10 Meters Lives! - See page 98

Amateur Radio

COMMUNICATIONS & TECHNOLOGY

http://www.cq-amateur-radio.com

CQ

JANUARY 2012

Check Out Our Digital Edition– See Page 18

- A Satellite Sextet, p. 13
- Results: 2011 CQ WPX SSB Contest, p. 22
- A Phone Contest Without a Mic? p. 34

On the Cover:
Jamie Droddy, KI4TXZ, and Thor Wilson, KI4TXV, with a model of the Aubiesat-1 satellite. See story on page 13 and details on page 4.

HF/50MHz ALL MODE TRANSCEIVER TS-590

Nothing But Performance

The TS-590S

Kenwood has essentially redefined HF performance with the TS-590S compact HF transceiver. The TS-590S RX section sports IMD (intermodulation distortion) characteristics that are on par with those "top of the line" transceivers, not to mention having the best dynamic range in its class when handling unwanted, adjacent off-frequency signals.*

- HF-50MHz 100W
- Digital IF Filters
- Built-in Antenna Tuner
- Advanced DSP from the IF stage forward
- 500Hz and 2.7KHz roofing filters included
- Heavy duty TX section

- 2 Color LCD

KENWOOD

Customer Support: (310) 639-4200
Fax: (310) 537-8235

Scan with your phone to download TS-590S brochure.

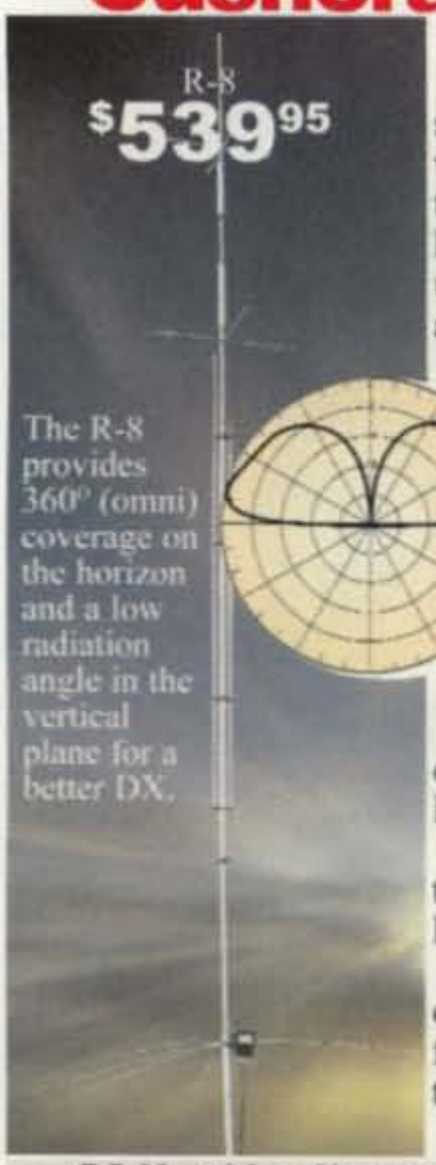
www.kenwoodusa.com

ISO9001 Registered

ADS#65211

* For 1.8/3.5/7/14/21 MHz Amateur bands, when receiving in CW/FSK/SSB modes, down conversion is automatically selected if the final passband is 2.7KHz or less.

Cushcraft R8 *8-Band Vertical*



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

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

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

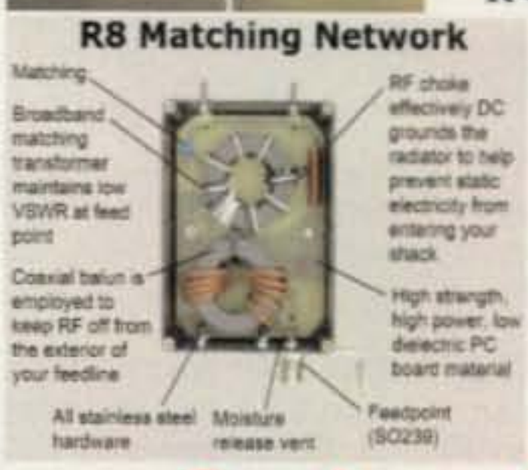
Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

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

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

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

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



MA-5B *5-Band Beam*

Small Footprint -- Big Signal

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

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

Cushcraft 10, 15 & 20 Meter Tribander Beams

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

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

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

Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios

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

Cushcraft Famous *Ringos* Compact FM Verticals

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

***Free* Cushcraft Catalog**
and Nearest Dealer . . . 662-323-5803
Call your dealer for your best price!

Cushcraft
Amateur Radio Antennas
308 Industrial Park Road, Starkville, MS 39759 USA
Open: 8-4:30 CST, Mon.-Fri. ***Add Shipping.***
• **Sales/Tech:** 662-323-5803 • **FAX:** 662-323-6551
http://www.cushcraftamateur.com

Cushcraft . . . Keeping you in touch around the globe!

Visit www.cushcraftamateur.com

Clarification on DXØDX Refunds

Last month, we reported that all donations made to the now-cancelled DXØDX expedition to the Spratly Islands would be refunded in full. This was not entirely accurate. In an e-mail to *CQ* in response to questions raised by readers, team leader Chris Dimitrijevic, VK3FY, explained that "(t)he extremely high cost of this DXpedition will mean that the team will receive refunds that will amount to less than what was contributed." He said the plan was for all DX0DX assets to be sold, with the proceeds being disbursed as either partial or full refunds. Individual donors were to receive 100% refunds, he said, with club and foundation sponsors being reimbursed for 80% of their donations. The remaining funds were to be divided among team members to help reimburse their major investments in the planned trip, which was cancelled due to safety concerns.

Hams Respond to Natural Disasters Around the World

Ham radio operators provided varying levels of communications assistance in response to floods in Thailand and Italy, an earthquake in Turkey and a damaging snowstorm in the U.S. Northeast in late October and early November.

"Newsline" reports that the secretary of Thailand's national ham radio association says its members have saved nearly 1000 lives by coordinating rescue communications in the wake of the country's worst flooding in over 60 years.

Hams also responded after a magnitude 7.2 earthquake struck eastern Turkey, to floods in Italy and a late October snowstorm that left huge swaths of the northeastern U.S. without power.

Senators Seek to Block FCC Approval of LightSquared

At least two U.S. Senators have taken action to try to stop the FCC from granting approval for LightSquared to operate a wireless internet service on frequencies adjacent to those used for the Global Positioning System (GPS). Citing potential interference to the satellite direction-finding system "on which our public safety and national security depend so heavily," Kansas Republican Pat Roberts introduced an amendment to an appropriations bill to prevent the FCC from using appropriated funds for approving LightSquared's application until interference concerns have been resolved, according to his website.

In addition, various news sources reported that Senator Chuck Grassley (R-Iowa) threatened to block confirmation of President Obama's two nominees to the FCC unless the Commission released documents he requested related to LightSquared. The Senate was scheduled at the end of November to begin the confirmation process for the two nominees, Democrat Jessica Rosenworcel and Republican Ajit Pai.

FCC Affirms BPL Rules

The FCC has made minor tweaks in its 2004 rules for Broadband over Power Lines (BPL), but adopted neither the changes proposed by the ARRL nor its own original proposal. In a Second Report and Order on the issue, which followed a 2008 federal court ruling that it had made procedural errors in the original proceeding, the FCC changed from 20 dB to 25 dB the amount by which BPL providers need to be able to notch their signals in the event of interference complaints. But it did not go along with the ARRL's request for mandatory notching of ham bands.

BPL is a means of providing high-speed internet access to homes via power lines, using frequencies in the HF and low VHF portions of the spectrum. In test markets, certain types of BPL caused massive interference to close-in amateur stations. So far, the system has not proven to be economically feasible anywhere that it has been tried.

European Governments Support Longwave Ham Band

The European Council of Post and Telecommunications Administrations (CEPT) has endorsed a proposal to create a worldwide secondary amateur radio allocation between 472 and 480 kHz. According to "Newsline," stations using the new allocation, if approved, would be limited to five watts effective radiated power (ERP). A ham allocation in the neighborhood of 500 kHz is expected to be taken up at this month's World Radiocommuincation Conference in Geneva, Switzerland. For more on WRC-12, see this month's "Washington Readout" column on page 52 of this issue.

The debut of the Portuguese-language edition of CQ drew a large and enthusiastic crowd at Fenarcom, Brazil's largest hamfest, in early November. (Photo courtesy Mick Stwertnik, NCG/Comet Antennas)

Portuguese Edition of *CQ* Launched in Brazil

The first edition of *CQ Radioamadorismo*, the Portuguese-language edition of *CQ* published in Brazil, was introduced at that country's largest hamfest, Fenarcom, on November 5. The issue and cover featured an interview with one of Brazil's best-known amateur satellite enthusiasts, Dr. Junior Torres de Castro, PY2BJO, who developed the DOVE satellite. The new magazine's website is <http://www.cqmagazine.com.br/>.

Ham Radio to Join Cast of "Last Man Standing"

Amateur radio will become an ongoing part of the ABC comedy, "Last Man Standing," as of the program's November 22 broadcast. Star Tim Allen will have various pieces of ham gear on his office desk, including rigs provided by ICOM, and an HF antenna from Comet. Scenes from CQ videos will be visible on his large-screen TV and some copies of *CQ* magazine may show up on his desk as well. His character will be identified as a licensed ham, although the callsign he will use is fictional.

Producer John Amodeo is a ham (NN6JA). He says he feels that ham radio fits right in with the persona of Allen's character, Mike Baxter, who is marketing director for an outdoor/sporting goods company. He also thinks that hams fit right in as part of the show's target audience. Amodeo warns that, at least at first, ham radio's presence will be only visual, and has not yet been worked into any scripts. (See John's article, "Producing Ham Radio," about how he got several of the show's staff members licensed as hams, on p. 30 of the Dec.2011 issue of *CQ*.)

Illegal 10-Meter Activity on the Rise

It seems that a large number of taxicabs in Russia have been illegally using the 10-meter band for their communications, but nobody much noticed until now, as the rising sunspot cycle brought about improved propagation on the band. According to "Newsline," most of the cabbies were using channelized FM rigs. Russia's Radio Frequency Service has reportedly promised to crack down on the illegal users.

AM and SSB transmissions by non-amateurs in North America have also been reported. U.S. amateurs hearing illegal activity on 10 meters are encouraged to gather as much information as possible and then get in touch with the FCC's Enforcement Bureau.

(Continued on pg. 10)

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

Download Your Next Radio From FlexRadio Systems

New RF Tracking Notch Filter Provides Revolutionary Capability!

Tracking Notch Filter™ (TNF)

FlexRadio Systems has developed a revolutionary new tool in the never ending fight against foreign broadcast carriers, "birdies", narrowband noise sources, and local shack interference: Infinitely adjustable RF Tracking Notch Filters. TNF gives the FlexRadio user the ability to have up to 18 frequency locked notches active in the receiver passband at the same time and the ability to memorize any number of notches across all bands. This includes the MultiRX™ mode second audio passband plus the FLEX-5000's RX2 second receiver.

How TNF Works

Since FlexRadio Systems' Software Defined Radios (SDRs) are based on software and digital signal processing, the math to create a single fixed audio notch such as "Automatic" notch filters (ANF) is a very simple process. Even fixed DSP radios can do this today. The challenge comes when the radio is tuned to keep a notch tracking the desired frequency. FlexRadio approached this from a different angle by developing a mathematical method to change the IF frequency of the notch as the radio is tuned in real time. Because this method is done in the digital SDR domain away from any analog component variations, notch tracking and repeatability problems are virtually eliminated. Best of all, if one tracking notch filter can be created, it's straightforward to create as many as needed. The result is a virtually unlimited number of stable, frequency locked, tracking notch filters.

How to Use TNF

The reason TNF works so well is the intuitive graphical user interface for adding, adjusting, and deleting TNF notches. TNF notches are added with a click of the mouse then dragged over the offending signal. A visual TNF ZOOM - TUNE mode allows for precise positioning and bandwidth control of the TNF notch. This combined with instant audio feedback allows you to optimize each TNF to remove just the offender while leaving your wanted signal in the passband. If the offending carrier is too strong for a NORMAL notch, right click the TNF notch and set it to DEEP or VERY DEEP to remove even the strongest interfering signals. When the TNF notch is properly adjusted you can easily make the TNF permanent. Tune away and come back, the TNF notch is there. Change bands and come back, TNF is on the frequency where you need it. You can even power down the radio and come back next week. Still there!

When to Use TNF

Some examples of when to use TNF are to remove constant DSL and environmentally generated birdies. Or spend a few minutes on 40 meters to magically remove those annoying AM carriers that appear across the band. Additionally, you can use TNF to temporarily block strong adjacent CW and digital signals.

Remember, you can only get TNF on PowerSDR™ for FlexRadio Systems products. To learn more check out our whitepaper or watch the TNF YouTube™ video. You can find these at http://www.flexradio.com/TNF.

Note to FlexRadio Owners

To download the revolutionary TNF feature for your FLEX-Series radio today, just visit www.flexradio.com for the latest version of PowerSDR™.

If you are not yet a FlexRadio owner, check out TNF and all the other revolutionary features that make the FlexRadio Systems SDRs the most amazing radios on the air!

4616 W. Howard Lane, Ste. 1-150, Austin, TX 78728
sales@flexradio.com / 512-535-4713

www.flexradio.com

FlexRadio Systems®
Software Defined Radios

CQ contents

JANUARY 2012

p. 95

p. 13

features

Vol. 68 No. 1

p.61

p. 22

departments

ON THE COVER: Aubiesat-1 Project Managers Jamie Droddy, KI4TXZ, and Thor Wilson, KI4TXV, hold a model of the student-built CubeSat at Auburn University back in 2007. The satellite was launched late in 2011 and is now OSCAR-71. See story on page 13. (Cover photo by Larry Mulvehill, WB2ZPI)

Array Solutions Your Source for Outstanding Radio Products

Happy Holidays from Array Solutions! Visit us for all your Holiday Gift Giving Solutions: www.arraysolutions.com

PowerMaster II

- New Larger, Sharp & Fast LCD Display
- Reduced Energy consumption
- USB and RS-232 interface built-in
- Best accuracy in the ham radio market
- New - Both 3kW and 10kW couplers on one display - switched
- Supports 2 like couplers simultaneously (3kW & 3kW, 3kW & V/UHF, 10kW & 10kW)
- SWR Threshold Protection (with amp PTT bypass)
- Hi / Lo Power Level Monitoring
- Single and Dual Rack Mount available
- New "Power Master Basic" Software - Free!

AIM *uhf* Analyzer

- Frequency range from 5 kHz to 1 GHz.
- Data plots include SWR, RL, R + X, series and parallel, magnitude, phase, and more.
- Dual Smith charts with rotation and 20 markers.
- Plots and calibration files can be saved and used anytime in CVS and dynamic formats.
- AIM 4170C is still in production covering 5kHz to 180 MHz.
- New TDR functionality

ACOM – Outstanding HF Power Products

ACOM 2000A

The ACOM 2000A Automatic HF Linear Amplifier is the world's most advanced legal-limit HF amplifier designed for amateur use. (160 thru 10m) (2x 4CX800A Tubes)

ACOM 1000
160-6m Amplifier

The world's best value in an amateur HF & 6m amplifier. Delivers 1000 watts output on all bands

(Single 4CX800A tube)

ACOM 1010
160-10m Amplifier

Economical 800 watt output 160-10m

(Single 4CX800A Tube)

ACOM 1011
160-10m Amplifier

Fast 30 second warm-up, 700 w output, 160-10m.

(2x 4CX250B Tubes)

Coming in 2012 ..

ACOM 800S Solid State Amplifier

160 through 6 M, 800 W from 1.8 to 54 MHz, no time limit

This Device has NOT been approved by the F.C.C. and may not be offered for sale or lease until approval of the F.C.C. has been obtained.

The information shown is preliminary and may be subject to change without notice or obligation.

OptiBeam Antennas

OptiBeam antennas are the best antennas you can buy. Whether it is an array of mono-banders or a multi-monobander antenna, you will more likely be first through a pileup with an OptiBeam. An OptiBeam is...

- Antenna Technology
- Electrical Properties
- Physical Properties
- Avoiding Disadvantages of Other Antenna Systems
- Technical Qualities
- Mechanical Quality Throughout

OptiBeam
We are proud to be the Official North American Dealer of OptiBeam Antenna Technologies

Vector Network Analyzer Model VNA 2180

Measures impedance magnitude, phase and transmission parameters for antennas, filters, and discrete components - using one or two ports.

- Frequency range is 5KHz to 180MHz.
- Data plots include: impedance, SWR, return loss, S11 and S21.
- Plots can be saved for before and after comparisons.
- New TDR functionality

AIM 4170C Antenna Lab RF Analyzer

The AIM 4170C antenna analyzer measures the complex impedance (magnitude and phase) at each frequency of interest in the range of 5KHz to 180 MHz. A PC is used to calculate all RF parameters, including R +/-X, Magnitude and Phase, SWR, Return Loss, line loss, and more and plot the results in an easy to read graph and interactive Smith Chart.

- New TDR functionality

Other Quality Products from Array Solutions...

ACOM
Sales and Service for Amplifiers and Accessories

Phillystran, Inc.
Official Worldwide Phillystran Distributor

RigExpert
Analyzers and Interfaces

Prosistel Rotators
Strongest Rotators on the Market

OptiBeam Antennas
German Engineering means High Performance

Hofi®
Surge Arrestors & Antenna Switches

SSB Electronics
VHF, UHF, & SHF Preamps and Switching Systems

www.arraysolutions.com
Sunnyvale, Texas USA
Phone 214-954-7140
sales@arraysolutions.com
Fax 214-954-7142

Array Solutions' products are in use at top DX and Contest stations worldwide as well as commercial and governmental installations. We provide RF solutions to the DoD, FEMA, Emcomm, UN, WFO, FAA and the State Dept. for products and installation of antennas systems, antenna selection, filtering, switching and grounding. We also offer RF engineering and PE consulting services.

The radio... YAESU
Choice of the World's top DX'ers

Loaded with Leading-edge Performance Capabilities. . .
The First Triumph in the 2nd Generation of the FT DX 9000 Lineage:
The Powerful FT-2000!

HF/50 MHz Transceiver
FT-2000
100 W Version (Internal Power Supply)

DMU-2000
Data Management Unit

Photograph shows 100-Watt version. Computer display and keyboard are after-market items, not supplied with the FT-2000.

HF/50 MHz Transceiver
FT-2000D
200 W Version
(External Power Supply)

Options

SP-2000
External Speaker
with Audio filters

RF μ-Tune Kits

160m Band
RF μ-Tune Kits A

80/40m Band
RF μ-Tune Kits B

30/20m Band
RF μ-Tune Kits C

- Up to three μ-Tune Kits may be connected.
- μ-Tune Kit is included in purchase price of μ-Tune Unit.

For the latest Yaesu news, visit us on the Internet:
http://www.vertexstandard.com

Specifications subject to change without notice. Some accessories and/or options may be standard in some areas. Frequency coverage may differ in some countries. Check with your local Yaesu dealer for specific details.

YAESU
Choice of the World's top DX'ers™

Vertex Standard
US Headquarters
10900 Walker Street
Cypress, CA 90630 (714)827-7600

Field Gear That Goes The Distance!

FT-450D
HF/50 MHz 100 W Easy to Operate All Mode Transceiver

- Illuminated Key Buttons
- 300Hz / 500Hz / 2.4 kHz CW IF Filter
- Foot Stand
- Classically Designed Main Dial and Knobs
- Dynamic Microphone MH-31 A8J Included

FT-857D
The World's Smallest HF/VHF/UHF Mobile Transceiver

- Ultra-Compact Package
- Ideal for Mobile or External Battery Portable Work
- Wide Frequency Coverage
- Optional Remote-Head
- High-Performance Mobile Operation

FT-897D
HF/VHF/UHF Portable Operation Powerful Transceiver

- The Ultimate Emergency Communications Radio
- Rugged, Innovative Multi-Band
- Operates on the SSB, CW, AM, FM, and Digital Modes
- Wide Frequency Coverage
- 20-Watt Portable Operation Using Internal Batteries
- 100 Watts When Using an External 13.8-Volt DC Power Source

FT-817ND
The Ultimate Backpack, Multi-Mode Portable Transceiver

- Self-Contained
- Battery-Powered
- Covering the HF, VHF, and UHF Bands
- Provides up to Five Watts of Power Output
- SSB, CW, AM, FM, Packet, or SSB-based Digital Modes like PSK31

YAESU
Choice of the World's top DX'ers℠
Vertex Standard US Headquarters
10900 Walker Street Cypress, CA 90630 (714) 827-7600

Vertex Standard US Headquarters
10900 Walker Street, Cypress, CA 90630 (714) 827-7600

http://www.vertexstandard.com

a CQ editorial

zero bias – CQ

BY RICH MOSESON,* W2VU

An Old Friend Returns

We've all probably had this experience at one time or another: We bump into an old friend we haven't seen in years, and after a few minutes of catching up, pick up our relationship as if there'd been no interruption at all. I had that experience during the CQ World Wide SSB Contest at the end of October. You may know my old friend … its name is 10 meters.

I didn't have a whole lot of operating time this year in the CQWW. Here in the northeast, we'd had a freak October snowstorm that dropped heavy wet snow on trees that still had most or all of their leaves. The damage to limbs, and to power lines, was worse than we've seen here in decades. Fortunately, we didn't lose power at our house, but my in-laws did, so a lot of time was devoted to getting them (and what could be salvaged from their refrigerator) moved into our house for a few days. But I did manage to get in a little operating time on Saturday night and Sunday.

I'd been hearing rumors that the higher sunspot numbers were bringing long-distance propagation back to my long-time favorite band, so on Sunday morning when I got back to the radio, I figured I'd give a listen to 10 meters. I didn't leave for the rest of the day (except for my two final QSOs, but more on them later). Not only was 10 meters open, it was open to Europe and it was packed! With my 100 watts and a vertical, I didn't work anything exotic, but for the first time in at least five years, I was working east-west paths on 10 meters. In the afternoon, I worked Hawaii and Alaska, and heard (but didn't work) several stations in Japan and New Zealand.

One of my favorite things about 10 meters is how you can watch the propagation move as you go through the day. At my location in the northeast, you start out working Europe in the morning, then the Europeans drop out and the US west coast starts to come in, followed by the Pacific and Asia as evening approaches. But you lose that at solar minimum. I looked back over my logs from 2006 to 2010. There were very few 10-meter contacts there at all, compared with other bands, and every one of them was on a north-south path—the Caribbean, Central America, and South America.

Don't get me wrong. There's plenty of great DX to be worked in those places. But as anyone who's been on 10 during the peak of a sunspot cycle can tell you, that's not what 10 meters is all about. Ten meters is all about worldwide DX with flea power and a wet noodle for an antenna. My colleague Richard Fisher, KI6SN, was telling me how he'd recently worked Japan from southern California on 10-meter FM simplex with 50 watts and an indoor dipole. That's what 10 meters is all about!

Something Different

There's something different in this rising sunspot cycle, though, than in the past. This time around, for the first time ever, *every licensed amateur in the United States—700,314 of us as of October 311—has operating privileges on 10 meters, including voice privileges on the hot DXing frequencies of 28.300 to 28.500 MHz.* General Class and higher licensees have the whole band available, but at the risk of repeating myself, for the first time ever, *every U.S. ham is invited to the party!*

Don't let antenna restrictions get in your way. A 10-meter dipole cut for 28.4 MHz (the center of the Tech/Novice phone band) is only 16 1/2 feet long. Put one up in your attic or garage (if you don't have one of those, get creative and find a place) and get on the air. Ten-meter verticals for your car are readily available and today's versions are much more compact than the 108-inch CB whip you may remember. Check our ads or your favorite ham dealer.

Predictions are that the peak of this sunspot cycle will be relatively brief. The "official" prediction is for a peak next year, in 2013; *CQ* Propagation Editor NW7US thinks we've got a little more time than that (see his column on page 98). But regardless of whether the cycle peaks in 2013 or 2014, it won't be with us for long this time around and we don't want you to miss out on all the fun this wonderful band has to offer. Get (or build) a radio that operates on 10 meters. Get (or build) an antenna, and *get on the air*!

Oh yes, about my last two contacts during the CQWW: Ten was still open but I'd worked just about everybody who had a chance of hearing me, so I switched over to 15 meters and the magic of sunspots was obvious there as well… I had time for only two QSOs—and here's one advantage of a vertical antenna—my first one was a ZD8 on Ascension Island in the South Atlantic, followed almost immediately by a VY1 in the Yukon. Ahhh … the warm glow of sunspots!

New Friends

As much fun as it was to spend time with my old friend, ten meters, I had just as much fun soon afterward with some new friends—of the human variety. The weekend after the CQ World Wide, I was invited to join the NYC Resistor "maker" group in operating a special event station in the middle of New York City. It was one of several stations operating that weekend to highlight efforts to purchase inventor Nikola Tesla's Long Island laboratory and turn it into a science center (see <http://www.teslasciencecenter.org/>).

I'll be writing a full article about it in an upcoming issue, but we were operating as N3Y from a balcony on the 38th floor of the New Yorker Hotel in midtown Manhattan. The NYC Resistor folks tend to be in their 30s, heavily into technology (including ham radio) and enjoy building things. I was one of three older hams in the group and was energized by the enthusiasm of these younger hams as they set up and operated on two HF bands plus satellites. We plan to do more in *CQ* in the future to help bring together the "maker" and ham radio communities. Stay tuned.

Doin' Digital

I can't wrap this up without coming back to last month's topic of our new digital editions. When I wrote last month's editorial, the first issue of *CQ* in digital form had not yet "hit the streets." Well, now it has, and while I really enjoy looking at the magazine on my computer screen, I am totally blown away by reading it on my wife's iPad®. The image quality is incredible and, if small type isn't your thing, a simple swipe of the fingers is all it takes to blow it up to whatever size you'd like. Plus, on all devices, just touching or clicking on the name of an article in the table of contents takes you right to it; likewise any links in articles or ads.

As of now, the features are still pretty basic. But as we, our writers and our advertisers learn more about what we can do with this new medium, I'm sure we'll see more and more enhancements.

And what about print? I still love the look, feel and portability of a printed magazine and probably always will. For me, the digital edition is going to be a valuable *add-on* to the print edition. Each has its distinct benefits and drawbacks, but the combination is unbeatable!

Best wishes from all of us at *CQ* to you and your families for a happy, healthy, safe, and prosperous new year!

73, W2VU

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

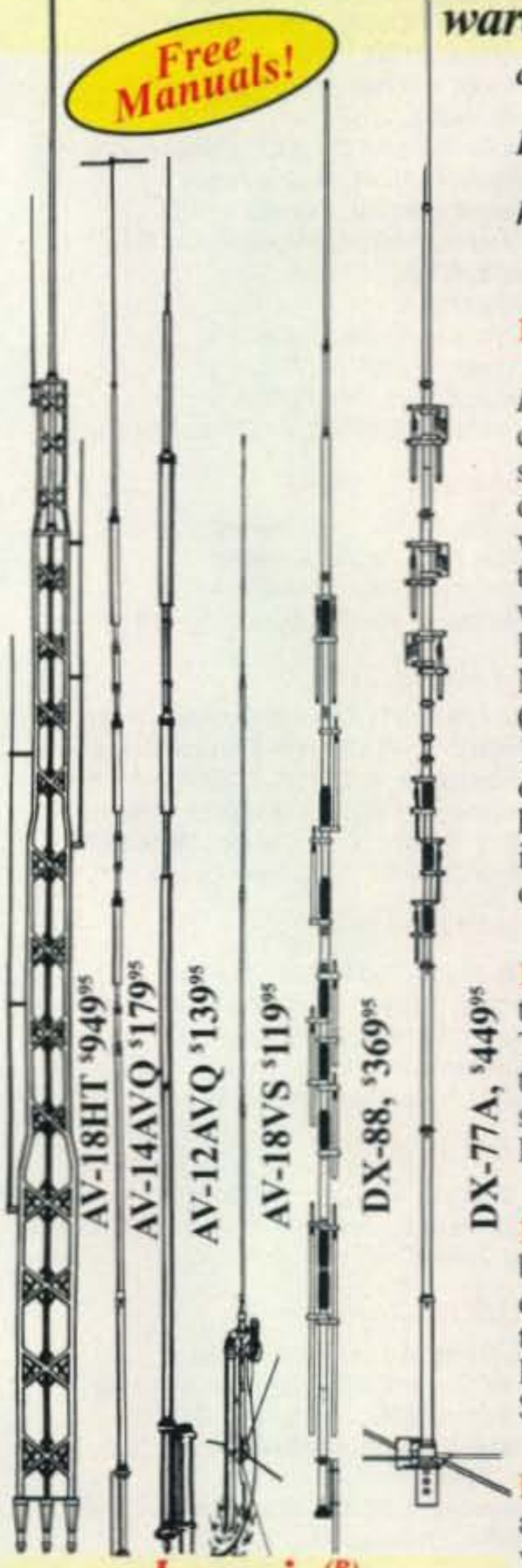
Note

1. Licensing statistics from <www.ah0a.org>

hy-gain® HF VERTICALS

Self-supporting -- no guys required . . . Remarkable DX performance -- low angle radiation, omnidirectional . . . Handles 1500 Watts . . . Low SWR . . . Automatic band switching . . . Aircraft quality aluminum tubing . . . Stainless steel hardware . . . Recessed SO-239 connector . . . Two year limited Warranty . . .

Free Manuals!



hy-gain® Classics

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

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

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

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

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

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

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

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

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

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

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

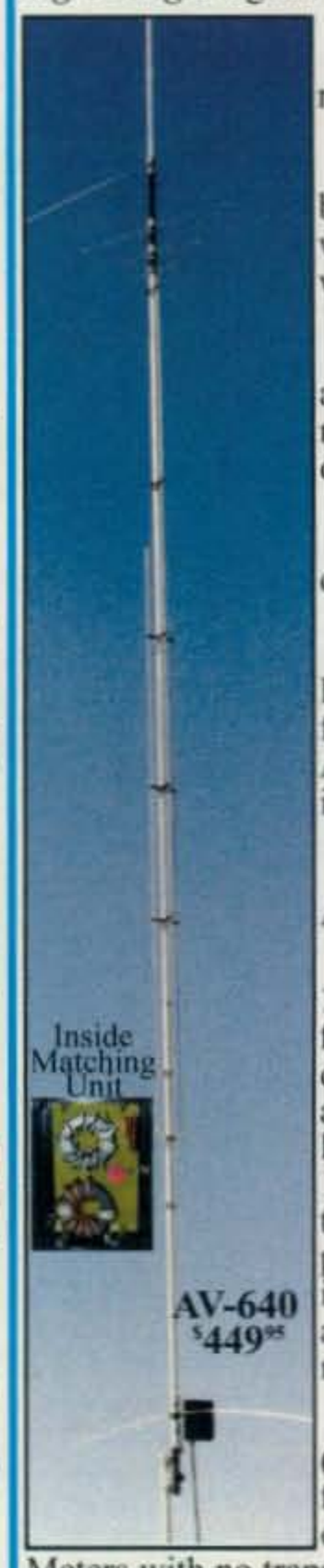
DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$179.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$139.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$119.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

hy-gain® PATRIOT

Hy-Gain's new PATRIOT HF verticals are the best built, best performing and best priced multiband verticals available today. For exciting DX make full use of your sunspot cycle with the PATRIOT's *low 17 degree angle* signal.



No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

Single coax cable feed. Each band is individually tunable. Extra wide VSWR bandwidth. End fed with broadband matching unit.

Sleek and low-profile

Low 2.5 sq. ft. wind surface area. Small area required for mounting. Mounts easily on decks, roofs and patios.

Full legal limit

Handles 1500 Watts key down continuous for two minutes.

Built-to-last

High wind survival of 80 mph. Broadband matching unit made from all *Teflon®* insulated wire. Aircraft quality aluminum tubing, stainless steel hardware.

hy-gain® warranty

Two year limited warranty. All replacement parts in stock.

AV-640, $449.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

AV-620, $349.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

Free Hy-Gain Catalog
and Nearest Dealer . . . 800-973-6572
Call your dealer for your best price!

hy-gain®

Antennas, Rotators & Towers
308 Industrial Park Road, Starkville, MS 39759 USA
Toll-free Customer Sales Hotline: 800-973-6572
• **TECH:** 662-323-9538 • **FAX:** 662-323-6551
http://www.hy-gain.com

announcements

PALM SPRINGS, CALIFORNIA – The Desert Radio Amateur Transmitting Society will hold the **Palm Springs Hamfest** on January 28 from 9:30 AM to 4:30 PM at "The Barn." More than 25 commercial vendors plus consignment sales. Activities include how-to demonstrations, seminars, swap meet, and an RV convoy from Quartzfest led by Gordon West, WB6NOA. E-mail: <PalmSprings.hamfest@gmail.com>. Website: <http://desertrats.am>. Talk-in 146.960 (PL 107.2). Special Event Station, **WD6RAT**, will be on the air from 9 AM to 3 PM. Frequencies include 7.251+; 14.251+ (voice); 14.070+ (PSK31); 14.109 to 14.111 (MT-63-1000); and 14.075 to 14.078 (Olivia-500). E-mail:<PalmSprings.hamfest@gmail.com>.

ERIE, PENNSYLVANIA – The Straight Key Century Club (SKCC) will broadcast special event station **K3Y** from 0000 UTC, January 1 to 2359 UTC, January 31 to honor six years of the organization's growth. Frequencies are 1.820. 3.550. 7.055, 10.120, 14.050, 18.080, 21.050, 24.910, and 50.090 MHz (±10 kHz). For a special QSL, send name, callsign, and address to Dan Rhodes, KA3CTQ, 618 Seminole Drive, Erie, PA 16505. Website: <http://www.skccgroup.com>.

GREENWOOD, SOUTH CAROLINA — The Greenwood Hamfest will be held January 14 at the Piedmont Technical College Multipurpose Building N. Activities include ARRL forums, dealers, flea market, and door prizes. VE Exams walk-in, starting at 10:30 AM. Contact: G.A.R.S., PO Box 2404, Greenwood, SC 29646. Website: <http://www.w4gwd.org>. Talk-in 147.165 (+)/ALT 443.900 + tone 107.2.

FORT WORTH, TEXAS – The Cowtown Hamfest 2012 will be held on January 20 and 21 at the Lockheed Martin Recreational Area. More than 100 tables, an outdoor tailgate flea market, educational programs, and VE testing. Contact David Forbes, KC5UYR, <kc5uyr@compuserve.com>. Talk-in 147.28, Tone 110.9

WAUKESHA, WISCONSIN – The 40th Annual Midwinter Ham Radio, Computer and Electronics Swapfest will be held on Saturday, January 7 from 8 AM to 2 PM at the Waukesha County Expo Center Forum. VE testing 9 AM to 11:15 AM at the AMF Waukesha Lanes. For vendor information and advanced registration (deadline December 28) contact: Phil Gural, W9NAW, 414-425-3649. Website: <http://www.warac.org>.

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

ham radio news (from pg. 2)

Steve Mendelsohn, W2ML; CQ Contributing Editor Gordon West, WB6NOA, and CQ Advertising Manager Chip Margelli, K7JA, at the Pacificon banquet in October, where CQ presented Mendelsohn with a Lifetime Achievement Award.

W2ML Receives Lifetime Achievement Award from *CQ*

CQ magazine honored Steve Mendelsohn, W2ML, with a Lifetime Achievement Award at the Pacificon hamfest in October. Mendelsohn, who is fighting pancreatic cancer, has been Communications Director of the New York City Marathon for more than 25 years and served the ARRL as Hudson Division Director and First Vice President. He was also a leader in repeater coordination in the 1970s and 80s. Professionally, as an audio engineer at CBS and then ABC, Steve was press pool broadcast engineer for four presidents during foreign trips, and more recently in charge of all radio communications at Giants Stadium in New Jersey during New York Jets home games.

60 Meters Gets New Channel, New Modes & Higher Power

The FCC adopted new rules for the 60-meter (5 MHz) band in mid-November, swapping one frequency for another and permitting greater flexibility in power and operating modes. Currently, hams in the U.S. have a secondary allocation on the band and are limited to upper sideband (USB) with a maximum of 50 watts PEP on five specific frequencies.

In the new rules, amateurs will also be able to use CW and the PSK-31 and Pactor-III digital modes; and the power limit has been doubled to 100 watts PEP. In addition, the current channel centered on 5368 kHz will be replaced by one centered on 5358.5 kHz. Voice and digital users should set their VFOs 1.5 kHz below the center frequency while CW ops should be right on the center frequency. The new rules take effect 30 days after publication in the *Federal Register*, which would most likely mean sometime in mid-January.

A publication of

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

CQ Amateur Radio (ISSN 0007-893X) Volume 68, No. 1. Published monthly by CQ Communications, Inc., 25 Newbridge Road., Hicksville, NY 11801, Telephone 516-681-2922. E-mail: cq@cq-amateur-radio.com. Fax 516-681-2926. Web site: www.cq-amateur-radio.com. Periodicals Postage Paid at Hicksville, NY 11801 and at additional mailing offices. Subscription prices (all in U.S. dollars): Domestic-one year $36.95, two years $66.95, three years $96.95; Canada/Mexico-one year $49.95, two years $92.95, three years $135.95: Foreign Air Post-one year $61.95, two years $116.95, three years $171.95. U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government including military services, only on a cash with order basis. Requests for quotations, bids, contracts., etc. will be refused and will not be returned or processed. Entire contents copyrighted 2012 by CQ Communications, Inc. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address.

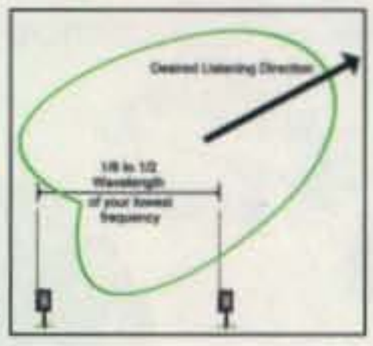
Printed in the U.S.A.
POSTMASTER: Send address changes to:
CQ Amateur Radio, 25 Newbridge Rd., Hicksville, NY 11801

#1 Rated Cable Assemblies Made in USA!

DX ENGINEERING

ARE YOU HEARING THEM ALL?

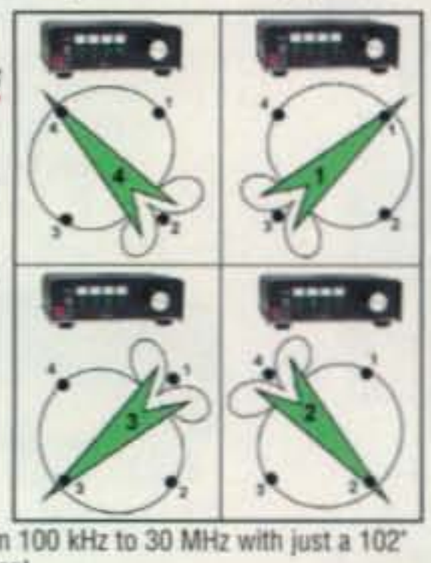
Receive Antenna Phasing Controller System



The NCC-1 is a two-channel receiving phasing system. This sophisticated controller allows the user to combine and independently adjust the phase and level of two antenna inputs, creating a fully adjustable phased array from any two antennas.

DXE-NCC-1	Receive Antenna Phasing Controller	$599.95
DXE-AAPS3-1P	Two Antenna System, electronically rotatable	$1,099.95

Receive Four Square Arrays



The patented* DXE-RFS-SYS-2P uses time delay phasing to produce wider and deeper rear nulls and a narrower main lobe in four selectable directions. The result is greatly reduced levels of noise and undesirable signals for a superior front-to-rear ratio. Use with DX Engineering Active Vertical Antennas for great F/R response over octaves of bandwidth from 100 kHz to 30 MHz with just a 102" whip as the antenna element.

**US Patent Number 7,423,588*

DXE-RFS-SYS-2P	Four Square Controller/ Switch Package	$389.95
DXE-RFS-SYS-3P	160/80/40m Electronics Package	$799.00
DXE-RFS-SYS-4P	Complete System Package	$1,650.00

Receive Eight Circle Switch and Controller Packages

This switchable 8-direction array allows the user to pinpoint the exact direction for maximum receive signal performance. It uses the same time delay phasing technique as the Receive Four Square system to provide excellent bandwidth and pattern control with 102" long active antenna elements.

DXE-RCA8B-SYS-2P	Receive Eight Controller/ Switch Package	$449.95
DXE-RCA8B-SYS-3P	Electronics Package	$1,375.00
DXE-RCA8B-SYS-4P	Complete System Package	$2,575.00

Beverage Antenna Components

DXE-BFS-1	Beverage Antenna System, single direction	$49.95
DXE-RBSA-1P	Reversible Beverage System, two direction	$199.95

Active Receive Antennas w/Internal Disconnect Relay

DXE-ARAV3-1P	Vertical Antenna	$289.95
DXE-ARAH3-1P	Horizontal Antenna	$349.95

Preamplifier

DXE-RPA-1	Receiver Preamplifier, 0.3-35 MHz	$119.95

Time Variable Sequencer Unit

DXE-TVSU-1A $199.95

Visit DXEngineering.com to see additional Receive Antenna products

GUARANTEED LOWER PRICES!

High Quality Cables—Performance Grade

- Heat shrink weatherproofing/strain relief
- All assemblies Hi-Pot high voltage tested
- Silver/Teflon® crimped and soldered connectors

RG-213/U DXE-213U Cable Assemblies with PL-259 Connectors

DXE-213DU003	3 ft.	$12.88
DXE-213DU006	6 ft.	$14.88
DXE-213DU012	12 ft.	$21.88
DXE-213DU018	18 ft.	$24.88
DXE-213DU025	25 ft.	$34.88
DXE-213DU050	50 ft.	$58.88
DXE-213DU075	75 ft.	$82.88
DXE-213DU100	100 ft.	$104.88
DXE-213DU125	125 ft.	$131.88
DXE-213DU150	150 ft.	$157.88
DXE-213DU175	175 ft.	$182.88
DXE-213DU200	200 ft.	$210.88

FREE SHIPPING on $50.00 or more Coax order!

RG-8/U DXE-8U Cable Assemblies with PL-259 Connectors

DXE-8UDU002	2 ft.	$12.88
DXE-8UDU003	3 ft.	$13.88
DXE-8UDU006	6 ft.	$16.88
DXE-8UDU009	9 ft.	$20.88
DXE-8UDU012	12 ft.	$24.88
DXE-8UDU018	18 ft.	$31.88
DXE-8UDU025	25 ft.	$39.88
DXE-8UDU050	50 ft.	$61.88
DXE-8UDU075	75 ft.	$85.88
DXE-8UDU100	100 ft.	$108.88
DXE-8UDU125	125 ft.	$139.88
DXE-8UDU150	150 ft.	$159.88
DXE-8UDU175	175 ft.	$179.88
DXE-8UDU200	200 ft.	$199.88

FREE SHIPPING on $50.00 or more Coax order!

RG-8X DXE-8X Cable Assemblies with PL-259 Connectors

DXE-8XDU1.5	1.5 ft.	$9.88
DXE-8XDU002	2 ft.	$10.88
DXE-8XDU003	3 ft.	$11.88
DXE-8XDU006	6 ft.	$13.88
DXE-8XDU012	12 ft.	$16.88
DXE-8XDU025	25 ft.	$23.88
DXE-8XDU050	50 ft.	$32.88
DXE-8XDU075	75 ft.	$40.88
DXE-8XDU100	100 ft.	$47.88
DXE-8XDU150	150 ft.	$69.88

FREE SHIPPING on $50.00 or more Coax order!

DXE-400MAX Cable Assemblies with PL-259 Connectors

DXE-400MAXDU003	3 ft.	$13.88
DXE-400MAXDU006	6 ft.	$15.88
DXE-400MAXDU009	9 ft.	$19.88
DXE-400MAXDU012	12 ft.	$24.88
DXE-400MAXDU018	18 ft.	$31.88
DXE-400MAXDU025	25 ft.	$39.88
DXE-400MAXDU050	50 ft.	$61.88
DXE-400MAXDU075	75 ft.	$85.88
DXE-400MAXDU100	100 ft.	$104.88
DXE-400MAXDU150	150 ft.	$159.88
DXE-400MAXDU175	175 ft.	$179.88
DXE-400MAXDU200	200 ft.	$199.88

Contact Us for Custom Lengths.

Rotor Control Cable

STI

Heavy Duty, Highest Quality—Cut to Your Length

DXE-CW8-HD 2 #16, 6 #18 AWG ..... per ft. **$0.89**
per 100 ft. **$89.00**

Coaxial Cable Prep Tools

- Precision, two-step operation
- No nicks or scratches to conductor
- Premium, long-lasting cutter blades
- For foam or solid dielectric cable preparation

DXE-UT-8213	Cable Stripper for RG-8, RG-213, etc.	$39.95
DXE-UT-808X	Cable Stripper for RG-8X, 9258, etc.	$39.95
DXE-UT-80P	PL-259 Assembly Tool	$22.95
DXE-UT-80N	2-Piece N Connector Tool	$22.95
DXE-CNL-911	Coax Cable Cutters	$23.75
DXE-170M	Precision Shear Side Cutters	$7.95

Now available in cost-saving tool kits with carrying case

DXE-UT-CASE	Molded carrying case only	$22.95
DXE-UT-KIT1	Basic Coax Cable Prep Kit	$99.95
DXE-UT-KIT2	Complete Coax Cable Prep Kit	$174.95

AMERITRON

AMR-AL-811H

800 Watt Amplifier

Only $859.00

Export-only models also in stock!

DX ENGINEERING IS NOW AN AUTHORIZED DISTRIBUTOR!

ROHN™ Products LLC

Rohn Commercial Towers

DX Engineering is now an Authorized Distributor of Rohn Commercial Tower products and accessories. We have the Rohn products you need to solve your tower structural needs.

Contact us for technical information and availability!

LIMITED TIME OFFER— FREE SHIPPING ON COMTEK BALUNS!

BETTER PERFORMANCE, LOWER PRICES—FROM JUST $49.95

COMTEK W2FMI Series Baluns

COMTEK SYSTEMS

Design inspired by Jerry Sevick W2FMI and perfected by DX Engineering's balun R&D department.

- High voltage compensating capacitors for unequalled low SWR—a DX Engineering innovation!
- Large fender washers distribute fastener loading to prevent case deformation
- Special coated toroid core handles close coupling without extra stress
- High, consistent common mode impedance across specified bandwidth—provides isolation where most needed
- Special wire sizing and Teflon-insulated wire sleeves for exact impedance matching and better isolation than Thermaleze wire
- Typical insertion loss: less than 0.2 dB
- Power handling: 3 kW continuous to 5 kW+ intermittent depending on model
- Silver-plated gasketed SO-239 connectors, stainless hardware, weatherproof NEMA box

1:1 Dual Wire/Single Core, 1.8 to 54 MHz

COM-BAL-11130E	3 kW, side eyebolts	$49.95
COM-BAL-11130ET	3 kW, side and top eyebolts	$49.95
COM-BAL-11130S	3 kW, side studs/wingnuts	$49.95
COM-BAL-11130T	3 kW, top studs/wingnuts	$49.95

1:1 Coax/Single Core

COM-BAL-11150E	5 kW, side eyebolts	$49.95
COM-BAL-11150ET	5 kW, side and top eyebolts	$49.95
COM-BAL-11150S	5 kW, side studs/wingnuts	$49.95
COM-BAL-11150T	5 kW, top studs/wingnuts	$49.95

1:1 Dual Wire/Dual Core

COM-BAL-11140T	5 kW, top studs/wingnuts	$69.95
COM-BAL-11140S	5 kW, side studs/wingnuts	$69.95

1:1 Coax/Dual Core

COM-BAL-11150DS	5 kW, side studs/wingnuts	$69.95
COM-BAL-11150DT	5 kW, top studs/wingnuts	$69.95

4:1 Dual Wire/Single Core

COM-BAL-41130E	3 kW, side eyebolts	$59.95
COM-BAL-41130ET	3 kW, side and top eyebolts	$59.95
COM-BAL-41130T	3 kW, top studs/wingnuts	$59.95
COM-BAL-41130S	3 kW, side studs/wingnuts	$59.95

4:1 Dual Wire/Dual Core

COM-BAL-41150T	5 kW, top studs/wingnuts	$89.95
COM-BAL-41150S	5 kW, side studs/wingnuts	$89.95
COM-BAL-41150E	5 kW, side eyebolts	$89.95

Contact us for recommendations for your application.

New Low Pricing on Vertical Antennas!

HUSTLER · HEIL SOUND · BELDEN · MIRAGE · hy-gain · ICOM · JSC WIRE & CABLE · VIBROPLEX · COMTEK · Tigertronics · AMERITRON · DIAMOND ANTENNA · The BetterRF Company · PolyPhaser · Cushcraft · MFJ

We Will Beat Any Competitors' Prices! Call us for complete details.

Thousands More Ham Products at DXEngineering.com

1.800.777.0703

Prices good through 2/15/11 Sale Code 1201CQ

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
1525 W. Magnolia Blvd, 91506
(818) 842-1786
(877) 892-1748
Eric, K6EJC, Mgr.
Magnolia between
S. Victory & Buena Vista
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(877) 892-1745
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(877) 520-9623
Jerry, N5MCJ, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102, 94085
(408) 736-9496
(877) 892-1749
Jon, K6WV, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Chuck, N1UC, Mgr.
RT.13 1/4 mi., So. I-295
newcastle@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 765-4267
Bill, K7WCE, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
John, WØIG, Mgr.
denver@hamradio.com

PHOENIX, AZ
10613 N. 43rd Ave, 85029
(602) 242-3515
(800) 559-7388
Gary, N7GJ, Mgr.
Corner of 43rd Ave & Peoria
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville,
1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr. 22191
(703) 643-1063
(800) 444-4799
Steve, W4SHG, Mgr.
Exit 161, I-95, So. to US 1
woodbridge@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Peter, KI1M, Mgr.
sales@hamradio.com
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

NEW EXPANDED STORE!

Special Holiday Discounts Off Our Already Low Prices!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Check out the latest Cool Winter Specials from YAESU
Yaesu coupons expire 1/16/12

YAESU

#1 Yaesu Dealer Worldwide

Competitive pricing!

FTM-350AR 2m/440 Dualband

- 50W 2m/440† - 1 watt 220Mhz
- TNC built-in, Bluetooth capable
- Band scope built-in
- 500 Memories

$50. mfr coupon

FT-857D

Ultra compact HF, VHF, UHF

FREE YSK-857

- 100w HF/6M, 50w 2M, 20w UHF
- DSP included • 32 color display
- 200 mems • Detachable front panel (YSK-857 required)

Call for Low Price!

FT-897D VHF/UHF/HF Transceiver

- HF/6M/2M/70CM • DSP Built-in
- HF 100W (20W battery)
- Optional P.S. + Tuner • TCXO Built-in

Call Now For Our Low Pricing!

FTDX5000MP 200w HF + 6M Transceiver

- Station Monitor SM-5000 Included
- 0.05ppm OCXO included
- 300 Hz Roofing filter included
- 600 Hz Roofing filter included
- 3 kHz Roofing filter included

$200. mfr coupon

FT-7900R 2M/440 Mobile

FREE YSK-7800

- 50w 2m, 45w on 440mHz
- Weather Alert
- 1000+ Mems
- WIRES Capability
- Wideband Receiver (Cell Blocked)

Call Now For Your Low Price!

FT-950 HF + 6M TCVR

- 100W HF/6M
- Auto Tuner built-in
- 3 roofing filters built-in
- DMU-2000 Compatible

NEW!

$30. mfr coupon

Call Now For Low Pricing!

VX-7R/VX-7R Black

50/2M/220/440 HT

- Wideband RX - 900 Memories
- 5W TX (300mw 220Mhz)
- Li-Ion Battery
- Fully Submersible to 3 ft.
- Built-in CTCSS/DCS
- Internet WIRES compatible

$5. HRO Coupon

Now available in Black!

FT-2000/FT2000D HF + 6M tcvr

- 100 W w/ auto tuner • built-in Power supply
- DSP filters / Voice memory recorder
- 200W (FT-2000D)
- 3 Band Parametric Mic EQ • 3 IF roofing filters

Call For Low Pricing!

FT-8800R 2M/440 Mobile

- V+U/V+V/U+U operation
- V+U full duplex • Cross Band repeater function
- 50W 2M 35W UHF
- 1000+ Memory channels
- WIRES ready

Call Now For Low Pricing!

$30. mfr coupon

$30. mfr coupon

VX-6R

2M/220/440HT

- wideband RX – 900 memories
- 5W 2/440 , 1.5W 220 MHz TX
- Li-ION Battery - EAI system
- Fully submersible to 3 ft.
- CW trainer built-in

NEW Low Price!

$5. HRO Coupon

VX-8DR/VX-8GR

50/144/220/440 (VX-8DR)
2m/440 w/ Built-in GPS (VX-8GR)

- 5w (1w 222 Mhz VX-8DR only)
- Bluetooth optional (VX-8DR only)
- waterproof/submersible 3 ft 30 mins
- GPS/APRS operation optional
- Li-ion Hi-capacity battery
- wide band Rx

$10. HRO Coupon

NEW

FT-450D HF + 6M TCVR

- 100W HF/6M • Auto Tuner built-in • DSP Built-in
- 500 Memories • DNR, IF Notch, IF Shift

Call Now For Special Pricing

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

Look for the HRO Home Page on the World Wide Web http://www.hamradio.com

#1 in Customer Service

COAST TO COAST FREE SHIPPING
UPS - Most Items Over $100
Rapid Deliveries From The Store Nearest To You!

vhf plus

BY JOE LYNCH,* N6CL

Six CubeSats, Four Universities, One Successful Launch

Launches of student-built CubeSats have been somewhat problematic in the past. For example, in March 2011, three CubeSats were lost when the Taurus rocket carrying NASA's Glory scientific spacecraft and a Poly Picosatellite Orbital Deployer (P-POD) container carrying three university payloads failed to reach the proper altitude. The three CubeSats that were lost included: Hermes from the University of Colorado, KySat-1 from the University of Kentucky, and Explorer-1 [PRIME] from Montana State University.

However, on October 28, 2011, CubeSat launches achieved a major success when, at 2:48 AM PDT, a Delta II carrying a National Polar-orbiting Operational Environmental Satellite System Preparatory Project (NPP) satellite, also carried three P-PODs and six CubeSats into orbit. All three P-PODs deployed successfully and ground operators around the world are tracking the CubeSats. More information from NASA can be found at this URL: <http://www.nasa.gov/mission _pages/NPP/main/index.html>.

Photo 1 shows the liftoff of the rocket. Videos of the launch, deployment, and after launch debriefing can be viewed at the following URLs:

Launch and initial deployment: <http://www.youtube.com/watch?v=9fhzXFxrOsg&feature=related> and <http://www.youtube.com/watch?feature=player_embedded&v=TQYwks8bOhU>.

Deployment of final payloads: <http://www.youtube.com/watch?feature=player_embedded&v=FFLmERzduUY>.

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

The CubeSats

The six CubeSats and their respective information (from http://www.cubesat.org) are as follows (also see photo 2):

Satellite: AubieSat-1
Organization: Auburn University
Downlink Frequency: 437.475 MHz
Transmit Power: 0.708W
Protocol: Morse Code
Baud Rate: 20wpm
<http://www.space.auburn.edu/index.htm>

Satellites: DICE (two satellites)
Organization: Utah State University
Downlink Frequency: 465 MHz
<http://www.sdl.usu.edu/programs/dice>

Satellite: Explorer-1 [PRIME] Flight Unit 2
Organization: Montana State University
Downlink Frequency: 437.505 MHz
Transmit Power: 0.85W

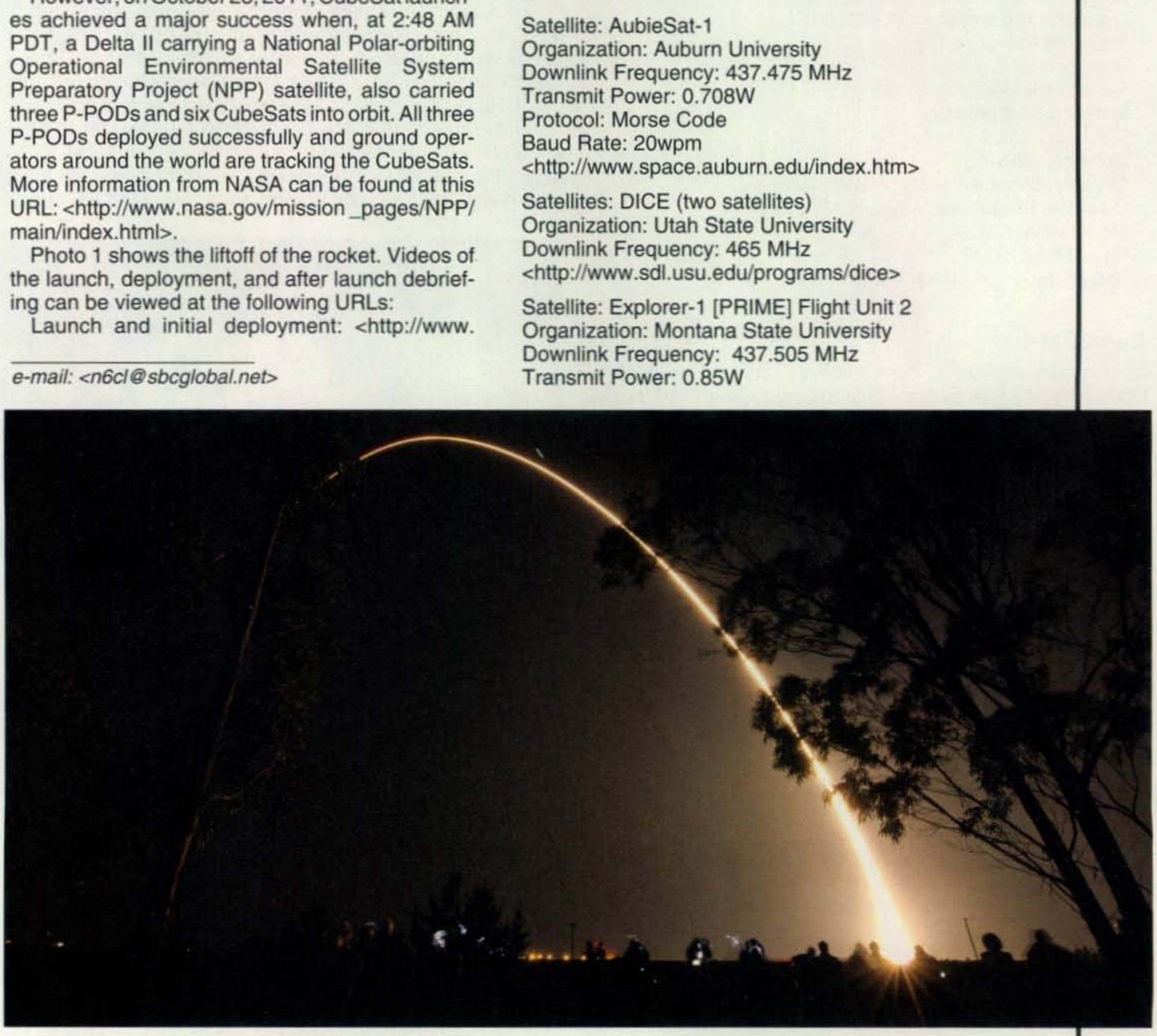


Photo 1– Liftoff of the NPP aboard a Delta II rocket at Space Launch Complex-2 at Vandenberg Air Force Base in California. (Photo credit: NASA/Bill Ingalls)

VHF Plus Calendar

Jan. 1	First quarter Moon
Jan. 2	Moon apogee
Jan. 4	*Quadrantids* meteor shower
Jan. 9	Full Moon
Jan. 16	Last quarter Moon
Jan. 17	Moon perigee
Jan. 23	New Moon
Jan. 30	Moon apogee
Jan. 31	First quarter Moon

—EME conditions courtesy W5LUU

Protocol: AX.25 FSK
Baud Rate: 1200
<http://ssel.montana.edu/e1p/>

Satellite: M-Cubed
Organization: University of Michigan
Downlink Frequency: 437.485MHz
Transmit Power: < 1W
Protocol: GMSK
Baud Rate: 9600
<http://umcubed.org/>

Satellite: RAX-2
Organization: University of Michigan
Downlink Frequency: 437.345 MHz
Modulation: GMSK
Baud Rate: 9600
<http://rax.engin.umich.edu/>

AubieSat-1

Now known as AO-71, this CubeSat is part of the Auburn University Student Space Program, and AubieSat-1 is the first student-built satellite in the state of Alabama to be accepted by NASA for launch. Now in space, the satellite communicates with Auburn students in Morse code. More information on the telemetry can be found at: <http://www.space.auburn.edu/Ham_Radio.htm>.

AO-71 is a CubeSat, which is a 4-inch, cube-shaped satellite that is used primarily for research. Its main objective is to test a new ultraviolet (UV) sensor developed by Dr. Minseo Park of the Physics Department.

When it was deployed from the rocket, two antennas emerged, one for receiving signals from Auburn University and one for sending signals back to Auburn. The students built a control center in the Physics Department from which they are giving the satellite commands to execute, as well as receiving data from the satellite such as temperature, battery charge and voltage, and power from the solar cells. The students will ultimately measure the decrease of solar-cell efficiency over time on protected versus non-protected solar panels.

Securing a spot on the rocket for the satellite was a competitive process. AubieSat-1 was selected in July 2010 by NASA and is one of only six CubeSats in the nation that launched on the Delta II rocket.

The program is operated solely by undergraduate students. Approximately one-hundred students have worked on the current satellite, and the goal of the program is to give them a unique experience working in teams on a space experiment and promote workforce development.

Two of those students were Jamie Droddy, KI4TXZ, and Thor Wilson, KI4TXV. A photo of these two students holding a model of the CubeSat was used for the month of July 2008 in *CQ*'s annual calendar and is on this issue's cover.

"We do things the students do not learn in class," said J-M Wersinger, KI4YAU, professor emeritus in the Department of Physics and director of the Auburn University Student Space Program. "The classwork is extremely important and useful, but it's not the whole story.

"In order to get a job, companies would like people to have skills, like being able to work in teams on projects, understanding what a deadline is, understanding how to work with people, to communicate, and the basics of management and systems engineering. It's not book learning. It's practical learning."

The students designed, built, and tested the satellite, and took it to California for a Mission Readiness Review, which they passed with flying colors. Finally, the satellite underwent some tests before being shipped to California for integration into a P-POD that was placed in the launching rocket with the other CubeSats.

The Auburn University Student Space Program is part of the College of Sciences and Mathematics. AubieSat-1 is sponsored by Auburn University and the Alabama Space Grant Consortium. Information for this piece was derived from this URL: <http://www.auburn.edu/academic/cosam/news/auburn-university-space-program-to-launch-states-first-student-built-satellite-into-space.htm>. A YouTube video about the project can be viewed at: <http://www.youtube.com/watch?feature=player_embedded&v=vdAiQi9_mgo>.

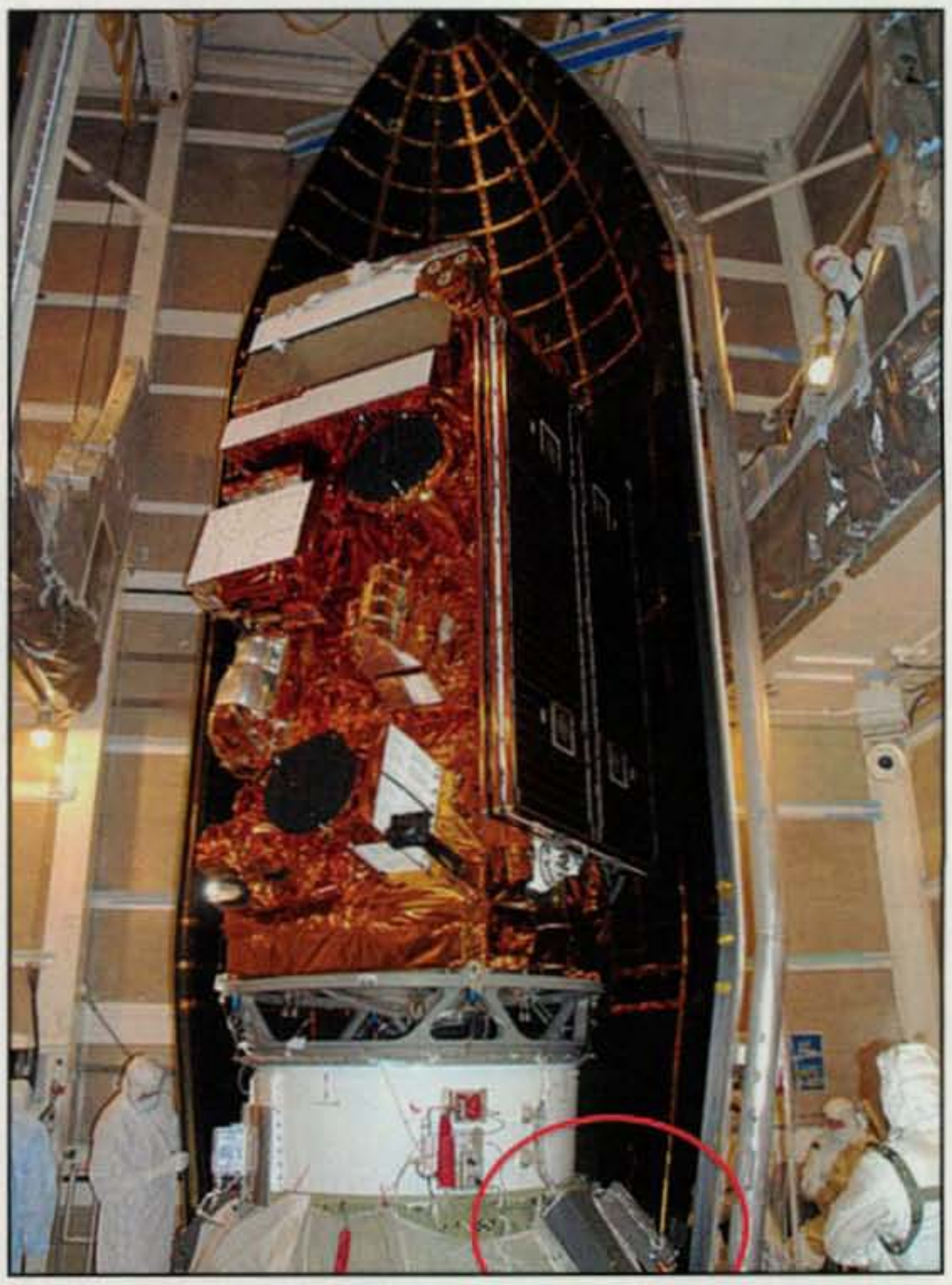


Photo 2– From left to right, AubieSat-1, Explorer 1 [PRIME] Unit 2, and M-Cubed. The three satellites rode together in the P-POD container to the right. (Photo courtesy of Dave Klumpar, KD7MFJ)

Discover the TEN-TEC Advantage

TEN-TEC Makes Radio More Fun

- You can't work 'em if you can't hear 'em – TEN-TEC rigs feature legendary receiver performance.

TEN-TEC EAGLE
Advanced Signal Reception™
Beats Rigs Costing Thousands More

- TEN-TEC means outstanding audio on both receive and transmit.

- You deserve superior service and support. TEN-TEC owners talk directly with hams who design, build and service their radios.

TEN-TEC OMNI VII
Easy-to-Use, Most Internet-ready HF

- TEN-TEC radios are easy to use and don't compromise on features or performance.

TEN-TEC ORION II
Highest-Performance,
Customizable DSP transceiver

You deserve great value. Save money – buy TEN-TEC factory-direct.
Building world-class radios in Sevierville, Tennessee since 1968.

RISK-FREE: 30-day Money-Back Guarantee. Try it in your shack, using your antennas.
Ask your friends how your new TEC-TEC sounds. Don't like your new radio?
Just send it back. No restocking fee. Financing available.

We've updated our Website!
Check us out – www.tentec.com

TEN-TEC

1185 Dolly Parton Pkwy., Sevierville, TN 37862. Sales: (800) 833-7373, sales@tentec.com. Office: (865) 453-7172. FAX: (865) 428-4483.
Service: (865) 428-0364, service@tentec.com M-F 8 AM-5 PM (Eastern Time). We accept Visa, MC, American Express and Discover.
All TEN-TEC radios come with our 30-day money-back guarantee.

Along with Wersinger, a student, Kyle Owen, KK4ANG, appears in the video. An additional video that shows some of the development and testing of the satellite, as well as the launch of the Delta II rocket and the AubieSat control room, can be viewed at: <http://www.youtube.com/watch?v =xnlJ58pABT4>.

For more information on AubieSat-1, go to: <http://www.space.auburn.edu/index.htm>. More information also can be found on AMSAT's AO-71 website: <http://www.amsat.org/amsat-new/satellites/satInfo.php?satID=138&retURL=/satellites/status.php>.

Photo 3– P-Pods onboard the Delta II rocket. (Photo courtesy <http://www.cubesat.org>)

DICE

DICE, which is an acronym for Dynamic Ionosphere CubeSat Experiment, will map geomagnetic Storm Enhanced Density (SED) plasma bulge and plume formations in Earth's ionosphere. While it is a non-amateur radio satellite, its mission and experiments have direct applicability to us.

Two identical spinning spacecraft will measure plasma density and electric fields to determine the how and why of variations in ionospheric plasma density that affect the performance of communications, surveillance, and navigation systems on Earth and in space.

A collaborative effort funded by NSF the DICE program, pulls together talent from multiple sources: scientists, engineers, students, and program specialists.

Principal Investigator Geoff Crowley is CEO of ASTRA (Atmospheric & Space Technology Research Associates, LLC, Texas) and a research professor at the University of Texas at San Antonio.

Deputy PI Charles Swenson teaches electrical and computer engineering at Utah State University, where he directs the Center for Space Engineering and is a senior scientist at SDL.

Commenting on these satellites in an email to your editor, Swenson wrote:

The DICE spacecraft are using government bands for communications. The uplink is at 449.97 MHz with a bandwidth of 34.4 kHz and the downlink is at 465.00 MHz with a bandwidth of ~3 MHz. It is a half-duplex system and is only active upon request from the ground station.

We are using an 18 meter DISH at Wallops Flight Facility on the east coast of USA to talk to DICE. At the very least we need 24 to 25 dB gain to get the 0.5 to 2 watt downlink signal and the wallops dish is more like 35 dB. The output power is adjustable and we are keeping the power flux density on the Earth low. The power flux-density produced at the Earth's surface by any space station in this 460-470 MHz band shall not exceed –152 dBW/m≤/4 kHz according to regulations so our equipment is unique. That said our data downlink is 1.5 mbits/second after accounting for our error correction code.

We did not place a beacon on the satellites. I should have placed an APRS beacon on DICE. I really wish we had done something more with the amateur community.

Co-PI Aroh Barjatya teaches physical sciences at Embry-Riddle Aeronautical University; he and his students will be calibrating the payload. Utah State University students are spearheading the design, build, and test of the dual satellite system.

DICE students at the Space Dynamics Laboratory (SDL) have taken leading roles in the satellite design, build, test, and integration. Additionally, Kelby Davis, AD7VO designed the antennas and oversaw most of the radio links.

Information for this piece was derived from this URL: <http://www.sdl.usu.edu/programs/dice>.

Explorer-1 [PRIME] Flight Unit 2

As mentioned above, the first Montana State University student-built satellite that was launched in the spring failed to reach orbit as a result of an anomaly with the TAURUS-XL rocket. The twin of that satellite is known as Explorer-1 [PRIME] Unit 2.

This miniature research satellite is called Explorer-1 [Prime] in honor of the first successful U.S. satellite. This CubeSat was a dream of the late Bill Hiscock, AD7SW. The following about Bill, which originally appeared in the July 2009 edition of this column, is from Dave Klumpar, KD7MFJ:

As Director of the Montana Space Grant Consortium, Bill had been an ardent supporter and sponsor of the MSU Space Science and Engineering Laboratory's (SSEL) hands-on student spaceflight hardware development projects. The SSEL has built two nanosatellites, commonly known as CubeSats, for MSGC. Both satellites utilize UHF and VHF communications in the Ham bands and operate in the Amateur Satellite Service under frequency coordination by the IARU. Both miniature scientific satellites carry radiation detector payloads built upon Geiger counters provided to SSEL by the late James A. Van Allen, discoverer of the Earth's radiation belts. The Montana Earth Orbiting Pico Explorer (MEROPE) was built for MSGC by Montana university students in the SSEL between 2001 and 2006. It was launched on a DNEPR launch vehicle in July 2006. The DNEPR experienced a premature engine shutdown during the first stage ascent, resulting in the loss of MEROPE and 22 other satellites intended for orbit.

The outcome of Hiscock's work is the Explorer-1 [Prime].

MSU students and faculty members watched the launch from Vandenberg Air Force base, as well as from MSU's Space Operations Center in Cobleigh Hall, said Dave Klumpar, director of MSU's Space Science and Engineering Laboratory.

MSU's satellite rode in a container with two other satellites, one from the University of Michigan and one from Auburn University, Klumpar said. All three satellites are aluminum cubes weighing no more than 2.2 pounds and measuring about four inches per side. That standardized size allows university-built satellites, called "CubeSats," to fit into an enclosed container called a P-POD. See photo 3.

"MSU's SSEL has the unique distinction of being the only university to fly a CubeSat on both of NASA's Educational Launch of Nanosatellite (ELaNa) missions," Klumpar said. "No other university in the world has

flown university-built small satellites on two NASA orbital launches."

Also on the rocket will be a NASA satellite that represents a critical first step in building the next generation of U.S. polar-orbiting climate and weather monitoring spacecraft. The satellite is a bridge between NASA's Earth Observing System satellites and the upcoming Joint Polar Satellite Systems satellites.

Because everything went as planned, MSU's Explorer-1 [Prime] roared into the morning sky on time. Almost two hours later, after the sun had recharged the satellite's batteries, the satellite came alive over the south Atlantic near the bulge of Africa. An antenna that had been coiled inside the cube will spring out to transmit and receive signals.

The satellite was designed to emit a "heartbeat" every 15 seconds, Klumpar said. The signal will allow ham radio operators around the world to detect the satellite and report its progress to MSU. MSU students will monitor the satellite from campus, receiving their strongest signals around 11:45 AM and 11:45 PM daily for at least four months.

The Explorer-1 [Prime] will circle the Earth every 90 minutes in an "eccentric" orbit, which means that the orbit will be elliptical instead of circular, and the distance above Earth will be anywhere from 283 to 503 miles, Klumpar said.

Explorer-1 [PRIME]

The problem with the rocket carrying the first Explorer-1 [Prime] was that the fairing —a protective covering that works like a clamshell—failed to fall away. As a result, the rocket carried extra weight and couldn't accelerate fast enough to reach orbit. Although MSU's satellite was deployed from the rocket in space, at an altitude of more than 350 miles, the rocket had not reached sufficient velocity to achieve orbit. The rocket and all four satellites onboard ultimately crashed into the Antarctic Ocean or southern Pacific Ocean.

MSU's satellite was never recovered, but its twin was already built and scheduled for flight. Students in the SSEL commonly build spares and backups, Klumpar said.

"When we started working on the Explorer-1 [Prime] many years ago, it was always the case that we would build a second unit in parallel with the first one," Klumpar said. "It's useful because if the first one had gone into orbit and an anomaly or strange behaviors had come up, we would have been able to use the twin down here to get a feel for what was going on there."

In the past six months, the twin has gone through rigorous testing that "gives us confidence that it was as good as the first one," Klumpar said. The current Explorer-1 [Prime] has been in California since Aug. 25. It was stored in a clean room at San Luis Obispo and double-bagged with nitrogen to keep out dust and moisture. The satellite headed to the Air Force base on Oct. 15 to be bolted to the rocket.

The Mission

MSU built the Explorer-1 [Prime] to replicate the scientific mission of the Explorer-1 mission which was launched on Jan. 31, 1958, and detected the existence of a band of energetic charged particles held in place by the Earth's magnetic field. The band was named the Van Allen Radiation Belt after the late James Van Allen, who directed the design and creation of instruments on Explorer-1.

Van Allen was head of the physics department when Klumpar was a master's degree student at the University of Iowa. Years later, Van Allen spoke at Klumpar's 40th high

school class reunion, and Klumpar told him about MSU's project. Van Allen suggested naming the satellite the Explorer-1 [Prime]. He later sent Klumpar some Geiger Tube radiation detectors from the Pioneer 10 mission, the first mission to leave the solar system.

One of the detectors rode in the Explorer-1 [Prime] satellite last spring to measure the intensity and variability of the electrons in the Van Allen belts. The intense radiation in the belts can damage space-borne objects and pose a danger to astronauts, making it imperative to understand its variability.

Another tube from Van Allen is in the satellite's twin. The satellite is also carrying solar cells for power, a radio receiver and transmitter, and a computer system to operate the entire device.

The satellite project is sponsored by the Montana Space Grant Consortium based at MSU. More than 125 undergraduate students have worked on the Explorer-1 [Prime] since the summer of 2006.

Dan Schwendtner, KE7SXF, a former SSEL graduate research assistant and now a master's degree student in mechanical engineering, said that he expected to watch the upcoming launch from Bozeman, Montana. He made the vacuum system that tested Explorer-1 [Prime] and said it was the first time that any SSEL satellite had been tested in an SSEL vacuum system. "It was important for me," Schwendtner commented. "It was part of the culmination of four years of work."

Information for this piece was derived from an article by Evelyn Boswell, of Montana State University, and is located at: <http://www.spaceref.com/news/viewpr.html?pid=35029>.

M-Cubed

One of two CubeSats launched by the University of Michigan, the M-Cubed, is a single CubeSat that has been granted a non-amateur experimental license by the FCC. It is proposing a V/U transceiver using 9k6 AX25 packet. The mission objectives for the Michigan Multipurpose Minisatellite (M-Cubed) are to capture mid-resolution images of the Earth from Low Earth Orbit, perform a technology demonstration for a novel new Field Programmable Gate Array (FPGA), and train the next generation of Aerospace Engineers.

Testing the FPGA on a CubeSat platform will provide valuable information as to how it survives Low Earth Orbit and how well it operates when processing real-image data. M-Cubed implements a 2-MP CMOS camera that will transfer the image to the FPGA upon request. To acquire the images on the ground post-processing, M-Cubed will downlink the images and FPGA data via UHF. To receive commands for scheduling picture taking opportunities, M-Cubed will be listening over VHF.

M-Cubed is also an educational project for engineering students at the University of Michigan. M-Cubed provides hands-on experience for students who would not otherwise have the opportunity to build flight hardware for a space mission. The training these students gain by working on this project will better prepare them for work in the aerospace industry after graduation.

As a secondary objective, M-Cubed is implementing storage of RSSI values at various frequencies in its bandwidth. This means M-Cubed can provide an RFI survey inside its band during mission operations. Additionally, M-Cubed is investigating the possibility of allowing open downlink of collected images in the amateur community.

Because of the strict power requirements and longer downlink times (images ~MB and downlink rate 9.6 kbps), this may

not be feasible, particularly not during operation of the FPGA. However, it is still under consideration as a secondary objective. This information can be provided to the IARU upon successful completion of M-Cubed's primary objective and this survey.

When not taking images or downlinking pictures, M-Cubed will be beaconing telemetry over UHF at specified intervals. This will be so that the University of Michigan and other operators in the AMSAT community can help track M-Cubed on orbit.

Information for this piece was derived from the AMSAT piece at this URL: <http://www.amsat.org/amsat-new/satellites/satInfo.php?satID=142&retURL=/satellites/status.php>. More information on this CubeSat can be found at: <http://www.umcubed.org/>.

Radio Aurora Explorer (RAX-2)

RAX-2 is the second CubeSat of the Radio Aurora Explorer program. The first RAX CubeSat was launched via the Department of Defense Space Test Program aboard a Minotaur-4 vehicle from Kodiak, Alaska, on November 20, 2010 at 01:25 UTC.

The primary objective for the RAX mission is to study the formation of field-aligned irregularities (FAI) in the lower portion of the polar ionosphere. To characterize these anomalies, a ground-based radar transmitter will be used in conjunction with the space-based receiver onboard RAX to measure FAI intensity, altitude distribution, and degree of alignment to the magnetic field.

This ground-based radar (called the Poker Flats Incoherent Scatter Radar, or PFISR) will transmit RF pulses into the ionosphere to be scattered off the FAI structures. See photo 4. The received signal magnitude and phase will be recorded, processed, and downloaded for analysis by the mission science teams. This process will repeat daily for approximately one year of science operations.

In addition to studying FAI, the secondary objective is to use the wide-band science receiver to characterize ambient RF emission levels in the 430–434 MHz and 437–438 MHz portions of the UHF band as a function of position and time over the United States. This information will be of particular benefit to Amateur Satellite Service coordinators who are charged with coordinating frequencies for the numerous amateur spacecraft operating in Low Earth Orbit.

Because of the large ground-coverage area, this information can also be beneficial to terrestrial coordinators. Identifying portions of the band with excessive RF noise will help coordinators assign frequencies clear of potentially harmful interference within the Amateur Radio Service.

These measurements will be made at the conclusion of the primary mission with potential to be conducted during breaks in primary mission operations. As with all data collected during this mission (including telemetry and mission science results), the measurements will be published and easily accessed by the amateur radio community at large on the web at <http://rax.engin.umich.edu/>. RAX-2 is 3U CubeSat with a coordinated downlink on 437.345 MHz. Also planned for the mission is a spread spectrum transceiver in the 2.4-GHz band.

The objective of the RAX mission is to understand the microphysics that lead to the formation of magnetic field-aligned plasma irregularities (FAI), an anomaly known to disrupt communications with orbiting spacecraft.

The RAX mission is specifically designed to remotely measure, with extremely high angular resolution, the 3-D k-spectrum (spatial Fourier transform) of ~1 m scale FAI as a function of altitude, in particular measuring the magnetic field alignment of the irregularities.

The RAX mission will use a network of existing ground radars that will scatter signals off the FAI to be measured by a receiver on the RAX spacecraft. The spacecraft will measure "radio aurora," or the Bragg scattering from FAI that are illuminated with a narrow beam incoherent scatter radar (ISR) on the ground. This remote sensing method is based on the powerful mathematical relation that the radio aurora

Photo 4– Incoherent scatter radar at Poker Flats Research Range (PFISR) during high auroral activity. (Photo courtesy the University of Michigan)

intensity is proportional to the irregularity k-spectrum evaluated at the Bragg wave number.

The proposed ground-to-space bistatic radar experiment highly resolves the k-spectrum, which means that the sensed volume of plasma is homogeneous and that the received signal contains a pure content of wave vectors, which are important for accurate analysis of wave growth and damping. Moreover, each experiment will be tagged with the convection electric field Ec, a principal driver of the irregularities, which will be measured (besides altitude profiles of plasma density and temperatures) by the ISR immediately before and after each experiment.

The RAX mission is a unique opportunity to quantify plasma processes in a homogeneously resolved volume of plasma with the driving force and the effect measured effectively simultaneously.

The University of Michigan principal investigator is Professor James Cutler, KF6RFX. Payload Software and Communications is being handled by Kyle Leveque, KG6TXT. Information for this piece was derived from the following: <http://www.amsat.org/amsat-new/satellites/satInfo.php?satID=141&retURL=/satellites/status.php> and <http://rax.engin.umich.edu/?page_id=13>. The RAX mission website is: <http://rax.sri.com/index.html>. More information on the mission and experiments can be found at this URL: <http://rax.engin.umich.edu/>. A home video of the launch can be seen here: <http://www.youtube.com/watch?feature=player_embedded&v=lYLnl4xrTQA>.

AubieSat-1 Gets OSCAR Designator

The following is from the AMSAT News Service:

OSCAR Number Administrator Bill Tynan, W3XO reports that he has advised J. M. Wersinger, PhD, KI4YAU, Professor Emeritus and Director of Auburn University's Student Space Program, that following the successful NASA ELaNa III launch on October 28, 2011 of AubieSat-1, and by the request of the AubieSat-1 team, the new satellite has been assigned an OSCAR number.

Professor Wersinger documented that telemetry has been received from the satellite. The IARU-Sat Website states that AubieSat-1 was fully coordinated with the IARU.

Bill wrote, "Therefore, by the authority vested in me by the AMSAT-NA President, I hereby designate AubieSat-1 as AubieSat Oscar 71 or AO-71 and welcome this newest OSCAR into the Amateur Radio satellite community. On behalf of AMSAT-NA and the world's amateur radio satellite community, I congratulate Professor Wersinger, Auburn University and all of those responsible for building, testing and launching this new CubeSat. May its mission meet with success."

AMSAT News Service Runs OSCAR 1 Announcement

For the past couple of months the AMSAT News Service has been re-running the Project OSCAR Newsletters to commemorate the 50th anniversary of OSCAR 1. For details, see:<http://www.amsat.org/amsat-new/news/>.

Current Contest

The ARRL VHF Sweepstakes is scheduled for the weekend of January 21–23. For ARRL contest rules, see the issue of *QST* prior to the month of the contest or: <http://www.arrl.org>.

Current Meteor Shower

The *Quadrantids,* or *Quads*, is a brief, but very active meteor shower. The expected peak is around 0720 UTC on 4 January, with approximately 120 meteors per hour at its peaks. The actual peak can occur three hours before or after the predicted peak. The best paths are north-south. Long-duration meteors can be expected about one hour after the predicted peak.

For more information on the above meteor shower predictions see Tomas Hood, NW7US's "Propagation" column elsewhere in this issue. Also visit the International Meteor Organization's website: <http://www.imo.net>.

And Finally . . .

Driving these CubeSats' development are many, many students—students from four different universities who have been inspired by peers and mentors to build and do great things. These students are among the future of amateur radio. It is a privilege to be able to report on their work in this column.

If you know of students who are making a difference in our wonderful hobby, please send their information to me at: <n6cl@sbcglobal.net>.

Until next month . . .

73 de Joe, N6CL

Study with the best! License Study Materials by Gordon West, WB6NOA & the W5YI Group

AMATEUR RADIO HAM IT UP! A NATIONAL RESOURCE

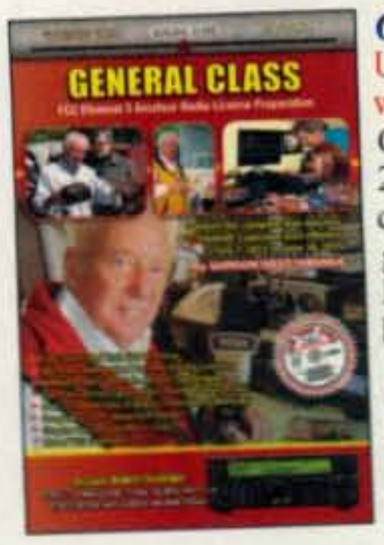
TECHNICIAN CLASS

***Technician Class* book**
for the 2010-2014 entry level exam! Gordo reorganizes the Q&A into logical topic groups for easy learning! Key words are highlighted in his explanations to help you understand the material for test success. Web addresses for more than 125 helpful, educational sites. Includes *On The Air* CD demonstrating Tech privileges. **GWTM $20.95**

Tech Book & Software Package
Gordo's book with W5YI software allows you to study at your computer and take practice exams. Explanations from Gordo's book are on the software – answer a question wrong and his explanation appears to reinforce your learning. Includes free Part 97 Rule Book. **NCS $29.95**

Tech Audio Course on CD
Welcome to Gordo's classroom! Technician audio theory course recorded by Gordo talks you through the Element 2 question pool. Follows the order of his ***Technician Class*** book, and is full of the sounds of ham radio operating excitement! An excellent study aid if you spend a lot of time in your car or pick-up! On 4 audio CDs. **GWTW $29.95**

GENERAL CLASS



***General Class* book**
Upgrade to the HF bands with Gordo & W5YI!
Gordo's manual for 2011-2015 reorganizes all the questions into logical topic groups for easier learning. His explanations include highlighted key words to help you remember the material for test success. Companion CD is full of great operating tips! Available about May 1st.
GWGM $24.95

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

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

EXTRA CLASS

***Extra Class* book**
Go to the top with Gordo!
2008-2012 book includes all Element 4 Q&A reorganized into logical topic groups. Gordo's fun, educational explanations with highlighted keywords, and great memory tricks for those tough theory questions! Wait 'til you meet "Eli the Ice Man!"
GWEM $24.95

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

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

Ham Operator Software has All Exams

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

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

NEW!

Using Your Meter

Teach yourself the correct use of your multitester. Book explains fundamental concepts of electricity including conventional and electron current and series and parallel circuits. It teaches how analog and digital meters work and tells you what the voltage, current and, resistance measurements mean. Then it provides fully-illustrated, step-by-step instruction on using your meter in practical applications in the home, workshop, automotive and other settings. An excellent learning tool and reference for the hobbyist and ham. **METR $24.95**

GROL + RADAR

Get your FCC commercial radio licenses and add valuable credentials to your resume! ***GROL+RADAR*** includes the new FCC Element 1 question pool for the Marine Radio Operator Permit (MROP), the Element 3 pool for the General Radiotelephone Operator License (GROL), and the Element 8 pool for the RADAR Endorsement. Many employers require these licenses for jobs in marine, aero, safety, and municipal positions. Gordo and his team have written clear explanations for all the Q&A to make studying for these exams educational and fun. If you're an Extra Class ham, many of the technical/math questions will look familiar to you. Fully-illustrated to aid your learning. Book includes a searchable CD-ROM with all FCC Rules for Parts 2, 13, 23, 73, 80 and 87. **GROL $49.95**

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

Getting Started in Electronics

by Forrest M. Mims
A great introduction for anyone who wants to learn the fundamentals of electronics. Includes 100 projects you can build, and great experiments that demonstrate how electricity works! **GSTD $19.95**

Engineer's Mini Notebooks

These Mims classics teach you hands-on electronics! Study and build 100s of practical circuits and fun projects. Each volume contains several of his famous Mini Notebooks. Terrific ideas for science fair projects and a great way to learn about electronics! Useful reference guides for your workbench!

Vol. 1: *Timer, Op Amp, & Optoelectronic Circuits & Projects* **MINI-1 $12.95**

Vol. 2: *Science & Communications Circuits & Projects* **MINI-2 $12.95**

Vol. 3: *Electronic Sensor Circuits & Projects* **MINI-3 $12.95**

Vol. 4: *Electronic Formulas, Symbols & Circuits* **MINI-4 $12.95**

Order today from W5YI: 800-669-9594 or on-line: www.w5yi.org

The W5YI Group P.O. Box 200065 Arlington, TX 76006-0065 *Mention this ad for a free gift.*

CQ

Results of the 2011 CQ WW WPX SSB Contest

BY RANDY THOMPSON,* K5ZD

Where were you when the clock ticked past 0000Z on March 26, 2011? Sitting in California freeway traffic at 4 PM on a Friday afternoon? Taking an afternoon walk at 1 PM on Saturday in New Zealand? Perhaps you were waking up from a pre-contest nap at 2 AM in Moscow? Or enjoying a cool evening at 9 PM in Argentina? Or finishing breakfast at 9 AM in Japan? A global DX competition doesn't wait until you are ready to go. It starts. For thousands of contesters around the world, the start of the 53rd CQ WW WPX SSB Contest was just what they were waiting for.

The clock ticked over and the bands filled with activity and excitement. Thousands of voices strained to be heard. For those at the receiving end of a pile-up the experience was exhilarating. For others, it was all about the thrill of discovering what the next turn of the dial would deliver. K8TE captured his experience this way: "Nice to hear so many stations! QRM is good!"

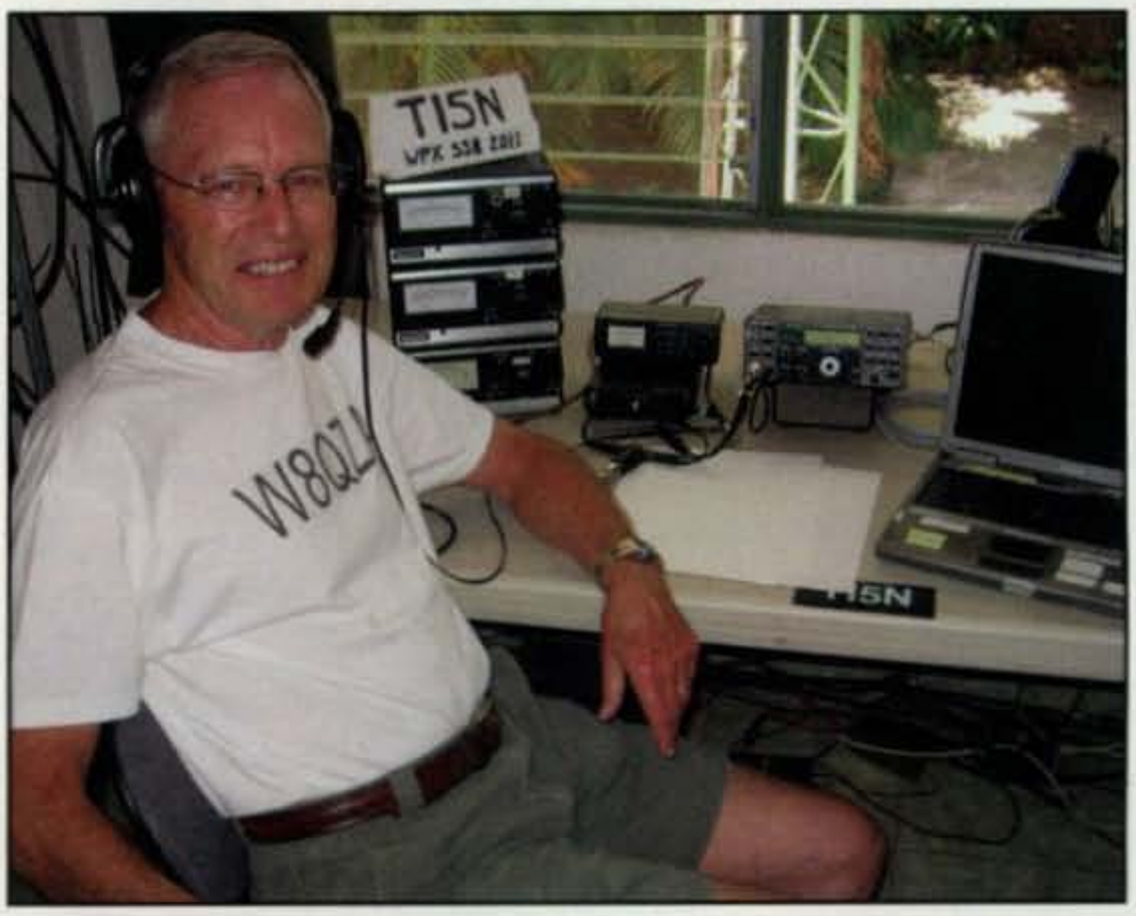
The band that generated the most excitement was 15 meters. Propagation was incredible with openings in what seemed like every direction. Long path, short path, or over the pole, many entrants noted that these were the best conditions they had ever experienced on the band. The scoring record for the single band 15 meter category fell at the World (CN2R), Asia (JA6GCE), Europe (CS2C), North America (VP2EH), and USA (KQ2M/1) levels.

When the 48 hours was over, the bands suddenly seemed empty. Satisfied operators sat back in their chairs, rubbed their tired ears, and sighed with contentment. KØJDD was happy: "First time to reach 1-million points." KG6DX exclaimed, "WOW, great conditions on 15. ... My first time ever breaking 1000 prefixes." AF2O showed why the contest activity keeps growing each year: "This was my first CQ WPX Contest and I can't wait for the next one." A record 5,143 logs were submitted showing contest activity from 208 countries!

One thing that makes the CQ WPX Contest so interesting is the use of callsign prefixes as multipliers. The gang at DR1A logged 1909 prefixes to increase their record count from just a year ago by almost 200! An amazing 217 entries exceeded 1000 prefixes after log checking. The top single operator prefix collector was CN2R, who worked 1443 prefixes (another record) and did it all on—where else?—15 meters! Each year it seems there are more and more interesting prefixes, both from the issuance of new callsign blocks as well as imaginative calls celebrating various events. Special thanks to those stations who provided some of the more interesting prefix multipliers: 3V1A, 4X2ØHC, BQ1ØØ, BV1ØØ, DK15ØRB, DR15ZBAY, HG2Ø11N, L9ØAA, LZ133GO, LZ137ØPRT, OH1ØX, RI1ANC, S52ØSCC, S52ØSLO, TC3C, TM72C, TM9ØLH, TO11A, VQ51V, YM7KA, and ZL5ØGH.

Single-Operator All Band

Returning to the top spot in the Single Operator All Band High Power category was Tom, W2SC, operating from 8P5A in Barbados. Tom expressed some frustration that the great conditions resulted in more multipliers, but not in a higher score than in 2010. Every continent except Africa was represented in the top 10. Jeff, K1ZM, pushed VY2ZM to world #2. The next three places were all close, with KH7X (op Mike, KH6ND) just beating the Oceania record to take third. Braco, E7DX, destroyed the European record by more than 25%. In only his third single op SSB contest and first in five years, John, W6LD, operated P4ØL from Aruba to fifth place and set a new record for South America. The best score from Asia was made by Anatoly, RC9O, just ahead of Vladimir, UN9LW, at UPØL. Anatoly missed breaking the Asia record by less than 1%.



Bill, W8QZA, looks very pleased with his world high score in the QRP category operating from TI5N. (Photo by TI5KD)

Krassy, K1LZ, ran away with the top USA score for Single Op All Band. Paul, K8PO, once again operating as AJ1I, finished second. Mitch, K7RL, borrowed the callsign KW7Y and made an incredible effort from the Pacific Northwest to finish third. NN5J (op Kevin, N5DX) and George, NR5M, had a fierce fight for WRTC qualifying points that ended in a virtual tie.

The most popular category in the contest is Single Op All Band Low Power, this time with 1508 logs submitted. Just as we saw in high power, there was no place like Barbados. Yuri, VE3DZ, stayed away from the beach long enough to pilot 8P3A to the top spot and a new North American record for the category. The top Africa score was by Ashraf, 3V8SS, from Tunisia. Daniel, LW6DG, finished in fourth place and set a new country record for Argentina. The European battle was won by Mitrut, YO3CZW, finishing ahead of Tine, S5ØA. Top Asia score went to the nifty callsign of H22H, operated by Spyros, 5B4MF.

Ed, N1UR, masquerading as NV1N, achieved a personal best score and dominated the USA low power entries with over 4-million points. The real race was for second place, with Ryan, KZ9O, finishing just a few points ahead of Terry, N4TZ, the op at KS9K. Ryan was originally planning to operate from WØAIH, but a snow storm cancelled the trip. He did a great job from his home station instead. Doug, WB8TLI, and Guy, N7ZG, put up a spirited fight for fourth.

Single-Operator Single Band

Jim, W7EJ, continued his effort to write CN2R into the world records one year and one band at a time. This year the target was 15 meters. Jim now owns the all band record plus each of the single band records from 160 meters to 15 meters. Wonder which band he will operate next? Jim also ended the five year run of 15 meter single band victories by Sergio, PP5JR. Sergio, operating his contest call

*e-mail: <k5zd@cqwpx.com>

TROPHY WINNERS AND DONORS

SINGLE OPERATOR ALL BAND

WORLD: Stanley Cohen, W8QDQ Trophy. Won by: **8P5A operated by Tom Georgens, W2SC**
WORLD Low Power: Caribbean Contesting Consortium Trophy. Won by: **8P3A operated by Yuri Onipko, VE3DZ**
WORLD QRP: Phil Krichbaum, NØKE Trophy. Won by: **TI5N operated by Bill Parker, W8QZA**

USA: Atilano de Oms, PY5EG Trophy. Won by: **Krassimir Petkov, K1LZ**
USA Low Power: Terry Zivney, N4TZ Trophy. Won by: **NV1N operated by Edward Sawyer, N1UR**
USA QRP: Doug Zwiebel, KR2Q Trophy. Won by: **Randy Shirbroun, NDØC**
USA Zone 4 High Power: Society of Midwest Contesters Trophy. Won by: **NN5J operated by Kevin Stockton, N5DX**
USA Zone 4 Low Power: Society of Midwest Contesters Trophy. Won by: **Ryan M. Klavekoske, KZ9O**
USA Zone 3 High Power: Lauri "Mac" McCreary, KG7C Trophy. Won by: **KW7Y operated by Mitch Mason, K7RL**
USA Zone 3 Low Power: Buz Reeves, K2GL Memorial Trophy. Won by: **Guy Molinari, N7ZG**

EUROPE High Power: Jim Hoffman, N5FA Trophy. Won by: **E7DX operated by Emir Memic, E77DX**
EUROPE Low Power: Ed Sawyer, N1UR Trophy. Won by: **Mitrut Marius, YO3CZW**
EUROPE QRP: Rick Williams, VE9HF Trophy. Won by: **Frank Paulus-Rieth, DL8LR**

AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **ST2AR operated by Robert Kasca, S53R**
ASIA: Chris Terkla, N1XS Trophy. Won by: **Anatoly Polevik, RC9O**
NORTH AMERICA: Albert Crespo, F5VHJ Trophy. Won by: **TO5A operated by Albert Crespo, F5VHJ**
NORTH AMERICA QRP: Phil Krichbaum, NØKE Trophy. Won by: **no entry**
OCEANIA: Phillip Frazier, K6ZM Memorial Trophy. Won by: **KH7X operated by Michael Gibson, KH6ND**
SOUTH AMERICA: Andrew Faber, AE6Y Trophy. Won by: **P4ØL operated by JOHN A. FORE, W6LD**

CANADA High Power: Todd Bendtsen, VE5MX Trophy. Won by: **VY2ZM operated by Jeffrey T. Briggs, K1ZM**
CANADA Low Power: Contest Club Ontario Trophy. Won by: **Steven Goldberg, VA3SWG**
JAPAN: Hamad Alnusif, 9K2HN Trophy. Won by: **Akira Minagawa, JAßJHA**

SINGLE OPERATOR, SINGLE BAND

WORLD: Steve Merchant, K6AW Trophy. Won by: **CN2R operated by James P Sullivan, W7EJ**
WORLD 28 MHz: Jorge Taboada, EA9LZ Trophy. Won by: **Juan Manuel Morandi, LU1HF**
WORLD 21 MHz: Stuart Santelmann KC1F Memorial (W3UA/RA3AA sponsor) Trophy. Won by: **VP2EH operated by Gordon Fogg, N5AU**
WORLD 14 MHz: Jorge Taboada, EA9LZ Trophy. Won by: **Pedro Claver Orozco, HK1X**
WORLD 7 MHz: Jorge Taboada, EA9LZ Trophy. Won by: **Salim Gechem, HK1T**
WORLD 7 MHz Low Power: Neal Campbell, K3NC Trophy. Won by: **Valeri Keller, DL2VK**
WORLD 3.7 MHz: D4C Contest Team Trophy. Won by: **9A4ØY operated by Sasa Pokorni, 9A3LG**
WORLD 1.8 MHz: UA2 Contest Club Trophy. Won by: **Fabio Piccinini, I4FYF**

USA 28 MHz: Maurice Schietecatte, N4LZ Trophy. Won by: **KZ5MM operated by Chuck Dietz, W5PR**
USA 21 MHz: Maurice Schietecatte, N4LZ Trophy. Won by: **Robert L. Shohet, KQ2M/1**
USA 14 MHz: Charles Wooten, NF4A Trophy. Won by: **John Bayne, KK9A/4**
USA 7 MHz: Yankee Clipper Contest Club Trophy. Won by: **WU3A/1 operated by Eugene Shablygin, W3UA**
USA 3.7 MHz: Bernie Welch, W8IMZ Memorial (WB8MRU sponsor) Trophy. Won by: **Steven Sussman, W3BGN**

EUROPE 28 MHz High Power: SKY Contest Club Trophy. Won by: **CR2T operated by Eduardo M. F. S. Machado, CU2AF**
EUROPE 21 MHz High Power: SKY Contest Club Trophy. Won by: **CS2C operated by Jiri Pesta, OK1RF**
EUROPE 14 MHz High Power: SKY Contest Club Trophy. Won by: **Sigurdur Jakobsson, TF3CW**
EUROPE 7 MHz High Power: SKY Contest Club Trophy. Won by: **EI7M operated by Dmitrij Pavlov, EI3JZ**
EUROPE 3.7 MHz High Power: SKY Contest Club Trophy. Won by: **9A8M operated by Igor Ovcin, 9A7DM**
EUROPE 1.8 MHz High Power: SKY Contest Club Trophy. Won by: **OG6A operated by Jukka Klemola, OH6LI**

SINGLE OPERATOR ASSISTED

WORLD: Emir-Braco Memic, OE1EMS Trophy. Won by: **ER4A operated by Sergey Rebrov, UT5UDX**
USA: Alabama Contest Group Trophy. Won by: **Rick Davenport, KI1G**
EUROPE: Martin Huml, OL5Y Trophy. Won by: **LX7I operated by Philippe Lutty, DF1LON**

OVERLAY CATEGORIES

WORLD Tribander/Single-Element: Helmut Mueller, DF7ZS Trophy. Won by: **3V8SS operated by Ashraf Chaabane, KF5EYY**
USA Tribander/Single-Element: Paul Newberry, N4PN Trophy. Won by: **KR4Z operated by Paul H. Newberry, Jr., N4PN**
USA Tribander/Single-Element Low Power: Al Josza, KG1E Trophy. Won by: **Jere Connan, KT4ZB**
Europe Tribander/Single-Element: Roger Miner, K1DQV Trophy. Won by: **E74HH operated by Vitomir Kregar, S56M**
WORLD Rookie: Val Edwards W8KIC Memorial (K3LR sponsor) Trophy. Won by: **Abdalla Farmawi, JY5CC**

MULTI-OPERATOR, SINGLE-TRANSMITTER

WORLD: Latvian Contest Club Trophy. Won by: **3V1A operated by YT1AD, YT3M, YT3W, S56A**
USA: Steve Bolia, N8BJQ Trophy. Won by: **AK1W operated by K5ZD, W1UJ**
AFRICA: Rhein Ruhr DX Association Trophy. Won by: **6V7D operated by UAØSC, UAØSE, UAØSW, RZØSR**
ASIA: W2MIG Memorial (NX7TT Sponsor) Trophy. Won by: **P33W operated by 5B4AIE, RA6LBS, RA3AUU**
EUROPE: Tonno Vahk, ES5TV Trophy. Won by: **TM6M operated by F1AKK, F4DXW, F8DBF**

MULTI-OPERATOR, TWO-TRANSMITTER

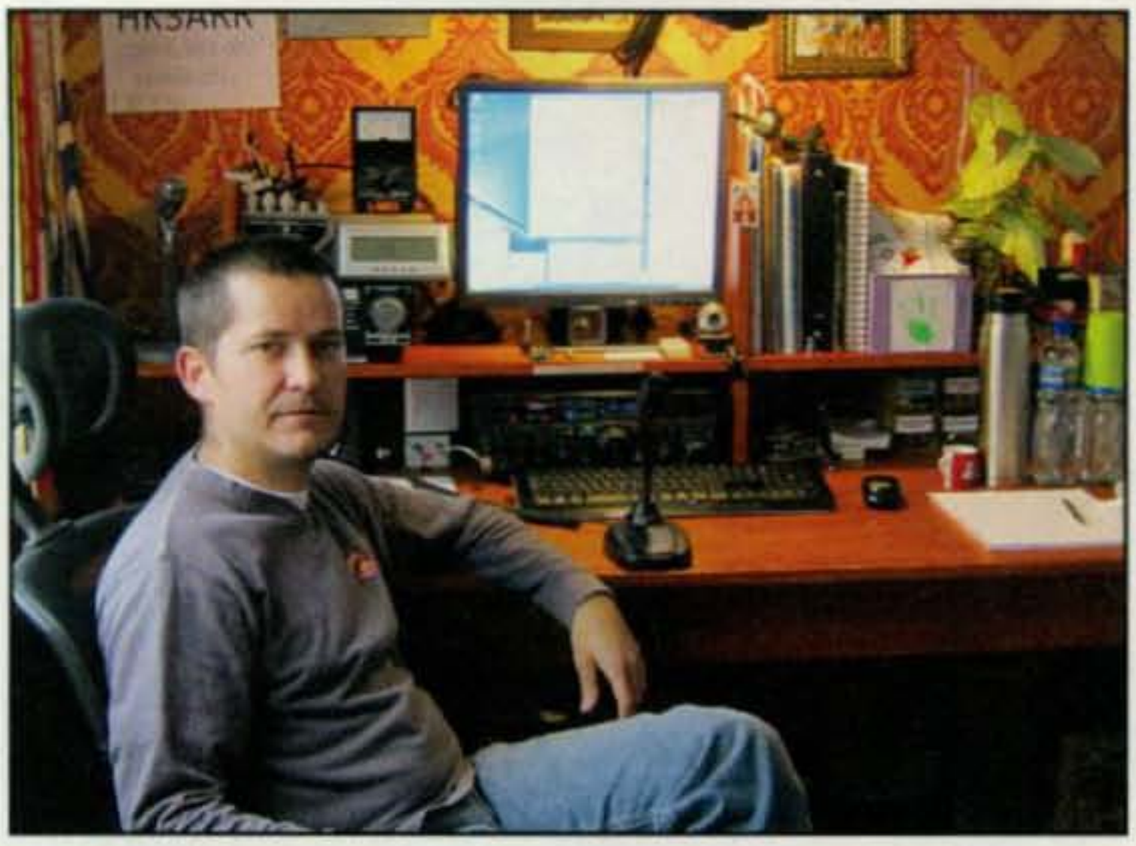
WORLD: Ken Adams, K5KA Memorial Trophy. Won by: **EB8AH operated by EA5DY, EA5DFV, OH6RX, EA8ZS, EA8AH, EA8CAC**
USA: Florida Contest Group Trophy. Won by: **KD4D/3 operated by AC6WI, W2CDO, K3RA, KD4D, WB2ZAB**
AFRICA: Walter Skudlarek, DJ6QT Trophy. Won by: **5D5A operated by N6KT, IK2SGC, IK2QEI**
EUROPE: Bernd Och, DL6FBL Trophy. Won by: **OL4A operated by OK1FFU, OK1RI, OK8WW, OM5AW, OM6NM**

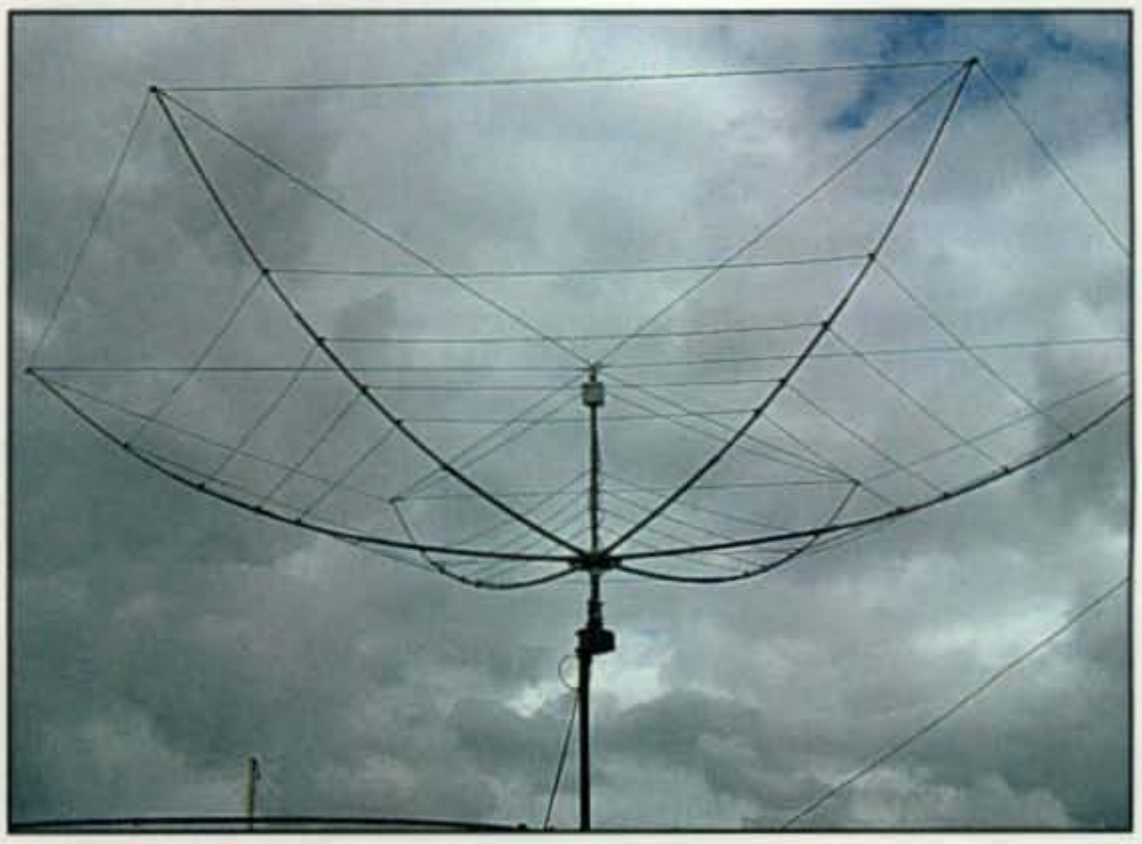
MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Gail Sheehan, K2RED Trophy. Won by: **DR1A operated by DB6JG, DF6JC, DJ7EO, DK6XZ, DL1QQ, DL3BPC, DL3DXX, DL6FBL, DL8DYL, DL8WPX, JK3GAD, PC5A, SV2KBS**
USA: Dale Hoppe, K6UA Memorial Trophy. Won by: **WX3B operated by WX3B, N8IVN, KB3CS, NY3A, N3YIM, KU1T, N3VOP, N3WZR, N3AFT, KC3VO, K1RH, KA3ITJ, N3SB**
EUROPE: Rick Dougherty, NQ4I Trophy. Won by: **OT5A operated by Arno, DF3TJ, Dorien, Marleen, ON1GL, ON3AEI, ON3AGM, ON3NG, ON4ADQ, ON4AEO, ON4AID, ON4AMI, ON4AQC, ON4ASB, ON4AWU, ON4CCL, ON4CCM, ON4CDE, ON4CJK, ON4GW, ON4JZ, ON4RK, ON4XB, ON5AEI, ON5CD, ON5CIM, ON5OT, ON5PVH, ON5UE, ON5UM, ON6LK, ON6LUQ, ON6MR, ON6PU, ON6SX, ON6UU, ON6YYY, ON7BRA, ON7JU, ON7NB, ON7SU, ON7USB, ON8MT, ON8TK, ON8UM, ON9CC, PA1BX, Timon**

CONTEST EXPEDITION

WORLD: C6APR Memorial (PT7ZZ sponsor) Trophy. Won by: **3D2A operated by OZ1IKY, VK4AN**





Anibal, HK3ARR, entered the WPX Contest for the first time and finished second in the world in 20 meters QRP.

ZX5J, ended up third behind a North American record score from VP2EH, operated by Gordon, N5AU. Bob, KQ2M, and CS2T (operated by Jiri, OK1RF) both set new records in their chase for fourth place overall. Special congratulations to Nobuo, JA6GCE, who broke the Asia record that has stood since 1992!

The solar radiation that made 15 meters so exciting also enhanced 10 meters. The number of 10 meter QSOs logged showed an increase of more than 100% over the total reported in 2010! The top six 10 meter scores in the world came from South America—taking full advantage of the north-south propagation into Europe and North America. Juan, LU1HF, returned to his usual place at the top of the 10 meter scores. AY5F, operated by Jesus, LU5FC, finished second just ahead of last year's winner, Walter, PP5WG, operating as PW5G. The top European score was from CR2T in the Azores, operated by Eduardo, CU2AF. Ten meter specialist Chuck, W5PR, operating as

WORLD TOP SCORES

SINGLE OPERATOR HIGH POWER
ALL BAND
8P5A (W2SC)	23,277,792
VY2ZM (K1ZM)	21,257,127
KH7X (KH6ND)	20,676,524
E7DX (E77DX)	20,438,120
P4ØL (W6LD)	20,415,539

28 MHz
LU1HF	11,168,770
AY5F (LU5FC)	9,614,682
PW5G (PP5WG)	8,832,948

21 MHz
CN2R (W7EJ)	20,704,164
VP2EH (N5AU)	14,899,185
ZX5J (PP5JR)	12,588,004

14 MHz
HK1X	13,783,532
TF3CW	7,473,415
OH4A (OH6KZP)	6,886,168

7 MHz
HK1T	11,997,104
EI7M (EI3JZ)	10,787,690
MW5A (GW4BLE)	9,480,054

3.7 MHz
9A4ØY (9A3LG)	2,468,252
H2T (5B4XF)	2,282,334
4L4CC	2,126,729

1.8 MHz
I4FYF	569,080
NT1E/8 (K3BU)	321,043
OG6A (OH6LI)	298,452

SINGLE OPERATOR LOW POWER
ALL BAND
*8P3A (VE3DZ)	11,958,208
*HI3TEJ	7,886,235
*3V8SS (KF5EYY)	6,999,180
*LW6DG	5,330,350
*YO3CZW	4,499,880

28 MHz
*PU2LEP	3,202,920
*EA8TX	3,091,200
*PY2MTS	2,814,700

21 MHz
*HI3K	3,250,488
*EA7RU	2,360,484
*C4Z (5B4AIZ)	2,292,070

14 MHz
*HC1JQ	843,465
*P43E	811,308
*TG9AXF	775,280

7 MHz
*DL2VK	1,189,964
*UR7TZ	972,802
*HI3FVA	886,914

3.7 MHz
*S57DX	610,136
*SP9H	585,932
*ES2MC	402,992

1.8 MHz
*YT4A (YT1AA)	194,103
*S52WW	121,426
*ER2RM	117,810

SINGLE OPERATOR ASSISTED
HIGH POWER
ALL BAND
ER4A (UT5UDX)	17,039,808
KP3Z (NP4Z)	14,794,199
RG9A	13,166,048
LX7I (DF1LON)	13,148,064
KI1G	13,075,616

28 MHz
LR2F (LU2FA)	7,317,450
LU7HN	3,965,672
HK3O	2,408,406

21 MHz
9Y4W	8,063,286
HK1R	7,519,374
KG6DX	6,915,088

14 MHz
XP1A (OX3KQ)	8,303,460
US1I	4,744,214
EO3Q (UR3QCW)	4,436,640

7 MHz
YTØA (YT7AW)	9,905,910
RT3F (RV3MQ)	4,710,744
RU9CK	4,355,085

3.7 MHz
US2YW	1,958,076
IR4C (IZ4NIC)	1,553,035
EU1A	1,398,984

1.8 MHz
IQ4RA (I4AVG)	545,606
DF2UU	400,365
EU3AR	393,242

SINGLE OPERATOR ASSISTED
LOW POWER
ALL BAND
*VE2XAA	4,893,202
*HA3DX (HA4XH)	3,984,042
*HG3A (HA3MY)	3,977,508
*S53F	3,745,168
*RV9UP	2,899,552

28 MHz
*PY2SEX	2,025,650
*PU1KGG	890,880
*PY2XC	440,228

21 MHz
*IZ5EBL	1,771,893
*EI4CF	1,679,330
*EF7A (EC7ABV)	1,544,472

14 MHz
*UA6LUQ	958,850
*SP4DZT	903,139
*S59N	570,850

7 MHz
*7Z1SJ	2,345,776
*HG9X (HA9PP)	1,295,608
*OK1UG	677,376

3.7 MHz
*VY2MGY (VE3MGY)	388,120
*DO1HDR	386,508
*YT8WW	381,150

1.8 MHz
*SP8LBK	63,855
*E74AA	60,760
*YU1XX	33,375

SINGLE OPERATOR QRP
ALL BAND
TI5N (W8QZA)	1,295,910
NDØC	748,572
DL8LR	537,010
KA1LMR	476,856
SP2DNI	410,400

28 MHz
KP2/NE1RD	129,762
LU7VCH	93,280
IØUZF	86,742

21 MHz
KH6LC (NH6V)	600,336
VE3HG	154,814
YT1CS	142,896

14 MHz
TG9ANF	1,254,892
HK3ARR	150,911
VA7IR	124,232

7 MHz
SP4GFG	206,365
9A9L	119,544
UT8UL	49,096

3.7 MHz
HG6C (HA6IAM)	157,339
SP2QOT	143,488
K3TW/4	10,812

1.8 MHz
R7NP	30,590
RA4FWA	9,880

ROOKIE
ALL BAND
JY5CC	8,357,766
6Y1X (KD8MJR)	1,629,996
*UD3D (RN3DNM)	1,613,294
DL6ER	1,102,362
*EY7BJ	1,086,566

28 MHz
*PU8WWW	390,000
*PU2KIV	126,485
*CT2KFA	66,740

21 MHz
ZL2GQ	1,065,088
IQ4FA (IZ4UEZ)	375,224
KHØ/KH7ERI	348,899

14 MHz
*YO5LD	187,740
*RA4SAT	155,367
*II3HRT (IZ8OJG)	38,001

7 MHz
*RA3MAV	185,409
DX9M (DU9XO)	134,560
*K3DCW	42,160

3.7 MHz
*SQ2HNA	142,437
*YO2MKD	2,048

1.8 MHz
*RA4FWA	9,880

TRIBANDER/SINGLE ELEMENT
HIGH POWER
ALL BAND
ST2AR (S53R)	12,793,690
LR4E (LW4EU)	6,710,136
E74HH (S56M)	6,598,899
RT4RO	6,340,471
KR4Z (N4PN)	6,200,704

28 MHz
ZV2V (PY2LED)	3,609,686
PY2ADR	1,980,915
CA3OEV	940,730

21 MHz
K6ND/1 (N8BO)	6,793,222
EB3CW	4,227,038
VK6IR	2,263,494

14 MHz
9A5ADT	2,588,040
PY7ZY	2,495,682
8SØC (SMØMPV)	2,429,799

7 MHz
S51CK	2,367,513
ES2TI	1,571,119
OR7R	1,550,472

3.7 MHz
US2YW	1,958,076
9A8M (9A7DM)	1,466,160
EU1A	1,398,984

1.8 MHz
EA1DVY	24,024
EA3EIQ	16,020

TRIBANDER/SINGLE ELEMENT
LOW POWER
ALL BAND
*8P3A (VE3DZ)	11,958,208
*3V8SS (KF5EYY)	6,999,180
*VE2XAA	4,893,202
*DM2DX	2,742,168
*KV4FZ (N2TTA)	2,654,680

28 MHz
*EA8/DL3KVR (DL3KVR)	523,446
*LU8DCF	421,176
*LW6DAK	276,066

21 MHz
*EA7RU	2,360,484
*C4Z (5B4AIZ)	2,292,070
*IZ5EBL	1,771,893

14 MHz
*S57U	442,508
*IZ2JQP	246,202
*VA3GUY	226,590

7 MHz
*EC7KW	362,470
*IZ1DGG	276,624
*OK2PPM	171,864

3.7 MHz
*VY2MGY (VE3MGY)	388,120
*ON1CB	203,856
*R3LC	176,276

1.8 MHz
*YT4A (YT1AA)	194,103
*DD9WG	13,940
*VE3EDY	4,080

MULTI-OPERATOR
SINGLE TRANSMITTER
3V1A	31,345,522
TM6M	28,016,921
PS2T	27,820,287
P33W	26,560,953
RF9C	25,051,994

MULTI-OPERATOR
TWO-TRANSMITTER
EB8AH	68,072,520
5D5A	64,373,694
D4C	62,380,227
PJ2T	37,468,288
PW7T	37,437,568

MULTI-OPERATOR
MULTI-TRANSMITTER
DR1A	63,397,890
CR3A	61,601,040
LP1H	45,443,754
OT5A	31,900,698
HG2Ø11N	31,347,558

**Low Power*

What's New At SteppIR?

High strength glass filled plastic motor shaft.
Made in USA

High strength glass reinforced plastic 40/30 loop couplers. Secure connection with waterproof seal.
Made in USA

BigIR Mark IV with wind reinforcing kit. The new BigIR version utilizes an aluminum reinforcing plate and saddles to transfer wind force away from EHU.

Molded high strength EHU housing. Made of a proprietary plastic material for added strength and weather resistance.
Made in USA

Introducing:
Adam Blackmer, K7EDX
Operations Manager
Adam is very high-energy and brings with him 20 years of construction management experience. His attention to detail, coupled with a vision for perfection, has already lead to significant improvement in manufacturing!

SteppIR website.
At SteppIR, we benefit greatly from many customers that simply want to help us get better. Brian Moran N9ADG spent a considerable amount of time helping us create a new website, which will be a continually growing and evolving means of communication with our customers.

High strength extruded solid aluminum saddles, no backing plate required, stainless steel set screws significantly enhance grip torque. 1.75", 2", 2.25", 2.5" and 3" OD sizes.
Made in USA

SteppIR™

2112 116 Ave NE #1-5, Bellevue, WA 98004
Tel: 425.453.1910 sales@steppir.com

KZ5MM, generated the top USA score. Chuck worked a number of Europeans during openings on both days. Don't forget to check 10 meters in 2012!

While the improved conditions on the high bands helped spread the load, 20 meters was still packed with activity and QRM. Finishing with the second highest 20 meter single band score ever, and a new South America record, was Pedro, HK1X, operating from the up-and-coming Jumanji farm station. The old record was from 1995! Three Europeans battled it out for second place, with Siggi, TF3CW, pulling ahead on the strength of a 10-hour run Saturday on the prime frequency of 14.154 MHz. Kim, OH6KZP, pushed OH4A to third place over Goran, S55OO, at S55T. Kim moved up in the log checking on the benefit of a very accurate log.

The top USA score on 20 meters was a real horse race between John, KK9A, in North Carolina, and Dan, W7WA, in Washington. It was a classic East Coast vs. West Coast match up, with Dan having more QSOs and multipliers, but John winning on the basis of more DX contacts. John celebrated his birthday on Sunday of the contest by not leaving his operating chair once during the last seven hours.

The 40 meter Single Band category offered some of the best competition and some of the most difficult QRM of the weekend. It seems the entire world was packed into 7125 to 7200. Whatever happened to working split?

Alexei, VE2XAA, finished as World high score for Single Op Assisted Low Power. Alexei became a Silent Key in August, never knowing of his victory.

Sal, HK1T, operating from the Jumanji farm superstation, took first place on 40 meters and broke the South America record set by ZX9A back in 1997. Close behind was Dmitrij, EI3JZ, operating from EI7M. The new record score for Europe goes well with the one EI7M set on 75 meters last year. Steve, GW4BLE, using the special callsign MW5A, and Dusan, YU1EA, operating from YT8A, had excellent scores to also beat the old European record. Facing line noise and family scheduling issues, Gene, W3UA, decided to give 40 meters a try. The result was a new USA record for the callsign WU3A/1.

The competition on 75 meters was a

EUROPE TOP SCORES

SINGLE OPERATOR HIGH POWER
ALL BAND

E7DX (E77DX)	20,436,120
ES5TV	17,333,274
OH1ØX (OH6UM)	14,470,407
4O3A	14,210,416
GM5X	14,190,036

28 MHz

CR2T (CU2AF)	866,500
IT9ZTX	251,902
GØAEV	164,905

21 MHz

CS2C (OK1RF)	9,479,430
UZ2M (URØMC)	5,995,920
RK4FF	5,890,665

14 MHz

TF3CW	7,473,415
OH4A (OH6KZP)	6,886,168
S55T (S55OO)	6,763,484

7 MHz

EI7M (EI3JZ)	10,787,690
MW5A (GW4BLE)	9,480,054
YT8A (YU1EA)	9,174,753

3.7 MHz

9A4ØY (9A3LG)	2,468,252
9A8M (9A7DM)	1,466,160
EMØX (UT2XQ)	1,404,288

1.8 MHz

I4FYF	569,080
OG6A (OH6LI)	298,452
LY2OU	253,982

SINGLE OPERATOR LOW POWER
ALL BAND

*YO3CZW	4,499,880
*S5ØA	3,810,142
*LY9A	3,565,608
*RM5D	2,967,752
*DP4X (DL1MGB)	2,875,560

28 MHz

*SV9GPV	514,215
*EA7ISH	231,825
*9A5ST	67,639

21 MHz

*EA7RU	2,360,484
*CT1EVE	602,948
*RW4WA	444,652

14 MHz

*YU7ZEX	704,600
*IZ2ACO	569,280
*UA1AQA	550,732

7 MHz

*DL2VK	1,189,964
*UR7TZ	972,802
*SM3C (SM5CCT)	637,259

3.7 MHz

*S57DX	610,136
*SP9H	585,932
*ES2MC	402,992

1.8 MHz

*YT4A (YT1AA)	194,103
*S52WW	121,426
*ER2RM	117,810

SINGLE OPERATOR ASSISTED
HIGH POWER
ALL BAND

ER4A (UT5UDX)	17,039,808
LX7I (DF1LON)	13,148,064
DL3TD	11,701,024
UU7J (UU4JMG)	11,224,305
EO4M (UR5MW)	10,214,841

28 MHz

IU9A (IT9SSI)	373,440
EB2AM	296,450
9A2U (9A3ZA)	254,584

21 MHz

E71A	6,175,638
EA7LL	5,671,710
TM2B (F4EGZ)	5,206,320

14 MHz

US1I	4,744,214
EO3Q (UR3QCW)	4,436,640
SN8R (SP8ONZ)	4,233,257

7 MHz

YTØA (YT7AW)	9,905,910
RT3F (RV3MQ)	4,710,744
S51CK	2,367,513

3.7 MHz

US2YW	1,958,076
IR4C (IZ4NIC)	1,553,035
EU1A	1,398,984

1.8 MHz

IQ4RA (I4AVG)	545,606
DF2UU	400,365
EU3AR	393,242

SINGLE OPERATOR ASSISTED
LOW POWER
ALL BAND

*HA3DX (HA4XH)	3,984,042
*HG3A (HA3MY)	3,977,508
*S53F	3,745,168
*DM9K (DL2OBF)	2,867,904
*G3VAO	1,969,692

28 MHz

*IT9BUN	166,618
*IT9ACN	138,097
*F4FDA	68,586

21 MHz

*IZ5EBL	1,771,893
*EI4CF	1,679,330
*EF7A (EC7ABV)	1,544,472

14 MHz

*UA6LUO	958,850
*SP4DZT	903,139
*S59N	570,850

7 MHz

*HG9X (HA9PP)	1,295,608
*OK1UG	677,376
*2E1FVS	407,968

3.7 MHz

*DO1HDR	386,508
*YT8WW	381,150
*SQ6CU	286,134

1.8 MHz

*SP8LBK	63,855
*E74AA	60,760
*YU1XX	33,375

SINGLE OPERATOR QRP
ALL BAND

DL8LR	537,010
SP2DNI	410,400
RW3AI	310,809
UT5UUV	257,796
EA1GT	247,723

28 MHz

IØUZF	86,742
I5KAP	43,792
EC4AA	6,468

21 MHz

YT1CS	142,896
RT4W	128,270
G3R (GØDCK)	119,493

14 MHz

9A2EY	94,400
SP3DRM	77,400
SM6CRM	63,680

7 MHz

SP4GFG	206,365
9A9L	119,544
UT8UL	49,096

3.7 MHz

HG6C (HA6IAM)	157,339
SP2QOT	143,488
OH9FTW	2

1.8 MHz

R7NP	30,590
RA4FWA	9,880

ROOKIE
ALL BAND

*UD3D (RN3DNM)	1,613,294
DL6ER	1,102,362
*MØGVZ	978,510
*OH3FOG	634,476
*SN1T (SQ1RET)	603,809

28 MHz

*CT2KFA	66,740
IZ2ODM	42,350
*EA1HVY	18,375

21 MHz

IQ4FA (IZ4UEZ)	375,224
*EA4FTA	138,444
*YL3AGV	65,886

14 MHz

*YO5LD	187,740
*RA4SAT	155,367
*II3HRT (IZ8OJG)	38,001

7 MHz

*RA3MAV	185,409
*YO2MJZ	24,890
*9A6SJZ	6,201

3.7 MHz

*SQ2HNA	142,437
*YO2MKD	2,048
*LA9NSA	24

1.8 MHz

*RA4FWA	9,880

TRIBANDER/SINGLE ELEMENT
HIGH POWER
ALL BAND

E74HH (S56M)	6,598,899
RT4RO	6,340,471
EE3A (EA3ATM)	6,160,826
DH6BQA	4,892,702
EA3RR	4,689,410

28 MHz

IT9ZTX	251,902
S56P	216,000
OE5UAL	64,801

21 MHz

EB3CW	4,227,038
CT1EOD	1,391,940
IZ5CML	1,085,812

14 MHz

9A5ADT	2,588,040
8SØC (SMØMPV)	2,429,799
OU5A (YT2T)	1,492,092

7 MHz

S51CK	2,367,513
ES2TI	1,571,119
OR7R	1,550,472

3.7 MHz

US2YW	1,958,076
9A8M (9A7DM)	1,466,160
EU1A	1,398,984

1.8 MHz

EA1DVY	24,024
EA3EIQ	16,020

TRIBANDER/SINGLE ELEMENT
LOW POWER
ALL BANDS

*DM2DX	2,742,168
*I2WIJ	2,224,908
*EI8GQB (ON4EI)	2,141,737
*G3VAO	1,969,692
*EW1IP	1,482,960

28 MHz

*YU2A	53,820
*IV3RCH	25,925
*EE1B (EA1YB)	23,715

21 MHz

*EA7RU	2,360,484
*IZ5EBL	1,771,893
*EI4II	346,290

14 MHz

*S57U	442,508
*IZ2JQP	246,202
*YP5WFF (YO5OAG)	154,904

7 MHz

*EC7KW	362,470
*IZ1DGG	276,624
*OK2PPM	171,864

3.7 MHz

*ON1CB	203,856
*R3LC	176,276
*EC7AKV	56,718

1.8 MHz

*YT4A (YT1AA)	194,103
*DD9WG	13,940

MULTI-OPERATOR
SINGLE TRANSMITTER

TM6M	28,016,921
RL3A	20,949,828
OE3K	19,384,308
OM7M	15,918,732
IO5O	12,066,208

MULTI-OPERATOR
TWO-TRANSMITTER

OL4A	33,215,652
9A1A	32,921,826
9A1P	31,970,812
DQ8N	30,797,352
9A7A	25,747,659

MULTI-OPERATOR
MULTI-TRANSMITTER

DR1A	63,397,890
OT5A	31,900,698
HG2Ø11N	31,347,558
LZ9W	30,426,851
LY7A	19,088,582

**Low Power*

MFJ-989D 1500 Watt *legal limit* Tuner

World's most popular 1500 Watt Legal Limit Tuner just got better -- much better!

MFJ-989D

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter with no price increase. Easily handles *full* 1500 Watts SSB/CW over 1.8-30 MHz. **$389.95**

New dual 500 pF *air variable capacitors* give you twice the capacitance for more efficient operation on 160 and 80 Meters.

New, improved *AirCore™ Roller Inductor* gives you lower losses, higher Q and handles more power more efficiently.

New TrueActive™ peak reading Cross-Needle *SWR/Wattmeter* lets you read *true* peak power on all modes.

New high voltage *current balun* lets you tune balanced lines at high power -- no worries.

New crank knob lets you reset your roller inductor quickly, smoothly and accurately.

New larger 2-inch diameter *capacitor knobs* with easy-to-see dials make tuning much easier.

New cabinet maintains components' high-Q. Generous air vents keep components cool. 12⅞Wx6Hx11⅝D inches.

Includes six position ceramic antenna switch, 50 Ohm dummy load, indestructible multi-color Lexan front panel with detailed logging scales and legends.

The MFJ-989D uses the superb time-tested T-Network. It has the widest matching range and is the easiest to use of all matching networks. Now with MFJ's new 500 pF air variable capacitors and new low loss roller inductor, it easily handles higher power much more efficiently.

MFJ *Differential-T™* 1.5kW Tuner

MFJ-986

$349.95

Simple two knob tuning makes antenna tuning foolproof and easier than ever! Handles 1.5 kW PEP SSB/CW amplifier output, 1.8-30 MHz. *AirCore™* roller inductor, *Differential-T™* capacitor, lighted peak/average Cross-Needle SWR/Wattmeter, Six position antenna switch, balun. 10¾Wx4½Hx15D".

MFJ *compact* kW Tuner

MFJ-962D

$299.95

A few more dollars steps you up to a kW tuner for an amp later. Handles 1.5 kW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore™* roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, Six position antenna switch, balun, Lexan front panel, 1.8-30MHz. 10¾x4½x10⅞ in.

MFJ *Fully Balanced* 1.5 kW Tuner

MFJ-976

$499.95

MFJ-976 is a *fully balanced* wide range (12-2000 Ohms) antenna tuner that gives you *superb* current balance. Handles *full* 1.5kW SSB/CW, 1.8-30 MHz. Tunes *all* balanced lines -- 600 Ohm *open wire* line, 450/300 Ohm *ladder* lines, 300/72 Ohm *twin lead*. Also tunes wires/coax fed antennas. Cross-Needle meter.

MFJ 2500 Watts *ContinuousCarrier™* Tuner

Silver plated Edge-Wound Roller Inductor . . .1000/500 pF Variable Capacitors . . . Antenna Switch . . . 4-Core Balun . . . true Peak Cross-Needle Meter . . . Dummy Load . . . Extremely Wide Matching Range . . .

The MFJ-9982 ContinuousCarrier™ antenna tuner handles 2500 Watts continuous carrier output on all modes and all HF bands into most unbalanced antennas -- even on 160 Meters where even the best antenna tuners fail!

MFJ-9982 **$699.95**

The MFJ-9982 gives you every feature you'll ever want in a high power tuner -- wide matching range, 1.8 to 30 MHz coverage, 6-position antenna switch, 4-core balun, dummy load, true peak/average lighted SWR/Wattmeter, 6:1 reduction drives with detailed logging scales, 3-digit turns counter, extra large knobs.

New Components, New Technologies

The *Heart and Soul* of the MFJ-9982 is its roller inductor and variable capacitors.

MFJ's high power, high-Q *continuous current AirCore™* roller inductor is no ordinary roller inductor! It's edge wound from thick .06-inch *silver-plated* solid copper strap.

It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn up ordinary roller inductors.

Self-insulating construction reduces stray capacitance -- keeps self-resonant frequencies high and out-of-the-way. Dual, *silver-plated* compression wheels give ultra low-resistance contacts. New fast-tune crank knob.

High-current, *high-capacitance* 1000 pF and 500 pF air variable capacitors have low minimum capacitance and are self-insulating.

These newly developed air variable capacitors give you *very high efficiency* on 160/80 Meters *and* MFJ's patent pending innovation gives you *extremely wide matching range* on 10/12/15 Meters at 2500 Watts -- a feat *only* the MFJ-9982 has achieved.

Hi-Voltage/Current Antenna Switch

The antenna switch is completely isolated to handle high-voltage, high impedance antennas. High-current, low impedance antennas are handled by parallel sets of high-current contacts of *two* ceramic switches.

New 4-Core Balun

Powerful balun -- Four 2½ inch cores, 12-gauge *Teflon™* wire. Run balanced lines at full 2500 Watts SSB/CW continuous, 24/7.

New Balanced Line Feed-Thru Insulator

Allows massive transmitter currents to flow directly to the antenna without passing through lossy screws or bolts.

TrueActive™ Peak Reading Circuit

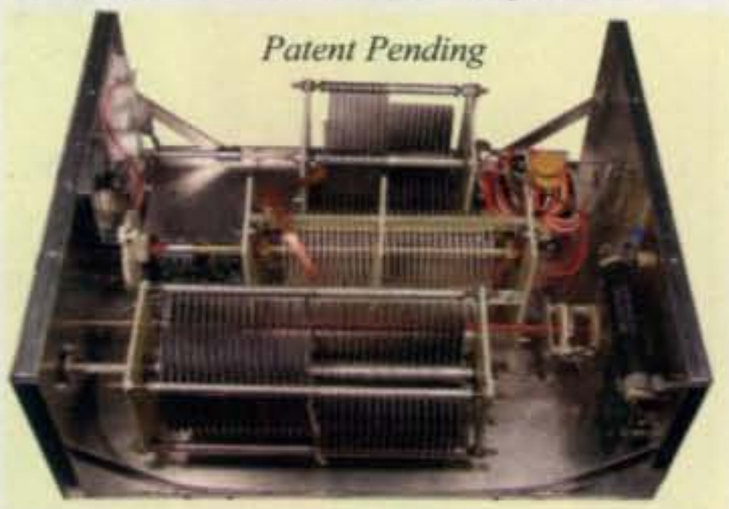
New TrueActive™ circuit reads *true* peak or average power on all modes. *Cross-Needle* meter reads SWR/forward/reflected power.

1500 Watt Dummy Load

1500 Watt air-cooled non-inductive 50 Ohm resistor. 100W/10 min., 1.5kW/10 sec.

New Cabinet maintains high Q

New roomy cabinet maintains high Q. Vent holes. Heavy gauge, .08 inch aluminum braced chassis. Vinyl cover, non-stripping PEM nuts, heavy 10-gauge and copper strap wiring throughout. 13¾Wx7Dx16¼D inches. 15 pounds.



Free MFJ Catalog

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

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

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

MFJ . . . The World Leader in Ham Radio Accessories

three-way race between a European and two Asians. The winner was special call 9A4ØY operated by Sasa, 9A3LG. Close behind was H2T (Paris, 5B4XF op) and Levan, 4L4CC. Sasa was able to overcome the points per QSO disadvantage by working more contacts and almost 200 more multipliers than the other two. Alfredo, WP3C, had an excellent score to finish fourth. Perennial 75 meter entrant Steve, W3BGN, returned to the top spot for the USA.

With the high bands rocking, the diehard 160 meter operators did the best with what activity they could find. Fabio, I4FYF, claimed the world trophy. Yuri, K3BU, dealt with line noise and QRN to take the top USA spot as NT1E/8. OG6A and LY2OU battled it out for third with logging accuracy making the difference.

Single-Operator QRP

The contesters who enter WPX SSB running 5 watts or less are a special breed. KP2/NE1RD summed up the magic this way: "I hope I never get so old or jaded that I stop feeling the wonder of working somebody halfway around the world with the power equivalent of a night light!" The world high QRP score was from TI5N with Bill, W8QZA, at the controls. Bill moved up from third place last year. Second place went to Randy, NDØC. This is Randy's second consecutive USA win in the QRP all band category. Frank, DL8LR, took the top European spot ahead of Andrzej, SP2DNI.

Scott, NE1RD, once again packed his suitcase station off to KP2 for the contest and finished first on 10 meters. Rob, NH6V, borrowed the KH6LC station to win 15 meters and set a new Oceania record. Tadeusz, SP4GFG, made a very nice effort on 40 meters. Gulyas, HA6IAM, used the call HG6C to win on 75 meters.

Well-known German contester DL3TD tragically died in a fire at his home only weeks after the contest. Lothar finished his last contest as #8 in the World for Single Op Assisted All Band High Power.

Single-Operator Assisted

The Assisted All Band High Power category has become super competitive with five continents represented in the world top 10. The winner, with a big lead, was Sergey, UT5UDX, operating from ER4A. Felipe, NP4Z, used his KP3Z club callsign to finish in second place and set a new North American record score. The next three scores were very close. Yuri, RG9A, took third place just ahead of Philippe, DF1LON, operating from LX7I. Rick, KI1G, had the top USA score and almost doubled the existing USA record. ZX2B operated by Wanderly, PY2MNL, put South America in the top 10. Sadly, seventh place finisher Lothar, DL3TD, died tragically in a fire at his home just a few weeks after the contest. His enthusiasm and passion for contesting was well known and will be missed.

The All Band Low Power category was equally competitive, with Alexey, VE2XAA, taking the victory. Alexey became a Silent Key in August. Less than 7000 points separated the next two entries in a race between Hungarian club stations. Karoly, HA4XH, operated from HA3DX, the club station of Paks Nuclear Power Plant, while Istvan, HA3MY, used the Mecsek Radio Klub station HG3A. Karoly moved ahead after the log checking and now owns the European record

SUCH A HAM

I remember when you looked at me like that.

USA TOP SCORES

SINGLE OPERATOR HIGH POWER ALL BAND

K1LZ	15,921,388
AJ1I (K8PO)	11,615,760
KW7Y (K7RL)	10,838,960
KC3R (LZ4AX)	10,821,048
NN5J (N5DX)	10,812,560

28 MHz

KZ5MM (W5PR)	737,352
WN1GIV/4 (N4BP)	375,648
N8II	323,179

21 MHz

KQ2M/1	9,591,670
K6ND/1 (N8BO)	6,793,222
WK5T (N2IC)	5,459,874

14 MHz

KK9A/4	6,403,079
W7WA	6,265,176
KZ7X (W7WW)	968,320

7 MHz

WU3A/1 (W3UA)	4,731,424
W1XX	1,114,452
KX9DX	310,170

3.7 MHz

W3BGN	1,211,266
KI5XP (W5XZ)	454,553
K9SH	116,800

1.8 MHz

NT1E/6 (K3BU)	321,043
K1HAP	34,476
K6NDV/1 (K6ND)	10,633

SINGLE OPERATOR LOW POWER ALL BAND

*NV1N (N1UR)	4,328,401
*KZ9O	1,976,631
*KS9K (N4TZ)	1,962,765
*WB8TLJ	1,368,276
*N7ZG	1,335,227

28 MHz

*W4IX	209,916
*NA4W (K4WI)	61,686
*ND6S	59,451

21 MHz

*W2AW (N2GM)	1,313,786
*N9TGR	975,730
*N5DO	735,072

14 MHz

*AD7J (W7FP)	385,170
*N7BK	382,104
*WB2TFM/4	207,399

7 MHz

*WA7NWL	127,920
*K9SQL	95,700
*K8SM	87,696

3.7 MHz

*W6HH/5	10,296
*NA8V	7,791

1.8 MHz

*NX1T	6,840
*W1WBB	2,368

SINGLE OPERATOR ASSISTED HIGH POWER ALL BAND

KI1G	13,075,616
NY6DX/2	7,028,320
NS1L/4	5,807,004
NF4A	4,544,232
AB3CX/2	4,447,776

28 MHz

K1ZZ	281,300
AC6DX	135,216
W2RR (WA2AOG)	68,068

21 MHz

W4MYA	2,747,654
NQ5K (W5ASP)	1,177,274
W6AFA	1,153,977

14 MHz

WR2G	1,089,774
KI7M	1,086,470
W9EXY	838,380

7 MHz

W2IRT	1,252,973
K4KZZ	343,640
WJ1R	30,444

3.7 MHz

NØRQ/5	150

1.8 MHz

W2MF	93,492
WG5J	660

SINGLE OPERATOR ASSISTED LOW POWER ALL BAND

*KT4ZB	1,723,498
*NR1I (W1NT)	1,555,398
*KA2KON/1	1,446,975
*KØRI	1,445,550
*WV6E	1,398,624

28 MHz

*K6LE	11,050
*N1VVV	4,770
*N2OO	4,520

21 MHz

*W4UAL (K4CWW)	498,190
*KG1E	349,932
*KM4HI	349,182

14 MHz

*WØON	247

7 MHz

*KA9O	93,644
*N7MAL	19,173

3.7 MHz

*KA3ITJ	6,432

SINGLE OPERATOR QRP ALL BAND

ND0C	748,572
KA1LMR	476,856
WB2R (W2MFT)	171,600
NT4TS	169,684
K8DRT	132,932

28 MHz

KIØG/5	13,266
KJ6JNC	105

21 MHz

WA6FGV	41,480
N6HI/7	2,964
WA7LNW	1,500

14 MHz

WB7OCV/2	71,001
KR2AA	3,196

3.7 MHz

K3TW/4	10,812
WBØIWG/3	3,060

ROOKIE ALL BAND

NR7E	1,083,656
NX9G	948,915
KI6QDH	445,725
*AD2AM	286,878
*KB1THU	197,714

28 MHz

*KE5SNJ	21,672
*K3MAF/4	7,236
*KJ4VWL	5,967

21 MHz

*KJ6HBY	2,176

14 MHz

*NQ3U	25,641
*WØGAF	10,153

7 MHz

*K3DCW	42,160

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

KR4Z (N4PN)	6,200,704
NF4A	4,544,232
AB3CX/2	4,447,776
W5TK	3,461,544
K3MD	3,256,878

28 MHz

KA2LIM	95,976
K7ZD	1,235

21 MHz

K6ND/1 (N8BO)	6,793,222
KZ5J	730,862
N2EIK	608,697

14 MHz

KZ7X (W7WW)	968,320
KD8SQ	139,308
W8GOC	39,996

7 MHz

KX9DX	310,170
K4RDU	56,832
WJ1R	30,444

3.7 MHz

WN2O (N2GC)	46,107
W8JMF	4,142
NØRQ/5	150

TRIBANDER/SINGLE ELEMENT LOW POWER ALL BAND

*KZ9O	1,976,631
*KT4ZB	1,723,498
*WB8TLJ	1,368,276
*N7ZG	1,335,227
*AD1C/Ø	987,525

28 MHz

*N8PJ	6,336
*KE7DX	1,518
*KD4MXA	351

21 MHz

*WN4BFZ (K4YA)	535,612
*KG1E	349,932
*KM4HI	349,182

14 MHz

*KØWHV	85,932
*N8WAV	82,593
*N9LOH	45,108

7 MHz

*WA7NWL	127,920
*K9SQL	95,700
*K8SM	87,696

3.7 MHz

*W6HH/5	10,296
*KA3ITJ	6,432

1.8 MHz

*W1WBB	2,368

MULTI-OPERATOR SINGLE TRANSMITTER

AK1W	16,567,248
NK7U	13,304,610
KØDU	12,126,541
NR3X/4	10,629,541
AJ9C	5,994,897

MULTI-OPERATOR TWO-TRANSMITTER

KD4D/3	21,464,896
WW4LL	16,979,974
WC6H	13,644,735
W7RN	12,408,773
KK7OO	10,966,914

MULTI-OPERATOR MULTI-TRANSMITTER

WX3B	19,928,644
NX5M	17,133,200
NR6O	14,961,801
NE1C	10,043,890
AK7AZ	5,059,080

*Low Power

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
1525 W. Magnolia Bl., 91506
(818) 842-1786
(877) 892-1748
Eric, K6EJC, Mgr.
Magnolia between
S. Victory & Buena Vista
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(877) 892-1745
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(877) 520-9623
Jerry, N5MCJ, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(877) 892-1749
Jon, K6WV, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Chuck, N1UC, Mgr.
RT.13 1/4 mi., So. I-295
delaware@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 765-4267
Bill, K7WCE, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
John WØIG, Mgr.
denver@hamradio.com

PHOENIX, AZ
10613 N. 43rd Ave., 85029
(602) 242-3515
(800) 559-7388
Gary, N7GJ, Mgr.
Corner of 43rd Ave. & Peoria
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
NEW Expanded Store
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
atlanta@hamradio.com

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Steve, W4SHG, Mgr.
Exit 161, I-95, So. to US 1
virginia@hamradio.com

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Peter, KI1M, Mgr.
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

HRO Holiday Specials For You!

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

World's LARGEST HAM RADIO INVENTORY in stock for quick delivery

DISCOVER THE POWER OF DSP WITH ICOM!

IC-9100 The All-Round Transceiver

• HF/50MHz 144/430 (440) MHz and 1200MHz*3 coverage • 100W on HF/50/144MHz, 75W on 430 (440) MHz, 10W on 1200MHz*3 • Double superheterodyne with image rejection mixer

IC-7000 All Mode Transceiver

• 160-10M/6M/2M/70CM • 2x DSP • Digital IF filters • Digital voice recorder • 2.5" color TFT display

IC-718 HF Transceiver

• 160-10M* @ 100W • 12V operation • Simple to use • CW Keyer Built-in • One touch band switching • Direct frequency input • VOX Built-in • Band stacking register • IF shift • 101 memories

IC-V8000 2M Mobile Transceiver

• 75 watts • Dynamic Memory Scan (DMS) • CTCSS/DCS encode/decode w/tone scan • Weather alert • Weather channel scan • 200 alphanumeric memories

IC-2820H Dual Band FM Transceiver

• D-STAR & GPS upgradeable 2M/70CM • 50/15/5W RF output levels • RX: 118-173.995, 375-549.995, 810-999.99 MHz** • Analog/digital voice with GPS (optional UT-123) • 500 alphanumeric memories

IC-7800 All Mode Transceiver

• 160-6M @ 200W • Four 32 bit IF-DSPs+ 24 bit AD/DA converters • Two completely independent receivers • +40dBm 3rd order intercept point

IC-7600 All Mode Transceiver

• 100W HF/6m Transceiver, gen cov. receiver • Dual DSP 32 bit • Three roofing filters- 3, 6, 15khz • 5.8 in WQVGA TFT display • Hi-res real time spectrum scope

IC-7700 Transceiver. The Contester's Rig

• HF + 6m operation • +40dBm ultra high intercept point • IF DSP, user defined filters • 200W output power full duty cycle • Digital voice recorder

IC-2200H 2M Mobile Transceiver

• 65W Output • Optional D-STAR format digital operation & NEMA compatible GPS interface • CTCSS/DTCS encode/decode w/tone scan • 207 alphanumeric memories • Weather alert

IC-92AD Analog + Digital Dual Bander

$10 HRO COUPON!

• 2M/70CM @ 5W • Wide-band RX 495 kHz - 999.9 MHz** • 1304 alphanumeric memories • Dualwatch capability • IPX7 Submersible*** • Optional GPS speaker Mic HM-175GPS

IC-PW1 HF + 6M Amplifier

• 1.8-24MHz + 6M Amp • 1KW amplifier • 100% duty cycle • Compact body • Detachable controller • Automatic antenna tuner

IC-7200 HF Transceiver

• 160-10M • 100W • Simple & tough with IF DSP • AGC Loop Management • Digital IF Filter • Digital Twin PBT • Digital Noise Reduction • Digital Noise Blanker • USB Port for PC Control

ID-880H Analog + Digital Dual Bander D-STAR

• D-STAR DV mode operation • DR (D-STAR repeator) mode • Free software download • GPS A mode for easy D-PRS operation • One touch reply button (DV mode) • Wideband receiver

IC-V80 2M Handheld Transceiver

• 2M @ 5.5W • Loud BTL audio output • Military rugged • Classic 2M operation

IC-80AD Analog + Digital Dual Bander D-STAR

• D-STAR DV mode operation • DR (D-STAR repeater) mode • Free software download • GPS A mode for easy D-PRS operation

IC-T70A Dual Band FM Transceiver

2M + 70CM • 5/2.5/0.5 Watts Output Power • RX: 136-174, 400-479 MHz** • 302 Alphanumeric Memory Channels • 700mW Loud Audio • Ni-MH 7.2V/1400mAh Battery

*Except 60M Band. **Frequency coverage may vary. Refer to owner's manual for exact specs. ***Tested to survive after being under 1m of water for 30 minutes. *1 AA Alkaline batteries not included, radio comes with a AA alkaline battery tray. *2 For shock and vibration. *3 Optional UX-9100 required. Contact HRO for promotion details. CQ JAN 2012. The Icom logo is a registered trademark of Icom Inc. 20478b

ICOM

CALL TOLL FREE

Phone Hours: 9:30 AM – 5:30 PM
Store Hours: 10:00 AM – 5:30 PM Closed Sun.

Toll free; incl. Hawaii, Alaska, Canada; call routed to nearest store; all HRO 800-lines can assist you. If the first line you call is busy, you may call another.

West.....800-854-6046
Mountain.....800-444-9476
Southeast.....800-444-7927
Mid-Atlantic...800-444-4799
Northeast.....800-644-4476
New England..800-444-0047

Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

#1 in Customer Service

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

Send your voice to the world with a mobile radio.

Work a D-STAR repeater and you're tied in to worldwide communications, whether you're using a D-STAR mobile or handheld radio. Enjoy advanced digital communication with D-STAR transceivers.

D-PRS™

IC-2820H
FEATURE-RICH MOBILE + OPTIONAL GPS RECEIVER

D-STAR optional

- 50/15/5 Watt Output
- RX: 118–549.995, 118–173.995, 375–549.999, 810–999.990MHz*
- 522 Alphanumeric Memory Channels
- One Touch Reply Function
- Digital Voice/GPS (Optional UT-123 Required)
- Low Speed Data (Optional OPC-1529R Required)

ID-880H
GO DIGITAL ON 23cm

D-STAR ready

- 50/15/5 Watt VHF/UHF
- FM, AM (Receive only), DV
- RX: 118–999.99MHz*
- 1052 Alphanumeric Memory Channels
- Free Programming Software!†

†www.icomamerica.com/amateur/DSTAR for details about free software

ID-1
GO DIGITAL ON 23cm

D-STAR ready

- 10 Watt on 23cm (FM, DV, DD)
- RX: 1240–1300MHz*
- 100 Alphanumeric Memory Channels
- USB Rig Control, Ethernet Plug for DD
- Black Box Operation
- Remote Control Head, Remote Speaker and Cables Included
- PC Software Included

NEW ID-31A COMING SOON!
D-STAR OPERATION IN THE PALM OF YOUR HAND!

D-STAR ready

- FM Analog Voice or D-STAR DV
- Built-in GPS Receiver
- IPX7 Submersible

*This device has not been approved by the FCC. This device may not be sold or leased, or be offered for sale or lease, until approval by the FCC has been obtained.

IC-80AD
NEXT GENERATION 2M/70CM DUAL BANDER

D-STAR ready

- 5/2.5/0.5/0.1 Watt VHF/UHF
- FM, FM-N, AM (Receive only), WFM (Receive only), DV
- RX: 0.495–999.990MHz*
- 1052 Alphanumeric Memory Channels
- Li-ion Battery
- Free Programming Software†

†www.icomamerica.com/amateur/DSTAR for details about free software

IC-92AD
MILITARY RUGGED AND SUBMERSIBLE

D-STAR ready

- 5/2.5/0.5/0.1 Watt Output
- RX: 0.495–999.990, 118–174, 350–470MHz*
- 1304 Alphanumeric Memory Channels
- Optional GPS Speaker Mic (HM-175GPS)
- IPX7 Submersible

*Frequency specs may vary. Refer to owner's manual for exact frequency specs.

ICOM®

for the category. Alexey, RV9UP, beat Yuri, RT9S, to set a new record score for Asia. Top USA score went to Jere, KT4ZB.

Overlay Categories

The CQ WPX Contest has two overlay categories which act as separate contests within the contest. The Rookie overlay category is for operators who have been licensed for less than three years at the time of the contest. There were 182 entries this year. In his last year of eligibility, Abdalla, JY5CC, won in dramatic fashion with the highest score in the history of the Rookie category. Second place was a race between Robert, KD8MJR, at 6Y1X and Vladimir, RN3DNM, operating UD3D. Both of them provided welcome multipliers and demonstrated they are fast learners. Another remarkable score was submitted by 15-year-old Sassi, ZL2GQ, who made over 1-million points on 15 meters single band. The top USA Rookie score was made by Jeff, NR7E.

The Tribander/Single-Element (TBSE) overlay category allows stations with similar equipment to compare and compete with one another. The popularity of TBSE keeps growing, with 764 entries this year. Robert, ST2AR, overcame receive problems due to a sticky relay in his transceiver and still dominated the category. Being in a rare country with direct propagation to Europe has its advantages! The second highest overall score was by Will, N8BO, operating single band 15 meters as K6ND/1. Close behind was a group of all-band scores led by LR4E with Jorge, LW4EU, at the controls. Vitomir, S56M, turned in the top European score from E74HH. KR4Z operated by Paul, N4PN, was the top USA scorer all band.

On low power TBSE, it was 8P3A, 3V8SS, and VE2XAA who led the pack. Cristobal, EA7RU, and Brian, C4Z, had a very close race on 15 meters.

Multi-Operator

There were 241 entries in the Multi-Operator Single Transmitter category. While many big stations complain about the band-change rule, it has increased the overall popularity of the category and set up some very spirited competition. The winning team was 3V1A operated by YT1AD, YT3M, YT3W, and S56A. The TM6M operating team of F1AKK, F4DXW, and F8DBF made over 6000 contacts on their way to an impressive second place finish and a new European record. PY2NDX, PY2YU, and PY2ZEA pushed PS2T to third place. P33W from Cyprus represented the fourth continent in the top four scores due to a fine job by 5B4AIE, RA6LBS, and RA3AUU.

The most exciting battle of the weekend was the northern Africa Multi-Two shootout among EB8AH, 5D5A, and D4C. Each station made over 10,000 contacts! Each had about 1700 prefixes. In the end, it was the six operators at EB8AH in the Canary Islands who captured the win with the highest score in the history of the contest at 68-million points. Second place was 5D5A from Morocco with a three-operator team that moved up a place due to an extremely accurate log. The three ops at D4C in Capes Verde made the most contacts, but fell to third. Not much sleep at 5D5A or D4C in order to do full 48 hour efforts in Multi-Two with only three operators!

It was a photo finish between PJ2T and PW7T for the South America Multi-Two honors. PJ2T ended up winning by 30K points on a total score of 37 million (that's only 0.08%)! Just one more multiplier would have made the difference. Down under, the team at VK4KW increased the Oceania record by 30%. The top USA score was by KD4D/3 in Maryland.

The Multi-Multi category was won by European powerhouse DR1A. In addition to setting an all-time prefix record, they raised the European record from 47-million to 63-million points! The ten operators from the CT3 Madeira Contest Team pushed CR3A to second place. The boys at LP1H set a goal of 45-million points and made it! The top USA Multi-Multi was a very enthusiastic crew at WX3B.

Final Thoughts

The WPX SSB Contest occurred less than three weeks after the Japanese tsunami disaster. There were many comments in the logs expressing sympathy and hope for all in the affected areas of Japan. We had 13 logs from JA7 and hope we will see more in the future as the area recovers.

CQ WW WPX SSB CONTEST ALL-TIME RECORDS

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	CN2R('07)	1,613,955	399
3.5	CN2R('06)	11,849,076	894
7.0	CN2R('05)	14,724,696	931
14	CN2R('08)	15,778,840	1199
21	CN2R('11)	20,704,164	1443
28	D44AC('02)	15,707,401	1123
AB	CN2R('10)	27,059,084	1373
QRP/p	HC8A('94)	7,520,562	714
Assisted	CQ3L ('10)	17,479,764	1206

Multi-Operator Single Transmitter

5D5A('10)		36,669,952	1532

Multi-Operator Two Transmitter

EB8AH('11)		68,072,520	1765

Multi-Operator Multi-Transmitter

EA8AH ('10)		66,077,858	1665

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95)	327,712	308
3.5	K1UO('10)	2,161,782	602
7.0	WU3A/1('11)	4,731,424	796
14	KQ2M('09)	7,034,082	1082
21	KQ2M/1('11)	9,591,670	1210
28	NY4A('00)	6,006,573	877
AB	K1LZ('11)	15,921,388	1246
QRPp	KR2Q('00)	2,688,158	649
Assisted	KI1G('11)	13,075,616	1268

Multi-Operator Single Transmitter

AK1W('11)		16,567,248	1343

Multi-Operator Two Transmitter

K1LZ('10)		30,393,480	1560

Multi-Operator Multi-Transmitter

KM3T('00)		29,338,460	1355

QRPp RECORD

HC8A('94) 7,520,562

WPX (Prefix) RECORD

DR1A('11) 1909

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	CN2R('07)	1,613,955	399
3.5	CN2R('06)	11,849,076	894
7.0	CN2R('05)	14,724,696	931
14	CN2R('08)	15,778,840	1199
21	CN2R('11)	20,704,164	1443
28	D44AC('02)	15,707,401	1123
AB	CN2R('10)	27,059,084	1373

ASIA

1.8	*YMØT('05)	486,846	222
3.5	H2T('10)	3,067,296	534
7.0	5B/KC2TIZ('10)	6,761,872	754
14	P33W('10)	8,004,130	1030
21	JA6GCE('11)	7,055,664	996
28	H22H('00)	9,092,146	931
AB	5B4AII('09)	17,320,771	1093

EUROPE

1.8	SN3R('07)	835,884	434
3.5	EI7M('10)	3,527,075	731
7.0	EI7M('11)	10,787,690	1054
14	TM77M('10)	8,271,768	1046
21	CS2C('11)	9,479,430	1245
28	GM7V('00)	8,305,756	982
AB	E7DX('11)	20,438,120	1322

NORTH AMERICA

1.8	VA1A('99)	535,225	271
3.5	ZF1A('08)	2,269,344	462
7.0	TI4CF('05)	8,057,479	751
14	KP2A('95)	7,088,976	912
21	VP2EH('11)	14,899,185	1305
28	KP2A('00)	11,385,710	1046
AB	8P5A('10)	24,245,732	1358

OCEANIA

1.8	KH6ND('07)	26,432	59
3.5	WH7Z('03)	1,208,900	308
7.0	ZL3A('08)	8,200,800	816
14	KH6ND('03)	6,493,727	887
21	AH7DX('00)	7,645,990	890
28	TXØDX('00)	12,049,422	847
AB	KH7X('11)	20,676,524	1244

SOUTH AMERICA

1.8	HK1KYR('10)	44,814	77
3.5	P4ØA('96)	1,715,076	426
7.0	HK1T('11)	11,997,104	952
14	HK1X('11)	13,783,532	1259
21	ZX5J('10)	16,746,977	1369
28	ZX5J('99)	14,405,820	1095
AB	HC8A('01)	25,180,199	1199

MULTI-OPERATOR SINGLE TRANSMITTER

AF	5D5A('10)	36,669,952	1532
AS	5B/AJ2O('05)	28,966,272	1252
EU	TM6M('11)	28,016,921	1541
NA	VP2EC('92)	24,409,580	1115
OC	T33RD('99)	17,778,372	998
SA	HC8A('93)	32,502,677	1107

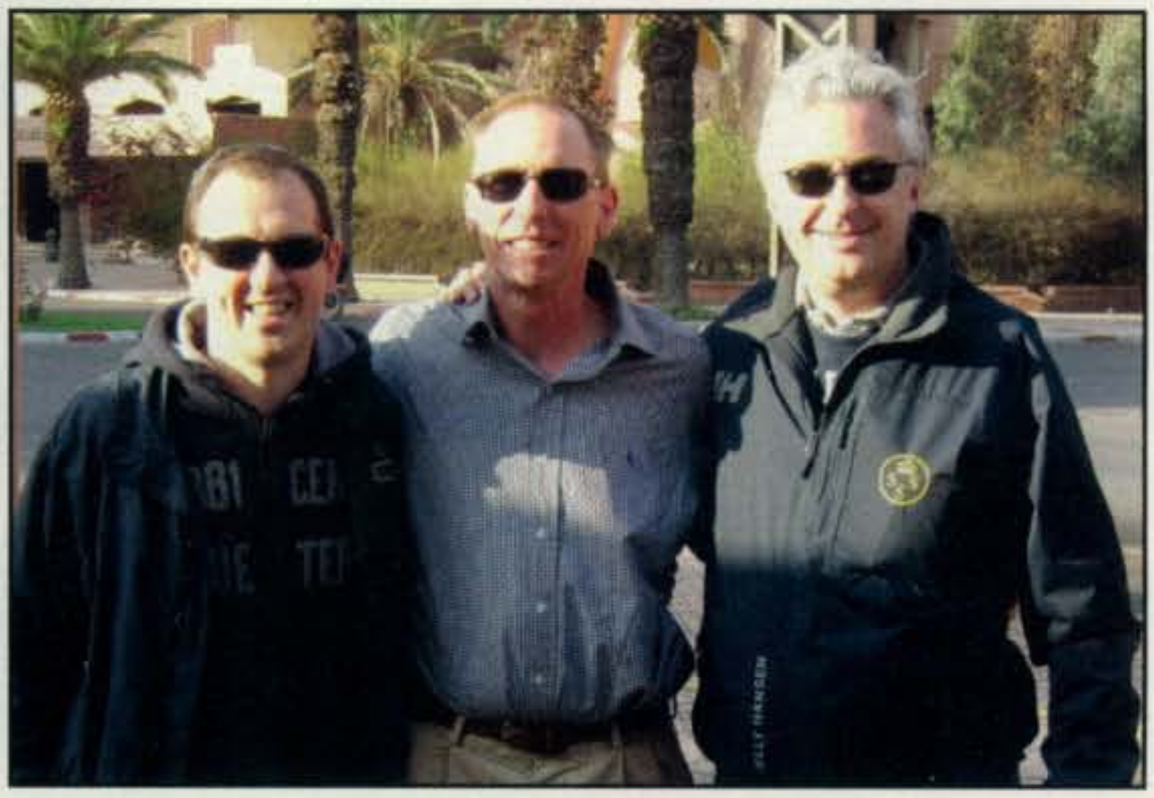
MULTI-OPERATOR TWO TRANSMITTER

AF	EB8AH('11)	68,072,520	1765
AS	A61AJ('04)	30,157,650	1255
EU	OL4A('10)	33,393,180	1590
NA	K1LZ('10)	30.393,480	15660
OC	VK4KW('11)	26,528,482	1369
SA	HC8GR('10)	52,450,389	1497

MULTI-OPERATOR MULTI-TRANSMITTER

AF	EB8AH('10)	66,077,858	1665
AS	P3A('00)	53,554,592	1456
EU	DR1A('11)	63,397,890	1909
NA	WL7E('00)	42,013,215	1395
OC	KH7R('02)	32,806,032	1304
SA	HC8N('03)	60,703,452	1476

The multi-single team of CB3C gave everyone a new multiplier. Roberto, CE3DOH, on the left, Marco, CE3MMT, in the front, and Esteban, XQ7UP, on the right.



In the Multi-Two category, second place went to 5D5A from Morocco with a three-operator team (IK2QEI, N6KT, IK2SGC) that moved up a place due to an extremely accurate log.

Log Checking Honor Roll

There were 2,744,917 total QSOs recorded in the 5,143 logs received for the 2011 edition of the WPX SSB Contest. More than 2 million, or 75%, of these contacts could be cross checked against another log. An incredible 95.5% of the cross-checked QSOs were made without errors. That's rather amazing when you consider all of the QRM, QSB, and other distractions a phone contest inflicts. The average score reduction for all logs was 11.4%—not bad when you consider the frequent double hit of losing a contact and a multiplier.

Everyone who submitted a log to the WPX Contest should have received an e-mail with their log-checking report. The report shows all errors found in the log and how the final score was calculated. The reports also show how others may have miscopied your callsign or exchange. They are a great tool for learning how to improve your operating skills. Send an e-mail to <director@cqwpx.com> to request your report.

The most accurate log was from Eero, VE3BVA, who made 380 contacts without any score reductions. Other top golden logs (with QSOs made) include SP4GFG (323), DL7URH (319), N6ORB (297), VR2XLN (254), DL4RAT (220), and AI4UN (211). W2MF did 210 error-free QSOs all on 160 meters! There were 328 logs with no reductions.

There were 916 stations that did not cause any errors in the logs of the stations they worked. The top "golden transmitter" was Takayuki, JRØGUY, with 201 QSOs. Others in this elite group included OH1O (199), SP4LVK (181), KØRC (161), and UU5A (153).

The gold medal of accuracy goes to Enda, EI2II, who managed 141 two-way contacts without a single mistake either transmitted or received. The silver medal goes to Elmer, DU1EG, with 135.

Congratulations to all of the accuracy aces!

There were a number of comments after the contest about over-processed audio, poor-quality signals with wide splatter, excess power, and generally rude operating. Contesting is a sport where we all are sharing the same field. It is poor sportsmanship to pollute the bands with poor signals and ruin the fun for everyone else. For 2012, the WPX Contest Committee will establish a group of monitors to listen to the bands during the contest. The committee will reserve the right not to accept logs from stations that demonstrate poor technical practices or sportsmanship. Fair play and quality signals will attract more people to contesting and provide more contacts for everyone.

It takes a team to compile the results of so many logs. We could not do it without the software development efforts of Ken, K1EA. The 58 paper logs received by mail were converted into Cabrillo format by AE6Y, AL1G, DO4HAM, JY5CC, K1PX, K2DSL, K8PO, KN3A, LY4U, N1XS, UA4FER, and W2JU. Log-checking help was provided by Jim, WI9WI. Thanks to Barry, W5GN, for printing and mailing the more than 1900 certificates that were earned. Doug, K1DG, coordinates the plaque sponsors and distribution.

The 2012 WPX SSB Contest will be held on March 24 and 25. The log deadline has been moved up to April 18. Please read the rules carefully as there are some changes. Rules can be found in the February issue of *CQ*, on the CQ website <www.cq-amateur-radio.com> (*for expanded tables, QRM, and a list of guest operators and ops of multi stations for the 2011 contest, also see the CQ website—ed.)*, and on the CQ WPX Contest website <www. cqwpx.com>. Keep up with the latest news on the CQ WPX Contest by joining our Facebook Fan page (search for wpx). Let's hope for even better conditions in 2012!

73, Randy, K5ZD

(Continued on page 102)

It's been a long time since computers made telegraph keys optional equipment for CW contests. But a phone contest without a microphone?? Read on...

Who Needs A Microphone For A Phone Contest?

BY JAMIE DUPREE,* NS3T

All week in my job as a radio reporter covering Capitol Hill, I do one thing over and over: I talk into a microphone. That background might make it easier to understand that when it comes to SSB contesting on the weekend, as using a microphone is the last thing I want to do.

Thus, over the last half dozen years I have designed a system of over 17,000 recorded voice files which allows me to call CQ, run stations, move them to a different frequency, search & pounce—you name it—but my microphone stays tucked away in the cabinet while other competitors are losing their voices and yelling themselves hoarse.

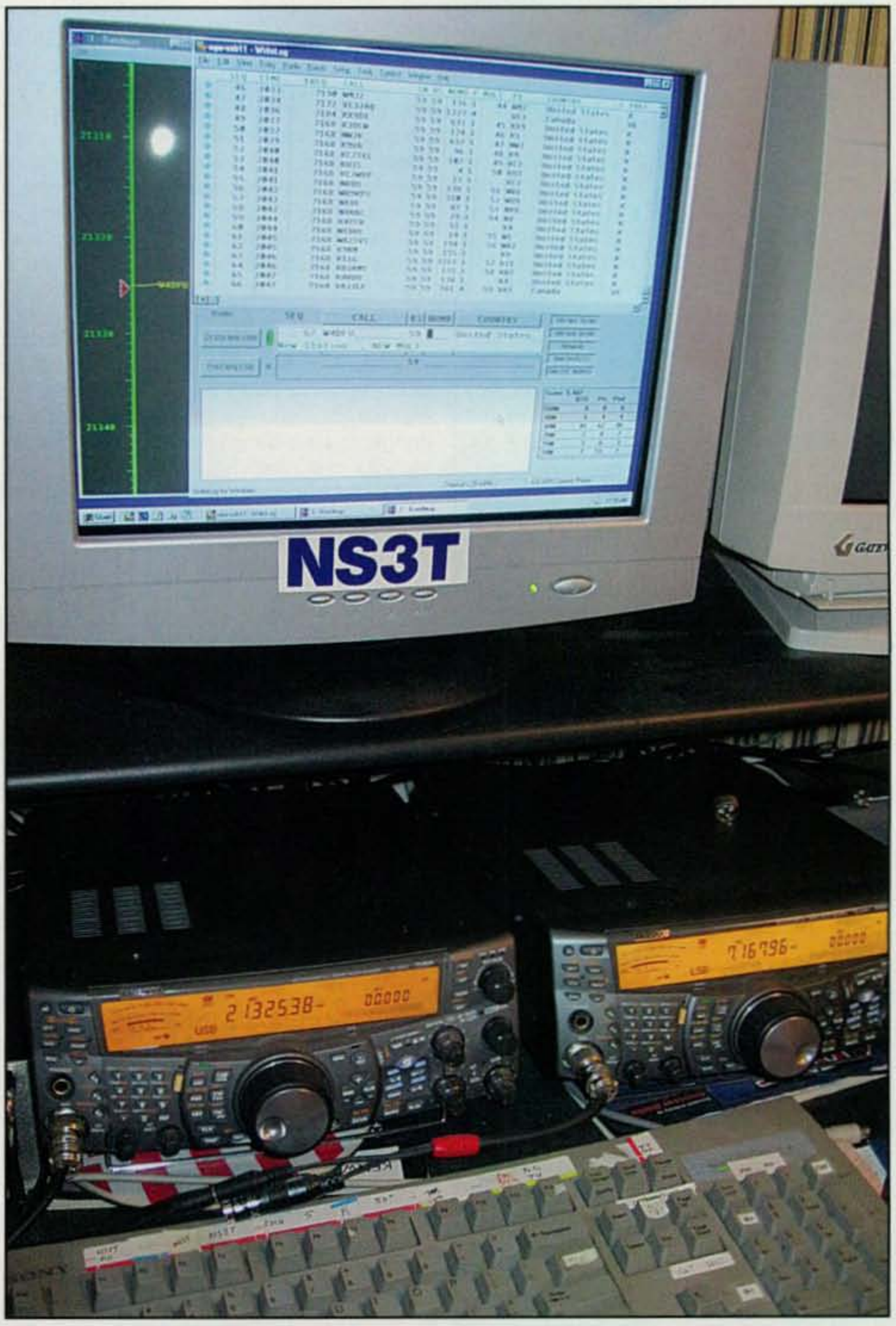
All the while my wife and kids hardly even know that I'm on the radio, and that's very good, considering they're just above me as I sit in my basement shack.

Some of my colleagues in the Potomac Valley Radio Club in the Washington, D.C. area know full well that when they hear NS3T calling CQ during an SSB contest, it's not me, but rather it's a recording of my voice:

"QSL, Hal," said one wise guy last year, referring to the computer in the movie *2001: A Space Odyssey*.

"QSL, Jamie's computer," said another after getting my exchange.

It's all my voice going out over the air, but I get to sit quietly in my shack, just



The author's station with twin Kenwood TS-2000 transceivers set up for SO2R (Single-Operator, 2 Radios) contesting.

*9712 Summit Ave., Kensington, MD 20895
e-mail: <ns3t@arrl.net>
The author also runs a contesting news website at <http://www.radio-sport.net>

Closeup of Jamie's number-one radio and computer keyboard. The audio from his computer is fed into the rig's mic jack. Note that the function keys each are labeled for a different segment of contest exchange.

like I'm operating a CW contest, and I don't lose my voice during a contest weekend.

No Voice Means No Contest

I started fooling around with recorded voice files for contesting in 2003, when my regular voice began to have problems. As a result, I slowly started what I still consider a "very" long-term project for contesting voice files.

Think about how often many of you have had to cut short a contest because your voice was giving out. Maybe you had a cold and it was just killing your voice. Here are just a few of the examples from the 3830 internet reflector after a major SSB contest:

- "Started losing my voice a few hours into the contest which made things tough."
- "Great fun but SSB QSO numbers suffered due to losing my voice."
- "Caught terrible flu two days before the contest and just couldn't make my voice work."
- "Thursday I had a sore throat and by 0230Z, I was losing my voice."

You don't have to suffer like that. There is another option.

The Happy S&P'er

Let's get started with something simple. How about the nine audio files you need to search & pounce your way around the bands during a contest? That's right, just nine recorded audio files can do the trick and have you making contest contacts with your microphone unplugged from the radio. They are:

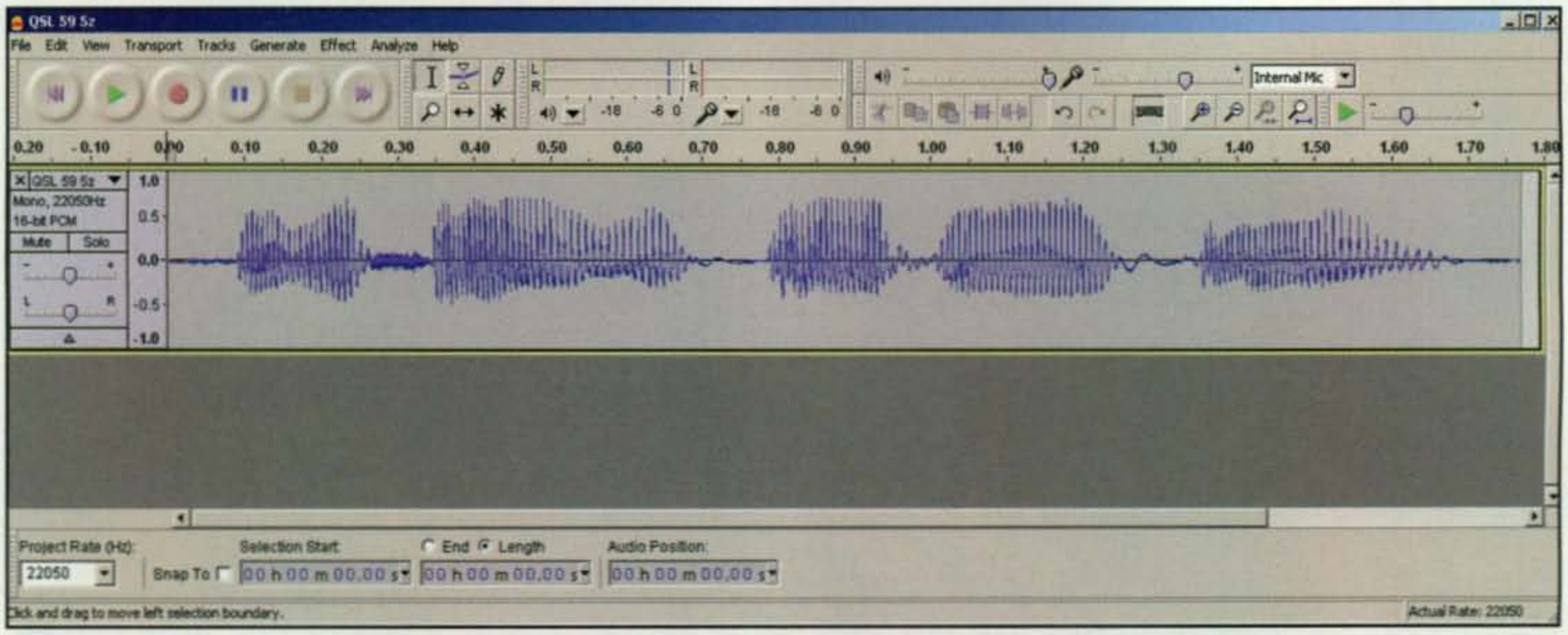
- Two versions of your callsign
- Contest exchange and repeat
- Your suffix and prefix
- Your call area number repeat (one-two-three is mine)
- Thanks or 73
- Roger or QSL

That's your lineup of nine audio files to be what I call "The Happy S&P'er."

Think about it. . . . You don't say very much on the air if you are in search & pounce mode. You give your call, wait for the other guy's exchange, give your info and maybe say 73. If you want to just S&P, things don't have to be too complicated when it comes to audio files. However, maybe you would like to do more with voice files.

The most frequently used application of recorded voice files for contesting is where you use your voice (live) to say the station's callsign, but then you push a button for the exchange. We have seen huge growth in the ARRL November Sweepstakes for this kind of combination of "live" and "taped" messages, in which a competitor will say the callsign and give the serial number, followed by a recorded voice file that has the rest of the information in the lengthy SS exchange.

I wanted to do more, though. I wanted to keep that microphone disconnected from the rig, and I did not want something that sounded like a verbal robot. I wanted my voice on the air, but while my mouth stayed shut. Thus, I started



A sample Audacity recording screen. Here Jamie has recorded "QSL, five-nine, five" for part of the CQ World-Wide DX Contest exchange.

recording. Now I have 17,327 files taking up 1.12 Gigabytes of space in my contest audio folder. (Don't worry; it's copied in several places.)

A Little Advice

Before you think about recording thousands of voice files, I want to give a couple of warnings: First, this kind of project is not for everyone.

Second, it is very time consuming. It can be very frustrating, and it easily can be screwed up.

Also, every piece of contesting software treats voice files differently. I use Writelog® (see "References" for contact information), because I have found that it is by far the most powerful contest logging software when it comes to recorded voice files. However, don't let that stop you from checking out what your logging software can do with recorded files, because many of you complain on a regular basis about how a contest weekend shreds your voice.

How to Record

When it comes to recording and editing sound files, I have an edge on most people, since that's what I do every day in my job. It means I can zip my way through recording and editing, a process that might take others some time to master, but it doesn't mean you can't try.

My audio editor of choice is the same one I use for my news work. It is called Audacity, which is freeware that is available on the internet. It's really pretty basic stuff to trim audio off the front and back end by highlighting it with your cursor and pressing the delete key. Once you take some time to master the shortcuts and more, you can also be an audio editing whiz.

Many hams have their rig hooked up to a computer in the shack, so you can start your voice files project right there. I would recommend using the same microphone for recording voice files that you use on the air, especially if you are mixing your own "live" voice with recorded .WAV files, which is certainly the most popular use of recorded audio files in contesting.

This brings up a very interesting part of this process, which is that you need to match not only the sound levels of your live and taped voice, but also—as best as you can—the "urgency" and the "pacing" of a contest environment in your recorded files.

Many of us have heard contesters who furiously give your call, only to then hit the button to fire the .WAV file exchange which sounds like it was recorded while they were asleep, because the pace is so much slower than everything else that they are doing in the contest. I cannot say how many hundreds of files I have recorded and then later deleted, simply because they did not sound good on the air.

How do you figure out the best "pace" for your recorded files? I did something simple: I just turned the tape recorder on during a big contest and recorded lots of different contesters calling CQ and running stations. I also recorded my own sound for a comparison. Then I went through a lot of the recorded contest audio and found stations that had a pace that I liked. I timed the length of their exchanges and came up with a length and pacing that seemed a comfortable fit for my contesting.

One more note about recording voice files is that you might want to be careful about the size of the file involved as well as what type is supported by your contest logger. All of my .WAV files have a bit rate of 176 kbps, audio sample size of 8 bit, sample rate of 22 kHz, and are recorded in a PCM mono format. The sample rate of 22050 is half of my usual news size of 44100. It does give you a slightly "rougher" sound at 22050, but that's okay. I'm not putting these together for an FM stereo news station. It is SSB, after all, and it saves a good chunk of disk space. You can save more by using .mp3 files, but first make sure your recording software can use them.

The CQ Machine

If you want to take the big step and set up something where you can call CQ in a contest without a microphone, then you need to record a lot of prefixes and suffixes. However, before I started recording, I thought about who might respond to my CQ. I run low power and have wires in the trees of my suburban backyard, so I'm not a big signal on the air in SSB tests. Because of that, I started by focusing on calls in the U.S. and Canada for domestic contests.

First I broke down the different W/VE prefixes and how many files it would take to record those:

- AA1–ALØ (120 files)
- KA1–KZØ (260)
- NA1–NA (260)

TIMEWAVE TECHNOLOGY INC.

Available at:
- Universal Radio
- AES
- HRO
- Radio City
- R&L Electronics

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

PK-232SC Multimode Data Controller*

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

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

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

Now Shipping

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

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

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

Signal Processing, Antenna Analysis, Data & Remote Control

TZ-900 Antenna Analyzer

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

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

DSP-599zx Audio Signal Processor*

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

ANC-4 Antenna Noise Canceller

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

DSP-232+ Multimode Data Controller*

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

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

Available with USB or RS-232

HamLink™ Wireless and USB Remote Control & Audio

HamLinkUSB™ Rig Control Plus

Logic Level plus PTT

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

Use the PK-232 with new computers!

HamLinkBT-BTH+™ Bluetooth® Adaptor

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

***From the Timewave Fountain of Youth** - Upgrades for many of our DSP & PK products. Call Us Now!*

Timewave Technology Inc.
27 Empire Drive, Suite 110
St. Paul, MN 55103 USA

www.timewave.com
sales@timewave.com

651-489-5080
Fax 651-489-5066

- WA1–WZ (260)
- N, K, W (30)
- VA, VB, VC, VE, VY (50)

Yes, that means I started by recording Alpha-Alpha-One, Alpha-Alpha-Two, Alpha-Alpha-Three, etc. That's 980 files just in the U.S. and Canadian prefixes right there. Along the way, I have added in some foreign prefixes and calls, but for the most part, I have left my focus on North America and some of the Caribbean.

Now comes the fun part—the suffixes! Like anything, when you add another variable into the equation, the range of results becomes larger:

- A–Z (26 files)
- AA–ZZ (676 files)
- AAA–ZZZ (17,576 files)

Even by my standards, recording all of the 17,576 three-letter suffix combinations seemed a bit excessive, so I tried to figure out which ones are most active, and then I sat down and recorded some of those from time to time.

For many calls, the recorded prefixes and suffixes that I developed work together pretty well and sound good on the air, but that does not happen automatically. Because of that, I have recorded hundreds and hundreds of full calls so that it sounds even better on the air, especially when it comes to 2 × 1 calls like my own. For example, if you just use "Norway-Sugar-Three" and "Tango" for my NS3T call, it doesn't sound great. However, if you have "NS3T" already recorded along with a lot of other calls, they roll off the (recorded) tongue on the air much better. It wasn't hard to figure out what calls to record, as I just looked at my logs—3830 listings on the internet and contest results to see what calls are active—and recorded many of them. The downside is obvious, as it could mean a lot of work, but the reward is a recorded sound that hardly anyone can tell is not live.

How does it sound? I am biased. I think it sounds great. Here is a link from a November Sweepstakes contest to show you how it works calling CQ: <http://www.radio-sport.net/ns3t-2a. mp3>.

The Power of Writelog

I also have greatly improved the sound of my contest voice files by using the power of my Writelog contest software, which allows a variety of extras when it comes to recorded files.

Let's say you are calling CQ and NN3W answers. You type NN3W into the log entry box and hit the key that fires your .WAV files exchange (for me that is the apostrophe key, next to "Enter). Writelog immediately looks in your voice files folder for NN3W.wav. If it's not there, then the search gets shortened to NN3.wav, butted together with W.wav. It goes all the way down to N.wav, N.wav, 3.wav, W.wav if necessary.

However, since I know NN3W, his call is listed in my "Friends" file for SSB contests, where I have calls of people I know, plus their names (NN3W=NAME-RICH). That allows me to use the %H command to check each call for my "Friends" file, and if they are there, Writelog can send the "NAME-RICH" file so that it says "Thanks, Rich" and then goes into my exchange.

The same thing can be used in the NAQP contests, where the name is part of the exchange, as Writelog can read the name entry field (%F2) and will automatically send a greeting based on the name in that field. If I type in "Jack," Writelog will fire off a voice file that says "Thanks, Jack" followed by my exchange.

It took a lot of experimenting, but I also figured out ways to have one key do different things with a voice file, depending on what information is in the log entry window. For example, if the exchange involves a state, province, or section, pushing a certain key can trigger a file that says, "I need your state again" or "I need your section; what's your section?" However, if I have typed something such as "IA" into that specific log entry field, then pushing the same button will send out "Is that Iowa? India Alpha?" I have done the same for serial numbers and other common exchange information.

I'm Not Wasting Time

I've had a number of people tell me I'm wasting my time with this project, that I could never win a contest with it, etc. While it may not be a match for the fast talkers who can get the rate meter above 500 in an SSB test, there is one area where they are no match for me. My callsigns and my exchanges never stumble.

Next time there is a phone contest on the bands, listen for a while—especially on Sunday—and see how many times the big guns are flubbing their lines, stumbling over calls, getting tongue-tied. *They* are wasting time. Whether the contest period is 10, 12, 24, 36, or 48 hours, there is only so much time that we have on the air, and if you are losing time for any reason, you are losing points.

One area in which this system is very effective is with SO2R (Single Operator, 2 Radios). I'm not using any energy pushing the CQ button, since I use the automatic repeat feature in Writelog. Therefore, while my CQ is being transmitted, I can calmly listen on the other radio and get ready to pounce on another contact. Maybe someday I can take a thumb drive with my voice files to a big station somewhere and see how well it does there.

The Bottom Line

As you can tell, this isn't the easiest project, but it has enabled me to get on the air at all hours of the day and night during an SSB contest without disturbing anyone in my house. I can play the role of "Happy S&P'er," or I can get on and call CQ, and probably no one realizes that I'm churning out sounds from my hard drive, instead of from my lungs and vocal chords.

Is it worth it? You bet it is. Is it for everyone? Probably not, but it is interesting.

The genesis for this article was a speech that I gave to a group of contesters who were gathered in Orlando, Florida for the 65th Orlando HamCation. I was ready to talk about my contesting website, <radio-sport.net>, or how my job in radio news can be much like contesting (sitting in the chair for hours at a time) or my news work in general, since I had some hams who were actual listeners at the event as well. At one point, tough, I decided to bring up the subject of my voice files project. Suddenly my speech was all about voice files with lots of intrigued hams.

"Who would have thought that would be the focus?" said Dan Street, K1TO, one of the organizers of the event. It reminded me that I did have something different on the hard drive of my shack computer. Thus, if you hear NS3T on the air in a phone contest, you will know that my microphone is not plugged in (it's in the cabinet) and that I'm not yelling myself hoarse.

References

Writelog: <http://www.writelog.com>
Audacity: < http://audacity.sourceforge.net/>

ALINCO

144/440MHz FM DUAL BAND HANDHELD TRANSCEIVER

DJ-V57T

Value, Performance, Rugged and Easy!

Double Your Radio Fun with this Tough Talker Dual Band HT!

Ergonomically designed to fit in the palm of your hand, this dual band HT is the newest member of the Alinco family and carries on the proud tradition of high quality transceivers that combine leading edge technology with simple operation. The sound quality will amaze you as its large 40mm internal speaker delivers crisp, clean audio.

Engineered for success, this dual band is packed with features

- 144/440MHz dual-band hand held transceiver
- Choice of 3 power output levels: High 5W(13.8VDC), Low 0.5W and userselectable Mid-power (1-3W)
- Quick-write memory channel (Uses a single key touch to copy current VFO data to the Lowest number of memory channels available)
- Direct frequency input through illuminated keypad
- High-grade water-resistant materials compatible to IPX7
- Rugged polycarbonate body resists dirt and dust
- Great audio with large 40mm internal speaker
- Easy-to-read backlit alphanumeric display
- 200 Memories, plus one call channel on each band
- VFO, Memory and Scan modes
- 39 CTCSS tone squelch (encode + decode) and 104 DCS
- Ni-MH standard and varieties of optional batteries including Li-ion
- Search-scan (programmed scanning) available on each band
- Tone burst function (1000, 1450, 1750 and 2100Hz)
- Battery-drain function avoids memory effect
- Two-touch repeater-setting access
- Internal VOX
- Wire cloning capability
- SMA antenna port
- 2-level attenuator
- DTMF encode and auto-dialer

IPX7 COMPATIBLE WATER-RESISTANCE

Standard Accessories for the T-version

GRE AMERICA, INC.
425 Harbor Blvd. Belmont, CA 94002
Tel: 650-591-1400 Fax: 650-591-2001
Web: http://www.greamerica.com

* Specifications Subject to Change without notice

What You've Told Us...

Our October survey asked about your involvement in amateur radio emergency and public service communications, and not surprisingly, three-quarters of the readers who responded are either currently (54%) or formerly (21%) involved in some way with this vital aspect of ham radio. Plus, nearly two-thirds (61%) of you have helped provide communications during at least one actual emergency, and 75% have helped out with at least one public service event.

Two-thirds of *CQ* readers are members of at least one emergency-communications-related group. Of that number, 73% belong to the ARRL's Amateur Radio Emergency Service (ARES), followed by National Weather Service SKYWARN (64%), RACES (35%), an emcomm-focused radio club (28%), CERT (Community Emergency Response Team)(20%), other (14%), MARS (13%), SATERN (10%), Southern Baptist Disaster Relief (3%) and REACT (also 3%).

That same two-thirds of our readers have completed at least some formal emcomm training. Among them, 68% have taken a SKYWARN course, followed by 55% who have taken a FEMA (Federal Emergency Management Agency) course; 43% have miscellaneous other training, and 32% have completed an ARRL online emcomm course. Somewhat surprisingly with this level of activity and training, only 32% have ever held an emcomm leadership position, such as an ARRL Emergency Coordinator or RACES officer (only 10% currently).

Finally, 51% of readers say amateur radio is an active participant in their community's emergency response plan; 24% say they're not sure, 17% say yes, but mostly on paper, and 11% say no.

This month's winner of a free digital *CQ* subscription is Zaro Kovac, E73DU, of Trebinje, Bosnia and Herzegovina.

Reader Survey January 2012

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

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

This month, as we report on good DX returning to the upper HF bands, we'd like to know some more about your HF activities and experiences.

Please answer by circling the appropriate numbers on the reply card or by going to the following web link <www.surveymonkey.com/s/CQJan12> [From the digital edition, just click on the link].

1. Are you currently active on HF?
- Yes 1
- No 2

2. What is the first solar cycle you remember (as a ham or SWL)?
- Cycle 17 (1933–1944) or earlier 3
- Cycle 18 (1944–1954) 4
- Cycle 19 (1954–1964) 5
- Cycle 20 (1964–1976) 6
- Cycle 21 (1976–1986) 7
- Cycle 22 (1986–1996) 8
- Cycle 23 (1996–2008) 9
- Cycle 24 (2008–present) 10

3. Which HF band is your favorite today?
- 160 meters (yes, we know it's technically MF) 11
- 80/75 meters 12
- 60 meters 13
- 40 meters 14
- 30 meters 15
- 20 meters 16
- 17 meters 17
- 15 meters 18
- 12 meters 19
- 10 meters 20

4. How recently have you been on 10 meters?
- Today 21
- Within the past week 22
- Within the past month 23
- Within the past year 24
- 1–5 years ago 25
- 6–10 years ago 26
- More than 10 years ago 27
- I've never been on 10 meters 28

5. If a new ham band is created in the vicinity of 500 kHz, how likely would you be to try to operate there?
- Very likely 29
- Somewhat likely 30
- Somewhat unlikely 31
- Very unlikely 32
- Would need to learn more first 33

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

MFJ *Balanced Line* Antenna Tuner

Superb balance . . . Very wide matching range . . . Covers 1.8-54 MHz . . . Cross-Needle SWR Wattmeter . . . Handles 300 Watts . . . Compact size . . .

The MFJ-974HB is a* fully balanced true *balanced line antenna tuner. It gives you superb current balance.

Johnson Matchbox

For decades, the Johnson Matchbox has been the standard of comparison for balanced line antenna tuners. But, it had a severely limited matching range and covered only 80, 40, 20, 15 and 10 Meters.

***The** MFJ-974HB is its successor.* It meets today's needs and even surpasses the Johnson Matchbox outstanding performance.

Everything You Need

The MFJ-974HB gives you excellent current balance, very wide matching range(12-2000 Ohms) and covers 1.8 through 54 MHz *continuously* including all WARC bands, 160 Meters, 6 Meters and the new 60 Meter band. Handles 300 Watts SSB PEP and 150 Watts CW.

Tuning is fast and easy - - just three tuning controls. You can adjust for highly efficient broadband low-Q operation or use higher Q when you encounter extreme loads.

A large three-inch lighted Cross-Needle SWR/Wattmeter lets you read SWR, peak or average forward and reflected power *all at a glance* on 300/60 or 30/6 Watt ranges.

A ground post is provided to ground one output terminal so you can also tune random wires and coax fed antennas.

Compact 7½Wx6Hx8D in. fits anywhere.

Tunes any Balanced Line

The MFJ-974HB tunes any balanced lines including 600 Ohm open wire line, 450/300 Ohm ladder lines, 300/72 Ohm twin lead - - shielded or unshielded.

Superb current balance minimizes feedline radiation that can cause troublesome TVI /RFI, painful RF bites, mysterious RF feedback problems and radiation pattern distortion.

Excellent Balance, Excellent Design

The MFJ-974HB is a *fully balanced* wide range T-Network. *Four* 1000 Volt air variable capacitors are gear driven. A high-Q air wound tapped inductor is used for 80-10 Meters with separate inductors for 6 and 160 Meters. The tuning components are mounted symmetrically to insure electrical balance.

MFJ-974HB
$209.95

A 1:1 *current* balun is placed on the low impedance 50 Ohm input side to convert the balanced T-Net-work to un-balanced operation. An efficient balun is made of 50 ferrite beads on RG-303 *Teflon*™ coax to give very high isolation. It stays cool even at max power.

Balanced Line = Extremely Low Loss

Balanced lines give extremely low loss.

Doublet, horizontal loop, vertical loop, quad, double extended Zepp, Lazy H, W8JK antennas all give efficient multi-band operation when fed with balanced lines.

6-80 Meter Balanced Line Tuner

MFJ-974B
$189.95

MFJ-974B, $189.95. Same as MFJ-974H but for 6-80 Meter operation (no 160 Meters).

160-6 Meters All Band Doublet Antenna

MFJ-1777, $59.95. 102 feet doublet antenna covers 160-6 Meters with balanced line tuner. Super strong custom fiberglass center insulator provides stress relief for 450 Ohm ladder line (100 feet included). Authentic *glazed ceramic* end insulators. Handles 1500 Watts.

MFJ 1500 Watt *Fully Balanced* Antenna Tuner

Fully balanced MFJ-976 handles 1500 Watts legal limit . . . Extra-wide 12-2000 Ohms matching range . . . continuous 1.8 to 30 MHz coverage including all WARC bands . . . Four separate 500 pF in two gangs gives you a total of 2000 pF capacitance . . . Heavy duty 1:1 current balun . . . more!

MFJ-976
$499.95

The MFJ-976 is a 1500 Watt Legal Limit *fully balanced* antenna tuner.

You get *superb* current balance, very wide matching range (12-2000 Ohms) and *continuous* 1.8-30 MHz coverage including all WARC bands. Handles *full* 1500 Watts SSB *and* CW.

You can tune *any* balanced lines including 600 Ohm open wire line, 450/ 300 Ohm ladder lines, 300/72 Ohm twin lead -- shielded or unshielded. Also tunes random wires and coax fed antennas.

MFJ's *fully balanced* extremely wide-range T-network gives you simple, fast three knob tuning. No complicated switching between high and low impedance and switching in additional capacitance of L-networks.

Four separate 500 pF in two gangs gives you a total of 2000 pF for highly efficient low loss operation on 160 Meters.

You get superb 10 Meter performance due to MFJ's low minimum capacitance and exclusive *Self-Resonance Killer*™ high-Q *AirCore*™ roller inductor with silver plated contacts.

Heavy duty 1:1 current balun gives you *superb balance* and stays cool even at 1.5kW.

True *active* peak reading lighted Cross-Needle SWR/Wattmeter lets you read SWR, *true peak* or average forward and reflected power all at a glance on 300/ 3000 Watt ranges. 12Wx6Hx15¾D inches.

Ladder line, Twin lead, Insulators, Copper wire . . .

Super-strong fiberglass 450 Ohm ladder line insulators

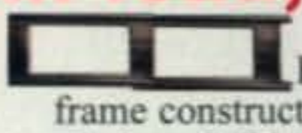
MFJ-16D01, $8.95. *Center* insulator. Double weave ladder line stress-relief. Strong wire tie points. Hang hole.

MFJ-16E01, $9.95. Feedpoint *End* Insulator. Double weave ladder line stress relief. Built-in SO-239 connector.

MFJ-16F01, $8.95. *Middle* insulator. High-strength coax connection at mid-point with SO-239, quadruple weave-through ladder line stress relief.

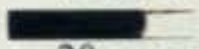
MFJ-16C06, $4.56. Authentic *glazed ceramic* Insulator, 6-pack.

450 Ohm Ladder Line



Extremely low loss, open-frame construction. Heavy duty black polyethylene. Solid 18 gauge wire. MFJ-18H050, **50 Ft.**, $19.95. MFJ-18H100, **100 Ft.**, $34.95. MFJ-18H250, **250 Ft.**, $89.95.

300 Ohm Twin-Lead



20 gauge stranded copper wire. Black polyethylene. MFJ-18T050, **50 Ft.**, $24.95. MFJ-18T100, **100 Ft.**, $44.95. MFJ-18T250, **250 Ft.**, $99.95.

Copper Antenna Wire

Flexible, 7-strand, 14 gauge, hard solid-copper wire. Strong/long-lasting. MFJ-18G100, **100 Ft.**, $24.95. MFJ-18G250, **250 Ft.**, $59.95.

Free MFJ Catalog

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

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

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

MFJ . . . The World Leader in Ham Radio Accessories

Announcing:

The 2012 CQ World-Wide WPX Contest
RTTY: February 11–12

Starts: 0000 GMT Saturday Ends: 2359 GMT Sunday

I. Objective: For amateurs worldwide to contact as many amateurs and prefixes as possible during the contest period.

II. Period of Operation: 48 hours. Single Operator stations may operate 30 of the 48 hours–*off times must be a minimum of 60 minutes* during which no QSO is logged. Multi-operator stations may operate the full 48 hours.

III. Bands: Only the 3.5, 7, 14, 21, and 28 MHz bands may be used. *Observance of established band plans is strongly encouraged.*

IV. Terms of Competition for All Categories:

(a) All entrants must operate within the limits of their chosen category when performing any activity that could affect their submitted score. Only the entrant's callsign may be used to aid the entrant's score.

(b) A different callsign must be used for each entry.

(c) Entrants must not exceed the total output power limit of their entry category on any band. Power is measured at the final output connector of the transmitter.

(d) Self-spotting or asking other stations to spot you is *not* allowed.

(e) Use of QSO alerting assistance is permitted in all categories.

(f) All operation must take place from one operating site. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant.

(g) The entry location of a remote station is determined by the physical location of the transmitters, receivers, and antennas. A remote station must obey all station and category limitations.

V. Entry Categories:

A. Single Operator Categories: All operating and logging functions are performed by one person (the operator). Only one transmitted signal is permitted at any time.

(a) Single Operator High (All Band or Single Band): Total output power must not exceed **1500 watts.**

(b) Single Operator Low (All Band or Single Band): Total output power must not exceed **100 watts.**

(c) Single Operator QRP (All Band or Single Band): Total output power must not exceed **5 watts.**

B. Single Operator Overlay Categories: Single Operator entrants may **also** submit their log for **one** of the categories shown below by adding an additional line in the Cabrillo log file header called CATEGORY-OVERLAY. All Overlay entries are grouped into high power and low power in the results.

(a) Tribander/Single Element (TB-WIRES): During the contest an entrant shall use only one (1) tribander (any type, with a single feed line from the transmitter to the antenna) for 10, 15, and 20 meters and single-element antennas on 40 and 80 meters.

(b) Rookie (ROOKIE): To enter this category the operator must have been licensed as a radio amateur three (3) years or less on the date of the contest. Indicate the date first licensed in the SOAPBOX field.

C. Multi-Operator Categories (All Band, High power only): More than one person can contribute to the final score during the official contest period. Select category based on number of transmitted signals. Total output power of each transmitted signal must not exceed **1500 watts.**

(a) Single-Transmitter (MULTI-ONE): Only one transmitted signal is permitted at any time. A maximum of ten (10) band changes may be made in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters counts as two band changes. Use a single serial number sequence for the entire log.

(b) Two-Transmitter (MULTI-TWO): A maximum of two transmitted signals is permitted at any time on different bands. Either transmitter may work any and all stations. A station may only be worked once per band regardless of which transmitter is used. **The log must indicate which transmitter made each QSO** (column 81 of CABRILLO QSO template for CQ contests). Each transmitter may make a maximum of eight (8) band changes in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters counts as two band changes. Use a separate serial number sequence for each band.

(c) Multi-Transmitter (MULTI-UNLIMITED): No limit to transmitters, but only one transmitted signal (and running station) allowed per band at any time. Use a separate serial number sequence for each band.

VI. Exchange: RS(T) report plus a progressive contact serial number starting with 001 for the first contact. Note: Multi-Two and Multi-Unlimited entrants use separate serial number sequences on each band.

VII. Contact Points:

(a) Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7 and 3.5 MHz.

(b) Contacts between stations on the same continent, but different countries, are worth two (2) points on 28, 21, and 14 MHz and four (4) points on 7 and 3.5 MHz.

(c) Contacts between stations in the same country are worth 1 point on 28, 21, and 14 MHz and two (2) points on 7 and 3.5 MHz.

VIII. Prefix Multipliers: The prefix multiplier is the number of valid prefixes worked. Each PREFIX is counted only once regardless of the band or number of times the same prefix is worked.

(a) A PREFIX is the letter/numeral combination which forms the first part of the amateur call. Examples: N8, W8, WD8, HG1, HG19, KC2, OE2, OE25, LY1000, etc. Any difference in the numbering, lettering, or order of same shall count as a

separate prefix. A station operating from a DXCC country different from that indicated by its call sign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation, the portable designator will then become the prefix. Example: N8BJQ operating from Wake Island would sign N8BJQ/KH9 or N8BJQ/NH9. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (/W8, /AD8, etc.). Portable designators without numbers will be assigned a zero (Ø) after the second letter of the portable designator to form the prefix. Example: PA/N8BJQ would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or other license class identifiers do not count as prefixes.

(b) Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

IX. Scoring: A station may be worked once on each band for QSO point credit. Prefix credit may be taken only once.

(a) Single-Operator:

(i) All-Band score is total contact points from all bands multiplied by the number of different prefixes worked.

(ii) Single-Band score is total contact points on the band entered multiplied by the number of different prefixes worked on that band only.

(b) Multi-Operator: Scoring is the same as Single-Operator, All-Band.

X. Awards: Only logs submitted in electronic format are eligible for awards. A single-band log will be eligible for a single-band award only.

To be eligible for an award, a Single Operator station must show a minimum of 4 hours of operation. Multi-operator stations must operate a minimum of 12 hours.

(a) Plaques are awarded to recognize top performance in a number of categories. View the current list of plaques and sponsors at <http://www.cqwpxrtty.com/plaques.htm>.

Only one plaque will be awarded per entry. A station winning a World plaque will not be considered for a sub-area award. That award will be given to the runner-up for that area if the number of entries justifies the award.

(b) Certificates will be awarded to the highest scoring station in each category listed under Section V . . .

(i) In every participating country.

(ii) In each call area of the United States, Canada, Russia, Spain, and Japan.

(iii) At the discretion of the contest director second- and third-place awards may be made.

XI. Club Competition: A plaque will be awarded each year to the club that has the highest aggregate score from logs submitted by its members. To be listed in the results, a minimum of three logs must be received from a club.

(a) The club must be a local group and not a national organization (e.g., ARRL or DARC).

(b) Participation is limited to members residing in or operating from a local geographic area (exception: DXpeditions specially organized for operation in the contest and manned by members).

(c) Single-operator entries can only contribute to one club. Multi-operator scores may be allocated to multiple clubs as indicated with the entry. Please spell out the full club name in your entry.

XII. Instructions for Submission of Logs: We would appreciate receiving all logs in electronic format. Electronic submission of logs is **required** for anyone competing for an award and for all who use a computer to log the contest or prepare contest logs.

(a) The log MUST show the following for each contact: correct time in UTC, frequency (or band), call, serial number sent, and serial number received. A log without all required information may be reclassified to checklog.

(b) Single-band entrants are required to include all contacts made during the contest period, even if on other bands. Only contacts made on the band specified in the Cabrillo header or summary sheet will be considered for scoring purposes. Logs with contacts only on one band will be classified as single band entries.

(c) The CABRILLO file format is the standard for logs. For detailed instructions on filling out the CABRILLO file header, see the WPX RTTY Contest Web site <www.cqwpxrtty.com>. Failure to fill out the header correctly may result in your entry being placed in the wrong category or reclassified as a checklog. *Note:* U.S. stations must indicate the location of where you operated from in the CABRILLO header (e.g., LOCATION: OH).

(d) E-mail or Web upload is the expected method of log submission. Logs in CABRILLO format should be sent to <rtty@cqwpx.com>. Include only your callsign in the "Subject:" line of your e-mail. Web upload of logs is available on the CQ WPX Web site at <www.cqwpxrtty.com>. All logs received via e-mail will be confirmed via e-mail. A listing of logs received can be found on the CQ WPX RTTY Web Site.

(e) Instructions for NON-CABRILLO electronic logs: If you are not able to submit a CABRILLO format log, please contact the Contest Director for assistance with submitting another format.

(f) Instructions for paper logs: All paper logs should be sent to Paper Logs, Box 481, New Carlisle, OH 45344, USA. Please mark WPX RTTY on the envelope. Each paper log entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the entrant's name and mailing address in BLOCK LETTERS.

XIII. Rule Violations: Violation of amateur radio regulations or the rules of the contest; unsportsmanlike conduct; taking credit for excessive unverifiable QSOs or multipliers; use of any non-amateur means of communication to SOLICIT, ARRANGE, or CONFIRM any contacts during or after the contest will be deemed sufficient cause for disqualification.

An entrant whose log is deemed by the WPX RTTY Contest Committee to contain rule violations may be issued a Yellow or Red card depending on the seriousness of the infraction. If the entry is in a multi-operator category, all listed operators are so affected.

YELLOW card: Any entrant or operator issued a yellow card is not eligible for an award and will be listed at the end of the published results.

RED card: Any entrant or operator issued a red card is not eligible for an award, will be listed at the end of the published results, and will be ineligible for any *CQ*-sponsored contest award for a period of one year beginning with the publication of the violation in *CQ* magazine.

XIV. Declaration: By submitting an entry in the CQ WPX RTTY Contest you agree that: (1) you have read and understood the rules of the contest and agree to be bound by them, (2) you have operated according to all rules and regulations of your country that pertain to amateur radio, (3) your log entry may be made open to the public, and 4) all actions and decisions of the WPX RTTY Contest Committee are official and final.

XV. Deadline: All entries must be e-mailed or postmarked NO LATER than March 1, 2012. Logs e-mailed or postmarked after the deadline may be ineligible for any awards.

Questions pertaining to the WPX Contest may be e-mailed to the WPX RTTY Contest Director, Ed Muns, WØYK, at <w0yk@cqwpxrtty.com>.

AMERITRON . . . 800 Watts . . . $949!

More hams use Ameritron AL-811/H amplifiers than any other amplifier in the world!

Only the Ameritron AL-811H gives you four *fully neutralized* 811A transmitting tubes. You get absolute stability and superb performance on higher bands that can't be matched by un-neutralized tubes.

AL-811H
$949
Suggested Retail
4-Tubes, 800 Watts

AL-811
$799
Suggested Retail
3-Tubes, 600 Watts

You get a quiet desktop linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet -- no special wiring needed.

You get all HF band coverage (with license) -- including WARC and most MARS bands at 100% rated output. Ameritron's *Adapt-A-Volt*™ hi-silicon core power transformer has a special buck-boost winding that lets you compensate for high/low power line voltages.

You also get efficient full size heavy duty tank coils, slug tuned input coils, operate/standby switch, transmit LED, ALC, dual illuminated meters, QSK with optional QSK-5, pressurized cooling that you can hardly hear, full height computer grade filter capacitors and more. 13¾Wx8Hx16D inches.

AL-811, $799. Like AL-811H, but has three 811A tubes and 600 Watts output.

AMERITRON *no tune* Solid State Amplifiers

ALS-500M 500 Watt Mobile Amp

ALS-500M
$899
Suggested Retail

500 Watts
PEP/400W CW output, 1.5-22 MHz, instant bandswitching, no tuning, no warm-up. SWR, load fault, thermal overload protected. On/Off/Bypass switch. Re-mote on/off control. DC current meter. Ex-tremely quiet fan. 13.8 VDC. 9Wx3½Hx15D in., 7 lbs. **ALS-500RC, $49,** Remote Head.

ALS-600 Station 600 Watt FET Amp

***No tuning**, no fuss, no worries -- just turn on and operate.* 600 Watts PEP/500W CW, 1.5-22 MHz, instant bandswitching, SWR protected, extremely quiet, SWR/Wattmeter, ALC control. 120/220 VAC. Inrush protected.

ALS-600
$1499
Suggested Retail

9½Wx6Hx12D in. **ALS-600S, $1599,** ALS-600 with 10 lb. switching power supply.

Whisper quiet *desktop* amp plugs into

AL-80B
$1449
Suggested Retail

120 VAC to give *full* kilowatt SSB PEP output. Ameritron's exclusive *DynamicALC*™ doubles average SSB power out and *Instantaneous RF Bias*™ gives cooler operation. All HF bands. 850 Watts CW out, 500 Watts RTTY out, extra heavy duty power supply, 3-500G tube, 70% efficiency, tuned input, Pi/Pi-L output, inrush current protection, dual Cross-Needle meters, QSK compatible, 48 lbs. 14Wx8½Hx15½D in. **Two-year warranty.**

ALS-1300 Solid State 1200 Watt Amp

ALS-1300
$2899
Suggested Retail

Ameritron's *highest power* solid state FET no-tune amplifier gives you instant bandswitching, no tuning, no warm-up, no tubes to baby and no fuss! Outstanding reliability is insured by using eight rugged MRF-150 power FET's mounted on the dual heavy duty heat sink. Run up to 1200 Watts of clean SSB output power (just 100 Watts drive gives full rated power) for continuous coverage between 1.5-22 MHz. Compact 10Wx6½Hx18D in.

Near Legal Limit ™ Amplifier

AL-572
$1695
Suggested Retail

New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *60%* of price of a full legal limit amp! 4 rugged 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 14½Wx 8½Hx15½D inches fits on desktop. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted cross-needle meters, multi-voltage transformer.

HF Amps with Eimac *3CX800A7*

Suggested Retail

AL-800
$2045
1 *Eimac*® tube, 1250 W

AL-800H
$3045
2 *Eimac*® tubes, 1.5 kW *Plus*
With Imported Tube
AL-800F, $1875
AL-800HF, $2745

These *compact* desktop amplifiers with 3CX800A7 tubes cover 160-15 Meters including WARC bands. Adjustable slug tuned input circuit, grid protection, front panel ALC control, vernier reduction drives, heavy duty 32 lb. silicone steel core transformer, high capacitance computer grade filter capacitors. Multi-voltage operation, dual lighted cross-needle meters. 14¼Wx8½Hx16½D in.

AMERITRON *full legal limit* amplifiers

AMERITRON legal limit amps use a super heavy duty Peter Dahl Hypersil® power transformer capable of 2.5 kW!

Most powerful -- *3CX1500/8877*

AL-1500
$3495
Eimac® Tube

AL-1500F
$3095
Imported tube

Suggested Retail

Ameritron's *most powerful* amplifier uses the herculean 3CX1500/8877 ceramic tube. 65 watts drive gives you full legal output -- it's just loafing with a 2500 Watts power supply.

Toughest -- *3CX1200A7*

AL-1200
$3459
Suggested Retail

Get ham radio's *toughest* tube with the Ameritron AL-1200 -- the *Eimac*® 3CX1200A7. It has a 50 Watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: A super heavy duty power supply that loafs at full legal power -- it can deliver the power of more than 2500 Watts PEP two tone output for a half hour.

Classic -- *Dual 3-500Gs*

AL-82
$2745
Suggested Retail

This linear gives you full legal output using a *pair* of *genuine* 3-500Gs. Competing linears using 3-500Gs *can't* give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential.

Call your dealer for your best price!

Free Catalog: 800-713-3550

Ameritron *brings you the finest high power accessories!*

ARB-704 amp-to-rig interface. . . $59.95

Protects rig from damage by keying line transients and makes hook-up to your rig easy!

ADL-1500 Dummy Load with oil . . . $74.95

Oil-cooled. 50 Ohms. 1500 Watts/5 minutes. SWR< 1.2 to 30 MHz. Low SWR to 400 MHz.

ADL-2500 fan-cooled Dry Dummy Load, $209.95

Whisper quiet fan, 2.5kW/1 minute on, ten off. 300W continuous. SWR< 1.25 to 30 MHz.<1.4 to 60 MHz.

ATP-100 Tuning Pulser . . . $69.95

Safely tune up for full power, best linearity. Prevents overheating, tube damage, power supply stress, component failure.

AMERITRON
. . . the world's high power leader!
116 Willow Road, Starkville, MS 39759
TECH (662) 323-8211 • **FAX** (662) 323-6551
8 a.m. - 4:30 p.m. CST Monday - Friday
For power amplifier components call (662) 323-8211
http://www.ameritron.com

AMERITRON . . . the world's high power leader!

math's notes

BY IRWIN MATH,* WA2NDM

The Operational Amplifier (continued)

To continue our op amp discussion from last month let us now look at fig. 1. Here we have connected V+in to ground (or 0 volts). As a result V–in will be forced to a value that is within 100 microvolts (in our circuit example) of 0 volts. We have also added two resistors to the V–in terminal. One, called Rin, is connected to our input source, while the other, Rf, is connected to the output of the op-amp.

For this example let us also assume that the values of both resistors are the same. Since V–in must be at zero volts (because V+in is connected to ground), all of the input voltage has to be present across Rin. Remembering what we discussed last month, you will now see that the output voltage must rise to the point where it is essentially equal to the input voltage (for now we will ignore the 100-microvolt offset) since its other end is at V–in (or 0). Also, all of it has to be present across Rf. Furthermore, since the input is connected to V–in, the output must be of the opposite polarity. An input of +1 volt therefore will result in an output of –1 volt.

This is one of the most common conventional op-amp circuit configurations. You might also immediately realize that if Rf is increased, let us say to 10 times Rin, the output now will have to increase to 10 times the input. This leads us to the simple formula for this circuit, which is –Vout = Vin(Rf/Rin).

In the event that you do not want the inversion in polarity, fig. 2 shows the same basic circuit but with the input applied to V+in. Now the formula becomes Vout = Vin (Rf/Rin). Note that in both cases of our example the offset voltage was ignored, as it was only a tiny portion of the actual values. In "real world" examples it may (or may not) be important.

To reiterate, you should remember that the value of V–in (with respect to common) will always be essentially the same as the value of V+in (also with respect to common). Any input to a series resistor will always cause the output to go to a value where the V+in and V-in voltages (including, but not necessarily limited to, 0) are essentially the same. This means that in our example we can connect additional resistors to V-in as shown in fig. 3. The output of the op-amp will then be the sum of all of the voltages applied to these resistors as shown in

*c/o CQ magazine

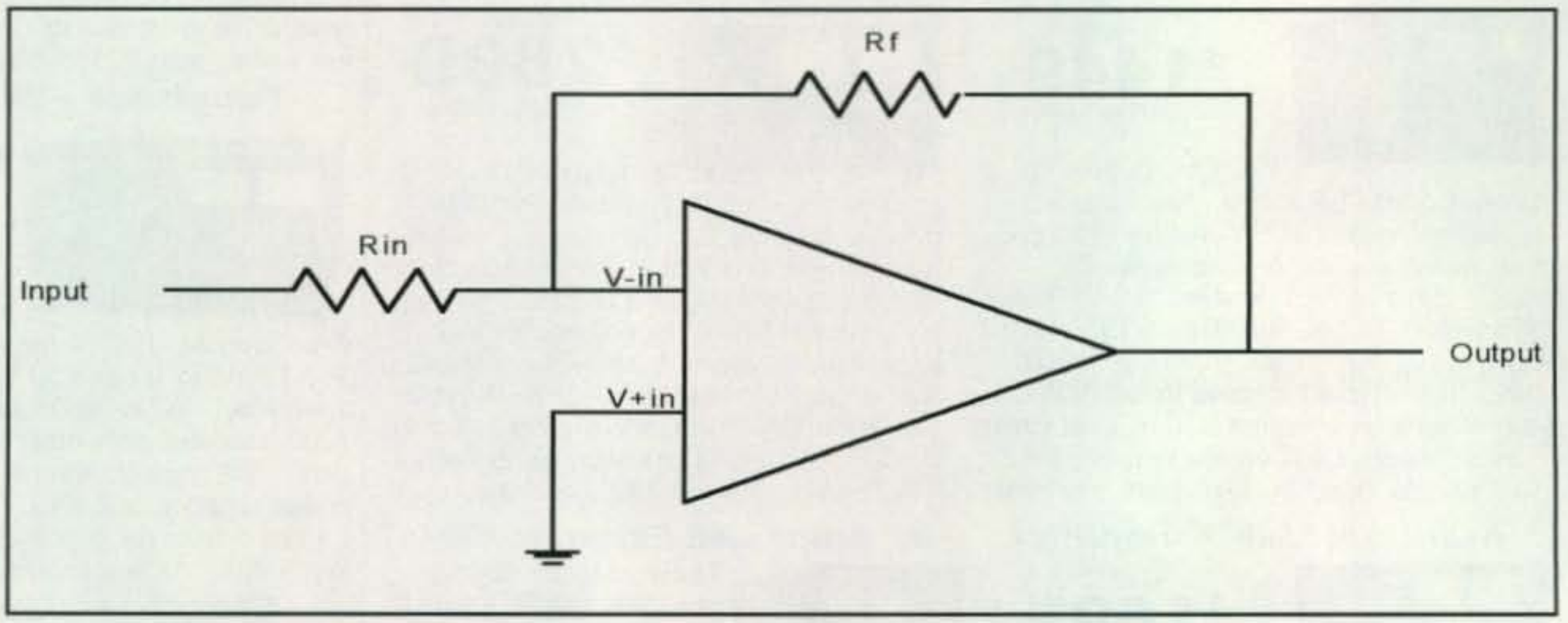


Fig. 1– Common inverting op-amp circuit.

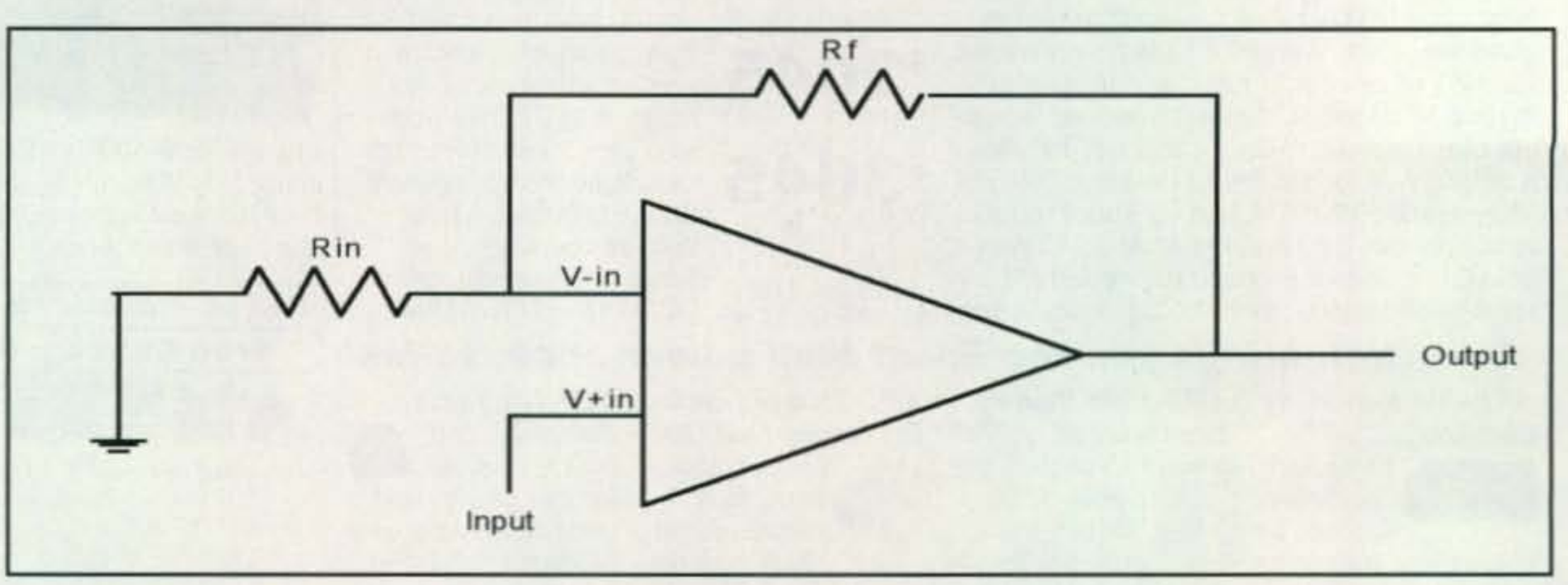


Fig. 2– Common non-inverting op-amp circuit.

Winter Finds at the CQ Store

FREE shipping on orders of $100 or more!

HF Antenna Collection

RSGB 252 pages.

A collection of outstanding articles and short pieces which were published in *Radio Communication* magazine. Includes single- and multi-element, horizontal and vertical antennas, extremely small transceiving and receiving antennas, feeders, tuners and more!

Order: RSHFAC $33.00

Backyard Antennas

RSGB 208 pages

Antenna guru Peter Dodd explains how using a variety of simple techniques make it possible to achieve very high performance from a compact antenna.

Order: RSBYA $33.00

Virtual Radar Explained

By Mick Richards, G4WNC
RSGB

The reception and plotting of ADS-B transmissions for aircraft. Great for aviation enthusiasts.

Order: RSVRE $16.95

Guide to VHF/UHF Amateur Radio

By Ian Poole, G3YWX
RSGB 112 pages

Everything you will need to help you enjoy VHF/UHF to the fullest. Choosing the right transmitter, receiver, antenna, utilizing the correct part if each band and more!

Order No. RSGVUAR $16.00

HF Antennas For All Locations

by Les Moxon, G6XN

RSGB 322 pages

Details the design and construction of hundreds of amateur antennas. You'll sure to find one antenna in this collection that will work for you!

Order RSHFAAL $33.50

Understanding, Building & Using Baluns & Ununs

by Jerry Sevick, W2FMI

The successor to the popular and authoritative Baluns and Ununs. Great deal of new tutorial material, and designs not in previous book, with crystal clear explanations of how and why they work.

8.5 X 11 Paperback $19.95
***New!* CD Version $14.95**
Buy both for only $29.95

The Short Vertical Antenna and Ground Radial

by Sevick, W2FMI

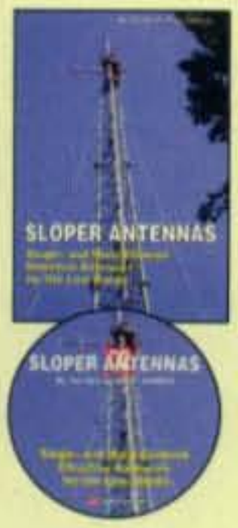
Small but solid guide walks you through the design and installation of inexpensive, yet effective short HF vertical antennas.

6 X 9 Paperback $10.00

Sloper Antennas

By Juergen A. Weigl, OE5CWL

Single- and Multi-Element Directive Antennas for the Low Bands



With calculations and practical experience, this book shows which basi concepts have to be considered for sloper antennas for the low bands.

6 X 9 Paperback $24.95
***New!* CD Version $18.95**
Buy both for only $36.95

Reflections III

by Walter Maxwell, W2DU

Includes all the information in Reflections I & II and much, much more! This fully revised and updated, this 424-page, third edition is truly a must have!

8.5 X 11 Paperback $39.95
***New!* CD Version $29.95**
Buy both for only $59.95

VHF/UHF Handbook

Edited by Andy Barter, G8ATD
RSGB 320 pages.

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.

Order: RXVUH $29.50

HF Antennas for Everyone

Edited by Giles Rad, G1MFG
RSGB

No matter the size of your available space - you'll find antenna designs that will help yo get your signals in and out!

Order: RSHFAE $27.95

HF Amateur Radio

RSGB 2007 Second Edition

This full revised and expanded second edition guides you through setting up an efficient amateur radio station, equipment to choose, installation, the best antenna for your location and MUCH more.

Order: RSHFAR $23.00

Collins Radio Repair & Tune-Up DVD Guides

From Hi-Res Communications, Inc., these well-produced, authoritative DVDs cover all the most common repair and tune-up subjects on these classic radios. It's like having an experienced professional right next to you!

Collins KWM-2
2 disc set, 236 minutes
Order No. C-KWM
$89.95

Collins 75S-3/32S-3
2disc set, 226 minutes
Order No. C-75S
$89.95

Collins 30L-1
Single Disc, 61 minutes
Order No. C-30L
$39.95

Shipping & Handling: U.S. add $7 for the first item, $3.50 for the second and $2 for each add'l item. FREE shipping on orders over $100 to one U.S. address. CN/MX-$15 for 1st item, $7 for 2nd and $3 for each add'l. All Other Countries-$25 for 1st item, $10 for 2nd and $5 for each additional. Buy Both=single item!

CQ Communications, Inc., 25 Newbridge Road, Hicksville, NY 11801
***Call:* 1-800-853-9797 • *Fax:* 516-681-2926 • *website:* www.cq-amateur-radio.com**

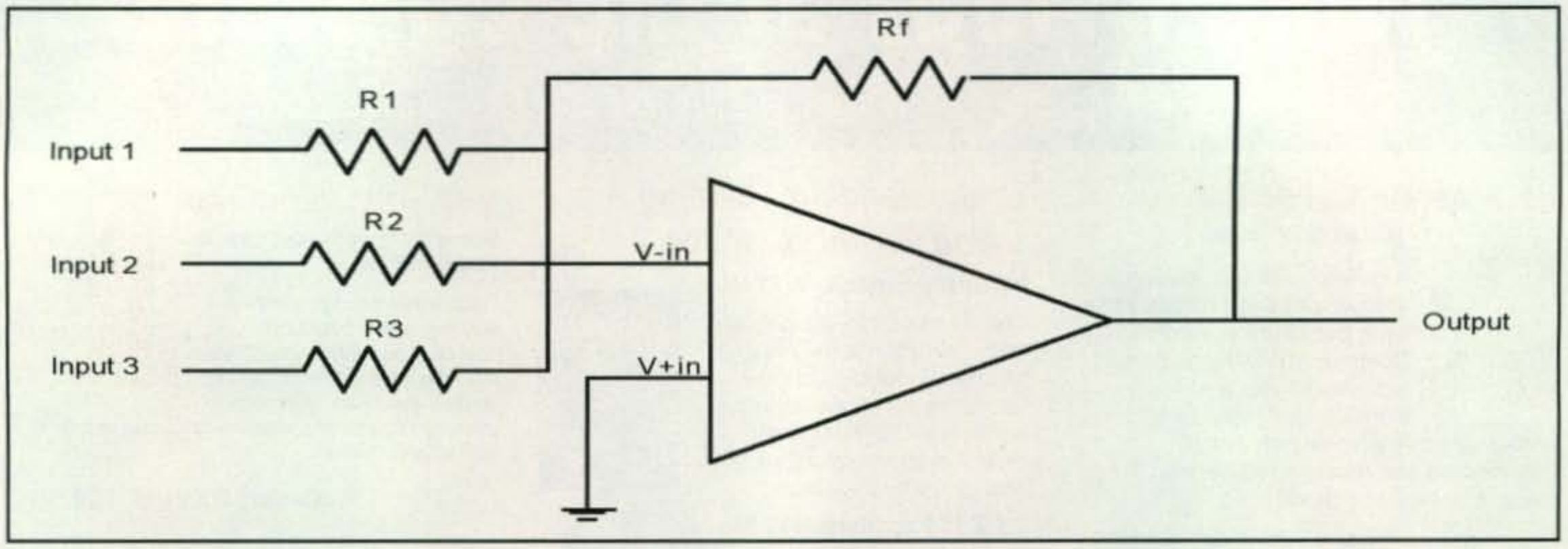


Fig. 3– Common multi-input inverting op-amp circuit.

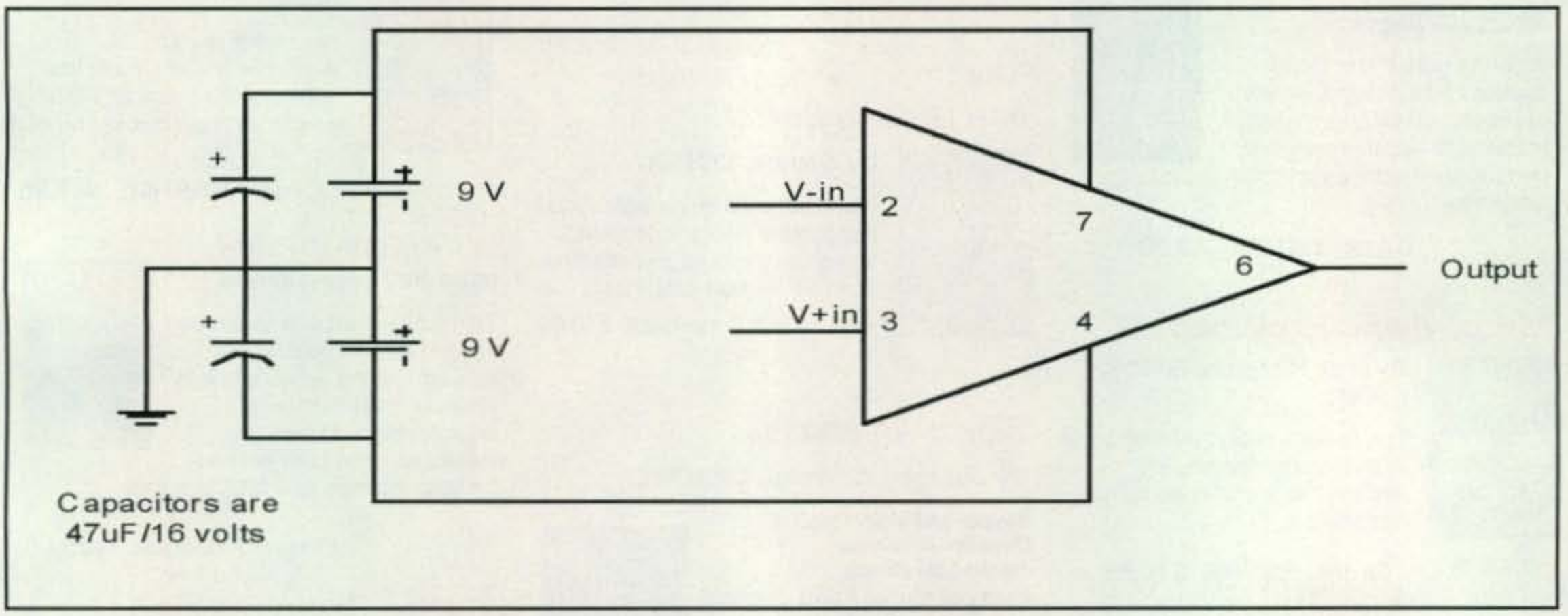


Fig. 4– Simple op-amp test circuit described in text.

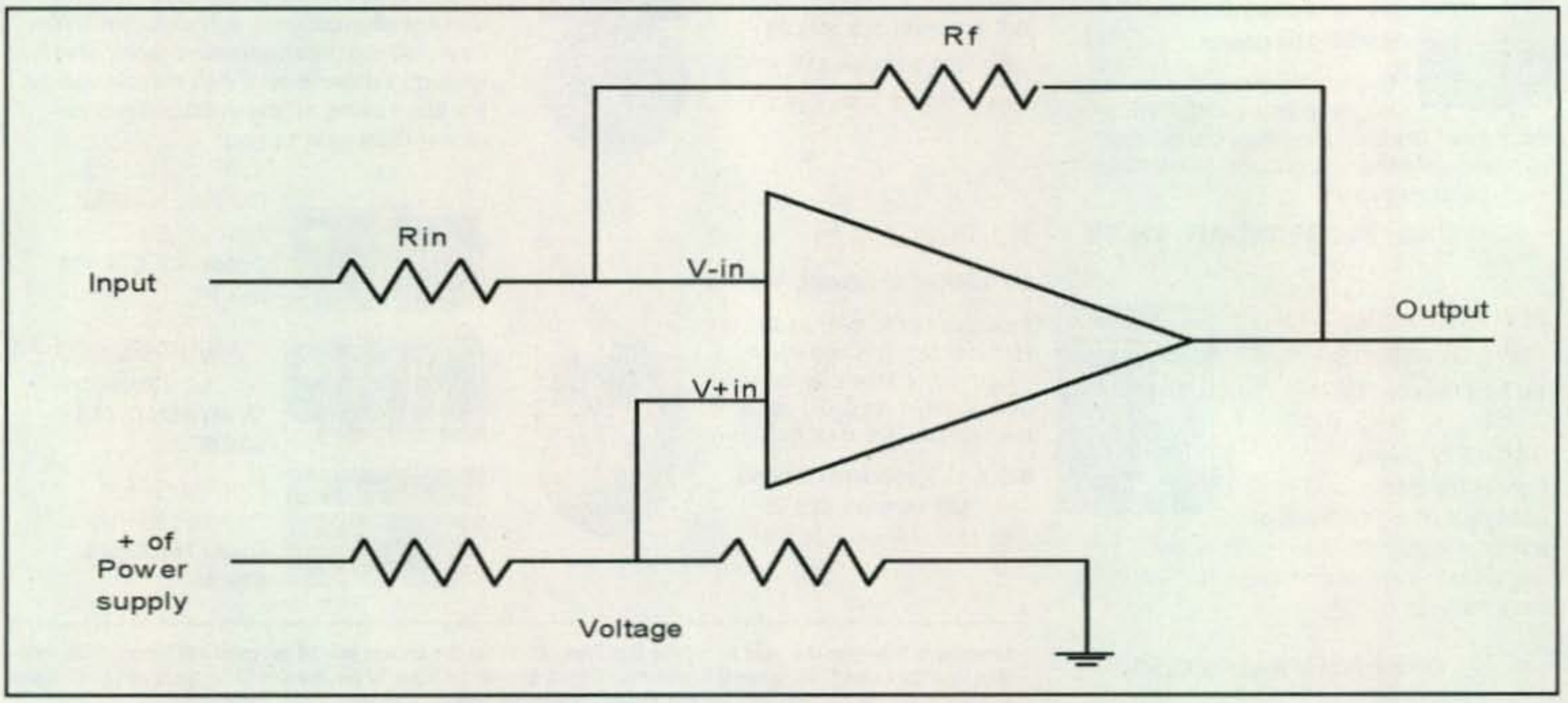


Fig. 5– Using a single power supply to power an op-amp circuit.

the diagram, since the values of V+in and V-in are both 0.

This circuit is an ideal mixer, since one input will not affect any other input. In addition, if the various input resistors were potentiometers, the circuit would be the basis of a good audio (or RF, for that matter) mixer.

At this point we would suggest that you get yourself a couple of inexpensive op-amps (the LM-741 is a good, readily available choice) and build the test circuit of fig. 4. Your power supply will be a couple of 9 volt batteries, and your breadboard can be one of the low-cost so-called "solderless breadboards." These can be used to quickly configure various circuits and will not "break the bank." Since op-amps can be touchy, a coupe of electrolytic capacitors should be added between the positive and negative supplies to ground as shown. You should also have a simple power supply for your signal source and a DVM. In a pinch, you can always use a 1.5-volt battery as your signal source.

Before leaving you on your own, I would like to take a moment to discuss power supplies for op-amp circuits. Up to now in our discussion we have used both positive and negative supplies. An op-amp can be run from a single supply, however, by biasing it as shown in fig. 5. Here the V+in terminal is brought to a point that is half of the power supply by means of two resistors. This now means that the "0 point" will be half of the power supply, or 4.5 volts in this example. With no input to the circuit of fig. 1, the output will be +4.5 volts. With a +1 volt input, the output will be +3.5 volts, and with a –1 volt input, the output will be +5.5 volts. You get the idea.

So far we have discussed the very basics of "ideal" op-amps and given some very simple examples. In the real world, however, all of the parameters of each specific op-amp will determine how well a particular device will operate in your application. If you try to repeat the examples given, you will at least quickly see the "real world" results of the device. Then, when you are more familiar with the operation of the device, it would be a good idea to search the internet or even the application notes published by the various semiconductor manufacturers for more elaborate circuits and applications with which to experiment.

The operational amplifier can be a very powerful circuit element that can be used in countless applications way beyond our simple introduction.

Have fun experimenting and a very Happy New Year to all!

73, Irwin, WA2NDM

BY FREDERICK O. MAIA,* W5YI

ITU World Radio Conference to be held Jan. 23 to Feb. 17, 2012

Amateur radio access to new spectrum around 500 kHz is on the agenda; 60 meters endangered

The International Telecommunication Union holds major international meetings, called World Radio Conferences (WRC), every three or four years. The next month-long WRC-12 will be convened at ITU headquarters in Geneva beginning in mid-January. The conference has the very important task of reviewing the international treaty that governs all radiocommunications.

It will be preceded by the Radiocommunication Assembly from January 16–20 which will decide the structure, working methods, and schedule of the various study groups that will address each agenda item.

The radio spectrum is a valuable and limited natural resource. Radio waves do not stop at national boundaries, and international coordination is required to eliminate interference between countries. National governments of the world manage their radio services in accordance with the telecommunications regulatory framework established at these World Radio Conferences.

History of International Radio Regulation

The history of international radio regulation extends back before there was radio, to the formation of the International Telegraph Union in 1865. In 1876, after the invention of the telephone, the ITU drew up international rules governing telephony. The development of radio around the turn of the last century led to the first International Radiotelegraph Conference in Berlin in 1906. The two groups met separately until 1932, when they were merged to form today's International Telecommunication Union. The ITU became a United Nations specialized organization in 1947, with headquarters in Geneva, Switzerland. Its stated goal was to extend, improve, and promote all forms of international telecommunications.

Member countries have met periodically over the past century. These gatherings, originally held every ten or twenty years and covering all radio services, used to be called World Administrative Radio Conferences, or WARCs. At the 1979 WARC, three new HF amateur radio bands were established: 30 meters, 17 meters, and 12 meters. That is why today these three bands are often referred to by hams as the "WARC bands."

The ITU was restructured in 1992 and future conferences became known as World Radio Conferences (WRCs). Because telecommunications technology changes so rapidly and is so important to the global economy, the ITU now holds WRCs more frequently and with limited agendas. The last WRC was held in 2007 and the next, WRC-12, will convene this month. In attendance will be 193 ITU member states. (The most recent member to join the ITU is South Sudan, which became a member on July 14, 2011.) Together they will discuss and vote on possible changes to the International Radio Regulations.

These regulations tend to be very general in scope, thus providing a certain amount of national flexibility and application. These accords have the force of an international treaty once ratified at the national level.

ITU membership is open to governments, which may join the Union as Member States, as well as to private organizations such as carriers, equipment manufacturers, funding bodies, research and development organizations, and international and regional telecommunication organizations, which can join the ITU as Sector Members. At present there are around 700 Sector Members. The International Amateur Radio Union, IARU, has official observer status at the ITU.

All United Nations countries are automatically members of the ITU, and those that are not UN members can be voted in by two-thirds vote. In 1993, the ITU was remodeled into three bureaus, or sectors. They are the Telecom Standardization Sector (commonly referred to as ITU-T), the Telecom Development Sector (ITU-D), and the Radiocommunications Sector (ITU-R). Each of the three ITU bureaus has various advisory and study groups.

According to the ITU, the objective of the Radiocommunication Sector is "...to ensure rational, equitable, efficient, and economical use of the radiofrequency spectrum by all radiocommunication services, including those using satellite orbit,

*1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

and to carry out studies and adopt recommendations on radiocommunication matters."

Preparing for a WRC

The general scope of WRC agendas is established four to six years in advance, with the final agenda set by the ITU Council two years before the conference, by concurrence of a majority of member states.

Member countries prepare for these conferences by organizing national and regional telecommunications meetings addressing the agenda items. The FCC, NTIA (National Telecommunications and Information Administration) and Department of State collaborate to develop the U.S. positions.

Preparations for World Radio Conferences are also conducted by regional groups such as APT (Asia-Pacific Telecommunity), CITEL (Inter-American Telecommunication Commission), CEPT (European Conference of Postal and Telecommunication Administrations), and ERO (the European Radiocommunications Office). There is also an Arab Regional Group.

The ITU's Study Groups represent a major aspect of ITU-R activities. More than 1500 specialists from telecommunication organizations and administrations around the world participate in the work of the Radiocommunication Sector's seven study groups. Terrestrial services (such as amateur radio) are handled by Study Group 5. Each Study Group is further separated into subsidiary "Working Parties" (WP), "Task Groups" (TG), and "Rapporteur (reporting) Groups" (RG). Amateur radio agenda items are considered by Working Party 5A.

The recommendations of each Study Group are then summarized into a consolidated CPM (Conference Preparatory Meeting) Report and circulated to the various ITU members about six months before the Conference starts. The CPM Report represents a consensus of ways to act on each agenda item. The CPM Report for WRC-12 was released on February 25, 2011.

WRC-12

A major focus of WRC-12 will be on developing a sharing mechanism for radio-frequency spectrum that is being freed up by the move from analog to digital television broadcasting. Additional spectrum will be identified for other radiocommunication services related to the environment, meteorology, and climatology, as well as disaster prediction, mitigation, and relief. Also on the agenda is a possible international amateur radio allocation in the area of 500 kHz.

Since early in the 20th century, the radio frequency of 500 kHz has been an international calling and distress frequency for Morse code maritime communications. It was frequently referred to by its equivalent wavelength, 600 meters.

The United States Coast Guard used to maintain 24-hour watches on this frequency. Many SOS calls and medical emergencies at sea were handled on 500 kHz until the late 1980s. Rarely is the frequency now used. Emergency traffic on 500 kHz has been almost completely replaced by the satellite-based Global Maritime Distress Safety System(GMDSS).

Most nations now have ended monitoring of maritime transmissions on 500 kHz. The nearby frequencies of 518 kHz and 490 kHz are used for the Navtex (Navigational Telex) component of GMDSS. Navtex is an international automated direct-printing service delivering navigational and meteorological warnings, forecasts, and urgent marine safety information to ships at sea.

There have been proposals to allocate frequencies at or near 500 kHz for amateur radio use. Some countries already allow their radio amateurs to use 500 kHz. Other regions have

granted experimental uses to selected licensees in advance of any international frequency allocation. The FCC granted the American Radio Relay League an experimental license to explore such uses in September 2006.

During the upcoming World Radio Conference, a 15-kHz allocation to the Amateur Radio Service will be "considered on a secondary use basis taking into account the need to protect existing services." The specific frequencies are yet to be determined, but are expected to be between 415 and 526.5 kHz.

The issue is whether to allocate spectrum to the amateur service and how to protect existing services in the band from harmful interference. The band 415 to 526.5 kHz largely is allocated to the maritime mobile and aeronautical radionavigation services. Currently, only radiotelegraphy may be used on the band from 495–505 kHz.

The principal interest of the Amateur Radio Service in this band lies in its unique propagation properties, which are different from those in the 135-kHz and 1800-kHz bands. For example, the band allows for propagation unaffected by ionospheric disturbances and sunspot cycle variations. This characteristic would prove invaluable in the continuing development by radio amateurs of dependable emergency communications.

Worldwide, the amateur service, as a secondary user, successfully shares with the fixed service between 10.100 and 10.150 MHz. In some countries, including the U.S., amateurs utilize specific channels between 5.25 and 5.45 MHz on a secondary basis shared with the primary fixed and mobile services. The primary interference avoidance technique on these bands has been a listen-before-transmit protocol, supplemented by appropriate regulatory power limitations. These techniques have led to successful sharing arrangements. (In an unexpected and unfortunate proposal to WRC-12, the United States has proposed to allocate 5.25–5.45 MHz to the radiolocation service to accommodate HF oceanographic radar. This could adversely impact U.S. amateur service access to the 5 channels in this range since sharing will be difficult.)

In the 500-kHz range, the United States supports the secondary allocation subject to the protection of incumbent radiocommunication services. The U.S. State Department has sent its proposals off to Geneva, including a recommendation for a secondary allocation for the amateur service at 461–469 kHz and 471–478 kHz.

Two possible methods of providing access to amateurs in the 500-kHz range, along with the possibility of there being no change (and therefore no allocation), are set out in the CPM Report, along with the advantages and disadvantages of each. ARRL Chief Technology Officer Brennan Price, N4QX, attended the CPM as a member of the United States delegation.

What is now called Method "A" envisions an allocation of up to 15 kHz between 472 and 487 kHz. Method "B" calls for allocations of 461–469 kHz and 471–478 kHz. The U.S. supports Method "B," which also has sufficient support among other administrations in the Americas to have become an Inter-American Proposal of the Inter-American Telecommunication Commission (CITEL). But some other administrations support Method "A."

At its meeting from September 26 to 29, the European (CEPT) project team approved a draft proposal for the secondary MF amateur allocation to be an 8-kHz–wide band between 472 and 480 kHz. This is supported by the 48-country European bloc.

ARRL Chief Executive Officer David Sumner, K1ZZ, said, "While an 8-kHz allocation does not fully meet our objective of 15 kHz, having a European Common Proposal for an amateur allocation is a major step toward possibly achieving one at WRC-12."

The National Telecommunications and Information Administration notes that "The maritime community also has emerging requirements for globally harmonized interoperable maritime spectrum in support of safety and security requirements in the 415–526.5 kHz band." The NTIA is the White House advisor on telecommunications matters.

A new digital system centered on 500 kHz is being developed by the maritime radio community, and an amateur allocation, even on a secondary, not-to-interfere basis, was found to be incompatible with the planned system.

The International Maritime Organization (IMO) opposes any secondary MF allocation to the amateur service at any 600-meter frequency. The IMO's primary purpose is to develop and maintain a comprehensive regulatory framework for shipping at sea. The IMO believes "based on existing studies" that any such allocation will cause harmful interference to future maritime needs and recommends that the allocation to the amateur service not be made.

We will know the result of the voting on February 17. See you next month.

73, Fred, W5YI

Announcing:

2012 Nominations Open for the *CQ* Amateur Radio, DX, and Contest Halls of Fame

Each year *CQ* recognizes those who have made significant contributions to amateur radio in general, and to DXing and contesting in particular, creating three categories of awards. Nominations are now open and will close on **March 1, 2012 for all three Halls of Fame**.

CQ Amateur Radio Hall of Fame

Amateur radio operators have been responsible for many advances in communications technology, and entire industries have been built on the foundation of amateur radio experimentation and activity. In an effort to recognize outstanding amateurs and their achievements, and help the public appreciate the far-reaching and long-standing value of amateur radio in our society, we have established the *CQ* Amateur Radio Hall of Fame. Nominations for the 2012 "class" are now open. Members of the 2011 "class" were announced last May and appeared in the July issue of *CQ*.

The *CQ* Amateur Radio Hall of Fame honors those whose technical or other accomplishments have helped propel amateur radio forward, or whose achievements in other areas of life have helped improve ham radio's reputation simply through association. Nominees for the *CQ* Amateur Radio Hall of Fame will be judged on the basis of qualifying in one of two broad areas: those individuals—whether licensed amateurs or not—who have made significant contributions to the amateur radio hobby; and those radio amateurs who have made significant contributions to society in general. Nominees must have made *significant* contributions of nationwide or worldwide impact.

In order to be consistent with the nomination deadline for the CQ Contest and DX Halls of Fame, the nomination deadline for the CQ Amateur Radio Hall of Fame is March 1. Nominations received after that date will be considered for future selection. Nominations for the Amateur Radio Hall of Fame may be made by clubs, organizations, or individuals. State your candidate's name, where to contact him/her if still living, for which category you are nominating him/her, and a brief one- to two-paragraph description of this person's accomplishments. Please include your name and contact information as well. E-mail to <hall-of-fame@cq-amateur-radio.com> or mail to *CQ* Amateur Radio Hall of Fame, 25 Newbridge Rd., Hicksville, NY 11801. The official nomination form is on the *CQ* website <www.cq-amateur-radio.com>. If you feel someone has earned this recognition, please submit a nomination. Please *don't* assume that someone else will nominate the person you may have in mind.

We will announce this year's selections at the Dayton Hamvention® in May 2012. Please help us recognize these "ham radio heroes" whose contributions have helped shape our hobby, our nation, or our world.

CQ DX and Contest Halls of Fame

Nominations for the CQ DX Hall of Fame and the CQ Contest Hall of Fame recognize those amateurs who have made major contributions to DXing and contesting, respectively. The activities and accomplishments that qualify one for membership in these elite groups involve considerable personal sacrifice and can usually be described by the phrase "above and beyond the call of duty." Nominations for the Contest and DX Halls of Fame are made **by contesting or DX clubs or national organizations**, and must be submitted by **March 1** of each year to be considered.

A maximum of two (2) people may be inducted into each hall of fame (DX and contest) each year. Nominations for the CQ Contest and DX Halls of Fame should be directed to Bob Cox, K3EST, c/o CQ Communications Inc., 25 Newbridge Rd., Hicksville, NY 11801; or via e-mail to <k3est@cqww.com>.

magic in the sky

BY JEFF REINHARDT,* AA6JR

Commentary: The Battle for Hearts, Minds—and Logic?

Ah, California, sometimes referred to as "the land of fruits and nuts." It's home to some 33 million people—including me—and about 98,500 of my fellow residents in America's most populous state are amateur radio licensees.

Over the last several months, there's been a very curious (to me, anyway) battle being fought in some corners of the Golden State, and I understand in some other areas of the country, about utility companies using wireless technology to gather meter readings.

Now in the interest of full disclosure, I do work for a utility, which is how I came upon the material in this essay, but listen up: What's happening "out there" could affect your ability to operate amateur radio equipment.

Utilities around the world, including natural gas, water, and electrical service providers, are converting their meter-reading operations to more efficient methods of gathering customer usage. In the old days, manual entries were made in reading books by workers making their rounds and transposed into billing data by back-office personnel. With the computer age came electronic data entry devices, essentially hand-held units used by field personnel to record meter readings which are downloaded back at the home base.

More recently, Automated Meter Reading and Automated Meter Infrastructure (AMR and AMI) have come along. AMR and AMI units transmit their data via radio. AMR units electronically record metered use, and when queried by a hand-held or drive-by unit, convey their usage data to a collection device by radio. AMI units send their data, usually a few times an hour along what's called a "mesh network," passing data from device to device until it reaches a collection point that then forwards the data via the internet or phone links to headquarters, where the information is applied to customer accounts. Mesh networks are self-forming and in case a unit fails, self-healing. They can also report that a unit in that network has gone down.

The main benefit of AMR and AMI is efficiency, in that meter readers can cover more ground or in the case of AMI, not have to read a route at all, as the data is automatically forwarded. In some cases, this allows those personnel to be used for other functions, and yes in some cases it may mean fewer jobs available to meter-readers. In areas where severe winter weather occurs, the radio-read devices are valuable, saving personnel from the hazards of digging out the data and/or driving dangerous routes. However, there are benefits to the customer as well. If an abnormally high usage surfaces, such as a broken water line or a failed washing machine hose, it can send an alert to HQ, which can then contact the customer and hopefully minimize losses and property damage.

An old-fashioned "dumb" electric meter that needs to be read manually by a meter reader.

Electrical utilities are taking things a step further by implementing a "smart grid" concept where time of use billing and interactivity between the meter and certain appliances is being rolled out. Some folks like that and some don't; others have tried to politicize the practice, but adoption of the "smart grid" system crosses party lines and presidential administrations.

Now the purpose of this tome is not to sing the praises of your local utility or debate the political points of a "smart grid." I'll let other folks conduct those discussions.

There are a number of different brands of AMR and AMI units already in use. You may have one or more already in use at your home or business.

Electric utility AMR and AMI units usually are embedded in the meter and draw from the power available from the utility. Gas and water AMR and AMI units are usually battery powered, with—get this—an expected battery life of ten years or more. They usually connect to a meter with an electronic register and may be attached to the meter by a wire, but they can also be embedded in the meter as a single unit.

Many of the units transmit their data in the low end of the 900-MHz band. AMR data bursts are sent only when the meter is queried; the AMR data stream can be up to three seconds long. AMI transmissions usually are a fraction of a second, typically two or three times per hour. Notably, the units transmit at about 250 milliwatts, or for lay persons one quarter of a watt. Remember that figure. Most units encrypt

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

the data, which usually contains just the usage and a meter number. All AMR/AMI units must comply with FCC regulations. The low power output is also a factor in achieving the projected ten-year battery life of a unit.

Protest!

Several months ago, Pacific Gas & Electric rolled out its "smart meter" program in California. At the same time, it raised rates. Following that, customers began to associate the two actions. In some minds, a smart meter meant your bill would increase. This seems to have ignited a brush fire (always a dangerous thing in California) that has seen the demonization of wireless meter technology. If you do an internet search on "smart meters," you will come across some pretty amazing material, and most of it is, uh, *balderdash*.

One of the more frequent contentions is the citation of a World Health Organization study on cell-phone usage. Never mind that when a cell phone is used it is 100-percent duty cycle, held directly against your head, and while power levels may vary in newer phones, it's not out of the question that their output exceeds 300 milliwatts. And, oh yes, the well-publicized cell-phone studies have been pretty much inconclusive.

Also out of the World Health Organization came another claim that *all* radio signals should be classified as a "class 2B carcinogen." You can look it up. That item is frequently quoted by those opposed to AMR/AMI. What most detractors fail to include is that Class 2B is the lowest of those classifications, referring to something that contains items that *might, possibly* have a link to the development of cancer, but not enough is known to make a direct correlation. By the way, other items on the class 2B list include pickled vegetables and coffee.

This material and more has resulted in lines of individuals spouting these reports at public meetings. Utilities, and in some cases members of the IEEE, have been trying to combat the fear (and in some cases hysteria) with facts, but in these charged venues the factual data is usually shouted down. (See *IEEE Spectrum*, August 2011; *Scientific American*, August 2011.)

People in some surprisingly upscale communities, where you think folks might be better educated, have said some pretty amazing things. No one seems to grasp the illogic that a 250-milliwatt signal on 918 MHz transmitted for one eigth of a second is somehow going to be the end of civilization. Never mind they walked through an automatic door operated by Doppler radar and used a wireless microphone to make their thoughts known at a public meeting in a room where there were dozens of cell phones and Wi-Fi signals present.

Certain folks are now even declaring that they "have a constitutional right" to be free from radio signals. Others claim that regardless of their cell phones, baby monitors, cordless phones (some on 900 MHz or above), microwave ovens, garage-door openers, remote-control video games, in-home Wi-Fi and remote car door lock key-fob, that a 918-MHz 1/4-watt signal is somehow going to affect their lives in its own unique way. Others claim that when they use their cell phone it's "their" choice, but the logic breaks down when you press them by asking, "Does that mean you can use your cell phone when you choose, but are you also saying you have the right to tell me I cannot use my cell phone in your presence?"

While listening to some of these claims, it occurred to me that a ham radio operator could move in next door to many of these folks and legally transmit with 25, 50, 100 watts or more on any number of frequencies above or below 900 MHz and stay within the FCC's power density limitations. Then I began

LDG ELECTRONICS

FREE Balun

with any new LDG tuner or S9V antenna!

Purchase any new LDG Tuner or S9V Antenna between 9/1/11 and 4/15/12 and receive a FREE balun! Log-on to www.ldgelectronics.com for more information!

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

NEW! AT-200Pro II

The AT-200ProII now includes LEDs to show antenna position and if the tuner is in bypass. A two position antenna switch stores 2000 memories per switch. Handles up to 250 watts SSB or CW on 1.8 to 30 MHz and 100 watts on 54 MHz. Rugged and easy to read LED bar graphs simultaneously show RF power and SWR. Includes a six foot DC power cable.

Suggested Price $259.99

Z-11Pro II

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 six foot DC power cable.

Suggested Price $179.99

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). 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.

Suggested Price $129.99.

radio not included

AT-897Plus

for the Yaesu FT-897

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

AT-600Pro

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

Suggested Price $359.99

Z-100Plus

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

We have a tuner that will work for you!

*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!*

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

The #1 Line of Autotuners!

Designed to handle the higher power of the Tokyo Hi Power HL-45B.

NEW! Z-817H

The ultimate autotuner for QRP radios including the Yaesu FT-817(D) with addition of the Tokyo High Power HL-45B. Interfaces to the CAT port (ACC) on the back of the radio with the provided cable. One button push on the tuner and the Z-817H takes care of the rest. Will also function as a general purpose antenna tuner with other QRP radios or QRP radios with up to 75 watt HF amps. Powered by four AA internal Alkaline batteries (not included). 2000 memories cover 160 through 6 meters.

Suggested Price $159.99

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

AT-100Pro II

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

Suggested Price $229.99

AT-1000Pro

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

Suggested Price $599

IT-100

Matched in size to the IC-7000 and IC-706, for either manual or automatic tunes, and status LEDs. 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. For your Icom radio that is AH3 or AH-4 compatible. ***Suggested Price $179.99***

YT-100

For Yaesu FT-857, FT-897 and FT-100 (and all D models) an integrated tuner, powered by the interface. Press the tune button on the tuner, and everything else happens automatically. ***Suggested Price $199.99***

KT-100

For AT-300 compatible Kenwood transceivers (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. ***Suggested Price $199.99***

YT-450

Designed for Yaesu's newest 100 watt radios. Interfaces directly with the Yaesu FT-450 and FT-950 radios. Press the tune button on the tuner and the rest happens automatically. 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! Seamless connection to a PC.

Suggested Price $249.99

YT-847

YT-847 Autotuner is an integrated tuner for the Yaesu FT-847. An included CAT/Power cable interfaces with your FT-847. Just press the tune button on the tuner and everything else happens automatically!

Suggested Price $249.99

FREE!

RBA-1:1 Balun or RU-4:1 Unun

When You Buy A S9V 43', 31' or 18' Multiband Antenna

Purchase an S9V 43', 31' or 18' antenna and fill out the included form. Mail it to LDG Electronics, and we will send you either a 200 watt balun or unun, your choice!

Antennas!

S9V 43' $199.99

80-6 meters *Fixed Operation*

The S9V 43' is a high-performance lightweight telescoping fiberglass vertical. The best value in high-performance 'tall' verticals!

S9V 31' $99.99

40-6 meters *Fixed or Portable Operation*

S9V 18' $49.99

20-6 meters *Fixed or Portable Operation*

The S9V 31' and 18' are tapered, ultra-lightweight fiberglass vertical antennas. Friction-locking sections and high-tech polymer tube rings allow the antenna to be quickly and safely deployed in practically any environment without tools!

S9RP $39.99

Aluminum Radial Plate

Includes 20 sets of stainless steel nuts & bolts

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

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

LDG

Oops...

Well, this is a new one ... correcting someone else's mistake! (Normally, we have enough of our own to worry about!) In the November issue in the photo on page 20 of the "Morse Coded Jewelry," while the word "friend" is spelled correctly in Morse code on the necklace, the letter "e" is missing from the code message on the accompanying card. Thanks to all of our eagle-eyed CW readers for catching the error. *(I thought CW was supposed to be an aural language!—W2VU)* Several readers also asked for ordering information. The website is <http://coattonline.com/jewelry.html>.

Also in the November issue, we had a mixup in the callsign of author Dain Lones ("Building a 1930s Transmitter in 2011"). His call is KC6WZK, not WCK. Our apologies.

Also, author Gary Geissinger, WAØSPM, informs us that RadioShack no longer sells the isolation transformer he used in his project article "An ICOM to iPad Interface" in our November Technology Special. He says Digi-Key's part # MT7207-ND (http://bit.ly/vxEjkg) should be a good substitute (although he had not tested one at press time), and notes that at least one seller on eBay appears to have a stock of the original RadioShack transformers, under NEW RADIOSHACK 1:1 ISOLATION TRANSFORMER 273-1374 (http://bit.ly/s1tzQU). The usual caveats apply regarding purchases from eBay vs. an established dealer.

This is an AMR (Automated Meter Reading) transponder for a water meter. It transmits usage data via radio when queried by a meter reader walking or driving past.

to wonder how might this uninformed hysteria affect our hobby. Indeed, some hams have already faced such concerns.

It can't be determined which arguments are insincere, specifically the type where folks opposed to an idea throw anything and everything against the wall to see what sticks, or maybe are just plain uninformed.What's apparent is that some of it does stick, revealing people who sit on regulatory bodies who don't have a clue as to the nature of radio waves ,and in some cases basic physics. Too often true experts are negated by uninformed speakers who put forth specious claims unsupported by any meaningful or reliable data.

To combat some of this, the California Council on Science & Technology was commissioned by the state to study wireless meters. You can read its report at: <www.ccst.us/news/2011/ 20110111smart.php>. Sadly, its findings are casually dismissed by many opponents, and are either not read or not understood by local officials.

It's also apparent there's an outbreak of ignorance in certain areas of our society and it may be spreading. We now have a full generation of people who extensively use technology with fewer and fewer of them aware of exactly what makes their high-tech devices work. Bluetooth, anyone? There's no clue among many of how rapidly signal strength falls off as distance increases. There's no concept of the magnitude of the RF frequency spectrum or any of its characteristics. Sadly, in some cases, to certain devices there are attached mystical properties that simply are just not possible, yet are held as fervent beliefs.

It is understood how some folks can be opposed to certain ideas or concepts. After all, we are entitled to our opinions. Where things go off-track is when disingenuous arguments are made simply to achieve an end, with no thought given to the consequences, or when opinions are formed based on faulty data.

Today the wireless meter, tomorrow your ability to use your cell phone, and the week after that perhaps your ability to operate your ham rig? Could it happen?

As this new year begins, one wonders if ignorance could be the device that takes away the "Magic in The Sky."

73, Jeff, AA6JR

Arkansas SKYWARN® Lessons in Social Graces:

How One EmComm Organization is Embracing the Web for the Greater Good

BY RICHARD FISHER,* KI6SN

The stampede of internet social networking and streaming audio and video sites, and increasingly reliable cell phone coverage, offers radio amateurs two choices: Either jump on for the ride or get trampled. This inconvenient truth—to steal a phrase from both a documentary and a former vice president—is no more evident than in emergency communications.

"When all else fails, amateur radio," loses some of its zing when all else *doesn't fail*. That's happening more and more. It's a good thing. Better technologies and contingencies in the private commercial sector are keeping cell and internet systems in the game longer and better, even when disaster strikes.

Does this minimize the need for amateur radio's EmComm readiness? *Absolutely not*. If anything, it underscores the need for hams to stay in that discomfort zone, fight complacency, and be trained and ready *when* —not *if*—all other emergency communications go *kablooey*.

Here's one organization that has recognized the internet's social networking and live streaming value and is using it to strengthen amateur radio's position as the best, most reliable and efficient emergency communicators on the planet. It's Arkansas SKYWARN®.

A loving embrace of new technologies and communications channels by this forward-looking organization is making a solid organization of radio amateurs even better and provides a lesson for us all.

And So It Began . . .

Danny Straessle, KE5WLR, reports from Little Rock that during its September 2011 training net session, "Arkansas SKYWARN® announced an expanded Internet presence for the organization."

The organization has recognized the value of the Web and social media and, as you'll see, is jumping in with both feet.

"Through a combination of traditional internet resources and the newer social media utilities," he said, "Arkansas SKYWARN® is providing an opportunity for certified amateur radio storm spotters to interact off-air in a non-net environment."

On the Web

"Arkansas SKYWARN® is in the process of building a new website that will serve as a resource for safe storm-spotting best practices and will exist as *the place* where ... spotters in Arkansas can reference training material throughout the year." (See photo A.)

Photo A– Quick links to Arkansas SKYWARN's® Facebook, Twitter, and live RadioReference.com streaming audio sites are lined-up across the bottom of the organization's website: <http://www.arkskywarn.org> (Internet screen grab)

Straessle noted that "while severe weather can occur during any month on the calendar, the new website will be particularly useful for training online in the typical off-season. Look for the new site to come online before the 2012 spring storms arrive."

For updates and additional information, check: <http://www.arkskywarn.org>.

On Facebook

A Facebook page designed for certified amateur radio operator storm spotters to share their "severe weather event experiences, photos, and videos" with others who are interested in storm spotting, including non-amateur radio operators, has been established by Arkansas SKYWARN®, as well (see photo B).

Straessle stressed the Facebook page "is not intended for submitting storm reports to the National Weather Service. It's a conversation about storm spotting in which everyone is eager to hear your story. Where did you deploy? What did you see? What did you report or not report and why?"

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

Photo B– A Facebook page has been designed by Arkansas SKYWARN® for spotters to share their "severe weather event experiences, photos and videos" with others who are interested in storm spotting. See: <http://www.facebook.com/arkskywarn>. (Internet screen grab)

These and many other questions "demand answers," Straessle writes, "and your willingness to share the experience will contribute to a body of knowledge that ultimately will benefit the training of others."

"*Everyone* is invited to participate in weather discussions, including events that happen outside the state of Arkansas," KE5WLR said. "Posts/topics are limited to weather, storm spotting best practices, the National Weather Service—and all of the agency's products—and amateur radio. All off-topic posts will be deleted."

By the way, a Facebook account is *not required* to view these discussions. Visit: <http://www.facebook.com/arkskywarn>, and get in on the conversation, he commented.

Twitter

In response to a request from amateur radio operators who "want to be notified when Arkansas SKYWARN® has been activated by the National Weather Service Little Rock Forecast Office, a Twitter feed has been established to communicate such information off-air," Straessle said (see photo C).

"Both the Facebook fan page and the Twitter feed have been linked so that end-users can also be notified when the conversation expands and new information has been posted," he added.

A Twitter account is *not required* to view the feed. "Follow Arkansas SKYWARN® at <http://www.twitter.com/arkskywarn> and find out how you, too, can be notified when you don't have access to a radio or scanner," KE5WLR said.

Photo C– Hams who "want to be notified when Arkansas SKYWARN® has been activated by the National Weather Service Little Rock Forecast Office," are invited to sign up for a Twitter feed . . . "to communicate such information off-air," KE5WLR said. Visit: <http://www.twitter.com/arkskywarn>. (Internet screen grab)

Live Streaming Audio Feed

For more than a year, amateur radio operators and the public-at-large have been able to monitor Arkansas SKYWARN® via the internet through a live audio feed provided by the Central Arkansas Radio Emergency Net (CAREN Club) on RadioReference. com (see <http://www.RadioReference.com> and photo D).

"The streaming audio feed meets a high demand for monitoring Arkansas SKYWARN® from those who cannot do so at any given time with a receiver," KE5WLR said. "People who spend most of their day in an office or are perhaps traveling outside Arkansas for an extended period of time have been able to monitor rapidly changing weather conditions by listening to the net on their computers or smart phones and other devices." To listen live, visit: <http://www.arkskywarn.org>.

When on the link, you'll be hearing the W5DI repeater in Little Rock on 146.940 MHz.

Arkansas SKYWARN's® Word to the Wise

"These expanded Internet presence and social media interactive opportunities are designed only to supplement the training mission of Arkansas SKYWARN®," the organization warns, "and should not be relied upon as a replacement for monitoring amateur radio frequencies and NOAA Weather

Radio. Stations with reportable criteria should pass traffic directly to an Arkansas SKYWARN® net control operator or the National Weather Service."

The Foundation on Which They Build

By way of history, the Arkansas Weather Net was incorporated as a non-profit amateur radio organization in the late 1960s to "provide real-time field reports to the National Weather Service in Little Rock (then located at Adams Field) during significant weather events.

"Nets were conducted over what was then the new 2-meter FM repeater operating on 146.940 MHz, constructed by the Central Arkansas Radio Emergency Net (CAREN Club)," the organization explained.

"A few years later, in the early 1970s, the NWS rolled out its official SKYWARN® program, which collects field reports from volunteer weather spotters to aid forecasters in issuing and verifying severe weather watches and warnings," Arkansas SKYWARN® reported. "It was then (that the) Arkansas Weather Net began operating under the trade name of Arkansas SKYWARN®," and is sponsored by Arkansas Weather Net, Inc., and operated under the authority of the National Weather Service."

When severe weather threatens, the NWS is the sole authority for making a determination as to whether Arkansas SKYWARN® is activated.

*(**IN DEPTH:** For complete information about SKYWARN® and how to become a severe weather spotter, visit: <http://skywarn.org/>.—ed.)*

Share Your Group's Innovative Ideas with *CQ* Readers

Is your group or organization using social networking, the Internet or cell phone technologies to enhance emergency communications or training? We'd like to hear from you.

Please drop an email to: <ki6sn@cq-amateur radio.com>, or write to: Richard Fisher, KI6SN, CQ Public Service, CQ Communications, Inc., 25 Newbridge Rd., Hicksville, NY 11801. We'll share your innovative ideas and initiatives with other *CQ* readers.

North Carolina Hams Feel the Need for Speed

Seven radio amateurs from Orange County Radio Amateurs provided com-

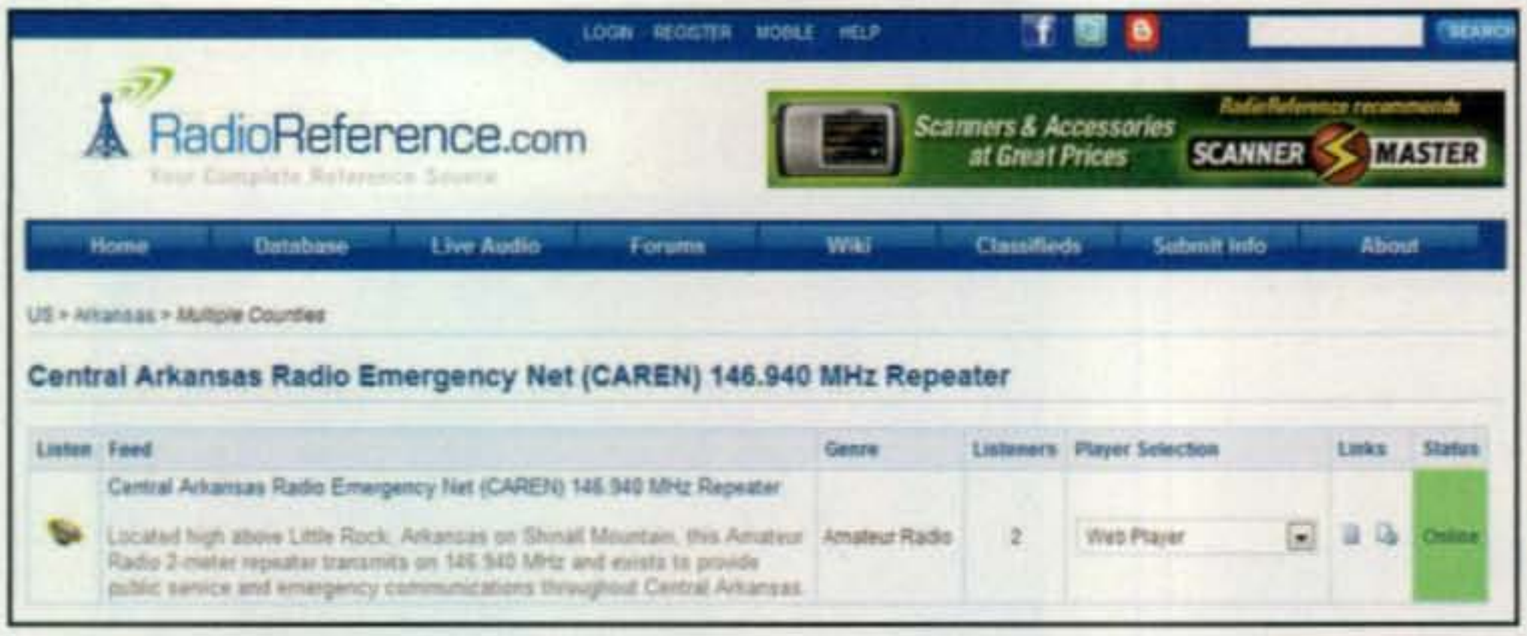


Photo D– Arkansas SKYWARN's® streaming audio feed "meets a high demand for monitoring . . . from those who cannot do so at any given time with a receiver," KE5WLR said. To hear the W5DI Little Rock 146.940 MHz repeater, visit: <http://www.arkskywarn.org>. (Internet screen grab)

munications support during the Occoneechee Speedway's Fifth Annual Car Show and Racers' Reunion in November 2011 at Hillsborough, North Carolina.

"This was the second year in which (OCRA) had a presence there, which features 50 years' worth of classic automobiles and race cars," writes Woody Woodward, K3VSA. "Some came complete with their original vintage race drivers. Once again, Lad Carrington, W4ORD, led the group providing emergency communication and representing amateur radio at the event." (See photos E and F.)

The Occoneechee Speedway at Hillsborough "dates back to the 1948 inauguration of NASCAR and is the last remaining of the famous Southern heritage 'dirt tracks,'" Woodward said. *(**IN DEPTH:** For more information about the history of Occoneechee Speedway at Hillsborough, visit: <http://www.historicspeedwaygroup.org/>.—ed.)*

"W4ORD manned a booth promoting ham radio and providing emergency communication support through OCRA's W4UNC 442.150-MHz repeater. Other OCRA members and associates who assisted or attended included: Dee Ramm, KU4GC; Karl Ramm, N1XPB; Lenore Ramm, KF4PAB; Vic Merryman, KØOUX; Dewey Thompson, WA4AHR; me; and my daughter, Michaela," K3VSA said. *(For more information about OCRA, visit: <http://ncocra.org/>.—ed.)*

"Fortunately for all concerned, no emergencies occurred, so our participation consisted of being prepared for action and showing the flag for amateur radio," Woodward said.

*(**WATCH:** A video of what Occoneechee Speedway looks like today and to hear reminiscences of those who were there in its heyday: <http://bit.ly/sjRbHM >.—ed.)*

For this month, 73, Richard, KI6SN

Photo E– Lad Carrington, W4ORD, gives a short tutorial on amateur radio to Miss Occoneechee/Orange Speedway 2011 Michelle Montgomery during the Fifth Annual Car Show and Racers' Reunion in November 2011. (Courtesy of K3VSA)

Photo F– Paint and chrome from a classic 1955 Chevrolet gleam in the sunshine at the 2011 Occoneechee Speedway Fifth Annual Car Show and Racers' Reunion, where seven members of Orange County Radio Amateurs provided communications support. (Courtesy of K3VSA)

Safety in the Ham Shack

BY RICH ARLAND,* K7SZ

This month we are going to focus on safety aspects in and around the radio shack. While we love our hobby and enjoy many hours of pleasure talking around the world, building equipment and erecting antennas, ham radio has a dark side. It relies on electricity … and electricity can kill you!

Safety should be a primary concern for all ham radio operators. Today's gear primarily is transistorized, so the lethal voltages found in vintage vacuum-tube gear are no longer present (kilowatt linear amplifiers and restored boatanchor gear notwithstanding). However, the unsuspecting amateur radio operator can manage to get into trouble in other ways that may or may not be so obvious.

Antenna Safety

Scenario #1: Antenna parties. We all want the biggest and best antennas that we can afford so our signals will reach farther, whether we are talking about HF wire and/or directional antennas or VHF/UHF Yagis or loop antennas. Bigger and higher are always better, as the old saying goes. However, when it comes to antenna systems there are several major safety areas we need to cover.

First is falling objects! Hard hats are the order of the day whether you are dealing with putting a dipole in a tree or erecting a 100-fooot tower with big beams. You *need* head protection. Hard hats are not expensive, and for $10 or $15 you literally can save your life should your head become the target of a free-falling wrench or cordless drill dropping from a tall tower or an errant branch falling from a tall tree. Even from 30 feet, that same wrench/drill will hurt like heck and definitely leave a divot in your skull. As some guy named Newton (actually he is a distant cousin of mine!) tells us, things accelerate when falling at a rate of 32 feet per second squared. Obviously, the taller the structure, the more velocity this naughty missile picks up on its way back to Terra Firma. If you happen to be in the glide path (?), well, here's hoping you have a real good medical insurance plan!

The second safety area we need to explore regarding antennas is the proximity of power lines. Every year hams and CBers get killed when the antenna that they are manhandling into place suddenly gets away from them and yaws into a nearby power line. My sage words of advice: Stay as far away as possible from power lines on your property whether they be on power poles or the drop from the "pole-pig" to your house. Keep clear! Period! Should you have no other choice than to erect in an area where your antenna and support structure are in close proximity to power lines, use experienced hams to help you. Extra hands, eyes, and in-depth experience are well worth the effort.

Ensure that your installation will not topple into the power lines by guying with Dacron® cord or some other non-conductive guy medium. Above all, *be careful!* Close coordination between ground crew and the antenna installers is paramount! Oh, yeah…don't forget your hard hat!

Finally, gloves. Get a good pair of work gloves and wear them! Not only will gloves keep your hands from getting chewed up when handling rope or guy wires, they also will enhance your grip on tools and tower sections. Don't erect antennas without gloves!

Scenario #2: Station ground. Wow! There have been volumes written regarding how to properly ground and bond electronic communications equipment starting with the US military and its "MIL-STD-188-124B, Grounding, Bonding and Shielding" series of regulations. First of all, unless your home was constructed recently, the simple fact is you may *not* have a good AC service ground on your electric service where the drop from the "pole-pig" enters your home.

We moved into a 20-year old home in Dacula, Georgia a little over three years ago. Upon inspecting the electrical service, I found that the service ground was not even connected to the drop! Effectively my house was isolated from earth ground, which meant that none of my equipment was "grounded" via the center pin on the wall outlets! Now before you fire up the e-mail, I *know* that the ground pin on an AC receptacle is *not* the place to depend upon for proper grounding of radio gear. That takes a whole separate ground buss that can get quite interesting. The Devil is in the details, as they say.

Providing an adequate station ground for your gear can be an exercise in learning. For instance, true or false: Ground braid makes a good low-resistance path when used as part of the station ground? *False!* Due to the way the braid is constructed, braid does not offer a low-resistance path and is a very *poor* means to ensure your gear is grounded.

A better method is through the use of copper strap or flashing (3–4 inches wide) available at home-improvement stores, ham retailers, or over the internet. We'll discuss this a bit later on in this column.

All of your gear should be connected to the *same* point in the shack which will be attached to

*770 William St. SE, Dacula, GA 30019
e-mail: <k7sz@live.com>

a series of ground rods outside the shack to maximize the effects of a ground system. This sounds like a lot of work, and it its. One of the first things I did on my AC service ground was to pull out the old 4-foot ground rod (not within electrical code) and pound in an 8-foot ground rod with the proper clamp on the top end to secure a piece of #4 AWG (that's pretty big!) which was then connected to the AC service. Now, at least, the house was "grounded," but the gear was not. Stick with me, as it gets better.

Unfortunately, my shack is laid out in a fashion that does not lend itself well to adding a ground to the gear without traveling about 15 feet from the gear to the front garden. Along the side of the house where my shack sits is a slab of concrete, so it is not possible to implant a series of ground rods with access through a nearby window. In order to do this correctly, I have to pound the ground rods in the front garden, interconnect them with copper strap, and then route the ground buss into the shack through the wall of the shack. Unfortunately there is no window or door handy, which means I will have to punch a hole in the siding and run the ground buss from the series of ground rods in the front garden into the shack and over to the ops bench. This will make a total ground run of about 15–20 feet. This is a lot longer than I'd like, but in order to do this grounding and bonding thing properly that is the way things shake out.

As far as the ground rods and connecting them together to form a buss, that is fairly straightforward. One 8-foot ground rod is not enough. However, several 8-foot copper-clad steel ground rods driven in full-length and connected together using 3–4-inch wide copper strap will provide adequate protection for your gear. The most cost-effective spacing between rods for normal (grassy) soil is two times the length of a rod. If 8-foot ground rods are used, they should be placed on 16-foot centers and connected using 3- or 4-inch wide copper strap.

Will it withstand a direct lightning hit? Probably not. However, combining the bonded ground rods with gas-discharge lightning arrestors on your coaxial cables will give your gear a good chance at withstanding a *close* hit. Why not use fuses? Simple: Fuses are too slow to react to the extremely short electrical pulse of a lightning strike. The fact is, the fuse just won't blow quickly enough and will allow the electrical pulse through to your equipment—definitely not a good thing. Gas-discharge lightning arrestors attached to each coaxial line will quickly bleed off the incoming spike of electricity and protect your gear. DX Engineering (http://www.dxengineering.com/default.asp?DeptID=19) and Alpha Delta (http://www.alphadeltacom.com/) have exactly what you need to keep your gear safe and your shack properly grounded. A great 11-page PDF document is available (http://home.comcast.net/~wx2nj/PEN1016.pdf) that explains quite clearly what steps need to be taken to implement a good station ground that will offer the maximum protection to your gear and shack. At one time, PolyPhaser also published a book that outlined how to deal with lightning (*The Grounds for Lighting Protection*, but it's not clear from its website whether the book is still available.—ed.).

One final thought: Do your own research. Bonding and grounding depends upon many variables: soil conductivity in your area, materials used, local weather patterns, etc. Obtaining and maintaining a good station ground is an ongoing task. Once things are in the ground, they will start to deteriorate. Some well-designed installations will last many years, while others will last only a couple of years, all thanks to the various minerals, acids, and bases that are in the soil. Therefore, keeping on top of your station ground to assure maximum protection for your shack and gear is essential.

Further reading includes the three-part series entitled "Lightning Protection for the Amateur Station" by Ron Block, KB2UYT, and which appeared in the June, July, and August 2002 issues of *QST*. Additional information on lightning protection and the ham shack can be found at: <http://www.arrl.org/lightning-protection>.

Safety in the Shack

Finally, we need to cover safe work practices in the shack. I do a lot of homebrewing and kit building and I am constantly at the workbench, soldering iron in hand. Over the years I have trained myself to conscientiously turn *off* the soldering iron whenever I get up from the bench, even for a few moments. The iron, a nice Weller WES-51 soldering station, can reach operating temperature quite quickly, so to prevent having a fire start on the workbench in the shack, I turn my iron off *every* time I leave the workbench area.

Speaking of fires, you do have a small CO_2 fire extinguisher in your shack, right? No? Well, don't let fear hold you back! Get one in there pronto. How about a master power disconnect switch? You

know, the type where you hit one big button or toggle switch and it shuts down the entire station. Yeah, I don't either, but it is on my "to do" list and there will be one installed post-haste. How about an intercom so you can communicate with someone else in the house should you need immediate assistance? My intercom is part of our cordless phone system and I am glad we have it. My wife Pat and I use it all the time.

Since working with homebrew gear can get into the realm of metal work, how about looking over your metal shop tools and seeing that they are securely mounted, power cords in good condition, safety goggles handy (nothing like a small bit of aluminum flying into your eye when drilling or polishing a chassis—not!)?

Do you use a standard AC power supply to provide power for your station, or are you like me and depend upon a huge deep-cycle battery to power your radios? I got away from AC supplies a few years ago, deciding to use a big deep-cycle marine dual-duty (whatever that means!) battery by Optima. It is the Blue Top, rated at 55 A/Hr with a 750-A cold cranking capacity. I used a "smart" charger on this battery for several years up until the lightning strike that took out the charger last summer! It also almost drained the Optima battery, but thankfully I was able to disconnect things before the battery was ruined. Should you use a battery to power your station, I highly recommend a sealed deep-cycle battery. The reason is that there is no chance of coming in contact with either the sulfuric acid electrolyte or the hydrogen (spelled "EXPLOSIVE"!) gases given off during recharging of lead-acid batteries. If you use wet-cell batteries of the type that you can open the individual cells, I strongly recommend that they be placed in a special battery box outside the shack and the output run into the shack via #4 AWG or larger bus wiring. This will reduce or totally eliminate the chance of a stray spark setting off hydrogen gases vented from a recharged battery.

Well, that's a wrap for this column, gang. I cannot over-stress the idea of taking the safety side of ham radio seriously. The "it'll never happen to me" attitude is an accident waiting to happen. Be safe, be alert, but above all, do you r own research and come up with workable solutions to the various safety issues at your own shack.

Next month, me thinks, we'll discuss keys. You know . . . those things that you use to make dots and dashes!

Until next time, have fun and get on the radio! Vy 73, Rich K7SZ

our readers say

Useless Machine

The following letter was directed to "Ham Notebook" editor Wayne Yoshida, KH6WZ, who wrote about a "useless machine" in his September column:

Dear Wayne,

I read your article last week, and yesterday I went to a British Car show in Norcross, Georgia (http://www.babg.org/BritishCarFayre.html). On top of a "Mini something" was a brown box with a switch sticking out the top. I was walking with a neighbor ham and he hadn't seen the article. I immediately recognized what it was. I looked around for the owner to ask permission to work the switch, but he wasn't near. So I told Mike what I thought it was and couldn't resist operating the switch. And guess what? A little hand came our of the box and turned the switch off. Sorry, I didn't get a photo.

73, Norm Schklar, WA4ZXV

KH6WZ responds:

Greetings Norm,

I am glad you liked that article. When I saw the thing, I had to laugh out loud. Actually, "fun" boxes like this have been around for a very long time. One configuration was an artful wooden box called a "nasty box," and when someone opened the box, a snap-action lever would slap your hand/fingers when you opened it.

When I took junior high school electric shop (sadly, shop classes in junior and high schools out here have gone away years ago), a friend and I were always accused of "knowing more about electronics than the teacher." (Our metal shop teacher doubled as the electric shop teacher back then.)

Anyway, one class project was "electro-magnet." Well, we wanted to show off, and we made "step-up transformer" instead. The secondary winding terminated into the handle used to hold the electromagnet, and so whenever the contacts were pressed, people would get a little tingle. Fun times. 73.

Ted McElroy's Call Sign?

Editor, *CQ*:

Reading the October issue of *CQ* and reading the part about W1JYN getting a license issued in 1936/1937 made me go look it up. I have a 1939/1940 issue of the *Callbook*. ... It has a map of the call districts, W1 to W9. NO ZEROs back then.

It lists no W1JYN - Ted McElroy - just not there. Blank.

It lists the following:

W1JYL - James H.J. Herrington - 381 Capital Av. - Hartford, Conn.

W1JYM - Omer A. Lizotte - 1543 Slade St. - Fall River, Mass.

W1JYO - M.A. Mackay - 234 W. Newton St. - Boston, Mass

W1JYQ - G.W. Whitney - 30 Pellom Pl. - Stamford, Conn .

This is my third time reading this issue. Who knows why this is blank. But thanks for the great magazine. I also read *World Radio* on the web.

Thomas E Herold, N9BUL

W2VU responds:

Thanks for the interesting note, Thomas. There are several internet references to McElroy with the call sign W1JYN, focusing on the 1936 listing. At this point in time, we do not know how long his license was active, or whether perhaps the early *Callbooks* did not include all listings, or withheld listings at a licensee's request.

Technology Special

Editor, *CQ*:

Tech issue of *CQ* (November 2011) is totally excellent. Congratulations. 73, John Thompson, K3MD

kit-building

BY JOE EISENBERG,* KØNEB

"An Open and Shut Case"

There are many kits that are provided at a very low cost to the builder, but the bargain is often due to there not being a supplied case for the finished board. A number of great cases that can accommodate most kits are available from many sources at a reasonable cost. There are a large number of smaller kits that are designed to fit inside a standard Altoids® or similar mint tin. Thus, save your mint tins for some great and low-cost cases! I have found a great source for cases is the hamfest flea market. In addition to unbuilt kits, I have found many unused project boxes of all kinds for sale for very little.

When choosing a case, look for one that can easily accommodate the project, including all of the jacks, controls, and other components. Unless the project is designed for a specific case, such as an Altoids® tin, try to use a case bigger than needed in case you want to make additions or modifications. Mint tins require special care when drilling holes in them. There is a variety of methods, including using various metal punches or carefully drilling, using a small block of wood behind the surface to prevent tearing of the thin metal case.

Last month I featured a QRSS beacon kit by Hans Summers, GØUPL, and Steve Farthing, GØXAR. This kit can fit inside a mint tin, but I found old Bud box, which is large enough to hold two of these kits, at a hamfest flea market and I chose that. Since I got both the 30- and 40-meter versions of the same kit, I can place both in the case at the same time and provide for switches to activate one or the other, or both if desired. There is also room to accommodate a receiver board above the two transmitters if needed. On the bottom there are screw heads that protrude from the bottom of the case. To prevent scratching of the table surface, I used stick-on rubber feet. You often can find sheets of self-stick rubber feet at hamfests or at most RadioShack® stores. Just make sure they are thick enough to allow for sufficient space underneath your case for the screw heads to stay above the surface.

In my QRSS kit case you see a BNC back-panel connector. I often find BNC panel jacks and SO-239 panel jacks for sale at hamfests. I store them in a parts bin so they are available when I am finishing my kits. I try to keep an assortment of RF panel connectors, switches, and other jacks on hand. In this kit I also placed a 1/8-inch jack on the back so that I can hear the output audio from the kit to monitor the keying. The audio output from the QRSS beacon is quite loud, so I do not leave a speaker plugged in all of the time, but it is good to have the output available to listen to without having to open the case.

Another modification I made was that I replaced the hard-wired speed-selection jumpers with a small DIP switch so I can make changes to the speed of the beacon merely by changing the DIP switch settings instead of hard-wiring jumpers. Since there are only three jumpers, the fourth switch is not used.

An interesting note: When showing this kit, I have been asked why I didn't place the LED on the front panel, since normally you would want it to be visible. The LED in this kit is being used for its properties as a low-variability varactor to create the approximately 5-Hz frequency shift and so was chosen as a component over a much more expensive varactor diode. Because it is used as an oscillator component, it doesn't have enough current flowing through it to light up, so it just resides on the board, never to be lit! This, of course, doesn't preclude my placing indicator LEDs on the front panel in the future to indicate which of the two beacons is in use.

The power-supply requirement of this kit is 5 VDC. Since I almost always try to be standard in using 12 VDC for my power supply, I added a 7805 regulator to my case, using the case itself as the heatsink. The cost of adding the 7805 regulator was minimal, including the two electrolytic capacitors needed to use a 7805. I used the simple diagram on the 7805 datasheet for my regulator circuit. Now my kit runs on any DC voltage from 5 VDC up to 15 VDC. This also helps keep the oscillator stable.

I have found that using a small length of RG-174 coax works great for the RF connections from my kits to the output jacks. If the jack is close enough to the board, less than an inch or so, I use just a straight wire. Look for some RG-174 at hamfest flea markets. With kits a little goes a long way, so get a few feet of RG-174 coax to keep on hand. I also find it hard to pass up a spool of hookup wire or enam-

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

Base view of the QRSS Beacon kit mounted in a Bud box.

eled wire. Having multiple colors and sizes of wire is handy as well when wiring your kit into a case.

Drilling holes in the case can be easier with a small benchtop drill press. I don't have one, but they can be very handy. I often use a small Dremel tool to drill the pilot holes, and then widen them with a Unibit step drill bit in my hand-held power drill. A Unibit allows you to steadily increase the hole size until the desired size is reached with very little burring along the outside. Check your hardware store for the Unibit #10502 set of three bits or any of the individual bits. Harbor Freight also carries step-drill bits and often has a set of three of them on sale. The three-bit set is available as Harbor Freight #91616 and is available at <http://www.harborfrieght.com> .

Zap!

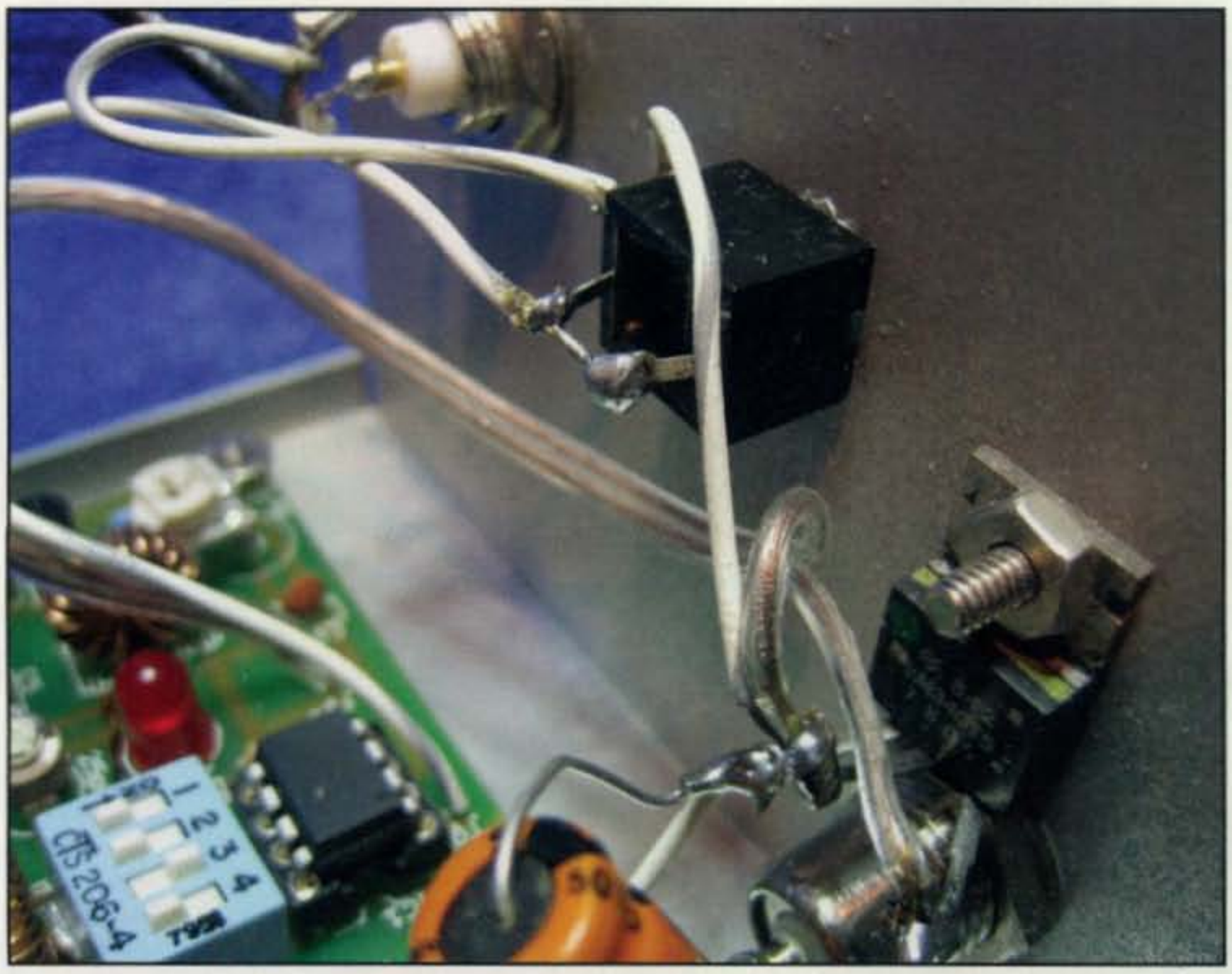
With the cold weather season at hand it is time to talk a bit about *electro-static discharge*, or *ESD*. Many kits have CMOS or other components that are static-sensitive. That annoying "zap" of static electricity that is so common in winter can be deadly to your kits and projects.

Normally, I use a metal cookie sheet to cover my work surface to keep small parts from falling into cracks in the bench or rolling off the work surface. It also doubles as a connecting point for my ESD strap. I also ground the cookie sheet through a 1-Meg resistor, as well as connect my ESD strap to it when working with static-sensitive parts. ESD straps have a 1-Meg resistor in them to prevent the wearer from stray voltages in case the strap comes in contact with them. The resistor is high enough for safety, while allowing the discharge of static charges. Static potentials of as low as 30 volts can cause permanent or hidden damage to CMOS parts. You can't feel that, but it can damage parts.

Therefore, especially when indoor humidity is low, or you are working with CMOS parts, be sure to follow ESD precautions. RadioShack has a readily available ESD strap as part #276-2397.

Enjoy the winter months by spending time on the bench building kits!

73 de Joe, KØNEB



View inside the case showing the power jack with 7805 regulator mounted just above, along with a 1/8-inch jack for audio out and BNC RF output.

Close-up of QRSS board mounted in the case with the DIP switch mod in the lower right of the board.

BY WAYNE YOSHIDA,* KH6WZ

"5S" in Your Shack: One Way to Get Organized

It is late October as I write this installment of "The Ham Notebook." The east coast is being blasted by a "Nor'easter" heavy winter storm and many businesses there are closed today. I am taking advantage of the mild southern California weather and decided to start cleaning out my garage (see photo 1).

I need to clear out my garage to make enough room for my car, my workbench, and a kit car project. I am trying to apply the rules of "5S" in my garage and workspaces in my operating room. This extraordinary amount of organization will be a challenge for me, since I organize things in "piles" and always have multiple projects going at the same time. This may be related to my earliest childhood days, when I would routinely use my crayons to color things outside the lines.

"5S" Defined

"5S" is a Japanese manufacturing optimization philosophy. The five concepts of 5S are Sort (*Seiri*, pronounced "say-eerie"), Set in Order (*Seiton,* "say-ton"), Shine (*Seiso,* "say-so"), Standardize (*Seiketsu,* "say-ket-sue"), and Sustain (*Shitsuke*, "she-shoo-kay"). These are the most common translations of the five concepts, but there are some other translations. For example, at my company, Set in Order is called Simplify, Shine is Sweep (see photo 2).

5S is related to several other programs such as Six Sigma, Lean, and other manufacturing optimization practices. It is a system or a philosophy of organizing everything in order to recognize when something is out of place. It is sort of an extreme version of having a place for everything, and everything in its place. A common example of this organization is the "shadow board" for tool storage, like what we had in school shop class. Each and every tool had a matching icon in the wall cabinet, so if any item was missing, it was immediately noticed.

1. Sort: "Sort" is the first 5S step, and it is exactly what it sounds like. The most-often used items should be stored or arranged so they are close at hand to maximize efficiency. For example, my soldering station includes an iron

*28181 Rubicon Court, Laguna Niguel , CA 92677
e-mail: <kh6wz@cq-amateur-radio.com>

Photo 1– I really need to clean up my garage and get things organized so I will be able to work more efficiently on my new projects. The 5S rules are needed here.

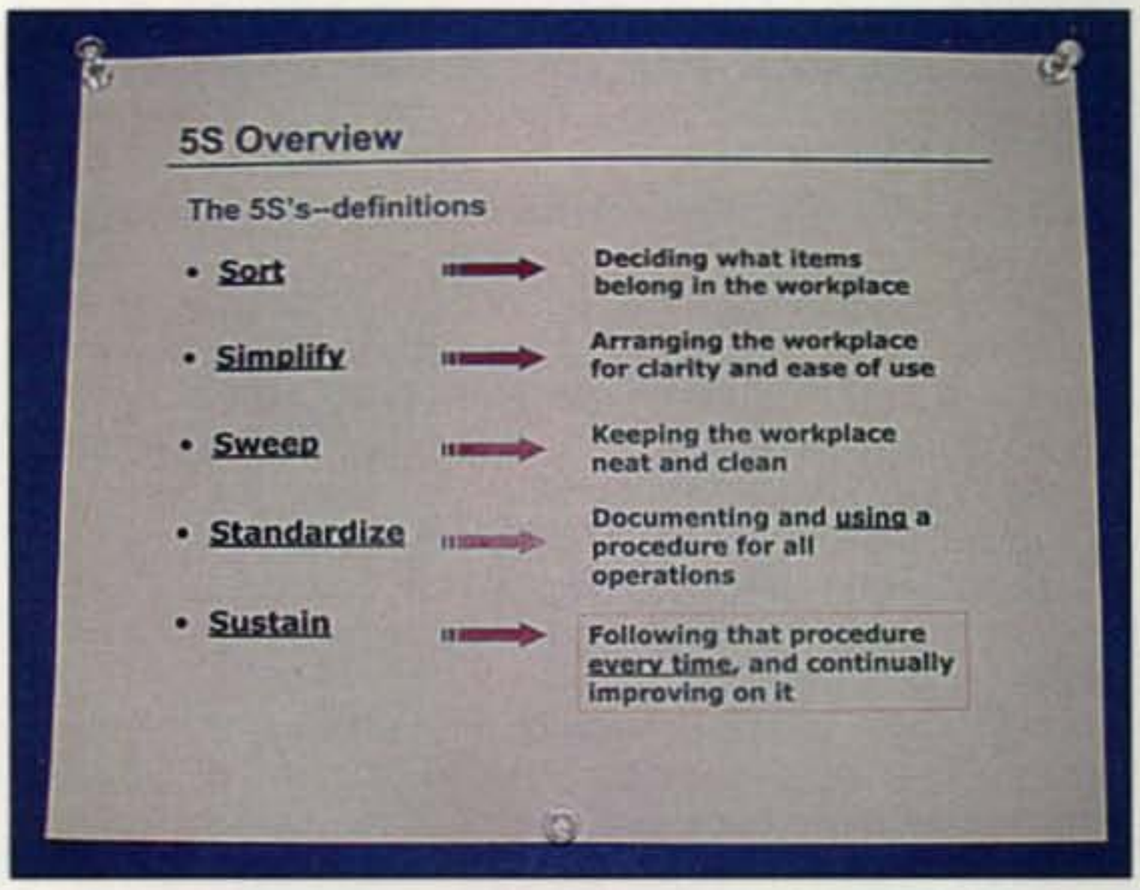


Photo 2– There may be some slight variations in the English translation for the 5S concepts, but they are pretty much the same, action-wise.

Photo 3– These plastic silverware trays are an example of "set in order." Small hand tools are placed in compartments, rather than jumbled into a single tray. An even better solution would be to have each tool fit into its own cut-out within the tray.

tip cleaner, a roll of solder, and solder wick all clustered together in one location.

2. Set: "Set" is the second step in this process. After sorting through your items, you need a place to put them and keep them in order. As mentioned previously, a shadow board for tools is a very common helper for this step. In photo 3 you can see the 99-cent plastic silverware trays to organize my rolling cabinet drawers. Labels help organize storage boxes and containers. They also help identify the locations for each storage box to simplify putting the item back into its correct place.

3. Shine: "Shine" is a way to remember that you must maintain your equipment and tools. It should include making sure measuring instruments are kept in calibration.

Photo 4– An organized and labeled cabinet is an example of "Sustain." Here production test fixtures are in labeled drawers.

4. Standardize: "Standardize" procedures and policies to make things easy to maintain and operate. This may not be too important when working in a one-person environment such as your ham station, but think about what can happen to things when you decide to operate a contest with multiple operators. Knowing what goes where and establishing a rule that includes putting things away where they belong (not where they were found) will reduce stress while working stations under pile-up pressure.

5. Sustain: "Sustain" is probably the hardest part of the 5S philosophy. It is fairly easy to do a massive cleaning and organizing effort once, but what happens a week, a month, or a year from that point? This process must be continuous and ongoing.

The quality department at the office has been doing this 5S and Lean stuff for several years and even conducts audits for this practice (among other things) on a regular schedule. Photos 4 and 5 show an example of a 5S technique in action in our test fixture storage area. Notice how labels are everywhere. Each item is labeled, its corresponding storage box is labeled, and even the location of the storage box is labeled.

This organization system makes a lot of sense in a manufacturing environment, and if you think about this, it can be applied to just about everything you do around the office, your house, and even your ham station.

A Nice Rack

I purchased a Broder rack system from Ikea for storing large items and storage containers. Broder is a modular support and shelf system and can be expanded as the need arises. The galvanized steel supports and shelving are strong enough to carry "heavy tires and bags of cement" and should be corrosion-proof. I wanted a shelving system that would be

mounted on the wall, rather than sitting on the floor, for two reasons: First, I wanted to avoid getting anything wet in case of a flood, and second, I wanted my garage shop to accommodate my iRobot Dirt Dog floor sweeper (see photo 6). Sadly, the Dirt Dog has been discontinued, although other vacuuming-type models are available.

Small Parts Storage

Photo 7 shows how I used to store small parts before I decided to go through the 5S process. One problem with storing many different small items is the number of individual containers, drawers, or bins required. Although this looks somewhat nice and tidy, and every part number has its own storage location, a problem arises: As the number of different parts increases, the cost and volume of the storage area must also increase. Considering most of the parts I have were either free or purchased at a low price, it does not make much sense to pay more for the storage system than the parts themselves!

I decided to minimize the cost of storage by using zip-top plastic sandwich bags from the grocery store. This is similar to the way my friend Dave Glawson, WA6CGR, stores his vast inventory of small parts. You can reduce a large amount of space by storing items in envelopes, bags, or other small containers (see photo 8). Then store those packets as a group, as seen in photo 9. This system is especially useful for storing resistors, since there can be over 100 different values.

For example, a plastic storage tub labeled "Capacitors, Except Electrolytic" contains several values and types of ceramic disc, silver mica, and other through-hole capacitors.

Since markings on the plastic bags tend to wear off, instead small slips of paper showing the values and ratings are placed inside the bags. Static-sensitive parts such as transistors and ICs are stored in anti-static, ESD-safe bags and envelopes.

Photo 5– Each test fixture is further organized into an individual storage box within the drawer. Can you see the open space on the bottom left? Each space is marked, so everyone knows "TMRF151G" is in use on the factory floor.

Photo 6– One criterion for my re-organized garage is to have everything off the floor so my DirtDog® can sweep underneath and to prevent or minimize water damage in case of a flood.

My Efforts

You may have noticed that I do not have any "after" pictures in this article. This is because I am still working on the "Sort" part of the 5S program. My 5S effort is still in progress, and it is taking much more time than I thought it would. But the idea is there, and once I finally get things organized (uh . . .

Photo 7– These storage bins from the hardware store are handy, but they can become an expensive way to store free parts.

Photo 8– Plastic zipper-top bags can be used to store lots of different small parts, such as transistors and capacitors.

Photo 9. The small packets are then placed in large tubs so they can easily be found.

sorted) using the 5S concept, I will try to sustain this throughout my garage, workshop, station, and even the rest of the house. Getting to 5S is on my list of resolutions for 2012.

73 and Happy New Year,

Wayne, KH6WZ

References

A Free 5S Handbook online from Brady Corporation: <http://bit.ly/vBMc2d>.

Wikipedia has an entry on 5S: <http://bit.ly/Soneu>.

YouTube has many entries on Six Sigma and 5S. Here's one: <http://bit.ly/dC3nLY>.

Dilbert's thoughts on Six Sigma, Lean, and 5S: <http://bit.ly/tkFSkh> and <http:// bit.ly/v6tIM5>.

Broder shelving system at Ikea: <www.ikea.com>.

iRobot® floor cleaning robots: <www.irobot.com>.

antennas

BY KENT BRITAIN,* WA5VJB

Receiver SWR and Some Simple Antennas for 10 Meters

This time around we will be looking at a variety of antenna topics. We'll start out with a reader e-mail about receivers and loads.

From Clyde, we got an e-mail bringing up an important point: While the impedance and SWR of the antenna may work out to 50 ohms, looking back into a receiver you do not always see a 50-ohm load.

The receiver front end is matched to 50 ohms, but it may not always look like a 50-ohm load. With the typical HF receiver the first RF amp is mainly a voltage amplifier looking at a 50-ohm load. Now if your rig has an attenuator, or a Local/DX switch, then in the Local or –10 dB position, the receiver looks pretty close to 50 ohms. However, the rest of the time the HF receiver front end looks like a very high impedance.

This can get even worse with many GaAs FET preamps. In photo A is a super-duper GaAs FET preamp with a .1- to .15-dB noise figure. Sorry for the poor photo, but I didn't want to take it out of my station. These noise-figure values are well into the uncertainty range of automatic noise-figure meters. Trying to figure our why 10-GHz power GaAs FETs gave such an amazing noise figure at 2 meters, I got access to a fancy network analyzer. The input measured dB *return gain*! Return gain? Imagine you have built an HF amp for your QRP rig and you put an SWR meter between the rig and the amp.

You see 1 watt going into the amp and 2 watts reflected! Fig. 1 shows what this would look like to a directional power meter. Uhhh … 1 watt in and 1 watt reflected is an SWR of α (infinity), so 2 watts reflected is 2× infinity? Oh, this new math! Of course, this is a condition that SWR just isn't designed to handle, but needless to say, such a system can be a bit interesting to tune up without oscillating.

In recent years there has been considerable RF modeling work to bring down the input impedance of a GaAs FET amp with feedback techniques to make the preamps look more like a 50-ohm load. The families of MMIC amplifiers look pretty much like 50-ohm resistors on their inputs and outputs when powered. As for those amazing noise figures on VHF from 1/4–1 watt GaAs FETs for microwave amps, it turned out to be a matter of impedance. The 12-GHz GaAs FET used in a Satellite LNB can have a 3000–5000-ohm input impedance at 2 meters. The input matching circuit for this much impedance change had a lot of loss. The bigger gate power FETs had a much lower input impedance and thuis were easier to match with low-loss matching circuits. While the power FETs had a higher basic noise figure, the lower loss matching circuits more than made up for this.

Another way to get a good 50-ohm match for an amplifier is to use a circulator such as the one in photo B. A circulator is the RF equivalent of a diode, or in hydraulics, a check valve. RF can go in only one direction. Now the antenna sees the receiver front end as a nearly perfect 50-ohm load.

Here is one of those "facts" I have been told, but not able to verify in recent years. Perhaps one of you knows more about this and we can pass it along, but I am told that all the early C-Band satellite LNAs (LNBs were much later) were required to have a circulator on the input as in photo B. The circulator has a very low SWR, or *input return loss*,

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

Photo A– Preamp with an input SWR > infinity!

Photo B– Circulator with 50-ohm termination.

BLAST OFF!

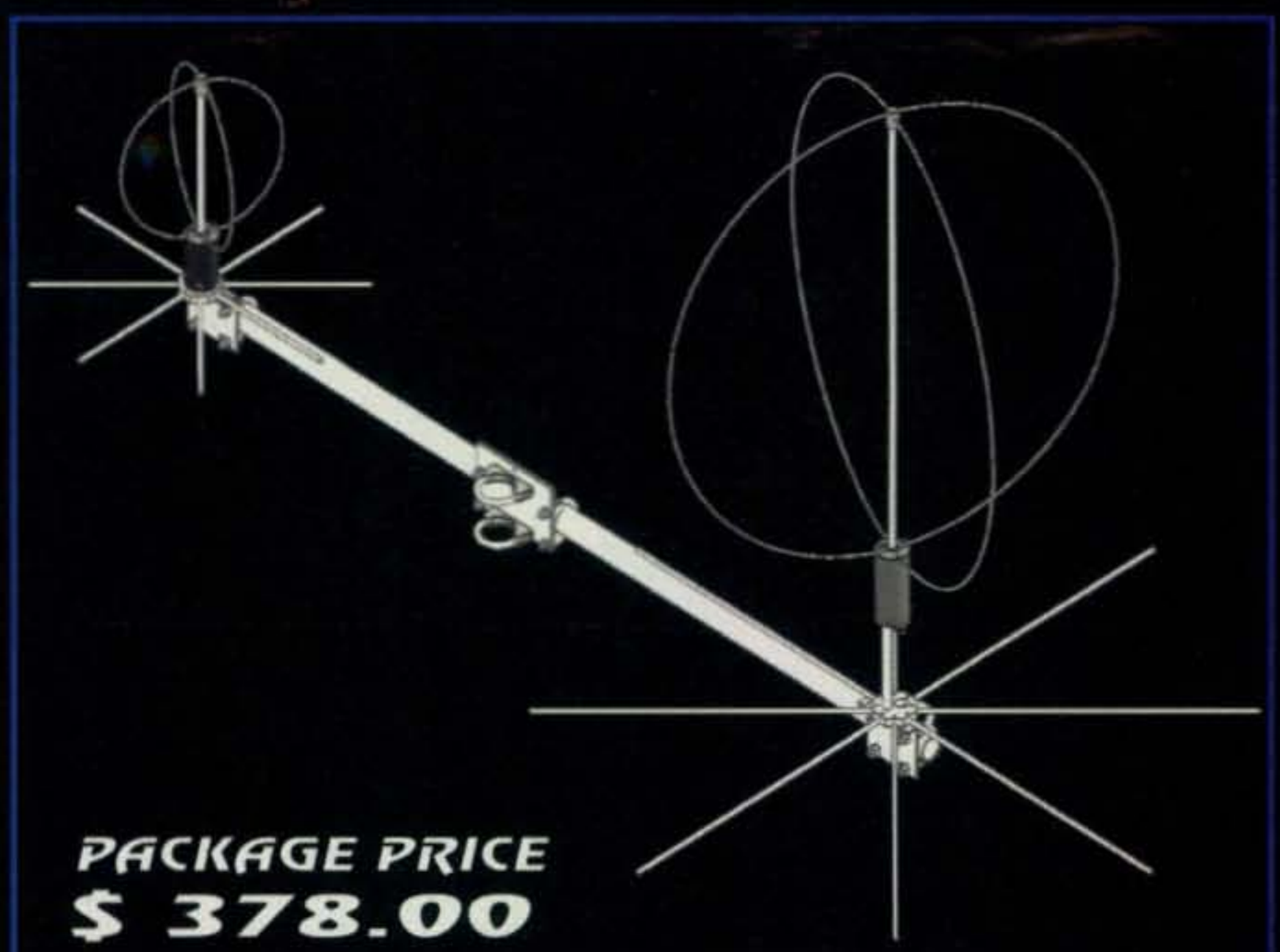
REACH ORBIT WITH AN M2 SATELLITE PACKAGE

WORLD CLASS PRODUCTS

SATELLITE PACKAGE 1

A perfect satellite package to get you up and running on the Low Earth Orbit Satellites.

Purchase the EB-144 and the EB-432 and get the cross-boom with hardware kit — a $40.00 value — FREE!



PACKAGE PRICE
$ 378.00

PLUS GREAT PACKAGE DEALS FOR THE ADVANCED SATELLITE USER

PURCHASE THE 2MCP14 & 436CP30 WITH HD FIBERGLASS BOOM KIT AND SAVE $50

SATELLITE PACKAGE 2
PACKAGE PRICE
$ 647.00

PURCHASE THE 2MCP22 & 436CP42UG WITH HD FIBERGLASS BOOM KIT AND SAVE $50

SATELLITE PACKAGE 3
PACKAGE PRICE
$ 821.00

4402 N. Selland Ave.
Fresno, CA 93722
Phone (559) 432-8873 Fax (559) 432-3059
www.m2inc.com

M2 Offers many HF Logs, Monobanders and Multiband products, not to mention our full line of VHF, UHF and Microwave antennas. We are your one stop shop for all of your High Quality Antenna needs.
Check us out on the web at www.m2inc.com

ANTENNAS POSITIONERS ACCESSORIES

PRICES VALID THROUGH FEBRUARY 15, 2012

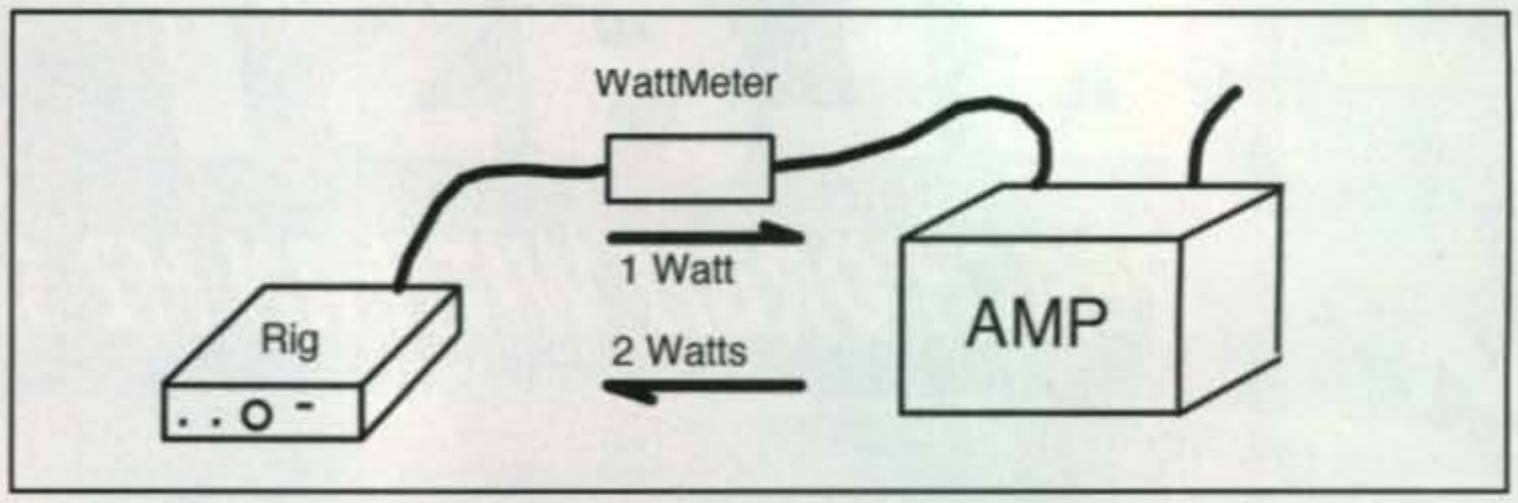


Fig. 1– An amplifier with input return gain.

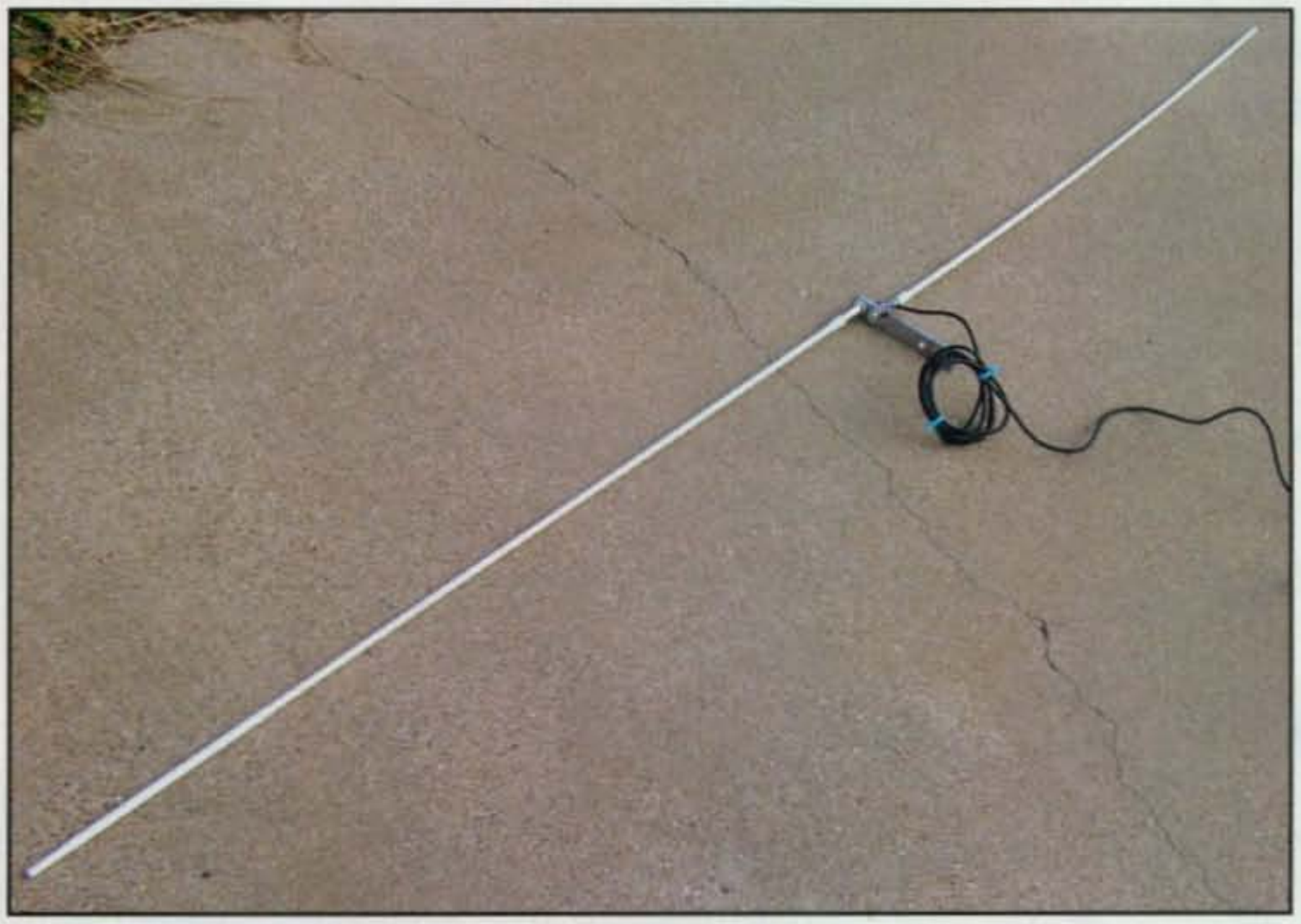


Photo C– Ten-meter portable dipole made from CB whips.

and any signals generated in the GaAs FET preamp are trapped in the preamp. You might think that the few milliwatts reflected from those poorly matched GaAs FETs, or a spurious oscillation, would not cause a problem, but that noise generator is sitting at the focus of a big dish, and there could be nearly 1 million of these noise generators pointing back at the Galaxy IV satellite. That's quite an opportunity for jamming the satellite! Does anyone know if the input circulators were required or just considered good engineering?

Sunspots are Back!

Sunspots are back and 10 meters is hopping again. Here are a couple of easy 10-meter construction projects, and a bit of antenna theory as we go along, of course.

At flea markets and garage sales you often see the classic 4-foot CB fiberglass whips pretty cheap. They are not that hard to move to 10 meters once you realize what's going on in there. On 11 meters, a quarter-wave whip is 108 inches long. 108? Why do they usually sell 102-inch whips? They expect you to have a 6-inch spring at the base of that whip.

OK, a quarter wave is 108 inches, but if you take one of the antennas in photo C, cut off the heat shrink, and unwind the wire, you will find about 35 feet of wire. Multiply by 12 and you have 420 inches of wire!

Confused? In fig. 2 you can see the wires are tightly coiled. There is a lot of capacitance between those coils, as so much of the RF is bypassing the coil capacitively. We can take advantage of this . . . more in a moment.

If you have worked with a lot of loaded verticals, you know that it only takes a few turns of coil to load a whip at the base, more turns when the load is in the middle of the whip, and even more turns when the loading coil is at the top of the antenna. A 4-foot top load needs a lot of turns. Therefore, to move that 4-foot whip from 27 MHz to 28.5 MHz you need to remove about 2 feet of wire. Of

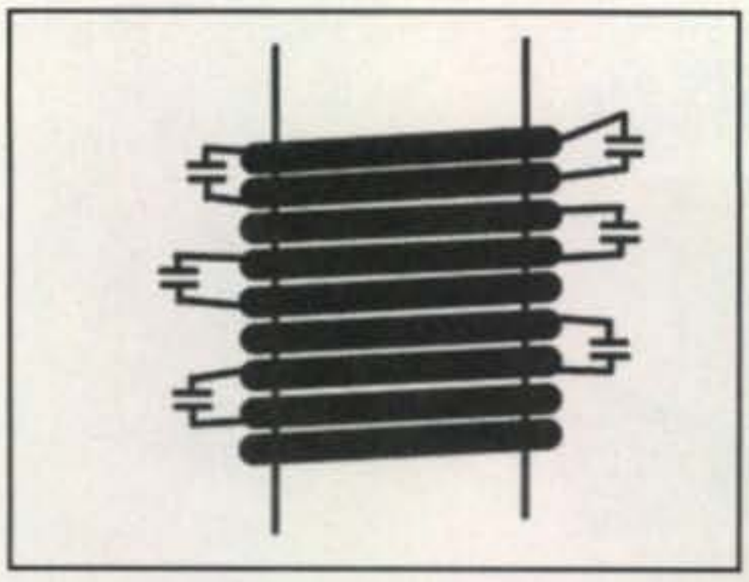


Fig. 2– Capacitive bypassing of the loading coil.

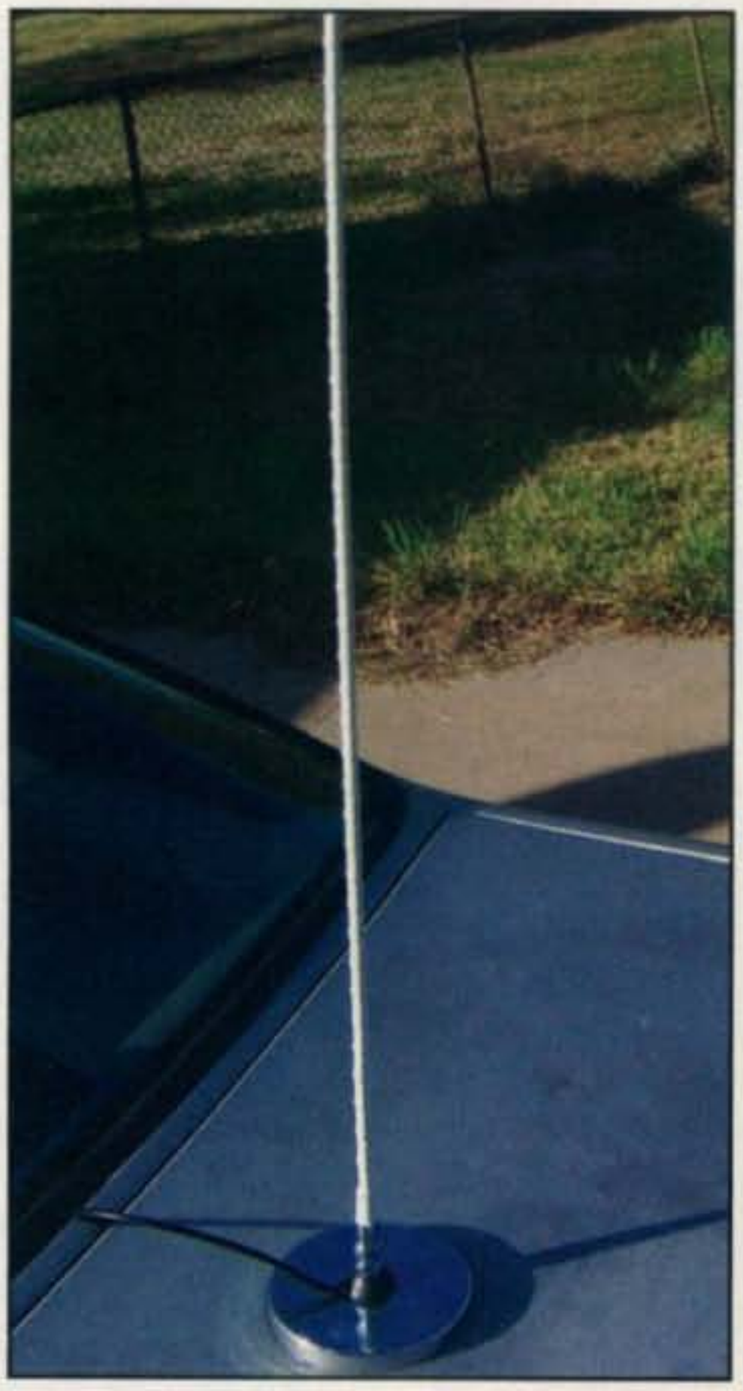


Photo D– 10-meter mag mount.

course, do it a few inches at a time until you see a reasonable SWR at 28.0 MHz and then walk it up to your favorite 10-meter frequency.

In photos C and D, we have two uses for your new 10-meter antennas. The dipole is great hanging off a tower or for portable use. You can mount it vertically or horizontally. I built my base for the dipole out of an old mirror mount. Photo E shows a wire-wound top-loaded vertical.

The dipole will have some RF on the outside of the coax, so you are going to need a balun (photo F). Perhaps the easiest to make is a "noise" balun. Four or five turns of RG-58 in a 6- to 8-inch

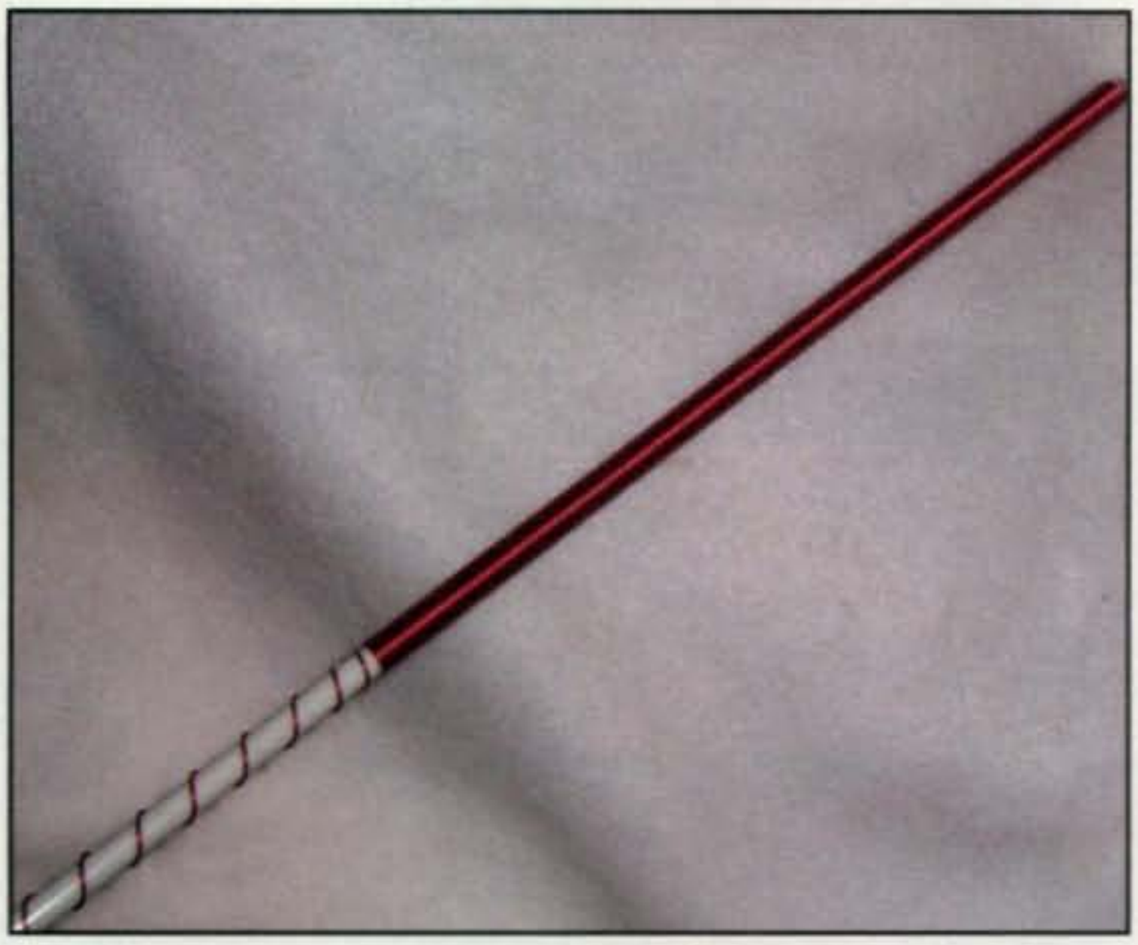


Photo E– Wire-wound top-loaded vertical.

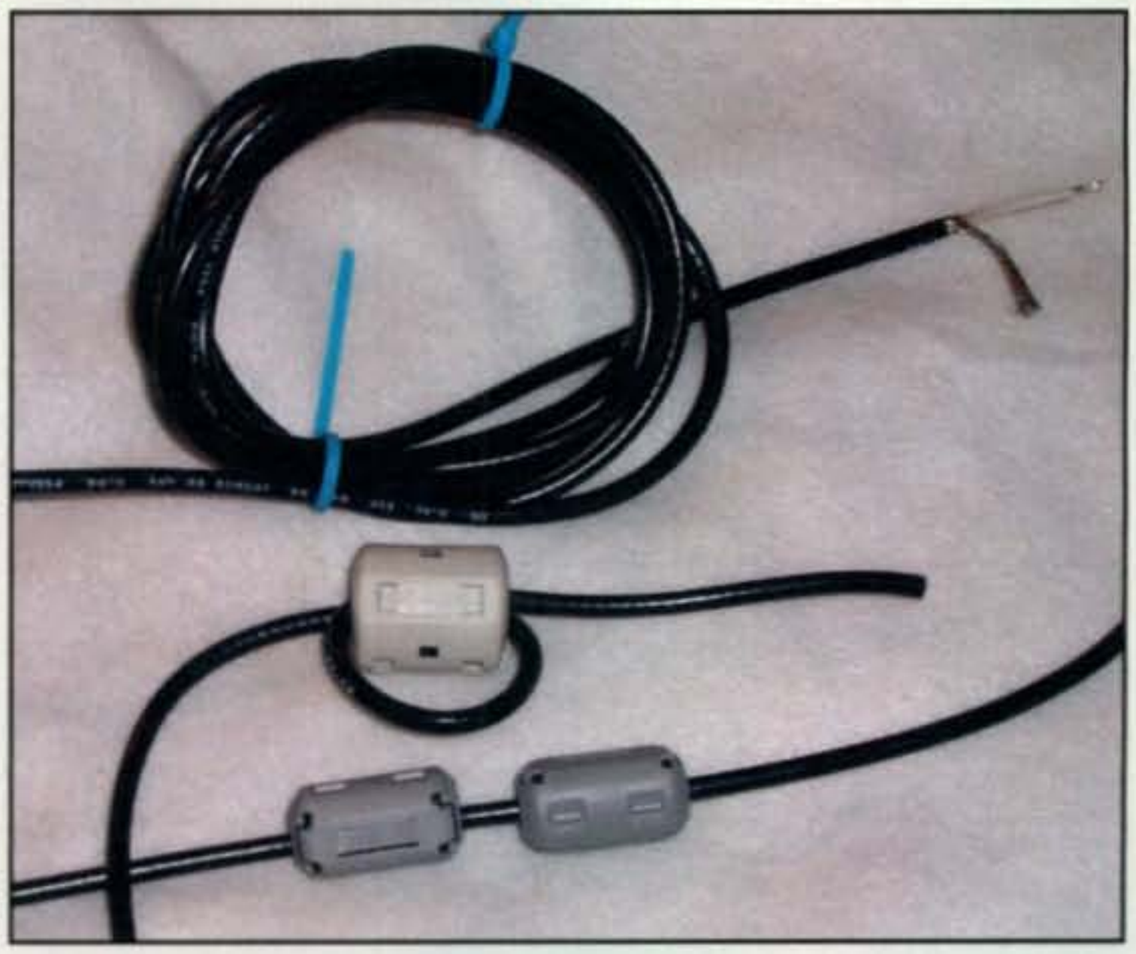


Photo F– A variety of baluns.

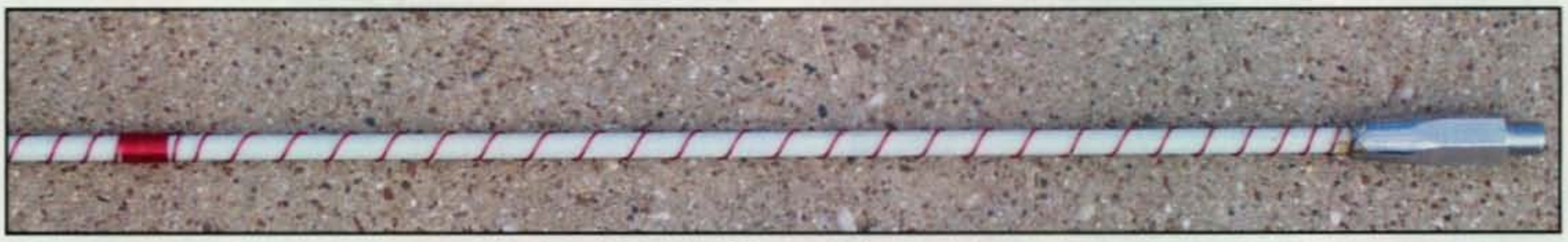


Photo G– 160-MHz weather-band trap.

loop work well, as will a couple of ferrite beads. Several types of baluns are shown in photo F.

Now for the marketing angle. Ever look at the CB antennas at a truck stop or in a CB shop? See them advertise a short whip as 5/8, 7/8, or even full wave? They are talking about the length of the wire in the short vertical. A 5/8-wave vertical has to be 5/8 of a wavelength high. It cannot be shortened and still have the gain of a 5/8 vertical. Despite what the advertising says, they all radiate as loaded 1/4-wave verticals.

Next, let's take advantage of the capacitance between the windings of the loading coil.

In photo G, you see a short section of tightly wound coil. Most CB rigs used by truckers also have the NOAA 160-MHz weather band. For some reason, truckers like to monitor weather conditions, especially this time of year. The parasitic capacitance turns that coil into a 160-MHz trap, just like the traps you have in many HF trap verticals. Twenty-six turns will self resonate at 2 meters! Want to build a multiband fiberglass vertical? Come up 15 inches from the base, tightly wind 26 turns of wire, and then make the rest of the antenna.

But isn't a quarter wave on 2 meters 18 inches? Yes, but you have some base hardware and the 146-MHz trap doesn't begin at exactly the first turn of the trap. Take my word for it; about 15 inches is what you want. For two years I have had a 6/2-meter trap vertical on my van and many of you have seen me selling 2/10-meter trap verticals at the Dayton Hamvention®. Sounds like the start of another column.

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

73, Kent, WA5VJB

New Gear for a New Year

BY JOHN WOOD,* WV5J

There's nothing like having a new piece of ham gear to get this new year started right. It doesn't matter if it's something you were given for Christmas or it's the piece of gear you didn't get (no matter how many hints you dropped) and now have the fun of buying it for your shack—a.k.a., yourself.

One item that many hams need to acquire on a regular basis is a new handheld transceiver. New models are coming out all the time, some with surprising new features and others with surprising low prices. Handhelds that are owned, used, and loved every day may suffer from rigors such as being dropped in a puddle or bounced on a hard concrete floor. Therefore, it's an item that commonly needs to be replaced.

But what if you could purchase a handie-talkie that has many of the features hams demand these days but also excels in matters of practicality because it sports a tough water-, dirt- and dust-resistant exterior that is ergonomically designed to fit the hand and is priced affordably to limit the bite on the typically tight ham wallet? The HT I have in mind is the new DJ-V57T from Alinco.

Photo A– Introducing the Alinco DJ-V57T, a very practical dual-band handheld that comes with an affordable price tag and some impressive capabilities.

The Alinco DJ-V57T

A year or two ago Alinco came out with a new design for a handful of its single-band HTs when it introduced the DJ-V17T for 2 meters, the DJ- 27T for the 222-MHz band, and the DT-47T for the 440-MHz band. But what about the dual bander? For reasons known only to Alinco, until now it continued to market the DJ-596T as its dual-band HT.

Alinco has recently released the DJ-V57T (photo A) which is similar in looks to the trio mentioned above. However, this one covers the VHF and UHF ham bands with three power levels up to 5 watts selectable through the 16-button key pad and all wrapped up in a polycarbonate body that saves weight while also providing strength and enough protection to merit an IPX7 designation for limited waterproofing. This HT is capable of surviving immersion in 1 meter of still water for up to 30 minutes. That means the DJ-57T can hang with you in bad weather or good when you're backpacking, camping, hiking, fishing, or just relaxing around the house.

Earlier, I did mention that this HT is affordable, so let me define that relevant term. For a list price of $149.95 or a street price of around $139.95, you get the dual band HT, an EDC-146 wall-wart charger, a belt clip, hand strap, flexible antenna for an SMA male connector, and an EBP-65 7.2-volt, 700-mAh rechargeable nickel-metal-hydride battery pack. After being in the hobby for more than 35 years, I can tell you that's a very competitive price for a brand-new dual-band handheld that will receive and transmit on the two bands where many ham repeaters live.

Also, if you wish to accessorize, Alinco offers a variety of extras such as lithium-ion battery packs, drop-in chargers, cigarette-lighter adapters, microphones, headsets, a soft case, a clone cable, PC programming capability, earphones, speaker mics, and even a tie-pin mic with VOX.

In actual service, this HT performs well and gets excellent audio and signal reports. It's easy to operate, easy to change frequencies and other settings, and easy to take with you whether you clip it to our belt or stuff it in a pocket. To prevent accidental key presses when you choose the pocket option, it's a good idea to lock the keypad—easy as one, two with a press of the function button and a press of the Scan KL button. In fact, a press of the function button and one button on the keypad allows you to quickly change the frequency step (your choice of 5, 10 12.5, 15, 20, 25, 30 kHz), frequency shift, alarm function, save frequencies to one of 200 memory positions available, name the memories, activate tone squelch, DCS or VOX, change power output settings (indicated by an L for low, an M for medium, and no letter display for high power) as determined by the battery pack attached, reverse the frequencies while in repeater operation, adjust the receive attenuation, or modify the tone dial memories.

There are more features to adjust in the set mode, such as automatic power off (APO) function, but I'll leave that for you to discover (hold down the function key down for at least two seconds to enter the set menu).

Obviously this HT is feature-rich on two levels, so be sure to explore and read the 72-page user

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

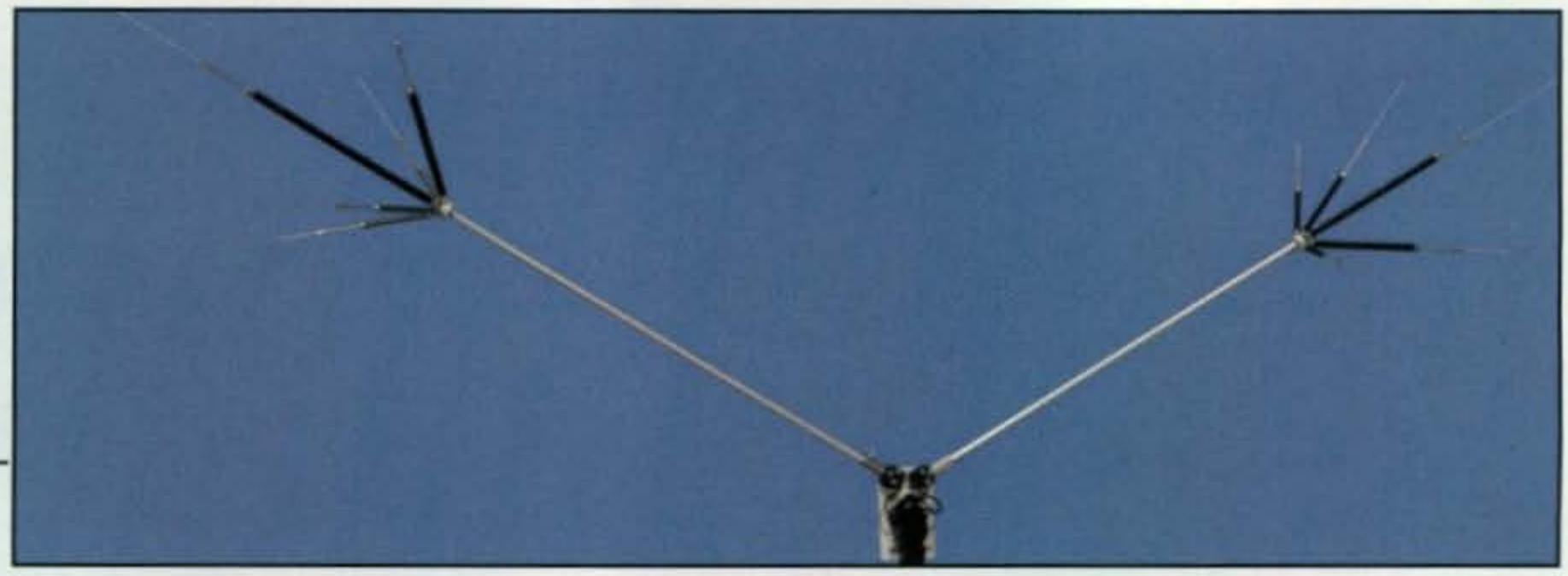


Photo B– Comet Antenna debuts its CHV-5X five-band rotatable dipole that covers 40/20/15/10 and 6 meters and measures less than 13 feet wide and comes in at under six pounds.

manual to get acquainted with all that this radio can do. For more information, visit <www.alinco.com>.

Skyhooks and Other Related Items

I was told that engineers at Comet Antennas had been busy designing compact skyhooks that appeal to a growing number of hams who need compact antennas that get their signals out but avoid antenna complaints from their neighbors and manage antenna restrictions. However, I had no idea what products that research was leading to until I saw some of the small low-band antennas Comet had on display at its booth at the Dayton Hamvention® in May 2011. One of the ideas that Comet decided to bring to market is the CHA-250B broad-band vertical.

Comet is also releasing its newest rotatable dipole design, the CHV-5X (photo B), which appears to incorporates some of these smaller HF whips. The company tell me it covers the 40-, 20-, 15-, 10-, and 6-meter bands, measures about 13 feet long, weighs in at less than six pounds, and so far has proven to be a very successful product. For details go to: <www.cometantenna.com>.

MFJ QRPocket Tuner

For QRP operators who want to transfer the last milliwatt to the antenna, there's the new MFJ QRPocket Antenna Tuner designated the MFJ-9201 (photo C) from MFJ Enterprises.

This small (4"W x $2\frac{5}{8}$"H x $1\frac{1}{2}$"D) performer covers 80 through 10 meters, handles up to 25 watts, and boasts a custom 12-position inductor switch, a tune/bypass switch, BNC connectors, and antenna and transmitter tuning capacitors.

Photo C– MFJ Enterprises of Starkville, MS adds a QRP antenna tuner to its product line and christens it as the QRPocket Tuner, MFJ-9201.

The handy package, priced at $49.95, works well with the MFJ-9200 QRP transceiver or any other popular QRP rig and fits easily in a ham's go bag or an attache case.

MFJ has also introduced the MFJ-9211, a QRP 4:1 current balun that let's you use your favorite QRP rig with a balanced line antenna. Built in a tough plastic case, the MFJ-9211 has five-way binding posts for balanced line connections and a BNC output to any MFJ QRP rig or other popular rig.

As always, any MFJ item purchased is protected by MFJ's "No Matter What" one-year limited warranty such that should you have a problem, MFJ will repair or replace at its option the MFJ parts for one complete year.

For more information about MFJ products, visit <www.mfjenterprises.com>, call 1-800-647-1800 or write to MFJ, 300 Industrial Park Road, Starkville, MS 39759.

GeoTool Antenna Products

GeoTool is well-known for its patented stake pocket antenna mounts. It has been manufacturing them since 1997 and has increased the line to include five different sizes to fit most pickup trucks.

GeoTool has announced new screwdriver antenna mounts (photo D), and two sizes of Delrin antenna insulators for base-loaded mobile whips. Different top configurations fit HF (3/8"-24), NMO, and SO-239 antenna adaptors.

With the exception of brass NMO connectors, and plated brass SO-239 connectors, GeoTool uses only stainless-steel hardware. In contrast to mounts attached to the sheet metal at the top of the stake pocket, GeoTool says its mounts derive lateral support between the bottom of the stake pocket bracket and the top lip of the sheet-metal top opening. This allows the GeoTool mount to avoid damage from driving under a garage door with the antenna up.

Both of the new mount types attach securely to the standard GeoTool HF mount body. In addition, both mounting systems can be used for marine and fixed-station installations, with several possible applications.

GeoTool's new screwdriver antenna mount is for antennas that attach with a bolt extending up into the base of the antenna. Most antennas have a 3/8"-24 bolt, but the mount can be ordered with other bolt sizes. The Delrin insulator is $\frac{1}{2}$" thick and provides a wide gap to reduce the resonant-frequency-raising capacitance between the bottom of the antenna and the mount. The insulator is made in two sizes, 1.5" and 2.0" diameter, and fits many screwdriver antenna systems. The screwdriver antenna mount top hardware is available separately for those who wish to mount antennas on metal railings, vertical masts, or boats.

Also from GeoTool comes new low-capacitance Delrin antenna insulators (photo E), which are available in two sizes, 1.5" × 3.0" and 2.0" × 4.0", or larger upon request. These

Photo D– GeoTool has announced its new screwdriver antenna mounts that attach securely to the standard GeoTool HF mount body.

Photo E– GeoTool is also bringing to market two new Delrin insulators which provide a wide gap to reduce the resonant-frequency-raising capacitance between the bottom of the antenna and the mount.

insulators were designed as isolated base mounts for use with any brand of remote antenna coupler. The coupler must be mounted near the antenna, and coax is never used to feed the antenna. The insulators use stainless-steel hardware throughout and have internal stainless-steel adapters to provide increased strength without wear and tear on the Delrin insulator. The heavy-duty model has twice the internal stainless threads and 1.5" to 2.0" between the antenna and base mounting bolts. The standard model has 0.75" to 1.0" between the antenna and base mounting bolts. The insulators have a myriad of other uses.

For more information about GeoTool products, write to the

Looking Ahead in CQ

Here are some of the articles we're working on for upcoming issues of *CQ*:

- *CQ* Market Survey: VHF/UHF Handhelds, by WB6NOA
- The ON4WW Ultimate Beverage Switchbox, by ON5UK
- The Extraordinary Cycle 19, by W4YO
- TeslaGRAM: A Multinational Special Event, by W2VU

Do you have a ham radio story to tell? A possible article for one of our specials? We'd like to hear from you. See our writers' guidelines on the *CQ* website at <http://www.cq-amateur-radio.com/guide.html>. Upcoming specials are: QRP (April issue), Take it to the Field (June), Emergency Communications (October), and Technology (November).

Photo F– Davis Instruments' new Vantage Vue wireless weather station features an easy-to-install system, outdoor sensor array and LCD console.

company at 2375 Elden Ave. A-2, Costa Mesa, CA 92627, call them at 714-403-2026, send them a fax at 949-548-8885, visit the GeoTool website at <www.geotool.com/antmount.htm>, or e-mail GeoTool at <info@geotool.com>.

Davis Vantage Vue Weather Station

The new Davis Vantage Vue weather station (photo F), from Davis Instruments, combines Davis's legendary accuracy and rugged durability into a compact station that's easy to set up and use. Vantage Vue includes a sleek but tough outdoor sensor array and a distinctive LCD console. Its unique Weather Center function provides additional information on each weather variable. In addition, Davis has made Vantage Vue radio-compatible with its flagship Vantage Pro2 professional stations so you can mix-and-match most components. The station includes an integrated sensor suite including temperature, wind, and rain sensors, the console, and mounting hardware.

The all-important console reports time and date, and the eight phases of the moon from New to Full. It also displays forecast icons that let you know to expect sun, partly sunny, clouds, rain, or snow, the temperature and humidity with updates of the outside temperature every 10 seconds, and inside temperature every minute. In addition, it gives outside humidity updates every 50 seconds and inside humidity every minute. The console can also retransmit or extend range to additional consoles up to 1000 feet away. It also shows barometric pressure and a trend arrow that indicates it's rising, falling, or stable, rain totals, and the rain rate every 20 seconds for the last 25 hours, days, months. There's even a "Change In Weather Since Yesterday" feature that allows comparisons of changes of temperature and barometric pressure from day to day.

In addition, the console is a weather center that provides additional information for each weather variable, such as daily highs and lows, temperature changes by the hour, and barometric value changes. The console even displays astronomical data such as meteor showers and graphs the last 25 hours, days, or months while also providing a view of up to 50 graphs, including temperature, rain, rain rate, wind and barometric pressure, and lots more—all on the console.

For more on the Davis Vantage Vue go to: <www.vantagevue.com>.

Book Corner

There's lots for us to talk about in the Book Corner this month, so we'd better get right to it.

We'll start with one of the biggest and heaviest books I've seen in recent days, the hard-bound 89th edition of *The ARRL Handbook For Radio Communications* (photo G). Almost two inches thick, it's easy to believe that this one book is a single resource for those interested in electronic fundamentals, radio design, and the practical application of analog and digital radio knowledge in creating successful projects.

In this updated reference, the ARRL has included an answer to the question "What is amateur radio?" while also answering questions on fundamental theory, analog and digital basics, RF techniques, power supplies and multiple chapters on practical design of transmitters and receivers, antenna systems and radio propagation, plus comprehensive information on equipment construction and maintenance and station assembly and management.

For $59.95, you get this complete chronicle of radio evolution plus an accompanying CD.

There is also a companion book to *The ARRL Handbook For Radio Communications* and it is entitled *The ARRL Antenna Book For Radio Communications* (photo H). It describes antennas for nearly any frequency range and operating application, and that includes everything from antennas for the HF bands all the way through VHF, UHF, and microwave.

The 22nd edition of *The ARRL Antenna Book* lists for $59.95. You'll find the League has brought each chapter up to date while including complete construction notes on how to build wire and loop antennas, verticals, Yagi beam antennas plus C-pole ground independent HF antennas, patch and Vivaldi antennas, and even a 40-meter Moxon beam. The book is also accompanied by a CD ROM disk that gives you fully searchable text and illustrations.

Both of these books and any other books in the ARRL libary can be purchased at <www.arrl.org> or by calling 800-594-0200.

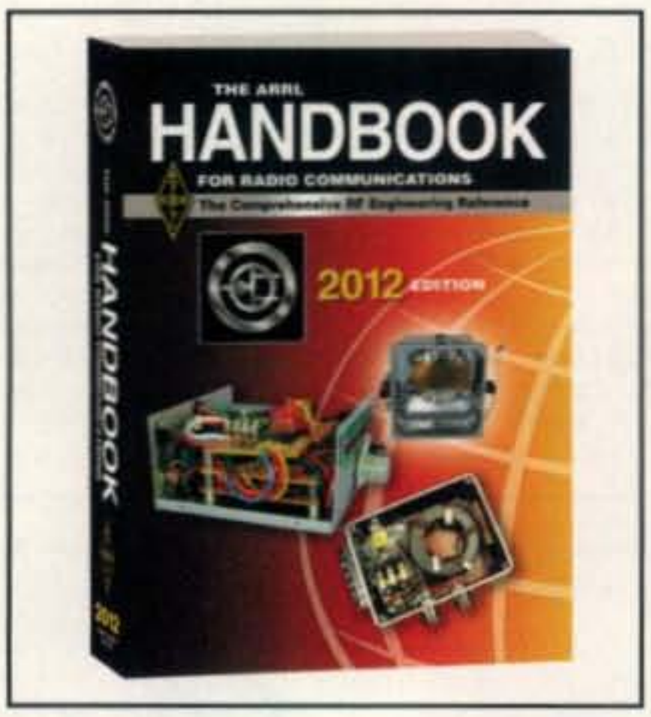


Photo G– The hard-bound 89th edition of The ARRL Handbook For Radio Communications. (see text).

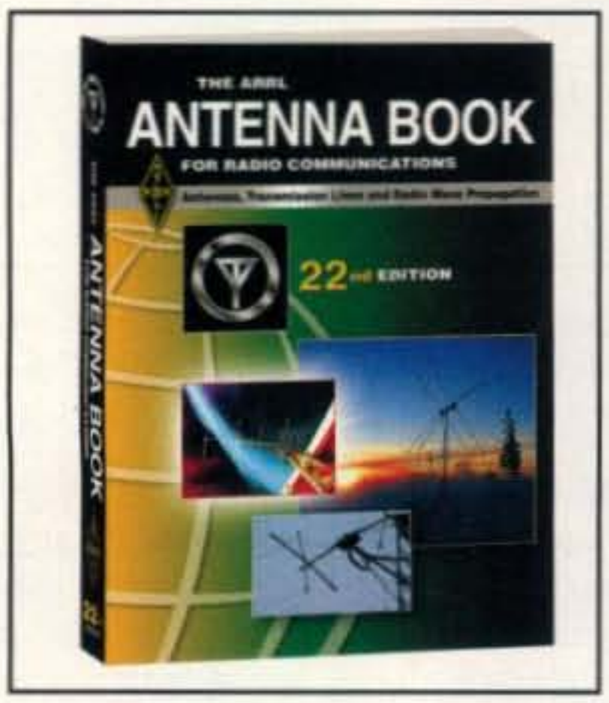


Photo H– The ARRL Antenna Book For Radio Communications *It describes antennas for nearly any frequency range and operating application, and more.*

Corrections

I've noticed that when a person does a lot of writing, it seems inevitable that a certain small percentage of what they write is inadvertently in error. I proved this recently when I wrote about the Baofeng UV-3R handheld and mentioned a stateside dealer where these amazingly small but powerful (2-watt output) amateur HTs could be purchased, NH7QH Radio Supplies in Aiea, Hawaii. I listed the wrong URL and should have instead given you <www.hawaiiradiosales.com>. My apologies to the owner of Hawaii Radio Sales, Chris Colquhoun, NH7QH.

It was also brought to my attention that I was in error in October's "What's New" when I mentioned that Pete Markavage, WA2CWA, was the owner of Nifty Products. Pete tells me that Bernie Lafreniere, N6FN, is the actual owner of Nifty Products. To those gentlemen and my readers, I'm sorry that I got that confused.

In Closing

Well, I guess that wraps up another look at "What's New" in the world of amateur radio. Until we meet here again next month, take care and enjoy this multifaceted hobby we call "amateur radio."

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.*

awards

BY TED MELINOSKY,* K1BV

DX Grid Square Awards

This month we first continue with a couple more questions from county hunters and answers to help them along the path to the USA-CA award. Then we move on to grid square awards from around the world.

Q: Percy Ford, KA1JPR, writes that the state of Connecticut doesn't have counties anymore and asks how this might be be reflected in the USA-CA rules and list of counties for the award.

A: It's true that CT no longer has a county listing. This change took place in 1960, at about the time the USA-CA rules were written by Clif Evans, K6BX, the first awards editor for *CQ* magazine. However, Connecticut judicial districts still follow the old county boundaries, and the eight counties are still widely used for geographical and statistical purposes. While watching local TV weather shows, announcers commonly refer to "heavy thunderstorms in Middlesex County crossing to Tolland [where I live] and Windham Counties." There's no requirement in the USA-CA rules that counties must perform a governmental function, and that's the case in Connecticut.

Q: Don Simmonds, N5XG, earned USA-CA a few years ago with a Mixed Mode application. He asks whether it would be possible to change the award to reflect an "ALL CW" status now that he managed to replace all the SSB contacts with CW.

A: Yes. While USA-CA is basically a "one time" award, I have no problem receiving your new list of contacts showing that all contacts are of a single mode or made on a single band. I'll provide a small endorsement sticker for you to add to the award certificate. This is treated as an endorsement, with a fee of $1.25.

Grid Square Awards

Grid squares are a way of dividing up the surface of the Earth to provide a quick geographical reference. For ham radio purposes, they are an abbreviated way of describing your location anywhere on Earth in a manner that is easy to communicate over the air. The most common system is called the Maidenhead Locator System. The name comes from the town outside London where it was first developed in 1980 by a meeting of European VHF managers.

The basic grid square measures 1° latitude by 2° longitude. A grid square is indicated by two letters (the field) and two numbers (the square), as in FN31, the grid square covering the part of Connecticut where I live.

Sub-squares are further designated by the addition of two letters after the grid square, as in FN31UQ. These are often used in VHF contests and describe territory roughly equal to 3 × 4 miles in the continental U.S.

There are a number of HF awards that use Maidenhead grid squares. *CQ* offers the CQ DX Field Award, which covers contacts with all the fields (1st two letters only) on Earth—all 324 of them! Also, there are a number of countries that offer a similar, yet restricted grid square award covering only their country. Since the grid system describes the entire surface of the Earth, and most hams operate from dry land, some isolated areas in these countries can only be activated by special expeditions. Let's look at some of these awards.

Denmark OZ Locator Award. For the basic award, contact Danish stations in at least 10 of the grid locator squares in Denmark after 1 January 1985. OZ is covered by the following squares:

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

William N. Pedersen, KM1C
USA-CA 1219
October 1, 2011

Bill Morgan, KØDEQ
USA-CA 1220
October 11, 2011

USA-CA Honor Roll

500
KM1C.....3552
KØDEQ.....1418

1000
KM1C.....1819

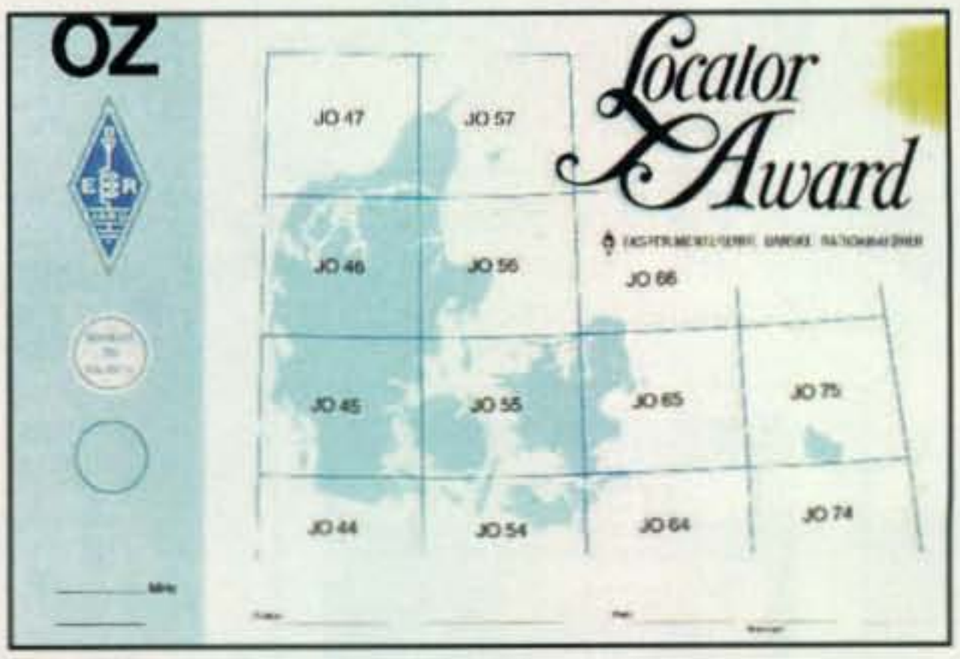
1500
M1C.....1529
KØDEQ.....1530

2000
KM1C.....1417

2500
KM1C.....1333
KØDEQ.....1334

3000
KM1C.....1244
KØDEQ.....1245

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.



Denmark OZ Locator Award. For the basic award, contact Danish stations in at least 10 of the grid locator squares in Denmark after 1 January 1985.

JO44, JO45, JO46, JO47, JO54, JO55, JO56, JO57, JO64, JO65, JO66, JO74, and JO75. Contacts via active repeaters do not count, nor do cross-band and crossmode contacts. Phone or CW contacts OK. QSLs must be submitted when applying. Endorsements are available for each additional three squares. Endorsements also are available for: Phone, CW, EME, MS, and Satellite by band. Send GCR list and fee of 20 DKK, $US4, or 5 IRCs to: Award Manager, Allis Andersen, OZ1ACB, Kagsaavej 34, DK-2730 Herlev, Denmark. Internet: <http://www.edr.dk/Default.aspx?ID=84>.

Italy Worked All Italian Squares. ARI of Busto Arsizio sponsors this award for working Italian grid squares. The size of each square is 10 ft. of a degree on the parallel and 10 ft. of a degree on the meridian. In each square are eight WWL little squares, two on the parallel and four on the meridian. The geographical coordinates of start and finish on this grid are: from latitude 47º10'N to latitude 35º20'N and from longitude 6º30'E to longitude 18º40'E, for a total of 5183 squares. This grid contains all Italian territory, islands included. To identify the squares, an alpha-numerical code has been used: On the direction of the parallels there is a number from 00 to 72; for the meridians there is a pair of letters coupling the letters A, B, C, D, E, F, G, and H with the letters J, K, L, M, N, P, Q, R and S, obtaining AJ, AK, AL, AM, AN, AP, AQ, AR, AS, BJ, BK, BL, and so on until the couple HR. Thus the codes of the squares go from AJ00 to HR72. Many squares are in the sea, while some others do not contain an Italian territory and cannot be used. This provides a total of 1488 valid squares.

The objective of the Croatia Worked 9A Locators Award is to stimulate amateur radio activity from all grid squares in the Republic of Croatia.

The basic award requires working 100 such squares on or after 1 January 1994. SWL OK. Endorsements available for each additional 100 squares. You may work fixed or mobile stations in the squares. Contacts via link/repeater are not valid. All contacts must be made from the same country and with your own callsign. The HF award requires using only HF. Endorsements available for monoband, WARC, CW, RTTY, Phone, etc.

Send a GCR list and fee of $US15 or 10 Euros to: ARI di Busto Arsizio, PO Box 125, I-21052 Busto Arsizio (VA), Italy. Internet: <http://www.aribusto.it>.

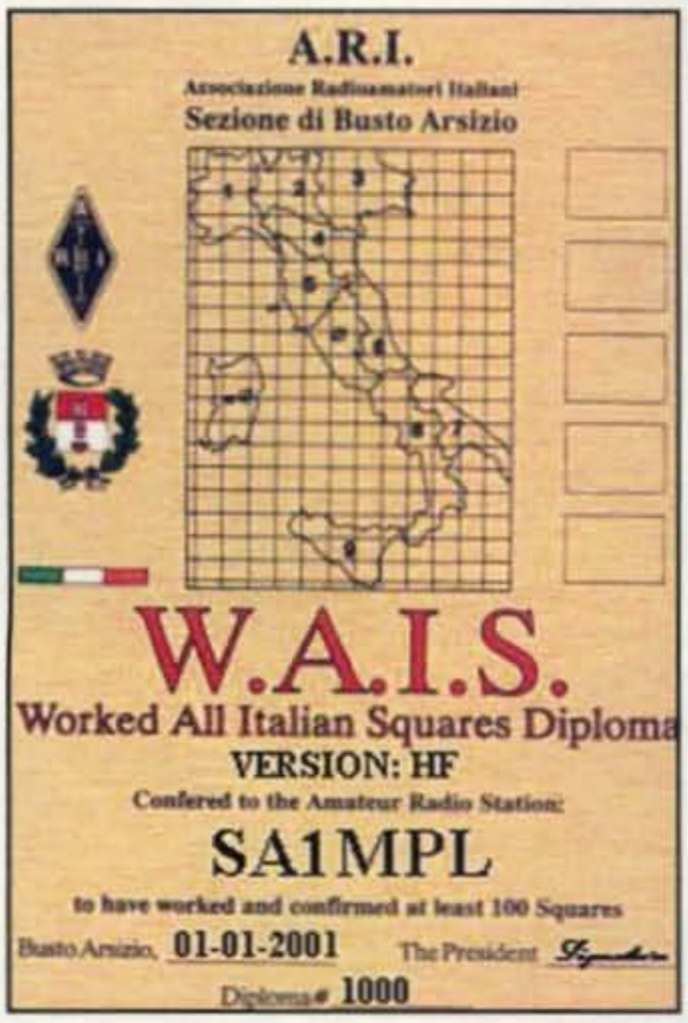
Croatia Worked 9A Locators Award. The objective of this award is to stimulate amateur radio activity from all grid squares in the Republic of Croatia. Only contacts made on 50 MHz and above are valid for this award and no repeaters allowed. The award can be issued for three different levels, either mixed band or single band:

3rd level – 6 grid squares minimum
2nd level – 10 grid squares minimum
1st level – all 15 grid squares

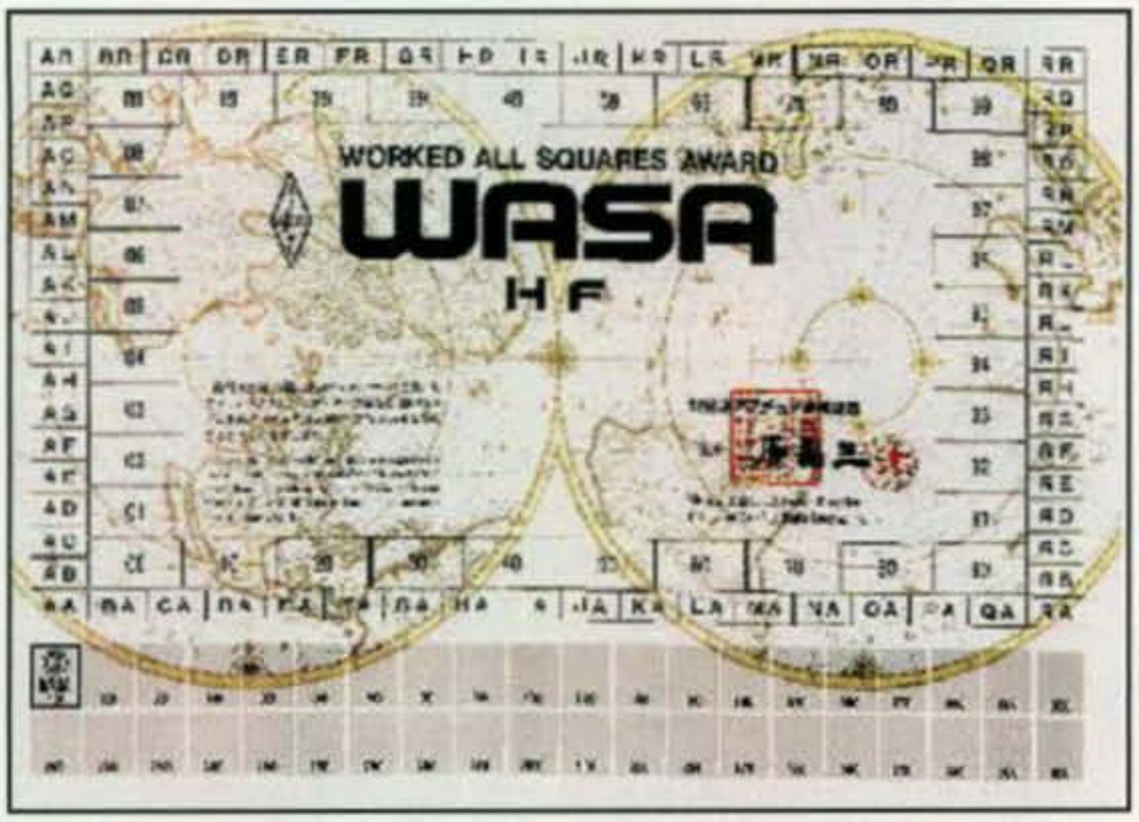
Grid squares in 9A are: JN 64, 65; JN 72, 73, 74, 75, 76; JN 82, 83, 84, 85, 86; JN 92, 94, 95.

Contacts made on any band after 5 July 1992 count for the award. SWL OK. A submission of the log entries and possession of the QSL cards are required for the award. QSLs may be requested for verification. Award fee is 5 Euros or $US6 , and 3 Euros or $US4 for different level endorsements. Apply to: Vladimir Pavlica, 9A9R, HRS Diploma Manager, Hrvatski Radioamaterski savez, Dalmatinska 12, P.p. 149, 10002 Zagreb, Croatia. E-mail: <vladimir.pavlica@ri.htnet.hr>; internet: <http://www.hamradio.hr/index.php>.

Japan Worked All Squares Award. Contact at least 100 different grid square locators in Japan (first 4 digits); sticker endorsements are available for each additional 100 squares. Contacts after 1 July 1992 count. All contacts must be made from the same grid



ARI of Busto Arsizio sponsors the Italy Worked All Italian Squares award for working Italian grid squares.



Contact at least 100 different grid square locators in Japan to earn the Worked All Squares Award.

square in your country. Even if the square of the station that issued a QSL card is not shown clearly, a QSL card showing the longitude and latitude of the station from which its square can be calculated will be valid. In this case, these coordinates should be shown on the QSL card list. No cross-band contacts except by satellite. Endorsement fee is 5 IRCs.

Available in two classes: WASA-V-U-SHF (50 MHz and above) and WASA-HF (28 MHz and below). GCR list must include grid square data. No endorsements for band/mode. SWL OK. Fee is 12 IRCs. All contacts must be made on land within the same call area, or if no call area exists, within the same country. Apply to: Japan Amateur Radio League – Award Desk, 1-14-5 Sugano, Toshima-ku, Tokyo 170-8073, Japan. E-mail: <oper@jarl.or.jp>; internet: <http://www.jarl.or.jp/English/4_Library/A-4-2_Awards/Award_Main.htm>.

We're always on the hunt for new awards to feature in these pages. I invite your e-mails to the address shown elsewhere in this column.

73, Ted, K1BV

Arthur Burke, N4PJ
USA-CA All Counties #1218, August 12, 2011

My county hunting pursuit gathered significant steam about three years ago. When first licensed in late 1978, I mistakenly assumed one collected the counties in a haphazard, random manner, mostly via contests. After a long absence from the air, in 2004 I returned and my county total was only around 800. Then, around the time I returned to the air, I discovered the County Hunter Nets. My numbers grew moderately fast from that point. They really grew when I discovered the advantage of being retired. That translates to living in front of the radio to the exclusion of everything else one might consider important in life! Between sharp listening, a baby monitor in front of the rig, and permission to be an almost absent husband at times, the quest took on the semblance of an elephant in the room, and the numbers piled up faster and faster.

Having spent most of my amateur "career" as a DXer, the lure of collecting counties at first didn't hold the proverbial candle to DXing. The addiction and passion were both quite stealthy. I initially found it amazing that anyone would be interested in "...doing it again..." after collecting all 3077 counties. Then the affliction seized me as well.

Although the total odyssey has encompassed some 30+ years, slightly more than half the total was garnered in the last three years. During that period of time, I grew to appreciate the mobile community (and became part of it myself) for their dedication and enjoyment of motoring near and far to "run" counties. Marsha and I recently completed a 7,971-mile journey from central Florida to Seattle and back, wandering through 19 states and 268 counties, making almost 5,000 contacts in the process. Thus far, we've accumulated approximately 35,000 miles in the pursuit of collecting/dispensing counties. That might look like a lot of miles, but I'm aware of several other guys who are well in excess of 100,000 miles! Did I say it was addictive?

Often I thought about those 10 years I lived in the Kansas City area. I often wished it was then that I had discovered serious county hunting. I figured living in the middle of the country would make it more or less equidistant to the far corners of the U.S. However, even here in central Florida, I've enjoyed the ability to hear and be heard with a beam at 50 feet, mostly running around 100 watts.

It is sometimes difficult to express the joy of firing off "CHN de N4PJ/M" either in a county or on a county line and being deluged with calls from those afflicted with the same passion for county hunting. My DXCC counts for Mixed, Phone, and CW are all well over 300 (I'm currently three short of the Mixed Honor Roll). I've dabbled in a lot of various contests over the years, but only been serious a very few times. CW has almost always been my first "love." I used to joke that I bought a microphone in self-defense!

Arthur, N4PJ, USA-CA All Counties #1218.

If you think you're bored with your current sub-hobby pursuits, take a peek at <www. marac.org> or <www.countyhunter.com> to learn more.

I feel like a guy on Oscar night—three minutes to thank everyone responsible and deathly afraid you'll forget the most important ones!

First, a huge thanks to my biggest supporter and booster, my wife Marsha, N4BU, without whom I might still be pursuing this award. There are probably several categories of wives out there: There are some who tolerate their spouse's activities; there are some who support it; and then there's Marsha. She not only tolerates and supports me, she encourages me!

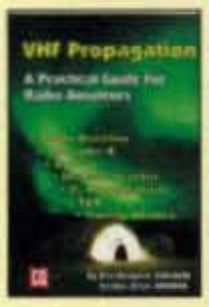
Then there are the guys who not only appear countless times in my log, but who also went "above and beyond" by making special efforts to deliver counties for me: N4CD, K5GE, W4SIG, N4AAT, NØKV, W9MSE, WØGXQ, and N5XG. N4CD is particularly noteworthy, as he's Mr. Ubiquitous —seemingly everywhere, all the time! I also can't forget to thank that awesome father and son duo, K8ZZ and W8JJ. And last, but not least, a guy who also appears in my log a lot, KL1V.

It has been a great adventure, and I thank all of you for the ride.

—N4PJ

Winter Finds at the CQ Store

FREE shipping on orders of $100 or more!



VHF Propagation

by Neubeck, WB2AMU & West WB6NOA

A comprehensive source-book on VHF propagation by two great authors. Includes: Tropo ducting, Aurora, Meteor Scatter, TEP, Sporadic-E, Combo Modes and more!

6 X 9 Paperback $15.95

A Year of DX

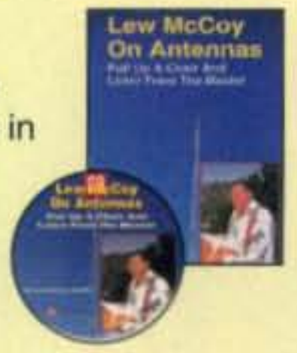
by Bob Locher, W9KNI

Look over the shoulder as the author works country after country, in pursuit of the Holy Grail – winning the CQ DX Marathon.

6 X 9 Paperback $19.95

Lew McCoy on Antennas

by Lew McCoy, W1ICP



Unlike many technical publications, Lew presents his invaluable antenna info in a casual, non-intimidating way for anyone!

8.5 X 11 Paperback $19.95
***New!* CD Version $14.95**
Buy both for only $29.95

The NEW Shortwave Propagation Handbook

by W3ASK, N4XX & K6GKU

This authoritative book on shortwave propagation is your source for easy-to-understand information on sunspot activity, propagation predictions, unusual propagation effects and do-it-yourself forecasting tips.

8.5 X 11 Paperback $19.95
***New!* CD Version $14.95**
Buy both for only $29.95

"Up Two" by G3SXW

Are you a DX'er? Have you longed to be on the other side of the pile-ups? Do you dream of taking a rig to exotic locations? If your answer to any of the above questions is yes, this book is certain to bring you the vicarious thrills of operating from exotic places.

6 X 9 Paperback $19.95

Reflections III

by Walter Maxwell, W2DU

Includes all the information in Reflections I & II and much, much more! This fully revised and updated, this 424-page, third edition is truly a must have!

8.5 X 11 Paperback $39.95
***New!* CD Version $29.95**
Buy both for only $59.95

The Quad Antenna

by Bob Haviland, W4MB

Comprehensive guide to the construction, design and performance of Quad Antennas. General Concepts, Circular-Loop & Arrays, Rectangular & Square Loops, Multi-Element Quads and more!

8.5 X 11 Paperback $19.95
***New!* CD Version $14.95**
Buy both for only $29.95

W6SAI HF Antenna Handbook

by Bill Orr, W6SAI

W6SAI was known for his easy-to-understand writing style. In keeping with this tradition, this book is a thoroughly readable text for any antenna enthusiast, jam-packed with dozens of inexpensive, practical antenna projects that work!

8.5 X 11 Paperback $19.95
***New!* CD Version $14.95**
Buy both for only $29.95

The Complete DXer

Third Edition

The joy of the chase, the agony of defeat, the thrill of victory are the stuff of The Complete DXer, a book that is almost as seductive as the DX chase it describes. It excites, it entertains, it teaches!

6 X 9 Paperback $19.95

"Getting Started" DVD Paks

CQ Ham Radio Welcome Pak

1 DVD contains 3 programs:
Ham Radio Horizons
Getting Started in Ham Radio
Getting Started in VHF
Order HAMDVD ~~$24.95~~ $18.00

CQ HF Specialty Pak

1 DVD contains 2 programs:
Getting Started in DXing
Getting Started in Contesting
Order HFDVD ~~$24.95~~ $18.00

CQ VHF Specialty Pak

1 DVD contains 3 programs:
Getting Started in Satellites
Getting Started in VHF
Getting Started in Packet
Order VHFDVD ~~$24.95~~ $18.00

Any 2 Paks only $35.00 3 Paks only $52.00

Nifty E-Z Guide to PSK31Operation

A Complete PSK31 Operating Guide!

Using DigiPan software as a basis, a detailed step-by-step approach is used for configuring your interface hardware, software and computer system for PSK31 operation. Detailed instructions and computer screen shots are provided for several Windows operating systems.

6 X 9 Paperback $12.95

33 Simple Weekend Projects

by Dave Ingram, K4TWJ

Do-it-yourself electronics projects from the most basic to the fairly sophisticated. Practical tips and techniques on creating your own projects.

6 X 9 Paperback $17.95

Shipping & Handling: U.S. add $7 for the first item, $3.50 for the second and $2 for each add'l item. FREE shipping on orders over $100 to one U.S. address. CN/MX-$15 for 1st item, $7 for 2nd and $3 for each add'l. All Other Countries-$25 for 1st item, $10 for 2nd and $5 for each additional. Buy Both=single item!

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

***Call:* 1-800-853-9797 • *Fax:* 516-681-2926 • *website:* www.cq-amateur-radio.com**

dx

BY CARL SMITH,* N4AA

Contest/DX Expeditions!

Wow! Where did all that propagation come from? What a great contest season we're having so far. The CQ WW DX SSB Contest the end of October was the last event prior to this writing, so I can only comment on that one, but what a weekend it was. Conditions on 10 meters were like nothing I've heard in years—long, deep into Asia almost all weekend long and the signals from Europe were S-meter bending. It's been so long since I've heard signals like that … my ears are still ringing. The "big guns" running multi-multi reported QSO numbers on 10 meters in excess of 3000. When's the last time you saw those kind of numbers? Unreal but thrilling! It wasn't only 10 meters either. The 15-meter numbers were almost as good, if not better, and the old standby—20 meters—well, it was 20 meters.

The QRM on 40 was so bad I had to give up. My ears just couldn't stand it … hi.

WW SSB Contest DXpeditions

DXpeditions all over during the week before and after the WW SSB contest made it really fun to be on the air.

The T32C DXpedition had just ended with a record-breaking 213,000 QSOs. Next we had the TX operation from French Polynesia and then from Marquesas. South Cook must have had a "brown-out" from all the activity going on down there during the contest. At least three different operations were heard on the air that weekend.

Africa was not to be outdone for contesters. At least 15 operations were on the air from various parts of Africa. Asia was well represented as well, with at least 23 different operations.

Stations all over Oceania were very active, some 13 announced and a number of others actually heard or worked. Then there were all those Caribbean operations and many South American stations, too.

If you were on the air and didn't add at least a few to your countries (entities) count, well… they were there, unless you've worked them all anyway. It was a lot of fun for most of us for sure. Now for the CW leg of the CQ WW coming up the end of November.

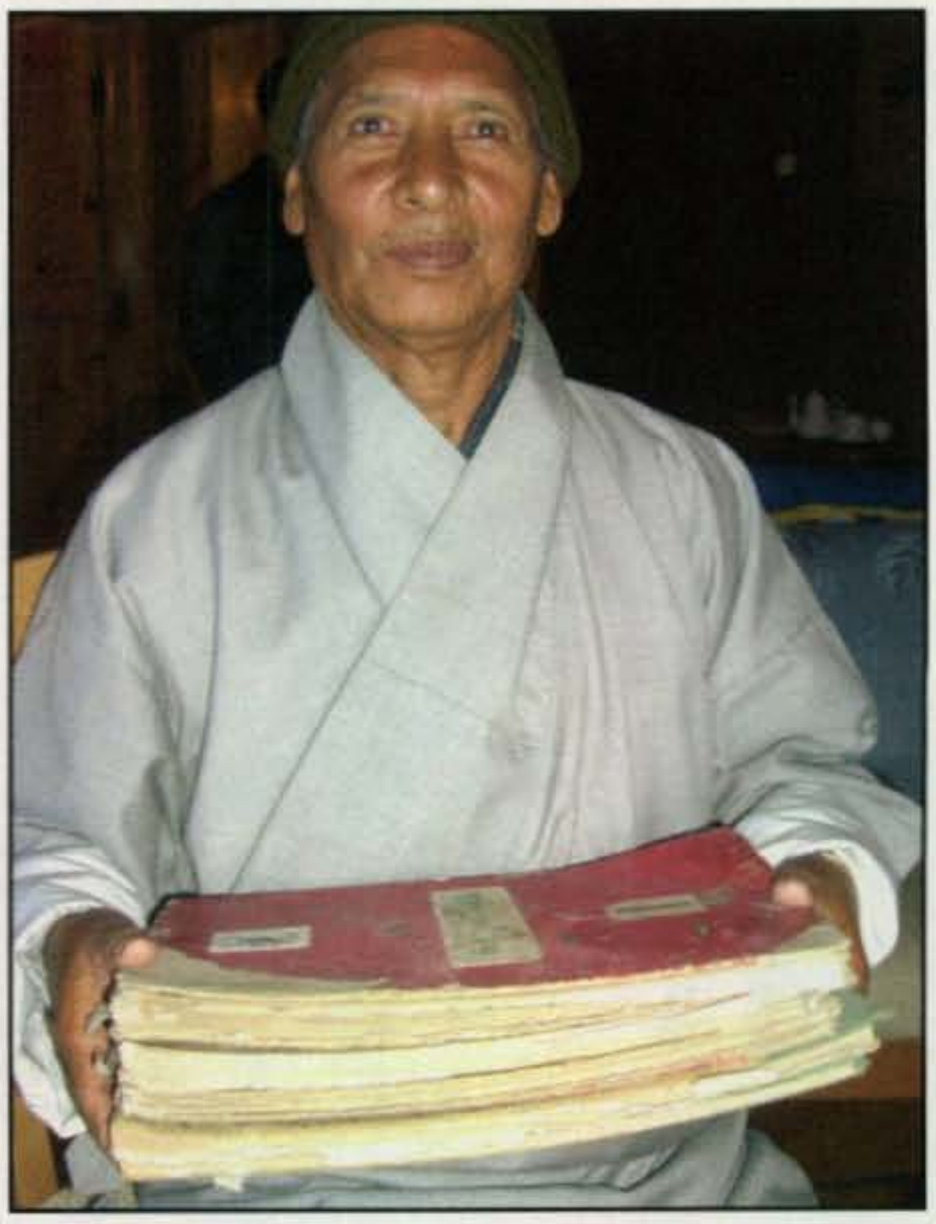
Upcoming Activities

This is the DX column, so I better continue on with that. We have a number of DXpeditions scheduled for the next few months, and there are always those short ones for the contest weekends all the way to the end of May.

9N7MD–Nepal was ready for action the last two weeks of November by a major DXpedition team.

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

Working T32C on all 32 of the possible bands/modes was a real challenge. No one actually achieved that level, but Dave, K4SV, tried hard to reach it. He did manage to make 27 of those contacts. Here's his latest antenna project, a SteppIR DB-42 array at around 90 feet. (Photo courtesy of K4SV)



Pradhan, A51PN, with his paper logs of some 30,000 contacts between 1972 and 1983. Glenn, WØGJ, was in Bhutan the end of October and met Pradhan, who handed over those paper logs to him. (Photo courtesy of WØGJ)

They were scheduled for two weeks of activity.

CYØ–Sable Island will see another DXpedition December 28, 2011 to January 6, 2012. Murray, WA4DAN, will team up with Ron, AA4VK, and Jeff, N1SNB, for a week. Randy, NØTG, had been planning to go back later in the year, but the opportunity presented itself and Murray and friends will take advantage of it. Randy won't be able to go on this one. Murray said they would make the most of the propagation on 10 meters and have two stations on that band as much as possible.

ET–Ethiopia ... A team headed by David, K3LP, is scheduled to be in the country December 8–13. The four-mem-

5 Band WAZ

As of November 1, 2011, 857 stations have attained the 200 zone level and 1748 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):

N7US, 199 (18)
N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40)
IK1AOD, 199 (1)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
RU3FM, 199 (1)
N3UN, 199 (18)
W1FZ, 199 (26)
SM7BIP, 199 (31)
N4NX, 199 (26)
EA7GF, 199 (1)
JA5IU, 199 (2)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
N5AW, 199 (17)
JH7CFX, 199 (2)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10)
RX4HZ, 199 (13)
S58Q, 199 (31)
G3NKC, 199 (31 on 10)
K8PT, 199 (26)
N8AA, 199 (23)
HB9ALO (1)
IZ1ANU, 199 (1)
IN3ZNR, 199 (1)
K2FF, 198 (18, 23)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
F5NBU, 198 (19, 31)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W9RN, 198 (26, 19 on 40)
W5CWQ,198 (17, 18)
I5KKW, 198 (31&23 on 20)
UA4LY, 198 (6&2 on 10)
IK4CIE, 198 (1, 31)
JA7XBG, 198 (2 on 80&10)
JA3GN, 198 (2 on 80&40)

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

DS4DRE (156 zones)

5 Band WAZ updates:

K1BD (191 zones)
I5KKW (200 zones)
N4GG (197 zones)
K9MM (196 zones)
K6ZZ (196 zones)

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WAZ Program

17 Meters CW

82 ..... WD5DBV

160 Meter Updates

WK3N ..... 40 zones
K4IQJ ..... 38 zones

All Band WAZ

Mixed

8837 ..... WXØV
8838 ..... EA1AR
8839 ..... JHØJVA
8840 ..... KBØEO

SSB

5186 ..... IK2RPE
5187 ..... WA7SRZ
5188 ..... EA3CJU

CW

651 ..... JR2BYJ
652 ..... ON6KE

RTTY

217 ..... K3GP

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, P.O. Box 449, Wiggins, MS 39577-0449. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

CQ DX Awards Program

SSB

2571 ..... K7CU
2572 ..... JA1RUR
2573 ..... SV8PKI
2574 ..... K5JMB

CW

1124 ..... K7CU
1125 ..... K6YK
1126 ..... N3KEM

RTTY

56 ..... UT2AB

RTTY Endorsement

200 ..... YO6HSU

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604. We recognize 342 active countries. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.

Glenn Johnson, WØGJ, has been to Bhutan several times. He went again in October with this "Minnesota Team." Left to right: Ralph Fedor, KØIR/A51IR; Sandy Fedor; Vivien Johnson, KL7YL; Glenn Johnson, WØGJ/A51B; Gena Cahill; Pat Cahill, WØBM/A51BM. (Photo courtesy of Scott, KØMD)

ber team will be operating but also conducting exams to hopefully increase the population of licensed hams in Ethiopia. They will also install and leave behind antennas, a radio, and an amplifier.

HKØ–Malpelo is going to be "invaded" by a team of DXpeditioners the end of January. An "inspection team" went there for a preliminary check of the island in October just so they would know what they would be facing when the whole team arrived. Plans can now be "tweaked" and solid planning can take place. This one has seen very little CW/digital activity in many years, so we are looking forward to a really serious effort by the team to work those modes.

CD5546 on The Air

"CQ CQ CQ this is CD5546, over." Would you answer that call on 20 or 15 meters? That's a very strange call to be heard on the ham bands, right? Well, folks, it is legal and here's the story behind it.

It seems that Tony, EA7AQH, retired and moved from Spain to Chile. He operated for a few years as CE/EA7AQH but then decided as a citizen of Chile he should have a Chile license. When he applied for a license, he got one… a *Novice* license and a *Novice* callsign. Yes, CD5546 is the call he was assigned. So if you should hear this call for the next 1 1/2 years, be assured that it is not a pirate operating on the ham bands. Give Tony a call and enjoy the QSO. He will, for sure.

VO2FF Silent Key

In the November column I had a story about Mike, KQØB, and his effort to work someone in Zone 2. He finally made it by working Daniel, VO2FF, back in July. Mike just reported that VO2FF recently became a Silent Key, making that QSO even more memorable. Mike says: "VO2FF passed away last weekend suddenly. I was really shocked when VO2NS contacted me and told me of the news. Daniel is the ham who gave me my last zone on 10 meters (Zone 2). He is the one mentioned in the "DX" column of the November issue of *CQ* magazine. I am glad I had the opportunity to know Daniel and I am equally glad that I sent my write-up of the article to him on October 5."

Last month I mentioned Silent Keys, not knowing I would be talking about it again this month. Daniel was one of those I didn't know other than his call and where he was located. It seems there are a lot out there we only know by their call and where they are. Do we spend too much time with "599 xx" that we don't get to know the other guy? Give that some thought while you're enjoying family and friends over the holidays.

LoTW

The STØR QSL cards were very popular the end of October and early November. The confirmations were so popular, in fact, that the ARRL's DXCC desk offered a special deal using LoTW (Logbook of The World) to handle the onslaught. Apparently it worked and it helped the staff get through that period without too much difficulty.

In addition, just after the CQ WW SSB Contest weekend so many contesters jumped in to upload their logs to the LoTW that it was on the verge of crashing. The ARRL put out this message: "Due to a large number of radio amateurs uploading their logs to Logbook of

The WPX Program

SSB

3106	SM7ZDC	3108	WU1U
3107	NØAZZ	3109	W4TTO

Mixed

2170	W4QK	2172	NA5DX
2171	WU1U		

CW: 2750 IØNNY. 5900 K2VV.
SSB: 350 W4TTO. 450 WU1U. 600 N3ALN. 650 EA3FYD. 5100 K2VV.
Mixed: 500 WU1U. 600 NA5DX. 700 N3ALN. 1750 DL1ECG. 6750 K2VV.

160 Meters: DL1ECG
12 Meters: JA7OXR
10 Meters: JA7OXR

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, NN1N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, TF8GX, S58MU, UX1AA, AB1J, DM3FZN, AG4W, UA3QNS, RX3AGD.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, N3XX, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, NN1N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UR5FEO, N3RC, UT3IZ RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, S58MU, UX1AA, DM3FZN, AG4W, UA3QNS, RX3AGD.

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 CQ DX Field Award Program

SSB

73 ..... KØKG

CW

63 ..... PAØQRB

MIXED Endorsements

244 ..... W1CU

SSB Endorsements

224 ..... W1CU

CW Endorsements

233	W1CU	100	YO6HSU

Digital Endorsements

174	W1CU	3.5/7 MHz	JN3SAC
100	YO6HSU/105		

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604 USA. Please make all checks payable to the award manager.

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

6469 9A2AA	4229 I2MQP	3773 IK2ILH	3104 K9UQN	2428 N6QQ	1862 VE9FX	1322 AA4FU	723 KØDAN	620 PI4DHV
6122 K2VV	4201 KF2O	3762 WB2YQH	3091 9A4W	2338 I2EAY	1818 KX1A	1269 K5WAF	707 W1/E74OF	616 DL5JH
5784 W1CU	4158 N6JV	3474 SM6DHU	3007 W2WC	2292 AB1J	1727 N3RC	1116 YU7FW	682 AI8P	600 IK1RKN
5303 9A2NA	4129 S58MU	3386 N8BJQ	2922 OZ1ACB	2116 AE5B	1667 SQ7B	1066 JA1CKE	662 JA7OXR	600 KB9OWD
5013 EA2IA	4101 WA5VGI	3305 JH8BOE	2559 W3LL	2192 N2SS	1655 SV1DPI	976 KM6HB	653 KK3Q	
4785 N4NO	4078 KØDEQ	3238 K1BV	2544 W6OUL	2106 KØKG	1593 S55SL	964 K8ZEE	650 N3YZ	
4399 YU1AB	4022 N9AF	3231 W2OO	2530 YO9HP	2084 WD9DZV	1462 DL4CW	815 KL7FAP	649 RA9OO	
4344 VE3XN	4005 W9OP	3207 W9IL	2499 VE6BF	1971 W2FKF	1446 DF3JO	781 V51YJ	647 PAØQRB	
4290 I2PJA	3967 ON4CAS	3116 JN3SAC	2493 I5RFD	1936 AG4W	1383 IWØHOU	726 K5IC	644 KWØH	
4250 S53EO	3892 YU7BCD	3105 KC9ARR	2476 K5UR	1905 W7CB	1337 K6UXO	725 WK3N	636 ZS2DL	

SSB

5169 IØZV	3387 KF2O	2726 WA5VGI	2288 W3LL	2093 W2WC	1782 W6OUL	1463 I2EAY	1031 IK8OZP	717 KØDAN
4663 K2VV	3323 OE2EGL	2711 LU8ESU	2275 IK2DZN	2076 K2XF	1776 JN3SAC	1410 S55SL	1022 NW3H	640 UA9YF
4606 VE1YX	3259 CT1AHU	2595 EA1JG	2271 SV3AQR	1986 DL8AAV	1719 K9UQN	1386 IK4HPU	1012 KU4BP	637 K5WAF
4584 F6DZU	3108 I4CSP	2497 S58MU	2224 N8BJQ	1971 W2FKF	1623 VE9FX	1377 EA3NP	1117 WD9DZV	600 WA2BEV
4567 OZ5EV	3047 KØDEQ	2471 I3ZSX	2209 IK2QPR	1935 SV1EOS	1612 AG4W	1258 N1KC	978 EA7HY	
4238 I2PJA	3022 I8KCI	2459 W2OO	2201 NQ3A	1927 AE5B	1611 W2ME	1146 SQ7B	965 VE6BF	
4208 9A2NA	2903 IN3QCI	2451 EA3GHZ	2107 N6FX	1889 N6QQ	1561 PT7ZT	1145 EA3EQT	883 WA5UA	
3962 I2MQP	2857 4X6DK	2417 SM6DHU	2099 KI7AO	1879 K3IXD	1534 AE9DX	1089 IZ8FFA	875 K7SAM	
3741 EA2IA	2779 YU7BCD	2333 W9IL	2098 K5UR	1844 YO9HP	1480 AB5C	1083 KX1A	758 IV3GOW	
3557 N4NO	2761 KF7RU	2326 CX6BZ	2094 I8LEL	1825 KQ8D	1464 VE7SMP	1042 IZØBNR	724 W3TZ	

CW

5464 K9QVB	3750 VE7CNE	2914 SM6DHU	2647 IØNNY	2342 N6FX	1665 YO9HP	1220 AA4FU	813 VE9FX	600 IK2SGV
5452 WA2HZR	3722 9A2NA	2884 I7PXV	2632 W2ME	2182 W9HR	1548 WD9DZV	1210 DL4CW	794 LA5MDA	
5428 K2VV	3676 S58MU	2774 N8BJQ	2502 JA9CWJ	2178 I2MQP	1461 WO3Z	1160 AA5JG	753 F5PBL	
4316 N4NO	3560 WA5VGI	2730 IK3GER	2473 OZ5UR	2010 K5UR	1445 EA2CIN	1125 IØWOK	749 AE5B	
4182 N6JV	3379 KØDEQ	2723 EA7AZA	2434 W9IL	1990 W6OUL	1424 N6QQ	1145 VE1YX	732 SQ7B	
4024 LZ1XL	3145 W8IQ	2721 K9UQN	2424 W2WC	1983 EA7AAW	1336 WA2VQV	1102 IT9ELD	695 S55SL	
3918 VE7DP	3132 KF2O	2701 JN3SAC	2373 VE6BF	1848 I2EAY	1312 K6UXO	1049 K5WAF	629 IV3GOW	
3780 EA2IA	3046 YU7BCD	2692 KA7T	2365 W2OO	1827 AC5K	1223 KX1A	821 HB9DAX	615 JH6JMM	

DIGITAL

1534 W3LL	1133 N6QQ	1056 WD9DZV	1009 GUØSUP	866 SQ7B	800 KF2O
1312 N8BJQ	1066 YO9HP	1049 W2OO	894 AG4W	836 KØDEQ	

The World (LoTW) after last weekend's CQ World-Wide SSB Contest, the ARRL's online QSL verification service is expe-riencing delays. According to ARRL IT Department Manager Michael Keane, K1MK, there is about a 33 hour wait for logs to be processed."

"Logs are processed in the order in which they were received," he explained. "If you have uploaded your log to LoTW, your log is currently queued for processing. It has not been lost in the system. Uploading your log multiple times will only further delay your log and those of others to be processed."

Thankfully this problem didn't last too long once the word got out and things settled down.

Bhutan

On the first page of this column there is a photo of Pradhan, A51PN, with his paper logs of some 30,000 contacts between 1972 and 1983. Glenn Johnson, WØGJ, was in Bhutan the end of October and met Pradhan, who handed over those paper logs to him. Glenn says he will be able to answer QSL requests for anyone needing a card for A51PN. Please send your request to the Callbook address of WØGJ, and don't forget the SAE and sufficient postage. Glenn added, "Pradhan has meticulous notes in his logs about QSLs that were returned."

Glenn plans to digitize and upload the logs to LoTW, but it will take a bit of time for 30,000 QSOs.

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

73, Carl, N4AA

Masao, JE1LGY/ZP7, visited Doug, ZP6CW. Masao is a medical volunteer working in the interior of Paraguay. Masao told Doug that Doug was "very famous in Japan." Masao took many photos of Doug, his shack, and his big log periodic antenna. (Photo courtesy of ZP6CW)

Lot, DJ7ZG, and Babs, DL7AFS, have traveled allover the world and worked many DXers from islands and countries everywhere. Here they proudly hold their respective #1 DXCC Honor Roll plaques. They were on Cocos Keeling as VK9CX as this was written in early November.

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604.

Mixed

K2TQC	272	W6OAT	213	NI6T	193
W1CU	244	VE3ZZ	207	N4NX	192
HAØDU	240	JN3SAC	207	ON4CAS	191
VE7IG	239	HA5WA	206	HA9PP	190
VE3XN	234	F6HMJ	206	BA4DW	188
HA5AGS	228	KF8UN	205	HB9DDZ	188
9A5CY	227	OK1AOV	205	K2AU	183
N8PR	223	RW4NH	203	K2SHZ	182
HA1RW	220	N4MM	202	K1NU	180
HA1AG	218	W4UM	202	W5ODD	177
KØDEQ	216	IV3GOW	201	NØFW	176
K8SIX	215	K8OOK	196		

SSB

W1CU	224	VE7SMP	190	JN3SAC	177
W4ABW	202	N4MM	186	NØFW	176
KØDEQ	192	W4UM	184	DL3DXX	175

CW

DL6KVA	233	JN3SAC	202	N4MM	179
W1CU	233	W4UM	197	N4NX	177
DL2DXA	209	OK1AOV	196	N7WO	175
KØDEQ	207	HB9DZZ	186		
DL3DXX	203	OK2PO	184		

QSL Information

GØANA via GWØANA
G1RCV via G4DFI
G1T via MØSCG
G3RCV via G4DFI
G3RCV/P via G4DFI
G3XAQ/6Y5 via G3SWH
G4AKC/SV8 via G4AKC
G5ASE via DL1DA
GAØFGI via GMØFGI
GAØNBM via GMØNBM
GA2MP via N3SL
GA3YOR via GM3YOR
GA3YTS via GM3YTS
GA4FDM via GM4FDM
GA4YMM via GM4YMM
GBØBME via G7WAW
GBØGRA via MØJHW
GBØHDX via MØJHW
GBØMPA via GWØANA
GBØU via GWØANA
GBØYEZ via G4PLY
GB100BP via GWØANA
GB100EGL via GWØANA
GB100FI via GWØANA
GB100LP via GWØANA
GB100SFL via GWØANA
GB111HP via G4PLY
GB150VC via G4DFI
GB1CPB via G5XW
GB1DLH via GB6BSR
GB1OL via MM5DWW
GB1TT via MØXIG
GB1WT via MØXIG
GB200HNT via GWØANA
GB200T via G4DFI
GB2ADU via GW4XKE
GB2BF via G4DFI
GB2FB via G4DFI
GB2HLB via GM3WUX
GB2MS via MØPAI
GB2MWT via MØXIG
GB2OH via MØCNP
GB2PBL via G5XW

(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>.)

GEORGE TRANOS,* N2GA

Tips for Contesting During Periods of High Solar Activity

With ever-increasing predictions for higher solar activity in sunspot Cycle 24, contesters are adjusting their plans to cope with change. It seemed to take quite a while to rise up from the sunspot minimum. Now that better conditions have arrived, it is important to think of ways to take advantage of the higher solar flux and maximize your score.

"I will be spending lots more time on 10 and 15 meters in order to maximize my QSO and multiplier totals," says Ted Console, K2QMF, from New York. "This, however, requires some additional understanding of propagation and MUF (maximum usable frequency) in order to determine the best times to be on these bands for highest QSO rates."

Other contesters agree that the higher bands will be the place to be. "Clearly, one has to spend more time working on making sure the high-band antennas work," says Dennis McAlpine, K2SX, from South Carolina. McAlpine adds, "However, the contrarian might say that poorer antennas will work better in higher SFI (solar flux Indices) as you need less signal if the SFI is up, so the place you need the better signal is the low bands rather than the high bands because you will need more signal to get through."

With more contesters flocking to the high bands, Mike Lisenco, N2YBB, of Brooklyn, New York is thinking of ways to make his signal stand out from the crowd. "Believe it or not, I'm thinking about running high power instead of my usual low power entry," says Lisenco. "You would think that I would be better off the other way around as conditions are better. But to me it seems that the better band conditions will bring more operators to the contest and allow for better DXing. As a result, I think that the added gain of 1KW over 100 watts will allow me to be heard against the increased activity."

Paul Young, K1XM, from Massachusetts says, "I may get on a bit more from home in minor contests, but overall my plans have not changed. I'll still be out of the U.S. for the CQ WW CW, and maybe for CQ WW SSB."

Hams who have lived through the ups and downs of the sunspot cycle realize that band plans will change with activity levels. Higher sunspots will allow ten and fifteen meters to be open longer to many parts of the world. This will allow multiple high bands to be open at one time leading to a choice of frequencies for all operators. With less crowding, people can spread out more over the band, leading to fewer frequency fights and generally easier signal readability. The result will be higher scores and more fun for all.

*P.O. Box 657, Copiague, NY 11726
e-mail: <n2ga@cq-amateur-radio.com>

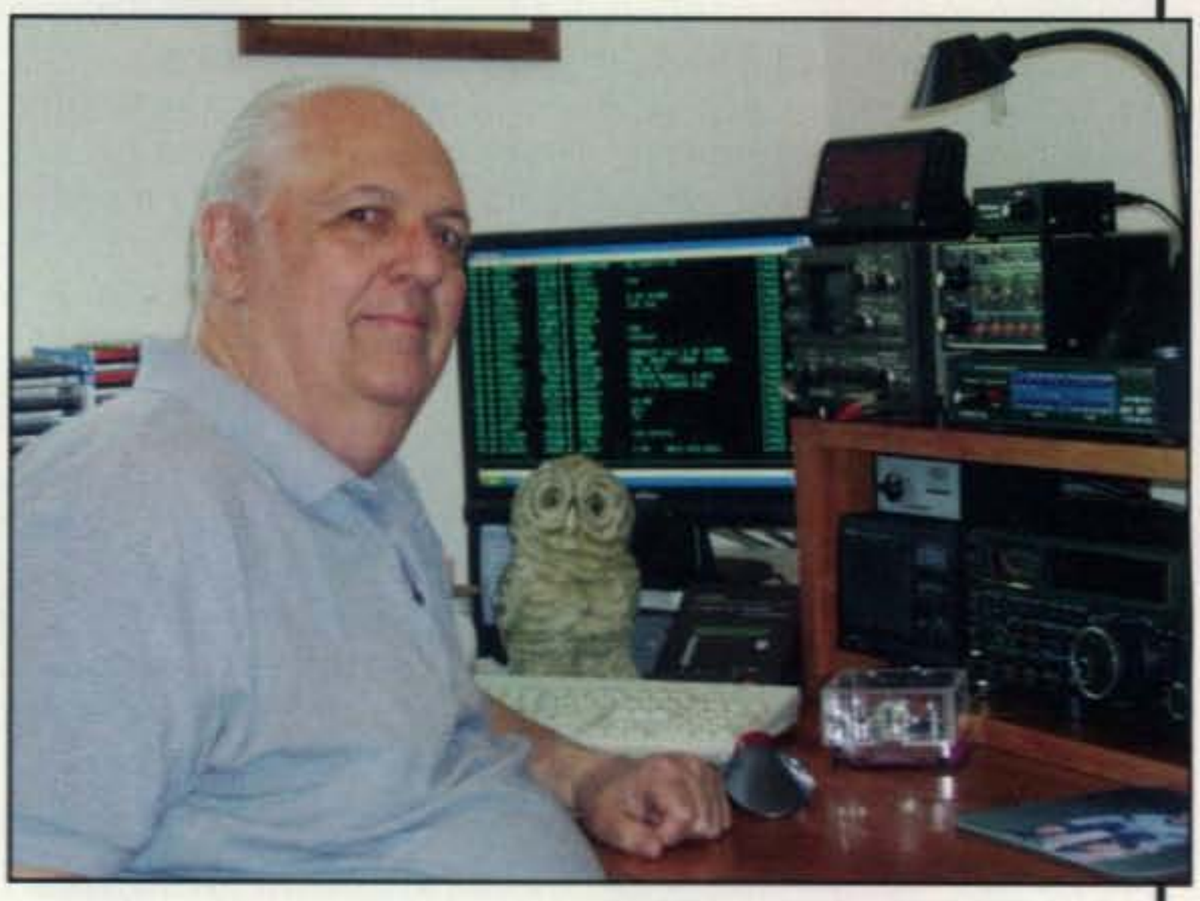
Calendar of Events

All year	**CQ DX Marathon**
Jan. 1	SARTG New Year RTTY Contest
Jan. 7–8	ARRL RTTY Roundup
Jan. 8	DARC 10-Meter Contest
Jan. 14–15	Hunting Lions in the Air
Jan. 14–15	North American CW QSO Party
Jan. 21–22	Hungarian DX Contest
Jan. 21	LZ Open Contest
Jan. 21–22	BARTG RTTY Sprint
Jan. 21–22	North American SSB QSO Party
Jan. 27–29	**CQ WW 160M CW Contest**
Jan. 28–29	REF CW Contest
Jan. 28–29	UBA SSB Contest
Feb. 4	Minnesota QSO Party
Feb. 4–5	Delaware QSO Party
Feb. 5	North American CW Sprint
Feb. 11–12	**CQ WW RTTY WPX Contest**

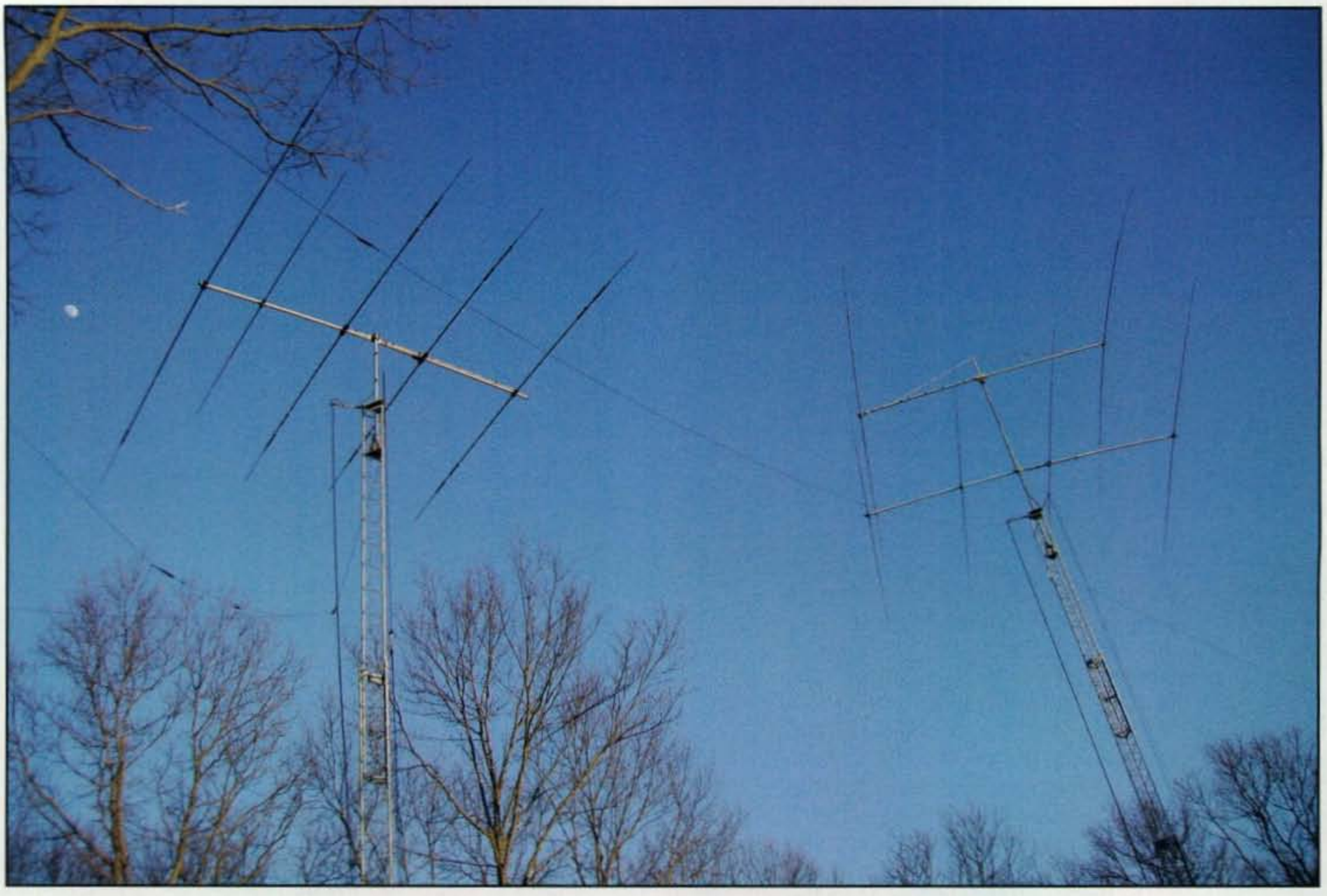
For direct links to the rules pages for these contests, see the current issue highlights page on the CQ website at <http://www.cq-amateur-radio.com>.

Good Conditions Last Fall

This past fall's great solar conditions led to greater activity and higher scores in the big contests. The October CQ World-Wide DX SSB Contest was a great example, with 10 meters wide open to many areas of the world. Activity there started at 28.300 MHz and went all the way up to and over 29 MHz!



Ted Console, K2QMF, in his well-equipped shack on Long Island, New York. (Photo courtesy K2QMF)



Two towers are part of the K2QMF antenna farm. (Photo courtesy K2QMF)

Many contesters noted that there was no one good spot to be, that anywhere on 10 meters was a good spot. On the east coast of the US, 10 stayed open well after darkness fell with many Japanese, Chinese, and southeast Asian stations worked during that time.

When this column was written, ARRL Sweepstakes CW had just finished with great activity in the U.S. and Canada. Assuming similar conditions, the upcoming CQ WW DX CW Contest shows all indications of possible record-breaking scores and activity. The ARRL 10-Meter contest should also see better results with higher totals all around.

The Downside of Higher Solar Activity

Higher solar flux can generate coronal mass ejections (CMEs) and solar flares. Solar flares can disrupt communications and even affect electrical systems. These bursts of solar energy occur in active solar regions around sunspots. According to Wikipeida, "Flares are powered by the sudden (timescales of minutes to tens of minutes) release of magnetic energy stored in the corona. The same energy releases may produce coronal mass ejections (CME). X-rays and UV radiation emitted by solar flares can affect Earth's ionosphere and disrupt long-range radio communications. Direct radio emission at decimetric wavelengths may disturb operation of radars and other devices operating at these frequencies."

Scientists are now predicting the peak of Cycle 24 to be in 2013. Until then we can expect a continuing number of solar flares and CMEs. While ionization of the Earth's atmosphere is necessary for long-range HF communication, disruptions can occur when flares or CMEs affect the Earth's magnetic field. A side effect can be the beautiful "northern lights" or aurora. This natural light display is normally prevalent at higher latitudes but can migrate towards the Earth's equator with higher levels of solar activity and stronger solar storms.

Propagation Changes

As solar flux goes higher, ten and fifteen meters become the "money bands" during the daytime hours. Look for openings where both ends of the path are in daylight and especially strong openings along the gray line. Signals tend to appear stronger during twilight as the sun is no longer ionizing the *D*-layer of the ionosphere closest to the Earth. Since this layer absorbs radio frequency energy, once it begins to disappear it will allow more signals to pass through it. Since the higher *E*- and *F*-layers are still being hit by sunlight, these layers continue to refract radio waves during twilight, causing a seeming strengthening of signals. Evening gray line can create strong signals on ten meters from the west causing, for example, Japanese stations to pop out of the noise on the U.S. east coast. Since the MUF is low in the morning, the gray line then normally does not support 10-meter propagation but may work well for 20 meters (or even 15 meters if it is open). Morning gray line also can work well on the lower frequencies such as 40 and 80 meters since the absorption is lower then, as well.

Twenty meters will also be alive with unusual nighttime openings when the solar flux is high. Look for signals over the pole when there are no solar storms. For the U.S. east coast, this means sig-

nals into Siberia, southeast and south Asia. Long-path openings may also be prevalent during these times. A knowledge of propagation at the peak of the sunspot cycle can yield many new multipliers that will go a long way to increasing your contest scores.

Activity is Good and Bad

With more sunspots comes increased band activity. This may create situations in which pile-ups develop. Try to listen first before calling and do not call if you cannot hear the transmitting station. Also, try to avoid being an alligator with a big mouth and no ears—incessant calling without listening just creates noise and makes it more difficult for the station working down the pileup to be efficient. Do not send your call again if a partial callsign is sent and it is not part of your call! Considerate operating goes a long way to making it easier for everyone to work the needed multiplier.

Be aware of "contest free" zones and avoid these frequencies. The biggest complaint heard about contests is the disruption that they cause to the bands when they are occurring. This is especially true during the "big" DX contests like CQ World-Wide DX and the ARRL DX contests. While it is true that some people may never be happy, it is important that we are considerate of others who do not share our passion. This includes individual stations looking for casual contacts as well as net operations. While no one person has the right to any frequency, consider the consequences of politely responding to stations asking for use of a certain frequency at a specific time. You may be able to put a few of those stations in your log if you ask them for a contact in exchange for moving off frequency. When this occurs, everyone gets what they want and you become a goodwill ambassador for contesters everywhere.

Considerate operating also includes listening before calling CQ. Nothing is more annoying than having someone CQ right on your frequency, interrupting a QSO in progress. Some of the biggest offenders can be big-gun contest stations who should know better. Of course, the heat of battle, fatigue, and confusion can cause mistakes to be made. However, intentionally transmitting without listening first and asking if the frequency is in use is just poor operating practice and can make enemies both inside and outside the contest community.

Dennis McAlpine, K2SX, at his South Carolina station. (Photo courtesy of K2SX)

Take Advantage of the Great Conditions

Now is the time to get on the bands and make the sunspots work for you. As many an oldtimer has said, "there are no meters like ten meters" and that is so true at the peak of the sunspot cycle. If you are into DX, it's much easier to work it on 10 meters. The band tends to be directional and sometimes you'll only work stations in one small area. This can work to your advantage as you might be the only one who has a strong signal there. If there are multipliers in that area, you'll be in luck and will have an easy pick of them.

The contest season is still mostly ahead of us with the CQ WPX and ARRL DX contests upcoming this winter and early spring. Check solar conditions and get on the air and check out 10 and 15 meters when the solar flux is high. You'll be glad you did.

I wish you all the best for a happy and healthy 2012! I hope to CU on the air on 10 meters this year!

73, George, N2GA

propagation

BY TOMAS HOOD,* NW7US

Solar Cycle 24 Finally Active in 2011

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, October 2011: 88
Twelve-month smoothed, April 2011: 42

10.7 cm Flux
Observed Monthly, October 2011: 137
Twelve-month smoothed, April 2011: 100

***Ap* Index**
Observed Monthly, October 2011: 7
Twelve-month smoothed, April 2011: 8

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, October 2010: 24
Twelve-month smoothed, April 2010: 14

10.7 cm Flux
Observed Monthly, October 2010: 82
Twelve-month smoothed, April 2010: 78

***Ap* Index**
Observed Monthly, October 2010: 6
Twelve-month smoothed, April 2010: 6

Moderate 2011 CQ WW SSB Contest Conditions

The 2011 CQ World-Wide DX SSB Contest weekend of October 29–30 started off with great geomagnetic activity conditions. Geomagnetic activity was very quiet, making for a very stable ionosphere. Sunspot counts were incredible, though! On the first contest day the sunspot count was 73 (compared to a year ago, when the count was 32 on both days). The 10.7-cm solar flux index was 123 and 127, compared with last year's 85 and 81. All of the HF contest bands were usable, including 10 meters! The contest yielded great results for most every participant, compared with the last several years.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for January 2012

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-8, 10-13, 16-20, 24-31	A	A	B	C
High Normal: 9, 21	A	B	C	C-D
Low Normal: 23	B	C-B	C-D	D-E
Below Normal: 14-15, 22	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 2 will be good (B) on January 1–8, fair (C) on the 9th, good (B) on the 10–13, 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.

A significant number of sunspot cycle records were made during the second half of 2011 as solar Cycle 24 rapidly increased in sunspot activity. For instance, on August 9, 2011, the most powerful x-ray flare so far recorded during the new cycle was measured at a peak of X6.9, originating from active sunspot region 1263. The movie at <http://g.nw7us.us/vUzvvz> reveals a powerful release of energy that pulses with light. The event released x-ray, extreme ultraviolet, and radio energy that resulted in an R3-level radio blackout, and a Type-II radio burst that was heard on radio receivers.

Table I shows the top ten most powerful x-ray flares so far occurring since the start of Cycle 24. One of these flares, occurring on September 22, peaking at magnitude X1.4, was a stunning show of huge magnetic loops and originated at one of the largest sunspot regions of 2011. You can see this spectacular eruption in various different wavelengths (capturing the Sun and the x-ray flare in various temperatures ranging from 4500 degrees Celsius to more than several million degrees Celsius!) at < http://g.nw7us.us/t8Zcmo>.

The largest active sunspot region of solar Cycle 24 as of press-time (in mid-November) was NOAA Active Region 1339 (which was also the origin of the X1.9-class x-ray flare on November 3, 2011, the fourth largest so far in this cycle), a huge 1400 solar units in size. The active sunspot region 1302, on September 25, was only 1300 solar units in size! The unit of a sunspot area is measured in millionths of the Sun's visible hemisphere; the largest sunspot group on record had an area of 6100 millionths on April 8, 1947.

The highest daily sunspot count so far in the new cycle occurred on November 9, at 208, when the total sunspot area was a huge 2102 solar units, the largest sunspot area yet during this cycle (as of press time). The day with the highest 10.7-cm radio flux reading so far was September 9, 2011, when it reached 190. All of these records come after

*e-mail: <nw7us@nw7us.us>

roughly eight long years since the Sun had the same level of activity.

Good Conditions for 2012

There is no mistaking it, now. The new solar cycle is well under way. The autumn season of 2011 was the most exciting DX season in years. This new year, 2012, promises to be alive with opportunity on all HF bands, as the cycle continues to move toward the solar cycle maximum.

Here is an overview of expected propagation conditions on each amateur band between 6 and 160 meters for 2012.

6 Meters: The steady increase in solar activity had already given hint of life on the "Magic Band" late last year. We should see action on 6 meters not only during the summer tropo and sporadic-*E* season, but increasingly as we move into the year we should see an increase in *F*-region propagation as the 10.7-cm radio flux climbs higher. Of course, aurora will play a role during spring and fall. Meteor-scatter propagation offers an occasional peak in activity, as well. By the end of 2012, we'll see active periods whn the *F*-region becomes the propagation mode for this band.

10 and 12 Meters: These bands will finally be players this year, and not just during times of sporadic-*E* activity. During the first quarter of 2012 these bands will be temperamental. They will become more and more stable and reliable as the cycle moves ever closer to the peak (which is forecast for 2013, but which this columnist expects in 2014 or 2015). Remember, when these bands are open, it does not take a lot of power nor does it take elaborate antenna systems to work DX, because signals are not absorbed by the lower ionospheric regions as much as are signals on lower frequencies, such as on 20 meters, for instance. This year will be exciting for these two bands.

15 and 17 Meters: These bands should be major daytime players. They will remain open for DX an hour or two after dark, and open about an hour or two before sunrise, providing DX into most regions of the world, following the Sun throughout the day. Along with 20 meters, these bands will suffer more during x-ray flares than the higher bands such as 12 and 10 meters.

20 Meters: This band is going to be the 24-hour workhorse band. Expect reliable conditions during the daylight hours, with DX openings possible to many areas of the world throughout the year. DX conditions on this band tend to peak for a few hours after local sunrise and again during the sunset period, but also provide DX via long path and into various regions of the world even during hours of darkness, when the 10.7-cm radio flux is higher. There will be moderate nighttime openings especially during the spring and autumn DX seasons. The only caveat is during geomagnetic storms and x-ray flare activity, when this band suffers.

30 Meters: With Cycle 24 offering more sunspot activity, conditions on this band offer strong openings, especially a few hours before sunset until a few hours after sunrise. In 2012 thirty meters will be an exciting band for those low-power digital signals. Winter brings longer nights, providing the right mix for exceptional worldwide DX.

40, 60, 80, and 160 Meters: These are nighttime DX bands. Great worldwide DX should continue on 40 meters from about

Class	Date (all in 2011)	NOAA Active Region
X6.9	August 9	1263
X2.2	February 15	1158
X2.1	September 6	1283
X1.9	November 3	1339
X1.9	September 24	1302
X1.8	September 7	1283
X1.5	March 9	1166
X1.4	September 22	1302
M9.3	August 4	1261
M9.3	July 30	1260

Table I– The top ten most powerful x-ray flares so far occurring since the start of Cycle 24.

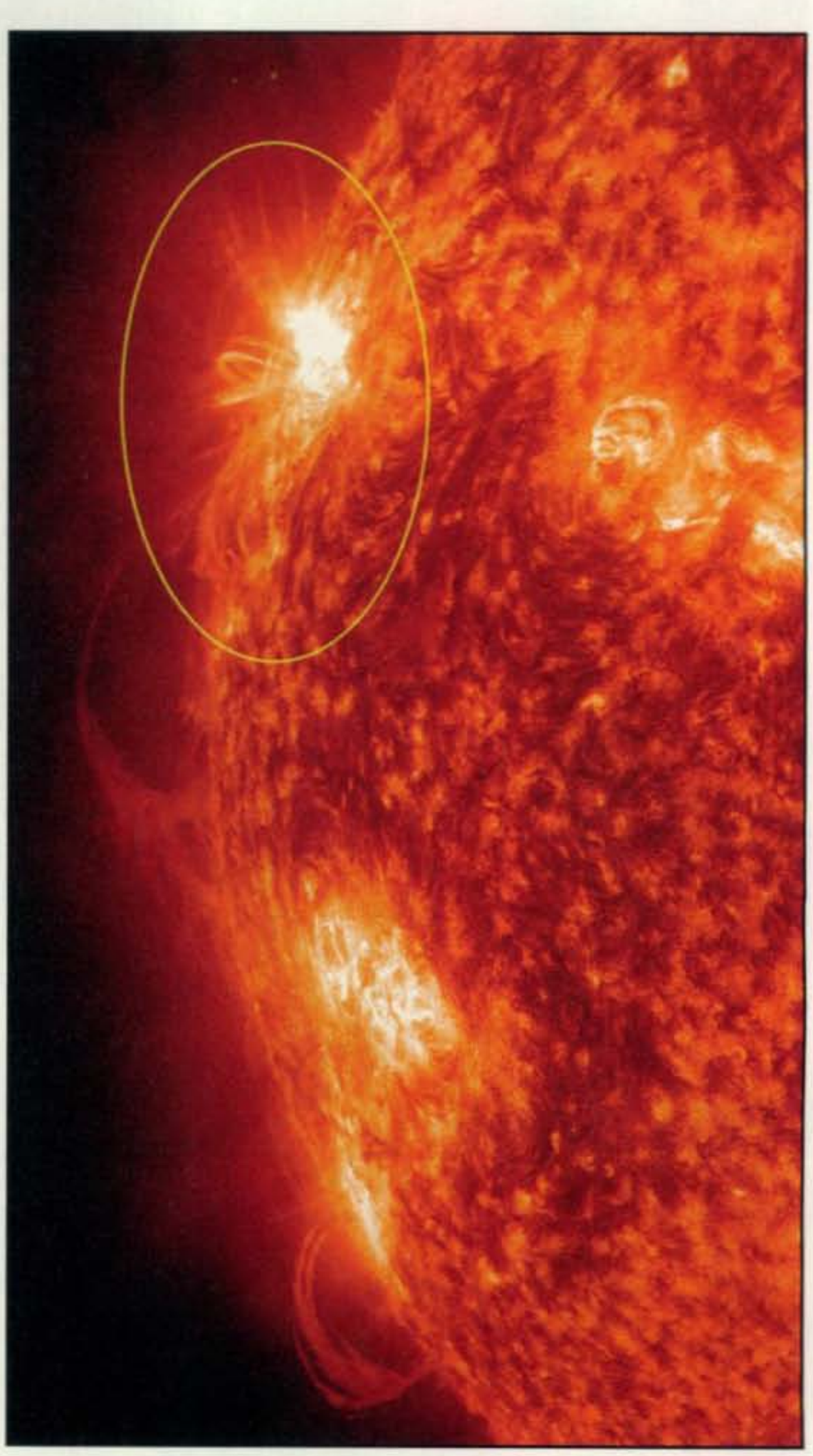


Fig. 1– A magnitude M4.3 x-ray flare is captured by the Solar Dynamics Observatory (SDO) Atmospheric Imaging Assembly (AIA) at 2202 UTC on November 2, 2011. Notice the interaction between the sunspot region where the flare occurs (circled in yellow) and the sunspot region to the south, as seen by a huge arch of solar plasma formed by powerful magnetic field lines. As the final months of 2011 progressed, the Sun unleashed more and more of these M-class flares, and even more smaller, C-class flares, with a few stronger X-class flares thrown in for good measure. (Source: NASA/SDO/AIA)

Fig. 2– The largest active sunspot region yet in Solar Cycle 24 was measured on November 3, 2011, with NOAA Active Region 1339 measuring a massive 1400 solar units in size (see text)! As the region continued to rotate across the solar disc, it helped keep the high frequencies alive with DX, as the 10.7-cm Radio Flux remained in the mid- to upper 100s, and the background hard x-ray flux remained in the high B- to low C-class. Sunspot regions with large spots are not unusual, though most sunspot regions tend to be smaller, with many of them spread out around the solar disc. (Source: NASA/SDO/Helioseismic and Magnetic Imager [HMI])

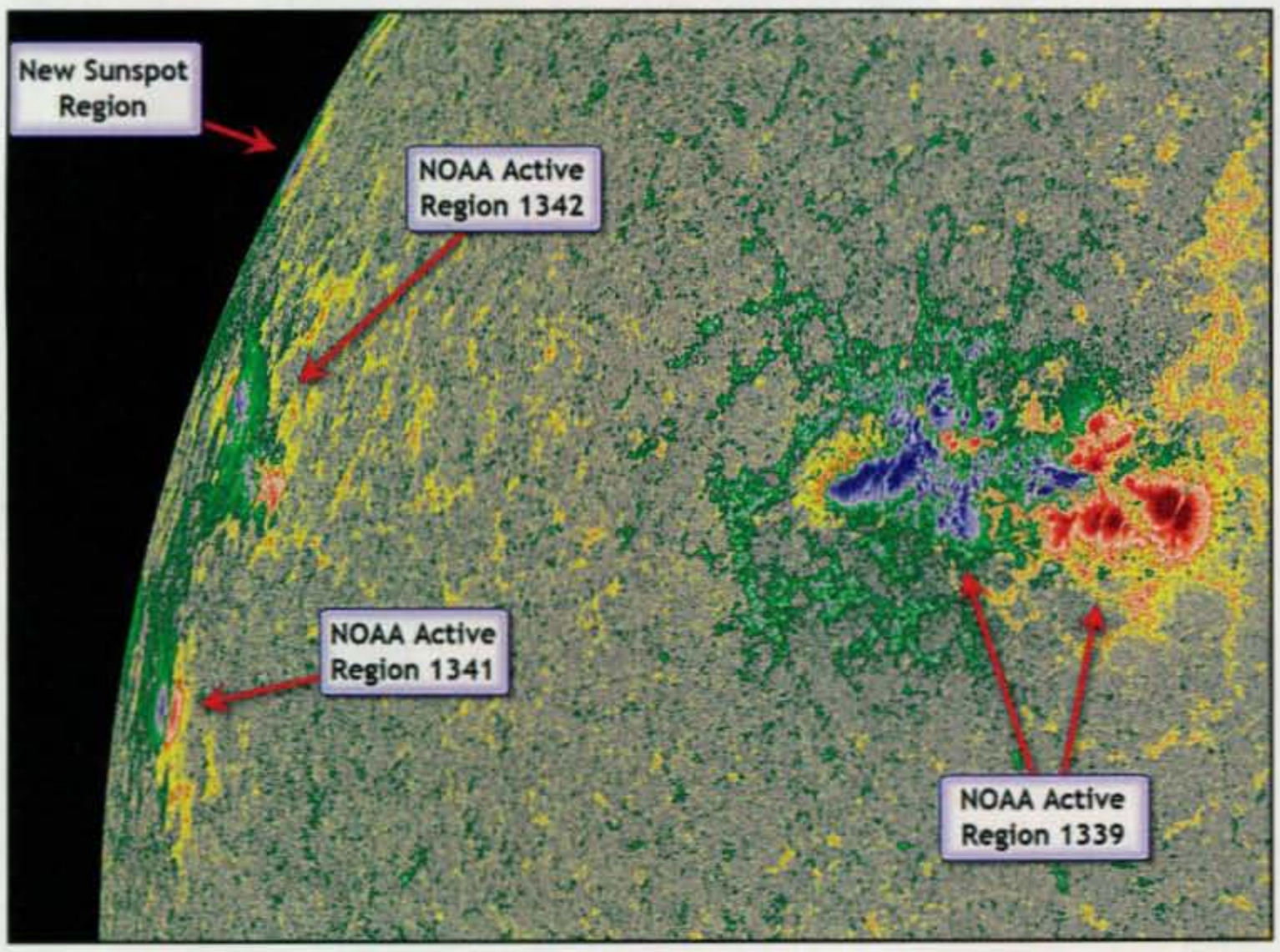


Fig. 3– This is a colorized view of the giant active sunspot region NOAA AR 1339 taken on November 6, 2011. In this HMI Magnetogram, the color red represents a negative magnetic polarity, and blue represents a positive poslarity. The colors green and yellow are a discontinuous color gradient showing lower magnetic field strengths either side of zero. As has been explained in previous issues of this column, sunspot regions have magnetic polarity, at least bipolar, though often more complex with multiple poles, as complex magnetic structures punch through the sunspot region from deep within the Sun, out into the corona, and then back into the Sun either nearby in the same sunspot region, or sometimes, farther away in another sunspot region. (Source: NASA/SDO/HMI)

two hours before sunset to approximately two hours after sunrise during all seasons. Expect coast-to-coast DX in 60 meters. DX openings on 80 and 160 should peak during the early spring, late fall, and winter months. Expect somewhat stronger signals than those of last year.

January Propagation

It should be a toss-up between 17 and 20 meters for some great DX propagation openings during the daylight hours. These bands should open to most areas of the world, often with very strong signals. Seventeen meters may have a slight edge before noon, with 20 meters taking the lead after noon and becoming the optimum DX band during the late afternoon hours. Short-skip openings between distances of about 1200 and 2300 miles should be excellent during the daylight hours. Excellent short-skip openings are expected on 15 and 17 meters from shortly after sunrise through the early evening hours for distances between 1000 and 2300 miles. Twenty meters is expected to be a solid band with openings for both DX and short-skip. DX conditions should peak during a window of an hour or so right after sunrise and again during the late afternoon and early evening hours. Short-skip openings between approximately 1300 and 2300 miles should be possible from just after sunrise to as late as midnight. Shorter distance openings should also be possible from mid-morning to mid-afternoon.

The optimum band for DX conditions during the hours of darkness should be 40 meters. Expect openings to most areas of the world from shortly before sundown, through the hours of darkness, and until shortly after sunrise. Signal levels may be exceptionally strong at times. During the daylight hours, short-skip conditions should be optimal for openings between approximately 100 and 600 miles. Skip will lengthen during the late afternoon, and by nightfall short-skip conditions should be optimal for openings between 800 and 2300 miles.

Expect 60 meters to play a significant role in nightly DX across the United States. With very low noise levels this month, the weaker signals of 60 meters will be easy to copy.

Because atmospheric noise levels will be at seasonally minimum levels in the Northern Hemisphere during January, the 80- and 160-meter bands should also be hot. Expect some good openings to many parts of the world on 80 meters

during the hours of darkness and the sunrise period. Short-skip openings between distances of 50 and 250 miles should be optimal on 80 meters during the daylight hours. During the later afternoon and early evening hours short-skip openings should increase to between 250 and 1500 miles, and by nightfall openings up to and beyond 2300 miles should be possible.

Expect some DX openings on the 160-meter band during the hours of darkness. Openings towards Europe and the east should peak at about midnight. Openings towards the South Pacific and in a generally southerly direction may be possible just before daybreak, as well as openings into Asia and North Pacific. Short-skip openings up to 1300 miles should be possible during the hours of darkness, and frequently the skip will extend out as far as 2300 miles. During the daylight hours intense ionospheric absorption will severely limit openings, although some may be possible at times up to 150 miles or so.

VHF Conditions

Sporadic-*E* can occur during January, so be on the lookout. This has happened right around New Year's Day and that week. After that, it is rare.

The *Quantrantids* meteor shower is the major meteor shower for January and appears from January 1 to January 5. The maximum should occur on January 3. This shower can sometimes be quite intense, so it may be a good idea to set up some 2- and 6-meter schedules. Morning meteor openings may be the best bet during this month.

Check out *CQ VHF* magazine's "VHF Propagation" column for an in-depth look at propagation on VHF and above.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for October 2011 is 88.0. The lowest daily sunspot value of 48 was recorded for October 8. The highest daily sunspot count was 136 on October 21. The 12-month running smoothed sunspot number centered on April 2011 is 41.8. A smoothed sunspot count of 76, give or take about 9 points is expected for January 2012.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 137.2 for October 2011. The 12-month smoothed 10.7-cm flux centered on April 2011 is 100.4. The predicted smoothed 10.7-cm solar flux for January 2012 is 128, give or take about 9 points.

The observed monthly mean planetary *A*-index (*Ap*) for October 2011 is 7, which is quiet. The 12-month smoothed *Ap* index centered on April 2011 is 7.5. Expect the overall geomagnetic activity to be varying greatly between quiet to stormy during January. Refer to the Last-Minute Forecast at the beginning of this column for the outlook on conditions during January 2012.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://forums.hfradio.org/>. If you are on Facebook, check out <http://www.facebook.com/spacewx.hfradio> and <http://www.facebook.com/NW7US>. Speaking of Facebook, check out the CQ Amateur Radio Magazine fan page: <http://www.facebook.com/CQMag>.

With all the new solar cycle activity, I'll be keeping my ears to the radio, hoping to hear you on the air. Happy DX!

73, Tomas, NW7US

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2011 WPX SSB RESULTS
SINGLE OPERATOR
NORTH AMERICA

United States

K1LZ	**A**	**15,921,388**	**4088**	**1246**
AJ1I	*	11,615,760	3526	1095
			(OP: K8PO)	
KK1KW	*	6,869,520	2307	940
NU1O	*	1,756,516	1067	628
NN1N	*	1,304,020	903	577
AD1DX	*	1,129,590	879	495
N1BCL	*	919,770	775	465
N1SV	*	845,616	777	446
W1STT	*	609,030	534	402
NY1H	*	466,792	489	332
AA1O	*	300,030	382	274
N1KWF	*	253,236	412	282
NE1H	*	220,857	314	273
K1YSY	*	200,613	301	233
AB1BR	*	139,462	247	206
KZ1M	*	126,690	250	205
			(OP: W1EQ)	
K1VO	*	68,250	165	150
K1DG	*	45,859	136	121
W1MSN	*	42,721	133	119
N1QEH	*	26,663	104	91
K1SD	*	23,793	83	77
WC1M	*	23,736	95	86
K1PTF	*	10,797	62	59
W1WEF	*	5,805	47	45
WA1OUI	*	880	22	20
W3EP/1	**28**	**153,510**	**344**	**215**
KQ2M/1	**21**	**9,591,670**	**3006**	**1210**
K6ND/1	*	6,793,222	2494	1007
			(OP: N6BO)	
W5WMU/1	*	1,673,769	1111	629
KD2HE/1	*	97,536	211	192
K1QS	**14**	**324,720**	**367**	**328**
AB1EP	*	123,768	240	216
WU3A/1	**7**	**4,731,424**	**1463**	**796**
			(OP: W3UA)	
W1XX	*	1,114,452	821	459
K1HAP	**1.8**	**34,476**	**121**	**102**
K5NDV/1	*	10,633	50	49
***NV1N**	**A**	**4,328,401**	**1925**	**839**
			(OP: N1UR)	
*NM1C	*	509,517	496	339
*NJ1H	*	400,680	469	318
*KR1A	*	323,736	447	282
			(OP: KL7JT)	
*W1CCE	*	307,004	419	284
*N1IW	*	277,552	422	304
*WA1DRQ	*	194,684	324	238
*N1MXO	*	172,753	283	203
*K1VU	*	136,305	273	195
*KB1REQ	*	102,942	192	171
*KB1FRK	*	98,808	220	184
*KA1C	*	64,922	184	143
*W1PL	*	58,290	191	145
*W1TO	*	53,802	142	122
*W1/YO7ARY	*	53,144	170	146
*K1BBM	*	50,816	148	128
*KB1TBU	*	40,182	129	111
*K1LOG	*	29,952	108	96
*K1GQ	*	27,468	96	84
*N1NN	*	21,182	99	89
*KB1P	*	11,178	72	69
*KK1X	*	10,833	70	69
*W1BP	*	10,797	65	59
*W1MJ	*	8,925	58	51
*K1TR	*	8,056	56	53
*KE1CY	*	5,175	48	45
*W1BJ	*	3,686	40	38
*N1ZN	*	3,168	34	33
*N1XUQ	*	2,277	34	33
*KB1UMM	*	2,146	30	29
*N1EMF	*	1,750	29	25
*W1KU	*	1,008	26	24
*KK1W	*	867	17	17
*NBAGL/1	*	252	15	14
***AE1P**	**28**	**6,258**	**55**	**42**
*AB1HD	*	14	3	2
***N1WRK**	**21**	**58,540**	**142**	**133**
***WI1K**	**14**	**15,840**	**98**	**88**
***KA8HKC/1**	**7**	**12,240**	**84**	**72**
***NX1T**	**1.8**	**6,840**	**61**	**45**
*W1WBB	*	2,368	34	32
KM2O	**A**	**1,265,680**	**815**	**528**
W2OSR	*	337,922	406	317
K2BBQ	*	295,604	406	268
K2FJ	*	234,950	359	254
K2LE	*	224,532	302	243
WO2Y	*	198,912	282	256
WB2SIH	*	192,816	351	234
K2DLS	*	165,024	291	216
K3QDV/2	*	158,152	277	212
WB2KLD	*	108,528	216	168
WC2W	*	105,456	214	169
W2MC	*	102,483	217	177
AF2O	*	66,560	163	130
KC2LST	*	57,456	158	133
N2USM	*	52,125	146	139
NV2G	*	49,664	145	128
			(OP: N2ZN)	
W2ARP	*	30,438	115	114
KC2HZW	*	24,104	109	92
KC2PVM	*	16,318	88	82
KA2LIM	**28**	**95,976**	**242**	**172**
K2XA	*	9,744	67	58
WB2SNN	*	44	4	4
N2MM	**21**	**2,346,333**	**1294**	**733**
N2EIK	*	608,697	660	423
N2NT	*	25,024	103	92
KA2BXH	*	2,052	27	27
WN2O	**3.7**	**46,107**	**128**	**109**
			(OP: N2GC)	
***WA2JQK**	**A**	**1,182,363**	**869**	**497**
*NW2K	*	696,784	723	428
*KU2M	*	681,720	576	390
*NT2I	*	630,540	621	372
*K2DSL	*	466,745	554	337
*WA2MCR	*	429,135	489	335
*N2JF	*	401,835	436	301
*W2ML	*	350,760	418	316
*AB2TC	*	317,612	397	271
*KX2S	*	312,900	384	298
*AD2AM	*	286,878	386	274
*NA2NY	*	177,888	287	218
*K2JMY	*	174,930	305	238
*K2RET	*	134,469	257	201
*W2VU	*	129,294	254	198
*KC2WUF	*	125,970	251	195
*N2MTG	*	107,606	245	173
*WA2FBN	*	105,225	227	183
*KC2QJB	*	89,428	202	158
*N2UZQ	*	58,800	160	140
*KD2MU	*	46,494	144	126
*W2FUI	*	45,540	137	115
*WA2NLL	*	43,400	138	124
*W2TF	*	39,663	123	113
*N2KPS	*	30,193	118	109
*AE2NG	*	27,234	119	102
*KC2SNW	*	25,284	107	98
*N2GXJ	*	23,490	104	90
*W2MRD	*	19,662	90	87
*WB2ZEX	*	17,632	88	76
*KC2WLO	*	13,860	70	63
*N3LZG/2	*	10,863	71	71
*AB2IO	*	9,454	73	58
*AD2TM	*	8,058	55	51
*K2DV	*	7,722	58	54
*KC2OVM	*	7,065	49	45
*KC2TFI	*	6,696	57	54
*WY1H/2	*	5,123	50	47
*N3UXK/2	*	3,384	38	36
*WA2CLP	*	2,944	35	32
*KC2JRQ	*	2,294	31	31
*W2QAC	*	1,890	30	30
*K2JF	*	1,012	24	23
*KA2IBN	*	420	15	15
*K2DL	*	207	9	9
*K2AMP	*	144	9	9
*W2HCB	*	36	3	3
***N2SLO**	**28**	**7,155**	**61**	**53**
*KC2ZXY	*	65	5	5
***W2AW**	**21**	**1,313,786**	**879**	**601**
			(OP: N2GM)	
*N2DD	*	44,520	140	140
*N2GA	*	40,680	126	113
*N2JUS	*	22,968	93	88
*KC2ZGI	*	10,919	64	61
*AA2DS	*	9,234	57	57
*K2PAL	*	7,208	54	53
*KC2OSR	*	2,747	41	41
*N2RHL	*	2,660	35	35
***W2AAB**	**14**	**61,138**	**171**	**154**
*KC2FBV	*	5,886	54	54
*W2NTV	*	4,440	42	40
*W2IMY	*	126	7	6
*N2PQJ	*	18	3	3
***K2SZ**	**7**	**45,368**	**118**	**107**
*W2LP	*	32,980	106	97
KC3R	**A**	**10,821,048**	**3290**	**1148**
			(OP: LZ4AX)	
KB3UHN	*	4,124,224	1770	832
NG3R	*	3,724,060	1642	790
			(OP: W2GD)	
K3MD	*	3,256,878	1669	813
N3UM	*	1,244,925	811	503
KW3A	*	575,232	628	384
WB3FIZ	*	293,524	375	308
WR3H	*	273,020	340	292
W3GNQ	*	120,239	247	193
NA3F	*	112,326	238	194
K3MRG	*	89,318	190	142
KA3HED	*	66,178	199	163
K3RMB	*	50,419	164	127
AF3I	*	22,892	107	97
N3XL	*	20,640	91	80
W3FVT	*	20,160	100	84
W6AAN/3	*	10,788	64	62
W3BGN	**3.7**	**1,211,266**	**840**	**482**
***KB3LIX**	**A**	**771,676**	**667**	**412**
*KD3HN	*	756,903	661	399
*ND3R	*	393,072	459	304
*ND3D	*	197,184	352	237
*KK9W/3	*	163,560	322	232
*WB9KPT/3	*	128,554	248	199
*K3CWF	*	121,444	245	194
*K2LNS/3	*	117,780	243	195
*K3STL	*	116,688	254	187
*WB3BSA	*	109,552	203	167
*K3FS	*	47,125	139	125
*N3RN	*	42,525	130	105
*N8NA/3	*	42,435	132	115
*KO3T	*	38,025	133	117
*K3TN	*	33,488	125	104
*N3CHX	*	31,672	131	107
*WA3EQJ	*	30,740	124	106
*K3SI	*	12,012	76	66
*N3LT	*	10,985	67	65
*KN3A	*	6,958	49	49
*KB3OZA	*	5,568	49	48
			(OP: N1MM)	
*AK3S	*	5,264	49	47
*KB3RKM	*	4,173	42	39
*W3RLO	*	2,640	31	30
*WB3IGR	*	55	5	5
***N3CR**	**28**	**20,992**	**99**	**82**
***W3RC**	**21**	**58,456**	**148**	**136**
***NQ3U**	**14**	**25,641**	**103**	**99**
*WA2VQV/3	*	11,256	69	67
*N3XPD	*	2,436	30	28
*N3QEH	*	308	12	11
***K3DCW**	**7**	**42,160**	**150**	**124**
*KA2BKG/3	*	2,970	27	27
*AI3G	*	2,520	40	30
KR4Z	**A**	**6,200,704**	**2373**	**1004**
			(OP: N4PN)	
WZ4F	*	4,332,552	2012	888
			(OP: K4AB)	
K4PV	*	3,643,200	1910	825
AD4L	*	1,868,060	1129	620
N4NO	*	1,097,310	839	474
KA8Q/4	*	1,039,745	745	427
W2OX/4	*	706,258	681	427
NC4MI	*	464,800	505	350
AJ4RW	*	355,473	419	311
WX4US	*	322,838	413	302
WY6K/4	*	297,675	427	315
NE4M	*	278,100	396	270
KU8E/4	*	274,219	358	257
N4WZ	*	259,424	388	268
W4KW	*	251,720	345	248
WD4MW	*	189,772	307	227
W4GHS	*	178,935	309	237
K4CX	*	170,544	294	228
WW4CP	*	165,624	289	201
N4BCB	*	160,484	279	212
NJ4F	*	133,980	264	210
AI4WU	*	123,888	216	174
N4CW	*	107,445	199	195
AI4WW	*	104,248	213	166
KY4P	*	97,825	217	175
K4SV	*	89,265	211	165
WM2Z/4	*	83,410	266	190
KK9O/4	*	72,981	177	159
W2OO/4	*	64,239	169	147
KD4QMY	*	62,064	154	144
AE4EC	*	61,004	191	151
K7OM/4	*	53,328	169	132
N3KN/4	*	47,291	159	131
W4AX	*	46,080	146	120
N4MM	*	39,552	115	103
N4RWH	*	38,253	146	123
KI4VCT	*	33,674	131	113
N2YO/4	*	32,928	111	96
WD4DHJ	*	28,910	117	98
AB4GG	*	26,481	119	91
KT4OO	*	19,840	99	80
KW4G	*	18,144	90	84
WA2EKK/4	*	17,182	82	71
NY4O	*	17,100	65	60
WD8RYC/4	*	14,427	63	63
N4WPJ	*	13,333	76	67
W4ATL	*	11,635	68	65
K4RO	*	10,320	63	60
NV4A	*	7,238	48	47
N7BU/4	*	4,200	40	35
KB4EB	*	3,914	39	38
KG4JSZ	*	736	16	16
WN1GIV/4	**28**	**375,648**	**639**	**312**
			(OP: N4BP)	
W4OGG	*	1,924	29	26
KM9P/4	**21**	**4,018,128**	**1809**	**863**
			(OP: KBEJ)	
N4LZ	*	31,790	114	110
NX9T/4	*	28,300	107	100
KK9A/4	**14**	**6,403,079**	**2530**	**1091**
N4TB	*	213,666	355	298
K4RDU	**7**	**56,832**	**145**	**128**
AA4D	*	15,892	59	58
KD4FMW	*	1,184	16	16
***WB4JFS**	**A**	**584,696**	**620**	**371**
*W4FT	*	573,978	560	353
*W4PFM	*	550,706	545	359
*NV4B	*	528,870	565	366
*W4YE	*	528,580	546	380
*W4SAR	*	449,388	507	342
*N2ESP/4	*	406,077	451	317
*N4HXI	*	305,572	480	316
*KD4LYS	*	268,268	355	258
*W4GDG	*	243,036	348	258
*K4FJW	*	237,503	355	259
*AI4DB	*	227,447	351	253
*K4DMR	*	219,648	359	264
*KS4X	*	157,740	270	220
*W4NBS	*	151,140	277	229
*K7JNX/4	*	149,947	269	217
*K4NC	*	132,200	255	200
*KS4YX	*	108,273	243	187
*W4JDS	*	108,225	256	195
*K4DMH	*	107,352	237	189
*W4FRA	*	88,025	226	175
*AB4G	*	83,160	217	168
*W4UEF	*	77,616	187	147
*K4ORD	*	75,841	197	149
*N4DTF	*	75,485	185	155
*VE3JDF/W4	*	73,755	202	165
*AI4UN	*	70,152	211	158
*N4VAN	*	66,788	159	118
*KE4KY	*	65,001	172	141
*W4ZAO	*	63,948	192	146
*KU4WD	*	55,913	160	143
*AJ4VE	*	55,645	155	155
*WA8QYJ/4	*	54,912	154	143
*NE4W	*	51,101	144	137
*WBQQG/4	*	41,280	139	120
*W4GKA	*	40,817	140	119
*KE4K	*	39,663	150	117
*N4NIA	*	33,855	127	111
*W4JHU	*	32,946	122	102
*KJ4KVC	*	32,340	119	98
*AK4IK	*	32,219	115	101
*K4KAY	*	30,870	115	105
*WA2EAJ/4	*	29,682	119	102
*K3MZ/4	*	29,184	116	96
*KJ4ERZ	*	28,987	116	101
*N9MXI/4	*	25,454	103	89
*KA4TEU	*	23,736	100	86
*AI4GR	*	23,218	111	94
*AK4EE	*	23,136	105	96
*N2WN/4	*	23,055	99	87
*W1ZRV/4	*	22,692	120	93
*KE4KMG	*	19,952	100	86
*KN4KL	*	19,671	102	83
*KG4IGC	*	19,656	94	84
*KW4J	*	18,530	101	85
*K4LHP	*	17,850	96	85
*K4DJV	*	17,775	91	79
*K4LXX	*	17,760	84	74
*K7CS/4	*	17,700	88	75
*AJ1F/4	*	17,548	93	82
*N3FP/4	*	17,238	89	78
*K4GOP	*	14,904	77	69
*K4ALE	*	14,352	79	69
*W4AMS	*	14,340	62	60
*KE4SAV	*	13,984	83	76
*K1GIG/4	*	13,968	78	72
*KC4QYG	*	13,875	87	75
*NY4S	*	13,870	75	73
*WBØPOH/4	*	11,284	70	62
*K4DJ	*	9,328	63	53
*KX4O	*	9,089	68	61
*WX4RM	*	7,708	52	47
*KC2LNC/4	*	5,170	51	47
*K4EAK	*	5,106	50	46
*NØRZT/4	*	4,400	48	44
*AA4KD	*	3,686	42	38
*W6UB/4	*	3,332	35	34
*KS4S	*	2,812	39	38
*KM4RK	*	2,613	43	39
*KJ4UZL	*	1,500	26	25
*KJ4IWX	*	1,426	23	23
*KJ4LXC	*	1,426	23	23
*W4CAR	*	1,122	17	17
			(OP: KJ4IWX)	
*KE4QCM	*	756	18	18
*AJ4MJ	*	600	16	15
*KJ4PJU	*	570	15	15
*KC4FLB	*	480	15	15
*AK4FK	*	403	13	13
*NB4F	*	363	11	11
***W4IX**	**28**	**209,916**	**367**	**252**
*NA4W	*	61,686	195	138
			(OP: K4WI)	
*KI4LTO	*	25,116	107	91
*N4IG	*	22,632	104	82
*K3MAF/4	*	7,236	57	54
*KJ4VWL	*	5,967	56	51
*W4YTB	*	3,128	37	34
*KJ4BIX	*	1,650	25	25
*KD4MXA	*	351	15	13
***WN4BFZ**	**21**	**535,612**	**509**	**407**
			(OP: K4YA)	
*WA4AXT	*	121,983	233	219
*N3TG/4	*	17,120	84	80
*NQ4K	*	518	14	14
*NG4L	*	112	7	7
***WB2TFM/4**	**14**	**207,399**	**295**	**269**
*K9RIM/4	*	68,425	171	161
*AI4CN	*	570	15	15
*K4NDH	*	288	12	12
*WA4JA	*	180	10	9
*AK4Q	*	96	6	6
*K4MTX	*	91	7	7
***K4YCR**	**7**	**7,748**	**60**	**52**
NN5J	**A**	**10,812,560**	**3081**	**1117**
			(OP: N5DX)	
NR5M	*	10,213,848	3301	1143
KT5J	*	7,581,120	3276	1060
			(OP: K5TR)	
WM5R	*	5,099,130	2720	954
WD5K	*	2,312,587	1343	727
AC5O	*	2,021,118	1310	678
K5ER	*	1,428,900	1142	550
AD5XD	*	1,249,852	1141	542
K5ZCJ	*	594,816	640	384
K5QEA	*	587,465	567	401
ND5T	*	542,682	603	413
K5GKC	*	485,625	606	375
N5VU	*	403,200	515	315
KD5JAA	*	220,575	362	255
AE5P	*	126,636	236	183
N5DY	*	124,435	252	205
AB5C	*	115,173	233	201
WA5LFD	*	35,956	131	101
K5PO	*	26,287	128	97
NM5NM	*	26,103	135	113
			(OP: AA5B)	
KE1R/5	*	21,750	99	87
W5RAW	*	15,908	100	82
KZ5MM	**28**	**737,352**	**829**	**396**
			(OP: W5PR)	
WK5T	**21**	**5,459,874**	**2440**	**1029**
			(OP: N2IC)	
WA5ZUP	*	767,520	799	480
KZ5J	*	730,862	770	478
W5ZAF	**14**	**936**	**18**	**18**
KI5XP	**3.7**	**454,553**	**492**	**341**
			(OP: W5XZ @W5WMU)	
NE5D	**1.8**	**3,472**	**33**	**31**
			(OP: K5RX)	
***K5DHY**	**A**	**439,452**	**483**	**351**
*WI5ID	*	295,139	411	311
			(OP: K5IID)	
*N5AW	*	198,204	293	249
*NW5Q	*	160,704	333	216
*KX5A	*	155,820	279	210
			(OP: K5XA)	
*KAØZPP/5	*	125,200	243	200
*WA8ZBT/5	*	122,850	274	195
*KD5J	*	99,680	216	178
*WA5SOG	*	90,288	201	171
*KV5Q	*	88,407	245	171
*AE5MM	*	75,040	195	160
*K5BZH	*	70,308	225	162
*AG5S	*	63,804	201	156
*NU5DE	*	48,400	135	121
*K8TE/5	*	46,816	148	133
*NX8G/5	*	44,540	163	131
*KE5ZRU	*	32,967	130	111
*KE5ZRT	*	30,411	129	109
*K5QW	*	29,574	119	106
*KE5MO	*	27,911	115	113
*NK5G	*	26,410	115	95
*N5LTM	*	25,353	106	81
*W5RYA	*	20,496	101	84
*NT5SM	*	19,530	113	93
*AA5JG	*	12,040	77	70
*KD5JHE	*	9,960	67	60
*WQ5C	*	8,960	65	64
*KEØCP/5	*	4,620	42	42
*KM5Z	*	4,512	52	48
*KD6ZBE/5	*	874	19	19
*W4JHC/5	*	225	9	9
*N2PKW/5	*	133	7	7
***KE5SNJ**	**28**	**21,672**	**105**	**84**
*K3TD/5	*	6,800	51	50
*W5ESE	*	6,468	53	44
***N5DO**	**21**	**735,072**	**717**	**494**
*WU5Z	*	111,930	252	210
*WAØQJE/5	*	6,292	54	52
*N5DTT	*	2,997	38	37
***W5CSM**	**14**	**32,332**	**123**	**118**
*NM5M	*	10,557	78	69
***W6HH/5**	**3.7**	**10,296**	**67**	**66**
NY6N	**A**	**7,758,693**	**2739**	**1017**
			(OP: W6YI)	
N6WIN	*	4,130,014	2191	833
W6TK	*	3,461,544	1803	786
NF6A	*	2,463,636	1233	633
			(OP: K6XX)	
K6TU	*	2,124,369	1211	603
KC6X	*	1,845,831	1209	611
WA6KHK	*	1,124,504	930	524
N6JS	*	932,735	929	505
KI6VC	*	679,053	955	461
AA6PW	*	631,618	799	442
K6NR	*	518,880	511	368
N6ETO	*	418,140	476	345
KT6VV	*	409,024	546	332
WW6O	*	396,990	500	330
NO6F	*	394,450	548	350
			(OP: K2RD)	
K6LRN	*	392,735	454	343
W6UM	*	256,425	325	263
N6AN	*	208,175	454	275
K6JAT	*	198,050	364	233
KY6LA	*	149,552	291	208
N6AJR	*	80,850	211	165
WO6M	*	72,065	175	145
KYØW/6	*	50,232	168	138
			(OP: WØYK)	
KM6I	*	48,620	175	130
WT6H	*	38,041	138	109
W6ONV	*	33,681	137	109
WB1DSJ/6	*	26,775	124	105
K6DGW	*	26,235	119	99
KB6A	*	22,222	96	82
K5UUW	*	19,344	89	78
N6RI	*	7,595	55	49
N6BY	*	6,864	50	48
W6GJB	*	3,052	29	28
W4UAT/6	**28**	**12,508**	**73**	**59**
NK6A	**21**	**202,990**	**336**	**265**
NU6S	*	111,315	236	205
K6YK	*	53,599	145	133
N2NS/6	*	19,188	98	82
K6HNZ	**14**	**675,605**	**786**	**485**
NJ6P	*	635,401	829	481
W6RKC	**7**	**5,418**	**44**	**42**
***NN3V/6**	**A**	**729,504**	**729**	**447**
*WN6K	*	616,250	749	425
*AA6K	*	548,073	536	383
*K3FIV/6	*	335,485	494	293
*KE6SHL	*	181,920	382	240
*N6ORB	*	149,184	297	222
*W6UX	*	135,255	312	213
*N6DZR	*	133,824	292	204
*NN6CH	*	113,984	269	208
*WV6N	*	86,584	198	158
*KI6WCI	*	76,050	222	169
*AE6YB	*	74,043	262	171
*K6TV	*	66,341	212	163
*AA6EE	*	65,469	185	157
*N6MI	*	52,882	165	137
*K3UAZ/6	*	49,125	166	131
*NZ6Q	*	31,900	126	110
*W6RGS	*	22,764	115	84
*KD6LU	*	17,010	104	81
*KF6RCP	*	15,215	104	85
*N6OU	*	9,638	76	61
*N6BHX	*	9,576	78	63
*KS6M	*	7,503	63	61
*K6IWA	*	5,724	62	54
*KF6ZYD	*	4,048	49	44
*K6ACJ	*	3,315	45	39
*WN6E	*	3,120	40	40
*W6VMS	*	2,639	31	29
*N3APA/6	*	1,925	26	25
*WE6CW	*	1,342	22	22
*NC6PT	*	1,170	19	18
*K6GEP	*	1,020	20	20
*WA3YTI/6	*	940	20	20
*WK6CM	*	522	18	18
*KB5MU/6	*	372	12	12
*KI6LAV	*	322	15	14
***ND6S**	**28**	**59,451**	**210**	**149**
*KD6YG	*	1	1	1
***AF6AV**	**21**	**157,872**	**296**	**253**
*K7XE/6	*	126,324	235	198
*W6MIL	*	10,296	81	72
			(OP: N6WR)	
*KJ6HBY	*	2,176	38	34
*AJ6B	*	720	20	20
***N6DO**	**14**	**1,984**	**33**	**31**
*KI6OVJ	*	1,040	26	26
*N6WR	*	448	14	14
*K6MSM	*	8	2	2
***W5NYV/6**	**7**	**153**	**9**	**9**
*WR6WR	*	108	8	6
			(OP: N6WR)	
KW7Y	**A**	**10,838,960**	**3404**	**1199**
			(OP: K7RL)	
WS7X	*	4,148,618	2295	907
K7ZS	*	1,870,869	1292	623
K7EDX	*	1,295,264	1043	544
W7AT	*	1,250,418	891	533
			(OP: W7EW)	
NR7E	*	1,083,656	987	523
K7LY	*	1,001,088	1011	528
NB7V	*	607,550	876	419
K7JQ	*	593,480	690	401
N3RC/7	*	542,954	587	401
NU7J	*	518,384	535	362
KG7C	*	501,322	559	367
W7VJ	*	472,078	520	386
KF7IQ	*	467,808	501	352
KD7DCR	*	423,384	483	354
WD7K	*	401,150	454	355
KS7T	*	379,701	504	343
N7VF	*	358,449	438	303
KA7HUO	*	184,626	511	263
WU6W/7	*	178,980	326	228
WA7PRC	*	173,628	299	234
WN7T	*	134,343	269	207
KT7E	*	132,462	282	223
WG7X	*	121,992	261	204
K7ABL	*	118,230	235	210
W7TX	*	108,501	215	177
NQ7R	*	67,348	193	149
W7GT	*	51,816	161	127
WO7V	*	51,737	153	133
KK7X	*	46,417	149	133
AA7V	*	44,530	138	122
N1KEZ/7	*	30,688	133	112
W7ABC	*	10,988	68	67
W7JAM	*	1,638	27	26
KK7CG	*	440	21	20
N7RQ	**21**	**2,315,214**	**1472**	**726**
WA7LT	*	1,176,895	956	565
NF7E	*	441,210	559	385
AB7R	*	351,750	539	335
W7IWW	*	335,454	478	326
NG7Z	*	149,814	374	246
W7WA	**14**	**6,265,

*K7ACZ	*	195,254	291	233	
*WØPAN/7	*	191,400	389	232	
*N7MZW	*	185,991	415	251	
*K7TR	*	165,206	317	226	
*AA7DK	*	142,776	287	216	
*N7VS	*	123,264	268	192	
*KF7GNI	*	107,712	264	187	
*KF7GYE	*	106,326	234	179	
*KE7VUX	*	105,185	233	193	
*KC7V	*	101,904	234	193	
*K7ZG	*	99,144	263	204	
*KB7KYK	*	91,002	247	174	
*WX7E	*	80,384	176	157	
*AD7MQ	*	80,275	235	169	
*N7VEA	*	77,588	205	163	
*KC7H	*	63,899	203	157	
*KAØADZ/7	*	43,824	171	132	
*K6KR/7	*	41,151	155	129	
*W7YVK	*	25,996	119	97	
*AD7UP	*	25,270	107	95	
*WA7DUH	*	25,070	144	109	
*KD7SWL	*	24,934	98	91	
*N7OMS	*	23,716	117	98	
*W7FD	*	22,560	116	94	
*KK7VL	*	19,608	91	76	
*W7JFF	*	18,392	103	88	
*KG9JP/7	*	16,576	83	74	
*W7GIB	*	15,687	98	83	
*AI9Q/7	*	13,532	73	68	
*N7IYT	*	13,148	90	76	
*N7WA	*	12,220	68	65	
*KD7HGS	*	9,344	74	64	
*KF7IYQ	*	7,473	63	53	
*K7RXC	*	7,370	80	67	
*KE7UQL	*	7,260	64	55	
*WA7SHP	*	6,118	50	46	
*W7WOF	*	5,967	54	51	
*W7JU	*	5,418	49	42	
*N7NSL	*	5,040	47	45	
*K7JKM	*	4,656	52	48	
*AD7JX	*	3,053	46	43	
*KF7MAX	*	2,812	40	37	
*AE7IX	*	1,843	20	19	
*KB7ZVT	*	1,680	28	28	
*KE7MPM	*	1,512	30	24	
*KE7MPN	*	840	20	20	
***K7ULS**	**28**	**20,169**	**94**	**83**	
*KE7DX	*	1,518	24	23	
*W6ABM/7	*	102	6	6	
***W7UPF**	**21**	**235,788**	**337**	**294**	
*WE6EZ/7	*	35,941	138	127	
*WU9B/7	*	22,692	100	93	
***AD7J**	**14**	**385,170**	**418**	**370**	
			(OP: W7FP)		
*N7BK	*	382,104	438	366	
*K6LDN/7	*	77,106	205	181	
*W7ASF	*	25,560	97	90	
*K7SR	*	7,860	62	60	
*K6TUJ/7	*	5,130	60	54	
*WX7B	*	798	21	21	
***WA7NWL**	**7**	**127,920**	**286**	**195**	
K8AO	**A**	**1,005,004**	**763**	**502**	
WD8EOL	*	647,390	627	410	
WA8FRE	*	637,960	690	410	
K8YYY	*	568,071	562	381	
AD8W	*	545,870	587	338	
N8IVE	*	412,720	445	308	
W8EI	*	306,860	413	268	
K8VUS	*	281,155	386	277	
N8AA	*	91,840	200	164	
KQ8RP	*	86,592	196	164	
K8BZ	*	69,146	172	154	
W8HMK	*	21,156	97	86	
KE8E	*	4,788	48	42	
W8MET	*	969	17	17	
N8RLG	*	936	21	18	
K8LO	*	384	12	12	
AL7BA/W8	*	374	11	11	
N8II	**28**	**323,179**	**578**	**293**	
N8BJQ	**21**	**1,834,250**	**1089**	**667**	
KC8ZMN	*	138,436	245	212	
KD8SQ	**14**	**139,308**	**248**	**228**	
W8GOC	*	39,996	139	132	
K8ME	**7**	**15,840**	**60**	**60**	
W8JMF	**3.7**	**4,142**	**38**	**38**	
NT1E/8	**1.8**	**321,043**	**471**	**277**	
			(OP: K3BU)		
***WB8TLI**	**A**	**1,368,276**	**909**	**546**	
*WS6K/8	*	328,992	451	298	
*KB8KE	*	261,944	370	274	
*N8OQQ	*	236,988	392	261	
*N8BV	*	232,560	418	255	
*W8AB	*	219,558	369	258	
*KD8HHG	*	204,106	318	239	
*W8TM	*	188,034	283	222	
*N8VV	*	179,011	297	239	
*AF8C	*	172,664	314	226	
*KD8NOH	*	171,986	290	226	
*WB8JUI	*	160,664	267	266	
*KA8NJW	*	145,379	274	211	
*WJ8E	*	138,245	254	215	
*WT8E	*	130,248	314	216	
*WA8SDF	*	115,140	256	190	
*N8HP	*	101,135	230	179	
*WA8YVF	*	98,580	225	186	
*W8KNO	*	96,111	217	177	
*W8ASA	*	94,134	219	174	
*AC8HN	*	61,020	192	135	
*KN8F	*	59,220	164	141	
*AA8IA	*	56,160	174	135	
*KD8JAM	*	42,402	134	111	
*NF8M	*	32,340	127	105	
*NN8M	*	32,100	122	100	
*N8GIE	*	30,240	118	108	
*W8IDM	*	26,730	103	90	
*WB8MIW	*	23,183	111	97	
*KJ8O	*	17,220	86	84	
*N8YOH	*	15,111	77	73	
*WC8Z	*	12,024	75	72	
*K8JTD	*	9,499	72	59	
*W3GEG/8	*	4,644	60	54	
*KC8KCU	*	3,132	36	36	
*N8SBE	*	2,976	34	32	
*KD8OLH	*	2,346	35	34	
*N8XTH	*	2,072	30	28	
*KC8HQS	*	1,450	25	25	
*N9KCQ/8	*	760	21	20	
*AB8YK	*	315	15	15	
*KD8ICP	*	96	9	8	
*KD8OLG	*	70	7	7	
***N8CN**	**28**	**26,010**	**108**	**90**	
*W8CDL	*	9,720	65	60	

*N8PJ	*	6,336	52	48	
*KE8FO	*	5,125	48	41	
*N8PVT	*	119	7	7	
***KN8D**	**21**	**6,579**	**52**	**51**	
***N8WAV**	**14**	**82,593**	**190**	**189**	
*KB8MYC	*	10,168	63	62	
***K8SM**	**7**	**87,696**	**259**	**158**	
*NR8U	*	51,876	169	131	
***NA8V**	**3.7**	**7,791**	**49**	**49**	
W9OP	**A**	**409,118**	**467**	**337**	
N9WKW	*	343,872	440	288	
KG9N	*	203,708	363	254	
N9JZN	*	148,176	281	196	
NT9F	*	121,632	265	181	
KB9KEG	*	100,464	243	182	
N9OK	*	88,236	217	172	
KK7Z/9	*	79,050	189	155	
K9WWT	*	68,975	214	155	
KR9E	*	46,112	149	131	
W3HDH/9	*	44,506	137	119	
NA9US	*	34,965	123	111	
			(OP: N9GH)		
K9QC	*	34,299	115	111	
KC9EOQ	*	33,063	119	107	
N9ROD	*	23,585	103	89	
K9CT	**21**	**2,632,392**	**1418**	**756**	
WE9V	*	654,164	643	427	
W9GL	*	112,048	215	188	
K9JIG	*	7,007	50	49	
KX9DX	**7**	**310,170**	**700**	**294**	
K9SH	**3.7**	**116,800**	**288**	**200**	
***KZ9O**	**A**	**1,976,631**	**1454**	**653**	
*KS9K	*	1,962,765	1151	603	
			(OP: N4TZ)		
*W9TC	*	553,320	569	348	
*K9JE	*	529,515	543	369	
*N9LYE	*	379,138	519	326	
*AB9KZ	*	189,290	319	230	
*N9LB	*	178,528	307	224	
*K9PMV	*	132,778	245	197	
*NV9X	*	132,459	306	201	
*KC9QOJ	*	116,662	241	182	
*KC9LQS	*	103,974	241	186	
*AI9K	*	88,528	242	176	
*KB9YGD	*	79,360	199	160	
*KB9RDS	*	70,499	179	143	
*N9YH	*	67,466	195	158	
*K9IAC	*	64,727	185	169	
*WR9Y	*	59,130	181	146	
*WB9LRK	*	36,408	135	111	
*N9NA	*	30,800	124	110	
*KC9DOA	*	30,747	141	111	
*KC9STV	*	30,709	115	107	
*W9HT	*	28,288	134	104	
*KW9N	*	25,575	109	93	
*WC9B	*	24,840	102	90	
*KB9O	*	18,648	95	84	
*KC9QHL	*	3,977	42	41	
*KC9ELU	*	3,510	39	39	
*K9TCD	*	2,937	34	33	
*KC9IL	*	2,015	34	31	
*KC9PGH	*	858	22	22	
*KA9OBZ	*	518	14	14	
*KC9KIO	*	44	4	4	
***W9KVR**	**28**	**280**	**12**	**10**	
*N9ICV/9	*	12	2	2	
***N9TGR**	**21**	**975,730**	**777**	**530**	
*KA9JAC	*	21,312	102	96	
*K1GU/9	*	1,798	30	29	
*W9ILY	*	220	10	10	
***N9LOH**	**14**	**45,108**	**139**	**126**	
*KE9EX	*	782	17	17	
*KC9RWO	*	3	1	1	
***K9SQL**	**7**	**95,700**	**232**	**174**	
*N9WEW	*	1,792	37	32	
KU1CW/Ø	**A**	**8,850,231**	**3038**	**1129**	
KØSR	*	6,563,991	2723	1029	
KGØF	*	5,166,646	2420	998	
			(OP: WØUA)		
NAØCW	*	2,353,911	1349	717	
			(OP: NØKE)		
NXØX	*	2,202,876	1440	702	
KØVXU	*	1,719,872	1111	616	
KØEA	*	844,944	729	464	
K9MWM/Ø	*	745,731	803	441	
KCØMO	*	713,496	699	411	
			(OP: KØOU)		
NØOK	*	529,606	512	362	
KØDEQ	*	452,138	555	362	
WDØECO	*	441,428	608	338	
WØBH	*	364,182	477	322	
NØIRM	*	297,700	359	260	
WØHBH	*	265,131	359	267	
WAØJZK	*	226,424	374	248	
WDØBMS	*	210,875	291	241	
NØOST	*	199,444	333	238	
NØRPI	*	188,032	307	226	
KVØO/Ø	*	184,756	429	247	
NØGMT	*	167,014	314	226	
WØKIT	*	93,353	206	167	
NAØBR	*	75,932	205	164	
KØXTR	*	50,716	160	124	
WØRIC	*	34,711	109	103	
KEØL	*	34,441	110	101	
KØLDS	*	31,395	113	105	
NØRP	*	29,008	120	112	
WAØVPJ	*	21,185	105	95	
KXØA	*	20,856	93	88	
			(OP: K9DU)		
KØPFZ	*	2,496	35	32	
KC9UMR/Ø	*	1,176	24	24	
KØRH	**21**	**330,928**	**496**	**296**	
KØPIR	*	3,038	34	31	
WØPPF	**14**	**27,846**	**128**	**119**	
NØZC	*	1,400	25	25	
NYØT	**7**	**40,704**	**129**	**128**	
***AAØNK**	**A**	**503,550**	**531**	**373**	
*NXØP	*	453,008	529	368	
*KØJJM	*	421,824	499	338	
*NØUY	*	379,200	432	316	
*WØØTSR	*	376,752	477	334	
*NEØS	*	273,480	393	265	
*ADØH	*	244,720	410	266	
*WØOVM	*	238,602	360	266	
*WØØLJK	*	222,194	363	269	
*ACØB	*	219,032	358	262	
*WAØLJM	*	168,432	302	242	
*WDØBMR	*	163,068	265	214	
*NØGOS	*	124,341	300	217	
*NFØN	*	99,474	213	177	
*KØBJ	*	93,520	202	167	

*KØHNC	*	76,304	193	152	
*NØNM	*	57,486	172	143	
*KØAD	*	56,794	170	146	
*KR7C/Ø	*	56,457	191	153	
*KØRC	*	56,211	161	123	
*NZØF	*	47,302	156	134	
*KDØZZ	*	41,418	136	118	
*KØVD	*	33,210	150	123	
*KØLAF	*	28,288	123	104	
*NO2O/Ø	*	24,192	121	108	
*N5RR/Ø	*	22,116	110	97	
*WØNFS	*	21,894	100	89	
*KCØUUT	*	21,672	97	86	
*KØNR	*	18,920	98	86	
*KDØHLB	*	18,746	113	91	
*KØMPH	*	18,450	89	82	
*KFØF	*	17,544	92	86	
*NØJE	*	16,940	84	77	
*NØAXZ	*	16,766	92	83	
*KØRJW	*	12,144	82	69	
*KØFYI	*	10,440	61	60	
*NØANP	*	5,850	51	50	
*NØUJJ	*	5,830	60	53	
*WN4GMT/Ø	*	4,687	49	43	
*KDØLHI	*	4,440	41	40	
*NØDSN	*	4,048	52	46	
*WØRU	*	3,367	43	37	
*KØHAX	*	1,891	33	31	
*KØNEB	*	1,872	26	26	
*KØANS	*	1,764	30	28	
*KBØNHW	*	1,647	29	27	
*KDØOAE	*	1,643	41	31	
*KDØKQS	*	1,350	29	27	
*KDØKJL	*	608	19	19	
*KDØBLZ	*	216	9	9	
***KCØRQH**	**28**	**1,474**	**23**	**22**	
***WØETT**	**21**	**167,948**	**287**	**242**	
*KSØAA	*	4,592	45	41	
***KØWHV**	**14**	**85,932**	**192**	**186**	
*KCØYHU	*	10,439	77	73	
*WØGAF	*	10,153	77	71	
*KDØNEO	*	1	1	1	
***ACØPB**	**7**	**260**	**10**	**10**	
Alaska					
KL1V	**A**	**1,777,104**	**1253**	**602**	
AL1G	*	32,344	118	104	
WL7O	**7**	**667,756**	**505**	**278**	
***KL7SB**	**A**	**494,532**	**603**	**342**	
*WL7BDO	*	251,438	384	242	
*KL2SX	*	196,968	303	232	
*KL7R	*	67,539	185	141	
*KL7NC	*	25,840	114	76	
***WL7UQ**	**14**	**117,390**	**220**	**195**	
*KL2ZZ	*	32	4	4	
Anguilla					
VP2EH	**21**	**14,899,185**	**4348**	**1305**	
			(OP: N5AU)		
Barbados					
8P5A	**A**	**23,277,792**	**6158**	**1376**	
			(OP: W2SC)		
8P6ER	*	23,296	112	91	
***8P3A**	**A**	**11,958,208**	**3211**	**1088**	
			(OP: VE3DZ)		
Bermuda					
***VP9I**	**A**	**2,461,312**	**1385**	**656**	
			(OP: N1SNB)		
Canada					
VY2ZM	**A**	**21,257,127**	**4939**	**1257**	
			(OP: K1ZM)		
VE9HF	*	2,042,516	1128	613	
VA1MM	*	164,016	264	201	
VO1BQ	*	73,848	181	136	
***VE1ZA**	**A**	**1,192,671**	**785**	**489**	
*VO1DJT	*	404,580	424	330	
***VE1SQ**	**14**	**25,632**	**100**	**96**	
			(OP: VE1RAR)		
VE2EZD	**A**	**3,978**	**44**	**39**	
***VE2HIT**	**A**	**1,008,616**	**695**	**392**	
*VE2AWR	*	740,405	627	373	
*VA2UTC	*	31,383	115	99	
*VA2OP	*	19,320	73	69	
*VE2GLA	*	12,096	67	64	
*VE2AXO	*	7,568	48	44	
VE3EJ	**A**	**19,309,150**	**4413**	**1283**	
XL3A	*	17,686,638	4310	1251	
			(OP: VE3AT)		
VE3JM	*	509,139	525	327	
VA3EC	*	49,078	136	106	
VA3LUK	*	22,041	93	79	
VE3KZ	**21**	**3,179,880**	**1418**	**883**	
VA3FP	*	123,615	221	201	
VA3XH	**3.7**	**18,550**	**53**	**50**	
***VA3SWG**	**A**	**3,467,408**	**1452**	**746**	
*VE3JAQ	*	2,759,275	1307	703	
*VE3TU	*	1,052,388	789	414	
*VA3WU	*	866,244	646	444	
*VE3TW	*	651,105	587	371	
*VE3NNG	*	416,484	412	276	
*VE3BVA	*	386,208	380	298	
*VA3GKO	*	383,838	410	266	
*VE3RZ	*	381,351	396	317	
*VE3NB	*	356,070	350	286	
*VE3EK	*	277,574	330	242	
*VE3AGC	*	118,320	218	174	
*VA3JWR	*	99,825	199	165	
*VA3ARK	*	98,910	225	157	
*VE3RCN	*	65,349	164	137	
*VE3WMJ	*	14,824	78	68	
*VE3FWA	*	12,408	69	66	
*VE3KNT	*	3,248	28	28	
*VE3EXW	*	2,996	33	28	
*VA3CME	*	30	5	5	
***VA3GUY**	**14**	**226,590**	**307**	**273**	
***VE3SWS**	**7**	**76,080**	**125**	**120**	
*VE3LM	*	462	11	11	
*VE3IAE	*	280	7	7	
***VE3EDY**	**1.8**	**4,080**	**40**	**30**	
VE4KZ	**14**	**12,040**	**71**	**70**	
***VE4YU**	**A**	**622,839**	**592**	**399**	
*VE4RA	*	68,150	167	145	
*VE4XM	*	31,720	123	104	
VA5SAM	**A**	**330**	**11**	**11**	
VE5ZX	**21**	**1,181,160**	**873**	**579**	
VE5CPU	**14**	**24,596**	**181**	**86**	

VE6TL	**A**	**2,545,176**	**1367**	**692**	
***VA6UK**	**A**	**219,098**	**316**	**253**	
*VE6SQ	*	139,279	301	197	
VA7ST	**A**	**1,439,296**	**896**	**523**	
VE7AX	*	193,428	290	243	
VE7NSR	*	16,600	94	83	
			(OP: VA7JMO)		
VA7BS	*	8,178	64	58	
VE7XF	**21**	**931,095**	**748**	**495**	
***VE7BC**	**A**	**787,270**	**670**	**421**	
*VE7IN	*	333,464	361	292	
*VE7RSV	*	7,956	52	51	
***VA7CRZ**	**21**	**103,578**	**218**	**183**	
***VE7DAQ**	**14**	**338**	**13**	**13**	
VY1EI	**21**	**749,480**	**850**	**410**	
***VE8GER**	**A**	**478,764**	**483**	**372**	
***VE8DW**	**14**	**560**	**14**	**14**	
Cayman Islands					
***ZF2AE/ZF8**	**A**	**71,292**	**196**	**156**	
			(OP: AA5UK)		
Costa Rica					
***TI7/NØSXX**	**A**	**597,888**	**823**	**346**	
Cuba					
***CM5FZ**	**A**	**172,380**	**254**	**195**	
*CM2XT	*	85,068	219	153	
*CM2RVA	*	2,697	40	31	
***CM8WAL**	**28**	**152,036**	**309**	**199**	
Dominica					
***J73WA**	**A**	**161,264**	**313**	**211**	
Dominican Republic					
HI8PJP	**28**	**168,210**	**349**	**210**	
***HI3TEJ**	**A**	**7,886,235**	**2751**	**1005**	
***HI3EPR**	**28**	**402,420**	**640**	**285**	
***HI3K**	**21**	**3,250,488**	**1585**	**811**	
***HI3CC**	**14**	**572,648**	**627**	**376**	
***HI3FVA**	**7**	**888,914**	**540**	**358**	
Guatemala					
***TG9AXF**	**14**	**775,280**	**721**	**440**	
Honduras					
***HQ9R**	**21**	**1,318,214**	**927**	**566**	
			(OP: WQ7R)		
Jamaica					
6Y1X	**A**	**1,629,996**	**1373**	**492**	
			(OP: KD8MJR)		
Martinique					
TO5A	**A**	**10,088,316**	**3185**	**1029**	
			(OP: F5VHJ)		
***FM1HN**	**21**	**23,023**	**91**	**91**	
***FM5FJ**	**14**	**748,134**	**594**	**467**	
Mexico					
XE2S	**A**	**1,156,608**	**930**	**502**	
XE1GRR	*	130,025	294	175	
XE2WWW	**21**	**108,108**	**245**	**182**	
***XE3N**	**A**	**1,518,236**	**941**	**538**	
*XE1FZE	*	190,125	345	225	
*XE2JA	*	26,730	115	99	
***XE1L**	**28**	**513,628**	**852**	**292**	
Panama					
***HP3FTD**	**A**	**32,064**	**119**	**96**	
Puerto Rico					
K4J	**28**	**35,568**	**149**	**104**	
			(OP: KP4JRS)		
KP4WW	**21**	**5,068,602**	**2209**	**954**	
WP3C	**3.7**	**1,802,710**	**788**	**490**	
***WP3GW**	**A**	**399,066**	**427**	**293**	
*NP4EG	*	137,313	293	209	
*NP3HM	*	77,760	195	162	
*NP3CW	*	32,028	147	102	
Sint Maarten					
PJ7MF	**14**	**12**	**2**	**2**	
U.S. Virgin Islands					
WP2Z	**A**	**4,009,768**	**2294**	**772**	
			(OP: K8MJZ)		
NP2X	*	654,240	684	376	
***KV4FZ**	**A**	**2,654,680**	**1639**	**665**	
			(OP: N2TTA)		
AFRICA					
African Italy					
***IH9YMC**	**21**	**128,838**	**230**	**197**	
Canary Islands					
EC8AFM	**A**	**368,280**	**385**	**297**	
EA8CNB	*	33,077	118	97	
EA8DO	**28**	**2,172,000**	**1237**	**600**	
***EA8OM**	**A**	**1,454,111**	**848**	**521**	
			(OP: DJ1OJ)		
*EA8BQM	*	653,752	577	374	
*EA8CVW	*	94,956	194	164	
*EA8AQV	*	3,570	35	34	
*EA8DG	*	615	15	15	
***EA8TX**	**28**	**3,091,200**	**1509**	**700**	
*EA8/DL3KVR	*	523,446	577	309	
***EC8AQQ**	**21**	**130,900**	**243**	**187**	
Djibouti					
J28RO	**A**	**87,616**	**206**	**148**	
			(OP: F5IRO)		
***J28AA**	**14**	**126**	**7**	**6**	
			(OP: E78A)		
Madeira Islands					
CR3L	**A**	**1,542,816**	**815**	**529**	
			(OP: DL9OLI)		
***CT3FJ**	**14**	**21,930**	**91**	**85**	
Morocco					
CN2R	**21**	**20,704,164**	**4830**	**1443**	
			(OP: W7EJ)		
***CN2BC**	**A**	**2,639,091**	**1273**	**537**	
			(OP: DL7BC)		
*CN8YE	*	532,012	501	338	
*CN8SG	*	508,878	537	306	
Nigeria					
5N7M	**A**	**828,672**	**649**	**416**	

Rep. of Congo					
***9Q6CC**	**28**	**1,718,528**	**1086**	**548**	
			(OP: CX2CC)		
South Africa					
ZS6BRZ	**A**	**1,721,091**	**1066**	**563**	
ZS9Z	*	1,302,840	894	504	
			(OP: ZS1OIN)		
***ZS2NF**	**A**	**27,540**	**98**	**90**	
*ZS1JY	*	5,324	44	44	
Sudan					
ST2AR	**A**	**12,793,690**	**3702**	**1105**	
			(OP: S53R)		
Tunisia					
***3V8SS**	**A**	**6,999,180**	**2313**	**930**	
			(OP: KF5EYY)		
ASIA					
Armenia					
EK3SA	**21**	**2,557,390**	**1345**	**694**	
***EK3GM**	**A**	**194,634**	**236**	**198**	
Asiatic Russia					
RC9O	**A**	**17,252,196**	**3678**	**1222**	
RA9AE	*	5,718,761	2004	857	
R8MC	*	5,108,870	1796	845	
RU9AC	*	3,582,811	1473	701	
RA9AAA	*	1,923,594	1026	613	
UA9XF	*	1,739,920	940	520	
RL9I	*	1,038,192	749	503	
RX9JD	*	579,072	524	384	
R9QQ	*	533,664	483	327	
R8TX	*	228,352	328	256	
RM9T	*	160,011	239	207	
UA9XZ	*	107,460	216	180	
RK9AN	*	64,064	155	143	
R8XA	*	61,640	150	134	
UA9FM	*	26,481	103	97	
RT9A	*	5,450	53	50	
RZ9UI	**28**	**169,460**	**346**	**229**	
UA9TF	*	30,210	130	106	
RF9M	**21**	**2,038,013**	**1237**	**653**	
UA9FGJ	*	930,741	704	483	
R9CB	*	613,854	585	402	
UI8U	*	441,056	488	352	
RV9JR	**14**	**2,001,000**	**1085**	**667**	
R9UT	*	481,800	505	365	
UA9YF	*	106,020	202	190	
R8US	*	5,760	48	48	
RN9N	**7**	**780,039**	**436**	**339**	
UA9FBV	*	96,901	147	127	
RX9UKF	**3.7**	**83,463**	**146**	**129**	
***UA9R**	**A**	**2,608,501**	**1240**	**623**	
*R9FR	*	758,340	594	396	
*UA9AU	*	536,900	501	350	
*RT9YA	*	437,235	444	309	
*RX9KD	*	364,240	434	290	
*RX9OJ	*	306,720	381	284	
*R8MD	*	262,295	344	251	
*RV9WND	*	101,244	219	177	
*RC9YA	*	96,148	226	172	
			(OP: RW9Y)		
*UA9CBM	*	37,400	124	110	
*R9OAZ	*	31,284	112	99	
*RW9UX	*	23,406	98	94	
*UA9AX	*	14,070	78	70	
*RV9MA	*	11,859	73	67	
*RA9JB	*	10,106	64	62	
*UA9XBJ	*	9,858	59	53	
*RA9UGU	*	8,056	57	53	
*RV9WA	*	7,722	55	54	
*UA9JFR	*	4,602	41	39	
*RM9X	*	3,944	36	34	
*RZ9WU	*	2,400	32	30	
*R9UG	*	1,848	29	28	
***RZ8U**	**21**	**846,384**	**736**	**462**	
*RV9YZ	*	375,023	449	331	
*R9WS	*	324,678	380	318	
*RU9WZ	*	314,975	416	293	
*R9RA	*	286,650	365	294	
*RX9CCJ	*	168,980	284	238	
*RA9XU	*	113,365	242	205	
*RZ9UMA	*	39,676	127	109	
*UB8QAA	*	15,124	80	76	
***RV9CM**	**14**	**139,260**	**234**	**211**	
*UA9ODE	*	31,096	116	104	
*RK9UAC	*	29,580	108	102	
*RZ9UGN	*	4,320	41	40	
*RZ9YB	*	3,536	37	34	
***RK9ALP**	**7**	**6,335**	**42**	**35**	
RWØCN	**A**	**11,125,136**	**3356**	**1176**	
RWØA	*	7,073,011	2447	913	
			(OP: RAØAM)		
RMØA	*	955,778	665	446	
			(OP: UAØANW)		
UAØIBX	*	709,650	633	415	
RØ/KE5JA	*	399,776	641	248	
RAØAPW	*	161,994	233	203	
UAØDAM	*	142,875	248	225	
UAØSOX	*	90,424	193	178	
RWØUM	*	78,942	217	177	
RZØSW	*	9,300	73

*RUØUA	*	5,220	45	45
*RWØCV	*	2,508	34	33
Asiatic Turkey				
TA2ZAF	**28**	**24,092**	**116**	**76**
			(OP: OK1MU)	
***TC3C**	**A**	**2,759,445**	**1319**	**585**
			(OP: TA3HM)	
*TA1HZ/2	*	258,664	310	248
*TA3X	*	148,365	239	189
*TA7EB	*	5,476	38	37
***TC6IK**	**21**	**34,299**	**128**	**103**
***TC2T**	**14**	**293,376**	**405**	**256**
			(OP: TA2MW)	
*TA4AU	*	30,199	107	101
***TB2MYE**	**7**	**5,040**	**30**	**30**
*TA2KN	*	150	5	5
			(OP: TA1FR)	
Azerbaijan				
***4K9W**	**A**	**148,400**	**248**	**212**
***4K8M**	**28**	**10,492**	**75**	**61**
***4K5FO**	**14**	**351,430**	**409**	**311**
Bhutan				
A5	**A**	**50,050**	**266**	**130**
			(OP: JH1AJT)	
China				
BD4QH	**A**	**1,083,360**	**884**	**488**
BD3OE	*	258,520	478	281
BH4RIC	*	1,612	32	31
BD5DML	*	1,148	31	28
BG4GGS	*	990	23	22
BG5DOD	*	70	7	7
BA8AG	**28**	**62,729**	**230**	**149**
BG9BUS	**21**	**680**	**20**	**20**
B7M	**14**	**609,368**	**671**	**422**
BH7PAZ	*	442,378	556	373
BH4SYG	*	6	2	2
***BD2OB/7**	**A**	**124,972**	**255**	**199**
*BG5CIC	*	101,742	250	186
*BG5FFK	*	95,586	224	178
*BY4LY	*	66,452	217	148
			(OP: BD4MCG)	
*BD4RDU	*	55,998	199	122
*BD4KYA	*	55,970	175	145
*BD9BU	*	32,736	163	124
*BG7NFM	*	31,860	132	118
*BG8GAM	*	24,852	134	109
*BH4SCF	*	23,142	107	87
*BD2TBJ	*	23,100	110	100
*BH7PFH	*	23,056	102	88
*BH1ERB	*	13,680	92	80
*BG5PN	*	12,312	81	72
*BG4UZN	*	11,160	74	72
*BD4RQ	*	8,236	64	58
*BG6JPV	*	7,080	69	60
*BG2VIA	*	5,593	54	47
*BG5LW	*	5,546	47	47
*BG8DMY	*	4,730	63	55
*BD1MWH	*	4,680	45	40
*BA4SCP	*	4,452	52	42
*BD8EM	*	4,284	60	51
*BG8DVM	*	3,444	44	41
*BH4TZM	*	3,430	39	35
*BD4SX	*	2,912	34	32
*BH4SRC	*	2,664	41	37
*BG4KLA	*	2,409	37	33
*BG6ICL	*	2,139	32	31
*BD3RQ	*	648	19	18
*BG8BIN	*	544	18	17
*BH7PRM	*	315	16	15
***BH7OZG**	**28**	**91,520**	**295**	**160**
***BD8ASG**	**21**	**255,190**	**408**	**302**
*BG7IEU	*	86,070	229	190
*BA6IV	*	69,888	195	168
*BD6JJX	*	57,904	194	154
*BD5HSV	*	35,424	129	123
*BG4TYQ	*	33,579	132	117
*BD6JEQ	*	9,152	69	64
*BG6KAD	*	680	17	17
*BG6IF	*	63	7	7
*BG2TBN	*	12	2	2
*BG8AAK	*	9	3	3
***BD4WZH**	**14**	**70,215**	**250**	**155**
*BD5HST	*	55,100	179	145
*BD4TJ	*	3,311	47	43
*BD6HG	*	1,590	33	30
*BA4KX	*	1,300	28	26
*BD4QA	*	330	16	15
Cyprus				
P33P	**A**	**394,012**	**386**	**274**
			(OP: 5B4ZN)	
C4W	**28**	**730,560**	**793**	**320**
		(OP: 5B4WN @5B4ES)		
H2T	**3.7**	**2,282,334**	**807**	**498**
			(OP: 5B4XF)	
***H22H**	**A**	**4,384,710**	**1802**	**774**
			(OP: 5B4MF)	
*5B/HA5PP	*	2,974,599	1444	603
*H2E	*	914,805	672	435
***C4Z**	**21**	**2,292,070**	**1337**	**622**
			(OP: 5B4AIZ)	
Georgia				
4L4CC	**3.7**	**2,126,729**	**799**	**487**
***4L6DL**	**21**	**477,954**	**529**	**318**
Hong Kong				
VR2XMT	**21**	**8,750**	**90**	**70**
***VR2PX**	**A**	**110,880**	**282**	**210**
***VR2PW**	**14**	**139,672**	**258**	**221**
India				
VU2SWS	**A**	**422,864**	**459**	**304**
***VU3DJQ**	**28**	**84,111**	**224**	**159**
Israel				
***4Z5TZ**	**A**	**148,928**	**249**	**179**
*4Z5MV	*	24,480	96	90
*4Z5PJ	*	17,171	85	77
*4Z5FI	*	1,400	24	20
***4X6DK**	**28**	**137,634**	**273**	**174**
***4X2ØHC**	**14**	**11,224**	**64**	**61**
			(OP: 4Z5FI)	
Japan				
JQ1QKK	**A**	**592,007**	**570**	**403**
JA1IKA	*	187,824	309	208
JK1MZT	*	60,588	158	132
JE1REU	*	34,216	128	94
JA1IXY	*	30,186	92	86
JP1EWY	*	19,656	86	78
JA1JYS	*	10,812	63	53
JO1SIM	*	936	20	18
JI1DSU	*	714	14	14
JH1EAQ	**21**	**122,521**	**276**	**161**
***JH1FNU**	**A**	**326,200**	**430**	**280**
*JA1GLE	*	268,324	353	259
*JHØCEO/1	*	137,632	273	184
*JA1AZR	*	49,088	156	104
*JF1KWG	*	45,714	134	114
*7K4VPV	*	44,323	133	127
*JA1DDZ	*	40,115	126	113
*JA1VGV	*	37,130	114	94
*JP1HUJ	*	33,174	122	97
*JA1ATM	*	26,809	120	83
*JA1FO	*	22,560	98	80
*JG1LPL	*	9,177	65	57
*JG1SWV	*	5,250	56	50
*JG1GCO	*	3,627	42	39
*JA1LBZ	*	3,220	35	35
*JJ1WWL/1	*	1,272	25	24
*JN1CDB	*	1,100	21	20
*7N4CPT	*	495	11	11
*JR1AHP	*	27	3	3
***JH5GHM/1**	**28**	**6,075**	**55**	**45**
*7N2UQC	*	2,604	34	31
***JA1PJS**	**21**	**187,296**	**291**	**246**
*JA1BPA	*	118,170	233	202
*JA1RYC	*	52,542	149	139
*JP1IXV	*	33,072	116	106
*JK1NSR	*	21,384	96	88
*JA1TBX	*	20,520	97	90
*JO1GRR	*	13,832	78	76
*JA1OHP	*	10,710	65	63
*JF1PYJ	*	9,440	61	59
*JK1BII	*	9,424	67	62
*JA1JLP	*	9,322	61	59
*JN1DNV	*	8,468	59	58
*JE1JAC	*	6,580	52	47
*JA1DBG	*	6,500	50	50
*JI1LAI	*	867	17	17
*JF1HJX	*	532	14	14
*JN1BBO	*	403	13	13
*JL7FBV/1	*	220	10	10
***JF1TEU**	**14**	**13,720**	**78**	**70**
*JA1KEV	*	7,564	66	61
***JA1XMS**	**7**	**298,146**	**256**	**222**
*JJ1YED	*	520	10	10
			(OP: JK1BII)	
***JE1SPY**	**3.7**	**15,120**	**74**	**60**
JA2IVK	**A**	**4,868,240**	**1820**	**806**
JA2VHO	*	755,172	630	396
JA2BNN	*	470,854	539	311
JA2AXB	*	219,716	331	236
JR2PMT	*	200,466	289	222
JE2OTM	**3.7**	**4,031**	**31**	**29**
***JA2CUS**	**A**	**621,152**	**578**	**376**
*JA2GHP	*	77,792	188	136
*JA2KPW	*	74,316	183	132
*JP2MRD	*	26,076	104	82
*JF2OHQ	*	9,700	70	50
*JQ2OUL	*	6,144	54	48
*JR2PAU	*	6,090	45	42
***JH2MYN**	**28**	**11,220**	**73**	**66**
***JA2MOG**	**21**	**81,627**	**191**	**169**
*JE2HXL	*	76,608	180	168
*JA2PFO	*	24,459	100	93
*JA2KKA	*	22,506	100	93
*JF2FIU	*	6,400	50	50
*JR2AAN/2	*	6,050	52	50
*JS2PHO	*	4,662	43	42
*JG2VSF	*	40	4	4
***JA2GTW**	**7**	**94,120**	**144**	**130**
JO3DDD	**A**	**2,976,850**	**1444**	**725**
JR3NZC	*	1,075,482	828	447
JA3EY	*	88,683	161	123
JN3QNG	*	30,039	116	93
JA3LEZ	*	24,288	99	88
JA3QOS	**28**	**30,603**	**124**	**101**
JH3GCN	**21**	**69,576**	**169**	**156**
JF3LOP	**3.7**	**6,280**	**41**	**40**
***JO3PSJ**	**A**	**179,760**	**312**	**214**
*JA3HBF	*	94,200	206	150
*JA3JM	*	11,136	69	58
*JG3BXS	*	9,828	69	54
*JR3KAH	*	9,180	71	54
*JA3KDJ	*	7,611	65	59
*JO3EVM	*	5,031	44	43
*JI3OGI	*	400	12	10
***JF3BFS**	**21**	**1,408,872**	**913**	**564**
*JR3RIY	*	1,406,874	903	574
*JH3OXM	*	41,250	136	125
*JA3BBG	*	14,896	80	76
*JA3PYH	*	13,860	78	70
*JI3FLA	*	1,152	25	24
***JA3DAY**	**14**	**26,550**	**103**	**90**
***JA3NOJ**	**7**	**4,466**	**33**	**29**
JA4NQD	**A**	**20,381**	**116**	**89**
JM4WUZ	**21**	**190,530**	**315**	**219**
JA4AQR	*	54,940	146	134
***JR4POP**	**A**	**139,080**	**255**	**190**
***JR4LRY**	**21**	**3,686**	**40**	**38**
***JR4GPA**	**14**	**164,004**	**287**	**237**
*JR4FLW/4	*	20,076	96	84
***JR4VEV**	**7**	**17,784**	**63**	**57**
JA5FBZ	**21**	**742,349**	**627**	**439**
***JG5UWK**	**A**	**87,843**	**204**	**141**
***JG5DHX**	**21**	**139,764**	**258**	**228**
JA6BWH	**A**	**440,640**	**471**	**324**
JE6HUR	*	10,710	63	51
JA6GCE	**21**	**7,055,664**	**2519**	**996**
***JR6GIM**	**A**	**110,396**	**222**	**193**
*JE6HID	*	432	14	12
***JA6WFM**	**28**	**95,460**	**229**	**172**
***JA6EFT**	**21**	**31,920**	**120**	**105**
***JA6FGC**	**7**	**31,312**	**85**	**76**
JE7YSS	**A**	**1,826,432**	**1046**	**608**
			(OP: 7N4TEN)	
JA7JH	**28**	**10,140**	**64**	**60**
***8N7YAB/7**	**A**	**133,900**	**270**	**206**
			(OP: JH7CUO)	
*JA7SSP	*	13,908	69	61
*JA7VEI	*	5,934	47	46
*JI7OED/7	*	84	6	6
***JH7RTQ**	**21**	**1,277,312**	**811**	**587**
*JO7GVC	*	73,800	173	164
*JH8CLC/7	*	3	1	1
***JA7HYS**	**7**	**7,216**	**41**	**41**
JA8DIV	**A**	**152,234**	**238**	**206**
JA8ECS	**28**	**3,496**	**42**	**38**
JH8SIT	**14**	**45,496**	**139**	**121**
***JA8IJI**	**A**	**94,696**	**203**	**178**
*JL8MBF	*	50,808	149	116
*JE8KKX	*	32,256	115	96
JA9CCG	**21**	**168,032**	**263**	**236**
***JA9EJG**	**A**	**2,904**	**35**	**33**
***JH9VUU**	**21**	**3,500**	**38**	**35**
JAØJHA	**A**	**13,744,296**	**3876**	**1182**
JAØCIY	*	189,216	307	219
JRØGUY	**21**	**92,400**	**201**	**176**
***JHØEPI**	**14**	**151,668**	**278**	**198**
Jordan				
JY5CC	**A**	**8,357,766**	**2591**	**866**
Kampuchea				
***XU7KOH**	**A**	**86,625**	**276**	**175**
***XU7FMZ**	**21**	**407,370**	**605**	**370**
			(OP: JA1FMZ)	
Kazakhstan				
UPØL	**A**	**16,480,550**	**3771**	**1175**
			(OP: UN9LW)	
UP2L	*	15,886,534	3884	1207
			(OP: UN9LG)	
UP4L	*	10,621,306	2873	1033
			(OP: UN7LZ)	
UN7MMM	*	4,105,080	1648	756
UN6P	*	32,205	101	95
UN8GV	**21**	**2,247,570**	**1307**	**678**
UP7P	*	2,178,540	1215	684
			(OP: UN7PBY)	
UN7PL	**14**	**460,790**	**466**	**355**
UN8LWF	*	80,295	185	159
			(OP: UN9LAB)	
UN7FDP	*	7,293	51	51
***UN7FW**	**A**	**1,596**	**28**	**28**
***UN3Z**	**28**	**2,640**	**33**	**30**
***UN6LN**	**21**	**612,196**	**613**	**386**
*UN7EX	*	28,200	112	100
*UN7TW	*	901	18	17
***UN7RL**	**14**	**194,304**	**289**	**256**
*UN9PQ	*	143,000	252	220
*UN5C	*	13,774	74	71
*UN2G	*	817	19	19
Kyrgyzstan				
EX8AB	**A**	**118,000**	**250**	**200**
***EX2X**	**A**	**1,661,660**	**1029**	**581**
***EX8MK**	**28**	**4,646**	**48**	**46**
Lebanon				
***OD5WPX**	**A**	**829,143**	**698**	**369**
			(OP: OD5NJ)	
Macau				
***XX9AU**	**21**	**6,222**	**70**	**51**
Ogasawara				
***JD1BIA**	**28**	**189**	**9**	**7**
Qatar				
A71BX	**21**	**712,011**	**654**	**391**
Saudi Arabia				
***HZ1PS**	**A**	**723,384**	**616**	**394**
*HZ1HN	*	19,327	81	77
***HZ1DG**	**28**	**392,462**	**483**	**289**
Singapore				
***9V1IZ**	**21**	**1,104**	**25**	**23**
South Korea				
HL5UOG	**A**	**95,760**	**222**	**171**
DS5QLJ	*	10,725	68	65
HL5/LA8JKA	**21**	**467,548**	**481**	**358**
***DS3BNU**	**A**	**8,477**	**60**	**49**
***HL5YI**	**14**	**570**	**17**	**15**
Taiwan				
BV1EK	**A**	**399,546**	**473**	**302**
***BX2AI**	**A**	**40,474**	**161**	**118**
*BV4VQ	*	17,544	113	86
***BU2AE**	**21**	**44,622**	**167**	**134**
Thailand				
HSØZDG	**A**	**2,403,058**	**1328**	**686**
E2E	*	1,977,360	1220	616
			(OP: HSØZDW)	
HSØZEE	*	9,338	63	58
HSØZDR	**21**	**39,729**	**135**	**123**
***HSØZHC**	**A**	**333,900**	**455**	**315**
*E21YDP	*	285,012	390	273
***E2ØYLM**	**21**	**99,395**	**230**	**193**
Vietnam				
***XV4Y**	**A**	**8,142**	**76**	**59**
West Malaysia				
9M2NNM	**A**	**432,776**	**604**	**376**
9M2TO	*	53,280	182	148
9M2IDJ	**28**	**36,890**	**132**	**119**
9M2CQC	**14**	**136,728**	**237**	**216**
***9M2ZAK**	**A**	**47,150**	**151**	**115**
*9M2MRS	*	1,224	25	24
***9W2ESM**	**28**	**14,475**	**86**	**75**
*9W2WWW	*	2,640	36	30
*9W2CBL	*	1,430	25	22
*9W2CEH	*	198	10	9

EUROPE

Aland Islands				
OHØYY	**14**	**772,750**	**1010**	**562**
			(OP: OH2YY)	
Andorra				
***C31CT**	**A**	**130,848**	**338**	**232**
Austria				
OE6MDF	**A**	**2,463,750**	**1376**	**750**
OE9MON	*	296,670	435	319
OE2IJL	*	79,016	191	166
***OE3JTB**	**A**	**875,854**	**725**	**511**
*OE3DMA	*	377,856	494	369
*OE3MWS	*	294,201	376	291
*OE6U	*	281,019	420	331
			(OP: OE6HLF)	
*OE8YMO	*	50,160	186	165
***OE5D**	**28**	**22,320**	**102**	**80**
			(OP: OE2UKL)	
Azores				
CR2T	**28**	**866,500**	**940**	**500**
			(OP: CU2AF)	
***CU5CQ**	**A**	**6,138**	**63**	**62**
*CU3FV	*	44	4	4
Balearic Islands				
***EA6OM**	**28**	**7,296**	**52**	**48**
Belarus				
EU1AZ	**A**	**3,623,136**	**1833**	**876**
EU5T	*	3,491,962	1823	862
			(OP: EW2A)	
EV25D	*	2,376,192	1447	768
			(OP: EW8DD)	
EU4AA	*	466,250	566	373
EW8DX	*	320,105	473	365
EW3LN	*	83,961	209	171
EW8ADX	*	42,360	144	120
EW6GF	**14**	**341,890**	**629**	**382**
EU3AA	**7**	**147,060**	**270**	**228**
***EU2MM**	**A**	**613,408**	**713**	**464**
*EU1EU	*	33,948	181	138
*EW7LE	*	7,381	64	61
*EW6GL	*	1,944	29	27
***EW6AF**	**21**	**203,095**	**350**	**269**
*EW2EO	*	200	10	10
***EV6M**	**14**	**31,725**	**150**	**141**
***EW2EG**	**7**	**240**	**12**	**12**
***EU2EU**	**1.8**	**1,484**	**28**	**28**
Belgium				
OQ5M	**21**	**2,345,912**	**1346**	**664**
			(OP: ON5ZO)	
OQ7T	**7**	**952,380**	**915**	**468**
***OP4A**	**A**	**337,350**	**469**	**346**
*ON3AR	*	310,976	419	344
*ON3ND	*	118,910	304	235
*ON8WV	*	82,533	218	183
*ON7BT	*	71,154	203	177
*OP4K	*	47,558	185	158
*ON6LO	*	37,000	167	148
*ON5WL	*	19,491	99	89
*ON3EA	*	18,100	115	100
***ORØA**	**28**	**37,961**	**137**	**119**
***OSØS**	**21**	**58,706**	**176**	**149**
*ON6FC	*	31,030	116	107
***ON1CB**	**3.7**	**203,856**	**345**	**248**
Bosnia-Herzegovina				
E7DX	**A**	**20,438,120**	**4890**	**1322**
			(OP: E77DX)	
E74HH	*	6,598,899	2599	1041
			(OP: S56M)	
***E73MJ**	**A**	**67,240**	**206**	**154**
*E74KM	*	12,825	86	75
*E77J	*	2,475	35	33
			(OP: YU2EA)	
***E78CB**	**21**	**5,382**	**46**	**39**
***E79D**	**7**	**349,798**	**418**	**326**
Bulgaria				
LZ3FN	**A**	**3,062,268**	**2068**	**814**
LZ2JR	*	61,021	169	139
LZ1RGT	*	34,391	134	119
LZ2ZG	*	6,811	52	49
LZ9Z	**28**	**1,470**	**24**	**21**
LZ2PG	**21**	**35,203**	**114**	**107**
LZ5K	**14**	**706,008**	**883**	**552**
LZ8A	*	3,366	52	51
			(OP: LZ1KDP)	
LZ1KPP	*	624	27	26
LZ1GL	**7**	**358,618**	**435**	**338**
LZ1KKZ	*	23,296	108	91
			(OP: LZ1DLZ)	
***LZ2FQ**	**A**	**768,725**	**803**	**485**
*LZ1DM	*	417,087	552	363
*LZ1BY	*	163,639	320	241
*LZ1JZ	*	43,200	139	120
*LZ3GH	*	28,016	118	103
*LZ2FM	*	20,203	104	89
*LZ3RN	*	10,168	67	62
*LZ1RN	*	7,705	70	67
*LZ1DNY	*	5,412	50	44
*LZ1MC	*	1,700	30	25
***LZ3DJ**	**21**	**1,952**	**34**	**32**
*LZ1HW	*	96	6	6
Corsica				
***TK/F8DZY**	**A**	**252**	**19**	**18**
Crete				
***SV9GPV**	**28**	**514,215**	**649**	**351**
Croatia				
9A8A	**A**	**169,320**	**315**	**255**
9A5MT	**28**	**13,940**	**75**	**68**
9A25TA	**7**	**1,152,320**	**966**	**520**
			(OP: 9A3TA)	
9A3AGS	*	433,561	465	361
9A4BY	**3.7**	**2,468,252**	**1373**	**691**
			(OP: 9A3LG)	
9A8M	*	1,466,160	1066	596
			(OP: 9A7DM)	
9A2R	*	894,870	778	489
9A2LX	*	245,385	402	287
***9AØW**	**A**	**567,666**	**564**	**423**
*9A1IW	*	553,932	635	414
*9A6IND	*	128,710	262	211
*9A2GA	*	49,320	152	137
*9A1SZ	*	15,486	91	87
***9A5ST**	**28**	**67,639**	**179**	**143**
***9A7B**	**21**	**2,340**	**30**	**30**
			(OP: 9A4W)	
***9A2XW**	**7**	**88,634**	**229**	**182**
*9A2VX	*	76,500	191	170
*9A3IGY	*	61,620	178	158
*9A6SJZ	*	6,201	59	53
***9A1JSB**	**3.7**	**324,912**	**450**	**336**
			(OP: 9A7ZZ)	
Czech Republic				
OK7X	**A**	**1,331,120**	**966**	**560**
OK2SAR	*	722,680	762	445
OK2WZN	*	261,018	424	306
OK6CX	*	65,394	205	173
OK2MA	*	8,262	57	51
OK1FPS	**28**	**95,116**	**243**	**172**
OK1XC	**21**	**505,160**	**539**	**365**
OL9Z	**14**	**4,926,056**	**2306**	**986**
			(OP: OK2PVF)	
OK1NG	*	35,768	144	136
OLØW	**3.7**	**933,863**	**794**	**497**
			(OP: OK1DSZ)	
***OK5Y**	**A**	**1,422,808**	**1056**	**607**
			(OP: OK2PTZ)	
*OK2BEN	*	561,867	592	391
*OK2KFK	*	466,050	586	390
*OK1HEH	*	423,696	561	364
*OK1BA	*	371,640	502	380
*OK1MKU	*	363,286	430	337
*OK2BRX	*	289,920	414	302
*OK2WYK	*	176,880	354	264
*OK1BLU	*	147,159	313	249
*OK2PCL	*	140,504	259	182
*OK2PBG	*	65,856	187	147
*OK1MKI	*	60,621	198	167
*OK1JOC	*	48,848	161	142
*OL2T	*	48,657	178	147
*OK2UFU	*	36,156	167	138
*OK1ZHV	*	23,968	120	107
*OK5ZH	*	15,228	101	81
*OK1FCA	*	999	27	27
*OK2JNB	*	432	16	16
*OK1CAI	*	72	8	8
***OK2SW**	**28**	**15,665**	**85**	**65**
***OK2BUT**	**21**	**279,300**	**371**	**300**
*OK2QX	*	151,417	269	223
*OK1CLD	*	63,936	166	148
*OK1MMN	*	12,460	75	70
***OK2ILD**	**14**	**13,680**	**94**	**90**
***OK1LX**	**7**	**513,240**	**600**	**390**
*OK2BRS	*	122,765	248	215
*OK2XKA	*	30,388	110	107
*OK7MT	*	7,884	55	54
***OK1HFP**	**3.7**	**99,594**	**255**	**198**
***OK1KZ**	**1.8**	**1,798**	**31**	**31**
Denmark				
OZ5EV	**A**	**1,029,996**	**778**	**578**
OZ2BKK	*	494,508	587	406
OZ7EA	*	141,648	291	227
OZ1HHH	*	16,790	81	73
OZ8DX	*	7,020	52	45
5P5N	*	5,850	46	45
OZ3BJ	**28**	**7,008**	**50**	**48**
OZ9EC	**14**	**2,842**	**52**	**49**
***OZ4NA**	**A**	**726,028**	**735**	**466**
*5PØO	*	351,828	502	348
*OZ1KVM	*	194,103	355	273
*OU2P	*	96,957	242	189
*OZ1LFI	*	90,528	235	184
*5P8W	*	58,220	203	164
*OZ5HZ	*	45,504	182	144
*OZ5TL	*	25,596	124	108
*5P1B	*	5,600	50	50
*OZ7AEI	*	2,961	52	47
*OZ4RT	*	740	20	20
***OV3X**	**21**	**79,514**	**188**	**166**
			(OP: OZ8AE)	
***OZ1XV**	**14**	**35,030**	**189**	**155**
***OZ1JVX**	**7**	**30,456**	**121**	**108**
***OZ3ABE**	**3.7**	**46,843**	**164**	**139**
England				
M6T	**A**	**10,741,224**	**3260**	**1194**
			(OP: G4BUO)	
MØWLF	*	2,995,190	1593	803
G4SGI	*	211,408	396	292
M1AQV	*	147,777	263	227
2EØCNL	*	115,839	243	211
G7VRK	*	111,748	232	182
G8JXV	*	105,196	229	182
MØVKY	*	546	14	14
GØAEV	**28**	**164,905**	**321**	**215**
MØGME	**21**	**197,017**	**304**	**271**
***G3Y**	**A**	**1,473,121**	**1014**	**611**
			(OP: G3YBY)	
*G3ZQH	*	1,395,456	1104	632
*MØGVZ	*	978,510	926	507
*MØMCV	*	964,911	860	543
*G4DFI	*	374,339	510	371
*G3TDH	*	292,060	460	340
*GØVVM	*	182,614	379	262
*2EØPLA	*	161,868	315	246
*G8MIA	*	134,470	267	226
*G6UBM	*	129,384	266	216
*G8ZRE	*	105,792	301	228
*G8KEK	*	96,255	263	207
*G7DPE	*	88,765	259	205
*G7WBX	*	87,703	202	187
*MØMXX	*	76,636	249	196
*G7RTI	*	56,640	198	160
*M3PZT	*	48,034	162	146
*G7DDN	*	43,942	151	127
*MØGKC	*	36,465	151	143
*MØGOJ	*	34,013	135	113
*MØRBY	*	14,915	102	95
*G4GIR	*	7,410	62	57
*2EØWDX	*	4,732	52	52
*MØPKZ	*	2,774	39	38
*GØFPU	*	2,414	36	34
*GØVQR	*	2,220	30	30
***G2YC**	**14**	**11,616**	**100**	**96**
***G8HBA**	**7**	**129,960**	**268**	**228**
*G1N	*	20,038	92	86
			(OP: G3MZV)	
*MØVFC	*	2,442	34	33
Estonia				
ES5TV	**A**	**17,333,274**	**4594**	**1327**
ES4RD	**21**	**618,849**	**619**	**423**
ES5RW	**14**	**5,896,620**	**2773**	**1020**
ES8TJM	**7**	**205,360**	**343**	**272**
***ES1LS**	**A**	**669,263**	**744**	**469**
*ES1XQ	*	81,657	263	211
			(OP: ES1TRE)	
*ESØIA	*	30,840	144	120
*ES1BA	*	300	10	10
***ES6TX**	**7**	**65,056**	**165**	**152**
***ES2MC**	**3.7**	**402,992**	**478**	**356**
European Russia				
RA1QD	**A**	**114,170**	**258**	**233**
RD1A	*	88,830	223	189
RZ1AZ	*	32,596	127	116
RJ1A	*	15,036	90	84
			(OP: RVØCA)	
RA1OD	*	5,848	49	43

RO1A	*	3,560	42	40
			(OP: RØCY)	
RZ1ZZ	**14**	**2,640,840**	**1685**	**885**
RA1TV	*	12,525	77	75
***RX1CQ**	**A**	**2,551,122**	**1559**	**794**
*RW1CW	*	2,349,968	1385	761
*UA1CUR	*	701,155	739	455
*UA1ZLN	*	272,904	488	332
*U1BA	*	194,300	355	268
*RO1B	*	144,826	277	227
*RV1AE	*	74,448	237	198
*RA1QDP	*	47,235	165	141
*RA1AKR	*	24,795	110	95
*RW1AI	*	5,555	58	55
*UA1AAR	*	507	13	13
***RW1CX**	**28**	**816**	**17**	**16**
***UA1AQA**	**14**	**550,732**	**731**	**476**
*UA2FFX/1	*	291,445	499	385
***RA1AIZ**	**7**	**19,712**	**93**	**88**
RM3F	**A**	**7,988,987**	**3216**	**1159**
			(OP: UA3DPX)	
R3KM	*	2,790,514	1646	839
R3CM	*	2,171,046	1463	743
R3GZ	*	1,294,776	985	588
RA3NC	*	794,244	805	484
RQ5D	*	727,888	822	536
			(OP: RK3F)	
UA3RC	*	403,903	687	391
R3FC	*	300,792	481	332
UA3VFS	*	278,425	408	301
RW3WX	*	268,416	374	288
UA3AGW	*	256,041	402	261
RW3XZ	*	183,825	360	285
R3MS	*	164,880	303	240
R3QX	*	88,140	247	195
RZ3DN	*	74,043	213	171
R3QF	*	73,010	172	149
R2DX	*	63,672	221	168
R3DL	*	52,374	158	129
RA3EA	*	44,160	143	128
R2DW	*	36,994	122	106
RV3IC	*	21,816	107	101
UA3DPM	*	1,063	20	19
RA3PCI	*	330	11	11
R3FN	*	48	4	4
UA3QNS	**28**	**59,321**	**178**	**137**
RA3QPY	**21**	**1,880,739**	**1404**	**651**
RN3RQ	*	129,744	286	212
RK3TD	*	12,118	90	83
RT3DX	**14**	**1,873,060**	**1514**	**787**
RW3DU	*	330,848	494	392
R3ZZ	**7**	**2,527,826**	**1229**	**721**
R3OM	**3.7**	**7,581**	**58**	**57**
***RM5D**	**A**	**2,967,752**	**1740**	**856**
*UD3D	*	1,613,294	1326	662
			(OP: RN3DNM)	
*UA3BL	*	1,469,172	1129	641
*R3FF	*	1,223,158	1109	599
*RA3DAD	*	1,098,608	892	577
*UA3ABJ	*	905,445	791	513
*UA3VVB	*	691,122	698	458
*RN3ZIC	*	617,320	683	440
*RO3DX	*	532,440	559	408
*RL3ZH	*	505,176	632	388
*UA3AIU	*	476,406	569	399
*UA3UNP	*	375,394	508	362
*UA3RAU	*	186,334	318	302
*UA3DKT	*	132,090	280	238
*UA3RN	*	129,899	295	241
*UB3DBW	*	125,325	255	225
*RA3RBL	*	98,980	232	202
*RK3DU	*	91,872	244	198
*RN3ZR	*	84,824	231	184
*RV3DHC	*	83,640	243	205
*RN3ZIN	*	80,626	237	182
*RZ3DA	*	76,944	202	168
*RA3VE	*	74,480	240	190
*RA3TA	*	69,300	219	180
*RX3AON	*	57,120	187	160
*RZ3GV	*	52,976	173	154
*UA3DFR	*	47,759	191	163
*RW3T	*	46,115	144	115
*RN3FY	*	30,705	130	115
*RL3QCQ	*	29,190	143	139
*R3DZ	*	28,728	129	114
*RX3XP	*	26,564	122	116
*RX3AEX	*	25,452	146	126
*UA3IAR	*	23,716	131	121
*UB3DAO	*	23,100	122	110
*RA3RGQ	*	23,040	97	80
*RX3MX	*	22,968	101	88
*RZ3DC	*	20,952	103	97
*RV3YR	*	20,148	100	92
*RZ3ATG	*	19,899	113	99
*UA3UBT	*	18,601	98	89
*RK3IT	*	16,280	82	74
*RA3IS	*	15,190	69	62
*RX3MM	*	7,300	55	50
*UA3DSS	*	4,920	42	41
*RA3XGY	*	2,484	39	36
*RW3LL	*	1,848	22	22
*UA3DFM	*	780	20	20
*RK3CQ	*	486	19	18
***RN3RY**	**28**	**2,430**	**32**	**30**
*RD5O	*	931	22	19
*RW3VA	*	481	13	13
***RD3PX**	**21**	**178,080**	**352**	**265**
*R3BT	*	34,553	110	109
*UA3YAA	*	22,752	103	96
*RU3C	*	14,536	85	79
			(OP: R3ID)	
*RT3M	*	6,069	55	51
*RD3BY	*	5,733	51	49
*RM5O	*	756	32	27
***RA3DGH**	**14**	**65,096**	**233**	**205**
*RY3F	*	51,030	187	162
*RJ3DA	*	19,610	109	106
*R2GM	*	19,008	88	88
*RU3SD	*	6,594	53	42
*RA3TNC	*	108	6	6
***RA3MAV**	**7**	**185,409**	**297**	**243**
*RW3QF	*	56,448	147	144
*RA3YDA	*	48,006	132	127
***R3LC**	**3.7**	**176,276**	**321**	**254**
*RU3PE	*	53,900	174	154
*R3AAA	*	260	10	10
RM4HZ	**A**	**3,420,576**	**2231**	**864**
R4IO	*	499,460	612	340
UA4CNZ	*	418,332	644	426
RW4AD	*	272,875	456	295
UA4NC	*	140,250	297	250
RW4PK	*	99,975	285	215
RV4LC	*	80,040	220	184
RN4HJQ	*	37,631	135	121
RU4CO	*	31,828	121	109
RK4NAB	*	7,470	88	83
UA4HOX	**28**	**54,210**	**173**	**130**
RK4FF	**21**	**5,890,665**	**2791**	**1045**
RZ4HC	**14**	**220,590**	**398**	**342**
RG4F	*	220,506	382	257
UA4NDX	**1.8**	**28,638**	**127**	**111**
***RU4AA**	**A**	**675,745**	**752**	**449**
*RZ4WZ	*	478,816	573	416
*RA4ACX	*	478,385	585	397
*RA4DR	*	420,147	562	399
*RU4SO	*	412,848	511	423
*UD4FD	*	410,836	558	379
*UA4UT	*	273,300	422	300
*RA4CB	*	237,406	376	299
*RA4PIT	*	204,600	403	310
*RN4CA	*	195,552	375	288
*RX4YY	*	194,259	410	293
*RA4HMT	*	149,504	309	256
*RN4NF	*	149,358	262	219
*RA4FUN	*	62,424	165	136
*RK4PC	*	23,730	116	105
*RA4DAR	*	18,656	99	88
*RW4F	*	14,430	80	78
*R4WT	*	13,524	105	92
*RK4PA	*	11,218	79	71
*UA4PCM	*	4,070	37	37
*RA4UAT	*	4,032	37	36
*UA4FER	*	1,408	24	22
***RW4WA**	**21**	**444,652**	**692**	**442**
*UA4AGO	*	28,072	132	121
*RV4LS	*	4,407	40	39
*RW4LQ	*	736	16	16
***RK4R**	**14**	**38,760**	**165**	**152**
*RN4F	*	12,300	78	75
*RD4AA	*	336	21	21
***RA4PTI**	**3.7**	**29,664**	**113**	**103**
*RA4FUT	*	20,832	101	93
***RX4W**	**1.8**	**15,440**	**89**	**80**
R7AY	**A**	**1,027,725**	**931**	**579**
RT7D	*	420,256	620	368
			(OP: R6CD)	
RA6GW	*	155,992	300	248
RC7A	*	29,493	131	113
RA6AR	*	28,956	137	127
RA7C	*	9,555	67	65
RA7A	*	5,950	52	50
RX6AM	**28**	**26,784**	**117**	**93**
RA6XB	**1.8**	**7,000**	**61**	**56**
RM6J	*	5,885	58	55
***RL6M**	**A**	**2,425,386**	**1738**	**789**
*R7NA	*	415,659	496	349
*UA6AES	*	368,630	521	382
*RU6YZ	*	196,204	365	271
*R7MP	*	160,704	347	248
*RA6LIS	*	127,292	302	242
*RA6HSM	*	43,392	150	128
*RA7Y	*	13,824	72	64
*RZ6DX	*	9,275	59	53
*RK6AQP	*	6,076	51	49
*RU6HL	*	3,780	38	36
*RV6FA	*	2,760	32	30
*UA6YI	*	1,953	25	21
***UA6LCN**	**28**	**11,088**	**71**	**63**
*R6CW	*	3,861	44	39
*RX6LOL	*	2,975	40	35
*RK6CM	*	1,768	28	26
*UA6JFG	*	918	19	17
*RN6LOT	*	405	15	15
***RW6AH**	**14**	**97,482**	**263**	**231**
*R7MC	*	61,974	198	198
*RV6ACC	*	20,160	128	120

European Turkey

***TA1CQ**	**A**	**297,726**	**489**	**347**
*TA1DK	*	103,092	267	213

Finland

OH1ØX	**A**	**14,470,407**	**3879**	**1269**
			(OP: OH6UM)	
OH8X	*	10,056,555	3533	1215
			(OP: OH4JFN)	
OH1F	*	6,549,740	2608	1060
			(OP: OH1NOA)	
OH4BNP	*	1,171,150	977	590
OH1B	*	439,704	537	394
			(OP: OH1BOI)	
OG4T	*	358,758	451	342
			(OP: OH4MFA)	
OH3FM	*	4,142	43	38
OH1RX	**28**	**34,230**	**123**	**105**
OG1M	**21**	**964,910**	**822**	**470**
			(OP: OH1VR)	
OI6X	*	842,002	783	439
			(OP: OH6NJ)	
OH4A	**14**	**6,886,168**	**2842**	**1096**
			(OP: OH6KZP)	
OG9X	*	4,556,728	2464	977
OH5TS	*	971,652	926	561
OG6A	**1.8**	**298,452**	**439**	**308**
			(OP: OH6LI)	
***OH1LEG**	**A**	**94,830**	**208**	**174**
*OH1O	*	87,035	199	169
*OH2GBI	*	22,365	111	105
			(OP: NG8T)	
*OH7UM	*	4,536	42	42
***OH6JYH**	**21**	**28,710**	**131**	**110**
***OI3V**	**14**	**181,643**	**429**	**337**
			(OP: OH3LB)	
*OF5ØVRA	*	144,942	340	294
			(OP: OH4TY)	
*OG3P	*	143,028	361	274
			(OP: OH3P)	
*OH6TN	*	12,201	86	83
*OH1TD	*	3,080	44	44

France

F4DSK	**A**	**1,663,844**	**1137**	**653**
F6DZU	*	919,600	860	550
F5POJ	*	642,410	697	454
F5BBD	*	472,576	566	416
F6GPT	*	231,280	428	295
F5PU	*	174,110	260	230
F1SMV	*	9,792	68	64
TM2C	**21**	**2,879,482**	**1641**	**734**
			(OP: F5TRO)	
***TM72C**	**A**	**2,186,072**	**1371**	**721**
			(OP: F4FIP)	
*F5LIW	*	1,061,649	823	537
*F4FFZ	*	656,370	681	459
*TM22P	*	505,621	592	421
			(OP: F6HRP)	
*F4EJW	*	486,134	606	418
*F5BSB	*	476,452	518	383
*F6DRP	*	354,926	495	374
*F5MMF	*	131,080	277	232
*F8VNU	*	95,836	240	194
*F5PAL	*	88,924	218	188
*F5BTH	*	79,296	227	192
*F6EWX	*	78,764	220	203
*F1ICS	*	76,563	211	181
*F1UIJ	*	72,105	200	165
*F5AD	*	71,449	195	173
*F4GBW	*	68,445	219	195
*TM90ILH	*	57,865	190	163
			(OP: F4ASK)	
*F8NUH	*	28,600	116	104
*F4FLF	*	26,299	100	91
*F1IWH	*	24,309	124	111
*F8DYD	*	22,680	113	108
*F4DFR	*	20,793	99	87
*F1MQJ	*	19,847	95	89
*F4FHV	*	11,635	69	65
*F4AVX	*	7,888	60	58
*F4FSB	*	4,664	55	53
*F5MLJ	*	2,726	34	29
*F4FWN	*	273	13	13
*F4GFT	*	266	14	14
***F8AKC**	**28**	**33,957**	**119**	**99**
*F5DRD	*	12,444	73	61
***F5VMO**	**21**	**1,040**	**20**	**20**

Germany

DM1A	**A**	**8,462,286**	**2895**	**1098**
			(OP: DL1IAO)	
DD2ML	*	4,060,768	2034	904
DFØBV	*	1,976,262	1198	681
			(OP: DL1MAJ)	
DK7MCX	*	1,578,252	1129	604
DF9OO	*	1,347,442	998	601
DL6ER	*	1,102,362	884	538
DL9GWD	*	988,000	780	500
DK5TX	*	784,557	729	487
DL5AXX	*	753,304	600	493
DL6RAI	*	732,928	666	448
DK7FP	*	590,376	616	408
DC1JAG	*	514,920	587	420
DGØCC	*	513,216	663	432
DK5MB	*	406,847	439	361
DL8EAQ	*	338,316	434	363
DJ1ER	*	332,655	451	335
DL9DYL	*	325,052	387	329
DL8YR	*	315,324	445	342
DG9MDM	*	209,616	329	264
DJ2ST	*	178,365	297	235
DM3KXL	*	175,895	343	277
DP5K	*	166,844	287	212
			(OP: DL2FCB)	
DL9EO	*	165,710	281	227
DM4DX	*	159,809	326	247
DC9ZP	*	152,205	265	219
DL9HD	*	129,210	242	219
DL5ST	*	122,590	243	230
DG1LS	*	112,996	267	212
DC6RI	*	109,728	268	216
DL6DVU	*	83,720	222	184
DJ6TB	*	60,160	184	160
DL9SUB	*	33,372	124	103
DK4VF	*	22,264	100	92
DG5AA	*	16,650	82	74
DF5RF	*	10,203	61	57
DL7DCL	*	2,100	30	30
DJ6TK	**21**	**28,016**	**111**	**103**
DK1QH	**14**	**124,356**	**290**	**241**
DL9ZWG	*	18,616	106	104
DJ7WW	**7**	**3,742,772**	**1385**	**814**
DJ2YE	*	198,052	317	268
DF2QZ	*	2,320	20	20
DF2DJ	**3.7**	**887,314**	**815**	**487**
DB2B	*	667,306	708	458
			(OP: DL8OBF)	
***DP4X**	**A**	**2,875,560**	**1544**	**773**
			(OP: DL1MGB)	
*DM2DX	*	2,742,168	1511	799
*DJØMCZ	*	1,122,015	903	571
*DL4ZA	*	1,029,996	948	561
*DP4M	*	827,040	839	480
			(OP: DJ4MH)	
*DL6NDW	*	744,668	786	466
*DQØA	*	658,112	702	452
			(OP: DK2DQ)	
*DMØB	*	627,696	588	432
			(OP: DK9IP)	
*DK6BT	*	491,568	527	392
*DAØCCC	*	369,360	492	380
			(OP: DO4HAM)	
*DK7CH	*	365,568	514	357
*DH2PG	*	336,024	457	359
*DK5DC	*	314,846	372	301
*DL4OCH	*	311,640	424	318
*DO5M	*	271,150	449	319
			(OP: DJØZY)	
*DL9KI	*	255,200	427	319
*DJ4DN	*	237,630	348	267
*DJ3JD	*	229,950	381	315
*DL1TS	*	210,816	363	288
*DK15ØRB	*	201,828	363	278
			(OP: DL1SBF)	
*DL1TPY	*	180,923	317	239
*DO3D	*	177,003	337	277
*DL4EBA	*	170,085	348	255
*DL4AC	*	162,657	319	279
*DD1OP	*	159,034	321	262
*DL5JH	*	156,400	298	272
*DL3HWM	*	153,517	277	241
*DK7GH	*	152,865	277	237
*DO9PL	*	142,252	290	244
*DL3UX	*	136,572	302	228
*DL5ALW	*	119,848	244	211
*DL4EAX	*	117,920	276	220
*DL2DQL	*	117,300	273	230
*DG3NEC	*	115,136	275	224
*DF5BM	*	101,015	267	227
*DK9LB	*	99,414	216	189
*DL3WKG	*	93,051	255	211
*DL6MHW	*	91,542	244	209
*DL7DET	*	91,287	219	189
*DO5AWE	*	81,765	247	207
*DF5AN	*	80,808	209	182
*DJ4WM	*	80,478	171	153
*DF5BX	*	78,660	231	190
*DL9LF	*	78,088	202	172
*DF9FT	*	75,624	189	184
*DJ1FZ	*	71,040	180	180
*DK6AY	*	69,316	202	172
*DO3KMF	*	68,904	196	174
*DO1MGN	*	62,370	175	154
*DL3EBX	*	59,006	192	163
*DH2PL	*	55,279	172	149
*DH5WB	*	53,340	173	140
*DC2CB	*	52,965	186	165
*DG2MEL	*	50,868	180	162
*DK6NF	*	50,320	165	136
*DG6OAG	*	50,220	148	135
*DK4GC	*	48,804	157	147
*DL4LAX	*	46,046	171	143
*DO1CS	*	45,684	176	141
*DL1DF	*	43,818	155	134
*DK6RF	*	43,508	168	149
*DJ5QE	*	42,108	139	116
*DL3RCG	*	41,601	166	147
*DL1DXF	*	41,480	137	122
*DO6NI	*	34,776	136	126
*DL7VRG	*	34,270	127	115
*DM2AWM	*	30,012	126	122
*DL2AWA	*	29,252	116	103
*DG4YGW	*	29,210	137	115
*DL2RCH	*	29,133	139	117
*DO3QQ	*	28,589	128	113
*DL1VJL	*	24,698	117	106
*DK8EY	*	24,096	106	96
*DL1AWC	*	23,735	113	101
*DK3UO	*	22,984	120	104
*DO7AK	*	21,338	98	94
*DL8DXL	*	19,902	101	93
*DL6NWA	*	18,228	109	98
*DL2DUA	*	17,760	98	96
*DL1ARD	*	17,017	98	91
*DO3PKE	*	16,968	92	84
*DG8FAY	*	16,102	86	83
*DK8CB	*	15,355	92	83
*DG4HZ	*	15,355	90	83
*DK4REX	*	13,746	96	87
*DM3KZN	*	13,542	81	74
*DF6JF	*	13,024	99	88
*DL1GO	*	12,798	85	81
*DL8AX	*	12,450	90	83
*DC2CT	*	11,466	86	78
*DG6DAF	*	11,025	65	63
*DL1HSI	*	10,150	65	58
*DL8ZAW	*	8,555	66	59
*DO8YX	*	8,384	68	64
*DG7HL	*	7,424	61	58
*DM3FF	*	7,392	77	66
*DO3MMW	*	7,296	67	64
*DN2TL	*	6,726	58	57
*DL5ANS	*	6,612	57	57
*DGØLFG	*	6,216	51	42
*DL3LAB	*	6,174	53	49
*DD5MA	*	5,720	57	52
*DJ5LY	*	5,564	57	52
*DM3F	*	5,490	46	45
		5,084	44	41
			(OP: DH5FS)	
*DK5K	*	4,370	41	38
			(OP: DH1TW)	
*DO1CDE	*	4,128	45	43
*DL5WS	*	2,928	48	48
*DA3T	*	2,886	45	39
*DL1RIO	*	2,664	38	37
*DB9RZ	*	2,628	36	36
*DL7CU	*	2,201	34	31
*DO5TMM	*	2,079	35	33
*DK3AX	*	1,450	30	29
*DH1MST	*	665	19	19
*DO2RIS	*	504	18	18
*DL7LZ	*	384	12	12
*DL5HF	*	368	16	16
*DL5FCY	*	200	10	10
***DJ2GMS**	**28**	**119**	**7**	**7**
***DJ9ZB**	**21**	**279,000**	**380**	**310**
*DL1MHJ	*	76,424	185	164
*DL3ZAI	*	43,896	136	124
*DO6SR	*	33,189	125	111
*DL5KUD	*	11,224	64	61
*DL3DRN	*	4,928	45	44
*DO2RL	*	3,240	37	36
*DO1NPF	*	144	8	8
***DL9ZP**	**14**	**311,170**	**493**	**370**
*DL4WA	*	190,035	368	309
*DK5FF	*	129,241	327	259
*DL9LM	*	82,818	247	214
*DL4JYT	*	35,568	159	144
*DL7VMM	*	19,980	119	108
*DC2TOM	*	1,998	37	37
*DK6KN	*	625	28	25
***DL2VK**	**7**	**1,189,964**	**795**	**521**
*DB4SP	*	21,700	106	100
*DF7JC	*	13,272	84	79
*DL1HUH	*	4,324	50	46
*DB4MZ	*	1,539	27	27
***DL1ET**	**1.8**	**67,830**	**212**	**170**

Greece

SV2GJV	**A**	**632,000**	**672**	**395**
SV2JAO	*	579,264	619	431
***SV7CUD**	**A**	**150,570**	**307**	**247**
*SV7BVM	*	118,854	280	213
*SV2HWR	*	52,850	165	151
*SV2CUU	*	720	18	16
***SV2YC**	**14**	**31,232**	**133**	**128**

Guernsey

***MUØFAL**	**28**	**2,158**	**29**	**26**

Hungary

HA1TNX	**A**	**956,800**	**720**	**520**
HG1G	**28**	**52,794**	**166**	**126**
HA8TP	*	4,725	45	35
***HA7JQK**	**A**	**37,846**	**152**	**127**
*HG3FUG	*	23,500	106	100
***HA3JO**	**7**	**26,852**	**108**	**98**
*HA9SU	*	120	8	8

Iceland

TF3CW	**14**	**7,473,415**	**3105**	**1145**
TF3SG	**3.7**	**18,486**	**81**	**79**
***TF3JA**	**14**	**77**	**7**	**7**

Ireland

EI9HX	**14**	**3,256,092**	**1891**	**876**
EI7M	**7**	**10,787,690**	**2595**	**1054**
			(OP: EI3JZ)	
***EI8GQB**	**A**	**2,141,737**	**1298**	**667**
			(OP: ON4EI)	
*EI5GSB	*	759,528	771	462
*EI4GNB	*	623,664	667	426
*EI4HQ	*	94,770	233	195
***EI4II**	**21**	**346,290**	**472**	**357**

Italy

IR4X	**A**	**10,792,254**	**3240**	**1111**
			(OP: IZ3EYZ)	
IR4M	*	10,090,080	3197	1008
			(OP: IK4MGP)	
IZØPAU	*	533,023	757	433
IZ1PKV	*	441,216	575	384
IWØGTA	*	420,510	505	393
IZ8EEL	*	228,010	358	302
IZ5NSH	*	219,928	364	296
IK1MNG	*	145,684	295	242
IZ4EFP	*	69,344	198	176
IZ2KRZ	*	58,788	167	142
IR2R	*	44,304	156	142
IK4AUY	*	8,150	55	50
I4FYV	*	1,323	22	21
IZ8HUJ	**28**	**2,548**	**32**	**28**
I8UZA	*	1,254	23	22
IZØEGA	*	75	5	5
IWØBCF	**21**	**349,675**	**431**	**355**
IK2AHB	*	28,302	118	106
IQ4RN	**14**	**3,214,340**	**1888**	**865**
			(OP: IK4DCX)	
IZ8EFD	*	526,164	787	489
IWØHLZ	*	270,052	602	362
IK8NSR	*	149,940	405	294
IK3UNA/1	**7**	**933,152**	**909**	**482**
IZ1PMC	*	120,204	233	212
I4FYF	**1.8**	**569,080**	**650**	**410**
IZ6CLN	*	141,940	303	235
***I2WIJ**	**A**	**2,224,908**	**1301**	**763**
*IO2Z	*	1,543,095	1078	647
			(OP: IK2DZN)	
*IZ5NFC	*	1,185,257	1074	617
*IK7NXU	*	554,116	586	437
*IZØPMV	*	388,015	498	355
*IK4QJF	*	355,710	499	355
*I5DOF	*	293,248	445	316
*IZ8TXX	*	278,040	447	331
*IK6GPZ	*	250,100	405	305
*IZ5IMD	*	225,844	334	262
*IZ5HSK	*	195,579	312	279
*IK3SSW	*	182,560	340	280
*IZ3SQW	*	158,080	327	247
*IZ5MMT	*	124,764	264	222
*IZ3QHA	*	120,540	302	246
*IK3ZBM	*	114,636	273	246
*IW5ECP	*	98,088	227	201
*IZ1UKG	*	94,080	232	196
*IZ2BKA	*	88,644	210	178
*IZ5MKA	*	74,217	194	173
*IZ3BSU	*	74,048	213	178
*IW1RHR	*	73,346	201	169
*IK7SBU	*	73,319	198	157
*IZ5OQX	*	66,584	197	164
*IØKHP	*	62,928	187	171
*IZ1HDR	*	59,675	194	175
*IZ8GBT	*	48,891	142	129
*IW2NRI	*	47,816	150	139
*IZ7SLU	*	45,276	161	147
*IN3MNS	*	43,520	155	136
*IK8MYM	*	42,966	159	126
*IW2MYH	*	42,834	132	118
*IV3NVB	*	42,636	148	132
*IZ5IJY	*	37,504	141	128
*IZ1HBC	*	33,264	157	132
*IZ8CLM	*	25,168	104	88
*IK2WFN	*	24,926	114	103
*IN3UFW	*	24,289	121	107
*IZ4DUX	*	24,000	109	100
*I4AUM	*	22,050	105	105
*I7PXV	*	21,408	97	96
*IK2HLM	*	20,916	97	83
*I1YGQ	*	20,273	104	97
*IN3ADW	*	20,160	99	90
*IK2LFD	*	18,392	101	88
*IW1RGP	*	15,570	95	90
*IZ8EFE	*	14,578	77	74
*IWØEYT	*	13,398	88	87
*IZ2NYY	*	12,024	73	72
*IW5ELA	*	8,957	58	53
*IO4UI	*	8,512	68	64
			(OP: I4JEE)	
*IZ3QFG	*	8,352	73	72
*IZ8LIP	*	7,986	68	66
*IZ8ESX	*	5,934	50	43
*IZØRVC	*	5,616	53	52
*IZ3QCH	*	5,487	60	59
*IZ8LLH	*	5,474	48	46
*IK4XQT	*	4,089	50	47
*IZ2NZZ	*	3,713	49	47
*IZ8FTW	*	3,201	40	33
*IV3BCA	*	2,952	36	36
*IV3KSE	*	2,856	37	34
*IQØCI	*	2,440	46	40
			(OP: IKØVVE)	
*IZ8INR	*	2,343	33	33
*IZ5RAQ	*	2,080	40	40
*IZ8CJV	*	722	19	19
*IZØTVI	*	720	18	18
*IZ2CSX	*	720	19	18
*IZ5IOM	*	675	15	15
*IV3SGJ	*	646	20	17
*I3YYY	*	184	18	8
*IZ1QYD	*	171	9	9
*IZ3GKI	*	66

*IZ7DUU	*	924	22	22
*IZ7SIA	*	760	20	20
Jersey				
MJØJZE	**A**	**9,853**	**67**	**59**
			(OP: MWØJZE)	
GJ4OH	**28**	**4,366**	**41**	**37**
			(OP: MWØJZE)	
***MHØPMT**	**A**	**327,804**	**483**	**354**
			(OP: PD1RP)	
*GJ5XW	*	261,792	450	324
Kaliningrad				
RN2FQ	**A**	**55,485**	**170**	**137**
***UA2FHZ**	**A**	**54,020**	**179**	**148**
Latvia				
YL2KO	**A**	**7,830,312**	**2841**	**1101**
YL2SM	*	6,982,200	2687	1080
YL2SW	*	2,340,864	1486	768
YL9T	*	2,053,440	1444	720
			(OP: YL2TW)	
YL3DR	*	971,208	823	564
YL3FT	**7**	**3,608,752**	**1409**	**784**
***YL2TB**	**A**	**471,025**	**540**	**415**
*YL2CR	*	265,156	432	302
*YL2PP	*	32,800	110	100
***YL3BZ**	**28**	**4,158**	**43**	**42**
***YL2GUV**	**21**	**97,536**	**201**	**192**
*YL2PJ	*	68,923	188	157
*YL2IP	*	9,238	73	62
***YL2PN**	**14**	**14,248**	**113**	**104**
***YL2GQG**	**3.7**	**123,975**	**258**	**225**
Lithuania				
LY8O	**A**	**9,796,722**	**3147**	**1131**
LY2MM	*	1,023,990	857	535
LY2AE	*	665,910	681	441
LY1AKM	*	75,240	219	171
LY4L	*	40,600	170	145
LY1XA	**21**	**49,387**	**165**	**131**
LY2OU	**1.8**	**253,982**	**408**	**302**
LY5O	*	25,029	119	103
***LY9A**	**A**	**3,565,608**	**1956**	**872**
*LY4T	*	1,274,990	1007	590
*LY6A	*	736,715	752	485
*LY2N	*	397,100	498	361
*LY2TS	*	336,316	451	332
*LY2T	*	193,154	398	299
*LY1K	*	107,226	279	207
*LY1NDN	*	66,585	224	193
*LY2RJ	*	63,648	193	156
*LY5K	*	30,375	148	135
*LY2OM	*	11,613	82	79
***LY5I**	**7**	**198,656**	**299**	**256**
*LY2ND	*	82,536	200	181
Macedonia				
Z30A	**7**	**1,196,352**	**898**	**536**
***Z35W**	**A**	**350,901**	**542**	**381**
Malta				
9H1XT	**A**	**10,366**	**75**	**73**
Moldova				
ERØFEO	**A**	**209,520**	**387**	**291**
			(OP: UR5FEO)	
***ER1CS**	**A**	**386,400**	**509**	**350**
*ER5AA	*	110,700	249	205
*ER3ZZ	*	95,604	212	186
***ER2RM**	**1.8**	**117,810**	**255**	**210**
Montenegro				
4O3A	**A**	**14,210,416**	**3972**	**1228**
Netherlands				
PA1TX	**A**	**961,114**	**841**	**553**
PA3S	*	301,124	488	332
PAØLOU	*	212,976	342	272
PAØVST	*	7,800	57	52
PA3CAL	*	324	12	12
PAØJNH	**21**	**87,061**	**191**	**181**
PA1NHZ	*	47,436	146	134
PA3AAV	*	24,795	103	95
PA2C	**14**	**1,640,535**	**1182**	**611**
***PA8KW**	**A**	**1,046,891**	**881**	**529**
*PD3MDM	*	749,700	768	490
*PI4N	*	709,079	738	499
			(OP: PD1KSA)	
*PA3T	*	596,310	622	429
*PB6W	*	508,362	681	439
*PA3FYG	*	452,230	519	410
*PDØHM	*	398,193	547	401
*PD5LO	*	368,732	486	364
*PH2A	*	304,752	401	336
*PE1LGZ	*	300,354	434	339
*PA3DBS	*	272,210	421	326
*PA1NL	*	249,795	398	315
*PD3LHS	*	215,364	400	274
*PG1R	*	214,272	369	279
*PD1TV	*	214,118	403	302
*PAØB	*	192,351	391	291
*PD6W	*	124,928	309	244
			(OP: PDØEMR)	
*PA4PS	*	99,540	251	210
*PAØEMO	*	95,046	258	217
*PA8KM	*	93,685	246	205
*PA3ARM	*	90,486	243	198
*PA9DD	*	84,334	190	149
*PDØME	*	81,952	233	197
*PE2KM	*	76,125	202	175
*PA3EEG	*	63,244	196	163
*PA3ANN	*	58,740	210	178
*PA3FUJ	*	56,248	196	178
*PHØAS	*	51,708	158	139
*PA3CMF	*	38,654	174	154
*PA5VK	*	37,812	146	137
*PA3J	*	37,296	144	112
*PA3GEO	*	30,688	150	137
*PE2JMR	*	30,600	107	90
*PA3GDD	*	30,573	140	129
*PA2CVD	*	27,470	155	134
*PD1B	*	21,708	122	108
*PE1NCP	*	20,544	105	96
*PG2D	*	15,484	104	98
*PA1PAT	*	13,448	94	82
*PE1EWR	*	11,424	76	68
*PA1VC	*	9,424	83	76
*PA1MBC	*	7,276	73	68
*PI9SRS	*	7,198	70	61
*PE1LTY	*	5,439	51	49
*PE1NBD	*	4,578	43	42
*PA2NJC	*	2,128	28	28
*PA3ETC	*	1,917	29	27
*PA/F8FFV	*	1,593	27	27
*PAØCYW	*	1,225	25	25
*PD9FER	*	252	9	9
***PA2REH**	**21**	**12,792**	**83**	**78**
***PA5AD**	**7**	**6,050**	**59**	**55**
Northern Ireland				
***GI4AAM**	**14**	**21,204**	**129**	**124**
Norway				
LN8W	**A**	**1,930,692**	**1210**	**641**
			(OP: LB1GB)	
LA3BPA	*	458,750	479	367
LA6KOA	*	327,456	562	379
LB9RE	*	122,096	224	208
LA5HPA	*	12,350	68	65
LA7SI	*	5,676	48	43
LA9OSA	*	154	14	14
LA7WCA	**14**	**5,760**	**47**	**45**
***LA7GNA**	**A**	**426,087**	**508**	**387**
*LA2HFA	*	237,208	422	298
*LA7TN	*	212,415	423	289
*LA6CF	*	114,228	228	167
*LA1VNA	*	36,418	166	131
*LA1DSA	*	33,712	124	112
*LA1QDA	*	30,360	139	120
*LA1PHA	*	28,050	124	110
*LA4ESA	*	18,096	116	104
*LA7VRA	*	17,458	98	86
*LA7CL	*	16,450	104	94
*LA6NNA	*	15,698	99	94
*LA4CSA	*	4,760	58	56
*LB3NE	*	2,240	36	35
*LA2GTA	*	1,296	24	24
*LA1ORA	*	836	22	22
*LA9NM	*	532	19	19
***LA2GN**	**21**	**3,555**	**51**	**45**
***LA3HPA**	**14**	**50,320**	**211**	**185**
*LB9LE	*	8,480	85	80
*LA6BNA	*	100	10	10
***LA9NSA**	**3.7**	**24**	**4**	**4**
Poland				
SP9LJD	**A**	**8,721,968**	**2877**	**1096**
SP6OUJ	*	367,425	483	345
SP9CLO	*	128,681	261	217
SP8NR	*	127,206	209	191
SP8UFB	*	73,425	196	165
SP7PTK	*	66,990	169	165
SQ6OXC	*	62,865	191	165
SN4W	*	58,617	205	167
			(OP: SP4ICP)	
SN2M	*	47,719	143	119
			(OP: SP2XF)	
SQ1BHH	*	35,056	130	112
SN7F	*	26,093	115	97
			(OP: SP7LFT)	
SP8TDV	*	11,700	70	65
SP8DHJ	*	2,844	36	36
SN9D	*	960	21	20
			(OP: SP9FOW)	
SQ6NEF	*	736	16	16
SP3RBG	*	630	15	14
SP8HXN	*	48	4	4
SP5ENA	**28**	**3,910**	**41**	**34**
SN3C	**21**	**261,250**	**360**	**275**
			(OP: SP3ASN)	
SP3GXH	*	195,644	313	236
SN2B	**14**	**5,217,324**	**2384**	**931**
			(OP: SP2WKB)	
SP9JZT	**7**	**501,220**	**539**	**380**
SO6V	**3.7**	**900,695**	**837**	**499**
			(OP: SP6DVP)	
SQ7FPD	*	27,432	119	108
***SO2S**	**A**	**1,519,064**	**1118**	**634**
			(OP: SP2QG)	
*SO9G	*	604,262	644	431
			(OP: SP9DTE)	
*SP8CGU	*	487,025	539	385
*SQ2WHH	*	323,392	513	326
*SP9NWN	*	231,684	338	258
*SP4AAZ	*	216,692	400	284
*SP6OPZ	*	199,727	401	271
*SP9BGS	*	189,070	310	259
*SP2GMA	*	182,091	362	273
*SQ9DXN	*	176,460	295	255
*SP3UIW	*	170,146	333	241
*SP9RTL	*	149,314	319	242
*SP6ZJP	*	141,300	288	225
			(OP: SP6GHR)	
*SP1QXK	*	133,300	265	215
*SP6NVK	*	129,843	297	229
*SP4FMD	*	112,554	284	222
*SP3HZG	*	103,383	235	189
*SP7FBQ	*	92,496	232	188
*SP2FUD	*	91,924	211	196
*SN1Z	*	84,203	193	161
			(OP: SQ1EIX)	
*SP9DEM	*	76,288	164	149
*SP7TEX	*	66,660	195	165
*SQ5NBE	*	59,592	192	156
*SN3B	*	50,232	160	138
			(OP: SQ3JPV)	
*SQ7LQJ	*	46,843	158	139
*SP7FDV	*	44,080	166	152
*SQ5OUO	*	39,552	145	128
*SQ9JYK	*	36,344	128	118
*SN8L	*	35,108	148	134
*SP3BVI	*	33,012	148	131
*SP6QKS	*	32,450	140	118
*SP4AVG	*	30,720	135	120
*SQ6STI	*	29,095	127	115
*SQ7VO	*	27,225	115	99
*SP3SPK	*	26,214	114	102
*SP1MVW	*	24,969	142	123
*SQ2OMG	*	24,738	105	93
*SQ8OGC	*	22,442	116	98
*SP9OHL	*	22,135	98	95
*SO7B	*	20,332	100	92
			(OP: SQ7PGO)	
*SQ6NEJ	*	18,315	113	99
*SP6RYD	*	17,952	96	88
*SP9IHP	*	13,797	68	63
*SQ5STN	*	10,880	69	68
*SP5XOV	*	9,499	64	59
*SQ7OBB	*	9,372	72	71
*SQ7OTH	*	9,295	67	65
*SQ3OOB	*	9,135	65	63
*SQ3LLR	*	8,493	61	57
*SQ8MHH	*	7,920	58	55
*SQ5SAA	*	7,056	57	56
*SP6BXP	*	6,890	54	53
*SP3YM	*	6,768	49	47
*SQ5ABF	*	3,760	48	47
*SQ1RMM	*	2,418	32	31
*SQ8MXC	*	1,728	32	32
*SP5IKO	*	363	11	11
*SQ3RX	*	216	9	8
***SP9DSD**	**28**	**50,520**	**163**	**120**
*SQ8J	*	24,930	106	90
*SP6EF	*	14,213	79	61
*SP5TWA	*	5,000	44	40
*SQ9IAU	*	4,840	41	40
***SP6A**	**21**	**256,452**	**353**	**301**
*SQ2NNN	*	160,776	284	231
*SP4ICD	*	73,548	193	162
*SP9CLU	*	24,192	106	96
*SP3JBI	*	23,229	108	89
*SP9EWM	*	7,049	56	53
*SP1II	*	5,544	47	44
*SQ9GW	*	3,348	37	36
*SP1APZ	*	1,325	25	25
*SP1MAB	*	630	16	15
***SP3NNH**	**14**	**273,371**	**419**	**343**
*SP5EOT	*	59,724	210	189
*SP5DRE	*	48,783	176	161
*SP8QJM	*	28,006	163	134
*SQ4RCU	*	11,305	108	95
*SP5LGN	*	3,528	43	42
*SP5BMU	*	1,452	34	33
*SQ7OTA	*	15	3	3
***SQ4G**	**7**	**259,811**	**374**	**289**
*SP9EML	*	139,284	240	212
*SP9TTT	*	32,560	120	110
*SP1FFC	*	25,792	111	104
*SP7UWL	*	18,122	88	82
*SP2MHC	*	9,490	69	65
***SP9H**	**3.7**	**585,932**	**668**	**428**
*SP4SHD	*	149,760	291	240
*SQ2HNA	*	142,437	309	237
*SN1C	*	97,608	244	196
			(OP: SP1RFC)	
*SO4R	*	83,475	209	175
*SN9I	*	59,040	175	164
			(OP: SP9EMI)	
*SP5ELA	*	2,352	24	24
***SP1FPG**	**1.8**	**77,096**	**207**	**184**
*SP6OPY	*	5,049	52	51
Portugal				
CT1DIN	**A**	**61,875**	**197**	**165**
CT4NH	**28**	**42,619**	**138**	**109**
CS2C	**21**	**9,479,430**	**3625**	**1245**
			(OP: OK1RF)	
CT1EOD	*	1,391,940	1186	660
CR6K	*	440,800	578	400
			(OP: CT1ILT)	
***CR5CQK**	**A**	**507,366**	**658**	**426**
			(OP: CT1CQK)	
*CQ7L	*	393,536	484	352
			(OP: CT1EGF)	
*CT2JBG	*	190,883	320	259
*CT1DSJ	*	89,424	301	216
*CT1FOQ	*	19,109	101	97
***CT2KFA**	**28**	**66,740**	**178**	**142**
***CT1EVE**	**21**	**602,948**	**873**	**491**
*CT1EGW	*	356,024	436	382
***CT1DZY**	**14**	**21,842**	**143**	**134**
Romania				
YO8RNI	**A**	**406,700**	**508**	**350**
YO5QAW	*	334,305	447	323
YO7DAA	**14**	**7,812**	**63**	**63**
YO8RZJ	**3.7**	**50,827**	**158**	**137**
***YO3CZW**	**A**	**4,499,880**	**2468**	**924**
*YO9AGI	*	319,725	495	315
*YO3KSR	*	277,932	424	318
			(OP: YO3GSK)	
*YO4US	*	269,925	426	305
*YO8RFS	*	265,683	418	291
*YO9GVN	*	193,496	337	268
*YO5BXI	*	117,390	270	210
*YO2MKT	*	89,262	216	174
*YO5FMT	*	82,026	229	186
*YO8SGN	*	77,268	241	188
*YO6DBL	*	76,912	211	176
*YO9GSB	*	74,202	187	149
*YO9HG	*	70,798	223	182
*YO5ØKPB	*	60,131	183	157
*YO5TP	*	47,115	153	135
*YO8THG	*	45,353	149	133
*YO9FLD	*	12,638	77	71
*YO9IKW	*	11,520	64	60
*YO5CZZ	*	11,394	63	54
*YO4RSS	*	8,201	61	59
*YO2MNC	*	3,400	37	34
*YO5CCQ	*	2,844	37	36
*YP2W	*	1,280	20	20
*YO4BTB	*	828	19	18
*YO7AWZ	*	570	16	15
***YO6CFB**	**28**	**9,072**	**61**	**54**
*YO9IF	*	3,264	36	32
*YO6PJU	*	27	3	3
***YO9XC**	**21**	**140,990**	**311**	**230**
*YO5PCY	*	112,560	247	201
*YO4DI	*	44,289	163	133
*YO6XK	*	14,892	90	73
*YO5AYT	*	5,029	55	47
*YO6OHS	*	3,071	43	37
*YO5KAS	*	1,357	23	23
			(OP: YO5BTZ)	
*YO4RDJ	*	48	4	4
***YP5WFF**	**14**	**154,904**	**374**	**289**
			(OP: YO5OAG)	
*YO5OLD	*	63,680	237	199
*YO9CWY	*	45,461	196	169
*YO5OET	*	12,350	102	95
*YO4BEX	*	12,144	104	92
***YO7LBX**	**7**	**228,802**	**338**	**277**
*YO9IXC	*	73,752	191	168
*YO2MJZ	*	24,890	98	95
*YO8RFJ	*	17,794	91	82
*YO9HRB	*	108	9	9
***YO5OHY**	**3.7**	**88,350**	**209**	**186**
Sardinia				
ISØHQJ	**A**	**322,896**	**465**	**336**
***ISØBSR**	**A**	**352,078**	**668**	**401**
Scotland				
GM5X	**A**	**14,190,036**	**4288**	**1292**
GM4JR	*	388,066	478	371
GM2Y	*	79,200	197	176
			(OP: MMØDXH)	
***MMØLID**	**A**	**480,570**	**624**	**415**
*MMØBQN	*	392,046	492	361
*MMØLBX	*	149,596	332	251
*GM4SQM	*	64,175	176	151
*GM4UYZ	*	7,752	76	68
*MMØVTV	*	627	19	19
***GM3C**	**14**	**121,857**	**314**	**269**
			(OP: GMØNBM)	
Serbia				
YT3R	**A**	**503,040**	**537**	**384**
			(OP: YT1CC)	
YU5A	**21**	**4,779,000**	**2187**	**810**
			(OP: YU1EW)	
YU1KX	*	1,061,173	850	487
YT1A	**14**	**973,268**	**1002**	**596**
YT8A	**7**	**9,174,753**	**2465**	**1063**
			(OP: YU1EA)	
***YU1JW**	**A**	**1,506,048**	**1112**	**636**
*YT9M	*	1,371,216	1096	588
			(OP: YU1PJ)	
*YT2VP	*	193,778	372	257
*YT2N	*	98,049	251	203
			(OP: YU2MMA)	
*YU5CW	*	95,000	245	190
*YU3MUP	*	26,418	122	111
*YT3H	*	17,139	97	87
*YT5TT	*	2,204	33	29
***YU7KM**	**21**	**116,580**	**244**	**201**
*YU1HFG	*	64,077	200	159
*YU1M	*	36,515	131	109
			(OP: YU1MM)	
*YU1IZ	*	714	18	17
***YU7ZEX**	**14**	**704,600**	**871**	**542**
***YT9C**	**7**	**296,564**	**370**	**302**
***YT4A**	**1.8**	**194,103**	**344**	**273**
			(OP: YT1AA)	
Shetland and Fair Isle				
GZ5Y	**A**	**941,215**	**869**	**545**
			(OP: GM4SSA)	
Sicily				
IT9ZTX	**28**	**251,902**	**390**	**266**
IT9YVO	**21**	**1,648,625**	**1337**	**605**
***IT9WTY**	**A**	**453,720**	**555**	**398**
*IF9ZWA	*	184,464	307	252
*IT9AJP	*	147,808	297	248
*IT9RZU	*	2,296	28	28
***IR9Z**	**21**	**28,702**	**150**	**127**
			(OP: IT9VCE)	
*IT9AXQ	*	1,053	27	27
***IT9LED**	**14**	**104,550**	**388**	**255**
*IT9MYY	*	46,458	189	178
*IW9FI	*	43,172	193	172
*IT9IMJ	*	23,241	137	127
***IT9JDH**	**3.7**	**17,922**	**94**	**87**
Slovakia				
OM2VL	**A**	**11,983,006**	**3504**	**1142**
OM3IAG	*	534,781	570	403
OMØWR	*	231,012	399	276
OM55TV	*	152,848	302	233
			(OP: OM3M8)	
OM8KD	*	52,305	193	165
***OM5X**	**A**	**1,103,760**	**858**	**540**
*OM4DN	*	487,186	618	391
*OM1DK	*	216,265	318	259
*OM3TLE	*	42,742	165	142
*OM2DT	*	38,640	144	120
*OM2AML	*	20,758	106	97
*OM1DI	*	17,762	85	83
*OM7LM	*	2,511	31	31
*OM8AXU	*	1,891	31	31
*OM7JM	*	1,782	29	27
***OM3TB**	**14**	**55,748**	**214**	**181**
***OM6TX**	**7**	**184,064**	**315**	**256**
Slovenia				
S53MM	**A**	**8,802,092**	**2804**	**988**
S51F	*	5,476,911	2247	957
S51Z	*	299,700	391	300
S55KZ	*	19,716	104	93
S55T	**14**	**6,763,484**	**2850**	**1093**
			(OP: S55OO)	
S5ØK	*	6,233,838	2721	1047
S53M	*	1,390,878	1110	599
			(OP: S51FB)	
***S5ØA**	**A**	**3,810,142**	**1703**	**833**
*S58RU	*	179,800	315	248
*S57YX	*	46,980	152	135
*S57AD	*	41,600	164	128
*S51JS	*	39,932	167	149
*S58MU	*	18,564	101	91
***S57U**	**14**	**442,508**	**577**	**452**
***S57DX**	**3.7**	**610,136**	**626**	**424**
***S52WW**	**1.8**	**121,426**	**269**	**218**
Spain				
EC1KR	**A**	**8,267,890**	**2996**	**1070**
EB1IC	*	41,280	131	120
EA1BLA	*	1,856	30	29
EA1KP	**21**	**2,244,255**	**1489**	**677**
ED1A	*	943,248	849	457
			(OP: EA1AST)	
EA1IR	*	674,310	690	455
EA1EY	**14**	**1,329,216**	**1438**	**688**
EB1TR	*	9,672	90	78
EA1DVY	**1.8**	**24,024**	**100**	**91**
***EF1W**	**A**	**470,148**	**550**	**406**
			(OP: EA1WS)	
*EA1EA	*	292,810	408	329
*EA1JO	*	291,942	444	331
*EA1HOE	*	275,520	422	320
*EC1AE	*	86,940	235	210
*EA1SV	*	49,632	158	132
*EA1AW	*	19,402	96	89
*ED1J	*	10,695	74	69
			(OP: EA1GPL)	
*EB1HYS	*	7,236	70	67
*EA1NY	*	1,856	29	29
*EA1SB	*	660	16	15
***EE1B**	**28**	**23,715**	**104**	**93**
			(OP: EA1YB)	
*EA1HVY	*	18,375	85	75
***ED1C**	**21**	**373,527**	**532**	**363**
			(OP: EA1AJV)	
*EA1JK	*	58,058	168	154
*EA1JJ	*	34,524	139	126
***EB1EVX**	**14**	**58,548**	**223**	**204**
EF2O	**A**	**1,018,710**	**852**	**539**
			(OP: EA2AOO)	
ED2H	**21**	**990,552**	**954**	**596**
			(OP: EA2KB)	
ED2T	**3.7**	**310,896**	**380**	**306**
			(OP: EA2ASY)	
***EF2F**	**A**	**320,040**	**603**	**381**
			(OP: EA2DNR)	
*EA2AEJ	*	187,068	342	262
*EA2RW	*	21,146	119	109
*EA2AVM	*	3,081	39	39
***EA2BVV**	**14**	**2,024**	**44**	**44**
EE3A	**A**	**6,160,826**	**2457**	**1007**
			(OP: EA3ATM)	
EA3RR	*	4,689,410	2084	890
EH3O	*	4,688,597	2178	947
			(OP: EA3GEG)	
EA3AV	*	329,039	441	293
EA3AS	*	176,487	347	267
EA3BFB	*	43,056	125	117
EA3CEC	*	16,056	77	72
EA3CI	**21**	**2,127,840**	**1339**	**660**
EA3BOX	*	1,330,692	1029	561
EE3E	**7**	**1,255,912**	**860**	**547**
			(OP: EA3ELZ)	
EA3EIQ	**1.8**	**16,020**	**96**	**89**
***EA3GHZ**	**A**	**639,080**	**837**	**520**
*EA3AYQ	*	275,632	433	322
*EB3FLY	*	195,888	339	264
*EA3GI	*	91,290	211	179
*EB3JT	*	41,984	151	128
*EA3HEK	*	41,664	145	124
*EA3OW	*	17,572	102	92
*EA3FHP	*	9,159	74	71
*EA3GYE	*	1,078	22	22
*EA3GOD	*	588	14	14
*EA3KL	*	176	12	11
***EF3E**	**21**	**27,727**	**132**	**119**
			(OP: EC3PL)	
EA4KD	**A**	**6,484,371**	**2503**	**1021**
EA4TG	**21**	**476,364**	**692**	**428**
***EA4FJJ**	**A**	**99,678**	**279**	**222**
*EA4LU	*	87,084	212	177
*EA4CWW	*	37,878	131	118
*EA4DGZ	*	35,148	126	116
*EA4RF	*	24,480	113	102
*EA4MI	*	1,610	36	35
***EA4ZK**	**28**	**23,895**	**107**	**81**
***EA4FTA**	**21**	**138,444**	**280**	**249**
*EA4AOC	*	40,128	174	152
***EA4YK**	**14**	**38,038**	**140**	**133**
*ED4T	*	2,257	37	37
			(OP: EA4CWN)	
ED5J	**A**	**384,444**	**445**	**362**
			(OP: EA5DM)	
EA5EV	*	334,848	410	327
EA5GIN	*	108,768	263	206
EB5GGB	*	5,590	46	43
EE5R	**21**	**179,835**	**380**	**285**
			(OP: EA5RN)	
EA5BZ	*	99,484	294	209
***EA5FWW**	**A**	**245,820**	**345**	**255**
*EB5CS	*	159,210	329	261
*EA5HRB	*	135,024	262	232
*EB5HRX	*	27,233	126	113
*EF5T	*	3,510	59	54
			(OP: EA5HRT)	
*EA5CZM	*	2,880	37	36
*EA5OL	*	1,035	23	23
***EA5TN**	**28**	**10,638**	**67**	**54**
***EB5AV**	**21**	**75,538**	**192**	**179**
***EE5W**	**7**	**76,160**	**176**	**160**
			(OP: EA5AVW)	
*EA5HMW	*	648	19	18
EB7CIN	**A**	**153,972**	**282**	**234**
EA7HNN	*	29,070	132	114
EA7ATX	**7**	**536,042**	**502**	**389**
***EE7R**	**A**	**1,027,266**	**859**	**547**
			(OP: EA7IA)	
*EA7HLU	*	638,457	906	487
*EA7HGX	*	121,914	271	234
*EA7HE	*	53,650	173	145
*EC7DDZ	*	39,955	137	131
*EA7NW	*	10,670	56	55
*EA7VJ	*	9,735	64	59
*EA7CF	*	3,120	40	40
*EA7FIQ	*	988	19	19
*EA7GTJ	*	893	19	19
***EA7ISH**	**28**	**231,825**	**396**	**275**
***EA7RU**	**21**	**2,360,484**	**1627**	**798**
*EC7JA	*	257,375	516	355
*ED7C	*	40,750	145	125
			(OP: EA7HMD)	
*EA7GYU	*	29,475	160	131
***EA7IVP**	**14**	**651**	**21**	**21**
***EE7H**	**7**	**55,896**	**153**	**136**
			(OP: EA7AH)	
*EA7CVF	*	8,526	62	58
Sweden				
SJ2W	**A**	**13,161,250**	**3674**	**1250**
			(OP: SM2WMV)	
SM6BGG	*	2,305,576	1361	728
SM7DQV	*	945,664	802	512
SE6Y	*	685,698	709	447
			(OP: SM6DED)	
SMØBSO	*	493,240	578	440
SM6FJY	*	347,730	475	335
SM7PEV	*	226,285	347	271
SM6CMU	*	147,420	261	189
SI3A	*	75,088	245	208
SM6AHU	*	35,245	144	133
SD2G	*	17,199	114	91
SD3A	*	16,200	98	90
8S5A	*	4,633	44	41
SM3VAC	*	2,700	32	30
SM6E	**28**	**630**	**15**	**15**
			(OP: SM6FUD)	
SK3W	**21**	**5,313,540**	**2239**	**885**
			(OP: SG3P)	
SM5CEU	*	290,290	371	319
SF6DX	**14**	**39,087**	**152**	**129**
			(OP: SM6FUD)	
***SM5DQE**	**A**	**440,296**	**592**	**376**
*SF3A	*	417,872	543	364
			(OP: SM3CER)	
*SM5DXR	*	323,387	518	331
*S

*SI5Y	*	141,276	304	244
			(OP: SM5BKK)	
*SM7UFR	*	110,250	262	210
*SE6C	*	84,483	246	189
			(OP: SM6CDN)	
*SM4WKT	*	38,497	152	137
*SM7S	*	33,891	152	143
			(OP: SM7ZDC)	
*SE6N	*	26,780	124	103
			(OP: SA6AXR)	
*SM5ACQ	*	20,091	122	111
*SA7AOI	*	18,696	89	82
*SB3W	*	14,430	82	78
			(OP: SM3RAB)	
*SMØHBV/3	*	13,795	103	89
*SA5ATV	*	4,640	64	58
*SM7RPU	*	1,320	22	20
*SM4YPH	*	768	16	16
*SMØA	*	704	22	22
			(OP: SMØAIG)	
*SMØBDS	*	435	15	15
*SA5BKE	*	80	8	8
***SK4UW**	**21**	**9,490**	**73**	**65**
			(OP: SM4JHK)	
***SH7DX**	**14**	**103,896**	**278**	**234**
***SM3C**	**7**	**637,259**	**533**	**413**
			(OP: SM5CCT)	
*SMØRCL	*	4,708	44	44
*SI5S	*	1,040	20	20
***SM6NJK**	**3.7**	**43,065**	**157**	**135**

Switzerland

HB9CVQ	**A**	**450,670**	**515**	**374**
HB4FR	**28**	**21,414**	**95**	**83**
			(OP: HB9ACA)	
***HB9ARF**	**A**	**488,033**	**565**	**403**
*HB9WDY	*	274,680	396	315
*HB9RJG	*	106,920	273	220
*HB9SVT	*	48,360	176	156
*HB9TSU	*	3,486	43	42
*HB9BGF	*	2,175	30	29
***HB9TOC**	**7**	**87,042**	**204**	**178**
***HB9AWS**	**3.7**	**1,972**	**30**	**29**

Ukraine

US5D	**A**	**3,731,364**	**1883**	**884**
			(OP: UT7DX)	
UW5U	*	3,533,766	1937	883
UV5U	*	3,163,680	1626	845
			(OP: UX1UA)	
UZØU	*	2,862,188	1746	833
			(OP: UY5ZZ)	
UT6EE	*	799,515	739	489
UXØRR	*	761,607	742	471
UY8IO	*	662,972	710	428
US5UO	*	481,862	516	394
UX7CQ	*	336,960	501	351
UY5HF	*	320,876	607	388
UT5RB	*	189,497	323	253
UR4EI	*	189,210	342	265
USØQG	*	143,389	312	223
UTØEZ	*	55,948	159	142
UU2JG	*	36,396	126	108
USØVA	*	31,866	127	113
UT3RN	*	28,320	134	118
US4IQS	*	22,660	108	103
UT2IW	*	10,980	69	61
UY4WWA	*	10,863	74	71
			(OP: URSWMM)	
UT5EO	*	1,770	33	30
UR4IXM	*	1,245	19	15
UR5EPG	**28**	**8,250**	**58**	**50**
UZ2M	**21**	**5,995,920**	**2586**	**1032**
			(OP: URØMC)	
UT7U	*	153,265	331	203
UV8M	*	79,373	241	161
			(OP: UX3MR)	
UR7EM	*	77,226	211	183
UW8SM	*	38,406	144	111
UT8LN	*	12,606	69	66
UT7QL	**14**	**561,150**	**736**	**522**
UZ3RR	*	713	23	23
UR7QC	**7**	**450,210**	**435**	**349**
UW2Q	*	136,080	251	210
			(OP: UR6QS)	
EMØX	**3.7**	**1,404,288**	**1001**	**576**
			(OP: UT2XQ)	
US8IGL	*	243,483	368	277
UT5ECZ	*	233,376	352	286
UX1VT	*	226,575	377	285
UY3AW	*	37,000	134	125
USØI	*	21,120	101	96
***USØHZ**	**A**	**1,931,825**	**1317**	**665**
*UR4U	*	1,402,984	1044	596
			(OP: UR4UDI)	
*UY2IG	*	939,225	903	525
*UR5ETN	*	713,680	738	440
*UY2UQ	*	622,050	690	429
*UU2CW	*	559,874	657	406
*UX3HA	*	482,997	608	393
*UT3UZ	*	481,460	589	380
*UV5EEO	*	463,200	596	386
*US5E	*	434,656	549	376
*US2IW	*	407,862	482	378
*UV3QF	*	382,950	539	370
*UYØCA	*	377,928	503	362
*UY5TE	*	314,940	482	348
*UT5JCE	*	286,605	405	297
*UX7FC	*	240,210	403	306
*US5ISV	*	207,174	358	258
*US7LM	*	204,336	345	264
*UY1HY	*	203,346	330	286
*UT8EL	*	200,994	409	278
*UZ2L	*	199,206	389	279
			(OP: US4LS)	
*UT4XU	*	190,437	329	257
*UT5EOX	*	183,806	363	266
*UX7U	*	169,400	362	280
			(OP: UX7UA)	
*UT5UKY	*	162,681	324	257
*UUØJC	*	159,160	280	230
*US5IND	*	145,518	324	237
*UT7X	*	137,858	289	229
			(OP: UT7XX)	
*UT8IA	*	124,041	289	239
*UT5UON	*	117,558	227	189
*UY5AR	*	107,088	235	194
*UT4TA	*	90,540	226	180
*UR5RPG	*	76,384	212	176
*US8IM	*	74,256	216	182
*US7IID	*	73,108	210	196
*UX7FD	*	60,900	206	174
*UX2MK	*	55,277	192	167
*UU6JJ	*	40,831	143	133
*UR5ZIW	*	40,260	135	122
*UR7CT	*	38,038	149	133
*UR3PGW	*	31,122	122	117
*UR5RP	*	28,875	138	125
*UU1K	*	28,024	126	113
			(OP: UUØJM)	
*UR5WHT	*	27,861	127	111
*UR7AA	*	23,226	106	98
*UT4UEG	*	19,838	110	91
*UU5TN	*	9,620	77	65
*UY2RZ	*	8,845	64	61
*UT7VR	*	7,524	60	57
*UT7HM	*	6,820	66	62
*UR5WX	*	4,692	49	46
*UTØNN	*	4,141	42	41
*UY1U	*	3,108	40	37
*UU2JA	*	1,925	28	25
*US5VAC	*	336	12	12
***UR5WHQ**	**28**	**2,100**	**28**	**25**
***UT5LO**	**21**	**235,705**	**371**	**295**
*UXØUW	*	96,426	219	198
*UT6IS	*	57,539	208	163
*US7IA	*	53,284	179	154
*UX5TQ	*	40,572	166	138
*UT7LA	*	37,200	143	124
*UR5EFL	*	28,175	137	115
*UT1IM	*	15,228	86	81
***UR5MM**	**14**	**393,384**	**533**	**444**
*US1PM	*	287,066	511	362
*UR8QR	*	204,702	402	327
*US4IPC	*	88,080	271	240
*US3WD	*	79,236	258	213
*UT3EK	*	43,725	174	159
*UR4QSG	*	14,600	112	100
*UR3LPP	*	225	9	9
***UR7TZ**	**7**	**972,802**	**758**	**503**
*UT3EG	*	141,432	252	213
*UT8QQ	*	119,339	236	209
*UT5KL	*	88,677	200	177
*US5ZFT	*	46,750	140	125
***US7WW**	**3.7**	**291,444**	**428**	**326**
*US2IZ	*	22,372	113	94
***US8ICM**	**1.8**	**1,029**	**21**	**21**

Wales

GW9T	**A**	**10,526,468**	**3397**	**1132**
			(OP: MWØZZK)	
MWØX	**28**	**4,563**	**47**	**39**
			(OP: MØOXO)	
GW5R	**21**	**3,171,424**	**1739**	**713**
			(OP: GW3YDX)	
MW5A	**7**	**9,480,054**	**2548**	**1038**
			(OP: GW4BLE)	
***GW8NBI**	**A**	**205,905**	**373**	**265**
***GW4EVX**	**21**	**98,112**	**224**	**192**
***MW8T**	**7**	**15,000**	**80**	**75**
			(OP: MMØCWJ)	

OCEANIA

Australia

VK1MJ	**A**	**39,710**	**106**	**95**
***VK1PAR**	**A**	**28,644**	**97**	**84**
***VK1MAT**	**14**	**225**	**9**	**9**
VK2IM	**A**	**3,786,880**	**1508**	**640**
VK2BCQ	*	63,384	164	139
VK2ERP	*	30,694	121	103
VK2ACC	*	29,302	105	98
***VK2HBG**	**A**	**98,596**	**203**	**157**
*VK2WAY	*	29,058	98	87
***VK2WTT**	**14**	**38,976**	**123**	**116**
VK3TDX	**A**	**1,989,376**	**1073**	**608**
VK3DOG	*	212,930	293	214
VK3AVV	*	189,200	277	215
***VK3MDX**	**A**	**116,272**	**212**	**169**
*VK3TZ	*	109,210	204	163
*VK3LM	*	65,142	150	141
***VK3VTH**	**14**	**2,052**	**27**	**27**
VK4EMM	**A**	**2,856,276**	**1376**	**636**
VK4IU	*	81,780	202	141
***VK4VDX**	**A**	**168,696**	**255**	**213**
*VK4XES	*	63,512	147	136
*VK4BL	*	28,608	111	96
*VK4QH	*	2,650	28	25
***VK4FJ**	**21**	**68,497**	**175**	**143**
***VK4DMP**	**14**	**56,823**	**150**	**141**
*VK4MN	*	5,625	45	45
***VK5MK**	**A**	**17,822**	**74**	**67**
***VK5FCJM**	**21**	**3**	**1**	**1**
***VK5FMPJ**	**7**	**4**	**2**	**2**
VK6FDX	**A**	**141,038**	**267**	**194**
***VK6HAD**	**A**	**51,528**	**165**	**114**
*VK6FMAB	*	40	6	5
***VK7NET**	**A**	**100,110**	**206**	**141**

Brunei

***V85RY**	**A**	**195,412**	**340**	**196**
*V85ZX	*	23,384	107	79
***V85AVE**	**14**	**185,031**	**384**	**231**

Cocos-Keeling

***VK9CF**	**A**	**584,802**	**673**	**318**
			(OP: NL8F)	

East Malaysia

9M6YBG	**A**	**321,134**	**425**	**242**
***9W6ZAM**	**28**	**3,686**	**46**	**38**

Guam

WH2X	**21**	**1,522,730**	**984**	**545**

Hawaii

KH7X	**A**	**20,676,524**	**4568**	**1244**
			(OP: KH6ND)	
NH6P	**21**	**6,555,696**	**2634**	**872**
WH7Z	*	543,696	651	282
			(OP: WØCN)	
KH6QJ	**3.7**	**8,225**	**43**	**35**
***KH6CJJ**	**A**	**414,488**	**482**	**263**
*NH6AB	*	168,439	272	179
*WH6C	*	58,440	165	120
*NH7J	*	49,911	140	127
*KH7T	*	26,010	104	85
*KH6/KØYR	*	1,210	22	22
***NH7PE**	**28**	**9,912**	**71**	**59**
*AH6KW	*	2,409	36	33
***NH7RO**	**14**	**560**	**14**	**14**
*WH7GG	*	200	10	10

Indonesia

YB1AR	**A**	**2,236,188**	**1176**	**614**
YC1LA	**21**	**694,190**	**627**	**422**
YB3XM	*	40,368	130	116
YB3GE	**14**	**14,555**	**76**	**71**
YC5EN	**7**	**143,498**	**169**	**157**
***YB3IZK**	**A**	**169,520**	**270**	**208**
*YB1CYD	*	106,225	219	175
*YC1BRS	*	47,064	133	106
*YB8EL	*	31,066	116	98
*YBØJZS	*	23,534	100	82
*YB1AQD	*	21,855	95	93
*YBØCOU	*	828	18	18
***YBØNFL**	**28**	**50,168**	**172**	**138**
*YB1TJ	*	9,860	69	58
***YCØNSI**	**21**	**125,385**	**244**	**195**
*YC1BAH	*	73,628	175	158
*YC9ADS	*	60,280	170	137
*YB1UUN	*	58,241	153	139
***YB1ALL**	**14**	**290,100**	**350**	**300**
*YB1BGI	*	49,387	147	131
*YB2BBY	*	7,896	60	56
***YB1ACN**	**7**	**150,857**	**189**	**161**
*YC2WBF	*	89,375	155	125
*YC2LEV	*	26,499	84	73
*YDØOXA	*	5,985	36	35
*YCØOHG	*	2,134	24	22
***YB2DX**	**3.7**	**9,984**	**53**	**48**
*YC2FAJ	*	16	4	4

New Zealand

ZL2UO	**A**	**241,304**	**336**	**248**
ZL1AIX	*	180,880	276	170
ZL1BIV	*	67,032	167	152
ZL4IG	*	32,544	109	96
***ZL1AAO**	**A**	**316,712**	**431**	**236**
*ZL2MM	*	62,010	177	130
***ZL4CR**	**21**	**6,837**	**58**	**53**

Northern Mariana Islands

KHØ/KH7ERI	**21**	**348,899**	**534**	**227**
KHØ/WN1Y	**14**	**171,380**	**287**	**209**

Philippines

DZ1B	**A**	**3,347,390**	**1670**	**545**
			(OP: DU1BP)	
DU1AV	*	1,126,776	984	353
DU1UGZ	**21**	**381,210**	**476**	**291**
DX9M	**7**	**134,560**	**201**	**145**
			(OP: DU9XO)	
***DU1LC**	**A**	**648,351**	**611**	**333**
*DV1JM	*	345,432	498	222
*DV3NCA	*	21,883	104	79
*DW7DQS	*	45	3	3
			(OP: DW7DSH)	
***DU1EG**	**28**	**26,465**	**135**	**67**
***DW1VKT**	**21**	**56,199**	**160**	**131**
***DU1JI**	**14**	**176,200**	**312**	**200**
***DU1EE**	**7**	**77,608**	**156**	**109**

Timor-Leste

***4W3A**	**28**	**110,084**	**267**	**145**
			(OP: VK2CZ)	

SOUTH AMERICA

Antarctica

RI1ANC	**A**	**1,643,186**	**1016**	**527**
***LU1ZI**	**7**	**12**	**2**	**2**

Argentina

LT1F	**A**	**13,039,908**	**3965**	**1113**
			(OP: LU1FAM)	
LR4E	*	6,710,136	2636	899
			(OP: LW4EU)	
AY8A	*	5,376,818	2216	857
			(OP: LU8ADX)	
LU1HF	**28**	**11,168,770**	**3507**	**1102**
AY5F	*	9,614,682	3116	1078
			(OP: LU5FC)	
LU4DJB	*	743,906	633	431
LU8VCC	**14**	**62,370**	**177**	**135**
LW3EWZ	**7**	**39,711**	**99**	**93**
LU6FEC	**3.7**	**8,686**	**43**	**43**
***LW6DG**	**A**	**5,330,350**	**2199**	**850**
*LV6D	*	1,808,730	1096	594
			(OP: LW3DC)	
*AYØDX	*	651,964	643	389
			(OP: LU3DR)	
*LU5EVK	*	160,580	289	217
*LW4EF	*	116,400	280	194
*LW1HR	*	104,493	235	183
*LU5CAB	*	86,636	233	179
*LU3FLV	*	51,975	167	135
*LU1IBL	*	36,153	118	103
*LU4FLJ	*	31,408	115	104
*LR1A	*	25,100	119	100
			(OP: LU1AS)	
*LU6KA	*	23,128	138	98
*LU9EY	*	17,724	98	84
*LW7DUC	*	1,403	23	23
***LU3HIP**	**28**	**1,848,196**	**1195**	**596**
*LU6FOV	*	1,660,468	1030	571
*LW1DG	*	1,046,145	798	485
*LU8DCF	*	421,176	476	327
*LU3DX	*	372,840	420	312
*LW6DAK	*	276,066	378	294
*LU1MPK	*	145,110	279	210
*LU8DY	*	134,244	246	198
*LU5MT	*	115,320	239	186
*LU6EVD	*	81,954	214	174
*LU2EM	*	80,272	202	173
*LU1FU	*	49,980	156	140
*LU1EXR	*	20,252	93	83
*LU7DSU	*	14,896	80	76
*LU1VZ	*	13,534	77	67
			(OP: LU9VEA)	
*LU7ADR	*	2,244	33	33
*LO7D	*	450	17	15
			(OP: LW1DRH)	
***LU3DK**	**21**	**108,595**	**228**	**185**
*LU9FHF	*	32,704	119	112
***LS2D**	**14**	**489,720**	**561**	**318**
			(OP: LU1DK)	

Aruba

P4BL	**A**	**20,415,539**	**5142**	**1223**
			(OP: W6LD)	
P43A	**21**	**7,749,632**	**2577**	**1024**
***P43E**	**14**	**811,308**	**725**	**388**

Brazil

PY5KW	**A**	**2,832,684**	**1502**	**678**
ZV2K	*	1,808,409	1123	601
			(OP: PY2SHF)	
PV8ABC	*	183,885	258	195
PY1WS	*	129,024	234	192
PV8ADI	*	53,013	148	123
PV8AA	*	15,476	76	73
PY3AT	*	14,212	73	68
PY3PA	*	12,032	69	64
PY7GK	*	10,512	73	72
PY2WO	*	3,150	35	35
PY2NF	*	1,352	31	26
PP5JY	*	688	17	16
PW5G	**28**	**8,832,948**	**2866**	**1083**
			(OP: PP5WG)	
ZW5B	*	8,231,482	2856	1019
			(OP: PY5KD)	
ZV2V	*	3,609,686	1660	769
			(OP: PY2LED)	
PW2D	*	3,232,530	1547	735
			(OP: PY2ZXU)	
PY7ZBK	*	864,192	701	448
PT9PA	*	306,612	402	306
ZX5J	**21**	**12,588,004**	**3358**	**1298**
			(OP: PP5JR)	
PY2BK	*	4,173,304	1702	851
PP1CZ	*	2,288,200	1220	673
PY5QW	*	411,928	445	341
PR5B	**14**	**4,906,815**	**1947**	**877**
			(OP: PY2LSM)	
PY5AB	**3.7**	**1,386**	**19**	**18**
***PY2NY**	**A**	**3,577,986**	**1616**	**766**
*PV7M	*	878,688	746	452
			(OP: PT7ZT)	
*PY1RY	*	225,968	383	232
*PV8AAS	*	77,655	199	167
*PV8AX	*	49,776	171	136
*PY2RDZ	*	34,632	138	117
*PY4DK	*	24,824	131	107
*PY2RE	*	21,510	117	90
*PY1CD	*	15,066	92	81
*PV8RF	*	13,213	92	73
*PY3TIO	*	11,715	76	71
*PY1PDF	*	7,722	73	66
*PY1MT	*	7,000	64	56
*PY1KB	*	6,396	57	52
*PY2XV	*	6,072	49	46
*PV8AZ	*	6,050	55	50
*PU3KNG	*	5,198	50	46
*PY3AJB	*	4,324	47	46
*PY2NA	*	2,480	31	31
*PR7SD	*	476	14	14
*PP5NS	*	153	10	9
***PU2LEP**	**28**	**3,202,920**	**1509**	**744**
*PY2MTS	*	2,814,700	1411	700
*PU8WWW	*	390,000	464	325
*PY2SRB	*	147,581	266	203
*PY3FBI	*	30,030	122	110
*PU2SDX	*	26,730	115	99
*PU2TRX	*	19,584	126	102
*PU1JOR	*	18,249	89	79
*PY2LUC	*	18,090	99	90
*PU2RKP	*	11,932	85	76
*PU3SVA	*	7,772	59	58
*PY1TR	*	7,475	74	65
*PY5KC	*	7,316	70	62
*PU5AAD	*	6,477	51	51
*PU8TLS	*	6,448	78	62
*PU3KNP	*	5,406	56	53
*PU2RGD	*	3,612	44	43
*PU2UJG	*	3,600	51	45
*PU1KVA	*	1,976	44	38
*PU2UTC	*	735	24	21
*PY2SEI	*	570	19	19
***PY2ZR**	**21**	**107,508**	**215**	**186**
*PY4EK	*	47,424	151	114
*PY2TIM	*	24,628	100	94
*PY2KPY	*	4,141	41	41
*PV8DR	*	348	13	12
***PR7AR**	**14**	**10,856**	**68**	**59**
***PR7DZ**	**7**	**168,304**	**190**	**157**
*PV8CQ	*	7,524	40	38

Chile

CE3DNP	**28**	**1,581,759**	**1029**	**543**
CA3OEV	*	940,730	791	445
***CE3TKV**	**A**	**3,608**	**46**	**41**
***CE4WW**	**28**	**171,000**	**289**	**228**
			(OP: CE4UJU)	
*CE3LQH	*	28,840	127	103
*XQ4CW	*	6,820	60	55
***CE1UGE**	**21**	**107,136**	**225**	**192**
***3G1C**	**14**	**456,576**	**511**	**328**
			(OP: CE1KR)	

Colombia

HK3Q	**A**	**254,735**	**333**	**265**
HK1X	**14**	**13,783,532**	**3745**	**1259**
HK1T	**7**	**11,997,104**	**2167**	**952**
HK1W	**3.7**	**996,660**	**518**	**339**
***HK5P**	**A**	**2,598,896**	**1195**	**664**

Curacao

***PJ2OF**	**A**	**245**	**7**	**7**

Ecuador

***HC5VF**	**A**	**327,114**	**416**	**306**
***HC1JQ**	**14**	**843,465**	**673**	**435**

French Guiana

***FY1FL**	**A**	**916,752**	**728**	**426**

Paraguay

***ZP9MCE**	**28**	**22,050**	**113**	**98**

Suriname

PZ5RA	**A**	**2,966,364**	**1362**	**666**

Uruguay

CX5TR	**A**	**28,944**	**118**	**108**
CX2DK	**21**	**2,334,660**	**1245**	**668**
CX8BR	**7**	**3,168**	**24**	**24**
***CX2TG**	**28**	**208,715**	**326**	**247**

Venezuela

YV5NWG	**A**	**56,870**	**138**	**121**
YV5AM	**21**	**3,900,575**	**1727**	**775**
YV5MSG	**3.7**	**492,060**	**365**	**236**
***YY5OSW**	**A**	**182,025**	**287**	**225**
*YY5COR	*	42,075	109	99
*YV5JGO	*	11,484	61	58
*YY5TIO	*	1,800	24	24
*YY5APA	*	775	27	25
***YV4CW**	**21**	**44,505**	**143**	**129**
*YV1FYZ	*	10,557	73	69
***YV5ER**	**14**	**52,920**	**143**	**135**
*YV5OIE	*	32,256	119	96
***YY5EDG**	**7**	**240,768**	**237**	**198**
*YY5CPG	*	19,053	76	73

ASSISTED
NORTH AMERICA

United States

KI1G	**A**	**13,075,616**	**3341**	**1268**
KA1IQR	*	2,870,881	1329	767
K1AR	*	2,445,414	1331	722
W1KQ	*	1,207,675	857	469
N1IXF	*	977,340	713	455
AE1T	*	522,396	468	378
AD1L	*	452,540	482	374
K1BG	*	299,493	380	311
W1MAW	*	162,330	237	210
W1BYH	*	112,852	183	178
NF1A	*	83,655	198	169
WA1Z	*	75,690	170	145
KX1G	*	74,784	166	152
W1EL	*	10,578	47	43
K1ZZ	**28**	**281,300**	**447**	**290**
K1JB	**14**	**95,940**	**207**	**195**
WJ1R	**7**	**30,444**	**91**	**86**
***NR1I**	**A**	**1,555,398**	**1024**	**578**
			(OP: W1NT)	
*KA2KON/1	*	1,446,975	870	531
*KS1J	*	652,460	579	404
*N1API	*	409,360	480	344
*KE1V	*	371,742	425	334
*KB1THU	*	197,714	288	242
*WA1ZYX	*	51,460	148	124
*WO1N	*	41,040	126	120
*KB1SUN	*	20,303	95	79
***N1VVV**	**28**	**4,770**	**51**	**45**
***KG1E**	**21**	**349,932**	**363**	**363**
NY6DX/2	**A**	**7,028,320**	**2293**	**1040**
AB3CX/2	*	4,447,776	1916	856
KE2DX	*	1,788,700	1040	620
N2SQW	*	1,330,435	892	503
WT4Q/2	*	1,313,208	945	552
W6XR/2	*	1,231,230	784	533
N2MUN	*	853,244	717	434
W2LK	*	713,988	598	396
N1IBM/2	*	633,360	537	390
AB2DE	*	504,065	448	365
WC2L	*	491,643	455	393
			(OP: W2GDJ)	
NJ1F/2	*	322,803	393	279
K2NV	*	192,096	292	232
N2WKS	*	129,626	297	197
WK2E	*	74,256	170	156
W1GD/2	*	62,785	151	145
N2SY	*	41,515	133	115
W2RR	**28**	**68,068**	**186**	**143**
			(OP: WA2AOG)	
WR2G	**14**	**1,089,774**	**786**	**567**
W2IRT	**7**	**1,252,973**	**1061**	**583**
W2MF	**1.8**	**93,492**	**210**	**159**
***N2RJ**	**A**	**1,205,874**	**780**	**489**
*KA2D	*	768,012	613	446
*N2FF	*	683,514	599	414
*KS2G	*	452,412	472	354
*KC2OBN	*	174,840	301	235
*W2RDM	*	138,483	255	207
*K2SI	*	81,056	194	149
*W2CCW	*	37,343	114	107
*K9VB/2	*	25,542	94	86
*K2CYE	*	20,336	88	82
*NP3D/2	*	1,350	16	15
***N2OO**	**28**	**4,520**	**45**	**40**
***KB2NGK**	**21**	**9,912**	**59**	**59**
K3WW	**A**	**3,566,619**	**1474**	**791**
W3FW	*	2,843,236	1344	716
AA3B	*	2,271,984	1082	662
NA3M	*	2,181,150	1107	655
W3KL	*	2,093,712	1021	636
N3OC	*	1,426,886	987	566
N3RD	*	1,123,864	770	488
NW3H	*	412,148	464	319
W3FV	*	307,944	388	273
W3SQ	*	183,209	293	221
NN3RP	*	159,032	287	206
K3RWN	**21**	**24,100**	**103**	**100**
K3YG	*	290	10	10
***NK3Y**	**A**	**783,666**	**584**	**442**
*N3ALN	*	353,340	476	302
*W4EE/3	*	338,844	430	302
*WW3S	*	100,848	219	191
*W3OD	*	99,703	195	179
*WA3AER	*	94,860	250	170
***N3ZA**	**21**	**64,650**	**158**	**150**
***KA3ITJ**	**3.7**	**6,432**	**52**	**48**
NS1L/4	**A**	**5,807,004**	**2262**	**1022**
NF4A	*	4,544,232	1952	924
KG4W	*	2,253,733	1261	677
N4ZZ	*	1,447,635	1155	595
N3CZ/4	*	1,011,348	792	468
N4DJ	*	680,616	590	411
K3IE/4	*	642,942	590	414
N4DWK	*	605,170	522	365
W4PHS	*	330,867	406	291
KR4F	*	317,196	358	324
NQ1W/4	*	288,496	359	292
			(OP: K1KO)	
AA4DD	*	235,417	326	199
W4AS	*	221,925	276	275
N4PB	*	194,649	282	217
WØYR/4	*	131,018	261	218
N4BCD	*	123,804	223	181
WE4M	*	122,778	201	171
			(OP: N2QT)	
N4DXI	*	108,016	219	172
NZ4O	*	101,574	187	171
W4JAM	*	72,645	176	145
W4DMB	*	60,384	148	148
WF4W	*	58,896	152	144
ND4V	*	55,485	155	135
KF4ZS	*	53,317	154	131
WA3OFC/4	*	50,560	141	128
NS4X	*	17,302

W4BQF	**28**	**16,100**	**105**	**70**	***K8BL**	**A**	**307,026**	**333**	**333**											
N3UA/4	*	2,511	31	31	*WD8S	*	164,590	265	218											
W4MYA	**21**	**2,747,654**	**1366**	**806**	*KD8NJZ	*	12,400	66	62											
KI4TZ	*	636,795	589	445	*K8ZT	*	6,916	53	52											
NS1S/4	*	161,103	249	249	*W8IDW	*	6,084	55	52											
			(OP: K1ZZI)		*K9TRV/8	*	960	16	15											
KC4HW	**14**	**43,329**	**152**	**143**	*K8GT	*	720	16	16											
K4KZZ	**7**	**343,640**	**341**	**284**																
***KT4ZB**	**A**	**1,723,498**	**1083**	**614**	**WN9D**	**A**	**2,768,535**	**1435**	**765**											
*N4VA	*	156,450	276	210				(OP: W9IU)												
*KM4JA	*	133,865	260	205	N2BJ/9	*	2,509,026	1336	741											
*K4MCK	*	126,730	241	190	K9NW	*	1,416,506	884	559											
*K4OMG	*	101,314	223	179	NX9G	*	948,915	773	495											
*K4FTO	*	97,544	227	178	K9MMS	*	702,048	610	412											
*WV4V	*	50,435	151	131	W9GIG	*	154,674	242	234											
*KC4YBO	*	38,316	151	124	K9EN	*	150,420	269	230											
*KI4TZU	*	29,502	116	99	WA9IVH	*	128,100	249	183											
*W4WNT	*	27,700	105	100	W9II	*	57,969	158	113											
*N4BFR	*	21,840	101	91	N7MB/9	*	40,859	117	91											
*NW4V	*	6,721	49	47	**W9IIX**	**21**	**172,020**	**284**	**244**											
*AI4VA	*	4,092	49	44	**W9EXY**	**14**	**838,380**	**767**	**534**											
*WA4PGM	*	2,322	33	27	***WE9R**	**A**	**485,296**	**461**	**392**											
*KI4HHK	*	2,156	29	28	*KA9MOM	*	197,956	320	242											
***W4UAL**	**21**	**498,190**	**615**	**385**	*KC9IRQ	*	170,275	245	245											
			(OP: K4CWW)		*W9LW	*	139,471	263	211											
*KM4HI	*	349,182	397	342	*N9VPV	*	76,320	182	159											
					*WB9YBI	*	54,526	178	137											
K5MV	**A**	**1,818,288**	**1209**	**648**	*W9IKU	*	52,536	168	132											
K5UA	*	1,234,548	804	497	*K9GY	*	46,464	150	128											
N5JR	*	1,126,175	772	535	*KB9NW	*	19,488	96	87											
W5GN	*	1,068,132	805	501	*K9OR	*	17,712	72	72											
KE5FXE	*	309,763	437	307	*K9AIH	*	1,650	22	22											
K5YM	*	196,605	322	257	***KA9O**	**7**	**93,544**	**224**	**164**											
K5LAD	*	158,625	264	225																
K7IA/5	*	92,220	214	174	**WØBM**	**A**	**1,736,060**	**1019**	**618**											
NM6E/5	*	87,352	238	179	KØCF	*	748,000	637	400											
K5WBM	*	32,816	118	112	KØBUD	*	454,790	473	365											
W5KI	*	11,180	79	65	NCØO	*	377,175	395	321											
K5HDU	*	7,293	55	51	NØBK	*	365,115	418	303											
NQ5K	**21**	**1,177,274**	**992**	**574**	KØDG	*	271,400	373	295											
			(OP: W5ASP)		NØRN	*	252,681	318	247											
NØRQ/5	**3.7**	**150**	**5**	**5**	AEØRX	*	214,830	317	231											
WG5J	**1.8**	**660**	**24**	**22**	K5VYT/Ø	*	209,678	304	238											
***NE5LL**	**A**	**360,640**	**495**	**322**	W4RK/Ø	*	167,628	328	229											
			(OP: N1CC)		WØMU	*	165,150	253	225											
*WØVX/5	*	158,259	261	213	WØRAA	*	151,917	276	237											
*AB5XZ	*	58,656	200	141	K4IU/Ø	*	102,180	224	195											
*N5DGK	*	29,268	121	108	WBØN	*	80,640	168	168											
*KE5LQ	*	19,200	98	80	WGØM	*	75,579	221	177											
*K1GMD/5	*	12,540	64	60	KØAP	*	59,064	158	138											
					AAØA	*	43,798	135	122											
N6QQ	**A**	**3,123,318**	**1406**	**814**	NØKQ	*	25,578	107	87											
AD6WL	*	1,841,088	1177	669	KØFG	*	24,402	94	83											
WF6C	*	944,520	767	510	**NØUU**	**21**	**176,605**	**275**	**247**											
			(OP: K6SRZ)		NSØM	*	37,950	122	115											
K6RIM	*	552,450	524	381	**WØCEM**	**14**	**371,628**	**419**	**372**											
KI6QDH	*	445,725	547	315	***KØRI**	**A**	**1,445,550**	**978**	**575**											
WM6DX	*	261,330	357	281	*AD1C/Ø	*	987,525	794	475											
			(OP: W6DPD)		*KØKX	*	576,972	501	396											
N6WK	*	223,340	316	260	*WØERP	*	123,004	231	191											
K6JEB	*	115,620	265	188	*NXØI	*	93,798	256	193											
N6OPR	*	62,730	184	153	*KØACP	*	65,637	182	153											
N6VH	*	51,952	170	136	*ACØUR	*	56,580	161	138											
WM6A	*	34,900	111	100	***KCØDEB**	**21**	**190,258**	**304**	**251**											
			(OP: K6TA)		*KFØIQ	*	1,180	20	20											
AG6AZ	*	22,410	94	90	***WØDN**	**14**	**247**	**15**	**13**											
WK6LA	*	14,256	83	81																
			(OP: K6LA)																	
AE6RR	*	7,473	59	53	**AL9A**	**A**	**2,761,718**	**1397**	**731**											
W6DR	*	5,687	54	47	KL7/N6SPP	*	15,890	75	70											
AC6DX	**28**	**135,216**	**352**	**216**																
NN6NN	*	3,672	41	36																
			(OP: W6XK)																	
KZ5OM/6	*	1,440	27	24	**VE1OP**	**14**	**387,717**	**410**	**341**											
			(OP: K6III)		***VE1ZD**	**A**	**826,256**	**653**	**452**											
W6AFA	**21**	**1,153,977**	**869**	**561**	***VY2MGY**	**3.7**	**388,120**	**408**	**248**											
WB6BFG	*	240,120	331	290				(OP: VE3MGY)												
K6CTA	*	93,450	197	178	*VE9ML	*	193,914	222	189											
K6III	*	32,542	121	106																
N6XI	*	7,076	61	58	**VA2WA**	**A**	**4,116,690**	**1529**	**790**											
***WV6E**	**A**	**1,398,624**	**900**	**544**				(OP: VA2WDQ)												
*K6AAB	*	289,200	423	300	VE2NGH	*	145,800	221	216											
*KE6QR	*	193,492	302	244	VE2FXL	*	19,040	86	80											
*N6RV	*	111,320	214	184	***VE2XAA**	**A**	**4,893,202**	**1839**	**898**											
*K7LA/6	*	28,090	128	106	*VA2BNE	*	4,662	39	37											
*K6DSW	*	17,052	108	87																
*W6JWP	*	13,860	86	70	**VE3UTT**	**A**	**8,276,950**	**2317**	**1010**											
*KD6WKY	*	13,715	76	65	VE3MMQ	*	3,852,800	1544	800											
*NS6T	*	3,293	38	37	VA3DX	*	358,112	384	304											
***K6LE**	**28**	**11,050**	**73**	**65**	**VE3IO**	**14**	**264,615**	**330**	**299**											
					VE3CX	**7**	**3,595,152**	**1357**	**619**											
K7WP	**A**	**1,237,545**	**855**	**515**	***VA3UG**	**A**	**777,692**	**663**	**398**											
W7PP	*	960,364	759	487	*VE3XAT	*	243,672	326	264											
K7XC	*	636,813	554	409	*VE3AJ	*	4,472	44	43											
NR7DX	*	594,814	616	418	***VE3AUO**	**28**	**15,400**	**90**	**70**											
			(OP: K7ABV)																	
W6SA/7	*	510,490	587	355	**VA5LIZ**	**A**	**2,133**	**27**	**27**											
NA6E/7	*	489,375	553	375																
			(OP: WT6P)		**VA7FC**	**A**	**698,880**	**757**	**384**											
K7FA	*	431,604	550	342	VE7TG	*	114,276	196	178											
KE7YF	*	400,983	455	319	***VA7BEC**	**A**	**1,099,332**	**885**	**486**											
K7VIT	*	377,520	448	330																
K7LV	*	344,208	423	303																
KY7M	*	247,660	342	290	**XP1A**	**14**	**8,303,460**	**2909**	**1094**											
K7EG	*	206,148	294	246				(OP: OX3KQ)												
NO7T	*	202,250	280	250																
N7QS	*	111,265	228	187																
KC7PM	*	77,763	230	161																
W7SW	*	29,585	107	97	***HH2/PY1ZV**	**A**	**383,238**	**430**	**282**											
NA2U/7	*	22,275	105	99																
W7AUM	*	18,785	90	85																
K7GZP	*	9,300	62	50	**XE2AC**	**A**	**13,334**	**53**	**59**											
K7AWB	*	24	4	2	**XE1EE**	**28**	**111,864**	**282**	**177**											
K7ZD	**28**	**1,235**	**22**	**19**	***XE1GZU**	**A**	**112,391**	**229**	**167**											
K7EIQ	**21**	**49,776**	**148**	**136**																
KI7M	**14**	**1,086,470**	**992**	**595**																
***N7UR**	**A**	**444,360**	**525**	**345**	**KP3Z**	**A**	**14,794,199**	**4076**	**1207**											
*KE7LOQ	*	102,820	207	194				(OP: NP4Z)												
*KD7PCE	*	51,030	161	135	WP4SK	*	1,235,520	1161	480											
*ND8N/7	*	36,890	162	119	***NP4G**	**14**	**277,685**	**453**	**279**											
*KC7KCJ	*	12,324	90	78																
*WS7I	*	4,403	45	37																
***N7FLT**	**21**	**179,031**	**287**	**249**	**V47JA**	**A**	**335,920**	**369**	**260**											
***N7MAL**	**7**	**19,173**	**80**	**77**				(OP: W5JON)												
ND8L	**A**	**1,361,165**	**852**	**559**																
W8GNM	*	423,186	441	281	**VQ9IV**	**A**	**12,586,728**	**4023**	**1176**											
K8ROX	*	351,624	386	299				(OP: W5CW)												
AC8G	*	223,517	323	259																
K1LT/8	*	26,487	101	81																
KX8O	*	22,022	102	91	***KP2DX**	**A**	**1,019,900**	**847**	**434**											
N8KOJ	*	4,746	45	42	*KP2B	*	20,995	94	85											
K8FZY	**14**	**345**	**15**	**15**				(OP: WP3A)												

AFRICA

Burkina Faso

XT2VVO	**A**	**310**	**10**	**10**

Canary Islands

***EC8AVE**	**A**	**11,098**	**65**	**62**
***EA8CQW**	**28**	**74,790**	**194**	**135**

Egypt

***SU1HZ**	**A**	**223,860**	**318**	**246**

Madeira Islands

CQ3L	**A**	**12,435,561**	**3348**	**1117**
			(OP: DF7ZS)	
CT3HF	*	1,910,160	1161	560

Namibia

V51Q	**28**	**13,398**	**70**	**66**

South Africa

ZS6QDW	**28**	**924,224**	**722**	**448**

ASIA

Asiatic Russia

RG9A	**A**	**13,166,848**	**3274**	**1109**
RN9CM	*	5,529,342	1922	861
RL9AA	*	4,930,311	1807	879
RM9RZ	*	1,924,722	1002	654
RM8W	*	741,200	587	436
RG8K	*	500,220	485	397
UA9AGX	*	212,400	309	236
RC9F	*	134,302	261	181
RA9JBA	*	120,696	229	188
UA9CGL	*	100,632	203	168
RW9TA	*	94,772	210	172
RK9UE	*	60,207	167	141
RK9KWI	*	53,704	150	137
RO9O	*	35,424	138	108
UA9OC	*	26,412	96	93
UA9OCQ/9	*	200	8	8
R9UAG	**21**	**557,274**	**582**	**393**
RZ9YF	*	211,255	319	253
RA9UN	*	190,750	323	250
RU9AZ	*	57,915	155	143
RA9ST	*	1,872	28	26
UI9I	**14**	**3,760,536**	**1591**	**884**
			(OP: RU9I)	
RK8I	*	1,613,040	967	611
RK9DM	*	1,396,528	872	592
RW9TP	*	276,500	337	316
RT8O	*	53,654	145	139
R9OA	*	43,066	137	122
RA9UAD	*	27,438	107	102
RU9CK	**7**	**4,355,085**	**1159**	**703**
R8TT	*	1,432,635	610	447
RK9CZO	*	726,002	422	326
			(OP: UA9QCQ)	
RW9UDS	**1.8**	**6,392**	**37**	**34**
***RV9UP**	**A**	**2,899,552**	**1368**	**722**
*RT9S	*	2,267,234	1103	586
*RW9QC	*	661,521	547	357
*RZ9CJ	*	638,844	544	383
*RN8W	*	189,738	295	254
*UA9UDX	*	125,190	267	195
*RK9DC	*	105,408	200	192
*RG8U	*	87,657	213	183
*RV9CP	*	45,934	142	119
*RT9T	*	35,728	118	112
*UI8W	*	27,918	97	94
			(OP: RW9WW)	
*RV9CX	*	14,760	62	60
*UA9JNT	*	7,236	56	54
*UA9OAL	*	2,618	35	34
*UF8T	*	2,520	30	30
***UA9LAO**	**28**	**656**	**18**	**16**
***R9MC**	**21**	**551,379**	**543**	**393**
*RA9MX	*	114,240	216	204
***RD8O**	**14**	**9,394**	**61**	**61**
*RW9QA	*	6,528	50	48
***UA9SUX**	**7**	**9,040**	**40**	**40**
RAØSMS	**A**	**2,400,828**	**1220**	**708**
RAØFU	*	1,659,539	936	619
RWØBG	*	297,498	357	277
UAØSR	*	106,225	219	175
RXØAK	*	4,410	42	42
RUØA	*	2,760	33	30
UBØA	**21**	**3,701,236**	**1700**	**854**
RWØUU	*	9,145	63	59
UCØA	**14**	**648,000**	**555**	**432**
UAØQBR	*	390,312	405	351
RKØUT	*	246,810	328	285
RZØSZZ	*	118,404	250	198
			(OP: RNØSA)	
***RAØJBL**	**A**	**444,555**	**447**	**333**
*RZØSB	*	121,000	246	200
*RAØANO	*	102	6	6
***RWØMM**	**21**	**324**	**12**	**12**

Asiatic Turkey

TA3IW	**A**	**190,209**	**267**	**213**

China

BA7IO	**28**	**206,296**	**341**	**241**
BD7LMD	**21**	**53,352**	**172**	**152**
***BA1AI**	**A**	**909,792**	**783**	**468**
*BD4CD	*	87,084	214	177
*BD9AFM	*	67,320	230	165
*BD7MTJ	*	65,469	200	139
*BA6QR	*	50,310	177	130
*BD4TS	*	15,210	98	78
*BD4SFE	*	13,908	80	76
*B4TB	*	9,240	71	60
			(OP: BA4TB)	
*BG2VJM	*	7,747	83	61
***BA1SN**	**21**	**196,176**	**323**	**268**
*BH1IIJ	*	66,939	207	159
*BD4CZX	*	51,786	166	137
*BG2AUE	*	35,030	124	113
***BD4CQ**	**14**	**21,714**	**106**	**94**

Cyprus

5B4KH	**21**	**5,206,250**	**2152**	**850**
C4M	**1.8**	**180,264**	**190**	**168**
			(OP: 5B4AGM)	

Georgia

***4L6QC**	**21**	**52,220**	**154**	**140**

Hong Kong

VR2XLN	**21**	**76,908**	**254**	**174**

Israel

4XØA	**28**	**89,392**	**200**	**151**
***4Z5OZ**	**A**	**237,380**	**332**	**260**

Japan

JQ1BVI	**A**	**4,121,208**	**1739**	**819**
JH1OVY	*	66,768	163	156
JA1QGT	**28**	**3,456**	**38**	**36**
JH1APK	**3.7**	**3,584**	**29**	**28**
***JH1DGQ**	**A**	**251,498**	**330**	**221**
*JA1IST	*	212,872	317	236
*JS1KQQ	*	20,335	97	83
***JM1NKT**	**21**	**478,040**	**504**	**370**
*JM1LRQ	*	476,630	483	385
JG2REJ	**A**	**305,370**	**389**	**270**
JA2FSM	*	11,280	68	60
***JF2OZH**	**A**	**53,966**	**141**	**121**
*JK2VOC	*	27,783	137	81
JS3CTQ	**A**	**9,179,503**	**2830**	**1069**
JN3SAC	*	220,410	320	237
***JA3PYC**	**A**	**91,260**	**195**	**156**
*JL3RDC	*	4,251	41	39
*JM3PLL	*	3,325	37	35
JO4CFV	**A**	**31,680**	**121**	**88**
JI5SKS	**A**	**2,760**	**30**	**30**
JA6BZI	**A**	**3,281,740**	**1371**	**770**
***JA6DIJ**	**A**	**431,268**	**487**	**332**
JA7ZP	**A**	**154,840**	**241**	**196**
JA7NVF	**21**	**5,487,456**	**2121**	**928**
***JJ7OIP**	**21**	**983**	**21**	**21**
JR9GMS	**A**	**1,281**	**21**	**21**
***JH9URT**	**7**	**61,776**	**124**	**108**
JHØNOS	**A**	**568,764**	**523**	**333**
***JAØBJY**	**A**	**40,014**	**125**	**114**
***JRØBUL**	**28**	**2,059**	**31**	**29**

Kampuchea

***XU7ACY**	**A**	**361,935**	**582**	**315**

Kazakhstan

UN2E	**A**	**1,326,708**	**811**	**538**
UN4PG	**14**	**340,992**	**396**	**333**

Kyrgyzstan

***EX7ML**	**21**	**493,950**	**511**	**370**

Mongolia

JT5DX	**A**	**7,760,949**	**2546**	**1007**
			(OP: JT1CO)	
***JT1BV**	**A**	**766,976**	**649**	**448**

Qatar

A71EM	**A**	**3,129,280**	**1376**	**704**

Saudi Arabia

HZ1FS	**A**	**2,751,756**	**1395**	**658**
			(OP: DL2RMC)	
***7Z1SJ**	**7**	**2,345,776**	**805**	**542**

South Korea

HL1/WX8C	**14**	**8,909**	**68**	**59**
***HL1VAU**	**A**	**226,540**	**334**	**241**
*DS5TOS	*	131,930	235	167
***DS2NMJ**	**21**	**13,317**	**72**	**69**

Taiwan

BX5AA	**21**	**2,949,210**	**1541**	**810**
***BU2AU**	**A**	**474,768**	**673**	**314**

Tajikistan

EY8MM	**A**	**829,739**	**670**	**443**
***EY7BJ**	**A**	**1,086,566**	**839**	**529**

Thailand

***HSØZHG**	**21**	**96,200**	**240**	**200**

United Arab Emirates

***A65CA**	**A**	**663,480**	**576**	**388**
*A65BU	*	215,830	305	226

Vietnam

XV1X	**A**	**639,324**	**712**	**413**

West Malaysia

9M2ADX	**A**	**30,240**	**118**	**96**

EUROPE

Aland Islands

OHØZ	**21**	**588,544**	**578**	**418**
			(OP: OH3BHL)	
OGØZ	**14**	**1,166,220**	**994**	**589**
			(OP: OH9MM)	

Austria

OEØQ	**A**	**1,048,562**	**799**	**538**
			(OP: OE8SKQ)	
OEØOLK	*	12,528	96	87
OE5UAL	**28**	**64,801**	**181**	**137**
***OE5HSN**	**A**	**347,548**	**444**	**323**
*OE5JSL	*	22,528	99	88

Belarus

EV1R	**A**	**3,338,084**	**1779**	**863**
EW4AA	*	2,907,447	1531	863
EW7BR	*	749,982	755	478
EW8DJ	*	79,680	191	166
EU1A	**3.7**	**1,398,984**	**995**	**568**
EU3AR	**1.8**	**393,242**	**518**	**353**
***EW1IP**	**A**	**1,482,960**	**1103**	**592**
*EW2AO	*	275,127	461	313
*EV2SG	*	246,480	393	312
			(OP: EW8OG)	
*EW7DK	*	194,376	339	267

Belgium

OS8A	**A**	**3,784,420**	**1713**	**874**
ON6CQ	*	1,408,407	983	637
OP4B	*	77,588	203	163
OQ4U	**21**	**5,004,554**	**2130**	**898**
OQ4B	*	674,620	624	445
OR7R	**7**	**1,550,472**	**983**	**616**
***ON4VDV**	**A**	**962,064**	**755**	**524**
*OO7W	*	663,156	741	468
*ON4CAS	*	410,496	493	384
*ON7BBR	*	344,420	474	340
*ON6LY	*	123,968	239	208
*OR4K	*	83,215	200	187
***OR2F**	**14**	**25,192**	**146**	**134**
			(OP: ON8LDS)	

Bosnia-Herzegovina

E74Y	**A**	**1,049,995**	**892**	**563**
E71A	**21**	**6,175,638**	**2469**	**966**
E77C	**3.7**	**973,443**	**843**	**501**
***E72MM**	**14**	**31,297**	**125**	**119**
***E74AA**	**1.8**	**60,760**	**192**	**155**

Bulgaria

LZ1BJ	**A**	**1,274,290**	**1015**	**610**
LZ1YE	**28**	**5,588**	**49**	**44**
LZ11RF	**14**	**18,000**	**106**	**100**
				(OP: LZ1YE)
***LZ2SX**	**A**	**1,270,200**	**1072**	**584**
***LZ2JA**	**21**	**397,896**	**528**	**354**

Crete

SV9COL	**21**	**229,596**	**478**	**318**
***SVØXCC/9**	**A**	**81,900**	**289**	**210**

Croatia

9A4M	**A**	**25,725**	**120**	**105**
9A2KD	*	10,290	75	70
9A2U	**28**	**254,584**	**409**	**263**
				(OP: 9A3ZA)
9A4QX	*	176,412	350	244
9A5D	**21**	**2,636,151**	**1517**	**681**
				(OP: 9A5DU)
9A5ADT	**14**	**2,588,048**	**1751**	**819**
9A1CMA	**7**	**138,575**	**292**	**215**
				(OP: 9A5TO)
***9A3XV**	**A**	**7,991**	**66**	**61**

Czech Republic

OK1BET	**A**	**1,438,294**	**1029**	**611**
OK7Y	*	1,138,290	862	570
OK1TRA	*	254,448	398	304
OK8DD	*	22,100	92	85
OK1GK	**28**	**14,586**	**81**	**66**
OK4U	**21**	**3,711,855**	**1725**	**795**
				(OP: OK1DIG)
OK1D8E	*	1,364	24	22
OL3R	**14**	**3,418,792**	**1757**	**923**
				(OP: OK1VWK)
OK1T	**1.8**	**206,525**	**359**	**275**
				(OP: OK1TP)
OK7K	*	177,250	330	250
				(OP: OK1BN)
***OK4DZ**	**A**	**146,900**	**267**	**226**
***OK1AY**	**14**	**71,196**	**204**	**204**
***OK1UG**	**7**	**677,376**	**628**	**448**
*OK2PPM	*	171,864	279	231
***OK1IC**	**3.7**	**14,418**	**88**	**81**

Denmark

OZ1ADL	**A**	**2,807,695**	**1341**	**781**
5PSK	*	1,348,182	1065	619
				(OP: DL7AOS)
OZ2PBS	*	812,520	733	488
OZ6AGX	*	160,024	296	241
OU5A	**14**	**1,492,092**	**1260**	**651**
				(OP: YT2T)
OZ7AM	**3.7**	**914,977**	**763**	**497**

England

GØVXE	**A**	**2,055,504**	**1284**	**748**
G3RXQ	*	519,944	534	412
G6T	*	249,795	377	305
				(OP: G4MKP)
GØMTN	*	219,735	387	285
MØRNR	*	124,656	248	212
GØRPM	*	117,600	244	196
M1JJK	*	93,310	267	215
GØHVQ	**28**	**36,000**	**127**	**100**
G8DYT	**3.7**	**337,456**	**408**	**322**
G4NXG	*	81,174	193	166
G3TXF	**1.8**	**190,026**	**301**	**243**
***G3VAO**	**A**	**1,969,692**	**1259**	**652**
*G2F	*	33,220	120	110
				(OP: MØCHK)
*2EØVKG	*	27,720	131	105
*G4WGE	*	17,190	100	90
***M/YO4RDW**	**14**	**141,625**	**344**	**275**
***2E1FVS**	**7**	**407,968**	**431**	**352**

Estonia

ES2BH	**A**	**682,774**	**693**	**487**
ES5MG	**28**	**23,760**	**106**	**88**
ES2TT	**14**	**16,653**	**93**	**91**
ES2TI	**7**	**1,571,119**	**952**	**613**
***ES5TF**	**A**	**595,014**	**605**	**457**
***ES6Q**	**21**	**875,655**	**693**	**549**
				(OP: ES5RY)

European Russia

RU1AB	**A**	**1,001,812**	**812**	**518**
RA1AL	*	447,024	564	402
RV1CC	*	299,915	387	287
RN1N	*	249,156	406	324
UA1ORK	*	13,065	72	67
***UA1CEI**	**A**	**1,814,850**	**1349**	**666**
*R1AT	*	255,040	478	320
R5GA	**A**	**6,341,500**	**2684**	**1100**
RY3D	*	2,900,350	1746	817
RM2U	*	2,563

RT3T	*	370,880	389	320	DK2AT	*	973,700	891	535	II1H	*	98,800	238	200	**SO6I**	**28**	**2,465**	**30**	**29**	
RA3OA	*	341,448	442	328	DH1PS	*	964,371	755	521				(OP: I1HJT)					(OP: SP6JIU)		**Spain**
***R5ACQ**	**A**	**156,123**	**314**	**249**	DKØA	*	858,276	730	486	I1NVU	*	80,400	243	201	**SP1RKT**	**21**	**439,673**	**476**	**403**	**EA1WX**	**A**	**109,200**	**236**	**210**
*RT3LA	*	139,194	274	222				(OP: DL7JAN)		I3VJW	*	42,265	130	107	SP1NY	*	219,186	329	246	**EA1YG**	**28**	**120,960**	**246**	**189**
*RU3U	*	114,840	275	220	DL2OBO	*	850,527	684	459	IZ3DVU	*	38,048	128	116	**SN8R**	**14**	**4,233,257**	**2147**	**931**	*EE1A	A	274,752	453	318
*RA3RRP	*	105,985	252	205	DL6EZ	*	835,328	751	502	IZ6KFH	*	18,798	86	78				(OP: SP8ONZ)					(OP: EA1HDD)	
*RX3VF	*	102,212	221	202	DK6CQ	*	728,160	662	480	IZØGYP	*	11,651	66	61	**SO8N**	**7**	**2,304,959**	**1235**	**709**	*EA1HLL	21	28,638	135	111
*RU3XK	*	63,585	198	157	DF2TT	*	661,164	602	476	IZ2DII	*	4,312	46	44				(OP: SQ8GHY)						
*RL3F	*	24,684	133	121	DL1OLJ	*	653,650	618	425	**IZ2ODM**	**28**	**42,350**	**142**	**110**	SP4TKR	*	1,169,049	851	537	**EC2DX**	**A**	**9,576,729**	**2914**	**1181**
*UA3RW	*	21,384	99	88	DJ1YFK	*	531,846	585	378	IZ4MJP	*	6,392	49	47	SN3X	*	1,106,700	841	525	EA2NN	*	953,568	914	602
*RL3FXX	*	2,400	40	40	DL5YM	*	509,320	604	428	**IW2HAJ**	**21**	**4,239,372**	**1898**	**881**	SP9IKN	*	17,711	89	89	**EB2AM**	**28**	**296,450**	**413**	**275**
*RL3FA	*	602	14	14	DFØPWR	*	382,344	524	358	IZ5CML	*	1,085,812	850	494	**SQ8MFB**	**3.7**	**21,930**	**115**	**102**	*EA2CE	A	109,200	252	210
*R3XAA	*	65	5	5				(OP: DL6YAO)		IQ4FA	*	375,224	454	356	SP5PCM	*	6	1	1	*EA2CJ	*	14,775	77	75
***R3VA**	**28**	**10,920**	**71**	**60**	DK1AX	*	369,595	516	383				(OP: IZ4UEZ)		**SP6AXW**	**1.8**	**8,253**	**65**	**53**	*EA2KP	*	624	16	16
***R2SA**	**21**	**178,432**	**348**	**272**	DP7A	*	312,180	404	330	IZ8EPX	*	292,248	493	328	***SP9AQF**	**A**	**637,259**	**619**	**413**	***EA2WD**	**28**	**22,714**	**95**	**82**
***RK3SWB**	**14**	**387,768**	**497**	**428**				(OP: DL2YL)		IZ5FDJ	*	54,648	148	138	*SQ8LSC	*	621,000	544	460	***EA2DT**	**21**	**463,942**	**539**	**421**
			(OP: RV3SFF)		DJ4MZ	*	306,810	389	315	**IKØPHY**	**14**	**2,721,546**	**1726**	**909**	*SN1T	*	603,809	663	443					
*RX3DBG	*	212,550	380	327	DG4R	*	296,808	392	332	IR2C	*	852,120	767	526				(OP: SQ1RET)		**EA3WD**	**A**	**390,080**	**454**	**265**
***R3LA**	**1.8**	**666**	**18**	**18**				(OP: DL1RG)					(OP: IK2JUB)		*SN7S	*	307,104	489	336	**EB3CW**	**21**	**4,227,038**	**1941**	**881**
					DK5IR	*	290,665	402	305	**IZ8GBH**	**7**	**17,280**	**83**	**80**				(OP: SP7IDX)		**EA3NT**	**14**	**353,616**	**567**	**417**
RT4RO	**A**	**6,340,471**	**2945**	**1087**	DG2NMH	*	204,703	368	277	**IR4C**	**3.7**	**1,553,035**	**989**	**605**	*SP1GZF	*	254,569	371	287	**EE3R**	**7**	**52,644**	**125**	**123**
RW4W	*	4,099,788	2232	957	DG3FK	*	145,266	245	213				(OP: IZ4NIC)		*SP1O	*	223,015	316	235				(OP: EA3DR)	
RW4PL	*	3,453,680	1975	920	DM5TI	*	126,672	234	203	IZ5MOQ	*	1,163,674	992	542	*SP9HZW	*	117,968	240	202	***EA3GYK**	**A**	**56,518**	**186**	**154**
RO4F	*	2,731,040	1676	845	DL1NEO	*	115,500	243	210	IZ5NFD	*	333,317	455	331	*SP4Z	*	96,432	194	168				(OP: DK7TM)	
UA4LCH	*	693,600	637	425	DL1PT	*	69,874	200	161	**IQ4RA**	**1.8**	**545,606**	**609**	**409**	*SP6FXY	*	87,420	197	155	*EA3NO	*	12,300	73	60
UA4PAN	*	464,350	587	370	DL1YFF	*	53,454	167	151				(OP: I4AVG)		*SP7CCB	*	41,580	148	126	*EA3BO	*	216	9	9
RA4CKC	*	82,584	209	186	DJ2QV	*	47,458	143	122	***I1EIS**	**A**	**1,107,288**	**881**	**546**	*SP5BNB	*	3,672	38	34	***EA3HAQ**	**7**	**33,150**	**107**	**102**
RW4WZ	*	16,530	95	87	DL8UAA	*	33,517	131	121	*IW4EGX	*	772,146	727	474	*SP6IHE	*	1,944	25	24					
RW4NN	*	12,720	64	60	DL3ZH	*	25,575	106	93	*IZ1JLN	*	596,250	616	450	*SQ5LWN	*	108	6	6	**ED4A**	**A**	**947,520**	**857**	**560**
UA4WW	*	1,666	34	34	DM2FDO	*	20,504	90	88	*IZ6NCN	*	349,205	468	331	***SO1D**	**21**	**86,866**	**196**	**169**				(OP: EA4TV)	
RV4CT	*	1,298	23	22	DL5NDX	*	19,350	98	86	*IN3FHE	*	190,242	309	271				(OP: SP1JPQ)		EA4ETW	*	470,119	507	377
UA4CC	**28**	**8,109**	**57**	**51**	DL2SWN	*	6,116	48	44	*IZ5HPQ	*	185,420	284	254	*SP3LPG	*	45,696	145	128	EA4DEC	*	12,600	73	72
RM4R	**14**	**286**	**13**	**13**	DJØTP	*	5,658	44	41	*IK3SCB	*	49,725	162	153	*SQ8JLN	*	2,370	31	30	**EA4DW**	**21**	**209,948**	**330**	**292**
R4NW	**3.7**	**14,472**	**75**	**72**	DL1SWT	*	4,256	39	38	*IWØEAC	*	24,390	106	90	*SQ1K	*	1,357	23	23					
RA4LW	**1.8**	**238,569**	**392**	**283**	DL9NDV	*	3,520	46	44	*IZØHLY	*	14,800	85	80	*SP1KIZ	*	798	19	19	**EA5KA**	**A**	**2,249,245**	**1337**	**751**
***RA4AAO**	**A**	**1,030,538**	**860**	**521**	DL6AG	*	2,790	32	30	***IV3RCH**	**28**	**25,925**	**113**	**85**	*SQ6PWJ	*	225	9	9	EF5K	*	1,582,199	1550	739
*UB4FAB	*	95,676	235	201	DN2JOM	*	1,066	27	26	***IZ5EBL**	**21**	**1,771,893**	**1087**	**629**	*SQ6PPI	*	12	2	2				(OP: EA5DWS)	
*R4RR	*	31,440	132	120	**DO4DXA**	**28**	**11,222**	**67**	**62**	*IZ8GNR	*	221,676	352	273	*SP6ZC	*	3	1	1	EE5J	*	303,933	481	353
*RU4CS	*	24,300	91	81	**DF9ZP**	**21**	**4,920,066**	**2014**	**942**	*IZ1MHY	*	1,449	23	23	***SP4DZT**	**14**	**903,139**	**974**	**593**				(OP: EA5YJ)	
*RU4F	*	7,250	63	58	DHØGDS	*	73,160	187	155	*IZØLHL	*	36	4	4	*SP9KRT	*	45,424	190	167	EA5DIT	*	26,505	98	93
*RK4YJ	*	300	10	10	**DK9HN**	**3.7**	**124,821**	**231**	**207**	***II3HRT**	**14**	**38,001**	**197**	**159**				(OP: SP9ADU)		***EA5HAB**	**A**	**379,626**	**618**	**403**
***RN4SN**	**21**	**229,429**	**393**	**313**	**DF2UU**	**1.8**	**400,365**	**533**	**369**				(OP: IZ8OJG)		*SQ3LMY	*	19,729	116	109	*EA5CCY	*	912	17	16
***RA4SAT**	**14**	**155,367**	**316**	**283**	***DM9K**	**A**	**2,867,904**	**1486**	**832**	*IR3Z	*	23,500	128	125	*SP3VSE	*	6,552	57	56					
*RA4Y	*	35	7	7				(OP: DL2DBF)					(OP: IN3XUG)		***SQ6CU**	**3.7**	**286,134**	**461**	**309**	**EA7ZY**	**28**	**64,680**	**206**	**165**
					*DF2SD	*	1,346,328	967	621	***IZ1N8X**	**7**	**56,259**	**167**	**141**	*SQ6JX	*	205,516	376	269	**EA7LL**	**21**	**5,671,710**	**2553**	**990**
RG6G	**A**	**5,426,615**	**2642**	**1021**	*DF2AJ	*	1,288,200	993	600						*SP9PTG	*	336	15	14	***EA7CWA**	**A**	**51,745**	**144**	**131**
RC6U	*	3,610,911	2178	947	*DR15ZBAY	*	355,824	502	336			**Kaliningrad**			***SP8LBK**	**1.8**	**63,855**	**199**	**165**	*EA7HYL	*	5,950	50	50
UA6AA	*	221,553	319	239				(OP: DK8NC)		***UA2FT**	**7**	**33,696**	**112**	**104**						***EF7A**	**21**	**1,544,472**	**1311**	**684**
UA6HO	*	28,086	109	93	*DJ6OZ	*	346,115	456	341								**Portugal**						(OP: EC7ABV)	
UA6LJE	*	11,076	75	71	*DH6DAO	*	278,720	427	335			**Latvia**								*ED7D	*	131,412	283	233
R7LV	**28**	**43,670**	**137**	**110**	*DK4WF	*	244,245	359	285	**YL6W**	**A**	**4,802,976**	**2058**	**981**	**CT1EAT**	**A**	**6**	**2**	**1**				(OP: EA7KJ)	
R7MM	**21**	**532,350**	**680**	**455**	*DL1DTL	*	214,090	331	271	YL7A	*	725,464	695	472	**CT1BOL**	**28**	**125,665**	**245**	**205**	***EC7KW**	**7**	**362,470**	**409**	**335**
R7HF	*	123,420	358	242	*DL3ABL	*	199,171	300	259	**YL2BJ**	**28**	**38,297**	**131**	**109**	***CT2IVH**	**A**	**105,565**	**271**	**215**	***EC7AKV**	**3.7**	**56,718**	**156**	**138**
UA6AIW	**1.8**	**61,535**	**190**	**155**	*DL7URH	*	183,535	319	235	***YL3AGV**	**21**	**65,886**	**199**	**158**	*CT1EBM	*	1,479	29	29					
***UA6HHE**	**A**	**194,266**	**394**	**274**	*DL5JAG	*	125,840	293	242						*CT1DOF	*	6	2	1			**Sweden**		
*RW7M	*	46,728	148	132	*DL5GAC	*	104,082	247	209			**Lithuania**			***CT2IOV**	**21**	**459,325**	**720**	**475**	**SM6NOC**	**A**	**269,448**	**400**	**309**
*RU7A	*	4,142	40	38	*DG9VH	*	85,371	244	199	**LY3X**	**A**	**2,683,041**	**1401**	**769**						SF7WT	*	147,662	261	202
*RA6YJ	*	168	8	8	*DKØPC	*	82,400	213	206	LY2FN	*	1,101,480	898	536			**Romania**						(OP: SM7WT)	
***UA6LUQ**	**14**	**958,850**	**944**	**635**				(OP: DL9EE)		LY7M	*	344,610	445	315	**YO9W**	**A**	**10,283,888**	**3242**	**1128**	**SK2T**	**21**	**1,937,824**	**1162**	**656**
*UA6GU	*	2,860	45	44	*DK3GI	*	80,494	176	167	LY1R	*	135,949	268	187				(OP: YO9GZU)					(OP: SM2LJY)	
					*DL1SVA	*	62,487	178	159	LY3CY	*	61,288	190	163	YO3APJ	*	2,143,330	1293	670	SM5D	*	1,825	25	25
		European Turkey			*DL1DBR	*	57,462	184	157	LY2XW	*	50,279	153	137	YP5A	*	1,137,764	991	596				(OP: SM5DJZ)	
TC1DX	**A**	**7,560**	**64**	**54**	*DJ3HW	*	56,374	154	142	**LY5Y**	**14**	**191,980**	**388**	**290**				(OP: YO5AM)		**8SØC**	**14**	**2,429,799**	**1478**	**829**
TA1TA	*	2,318	40	38	*DG1ATN	*	47,955	156	139	**LY5D**	**7**	**514,909**	**547**	**397**	YRØR	*	352,602	459	342				(OP: SMØMPV)	
					*DL2YCA	*	46,110	187	159				(OP: LY3BY)					(OP: YO3HKW)		***SA3V**	**A**	**505,468**	**577**	**428**
		Finland			*DF1HF	*	35,880	146	130	***LY2SA**	**A**	**665,280**	**615**	**440**	YO3JW	*	143,115	291	235				(OP: SA3ARL)	
OH8L	**A**	**6,863,710**	**2501**	**1085**	*DG2BHB	*	22,977	119	111	*LY5T	*	582,528	625	444	**YO2AOB**	**28**	**53,120**	**162**	**128**	*SAØBJL	*	113,740	310	235
			(OP: OH8LQ)		*DO9ST	*	22,176	106	99	*LY4Q	*	114,807	289	231	**YO9HP**	**21**	**1,462,734**	**1008**	**611**	*SM6MVE	*	106,665	245	195
OH6OS	*	567,168	599	422	*DL7TJ	*	12,348	69	63	*LY3NX	*	12,782	78	77	YO2RR	*	233,768	359	277	*SG6T	*	87,932	201	178
OH3JR	*	114,072	197	196	*DL7BY	*	4,524	44	39						YO3BL	*	1,488	24	24				(OP: SM6WET)	
OG6N	**21**	**3,699,717**	**1688**	**861**	*DL8WJM	*	2,079	28	27			**Luxembourg**			**YO5OEF**	**1.8**	**202,692**	**373**	**266**	*SE3K	*	12,284	92	83
			(OP: OH6NIO)		*DK6AH	*	1,586	26	26	**LX7I**	**A**	**13,148,064**	**3693**	**1286**	***YQ5Q**	**A**	**1,652,696**	**1193**	**664**				(OP: SA3ARK)	
OG5B	*	3,588,885	1662	865	*DK6RS	*	363	12	11				(OP: DF1LON)					(OP: YO5OHO)		*SM6NET	*	10,251	69	67
			(OP: OH5BM)		***DO1RTO**	**28**	**5,480**	**47**	**40**						*YO4RST	*	261,660	373	294	*SE5E	*	9,180	62	60
OH8MJ	*	247,401	343	297	***DM6DX**	**21**	**688,176**	**607**	**432**			**Macedonia**			*YO9RKH	*	167,222	312	242				(OP: SM5AJV)	
OH6RE	**14**	**588,468**	**727**	**534**	*DH7LF	*	85,462	192	173	**Z36W**	**A**	**262,812**	**505**	**362**	*YP6Z	*	16,555	83	77	*SMØFM	*	3,916	44	44
OH2V	*	275,274	521	369	*DGØOM	*	2,340	30	30	**Z35N**	**1.8**	**303,052**	**449**	**317**				(OP: YO6PZZ)		*SC3A	*	1,922	32	31
			(OP: OH4KA)		***DL1HWH**	**14**	**2,322**	**46**	**43**	***Z32ID**	**21**	**361,680**	**504**	**330**	*YO2MLC	*	12,358	75	74				(OP: SM3WMU)	
OH6M	**7**	**673,623**	**609**	**409**	***DL5RU**	**7**	**122,202**	**243**	**219**						***YO5PBW**	**28**	**38,695**	**130**	**109**	***SE5S**	**21**	**129,078**	**254**	**202**
			(OP: OH6LBW)		***DO1HDR**	**3.7**	**386,508**	**510**	**372**			**Moldova**			*YO5CRQ	*	18,130	87	70	*SMØQ	*	19,082	113	94
***OH3JP**	**A**	**787,572**	**702**	**501**	***DD9WG**	**1.8**	**13,940**	**89**	**82**	**ER4A**	**A**	**17,039,808**	**4236**	**1384**	***YO3ZA**	**21**	**186,493**	**317**	**251**				(OP: SMØOGQ)	
*OH3FOG	*	634,476	667	444									(OP: UT5UDX)		*YO3FOU	*	37,147	140	121					
*OH6GDX	*	403,368	558	392			**Greece**			***ER4LX**	**A**	**604,304**	**681**	**422**	***YO5LD**	**14**	**187,740**	**405**	**315**			**Switzerland**		
*OH2FHN	*	18,414	105	99	**SX3B**	**14**	**1,079,100**	**1229**	**660**	*ER3CT	*	547,863	612	411	***YO2MKD**	**3.7**	**2,048**	**32**	**32**	**HB9AUS**	**A**	**2,036,732**	**1110**	**668**
*OH2LNH	*	17,473	107	101				(OP: SV1BDO)												**HB9DUR**	**21**	**2,597,925**	**1438**	**705**
*OH7KBF	*	14,400	106	96								**Netherlands**					**Serbia**							
***OH3BU**	**28**	**11,285**	**67**	**61**			**Guernsey**			**PA7AL**	**A**	**390,000**	**541**	**390**								**Ukraine**		
***OH4KZM**	**14**	**48,840**	**189**	**185**	***MUØGSY**	**21**	**265,330**	**445**	**314**	PA2A	*	129,696	260	224	**YT7R**	**A**	**2,546,760**	**1418**	**760**	**UU7J**	**A**	**11,224,305**	**3587**	**1269**
										PA5KT	*	27,455	104	95				(OP: YU7BW)					(OP: UU4JMG)	
		France					**Hungary**			PA1T	*	1,710	31	30	YU1UN	*	887,524	777	506	EO4M	*	10,214,841	3573	1207
TM7F	**A**	**8,597,160**	**2962**	**1170**	**HA8IE**	**A**	**5,354,718**	**2401**	**1013**	**PA3EWP**	**28**	**94,000**	**236**	**188**	YT9A	*	857,440	597	466				(OP: UR5MW)	
			(OP: F6GLH)		HA3NU	*	299,667	394	303	***PE1FTV**	**A**	**539,688**	**658**	**398**	YU2M	*	139,104	275	216	UW7LL	*	4,126,902	1936	942
F8FKJ	*	1,315,625	915	625	***HA3DX**	**A**	**3,984,042**	**1901**	**859**	*PD7BZ	*	302,400	439	350	**YT1T**	**21**	**799,119**	**704**	**459**	EM2G	*	3,474,480	1822	930
F5JFU	*	480,319	480	413				(OP: HA4XH)		*PE4BAS	*	173,988	296	243	**YTØA**	**7**	**9,905,910**	**2446**	**1097**				(OP: UR7GO)	
F5CQ	*	178,162	266	229	*HG3A	*	3,977,508	1809	922	*PC2F	*	94,400	245	200				(OP: YT7AW)		UT2UU	*	3,158,721	1766	843
F5KEQ	*	174,906	288	237				(OP: HA3MY)		*PD3EM	*	91,374	226	194	***YU1AST**	**A**	**14,235**	**77**	**73**	UXØFF	*	1,052,480	876	572
			(OP: F5MYK)		*HA6NL	*	1,165,595	1032	565	*PI4HQ	*	61,902	208	171				(OP: YU2EA)		UT5ERV	*	808,561	795	481
F6FLU	*	61,744	163	136	*HG8C	*	264,695	403	317	*PG2AA	*	53,454	168	151	***YU2A**	**28**	**53,820**	**157**	**138**	UU2JQ	*	555,954	584	434
F5VML	*	47,192	145	136				(OP: HA8EK)		*PA3HGF	*	10,117	73	67	***YT2B**	**21**	**80,782**	**193**	**169**	UY4I	*	545,610	626	390
F4CPF	*	46,443	136	113	*HA5OO	*	109,251	220	183	*PAØMJM	*	2,236	28	26	*YT7EE	*	61,568	181	148				(OP: US3IZ)	
F5NBX	**28**	**9,462**	**64**	**57**	*HA8CQ	*	47,286	171	142	***PAØMIR**	**21**	**192,768**	**298**	**256**	***YT8WW**	**3.7**	**381,150**	**497**	**363**	UT7EZ	*	243,712	334	256
TM2B	**21**	**5,206,320**	**2111**	**1008**	*HA5BA	*	27,032	122	109						***YU1XX**	**1.8**	**33,375**	**129**	**125**	UW5ZM	*	174,110	281	230
			(OP: F4EGZ)		***HGØR**	**28**	**66,120**	**180**	**145**			**Northern Ireland**					**Sicily**			UT7NY	*	138,189	258	219
TM3R	*	335,569	468	311				(OP: HAØNAR)		**GI5K**	**A**	**1,293,305**	**812**	**585**						UT1AA	*	128,936	286	227
			(OP: F5UTN)		***HG3FMZ**	**21**	**25,947**	**111**	**93**				(OP: MIØLLL)		**IO9E**	**A**	**988,416**	**800**	**572**	UX6VA	*	40,535	144	121
F1UVN	**14**	**154,521**	**292**	**291**	***HG9X**	**7**	**1,295,608**	**811**	**568**	***GI7AXB**	**A**	**963,889**	**869**	**523**				(OP: IT9DFI)		UR3IBK	*	18,437	110	103
***TM4C**	**A**	**185,130**	**317**	**255**				(OP: HA9PP)		*GI9Q	*	31,331	110	97	**IU9A**	**28**	**373,440**	**446**	**320**	**UZ5Q**	**28**	**14,400**	**87**	**72**
			(OP: F4GDI)		***HA4XH**	**3.7**	**100,394**	**240**	**202**				(OP: GI4FUE)					(OP: IT9SSI)					(OP: UY5QZ)	
*F4FEP	*	18,600	88	75											IT9ABN	*	30,888	110	99	**UR5IFX**	**21**	**2,154,140**	**1469**	**740**
*F4FRF	*	10,318	72	67			**Iceland**					**Norway**			**IR9P**	**7**	**183,732**	**299**	**244**	EMØK	*	712,140	655	429
***F4FDA**	**28**	**68,586**	**177**	**138**	**TF3AO**	**21**	**150,398**	**422**	**278**	**LN3Z**	**A**	**7,713,944**	**2628**	**1112**				(OP: IW9HMQ)					(OP: USØKW)	
***F8CGL**	**7**	**212,792**	**325**	**258**									(OP: LA3BO)		***IT9BUN**	**28**	**166,618**	**269**	**227**	**US1I**	**14**	**4,744,214**	**2420**	**1051**
							Ireland			LAØFA	*	301,320	366	279	*IT9ACN	*	138,097	256	197	EO3Q	*	4,436,640	2341	1040
		Germany			**EI7JQ**	**A**	**285,390**	**435**	**315**	LA9DFA	*	42,630	170	147	*IT9AUH	*	36,075	127	111				(OP: UR3QCW)	
DL3TD	**A**	**11,701,024**	**3284**	**1168**	**EI2CN**	**28**	**58,112**	**169**	**128**	**LAZXPA**	**3.7**	**162,214**	**248**	**221**	***IT9ORA**	**21**	**15,120**	**85**	**80**	UT7E	*	1,043,611	1157	647
DK2OY	*	5,376,798	2155	973	**EI6JK**	**7**	**690,931**	**627**	**419**	***LAØOSA**	**14**	**12,648**	**104**	**93**									(OP: UR5GDX)	
DH8BQA	*	4,892,702	2257	953	***EI2II**	**A**	**45,276**	**141**	**132**								**Slovakia**			**US2YW**	**3.7**	**1,958,076**	**1213**	**654**
DK5DQ	*	3,972,936	1801	894	***EI4CF**	**21**	**1,679,330**	**1140**	**610**			**Poland**			**OM8DD**	**21**	**1,644,500**	**1084**	**572**	UX7LL	*	1,660	21	20
DLØMFL	*	1,967,662	1238	698						**SP9QMP**	**A**	**3,083,781**	**1519**	**823**	**OM3TWM**	**3.7**	**987,012**	**769**	**513**	**UR5AKU**	**1.8**	**54,981**	**171**	**149**
			(OP: DL2JRM)				**Isle of Man**			SQ9HZM	*	2,897,101	1697	779	***OM6AL**	**A**	**243,483**	**421**	**293**	UW1I	*	49,478	163	143
DL5JS	*	1,929,200	1126	700	**MD2C**	**A**	**3,010,410**	**1582**	**806**	SQ9LR	*	1,107,465	842	505	*OM5UM	*	63,504	194	168				(OP: UW5IM)	
DJ5AN	*	1,908,302	1098	683				(OP: MDØCCE)		SO7A	*	585,230	618	430	*OM3ZBG	*	5,220	64	58	UT5UGR	*	30,160	131	116
DK1KC	*	1,606,365	1038	657						SP1MVG	*	526,140	493	370	***OM8LA**	**21**	**67,167**	**186**	**153**	***UZ5U**	**A**	**710,028**	**698**	**489**
DHØGHU	*	1,466,553	952	627			**Italy**			SP5XSL	*	157,462	321	262						*UY4F	*	368,004	543	364
DJØIF	*	1,419,858	1014	606	**IR2M**	**A**	**6,031,872**	**2392**	**1071**	SO2W	*	71,690	177	134			**Slovenia**						(OP: UR5FEL)	
DJ3WE	*	1,407,150	1042	590				(OP: IZ2FDU)		SP6FJ	*	58,797	150	141	**S58M**	**A**	**205,660**	**334**	**260**	*UT3IWA	*	235,824	436	289
DM2C	*	1,123,812	961	558	IZ4GWE	*	1,761,914	1129	673	SP1MWN	*	52,250	149	125	**S56P**	**28**	**216,000**	**374**	**250**				(OP: UR7IJM)	
			(OP: DM5LS)		IK8UND	*	875,700	952	556	SP3GTS	*	34,176	133	128	S57AW	*	198,720	357	240	*UY7C	*	167,079	312	249
DQ5T	*	1,104,314	810	571	IZ1TRG	*	403,512	529	408	SP2LQP	*	27,778	94	86	**S51DX**	**14**	**48,960**	**189**	**153**	*UR5AMK	*	128,439	286	201
			(OP: DL4LAM)		IR4E	*	280,725	397	285	SQ6IYS	*	19,964	110	92	**S51CK**	**7**	**2,367,513**	**1382**	**699**	*UX6IB	*	80,088	215	188
DL2AA	*	1,090,870	806	517				(OP: IK4ZHH)		SQ1OD	*	3,927	38	33	***S53F**	**A**	**3,745,168**	**1782**	**833**	*US1GBH	*	51,120	166	144
DJ9MH	*	1,083,817	882	551	IZ5ILJ	*	142,350	248	219	SQ1DWS	*	736	16	16	*S53O	*	1,072,926	849	537	*UYØIX	*	21,012	112	103
DL8QS	*	1,067,473	889	583	IWØGYC	*	116,204	235	209	SP3KPN	*	567	23	21	*S52W	*	40,194	143	126	*UT9UD	*	5,194	54	53
															***S52OT**	**21**	**516,577**	**529**	**379**	***UR2VA**	**28**	**3,162**	**36**	**31**
															***S59N**	**14**	**570,850**	**775**	**466**					

*UR6IJ	21	172,186	303	251	
*UT2IV	"	120,537	271	227	
*UT1ML	"	24,232	134	104	
*UR5IKN	"	10,676	68	68	
*UT7Y	14	331,296	587	406	
			(OP: US0YW)		
*UT2AB	"	36,772	122	116	
*UX7UN	7	4,508	48	46	
*UR9QQ	3.7	96,696	240	204	
Wales					
MW9W	21	212,436	358	252	
			(OP: G1VDP)		
*MW0MWZ	A	217,242	390	298	
*MW0MAU	"	117,822	278	219	
OCEANIA					
Australia					
*VK100	A	72,765	160	135	
VK2CA	A	2,015,059	1217	571	
*VK2HEK	A	1,188	19	18	
VK6IR	21	2,263,494	1252	654	
East Malaysia					
9M6Z	A	6,419,672	2168	938	
			(OP: 9M6DXX)		
French Polynesia					
FO8RZ	A	722,296	682	376	
Guam					
KG6DX	21	6,915,088	2420	989	
Hawaii					
AH7NA	28	2,320,980	1594	505	
			(OP: N6EE)		
AH6RR	"	341,600	481	280	
Indonesia					
YB4IR	A	1,242,824	747	487	
YC1BTJ	7	93,625	144	125	
*YB0MWM	A	308,424	402	284	
New Zealand					
ZL3IO	A	3,124,800	1523	620	
ZL50GH	"	1,032,790	790	458	
			(OP: ZL1ANH)		
ZL3IQ	28	156,480	326	163	
ZL2GQ	21	1,065,088	865	424	
Philippines					
4H1T	A	3,761,478	1743	651	
			(OP: DU1IVT)		
DU1EV	7	197,663	230	157	
*DU7RH	28	11,128	80	52	
SOUTH AMERICA					
Argentina					
LU7YZ	A	490,050	556	330	
LR2F	28	7,317,450	2540	966	
			(OP: LU2FA)		
LU7HN	"	3,965,672	1757	796	
*LU5FF	A	1,938,020	1103	635	
*LU7CAW	28	585	15	15	
Brazil					
ZX2B	A	11,112,785	3307	1135	
			(OP: PY2MNL)		
PY2HL	"	3,249,414	1543	777	
PY2NZ	"	603,687	537	399	
PY4RGS	"	524,348	547	374	
PY7VI	"	327,267	416	279	
PY7XC	"	76,944	174	168	
ZW5V	"	12,709	75	71	
			(OP: PY5KA)		
PY2FSG	"	6,533	52	47	
PY2ADR	28	1,980,915	1150	615	
PP2EG	"	1,135,200	815	516	
PY7ZY	14	2,495,682	1260	683	
PY2KQ	"	59,500	167	140	
PY1NB	7	155,430	181	157	
*PY3APY	A	100,817	240	181	
*PY3OPP	"	32,480	121	112	
*PP5AMP	"	22,504	113	97	
*PY2MTV	"	17,328	86	76	
*PY2DEZ	"	13,320	84	74	
*PY3BRA	"	4,888	69	52	
*PY2SEX	28	2,025,650	1139	638	
*PU1KGG	"	890,880	710	464	
*PY2XC	"	440,228	524	314	
*PY2HT	"	163,296	287	224	
*PU2KIV	"	126,485	259	205	
*PY1YL	21	70,528	174	152	
*PY4XX	"	16,128	92	84	
*PY2LCD	"	11,360	75	71	
Chile					
CE4CT	A	10,710,449	3414	1013	
XR3P	"	2,574,080	1450	640	
			(OP: CE3PG)		
CE2WZ	"	271,421	396	269	
CE1N	7	2,175	25	25	
			(OP: CE1TBN)		
Colombia					
HK3O	28	2,408,406	1605	546	
HK1R	21	7,519,374	2613	997	
Paraguay					
ZP5RPO	A	10,080	64	60	
Trinidad & Tobago					
9Y4W	21	8,063,286	2728	1023	
Venezuela					
YV1FM	A	116,926	225	181	
YW4V	28	878,598	825	399	
			(OP: YV4DYJ)		
YY7OMF	21	19,683	86	81	
YW5T	7	3,729,512	1049	622	
			(OP: YV5JBI)		
*YV8AD	A	753,168	598	408	
*4M1F	14	2,291	30	29	
			(OP: YV1JGT)		
*4M5L	7	104,808	139	132	
			(OP: YV5LI)		
QRP					
TI5N	A	1,295,910	992	510	
			(OP: W8QZA)		

NDØC	"	748,572	728	428	
DL8LR	"	537,010	571	415	
KA1LMR	"	476,856	529	333	
SP2DNI	"	410,400	545	360	
RW3AI	"	310,809	515	331	
UT5UUV	"	257,796	448	297	
EA1GT	"	247,723	453	301	
JR3RWB	"	234,558	376	249	
PE2K	"	213,785	407	299	
UAØA	"	201,716	296	239	
IZ1ANK	"	180,420	386	291	
WB2R	"	171,600	304	220	
			(OP: W2MFT)		
NT4TS	"	169,684	290	236	
SP9RQH	"	156,809	290	233	
K8DRT	"	132,932	261	199	
LU1VK	"	106,974	266	189	
KC5WA	"	91,000	225	175	
OZ8OM	"	88,320	203	160	
IZ8EWD	"	87,555	230	195	
ON4MW	"	75,348	184	156	
8A4WI	"	74,740	206	148	
SP8LXE	"	71,456	208	176	
YO2LXW	"	67,125	214	179	
YO4AAC	"	62,865	198	165	
IK3XTY	"	57,528	200	153	
EU1UA	"	55,806	189	142	
OE3MNC	"	48,980	187	158	
DH5MM	"	43,428	155	154	
SA3BGM	"	42,485	180	145	
HAØGK	"	41,448	133	132	
PY4ZO	"	28,231	129	109	
RK4FAD	"	24,717	118	107	
WE7P	"	24,240	117	101	
SP7SZC	"	23,124	132	123	
VK4ATH	"	22,532	99	86	
AB3GB	"	21,988	104	92	
UT5UPN	"	20,806	111	101	
LA1TPA	"	19,292	122	106	
N8HM/3	"	18,900	102	75	
ER1DA	"	16,450	101	94	
R2AD	"	15,000	110	100	
OZ7DK	"	13,464	97	88	
DJ3GE	"	13,398	93	87	
EA1TI	"	12,243	82	77	
VK2FHRK	"	12,201	55	49	
LA8OKA	"	11,039	93	83	
KU7Y	"	10,251	76	67	
KT8K	"	9,734	65	62	
WA5RML	"	9,438	93	78	
RK6AQM	"	8,840	68	65	
RL3DZ	"	7,275	78	75	
7K1CPT	"	6,768	57	48	
ES1WST	"	6,552	52	52	
PY2BN	"	6,500	56	52	
RU9UN	"	6,486	50	47	
W9AQ	"	6,477	56	51	
AF9J	"	6,050	63	55	
US0YA	"	5,805	46	45	
K6MI	"	4,554	58	46	
JJ5HUD	"	4,551	51	41	
N4ZAK	"	3,441	42	37	
BG4HUB	"	3,400	38	34	
VA3RKM	"	3,360	36	35	
VE1MEA	"	2,905	38	35	
W2JEK	"	2,220	37	30	
YU3MX	"	1,984	31	31	
JM1KLO	"	1,680	28	24	
BH1BSH	"	1,612	33	31	
AA3CS	"	1,425	26	25	
DD1OPI	"	1,274	27	26	
DHØJAE	"	1,075	28	25	
IZ8JJI	"	924	23	22	
KA7PLE	"	840	24	24	
G4VPD	"	156	12	12	
VK4FJAM	"	48	6	6	
UA1CAK	"	16	8	2	
KP2/NE1RD	28	129,762	355	178	
LU7VCH	"	93,280	209	176	
IØUZF	"	86,742	209	158	
PU5ATX	"	77,655	204	155	
LU3HFA	"	74,221	188	161	
I5KAP	"	43,792	139	112	
PX2W	"	31,096	112	104	
			(OP: PY2TI)		
KIØG/5	"	13,266	73	66	
EC4AA	"	6,468	50	49	
JA4DQX	"	5,934	51	43	
JA2MWV	"	4,859	48	43	
YO5OPH	"	4,588	42	37	
IKØBZE	"	2,552	32	29	
SP6JOE	"	2,366	32	26	
VU2LYX	"	1,620	29	27	
			(OP: VU2UR)		
YO8DDP	"	1,430	23	22	
DF7LS	"	833	17	17	
BD4HY	"	352	12	11	
KJ6JNC	"	105	7	7	
VR2XNG	"	4	2	2	
KH6LC	21	600,336	556	379	
			(OP: NH6V)		
VE3HG	"	154,814	258	227	
YT1CS	"	142,896	288	229	
RT4W	"	128,270	306	254	
G3R	"	119,493	258	213	
			(OP: GØDCK)		
UN8PT	"	114,130	236	202	
IV3AOL	"	70,707	182	147	
SP4LVK	"	64,084	181	148	
JH3DMQ	"	59,782	171	142	
YO8SSB	"	58,546	159	146	
JR1NKN	"	54,128	160	136	
WA6FGV	"	41,480	160	136	
MM3AWD	"	41,175	185	135	
RZ6HX	"	36,036	143	132	
YU7ZZ	"	30,780	128	108	
VE2TLH	"	21,627	95	89	
			(OP: VA2SG)		
SQ9AOR	"	10,106	72	62	
YO2LAN	"	9,338	69	58	
BD4WM	"	9,114	72	62	
LA8WG	"	8,906	83	73	
RA9MU	"	8,721	61	57	
YB2OK	"	8,442	70	67	
OK1AIJ	"	4,400	52	44	
RA4DX	"	4,214	54	49	
VU2UR	"	4,182	48	41	
N6HI/7	"	2,964	41	39	
WA7LNW	"	1,500	26	25	
JL3SBE	"	1,242	24	23	
UT2AA	"	1,075	25	25	
YO9RIJ	"	897	24	23	
JO3XCK	"	495	15	15	

K2HT/B	"	91	8	7	
JR2DAJ/2	"	55	5	5	
VR2HKS	"	3	1	1	
			(OP: VR2UNG)		
TG9ANF	14	1,254,892	969	556	
HK3ARR	"	150,911	250	229	
VA7IR	"	124,232	248	212	
9A2EY	"	94,400	281	236	
SP3DRM	"	77,400	236	200	
WB7OCV/2	"	71,001	175	161	
SM6CRM	"	63,680	220	199	
LZ7H	"	54,126	214	186	
HG1X	"	52,288	192	172	
			(OP: HA1RS)		
UA1CEC	"	52,076	209	188	
GØRRM	"	21,546	144	126	
SQ3OGP	"	15,582	107	98	
EI6KC	"	15,048	123	114	
UU4JOE	"	14,820	102	95	
IZ2QKG	"	6,525	80	75	
KR2AA	"	3,196	34	34	
2MØCFB	"	2,880	50	48	
9A8MM	"	2,478	43	42	
UA3TW	"	2,356	39	38	
BY4CYL	"	1,924	30	26	
R2WW	"	255	15	15	
VR2UNG	"	220	10	10	
VE6SKY	"	50	5	5	
SP4GFG	7	206,365	323	277	
9A9L	"	119,544	236	204	
UT8UL	"	49,096	152	136	
HA6FQ	"	47,677	148	139	
UB6HBY	"	319	11	11	
HG6C	3.7	157,339	308	247	
			(OP: HA6IAM)		
SP2QOT	"	143,488	295	236	
K3TW/4	"	10,812	74	68	
WBØIWG/3	"	3,060	35	34	
OH9FTW	"	2	1	1	
R7NP	1.8	30,590	131	115	
RA4FWA	"	9,880	74	65	
ROOKIE					
United States					
NR7E	A	1,083,656	987	523	
NX9G	"	948,915	773	495	
KI6QDH	"	445,725	547	315	
WO4MW	"	189,772	387	227	
AF2O	"	66,560	163	130	
WT6H	"	38,041	138	109	
WE7P	"	24,240	117	101	
AG6AZ	"	22,410	94	90	
*AD2AM	A	286,878	386	274	
*KB1THU	"	197,714	288	242	
*KD8NOH	"	171,986	290	226	
*NW5Q	"	160,704	333	216	
*K4MCK	"	126,730	241	190	
*KC2WUF	"	125,970	251	195	
*KC9QOJ	"	116,662	241	182	
*KF7GNI	"	107,712	264	187	
*AB4G	"	83,160	217	168	
*KI6WCI	"	76,050	222	169	
*N4VAN	"	66,788	159	118	
*W4ZAO	"	63,948	192	146	
*W1PL	"	58,290	191	145	
*NZØF	"	47,382	156	134	
*KE5ZRU	"	32,967	130	111	
*KC9STV	"	30,709	115	107	
*KE5ZRT	"	30,411	129	109	
*AK4EE	"	23,136	105	96	
*KB1SUN	"	20,303	95	79	
*KDØHLB	"	18,746	113	91	
*K4LHP	"	17,850	96	85	
*W7GIB	"	15,687	98	83	
*KD8NJZ	"	12,400	66	62	
*WC8Z	"	12,024	75	72	
*K8JTD	"	9,499	72	59	
*KF7IYQ	"	7,473	63	53	
*W8IDW	"	6,084	55	52	
*AK3S	"	5,264	49	47	
*KC9QHL	"	3,977	42	41	
*WN6E	"	3,120	40	40	
*KØHAX	"	1,891	33	31	
*KDØOAE	"	1,643	41	31	
*KJ4UZL	"	1,500	26	25	
*KDØKQS	"	1,350	29	27	
*KC9PGH	"	858	22	22	
*KDØKJL	"	608	19	19	
*KE5SNJ	28	21,672	105	84	
*K3MAF/4	"	7,236	57	54	
*KJ4VWL	"	5,967	56	51	
*W4YTB	"	3,128	37	34	
*KC2ZXY	"	65	5	5	
*KJ6HBY	21	2,176	38	34	
*NQ3U	14	25,641	103	99	
*WØGAF	"	10,153	77	71	
*KDØNEO	"	1	1	1	
*K3DCW	7	42,160	150	124	
NORTH AMERICA					
6Y1X	A	1,629,996	1373	492	
			(OP: KD8MJR)		
*KL2SX	A	196,968	303	232	
*VE3KNT	"	3,248	28	28	
ASIA					
JY5CC	A	8,357,766	2591	866	
BG4HUB	"	3,400	38	34	
JR2DAJ/2	21	55	5	5	
*EY7BJ	A	1,086,566	839	529	
*RV9WND	"	101,244	219	177	
*BD4RDU	"	55,998	199	122	
*BH4SCF	"	23,142	107	87	
*BH1ERB	"	13,680	92	80	
*JG1LPL	"	9,177	65	57	
*BG2VJM	"	7,747	83	61	
*JG1SWV	"	5,250	56	50	
*BH4SRC	"	2,664	41	37	
*BD8ASG	21	255,190	408	302	
*RZ9UMA	"	39,676	127	109	
*TA4AU	14	30,199	107	101	
EUROPE					
DL6ER	A	1,102,362	884	538	
IZØPAU	"	533,023	757	433	
IZ1PKV	"	441,216	575	384	
OE3MNC	"	48,980	187	158	
SA3BGM	"	42,485	180	145	
DN2JOM	"	1,066	27	26	
LA9OSA	"	154	14	14	
IZ2ODM	28	42,350	142	110	

IQ4FA	21	375,224	454	356	
			(OP: IZ4UEZ)		
2MØCFB	14	2,880	50	48	
RA4FWA	1.8	9,880	74	65	
*UD3D	A	1,613,294	1326	662	
			(OP: RN3DNM)		
*MØGVZ	"	978,510	926	507	
*OH3FOG	"	634,476	667	444	
*SN1T	"	603,809	663	443	
			(OP: SQ1RET)		
*ESSTF	"	595,014	605	457	
*UT3UZ	"	481,460	589	388	
*PDØHM	"	398,193	547	401	
*IZØPMV	"	388,015	498	355	
*ISØBSR	"	352,078	668	401	
*EF2F	"	320,040	603	381	
			(OP: EA2DNR)		
*OE6U	"	281,019	420	331	
			(OP: OE6HLF)		
*IZ8TXX	"	278,040	447	331	
*EE1A	"	274,752	453	318	
			(OP: EA1HDD)		
*PD1TV	"	214,118	403	302	
*EA2AEJ	"	187,068	342	262	
*TM4C	"	185,130	317	255	
			(OP: F4GDI)		
*MMØLBX	"	149,596	332	251	
*MWØMAU	"	117,822	278	219	
*SAØBJL	"	113,740	310	235	
*UB4FAB	"	95,676	235	201	
*YO2MKT	"	89,262	216	174	
*PDØME	"	81,952	233	197	
*DL7DET	"	81,765	247	207	
*ES1XQ	"	81,657	263	211	
			(OP: ES1TRE)		
*YO8SGN	"	77,268	241	188	
*DO3KMF	"	62,370	175	154	
*5P8W	"	58,220	203	164	
*SV2HWR	"	52,850	165	151	
*IZ7SLU	"	45,276	161	147	
*UR5ZIW	"	40,260	135	122	
*S51JS	"	39,932	167	149	
*LA1DSA	"	33,712	124	112	
*2EØVKG	"	27,720	131	105	
*SQ2OMG	"	24,738	105	93	
*DO3QQ	"	24,698	117	106	
*IWØEAC	"	24,390	106	90	
*UB3DAO	"	23,100	122	110	
*SQ8OGC	"	22,442	116	98	
*SO7B	"	20,332	100	92	
			(OP: SQ7PGO)		
*LA7VRA	"	17,458	98	86	
*YP6Z	"	16,555	83	77	
			(OP: YO6PZZ)		
*DK8CB	"	15,355	90	83	
*IZ8EFE	"	14,578	77	74	
*DL1GO	"	12,450	90	83	
*YO2MLC	"	12,358	75	74	
*IZ3QFG	"	8,352	73	72	
*DG7HL	"	7,392	77	66	
*DO3MMW	"	6,726	58	57	
*DN2TL	"	6,612	57	57	
*IZØRVC	"	5,616	53	52	
*DD5MA	"	5,564	57	52	
*IZ3QCH	"	5,487	60	59	
*LA4CSA	"	4,760	58	56	
*YO2MNC	"	3,400	37	34	
*DL1RIO	"	2,664	38	37	
*IZ5RAQ	"	2,080	40	40	
*LA2GTA	"	1,296	24	24	
*IZØTVI	"	720	18	18	
*F4FWN	"	273	13	13	
*IZ1QYD	"	171	9	9	
*CT2KFA	28	66,740	178	142	
*EA1HVY	"	18,375	85	75	
*SP5TWA	"	5,000	44	40	
*EA4FTA	21	138,444	280	249	
*YL3AGV	"	65,886	199	158	
*EA1HLL	"	28,638	135	111	
*UR5EFL	"	28,175	137	115	
*UB8QAA	"	15,124	80	76	
*YO5LD	14	187,740	405	315	
*RA4SAT	"	155,367	316	283	
*II3HRT	"	38,001	197	159	
			(OP: IZ8OJG)		
*LA8OSA	"	12,648	104	93	
*IZØUME	"	8,300	87	83	
*RA3MAV	7	185,409	297	243	
*YO2MJZ	"	24,890	98	95	
*9A6SJZ	"	6,201	59	53	
*DB4MZ	"	1,539	27	27	
*SQ2HNA	3.7	142,437	309	237	
*YO2MKD	"	2,048	32	32	
*LA9NSA	"	24	4	4	
OCEANIA					
VK3DOG	A	212,930	293	214	
ZL2GQ	21	1,065,088	865	424	
KH8/KH7ERI	21	348,899	534	227	
DX9M	7	134,560	201	145	
			(OP: DU9XO)		
*DW7DQS	A	45	3	3	
			(OP: DW7DSH)		
*9W6ZAM	28	3,686	45	38	
*VK3VTH	14	2,052	27	27	
*VK1MAT	"	225	9	9	
*VK5FMPJ	7	4	2	2	
SOUTH AMERICA					
*YY5OSW	A	182,025	287	225	
*PY1CD	"	15,066	92	81	
*PY1PDF	"	7,722	73	66	
*PU8WWW	28	390,000	464	325	
*PU2KIV	"	126,485	259	205	
*PY1TR	"	7,475	74	65	
*PY1YL	21	70,528	174	152	
*YY5CPG	7	19,053	76	73	
TRIBANDER/SINGLE ELEMENT					
United States					
KR4Z	A	6,200,704	2373	1004	
			(OP: N4PN)		
NF4A	"	4,544,232	1952	924	
AB3CX/2	"	4,447,776	1916	856	
W6TK	"	3,461,544	1803	786	
K3MD	"	3,256,878	1669	813	
KA1IOR	"	2,870,881	1329	767	
WD5K	"	2,312,587	1343	727	
KG4W	"	2,253,733	1261	677	
NXØX	"	2,202,876	1440	702	
NA3M	"	2,181,150	1107	655	

AC5O	"	2,021,118	1310	678	
AD4L	"	1,868,060	1129	620	
K5MV	"	1,818,288	1209	648	
KE2DX	"	1,788,700	1040	620	
NU1O	"	1,756,516	1067	628	
WØBM	"	1,736,060	1019	610	
N2SQW	"	1,330,435	892	503	
N3UM	"	1,244,925	811	503	
W1KQ	"	1,207,675	857	489	
AD1DX	"	1,129,590	879	495	
N3CZ/4	"	1,011,348	792	468	
K7LY	"	1,001,088	1011	528	
W7PP	"	960,364	759	487	
WF6C	"	944,520	767	510	
			(OP: K6SRZ)		
N1BCL	"	919,770	775	465	
N2MUN	"	853,244	717	434	
NDØC	"	748,572	728	428	
KØCF	"	748,000	637	400	
K3IE/4	"	642,942	590	414	
N1IBM/2	"	633,360	537	390	
NR7DX	"	594,814	616	418	
			(OP: K7ABV)		
K7JQ	"	593,480	690	401	
KW3A	"	575,232	628	384	
N3RC/7	"	542,954	587	401	
ND5T	"	542,682	603	413	
AE1T	"	522,396	468	378	
AB2DE	"	504,065	448	365	
NA6E/7	"	489,375	553	375	
			(OP: WT6P)		
KF7IQ	"	467,808	501	352	
NY1H	"	466,792	489	332	
NC4MI	"	464,800	505	350	
AD1L	"	452,540	482	374	
KD7DCR	"	423,384	483	354	
KT6VV	"	409,024	546	332	
KE7YF	"	400,983	455	319	
WW6O	"	396,990	500	330	
NO6F	"	394,450	548	350	
			(OP: K2RD)		
NJ1F/2	"	322,803	393	279	
KR4F	"	317,196	358	324	
KU8E/4	"	274,219	358	257	
KØDG	"	271,400	373	295	
K2FJ	"	234,950	359	254	
K2LE	"	224,532	302	243	
N6WK	"	223,340	316	260	
NØOST	"	199,444	333	238	
K6JAT	"	198,050	364	233	
K5YM	"	196,605	322	257	
K2NV	"	192,096	292	232	
KV6O/Ø	"	184,756	429	247	
WA7PRC	"	173,628	299	234	
WB2R	"	171,600	304	220	
			(OP: W2MFT)		
NØGMT	"	167,014	314	226	
AB1BR	"	139,462	247	206	
N2WKS	"	129,626	297	197	
WG7X	"	121,992	261	204	
K5JEB	"	115,620	265	188	
W1BYH	"	112,852	183	178	
WB2KLD	"	108,528	216	168	
N4DXI	"	108,016	219	172	
W2MC	"	102,483	217	177	
NM6E/5	"	87,352	238	179	
KK7Z/9	"	79,050	189	155	
WGØM	"	75,579	221	177	
WK2E	"	74,256	170	156	
W4DMB	"	60,384	148	148	
N6VH	"	51,952	170	136	
AA7V	"	44,530	138	122	
N7MB/9	"	40,859	117	91	
NA9US	"	34,965	123	111	
			(OP: N9GH)		
K9QC	"	34,299	115	111	
KI4VCT	"	33,674	131	113	
NM5NM	"	26,103	135	113	
			(OP: AA5B)		
NØKQ	"	25,578	107	87	
KØFG	"	24,402	94	83	
AB3GB	"	21,988	104	92	
KXØA	"	20,856	93	88	
			(OP: K9DU)		
NY4D	"	17,100	65	60	
W5KI	"	11,180	79	65	
K1PTF	"	10,797	62	59	
KU7Y	"	10,251	76	67	
AE6RR	"	7,473	59	53	
KA2LIM	28	95,976	242	172	
K7ZD	"	1,235	22	19	
K6ND/1	21	6,793,222	2494	1007	
			(OP: N8BO)		
KZ5J	"	730,862	770	478	
N2EIK	"	608,697	660	423	
WB6BFG	"	240,120	331	290	
NK6A	"	202,990	336	265	
NØUU	"	176,605	275	247	
K7EIQ	"	49,776	148	136	
NX9T/4	"	28,300	107	100	
KA2BXH	"	2,052	27	27	
WA7LNW	"	1,500	26	25	
KZ7X	14	968,320	1261	544	
			(OP: W7WW)		
KD8SQ	"	139,308	248	228	
W8GOC	"	39,996	139	132	
WØPPF	"	27,846	128	119	
KX9DX	7	310,170	700	294	
K4RDU	"	56,832	145	128	
WJ1R	"	30,444	91	86	
AA4D	"	15,892	59	58	
W6RKC	"	5,418	44	42	
WN2O	3.7	46,107	128	109	
			(OP: N2GC)		
W8JMF	"	4,142	38	38	
NØRQ/5	"	150	5	5	
*KZ9O	A	1,976,631	1454	653	
*KT4ZB	"	1,723,498	1083	614	
*WB8TLI	"	1,368,276	909	546	
*N7ZG	"	1,335,227	958	547	
*AD1C/Ø	"	987,525	794	475	
*KB3LIX	"	771,676	667	412	
*KA2D	"	768,012	613	446	
*NW2K	"	696,784	723	428	
*N2FF	"	683,514	599	414	
*WN6K	"	616,250	749	425	
*WB4JFS	"	584,696	620	371	
*W4FT	"	573,978	560	353	
*W9TC	"	553,320	569	348	
*AA6K	"

*KS2G	*	452,412	472	354
*N7UR	*	444,360	526	345
***K5DHY**	*	**439,452**	**483**	**351**
***N1API**	*	**409,360**	**480**	**344**
*N2JF	*	401,835	436	301
*NJ1H	*	400,680	469	318
*WBØTSR	*	376,752	477	334
*N3ALN	*	353,340	476	302
*KR1A	*	323,736	447	282
			(OP: KL7JT)	
*WS7V	*	307,450	413	325
*W1CCE	*	307,004	419	284
*WI5ID	*	295,139	411	311
			(OP: K5IID)	
*NEØS	*	273,480	393	265
*KB8KE	*	261,944	370	274
*ADØH	*	244,720	410	266
*K4DMR	*	219,648	359	264
*ACØB	*	219,032	358	262
*KA9MOM	*	197,956	320	242
*ND3D	*	197,184	352	237
*K7ACZ	*	195,254	291	233
*NA2NY	*	177,888	287	218
*AFØC	*	172,664	314	226
*WD8S	*	164,590	265	218
*KK9W/3	*	163,560	322	232
*WB8JUI	*	160,664	267	266
*KS4X	*	157,740	270	220
*N4VA	*	156,450	276	210
*W4NBS	*	151,140	277	229
*N6DZR	*	133,824	292	204
*K4NC	*	132,200	255	200
*W2VU	*	129,294	254	198
*KAØZPP/5	*	125,200	243	200
*N6RV	*	111,320	214	184
*K4DMH	*	107,352	237	189
*WA2FBN	*	105,225	227	183
*KC7V	*	101,904	234	193
*K4OMG	*	101,314	223	179
*W3OD	*	99,703	195	179
*WA8YVF	*	98,580	225	186
*K4FTO	*	97,544	227	178
*WV6N	*	86,584	198	158
*AD7MQ	*	80,275	235	169
*AE6YB	*	74,043	262	171
*AA6EE	*	65,469	185	157
*KC7H	*	63,899	203	157
*KN8F	*	59,220	164	141
*AB5XZ	*	58,656	200	141
*ACØUR	*	56,580	161	138
*AA8IA	*	56,160	174	135
*AJ4VE	*	55,645	155	155
*W1TO	*	53,802	142	122
*N3RN	*	42,525	130	105
*KD8JAM	*	42,402	134	111
*WØQQG/4	*	41,280	139	120
*K6KR/7	*	41,151	155	129
*WO1N	*	41,040	126	120
*NN8M	*	32,100	122	100
*N3CHX	*	31,672	131	107
*KC9DOA	*	30,747	141	111
*K1LOG	*	29,952	108	96
*N5DGK	*	29,268	121	108
*AE2NG	*	27,234	119	102
*N2GXJ	*	23,490	104	90
*AI4GR	*	23,218	111	94
*N5RR/Ø	*	22,116	110	97
*W2MRD	*	19,662	90	87
*W7JFF	*	18,392	103	88
*K7CS/4	*	17,700	88	75
*K6DSW	*	17,052	108	87
*NØJE	*	16,940	84	77
*KØFYI	*	10,440	61	60
*AB2IO	*	9,454	73	58
*K4DJ	*	9,328	63	53
*K2DV	*	7,722	58	54
*K7RXC	*	7,370	80	67
*NW4V	*	6,721	49	47
*K6IWA	*	5,724	62	54
*W7JU	*	5,418	49	42
*WN4GMT/Ø	*	4,687	49	43
*KEØCP/5	*	4,620	42	42
*WS7I	*	4,403	45	37
*KC9ELU	*	3,510	39	39
*WØRU	*	3,367	43	37
*NS6T	*	3,293	38	37
*KC8KCU	*	3,132	36	36
*KI4HHK	*	2,156	29	28
*WA3YTI/6	*	940	20	20
***N8PJ**	28	**6,336**	**52**	**48**
***KE7DX**	*	**1,518**	**24**	**23**
***KD4MXA**	*	**351**	**15**	**13**
***WN4BFZ**	21	**535,612**	**509**	**407**
			(OP: K4YA)	
***KG1E**	*	**349,932**	**363**	**363**
*KM4HI	*	349,182	397	342
***W7UPF**	*	**235,788**	**337**	**294**
***KCØDEB**	*	**190,258**	**304**	**251**
*N7FLT	*	179,031	287	249
*WA4AXT	*	121,983	233	219
***N2GA**	*	**40,680**	**126**	**113**
*WE6EZ/7	*	35,941	138	127
*N2JUS	*	22,968	93	88
*WU9B/7	*	22,692	100	93
***KA5JAC**	*	**21,312**	**102**	**96**
***KN8D**	*	**6,579**	**52**	**51**
***N5DTT**	*	**2,997**	**38**	**37**
*W9ILY	*	220	10	10
*NG4L	*	112	7	7
***KØWHV**	14	**85,932**	**192**	**186**
***N8WAV**	*	**82,593**	**190**	**189**
***N9LOH**	*	**45,108**	**139**	**126**
***K7SR**	*	**7,860**	**62**	**60**
***N6DO**	*	**1,984**	**33**	**31**
***W2IMY**	*	**126**	**7**	**5**
***WA7NWL**	7	**127,920**	**286**	**195**
***K9SQL**	*	**95,700**	**232**	**174**
***K8SM**	*	**87,696**	**259**	**168**
***KA8HKC/1**	*	**12,240**	**84**	**72**
***KA2BKG/3**	*	**2,970**	**27**	**27**
*N9WEW	*	1,792	37	32
***W6HH/5**	3.7	**10,296**	**67**	**66**
***KA3ITJ**	*	**6,432**	**52**	**48**
***W1WBB**	1.8	**2,368**	**34**	**32**
NORTH AMERICA				
VA2WA	A	**4,116,690**	**1529**	**790**
			(OP: VA2WDQ)	
VE3MMQ	*	**3,852,800**	**1544**	**800**
VE9HF	*	**2,042,516**	**1128**	**613**
VA7FC	*	**698,880**	**757**	**384**
VE2NGH	*	145,800	221	216
XE1GRR	*	**130,025**	**294**	**175**
VE2FXL	*	19,040	86	80
HI8PJP	28	**168,210**	**349**	**210**
KP2/NE1RD	*	**129,762**	**355**	**178**
K4J	*	**35,568**	**149**	**104**
			(OP: KP4JRS)	
VY1EI	*	**749,480**	**850**	**410**
VE1OP	14	**387,717**	**410**	**341**
VA7IR	*	**124,232**	**248**	**212**
***8P3A**	A	**11,958,208**	**3211**	**1088**
			(OP: VE3DZ)	
***VE2XAA**	*	**4,893,202**	**1839**	**898**
***KV4FZ**	*	**2,654,680**	**1639**	**665**
			(OP: N2TTA)	
***VP9I**	*	**2,461,312**	**1385**	**656**
			(OP: N1SNB)	
***VE3TU**	*	**1,052,388**	**789**	**414**
*VE3TW	*	651,105	587	371
*VE3NNG	*	416,484	412	276
***VO1DJT**	*	**404,580**	**424**	**338**
***WP3GW**	*	**399,066**	**427**	**293**
***HH2/PY1ZV**	*	**383,238**	**430**	**282**
***XE1FZE**	*	**190,125**	**345**	**225**
***VE6SQ**	*	**139,279**	**301**	**197**
***ZF2AE/ZF8**	*	**71,292**	**196**	**156**
			(OP: AA5UK)	
***VA7CRZ**	21	**103,578**	**218**	**183**
***VA3GUY**	14	**226,590**	**307**	**273**
***VE8DW**	*	**560**	**14**	**14**
***VE3SWS**	7	**76,080**	**125**	**120**
*VE3IAE	*	280	7	7
***VY2MGY**	3.7	**388,120**	**408**	**248**
			(OP: VE3MGY)	
***VE3EDY**	1.8	**4,080**	**40**	**30**
AFRICA				
ST2AR	A	**12,793,690**	**3702**	**1105**
			(OP: S53R)	
CT3HF	*	**1,910,160**	**1161**	**560**
CR3L	*	1,642,016	815	529
			(OP: DL9OLI)	
***3V8SS**	A	**6,999,180**	**2313**	**930**
			(OP: KF5EYY)	
***CN2BC**	*	**2,639,091**	**1273**	**637**
			(OP: DL7BC)	
***EA8/DL3KVR**	28	**523,446**	**577**	**309**
			(OP: DL3KVR)	
***CT3FJ**	21	**21,930**	**91**	**85**
ASIA				
JH8NOS	A	**568,764**	**523**	**333**
RG8K	*	**500,220**	**485**	**397**
P33P	*	**394,912**	**385**	**274**
			(OP: SB4ZN)	
JN3SAC	*	**220,410**	**320**	**237**
UA9AGX	*	212,400	309	236
JR2PMT	*	**200,456**	**289**	**222**
JAØCIY	*	189,216	307	219
RC9F	*	134,302	261	181
UABSR	*	**106,225**	**219**	**175**
JH1OVY	*	**66,768**	**163**	**156**
9M2ADX	*	**30,240**	**118**	**96**
JN3QNG	*	30,039	116	93
JA1JYS	*	10,812	63	53
RZØSW	*	9,300	73	62
JR9GMS	*	**1,281**	**21**	**21**
4XBA	28	**89,392**	**200**	**151**
UA9FGJ	21	**938,741**	**704**	**483**
RA9UN	*	190,750	323	250
JH1EAQ	*	**122,521**	**276**	**161**
JA4AQR	*	**54,940**	**146**	**134**
UN7PL	14	**460,790**	**466**	**355**
UN4PG	*	340,992	396	333
JH8SIT	*	**45,496**	**139**	**121**
R9DA	*	**43,066**	**137**	**122**
JH1APK	3.7	**3,584**	**29**	**28**
***UA9R**	A	**2,608,501**	**1240**	**623**
*RT9S	*	2,267,234	1103	586
***EX2X**	*	**1,661,660**	**1029**	**581**
***UAØSJ**	*	**1,391,621**	**926**	**583**
***H2E**	*	**914,805**	**672**	**435**
***HZ1PS**	*	**723,384**	**616**	**394**
***A65CA**	*	**663,480**	**576**	**388**
*RZ9CJ	*	638,844	544	383
***JA2CUS**	*	**621,152**	**578**	**376**
***BU2AU**	*	**474,768**	**673**	**314**
***JA6DIJ**	*	**431,268**	**487**	**332**
*RX9DJ	*	306,720	381	284
***TA1HZ/2**	*	**258,664**	**310**	**248**
*A65BU	*	215,830	305	226
*RXØSA	*	213,824	315	257
***JA1IST**	*	**212,872**	**317**	**236**
*RN8W	*	189,738	295	254
*RAØUBI	*	164,980	295	226
***8N7YAB/7**	*	**133,900**	**270**	**206**
			(OP: JH7CUO)	
*RC9YA	*	96,148	226	172
			(OP: RW9Y)	
***BG5FFK**	*	**95,586**	**224**	**178**
***JA3HBF**	*	**94,200**	**206**	**150**
***JG5UWK**	*	**87,843**	**204**	**141**
*BD4CD	*	87,084	214	177
*JF2OZH	*	53,966	141	121
*RXØSC	*	49,868	146	137
*JA1AZR	*	49,088	156	104
*JF1KWG	*	45,714	134	114
*7K4VPV	*	44,323	133	127
*JP1HUJ	*	33,174	122	97
***JE8KKX**	*	**32,256**	**115**	**96**
*JA1ATM	*	26,809	120	83
*BG8GAM	*	24,852	134	109
*BD2TBJ	*	23,100	110	100
*JS1KQQ	*	20,335	97	83
*BD4TS	*	15,210	98	78
*JA7SSP	*	13,908	69	61
*JG3BXS	*	9,828	69	54
***XV4Y**	*	**8,142**	**76**	**59**
*JL3RDC	*	4,251	41	39
*JJ1WWL/1	*	1,272	25	24
*BG8BIN	*	544	18	17
*7N4CPT	*	495	11	11
*JR1AHP	*	27	3	3
***UN3Z**	28	**2,640**	**33**	**30**
***7N2UQC**	*	**2,604**	**34**	**31**
***C4Z**	21	**2,292,070**	**1337**	**622**
			(OP: 5B4AIZ)	
***R9MC**	*	**551,379**	**543**	**393**
***JM1NKT**	*	**478,040**	**504**	**370**
*JM1LRQ	*	476,630	483	385
***XU7FMZ**	*	**407,370**	**605**	**370**
			(OP: JA1FMZ)	
***BA1SN**	*	**196,176**	**323**	**268**
*JA1BPA	*	118,170	233	202
***HSØZHG**	*	**96,200**	**240**	**200**
***JA2MOG**	*	**81,627**	**191**	**169**
*BG2AUE	*	35,030	124	113
*JA2PFO	*	24,459	100	93
***9V1IZ**	*	**1,104**	**25**	**23**
*BG8AAK	*	9	3	3
***JR4GPA**	14	**164,004**	**287**	**237**
***UN9PQ**	*	**143,000**	**252**	**220**
***JA3DAY**	*	**26,550**	**103**	**90**
***HL5YI**	*	**570**	**17**	**15**
***JA6FGC**	7	**31,312**	**85**	**76**
***JR4VEV**	*	**17,784**	**63**	**57**
***JA7HYS**	*	**7,216**	**41**	**41**
OCEANIA				
VK2CA	A	**2,015,059**	**1217**	**571**
ZL1AIX	*	**180,880**	**276**	**170**
ZL1BIV	*	67,032	167	152
VK2BCQ	*	63,384	164	139
ZL4IG	*	32,544	109	96
AH6RR	28	**341,600**	**481**	**280**
VK6IR	21	**2,263,494**	**1252**	**654**
WH7Z	*	**543,696**	**651**	**282**
			(OP: WØCN)	
KH6QJ	3.7	**8,225**	**43**	**35**
***VK9CF**	A	**584,802**	**673**	**318**
***ZL1AAO**	*	**316,712**	**431**	**236**
***VK4XES**	*	**63,512**	**147**	**136**
***NH7J**	*	**49,911**	**140**	**127**
***VK2WAY**	*	**29,058**	**98**	**87**
*VK4BL	*	28,608	111	96
*VK2HEK	*	1,188	19	18
***YBØNFL**	28	**60,168**	**172**	**138**
***YCØNSI**	21	**125,385**	**244**	**195**
*YC1BAH	*	73,628	175	158
*YB1UUN	*	58,241	153	139
***DU1JI**	14	**176,200**	**312**	**200**
***YB2BBY**	*	**7,896**	**60**	**56**
***VK4MN**	*	**5,625**	**45**	**45**
SOUTH AMERICA				
LR4E	A	**6,710,136**	**2636**	**899**
			(OP: LW4EU)	
AY8A	*	5,376,818	2216	857
			(OP: LU8ADX)	
XR3P	*	**2,574,080**	**1450**	**640**
			(OP: CE3PG)	
ZV2K	*	**1,808,409**	**1123**	**601**
			(OP: PY2SHF)	
PY2NZ	*	603,687	537	399
LU7YZ	*	490,050	556	330
PY7VI	*	327,267	416	279
CE2WZ	*	271,421	396	269
ZW5V	*	12,709	75	71
			(OP: PY5KA)	
ZV2V	28	**3,609,586**	**1560**	**769**
			(OP: PY2LED)	
PY2ADR	*	1,980,915	1150	615
CA3OEV	*	**940,730**	**791**	**445**
PY7ZY	14	**2,495,682**	**1260**	**683**
***PY2DEZ**	*	**13,320**	**84**	**74**
***HK5P**	A	**2,598,896**	**1195**	**664**
***LU5FF**	*	**1,938,020**	**1103**	**635**
*AYØDX	*	651,964	643	389
			(OP: LU3DR)	
*LW4EF	*	116,400	280	194
*LU1IBL	*	36,153	118	103
***YY5TIO**	*	**1,800**	**24**	**24**
*YY5APA	*	775	27	25
***LU8DCF**	28	**421,176**	**476**	**327**
*LW6DAK	*	276,066	378	294
***CE3LQH**	*	**28,840**	**127**	**103**
***PY5KC**	*	**7,316**	**70**	**62**
***PY2LCD**	*	**11,360**	**75**	**71**
EUROPE				
E74HH	A	**6,598,899**	**2599**	**1041**
			(OP: S56M)	
RT4RO	*	**6,340,471**	**2945**	**1087**
EE3A	*	**6,160,826**	**2457**	**1007**
			(OP: EA3ATM)	
DH8BQA	*	**4,892,702**	**2257**	**953**
EA3RR	*	4,689,410	2084	890
EH3O	*	4,688,597	2178	947
			(OP: EA3GEG)	
EU1AZ	*	**3,623,136**	**1833**	**876**
EU5T	*	3,491,962	1823	862
			(OP: EW2A)	
RW4PL	*	3,453,680	1975	920
EV1R	*	3,338,084	1779	863
UT2UU	*	**3,158,721**	**1766**	**843**
MD2C	*	**3,010,410**	**1582**	**806**
			(OP: MDØCCE)	
MØWLF	*	**2,995,190**	**1593**	**803**
EW4AA	*	2,907,447	1531	863
RO4F	*	2,731,040	1676	845
GE6MDF	*	**2,463,750**	**1376**	**750**
YO3APJ	*	**2,143,330**	**1293**	**679**
GØVXE	*	2,055,504	1284	748
YL9T	*	**2,053,440**	**1444**	**720**
			(OP: YL2TW)	
DFØBV	*	1,976,262	1198	681
			(OP: DL1MAJ)	
IZ4GWE	*	**1,761,914**	**1129**	**673**
F4DSK	*	**1,663,844**	**1137**	**653**
DK1KC	*	1,606,365	1038	657
EF5K	*	**1,582,199**	**1550**	**739**
			(OP: EA5DWS)	
5P5K	*	**1,348,182**	**1065**	**619**
			(OP: DL7AOS)	
LY2MM	*	**1,023,990**	**857**	**535**
DL9GWD	*	988,000	780	500
PA1TX	*	**961,114**	**841**	**553**
HA1TNX	*	**956,800**	**720**	**520**
EA2NN	*	**953,568**	**914**	**602**
ED4A	*	**947,520**	**857**	**560**
			(OP: EA4TV)	
GZ5Y	*	**941,215**	**869**	**545**
			(OP: GM4SSA)	
YU1UN	*	**887,524**	**777**	**506**
IK8UND	*	875,700	952	556
DKØA	*	858,276	730	486
			(OP: DL7JAN)	
DK5TX	*	784,557	729	487
UXØRR	*	761,607	742	471
LY2AE	*	665,910	681	441
DF2TT	*	661,164	602	476
DL1OLJ	*	653,650	618	425
DK7FP	*	590,376	616	408
G3RXQ	*	519,944	534	412
DGØCC	*	513,216	663	432
DL5YM	*	509,320	604	428
EU4AA	*	466,250	566	373
OH1B	*	**439,704**	**537**	**394**
			(OP: OH1BOI)	
IWØGTA	*	420,510	505	393
ED5J	*	384,444	445	362
			(OP: EA5DM)	
OG4T	*	358,758	451	342
			(OP: OH4MFA)	
EA5EV	*	334,848	410	327
EWØDX	*	320,105	473	365
IR4E	*	280,725	397	285
			(OP: IK4ZHH)	
SM6NOC	*	**269,448**	**400**	**309**
OK2WZN	*	**261,018**	**424**	**306**
F6GPT	*	231,280	428	295
UA6AA	*	**221,553**	**319**	**239**
GØMTN	*	219,735	387	285
UT5RB	*	189,497	323	253
UR4EI	*	189,210	342	265
F5KEQ	*	174,906	288	237
			(OP: F5MYK)	
EB7CIN	*	**153,972**	**282**	**234**
IZ5ILJ	*	142,350	248	219
MØRNR	*	124,656	248	212
IWØGYC	*	116,204	235	209
DL1NEO	*	115,500	243	210
G7VRK	*	111,748	232	182
DC6RI	*	109,728	268	216
G8JXV	*	105,196	229	182
M1JJK	*	93,310	267	215
OZ6OM	*	88,320	203	160
IZ8EWD	*	87,555	230	195
GM2Y	*	**79,200**	**197**	**176**
			(OP: MMØDXH)	
OP4B	*	**77,588**	**203**	**163**
LY1AKM	*	75,240	219	171
DJ6TB	*	60,160	184	160
IK3XTY	*	57,528	200	153
SP1MWN	*	**52,250**	**149**	**125**
F5VML	*	47,192	145	136
DH5MM	*	43,428	155	154
LA9DFA	*	**42,630**	**170**	**147**
I3VJW	*	42,265	130	107
R2DW	*	**36,994**	**122**	**106**
SP2LQP	*	27,778	94	86
SN7F	*	26,093	115	97
			(OP: SP7LFT)	
RK4FAD	*	**24,717**	**118**	**107**
LA1TPA	*	19,292	122	106
RW4WZ	*	16,530	95	87
EA4DEC	*	12,600	73	72
LA8OKA	*	11,039	93	83
OK2MA	*	8,262	57	51
IK4AUY	*	8,150	55	50
LZ22G	*	**6,811**	**52**	**49**
IZ2DII	*	4,312	46	44
DL9NDV	*	3,520	46	44
IZ8JJI	*	924	23	22
IT9ZTX	28	**251,902**	**390**	**266**
S56P	*	**216,000**	**374**	**258**
OE5UAL	*	**64,801**	**181**	**137**
CT4NH	*	**42,619**	**138**	**109**
OH1RX	*	**34,230**	**123**	**105**
IT9ABN	*	30,888	110	99
IZ4MJP	*	**6,392**	**49**	**47**
IZØEGA	*	75	5	5
EB3CW	21	**4,227,038**	**1941**	**881**
CT1EOD	*	**1,391,940**	**1186**	**660**
IZ5CML	*	**1,085,812**	**850**	**494**
ED2H	*	**990,552**	**954**	**596**
			(OP: EA2KB)	
OI6X	*	**842,002**	**783**	**439**
			(OP: OH6NJ)	
OQ4B	*	**674,620**	**624**	**445**
IWØBCF	*	349,675	431	355
IZ8EPX	*	292,248	493	328
OH8MJ	*	247,401	343	297
SV9COL	*	**229,596**	**478**	**318**
SP1NY	*	**219,186**	**329**	**246**
RM5P	*	**38,383**	**142**	**131**
IK2AHB	*	28,302	118	106
SM5D	*	**1,825**	**25**	**25**
			(OP: SM5DJZ)	
9A5ADT	14	**2,588,040**	**1751**	**819**
8SØC	*	**2,429,799**	**1478**	**829**
			(OP: SMØMPV)	
OU5A	*	**1,492,092**	**1260**	**651**
			(OP: YT2T)	
SX3B	*	**1,079,100**	**1229**	**660**
			(OP: SV1BDO)	
IZ8EFD	*	**526,164**	**787**	**489**
IKØNSR	*	149,940	405	294
LZ7H	*	**54,126**	**214**	**186**
IZ2QKG	*	6,525	80	75
S51CK	7	**2,367,513**	**1382**	**699**
ES2TI	*	**1,571,119**	**952**	**613**
OR7R	*	**1,550,472**	**983**	**616**
9A2STA	*	**1,152,320**	**966**	**529**
			(OP: 9A3TA)	
IK3UNA/1	*	**933,152**	**909**	**482**
IZ1PMC	*	120,204	233	212
UB6HBY	*	**319**	**11**	**11**
US2YW	3.7	**1,958,076**	**1213**	**654**
9A8M	*	**1,466,160**	**1066**	**596**
			(OP: 9A7DM)	
EU1A	*	**1,398,984**	**995**	**568**
IZ5MOQ	*	**1,163,674**	**992**	**542**
G8DYT	*	**337,456**	**408**	**322**
ED2T	*	**310,896**	**380**	**306**
			(OP: EA2ASY)	
G4NXG	*	81,174	193	166
EA1DVY	1.8	**24,024**	**100**	**91**
EA3EIQ	*	**16,020**	**96**	**89**
***DM2DX**	A	**2,742,168**	**1511**	**799**
***I2WIJ**	*	**2,224,908**	**1301**	**763**
***EI8GQB**	*	**2,141,737**	**1298**	**667**
			(OP: ON4EI)	
***G3VAO**	*	**1,969,692**	**1259**	**652**
***EW1IP**	*	**1,482,960**	**1103**	**592**
*G3Y	*	1,473,121	1014	611
			(OP: G3YBY)	
***UR4U**	*	**1,402,984**	**1044**	**596**
			(OP: UR4UDI)	
*G3ZQH	*	1,395,456	1104	632
***YT9M**	*	**1,371,216**	**1096**	**588**
			(OP: YU1PJ)	
*DF2AJ	*	1,288,200	993	600
***LZ2SX**	*	**1,270,200**	**1072**	**584**
*I1EIS	*	1,107,288	881	546
***OM5X**	*	**1,103,760**	**858**	**540**
***F5LIW**	*	**1,061,649**	**823**	**537**
***EE7R**	*	**1,027,266**	**859**	**547**
			(OP: EA7IA)	
***GI7AXB**	*	**963,889**	**869**	**523**
***ON4VDV**	*	**962,064**	**755**	**524**
***UA3ABJ**	*	**905,445**	**791**	**513**
***OE3JTB**	*	**875,854**	**725**	**511**
*DP4M	*	827,040	839	480
			(OP: DJ4MH)	
***OH3JP**	*	**787,572**	**702**	**501**
*IW4EGX	*	772,146	727	474
*EI5GSB	*	759,528	771	462
*DL6NDW	*	744,668	786	466
***UA1CUR**	*	**701,155**	**739**	**455**
*UA3VVB	*	691,122	698	458
*DQØA	*	658,112	702	452
			(OP: DK2DQ)	
*F4FFZ	*	656,370	681	459
*IK7NXU	*	554,116	586	437
***PA3FYG**	*	**452,230**	**519**	**410**
***SM5DQE**	*	**440,296**	**592**	**376**
***LA7GNA**	*	**426,887**	**508**	**387**
*SF3A	*	417,872	543	364
			(OP: SM3CER)	
*ON4CAS	*	410,496	493	384
***LY2N**	*	**397,100**	**498**	**361**
***MMØBQN**	*	**392,046**	**492**	**361**
*DABCCC	*	369,360	492	380
			(OP: DO4HAM)	
*DR15ZBAY	*	355,824	502	336
			(OP: DK8NC)	
*IK4QJF	*	355,710	499	355
***5PØO**	*	**351,828**	**502**	**348**
*OE5HSN	*	347,548	444	323
*ON7BBR	*	344,420	474	340
*OP4A	*	337,350	469	346
*I5DOF	*	293,248	445	316
***EA1EA**	*	**292,810**	**408**	**329**
*G3TDH	*	292,060	460	340
***HB9WDY**	*	**274,680**	**396**	**315**
***YL2CR**	*	**265,156**	**432**	**302**
*DJ4DN	*	237,630	348	267
*DK15ØRB	*	201,828	363	278
			(OP: DL1SBF)	
*IZ5HSK	*	195,579	312	279
*U1BA	*	194,300	355	268
*DL7URH	*	183,535	319	235
***OK2WYK**	*	**176,880**	**354**	**264**
*SJ7M	*	176,421	339	271
*UT5UKY	*	162,681	324	257
*DL4AC	*	162,657	319	279
*2EØPLA	*	161,868	315	246
***SV7CUD**	*	**150,670**	**307**	**247**
*SI5Y	*	141,276	304	244
			(OP: SM5BKK)	
*PD6W	*	124,928	309	244
			(OP: PDØEMR)	
*IZ5MMT	*	124,764	264	222
*ON6LY	*	123,968	239	208
*SV7BVM	*	118,854	280	213
*IK3ZBM	*	114,636	273	246
*LA6CF	*	114,228	228	167
*SM6MVE	*	106,665	245	195
***CT2IVH**	*	**105,565**	**271**	**215**
*DL5GAC	*	104,082	247	209
*IW5ECP	*	98,088	227	201
*F8VNU	*	95,836	240	194
*EI4HQ	*	94,770	233	195
*PA8KM	*	93,685	246	205
***SP7FBQ**	*	**92,496**	**232**	**188**
*UT4TA	*	90,540	226	180
*SG6T	*	87,932	201	178
			(OP: SM6WET)	
*G7WBX	*	87,703	202	187
*SP6FXY	*	87,420	197	155
***EA4LU**	*	**87,084**	**212**	**177**
*SE6C	*	84,483	246	189
			(OP: SM6CDN)	
*IW1RHR	*	73,346	201	169
*GM4SQM	*	64,175	176	151
*DL1SVA	*	62,487	178	159
*SQ5NBE	*	59,592	192	156
*DL1DBR	*	57,462	184	157
*PG2AA	*	53,454	168	151
*DK6NF	*	50,220	148	135
*OE8YMQ	*	50,160	186	165
***9A2GA**	*	**49,320**	**152**	**137**
*OL2T	*	48,657	178	147
*IW2NRI	*	47,816	150	139
*EI2II	*	45,276	141	132
*G7DDN	*	43,942	151	127
*IV3NVB	*	42,636	148	132
***EB3JT**	*	**41,984**	**151**	**128**
***S57AD**	*	**41,600**	**164**	**128**
*OM2DT	*	38,640	144	120
*ON6LO	*	37,000	167	148
*EA4DGZ	*	35,148	126	116
*IZ1HBC	*	33,264	157	132
*G2F	*	33,220	120	110
			(OP: MØCHK)	
*GI9Q	*	31,331	110	97
			(OP: GI4FUE)	
*UR5RP	*	28,875	138	125
*SQ7VO	*	27,225	115	99

*EA3BO	*	216	9	9
*I3YYY	*	184	18	8
***YU2A**	**28**	**53,820**	**157**	**130**
***IV3RCH**	**"**	**25,925**	**113**	**85**
***EE1B**	**"**	**23,715**	**104**	**93**
			(OP: EA1YB)	
*I5JKI/3	*	23,120	106	80
***OE5D**	**"**	**22,320**	**102**	**80**
			(OP: OE2UKL)	
***OH3BU**	**"**	**11,285**	**67**	**61**
***EA5TN**	**"**	**10,638**	**67**	**54**
***R6CW**	**"**	**3,861**	**44**	**39**
*IZ3NVR	*	3,400	36	34
***EA7RU**	**21**	**2,360,484**	**1627**	**798**
***IZ5EBL**	**"**	**1,771,893**	**1087**	**629**
***EI4II**	**"**	**346,290**	**472**	**357**
***MUØGSY**	**"**	**265,330**	**446**	**314**
***PAØMIR**	**"**	**192,768**	**298**	**256**
***SQ2NNN**	**"**	**160,776**	**284**	**231**
***OK2QX**	**"**	**151,417**	**269**	**223**
***SE5S**	**"**	**129,078**	**254**	**202**
***GW4EVX**	**"**	**98,112**	**224**	**192**
***YL2GUV**	**"**	**97,536**	**201**	**192**
***YT2B**	**"**	**80,782**	**193**	**169**
***OV3X**	**"**	**79,514**	**188**	**166**
			(OP: OZ8AE)	
***DL1MHJ**	**"**	**76,424**	**185**	**164**
*OK1CLD	*	63,936	166	148
*IZ5FDD	*	58,201	155	143
***OH6JYH**	**"**	**28,710**	**131**	**110**
***IT9ORA**	**"**	**15,120**	**85**	**80**
*DGØOM	*	2,340	30	30
*IZ3ALW	*	429	13	13
***S57U**	**14**	**442,508**	**577**	**452**
***IZ2JQP**	**"**	**246,202**	**397**	**341**
***YP5WFF**	**"**	**154,904**	**374**	**289**
			(OP: YO5OAG)	
***OG3P**	**"**	**143,028**	**361**	**274**
			(OP: OH3P)	
***IT9LED**	**"**	**104,550**	**388**	**255**
*YO5OLD	*	63,680	237	199
***EB1EVX**	**"**	**58,548**	**223**	**204**
*OH4KZM	*	48,840	189	185
*IW9FI	*	43,172	193	172
***DL4JYT**	**"**	**35,568**	**159**	**144**
***SV2YC**	**"**	**31,232**	**133**	**128**
***CT1DZY**	**"**	**21,842**	**143**	**134**
***RV6ACC**	**"**	**20,160**	**128**	**120**
***R2GM**	**"**	**19,008**	**88**	**88**
***OK2ILD**	**"**	**13,680**	**94**	**90**
***G2YC**	**"**	**11,616**	**100**	**96**
***ED4T**	**"**	**2,257**	**37**	**37**
			(OP: EA4CWN)	
***EC7KW**	**7**	**362,470**	**409**	**335**
***IZ1DGG**	**"**	**276,624**	**404**	**306**
***OK2PPM**	**"**	**171,864**	**279**	**231**
***LY2ND**	**"**	**82,536**	**200**	**181**
***RW3QF**	**"**	**56,448**	**147**	**144**
***YO9HRB**	**"**	**108**	**9**	**9**
***ON1CB**	**3.7**	**203,856**	**346**	**248**
***R3LC**	**"**	**176,276**	**321**	**254**
***EC7AKV**	**"**	**56,718**	**156**	**138**
***IT9JDH**	**"**	**17,922**	**94**	**87**
***YT4A**	**1.8**	**194,103**	**344**	**273**
			(OP: YT1AA)	
***DD9WG**	**"**	**13,940**	**89**	**82**

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

United States

AK1W	**16,567,248**	**4281**	**1343**
NG1G	2,754,992	1337	739
W1NRG	218,785	335	245
N1NC	377	13	13
WV2ZOW	**819,227**	**721**	**409**
NO2J	241,304	372	278
W3LJ	**312,040**	**409**	**290**
N3XUD	97,650	251	186
KE3X	37,387	140	109
NR3X/4	**10,629,541**	**3330**	**1237**
AD4ES	1,380,128	987	544
KI4UDF	66,444	183	147
WBSAAR	**3,206,235**	**1972**	**795**
WDØGTY/5	47,450	174	130
W5LCC	46,494	148	123
WD5IYF	6,240	86	80
KK5DNA	6,118	47	46
WQ6X	**4,958,590**	**2215**	**910**
KE1B/6	4,645,344	2085	913
KU6W	2,090,982	1417	619
K6XV	929,250	777	450
K6VO	53,592	307	154
KI6YYT	40,098	148	123
W6KA	17,466	118	82
NK7U	**13,304,610**	**3724**	**1335**
N7TT	4,428,114	2128	822
KI7Y	3,185,955	1867	747
K7MO	3,129,148	1799	788
WL7E/WZ7	498,852	552	372
W7TVC	319,872	489	294
K7MKL	311,916	441	278
KE7ZDJ	173,628	331	234
K7JAN	139,612	304	209
WA2HOM/8	**1,830**	**30**	**30**
AJ9C	**5,994,897**	**2291**	**1037**
KD9ST	5,938,968	2550	966
KC9ARR	1,993,820	1260	655
KØDU	**12,126,541**	**3821**	**1249**
KDØS	980,378	812	478
KØJDD	956,920	734	470
WØTT	432,432	497	364
KØJE	406,847	409	361

Alaska

KL7RA	**14,429,550**	**4146**	**1245**
KL7AIR	540,200	516	370

Belize

V3M	**9,193,362**	**3681**	**934**

Canada

VO1KVT	**4,099,753**	**1718**	**791**
VA2TG	**2,548,353**	**1307**	**659**
VC2B	2,235,096	1116	666
VC3Z	**4,749,932**	**1658**	**902**
VE6AO	**623,745**	**629**	**415**
VE7SV	**12,242,246**	**3132**	**1181**
VE7GL	9,514,218	2822	1077
VE7NA	60,620	170	140

Cayman Islands

ZF1A	**8,426,733**	**2906**	**959**

Guadeloupe

TO11A	**12,217,018**	**3829**	**1091**

Honduras

HR2OMR	**1,612,325**	**1246**	**533**

Mexico

XE2AU	**30,603**	**126**	**101**

Nicaragua

YN2ET	**3,968,144**	**2506**	**656**

U.S. Virgin Islands

KP2TM	**17,438,220**	**5668**	**1290**

AFRICA

Senegal

6V7D	**17,587,108**	**4604**	**1253**

Tunisia

3V1A	**31,345,522**	**5383**	**1469**

ASIA

Asiatic Russia

RF9C	**25,051,994**	**4962**	**1387**
RK9CYA	3,379,056	1434	697
UA9UZZ	1,548,660	948	530
UA8WAA	148,400	201	175
RZ9UWD	52,452	157	124
RZ9WWB	39,790	130	115
RK9SWF	23,030	105	98
UAØAYA	**763,860**	**641**	**435**

Asiatic Turkey

YM7KA	**10,687,088**	**2955**	**1028**

Azerbaijan

4K7Z	**333,735**	**409**	**285**

Bangladesh

S21YZ	**15,921**	**107**	**87**

China

BY5CD	**5,288,661**	**2111**	**889**
BY1OK	1,447,551	1209	567
BY4DX	1,097,728	860	512
B5B	658,577	739	389
BY4SA	524,811	576	373
B4VE	382,030	540	302
BY1CQ	72,652	261	164
BY1SK	53,676	209	142
BY1DX	35,400	147	120

Cyprus

P33W	**26,560,953**	**5434**	**1377**

Japan

JI2ZEY	**4,244,000**	**1694**	**800**
JA2ZJW	4,012,948	1747	823
JA2YNI	22,194	92	81

Kazakhstan

UP9L	**4,735,416**	**1833**	**794**

Kuwait

9K2HN	**17,308,980**	**4167**	**1170**

Macau

XX9ET	**36,660**	**190**	**130**

Saudi Arabia

HZ1TL	**1,528,362**	**1007**	**558**

Singapore

9V1YC	**1,371,644**	**989**	**548**

United Arab Emirates

A61ZX	**4,431,792**	**2075**	**762**

EUROPE

Austria

OE3K	**19,384,308**	**4662**	**1476**
OE5XIL	274,781	413	299
OE2XWL	145,040	310	245

Belarus

EW8ZO	**53,920**	**199**	**160**
EW8ZZ	880	20	20

Bosnia-Herzegovina

E74EBL	**8,022,119**	**2828**	**1103**
E73ESP	991,880	988	548
E73DPR	248,534	387	286

Bulgaria

LZ5R	**8,828,160**	**3324**	**1210**

Croatia

9A6B	**2,524,871**	**1282**	**727**
9A3W	1,260,288	937	547

Czech Republic

OK2KOJ	**1,733,424**	**1119**	**616**
OL1B	12,705	83	77
OK5SWL	400	17	16

Denmark

5P3WW	**6,304,320**	**2831**	**995**
OZ2AR	1,550,340	1022	638
OZ5BAL	261,105	405	309
5Q1A	95,067	218	189

England

G2W	**7,568,046**	**2830**	**1042**
G5FZ	5,003,919	2306	907
M4U	2,659,068	1570	783
M2W	2,628,591	1516	777
G1T	240,188	418	298
M8Y	189,189	343	273
G3PIA	154,206	293	234
G5N	15,066	102	93

European Russia

RL3A	**20,949,828**	**5317**	**1458**
RC3W	3,868,452	2059	918
RM3Q	3,212,880	1990	880
R2AB	1,087,370	979	590
RK4HYT	**783,522**	**848**	**474**
RY6Y	**3,325,020**	**2041**	**906**

Finland

OH6K	**524,097**	**586**	**413**

France

TM6M	**28,016,921**	**6049**	**1541**
F4FLQ	5,871,798	2204	1026
TM38O	598,490	705	485
F6KRK	190,716	314	276

Germany

DJ8OG	**6,456,352**	**2291**	**1064**
DP4W	4,740,645	1968	897
DR2W	3,440,938	1732	874
DKØMM	2,965,360	1539	808
DP9I	1,949,972	1347	706
DL1NKS	1,285,556	1057	557
DJØA	1,180,530	887	585
DM5Z	1,098,900	923	540
DKØGYB	1,016,056	903	527
DL1M	531,278	573	418
DR4O	500,656	570	377
DLØUM	459,163	518	373
DHØMA	327,565	441	343
DLØSM	83,284	219	188
DKØSU	5,418	45	43

Greece

SZ3P	**3,472,192**	**2239**	**908**
SZ1A	3,406,284	2116	882
SX1L	3,188,896	2038	908

Ireland

EI9E	**11,772,840**	**3889**	**1194**
EI6DX	6,696,720	2856	1048
EIØW	1,566,550	1112	646

Isle of Man

GT8IOM	**873,675**	**845**	**495**
GDØAMD	237,922	459	337

Italy

IO5O	**12,066,208**	**3398**	**1328**
II5P	6,848,990	2497	1154
IR6T	5,114,088	2148	1022
IY4FGM	2,883,958	1595	854
IK2LTR	2,048,960	1116	760
IQ3GO	859,066	778	494
IQ2VC	137,475	295	235
IQ2BJ	102,377	278	227

Kaliningrad

UA2F	**99,337**	**240**	**161**

Latvia

YL1XN	**836,022**	**873**	**478**

Lithuania

LY21A	**10,766,686**	**3520**	**1246**

Moldova

ER4KAA	**3,924**	**45**	**36**

Netherlands

PA6V	**3,201,200**	**1631**	**848**
PA5W	409,216	477	368

Norway

LA2BØD	**26,555**	**121**	**113**

Poland

SN7H	**1,884,288**	**1246**	**701**
SP9KDA	1,164,546	881	558
SP6PYP	57,682	159	151
SP1KZE	7,378	64	62

Romania

YO8Q	**5,370,130**	**2683**	**1019**
YP7P	4,197,330	2227	939
YR8D	859,313	785	497
YR1C	757,304	807	523

Scotland

GM7A	**1,873,440**	**1160**	**729**
MMØTAI	1,101,600	937	425

Serbia

YT9X	**8,812,268**	**3095**	**1172**
YT3Z	1,264,488	1003	564

Sicily

IR9Y	**11,993,376**	**3653**	**1383**
II9K	4,314,952	2109	1016
IF9A	3,776,715	2234	943

Slovakia

OM7M	**15,918,732**	**4073**	**1406**
OM5M	6,919,192	2618	1064
OM3RRC	64,370	190	157

Slovenia

S52ØSLO	**8,220,300**	**2883**	**1166**
S52ØSCC	7,795,548	2975	1102
S53EA	6,088,992	2633	984
S59T	71,136	204	171

Spain

ED1T	**2,795,276**	**2049**	**814**
ED1G	2,120,300	1357	700
ED2C	**2,746,042**	**1741**	**806**
ED2A	13,072	86	76
EE3EA	**1,189,099**	**1163**	**619**
EA4RCT	**47,272**	**185**	**152**
EE5B	**376,232**	**458**	**359**
EE5F	354,224	472	338

Sweden

SK7OA	**3,029,719**	**1704**	**803**

Switzerland

HB9EE	**3,710,460**	**1939**	**852**
HB9FA	111,366	256	207

Ukraine

UW4I	**6,201,545**	**2770**	**1061**
UU4JYM	1,526,415	1201	605
UR4PWL	139,230	298	221
UT1KWA	61,596	218	177
UU5A	39,330	153	115
UR4PWC	17,177	93	89
US0LW	6,594	49	42

OCEANIA

Australia

VK4NM	**6,133,875**	**2072**	**825**
VK4WIP	1,252,649	876	509
VK6NC	**2,897,063**	**1408**	**703**

Fiji

3D2A	**6,701,400**	**2549**	**918**

Guam

KH2JU	**2,274,250**	**1297**	**550**

Indonesia

YB1C	**2,845,944**	**1361**	**696**

Philippines

4D1HR	**308,656**	**520**	**202**
DX7CA	57,942	156	111
DX1GSP	5,076	61	47
DX1RN	198	9	9

SOUTH AMERICA

Argentina

LS1D	**13,754,238**	**3857**	**1198**
LO7H	4,899,720	2092	840
LQ5H	3,878,056	1814	761
LU1UM	3,383,898	1701	713
LT4S	2,707,230	1404	710
L73D	2,620,233	1382	693
L90AA	1,229,184	927	528
LT5X	837,200	727	460
LR3Y	602,070	659	366
LT5D	387,817	428	311

Aruba

P40M	**22,399,690**	**5539**	**1310**

Brazil

PS2T	**27,820,287**	**5700**	**1551**
PQ5B	13,351,525	3877	1175
PV2P	12,513,912	3527	1214
PT6TS	8,053,986	2660	1007
ZW4O	7,064,838	2397	1023
PX2V	4,031,754	1760	799
ZW8T	2,936,682	1403	714
PR5A	2,118,540	1156	670
PY1GQ	1,578,330	989	570
PR7AA	1,468,966	962	551

Chile

CE3G	**4,446,015**	**1910**	**805**
CE1TT	2,479,518	1429	657
CB3C	1,607,990	1039	565

Ecuador

HD2A	**6,656,118**	**2274**	**878**

MULTI-OPERATOR TWO-TRANSMITTER NORTH AMERICA

KD4D/3	**21,464,896**	**4954**	**1396**
VC5X	**20,699,816**	**5185**	**1426**
WW4LL	**16,979,974**	**4808**	**1411**
WC6H	**13,644,735**	**4685**	**1257**
W7RN	**12,408,773**	**4074**	**1271**
KK7OO	10,966,914	4023	1134
K4BP	10,155,080	3450	1180
WF3C/4	8,199,532	3457	1126
VE6FI	7,291,778	2469	991
VE3RM	**5,479,980**	**1861**	**836**
NØMA	**4,372,553**	**1937**	**901**
N8AJN/Ø	1,423,488	1023	528
VE3BK	1,090,796	782	478
W8BI	**1,051,404**	**924**	**492**
NG1R	**1,038,632**	**763**	**476**
N4YT	177,660	304	235
KU8K	171,948	300	267

AFRICA

EB8AH	**68,072,520**	**10525**	**1765**
5D5A	**64,373,694**	**10233**	**1694**
D4C	**62,380,227**	**10652**	**1743**
EE9K	**1,888,342**	**1023**	**601**

ASIA

8J7P	**15,074,700**	**4319**	**1308**
8I1Z	8,205,288	2683	1092
RT9J	**7,473,574**	**2394**	**1006**
A6ØA	**3,901,496**	**1700**	**692**
8Q10O	**3,624,842**	**1954**	**767**
83C	3,429,920	1704	776
JO1ZRT	**121,329**	**246**	**183**

EUROPE

OL4A	**33,215,652**	**6855**	**1692**
9A1A	**32,921,826**	**7132**	**1666**
9A1P	31,970,812	6813	1649
DQ8N	**30,797,352**	**7071**	**1642**
9A7A	25,747,659	6005	1593
II9T	**20,116,272**	**5730**	**1488**
DR5N	19,511,180	5017	1486
HG7T	**17,453,216**	**4613**	**1432**
IQ1RY	**16,298,334**	**4564**	**1417**
PI4DX	**16,287,744**	**4187**	**1408**
OL1X	14,130,732	4254	1353
S52ZW	**13,706,445**	**3920**	**1335**
YU5R	**12,621,324**	**4178**	**1348**
DP5M	11,357,439	3660	1259
9A3B	10,785,600	3637	1260
RG3K	**10,022,980**	**3407**	**1276**
IR9W	9,200,955	3715	1263
7SØX	**8,410,650**	**3200**	**1193**
EE2K	**8,058,946**	**3166**	**1198**
G5O	**7,770,550**	**2925**	**1150**
OL1C	6,326,495	2350	1015
OMØA	**6,096,566**	**2764**	**983**
CR6P	**5,345,352**	**2155**	**1017**
IR3Y	4,425,904	2068	919
LN5O	**4,273,220**	**1802**	**917**
ED5K	**3,357,924**	**2058**	**922**
DLØRH	2,363,600	1573	760
PA6Y	1,877,572	1278	734
M9C	1,001,091	910	579
IR8W	736,009	751	491
SK6HD	568,350	646	421
LA1K	32,096	160	136

OCEANIA

VK4KW	**26,528,482**	**5756**	**1369**
YEØX	**8,779,259**	**2758**	**1003**

SOUTH AMERICA

PJ2T	**37,468,288**	**7522**	**1408**
PW7T	**37,437,568**	**7163**	**1568**
PT5T	32,529,640	6431	1573
XR6T	**12,613,116**	**3821**	**1156**
LU1MA	**10,836,942**	**3206**	**1213**
PR5D	5,577,228	2146	914
PT5O	4,937,177	2032	857
CV5D	**3,669,138**	**1722**	**781**
LU6ETB	498,978	546	342
CE1Z	378,708	552	302

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

WX3B	**19,928,644**	**5347**	**1444**
NX5M	**17,133,200**	**5733**	**1450**
NR6O	**14,961,801**	**4884**	**1369**
NE1C	**10,043,890**	**2975**	**1142**
VA5AA	**10,004,828**	**3240**	**1174**
AK7AZ	**5,059,080**	**2807**	**936**
AB5K	714,492	996	446

AFRICA

CR3A	**61,601,040**	**10050**	**1710**

ASIA

BV10O	**833,000**	**1108**	**392**

EUROPE

DR1A	**63,397,890**	**11705**	**1909**
OT5A	**31,900,698**	**7391**	**1654**
HG2Ø11N	**31,347,558**	**7256**	**1683**
LZ9W	**30,426,851**	**7458**	**1673**
LY7A	**19,088,582**	**5835**	**1429**
EA3DUM	**10,444,395**	**3505**	**1235**
SX5P	**9,579,648**	**4037**	**1216**
DP6T	9,044,750	2981	1210
OZ5GX	**2,006,892**	**1537**	**642**
SK6O	**1,047,508**	**882**	**532**
OK1KOB	**739,908**	**767**	**468**
RM2T	**163,527**	**381**	**273**

OCEANIA

VK1CC	**1,608,491**	**956**	**563**
DX1DBT	**416,598**	**554**	**294**

SOUTH AMERICA

LP1H	**45,443,754**	**8775**	**1707**
PT2CM	**15,145,130**	**4126**	**1246**
CE1A	**6,242,264**	**2235**	**952**

CHECK LOGS

4Z5FL, 5C5W, 9A4W, 9A4WY, AA5AU, AD5WB, AG4CG, AJ4ME, CE3PHI, CX9AU, DC2DC, DK9BW, DLØIT, DL1NPG, DL2AL, DL4RAT, DL8MBS, DL8USA, DM3BJ, DM3RB, DM3XI, DM5DX, DM5HF, DO6AFL, DR2O, E72U, E74WN, E77M, EA1AKS, EA1IT, EA2JE, EA2MH, EA3BJM, EA3EJI, EA4GB, EA5HJO, EA7GV, EC2DM, EC5CYI, EC7HC, EF8F, EI7JK, ER3DX, ES6RMR, F1VNR, G3RWL, GM3MZX, HA2QW, HA3OU, HG2W, HK3JJH, I2DMI, II8ITA, IK3QAR, IV3JCC, IZØHTW, JA7VEI, K5WW, K7LU, K8YC, KC4NPR, KU4BP, LA8HGA, LY1CT, LY2BKT, LY2CO, LY5M, LZ133GO, LZ137ØPRT, LZ1GU, OE6IMD, OH6LI, OK1VKC, OK2EQ, OK2ZW, OL8M, OM4EX, ON5RZ, OO4O, OO9O, PAØRBO, PAØRRA, PA3EBP, PP5BI, PV8DX, PY2PT, PY4CHM, R3GM, R3PA, R4NX, R5OE, R6YY, R7MA, RA3THN, RA3XDX, RA3ZV, RA4WC, RA5DU, RA6FUZ, RA9AMO, RA9CIN, RA9DZ, RA9OFE, RD3AW, RK3XWO, RN1ON, RN3BO, RN9A, RU3EJ, RU6L, RU9YF, RV3LO, RV6LLI, RW9OWD, RX3AGD, RX3XA, RX9WN, RY9C, RZ3AWI, RZ3DOT, RZ3EC, RZ9UO, SO7O, SP2QCU, SP3J, SP3QYQ, SP5ELW, SP5GDY, SP5ZIM, SP6CZ, SP6M, SP6NVN, SP7HOV, SP7IFM, SP9AUV, SP9CIH, SQ4HRN, SQ4JEN, SQ5NAR, SQ6MS, SQ7MHN, SQ8IFG, SV1DPI, TA2RX, TC7TC, UA1AJW, UA3FX, UA3OQ, UA4AAC, UA7F, UA9BA, UA9LGD, UA9ONJ, UB8XAB, UN6G, UN7BEW, UN7JX, UN7QF, UR3QNV, UR4IOR, UR5AMJ, UT3IZ, UT3UX, UT5SA, UU7JM, UW7W, UX1AA, UY5BT, UY5QQ, UY9IF, V85/9M6XRO, VE2/VE3TLY, VE3JSQ, VK6WX, VK7XX, W5FIT, W6LOL, W6NWF, WAØB-SW, WA6HYI, WW2DX, XQ7UP, YB2VTO, YLØY, YL2TD, YL7X, YO2CMI, YO2MHJ, YO3CCC, YO3JF, YO6ADW, YO9DL, YO9FNP, YO9KPM, YR5N, YU1EW, YY6CAM, ZL1BYZ, ZX5ZZ

Rule Violations:
Yellow Cards: 4M5IR (YV5KG), EA1AAW, I04C (IZ4DPV), IZ8FWN, ON3HLU, RU5TT (RN3TE), SN3A (SP3GEM), SN3S (SQ3LVO), UA5A (RA3AKT), UI4I, UR5AS, W6AEA — unclaimed assistance [rule IV(e)]
Red Card: SN3R (ops 3Z3AHK, SP3HRN, SP3RBR, SP5XVY, SP6HEQ, SQ3JPM, SQ6ODD) – more than one signal [rule V.D(a)]
Log Withdrawn: WW2DX

advertisers' index

including website addresses

10-10 International Net, Inc.	54	www.10-10.org
Advanced Specialties Inc.	54	www.advancedspecialties.net
Alinco	53	www.alinco.com
Ameritron	47	www.ameritron.com
Antique Radio Classified	78	www.antiqueradio.com
Arlan Communications	45	www.arlancommunications.com
Array Solutions	5	www.arraysolutions.com
bhi Ltd	33	www.bhi.ltd.com
BATTERIES AMERICA/Mr. Nicd.	115	www.batteriesamerica.com
Bencher, Inc.	45	www.bencher.com
Buddipole Antennas	19	www.buddipole.com
CQ Amateur Radio Calendar	83	www.cq-amateur-radio.com
CQ Bookshop	49,89	www.cq-amateur-radio.com
CheapHam.com	87	www.CheapHam.com
Command Productions	67	www.LicenseTraining.com
Communication Concepts, Inc	51	www.communication-concepts.com
Cushcraft	1	www.cushcraftamateur.com
Cutting Edge Enterprises	79	www.powerportstore.com
DX Engineering	11	www.DXengineering.com
DX Store	93	www.dxstore.com
DZ Company	69	www.dzkit.com
Diamond Antenna	55	www.diamondantenna.net
EZ Hang	69	www.ezhang.com
Elecraft	17	www.elecraft.com
Electric Radio Magazines	19	www.ermag.com
FlexRadio Systems	3	www.flex-radio.com
Force 12, Inc.	97	www.force12inc.com
GRE	39	www.greamerica.com
Green Heron Engineering LLC	51	www.greenheronengineering.com
Ham Radio Outlet	12,30	www.hamradio.com
HamTestOnline	28	www.hamtestonline.com
Hy-Gain	9	www.hy-gain.com
ICOM America, Inc	31	www.icomamerica.com
Idiom Press	28	www.idiompress.com
KJI Electronics	113	www.kjielectronics.com
Kanga US	54	www.kangaus.com
Kenwood U.S.A. Corporation.	Cov. II	www.kenwoodusa.com

ham shop

Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are $1.00 per word. Boldface words are $1.50 each (specify which words). Minimum charge $2.00. No ad will be printed unless accompanied by full remittance. All ads must be typewritten double-spaced.
Closing Date: The 10th day in the third month preceding date of publication (example: Jan. 10th for the March issue). Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of *CQ* cannot vouch for the merchandise listed therein. The publisher reserves the right to reject any advertisement. Direct all correspondence and ad copy to: CQ Ham Shop, 25 Newbridge Road, Hicksville, NY 11801 (fax: 516-681-2926; e-mail: <hamshop@cq-amateur-radio.com>.

"QRZ DX"—since 1979: Available as an **Adobe PDF file** each Wednesday or by regular mail. Your best source for weekly DX information. Send #10 SASE for sample/rates. **"The DX Magazine"—since 1989:** Bimonthly – Full of DXpedition reports, QSL Information, Awards, DX news, technical articles, and more. Send $3.00 for sample/rates. DX Publishing, Inc., P.O. Box DX, Leicester, NC 28748-0249. Phone/Fax: 828-683-0709; e-mail: <DX@dxpub.com>; WEB PAGE: <http://www.dxpub.com>.

At **www.HamRadioExpress.com** we know you can't afford to waste time looking for Ham Radio Antennas & Accessories. With **over 3,000 products in our four warehouses**, you can rely on **Ham Radio Express** to have the parts you need, in stock, especially those special, hard-to-find parts, fixed station antennas, baluns, mobile antennas, mobile antenna mounts, accessories, and RF connectors. **Custom Built Cable Assemblies** for your Packet TNC/KPC to radio interface devices. We stock interface cables for all amateur radio makes and models: AEA, Kantronics, MFJ, PacComm, and more Packet Controllers. All cables are in stock or can be built in one day. All cable assemblies are double-checked before they are shipped. Toll-Free Order Lines: M–F 9 AM to 4 PM: **1-800-726-2919** or **1-866-300-1969**; Fax **1-434-525-4919**. **Help and Tech Support:** *Not sure what model you need?* At **www.HamRadioExpress.com** our Technical Support staff (1-434-509-0617, 9 AM to 4 PM weekdays) can help you decide what you need, and all available for same-day shipment. On-line visit: **www.HamRadioExpress.com**

CERTIFICATE for proven contacts with all ten American districts. SASE to W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

MAUI, HAWAII: vacation with a ham. Since 1990. <www.seaqmaui.com>, telephone 808-572-7914, or <kh6sq@seaqmaui.com>.

ALUMINUM CHASSIS AND CABINET KITS, UHF-VHF Antenna Parts, Catalog. On the web: <http://www.k3iwk.net>.

REAL HAMS DO CODE: Move up to CW with **CW Mental Block Buster III.** Succeed with hypnosis and NLP. Includes two (2) CDs and Manual. Only $29.95 plus $7.00 s/h US. FL add $2.14 tax. Success Easy, 160 West Camino Real #128, Boca Raton, FL 33432, 561-302-7731, <www.success-is-easy.com>.

TWO NEW NOVELS involving ham radio: *Full Circle*, and *Frozen in Time*, by N4XX. Visit <http://www.theodore-cohen-novels.com/>.

QSLing SUPPLIES. e-mail: <plumdx@msn.com>.

WWW.PEIDXLODGE.COM

CASH FOR COLLINS, HALLICRAFTERS SX-88, & DRAKE TR-6. Buy any Collins equipment. Leo, KJ6HI, phone/fax 310-670-6969, e-mail: <radioleo@earthlink.net>.

www.SecondHandRadio.com

MicroLog by WAØH
Free download . . . www.wa0h.com

LOOKING GREAT on the wall behind your equipment. <www.hamradioprints.com>

OVERSEAS AIRMAIL POSTAGE plus complete line of airmail envelopes. Order directly from our website. James E. Mackey, proprietor. website: <www.airmailpostage.com>

ARUBA RADIO RENTAL: www.p49v.com

RFI Filters <www.RFchoke.com>

TOWER ACCESSORIES Gin Pole Kits – stand off brackets – antenna mounts – vehicle radio mounts – for 30 years. IIX Equipment Ltd., 708-337-8172, <http://www.w9iix.com/>.

VORTEX ANTENNA SYSTEMS specialist in HF and VHF high performance antennas. Yagis and Delta Loops. Linear Loaded 30 and 40m Arrays. OWA Arrays, bespoke individual design solutions. Antenna related hardware. We ship worldwide including North America. <www.vortexantennas.co.uk/>. or by e-mail to <enquiries@vortexantennas.co.uk>.

WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear—new, old, in any condition—to the Radio Club of Junior High School 22, the Nation's only full time non-profit organization working to get Ham Radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 31st year of service. It is always easier to donate and usually more financially rewarding, BUT MOST IMPORTANT your gift will mean a whole new world of educational opportunity for children nationwide. Radios you can write off; kids you can't. Make 2011 the year to help a child and yourself. Write, phone, or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Twenty-four hours call 516-674-4072; fax 516-674-9600; or e-mail <crew@wb2jkj.org>. Join us on the WB2JKJ Classroom Net, 7.238 MHz, 1200–1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 1:00–3:00 PM Eastern. Sr. Noreen Perelli, KE2LT, 2755 Woodhull Ave., Bronx, NY 10469.

"World of Keys – Keys III" features highly detailed views and photos of keys, bugs, and paddles like few people have ever seen! I's available on CD ($16) or as a full-size book ($18). Also still available, **"Keys II"** ($16) and **"QRP Romps!"** ($18), plus **"Your Guide to HF Fun"** ($16). Available from dealers nationwide. Also please see: <http://www.k4twj.com/>.

PACKET RADIO AND MORE! Join TAPR, connect with the largest amateur radio digital group in the U.S. Creators of the TNC-2 standard, working on Software Defined Radio technology. Benefits: newsletter, software, discounts on kits and publications. For membership prices see the TAPR website: <http://www.tapr.org>).

FOR SALE: CQ/Ham Radio/QST/73 magazines and binders. SASE brings data sheet. W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

WANTED: VACUUM TUBES – Commercial, industrial, amateur. Radio Daze, LLC, 7620 Omnitech Place, Victor, NY 14506 USA (phone 585-742-2020; fax 800-456-6494; e-mail: <info@radiodaze.com>).

www.oldqslcards.com

HAWAII HAM STATION RENTAL: Beautiful Big Island location. Brochure: <KD4ML@juno.com>.

DXPEDITION DVD VIDEOS: For full description and how to order . . . <www.k4uee.com/dvd/>.

www.isotronantennas.com FOR HF. CHECK IT OUT! Telephone: 719-687-0650; **<wd0eja@isotronantennas.com>**

NEAT STUFF! DWM Communications — <http://qth.com/dwm>

HOMEBREW! "Recollections of a Radio Receiver" a 565 page book on HBR homebrew receivers. $10 delivered (eBook on CD-ROM). Details <www.w6hht.com>

SMART BATTERY CHARGERS: 5A model for larger deep cycle down to 1/4A model for smaller QRP lead acid batteries. <www.a-aengineering.com>

ARMS – Amateur Radio Missionary Net. Christian Fellowship Net, Everyone Welcome. 14.3075 Daily except Sunday 1500–1700Z, –1 Hr DST. Website: www.qsl.net/arms

HONDURAS DX VACATION: K3, Alpha 86, SteppIR, Meals, Private Facilities. HR2J, (206) 259-9688.

DISPLAY YOUR CALL SIGN IN NEON. To order call 1-401-846-0294, Duncan DeSigns

YAGIS DESIGNED BY WA3FET/K3LR: Bust pileups using these proven DX and Contest winning "Ultimate OWA Yagis"! Learn more and request free PDF catalog at www.SuperBertha.com or call 814-881-9258.

ROTATING MONOPOLE TOWERS: SuperBertha . . . BudgetBertha . . . No guy wires, Entire pole rotates, Ground level rotor. Stack and rotate all your antennas at optimum heights on one monopole. The Ultimate antenna system! Learn more and request free PDF catalog at www.SuperBertha.com or call 814-881-9258.

HAWAII DX VACATION: SteppIR antennas, amplifiers. KH6RC, <www.leilanibedandbreakfast.com>.

<http://www.vintagehamshack.com>

HY POWER ANTENNA COMPANY <http://www.freewebs.com/hypower> Multiband dipoles, delta loops, half squares and QRP antennas.

WWW.KM5KG.COM

HAM TRAVELERS Discount travel, tours, cruises, more. **www.GreatExpectationTravel.com**

PROMOTIONAL VIDEO: 15-minute DVD describes amateur radio's fun and public service. Details: <www.neoham.org>.

WANTED: OLD QSL CARD COLLECTIONS. Collector seeks US & DX cards. W2VRK, 9 Laird Terrace, Somerset, NJ 08873; e-mail: <tpllrs@comcast.net>.

TELEGRAPH KEY INFORMATION AND HISTORY MUSEUM: <http://w1tp.com>

HAM RADIO GIFTS: <www.mainestore.com>

FT243 AND HC6U CRYSTALS: www.af4k.com

ROTATING GUYED TOWERS AND ORBITAL RING ROTORS: Rotating bases, Rotating guy rings, Orbital ring rotors. For 45G, 55G, or Custom. Learn more and request free PDF catalog at www.SuperBertha.com or call 814-881-9258.

VAIL, COLORADO mountaintop 40-mile views, 4000-square-foot home. Upscale construction and finishes. Secluded woods but 10 minutes to town. Includes $75K ham station and other items. Front cover *CQ* magazine 2004. One of the best ham locations in country. Selling for health reasons. Just dropped price $300K well below appraisal and construction cost for quick sale. $895K. www.w0tm.com, phone 913-441-6593.

FREE 2-meter Repeater Frequencies for Travelers by Western Trucker: **USREPEATERS.ORG**

CHECK SPOTS; log contacts; manage QSLs, LoTW with DXtreme Station Log: <http://www.dxtreme.com/>.

DX BOOKS: "Up Two – Adventures of a DXpeditioner," "Contesting in Africa," Micro-DXpeditioning Uncovered," "DX Delights – Tales of Travels with my Radio." All informative and fun! Signed by the author, **Roger Western, G3SXW.** Details: <g3sxw@btinternet.com>, $20 each including postage. PayPal or cash to G3SXW.

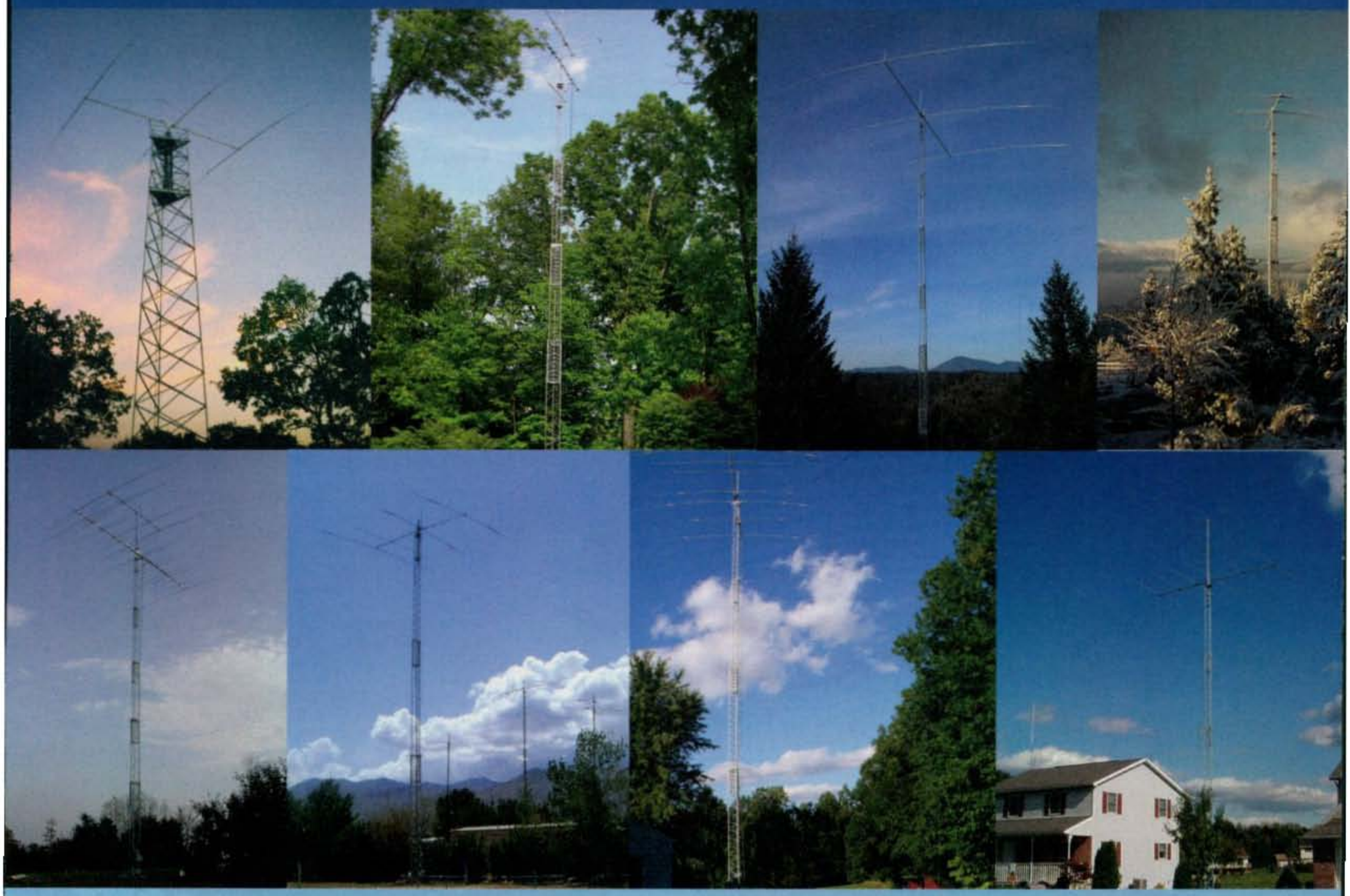
advertiser's index

including website addresses

LDG Electronics, Inc.	58,59	www.ldgelectronics.com
LTA Projects	57	www.ltaprojects.com
LNR Precision, Inc.	73	www.lnrprecision.com
M² Antenna Systems, Inc.	77	www.m2inc.com
MFJ Enterprises, Inc.	27,43	www.mfjenterprises.com
Morse Express	101	www.morseX.com
N3ZN Keys, LLC	101	www.n3znkeys.com
N6BT.com	63	www.n6bt.com
NH7QH Radio Supplies LLC	19	www.hawaiiradiosales.com
National RF, Inc.	113	www.NationalRF.com
NiCd Lady, The	85	www.nicdlady.com
ORLANDO HamCation℠ 2011	79	www.HamCation.org
Penny's Stitch n' Print	87	www.pennystitch.com
PowerPort	79	www.powerportstore.com
QCWA	54	www.qcwa.org
QSLs by W4MPY	87	www.qslman.com
R.F. Connection	113	www.therfc.com
RF Parts Company	23	www.rfparts.com
Radio Club of J.H.S. 22	91	www.wb2jkj.org
SteppIR Antennas Inc.	25	www.steppir.com
TEN-TEC, Inc.	15	www.tentec.com
Ten-Ten International Net, Inc.	57	www.ten-ten.org
XTAL SET SOCIETY	113	www.midnightscience.com
Timewave Technology, Inc.	37	www.timewave.com
TOKYO HY-POWER LABS, INC.–USA	Cov III	www.tokyohypower.com
U.S. Tower Corporation	116	www.USTower.com
Universal Radio, Inc.	63	www.universal-radio.com
Vibroplex	79	www.vibroplex.com
W2IHY Technologies	45	www.w2ihy.com
W4RT Electronics	29	www.w4rt.com
W5YI Group	21	www.w5yi.org
West Mountain Radio	73	www.westmountainradio.com
Yaesu	6,7,Cov IV	www.vxstdusa.com
Yuma Hamfest	46	www.yumahamfest.org

Visit our website for direct links to our advertisers!
Let CQ help you get the most for your advertising dollar.
Contact Chip Margelli, K7JA
405-ADS-CQCQ (405-237-2727)
e-mail:ads@cq-amateur-radio.com
Please direct editorial and subscription questions to (516) 681-2922

Experts in building today's high performance tower systems



US TOWER CORPORATION

US Tower systems provide a strong base to broaden your broadcast; whether you're tight on space, or have room to grow.

1099 W. Ropes Ave. ▪ Woodlake, CA 93286 ▪ (559) 564-6000 ▪ WWW.USTOWER.COM

TOKYO HY-POWER

It only weighs 21lbs...

so don't leave for an expedition without the HL-550FX.

HL-550FX

Solid-state
HF/50MHz 550W Linear Power Amplifier
Auto Select AC Line Compatible World-wide

TOKYO HY-POWER

Visit Our NEW Website:
www.tokyohypower.com

TOKYO HY-POWER LABS., INC. – USA
6046 FM2920 Rd. Suite 133
Spring, Texas 77379-2542
USA Factory Support Tel: 713-818-4544
USA Factory Email: thpsupport@airmail.net
TOKYO HY-POWER LABS., INC. – JAPAN
1-1 Hatanaka 3chome,
Niiza Saitama 352-0012
Phone: +81 (48) 481-1211
FAX: +81 (48) 479-6949
e-mail: info@thp.co.jp

– Available Exclusively from –

HAM RADIO OUTLET
WORLDWIDE DISTRIBUTION

www.hamradio.com

Western US/Canada	**Southeast**	**Northeast**
1-800-854-6046	**1-800-444-7927**	**1-800-644-4476**
Moutain/Central	**Mid-Atlantic**	**New England/Eastern Canada**
1-800-444-9476	**1-800-444-4799**	**1-800-444-0047**

The radio YAESU ...

The Dawn of a New Era
Dynamic Range 112 dB/IP3 +40 dBm

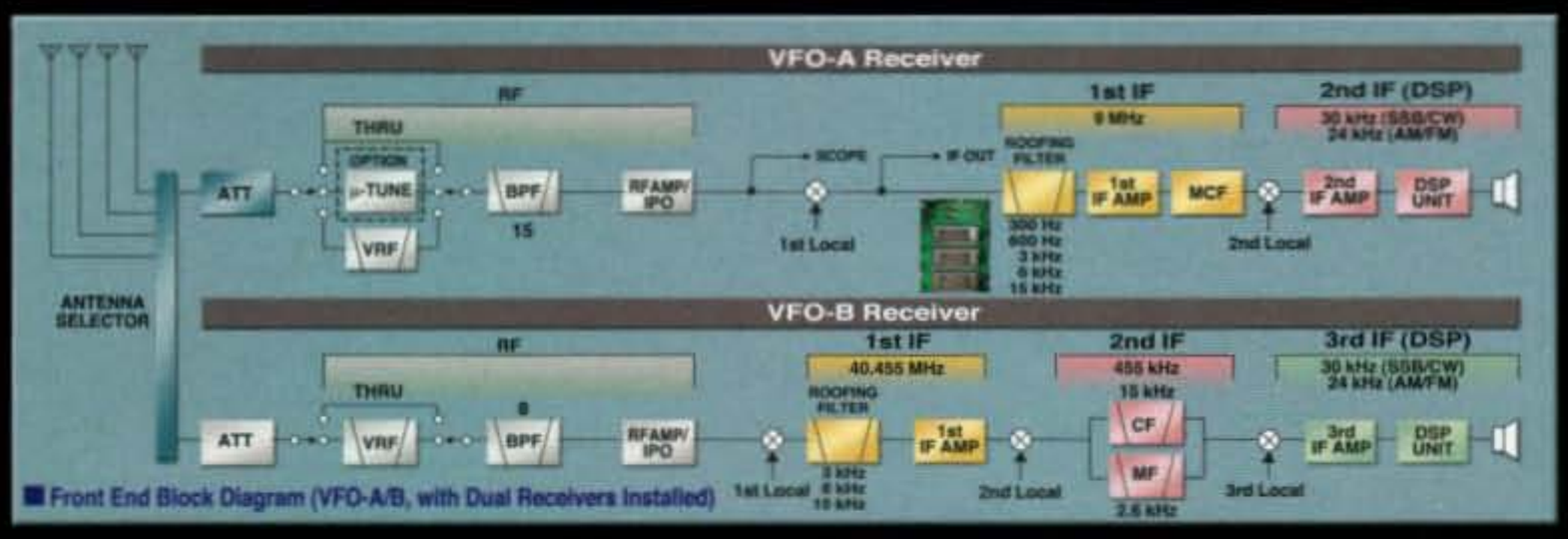
The New Premium HF/50 MHz Transceiver
FT DX 5000 Series

Two Totally Independent Receivers - The VFO-A/Main Receiver utilizes Super Sharp Roofing filters to give you the highest performance and best flexibility

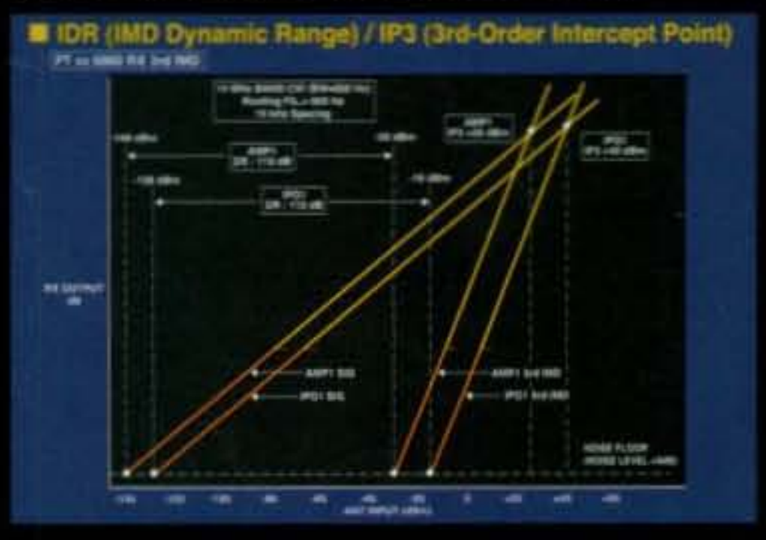
The tight shape factor 6 pole crystal filters and D Quad Double Balanced Mixer design afford incredible improvement in 3rd – Order dynamic range and IP3 performance

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

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



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



HF/50 MHz 200 W Transceiver NEW
FT DX 5000MP

Station Monitor SM-5000 included
± 0.05ppm OCXO included
300 Hz Roofing Filter included

HF/50 MHz 200 W Transceiver NEW
FT DX 5000D

Station Monitor SM-5000 included
± 0.5ppm TCXO included
300 Hz Roofing Filter optional

HF/50 MHz 200 W Transceiver NEW
FT DX 5000

Station Monitor SM-5000 optional
± 0.5ppm TCXO included
300 Hz Roofing Filter optional

For the latest Yaesu news, visit us on the Internet:
http://www.yaesu.com

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

YAESU
Choice of the World's top DX'ers℠

Vertex Standard US Headquarters
10900 Walker Street Cypress, CA 90630 (714) 827-7600