Kiribati, April 2011; E44M, Palestine; FT5GA, Glorioso; FW5RE, Wallis & Fortuna; K4M, Midway; K5D, Desecheo; S04R, Western Sahara; TY1MS, Benin; VK9LA, Lord Howe Island; XV4D, Vietnam; VK9XX, Christmas Island; ZYØT, Trindade; VK9C, Cocos Keeling; DXØDX, Spratly; VP8O, South Orkney; CYØ, Sable Island; ZL8X, Kermadec; VK9N, Norfolk Island; 9UØA, Burundi; ZK2A, Niue; 9XØSP, Rwanda; 5V7TT, Togo; PJ7E, St. Maarten; 3CØC, Annobon Island; E4X, Palestine; T31X, Pacific Islands; and YI9PSE, Iraq.

See the NCDXF website: <http:// www.ncdxf.org/>.

All of the above amounts to a *lot* of money. Where do these organizations get all that money?

From us .... Yes, you and I are the ones who make it possible for INDEXA and NCDXF to provide the funding for groups to go these places and make it possible for you and me to make the contacts and confirm them. Have you made any effort to help these organizations? Some of you make donations directly to the DXpeditions, either before they go, or you make a donation "on line," which is fine and I know they appreciate all of the $5, $10, or perhaps even $100 donations. These add up, but not to the level required for many of these DXpeditions, especially those to the Antarctic regions. These trips cost tens of thousands of dollars, and the organizers look to the major DX foundations for much of that cost.

A significant financial contribution was made to NCDXF from the estate of W4AI. See the story elsewhere in this column. Left to right: Fred, K4LQ; John, W4AI (SK); and Dale, W4QM. the photo was taken in September 2004. (From the NCDXF website)

Here's part of an annoucement I saw recently from NCDXF. John Beck, W4AI, passed away in February 2008 at the age of 89. NCDXF received a very substantial contribution from the estate, made possible through the efforts of Mr. Beck's executor, Dale Strieter, W4QM.

I'm told there are a number of ways for you to leave a portion of your estate to these organizations. However, you should contact a knowledgeable person to determine just how that can be done.

That's beyond my expertise, and I wouldn't even attempt to try to tell you how to do it.

That's a wrap for this month. Enjoy the weather (good or bad, aswe can't change it). Enjoy whatever on-the-air activity you like, but please remember it should be FUN!

73, Carl, N4AA

CQ DX Field Award Honor Roll

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

Mixed

K2TQC	265	K8SIX	215	N4NX	192
HAØDU	240	W6OAT	212	ON4CAS	191
VE7IG	237	VE3ZZ	207	HA9PP	190
W1CU	235	HA5WA	206	BA4DW	188
VE3XN	234	F6HMJ	206	HB9DDZ	188
HA5AGS	228	JN3SAC	206	IV3GOW	184
N8PR	223	KF8UN	205	K2SHZ	182
HA1RW	220	OK1AOV	205	K1NU	180
9A5CY	219	N4MM	202	W5ODD	177
HA1AG	218	W4UM	200	NØFW	176
KØDEQ	216	K8OOK	195		

SSB

W1CU	213	VE7SMP	190	NØFW	176
W4ABW	202	N4MM	186	DL3DXX	175
KØDEQ	192	W4UM	183	JN3SAC	175

CW

DL6KVA	233	JN3SAC	200	N4MM	179
W1CU	229	OK1AOV	196	N4NX	177
DL2DXA	209	W4UM	195	N7WO	175
KØDEQ	207	HB9DZZ	186		
DL3DXX	203	OK2PO	184		

A Wire and a Dream

Introducing George Tranos, N2GA

From the editor: As noted in this space last month, John Dorr, K1AR, has decided to hand over the reins of this column after a run of nearly 22 years. This month, I would like to introduce *CQ*'s new Contest Editor, George Tranos, N2GA.

George has been an active contester for two decades, operating—and often winning—a variety of contests from both stateside and DX (mostly Caribbean) locations. He has also been a referee at three World Radio Teamsport Championship (WRTC) competitions, in 2000, 2006, and 2010, and is a member of the Yankee Clipper Contest Club as well as the New York-based Order of Boiled Owls. He is also a committee member and past chairman of Ham Radio University, former ARRL Section Manager for New York City/Long Island, and past president of the Long Island Mobile Amateur Radio Club.

Professionally, George is president of a software and management consulting firm, vice president of a school for professional motorcycle riders, and a freelance journalist. He lives in Copiague, New York, with his wife, Diane Ortiz, K2DO, who is also an accomplished contester.

I am confident that George will uphold the high standards for this column established by K1AR and will bring to it his own perspective. Welcome aboard, George!

—73, W2VU

Calendar of Events

All year	**CQ DX Marathon**
Feb. 25–27	**CQ 160M SSB Contest**
Feb. 26–27	North American RTTY QSO Party
Feb. 26–27	REF SSB Contest /
Feb. 26–27	UBA CW DX Contest
Mar. 1	AGCW YL-CW QSO Party
Mar. 5–6	ARRL SSB DX Contest
Mar. 12	AGCW QRP Contest
Mar. 12–13	EA PSK31 Contest
Mar. 12–13	RSGB Commonwealth CW Contest
Mar. 13	North American RTTY Sprint
Mar. 13	Wisconsin QSO Party
Mar. 19	10-10 Mobile QSO Party
Mar. 19–20	Russian DX Contest
Mar. 19–21	BARTG HF RTTY Contest
Mar. 26–27	**CQ WW WPX SSB Contest**
Mar 28	QRP Homebrewer Sprint
Apr. 2–3	SP DX Contest
Apr. 2–3	Missouri QSO Party
May 28–29	**CQ WW WPX CW Contest**

Tuning the bands one weekend, you come across a cacophony of sound. Not knowing what it is, you listen harder. Many signals are crammed into a small amount of spectrum. The clatter comes in rapid bursts and is gone just as quickly as it starts. You've never heard the radio so alive and full of callsigns. You've just encountered your first contest.

Isn't it amazing how different the airwaves can be in the space of just a few hours or even minutes? Once a contest starts, activity levels rise quickly, sometimes overwhelming a group of frequencies. It becomes difficult to find a clear spot with no other callers. For the casual ham radio operator, contests can seem a bit overwhelming at first.

There is a rhyme and reason, however, and it can be learned, improved upon, and sometimes mastered, if only for a short time. One of the greatest aspects of contesting is that everyone starts off fresh every time. Each contest stands on its own, is unique in a specific way, and begins anew in every instance. Last time you may have done poorly, but this time you have another chance!

When operating casually, there is no pressure of time. You can tune around and listen for something that sounds interesting and then call or join in if you want. Contesting adds time limits by implementing an operating period with start and end times. Its purpose is to work as many stations in as many different places as quickly as possible. The best contesters establish and maintain a quick rate, sometimes making three or more contacts a minute over a long period of time. While this may be difficult to achieve for the new contester or even a more experienced contester operating at a small station, a top-notch operator can run and hold a frequency for hours.

Reasons for Contesting

Even if you don't have a big station, there are many reasons to give contesting a try. First and foremost is that it is fun. The information that is exchanged is formatted and normally quite brief. For each contact, you might only have to transmit a signal report and your state, for example. Of course, each contest is different and you need to read the rules to know what the "exchange" is.

There are other reasons to participate as well. Competitive operating events allow you to build your own personal operating skills, make lots of contacts, and test your station. You will learn a lot about propagation and what bands and modes work best for you. You'll have a chance to learn and experiment with antennas. You can compete against yourself and your friends and even earn awards.

What do you need to get started? For most people, whatever you currently have in the way of radios and equipment is enough to participate. Like any other sport, as you improve you will want better equipment, but you can have fun right away with what you have now. You don't need a monster antenna, linear amplifier, or one of the latest and greatest transceivers with all of the newest bells and whistles. All you need is a wire and a dream.

You do need a radio, microphone or key, and antenna. A license to operate the specific contest

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band is required, or you could operate with a friend who has such a license. A computer with contest logging software is helpful and many hams have one. The most important ingredient you should supply is enthusiasm.

Preparation and Planning

The best way to get started is to prepare in advance. Read the contest rules and learn the basics—the contest start and end dates and times, objective, bands and modes, information to be exchanged, entry classes, scoring, and log submission. All contest sponsors today have websites with this information. Read this before the contest starts!

Have a plan for the contest. If you know how much time you have, plan your operating time around your station's strengths and the propagation prediction. If you only have one antenna and it works best on 15 meters, plan on being on when 15 meters is open and you will be productive. This will maximize your potential score and increase the fun factor.

As you become more serious about contesting, you can become more precise in your planning. You may want to develop a band plan to predict which bands you want to operate at what times. Try planning your sleep periods so you can be off at minimum activity times. Take a look at your log from last year or prior years to see if you can spot any specific things that you did well. This will help you be in the right place at the right time for that rare opening or peak-rate timeframe.

Before the contest, you should operate your radio and test your antennas and your computer logging program. Get on the bands and get a feel for propagation in the days leading up to the contest. When does a specific band open? Where are the signals coming from that are strongest on that band? If you have a directional antenna, try rotating it and determine the correct beam headings for the major population centers of Europe, North America, South America, Japan, and others.

Strategy Choices

Try to be on at the start of the contest. Many operators have their best rates right at the beginning. Be prepared to make lots of contacts quickly!

Your first choice is to determine your operating strategy. Do you want to search the bands and pounce on the stations you hear? This strategy may yield the most contest multipliers. Multipliers are what create the need for operating strategy. Without multipliers, every contest would simply be a competition to see who could make the most contacts. With multipliers, it's possible for one station with more multipliers to outscore another station with more contacts.

You could sit on one frequency and "run" stations. This may yield a great number of QSOs but not many multipliers. Conversely, you could do a lot of searching and work only new multipliers, but your QSO total may suffer. A good strategy might be to try to run when you can and search when your rates get low. Of course, it depends on your station, antennas, power level, location, operating skill, and mindset.

Most contests are scored by taking your total number of QSOs and multiplying by a factor (sometimes based on power level) to determine your QSO points. Often, your total score is determined by taking QSO points times your total multipliers. Sometimes multipliers can be once for the entire contest (such as sections in ARRL Sweepstakes) or once per band and/or mode (such as countries in CQ World-Wide DX). Read and know the rules and hunt for multipliers to increase your score.

Many logging programs can help you determine the "worth" of a multiplier in QSOs. They might have a value such as "minutes per multiplier" or QSOs per multiplier. Either way, you'll have an idea of how long you should wait in a pile-up to work the multiplier. Note that some multipliers may be easy to work, while others are much harder. The great thing about contest operating is that every multiplier is worth the same! Therefore, try not to get distracted by the rarity of the multiplier, especially if other multipliers are available quickly. You may find that if you save the more difficult to get multipliers in memory and then come back to them later, they will be easier to work as propagation changes or their pile-up fades.

Today a logging program is almost a necessity. Sure you can get by without one, but then you would have to keep track of every QSO by writing down its date and time, station worked, band, mode, and exchange. This way would be much harder to keep track of multipliers worked and needed and calculate the total score. Computers can make things a lot easier. They will automatically record the date and time of the contact and can track the band, exact frequency, and mode with a simple computer-to-radio interface. Then all you have to do is make contacts and record the unique information for each QSO.

The logging program does the rest. It will log your QSO, determine if the station you are working is a multiplier, or if you've already worked it (and it's a DUPE, or duplicate station with no points). The computer will tally your multipliers and help you determine which multipliers you still have not worked and are needed on a specific band (or overall). The logging program will keep a running score, track your rate, and help you determine if it's time to change bands. The program can control radios and antennas, and show beam headings, country names, prior exchanged information when working a station on another band, and help with partial callsigns. Computers can also act as CW memory or voice keyers. For RTTY operators, a computer and associated sound card with RTTY demodulating software can be used as the RTTY modem.

Flying Solo or Getting Help

A computer and packet cluster interface can link you to other users who will "spot" stations that they hear. This spotting assistance may help you work more stations and identify needed multipliers, but it may also put you into a different category (depending on the rules; in CQ contests, for example, using spots would put a single-operator station into the "Assisted" category). For many people, using spots is a boon to their operating, and with the appropriate computer/radio interface allows "point and click" operating. Spotting can also be a bane to operating, though, as sometimes the spots contain incorrect callsigns or can lead to huge "packet pile-ups," when everyone clicks on a newly spotted station. In many contests, single operators *not* using spotting assistance sometimes submit the highest scores! This is because spotting may be more of a distraction at times than assistance. Of course, your mileage may vary.

Computers can also help create your output log file to submit to the contest sponsor. This log can also be used to interface to your general logging software or to ARRL's Logbook of The World (LoTW) to QSL for awards such as DXCC or Worked All States. Computers can also provide useful post-contest analysis, such as rates per hour, number of stations per multiplier, QSOs per band, etc.

Contesting aids are helpful and some may seem necessary, but none of them is a substitute for smart and considerate operating. Listen before you call. Make sure the frequency is not in use before trying to call CQ. Avoid frequency fights or anything that will give ham radio in general or contesting specifically a bad name. Remember, a ham is considerate and can and should positively contribute to international goodwill.

When operating, keep your exchange short and direct. Avoid excessive words and don't repeat the other station's exchange unless you need a fill or need to confirm something. Give the exchange information in the correct order; if it's signal report, name, and state then give it that way. Use standard international phonetics and don't use "cute" names. "Albany" doesn't work as well as "Alpha" as a substitute for the letter "A." Don't spend time waiting to work the "big guns"; they most likely will be there at the end of the contest and will probably come looking for you when they run out of other stations to work. Use your operating time wisely: Be in the right place at the right time on the right band.

No matter the size of your log, make sure to submit it! Even if you don't think your score will be "competitive," your log will help verify the scores of the stations you contacted. Besides, you never know …

Most logs today are sent via e-mail or through a website and use something called the "Cabrillo" format. Most logging programs output this format, or there are other programs available that can convert your log into it. More contest results are being published on the web and are often available there before they are printed on paper in a magazine. Log-submission deadlines are getting shorter because of this. Make sure you read the contest rules to determine the submission deadlines and where and how to submit your log. Regardless of your score, it's always nice to see your callsign listed and you will have something to shoot for the next time you operate.

So the next time you tune across the bands and hear someone calling "CQ Contest," you can jump in and join the fun. You'll be glad you did.

73, George, N2GA

propagation

BY TOMAS HOOD,* NW7US

Where's the New Sunspot Cycle?

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, December 2010: 15
Twelve-month smoothed, June 2010: 16

10.7 cm Flux
Observed Monthly, December 2010: 84
Twelve-month smoothed, June 2010: 80

***Ap* Index**
Observed Monthly, December 2010: 3
Twelve-month smoothed, June 2010: 6

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, December 2009: 11
Twelve-month smoothed, June 2009: 3

10.7 cm Flux
Observed Monthly, December 2009: 77
Twelve-month smoothed, June 2009: 70

***Ap* Index**
Observed Monthly, December 2009: 1
Twelve-month smoothed, June 2009: 4

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for March 2011

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1, 12-16, 18-19, 21, 24-5, 28	A	A	B	C
High Normal: 2, 4-11, 17, 22-23, 26-27, 29, 31	A	B	C	C-D
Low Normal: 3, 20, 30	B	C-B	C-D	D-E
Below Normal: N/A	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 2 will be good (B) on March 1st, fair (C) on the 2nd, prro (D) to fair (C) on the 3rd, 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.

Sunspot activity over the last year has been slowly increasing, but much more slowly than hoped for. Certainly, the solar cycle minimum between sunspot Cycle 23 and the new Cycle 24 is one of the longest since the early 1900s. A great deal of speculation still circulates amongst the amateur radio community. Generally, most months in 2010 saw a rise in sunspot activity. On the other hand, some of the dips were pretty steep. An example is the December 2010 dip from November's smoothed observed sunspot count of 21.6 down to 14.5. That was the lowest since June 2010. However, don't let these dips cause you to speculate that the new cycle is fizzling out. While this cycle is unusual from our limited perspective of a decade or two of personal observation (or maybe you have observed a few more than two), it is not unheard of when you look at the record spanning the last 400-some years of sunspot data.

An interesting observation of sunspot Cycle 24 during 2010 has been the stability and relative "calm" of the new sunspots emerging. Past sunspot cycles do indicate that the very beginning of a cycle presents many sunspots that are not very "energetic." As a cycle progresses and sunspots drift toward the solar equator, they tend to become more complex and energetic, unleashing flares and space weather. What is nice during these calmer events is that we're not seeing total blockage on the shortwave bands due to sudden ionospheric disturbances.

Such quiet geomagnetic conditions, coupled with rather stable ionospheric conditions, lead to reliable DX on those paths that open up via the *F*-regions. If a band is open, it typically offers reliable and consistent results. Once the sunspots become more complex and energetic, the conditions will become much more variable.

Gray-line Propagation

March is one of the optimal DX months. As the Spring Equinox approaches, the gray-line begins to run straight north and south. With the return of sunlight to the polar north, north to south openings on the higher shortwave frequencies (20 through 10 meters) are improving. With low sunspot energy, openings on east/west paths on higher frequencies continue to be short and weak, if they occur at all. The good news is that this year we are seeing an increase in the 10.7-cm radio flux levels (and even more significantly, we're seeing the background X-ray flux increasing more and more

*e-mail: <nw7us@sunspotwatch.org>

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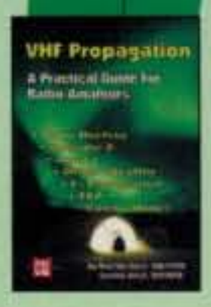

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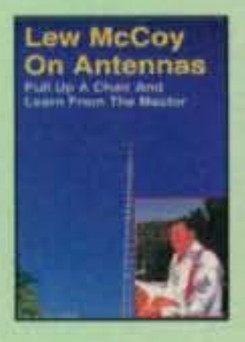

by Lew McCoy, W1ICP

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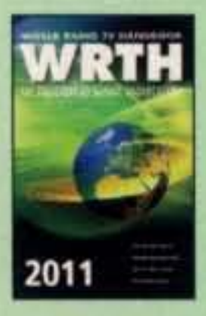

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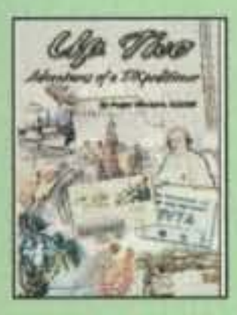

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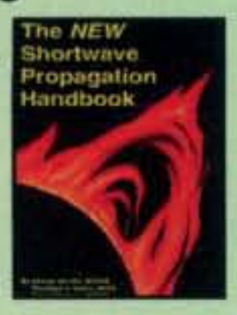
The NEW Shortwave Propagation Handbook

by W3ASK, N4XX & K6GKU



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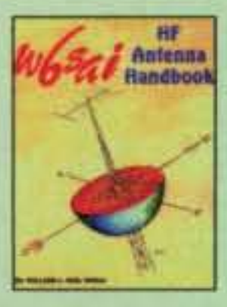

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into the B-range), which could strengthen these openings, affording an opportunity to catch some longer-range DX.

During the daylight hours, the energy from the Sun ionizes our upper atmosphere, causing distinct layers of ionized gas to form. These layers form what we call "the ionosphere." The layer closest to the Earth is called the "*D*-layer" or "*D*-region." This layer of ionized gases generally absorbs some of the energy of an HF (high-frequency; those frequencies below 30 MHz) radio wave, and hence the *D*-region is often called the "absorption layer."

As a radio signal travels through the *D*-region, it gets attenuated. How much a radio wave is attenuated depends on how energized the *D*-region has become, the frequency of the radio wave, and the angle at which the radio wave enters the *D*-region.

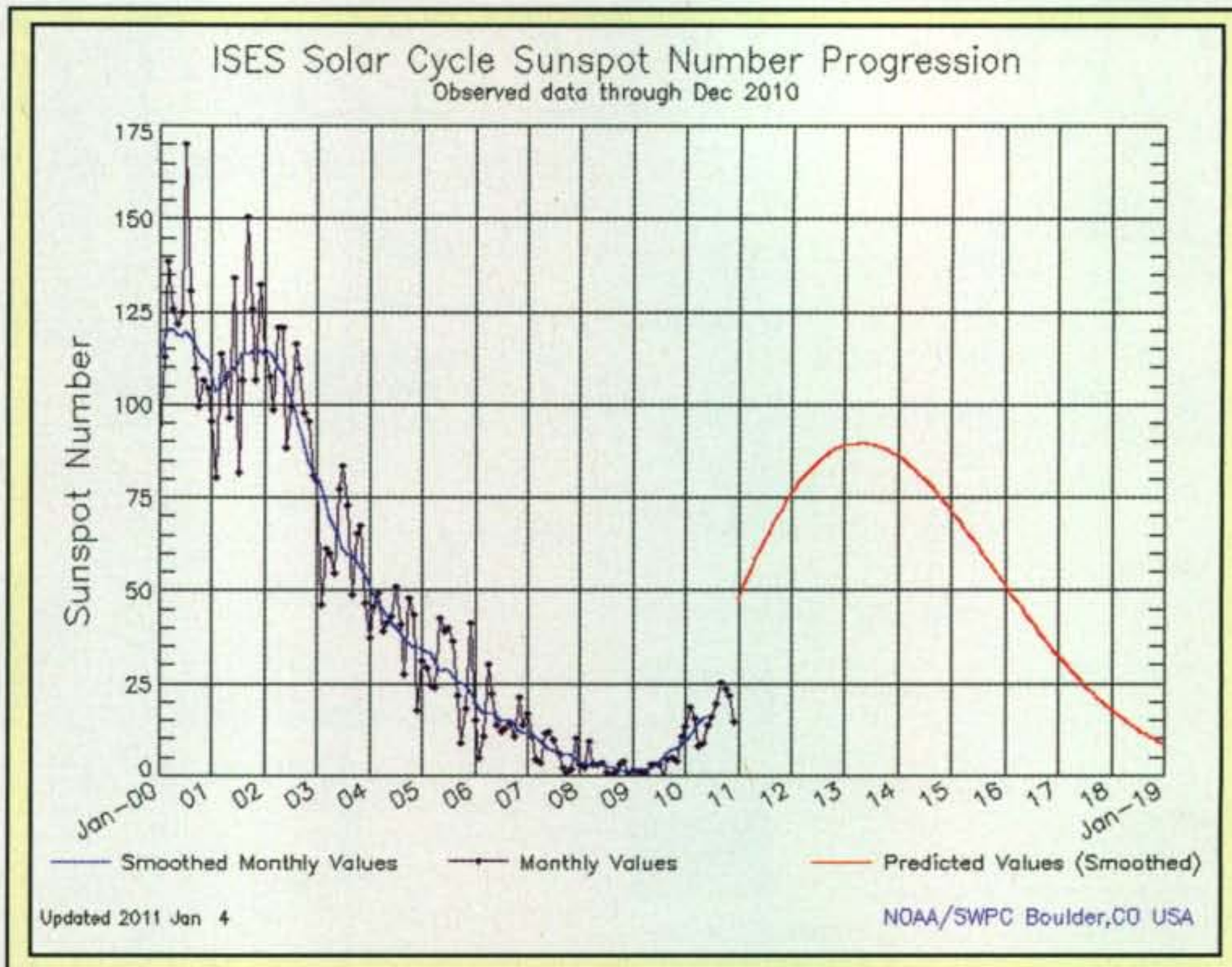
When the end of daylight occurs at our radio shack and sunset ends the direct exposure of the ionosphere above us to sunlight, solar radiation no longer strikes the ionosphere and ionization stops. Without this solar radiation, the layers of ionization decrease in density by a process called "recombination." This causes the maximum usable frequency (MUF) to become lower as well, which is why by total darkness the highest HF bands close down. Those frequencies do not get refracted, but continue on out into space.

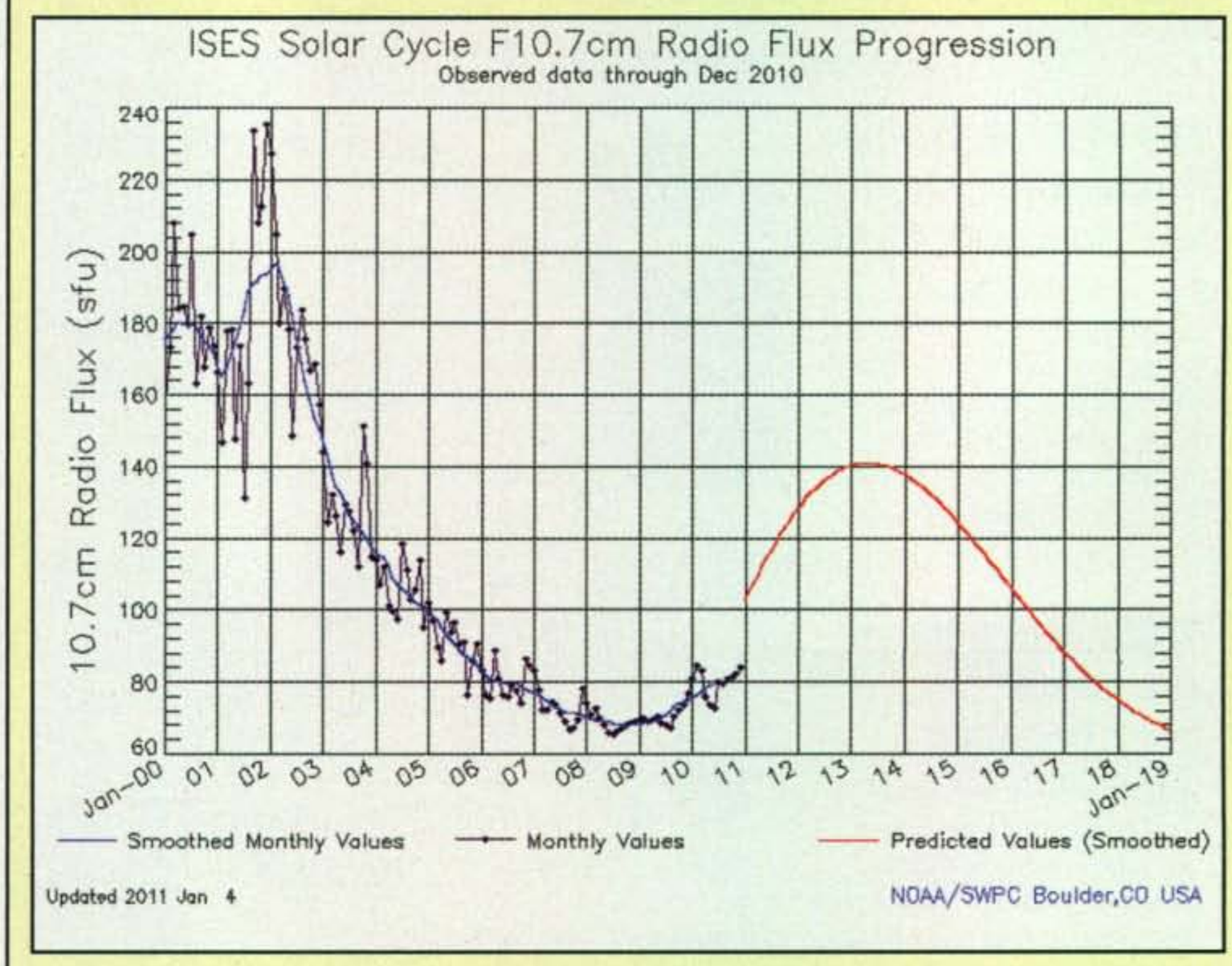
The *D*-region is the first layer where ionization stops. Since it is closest to the ground, sunlight no longer reaches it, while higher levels of the atmosphere remain in sunlight. Think about how you can see a passing satellite by the sunlight reflected on its surface, while you are standing in darkness; it's dark on the ground, but the satellite is still being illuminated. As the *D*-region goes into recombination, the electron density goes down, and the absorption does down.

During the twilight hours the *D*-region rapidly loses its ionization and does not absorb radio signals passing through it, while the *E*- and *F*- regions are still being ionized by sunlight. This makes for about 45 to 60 minutes of stronger signal propagation on a wide range of HF frequencies. As the ionization decreases, lower and lower frequencies start to punch through the *D*-region with almost no signal attenuation. Yet the MUF is still high, allowing long-distance skip propagation. Then, when the Sun is blocked from illuminating the *E*- and *F*- regions, the MUF can drop dramatically and very quickly (within minutes). This twilight zone, where the Sun is exactly 12 degrees below the horizon, is called the "gray line," or in astronomical terms, the "terminator." The same principles apply at sunrise; the upper ionosphere begins to become ionized, while the *D*-region is still dark and low in density, offering free passage of very low HF signals, even microwave signals.

Signals that are aimed along a path that stays within the gray line often experience significant improvements in propagation. This is what we refer to as "gray-line propagation," and is a very exciting way to hear exotic DX signals. These signals may be coming in from the long path as well as the short path, but always along this gray line.

There is an excellent article regarding gray-line propagation at the web page of Steve Nichols, GØKYA: <http://www.qsl.net/g0kya/radcom.html>. Steve, a member of the Radio Society of Great Britain's Propagation Studies Committee, believes that propagation around sunrise and sunset is not fully understood. His article outlines the





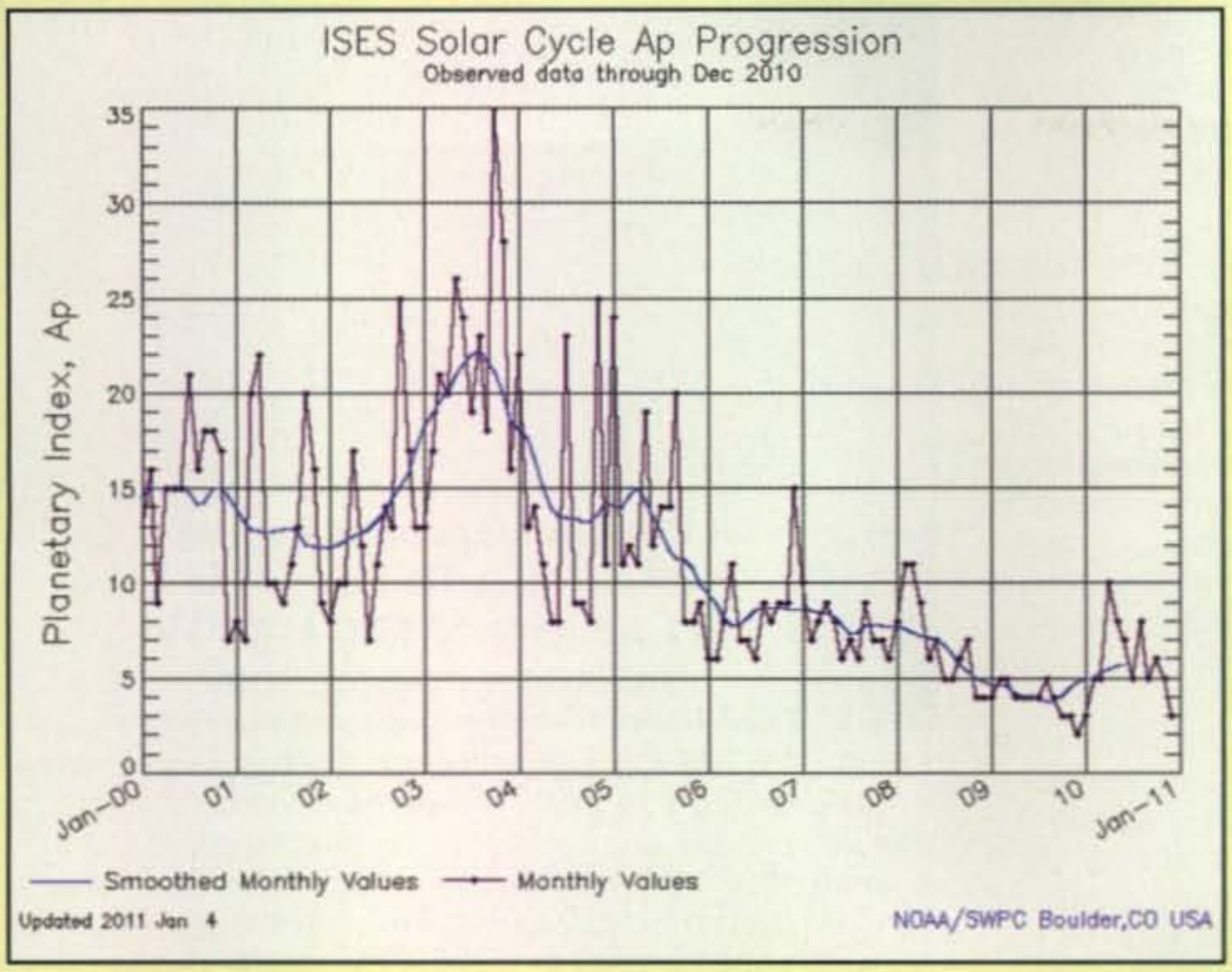


Fig. 1– Sunspot Cycle 24 progression charts showing thevariable nature of month sunspot counts. December 2010 shows a rather sharp dip. However, the overall energy of the sunspots during December was higher than the previous few months, as indicated by the slow yet steady rise in the 10.7-cm monthly observed indices. While there is a definite and continuing upward trend, it is typical to see months when the count moves lower than previous months. As can be seen by the geomagnetic progression chart (Ap), conditions were very favorable for stable HF propagation, as the geomagnetic field was very quiet. This results in some very stable, reliable communications when a DX opening is present on a given ionospheric path. (Source: Space Weather Prediction Center [SWPC]/The National Oceanic and Atmospheric Administration [NOAA])

mechanisms behind gray-line and other twilight propagation modes, and also explains a research project designed to better understand these modes.

As we are right at the start of solar Cycle 24, gray-line propagation will bring exciting DX. Tune around the lower amateur radio HF bands about an hour before sunrise, and again right before sunset, and look for these long-distance signals. Of course, gray-line DX will occur on most of the HF spectrum, but is quite noticeable on these lower shortwave bands, since DX signals on these bands are rare.

March Propagation

At this time, the ionosphere is not being energized enough to support much propagation on the highest HF bands via the *F*-regions. This is because the solar energy is not yet at a consistently high enough level to ionize the *F*-regions sufficiently for refracting these higher frequencies. With the reduced energy level of the ionosphere, even 20-meter propagation suffers with short openings, and limited distances. Overall, signals are generally weaker over many radio circuits during this part of the solar cycle.

Ten meters will be spotty, with the most reliable propagation along north/south paths, and mostly over shorter distances. I've been following the revealing reports from the PropNET propagation research group <http://www.propnet.org/>. They conduct daily propagation tests on 10 meters. The reports confirm that even during the lowest phase of the solar cycle, 10 meters does have life. You won't know it, though, if you are not on the band trying. When the 10.7-cm radio flux rose above 90 several times this past year, there were reports of two-way (non-sporadic-*E*) Morse Code contacts successfully made on 10 meters.

Fifteen meters will be somewhat more usable than 10. We will find 15 opening up to more areas and for somewhat longer periods into the evenings. Those daytime paths that do open up (certainly much less often than during the peak solar cycle years) will not degrade much until midsummer. You will see these openings mostly from regions close to the equator, as the current solar activity is not supporting the propagation of these higher frequencies via the *F*-region of the ionosphere.

Seventeen and 20 meters will remain in good shape. Both short- and long-path circuits are reliable and solid. All nighttime paths are wide open during March. Primetime evening hours in the United States are sunrise hours across Russia, Africa, and both the Near and Far East. Expect a lot of short- and long-path DX into these areas of the world. The daytime band of choice will be 20 meters, as has been proven in contests during past solar cycle minimums.

Between sunset and midnight, expect DX openings on all bands between 20 and 160 meters, with occasional openings on 15 and 17 when conditions are High or Above Normal. Conditions on 30, 40, 60, 80, and 160 meters should favor openings to the east and south. These bands should peak for openings to Europe and Africa near midnight.

From midnight to sunrise, expect optimum DX conditions on 30, 40, 60, 80, and occasionally 160 meters. Conditions should favor openings toward the west and south. Some rather good 20-meter openings should also be possible toward the south and west during this time.

The seasonal drop of daytime maximum usable frequencies continues,

and the geomagnetic activity as reported by the planetary *A*-index (*Ap*) is on its seasonal rise. Take advantage of the current excellent conditions and work the world before the summer conditions create greater challenges.

VHF Conditions

The possibilities for ionospheric openings on the VHF bands usually improve during March and the spring months as more auroras occur close to the equinoctial period. There is a slight but fair chance for an increase in widespread auroral activity during March, but definitely by April, since we will continue to experience coronal-hole activity and possible solar flares during this new solar cycle. These auroras could be accompanied by auroral-scatter-type openings on 6 and 2 meters. Check the Last-Minute Forecast at the beginning of this column for those days in March expected to be Below Normal or Disturbed. These are days on which auroral activity is most likely to occur.

Conditions should be optimal during March for trans-equatorial scatter propagation between the southern tier states and countries deep in South America. The best time for TE openings should be between 8 and 11 PM local time. Don't forget to check out *CQ VHF* magazine for more details on VHF propagation and conditions.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for December 2010 is 14.5, quite a dip from November's 21.6. Remember, it is typical to see such swings between months during a sunspot cycle. The lowest daily sunspot value of zero (0) was recorded for December 18 through 21. The highest daily sunspot count was 31 on December 4. The 12-month running smoothed sunspot number centered on June 2010 is 16.4, up a point from May's 15.5. A smoothed sunspot count of 38, give or take about 9 points, is expected for March 2011.

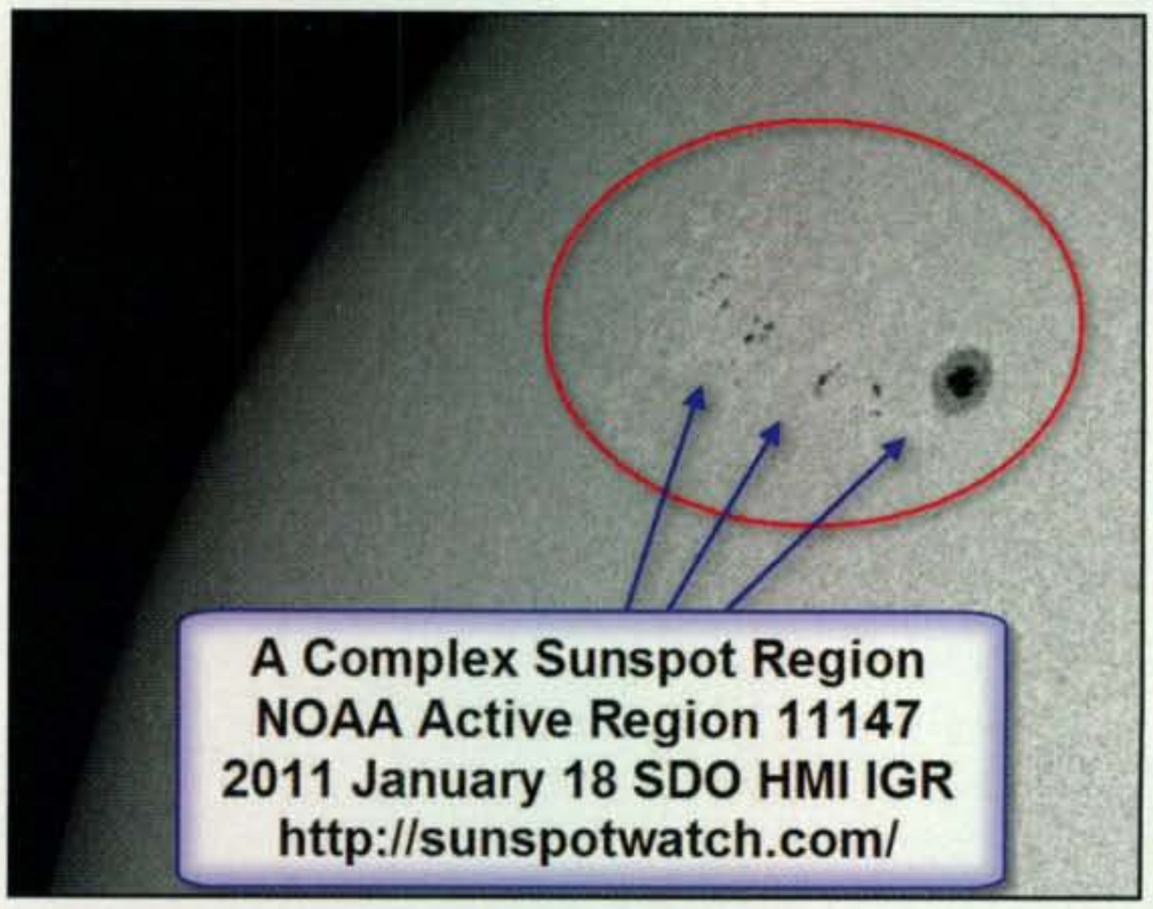


Fig. 2– The intensitygram view of the active sunspot region 11147 on January 18, 2011. The leading sunspot group is large and well-defined, and not overly complex (therefore, not highly energetic). However, there are numerous other smaller sunspots trailing, and these make the entire region moderately complex and energetic, unleashing B- and C-class X-ray flares. In turn, these sunspots caused the background X-ray flux to rise, as well as pushing the 10.7-cm radio flux into the 80s. (Source: Solar Dynamics Observatory/NASA)

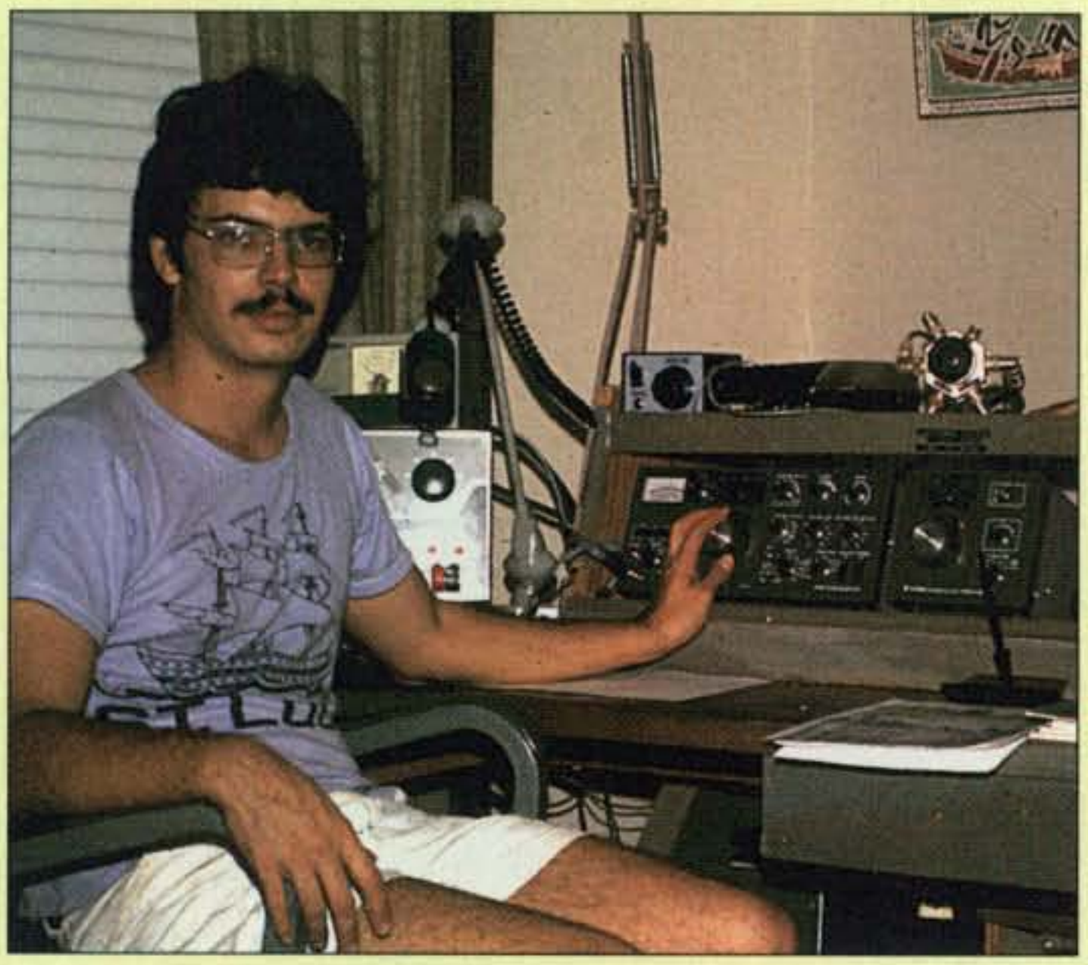
The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 84.3 for December 2010, up a few points from November's 82.5. The 12-month smoothed 10.7-cm flux centered on June 2010 is 79.9, about a point up from May's 79.0. The predicted smoothed 10.7-cm solar flux for March 2011 is 100, give or take about 9 points. If we do see this high a flux in March, expect some openings on 10 and 12 meters, and a good amount of activity on 15 meters.

The observed monthly mean planetary *A*-index (*Ap*) for December 2010 is 3, a bit more quiet than November (5), and still very quiet. The 12-month smoothed *Ap* index centered on June 2010 is 5.8, about the same as for May. Expect the overall geomagnetic activity to be varying greatly between quiet to minor storm level during March; expect more geomagnetic activity as we continue into the new sunspot cycle. Refer to the Last-Minute Forecast for the outlook on conditions during this month.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. If you are on Facebook, check out <http://tinyurl.com/fbswx> and <http://tinyurl.com/fb-nw7us>. Speaking of Facebook, check out the CQ Amateur Radio Magazine fan page at <http://tinyurl.com/fb-cqm>.

Now that the new solar cycle is active, I'll be keeping my ears to the radio, hoping to hear you on the air. Happy DX!

73, Tomas, NW7US



Oops...

From the geographically-challenged department: In January's article on the history of the CQ WPX Contest, the caption for the photo of Chip Margelli, K7JA, operating from KG6SW in 1979, said that the station was in Guam. Not so. Chip informs us that he was actually operating from Saipan, at the shack of Dr. Len Kaufer. Guess we need an extended visit to the South Pacific to get our islands straight!!

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2010 WPX CW RESULTS
SINGLE OPERATOR
NORTH AMERICA

United States

AJ1I	**A**	**5,517,941**	**2342**	**821**
			(OP: K8PO)	
WC1M	*	5,361,419	2134	797
W5MPC/1	*	750,060	771	405
K1AR	*	666,490	636	365
NW1E	*	644,170	687	370
			(OP: K3IU)	
NM1JY	*	403,848	599	316
K5ZD/1	*	377,405	355	263
AE1T	*	338,955	463	295
KQ2M/1	*	279,792	412	268
KD2HE/1	*	161,916	366	206
W1UJ	*	146,010	249	186
W1BYH	*	109,760	202	160
W1FM	*	7,626	65	62
NN1N	**14**	**2,216,760**	**1438**	**735**
K1NEF	**7**	**81,000**	**145**	**125**
***NV1N**	**A**	**2,062,368**	**1476**	**594**
			(OP: N1UR)	
*KW2G/1	*	795,476	772	404
			(OP: W1WBB)	
*W1CCE	*	504,234	623	327
*KS1J	*	327,456	478	288
*NJ1T	*	225,272	301	232
*N1QY	*	156,325	277	185
*W1TO	*	98,325	222	171
*N1IW	*	94,250	171	145
*K1PU	*	89,194	239	161
*AA1AR	*	83,070	238	195
*W1/YO7ARY	*	75,992	269	161
*K1SND	*	53,156	170	137
*K1QO	*	38,236	151	121
*KX1E	*	32,107	118	97
*N1NN	*	27,417	124	111
*N1GN	*	26,976	122	96
*AB1HL	*	15,318	80	69
*WB1FJH	*	13,651	88	73
*WA1ESO	*	5,830	58	55
*W1MAW	*	5,472	39	38
*W1OHM	*	4,928	69	56
*N1YX	*	3,969	57	49
*KA1RI	*	2,556	39	36
			(OP: W1XX)	
*W1/CT1AGF	14	24	4	4
***AB1J**	**3.5**	**48,000**	**162**	**125**
*WW1M	*	3,395	41	35
NT2A	**A**	**892,143**	**879**	**441**
NX2X	*	738,815	786	385
WN2O	*	618,372	635	356
			(OP: N2GC)	
K2FU	*	616,834	662	358
KM2O	*	375,154	501	307
			(OP: K2XA)	
W2FUI	*	82,348	230	173
K2YR	*	52,374	176	129
N2EIK	*	21,730	107	82
W2RR	**28**	**3,465**	**48**	**45**
			(OP: WA2AOG)	
KR2AA	**14**	**253,154**	**495**	**311**
WA2JQK	**7**	**7,336**	**70**	**56**
***K2UF**	**A**	**830,070**	**775**	**401**
*K1TN/2	*	556,830	608	345
*K2DB	*	140,015	284	205
*KR2Q	*	121,264	228	176
*WA2MCR	*	98,645	228	181
*N2SO	*	70,684	243	164
*NA2M	*	42,340	141	116
*N2NC	*	38,868	157	123
*KR2D	*	30,282	134	98
*AE2T	*	27,368	116	88
*NV2G	*	18,832	107	88
			(OP: N2ZN)	
*KA2FHN	*	14,596	113	82
*AG2T	*	5,304	59	51
*KV2X	*	3,198	47	39
***W2AW**	**14**	**128,594**	**294**	**226**
			(OP: N2GM)	
*WB2REM	*	35,108	187	131
*KD2MX	*	12,876	96	87
*WW2P	*	7,245	80	63
***W2EG**	**7**	**841,759**	**591**	**379**
KC3R	**A**	**6,532,302**	**2674**	**903**
			(OP: LZ4AX)	
AA3B	*	5,532,196	2476	802
K3ZO	*	3,964,797	1865	733
N1WR/3	*	1,736,640	1254	540
K3MD	*	1,389,584	1326	532
N3UM	*	1,258,136	909	493
WM3T	*	967,200	690	400
			(OP: N3KS)	
N3XL	*	148,932	281	197
K3RMB	*	103,530	274	174
N3INJ	*	54,720	123	114
W3FV	*	32,800	99	82
KN3A	*	5,202	56	51
KT3M	**14**	**1,548,063**	**1221**	**627**
AD8J/3	**7**	**55,414**	**108**	**103**
***W3EF**	**A**	**2,437,827**	**1347**	**609**
*WA1LWS/3	*	492,586	692	326
*KB3LIX	*	295,872	492	268
*W3DQN	*	246,515	453	235
*AD3PA	*	240,250	404	250
			(OP: K3MSB)	
*N3QE	*	221,350	328	233
*NA3F	*	121,290	257	195
*K3TN	*	85,332	212	156
*WC3O	*	82,852	247	154
*NN3Q	*	68,850	235	150
*WA2VQV/3	*	61,985	230	161
*N3NZ	*	43,554	193	119
*ND3R	*	43,008	166	128
*KB3CTX	*	42,336	196	126
*K3RWN	*	29,610	138	105
*KA3QLF	*	21,888	143	114
*KE3X	*	11,454	98	83
*WA2EAJ/3	*	5,841	68	59
***NJ3K**	**14**	**130,255**	**425**	**239**
***KZ3M**	**7**	**209,729**	**297**	**221**
*AI3G	*	2,769	50	39
NXØX/4	**A**	**3,086,655**	**2052**	**715**
			(OP: N4PN)	
NN4US	*	2,808,364	1978	689
			(OP: N5WR)	
N6AR/4	*	2,795,386	1880	671
K4RO	*	1,396,984	1396	524
KM4MK	*	1,219,775	1501	503
			(OP: N4UU)	
NN4MM	*	1,022,110	829	430
			(OP: K9MUG)	
NJ4I	*	959,968	1258	458
			(OP: K4LTA)	
N4EEB	*	906,382	1172	458
AK4K	*	556,380	880	396
			(OP: W4LT)	
N4CW	*	514,941	573	339
WA4JUK	*	452,430	692	330
WZ4F	*	444,780	629	353
			(OP: K4AB)	
N4ZZ	*	404,950	747	350
K4LQ	*	365,712	430	304
N4DW	*	341,931	493	293
W7DO/4	*	338,826	456	298
W4SVO	**21**	**602,490**	**913**	**453**
K4FJ	*	178,432	362	272
K4SV	*	68,972	264	172
W4NZ	*	27,474	145	114
N4NM	*	16,376	105	89
AD4EB	**14**	**233,632**	**540**	**298**
N2YO/4	**7**	**298,584**	**389**	**264**
K4XD	*	10,335	97	65
***WJ9B/4**	**A**	**1,897,920**	**1553**	**576**
*NA4K	*	1,247,076	1197	486
*WK2G/4	*	1,244,880	1259	494
*N4PSE	*	724,992	815	384
*W2TX/4	*	694,668	775	366
*N4IG	*	580,488	648	361
*W4YE	*	521,640	606	345
*KN4QD	*	411,179	606	323
*WF7T/4	*	371,762	711	302
*NM2L/4	*	203,112	496	248
*AE4Y	*	173,817	481	217
*W6UB/4	*	169,992	377	216
*K1GU/4	*	145,452	289	186
*N4WO	*	123,435	330	195
*KE4KY	*	116,484	346	204
*W4RYW	*	113,231	231	199
*WC4E	*	86,227	217	163
*WC4CC	*	81,375	196	155
			(OP: K4CC)	
*N3TG/4	*	76,812	209	148
			(OP: K4WI)	
***WB4TDH**	**21**	**124,509**	**345**	**231**
*KC4ABC	*	4,704	48	48
***WA2ASQ/4**	**14**	**33,777**	**182**	**139**
*K4FX	*	25,740	137	117
*N4MM	*	3,528	38	36
***N3GD/4**	**7**	**171,072**	**250**	**198**
***K4WI**	**1.8**	**351**	**13**	**13**
K5WA	**A**	**2,296,944**	**1934**	**624**
WC5T	*	2,247,315	2066	595
			(OP: K5PI)	
K7IA/5	*	574,500	933	383
AA5AU	*	320,229	535	299
NO5K	*	313,500	860	300
			(OP: W5ASP)	
AI5M	*	235,197	597	281
WB5AAR	*	209,085	510	263
			(OP: N5RZ)	
KM4DR/5	*	181,040	630	248
N5VU	*	150,936	397	228
NK5Z	*	136,656	368	208
KZ5D	*	84,729	406	183
NT5C	*	42,316	234	142
			(OP: N3BB)	
AD5Q	*	31,242	182	127
WS1L/5	*	18,527	129	97
WØZW/5	*	5,763	59	51

The C4I contest team included Mitko, LZ3NY; Vesco, LZ3CQ; Savi, LZ1UK; and Andy, LZ2HM. They were world champions in the Multi-Two category.

K4DJ	*	338,580	518	297
K7CS/4	*	324,000	486	270
NE4M	*	296,928	634	288
AI4WW	*	245,364	426	254
KM4M	*	236,500	396	275
			(OP: W3BP)	
KU8E/4	*	212,880	386	240
W4BQF	*	132,276	390	219
N3JT/4	*	124,729	292	187
K4HAL	*	124,179	323	213
WJ2D/4	*	115,680	216	160
KY4P	*	104,232	257	172
WR1Q/4	*	97,512	293	204
WX4G	*	97,005	158	145
NN3RP/4	*	89,964	313	196
N4IR	*	73,743	199	141
K3CQ/4	*	69,158	205	151
W4VIC	*	64,779	193	143
NA4C	*	50,456	208	136
WY4Y	*	41,844	180	132
			(OP: NS3Q)	
NE8J/4	*	30,012	186	123
N4GI	*	29,120	108	80
AJ4FM	*	26,016	114	96
KI4CBN	*	15,106	93	83
AB4GG	*	14,504	98	74
K4RFE	*	13,674	118	86
AE4EC	*	8,280	89	72
WN1G/V/4	**28**	**320,306**	**709**	**334**
			(OP: N4BP)	
N3UA/4	*	3,735	45	45
*AC6NN/4	*	75,696	204	152
*K4FTO	*	74,550	236	150
*K4AMC	*	68,992	303	154
*W4UAL	*	49,786	204	146
			(OP: K4CWW)	
*NX4N	*	48,471	210	151
*K4CWW	*	41,088	181	128
*N4ARO	*	40,057	122	103
*KQ4Y	*	33,491	167	107
*W4BK	*	27,951	165	121
*N5VI/4	*	23,715	90	85
*NA4BW	*	23,088	142	104
*AA4KD	*	21,714	139	94
*WA8OJR/4	*	15,753	115	89
*N4CU	*	14,190	122	86
*N4DXI	*	13,608	102	84
*WI4R	*	13,050	103	87
*KJ4AOM	*	12,960	101	72
*N4AU	*	12,208	69	56
*K4GSG	*	12,194	102	91
*KI4EZC	*	9,135	78	63
*WB4ZPF	*	6,858	58	54
*AI4UN	*	5,564	62	52
*WU4B	*	3,360	42	40
*KJ4WD	*	2,747	46	41
*K4AGT	*	2,418	29	26
*N4DE	*	2,040	31	30
*K4CQW	*	1,880	45	40
*K3MZ/4	*	768	18	16
***KN4Y**	**28**	**28,350**	**184**	**126**
*NA4W	*	21,109	140	101
NJ5DX	*	640	17	16
			(OP: W5OV)	
K5DU	**28**	**150,894**	**516**	**249**
W5VX	*	22,363	148	107
NR5M	**21**	**713,094**	**1035**	**471**
			(OP: NM5M)	
NM5M	**14**	**2,014,517**	**1683**	**727**
			(OP: K5GA)	
WD5K	*	747,000	921	500
NO5D	*	280,908	627	324
			(OP: K5NZ)	
NG5A	**7**	**474,897**	**632**	**311**
			(OP: N1XS)	
WD5R	*	67,680	141	120
			(OP: N5ECT)	
W5MJ	**3.5**	**65,567**	**310**	**173**
KT2Z/5	**1.8**	**28,676**	**172**	**107**
			(OP: K5NA)	
***NN5J**	**A**	**2,626,140**	**1972**	**660**
			(OP: N5DX)	
*KK5I	*	1,287,420	1687	499
			(OP: W5CW)	
*W5RYA	*	523,709	946	367
*NE5LL	*	377,600	828	320
			(OP: N1CC)	
*W5UE	*	306,210	645	295
*N5AW	*	262,542	503	282
*K5IID	*	224,035	483	259
*WQ5L	*	196,930	412	235
*NK5G	*	172,956	460	213
*W5KDJ	*	151,767	491	231
*AC5K	*	141,700	392	218
*N5KWN	*	85,655	331	185
*KE3D/5	*	80,580	232	170
*K5ME	*	74,880	254	156
*KX5A	*	71,495	291	181
			(OP: K5XA)	
*W5WZ	*	70,882	242	166
*W5JBO	*	44,671	192	131
*WA5ZKO	*	40,592	161	118
*KØGEO/5	*	31,920	191	120
*N5XE	*	31,552	144	116
*KM5PS	*	26,096	159	112
*W5QLF	*	13,344	129	96
*K3TD/5	*	10,512	97	72
*WA5J	*	5,940	84	60
*AE5KM	*	4,429	51	43
*AC5TU	*	304	16	16
***W5KI**	**28**	**15**	**3**	**3**
*W4JHC/5	21	3	1	1
***W5YZ**	**14**	**50,020**	**232**	**164**
***N5ER**	**7**	**139,582**	**267**	**202**
KC6X	**A**	**870,048**	**1098**	**424**
W6TK	*	761,994	996	411
W6SX	*	671,209	1093	379
WA6KHK	*	478,608	802	338
K6LRN	*	419,228	668	337
NW6H	*	418,600	663	325
			(OP: K6RB)	
KI6VC	*	290,640	811	280
KR7O/6	*	219,883	335	173
			(OP: N6TV)	
KE1B/6	*	176,852	495	247
W6ONV	*	172,928	465	224
N6NF	*	166,665	410	205
K6IT	*	139,742	373	214
N5KO/6	*	122,298	347	187
NY6I	*	105,105	339	195
			(OP: K6DGW)	
AJ6V	*	82,460	336	190
N6MI	*	70,215	226	155
K6TU	*	50,832	205	144
N6HC	*	47,275	240	155
W4NJK/6	*	44,118	212	129
WB6JJJ	*	20,412	113	84
N6RI	*	5,343	48	39
W6SJ	*	3,237	44	39
N6AJR	*	2,838	50	43
W5VNR	**28**	**272**	**18**	**17**
NG6S	**14**	**288,414**	**498**	**327**
			(OP: W4UAT)	
WT6K	**7**	**11,850**	**95**	**79**
***WN6K**	**A**	**451,332**	**794**	**324**
*N6AA	*	257,740	529	263
*N6MU	*	138,444	278	278
*N6NG	*	135,864	381	222
*NC6V	*	124,821	392	201
*K6GEP	*	124,752	354	184
*W6IYS	*	97,018	310	179
*KK6XN	*	91,482	307	158
			(OP: W6KY)	
*KX8X/6	*	89,784	365	174
*AA6EE	*	61,104	233	152
*AF6EV	*	59,840	217	136
*N6MUF	*	49,368	227	136
*K6CSL	*	48,374	210	134
*NF6P	*	39,606	191	123
*W6RFF	*	38,564	166	124
*K6MEE	*	28,980	176	115
*KN6Y	*	25,334	151	106
*WW6D	*	16,632	106	88
*NC6RJ	*	15,600	120	80
*KA3DRR/6	*	15,549	116	73
*W6FG	*	12,994	106	73
*K7SDW/6	*	12,012	101	78
*AF6JX	*	8,748	62	54
*KI6OY	*	6,669	92	57
*K6VAR	*	6,360	71	53
*KI6QDH	*	1,353	44	33
***KM6Z**	**14**	**157,530**	**467**	**267**
*NY6U	*	140	10	10
***WØNV/6**	**7**	**27,542**	**111**	**94**
*W6/VK2IMM	*	826	14	14
KR7X	**A**	**2,589,472**	**1984**	**608**
			(OP: K7GK)	
K7QQ	*	1,822,851	1664	543
K7ZZ	*	1,215,808	1412	484
K7AR	*	851,003	895	443
W7IJ	*	651,672	819	378
WA7LT	*	319,272	631	318
WI7N	*	317,376	672	304
KN7K	*	305,357	647	283
N6KW/7	*	260,848	597	272
NI7R	*	229,750	496	250
KS7T	*	217,005	591	255
W7SW	*	187,920	509	232
NR7DX	*	178,808	465	248
			(OP: K7ABV)	
W7VXS	*	148,552	460	248
KE2VB/7	*	132,672	483	192
KI7MT	*	112,548	373	226
N6TW/7	*	111,544	275	191
N7QS	*	104,430	337	177
NC6X/7	*	95,480	380	155
W7YS	*	76,032	297	176
KN5H/7	*	59,943	248	159
W7ON	*	32,226	186	123
KZ7X	*	32,004	204	127
			(OP: K6LL)	
KV7DX	*	30,480	173	120
			(OP: KN5H)	
K7KAR	*	20,097	133	99
K8BN/7	*	8,190	67	63
K7EG	*	3,168	44	44
AB7E	**28**	**35,483**	**202**	**137**
K8IA/7	**21**	**323,360**	**648**	**344**
W7UT	*	181,936	427	274
KN7T	**14**	**430,848**	**837**	**396**
KO6I/7	*	402,432	775	384
			(OP: N7BV)	
W6AEA/7	*	310,500	709	345
K7ZD	*	242,788	509	322
***KE7X**	**A**	**740,950**	**1219**	**406**
*K7WP	*	731,470	1134	386
*K2PO/7	*	562,650	954	363
*KQ7W	*	530,535	962	339
*NG7Z	*	307,321	697	301
*W7RV	*	239,666	516	266
*N7RO	*	223,025	556	275
*NR7Q	*	221,605	496	235
*AB7RW	*	208,896	547	272
*W7GVE	*	167,692	493	226

*KC7V	*	129,990	443	210
*WAØWWW/7	*	93,766	322	173
*WE6EZ/7	*	87,210	328	171
*KE7YF	*	84,336	312	168
*W7QN	*	82,075	310	175
*W9CF/7	*	67,646	284	149
*K6KR/7	*	66,600	271	148
*K6WSC/7	*	62,181	259	147
*N7VS	*	61,019	263	161
*N7EIE	*	50,050	243	143
*NE6LE/7	*	49,880	221	145
*AA7IH	*	40,040	210	143
*W7JDE	*	32,301	150	111
*N7VM	*	28,620	153	106
*NE7D	*	21,311	123	101
*W3CP/7	*	20,794	96	74
*K7KU	*	20,540	108	79
			(OP: KØKR)	
*K7AMS	*	16,102	122	97
*K7ULS	*	12,308	98	68
*K7GS	*	4,560	52	48
*KI7N	*	2,030	37	29
*K7GIM	*	1,224	45	36
***WA7NWL**	**21**	**7,504**	**72**	**67**
***N7CW**	**14**	**100,323**	**317**	**213**
*W7MTL	*	15,700	114	100
***KS5A/7**	**7**	**182,206**	**387**	**233**
*KX7L	*	55,626	196	146
*WB7FJG	*	8,281	55	49
N8BJQ	**A**	**1,557,166**	**1307**	**542**
K8GL	*	679,374	658	414
NE8P	*	611,040	854	402
NF8R	*	468,000	532	312
N8AA	*	422,807	537	323
W8OHT	*	233,662	385	247
W8PN	*	148,419	386	207
K8JQ	*	68,480	291	160
K8ALM	*	17,385	65	57
N8AGU	*	11,424	57	56
W8GXT	**7**	**162,945**	**333**	**213**
KO8M	**1.8**	**12,728**	**111**	**74**
***KV8Q**	**A**	**798,391**	**1008**	**401**
*N8VV	*	506,688	712	348
*N9AUG/8	*	298,186	493	266
*W8IQ	*	95,841	207	207
*AA8IA	*	86,352	270	168
*W8IDM	*	68,640	222	156
*NS8O	*	68,000	285	200
*W8TM	*	52,059	144	111
*W8DHG	*	29,224	146	104
*K8MEG	*	27,798	142	113
*W8TK	*	14,857	100	83
*WB2DFC/8	*	6,480	87	72
*W8WTS	*	4,386	59	43
*KB8PGW	*	726	26	22
***K8AJS**	**21**	**61,770**	**240**	**174**
***AF8C**	**14**	**1,806**	**45**	**42**
***WB8JUI**	**3.5**	**18,382**	**131**	**91**
K9CT	**A**	**2,238,654**	**1791**	**634**
W9OP	*	606,779	766	379
K9CC	*	540,768	986	344
NS9I	*	190,754	445	254
K9UQN	*	182,490	445	237
N9WKW	*	125,970	306	195
KY9KYO	*	101,340	298	180
KG9N	*	97,836	336	186
W9SE	*	91,065	315	195
WW9R	*	90,574	421	179
K9WWT	*	78,223	342	179
W3HDH/9	*	44,928	143	117
NJ9Z	*	5,985	53	45
K9ZO	**14**	**1,366,384**	**1263**	**632**
K9OM	*	585,398	773	451
WX9U	*	2,838	36	33
AB9H	**7**	**400,327**	**586**	**313**
***KS9K**	**A**	**1,474,998**	**1315**	**519**
			(OP: N4TZ)	
*K9QVB	*	978,746	1198	458
*KZ9O	*	646,815	1066	403
			(OP: KB9OWD)	
*K9MMS	*	472,527	706	333
*K9MY	*	144,300	361	222
*N5IE/9	*	89,853	320	183
*W9RE	*	56,794	197	146
*WR9Y	*	45,640	217	140
*N9LJX	*	33,428	187	122
*W9OA/9	*	26,510	126	110
*N9LYE	*	24,087	150	111
*NV9X	*	16,975	124	97
*K9AIH	*	12,580	101	74
*WA9LEY	*	8,960	79	70
*WC9B	*	8,844	70	67
*W9VQ	*	8,832	77	69
*WQ9T	*	5,559	60	51
*N9BT	*	5,148	64	52
*N4YHC/9	*	110	11	10
***N9TF**	**28**	**2,331**	**38**	**37**
***AJ9C**	**14**	**1,218**	**31**	**29**
*KK9V	*	540	24	20
*KC9IL	*	525	21	21
***K9UIY**	**7**	**216,500**	**493**	**250**
KU1CW/Ø	**A**	**2,462,082**	**2197**	**651**
WØUA	*	1,660,644	1666	566
KCØMO	*	1,120,230	1397	486
			(OP: KØOU)	
NAØCW	*	1,035,975	1298	475
			(OP: NØKE)	
KØDEQ	*	604,396	880	394
WT7TT/Ø	*	587,412	1298	378
			(OP: WØZA)	
KØFX	*	385,285	638	307
KGØKP	*	93,240	273	168
KSØX	*	82,388	299	172
W7KU/Ø	*	37,448	195	124
NØRN	*	26,880	129	105
K4IU/Ø	*	3,096	53	43
WØEWD	**7**	**431,208**	**667**	**339**
NEØU	*	173,010	385	219
***WØETT**	**A**	**470,193**	**852**	**339**
*NAØN	*	222,952	608	248
*AD1C/Ø	*	141,680	440	230
*KBØEO	*	113,600	350	200
*WØHBH	*	101,689	294	199
*KØHNC	*	101,325	350	175
*WØRAA	*	95,190	354	190
*WØMSM	*	94,302	285	169
*KSØM	*	58,745	213	155
*WDØT	*	55,386	271	153
*KUØK	*	53,972	199	131
			(OP: KØVBU)	
*NFØN	*	47,320	219	140
*KØRC	*	31,239	143	117
*AA2L/Ø	*	29,430	184	109
*N1WQ/Ø	*	27,816	165	122
*WIØWA	*	13,452	134	76
			(OP: NØAC)	
*KBØL	*	2,501	47	41
*WØSHQ	*	180	11	9
			(OP: OH6KZP)	
***KUØW**	**21**	**4,275**	**47**	**45**
			(OP: NØAX)	
***NØGOS**	**14**	**59,940**	**267**	**180**
*NWØDX	*	26,289	150	127
			(OP: KØIO)	
*KRØSS	*	1,015	30	29
			(OP: OH6KZP)	
***KØPK**	**7**	**84,796**	**273**	**172**
*N9HDE/Ø	*	1,620	35	27
***ACØDS**	**3.5**	**35,250**	**191**	**125**
*W7DRA/Ø	*	2,448	45	36
Alaska				
KL5DX	**A**	**607,128**	**707**	**328**
AL1G	*	130,312	334	182
***KL7R**	**A**	**2,788**	**35**	**34**
Antigua & Barbuda				
V26E	**A**	**3,861,788**	**1408**	**646**
			(OP: AB2E)	
Canada				
VY2ZM	**A**	**10,232,376**	**2983**	**924**
			(OP: K1ZM)	
VY2TT	*	4,853,520	1835	749
			(OP: K6LA)	
VA1MM	*	1,838,067	1068	511
VE1MC	*	685,800	585	360
VE1DT	**7**	**859,238**	**505**	**349**
***VE9HF**	**A**	**305,676**	**513**	**252**
*VE1RSM	*	174,845	288	187
*VO1GO	*	152,820	217	180
*VE1ZA	*	60,368	154	112
*VO1HP	*	32,015	111	95
***VO1TA**	**21**	**46,374**	**137**	**118**
*VY2LI	*	1,586	27	26
***VE1AL**	**14**	**247,095**	**349**	**289**
*VA1CHP	*	129,684	271	202
*VE1GW	*	48,990	154	138
VA2EW	**A**	**3,932,202**	**1731**	**646**
			(OP: VE2TZT)	
VC2W	*	2,891,120	1599	568
			(OP: VA2WDQ)	
VE2FK	**14**	**21,360**	**99**	**89**
VE2DWA	1.8	208	8	8
***VE2AWR**	**A**	**195,510**	**312**	**190**
*K2NV/VE3	*	159,250	299	182
*VE2EZD	*	103,600	219	148
*VE2JCW	*	12,512	82	68
***VE2HLS**	**14**	**54,230**	**164**	**145**
VE3JM	**A**	**5,486,397**	**2128**	**777**
VE3EJ	*	2,831,766	1405	573
VE3OI	*	2,581,305	1459	555
VE3KF	*	1,801,629	1211	477
VE3CR	*	454,208	444	302
VA3EC	*	177,632	298	208
VE3EBN	*	29,532	110	92
***VE3EY**	**A**	**683,592**	**654**	**312**
*VE3DZ	*	474,953	507	293
*VE3XB	*	459,309	491	283
*VE3FH	*	421,632	513	256
*VE3UZ	*	297,430	416	245
*VE3TW	*	254,371	393	221
*VE3KAO	*	196,218	336	198
*VE3OM	*	165,170	297	199
*VE3FJ	*	107,512	278	178
*VE3RCN	*	58,671	169	123
*VA3HJ	*	54,540	175	108
*VE3XAT	*	19,210	95	85
*VA3ATT	*	16,524	84	68
*VA3FN	*	14,212	90	68
***VA3GUY**	**14**	**26,460**	**128**	**105**
*VA3RJ	*	15,228	89	81
***VE3IAE**	**7**	**392,815**	**351**	**251**
*VE3GSI	*	190,686	235	183
***VE3OSZ**	**3.5**	**89,281**	**171**	**127**
*VE3DUS	*	5,889	42	39
***VE4YU**	**A**	**142,740**	**323**	**183**
*VE4EAR	*	3,069	39	33
***VA5LF**	**A**	**25,714**	**115**	**86**
VE6TL	**A**	**685,838**	**845**	**307**
VC6X	**14**	**194,360**	**414**	**226**
			(OP: VE6BF)	
***VE6SQ**	**A**	**32,660**	**141**	**92**
VA7ST	**A**	**1,188,768**	**1031**	**406**
VE7JKZ	*	206,584	355	196
***VA7KO**	**A**	**522,801**	**657**	**289**
*VA7ND	*	266,936	463	244
			(OP: VE7ALN)	
*VA7CPC	*	61,866	195	126
*VE7BGP	*	29,694	127	98
***VE7CV**	**14**	**192,660**	**371**	**247**
*VE7MID	*	84,546	240	183
*VA7MM	*	21,855	111	93
*VE7NI	*	17,978	95	89
*VA7ALK	*	2,627	37	37
VY1EI	**14**	**100,368**	**300**	**164**
Costa Rica				
***TI5N**	**A**	**3,997,952**	**1812**	**679**
			(OP: OHØXX)	
Cuba				
***CO2JD**	**7**	**538,110**	**481**	**270**
*CO2WF	*	94,062	198	122
El Salvador				
***YS1GR**	**A**	**108,717**	**243**	**167**
Honduras				
***HQ9R**	**14**	**322,054**	**539**	**283**
			(OP: WQ7R)	
Martinique				
FM5BH	**7**	**6,030,288**	**1623**	**752**
Mexico				
4B2S	**A**	**959,454**	**937**	**353**
			(OP: XE2S)	
XE1MM	*	587,718	651	309
XE2WWW	**14**	**131,225**	**361**	**181**
***4B2AU**	**A**	**78,694**	**221**	**146**
			(OP: XE2AU)	
*XE1GZU	*	19,908	103	79
***XE2YWH**	**21**	**18,700**	**98**	**85**
***XE1YZY**	**14**	**142,623**	**360**	**207**
Nicaragua				
***YN2GY**	**A**	**5,127,936**	**2182**	**784**
			(OP: K9GY)	
Puerto Rico				
WP4WW	**28**	**15,403**	**97**	**73**
			(OP: KP4JRS)	
***NP3CW**	**A**	**406**	**16**	**14**
AFRICA				
Canary Islands				
EF8M	**A**	**18,395,154**	**4353**	**1026**
			(OP: RZ3AZ)	
***EG8GCA**	**A**	**672,994**	**618**	**371**
			(OP: EA8DA)	
*EA8NQ	*	466,716	431	276
***EA8CQW**	**28**	**14,280**	**73**	**68**
Djibouti				
***J28AA**	**A**	**871,321**	**659**	**379**
			(OP: E7BA)	
Madeira Islands				
CT3KN	**28**	**214,700**	**327**	**226**
Morocco				
***CN8KD**	**A**	**2,645,902**	**1254**	**551**
*CN8YR	*	200,260	288	190
Namibia				
***V55X**	**A**	**151,657**	**249**	**187**
			(OP: V51YJ)	
South Africa				
ZS1EL	**A**	**153,270**	**250**	**195**
***ZS2NF**	**A**	**13,806**	**69**	**59**
*ZS1JY	*	12,508	62	53
*ZS4JAN	*	2,610	31	30
Sudan				
ST2AR	**A**	**2,553,672**	**1383**	**569**
Tunisia				
3V8BB	**21**	**2,813,136**	**1550**	**618**
			(OP: YT1AD)	
3V8CB	**7**	**10,758,020**	**2265**	**805**
			(OP: YT3W)	
***3V8SS**	**A**	**1,530,816**	**1097**	**402**
			(OP: KF5EYY)	
ASIA				
Armenia				
***EK6LP**	**21**	**26,558**	**118**	**98**
Asiatic Russia				
RA9AE	**A**	**2,951,910**	**1592**	**585**
RW9JZ	*	1,403,820	1097	495
UA9BS	*	747,156	635	348
RA9SF	*	731,712	603	296
UA9QQ	*	434,112	527	238
RV9FT	*	316,944	414	279
UA9MC	*	291,120	373	240
RU9WX	*	265,984	386	256
UA9KZ	*	229,416	352	237
RZ9HA	*	182,025	319	225
RZ9AW	*	125,398	262	182
UA9XZ	*	92,125	165	125
RA9XU	*	75,840	183	160
RK9UE	*	25,194	140	102
UA9XHT/9	*	9,912	68	59
UA9CGL	*	7,884	58	54
RX9AM	*	3,052	34	28
UA9TF	**28**	**586,105**	**602**	**355**
UA9QA	*	136,488	283	188
UA9UR	*	105,648	242	186
UA9CDV	*	36,064	133	98
RX9LW	*	1,210	25	22
UA9FGJ	**21**	**439,362**	**499**	**317**
RK9JWV	**14**	**743,535**	**784**	**403**
UA9CAX	*	305,146	423	271
RV9LM	*	183,680	308	224
RV9SV	**7**	**1,080,576**	**621**	**336**
UA9QM	*	1,069,434	584	354
RU9CD	*	120	5	5
***RV9CX**	**A**	**3,062,950**	**1439**	**550**
*RN9CM	*	2,205,712	1209	496
*RA9SN	*	1,147,851	837	383
*UA9AOL	*	979,416	770	366
*UA9BX	*	896,292	705	386
*UA9AX	*	482,560	557	320
*UA9KAA	*	481,185	505	289
*RN9RF	*	465,575	492	275
*RV9MZ	*	324,000	405	250
*RX9FB	*	322,126	411	266
*RK9XX	*	311,372	366	241
*RX9DJ	*	228,866	359	206
*RA9MC	*	207,932	357	227
*RA9FEU	*	192,774	299	178
*RA9YAI	*	177,200	332	200
*UA9CBM	*	97,300	236	175
*RV9UB	*	47,008	144	113
*RW9OX	*	43,890	143	105
*RX9AON	*	24,684	85	68
*UA9CHL	*	22,770	99	90
*RC9F	*	20,952	86	72
*RU9UG	*	19,671	98	79
*UA9OV	*	14,384	71	62
*RU9YF	*	3,549	40	39
***UA9MW**	**28**	**9,984**	**76**	**64**
***UA9AFS**	**21**	**339,872**	**431**	**304**
***RW9QA**	**14**	**357,650**	**438**	**311**
*RA9XF	*	269,538	373	269
*RQ9I	*	243,774	363	261
			(OP: RW9IM)	
*UA9WOB	*	175,553	318	217
*RA9UIV/9	*	123,134	274	193
*RW9SZ	*	116,383	246	181
*UA9LAO	*	89,976	205	163
*RV9AZ	*	74,880	197	144
*RA9AFZ	*	25,756	106	94
*UA9ADW	*	23,343	103	93
*RW9RW	*	60	6	6
***RA9AP**	**7**	**1,470,144**	**642**	**403**
***RZ9AE**	**3.5**	**274,712**	**270**	**184**
RAØFU	**A**	**1,265,252**	**1260**	**412**
UAØFAI	*	612,495	828	351
RAØAA	*	141,904	288	196
UAØAKY	*	136,080	284	189
RUØAW	*	62,850	170	150
UAØSW	**28**	**19,320**	**120**	**92**
UAØIDZ	**14**	**490,314**	**652**	**374**
RAØUF	*	105,105	314	195
UAØAZ	*	29,318	115	107
***RUØAE**	**A**	**421,651**	**513**	**289**
*UAØOD	*	341,384	525	278
*UAØCMG	*	58,716	235	126
*UAØZC	*	192	8	8
***RNØCW**	**28**	**11,242**	**144**	**73**
***UAØOA**	**21**	**12,782**	**109**	**83**
***RWØAJ**	**14**	**226,026**	**364**	**261**
*UAØJF	*	156,306	342	239
***RZØCQ**	**7**	**5,952**	**32**	**31**
Azerbaijan				
***4K9W**	**A**	**928,620**	**687**	**385**
*4K6FO	*	550,122	442	277
China				
B4TB	**A**	**25,368**	**131**	**84**
			(OP: BA4TB)	
BA4SI	*	21,528	113	92
***BD1TCC**	**A**	**417,600**	**573**	**288**
*BA1SN	*	85,490	265	166
*BA4VE	*	51,569	248	139
*BD4JWU	*	43,250	205	125
*BD1RCR	*	42,602	198	119
*BD1HW	*	39,098	244	113
*BD7RDC	*	35,504	166	112
*BD1AQH	*	32,548	124	103
*BD5CFY	*	30,508	160	116
*BD2RJ	*	24,440	201	104
*BH1GXH	*	7,840	80	56
*BA5FB	*	820	20	20
***BD7NWF**	**28**	**21,200**	**150**	**100**
*BA7QT	*	5,162	78	58
*BA7JC	*	5,096	77	56
***BA6IV**	**21**	**67,150**	**251**	**170**
*BG6IQL	*	12,600	90	84
*BA4WW	*	4,293	61	53
***BD7KBH**	**14**	**87,020**	**240**	**190**
*BA1GN	*	82,770	250	186
*BG4FFM	*	17,766	137	94
*BD4EP	*	15,576	151	88
*BG6JJX	*	9,652	91	76
*BH1IIA	*	3,713	49	47
*BD2BT	*	2,432	42	38
*BD4QA	*	609	22	21
Cyprus				
C4M	**14**	**2,777,625**	**1504**	**575**
Georgia				
4LBA	**A**	**10,564,020**	**3585**	**810**
			(OP: UU8JM)	
4L4/UT5EO	**28**	**255,552**	**434**	**242**
4L2M	**3.5**	**730,170**	**455**	**285**
***4L1MA**	**A**	**90,767**	**165**	**139**
Hong Kong				
***VR2IZ**	**A**	**37,742**	**221**	**113**
***VR2PX**	**14**	**299,730**	**520**	**309**
India				
***VU2RMS**	**A**	**178,928**	**318**	**211**
Israel				
***4Z5QQ**	**14**	**116,802**	**226**	**189**
Japan				
JE1CKA	**A**	**979,170**	**837**	**381**
JA1JKG	*	877,968	757	402
JI1ALP	*	405,805	543	277
JE1LFX	*	136,500	304	182
JA1HP	*	121,584	344	204
JG1FKT	*	45,194	175	118
JJ1WWL	*	36,600	110	100
JA1MJN	*	34,668	145	108
JO1SIM	*	31,445	145	95
JA1LZR	*	20,470	103	89
JA1XUY	*	11,457	73	57
JG1WNO	*	6,669	41	39
7J1ABO	*	6,120	58	51
JL1LNC	*	2,592	47	36
JQ1KRT	21	143	11	11
JF1NZW	**14**	**26,532**	**109**	**99**
JK1LUY	*	9,867	77	69
JF1SQC	**7**	**600,704**	**477**	**304**
JH1APK	*	81,534	143	127
***JI1RXQ**	**A**	**649,296**	**651**	**324**
*JA1BJI	*	629,924	707	334
*JH1EAQ	*	588,708	701	316
*JS1OYN	*	507,344	691	296
*JE1REU	*	161,665	383	217
*JA1CP	*	159,698	382	187
*JE1SGH	*	106,074	277	166
*JA1AZR	*	58,443	223	121
*JE1LDU	*	52,533	175	117
*7K1EQG	*	48,140	187	116
*JE1NVD	*	45,981	199	117
*JA1BNW	*	41,580	167	132
*7N4MXU	*	31,213	123	91
*JA1IZ	*	29,808	120	108
*7K1MAG	*	29,704	104	79
*JE1RRK	*	27,702	116	81
*7N4QCQ	*	24,552	102	88
*JA1CPZ	*	19,620	98	90
*JN1IZK	*	18,944	122	74
*JP1HUJ	*	17,633	98	77
*JL1MWI	*	17,466	103	82
*JN1KWR	*	17,094	135	77
*JJ1MZH	*	17,052	86	58
*JH1HMC	*	9,604	66	49
*7M2GCW	*	6,954	75	61
*JF1DAJ	*	5,830	64	53
*JE1SHW	*	5,734	56	47
*JA1HNW	*	4,608	34	32
*JG1WKM	*	3,840	42	40
*JK1NSR	*	3,555	54	45
*JI1UDD	*	2,772	36	28
*JA5INF/1	*	2,398	26	22
*JI1DSU	*	2,112	45	33
*JI1AVY	*	1,760	20	20
*JA1HG	*	1,760	20	20
*JA8APB/1	*	1,344	34	32
*JN1HYU	*	988	31	26
*7L3DGP	*	620	23	20
*JN1BBO	*	448	14	14
*JR1AHP	*	363	11	11
*JM1DSC	*	280	14	14
***JL1ZNE**	**21**	**21,828**	**145**	**102**
			(OP: JA1KFX)	
*JP10XV	*	6,104	63	56
*JO1WIZ	*	5,612	72	61
*JA1BAS	*	4,455	63	55
*JI1BBN	*	1,485	35	33
*JR1FVW	*	54	6	6
*JI1LAI	*	45	5	5
***JA1BFN**	**14**	**14,430**	**85**	**78**
*JL7FBV/1	*	2,596	48	44
*JK1SDQ	*	1,120	29	28
***JA1XMS**	**7**	**388,894**	**380**	**242**
*JJ4NZO/1	*	224	15	14
*JI1BDQ	*	162	6	6
***JE1SPY**	**1.8**	**936**	**26**	**18**
JF2QNM	**A**	**870,176**	**773**	**383**
JA2AXB	*	80,041	183	131
JA2VHO	*	77,700	201	140
JR2PMT	*	20,867	98	77
JF2FIU	*	558	19	18
***JF2OZH**	**A**	**78,810**	**219**	**142**
*JE2HCJ	*	13,068	72	66
*JA2KPW	*	12,685	75	59
*JF2OHQ	*	12,675	77	65
*JR2FJC	*	3,784	46	43
*JE2HXL	*	2,660	40	38
*JK2VOC	*	240	12	12
***JA2KVB**	**21**	**113,223**	**288**	**219**
*JA2KKA	*	4,018	53	49
*JR2AAN/2	*	77	7	7
***JG2KKG**	**14**	**201,478**	**374**	**262**
***JA2PFO**	**7**	**82,705**	**212**	**139**
*JA2GTW	*	58,650	119	102
*JF2RCX	*	46,662	141	101
JR3NZC	**A**	**99,548**	**216**	**164**
JA3AVO	*	98,596	241	157
JA3DAY	**14**	**76,466**	**195**	**173**
JF3LOP	**3.5**	**14,322**	**84**	**62**
***JA3JM**	**A**	**214,452**	**382**	**222**
*JF3NKA	*	134,273	415	191
*JG3WDN	*	128,484	324	172
*JE3UHV	*	119,906	284	167
*JG3CQJ	*	64,384	205	128
*JR3NDM	*	35,672	145	104
*JG3SVP	*	14,852	142	79
*JO3EVM	*	2,318	42	38
*JI3OGI	*	1,100	28	25
*JR7HOD/3	*	574	14	14
*JI3DNN/3	*	527	18	17
***JF3BFS**	**21**	**108,498**	**290**	**214**
*JO3RCK	*	1,404	28	26
***JF3IYW**	**14**	**104,721**	**298**	**201**
*JA5UBW/3	*	18,333	115	97
***JL3MCM**	**7**	**74,803**	**154**	**127**
*JE3EVI	3.5	1	1	1
JH4UYB	**A**	**3,100,048**	**1573**	**622**
JM4WUZ	**21**	**30,988**	**159**	**122**
***JR4PDP**	**A**	**66,820**	**244**	**130**
*JI4JGD	*	13,390	117	65
*JI4WHS	*	12,506	107	74
***JR4FLW/4**	**21**	**13,600**	**102**	**85**
***JR4GPA**	**14**	**132,225**	**328**	**215**
***JR4URW**	**7**	**41,006**	**137**	**101**
*JA4AVO	*	4,932	36	36
*JK4DUJ	*	988	29	26
JA5FBZ	**21**	**242,870**	**448**	**298**
JA5APU	**14**	**202,072**	**380**	**268**
***JG5DHX**	**A**	**73,944**	**233**	**156**
*JA5SUD	*	23,895	105	81
*JI5NWQ	*	2,728	35	31
*JA5IDV	21	30	6	6
***JA5ATN**	**7**	**30,966**	**85**	**78**
JA6BWH	**A**	**117,304**	**243**	**172**
JA6WIF	**28**	**97,658**	**309**	**193**
JA6SRB	**3.5**	**4,590**	**38**	**34**
***JA6CYL/6**	**A**	**107,559**	**291**	**171**
*JA6FFK	*	30,260	106	89
***JH6WHN**	**28**	**1,705**	**33**	**31**
***JQ1AHZ/6**	**21**	**1,995**	**43**	**35**
*JH6WXF	*	120	10	10
***JR6GIM**	**14**	**298,931**	**473**	**317**
*JA6WW	*	304	16	16
JA7DLE	**A**	**1,686,036**	**1150**	**482**
JA7BME	*	558,675	604	325
JA7COI	*	545,110	696	302
JE7YSS	*	213,280	366	248
			(OP: 7N4TEN)	
JA7FTR	*	159,727	309	211
JH7XMO	**14**	**521,172**	**634**	**372**
JG7EHM	*	70,785	198	165
JA7AKH	*	38,640	166	120
JA7MJ	**7**	**132,020**	**201**	**164**
***JE8KGH/7**	**A**	**157,890**	**367**	**190**
*JH7DOX	*	83,096	257	136
*JR7RZM	*	59,653	191	121
*JA7CPW	*	50,490	163	110
*JP7AWQ	*	49,742	154	119
*JN7KRH	*	765	18	17
***JF7GDF**	**14**	**4,048**	**57**	**46**
*JF7VVL/7	7	36	6	6
JH8CXW	**A**	**39,104**	**134**	**104**
JA8MXC	**7**	**1,343**	**17**	**17**
JA9CWJ	**21**	**78,442**	**207**	**182**
***JA9EJG**	**A**	**3,520**	**47**	**40**
JHØINP	**A**	**661,365**	**671**	**345**
JHØCCK	*	5,670	44	42
JAØFVU	**28**	**792**	**25**	**24**
***JHØNEC**	**A**	**253,952**	**449**	**256**
*JAØBJY	*	31,280	121	92
***JRØBUL**	**28**	**228**	**13**	**12**
***JAØUPW**	**21**	**1,247**	**31**	**29**
***JIØWVQ**	**7**	**4,544**	**36**	**32**
Kazakhstan				
UPØL	**A**	**8,315,904**	**2907**	**768**
			(OP: UN9LW)	
UN9L	*	881,760	776	352
UN1F	*	59,185	180	133

UN5J	*	22,950	101	85
UP1G	**28**	**377,856**	**492**	**288**
UP6P	*	248,248	416	248
			(OP: UN6P)	
UN3GX	*	134,505	291	183
UN9GD	**21**	**1,834,348**	**1229**	**604**
UP2L	**14**	**4,707,755**	**2089**	**871**
			(OP: UA9BA)	
UN2E	*	724,581	663	429
UNØL	*	6,958	50	49
***UN7CAD**	**A**	**326,783**	**390**	**229**
*UN6G	*	165,354	267	186
*UP2F	*	65,780	185	115
			(OP: UN8FM)	
***UN8GU**	**28**	**243,219**	**393**	**251**
***UN7CH**	**21**	**100,748**	**221**	**178**
*UNØC	*	50,688	151	132
***UN7CN**	**14**	**400,575**	**482**	**327**
*UN7EX	*	101,160	225	180
*UN7JC	*	49,920	145	128
***UN8GA**	**7**	**115,197**	**176**	**129**
***UN5C**	**3.5**	**38,070**	**92**	**81**
Kuwait				
9K2HN	**28**	**9,880**	**69**	**52**
Kyrgyzstan				
EX2A	**A**	**1,277,556**	**997**	**402**
EX8AB	*	890,060	872	382
Palestine				
***E2BYLM/4**	**21**	**18,957**	**101**	**89**
Saudi Arabia				
***7Z1HB**	**A**	**661,304**	**606**	**343**
			(OP: DL2RMC)	
*7Z1HL	*	317,292	390	274
*HZ1PS	*	114,390	227	186
***7Z1SJ**	**28**	**93,240**	**205**	**168**
Singapore				
9V1YC	**A**	**172,886**	**324**	**233**
South Korea				
DS5DNO	**A**	**203,712**	**539**	**192**
HL5UOG	*	53,560	245	130
***DTØIT**	**A**	**86,790**	**447**	**165**
			(OP: DS3FYW)	
*HL5YI	*	47,970	186	123
*DS1RJI	*	9,891	94	63
*DS1RZD	*	8,436	72	57
*HL5JCB	*	540	21	20
Taiwan				
BW/DL3OCH	**A**	**367,536**	**727**	**304**
***BV4VR**	**A**	**10,812**	**81**	**68**
***BW4/JS2PHO**	**21**	**5,775**	**93**	**55**
Tajikistan				
***EY7BD**	**A**	**9,204**	**62**	**52**
*EY7BJ	*	9,126	61	54
Thailand				
E21EIC	**A**	**1,667,250**	**1215**	**494**
HSØAC	*	345,728	587	296
			(OP: OZ1HET)	
***HSØZEE**	**A**	**181,818**	**331**	**222**
***HS8JYX**	**14**	**4,554**	**60**	**46**
Turkey				
TC4X	**A**	**8,965,635**	**2965**	**829**
			(OP: OH2PM)	
***TA3D**	**14**	**20,554**	**91**	**86**
*TA4/G4MEM	*	1,716	26	26
UK Bases on Cyprus				
ZC4LI	**7**	**4,770,336**	**1356**	**632**
United Arab Emirates				
A61BK	**A**	**1,680**	**30**	**28**
A65BD	**14**	**51,062**	**146**	**121**
Vietnam				
XV1X	**A**	**291,536**	**526**	**266**
West Malaysia				
***9M2TO**	**A**	**281,843**	**528**	**281**
EUROPE				
Aland Islands				
OGØI	**A**	**3,514,563**	**2698**	**741**
			(OP: OH2TA)	
Austria				
OE8SKQ	**A**	**638,287**	**997**	**481**
OE2VEL	**28**	**56,055**	**244**	**185**
***OE1TKW**	**A**	**88,953**	**258**	**199**
*OE/DL7VMM	*	34,348	161	124
Belarus				
EW8DX	**A**	**2,059,180**	**1858**	**596**
EW8KY	*	999,792	1141	477
EW3LN	*	905,814	1039	474
EW8OM	*	888,066	1174	479
EW8DJ	*	771,264	989	412
EW8MW	*	56,151	213	153
EW1BA	*	25,662	122	91
EU7SR	*	13,715	81	65
EW2EG	**7**	**30,956**	**130**	**109**
EU8KP	*	3,234	44	42
***EU2MM**	**A**	**1,736,960**	**1749**	**590**
*EW1IP	*	1,411,910	1500	542
*EU8RZ	*	1,213,941	1314	519
*EU1DX	*	977,130	1125	517
*EU6AA	*	643,168	849	398
*EW6CU	*	562,356	794	381
*EW1EA	*	481,806	710	377
*EU6AF	*	446,371	683	349
*EU4CQ	*	182,952	412	264
*EW8OF	*	140,118	405	242
*EW2ES	*	71,307	288	171
*EW7DK	*	16,720	102	88
*EW6GL	*	6,200	77	62
***EW5M**	**28**	**5,104**	**68**	**58**
			(OP: EW8CY)	
***EW6GF**	**14**	**289,710**	**662**	**370**
*EV6M	*	254,040	511	348
***EV6Z**	**7**	**223,266**	**378**	**254**
Belgium				
OQ5M	**A**	**2,370,418**	**1925**	**641**
			(OP: ON5ZO)	
ON6NL	*	1,654,501	1661	589
OQ5A	*	145,824	355	248
OQ0A	**14**	**35,905**	**209**	**167**
OQ3R	**7**	**1,100,834**	**890**	**478**
ON4LG	*	29,973	115	103
***ON3ND**	**A**	**709,512**	**1021**	**444**
*OR6C	*	266,430	504	321
*ON4VMA	*	207,857	475	271
*ON5WL	*	200,736	456	272
*OS2A	*	85,056	257	192
*OT7X	*	40,442	194	146
*ON6UF	*	33,840	148	120
*ON6SI	*	2,173	48	41
***ON5SV**	**21**	**48,321**	**218**	**177**
***OR2F**	**14**	**300,272**	**562**	**392**
			(OP: ON8LDS)	
***ON4ALY**	**7**	**21,528**	**113**	**92**
Bosnia-Herzegovina				
E72W	**21**	**417,543**	**823**	**413**
E73X	**7**	**151,875**	**301**	**225**
E71A	**3.5**	**1,659,024**	**1129**	**562**
E73ESP	*	36,120	148	120
			(OP: E73QI)	
***E72U**	**A**	**276,336**	**530**	**303**
*E73XL	*	193,617	454	303
*E78CB	*	4,929	58	53
***E77C**	**21**	**301,088**	**622**	**388**
***E73PY**	**7**	**261,372**	**371**	**276**
*E73ECJ	*	23,959	117	97
			(OP: E73ZR)	
***E79Z**	**1.8**	**100,084**	**270**	**191**
*E71GJK	*	46,104	182	136
Bulgaria				
LZ3FN	**A**	**5,353,144**	**2883**	**838**
LZ65P	*	1,052,352	1581	504
LZ2NG	*	731,394	852	454
LZ1BJ	*	237,432	581	312
LZ7G	**7**	**327,700**	**404**	**290**
LZ2UW	*	135,168	248	192
***LZ9R**	**A**	**2,141,988**	**1827**	**618**
			(OP: LZ3YY)	
*LZ2SX	*	1,549,230	1510	565
*LZ1RGM	*	407,378	604	347
*LZ1ONK	*	249,110	480	290
*LZ4AE	*	222,154	464	277
*LZ18DFT	*	219,640	460	289
*LZ1FJ	*	205,720	459	278
*LZ3TL	*	54,774	216	153
*LZ2DF	*	47,382	203	149
*LZ2FQ	*	38,280	156	145
***LZ3PZ**	**28**	**24,892**	**159**	**127**
*LZ2JA	*	2,788	46	41
*LZ3HK	*	1,715	41	35
***LZ1FH**	**14**	**179,300**	**454**	**326**
*LZ1EP	*	45,752	218	172
***LZ1DNY**	**7**	**150,336**	**255**	**216**
Corsica				
***TK/S59AA**	**A**	**2,424,200**	**1834**	**680**
Crete				
SV9COL	**A**	**8,307**	**46**	**39**
SY9A	**28**	**20,706**	**164**	**119**
Croatia				
9A5K	**A**	**5,263,362**	**2779**	**813**
9A5W	*	4,009,416	2222	744
9A4WY	*	2,268,448	1803	656
9A1CCY	**28**	**978,924**	**1273**	**582**
			(OP: 9A3NM)	
***9A8W**	**A**	**286,380**	**549**	**333**
*9A6AR	*	262,626	403	273
*9A8A	*	210,520	414	277
*9A4U	*	49,170	225	165
			(OP: 9A6KKD)	
*9A2GA	*	6,222	68	61
***9A3VM**	**28**	**429,450**	**894**	**409**
*9A3IH	*	89,539	319	229
*9A4MF	*	6,603	85	71
***9A7T**	**7**	**1,078,640**	**830**	**485**
			(OP: 9A5MR)	
Czech Republic				
OK8DD	**A**	**1,197,670**	**1043**	**523**
OL4M	*	620,186	865	434
OK2PCL	*	79,799	265	199
OK2SAR	*	29,110	83	71
OK2ABU	**28**	**30,105**	**186**	**135**
OK1EP	**14**	**824,450**	**1029**	**550**
OK1DOL	*	647,326	882	482
OK1Z	**7**	**3,354,720**	**1486**	**696**
			(OP: OK1DKZ)	
OK1FPS	*	2,568,660	1245	620
***OL6P**	**A**	**2,443,150**	**1781**	**655**
			(OP: OK2PP)	
*OK1HX	*	1,329,678	1380	549
*OL26LP	*	1,273,000	1237	536
			(OP: OK1CZ)	
*OK7U	*	1,176,378	1189	518
			(OP: OK1HDU)	
*OK2BUT	*	686,140	946	455
*OK1BA	*	663,584	871	466
*OK5OK	*	633,699	873	407
*OL7P	*	598,356	793	396
			(OP: OK1CRM)	
*OK1HGM	*	559,770	843	397
*OK7MT	*	478,172	581	346
*OL73NR	*	435,591	696	351
			(OP: OK1NR)	
*OK1LO	*	365,160	581	340
*OK1FCA	*	355,914	664	338
*OK1MKI	*	341,592	636	344
*OK2TDM	*	330,402	528	318
*OK2EC	*	273,604	501	292
*OK2BND	*	222,680	514	293
*OK2BNF	*	201,356	447	284
*OK1FHI	*	193,011	474	303
*OL2U	*	189,409	422	257
*OK5TFC	*	166,980	376	253
			(OP: OK1HCG)	
*OK2KFK	*	165,632	397	256
*OK2KG	*	136,422	378	234
*OK1MKU	*	118,656	226	192
*OK2SWD	*	94,990	311	230
*OK1DRX	*	93,771	271	207
*OK2PBG	*	77,106	250	181
*OK1BLU	*	67,875	229	181
*OK2BNC	*	67,008	281	192
*OK1UKV	*	65,740	246	173
*OK2AJ	*	41,820	217	164
*OK1JVT	*	30,613	146	121
***OK2QX**	**28**	**115,500**	**354**	**250**
*OK1DST	*	4,047	64	57
*OK1KZ	*	3,840	61	48
***OL2N**	**21**	**470,984**	**764**	**452**
			(OP: OK1FDR)	
*OK2HZ	*	90,831	277	221
***OK1GS**	**14**	**186,694**	**440**	**323**
*OK1FGD	*	73,790	316	235
*OK1MMN	*	28,755	151	135
*OK2PHI	*	621	23	23
***OL4W**	**7**	**1,054,616**	**894**	**482**
			(OP: OK1IF)	
*OK1SI	*	208,684	322	257
*OK1AY	*	98,420	227	185
*OK2TEO	*	18,423	94	89
*OK2OP	*	11,025	67	63
***OK1DDQ**	**3.5**	**189,083**	**377**	**251**
*OK2BME	*	14,985	105	81
***OK6Y**	**1.8**	**110,544**	**295**	**196**
			(OP: OK2PTZ)	
*OK1JOK	*	53,582	198	146
Denmark				
OZ8SW	**A**	**376,000**	**668**	**376**
OZ2TF	*	357,720	668	330
OZ7RQ	**14**	**140,165**	**336**	**289**
OZ7YL	**7**	**65,830**	**166**	**145**
OZ1CCM	*	46,872	137	124
***OV3X**	**A**	**772,192**	**982**	**472**
			(OP: OZ8AE)	
*OZ5RM	*	63,882	243	169
*OZ5UR	*	38,624	175	136
*OZ1DGQ	*	9,856	98	88
***OZ7BQ**	**21**	**84,870**	**296**	**230**
***OZ6TL**	**7**	**166,380**	**308**	**236**
Dodecanese				
***SV5/DL3DRN**	**A**	**218,148**	**580**	**294**
England				
G5W	**A**	**3,387,516**	**2098**	**726**
			(OP: 5B4WN)	
M9X	*	3,258,405	2179	703
			(OP: G4MKP)	
G3P	*	1,603,280	1480	560
			(OP: G3WPH)	
G3PSM	*	472,320	677	369
G4SGI	*	342,432	585	328
G4AMT	*	208,765	311	215
G4IUF	*	25,289	148	121
G7N	**21**	**292,600**	**644**	**380**
			(OP: GØORH)	
G5E	**14**	**1,193,895**	**1224**	**617**
			(OP: G3RAU)	
MØVKY	*	1	1	1
G3MZV	**7**	**425,568**	**472**	**341**
G3TXF	**3.5**	**209,754**	**346**	**258**
***G3LIK**	**A**	**326,874**	**584**	**347**
*G3JJZ	*	313,353	531	333
*G3RSD	*	211,988	445	268
*G4DDX	*	141,235	338	235
*G6NUM	*	94,552	314	212
*G3RLE	*	67,200	220	168
*G7TMU	*	28,396	156	124
*G2HDR	*	16,626	134	102
*MØANQ	*	529	23	23
*MØKIS	*	208	15	13
***MØNDZ**	**14**	**71,496**	**276**	**216**
***M7A**	**7**	**1,598,590**	**1019**	**557**
***MØRYB**	**3.5**	**85,744**	**238**	**184**
***G3R**	**1.8**	**4,554**	**54**	**46**
			(OP: GØDCK)	
Estonia				
ES4RD	**A**	**289,710**	**513**	**290**
***ESØDJ**	**21**	**369,879**	**760**	**417**
*ES1CN	*	76,380	297	228
***ES8DH**	**7**	**251,979**	**414**	**273**
*ES4MM	*	114,885	230	207
European Russia				
RA1AGL	**A**	**1,010,763**	**1380**	**477**
RA1AL	*	731,430	985	405
RU1QD	*	411,102	674	331
RV1CC	*	19,824	101	84
RV1AC	*	133	12	7
RA1TU	**14**	**625,464**	**906**	**504**
RU1QQ	**7**	**626,400**	**643**	**400**
***UA1CEC**	**A**	**736,379**	**1008**	**413**
*UA1CUR	*	472,472	735	364
*UA1TGQ	*	388,833	646	339
*RZ1OK	*	281,135	539	295
*UA1ZZ	*	232,864	490	304
*RA1TV	*	124,850	327	227
*RD1AN	*	122,126	394	227
*UA1AAR	*	21,018	111	93
***RN1NU**	**28**	**22,017**	**157**	**123**
***UA1AFT**	**14**	**382,630**	**618**	**415**
*UA1ODM	*	109,174	299	247
***UA1OMS**	**7**	**21,248**	**100**	**83**
RS3A	**A**	**5,548,400**	**3012**	**880**
			(OP: RA3CW)	
RG3K	*	3,321,162	2632	741
			(OP: UA3QDX)	
RU3UR	*	1,522,126	1384	577
RK3ER	*	1,385,390	1534	545
RO3DX	*	1,222,752	1289	542
UD3D	*	1,112,584	1466	517
			(OP: RK3DZH)	
RA3RK	*	1,021,410	1197	485
RU5A	*	991,800	1395	522
RA3NC	*	964,154	1112	466
RX3DBH	*	936,092	1242	452
RK3ZZ	*	890,352	1092	486
RN3BO	*	627,457	961	389
RA3CM	*	513,825	754	425
UA3AGW	*	380,480	492	320
RV3NB	*	340,750	568	290
UA3TCJ	*	243,451	502	307
RL3AB	*	235,258	529	302
RA3ST	*	159,005	371	245
R2DW	*	142,560	293	264
RA3TT	*	139,536	380	272
RW2WR	*	116,427	309	197
RU3MW	*	60,198	237	158
RZ3DA	*	35,910	140	114
UA3PPP	*	19,800	125	100
RN3DDR	*	2,144	34	32
UA3DAM	*	273	13	13
RA3BT	**28**	**23,980**	**130**	**110**
UA8AA/5	**21**	**240,018**	**539**	**327**
RV3FI	**14**	**254,351**	**495**	**347**
RA3ZZ	**7**	**486,420**	**448**	**330**
RL3AF	*	262,328	385	271
RX3OM	**3.5**	**23,377**	**126**	**97**
***RK3IM**	**A**	**1,695,891**	**1525**	**579**
*RN3QP	*	1,290,786	1575	511
*RU3SE	*	1,035,684	1194	468
*RV3QX	*	899,080	1182	455
*RL3ZI	*	878,526	1175	459
*RU3ZV	*	776,919	992	429
*RL3FO	*	691,842	1035	402
*RW3TA	*	668,525	958	425
*UA3DCW	*	543,132	920	423
*UA3AKI	*	473,750	769	379
*RU3XY	*	456,453	714	369
*UA3QFU	*	379,496	501	356
*RV3MR	*	290,250	576	270
*UA3QR	*	282,338	556	301
*UA3QAM	*	244,237	467	287
*RX3VF	*	214,398	419	277
*UA3UDE	*	195,360	413	240
*RK3TD	*	186,624	414	243
*RX3AP	*	186,250	423	250
*RN3ZR	*	177,250	401	250
*UA3DKN	*	166,750	404	230
*RU3WR	*	149,688	408	243
*RW3ZA	*	147,420	297	252
*RV3DHC	*	145,770	426	215
*RN3FR	*	139,293	369	231
*RJ3AM	*	134,874	424	254
*RK3BA	*	108,852	271	188
*RV3DCZ	*	108,120	324	204
*UA3DSS	*	106,600	298	205
*RK3RX	*	102,592	362	229
*RA3XCZ	*	101,430	346	210
*UA3TN	*	86,775	314	195
*UA3DFM	*	79,407	254	173
*RU3VV	*	59,040	222	160
*RN3DKE	*	55,596	237	164
*UA3EAA	*	48,910	198	146
*RZ3OV	*	47,436	171	134
*RW3DOX	*	46,935	229	149
*RN3AAB	*	45,406	189	146
*UA3DKT/3	*	41,588	185	148
*RV3TG	*	36,540	165	145
*RA3BQ	*	32,946	134	114
*RZ3GV	*	28,676	146	107
*UA3UCD	*	25,380	125	108
*RW3DY	*	21,114	136	102
*RK3FM	*	19,503	100	99
*UA3DQK	*	18,527	113	97
*RA3SS	*	17,472	105	96
*RX3AGQ	*	17,384	124	106
*RA3MB	*	16,356	121	94
*RX3MM	*	11,532	78	62
*UA3EAY	*	10,981	89	79
*UA3TAO	*	10,744	74	68
*RD3DT	*	3,300	58	50
*UA3YCX	*	2,014	40	38
*UA3UBT	*	1,508	31	29
***UA3QG**	**28**	**168,128**	**425**	**284**
*RA3UT	*	137,190	379	255
*RA3BB	*	38,860	208	145
*RX3BP	*	29,900	162	130
*U3OI	*	24,089	146	109
*RU3XB	*	14,877	110	87
*UA3DA	*	9,525	87	75
***UA3ABJ**	**21**	**234,432**	**503**	**333**
*RV3QO	*	73,566	301	201
*UA3DCM	*	62,884	246	199
*RA3MAV	*	19,376	142	112
*RD3PX	*	18,260	123	110
*RA3MAU	*	1,794	43	39
***RN3T**	**14**	**269,744**	**547**	**368**
			(OP: UA3TW)	
*UA3VVB	*	171,072	364	297
*RD3AY	*	17,888	122	104
***RX3ZX**	**7**	**183,084**	**280**	**219**
*UA3PNO	*	50,180	151	130
*RU3UW	*	29,391	112	97
*RW3VM	*	2,436	22	21
***UA3DCE**	**3.5**	**5,980**	**58**	**52**
***RZ3AUL**	**1.8**	**96,820**	**262**	**188**
*RA3ZC	*	63,024	207	156
UA4WKW	**A**	**3,757,240**	**2491**	**790**
RD4WA	*	2,743,860	2091	695
UA4PN	*	841,526	984	434
UA4SAW	*	546,231	789	399
RT4W	*	540,400	823	386
RW4HP	*	181,504	449	256
RW4PY	*	99,540	295	210
UA4WW	*	31,414	178	139
RX4CD	*	25,288	126	109
UA4NCI	*	10,788	73	62
RA4WC	**3.5**	**119,867**	**284**	**187**
***UA4ALI**	**A**	**1,022,256**	**1204**	**496**
*RU4SO	*	963,063	1077	477
*UA4AGO	*	706,490	997	430
*UA4PAQ	*	523,370	794	398
*UA4HIP	*	251,958	496	294
*UA4WAV	*	238,420	488	262
*R4WAA	*	208,278	466	266
*RV4LC	*	150,516	355	222
*RW4NQ	*	135,065	293	227
*RW4CLF	*	102,087	264	199
*UA4AAC	*	80,388	229	154
*RN4CU	*	63,580	227	170
*RN4CA	*	47,333	200	143
*UA4UBW	*	27,966	130	118
*RX4AW	*	18,522	112	98
*UA4PAY	*	3,159	40	39
*UA4NC	*	1,120	40	35
*UA4CNU	*	728	15	13
***UA4LW**	**21**	**57,525**	**232**	**195**
***RK4PB**	**14**	**34,750**	**178**	**139**
*UA4SBZ	*	3,619	52	47
***RK4PA**	**7**	**45,021**	**140**	**129**
RW6HX	**A**	**3,422,250**	**2464**	**750**
UA6GR	*	1,135,575	1184	525
RA6MQ	*	734,440	889	427
RK6HG	*	211,728	484	264
RA6EE	*	173,935	328	215
RN6AT	*	90,720	328	216
RA6AR	*	4,180	63	55
RZ6AK	*	1,560	30	30
RZ6HF	**14**	**863,686**	**1122**	**554**
RW6BN	*	69,345	238	201
RW6CF	**7**	**1,262,723**	**906**	**529**
***RM7M**	**A**	**1,849,907**	**1018**	**409**
*RZ6BU	*	1,307,352	1338	564
*RW6AHO	*	1,223,586	1434	498
*RA6YBW	*	432,588	826	354
*RV6LCI	*	429,088	691	368
*RW6MBC	*	290,280	497	295
*RN6AH	*	229,558	470	266
*RA6FQL	*	191,142	493	287
*UA6HO	*	162,911	397	259
*UA6HFI	*	146,500	395	250
*RU6BR	*	106,133	302	211
*RA6FPV	*	87,688	307	194
*UA6HRX	*	75,849	279	193
*RV6AAA	*	73,340	210	190
*RA6AX	*	48,732	167	131
*RX6LD	*	19,240	121	104
*RA6AAW	*	4,477	39	37
*RA6XB	*	1,674	33	27
***RU6YJ**	**28**	**21,780**	**149**	**121**
*UA6NZ	*	19,260	119	107
*RV6BK	*	2,030	38	35
***RV6LX**	**21**	**129,200**	**363**	**272**
***RW6FZ**	**14**	**291,750**	**636**	**375**
*RA6MS	*	23,091	151	129
***UA6GS**	**7**	**99,680**	**228**	**178**
***RA6FV**	**3.5**	**231,200**	**410**	**272**
*RK6ASY	*	49,005	173	135
Faroe Islands				
OY6A	**7**	**324,714**	**484**	**299**
			(OP: OY2J)	
Finland				
OG1M	**A**	**722,610**	**1069**	**455**
			(OP: OH1VR)	
OH2VZ	*	328,130	624	314
OG6R	*	327,540	505	309
			(OP: OH6XY)	
OH2XX	*	265,013	444	289
OH1BOI	*	69,552	232	189
OH2BBT	*	44,795	218	155
OH3FM	*	31,098	209	142
OH3BU	**28**	**289,161**	**744**	**361**
OI6X	**21**	**333,000**	**794**	**375**
			(OP: OH6NJ)	
OH5Z	**14**	**1,981,875**	**1606**	**755**
			(OP: OH5WH)	
OH6RE	*	720	16	15
OH6LJ	**3.5**	**835,635**	**816**	**435**
OH1RX	*	158,688	318	228
OG4T	**1.8**	**52,471**	**189**	**137**
OG9W	*	39,809	160	121
			(OP: OH2BCJ)	
***OH7FKV**	**A**	**558,999**	**1011**	**399**
*OH8F	*	66,394	266	178
*OH1NOA	*	58,482	262	171
***OH6RC**	**28**	**13,552**	**116**	**112**
***OH2BAH**	**21**	**17,600**	**124**	**110**
***OH3LB**	**14**	**61,910**	**288**	**205**
France				
TM6X	**A**	**4,306,610**	**2628**	**799**
			(OP: F5VHY)	
F/G4BJM	*	1,341,608	1338	536
F5BBD	*	413,772	699	348
F5POJ	*	168,941	402	241
F5CQ	*	77,418	159	138
F8DFP	*	33,596	199	148
F1UVN	*	216	12	12
F5VKT	**21**	**276,020**	**512**	**373**
F5JY	*	115,968	341	256
F5NBX	*	65,184	258	194
F2DX	**3.5**	**1,433,964**	**990**	**516**
***F9KP**	**A**	**471,988**	**660**	**374**
*F4DXW	*	469,326	591	429
*F5INJ	*	311,025	559	319
*F5SGI	*	220,524	418	282
*F6GQO	*	124,042	348	218
*F6JOE	*	119,364	285	196
*F5PAL	*	78,400	296	200
*F5LMJ	*	71,004	244	183
*F9DK	*	59,926	245	166
*F6DZD	*	33,117	186	133
*F5GGL	*	1,656	24	23
*F8DYD	*	990	30	30
*F5BTH	*	850	34	34
***F5TMJ**	**28**	**3,036**	**48**	**44**
***F5VHE**	**21**	**40,836**	**192**	**164**
***F6FTB**	**7**	**252,628**	**413**	**274**
*F4FEP	*	5,382	46	46
Germany				
DL3YM	**A**	**4,201,626**	**2422**	**767**
DK3WW	*	2,947,500	1776	750
DL6ØDARC	*	1,879,840	1841	620
			(OP: DL9GFB)	
DLØGL	*	1,452,238	1395	587
			(OP: PAØR)	
DL5YM	*	1,204,416	1301	544
DJ6OZ	*	1,093,599	1147	507
DD2ML	*	723,840	956	464
DL4ME	*	651,301	894	413
DK5AD	*	600,248	794	418
DJ6QT	*	539,448	762	399
DL8DYL	*	487,032	589	364
DL1DTC	*	420,002	752	374
DF9LJ	*	383,780	484	310
DJ2IA	*	369,874	607	346
DL7JOM	*	290,580	604	334
DK7AN	*	278,630	486	298
DL6UNF	*	225,475	493	311
DL2DX	*	221,850	485	306
DC9ZP	*	201,492	431	261
DL8NBJ	*	103,044	254	186
DL1YFF	*	93,896	249	194
DL5SVB	*	91,959	290	203
DK3AX	*	81,175	279	191
DF3EH	*	76,235	295	193
DR888PL	*	73,784	261	184
			(OP: DL5JAN)	
DJ3WE	*	69,520	204	158
DK6CQ	*	46,170	178	162
DL8RDL	*	28,028	115	98
DL8WX	*	23,250	107	75
DG1CMZ	*	12,816	81	72
DJ8QA	*	1,768	38	34
DL2AMD	*	96	9	8
DJ6TX	**28**	**4,380**	**69**	**60**
DJ8IF	**3.5**	**295,590**	**456**	**295**
DK5JM	*	154,712	346	233
DKØAE	*	968	23	22
			(OP: DJ1AA)	
***DD5M**	**A**	**1,830,045**	**1632**	**609**
			(OP: DJ8ZY)	
*DJ9DZ	*	1,456,960	1466	580
*DFØBV	*	1,289,376	1220	528
			(OP: DL1MAJ)	
*DF5BM	*	857,440	1005	460

*DJ8EW	*	604,219	763	413
*DG7RO	*	570,243	836	393
*DK5DQ	*	566,519	831	397
*DL3KWF	*	507,472	784	368
*DL5YL	*	492,400	778	400
*DL4ZA	*	480,700	781	380
*DR2Ø1ØN	*	410,392	643	344
*DJ3XA	*	397,698	662	357
*DL4JYT	*	377,650	648	350
*DL1EAL	*	367,452	604	346
*DF8UO	*	343,349	623	323
*DL4HRM	*	320,787	643	327
*DJ3XD	*	317,120	606	320
*DL5KM	*	308,823	525	311
*DJ8UV	*	273,624	527	312
*DJ8OG	*	254,752	492	304
*DL3FF	*	248,363	519	307
*DL3KWR	*	241,956	470	286
*DL2ANM	*	234,476	485	292
*DM3FZN	*	233,640	537	295
*DL5ARM	*	232,392	497	276
*DM5JBN	*	220,968	478	279
*DL3WKG	*	218,981	445	287
*DJØSP	*	212,860	502	290
*DL7YAD	*	198,648	311	248
*DC9MA	*	197,715	472	269
*DL1TPY	*	197,446	446	269
*DM2RN	*	189,409	455	257
*DL4MAQ	*	187,256	373	263
*DH2URF	*	177,120	350	288
*DL6DCD	*	170,808	401	264
*DL1THB	*	163,322	425	254
*DK7GH	*	162,870	378	267
*DP5X	*	151,217	358	233
			(OP: DL3EBX)	
*DL6NWA	*	151,040	424	256
*DL7UXG	*	149,940	399	255
*DL5CD	*	134,015	382	245
*DK3YD	*	132,662	340	226
*DF2PH	*	125,188	363	238
*DD3WW	*	120,652	326	217
*DL1RTS	*	120,540	340	245
*DL5ASK	*	118,680	294	215
*DL1BA	*	116,032	327	259
*DL1KUR	*	109,087	342	211
*DL2AJB	*	103,680	299	240
*DL1VJL	*	96,784	236	184
*DF4TS	*	95,722	304	209
*DL6AWJ	*	94,598	287	203
*DL2AL	*	91,751	316	209
*DL1HSI	*	83,790	275	190
*DG4YGW	*	82,896	271	176
*DL5AOJ	*	79,788	301	218
*DK3PM	*	79,629	247	209
*DK4VY	*	78,255	249	185
*DR2Ø1ØL	*	78,195	311	195
			(OP: DF6WE)	
*DF2TG	*	67,450	238	190
*DL5CL	*	67,270	214	155
*DK8EY	*	62,155	213	155
*DL2AWA	*	56,564	232	179
*DL2ZA	*	54,756	235	162
*DL7FA	*	51,340	264	170
*DK1LRS	*	50,666	217	154
*DJ5KX	*	50,325	228	165
*DJ5TT	*	48,160	213	160
*DK4WF	*	47,874	204	158
*DL2AXM	*	47,790	226	162
*DL4VQ	*	40,310	187	139
*DL9NEI	*	39,200	190	140
*DJ8RX	*	27,972	164	126
*DF6RI	*	27,216	146	112
*DO6SR	*	26,208	172	126
*DL1DWR	*	21,318	141	114
*DL3DUE	*	20,900	107	100
*DO1AYJ	*	19,610	146	106
*DL9FBF	*	19,260	120	107
*DK9MH	*	15,520	116	97
*DF7JC	*	15,390	105	90
*DJ1HF	*	14,535	109	95
*DL6NDW	*	14,007	102	87
*DL2MLU	*	11,985	96	85
*DF4TD	*	11,484	59	58
*DO3QQ	*	11,139	110	79
*DC3HB	*	8,140	84	74
*DL9GWA	*	7,128	95	81
*DL6RBH	*	5,544	68	56
*DL5KMS	*	4,947	56	51
*DL9FB	*	4,400	60	55
*DF6FR	*	4,320	37	36
*DL7VRG	*	2,914	51	47
*DO1YCL	*	2,214	43	41
*DL8ZAJ	*	1,872	37	36
*DL5LWM	*	1,794	42	39
*DO2MS	*	1,505	35	35
*DL1AWM	*	1,078	25	22
*DL3JRA	*	850	26	25
*DA3T	*	741	20	19
			(OP: DL8DXL)	
*DL7BY	28	118,872	379	254
*DL3KVR	*	19,754	136	119
*DL1SBF	*	15,912	121	104
*DL4EAX	*	2,772	49	44
*DL5SWB	*	1,640	41	40
*DL1ARD	21	3,024	55	54
*DL9ZP	14	588,846	834	502
*DL9LM	*	216,092	456	356
*DK5IM	*	136,831	407	293
*DL4FN	*	98,592	313	237
*DL8WEM	*	42,039	211	173
*DF8XC	*	29,187	159	141
*DL1FMG	*	14,873	127	107
*DL9ZWG	*	1,026	27	27
*DF7GG	7	773,757	733	447
*DL5KUD	*	643,357	609	409
*DL6KWN	*	261,892	367	281
*DL8WAA	*	51,338	148	133
*DL4FDM	*	23,600	101	100
*DFØSX	3.5	33,984	159	118
			(OP: DL1CW)	
*DK9HE	*	6,104	61	56
*DL1ET	1.8	71,643	238	167

Greece

J48HW	A	2,030,720	2009	608
			(OP: HAØHW)	
*SV3AWG	A	258,600	547	300
*SV2HWR	14	336,259	690	397
*SV2BFL	*	56,291	212	181
*SV1JFT	7	9,744	65	58

Guernsey

*2UØARE	A	222,678	480	278
			(OP: MUØFAL)	

Hungary

HA1AG	A	5,090,877	2687	843
HA3OU	*	1,091,935	1159	535
HA7LW	*	752,352	1006	461
HA8TP	*	648,805	1014	449
HA5JI	*	347,415	493	285
HA9SU	*	11,438	101	86
HG7T	14	1,884,212	1500	748
HA3LN	*	1,494,816	1437	677
*HA5LZ	A	550,923	899	449
*HA2MN	*	275,678	439	299
*HA6NN	*	124,740	367	231
*HA4YF	*	104,157	277	213
*HA5UK	*	57,218	162	122
*HA7JQK	*	30,316	147	106
*HAØLW	28	20,905	124	113
*HA5KDQ	*	608	20	19
			(OP: HA1CW)	
*HG6ØVOTT	21	695,956	983	514
			(OP: HA3UU)	
*HA25NAR	*	183,144	473	312
			(OP: HAØNAR)	
*HG4F	14	1,014,072	1170	564
*HA8EN	*	129,826	381	278
*HA8YU	*	22,302	123	118
*HA5NB	*	13,332	110	101
*HA3MU	7	678,300	630	420
*HA1FF	3.5	355,040	558	317
*HA4FV	*	332,010	524	315
*HA7SBQ	*	145,985	325	215

Iceland

*TF3GB	A	115,056	288	204

Ireland

EI2CN	14	1,678,172	1517	667
*EI4HQ	A	144,595	341	239
*EI4II	*	79,002	285	189
*EI7CC	*	19,716	132	106
*EI8JX	14	55,848	209	179

Italy

IO3J	A	2,159,274	1458	611
			(OP: IV3ZXQ)	
IØZUT	*	535,390	693	370
IK8UND	*	248,977	541	307
IK4ZGO	*	223,312	421	272
IK5FKF	*	84,341	260	193
IZ8EEL	*	76,704	258	204
IK8YJQ	*	55,610	207	166
IZ8EDL	*	49,728	192	192
IKØEFR	*	34,816	163	128
IK3OII	*	27,572	134	122
IZ1CLA	*	3,564	45	44
IQØCI	7	762,025	733	425
			(OP: IKØVVE)	
*IZ3DBA	A	716,184	983	441
*IN3FHE	*	608,183	808	409
*I6FDJ	*	312,285	605	327
*IK2NUX	*	94,470	246	201
*IK2CZQ	*	63,540	189	180
*IK2IKW	*	48,618	192	146
*IK2AIT/2	*	44,304	212	142
*IKØYUT	*	31,878	155	126
*IV3KSE	*	30,444	159	118
*IZ8JFL	*	30,336	174	128
*IK2NCF	*	23,112	148	107
*IKØFUX	*	22,560	110	96
*IZ1DXS	*	13,629	90	77
*IV3DYS	*	8,906	86	73
*IK3IUL	*	7,540	71	65
*IZ3NPZ	*	1,664	34	32
*IZ2FLX	21	57,196	189	181
*IKØEIE	*	34,580	177	140
*IQ2CU	14	97,776	308	252
			(OP: IN3OWY)	
*IV3NVN	7	852,093	740	453
*I4JEE	3.5	612	17	17

Jersey

MJ/W1NN	A	2,973,225	2327	725

Kaliningrad

RV2FZ	A	216	11	6
*RA2FB	A	251,664	548	294
*RK2FWN	*	49,840	153	140
*RA2FX	14	21,801	146	129
*RN2FQ	*	16,854	113	106
*UA2FL	3.5	711,350	788	410

Latvia

YL9T	A	1,497,660	1647	545
			(OP: YL2TW)	
YL2II	*	126,140	412	265
YL4U	*	123,816	389	264
YL8M	*	87,418	291	218
YL2SM	21	798,970	1161	545
YL3FT	14	1,881,900	1537	738
*YL5M	A	1,048,278	1184	462
			(OP: YL2UZ)	
*YL2PN	*	713,592	1045	408
*YL2TB	*	659,464	864	442
*YL3DX	*	387,599	708	347
*YL2IU	*	91,140	303	196
*YL2CR	*	89,115	323	195
*YL2IP	*	10,584	97	84
*YL2CV	28	104,742	351	253

Lithuania

LY9Y	A	3,955,490	2651	770
LY2MM	*	1,859,158	1648	622
LY2BKT	*	1,168,830	1349	486
LY2J	*	1,147,572	1412	502
LY2TS	*	945,035	1102	469
LY2F	*	676,795	831	427
LY2OM	*	251,370	517	294
LY3W	28	392,400	797	400
LY8O	21	1,089,622	1357	617
LY3M	*	93,214	292	223
LY3BG	7	149,947	314	217
LY2T	3.5	677,502	767	399
LY2OU	1.8	95,570	262	190
*LY4T	A	1,538,262	1561	561
*LY3B	*	1,294,920	1473	545
*LY2K	*	654,003	977	441
*LY2DV	*	272,310	580	290
*LY1FGP	*	211,432	406	247
*LY2BOS	*	110,745	314	207
*LY2LF	*	109,655	393	241
*LY1BX	*	91,014	290	197
*LY2ND	*	64,617	269	181
*LY2AO	*	11,076	88	71
*LY2BIM	*	891	30	27
*LY1CT	28	66,560	294	208
*LY1M	7	199,592	319	244
*LY2GW	3.5	487,976	623	362
*LY7Z	*	303,408	480	301
			(OP: LY2TA)	
*LY3O	*	80,808	224	168
*LY2SQ	*	1,920	35	32

Luxembourg

*LX/OO4A	A	1,550	31	31
			(OP: ON6ML)	

Macedonia

*Z35G	A	261,450	488	315
*Z32ID	*	163,773	505	279
*Z36W	*	31,496	147	127
*Z33F	21	440,742	884	447
*Z35F	14	419,133	742	429
*Z31MM	3.5	72,372	203	163

Moldova

ER4A	A	14,186	92	82
			(OP: RA4LW)	
ER5AA	7	470,340	549	335
*ER1DA	A	898,625	1049	455
*ER2RM	*	121,623	362	213
*ER3AU	*	48,504	163	129
*ER3ZZ	*	23,001	145	123
*ER5DX	28	330	16	15
*ER6A	7	1,725,584	1178	568

Montenegro

4O3A	A	6,493,360	3207	920

Netherlands

PAØLOU	A	532,032	833	408
PAØCYW	*	355,563	637	351
PA3GVI	*	236,041	442	271
PA3AAV	*	212,807	496	301
PAØJNH	*	185,400	351	309
PA1BX	*	59,657	236	169
PA2ALF	*	54,300	242	181
PAØJED	21	145,002	400	286
*PA3ARM	A	846,387	1027	471
*PG6EL	*	597,958	882	409
			(OP: PG2AA)	
*PA3CVI	*	507,892	763	374
*PA3DBS	*	326,874	661	347
*PA1NL	*	318,464	577	311
*PA3AIN	*	222,921	525	279
*PAØGRU	*	202,635	502	285
*PD7BZ	*	201,717	438	279
*PA3BFH	*	201,300	441	275
*PA3ANN	*	179,256	460	264
*PA7DW	*	143,883	335	219
*PA3GCV	*	117,600	296	200
*PD5LO	*	92,768	274	208
*PDØ5CW	*	88,319	296	217
			(OP: PD5CW)	
*PA3HK	*	84,546	301	198
*PA3AQL	*	79,928	284	194
*PAØWLB	*	67,374	259	197
*PA3EEG	*	46,472	197	148
*PA3AFF	*	43,230	204	131
*PA3CLQ	*	37,296	187	144
*PA9CC	*	35,772	154	132
*PA5GU	*	34,572	190	134
*PAØWKI	*	33,579	169	123
*PA75HV	*	23,328	134	108
			(OP: PAØFAW)	
*PA9CW	*	20,125	134	115
*PA2CHM	*	11,305	97	85
*PAØSKP	*	9,360	73	65
*PAØQRB	*	5,820	63	60
*PA3DAT	*	5,451	74	69
*PAØB	*	5,070	68	65
*PA3GEO	*	4,930	71	58
*PA3HFG	*	2,989	54	49
*PAØFEI	*	2,016	35	32
*PA8KW	*	42	8	7
*PA2REH	28	39,524	211	164
*PA3MR	14	167,232	435	312
			(OP: IK1PMR)	
*PA7HPH	*	14,874	126	111

Norway

LA8OM	A	1,911,840	1783	569
LA9TJA	28	23,443	192	119
LN9Z	14	848,040	1094	555
			(OP: LB1GB)	
LA9Z	7	1,500,128	1239	518
			(OP: LB1G)	
*LA2HFA	A	288,695	582	319
*LA8AW	*	177,072	424	248
*LA6DW	*	26,304	129	96
*LA5MDA	*	10,512	100	73
*LA7SI	28	2,214	48	41
*LN3R	7	247,480	373	269
			(OP: LA5LJA)	
*LA4EJ	*	18,444	92	87

Poland

SP2QG	A	1,763,860	1588	602
SP4JCP	*	1,003,428	1210	489
SP3GTS	*	582,253	647	373
SP6AXW	*	356,712	595	356
SP2HPM	*	257,054	535	301
SN7F	*	207,207	472	273
			(OP: SP7LFT)	
SP2FGO	*	171,675	343	225
SN4F	*	39,445	202	161
SP3VT	*	32,770	141	113
SP7HOV	*	11,786	81	71
SP1KCJ	*	372	31	31
			(OP: SP1MVW)	
SN2M	28	37,352	198	161
			(OP: SP2XF)	
SP3CFM	*	1	1	1
SP2FAP	14	325,532	598	388
SP9RI	*	69,445	257	215
SN8C	7	1,001,312	914	464
			(OP: SP8HZZ)	
SP2MHC	*	1,764	31	28
SP3GEM	3.5	1,256,000	1011	500
			(OP: SP3HLM)	
*SP1AEN	A	1,438,250	1443	523
*SP3LPG	*	1,144,117	1074	527
*SP6A	*	912,671	1010	499
*SP5EOT	*	582,096	837	402
*SN3C	*	551,903	746	383
*SP6LV	*	392,392	700	364
*SQ9E	*	389,752	583	344
*SN3ØJ	*	275,728	576	304
			(OP: SP5JXK)	
*SP3DIK	*	269,757	497	291
*SQ3VV	*	262,191	512	291
*SP9FT	*	233,446	526	302
*SP3DOF	*	230,701	488	281
*SN2MTBO	*	201,856	434	304
			(OP: SP2GCE)	
*SP6QKP	*	194,299	456	287
*SO8A	*	119,184	285	208
*SP4AVG	*	84,272	291	184
*SP7OGP	*	66,259	232	173
*SP3DSC	*	53,106	231	159
*SP8AJK	*	35,643	152	109
*SP2HWW	*	28,350	169	135
*SQ7VO	*	25,422	156	114
*SO8O	*	21,210	111	101
			(OP: SP8AJC)	
*SP7TES	*	20,826	98	89
*SP7LIE	*	14,484	120	102
*SO2D	*	13,320	104	90
			(OP: SP2IKP)	
*SP3OL	*	10,200	93	75
*SP6BEN	*	6,206	59	58
*SN1A	*	5,170	51	47
			(OP: SP1EG)	
*SP3JIA	*	3,160	45	40
*SP3GRQ	*	2,925	48	45
*SP9ERL	*	2,460	33	30
*SP2DKI	*	2,100	41	35
*SP1EGN	*	360	18	18
*SQ9BDN	28	50,445	217	177
*SN9I	*	12,090	109	93
			(OP: SP9EMI)	
*SP2AYC	*	12,000	112	96
*SP5XOV	*	1,302	34	31
*SP4JCQ	14	1,065,285	1285	607
*SN2K	*	671,316	884	516
			(OP: SP2FWC)	
*SP9BNM	*	217,078	527	349
*SP8BAB	*	164,952	399	316
*SP9CXN	*	26,312	166	143
*SQ3LLR	*	1,295	38	35
*SP6OJE	7	1,115,898	896	489
*SP5CNA	*	891,514	785	442
*SP9GKM	*	20,516	97	92
*SQ7LQJ	*	1,638	28	26
*SN5Q	3.5	300,196	483	299
			(OP: SQ5RDX)	
*SP3CYY	*	28,770	133	105

Portugal

CR6K	A	6,922,045	3191	977
			(OP: CT1ILT)	
CT1JLZ	14	4,875,330	2614	978
			(OP: OK1RF)	
*CT1ENQ	A	6,720	68	56
*CT1AOZ	28	30,595	156	145
*CT1BWW	21	97,812	284	234
*CT7/CU8AS	*	360	12	12
*CT1FUH	14	11,921	99	91

Romania

YO4KCC	A	952,020	1225	492
YO6UO	*	272,426	540	319
YO2RR	21	433,752	820	424
YO5AJR	1.8	128,752	304	208
*YO3APJ	A	1,615,768	1477	602
*YR8D	*	874,713	1156	483
*YO5BRZ	*	818,340	1098	460
*YO2GL	*	817,212	981	451
*YO9CWY	*	534,336	857	368
*YO7NW	*	470,625	764	375
*YO5AIR	*	291,900	586	300
*YO3BAP	*	237,300	516	300
*YO4SI	*	184,875	399	255
*YO3CVG	*	181,678	424	266
*YO3FRI	*	166,880	455	280
*YO2LAN	*	78,585	184	155
*YO7ARZ	*	72,576	290	192
*YO9CB	*	57,316	229	161
*YO9HG	*	36,806	209	154
*YO4AUL	*	35,200	160	128
*YO5DAS	*	34,450	162	130
*YO8RFS	*	32,630	154	130
*YO6HSU	*	13,728	86	78
*YO4BTB	*	6,270	70	55
*YO4ASG	*	1,300	28	25
*YO8AXP	28	318,801	671	357
*YO2AOB	*	70,034	294	194
*YR8B	21	816,945	1104	535
			(OP: YO8TOH)	
*YO4XT	*	80,958	296	206
*YO9IF	*	21,539	137	119
*YO5BXI	*	14,523	118	103
*YO4BEX	14	62,928	250	207
*YO7NE	*	27,104	128	121
*YO7LHC	*	11,074	102	98
*YO2IS	1.8	55,056	185	148

Scotland

GM4SID	A	657,846	884	414
GM3WUX	*	378,378	803	378
GM1F	*	135,125	331	235
			(OP: GM4FAM)	
GM3JKS	*	93,654	269	198
GM4FFF	*	41,528	152	116
			(OP: MMØDFV)	
GMØEGI	*	23,520	135	112
GM4AFF	28	178,674	514	307
GM2V	14	1,318,428	1483	636
			(OP: GM3WOJ)	
GM2A	7	218,722	376	238
*GM3C	A	368,039	689	343
			(OP: GMØNBM)	
*GMØWED	*	158,746	355	238
*GSØTOW	*	86,699	260	181
			(OP: GM4CXM)	

Serbia

YU1KT	A	387,072	697	336
YU1JF	*	94,608	303	216
YT2T	28	908,600	1348	550
YU1KX	21	1,420,710	1477	690
YT9A	14	2,486,352	1841	816
YTØA	7	4,036,702	1730	722
			(OP: YT1CI)	
YT7KM	*	1,765,512	1158	558
YU2A	*	551,688	503	362
*YU1PJ	A	892,856	1067	479
*YU2M	*	663,772	825	404
*YUØA	*	626,463	819	423
			(OP: YU1RA)	
*YU1CC	*	247,248	472	272
*YU7WW	*	48,822	254	158
*YU4ØFN	*	31,842	142	122
			(OP: YU7FN)	
*YU14ØZ	*	25,272	130	108
			(OP: YT1UM)	
*YU1AT	*	3,276	45	42
*YU6DX	28	102,363	377	229
*YU9DX	*	30,654	196	131
*YU7KM	21	138,462	400	282
*YT7R	*	38,570	196	145
			(OP: YU7BW)	
*YT7IM	*	29,154	141	129
*YU3W	*	1,305	49	45
			(OP: YU1MM)	
*YT5N	14	284,952	542	383
			(OP: YU7AF)	
*YU5ZM	*	95,904	251	216
*YT9C	7	471,680	471	335
*YU7D	*	286,254	399	279
*YU7MO	*	600	10	10
*YT4A	1.8	151,646	325	226

Sicily

*IT9AJP	A	139,376	308	248
*IT9ORA	*	10,480	100	80
*IT9IZY	28	22,784	191	128
*IT9LKX	21	182,682	380	306

Slovakia

OM7CW	A	3,637,116	2328	714
OM6T	*	1,877,996	1404	596
OM6A	*	1,769,836	1754	578
			(OP: OM6NM)	
OMØWR	7	333,727	444	293
*OM4KW	A	1,204,164	1267	498
*OM8DD	*	1,181,439	1164	513
*OM8ON	*	836,892	877	486
*OM4DN	*	472,506	764	366
*OM3IAG	*	330,536	539	316
*OMØTT	*	263,730	532	298
*OM7AG	*	243,528	490	292
*OM7SR	*	168,421	415	251
*OM7YC	*	125,202	338	231
*OM3BA	*	120,536	341	244
*OM4DA	*	96,810	283	210
*OM6MS	*	53,920	211	160
*OM4DU	*	35,370	145	131
*OM7AT	*	21,114	133	102
*OM8TA	*	18,270	131	105
*OM3TLE	*	10,082	90	71
*OM3TB	14	259,128	519	366
*OM3R	*	213,395	484	335
			(OP: OM3CFR)	
*OM3CDN	7	224,954	371	274
*OM4J	*	139,105	251	215
			(OP: OM4JD)	
*OM8AQ	*	131,840	294	206
*OM8KW	*	1,984	37	31
*OM3ZWA	3.5	602,160	735	390
*OM5FA	*	204,600	391	248

Slovenia

S5ØA	A	5,083,750	2722	830
S53MM	*	4,722,668	2557	796
S52OP	*	4,188,801	2472	789
S5ØC	*	4,171,825	2338	775
			(OP: S53CC)	
S51NZ	*	1,767,892	1697	613
S5ØK	14	2,704,130	1955	806
S55T	*	2,525,910	1830	807
			(OP: S57AL)	
S53P	*	664,245	940	509
			(OP: S52IC)	
S58Q	7	1,542,800	1011	532
S59T	*	1,512	29	28
S53DIJ	*	780	20	20
S57C	3.5	212,520	391	253
*S58MU	A	1,470,612	1502	572
*S57U	*	1,381,396	1395	562
*S59MA	*	114,490	304	214
*S53AU	*	55,596	168	113
*S53QD	*	52,884	192	156
*S53XX	*	4,655	58	49
*S54A	14	613,725	920	501
*S59N	*	160,524	461	294
*S57DX	7	2,056,256	1226	608
*S51F	*	1,930,480	1137	590
*S56DX	*	276	12	12
*S59EIJ	*	209	11	11
*S58WW	3.5	76,692	219	166
*S58RU	1.8	18,816	116	98

Spain

EF1A	A	2,774,184	1855	686
			(OP: EA1XT)	
EA1EXE	*	559,725	888	425
*EA1JO	A	429,516	670	388
*EA1VT	28	34,884	181	153
*EA1AST	*	7,344	76	72
*EA2CTB	A	5,916	59	51
*EA2SS	21	66,640	311	196
AO3T	28	601,145	1086	479
			(OP: EA3AKY)	
*EF3A	A	1,546,230	1669	597
			(OP: EA3KU)	
*EA3ALZ	*	207,746	438	266
*EA3AXM	*	20,580	114	98
*EA3FHP	*	682	24	22
*EA3AVV	28	9,234	105	81
*EA3GXJ	3.5	411,921	514	333
EA4TX	A	1,780,164	1798	636
EA4DRV	*	1,205,600	1510	548
*EA4/UY7CW	A	172,860	496	268
*EA4OA	*	29,904	146	112
*EA4BNQ	*	12,282	103	89
*EA4FLY	28	2,356	42	38
*AN4A	14	20,437	126	107
			(OP: EA4CWN)	
EA5ARC	A	19,700	111	100
EA5KA	*	12,720	94	80
EA5HPX	14	1,235,851	1296	617
*EA5YU	A	933,196	1044	508
*EA5FQ	*	596,232	908	441
*EA5CP	*	214,896	564	296
*EB5CS	*	73,008	243	169
*EF5K	28	301,290	780	363
			(OP: EA5DWS)	
*EC5AGM	14	198	11	11
*EA5GTQ	7	418,134	484	307
*EA7TL	A	382,356	656	342
*EF7A	*	299,628	576	348
			(OP: EC7ABV)	

*AO7AAW	"	260,520	494	334
				(OP: EA7AAW)
*EA7MT	"	163,095	367	249
*EA7AZA	"	144,474	321	199
*EA7OR	"	83,328	262	192
*EA7CIX	"	61,620	212	158
*EA7CWA	"	27,270	118	101
*EA7VJ	"	2,720	42	40
*EA7GV	28	3,996	66	54
*AO7T	21	165,986	427	298
				(OP: EA7KJ)

Sweden

SM3C	A	1,221,990	1444	529
				(OP: SM5CCT)
SM6BGG	"	697,291	886	427
SMØBSO	"	336,490	627	322
SMØBYD	"	166,022	322	257
8S6E	"	157,550	423	274
				(OP: SM6FUD)
SK7OA	"	26,703	147	129
				(OP: SM7LXV)
SM5J	"	12,600	74	70
8SØW	"	660	21	20
				(OP: SMØNJO)
SJØX	7	1,839,344	1180	592
				(OP: PY2ZXU)
*SC3N	A	999,400	1279	475
				(OP: EA8CN)
*SE6Y	"	971,620	1236	481
				(OP: SM6DED)
*SM6BSK	"	598,880	862	394
*SM5DQE	"	453,002	801	349
*SG5W	"	446,772	712	372
				(OP: SM5IMO)
*SMØS	"	378,028	496	322
*SM5BSB	"	338,240	689	320
*SC7DX	"	332,655	581	335
				(OP: SM7GIB)
*SM7CIL	"	242,303	605	337
*SM5DXR	"	198,648	523	267
*SI5Y	"	194,535	404	297
				(OP: SM5BKK)
*SM7CQY	"	164,920	423	248
*SM3X	"	154,878	420	249
				(OP: SM3CVM)
*SM7EH	"	152,888	392	232
*SE6C	"	118,320	375	232
				(OP: SM6CDN)
*SA6G	"	114,480	359	240
*SE7A	"	113,102	335	194
				(OP: SM7YII)
*8SØA	"	80,166	274	186
				(OP: SMØAIG)
*SM7BVO	"	78,078	298	182
*SM5ACQ	"	63,510	239	174
*SM6Z	"	62,478	237	178
				(OP: SM6BZE)
*SMØBDS	"	53,464	206	164
*SJ7M	"	30,810	166	130
*SE6N	"	29,868	170	114
*SM6MIS	"	24,000	146	120
*SM7TZK	"	12,528	83	72
*SM3EAE	"	11,696	100	86
*SM2BJT	"	2,530	53	46
*SM7ATL	28	6,232	80	76
*SM5C	21	1,739	39	37
				(OP: SM5CBM)
*SA6AIN	"	816	36	34
*SM6IQD	7	59,276	184	146
*SM6Q	"	9,035	68	65
*SM5DNO	"	7,030	77	74

Switzerland

*HB9AA	A	1,278,396	1318	534
				(OP: HB9ARF)
*HB9WDY	"	13,659	105	87
*HB9DHG	7	1,063,988	894	461

Ukraine

UW2M	A	5,807,730	3145	886
				(OP: URØMC)
UW1M	"	4,023,798	2833	766
				(OP: UR5MW)
UX5D	"	2,559,528	1897	684
				(OP: UT7DK)
UW5U	"	2,538,028	2091	683
UYØZG	"	2,381,104	2174	652
UW5M	"	2,302,080	2019	640
				(OP: UT7MA)
UW8SM	"	2,054,718	1730	633
UV5U	"	1,681,614	1540	594
				(OP: UX1UA)
US5E	"	1,177,696	1293	494
				(OP: UR7EQ)
UT3N	"	783,541	1109	437
				(OP: UT3NK)
UR3IQO	"	680,214	981	438
UR7QM	"	659,464	961	442
US7IVW	"	569,576	770	392
UY2RA	"	483,604	806	379
US7IID	"	465,791	750	379
UX3HA	"	401,003	737	359
UR5WCQ	"	364,798	579	367
UT1AB	"	245,092	502	284
UT4PZ	"	166,140	397	260
UX5UO	"	116,688	292	221
UT6IS	"	91,224	315	181
UR4EI	"	84,534	293	193
UR7VA	"	7,410	70	65
UU9CW	"	48	4	4
UT7EZ	28	129,286	366	254
UR6IJ	21	257,985	502	351
UT7LA	"	154,037	381	289
UZ7U	14	1,697,382	1511	731
				(OP: UT3UA)
UZØU	"	936,804	1216	564
				(OP: UY5ZZ)
US8IBS	"	730,785	1067	515
UY4WWA	"	97,180	321	215
				(OP: UR5WMM)
UU1JO	"	3,780	54	54
UR7QC	7	831,475	732	421
UY2ZZ	"	229,152	346	264
UT5SA	"	86,500	215	173
US3IP	"	19,890	97	85
EMØX	3.5	949,200	904	452
				(OP: UT2XQ)
UY3AW	"	148,275	317	225
UT7CR	"	147,705	312	215
UX7CQ	"	24,180	120	93
*UX1UX	A	1,496,406	1607	541
*UU5JZA	"	1,308,300	1332	525
				(OP: UU1JN)
*USØHZ	"	1,305,090	1376	510
*UT5UIA	"	1,115,545	1261	505
*UT4EK	"	1,111,240	1228	520
*UX7U	"	1,089,310	1300	485
*UY1U	"	1,036,555	1076	481
				(OP: UT5UN)
*UTØNT	"	1,036,485	1131	465
*UU2CW	"	1,004,157	1122	483
*UW7M	"	969,990	1240	465
				(OP: UR3MP)
*UT3UZ	"	783,667	1063	443
*UT4XU	"	673,379	841	427
*UU6JJ	"	668,072	940	488
*UTØL	"	599,298	801	399
*UY5AA	"	563,695	796	407
*UY5TE	"	512,512	873	364
*UT1IM	"	486,164	710	358
*UY2UQ	"	457,125	810	375
*US2IZ	"	445,885	718	335
*UY5AR	"	396,935	681	385
*UR4CU	"	275,114	583	301
*UR5ZVJ	"	266,970	600	330
*US7WW	"	250,179	464	267
*UX6IR	"	249,969	359	291
*US3IZ	"	226,164	564	282
*UX8IW	"	188,848	457	232
*UU1JE	"	143,892	437	252
*UX6IB	"	115,596	323	228
*UR8GX	"	98,946	265	207
*UR5XMM	"	96,693	284	193
*UT/PA3BUD	"	84,135	287	213
*US7IA	"	79,450	262	175
*UW3M	"	71,100	225	158
				(OP: US2MT)
*UX1HW	"	70,720	247	170
*UR4IZ	"	70,560	226	160
*UU1CW	"	63,036	199	153
*UY5VA	"	62,730	252	170
*UR5KED	"	61,950	247	177
*UU9JR	"	61,576	202	172
*UW7CN	"	55,158	217	174
*US5LAE	"	54,782	262	182
*UT8EL	"	52,448	248	149
*US2IW	"	39,040	143	122
*US6CQ	"	36,894	190	143
*UT7HM	"	36,462	165	118
*UR5EPG	"	36,162	196	147
*UR5EIT	"	32,053	174	133
*UR5EU	"	27,040	131	104
*URØEG	"	23,808	128	96
*UX5TQ	"	23,210	130	110
*UY2RZ	"	19,135	107	89
*US3WD	"	17,600	130	110
*UT2IV	"	13,440	98	80
*UT5EPP	"	7,434	65	59
*US5EEK	"	5,742	62	58
*UR8IDX	"	4,360	42	40
*UR6IS	"	3,822	45	42
*UT4ZX	"	3,403	45	41
*EN7U	"	2,440	40	40
				(OP: UR4UDI)
*US6IPD	"	204	13	12
*UT8EU	28	179,655	441	295
*UR5LJD	"	59,096	243	178
*UT7QF	"	14,155	114	95
*UU2JG	"	3,432	42	39
*UT3QU	21	129,980	337	268
*UZ5UA	"	121,030	362	266
*UR5WCA	"	57,846	237	186
*UXØUW	"	55,468	227	196
*US1PM	14	443,072	795	448
*UR7MZ	"	120,900	349	260
*UR4GU	"	107,950	357	254
*UR5WX	"	90,944	299	232
*UX7QD	"	67,122	295	198
*UR5EFL	"	60,610	248	190
*US3ITA	"	3,650	54	50
*UX4FC	7	378,630	500	315
*UT3EK	"	340,054	428	319
*UW1WU	"	336,922	434	314
*UT5CY	"	170,407	317	239
*UW2F	"	152,934	265	213
				(OP: UTØFT)
*UR8QR	"	138,866	258	218
*UZ8I	3.5	166,950	339	225
				(OP: US7IY)
*UR3LPM	"	122,412	291	202
*UX5NQ	1.8	115,978	295	206
*UT5PH	"	14,868	90	84

Wales

GW4BLE	28	10,353	98	87
*GW3KDB	A	658,741	916	443

OCEANIA

Australia

*VK2BJ	A	211,323	272	203
*VK2PN	"	60,214	155	119
*VK2AR	7	62,317	113	101
*VK3IO	A	203,406	239	167
*VK3GDM	"	1,610	27	23
VK4EMM	A	3,885,024	1478	624
*VK4TT	A	66,464	181	124
*VK4KW	28	1,584	25	22
				(OP: VK4BAA)
VK7GN	A	117,450	196	150
*VK8AV	7	41,244	93	84

East Malaysia

*9M6YBG	21	38,718	165	81

Guam

KG6DX	A	1,215,871	1005	367
*KH2/JJ1LRD	A	74,044	222	107

Hawaii

NH6P	A	2,392,632	1503	424
				(OP: KH7Y)
KH6ZM	1.8	10,915	54	37
*KH7B	A	4,433,494	2012	533
*KH6CO	"	37,206	129	106
				(OP: KH6OO)
*AH7C	14	28,012	106	94

Indonesia

YB4IR	A	673,296	555	332
*YC3TKH	A	35,600	119	100
*YC1BJX	21	395,514	470	301
*YB1ALL	"	265,430	367	254
*YB3XM	"	121,824	240	188
*YB3BOA	"	115,170	264	165

Mariana Islands

AHØS	A	670,080	711	240
				(OP: JH1DVG)

New Zealand

ZL3IO	A	2,726,640	1190	541

Philippines

DU1EV	7	9,828	44	39
*4F1BYN	A	29,565	108	81
*DV1UBY	"	3,776	39	32

SOUTH AMERICA

Antarctica

R1ANP	7	768	12	12
				(OP: RW1AI)

Argentina

L33M	A	898,032	723	424
				(OP: LU3MAM)
LU1DZ	"	93,620	215	151
LU1HF	28	2,211,832	1229	622
LP2F	21	5,140,625	2016	875
				(OP: LU4FPZ)
LU6UO	"	987,000	735	470
LW4EU	7	1,376,624	620	388
				(OP: LU5DX)
LU5OM	"	700,494	398	313
*LW1E	A	190,536	298	204
				(OP: LU1EWL)
*LU5DX	28	5,203	44	43
*LU8QT	21	422,256	498	304
*L73D	"	272,607	366	267
				(OP: LW6DW)
*LU1ICX	7	64,636	121	113
*LU7EE	"	63,470	120	110

Aruba

P43JB	A	852,148	718	362
*P49Y	A	8,644,584	2681	807
				(OP: AE6Y)
*P4/K1KG	"	292,374	424	222

Brazil

PV8AA	A	4,818,100	1874	700
				(OP: PV8DX)
PP1CZ	"	1,125,376	857	448
PS7DX	"	90,744	184	152
PP5JY	"	51,342	163	129
PT1A	"	30,600	108	90
				(OP: PY1ZV)
PV8ADI	"	13,585	114	95
PY1WG	"	969	19	19
PY1KO	28	16,717	86	73
ZX5J	21	6,673,540	2378	955
				(OP: PY2NDX)
PY2FFW	"	2,560	32	32
PY3AU	14	41,654	129	118
PT3T	3.5	67,788	144	126
				(OP: PY3XX)
PP5BK	"	2,162	23	23
PR7AR	"	780	15	15
*PS2T	A	5,296,600	2019	746
				(OP: PY2NY)
*PY7GK	"	183,120	280	218
*PR7HR	"	74,930	156	118
*PY7OJ	"	21,525	89	75
*PY2FCL	"	16,279	83	73
*PW1W	"	10,561	68	59
*PR7AYE	"	3,625	31	29
*PY3KN	"	1,248	24	24
*PU4GGS	"	322	13	14
*PU4HUD	"	266	15	14
*PU2RKP	"	35	9	5
*PY2MTS	28	321,180	428	265
*PY3YD	"	59,340	174	129
*PT4C	21	66,138	166	151
				(OP: PY4XX)
*PU8TEP	"	28,531	111	103
*PV8DR	"	3,744	41	36
*PY2AE	7	870	16	15
*PY4TW	"	60	6	6
*PY6KY	3.5	1,360	20	20

Chile

XQ1IDM	14	2,580,282	1398	639
CE3DNP	"	251,920	377	235
*CA3KHZ	7	127,845	174	135

Colombia

HK3Q	A	72,312	186	131
HK1A	28	892,170	765	414
HK1KYR	21	3,828,006	1769	741
HK1X	14	4,667,505	1988	815
HK1N	7	3,443,979	1097	561

Netherlands Antilles

PJ4A	A	14,688,993	3718	957
				(OP: K4BAI)

Paraguay

*ZP9EH	A	43,542	147	118

Uruguay

CW5W	A	7,402,054	2338	838
				(OP: CX6VM)
*CX9AU	A	1,159,154	751	446
*CX7CO	28	6,570	52	45
*CX5TR	21	172,716	282	222

Venezuela

YV5JBI	A	371,712	386	256
YW4D	3.5	333,355	281	209
				(OP: YV1DIG)
*4M5IR	A	82,764	160	121

QRP

TM77M	A	1,951,964	1501	644
				(OP: F5MUX)
OK1DVM	"	1,756,188	1387	621
OK2BYW	"	1,369,887	1281	537
OK7CM	"	1,297,322	1300	533
TM3T	"	808,152	1053	446
				(OP: F5VBT)
DR2Q	"	647,712	912	416
				(OP: DL8MBS)
RA3AN	"	596,055	970	395
RW3AI	"	462,204	794	347
DF5RF	"	426,492	697	359
N7IR	"	403,170	700	302
W4QO	"	400,830	643	310
W6QU/Ø	"	352,401	695	291
				(OP: W8QZA)
HB9DAX	"	350,817	588	337
VA3SB	"	349,074	484	246
UT5UUV	"	293,879	601	293
N5DO	"	293,728	619	274
G4DBW	"	280,288	584	304
YU1LM	"	276,000	558	300
AA1CA	"	270,458	496	271
I2AZ	"	270,116	475	308
HA5BA	"	263,610	528	303
RN4HAB	"	248,825	537	269
UX8ZA	"	222,222	494	273
RA9AN	"	220,455	307	207
UT5IZ	"	216,744	481	264
G3YMC	"	201,150	512	270
G3LHJ	"	187,136	413	272
HA8DM	"	185,976	405	246
DL5JAG	"	179,423	429	269
YO4AAC	"	172,380	461	260
VE3RSA	"	170,100	305	180
RW6FO	"	160,369	407	239
YU1FG	"	156,288	311	222
UN8PT	"	154,835	315	179
K4ORD	"	147,900	320	204
RK4FB	"	136,960	365	214
DF5SF	"	136,284	370	246
K8CN/1	"	132,932	341	199
UF3CWR	"	120,887	337	221
				(OP: RV3BR)
S59D	"	118,200	338	200
WT5R	"	114,063	369	197
				(OP: W5ZL)
WA8WV	"	113,920	250	178
KT8K	"	111,938	325	194
PE2KP	"	100,738	332	209
UAØWAA	"	96,768	179	144
YO8WW	"	95,232	237	186
RV3DBK	"	90,346	334	199
PY4ZO	"	86,640	206	152
UT5DJ	"	78,402	255	179
8J4P	"	69,252	391	116
				(OP: JA4MRL)
K9JWV/7	"	67,196	302	157
NU4I	"	64,998	220	138
ON7CC	"	61,752	249	166
WC7S	"	60,375	309	161
AI9K	"	57,868	224	148
PA1B	"	56,052	236	162
OK2BWJ	"	51,975	204	165
K8ZT	"	46,898	171	131
VA3RKM	"	46,740	172	114
IU3AC	"	44,016	231	168
				(OP: IZ3NVR)
KEØG	"	43,736	237	142
YL2MR	"	41,080	212	158
WQ8RP	"	35,560	199	127
				(OP: N8XX)
DF1SZ	"	35,391	172	141
PY2IAX	"	33,229	134	101
JA9BGL	"	33,072	145	104
7K1CPT	"	32,046	155	98
YV6BXN	"	26,640	98	80
EA1GT	"	25,606	152	118
W2MFT	"	24,024	145	104
K6MI	"	23,600	133	100
OZ4CG	"	22,454	127	103
EA3FHC	"	22,018	138	101
K6WH	"	21,855	147	93
YO6DBL	"	21,228	102	87
OZ8A	"	21,182	156	119
GØAZH	"	21,168	137	108
KF7ADB/4	"	19,929	100	73
N2LK	"	18,832	113	88
RX1CQ	"	18,000	111	90
VA3WPV	"	17,873	79	61
W4UT	"	17,346	134	98
SM6AHU	"	16,544	130	94
UU9JQ	"	16,038	124	99
DL5WS	"	15,600	125	100
JK1TCV	"	15,420	70	60
SP9RQH	"	13,321	92	77
RK6AQM	"	12,859	83	77
BA1IO	"	12,636	101	78
VE3MO	"	11,151	80	59
K5ND	"	10,721	103	71
WB5NMZ/4	"	10,336	85	68
JM1KLO	"	10,065	104	61
UR9QQ	"	9,100	79	70
W6GMT/Ø	"	9,072	90	63
WØMRZ	"	8,232	109	84
WO9S	"	7,906	76	67
NU4B	"	7,866	69	69
ES1WST	"	7,865	69	55
JR6HMJ/1	"	7,257	86	59
OK2CMZ	"	6,900	81	69
JA1KEB	"	6,802	46	38
DL3BVA	"	6,570	80	73
G6CSY	"	5,670	45	45
NF8M	"	5,187	65	57
YO8SAI	"	5,100	78	68
PC2F	"	3,320	45	40
3Z9TA	"	3,015	53	45
				(OP: SQ9FCH)
NO2D/Ø	"	2,816	57	44
WØRSP/7	"	2,700	32	25
DM1LM	"	2,684	49	44
AF9J	"	2,520	52	40
W2JEK	"	2,184	24	24
F5UKL	"	2,106	46	39
KS4X	"	2,088	30	29
RNØQQ	"	2,013	45	33
EI8FH	"	1,947	33	33
K2HT/Ø	"	1,558	42	38
NQ2W	"	858	22	22
JQ2OUL/2	"	760	21	20
PA1W	"	540	20	20
PY1CMT	"	234	13	13
RA4UAT	"	66	6	6
RZ4AA	"	60	6	6
DHØJAE	"	20	4	4
LU7HZ	"	18	3	3
KJ4UZX	"	9	3	3
YO8DDP	28	135,182	418	263
4X1VF	"	67,952	181	137
LZ1MG	"	48,151	228	179
HA7VK	"	37,848	198	152
DL9YX	"	34,854	191	157
UA6CFD	"	33,880	205	140
F8AKC	"	33,516	170	147
W5GAI	"	32,250	185	125
DL8TG	"	30,879	180	141
YR8I	"	23,625	162	125
				(OP: YO8BIG)
4L1FP	"	20,230	97	85
UR4CWQ	"	6,045	70	65
SV5/DJ5AA	"	5,120	71	64
GM4UBJ	"	4,818	75	66
GWØVSW	"	3,621	59	51
MØCEF	"	2,050	43	41
LY2BBF	"	1,512	39	36
SP9NLI	"	950	27	25
DL2MIH	"	441	21	21
VU2LYX	"	312	14	13
AB8FJ	"	156	12	12
N1VVV	"	80	8	8
W5JBV/4	"	77	8	7
RV3GM	"	25	5	5
HG3IPA	21	249,568	591	352
				(OP: HA3JB)
CX2AQ	"	145,848	257	206
RZ6HX	"	117,660	334	265
SP4GFG	"	80,456	288	226
JH7RTQ	"	31,720	160	130
IV3AOL	"	30,988	152	127
RD9CX	"	28,421	113	97
WA6FGV	"	22,032	135	108
HG5O	"	20,496	143	122
N6WG	"	14,952	124	89
OK1AIJ	"	14,630	124	110
E21AOY	"	14,168	88	77
JR1NKN	"	11,869	107	83
BD4SP	"	10,241	100	77
VU2UR	"	7,930	65	61
JH3DMQ	"	1,222	29	26
JA4GNK	"	48	4	4
JA1KPF	"	25	5	5
IØUZF	14	410,130	645	434
UA6LCJ	"	223,431	499	337
HA6IAM	"	215,376	471	336
YU5RY	"	191,637	403	321
UU7JF	"	140,505	403	285
HA7MW	"	89,910	292	243
JR3RWB	"	85,540	239	188
M/YO4RDW	"	82,570	283	230
LZ1VB	"	71,478	234	209
N8HP	"	59,168	209	172
W7JI/Ø	"	46,359	229	153
IZ2QKG	"	41,743	208	169
SM6CRM	"	33,280	182	160
RWØAA	"	30,888	129	108
VE3GTC	"	26,832	123	104
LA8WG	"	22,244	157	134
F5MPN	"	21,392	128	112
NT2DR	"	18,600	115	100
SP6BXM	"	16,184	139	119
W2AAB	"	16,182	114	93
WY6DX/5	"	14,196	116	91
OH7FF	"	10,881	99	93
9A8MM	"	10,406	96	86
UR4MCK	"	5,772	77	74
DL2DWP	"	3,886	65	58
KIØG	"	1,620	44	36
UCØLAF	"	1,196	26	26
IZ2FME	"	1,089	35	33
KL7/WA4DOX	"	261	11	9
JA1POS	"	120	10	10
SE6U	"	4	2	2
DL1DQY	7	469,800	473	360
YU1WC	"	400,510	469	331
S57T	"	229,356	357	276
RU3RM	"	144,976	290	221
HAØGK	"	121,968	261	198
F5UL	"	121,830	234	186
RAØAY	"	60,180	119	102
E73TTT	"	52,801	155	133
NE6M	"	50,673	176	133
YO8RIX	"	49,068	172	141
RA3XEV	"	38,520	146	120
UR5FCM	"	37,996	145	118
IW3ILM	"	35,502	145	122
K3TW	"	32,700	100	100
YO6CFB	"	30,956	129	109
UR3QNV	"	20,145	96	85
N2JNZ	"	15,824	105	86
RC4AA	"	7,946	61	58
				(OP: RW4AO)
KU7Y	"	7,424	70	58
BD4RDR	"	5,535	49	45
YO3GLH	"	1,372	27	28
GM1J	"	1,276	25	22
				(OP: MMØBQI)
JK3AHS	"	450	20	18
AC8AP	"	299	25	23
KCØYNE	"	48	6	6
YC2WBF	"	40	4	4
LY5G	3.5	327,285	493	315
OK1FKD	"	192,468	376	258
SP4GL	"	155,877	334	233
UR5LAM	"	134,829	305	211
SQ7FPD	"	25,235	118	103
RA1AEI	"	4,888	61	52
JAØAOQ	"	2,231	24	23
HA8BE	1.8	59,343	196	151
LY4BF	"	17,372	105	86
DJ3GE	"	612	19	18

ASSISTED

NORTH AMERICA

United States

WU3A/1	A	4,139,520	1858	784
K3WW	"	3,769,519	1709	689
WK1Q	"	3,147,290	1525	694
				(OP: K1MK)
NS1S/4	"	2,492,952	1815	627
				(OP: K1ZZI)
W5MX/4	"	2,271,132	1603	612
AB3CX/2	"	2,067,440	1422	601
WN9O	"	1,873,776	1411	618
				(OP: W9IU)
WW2DX	"	1,792,956	1043	561
WR3Z	"	1,583,772	1333	573
N7TT	"	1,460,796	1483	516
KR4F	"	1,404,718	1250	538
KYØW/6	"	1,278,464	1496	512
				(OP: K6SRZ)
K9NW	"	1,185,358	1018	487
W8MJ	"	1,122,660	994	495
KG4W	"	1,045,644	872	474
K2QMF	"	992,256	786	456
K3IE/4	"	975,989	946	469
W3KL	"	911,898	814	433
WM6A	"	902,372	1057	433
				(OP: K6TA)
N6QQ	"	878,540	954	436

K2MK	"	862,284	767	397
WA3AAN	"	817,284	883	403
K3KO/4	"	728,180	563	460
NT6X	"	722,274	1032	406
NØXR	"	**641,466**	**1072**	**378**
AC4CA/5	"	**632,772**	**915**	**378**
WF2B	"	623,558	693	377
				(OP: K2ONP)
N3OC	"	603,480	684	376
NN6NN	"	584,045	754	385
				(OP: N6EE)
NZ1U	"	514,344	532	348
				(OP: W1UJ)
KEØUI/1	"	506,226	868	357
NF4A	"	482,058	670	339
N3AM	"	469,650	498	310
W2LE	"	443,996	523	314
N2BJ/9	"	404,767	672	341
AF6T	"	388,395	696	315
				(OP: K6GT)
NQ7R	"	342,996	619	303
N7WA	"	305,152	519	256
K2ZC	"	269,197	362	241
KQ3F	"	257,810	359	254
NB4M	"	251,781	470	267
K2TTT	"	250,158	355	241
KB1NRB	"	234,878	507	266
NN4GG	"	220,869	485	253
				(OP: N4GG)
N3ND/4	"	217,327	416	253
N6DW	"	212,500	433	250
NO6T	"	150,748	412	223
				(OP: N6NC)
K6RIM	"	148,654	359	233
NE6I	"	139,810	344	205
AB2DE	"	132,010	274	215
NK6A	"	127,092	372	204
WØTT	"	113,850	293	207
K7VIT	"	105,276	348	186
WX7P	"	93,122	352	202
ND8L	"	92,050	236	175
W2RZS	"	85,470	183	154
				(OP: WB2NVR)
KØKX	"	82,303	197	169
K2WK/4	"	75,306	196	163
N2SQW	"	74,141	196	151
WT5U	"	67,155	255	165
ABØTX	"	63,602	286	154
N4WW	"	61,999	129	119
NJ1F/2	"	61,695	172	135
WQ6K	"	55,107	201	157
				(OP: N6IE)
W4BCG	"	44,240	172	140
WF4W	"	42,812	178	139
KT7G	"	41,148	181	127
N6ER	"	37,990	190	131
KF6I	"	35,910	177	126
WB4MAK	"	31,178	133	119
AI2N	"	30,940	105	91
NSØM	"	28,200	171	120
N8IW	"	25,506	137	109
K7LV	"	23,800	142	100
N4FY	"	23,406	120	94
W9VA	"	19,383	106	91
W4HJ	"	17,822	77	67
K4GM	"	17,460	124	97
N4TL	"	15,680	91	80
W3WC	"	15,622	79	73
KR7RK	"	11,232	74	72
KF6A	"	7,488	50	39
AA8LL	"	6,300	49	45
NX2PX/8	"	6,096	51	48
NØBK	"	4,440	44	37
K1GI/9	"	2,867	58	47
K7UN	"	2,838	49	43
W3BW	"	1,800	24	24
WZ7ZR	**21**	**158,063**	**419**	**263**
				(OP: W7ZR)
KØLUZ/4	**14**	**1,363,716**	**1205**	**621**
N2MM	"	**1,233,940**	**1116**	**599**
WO4O	"	1,100,840	1162	580
W4CU	"	440,360	672	404
N6JV	"	**422,497**	**702**	**409**
WR2G	"	74,648	185	172
WS9M/2	"	39,621	166	141
KØBX	"	**16,478**	**80**	**77**
K7EIQ	"	**13,020**	**107**	**93**
W1EBI	"	6,032	53	52
N3GJ	**7**	**9,840**	**41**	**40**
W4PK	**3.5**	**177,946**	**243**	**193**
***W1FA**	**A**	**423,108**	**486**	**292**
***AA4LR**	"	**421,935**	**617**	**345**
*NV4B	"	288,090	483	297
***NØSXX**	"	**274,596**	**587**	**294**
*N3CZ/4	"	268,920	441	249
*NXØI	"	212,344	480	254
***W3KB**	"	**188,881**	**283**	**223**
*NØHR	"	171,182	364	251
*W4EE/3	"	162,717	326	219
*WGØM	"	152,692	425	236
*AD4ES	"	145,180	419	238
***KE6QR**	"	**136,315**	**438**	**199**
*N4JIK	"	117,912	322	204
***K5GM**	"	**106,689**	**313**	**183**
***N2FF**	"	**105,840**	**211**	**168**
***K7RR**	"	**101,184**	**286**	**186**
***K8GT**	"	**97,560**	**274**	**180**
*WU9B/7	"	88,736	319	188
*NR3X/4	"	87,248	235	164
				(OP: W4KAZ)
*N2YBB	"	82,611	171	137
*WL7E/WZ7	"	75,112	272	164
				(OP: WL7E)
*K2DSL	"	67,500	241	150
*NP3D/NY2	"	53,250	158	125
				(OP: NP3D)
*ND8N/7	"	49,403	215	127
*KE7DX	"	37,120	156	128
*WBØN	"	26,751	138	111
*K9JM/6	"	24,531	149	111
*N1API	"	23,920	132	104
*N6AN	"	22,072	131	89
*W4BW	"	18,031	104	73
*KD6WKY	"	18,000	149	90
*K1SM	"	12,410	78	73
*NU6T	"	11,025	111	75
*W1RM	"	10,672	61	58
*KT8X	"	7,000	56	56
*W4WNT	"	4,224	46	44
*KI4FW	"	1,961	41	37
***ND6S**	**28**	**1,677**	**40**	**39**
***WD4DDU**	"	**322**	**14**	**14**
***WA7LNW**	**21**	**115,291**	**388**	**223**
***NW4V**	**14**	**125,255**	**337**	**235**
***WB2AA**	"	**96,555**	**250**	**205**
***K7FA**	"	**43,492**	**233**	**166**
*NI5L/7	"	31,624	178	134
*W7SST	"	11,180	102	86
***KFØIQ**	"	**1,071**	**21**	**21**
***N4NX**	**7**	**298,480**	**363**	**287**
***N7MAL**	"	**81,065**	**239**	**155**
*KN6VVH/7	"	27,700	118	100
				(OP: W6NF)
***W8AEF/7**	**3.5**	**44,250**	**190**	**125**

Alaska

AL9A	**A**	**7,380**	**51**	**45**
***KL2R**	**14**	**69,312**	**197**	**152**

Canada

VE1OP	**A**	**2,863,144**	**1441**	**634**
VE3UTT	"	**2,424,775**	**1254**	**575**
VE3RZ	"	573,352	611	296
VE3IIE	"	509,292	446	301
				(OP: VE3MMQ)
VE7KS	"	**388,225**	**441**	**265**
VE5MX	"	**238,700**	**439**	**217**
VE3CX	**14**	**1,088,838**	**1038**	**502**
VE6AO	"	**9,815**	**72**	**65**
				(OP: VE6TC)
VA6XDX	**7**	**156,999**	**222**	**177**
				(OP: VE6LB)
***VE2XAA**	**A**	**1,125,200**	**842**	**400**
***VE7WEB**	"	**285,750**	**494**	**225**
***VE3XD**	"	**209,304**	**303**	**216**
*VE3MGY	"	198,540	384	180
***VE5ZX**	"	**198,016**	**397**	**221**

Dominican Republic

***HI8PJP**	**28**	**75**	**5**	**5**

Mexico

XE1KK	**A**	**61,920**	**144**	**120**
4B1EE	**14**	**36,960**	**138**	**120**
				(OP: XE1EE)
***XE2AC**	**A**	**124,852**	**275**	**182**

U.S. Virgin Islands

KP2M	**A**	**8,679,960**	**2897**	**940**
				(OP: K3TEJ)
NP2X	"	1,308,500	1004	500
***KP2B**	**A**	**657,536**	**572**	**352**
				(OP: WP3A)
*NP2L	"	320,408	375	242

ASIA

Asiatic Russia

UA9PC	**A**	**8,657,730**	**2766**	**855**
RX9SA	"	3,249,350	1473	650
R9FM	"	3,028,854	1360	543
RM9RZ	"	2,448,000	1421	600
RVØAL	"	**1,076,758**	**1002**	**458**
R8TX	"	482,898	602	302
RX9SS	"	440,744	527	296
RM8W	"	343,978	437	302
UA9AGX	"	315,530	405	278
UA9OC	"	274,750	367	250
UAØAGI	"	126,633	294	191
RZ9OJ	"	45,714	163	114
RWØMM	"	38,354	162	127
RU9UC	"	10,034	60	58
RZØAF	**28**	**8,178**	**63**	**58**
UA9TZ	**21**	**615,980**	**616**	**380**
RK8I	"	268,176	426	296
UA9XC	"	2,030	30	29
UI9I	**14**	**2,759,496**	**1508**	**744**
				(OP: RZ9HT)
RKØUT	"	**422,100**	**555**	**350**
RV9CP	"	366,543	445	293
RXØQA	"	317,440	455	320
RA9UN	"	127,058	257	202
RAØAM	"	27,168	121	96
UAØQBR	"	5,502	48	42
RK9QWM	**7**	**1,310,444**	**647**	**394**
				(OP: RW9QP)
***RG9A**	**A**	**4,380,350**	**1831**	**650**
				(OP: UA9AM)
*UA9SP	"	3,031,938	1540	546
*RL9AA	"	1,745,807	1204	541
*RU9DD	"	851,500	727	325
*UA9OA	"	629,640	619	330
*UA9XS	"	568,464	589	312
*RU9CI	"	489,697	504	271
*RW9WW	"	285,889	307	251
*UA9SAW	"	168,454	296	209
*RV9UP	"	157,795	325	209
*RX9WN	"	69,825	168	147
*RA9SC	"	51,205	148	133
***RAØANO**	"	**33,408**	**111**	**96**
*RZ9IR	"	11,856	66	57
*RA9AC	"	7,708	57	47
***RC8I**	**21**	**539,392**	**584**	**392**
				(OP: RZ9HG)
***RV9UF**	**14**	**161,920**	**308**	**220**
*RA9MX	"	106,128	225	201
***RAØSMS**	"	**19,474**	**135**	**91**

China

BD1ISI	**A**	**691,530**	**891**	**370**
BY4QA	"	629,006	786	358
				(OP: DL2JRM)
BD5WW	**14**	**473,396**	**679**	**371**
***BD4SQ**	**A**	**127,835**	**440**	**185**
*BD4SX	"	61,299	187	139
*BA4SD	"	4,750	64	50
***BA4QO**	**21**	**122,650**	**309**	**223**
*BD4HF	"	3,726	71	54
***BH4RKH**	**14**	**140**	**10**	**10**

Georgia

4L8A	**14**	**3,962,794**	**1905**	**781**
***4L6QC**	**21**	**398,702**	**479**	**311**

India

***VU2NKS**	**A**	**143,968**	**243**	**176**

Israel

***4Z5TK**	**A**	**446,907**	**469**	**311**
*4X1WQ	"	11,607	67	53

Japan

JA6LCJ	**A**	**1,269,940**	**1012**	**470**
JA6BZI	"	455,390	508	310
JN3SAC	"	**154,979**	**306**	**193**
JH6JSR	"	74,000	213	148
JF9JTS	"	**54,309**	**193**	**129**
JH1OVY	"	**49,590**	**155**	**114**
JA2FSM	"	**35,360**	**155**	**104**
JJØMPI	"	**34,456**	**160**	**118**
JA8JMG	"	**29,592**	**144**	**108**
JA7ZP	"	**2,320**	**30**	**29**
JA1HGY	"	24	2	2
JA7OWD	**28**	**2,542**	**48**	**41**
JR9GMS	**14**	**45,936**	**152**	**132**
JH1ACA	"	**26,487**	**122**	**109**
JM2RUV	7	126	6	6
JF1RYU	**3.5**	**29,815**	**129**	**89**
***JA6DIJ**	**A**	**337,155**	**492**	**285**
***JH1GNU**	"	**119,556**	**290**	**162**
***JA3PYC**	"	**100,678**	**217**	**142**
*JG3FEA	"	66,445	207	137
*JA1KEV	"	40,248	182	117
***JH1GUO/4**	"	**38,893**	**137**	**89**
*JE1SCJ	"	33,060	142	95
*JI1LAT	"	30,096	116	99
*JA1MZM	"	25,844	114	91
*JRØKVU/1	"	21,356	109	76
*JH1DYV	"	13,260	71	60
***JA2KCY**	"	**4,884**	**49**	**44**
*JI3KXB	"	270	10	10
***7L2OHM**	**28**	**1**	**1**	**1**
***JS1IFK**	**21**	**5,225**	**62**	**55**
***JHØEPI**	**14**	**5,928**	**64**	**57**
***JA4AQR**	"	**3,978**	**39**	**39**
***JH3LFL/1**	**7**	**101,609**	**203**	**139**
*JL3RDC	"	12	3	3
***JM1NKT**	**3.5**	**30,515**	**119**	**85**

Kampuchea

***XU7ACY**	**A**	**702,151**	**750**	**401**

Kazakhstan

UN4PG	**21**	**599,148**	**645**	**396**
UN7QF	**14**	**6,800**	**59**	**50**
UP7A	**7**	**3,219,984**	**1108**	**531**
				(OP: UN7AL)
***UN9LU**	**A**	**236,761**	**365**	**227**

Qatar

A73A	**A**	**5,511,792**	**2145**	**726**
				(OP: A71BX)

South Korea

HL2DYS	**A**	**64,320**	**226**	**160**
***HL1VAU**	**A**	**261,378**	**520**	**234**

Thailand

***E21YDP**	**A**	**726,856**	**689**	**377**

Turkey

TC7M	**A**	**7,524,468**	**2635**	**756**
				(OP: RW3GU)

United Arab Emirates

***A65CA**	**A**	**125,985**	**234**	**185**

Uzbekistan

***UK8AR**	**21**	**460,360**	**552**	**340**

EUROPE

Austria

OE3KAB	**7**	**159,600**	**273**	**210**
***OE1PPA**	**A**	**63,070**	**233**	**170**

Belarus

EW5A	**A**	**2,737,595**	**2260**	**731**
				(OP: EW2AA)
EV1R	"	2,313,460	1884	655
EW7BR	"	1,243,440	1252	495
EU1FC	**14**	**1,209,663**	**1459**	**637**
EU1UN	**3.5**	**988,097**	**894**	**473**
EW8EW	"	279,314	456	281
***EW1NA**	**A**	**159,300**	**411**	**236**
***EU1CL**	**14**	**418,625**	**815**	**425**
***EU1AZ**	**7**	**719,468**	**666**	**428**

Belgium

ON7ON	**A**	**46,189**	**188**	**143**
OR2A	**14**	**840,155**	**1007**	**565**
				(OP: ON7YX)
***OO9O**	**A**	**249,417**	**524**	**321**
				(OP: ON7SS)
***OQ4B**	**21**	**39,072**	**170**	**148**
				(OP: ON4BHQ)

Bulgaria

LZ8E	**A**	**6,903,472**	**3583**	**944**
				(OP: LZ2BE)
LZ2ZG	**28**	**28,625**	**153**	**125**
LZ5K	**21**	**28,556**	**168**	**121**
***LZ1QV**	**7**	**387,891**	**474**	**329**

Crete

***SV9/YL2VW**	**28**	**101,322**	**372**	**234**
				(OP: YL2VW)

Croatia

9A2EU	**A**	**675,384**	**734**	**428**
9A2U	**28**	**482,664**	**874**	**442**
				(OP: 9A3ZA)
9A5D	**21**	**969,555**	**1306**	**593**
				(OP: 9A3ID)
9A5MT	**7**	**3,102,870**	**1472**	**706**
***9A3XV**	**A**	**820,352**	**822**	**442**
***9A1CMA**	**3.5**	**1,860**	**32**	**30**
				(OP: 9A5TO)

Czech Republic

OK7Y	**A**	**2,044,704**	**1604**	**608**
				(OP: OK1FDY)
OK1DG	"	1,970,664	1642	628
OK1VD	"	1,864,770	1448	610
OK1HEH	"	574,080	831	384
OL8R	**21**	**1,005,024**	**1159**	**608**
OK1IC	"	681,108	899	538
OK1MBZ	"	100,064	303	236
OL3Z	**14**	**2,278,748**	**1634**	**799**
				(OP: OK1HMP)
OL8M	"	1,715,220	1485	733
				(OP: OK1DRQ)
OL9Z	"	1,526,175	1514	675
				(OP: OK2PVF)
OL7M	**1.8**	**284,598**	**487**	**291**
				(OP: OK1CW)
***OK1TA**	**A**	**1,509,680**	**1285**	**565**
*OK2BXE	"	1,033,182	1094	513
*OK1JOC	"	576,281	856	409
*OK6AY	"	258,960	509	312
				(OP: OK1AY)
*OK3M	"	172,002	359	263
*OK1EV	"	80,010	288	210
*OK2TBC	"	69,560	260	188
*OK1TD	"	60,605	181	155
***OK1UG**	**7**	**811,632**	**711**	**444**
***OK1IBP**	**3.5**	**163,954**	**334**	**239**

Dodecanese

SV5DKL	**21**	**774,787**	**1049**	**557**

England

G6PZ	**A**	**5,607,756**	**2589**	**867**
				(OP: GIØRTN)
G4IIY	"	475,606	709	397
G8JXV	"	129,291	303	213
M5W	**21**	**648**	**25**	**24**
				(OP: GØMTN)
GØMTN	**14**	**708,560**	**992**	**521**
M7T	**7**	**153,888**	**286**	**224**
				(OP: G3YYD)
***G4WGE**	**A**	**436,192**	**709**	**344**
*G8MIA	"	101,297	296	203
***M5E**	**7**	**1,621,069**	**1048**	**571**
				(OP: GØCKV)
*M6W	"	73,692	147	138
				(OP: GØDEZ)

Estonia

***ES4RX**	**A**	**436,740**	**751**	**348**

European Russia

UA3MIF	**A**	**3,293,886**	**2329**	**731**
RT3T	"	2,743,832	2132	728
RN3QO	"	2,482,440	1870	685
RT4RO	"	**1,871,424**	**1757**	**576**
R3AT	"	1,744,162	1706	581
RA1QD	"	**1,162,870**	**1290**	**515**
RN3A	"	736,345	954	437
UA6GF	"	**712,663**	**972**	**427**
RU6MD	"	409,125	674	375
RW6AMP	"	353,150	722	350
RN3LA	"	182,320	326	215
RX3AEX	"	142,596	408	233
UA1NFA	"	116,982	305	194
UA3SAQ	"	37,920	143	120
RZ4FWA	"	23,433	121	107
				(OP: UA4FJ)
UA3QIX	"	3,186	34	27
UA6AA	**28**	**183,586**	**451**	**299**
RW3XM	**21**	**152,021**	**401**	**281**
R7LV	**14**	**3,554,109**	**1670**	**821**
RX6AM	"	1,410,191	1380	677
UA3KM	"	**713,184**	**848**	**544**
UA6LUQ	"	548,205	829	483
RW4WZ	"	**24,130**	**136**	**127**
UA6LCN	**7**	**1,719,630**	**1063**	**579**
UA6GP	"	1,576,972	1068	562
UA3MNB	"	**1,293,960**	**896**	**526**
UA6AKD	"	281,710	438	286
RT3M	**3.5**	**432,480**	**595**	**340**
RA3FD	"	35,420	144	115
UA4FCO	"	**18,618**	**100**	**87**
***RN4WA**	**A**	**2,095,712**	**1904**	**632**
***R3/SM6LRR**	"	**379,452**	**592**	**307**
***UA6YH**	"	**369,172**	**598**	**356**
*RK4YJ	"	362,470	569	335
*RA4ACX	"	244,256	511	272
*RU3UM	"	207,459	461	267
*UA3AMZ	"	164,422	430	229
*RA4HO	"	145,328	383	248
*RU4LM	"	136,072	312	233
*RL3KO	"	76,788	209	158
*RU3AT	"	27,328	165	122
*R5ACQ	"	26,334	150	114
*UA3RW	"	26,112	178	128
*RK3VWB	"	9,928	81	73
*UA6JCC	"	8,645	66	65
*RV3YR	"	5,529	64	57
*UA4FTA	"	5,243	55	49
*RA3VE	"	208	13	13
*RU6FA	"	171	9	9
***UA6AK**	**28**	**148,608**	**436**	**258**
***RN4AO**	"	**79,838**	**304**	**209**
*RU6YY	"	58,560	221	183
***RU3PU**	"	**34,020**	**182**	**140**
*RA3XE	"	19,190	125	101
*RA3EA	"	943	33	23
***UA3AO**	**21**	**203,490**	**495**	**323**
*UA3YFL	"	32,558	175	146
***RD1AW**	**14**	**409,790**	**726**	**430**
***RW6AH**	"	**303,360**	**583**	**384**
***RX3DBG**	"	**50,225**	**215**	**175**
***RW1AU**	**7**	**205,820**	**371**	**251**

Faroe Islands

OY1CT	**A**	**200,332**	**606**	**314**

Finland

OH8L	**A**	**3,293,460**	**2209**	**810**
				(OP: OH8LQ)
OH6MW	"	1,939,074	2116	586
OH6K	"	454,977	618	411
				(OP: OH6VM)
OH2KW	"	32,606	142	119
OH4MDY	**28**	**266,766**	**707**	**346**
OH9MM	**14**	**4,366**	**66**	**59**
OH6M	**7**	**1,504,160**	**1073**	**544**
				(OP: OH6LBW)
***OG6N**	**A**	**1,101,870**	**1292**	**583**
*OF5ØRR	"	686,070	881	462
				(OP: OH8FKU)
*OH2LNH	"	286,440	584	308
*OH8KVA	"	94,878	261	189

France

F5IN	**14**	**1,843,908**	**1463**	**732**
***F8CRS**	**A**	**409,260**	**585**	**359**
*F5IYJ	"	21,462	107	98
***F4FDA**	**28**	**22,920**	**149**	**120**

Germany

DL3TD	**A**	**5,418,000**	**2471**	**903**
DL7ON	"	3,419,886	2102	786
DL6KVA	"	2,324,340	1713	698
DK2CX	"	2,301,354	1491	649
DL5JS	"	1,543,984	1345	571
DHØGHU	"	1,478,504	1265	568
DF1LON	"	1,347,532	1096	548
DL8SCG	"	1,054,193	1159	511
DK3GI	"	759,215	918	479
DD1JN	"	406,980	649	342
DL8QS	"	341,848	609	346
DK7VW	"	325,150	565	350
DF5ZV	"	280,202	541	338
DL1NEO	"	276,255	505	315
DF2TT	"	257,040	477	315
DL5ST	"	246,400	395	352
DQ5T	"	238,194	467	297
				(OP: DL4LAM)
DJ9RR	"	225,132	549	292
DL6EZ	"	193,438	421	287
DJ4KW	"	189,904	445	286
DL9SEV	"	144,640	403	256
DJ5AN	"	118,728	283	204
DL1BUG	"	107,060	298	202
DKØIU	"	62,073	241	171
				(OP: DJ4KW)
DL9NDV	"	53,406	187	138
DJ1AA	"	51,107	197	149
DJ6TB	"	40,320	171	126
DL8UAT	"	7,440	62	62
DJØTP	"	621	23	23
DF9ZP	**21**	**281,559**	**526**	**381**
DK1QH	**14**	**103,335**	**309**	**249**
DP3D	**7**	**1,472,392**	**1035**	**536**
				(OP: DK3KD)
DG4R	"	289,261	399	301
				(OP: DL1RG)
DD9WG	**1.8**	**30,120**	**141**	**120**
***DK1KC**	**A**	**1,221,138**	**1219**	**537**
*DF3AX	"	932,480	1152	470
*DL2IAN	"	849,888	956	468
*DL4SDW	"	659,861	827	431
*DL3VZL	"	584,220	770	428
*DJ1OJ	"	529,053	777	413
*DM3PKK	"	514,909	726	397
*DL1DVE	"	489,868	688	412
*DK5MB	"	349,650	482	350
*DLØNG	"	267,509	458	293
				(OP: DK8NC)
*DF1HF	"	251,410	488	310
*DF9TS	"	249,490	506	305
*DL5GAC	"	195,960	463	284
*DF7ZS	"	188,298	421	297
*DR3W	"	174,105	415	265
				(OP: DL6MHW)
*DKØA	"	149,188	380	247
				(OP: DL7JAN)
*DM1TT	"	139,995	359	255
*DK3DUA	"	116,144	343	244
*DL2YCA	"	112,700	358	230
*DK7ZH	"	107,004	292	222
*DF9DM	"	105,569	341	229
*DK4LX	"	88,201	216	193
*DL6ZBN	"	83,544	231	177
*DL2IPU	"	67,716	203	162
*DJ5QV	"	63,801	181	153
*DK5IR	"	50,434	199	151
*DJ1CW	"	49,761	223	171
*DB7MA	"	46,206	194	153
*DG8VE	"	36,332	147	124
*DL1VTL	"	30,276	130	116
*DJ5QE	"	28,420	148	116
*DL1SVA	"	17,441	127	107
*DJ3HW	"	16,960	76	64
*DL9NCR	"	16,150	101	85
*DL8CA	"	8,874	63	58
*DF2CH	"	5,412	69	66
*DL7URH	"	3,870	53	45
*DL5HF	"	1,440	38	36
*DL6EBP	"	24	4	2
***DL2SWN**	**28**	**95,064**	**331**	**233**
*DN7DX	"	42	7	7
***DH8BQA**	**21**	**301,824**	**619**	**384**
*DO4DXA	"	13,386	109	97
***DD1IM**	**14**	**190,674**	**407**	**321**
*DK5OS	"	26,130	159	134
*DL1OJ	"	1,334	29	29
***DD1MAT**	**7**	**118,776**	**230**	**196**

Greece

SV1ENG	**A**	**2,059,626**	**1906**	**687**
SV1DPI	"	85,020	318	218

Hungary

HA8JV	**A**	**3,502,639**	**2169**	**757**
HA3NU	"	3,284,607	2369	789
HA9PP	**7**	**2,880,086**	**1379**	**682**
HA3LI	**3.5**	**789,360**	**814**	**440**
***HA6NL**	**A**	**1,046,615**	**1310**	**479**
***HG8C**	**14**	**501,380**	**805**	**473**
				(OP: HA8EK)
***HG2W**	**7**	**427,653**	**516**	**337**

Iceland

***TF3DC**	**A**	**17,355**	**97**	**89**

Ireland

EI2JD	**A**	**656,908**	**723**	**406**
***EI/W5GN**	**A**	**555,984**	**725**	**396**
*EI2JK	"	162,250	390	295
***EI6DX**	**14**	**3,510**	**57**	**54**

Isle of Man

MDØCCE	**A**	**1,065,634**	**1196**	**551**

Italy

IKØYVV	**A**	**3,769,880**	**2266**	**790**
IN3QBR	"	2,506,257	1857	691
IR4E	"	704,900	850	475
				(OP: IK4ZHH)
IR3W	"	559,104	988	448
				(OP: I3FIY)
IO4T	"	255,780	442	294
IKØTUM	"	123,165	259	207
IK3DVY	"	84,778	255	194
IZØGYP	"	6,298	51	47
II7M	**28**	**576,650**	**912**	**475**
				(OP: IK7JWY)
IQ2CJ	**21**	**1,194,248**	**1257**	**662**
				(OP: IK2PFL)
IZØGXM	"	345	15	15
IR2C	**14**	**2,790,264**	**1827**	**844**
				(OP: IK2JUB)
IK8TEO	"	192,708	442	318
IC8FBU	**7**	**40,817**	**133**	**119**
II1H	**3.5**	**910,860**	**832**	**470**
				(OP: I1HJT)
***IK2HDF**	**A**	**1,495,545**	**1448**	**557**
*IK2AHB	"	160,325	361	265
*IZØFZM	"	74,686	294	214
*IK3QAR	"	43,332	230	157
*IK3ORD	"	41,022	202	159
*IW5EIJ	"	38,100	171	127
*IZ1GIP	"	32,379	146	129
*IZ8PPH	"	2,436	44	42

*IV3AZV	14	172,542	476	298
*IV3WJP	7	476,686	531	361
*IZ1MKB	"	201,840	319	232
*IC8POF	1.8	1,914	34	29
Kaliningrad				
*UA2FT	A	48	6	6
Latvia				
YL6W	A	3,930,120	2547	810
YL5T	"	1,153,280	1281	544
			(OP: YL3DQ)	
YL2PP	28	4,437	53	51
*YL2KF	14	140	12	10
Lithuania				
LY3CY	A	97,732	335	212
LY7M	3.5	1,043,289	919	481
LY2IJ	1.8	333,402	515	307
*LY2BNL	A	29,172	160	132
*LY3CW	3.5	399,500	545	340
Moldova				
ERØWW	A	8,078,556	3826	996
			(OP: UT5UDX)	
*ER3DX	A	23,856	113	84
Netherlands				
PA3FKN	A	1,531,030	1390	566
PA5WT	"	1,063,180	1173	530
PA1TX	"	507,726	814	421
PA5TT	"	376,523	596	361
PA3FQA	"	204,750	454	273
PA7RA	"	101,920	344	224
PB2JJ	14	735,165	985	527
*PA44N	A	1,242,850	1315	530
			(OP: PA4N)	
*PA3HGF	"	81,408	288	192
*PF6WW	28	95,040	358	240
*PAØMIR	21	14,208	108	96
*PI4WLD	14	6,555	57	57
			(OP: PAØMIR)	
*PA4AO	7	164,058	301	222
*PC6ØØP	3.5	11,323	77	67
			(OP: PAØMIR)	
Norway				
LN5O	A	1,470,530	1482	614
			(OP: LA6FJA)	
*LA4RT	A	97,394	336	209
*LA3ZA	"	81,984	265	183
Poland				
SO6I	A	1,706,040	1468	630
SP1NY	"	1,592,136	1359	567
SO2W	"	135,110	309	229
SP8HKT	"	133	8	7
SP8HXN	28	9,750	86	78
SP2JMB	21	373,428	602	414
SP3GXH	"	30,590	158	133
SN7Q	14	2,072,227	1735	743
			(OP: SP7GIQ)	
SN8R	7	3,017,454	1440	698
			(OP: SP8ONZ)	
SQ5M	"	572,887	563	367
SP8LBK	1.8	95,460	257	185
*SP3BJK	A	948,094	1139	482
*SQ9FMU	"	263,064	481	291
*SP6FXY	"	17,182	95	71
*SP6IHE	"	11,016	60	54
*SP6ZC	"	5,043	45	41
*SP2ØIØCY	28	6,603	75	71
			(OP: SP5BMU)	
*SQ5STS	"	2,604	44	42
*SQ5FWR	21	77,000	278	220
*SP5AUY	7	311,558	363	299
*SP6EIY	3.5	327,816	491	314
*HF1ØØHP	"	60,465	202	145
Portugal				
*CT1HMN	A	67,554	217	162
Romania				
YQ9W	A	4,933,055	2881	827
			(OP: YO9GDN)	
YO9HP	"	3,800,345	2614	815
YQ6A	"	2,207,740	1954	661
			(OP: YO6BHN)	
YO7FB	"	1,734,432	1807	623
YO4DW	"	444,600	626	360
YR9F	"	208,208	547	308
			(OP: YO9FNP)	
YO4CSL	"	546	14	13
YR5T	14	942,276	1149	596
			(OP: YO5CBX)	
YR5N	1.8	112,308	284	196
			(OP: YO5PBF)	
*YQ5Q	A	1,558,540	1777	596
			(OP: YO5OHO)	
*YO9SW	"	76,728	286	184
*YO9IGS	28	238	15	14
*YO9BXC	21	54,180	193	172
*YO5OAG	14	50,730	197	178
*YO9AGI	7	680,400	676	405
*YO2AQB	1.8	7,808	73	61
Scotland				
*GM4UYZ	A	4,661	68	59
Serbia				
YT4W	14	2,194,943	1833	787
			(OP: YU1DW)	
YU5R	"	1,616,568	1546	698
YU1LA	7	4,406,565	1733	789
*YT3M	A	2,947,680	1956	736
			(OP: YU1YV)	
*YU1AAV	"	170,970	409	278
			(OP: YT1CC)	
*YUØU	28	53,580	263	188
*YT2AAA	14	587,010	779	510
*YU1R	"	554,830	875	491
			(OP: YT1NP)	
*YUØW	"	427,128	736	444
*YT1HA	7	570,778	592	377
*YU2FG	"	277,623	377	283
Sicily				
IT9VDQ	28	529,686	962	459
IT9BLB	21	1,489,644	1487	702
IT9IMJ	"	13,578	99	93
IT9MUO	14	1,113,245	1121	595
*IT9RZU	A	242,880	527	330

Slovakia				
OMØM	A	4,055,128	2252	812
			(OP: OM8AW)	
OM4XA	"	774,974	888	449
OM3AG	28	211,008	531	314
OM3DX	14	3,162	52	51
*OM5X	A	1,888,020	1559	612
			(OP: OM5XX)	
*OM6AL	"	429,840	716	360
*OM8LA	"	223,938	483	286
*OM5UM	"	144,648	385	252
*OM3NI	14	172,038	433	318
Slovenia				
S56A	A	2,337,896	1520	682
S52AU	"	783,224	787	442
S55O	"	708,800	903	443
S51Z	"	347,520	512	320
S51DX	"	341,784	689	303
S59ZZ	"	9,500	89	76
S53O	28	522,309	919	453
S5ØR	21	886,275	1039	585
S56X	7	2,780,163	1397	673
S53M	"	2,523,675	1271	627
			(OP: S51FB)	
*S53F	14	1,198,891	1215	647
Spain				
EA4KA	A	754,728	881	492
EA4GB	"	392,940	511	333
EA1WX	"	370,758	586	366
EA3CEC	28	888	25	24
EA5FID	21	641,538	917	522
EA3JW	"	95,816	359	232
*EA2BNU	A	737,424	875	432
*EA4XT	"	175,872	383	256
*EC1KR	"	74,724	216	156
*EA1CS	"	73,146	226	167
*EA4/DH1TW	"	38,896	193	143
*EA3GBA	"	16,929	118	99
*EB3CML	"	608	20	19
*EA3NO	28	24,318	173	126
*EA4ZK	"	1,344	41	28
*EA2BVV	21	45	9	9
Sweden				
SE5E	A	3,261,775	2572	725
			(OP: SM5AJV)	
SM6CNN	"	2,524,716	1875	723
SEØX	"	1,309,350	1227	602
			(OP: SMØMDG)	
SM5QU	"	595,362	890	402
SMØGYX	"	178,840	482	263
SA1A	"	49,588	213	161
			(OP: SM1TDE)	
*SM6EQO	A	690,069	1072	411
*SMØQ	"	587,019	1121	419
			(OP: SMØOGQ)	
*SM5D	"	575,664	912	402
			(OP: SM5DJZ)	
*SLØW	"	380,800	693	340
			(OP: SMØAJU)	
*SM2BJS	"	197,102	509	278
*SM6NOC	"	158,574	381	247
*SM6NJK	3.5	180,565	357	245
Switzerland				
HB9FBS	3.5	406,144	517	334
Ukraine				
UW3U	A	4,730,715	2800	855
			(OP: UT7UJ)	
UW1G	"	4,168,494	2931	814
			(OP: UY5HF)	
UWØK	"	1,862,264	1687	667
			(OP: USØKW)	
UR5QA	"	1,578,208	1558	596
UW8M	"	695,136	956	416
			(OP: UR5MID)	
UTØRM	"	471,936	968	384
UR6F	"	180,518	478	262
			(OP: UXØFF)	
UR5FS	"	136,200	321	227
UT7MR	"	67,815	245	165
UX8IX	"	66,021	237	177
UT6EE	"	65,526	210	163
UU2JQ	"	57,090	176	165
UR7ZO	"	42,757	195	143
UU2J	21	862,190	1109	565
			(OP: UU5JIB)	
UW5Q	14	1,935,480	1626	762
			(OP: UR3QCW)	
UT4ZG	"	1,142,582	1284	623
UY7C	"	742,368	1064	528
			(OP: UR3CMA)	
UT5UGR	7	3,398,725	1633	727
UR5IFX	"	1,298,746	926	503
UT2UB	3.5	536,870	676	370
*UT2UU	A	1,302,756	1412	546
*UT2IO	"	1,103,860	1280	485
*UT8IM	"	789,096	999	427
*UT5UON	"	756,896	963	436
*UT2FA	"	652,698	1041	474
*EO1I	"	563,680	918	416
*UY5ZI	"	491,730	787	370
*UT1AA	"	355,576	673	338
*US9PA	"	254,280	511	326
*UX1AA	"	142,943	324	223
*US7LM	"	16,300	116	100
*UT5UKA	"	12,750	86	75
*UR2VA	28	173,121	411	299
*UR5LO	"	169,443	440	281
*UU1AZ	21	1,082,640	1233	624
*US4L	"	12,125	107	97
*UR5VR	14	13,260	91	85
*UT8AS	7	518,256	557	366
*UT3L	3.5	232,200	412	270
*UR5IHQ	"	116,032	278	196

OCEANIA

Australia				
VK6HZ	A	242,658	340	221
VK2IM	7	3,103,056	1013	528
New Zealand				
ZM4G	21	471,165	547	303
ZL3PAH	7	66,886	117	106
*ZL3GA	A	35,174	102	86
*ZM3T	14	305,240	413	260
			(OP: W3SE)	
Philippines				
*DV1/JO7KMB	14	188,902	319	206

SOUTH AMERICA

Argentina				
LO2F	A	5,969,240	2192	790
			(OP: LU1FAM)	
LU4DX	"	2,470,438	1173	593
			(OP: LU1AEE)	
LU6QI	"	1,207	17	17
*LU5FF	A	2,307,497	1255	587
*LU5UBI	28	700	18	14
Brazil				
PT2ZHA	A	2,836,161	1419	629
PY2LSM	"	173,124	233	189
PX8XL	"	6,222	65	51
PP5BZ	7	187,452	215	164
*PR7AB	A	706,584	630	354
*PY2SEX	"	564,224	501	304
*PW2B	"	272,460	333	239
*PQ4F	"	115,940	221	170
			(OP: PY4FQ)	
*PY2ASS	"	43,890	151	114
			(OP: PY2AXH)	
*PY2MR	"	7,452	61	54
*PY2XC	28	11,312	73	56
*PY7ZY	14	819,624	633	444
*PR7AF	7	87,625	125	125
*PU2MZI	3.5	10,927	54	49
Chile				
*CE3AA	A	1,771,761	1057	563
			(OP: XQ4CW)	
Uruguay				
CW7T	A	75,400	161	130

TRIBANDER/SINGLE ELEMENT

United States				
NXØX/4	A	3,086,655	2052	715
AB3CX/2	"	2,067,440	1422	601
N1WR/3	"	1,736,640	1254	540
KR4F	"	1,404,718	1250	538
K3MD	"	1,389,584	1326	532
KYØW/6	"	1,278,464	1496	512
N3UM	"	1,258,136	909	493
KG4W	"	1,045,644	872	474
K3IE/4	"	975,989	946	469
N4EEB	"	906,382	1172	458
NT2A	"	892,143	879	441
WA3AAN	"	817,284	883	403
W6TK	"	761,994	996	411
NX2X	"	738,815	786	385
W6SX	"	671,209	1093	379
NØXR	"	641,466	1072	378
WN2O	"	618,372	635	356
NE8P	"	611,040	854	402
K7IA/5	"	574,500	933	383
AK4K	"	556,380	880	396
K9CC	"	540,768	986	344
NF4A	"	482,058	670	339
WA4JUK	"	452,430	692	330
WZ4F	"	444,780	629	353
NQ7R	"	342,996	619	303
AE1T	"	338,955	463	295
K4DJ	"	338,580	518	297
K7CS/4	"	324,000	486	270
N6KW/7	"	260,848	597	272
KB1NRB	"	234,878	507	266
KU8E/4	"	212,880	386	240
N6DW	"	212,500	433	250
W7SW	"	187,920	509	232
KM4DR/5	"	181,040	630	248
KE1B/6	"	176,852	495	247
NO6T	"	150,748	412	223
W8PN	"	148,419	386	207
KE2VB/7	"	132,672	483	192
AB2DE	"	132,010	274	215
NK6A	"	127,092	372	204
K4HAL	"	124,179	323	213
W1BYH	"	109,760	202	160
NC6X/7	"	95,480	380	155
AJ6V	"	82,460	336	190
K2WK/4	"	75,306	196	163
N2SQW	"	74,141	196	151
N4IR	"	73,743	199	141
N6MI	"	70,215	226	155
KN5H/7	"	59,943	248	159
K6TU	"	50,832	205	144
W4BCG	"	44,240	172	140
WY4Y	"	41,844	180	132
W7KU/Ø	"	37,448	195	124
W7ON	"	32,226	186	123
KV7DX	"	30,480	173	120
N4GI	"	29,120	108	80
K4GM	"	17,460	124	97
W3WC	"	15,622	79	73
N8AGU	"	11,424	57	56
W1FM	"	7,626	65	62
NØBK	"	4,440	44	37
N6AJR	"	2,838	50	43
WN1GIV/4	28	320,306	709	334
AB7E	"	35,483	202	137
WZ7ZR	21	158,063	419	263
N4NM	"	16,376	105	89
W4CU	14	440,360	672	404
W6AEA/7	"	310,500	709	345
NQ5D	"	280,908	627	324
K7ZD	"	242,788	509	322
K7EIQ	"	13,020	107	93
K4XD	7	10,335	97	65
*NA4K	A	1,247,076	1197	486
*KV8Q	"	798,391	1008	401
*KW2G/1	"	795,476	772	404
*KZ9O	"	646,815	1066	403
*K2PO/7	"	562,650	954	363
*K1TN/2	"	556,830	608	345
*KQ7W	"	530,535	962	339
*N8VV	"	506,688	712	348
*WA1LWS/3	"	492,586	692	326
*WN6K	"	451,332	794	324
*KN4QD	"	411,179	606	323
*WE5U	"	306,210	645	295
*KB3LIX	"	295,872	492	268
*NØSXX	"	274,596	587	294
*N3CZ/4	"	268,920	441	249
*AD3PA	"	240,250	404	250
*W7RV	"	239,666	516	266
*NJ1T	"	225,272	301	232
*K5IID	"	224,035	483	259
*NR7Q	"	221,605	496	235
*NM2L/4	"	203,112	496	248
*WQ5L	"	196,930	412	235
*WGØM	"	152,692	425	236
*K9MY	"	144,300	361	222
*AD1C/Ø	"	141,680	440	230
*KC7V	"	129,990	443	210
*NC6V	"	124,821	392	201
*WT5R	"	114,063	369	197
*W4RYW	"	113,231	231	199
*KT8K	"	111,938	325	194
*N2FF	"	105,840	211	168
*W1TO	"	98,325	222	171
*W8IQ	"	95,841	207	207
*WØMSM	"	94,302	285	169
*N5IE/9	"	89,853	320	183
*KX8X/6	"	89,784	365	174
*WU9B/7	"	88,736	319	188
*WE6EZ/7	"	87,210	328	171
*WC4E	"	86,227	217	163
*KE7YF	"	84,336	312	168
*AA1AR	"	83,070	238	195
*WC3O	"	82,852	247	154
*N2YBB	"	82,611	171	137
*KE3D/5	"	80,580	232	170
*K5ME	"	74,880	254	156
*K4FTO	"	74,550	236	150
*N2SO	"	70,684	243	164
*NS8O	"	68,000	285	200
*W9CF/7	"	67,646	284	149
*K6KR/7	"	66,600	271	148
*K6WSC/7	"	62,181	259	147
*AA6EE	"	61,104	233	152
*KUØK	"	53,972	199	131
*NP3D/NY2	"	53,250	158	125
*N7EIE	"	50,050	243	143
*ND8N/7	"	49,403	215	127
*K6CSL	"	48,374	210	134
*KEØG	"	43,736	237	142
*N2NC	"	38,868	157	123
*W6RFF	"	38,564	166	124
*KE7DX	"	37,120	156	128
*WQ8RP	"	35,560	199	127
*N9LJX	"	33,428	187	122
*KX1E	"	32,107	118	97
*KØGEO/5	"	31,920	191	120
*W2MFT	"	24,024	145	104
*KA3QLF	"	21,888	143	114
*K6WH	"	21,855	147	93
*W3CP/7	"	20,794	96	74
*NV2G	"	18,832	107	88
*W4UT	"	17,346	134	98
*N4DXI	"	13,608	102	84
*K4GSG	"	12,194	102	91
*KE3X	"	11,454	98	83
*WB5NMZ/4	"	10,336	85	68
*N1YX	"	3,969	57	49
*N4DE	"	2,040	31	30
*KI7N	"	2,030	37	29
*K7GIM	"	1,224	45	36
*KJ4UZX	"	9	3	3
*N9TF	28	2,331	38	37
*W5KI	"	15	3	3
*WA7LNW	21	115,291	388	223
*WA7NWL	"	7,504	72	67
*W4JHC/5	"	3	1	1
*NW4V	14	125,255	337	235
*N8HP	"	59,168	209	172
*K7FA	"	43,492	233	166
*NI5L/7	"	31,624	178	134
*NWØDX	"	26,289	150	127
*KIØG	"	1,620	44	36
*KK9V	"	540	24	20
*KS5A/7	7	182,206	387	233
*KØPK	"	84,796	273	172
*N7MAL	"	81,065	239	155
*N2JNZ	"	15,824	105	86
*KU7Y	"	7,424	70	58
*AB1J	3.5	48,000	162	125
*W8AEF/7	"	44,250	190	125
*WW1M	"	3,395	41	35

DX

TC4X	A	8,965,635	2965	829
S53MM	"	4,722,668	2557	796
S5ØC	"	4,171,825	2338	775
IKØYVV	"	3,769,880	2266	790
M9X	"	3,258,405	2179	703
MJ/W1NN	"	2,973,225	2327	725
VC2W	"	2,891,120	1599	568
VE1OP	"	2,863,144	1441	634
EF1A	"	2,774,184	1855	686
EW5A	"	2,737,595	2260	731
ST2AR	"	2,553,672	1383	569
IN3QBR	"	2,506,257	1857	691
OO5M	"	2,370,418	1925	641
9A4WY	"	2,268,448	1803	656
UW8SM	"	2,054,718	1730	633
J48HW	"	2,030,720	2009	608
LA8OM	"	1,911,840	1783	569
RT4RO	"	1,871,424	1757	576
LY2MM	"	1,859,158	1648	622
VE3KF	"	1,801,629	1211	477
EA4TX	"	1,780,164	1798	636
S51NZ	"	1,767,892	1697	613
R3AT	"	1,744,162	1706	581
YO7FB	"	1,734,432	1807	623
ON6NL	"	1,654,501	1661	589
G3P	"	1,603,280	1480	560
SP1NY	"	1,592,136	1359	567
RU3UR	"	1,522,126	1384	577
YL9T	"	1,497,660	1647	545
DLØGL	"	1,452,238	1395	587
DF1LON	"	1,347,532	1096	548
SEØX	"	1,309,350	1227	602
EW7BR	"	1,243,440	1252	495
SM3C	"	1,221,990	1444	529
PP1CZ	"	1,125,376	857	448
UD3D	"	1,112,584	1466	517
MDØCCE	"	1,065,634	1196	551
LY2TS	"	945,035	1102	469
L33M	"	898,032	723	424
OM4XA	"	774,974	888	449
S550	"	708,800	903	443
IR4E	"	704,900	850	475
UW8M	"	695,136	956	416
AHØS	"	670,080	711	240
JHØINP	"	661,365	671	345
GM4SID	"	657,846	884	414
HA8TP	"	648,805	1014	449
UAØFAI	"	612,495	828	351
IØZUT	"	535,390	693	370
VE3IIE	"	509,292	446	301
G4IIY	"	475,606	709	397
G3PSM	"	472,320	677	369
VE3CR	"	454,208	444	302
RU6MD	"	409,125	674	375
OZ8SW	"	376,000	668	376
SP6AXW	"	356,712	595	356
S51DX	"	341,784	689	303
OH2VZ	"	328,130	624	314
UA9AGX	"	315,530	405	278
DF2TT	"	257,040	477	315
YR9F	"	208,208	547	308
RN3LA	"	182,320	326	215
SMØGYX	"	178,840	482	263
SMØBYD	"	166,022	322	257
OO5A	"	145,824	355	248
R2DW	"	142,560	293	264
JE1LFX	"	136,500	304	182
G8JXV	"	129,291	303	213
YL2II	"	126,140	412	265
IKØTUM	"	123,165	259	207
JA1HP	"	121,584	344	204
UA9XZ	"	92,125	165	125
SV1DPI	"	85,020	318	218
IK3DVY	"	84,778	255	194
UR4EI	"	84,534	293	193
OH1BOI	"	69,552	232	189
PA1BX	"	59,657	236	169
JF9JTS	"	54,309	193	129
HL5UOG	"	53,560	245	130
JH1OVY	"	49,590	155	114
SA1A	"	49,588	213	161
ON7ON	"	46,189	188	143
JG1FKT	"	45,194	175	118
GM4FFF	"	41,528	152	116
DJ6TB	"	40,320	171	126
JH8CXW	"	39,104	134	104
JA1MJN	"	34,668	145	108
G4IUF	"	25,289	148	121
UN5J	"	22,950	101	85
JR2PMT	"	20,867	98	77
JA1LZR	"	20,470	103	89
SV9COL	"	8,307	46	39
DL8UAT	"	7,440	62	62
RA6AR	"	4,180	63	55
RX9AM	"	3,052	34	28
JL1LNC	"	2,592	47	36
9A2U	28	482,664	874	442
OH3BU	"	289,161	744	361
CT3KN	"	214,700	327	226
UA6AA	"	183,586	451	299
UA9QA	"	136,488	283	188
LZ2ZG	"	28,625	153	125
SY9A	"	20,706	164	119
WP4WW	"	15,403	97	73
EA5FID	21	641,538	917	522
UN4PG	"	599,148	645	396
OI6X	"	333,000	794	375
G7N	"	292,600	644	380
LY3M	"	93,214	292	223
JA9CWJ	"	78,442	207	182
IZØGXM	"	345	15	15
C4M	14	2,777,625	1504	675
EU1FC	"	1,209,663	1459	637
OR2A	"	840,155	1007	565
UY7C	"	742,368	1064	528
JH7XMO	"	521,172	634	372
RA9UN	"	127,058	257	202
VY1EI	"	100,368	300	164
JA3DAY	"	76,466	195	173
A65BD	"	51,062	146	121
JR9GMS	"	45,936	152	132
4B1EE	"	36,960	138	120
VE2FK	"	21,360	99	89
UAØQBR	"	5,502	48	42
OH9MM	"	4,366	66	59
ZC4LI	7	4,770,336	1356	632
LU5OM	"	700,494	398	313
YU2A	"	551,688	503	362
G3MZV	"	425,568	472	341
UY2ZZ	"	229,152	346	264
VA6XDX	"	156,999	222	177
JH1APK	"	81,534	143	127
ZL3PAH	"	66,886	117	106
HA3LI	3.5	789,360	814	440
DD9WG	1.8	30,120	141	120
*UA9SP	A	3,031,938	1540	546
*TK/S59AA	"	2,424,200	1834	680
*LU5FF	"	2,307,497	1255	587
*OM5X	"	1,888,020	1559	612
*CE3AA	"	1,771,761	1057	563
*YO3APJ	"	1,615,768	1477	602
*EF3A	"	1,546,230	1669	597
*OK1TA	"	1,509,680	1285	565
*EW1IP	"	1,411,910	1500	542
*S57U	"	1,381,396	1395	562
*OK1HX	"	1,329,678	1380	549
*UU5JZA	"	1,308,300	1332	525
*UT2UU	"	1,302,756	1412	546
*DFØBV	"	1,289,376	1220	528
*OL26LP	"	1,273,000	1237	536
*PA44N	"	1,242,850	1315	530
*OK1KC	"	1,221,138	1219	537
*OM8DD	v	1,181,439	1164	513
*VE2XAA	"	1,125,200	842	400
*RU3SE	"	1,035,684	1194	468
*EU1DX	"	977,130	1125	517
*EA5YU	"	933,196	1044	508
*9A3XV	"	820,352	822	442
*YO5BRZ	"	818,340	1098	460
*UT3UZ	"	783,667	1063	443
*OV3X	"	772,192	982	472
*RL3FO	"	691,842	1035	402
*OK2BUT	"	686,140	946	455
*VE3EY	"	683,592	654	312
*LY2K	"	654,003	977	441
*JI1RXQ	"	649,296	651	324
*EU6AA	"	643,168	849	398
*YUØA	"	626,463	819	423
*SM6BSK	"	598,880	862	394
*PG6EL	"	597,958	882	409
*JH1EAQ	"	588,708	701	316
*SP5EOT	"	582,096	837	402
*SM5D	"	575,664	912	402
*DG7RO	"	570,243	836	393
*DK5DQ	"	566,519	831	397
*UY5AA	"	563,695	796	407
*HA5LZ	"	550,923	899	449
*UA3DCW	"	543,132	920	423
*DJ1OJ	"	529,053	777	413
*DM3PKK	"	514,909	726	397
*UA9AX	"	482,560	557	320

*VE3DZ	*	474,953	507	293	*JH1DYV	*	13,260	71	60	W4K		289,440	510	268
***UA1CUR**	*	**472,472**	**735**	**364**	***BV4VR**	*	**10,812**	**81**	**68**	AE6RF		258,020	606	266
*US2IZ	*	445,885	718	335	*YL2IP	*	10,584	97	84	**W3LJ**		**189,410**	**374**	**235**
***RA6YBW**	*	**432,588**	**826**	**354**	*LA5MDA	*	10,512	100	73	**N9NA**		**152,490**	**371**	**221**
*RV6LCI	*	429,088	691	368	***IT9ORA**	*	**10,480**	**100**	**80**	KJ4BIW		47,886	165	138
***BD1TCC**	*	**417,600**	**673**	**288**	***DS1RJI**	*	**9,891**	**94**	**63**					
*SQ9E	*	389,752	583	344	*DC3HB	*	8,140	84	74			**Canada**		
*UA1TGQ	*	388,833	646	339	*JF1DAJ	*	5,830	64	53	**VE7GL**		**3,637,128**	**1781**	**599**
***YL3DX**	*	**387,599**	**708**	**347**	*US5EEK	*	5,742	62	58	**VE3YAA**		**2,225,365**	**1362**	**523**
*R3/SM6LRR	*	379,452	592	307	*JE1SHW	*	5,734	56	47	VE3EK		400,074	490	262
*DL4JYT	*	377,650	648	350	*JA2KCY	*	4,884	49	44					
***JA6DIJ**	*	**337,155**	**492**	**285**	***DV1UBY**	*	**3,776**	**39**	**32**			**ASIA**		
***G3LIK**	*	**326,874**	**584**	**347**	*PR7AYE	*	3,625	31	29			**Asiatic Russia**		
*PA3DBS	*	326,874	661	347	*JI1UDD	*	2,772	36	28	**RK9CWA**		**10,729,320**	**3443**	**840**
*DL4HRM	*	320,787	643	327	***ZS4JAN**	*	**2,610**	**31**	**30**	RK9CYA		2,949,072	1536	536
***NP2L**	*	**320,408**	**375**	**242**	*EN7U	*	2,440	40	40	RK9CWW		1,081,280	689	436
***EF7A**	*	**299,628**	**576**	**348**	*EI8FH	*	1,947	33	33	RF9W		469,477	520	317
*VE3UZ	*	297,430	416	245	*DL8ZAJ	*	1,872	37	36	UA9UZZ		106,480	249	176
***VE7WEB**	*	**285,750**	**494**	**225**	*JR1AHP	*	363	11	11	**RZØSZZ**		**4,212**	**53**	**36**
*SN3ØJ	*	275,728	576	304	*DL6EBP	*	24	4	2					
*LY2DV	*	272,310	580	290	***UT8EU**	28	**179,655**	**441**	**295**			**China**		
*DLØNG	*	267,509	458	293	***UA3QG**	*	**168,128**	**425**	**284**	**B5A**		**1,205,725**	**1343**	**425**
*UR5ZVJ	*	266,970	600	330	*RU3PU	*	34,020	182	140	BY8AC		406,944	578	314
***OR6C**	*	**266,430**	**504**	**321**	***YU9DX**	*	**30,654**	**196**	**131**					
*9A6AR	*	262,626	403	273	***EA3NO**	*	**24,318**	**173**	**126**			**Cyprus**		
*DJ8OG	*	254,752	492	304	***IT9IZY**	*	**22,784**	**191**	**128**	**P33W**		**18,656,465**	**5064**	**1049**
*VE3TW	*	254,371	393	221	***GM4UBJ**	*	**4,818**	**75**	**66**	C4N		12,092,345	3950	895
***JHØNEC**	*	**253,952**	**449**	**256**	***EA7GV**	*	**3,996**	**66**	**54**					
*0090	*	249,417	524	321	***LA7SI**	*	**2,214**	**48**	**41**			**Japan**		
*SM7CIL	*	242,303	605	337	***MØCEF**	*	**2,050**	**43**	**41**	**JJ1ZEJ**		**775**	**29**	**25**
***UA4WAV**	*	**238,420**	**488**	**262**	*RV6BK	*	2,030	38	35					
*UA1ZZ	*	232,864	490	304	***DH8BQA**	21	**301,824**	**619**	**384**			**EUROPE**		
*RX9DJ	*	228,866	359	206	***UA3ABJ**	*	**234,432**	**503**	**333**			**Bosnia-Herzegovina**		
*OM8LA	*	223,938	483	286	***JA2KVB**	*	**113,223**	**288**	**219**	**E7DX**		**8,917,915**	**4058**	**1055**
*PA3AIN	*	222,921	525	279	***CT1BWW**	*	**97,812**	**284**	**234**	E73M		8,564,307	3961	1041
***LZ4AE**	*	**222,154**	**464**	**277**	*VO1TA	*	**46,374**	**137**	**118**					
*LY1FGP	*	211,432	406	247	***OQ4B**	*	**39,072**	**170**	**148**			**Bulgaria**		
***VK2BJ**	*	**211,323**	**272**	**203**	***PAØMIR**	*	**14,208**	**108**	**96**	**LZ1ØRF**		**4,178,430**	**2783**	**765**
*VE3XD	*	209,304	303	216	***JO1WIZ**	*	**5,612**	**72**	**61**					
*RA9MC	*	207,932	357	227	***SA6AIN**	*	**816**	**36**	**34**			**Corsica**		
*SN2MTBO	*	201,856	434	304	*EA2BVV	*	45	9	9	**TK9E**		**973,544**	**1332**	**481**
*PD7BZ	*	201,717	438	279	***S54A**	14	**613,725**	**920**	**501**					
*DL5GAC	*	195,960	463	284	***Z35F**	*	**419,133**	**742**	**429**			**Croatia**		
*SI5Y	*	194,535	404	297	***UA1AFT**	*	**382,630**	**618**	**415**	**9A3B**		**4,149,586**	**2728**	**791**
*SP6QKP	*	194,299	456	287	***ZM3T**	*	**305,240**	**413**	**260**					
*OK1FHI	*	193,011	474	303	***DD1IM**	*	**190,674**	**407**	**321**			**Czech Republic**		
*UX8IW	*	188,848	457	232	***OK1GS**	*	**186,694**	**440**	**323**	**OL7C**		**3,192,116**	**2456**	**724**
*DF7ZS	*	188,298	421	297	***UA3VVB**	*	**171,072**	**364**	**297**	OK2KPS		832,150	1035	445
***PY7GK**	*	**183,120**	**280**	**218**	***XE1YZY**	*	**142,623**	**360**	**207**	OL1B		404,831	599	383
*UA6HO	*	162,911	397	259	***VA1CHP**	*	**129,684**	**271**	**202**	OK2KOJ		390,208	628	364
*JE1REU	*	161,665	383	217	***UR7MZ**	*	**120,900**	**349**	**260**	OK5SWL		5,133	60	59
***IK2AHB**	*	**160,325**	**361**	**265**	***VE7MID**	*	**84,546**	**240**	**183**					
*EW1NA	*	159,300	411	236	*DK5OS	*	26,130	159	134			**Denmark**		
*SM6NOC	*	158,574	381	247	***AN4A**	*	**20,437**	**126**	**107**	**OZ2AR**		**295,800**	**550**	**348**
*RV9UP	*	157,795	325	209	***JA1BFN**	*	**14,430**	**85**	**78**					
*SM3X	*	154,878	420	249	***HA5NB**	*	**13,332**	**110**	**101**			**England**		
***V55X**	*	**151,657**	**249**	**187**	***PI4WLD**	*	**6,555**	**57**	**57**	**M2W**		**4,193,640**	**2620**	**792**
*DP5X	*	151,217	358	233	***JF7GDF**	*	**4,048**	**57**	**46**					
***EI4HQ**	*	**144,595**	**341**	**239**	***JA4AQR**	*	**3,978**	**39**	**39**			**Estonia**		
*G4DDX	*	141,235	338	235	*YL2KF	*	140	12	10	**ES9C**		**8,946,126**	**4559**	**1029**
*EW8OF	*	140,118	405	242	*KL7/WA4DOX	*	261	11	9					
***JF3NKA**	*	**134,273**	**415**	**191**	***M5E**	7	**1,621,069**	**1048**	**571**			**European Russia**		
*JG3WDN	*	128,484	324	172	***IV3NVN**	*	**852,093**	**740**	**453**	**RT4F**		**9,460,550**	**4623**	**1030**
***A65CA**	*	**125,985**	**234**	**185**	***EU1AZ**	*	**719,468**	**666**	**428**	**RU1A**		**8,331,312**	**4051**	**1018**
*RA1TV	*	124,850	327	227	***DL5KUD**	*	**643,357**	**609**	**409**	**RT3F**		**6,614,530**	**3738**	**949**
*SE6C	*	118,320	375	232	***VE3IAE**	*	**392,815**	**351**	**251**	UA3R		4,945,407	3471	823
*DK3DUA	*	116,144	343	244	***YU2FG**	*	**277,623**	**377**	**283**	RK3GYM		4,425,984	2990	816
*UX6IB	*	115,596	323	228	*DD1MAT	*	118,776	230	196	RK3DXZ		2,530,974	2042	678
***HZ1PS**	*	**114,390**	**227**	**186**	***JA2PFO**	*	**82,705**	**212**	**139**	RK3QWM		1,082,808	1368	486
*LY2LF	*	109,655	393	241	***JL3MCM**	*	**74,803**	**154**	**127**	UE4CAC		998,280	1289	472
*DL1KUR	*	109,087	342	211	*M6W	*	73,692	147	138	RK4HYT		487,396	753	364
***YS1GR**	*	**108,717**	**243**	**167**	*JF2RCX	*	46,662	141	101	RZ1AWZ		135,924	524	241
*JA6CYL/6	*	107,559	291	171	***JR4URW**	*	**41,006**	**137**	**101**	**UA6YW**		**73,986**	**222**	**177**
*JE1SGH	*	106,074	277	166	***JI1BDQ**	*	**162**	**6**	**6**	RK1QWX		65,504	265	178
*RA3XCZ	*	101,430	346	210	*JL3RDC	*	12	3	3	RK3PWJ		46,767	171	131
***LA4RT**	*	**97,394**	**336**	**209**	***SN5Q**	3.5	**300,196**	**483**	**299**					
*UR5XMM	*	96,693	284	193	***JM1NKT**	*	**30,515**	**119**	**85**			**Finland**		
*OK1DRX	*	93,771	271	207	***PC6ØØP**	*	**11,323**	**77**	**67**	**OH8TA**		**146,320**	**399**	**248**
*PD5LO	*	92,768	274	208	***YT4A**	1.8	**151,646**	**325**	**226**					
*YL2IU	*	91,140	303	196								**France**		
*DK4LX	*	88,201	216	193						**TM33E**		**7,071,764**	**3480**	**973**
*EA7OR	*	83,328	262	192						TM5KD		358,110	628	345
***4M5IR**	*	**82,764**	**160**	**121**										
*OK1EV	*	80,010	288	210								**Germany**		
*PA3AQL	*	79,928	284	194						**DL2A**		**2,685,825**	**1987**	**675**
***JF2OZH**	*	**78,810**	**219**	**142**						DLØIL		2,171,823	1708	633
*IZØFZM	*	74,686	294	214						DL1NKS		1,332,420	1378	530
***KH2/JJ1LRD**	*	**74,044**	**222**	**107**										
*YO7ARZ	*	72,576	290	192								**Greece**		
*DL2IPU	*	67,716	203	162						**SX1L**		**4,269,057**	**3027**	**799**
***VK4TT**	*	**66,464**	**181**	**124**										
***UP2F**	*	**65,780**	**185**	**115**								**Hungary**		
*IK2CZQ	*	63,540	189	180						**HA8KVK**		**1,845,000**	**1618**	**615**
*DK8EY	*	62,155	213	155										
*OK1TD	*	60,605	181	155								**ITU HQ Geneva**		
***VE1ZA**	*	**60,368**	**154**	**112**						**4U1ITU**		**822,030**	**1057**	**470**
*VK2PN	*	60,214	155	119										
*VE3RCN	*	58,671	169	123								**Italy**		
***OH1NOA**	*	**58,482**	**262**	**171**						**IR1Y**		**7,149,130**	**3344**	**955**
*JA1AZR	*	58,443	223	121						I1XSG		1,967,182	1764	619
*HA5UK	*	57,218	162	122										
*PA1B	*	56,052	236	162								**Latvia**		
*JE1LDU	*	52,533	175	117						**YL1S**		**591,850**	**765**	**445**
*IK2IKW	*	48,618	192	146										
*IU3AC	*	44,016	231	168								**Lithuania**		
*PA3AFF	*	43,230	204	131						**LY2XW**		**1,905,826**	**1962**	**598**
***EA4/DH1TW**	*	**38,896**	**193**	**143**						LY5W		1,624,818	1662	563
***JH1GUO/4**	*	**38,893**	**137**	**89**										
*IW5EIJ	*	38,100	171	127								**Netherlands**		
***VR2IZ**	*	**37,742**	**221**	**113**						**PI4TUE**		**3,416,031**	**2237**	**747**
***ZL3GA**	*	**35,174**	**102**	**86**										
*PAØWKI	*	33,579	169	123								**Norway**		
*PY2IAX	*	33,229	134	101						**LA2AB**		**1,608,243**	**1622**	**559**
*JE1SCJ	*	33,060	142	95										
***VE6SQ**	*	**32,660**	**141**	**92**								**Poland**		
*YU4ØFN	*	31,842	142	122						**SO9Q**		**6,286,754**	**3208**	**934**
*VE7BGP	*	29,694	127	98										
*G7TMU	*	28,396	156	124								**Romania**		
*DF6RI	*	27,216	146	112						**YP7P**		**205,920**	**517**	**288**
*YV6BXN	*	26,640	98	80						YO6KNY		60,214	212	161
*R5ACQ	*	26,334	150	114										
*PA75HV	*	23,328	134	108								**Serbia**		
***F5IYJ**	*	**21,462**	**107**	**98**						**YT1R**		**4,146,011**	**2807**	**799**
*SO8O	*	21,210	111	101						YT6T		3,447,000	2280	750
*OZ8A	*	21,182	156	119										
*GØAZH	*	21,168	137	108								**Slovakia**		
*RX6LD	*	19,240	121	104						**OM3RRC**		**2,923,480**	**2135**	**742**
*RX1CQ	*	18,000	111	90						OM3KWZ		1,939,920	1666	590
*JP1HUJ	*	17,633	98	77										
*DF7JC	*	15,390	105	90								**Spain**		
*JG3SVP	*	14,852	142	79						**EA3NT**		**991,800**	**1190**	**522**
*DL6NDW	*	14,007	102	87										
***HB9WDY**	*	**13,659**	**105**	**87**										

ROOKIE

United States

***K2DSL**	A	**67,500**	**241**	**150**
***AF6EV**	*	**59,840**	**217**	**136**
*K6MEE	*	28,980	176	115
***KF7ADB/4**	*	**19,929**	**100**	**73**
*WI4R	*	13,050	103	87
*K6VAR	*	6,360	71	53
*KI6QDH	*	1,353	44	33

DX

***OF5ØRR**	A	**686,070**	**881**	**462**
*OH7FKV	*	558,999	1011	399
PY2LSM	*	**173,124**	**233**	**189**
***RN3DKE**	*	**55,596**	**237**	**164**
***URØEG**	*	**23,808**	**128**	**96**
***DO3QQ**	*	**11,139**	**110**	**79**
***DS1RZD**	*	**8,436**	**72**	**57**
***BH1GXH**	*	**7,840**	**80**	**56**
***IZ8PPH**	*	**2,436**	**44**	**42**
***PU4GGS**	*	**322**	**13**	**14**
***MØKIS**	*	**208**	**15**	**13**
***SQ5STS**	28	**2,604**	**44**	**42**
***EA4FLY**	*	**2,356**	**42**	**38**
***PU8TEP**	21	**28,531**	**111**	**103**
***RA3MAV**	*	**19,376**	**142**	**112**
IT9IMJ	*	**13,578**	**99**	**93**
***JO3RCK**	*	**1,404**	**28**	**26**
***JR2AAN/2**	*	**77**	**7**	**7**
***SV2HWR**	14	**336,259**	**690**	**397**
***UR5EFL**	*	**60,610**	**248**	**190**
***BG4FFM**	*	**17,766**	**137**	**94**
*BH1IIA	*	3,713	49	47
*BH4RKH	*	140	10	10
***UW1WU**	7	**336,922**	**434**	**314**
***F4FEP**	*	**5,382**	**46**	**46**

MULTI-OPERATOR SINGLE-TRANSMITTER NORTH AMERICA

United States

NY4A	**5,841,118**	**2405**	**839**
NJ4M	4,844,296	2713	824
KX7M/6	**3,975,669**	**2491**	**687**
NG7M	**2,391,264**	**2063**	**608**
W7VJ	1,918,080	1681	576
AC8W	**1,592,010**	**1669**	**570**
NX6T	1,178,625	1501	449
NC6CC	902,190	1255	435
KW6Q	846,469	1009	437
KZ5P	**644,127**	**1141**	**393**

World high score on 160 meters was made by Miki, YO5AJR.

Sweden

SI9AM	**928,972**	**1221**	**491**
SK6HD	143,736	383	226

Switzerland

HB9LL	**438,918**	**811**	**383**

Ukraine

EM7L	**5,597,250**	**3302**	**850**
UWØL	1,382,321	1457	527
UU4JWC	54,464	227	148
UU4JWA	32,844	172	138

OCEANIA

Guam

AH2Y	**3,001,264**	**1531**	**508**

Indonesia

YE1C	**3,179,096**	**1585**	**568**
YC1ZAC	16,320	91	64
YE1ZAL	2,470	27	26

New Zealand

ZL2AGY	**650,180**	**517**	**290**

SOUTH AMERICA

Argentina

LS1D	**8,950,139**	**2583**	**913**
LU3DKV	1,684,254	1108	507

Brazil

PP5JN	**137,632**	**267**	**184**
PR5A	1,088	34	34

Chile

CD1R	**1,893,296**	**1116**	**482**

MULTI-OPERATOR TWO-TRANSMITTER NORTH AMERICA

K1LZ	**14,081,100**	**4306**	**1122**
KD4D/3	**11,223,000**	**3926**	**1044**
NY6N	**6,573,159**	**3725**	**789**
WX3B	5,128,932	2429	831
ND2T/6	5,079,270	3207	722
WC6H	4,567,015	3070	701
W1CU/7	**4,161,375**	**2851**	**675**
AK6M	3,320,460	2582	645
WQ2N	**1,952,552**	**1499**	**586**
NG5X	**1,611,120**	**1624**	**548**
KI7Y	1,246,476	1499	497
VE9ML	**1,186,990**	**845**	**434**
WF6C	815,104	911	398
NQØK	**17,127**	**167**	**99**

AFRICA

EA8URL	**9,200,604**	**3031**	**867**

ASIA

C4I	**23,491,776**	**5769**	**1056**
B1Z	**2,632,920**	**2018**	**593**
7J1YAJ	**1,895,784**	**1418**	**516**
RUØLL	**1,447,519**	**1318**	**433**
BXØWPX	**1,263,881**	**1422**	**439**
RN9CWJ	**718,478**	**544**	**298**
JA1ZGP	614,728	836	344
8J7SK	**189,696**	**481**	**192**

EUROPE

OM7M	**12,611,960**	**5242**	**1091**
LX7I	**11,283,975**	**4817**	**1095**
DQ4W	**10,803,466**	**4964**	**1037**
DM9K	10,527,160	4689	1048
HG1S	**10,033,401**	**4364**	**1047**
YT9X	**9,725,820**	**4953**	**1011**
S5ØG	**9,471,780**	**4398**	**1010**
DLØCS	8,765,312	4286	992
S52ZW	8,253,645	4000	965
DR4A	8,090,495	4284	973
LZ5R	**9,274,512**	**4907**	**1002**
LY2W	**7,837,884**	**4219**	**918**
LN3Z	**5,811,750**	**3861**	**875**
G5D	**5,780,268**	**3378**	**897**
YLØY	**5,757,912**	**3559**	**874**
G5O	5,657,057	3454	857
RM5A	**4,588,287**	**3024**	**853**
OL1C	**4,555,320**	**2671**	**840**
LY6A	3,918,102	2974	758
OZ5E	**3,678,129**	**2483**	**819**
4U1ØNPT	**1,921,920**	**1869**	**624**
RK4WWQ	**1,804,062**	**1905**	**606**
PI4DX	**820,040**	**1020**	**494**
HB9CA	**375,928**	**625**	**392**

OCEANIA

KH6LC	**8,826,291**	**3224**	**701**
ZM1A	**8,289,021**	**2510**	**771**
DX1DBT	**27,064**	**128**	**68**

SOUTH AMERICA

PW7T	**20,892,576**	**4982**	**1186**
PJ2T	**18,044,546**	**4507**	**1046**
PX2C	6,287,544	2174	837

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

KM3T/1	**14,733,230**	**4891**	**1117**
NQ4I	**10,921,286**	**4828**	**1046**
NR4M	10,876,056	4312	1037
NR6O	**5,612,130**	**3474**	**762**
VE7SV	**4,803,284**	**2258**	**652**
VE7UF	4,647,780	2540	604
NI6T	1,885,520	1628	518
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HF/50 MHz 100 W All Mode Transceiver

FT-450D

With Built-in Automatic Antenna Tuner

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NEW **300 Hz/500 Hz/2.4 kHz CW IF Filters**

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- **CONTOUR Control Operation**
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  Highly-effective system that can remove an interfering beat tone/signal.

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  The DSP IF WIDTH tuning system provides selectable IF passband width to fight QRM.
  SSB - 1.8/2.4/3.0 kHz, CW - 300 Hz/500 Hz/2.4 kHz
- **Digital Microphone Equalizer**
  Custom set your rig to match your voice characteristics for maximum power and punch on the band.
- **Fast IF SHIFT Control**
  Vary the IF SHIFT higher or lower for effective interference reduction / elimination.

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MOS FET RD100HHF1

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●10 kHz Roofing filter ●20 dB ATT/IPO ●Built-in TCXO for incredible ±1 ppm/hour (@+77°F, after warm-up) stability ●CAT System (D-sub9 pin): Computer programming and Cloning capability ●Large, Easy-to-See digital S-meter with peak hold function ●Speech Processor ●QUICK SPLIT to automatically Offset transmit frequency (+5 kHz default) ●TXW to monitor the transmit frequency when split frequency operation is engaged ●Clarifier ●Built-In Electronic Keyer ●CW Beacon (Up to 118 characters using the CW message keyer's 3 memory banks) ●CW Pitch Adjustment (from 400 to 800 Hz, in 100 Hz steps) ●CW Spotting (Zero-Beating) ●CW Training Feature ●CW Keying using the Up/Down keys on the microphone ●Two Voice Memories (SSB/AM/FM), store up to 10 seconds each ●20 second Digital Voice Recorder ●Dedicated Data Jack for FSK- RTTY operation ●Versatile Memory System, up to 500 memory channels that may be separated into as many as 13 Memory Groups ●CTCSS Operation (FM) ●My Band / My Mode functions, to recall your favorite operating set-ups ● Lock Function ●C.S. Switch to recall a favorite Menu Selection directly ●Dynamic Microphone included ●IMPORTANT FEATURES FOR THE VISUALLY IMPAIRED OPERATOR – Digital Voice Announcement of the Frequency, Mode or S-meter reading

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