Dayton Preview Issue!

Amateur Radio

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

COMMUNICATIONS & TECHNOLOGY

MAY 2012

CQ

NOW in Digital and Print Editions!

- Results: 2011 CQ WW RTTY DX Contest, p. 13
- 2011 CQ WW Foxhunting Weekend, p. 30
- Extraordinary Cycle 19, p. 22
- Hamming on the High Seas, p. 26

$5.99US/CAN

05

0 74851 08223 2

Join Us at Dayton–5/18-20

CQ WPX CW Contest–5/26-27

On the Cover: Jeff Lynch, WA1VQY, of Tiverton, Rhode Island. Details on page 70.


KENWOOD
KENWOOD'S NEW HF
TRANSCEIVER AT
DAYTON 2012
KENWOOD
Dates: May 18th - 20th, 2012 Venue: Hara Arena (Dayton, Ohio)
www.kenwoodusa.com
ADS#11912

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.

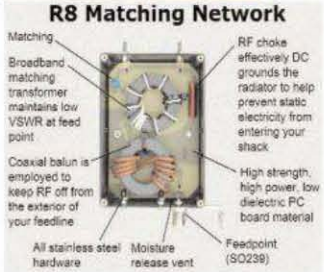
Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

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.

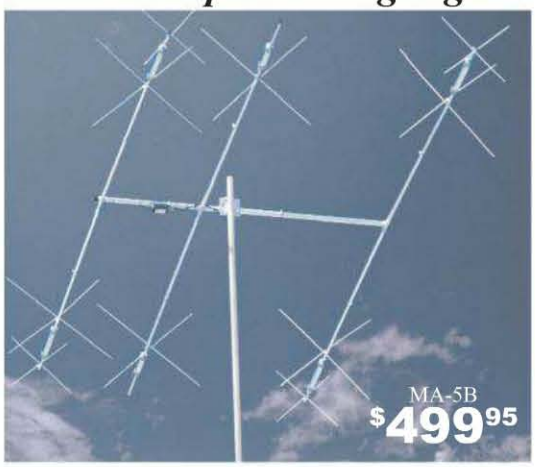
R8 Matching Network



R8's Rugged Design

MA-5B *5-Band* Beam

Small Footprint -- Big Signal



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

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

Cushcraft 10, 15 & 20 Meter Tribander Beams

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

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

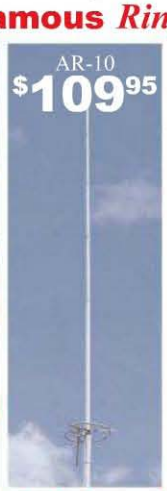
The 3-element A3S/A3WS and 4-element A4S are world-famous for powerhouse gain and super performance. **A-3WS, $499.95,** 12/17 M. **30/40 Meter** *add-on kits* available.

Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios

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

Cushcraft Famous *Ringo* Compact FM Verticals



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

***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

Dayton 2012 Award Winners Announced

The Dayton Amateur Radio Association has named S. Suri, VU2MY, as the 2012 winner of the Dayton Hamvention ® Radio Amateur of the Year award. Suri, of Hyderabad, India, is the founder, chairman and chief executive officer of India's National Institute of Amateur Radio and has been responsible for amateur radio's role in responding to many natural disasters, most notably the 2004 tsunami that struck countries around the Indian Ocean. Suri is only the second non-US amateur to receive this honor from the association. The first was DXer and DXpeditioner Martti Laine, OH2BH, in 2000.

This year's Technical Achievement award goes to the ARRL's Joel Hallas, W1ZR, of Westport, Connecticut. Hallas is a prolific author best known for his "The Doctor is In" column in *QST*.

Dayton's 2012 Special Achievement award goes to Steven Betza, WZ2V, of Endicott, New York. He was recognized for his efforts to promote electronics engineering programs in college and high school, most notably his "Blue Horizon" project which set the world record for the highest amateur balloon flight and resulted in the licensing of 38 new hams.

Finally, this year's club award goes to Germany's national amateur radio association, the Deutscher Amateur Radio Club (DARC). All of the awards will be presented at the Dayton Hamvention® later this month.

ARRL Restructures DXCC Fees

The ARRL has announced a new fee structure for its popular DX Century Club (DXCC) program. It establishes a single fee per application, although those will vary depending on whether they are submitted on paper, online or via Logbook of the World (LoTW). Some fees are now higher, others lower. The new fee structure took effect on April 2. A full explanation is available online at <http://bit.ly/ysrIFb>; a PDF file containing a chart with all the different fees is at <http:bit.ly/GB5lat>.

ARRL Publishes Guidelines for New 60-Meter Privileges

New FCC rules granting amateurs additional mode and power privileges on the 5-MHz band, along with one frequency swap, took effect on March 5. The new rules are complicated, though, and the ARRL has published a guide to keeping legal on the band. A summary of the guidelines appears in a sidebar to this month's "Washington Readout" column (see page 46 of this issue). ARRL members may also find a detailed explanation in the April issue of *QST*.

Brazil Bans Hams from PYØS

The St. Peter and St. Paul archipelago in the mid-Atlantic Ocean is now off-limits to amateur radio DXpeditions. The islands currently sit at #16 on *The DX Magazine*'s "Most Wanted" list. According to a report on Southgate Amateur Radio News, the government of Brazil, which owns the islands, issued the new restrictions in an announcement on the website of the country's Secretariat of the Interministerial Commission for Sea Resources (SERCIM). At press time, Brazil's national amateur radio association, as well as several Brazilian DX groups, were working with federal lawmakers to try to overturn the ruling.

"Man on a Mission" Movie to be on DVD

Richard Garriott, W5KWQ, has produced a documentary titled "Man on a Mission" which follows his quest to follow his father, Owen Garriott, W5LFL, into space and become the first second-generation American in space. The elder Garriott was the first radio amateur to operate from space, back in 1983. According to *Newsline*, the documentary is already available via video-on-demand, and a DVD version is expected to be released this month. More information is available on the First Run Features website at <http://bit.ly/wIa0oi>.

"Ice Goat 1" on APRS

A buoy designed to monitor and report weather in the Arctic seas was deployed in March by students from the U.S. Naval Academy and is beaconing its location via APRS, the Automatic Packet Reporting System. According to the AMSAT News Service, the buoy was dubbed "Ice Goat 1" and was transported to an area of Arctic ice off the coast of Point Barrow, Alaska, that was expected to melt in the spring. The scientific data will be transmitted back to the Naval Academy on an Iridium satellite link, but it will be transmitting position information via APRS on 145.825 MHz with hopes that its signals will be relayed to the worldwide APRS network by the digipeater aboard the International Space Station.

New "Topic Channels" on IRLP

IRLP, the Internet Radio Linking Project, has added a new dimension to the links it offers. In addition to linking individual repeaters around the world and providing "reflectors" that can bring together multiple repeaters, *Newsline* reports that IRLP has now added "topic channels." These are special-interest reflectors, each devoted to a different topic, from DXing to sports, food and politics. For details, see <http://www.irlptopics.net/>.

Six Meters Comes to Senegal

Hams in Senegal will soon have access to the six-meter band, just in time for the transatlantic DX that is often found on the band during solar cycle peaks. According to *Newsline*, the 50–51 MHz allocation will become effective when new international regulations approved at WRC-12 earlier this year become official, probably around the beginning of 2013. Meanwhile, though, Southgate Amateur Radio News reports that authorities in Sengal have given approval for members of the Saly Amateur Radio Club in Mbour to operate their club station on six with the special callsign 6V7SIX. Club members will be monitoring the intercontinental calling frequency of 5.110 MHz as well as the French calling frequency at 50.210 MHz. As of now, 6V7SIX is the *only* Senegalese station authorized to operate on six meters.

Success for Cubesat's Science Mission

Controllers of RAX-2, the Radio Auroral Exoplorer 2 cubesat, report that the satellite's science mission has been a success, with the help of the amateur radio community. According to Southgate Amateur Radio News, the mission is to study the formation of a plasma anomaly that is known to cause scintillation of radio signals in UHF and higher frequency bands. Matt Bennett, KF6RTB, reported on March 9 that after three years in orbit, the satellite had finally detected the long-sought anomaly, using its space-based receiver to monitor signals from a high-powered radar transmitter in Alaska. More information is available at <http://rax.engin.umich.edu>.

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.

NOW SUPPORTS NEW 60m BAND!

FLEX-1500

- 86db Dynamic Range Receiver
- 48 KHz Receive Bandwidth
- Transverter Interface
- 5 Watts PEP Output
- Only 1.2 Pounds

FLEX-3000

- >93db Dynamic Range Receiver
- 96 KHz Receive Bandwidth
- Built in Auto Tuner
- 100 Watts Output

FLEX-5000

- 99db Dynamic Range Receiver
- 192 KHz Receive Bandwidth
- Optional VHF/UHF Module
- Optional 2nd Receiver
- Optional Auto Tuner
- 100 Watts Output

REVOLUTIONARY

FlexRadio Systems' exclusive Tracking Notch Filter dramatically redefines the way amatuer radio operators are thinking about and actually removing noise sources.

FlexRadio Systems®
Software Defined Radios

VISIT US TO FIND INNOVATIVE SOLUTIONS TO YOUR AMATUER RADIO NEEDS

Address: 4616 W. Howard Lane, Ste. 1-150, Austin, TX 78728
Office: 1-512-535-4713 / Fax: 1-512-233-5143
sales@flexradio.com
www.flexradio.com

CQ contents

MAY 2012

p. 60

p. 13

features

Vol. 68 No. 5

13 **RESULTS OF THE 2011 CQ WW RTTY DX CONTEST**
By Ed Muns, WØYK

Plaque Winners and Sponsors 14
Top Scores 15
Band-By-Band Breakdown 18
Top Scores in Very Active Zones 18
Club Scores 19
Scores.....106

22 **THE EXTRAORDINARY SOLAR CYCLE 19:** Fond memories of one who lived it back in the late 1950s and early 1960s
By Edmun B. Richmond, W4YO

26 **HAMMING ON THE HIGH SEAS:** Practical guidelines for operating maritime mobile on cruise ships *By Robert Hayos, K6CUK*

30 **RESULTS OF THE 2011 CQ WW FOXHUNTING WEEKEND**
By Joe Moell, KØOV

38 **MATH'S NOTES:** A wideband field strength meter
By Irwin Math, WA2NDM

52 **LEARNING CURVE:** Working "the birds" *By Rich Arland, K7SZ*

60 **HAM NOTEBOOK:** The wonderful world of surplus
By Wayne Yoshida, KH6WZ

65 **ANTENNAS:** Making a quarter-wave antenna really work
By Kent Britain, WA5VJB

68 **MOBILING:** New rigs and antennas, plus tips for on the road operating
By Jeff Reinhardt, AA6JR

72 **KIT-BUILDING:** "The annual pilgrimage" . . . Dayton Hamvention® 2012
By Joe Eisenberg, KØNEB

p. 30

p. 96

departments

44 **WASHINGTON READOUT:** New worldwide 600-meter ham band awarded at WRC-12 *By Frederick O. Maia, W5YI*

48 **PUBLIC SERVICE:** Indiana ham puts his radio, and life, on the line when tornado strikes *By Richard Fisher, KI6SN*

77 **WHAT'S NEW:** Catching up for Dayton *By John Wood, WV5J*

81 **AWARDS:** USA-CA and LoTW, plus awards from the URC in France
By Ted Melinosky, K1BV

84 **VHF PLUS:** "Rampart" and a new cubesat *By Joe Lynch, N6CL*

88 **DX:** March huge solar flare, plus DX around the world
By Carl Smith, N4AA

96 **CONTESTING:** The YL advantage—perception or reality?
By George Tranos, N2GA

101 **PROPAGATION:** Propagation reliability *By Tomas Hood, NW7US*

2 **HAM RADIO NEWS**

8 **ZERO BIAS**

10 **ANNOUNCEMENTS**

114 **HAM SHOP**

AMERITRON mobile *no tune* Solid State Amp

500 Watts, Instant bandswitching, no tuning, no warm-up, SWR protected, 1.5-22 MHz . . . NEW! ARI-500 Amplifier Radio Interface reads transceiver band data -- automatically bandswitches ALS-500M amp . . . NEW! ALS-500RC Remote Head gives total remote control!

ALS-500M
$849
Suggested Retail

comes on as needed. Excellent harmonic suppression, push-pull output, DC current meter. 13.8 VDC/80 Amps. 3½x9x15 inches. 7 lbs.

Choose ARI-500 for fully *automatic bandswitching* or ALS-500RC for *manual* remote control.

Just turn on and operate -- no warm-up, no tuning, instant bandswitching. Compact.

Ameritron's ALS-500M solid state *mobile* amp gives you 500 Watts PEP SSB or 400 Watts CW output! Covers 1.5-22 MHz, (10/12 Meters with MOD-10M, $29.95 kit, requires FCC license).

Virtually indestructible! *Load Fault Protection* eliminates amplifier damage due to operator error, antenna hitting tree branches, 18-wheeler passing by. *Thermal Overload Protection* disables/bypasses amp if temperature is excessively high. Auto resets.

Typically 60-70 watts in gives full output. ON/OFF switch bypasses amplifier for "barefoot" operation. Extremely quiet fan

***New* ARI-500, $119.95**, *Amplifier Radio Interface* reads band data from your transceiver so you can *automatically bandswitch* your ALS-500M amplifier. *See right inset.*

***New* ALS-500RC, $49.95**, *Remote Head* lets you mount ALS-500M amplifier *anywhere* and gives you full *manual remote control*. Select desired band, turn On/Off and monitor current draw on its DC Current Meter. Power, transmit and overload LEDs. RJ-45 cables plug into Amplifier/ Remote Head. Works with serial numbers above 13049 (below 13049 requires the ARF-500K, *see below*).

ALS-500M, $849, 500 Watt mobile amp.

ALS-500MR, $879, ALS-500M mobile amp ***plus*** ALS-500RC *Remote Head.*

ARF-500K, $179.95, Remote kit for older ALS- 500M mobile amps with serial # below 13049. Includes filter/relay board for ALS-500M, AL-500RC Remote Head, cables, hardware, instructions.

ARF-500K2, $289.95. Includes ARF-500K Remote kit for older ALS-500Ms ***plus*** ARI-500 *Amplifier Radio Interface* below.

Let your rig *auto bandswitch* your ALS-500M Amplifier

ARI-500
$119.95
Ship Code A

The Ameritron ARI-500 *Amplifier Radio Interface* reads band data from your Icom, Yaesu, Kenwood or Alinco transceiver so they can remotely and automatically bandswitch your ALS-500M amp. Lets you mount your ALS-500M out-of-the-way in your trunk. Works with serial numbers above 13049 (below 13049 requires the ARF-500K, *see above*). You can add the ALS-500RC for manual bandswitching and data monitoring, etc, *see left description.*

Programmable Screwdriver Antenna Controller

10 Memories . . . Super Accurate . . . AutoPark™ . . . StallProtector™ . . . Super bright LEDs

Tuning your mobile screwdriver antenna couldn't be easier or more reliable!

The SDC-102 lets you save *10* of your favorite screwdriver antenna positions in memory -- that's more than enough for all HF bands. Then, with a push of a button, you can quickly return to any saved position.

Up/Down buttons let you manually move the antenna to any desired position. A 4-digit turns counter gives you precise antenna position -- you can see its *super bright LEDs* even in direct sunlight!

Returning to a position from memory is extremely accurate for three reasons . . .

A. The antenna always moves to its desired position from the bottom, insuring that the motor is always loaded the same.

B. Ameritron's exclusive *AutoPark*™ feature automatically bottoms your antenna for parking in your garage and *resets and calibrates* your counter each time to eliminate antenna slippage and turns count errors.

SDC-102
$129.95
Suggested Retail

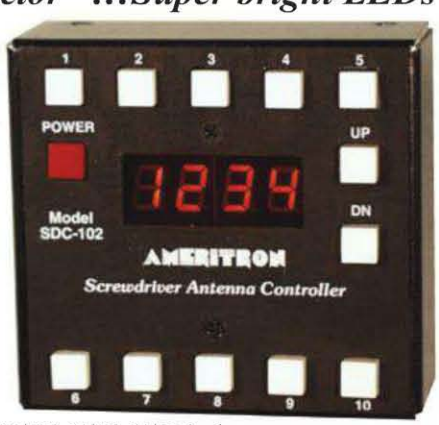
C. The momentum of the moving antenna causes it to overshoot its stop point. Ameritron's exclusive *Dead-OnSTOP*™ feature automatically reverses the motor briefly just before it stops to eliminate overshoot and come to a precise stop.

Ameritron's exclusive *StallProtector*™ feature prevents your expensive motor from burning out. Automatically detects motor stall and completely shuts off power to motor.

Monitor motor current on LEDs for signs of trouble and to determine stall current.

If you wire the motor backwards, you can reverse its direction from the SDC-102 front panel so the UP button is always up and the DOWN button is always down.

Compatible with single and dual magnetic turns sensors. Requires 12 VDC.



3½Wx3¼Hx1¼D inches.

SRS-100, $29.95. Magnetic sensor kit for High Sierra antennas to use SDC-102.

SRS-1001, $9.95. Magnetic sensor kit for Hi-Q Antennas to use SDC-102.

1.2 kW Screwdriver Antenna

SDA-100
$409
Suggested Retail

SDA-100 lets you operate 3.5 to 30 MHz continuous with six foot whip at full 1200 Watts PEP.

World's most rugged screwdriver antenna features . . . super heavy-duty commercial Pittman 12 Volt gear motor . . . stainless steel/ aircraft aluminum CNC machined components . . . 2-inch machine groove fiberglass coil form with 14-gauge wire wound at 8 turns per inch . . . built-in magnetic sensors . . . super durable Lexan cover . . .

SWP-100, $24.95. 6-ft stainless whip. **SDM-100, $99.** Stainless steel mount. ***Saves $16.85!*** **SDA-110, $509.95.** Includes SDA-100, SDC-100, SWP-100.

Flat Mobile Wattmeter

AWM-35
$159.95
Suggested Retail

Ultra-thin 1⅝ inch flat mobile SWR/ Wattmeter *flat mounts* on your dashboard wall or shelf for easy viewing. Lighted Cross-Needle meter and *active* electronics let you read *true* peak or average power in 3000/300 Watt ranges 1.8-30 MHz. "High SWR" LED. 5Wx3¼Hx1⅝D inches. *Remote sensor* with 25 feet thin, flexible cable is 3½Wx2¾Hx2¾D inches. Use 9V battery or 12 VDC.

Digital Screwdriver Controller

4-digit *super bright* LEDs let you re-tune *exactly* -- fast, no guessing. Digital count range -999 to +999. On/off/reset switch for easy calibration. 4Wx1½H x2D". Use 13.8VDC.

SDC-100B
$99.95

Call your dealer for your best price!

Free Catalog: 800-713-3550

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!

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
The radio

YAESU USA
6125 Phyllis Drive, Cypress, CA 90630 (714) 827-7600

http://www.yaesu.com

Rugged Emergency HF/VHF/UHF Portable Operations

FT-897D

100 W All Mode Transceiver
HF/50/146/440 MHz

When it's crunch time... the Ultimate Emergency Communications Radio

Rugged
Portable
Reliable
Proven
Manpack

- **SSB/CW/FM modes on all the Bands you need during an Emergency**
- **Rugged Construction...right down to the Carrying Handle**
- **DC 13.8V Mobile Operation**
- **Optional Internal Batteries for walk-around convenience when you need it**
- **AC switching power supply accessory that fits inside the radio**
- **Optional External Antenna Tuner**
- **Built-in DSP for Reliable Receiver Performance under tough conditions**

The FT-897D is a rugged, innovative, multiband, multimode portable transceiver for the amateur radio MF/HF/VHF/UHF bands.

YAESU
The radio

YAESU USA
6125 Phyllis Drive, Cypress, CA 90630 (714) 827-7600

http://www.yaesu.com

zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

May Madness

As I write this in mid-March, college basketball—along with its millions of fans—is in the midst of "March Madness," the NCAA championship tournament also referred to as "the Big Dance." Ham radio's "big dance" comes later this month in southwestern Ohio. Between the 17th and 20th of May, more than 20,000 radio amateurs from around the world will converge on the somewhat rundown (what some may call "shabby chic" … minus the "chic") Hara Arena for the 61st annual Dayton Hamvention®.

It is three days (four, if you count setup day on Thursday) of controlled chaos, with packed exhibit halls, a monster flea market, non-stop forums, nearly-all-night hospitality suites and about 40,000 very tired feet. I've been there at least 25 times and it remains at the top of my ham radio agenda each year. Even though it's virtually guaranteed that something will go wrong (last year, it took me nine hours to get there from New Jersey—by air!), something will break (hopefully, not the sewage line again), something won't be where it's supposed to be when it's supposed to be there, I still wouldn't miss it.

Somehow, every year, everything works out, it all comes together and 20+ thousand of us all have a great time mingling and shopping and swapping stories. If you've never been to Dayton, getting there at least once should be on your "bucket list" (things to do before you "kick the bucket"); if you've been there before, then you're probably trying to figure out how you can get there again … if you don't already have your reservations made.

For the uninitiated, the exhibit area consists of nearly 500 booths spread across five exhibition halls and one corridor ("Audio Alley"), to be occupied by more than 250 different vendors showcasing and/or selling the latest and greatest in just about anything remotely related to amateur radio. The huge outdoor flea market has more than 2200 booths and as of mid-March, more than 750 different vendors were signed up to wheel and deal and socialize, as long as it isn't raining or snowing or hailing … too hard. It's said that if you can't find what you're looking for in the Dayton flea market, it likely doesn't exist! Then, there are the multiple simultaneous forums, spread across all three days, featuring leaders and top experts in virtually every phase of amateur radio; dinners and special events for various sub-hobbies within amateur radio, and even whole sub-events such as Contest University and the Four Days in May QRP gathering. If it's happening in ham radio, Dayton is the place to find the people who are making it happen.

Ah yes, the people. To me, that's the best part of going to Dayton. True, there's all sorts of great gear to drool over (and hopefully take home with you), and all sorts of great activities to learn about; but at the base of it all—like everything else in ham radio—is the people.

Ham radio is often perceived and portrayed as a technical hobby. And there's no question that everything we do has some basis in technology. But the reality is that this is a *people* hobby. We develop, modify, improve and use all that technology in pursuit of one overriding goal—making contact with other people. It's what differentiates us from just about every other hobby there is. You can collect stamps by yourself. You can go sailing or hiking or biking on your own. Same with hunting or fishing. Of course, there are social aspects to these other hobbies, but they're not essential. It's very hard to *do* ham radio completely by yourself. You *need* to contact other people, even if it's just to prove that your latest engineering marvel actually works.

And our people tend to be some of the most wonderful, caring and fascinating people you could hope to have as your friends. You don't have to be a rocket scientist to be a ham, but there are plenty of rocket scientists who *are* hams. Add in the occasional Nobel Prize winner, admiral, ambassador and, well, you get the picture. But the best part is that, regardless of their status or position in "real life," when they're at some ham radio event (such as Dayton), they're just plain hams. We're all on a first-name basis, and our conversations revolve more around ham radio activities than the concerns of our professional lives.

To me, the best part of Dayton is that we get to meet and greet so many of these wonderful people, especially our fellow hams from around the world. The FCC tells us that one of the reasons ham radio exists is "to enhance international goodwill." Every day of the year, we get the opportunity to do that on the radio; at Dayton we have the chance to do it in person. Each of us gets to be a personal ambassador, not only for amateur radio, but for our nation and our culture.

On an international scale, ham radio really is a form of cultural exchange. Think of the QSL cards you have in your collection. Probably the most interesting ones tell you something about the place where the other ham lives. Same with your most interesting QSOs. And when you get to meet a ham from another country, or another culture, in person at a place like Dayton, you have an opportunity to exchange more than a signal report and a QSL card. You really have the chance to get to know the person a little better.

I was reminded of this a few days ago at a more traditional type of cultural exchange—a concert. It was called Celtic Appalachia and was actually half concert and half history lesson. It focused on the Gaelic (primarily Irish and Scottish), African and Native American roots of "all-American" bluegrass and country music. Organized by the Irish Arts Center in New York City, it featured traditional Irish (and New York Irish) musicians, a bluegrass band from Virginia, and a West African "griot" (historian and storyteller) who played guitar like no one else I've ever heard, as well as gourd-based instruments that are the precursors of the modern banjo.

It made me think of ham radio. No, I mean it. There on the stage was a group about as diverse as any I've seen anywhere … except at Dayton or on a multinational DXpedition. The bulk of the performers were Irish and Irish-American, mostly Catholics. The bluegrass band was descended from Scots-Irish Protestants who had settled in Northern Ireland, and then came to America because they couldn't get along with the Irish-Irish. Plus you had the griot from Mali, who had no cultural connection to either of the other groups … except through music. And there they all were, making beautiful music together … just as groups of hams from different cultures regularly make music together on the ham bands (that's not just an analogy; CW has a musical cadence, which is why musicians often have an easier time learning code than non-musical people).

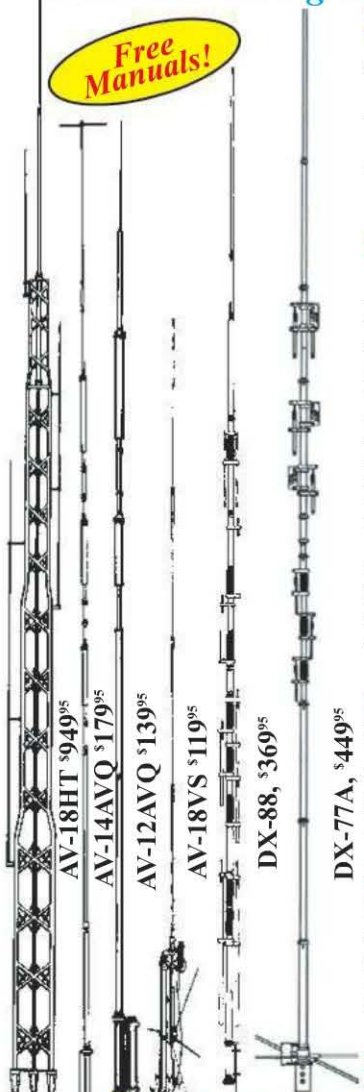
Ham radio, like music, can help build bridges between different cultures in a way that no government can. It is our special contribution to making the world a slightly better place. And there's no better place to start than in Dayton. Hope to see you at Hara for May Madness!

—73, Rich W2VU

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

hy-gain® HF VERTICALS

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



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 band-switching (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.

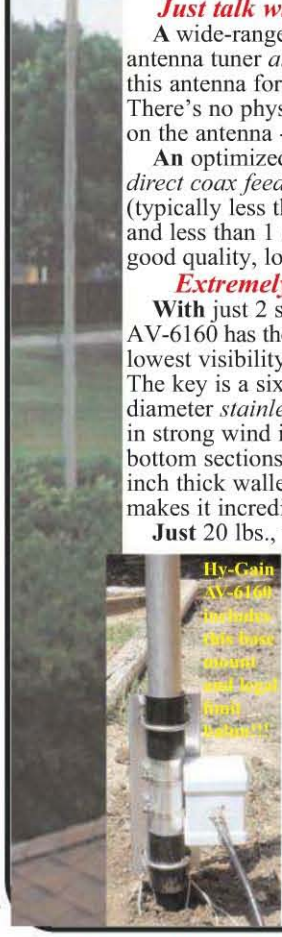
Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$179.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$139.95	10,15,20 M	1500 W PEP	13 feet	9 pounds	80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

Hy-Gain 160-6 Meters Self-Supporting Vertical

Full 1500 Watts, 43 feet, includes base mount

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

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



Exceptional Performance

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

Just talk with automatic tuner!

A wide-range automatic or manual antenna tuner *at your rig* easily matches this antenna for all bands 160-6 Meters. There's no physical tuning adjustments on the antenna -- you simply put it up!

An optimized balun design allows *direct coax feed* with negligible coax loss (typically less than 1/2 dB 60-6 Meters and less than 1 dB 160-80 Meters with good quality, low-loss coax).

Extremely low wind loading

With just 2 square feet wind load, the AV-6160 has the lowest wind-loading and lowest visibility of any vertical antenna! The key is a six foot section of tapering diameter *stainless steel* whip that flexes in strong wind instead of stressing the bottom sections. Its 2-inch O.D.and .120 inch thick walled tubing bottom section makes it incredibly strong.

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

Assembles in an hour

Ground mounting lets you hide antenna base in shrubbery. Requires ground system -- at least one radial. More extensive ground work better.

Stealth Operation

Low profile. Hide behind trees, fences, buildings, bushes. Use as flagpole. Easily telescopes down during the day.

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

CADILLAC, MICHIGAN: Wexaukee Amateur Radio Club 50th Annual Cadillac Swap on **May 5** at the Cadillac Junior High School. Contact: Alton McConnmell, (231) 867-3774, P.O. Box 163, Cadillac, MI 49601. E-mail: <nu81@yahoo.com>. (Talk in 146.98 [no PL])

CEDARBURG, WISCONSIN: The Ozaukee Radio Club Inc.34th Annual Indoor Amateur Radio, Electronics & Computer Spring Swapfest, May 5 at the Circle B Recreation Center Contact: Tom Nawrot, AA9XK, (262) 242-1029. (Talk in 146.97- [PL 127.3]).

GREENSBURG, KANSAS: Salvation Army Emergency Radio Network special event station, **KSØSA**, 1600 to 2100 UTC **May 5** to honor the fifth anniversary of the Greensburg Kansas Tornado. Frequencies 10.115, 18.135, 7.255, and 14.040. Certificate and QSL available by sending a 9- by 12-inch SASE to SATERN, KSØSA, Greensburg Special Event, c/o The Salvation Army EDS, P.O. Box 412577, Kansas City, MO 64141.

HAGERSTOWN, MARYLAND: Antietam Radio Association The Great Hagerstown Hamfest, May 5 at the Washington County Agricultural Center. Contact: Antietam Radio Association, PO Box 52, Hagerstown, MD 21741. Website: <http://www.w3cwc.org/HamFests.html>. (Talk in 147.090; exams 12:30 PM).

PITT MEADOWS, BRITISH COLUMBIA, CANADA: Maple Ridge Amateur Radio Club annual **Maple Ridge Swap Meet, May 6**, 12460 Harris Road. Contact: Nick (604) 465-9476. E-mail: <ve7te@mrarc.net>. Website: <http://www.mrarc.ca>. (Talk in 146.800 -600 [tone 156.7]).

WRIGHTSTOWN, PENNSYLVANIA: Warminster Amateur Radio Club Hamfest 2012, May 6, Middletown Grange Fair Grounds. Contact: Stew Leabman (215) 794-1360. E-mail: <hamfest12@k3dn.org>. Website: <http://www.k3dn.org/hamfest.htm>. (Talk in 147.09+ (131.8)/443.95; exams 10 AM).

BYRON, GEORGIA: Middle Georgia Radio Association, **Central Georgia Amateur Radio Club, Inc.**, and **KG4BMS, Heart of Georgia Hamfest**, **May 12** at the Byron Middle School. Contact: Dave Stewart, KN4DS, (478) 335-2852. E-mail: <kn4ds@arrl.net>. Website: <http://www.heartofgeorgiahamfest.com>. (Talk in 146.850 –600; exams 9 AM to noon)

FAIRMONT, WEST VIRGINIA: Mountaineer ARA special event station, **W8SP**, from 0000 UTC to 2400 UTC, **May 12** to commemorate the first official observance of Mother's Day at the International Mother's Day Shrine in Grafton, WV. Bottom portion of the General 80-, 40-, 20-, and 15-meter phone and CW bands, and Novice 10-meter phone sub-band. For a certificate, send QSL and 9 by 12 inch SASE to Charles T. McClain, K8UQY, RT. 4, Box 161, Grafton, WV 26354.

REIDSVILLE, NORTH CAROLINA: TRockingham County Amateur Radio Club Inc. 8th Annual Rockingham County Swapfest, May 12 at the Calvary Baptist Church. Contact RCARC Swapfest, c/o George Brewer, WN4LTY, 5190 NC Hwy 700, Eden, NC 27288. Website: <http://www.rcarc.com>. (Talk in 146.850 [PL 103.5]).

STANWOOD, WASHINGTON: The Stanwood Camano Amateur Radio Club 21st Annual Electronic Flea Market and Hamfest, May 12 at the Stanwood Middle School. Contact: Jim Ruble, KE7MHF, (360) 629-4713. E-mail: <ke7mhf@arrl.net>; <http://www.scarcwa.org>. Talk in 145.19-; exams)

TINTON FALLS, NEW JERSEY: Garden State Amateur Radio Assn Fifth Semi-Annual Hamfest, May 12 at the MOESC, 100 Tornillo Way. Contact: (732) 493-4236. E-mail: <w2kq@arrl.net>. Website: <http://www.gardenstateara.org>. (Talk in 147.045 +600 [PL 67.0] or NJ Link System; exams 10 AM)

SUMISWAL, EMMENTAL, SWITZERLAND: Mennonitischer Europaischer Regional Konferenz (Mennonite European Rigional Conference), **Special Event Station HB9MERK**. 0900 UTC **May 17** to 1900 UTC May 20 on 80, 40, 15, 10 propagation permitting. (Ops: HB9ARL, HB9ELZ, PAØHEL, plus). QSL via: PAØHEL, Almelo, Netherlands (no eQSL, only paper).

Norwich, New York: UHS Chenango Memorial Hospital 100th Anniversary Special Event Station NN2C, 1600 UTC **May 18–20**, 2200 all bands, all modes. QSL to Tony Masi, N2GVB, <amasi-jr@sthy.rr.com>.

DAYTON, OHIO: Dayton Amateur Radio Association Dayton Hamvention® May 18–20, Hara Arena. *(VISIT: <http://bit.ly/zli5Uu> to purchase tickets online).* Contact: (937) 276-6930. E-mail: <info@hamvention.org>. Website: <http://hamvention.org>. ***See us at the CQ Booth.***

DAYTON, OHIO: SouthWest Ohio DX Association 27th Annual DX Dinner® Friday, **May 18** at the Dayton Marriott, 1414 South Patterson Boulevard. The dinner will include prizes and speakers. Tickets are $42. Website: <http://www.swodxa.org>.

PINELLAS PARK, FLORIDA: Glorious Society 2012 Wormfest, May 26 at Freedom Lake Park. Website: <http://www.thewormholesociety. org>.

WASHINGTON, NEW JERSEY: Bergen Amateur Radio Association B.A.R.A. Spring Hamfest, May 26 at the Westwood Regional High School. Contact: Jim Joyce, K2ZO, (201) 664-6725. E-mail: <k2zo@arrl.net>. Website: <http://www.bara.org>. Talk in 146.19/79 (PL 141.3); exams 8 AM).

WEST FRIENDSHIP, MARYLAND: The Maryland FM Association, Inc. Memorial Weekend Hamfest, May 27 at the Howard County Fair Grounds. AContact: Maryland F.M. Association, Inc., PO Box 351, Hanover, MD 21076. E-mail: <wa3mnn@verizon.net>. Website: <http://www.marylandfm.org>. (Talk in 146.16/146.76, 223.16/224.76, 449.0/444.0 [PL 107.2]; exams 8:30 AM).

SEASIDE, OREGON: SEAPZAC NORTHWESTERN DIVISION CONVENTION, June 1–3, contact Will Sheffield, N7THL, (503) 642-7314, e-mail: <n7thl@arrl.net>; website: <www.seapac.org>. ***See us at the CQ Booth.***

ATLANTA, GEORGIA: The Atlanta Radio Club and the **Gwinnett Amateur Radio Society Atlanta Hamfest** and **ARRL Georgia Section Convention, June 2** at Jim Miller ParkContact John Talipsky, N3ACK, 385 Madison Chase Drive, Lawrenceville, GA 30045. E-mail: <n3ack@atlantaradioclub.org>. Website: <http://www.atlantahamfest.com>. (Talk in 146.820- [PL 146.2]; exams)

BALTIMORE, MARYLAND: Amateur Radio Club of the National Electronics Museum (K3NEM) special event station **W2W**, 1200 to 2200 UTC **June 2–6** to commemorate the role of electronics in World War II. Frequencies: 7.240, 14.270, 21.270. QSL to W2W – Special Event Station, Box 1693, MS 4015, Baltimore, MD 21203. Certificate available via SASE. Website: <http://ww-2.us>.

HUDSONVILLE, MICHIGAN: Independent Repeater Association, Inc. 2012 Annual Hamfest, June 2 at the Hudsonville FairgroundContact Don, (616) 532-7769 after 4 PM. E-mail: <ira-hamfest@w8ira.org>. (Talk in 147.160 (PL 94.8); exams 9– 10:30 AM).

MISSISSAUGA, ONTARIO, CANADA: Mississauga Amateur Radio Club a special event station from 1400 to 2000 UTC, Saturday, **June 2** and Sunday, **June 3** at the Annual Bread and Honey Festival. Frequencies: 14.240 and 7.230. For a certificate, contact MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Cres., Mississauga, ON, Canada L5L 1M6. Include $2 U.S. for postage. Website: <http://www.marc.on.ca>.

SHOW LOW, ARIZONA: Kachina Amateur Radio Club White Mountain Hamfest, **June 2** at the Show Low City HallContact Jim Mortensen, <w7azy@arrl.net>. Website: <http://www.kachina-arc.org>. (Talk in 145.310 [PL 110.9]; exams)

ST. PAUL, MINNESOTA: South East Metro Amateur Radio Club special event station **WØM** to commemorate the Battle of Midway from 1300 to 0000 UTC **June 2** at Fleming Field Airport. Frequencies: 7.260, 14.260, 21.360, and 28.460. QSL with an 8.5- by 11-inch SASE to WØCGM Special Event, 1655 – 68th Street West, Inver Grove Heights, MN 55077. Contact Skip Jackson, KSØJ, (651) 260-4330. Email: <ks0j@arrl.org>. Website: <http://www.semarc.org>.

TEDROE, OHIO: Fulton County Amateur Radio Club Outdoor Flea Market and Hamfest, **June 2** at the Roth Family Woodlot, 105 Hill Avenue. Website: <http://www.k8bxq.org>. (Talk in 147.195+)

TOPEKA, KANSAS: Special event station **WØVFW** 1500 to 2350 UTC **June 2** to honor the 92nd Annual State Convention of the VFW Department of Kansas. Frequencies include 21.240, 18.140, and 14.240 SSB. QSL rto: Dwight Holtzen, 795 N. McComas Street, Wichita, KS 67203.

CAMBRIDGE, ONTARIO, CANADA: Guelph and the Kitchener-Waterloo Amateur Radio Clubs 38th Annual Central Ontario Amateur Radio Fleamarket and Hamfest, June 3 at the Waterloo Regional Police Association Recreation Centre. Contact: Nick, VA3NNW, weekends and nights only (519) 884-3760. E-mail: <info@hamfest.on.ca>. Website: <http://www.hamfest.on.ca>. (Talk in 146.970- [tone 131.8] or 146.529 simplex)

PRINCETON, ILLINOIS: The Starved Rock Radio Club Amateur Radio Hobbyist and Collectors Show, June 3 at the Bureau County Fairgrounds. Contact with a SASE: Matthew Weaver, KB9VZH, 319 Desoto Street, Ottawa, IL 61350. Phone: (815) 313-5924. E-mail: <starvedrockhamfest@hotmail.com>. Website: <http://www.qsl.net/w9mks/hamfest.htm>. (Talk in 146.955 -103.5; exams)

*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.*

A publication of

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

CQ Amateur Radio (ISSN 0007-893X) Volume 68, No. 5. Published monthly by CQ Communications, Inc., 25 Newbridge Road., Hicksville, NY 11801, Telephone 516-681-2922. E-mail: cq@cq-amateur-radio.com. Fax 516-681-2926. Web site: www.cq-amateur-radio.com. Periodicals Postage Paid at Hicksville, NY 11801 and at additional mailing offices. Subscription prices (all in U.S. dollars): Domestic-one year $38.95, two years $70.95, three years $102.95; Canada/Mexico-one year $51.95, two years $96.95, three years $138.95: Foreign Air Post-one year $63.95, two years $120.95, three years $177.95. U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government including military services, only on a cash with order basis. Requests for quotations, bids, contracts., etc. will be refused and will not be returned or processed. Entire contents copyrighted 2012 by CQ Communications, Inc. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address.

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

DX ENGINEERING

ICOM · Cushcraft · hy-gain · HUSTLER · MFJ · AMERITRON · BELDEN · Tigertronics · COMTEK · VIBROPLEX · PLASTI DIP · The BetterRF Company · VECTRONICS · PolyPhaser · ROHN · JSC WIRE & CABLE · LOCTITE · butternut · MIRAGE · LDG ELECTRONICS · CQ · HEIL SOUND · DIAMOND ANTENNA · BENCHER, INC. · STI · RADIO

We Will Beat Any Competitor's Price!

DX Engineering Full Size 75/80 Meter Quarter-Wave Vertical Antennas

The 68 foot tall, high performance, full size antennas have rugged base sections (2, 3 or 4 inch diameter) made from aircraft-grade aluminum tubing. The VA-1 requires simple guying. The VA-2 and VA-3 models are very stout and don't require guying. The VA-2 and VA-3 antennas are supplied with a Heavy Duty Plus Stainless Pivot Base and can be lowered easily with the optional, DXE-VRW one-man, manual winch.

- 2:1 bandwidth up to 500 kHz
- DX Engineering structural design + high strength tubing manufactured to rigid specifications = **Highest Wind Ratings**
- High strength, UV-protected Extren® insulator = **High Power Handling Capacity**
- Specially manufactured stainless steel and aluminum saddle clamps, stainless steel bolts, and precision machining = **Reliability Second to None**
- Specially manufactured Pivot Base supplied with VA-2 and VA-3 antennas = **Easy Tilt Up and Down**

DXE-7580FS-VA-1	Vertical Antenna, standard HD, 2 inch OD base section	**$379.50**
DXE-7580FS-VA-2	Vertical Antenna, Heavy Duty, 3 inch OD base section	**$675.50**
DXE-7580FS-VA-3	Vertical Antenna, Super Duty, 4 inch OD base section	**$1,675.50**

DXE-VRW-1 Manual Winch

A great option, this winch allows one person to easily raise or lower a VA-2 or VA-3 vertical antenna.

DXE-VRW-1 Manual Winch..... **$169.99**

65 Ft. Telescoping Antenna Kit

- Eleven telescoping sections from 2" to 7/8" O.D.
- Stainless steel element clamps

DXE-ATK65	Telescoping Antenna Kit	**$194.50**
DXE-VE-BASE	Fixed Vertical Insulated Base Kit	**$99.50**
DXE-VA-BASE	HD Vertical Insulated Tilt Base Kit	**$159.50**

6063-T832 Aluminum Tubing

- Smoothly telescoping sections
- Drawn, not extruded, tubing
- Best quality at the lowest price, guaranteed
- Custom made to DX Engineering's rigid specifications
- For best results, use DXE Stainless Steel Element Clamps to assemble slit lengths

DX Engineering Has Stainless Steel Element Clamps that Fit Exact Tubing Sizes! See DXEngineering.com for details.

Telescoping, High Strength, FiberGlass Tubing

Great for wire antenna spreaders or insulated stacking frames.

- Tubing custom made to DX Engineering's rigid specifications in smoothly telescoping sections
- Neutral, light gray color
- 1/8" nominal wall x 8 feet long
- Available in unslit tubing or one end slit tubing

Unslit End, Telescoping Fiberglass Tubing
available in sizes from 0.500" O.D. to 2.000" O.D. (in .25" increments) ..... **$6.45 to $25.95**

Slit One End, Telescoping Fiberglass Tubing
available in sizes from 0.750" O.D. to 2.000" O.D. (in .25" increments) ..... **$18.95 to $30.95**

50 Ft. Telescoping Fiberglass Tubing Mast Kit

- Includes DX Engineering Stainless Steel Element Clamps
- Tapers from 2.00" to .50" O.D. in seven 8 ft. sections

DXE-FTK50 50 ft. Telescoping Tubing Kit..... **$138.00**

Rohn Commercial Towers

Rohn Commercial Tower products and accessories are now available at DX Engineering. We have the Rohn products – Towers, Masts, and Tower and Installation Accessories – to meet your tower structural needs.

Contact DX Engineering Customer Support for your application.

SignaLink™ USB Unit from Tigertronics

- Easiest installation and setup—for Mac or PC
- Software included on CD ROM
- Built-in low noise sound card
- USB port powered
- Works with ALL radios
- Supports all sound card digital and voice modes, including MT63, EchoLink®, PSK-31, SSTV, CW and RTTY

TIG-SL-USB **$89.95**

- **Requires a radio interface cable**

Any Radio Interface Cable (except the special Elecraft K3 cable), is only **$12.95** when purchased with a SignaLink™ unit

TOTALLY FREE SHIPPING ON COMTEK BALUNS*

COMTEK W2FMI Series Baluns

Better Performance, Lower Prices!

From just $49.95

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

- Featuring a DX Engineering innovation: High voltage compensating capacitors for unequalled low SWR
- Large fender washers distribute fastener loading
- Special toroid core handles high power with minimum thermal stress
- High, consistent common mode impedance across HF spectrum provides isolation where it's needed most
- 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: up to 5 kW+ intermittent depending on model, see website
- Silver-plated gasketed SO-239 connectors, stainless hardware and a 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 DX Engineering Customer Support for recommendations for your application. **Your Comtek balun order is shipped free, via UPS ground, anywhere in the contiguous 48 United States.*

World Class Products Shipped Worldwide, Every Day!

Thousands More Ham Products at

DXEngineering.com

1.800.777.0703

8:30 am to 4:30 pm ET
1230 to 2030 UTC (March-October)
1330 to 2130 UTC (November-February)

Tech/International: **330.572.3200** Country Code: **+1**
Sale Code: **1205CQ**
Prices effective through 6/15/12

Order by 4 PM ET (US) for Same-Day Shipping

We'll See You at Booths 0-7 in the Main Arena at Dayton Hamvention!

See us at Dayton Hamvention - Booths 20, 21, 22 & 23

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

Check out the latest Cool Winter Specials from YAESU
Yaesu coupons expire 6/30/12

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

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

$20. mfr coupon

FREE YSK-857

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

$20. mfr coupon

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

$50. mfr coupon

FT-7900R 2M/440 Mobile

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

FREE YSK-7800

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

Now available in Black!

$100. mfr coupon

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!

FREE YSK-8900

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!

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

$40. mfr coupon

Call Now For Low Pricing!

$30. mfr coupon

VX-8GR only

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

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!

Results of the 2011 CQ WW RTTY DX Contest

BY ED MUNS,* WØYK

The 25th annual running of the world's largest RTTY competition kicked off the CQ WW season on a memorable propagation weekend. The MUF was almost too high, with the SFI peaking at 169, enabling 10 and 15 meters to reach virtually anywhere worldwide with modest power and antennas. During the day, 20 meters was effectively blacked out with the solar flux so high. At mid-day, there were hardly any signals visible on the 20 meter bandscope. Accordingly, 80 and 40 meters were much more challenging this time than they have been in the recent years of the solar minimum.

Participation in RTTY contests continues its ascent, and all-time highs were set in this event. 14,403 callsigns were present—an 18% increase over the prior year. Submitted logs rose 25% from the previous high of 2681 in 2010 to 3373 in 2011. A portion of this increase was due to a more aggressive pursuit of log submissions from casual participants who operate for reasons other than score. There were QSOs with 214 countries and all 40 zones.

UZ2M captured the most accumulated zones at 145, with ES9C and EF8M tied at 143, and RL3A in fourth with 141. Country accumulation was led by ES9C with 453, followed by EF8M with 447, UZ2M with 419, and CN3A with 419. The top NA country totals came from the east coast, where KI1G had 403 and K1SFA had 400. Further down the country standings was P49X in 14th place with 382.

VE/US multipliers were readily available on all bands, with P49X logging 264. W6YX and EF8M tied for second with 260. K1SFA was third with 252. As intended by the founders of this contest, this third multiplier that subdivides North America better levels the playing field with Europe's access to many more countries on the low bands.

Twelve new world records were established, while 62 new continental records were set, 44% of the total world and continental records possible! From the following table, it is clear how the MUF affected propagation with the records heavily weighted on 10 and 15 meters:

	World		Continent	
	New	Avail.	New	Avail.
SO10	4	4	17	20
SO15	3	4	13	20
SO20	1	4	3	20
SO40	1	4	2	20
SO80	1	4	5	20
SOAB	1	4	14	20
MS	1	2	3	10
M2		1	3	5
MM		1	2	5
Total	12	28	62	140

(Assisted and unassisted categories combined)

This is the result of optimal 10–15 meter propagation coinciding with record participation.

Single-Op High Power (725 logs)

Single-Op All Band High Power (550). Top honors go to Arunas, LY5E (LY2U), who set a new European record with 6.3M points. Dennis, 6Y6U (W1UE) took second place, while establishing the new North America record with 6.0M. Filipe, CR6K (CT1ILT), was close in third place with 5.8M. John, K1FWE, grabbed the new USA record with 5.0M. In all, 36 of the top 50 all-time slots in this category are now occupied by participants in the 2011 contest!

Single-Op 80 Meters High Power (12). Daniel, VE2SB, won with 92K and set the new NA record. Mauro, IN3QBR, was second and led Europe with 82K. Waldir, PY2WC, set the SA record with just 77 points, so there are still lots of record opportunities available!

Single-Op 40 Meters High Power (21). Paolo, YW4D (YV1DIG), won this category with 471K. The next four places were in Europe (YT8A, 9A3AAX, S36W, and S51CK), followed by three USA stations (WØGJ, K7WP, and W1TY/2).

Single-Op 20 Meters High Power (33). Gennadiy, UN1L, made 667K from Asia to win, while SO4M took second place with 642K and John, KK9A/4, took third with 614K, short of his NA record set in 2010. Matteo, T77NM, took fourth with 608K.

Single-Op 15 Meters High Power (44). Robert, ST2AR, blasted this world record by 31% with a score of 1.1M, and Juan, YW5T (YV5JBI), took second place with 744K. Leo, S50R, set a new European record with 695K for third place world, and Yuri, EYØA (UA4LCQ), set a new Asia record for fourth place.

Single-Op 10 Meters High Power (65). Rene, LU7HN, set the new world record with 844K and Max, KH6ZM, took second place with a new Oceania record. Third place world was Yasu, JA6WJL, with 447K and the new Asia record. Fourth place Erik, PI4DX (PD1DX), won Europe with 385K.

Nuno, CT1EEK, had "incredible fun" on a revived 10-meter band and took third place Europe in 10 Meters Low Power.

The 400-year-old (adding all their ages!) CR3L Multi-Multi team—(left to right) DJ6QT, DK4QT, DJ6XV, DM3BJ, DL6TK, and DL1YFF—narrowly surpassed the youthful K1SFA competitors for first place.

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

This fine ED1R team took third place in Multi-Two. Left to right: EC1KR, EB7ABJ, EC4DX, EC7AKV, and EA4AOC.

Single Operator Low Power (1589)
Single-Op All Band Low Power (1238). Fabi, VA2UP, was first place world with a new NA record and 4.0M, and Mohamed, 5C5W (CN8KD), was second with a new Africa record and 3.9M. Don, AA5AU, took third with 2.7M and Enrico, 6V7X (IK2FIL), took fourth with 2.5M. Ted, HI3TEJ, was fifth with 2.4M.

Single-Op 80 Meters Low Power (14). Gyorgy, HA1WD, was first with 71K. Gordon, NQ4K, set a new NA record with 9K.

Single-Op 40 Meters Low Power (39). Tomek, SP3VSE, took first place with 211K, Jan, SP6IHE, was second with 156K, and Andris, YL3CU, was third with 141K. Nori, JL3TMH, set a new Asia record with 35K.

Single-Op 20 Meters Low Power (85). Gennady, EU1DX, had the first-place finish of 351K and Melnikov, RM2M, took second with 336K. Costantino, IC8TEM, was a close third with 335K and Iacopo, IK5AWB, took fourth with 318K.

Single-Op 15 Meters Low Power (84). Ion, YO3JF, made 382K for first place and Andrei, UZ7HO, took second with 378K. Third-place Dimitry, 4Z5CP, set a new Asia record with 340K and in fifth place Bill, VY2LI, set a new NA record with 265K.

Single-Op 10 Meters Low Power (129). This category set all new world and continent records. Augusto, PY2EB, was first with 423K and Sulaiman, 7Z1SJ, was second with 395K and a new Asia record. Francisco, EA7ISH, took fourth with 325K and the new Europe record, while Nicolas, FG4NO, took sixth with 265K and the new NA record. Fifteenth-place Duarte, CT3HF, set the new Africa record with 130K.

Single-Op Assisted High Power (373)
Single-Op Assisted All Band High Power (288). Rick, KI1G, was first place world with 6.4M and the new NA record. Yuri, RG9A, was close behind with 6.2M, and third-place Boyan, LZ8E (LZ2BE), had 5.5M for a new Europe record. Bud, AA3B, took fourth with 4.9M.

Single-Op Assisted 80 meters High Power (7). The first five places came from Europe: Mario, IZØKBR, with 116K, Silvio, IZ5DIY, with 110K, Alajos, HA3LI, with 94K, Alex, UX1UX, with 75K, and Francesco, IKØXBX, with 50K. Sixth place Vit, RXØAT, set the new Asia record with 17K.

Single-Op Assisted 40 meters High Power (11). The first ten places were in Europe: Marco, I4LXV, was first with 458K, Vladan, YT1VP, was second with 410K, Vlad, UW4I, was third with 294K, Andrey, RW4PL, was fourth with 291K, and Bengt, SM6FUD, was fifth with 165K.

Single-Op Assisted 20 meters High Power (13). Nine of the first ten places were also from Europe on this band, which behaved more like a "low band" than a "high band." Fulvio, IK4MGP, was first with 857K, Jose, CT3KY, was second with 683K, Ruslan, EO3Q (UR3QCW), was third with 679K, Sekcja, SN2K (SP2DWG), was fourth with 578K, and Ryszard, SP8ONZ, was fifth with 305K.

Single-Op Assisted 15 meters High Power (22). Antonio, CT3EN, set a new world record with 985K, while second-place Stephane, TM6M, set a new Europe record with 908K. Vlad, R7LV, took third with 735K and fourth place Joel, VE6WQ, set a new NA record with 628K.

Single-Op Assisted 10 meters High Power (32). The top 12 finishers all broke the prior world record, which shows the opportunity in some of these categories. Joel, KG6DX, set a new world record from Oceania with 733K, more than doubling the score of second-place Braco, 9A7R, who set the new Europe record with 327K. Fifth place Julio, PU4LOG, set a new SA record with 267K, and sixth place Masa, JO1WKO, set a new Asia record with 263K. Eighth place Alejandro, XE1EE, broke the NA record with 253K.

2011 CQ WW RTTY CONTEST PLAQUE WINNERS AND SPONSORS

Single Operator High Power Unassisted
World: Sponsored by John Orton, W5JBO. **Winner: LY5E (op: Arunas Vaglys, LY2IJ)**
Asia: Sponsored by Alex Panoiu, YO9HP. **Winner: Masaki Okano, JH4UYB**
Canada: Sponsored by Contest Group du Quebec. **Winner: Yuri Onipko, VE3DZ**
USA: Sponsored by Charles Anderson, KK5OQ. **Winner: John Webster, K1FWE**

Single Operator Low Power Unassisted
World: Sponsored by Don Hill, AA5AU. **Winner: Fabi Bertolotto, VA2UP**
Asia: Sponsored by Jim Reisert, AD1C. **Winner: Peter Saunders, HZ1PS**
Europe: Sponsored by Tyler Stewart, K3MM. **Winner: Aleksander Wieczorek, SQ9UM**
North America: Sponsored by Joseph Young, W6RLL. **Winner: Don Hill, AA5AU**
South America: Sponsored by Trey Garlough, N5KO. **Winner: Vitor Luis Aidar Dos Santos, PY2NY**
Canada: Sponsored by Bob Loranger, VE2AXO. **Winner: Bob Loranger, VE2AXO**

Single Operator Assisted High Power
World: Sponsored by Mike Sims, K4GMH. **Winner: Rick Davenport, KI1G**
Asia: Sponsored by Lakshman "Lucky" Bijanki, VU2LBW. **Winner: Yuri Kurinyi, RG9A**
North America: Sponsored by Jamie Tolbert, Jr., WW3S and Ray Fallen, Jr., ND8L. **Winner: Bud Trench, AA3B**

Single Operator Assisted Low Power
World: Jim Barron, WB5AAA. **Winner: Fabi Bertolotto, VA2UP**
North America: George Marzloff, K4GM. **Winner: Don Hill, AA5AU**

Single Operator Single Band
World 28 MHz High Power: Sponsored by Steve Hodgson, ZC4LI. **Winner: Rene Giorda, LU7HN**
World 28 MHz Low Power: Wray Dudley, AB4SF. **Winner: Augusto Reis, PY2EB**
World 21 MHz High Power: Sponsored by Steve "Sid" Caesar, NH7C. **Winner: Robert Kasca, ST2AR**
World 14 MHz High Power: Sponsored by Kenneth Young, AB4GG. **Winner: Gennadiy Gleizer, UN1L**
Europe 14 MHz High Power: Sponsored by Bob Raymond, WA1Z. **Winner: SO4M (op: Miroslaw Razny, SP4MPG)**
North America 14 MHz High Power: Sponsored by Patrick W. Soileau, ND5C. **Winner: John Bayne, KK9A/4**
USA 14 MHz High Power: Sponsored by Jamie Punderson, W2QO. **Winner: Steve Sawyer, KTØDX**
World 7 MHz High Power: Sponsored by Abroham Neal Software by K3NC. **Winner: YW4D (op: Paolo Stradiotto, YV1DIG)**
North America 7 MHz High Power: Sponsored by Don Reed, K2OGD. **Winner: Glenn Johnson, WØGJ**
World 3.5 MHz High Power: Sponsored by Glenn Vinson, W6OTC. **Winner: Daniel Richer, VE2SB**
World 3.5 MHz High Power Assisted: Sponsored by Mario Lamanna, IZØKBR. **Winner: Mario Lamanna, IZØKBR**

Multi-Op Single Transmitter Low Power
North America: Sponsored by Dennis Conklin, AI8P. **Winner: VP9I (ND8L, WW3S)**

Multi-Op Single Transmitter High Power
World: Sponsored by Kevin Rowett, K6TD. **Winner: EF8M (ops: RD3A, UA5C, EA8CAC, EA8AH)**
Europe: Tartu Contest Team, ES5Q, **Winner: UZ2M (ops: RA4LW, RW4LE, UX3MZ, UX3MR, UR5MID, URØMC, UT3MD)**
North America: Sponsored by Steve Jarrett, K4FJ. **Winner: K4FJ (ops: K3KG, K4FJ)**

Multi-Op Two Transmitter
World: Sponsored by Ed Muns, WØYK,. **Winner: P49X (ops: WØYK, N4RR, K6AW, W6OTC)**
Europe: Sponsored by CT3 Madeira Contest Team CR3A/CQ9K. **Winner: ES9C (ops: YL2KF, YL1ZF, YL3DW, ES5RY, ES5TV, ES2DW, ES5GP, ES5NHC, ES2MA, ES2NA, ES5JR, ES5QX)**
North America: Sponsored by Steve Merchant, K6AW. Winner: **NR4M (ops: NR4M, K4EC, K7SV, N3ZV, W4MYA, KI4UDF)**
USA: Sponsored by Abroham Neal Software by K3NC. **Winner: KØIR (ops: KØIR, WAØMHJ, NØKK, NØAT, NØHJZ, WØELT)**

Multi-Op Multi-Transmitter
World: Sponsored by KA4RRU RTTY Team. **Winner: CR3L (DJ6QT, DJ6XV, DK4QT, DL1YFF, DL6TK, DM3BJ)**
Europe: DX Old Timers Club – Silvano Amenta, KB5GL/IT9SEZ Memorial. **Winner: IT9BLB (op: IK3QAR, IT9BLB, IT9MBZ, IT9MUO, IT9PAD, IT9RBW, IT9RGY, IT9VDQ, IT9ZGY, IT9ZMX)**

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

(Plaque sponsors as of publication date. Additional plaques may be sponsored.)

Single-Op Assisted Low Power (287)
This category is new, bringing RTTY in line with the other modes of CQ WW. Therefore all of this year's top scores also establish the category record.

Single-Op Assisted All Band Low Power (222). Robert, S57AW, set the new world and Europe records with 3.5M. Mark, N2QT, took second with 2.6M for the new NA record. John, GW4SKA, took third and Alex, PY2SEX, took fourth with 2.0M establishing the SA record. Eighth place Romeo, RW9C, set the new Asia record with 1.4M.

Single-Op Assisted 80 meters Low Power (4). The four entries were all from Europe. Fucelli, IKØXBX, set the new world record of 50K.

Single-Op Assisted 40 meters Low Power (6). The six entries here were also from Europe. Robby, DM6DX, set the new world record, 87K.

Single-Op Assisted 20 meters Low Power (12). Out of the five Europeans in the top slots Krstov, Z35X, won this category with a new world record of 274K. Sixth place Dan, KF6A, set the NA record with 22K and eighth place Batbayar, JT1BE, set the Asia record with 11K.

Single-Op Assisted 15 meters Low Power (12). Ludek, OK3C, won with the world record score of 300K and Yuri, UA9AFS, set the Asia record for second place with 186K. Ninth place

TOP SCORES

WORLD
SINGLE OPERATOR
HIGH POWER All Band
LY5E 6,319,620
6Y6U 6,010,598
CR6K 5,835,904
ER4A 5,026,543
K1FWE 5,008,245

28 MHz
LU7HN 843,817
KH6ZM 662,155
JA6WJL 447,096

21 MHz
ST2AR 1,061,583
YW5T 744,315
S50R 694,785

14 MHz
UN1L 667,290
SO4M 642,497
KK9A/4 614,100

7 MHz
YW4D 471,314
YT8A 420,050
9A3AAX 282,720

3.5 MHz
VE2SB 92,180
IN3QBR 81,750
DL1SWB 62,136

LOW POWER All Band
*VA2UP 3,977,680
*5C5W 3,864,324
*AA5AU 2,713,962
*6V7X 2,478,894
*HI3TEJ 2,436,352

28 MHz
*PY2EB 422,688
*7Z1SJ 394,896
*5K3R 392,496

21 MHz
*YO3JF 382,382
*UZ7HO 377,739
*4Z5CP 340,136

14 MHz
*EU1DX 350,625
*RM2M 335,556
*IC8TEM 335,100

7 MHz
*SP3VSE 210,870
*SP6IHE 155,703
*YL3CU 141,105

3.5 MHz
*HA1WD 71,355
*UA2FL 41,361
*UT4EK 35,970

ASSISTED
HIGH POWER All Band
KI1G 6,416,744
RG9A 6,174,350
LZ8E 5,455,800
AA3B 4,924,996
UA5F 3,971,645

28 MHz
KG6DX 732,828
9A7R 326,970
LZ9A 297,440

21 MHz
CT3EN 984,987
TM6M 908,205
R7LV 734,760

14 MHz
IK4MGP 856,753
CT3KY 682,689
EO3Q 679,328

7 MHz
II4LXV 458,040
YT1VP 409,770
UW4I 294,060

3.5 MHz
IZØKBR 116,100
IZ5DIY 110,016
HA3LI 93,832

LOW POWER All Band
*S57AW 3,500,924
*N2QT/4 2,640,352
*GW4SKA 2,575,170
*PY2SEX 2,007,440
*LZ9R 1,853,556

28 MHz
*PU4LOG 266,754
*PY2DN 239,320
*PA1CC 215,760

21 MHz
*OK3C 300,004
*UA9AFS 186,480
*IZ4AFW 168,818

14 MHz
*Z35X 273,762
*E74AA 175,260
*ED2Y 163,737

7 MHz
*DM6DX 87,163
*R2SA 68,040
*IKØLNN 63,812

3.5 MHz
*IKØXBX 49,650
*YU7U 13,923
*E72MM 6,660

MULTI-OPERATOR
SINGLE TRANSMITTER
HIGH POWER
EF8M 12,197,500
CN3A 10,612,800
UZ2M 6,690,831
RL3A 4,841,200
OL7M 4,528,359

MULTI-OPERATOR
SINGLE TRANSMITTER
LOW POWER
*VP9I 3,438,541
*LZ5R 2,041,560
*WW4LL 1,954,310
*YT3M 1,814,274
*CS5CRE 1,228,392

MULTI-OPERATOR
TWO TRANSMITTER
P49X 14,161,441
ES9C 11,095,980
ED1R 7,146,396
IQ1RY 6,512,454
EF7R 6,390,258

MULTI-OPERATOR
MULTI-TRANSMITTER
CR3L 10,080,564
K1SFA 10,002,562
IT9BLB 9,790,016
LX7I 7,813,069
ED5CEF 6,417,450

UNITED STATES
SINGLE OPERATOR
HIGH POWER All Band
K1FWE 5,008,245
K1LZ 3,361,750
W3LL 3,093,408
W4PK 2,580,550
W7RN 2,492,952

28 MHz
WA7LNW 165,977
N4ZZ 136,620
N4TB 118,156

21 MHz
N2WK 505,689
K9OM 453,407
WB4YDL 293,168

14 MHz
KK9A/4 614,100
KTØDX 148,000
W7PU 84,189

7 MHz
WØGJ 160,016
K7WP 149,193
W1TY/2 118,300

3.5 MHz
KC8IMB 23,828
W6WRT 16,932
N2EIK 4,753

LOW POWER All Band
*AA5AU 2,713,962
*WA1FCN/4 1,294,475
*N2ZAK 1,232,607
*WB2RHM/4 997,890
*NTØF 871,579

28 MHz
*N2WN/4 84,882
*K4WI 82,368
*N1IX 49,248

21 MHz
*AB1J/9 221,650
*K2EN 121,568
*WB5NMZ/4 78,008

14 MHz
*N2YBB 123,015
*WM5DX 121,296
*W4LC 116,145

7 MHz
*W9KVR 40,018
*ABØYM 6,944
*K4LHP 3,784

3.5 MHz
*NQ4K 9,006
*KØIDT 5,141

ASSISTED
HIGH POWER All Band
KI1G 6,416,744
AA3B 4,924,996
AI9T 3,155,349
W3FV 3,133,682
WØLSD 2,824,225

28 MHz
KØPK 126,429
K6TA 118,692
N6ML 114,328

21 MHz
K6LL/7 461,390
WJ2D/4 429,444
N7AT 427,800

14 MHz
KC4HW 107,725
WA8RPK 3,572

7 MHz
K8CPA 648

LOW POWER All Band
*N2QT/4 2,640,352
*KØKX 1,452,550
*KA2D 1,232,415
*KS1J 1,224,546
*N2FF 1,121,523

28 MHz
*KCØDEB 58,432
*NF3C/4 14,229
*KFØIQ 9,261

21 MHz
*N4RA 16,974

14 MHz
*KF6A/8 21,945
*W6RKC 1,632

MULTI-OPERATOR
SINGLE TRANSMITTER
HIGH POWER
K4FJ 4,234,705
AA7A 2,276,784
K7BTW 1,673,592
AA4HP 1,626,570
N2BJ/9 1,180,783

MULTI-OPERATOR
SINGLE TRANSMITTER
LOW POWER
*WW4LL 1,954,310
*N9LAH 1,144,150
*WJ4N 899,248
*KU1YL/Ø 873,681
*W9TTT 407,259

MULTI-OPERATOR
TWO TRANSMITTER
NR4M 6,363,236
KØIR 5,724,545
W6YX 4,015,935
W1DX 2,727,207
ND2W 2,658,575

MULTI-OPERATOR
MULTI-TRANSMITTER
K1SFA 10,002,562
KA4RRU 4,451,840
AK7AZ 873,794

EUROPE
SINGLE OPERATOR
HIGH POWER All Band
LY5E 6,319,620
CR6K 5,835,904
ER4A 5,026,543
SN7Q 4,520,880
RG3K 3,755,400
UW5U 2,408,008

28 MHz
PI4DX 384,945
9A4WY 237,284
DL3BQA 233,464

21 MHz
S50R 694,785
EB2AM 612,376
Z35T 592,200

14 MHz
SO4M 642,497
T77NM 608,478
IZ3GOM 366,876

7 MHz
YT8A 420,050
9A3AAX 282,720
Z36W 249,948

3.5 MHz
IN3QBR 81,750
DL1SWB 62,136
OG8A 29,913

LOW POWER All Band
*SQ9UM 2,354,208
*GØMTN 1,896,673
*URØHQ 1,627,140

28 MHz
*EA7ISH 324,650
*S56A 180,222
*CT1EEK 131,920

21 MHz
*YO3JF 382,382
*UZ7HO 377,739
*ED1A 306,342

14 MHz
*EU1DX 350,625
*RM2M 335,556
*IC8TEM 335,100

7 MHz
*SP3VSE 210,870
*SP6IHE 155,703
*YL3CU 141,105

3.5 MHz
*HA1WD 71,355
*UA2FL 41,361
*UT4EK 35,970

ASSISTED
HIGH POWER All Band
LZ8E 5,455,800
UA5F 3,971,645
UU7J 2,961,798
UW8I 2,679,600
YO9HP 2,508,288

28 MHz
9A7R 326,970
LZ9A 297,440
9A6B 295,812

21 MHz
TM6M 908,205
R7LV 734,760
DJ3IW 600,600

14 MHz
IK4MGP 856,753
EO3Q 679,328
SN2K 578,476

7 MHz
II4LXV 458,040
YT1VP 409,770
UW4I 294,060

3.5 MHz
IZØKBR 116,100
IZ5DIY 110,016
HA3LI 93,832

LOW POWER All Band
*S57AW 3,500,924
*GW4SKA 2,575,170
*LZ9R 1,853,556

28 MHz
*PA1CC 215,760
*F4FDA 178,205
*LZ2ZG 133,920

21 MHz
*OK3C 300,004
*IZ4AFW 168,818
*IKØEIE 135,240

14 MHz
*Z35X 273,762
*E74AA 175,260
*ED2Y 163,737

7 MHz
*DM6DX 87,163
*R2SA 68,040
*IKØLNN 63,812

3.5 MHz
*IKØXBX 49,650
*YU7U 13,923
*E72MM 6,660

MULTI-OPERATOR
SINGLE TRANSMITTER
HIGH POWER
UZ2M 6,690,831
RL3A 4,841,200
OL7M 4,528,359
OH8A 4,124,061
SSØW 3,894,905

MULTI-OPERATOR
SINGLE TRANSMITTER
LOW POWER
*LZ5R 2,041,560
*YT3M 1,814,274
*CS5CRE 1,228,392
*DD1A 838,299
*SP9KDA 746,856

MULTI-OPERATOR
TWO TRANSMITTER
ES9C 11,095,980
ED1R 7,146,396
IQ1RY 6,512,454
EF7R 6,390,258
SSØXX 6,173,958

MULTI-OPERATOR
MULTI-TRANSMITTER
IT9BLB 9,790,016
LX7I 7,813,069
ED5CEF 6,417,450
HG1S 6,227,145
EA3CCN 5,757,056

*Low Power

SteppIR Antenna Selection Guide

Antenna Specification Sheet

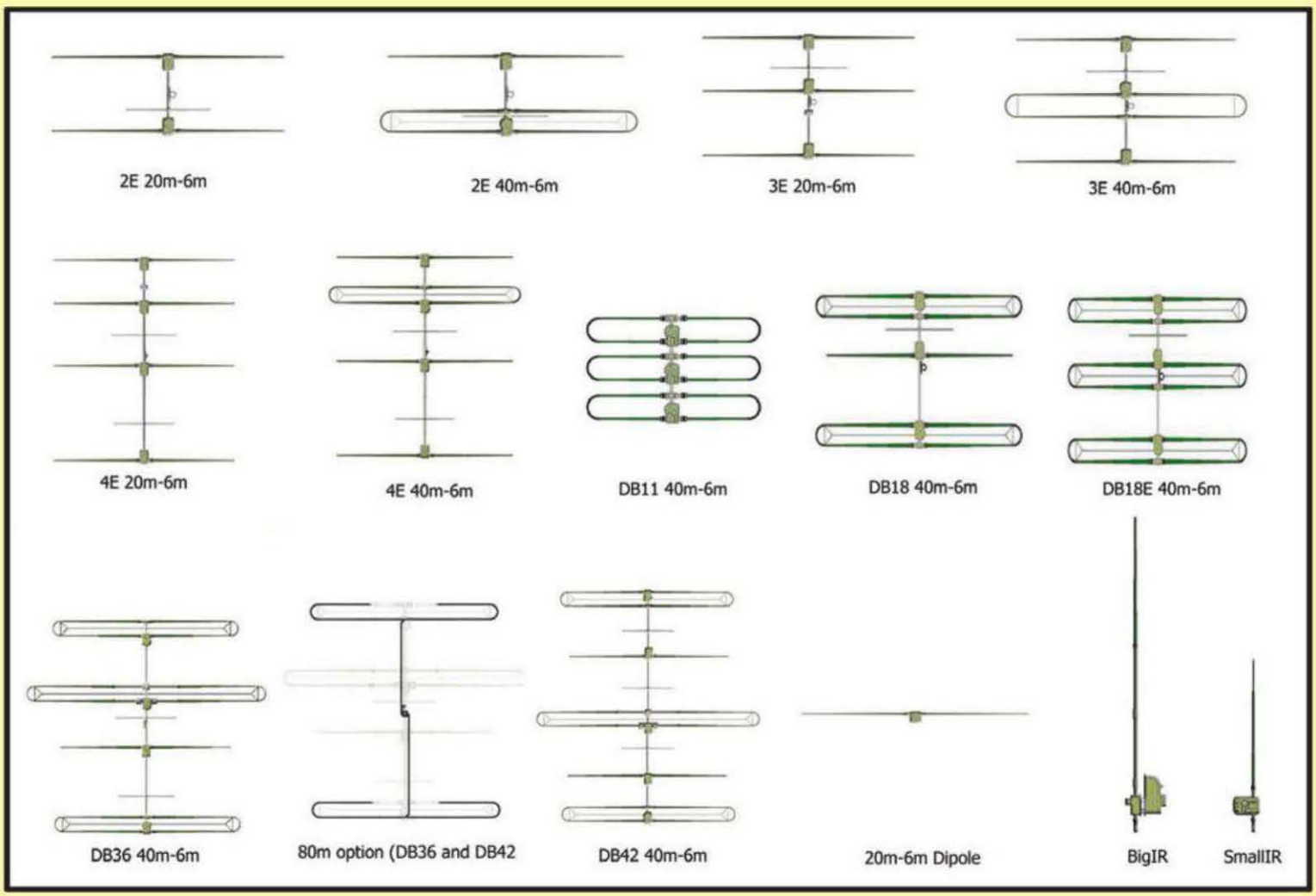
Item	Dipole 20m-6m	2 element Yagi	3 element Yagi	4 element Yagi	DB11 Yagi	DB18 Yagi	DB18E Yagi	DB36 Yagi	DB42 Yagi MonstIR PRO	40m - 30m Dipole Option	BigIR III Vertical	Small IR Vertical
Weight	15 lb 6.80 kg	30 lb 13.6 kg	51 lb 23.1 kg	99 lb 45.0 kg	63 lb 28.57 kg	96 lb 43.5 kg	110 lb 50 kg	160 lb 72.8 kg	238 lb 108 kg	15 lb 6.80kg	15 lb 6.8 kg	12 lb 5.4 kg
Max. Wind SurfaceArea	1.9 sq ft 0.17 sq m	4.0 sq ft 0.37 sq m	6.1 sq ft 0.57 sq m	9.7 sq ft 0.90 sq m	5.9 sq ft 0.54 sq m	10.1 sq ft 0.93 sq m	12.1 sq f 1.12 sq m	17.5 sq ft 1.63 sq m	19.9 sq ft 1.85 sq m	2.0 sq ft 0.19 sq m	1.9 sq ft 0.17 sq m	1.0 sq ft 0.9 sq m
Wind Rating	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	100 MPH 160 KPH	50-MPH *100MPH w/2 guys	100 MPH 160 KPH
Longest Element	36 ft 10.97 m	36 ft 10.97 m	36 ft 10.97 m	36 ft 10.97 m	19 ft 5.79 m	39 ft 11.9m	39 ft 11.9 m	49 ft 14.9 m	49 ft 14.9 m	39 ft 11.9 m	33 ft 10.05 m	18 ft 5.49 m
Power Rating	3000 Watts	3000 Watts	3000 Watts	3000 Watts	3000 Watts	3000 Watts	3000 Watts	3000 Watts *1500 w w/80m opt.	3000 Watts *1500 w w/80m opt.	3000 Watts	3000 Watts	3000 Watts
Boom Length	—	57 in 1.44 m	16 ft 4.87 m	32 ft 9.75 m	11 ft 3.35 m	19 ft 5.79m	19 ft 5.79 m	36 ft	42 ft 8 in 13.0 m	—	—	—
Boom Diameter	—	1.75 in 4.45 cm	1.75 in 4.45 cm	1.75—2.50 in 4.45—6.35cm	1.75 in 4.45 cm	1.75—2.0 in 4.45—5.08cm	1.75—2.0 in 4.45—5.08cm	1.75~ 2.5 in 4.45—6.35cm	1.75 - 3 in 4.45—7.62cm	—	—	—
Mast Diameter	2.0 in 4.45 cm	2.0 in 5.08 cm	2.0 in 5.08 cm	2.0 in 5.08 cm	1.75 - 3 in 4.4-7.6 cm	1.75 - 3 in 4.4-7.6 cm	1.75 - 3 in 4.4-7.6 cm	1.75 - 3 in 4.4-7.6 cm	1.75 - 3 in 4.4-7.6 cm	—	1.5 in 3.81 cm	1.5 in / 3.81 cm
Frequency Coverage	13.8—54.0 MHz	13.8—54.0 MHz *40/30 opt. avail.	13.8—54.0 MHz *40/30 opt. avail.	13.8—54.0 MHz *40/30 opt. avail.	13.9—54.0 MHz	6.8—54.0 MHz (2E on 30m)	6.8—54.0 MHz (3E on 30m)	6.8—54.0 MHz *80m opt. available	6.8—54.0 MHz *80m opt. available	6.8—13.8 MHz	6.8—54.0 MHz *80m coil opt. avail. (1500w)	13.8—54.0 MHz *80/40/30 & 40/30 coils avail
Turning Radius	18 ft 5.48 m	18.15 ft 5.53 m	19.7 ft 6.0 m	24.1 ft 7.35 m	10.5 ft 3.20m	21.58 ft 6.57 m	21.58 ft 6.57 m	26 ft 8.0 m	29 ft 8.8 m	NA Option for 2, 3, & 4E Yagi	—	—
Cable Requirements (shielded)	4 Wire 22 AWG	12 Wire 22 AWG	12 Wire 22 AWG	16 Wire 22 AWG	16 Wire 22 AWG	16 Wire 22 AWG	16 Wire 22 AWG	*16 Wire 22 AWG	24 Wire 22 AWG	—	4 Wire 22 AWG	4 Wire 22 AWG
Balun Included?	No (optional)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No (optional)	No (optional)

SteppIR has Auto-Tune Yagi, Dipole, and Vertical Antennas to fit any lot size and any budget.

Come to our web site www.SteppIR.com for support information, or to order antennas, parts, and accessories directly from SteppIR!

SteppIR

Patented Auto-Tune Technology Makes You Loud. . .on Lots of Bands!



Come see us in the Main Arena in Dayton, and be sure to check our web site often for late-breaking announcements.

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

SteppIR

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

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

WORLD

TOP SINGLE OPERATOR ALL BAND

Station	80	40	20	15	10
LY5E	306/47/10/6	499/66/23/41	1086/97/33/49	1171/92/35/53	513/80/31/42
6Y6U	125/26/11/36	735/62/20/51	569/69/24/53	1251/76/24/53	1099/61/18/54
CR6K	137/52/13/23	463/61/19/43	583/82/28/55	1031/89/29/58	1000/83/29/54
ER4A	287/43/11/8	493/61/20/29	941/82/28/48	1245/94/32/57	392/67/30/37
K1FWE	268/37/12/45	590/64/20/46	917/72/25/49	1062/81/27/46	529/68/23/20

SINGLE OPERATOR ASSISTED ALL BAND

KI1G	249/41/12/50	614/74/24/50	689/94/32/52	992/103/35/51	838/91/30/37
RG9A	275/52/9/0	584/78/23/17	891/96/32/39	1048/106/33/43	743/84/30/8
LZ8E	274/48/11/6	668/76/25/35	792/85/31/43	939/89/32/55	624/84/34/46
AA3B	235/38/11/42	574/66/21/49	729/81/27/48	808/76/24/33	815/69/19/18
UA5F	221/47/10/9	599/80/25/31	575/95/32/44	869/97/31/50	319/70/30/32

MULTI-OPERATOR SINGLE TRANSMITTER

EF8M	289/58/16/42	771/76/24/50	775/101/32/55	1253/105/35/55	1867/107/36/58
CN3A	270/54/15/36	796/69/21/51	948/94/32/56	1103/102/35/52	1400/100/32/55
UZ2M	216/56/16/10	582/82/24/41	980/102/35/52	1238/106/35/53	661/93/35/39
RL3A	227/53/13/7	515/76/26/37	710/100/35/45	1061/103/36/53	366/83/31/30
OL7M	220/48/10/11	369/69/21/41	595/89/30/48	1024/101/36/55	420/78/31/43

MULTI-OPERATOR TWO TRANSMITTER

P49X	211/39/13/45	875/71/24/52	1360/89/33/55	2023/97/34/57	1907/87/28/55
ES9C	506/56/15/12	1035/84/25/49	1652/106/34/55	1630/110/35/57	843/97/34/43
ED1R	208/45/10/11	769/67/21/47	969/93/31/53	1237/82/27/55	1057/86/33/55
IQ1RY	317/44/10/12	610/64/20/43	957/90/31/46	968/89/33/57	966/75/33/55
EF7R	221/50/12/9	602/63/20/45	961/88/29/51	1199/81/28/54	1151/85/30/54

MULTI-OPERATOR MULTI-TRANSMITTER

CR3L	276/47/14/34	898/72/23/48	1032/81/27/51	1294/81/28/56	1352/80/26/54
K1SFA	577/47/14/55	1157/79/25/56	1344/94/33/56	1474/95/32/52	1062/85/26/33
IT9BLB	463/55/13/15	971/75/25/47	1467/101/32/51	1272/98/33/54	1190/88/32/57
LX7I	460/49/11/18	785/65/18/52	827/82/29/50	1287/93/33/57	1090/85/31/54
ED5CEF	288/39/9/10	801/68/25/43	1292/77/28/54	1131/70/27/55	943/68/29/48

USA

SINGLE OPERATOR ALL BAND

K1FWE	268/37/12/45	590/64/20/46	917/72/25/49	1062/81/27/46	529/68/23/20
K1LZ	278/40/15/51	739/66/21/50	385/55/26/47	841/75/24/38	402/54/17/16
W3LL	250/35/11/45	364/53/15/44	368/60/24/36	560/64/24/32	754/66/23/20
*AA5AU	263/17/10/50	311/60/19/42	473/53/21/48	823/78/25/49	489/71/24/30
W4PK	143/24/12/34	357/48/15/45	389/58/24/40	712/63/17/30	564/55/19/21

SINGLE OPERATOR ASSISTED ALL BAND

KI1G	249/41/12/50	614/74/24/50	689/94/32/52	992/103/35/51	838/91/30/37
AA3B	235/38/11/42	574/66/21/49	729/81/27/48	808/76/24/33	815/69/19/18
AI9T	155/12/9/47	420/59/20/50	477/77/24/45	563/80/27/28	711/74/22/17
W3FV	113/27/11/38	502/62/19/47	351/63/24/35	651/71/25/28	633/69/22/16
WØLSD	109/15/11/44	632/68/25/49	470/75/27/51	658/85/28/48	291/74/24/29

MULTI-OPERATOR SINGLE TRANSMITTER

K4FJ	153/28/10/42	436/63/19/45	464/85/28/46	772/92/30/40	833/80/23/22
AA7A	97/10/8/38	488/43/18/48	277/55/23/52	599/80/31/48	493/70/25/33
WW4LL	128/20/10/39	424/61/18/47	254/72/21/43	318/79/29/34	495/75/23/15
K7BTW	130/11/10/42	485/49/22/49	333/47/23/51	369/70/26/43	408/46/20/39
AA4HP	18/7/7/11	251/40/13/35	372/59/21/37	442/58/21/40	472/73/23/20

MULTI-OPERATOR TWO TRANSMITTER

NR4M	328/39/12/49	718/72/21/51	799/88/31/53	1098/95/31/44	918/85/30/23
KØIR	377/23/11/52	850/65/22/51	682/79/28/51	1327/95/33/49	774/82/28/16
W6YX	320/17/12/51	721/66/25/53	531/72/26/54	817/88/30/55	634/72/25/47
W1DX	176/34/10/36	399/52/15/43	342/78/26/48	487/74/24/36	626/73/22/22
ND2W	168/16/11/42	468/55/15/43	523/67/26/44	797/67/25/35	516/63/22/20

MULTI-OPERATOR MULTI-TRANSMITTER

K1SFA	577/47/14/55	1157/79/25/56	1344/94/33/56	1474/95/32/52	1062/85/26/33
KA4RRU	290/15/9/52	669/59/17/56	705/79/31/52	871/76/26/38	928/77/26/27
AK7AZ	101/5/6/36	242/27/15/45	219/30/18/43	494/56/23/47	154/38/20/24

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

W7RN.....2,492,952
N6QQ.....1,301,966
KR7X.....1,258,530
K2PO/7.....1,057,588
W7PP.....998,130

Zone 4

AI9T.....3,155,349
WØLSD.....2,824,225
*AA5AU.....2,713,962
VE3DZ.....2,585,024
K5DU.....2,433,042

Zone 5

KI1G.....6,416,744
K1FWE.....5,008,245
AA3B.....4,924,996
*VA2UP.....3,977,680
K1LZ.....3,361,750

Zone 14

CR6K.....5,835,904
LM9L4ØY 3,593,400
TMØT.....3,473,526
DL1IAO.....2,955,216
EA1AKS.....2,596,556

Zone 15

LY5E.....6,319,620
SN7Q.....4,520,880
S57AW.....3,500,924
OH8X.....3,374,920
OH4A.....3,038,165

Zone 16

ER4A.....5,026,543
UA5F.....3,971,645
RG3K.....3,755,400
UW1M.....2,970,973
UU7J.....2,961,798

Zone 20

LZ8E.....5,455,800
YO9HP.....2,508,288
LZ9R.....1,853,556
YO3CZW.....1,577,107
YO3APJ.....1,134,060

Zone 25

JH4UYB.....2,869,920
JM1XCW.....2,335,464
JQ1BVI.....1,563,088
JA1OVD.....1,535,314
JH4UTP.....1,213,025

**Low Power*

Important Online Resources

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

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

Carlos, PY4XX, set the SA record with 51K and eleventh place Richard, N4RA set the NA record with 17K.

Single-Op Assisted 10 meters Low Power (31). Julio ,PU4LOG, is the new world record holder with 267K while Roberto , PY2DN, took second with 239K. Ton, PA1CC, in third, set the new Europe record with 216K and Huang, BD7IS, took fourth with the new Asia record of 182K. John, KCØDEB, set the NA record with 58K.

Multi-Operator (141)

Multi-Single Low Power (31). Last year's NA winner VP9I (ND8L, WW3S) moved up from fourth place world to win in 2011 and set a new NA record with 3.4M points. Second place was LZ5R (LZ1UK, LZ3RR) with 2.0M, and the WW4LL (WW4LL, K1ZZI, K9MUG, WF4W, W4KTR, KB4KBS) team took third with 2.0M.

Multi-Single High Power (64). The EF8M team of RD3A, UA5C, EA8CAC, and EA8AH captured another category world record with 12.2M. Second place CN3A (IK2QEI, IK3STG, IW3IFJ, IZ4GWE, CN8WW, CN8WK) made 10.6M, and third place UZ2M (RA4LW, RW4LE, UX3MZ, UX3MR, UR5MID, URØMC, UT3MD) set a new Europe record with 6.7M.

Multi-Two (29). The P49X team of W6OTC, K6AW, WØYK, and N4RR took first place and racked up 14.2M for a new SA record, while ES9C (YL2KF, YL1ZF, YL3DW, ES5RY, ES5TV, ES2DW, ES5GP, ES5NHC, ES2MA, ES2NA, ES5JR, ES5QX) took second place and a new European record with 11.6M. Third place was nailed by ED1R (EA1CJ, EC1KR, EA4TD, EA4AOC, EA4GBV, EA4GEL, EC4DX, EC7AKV, EB7ABJ) with 7.1M points.

EUROPE

SINGLE OPERATOR ALL BAND

LY5E	306/47/10/6	499/66/23/41	1086/97/33/49	1171/92/35/53	513/80/31/42
CR6K	137/52/13/23	463/61/19/43	583/82/28/55	1031/89/29/58	1000/83/29/54
ER4A	287/43/11/8	493/61/20/29	941/82/28/48	1245/94/32/57	392/67/30/37
SN7Q	249/47/11/16	467/54/21/43	549/65/26/41	886/81/33/56	699/71/28/51
RG3K	195/36/7/1	465/67/21/29	853/74/26/38	1168/78/30/55	367/51/24/13

SINGLE OPERATOR ASSISTED ALL BAND

LZ8E	274/48/11/6	668/76/25/35	792/85/31/43	939/89/32/55	624/84/34/46
UA5F	221/47/10/9	599/80/25/31	575/95/32/44	869/97/31/50	319/70/30/32
S57AW	249/52/12/12	362/68/23/39	475/87/28/43	577/85/31/55	438/70/29/45
UU7J	180/41/12/7	269/54/18/26	418/70/27/30	803/75/29/43	590/77/32/41
UW8I	178/45/11/3	342/64/20/29	658/83/28/44	759/86/29/48	171/53/27/10

MULTI-OPERATOR SINGLE TRANSMITTER

UZ2M	216/56/16/10	582/82/24/41	980/102/35/52	1238/106/35/53	661/93/35/39
RL3A	227/53/13/7	515/76/26/37	710/100/35/45	1061/103/36/53	366/83/31/30
OL7M	220/48/10/11	369/69/21/41	595/89/30/48	1024/101/36/55	420/78/31/43
OH8A	225/50/12/1	368/69/23/16	888/94/33/51	886/92/32/48	373/84/32/30
S5ØW	245/44/11/9	475/65/21/42	536/83/30/44	612/77/30/55	549/72/30/52

MULTI-OPERATOR TWO TRANSMITTER

ES9C	506/56/15/12	1035/84/25/49	1652/106/34/55	1630/110/35/57	843/97/34/43
ED1R	208/45/10/11	769/67/21/47	969/93/31/53	1237/82/27/55	1057/86/33/55
IQ1RY	317/44/10/12	610/64/20/43	957/90/31/46	968/89/33/57	966/75/33/55
EF7R	221/50/12/9	602/63/20/45	961/88/29/51	1199/81/28/54	1151/85/30/54
S5ØXX	504/57/14/23	645/67/22/39	716/94/32/43	1067/89/33/55	748/68/28/50

MULTI-OPERATOR MULTI-TRANSMITTER

IT9BLB	463/55/13/15	971/75/25/47	1467/101/32/51	1272/98/33/54	1190/88/32/57
LX7I	460/49/11/18	785/65/18/52	827/82/29/50	1287/93/33/57	1090/85/31/54
ED5CEF	288/39/9/10	801/68/25/43	1292/77/28/54	1131/70/27/55	943/68/29/48
HG1S	508/56/14/17	700/72/24/46	856/96/33/38	1160/89/32/55	596/61/31/53
EA3CCN	330/50/10/12	717/61/22/40	1221/77/28/51	944/86/31/58	641/58/22/50

**Low Power*

Kenny, VP9GE's son, was running the VP9I pile-up while WW3S and ND8L sat on the porch for a break. waving waved at the cruise ships.

Multi-Multi (17). A three-continent race for top honors in this category came down to final log checking. CR3L (DJ6QT, DJ6XV, DK4QT, DL1YFF, DL6TK, DM3BJ) came out on top with 10.1M; K1SFA (K1MK, K1SFA, K1TTT, KB1SUA, N1FJ, N2WQ, NW2Q, W1EQO, W1TO @K1TTT) took a very close second and the new NA record with 10.0M; and IT9BLB (IK3QAR, IT9BLB, IT9MBZ, IT9MUO, IT9PAD, IT9RBW, IT9RGY, IT9VDQ, IT9ZGY, IT9ZMX) took third with 9.8M for a new Europe record.

Clubs

United States. With the fewest logs (30), the Yankee Clipper Contest Club (YCCC) won this year with 35.9M. Second-place Potomac Valley Radio Club (PVRC) accumulated 33.2M points with 50 logs, and third-place Northern California Contest Club (NCCC) had 27.1M from 38 logs.

Europe. The same three clubs finished in the same order as last year,

CLUB SCORES

UNITED STATES

Club	# Entrants	Score
YANKEE CLIPPER CONTEST CLUB	30	35,892,636
POTOMAC VALLEY RADIO CLUB	50	33,185,072
NORTHERN CALIFORNIA CONTEST CLUB	38	27,100,477
MINNESOTA WIRELESS ASSN	49	20,695,177
FRANKFORD RADIO CLUB	12	14,419,708
CTRI CONTEST GROUP	8	10,985,921
FLORIDA CONTEST GROUP	18	9,633,038
SOCIETY OF MIDWEST CONTESTERS	16	9,257,080
ARIZONA OUTLAWS CONTEST CLUB	26	8,619,725
ALABAMA CONTEST GROUP	13	6,886,231
WILLAMETTE VALLEY DX CLUB	21	6,080,793
LOUISIANA CONTEST CLUB	3	4,229,222
TENNESSEE CONTEST GROUP	15	3,623,725
NORTH COAST CONTESTERS	4	3,623,388
SOUTHERN CALIFORNIA CONTEST CLUB	14	3,442,362
ORDER OF BOILED OWLS OF NEW YORK	9	3,185,963
WESTERN WASHINGTON DX CLUB	8	3,007,336
GRAND MESA CONTESTERS OF COLORADO	8	2,976,128
BERGEN ARA	6	2,714,837
CENTRAL TEXAS DX AND CONTEST CLUB	5	2,561,858
HUDSON VALLEY CONTESTERS AND DXERS	10	2,073,753
MAD RIVER RADIO CLUB	6	1,972,139
SOUTHWEST OHIO DX ASSOCIATION	3	1,835,333
KANSAS CITY DX CLUB	4	1,713,123
SPOKANE DX ASSOCIATION	6	1,538,680
MISSISSIPPI VALLEY DX/CONTEST CLUB	3	1,519,108
METRO DX CLUB	5	1,512,030
CAROLINA SHINE	4	1,423,931
ROCHESTER (NY) DX ASSN	6	1,282,561
CAROLINA DX ASSOCIATION	4	1,158,550
DELAWARE LEHIGH AMATEUR RADIO CLUB	3	1,017,576
ALLEGHENY VALLEY RADIO ASSOCIATION	3	895,081
STERLING PARK AMATEUR RADIO CLUB	3	786,548
SKY CONTEST CLUB	3	602,161
DELARA CONTEST TEAM	3	601,044
SKYVIEW RADIO SOCIETY	5	568,709
NORTH CAROLINA DX AND CONTEST CLUB	3	446,994
SOUTH EAST CONTEST CLUB	4	442,125
LOW COUNTRY CONTEST CLUB	3	378,218
BRISTOL (TN/VA) ARC	4	314,318
KENTUCKY CONTEST GROUP	3	138,376

DX

BAVARIAN CONTEST CLUB	73	48,894,090
RHEIN RUHR DX ASSOCIATION	69	46,746,808
UKRAINIAN CONTEST CLUB	38	33,036,364
SLOVENIA CONTEST CLUB	9	15,823,538
CONTEST CLUB FINLAND	10	11,347,843
BLACK SEA CONTEST CLUB	31	9,150,023
CONTEST CLUB ONTARIO	20	9,036,661
ARAUCARIA DX GROUP	12	8,632,597
LU CONTEST GROUP	14	8,429,734
HA-DX-CLUB	3	8,269,700
SOUTH URAL CONTEST CLUB	4	7,892,431
CONTEST GROUP DU QUEBEC	9	7,608,026
DL-DX RTTY CONTEST GROUP	12	6,807,422
RUSSIAN CONTEST CLUB	16	6,575,093
LITHUANIAN CONTEST GROUP	4	6,540,949
BRITISH COLUMBIA DX CLUB	3	5,960,786
TEMIRTAU CONTEST CLUB	4	5,447,280
ORCA DX AND CONTEST CLUB	5	4,683,693
BESSARABIAN CONTEST CLUB	11	3,514,082
LATVIAN CONTEST CLUB	7	3,436,718
GRUPO DXXE	6	3,098,072
CHILTERN DX CLUB	5	2,915,717
BRITISH AMATEUR RADIO TELEDATA GROUP	3	2,901,105
VK CONTEST CLUB	6	2,831,940
RTTY CONTESTERS OF JAPAN	6	2,782,936
BELARUS CONTEST CLUB	3	2,756,051
SP DX CLUB	17	2,749,402
CROATIAN CONTEST CLUB	15	2,538,220
RIO DX GROUP	4	2,347,366
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	3	2,210,655
SASKATCHEWAN CONTEST CLUB	3	2,048,790
YO DX CLUB	6	1,951,357
VU CONTEST GROUP	4	1,935,972
GRIMSBY AMATEUR RADIO SOCIETY	3	1,910,706
TALL TREES CONTEST GROUP	3	1,882,436
599 CONTEST CLUB	3	1,839,532
MARITIME CONTEST CLUB	6	1,439,509
DXARC DX COLOMBIA AMATEUR RADIO CLUB	3	1,424,986
Z37M CONTEST TEAM	5	1,208,181
FALKOPINGS RADIOCLUB	3	1,148,304
LES NOUVELLES DX	3	1,136,823
ARCK	4	670,618
BALATON RADIOAMATEUR DX CLUB	3	640,219
TOP OF EUROPE CONTESTERS	4	594,146
KOREA CONTEST CLUB	3	579,469
WORLD WIDE YOUNG CONTESTERS	4	551,246
GIPANIS CONTEST GROUP	3	527,854
MOSCOW RADIO CLUB	4	515,762
VRHNIKA CONTESTERS	3	501,610
PERUGIA CONTEST CLUB	7	496,413
UA2 CONTEST CLUB	6	421,738
HAROS RADIO CLUB	3	370,397
CLIPPERTON DX CLUB	3	335,051
CANTAREIRA DX GROUP	3	292,065
NANAIMO AMATEUR RADIO ASSOCIATION	3	269,972
GERMAN DX FOUNDATION	3	174,016

Khrystyne, K1SFA, running a good rate on 20 meters with her Multi-Multi team at K1TTT.

with the Bavarian Contest Club (BCC) winning with 73 logs and 48.9M. The Rhein Ruhr DX Association (RRDXA) took second with 69 logs and 46.7M. The Ukrainian Contest Club (UCC) made 33.0M with its 38 logs.

World. The top two US teams (YCCC and PVRC) got by the UCC for third and fourth place world.

Logs

Thanks to more participation and more logs from non-contesters, over 85% of all QSOs in the logs were cross-checked for accuracy, an increase of 7% over 2010. A large part of this increase was the willingness of casual operators to contribute their logs to the checking process. Nearly 97% of all cross-checked QSOs were good, another increase from 2010. At the same time, the log-checking software has improved in its ability to catch busted callsigns and exchanges. So, it appears that logging accuracy has improved, which is a good thing. Busted calls came down from 1.4% to 1.1%, busted exchanges were up from 0.6% to 0.9%, and NILs (Not-In-Log) were down from 1.6 to 1.1%. You can compare these averages with your individual statistics by obtaining your LCR (Log Check Report) from <w0yk@cqwwrtty.com>.

Website

The contest website <www.cqwwrtty.com> is a valuable source of information to help prepare for the contest, submit logs after the contest, and access results and records spanning the entire history of CQ WW RTTY. Be sure to visit it when you have questions and take a minute to examine what is there.

Thanks

Thanks to all participants for making this a fun event. Thanks also to the team of volunteers behind the scene who make it all possible:

- Gail, K2RED, of *CQ* magazine expertly edits and assembles the output from log checking into this published article, as she does for all *CQ* contests.
- Ken, K1EA, provides the log check software and consulting during log check.
- Mark, K6UFO, laboriously typed in paper logs and fixed problem logs.
- Bob, KØRC, prototyped a simple system for us to send e-mail requests for missing logs.
- Mike, K4GMH, manages the CQ RTTY contest plaque program.
- Barry, W5GN, manages the certificate printing and mailing.
- Randy, K5ZD, set up the original website and continues to consult on its evolution as well as the searchable scores database that he set up with Don, AA5AU.

For expanded results of the contest, including QRM, operators of multi stations, and plaque information, and more, go to <www.cq-amateur-radio.com> and <cqwwrtty.com>.

See you in the 2012 contest! *73, Ed, WØYK*

(Scores on page 106)

SUCH A HAM

Just running a bit of coax through, Mavis.

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-10 $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-10 $29.95**

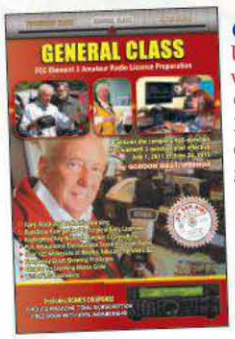
Tech Audio Course on CD
Welcome to Gordo's classroom! Technician audio theory course recorded by Gordo talks you through the Element 2 question pool. Follows the order of his ***Technician Class*** book, and is full of the sounds of ham radio operating excitement! An excellent study aid if you spend a lot of time in your car or pick-up! On 4 audio CDs. **GWTW-10 $29.95**

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-09 $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-09 $79.95**

GENERAL CLASS



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

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

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

Ham Operator Software has All Exams

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

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

Learn Morse Code for HF Fun!
In-depth CD audio courses recorded by Gordo:

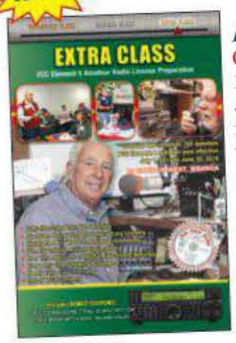
0-5 wpm on 8 audio CDs	GW05 $39.95
0-5 wpm CW refresher course on 2 audio CDs	GWCT $14.95
5-13 wpm on 8 audio CDs	GW13 $39.95
10-28 wpm on 8 audio CDs	GW20 $39.95

GW13 & 20 Special Order Only!

Learn all about electronics with our Basic books

Basic Electronics	BELC $19.95
Basic Digital Electronics	BDIG $19.95
Basic Communications Electronics	BCOM $19.95

NEW! EXTRA CLASS



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

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

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

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.

With great DX finally returning to the upper HF bands as solar Cycle 24 heats up, we thought this would be a good time to bring you W4YO's recollections of the granddaddy of all sunspot cycles back in the late 1950s and early 1960s.

The Extraordinary Solar Cycle 19
Fond Memories of One Who Lived It

BY EDMUN B. RICHMOND,* W4YO

On the cover of the March 1956 issue of *CQ* magazine there is a photograph of the solar disk with a large group of sunspots clearly visible. Over this photo are emblazoned the words in large, capital letters, "ONCE in a LIFETIME CONDITIONS" (see fig. 1). In an article beginning on page 28, then-Propagation Editor George Jacobs, W3ASK, penned, Cycle 19 "will be one of outstanding intensity with the maximum likely to surpass all others hitherto observed." Further, he prophetically wrote, "shortwave conditions during the next few years may be *better than they have ever been in the history of radio.*" (italics, his)[1]

Little did we know how true these pronouncements would become. Cycle 19 was the best! It was the mother of all sunspot cycles! It was also my first solar cycle as a licensed amateur (what a way to begin). It lasted 10.5 years, running from April 1954 until October 1964. It produced a record yearly smoothed sunspot number of 201 in 1957 (see fig. 2), and of the 20 largest monthly sunspot totals of all times, Cycle 19 contributed 15 (see Table I), with October 1957 ranking the highest month on record with 253.8 sunspots!

I had received my Novice license in January 1956, just in time to catch the upswing of this record event. During that year, I was a senior in college and living with my parents in Lakeland, Florida. I was in my last semester, busy trying to keep my grades up and make sure I had all of my graduation requirements, while actively chasing DX on the 15-meter Novice band and diligently studying for the General Class examination. It was quite a balancing act, and in retrospect, I think DXing probably won out even though I did indeed graduate. In April, I drove to the FCC field office in Tampa, passed the General exam, and received my upgraded license and call in May. As a result, I began my journey into Cycle 19 and was on the air on 10, 15, and 20 meters, phone and CW, while these remarkable conditions progressed.

My first ham station was rather ordinary for the time. It consisted of a Johnson Viking II transmitter, with 180 watts on CW and 135 watts on AM phone (SSB was in its infancy in those days). My receiver was a Hallicrafters SX-24, and my antenna was a 40-meter dipole.

After receiving my General Class license, I gradually refined my antenna system. I built a two-element cubical quad for 20 meters and mounted it on a 50-foot crank-up tower which I bought from a local ham. In the fall of that year, I built a 2-element 10-meter beam. Then in the spring of 1957, I bought some aluminum tubing and fashioned a three-element Yagi for 15 meters. Both of these antennas were mounted on 30-foot TV towers that I was able to scrounge at local appliance store scrap heaps.

Later I traded my SX-24 with Leo Meyerson, at World Radio Laboratories, for a used Collins 75A2 (you're a real old-timer if you remember Leo at WRL).[2] I also added a specially ordered left-handed Vibroplex Bug, which I still use. I worked most of Cycle 19 with that station.

In 1963, I moved to Miami to begin what was to be a 34-year teaching career. The following year, I retired my Viking and purchased a used Hallicrafters HT-32 transmitter, which I used as an exciter with the linear amplifier I built with four 811As. I also put up a three-band quad, which helped me work some more DX toward the end of Cycle 19 and beyond.

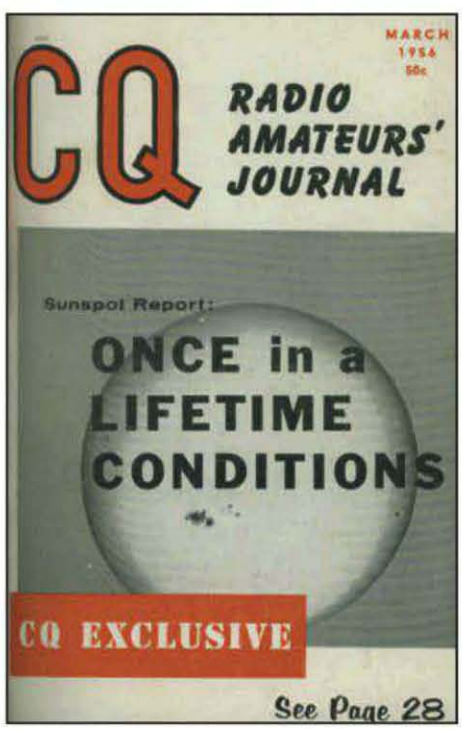


Fig. 1– The special nature of solar Cycle 19 was obvious well before it reached its peak, as evidenced by this CQ *cover from March 1956.*

Logbook Memories

The delight of hamming during Cycle 19 is probably best illustrated by the entries in my logbooks. I decided to delve into my old logs for this period just to relive

**11 Ocean Marsh Lane, Harbor Island, SC 29920-5002*
e-mail: <w4yo@arrl.net>

digital HFDSP

Icom's pioneering work in Digital Signal Processing lets today's ham isolate weak signals without needing to buy expensive optional filters.

your **hobby.** your **life.** your love for **ham radio.**

IC-7800

200 Watt Output (50W AM),
Built-in Power Supply

RX: 0.030–60.000MHz*

Four 32 Bit IF-DSPs + 24 Bit
AD/DA Converters

2 Independent Receivers

+40dBm 3rd Order Intercept Point

3 Roofing Filters

Selectable, "Build Your Own"
IF Filter Shapes

IC-7700

200 Watt Output (50W AM),
Built-in Power Supply

RX: 0.030–60.000MHz*

Two 32 Bit IF-DSPs + 24 Bit
AD/DA Converters

Single Receive

+40dBm 3rd Order Intercept Point

3 Roofing Filters

Selectable, "Build Your Own"
IF Filter Shapes

IC-7600

USB Control Audio

100 Watt Output (30W AM),
Optional PS-126

RX: 0.030–60.000MHz*

USB Port for CI-V Format
PC Control and Audio In/Out

Dual Receive

+30 dBm 3rd Order Intercept Point

3 Roofing Filters

Selectable, "Build Your Own"
IF Filter Shapes

you can't work 'em if you can't hear 'em

Information & Downloads

AMATEUR TOOL KIT | COMIC BOOKS | VIDEOS | WWW.ICOMAMERICA.COM

*Frequency coverage may vary. Refer to owner's manual for exact specifications.

ICOM®

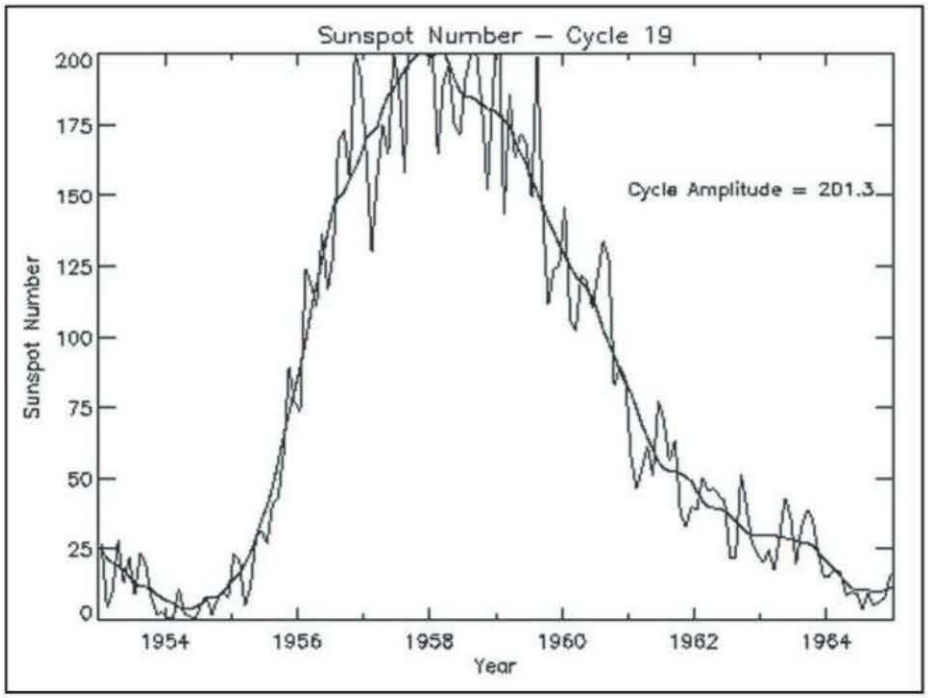


Fig. 2– Graph of sunspot numbers during Cycle 19. The heavy (less variable) line is the running smoothed sunspot number, which shows the general variation of the solar cycle. The lighter (more variable) line is the monthly averaged sunspot number, which shows bursts of activity within the cycle. (Courtesy IPS Radio and Space Service © Commonwealth of Australia 2011)

how good conditions were, based on what I was working.

My primary interest in ham radio has always been DXing, and that is the reference point from which I will always remember Cycle 19. I filled a total of 14 ARRL logbooks from my first ham QSO on January 18, 1956 until September 30, 1964. In that time, with my limited power, I worked a mixed total of 278 countries, CW and phone, and 208 countries on AM phone.[3] My only activity during Cycle 19 was on 10, 15, and 20 meters. I didn't become interested in DXing on the lower frequencies until many years later, so I cannot comment on Cycle 19's effect on 40, 80, and 160 meters.

Twenty meters was open all day and all night to some part of the globe. Fifteen meters was not far behind, remaining open to the Pacific and the Far East well after sunset, and sometimes until the approach of local midnight. Ten meters was its typical self, a daylight band, but beginning earlier in the mornings and remaining open through sunset and many hours thereafter. Conditions were so fabulous, and the MUF (maximum usable frequency) was so high, that occasionally certain long-haul paths to Southeast Asia, which normally were worked on 20 meters at only fair signal strength at my QTH, were worked on 15 meters at hours when no equivalent openings were available on 20. In addition, those openings produced stronger signal strength than normally was heard on 20 meters. My log in 1961 shows working stations in XZ (Burma), VS1 (Singapore), and 9M2 (Malaya) in mid-morning on 15-meter AM phone with solid S9+ signals. If I only didn't have to eat, sleep, or go to work, I thought, I could devote much more time to DXing!

Although probably not intentionally planned for Cycle 19, the 10.5-year period saw an increase in amateur radio DXpeditions in order to put countries on the air from far-flung locations, which were sometimes difficult to reach.[4] The earliest of these were the 1955–1963 Yasme DXpeditions of Danny Weil, VP2VB, which took place fully within the Cycle 19 span. The two other main ongoing DXpeditions of the time were by Gus Browning, W4BPD, from 1960 through 1981, and Don Miller, W9WNV, from 1962–1967. Their activity just caught the final years of Cycle 19, and continued for many years thereafter. With the conditions of Cycle 19, many DXers were made extremely happy by these intrepid hams' exploits and were able to add several new countries to their totals.

Conditions were so good that it really didn't matter if you had a high-power station with a large antenna farm or a modest station with dipoles. Everyone had a chance to get through, and if the DX remained active in one location long enough, chances were good that you would be able to work them on one band or another before they moved on, and you'd have another "New One" in the log.

A Changing World Map

During Cycle 19, the geopolitical makeup of the world was changing. New countries were being born and some old

Monthly Sunspot Totals—Top 20

Ranking	Month/Year	Solar Cycle	Sunspot Number
1	**October 1957**	**19**	**253.8**
2	**December 1957**	**19**	**239.4**
3	**September 1957**	**19**	**235.8**
4	**January 1959**	**19**	**217.4**
5	**November 1957**	**19**	**210.9**
6	**January 1958**	**19**	**202.5**
7	**November 1956**	**19**	**201.3**
8	May 1947	18	201.3
9	**September 1958**	**19**	**201.2**
10	**June 1957**	**19**	**200.7**
11	**August 1958**	**19**	**200.2**
12	August 1990	22	199.9
13	**August 1959**	**19**	**199.6**
14	June 1989	22	196.0
15	**April 1958**	**19**	**196.0**
16	**December 1956**	**19**	**192.1**
17	**July 1958**	**19**	**191.4**
18	**March 1958**	**19**	**190.7**
19	April 1948	18	189.7
20	August 1947	18	188.8

Table I– The top 20 months of all time (during which sunspots have been counted) for monthly sunspot totals. Fifteen of the 20 were during Cycle 19 (in bold), including #1, October, 1957. (Courtesy IPS Radio and Space Service © Commonwealth of Australia 2011)

countries ceased to exist. The early 1960s brought the most change. To paraphrase Harold MacMillan, the then-Prime Minister of the United Kingdom, a new wind was blowing across the face of Africa, which created new countries out of former British and French colonies. Asia quickly followed. This presented a multitude of new countries to be added to the DXCC list, as well as several countries which no longer existed and therefore were deleted. Geopolitical entities continued to be created throughout the 1960s, which gave us hams new possibilities to add to our country totals. However, scarcity of activity in these new countries became a problem. As most of the European hams left their former colonies, there were few or no licensed local hams to replace them. As a result, several of those new countries became quite rare.

With those high sunspot numbers and correspondingly high MUF, one would contact other hams around the world who were using simple, low-power transmitters, especially on 10 and 15 meters. Many hams jokingly spoke about working the world with a couple of watts and a wet noodle for an antenna, or loading up a mattress spring. My logbooks and QSL cards from the period show many stations running less than 100 watts, and a good number running less than 50 watts. One day I worked FQ8AF, in French Equatorial Africa, on 10 meters CW while he was running 10 watts. On several occasions I thought I would try a little QRP. I reduced my output power to a few watts and would call CQ on 10 and 15 phone. One EA8 (Canary Islands) station who came back to me gave me a 5×9+ report and wouldn't believe I was running 10 watts.

Back in the mid-1960s, there was a popular TV program called "That Was the Week that Was." When speaking of Cycle 19, the amateur community could truly say, "That Was the Cycle that Was." Every ham who was on the air during Cycle 19 will surely praise its memory. To have been active and have experienced propagation during that cycle was something extraordinary. In other years and in other cycles, sunspot numbers came close to the records produced by Cycle 19, but none surpassed it. The pronouncement on the cover of the March 1956 issue of *CQ* magazine certainly seems to be coming true, even after all these years.

It makes one wonder. ...Will it ever happen again in our lifetimes? You younger hams might have a chance to experience it. We old-timers probably don't have many sunspot cycles left. But who knows? Maybe the propagation gods will smile upon us and we'll get lucky again. One can only hope ... and dream!

Notes

1. George Jacobs, W3ASK, "The Sunspot Story: Cycle 19 (Once in a Lifetime Conditions), *CQ Radio Amateurs' Journal*, vol. 12, no. 3 (March 1956), p. 28.

2. In the 1950s and 1960s, there were several mail-order houses devoted to the sale of ham equipment. World Radio Laboratories was one, and was owned by Leo Meyerson, WØGFQ. If you wanted to trade a piece of equipment, you wrote directly to Leo and you always received a personal answer with an offer. Leo was a real gentleman. He recently passed away, soon after his 100th birthday.

3. In those days, DX entities, as they are known today, were called countries.

4. For an excellent description and history of DXpeditions, see the website: <www.deltadxnet/ABCDx/Sections/DXpeds.htm>.

Have you ever dreamed of combining amateur radio with a voyage on a cruise ship … hamming on the high seas? K6CUK offers some practical guidelines to help you make that dream a reality.

Hamming on the High Seas
Operating Maritime Mobile on Cruise Ships

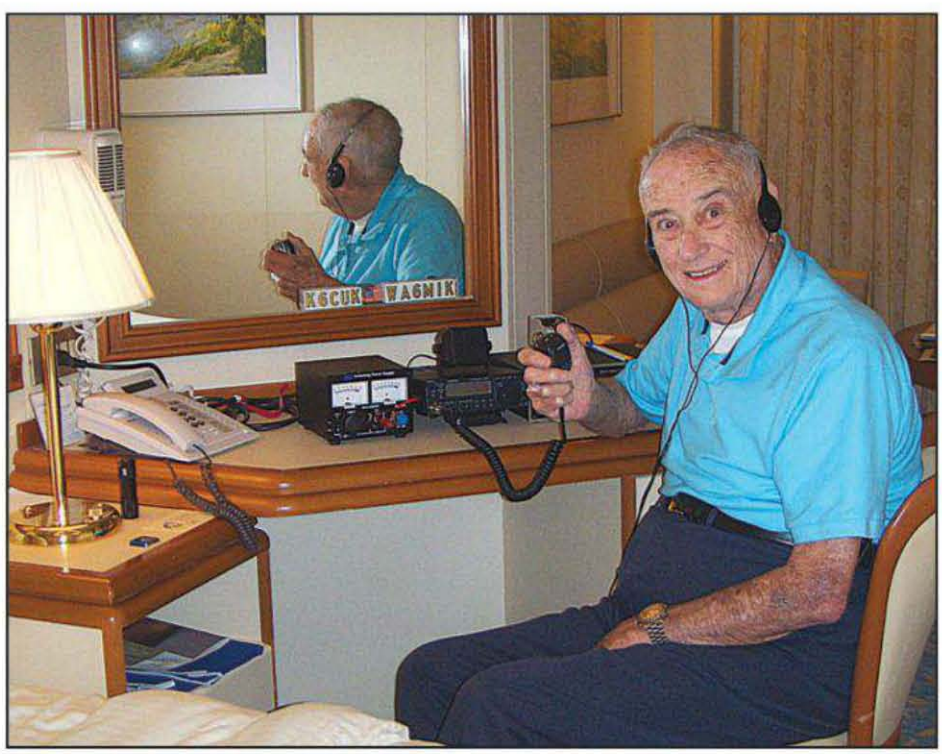
BY ROBERT HAYOS,* K6CUK

During some sixty years of hamming I have had many opportunities to operate portable and mobile on both aircraft and on small boats. Frequently, I had wondered about the possibility of using my ham gear aboard a cruise ship. Several friends who had served as radio officers aboard commercial cargo ships offered encouragement to investigate such a possibility. Having a ham wife (Norma, WA6MIK) with a love of travel, a desire to visit faraway destinations, and the ability to participate in our common hobby surely encouraged me further to search out such venues.

Generally, we found that all radio communications aboard commercial vessels are conducted under cruise company policies and authority. As such, each company can set its own regulations about allowing itinerant operators any on-board privileges—i.e., ham operations.

A few years ago a cruise aboard a delightful passenger ship from London through the Baltic Sea to St. Petersburg, Russia, provided my first opportunity to explore the possibility of successful maritime mobile operation. More recently, my wife set her sights on a two-week cruise from Los Angeles to Hawaii and back, a perfect chance to "ham it up" again while also enjoying the multitude of activities to be found while savoring the pleasures of cruising at sea.

The first consideration for such a trip is meeting the ham operator licensing requirements of the country in which the ship is registered. This is important, because the ship's country of registry may be different than either your point of departure or destination. This licensing authority must involve the country of ship's registry and, of course, any concerned country licensing requirements.[1] Today this requirement can often (but not always) be circumvented because of the Conference of Postal and Telecommunications Administration (CEPT) rules for participating countries.



Bob, K6CUK, at his stateroom "shack" aboard the Golden Princess cruise ship.

Seeking Permission

Once licensing rules have been met, the actual operating authority generally is granted by the cruise line's policies. As such, each company can set its own regulations about allowing itinerant operators any on-board radio privileges. The approval of the vessel's Master (Captain) and his Electro Technical Officer or Radio Officer, if any, is then requested. The preliminary communications for such a request must include the following items:

1. A carefully worded letter to the cruise line's customer assistance personnel requesting permission to operate on the cruise ship. Included should be your date of sailing, the ship's name, and your reservation information (with possible level of priority).
2. A clear description of your FCC amateur radio license authority (with a copy) and your radio communications experience level.

*1502 E. Sycamore Ave., El Segundo, CA 90245
e-mail: <rhayos@socal.rr.com>

3. A description of equipment to be used, international amateur frequencies, power requirements, and antenna installation (everything to be portable and non ship-invasive).

4. A requirement for a small, secluded space for operating, preferably on an upper deck or from your stateroom balcony without any ship structural overhang (a clear shot for antennas).

5. Assurance of non-interference with normal ship communications and operations.

6. A statement promising complete cooperation with ship personnel and passengers.

A careful assessment of all specific components of the radio package and the means of transportation together with any required support tools, etc., will be most helpful. The actual radio package for this trip[2] included a small Kenwood TS-50 100-watt transmitter, a small MFJ switching power supply (115V to 12 VDC), and a small MFJ antenna tuner. The antenna itself was a former loaded mobile whip fastened to an aluminum channel and was to be strapped to the ship's external railing on our balcony. Antenna return grounding was by means of two 7-foot lengths of copper braid connected by alligator clips to the railing frame.

Final Approval

With all equipment in place prior to actual operations, the ship's Electro-Technical Communications Officer was called for a final go-ahead. His main concerns, of course, were that there not be any interference with ship communications and the location of the ham antenna.

Bob's XYL Norma, WA6MIK, at the balcony railing with vertical antenna.

The first call at sea on 20 meters was made on the popular MM (maritime-mobile) frequency of 14.300 MHz as the ship was departing the Los Angeles lighthouse. It was answered almost immediately by a plethora of most welcome calls. During the next two weeks of the cruise, over 40 contacts were logged, with stations as far away as OX3KQ in Greenland.

All in all a very satisfying end to a fine adventure!

Notes

1. For more information on international licensing rules, see <http://www.arrl.org/international-1>.

2. The cruise line for the trip described in this article was Princess Lines of Santa Clarita, CA. The ships were the Royal Princess and the Golden Princess. Not all cruise lines will permit on-board ham radio operations by passengers. It is really a matter of company policy.

LDG ELECTRONICS

#1 Line of Autotuners!

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

M-1000 Meter sold separately

NEW! AT-1000Proll

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

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

AT-600Pro

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

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

AT-100Proll

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-100Proll requires just 1 watt for operation, but will handle up to 125 watts. Includes six-foot DC power cable.

Suggested Price $229.99

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

AT-200Proll

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

Suggested Price $259.99

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

Z-100Plus

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

Suggested Price $159.99

Z-11Proll

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

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). 2,000 memories cover 160 through 6 meters. Also functions as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the Tune button on the tuner. Powered by four AA internal alkaline batteries (not included), so there are no additional cables required.

Suggested Price $129.99

IT-100

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

radio not included

AT-897Plus for the Yaesu FT-897

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

Suggested Price $199.99

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

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

Whether you're searching or hiding, nothing beats the excitement and intrigue of foxhunting. Participate in CQ's Foxhunting Weekend and find out for yourself.

Results of the 2011 CQ WW Foxhunting Weekend

BY JOE MOELL,* KØOV

In last month's issue of *CQ* I asked what a lawn-sprinkler pipe, a power-pole transformer, and a baby carriage have in common. The answer was that they all have been used as places to put transmitters for ham radio hidden transmitter hunts, also called foxhunts, bunny hunts, and T-hunts. Now you can add a snow bank, a tree limb, and a wheelbarrow full of manure to the list. They all were employed by clever and devious huntmasters during 2011.

One of the reasons that ham radio foxhunting becomes more popular every year is that it's an opportunity to unleash creativity, both for the hider and the hunters. Hiders are always on the lookout for clever places to put transmitters and ways to "bounce" VHF signals so that they appear to be coming from the wrong direction. Hunters are constantly seeking out new techniques and technologies so that they can win hunts by arriving first or having the lowest vehicle mileage, depending on the rules of the hunt.

For many ham radio clubs around the country, the kickoff of a warm-weather season of transmitter hunting is the CQ World-Wide Foxhunting Weekend. This year, it is May 12–13. Each group sets its own rules and no two groups do it exactly the same way.

As always, last year's Foxhunting Weekend announcement brought a big batch of reports about hams having fun. Most hunts were on 2 meters, where most hams have receiving equipment. A directional antenna and an RF attenuation system are all that it takes to join in. Both are easy to build or inexpensive to buy.

Some clubs are so eager that they don't wait for Foxhunting Weekend, or even for winter to end. In Manchester, Connecticut it's a tradition to have a mobile foxhunt on New Year's Day. Hunters drive their vehicles full of radio direction finding (RDF) gear to a local school. A 1 PM the hider's signal appears on the input frequency of the club's 2-meter repeater. The hunters take off, hoping to find the hider within the 2-hour time limit. Participants and non-participants are encouraged to get on the repeater and share signal levels and other helpful information, but hunters are to observe radio silence once they find the hiders and the tailgate party that they have prepared.

A little precipitation might deter many hams from seeking hidden transmitters on foot, but that wasn't the case in Eatonville, Washington, near Tacoma. Rich Patrick, KR7W, reported on a foxhunting session last November that was made more interesting by an unexpected snowstorm with accumulations of up to two feet. Bob Heselberg, K7MXE, put out five transmitters in a snow-covered cow pasture and wooded terrain in the hills above Alder Lake. He also put out some decoy markers and fooled at least one hunter into punching in at a decoy instead of the actual transmitter nearby. According to KR7W, "It's hard to keep on-bearing when the terrain looks the same every which way you look."

A foot of new snow made foxhunting interesting at the annual Utah VHF Society meeting and swapmeet in Salt Lake City during February 2011. Larry

Falling snow didn't deter the intrepid on-foot transmitter hunters in Eatonville, Washington last November. Hunters Chuck Kemmer, AC7QN (left), and Rich Patrick, KR7W (center), are in a heated discussion with huntmaster Bob Heselberg, K7MXE, about Bob's decoy transmitter marker. (Photo courtesy KR7W)

*Moderator, CQ WW Foxhunting Weekend
PO Box 2508, Fullerton, CA 92837
e-mail: <homingin@aol.com>
Web: <www.homingin.com>

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground system or radials. Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna . . . Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

MFJ-1798
$299.95

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

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

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. In *phase* antenna current flows in all parallel radiators. This forms a very large equivalent radiator and gives you incredible bandwidths. Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands. Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

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

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

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

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

MFJ *6-Band* Halfwave Vertical Antenna

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed

MFJ-1796
$229.95

MFJ-1796 is only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments, small lots, trailers. Perfect for field day, DXpeditions, camping.

Efficient end-loading, no lossy traps. Entire length always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands.

MFJ-1796W, $229.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ-1792, $189.95. Full size 1/4 wave radiator for 40 Meters. 33 ft., handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $209.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

6-Band, 40-2 Meters *Rotatable* Mini-Dipole

Low profile 14 feet . . . 7 ft. turning radius . . . 40, 20, 15, 10, 6, 2 Meters . . . 1500 Watts . . .

MFJ-1775
$249.95

MFJ-1775 is inconspicuous and low profile -- not much bigger than a TV antenna and is easily turned by a lightweight rotator like Hy-Gain's *AR-35*.

It's no Wimp! Its *directivity* reduces QRM/noise and lets you *focus* your signal in the direction you want -- work some *real* DX.

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

Features automatic band switching and uses highly efficient end-loading with its *entire length* always radiating. With 6 and 2 Meters thrown-in, you have ham radio's most versatile *rotatable* dipole!

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

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

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

MFJ *80/40/20* Meter *Rotatable* Dipole

MFJ-1785
$369.95

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

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$419.95

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes. Enjoy DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto tunes to desired band, then beeps to let you know. No control cable is needed.

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

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

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

Cover 40-15 Meters. MFJ-1788, $469.95. Like MFJ-1786 but covers 40 - 15 Meters continuous. Includes remote control.

MFJ's G5RV Antenna

MFJ-1778
$44.95

Covers all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 M as Marconi. 1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

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

MFJ . . . the world leader in ham radio accessories!

Dealer/Catalog/Manuals
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.***

Sure you can have a foxhunt in the snow! Just protect the transmitters from moisture like Larry Jacobs, WA7ZBO, did for this Utah VHF Society event last February. (Photo by WA7ZBO)

Jacobs, WA7ZBO, organized the hunt as part of an open-house event. To protect his five transmitters, he put them in disposable plastic food containers. Nine attendees were successful in finding them.

WA7ZBO is a tireless promoter of hidden transmitter hunting in central Utah. In March he set up an unattended transmitter on the west side of the Salt Lake Valley behind a church. It stayed on the air for a full week, sending beeps, a CW ID, and voice promptings from an MP3 player. Hunters could use it to practice RDF skills at their leisure.

RDF for Public Service

Year after year, the hams of Daytona Beach, Florida have had monthly mobile transmitter hunts to see who is speediest at finding the "bunny," as they call the hider. Maybe they're in such a hurry because the hunt ends at a restaurant or ice cream parlor and they don't want to miss out on the goodies. For Foxhunting Weekend last year in Daytona, Bob Ledford, WA4IDI, reported that it was a quick drive to find a transmitter at a sewer plant, followed by a gathering at the Dairy Queen.

All that practice paid off for these Daytona Beach hams when a carrier appeared on marine calling channel 16 in August. Their cooperative RDF efforts led them to within a few blocks of the source when it went off the air. A few days later it was back and Frank Haas, KB4T, resumed the search, assisted by Joe Daley, N2GBT.

All bearings pointed to the local marina, so Frank went to security and obtained a key that would get them into any of the docks there. The signal would occasionally go away or change power, but they persevered. A few minutes later their antennas were pointing at an 18-foot inboard/outboard runabout. Inside they could see an old, corroded marine radio, set to channel 16 and locked in transmit. Marina management, the Coast Guard, and the FCC were notified and the problem was solved. Good work!

Mike Brost, WA9FTS, is a long-time transmitter chaser in the Chicago area. He wrote: "We still take foxhunting seriously here with hunts every Saturday night. On March 26, Patty, wife of Matt Sanderson, KC9SEM, showed up to hunt, even though she was very pregnant and having some contractions. Matt and Patty won the hunt, and at the restaurant afterwards, her contractions were more numerous. I left them at 11 PM and the next day I found out that their new son had arrived at 4:40 AM.

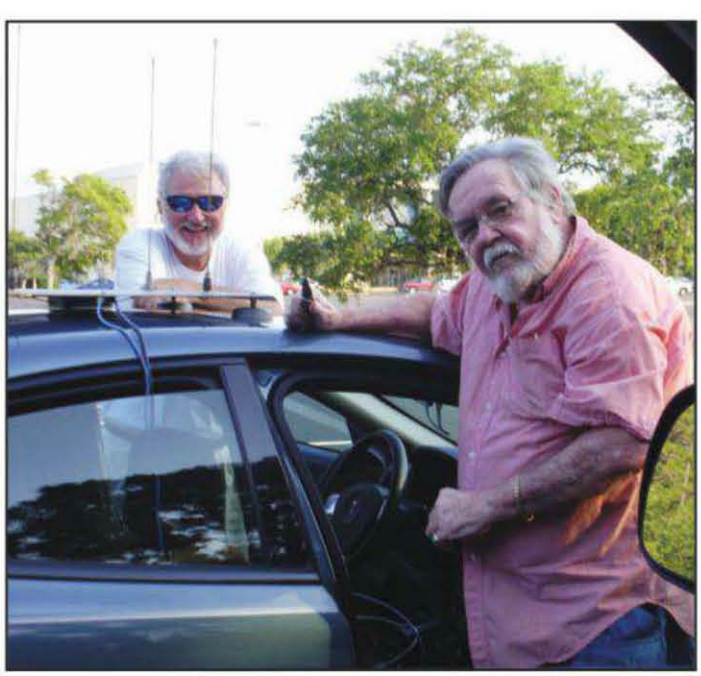
"Patty came home a couple of days later from the hospital," Mike continued. "On April 2, Matt and Patty showed up to hunt with 6-day-old Jacob. Patty was in the back of the Ford F-150 ready to turn the beam with her right hand and hold Jacob in her arm."

Hider Tony Levand, AA9CC, told the story of that hunt: "We decided to find a water tower to illuminate with RF from beneath. We did it by pointing the 10-element beam straight up from the base of the tower. All of the hunters heard the 5-watt signal except for WA9FTS. Mike reported not hearing it when he started, but somehow he won the hunt nonetheless. This setup got out so well that I suggested humorously that our repeater be set up this way."

Hams in the Grand Rapids area reported on a mobile hunt at the Independent Repeater Association hamfest/swapfest at the Hudsonville fairgrounds. These Michigan foxhunters were so eager to do well at this event that they held two evening practice sessions beforehand. Scoring was by odometer mileage, lowest wins. The transmitter for one was six miles away and the results were so close that the top three teams came in with odometer readings within 0.3 miles of each other.

The Grand Rapids hunt on Foxhunting Weekend was organized by Sheila Bosscher, K8AJ, who proudly refers to herself as the "vixen" (a female fox). Michel Hill, W8DER, reported, "The hunt started at 10:00 AM and the rains came. But not one ham remembers if the rain continued or stopped after her first transmission. She was weak, but definitely at a bearing of 57 degrees. We all thought this was going to be a cake walk, because the Grand River was only 3 miles away and she certainly wouldn't be on the other side. The only bridge is too far away and besides, there was a big run going on over there.

"Sheila's instructions stated that she would be located in a car on publicly accessible land or water," Michel continued. "That must have been a clue! Maybe she was in a boat, but



Doppler RDF sets are preferred by many foxhunters in the Daytona Beach area. Most Dopplers can be installed quickly on almost any car, truck, or van. Front to back are Fred Villers, K8FV, and Glenn Karel, WB4WHN. (Photo by Hugh Royal, W4AND)

certainly not on the other side of the river. An hour and a half later, we were still going up and down every road to the river looking for a vehicle floating on a raft. We finally hung our heads and crossed the river.

"Sheila had given us another clue at the start of the hunt: 'Don't jump to conclusions.' Just on the other side of the bridge is Johnson Park on the side of a hill. That was too obvious, so we drove on up the hill. We thought the signal was coming from up the hill past that water storage tank because each bearing pointed to the tank. However, we couldn't hear the fox once we were in front of the tank.

"Finally we found K8AJ at the dead end of a road behind the water storage tank. Time was up, but we didn't get skunked. What a blast! It was still raining, but I hadn't noticed. We shared stories at the local Wendy's and started looking forward to the next hunt."

Is Fibbing OK?

In southern California the longstanding mantra is "Never trust anything said by another T-hunter." Deception and trickery are part of the game. Elsewhere, members of the Pottstown Area Amateur Radio Club in southeastern Pennsylvania got a taste of that during their May 14 event, as reported by Bill Hewitt, KB3UHK. The format of PAARC's monthly sessions is a mobile hunt on 146.51 MHz, followed by an on-foot search for little transmitters on 146.40 and 146.565 MHz.

"The fox's den was aptly named," Bill wrote. "It was the Fox Pavilion at Victory Park in Royersford, about 12 miles from the start. Although there were plenty of reflections, everyone got there in less than 15 miles. Ron Donovan, WA8YIH, had placed one foxbox about eight feet up in the crook of a tree, while Bob Rex, K3DBD, had hidden the other under the decking of a foot bridge.

"Jim Toth, K3CHJ, asked Bob if his fox was under the bridge, and Bob said no. He justified it later by saying that the fox was actually under the decking of the bridge, not the bridge itself. This caused a friendly discussion which is still going on at our weekly breakfast meetings, where Jim can be heard repeating, 'If something is under the decking, then it is under the bridge.' For us, the moral of the story is not to listen to any advice from the fox. It is designed to mislead you. The radio equipment doesn't lie."

From Denver, Rick von Glahn, NØKKZ, reported on a May 15 hunt that had a similar format to the one in Pottstown: "Dan Meyer, NØPUF, was the fox. He is one of the top mechanics at a local car dealer and it was his job to test drive a car and see if he could make it fault to aid in diagnosing a problem. Instead of just driving up and down the city streets, he decided to combine the search for a good hiding place with his checkout of the ailing car."

Rick continued, "While driving past the South Platte, Dan found his spot. His drive-to beacon was along the banks of the South Platte. Two on-foot transmitters were close by, one on the east and one on the west bank of the river. Fortunately, there was a walking bridge that made the river crossing quick and easy."

Foxhunting and camping were combined for some when Neil Robin, WA7NBF, and Paul Voorhees, W7PV, put on an

This is Blue, who had a great time hunting radio foxes with her dad, Byon Garrabrant, N6BG, at the 2011 Yuma (Arizona) Hamfest in February. Then in November, Byon put on a well-attended five-fox on-foot hunt at Papago Park in Phoenix. (Photo by Joe Moell, KØOV)

CQ WW Foxhunting Weekend May 12-13, 2012

CQ magazine has designated May 12–13, 2012 as the CQ World-Wide Foxhunting Weekend and is encouraging all hams and radio clubs to hold hidden transmitter hunts. Since the primary objective is more hunt participation, we don't insist that your event be on that weekend. Any time in the spring is fine with us!

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

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

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

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

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

Joe Moell, KØOV
Foxhunt Weekend Moderator

informal session at 784-acre Fort Flagler State Park on Marrowstone Island in Puget Sound, about forty miles northwest of Seattle. According to Neal, "It is an outstanding salt water marine park with 3.5 miles of beach and fine camping. It has old gun emplacements and many bunkers to explore. Four transmitters were out for folks to find. The location of one on a bluff edge made for some interesting bearings."

Hamfests and Conventions

The annual AES Superfest foxhunt in Milwaukee was organized by Paul Gruettner, WB9ODQ. He placed six little transmitters on the AES property in unlikely places, including beneath a discarded basketball backboard and under a pile of trash. It took Brian Jansen, KC9GMW, just 34 minutes to find all of them.

It has become a tradition to have an on-foot transmitter hunt at Fort MacArthur in San Pedro, California whenever the ARRL Southwestern Division Convention is in the Los Angeles area. For the 2011 convention in September, I went for a personal record by hiding sixteen 2-meter transmitters, plus a few non-transmitting decoys, in the 130 acres of the fort and surrounding park. Most were concealed in the old fortifications and bunkers that had protected the City of Angels from air attack in World War II.

Before the hunt Marvin Johnston, KE6HTS, conducted a workshop for building measuring-tape antennas and offset attenuators[1] from kits that he brought along. This was all they needed for a very effective direction finding with their own handie-talkies and scanners. For several of the participants, this would be their first attempt at RDF, but not their last.

Hunters were given a list of frequencies of the transmitters and some clues as to what they would sound like. Then they were told to find as many as they could in 90 minutes. Each transmitter or its antenna had a tag with a three-digit number on it, to be written onto the clue sheet. Hunters had to pay careful attention, because if they incorrectly marked the number of a decoy, they might lose points. When the final whistle sounded, the team of Byon and Lara Garrabrant (N6BG and KD6AYO) of Chandler, Arizona had found eight of them, more than anyone else. The hunt was a success because everyone, even the first-timers, found at least one.

Sixteen is a lot of transmitters, but it doesn't come close to the 40 little foxes that were set out for attendees of the Dayton Hamvention® to locate. That's probably a world record, and it was a fitting way to make up for several years without a foxhunt at the nation's biggest ham radio gathering. The huntmasters were Hamvention® Foxhunting Forum hosts Bob Frey, WA6EZV; Dick Arnett, WB4SUV; and Brian DeYoung, K4BRI, with help from Phil Smith, KG8AP.

The site was Sinclair Park, less than two miles from Hara Arena, the site of the yearly Hamvention®. WA6EZV wrote, "It is a lovely, wooded setting surrounded by a jogging/walking track. A single road leads into the center of the park and a lodge. There are picnic areas, ball fields, and plenty of other places to stash transmitters."

The hunt format was similar to my convention hunt in California, but the hunters had only an hour to search. With so many transmitters in a mere 10-acre site, they had to pay very

DIGITAL

ALINCO®

Quality. Style. Performance!

440MHz FM MOBILE TRANSCEIVER
DR-435TMkIII

220MHz FM MOBILE TRANSCEIVER
DR-235TMkIII

144MHz FM MOBILE TRANSCEIVER
DR-135TMkIII

50MHz FM MOBILE TRANSCEIVER
DR-06T

29MHz FM MOBILE TRANSCEIVER
DR-03T
(Digital mode not supported.)

*Shown with EDS-9

144/440MHz FM FULL-DUPLEX MOBILE TRANSCEIVER
DR-635T

HF 100W SSB/CW/FM/AM
DESK-TOP TRANSCEIVER
DX-SR8T

SSB/AM/FM/CW and I/Q
LW/MW/SW 150KHz to 30MHz
DESK-TOP RECEIVER
DX-R8T

Whatever your favorite operating frequency, Alinco has a radio that's perfect for making the most of your budget. Featuring a wide selection of easy-to-operate, multi-band desktop,handheld and mobile radios, Alinco delivers maximum value for your amateur radio enjoyment.

144/440MHz FM
HANDHELD TRANSCEIVER
DJ-V57T NEW

440MHz FM HANDHELD TRANSCEIVER
DJ-V47T

222MHz FM HANDHELD TRANSCEIVER
DJ-V27T

144MHz FM HANDHELD TRANSCEIVER
DJ-V17T

144/440MHz FM DUAL
HANDHELD TRANSCEIVER
DJ-C7T

144MHz FM
HANDHELD TRANSCEIVER
DJ-175T

222/902MHz FM FULL-DUPLEX
HANDHELD TRANSCEIVER
DJ-G29T NEW

144/440/1200MHz FM FULL-DUPLEX
HANDHELD TRANSCEIVER
DJ-G7T

IPX7 COMPATIBLE Water-resistant

GRE America, Inc., 425 Harbor Blvd. Belmont, CA. 94002 USA.
Ph: (650) 591-1400 Fax: (650) 591-2001 email: alinco-sales@greamerica.com Website: http://www.greamerica.com

IPX7 COMPATIBLE Water-resistant

See us at the Dayton Hamvention®, booths 440-451 and please visit GRE next to us in booths 452-454 for the latest in scanners.

Distributed in North America by GRE®

Ted Luebbers, K1AYZ, added some PVC pipe to his 2-meter measuring-tape Yagi to give it a nice handle that balances the antenna and keeps his hand from affecting the directional pattern. He used it on the first Foxhunting Weekend event of the Royal Harbor Amateur Radio Club in Tavares, Florida. (Photo courtesy K1AYZ)

The 80-meter band is excellent for foxhunting, especially for beginners. Equipment is small and easy to carry. Confusing signal reflections from buildings and hills don't exist on that band. Kuon Hunt, KB7WRG, is showing her 80-meter RDF set to Jay Hennigan, WB6RDV, at a training session before last year's USA ARDF Championships. (Photo by Joe Moell, KØOV)

close attention and do close-in "sniffing" to be sure that they found the correct transmitters. "Not only did you need to keep track of the frequency," wrote Bob, "but also if it was a solid carrier or intermittent with tones, warbles, CW, AM, or FM. With such a large number of transmitters in a small area, it was not uncommon for someone to come upon one by accident and incorrectly tag it as the one being hunted.

"It's no easy task trying to assemble 40 transmitters for a foxhunt," Bob continued. "Most of the units were handmade by WB4SUV with contributions from the other hosts and Matthew Robbins, AA9YH. Fifteen of them were pad-to-pad soldered from a design on WB2HOL's website.[2] Besides all the 2-meter rigs, there were eight 80-meter QRP transmitters.[3] Powers ranged from 5 milliwatts to 1 watt. The largest transmitters were nearly 12 inches long and 4 inches wide, while the smallest were only 1 inch by 2 inches.

"For those with no RDF gear, there was a good selection of loaner sets for both 2 meters and 80 meters. Newcomers needing assistance were given a short training session prior to the actual hunt. Officially, we logged results for 21 hunters representing 14 teams, and there were a few more latecomers who were unofficial. The winner was Addison Bosley, KJ4VCV. At age 13, he is already well-experienced, having won medals at the USA ARDF Championships in 2009 and 2010."

Hiding 40 transmitters was outrageous, and so was one of the hiding spots for a hunt in the San Diego area last August, put on by Joe Corones, N6SZO, and Greg Spaulding, KD6YQR. "This was an attempt to draw the hunters to Blossom Valley by bouncing a signal off the south face of the El Monte and San Diego River gorge just west of El Capitan, which is north of Glen Oaks," Joe wrote. "I talked my friend Lisa into the use of her horse ranch and training facility, which is off El Monte Rd. It is private property which is against the rules unless you have permission and somehow advertise that fact. We did it by putting up two magnetic T-hunt signs, one on the gate to the ranch and one covering the PRIVATE sign in the front yard."

N6SZO continued, "The main fox used an 11-element beam in the back of Greg's pickup, pointed at the top of Blossom Valley and running 5 watts. A second transmitter, running just 15 milliwatts, was carefully wrapped in a heavy-duty Ziploc® bag down in a wheelbarrow of horse manure. From our observation post in the yard, we could see the wheelbarrow.

"One hunter noted that the wheelbarrow looked 'awfully suspicious' but we reminded him that he had to actually identify the T. This was a case where RF 'sniffers' really come in handy. And really, a wheelbarrow of manure on a horse ranch? Why would that be suspicious?"

What Will Your Club Do?

Thanks to everyone who sent stories and photos of their hunts on Foxhunting Weekend and throughout the year. There were far too many to put in this article, so I have put up a page[4] with more of them at my website.

This year promises to be even better. Now is the time for your club to make plans for 2012. If there has never been a hunt in your area, or if it has been a while, make it simple to get maximum interest and participation. If RDF is already a regular activity, try something new and encourage members who have not participated before.

Be sure to get together after the event to share stories with fellow hunters. Then gather the results plus everyone's photos and send them to me for the report in *CQ* magazine next year. Report forms and more information can be found at my website.[5] I am eager to read your reports of 2012 foxhunting activities and the new ideas that you come up with. Happy hunting!

Notes

1. http://www.homingin.com/equipment. html
2. http://theleggios.net/wb2hol/projects/ rdf/rdf.htm
3. http://www.homingin.com/joemoell/ 80intro.html
4. http://www.homingin.com/fw11pix.html
5. http://www.homingin.com

A Wideband Field Strength Meter

BY IRWIN MATH,* WA2NDM

One of the more common pieces of equipment that many amateur operators use is the field strength meter. Various versions of this device have been around almost since the beginning of the amateur radio hobby. Most typically consist of a diode detector (often germanium for sensitivity), followed by a micro-ammeter, and usually are limited to frequencies in the HF region, although some VHF and even UHF versions do exist. In addition to measuring the output of a transmitter, the field strength meter is also useful for antenna radiation pattern measurements, hidden transmitter locations (such as in a fox hunt), and general RF detection.

This month we would like to introduce you to a more modern version of the field strength meter, one that covers the range from 10 kHz to over 1 GHz (1000 MHz) and is almost as simple to build as its many predecessors.

Our circuit uses the Linear Technology LTC5507, which is described by the company as an "RF Power Detector." It consists of a Schottky diode peak detector and gain of 2 buffer amplifier all contained in a tiny SOT type surface mount package. The chip operates from 2.7 to 6 volts DC and therefore can

*c/o CQ magazine

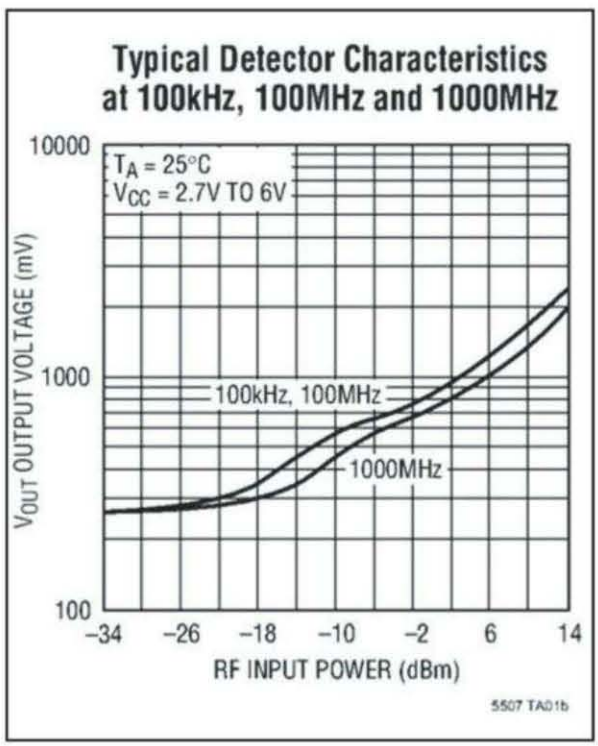


Fig. 1– Frequency response of LTC5507.

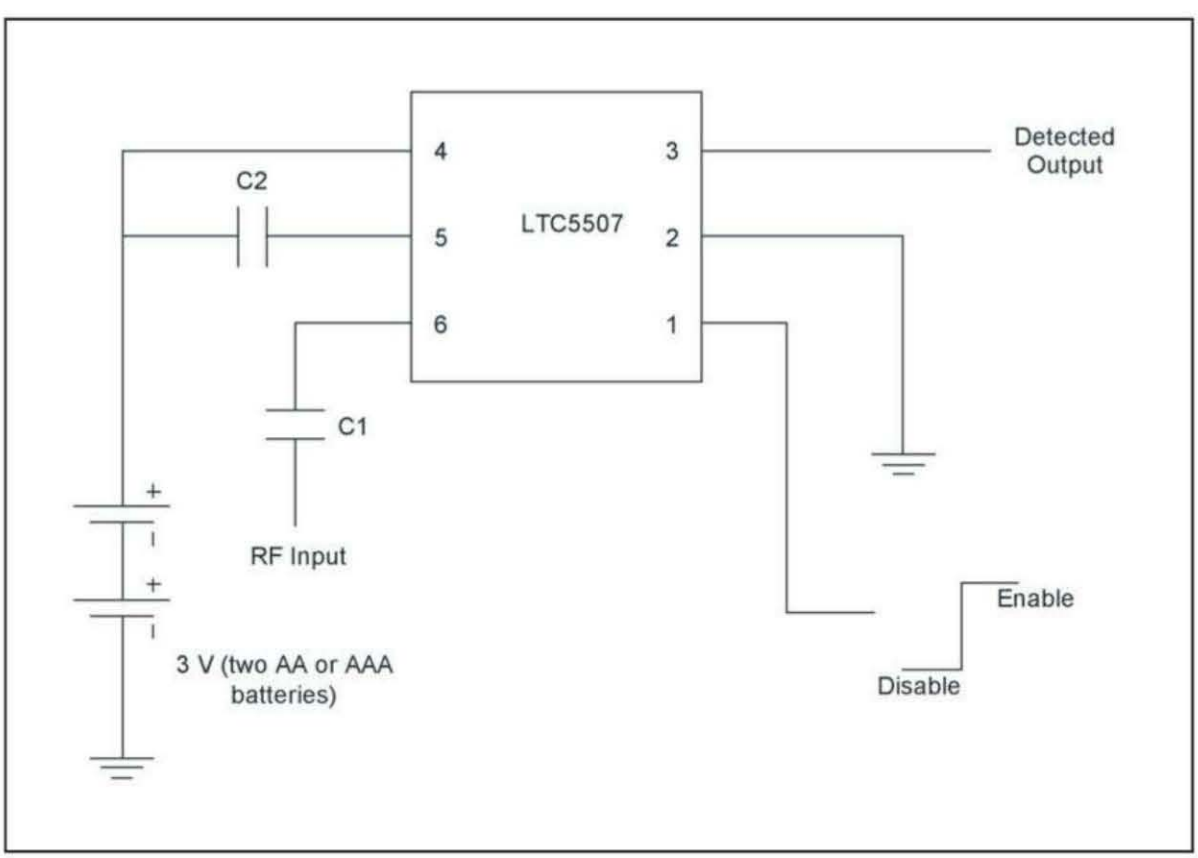


Fig. 2– Basic LTC5507 circuit.

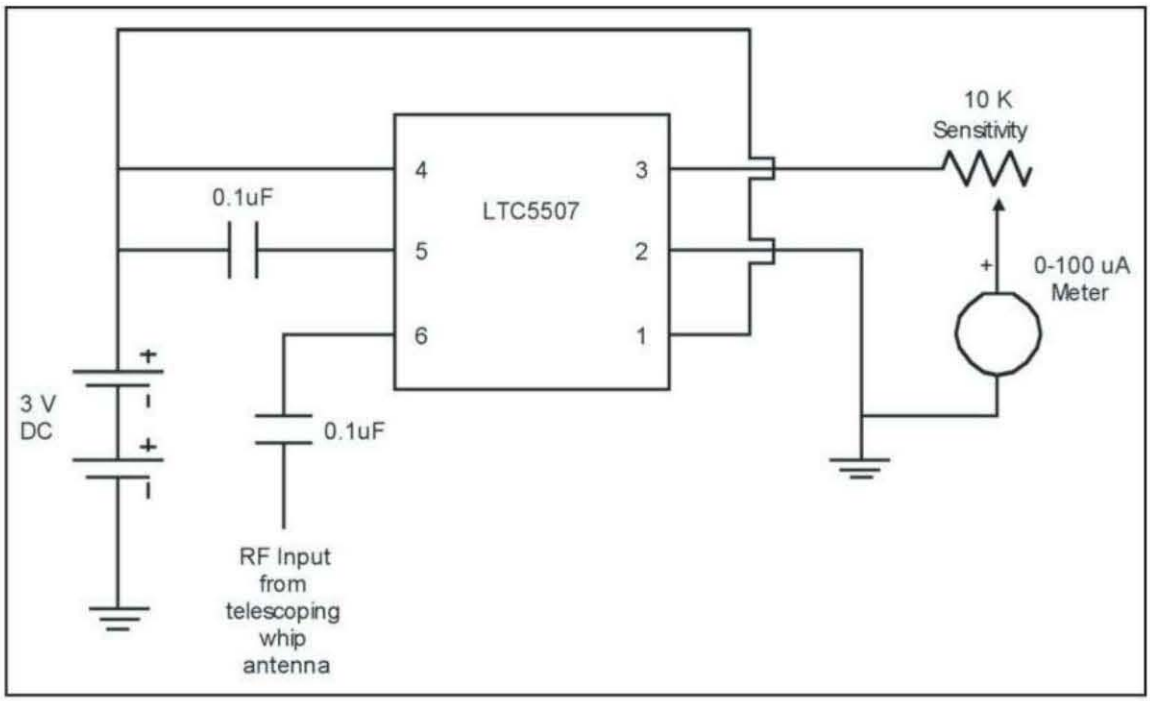


Fig. 3– LTC5507 field strength meter circuit.

be powered from a couple of AA batteries. The sensitivity of the circuit extends from –34 dBm (about 1/2 microwatt) to +14 dBm (about 20 milliwatts) over the entire frequency range. The resulting DC output has a frequency response of DC up to about 1.5 MHz, so it can even be used as a wide-band AM detector, if you wish. Fig. 1 is a graph showing the input power vs. output DC level (in millivolts) over the entire range of the chip. While not particularly linear, the range is quite impressive.

Fig. 2 is the basic operating schematic of the LTC5507. C1 couples the input to the chip and should be chosen for the frequency range desired. It should be a ceramic type for best results, and you must be careful of self-resonances, particularly at high frequencies. Remember, if you use a 0.1 µF, for example, it does not take much lead length to resonate above a few tens of MHz. As a result, it is not a good idea to use any sort of electrolytic capacitor, since the internal winding of the foil elements in the capacitor package is inductive and will certainly resonate at some frequency over the wide range of the device. C2 is the filter capacitor for the output of the peak detector and will affect the speed of response of the output. As a rule of thumb, both C1 and C2 should be selected according to the following guidelines suggested by Linear Technology:

$$C1 = C2 = 1/30 \times F$$

F is the lowest frequency desired in MHz, and both C1 and C2 are in µF.

Of course, you can always experiment with these values to meet your specific needs, so don't be afraid to "play."

Fig. 3 is the schematic of a complete field strength meter covering the entire 10-kHz to 1-GHz range using the LTC5507. You will note that we have coupled the input to an adjustable telescoping whip antenna and the output to a 100-microampere panel meter along with a variable "sensitivity" control. Power is provided by a couple of AA or AAA batteries, and the entire device is mounted in a small aluminum enclosure. Power drain is very low, and the batteries will last for many hours of measurements. Due to the small size of the components and the frequencies involved, try to keep all input leads as short as possible. Also, don't be afraid to solder directly to the pins of the chip. Use a soldering iron with a tiny tip and a single strand of wire from common twisted conductor wire to connect to the chip. We routinely use individual strands from common #16 stranded house wire, and they are perfect for the task. A free 1-foot "sample" from a local home center will provide enough jumpers for numerous experiments. Finally, be sure to download the data sheet from the Linear Technology website for more information.

73, Irwin, WA2NDM

What You've Told Us...

The first thing we noticed in looking at the responses to February's survey about CW activity five years after the FCC ended its code-testing requirement is that it no longer seems to be the emotional issue it once was. In the past, any survey on Morse code caused a big spike in the number of responses. This month's numbers were thoroughly average.

Among our respondents, 71% said that they currently operate CW. The majority (56%) said there has been no change in their level of on-air CW activity in the past five years, but 18% said their CW activity had increased, while only 2% said it had decreased. In addition, 5% said they were licensed after the code test was dropped and 21% said they're not active on CW at all. Your perceptions of the general level of CW activity is in line with everything else we've been hearing. While 43% said activity levels were about the same now as they were five years ago, 26% said there seems to be more, and only 9% said there is less. Another 22% said they don't know.

Nineteen percent of our respondents identified themselves as relatively new to CW operating. Of that group, 42% said people they contact on CW generally are patient with them, 33% said they find plenty of people to contact at slow speeds, and 27% have gotten help and advice from other hams on CW operating. On the flip side, 18% are having trouble finding people to contact at slow speeds, 11% say they haven't received CW-related help from other hams, and 2% say other hams are not patient with them.

Among our experienced CW operators (63% of the total), 71% said they've slowed down to accommodate newer, slower, operators; 40% have offers help and advice to new CW ops and 38% have gone out of their way to contact newer operators.

Finally, 27% of the respondents said that they have purchased a new telegraph key in the past year. Of that group, 65% bought new keyer paddles, 29% bought a hand key and 16% bought a semiautomatic "bug."

This month's free subscription winner is Joel Clements, N7SIY, of Cedar City, Utah.

Reader Survey May 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's issue covers some of the more specialized areas of ham radio, such as foxhunting, RTTY, and amateur satellites. So we'd like to ask a few questions about your interest and activity levels in some of those areas.

Please answer by circling the appropriate numbers on the reply card or by going to the following web link <www.surveymonkey.com/s/CQMay12> [From the digital edition, just click on the link].

1. Which statement best describes your participation in hidden-transmitter hunts (also called foxhunts, bunny hunts, T-hunts and radio direction-finding, or RDF)?

A regular part of my ham radio activities.....1
Do it occasionally, but not regularly 2
Tried it once; would like to do it again.....3
Tried it once; didn't like it 4
Never tried it, but I'd like to someday.....5
Never tried it, and I'm not interested 6

2. Which statement best describes your participation in amateur satellite communications?

A regular part of my ham radio activities.....7
Do it occasionally, but not regularly 8
Tried it once; would like to do it again.....9
Tried it once; didn't like it 10
Never tried it, but I'd like to someday.....11
Never tried it, and I'm not interested 12

3. Which statement best describes your activity in RTTY (radioteletype) or other digital keyboard modes?

A regular part of my ham radio activities.....13
Do it occasionally, but not regularly 14
Tried it once; would like to do it again.....15
Tried it once; didn't like it 16
Never tried it, but I'd like to someday.....17
Never tried it, and I'm not interested 18

4. Which statement best describes your activity on 60 meters?

A regular part of my ham radio activities.....19
Do it occasionally, but not regularly 20
Tried it once; would like to do it again.....21
Tried it once; didn't like it 22
Never tried it, but I'd like to someday.....23
Never tried it, and I'm not interested 24

5. Which statement best describes your activity in VHF/UHF "weak-signal" communications?

A regular part of my ham radio activities.....25
Do it occasionally, but not regularly 26
Tried it once; would like to do it again.....27
Tried it once; didn't like it 28
Never tried it, but I'd like to someday.....29
Never tried it, and I'm not interested 30

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

MFJ Dummy Load/Wattmeter

1.5 kW Dry Dummy Load has built-in precision, true peak-reading SWR/Wattmeter switchable to external antenna!

World's most versatile 1.5 kW dummy load has a *built-in* true peak reading SWR/Wattmeter that you can switch and use independently!

You'll find tons of uses!

Tune up your transceiver, linear amplifier or antenna tuner into a safe 50 Ohm dummy load at *full power*. Then instantly switch to your antenna and monitor SWR, forward and reflected power.

Use for testing/tuning transmitters, transceivers, amplifiers, antenna tuners, baluns, transformers, filters, matching networks, coax, stubs, transmission lines and antennas.

The 50-Ohm dry dummy load works DC to 60 MHz. SWR is below 1.3:1 at 30 MHz. Can handle 100 Watts for ten minutes or 1500 Watts for ten seconds. Comes with power derating curve.

MFJ-267 **$159.95**

Extra-large three-inch lighted Cross-Needle meter reads SWR (1:1 to 8:1), forward and reflected power *simultaneously*.

Reads *true peak* PEP or average power on 300/3000 Watts forward and 60/600 Watts reflected power ranges 1.8-54 MHz.

High accuracy comes from a carefully designed directional coupler, an accurate active-peak reading circuit and a precision d'Arsonval meter movement.

RF tight perforated aluminum cabinet. 4½Wx3½Hx10½D inches. Uses 12 VDC or 120 VAC with **MFJ-1312D, $15.95.**

MFJ HF/VHF/UHF Dummy Loads

Dry 300 Watt HF/VHF Dummy Load

MFJ-260C **$39.95**

Air-cooled, non-inductive resistor in a perforated metal housing; Has SO-239 connector. Full load for 30 seconds. Silk-screened derating curve to 5 minutes. Handles 300 Watts. SWR is below 1.1:1 to 30 MHz, 1.5:1 from 30 to 650 MHz. Compact 2¼x2¼x7 inches. **MFJ-260CN, $49.95.** With type "N" connector.

Dry 1.5 kW HF/VHF/UHF Dummy Load

MFJ-264 **$74.95**

Ham radio's most versatile 50 ohm *dry* dummy load. Works with all radios from 160 Meters through 650 MHz. SWR below 1.3 to 650 MHz and below 1.1 at 30 MHz. Handles 100 watts for ten minutes, 1500 Watts for 10 seconds. 3Wx3H x9D inches. Has SO-239 connector. **MFJ-264N, $84.95.** With type "N" connector.

Oil-Cooled 1 KW CW, 2 KW SSB VersaLoad™

MFJ-250X **$49.95**

Run 1KW CW or 2 KW PEP for 10 minutes. Run *continuous duty* with 200 Watts CW or 400 watts PEP. Transformer oil not included. Low VSWR to 400 MHz. Under 1.2:1 to 30 MHz. SO-239 connector. Safety vent with cap, carrying handle. 7½Hx6⅝D inches. **MFJ-250, $69.95.** Includes transformer oil (no PCB).

3 GHz, 300 Watts Dry Dummy Load

MFJ-263 **$99.95**

New high-tech metal film resistor gives low SWR up to 3 GHz at 300 Watts! Mounted on large heavy-duty air-cooled heatsink. SWR is less than 1.1 DC to 1 GHz, 1.2 at 1.5 GHz and 1.5 at 3 GHz. Handles 125 Watts *continuous* and 300 Watts for ten seconds. High quality *Teflon*(R) N connector. 10¾Wx2¼Hx5¼D in. **New!**

MFJ Frequency Counters

MFJ-886 **$129.95**

MFJ-886 covers 1 MHz to 3 GHz with 300 MHz direct count, 0.1 Hz resolution. 4 gate times. 10-digit high-contrast 3/4 inch LCD display. Lock display button. Bargraph shows RF field strength. Includes rechargeable Ni-Cad batteries, charger, telescopic antenna. Black anodized aluminum. 2¾x2¼x1¼ inches.

MFJ-888 **$199.95**

MFJ-888, like MFJ-886, but covers *10 Hz*-3 GHz. Measures frequency/ period, has 50/1M Ohm input, auto hold, LED backlight, beeper. 2¾x4¼x1¼ inches

Field Strength Meters

MFJ-802 **$49.95**

MFJ-802 shows relative antenna field strength. Use to determine radiation pattern. Has large 3 inch meter. Telescoping *dipole* reduces influence of surrounding objects and is more reliable and repeatable than monopole. Sensitivity control. Jack for remote sensor. **MFJ-802R, $34.95.**

MFJ-801 **$29.95**

MFJ-801 has 1¾ inch meter, sensitivity control, 20 inch extended telescoping monopole antenna.

Find Power Line Noise fast!

MFJ-852 **$119.95** with dipole

MFJ-856 **$159.95** with 3 el.Yagi

Choose 3 element Yagi or compact telescoping dipole to quickly pinpoint noise. Walk or drive with these handheld, directional noise finders to search out leaky insulators, loose hardware and corroded ground lines quickly. Track noise directly to pole, transformer, insulator or others. Has field-strength meter, headphone jack to listen or record. Operates in optimum 135 MHz region. Sensitive .3uV receiver, 70 dB AGC.

81 dB Step Attenuator

MFJ-762 **$89.95**

81 dB Attenuator in 1 dB steps. 50 Ohms. Usable to 500 MHz. 250 milliwatt maximum input. BNC connectors. Shielded stages. Connect between receiver and antenna and use S-meter as a precision calibrated field strength meter. Prevent receiver blocking, cross-modulation. Determine gain/loss, ideal for fox hunting. Evaluate linearity. Isolate circuits. Extend range of sensitive equipment. Measure input/output level differences.

Compact Cross-Needle SWR/Wattmeters

MFJ-822 **$59.95**

MFJ-822, $59.95. Large 3-inch *lighted* Cross-Needle meter covers 1.8-200 MHz in 2 power ranges: 30/300 Watts. Read forward, reflected power, SWR *simultaneously*. Compact 3¼Wx3¼H x3¼D inches takes little space. Perfect for home, mobile or portable use. SO-239 connectors. Use 12 VDC for lamp (cable included). **MFJ-842, $59.95.** Like MFJ-822, but covers 140-525 MHz, 15/150 Watt ranges.

25-1300 MHz Discone Antenna

MFJ-1868 **$59.95**

Ultra wide-band antenna receives 25-1300 MHz. Perfect for scanners. Transmit 50-1300 MHz. Handles 200 Watts. Ideal for 6/2/1¼ Meters, 70/33/23 CM ham bands. Excellent for testing various transmitters on single coax. SO-239, 50 feet coax, stainless steel elements.

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.***

BY FREDERICK O. MAIA,* W5YI

New Worldwide 600-meter Ham Band Awarded at WRC-12

Delegates approve secondary 472-479 kHz frequency allocation to the Amateur Radio Service.

The World Radiocommunication Conference (WRC) is held every three or four years by the Geneva-based International Telecommunication Union (ITU) to review, and, as necessary, revise the international Radio Regulations (for background, see sidebar "About the ITU and the Radio Regulations").

WRC-12, Geneva

The 2012 World Radiocommunication Conference took place in Geneva, Switzerland, from January 23 to February 17, 2012. There were more than 3000 participants representing 150 out of the International Telecommunication Union's 193 member states.

The WRC was preceded by the Radiocommunication Assembly (RA) from January 16-20, 2012. The Radiocommunication Assembly is responsible for the structure and approval of radiocommunication studies and assigns conference preparatory work and other questions to various study groups.

About 100 observers, including the International Amateur Radio Union (IARU), also were in attendance. Created in Paris, France in 1925, the IARU is an international confederation of national amateur radio societies from around the world. The IARU represents the interests of amateur radio at international meetings.

WRC-12 ended in Geneva on Friday, February 17 after several all-night sessions in its final week where delegates worked hard to reach a consensus on an updated worldwide framework for use of the radio spectrum.

The best guess is that it will be five years before 472–479 kHz becomes available to U.S. radio amateurs.

Agenda Item 1.23

One of the items on the agenda was consideration of a possible secondary allocation to the Amateur Service of about 15 kHz somewhere between 415 and 526.5 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 communication. Many SOS calls and medical emergencies at sea were handled on that frequency until the late 1980s. However, because of the near disappearance of the commercial use of Morse code, the frequency is now rarely used.

Emergency traffic on 500 kHz has been replaced by the Global Maritime Distress Safety System (GMDSS). This system, which the world's maritime nations, including the United States, have implemented, is based upon a combination of satellite and terrestrial radio services and has changed international distress communications from being primarily ship-to-ship based to primarily ship-to-shore.

Beginning in the late 1990s, most nations ended monitoring of transmissions on 500 kHz. The nearby frequencies of 518 kHz and 490 kHz are used for the Navtex component of GMDSS.

Maritime Mobile Service, 495–505 kHz

Agenda Item 1.10 called for the conference to examine the frequency allocation requirements with regard to operation of safety systems for ships and ports and associated regulatory provisions, in accordance with Resolution 357 (WRC-07).

Toward that end, WRC-12 delegates approved a worldwide exclusive allocation to the Maritime Mobile Service from 495–505 kHz. An amateur allocation on these frequencies, even on a secondary, not-to-interfere basis, was found to be incompatible with a new digital navigation system being planned for this spectrum.

Amateur Radio Service, 472–479 kHz

The ITU allocation plan divides the world into three geographical regions. Region 1 includes Europe the Middle East, Northern Asia, and Africa; Region 2 is North, Central, and South America; and Region 3 includes China, India, Asia, Australia, and the South Pacific.

*1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

Except for some Middle Eastern countries and the Russian Federation, a global 7-kilohertz segment from 472–479 kHz was identified as agreeable as an Amateur Service allocation for all three ITU Regions. Access to this spectrum will be on a secondary basis to the Maritime Mobile Service using narrow band modes.

These frequencies are very close to those originally promoted by CEPT, the European Conference of Postal and Telecommunications Administrations. CEPT's proposal was for a 600-meter Amateur Service allocation from 472–480 kHz.

CEPT is one of the regional organizations recognized by the ITU in its WRC preparations. It is a collaboration of 48 countries across Europe that work together to coordinate telecommunications for their mutual benefit.

On February 14, 2012, the delegates at WRC-12 formally approved allocating 472–479 kHz to the Amateur Radio Service with a power limit of 1 W EIRP (effective isotropically radiated power). A special provision allows countries to permit up to 5 W EIRP under certain circumstances.

About the ITU and the Radio Regulations

The ITU is an international organization established to standardize and regulate international radio and telecommunications. It was founded as the International Telegraph Union in Paris on May 17, 1865, and today is the world's oldest international organization. It became a United Nations agency in 1947.

Although its first area of expertise was the telegraph, the work of the ITU now covers everything from digital broadcasting to the internet, and from mobile technologies to 3D TV. An organization of public-private partnership since its inception, the ITU currently has a membership of 193 countries and some 700 private-sector entities. The ITU is headquartered in Geneva, Switzerland and has twelve regional and area offices around the world.

The ITU has three main areas of activity which are organized in "Sectors." Amateur radio regulations are handled by the ITU's Radiocommunication Sector (ITU-R)

Revisions to the Radio Regulations are made on the basis of an agenda determined by its governing body, the ITU Council, which takes into account recommendations made by previous world radiocommunication conferences.

The general scope of the agenda of world radiocommunication conferences is established four to six years in advance, with the final agenda set by the ITU Council two years before the conference with the concurrence of a majority of member states.

The Radio Regulations are an intergovernmental treaty which, among other things, defines the allocation of different frequency bands to different radio services, including the Amateur Radio Service.

ARRL Issues Recommendations for New 60-Meter Privileges

Expanded amateur privileges on the 5-MHz (60-meter) band became effective on March 5, 2012. These include one new frequency (swapped with another), increased maximum power limits, and permission to operate CW and some digital modes in addition to upper sideband (USB) voice. However, there continue to be very specific rules and restrictions regarding amateur operation on this band, which is secondary to federal government users in the United States.

The ARRL has published a "recommended practices" guide to our new privileges on 60 meters, and we urge every current or potential user of the band to read it carefully and abide by its recommendations. Here is a summary:

Power

Amateurs are now permitted to use up to 100 watts ERP, relative to a half-wave dipole. If you are using a dipole, you may run up to 100 watts output. But if you are using a beam with 3 dB gain over a dipole (dBd), then you may put out only 50 watts (50w + 3dB = 100w ERP). *(Read more specifics in the ARRL guide.)*

Frequencies

Sixty meters continues to be a channelized band, with amateur signals restricted to five specific frequencies. Table 1 contains the frequencies to which you should tune your transceiver for USB or digital modes (these take into account the offset of a USB signal from the center frequency). Table 2 contains the center frequencies for each channel. These should be used for CW operation and must be on the exact frequency. However, see note below in CW section.

Channel 1	5330.5 kHz
Channel 2	5346.5 kHz
Channel 3	5357.0 kHz
Channel 4	5371.5 kHz
Channel 5	5403.5 kHz

Table 1. "Suppressed carrier" frequencies for the five 60-meter amateur channels. Tune your rig to one of these exact *frequencies for* ***USB*** *or* ***digital mode*** *operation (see text for additional detail).*

Channel 1	5332.0 kHz
Channel 2	5348.0 kHz
Channel 3	5358.5 kHz
Channel 4	5373.0 kHz
Channel 5	5405.0 kHz

Table 2. Center carrier frequencies for the five 60-meter amateur channels. Tune your rig to one of these exact *frequencies for* ***CW*** *operation (see text for additional detail).*

Modes

There is no change in the requirements for operating **USB voice**. Just tune to one of the frequencies in Table 1 and operate, making sure you are in compliance with power limits and that your signal is not more than 2.8 kHz wide.

CW operation is also pretty straight-forward, using the frequencies in Table 2. *However,* many transceivers offset the CW frequencies from what is on the display by several hundred Hertz (typically 600–700 Hz) in order to produce a pleasing tone in your headset. If your rig does this, you must compensate to make sure you are transmitting on the exact frequency specified in Table 2. See your user manual, use a frequency counter, or contact your manufacturer.

Digital modes are subject to a 60-Hz bandwidth limitation, so traditional Baudot RTTY will be too wide to be permitted (even though the FCC's Report and Order refers to RTTY). The National Telecommunications and Information Administration (NTIA), which coordinates federal government radio operations, has requested that amateur digital communications on 60 meters be limited to PSK-31 and PACTOR-III only. The ARRL strongly recommends compliance with this request.

To operate PSK-31 on 60 meters, you must be transmitting on the center channel. However, the League guide says the easiest way to comply with this rule is by putting your rig in USB mode and tuning to one of the USB frequencies in Table 1. Then, using the audio frequency setting on your waterfall display, click the mouse to place the cursor at the 1500-Hz mark. This will compensate for the offset and put you right on frequency. *You may not vary from this specific setting.*

For PACTOR-III, the guide says you simply put the rig in USB mode and tune to one of the Table 1 frequencies. It notes that automatic PACTOR operation is not permitted, only live keyboard-to-keyboard QSOs.

Additional Tips

The ARRL guide also includes tips on avoiding interference to primary users, and suggested operating practices beyond the legal requirements. The complete guide (a 5-page PDF document) may be downloaded from <http://bit.ly/y04J7h>, a shortened link directly to the guide on the ARRL website.

These countries include administrations whose territory is beyond 800 kilometers (about 500 miles) from the borders of the following countries: Algeria, Saudi Arabia, Azerbaijan, Bahrain, Belarus, China, Comoros, Djibouti, Egypt, United Arab Emirates, the Russian Federation, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Lebanon, Libya, Morocco, Mauritania, Oman, Uzbekistan, Qatar, Syrian Arab Republic, Kyrgyzstan, Somalia, Sudan, Tunisia, Ukraine, and Yemen. (Most of the United States is more than 500 miles from any of these countries, so it is possible that any eventual U.S. amateur privileges on 600 meters will permit up to 5 watts EIRP, except in parts of Alaska.) The change becomes effective with the adoption of the Final Acts of the Conference.

The new band at 600 meters represents the return of all amateurs to the medium waves. This is an area of spectrum to which U.S. hams have not had access—except for an experimental license—since the earliest days of radio. In recent years, some limited amateur radio operation has also been allowed in the region of 500 kHz in the UK, Germany, and Sweden.

In September 2006, the FCC's Office of Engineering and Technology did grant an experimental license, WD2XSH, to the ARRL on behalf of a group of radio amateurs who were interested in investigating spectrum from 505–510 kHz using narrowband modes at power levels of up to 20 W effective radiated power (ERP) using CW and PSK31.

Propagation at 500 kHz

Medium frequency (MF) refers to radio frequencies (RF) in the range of 300 kHz to 3 MHz. Part of this band includes the medium-wave AM broadcast band. In North America this extends from 535 kHz to 1705 kHz.

Propagation at MF is primarily via ground waves. Groundwave propagation at these frequencies follows the curvature of the Earth over conductive surfaces such as the sea and damp earth. At sea, MF communications typically can be heard over several hundred miles.

MF skywave propagation depends on the various layers in the ionosphere as the signal is refracted back down to Earth. Late at night, especially in winter months and at times of low solar activity, the lower ionospheric *D*-layer can virtually disappear. When this happens, MF radio waves can easily be received hundreds or even thousands of miles away, as the

signal will be refracted by the remaining *F*-layer. This can be very useful for long-distance communication on a quiet frequency.

Hurry Up and Wait

Don't plan on getting a 600-meter station on the air anytime soon. The new allocation will not take effect until it is entered into the ITU's Radio Regulations, which is unlikely to be earlier than January 1, 2013.

Once that happens, each country's telecommunications regulations will need to be revised to implement the allocation to radio amateurs on a country-by-country basis. Each administration around the world must determine what modes and bandwidths will be used and when and which operators in that country will have access to the spectrum.

This could take a few years of rulemaking. (It took four years for U.S. amateurs to reap the no-code benefits of WRC-2003.)

Here in the United States, the Final Acts of WRC-12 must be ratified (approved) by Congress. Each time Congress enacts a law affecting telecommunications, the FCC develops rules to implement the new regulations. The Commission takes a series of steps to develop these rules. These steps offer consumers an opportunity to submit both comments and reply comments to the FCC. It is all very time consuming, since all comments must be read and considered.

The first step is generally a *Notice of Proposed Rulemaking* (NPRM) issued by the FCC. An NPRM contains proposed changes to the Commission's rules and seeks public comments and reply comments on these proposals.

After reviewing the comments, a *Further Notice of Proposed Rulemaking* (FNPRM) could be issued (and more comments) ... or the FCC could go directly to a *Report and Order* (R&O).

The R&O states the new rules and a summary of the R&O is published in the Federal Register. The Federal Register summary will tell you when a rule change will become effective.

Those having an objection to the R&O can file a Petition for Reconsideration within 30 days from the date the R&O appears in the Federal Register.

A Memorandum Opinion and Order (MO&O) is issued in response to the Petition for Reconsideration affirming the new allocation regulations, or an Order on Reconsideration amending the new rules or stating that the rules will not be changed could be issued.

Each of these rulemaking steps can take months (or longer) to implement. The best guess is that it will be five years before 472–479 kHz becomes available to U.S. radio amateurs.

There is also an effort under way to place an amateur radio item on the agenda for the next WRC, which will take place in 2015. CEPT is working on an allocation at 700 MHz, since additional TV spectrum is expected to be released in Europe. The next WRC will also consider a possible worldwide amateur allocation at 5 MHz (60 meters). This band is currently available only in certain countries (including the U.S.). Amateurs in the U.S. recently were given new privileges on 60 meters, as well as one frequency that was nearly always in use by the band's primary user exchanged for one that should be available for hams to use more frequently. For more on the new rules, see the sidebar "ARRL Issues Recommendations for New 60-Meter Privileges." 73, Fred, W5YI

public service

BY RICHARD FISHER,* KI6SN

Indiana Ham Puts His Radio, and Life, On The Line when Tornado Strikes

The tornado outbreak that brought March 2012 "roaring in like a lion" across the Tennessee and Ohio valleys and parts of the southern United States was one as remarkable as it was tragic:

- Thirteen tornadoes with an intensity of EF-3 (136 to 165 mph winds) or higher were confirmed in seven states: Alabama, Kentucky Georgia, Tennessee, Indiana, Ohio, and West Virginia.
- Thirty-nine people were killed.
- The most severe tornado, an EF-4 (166 to 200 mph) on March 2, touched down in Henryville, Indiana, where top winds were clocked at 170 mph—of such intensity that a factory building was leveled to its foundation "with anchoring bolts bent in the direction of storm."
- Dr. Greg Forbes, severe storm expert for The Weather Channel, reported that 71 tornadoes touched down March 2, significantly eclipsing the March 31, 1990 record-setting 59 tornadoes for a single day in March.
- A total of 1063 severe weather reports were made, the most since May 25, 2011.

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

Radio amateurs from across this massive tornado-ravaged region were called to service and stepped up in a selfless and mighty way.

This month we'll focus on reports from Indiana, where 13 people were killed and many millions of dollars in damage are being reported. Other chapters of this amazing story from other regions and other states will be told in subsequent editions of "Public Service."

Tornado on the ground! Call it in to the county!

By Delbert Felix, WY9L

The Ripley County ARES® (Amateur Radio Emergency Service) team was deployed to do severe weather spotting at mid-afternoon on Friday, March 2. While I was traveling west on Highway 50, I spotted heavy rotation in the clouds. *(**IN DEPTH:** For information on Ripley County, Indiana, visit: <http://www.ripleycounty.com/>.—ed.)*

As I proceeded toward the town of Holton, a funnel cloud began to develop and was dropping toward the ground. I pulled my truck across Highway 50 to block vehicles that were headed into the path of the tornado.

I was screaming into the amateur radio rig: "Tornado on the ground! . . . Tornado on the ground! Call it in to the county!"

Radio amateurs who provided vital communications when tornadoes ravaged Indiana included, back from left: Johnathon Stemann, KC9PXV; James Meyer, KB9UVF; Floyd Whitham, W9VR; Randy Baugh, KB9NZE; Dave Mayer, WD8NMZ; Ken Courtney, W9BLA; John Ryle, American Red Cross Southeastern Indiana Chapter Executive Director; and George Long, Red Cross Regional Assistant Disaster Director. In the front row, from left, are: Delbert Felix, WY9L; Judy Baugh, KC9OJE; and Gene Dolgner, KC9RLC. (Courtesy of WY9L)

The force of the winds sheared off trees and damaged homes across Ripley County, Indiana. (Courtesy of KC9RLC)

I tried to get a couple of people out of their vehicles to safety in a basement of one of the houses that was nearby, but people were too interested in taking photos.

As I tried to get back to my vehicle, I was blown down and could not get back up due to high winds, so I crawled to a nearby mailbox post and held on until the tornado passed. It seemed like forever, but was actually over in just a few minutes. When it passed, I got up and checked on the people sitting in their vehicles. Everyone was fine.

I was experiencing severe back pain from my tumble, but managed to get back into my truck to drive about 200 feet to the edge of town and blocked traffic once again.

The town had exploded with debris everywhere. Many power lines were down and rubble from homes littered the streets. I called American Red Cross Southeastern Indiana Chapter Executive Director John Ryle to advise him that we needed shelter set up immediately at one of the two schools owned by the South Ripley School Corporation in Versailles, Indiana. I recommended deploying the American Red Cross Disaster Assistance Team (DAT). I also serve as the Ripley County DAT leader. So I started wearing two hats at once for this disaster.

My wife, Donna, KC9RGI, is from Holton. The first thing I noticed was a mobile home belonging to my daughter's godfather had disintegrated. Moments later, the fire department, EMS personnel, and law enforcement began arriving from all agencies around Holton. At this time, I was relieved by the fire chief of Versailles and I started getting ARES members organized to assist the Red Cross with communications, as well as labor for its shelter.

I arrived at the Red Cross office and the ARES team was already in motion loading cots and equipment for the Red Cross.

Once the supplies arrived at the school, Red Cross personnel had arrived and they worked along with ARES to get the shelter set up immediately. I traveled between the shelter, Red Cross office, and tRipley County EOC (emergency operations center) many times in the hours that followed.

I would like to thank the Ripley County Repeater Association <http://rcrepeater.tripod.com/> for allowing us to use its amateur radio repeater. Ours was down for repair.

David Rayner, AI9D, did an excellent

Preliminary Findings: NWS Storm Survey Teams

- Two separate super-cell thunderstorms were tracked over southern Indiana and into Kentucky with each producing a tornado along their path.
- Between the towns of Pekin and Henryville the storms followed essentially the same path and were separated by approximately 10 minutes.
- The first storm was the more powerful of the two, producing an EF-4 tornado (166 to 200 mph winds) which damaged homes and a large junior-senior high school in Henryville.
- Further EF-4 damage was found near Chelsea in Jefferson County.
- Near Pekin in Washington County EF-3 (136 to 165 mph winds) damage was found.
- EF-2 tornado (111 to 135 mph winds) was preliminarily identified in Posey County.
- EF-3 tornado was preliminarily identified in Ripley County.

(Note: Findings are preliminary and are complicated by the long distances and overlapping tracks the storms and tornadoes traveled, according to the NWS and Indiana Department of Homeland Security.—ed.)

A piece of wood, propelled by tornado-force wind, impaled the roof of this house in Holton, Indiana. (Courtesy of KC9RLC)

job as Weather Net control station. It seems as if the net control is never recognized when people ask about the storm spotters. Without his service many lives would not have been spared; we have quite a list of scanner listeners on both the 146.805-MHz machine and our machine (Ripley County Amateur Radio Club) on 441.775 MHz (http://rcarc.ripleycounty.net/).

The saying "When all else fails . . . amateur radio" certainly applied to the ARES team of Ripley County. It served our citizens remarkably well in March 2012 as it has for the four years it has been in operation.

Indiana: County-By-County Death Toll

Ripley: 2 fatalities from the Holton area
Clark: 1 fatality in Henryville
Jefferson: 4 fatalities in Saluda Township near Chelsea
Scott: 1 fatality in Lexington Township (southeast Scott County)
Washington: 5 fatalities in New Pekin

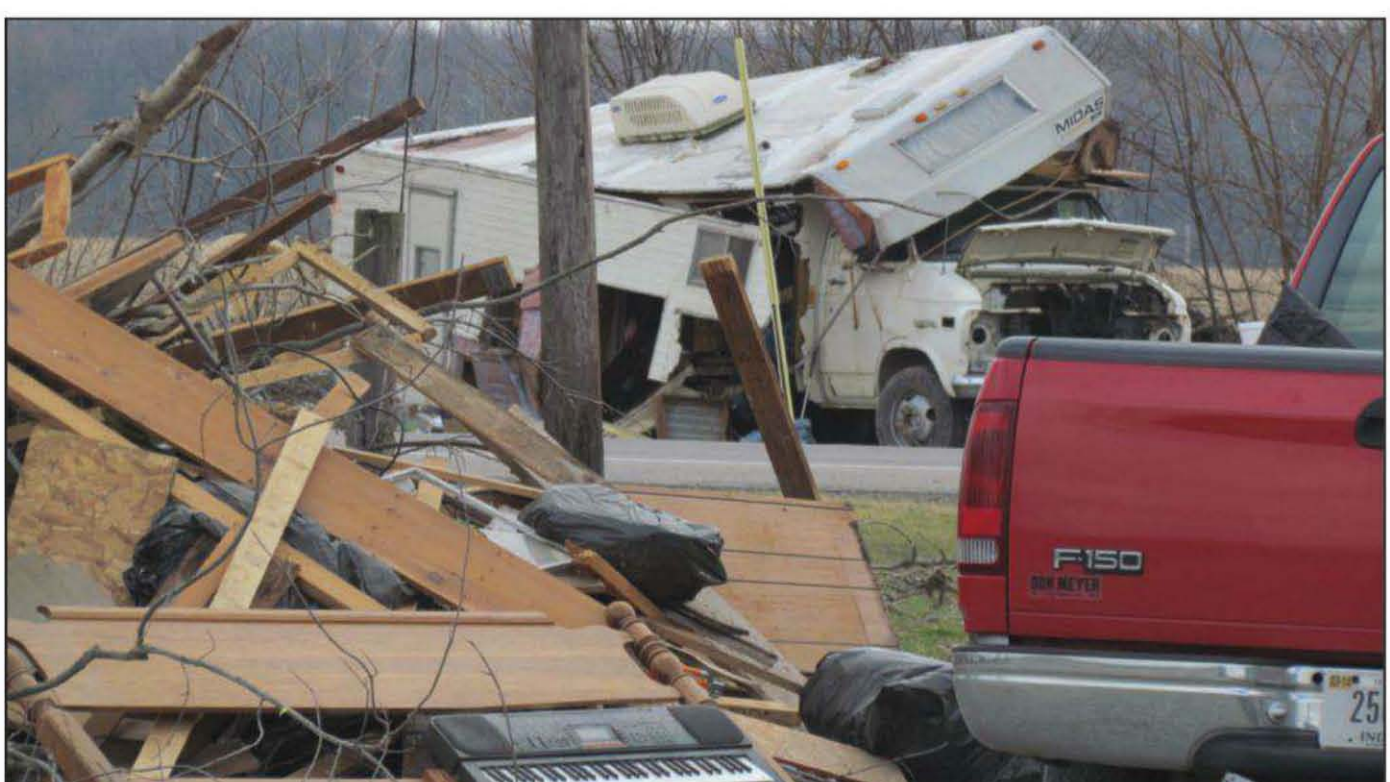
I am extremely pleased with the response of ARES members and their performance. There is always room for improvement, and I feel the ARES numbers will grow and continue to do good things in the future for the residence of Ripley County and its surrounding counties. We give our thanks, as well, to all the agencies—public and private—that assisted in response to the Holton tornado.

Delbert Felix, WY9L, is ARRL District Emergency Coordinator for District 9; and S.E.I. American Red Cross Disaster Assistance Team (DAT) Leader, Ripley County office.

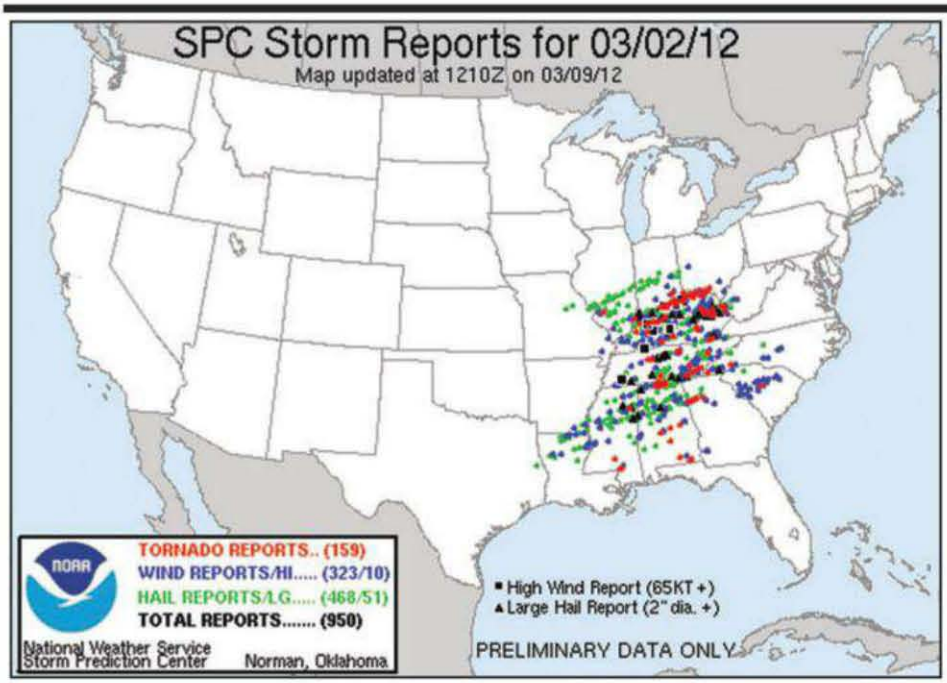
Standing Tall and Ready in Decatur County

By Mike Caster, K9MDC

About 1:30 PM local time, Shawn Fields, KD9UDC, Decatur County



Debris piled in the aftermath of the severe weather outbreak in Indiana was a common sight in the Holton area. Houses, cars, trucks, and motorhomes all took the brunt of the storms. (Courtesy of KC9RLC)



In this National Oceanic and Atmospheric Administration map of the severe weather outbreak on March 2 red dots are tornadoes, blue are high winds; and green indicate hail. Black boxes are reports of 65+ knot winds (75 mph); black triangles indicate 2+ inch diameter hail. (Courtesy of NOAA)

ARES AEC in charge of SKYWARN® activities, called me to discuss communications strategies for the approaching dangerous weather. I decided to implement and test our phone tree plan. ***(IN DEPTH:*** *For information on Decatur County, Indiana visit: <http://www.decaturcounty.in.gov/>.—ed.)*

An e-mail was sent to KC9UDC, and Mike McCoy, KC9ELU, the other AEC. It included instructions, phone numbers, and whom to call. I then called Shawn and Mike with the directive to implement the phone tree and advise all ARES members to prepare for SKYWARN® activation.

Shawn called and reached his assigned members. Mike was working, however, so I called his half of the list.

It appears, with the exception of one, all members responded to the calls. We left a message for her. I believe she was at work.

At 3:45 PM NWS Indianapolis activated a SKYWARN® net. Decatur County called a net and stayed in net mode for an hour and 20 minutes. Six mobile operators and three base stations participated. Decatur County did not experience any severe weather. The net stood down at 5:05 PM.

Mike Caster, K9MDC, is Decatur County ARRL EC.

More to Come . . .

That's it for this month. In coming months we'll be heralding the heroics of other radio amateurs who played such an important role in emergency communications during the March 2012 tornado outbreak.

73, Richard, KI6SN

learning curve

BY RICH ARLAND,* K7SZ

Working "The Birds"

One facet of the ham radio hobby that absolutely intrigues me is satellite communications, or SATCOM. I grew up with the space program. I can remember Alan Shepard's suborbital flight aboard Freedom 7 on May 5, 1961. I watched on a rather snowy TV picture as Shepard was fired into a sub-orbital spaceflight by a Redstone launch vehicle. I was 15 years old. I can visualize that flight like it was yesterday. Friendship 7 carried John Glenn on February 20, 1962 for three orbits, putting America's first astronaut in Earth orbit. Glenn's launch vehicle was a converted Atlas ICBM. By the end of the Mercury program in 1963, we had launched six American astronauts into space and recovered them all successfully! America's space program was on the move: Next stop, the MOON!

Gemini and then Apollo followed Project Mercury, each program pushing our fledgling space agenda further and further ahead, culminating in our landing of two astronauts on the surface of the moon in 1969. On that stifling July day I was on my way via the Japanese train system to work at the Fuchu Tech Control facility just north of Tokyo. Although we were discouraged from wearing our military uniforms while off-base, I was truly glad I had worn mine that day. I think I shook hands with every Japanese person on Honshu! They were not greeting me, but they were showing their love of America and the fact we had done something that had never been done in the entire history of mankind: putting humans on another planetary body. Even today, thinking back on this event and my train ride from Nishi-Tachikawa to Fuchu, I feel humbled by what Buzz Aldrin and Neil Armstrong accomplished. It was a great day to be an American!

*770 William St. SE, Dacula, GA 30019
e-mail: <k7sz@live.com>

Clint Bradford, K6LCS (on right), at the Santa Barbara, California, hamfest a couple of years ago, helping a newly-licensed amateur (in striped shirt) make his first-ever ham radio contacts via satellite. (K6LCS photo)

Around the time that Alan Shepard flew in Freedom 7, a group of dedicated hams fabricated a small transmitter package and approached NASA and the USAF to find a ride into orbit for what soon became OSCAR-1. OSCAR stands for **O**rbiting **S**atellite **C**arrying **A**mateur **R**adio, and ham radio's first attempt to orbit a small transmitter into space was a success. Lofted into orbit on December 12, 1961, OSCAR-1 made ham radio history! Many heard the "HI" sent in CW by OSCAR-1 during the following 22 days that the bird was in orbit, including one 15-year-old soon-to-be licensed amateur radio operator, yours truly.

I never lost my interest in SATCOM. It wasn't until the early 1980s when I got really bitten by the SATCOM bug while stationed in England with the Air Force (ours, not theirs!). Sitting on my workbench was a 23-channel CB rig that I had just converted for 10-meter FM. I kept hearing something trying to break the squelch, so I opened the squelch and heard some CW! I had not calibrated the dial at that time, so all I knew for sure was that the rig was on 10 meters, somewhere around 29 MHz. The noise bursts (which are exactly what CW sounds like when being received on an FM receiver) were readable and eventually I pulled a callsign out of the mess: AO-7! AMSAT-OSCAR 7! Wow! Who woulda' thunk it?? To top it all off, the only antenna I had on the converted CB rig was a 5-foot piece of hook-up wire. You gotta love this hobby!

This extremely crude experiment led me to start actively listening for the downlink beacons on several of the Low Earth Orbit (LEO) satellites, also called "birds." It was fun. It was exciting. It was *different*! But most of all, it was habit forming. I was hooked.

Unfortunately, the days of the 1980s and '90s are long gone and with them the majority of the LEO birds that offered an inexpensive and relatively easy way to play in the SATCOM arena. Most of these satellites had on-board transponders in what was then called "Mode A," which was a 2-meter uplink and a 10-meter downlink. This was easy to do with a good HF receiver and a simple 2-meter CW or SSB rig as a transmitter. Antennas were not a big problem, and I utilized omnidirectional verticals on both 2 and 10 meters

for many years to work these SATs. Over the years, these satellites fell victim to air molecules (yes, there are air molecules in low Earth orbit), which produce a drag on the satellite, causing it to eventually slow down enough to fall out of orbit and re-enter the Earth's atmosphere. In short, the bird dies.

Not all is lost, however, as there are several LEO birds that carry equipment that make it possible to communicate through the satellites via V/UHF FM! Now *that* is cool!

Before we go any further, let's take a closer look at the lexicon of terms you'll encounter in the amateur satellite communications arena.

Our first acronym is **LEO**, short for **Low Earth Orbit** satellites. From the Earth's surface outward, between 160 to 2000 km, is referred to as low earth orbit. Anything in orbit above that 2000-km distance is considered a middle or high Earth orbit. Currently there are several LEO birds available for today's budding amateur SATCOM enthusiast who has a dual-band VHF/UHF handheld. At these distances the signals from the satellite coming back to Earth are relatively strong and easily picked up by most radios of today.

Another couple of unique SATCOM terms are **uplink** and **downlink**. The uplink is a block of frequencies from your Earth station that you transmit on to get "up" to the satellite. Obviously, downlink is a block of frequencies that are used from the satellite "down" to your Earth station. Often you will see these chunks of frequency spectrum expressed as **Modes**. Instead of saying "2-meter uplink and 70- centimeter downlink," many SATCOM ops refer to this particular grouping as **Mode V/U**, as in VHF uplink and UHF downlink. Since the actual up and downlink frequencies are well published, when you say **Mode V/U** you are automatically talking about 2 meters up and 70 cms down. Mode U/V would be the reverse of Mode V/U: 70 cms up and 2 meters down. Pretty easy!

Orbital period is yet another SATCOM unique term. This is the time that it takes for the satellite to circle the Earth. LEO birds have an orbital period of around 90 minutes. This is calculated once the orbit of the satellite has been established and is part of the unique set of numbers, called **KEPS**, (short for **Keplerian Elements**), that is used to compute the time the satellite will appear at your local horizon (called **Acquisition of Signal,** or **AOS**) and when it will drop below your local hori-

Array Solutions

Please visit our booth in Dayton to see more new products. We were not ready to go at press time, but we have some very exciting new products that will be announced in Dayton!

Dayton HAMVENTION® 2012 Internationally Connected

See us at the Dayton Hamvention®, May 18-20, 2012 – Booth #606-622

Introducing the ACOM 1500

The ACOM 1500 is based on the very popular of ACOM 1000. It is the same physical size and general appearance as the 1000. The tube is one 4CX1000A and the power supply is beefed up to provide 1500w PEP output on 160 through 6m. The other differences are 3 switchable antenna outputs, a larger and easier to read LCD display, and an LED TX indicator. Pricing has not been set, and FCC approval is pending.

The ACOM 1500 has not been approved by the FCC. This device may not be sold or leased, or offered for sale or lease, until FCC approval has been obtained.

NEW!

See the full ACOM line at Dayton

NEW!

PowerMaster II

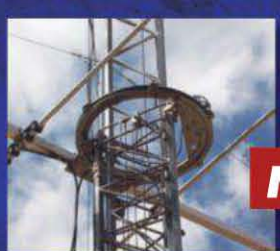
- New Larger, Sharp & Fast LCD Display
- Reduced Energy consumption
- USB and RS-232 interface built-in
- Best accuracy in the market
- New - Both 3kW and 10kW couplers on one display - switched
- Supports 2 like couplers simultaneously (3kW & 3kW, 3kW & V/UHF, 10kW & 10kW)
- SWR Threshold Protection (with amp PTT bypass)

Green Heron

The RT-21 and RT21D (deluxe) controllers support virtually all commercial rotators and Array Solutions is pleased to offer Green Heron controllers pre-configured for Prosistel and M2 Orion rotators.

Prosistel

The most powerful Antenna Rotator systems available for amateur, commercial, government or military services. The new PST110 is the largest rotator available for amateur service.



The new stainless steel ring rotor is as much art as it is engineering. See them in Dayton.

NEW!

SSB Electronics Antenna Switches and Preamps

Array Solutions now carries the full line of SSB's top of the line VHF, UHF, and SHF sequencers, switches and preamps. See them all in Dayton!

NEW!

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.

Array Solutions

Please visit our booth in Dayton to see more new products. We were not ready to go at press time, but we have some very exciting new products that will be announced in Dayton!

Dayton HAMVENTION® 2012
Internationally Connected

See us at the Dayton Hamvention®, May 18-20, 2012 – Booth #606-622

OptiBeam

OptiBeam antennas are known around the world as the best-designed amateur antennas achieving optimum performance on every band. There are no lossy traps in the multiband designs and they deliver true mono-bander performance on each band. OptiBeam construction is without peer in the industry. The finest German craftsmanship and the best available materials are used to ensure maintenance-free, long-term performance. Tom, DF2BO will once again be with us in Dayton. Stop by for your personal OptiBeam system consultation."

NEW!

Bird Wattmeter Digital Display Conversion Kits

Upgrade for your Bird analog watt meter that will transform your Model 43 into a state of the art digital meter!
AS-43A Average Power Reading Bird Wattmeter Kit Digital meter kit
AS-43AP Peak Power Reading Bird Wattmeter Kit Digital meter kit

Announcing the NEW Array Solutions...

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.
- True TDR function.

NEW!

Rig Expert Antenna Analyzers

RigExpert manufactures powerful antenna analyzers designed for testing, checking, tuning or repairing antennas and feedlines. See the full line including the new AA-1000 in Dayton!

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. True TDR function.

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.
- Dual Smith charts with zoom and rotation.
- Analog/digital I/O port for accessories.
- True TDR function.

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

ARRAY SOLUTIONS

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.

zon (called **Loss of Signal**, or **LOS**). These two sets of times are critical in establishing contacts on a LEO sat. The closer the "pass" is to being directly overhead between AOS and LOS, the longer talk time you will have.

One cardinal rule regarding SATCOM: always, *always* use just enough power on your uplink transmission to hit the satellite reliably. Anything over and above that is wasting power. Also, using large amounts of uplink RF can block other stations from accessing the satellite and limit your number of potential contacts.

You'll also encounter **apogee** and **perigee**: the high point and low point, respectively, in the satellite's orbit. This isn't all that critical when we speak of LEO birds, but there are other satellites out there that have highly elliptical orbits called **Molniya** orbits which have a very low perigee and an extremely high apogee, allowing many hours of access time when they are above your local horizon.

Thanks to Clint Bradford, K6LCS, Area Coordinator for AMSAT and keeper of the <www.work-sat.com> website, for graciously offering the accompany-

Work Satellites with your HT!

By Clint Bradford, K6LCS, Area Coordinator for AMSAT

Most hams already have the necessary equipment to work FM amateur satellites. This guide offers all the information you need to "work the birds." All cited resources—and a lot more info—are available to you at: <http://www.work-sat.com>

If you have 2M and 440 capabilities (either "split frequencies" in one HT, or two radios), you can work FM amateur satellites! For example, for satellite SO-50's VHF/UHF (V/U) mode, the UPLINK frequency (to SO-50) for FM voice is 145.850 MHz.* The Downlink freq (from SO-50) is 436.795 MHz.

First, you need to know WHEN and WHERE the satellite will be passing over your location. There are several commercial computer programs that will tell you. In the home office, I use MacDoppler. Outside, though, I use PocketSat on my Palm PDA or iPod touch/iPhone. On my netbook, Nova for Windows and SatPC32 are amazing. But free of charge info is also available online at <www.amsat.org> or <http://heavens-above.com>.

Plug in your longitude and latitude coordinates on either or both of these sites, and you can access amateur satellite pass information.

The one "absolute" for success is to open up your squelch. We are talking about "weak signals" from 500+ miles away, so don't expect the satellite to be strong enough to break squelch like your local repeater. Sure, it's a little noisy, but that's part of the process: That noise is an aid in locating the satellite. When the frequency starts to exhibit quieting, that's a sign that you are capturing the satellite's signal.

Improve your HT's stock antenna (most are rated at NEGATIVE 2–3 dB!). For BNC connectors, Pryme's AL-800 will make the difference. For SMA, the Diamond SRH-320a or Smiley 270A are better performers. Using an Arrow dual-band Yagi or Elk log-periodic is better. If you prefer to homebrew your antenna, go to the worksat.com Web site's ANTENNAS page for construction article links. A fun project is the tape measure beam—for about $20 in parts!

Set up your radio to tune for the Doppler Effect on the downlink. Start listening above the center frequency; you will acquire the satellite sooner and clearer. When the downlink gets scratchy or fuzzy, tune down 5 kHz at a time and reception should be clearer. Only transmit when you can clearly hear the satellite. Follow the signal down in frequency as the pass continues *(but continue transmitting on the same frequency—ed.)*. Tables 1 and 2 show how I have programmed my HT for working the AO-27 and SO-50 satellites, respectively.

Ch #	Name	TX Freq	CTCSS	RX Freq	CTCSS
101	27 +2	145.850	None	436.805	None
102	27 +1	145.850	None	436.800	None
103	27 MID	145.850	None	436.795	None
104	27 -1	145.850	None	436.790	None
105	27 -2	145.850	None	436.785	None

Table 1. Here's how K6LCS has programmed his radios for AO-27. No CTCSS required. Successfully working AO-27 takes an "extra step" in planning, as you need to check its operating schedule to make sure it will be ON for your chosen pass. Links to that scheduling program are on the worksat.com site. Note that only the receive frequency changes.

Ch #	Name	TX Freq	CTCSS	RX Freq	CTCSS
201	50 +4	145.850	67.0	436.815	None
202	50 +3	145.850	67.0	436.810	None
203	50 +2	145.850	67.0	436.805	None
204	50 +1	145.850	67.0	436.800	None
205	50 74	145.850	74.4	436.795	None
206	50 MID	145.850	67.0	436.795	None
207	50 -1	145.850	67.0	436.790	None
208	50 -2	145.850	67.0	436.785	None
209	50 -3	145.850	67.0	436.780	None

Table 2. Here's how Clint has programmed his handheld radios for SO-50. SO-50 does require a tone of 67.0 on the uplink. If you KNOW the satellite is there, but you do not hear anyone else, then you might need to turn its ten-minute timer ON by sending it a couple seconds of 74.4 Hz on your uplink! (Channel 205 above is Clint's "wake-up" frequency.)

Don't hold your whip antenna upright. Held in a vertical position, your transmitted signal is hitting land-based receivers. You need to tilt your HT's antenna so that it is perpendicular to the airborne satellite. Very few of the ham satellites are land-based (grin), so you must TILT your antenna about the same amount as the satellite's ELEVATION. You'll quickly get the hang of it and hear the difference! You'll have better results with a modest beam or Yagi.

Ideally, we should all be working the satellites in full duplex mode, where we can simultaneously listen to the downlink as we are transmitting. Although this method is preferred, it is not mandatory: Carefully monitor the downlink, and wait for a break in the conversations to announce yourself. You might find it helpful to record your sessions for later review and logging. Even if you don't make a contact during a pass, a recording can help you recognize the callsigns and voices of other operators. Pocket recorders or smartphone apps are great for this. If working full-duplex, use an earpiece or headphones to monitor the downlink.

Knowing your grid square—and having a grid square map—is a quick way of identifying locations of what you will hear. The ARRL and Icom have grid square maps. Icom's is free and available at many ham radio stores.

It just takes a little preparation and planning for working amateur satellites. Not every pass is workable with an HT; don't go after the sub-10° elevation passes as you start "working the birds." Choose your passes wisely: Working higher elevation passes will give you better results and longer "talk time." When you clearly hear others, listen for a break in the action and use the ITU approved phonetics to announce your callsign, grid square, and op mode: "KILO-SIX-LIMA-CHARLIE-SIERRA, DELTA-MIKE - ONE-THREE, handheld."

Check work-sat.com for the satellites' home Web pages to make sure the sat is in the mode you can work with your setup!

Ask questions! Find an elmer in your club for support, or use the Work-Sat.com Yahoo Group for any questions and join AMSAT-NA! Membership isn't that expensive, and members are entitled to discounts on satellite tracking software and publications. Support the sats by supporting AMSAT!

Access this Web site for all citations, links, resources, and updates: <http://www.work-sat.com>.

A handheld radio and a handheld beam antenna are all you need to work some FM satellites. This antenna is a homebrew "Cheap Yagi" designed by CQ Antennas Editor Kent Britain, WA5VJB. Here Dave Clausen, W2VV, and Bill Ward, KD4ISF, try to work SO-50 from a hotel balcony in New York City. Note the angle of the antenna, as described in the text. (W2VU photo)

ing sidebar information on working the FM satellites for the neophyte SATCOM operator for inclusion in this column. Clint can be reached at: <www.worksat.com> or via e-mail at: <clint@clintbradford.com>. Also, to answer the most often-posed question: "Yes, it really is that easy!"

That's a wrap for this month. I hope Clint and I have stirred your interest and you'll take advantage of the opportunities to put your handheld rigs to use as SATCOM Earth stations. Next month: Hittin' the bush with K7SZ! Be there or be square (I always wanted to use that!)

73, Rich, K7SZ

This photo is on K6LCS's QSL card. It was shot at the Los Angeles County fair while working three countries (US, Canada, and Mexico) on a single pass of an FM satellite. Power out was just 2 watts. (K6LCS photo)

THE HISTORY OF M2 ANTENNA SYSTEMS, INC.

M2 Antenna Systems, Inc is a woman owned business that started in 1984 as a small typesetting business. It was originally a partnership between Myrna, K6MYM and Mike, K6MYC (hence the M2 name). When "desktop publishing" came along, Myrna decided it was time to sell the antiquated photographic and word processing equipment. (good thing!). At that time Mike and other owners of KLM Electronics had sold KLM and Mike was consulting. Soon an opportunity came along to "get back into the antenna business". A 150 foot dish project launched the Staal team of Mike, Matt and Kenny back to what they do best. Soon a huge project came along to provide the Trucking industry with instantaneous communication and location data using Meteor scatter techniques. Rapid growth motivated the company to move from the high dollar Silicon Valley to business friendly Fresno California and M2 was off and running.

Mike, the M of KLM has been designing and building antennas since 1971. He became a ham in 1956 and always had a great interest in antennas. He began moon bouncing as a pioneer in 1964 and has been active ever since.

M2 Antenna Systems Inc. uses this background of technical expertise and real world experience to understand and to accommodate your antenna and related equipment requirements. Now with over 41 years of experience designing and building antennas and systems we can satisfy your ever expanding communications needs.

We don't just build antennas, We have expanded our products to include positioners for both azimuth and elevation as well H frames, phasing lines, power dividers and now preamps, sequencers and our new line of solid-state Kilowatt amplifiers.

We understand radio propagation and Mother Nature's effects on it. We also understand how to beat Mother Nature mechanically. We take time to learn our customer's needs. We know the pitfalls, and we are dedicated to do everything we can to help you achieve the best, most reliable communication systems possible. We are still a woman-owned, small business with old-fashioned work ethics. Our growing base of repeat customers is a confirmation of our commitment to excellence and performance.

NEW FEATURED PRODUCTS

2M-1K2

- 2 Meter Solid State Amplifier
- Single LDMOS FET Device
- Instant On / No Warm Up
- 144-148 MHz
- 1200 Watts N @ 50W Drive
- 50% Duty Cycle
- DC Input 50VDC Power @35A
- AC Input 180-250VAC @15A
- N-Female Input/Output Conn
- 13.6VDC Preamp Relay Voltage
- N.O. External Relay Control
- Key Mode = Key to Ground
- (2) Temp Controlled Fans
- Over Temp Shut Down @ 90C
- Over Drive Fold Back
- Size 7.125"W / 9"H / 12.5"D
- Weight 21 lbs.

2M-PA

- 2 Meter Preamp
- High-Q Mini Helical Band Filter
- 144-147 MHz
- 0.5 dB Noise Figure
- 20 dB Gain / Nominal
- 0.2 dB Insertion Loss / Nominal
- +11-+18VDC Operating Voltage
- 160W Max Power Handling
- External Keying
- 10 dB Noise Test Generator
- 15 ms TR Delay
- Size 5"W / 5" H / 2" D
- Weight 2 lbs.

S3 SEQUENCER

- Full Sequencing Control
- (3) Outputs (2 Relay, 1 Collector)
- +11-18VDC, 1A Max Power Input
- GND / +2-12VDC to TX Input
- 50mS or 35 mS Timing on TX
- 120mS or 85 mS Timing on RX
- Size 3.07"W / 1.69"H / 4.72"D
- Weight 2 lbs.

The S3 Sequencer provides the timing and switching necessary to run most terrestrial and EME stations, without adding a lot of weight or expense. It's small size and easy setup make it ideal for trips and portable operations.

PREAMP/RELAY HOUSING

- EME Applications
- Terrestrial Applications
- Includes Preamp(s) and Relay(s)
- Single Polarity
- Dual Polarity
- Map 65 System
- 6M / 2M / 70CM
- Mast Mounted

Ideal for VHF/UHF Systems where Hi Power Transmit/ Receive (T/R) Function and polarity switching are common.

COME SEE US AT THE DAYTON HAMVENTION
MAY 18TH-20TH, 2012
AT BOOTHS 627 & 628

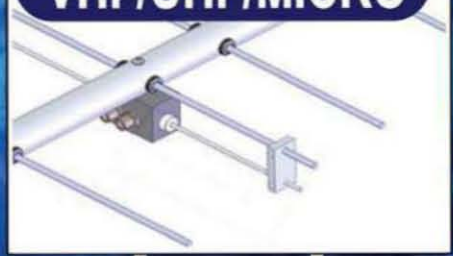
Dayton Hamvention®
Sponsored by Dayton Amateur Radio Association

FROM BEGINNERS TO ADVANCED OPERATORS, WE'VE GOT YOU COVERED

HF

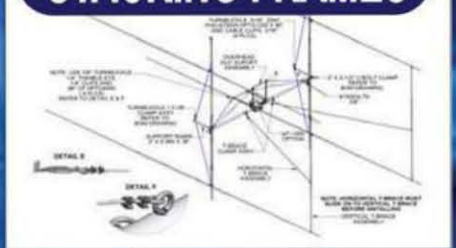
- HF LOG PERIODICS
- HF MONOBANDERS
- HF TRIBANDERS
- HF 125MPH MODELS

VHF/UHF/MICRO



- LINEAR YAGIS
- CROSS DIPOLE YAGIS
- CIRCULAR YAGIS
- HORIZONTAL OMNIS

STACKING FRAMES



- H-FRAME ASSEMBLIES
- T-BRACE ASSEMBLIES
- CROSS BOOM KITS
- CUSTOM MOUNTS

ROTATORS

- AZIMUTH ROTATOR
- ELEVATION ROTATORS
- CONTROLLER PACKAGES

ACCESSORIES

- COAXIAL RELAYS
- PORTABLE MASTS
- POWER DIVIDERS
- PHASING CABLES

M2 Antenna Systems, Inc.
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*

the ham notebook

BY WAYNE YOSHIDA,* KH6WZ

The Wonderful World of Surplus

Online auction sites such as eBay and CraigsList, as well as local surplus outlets and industrial supply stores (and quite often, your ham friends), can be a very useful and economical source for radio-related (RF) test equipment, components, and even complete radios. Our hobby is rich with old and new stories about finding, converting, and using surplus electronics in our personal communication stations. A "true ham" is at least aware of this tradition of converting or adapting and using non-ham gear for the ham bands. The FCC acknowledges the value of this experimentation, and amateur radio is the only radio service allowed to put homemade equipment on the air (FCC Basis and Purpose rules for Amateur Radio, 97.1 (b) and (c)).

When purchasing surplus gear, make sure you know what you are buying. If a seller does not post a photo of the item for sale, one must wonder whether or not there is something to hide. Be careful where you spend your money and make sure you understand the return or exchange policies—if any—before you complete the sale. Ask questions if you are not sure of anything. If possible, test the unit before purchasing it to make sure it is functioning, or at least that it matches the description and condition from the seller.

I must add one more thing that I feel very strongly about: If your purchase turns out to be defective, please do not sell it to someone else without disclosing its true condition. Sometimes a non-functioning piece of gear is exactly what the buyer wants or needs, especially if the item is rare and difficult to find. An example of this would be a collector of a certain radio who may be looking for a single part or two and not a complete and functioning unit.

Let's take a look at some of the extraordinary treasures I have found over the years. There's usually a great story behind each discovery.

*28181 Rubicon Court, Laguna Niguel , CA 92677
e-mail: <kh6wz@cq-amateur-radio.com>

Photo 1– Classic tube gear from the 1970s and earlier is still alive and well in many ham shacks today. Here is a very clean Heathkit SB-100 transceiver recently seen at a local swap meet.

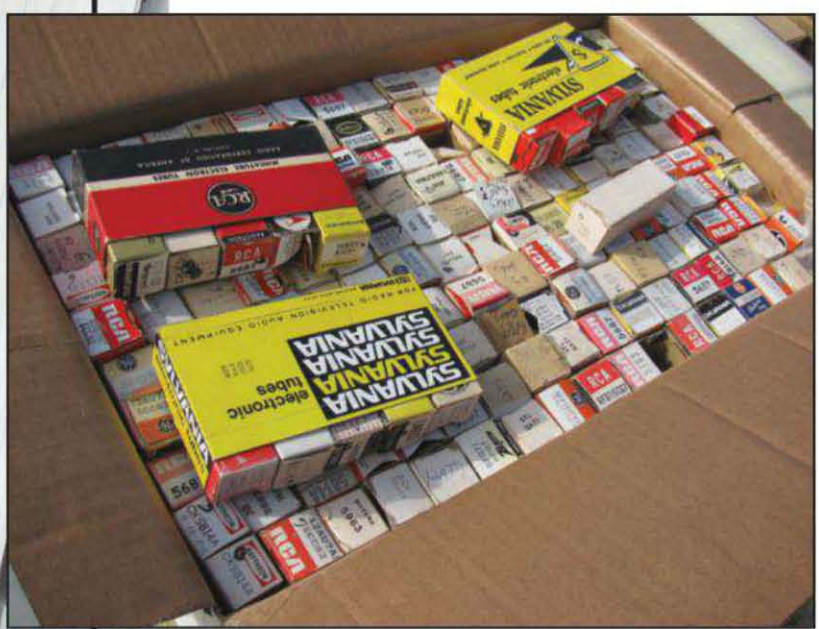


Photo 2– Vacuum tubes are still available in abundance, if you know where to look.

Going on a Surplus Safari: Wonderful Old Radio Sets and Components

As a first example, as equipment technology evolves and advances, finished products become obsolete and are scrapped or disposed of in another way and are replaced with new systems. Equipment from the 1970s and earlier, for example, includes many vacuum tubes rather than solid state devices inside their cabinets. Some of the advanced sets were a hybrid combination of tubes and solid state devices. Since many hams tend to keep their equipment for many years, it is not uncommon to see tube gear of some sort, even among the most modern station equipment.

The Heathkit transceiver in photo 1 is a good example of a nicely restored tube-based HF transceiver seen at a local ham radio swap meet (also known as tag sale, flea market, or rally, depending on where you are from). The classic rigs and test gear contain many tubes and no transistors or microprocessors at all.

Some people say that vacuum tubes are difficult to find, but any surplus hunter will tell you this is not true. The box full of tubes seen in photo 2 appeared at the same swap meet as the Heathkit radio mentioned above. The fellow selling these tubes has been coming to the same location every month for many years. I think 50 cents for an untested tube and a dollar for a tested and working tube are fairly good prices for replacement parts that may get those classic rigs going again.

Speaking of tubes, you may want to invest in a good tube tester, if you have many tubes in your collection. I purchased the military TV-7/U tube tester in photo 3 on eBay several years ago.

Photo 3– A US Army TV-7/U tube tester, purchased on eBay, is a great tool for testing old tubes.

Although I do not use it often, a tube tester is the only tool that can test vacuum tubes. Other tube testers are available; check the websites mentioned in the "References" section for useful information.

Large air- or vacuum-variable capacitors and inductors, and multi-way, ceramic insulator wafer switches—all very useful for high-power RF amplifiers and antenna tuners—are also frequently available as surplus, either as "new old stock" (NOS) or used. Many modern versions of these components just are not the same as these precision devices. These units are easily inspected, since a "bad" one would show visible signs of arcing or corrosion.

A capacitor tester, such as the one shown in photo 4, can verify capacitor and inductor operation, and an ohmmeter can verify whether or not switch contacts are working. I use an ultrasonic cleaner, filled with a weak solution of Krud-Kutter® and water, to make parts sparkle like new. Other cleaning detergents can be used, but avoid using corrosive cleaning agents when washing electronic parts and aluminum pieces in the ultrasonic cleaner.

In photo 5 you see a fairly modern commercial mobile radio, used on the

Photo 4– A capacitor and inductor tester, such as this item available in kit form, should be in your collection if you build and test your own gear.

Photo 5– The Motorola Spectra is one example of a great commercial radio unit that can be easily reprogrammed for the 902–928 MHz ham band.

900-MHz commercial radio band. With the proper programming, this unit can be used for a portion of the 902–928 MHz amateur radio band. Other land-mobile radios and even repeaters can also be reprogrammed or slightly modified to operate on various ham bands.

Amazingly Exotic Items

In some cases, converting surplus equipment is the only way to get on the air, such as microwave- and millimeter-wave station gear. Although kits and finished products to access these bands are available, they are not complete stations that can be put on the air right out of the box. Additional modules are necessary, such as transmit-receive change-over relays, reference frequency oscillators, and other assemblies. In addition, parts for these bands are extremely expensive if purchased new, if they can be found at all, in small (one each) quantities.

Low-loss cable assemblies and specialized connectors, RF relays, waveguide and waveguide assemblies are just a few types of components needed to construct a microwave ham radio station. See photo 6.

Once one establishes a viable microwave-band station at the 1-watt level, a reasonable station upgrade would be to increase power. This requires transmit-receive sequencing, and a waveguide (rather than a coax cable) type relay. Just like vacuum tubes, some folks say waveguide relays are difficult to find, but a good microwave surplus hunter can find them at reasonable prices.

The 24-GHz solid-state amplifier shown in photo 7 is one of my best surplus-derived items. Several years ago, these were simply unavailable, even as surplus. Today, however, solid-state microwave amplifiers in the 1W to 10W or more range are becoming available on the surplus market worldwide. This will definitely improve microwave-frequency contest scores as hams discover and integrate high power into their systems.

Now take a look at photo 8. I found this large and heavy piece of surplus test gear at a local industrial surplus store near my office one day. The price tag indicated it was $350. As you can see, the front panel is labeled "Microwave Noise Test Set" and drew my attention immediately. To me, $350 is a lot of money to spend on something in an unknown condition, and with a nothing-back guarantee. I peeked inside the cabinet, and to my surprise and delight I saw that the unit was not only very clean, it contained a whole lot of 10-GHz parts and assemblies. This was the first, and so far only, time I violated my rule about buying an item I did not fully understand. However, in this case I actually inspected the item and assessed what I could identify, and it was a great deal. While there are several sub-assemblies that I still do not understand, I estimated the actual value of the unit to be in the over $600 range.

I asked a store employee about the unit, and he said it had just come in, and the $350 was just a suggested selling price. Trying to contain my excitement

Photo 6– One of the best places to find various microwave cables, connectors, and waveguides is the surplus market. These very-low-loss components are must-have pieces to complete a high-performance microwave system.

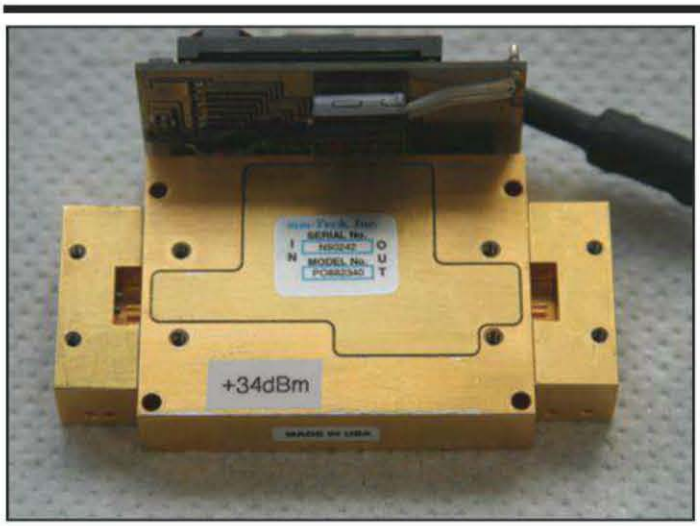


Photo 7– This 24-GHz solid-state amplifier is another example of a great surplus find.

as best as I could, I offered $200 for the item, and he accepted the deal. He even accepted my payment by credit card. A truly incredible find. Of course, the next step was to figure out how to get it home in my small coupe. I dragged the giant box out of the store, placed it on the passenger seat, and used the safety belt to secure it in place.

After examining my new Microwave Noise Test Set and admiring the construction, I began to take it apart. The unit included Simpson panel meters, a 110-VAC input, two microwave detector assemblies, a multi-voltage power supply, six waveguide relays, and many cable and waveguide pieces.

Photo 8– This "Microwave Noise Test Set," filled with dozens of 10-GHz components and assemblies, is another one of my most amazing surplus discoveries.

Photo 9– Specialized RF test instruments are a great value and can be found as surplus in many cities, as well as on eBay. Most of the test gear shown here is rated for the UHF and into the microwave frequency region.

Everything, including the cabinet, will keep me busy with parts for new 10-GHz projects for a long time.

Test Equipment

Surplus is not limited to parts. Perhaps the best deals in electronic surplus are the test instruments used for RF work, such as reference frequency standards, spectrum analyzers, signal generators, and frequency counters, especially units rated for use in the micro- and millimeter wave region. Other test instruments such as oscilloscopes and function generators are also great values on the surplus and used equipment market. See photo 9.

Here is a simple but often overlooked thing to check for just about all frequency-related test instruments. Many instruments have a switch on the rear panel to select either an internal or external frequency reference source. If the "INT/EXT" switch is in the "EXT" position, the unit will not function properly. Flipping the switch to the "INT" position may "fix" a non-operating unit.

I have one friend who saw this on a very nice frequency counter, but the seller was not able to make the unit work, so he was selling the unit in "Powers up, but as-is, no guarantees, non-functioning." The price was very good, especially since the unit was not working when the seller plugged it in.

When he got the unit home, he flipped the switch to the "INT" position, and the unit was fully functional!

As communications and radio technology advances in the commercial and other markets, including government and military services, hams have a great opportunity to obtain, convert, and adapt such equipment for use on the ham bands. This is one of ham radio's oldest and greatest traditions, and it is great to see this materiel going into ham shacks rather than the landfill. 73, Wayne, KH6WZ

References

Vacuum Tube Test Sets

The Idiot's Guide to Tube Testers: This is a website for vintage guitar amplifiers, but contains very good information on various makes and models of tube testers.
<http://tone-lizard.com/Tube_Testers.html>

All Tube Testers.com
Roger Kennedy
21143 Hawthorne Blvd. #354
Torrance, CA 90503
M–F: 8 AM – 6 PM Pacific Time (closed Saturday and Sunday)
<http://www.alltubetesters.com>

Capacitor and Inductor Testers

Almost All Digital Electronics
1412 Elm St., SE
Auburn, WA 98092
<http://www.aade.com>

Some multi-testers have test capability for capacitors as well as transistors and diodes.

900-MHz Equipment for the Ham Bands

The Repeater Builders Technical Information Page
Kevin Custer, W3KKC
<http://www.repeater-builder.com>

Southern California Repeater Builders
<http://www.ham-radio.com/repeaterbuilder/rptr_bildrs.html>

Exploring 900 MHz – Radios for 900 MHz/33 Centimeters & Their Modifications
<http://www.qsl.net/kb9mwr/projects/>

Making a Quarter-Wave Antenna Really Work

BY KENT BRITAIN,* WA5VJB

A quarter-wave antenna is a horrible, virtually non-functioning, antenna!

That should have gotten your attention. To be a bit more precise, a 1/4-wavelength antenna without its counterpoise, or a ground-plane, is a horrible antenna.

This month's column comes from a question poised by Ed, W8MFS. As an avid model R/C (radio-control) boat builder, Ed had a 1/4-wave antenna on his 50.8-MHz transmitter. Range was poor and he was looking for ways to improve his signal.

In photo A, I have a classic 1/4-wavelength VHF whip on the roof of a car. A 1/4-wave antenna is a horrible antenna at 50 ohms, but luckily there is 3000 lbs. of sheet metal under that 1/4 wave to act as a ground plane. Therefore, the mag-mount 1/4 wavelength and the sheet metal in the van form an antenna that is electrically 1/2 wavelength long.

A 1/4-wavelength antenna has to have some kind of ground plane or radial system to function as a low-SWR antenna in a 50-ohm system. Three, sometimes four, radials are used. If only one radial is used, I'm going to argue that you really have a bent dipole.

Here is where I have seen many wireless developers go wrong. In photo B we have a wireless product with a 1/4-wavelength antenna. I can assure you it's working pretty badly on the design frequency. Worse yet, it is working pretty well on the harmonics. An antenna that radiates harmonics is a bummer when you go in for FCC Part 15 testing.

Many a wireless developer thinks that a tiny PCB with a tiny battery is somehow the ground plane for a 315-MHz or 434-MHz transmitter. The next length for a resonant antenna is a 1/2-wave element. If you put 1/2 wave of wire on a small transmitter, the system looks like an end-fed 1/2-wave. But the 1/2-wave end fed antenna has about a 1000-ohm impedance, a real challenge to impedance-match to a RF chip that is expecting a 50-ohm load.

OK, a 1/4-wave doesn't work and the transmitter doesn't like a 1/2-wave. What's left? For the small wireless product, I am afraid I haven't come up with a better way of finding that compromise between an impedance that the transmitter can deal with and a whip long enough to radiate other than by experiment. Spectrum analyzers are great for this. Field strength meters will also work, or even a broadband receiver with an S-meter. Just start with a really long whip and some wire cutters, and start trimming a little bit at a time while watching signal

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

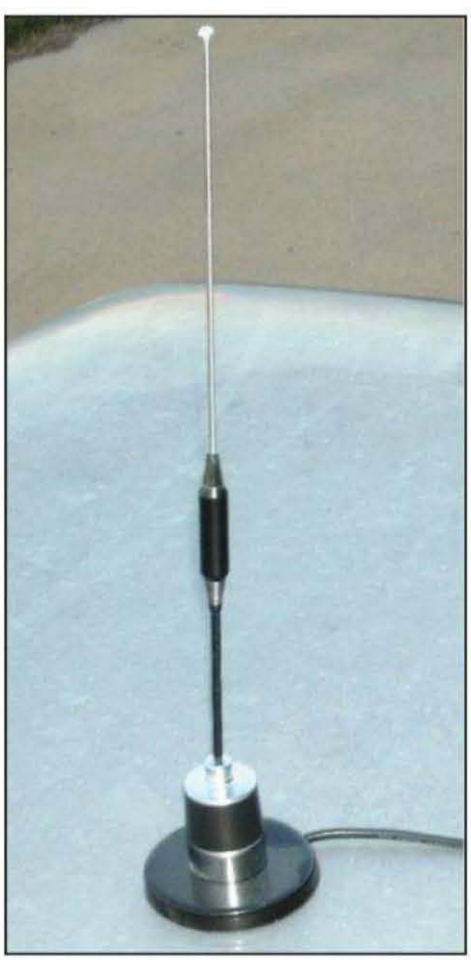


Photo A– Mag-mount 1/4-wave whip.

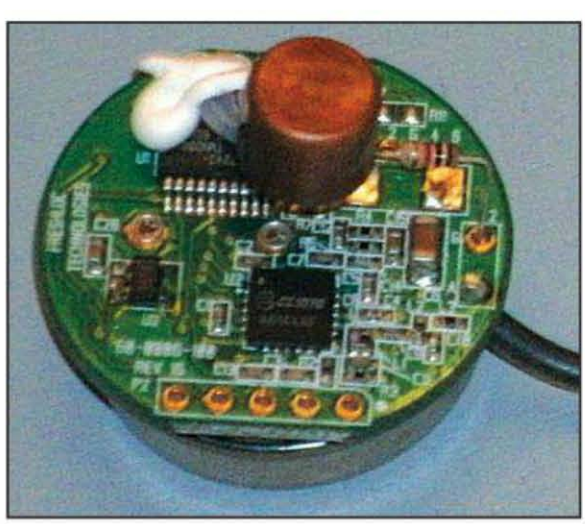


Photo B– Miniature wireless sensor with non-functional 1/4-wave antenna.

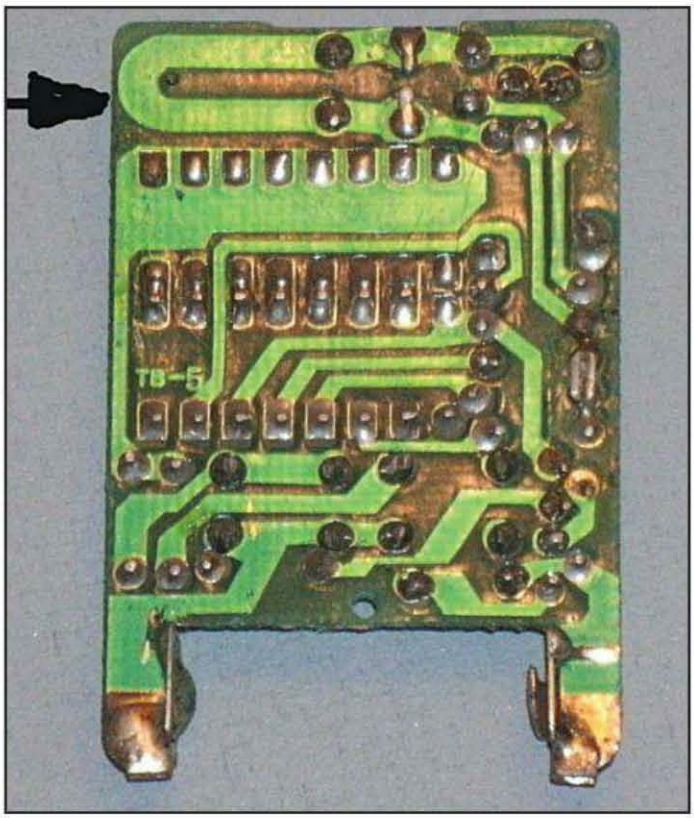


Photo C– Miniature 434-MHz transmitter with loop antenna.

Photo D– Ground radial or counter-poise for small transmitters.

strength. The best results are usually with a whip about .4 wavelengths long. You are forming an offset-fed dipole much like a Windom antenna. This also goes for the telemetry transmitters in model rockets, beacons on helium balloons, and even that handheld talkie.

Another way is to make a loop antenna like the miniature 434-MHz transmit antenna shown in photo C. If you don't have room for a proper whip, and the radio is too small to be a ground plane, a loop antenna works better than a non-resonant whip antenna.

Back to Ed's problem. The R/C transmitter is operating without a ground plane, and for radio waves nearly 20 feet long that handheld transmitter is too small to be a ground plane. My suggestion is a counterpoise. In this case you add one ground radial to the transmitter like the counterpoise in photo D. In simple terms, you are making a short whip into a 1/2-wavelength dipole. Some years ago these were sold under the name "Tiger Tail." *(Another manufacturer sold the same accessory as a "Rat Tail."—ed.)*

You will be amazed at how much stronger the signal from that talkie will be when you operate the radio with a resonant antenna system. Yes, that dangling wire is a problem, and you need a good electrical ground connection at the base of the antenna, but this will give you some extra dBs when you really need them. Ed wrote back that the counterpoise did indeed help the range of his RC boats.

Antenna Matching Tips

Here is an antenna matching technique KF5N showed me some years ago. In photo E are microstrip transmission lines. Different widths are different impedances—30, 50, 70, 100 ohms, etc. By adding in a section of transmission line with a different impedance and of a certain length, most any SWR can be matched.

Photo F shows another microwave tuning technique called "snowflaking" in which small pieces of copper foil are moved to different spots until the tech finds a good SWR/return loss. Well, snowflaking a length of coax is a bit tricky, but adding the lengths of transmission line of a different impedance is not.

The idea is to make up a variety of coax jumpers of 75-ohm coax—RG-59, RG-11, RG-6, etc.—and a supply of bar-

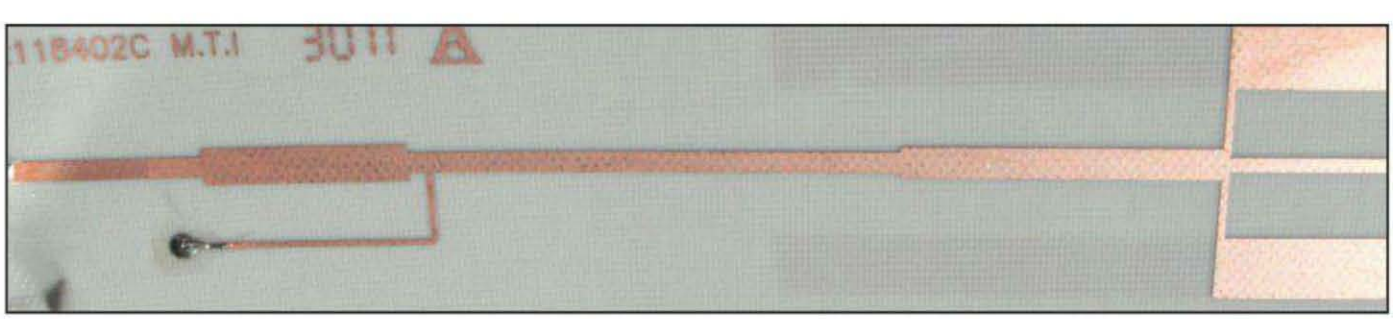


Photo E– Striplines of difference impedances.

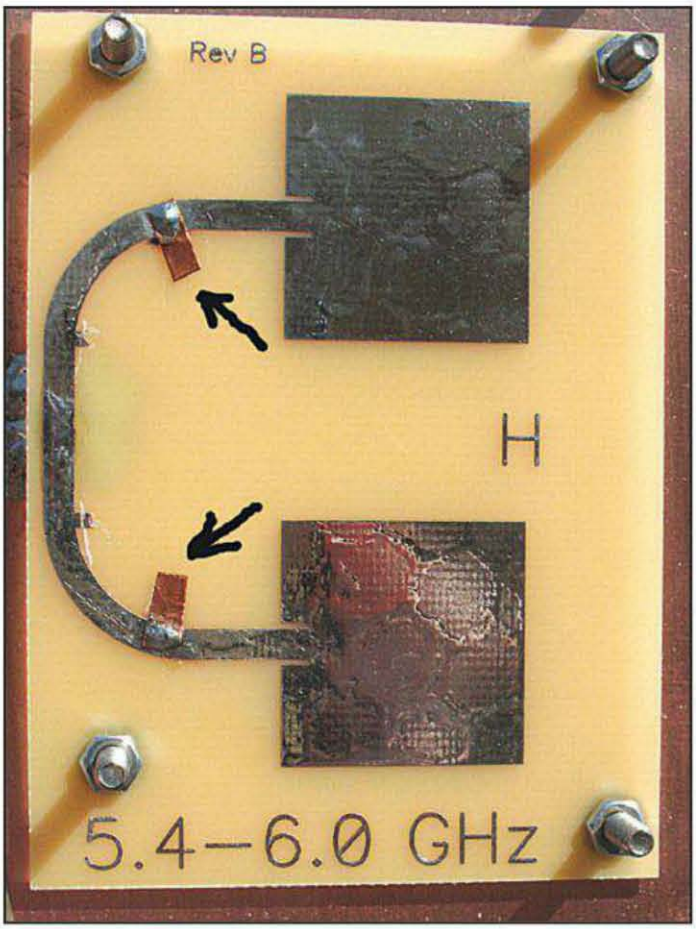


Photo F– Snowflaking (see text for details).

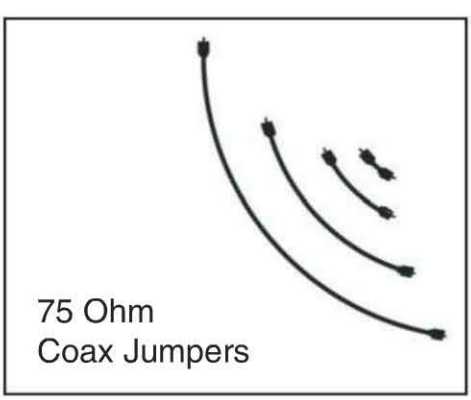


Fig. 1– Different lengths of 75-ohm coax.

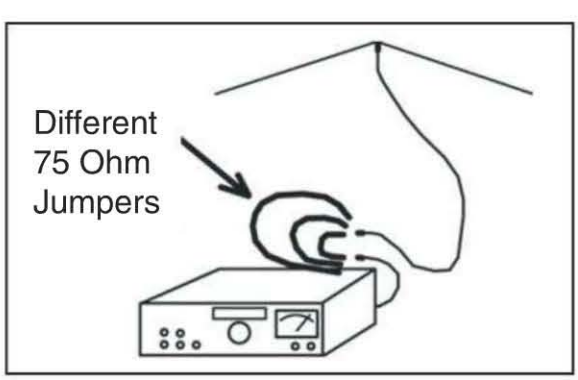


Fig. 2– Experimenting with 75-ohm sections.

rel connectors as shown in fig. 1. Add one of the jumpers to your feedline either at the rig end or at the antenna end, whichever is easier to get to (see fig. 2). Start with a short jumper, add another, take out a long jumper, and put in a shorter one. By experimenting with different lengths of 75-ohm coax you often can get a better SWR out of your 50-ohm system without using an antenna tuner, or as in my case, at least make the SWR warning light on my 6-meter rig stop flashing at me. Using a 75-ohm antenna system? I have several antennas configured as 75-ohm systems since the coax was cheaper! Now you can SWR-match the 75-ohm system with 50-ohm coax. This technique is probably more practical at 6, 10, and 15 meters than it is for 160 meters, but details like that never slowed down the typically ingenious ham.

Looking Ahead

I had intended to talk more about circuits where the reflected power off the input was greater than the input power. Sort of an SWR = > ∞ condition. That's only because SWR is not a very good measuring system for parametric amplifiers. A state-of-the-art low-noise amplifier with 30 dB of gain, and the same connector is both the input and the output. One connector? Both input and output? 30 dB gain? Yep. More in the next column.

As always, we welcome antenna questions and column suggestions from our readers. Many column topics have been suggested by you. E-mail to <wa5vjb@cq-amateur-radio.com> or <wa5vjb@amsat.org>. Also, for several dozen other antenna projects, you are welcome to visit <www.wa5vjb.com> and look in the Reference section.

73, Kent, WA5VJB

BY JEFF REINHARDT,* AA6JR

New Rigs and Antennas, plus Tips for On The Road Operating

For totally selfish reasons, I love the May issue of *CQ* whichcarries with it the affirmation that spring is really here and mobile operations are a lot easier. It is also a great time to inspect and "upgrade" your mobile; be sure to read this issue from cover to cover, including the ads, to catch up on some of the great tips on the latest rigs and antennas.

In previous May issues over the years, we've chronicled some of the differences between the mobile operators of yesterday and today, as well as the stark differences between modern rigs and those sometimes cantankerous "hollow state" rigs of yesteryear that could fill (and warm) a good portion of the trunk.

There was another aspect to operating mobile in those days of long ago. Some of the grizzled operators might remember the need to identify your rig as "mobile," and there were strict rules mandating you identify that you were operating from a call area other than your "home" call area when giving your ID. For a time, you also had to file a "flight plan" with the FCC letting them know you intended to stray from your home "territory." And let's not forget the regulations that applied to keeping a paper log, which would be a challenge under the most favorable circumstances, even if you were fortunate enough to have a "co-pilot"

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

Sometimes you just have to make the commitment to a great antenna system. (AA6JR photo)

doing the paperwork. Fortunately, the rules have changed to catch up with technology, making today's mobile operations a very casual activity.

So What's New?

I seldom pick up news releases, but the piece below caught my attention in that it seems to provide an answer to the age-old dilemma of operating different rigs and changing a rig from one car to another, or when upgrading to a new rig, often making it necessary to tear apart the car to route new cables. Like they say in the infomercials, "There has to be a better way…." In the interest of full disclosure, I have no connections with the company or its owners, and I have not tried the product but it looks pretty interesting:

"After many years of frustrating mobile radio installations, Bill Jordan, AE4S, believed there must be a better way than routing multiple cables from trunk-mounted radios to dash-located controls, microphones, and speakers. He developed and builds SwapMyRigs, which standardizes single-cable installations of mobile radios with remotable control. So you can swap radios without reinstalling cables. By routing all connections through a common cable, any radio with industry standard RJ jacks can be installed or replaced without using manufacturers' proprietary multi-cable separation kits.

"SwapMyRigs consists of two small field-configurable, powder-coated steel boxes called SMRs; one is at the transceiver and the other is at the remote location, connected by a standard computer VGA cable. The transceiver's microphone, control, and speaker jacks are connected to corresponding jacks in the co-located SMR, which translates the radio's conductors to those of a VGA cable. At the remote location, an identical SMR maps the VGA conductors back to the transceiver's connections. The microphone, control, and speaker plug into the SMR's jacks as if they were connected directly to the radio.

"By changing the SMR's jumpers, different radios can be used in the same car, or one transceiver can be used in different cars by running VGA cables in both of them. Replacement radios are installed simply by changing SMR jumper settings.

"The patented SMRs are sold in pairs for $79.95, preset and with radio interface cables for any RJ-compatible radio. High-quality five-meter VGA cables are also available. All prices include free shipping in the continental

US and a money-back guarantee. See: <http://www.swapmyrigs.com/>."

The Skyhook

May also finds many hams receiving the spring catalogs from ham retailers eager to take orders on all the new goodies. These catalogs are chock-full of new information, especially antennas. If your mobile skyhook has been on the car or truck for more than two years, this would be a good time to give it a good "checkup." Months of temperature extremes, rain, sun, ice, and wind can take a toll on even the best-made antennas and feed lines. You may not have noticed the performance of your system falling off, because in many cases it's a gradual process. Remember the old adage "A dime spent on an antenna is worth a dollar spent on a radio." This applies to mobile rigs as well. Your radio may be perfectly fine, but its performance could be limited by antenna and coax that are past their prime.

While cruising through the pages of the latest catalogs, I also noticed there are many new and clever mounting devices that work well with today's cars and trucks; many of the new designs don't require a hole to be drilled in the vehicle's body, yet they offer a sturdy and reliable mount for antennas from HF up through UHF frequencies.

Think Big

You might remember our previous column on hill-topping and the versatility a well-designed van can offer the serious operator who wants to head into the field or simply to Field Day. A "bare bones" new or used van can often be acquired for relatively little money and can serve "double duty" as an every-day vehicle if necessary.

One problem with a "bare bones" vehicle is that it's basically a steel box, which can be noisy and at times irritating while on the road because it seems to amplify every sound. In other words, you can feel like you're sitting inside a drum. We received a note from an experienced operator who has owned many such vans and he shares this bit of wisdom:

Tim, K3HX, writes—

"While not a hilltopper per se, I have operated van mobile/portable for many years. Here's a tip for reducing noise inside the van on the way to your destination.

"To reduce the 'riding inside an oil drum 'racket, run down to your dollar store and get a number of rubber 'sink mats' and use silicone adhesive (I have found General Electric RTV to give good service) to hold them to the panels where the windows would go if the van had windows. Also do this inside the side and rear doors and on the inside surface of the roof. These sink mats are about 12 inches by 14 inches and have a multitude of little suction cups on one side. Use the adhesive on the non-suction-cup side and hold the mat in place with duct tape until the adhesive cures. You may need padded 'dead men' sticks to hold the sink mats to the ceiling, in addition to the duct tape, while the RTV cures. Be sure the panels and mats dry and are free of grease.

"I've found this method to be the most cost-effective in dampening the racket. I tried the auto parts store 'sound deadening' mats, but the self-adhesive failed in the summer heat. Also, they were very pricey. The sink-mat method has been in use since my third van.

"To further reduce noise both on the road and when operating, you might consider automotive headliner material on the walls and ceiling. The stuff I use came from JC Whitney and was glued onto panels of 'luan floor underlayment' from the local home improvement store. I used 3M '77' spray adhesive. The fabric-covered panels were then screwed into the ribs of the body with self-drilling screws.

"I put in a layer of ordinary house fiberglass between the fabric-covered panels and the body of the van. This adds

On the Cover

Tiverton, Rhode Island, sits between two of the Ocean State's many bays, so perhaps it's no surprise that Jeff Lynch, WA1VQY, likes to collect boatanchors. Of course, we're talking about the radio variety here—classic American-made tube rigs from the '50s and '60s which have earned the nickname because they're big enough and heavy enough that they just might work for that purpose as well! Jeff says he has well over 50 boatanchors in his collection—three of the four walls in his 15x15-foot shack each have three shelves worth of gear on them—and anything that's on a shelf works (restoring boatanchors is another part of his addiction!).

Jeff has been a ham since 1975 (original call WN1VQY) and is part of a multigenerational radio family … his grandfather (now an SK) was WA1CXF, his father was a longtime scanner and shortwave enthusiast (but never a ham), and his son is KB1OAL. Back when Jeff was 15, he went into an electronics repair shop looking for a CB rig. The owner, John King, WA1ABI, suggested that ham radio might be a better way to go.

"He hooked up a rig and made a CW contact with Michigan or someplace," Jeff recalled. "I was hooked. Three weeks later, I took the Novice test in his shop …" John has also become a lifelong friend and mentor, still helping Jeff to this day on restoration projects.

Jeff is mostly active on CW and loves to ragchew, although he loves the sound quality of AM phone on those old tube rigs. And by the way, the red can on the floor contains fuel for the kerosene heater that keeps his shack warm. Don't worry, though, Jeff is the fire chief in the nearby town of Portsmouth, so he makes sure everything is done safely. And his cap is from the International Association of Arson Investigators, "one of the many hats you have to wear," he says, "as the chief of a small fire department." *(Cover photo by Larry Mulvehill, WB2ZPI)*

some thermal and sound insulation. I used about half the thickness (1.5 inches) of the standard roll. I held it in place over the sink mats with 3M 77 spray adhesive. Use lots of ventilation with the spray adhesive."

Thanks, Tim for those "sound" suggestions. If any of you have an idea or tip to pass along, please drop me a note at the e-mail address shown on the first page of this column. Please also send photos of your mobile rig, and right now my inventory of good mobile photos is lower than a gopher hole in Death Valley.

Mobile Operations—Staying Legal

This year a few more state legislatures have taken up the cause of trying to decrease accidents caused by distracted drivers. Sadly, a significant number of avoidable tragedies have been caused by drivers who were phoning, texting, adjusting their in-vehicle entertainment systems, and more, instead of driving properly. This point was driven home when I recently saw an SUV with a sign on its rear window stating the owner's daughter had been killed by a driver who was texting. I can't begin to imagine the grief of that parent.

While many jurisdictions have restrictions on using mobile phones, hams have been fortunate in "getting a pass" on many of those laws. However, we have the responsibility to use our radios wisely and in a manner that does not create problems, or we surely eill feel the full force of those same laws that restrict phone use. Some common-sense tips include pulling over to engage in a detailed QSO or to write down that rare DX call you just bagged. Having someone else drive while you operate the radio seems like a simple solution when another driver is present. Of course, too, putting down the radio when driving during adverse weather or even in the hours of darkness could make the difference between a happy trip and an adverse outcome.

Remember, a great rig and a high-quality antenna are but two elements that make for an enjoyable mobile radio experience. A highly skilled, attentive, experienced, and *safely operating* ham is the most vital component that completes that picture. So when you're on the road, please keep in mind you're one of the few lucky people able to use the privileges of two licenses at exactly the same time. Happy Mobiling!

73, Jeff, AA6JR

kit-building

BY JOE EISENBERG,* KØNEB

"The Annual Pilgrimage"

Like the swallows that return to Capistrano each May, the hams return to Dayton, Ohio, and Hara Arena for the Dayton Hamvention®. This gathering brings the most hams to one single place than any other hamfest. This year is my 33rd trek to Dayton, and I look forward to it all year long. There are always a number of new kits released at Hamvention®, so let's get started with a few previews of what is in store this year!

2012 Hamvention® Preview

Hendricks Kits. Hendricks Kits has introduced seven new kits since last year. A couple of kits, such as the SOTA Tuner and the Red Hot Radio transceiver, have been mentioned on these pages in previous issues of *CQ*. The popular low-cost Tayloe SWR indicator kit has now been matched with a case (photos A and B), making it one of the smallest QRP SWR devices yet! This kit provides a load for the transmitter regardless of the antenna being measured. That feature allows for tuning the antenna or using an antenna tuner without damaging the finals of a QRP transmitter, as many low-power transmitters have no SWR protection. Assembly time is less than an hour, and it goes together easily. This kit with the new case is sold for $25 and is available from Hendricks Kits at <http://www.qrpkits.com>.

Also, Hendricks Kits is introducing its very first 160-meter rig, the Ft. Tuthill 160M CW transceiver kit. Based on the successful 15-meter CW transceiver kit of the same name, the Ft. Tuthill 160 brings the same CW performance to the 160-meter band.

A 41-dB step attenuator (photo C) is another addition to the Hendricks lineup. It is useful for test-

Photo A– Front view of Hendricks Kits QRP SWR kit (photo courtesy of KI6DS)

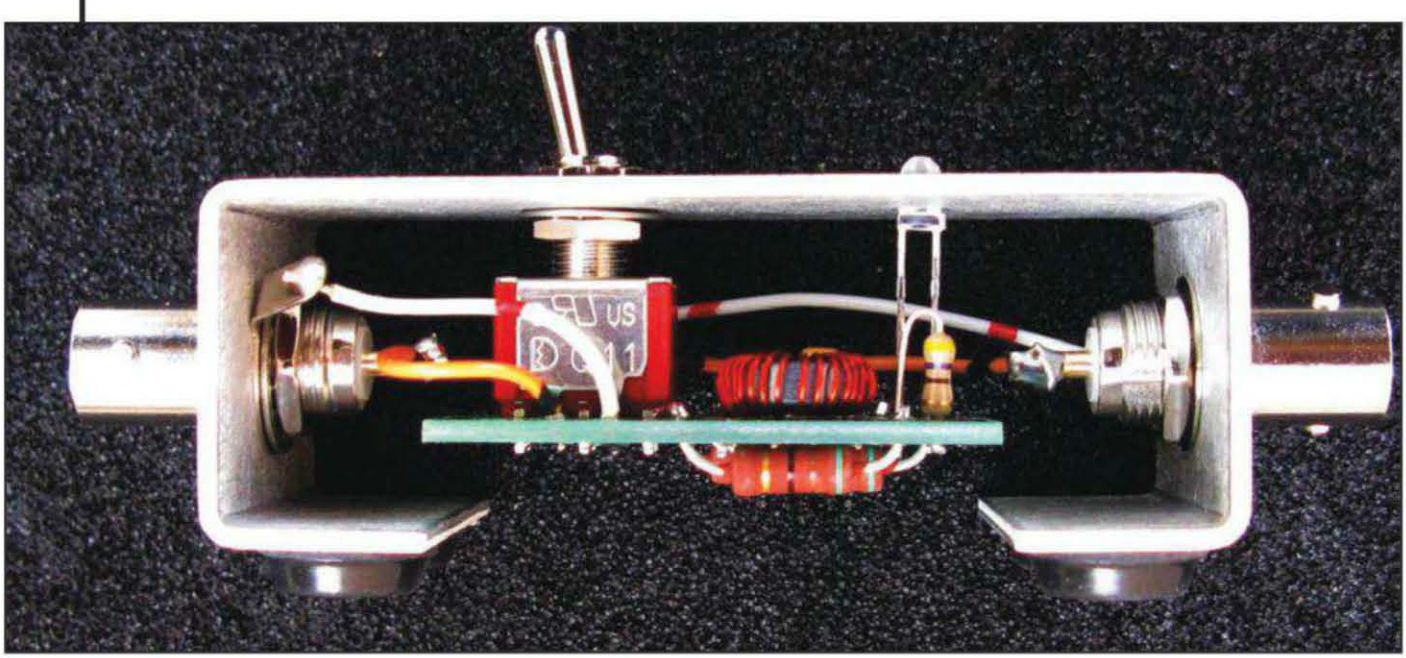


Photo B– Side view of assembled QRP SWR kit. (Photo courtesy of KI6DS)

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

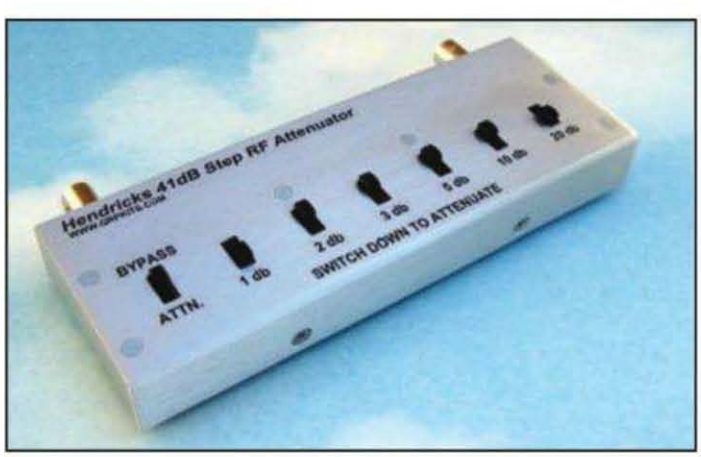


Photo C– Hendricks 41dB attenuator kit. The kit comes with case and BNC connectors. (Photo courtesy of KI6DS)

ing low-power transmitters and achieving a specific low-power output. The kit is easy and quick to build with its matching case and has no toroids to wind and no SMT parts.

Rounding out the lineup of new Hendricks Kits is the Weber triband CW transceiver kit. A follow-up to the Weber dual bander, this kit allows you to choose from any three amateur bands between 80 and 15 meters.

Look for Hendricks Kits this year in a new location in the Ballarena across from the ARRL Expo area at Hamvention®.

Elecraft. Elecraft returns this year with the hit of Hamvention® 2011, the KX3. The KX3 is a full-featured, SDR-based, low-power portable transceiver that does not need a computer to operate. It operates for hours on a built-in battery pack for portable operation. The KX3 requires no soldering, as it is a modular kit. As with its predecessors, even the case requires assembly, and it goes together easily. The boards come pre-assembled, so assembly is straightforward.

Also look for Elecraft's new amplifier kit, the KPA-500. This 500W HF amplifier kit is similar to the K3 and KX-3 modular kits, requiring no soldering for assembly. Elecraft also has a line of mini-module kits that are easy to assemble.

See Elecraft in the North Hall at Dayton or at <http://www.elecraft.com>.

Four Days in May. QRPARCI's Four Days in May will host a buildathon as part of its program at Dayton. For $45 the builders will get pizza to start the evening and a kit to build. This year's FDIM buildathon theme will be "Tools and Techniques" and will be led by Rex Harper, W1REX, as well as your columnist and other volunteers. As of this writing, the specific kit has not yet been named, but it is sure to be a fun time! In addition, on Thursday and Friday evenings at 8 PM, FDIM hosts a vendor night where a lot of kits can be purchased. For more information on FDIM, check out <http://www.fdim.qrparci.org>.

Kits Return to the Shack!

A recent trip to a local RadioShack store revealed the presence of new kits! Real kits are now available at RadioShack. In addition to now carrying the Arduino, Propeller, and Basic Stamp boards, RadioShack stores carry a small selection of

Photo D– Pro'sKit SS-201 soldering station and Pro'sKit 8PK-101D flush cutters.

the popular Velleman kits. These kits include simple beginner's kits such as a lighted heart and a chirping cricket, as well as an FM broadcast receiver kit. It also carries a Velleman audio amp kit as well as a power supply kit and a USB interface kit. There are lots of new kits to try and available locally in most RadioShack stores ... a welcome development! I have also found many of the same Velleman kits at Fry's Electronics.

This 'n That

During a recent visit to a hamfest, I discovered the Pro'sKit SS-201 soldering station (photo D). This compact soldering station has variable heat, a very fine tip, and a very light handle. It is ideal for soldering boards with tighter spacing and surface-mount components. It sells for about $40–45 at various vendors and does a great job! One of the vendors carrying the Pro'sKit line of soldering gear is AC&DC Electronics. Pro'sKit also makes a line of flush cutters, and I have found its 8PK-101D to be a great buy for $7. AC&DC carries a variety of insulated tuning tools, a must-have for kit builders, and other useful items such as multimeters and scope probes. AC&DC's website is: <http://acdcelectronics.net>. You can also find AC&DC Electronics in the flea market in Dayton.

Many of the vendors selling soldering tools also sell tiny cans of tip tinning material. Simply rolling your hot tip in this material rejuvenates the tinning on your tip and makes for much better solder flow. When looking for soldering tools, you might find small jars of paste flux also useful, especially when trying to solder thicker wire such as antenna wire or the braid on coax cables. Use it sparingly, but coat the areas you want to solder. You will be amazed at how much easier it is to solder heavy wires and braid as well as PL-259 connectors when you add a little paste flux. Be sure to use enough heat to adequately bond the solder to the wires.

See You at Dayton!

As always, I'll be at the Dayton Hamvention® and will be presenting the Kit Building Forum on Friday at 1145, as well as other presentations. You might also see me taking photos of the latest kits! It is great to meet my readers in person, so look for the "Cat in the Hat" at Dayton and be sure to say hi!

73 de Joe, KØNEB

Catching Up for Dayton

BY JOHN WOOD,* WV5J

As anyone who has attended the Dayton Hamvention® knows, there are a lot of items of interest to hams that become available at the world's largest hamfest in May. Realizing that the start of this great 61-year-old hamfest tradition is only days away, it is my intent to examine and review some of the ham radio accessories that have been made available so far in 2012 so that I you be caught up by the time Hamvention® gets under way on May 18, 19, and 20, plus there will be many new products released at the 2012 big ham party in Dayton, Ohio.

Bliley Zeus Series OCVCXO

Over at Bliley Technologies they've been working hard to introduce the second product in the Olympian family of oscillators, the Zeus Series OCVCXO (Oven Controlled Voltage Controlled Crystal Oscillators). See photo A.

According to a company press release, the Zeus Series offers customer-specified output frequencies between 30 MHz and 130 MHz with phase noise performance down to –178dBc/ Hz at 100 kHz offset. The company reports that this series has exceptional performance with optional frequency stability versus temperature from ±500 ppb down to ±50 ppb. Excellent long-term aging is typically ±1.50 ppm after 20 years. The package comes with an SMA female output and EMI feed throughs on all DC inputs. A RoHS-compatible version is available as the NVG108C, while the standard unit's part number is NV108C.

Bliley believes the Zeus family of OCVCXOs is ideal for phase-locked microwave signal sources such as DROs, low-noise test equipment, synthesizers, microwave communication systems, and radar applications. Hi-rec versions are available.

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

Photo A– Bliley has reason to be proud of its newest product, the Zeus Series OCVZXO oscillators which can perform as phase-locked microwave signal sources in applications such as DROs, low-noise test equipment, synthesizers, microwave communication systems, and radar applications.

For more information, contact Bliley Stocking Distributor, RFMW, Ltd.. 90 Great Oaks Blvd. #107, San Jose, CA 95119. Bliley is available by phone at 408-414-1450, or by e-mail at <info@rfmw.com>.

Nifty Guides Now Available for Alinco Radios

Nifty Ham Accessories, known for its series of ham radio guides, has recently added operating and programming guides for Alinco radios to its line of amateur radio products (photo B).

Nifty Guides for the following Alinco radios have been developed and are now available from the Nifty Ham Accessories web page and from many of the ham radio dealers carrying Alinco products: DJ-G7, DJ-G29, DJ-V57, DR-135, DR-235, DR-435 DR-635, and DX-SR8.

Nifty Guides are designed to simplify set-up and operating operations and ideal for learning about a new radio, or as a memory jogger for procedures that may have been forgotten. Guides are fully laminated for durability and are color-coded and indexed to quickly locate needed information. The new Alinco guides join the many guides that Nifty Ham Accessories has produced for Kenwood, Icom, Yaesu, and Elecraft transceivers plus other accessory equipment.

For the latest list of available Nifty Guides, books, and other accessories visit <www.niftyaccessories.com>.

British InnovAntennas Now Available at R&L

British InnovAntennas has honored R&L Electronics as its first American dealer. This means that the full line of high-performance HF, VHF, and UHF

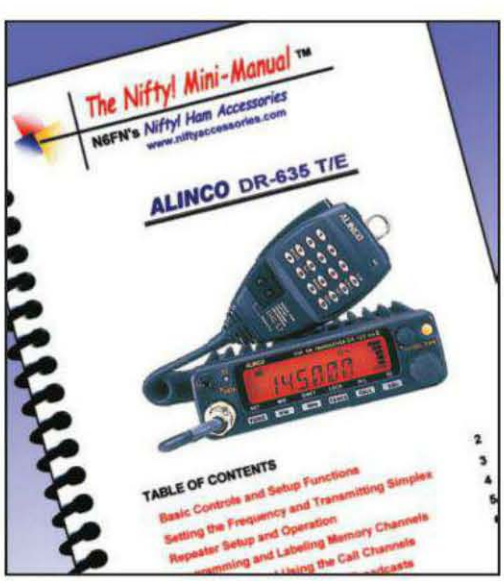


Photo B– Nifty Accessories has now added Alinco ham radios to its library of helpful booklets with the publication of Mini-Manuals about each of the models in the Alinco amateur line.

amateur radio antennas from fast-growing British company InnovAntennas are now available to customers across the United States via Hamilton, Ohio's R&L Electronics.

"Our customers have been hearing about the outstanding performance of InnovAntennas designs from their amateur radio friends overseas, reading about them in European journals such as *DUBUS* and from a handful of 'early adopter' American hams who couldn't wait and purchased InnovAntennas products direct from the UK," said R&L Electronics' Roger Smallwood. "We are proud to be the first American retailer to represent this exciting new brand.

InnovAntennas was launched in 2011 by Justin Johnson, GØKSC, after his hobby of designing antennas for his personal use led to a flood of requests to "make one for me" from amateur radio operators who recognized that Johnson's designs seemed to outperform the ones they could buy in a store. Today InnovAntennas is building antennas at a former boat factory in Canvey Island, England, and selling its products directly via <www.InnovAntennas.com> and via a network of dealers in Europe, Australia, and now, the United States.

InnovAntennas designs include LFA (loop fed array) and OP-DES (opposing-phase driven-element system) Yagis. Performance of GØKSC designs routinely top the charts in their boom-length class on the survey of moonbounce antennas compiled by VE7BQH and available online. (EMEers are among the ham world's most demanding operators.)

InnovAntennas America's William Hein said, "We selected R&L as our first American dealer due to its commitment to customer service, deep inventory, high order fill rate, great history, product knowledge, and enthusiasm for InnovAntennas' approach to design and construction. We look forward to a long, productive relationship with the gang from HAMilton, OH."

For more information, contact William Hein, AA7XT, at InnovAntennas America, Inc., 479 South 16 Rd., Glade Park, CO 81523; phone 888-998-8541 ext. 104, e-mail at <Bill@InnovAntennas.com>. You can also reach out to Roger Smallwood at R&L Electronics, 1315 Maple Ave., Hamilton, OH 45011, e-mail <sales@RandL.com>, or by phone at 800-221-7735. More information about InnovAntennas can be found at <www.InnovAntennas.com> or <www.RandL.com>.

MFJ: "For Top Portable Performance, Carry a Big Stick!

Backpackers will he happy to hear that MFJ is now producing a portable mono-pole antenna that features a rugged 17-foot stainless-steel collapsible whip paired with an adjustable high-Q air-wound coil that can be disassembled to a length of 28 inches in just a few seconds. (See photo C.)

Also, when it comes to antenna efficiency, MFJ says this new antenna—the MFJ-2286 priced at $99.95—stands head and shoulders above shorter backpack antennas.

This Big Stick eight-band vertical antenna features true backpack portability and fits into most any size packs, weighing just over 2 lbs. It's versatile, as well. It includes MFJ-342T pipe mount to quickly and easily attach to a 1/4-inch or 1/2-inch pipe or mast and offers general coverage from 7 to 55 MHz without gaps thanks to its tapped loading coil—great for ham bands and image-free shortwave broadcasts.

The MFJ-2286 is built to withstand the rigors of travel with its all-aluminum, stainless-steel construction that's rated to handle a full killowatt. With its counterpoise kit, it can also ensure low SWR, high efficiency, and maximum site safety.

The MFJ-2286 is protected by MFJ's famous NoMatterWhat™ one-year limited warranty. MFJ will repair or replace (at its option) your MFJ antenna no matter what for one complete year.

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

DXE-UT-KIT2-D Complete Coax Cable Prep Tool Kit

From our "Always One More Thing To Write About" department comes some big help if you're the one who spends a lot of time preparing coax cables for ham radio applications. DX Engineering has put together this time-saving kit which provides all seven of the company's popular cable tools and accessories in a convenient carrying case (photo D). It features a rugged, lockable enclosure fitted with a precut foam insert location for each tool and spare connectors.

Included cable strippers prepare RG-8X, Belden 9258, LMR-240, RG-8, RG-213, 9913F7, and LMR-400 (not LMR-400UF). Spare blades for both cable prep tools are provided. Price of the complete kit is $174.95. For more information or to order, visit <www.dxengineering.com>.

Ham Radio Deluxe Version 5.11

The first software item we're going to look at in this column is the new 5.11 version of Ham Radio Deluxe and the features added by HRD Software LLC.

Ham Radio Deluxe has been around quite a while now in its various versions and has established itself as somewhat of a standard for hams who like to team a computer with ham radio in a number of communication disciplines. This latest version follows the release of version 5.1 on February 3, 2012 and is another step in the continuing project of the company to eliminate outstanding issues found in previous versions of HRD.

Rick Ruhl, W4PC, co-owner and lead programmer, tells us, "We'll continue to update the 5.1x releases with 'bug fixes' as the development of enhancements for the 6.0 release continues. Ruhl added that the company has plans to facilitate both bug fixes and enhancements to Ham Radio Deluxe by moving the development team and the program source code from the obsolete Visual C++ 6.0 development environment to the current Visual Studio 2010 development environment. He

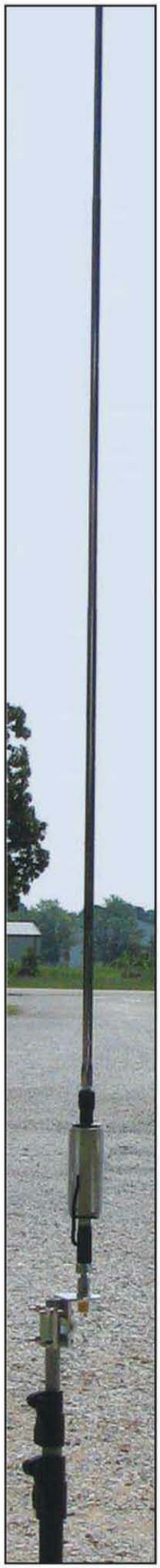


Photo C– MFJ's Big Stick vertical is a backpacker's dream antenna that can be set up as an 17-foot antenna or disassembled to a length of 28 inches in just a few seconds.

believes this major step enables a more straightforward, bug-free development process and better program integration using the more powerful VS 2010 and its support tools for enhancements to HRD. The 5.x releases of HRD are free.

HRD Software LLC has direct paid support available via phone and e-mail for the 5.1x products for an introductory price of $59.95. This pricing plan includes version 6.0 at no additional charge. The introductory price expires upon release of Ham Radio Deluxe 6.0.

In keeping with the tradition of debuting new products at Dayton, the scheduled release of Ham Radio Deluxe 6.0 is May 18, 2012 at Hamvention® and online. The MSRP for Ham Radio Deluxe 6.0 with support will be $79.95 when it is released.To download HRD products, visit <http://www.ham-radio-deluxe.com/>. You also can take part in the HRD Forum by going to <http://forums.hrdsoftwarellc.com/>.

Amateur Contact Log 3.2 is Now Available!

Scott Davis, N3FJP, told us that ever since he released Amateur Contact Log 3.1, he's had lots of great feedback with one recurring theme—compliments on the new text and display enhancements. Now he says if he could only make the DX List bigger, his software would be just about perfect. Therefore, he's been working on that feature and now you can specify the percentage of the screen that the DX Spotting window uses, as well as its font size and color. The DX List size has been 10% up until now, but you can enter any percentage you like by clicking Settings > Appearance > DX Spotting List Size. Change the font by clicking Settings > Appearance > DX Spotting List Font and the color by clicking Settings > Appearance > Color.

In addition, he's simplified the downloading of Jim, AD1C's latest country files from AC Log's menu options; click File > Download Country Files. This will download the country files to your N3FJP Software\Shared folder, which is where AC Log first checks for the latest country files. He says he is in the process of updating the contesting software to also first check in the shared directory for country files, so once that is complete, by using AC Log (or manually downloading the country files to your shared directory), HRD users should see it instantly and be able to update the country files for all programs.

He has also modified AC Log's eQSL upload sequence so that users have the opportunity to change their login info before the upload occurs. This is important to folks with multiple callsigns.

Finally, he's added a way for you to display your own 1000 × 568 splash screen graphic on the splash screen. He says you simply place a file named splash.jpg in the N3FJP Software\Shared directory in your Documents and Settings folder, but I'm going to have to test that first thing.

Jim adds that upgrading from version 3.1 to 3.2 is a pretty easy. Just download the latest from <www.n3fjp.com>, let it install in its own default working directory, and you will be all set. You'll find directions for upgrading from earlier versions on the website.

RFinder for Apple iPhone/iPad/iPod

For all of you iPhone, iPod, and iPad hams who have envied those Android owners and their app called RFinder, your life may now be a little easier. RFinder has now been released for the iOS and is available at the Apple App Store. Just look for RFinder – The Worldwide Repeater Directory (WWRD) for iOS! RFinder already runs on the Android platform, open source via CHIRP on Windows/Linux/Mac, and the World

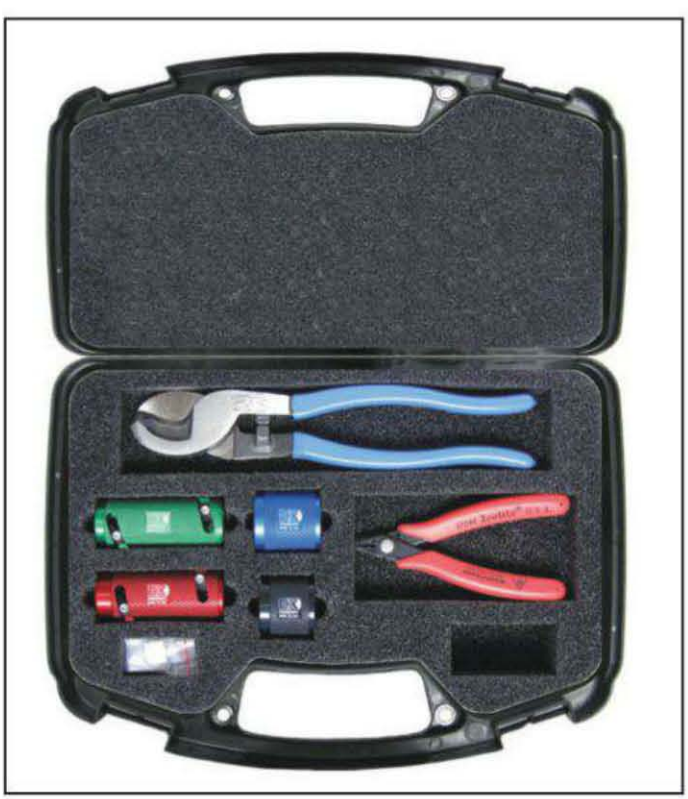


Photo D– DX Engineering seems to have thought of everything you might need if cable preparation is your job at the next Field Day operation. The kit, complete with tools, is designed to make preparing cable easy.

Wide Web. Bob Greenberg says his people are working diligently with RTSystems to incorporate the Worldwide Repeater Directory (WWRD) into the suite of radio programming software. "We have opened up the directory so anyone with a Windows application can request our API toolkit to incorporate the WWRD into their applications," Bob added. "Your annual subscription to the WWRD works on all platforms. Just use the same user/password combination on any WWRD enabled application and you are ready to go!"

Bob says the software has been enhanced with callsign lookup and improved data for Italy, France, and Israel. In the future, he says the RFinder crew is "improving the back end" to support D-STAR and working to automatically syncronize D-STAR data.

Bob left me with this hint of what we might find in RFinder in the future (make of it what you will): "Satellite data with footprint visualizations!"

Well, that pretty well wraps it up for another month. Until next time, enjoy attending the Dayton Hamvention® May 18, 19, and 20 if that's in your plans for the month, and if not, watch it thanks to Tom Medlin, W5KUB, at <www.W5KUB.com> and his Helmet Cam. And, oh yeah, thanks for reading "What's New"!

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.*

If you wanted a really good radio, why not have the world's best?

The all new Excalibur Pro.

WRTH AWARDS 2012
WinRadio Excalibur Pro BEST SDR

"The Excalibur Pro is the best SDR we have used - in some ways it is the best receiver we have used regardless of the underlying architecture - and undoubtedly represents a considerable advance in the state of the art."

John Nelson
World Radio TV Handbook 2012

www.winradio.com/g33

WiNRADiO® by RADIXON®: Great receivers ahead of their time.℠

awards

BY TED MELINOSKY,* K1BV

USA-CA and LoTW, plus Awards from the URC in France

In early January, the ARRL signed a formal agreement with CQ Communications to provide support for CQ awards with data from the Logbook of The World system. The first of the CQ award programs to be worked on is WPX. The other CQ awards, including USA-CA, will be worked on later in 2012. Just as with eQSL, there will be provision for either all LoTW or split applications, partly your QSL card data and partly the LoTW data.

Many questions remain to be answered, but the good news is that the long-awaited process is finally under way. Most importantly, please keep in mind that using LoTW is entirely voluntary. This is a tool that will be offered as an alternative to your physical possession of the QSLs/MRCs. Even today, with the availability of eQSL confirmation, only about 30% of USA-CA applications that arrive at my QTH make partial or full use of eQSL electronic confirmations. I suspect that the new option offered by the ARRL's LoTW will help control QSLing costs, but will not replace paper QSLs.

The National Union of Amateurs and Radioclubs (URC) Award Series

In 1981, when I started collecting awards information, all of the information I gathered came via traditional (snail) mail. Since the early 1990s the internet has quickly replaced a large portion of receiving award information.

Recently, though, I received an envelope from France via snail mail with prints of a web page from the French group The National Union of Amateurs and Radioclubs Award Series (l'Union Nationale des Radioamateurs et Radioclubs). This group apparently broke away from the R.E.F. (the principal group representing French amateurs) over 40 years ago. The URC was founded in 1968 by F9AA who, unhappy with the decisions taken by the bureau of the R.E.F., the French IARU member, wanted to create an alternative association to balance its power, especially vis à vis administration of French amateur radio operators. While not systematic opponents to the French R.E.F., they chose to take a different path in representation of French amateurs. Since its creation, the URC has put the emphasis on technical skill.

The URC offers an interesting group of awards, some of which parallel the R.E.F. awards and others which recognize club and SWL interests. The awards are colorful, modestly priced, and are broken into classes which allow you to earn them with a modest QSL collection.

General Requirements: Awards are available to amateurs, radio clubs, and SWLs. Send GCR list with fee of 10 Euros or 8 IRCs. Apply to: URC, BP 40148, F-42012 Saint Etienne Cedex 2, France. Internet: <http://www.urc.asso.fr>.

Departments of France. Contact different departments of France on or after April 1968. The award may be earned by amateur radio operators, radio clubs, and SWLs. All HF bands and all modes are allowed. (Remember that the Department number is usually the first two digits of the postal code shown on the QSL.)

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Heikki Tamminen, OH3JF
USA-CA All Counties #1221
February 23, 2012

USA-CA Honor Roll

500
DC4A.....3563
DF7EF.....3564

1000
LA9SN.....1823
DF7EF.....1824

1500
LA9SN.....1533
OH3JF.....1534

2000
OH3JF.....1420

2500
OH3JF.....1336

3000
OH3JF.....1247

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.

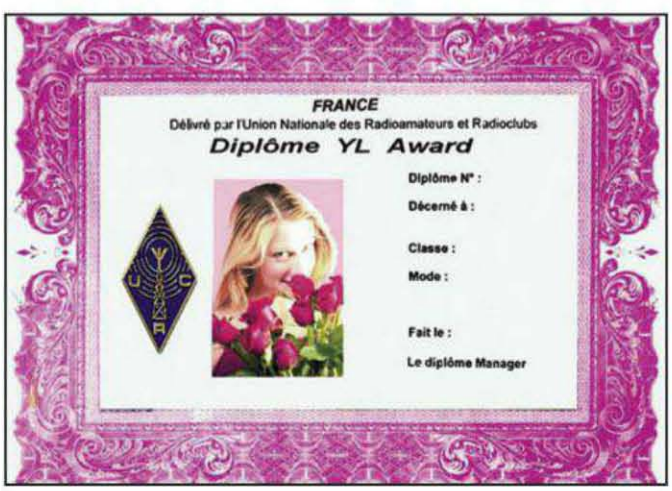
The award is available in four classes:
Class 1: 15 departments
Class 2: 35 departments
Class 3: 55 departments
Excellence: 99 departments

A list of French Departments can be found at: <http://en.wikipedia.org/wiki/Departments_of_France>.

Regions of France Award. Contact/SWL French regions on or after April 1968. Any bands and modes may be used. The award is available in four classes:
Class 1: 10 regions
Class 2: 15 regions
Class 3: 22 regions
Excellence: 27 regions

To earn the National Union of Amateurs and Radioclubs (URC) Departments of France Award, contact different departments of France on or after April 1968.

The Regions of France Award may be achieved by contacting (SWL OK) French regions on or after April 1968. Any bands and modes may be used.



To earn the Diplome YL Award, contact/SWL YL operators. The award is available in three classes. Use of any bands and modes is accepted.

A list of the regions of France can be found at at: <http://en.wikipedia.org/wiki/Regions_of_France>.

Diplome YL Award. Contact/SWL YL operators. The award is available in three classes using any bands and modes:

Class 1: 15 French YLs

Class 2: 15 French YLs plus 10 YL of foreign countries

Excellence: 20 French YLs plus 15 Yls of foreign countries.

Diplome URC des Radioclubs. The award is issued in three classes:

Class 1: Spell out the name "Union of Amateur Radioclubs" using the first letter or last letter of the callsign of stations contacted. The list of stations should represent at least three countries in each of the six continents.

Class 2: Spell out the same name as above but only using the last letter of the suffix of the stations contacted. The list of stations should include all six continents.

Class 3: Same as Class 1, except it must include at least five stations confirming an SWL report.

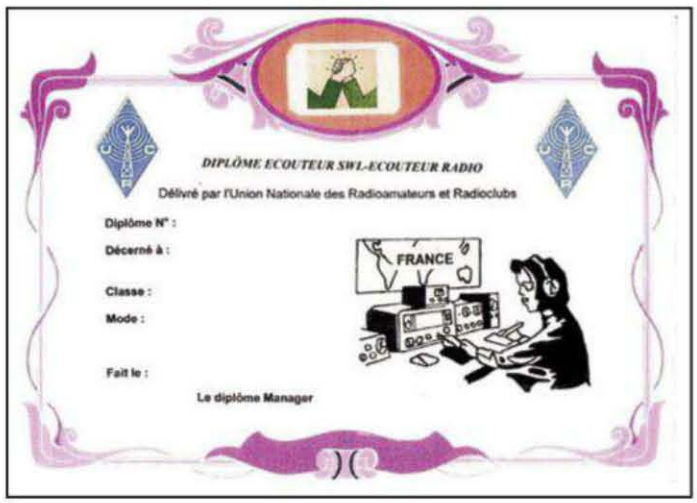
The following two awards are aimed at SWLs, but may be also earned by licensed amateur radio stations.

Diplome Ecouteur SWL – Ecouteur Radio. Issued in three classes for providing proof of receiving SWL cards as follows:

Class 1: 15 French SWL cards

Class 2: 15 SWL cards plus 10 French foreign SWL cards

Eccellence: 20 SWL cards plus 15 French SWL cards plus 1 YL SWL card. (A total of 36 cards.)



The Diplome Ecouteur SWL – Ecouteur Radio is issued in three classes for providing proof of receiving SWL cards (see text for details).

Diplome of URC des SWL. Available in three categories:

A. SWLs: must have received cards from 25 different countries plus 10 French Departments. (Total of 35 cards.)

B. Radioclubs: must have received at least 50 QSLs including cards from 20 different countries.

C. Amateurs: must have received at least 30 QSLs including cards from 10 different French Departments.

We are always interested in learning of new awards for publication in this column. Please contact me at the address on the first page of this column with details and a sample.

73, Ted, K1BV

BY JOE LYNCH,* N6CL

"Rampart" and a New Cubesat

"Rampart" is among the words in the U.S. national anthem, *The Star Spangled Banner,* whose definition is not well known—unless you are military. A rampart is a broad elevation or mound of earth raised as a fortification around a place and usually capped with a stone or earth parapet. If you did not previously understand the words "O'er the ramparts we watched were so gallantly streaming" from *The Star Spangled Banner*, you should be able to see that Francis Scott Key had to look over the rampart to see that the U.S. flag was "still streaming."

At this point in reading my column, you may be asking, "What does Rampart have to do with amateur radio?"

One of the cubesat missions listed on the Morehead State University's Space Science Center website (http://ssc.moreheadstate.edu/missions/) is named RAMPART. Now you may ask, "What does a cubesat have to do with rampart?" I have a couple of segues to go through in order to get to the answers.

Here is the first segue: Thanks to Rampart Hydro Services, which is located in Coroapolis, Pennsylvania, rampart has acquired a bit of a new meaning. Rampart (the company) has used ultra-high pressure water to provide rubber and paint removal services for a variety of customers for almost twenty years.

Here is the second segue: Morehead State's RAMPART mission is intended to certify warm gas propulsion subsystems and magnetic stabilization for cubesat orbital altitude adjustment. Those are fancy words that state that RAMPART CUBESAT will have a specially developed propulsion system that is designed to raise the cubesat's apogee orbit from 500 km to 1200 km.

The cubsat will also be testing rapid prototyping methods of building one-piece satellite structures, propellant tanks, printed-circuit-board cages, erectable solar panels, antenna deployment mechanisms, etc., at a fraction of the cost of current methods.

That mission statement is a mouthful of goals for a two-unit cubesat.

Several students who are in degree programs at the Ronald G. Eaglin Space Science Center at Morehead State University in Morehead, Kentucky, are building this two-unit cubesat with that special propulsion system. The extended acronym for the satellite is RAMPART CUBESAT, which stands for RApidprototyped Mems Propulsion And Radiation Test CUBEflow SATellite. The university plans to launch the satellite on a Minotaur from Vandenburgh in June 2013.

A paper authored by Gilbert Moore, N7YTK, et al., and entitled "3D Printing and MEMS Propulsion for the RAMPART 2U CUBESAT" unpacks the various components that will be in this cubesat. This paper was presented at the 24th Annual AIAA/USU Conference on Small Satellites, which took place August 9, 2010. The full version of that paper can be downloaded at: <http://ssc.moreheadstate.edu/missions/rampart/rampart.pdf>. Below are excerpts from that paper that are reprinted here with Moore's permission.

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

The following is a list of important dates VHF Plus enthusiasts:

May 5	η *Aquarids* meteor shower peak
May 6	Full Moon
May 6	Moon perigee
May 12	Last quarter Moon
May 18–20	Dayton Hamvention®
May 19	Moon apogee
May 20	New Moon and a Solar eclipse
May 26–27	Fourth Weekend of *DUBUS* EME Contest
May 28	First quarter Moon

—EME conditions courtesy W5LUU

Satellite Description

In its stowed configuration, the RAMPART satellite is a 2U (10cm × 10cm × 20cm) Cubesat that can share space with a separate 1U Cubesat in a standard 3U Poly Picosat Orbital Deployer (PPOD). Its total weight, including 0.6kg of propellant, is 2 kg.

The satellite's bus structure is a 3D-printed and nickel-plated card cage into which are inserted a battery card, four printed circuit boards, and a multiple-antenna deployment system. The 3Dprinted battery card contains eight Sanyo HR-4/3AAUP Nickel Metal Hydride (NMH) batteries.

The first printed circuit board contains a data-handling and electrical power control system (DH/EPS) provided by Jim White, WDØE, of Colorado Satellite Services. He presented his design in a paper entitled "CSS Bus for Rampart" at the 2010 Spring Cubesat Developers Workshop at Cal Poly San Luis Obispo in May 2010. The paper can be downloaded here: <http://www.cubesat.org/images/cubesat/presentations/DevelopersWorkshop2010/3_0900_pcbsat-rampart.pdf>.

This board also contains a 34mm × 68mm × 12.5mm experiment provided by Dr. James Lyke of the U.S. Air Force Research Laboratory Space Vehicles Directorate (AFRL/RV) to gather radiation performance statistics on three different types of plug-and-play modules—a radiation-hardened SPA-1 Applique Sensor Interface Module (ASIM) made in the U.S., a rad-hard SPA-1 ASIM made in Sweden, and a commercial U.S. PIC.

The second board contains an energetic particle measurement experiment, named DAVE, provided by Dr. David Klumpar, KD7MFJ, and his graduate students at Montana State University. Mounted on this board is a Geiger-Mueller tube identical to those flown by Dr. James A. Van Allen in 1958 in Explorers 1 and 3 to discover a belt of trapped energy particles around the Earth. The board also contains a 12.5mm diameter, 10cm long Neodymium permanent magnet with a field-strength of 703 Gauss at a distance of 10cm that will continually align RAMPART's longitudinal axis with the Earth's magnetic field.

The third board contains an AstroDev Be-1 2.4 GHz BPSK telemetry transmitter. The fourth board contains an AstroDev He-100 FSK/GMSK 437MHz/145.8MHz telemetry transceiver.

The somewhat soft electronic devices in this satellite have been protected by tantalum wafers to extend their lifetimes to the greatest possible extent in the enhanced


Why are top DXers & Contesters switching?
Come see us at Dayton and find out!
No Traps!
No Coils!
No Matching loss!
Single feed point!
The Ultimate Duo!
Single feed point Dual Bander
5el 28Mhz - 7el 50Mhz
by InnovAntennas
-
Dedicated band elements
AND spacing means
REAL monoband performance
Call us Toll Free
888 998 8541
InnovAntennas.us
Performance through Innovation
www.InnovAntennas.us info@InnovAntennas.us
High Performance, Low Noise antennas from 7 through 432 MHz

Looking Ahead in CQ

Here are some of the articles we're working on for upcoming issues of *CQ*:

"Take it to the Field" Special in June!

- Flight of the QRP Bird…
- Operate Digital Modes Without a Computer
- Taking it to the Field in New York City
- The Tacoma Truck-Tenna

Upcoming specials: Emergency Communications (October), Technology (November).

Do you have a ham radio story to tell? Something for one of our specials? See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com/guide.html>.

radiation environment to which they will be subjected during apogee passes.

Two sets of measuring-tape quarter-wave dipole UHF and VHF antennas and one monopole S-band antenna are also coiled up inside the bus. The telemetry boards and antennas are being provided by Professor Bob Twiggs, KE6QMD, of Morehead State University, and Nathan Fite, KJ4HVH, formerly of Morehead State University, now at Montana State University.

Attached to the front end of the satellite bus structure are four geared, double-sided, erectable 3D-printed solar panels on which are mounted a total of 32 SpectroLab triple-junction 26% efficient solar cells, covered by a combination of conventional and experimental cover glasses. The solar cells and cover glasses are being provided by David Wilt of AFRL/RV and mounted to the panels by Nathan Fite with guidance from AFRL. These panels are erected by an electric motor which has been previously flown in space on many occasions to actuate Planetary Systems Lightband deployment systems.

Bonded to an external face of the bus is another experiment provided by David Wilt to evaluate the long-term performance of advanced photovoltaic technologies, including a 4-junction 33% efficient Inverted Metamorphic Multijunction (IMM) solar cell, in a high-radiation environment. A 2cm × 2cm IMM cell is mounted next to a conventional 2cm × 2cm triple junction cell on a common circuit card for comparison purposes.

Attached to the back of the satellite bus structure is a warm gas (resistojet) propulsion system that was developed for RAMPART by Dr. Adam Huang and his graduate students in the University of Arkansas Department of Mechanical Engineering, using rapid prototyping and MEMS technologies. The RPS is contained in a 1U Cubesat that is attached to a 1U Bus that contains the remaining components of the satellite. It is based on a warm-gas (resistojet) configuration that raises the baseline vacuum specific impulse, Isp, of its propellant from 67s to 90s by adding heat energy to the propellant prior to its conversion to kinetic energy at the nozzle. The propellant of choice for the RPS is the pharmaceutical grade of DuPont™ Dymel®-134a (1,1,1,2-Tetrafluoroethane or R-134a refrigerant), which is approved by the FDA as a propellant due to its inertness.

The propellant has zero potential of flammability, is non-toxic, and does not leave residual contaminants that would affect other surrounding systems in case of leaks or bursts. A key feature of the propellant is that it is a compressed fluid, which differs from a cryogenic fluid in that its molecular weight is relatively high (i.e.,102 g/mol) which translates to a high boiling point of 247 K. Operationally, this means the fluid is self-pressurizing at the design RAMPART satellite temperature range, effectively eliminating pumps in the system by using temperature to control the pressure.

Have I whetted your appetite for more about this ambitious project? If so, then please look for an expanded version of this digest in the Spring or Summer 2012 issue of *CQ VHF* magazine.

Radio Amateur Encourages Engineering as a Career

The following is from *Southgate Amateur Radio News*:

Ali Guarneros Luna, KJ6TVO, has been involved in the development of the amateur radio CubeSat TechEdSat. In this video (http://www.youtube.com/watch?feature=playerembedded&v=2vVzxL4bvcg) she talks to teenagers at a careers night about her aspiration to become an engineer.

Ali was born in Mexico City and now lives in San Jose, California. She received her BS in Aerospace Engineering at San Jose State University in 2010 and will complete her MS in Aerospace Engineering from San Jose State University in 2012.

She currently works with the Edison Program, Small Spacecraft Payload and Technologies (SSPT) and SPHERES National Lab at NASA Ames Research Center. Under the Edison Program, Ali works on development of CubeSat projects, including TechEdSat, as the System Engineering, Mission and Ground Operations, and Launch Vehicle Service expert.

Under the Small Spacecraft Payload and Technologies Program, Ali works as Engineering Support for different missions, most currently in NLAS.

At SPHERES National Lab, Ali works as Engineer support for Ground Lab and Operation Support.

Education and Amateur Radio

The following is also from *Southgate Amateur Radio News*:

The Villages Amateur Radio Club, K4VRC (http://k4vrc.club.officelive.com/default.aspx) in The Villages, Florida, has taken ham radio into school by teaching amateur radio and electronics as part of the after-school program.

Their work in the intermediate and middle schools has attracted the interest of the media including the *Daily Sun* and MSNBC.

This report (http://www.youtube.com/watch?feature=playerembedded&v=ePVPY57WTdU) features 5th grader Cody Saucier, KK4GMQ, who achieved a 91% pass mark in his amateur radio exam.

W4FF Silent Key

Frank Fugle, W4FF, longtime weak-signal operator, became a Silent Key earlier this year. Arnie Coro, CO2KK, wrote: "W4FF, our good friend in Florida, will be missed by us Cuban VHF operators. Whenever there was an opening on 6 meters Frank was there." Samuel Horton, KD4ESV, wrote: "Rest in peace, Frank. I first talked to Frank back in 1992. He will be missed by many. He was a great man."

"The 50 MHz DX Bulletin" Ends Publication

"The 50 MHz DX Bulletin" has published its last bulletin, January 2012, Volume 23 Issue 1. It was originally founded by Harry Schools, K3HS, and later edited and published by Victor Frank, K6FV. Mark Moulding, KU7Z, wrote of its demise: "It was a great tool for knowing who was on and active from countries all over. Though the internet has taken over and supplies more immediate information, it will be missed."

Current Contests

European Worldwide EME Contest 2012: Sponsored by *DUBUS* and REF, the EU WW EME contest is intended to encourage worldwide activity on moonbounce. Information for this contest is available at the following website: <http://www.marsport.org.uk/dubus/>.

Spring Sprints: These short-duration (usually four hours) VHF+ contests are held on various dates (for each band) during the months of April and May. Please check <http://www.svhfs.org> for a future announcement.

2 GHz and Up World Wide Club Contest: Sponsored by the San Bernardino Microwave Society, this contest runs the

second weekend of May. Rules are available at the following URL: <http://www.hamradio.com/sbms/>.

Convention

Dayton Hamvention®: The Dayton Hamvention® will be held as usual at the Hara Arena in Dayton, Ohio on May 18–20. For more information, see the website: <http://www.hamvention.org>.

Calls for Papers

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

Central States VHF Society Conference: The Central States VHF Society is soliciting papers, presentations, and poster displays for the 46th annual conference on July 26–28, 2012. All aspects of weak-signal work on amateur radio bands of 50 MHz and above are sought. The papers will be published in the conference *Proceedings* and available at the conference. You do not have to attend the conference nor present the paper to have it published in the *Proceedings*. Poster's describing your project will be displayed during the two-day conference.

Presentations and posters at the conference may be technical or non-technical but will cover the full breadth of amateur weak-signal VHF/UHF activities. The presentations generally vary from 15 to 45 minutes, covering the highlights with details in the *Proceedings* paper.

If you would like to contribute a paper, presentation, or poster, please contact Rod Blocksome, KØDAS, CSVHF Conference Program Chairman, as soon as possible with the title and a short description. You can reach Rod at <k0das@arrl.net> or 690 Eastview Dr., Robins, Iowa 52328. Author guidelines and other details are available at <www.csvhfs.org>.

Microwave Update: The following is from Mike Lavelle, K6ML: The 50 MHz and Up Group is hosting this year's Microwave Update conference from October 18 to 21 in Santa Clara, CA, (near San Jose and San Francisco). See <http://www.microwaveupdate. org> for more info on the conference schedule, location, and hotel info. This is the first call for conference papers, presentations, and/or workshops on technical and operational aspects of microwave weak-signal amateur radio in the centimeter, millimeter, and submillimeter to light wavelengths. Papers can be short notes to full-length technical papers, original work, or just handy hints and tips; new designs or surplus conversion tips, professionally engineered,or hacked on a shoestring budget. Tutorials and overviews are also welcome to summarize current know-how and to help and encourage newcomers. Papers will be published in the *Proceedings* and may also be selected for presentation at the conference. Some topics may be organized and presented as workshops (for example, construction and measurement techniques).

Questions, papers, or ideas for papers should be sent to the following e-mail address: <mud2012papers@gmail.com>.

Meteor Showers

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

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

And Finally . . .

It turns out that Jim White, WDØE, lives on Rampart Road in Parker, Colorado. Too bad that he does not live on South Rampart Street, a street in New Orleans that was made popular by the Crosby Boys and the Andrew Sisters in their Big Band hit *South Rampart Street Parade*. The street gets its name from the wall, or "rampart" (rempart in French) that was built on the north side of the street in the city's early years to fortify the French colonial city. I was made aware of this song by my wife, Carol, W6CL, who is a Big Band fan, as part of our discussion of the meaning of rampart.

Now what does all of this business about rampart have to do with VHF? I am sure that there are other Big Band aficionados who read this column, including Dave Sublette, K4TO, who happens to live in Kentucky—which brings us back to Morehead State University in Morehead, Kentucky, the home of the now under development RAMPART CUBESAT.

If you have something to share in this column, which may or may not be rife with ironies, please contact me at: <n6cl@sbcglobal.net>.

Until next month… 73 de Joe, N6CL

BY CARL SMITH,* N4AA

March Huge Solar Flare *plus* DX Around the World

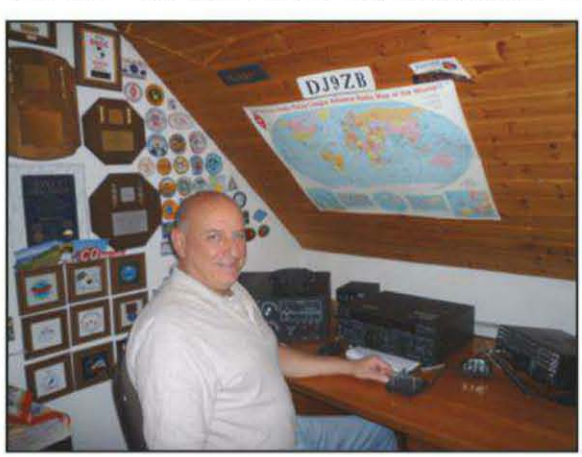
As I sit here this morning wrting my column, and it is almost mid-March, I'm waiting to hear more about the *huge* solar flare rushing toward Earth at a reported 4 million mph. Is that right? *Four million mph?* It is being called the largest flare in five years, and there was not only one, but *two* of them. Right now we have no idea what will happen, although the news media is cautiously telling us it could affect our power grids, GPS signals, and radio/TV signals. It will be a few more hours before the effects are upon us, so I hope I'm able to finish this writing before that happens. *(Obviously, it was possible!—ed.)*

Around-the-World Operations

By now many of you know that **T2T** did a really fine job of putting **Tuvalu** in logs around the world. The team ended up with 42,060 QSOs with 16,215 unique calls. They reported 29,130 on CW; 9,343 on SSB; and 3,587 on digital modes. QSL cards were printed and the mailing was expected to begin in mid-March by Bill, VK4FW.

HKØNA from **Malpelo** was a great operation, although pretty rough on the team. Not many DXpeditions have to climb mountains to get back and forth to an operating site, but these folks did. The final tally for this team was 195,356 QSOs with 91,791 on CW, 87,228 on SSB, and a whopping 16,337 on digital modes. That wa quite a feat considering the environment they had to endure on the island.

In February we got the opportunity to work **Somalia** when Darko, J28AA/E76A, got permission to operate from the Hawane Resort for eight days as **6O3A**. Operating alone, he managed to put 8,657 CW QSOs in the log, including 523 in the ARRL CW contest, and added another 101 Qs on SSB. He operated on 40 through 10 meters.



Mike Mraz, N6MZ, visited some friends in Europe. Here he is in the shack of Franz, DJ9ZB. Mike likes to go on DXpeditions, and you'll see his call listed in the logs of some of the biggest ones. (Photo courtesy of Franz, DJ9ZB)

In early March DXers got another opportunity to work a "rare one" when Elmo, EA5BYP, and Javier, EA5KM, got to **Equatorial Guinea** to operate as **3C6A** for several days. The transportation delayed their departure from there to **Annobon Island**, but they did get there to operate as **3CØE**. Unfortunately, a number of pirate stations were noted, making it difficult for DXers to know if they worked them or not.

The **Republic of South Sudan** finally got an "official" callsign allocation from the ITU. Henceforth any operations from this new country will use a prefix from the block "**Z8A through Z8Z**."

Senegal Allocated 6 Meters

In late February, François Normant, 6W7RT, President of ADRASEC Senegal & IARU R1 National EmComm Coordinator for Senegal reported:

"ADRASEC Senegal is proud to announce that following its application to the Regulatory Agency for Telecommunications and Posts (ARTP), the band 50–51 MHz has just been officially allocated at WRC-12 to the amateur service on a primary basis in Senegal. ADRASEC Senegal takes this opportunity to thank ARTP for their unconditional support.

"This allocation will only be effective when the new ITU Radio Regulations come into force and therefore all contacts made on 6m before that date have to be considered as unauthorized."

He shortly followed up with an announcement: "As of March 1, 2012, the Saly Amateur Radio Club station (ADRASEC Senegal) will be allowed to operate with the callsign 6V7SIX on the band. 5051 MHz. This is a temporary authorization valid until the new ITU Radio Regulations (WRC-12) come into force, normally by the end of 2012. A dual watch of 50.110 MHz (intercontinental calling frequency) and 50.210 MHz (French calling frequency) will be performed by the Radio Club operators.

"Watch for the next opening on the Magic Band and call us!"

Kilowatts for Australia

Starting March 1, 2012, the ACMA will accept applications from amateur Advanced licensees to use transmitter output power of up to 1,000 watts PEP from nominated fixed locations. The bands listed include 80 CW, 75 SSB, 40, 20, 17, 15, 12 & 10 meters. (160 meters is NOT included.)

For the entire story, go to: <http://www.acma.gov.au/WEB/STADARD/pc=PC_410285#>.

PYØS, St. Peter & St. Paul

The Southgate Amateur Radio News has reported that the Brazilian government has banned ama-

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

Dayton HAMVENTION® 2012
Internationally Connected

www.hamvention.org

Buy your Tickets, Flea Market, and Inside Exhibit spaces online.
OR Send SASE with a check made out to Dayton Hamvention
To: Hamvention Tickets, P.O. Box 1446, Dayton, OH 45401

The Biggest Show on Earth

- **Awards and Door Prizes**
- **Amateur of the Year & Club of the Year**
- **165,000 sq. ft. Inside Exhibitor Space**
- **Tech and Upgrade Tests FREE on Site**
- **12 Acres of Flea Market**
- **Public Special Event Station**

Ticket Prices: $20 in advance, $25 at the door.

General Inquiry: Dayton Hamvention®
937.276.6930
P.O. Box 964 Dayton, OH 45401

May 18-20, 2012 Hara Arena, Dayton, Ohio

The WPX Program

SSB

3117.....F4RST 3118.....N8HAM

Mixed

2184.....N5KE 2187.....IK2RGT
2185.....KB8VCV 2188.....JA1II
2186.....UT5KDS

Digital

73.....F4GTB 75.....N4PJ
74.....K9AAN

CW: 1650 N4PJ. 2800 IØNNY. 3500 KF2O.
SSB: 400 F4RST. 450 N8HAM. 1050 N4PJ. 2350 SV3AQR. 3800 KF2O.
Mixed: 450 IK2RGT. 500 UT5KDS. 550 K9OHI. 1350 W4UCZ. 2050 N4PJ. 4350 ON4CAS. 4700 KF2O.
Digital: 450 N4PJ. 600 K9AAN. 1000 KF2O.

40 Meters: KF2O
15 Meters: KF2O, W4UCZ
10 Meters: W4UCZ

Asia: KF2O

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, NN1N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ, S55SL, RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, TF8GX, S58MU, UX1AA, AB1J, DM3FZN, AG4W, UA3QNS, RX3AGD, WB5JID, LY3W.

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, I8RIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UR5FEO, N3RC, UT3IZ RU3ZX, YO9HP, RA3DNC, K8ZT, KE5K, JH8BOE, S58MU, UX1AA, DM3FZN, AG4W, UA3QNS, RX3AGD, LY3W.

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 WAZ Program

6 Meters

109.....PE5T

15 Meters SSB

653.....K2MHE 654.....K3PT

20 Meters SSB

1204.....K3PT 1205.....WB6UQT

12 Meters CW

60.....IK4WMA 61.....K9EU

17 Meters CW

83.....K9UP 84.....IK4WMA

30 Meters CW

104.....IK4WMA

40 Meters CW

285.....JG3LGD

80 Meters CW

91.....HB9ALO

160 Meters

395.....WØDD (31 zones) 396KH2/N2NL (33 zones)

160 Meter Updates

W2YC.....(40 zones) UT7EC.....(40 zones)

All Band WAZ Mixed

8886.....W8MET 8889.....JA1DEU
8887.....DL5XJ 8890.....DJ9BX
8888.....SQ9OH

SSB

5199.....W8MET 5203.....VE3TMG
5200.....N3NBT 5204.....OZ8RH
5201.....VE1VN 5205.....JA1II
5202.....SV8PKI

CW

665.....SM2LKW 670.....W1CDC
666.....JA2FGE 671.....JE1TRF
667.....W8MET 672.....OZ4CG
668.....N4ARO 673.....G3LPU
669.....MJØASP

RTTY

227.....W2LO 228.....WK3N

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>.

teur radio operations from this archipelago. The Brazilian Amateur Radio League and other DX groups have begun a major mobilization among government representatives to try to reverse the decision. Stay tuned for the "rest of the story."

Ron Wright, ZL1AMO, SK

(A number of tributes were posted and here is only one of them…)

"It is with great sadness that I report the passing of the legendary DXpeditioner ZL1AMO, Ron Wright, on March 6, 2012. He was 75. Ron was admitted to North Shore Hospital last week after he had a collapsed lung and was in stable condition at the time. He became a Silent Key earlier today.

"Ron was a serious CW op and would visit the U.S. Novice bands late in his DXpeditions. He had probably well over one-hundred DXpeditions throughout the Pacific, including 3D2RW, 3D2RW/R, 5W1CW, A35EA, C21/ZL1AMO, FWØBX, H44RW, T28RW, T28RW, T30BH, VR6HI, YJ0RW, ZK1CQ (South), ZK1CQ, (North), ZK1MB (North), ZK2RW, ZK3RW, ZL7AMO, ZL8AMO, and ZL9AMO, just to name a few! Many of these locations he visited multiple times between the late 1970s and 2002."

Sincere condolences to the family and friends of this DXing legend.

Nepal

Mentioned last month, now I have more news of the new licensees in Nepal.

Satish, 9N1AA, reports that nine of the 21 who passed the test have obtained their licenses and were assigned the following calls: OM Sanjeev Pandey, 9N1SP; YL Nisha Shrestha, 9N1NS; OM Ganesh Gimi, 9N1GJ; YL Niva Upretee, 9N1NU; OM Pravin Joshi, 9N1KK; OM Khagd Sen Oli, 9N1KS; OM Surya Shrestha, 9N1SS; YL Kampana Pokharel, 9N1MM; and OM Tara Neupane, 9N1TN. *(Note that most of suffixes of the above calls are the "initials" of the operator.)*

Satish, 9N1AA, is following up with the other 12 who have not yet applied for their licenses. Here is more from Satish: "A TS-570S has been donated to the club station by some "American friends." My XYL Kalpana has started setting up a club station in Matatirtha, on the outskirts of Kathmandu. She is trying to get permission for a club license with the call 9NØMM for the Moran Memorial Station. This would be a common place for any 9N ham to operate from a good station. A Force 12 4C antenna is already there and a 60-foot tower is erected. Several dipoles and a rhombic for 3.5 MHz directed toward the U.S. east coast is planned. 9N1MM should be functional by the end of March, and by June we expect the 9NØMM callsign." *(QSL Manager for 9N1MM and 9NØMM will be N4AA.)*

In response to questions about 6-meter operation, Satish says, "I have

5 Band WAZ

As of March 1, 2012, 872 stations have attained the 200 zone level and 1761 stations have attained the 150 zone level.

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

G4IRN

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)
IZ1ANU, 199 (1)
IN3ZNR, 199 (1)
IK4CIE, 199 (1)
JK1BSM, 199 (2)
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)
UA4LY, 198 (6&2 on 10)
JA7XBG, 198 (2 on 80&10)
JA3GN, 198 (2 on 80&40)

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

EA5GA (170 zones)
W8MET (170 zones)

5 Band WAZ updates:

K2FF (200 zones)
K6FW (184 zones)
NN6UK (183 zones)
UA3TCJ (200 zones)
SV1PL (200 zones)
JK1BSM (199 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>.

CQ DX Awards Program

SSB

2582.....N5KE

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Please make checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604. We recognize 342 active countries. Please make all checks payable to the award manager. Photocopies of documentation issued by recognized national Amateur Radio associations that sponsor international awards may be acceptable for CQ DX award credit in lieu of having QSL cards checked. Documentation must list (itemize) countries that have been credited to an applicant. Screen printouts from eQSL.cc that list countries confirmed through their system are also acceptable. Screen printouts listing countries credited to an applicant through an electronic logging system offered by a national Amateur Radio organization also may be acceptable. Contact the CQ DX Award Manager for specific details.

The CQ DX Field Award Program

Mixed

122.....N5KE
123.....FG4NO

Mixed Endorsements

OK1RD..... 150, 1.8 MHz & 50 MHz
KO6LU 100
HB9CQL.....100
N5KE.....100

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.

operated on 6 meters with my IC-7000 with only a dipole, working Indonesia, China, United Arab Emirates, Singapore, and Thailand."

Cluster Spotting

I've been getting a lot of comments recently about the poor practice of spotting DX callsigns on the various DX clusters. Folks, if you can't copy the signal well enough to be *absolutely* sure of what it is, *please* don't put it on the cluster. This is not good practice and only causes problems for the DX station and many DXers around the world. Here's a specific case of my own on 40 CW a while back: JY5HX was on the low end and his signal wasn't all that loud. However, I saw at least two different variations of his call posted on the cluster.

The team that brought you TN2T, January 22–31, 2012, from the Republic of Congo. They logged 50,570 QSOs: 25,000 on SSB, 23,000 on CW, and over 2,400 on RTTY. (See the photos and stats at: <http://www.tn2t.be/> (Photo courtesy of the TN2T website)

Left to right: Minister of Post and Telecommunication; Director of Communications; and Darko, J28AA/E70A. Darko holds his license to operate as 6O3A. (Photo from the BHCC website: <http://bhcc.ba>)

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	3628 ..SM6DHU	2922 ...OZ1ACB	2116 .....AE5B	1667 .....SQ7B	1066 ....JA1CKE	684 .....FG4NO	620.....PI4DHV
6177 .....K2VV	4228.....N6JV	3540 ...KC9ARR	2716 .....W3LL	2192 .....N2SS	1655.....SV1DPI	976 .....KM6HB	682.....AI8P	616.....DL5JH
5797.....W1CU	4187 .....KØDEQ	3475 .....N8BJQ	2544.....W6OUL	2106.....KØKG	1593.....S55SL	964 .....K8ZEE	662.....JA7OXR	600.....IK1RKN
5303 .....9A2NA	4129.....S58MU	3305....JH8BOE	2530 .....YO9HP	2084 ..WD9DZV	1463.....NE6I	815 .....KL7FAP	653.....KK3Q	600 ....KB9OWD
5142 .....EA2IA	4129....WA5VGI	3238 .....K1BV	2499 .....VE6BF	2004 .....W2FKF	1462.....DL4CW	808 .....W6PN	650 .....N3YZ	
4785.....N4NO	4074 ...YU7BCD	3231.....W2OO	2493 .....I5RFD	1954 .....W7CB	1446 .....DF3JO	781 .....V51YJ	649 .....RA9OO	
4722.....YU1AB	4022 .....N9AF	3207 .....W9IL	2476 .....K5UR	1936 .....AG4W	1383...IWØHOU	726.....K5IC	647.....PAØQRB	
4413 .....KF2O	4005 .....W9OP	3180 .....K9UQN	2445 .....AB1J	1862 .....VE9FX	1337 .....K6UXO	725 .....WK3N	644 .....KWØH	
4407 .....S53EO	3967...ON4CAS	3116....JN3SAC	2428 .....N6QQ	1818 .....KX1A	1322 .....AA4FU	723 .....KØDAN	636 .....ZS2DL	
4344.....VE3XN	3813..WB2YQH	3091.....9A4W	2338 .....I2EAY	1727.....N3RC	1269 .....K5WAF	712 .....ISØEBO	634.....	
4290 .....I2PJA	3773.....IK2ILH	3007 .....W2WC	2304 .....N3XX	1722 ...VE6BMX	1116.....YU7FW	707..W1/E74OF	UA3LMR/QRP	

SSB

5169 .....IØZV	3557 .....N4NO	2741 ...WA5VGI	2326 .....CX6BZ	2094.....I8LEL	1805 .....EA3NP	1480.....AB5C	1089 .....IZ8FFA	883 .....WA5UA
4663.....K2VV	3323...OE2EGL	2711 ...LU8ESU	2315 ..SV3AQR	2093.....W2WC	1782 ....W6OUL	1464 ..VE7SMP	1083.....KX1A	875.....K7SAM
4632 .....OZ5EV	3259...CT1AHU	2652 .....I3ZSX	2310 .....KI7AO	2076 .....K2XF	1776 ...JN3SAC	1463.....I2EAY	1042 ....IZØBNR	758.....IV3GOW
4606 .....VE1YX	3108.....I4CSP	2595.....EA1JG	2294 .....N8BJQ	1971.....W2FKF	1719.....K9UQN	1410 .....S55SL	1031 ....IK8OZP	724 .....W3TZ
4584 .....F6DZU	3101.....KØDEQ	2497 .....S58MU	2275 ....IK2DZN	1935...SV1EOS	1623.....VE9FX	1386 ....IK4HPU	1022 .....NW3H	717.....KØDAN
4238 .....I2PJA	3022.....I8KCI	2459 .....W2OO	2209....IK2QPR	1927.....AE5B	1612 .....AG4W	1282.....N3XX	1012 .....KU4BP	690.....W6PN
4208.....9A2NA	2903 .....IN3QCI	2451...EA3GHZ	2201 .....NQ3A	1889.....N6QQ	1611 .....W2ME	1258 .....N1KC	1007 ..VE6BMX	640 .....UA9YF
3962.....I2MQP	2877 ..YU7BCD	2449..SM6DHU	2159 ...DL8AAV	1879.....K3IXD	1561.....PT7ZT	1146 .....SQ7B	978 .....EA7HY	637.....K5WAF
3825.....EA2IA	2857.....4X6DK	2416.....W3LL	2131 .....N6FX	1844.....YO9HP	1550 ....IK2RPE	1145...EA3EQT	976 .....NE6I	600 ....WA2BEV
3593.....KF2O	2761 .....KF7RU	2333.....W9IL	2098 .....K5UR	1825 .....KQ8D	1534 .....AE9DX	1117..WD9DZV	965.....VE6BF	

CW

5752.....K9QVB	3750 ..VE7CNE	3042 .....I7PXV	2692.....KA7T	2365.....W2OO	1827 .....AC5K	1223 .....KX1A	1049 ....K5WAF	629 ....IV3GOW
5522 .WA2HZR	3722 .....9A2NA	3025 .SM6DHU	2632.....W2ME	2245 .....W9HR	1665 ....YO9HP	1220 .....AA4FU	821 ....HB9DAX	615 ....JH6JMM
5483 .....K2VV	3676.....S58MU	2843 .....N8BJQ	2502...JA9CWJ	2178 .....I2MQP	1548 .WD9DZV	1210 ....DL4CW	813 .....VE9FX	600.....IK2SGV
4316.....N4NO	3587...WA5VGI	2804 ....K9UQN	2473 ....OZ5UR	2010 .....K5UR	1461 .....WO3Z	1165 ..VE6BMX	794 ....LA5MDA	
4228.....N6JV	3471 ....KØDEQ	2730 ...IK3GER	2434 .....W9IL	1990....W6OUL	1445....EA2CIN	1160 .....AA5JG	753.....F5PBL	
4024 .....LZ1XL	3347 .....KF2O	2723...EA7AZA	2424 .....W2WC	1983..EA7AAW	1424 .....N6QQ	1125.....IØWOK	749 .....AE5B	
3918.....VE7DP	3226 ..YU7BCD	2701 ...JN3SAC	2381 .....N6FX	1945 .....N3XX	1336 .WA2VQV	1145 .....VE1YX	732 .....SQ7B	
3864 .....EA2IA	3223 .....W8IQ	2697.....IØNNY	2373 .....VE6BF	1848 .....I2EAY	1312 ....K6UXO	1102 ....IT9ELD	695.....S55SL	

DIGITAL

1700 .....W3LL	1133 .....N6QQ	1056 .WD9DZV	1049.....W2OO	894 .....AG4W	866 .....SQ7B	643.....K9AAN
1408 .....N8BJQ	1066 ....YO9HP	1054 .....KF2O	1009..GUØSUP	886 .....KØDEQ	685 .....EA2IA	

The DX Store

No BS. Just good old fashioned customer service.

SAVE BIG ON ICOM®

ICOM Repacked Radios and Receivers at Discounted Prices

90 Day ICOM Warranty

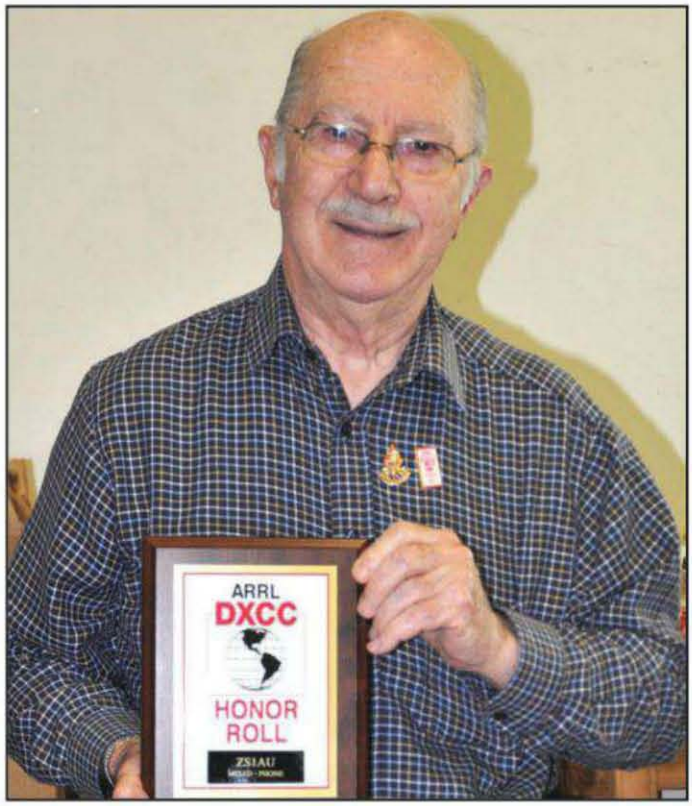
Don't get burned buying used, get a world class radio from an authorized repack dealer you can trust.

Factory repacked radios/receivers are covered by a full ICOM warranty for 90-Days and have been graded, completely tested and calibrated by ICOM factory service technicians.

sales@dxstore.com

www.dxstore.com

Nikolay, UXØFF, recently asked about rules for a WAZ via EME! He told Floyd, N5FG, CQ's WAZ Award Manager, "I'm active via moon bounce with new antenna. I now have 150 QSOs with 34 countries. I now plan to make WAZ on 2 meters. Now it's really possible …" (Photo courtesy of Nikolay, UXØFF)



The ARRL DXCC Honor Roll is not the easiest award to qualify for from many parts of the world, let alone from South Africa. Dennis, ZS1AU, proudly shows his new Honor Roll plaque. Many years, many cards, but now it is his. Congratulations, Dennis! (Photo courtesy of ZS1AU)

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Keith Gilbertson. Mail all updates to Keith Gilbertson, KØKG, 21688 Sandy Beach Lane, Rochert, MN 56578-9604.

Mixed

K2TQC....273	W6OAT....213	K8OOK....196
W1CU....244	VE3ZZ....207	N4NX....192
HAØDU....240	JN3SAC....207	ON4CAS....191
VE7IG....240	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	NI6T....200	

SSB

W1CU....224	KØDEQ....192	JN3SAC....177
W4ABW....202	N4MM....186	NØFW....176
VE7SMP....193	W4UM....184	DL3DXX....175

CW

DL6KVA....233	JN3SAC....202	N4MM....179
W1CU....233	W4UM....197	N4NX....177
DL2DXA....209	OK1AOV....196	N7WO....175
KØDEQ....207	HB9DZZ....186	
DL3DXX....203	OK2PO....184	

Unfortunately, there was a lot of QRM on his frequency with many stations calling him constantly… *bad practice.* My patience was wearing thin, but I stuck with it until I could definitely confirm the callsign, and I worked him through all of the very bad behavior. Let me say it again… and again…. *If you don't hear it yourself, with a high degree of confidence, don't post it.* For those watching the cluster spots… *Look, Listen, Confirm* before you put it in the log.

Until next time, enjoy the chase and Have Fun!

73, Carl, N4AA

QSL Information

HBØ/OE9SDV via OE9SDV
HBØ/OK2QA/P via OK2QA
HBØ/ON4DN via ON4DN
HBØ/T93Y via E73Y
HBØ/T96Q via E73Y
HBØ/VU2PAI via VU2PAI
HBØBOE via DJ9ZB
HBØLL via via DJ9ZB
HBØXSV via DJ6QT
HB9/HAØHW via HAØHW
HB9AV via HB9DUR
HB9EHJ via DL3OCH
HB9SPACE via HB9ACA
HB9TK via DJ3FY
HB9VELO via HB9OCR
HB9XGQ via DL1DA
HC1MD/HC4 via K8LJG
HC2SA via HC2S
HC5AI via HC5NAI
HC6JB via DJ9ZB
HC8/DF8AN via DF8AN
HE8BHY via HB9BHY
HE8CIC via HB9CIC
HE8CSA via HB9CSA
HE8CXZ via HB9CXZ
HE8DAX via HB9DAX
HE8FAP via HB9FAP
HE8ICE via HB9BHY
HE8IPA via HB9IPA
HE8XC via HB9XC
HE8XC/P via HB9DLO
HF1ØØZHP via SP6ZDA
HF1ØØZO via SP2PTU
HF128GWS via SP9PDG
HF12HAITI via SP2FAP
HF15ØLZ via SP4YPB
HF15PB via SP9YGD
HF1759BPK via SP3PJW
HF18WOSP via SP5PWK

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

The YL Advantage—Perception or Reality?

BY GEORGE TRANOS,* N2GA

Do female operators have an advantage when operating a contest? Opinion varies, but many feel they do. While young ladies (YLs) are still a small percentage of the hobby, their ranks are growing and there seem to be many more women on the air today than ever before. Some of the leading YLs from around the world had varying opinions on this topic:

"A YL voice stands out in pile-ups," according to **Ann Santos, WA1S**, of Sharpsburg, Georgia. "I can't remember how many times I heard in a pile-up, 'The YL only.'" Santos, a ham for 33 years, is considered one of the best YL contesters in the world. She took first place in 1996, 1997, and 1998 in the single-operator low-power category in the CQ World-Wide DX CW contest. WA1S says, "I think more YLs should participate [in contests]. Contesting has always been predominately men, and there are many women who are intimidated by this. Women can be just as good as men."

Anela Karacic, E70YL, of Sarajevo, Bosnia and Herzegovina, agrees. "I do not know of any disadvantages for YLs in contests!" Karacic says. "I think that YLs have some advantages because of the female voice, and especially YLs from countries where YLs are a rarity. Some OMs respect YLs and take a female callsign first in a pile-up. If you have a callsign with 'YL' in it, as I have in E70YL, it can be one more thing that can be to your advantage. My new callsign helps me a lot in pile-ups and when I am calling CQ in a contest or at any other time." She continues, "I will tell you what I have experienced during my time in this hobby. Some of my friends who are not hams have asked me several times what I am doing in this hobby that is, as they say, exclusively for men. That is the reason why ladies need to be more active and stronger in this. Luckily I have very good friends who encourage me to be on the air."

*P.O. Box 657, Copiague, NY 11726
e-mail: <n2ga@cq-amateur-radio.com>

Calendar of Events

All year	**CQ DX Marathon (http://bit.ly/vEKMWD)**
May 5-6	7th Area QSO Party (http://bit.ly/yJJlqw)
May 5-6	New England QSO Party (http://www.neqp.org/rules.html)
May 5-6	ARI DX Contest (http://bit.ly/5tzdKp)
May 5-6	Indiana QSO Party (http://www.hdxcc.org/inqp/rules.html)
May 5-6	10-10 Spring CW Contest (http://bit.ly/yTsaDk)
May12-13	CQ-M Int'l DX Contest (http://cq-m.andys.ru/rules_eng.php)
May 12-13	Volta WW RTTY Contest (http://www.contestvolta.com/volta45th.pdf)
May 12-13	**CQ WW Foxhunting Weekend (http://bit.ly/zBuff9)**
May 19-20	King of Spain CW Contest (http://bit.ly/PE5uI)
May 26-27	**CQ WW WPX CW Contest (http://www.cqwpx.com/rules.htm)**
Jun. 2-3	Alabama QSO Party (http://bit.ly/AhHgus)
Jun. 2-3	SEANET Contest (http://2012sea.net/mambo/content/view/5/10/)
Jun. 2-3	10-10 PSK Contest (http://www.ten-ten.org/oseason/oseason.html)

"YLs have a definite advantage when searching and pouncing in SSB contests," according to **Valerie Hotzfeld, NV9L**, of Wheatland, Wisconsin. "My friend once told me that we get an automatic 10 dB gain with our voices and it's so true. I can't speak for all YLs, but my only disadvantage is my inability to be a bit more cutthroat." According to Hotzfeld, "I would love to see more YLs active in contesting as well as all other aspects of amateur radio. I think we bring a different dimension to this hobby." She goes on to say, "Since I am new to contesting, I am soaking up every bit of information that I can to better my scores in hopes that someday soon you'll see NV9L at or near the top

Ann Santos, WA1S, at the controls of her PJ7/WA1S contest station in St. Maarten. (All photos courtesy of the subjects)

Anela Karacic, E70YL (ex-E74EE and ex-T95LKA) from Sarajevo, Bosnia and Herzegovina.

Valerie Hotzfeld, NV9L, from Wheatland, Wisconsin.

Rebecca Kimoto, VA7BEC, at the controls of her contest station in Delta, British Columbia, Canada.

Dawn Williams, KC9LQS, of Batavia, Illinois.

of the leader boards." NV9L says, "I love the competitive aspect of contesting; competing against others in my contest club, the 9-landers, everyone in zone 4, and the U.S. But more importantly, I contest to better my score and QSOs-per-hour rate. That's because my dream is to one day go on a 'most wanted' DXpedition. Contesting is also a fantastic way to quickly add a lot of new band countries to my log. Lastly, contesting pushes me to better my station, and in that category my enthusiasm most definitely exceeds my equipment."

Rebecca Kimoto, VA7BEC, of Delta, British Columbia, Canada, thinks, "A YL voice seems to get through when OMs are having trouble being heard. In a pile-up situation, taking the YL is probably just one way of sweeping the pile, like taking 'Kilo only' or 'DX station come again'. But I sense also that since YLs are few and far between in contests, the OMs are happy for the Q because it's kind of rare." Kimoto, a ham for nine years, continues, "There are no disadvantages to speak of. I like the fast pace of a contest, the challenge of picking out a call from the noise or amid a pile-up, and the opportunity for DX contacts and the chance to expand my DXCC wallpaper." VA7BEC says, "A welcoming environment for all radio amateurs that encourages more people to get involved and have fun in contests is the most important thing."

Dawn Williams, KC9LQS, of Batavia, Illinois, sees both advantages and disadvantages to being a female

Janet Robidoux, KØJE, and Janice Robidoux, KØJA, of Coon Rapids, Minnesota.

Donna Hinshaw, AG6V, of Petaluma, California, says, "YLs run the same gamut as OMs relative to skills, knowledge, dedication, and expenditures of money and time."

contester. "YLs do have a few advantages in contests. The pitch of the female voice provides a degree of gain that often helps in pile-ups. Less scientific but still significant, a YL's voice is often noticed simply because it is rare in contests. On the other hand, I find that being a YL has disadvantages as well. Primarily, women are often the primary caregivers to children and managers of the home. The 24/7 nature of those responsibilities sometimes makes it difficult to immerse myself as completely in contesting as I would like. With my youngest now in her teens, however, it's becoming a little easier. Another disadvantage some YLs face is that many of us came to the hobby later in life than a lot of our male peers. That means we enter the playing field with far less experience from which to draw, and in some cases, far less background in the sciences to support our new knowledge base. (Obviously, this applies equally to men who joined the hobby later in life.) Personally, I was fortunate to have been befriended by a number of male hams who are more than generous with their time and knowledge, and supportive of my growth in the hobby. But for a new

ham without that kind of support from one's peers, mastering radio science is a much slower road." Williams continues, "In the five years that I've been licensed, I have never heard more than a handful of YLs participating in a given contest, and I'd like to see this change. More than any other operating activity, contesting creates challenging conditions that hone your operating skills, improve your listening capabilities, and increase your efficacy. To succeed as a contester, you must draw on everything you've learned, every instinct you possess, and every strength you've developed. The fast pace of the exchange coupled with QRM, fluctuating band conditions, and the unique operating challenges inherent in any given contest force you to think on your feet and trust in your ability. Once you can perform well and comfortably enough to call yourself a good contester, you've developed the skill to be a great operator under normal conditions."

Twin sisters **Janet Robidoux, KØJE, and Janice Robidoux, KØJA**, of Coon Rapids, Minnesota, have been active hams for 59 years. According to KØJE, what keeps them operating is the "mental and technical challenge; Janice is the technical guru. We do all our own station hardware and software set up, logging, and reporting. (Janet climbs the tower, but we had a professional install the Pro 67 antenna.) We consult with our MWA contest club members for technical advice." Robidoux feels that "There may be a small edge in phone pile-ups" for YLs. She continues, "YLs should participate if they enjoy doing so. However, YLs who work and have families find it virtually impossible to spend

Susan M. King, K5DU, of Austin, Texas, participates in contests for "the thrill of victory and the agony of dupes. Contesting is fun!"

valuable weekend time at the rig." Both women say, "We like articles that tell how to improve our station for contesting. Perhaps you could feature a YL who does all her own technical support rather than depending on the OM, to encourage other YLs to do so."

Donna Hinshaw, AG6V, of Petaluma, California, was licensed in June 2009 and operates CW almost exclusively. Hinshaw says she enjoys contesting because "you can really experience the propagation. With a contest there are so many stations on from around the world or around the USA that I can watch the propagation change and affect the ability to make contacts easily. Also, I enjoy the thrill of hearing someone in a faraway place send my callsign and the mental challenge of figuring out how to get my call answered within a pile-up from a little pistol station." Of the YL advantage, AG6V thinks "In CW/digital contests, I don't think so. In SSB contests, there may possibly be an advantage since

Victoria Panagiotou, SV2KBS, in Serres, Greece

Cheryl Muhr, NØWBV, operating from Svalbard as JW/NØWBV.

higher pitched voices carry differently and some OMs may choose not to respond." She continues, "On one hand, I don't think the distinction of YL or OM participation in contesting makes any difference; the contest is just about people out on the bands doing what they enjoy. On the other hand, I *do* think it is important for YLs to participate in contests, as well as in club activities, to let our participation be seen. YLs run the same gamut as OMs relative to skills, knowledge, dedication, and expenditures of money and time."

"In SSB there is a bit of 'Who is the YL calling?' but RTTY and CW are level playing fields," according to **Susan King, K5DU**, of Austin, Texas. A ham for 32 years, King participates in "mostly major RTTY contests, but I have participated in almost every other contest." She enjoys contesting for "the thrill of victory and the agony of dupes. Contesting is fun!" K5DU is one of a very few hams who "met my mentor on the radio and married him—K5NA." King says, "Contesting is the future of ham radio. We need more YLs participating in contesting." An unusual topic she would like to see covered is "the search for headphones made to fit on YL-size heads."

Victoria Panagiotou, SV2KBS, of Serres, Greece, has been a ham since

2005. Panagiotou says, "I think being a YL contester is sort of a double-edged sword. YLs are really encouraged to get into it and actually have better opportunities than OMs—well, when on CW, you can't tell if it's a YL or OM operating—but if a woman makes a mistake and doesn't do as well, I think she's in an inferior position compared to a man. I think you really have to be a little bit better than the guys to prove yourself. And I like that!" SV2KBS continues, "Contesting is a hobby. According to 'N1FN's second law of hobby economics,' you can't make people want to do something. Therefore, as long as contesting is an activity that is dear to one's heart, giving joy and satisfaction to someone, namely a YL, then it's important for *her* own self to get on the air and devote the time to enjoy as much contest-RF as possible."

Cheryl Muhr, NØWBV, of Littleton, Colorado, has been a ham for 19 years. She likes operating in "all types (of contests) from Sprints to QSO Parties, Phone, RTTY, DX and local, YL, Field Day, and more!" Muhr says, "I like the challenge to improve myself. I am also a paper chaser and contesting helps me find countries/states/items I might not find otherwise." As far as YLs having an advantage, NØWBV says, "I think it could be either way depending on the contest. In many contests that use phone, the YL voice (or youth voice) is often used to pick out a station. It can get through better in a pile-up. During the YL-OM contests it is an advantage because OMs are looking for the YLs, but in the YL to YL contests, it can be hard to find/hear other YLs!" She adds, "It is important for the YL to participate in contesting just as it is important to get families and youth involved. It is a great way for YLs to get used to getting on the air because they have a 'set script' with the contest exchange and it is often less frightening than just calling CQ. We need every contester we can get!"

Kay Craigie, N3KN, of Blacksburg, Virginia, is the current president of the American Radio Relay League and an avid contester. A ham for 29 years, Craigie says, "The advantage is in phone contesting, where a YL's voice stands out in the bedlam. Even so, I like CW contesting better than phone contesting! When I can figure out how to take that 10 dB YL voice advantage down to the CW band, I'm going to knock people's socks off." She continues, "Contesting keeps my skills sharp. I enjoy working on improving my performance from one year to the next. I enjoy the intensity of contests. Because of my

ARRL President Kay Craigie N3KN, of Blacksburg, Virginia, says, "I think anyone who wants to improve operating skills, learn about propagation, and be stimulated to improve the performance of his or her station should try contesting. This is true regardless of age, gender, or other personal characteristics."

ARRL responsibilities I don't have a whole lot of time to operate, so being able to knock out a boatload of QSOs in a weekend keeps me grounded in the real world of amateur radio." N3KN continues, "I think anyone who wants to improve operating skills, learn about propagation, and be stimulated to improve the performance of his or her station should try contesting. This is true regardless of age, gender, or other personal characteristics. I think it's important to identify and mentor the next generation of contest operators. Many outstanding contesters have gone to considerable effort to do this. They can see beyond their own personal glory and invite beginners to get in the chair and start learning how to compete. You don't have to be one of those big guns to mentor newbies. Last year, a Technician who hasn't been on the air much operated the ARRL 10 Meter Contest from the modest station at my house. It was her first contest and everyone agreed she could become a good contester if she wants to. Her OM is an excellent contester, so she will have good coaching, and I have a General class study manual with her name on it."

While female operators may still be a rarity in contesting, the perceived advantage that they have appears to be at least partially real, especially when operating voice contests. The ranks of YLs are growing, and some of the best operators in the world are women. Women also have a unique voice in amateur radio, with a perspective that may be different from men. For our hobby and contesting to grow and thrive, the opinions of all contesters should be listened to regardless of gender. 73, George, N2GA

BY TOMAS HOOD,* NW7US

Propagation Reliability

A Quick Look at Current Cycle 24 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, February 2012: 33
Twelve-month smoothed, August 2011: 59

10.7 cm Flux
Observed Monthly, February 2012: 107
Twelve-month smoothed, August 2011: 118

***Ap* Index**
Observed Monthly, February 2012: 7
Twelve-month smoothed, August 2011: 7

One Year Ago: A Quick Look at Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, February 2011: 29
Twelve-month smoothed, August 2010: 17

10.7 cm Flux
Observed Monthly, February 2011: 95
Twelve-month smoothed, August 2010: 81

***Ap* Index**
Observed Monthly, February 2011: 5
Twelve-month smoothed, August 2010: 6

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for May 2012

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 9, 10, 15	A	A	B	C
High Normal: 5-8, 13-14, 16-18, 20-27	A	B	C	C-D
Low Normal: 4, 11-12, 19, 31	B	C-B	C-D	D-E
Below Normal: 1-3, 28-20	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 3 will be poor to fair (D-C) on May 1st through the 3rd, fair to good (C-B) on the 4th, and then good (B) from the 5th through the 8th, 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.

Anyone who has operated on the HF (shortwave) bands knows how variable the ionosphere can be. Even without considering the other system factors of transmitter power, receiver sensitivity, noise, frequency, and so forth, the varying ionosphere is always with us, creating ever-changing propagation conditions that can make our DX hunting or evening listening to a favorite station a challenging experience.

When we listen on HF radio and hear those elusive signals coming and going, chances are that the changing ionosphere is the cause. Most of the time, HF signals are stronger at night and become weaker during the daytime. Those diurnal effects are easy to understand, because when the sun shines on the upper atmosphere, more of the gaseous atoms are converted to ions, and those charged particles multiply and expand the ionosphere to lower altitudes. At night sunlight is gone, so the masses of charged particles tend to dissipate and the ionosphere's reflection height is said to rise.

However, even when a radio circuit is entirely in daytime or nighttime, the signals still vary because the ionosphere is non-uniform. I've never seen the ionosphere, but I suspect it would look like undulating cloud layers, and here in the Omaha, Nebraska area I've seen lots of those!

With all that going on, how in the world do we answer that age-old question "When will good propagation occur?" The solution is to use a propagation prediction program. Modern HF propagation models assume that HF signals "bounce" off a reflection layer of the ionosphere, and models such as VOACAP include elaborate ionospheric profiles that describe electron and ion density as a function of height. The profiles vary with day and night and are applied by the model according to each circuit's geometry. A long circuit may have several ionospheric reflection points—usually called *control points*—and the profiles may be different at each point. It takes a sophisticated computer model to keep track of all that.

Nevertheless, such models are based on average, or ambient, ionospheres. So how do they account for the undulating ionosphere that might vary from the average? The answer is that the models use a statistical computation to account for a range of ionospheric (and other system parameter) variability. And in HF system computations, those variabilities are expressed as *reliability*.

In the world of HF, *reliability* means *time availability*. For example, if our model predicts a reliability of 50%, it means that the prediction will be as computed or better during 15 days of a 30-day month. If we want a more conservative prediction, we could specify a *required reliability* of 90%. The

*e-mail: <nw7us@nw7us.us>

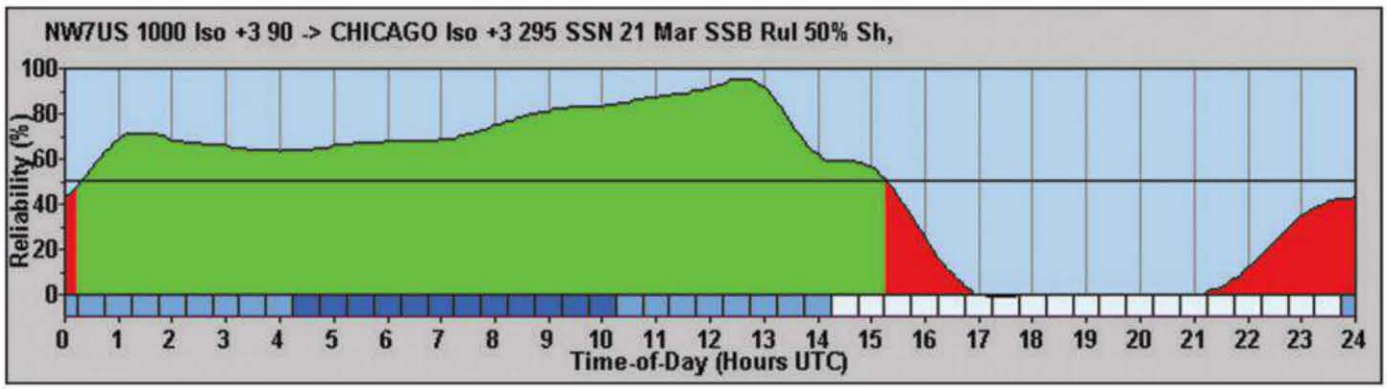


Fig. 1– The Reliability vs. Time-of-Day chart that graphs the path condition between a station in Washington State and Chicago, Illinois on 40 meters, where the horizontal black line at the 50% reliability illustrates an opening starting at about 0030 UTC and ending just after 1500 UTC. The signal is well into the green during this opening (see text for explanation). (Credit: NW7US, using ACE-HF Pro <http://hfradio.org/ace-hf>)

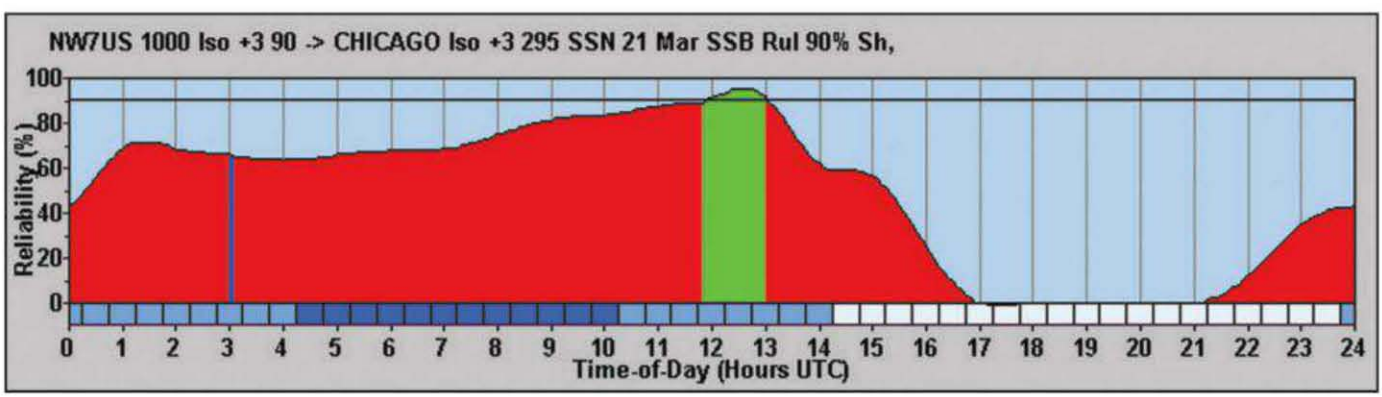


Fig. 2– The Reliability vs. Time-of-Day chart graphing the path condition between the same stations on 40 meters, where the horizontal black line at the 90% reliability illustrates a much more limited window during which the stations will have a reliable QSO. This is the window that will most likely occur during 90% of the month in question (see text). (Credit: NW7US, using ACE-HF Pro)

predicted reliabilities that equal or exceed 90% are those which would exist during 27 days of a 30-day month. If we set our required reliability at only 10%, then the predictions would be less accurate, because they would show the conditions that would exist during only three days of a 30-day month.

In ham radio operation, most users set required reliability at a median value of 50%. However, for military HF systems, 90% is used. The military wants to know what connectivity will exist most of the time; they don't care what will happen only some of the time. A DXpedition will wish to use the same 90% value, as the team will want to know with a high degree of certainty when and where to direct their efforts.

Using ACE-HF (http://hfradio.org/ace-hf), I modeled a circuit from a ham station in Washington to one in Chicago, and first specified a required reliability of 50%. Fig. 1 shows that the Reliability vs. Time-of-Day chart is well in the green most of the time in the 40-meter band (7.1 MHz). That is, the predicted reliabilities are above the 50% black line of the chart.

I wondered what would happen if I used the more conservative required reliability of 90%? With one click I changed to 90% and saw the chart of fig. 2. Oh, oh. My nice circuit has turned to mud! Except for the daytime hours when even 50% wouldn't work (remember that lowered ionosphere), the predicted reliability is now below 90% most of the time. What to do?

Well, maybe I could increase power, but I was already using a 1000-watt power amplifier. I had specified isotropic anten-

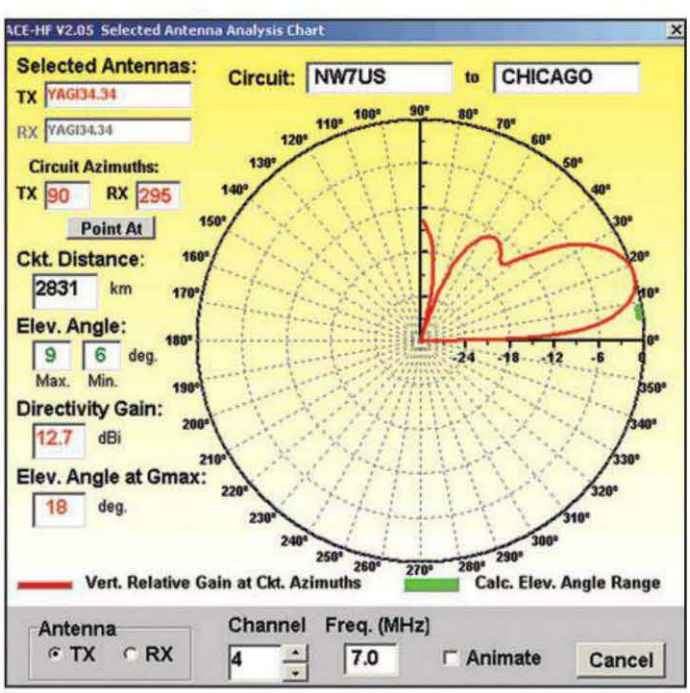


Fig. 3– A plot of the radiation pattern of a typical Yagi antenna designed for 40 meters, with a gain of 12.7 dBi. (Credit: NW7US, using ACE-HF Pro)

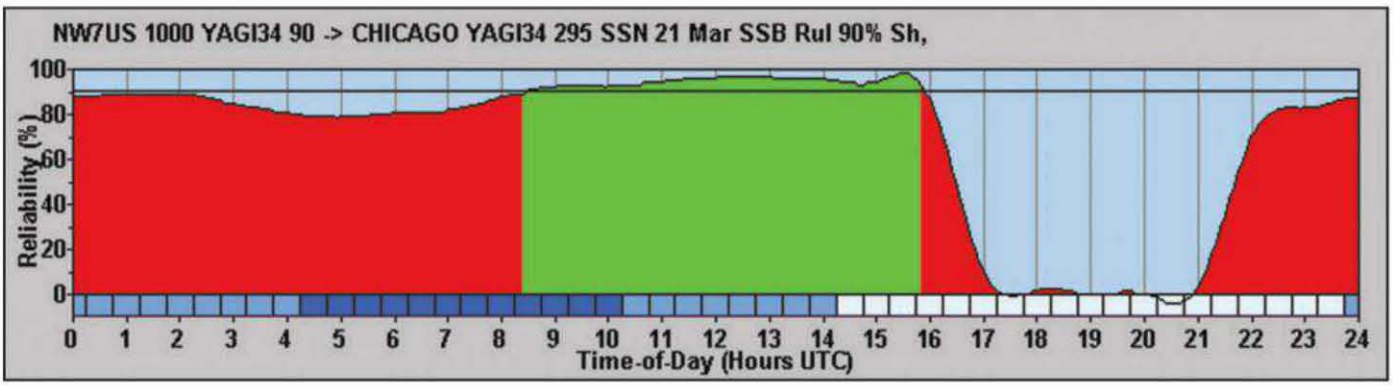


Fig. 4– Using a typical Yagi antenna designed for 40 meters, with a gain of 12.7 dBi, the reliability of 90% is more encouraging; the same 40-meter circuit between Washington State and Illinois is open for a much longer period of time than when using a lower-gain antenna. (Credit: NW7US, using ACE-HF Pro)

nas with a gain of +3 dBi at both ends of the circuit, so perhaps I could achieve more power by using directional antennas. Using ACE-HF's antenna analysis capability, I learned that a typical Yagi antenna has a gain of +12.7 dB at 40 meters, as shown in fig. 3. That should work!

Sure enough, when I specified Yagi antennas at both ends of the circuit, I could enjoy 90% reliability over a much longer period of time, as seen in fig. 4. The band was still dead during most of the daytime hours, but it was nearly in the green the rest of the time.

But wait! Why is it that when I added 12.7 dBi of power gain at both ends of the circuit, 25.4 dB in all, the reliability didn't jump to 100%? After all, that much gain is like increasing my transmitter power level to more than 100,000 watts. The answer is that *reliability is non-linear*.

Just for fun, I did some testing, varying antenna gain by different amounts to see what would happen to predicted reliability. Starting with my original isotropic antennas, I produced the curve shown in fig. 5. Even with an equivalent power level of more than 100,000 watts, the predicted reliability almost never reaches 100%. In contrast, a similar graph of signal-to-noise ratio (SNR) would be linear; predicted SNR increases dB for dB as transmitter power and/or antenna gain increases.

Now here's where statistics come in. ACE-HF (using VOACAP) computes reliability as a function of SNR distribution, which in turn is based on the specified required reliability. If you specify 90% required reliability, then the model computes SNR at 90% as:

$SNR90 = SNR - SNR_{LW}$

where: SNR is the monthly median SNR

and $SNR_{LW} = (SIG_{LW}\,2 + N_{up}^2)^{0.5}$

where SNR_{LW} and SIG_{LW} are the lower decile values of SNR and signal, respectively,

and N_{UP} is the upper decile value of total noise power.

These statistical factors are based on many years of field measurements in which distributions of signal and noise power were gathered during a wide range of ionospheric variation. Thus, when one specifies a higher required reliability factor, such as 90%, the statistical factors come into play and effectively reduce the predicted SNR and predicted reliability from their 50% median values.

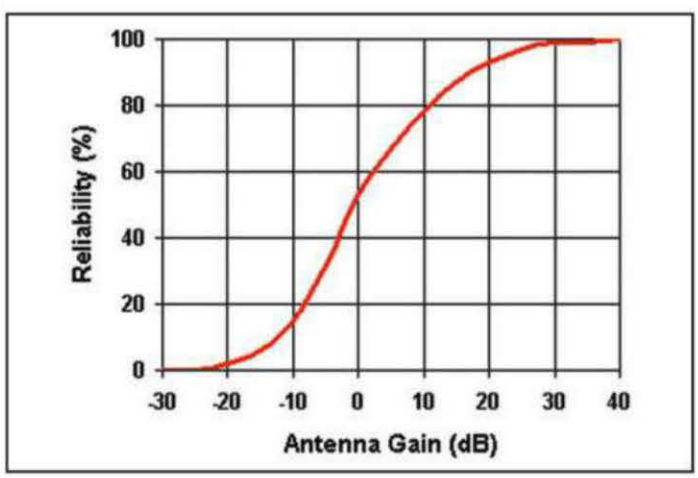


Fig. 5– A plot of reliability vs. the combined antenna gain between the two example stations. Clearly, using antennas with higher gain improves the reliability of the propagation in this 40-meter circuit (see text). (Credit: NW7US, using ACE-HF Pro)

Getting back to my example circuit, I wondered what would happen to predicted reliability in the other ham bands. Again using ACE-HF, I created a Summary REL chart to determine reliability over the frequency range. Fig. 6 shows the result, where the green areas are for reliabilities of 90% or more and the yellow areas are for reliabilities of from 50% to 90%. The figure shows that the lower bands are favorable at night, but as daylight approaches the path, 20 meters and higher become preferred.

One other ACE-HF tool is useful for understanding the effects of higher reliability settings. As shown in fig. 7, I created an area coverage display around my example station and selected the combined reliability setting of 50% and 90%. In this case, I returned to the original isotropic antennas with +3 dBi gain each, and selected 80 meters for my frequency.

The resulting display clearly shows that higher required reliabilities result in more conservative connectivity predictions. In the figure the inner curve bounds the area in which reception with 90% reliability or more can be obtained. The outer, 50%, curve shows that we can be assured of much greater coverage if we don't mind that it may not be available on half the days of the month.

This month we have explored the effects on HF communications of the *reliability*, or *time availability*, of our prediction and have shown how variable ionospheric conditions are

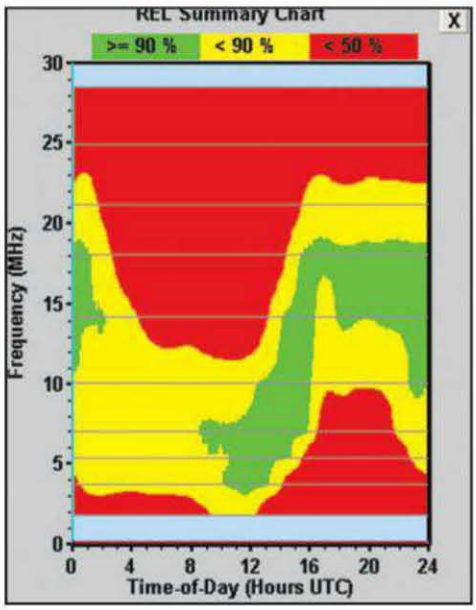


Fig. 6– Another way of looking at the reliability of the path between the two example stations. The green area reveals the time and frequency of an opening during 90% of the month, while the yellow area reveals openings between 50% and 90% of the month. Red indicates reliability below 50% of the month (see text). (Credit: NW7US, using ACE-HF Pro)

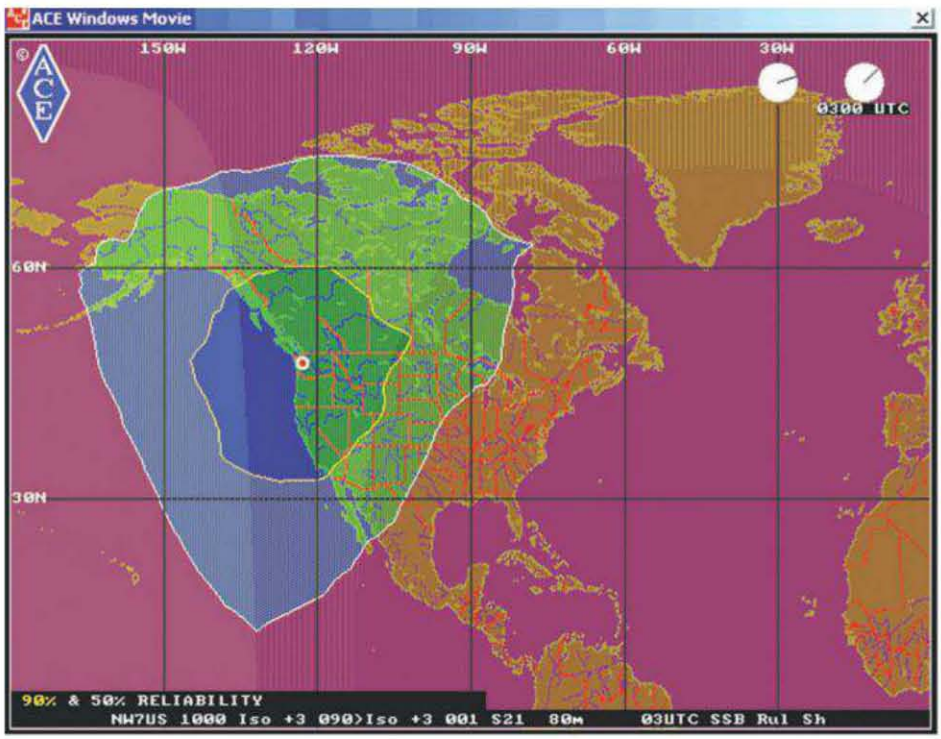


Fig. 7– The area coverage map produced by ACE-HF Pro for the 80-meter band, with a transmitted power of 1000 watts using isotropic antennas. The smaller, solid-blue footprint illustrates the area of likely coverage during 90% of the month, while the larger area is the likely area of coverage during half of the month (see text). (Credit: NW7US, using ACE-HF Pro)

accounted for by the statistical nature of modern propagation prediction models. As one might expect, the amount of power we focus on the ionosphere is paramount in determining the reliability of our circuit, and that power is a result of both transmitter power rating and antenna gain.

We'll continue diving into the science of the ionosphere and space weather, as well as using computer software tools that aid in understanding, analyzing, and predicting radio signal propagation. Stay tuned each month!

May HF Propagation

As we move away from the winter shortwave conditions into the longer days of summer, the overall trend in HF propagation is the opening up of the higher frequencies into many areas of the world. Some of these openings will be longer in duration than during the winter season. However, the openings occurring on the highest frequencies on a given path can be highly variable in strength. These openings are subject to fading and could be short-lived. The cause of this change is complex. The length of daylight over a region of the ionosphere, the intensity of the solar radiation, and the density and height of the various layers of the ionosphere all affect the propagation of the shortwave frequencies we're interested in. Winter daytime propagation over a given path may support higher frequencies than the same path during the summer daytime, while the summer nighttime frequencies will be higher than the winter nighttime frequencies on that same path (partly due to the proximity of the Earth to the sun, and partly because of the change in density of the ionospheric regions due to changes in the average temperatures).

On the higher HF frequencies (17 through 10 meters), fairly good daytime openings should be possible on paths running north and south during May. Fifteen meters will certainly be the best bet of the higher bands, with plenty of propagation also on 17 meters. Twelve meters will be alive on the days of the month when the flux is highest, and those days will also create openings on 10 meters, although the lower of the two will provide the most stability and openings. Another blessing this month is the

addition of sporadic-*E* propagation to the *F*-region openings. This creates opportunities to make two-way communications between closer regions as well as worldwide DX.

Most DX signals, and the most stabile paths, will be found on the middle and lower HF bands. Look for peaks in signals around the hours of sunrise, and again just before sunset and into the late evening. Daytime paths are best when they terminate in areas where it is night. This enhances propagation to remote parts of the world and lengthens the DX window. Twenty meters will be a great band, especially on north-south paths. Check this band around the hours of local sunrise and sunset.

Thirty meters becomes one of the great DX bands this month for those who enjoy CW and digital modes. Look for Europe and Africa early in the morning through late morning, then north-south openings during the day if the solar activity is lower. As sunset approaches, look for the South Pacific, then Asia as the sun sets.

Beginning in the late afternoon, and all through the night, 40 and 60 meters should provide good openings both on short paths, but also from Europe, Africa, and the east. Some DX should be possible on 75/80 meters, and even on 160 meters during the nighttime hours, but signals are expected to be mainly weak and covered by seasonal noise. Static levels also increase noticeably during May, and signals may sound weaker on DX openings during the daylight hours.

VHF Ionospheric Openings

Possible occasional sporadic-*E* propagation will keep the VHF enthusiast happy. Sporadic-*E* ionization is expected to increase considerably during May, and fairly frequent VHF meteor-scatter short-skip openings should be possible. These are likely to occur over distances of approximately 1000 to 1400 miles. Although sporadic-*E* openings can take place at just about any time, the best time to check is between 10 AM and 2 PM and again between 6 and 10 PM local daylight time.

A seasonal decline in transequatorial (TE) propagation is expected during May. An occasional opening may still be possible on VHF. The best time to check for VHF TE openings is between 9 and 11 PM local daylight time. These TE openings will be north-south paths that cross the geomagnetic equator at an approximate right angle.

Auroral activity is generally lower now than during March and April due to the change in the orientation and position of the Earth and magnetosphere in relation to the solar wind. Watch for *Kp* values above 6, which occur on days when we see coronal holes affecting space weather or the arrival of coronal mass ejections (CMEs) a few days after a major solar flare.

One meteor shower, the *Eta Aquarids*, will occur in May. The *Eta Aquarids* is a light shower, probably producing about ten strong meteors per hour. This shower has a good number of much smaller meteors that are not great visually, but can provide ionization off which you can ping a VHF signal. The shower starts around the end of April, but peaks between May 4 and May 8.

An interesting event will occur on May 20—an annular solar eclipse. The path of annularity will begin in southern China and move east through Japan, the northern Pacific Ocean, and into the western United States. A partial eclipse will be visible throughout parts of eastern Asia and most of North America (see <http://g.nw7us.us/ygGUCH>). This will create some interesting changes in the ionosphere, possibly affecting not only HF propagation, but any propagation of VHF that is occurring in the *E*- and *F*-regions.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for February 2012 is 33.1, a significant drop from January's 58.3 and December's 73.0. This continues a three-month sharp decline from the steadily rising activity over the previous three months. Don't fret, however, because as of the time we go to print, our local star is bursting with new activity. As mentioned before and in last month's column, it is typical of the fluctuation expected during the rise of any solar cycle. The lowest daily sunspot value of 9 was recorded for February 8. The highest daily sunspot count was 61 on February 1. The 12-month running smoothed sunspot number centered on August 2011 is 59.0, up from July's 57.3 (we reported 57.2, last month; the keepers of the records sometimes make minor adjustments after a careful review). A smoothed sunspot count of 70, give or take about 9 points, is expected for May 2012. Note how this prediction is significantly less than what was expected for April (see last month's column). However, these predicted monthly figures are based on a mathematical model that is influenced by the overall trend; it cannot possibly take into consideration the dynamic nature of our Sun. This cycle has proven to defy all predictions. It is this author's opinion that we're still in the rise of the cycle, and we'll see higher numbers again.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 106.7 for February 2012, down a bit from January's 133.1 and December's 141.2. The 12-month smoothed 10.7-cm flux centered on August 2011 is 117.9, slightly up from July's 115.4 and March's 110.9. The predicted smoothed 10.7-cm solar flux for May 2012 is 134, give or take about 9 points. Note again that this is lower than the predicted figure for April.

The observed monthly mean planetary *A*-index (*Ap*) for February 2012 is 7, a slight increase over January's 6. The 12-month smoothed *Ap* index centered on August 2011 is 7.4, while July's was adjusted to 7.3. Expect the overall geomagnetic activity to vary greatly between quiet to stormy during May, much like April; refer to the Last-Minute Forecast for the outlook on conditions during this month.

In Closing for This Month . . .

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me or catch me on the HF amateur bands. Also, please come and participate in my online propagation discussion forum at <http://forums.hfradio.org/>.

Remember, *CQ* magazine is on Facebook at <http://www.facebook.com/CQMag>. For space weather and radio propagation information on Facebook, please join this columnist's dedicated page at <http://www.facebook.com/spacewx.hfradio>.

Also, be sure to follow my Facebook as well as Twitter accounts. This will allow you to interact with me and directly ask about space weather and radio propagation. You can find the links to each account on my main web page at <http://NW7US.us>. Additionally, you can "follow" @hfradiospacewx for hourly "tweets" of space weather and radio propagation data such as the 10.7-cm radio flux and so on.

At the time of writing this column, I have moved from Montana to Omaha, Nebraska. This is the same area in which *CQ*'s "Kit Building" columnist Joe Eisenberg, KØNEB, resides. QRP kit building and portable operations are now being enjoyed, which in turn will inspire some upcoming discussions of propagation and QRP activity. Happy DXing!

73, Tomas, NW7US

Number groups after callsigns denote the following: Band, Final Score, QSOs, US/VE, Zones, Countries. An asterisk (*) indicates low power. Certificate winners are listed in boldface.

2011 RTTY RESULTS
SINGLE OPERATOR
NORTH AMERICA
United States

K1FWE	A	5,008,245	3366	322	107	206
K1LZ	"	3,361,750	2645	290	103	202
(OP: K3JO)						
K5ZD/1	"	2,262,040	1718	270	89	171
K1IMI	"	1,145,657	1144	205	72	124
(OP: N4CW)						
AE1P	"	606,424	758	166	67	131
AJ1E	"	549,895	722	166	59	130
W1ZK	"	537,738	701	171	65	82
W1EQ	"	456,570	659	149	58	78
N1SV	"	196,224	420	102	38	52
WA1Z	"	126,222	298	85	43	65
K1GE	"	24,192	87	67	27	2
K1KU	"	23,052	100	65	30	18
W2HDI/1	"	4,644	34	26	20	8
W1ZT	7	16,786	103	38	12	27
*WA1EHK	A	810,030	846	216	69	117
*W2JU/1	"	798,490	840	203	70	112
*K1XM	"	698,728	832	186	56	92
*W1BYH	"	495,059	612	190	67	140
*AB1OD	"	434,230	526	180	69	97
*W1/YO7ARY	"	360,425	548	153	61	111
*W1CCE	"	216,576	375	138	56	62
*W1PL	"	131,610	353	86	39	89
*K1VU	"	124,020	257	111	56	67
*KT1I	"	114,576	285	94	41	82
*KB1GKN	"	101,000	239	92	44	64
*KK1X	"	90,090	228	94	46	70
*KA1CQR	"	63,342	228	70	32	51
*KB1MCK	"	51,898	184	69	33	52
*KG1V	"	50,204	160	74	34	46
*KC1UX	"	47,824	150	66	33	23
*K1DUQ	"	33,835	131	57	23	21
*W1NK	"	22,002	81	62	32	20
*W1BS	"	15,640	71	57	25	3
*WN1E	"	14,065	79	34	29	34
*KO1H	"	10,541	74	25	20	38
*KX9X/1	"	7,437	48	35	23	9
*K1BSB	"	6,264	59	27	14	17
*K1OC	"	5,704	38	37	22	3
*W1HFF	"	2,730	28	20	12	3
*N1IX	28	49,248	284	46	16	19
*NJ1H	"	22,490	134	37	14	14
*NR1H	21	5,040	45	30	12	0
*W1Y	14	9,860	96	29	11	28
(OP: WAØSKN)						
NX2X	A	1,201,180	1134	222	79	135
WA2ETU	"	493,392	668	149	70	85
W2LE	"	396,788	559	169	47	43
KC2LST	"	265,643	405	148	55	74
W2IUC	"	191,919	338	123	48	76
NG2P	"	179,040	295	148	57	35
KB2CKN	"	155,718	323	110	50	86
WS9M/2	"	146,608	373	97	34	56
KD2XN	"	91,364	215	98	34	50
N2RIT	"	24,651	109	55	24	20
WB2ABD	"	18,818	91	42	21	34
N2WK	21	505,689	1153	94	32	51
N2SQW	14	20,636	118	42	15	20
W1TY/2	7	118,300	501	63	17	50
N2EIK	3.5	4,753	89	10	8	31
*N2ZAK	A	1,232,607	1169	254	88	129
*K2DSL	"	832,315	956	203	64	142
*N2LK	"	588,672	732	189	67	128
*WA2LXE	"	585,156	746	181	72	110
*W2RLK	"	210,100	405	129	47	99
*N2FJ	"	201,025	327	146	54	75
*KC2KY	"	196,992	381	108	38	70
*KD2MX	"	195,672	365	128	48	87
*AD2TM	"	195,027	372	125	49	85
*K2TWI	"	175,870	321	138	49	28
*K9CHP/2	"	161,994	332	122	43	38
*N2MUN	"	160,696	322	113	43	56
*WB2JEP	"	159,430	322	108	41	65
*WB2OQQ	"	156,006	298	116	48	50
*KC2WUF	"	102,010	243	99	52	51
*K3UK/2	"	101,688	319	77	46	100
*WA2MCR	"	87,962	261	85	47	74
*K2TV	"	81,900	200	97	44	41
*N2NF	"	68,838	198	87	29	38
*KA2FHN	"	61,030	179	82	43	45
*KB2HSH	"	59,730	193	66	38	61
*N2UN	"	43,860	159	81	31	17
*W2YK	"	43,520	161	63	30	35
*N2JF	"	18,900	105	53	25	12
*K2ZC	"	17,302	98	40	18	24
*N2ZN	"	7,488	59	28	17	27
*WA3AFS/2	"	6,110	45	33	18	14
*ND2K	"	6,014	44	28	19	15
*AK2X	"	3,038	40	22	15	12
*K2EN	21	121,568	425	64	22	30
*N2YBB	14	123,015	376	71	23	45
W3LL	A	3,093,408	2296	278	97	177
NA3M	"	1,813,730	1635	235	82	153
NJ3I	"	739,440	847	212	65	118
W2GG/3	"	341,374	532	155	52	56
N3XL	"	181,704	359	123	53	92
K3RMB	"	159,390	318	116	47	67
KJ3X	"	134,995	308	98	47	58
(OP: K1DQV)						
N3IYX	"	85,750	228	91	37	47
K3SV	"	60,976	160	85	35	28
K3PG	"	43,120	136	71	38	31
KW3A	"	42,196	130	78	34	25
WB4PWZ/3	"	37,840	119	77	33	0
WA3FRP	"	37,506	144	59	23	32
WW3QB	"	14,283	81	50	16	3
W3ABT	"	7,020	48	41	12	1
(OP: WA3FRP)						
AI3Q	14	76,329	318	51	14	34
*KB3LIX	A	787,720	810	225	74	120
*WA1LWS/3	"	620,776	777	183	63	130
*WB3FIZ	"	445,004	617	183	67	72
*WØBR/3	"	346,764	615	127	48	109
*K3GW	"	313,547	471	163	54	54
*WB9KPT/3	"	273,661	467	132	50	101
*N3ALN	"	182,320	350	124	54	87
*KW3W	"	181,424	366	111	37	84
*K3CWF	"	175,856	349	115	48	69
*AF3I	"	156,699	327	110	44	53
*W3BUI	"	121,107	252	108	48	63
*WD3K	"	112,387	275	106	33	48
*N3WD	"	94,470	225	98	45	58
*K3NK	"	93,312	186	120	62	10
*W3OFD	"	66,980	186	82	38	50
*WA2EAJ/3	"	63,840	209	73	23	37
*K3FH	"	55,200	153	80	37	43
*K3FS	"	52,094	175	78	27	17
*K3UA	"	41,180	173	54	37	54
*W3DQT	"	40,986	141	63	31	44
*N3JNX	"	25,916	101	57	35	32
*AB3IC	"	23,868	98	54	28	26
*WA3AAN	"	21,476	97	54	35	29
*K3TXT	"	11,340	62	39	20	11
*N3RDV	"	8,580	58	37	22	19
*KN3A	"	5,673	46	24	19	18
*W6AAN/3	"	5,538	48	29	10	0
*W3TNU	"	4,828	59	15	17	36
*WA3WZR	"	3,245	38	35	18	2
*K3CC	"	2,204	27	19	13	6
*K3YJP	"	1,976	22	17	15	6
*K3BAK	"	1,122	22	16	11	6
*KB3VNH	"	484	15	9	7	6
*N8HM/3	28	736	20	13	8	2
*WA2VQV/3	14	1,064	22	15	10	3
W4PK	A	2,580,550	2165	248	87	170
AB4GG	"	1,896,168	1789	226	81	185
K4FX	"	1,468,341	1411	225	79	153
N6AR/4	"	1,057,395	971	242	82	147
N3MK/4	"	883,320	969	219	74	115
W2YE/4	"	769,872	898	182	64	98
KJ4DHB	"	621,468	796	185	61	120
W4OX	"	563,064	699	170	69	109
K4HAL	"	409,182	624	153	56	73
WY4Y	"	376,856	636	145	63	81
(OP: NS3Q)						
K5VIP/4	"	343,830	486	158	67	89
K4CX	"	308,066	641	131	47	64
NJ4F	"	302,093	454	145	67	107
KR4LO	"	289,892	453	152	57	65
KG4CUY	"	254,610	427	129	58	83
AI4WW	"	200,560	417	115	41	74
K8KI/4	"	199,576	391	139	45	63
ND4V	"	163,704	296	131	47	50
K4ADR	"	143,990	356	85	36	66
WK4Y	"	141,660	402	90	40	50
N4MM	"	133,041	288	119	43	21
N4QS	"	118,904	286	94	39	45
K4BX	"	90,730	264	73	42	96
WR4B	"	72,385	171	94	42	19
W5XB/4	"	51,652	178	65	36	47
K4RO	"	49,815	205	57	28	38
K4LRP	"	44,100	182	63	26	11
N4TL	"	41,580	131	72	35	28
WD8RYC/4	"	33,664	105	74	43	11
W4CZ	"	27,323	119	68	20	1
AJ4CG	"	26,752	111	49	34	45
NJ2F/4	"	25,877	107	46	33	34
WBØPOH/4	"	21,600	100	52	25	19
K7OM/4	"	20,355	99	45	36	34
(OP: K7OM/4)						
N3BM/4	"	14,852	73	47	20	12
KJ4DHF	"	12,556	75	44	25	17
W9QO/4	"	2,618	26	23	11	0
NS4X	"	1,485	29	12	12	9
WA4NMS	"	893	18	10	9	0
N4ZZ	28	136,620	588	56	19	15
N4TB	"	118,156	420	67	22	20
N3UA/4	"	107,017	410	63	21	19
WØPV/4	"	102,843	360	66	25	26
WØYR/4	"	75,330	292	61	22	10
WB4YDL	21	293,168	843	74	28	44
KK9A/4	14	614,100	1513	87	35	56
AJ4FM	"	22,088	126	43	17	28
*WA1FCN/4	A	1,294,475	1416	212	78	165
*WB2RHM/4	"	997,890	929	241	81	143
*N4IG	"	420,701	546	183	68	80
*W4GDG	"	386,540	578	146	52	110
*K4MCK	"	289,408	457	144	63	97
*W8KHP/4	"	272,304	456	140	54	50
*K4CC	"	258,704	406	152	56	88
*W4WWQ	"	205,640	356	138	60	67
*W3SA/4	"	203,708	366	128	52	74
*WA8OJR/4	"	200,790	396	115	51	64
*KU8E/4	"	195,228	337	128	63	70
*WF7T/4	"	158,412	312	117	56	85
*WØQQG/4	"	143,877	319	116	49	76
*K4DJG	"	133,062	284	111	42	48
*K1GU/4	"	124,670	304	96	39	47
*W4EYJ	"	120,546	319	96	43	42
*W4JHU	"	106,858	250	95	51	56
*KS4S	"	106,800	303	79	42	79
*W4BK	"	103,525	250	87	44	74
*K4FJW	"	96,300	243	92	49	73
*N4NIA	"	95,816	244	98	47	58
*WK4P	"	94,954	237	106	47	44
*KU4A	"	82,844	237	82	31	36
*W6DVS/4	"	79,560	213	96	38	36
*K4FTO	"	77,760	231	87	41	64
*W7HJ/4	"	76,483	181	96	55	36
*NC4MI	"	75,012	224	98	44	46
*N4BCB	"	71,208	190	82	44	58
*KM4JA	"	67,319	172	89	40	34
*ND4X	"	64,815	181	86	33	26
*NT4TS	"	60,984	267	62	22	42
*ND1Y/4	"	60,900	164	90	45	40
*NZ4O	"	58,496	207	75	23	30
*K8LF/4	"	57,436	166	80	40	53
*KM4RK	"	55,770	159	84	43	38
*AJ4GL	"	49,290	155	83	36	40
*K4LCM	"	42,140	158	58	33	49
*KD4SM	"	32,058	104	71	32	14
*N4AU	"	31,970	114	66	29	20
*KI4SP	"	29,925	130	59	34	40
*KK4R	"	28,956	103	65	36	13
*W4IWH	"	25,531	158	35	23	63
*NR4C	"	24,634	104	60	29	20
*K4EDI	"	23,616	101	62	31	30
*WO4MW	"	22,477	108	58	41	34
*N4MUH	"	14,536	78	42	19	18
*KC4SAW	"	14,240	73	44	23	13
*KR4F	"	11,461	63	49	19	5
*N3CZ/4	"	10,872	71	31	23	18
*WB4OMM	"	8,487	47	41	19	9
*KJ4WLN	"	7,738	56	31	23	19
*AI4GR	"	6,678	59	21	20	22
*AJ4IR	"	5,916	44	30	16	12
(OP: KJ4LQX)						
*KI4EEY	"	5,767	62	21	20	32
*N5HOT/4	"	4,416	51	12	14	38
*KB4VC	"	2,440	29	18	13	9
*K4XD	"	2,414	26	21	9	4
*W4ELP	"	2,400	44	12	11	25
*WO4O	"	1,680	26	15	9	11
*K3RWN/4	"	1,598	27	17	9	8
*KC3EF/4	"	195	7	7	6	0
*N2WN/4	28	84,882	360	54	20	12
*K4WI	"	82,368	348	61	21	17
*KC4WQ	"	20,935	174	28	14	11
*KTØP/4	"	17,225	120	38	16	11
*K3TW/4	"	4,074	43	20	13	9
*KE1F/4	"	3,567	61	14	11	16
*KO4OL	"	1,296	24	17	9	1
*WB5NMZ/4	21	78,008	331	54	15	29
*W4LC	14	116,145	405	74	22	49
*N3TG/4	"	7,670	60	31	10	18
*K4MTX	"	2,340	40	15	14	16
*K4LHP	7	3,784	38	21	10	13
*NQ4K	3.5	9,006	144	12	8	37
K5DU	A	2,433,042	2350	215	86	221
N5RZ	"	2,375,191	2176	246	97	216
K6SXA/5	"	840,420	817	220	90	150
K7IA/5	"	834,534	1039	185	72	169
NX5O	"	342,228	566	129	74	113
N5VU	"	337,393	497	155	62	90
KD5JAA	"	217,455	396	99	58	128
K5CM	"	103,530	333	51	41	82
KK5JY	"	97,572	293	85	36	52
AC4CA/5	"	44,525	142	68	40	29
KD5J	"	34,144	142	41	21	35
W5JE	"	33,720	152	52	32	36
AB5C	"	29,250	112	63	27	0
K5GZR	"	10,206	65	30	19	32
KB5U	"	6,532	52	27	23	21
N5MOA	28	112,119	324	78	26	29
W5MK	"	7,695	82	22	14	9
*AA5AU	A	2,713,962	2359	279	99	219
*AD5XD	"	815,994	1142	167	70	177
*N5KWN	"	772,398	1026	183	77	163
*N5IJE	"	447,655	682	145	66	144
*AD5CA	"	352,359	571	135	64	130
*K5DHY	"	214,803	362	128	62	71
*N5RN	"	203,544	392	121	43	93
*N5PU	"	180,564	477	100	39	107
*KC5YPU	"	120,416	400	68	40	104
*N5RLM	"	106,491	330	89	46	96
*N5UWY	"	87,980	265	77	44	45
*AD5LU	"	80,040	233	73	42	59
*WB5AAA	"	78,396	235	73	42	26
*WA9AFM/5	"	75,520	219	73	35	52
*W5TTY	"	57,817	179	71	47	61
*AA5VU	"	46,956	193	63	40	69
*W5KDJ	"	41,820	177	55	24	44
*W5EK	"	33,276	119	70	32	16
*W5JBO	"	26,596	135	35	23	64
*N5LYJ	"	17,019	89	53	30	10
*KD5YUK	"	13,869	77	47	22	0
*W5PQ	"	12,177	106	27	26	46
*KB5REX	"	10,640	56	51	25	0
*AE5MM	"	9,912	61	46	29	9
*KD5NXR	"	9,310	50	43	25	2
*AE5EO	"	7,030	53	27	21	26
*WA5NOM	"	2,183	22	22	15	0
*W5ZO	28	25,179	127	48	18	11
*N4UPX/5	"	11,556	123	27	15	12
*K5PAX	"	4,128	41	21	16	11
*N5RMS	"	4,059	55	14	14	13
*WM5DX	14	121,296	553	61	20	52
NN6XX	A	770,308	896	172	88	167
K6LRN	"	524,564	677	163	80	155
W6SX	"	486,528	989	89	64	183
K6GEP	"	473,484	696	133	72	169
N6CK	"	424,530	712	90	77	151
WS6X	"	350,550	501	156	72	114
K6XX	"	268,965	531	103	56	56
WB6JJJ	"	238,420	422	101	63	96
KO6LU	"	216,832	481	82	55	119
K6RB	"	198,621	417	73	56	132
N6BM	"	198,380	526	70	47	101
WX6V	"	182,368	292	124	65	89
KD6HQ	"	108,070	313	58	49	107
AK7G/6	"	97,760	266	76	52	80
K6SFK	"	62,640	185	71	47	56
AI6YL	"	34,452	122	59	45	28
N6RW	"	23,517	77	74	43	0
N6QEK	"	20,916	100	36	33	57
K6DGW	"	12,771	106	18	18	63
AC6T	"	11,132	77	29	24	39
N6AJR	"	10,908	74	33	33	35
AF6SN	"	10,224	110	14	13	44
AE6OU	"	8,556	60	27	24	11
W6RYI	"	7,866	56	26	21	22
KM6I	"	6,545	61	17	23	37
K6LPO	"	6,319	50	29	25	17
W6ONV	"	4,532	45	14	15	15
WA6KEK	"	3,160	37	26	14	0
KM6HB	"	3,072	34	21	15	12
WU6X	"	2,655	43	11	12	22
N6XI	28	1,650	30	9	11	10
W6WRT	3.5	16,932	227	11	9	48
*W6UX	A	316,953	696	99	55	147
*W6ZL	"	108,647	268	83	48	56
*W8KA/6	"	97,513	243	83	47	39
*AF6SA	"	96,348	235	83	57	77
*W6KY	"	93,122	253	69	54	79
*N6DZR	"	65,136	155	76	59	42
*N3PV/6	"	64,617	200	63	47	71
*KG6MZS	"	62,271	206	56	36	61
*N6OPR	"	57,663	274	41	29	59
*N6RV	"	40,052	131	64	41	19
*K6BIR	"	31,744	137	35	32	61
*K6GFJ	"	29,484	131	55	26	0
*KE6SHL	"	22,196	113	33	37	54
*K6JF	"	19,740	100	37	31	37
*W8QZA/6	"	18,476	127	21	28	75
*NA6G	"	15,900	109	24	24	58
*N6FD	"	1,600	26	8	10	14
*NQ6E	"	1,012	25	8	8	7
*N3FAW/6	"	714	38	15	13	23
*KF6HI	28	3,920	38	25	9	1
*N6BHX	"	2,664	42	10	10	4
*NK6A	21	19,092	135	31	17	38
W7RN	A	2,492,952	2533	201	99	232
(OP: WK6I)						
KR7X	"	1,258,530	1668	169	93	193
W6AEA/7	"	963,792	1223	155	80	179
KO7AA	"	642,752	978	138	66	148
N3RC/7	"	570,032	867	146	61	161
N7TT	"	368,632	900	99	56	129
KD7MSC	"	315,252	688	89	57	132
KS7S	"	306,210	521	119	62	114
WU6W/7	"	299,880	599	104	61	150
K7JJ	"	295,472	503	117	67	129
K7MKL	"	286,996	558	105	63	146
W7VXS	"	272,246	599	104	54	125
K7JQ	"	249,275	439	108	67	120
KR2E/7	"	204,764	386	113	59	112
NG7Z	"	174,549	480	72	52	125
W7LD	"	173,524	438	96	60	128
KV7DX	"	151,728	387	74	55	89
(OP: AA7V)						
NO7T	"	126,854	258	100	54	67
NI7R	"	124,189	307	81	49	103
WG7X	"	110,630	325	73	56	101
KX7YT	"	65,016	174	71	45	56
K7EM	"	60,152	153	97	45	4
KB7N	"	42,525	185	42	34	59
W7SO	"	38,688	135	56	42	26
KI7Y	"	26,596	157	25	26	71
KF7F	"	11,088	70	32	27	18
KJ7GI	"	6,572	70	14	17	31
KD7ODG	"	5,187	51	17	18	22
KN7PF	"	5,037	49	29	21	19
K7ABL	"	4,582	48	17	19	22
KK7CG	"	3,350	68	13	17	37
KF7PG	"	1,764	39	5	6	25
WA7LNW	28	165,977	683	67	24	40
N4CC/7	"	4,469	59	15	12	14
W7ZR	21	264,854	945	70	27	54
W7PU	14	84,189	479	55	27	51
K7WP	7	149,193	613	62	23	52
*WT6P/7	A	470,452	742	125	62	162
*K7TQ	"	319,176	572	99	62	151
*WO7V	"	246,480	591	68	54	138
*N7VEA	"	197,532	424	84	56	139
*W7YAQ	"	192,696	349	120	61	78
*W7WEC	"	180,795	444	72	56	127
*N7MQ	"	172,235	375	95	55	95
*K7HBN	"	131,264	287	88	57	79
*KS5A/7	"	127,238	359	73	45	108
*WS7V	"	118,188	304	86	46	69
*N7BPA	"	108,560	279	76	58	102
*WAØWWW/7	"	82,892	245	64	42	106
*W7UG	"	78,470	274	79	43	68
*K6UM/7	"	67,260	227	50	43	84
*KD6OAT/7	"	50,666	195	52	38	64
*WA7SHP	"	44,352	200	32	35	65
*W7OR	"	34,780	156	59	41	48
*KD7RUS	"	31,968	148	49	38	57
*KE7AUB	"	26,904	130	39	34	45
*W7/KL7WP	"	24,924	159	32	33	69
(OP: KL7WP)						
*N6MA/7	"	24,128	100	49	29	38
*K7AKP	"	16,800	117	27	29	56
*KC7CM	"	15,700	106	27	28	45
*NB7O	"	14,715	110	29	30	50
*AE7KL	"	12,096	109	23	16	33
*K6WSC/7	"	9,796	53	38	29	12
*K7ARJ	"	9,052	58	36	22	15
*K7GZP	"	7,900	63	26	25	28
*KE7IHG	"	4,130	49	18	21	20
*W7EWG	"	3,876	60	10	14	33
*WA7YAZ	"	3,120	37	19	19	22
*WA7BME	"	1,156	22	9	10	15
*N7DB	28	29,325	194	32	20	33
*WE6EZ/7	"	20,925	151	38	17	20
*K7MY	21	33,464	176	47	19	28
*W1ZD/7	14	89,872	437	59	25	53
N8BJQ	A	1,524,570	1389	238	80	127
KE8M	"	850,824	976	192	68	64
K8MP	"	262,080	527	98	41	95
W8AKS	"	258,456	508	122	46	99
W8OHT	"	212,040	392	144	61	74
W8CAR	"	113,364	245	101	59	41
K8ESQ	"	112,128	251	107	40	45
K8ZZU	"	93,380	236	90	32	39
WD8KNC	"	70,472	212	88	42	54
N8IW	"	62,643	169	80	41	36
N8CAK	"	52,788	159	85	43	38
WB8MKH	"	42,104	177	49	31	72
AC8DU	"	39,038	206	77	32	40
K8LO	"	19,929	102	45	23	5
AJ8B	"	10,981	56	42	29	8
W8TE	"	3,312	31	28	8	0
W8LIG	"	1,368	20	17	13	6
KC8IMB	3.5	23,828	289	15	9	50
*WB8TLI	A	544,810	584	212	82	68
*AA8IA	"	351,102	564	150	67	109
*W8KX	"	272,960	400	184	72	64
*N2OPW/8	"	268,492	451	141	55	105
*WS6K/8	"	217,899	391	129	54	96
*KJ8O	"	207,726	403	117	52	98
*NX8G	"	160,965	339	107	44	68
*KB8OCP	"	160,300	343	116	46	67
*K8GT	"	139,314	257	122	56	36
*K8SIA	"	123,210	232	122	50	50
*AA8EN	"	103,115	306	75	39	91
*K3JT/8	"	74,382	209	70	43	41
*N1IW/8	"	57,213	162	85	37	41
*K8TJM	"	56,092	167	80	36	32
*W8IDM	"	32,545	114	71	27	17
*NF8M	"	13,528	65	44	24	8
*KB8ZB	"	11,310	55	48	29	1
*W8AB	"	5,022	54	20	17	25
*AF8A	"	2,397	36	14	13	20
*WB8JUI	28	23,958	159	43	15	8
*WD9FTZ/8	"	2,988	34	18	11	7
*WG8Y	21	25,398	134	44	20	19
*KC8FVE	14	10,220	69	36	15	19
*WB8JAY	7	1,034	22	17	5	0
W9IU	A	1,879,247	1586	266	94	161
WI9WI	"	443,729	698	142	63	114
KE9ET	"	412,380	505	207	69	14
W9LHG	"	302,216	500	137	54	105
K9BJM	"	288,080	428	159	53	65
AJ9C	"	256,768	433	137	54	81
KK7Z/9	"	224,985	408	125	54	104
N9WKW	"	159,258	323	110	51	48
W9FFC	"	148,096	313	119	46	43
N9EP	"	61,353	215	70	34	49
W9OA/9	28	113,715	457	61	23	11
(OP: W9OA/9)						
K9OM	21	453,407	1022	98	34	47
*KB9S	A	405,504	622	153	63	72
*K9NR	"	372,480	649	136	56	48
*W9HLY	"	269,645	545	108	44	47
*KA9MOM	"	251,140	451	128	55	107
*AB9QH	"	215,472	381	127	58	83
*KB9OWD	"	126,084	374	78	39	111
*WQ9T	"	106,575	257	89	43	71
*WE9R	"	72,051	206	91	40	10
*KB9DVC	"	57,275	151	85	38	22
*N9LYE	"	57,050	176	68	41	66
*W9AKS	"	56,448	182	81	35	28
*W9WLX	"	33,024	124	58	36	34
*N9BT	"	29,869	122	60	27	32
*KF9WY	"	29,412	114	62	40	27

*AI9K	"	28,448	124	45	34	33
*K9WMS	"	26,790	106	60	25	10
*NV9X	"	26,768	103	53	39	20
*K9EMG	"	20,400	81	57	33	10
*KC9IL	"	16,416	70	47	32	17
*AF9J	"	14,220	84	36	23	31
*N9SB	"	13,244	95	27	23	36
*N9MSG	"	8,710	56	37	18	12
*AA9UF	"	3,526	55	16	11	14
*KV9W	"	2,604	35	21	7	0
***AB1J/9**	**21**	**221,650**	**631**	**82**	**27**	**34**
*W9VQ	"	68,598	259	64	21	18
*K9PY	"	34,358	155	56	16	10
*KC9IRQ	"	7,729	47	41	14	4
***W9KVR**	**7**	**40,018**	**208**	**50**	**16**	**41**
NØKE	**A**	**1,652,820**	**1500**	**228**	**101**	**178**
KØRC	"	1,552,629	1300	271	95	167
ABØRX	"	1,308,526	1394	189	82	162
ACØC	"	1,066,988	1407	205	71	166
ABØLR	"	919,240	1006	242	92	156
KI6DY/Ø	"	824,356	1093	178	60	144
KØJJR	"	616,938	731	197	68	132
KØJPL	"	609,880	734	181	83	122
NØBUI	"	494,845	796	139	54	106
WBØKGN	"	393,452	542	171	64	99
KØFX	"	348,268	510	171	80	81
KØHB	"	341,952	549	134	64	114
WØRX	"	276,210	408	144	71	82
WØEM	"	226,566	674	104	42	100
KIØF	"	162,792	300	125	53	60
WØSHL	"	122,008	249	121	45	36
KØMD	"	109,620	329	83	49	71
KØLDS	"	46,248	160	65	40	36
NØKBD	"	42,048	196	56	34	54
KCØRET	"	37,660	147	55	32	53
KØFYI	"	33,909	113	91	34	2
KIØHA	"	32,250	101	64	48	13
KØTZ	"	11,869	65	40	23	20
KAØVXK	"	4,675	49	20	18	17
KØLD	"	588	14	10	4	0
W5AP/Ø	**21**	**40,000**	**192**	**51**	**22**	**27**
NØKQ	"	10,440	84	28	15	15
KTØDX	**14**	**148,000**	**640**	**68**	**28**	**52**
WØGJ	**7**	**160,016**	**707**	**62**	**21**	**54**
***NTØF**	**A**	**871,579**	**1054**	**197**	**67**	**145**
*KØMPH	"	463,986	664	164	63	119
*KØAD	"	251,781	575	110	49	108
*WNØL	"	226,825	426	123	49	43
*NXØI	"	197,358	410	123	58	78
*KØBJ	"	183,456	320	126	63	63
*WØTUP	"	175,436	408	100	47	97
*KSØT	"	139,037	321	104	50	103
*K1ING/Ø	"	138,992	355	96	47	95
*WØRK	"	129,408	277	105	50	37
*NØMK	"	124,712	267	105	57	76
*WAØLJM	"	105,600	250	91	40	34
*WØOVM	"	88,862	228	111	46	0
*KØOB	"	73,616	229	72	42	58
*WGØM	"	71,708	303	47	32	103
*WAØGUD	"	69,006	210	89	45	25
*WBØQLU	"	66,584	199	77	35	52
*K7RE/Ø	"	58,078	345	47	25	70
*KØWA	"	40,950	135	72	30	15
*NØUJJ	"	38,766	154	56	34	52
*KAØEIC	"	35,757	144	57	33	47
*WØPC	"	19,647	99	37	35	39
*WØVB	"	18,139	83	56	31	10
*KJØB	"	16,617	72	48	26	13
*KCØREN	"	16,585	101	34	30	43
*WBØULX	"	16,450	79	40	27	27
*NØSO	"	14,758	87	42	27	25
*KØWIU	"	13,528	85	30	22	37
*KBØNHW	"	13,485	97	31	22	34
*WCØV	"	10,112	64	31	20	13
*KIØG	"	10,004	96	26	19	37
*KØFBV	"	8,772	72	36	18	14
*KØYQ	"	8,379	50	40	20	3
*WØMRM	"	7,906	50	34	24	1
*WØNZG	"	7,178	53	31	21	22
*WØGLB	"	7,155	52	34	19	0
*NØMTC	"	6,235	50	30	13	0
*KØVG	"	3,038	36	26	16	7
*KØSDW	"	2,976	35	18	15	15
*KDØNIL	"	2,430	32	16	18	20
*NØLEF	"	1,769	28	18	5	6
*NØIBT	"	361	15	5	5	9
***NØOK**	**28**	**35,189**	**171**	**53**	**20**	**4**
***ABØYM**	**7**	**6,944**	**100**	**18**	**10**	**28**
***KØIDT**	**3.5**	**5,141**	**105**	**4**	**5**	**44**

Alaska

KL7AC	**A**	**867,840**	**1236**	**98**	**58**	**164**
AL1G	"	82,246	315	26	24	68
KL5E	"	7,440	55	25	19	18
NL8F	"	2,720	49	10	12	18
KL8DX	**28**	**30,303**	**236**	**12**	**9**	**42**
***AL7L**	**A**	**396**	**12**	**6**	**7**	**5**

Canada

VY2SS	**A**	**292,221**	**866**	**76**	**23**	**38**
VE9MY	"	106,023	225	104	37	36
VO1OR	"	47,450	187	70	22	38
***VE9NC**	**A**	**530,228**	**747**	**136**	**57**	**91**
*VE1ZD	"	266,064	426	140	54	82
*VO1BQ	"	22,080	100	51	22	23
***VY2LI**	**21**	**264,966**	**814**	**66**	**20**	**43**
VE2EZD	**A**	**265,720**	**385**	**134**	**58**	**88**
VE2SB	**3.5**	**92,180**	**459**	**41**	**14**	**55**
***VA2UP**	**A**	**3,977,680**	**2807**	**271**	**81**	**208**
*VE2AXO	"	780,435	884	185	58	126
*VE2EBK	"	517,145	581	185	70	98
*VA2WA	"	102,070	248	86	49	38
						(OP: VA2WDQ)
*VE2KOT	"	33,005	124	46	26	43
*VE2SG	"	13,770	71	36	20	25
*VE2GGY	"	3,528	55	23	11	22
VE3DZ	**A**	**2,585,024**	**2102**	**243**	**82**	**153**
VE3RTU	"	1,697,605	1422	230	91	134
VE3EY	"	305,440	518	111	41	78
VE3FWA	"	203,315	324	117	64	78
VE3FJ	"	172,000	327	115	48	52
VE3CX	**14**	**106,172**	**359**	**63**	**17**	**47**
VA3TTU	"	95,360	297	68	21	39
***VA3SB**	**A**	**751,872**	**783**	**206**	**68**	**110**
*VE3IAE	"	630,432	715	193	67	92
*CG3FH	"	609,828	683	182	58	116
						(OP: VE3FH)
*VE3JI	"	581,571	676	172	63	126
*VE3FDT	"	536,346	596	193	67	99
*VA3MJR	"	260,084	390	186	67	0
*VE3AJ	"	134,907	273	99	42	52
*VE3GYL	"	121,952	251	101	43	62
*VE3KAO	"	109,040	241	77	46	65
*VE3EK	"	62,775	192	66	29	40
*VE3MCF	"	22,052	125	39	13	22
*VE3RCN	"	12,000	64	32	23	41
*VE3WA	"	10,125	54	52	29	0
*VA3TPV	"	9,216	62	33	17	22
*VE3FZ	"	3,384	34	18	17	12
***VA3RNJ**	**7**	**112**	**5**	**4**	**3**	**1**
VE4EAR	**A**	**1,089,786**	**978**	**215**	**84**	**148**
VE5CPU	**14**	**23,100**	**194**	**11**	**10**	**45**
***VA5LF**	**A**	**484,410**	**625**	**133**	**67**	**135**
*VA5RI	"	17,523	79	35	27	37
*VE5UO	"	4,524	47	15	16	21
VE6RRD	**A**	**23,072**	**97**	**37**	**32**	**43**
***VE6SQ**	**A**	**292,410**	**535**	**79**	**51**	**140**
*VE6AX	"	163,905	301	84	55	84
*VE6MO	"	48,786	167	46	37	58
*VE6SKY	"	7,812	72	11	12	40
*VE6DJT	"	2,898	31	9	14	19
VA7HZ	**A**	**30,723**	**118**	**34**	**40**	**59**
VE7HBS	**14**	**36,087**	**272**	**11**	**10**	**48**
***VE7BC**	**A**	**463,526**	**727**	**80**	**60**	**153**
*VA7ST	"	449,268	612	110	67	171
*CF7AM	"	414,128	744	73	47	166
						(OP: VA7AM)
*VE7BSM	"	211,250	416	81	51	118
*VE7FCO	"	50,362	154	54	33	62
*VA7CPC	"	24,415	127	25	23	47
*VA7DXC	"	22,320	120	21	23	49
*VE7BGP	"	8,360	53	24	24	28
***VA7MM**	**28**	**9,676**	**79**	**20**	**15**	**24**
CG9HF	**A**	**222,456**	**415**	**104**	**50**	**94**
						(OP: VE9HF)

Costa Rica

***TI2WMP**	**14**	**1,032**	**19**	**17**	**7**	**0**
***TI2KAC**	**7**	**4,961**	**49**	**27**	**9**	**5**

Cuba

CO2QM	**A**	**15,604**	**101**	**39**	**22**	**33**
***CO3JN**	**A**	**890,668**	**896**	**211**	**72**	**145**
*CO2NO	"	615,986	855	146	47	129
*CM3RPN	"	540,973	700	171	62	114
*CO2MS	"	226,460	402	124	44	92
*CO8CML	"	181,420	400	94	36	63
*CO2VE	"	156,114	375	87	26	76
*CO3CJ	"	87,132	290	93	40	79
*CO2IZ	"	56,834	163	80	37	40
*CO2ZK	"	38,907	132	62	33	36
*CO6HZ	"	25,900	148	64	36	48
*CO2GL	"	21,432	120	33	18	43
*CO2WL	"	19,588	129	50	34	34
***CO8TW**	**28**	**56,551**	**267**	**40**	**16**	**41**
***CO6LP**	**21**	**218,805**	**681**	**70**	**23**	**52**
***CO2CW**	**14**	**55,224**	**243**	**55**	**22**	**40**
*CO6EC	"	17,056	105	43	15	24
***CO2ZT**	**7**	**50,610**	**267**	**46**	**16**	**43**
*CO2KY	"	23,463	152	43	12	24
*CO8ZZ	"	22,848	121	40	13	31
*CO2XPR	"	6,032	65	33	11	14
*CM2ORO	"	4,216	78	34	12	16
*CO2RR	"	2,268	130	40	14	30

Dominican Republic

HI8PJP	**14**	**79,686**	**321**	**55**	**18**	**41**
***HI3TEJ**	**A**	**2,436,352**	**2060**	**225**	**83**	**188**
***HI8PLE/7**	**28**	**20,345**	**119**	**33**	**13**	**19**
						(OP: HI8PLE/7)
***HI3TT**	**14**	**38,016**	**186**	**40**	**19**	**37**

Guadeloupe

FG5LA	**21**	**188,110**	**593**	**62**	**21**	**47**
***FG4NO**	**28**	**265,275**	**796**	**60**	**21**	**50**

Guatemala

TG9SM	**14**	**25,080**	**197**	**23**	**14**	**39**
TG9ADQ	"	20,769	154	14	10	45
***TG9ANF**	**14**	**238,149**	**789**	**61**	**24**	**56**

Jamaica

6Y6U	**A**	**6,010,598**	**3779**	**294**	**97**	**247**
						(OP: W1UE)

Martinique

***FM1HN**	**21**	**100,224**	**394**	**59**	**19**	**38**

Mexico

XE1GRR	**A**	**395,352**	**775**	**93**	**48**	**87**
XE3RR	"	111,200	299	73	32	95
XE1R	**28**	**104,390**	**427**	**44**	**20**	**46**
***XE2FGC**	**A**	**734,643**	**936**	**116**	**56**	**179**
*XE1XOE	"	355,428	521	115	61	148
*XE2S	"	64,413	186	51	33	69
***XE3N**	**28**	**119,554**	**472**	**47**	**22**	**44**
***XE1ZTW**	**21**	**5,152**	**60**	**14**	**10**	**22**

Puerto Rico

KP4JRS	**14**	**180,848**	**676**	**49**	**23**	**55**
***NP4BM**	**A**	**727,623**	**877**	**152**	**57**	**142**
*WP3GW	"	196,420	340	143	55	46
*KP4JFR	"	58,344	185	71	32	40
***WP4WW**	**28**	**166,760**	**664**	**45**	**14**	**51**
						(OP: NP3SI)
*NP3YL	"	4,116	44	15	9	18

AFRICA

Canary Islands

EA8CNB	**A**	**1,243,692**	**1165**	**209**	**72**	**105**
***EC8CQ**	**A**	**330,048**	**608**	**104**	**37**	**51**
*EA8AQV	"	91,683	182	76	58	49
*EA8GP	"	1,482	64	26	13	0
***EA8ARG**	**14**	**28,275**	**136**	**50**	**17**	**8**

Ceuta and Melilla

***EE9K**	**A**	**100,008**	**345**	**60**	**21**	**27**
						(OP: EA9CF)

Djibouti

***J28RO**	**A**	**83,840**	**238**	**84**	**32**	**12**
						(OP: F5IRO)

Madeira Islands

***CT3HF**	**28**	**129,812**	**477**	**59**	**23**	**10**

Morocco

***5C5W**	**A**	**3,864,324**	**2561**	**230**	**79**	**207**
						(OP: CN8KD)

Senegal

***6V7X**	**A**	**2,478,894**	**2016**	**197**	**69**	**160**
						(OP: IK2FIL)

South Africa

ZS6RJ	**A**	**18,320**	**92**	**56**	**24**	**0**
***ZS1JY**	**A**	**24,929**	**89**	**43**	**27**	**27**

Sudan

ST2AR	**21**	**1,061,583**	**1959**	**96**	**32**	**55**

ASIA

Armenia

***EK3GM**	**A**	**40,896**	**161**	**71**	**25**	**0**

Asiatic Russia

UA9OG	**A**	**1,389,804**	**1483**	**237**	**70**	**47**
RN9CM	"	868,868	908	248	89	27
RW9MZ	"	150,080	357	121	39	0
R8TX	"	116,550	352	80	38	8
UA9XF	"	106,533	310	100	33	0
UA9YE	"	91,416	218	98	43	15
R9CD	"	29,610	160	52	18	0
RT8O	"	20,032	110	44	20	0
RA9UN	**21**	**28,270**	**218**	**44**	**11**	**0**
***RT9S**	**A**	**1,385,856**	**1256**	**266**	**89**	**46**
*RA9JB	"	956,590	1228	199	56	34
*RU9AZ	"	779,462	955	212	76	14
*UA9FGJ	"	437,070	600	186	58	11
*UA9AL	"	399,200	781	153	46	1
*R8XF	"	367,092	819	126	36	0
*RT8X	"	279,498	480	153	57	12
*RA9CUU	"	267,200	596	121	45	1
*UA9OA	"	249,246	504	131	44	8
*RA9MX	"	246,000	375	168	64	8
*RL9I	"	175,120	392	94	44	38
*RA9DP	"	121,953	294	109	42	8
*R9UG	"	72,312	215	86	42	3
*UA9AX	"	65,685	178	92	42	11
*RK9UE	"	43,962	163	74	27	1
*UA9SUX	"	37,000	154	72	26	2
*RK9FBE	"	27,434	128	60	24	2
*RK9AK	"	19,116	98	57	24	0
*UA9CGL	"	1,922	24	17	11	3
***RA9RR**	**28**	**94,001**	**492**	**53**	**14**	**0**
*R9OSN	"	6,475	64	28	9	0
***UF8T**	**21**	**30,422**	**155**	**53**	**19**	**10**
*UA9KAD	"	9,284	89	31	13	0
***RX9FG**	**14**	**143,640**	**595**	**70**	**24**	**1**
*RA9AFZ	"	33,288	172	55	17	1
UAØYAY	**A**	**864,708**	**1123**	**193**	**74**	**32**
RWØAQ	"	783,900	1156	173	60	27
RKØSP	"	78,255	240	95	40	6
UAØBA	"	54	3	3	3	0
UAØCW	**28**	**63,440**	**233**	**60**	**28**	**16**
RWØSR	**21**	**119,238**	**463**	**63**	**25**	**14**
UAØAYA	"	95,319	409	63	18	8
						(OP: RAØAY)
UAØSR	"	74,124	240	64	24	28
***UAØC**	**A**	**432,666**	**803**	**119**	**69**	**46**
*RAØACM	"	155,759	435	99	30	2
*RAØWHE	"	97,161	275	107	31	1
*UAØWF	"	89,100	293	91	41	3
*RXØSA	"	72,964	269	86	30	0
*RAØAY	"	45,472	175	75	35	2
*RUØLI	"	33,750	146	57	24	9
*RDØCD	"	33,028	156	66	26	0
*RVØAUI	"	30,555	124	60	31	6
*RZØSW	"	12,663	87	44	23	0
*UAØZC	"	11,115	69	49	16	0
***RNØSS**	**28**	**123,760**	**577**	**61**	**19**	**0**
***UAØSIK/Ø**	**21**	**48,165**	**197**	**56**	**21**	**18**
*RXØSC	"	43,296	206	57	19	12
*RWØLQ	"	40,832	172	54	21	13
***RWØAJ**	**14**	**7,905**	**62**	**33**	**15**	**3**

Asiatic Turkey

***TA2/TA1CQ**	**A**	**38,024**	**154**	**70**	**27**	**0**

Azerbaijan

***4K9W**	**A**	**82,315**	**325**	**80**	**19**	**2**

China

BD4QH	**A**	**273,764**	**649**	**106**	**51**	**21**
B4TB	"	12,859	65	43	29	5
BA1RB	"	3,219	37	21	15	1
BA7CK	**28**	**136,285**	**557**	**60**	**25**	**12**
BD7LMD	**14**	**72,819**	**374**	**59**	**24**	**4**
***BD3RQ**	**A**	**141,120**	**388**	**101**	**48**	**11**
*BD6OT	"	45,990	221	62	37	6
*BD1LEN	"	34,216	172	54	31	6
*BD3MF	"	27,140	151	60	30	2
*BD6AHU	"	25,203	131	56	33	4
*BD1DCG	"	13,572	107	37	21	0
*BH1LND	"	8,848	82	36	20	0
*BD4CD	"	7,725	50	35	28	12
*BD3MH	"	6,477	55	32	19	0
*BH1IUM	"	3,880	49	25	15	0
*BH3QBY	"	2,146	36	19	10	0
*BD7MTJ	"	560	11	10	9	1
*BG6CJR	"	240	10	7	5	0
***BD7NWF**	**28**	**119,795**	**484**	**62**	**25**	**10**
*BG6IF	"	605	23	7	4	0
***BD6PA**	**21**	**50,765**	**283**	**51**	**16**	**4**
*BD6IC	"	8,820	100	26	13	3
***BG2AUE**	**14**	**41,648**	**252**	**50**	**20**	**6**
*BA5HAM	"	20,520	166	40	18	2
***BA4SCP**	**7**	**720**	**32**	**9**	**7**	**0**
*BY1QH	"	325	13	7	6	0

Georgia

***4L9QQ**	**3.5**	**24,075**	**200**	**38**	**7**	**0**

Hong Kong

VR2XMT	**A**	**99,330**	**407**	**62**	**40**	**8**
***VR2VIY**	**A**	**30,636**	**135**	**58**	**33**	**1**

India

VU2LBW	**A**	**1,207,710**	**1232**	**226**	**79**	**50**
***VU2NKS**	**A**	**641,823**	**825**	**191**	**65**	**17**
*VU2RMS	"	92,852	267	96	31	12
*VU2PTT	"	71,604	171	101	45	10
*VU2ABS	"	14,835	84	51	18	0
***VU3DJQ**	**7**	**390**	**14**	**8**	**5**	**0**

Israel

***4Z5MY**	**28**	**4,477**	**54**	**23**	**11**	**3**
***4Z5CP**	**21**	**340,136**	**892**	**80**	**31**	**25**

Japan

JA1OVD	**A**	**1,535,314**	**1337**	**214**	**99**	**105**
JF1NHD	"	928,032	1011	167	69	100
JA1AYO	"	543,932	619	179	85	59
JF1OPL	"	318,008	454	107	59	88
JA1IKA	"	250,446	371	133	81	53
7K4QOK	"	221,325	407	107	42	46
JO1VRV	"	140,461	278	116	55	26
JL1DLQ	"	137,735	294	88	45	36
JE1SGH	"	35,728	117	61	37	18
JA1RTX	"	32,011	97	45	40	34
JA1KJW	"	26,093	114	65	32	0
JO1SIM	"	23,290	108	54	27	4
JK1KSB	"	2,263	25	21	10	0
JE1LFX	**28**	**272,745**	**680**	**72**	**28**	**45**
JL1SAM	"	109,595	366	57	25	33
JA1HGY	"	55,392	205	57	24	15
JN1RQV	"	11,220	75	32	12	7
JF1DMY	**21**	**38,130**	**149**	**50**	**21**	**22**
JR1HUA	"	21,666	114	42	15	12
JR1LZK	**14**	**19,344**	**90**	**45**	**23**	**10**
***JI1RXQ**	**A**	**1,039,218**	**990**	**183**	**85**	**111**
*JA1BJI	"	996,450	969	212	96	82
*7N2UQC	"	495,112	602	163	82	66
*JA1HFY	"	251,520	408	136	79	47
*JA1FRQ	"	199,520	342	112	68	52
*JA1IZ	"	191,178	308	124	60	50
*JA1EMQ	"	191,130	320	122	66	42
*JF1LMB	"	151,844	274	107	57	39
*JA1AZR	"	115,940	241	89	63	35
*JI1LAT	"	80,500	184	79	48	34
*JA1IE	"	73,632	191	79	49	28
*JF1MAD	"	71,012	164	84	50	30
*JA1NGW	"	57,440	137	78	47	35
*JA1BFN	"	53,808	173	58	30	30
*JA1MVK	"	37,940	129	56	44	40
*JA1RRA	"	36,828	128	58	33	17
*JA1SKE	"	27,810	110	41	28	21
*7K2PZG	"	25,960	91	71	40	7
*7M4OOS	"	23,940	133	41	16	13
*JA1OHP	"	23,900	90	48	37	15
*JA1BHK	"	23,092	109	49	33	10
*7N4QCQ	"	21,402	89	51	29	7
*7M1MCY	"	21,216	91	50	32	14
*JF1VRU	"	20,944	93	42	27	19
*JA1PTO	"	11,180	64	37	21	7
*JF1DAJ	"	11,026	60	36	26	12
*JP1HUJ	"	9,632	68	30	14	12
*JA1CPZ	"	7,296	49	20	15	22
*JA1LZK	"	6,270	48	22	19	14
*JA1SCE	"	4,233	34	26	20	5
*JA1KEB	"	3,652	32	18	15	11
*JJ1LRD	"	2,788	33	23	16	2
*JP1LRT	"	2,196	22	15	12	9
*JA1PYP	"	1,485	20	17	10	0
*JA5INF/1	"	1,363	25	16	13	0
						(OP: JA5INF/1)
*JE1QCL	"	1,353	27	20	12	1
*7K3OZQ	"	403	11	6	4	3
*JR1AHP	"	117	5	5	3	1
***JH1DGQ**	**28**	**70,992**	**245**	**53**	**24**	**25**
*JH1XUZ	"	51,243	207	46	22	19
*JF1WQC	"	22,052	108	42	22	10
*JI1HFJ	"	10,494	79	28	19	6
***JK1NSR**	**21**	**65,624**	**231**	**59**	**24**	**21**
*JG1IEF	"	56,056	195	53	21	30
*JF1PYJ	"	28,336	128	35	19	23
*JI1SAI	"	27,432	140	45	17	10
*JA1HOM	"	15,975	99	39	19	13
*JI1BBN	"	14,616	98	40	15	3
*JH1KIM	"	4,970	52	28	7	0
*JI1EWK	"	4,536	48	22	13	7
*JI1UDD	"	1,242	18	7	8	8
***JF1TEU**	**14**	**13,992**	**80**	**34**	**25**	**7**
*JE1RRK	"	6,820	80	32	17	6
*JR1UMO	"	1,755	23	13	11	3
*JE1GZB	"	925	22	10	11	4
*JK1LUY	"	160	6	6	4	0
***JH1APZ**	**7**	**28,914**	**138**	**42**	**23**	**14**
JA2VHO	**A**	**379,296**	**506**	**144**	**71**	**73**
JA2HOL	"	162,778	401	81	38	32
JR2PMT	"	133,076	254	115	55	36
JA2ATE	"	29,744	118	67	34	3
JF2FIU	"	24,750	98	36	25	29
JA2CPD	"	8,662	49	35	19	7
JR2BCF	"	6,324	54	30	19	2
JA2FJF	"	4,000	33	26	16	8
JA2FSM	**28**	**24,318**	**138**	**16**	**15**	**32**
JH2BTM	**21**	**71,904**	**242**	**54**	**23**	**30**
***JR2PAU**	**A**	**152,544**	**279**	**106**	**65**	**56**
*JK2KNR	"	118,668	239	100	57	29
*JA2GHP	"	81,528	188	88	44	26
*JR2MIN	"	50,700	154	68	37	25
*JA2HBK	"	33,728	99	67	39	18
*JA2LCN	"	15,663	84	48	21	0
*JA2IXS	"	14,022	80	51	31	0
*JA2RPZ	"	11,289	64	36	26	9
*JE2TLZ	"	2,975	29	22	9	4
*JF6IHU/2	"	198	7	6	5	0
***JE2UFF**	**28**	**261,166**	**698**	**74**	**29**	**31**
*JH2MYN	"	30,415	141	41	24	14
*JE2SOY	"	20,215	119	40	21	4
***JA2HYD**	**21**	**21,888**	**116**	**40**	**17**	**15**
*JR2AAN/2	"	6,525	55	20	13	12
***JJ2DWL**	**7**	**2,720**	**33**	**14**	**10**	**8**
JR3NZC	**A**	**983,592**	**1034**	**184**	**79**	**79**
JA3QOS	"	171,380	308	123	59	27
JA3AVO	"	56,680	149	65	36	29
JF3LOP	**28**	**810**	**21**	**12**	**3**	**0**
JL3SBE	**21**	**72,150**	**254**	**60**	**24**	**27**
JH3GCN	"	3,384	46	25	10	1
JG3WCZ	"	6	1	1	1	0
JO3AGQ	**7**	**1,040**	**23**	**13**	**7**	**0**
***JH3CUL**	**A**	**482,670**	**665**	**162**	**70**	**47**
*JF3NKA	"	299,386	505	111	53	50
*JA3IKG	"	284,616	435	145	54	37
*JA3HBF	"	236,430	429	132	58	32
*JA3JM	"	180,011	308	114	69	44
*JR3NDM	"	92,511	216	99	53	19
*JH3WKE	"	90,300	196	86	53	36
*JO3EVM	"	84,064	207	79	42	27
*JO3PSJ	"	82,296	224	94	49	19
*JA3KKE	"	76,796	204	72	44	30
*JE3UHV	"	74,060	187	86	51	24
*7J3AOZ	"	41,750	143	64	42	19
*JH3PTC	"	35,178	121	55	42	26
*JI3FLA	"	24,057	153	45	26	28
*JA3JND	"	13,575	79	39	24	12
*JA3DAU	"	9,724	76	37	14	1
*JO3QVT	"	8,162	56	38	26	13
*JL3DGI	"	2,964	28	21	13	4
*JI3OGI	"	126	5	3	3	3
***JH3DMQ**	**28**	**74,140**	**243**	**57**	**27**	**26**
*JA4XHF/3	"	43,516	179	49	23	14
						(OP: JA4XHF/3)

*JR3RIY	21	208,593	598	70	24	35
*JE3EVI	"	4,888	43	21	15	11
*JP3BHC	"	1,380	26	19	11	0
*JL3TMH	7	34,918	205	42	23	14
*JL3MCM	"	162	6	2	2	5
JH4UYB	A	2,869,920	2164	251	97	132
JO4CTB	"	99,550	207	84	59	38
JH4BTI	21	40,050	177	51	20	19
*JE4MHL	A	416,625	512	171	85	47
*JI4JGD	"	4,815	43	18	15	12
*JF4RKC	"	4,743	34	28	17	6
*JI4UEN	21	52,822	220	50	23	25
*JN4UUS	"	42,370	158	47	20	28
*JH4GLG	"	19,182	100	41	18	10
*JR4GPA	14	50,007	237	57	18	4
*JJ4CDW	"	38,822	163	60	24	10
*JR4VEV	7	21,842	153	32	22	13
*JH4WUI/4	"	63	4	3	2	2
JE5JHZ	A	60,768	156	81	43	20
*JA5SUD	A	231,220	383	129	64	27
*JJ5HUD	"	52,925	142	75	46	24
*JA5FMT	"	15,246	75	47	30	0
*JA5CUX	"	10,472	58	40	29	8
*JA5ENO	"	2,015	26	22	8	1
*JA5BZL	28	22,052	103	43	19	12
*JA5XPD	"	3,420	31	19	11	8
*JG5DHX	21	6,650	55	31	14	5
JA6BZI	A	672,588	688	196	85	76
JH6QFJ	"	307,444	555	126	53	23
JA6WJL	28	447,096	1031	89	33	34
*JA1IST/6	A	143,910	271	119	61	25
*JR6GIM	"	63,523	186	80	40	19
*JF6MGC	"	18,564	83	51	31	2
*JH7IPR/6	"	12,998	73	45	22	0
*JK6JAB	"	6,785	55	34	23	2
*JA6TWS	"	4,620	53	30	14	0
*JH6WHN	28	127,413	430	66	27	24
*JA6WFM	"	45,592	194	46	19	17
JA7IC	A	839,694	913	176	77	96
JA7BME	"	798,690	840	181	79	77
JH7QXJ	"	239,258	387	112	61	54
*JA7VEI	A	246,261	362	117	67	65
*JE7HYK	"	160,328	314	103	59	34
*JH7IMX	"	43,942	147	53	44	30
*JL7OTC	"	22,227	93	48	28	17
*JP7AWQ	"	13,072	64	40	26	10
*JA7BOM	"	1,508	20	13	8	5
*JH7RTQ	28	62,698	247	49	25	20
*JA7KQC	14	2,240	26	21	13	1
JA8TR	A	369,974	602	125	53	73
JA8MXC	7	4,554	63	14	10	9
*JA8EIU	A	277,992	447	142	64	37
*JA8CEA	"	35,096	113	47	30	30
*JR8ORC	"	31,300	113	59	28	13
*JE8KKX	"	10,764	53	34	23	12
*JA8IJI	14	3,740	44	19	11	4
JA9CWJ	14	100,300	315	71	26	21
*JA9LX	A	168,287	324	114	58	31
*JH9KVF	28	182,876	510	68	28	35
*JE9MBV/9	21	8,427	64	35	14	4
JHØINP	A	270,802	468	73	47	83
*JAØCGJ	A	270,465	471	102	59	58
*JAØNFP	"	150,288	272	106	65	31
*JRØBUL	28	10,017	67	27	16	10

Kazakhstan

UN8PIM	A	215,860	478	124	48	0
UN9PQ	28	7,308	62	32	10	0
UN1L	14	667,290	1492	97	32	48
*UN7CN	A	513,597	720	187	63	9
*UN7TDB	"	269,178	580	126	45	3
*UN8PT	"	43,818	163	71	33	5
*UN3Z	28	22,770	125	51	18	0
*UN5J	"	504	12	10	4	0
*UN7JX	21	215,900	646	82	28	17

Kuwait

9K2HN	A	204,844	437	101	39	26

Kyrgyzstan

EX8AB	A	206,455	501	113	44	0
*EX2U	A	46,800	194	74	26	0
*EX8AI	14	71,520	347	57	18	5

Lebanon

*OD5NJ	A	137,268	396	93	30	0
*OD5NF	"	5,586	63	32	10	0
*OD5PL	28	102,828	506	45	13	18

Mongolia

JT1F	14	147,805	622	75	28	0
					(OP: JT1DA)	

Saudi Arabia

HZ1FI	A	1,091,417	1174	211	66	46
					(OP: DL2RMC)	
*HZ1PS	A	1,463,000	1353	214	68	98
*7Z1HL	"	513,330	751	155	55	31
*HZ1DG	"	6,201	60	29	10	0
*7Z1SJ	28	394,896	952	87	32	33

South Korea

DS5QLJ	A	84,711	243	82	47	22
HL3AMO	28	10,203	67	27	21	9
*HL1VAU	A	567,502	725	187	84	28
*HL2CFY	"	53,560	160	88	42	0
*DS3BNU	"	37,590	167	51	43	11
*HL5JCB	"	29,478	110	57	34	11
*DS2GOO	"	1,764	45	8	6	4
*HL5YI	28	722	13	7	7	5

Taiwan

BV1EK	A	237,384	443	128	62	26
*BV4VQ	21	3,612	85	12	9	0
*BV4VR	14	9,652	111	24	14	0

Tajikistan

EYØA	21	667,212	1614	95	32	29
					(OP: UA4LCQ)	

Thailand

HSØZDY	28	27,450	138	55	20	0
*E21YDP	A	836,583	1035	196	69	38

UK Bases on Cyprus

ZC4LI	21	611,985	1332	87	32	46
*ZC4MIS	A	173,250	436	110	39	1

United Arab Emirates

A65EE	A	972,541	1273	168	49	64
A61BK	28	262,104	730	75	29	30
*A65BR	A	293,584	433	150	57	29

Uzbekistan

*UK7AZ	21	21,094	149	37	13	3

West Malaysia

9M2CNC	A	371,830	690	140	51	15
					(OP: G4ZFE)	
9M2TO	"	288,990	666	126	51	13
9M2CQC	"	179,985	426	111	51	7
*9M2NNM	A	240,275	587	115	50	10
*9M2DRL	21	5,236	69	18	14	2

EUROPE

Austria

*OE5PEN	A	288,200	590	166	54	0
*OE3RTB	"	215,452	380	140	55	49
*OE3DMA	"	103,788	409	92	27	5
*OE9HGV	"	63,801	199	74	38	27
*OE2LRO	"	45,384	162	57	31	36

Balearic Islands

EA6LP	A	444,242	685	184	66	52

Belarus

EU1AZ	A	1,756,609	1588	276	97	114
EW8DD	"	1,201,293	1515	206	84	91
EV1R	"	648,817	755	215	74	88
EU6AF	"	623,934	970	193	63	50
*EW8DZ	A	545,832	836	222	82	38
*EW8OG	"	388,878	645	176	67	39
*EU4CQ	"	312,872	458	170	71	55
*EW6FX	"	169,260	362	139	51	27
*EW7LE	"	130,113	309	113	45	25
*EW6DM	"	82,928	277	103	31	12
*EU1DX	14	350,625	919	96	30	39
*EW6EN	"	71,052	359	63	19	11

Belgium

OS1T	A	921,600	933	195	73	132
OT6N	"	554,800	845	161	64	79
ON4ALY	"	116,000	454	70	22	24
OR3A	"	46,864	187	84	22	10
OOØA	14	22,869	172	46	11	6
*OP7B	A	558,360	800	128	57	97
					(OP: ON7BJ)	
*ON5GQ	"	333,303	620	131	58	52
*OP3A	"	305,256	588	144	54	39
					(OP: ON8AJ)	
*ON5RA	"	267,900	411	149	61	75
*ON6AT	"	42,240	135	55	33	40
*ON7BT	"	38,564	141	66	36	22
*ON4VMA	"	35,960	166	71	25	20
*ON6FC	"	5,858	50	33	21	4
*ON6UF	"	1,000	24	16	4	0
*ON4CT	28	126,619	392	55	29	43
*ON3DI	21	13,311	128	36	15	0
*OSØS	14	101,565	431	66	21	24

Bosnia-Herzegovina

*E73PY	A	51,940	253	78	28	0
*E79SD	7	47,067	282	53	14	20

Bulgaria

LZ1BJ	A	266,696	574	117	36	59
LZ1794MAB	"	16,660	141	36	17	15
					(OP: LZ1ZF)	
LZ3CB	"	2,528	39	20	8	4
*LZ5XQ	A	576,870	785	197	71	67
*LZ2FQ	"	152,110	304	115	49	41
*LZ1BY	"	61,506	218	69	38	27
*LZ4BU	"	6,099	47	26	19	12
*LZ2JA	28	24,092	124	32	21	23

Corsica

*TK/DF6ZY	A	144,440	398	123	37	24
					(OP: DF6ZY)	

Crete

SV9AHZ	A	11,932	61	39	22	15
*SV9FBK	A	7,788	56	44	22	0
*SV9COL	14	7,722	70	33	12	9

Croatia

9A4WY	28	237,284	629	59	24	54
9A8W	21	433,314	987	89	32	50
9A9SF	"	361,284	866	77	29	55
9A3AAX	7	282,720	1016	62	18	44
*9A3ZI	A	1,104,216	1202	235	79	103
*9A3BIM	"	840,708	977	197	68	121
*9A8A	"	79,212	218	99	41	24
*9A/PC5A	"	31,200	129	79	34	7
*9A6ZT	"	20,680	94	41	28	25
*9A12AO	"	15,732	104	45	24	7
*9A6Z	"	13,068	96	46	20	0
*9A2BW	"	9,432	66	43	22	7
*9A5ALL	"	1,428	25	22	15	5
*9A4AA	3.5	1,140	32	17	3	0

Czech Republic

OK2SFP	A	1,199,829	1400	214	79	100
OK1DBE	"	1,085,007	1113	239	84	104
OK6AB	"	611,672	763	153	73	88
OK2SG	"	350,280	420	217	75	68
OK1FAV	"	193,884	341	80	52	82
OK2BXW	28	13,630	93	20	13	25
OK2SAR	7	72,601	468	52	15	12
OK1MSP	"	52,170	198	58	19	34
*OK1VRF	A	776,286	898	210	84	72
*OK1WCF	"	691,920	789	181	72	107
*OK1DKO	"	508,620	815	173	57	64
*OK2UHP	"	292,336	574	139	53	50
*OK1HEH	"	224,730	449	145	50	32
*OK2PAD	"	140,205	299	110	46	39
*OK1DEZ	"	130,848	296	112	52	24
*OK2SPD	"	118,830	324	108	41	21
*OK2JNB	"	55,913	196	70	41	32
*OK5ZH	"	53,172	210	82	32	12
*OK2QX	"	49,588	132	91	47	16
*OK2BJ	"	47,762	124	62	41	40
*OK1KMG	"	31,506	136	82	28	8
					(OP: OK1ULE)	
*OK7T	"	31,482	134	42	20	37
					(OP: OK1FHI)	
*OK2SWD	"	21,156	124	58	24	4
*OK1HL	"	19,110	98	50	30	11
*OK1PMA	"	13,321	75	47	21	9
*OK7CM	"	9,805	87	32	16	5
*OK6RW	"	8,584	51	34	24	0
*OK2CLW	"	2,666	32	14	10	7
*OK1ULE	"	80	9	4	4	0
*OK5SWL	21	924	20	13	9	0
*OK3MO	14	34,340	231	51	13	4
*OK1HGM	"	12,648	93	39	14	9
*OK1VPO	7	44,004	289	50	12	14
*OK1SI	"	17,864	153	45	10	3

Denmark

OZ5NJ	A	1,336,203	1499	184	71	108
OZ1JTE	"	902,781	1156	208	80	75
OV1A	"	558,960	682	190	73	77
OZ1FAO	"	542,626	622	158	66	119
OZ1ADL	28	66,468	279	26	16	45
*OZ6TL	A	218,094	454	150	58	15
*OZ7AM	"	86,625	217	72	38	55
*OZ6AGX	"	86,548	270	91	38	25
*OZ/DL3ARK	"	37,926	141	61	33	32
*OZ5TL	"	24,552	145	60	29	4
*OZ1DGQ	"	14,857	78	33	24	26
*5P5U	28	5,863	60	22	13	6
*OZ1JVX	21	20,235	127	33	15	23
*OZ7AEI	7	8,930	132	32	5	1

England

G3TBK	A	1,696,320	1465	248	95	153
G3TXF	"	1,231,230	1146	236	84	131
GØHDV	"	725,208	1066	191	65	72
M2G	"	623,080	878	138	52	106
GØGFQ	"	80,640	197	84	47	37
G8UBJ	"	35,280	119	44	30	46
G3RTU	"	7,991	72	41	16	4
MØVBY	"	2,576	45	19	9	0
M5A	28	29,614	158	17	13	37
					(OP: G3WVG)	
M3I	21	411,835	1035	69	29	57
					(OP: GØORH)	
G1N	7	53,105	286	56	13	26
					(OP: G3MZV)	
*GØMTN	A	1,896,673	1550	286	87	154
*MØVAA	"	1,398,064	1260	257	84	131
*G4DBW	"	861,360	1012	219	77	92
*G4SGI	"	319,590	528	156	59	50
*G3TDH	"	318,932	494	160	60	64
*MØOSH	"	252,648	496	132	47	53
*MØRYB	"	243,036	423	139	53	66
*G8MIA	"	196,672	364	115	42	67
*G3RLE	"	193,256	353	121	55	56
*G8APB	"	165,440	314	133	54	48
*MØGVZ	"	164,800	352	115	48	43
*G3RSD	"	148,248	323	117	47	49
*MØTQR	"	137,196	299	119	44	43
*G6CSY	"	109,908	280	103	38	31
*G4WGE	"	101,310	272	86	40	39
*G3SNU	"	93,015	307	114	38	7
*G1FON	"	71,001	214	92	42	27
*MØTJU	"	67,680	167	108	38	34
*GØGDU	"	66,138	215	104	33	14
*G7TWC	"	45,110	138	63	37	30
*G7RTI	"	26,800	128	61	25	14
*2EØJXE	"	26,796	157	56	19	9
*G3LHJ	"	19,208	79	56	33	9
*G3KMQ	"	17,848	65	43	39	15
*G7MJX	"	16,344	114	47	20	5
*G6NHU	"	8,866	67	42	20	0
*G3LDI	"	7,434	44	19	17	23
*G3IGU	"	5,850	57	34	16	0
*GØWHO	"	4,480	71	45	19	6
*M3C	"	4,095	32	15	13	17
					(OP: GØVQR)	
*MØAFZ	"	198	15	4	2	0
*G3KNU	28	37,044	169	41	19	24
*G4FKA	21	71,126	282	54	16	36
*M/YO4RDW	14	33,915	198	46	15	24
*G3VMY	7	69,113	355	60	15	28

Estonia

ES4RD	A	344,556	760	112	52	40
*ES2DJ	28	19,251	110	35	18	16
*ES1WST	"	5,292	57	17	11	8
*ES1ABT	"	3,960	36	16	14	10
*ES1LS	21	103,505	350	67	25	35
*ES6DO	"	2,255	26	21	14	6
*ES1HJ	14	34,884	233	44	14	18

European Russia

RG3K	A	3,755,400	3048	306	108	136
RW4W	"	2,503,497	2290	330	103	68
RA4HL	"	885,720	1121	234	77	55
RN3ZC	"	792,880	1010	227	82	65
RW6CR	"	622,380	1244	149	47	50
RN3A	"	613,167	907	185	77	51
UA3QGT	"	558,250	831	190	72	57
RK4S	"	363,912	688	201	56	0
UA3TCJ	"	337,928	604	97	45	70
RW4NN	"	300,366	560	132	61	53
RA3NC	"	283,998	486	190	70	26
RL2A	"	272,556	458	161	72	35
RW4FE	"	192,559	304	129	68	44
R7HF	"	186,463	408	117	46	36
RX3AEX	"	145,948	311	127	54	33
RA3TT	"	138,106	309	131	54	14
RT3P	"	106,722	304	79	39	36
					(OP: UA3PAB)	
RA3FD	"	99,960	290	117	38	13
UA4NC	"	82,236	252	130	44	4
UA3DPM	"	64,622	179	86	45	27
RJ4F	"	61,500	159	63	40	47
RZ3AIU	"	10,878	140	34	8	0
UA1OIZ	"	6,968	46	27	25	0
R6AF	"	6,272	52	30	15	4
UA1ORK	"	4,437	31	25	20	6
RZ3DX	28	108,738	348	74	30	22
RV3A	"	53,429	209	53	27	21
UA3EAY	"	22,576	105	41	23	19
RZ3DA	"	22,050	125	44	21	10
RV6ASU	"	19,680	92	48	23	9
R1AC	"	1,512	19	11	8	8
R3PW	14	355,593	1084	86	28	33
R3BT	"	246,638	659	92	33	33
RX6MR	"	84,099	388	67	21	9
UA6AKD	7	64,657	400	56	14	13
RT4W	"	21,584	172	48	14	9
RV5K	3.5	24,299	282	39	8	0
*R7MM	A	1,410,758	1420	274	90	85
*UC6A	"	1,247,153	1267	283	92	82
*RA4FUN	"	1,019,088	1214	233	86	59
*UA4ALI	"	803,000	1037	222	81	62
*RX3ZX	"	731,000	990	227	74	39
*RV3ZN	"	693,912	937	224	76	48
*UA6BJY	"	566,990	869	181	61	53
*UA4HJ	"	537,240	769	237	82	11
*RN3QQ	"	508,295	634	243	86	38
*RW3LB	"	423,258	625	196	77	45
*R3FO	"	419,190	769	199	68	0
*RO1B	"	389,658	620	193	72	38
*UA3DCW	"	349,643	653	153	66	32
*RW3WX	"	318,780	512	166	69	41
*UA4FEN	"	308,340	549	192	65	13
*RA3ZSK	"	299,720	647	163	50	23
*RA1ALC	"	288,785	519	166	57	36
*RA3ATE	"	276,259	605	166	51	10
*RA6C	"	262,404	607	158	40	24
*RN3ZIC	"	233,996	368	164	62	48
*RQ3M	"	228,956	463	169	53	16
*UA3QJJ	"	225,212	424	141	64	39
*RU4PH	"	223,416	495	169	53	10
*RN6AI	"	221,672	473	154	52	23
*R2PA	"	220,160	344	136	63	57
*UA3TN	"	218,190	480	157	53	0
*R3PA	"	215,277	425	147	60	12
*UA3PT	"	213,663	546	153	48	0
*RW2WR	"	206,790	415	154	57	15
*RU3XB	"	206,421	390	158	60	31
*RN3DHU	"	178,086	423	132	45	24
*RU3WR	"	163,850	348	139	57	30
*RA3QH	"	153,784	401	139	39	10
*RW3PF	"	148,500	337	118	47	33
*UA3GX	"	141,900	307	140	50	25
*RA4FP	"	135,968	250	143	57	24
*UA6XES	"	135,952	368	165	53	14
*RA6HSM	"	125,330	358	116	40	10
*RU4LM	"	118,932	296	139	42	6
*RA3YBU	"	117,195	268	127	49	19
*UA6HO	"	116,966	219	153	65	15
*UA3QCB	"	113,050	299	123	48	19
*RM2T	"	102,346	380	109	37	0
*RV4HL	"	99,160	251	127	44	14
*RA6MK	"	94,302	306	115	43	11
*UA4LU	"	87,520	261	112	41	7
*RA3FH	"	82,472	218	101	43	25
*RN3BW	"	78,824	199	81	45	41
*UA3MOM	"	77,775	233	128	46	9
*R4WT	"	73,320	259	104	36	1
*RO3DX	"	62,168	170	76	46	30
*RN3DHL	"	59,075	196	82	40	17
*RN3AJK	"	57,961	214	104	34	11
*RG5G	"	53,250	152	85	40	25
*RW6HJV/6	"	51,186	265	80	31	3
					(OP: RW6HJV/6)	
*RN6MA	"	48,042	205	63	29	10
*UA3NFI	"	45,770	167	70	34	11
*RX3AFE	"	43,470	165	73	33	20
*RX3MM	"	35,090	144	67	33	10
*UA3UBT	"	33,000	143	69	28	13
*RV3DBK	"	31,960	182	67	18	0
*RA3QDG	"	29,014	155	69	20	0
*RV3IC	"	28,380	102	59	39	12
*RA3VMD	"	23,124	104	56	29	9
*RA6XB	"	20,304	81	66	30	12
*RV6ACC	"	17,940	135	53	14	2
*RV3YR	"	16,274	86	36	20	23
*RY7A	"	15,041	77	50	25	14
*RA6FUZ	"	14,527	79	34	20	19
*RK1AX	"	13,832	68	63	26	2
*R2EAA	"	12,608	106	49	11	4
*RO7M	"	12,376	71	39	17	12
*RX3MX	"	11,925	68	37	28	10
*UA3SNJ	"	10,362	76	44	18	4
*RN6DR	"	4,888	50	30	15	2
*RK6AQM	"	4,494	47	28	11	3
*UA1OMS	"	4,116	40	24	15	3
*RA3RCL	"	2,622	27	20	15	3
*RK4HZ/3	"	1,566	26	18	11	0
					(OP: RK4HZ/3)	
*UB1AAZ	"	975	18	14	10	1
*RA3BQ	"	735	12	9	8	4
*UA3RAB	"	-16	2	2	2	0
*RA4WC	28	93,012	461	59	23	10
*R3BB	"	57,660	273	51	27	15
*RV4LS	"	32,752	144	55	23	14
*RV3LO	"	26,166	111	43	22	24
*UA4PAY	"	23,800	159	47	19	2
*RA3IS	"	9,184	65	26	18	12
*RW4NH	"	3,864	32	18	14	10
*R7BN	"	3,026	55	21	7	6
*RZ3AV	21	130,048	502	73	22	33
*RL3AW	"	82,677	300	69	24	34
*RW4LQ	"	13,651	72	36	17	20
*RA3XEV	"	12,576	122	33	10	5
*RA4LK	"	2,840	33	15	11	14
*RM2M	14	335,556	1000	83	32	41
*RW6AH	"	98,490	437	64	21	20
*RX4W	"	8,507	97	35	12	0
*RW3AI	"	5,625	58	28	12	5
*R4WAA	7	73,695	454	63	18	4

European Turkey

*TA1CM	A	34,979	157	87	32	14
*TA1BM	14	88,230	424	70	22	10

Finland

OH8X	A	3,374,920	2559	296	118	142
					(OP: OH6UM)	
OH4A	"	3,038,165	2559	303	109	147
OH7UE	"	1,582,680	1682	250	95	91
OH7KNM	"	884,017	1161	228	75	46
OH3OJ	"	514,776	999	171	58	12
OH2BBT	"	440,259	595	175	71	57
OH5KW	"	234,134	306	236	85	13
OH2BCK	"	148,780	315	45	28	100
OH2XX	"	60,588	185	49	33	50
OH7FAE	"	46,080	174	80	40	0
OH5UFO	28	116,875	363	65	27	33
OH9R	"	47,793	223	53	24	12
					(OP: OH2RI)	
OG4X	"	2,997	30	20	12	5
OH1SIC	7	26,554	173	48	14	9
OG8A	3.5	29,913	268	47	11	1
*OH2NT	A	243,225	547	153	56	16
*OH8HTG	"	138,106	337	135	52	12
*OH1XY	"	43,860	129	60	39	30
*OH3DP	"	40,424	140	58	35	31
*OH2LZI	"	17,334	157	37	11	6
*OH6FSG	"	6,272	60	33	15	1
*OH5VG	"	2,550	25	5	7	22
*OH8KVY	21	46,080	218	57	24	15
*OH8JJ	"	35,492	219	47	14	15
*OH9UFO	3.5	2,352	67	18	3	0

France

TMØT	A	3,473,526	2679	257	101	215
F8DHB	"	362,340	631	108	39	97
F2LZ	"	243,000	390	122	59	69
F8AAN	"	219,300	451	106	47	62
F5OAM	"	196,112	554	125	43	38
F5GFA	"	157,556	404	136	51	51
F1RHS	"	96,363	356	90	38	1

F5RJW	"	92,217	248	88	37	52
F6BIP	"	56,810	156	52	36	42
F4FNL	"	48,972	197	76	33	23
F5QE	"	47,994	239	72	22	20
F4FGB	"	1,224	20	4	5	15
F5CQ	**28**	**98,748**	**306**	**50**	**21**	**46**
F5VML	"	10,166	85	20	14	12
F5NBX	**21**	**129,870**	**397**	**58**	**25**	**47**
***F6HRP**	**A**	**818,640**	**880**	**187**	**66**	**126**
*F5VBT	"	602,556	993	216	66	16
*F5RD	"	406,890	665	153	60	61
*F8BNN	"	244,970	424	143	51	68
*F4FHZ	"	171,754	388	123	44	44
*F1IWH	"	164,640	351	127	44	39
*F5AXG	"	160,446	322	117	53	51
*F4EUN	"	158,844	396	147	46	24
*F6GCI	"	132,300	269	115	52	43
*F6FTB	"	130,752	298	100	47	45
*F6EWX	"	92,750	243	107	40	28
*F4FDR	"	87,016	320	107	31	8
*F5GGL	"	55,014	137	90	55	28
*F8PMO	"	22,770	109	61	34	4
*F5PJG	"	320	11	10	6	0
***F1AEY**	**28**	**101,556**	**372**	**56**	**26**	**35**
*F6IRG	"	63,960	238	41	23	40
***F6OBD**	**14**	**15,060**	**129**	**48**	**10**	**2**

Germany

DL1IAO	**A**	**2,955,216**	**2114**	**294**	**104**	**181**
DL5JS	"	1,225,217	1117	236	83	138
DL6JZ	"	1,147,988	1152	244	85	107
DF9GR	"	1,071,850	1071	259	87	96
DK9WI	"	673,180	760	216	82	90
DF2RG	"	660,096	686	209	81	92
DK6CQ	"	657,702	765	211	74	81
DL1RYD	"	553,052	677	213	75	73
DL4ME	"	538,780	834	208	70	32
DL1STG	"	522,560	614	208	87	73
DF2TT	"	422,304	556	192	73	67
DK1AX	"	420,564	639	181	62	60
DK8EY	"	399,424	561	168	58	90
DJ6TK	"	389,064	564	181	68	63
DF2MC	"	335,400	530	123	63	74
DC9ZP	"	307,377	448	165	73	49
DF5BX	"	290,714	443	151	61	62
DL5SE	"	277,920	500	135	57	48
DJ5IW	"	235,224	436	146	60	36
DF3EH	"	224,680	468	96	44	65
DC2YY	"	209,456	378	136	56	55
DK4IO	"	194,656	368	121	55	48
DF8JK	"	165,222	424	135	46	20
DL7UFN	"	164,475	278	79	53	83
DL8QS	"	161,325	351	170	69	0
DK4LI	"	132,990	303	111	50	34
DL8CA	"	122,941	239	77	43	73
DL5ASK	"	104,468	261	105	50	27
DB9EX	"	88,288	197	101	47	30
DL7UMK	"	87,373	244	108	43	18
DM5EL	"	69,440	251	63	38	11
DL3MR	"	63,450	210	72	37	32
DK1AQ	"	51,561	127	75	45	33
DL8RDL	"	47,360	164	69	37	22
DL6ZXG	"	39,204	141	83	38	0
DJ4PI	"	26,565	102	59	30	26
DF6RI	"	21,165	117	46	21	18
DK7MD	"	20,564	74	42	32	23
DL7UG	"	15,050	83	48	26	12
DKØIU	"	10,812	103	38	11	2
						(OP: DJ4KW)
DL5MG	"	2,345	27	22	13	0
DL1EJA	"	18	2	2	1	0
DL3BQA	**28**	**233,464**	**561**	**79**	**32**	**43**
DL8USA	"	5,832	38	26	18	10
DL8OBQ	**21**	**564,080**	**1243**	**87**	**32**	**57**
DJ9AO	"	21,024	116	24	17	32
DK4WW	**14**	**81,328**	**363**	**69**	**22**	**13**
DJ2YE	**7**	**24,960**	**195**	**46**	**9**	**9**
DL1SWB	**3.5**	**62,136**	**500**	**51**	**11**	**10**
DL2SAX	"	25,653	301	42	8	1
***DM3HZN**	**A**	**768,621**	**941**	**194**	**71**	**92**
*DL8ZAW	"	428,110	583	162	63	85
*DJ1OJ	"	406,252	560	170	67	71
*DJ5TT	"	394,188	570	172	68	67
*DL6SFR	"	310,526	523	161	60	57
*DL1ARJ	"	304,956	574	159	60	39
*DK1LRS	"	299,638	610	158	51	24
*DL1APX	"	290,924	523	167	50	40
*DF3IS	"	279,130	490	159	58	54
*DL5ZB	"	252,538	345	124	66	96
*DF6WE	"	248,321	492	147	54	38
*DK3WN	"	244,767	441	152	57	40
*DL1MAJ	"	241,066	368	124	52	81
*DL5GAC	"	235,480	404	107	48	77
*DL5JBW	"	216,660	430	146	54	30
*DL3OH	"	215,050	371	136	60	57
*DGØKS	"	211,344	356	129	59	50
*DL5SWB	"	194,064	419	125	49	34
*DR9P	"	191,698	457	120	45	37
						(OP: DO9PL)
*DJ4MH	"	189,272	373	138	54	44
*DK9ETM	"	184,665	470	121	33	41
*DK6NF	"	182,439	303	113	57	63
*DO3PKE	"	162,870	389	94	39	50
*DJ4WM	"	159,624	353	124	44	48
*DL8ZAJ	"	150,722	300	122	55	44
*DL5JSP	"	139,020	284	115	56	39
*DL7UGO	"	136,350	298	114	49	39
*DK5IR	"	135,606	321	116	43	35
*DL4NN	"	122,436	287	108	52	19
*DH5MM	"	120,900	256	112	51	32
*DJ6JH	"	119,140	299	82	45	34
*DO1BEN	"	117,504	360	107	46	0
*DJ5HB	"	116,325	380	113	35	17
*DL1KUR	"	111,074	236	48	33	77
*DH2PL	"	108,455	233	98	45	56
*DK3PM	"	104,980	255	109	41	31
*DL1HSI	"	104,525	280	112	46	27
*DB4MZ	"	101,904	295	102	39	35
*DO3KMF	"	101,436	267	84	39	35
*DK5DC	"	100,368	202	104	54	46
*DL9NO	"	99,756	337	119	34	0
*DH6BH	"	94,872	232	103	47	27
*DM3FF	"	90,415	243	97	42	30
*DK5OS	"	87,264	256	72	32	40
*DL7FA	"	86,973	251	83	38	38
*DL2NYC	"	84,804	272	107	41	0
*DF5WW	"	83,398	260	104	41	16
*DF4WC	"	75,123	207	86	35	32
*DO3ME	"	73,968	218	55	30	49
*DL8VKO	"	67,320	195	75	45	33
*DL1DXF	"	65,520	164	66	43	47
*DJ6UP	"	65,486	218	80	36	21
*DJ3GE	"	62,020	199	87	35	18
*DL1BA	"	60,643	153	65	32	52
*DH7LF	"	55,796	222	49	26	41
*DB1RL	"	54,940	165	88	41	35
*DK7UM	"	54,264	195	76	32	25
*DL1JGG	"	52,640	197	87	37	16
*DJ8UB	"	50,765	182	84	34	25
*DK4RL	"	49,911	150	60	39	28
*DL2GK	"	46,872	160	65	26	33
*DL4EAX	"	45,593	176	81	28	18
*DL2DWP	"	45,440	172	82	35	11
*DL8MAS	"	41,895	158	79	39	15
*DL1ET	"	40,449	127	95	44	0
*DF5AN	"	39,732	142	71	37	24
*DL5HF	"	36,252	155	72	32	10
*DF2KD	"	33,135	170	86	35	20
*DL7ACN	"	32,745	124	54	33	24
*DF1LX	"	31,978	124	70	29	19
*DL2RUG	"	31,501	107	42	27	40
*DO8PP	"	29,866	139	59	28	22
*DK9MS	"	28,404	109	52	32	24
*DC4UX	"	27,800	137	65	29	6
*DM55JES	"	27,328	109	63	30	19
						(OP: DL8ULF)
*DL3BBY	"	24,970	83	55	41	14
*DK4EF	"	24,035	123	60	30	5
*DL4TL	"	23,128	100	45	27	26
*DO1SRB	"	21,804	118	41	24	14
*DL6CNG	"	20,280	81	53	36	15
*DO1CDE	"	19,359	101	42	30	9
*DG1RPU	"	18,437	92	45	35	23
*DGØEK	"	17,765	99	55	27	3
*DD1UN	"	14,840	84	24	20	26
*DG3RCE	"	14,400	96	51	18	6
*DO7ML	"	14,300	98	31	17	17
*DL2ARG	"	13,260	94	44	21	0
*DL3DXF	"	12,972	86	47	33	14
*DJ3QB	"	11,454	70	26	17	26
*DO3NO	"	9,945	69	30	19	16
*DB3KE	"	9,891	62	25	19	19
*DL6RBH	"	9,815	62	28	23	14
*DM5JBN	"	9,486	71	43	19	0
*DL5ST	"	9,086	58	28	22	9
*DL1CI	"	8,236	68	32	17	9
*DO5HAI	"	6,664	61	28	16	5
*DK9BW	"	6,588	59	31	14	9
*DL4RCK	"	5,922	53	28	19	0
*DB3LO	"	5,665	45	27	15	13
*DG5AAP	"	4,992	51	32	16	4
*DO4HBK	"	4,730	53	24	17	14
*DG1MHC	"	3,950	34	22	18	10
*DF1LON	"	3,160	32	22	15	3
*DL7VRG	"	3,024	35	25	12	5
*DF4PD	"	2,960	40	26	10	1
*DJ3AN	"	2,829	24	23	17	1
*DJ1RK	"	2,508	30	15	15	3
*DL1LAE	"	2,024	72	33	11	0
*DG1ATN	"	1,782	41	20	7	0
*DJ1MD	"	1,584	21	20	13	0
*DGØAM	"	1,333	24	14	13	4
*DC2IP	"	1,000	24	11	9	0
*DL2AJB	"	450	10	9	9	0
***DL1CW**	**28**	**4,797**	**43**	**14**	**10**	**15**
***DL5KUD**	**21**	**118,188**	**317**	**79**	**28**	**40**
*DO6GZ	"	42,390	199	44	16	30
*DO3SP	"	7,975	69	37	18	0
*DO4TP	"	2,686	34	8	7	19
*DO1DXX	"	312	8	7	6	0
***DL1DTL**	**14**	**48,000**	**216**	**61**	**18**	**21**
*DL8RCL	"	35,190	150	65	19	18
*DL8DUL	"	13,456	109	35	12	11
*DL9NEI	"	3,168	38	23	11	2
***DJØMCZ**	**7**	**87,514**	**458**	**58**	**15**	**25**
*DL8ZU	"	23,436	204	43	11	9
***DL1AIW**	**3.5**	**31,212**	**279**	**46**	**10**	**12**

Greece

SV1GYG	**A**	**366,030**	**669**	**125**	**55**	**65**
SV1JGX	"	336,905	806	152	62	1
SV2GJV	"	156,145	397	110	43	34
SV3GKU	"	114,380	295	94	42	36
SV8JE	"	13,770	73	35	24	26
SV1CJF	"	2,139	36	19	12	0
SV1MRV	"	1,584	36	25	11	0
***SV1NQX**	**A**	**187,083**	**521**	**113**	**37**	**19**
*SV7CUD	"	48,117	191	90	39	0
*SV2HTI	"	6,554	64	40	18	0
*SV8KOU	"	2,014	26	23	15	0
***SV2FLQ**	**28**	**42,874**	**165**	**38**	**29**	**30**

Guernsey

***GUØSUP**	**A**	**777,240**	**806**	**222**	**76**	**110**

Hungary

HA5SE	**A**	**340,291**	**507**	**137**	**59**	**85**
HA5AWT	**28**	**74,942**	**250**	**47**	**27**	**32**
***HA7YS**	**A**	**194,700**	**439**	**146**	**53**	**21**
*HA8XF	"	171,424	464	120	35	21
*HA3OU	"	102,675	227	100	45	40
*HA7LJ	"	80,592	269	97	36	13
*HA5OMM	"	71,136	206	87	44	25
*HA2ESM	"	2,208	29	5	5	22
***HAØLW**	**28**	**14,335**	**84**	**25**	**20**	**16**
*HG6C	"	10,528	87	23	15	18
						(OP: HA6IAM)
*HA2MN	"	7,912	71	20	14	9
***HA2SP**	**14**	**9,900**	**115**	**36**	**8**	**0**
***HA1WD**	**3.5**	**71,355**	**552**	**51**	**9**	**7**

Iceland

***TF3HP**	**A**	**19,565**	**116**	**57**	**19**	**15**
*TF8TTY	"	2,772	41	31	10	3

Ireland

***EI8FH**	**A**	**619,620**	**800**	**193**	**69**	**83**
*EI1DG	"	499,206	720	158	60	84
*EI4DW	"	305,184	501	124	55	85

Italy

IZ1PKV	**A**	**1,583,344**	**1417**	**240**	**89**	**140**
IK2BUF	"	595,440	743	210	71	79
IQ3UD	"	586,634	1038	184	77	13
						(OP: IW3RUA)
IK4QJF	"	496,485	731	150	58	87
IW2MYH	"	342,788	514	158	64	62
IK2DKX	"	303,564	575	129	57	60
IK3PQG	"	279,180	714	137	55	6
IKØFMB	"	226,944	587	120	49	23
IZ8EDL	"	206,388	314	161	64	48
IZØGKB	"	179,580	344	112	52	55
IK1MEG	"	167,463	331	100	43	64
IKØUTM	"	106,930	253	111	42	32
IK2DJV	"	87,846	250	35	29	57
IKØEFR	"	81,466	227	101	43	17
IWØSAF	"	81,169	214	73	40	44
I5JFG	"	71,375	203	49	36	40
IW1CQ	"	70,082	223	65	36	33
IK2AHB	"	41,654	137	67	38	13
IZ3KSO	"	29,103	126	60	33	16
IZ1RFL	"	22,890	92	52	34	23
IK5MEQ	"	5,727	45	32	25	12
IK3ASM	**28**	**17,073**	**98**	**27**	**20**	**16**
IZ5DKJ	**21**	**379,668**	**857**	**88**	**29**	**57**
IO3K	"	39,494	163	42	22	34
IZØGXM	"	15,695	79	32	14	27
IZ3GOM	**14**	**366,876**	**1051**	**86**	**28**	**44**
IN3QBR	**3.5**	**81,750**	**556**	**52**	**12**	**11**
I5WNN	"	15,224	198	39	5	0
***IW2MXY**	**A**	**694,203**	**850**	**203**	**76**	**82**
*IK2DZN	"	659,928	726	185	71	116
*IK3XJP	"	583,680	642	206	80	94
*IK5ZUB	"	502,265	634	176	61	86
*IR2ITA	"	441,375	651	177	69	75
						(OP: IZ2EWM)
*IK1RKU	"	431,235	571	176	66	73
*IØYQV	"	354,016	494	166	69	61
*IZØHAP	"	284,550	440	148	63	60
*IK5RUN	"	222,345	297	172	67	66
*IK8MYM	"	220,849	360	161	69	39
*IV3ARJ	"	216,027	424	159	53	31
*IV3BCA	"	187,636	417	137	53	54
*IZ8EEL	"	169,604	381	118	48	52
*IN3BIY	"	168,948	300	112	52	64
*IK8NBE	"	164,573	377	135	50	14
*IK1VEK	"	164,340	364	125	55	40
*I7/IN3IZT	"	163,438	391	122	49	38
*I2XLF	"	160,571	373	121	44	46
*IK6UBY	"	160,268	347	125	49	32
*IZ3GOG	"	154,336	286	127	59	26
*IØGIA	"	140,818	367	124	46	11
*IK2YSJ	"	140,192	316	121	48	39
*IK5UAN	"	126,075	248	87	46	72
*IKØCHU	"	113,634	275	91	40	46
*IZ5ILK	"	112,710	234	83	49	63
*IK5ZTT	"	111,931	311	103	32	38
*I2BZN	"	88,749	236	98	39	34
*IK2WFN	"	88,509	244	99	40	24
*IØHJN	"	87,696	236	94	39	41
*IZ8JFL/1	"	83,905	272	125	42	6
						(OP: IZ8JFL/1)
*IV3XZG	"	81,136	187	92	45	39
*IK7WPD	"	80,136	215	99	46	23
*IW3GXW	"	73,472	196	41	34	53
*IW1QLH	"	72,000	205	85	41	34
*IK2AUK	"	70,785	207	89	41	35
*IZ2EEV	"	69,108	215	95	36	25
*IK1WEG	"	57,988	196	90	43	0
*IZ1GLX	"	57,218	167	57	38	39
*IO4UI	"	52,026	173	78	34	26
*IN3JJI	"	50,960	234	74	27	3
*IV3RVN	"	50,858	227	90	28	0
*I1ABT	"	49,640	168	78	42	16
*IZØKBA	"	46,206	129	71	45	37
*IZ2MHT	"	44,835	126	57	39	51
*IK2NCF	"	44,403	155	58	32	33
*I2ORX	"	38,376	129	56	35	32
*IK7NXU	"	37,030	124	50	31	34
*IZ7EUB	"	36,250	101	55	43	27
*I4HRH	"	35,631	115	41	31	39
*IK2IKW	"	35,298	145	65	36	5
*IZ3LEY	"	34,960	136	70	31	14
*I8IEQ	"	32,330	119	73	37	12
*IZ2PCJ	"	29,887	98	56	34	31
*I4DZ	"	29,440	140	74	31	10
*IZØRVC	"	28,531	132	64	30	9
*IZ3NVR	"	28,413	123	55	25	19
*IZ5BSA	"	28,361	184	60	19	0
*IK1DFH	"	27,966	109	72	33	13
*IZ4OUR	"	27,485	114	74	28	13
*IK1MTX	"	27,141	107	60	33	16
*IZ1DXS	"	25,380	97	48	31	29
*IW6PWC	"	22,374	83	67	30	16
*IK1TWC	"	20,655	93	40	32	13
*IW2FUT	"	19,680	94	22	17	41
*IV3BXV	"	17,487	103	52	25	10
*IK3CST	"	15,308	80	42	24	20
*IV3DYS	"	11,856	99	55	19	2
*IZ3KSP	"	11,656	92	40	18	4
*IW4EQI	"	10,404	59	23	19	26
*IZ4RWU	"	10,286	75	49	18	7
*IZ2GLU	"	10,010	79	45	19	1
*IW2JRV	"	8,645	67	32	19	14
*IZ1TRG	"	7,992	59	37	21	16
*IZ6PTL	"	7,250	67	35	15	0
*IZØPMV	"	5,661	59	36	14	1
*IZ3TFL	"	5,512	37	15	16	21
*IK2QIN	"	5,253	55	30	14	7
*I2WIJ	"	4,186	36	14	11	21
*IW1RIU	"	3,588	32	21	19	6
*IZ2QGF	"	3,120	38	21	12	7
*IW3IOD	"	2,457	27	22	16	1
*IWØFEK	"	1,508	25	20	9	0
*IK2AOO	"	1,421	20	13	9	7
*IZ8GBT	"	1,334	16	9	12	8
*IZ2CSX	"	1,316	20	16	11	1
*IK7PTX	"	1,196	20	17	9	0
*IZ3GNG	"	143	5	5	4	2
***IKØPEA**	**28**	**47,730**	**161**	**50**	**26**	**35**
*IØUZF	"	29,230	130	32	19	28
*IK5PVX	"	20,838	104	24	18	27
*IWØRFB	"	5,754	49	16	14	12
*IZØGYP	"	4,633	40	14	10	17
*IØLTX	"	2,528	33	14	14	4
*IK8GYQ	"	1,280	28	11	9	0
***I4UUL**	**21**	**20,250**	**103**	**35**	**15**	**25**
*IV3NVN	"	80	5	4	4	0
***IC8TEM**	**14**	**335,100**	**1013**	**82**	**26**	**42**
*IK5AMB	"	318,087	994	85	30	38
*IZ2JPN	"	85,684	305	72	26	26
*I3PXN	"	57,150	339	56	18	16
*IN3OWY/I2	"	48,024	278	54	18	15
*IN3XWE	"	39,824	251	53	14	9
*IW2HUS	"	37,825	201	55	18	12
*I2BPP	"	12,540	99	38	12	10
*IZ2JNN	"	8,862	117	33	9	0
*IZ2QKG	"	6,090	89	27	7	1
*IK4XQT	"	144	9	5	3	0
***IW4EGX**	**7**	**64,092**	**309**	**56**	**15**	**27**
*IK2SBB	"	19,074	149	44	11	11

Kaliningrad

***RA2FF**	**A**	**214,591**	**439**	**106**	**48**	**67**
*UA2CZ	"	56,430	185	68	40	27
*UA2FX	"	11,520	72	18	16	30
***UA2FFW**	**28**	**61,800**	**220**	**43**	**25**	**35**
***RA2FB**	**21**	**36,036**	**171**	**47**	**15**	**22**
***UA2FL**	**3.5**	**41,361**	**407**	**40**	**10**	**1**

Latvia

YL2CZ	**A**	**401,450**	**499**	**211**	**73**	**66**
YL5T	"	282,808	481	110	53	69
						(OP: YL3DQ)
YL2IP	"	114,381	296	117	49	13
YL9T	**3.5**	**2,328**	**47**	**19**	**5**	**0**
						(OP: YL2TW)
***YL2QV**	**A**	**179,361**	**321**	**124**	**54**	**41**
*YL3AID	"	97,272	279	90	37	41
***YL3CU**	**7**	**141,105**	**592**	**69**	**18**	**28**

Lithuania

LY5E	**A**	**6,319,620**	**3575**	**382**	**132**	**191**
						(OP: LY2IJ)
***LY2BVB**	**A**	**195,487**	**354**	**134**	**55**	**44**
*LY2FN	"	57,754	197	82	39	13
*LY4K	"	26,000	119	69	24	7
*LY2TS	"	9,625	77	34	15	6
*LY2WN	"	3,150	49	26	7	2

Luxembourg

LX4A	**21**	**231,553**	**677**	**60**	**23**	**50**
***LX1DUC**	**A**	**40,051**	**156**	**69**	**35**	**17**

Macedonia

Z32XU	**28**	**4,641**	**50**	**17**	**13**	**9**
Z35T	**21**	**592,200**	**1298**	**97**	**34**	**57**
Z36W	**7**	**249,948**	**850**	**68**	**22**	**41**
***Z33A**	**A**	**270,396**	**665**	**143**	**47**	**13**
***Z36N**	**28**	**87,630**	**276**	**57**	**25**	**33**

Malta

***9H3IP**	**21**	**171,457**	**676**	**67**	**24**	**30**
						(OP: HA3JB)

Moldova

ER4A	**A**	**5,026,543**	**3358**	**347**	**121**	**179**
						(OP: UT5UDX)
***ER3AU**	**A**	**708,482**	**893**	**223**	**75**	**60**
*ERØFEO	"	519,370	695	219	73	42
						(OP: UR5FEO)
*ER3ZZ	"	176,250	322	139	60	36
*ER5DX	"	143,010	269	162	65	0
*ER6A	"	122,342	353	96	45	25
						(OP: ER1LW)
***ER1OO**	**28**	**2,975**	**31**	**17**	**13**	**5**

Netherlands

PA7LV	**A**	**2,250,925**	**1819**	**246**	**89**	**168**
PA3GCV	"	496,908	625	148	69	104
PA1TX	"	350,244	543	149	60	67
PAØWRS	"	337,932	460	153	63	82
PAØBWL	"	197,132	353	88	52	81
PAØLOU	"	178,340	310	126	67	48
PA5TT	"	130,187	257	112	54	45
PC2C	"	31,376	144	78	28	0
PA3GVI	"	24,346	122	56	20	18
PA2ALF	"	20,254	105	48	28	6
PA3BWK	"	13,192	99	49	15	4
PA1CW	"	11,160	103	43	15	2
PC3H	"	10,200	93	40	18	2
PI4DX	**28**	**384,945**	**928**	**78**	**32**	**55**
						(OP: PD1DX)
PA3EVY	**21**	**290,699**	**777**	**67**	**29**	**53**
***PA3DBS**	**A**	**687,582**	**893**	**213**	**77**	**67**
*PAØO	"	416,650	491	145	75	105
*PG7V	"	415,296	618	162	57	69
*PA3T	"	391,601	574	168	69	64
*PAØABM	"	300,288	481	165	62	49
*PA3ANN	"	284,510	615	161	51	18
*PE2K	"	201,150	396	124	53	48
*PA3ACA	"	179,310	362	118	48	49
*PA1RBZ	"	155,664	398	110	44	30
*PA3CMF	"	121,110	354	113	38	14
*PD3EM	"	120,400	302	102	39	34
*PA/DL1EAL	"	79,040	202	75	38	47
						(OP: DL1EAL)
*PA3ARM	"	77,285	252	89	36	20
*PA8KW	"	57,000	156	79	40	33
*PA2CVD	"	50,600	210	74	25	16
*PA4B	"	48,070	151	47	30	38
*PD2JAM	"	46,920	205	80	29	11
*PD1EJA	"	38,988	163	64	27	17
*PA3GDD	"	30,870	147	60	31	14
*PD5W	"	29,760	143	48	25	23
*PAØFLE	"	27,857	152	62	26	1
*PA5W	"	25,466	124	77	28	2
*PA1VC	"	20,586	103	58	25	11
*PA3GEO	"	17,466	101	56	23	3
*PA5KT	"	13,104	81	36	18	18
*PC5D	"	11,934	73	46	22	10
*PAØVST	"	9,453	55	24	24	21
*PE1MMZ	"	8,778	58	32	18	16
*PF7DKW	"	1,914	33	22	11	0
*PI4TIL	"	36	8	7	5	0
						(OP: PF7DKW)
*PC5F	"	24	2	2	2	0
***PAØMIR**	**28**	**56,784**	**201**	**49**	**23**	**32**
***PDØWR**	**14**	**25,690**	**184**	**52**	**16**	**2**
*PD1KSA	"	24,656	171	50	16	1
*PA4EA	"	2,581	42	20	8	1

Northern Ireland

***MIØSAI**	**A**	**671,488**	**907**	**178**	**64**	**102**
*GI4DOH	"	18,905	100	64	25	6

Norway

LM9L4ØY	**A**	**3,593,400**	**2627**	**313**	**114**	**173**
						(OP: LB8IB)
LA8PDA	"	579,908	826	152	65	81
LA4WKA	"	278,390	412	162	68	57
LA5HPA	"	227,408	432	140	61	32
LA3XTA	"	172,634	348	78	42	89
LA1BFA	"	19,695	87	66	29	6
LA3ANA	"	6,764	90	27	9	2
LA3WAA	**28**	**9,264**	**83**	**24**	**17**	**7**
LA2IJ	**7**	**54,740**	**326**	**56**	**16**	**13**
***LA7HJA**	**A**	**1,183,472**	**1066**	**235**	**93**	**130**
*LA5LJA	"	434,706	588	180	74	64
*LA8AW	"	146,556	299	108	48	51
*LA5TFA	"	91,915	317	109	35	11
*LA7SI	"	69,472	197	121	45	1
*LA3LJA	"	53,040	250	72	21	9
*LA1QDA	"	38,913	154	75	30	14
*LA8OKA	"	35,970	149	72	26	11
*LA9AU	"	25,415	161	57	19	9

Poland

SN7Q	**A**	**4,520,880**	**2850**	**318**	**119**	**207**
SP9LJD	"	1,915,902	1620	227	90	172
SP8NR	"	710,430	688	186	80	132
SP8TDV	"	397,992	538	167	67	75
SP3RBG	"	395,007	462	188	85	80

SN7F	"	382,228	567	177	63	52
						(OP: SP7LFT)
SQ7B	"	247,480	532	157	52	21
SP5NHK	"	219,520	430	151	54	40
SO4R	"	17,082	116	52	22	4
						(OP: SP4JCP)
SP4Z	28	183,122	428	79	33	46
SN3C	21	466,752	963	94	35	58
						(OP: SP3ASN)
SO4M	14	642,497	1409	106	35	52
						(OP: SP4MPG)
***SQ9UM**	A	2,354,208	1972	304	108	136
*SP9NWN	"	696,696	836	212	79	86
*SP8CGU	"	512,314	664	172	66	81
*SO9G	"	495,950	706	194	68	63
						(OP: SP9DTE)
*SP3MGM	"	287,005	444	177	69	59
*SP7QJB	"	262,482	518	156	56	34
*SP7AWG	"	235,368	393	137	62	53
*SP3HC	"	210,056	449	146	52	19
*SP9CXN	"	203,762	403	135	49	37
*SN9A	"	180,873	323	119	57	55
						(OP: SP9FQI)
*SP3GAX	"	166,540	356	149	59	12
*SP2MKZ	"	162,806	347	121	50	32
*SP7LIE	"	158,368	301	113	58	53
*SP9AUV	"	143,640	310	117	57	36
*SP6MLX	"	126,266	256	109	50	44
*SP3IC	"	123,079	292	79	40	48
*SP4BPH	"	113,386	296	117	42	19
*SO7B	"	108,488	242	91	46	54
*SP3DOF	"	102,144	304	110	38	20
*SP2UUU	"	93,225	277	111	40	14
*SP6NVK	"	79,086	214	75	38	34
*SN9I	"	77,010	201	94	38	38
						(OP: SP9EMI)
*SP7EBM	"	76,472	220	90	40	28
*SQ9FCH	"	70,500	207	90	38	22
*SP3DSC	"	64,000	226	69	39	20
*SP6BSL	"	63,595	149	81	55	25
*SP7SZW	"	63,570	263	89	31	10
*SP7DBI	"	56,211	240	80	28	15
*SO8O	"	47,762	136	79	43	21
*SP5GDY	"	38,830	131	42	36	32
*SP3SLK	"	35,968	126	59	40	29
*SP9GKJ	"	34,974	105	75	43	16
*SN1T	"	23,936	109	44	25	19
						(OP: SQ1RET)
*SQ7OTA	"	23,920	106	55	30	19
*SP3IOE	"	18,360	76	28	20	37
*SQ3LLR	"	14,400	72	32	25	18
*SP5MNT	"	13,464	81	23	21	24
*SO1D	"	12,738	79	34	20	12
						(OP: SP1JPQ)
*SO9R	"	9,782	58	40	25	8
*SP3UQG	"	7,936	45	32	24	6
*SP9AJM	"	7,308	47	27	19	17
*SP8AJK	"	6,556	57	26	18	0
*SP7EXJ	"	3,975	35	29	21	3
*SP8LXE	"	1,770	49	20	8	2
*SP5APW	"	294	9	4	4	6
***SN1Z**	28	33,475	127	56	25	22
						(OP: SQ1EIX)
*SP5CJQ	"	13,860	92	43	23	0
***SQ9AOR**	21	23,166	128	44	18	16
*SP9RQH	"	832	22	9	7	0
***SP3BGD**	14	4,092	41	17	12	15
***SP3VSE**	7	210,870	791	74	23	38
*SP6IHE	"	155,703	626	72	22	35
*SP3OL	"	12,397	147	40	9	0
***SP6EIY**	3.5	23,896	211	43	10	5
						(OP: SP6EIY/QRP)
*SQ2HNA	"	11,900	187	31	4	0
*SP9CTS	"	8,474	122	32	6	0

Portugal

CR6K	A	5,835,904	3214	367	118	233
						(OP: CT1ILT)
CT1AOZ	28	22,644	108	24	11	39
***CT1FOQ**	A	14,110	73	52	26	5
*CT1BWU	"	5,537	38	12	13	24
***CT1EEK**	28	131,920	432	76	23	37
*CT1FUH	"	21	4	4	3	0
***CT2IRY**	21	110,262	366	76	24	41

Romania

YO3CZW	A	1,577,107	1549	230	83	144
YO3APJ	"	1,134,060	994	237	87	137
YR1C	"	512,582	688	160	71	98
YO5PBF	"	146,064	334	117	54	33
YO2MFC	"	35,845	145	58	33	16
YO2RR	21	162,560	516	68	25	35
***YO8RFS**	A	185,459	366	131	58	38
*YO5BYV	"	140,800	346	129	50	21
*YO4FKO	"	127,328	319	91	44	38
*YO5TP	"	76,254	222	94	48	0
*YO6DBL	"	57,057	204	92	26	15
*YP6Z	"	40,068	134	31	28	49
*YO4AAC	"	39,668	207	67	24	3
*YO2LDU	"	38,913	202	74	28	7
*YR4D	"	16,380	116	46	19	0
*YO2MJI	"	8,869	102	36	13	0
*YO6FPW	"	5,290	60	36	10	0
***YO2IS**	28	71,126	251	53	25	28
*YO4BTB	"	2,400	28	15	11	6
*YO2MIL	"	1,850	31	14	17	6
***YO3JF**	21	382,382	902	98	34	50
***YO5OHY**	14	67,860	360	55	18	17

San Marino

T77NM	14	608,478	1560	92	32	50

Sardinia

ISØHQJ	A	73,253	257	81	37	21
***ISØLFZ**	A	280,130	537	159	57	41

Scotland

GM1BSG	A	543,582	791	174	61	68
MMØAMW	"	234,522	448	72	41	89
GM3MZX	"	134,248	313	126	48	20
GM1F	"	25,651	88	61	39	13
						(OP: GM4FAM)
GM3C	14	155,825	634	68	20	27
						(OP: GMØNBM)
***GM1J**	7	41,500	250	48	14	21
						(OP: MMØBQI)

Serbia

YU1KT	A	166,164	456	127	43	13
YU1CC	"	704	12	12	10	0
YT1FZ	21	42,406	211	50	24	17
YU1NR	14	303,888	972	87	30	39
YU1JW	"	7,268	78	27	11	8
YT8A	7	420,050	1284	80	28	47
***YT3H**	A	65,610	212	62	33	40
*YT2PFR	"	34,545	170	70	25	10
***YT2FA**	14	20,944	195	41	11	4

Sicily

***IW9BCW**	A	177,656	399	146	48	18
*IT9JDH	"	158,976	346	139	49	28
*IT9ESW	"	132,894	314	125	45	37
*IW9FI	"	71,295	239	93	36	18
*IT9JOF	"	17,056	75	35	27	20
*IT9SMU	"	1,961	19	16	15	6
*IT9ACJ	"	1,534	29	19	7	0
***IT9AJP**	28	30,624	138	45	21	21
*IT9DFI	"	6,157	51	23	16	8

Slovak Republic

OM6W	A	871,568	1067	215	77	84
OM7KW	"	352,656	609	115	46	76
OM3TPN	"	327,360	721	161	56	23
OM3IAG	"	204,575	378	123	56	66
OM3PA	"	167,625	325	134	49	42
OM7PY	28	29,684	127	35	21	26
***OM7OM**	A	293,832	549	154	55	43
*OM3R	"	292,297	589	156	52	31
						(OP: OM3CFR)
*OM6RK	"	264,620	684	138	37	27
*OM7AG	"	244,420	499	153	51	38
*OM5NL	"	242,627	363	125	56	72
*OM3TLE	"	123,778	300	123	50	26
*OM5MX	"	47,124	167	70	36	26
*OM2DT	"	27,008	105	72	39	17
*OM4TW	"	18,706	81	51	29	14
*OM7AX	"	18,696	81	27	20	35
*OM7ANO	"	6,630	76	36	12	3
***OM3PR**	28	5,712	49	29	19	0
***OM4O**	14	113,403	532	65	19	19
						(OP: OM3NI)
***OM1ASD**	3.5	2,324	49	24	4	0

Slovenia

S55O	A	2,614,640	2095	305	103	152
S53M	"	533,148	691	133	54	121
						(OP: S51FB)
S55OO	"	83,040	227	99	41	33
S51DX	"	51,562	196	88	37	2
S51DI	"	46,956	179	21	17	53
S52WW	"	13,692	71	52	25	7
S5ØR	21	694,785	1464	102	36	57
S51CK	7	237,084	842	76	22	40
***S57U**	A	1,220,857	1113	235	81	135
*S57YX	"	467,754	673	153	65	83
*S57OWA	"	240,350	477	171	59	0
*S57AM	"	156,864	315	133	47	48
*S5ØB	"	13,590	64	52	28	10
*S53F	"	9,522	61	43	22	4
***S56A**	28	180,222	460	74	29	44
***S57YK**	14	13,750	146	39	11	0
*S56WKC	"	2,025	38	18	7	0

Spain

EA1AKS	A	2,596,556	1964	274	102	187
EA5HAB	"	753,704	1160	202	66	45
EA1EVR	"	658,525	816	205	76	90
EE7H	"	266,814	652	74	29	80
EA3CS	"	58,400	173	84	30	32
EA1EPM	"	36,290	186	70	17	8
EB1DMQ	"	5,252	81	40	12	0
ED5J	28	14,924	138	24	14	14
						(OP: EA5DM)
EA3AGZ	"	14,190	84	32	19	15
EB2AM	21	612,376	1456	76	30	58
EA1AP	14	118,984	575	54	19	34
EA3NT	"	96,444	310	77	28	36
EA5KV	"	3,564	52	20	7	9
EE3E	7	25,564	150	43	16	18
						(OP: EA3ELZ)
***EA1WW**	A	658,619	786	201	68	108
*EE7A	"	349,370	509	181	61	68
*EA2BNU	"	316,652	467	152	58	91
*EA7IQM	"	214,115	536	109	42	78
*EA1VT	"	209,286	390	132	49	50
*EB5CS	"	133,352	257	97	45	69
*EA3FHP	"	127,584	434	89	38	17
*EA1AY	"	126,126	359	125	40	17
*EA1GT	"	111,826	288	112	43	32
						(OP: EA1GT/QRP)
*EF5T	"	94,402	304	95	33	26
						(OP: EA5HRT)
*EA5/DK7TM	"	89,700	297	96	37	23
*EA5FHC	"	85,324	265	125	41	0
*EA3AYQ	"	61,770	216	78	37	27
*EA3DEN	"	50,820	165	76	34	30
*EA7VJ	"	39,100	142	64	29	22
*EA3ANE	"	35,788	193	71	21	0
*EA3DWU	"	31,621	118	35	21	47
*EA7TG	"	19,303	93	33	26	38
*EA7AZA	"	11,109	74	46	23	0
*EA3HBO	"	4,700	41	20	15	15
*EA4BNQ	"	4,536	50	35	19	2
*EA2AVM	"	4,464	47	33	15	0
*EA2KK	"	2,310	30	21	14	0
*EA3KN	"	1,800	21	18	10	2
*EB1GZO	"	1,296	19	9	9	6
***EA7ISH**	28	324,650	863	74	26	51
*EA4AFP	"	64,380	233	64	24	28
*EA5GSW	"	33,750	157	46	23	21
*EA7CWA	"	32,490	147	51	21	18
*EA3GI	"	17,280	102	23	18	23
***ED1A**	21	306,342	821	81	29	52
						(OP: EA1AST)
*EA7HEG	"	153,636	611	62	21	41
*EE7X	"	140,490	526	63	20	43
						(OP: EA7JX)
***EA5ET**	14	217,620	770	76	26	33
*ED5K	"	113,124	419	72	23	37
						(OP: EA5FHK)
*EA5XC	"	94,843	394	63	22	34
*EB3GIH	"	36,818	220	52	14	16

Sweden

SM6BGG	A	1,247,041	1416	233	79	97
SM6NOC	"	1,016,730	1008	188	85	117
SMØBSO	"	539,028	725	182	74	66
SAØBDK	"	233,282	362	142	61	63
SM5BMB	"	101,772	205	114	58	26
SM6AHU	"	83,905	224	110	46	17
SM5EPO	"	78,824	198	85	45	37
SM5ACQ	"	53,064	185	83	34	15
SA1A	"	13,916	84	42	24	5
						(OP: SM1TDE)
SM5QU	7	51,796	258	58	16	18
***SM5CIL**	A	905,806	885	233	84	101
						(OP: SM7CIL)
*SM5FQQ	"	669,530	844	215	75	65
*SM4DQE	"	384,480	658	182	69	19
*SF3A	"	362,304	556	165	64	59
						(OP: SM3CER)
*SM2BJS	"	217,512	546	157	48	11
*SM5IMO	"	144,612	300	98	54	54
*SK6HD	"	112,530	230	74	46	66
						(OP: SM6FKF)
*SE6C	"	98,820	265	98	43	21
						(OP: SM6CDN)
*SM5IZS	"	35,211	124	69	36	16
*SM5MX	"	25,938	137	73	24	2
*SA6AIN	"	19,044	119	56	28	8
*SM7ATL	"	11,880	79	41	26	5
*SM3AF	"	11,122	112	39	20	8
*SA7AOI	"	1,568	20	9	10	9
*SM7YRN	"	986	26	17	12	0
***SE5S**	28	15,360	98	29	17	14
*SM3DXC	"	10,780	84	25	15	9
***SM2JUR**	21	6,165	65	32	12	1

Switzerland

HB9TOC	A	1,390,815	1255	258	85	122
HB9CAL	"	465,120	635	180	73	87
HB9BTI	"	375,435	551	157	66	86
HB9LF	"	19,184	102	49	25	14
						(OP: HB9EAZ)
***HB9AWS**	A	437,763	588	187	67	83
*HB9SVT	"	269,878	497	161	59	39
*HB9HQX	"	149,818	419	128	36	9
*HB9VID	"	39,910	146	75	37	18
*HB9CSM	"	15,222	126	58	28	0
*HB9ELD	"	12,089	75	57	19	1
*HB9EBM	"	8,820	55	25	15	23

Ukraine

UW1M	A	2,970,973	2253	307	111	159
						(OP: UR5MW)
UW5U	"	2,408,008	1854	314	111	144
						(OP: UY2UA)
UY7MM	"	1,449,624	1544	281	94	81
UV5U	"	820,896	856	228	84	96
						(OP: UX1UA)
UT2IW	"	285,678	471	175	64	30
UR4EI	"	176,880	346	131	45	44
UU4JC	"	171,360	323	114	54	56
UX3IW	"	163,398	274	118	67	56
UX8ZA	"	120,250	308	129	48	8
UT5ECZ	"	78,312	245	103	31	22
UTØRM	"	42,161	115	52	40	41
UR5ZMK	"	41,882	222	52	19	15
UW1I	"	13,725	88	43	16	16
						(OP: UW5IM)
UT1XX	28	102,875	324	63	28	34
UR5FBM	"	57,133	234	68	29	0
UX2X	"	49,900	186	49	24	27
						(OP: UT2XQ)
UY5QZ	"	16,510	111	35	19	11
UU2JG	"	5,049	43	26	20	5
UT4XD	21	95,832	379	75	25	21
UT5UGR	"	94,068	342	51	20	37
US7IS	"	73,008	305	62	23	23
***URØHQ**	A	1,627,140	1552	266	99	105
*UR4U	"	1,228,876	1149	260	95	129
						(OP: UR4UDI)
*US6CQ	"	942,837	1062	241	80	78
*UT5EPP	"	935,116	1227	232	78	57
*UY1HY	"	774,390	852	246	89	80
*UU1K	"	726,657	808	227	85	81
						(OP: UUØJM)
*UVØI	"	694,089	962	234	77	58
						(OP: UR5IFX)
*US5E	"	637,290	798	218	73	74
						(OP: UR7EQ)
*UU9JQ	"	576,079	786	190	67	72
*UT7I	"	552,012	841	213	71	30
*UT3N	"	490,050	882	187	68	15
						(OP: UT3NK)
*UR5ETN	"	459,171	662	197	72	44
*UR5WCQ	"	423,430	575	162	64	96
*UY5TE	"	346,332	596	174	56	36
*UT1IM	"	266,814	513	159	54	30
*UR7MZ	"	241,854	489	146	55	32
*UY1U	"	240,912	414	142	53	57
						(OP: UT5UN)
*UX2MF	"	237,380	395	183	63	40
*US8UA	"	229,862	371	163	63	37
*UX6IB	"	204,960	396	131	51	42
*UT3RS	"	204,512	418	135	59	30
*UR5IHQ	"	201,687	432	148	57	32
*UX7FC	"	181,335	380	147	49	35
*UW2F	"	180,386	415	139	44	19
						(OP: UTØFT)
*UY3MW	"	170,856	421	140	44	5
*UR7CT	"	158,498	320	107	51	36
*UX7FD	"	157,358	381	129	46	27
*UR4MHI	"	128,502	302	129	50	19
*UW1WU	"	124,932	324	107	41	26
*UT5JCE	"	122,562	295	122	49	27
*UV5QR	"	116,424	300	116	45	28
*UR7EC	"	116,046	254	102	50	37
*UR3UT	"	113,928	278	116	48	24
*UR3AC	"	104,490	314	114	39	9
*UT2AA	"	98,091	261	109	43	21
*UX7QV	"	96,320	303	91	43	26
*US1VS	"	95,518	289	108	43	12
*UTØUO	"	75,509	263	120	41	0
*UT1UW	"	72,822	177	75	49	35
*US5UCC	"	60,260	274	92	39	0
*US5ZFT	"	48,361	200	85	34	18
*UY5AA	"	47,905	137	68	43	32
*UR6QS	"	46,096	166	82	31	21
*UR5EIT	"	43,896	174	69	32	17
*US1UX	"	41,750	127	66	40	19
*UR7QM	"	39,794	208	69	25	7
*UX6IR	"	39,390	121	68	38	24
*US5CAO	"	37,926	120	86	43	0
*UX4FC	"	25,410	160	45	17	15
*UR8EQ	"	22,264	118	59	27	2
*UY5ME	"	20,480	122	61	19	0
*UR5LAK	"	17,400	92	54	27	6
*UR4FA	"	16,600	143	70	28	2
*UU9JCB	"	15,652	127	61	24	1
*UT7MR	"	9,660	78	53	15	1
*UU3JU	"	6,077	59	32	16	11
*UYØCA	"	2,829	24	18	16	7
***UT2IV**	28	48,918	239	53	26	14
*UR2VA	"	43,068	157	50	28	19
*UT7E	"	27,208	155	41	24	11
						(OP: UV5EOZ)
*UT8EU	"	24,560	119	42	23	15
*US5MPO	"	18,972	103	35	19	14
*US7IA	"	11,343	86	32	18	7
*UT5ERP	"	10,010	80	27	16	12
***UZ7HO**	21	377,739	933	91	32	48
***UR8QR**	14	72,265	341	67	21	9
*UZØU	"	59,892	342	49	20	23
						(OP: UY5ZZ)
*UT7Y	"	30,310	248	51	14	5
						(OP: USØYW)
*UY5QQ	"	26,082	170	51	14	4
*UR5EQU	"	19,096	156	42	14	0
*UR3LTD	"	2,314	40	19	7	0
***UY2UQ**	7	74,368	456	66	17	0
*UTØNN	"	1,827	32	18	7	4
***UT4EK**	3.5	35,970	302	50	11	5
*UT2HM	"	5,845	102	29	6	0

Wales

***MWØCRI**	21	135,847	449	65	22	44

OCEANIA

Australia

VK3TDX	A	1,823,904	1470	217	93	122
VK7AD	"	184,704	307	100	53	55
VK4IU	"	176,464	376	89	44	31
***VK5NPR/3**	A	268,956	366	129	77	73
						(OP: VK5NPR/3)
*VK3FM	"	213,525	343	103	59	57
*VK4BL	"	56,704	159	78	40	10
***VK4EJ**	28	107,690	351	50	24	36
***VK4FJ**	21	107,642	355	57	23	27

East Malaysia

***9M6YBG**	21	18,734	184	12	11	11

French Polynesia

FO5QB	A	68,766	158	71	50	36

Hawaii

KH7B	A	2,627	27	14	13	10
KH6ZM	28	662,155	1380	80	30	57
KH6MB	21	315,570	697	74	29	54
***KH6GMP**	A	74,750	212	33	32	60
*KH6OO	"	25,542	105	33	33	20

Indonesia

YB1AR	28	252,600	812	76	30	14
YB4IR	"	53,947	259	53	19	1
***YB1ALL**	A	1,029,786	1059	221	87	46
*YBØCOU	"	100,860	227	106	52	6
*YB8EL	"	29,718	157	31	26	21
***YBØAKM**	28	24,747	136	42	22	9
*YB8EXL	"	19,880	98	47	21	3
***YC2LEV**	21	29,600	154	52	22	0

New Zealand

ZM2A	A	82,536	198	69	39	44
ZL4NR	"	150	5	3	4	3
ZL3TE	28	101,146	353	34	23	46
						(OP: W3SE)
***ZL4NX**	A	163,114	296	96	49	46
						(OP: JM1CAX)
*ZL4RUGBY	"	66,625	218	45	31	49
						(OP: ZL4PW)
*ZL3NB	"	43,860	129	58	38	33
***ZL3AB**	28	1,711	25	11	10	8
***ZL3DW**	14	180	8	6	4	2

Northern Mariana Islands

***W6HGF/KHØ**	A	781,275	992	158	63	54
						(OP: W6HGF)

Palau

***T88TW**	A	3,168	50	13	15	4

Philippines

DU1IVT	A	64,703	261	36	35	18
***DV1JM**	A	958,110	1034	187	92	48
*DU3/NØQM	"	108,704	449	42	37	7
***DV1/JO7KMB**	28	59,754	302	46	17	6

SOUTH AMERICA

Argentina

LU1BJW	A	184,093	312	92	56	73
LW9ETQ	"	139,095	318	73	46	46
LU7FTS	"	75,774	194	62	40	44
LU7HN	28	843,817	1760	84	29	56
L4ØE	"	125,763	404	45	18	48
						(OP: LU4DX)
LU5OM	21	27,808	117	37	16	35
***LU7MCJ**	A	73,766	176	76	42	36
*LU1XT	"	24,168	112	61	32	13
*LW5ER	"	7,865	68	22	15	18
***AY8A**	28	209,170	567	59	22	49
						(OP: LU8ADX)
*LQ5H	"	52,245	271	21	16	44
						(OP: LU3HS)
*LW5EE	"	11,972	98	30	11	0
***LU6FHO**	21	19,339	130	46	18	19
***LU5MT**	14	22,176	117	42	19	23
*LU6FT	"	2,340	36	14	12	10

Bolivia

***CP1FF**	A	75,654	208	77	39	46

Brazil

PY2NZ	A	194,805	381	73	38	84
PV8ABC	"	190,564	295	132	57	55
PY1KN	"	35,156	139	45	23	26
PV8RR	"	20,592	99	49	19	10
PY2KP	"	18,915	77	54	29	14
PV8DX	"	330	9	8	7	0
PY2WC	3.5	77	6	4	4	3
***PY2NY**	A	1,137,240	1130	134	70	147
*PY3APY	"	54,234	149	71	37	23
*PV8AZ	"	50,694	174	45	26	48
*PU2WDX	"	9,315	77	30	15	0
*PU1MMZ	"	6,283	55	28	20	13
***PY2EB**	28	422,688	993	71	23	54
*PU5AAD	"	109,763	369	54	17	38
*PT9PA	"	43,430	181	50	22	14
*PY2OC	"	5,640	44	15	14	18
***PR7AR**	14	29,250	142	25	15	38

Chile

CE3FZ	A	11,712	71	26	18	20
***CE2WZ**	A	311,704	603	83	42	63
*CE1D	"	38,704	131	53	35	30

Colombia

***HK6P**	A	313,812	474	114	55	107
*HK1T	"	134,808	294	91	31	42
*HK6RF	"	14,355	75	41	32	14

*HK1R	"	11,356	69	14	17	37
5K3R	**28**	**392,496**	**941**	**67**	**26**	**55**
						(OP: HK3R)
*HK3Q	"	29,920	140	41	18	26

Ecuador

***HC1JQ**	**14**	**203,832**	**483**	**73**	**26**	**50**

Paraguay

***ZP9EH**	**A**	**84,238**	**202**	**70**	**41**	**43**
***ZP5AA**	**28**	**274,770**	**775**	**70**	**25**	**47**
						(OP: ZP5DBC)

Suriname

PZ5RA	**A**	**3,943,507**	**2469**	**258**	**92**	**201**

Uruguay

***CX9AU**	**A**	**119,922**	**268**	**66**	**40**	**52**
***CX3CCC**	**21**	**115,080**	**387**	**48**	**25**	**47**

Venezuela

4M5L	**28**	**277,836**	**704**	**64**	**22**	**51**
						(OP: YV5LI)
YW5T	**21**	**744,315**	**1571**	**80**	**29**	**56**
						(OP: YV5JBI)
YW4D	**7**	**471,314**	**1038**	**77**	**26**	**55**
						(OP: YV1DIG)
***YV5AAX**	**21**	**197,775**	**505**	**68**	**20**	**47**
*YV4BCD	"	47,040	202	39	18	39
***4M1F**	**7**	**34,800**	**165**	**44**	**13**	**23**

ASSISTED

NORTH AMERICA

United States

KI1G	**A**	**6,416,744**	**3382**	**403**	**133**	**240**
KA2KON/1	"	1,731,026	1413	289	90	127
W1MAT	"	1,047,960	1019	219	74	117
N1SNB	"	759,445	1056	167	53	115
N4BAA/1	"	281,196	474	142	50	27
AE1T	"	68,558	180	90	38	38
K3IU/1	"	43,442	158	65	28	14
***KS1J**	**A**	**1,224,546**	**1134**	**246**	**71**	**92**
*NF1O	"	422,253	546	187	67	97
*N1QD	"	261,227	444	130	58	51
*WA1N	"	239,856	446	132	42	89
*KV1J	"	198,596	345	130	53	79
*AD1L	"	189,475	284	167	63	35
*NE1F	"	188,838	311	136	61	72
*W1EL	"	125,866	239	134	49	23
*KB1IKD	"	83,694	216	90	37	47
*AA1AR	"	75,648	162	100	56	41
*N1MGO	"	70,228	222	73	38	70
***W1FA**	**28**	**7,956**	**64**	**31**	**10**	**10**
W2YC	**A**	**1,508,816**	**1216**	**276**	**96**	**149**
NO2T	"	912,275	1042	209	70	122
AB2ZY	"	840,476	1023	187	65	112
N1IBM/2	"	529,980	615	196	77	90
K2MK	"	356,764	478	174	63	79
K2CYE	"	349,250	585	141	51	62
W2LK	"	151,440	242	142	69	29
WW2DX	"	102,410	215	115	44	31
K2NV	"	57,834	251	54	18	9
N2NGW	"	24,856	102	62	27	15
***KA2D**	**A**	**1,232,415**	**1116**	**244**	**77**	**84**
*N2FF	"	1,121,523	1029	253	81	113
*N2JDQ	"	382,950	630	158	58	117
*K2BB	"	337,832	437	176	73	100
*K2SI	"	261,944	419	142	48	84
*NA2M	"	203,728	423	109	42	87
*K2ONP	"	131,112	230	151	52	13
*KS2G	"	60,214	149	96	42	23
*K2PAL	"	21,240	91	54	27	9
AA3B	**A**	**4,924,996**	**3161**	**330**	**102**	**190**
W3FV	"	3,133,682	2250	292	101	164
K3WW	"	1,008,729	1136	202	73	72
NE3H	"	973,140	1087	214	78	128
K3MD	"	928,512	1058	215	80	108
W3MF	"	802,200	772	241	82	97
K2PLF/3	"	620,544	648	230	79	95
N3QW	"	586,530	745	176	58	81
N3YEA	"	540,466	666	179	74	109
WC3O	"	272,529	457	154	50	79
NB3R	"	192,386	409	115	39	60
N1SZ/3	"	59,817	188	65	31	57
***W4EE/3**	**A**	**289,248**	**453**	**141**	**55**	**80**
*W3KB	"	237,538	358	158	58	50
*N3CHX	"	229,472	404	135	55	94
*AB3GY	"	79,992	207	97	44	57
*N1MD/3	"	33,147	120	61	29	37
***W3/NH7C**	**28**	**9,028**	**75**	**35**	**15**	**11**
						(OP: NH7C)
K4GMH	**A**	**2,311,510**	**1976**	**247**	**81**	**157**
W4UH	"	2,220,955	2035	292	97	216
W4DXX	"	2,210,816	1808	275	94	143
N4WW	"	1,976,953	1479	298	103	182
W4TTY	"	1,261,755	1114	273	88	134
K5EK/4	"	969,696	1123	190	61	85
K1KO/4	"	569,024	864	150	58	64
WB4MSG	"	546,742	746	172	63	108
N4LV	"	345,261	518	153	58	76
W4JAM	"	339,724	443	195	68	45
W1AJT/4	"	262,260	410	143	62	105
W4XMT	"	167,310	380	111	51	72
W4BCG	"	131,775	301	105	56	90
WA4ZXV	"	60,716	178	74	47	51
N4DWK	"	43,146	118	79	45	17
W4CWA	"	35,343	135	55	31	33
WD4LBR	"	23,400	112	51	16	5
KB4FB	"	5,824	42	33	15	4
W4GHD	"	4,134	49	15	17	21
W3GQ/4	"	304	10	10	7	2
WJ2D/4	**21**	**429,444**	**1033**	**89**	**32**	**37**
K4WW	"	163,072	519	71	20	21
KC4HW	**14**	**107,725**	**456**	**63**	**26**	**50**
***N2QT/4**	**A**	**2,640,352**	**1975**	**299**	**97**	**181**
*K4MM	"	738,888	795	219	80	109
*K4FPF	"	393,744	501	174	60	78
*W4UAL	"	357,889	584	142	60	85
						(OP: K4CWW)
*K1HTV/4	"	172,425	332	126	64	85
*AA4DD	"	167,079	293	128	55	66
*KB4CP	"	57,920	157	86	47	27
*WA4PGM	"	55,417	158	79	37	35
*ND4SC	"	25,863	150	39	28	44
						(OP: N3ND)
*N4NM	"	4,940	42	29	20	16
***NF3C/4**	**28**	**14,229**	**112**	**35**	**12**	**4**
						(OP: W4VIC)
***N4RA**	**21**	**16,974**	**92**	**43**	**19**	**7**
WA5ZUP	**A**	**1,833,927**	**1946**	**222**	**84**	**203**
KN5O	"	1,436,864	1533	204	76	136
W5KI	"	216,284	361	132	62	84
WØVX/5	"	51,198	134	81	48	30
AD5CQ	"	50,250	189	62	37	51
K5HDU	"	30,228	134	51	33	48
KK5OQ	**28**	**62,230**	**311**	**55**	**21**	**22**
***K5WW**	**A**	**222,224**	**413**	**118**	**58**	**128**
*K5DD	"	77,312	229	77	34	40
*NK5G	"	28,912	139	49	22	33
*W4JHC/5	"	5,814	43	30	18	9
N6QQ	**A**	**1,301,966**	**1098**	**283**	**108**	**196**
WE6Z	"	758,898	1040	144	77	178
NG6S	"	670,329	802	180	89	138
						(OP: W4UAT)
W6OQI	"	188,250	389	85	62	103
N6VH	"	157,368	352	82	54	113
N6WIN	"	104,139	249	87	45	71
K6HGF	"	85,974	297	63	32	66
N6AN	"	33,840	139	46	36	62
NN6NN	"	23,760	131	40	30	62
						(OP: W6XK)
K6SRZ	"	20,274	107	35	25	49
W6PK	"	4,720	36	25	21	13
K6TA	**28**	**118,692**	**425**	**61**	**25**	**40**
N6ML	"	114,328	421	61	25	38
						(OP: @K6LRG)
N6RO	"	67,512	330	53	24	39
K6MM	"	56,400	259	46	22	32
***WN6K**	**A**	**599,040**	**769**	**145**	**86**	**159**
*N2NS/6	"	326,109	528	114	69	110
*W6TK	"	270,270	478	111	65	97
*KI6QDH	"	180,048	398	86	58	120
*K6DEX	"	136,095	393	72	46	93
*K3FIV/6	"	122,434	286	76	59	86
*N6EE	"	40,820	134	64	39	27
*N6MSY	"	28,080	153	39	37	54
*K6LE	"	6,840	50	24	26	26
*K6ST	"	76	9	6	8	5
***W6RKC**	**14**	**1,632**	**33**	**7**	**8**	**17**
W7PP	**A**	**998,130**	**1030**	**225**	**88**	**177**
N7NM	"	654,258	866	151	87	193
K7RF	"	533,574	745	155	78	136
K7LV	"	235,456	389	121	67	95
K7EIQ	"	97,020	268	69	43	98
KT7G	"	83,260	224	72	51	58
KY7M	"	71,916	221	76	39	41
WX7P	"	60,140	250	52	35	68
KØIP/7	"	46,018	140	85	39	9
NA2U/7	"	31,824	150	38	29	69
N1KEZ/7	"	4,624	49	22	21	25
K6LL/7	**21**	**461,390**	**1191**	**96**	**34**	**55**
N7AT	"	427,800	1148	97	34	55
						(OP: K8IA)
W7WW	"	250,496	879	70	27	55
***K2PO/7**	**A**	**1,057,588**	**1225**	**179**	**87**	**162**
*W7OM	"	459,298	685	148	73	150
*K7VIT	"	211,120	434	92	63	105
*WB3JFS/7	"	148,934	410	78	52	96
*N1JM/7	"	40,317	161	47	38	66
*KX7L	"	32,332	155	38	35	45
*NQ7R	"	10,902	65	30	25	24
*W7RV	"	8,400	54	30	24	26
KU1T/8	**A**	**1,805,436**	**1623**	**215**	**82**	**141**
K8MM	"	738,304	781	218	79	115
K1LT/8	"	617,812	1118	115	45	58
AA8LL	"	299,782	364	197	73	52
K8ALM	"	4,747	38	32	14	1
WA8RPK	**14**	**3,572**	**56**	**14**	**9**	**24**
K8CPA	**7**	**648**	**23**	**9**	**6**	**12**
***N8RF**	**A**	**542,640**	**661**	**188**	**66**	**86**
*WA8Y	"	54,665	176	83	43	19
***KF6A/8**	**14**	**21,945**	**103**	**50**	**19**	**8**
AI9T	**A**	**3,155,349**	**2326**	**302**	**102**	**187**
W9MU	"	1,772,620	1410	294	102	130
NS9I	"	503,328	759	144	54	96
KT9L	"	466,830	610	168	61	113
WA9IVH	"	450,075	563	196	74	83
N9OK	"	240,660	412	133	55	64
N9AKR	"	193,039	469	100	34	27
AA9RR	"	86,184	182	127	41	3
***KA9O**	**A**	**226,196**	**379**	**167**	**63**	**63**
*K9OR	"	176,850	263	159	65	38
*N9ISN	"	20,564	80	63	39	4
WØLSD	**A**	**2,824,225**	**2160**	**317**	**115**	**221**
NØXR	"	955,710	1143	192	71	147
AE5E/Ø	"	762,777	909	188	77	122
NØBK	"	643,406	678	215	83	91
WØBM	"	640,588	623	252	86	50
KSØAA	"	631,489	961	157	62	154
WBØN	"	472,560	605	182	70	106
K7SCX/Ø	"	412,132	567	164	72	123
KØPC	"	403,144	650	144	53	116
KØAP	"	390,345	619	132	58	75
KØYR	"	331,179	513	146	63	94
KØBX	"	203,404	342	147	59	35
KEØL	"	109,848	286	85	40	74
KØXB	"	104,718	212	117	47	22
WØHBH	"	36,449	112	84	38	5
K4IU/Ø	"	15,105	89	40	27	28
KØKT	"	6,600	50	30	16	4
KØPK	**28**	**126,429**	**440**	**72**	**26**	**13**
***KØKX**	**A**	**1,452,550**	**1178**	**268**	**96**	**111**
*AD1C/Ø	"	671,105	862	182	72	141
*KCØBMF	"	670,344	781	198	75	135
*WBØSOK	"	321,356	432	177	69	76
*ACØPP	"	240,298	416	132	51	91
*KØJA	"	109,604	241	107	45	60
*KØJE	"	102,718	224	111	54	38
*NØAS	"	95,380	213	103	51	36
*ACØW	"	82,012	189	92	57	53
*NØEKM	"	63,358	165	96	46	16
*NØHR	"	60,345	149	99	39	11
*WØRAA	"	53,949	291	44	30	73
*AAØAW	"	37,440	156	61	32	37
*NØHJZ	"	25,511	127	47	24	26
*KCØNFB	"	8,875	52	33	24	14
*KDØCVO	"	4,720	66	23	23	34
*KNØR	"	2,268	27	19	9	0
*WØLM	"	1,512	21	14	12	10
***KCØDEB**	**28**	**58,432**	**238**	**61**	**21**	**6**
*KFØIQ	"	9,261	66	33	14	2

Alaska

AL9A	**A**	**937,629**	**1079**	**138**	**78**	**147**
***KL2R**	**A**	**103,740**	**247**	**77**	**45**	**68**
						(OP: N1TX)

Canada

VE1OP	**A**	**579,425**	**718**	**166**	**63**	**72**
***VE1BVD**	**A**	**575**	**18**	**10**	**10**	**5**
VE2FXL	**A**	**944,628**	**1051**	**176**	**61**	**116**
VE2FK	"	760,368	866	177	58	101
VA2EW	"	167,800	354	104	53	43
VA3DX	**A**	**100,636**	**226**	**93**	**45**	**43**
VE3SS	"	43,736	119	77	39	26
VE3EJ	"	9,750	49	36	29	13
VE5MX	**A**	**1,541,280**	**1289**	**230**	**97**	**180**
VE6WQ	**21**	**628,176**	**1328**	**97**	**34**	**53**
VE7TG	**A**	**242,896**	**355**	**121**	**68**	**115**
VE7CF	"	158,208	347	64	47	95

Martinique

FM5AN	**28**	**8,211**	**67**	**21**	**11**	**19**

Mexico

XE2K	**A**	**2,615,754**	**2025**	**232**	**105**	**210**
XE1EE	**28**	**252,555**	**714**	**74**	**26**	**49**
XE2X	**7**	**12,127**	**85**	**30**	**11**	**26**
XE2WK	"	2,046	30	10	7	16
***XE1GZU**	**A**	**51,910**	**141**	**68**	**44**	**33**

U.S. Virgin Islands

***KP2DX**	**A**	**238,500**	**423**	**99**	**46**	**120**
						(OP: KP2BH)

AFRICA

Canary Islands

***EC8AFM**	**A**	**372,565**	**493**	**157**	**54**	**66**
*EA8AJO	"	88,480	227	98	31	11

Madeira Islands

CT3BD	**A**	**311,170**	**493**	**148**	**59**	**83**
CT3EN	**21**	**984,987**	**1964**	**101**	**33**	**57**
CT3KY	**14**	**682,689**	**1356**	**97**	**30**	**50**

South Africa

ZS1LS	**A**	**32,207**	**106**	**70**	**30**	**7**

ASIA

Asiatic Russia

RG9A	**A**	**6,174,350**	**3541**	**416**	**127**	**107**
UI9I	"	2,632,925	2239	282	102	53
						(OP: RM9I)
UA9BS	"	903,921	944	259	93	15
RG8K	"	568,484	682	202	76	38
RM9RZ	"	565,956	704	211	81	24
RA9AU	"	414,960	640	172	52	16
RK9AX	**7**	**35,145**	**226**	**44**	**10**	**1**
***RW9C**	**A**	**1,355,634**	**1209**	**275**	**97**	**34**
*RA9AC	"	28,483	122	52	29	10
***UA9AFS**	**21**	**186,480**	**629**	**81**	**26**	**5**
UCØA	**A**	**1,271,930**	**1412**	**237**	**81**	**23**
UAØAGI	"	896,580	983	216	84	58
RAØFF	"	707,544	726	176	97	99
UAØQBR	"	294,372	503	137	54	31
RAØAM	**21**	**110,352**	**419**	**69**	**26**	**19**
RXØAT	**3.5**	**17,150**	**139**	**37**	**12**	**0**
***RAØANO**	**A**	**20,874**	**78**	**60**	**35**	**3**

Asiatic Turkey

***TC2T**	**A**	**143,846**	**383**	**107**	**35**	**0**
						(OP: TA2MW)
***TA7AO**	**28**	**2**	**1**	**1**	**1**	**0**

China

BD5DML	**21**	**46,008**	**232**	**48**	**21**	**12**
***BH3OTC**	**A**	**122,796**	**308**	**106**	**47**	**9**
***BD7IS**	**28**	**181,901**	**705**	**70**	**24**	**7**
*BD1BYV	"	60,792	310	47	19	2
***BD1QXU**	**21**	**123,066**	**454**	**59**	**25**	**22**
*BA1GM	"	6,000	85	21	9	0

Hong Kong

VR2XLN	**A**	**505,425**	**663**	**179**	**80**	**34**

India

***VU2UR**	**28**	**12,296**	**77**	**38**	**16**	**4**

Japan

JM1XCW	**A**	**2,335,464**	**1769**	**231**	**104**	**154**
JQ1BVI	"	1,563,088	1433	221	94	107
JA1WSK	"	488,523	580	159	73	69
JA1IZZ	"	191,316	327	104	60	50
JA1XUY	"	106,150	216	107	62	24
JL1BYZ	"	96,096	224	65	38	53
JE1HRC	"	58,499	164	85	42	10
JI1ALP	"	37,800	127	64	28	13
7L2OHM	"	16,245	99	38	14	5
JO1WKO	**28**	**262,800**	**644**	**73**	**31**	**42**
JA1BPA	**21**	**384,680**	**844**	**82**	**29**	**52**
***JA1MZM**	**A**	**115,024**	**266**	**77**	**44**	**37**
*7L4IOU	"	85,345	210	80	53	36
*JA1BWA	"	75,075	200	81	51	33
*JR4PMX/1	"	33,744	103	50	34	30
*JH1RRP	"	10,258	75	37	9	0
*JK1GKG	"	3,572	36	26	18	3
***JM1NKT**	**21**	**55,414**	**204**	**55**	**22**	**26**
***JS1IFK**	**14**	**9,984**	**87**	**33**	**14**	**1**
JF2IWL	**A**	**75,348**	**230**	**64**	**40**	**34**
JA2IVK	"	52,272	168	69	30	9
JH2FXK	"	43,407	135	59	29	29
***JA2AXB**	**A**	**172,848**	**307**	**102**	**56**	**50**
*JA2OVP	"	41,958	133	52	39	35
*JA2KCY	"	31,473	107	75	42	0
*JA2VHG	"	16,416	80	51	23	2
JN3SAC	**A**	**403,100**	**500**	**168**	**76**	**46**
JM3UGA	"	262,665	536	106	48	41
JA3EY	"	100,580	218	93	57	38
JS3CTQ	"	83,072	253	70	27	21
***JG3FEA**	**A**	**568,160**	**599**	**180**	**83**	**72**
*JA3PYC	"	49,420	131	78	44	18
JH4UTP	**A**	**1,213,025**	**1316**	**218**	**96**	**87**
JO4CFV	"	243,719	391	131	80	48
JH4RUF	"	58,125	138	74	54	27
JA4OPW	"	46,690	126	69	56	20
JM4WUZ	**28**	**23,450**	**169**	**37**	**13**	**0**
***JR4DHK**	**A**	**53,067**	**166**	**60**	**48**	**25**
***JR5XPG**	**A**	**247,299**	**429**	**108**	**54**	**59**
JA6ZPR	**21**	**279,152**	**700**	**72**	**27**	**47**
						(OP: JH6JSR)
***JA6DIJ**	**A**	**577,806**	**658**	**182**	**80**	**56**
*JA6GXP	"	90,630	215	84	41	34
JA7ZP	**A**	**180,000**	**295**	**129**	**71**	**40**
JA7FYU	"	299	9	8	5	0
JA7KY	"	54	5	2	3	4
JA8JMG	**A**	**626,040**	**767**	**155**	**73**	**68**
***JA8LRG**	**A**	**207,505**	**317**	**127**	**66**	**42**
*JL8MBF	"	25,920	111	56	29	5
JR9GMS	**A**	**66,265**	**159**	**69**	**35**	**41**
JAØFVU	**A**	**167,139**	**395**	**67**	**32**	**48**

Kazakhstan

UN4PG	**21**	**293,504**	**893**	**88**	**31**	**9**
***UN9LU**	**28**	**38,280**	**230**	**45**	**15**	**0**

Mongolia

***JT1BE**	**14**	**11,440**	**117**	**31**	**13**	**0**

Singapore

9V1YC	**A**	**27,560**	**106**	**56**	**44**	**6**

South Korea

DS5DNO	**A**	**70,912**	**222**	**63**	**43**	**22**
HL1/WX8C	**14**	**11,139**	**92**	**32**	**15**	**0**

EUROPE

Austria

OE6MDF	**A**	**1,815,187**	**1492**	**290**	**97**	**130**
OE6MMF	"	697,774	857	238	74	82
***OE2E**	**A**	**1,274,680**	**1154**	**216**	**81**	**143**
						(OP: OE2GEN)

Belgium

OQ5M	**28**	**37,401**	**152**	**35**	**23**	**33**
						(OP: ON5ZO)
***OP4A**	**A**	**161,040**	**387**	**85**	**40**	**51**
*ON4KGL	"	106,023	253	97	45	35

Bosnia-Herzegovina

***E74AA**	**14**	**175,260**	**647**	**72**	**25**	**30**
***E72MM**	**3.5**	**6,660**	**98**	**31**	**5**	**0**

Bulgaria

LZ8E	**A**	**5,455,800**	**3297**	**382**	**133**	**185**
						(OP: LZ2BE)
LZ9A	**28**	**297,440**	**669**	**87**	**33**	**49**
						(OP: LZ2HM)
LZ1NG	"	49,858	212	45	26	26
***LZ9R**	**A**	**1,853,556**	**1681**	**292**	**93**	**113**
						(OP: LZ3YY)
*LZ2STO	"	456,088	495	222	79	75
*LZ1QV	"	132,076	276	131	54	27
***LZ2ZG**	**28**	**133,920**	**373**	**70**	**30**	**35**
***LZ1MC**	**14**	**220**	**9**	**7**	**4**	**0**

Crete

***J49XB**	**A**	**690,368**	**997**	**205**	**65**	**52**
						(OP: DJ9XB)
*SVØXBZ/9	"	101,871	333	99	33	15
						(OP: YL2VW)

Croatia

9A7V	**A**	**602,723**	**688**	**168**	**75**	**106**
9A6JOY	"	67,080	234	85	25	20
9A7R	**28**	**326,970**	**720**	**89**	**33**	**51**
9A6B	"	295,812	668	81	33	48
						(OP: 9A2EU)
***9A3XV**	**A**	**11,826**	**80**	**46**	**21**	**6**

Czech Republic

OK2PF	**A**	**348,192**	**632**	**180**	**54**	**45**
OK1FJD	"	92,258	223	62	42	59
OK1XC	**21**	**94,050**	**334**	**55**	**23**	**36**
***OK7Y**	**A**	**530,593**	**699**	**187**	**71**	**73**
						(OP: OK1FDY)
*OK2PMS	"	157,528	314	109	48	46
***OK3C**	**21**	**300,004**	**651**	**97**	**33**	**49**
						(OP: OK2ZC)

Denmark

OZ4VW	**A**	**962,535**	**907**	**244**	**95**	**106**
***OZ/DL1OJ**	**A**	**20,070**	**119**	**57**	**25**	**8**

England

M7T	**A**	**2,431,337**	**1959**	**314**	**106**	**149**
						(OP: G3YYD)
M1AQV	"	329,175	435	171	67	77
G6T	"	72,738	200	74	40	48
						(OP: G4MKP)
***GØUGO**	**A**	**281,244**	**464**	**166**	**59**	**51**
*G6OKU	"	19,764	119	53	21	7
***MØVKG**	**7**	**70**	**8**	**5**	**2**	**0**

European Russia

UA5F	**A**	**3,971,645**	**2583**	**389**	**128**	**166**
RA6XV	"	811,422	1127	214	77	75
RU6L	"	85,800	187	46	35	84
RN1ON	"	77,792	179	114	50	12
RU6YJ	"	25,252	256	48	9	2
RU6M	"	3,162	32	22	19	10
UA4CC	**28**	**73,746**	**317**	**62**	**26**	**14**
RZ3EC	"	20,066	104	41	26	12
RM5P	"	19,809	126	37	24	10
R7LV	**21**	**734,760**	**1530**	**107**	**36**	**52**
UA3SAQ	"	462,668	1033	106	33	49
RW4WZ	**14**	**282,534**	**920**	**93**	**31**	**23**
RW4PL	**7**	**291,096**	**881**	**90**	**30**	**36**
***R2AT**	**A**	**645,123**	**832**	**215**	**78**	**66**
*R2LA	"	204,820	415	144	57	19
*RA3VX	"	67,782	211	112	37	9
*RK4YJ	"	58,212	190	97	42	8
*UA4WLI	"	47,994	201	86	27	1
*RA3ICK	"	46,991	146	82	40	15
*RK3RX	"	42,240	197	76	27	7
*R3RR	"	41,412	153	71	32	13
*RK3BA	"	10,500	71	38	23	9
***R6YY**	**28**	**109,668**	**436**	**64**	**26**	**24**
***R2SA**	**7**	**68,040**	**386**	**61**	**17**	**12**

European Turkey

TA1DX	**A**	**312,309**	**543**	**164**	**59**	**46**

Finland

OH1F	**A**	**1,919,304**	**1459**	**312**	**113**	**124**
						(OP: OH1NOA)
OH8KVA	"	171,585	407	129	52	24
OH2BF	"	4,876	32	30	22	1
OH7MN	**7**	**93,330**	**534**	**64**	**18**	**8**
***OH2LNH**	**A**	**237,669**	**494**	**155**	**55**	**17**

*OH8KA	*	191,274	431	148	52	13
***OH8FKU**	**28**	**9,858**	**73**	**26**	**17**	**10**
France						
F4ERS	**A**	**2,253,682**	**1856**	**263**	**98**	**177**
F4EIZ	**28**	**2,814**	**23**	**22**	**19**	**1**
						(OP: F4EIZ/P)
TM6M	**21**	**908,205**	**1848**	**99**	**35**	**57**
						(OP: F4DXW)
***F4GDI**	**A**	**567,464**	**684**	**189**	**78**	**89**
*F8CRS	*	422,646	496	177	65	105
***F4FDA**	**28**	**178,205**	**474**	**73**	**28**	**44**
***F4BKV**	**14**	**528**	**15**	**9**	**6**	**1**
Germany						
DD2ML	**A**	**1,972,860**	**1526**	**261**	**100**	**163**
DD1JN	*	1,844,376	1427	292	97	147
DK3GI	*	1,737,736	1300	279	100	160
DJ8OG	*	1,657,656	1229	285	110	157
DL1QW	*	1,649,010	1168	312	106	152
DJ3NG	*	1,080,930	1116	200	77	134
DHØGHU	*	1,056,428	1014	235	81	120
DL8OH	*	876,525	1010	199	86	118
DL7VEE	*	838,128	752	216	97	143
DL2IAN	*	729,495	870	212	73	92
DL6DCD	*	588,665	656	216	79	90
DL8SCG	*	554,048	653	164	85	103
DJ9RR	*	489,223	647	166	65	98
DL1NEO	*	483,075	629	195	65	79
DJ8EW	*	478,423	589	191	67	83
DL9NCR	*	475,310	716	162	66	70
DL5YM	*	332,028	526	151	64	61
DK1KC	*	318,164	432	167	66	75
DF2LH	*	288,544	429	141	64	79
DK5MB	*	258,635	363	165	67	67
DL6NCY	*	220,848	367	136	59	63
DL9NDV	*	183,580	299	157	59	52
DM2GG	*	166,659	341	120	52	47
DD8JJ	*	128,553	248	97	57	65
DL2RTL	*	102,249	207	92	47	50
DF2QZ	*	88,536	213	105	45	36
DJØTP	*	71,340	170	72	38	54
DL5XL	*	56,536	150	81	43	24
DJ9MH	*	50,750	133	56	41	48
DL5KUT	*	47,495	168	52	21	42
DJ1AA	*	45,288	149	79	31	26
DKØAE	*	44,744	148	79	31	26
						(OP: DJ1AA)
DM5DX	*	36,207	99	75	56	18
DL8AWK	*	28,120	159	69	26	0
DL8YR	*	11,020	60	44	30	2
DL9HK	*	8,816	53	31	27	0
DL1LH	**28**	**251,262**	**574**	**83**	**31**	**48**
DM3VL	*	8,432	51	30	18	14
DJ3IW	**21**	**600,600**	**1208**	**103**	**34**	**58**
DF9ZP	*	464,894	963	101	36	54
DK4WA	**14**	**53,286**	**207**	**57**	**25**	**25**
DO4DXA	**3.5**	**9,071**	**108**	**34**	**6**	**7**
***DL9YAJ**	**A**	**1,502,720**	**1258**	**276**	**106**	**130**
*DL3ANK	*	542,430	773	171	62	82
*DJ3AA	*	347,139	459	159	71	69
*DL5ARM	*	346,104	591	164	51	61
*DK4VY	*	254,610	413	148	60	62
*DF7JC	*	226,941	379	146	60	47
*DL6MHW	*	188,034	371	99	51	81
*DJ2YA	*	138,020	215	151	58	59
*DJ7JC	*	129,554	285	125	50	36
*DK3WW	*	124,944	230	120	55	53
*DL7URH	*	123,310	274	95	47	48
*DL8ZVG	*	114,624	297	119	47	26
*DF1HF	*	110,124	255	115	51	41
*DL9MKN	*	108,086	267	119	46	22
*DL4KW	*	93,150	223	82	48	32
*DJ3JD	*	76,212	206	71	46	29
*DJ2MX	*	56,434	149	49	32	58
*DF8UO	*	48,246	135	50	36	43
*DL3ZH	*	32,526	106	57	37	23
*DL6UAA	*	29,972	89	46	36	36
*DM2RM	*	26,136	103	40	27	32
*DL5WS	*	18,177	113	52	23	8
*DL1AQN	*	9,600	100	36	12	2
*DF2AJ	*	1,872	24	15	15	6
***DJ8ES**	**28**	**72,705**	**241**	**58**	**24**	**29**
*DJ2XC	*	16,510	94	33	19	13
***DO5WW**	**21**	**100,368**	**299**	**64**	**26**	**46**
***DM6DX**	**7**	**87,163**	**415**	**54**	**14**	**33**
Greece						
SV8RX	**A**	**202,477**	**388**	**140**	**62**	**31**
***SV1HKD**	**A**	**13,608**	**76**	**49**	**26**	**6**
*SV1DPP	*	9,856	49	33	27	17
Hungary						
HA8IE	**A**	**1,971,200**	**1492**	**309**	**116**	**135**
HA3HZ	*	480,675	658	199	71	55
HAØMS	*	338,289	591	162	62	43
HG3FMZ	**28**	**65,712**	**246**	**46**	**31**	**34**
HA3LI	**3.5**	**93,832**	**641**	**54**	**11**	**9**
***HAØGK**	**A**	**233,618**	**405**	**163**	**61**	**35**
*HA5PT	*	22,194	101	45	29	7
***HG8C**	**28**	**103,090**	**314**	**60**	**27**	**35**
						(OP: HA8EK)
*HA8BE	*	73,800	219	59	26	38
Iceland						
TF3AO	**A**	**689,274**	**1083**	**164**	**55**	**79**
TF3IG	*	41,402	190	77	31	19
***TF3PPN**	**A**	**676,506**	**1187**	**145**	**47**	**82**
Ireland						
EI2GLB	**A**	**1,261,620**	**1165**	**206**	**75**	**149**
EI7KD	*	266,288	874	69	21	46
***EI9ES**	**A**	**47,422**	**145**	**62**	**33**	**36**
Italy						
IZ6TSA	**A**	**2,382,660**	**1632**	**321**	**115**	**174**
IV3JCC	*	1,687,920	1238	273	109	159
IK2SND	*	989,945	946	210	96	133
IK8UND	*	713,658	829	188	75	100
IK3ORD	*	464,780	554	179	82	79
I3VJW	*	372,520	510	116	65	87
IK2SGF	*	363,346	576	103	52	123
IZ1JLN	*	294,920	462	170	67	55
IK5FKF	*	269,360	474	154	63	43
IK2GZU	*	41,396	135	63	41	27
I7CSB	*	10,494	62	20	18	28
IW1RAX	*	10,395	57	43	26	8
IK1TAZ	*	10,206	53	47	34	0
IWØGYC	*	7,344	57	30	24	0
IK4ZHH	*	4,440	51	21	16	0
IZ8DVD	**28**	**31,929**	**153**	**45**	**23**	**19**
IKØTUM	*	1,650	25	2	4	16
IV3TMV	**21**	**580,970**	**1132**	**112**	**37**	**56**
IK8YFU	*	14,204	92	36	14	17
IK4MGP	**14**	**856,753**	**1783**	**107**	**34**	**56**
II4LXV	**7**	**458,040**	**1221**	**86**	**28**	**51**
						(OP: I4IKW)
IZØKBR	**3.5**	**116,100**	**644**	**57**	**13**	**20**
IZ5DIY	*	110,016	557	58	13	25
***IØZUT**	**A**	**142,214**	**287**	**118**	**50**	**43**
*IZ1MHY	*	109,926	217	88	48	61
*IN3FHE	*	84,390	175	106	49	39
*IK1SOW	*	34,632	126	58	35	24
*IW3SAR	*	9,280	59	33	20	11
***IZ4AFW**	**21**	**168,818**	**449**	**77**	**26**	**48**
*IKØEIE	*	135,240	375	70	26	44
***IKØLNN**	**7**	**63,812**	**279**	**58**	**17**	**31**
*IZØEHL	*	7,788	95	36	8	0
***IKØXBX**	**3.5**	**49,650**	**338**	**52**	**9**	**14**
Lithuania						
LY1R	**A**	**1,822,499**	**1507**	**273**	**102**	**122**
LY775D	*	362,070	605	166	59	45
***LY2SA**	**A**	**378,531**	**543**	**190**	**73**	**44**
*LY2CV	*	22,692	144	56	21	16
Macedonia						
***Z35X**	**14**	**273,762**	**919**	**75**	**25**	**34**
Moldova						
***ER3DX**	**A**	**129,990**	**242**	**112**	**58**	**40**
***ER3MM**	**28**	**19,600**	**100**	**38**	**24**	**18**
Netherlands						
PA3S	**A**	**433,045**	**497**	**149**	**72**	**116**
PI4CG	*	100,646	336	94	34	30
						(OP: PD2PKM)
PAØVHA	*	15,576	195	36	7	1
PA1T	*	3,360	30	13	12	17
PA5O	**28**	**34,944**	**156**	**37**	**24**	**23**
***PD7BZ**	**A**	**390,998**	**621**	**151**	**53**	**70**
*PD5T	*	244,623	504	121	45	53
*PA3FYG	*	211,671	391	152	64	45
*PE1FTV	*	180,407	337	116	56	51
*PA3FXY	*	74,090	243	94	42	19
*PD3BVI	*	32,079	111	47	32	32
*PA2GR	*	29,887	140	79	38	4
*PA3HGF	*	28,355	108	45	30	32
***PA1CC**	**28**	**215,760**	**522**	**77**	**31**	**47**
*PE4BAS	*	5,382	47	21	14	11
***PE1PKR**	**14**	**14,080**	**128**	**38**	**12**	**5**
Northern Ireland						
***GI4SJQ**	**A**	**174,876**	**355**	**126**	**58**	**44**
Norway						
LA9TY	**A**	**332,555**	**447**	**174**	**71**	**48**
Poland						
SP7IIT	**A**	**59,436**	**130**	**82**	**59**	**15**
SQ8JX	*	49,140	253	73	23	9
SQ8J	**28**	**9,966**	**54**	**25**	**23**	**18**
SP3GXH	**21**	**351,726**	**732**	**97**	**35**	**51**
SN2K	**14**	**578,476**	**1355**	**101**	**34**	**46**
						(OP: SP2DWG)
SP8ONZ	*	304,722	830	91	30	41
***SN9P**	**A**	**576,081**	**652**	**195**	**69**	**99**
						(OP: SQ9GAI)
*SQ8MXN	*	174,840	355	144	58	33
*SP6JZP	*	174,528	356	125	57	34
*SN7S	*	164,501	473	99	46	34
*SQ5OLD	*	132,220	259	112	59	49
*SQ5JUP	*	54,416	164	92	42	18
*SQ3RX	*	37,742	147	61	34	18
*SP5OXJ	*	32,946	138	65	28	21
*SP3CGK	*	6,405	41	26	22	13
***SP2QOT**	**28**	**19,404**	**101**	**34**	**23**	**20**
*SQ1K	*	3,060	38	12	12	12
*SP1MWK	*	2,788	29	24	17	0
						(OP: SQ1EIX)
***SP1MHZ**	**21**	**125,994**	**358**	**69**	**25**	**44**
Portugal						
***CT2IOV**	**28**	**42,640**	**253**	**44**	**15**	**23**
Romania						
YO9HP	**A**	**2,508,288**	**1929**	**311**	**102**	**139**
YO6A	*	1,119,503	995	266	94	109
						(OP: YO6BHN)
YO7DAA	*	56,277	288	64	27	26
YR5T	**14**	**123,192**	**488**	**74**	**24**	**18**
						(OP: YO5CBX)
YO5BEU	*	3,200	62	26	6	0
***YO6HSU**	**A**	**458,556**	**687**	**187**	**71**	**51**
*YO8WW	*	331,401	499	167	72	62
*YO3FOM	*	314,096	467	156	71	66
***YO8DDP**	**28**	**29,526**	**155**	**38**	**25**	**11**
***YO9CWY**	**14**	**90,307**	**431**	**69**	**21**	**7**
Scotland						
GMØFGI	**A**	**1,292,304**	**1338**	**249**	**82**	**105**
MMØGPZ	*	158,288	315	117	44	47

Serbia

YT1VP	**7**	**409,770**	**1120**	**83**	**30**	**44**
***YU8NU**	**A**	**1,221**	**18**	**17**	**15**	**1**
***YU7U**	**3.5**	**13,923**	**145**	**41**	**8**	**2**

Sicily

IW9FRA	**A**	**1,848**	**23**	**15**	**15**	**3**
IT9FGA	"	858	13	11	11	0
***IT9SGN**	**A**	**936**	**23**	**18**	**8**	**0**
***IT9IMJ**	**7**	**3,648**	**67**	**28**	**4**	**0**

Slovak Republic

***OM7RC**	**A**	**119,867**	**254**	**91**	**50**	**46**
*OM3ZBG	"	42,558	209	79	28	16

Slovenia

S57DX	**A**	**436,356**	**593**	**155**	**64**	**87**
***S57AW**	**A**	**3,500,924**	**2101**	**362**	**123**	**194**
*S55VM	"	588,401	705	206	75	78
***S57EA**	**14**	**79,686**	**323**	**71**	**21**	**22**

Spain

EE3R	**A**	**655,962**	**780**	**187**	**78**	**89**
						(OP: EA3OR)
ED3A	"	308,236	528	134	57	72
						(OP: EA3DW)
EA5FIV	"	254,058	396	143	57	63
EB1IC	"	111,954	310	50	35	56
EF1A	"	86,994	205	96	50	33
						(OP: EA1XT)
EA7RU	"	86,553	221	84	37	42
EA4KD	**28**	**259,442**	**696**	**67**	**27**	**52**
EA7ZY	**21**	**263,128**	**973**	**59**	**17**	**48**
***EA5DKU**	**A**	**991,380**	**1113**	**231**	**74**	**105**
*EA2DCF	"	33,579	106	52	34	37
***EA3QP**	**28**	**9,324**	**116**	**22**	**14**	**0**
***ED2Y**	**14**	**163,737**	**706**	**63**	**18**	**32**
						(OP: EA2KU)
***EF7W**	**3.5**	**4,788**	**67**	**32**	**6**	**4**
						(OP: EC7KW)

Svalbard

JW7QIA	**A**	**610,793**	**820**	**168**	**68**	**87**

Sweden

SK2T	**A**	**2,107,200**	**1437**	**344**	**107**	**149**
						(OP: SM2LIY)
SM6GKT	"	160,083	329	133	56	42
SM3VAC	"	151,184	310	57	36	83
SFØD	"	41,844	155	76	37	19
						(OP: SMØDSF)
8SØC	"	17,115	66	61	44	0
						(OP: SMØMPV)
SM5CZQ	"	7,748	53	26	21	5
SM6FUD	**7**	**164,875**	**595**	**72**	**22**	**31**
***SM5D**	**A**	**499,768**	**632**	**204**	**80**	**65**
						(OP: SM5DJZ)
*SM7BHM	"	88,893	273	98	32	23
*SA3V	"	61,292	192	92	40	22
						(OP: SA3ARL)

Switzerland

HB9CRV	**A**	**411,474**	**678**	**164**	**64**	**63**
HB9RML	"	3,393	29	10	10	19
HB9LCW	**14**	**24,806**	**139**	**50**	**16**	**13**
HB9DHG	**7**	**55,821**	**405**	**48**	**12**	**9**

Ukraine

UU7J	**A**	**2,961,798**	**2260**	**317**	**118**	**147**
						(OP: UU1AZ)
UW8I	"	2,679,600	2108	331	115	134
						(OP: UT2IZ)
UXØFF	"	2,086,920	1760	286	106	135
UT1AA	"	385,050	617	181	65	56
UR5MBA	"	319,704	551	181	57	26
UT4HZ	"	154,889	346	135	52	16
UT4ZX	"	87,768	188	130	64	18
UT4ZG	**28**	**61,272**	**210**	**61**	**28**	**22**
EO3Q	**14**	**679,328**	**1554**	**99**	**35**	**50**
						(OP: UR3QCW)
UW4I	**7**	**294,060**	**1035**	**83**	**26**	**36**
UX1UX	**3.5**	**75,190**	**538**	**52**	**11**	**10**
UT5ZA	"	8,325	143	30	7	0
***US4LPY**	**A**	**1,213,470**	**1385**	**242**	**85**	**90**
*UT8EL	"	1,011,285	1216	265	81	59
*UX1IL	"	631,690	791	234	80	48
*UY7C	"	589,572	877	191	66	52
*UR5EPV	"	155,419	406	140	41	18
*UU4JIM	"	141,204	245	148	64	34
*UT9FJ	"	117,847	267	123	47	21
*UR5XMM	"	39,424	135	65	39	24
*UX1AA	"	13,024	68	24	20	30
***UT2AB**	**21**	**19,050**	**106**	**39**	**19**	**17**

Wales

GWØRYT	**A**	**144,536**	**293**	**97**	**44**	**62**
***GW4SKA**	**A**	**2,575,170**	**1829**	**303**	**109**	**173**

OCEANIA

Australia

VK2CA	**A**	**123,272**	**297**	**95**	**57**	**0**
***VK8PDX**	**A**	**83,144**	**210**	**104**	**48**	**0**
*VK6GOM	"	39,480	134	62	35	8

Guam

KG6DX	**28**	**732,828**	**1455**	**90**	**32**	**51**

Indonesia

***YBØJIV**	**A**	**38,512**	**173**	**46**	**23**	**14**

SOUTH AMERICA

Argentina

LU6ETB	**A**	**336,570**	**621**	**75**	**39**	**81**
LV5V	"	82,797	203	62	31	50
						(OP: LU5VV)
***LU8EOT**	**28**	**120,227**	**399**	**43**	**20**	**46**

Brazil

ZX2B	**A**	**3,808,317**	**2316**	**275**	**105**	**189**
						(OP: PY2MNL)
PY7ZY	"	98,670	245	67	32	44
PT7CG	**28**	**158,627**	**470**	**59**	**17**	**43**
ZY2C	"	107,321	364	47	20	40
						(OP: PY2ADR)
***PY2SEX**	**A**	**2,007,440**	**1537**	**226**	**91**	**143**
*ZW7B	"	1,160,683	1027	213	78	140
						(OP: PS7BY)
***PU4LOG**	**28**	**266,754**	**688**	**65**	**23**	**50**
*PY2DN	"	239,320	659	55	20	49
*PY2VZ	"	22,494	128	21	15	33
***PY4XX**	**21**	**50,505**	**194**	**53**	**19**	**33**

Chile

CE3PG	**A**	**529,976**	**776**	**107**	**47**	**94**

Colombia

***HK3JJB**	**A**	**41,496**	**150**	**66**	**29**	**38**

Uruguay

CX5TR	**A**	**4,032**	**50**	**22**	**12**	**2**

Venezuela

YW4V	**28**	**85,250**	**289**	**53**	**21**	**36**
						(OP: YV4DYJ)

MULTI-OPERATOR
SINGLE TRANSMITTER HIGH POWER

NORTH AMERICA

United States

K3OQ	**110,880**	**329**	**81**	**33**	**66**
K4FJ	**4,234,705**	**2658**	**348**	**110**	**195**
AA4HP	1,626,570	1555	237	85	143
N4RI	455,694	652	164	55	99
KA4PKB	283,682	538	125	63	134
K6MMM	**966,960**	**1152**	**154**	**91**	**163**
AA7A	**2,276,784**	**1954**	**258**	**105**	**219**
K7BTW	1,673,592	1725	223	101	224
WY7SS	1,155,680	1800	183	83	200
KK7PR	1,004,980	1309	161	86	189
N2BJ/9	**1,180,783**	**1270**	**204**	**80**	**125**

Canada

VE3FJB	**1,842,536**	**1704**	**221**	**74**	**141**
VE6AO	**435,070**	**749**	**80**	**56**	**142**

Greenland

OX4OK	**1,979,740**	**2017**	**195**	**68**	**132**

AFRICA

Canary Islands

EF8M	**12,197,500**	**4955**	**447**	**143**	**260**

Morocco

CN3A	**10,612,800**	**4517**	**419**	**135**	**250**

ASIA

Kazakhstan

UN8LWF	**2,375,325**	**2178**	**266**	**92**	**47**

EUROPE

Austria

OE9R	**734,045**	**981**	**130**	**52**	**117**

Czech Republic

OL7M	**4,528,359**	**2628**	**385**	**128**	**198**
OL3A	2,085,440	1604	280	101	151
OK1KSL	1,954,511	1571	277	95	161
OL7C	1,893,664	1727	217	91	164
OL2X	961,488	1039	217	85	94

Denmark

OZ2AR	**595,080**	**790**	**214**	**88**	**46**

England

G7BRC	**848,625**	**1053**	**201**	**67**	**97**

European Russia

RL3A	**4,841,200**	**2879**	**415**	**141**	**172**
RK3DXW	1,385,296	1349	264	95	104

Finland

OH8A	**4,124,061**	**2740**	**389**	**132**	**146**
OH3I	2,289,696	1786	313	110	129

France

TM4P	**2,731,545**	**2280**	**234**	**83**	**188**

Germany

DF5MA	**2,305,632**	**1756**	**305**	**105**	**154**
DK7ZT	1,304,774	1245	260	95	127
DF7ZS	1,230,188	1263	241	85	132
DL/KE9I	693,260	894	157	60	123
DG3FAW	404,982	612	158	65	75

Greece

SZ1A	**1,456,272**	**1548**	**258**	**85**	**89**

Italy

IV3HYD	**2,623,885**	**1730**	**315**	**115**	**175**
IQ2LS	459,797	599	147	65	101
IQ3GO	162,800	358	118	46	56

Luxembourg

LX8M	**2,790,791**	**2122**	**298**	**103**	**162**

Market Reef

OJØX	**3,180,546**	**2572**	**281**	**99**	**142**

Netherlands

PA6Y	**165,228**	**422**	**117**	**45**	**34**

Norway

LA1UKA	**75,900**	**290**	**90**	**35**	**13**

Poland

SP4YPB	**1,640,768**	**1484**	**274**	**100**	**122**

Portugal

CR5D	**2,371,040**	**2004**	**263**	**91**	**157**

Serbia

YT2T	**3,522,364**	**2237**	**357**	**124**	**187**
YT7W	1,909,474	1708	245	101	151

Sicily

IT9HBT	**1,696,968**	**1503**	**271**	**113**	**134**

Slovak Republic

OM5M	**3,608,088**	**2414**	**340**	**120**	**172**
OM3RRC	1,777,457	1677	227	82	154

Slovenia

S5ØW	**3,894,905**	**2417**	**341**	**122**	**202**

Spain

EE2K	**2,108,754**	**1898**	**249**	**91**	**146**
EA2TT	2,042,965	1910	233	84	170
ED2V	1,829,520	1734	250	86	148

Ukraine

UZ2M	**6,690,831**	**3677**	**439**	**145**	**195**
UT7L	2,139,000	1545	336	117	147
UWØL	157,759	331	136	47	34

OCEANIA

Fiji

3D2EG	**348,684**	**652**	**104**	**60**	**32**

SOUTH AMERICA

Argentina

LTØH	**2,690,142**	**1862**	**242**	**93**	**172**
LT5X	114,080	302	103	43	9

Brazil

PX2V	**1,429,341**	**1436**	**178**	**77**	**138**
ZV2K	938,100	1029	167	70	117

Chile

CE1TT	**740,116**	**868**	**147**	**64**	**120**

Uruguay

CV5K	**860,258**	**1105**	**148**	**62**	**91**

MULTI-OPERATOR
SINGLE TRANSMITTER LOW POWER

NORTH AMERICA

United States

***N3WZR**	**297,243**	**462**	**156**	**58**	**89**
***WW4LL**	**1,954,310**	**1619**	**307**	**101**	**178**
*WJ4N	899,248	1180	183	66	143
***W9CF/7**	**38,160**	**148**	**46**	**39**	**59**
*WS7I	15,660	77	46	39	23
***N9LAH**	**1,144,150**	**1112**	**244**	**95**	**151**
*W9TTT	407,259	670	147	63	123
***KU1YL/Ø**	**873,681**	**885**	**233**	**83**	**147**
*ACØE	145,632	332	102	44	76
*WØFRC	52,932	212	55	28	49

Bermuda

***VP9I**	**3,438,541**	**2287**	**304**	**100**	**213**

ASIA

China

***BA2IA**	**80,464**	**351**	**57**	**33**	**17**
*BG8GAM	54,252	269	98	39	0

South Korea

***DS3HWS**	**80,997**	**295**	**86**	**47**	**0**

EUROPE

Bulgaria

***LZ5R**	**2,041,560**	**1691**	**294**	**107**	**134**

Czech Republic

***OK2PQS**	**192,479**	**394**	**125**	**55**	**37**

Finland

***OH7AB**	**118,413**	**308**	**117**	**40**	**20**

Germany

***DD1A**	**838,299**	**977**	**214**	**74**	**111**
*DF9DD	340,659	513	166	66	65
*DLØLG	122,892	296	117	53	26
*DLØABT	1,148	18	17	11	0

Poland

***SP9KDA**	**746,856**	**978**	**211**	**79**	**79**

Portugal

***CS5CRE**	**1,228,392**	**1514**	**263**	**82**	**78**

Serbia

***YT3M**	**1,814,274**	**1672**	**243**	**81**	**138**

Ukraine

***UZ5HZZ**	**222,425**	**527**	**161**	**56**	**0**
*UU4JWC	1,131	25	20	9	0

SOUTH AMERICA

Argentina

***LU1UM**	**351,024**	**630**	**76**	**39**	**98**
*L73D	128,628	299	85	32	45
*LU3DY	76,293	204	68	37	42
*LV6D	45,594	159	41	27	34

Brazil

***PU5ATX**	**254,265**	**579**	**79**	**40**	**82**

MULTI-OPERATOR
TWO TRANSMITTER

NORTH AMERICA

United States

W1DX	**2,727,207**	**2030**	**311**	**97**	**185**
KA1C	614,005	810	187	63	121
ND2W	**2,658,575**	**2472**	**268**	**99**	**184**
NR4M	**6,363,236**	**3861**	**379**	**125**	**220**
W6YX	**4,015,935**	**3023**	**315**	**118**	**260**
W7CT	**1,969,996**	**2176**	**211**	**94**	**224**
WØRDS/7	385,917	667	127	64	138
KØIR	**5,724,545**	**4010**	**344**	**122**	**219**

Canada

VE7SV	**5,254,364**	**3299**	**317**	**124**	**250**

ASIA

Kazakhstan

UO6P	**4,930,608**	**3422**	**358**	**117**	**81**

EUROPE

Croatia

9A4P	**1,460,045**	**1586**	**234**	**85**	**126**

England

G3V	**2,687,122**	**2349**	**303**	**111**	**164**

Estonia

ES9C	**11,095,980**	**5666**	**453**	**143**	**216**

Finland

OH2ET	**4,286,676**	**3038**	**365**	**124**	**144**

Germany

DQ4W	**5,694,018**	**3280**	**373**	**134**	**206**

Hungary

HG7T	**4,972,677**	**3292**	**346**	**121**	**202**

Italy

IQ1RY	**6,512,454**	**3818**	**362**	**127**	**213**
IQ8PL	45,056	204	86	29	13

Netherlands

PI4CC	**5,386,780**	**3228**	**367**	**127**	**212**
PI4COM	2,646,981	1935	318	112	169
PI4W	2,348,731	2011	262	97	158

Norway

LN5O	**3,433,248**	**2331**	**330**	**111**	**183**

Poland

SN2B	**4,933,415**	**3198**	**337**	**115**	**201**

Scotland

GM7R	**5,781,888**	**3549**	**334**	**123**	**215**

Slovenia

S5ØXX	**6,173,958**	**3680**	**375**	**129**	**210**

Spain

ED1R	**7,146,396**	**4240**	**373**	**122**	**221**
EF7R	6,390,258	4134	367	119	213

SOUTH AMERICA

Argentina

LS1D	**3,647,064**	**2442**	**254**	**97**	**201**

Aruba

P49X	**14,161,441**	**6376**	**383**	**132**	**264**

MULTI-OPERATOR
MULTI-TRANSMITTER

NORTH AMERICA

United States

K1SFA	**10,002,562**	**5614**	**400**	**130**	**252**
KA4RRU	**4,451,840**	**3463**	**306**	**109**	**225**
AK7AZ	**873,794**	**1210**	**156**	**82**	**195**

Canada

VE7UF	**3,761,890**	**2881**	**246**	**109**	**250**
VE5RI	**1,283,480**	**1325**	**166**	**85**	**189**

AFRICA

Madeira Islands

CR3L	**10,080,564**	**4852**	**361**	**118**	**243**

ASIA

Taiwan

BV1OO	**454,725**	**969**	**136**	**61**	**18**

EUROPE

Finland

OH6R	**5,201,233**	**3554**	**369**	**121**	**157**

France

TM38O	**1,141,034**	**1295**	**201**	**68**	**113**

Hungary

HG1S	**6,227,145**	**3820**	**374**	**134**	**209**

Italy

II5ITA	**295,260**	**495**	**142**	**61**	**63**

Latvia

YL2CI	**2,614,864**	**2268**	**302**	**100**	**116**

Luxembourg

LX7I	**7,813,069**	**4449**	**374**	**122**	**231**

Sicily

IT9BLB	**9,790,016**	**5363**	**417**	**135**	**224**

Spain

ED5CEF	**6,417,450**	**4455**	**322**	**118**	**210**
EA3CCN	5,757,056	3853	332	113	211

SOUTH AMERICA

Colombia

HK1NA	**1,278,822**	**1179**	**150**	**77**	**166**

CHECK LOGS

3A2MW, 4M5RY, 7K1PTT, 9A2EU, A45XR, A65BP, AA3WZ, AB7R, BA4SD, BG6IRO, CU2JT, DF6YC, DF9FR, DGØCG, DG1RZH, DJ3OS, DJ9FG, DK6IM, DL1AB, DL2JIM, DL2LG, DL3HWF, DL3NSM, DL4CW, DL4JS, DL5MK, DL5MX, DL6OAA, DL7FCQ, DL8CKL, DL9GWA, DM5GI, DM6YY, E72U, E77M, EA1AW, EA1EWY, EA1GFY, EA3GBA, EA3JL, EA3NP, EA4GB, EA4MA, EA5FV, EA5HJO, EA6AZ, EA7AHA, EB2RA, EE5I, F1PYW, F3PZ, F6DKQ, F6FLU, GØPSE, G3RWL, G3VPS, G3VOO, G3ZSS, G4AYU, G4LWB, G7SSE, HA1DAE, HA1SN, HA2EOA, HB9AGH, I1MRH, IKØBZE, IKØHBN, IKØVVG, IK2LTR, IK5VQK, IW1PUR, IW2NEF, IW3IMM, IW5EDI, IW5EIJ, IW5ELL, IW6ASD, IZØUMÉ, IZ1AOC, IZ3EOU, IZ3ETU, IZ4DZD, IZ8FFA, IZ8FTW, J39BS, JA1MRM, JA2DGO, JA3AZD, JA3MIO, JA4UIT, JA7DNO, JE1JAC, JF9KVT, JG1FML, JL3RPD, JP2MRD, JT1DA, KØGK, KØQC, K2HU, K4DXR, K4KAY, K4REB, K4SAA, K4TRH, K6RBS, K8RC, K8YTO, K9JP, K9MY, KB1VMQ, KB3X, KB9GSY, KC2MBV, KD5JHE, KE4EX, KE5ZGI, KF7PBM, KI6X, KJ6P, KK3Q, KK7PW, KX1X, KY9J, KZ5J, L33M, LA4RT, LA7WCA, LA9FFA, LU4FPZ, LU6AM, LY9Y, LZ2XF, MØDAG, MIØGRG, N1IA, N1MJF, N1WQ, N2JEN, N3ME, N4KHI, N4SIA, N4WYR, N5ZM, N6GY, N6PZ, N7GVV, N7US, NA5DX, NA7RH, NIØB, NM1A, NY3C, OH3GGQ, OH3QL, OH8LXT, OK1DMP, OK2BHD, OK2DW, OK2VWB, OK2ZO, OM3RM, ON4AXU, ON4TO, OZ1AXG, OZ8ABE, PAØFVH, PAØJSE, PAØRRA, PA2KW, PA2LP, PA3A, PA3EBP, PDØMBY, PDØRKA, PD1ARM, PD2J, PT5T, PV8ADI, PY2SRB, RA3XDX, RA4UF, RA6YDX, RL3FA, RL3OCQ, RN3DNG, RU3EJ, RU4UR, RV6ALI, RY9C, RZØAF, S51JQ, S59D, SO7O, SP1DMD, SP1QXK, SP3CFM, SP3EFG, SP3EPG, SP3UY, SP4CJA, SP4GDC, SP6GCU, SP6M, SP7HOV, SP9FT, SP9IHP, SP9OYB, SP9XCN, SQ3LVF, SQ9ANS, SV2HXV, SV3DCX, SV5BYR, TF8SM, UA2FFX, UA3FX, UA4ANZ, UA9CDV, UN6G, UN8P, UR8IDX, USØLW, UT3UX, UT3WW, UT7EJ, UZ2HZ, VE2DLC, VE3FWF, VE3XD, VE3YXO, VK2MWG, VK4IMX, VK7ZE, WØELM, W1FNB, W1NDY, W2MXL, W3ML, W4ASE, W5IF, W6YA, W7JV, W7THY, W7YES, W9FF, WB2COY, WB8ART, WG4M, WM2Z, WS4C, XE2AUD, YO2CMI, YO8RAA, YY4ALK, Z35BY, ZL4AS.

advertisers' index

including website addresses

10-10 International Net, Inc.	96	www.10-10.org
Advanced Specialties Inc.	69	www.advancedspecialties.net
Alinco	35	www.greamerica.com
Alpha Delta Communications	53	www.alphadeltacom.com
Ameritron	5	www.ameritron.com
Antique Radio Classified	111	www.antiqueradio.com
Arlan Communications	69	www.arlancommunications.com
Array Solutions	54,55	www.arraysolutions.com
bhi Ltd.	25	www.bhi-ltd.com
BATTERIES AMERICA/Mr. Nicd.	115	www.batteriesamerica.com
Begali Keys	79	www.i2rtf.com
Bencher, Inc.	91	www.bencher.com
Buddipole Antennas	80	www.buddipole.com
C.A.T.S.	96	www.rotor-parts.com
CheapHam.com	71	www.CheapHam.com
Comet/NCG	51	www.natcommgroup.com
Command Productions	71	www.LicenseTraining.com
Communication Concepts, Inc	98	www.communication-concepts.com
Communications City	33	www.commcity.com
Cushcraft	1	www.cushcraftamateur.com
Cutting Edge Enterprises	74	www.powerportstore.com
DX Engineering	11	www.DXengineering.com
DX Store	93	www.dxstore.com
DZ Company	74	www.dzkit.com
Davis Rope and Cable Assembly	96	www.DavisRopeandCable.com
Dayton Hamvention® 2012	89	www.hamvention.org
Diamond Antenna	99	www.diamondantenna.net
EZ Hang	69	www.ezhang.com
Elecraft	45	www.elecraft.com
Electric Radio Magazines	74	www.ermag.com
ExpertAmpsUSA, LLC	90	www.expertampsusa.com
FlexRadio Systems	3	www.flex-radio.com
Force 12, Inc.	15	www.texasantennas.com
GRE	116	www.greamerica.com
GeoTool	74	www.geotool.com
Gigaparts, Inc.	37	www.gigaparts.com
Green Heron	97	www.greenheronengineering.com
HRD Software	61	www.ham-radio-deluxe.com
Ham Radio Outlet	12	www.hamradio.com
HamTestOnline	20	www.hamtestonline.com
Heights Tower Systems, Inc.	111	www.heightstowers.com
Hy-Gain	9	www.hy-gain.com
ICOM America, Inc	23	www.icomamerica.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:** Bi-monthly – 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 (1-434-632-7028, 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**

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, 568 SE Maple Terrace, Port St. Lucie, FL 34983, phone 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>

SMART BATTERY CHARGERS: 5A model for larger deep cycle down to 1/4A model for smaller QRP lead acid batteries. <www.a-aengineering.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 2012 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>).

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! Call: 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>

FREE 2-meter Repeater Frequencies for Travelers by Western Trucker: **USREPEATERS.ORG**

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.neo-ham.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.

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.

Marketing Services for Ham Radio Related Companies and Websites - Improve product sales and brand visibility with innovative online marketing strategies. Jeff Demers, N1SNB is a veteran online marketing consultant with years of experience selling online. If you've invested heavily in bringing a product or website to fruition and want to improve sales, we need to talk. Email me today at <jbdemers@gmail.com> or call me at 508-768-0032.

NEW AMATEUR RADIO MAP with DXCC list updates. Full color 22 x 34" – $10. Free shipping on club orders. **http://www.hamradiomap.qth.com/**

COLLINS . . . Owners of Collins 30S-1 amplifiers. Very rare K201, K202, and K203 relays now available. More info on **www.collinsradioactive.com**

advertiser's index

including website addresses

Idiom Press	20	www.idiompress.com
InnovAntennas	85	www.innovantennas.com
International Radio INRAD	20	www.inrad.net
KJI Electronics	96	www.kjielectronics.com
Kanga US	96	www.kangaus.com
Kenwood U.S.A. Corporation	Cov. II	www.kenwoodusa.com
LDG Electronics, Inc.	29	www.ldgelectronics.com
LNR Precision, Inc.	67	www.lnrprecision.com
M² Antenna Systems, Inc.	58,59	www.m2inc.com
MFJ Enterprises, Inc.	31,43	www.mfjenterprises.com
N3ZN Keys, LLC	113	www.n3znkeys.com
NH7QH Radio Supplies LLC	113	www.hawaiiradiosales.com
National RF, Inc.	113	www.NationalRF.com
New Super Antennas	97	www.newsuperantenna.com
NiCd Lady	39	www.nicdlady.com
PowerPort	74	www.powerportstore.com
QCWA	111	www.qcwa.org
QSLs by W4MPY	90	www.qslman.com
R.F. Connection	113	www.therfc.com
RF Parts Company	57	www.rfparts.com
Radio Club of J.H.S. 22	87	www.wb2jkj.org
RadioWavz	73	www.radiowavz.com
SolderBuddy.com	90	www.solderbuddy.com
SteppIR Antennas Inc.	16,17	www.steppir.com
TEN-TEC, Inc.	47	www.tentec.com
Ten-Ten International Net, Inc.	96	www.ten-ten.org
XTAL SET SOCIETY	113	www.midnightscience.com
Timewave Technology, Inc.	27	www.timewave.com
TOKYO HY-POWER LABS, INC.	Cov III	www.tokyohypower.com
Vibroplex	103	www.vibroplex.com
Vintage Manuals, Inc.	69	www.vintagemanuals.com
W2IHY Technologies	97	www.w2ihy.com
W4RT Electronics	63	www.w4rt.com
W5YI Group	21	www.w5yi.org
West Mountain Radio	83	www.westmountainradio.com
WinRadio	81	www.winradio.com/g33
Wireman	96	www.thewireman.com
Yaesu	6,7,Cov IV	www.yaesu.com

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

GRECOM

Scanning Just Got Easier!

2012
Dayton Hamvention
Please visit GRE at booth #451-454
May 18th - 20th

◀ ***NEW!*** ***PSR-120***
800MHz Analog Scanner

◀ ***PSR-800***
Digital P25 Scanner
Simply Enter Zip Code, load precise local Public Safety systems and start Scanning.

Digital Trunking Scanners ▶
PSR-500

PSR-600

PSR-310

PSR-410

◀ **Analog Trunking Scanners**

PSR-100 ▶

PSR-200U ▶

Conventional Scanners

PSR-700 the first Scanner with a built-in SD card and nationwide database included! ▶

PSR-700

The #1 Scanner Manufacturer for over 40 Years!

GRE

Our customers say our scanners are the easiest to use and the easiest to program. We have the best quality digital audio decoding and the best AGC action in the business. And we're your best value, too! It's no wonder that we're the #1 scanner manufacturer 40 years running. Call or visit your favorite GRE dealer today to find out more!

GRE AMERICA INC.
425 Harbor Blvd, Belmont, CA 94002

www.greamerica.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

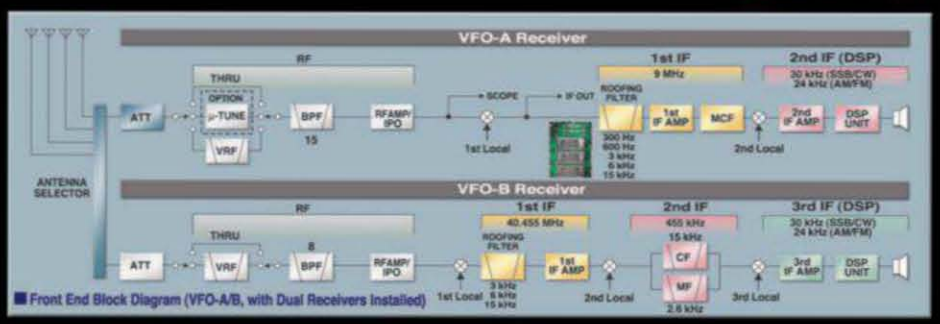
The New Premium HF/50 MHz Transceiver
FT DX 5000 Series

Two Totally Independent Receivers - The VFO-A/Main Receiver utilizes Super Sharp Roofing filters to give you the highest performance and best flexibility

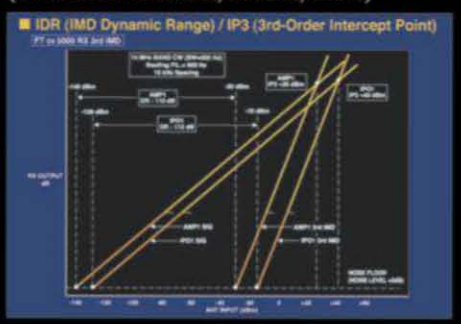
The tight shape factor 6 pole crystal filters and D Quad Double Balanced Mixer design afford incredible improvement in 3rd – Order dynamic range and IP3 performance

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
The radio

YAESU USA
6125 Phyllis Drive, Cypress, CA 90630 (714) 827-7600