45241

Amateur Radio

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

COMMUNICATIONS & TECHNOLOGY

MARCH 2008

CQ

Sunspot Cycle 24 Begins!

- Ham Radio in Afghanistan, p. 13
- CW Results, 2007 CQ WW WPX Contest, p. 24
- WPX Award Expands! New Rules, p. 38

On the Cover: George Dominick, W4UWC, of Knoxville, Tennessee. Details on page 80.

KENWOOD

Listen to the Future

New RC-D710

The RC-D710 is a standalone 1200/9600 bps TNC with APRS firmware

KENWOOD

KENWOOD

Listen to the Future

www.kenwoodusa.com

TM-G707A

TM-V7A

TM-D700A

With the supplied accessories the RC-D710 is a full upgrade to the TM-V71A. The TM-V71A will have full functionality of the TM-D710A by exchanging the TM-V71A panel with the RC-D710.

This is where it gets interesting!

PG-5J connection kit makes the RC-D710 a complete standalone APRS/TNC for your current radio. This option allows connectivity with previous and current Kenwood models* as an external modem.

Compatible models include: TM-D710A / TM-V71A / TM-D700A / TM-G707A / TM-V7A / TM-733A / TM-255A / TM-455A

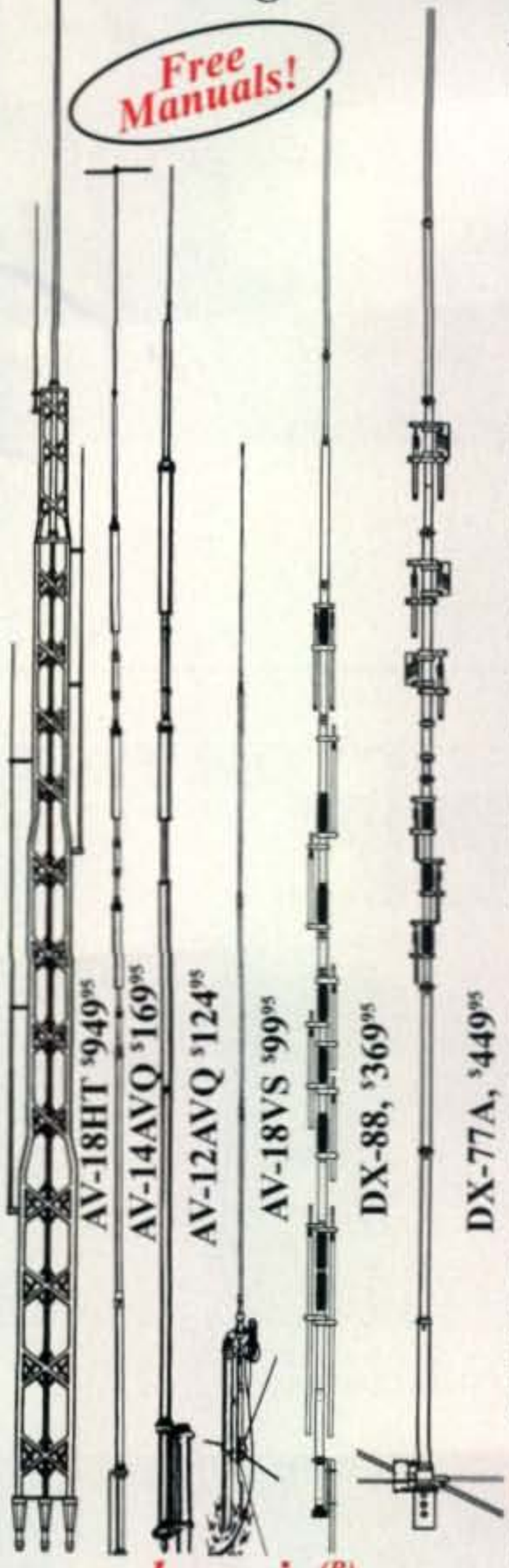
KENWOOD U.S.A. CORPORATION
Communications Sector Headquarters
3970 Johns Creek Court, Suite 100, Suwanee, GA 30024
Customer Support/Distribution
P.O. Box 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
Customer Support: (310) 639-4200 Fax: (310) 537-8235

www.kenwoodusa.com
ADS#47007

JQA-1205 091-A
ISO9001 Registered

hy-gain® HF VERTICALS

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



hy-gain(R) Classics

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

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

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

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

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

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

AV-14AVQ, $169.95. (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, $124.95. (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, $99.95. (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.

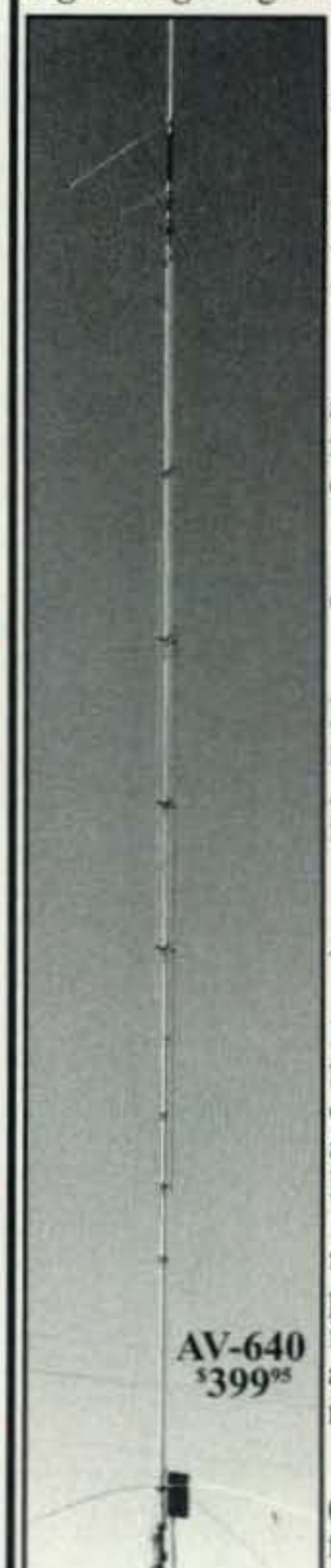
DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$99.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 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® PATRIOT

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



No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

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

Sleek and low-profile

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

Full legal limit

Handles 1500 Watts key down continuous for two minutes.

Built-to-last

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

hy-gain® warranty

Two year limited warranty. All replacement parts in stock.

AV-640, $399.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

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

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and Nearest Dealer . . . 800-973-6572
Call your dealer for your best price!

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Toll-free Customer Sales Hotline: 800-973-6572
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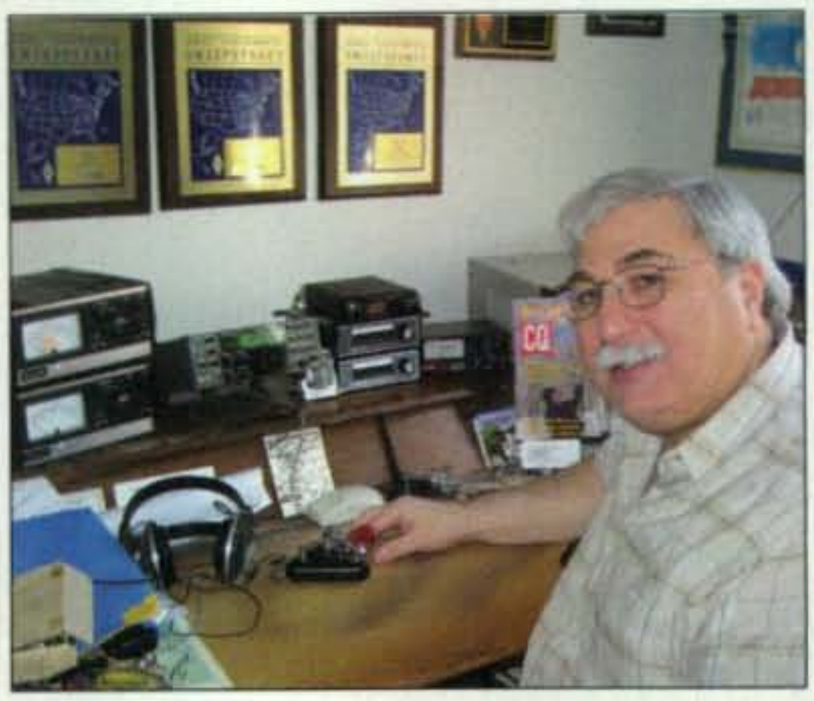

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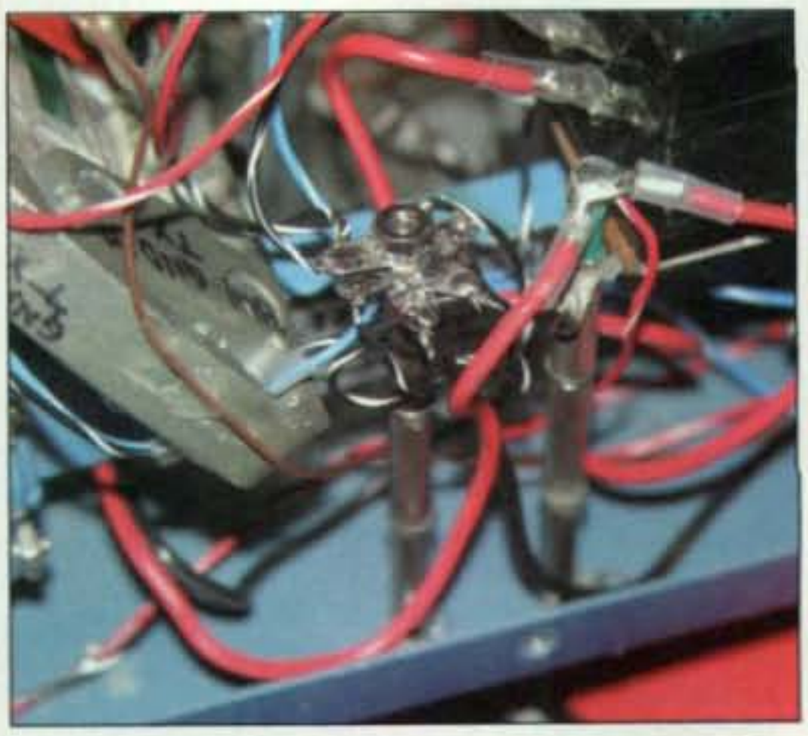

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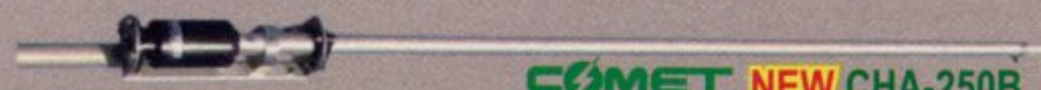
departments

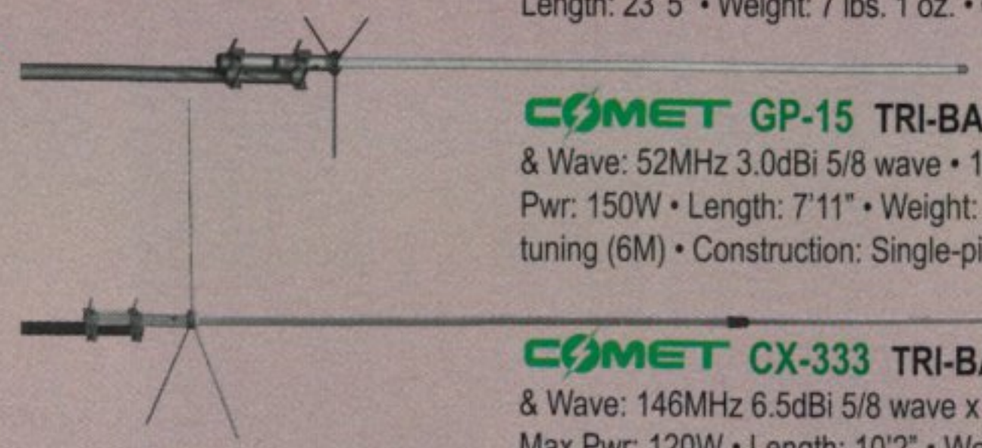
Life is a JOURNEY
Enjoy the ride!

COMET and Maldol Antennas

Base Antennas

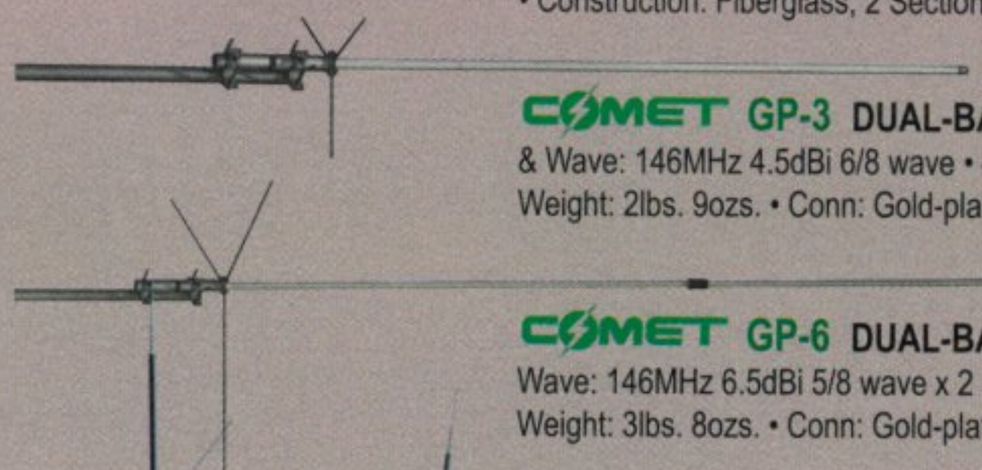


COMET NEW CHA-250B BROADBAND HF/6M GROUND-PLANE ANTENNA
A newly designed broadband vertical with NO GROUND RADIALS. EXTREMELY easy to assemble, requires no tuning or adjustments and VSWRis under 1.5:1 from 3.5-57MHz! • TX: 3.5MHz – 57MHz • RX: 2.0 – 90MHz • VSWR is 1.5:1 or less, continuous • Max Power: 250W SSB/125W FM• Impedance: 50 Ohm • Length: 23' 5" • Weight: 7 lbs. 1 oz. • Conn: SO-239 • Mast Req'd: 1" – 2" dia. • Max wind speed: 67MPH



COMET GP-15 TRI-BAND 52/146/446MHZ BASE REPEATER ANTENNA Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 8.6dBi 5/8 wave x 4 • Max Pwr: 150W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated SO-239• 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass

COMET CX-333 TRI-BAND 146/220/446MHZ BASE REPEATER ANTENNA Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 220MHz 7.8dBi 5/8 wave x 3• 446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz.• Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections



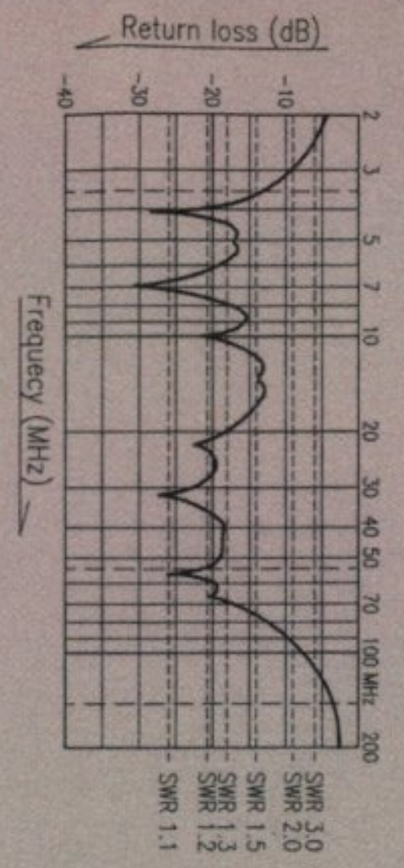
COMET GP-3 DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Max Pwr: 200W • Length: 5'11"• Weight: 2lbs. 9ozs. • Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

COMET GP-6 DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 200W • Length: 10'2"• Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

Maldol HVU-8 ULTRA-COMPACT 8 BAND HF/VHF/UHF VERTICAL ANTENNA
80/40/20/15/10/6/2M/70cm Only 1/2 the traditional size and weight of vertical HF antennas, and it includes 2M/70cm! Unique radial system rotates for balcony installations, the radials can all be rotated to one side. • HF and 6M: 1/4 wave-length • Gain 2M: 1/2 wave-length, 2.15dBi • Gain 70cm: Two 5/8waves in phase, 5.5dBi • Impedance: 50 Ohm • Max Power: HF 200W SSB • 6M–70cm: 150W FM• Conn: SO-239 • Height: Only 8'6" • Weight: 5lbs. 7ozs.

COMET GP-9 / GP-9N DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA
BEST SELLER!• Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 • 446MHz 11.9dBi 5/8 wave x 8 • Max Pwr: 200W• Length: 16' 9"" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated SO-239 • GP-9N Gold-plated N-type female • Construction: Fiberglass, 3 Sections

COMET NEW H-422 QUAD-BAND HF DIPOLE Compact 40/20/15/10M "V" or Horizontal Dipole • Max power: 1kW SSB • Length "V" Dipole: 24' 3" • Horizontal Dipole: 33' 10" • Shipping length: 79" • Weight: 11 lbs 14 ozs • Wind Load: 3.02 sq feet • Required mast size: 1.5" - 2.5" diameter • CBL-2000 2kW Balun included • Simple installation, band tuning and profile change



CHA-250B VSWR graph

"One person can effortlessly raise the antenna at night when no one can spot it, and take it down before daybreak. This antenna is also a great choice for portable operations, such as quick and easy mini-DXpedition to a campground or a nice tropical island! In short, the Comet CHA-250B is simple to assemble, painless to elevate and is easy on the eyes, while at the same time getting you on 6 meters thru 80 meters without the requirement of an antenna tuner and ground radials. You'll even be able to work some DX while you're at it!" – Dan Dankert N6PEQ

For a complete catalog, call or visit your local dealer.
Or contact NCG Company. 15036 Sierra Bonita Lane, Chino, CA 91710
909-393-6133 • 800-962-2611 • FAX 909-393-6136 • www.natcommgroup.com

ham radio news

It's Here! Solar Cycle 24 Officially Begins

Solar scientists have announced the official start of the new sunspot cycle, the 24th since recordkeeping began. The key event was the appearance on January 4th of a new sunspot whose magnetic polarity was the reverse of those spots associated with Cycle 23, according to David Hathaway of NASA's Marshall Space Flight Center. Radio propagation on the upper HF bands is heavily influenced by sunspot activity.

"New solar cycles always begin with a high-latitude, reversed polarity sunspot," Hathaway explained in a NASA news release, which further explained that old cycle spots congregate near the sun's equator while spots of a new cycle appear higher, in the range of 25–30 degrees latitude. Cycle 23 peaked in 2000–2002 (it had a double peak). The maximum of Cycle 24 is expected to be in 2011 or 2012. There is a split in scientific opinion on whether this cycle will be mild or intense, and how long it will last. The NASA release notes that the start of Cycle 24 does not necessarily mean that Cycle 23 has ended, and that it is likely that sunspots from both cycles may appear over the course of the next several months to a year.

Motorola Completes Buyout of Yaesu Parent

Motorola subsidiary MI, Inc. has completed its tender offer to acquire controlling interest in Vertex Standard, the manufacturer of Yaesu amateur radio equipment. A Motorola news release said the buyout, first announced last November, was completed in January, with Motorola paying some 12 billion Yen (about US$113 million) for a 78% ownership share in Vertex Standard, which became a Motorola subsidiary. When all of the details are finalized, Motorola will own 80% of Vertex, with the remaining 20% owned by Tokogiken, Ltd., a Japanese company controlled by Vertex Standard President and CEO Jun Hasegawa. Hasegawa will retain day-to-day control of Vertex-Standard's operations.

Yaesu's Executive Vice President for Amateur Radio Sales in North America, Dennis Motschenbacher, K7BV, told the *ARRL Letter* that he sees the merger as "an opportunity to make a solid 50-plus year old Yaesu company even stronger and more formidable" in the amateur market, and assured customers that "(t)here is absolutely no reason to have the slightest concern about equipment warranties and the continuation of support for our products."

FCC Changes Policy on Enforcement Actions

Concerns over privacy have prompted the FCC to scale back the amount of information it releases on its enforcement actions. In a January 15 e-mail to the amateur radio media, FCC Special Counsel Riley Hollingsworth said that "Due to privacy concerns, we are modifying our procedures so that only final actions will be posted on the Amateur section of our web pages, except of course for Notices of Apparent Liability, Notices of Violation, etc." In the past, letters requesting specific information in response to a complaint were included in the material released by the Commission, originally to the amateur media, and subsequently posted on the FCC's website. Now, says Hollingsworth, "Actions that are 'in process' will be summarized … just by action, city and state." When final action is taken on a particular case, Hollingsworth added, "those actions will appear on our web pages as appropriate." There have been several recent instances in which inquiries about possible rules violations have been widely publicized, only to have the Commission determine after receiving the response that no violations had occurred.

Yasme Excellence Award Winners Announced

Five prominent radio amateurs are sharing $8,000 in prizes as the initial winners of the Yasme Foundation's Yasme Excellence Awards, given to recognize service and dedication to amateur radio. Joseph Arcure, Jr., W3HNK, will receive $2,000 in recognition of his long service to DXers as a QSL manager; another $2,000 goes to Sheldon Shallon, W6EL, for his development of propagation prediction software, including MiniProp and W6ELProp; James Brooks, 9V1YC, was awarded $2,000 to honor his work in organizing and videotaping a wide variety of DXpeditions. Finally, according to the announcement, Finnish hams Jukka Salomaa, OH2BUA, and Antii Kantolqa, OH5TB, will share a $2,000 prize for "conceiving, operating and maintaining the DX Summit, the first widely-used Web-based spotting network portal." This tool, said the Yasme Foundation directors, "fundamentally changed the nature of HF operating."

New Prefix Block OK'd for Bosnia-Herzegovina

One of the little-noticed actions of the 2007 World Radiocommunication Conference (WRC-07) held in November was the formal approval of a new callsign prefix for Bosnia-Herzegovina, effective November 17, 2007. According to the ARRL, the E7A–E7Z callsign block is being phased in beginning January 1, 2008 to eventually replace the T9A-T9Z block used since the country declared its independence from the former Yugoslavia in 1991. There is no indication as to how long currently-issued T9 calls will remain valid.

The ARRL bulletin announcing the formal change quotes Bosnian Communications and Transport Minister Dr. Bozo Ljubic as explaining that the T9 prefix was allocated during wartime, and that the government was taking steps not only with radio licenses but drivers' licenses, passports and other documents to replace wartime identifiers with new ones that have no connection with "that troubled time."

New Extra Class Question Pool Released

The first major revision since 2002 of the question pool for the Amateur Extra Class license has been released by the Question Pool Committee of the National Conference of Volunteer Examiner Coordinators. The new pool consists of 741 questions (down *from more* than 800 in the current pool), which will be used as of July 1, 2008, to develop the 50-question Element 4 exam for the Extra Class license. It is scheduled to remain in use until 2012. The new questions include updates of Extra Class frequency privileges and license requirements.

More German Hams Gain Access to 6 Meters

Newsline reports that the last two German TV stations operating on analog channel 2 have taken those transmitters off the air as they move to digital broadcasting. The last Ch. 2 transmitters in Austria and Switzerland also shut down in late 2007. This means that the 40,000-square kilometer protection zone around each transmitter will no longer be necessary and that the longstanding ban on 50-MHz amateur radio transmissions within those zones will soon be lifted. This should give all German Class A hams full access to the European 6-meter band just as sunspot cycle 24 begins its climb out of the basement.

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.

The Call of the Open Road

Alinco helps you make mobile contacts with frequency!

DR-03T (29MHz) 10M FM Mobile/Base

Excellent TX/RX audio, 10W output, large alphanumeric display, remote control from multifunctional back-lit microphone, CTCSS and DCS encode/decode, 3 output level setting, 100 memories, theft alarm, cable-clone and more in a compact, easy-to-use design. ***Alinco value and affordability!***

DR-06T 6M FM Mobile/Base

Capture more of those exciting sporadic–E contacts with this 50W full powered 6M FM mobile. Work local and DX FM contacts, simplex or through repeaters. With optional EJU-41 TNC board, you can switch from voice to packet operations quickly and easily. Includes 100 alphanumeric memories, remote control *from multi*functional backlit microphone, 39 CTCSS and DCS encode/decode, 3 output level setting, theft alarm and more!

DR-135T Mk III
DR-435T Mk III
DR-235T Mk III
Mobile/Base

- Large, easy-to-read display
- 100 memories + call channel
- Alphanumeric channel labels
- CTCSS and DCS encode+decode and Euro tone bursts
- Optional digital voice communications board
- Optional internal 1200/9600 packet TNC, rear panel serial port
- Front panel GPS input for APRS™ trackers
- Ignition key on/off feature
- Large illuminated microphone keys
- Narrow FM feature
- Autodial memories
- Theft alarm feature
- H/M/L power output selection
  DR-135 50/10/5w
  DR-235 25/10/5w
  DR-435 35/10/5w
- MARS capability
- AM Airband RX on DR-135

DR-635 Mobile/Base
VHF + UHF

Dual Band Transceiver with Full Duplex Capability

- Large, 6 character alphanumeric display with separately selectable three color display illumination in blue, violet or amber. Remote mountable.
- TCXO stable to ±2.5 ppm
- Narrow FM mode
- Power supply voltage display
- Ignition key on/off & theft alarm features
- CTCSS, DCS encode/decode and DTMF encode functions plus European Tone Bursts
- Multiple scan modes and extended receive capabilities including broadcast FM

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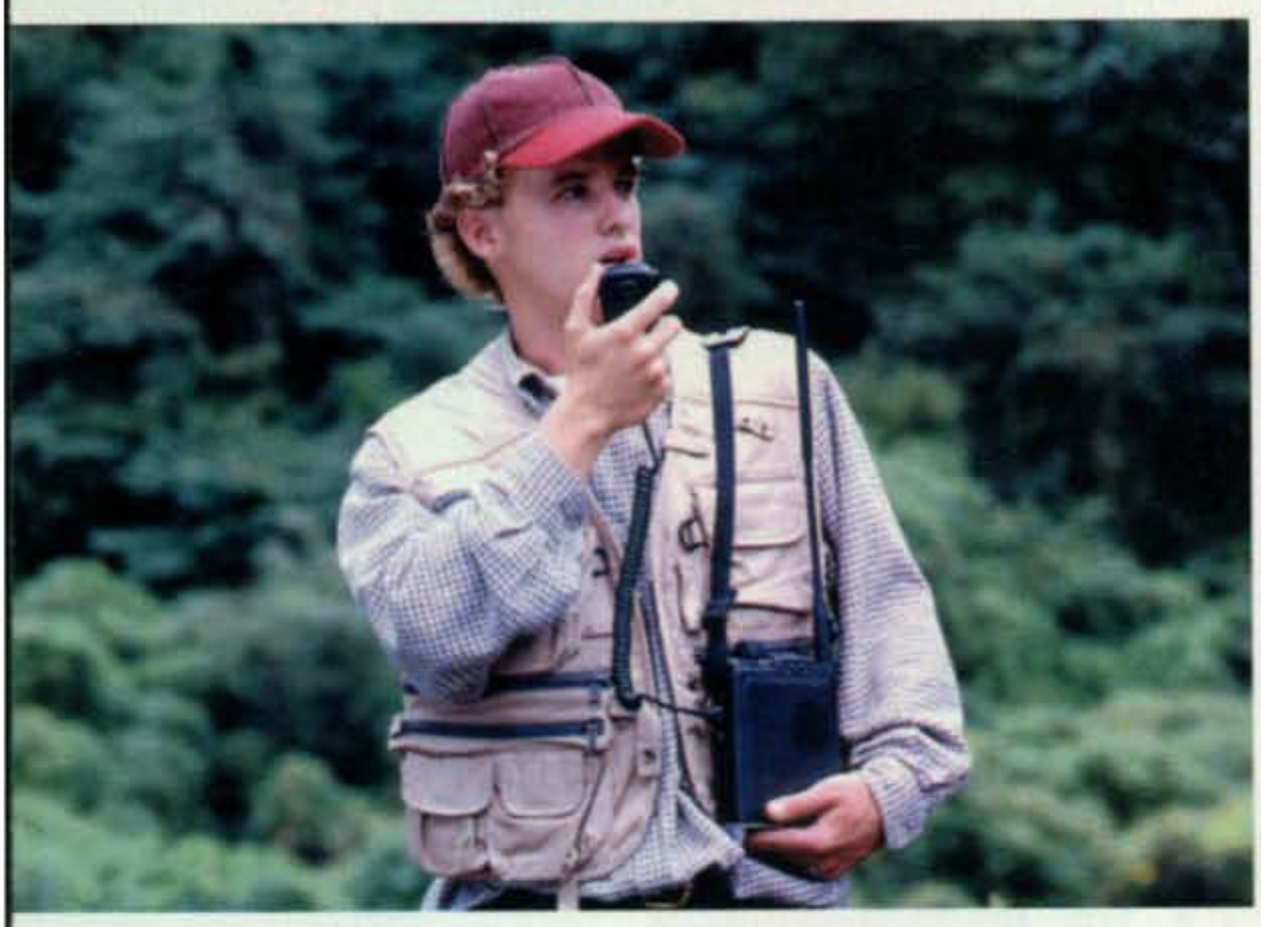
Yaesu - The Choice of the World's Top DXers ....on the VHF and UHF bands, too



HF/VHF/UHF Portable Operation Just Got a Lot More Powerful!

FT-897D TCXO DSP 60 m Band

HF/50/144/430 MHz
100 W All Mode Transceiver
(144 MHz 50 W/430 MHz 20 W)

HF/VHF/UHF Multimode Mobile Transceiver, now Including Built-in DSP

FT-857D DSP 60 m Band

HF/50/144/430 MHz
100 W All Mode Transceiver
(144 MHz 50 W/430 MHz 20 W)

Automatic Matching for FT-897/857 Series Transceivers

FC-40
Automatic-Matching 200-Memory Antenna Tuner (160 m ~ 6 m Band)

WATERPROOF

Mobile Auto-Resonating 7~430 MHz for FT-897/857 Series Transceivers

ATAS-120A
Active Tuning Antenna System (no separate tuner required)

VHF/UHF Base RadialKit ATBK-100 for ATAS-120A.

REAL PERFORMANCE, REALLY PORTABLE

FT-817ND
HF/50/144/430 MHz
5 W All Mode Transceiver
(AM 1.5 W)

60 m Band

ATAS-25
Manually-Tuned Portable Antenna

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

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Cypress, CA 90630 (714)827-7600

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.

Introducing the Yaesu FT-950 transceiver for DX enthusiasts
Superb receiver performance
Direct lineage from the legendary FT DX 9000 and FT-2000

HF/50 MHz 100 W Transceiver
FT-950

- Triple-conversion super-heterodyne receiver architecture, using 69.450 MHz 1st IF
- Eight narrow, band-pass filters in the RF stage eliminate out of band interference and protect the powerful 1st IF
- 1st IF 3 kHz Roofing filter included
- High-speed Direct Digital Synthesizer (DDS) and high-spec Digital PLL for outstanding Local Oscillator performance
- Original YAESU IF DSP advanced design, provides comfortable and effective reception. IF SHIFT / IF WIDTH / CONTOUR / NOTCH / DNR
- DSP enhancement of Transmit SSB/AM signal quality with Parametric Microphone Equalizer and Speech Processor
- Built-in high stability TCXO (±0.5 ppm after 1 minute@77° F)
- Built-in automatic antenna tuner ATU, with 100 memories
- Powerful CW operating capabilities for CW enthusiasts
- Five Voice Message memories, with the optional DVS-6 unit
- Large Multi-color VFD (Vacuum Fluorescent Display)
- Optional Data Management Unit (DMU-2000) permits display of various operating conditions, transceiver status and station logging.
- Optional RF μ -Tune Units for 160 m, 80/40 m and 30/20 m Bands

Optional, YAESU Exclusive, Fully-Automatic μ -Tuning Preselector System!

Fully automatic, Ultra-sharp, External μ -Tuning Preselector (optional) features a 1.1" (28 mm) Coil for High Q

On the lower Amateur bands, strong signal voltages impinge on a receiver and create noise and intermod that can cover up the weak signals you're trying to pull through. YAESU engineers developed the μ (Mu) Tuning system for the FT DX 9000/FT-2000, and it is now available as an option for the FT-950. Three modules are available (MTU-160, MTU-80/40, MTU-30/20); these may be connected externally with no internal modification required! When μ -Tuning is engaged, the VRF system is bypassed, but the fixed Bandpass Filters are still in the received signal path.

Optional External Data Management Unit (DMU-2000) Provides Many Display Capabilities

Enjoy the ultimate in operating ease by adding the DMU-2000! Enjoy the same displays available with the FT DX 9000 and FT-2000: Band Scope, Audio Scope, X-Y Oscilloscope, World Clock, Rotator Control, Extensive Transceiver Status Displays, and Station Logging Capability. These extensive functions are displayed on your user-supplied computer monitor.

Shown with after-market keyer paddle, keyboard, and monitor (not supplied).

DMU-2000
Data Management Unit (option)

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

Vertex Standard
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zero bias — a CQ editorial

BY RICH MOSESON,* W2VU

"The Sunspot Cycle is Dead! Long Live the Sunspot Cycle!"

Waiting for the new sunspot cycle to begin has been a little like living in an old-time kingdom, knowing that the sovereign was on his deathbed and just waiting for word from roving couriers that his long decline was over and that a new ruler had been installed. "The king is dead! Long live the king!" they'd cry. And we would all know that a new era had begun, even though we knew little to nothing about the new king.

So it is today as the news filters in from far-off sources (such as the orbiting SOHO solar observatory) that the long-ailing sunspot cycle that has ruled our radio lives for lo, nearly twelve years now, the 23rd in the current line, was declared dead by the royal physicians on the fourth day of January; and that the reign of its successor, Cycle 24, has officially begun. "The Sunspot Cycle is Dead! Long Live the Sunspot Cycle!"

It is much too early to know whether Cycle 24 will be a benevolent ruler, or whether its reign will be short or long-lived. There hasn't even been time to plan the coronation. Yet, there are already signs of life in the castle. After a long period of dormancy, lights in some far-off windows are beginning to be visible. And some wings of the castle—seemingly dead themselves in recent months—are showing signs of renewed activity.

In mid-January, for example, I tuned in 10 meters late one evening, hoping to find a couple of strong local stations to help me with some audio tests. It was about 10:30 at night. I never found the strong locals, but I did hear two fairly weak stations via groundwave from Brooklyn, New York (about 15–20 miles from my QTH in northern New Jersey), talking first with a station in St. Louis, Missouri (about 950 miles away) and then with another in South Carolina (about 750 miles away). I was able to hear all four stations. The strongest signal came from South Carolina. He was still talking with the guys in Brooklyn when I turned off the rig at about 11:00 PM.

The following night, according to reports on PropNet.org, there were openings of similar distances between stations in the southwest, also in the late evening local time (0600-0800 UTC). Now, there's nothing unusual about those distances—they're at the short end of sporadic-*E* range. But the *E* layer of the ionosphere depends on sunlight to get those electrons bouncing around All of these paths were long into nighttime at all points. So it wasn't your typical sporadic-*E*. Ten meters, late at night at the bottom of the sunspot cycle, is supposed to be dead, closed, good for local groundwave contacts only. Yet here were stations coming in from nearly 1000 miles away, with respectable signals. There are a few possibilities: (1) the "common wisdom" that says such paths are impossible is wrong (highly unlikely, say the possessors of the common wisdom); (2) Ten meters is on its way back! (too early, says the common wisdom), or (3) Ten meters was never really as dead as the common wisdom said it should be. And if you look at the results of last May's CQ WPX CW Contest (p. 24), you'll see that the top single-band entry on 10 meters made nearly 1300 contacts, and his prime competition wasn't far behind. And remember that in 2006, six meters opened from the U.S. east coast to Europe and from the west coast to Japan. Impossible, said "the possessors." Can't happen at the bottom of the cycle. Happened anyway.

Another example of achieving the so-called impossible is in K2RIW's article, "Wireless Magic," on page 32. It seems that when I wrote here in January about Dick's tech net on the LIMARC (Long Island Mobile Amateur Radio Club) repeater, I got some of the details wrong. Dick's article sets everything straight … and makes it crystal clear that the "common wisdom" that range on UHF is limited to line of sight is not only wrong, but *very* wrong. Especially if you've got enough power and enough aluminum in the air.

This is why propagation research—such as Dick and his partner were conducting—continues to be important, and why projects such as PropNet (www.propnet.org) are important. We need to remember that all the discoveries have not been made yet; that there is still quite a bit about propagation that we don't know; that the best way to find out if a band is open is to be on it, and that experts and "common wisdom" aren't always right.

Cultivating New Hams

Speaking of things "everybody knows" that aren't really right, there was an interesting thread of messages recently on the ARRL public relations reflector. One member wrote, "…if we don't come up with some additional angles that could attract people enough to want to get licensed, I think ham radio will continue its downward slide along with buggy whips, 8-track stereos, telex machines, floppy disks, film cameras, etc." That pretty much represents the "common wisdom" that amateur radio is obsolete, is in a steady decline and has been for a few decades now. The truth is that the all-time peak in amateur licenses came in 2003, just before the first round of code-free Technician licenses issued in 1991 started falling off the FCC's rolls (10-year license term plus 2-year grace period). For the past year, though, the numbers have held pretty steady and have even climbed a bit in recent months. Another reflector member, K2GW, took a look at the U.S. amateur population since 1930 as a percentage of the country's overall population and came up with a picture that was very different from the first one. Taking a snapshot from the so-called "golden days" until now, in 1950, his figures show that hams represented 0.06% of the overall population. By 1960, thanks to the Novice license and Sputnik, our population had nearly tripled (from 87,000 to 230,000) and at that point represented 0.13% of the U.S. population. By contrast, today we have over 655,000 licensed hams, representing 0.22% of the overall population. As I've often said before, not too bad for a "dying hobby."

BUT … this doesn't mean it isn't important to bring in new blood and to actively recruit new hams. The ARRL has set a goal of bringing 30,000 *new* people into amateur radio during 2008. It's ambitious but entirely achievable. We support and encourage this effort, but the keyword here is effort. And we can't rely on "those people in Newington" to get it done on their own. The League has a full-time Membership Director, but she is her entire staff. One person cannot recruit 30,000 … but 30,000 people can each recruit one. So let's help the ARRL reach its very worthy goal. Virtually every *CQ* subscriber is an active ham. Our challenge to you for 2008 is to recruit one new person into our hobby, just one (OK, more than one would be even better). Not only that, but do it again in 2009, and in 2010, etc. If 30,000 people each recruit one new ham each year for three years, that's 90,000 new faces, new callsigns, new opportunities for building worldwide friendships. But that's not all. You've also got to get your new recruits on the air and get them excited about ham radio. That way, they'll not only be active, but they'll also start doing their own recruiting. And that is the real ticket to sustained growth.

Now let's get out there and make it happen! After all, it's a new sunspot cycle out there… His Royal Highness, Sol XXIV, commands it!

73, W2VU

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

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Shipping Weight	26 lbs.
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Brake Power	**9000** in.-lbs.
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	31 lbs.
Effective Moment (in tower)	**3400 ft.-lbs.**

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

HAM-V

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

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

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

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announcements

Long Island Radio Day 2008 – The Long Island Wireless Historical Society will hold this event on Saturday, March 1, at the Tilles Center Atrium, C.W. Post Campus, L.I. University, Brookville, NY. Featured will be all aspects of radio from early spark transmission and Morse telegraphy to ham radio, broadcasting, radio control, and antique radios, plus lectures, tours, and workshops. Information call 516-623-5967.

50-year Sweetwater Jaycees Rattlesnake Roundup – This special event, sponsored by the Nolan County Amateur Repeater Association, will be held from 8 AM (local) March 7 to 5 PM March 9 on 7.245, 7.275, 14.247, and 14.256 MHz. For more information and certificate, contact Gary Armstrong, KC5NOX, 806 East 16th, Sweetwater, TX 79556 (e-mail: <garyarmstrong@sbcglobal.net>.

The following hamfests, etc., are scheduled for March:

Mar. 1, **2008 Greater Houston Hamfest**, Ft. Bend County Fairgrounds, Rosenberg, Texas. Contact Allen Brier, N5XZ, phone 281-342-1590, e-mail: <n5xz@arrl.org>. (Exams)

Mar. 8, **MTARA Hamfest**, Springfield Ternverein Club, Feeding Hills (Agawam), Massachusetts. Contact Cindy, K1ISS, phone 413-568-1175, e-mail: <k1iss-n1fi@comcast.net>; <http://www.mtara.org/ flea08.html>. (Talk-in 146.940 [PL 127.3]; exams 12 noon)

Mar. 8–9, **Charlotte Hamfest**, Charlotte Merchandise Mart, Charlotte, North Carolina. Contact info: phone 704-948-7373; e-mail: <hamfest@w4bfb.org>; <www.w4bfb.org/hamfest.html>. (Talk-in 145.29 [–600 kHz]; exams) *See us at the CQ Booth.*

Mar. 15, **Kennehoochee Hamfest**, Jim R. Miller Park, Marietta, Georgia. Info: <www.W4BTI.org>. (Talk-in 146.880 [–PL 100]; exams)

Mar. 15, **Charleston, WV Hamfest**, Coonskin Armory, Charleston, West Virginia. Contact Jim Damron, N8TMW, phone 304-965-5349; e-mail: <n8tmw@arrl.net; <karc.wvhamradio.com>. (Talk-in 145.35; exams 12:30)

Mar. 29, **Mississauga & Peel ARCs Ham-ex**, Brampton Fall Fairgrounds, Brampton, Ontario, Canada. Information: e-mail <info@ham-ex.ca>; <http://ham-ex.ca>. (Talk-in 145.430 [–103.5 tone]); exams)

Mar. 29, **Columbus ARC Hamfest**, Bartholomew 4H Fairgrounds, SW of Columbus, Indiana. Contact Marion Winterberg, WD9HTN, 812-342-4670, e-mail: <carc_in@yahoo.com>. (Talk-in 146.790/146.190 PL 100.0; exams 11 AM)

Mar. 29–30, **2008 Greater Baltimore Hamboree & Computerfest**, Maryland State Fairgrounds, Timonium, Maryland. Information: phone 443-590-1444; e-mail: <W3FT67@yahoo.com>; <www.gbhc.org>. *See us at the CQ Booth.*

Mar. 30, **Contoocook Valley Radio Club Hamfest**, Henniker Community School, Henniker, New Hampshire. Contact Jim, N1SE, 603-428-7436; <www.k1bke.org>. (Talk-in 146.895 [–600 Hz, PL 100]; exams)

our readers say

"Ham Radio's Technical Culture"

Editor, *CQ*:

I was disheartened to read another review of *Ham Radio's Technical Culture* in the September issue. I do not take particular issue with WA8FOZ, the author of the review. I do think that *Ham Radio's Technical Culture* does, however, belong on the trash heap.

The work discussed is written in the style of a scholarly work. The scholarship of the author, Kristen Haring, is, however, extremely poor and her ignorance of radio and radio amateurs is great. The book will be offensive to some. The book is based on reading back issues of *QST* from the 1950s and 1960s and not speaking directly with radio amateurs or attending the larger hamfests in order to see the full scope of amateur radio. Because of *QST*'s understandable focus on American amateur radio, the author has failed to see amateur radio as a worldwide phenomenon. ... Our fellow hams in Japan, for instance, are largely Japanese and not Americans.

Radio amateurs come from society in general and amateurs reflect the full political and social spectrum. On average, radio amateurs are a little smarter, have a bit more income, and are better educated that the general population, but they do reflect society in general—even sometimes the less attractive aspects. The author might lead some to think that radio amateurs are a bunch of racist, sexist, xenophobic, and drunken fellows. Some of the references to homosexuality are outright bizarre. On average—and this should be the point of such a book—radio amateurs have educated themselves on emerging communications

(Continued on page 97)

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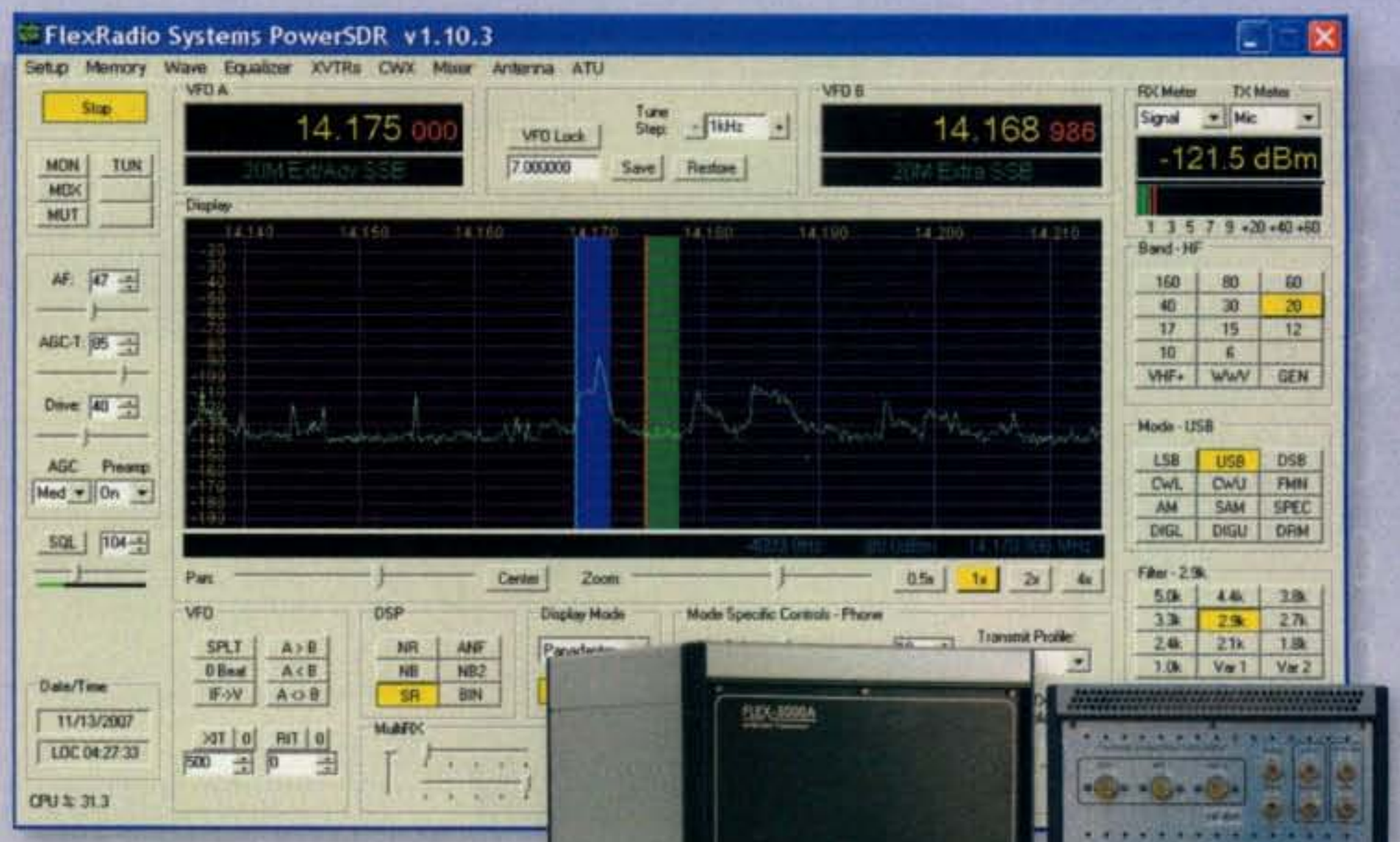

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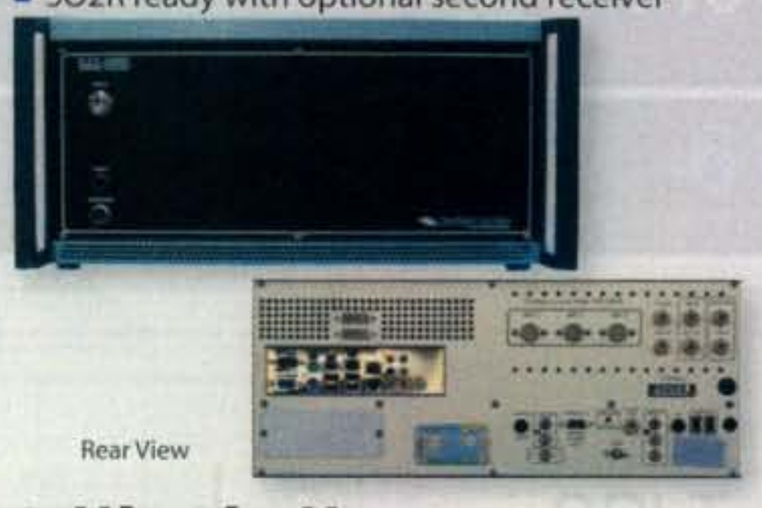

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T6EE, the first individual amateur radio licensee in current-day Afghanistan, shares his story of bureaucratic intrigue in getting a license, getting on the air, and getting the Amateur Radio Service in Afghanistan back in business. Oh, and he says anyone you may have worked with a YA call is probably operating illegally.

"The Responsible Person"

Bringing Amateur Radio Back to Afghanistan

BY JOHN KOUNTZ,* T6EE/KE6GFF

Nadershah Arian

Unqualified gratitude for the development of government-licensed amateur radio operations in Afghanistan is due to Engineer Nadershah Arian, Head of the Spectrum Allocation Department and Member of the Telecommunications Advisory Committee, Ministry of Communications, Islamic Republic of Afghanistan. That individuals may now obtain operating licenses is due in large measure to his efforts. Had he not been there and had I not mounted a campaign lasting nearly three weeks and which engaged practically every department of the Islamic Republic, the United States Embassy, and over 100 different taxi cabs in September 2004, a way would still have been found ... but someone else would have to have found it.

The much sought-after QSL card of John Kountz, KE6GFF/T6EE, one of only nine amateur radio operators currently licensed by the government of Afghanistan. (Photos courtesy of the author)

My connection to Afghanistan extends back more than 45 years. In October 1962, I drove across the country, and then returned there from the Pakistan-India border to sell the Italian car I had driven from Europe. Thus, a planned overland journey to the Malay Peninsula was ended. The ever-vigilant Government of India had a particularly curious requirement at the time that Indian auto insurance issued in the country of the car's origin was a prerequisite to driving on their roads! Given the condition of the typical Indian vehicle ... oh, well.

Pakistan, in contrast, didn't give a hoot but was broke, and I needed money to get back home! Afghanistan didn't give a hoot either, and there was money in Kabul for any functioning vehicle (in my case, a Lancia B10 Aurelia).

With that beginning, and the wonderful people by whom I was befriended, I returned several times to Afghanistan over the next decades to visit and act as sound recordist for assorted television broadcasters. Throughout those trips, the last thing on my mind was amateur radio. Perhaps this was because, although I've been engaged in electronics for longer than I can remember, my focus was audio and control, and I was neither motivated nor did I have the time to become an amateur radio operator.

That changed abruptly in 1993 with a catastrophic fire in Laguna Beach, California, a city characterized by natural disasters and litigious neighbors. As 366 homes were destroyed, telephone failures left no communication alternatives and that was enough for my wife and me. A weekend course by George Hively (W6GRH, now a SK) at Sony Studios in Culver City culminated with Technician Class licenses for both of us. KE6GFI, my XYL, took to amateur radio like the proverbial fish to water, and *voilá,* she was an Extra Class who spent considerable time goading me to do likewise (at a slower pace ... it is a hobby, after all). In fact, it wasn't until 2000 that a merger of amateur radio and

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e-mail: <John@T6EE.com>

Afghanistan dawned on me and advanced licensing became important. I became a General and then an Extra Class amateur!

Amateur Radio in Afghanistan

Afghanistan was (and, in certain measure, continues to be) a country without any infrastructure, and a large percentage of its population is either nomadic or living in isolated regions. Amateur radio could fill this communications void for these folks in a way otherwise only satellite telephones can, but at a significantly lower cost. Why then hasn't amateur radio been promoted? From my viewpoint, there are several reasons:

First, politics: Past governments were neither motivated to foster amateur radio nor to support radio transmission capabilities not directly under their control.

Second, education: In discussions with urban Afghans, I've learned that they usually view amateur radio as a rich man's indulgence or a foreigner's pastime. Rural Afghans, on the other hand, are aware of—but do not have—electricity, let alone the range of appliances made possible by that energy source. Also, while during the Russian occupation some were exposed to amateur radios with SSB used between mujaheddin groups, there was little thought that this equipment was anything but institutional. Thus, where a transistor receiver may exist, an individual amateur radio operator was a foreign concept and, although our military gave out satellite telephones to a chosen few, most are suspicious of those using them.

Third, logistics: While most cities and large villages have a local tinkerer capable of troubleshooting and perhaps fixing a radio or a television, there exists no widespread knowledge of electronics, and spare parts are not readily available.

Fourth, control: The Islamic Government of Afghanistan is just discovering the scope of its responsibilities, including telecommunications. Rarely do laws, rules, regulations, processes, and procedures emerge without a need to fill a requirement. As might be suspected, government participation in the development of amateur radio wasn't even on the horizon prior to 2004.

Even today there are no native Afghan amateur radio operators. In fact, it is not unsafe to assume there has never been an Afghan amateur radio operator in Afghanistan. Of course, there were numerous transient amateur operators who took advantage of lax governmental control and lack of enforcement by simply operating using "YA" callsigns of their own design. The earliest documented was Ralph A. "Pete" Peterson, an American using the call YA1AA in the 1950s. He was followed by Hank, YA1AM; Pit, YA1BW; Herbert Schastok, YA1OA; and so on. From 1963 to 2003, European and American employees of assorted foreign companies and governments took it upon themselves to fill the amateur vacuum by operating under a variety of YA callsigns. For the curious, a simple web search of "QSL collection" should fill in the blanks. Also, by the way, bootleggers abound in Afghanistan. YA calls continue to be abused, and my own call, T6EE, was used by someone operating on 80 and 20 meters a month after I had left the country.

Clearly, ministry-issued YA calls for various government and commercial stations have also been used by amateurs; the vacuum would be filled. The best example of these is YAØUSA, issued to the United States Embassy by the Ministry of Communications in 2002. Carl Renz, K4YT, obtained the call for the use of embassy employees. This would be appropriate since the YA call is for commercial stations, and one can suspect that it applied to the embassy's

Transitional Islamic Government of Afghanistan
Ministry of Communications
State Radio Inspection Department

دولت انتقالی اسلامی افغانستان
وزارت مخابرات
ریاست نظارت دولتی مخابره رادیویی

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اجازه نامه موقت استفاده از رادیوی آماتور را به آقای(JOHN C. KOUNTZ) تبعه کشور
ایریکا درمدت زمان انتخابات بروی مشخصات ذیل صادر نموده است

Name:	John C. Kountz
Passport Number:	
Station Name:	Amateur
Location:	Kabul, Shahr-e-Naw
Frequency:	14.200MHz
Power:	100 Watts
Class of Emission:	SSB/CW
Call Sign:	T6EE
Operating Hours:	24hrs
Issue Date:	04.10.2004
Expiry Date:	End of mission

قابل تذکر است اینکه باشنلی تعهد موصوف بمقدار حجم وعیار انتخابات ، رادیوی مذکور را به اداره
نظارت مخابره رادیویی وزارت مخابرات منظور آموزش پرسونل های این اداره تطوریکه تسلیم
میباشد که باظهار سپاس ازایشان توسیله نامه گزه محبت ازارتباط کاری ومسلکی این اداره استفاده
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مراتب فوق جهت آگاهی آن اداره محترم نگاشته شد

باحترام
انجنیر محمد معصوم ستانکزی
وزیر مخابرات

(Mr. John C. Kountz) سند کاپی به آقای بنام

Ministry of Communications
Mohammed Jan Khan Watt
Kabul, Afghanistan
Telephone: +93 20 2301130

وزارت مخابرات
محمد جان وات
کابل افغانستان
تلفون: +93 20 2301130

The author's original license document, from 2004, issued by the Ministry of Communications of the "Transitional Islamic Government of Afghanistan."

station and not a specific individual. While YAØUSA may still exist, it was silent during my visits in 2004 and 2006. It may return to the air once the new, multi-story embassy "fortress" is completed.

Today, "T6" callsigns (and licenses) for the Amateur Radio Service have been assigned to only nine individuals by Vizarat-e Mukhabarat (the Ministry of Communications, or MOC), the last being issued in December 2007. All are foreign nationals, including me. The list in Table I was provided by MOC and uses their terminology.

Getting the License: *Not* a Walk in the Park

It appears I am unique (something my mother told me as a small child) as the only non-Afghan, non-affiliated, unsponsored person to go Afghanistan at regular intervals simply to visit friends. Everyone else from the west goes there to make money, play soldier or spook, or be the representative of some organization or other. Because this is the case, I hadn't the faintest idea as to the strings, threats, or bribes various organizations pull to get their employees "on the air."

My first license (2004) was the product of discovering who the "responsible person" was (no modest endeavor, I assure you) in the Transitional Islamic Government of Afghanistan, a government for which neither a constitution nor a president had yet emerged. That this would be more than a phone call and, thank heavens, less than a career, should amaze no one. This was my odyssey...

Day One: Vizarat-e Mukhabarat

My first move was to the Ministry of Communications. There, on the tenth floor (the elevator didn't work), I met Engineer

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TEN-TEC

Call	Name	Made by	Power	Antenna type	Polarization
T6EE	John Kountz	Yaesu	95 watts	Inverted-V	V
T61AA	Ross Ballantyne	ICOM	100 watts	Wire dipole	H
T66T	Mika Karjanlahti	Kenwood	100 watts	—	H
T6GTT	Giannandrea Mangiavachhi	Kenwood	100 watts	Inverted-V	V
T6X	Andrey Fedorov	Yaesu	200 watts	Dipole	H
T68G	Johnny Johnson	ICOM	100 watts	Vertical OMNI Directional	V
T6KBLJD	James David Anderson	Yaesu	95 watts	Dipole	V
T6KBLRM	Rene Matthes	Yaesu	100 watts	Dipole	H
T6KBLNH	Normand Hokayem				

Table I– The nine individuals currently licensed by Afghanistan's Ministry of Communication, along with their transmitter brand and power, and the type and polarization of their antennas. (Courtesy MOC)

Nadershah Arian. I was dispatched to the Ministry of Foreign Affairs, where the proper approval would be provided to settle the matter.

Day Two: Vizarat-e Safarat

After wandering halls, climbing stairs, pumping hands, and drinking tea for almost an entire day, I found an office on the third floor of this British colonial brick structure where I supposedly would find that "responsible person."

It was significant that I had met practically everyone in the ministry and consumed more tea than medically advisable, but due to the lack of a sufficiently responsible person, I was now being accompanied by an underling from Foreign Affairs to the Ministry of the Interior in search of an even more responsible person. None was found. It was, however, gratifying to be told while walking back to Foreign Affairs that "...we are really trying to help you, but no one has ever asked for an amateur radio license. Please understand, there is no precedent..."

I was next dispatched to the United States Embassy with the idea that it would only take a few minutes and I could return to the ministry that afternoon. The ministry would be open until 4 PM.

Day Three: Safarat-e Amrika

The United States Embassy in Kabul is more fortress under siege than the architectural representation one might expect of the world's only superpower. There, in front of a tank barrier consisting of huge, staggered concrete blocks, was where the taxi dumped me off. The entrance to the embassy was about a quarter of a mile down a vacant street, each side of which was walled by three high container-vessel containers over the tops of which helmeted heads peered down on you. Finally, confronted by a door on either side of the street, I selected the one which seemed to be more inviting. A faceless voice asked, "What you want?" I responded, "I would like to meet with someone who could help in my dealing with the Ministry of Foreign Affairs."

The anonymous response was, "You citizen what country?"

My reply, "United States of America," provoked an unbelieving, "Give you passport!" I slid my passport through a slot in the wall adjacent the door, and apparently, once a connection was made between my face and the picture in the passport, there came a grunt and the door opened, my passport returned through another slot on the inside of the wall. I was shunted into a shooting gallery caged in on one side by cyclone fencing while the other side consisted of a solid, pock-marked concrete wall. About a dozen soldiers stood some three yards beyond the cyclone fence, weapons at the ready—for people just like me, no doubt. Passing through the shooting gallery, I entered a maze consisting of right-angle turns to emerge at a security gate where I was frisked and allowed to stand on a shipping pallet floating in a puddle of mud. There I found myself facing a soldier with the name "PHYZTER" stenciled on his flack jacket who lectured me from an elevated guard house. Obviously well-versed in winnowing spies from visitors, he challenged my entering the compound without an invitation and without the name of a specific responsible person. I suggested that the name of anyone at the embassy would be a plus, and he countered that I should make arrangements in advance and barked telephone numbers with Washington, DC prefixes followed by a couple of local telephone numbers. The DC numbers may or may not have been valid, and the local ones were bogus as there is no functioning telephone system in Kabul, much less a phone book.

There was no fee for John's 2004 license, but when he went back to reactivate it in 2006, he had to pay US$200! A further renewal for 2007 cost only US$35. (And you think $11 for the FCC to issue a vanity call is a lot!?)

Back with my friends, someone had met the United States Ambassador and he happened to have his cell-phone number.

Day Four: To Wait...

Of course, I immediately called the ambassador only to be told, as you might guess, perish the thought, he was busy with the presidential election (it was 2004 and that was the task *de jour*.) I asked if there was someone other than the Ambassador available and was given the number of an aide, 282828, who might be of assistance. Well at least it was a cell-phone number, but I didn't realize its significance until I had used it a couple of times (to wait, to wait, to wait!).

Day Five: Still Looking

Another call to my embassy resulted in a staff person who spoke English fluently, and although his comprehension may have served the embassy, his inability to identify anyone responsible for anything did little to further my effort. Back to scheming at my friend's house.

Day Six: A Little Progress

The next morning, with luck at my side, I tried the 28... number and got 28's roommate, who excused his companion's absence and told me to contact (let's call her) "Jane" at a certain number. ... I did so, with modest success. In Muslim countries, Friday is a holiday, whereas our hardship post bureaucrats take Saturday and Sunday off for a nominal work week of four days. Pretty tight window, but with perseverance, a breakthrough! It was Saturday, and as luck would have it, Jane answered. I asked for an audience, indicating the need for a letter of introduction. She began a litany: Monday was out, as were Tuesday and Wednesday; how about Thursday? Yes Ma'am, Thursday morning, and by the way, is the door on the right-hand side of the street? ... Oh, it's the one on the other side ... understood. See you on Thursday. The respite was welcome.

Days Seven through Ten:

I felt something would happen, so why not use the next few days to make ready, regardless of outcome? Telephone lines were purloined from those poles on which telephone lines still existed—a total of 50 feet of three strands of 22-gauge steel and two strands of 22-gauge copper. A survey of available power dictated a car battery. Those readily available ranged from Lada jeeps (of three, one had a battery with more than two functioning cells) to a Lexus SUV (the battery of which finally saved the day, but only after sheer luck, as explained later). I also needed a suitable location for an antenna that didn't stick out like a sore thumb to raise the curiosity of the morning ISAF helicopter flights over the neighborhood.

Day Eleven:

Two Global Security Gurkhas and a giant from somewhere in the Midwest stood at the entrance. Apparently, earlier I had gone to the wrong door. Oh, well, I'm here now and let's get this over with. I was issued a temporary "Call me Charlie"

The dots on the world map indicate places contacted by T6EE in 2006 and 2007. As you can see, propagation on 20 meters (the only band on which he is licensed to operate) favored Europe and western Asia.

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Designed from the ground up to provide 100 watt power handling in a small, lightweight package. Perfect for portable as well as sitting on your desk in your shack! The Z-100 will tune with 0.1 to 125 watts (50 watts on 6 meters), making it an excellent choice for almost any radio or operating style. Backpackers and QRP operators will appreciate the latching relays. Power can be removed from the tuner once you have tuned. Additionally, when it's not tuning, it draws nearly zero amps. ***Suggested Price $149***

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badge which identified me as acceptable as long as I was accompanied. Thus accompanied, I met Jane. It was interesting that YAØUSA existed, yet Jane had scant idea about amateur radio and suggested that I simply dictate whatever I wanted to say and she would type and sign it. Rather than ask for 40 acres and a mule, I said that I would like to set in motion an amateur radio activity in Afghanistan for Afghans and to that end would donate a Yaesu FT-897 to the MOC. Included in the "deal," I would operate a special event station on the occasion of the country's first open presidential election. I dictated, Jane typed, and several photocopies were made, just in case.

Day Twelve: Getting Responsible

"Ah, it took too long, this letter..." was the observation from the gentleman who earlier had dispatched me to the United States Embassy. He was referring to the fact that a few hours had stretched into a few days, but that was behind me now and so down to business. More introductions, tea, and stair climbing to find the responsible person. Finally, dressed in a smoking jacket, stoking a pipe, and seated at an enormous desk sat ... the responsible person. He offered me a cup of tea, which I declined, as he read the letter from the Embassy, and he told me to come back the next day.

Day Thirteen: Making Progress

Back at the Foreign Ministry that morning, the responsible person wouldn't be in until after noon: Would I care to wait (and drink more tea)? Not to let this chance slip by, I opted to wait, without tea. He arrived, had a few questions about amateur radio, and asked why I hadn't simply applied to the School of Journalism at Kabul University to broadcast over the radio. I explained that it wasn't just to transmit, but to receive as well. This was a concept somewhat beyond his acquaintance with radio, but he understood the idea and dispatched one of his underlings to compose a letter to the MOC. Letters in hand and expressions of gratitude abundantly presented, I was on my way to the MOC (essentially across the street from the Foreign Ministry). It was, however, after 5 PM and the MOC was closed.

Day Fourteen: YES! (Almost)

It was early in the morning when the gate opened at MOC and I passed my body search. I crawled up the ten flights of stairs characterizing the Ministry of Communication in 2004 to the Division of Spectrum Allocation, and after tea, offered up my package of letters. "Come back tomorrow and we'll have the license ready."

"By the way," I was asked, "what would you like as a callsign?" "T6EE," I responded, adding, "I believe an Afghan should have T6A."

Day Fifteen: Inching Closer

I was given an application for a commercial station license and attempted to fill it out, recognizing that a fixed frequency (14.2 MHz) would apply, as would a fixed location, antenna type, radio type, power, and manufacturer. My nationality, age, physical characteristics, and assorted minutiae, including a photograph, completed the document's requirements. In the early afternoon, I was presented with a letter in Dari (the dialect of Persian spoken in Afghanistan) explaining and recognizing the amateur radio station I could operate and a copy of the commercial application I had completed. Needless to say, I had several copies made before I left the MOC. I was told that I would have to go to the Ministry of Information and introduce myself. It's not over 'til it's over!

Day Sixteen: Ministry of Information

Almost all government buildings in Kabul stand at the edge of Pashtunistan Square (which is a round traffic circle and on the fringe of Zarnegar Park). The Ministry of Information is no exception. Because this is the center of Kabul, it is also the most traffic saturated and people-laden place in the city. As luck would have it, my taxi let me out at the entrance to Zarnegar Park (which is more refuge for the city's homeless than park). Because the park is very large and has only one entrance (which I didn't know at the time), I had to find a way either around or across it to get to the Ministry of Information. I selected the "through the park" approach only to discover the single-entrance feature. I can imagine the amazement of assorted shopkeepers as they watched an old guy climbing over the 3-meter high chain-link fence surrounding the park.

At the Ministry of Information, the standard tea was offered while people were dispatched to find out what to do with me. Ultimately I was introduced to the Head of the Bakhtar Information Agency (the government news service), who insisted that I had to employ an Afghan to run the

station. Believe me, it took the entire afternoon and a parade of bureaucrats to finally convince the gentlemen of the Ministry of Information that I was going to operate a device about the size of a tiffin (lunch box) with the power of a light bulb. Another cup of tea and I was out the door and back to home base.

Day Seventeen: Antenna Building

It took the entire day to find someone daring enough to climb the elderly pine tree and pull plastic cable through its tangle of wasp nests and dead limbs and feed it to the ground below. Because metal cable is available in one form or another everywhere, only unique antenna parts needed to be schlepped from overseas. These parts consisted of a coax connector with pig tails soldered to it, a 100-foot length of terminated RG58, and two 1-inch by 2-inch pieces of quarter-inch thick Plexiglas plates with holes drilled about a half inch from their ends. I connected 17 feet of telephone cable to each side of the coax connector and a Plexiglas insulator to the ends of the telephone cable. Then, with the RG58 and plastic cable attached, the entire thing was hoisted between the top of the pine tree and a rooftop, about 45 feet in the air. I cheated: It wasn't the inverted-V as indicated on the commercial license application; it was a wire dipole, which was rotated by climbing to the roof of the supporting building and walking one end of the antenna to a more productive orientation while reeling in the plastic cable from the tree as needed to keep the antenna away from the rooftop, which was corrugated steel.

Day Eighteen:

Securing the Lexus battery (from Guam!) took a modest amount of diplomacy (the Lexus would be immobilized during the time it was in "amateur" service.) It turned out that the Lexus owner would be out of town during the time remaining for amateur radio operation. A battery charger was a different story. The battery charger was negotiated from a machine shop and was huge (2 feet by 3 feet by 3.5 feet; 75 pounds) and growled fiercely when electricity was available. It worked and that was all that mattered.

Also, while on the subject of power, there was no dependable source of electricity. As mentioned earlier, Friday is a holiday that is dedicated to prayer. The city's mullahs, to ensure full congregations, turn off the electricity in each district (if not the entire city) on Friday. Plus, because it was Ramazan (the fasting month, also known as Ramadan), electricity was sporadically on and off each day at the whim of who knows who. Because of the lack dependable electricity, there are numerous diesel and gasoline generators, all of which make a lot of noise (both of the sound pressure level and electrical type). While battery powered, the ambient electrical noise level was typically S7 to S9, while sound levels, although unmeasured, were at least +70 dbC or more.

I am quick to add that the internal batteries in the FT-897 saved the day once the station was up and operating. Although the battery was rated at 100 AH (amp hours), I still had to keep an eye on the FT-897's voltmeter, and when the Lexus battery began to droop, I'd switch over to the internal batteries and run on low power.

Day Nineteen, et seq.:

On the air at last, and there's little to add, except that of the 132 completed contacts, nearly all have resulted in QSL cards. My only regret: I wasn't able to participate in the CQ World-Wide DX SSB Contest. I simply was there at the wrong time.

And Then 2006...

A glutton for punishment to begin with, I was amazed when my XYL facetiously suggested, "Why don't you try operating from Kabul during the CQ WW?" A suggestion I'm convinced she has regretted ever since. Needless to say, I accepted her "offer."

This time around things went considerably more smoothly. I knew on which side of Zarnegar Park to get out of a taxi, the services of Mr. 282828 and Jane were not required, and a 130-AH Japanese truck battery was purchased for US$70. I brought a complete wire dipole with me this time and a fresh FT-897 with an LDG antenna tuner and meter (to monitor battery voltage). The license problem was not solved, however, and a simple renewal was not in the offing, because no procedures existed at the time I was granted the original license. In the intervening two years, a US$200 license fee had come into being. Since I had paid nothing for the original license, I now had to pay US$200 to get on the air. I had no problem with the fee, and to allay any fear that this wasn't bakhshish (a bribe), I was given an official receipt and that was that. The results were considerably less time running from ministry to min-

A sampling of the QSL cards John has received for his contacts from T6EE. He's planning another trip to Kabul this year. … Will your card be added to the collection?

istry and more time on the air. I racked up 1623 Q's and 85 countries, of which 236 contacts were made during the CQ WW contest.

However, all was not roses, and lessons continue to be learned. Time, particularly accurate local time, is non-existent. I'm sure that the times I submitted for the CQ contest were terribly out of kilter given that Kabul time is +4.5 hours from Zulu and the only source of "accurate" Zulu was IRNN, the Iranian state television station, which has a rotating scroll of Tehran, Mecca, and UTC times during in its newscasts. Unfortunately, the T6EE station was not near any known television set, and therefore the time had to be "hand-carried" by wristwatch once transcribed from IRNN. Hand transcribing the log was also a challenge, particularly during pile-ups, of which, as you might imagine, there were several. The time problem was to yield a CQ WW SSB score of 20,000 (a lesson indeed).

… And 2007

This past year was anticipated to be the first time that Afghan amateur operators would be on the air. I looked forward to the occasion, particularly their operation during the CQ WW DX Contest, which would have been a first of no small importance for this emerging country. Unfortunately, this was not the case. Assorted international radio and telecommunications conferences occupied the Ministry of Communications administrators, leaving no one to mind the store.

In fact, although I had been contacted by the Ministry to conduct a short (two-day) course on "What is Amateur Radio" for its technical and regulatory staff, scant guidance was provided by the Ministry. The three one-hour PowerPoint sessions were assembled with the XYL's help via the internet two days before they were presented. Some 35 people attended the sessions, which terminated with erection of an inverted-V antenna on the roof of the Ministry's building and a half-day demonstration of the operation and features of the FT-897. I had almost forgotten the radio I had given the Ministry three years earlier. Believe me, it was gratifying to discover that the radio had not disappeared ... into the local bazaar. I completed the sessions by distributing an array of ARRL publications and my e-mail address, should questions arise.

I was ready for some heavy-duty DXing and the CQ contest (in the depths of the worst propagation conditions imaginable). The Japanese truck battery was resurrected, use of the battery charger negotiated, and accurate time (a GPS receiver and a computer program to extract and display the time) would be available. Also, given the bad propagation, I took one of Vern Wright's collapsible 3-element Yagis (which, by the way, had to be suspended via plastic cable between two buildings, reviving the landlord problem and making for exciting "armstrong" rotation action). A nominal 240 Q's were made during the contest, with over 1100 overall for three weeks of operation, but only one from the United States, W3IHJ.

And...

Yes I'm about to do it again. As I said, the XYL would ...

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Specifications
SOLID STATE

Freq Band:
1.8 – 28 MHz,
all HF amateur bands

Operation Mode:
SSB, CW, RTTY

Exciting Power (RF Drive):
100W max. (85W, typical)

Output Power (RF Out):
1.5kW min., SSB/CW
(1.2kW on 28 MHz)
1kW, RTTY
(5 minutes key down)

Auto Band Set:
With most modern
ICOM, Kenwood,
Yaesu HF Transceivers

Antenna Tuner:
Compatible with external
Tokyo Hy-Power HC-1.5KAT

RF Power Transistors:
ARF 1500 by Microsemi x 2

Antenna Relay:
QSK (Full Break-in compatible)

Power Supply:
Built-in 220/230/240/250VAC,
3kVA max.

Dimensions and Weight:
12.8 x 5.7 x 15.9 inches
(WxHxD),
Approx. 57.3 lbs.

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Specifications
SOLID STATE

Freq. Band:
3.5 – 28 MHz
HF Amateur Bands

Operation Mode:
SSB, CW, FM

Exciting Power (RF Drive):
50W

Output Power (RF Out):
400W max., SSB (PEP)/CW
350W typical, 300W minimum

Band Select (or Switch):
RF-Sensed Auto Band Select
or Manual Select

RF Power Transistors:
THP – 120 x 4

Power Supply:
13.8VDC, 60A. max.

Dimensions and Weight:
8.7 x 3.5 x 13 inches
(WxHxD)
Approx. 11lbs.

Optional Accessories

HRC-60
External
Remote
Controller

HP-450
Light-weight 13.8VDC, 60A.
Switching Power Supply

**When used with optional HRC-60 External Remote Controller.*

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Results of the 2007 CQ WW WPX CW Contest

BY STEVE MERCHANT,* K6AW

Despite continued poor bottom of the sunspot cycle conditions, contestants enjoyed very high levels of activity and a huge number of prefixes in the 2007 CQ WW WPX CW Contest. We received over 2500 CW log entries—a 20% increase in the past two years. Activity in the CQ WPX contests continues to climb, especially among European contesters. This was the 49th running of the CQ WPX CW contest, and everyone is hoping number 50 will happen under much better conditions.

Single Operator All Band

Operating this year as 3V8BB, Hrane, YT1AD, narrowly piloted his Tunisia station past Steve, K6AW, at HC8N in the Galapagos. Harry, RA3AUU, traveled to Cyprus to operate P33W and placed third. Marko, N5ZO, operated as PS2T, winning fourth place for this well-known Brazilian station, and PJ2T (Jim, WI9WI, op.) was fifth. The top North American score was turned in by Ken, K6LA, operating his Prince Edward Island station, VY2TT.

Just as with the 2007 CQ WPX SSB results, the top two scores in the USA came from Dan, K1TO, operating this time as NE4AA, and Alex, LZ4AX, at KC3R. Unlike the close SSB results, Dan had over a one-million point margin on CW. Dick, WC1M, did a nice job taking third place. Dave, K1ZZ, took fourth as KO3A, and contest regular Bud, AA3B, took fifth in the USA.

Once again the top European score came from 9A1A (Emil, 9A9A, op.), followed by Manfred, DJ1YFK. In third place was Boris, S58A, while only a little over 50,000 points behind him was Roger, EA3ALZ, operating from EA6FO in the Balearic Islands. There were three Asian stations in the top ten: P33W, UA9CLB, and C4W.

The SOAB Assisted category had the first four entries spread out over just a half million points and the first two finishers were USA stations. Sig, N3RS, operated as NN3L to take the top spot, followed very closely by Chas, K3WW. Third place was won by Alex, VE3KF, operating from TO3T in Martinique. Gerry, GØRTN, operated G6PZ to take fourth in the world and was the first European winner in this category in 2007.

The competition for first place SOAB low power world and Europe was won by CT6A operated by Filipe, CT1ILT. There was a real horse race for second and third place between Yasar, TC3D, and Yuri, VE3DZ, with Yasar taking second by a narrow margin. Perennial top finisher in this category, Ed, N1UR, took fourth world and first USA as NV1N, and right behind him was David, EA1FAQ.

The race for world high QRP was between Bosko, YT7TY, and Bill, W8QZA at TI5N, with Bosko winning by a slight margin. Antonin, OK7CM, moved up a notch from the SSB test to take third. Doug, KR2Q, won fourth place world and first place USA, and Milan, OK1IF, took fifth place as OL4W.

Single Band

Ten meters is not dead. Pavel, OK1MU, operated TA2ZAF and made almost 1300 contacts to win the top spot in the world and Asia. Right behind him was Diego, LW9DA, in second, and Al, RU6CQ was third and first in Europe. Giuseppe, IT9BLB at IU9S, was fourth and Edin, T97M, took fifth.

Fifteen meters was very hot for Faisal, 9K2RR, who operated Hamad, 9K2HN's station to take first place world. Silvio, LW9EOC, repeated his SSB win by taking LS1D to second place. 4O2A was operated by Nesa, YT1NP, for the third spot, and fourth was taken by UR6F, (Nikolay, UXØFF op.) Fifth place was won by Milan, YU1ZZ, operating as YZØZ.

As usual, 20 meters was a busy place. The top station was YT2T operated by 4N1JA. The next six stations were jammed into a spread of less than 350,000 points—a very competitive space. In second was another Serbian station, 4N8A operated by Dusan, YU1EA. Third was Pedro, HK1X; fourth was II7M (Arturo, IK7JWY op.); fifth was Nikola, 9A5W; and sixth was LZ9W (Ros, LZ1RGM, or.)

Forty meters was a close race between frequent winner John, KK9A, operating P4ØA from Aruba and Dule, ZM3A, far away in New Zealand. Third place was won by Vaho, 4L8A;, Robert, S57AW, was fourth; and Ivar, YU1LA, took fifth. Dave, NN1N, took first USA over Dave, W6NL operating KZ6D. Tom, K1KI, was in third place.

Franta, 7XØRY took a nice lead to win the 80-meter single band competition from Algeria. SO2R (Kaz, SP2FAX) was second and first Europe; YR7M (Tibi, YO9GZU) was third; OK3R (Miro, OK1DVM) fourth; and Karl, S52AW, was fifth. Steve, W3BGN, was first USA followed by Mike, K9NW, and Steve, KØXP.

One-sixty meters is an interesting band at this point in the sunspot cycle, even in late May. Arunas, LY2IJ, was first world and first Europe. Low power competitor Ozer, TA2RC, was second as YMØT; frequent competitor Steve, ZC4LI, was third from Cyprus; Hans, DF2UU, fourth;

The Single Op, All Band USA winner was Dan, K1TO, operating NE4AA. Dan had over a one-million point margin over the second place entrant. This photo shows the 40- and 20-meter setups, the two bands on which 95 percent of the QSOs were made in the contest.

*e-mail: <k6aw@cqwpx.com>

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Specifications

Frequency:
1.8 ~ 28MHz all amateur bands including WARC bands and 50MHz
Mode:
SSB, CW, RTTY
RF Drive:
85W typ. (100W max.)
Output Power:
HF 1kW PEP max.
50MHz 650W PEP max.
Circuit:
Class AB parallel push-pull
Cooling Method:
Forced Air Cooling
AC Power:
AC 240V default (200/220/235) – 10 A max.
AC 120V (100/110/115) – 20 A max.
Dimensions:
10.7 x 5.6 x 14.3 inches (WxHxD)/272 x 142 x 363 mm
Weight:
Approx. 20kgs. or 45.5lbs.
Optional Items:
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Band Decoder Cables included for Kenwood, ICOM and some Yaesu

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Mode:
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RF Drive:
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Output Power:
SSB 750W PEP max.,
CW 650W, RTTY 400W
Circuit:
Class AB parallel push-pull
Cooling Method:
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Corrections

In the write-up of the 2007 WPX SSB results in the January issue there were some errors in the list of trophy sponsors (the winners were correct). Accurate listings of all trophy sponsors can be found on the CQ WW WPX website, <www.cqwpx.com>. Also, the dates of this year's contest were incorrect. **The 2008 CQ WW WPX SSB Contest will be held March 29–30.**

In the 2006 WPX CW results we incorrectly awarded the Combined SSB-CW World SOAB, Al Slater, G3FXB Memorial Trophy. The correct winner is VC3J, operated by John Sluymer, VE3EJ.

and Wal, W8LRL, was fifth world and first USA using special event callsign WV8JR.

Multi-Single

This year's winner was the team of W6LD, WØYK, and KX7M operating as P4ØL in Aruba. Right behind them was a Latvian team (plus host Edu, EA8AUW) operating EE8A in the Canary Islands, finishing second. Moroccan station 5D5A came in third, fourth was ZF1A from the Caymans, and fifth was the French team at TM7XX. Sixth place world went to a multi-national team at VE3EJ, which was also the top North American winner.

In the USA there was a tight race between KT3Y (Phil, KT3Y, and Bob, K3EST) and Howie, NY4A. In the end the KT3Y team was able to prevail and take first place. Third was WU3A, followed by WA5Y and W1CU in fourth and fifth place, respectively.

Multi-Two

The Multi-Operator Two-Transmitter category was won by EF8M, a Russian team operating at Pekka, EA8AH's station in Gran Canaria. They achieved 33 million points, a new world record and over twice the points of any other multi-op entry. The Slovakian team at OM8A narrowly got in front of the third-place Croatian team at 9A7A for second world and first Europe. From Estonia, ES5Q was close behind in fourth, and LX7I was fifth.

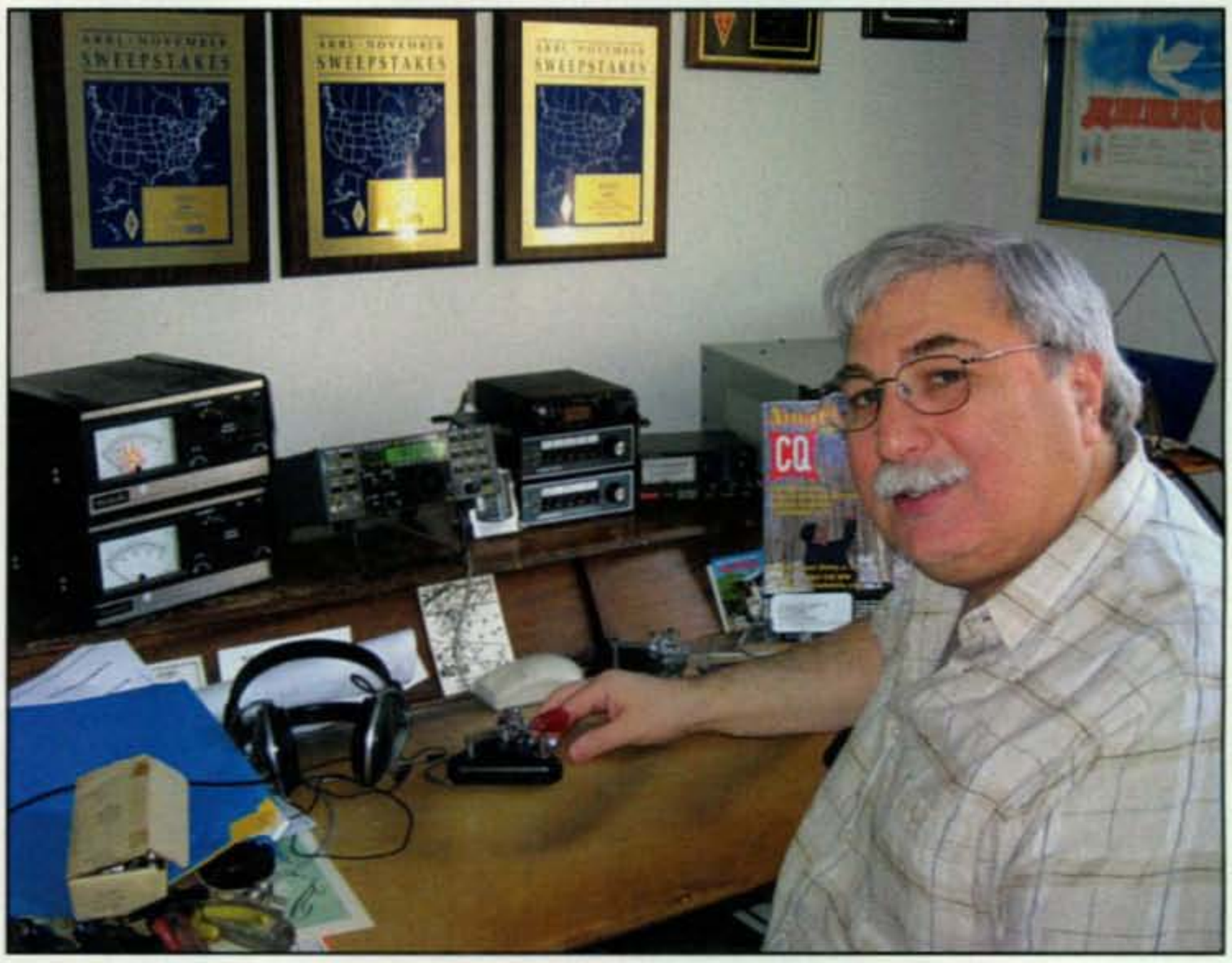
The KD4D team, operating from N3HBX's station, easily repeated their success of the SSB test as champion of the USA. The Floridians at AB1HZ took second place, and WX5S took third place from their West Coast location.

Multi-Multi

The German team at DR1A won the Multi-Op Multi-Transmitter category, followed closely by OM7M. NQ4I was third world and first USA, ZL6QH took fourth place as they bow out of contesting for a while, and LY7A was fifth. Second USA was NR4M, third was NX5M, NØNI was fourth, and KF7NN took fifth place from W4MYA's station.

Tribander/Single Element

The Tribander/Single Element category limits participants to a single tribander antenna for 10–20 meters and single-element wires for the low bands. The purpose is to provide a competition class for the "average" station. Boyan, LZ2ZBE, operating as LZ8A took first place world and first Europe. He was followed by Christo, LZ3FN, who took second place, and LR4E (Martin, LU5DX) was third. Eugene, RU9CK, was fourth and low power Yuri, VE3DZ, was fifth.



Doug, KR2Q, won fourth place world and first place USA QRP, All Band.

In the USA Paul, N4PN, using another unusual call, KW3A, scored a victory over WN2O, operated by Mike, N2GC.

Rookie

The Rookie category is for operators who have been licensed amateur radio operators for less than three years. Bogdan, RU9CD, scored an impressive win from Asiatic Russia to take the category. David, F8CRS, was second and first Europe, and Vange, BD7KLO, was third with a fine effort from China. All three entries were low power.

In the USA, Rocky, NE7D, took first with a nice low power score, followed by Mike, KB3P.

Chasing Prefixes

The winning strategy for the WPX contests must balance QSO points with prefixes. Leaders of the prefix hunt were EF8M with 1256 prefixes and DR1A with 1184, fine numbers for this point in the sunspot cycle. We appreciate

Steve, K6AW, operated superstation HC8N in the Galapagos and came in second place world Single Op, All Band, High Power.

all the operators who go out of their way to obtain special callsigns or activate club stations in order to provide the rest of us with a new multiplier. Special thanks to: 3Z5ØKCR, 5D5A, 5Q1CW, 9A95ØDM, DH15ØHZ, DL4ØRRDXA, DR8ØAMA, DTØHF, GB6BW, GXØSAC, H2E, LZØ7KM, ON6ØMCL, R15ØM, SC3ØVL, SJØWPX, SY8JG, SZ1A, UO5ØF, VQ97JC, and YUØ7HST.

New Records

Records can be broken even during poor propagation conditions. Congratulations to these new record holders:

7XØRY—Africa 80m, 1,562,172 points

EF8M—World and Africa Multi-Two, 33,324,192 points

KH6ND—Oceania 160m, 22,100 points

ZM3A—Oceania 40m, 6,043,950 points

Log Checking

The CQ WW WPX Log Checking Committee took extra care analyzing certain entries this year. There is a small group of entrants who specialize in seeing if they can bend or break the contest rules without detection. This is not a productive activity. The committee disqualified one high-scoring (top 15) entry, reduced some scores, and issued written warnings to other contestants.

Kudos

Many thanks to several members of the CQWW Contest Committee for helping with various log-handling issues. Thanks to Randy, K5ZD, for his help with redesigning and managing the CQ WPX website and for his fine write-up of this year's SSB contest. Thanks as well to Trey, N5KO, and his robots; they are a huge help in the log-checking process. Ken, K5KA, is doing a very excellent job managing the plaque program, and we are happy to welcome Jacques, F6BEE, to the WPX team as master record-handler. The biggest thanks go to Steve Bolia, N8BJQ, for his help and endless energy and enthusiasm, and to Gail, K2RED, who is our editor and who puts up with all our close-to-the-edge submissions for deadlines.

Rules Change

We have revised and simplified the logging requirements for multi-op stations effective with

2007 TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

WORLD: Steve Bolia, N8BJQ. **Won by: 3V8BB operated by Dr. Hrane Milosevic, YT1AD.**
USA: Dennis Motschenbacher, K7BV. **Won by: NE4AA operated by Dan Street, K1TO.**
EUROPE: Ivo Pezer, 5B4ADA/9A3A. **Won by: 9A1A operated by Zdravko "Emil" Balen, 9A9A.**
OCEANIA: Tom Morton, K6CT. **Won by: Dusko Dumanovic, ZM3A.**
CANADA: Radio Amateurs of Canada (RAC). **Won by: VY2TT operated by Kenneth Widelitz, K6LA.**
JAPAN: Simon Candotto, IV3NVN. **Won by: Masaki Masa Okano, M.D., JH4UYB.**
WORLD LOW POWER: Caribbean Contesting Consortium. **Won by: CT6A operated by Filipe Lopes, CT1ILT.**
CANADA LOW POWER: Contest Club Ontario. **Won by Yuri Onipko, VE3DZ.**
USA LOW POWER: Terry Zivney, N4TZ. **Won by: NV1N operated by Edward Sawyer, N1UR.**
USA ZONE 3 HIGH POWER: Jim Pratt, N6IG. **Won by: W6YI operated by Daniel Craig, N6MJ.**
USA ZONE 4 HIGH POWER: Society of Midwest Contesters. **Won by: KT2Z operated by Richard King, K5NA.**
USA ZONE 4 LOW POWER: Society of Midwest Contesters. **Won by: KS9K operated by Terry Zivney, N4TZ.**
NORTH AMERICA QRP: Dale Martin, KG5U. **Won by: TI5N operated by William Parker, W8QZA.**

SINGLE OPERATOR, SINGLE BAND

WORLD 3.5 MHz: Ranko Boca, 4O3A. **Won by: Frantisek Pubal, 7XØRY.**
WORLD 7 MHz: William D. Johnson, KVØQ. **Won by: P4ØA operated by John Bayne, KK9A.**
WORLD 14 MHz: Gene Walsh, N2AA. **Won by YT2T operated by Marko Zivkovic, 4N1JA.**
WORLD 28 MHz: Steve Hodgson, ZC4LI. **Won by TA2ZAF operated by Pavel Prihoda, OK1MU.**
USA 14 MHz: Kansas City DX Club. **Won by: Carol Richards, N2MM.**
USA 21 MHz: Charlie Wooten, NF4A. **Won by: WN1GIV operated by Robert Patten, N4BP.**
USA 28 MHz: Bernie Welch, W8IMZ Memorial. **Won by: NA4W operated by Courtney Judd, K4WI.**

MULTI-OPERATOR, SINGLE TRANSMITTER

WORLD: Ron Blake, N4KE. **Won by: P4ØL operated by WØYK, KX7M, W6LD.**
ASIA: W2MIG Memorial (NT4TT Sponsor). **Won by: JA5FDJ operated by JA5FBZ, JA5JCC, JA5THU, JA5FDJ.**
USA ZONE 4: Mike Fatchett, WØMU. **Won by: VE3EJ operated by S51TA, VE3EJ, VE3MM.**

MULTI-OPERATOR, TWO TRANSMITTER

USA: Florida Contest Group (FCG). **Won by: KD4D operated by NA3D, NI1N, NN3W, K3MM, K3RA, KD4D.**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Steve Merchant, K6AW. **Won by: DR1A operated by DF6JC, DJ6ET, DJ7EO, DL1MFL, DL3DXX, DL5LYM, DL6FBL, DL6LAU, DL9EE, JK3GAD, ON4JZ, ON5UM, PC5A.**
USA: Jim Reisert, AD1C. **Won by: NQ4I operated by NQ4I, N5BI, VE7ZO, KF4GTA, NF4A, K2UFT, K4BAI, W4QO, KC4BVF, WI4R.**

CONTEST EXPEDITION

WORLD: Phil Goetz, N6ZZ Memorial – OHØZZ (OH2BH, OH2MM, OH2PM, K6AW). **Won by: EE8A operated by YL2KL, YL3DW, YL2GQT, YL2PP, EA8AUW.**

COMBINED SSB/CW
Single Operator, All Band

WORLD: Yuri Blanarovich, K3BU. **Won by: UPØL operated by Vladimir Vinichenko, UN9LW.**

CLUB (SSB & CW)

WORLD: *CQ* magazine. **Won by: Bavarian Contest Club.**

the 2008 rules. All multi-ops in any category can simply record serial numbers by band. The requirement for transmitter number has been eliminated. The requirement for a separate set of numbers for the mult station in multi-single has also been eliminated.

Summary

The 2008 WPX CW Contest will be held on May 24 and 25. Please plan to join in the fun. Rules can be found on the CQ WPX Contest website (http://www.cqwpx.com), the *CQ* website (www.cq-amateur-radio.com), and in the February issue of *CQ*. Logs are requested to be submitted by e-mail in Cabrillo format. Send WPX CW logs to <cw@cqwpx.com>. See you in the 2008 contest!

73, Steve, K6AW

DX QRM

First time entered as a 2EØ (ex-M3CVN) and the rare prefix helped to get a good score on all bands. A smaller score, but 200 QSOs more than SSB WPX. Plenty of QSOs which is nice! First time I got over 1000 from the home QTH . . . **2EØCVN**. Started 5 hours late due to putting up antenna and being visited ny Murphy! Then rig worked intermittently. Better luck next year! . . . **3D2EE**. We had 7 hours of forced QRX for power failure but still a lot of fun! . . . **5D5A**. Great conditions to Europe . . . **6H1ZVO**. I would like to dedicate this effort in memory of Festus, 9M8FH, who became a silent key earlier this year. He had been a good friend of mine for the past 16 years and will be missed deeply. Conditions were probably at the absolute bottom (at least I hope) . . . **9M8DX**. Hello, gang, I'm HK1KXA and am back. Many thanks to Ramon Paredes (Paserco) who made possible my return to the contest arena by letting me using two of his tower cranes in Torrent (Spain) to hang my wire antennas. Next time beware! It will be aluminium elements . . . **AO5KXA**. First WPX CW from 5B for years even though I had to catch a flight out several hours before the end. Enjoyable as always. Many thanks to 5B4ES for hosting me

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

3V8BB (YT1AD)	13,036,170
HC8N (K6AW)	12,530,262
P33W (RA3AUU)	10,034,956
PS2T (N5ZO)	8,440,276
PJ2T (WI9WI)	8,288,055
UA9CLB	7,880,040
VY2TT (K6LA)	7,864,881
C4W	7,449,120
NE4AA (K1TO)	6,863,606
UPØL (UN9LW)	6,779,520
VB3A (VE3AT)	6,721,527
HZ1EX (PY2ZXU)	6,689,120
9A1A (9A9A)	6,266,028
VE3JM	5,925,920
KC3R (LZ4AX)	5,755,506
LU7HN	5,434,898
DJ5MW	5,432,754
S58A	5,243,836
EA6FO (EA3ALZ)	5,191,680
VC2M (VE2TZT)	5,074,420

28 MHz

TA2ZAF (OK1MU)	1,754,830
LW9DA	1,726,452
RU6CQ	754,290
IU9S (IT9BLB)	673,524
T97M	400,158
S57S	370,832
*9A3VM	357,930
*EX2X	305,532
*YO3CTK	276,340
*IK1PMR	260,090

21 MHz

9K2HN (9K2RR)	2,781,509
LS1D (LW9EOC)	1,836,510
4O2A (YT1NP)	1,255,484
UR6F (UX6FF)	1,132,216
YZØZ (YU1ZZ)	1,064,202
*PT7CG	840,650
9A7R	788,956
WN1GIV (N4BP)	766,752
*YT1AD (YU1DX)	732,366
*UP8A	675,220

14 MHz

YT2T (4N1JA)	3,119,402
4N8A (YU1EA)	2,926,865
HK1X	2,785,476
II7M (IK7JWY)	2,710,380
9A5W	2,643,053
LZ9W (LZ1RGM)	2,641,924
S57DX	2,582,755
YT5G	2,222,960
OL8M	1,992,870
S5ØK	1,790,775

7 MHz

P4ØA (KK9A)	6,114,276
ZM3A	6,043,950
4L8A	4,351,570
S57AW	4,248,735
YU1LA	3,783,546
YT5A	3,455,760
SN7Q	3,016,546
OM3CGN	2,617,269
HG1A (HA1ZN)	2,528,238
*TC3A (LZ1NK)	2,371,823

3.5 MHz

7XØRY	1,562,172
SO2R (SP2FAX)	1,078,725
YR7M (YO9GZU)	800,321
OK3R (OK1DVM)	789,090
S52AW	767,600
YLØA	756,288
YU1KR	682,443
T99W	664,056
9A5K	657,672
LN9Z (LA3BO)	650,880

1.8 MHz

LY2IJ	193,920
*YMØT (TA2RC)	117,250
ZC4LI	93,112
DF2UU	82,896
WV8JR (W8LRL)	56,760
SN2K (SP2FWC)	45,619
LY4T	40,713
YO5AJR	33,580
KH6ND	22,100
*OK1JOK	15,563

LOW POWER ALL BAND

CT6A (CT1ILT)	4,562,776
TC3D (TA3D)	3,756,288
VE3DZ	3,317,688
NV1N (N1UR)	2,939,640
EA1FAQ	2,903,784
C6AYM (K9GY)	2,559,984
UA4FER	2,500,020
EA7TN	2,426,248
3XD2Z	2,334,607
PV8DX	2,314,098
LY9A (LY3BA)	2,293,473
WJ9B	2,289,030
LY6M	2,200,308
PY2NY	2,146,688
YO3APJ	2,097,900
OM5CD	2,081,992
T94WF (S56M)	2,060,215
HA3NU	1,982,408
UT2UZ	1,881,130
S51F	1,815,192

28 MHz

9A3VM	357,930
EX2X	305,532
YO3CTK	276,340
IK1PMR	260,090
L55D (LW1EXU)	232,301
UZ5UA	223,380
HA8FK	186,588
HA8TP	171,680
RX6AH	168,487
UX4FC	161,568

21 MHz

PT7CG	840,650
YT1AD (YU1DX)	732,366
UP8A	675,220
9M8DX (VK6DXI)	610,056
UA9AFS	363,858
LU8EOT	308,257
SP2AVE	199,662
UN4PG	158,508
UA3AO	157,794
RW6AH	89,539

14 MHz

9A3B (9A1AA)	1,751,656
UN9L	1,619,628
HA8MD	1,492,614
S57Z	1,441,440
XM2FU	1,205,722
HG4F	1,051,680
DD4B (VE3ZIK)	1,019,898
UN6LN	933,401
N2WN	820,000
RW9UU	801,804

7 MHz

TC3A (LZ1NK)	2,371,823
Z35T	2,102,298
C6AWL (RA3CO)	1,957,122
S54A	1,336,944
OL6P (OK2WTM)	1,042,794
T99D	1,003,352
SN2N (SP2ASJ)	967,572
4L2M	935,640
SP2FAP	822,150
UA2FL	614,660

3.5 MHz

YTØA (YU7FU)	468,184
PAØMIR	343,403
SP5ELA/8	310,063
S59N	281,281
LY3CW	280,686
EV6M	268,125
YZ8A	245,220
HA6FQ	233,112
RW3AFY	229,250
KØXP	206,910

1.8 MHz

YMØT (TA2RC)	117,250
OK1JOK	15,563
LY2OU	10,176
SLØW (SMØAJU)	8,618
DJ8OG	7,392
WJ5K	3,864
OK1DXK	1,674

TRIBANDER/SINGLE ELEMENT

LZ8A (LZ2BE)	A	4,707,248
LZ3FN	A	4,466,660
LR4E (LU5DX)	A	4,439,966
RU9CK	A	3,778,320
*VE3DZ	A	3,317,688
S59ABC (S51DS)	A	3,089,580
EA5FV	A	3,073,029
5H3EE	A	2,864,932
RT9S (UA9SP)	A	2,763,420
CE4CT (XQ4CW)	A	2,656,012
S56A	A	2,602,842
KW3A (N4PN)	A	2,535,060
*EA7TN	A	2,426,248
IT9/S52A	A	2,367,590
*3XD2Z	A	2,334,607
WN2O (N2GC)	A	2,300,242
*T94WF (S56M)	A	2,060,215
EV1R (EU1PA)	A	2,034,576
SP5WA	A	1,979,295
S57M	A	1,950,208
*SN5J (SP5JXK)	28	114,729
OH3BU	28	99,615
ON5ZO	28	27,084
WN1GIV (N4BP)	21	766,752
*9M8DX (VK6DXI)	21	610,056
*9A4RV	21	83,888
K8IA	14	1,247,992
*DD4B (VE3ZIK)	14	1,019,898
*VE2XAA	14	725,274
*CS1GDX (CT1DRB)	14	566,244
PR5R (PY5AKW)	14	458,016
*S54A	7	1,336,944
SV1RP	7	1,139,448
IK2SND	7	992,320
*UA6LTI	7	593,217
*UW2F (UTØFT)	7	577,940
YU1KR	3.5	682,443
*PAØMIR	3.5	343,403
*S59N	3.5	281,281
*YZ8A	3.5	245,220

ROOKIE

*RU9CD	A	924,451
*F8CRS	A	387,400
*BD7KLO	A	298,116
*IZ1LBG	A	208,565
*NE7D	A	107,450
*B3APX	A	71,296
KB3P	A	57,472
*BD4ITN	A	51,240
*W4BW	A	48,256
*KE5FRF	A	36,625
*SP5XO	28	22,204
*US5IVD	28	4,959
*PU8TFA	21	325
*KT3X	14	307,536
*K4OSO	14	9,108

QRP/p

YT7TY	A	1,544,732
TI5N (W8QZA)	A	1,430,030
OK7CM	A	1,002,540
KR2Q	A	982,376
OL4W (OK1IF)	A	738,278
OM7DX	A	646,668
US2IZ	A	496,248
YP8A (YO8WW)	A	462,500
RW6HJV/6	A	453,832
DL8MBS	A	411,740
MØBPQ	28	81,952
EW6DX	28	41,040
OM7PY	28	21,960
SQ6ELV	28	21,358
LZ1MG	28	20,680
PW2C (PY2WC)	21	268,359
UX1UX	21	105,300
UU4J (UU4JO)	21	84,920
HG3IPA (HA3JB)	21	83,848
ER2RM	21	10,707
LZ1VB	14	328,042
HA6IAM	14	252,350
RU2FM	14	210,904
UA6LCJ	14	147,108
G3LHJ	14	114,210
ES1CW	7	525,844
UU2CW/QRP	7	430,962
SP1AEN	7	300,196
HAØGK	7	214,140
SP4GFG	7	140,737
LY2GW	3.5	151,182
HG6EU (HA6VA)	3.5	45,225
RA3WUO	3.5	11,956
RA3QH	3.5	7,788
LY4BF	1.8	924
DJ3GE	1.8	160

ASSISTED

NN3L (N3RS)	A	5,641,867
K3WW	A	5,543,721
TO3T (VE3KF)	A	5,407,251
G6PZ (GØRTN)	A	4,927,728
NZ1U (N2TTA)	A	3,572,160
S53O	A	3,425,092
OH8X (OH4JFN)	A	3,324,945
DK3GI	A	3,313,676
WR3Z	A	3,311,847
N3KS	A	2,971,566
RN3QO	A	2,786,724
VE3UTT (W1AJT)	A	2,771,264
*HG3M (HA3MY)	A	2,722,375
W8MJ	A	2,688,918
NN4GG (N4GG)	A	2,468,499
DK9TN	A	2,440,196
KW7Y (K7RL)	A	2,345,595
WN9O (W9IU)	A	2,280,473
OH6NIO	A	2,238,067
OK7Y	A	2,142,459
UW5W	28	309,264
F5IN	28	232,246
*9A2U (9A3ZA)	28	215,243
*RA6YDX	28	175,280
SP1NQN	28	149,952
T97C (N3UA)	21	865,998
DQ4Q	21	669,944
EO1I (UT1IA)	21	666,168
SN5M (SP5UAF)	21	655,860
*R15ØM (RA6YY)	21	437,825
RT9W (RX9WR)	14	2,561,878
UW5Q	14	2,232,424
YZ2A	14	1,925,084
YP3A (YO3GDA)	14	1,869,354
HB9DDO	14	912,716
PY7RP	7	4,215,288
YT5T	7	3,432,996
UW8M (UR5MID)	7	2,603,139
S56X	7	2,324,376
*4N1FG	7	1,880,013
HA3LI	3.5	510,454
LY8O	3.5	476,973
RU9WX	3.5	369,304
4O5Z (4N7ZZ)	1.8	116,802
*VE3MGY	1.8	39,116
NT1E (K3BU)	1.8	27,720

MULTI-OPERATOR SINGLE TRANSMITTER

P4ØL	15,992,050
EE8A	15,521,385
5D5A	15,165,971
ZF1A	14,054,082
TM7XX	10,363,000
VE3EJ	9,111,024
LR2F	8,819,720
OL3Z	7,317,024
EC2DX	7,085,192
HG1S	7,074,978
KT3Y	6,642,608
OL7R	6,402,570
4M5DX	6,272,656
NY4A	6,242,823
TMØR	6,068,125
OE2S	5,984,278
WU3A	5,636,150
DR8ØAMA	5,370,768
ZM1A	5,163,520
UA3R	4,957,506

MULTI-OPERATOR TWO TRANSMITTER

EF8M	33,033,312
OM8A	13,312,400
9A7A	12,907,656
ES5Q	11,700,700
LX7I	10,585,151
KD4D	10,228,761
RU1A	10,186,356
IR4X	10,055,650
C4I	9,504,810
KH6LC	9,226,647
HG6N	8,515,310
DKØED	8,259,680
AB1HZ	6,168,204
OL7D	5,389,736
DR5L	5,294,570
S52ZW	4,931,365
B7P	3,578,520
WX5S	3,372,376
ACØW	3,043,222
VA7RN	2,883,217

MULTI-OPERATOR MULTI-TRANSMITTER

DR1A	16,999,872
OM7M	15,780,980
NQ4I	11,097,060
ZL6QH	10,482,368
LY7A	9,039,801
NR4M	7,943,488
NX5M	6,656,382
JA3YBK	5,736,120
NØNI	5,188,376
KF7NN	4,946,289

**Low Power*

USA TOP SCORES

SINGLE OPERATOR ALL BAND

NE4AA (K1TO)		6,863,606
KC3R (LZ4AX)		5,755,506
WC1M		5,045,832
KO3A (K1ZZ)		4,980,512
AA3B		4,688,671
WK1Q (K1MK)		4,562,402
NY6N (N6MJ)		4,099,354
K3ZO		3,931,785
KT2Z (K5NA)		3,371,900
KU1CW		3,271,225
NT5C (N3BB)		3,152,480
*NV1N (N1UR)		2,939,640
WXØB (AD5Q)		2,856,216
K4RO		2,757,956
KW3A (N4PN)		2,535,060
N4ZZ		2,486,880
WN2O (N2GC)		2,300,242
*WJ9B		2,289,030
KQ2M		2,139,340
WO4O		2,095,848

28 MHz

*NA4W (K4WI)		18,130
*WD9DZV		6,882

21 MHz

WN1GIV (N4BP)		766,752
*WB4TDH		67,550
*WA7LNW		39,585
*W9ILY		35,360

14 MHz

N2MM		1,618,515
K8IA		1,247,992
W9WI		1,178,240
*N2WN		820,000
AC4TT (W1MO)		697,231
*N5DO		551,880
W9SE		349,443
*KT3X		307,536
*KR2AA		269,133
KU8E		252,047

7 MHz

NN1N		1,623,247
KZ6D (W6NL)		1,304,794
K1KI		759,021
AB9H		674,784
KT5E		653,796
WX9U		524,160
NM1JY		476,470
K5KA		300,578
*AA7AX		203,616
*W8TM		195,120

3.5 MHz

W3BGN		379,572
K9NW		234,228
*KØXP		206,910
WI4R (W4SVO)		176,358

1.8 MHz

WV8JR (W8LRL)		56,760
*WJ5K		3,864
*N9TF		800

LOW POWER ALL BAND

NV1N (N1UR)		2,939,640
WJ9B		2,289,030
WK2G		1,649,652
KS9K (N4TZ)		1,441,968
K4TD		1,182,168
W2TZ		1,089,511
KV8Q		980,120
K9QVB		909,904
KZ9O		772,191
N4EEB		709,280
KE4R		677,376
KØPK		623,616
K9OM		588,528
N4IG		577,777
NA4K		532,923
WØETT		510,720
N4PSE		478,800
NS4T		474,376
W1TO		459,585
WB2AA		438,728

28 MHz

NA4W (K4WI)		18,130
WD9DZV		6,882

21 MHz

WB4TDH		67,550
WA7LNW		39,585
W9ILY		35,360

14 MHz

N2WN		820,000
N5DO		551,880
KT3X		307,536
KR2AA		269,133
N4IJ		206,565

7 MHz

AA7AX		203,616
W8TM		195,120
N5ER		172,825
WF3C (K4EJ)		145,122
N7MAL		128,152

3.5 MHz

KØXP		206,910

1.8 MHz

WJ5K		3,864
N9TF		800

TRIBANDER/SINGLE ELEMENT

KW3A (N4PN)	A		2,535,060
WN2O (N2GC)	A		2,300,242
AA5B (@K5HAB)	A		1,914,204
K4PV	A		1,611,708
KZ5D	A		1,378,120
N3UM	A		1,354,764
K2SX	A		1,216,254
WØBH	A		1,035,119
*KV8Q	A		980,120
W6TK	A		958,329
WN1GIV (N4BP)	21		766,752
K8IA	14		1,247,992
KU8E	14		252,047
AB2MH	14		6,844
*N5PU	14		1,728
*N6AJR	7		2,686

ROOKIE

*NE7D	A		107,450
KB3P	A		57,472
*W4BW	A		48,256
*KE5FRF	A		36,625
KG6ZHC	A		32,656
*KCØVKN	A		27,501
*KT3X	14		307,536
*K4OSO	14		9,108
*W9JJC	14		1,170

QRP/p

KR2Q	A		982,376
N7IR	A		357,552
K4ORD	A		205,156
WA8WV	A		199,280
AA1CA	A		166,779
W5KDJ	A		140,556
KT8K	A		139,860
NA4BW	A		129,132
K3IU	A		80,325
WA8REI	A		74,682
WA6FGV	21		8,591
NØLY	14		59,334
K3TW	14		52,909
K4RDU	14		14,592
K2TA	7		119,850
NE6M	7		44,649
NT4D	7		36,810
N2JNZ	7		32,634
NU4B	7		29,716

ASSISTED

NN3L (N3RS)	A		5,641,867
K3WW	A		5,543,721
NZ1U (N2TTA)	A		3,572,160
WR3Z	A		3,311,847
N3KS	A		2,971,566
W8MJ	A		2,688,918
NN4GG (N4GG)	A		2,468,499
KW7Y (K7RL)	A		2,345,595
WN9O	A		2,280,473
N8BJQ	A		2,030,985
N4WW	A		2,022,570
W5WMU	A		1,722,217
KK5I (W5CW)	A		1,669,104
NC7J (W7CT)	A		1,585,964
NT2A	A		1,472,933
N5RR	21		205,920
NT1E (K3BU)	1.8		27,720
WA3AAN	14		57,876
*W5GZ	14		54,891
NS1S (K1ZZI)	7		1,667,658
*WB1EDI	7		40,553
KØCOP	7		20,672

MULTI-OPERATOR SINGLE TRANSMITTER

KT3Y		6,642,608
NY4A		6,242,823
WU3A		5,636,150
WA5Y		4,629,122
W1CU		3,267,781
NQ2F		3,056,631
AI6V		2,847,427
WE4OJ		2,266,880
AC8W		1,873,640
AD6E		1,818,170

MULTI-OPERATOR TWO TRANSMITTER

KD4D		10,228,761
AB1HZ		6,168,204
WX5S		3,372,376
ACØW		3,043,222
NG3U		2,184,593

MULTI-OPERATOR MULTI-TRANSMITTER

NQ4I		11,097,060
NR4M		7,943,488
NX5M		6,656,382
NØNI		5,188,376
KF7NN		4,946,289
WQ2N		1,523,834

*Low Power.

once again . . . **C4W**. Tnx Roberto, CE4CT, for hosting and sharing your time to help me. What a pity condx were not quite good, but it was interesting to find OM's anywhere. CW party was great. CQWW is the contest. Congratulations to everybody who was behind the scenes . . . **CE4CT**. Glad to have the chance to give the multiplier to some stations. I used my home station in Funchal, capital city of Madeira Island . . . **CT3EE**. Again good fun. Low bands were very noisy due to QRN! It was almost impossible to work on 160m! . . . **DAØI**. Only S&P. 10-15-20m: 3-ele FB-33 14m ag. 40m: dipole 2–3m ag, the dipole is a spare for receiving, lying 1 meter on a metal balustrade. So big cheers for all 14 USA stations with really big ears who heard me, sometimes on first shot! . . . **DF2LH**. Don't forget, the fun is the power! . . . **DK3RED**. Good conditions this year. 10m very active with EU openings. Some good DX for me onQRP: HC8N in the middle of a West Coast pile-up! The weekend but I enjoyed it very much . . . **F6FTB**. Some of the WPX contest special prefixes which have loads of "dits" can be difficult to copy when they come at you for the first time at 36 wpm! . . . **G3TXF**. Thanks to Paul, G6PZ, for the use of his great station. Lack of a top-notch 40 metre antenna hurt me badly, but Paul's new 4-over-4 SteppIR stack rocked on 15 and 20. Conditions were bad? I didn't really notice. This contest is always lots of fun . . . **G6PZ**. Aired our special events callsign (GB6GW) from my station for a couple of hours as part of the 75th anniversary celebrations of Blackwood & District Amateur Radio Society. All QSLs via GWØTKX . . . **GB6GW**. The GX prefix seemed to cause a lot of confusion. It's an English club prefix. Part time operation as part of an exhibition station during Scout centenary special event station . . . **GXØSAC**. About the same number of Q's with less claimed points is the result of this year's contest. No 80 meter operation possibility is available with the new antenna. It was a fun to take part anyway. Thanks for Q's. See you next year! . . . **HA2MN**. Had a power break during Sunday for 4 hours. Murphy was calling! have not had a break in years, but of course the only weekend in the year when power was needed a tree fell over the power lines! . . . **HSØZDY**. What a surprise the shining 10m (worked K3OO at 2230Z!) and the huge EU pile-up. Super 20m with good US pile-up at times and 40m as well . . . **I2WIJ**. I was late by two days to get to my contest QTH on Thassos island, Greece. Arrived Sunday afternoon, just after I drove 1400 km. Put up my monobander gp's and started. My rest man power was enough for this result, hi . . . **J48HW**. I entered single-op 160m low power. The condition between the USA and JA was not so good, but I could QSO with AAØRS. His signal was 599+, very strong! I used M.V. (micro vert) antenna for 160m in this contest. It was very fb. Its gain was nearly equal full-size dipole . . . **JE1SPY**. he aurora level >6 and high Kp really made this a tough one for us most of the weekend. Thanks to all who took the time to turn their antennas towards KL7 . . . **KL2R**. Under such condx there

ought to be a premium for working W's. Could work all EU all day and night on all 5 bands, but DX only on 20 and 40, where they drowned in the EU QRM. Was fun anyway, and I'll still come back . . . **LA6CF**. My first CW contest and what a fine experience. Almost without exception I met patient and helpful QSO partners willing to spend a little extra time to help me get everything right. I will do this again! . . . **MØTBF**. Best fun I had in ages running on 10m sporadic-E just like solar max but not DX . . . **MUØFAL**. A lot of fun despite generally bad propagation and QRN. Thanks to OH6LI for the station and to OH3AG for the callsign . . . **OF3F**. What a bad contest it was for me this year. Stormy weather (QRN). No QSOs withNA, SA, JA. I hope better condx, weather, and result next year. Thanks to all who heard my QRP signal in the noise . . . **OK1DSA**. Nice to work a hundred or so stations on 10m at the sunspot minimum! Great to work some new prefixes towards my WPX Award. Contests are fun. QSLing those contacts is even more fun! . . . **ON4CAS**. OU3, a new prefix for the first time in CQ WPX, but what a disappointment! Three out of four stations questioned the call by coming back to me . . . **OU3A**. Heavy QRN on the second night from thunderstorms made copying stations a real challenge . . . **P40A**. Worked QRP with my FT-817 and inverted-V. Best DX were HK1X and HC8N in the last hours of the contest (hi). Thank you for the nice contest . . . **PA1B**. Was surprised fb propagation on 10m. Tnx to all calling me. See you next year . . . **RV2FW/1**. When on the evening of the second day after a power break I lost whole day QSOs (at about 2000 QSOs) I gave up! Next time better . . . **S50R**. High noise level from thunderstorm. Second night surprised with strong NA signals but due to the 36 hour rule had planned for rest. However I like the 36 hour rule; you must plan ahead to be on the bands at the right time which also is a part of the competition . . . **SC3N**. Lucky for me my Writelog has great decoder for CW, so therefore I was able to participate. Unbelievable CW speed some send. But my CW ability is slowly returning. This is great fun and much easier to break through than on RTTY . . . **TF3AM**. There were hours in this contest where I struggled to work ten QSOs and other hours where my 5 watts seemed to work the world with one call. Thanks to Keko (TI5KD) and his wonderful wife Sophie for hosting me in the 5th year of doing this contest from there . . . **TI5N**. Fb 28 MHz QSOs! . . . **UA3AKI**. Not bad contdition on 10m. Much fun as usual . . . **UR5IKN**. My first contest operating from Oceania . . .

(Continued on page 105)

CONTINENTAL LEADERS

AFRICA

1.8	No Entry	
3.5	7XØRY	1,562,172
7	*EA8NQ	248,970.00
14	*EA8DA	702,240
21	AM8AAG	704
28	*ED8AMY	384
AB	3V8BB	13,036,170

ASIA

1.8	*YMØT	117,250
3.5	RV9SV	269,147
7	4L8A	4,351,570
14	*UN9L	1,619,628
21	9K2HN	2,781,509
28	TA2ZAF	1,754,830
AB	P33W	10,034,956

EUROPE

1.8	LY2IJ	193,920
3.5	SO2R	1,078,725
7	S57AW	4,248,735
14	YT2T	3,119,402
21	4O2A	1,255,484
28	RU6CQ	754,290
AB	9A1A	6,266,028

NORTH AMERICA

1.8	WV8JR	56,760
3.5	W3BGN	379,572
7	*C6AWL	1,957,122
14	N2MM	1,618,515
21	WN1GIV	766,752
28	*WP3C	132,200
AB	VY2TT	7,864,881

OCEANIA

1.8	KH6ND	22,100
3.5	YC2MXV	845
7	ZM3A	6,043,950
14	VK4BUI	181,940
21	*YBØYAD	17,219
28	*YB2EMK	2,184
AB	KH6WT	4,120,146

SOUTH AMERICA

1.8	PY7ZY	680
3.5	*PR7AR	1,014
7	P4ØA	6,114,276
14	HK1X	2,785,476
21	LS1D	1,836,510
28	LW9DA	1,726,452
AB	HC8N	12,530,262

MULTI-OPERATOR SINGLE TRANSMITTER

AF	EE8A	15,521,385
AS	JA5FDJ	2,674,649
EU	TM7XX	10,363,000
NA	ZF1A	14,054,082
OC	ZM1A	5,163,520
SA	P4ØL	15,992,050

MULTI-OPERATOR TWO TRANSMITTER

AF	EF8M	33,033,312
AS	C4I	9,504,810
EU	OM8A	13,312,400
NA	KD4D	10,228,761
OC	KH6LC	9,226,647
SA	No Entry	

MULTI-OPERATOR MULTI-TRANSMITTER

AF	No Entry	
AS	JA3YBK	5,736,120
EU	DR1A	16,999,872
NA	NQ4I	11,097,060
OC	ZL6QH	10,482,368
SA	No Entry	

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MFJ *IntelliTuner*™ Automatic Tuners

The MFJ-993B *IntelliTuner*™ lets you tune any antenna *automatically -- ultra fast.*

It's a comprehensive automatic *antenna tuning center* complete with SWR/Wattmeter, antenna switch for two antennas and 4:1 current balun for balanced lines.

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You get a highly efficient L-network, 6-1600 ohm matching at 300 Watts SSB/CW or *extra-wide* 6-3200 Ohm matching at 150 Watts SSB/CW, 1.8-30 MHz coverage, Cross-Needle *and* digital meters, audio SWR meter, *backlit* LCD, remote control port, radio interface, heavy-duty 16 amp/1000V relays.

MFJ-993B **$259.95**

The MFJ-993B automatically tunes for minimum SWR and remembers your frequency and tuner settings. The next time you operate on that frequency and antenna, these tuner settings are instantly restored and *you're ready to operate in milliseconds!* 10W x2¾ Hx9D". Use 12-15 VDC/1 amp or 110 VAC with **MFJ-1316, $21.95**. Radio interface cables, remote control available. See ***www.mfjenterprises.com***

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Like MFJ-993B but handles 600 Watts SSB /CW, matches 12-800 Ohms. 10,000 memories. Does not have LCD display, antenna switch, 4:1 current balun, audio SWR meter/feedback. 10Wx2¾Hx9D in.

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MFJ-9982 *2500 Watt* Tuner

The MFJ-9982 *ContinuousCarrier*™ antenna tuner handles 2500 Watts *continuous carrier* output on all modes and all HF bands into most unbalanced antennas -- even 160 Meters. 6-position antenna switch, 4-core balun, 1.5kW dummy load, true *peak/average* SWR/Wattmeter, 13¾Wx7Hx6¼D".

MFJ-9982 **$699.95**

MFJ-989D *Legal Limit* Tuner

MFJ-989D **$389.95**

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter. Easily handles *full* 1500 Watts SSB/CW, 1.8-30 MHz, including MARS/WARC bands. Six position antenna switch, dummy load. *New* 500 pF air variable capacitors. *New* improved *AirCore*™ Roller Inductor. *New* high voltage current balun. *New* crank knob. 12⅞Wx6Hx11⅝D".

MFJ-962D *compact* kW Tuner

MFJ-962D **$299.95**

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾Wx4½Hx10⅞D in.

MFJ-969 300W *Roller Inductor* Tuner

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 10½Wx3½Hx9½D inches.

MFJ-969 **$219.95**

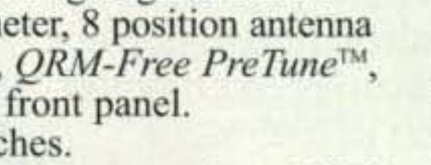
MFJ-949E *deluxe* 300 Watt Tuner

***More** hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, custom inductor switch, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/ Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. 10⅝Wx3½Hx7D inches.

MFJ-949E **$179.95**

MFJ-948, $159.95. Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner



***The** most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/ Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D".

MFJ-941E **$139.95**

MFJ-945E HF/6M *mobile* Tuner

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8Wx2Hx6D in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $6.95,** mobile mount.

MFJ-945E **$129.95**

MFJ-974HB *Balanced Line* Tuner

The MFJ-974HB *true* fully balanced antenna tuner tunes any balanced lines. Matches 12-2000 Ohms. Covers 1.8-54 MHz *continuously* including all WARC bands. 300 Watts SSB/150 Watts CW. Lighted Cross-Needle SWR/Wattmeter. 7½Wx6Hx8D in.

MFJ-974HB **$209.95**

MFJ-976, $499.95. 1500 Watt *fully balanced* antenna tuner. 1-30 MHz.

MFJ-971 *portable/QRP* Tuner

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. 6Wx6½Hx2½D in.

MFJ-971 **$119.95**

MFJ-902 *Tiny Travel* Tuner

Tiny 4½Wx2¼Hx3D", full 150 Watts, 80-10 Meters, has tuner bypass switch, for coax/random wire.

MFJ-902 **$99.95**

MFJ-904H, $149.95. Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. 7¼Wx2¼Hx2¾D in.

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Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2Wx3Hx4D inches.

MFJ-16010 **$69.95**

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In January's "Zero Bias" editorial, W2VU wrote about a tech net run by noted VHFer Dick Knadle, K2RIW, on New York's LIMARC repeater, and a story he told about bouncing 2-meter signals off airplanes over a 900-mile path. Well, it turns out it wasn't quite 900 miles and it wasn't 2 meters … but the real story is even more amazing! K2RIW was kind enough to fill in the details … plus a whole lot more.

The Magic of Wireless

BY RICHARD KNADLE,* K2RIW

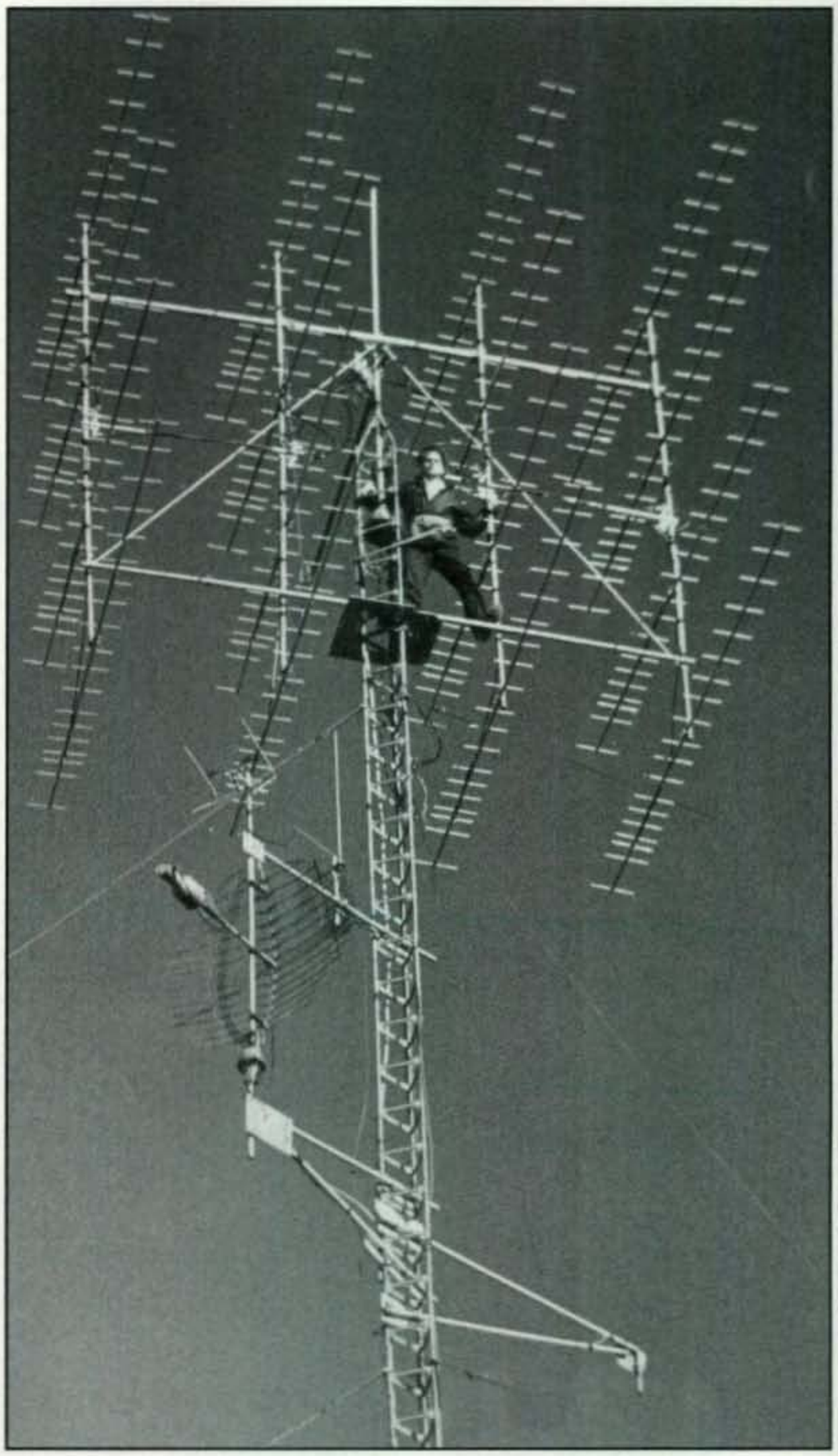
Thank you for the favorable January Zero Bias editorial about our Tech Nets. I thought you might appreciate some additional statistics about the Long Island Tech Net, and a minor correction for the data in your editorial.—K2RIW

The "current" Tech Net on LIMARC (146.85 MHz on Sunday from 8 to ~12 PM local) was started in September 1982, by Hip Koutsoupakis, then N2FDJ (now WB2HJK) and me. The first Tech Net of 2008 was number 1169 of the series. I'm as surprised as anyone that it has lasted this long. In the beginning I expected that we would answer everyone's questions during the one-hour shows within six months and it would be over. However, here we are, more than 25 years later, and now each show often lasts four hours; there often are that many questions. My current co-moderator, Mel, K2KEY, and I receive a surprising number of e-mails from hams who say they discovered the Tech Net on their scanners and decided to become hams after listening to it. (Hip was co-moderator for the first five years; Mel has been working with me for the past three.)

The "original" Long Island Tech Net was a creation of Edward Piller, W2KPQ (SK), one of the founders of LIMARC (Long Island Mobile ARC) in 1966. Ed was also a strong Fast Scan Amateur TV (ATV) enthusiast, and from 1975 to 1976 he moderated a weekly LIMARC program that was called "The ATV & Technical Net." The more recently resurrected (1982) "Technical Net" borrowed a portion of that name.

Signal Dropouts = A Minor Error?

LIMARC shares its 146.85 MHz frequency with the Frenchtown, NJ repeater. Therefore, LIMARC has created a null in its antenna pattern in that direction so as to minimize the co-channel interference. I am guessing that as Rich, W2VU, was driving home to Bloomfield, NJ while listening to the LI Technical Net, he was experiencing periodic dropouts and occasional receiver capturing from transmissions from the Frenchtown repeater. This may explain how Rich believed I was saying that I experienced the Doppler-shifted signals I heard on 2 meters, while I communicated with K4CAW in North Carolina at a distance of 900 miles *(Another possibility is that I was paying more attention to traffic than to the radio, and*



The beams that worked the west … or at least North Carolina … from New York on 432-MHz SSB. This 1980 photo shows the author standing amid his 16-Yagi array for 432. Each antenna had 19 elements, for a total of 304 elements. (All photos courtesy of the author)

**e-mail <k2riw@riwproducts.com>*

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Four rugged MRF-150 FETs at 50 Volts give high efficiency . . . No deterioration with use

ALS-600 **$1299** Suggested Retail

Ameritron ALS-600 *Solid State FET* compact desktop station amplifier is only 4 dB below 1500 Watts -- less than an S-unit!

There are no tubes, no tube heat, no tuning, no worry rugged -- just turn on, select band and operate. 600 Watts PEP/500W CW -- lets you talk to anyone you can hear!

Covers 1.5-22 MHz, (10/12 Meters with $29.95 kit, requires FCC license), instant bandswitching, SWR/thermal protected, extremely quiet, lighted peak reading Cross-Needle SWR/Wattmeter, front panel ALC control, operate/standby switch. 12.5 lbs., 9½Wx7⅛Hx12D in.

Includes ALS-600PS transformer AC power supply for 120/220 VAC, inrush current protected. 32 lbs., 9½Wx6Hx12D inches.

ALS-600 Amp with Switching Power Supply

***New!* ALS-600S, $1429.** ALS-600 amplifier with 10 lb. ALS-600SPS switching power supply combo.

Switching Power Supply

ALS-600SPS **$629** suggested retail

Works with all ALS-600 amplifiers. Extremely lightweight, just 10 lbs. Superb regulation, very low radiated noise. 9Wx6Hx14½D in.

From QST Magazine, March, 2005

". . . the ampifier faulted only when it was supposed to. It protected itself from our boneheaded, sleep-deprived band changing manuevers . . . "

"I found myself not worrying about damaging this amplifier. It seems quite capable of looking out for itself. . . . Kudos to Ameritron."

"I couldn't hear any noise at all from the SPS (*switching power supply*) on the vertical or quad…"

"I came to greatly appreciate the size, weight, reliability and simplicity of this amplifier."

"The ALS-600S makes it possible to pack a transceiver and a 600 Watt amplifier, that together weigh less than 30 pounds."

AMERITRON *mobile* 500 Watt *no tune* Solid State Amp

Instant bandswitching, no tuning, no warm-up, SWR protected, 1.5-22 MHz, quiet, compact

ALS-500M **$849** Suggested Retail

Ameritron's ALS-500M solid state *mobile* amp gives you 500 Watts PEP SSB or 400 Watts CW output! Just turn on and operate -- no warm-up, no tuning, instant bandswitching. Fits in very small spaces.

New ALS-500RC, $49 *Remote Head* lets you mount ALS-500M amplifier *anywhere* and gives you full control. Select desired band, turn On/Off and monitor current draw on its DC Current Meter. Has power, transmit and overload LEDs. RJ-45 cables plug into Amplifier/Remote Head.

Covers 1.5-22 MHz, (10/12 Meters with $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 comes on as needed. Excellent harmonic suppression, push-pull output, DC current meter. 13.8 VDC/80 Amps. 3½x9x15 in. 7 lbs.

ALS-500M, $849, 500 Watt mobile amp.
ALS-500MR, $879, ALS-500M/Remote Head
ALS-500RC, $49, Remote head for ALS-500M (for serial # above 13049).
ARF-500K, $179.95, Remote kit for ALS-500M serial # lower than 13049. Includes AL-500RC Remote Head, filter/relay board for ALS-500M, cables, hardware, instructions.

Free online manuals! **Ameritron brings you the finest high power accessories!**

ARB-704 amp-to-rig interface. . . $59.95

Protects rig from damage by keying line transients and makes hook-up to your rig easy!

RCS-4 Remote Coax Switch . . . $159.95

Use 1 coax for **4** antennas. No control cable needed. SWR <1.25, 1.5 - 60 MHz. Useable to 100 MHz.

RCS-8V Remote Coax Switch. . . $169.95

Replace **5** coax with 1! 1.2 SWR at 250 MHz. Useable to 450 MHz.<.1 dB loss, 1kW@ 150MHz.

RCS-10 Remote Coax Switch. . . $179.95

Replace **8** coax with 1! SWR<1.3 to 60 MHz.**RCS-10L, $219.95** with lightning arrestors.

New! RCS-12C Fully Automatic Remote Coax Switch Controller. . . $239.95

Band data from transceiver auto selects antennas. Antenna memories. No hotswitching. Rig-to-amp interface. For 3/4 BCD, 1 of 8 relay boxes. **RCS-12, $309.95**, auto controller with 8 coax relay box, to 60 MHz. **RCS-12L, $349.95**, with lightning arrestors.

AWM-30 Precision SWR Wattmeter..$149.95

Active circuit gives *true* peak/average readings on lighted cross-needle meter.3000/ 300 Watt ranges, Remote sensor.

AWM-35 Flat Mobile SWR Wattmeter . . $159.95

1⅝ in. thin on dashboard. Remote sensor, 25' cable. True *peak*, Cross-Needle,1.5 kW, 1.8-30 MHz. *High-SWR* LED.

ATP-100 Tuning Pulser . . . $69.95

Safely tune up for full power, best linearity. Prevents overheating, tube damage, power supply stress, component failure.

ADL-1500 Dummy Load with oil . . . $74.95

Oil-cooled. 50 Ohms. 1500 Watts/5 minutes. SWR< 1.2 to 30 MHz. Low SWR to 400 MHz.

ADL-2500 fan-cooled Dry Dummy Load, $219.95

Whisper quiet fan, 2.5kW/1 minute on, ten off. 300W continuous. SWR< 1.25 to 30 MHz.<1.4 to 60 MHz.

SDA-100 Mobile Screwdriver Antenna

$409.95 80-10M, fiberglass form, Pittman motor, CNC parts, magnetic sensors, #14 wire, 1.2 kW PEP. 6' whip, $24.95

800 Watts . . . $899
with four 811A tubes

AL-811H, $899. Plugs into 120 VAC outlet. All HF bands. Hi-silicon transformer, heavy duty tank coils, tuned input, operate/standby switch, Xmit LED, ALC, lighted meters, 32 lbs. 13¾Wx8Hx16D in.

AL-811, $749. Like AL-811H, but three 811A, 600 W.

Desktop Kilowatt
with Classic 3-500G tube

AL-80B, $1399. Whisper quiet 3-500G desktop amp gives *full* kilowatt SSB PEP output. Plugs into 120 VAC. Ameritron's exclusive *DynamicALC*™ doubles average SSB power out and *Instantaneous RF Bias*™ gives cooler operation. All HF bands. 48 lbs. 14Wx8½Hx15½D in.

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with Eimac® 3CX1500/8877

AL-1500, $3495. Ameritron's *most powerful* amplifier uses the herculean *Eimac®* 3CX1500/8877 *ceramic* tube. 65 Watts input gives you full output power -- it's just loafing with a 2500 Watt power supply. All HF bands, all modes. 77 lbs.17Wx10Hx18½D inches.

AL-1500F, $3095, Import tube.

1500 Watt* True Legal Limit™ *Antenna Tuner

ATR-30, $599.95 • Super high current edge-wound silver plated roller inductor • 500pf capacitors • 6:1 reduction drives • 3 core current balun • 6 position antenna switch • True *peak* meter

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A more recent photo of the author at the 150-foot level of "tower #2." He mounted the camera on an arm 4 feet off the tower, 10 feet above him, and then shot this self-portrait with a 10-foot-long cable release.

remembered the information incorrectly when I got home—W2VU). In reality, I held weekly QSOs (for 4 1/2 years) with Al, K4CAW (now a Silent Key), on 432 MHz SSB to North Carolina, at an airline distance of 480 miles.

The Tropo Experiment

I was using a homebrew 432-MHz 16-Yagi array antenna, 19 elements per Yagi (304 total elements, 29 dBi of gain; see sidebar, "The 16-Yagi Array"), on a 100-foot tower, fed by 700 watts from a K2RIW Parallel KW Stripline Amplifier. My 100-foot tower and land at 300 feet AMSL (Above Mean Sea Level) gives me an over-water, line-of-sight distance of 43 miles. The 480-mile QSOs were more than ten times that distance, and 90% of those QSOs were conducted without the benefit of a band opening or other enhancement. The long-range propagation experiment with K4CAW began in 1980, a couple of months after I had placed the 16-Yagi array on top of my 100-foot tower. That's when we met on the air one Tuesday night. We were amazed at the strength of the 480-mile, 432-MHz SSB signals under band conditions that seemed to be just ordinary. We decided to attempt the same QSO again on the next Tuesday, and that began a sequence of half-hour 7:30 PM (local) Tuesday schedules that lasted for 4 1/2 years.

We would take turns transmitting for 2 minutes, and we each kept records of the average signal strength during each 2-minute period. During summers, the signals would have higher peak amplitudes, but deeper valleys. The most reliable signals were in the winter when the band seemed to be quieter from QSB and QRN. We averaged over 90% SSB copy in the summer, but about 95% copy during the winter. We were also amazed that the rapid fading that usually occurred over that long path made the percentage of CW copy no better than the SSB copy, particularly with message repeating, and the knowledge of each other's vocabulary. Most of the information that passed between us was a description of what we each heard during the last 2-minute transmission period.

The Mystery

We were constantly amazed at the signal strength. The SSB tropo signals (both ways) averaged 2 dB above the noise, except for occasional Doppler-shifted SSB signal enhancement that brought our signal strengths 30 dB above the noise. The Doppler-shifted signals lasted about 2 minutes, and the event often happened twice during each half-hour schedule every Tuesday night. The enhancement always started out as a weak high- frequency whine that slowly increased to a strong 30-dB SNR signal, and it went through a zero beat over the first minute. Then the process would reverse over the next minute as the signal decreased to a weak high-frequency whine as the signal enhancement disappeared.

For over a year K4CAW and I were baffled by what was causing the periodic enhancement. The explanation finally occurred when K4CAW and I studied the airline schedules and discovered that the aircraft flying between New York City and Florida were passing over Washington, DC at 30,000 feet (in the mutual beam of our two antennas and at the approximate midpoint of our path), and this occurred at the rate of about twice per hour (as the planes passed through in either direction).

The Bi-Static Effect

The 432-MHz SSB signal echoes from the aircraft were really bi-static radar-like in nature. The Doppler Effect can be explained by picturing the signal path from K2RIW (on Long Island), to the aircraft, and on to K4CAW (in Greensboro, NC) as a bow string that gets stretched as the aircraft flies away from the midpoint. The rate of the stretching is minimum (the zero-beat), and the reflected signal is strongest, when the aircraft is at the midpoint (Washington, DC). As the aircraft leaves the midpoint, the "bow string" becomes more stretched, the Doppler-shifted signal (the whine) increases in frequency, and the signal strength decreases as the aircraft leaves the midpoint.

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Two models to choose from . . .

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***New!* MFJ-4175, $359.95.** 75 Amps *continuous*. 13.8-14.2 VDC. 7.8 pounds. 6½Wx3½Hx10D inches.108-132 VAC. *No RF hash!*

NEW! 25 Amp MightyLite™

Super light, super compact switching power supply delivers 25 Amps maximum/22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. ***No RF Hash!*** Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 2.86 lbs. 5¾Wx3Hx5¾D inches.

MFJ-4125
25 Amp
$109.95 plus s&h

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

MFJ-4035MV
$149.95

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

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$79.95 plus s&h

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$39.95 plus s&h

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MFJ-1118, $79.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $54.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $39.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

MFJ-1117, $59.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

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The 16-Yagi Array

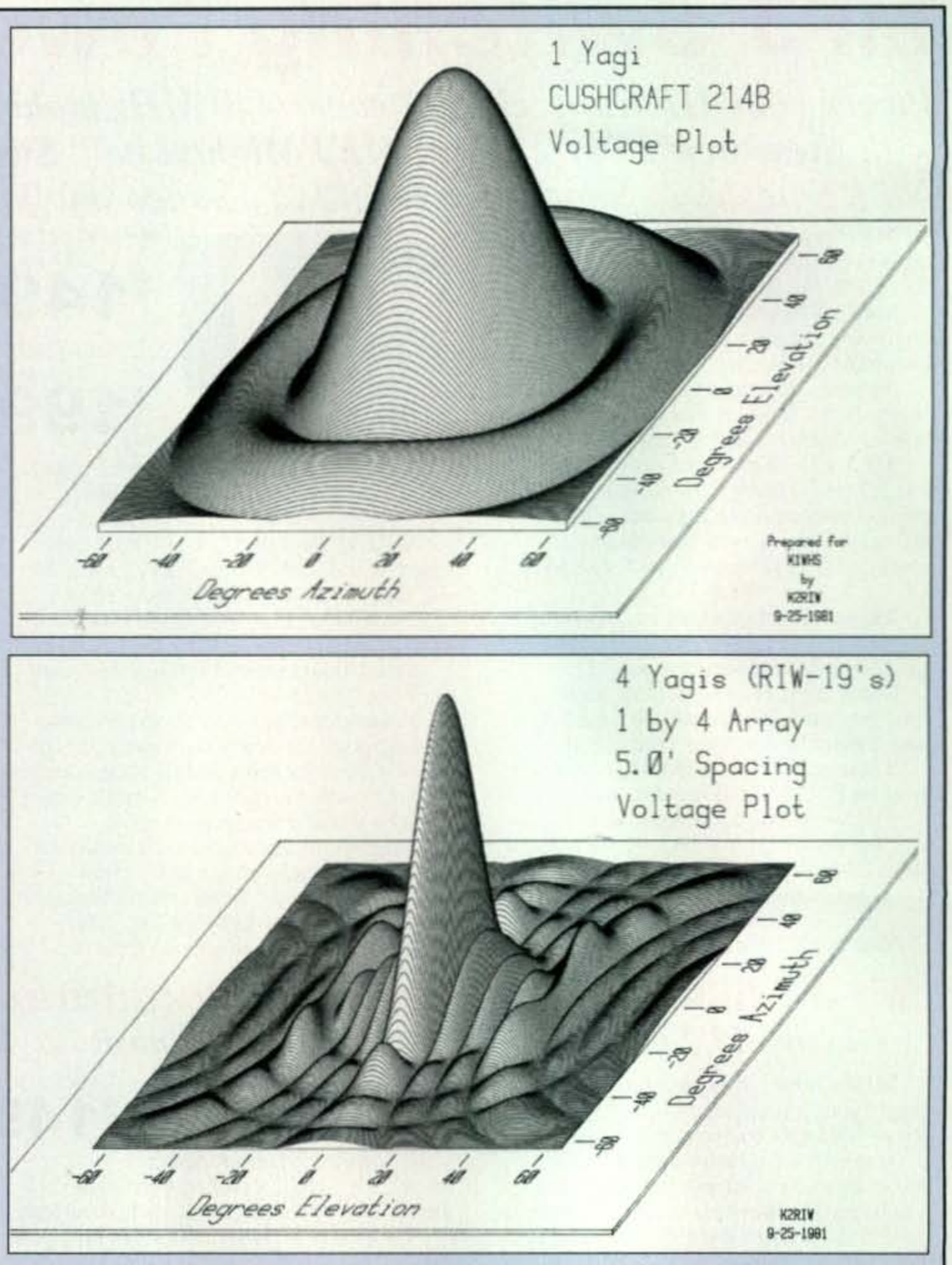
My 16-Yagi array was 17.5 feet wide, 16.5 feet high, and 13 feet deep. You could say it was a 3750-cubic-foot antenna, but it had a wind area of only 30 square feet. I had to construct most of it at the 100-foot level of the tower; that was the only way to get all of the hardware past the 12 guy wires. The whole antenna was first assembled on the ground, and then broken into five modules that were hauled up the tower and re-assembled on station. It was all constructed from thin-wall tubing to save weight and lower the moment of inertia. The array weighed 78 pounds, including 22 pounds for the phasing harness. It had a calculated wind failure of 78 mph.

Zoom Control

The array had three relays built into the phasing harness. In two seconds I could change the pattern of the antenna in three steps. By feeding: (1) one single antenna at the top of the array, (2) one vertical string of 4 Yagis, or (3) the whole 16-Yagi array, I could control the beam width from: (1) 26 × 26 degrees, (2) 26 × 5.5 degrees, or (3) 5.5 × 5.5 degrees. Each step would change the gain by 6 dB. It was a lot of fun to call CQ with a broad beamwidth that was 26 degrees in azimuth by 5.5 degrees in elevation, and then steer the antenna onto the answering target, switch to the 5.5 × 5.5 degree beamwidth, and observe the signal become 6 dB louder. The initial use of the broader beamwidth made it very easy to peak the signal into the center of main lobe of the higher gain configuration. This is required because all multi-Yagi arrays with horizontal stacking will have many side lobes that can create an azimuthal ambiguity, particularly when listening to an SSB signal. In that situation it would be very easy to peak up a signal into one of the side lobes, and mistakenly believe the signal was in the main lobe, which is 12 dB stronger.

What the Antenna Could Do

The 16-Yagi array approximately tripled my 432-MHz SSB range. That meant I could hold comfortable SSB QSOs with people within an area that became 10 times greater (10 times more amateurs) than what I would have had with a simpler antenna. Between 1980 and 1985, I had QSOs with 460 different 432-MHz stations in 24 states. I was having so much fun picking guys' brains that I never got around to doing EME, even though that antenna was more than capable. On three occasions I took first place in the Hudson Division in the June and September ARRL VHF contests by using nothing but 432 MHz. In September 1985 Hurricane Gloria hit the top of my tower with 105-mph winds and as predicted, much of the array became a pile of rubble on my front lawn. I wasn't very disappointed; it did what it was supposed to do for the 5 1/2 years that I used it.



3-D plots of the patterns of K2RIW's array as he switched in just one Yagi (top), four Yagis (center), and all 16 Yagis (bottom). He had to write the plotting program himself back in 1980. Each plot contained 10 megabytes of data, a massive amount in those days, and had to be stored on multiple tape files!

The last clue that confirmed the aircraft-echo hypothesis was that I could increase the Doppler signal strength (the amplitude of the whine) for about one minute by aiming my antenna 5 degrees to the left or right of the direct path, depending on which way the aircraft was traveling. My 16-Yagi array antenna had a beam width of 5.5 degrees.

An Expensive Hoax? (Not)

For the first year of our experiments, K4CAW and I were accused by a number of well-respected amateurs of creating a hoax. Al was using four big Yagis on a 100-foot tower while I was using 16 Yagis on a 100-foot tower. We both had good Low Noise Amplifiers (LNAs) on our receivers, and kW (input power) transmitters–Stripline Parallel KW Amplifiers. Amateurs with lesser equipment heard nothing and accused us of making believe we were making 480-mile 432-MHz SSB QSOs really by using the telephone. They should have realized that a half-hour phone call every week for 4 1/2 years would be quite a phone bill!

Finally, a few mountaintop-located amateurs near the midpoint of the path aimed their antennas in both directions, depending on which of us was transmitting. They were hearing our signals, and they declared, "Hey, these guys are really doing it!" It was fun being part of a "Long Range Hoax" that turned out to be real.

Data Contamination?

As you can see, this was a real fun experiment that lasted 4 1/2 years. However, it points up a significant error that has been occurring for decades. There have been a number of long-range tropospheric propagation experiments, ranging out to distances of 600 miles, that have been funded by a number of Department of Defense agencies. They often consist of high-powered transmitters, big antennas, and long-duration strip-chart recordings of the observer's receiver signal strength over periods of a year or more. Then the statistics of the signal strengths, over the seasons, for various weather conditions, become documented and published in the DOD and IEEE journals (among other places).

I believe the authors of these published reports have not realized that hidden within their data are the effects of aircraft reflections. They were not listening to the signals, as a ham would. They think they have been studying Mother Nature. They may not know that their data have a serious contaminant. Similarly, actress Jodie Foster, as Dr. Ellie Arroway in the Sci-Fi movie "Contact," discovered additional information from the radio telescope signals because she was "a listener."

RF Goes Everywhere

This experience has taught me that once you launch an RF signal, it goes to every part of the universe. The only real question left to ask is "Is that signal above the threshold of the equipment you are using to receive it?"

Admittedly, it can sometimes be very difficult to try to explain how that RF signal is able to go that far beyond the horizon, sift itself through all those local trees and buildings, and still arrive above threshold of good receiving equipment. However, the fact of the matter is that if you use a big-enough antenna, a large-enough transmitter, and a sensitive-enough receiver, almost any path can be bridged. That's part of the magic of wireless.

In response to requests from many participants, the rules for the CQ WPX Awards are being changed to permit credit for contacts on all bands through 6 meters, plus a new Digital WPX Award.

New Rules for CQ WPX Awards Expand Eligible Bands and Modes

Steve Bolia, N8BJQ, CQ WPX Awards Manager, has announced several changes to the WPX Award program, including the addition of new bands and modes that now qualify for award credit. Major changes include the introduction of a new Digital WPX Award for keyboard modes such as RTTY and PSK-31; the addition of credit for contacts made on the 60, 30, 17, 12, and 6 meter bands; provisions for submitting applications electronically; and increasing from two years to ten years the length of time a prefix remains "active" for award purposes after it is no longer authorized by the licensing authority. The changes are effective immediately.

The revised WPX Award rules are printed below, with the changes highlighted in bold:

The CQ WPX Awards Program

The CQ WPX Award recognizes the accomplishments of confirmed QSOs with the many prefixes used by amateurs throughout the world. Separate, distinctively marked certificates are available for SSB, CW, **Digital (RTTY/ PSK)**, and Mixed (CW, SSB/Phone, **Digital**).

1. Applications

A. All applications for WPX certificates (and endorsements) must be submitted on the official application form (CQ 1051). This form may be obtained by sending a self-addressed, stamped, business-size (4 × 9 inch) envelope to the WPX Award Manager, Steve Bolia, N8BJQ, P.O. Box 355, New Carlisle, OH 45344. It is also available on *CQ*'s website at <www.cq-amateur-radio.com/awardapps.html>. Computer printouts with a minimum of 10-point size type are acceptable provided they conform somewhat to the CQ 1051 application form. **Electronic applications will also be accepted and are encouraged. Please contact the WPX Award Manager for details.**

B. All call letters must be in strict alphabetical order and only the entire call letters are required and must be shown.

C. All QSOs must be made from the same country.

D. All entries must be clearly legible.

E: Certificates are issued for HF (160–10) **and 6 meters** for the following modes and number of prefixes. Cross-mode QSOs are not valid for **single-mode** certificates.

Mixed: 400 prefixes confirmed.
CW: 300 prefixes confirmed.
SSB: 300 prefixes confirmed.
Digital: 300 prefixes confirmed

A separate application is required for each mode.

F. Cards need not be sent, but they must be in the possession of the applicant. Any and all cards may be requested by the WPX Award Manager or by the CQ Awards Committee.

G. The application fee for each certificate is $6.00 for *CQ* subscribers (subscribers must include a recent *CQ* mailing label, or a photocopy of it) and $12.00 for non-subscribers, or the equivalent in IRCs at $.50 each.

H. All applications and endorsement requests should be sent to the WPX Award Manager.

2. Endorsements

A. Prefix endorsements are issued for each 50 additional prefixes submitted. Minimum submission at any one time is 50 prefixes.

B. Band endorsements are available for working the following numbers of prefixes on the various bands:

1.8 MHz—50
3.5 MHz—175
5 MHz—175*
7 MHz—250
10 MHz—250
14 MHz—300
18 MHz—300
21 MHz—300
24 MHz—300
28 MHz—300
50 MHz—250

**** The initial level of 175 prefixes for 60 meters may be increased in the future to no more than 250 when and if sufficient additional countries permit amateur operation on the band.***

C. Continent endorsements are available for working the following numbers of prefixes in the respective continents: North America 160, South America 95, Europe 160, Africa 90, Asia 75, and Oceania 60.

D. Endorsement applications may be submitted by computer printout or on CQ form 1051. Use a separate application for each mode of your endorsement application. **Electronic submission is preferred and encouraged.**

E. For prefix endorsements, list only additional call letters confirmed since the last endorsement application.

F. A self-addressed, stamped envelope or proper IRCs for surface or airmail return is required, and $1.00 or 2 IRCs for each endorsement sticker.

3. Prefixes

A. The letter/numeral combinations that form the first part of the amateur call will be considered the prefix. Examples: K6, N6, WD4, HG1, HG19, WB2, KC2, OE2, U3, ZS66, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix.

B. A prefix will be considered if licensed by the governing authority in the country of operation after November 15, 1945.

C. In cases of portable operation in another country or call area, the portable designator would then become the prefix. Example: WN5N/7 would count as W7, J6/WN5N would count as J6, KH6/WN5N would count as KH6, etc. Portable designators without numbers will be assigned a zero (Ø) at the end of the designator to form the prefix. Example: LX/WN5N would count as LXØ. The portable prefix must be an authorized prefix of the country/area of operation. Maritime mobile, mobile, /A, /E, /J, /P, interim license class identifiers **and unofficial prefixes** do not count as prefixes.

D. All calls without numbers will be assigned a zero (Ø) plus the first two letters to form a prefix. Examples: XEFTJW would count as XEØ, RAEM would count as RAØ, AIR as AIØ, etc.

WPX Honor Roll

The WPX Honor Roll recognizes the operators and stations that maintain a high standing in confirmed, current prefixes. The rules, therefore, reflect the belief that Honor Roll membership should be accessible to all active radio amateurs and not be unduly advantageous to the "old timers." With the exceptions listed below, all general rules for WPX apply toward Honor Roll credit.

A minimum of 600 prefixes is required to be eligible for the WPX Honor Roll. No certificates are issued, but a listing of members appears in *CQ* every other month.

A. Only current prefixes will be counted toward the WPX Honor Roll standings. Prefixes will be deleted from the Honor Roll listing **ten** years after they are no longer authorized for use by the governing authority or by the ITU.

(Note: Previous section B regarding special-issue prefixes has been deleted. They are now treated the same as other discontinued prefixes; see A above.)

B. Honor Roll applicants must submit their list of current prefixes (entire call required) separately from their regular WPX applications. **Electronic submission is preferred and encouraged. A simple ASCII file or an Excel spreadsheet showing just the call is sufficient. Contact the Award Manager for details. Use of regular form 1051 or a computer printout is also permissible. Handwritten applications must be legible.** Indicate Honor Roll and mode desired. Forms may be obtained by sending a business-size, self-addressed, stamped envelope or 1 IRC (foreign stations send extra postage or IRCs if airmail is desired) to the WPX Award Manager. A separate application must be made for each mode. Lifetime Honor Roll fee for each mode is $10.00.

A computer printout of your individual Honor Roll file may be obtained from the WPX Award Manager for $6.00 plus a self-addressed envelope and sufficient postage for return.

C. Endorsements for the Honor Roll may be made for 25 or more prefixes. A $1.00 endorsement fee plus an SASE or IRC are to be included. For prefixes by countries see the *Callbook* listing

WPX Award of Excellence

This is the ultimate award for the prefix DXer. The requirements are 1000 prefixes in Mixed mode, 600 prefixes in SSB, 600 prefixes in CW, all 6 continental endorsements, and the 5 **non-WARC** band endorsements 80–10 meters. **Special endorsement bars are available for Digital, 160, 60, 30, 17, 12, and 6 meters for those who have also qualified for those endorsements (see Rules 1E and 2B for qualifying numbers of prefixes).**

The WPX Award of Excellence plaque fee is $60.00 ($80.00 for overseas stations due to airmail postage costs). The endorsement bars are $6.50 each.

What You've Told Us...

Our November survey asked about your VHF/UHF FM mobiling activities, and an overwhelming 88% of you who responded say that you do operate ham radio from your vehicle. The prevalence of dual-band FM mobile rigs is obvious from the fact that 61% of you say you operate both VHF and UHF FM from your vehicle, while 23% operate VHF only, 1% work only UHF, and 14% operate neither (that would be the 12% who don't operate mobile plus, presumably, 2% who exclusively operate HF on the road).

A few more of you (36%) operate mainly on one favorite repeater than bounce around to several (31%), while 18% say their choice of repeaters depends on activity levels and that same 14% don't operate on repeaters. Operating times are interesting, with 47% of you active between noon and 5 PM, followed by 46% on from 5-7 PM, 37% between 9 AM and noon, 35% between 6 and 9 AM, 31% between 7 and 11 PM, and 7% between 11 PM and 6 AM.

Most of you (58%) always take a VHF/UHF FM rig with you on road trips, while 28% do so sometimes and 12% never do; 34% of you say it's moderately easy to find contacts on repeaters while traveling, while 33% say it's moderately difficult. That's followed by 11% who say it's very difficult, 7% who say it's very easy and, as always, 14% who don't operate on repeaters. Finally, 24% of you find it easier to get contacts in urban areas than in rural ones, while only 8% felt rural areas were easier and 21% said it was about the same in both; 30% said "drive times" were easier than "off times" for finding contacts, while 3% said off times were easier and 18% said time of day didn't make much difference.

This month's free subscription winner is John Demetrius, KC2OII, of Wayne, New Jersey.

(Note to readers: Our survey and results page in the January issue had to be dropped due to last-minute space needs. No pages were missing. We regret any confusion or inconvenience.)

Reader Survey March 2008

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

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

This month, we'd like to know about any other hams in your family and how you have influenced each other.

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

1. Are you the only currently-licensed ham in your immediate family (parents, siblings, spouse, children)?
Yes 29
No 30

2. Are you the only currently-licensed ham in your extended family (aunts/uncles, nieces/nephews, cousins, grandparents, grandchildren, in-laws)?
Yes 31
No 32

3. Has any relative, living or deceased, ever been a ham?
Yes 33
No 34

4. Which of the following relatives of yours are/were hams? (circle all that apply)
Parent 35
Sibling 36
Spouse 37
Child 38
Grandparent 39
Grandchild 40
Aunt/Uncle 41
Cousin 42
In-Law 43
None 44

5. Who influenced whom to get licensed? (circle all that apply)
I influenced a relative 45
A relative influenced me 46
We became hams together 47
No ham relatives 48
Not influenced by relatives 49

6. Who/what was your primary influence in becoming a ham?
Relative 50
Friend 51
School radio club 52
Local radio club 53
Observing ham activity 54
Reading about ham radio 55
Other 56

7. Do you currently have any family members who are potential hams?
Yes, he/she is working on a license 57
Yes, he/she has expressed some interest 58
Yes, he/she has *no* interest 59
No 60

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

Enjoy HF even more with HF Digital!

AOR offers new HF licensees a CLEAR difference with the amazing audio clarity of HF digital. The ARD9000 Mk2 and ARD9800 are both great ways to join in the fun because there's "no assembly required".

Add a whole new mode to your HF operation with a couple of quick connections and be part of the digital voice excitement that's sweeping the SSB bands. Once you hear the audio quality, you'll be a believer! Whenever these digital voice modems are demonstrated, looks of amazement pass through the crowds.

Using the open G4GUO protocol, the ARD9000 Mk2 or ARD9800 allows any ham to convert any existing HF analog transceiver to work digital voice in one easy step! The unit automatically detects digital signals and decodes them, but you also maintain full analog capabilities. Whether a contact comes in as digital or analog, the ARD9000 Mk2 and ARD9800 can handle it.

It's a real breakthrough in communications technology that uses the same audio frequencies (300 Hz ~ 2500 Hz) as microphone audio to transmit digital SSB voice signals.

Enjoy the clean, clear audio that makes HF digital so much fun!

- NO transceiver modifications necessary
- Digital voice communications using existing analog transceivers
- Works on Single Side Band (SSB) mode.
- Automatic digital receive
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- Built-in high grade Vocoder (AMBE)
- Built-in FEC protocol
- Compact unit. Easy to operate.
- Utilizes a uniquely designed high performance DSP engine
- Uses the established G4GUO open protocol
- ARD9800 can also be used for digital slow scan TV and data transmissions (images require optional memory board)

Be sure to check the website at www.aorusa.com for FAQs, links to user groups and more!

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BY BOB JOSUWEIT,* WA3PZO

Hams: "A Godsend When It Comes to Emergencies"

Ham radio operators around the country didn't take a break over the new year as severe weather and other emergencies occurred. This month we'll take a look at hams supplying shelter communications and others who are enhancing their capabilities thanks to a grateful governor.

Wisconsin Tornadoes

In early January, 20 Amateur Radio Emergency Service (ARES) operators in Kenosha County, Wisconsin were called into action after an outbreak of tornadoes which destroyed 26 houses and damaged 75 others. Winds as high as 150 mph were reported. With power out, hams provided communications between the Kenosha County Emergency Operation Center and two Red Cross relief shelters.

According to reports, the areas hardest hit by the storm included Wheatland and Somers townships and the city of Kenosha. Besides staffing the shelters, local amateur radio operators rode along with Red Cross damage assessment teams and relayed reports back to the American Red Cross in Racine.

"Providing communications is essential," said Alex Voss, N9RGX, Assistant Emergency Coordinator for the Racine County ARES. "Cell phones are not up to the task. When the teams deployed in the field need to call in their reports you don't want them fumbling with a cell phone. You can't have everyone calling the same phone number at once either. Having a dedicated person along who can radio the information back to the Red Cross is essential to get the time-valued information where it's needed fast."

Hams Keep Track

"Organization is key," Voss continued. "We set up a communications network at the Red Cross building in Racine, outside of the affected area. As radio operators volunteered, we assigned them to a location. Keeping track of the location of each team member and the situation helps keep them safe. When a disaster strikes, we don't want to add any of our volunteers to the list of affected individuals."

Voss added, "We were ready to go when activated. I couldn't be more proud of our volunteers. We will work with the responding agencies as long as they need us. We'll take what we've learned this time and use it to improve our response in the future."

In the Show-Me State

Meanwhile, Missouri hams had their eyes on the sky. More than 50 local ham radio operators reported the outbreak of tornadoes, hail, and damaging winds via the local Skywarn net. According to the National Weather Service, Skywarn is a volunteer program with nearly 280,000 trained severe-weather spotters, many of whom are ham radio opera-

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Jim Markstrom, KB9MMA (standing), ARRL Emergency Coordinator for Racine County, Wisconsin, and Alex Voss, N9RGX, coordinated the amateur radio response to tornadoes in the area in early January. (Photo courtesy of Dave Voss, WB9USI)

Assistant Emergency Coordinator Dave Voss, WB9USI (left), and Steve Buck, N9EAL, supply communications at a Red Cross shelter. (Photo courtesy of Dave, WB9USI)

tors. Rod Kittleman, KØADI, ARRL Southwest Missouri Public Information Officer, said the hams provided a majority of the mobile reports to the Springfield National Weather Service office as well as first-responder reports for the agencies responding to disaster scenes. He said the Skywarn participants were active for over 15 hours, providing information as to where funnel clouds were visible, where high winds were happening, and where tornadoes on the ground were heading. These vital reports assisted the Springfield National Weather Service in confirming radar images and getting early warnings out to the community.

"We had hams radio in reports from Barry and Lawrence County, where the first tornado touched down, all the way northeast into Pulaski County. Hams risked their lives to warn the public," said Kittleman. "Throughout the night, the hams reported accurate debris, damage, and hail reports which helped the National Weather Service pinpoint storms and tornadoes on the ground. Plus this allowed local law enforcement to focus more on emergency situations."

"Having a dedicated ham radio person stationed at the National Weather Service is essential in getting warnings out fast," Kittleman added. "Cell phones can't handle mass calling, let alone calling the same phone number at once."

Heroes from the Beginning

"One of the problems in this is always communication," Oregon Gov. Ted Kulongoski said after a visit to Vernonia following severe storms in December that left many without power and telephone service. "I'm going to tell you who the heroes were from the very beginning of this ... the ham radio operators. These people just came in and actually provided a tremendous communication link to us."

Clatsop County Sheriff Tom Bergin echoed the governor's feelings. "Really, it's ham radio operators who are the backbone, because we operate on power ... They are a godsend when it comes to emergencies."

Recently Governor Kulongoski made $250,000 available to the Oregon Emergency Management agency to develop and enhance a statewide ARES digital communications network (OADN). The network uses a combination of different radio equipment and spectrum segments, computers, and the internet to provide a robust back-up communications system in times of emergency or disaster. The primary purpose of the OADN is to provide back-up digi-

Oregon Governor Ted Kulongoski surveys storm damage in the Vernonia area that left many without power and telephone service. He said, "One of the problems in this is always communication," and cited hams as "the heroes ... from the very beginning of this." (Photo courtesy Oregon state website, www.oregon.gov).

tal communications capabilities between county Emergency Operations Centers, Oregon Emergency Management, and other state agencies in Salem in the event that normal communications systems fail during an emergency.

According to information provided by the OADN, the volunteer amateur radio operators of each county's ARES/RACES unit will install, maintain, and operate the network through an Intergovernmental Agreement between the individual county Emergency Mangers and Oregon Emergency Management.

Southern Explosion

In mid-December, a massive explosion at a chemical manufacturing plant rocked the north side of Jacksonville, Florida. According to the company's website, the plant makes petrol additives, solvents, and other products that it says are designed to replace conventional toxic industrial chemicals with low-environmental-impact versions. The explosion claimed four lives and put 14 others in the hospital. Many businesses in the area were also damaged. As a giant plume of smoke rose above the city, Jacksonville Fire-Rescue Department (JFRD) responded to the scene. District Emergency Coordinator Miller Norton, W4EMN, operated from the JFRD Command Van while Assistant Emergency Coordinator (AEC) Bill Sander, KA4OBP, paged the Duval County ARES leadership after hearing about the explosion on a local repeater so they would be aware of the incident and be prepared to activate if requested.

ARRL Emergency Coordinator General Dailey, KD4VVZ, was in contact with AECs Cary Beuershausen, N4CDB, and Scott Freudenthal, K2LSF, via UHF while they tried to determine the extent of the incident and prepared to mobilize ARES members. Beuershausen said that a formal VHF net was started on the W4RNG repeater and began taking check-ins from radio operators throughout the city. Norton reported via the net that cellular service in the industrial area where the blast occurred was unreliable and that some calls were not making it through due to abnormal heavy use in the area resulting from the situation.

"ARES members at the scene were instrumental in passing critical information," said Beuershausen. Red Cross official Rusty Russ, W4WCR, and Jacksonville Electric Authority (JEA) Agency Liaison Todd Lovelace, K1KVA, both provided on-scene updates to the net. Two of three JEA generating stations near the blast site were temporarily knocked offline and non-essential plant workers were ordered to evacuate. JEA implemented its written plan for amateur radio communications between its licensed employees and this became the only direct link between JEA and JFRD pertaining to the evacuations when they initially were ordered.

Beuershausen continued:

At 2:48 p.m., a third fire alarm was declared (the explosion occurred at 1:30 p.m.) and a half-mile radius including all homes and businesses was evacuated. At this time a Red Cross shelter was opened at a nearby elementary school. Sandor Wetsel, KG4FET, headed to the shelter to provide radio communications and AEC Sandy Ingle, KG4CQK, stood by as a back-up. It was at this time that JFRD made the official request for ARES activation. However, responders were advised not to report directly to the scene due to road blockages and the uncertainty of the types and toxicity of the chemicals involved in the blast. While authorities worked to determine this information, amateurs continued to pass traffic related to the incident. In addition to keeping local amateurs and authorities informed, ARES members also provided the first reports to the State Emergency Operations Center in Tallahassee via relay through the local ARES net and via Tom Nolan, KD4MWO, to the Southeastern Emergency Digital Association Network (SEDAN). Throughout the activation, approximately 25 amateurs checked in or provided information to the local net.

JFRD soon determined that the air quality posed no dangers to the community and that there were no toxic materials in the area. The shelter personnel were instructed to direct people back to their homes and businesses. Although a number of persons were injured by the blast, it was not treated as a mass casualty incident so local hospitals were not manned by ARES. The shelter and

VHF net remained operational until JFRD gave the order to shut down at 5:30 p.m.

Soldier-Ham Salute

Army MARS member Major Roman Kamienski, KG6QMZ, of Diamond Bar, CA, works in electronics and computer technology in civilian life. As a reserve officer he led a team of six fellow Army MARS members supporting VHF communications during a summer maneuver called "Pacific Warrior," involving some 3000 reserve troops. The hams' assignment included installing base stations and a repeater system covering a 30-mile convoy route through mountainous Central California terrain.

Kamienski received a surprise gift at his Army unit's Christmas party. He was presented the Army Commendation Medal with Oak Leaf cluster "for distinguished achievement." Kamienski was recognized for his role in planning radio communications involving the 63rd Regional Readiness Command, participating Signal units, and the Army Military Affiliate Radio System. "Major Kamienski exhibited strong leadership, technical expertise, the ability to collaborate across areas of responsibility and a positive attitude in supporting all participants in Pacific Warrior," his supervisor said in recommending the medal.

"Pacific Warrior was a win-win situation where we all worked together with Army and civilian equipment to help train soldiers and prepare them for combat," Kamienski said. He added that troops who saw the hams at work in the difficult terrain were astounded to hear they were working without pay.

According to a MARS press release, Kamienski (MARS call AAR9ZA) and the MARS team members received certificates of commendation from the 63rd RRC's commander, Major General Paul E. Mock. The other recipients were Region Nine Army MARS Director Mike Itnyre, W6WAR (AAA9RD); Derrill Coffman, W7LTM (AAT9WU); James Coote, W6CJ (AAR9QM); John Byrne, W6WJB (AAM9TCA); and Carl Swanson K6CRS (AAM9ICA). All deployed to the maneuver area for varying periods.

Kamienski has accumulated some 25 years of military service. He became a ham in 2003 and joined Army MARS soon thereafter. He holds an Amateur Extra license. His reserve assignment is the Automation and Telecommunications Division at HQ 63rd RRC.

NBEMS: A New Digital New Messaging System

A new NarrowBand Emergency Mes-

Major Roman Kamienski, KG6QMZ (right), briefs deployed Army MARS members and fellow officers at the Pacific Warrior exercise. From left: Michael Itnyre, W6WAR; Lt. Williamson; Derrill Coffman, W7LTM; and Lt. Kamrosky. (U.S. Army photo)

saging System (NBEMS) for Windows® was introduced in January. The system is a suite of software programs designed for point-to-point, fast, error-free emergency messaging up to or over 100 miles distant. According to the authors, it takes up a very minimum of space on the ham bands, leaving more space for all other ham activities.

The developers of the system, Skip Teller, KH6TY, and Dave Freese, W1HKJ, say it is designed primarily for use on the 2-meter band, or on HF with NVIS (Near Vertical Incidence Skywave) antennas, where there is a minimum of fading (QSB) to slow down message transfers. In information posted on the NBEMS website, the authors explain: "Two meters has the advantage that distances long enough to span disaster areas of up to 100 miles can be dependably done with small, portable antennas. In hilly regions, if 2 meters is not workable over the distances required, NVIS antennas on HF can be employed instead, but are not nearly as portable." NBEMS uses the computer soundcard as the modem, and other than a simple interface connection between the computer and transceiver, no additional hardware is needed.

The developers say that composing and sending emergency messages on NBEMS utilizes the same Outlook Express, Outlook, or Windows® Mail, e-mail program used for internet e-mail and is no more difficult than sending an e-mail over the internet. Messages just go over the radio instead, when the internet or phone service is not reachable in an emergency.

In addition to the mail capability, NBEMS uses PSK63, PSK125, or PSK250 to modulate 2-meter SSB or HF SSB transmitters, using horizontally polarized antennas for greatest range. Two meters is unique in that the propagation is more constant than on the lower bands from 6 meters on down, and range is greater and absorption less, than on the lowest UHF band, 70 cm. Thus, much wider modes that handle QSB by continuing to work far below the noise level are not needed.

The authors say this point-to-point system does not utilize repeaters or email robots for message forwarding. All forwarding is always done by stations manned by live operators on both ends who can confirm that a frequency is clear locally, negotiate a QSY if necessary, and confirm delivery of a message by the intended recipient. According to the NBEMS website, the system depends upon a multitude of radio amateurs providing the traditional public service function, similar to the way they always have, and gives more hams a chance to help out with emergency communications without requiring a large hardware investment. The software can also be used for daily casual communications on PSK31, PSK63, RTTY, or MFSK16 and is capable of sending flawless, high-resolution, passport-photo-size color images in less than 10 minutes over any path that can sustain PSK250 without excessive repeats. More information on NBEMS can be found at <http://www.w1hkj.com>.

With Thanks

Each month we bring you interesting stories of amateur radio operators serving in the public interest. In many cases we can't do it without your help. This month we want to thank Dave Voss, WB9USI; Rod Kittleman, KØADI; Cary Beuershausen, N4CDB; and Bill Sexton, N1IN. Do you have a story to tell of hams serving in the public interest? Drop us a note. Until next time...

73, Bob, WA3PZO

Step Up/Down Regulators

BY IRWIN MATH,* WA2NDM

Many experimenters are familiar with the common 7800 series of three-terminal DC regulators. These regulators are used to provide a fixed DC output voltage from a varying DC input and are available in many standard voltages such as 5.0 volts, 12 volts, 24 volts, to mention but a few. Depending on the package size, versions are available that can handle currents from 100 ma all the way up to 1.5 amps.

The usual circuit for the 7800 series is shown in fig. 1 and is as simple as can be. The value of C1 is 0.1 µF or greater, and the value of C2 can be anything from 1 µF to a few hundred µF, depending on the needs of the subsequent circuitry. Since the housings of the 7800 series regulators are normally connected to ground, they can readily be bolted to a metal chassis to act as a heat sink to prevent overheating when handling higher power. The 7800 series is really only intended to provide fixed voltages, however, so if you need in-between values it becomes a bit more involved. Although there are circuits to "fool" the 7800 to provide other voltages, there is a simpler solution, and that is the use of the LM317.

The LM317 was designed specifically as an adjustable three-terminal regulator. Its basic circuit is shown in fig. 2, and by the proper choice of resistor, values can be set to any output from 1.2 volts to 37 volts. As in fig. 1, the value of C1 is 0.1 µF or greater, and the value of C2 can be anything from 1 µF to a few hundred µF depending on the needs of the subsequent circuitry. The housing is not grounded, however, so in the event that a heat sink

*c/o CQ magazine

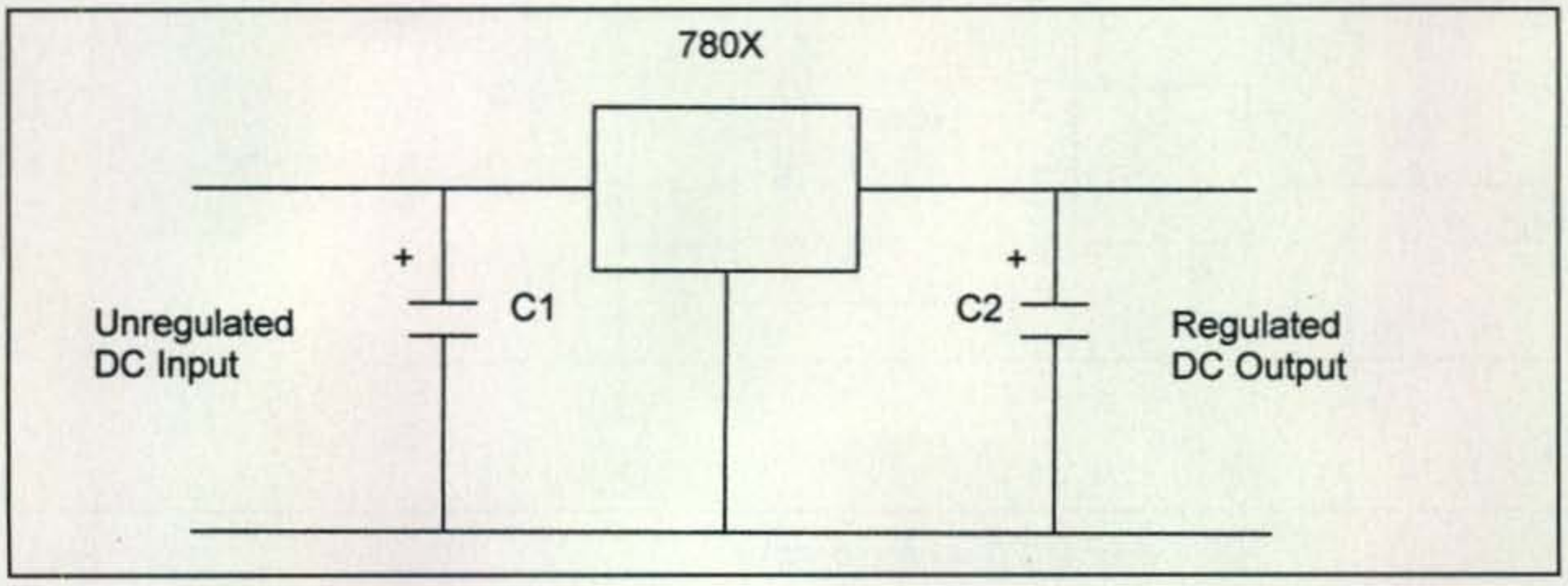

Fig. 1– The 7800 series fixed DC regulator.

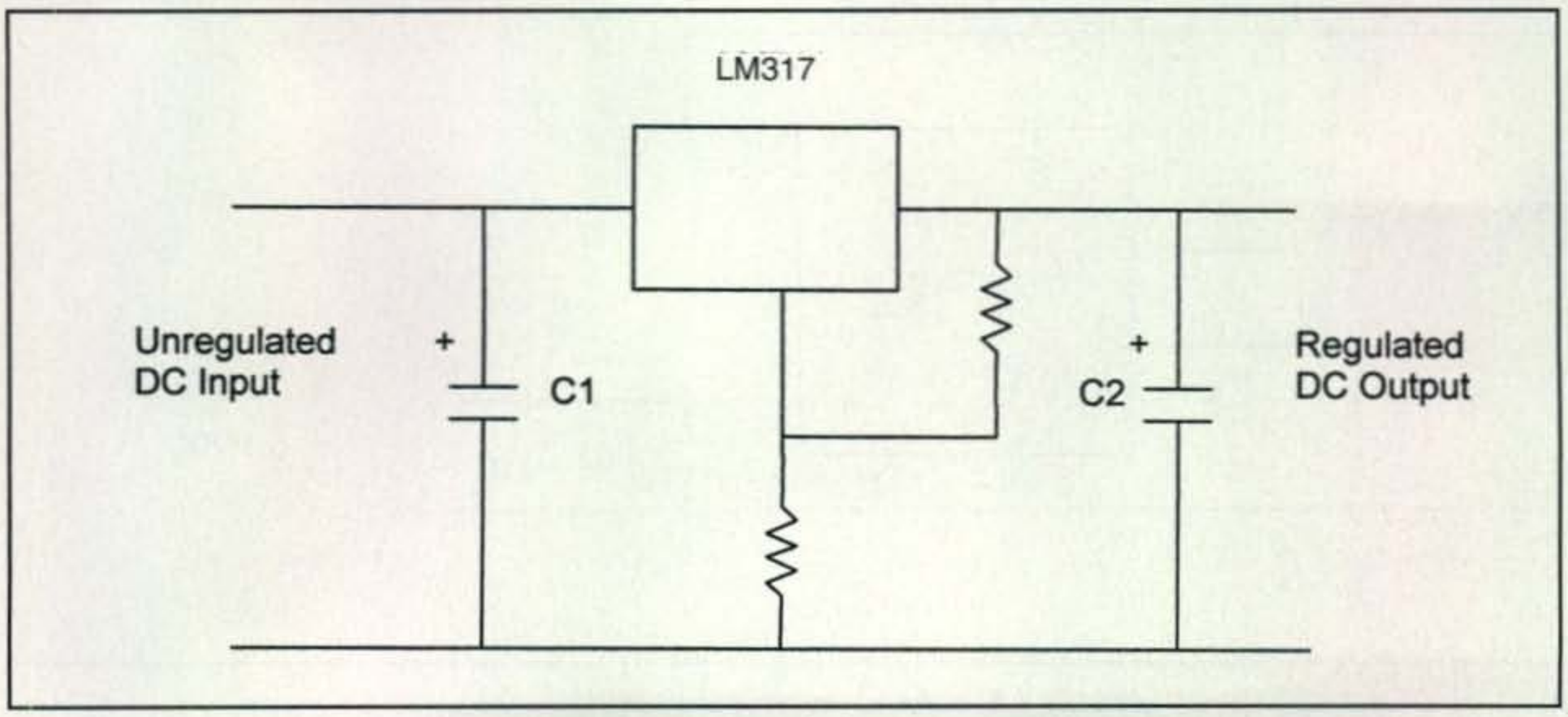

Fig. 2– LM317 adjustable DC regulator.

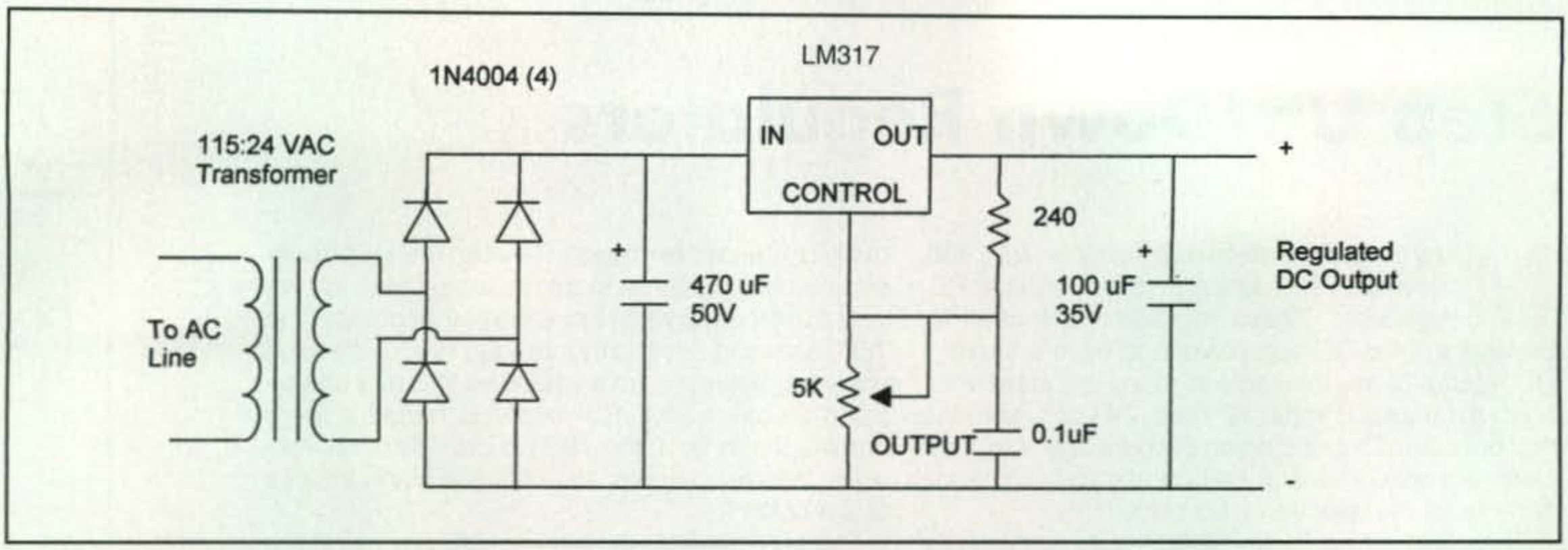

Fig. 3– A simple, adjustable regulated power supply.

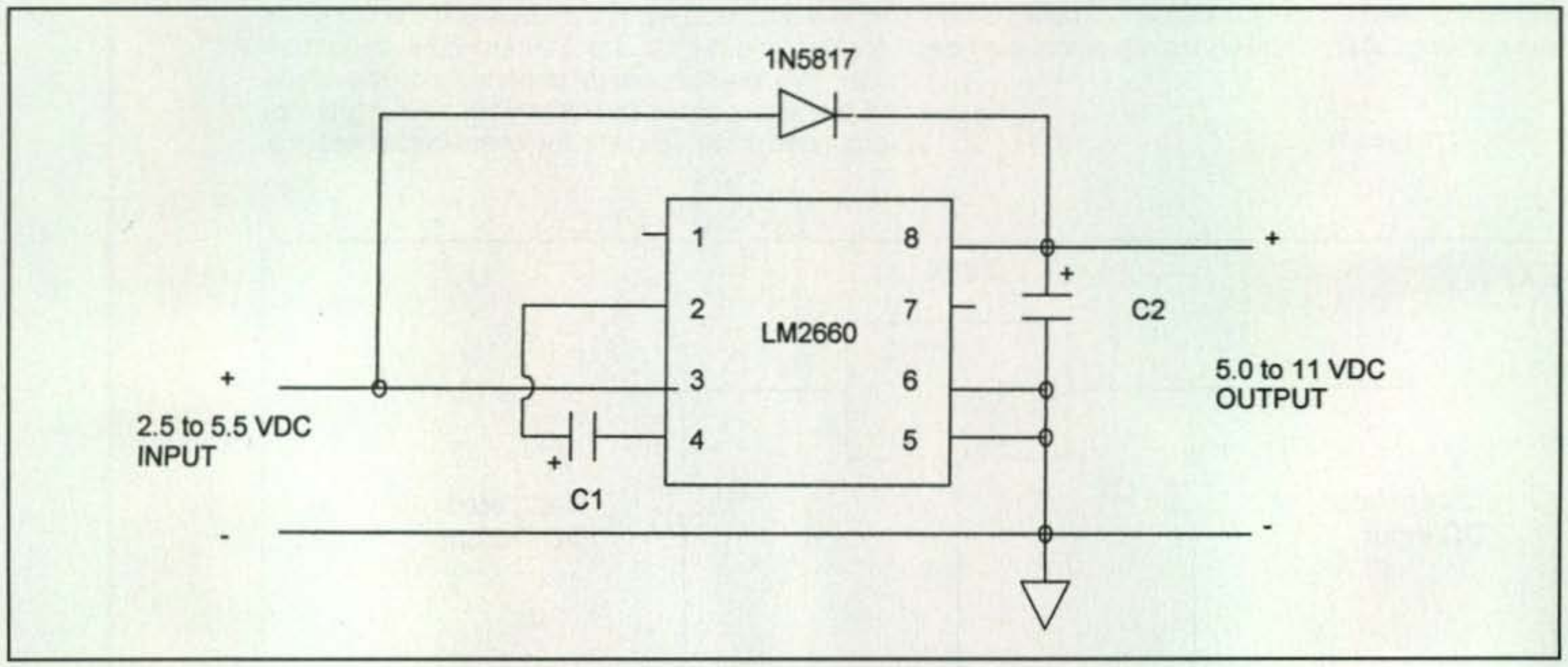

Fig. 4– DC voltage doubler.

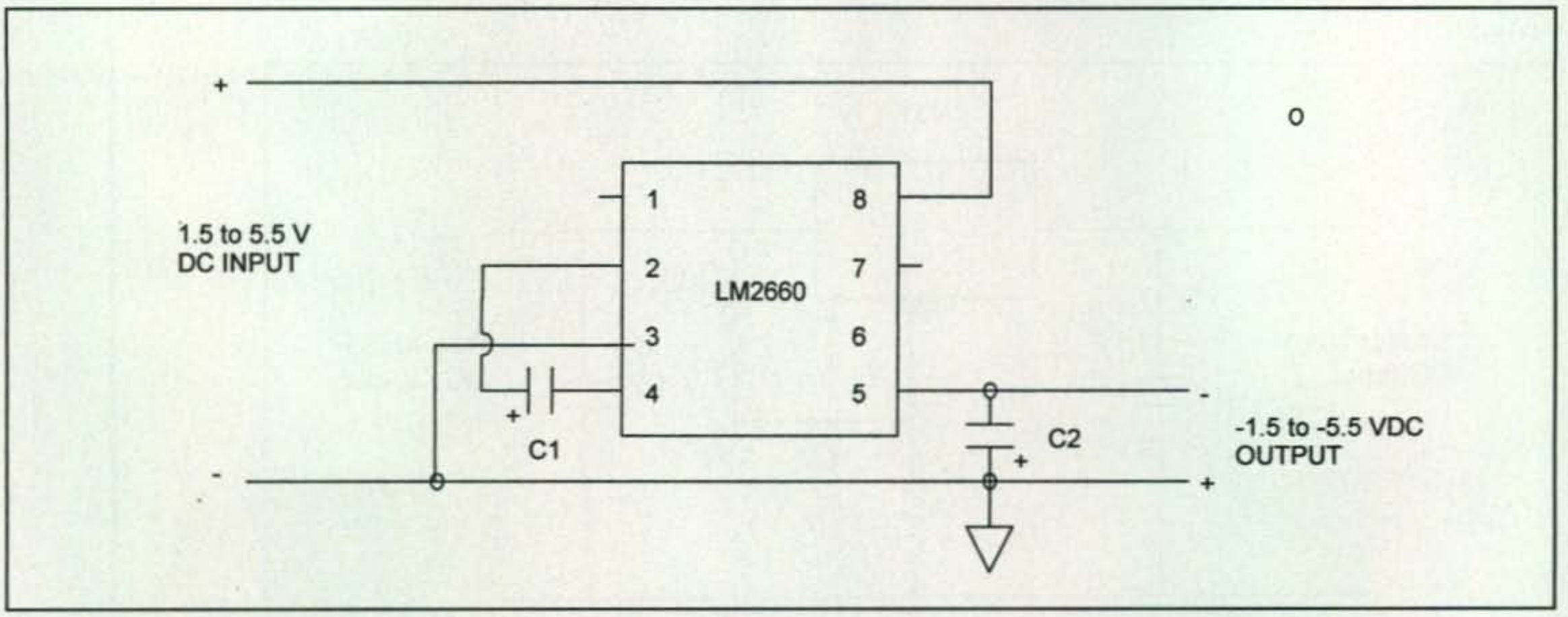

Fig. 5– DC voltage inverter.

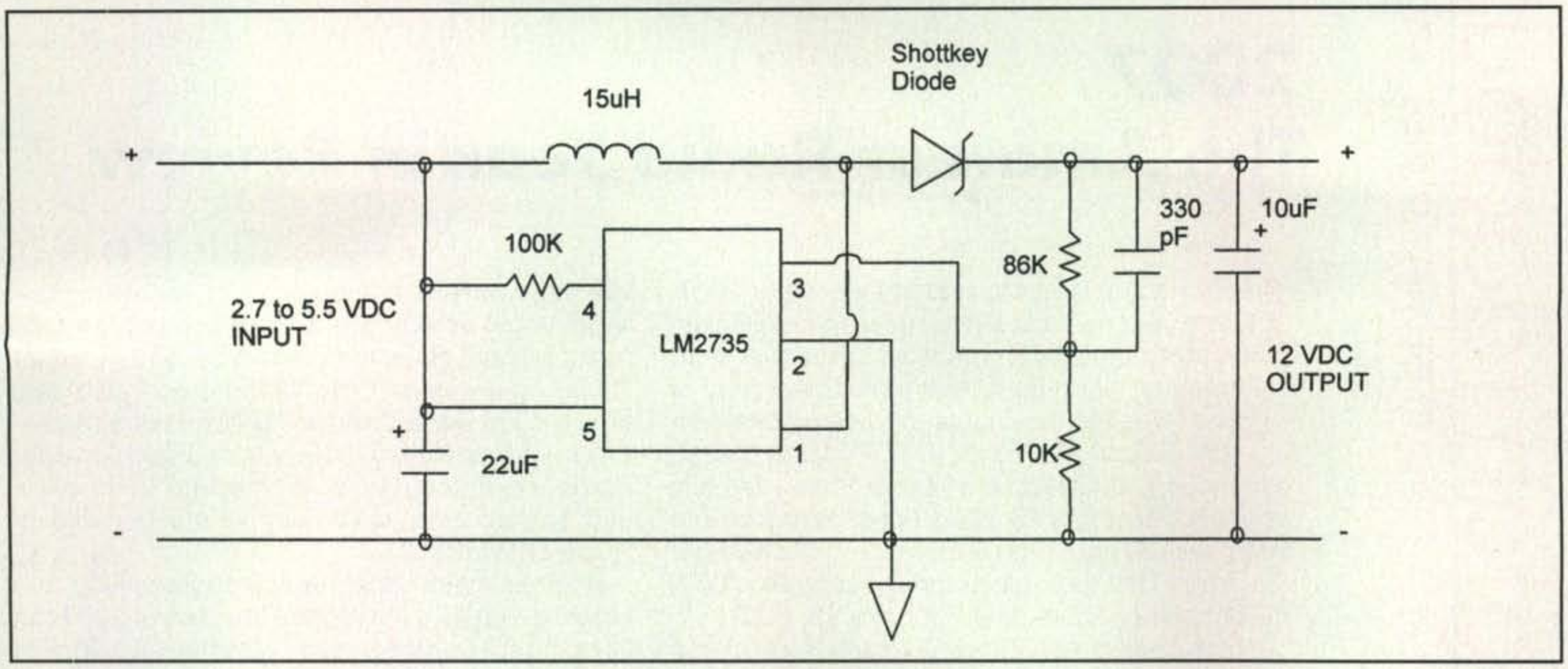

Fig. 6– Step-up DC regulator.

is required, it must be isolated from the rest of the circuitry. There are many such kits available with mica or plastic washers, so this is really not a significant problem.

Fig. 3, derived from the data sheet, shows a simple adjustable power supply using the LM317 that can provide a variable output from 1.2 volts to 25 volts at very low cost. If you build this circuit and add a voltmeter, current meter, power switch, and LED (to tell when the supply is on), you will have a general-purpose supply that can be used for most experimental purposes at a fraction the cost of even a "bargain" supply.

Both of the above circuits are essentially step-down power supplies. However, what if you need some way to step a low DC voltage into a higher one? The solution here is to use a switching regulator such as the National LM2660. This is actually a circuit that switches the voltage on an external capacitor at a rate of 20,000 or 80,000 times per second. When this switched capacitor is connected in series with the input, such as in fig. 4, you get twice the input voltage. When it is connected as in fig. 5, you can actually invert the input voltage. This is useful for providing a negative voltage from a positive DC input (at the same voltage), such as is often needed for some op-amp circuitry or bias purposes.

In both circuits, C1 is the switched capacitor and can be any value from 10 µF to 100 µF. It is best to use a low series impedance capacitor at this point, as the peak current flow and rapid switching speed can be significant. Fortunately, such capacitors are readily available from most major component distributors. C2 is the output filter capacitor and can be similarly chosen. It should be noted that currents as high as 100 ma can be provided by these circuits; however, the output is not specifically regulated. For more details, design notes, and variations go to the National Semiconductor Corp. website at <www.national.com>. There are many variations of the LM2660, so a little investigation may turn up exactly what you need.

Another type of regulator that can also be used to provide higher DC outputs is the boost regulator, such as the National LM2735. This circuit, shown in fig. 6, can be used to provide an output of 12 volts at up to 700 ma from an input that can vary between 2.7 and 5.5 volts. This is within the range of a couple of D batteries in series. In this circuit, the choke must be specifically designed for switching operation, as the peak currents can go as high as a couple of amperes. The two resistors shown are used to set the output voltage and the output is regulated.

The LM2735 switches at a frequency of a MHz or so and can achieve efficiencies of almost 90 percent. This means that a 12-volt 700-ma output (8.4 watts) will require 5 volts at almost 2 ampes, so perhaps something more substantial than a couple of D cells is really needed! For lower levels, however, the input current of course will be proportionately lower. Once again go to the National Semiconductor website for more details. Similar products can be found from Linear Technologies (www.linear.com), Texas Instruments (www.ti.com), and many others, so do not hesitate to visit and scan their websites as well. There have been a lot of new developments in the power-supply area and I am sure you can find the solution to your requirements with an internet search. Some companies even offer free design programs to make the job simpler. 73, Irwin, WA2NDM

readout

washington

BY FREDERICK O. MAIA,* W5YI

2007
The Amateur Radio Year in Review

I am writing this at the end of December 2007. Every year about this time we stop to reflect on the amateur radio happenings of the past year.

There can be no doubt that the biggest story of last year was the elimination of Morse code testing. The Report and Order in WT Docket 05-235 eliminating all telegraphy exams was actually adopted December 19, 2006, but could not go into effect until 30 days after publication in the *Federal Register*. That took place on January 24, 2007, making the effective date February 23, 2007.

It took a long time for the FCC to eliminate Morse code examinations. The 2003 World Radio Conference made it optional for a country to require its amateur radio operators to demonstrate manual telegraphy proficiency in order to have HF operating privileges. While several countries abolished code testing in their amateur services soon after the July 2003 implementation date, the FCC took much longer, since the U.S. government requires that the public participate in rule changes.

That meant the matter had to go through the "notice and comment" rulemaking phases. After a preliminary round of comments, the FCC proposed in mid-2005 to end telegraphy exams for all ham radio license classes. It was a very contentious issue and nearly 4,000 comments were filed by the October 31, 2005 cutoff date.

It took another 18 months for the FCC to evaluate the comments and release the final order. All told, it took nearly four years for the U.S. to join most other countries of the world in dropping the code test requirement.

The change meant that aspiring General and Amateur Extra Class ham operators would no longer have to pass a code test to upgrade. In addition, the high-frequency 10-meter voice operating privileges authorized to Novice and Tech Plus operators (as well as Novice/Tech Plus code privileges on 80, 40, and 15 meters) would be extended to all Technician Class operators.

There would now be only three written examinations to obtain a ham ticket: Element 2 for the Technician Class license; Element 3 for the General Class; and Element 4 for Amateur Extra Class. While code exams were abolished, thousands of amateur radio operators will continue to use code, not because they *have* to learn Morse, but because they *want* to. Also, new digital modes, such as PSK31 using a computer, are becoming increasingly popular.

The FCC said, "The overall effect of this action is to further the public interest by encouraging individuals who are interested in communications technology, or who are able to contribute to the advancement of the radio art, to become Amateur Radio operators...." The Commission also said Morse code testing was an "unnecessary regulatory burden that may discourage current Amateur Radio operators from advancing their skills and participating more fully in the benefits of Amateur Radio."

Another major amateur radio rulemaking that became effective just before the start of 2007 (on December 15, 2006) was WT Docket 04-140. Released in October, the so-called "Omnibus" Report & Order addressed 12 Petitions for Rulemaking, the major one being an ARRL frequency "refarming" plan. The primary change was that the Novice HF subbands were dropped in favor of expanded phone privileges for the General, Advanced, and Extra Class. In addition, Novice and Tech Plus licensees (followed two months later by all Technicians) were given access to all General Class CW frequencies on 80, 40, and 15 meters.

Eliminating Morse code testing caused an avalanche of amateur radio license and license upgrade applications during March 2007 as radio amateurs rushed to obtain their new operating privileges. However, the big question was "What impact would increasing HF voice frequencies and abolishing code testing have on overall Amateur Radio growth?" We found out this past year.

No Growth in Amateur Radio Just a Shift in License Classes

While the total population of the United States has been increasing by about 1percent a year, the total number of radio amateurs has been declining slightly over the past five years. That trend continued in 2007.

Actually, the last two recent major FCC rulemakings (WT Docket 04-140 and 05-235 [see above]) have had little impact on the total number of radio amateurs. They have, however, rearranged the mix of radio amateurs in each license class.

Since the beginning of 2007, there are about 3,600 more Extra (and 4,600 fewer Advanced Class) and 11,000 more General Class operators (and 8,300 fewer Technician Class licensees). It appears that the Advanced Class moved up to Extra and Techs moved up to General because they did not have to pass a code test to upgrade. The amateur radio operator census numbers as of the end of December are shown in Table I. (Note that no new Advanced Class licenses have been issued since 2000.)

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

The total number of U.S. radlo amateurs with unexpired licenses steadily increased from 1997 to 2002 and then began to decline. The biggest increase (about 5,000) was in 2000, the same year that the FCC restructured the hobby and reduced the top code speed to 5 wpm.

As of April 15, 2000 no new Advanced, Tech Plus, or Novice Licenses were issued by the FCC, and Technician Plus renewals were assigned Technician licenses. This effectively reduced the number of license classes from six to three. The number of license examinations went from eight to four.

Eliminated also in 2000 were the 13- and 20-wpm Morse code exams; only a single 5-wpm requirement remained. This caused a dramatic increase in the number of General and Extra Class licensees (more than 40,000) and a corresponding decrease in the number of Technician and Advanced Class amateurs, who no longer had to pass an additional telegraphy test to upgrade.

The bottom line is that the advent of the no-code Technician (February 1991), restructuring (April 2000), more voice frequencies (December 2006), and ending code testing (February 2007) have not increased the total number of radio amateurs. There are, in fact, fewer total amateurs than five or ten years ago.

Ending	Extra	Advanced	General	Technician	Novice	Total
Dec. 2007	111,847	65,327	142,410	314,784	20,431	654,799
Dec. 2006	108,223	69,915	131,224	323,073	23,633	656,068
Dec. 2005	107,440	74,221	135,067	319,125	26,747	662,600
Dec. 2004	106,090	77,948	138,292	319,742	29,765	671,837
Dec. 2003	104,894	82,034	141,498	322,821	32,812	684,059
Dec. 2002	103,257	84,326	139,848	321,805	36,072	685,308
Dec. 2001	97,977	86,545	138,625	319,735	40,155	683,037
Dec. 2000	93,807	88,783	134,144	319,874	45,632	682,240
Dec. 1999	75,392	103,471	110,386	335,768	52,375	677,392
Dec. 1998	74,669	103,592	111,513	326,432	57,617	673,823
Dec. 1997	73,949	105,835	114,877	317,676	64,169	676,506

Table I– Comparative year-end census figures for the last 10 years.

What has happened is that the number of radio amateurs in each license class has been reshuffled upward. Ten years ago there were almost as many Novices as Extra Class licensees. Today there are five times more Extra Class operators than Novices. However, like the Advanced Class, no new Novice licenses have been issued since 2000.

The FCC considers an amateur radio license to be active for 12 years—the 10-year license term plus the two-year grace period. According to FCC records there are about 712,000 individual radio amateurs (plus about 10,600 clubs) in the active amateur database. Fifty-seven thousand of these, about eight percent of the total, are expired individual licenses. They roughly consist of 6,000 Novices, 27,000 Techs, 13,000 Generals, 8,000 Advanced, and 3,000 Extra Class

On the Cover

George Dominick, W4UWC, of Knoxville, Tennessee, is a dyed-in-the-wool DXer whose chase for contacting distant stations began soon after he was licensed in 1952 by "trying hard and long to work California." Since then, he has confirmed 370 DX entities on voice alone, earning a spot on the DXCC Honor Roll as well as Worked All Continents, Worked All States, membership in the A1 Operator's Club, and SSB Worked All Zones #447, "from back in the late 1950s when only about a quarter of the hams on the air were using single sideband."

George says he inherited his interest in DX from his "elmer," W4DPI (SK), who was a distributor for Collins. "His interest was DXing and so is mine," George noted, adding, "I just enjoy talking to DX stations."

Along the way, he says, he built several of his own amplifiers and a variety of antennas. Three of his homebuilt amps are still in use, a 160/80/40 triband-der and a 20-meter monobander (rack-mounted), each using a 4CX-1000 tube, as well as a desktop amp using a 4CX-500. That's sitting right on top of the Collins 75S3 receiver on the left side of his operating position. George's main rig today is a Yaesu FT-1000 MkV; he also has an FT-990 and a commercially built Alpha amplifier.

Retired from the industrial electronics business, George notes that he has never changed his call; he started out in 1952 as WN4UWC and became W4UWC when he upgraded to General. He also notes that his two adult children are hams as well; son Marshall is K4UWC and daughter Susan is KE4EQU. *(Cover photo by Larry Mulvehill, WB2ZPI)*

licensees. It appears that more than half may be new hams who do not remain with the hobby, since nearly 60 percent of the 57,000 in the two-year grace period appear to be beginners.

International Space Station Keeps On Growing

Last year was a big year for amateur radio and licensed ham astronauts aboard the International Space Station. The space station grew in size, volume, and power production in 2007 as NASA launched three successful space shuttle missions. In addition, Russian Soyuz spacecraft carried supplies and crew members to the ISS. The station's six solar panels now extend to more than half an acre of surface area.

NASA astronauts and Russian cosmonauts safely conducted 23 spacewalks devoted to building and maintaining the station during 2007. The final spacewalk occurred on December 18, matching a record for the most spacewalks in a single year. Also, it was a historic 100th spacewalk overall since the construction of the International Space Station began.

On April 10, 2007 civilian Charles Simonyi journeyed to the International Space Station as a paying tourist aboard a Soyuz spacecraft along with the Russian Expedition 15 crew. He was active on ham radio, making several individual and school contacts during his ten-day stay. He holds the FCC-issued callsign KE7KDP as well as the Hungarian HA5SIK callsign. Simonyi reportedly paid $25 million for his space adventure.

On June 8, 2007, the STS-117 *Atlantis* shuttle crew delivered more parts and carried Expedition 15 Flight Engineer Clayton C. Anderson, KD5PLA, to the space station and returned Flight Engineer Sunita L. Williams, KD5PLB, to Earth. Williams participated in 33 school ham radio contacts while in orbit, second only to Bill McArthur, KC5ACR, who holds the record at 37.

On August 8, the Space Shuttle *Endeavour* delivered more space station segments. Among the STS-118 crew of seven was teacher-turned-astronaut Barbara Morgan, KD5VNP. She was first selected as Christa McAuliffe's backup, and they trained together in the original Teacher-in-Space Project. McAuliffe perished during the 1986 *Challenger* accident.

On October 11, a new Expedition 16 crew arrived at the space station on a Russian Soyuz TMA-11. The crew included NASA Astronaut and Crew Commander Peggy Whitson, KC5ZTD, and Flight Engineer/Cosmonaut Yuri Malenchenko, RK3DUP.

On October 23, the Space Shuttle *Discovery* delivered and installed a connecting tunnel to which two science lab modules—the European Columbus laboratory and the Japanese Kibo laboratory—will be attached. One of the STS-120 crew members was Dan Tani, KD5DXE, who swapped places with astronaut Clay Anderson, who returned to Earth.

A fourth shuttle mission, STS-122 aboard *Atlantis,* scheduled for launch on December 6, had to be scrubbed when fuel sensors in the external fuel tank failed. Another attempt on December 9 also had to be postponed. STS-122, carrying the European "Columbus" space lab to the space station, also was to return Astronaut Dan Tani, KD5DXE, to Earth on December 17. He was to be replaced by French Flight Engineer Leopold Eyharts, KE5FNO.

Sadly, Tani's mother, Rose Tani, died in a car-train crash on December 19 with no way for Dan to return for the memorial services and funeral. Still delayed at press time, STS-122 was rescheduled for mid-January. The seven-member STS-122 is commanded by Steve Frick, KD5DZC; another crew member is Mission Specialist Hans Schlegel, who holds the German call DG1KIH.

A record five shuttle missions are scheduled for 2008, four to the space station and one to repair the Hubble Space Telescope: January 10, STS-122; February 14, STS-123; April 24, STS-124; August 7, STS-125; and September 18 STS-126.

There also were dozens of amateur radio contacts between school children and astronauts aboard the International Space Station during 2007. On Thursday, May 31, ARISS (Amateur Radio onboard the International Space Station) made its 300th school contact since its inception back in December 2000. The ARISS program is operated jointly by NASA, AMSAT, the ARRL, and various worldwide agencies and is steered by an international committee.

Other 2007 Ham Radio Stories

February: The issuance of vanity callsigns resumed on February 8, after a lapse of some five weeks. The vanity callsign processing lapse was caused by the FCC's need to revise its online software to preclude amateurs from fil-

ing multiple applications for the same vanity call.

Also in February, the FCC turned down a petition seeking a rule requiring the question pools be provided for each written license examination element in languages other than English. At their conference in July, the Volunteer Examiner Coordinators also declined to prepare or sanction question pools in other languages.

The FCC denied another petition on February 28 seeking rules to preempt certain private deed covenants, conditions, and restrictions (CC&Rs) that preclude the installation of ham antennas and their support structures. The Commission declined to get involved, saying that CC&Rs are entered into voluntarily by home buyers and tenants.

March: Due to controversy and confusion within the amateur ranks, the ARRL revised its November 2005 "regulation by bandwidth" proposal (RM-11306). The "regulation by bandwidth" scheme was to provide for the introduction of future digital emissions while protecting traditional modes. In March the League asked the FCC to amend its petition to provide a bandwidth limit of 3 kHz on RTTY and data emissions below 28 MHz. This was to prevent automated digital "robot" stations from monopolizing a wide swath of spectrum. However, the bandwidth proposal remained contentious, and in April the ARRL asked that RM-11306 be withdrawn completely. The League said it will file an improved "regulation by bandwidth" proposal later after it reviews membership input. The FCC accepted the withdrawal on June 29.

April: In a Notice of Proposed Rule Making (NPRM) released April 18, the FCC proposed to reduce vanity callsign regulatory fees from $20.80 to $11.70. It was adopted effective September 17, making it the lowest fee in vanity callsign history. The vanity callsign regulatory fee is payable not only when applying for a new vanity call, but upon renewing a vanity call for another 10-year term.

May: The 56th Dayton Hamvention® got under way on Friday, May 18 at Hara Arena and continued through Sunday, May 20. It attracted nearly 20,000 attendees. During the Hamvention® NASA astronaut and ISS Expedition 12 Commander Bill McArthur, KC5ACR, presented an interesting talk about his ham radio experiences from space.

July: The FCC denied and dismissed three petitions for rulemaking that requested changes in the way amateur stations are identified on the air. Two asked that the time interval between required ID announcements be changed; the third wanted certain letter combinations (AF, AA, NA, NM, and ACG) reserved for use by current or honorably discharged members of the military.

October: The International Telecommunication Union (ITU) 2007 World Radio Conference got under way in Geneva on October 22 and continued through November 16. The ITU members agreed to maintain the 7.200–7.300 MHz 40-meter allocation in ITU Region 2 (the Americas) that had been somewhat at risk. A new worldwide secondary Amateur Service allocation at 135.7–137.8 kHz was approved. Also, it was agreed that the ITU would consider an allocation of about 15 kHz for hams around 500 kHz at WRC-11, set for 2011. That's the international distress frequency that the Maritime Service abandoned in the late 1990s. A worldwide amateur allocation at 5 MHz was not approved.

In late October, Riley Hollingsworth, K4ZDH, of the FCC's Enforcement Bureau, announced his retirement effective January 3, 2008. Hollingsworth is responsible for Amateur Radio Service enforcement matters. A week later, Riley decided not to retire, stating that there were several amateur radio issues on which he needed to continue working.

November: Motorola announced its intention to acquire a controlling interest in Vertex Standard Co, Ltd. Vertex is the parent company of Yaesu, a major amateur radio equipment manufacturer. The buyout was due to be completed in January.

73, Fred, W5YI

BY DAVE INGRAM,* K4TWJ

Hamming from the Shadows – Part V

This month's column continues our "Hamming from the Shadows" series with more views, ideas, and tips for happy hamming under less-than-ideal circumstances. As reported last month, an ever-increasing number of amateurs are falling into this category and equipment dealers are confirming that fact. They are selling more low-profile antennas and accessories than ever before. I should also reiterate that using a stealthy antenna is only one aspect of this game. You must call upon your time-acquired knowledge or study handbooks on how RF energy radiates from antennas, how it can couple into nearby wires of similar horizontal or vertical polarity, and how you can minimize such coupling with clamp-on toroids or by using low power. The main point to remember through it all is never give up! Where there is a will, there is a way. Amateur radio is a global hobby of special friends. All of us are on your side and pulling for you to stay on the air. As further encouragement, two friends now share their tales of success with us.

No Antennas—Period!

Dave Collins, AD7JT, recently retired and moved into a prim and proper community only to learn it is so restrictive that even birds need permits to fly by! However, that does not stop him from hamming in fine style.

Dave started with an unusual homemade antenna for 20, 15, and 10 meters installed in his garage. Later he added a center-fed Zepp for 40 meters that out of necessity wrapped around the inside walls of the garage. Using these antennas and a Yaesu FT-897D, Dave worked 48 states and 31 countries in four months, mostly on 20 meters CW. The only hitch was when he operated 40 meters with more than 50 watts; the garage door opener activated and tried to follow his keying (hmm . . . I recall seeing a commercial similar to that on TV with wham on a car hood!) Dave also noted that noise from power lines located within 12 inches of his in-garage antenna was limiting his reception. Outdoor antennas were strictly forbidden, so he added a 17-foot tall 20-meter vertical disguised as

*3994 Long Leaf Drive, Gardendale, AL 35071
e-mail: <k4twj@cq-amateur-radio.com>

Photo A– Typical of many modern subdivisions, the new QTH of Dave Collins, AD7JT, is totally devoid of tall trees, utility lines and even grass. After working 30 countries and 48 states with garage-hidden antennas, he added a homebrew 20-meter vertical painted to match his house, and it opened a complete new world of hamming enjoyment. Can you spot the vertical? It is between the two windows on left side of house. (Photo courtesy of AD7JT)

Photo B– A closer view of the 17-foot tall AD7JT 20-meter vertical. Painting antenna elements for camouflaging does not degrade performance, provided the paint does not contain lead or metal. Krylon® paint works very well. This antenna is so low profile it could easily be mistaken for an overflow drain for an attic-located water heater. (Photo courtesy of AD7JT)

Photo C– An in-garage view of Dave's hidden antennas. The ladder line to right of the water heater goes to a center-fed 40-meter Zepp with its flat-top wires strung around the inside walls of the garage. The two wires on the right side of the ladder line are parts of a homebrew antenna for 20, 15, and 10 meters. The antennas are not over 10 feet above ground, but they do work. (Photo courtesy of AD7JT)

something (an overflow pipe for a water heater in the attic?), painted it to match his house, centered it on a roof peak, and attached it 16 inches out from the house. He then buried 10 radials, added a transmission-line transformer, and fine-tuned the lash-up to yield a 1:1 SWR near 14.050 MHz. His noise level dropped S8 to S1, which was comparable to opening a new world of communications at his QTH.

Since that time (less than a year), Dave has worked 98 countries with the secret vertical. He has now started build-

Photo D– Antenna restrictions can prove quite discouraging, but as Dave agrees, a brand-new fancy-featured rig such as the Yaesu FT-2000 gracing the desk really lifts one's spirits. It is low-profile fun supreme! (Photo courtesy of AD7JT)

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Yaesu G-550	$299
Yaesu, G-800SA	$329
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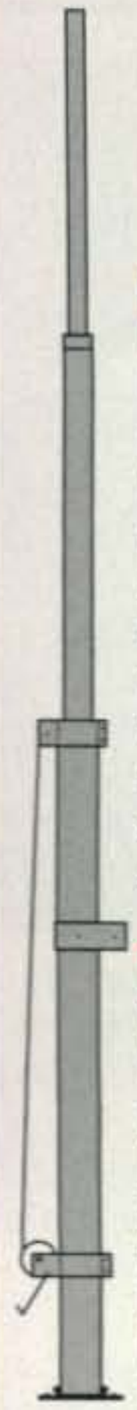

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Photo E– Pierre Bordeleau, VE2OPB, lives in a condo with nothing but a balcony to install an antenna. What to do? He devised a mount for two multiband Outbacker mobile whips, installed it on a patio chair, and added a balun at the feedpoint. The balcony is up four floors and overlooks the neighborhood, so the antenna radiates a good signal in unobstructed directions. (Photo courtesy of VE2OPB)

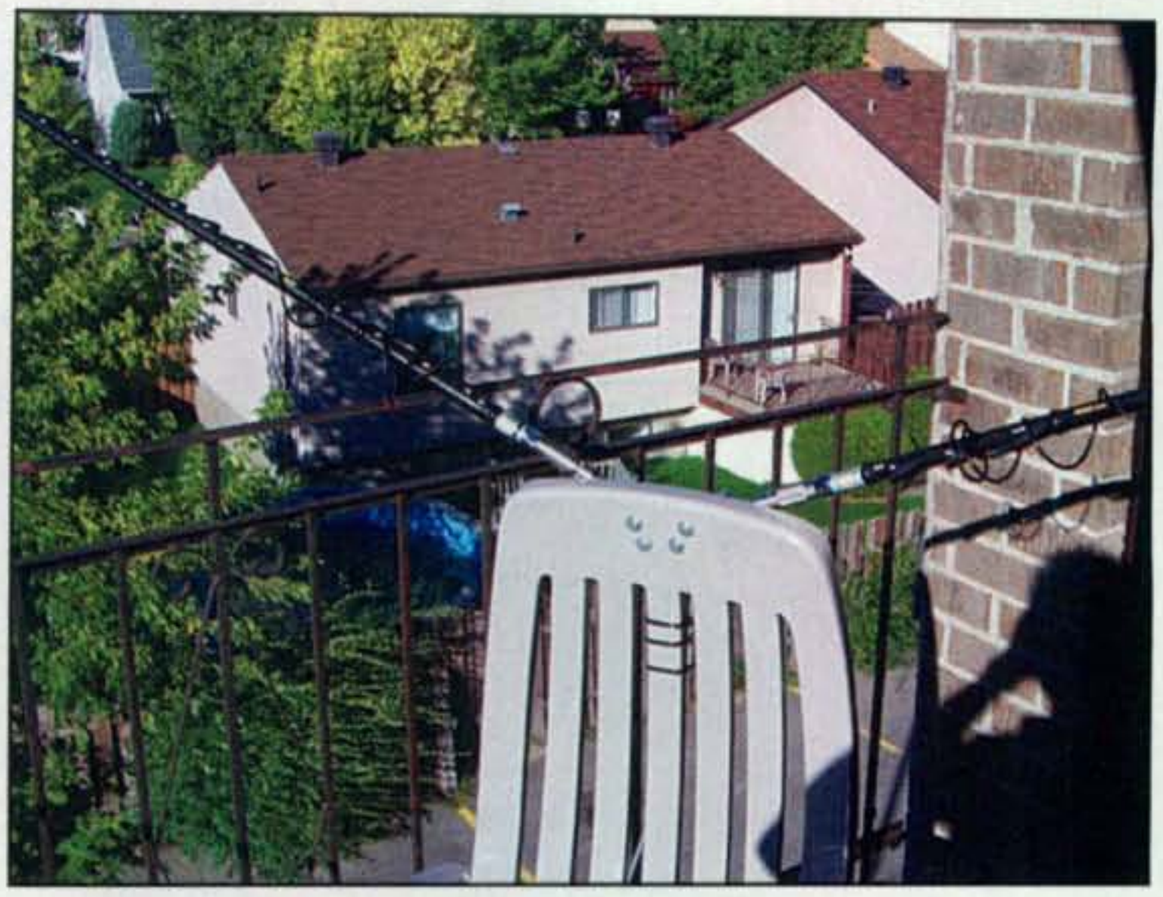

Photo F– Looking at Pierre's balcony antenna from another angle reveals one side is very close to the brick wall of the building, but it radiates a good signal regardless of the handicap. The important message here is where there is a will, there is a way. Yes, you can reach out worldwide from almost any QTH. (Photo courtesy of VE2OPB)

ing a 600-watt amplifier and replaced his FT-897 with a new FT-2000, so things are looking up, and that's the key to survival when hamming in the shadows.

I also see some interesting points worthy of mention. A fair number of amateurs *install* vertical antennas in areas that block their radiation, use only a ground stake with no radials, and soon conclude that verticals do not work well. That makes sense. Such compromise verticals are akin to half a dipole. Radials are mandatory for good results from quarter-wave verticals, and counterpoise rods/spokes are vitally important for top results from 3/8- 5/8-, or 1/2-wave verticals. How many radials? Considering 10 as minimum, 60 as a logical maximum holds merit, and six-conductor "ribbon cable" or rotor cable is an easy way to lay down several radials at one time.

Dave's setup illustrates another important point of encouragement. His vertical seems blocked by the garage and house, but there must not be significant metal or wires in the wood walls, because the vertical reaches out well and exhibits a low SWR. Thus, the bottom line is that regardless of the drawbacks in your antenna situation, give it a go. Even a handicapped setup beats no setup or giving up operating HF from home.

Balcony Blitz

Another encouraging story of HF success in the shadows comes from Pierre Bordeleau, VE2OPB. Pierre lives in a condo (up four floors), and the only place he has to install an antenna is on the balcony (which, incidentally, has a clear sky view to the southeast). This works out well for Pierre and allows him to work into North and South America, Africa, and some parts of Europe with reasonable success. Also note here that an amateur confined to a north-facing condo in Florida has a good shot at the U.S., Europe, much of Asia, and even northern Africa.

Photo G– Pierre's indoor setup consists of a Kenwood TS-570, an auxiliary tuner, an MFJ artificial ground, a 2-meter rig, and various other goodies. Home is where the ham gear is located! (Photo courtesy of VE2OPB)

Seeking an antenna capable of reasonably good performance but small enough to hide indoors, Pierre made a multiband dipole from a pair of Outbacker mobile antennas bolted to the back side of a patio chair. A balun just like anyone would add to a good wire dipole was included at the feedpoint, and quick mobile disconnects were added for fast setup and removal. Pierre says the antenna may be a compromise, but it is better than no antenna at all. We must agree, and its height helps offset its handicap. Pierre has used a Kenwood TS-570S with this setup for several years and has worked DX in all areas of the world with it.

Slinky, Sneaky Wires

Surely I speak for the multitudes in saying whether hidden in a garage, laid flat on a roof, or swung 90 feet in the air, a home setup just doesn't seem complete without some type of wire antenna. It may only be used for occasional low-band operation or serve as a backup antenna, but it is a timeless symbol of ham radio supreme.

Installing a wire antenna in highly restrictive neighborhoods, however, often requires thinking like an undercover agent. How so? As an easy-to-visualize example, consider an ever-popular dipole as shown in fig. 1. For ultra-low visibility, use thin, insulated wire in a blue-gray color for the elements and add tiny strips of clear Plexiglas™ for end insulators. Rather than using black rope, substitute clear nylon fishing line to secure the dipole's ends. Thin wire is more susceptible to breaking than large wire, so keep an extra roll on hand for quick replacement as needed. Supporting the antenna at its middle (and possibly along its length) will surely be necessary, but it also gives you the option of adding a balun (painted to match its background) at the feedpoint. If the balun will be laid flat on a roof, consider supporting it with a plastic wind vane strapped to a vent pipe. Cleverly installed, this antenna almost disappears against its background.

Once thinking along the line of disappearing wire antennas, numerous other possibilities come to mind. Rather than installing a monoband dipole, you might opt for a half-size Carolina Windom or a half-size G5RV. Another wire antenna with a growing reputation for easy installation and very good performance is the half-wave "End Fed Z" detailed by its manufacturer at <www. parelectronics.com> and sold by Universal Radio

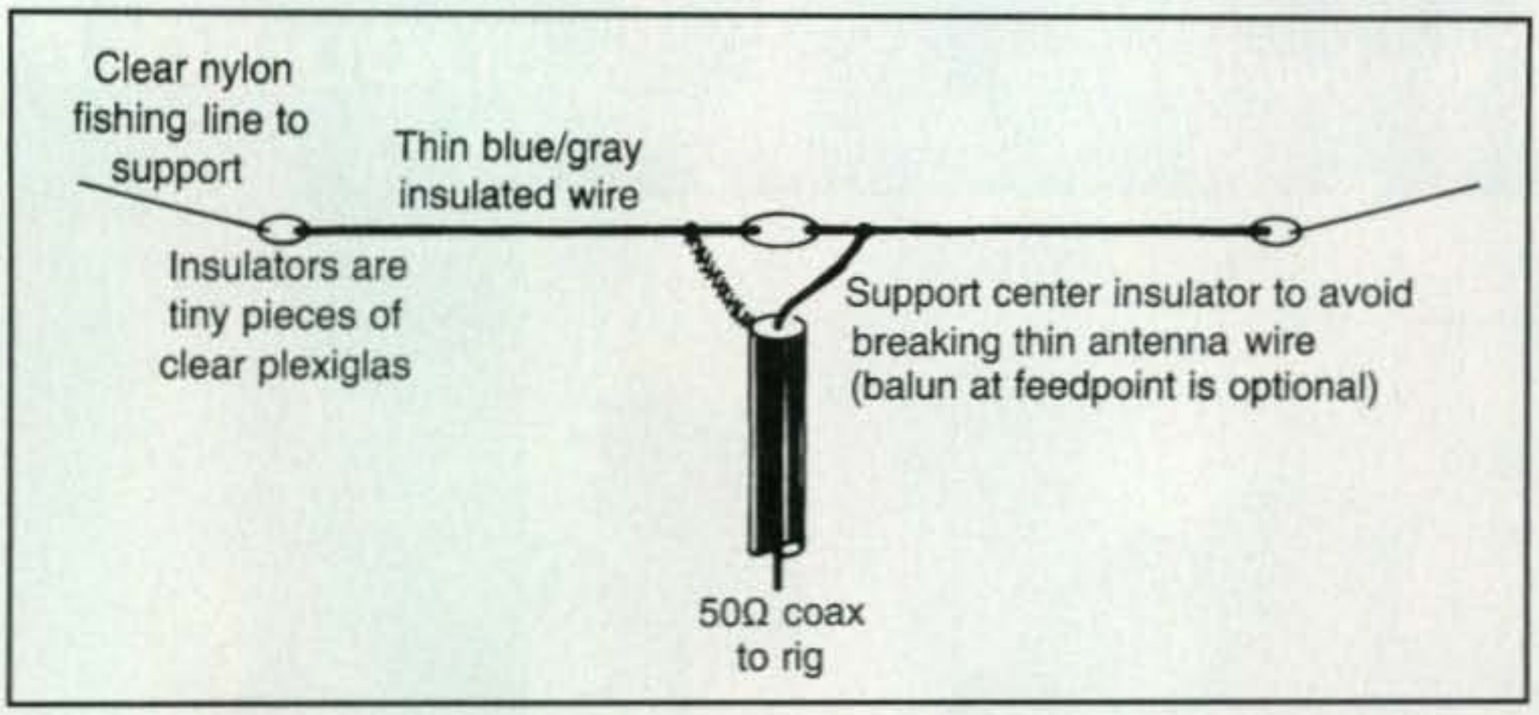

Fig. 1– Outline of an almost invisible dipole made with thin blue-gray insulated wire, clear Plexiglas™ insulators, and clear nylon fishing support line. The design concept may also be applied to Carolina Windoms, G5RVs, etc., as discussed in the text.

(phone 1-800-431-3939, or <www.universal-radio.com>).

The main radiating sections in all these antennas are usually comprised of heavy, shiny wire, but once again substitution of thin blue-gray wire lets them fade into the shadows. If you live in an apartment two or three stories above ground, a couple of additional possibilities warrant consideration. A dipole or End Fed Z can be installed horizontally, vertically, or sloping with its feedpoint or balun installed on a window sill or balcony and its far ends secured to convenient tie points with clear fishing line indoors to your rig. The antenna may be partially blocked by the building, but it can radiate just like its big-time counterpart installed up high outdoors in unblocked directions.

Remember, too, one of the main objectives in describing these stealthy antennas is to get your own creative thoughts perking. Feel free—indeed encouraged—to expand on or improve my suggestions herein and share your brainchild with others pursuing undercover hamming via this "shadows" series. Your e-mails, letters, notes, and photos are welcome!

Rose Garden Radiators

Thinking further along the hidden and/or disguised antenna path brings yet more interesting ideas to mind. Consider, for example, adding a plastic rain gutter and downspout with insulated wire, enclosed feedpoint, and sealed coax cable inside the gutter of your home. The antenna could be a dipole, an L, a Zepp, or a loop. It would not be too high above ground, but its resultant angle of radiation should prove quite attractive for in-country QSOs, Sprints, and ARRL Sweepstakes activities.

Another good "yard art" candidate is a giant rose trellis made of wood and supporting quarter-wave strips of copper ground strapping material (fig. 2). Slightly thick wood and a stout ground support should ensure rose-trellis stability. Staple the copper strapping (maybe removed from old coax) in place, paint the whole structure olive green, add plastic roses and ivy and some lattice panels, bury the radials and feedline, and enjoy.

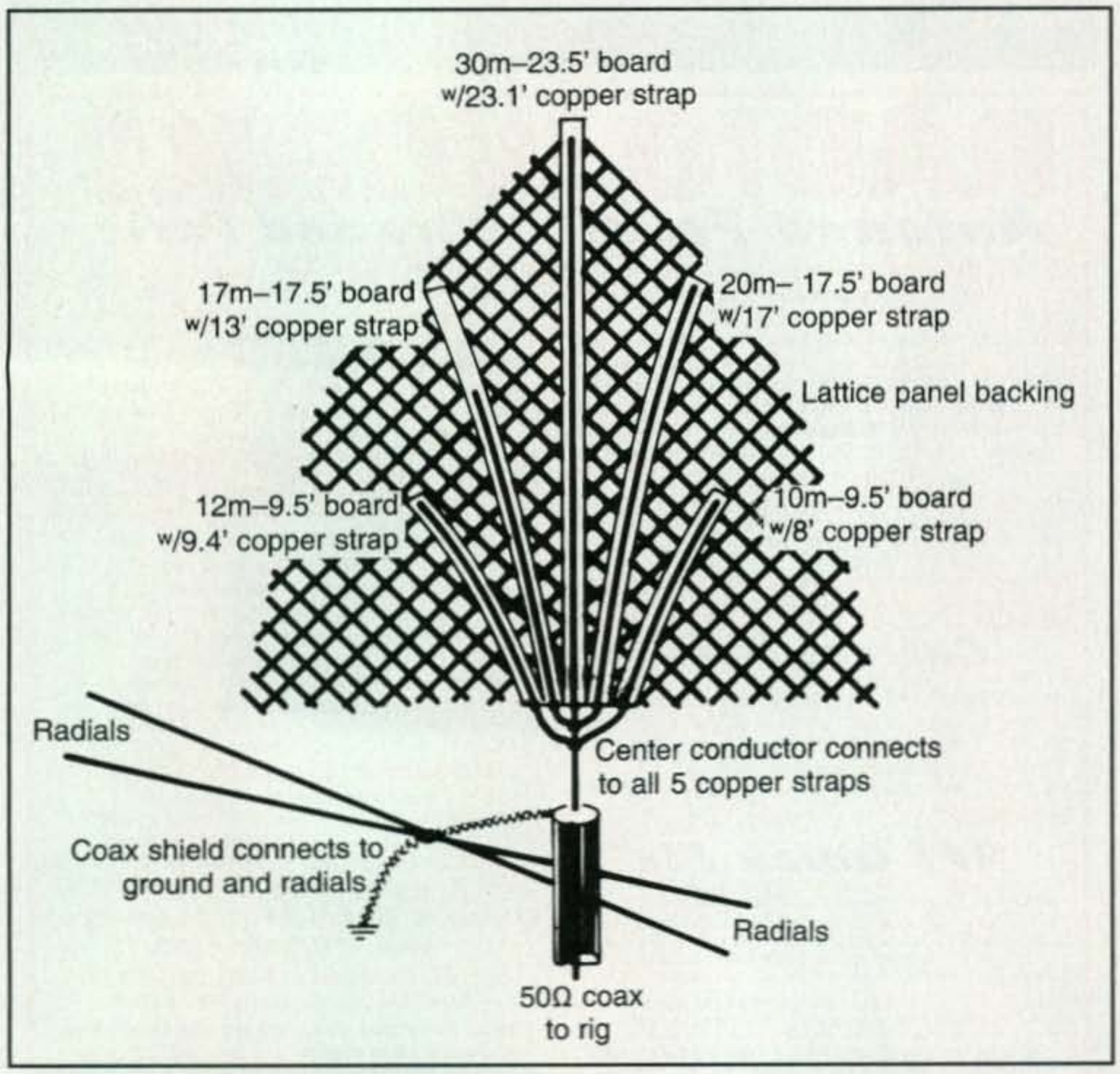

Fig. 2– Outline of a five-band vertical disguised as a rose trellis. The five radiating elements, each of different length, are copper ground strapping or braid removed from old coax and stapled to a wood trellis, which is painted green and embellished with roses. (Discussion in text.)

Conclusion

We are now overflowing available space, but we must reiterate one very important point before bowing out. Never overlook or underestimate the importance of minimizing RF interference to, well, anything imaginable—from touch lights and TVs to heating thermostats and toasters—resulting from direct-induction field radiation. Choose antenna locations removed from wires, use snap-on toroids liberally to reduce unavoidable RFI, and above all stay on the air. We all need each other, especially during times of perhaps difficult circumstances.

73, Dave, K4TWJ

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MODEL SS-18

DESKTOP SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1⅞ x 6 x 9	3.2
SS-12	10	12	1⅞ x 6 x 9	3.4
SS-18	15	18	1⅞ x 6 x 9	3.6
SS-25	20	25	2¾ x 7 x 9¾	4.2
SS-30	25	30	3¾ x 7 x 9¾	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2¾ x 7 x 9¾	4.2
SS-30M*	25	30	3¾ x 7 x 9¾	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9¾	6.5
SRM-30	25	30	3½ x 19 x 9¾	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9¾	6.5
SRM-30M	25	30	3½ x 19 x 9¾	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9¾	10.5
SRM-30-2	25	30	3½ x 19 x 9¾	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9¾	10.5
SRM-30M-2	25	30	3½ x 19 x 9¾	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

CIRCLE 134 ON READER SERVICE CARD

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

what's new

BY ANTHONY A. LUSCRE,* K8ZT

80-meter Vertical, Compact Rotatable Dipole, Receiver Pre-amp, and more

This month we include a look at a vertical 80-meter antenna and a compact 6-band rotatable mini dipole for 40 through 2 meters. We then take a look at a receiver pre-amp to help you hear those weak signals and a way to mount a new rig in a 19-inch rack. We then move on to a contesting software suite for your computer and learn about an opportunity to improve your contesting skills. Finally, we visit the Amateur Radio Website of the Month.

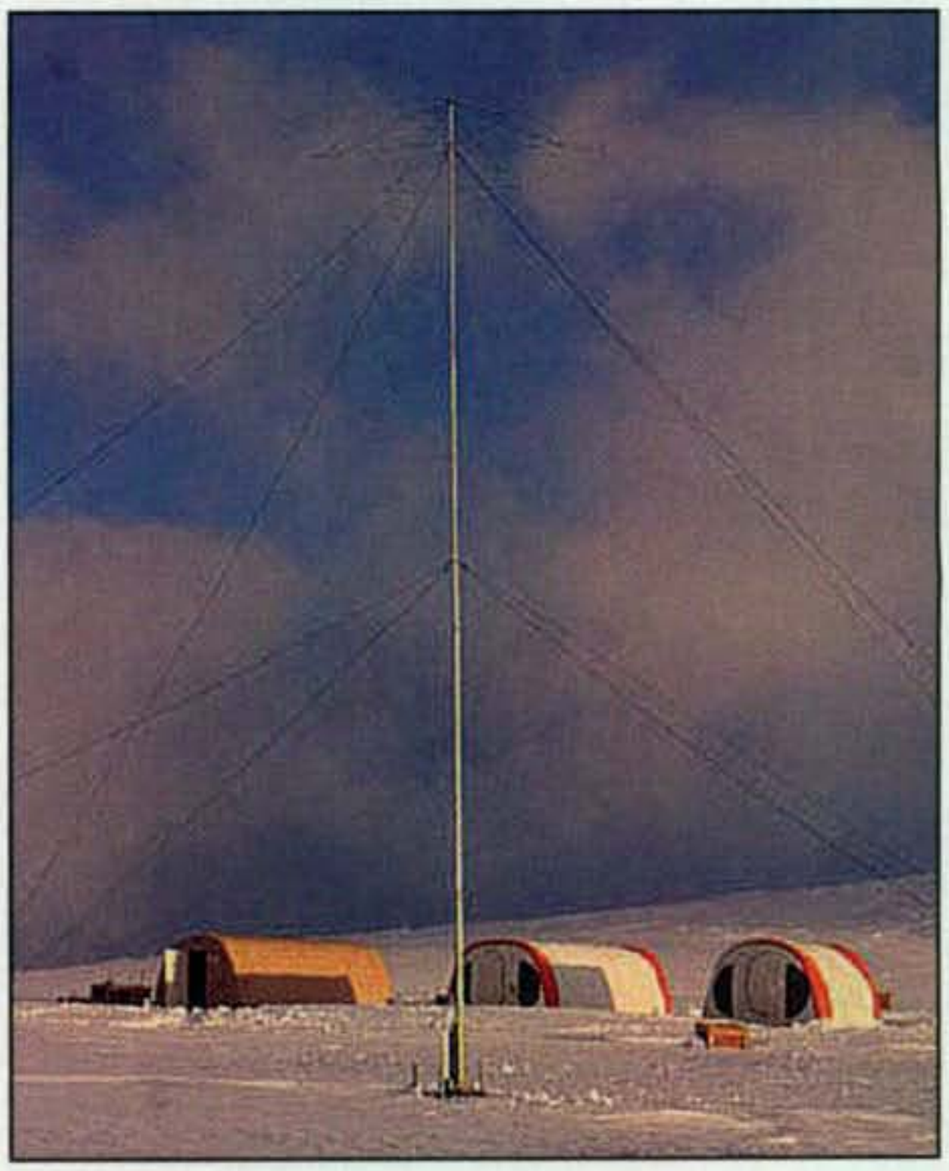

Photo A– The DXE-80VA-2 at 3Y0X Peter I Island (shown equipped with optional Top Hat Ice Kit). (Photo courtesy of DX Engineering)

DX Engineering's Thunderbolt™ HF Antenna

DX Engineering recently introduced its Thunderbolt™ antenna series. According to the manufacturer, "DXE-80VA-2 is a high-performance 80-meter vertical antenna system that is tunable to operate over segments of the entire band with an SWR of 1.5:1 or less, yet is only 43 feet high!" Use of 6063 corrosion-resistant aluminum tubing along with stainless-steel hardware makes for a very durable antenna, as was demonstrated during the 3Y0X DXpedition to Peter I (photo A).

The design also includes a top hat, allowing the antenna to be shorter without giving up efficiency or radiating performance. DX Engineering claims "you get full-size 80-meter performance in an antenna only 43 feet high."

For the best performance, as with most vertical antennas, a good ground radial system is an integral part of the installation. The DXE-80VA-2 comes with a radial plate to assist you in connecting your ground-radial wires (32 are recommended). An included tilt-base allows easier raising and lowering of the antenna. Completing the package are guy ropes and earth guy anchors.

For more information, contact DX Engineering, P.O. Box 1491, Akron, OH 44309-1491; on the web <www.dxengineering.com> (where you can also view assembly instructions); or telephone 800-777-0703.

MFJ's 6-Band Rotatable Mini Dipole

MFJ Enterprises has introduced its new Half Wave 6-Band Rotatable Mini Dipole. The MFJ-1775 antenna (photo B) covers 40, 20, 15, 10, 6, and 2 meters. With its small size, the MFJ-1775 is inconspicuous and low profile. It is not much bigger than an average TV antenna and can easily be turned by a lightweight TV rotator. The antenna's 14-foot length results in a tiny 7-foot turning radius and only 2 square feet of wind load. Construction includes use of "an incredibly strong," solid-fiberglass rod center insulator and 6063 T-6 aircraft-strength aluminum tubing for the radiator. Total weight is 15 lbs. The user must provide a 1- to 1.5-inch diameter vertical mounting mast for installation.

The MFJ-1775 provides a bi-directional pattern that can help reduce QRM and/or noise while maximizing your signal in the directions that you want. This helps you work the station you want to work even on a crowded band.

Each HF band uses separate, efficient end-loading coils wound on fiberglass forms with Teflon™ wire, and capacitance hats instead of lossy traps. On 6 and 2 meters the antenna acts as a full-length half-wave dipole. Feeding the antenna only requires one coaxial cable for all six bands. The antenna can provide an SWR of less than 2:1 with bandwidths ranging from 40 kHz on 40 meters to 1.2 MHz on 10 meters. Power handling is rated at a maximum of 1500 watts on the four HF bands and 300 watts on 6 and 2 meters.

To order or for your nearest dealer, contact MFJ Enterprises, Inc., phone 1-800-647-1800, fax 1-662-323-6551, or order directly online at <www.mfjenterprises.com>.

K8LV FLP1 Pre-amp

Are you looking for a way to improve your "ears" on the low bands? You may want to consider a sep-

*5441 Park Vista Court, Stow, OH 44224-1663
e-mail: <k8zt@cq-amateur-radio.com>

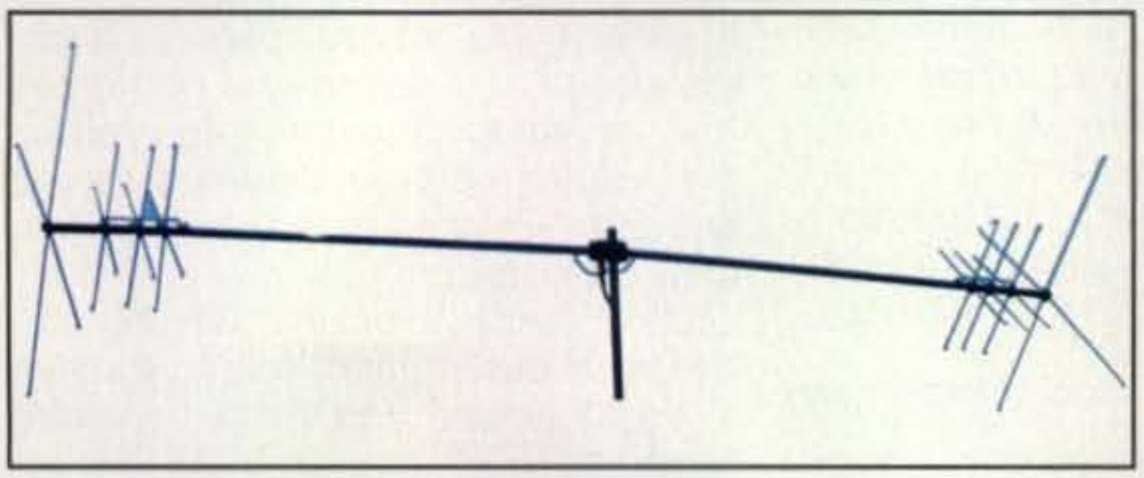

Photo B– The MFJ-1775 is so inconspicuous and low profile that it is even difficult to photograph it. (Photo courtesy of MFJ Enterprises)

Photo C – The small size of the K8LV Fish Lake Beverage Pre-Amp (FLP1) is evident in this photo. (Photo courtesy of K8LV)

arate receiving antenna. To get the most from your receiving antenna, a pre-amp can provide needed gain.

The K8LV Fish Lake Beverage Pre-amp (FLP1) can fill this need (photo C). The FLP1 high-performance RX antenna preamplifier is designed for 160 and 80 meters. It can be used not only for Beverage antennas, but also for a wide variety of receiving antenna designs. Most RX antennas for low-angle reception produce extremely attenuated feedline signals, which must be amplified to match typical signals received on your transmitting antenna. Designing the necessary amplification is complicated by the simultaneous need for good intermodulation performance and rejection of strong in- or near-band interference.

To meet both of these needs, this pre-amp utilizes a state-of-the-art MMIC for the active amplification, preceded by high-Q bandpass filters. The MMIC is based upon GaAs technology and is able to produce 20 dB of gain while maintaining an incredibly low level of intermodulation. This is specified in the form of a third-order intercept point of +35 dBm. This exceeds the intermodulation performance of most commercial ham radio transceivers.

The FLP1 comes pre-assembled using SMT components and two-sided PC board with ground plane. The final package is mounted in a custom metal enclosure that fully shields the electronics and provides a simple mounting flange for

Photo D – The RM-588 is a very efficient way to mount your Ten-Tec Omni-VII, especially if you are mainly controlling it through its remote access capabilities (see the November 2007 "What's New" column for more information). (Photo courtesy of Ten-Tec)

attaching to a flat surface. Each band is provided with a trimmer capacitor that allows peaking the input filter to anywhere within the band. It is factory set at the specified frequencies and normally will not require any further attention. The FLP1's power-supply line contains extensive RF and DC filtering to minimize problems with RFI from multiple transmitter stations, as well as reverse battery polarity protection. For more information visit <http://booksandtubes.com/K8LV.htm>.

Omni-VII Rack-Mount Hardware

Ten-Tec has announced the availability of the Model RM-588 19-inch rack-mounting hardware for the 588 Omni-VII transceiver (photo D). The hardware is used for mounting an Omni-VII into a 3U-opening standard 19-inch rack. The hardware mounts to the sides of the transceiver case. All necessary hardware is included. Price for the RM-588 is $49 and it is available directly from Ten-Tec, 1185 Dolly Parton Parkway, Sevierville, TN 37862; telephone 800-833-7373; <http://radio.tentec.com>.

Win-Test Contest Software

Win-Test is a new contest logging program written by Olivier, F5MZN (fig. 1). Win-Test is a Windows® -based contesting program. Although the software has all the advantages and features of a Windows® GUI (multiple resizable windows, point-and-click mouse use, etc.), the DOS-like appearance of the QSO entry fields will make many long-time users of earlier contesting software very comfortable. Win-Test currently supports over 80 domestic and international contests. You can use it for a single standalone station or a networked multi-op setup. Support of rig interfacing includes most radios currently in use by contesters, including a number of recent additions.

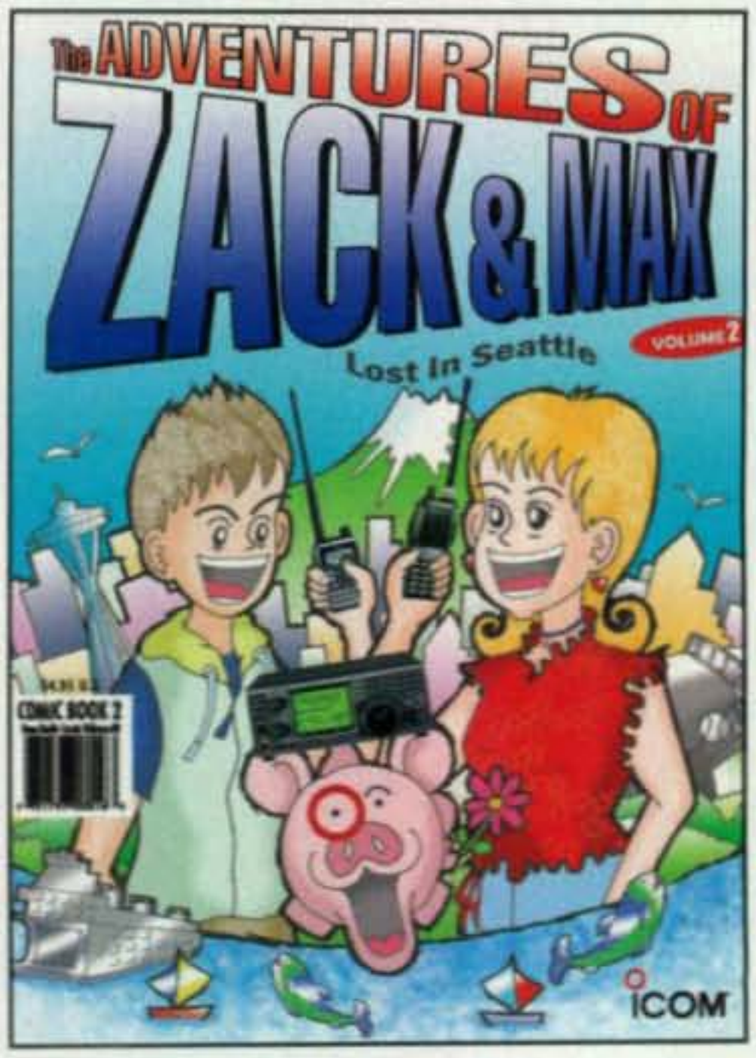

Fig. 2– Screen shot of one of the Zak & Max comic books available for free download at this month's Amateur Radio Website of the Month, ICOM America's Comic Book page (www.icomamerica.com/en/amateur/comic_book). The page features five different comic books which you can download in color or black and white.

Other features include: CW generation in the background, leaving you free to "type ahead" (no extra hardware required); RTTY mode by MMTTY interfacing; integrated voice keyer; partial and N+1 on-the-fly search; and database assisted field auto completion. Most keyboard shortcuts use the CT syntax, support for macros and message variables and integrated key remapping.

Windows® features include: resizable and floating windows, capability to interface many devices on serial ports and parallel ports, and USB and multi-monitor support (if your operating system allows it).

Features for multi-op contesting include: networking with Ethernet or RS-232 ports (can be mixed on the same machine); on-the-fly log synchronization (no central server required); and the ability to make skeds and pass mults between stations with ease. Win-Test is easy and powerful for use in SO2R (single-op, two-radios) operations.

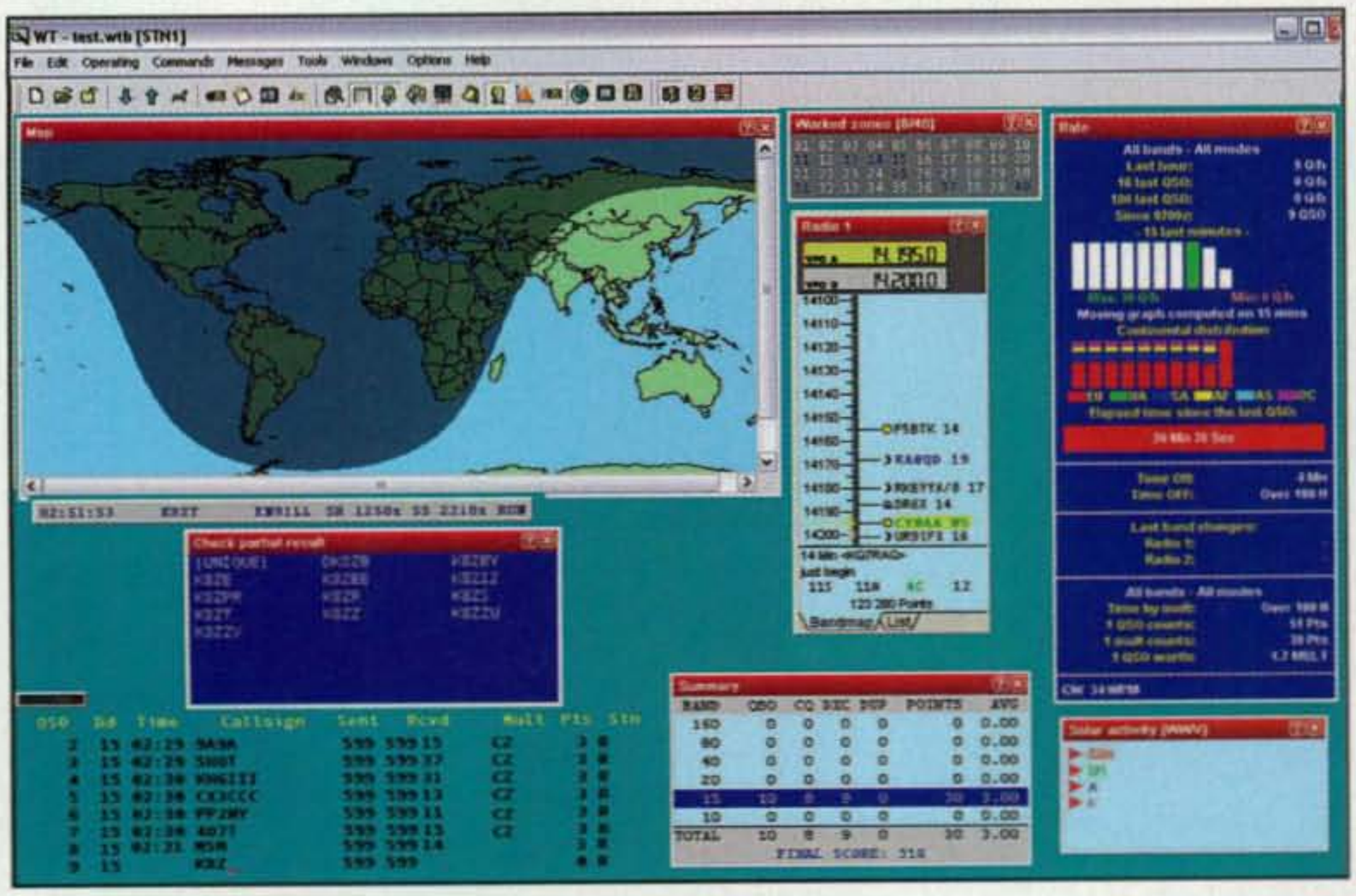

Fig. 1– Here is a screen shot of the Win-Test Contest Logging program. (Image courtesy of Olivier, F5MZN)

Not just a contest logger, Win-Test is a full-featured contesting suite. Features include: real-time grayline display, graphical and textual bandmaps, real-time objectives files comparison, extensive statistics and decision tools updated in real time, and propagation prediction software HamCAP interface.

When a contest is over, Win-Test can generate Cabrillo, ADIF, text and CSV files, easy summary generation for sending to the mailing lists (3830, etc.), and worked multipliers exports for post-contest analysis. For more information or to download a demo copy, visit <www.win-test.com>.

Contest University Dayton Hamvention® 2008

This is the second year for anyone interested in contesting and who is in the Dayton area the day before the opening of this year's Dayton Hamvention® to learn many winning contesting tips and tricks. You will not want to miss the chance to attend this year's "classes" or for alumni of last year, "graduate-level classes." This year's Contest University will be held on Thursday May 15, 2008, from 8:30 AM to 5:30 PM at the Crowne Plaza Hotel in Dayton, Ohio. For details see this month's "Contesting" column by John Dorr, K1AR, and the website <www.contestuniversity.com> .

The Amateur Radio Website of the Month

ICOM America sponsors this month's featured site. Tucked away at <www.icomamerica.com/en/amateur/comic_book> (fig. 2) is a treasure trove for anyone talking to or mentoring youngsters in the study of amateur radio. Here you will find five amateur radio comic books featuring Zak and his friend Max the pig. The books introduce the readers to many aspects of amateur radio while following the adventures of Zak and Max.

Originally, there was only one comic book in the series and you had to obtain printed copies from ICOM. Wisely, ICOM has continued the series with four more issues and made them all available for free downloading. You have a choice of downloading a color version or a black-and-white outline version that can also be used as a coloring book. The books use a style of drawing that is similar to the very popular "Anime" cartoons. Many youngsters are familiar with this style from the Pokemon animated cartoons and popular Pokemon, Yosi, and Yu Gi Oh trading cards.

I hope you will take advantage of this great resource by downloading, printing, and distributing them to grandchildren, nieces and nephews, students, scouts, and any youngsters with whom you come in contact. Also, when you visit ICOM's display at the Dayton Hamvention® or other ham radio events, please thank the staff for making these comic books available.

Wrap-up

That's all for this month's column. Thanks for the e-mails about last month's column and remember, I welcome your input, feedback, questions, and/or comments. Feel free to use my e-mail or address on the first page of this column. Until next month . . .

73, Anthony K8ZT

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

BY PHIL SALAS,* AD5X

LED Reader Feedback

This month I'm passing on some feedback I've received based on some of my LED articles (*CQ* "Weekender" columns June 2006, December 2006, December 2007, and *QST* September 2003).

From David, KR4OW:

Hi, Phil. Thanks for the LED info you've provided for different around the shack stuff you can make. I built the LED Light for transceiver night operation. We have a place over in Orlando called Sky Craft, where they sell surplus electronics and military/NASA stuff. Well, they had some 15k mcm LEDs that I picked up. I was able to throw the project together in about 30 minutes, including the drilling and hot melt glue. After that, I came up with the idea for emergency lighting around the house. In the summertime here in Florida, especially out here in the sticks, when we lose power it is gone for about 4 hours at time—and always at night! So since I am into the whole solar radio station as well, I bought a 120-volt relay and made a plug for it with a 10-ohm 10-watt resistor so that when the power goes out it drops the relay and connects the battery to the lighting.

All the lighting I made (six lights with six LEDs each for the major rooms) runs from a battery that gets charged from one of my 15-watt solar panels. So when the AC power drops out, I instantly have lighting. The entire system only draws about 400 ma according to my current meter. My battery is a 35-ah gel cell that I bought at a yard sale, and it does a good job of powering the system for at least four hours. The LED lights give more than enough lighting for everyone to see where they need to go and not trip over anything. I have about $30 total into this system, and most of that is built into plastic project boxes. My next project will be based on recycling all those non-working yard solar lights. I ran an ad in our local newspaper looking for broken ones and wound up with over 100 of them for free! I am also going to recycle the solar cells in those yard lights and make low-current panels for even more projects. The options are limitless with all the free energy!"

AD5X replies:

Wow, David, that is a *great* idea about using those non-functioning solar yard lights. The LEDs

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e-mail: <ad5x@cq-amateur-radio.com>

Photo A– An inexpensive LED tester permits you to easily determine LED polarity and brightness at different current levels.

are very bright, and they all have solar cells for charging during the day. I also found out why the non-working lights are so abundant. I was talking to a guy at my local Home Depot about these yard lights. He told me that when the lights stop working, people just buy new ones, and all they really need is a new rechargeable battery.

From Joe, K8JPV:

I like your neat LED lamp that you use for illuminating your operating position in the dark. I have made similar lamps, but for mobile use I've found that the ultra-bright red LEDs give plenty of illumination without affecting my night vision. In my boat, I use the ultra-bright yellow and/or red LEDs to also lessen the attraction to bugs.

AD5X replies:

Joe, this is another great idea. After receiving your e-mail, I played around with ultra-bright red

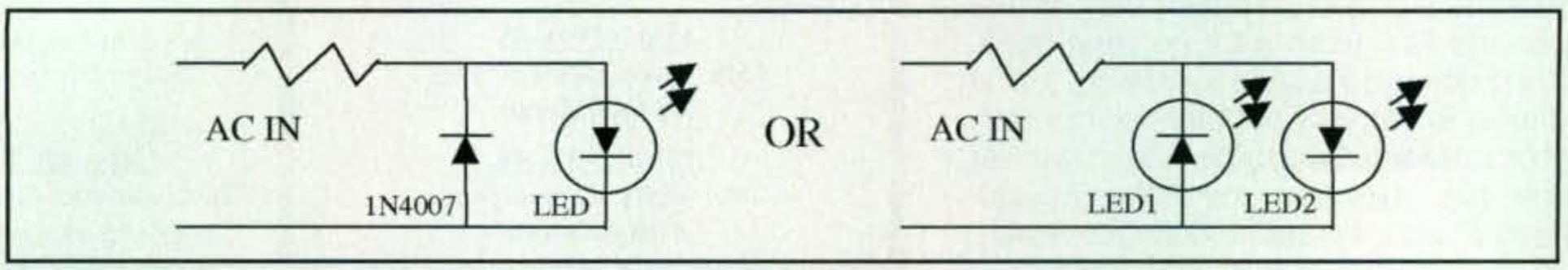

Fig. 1– LED AC operation.

and yellow LEDs. In particular, the red LEDs do a great job of illuminating things without hurting my night vision. The yellow LEDs are almost as good as the red LEDs, and I verified that neither attracts bugs. Thanks for the input!

How to Use the LEDs

I'll finish this month's column off with a short review on how to use these LEDs.

Remember that you must use a series current-limiting resistor from your voltage source. Most LEDs have full brightness at 20 ma, but check the data sheet on your particular LED to make sure. Use the following formula to determine the value of the current-limiting resistor (R_{CL}):

$$R_{CL} = \frac{V_{SUPPLY} - V_{LED}}{I_{LED}}$$

V_{LED} is the forward voltage drop of an LED. This varies for the different LEDs. Typically, this is about 2 volts for red LEDs, 3 volts for green and yellow LEDs, and 4 volts for white LEDs.

You can run LEDs from AC voltage as well, since the LED is a rectifier and will convert the AC to DC for you. I use LEDs this way to replace pilot lamps in my boatanchor radios. Use the AC RMS voltage for "V_{SUPPLY}" in the above equation. The only danger is that LEDs have a low reverse breakdown voltage which can be exceeded in even low-voltage AC applications. To protect the LED in AC applications, put a reverse-connected diode or a reverse-connected second LED across the first LED as shown in fig. 1. I like using the two-LED approach, as this gives twice the light output.

Finally, if you work with LEDs much, you might consider purchasing an LED tester, such as the All Electronics (www.allelectronics.com) LT-100 (see photo A). This particular tester checks LEDs at current levels of 2–50 ma. I've found this invaluable in checking out the brightness of different LEDs, permitting me to better match the brightness of different color LEDs used in the same project.

Remember, if you have any feedback or ideas, please e-mail me and I'll share them with other readers. Meanwhile, I think I'll take out an ad in my local paper asking about those "bad" yard lights! Until next month...

73, Phil, AD5X

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Ground

A ham friend of mine recently moved into a new house. A temporary antenna installation took place within the first week or two of occupancy. Interestingly, the back yard came with a tether-ball pole, a perfect place for his multiband vertical antenna. As he installed the antenna, Dennis wondered about station grounding. When one talks about "ground" in the electrical sense, it is much more than "dirt" or "earth." Also, there are at least two different types of "ground."

Safety Ground

One of the types of ground we need to be concerned about is called *safety ground.* This is also called the *surge* ground. Since the phrase contains the word *safety,* we should pay attention to this warning. Examples of safety grounds are all over the place, in and out of your ham shack. For example, one safety ground is the metal chassis of your radio equipment (see photo A); another is the terminal connected to the green wire in your AC outlets.

By the way, do not even think about using that green wire in your AC outlet for an RF ground! If you do, you will couple RF energy from your radio into the AC mains wiring, turning your AC wiring into an antenna that will radiate harmonics into places you probably won't want it to go, such as the stereo, television, telephone, computer, and all those other electronic items around the house—and the neighbors' houses. Even more critical, this is a violation of the National Electrical Code (NEC), which states that the ground wire in AC receptacles must not carry any current. If RF couples into the AC line, the energy may hinder proper operation of GFCI (ground fault circuit interrupter) outlets and other safety items around your house.

The safety ground is in place to protect equipment and appliance users from electrical shock if something short-circuits inside the item, or somewhere along the electrical path. In addition, this ground provides a safe path for current to pass through in case of a power surge or nearby lightning hit. (A "direct hit" is a very different thing, however, and unfortunately, in most cases equipment damaged by a direct lightning hit is destroyed.)

Speaking of lightning protection, the safety ground must provide a very direct, low-resistance path for energy to follow. This is most important for lightning protection.

One of the best sources of information on lightning protection is the PolyPhaser Corporation. Take a look at its website for an overview of products and technical information. The site may even have specific information for ham stations.

*16428 Camino Canada Lane, Huntington Beach, CA 92649
e-mail: <kh6wz@cq-amateur-radio.com>

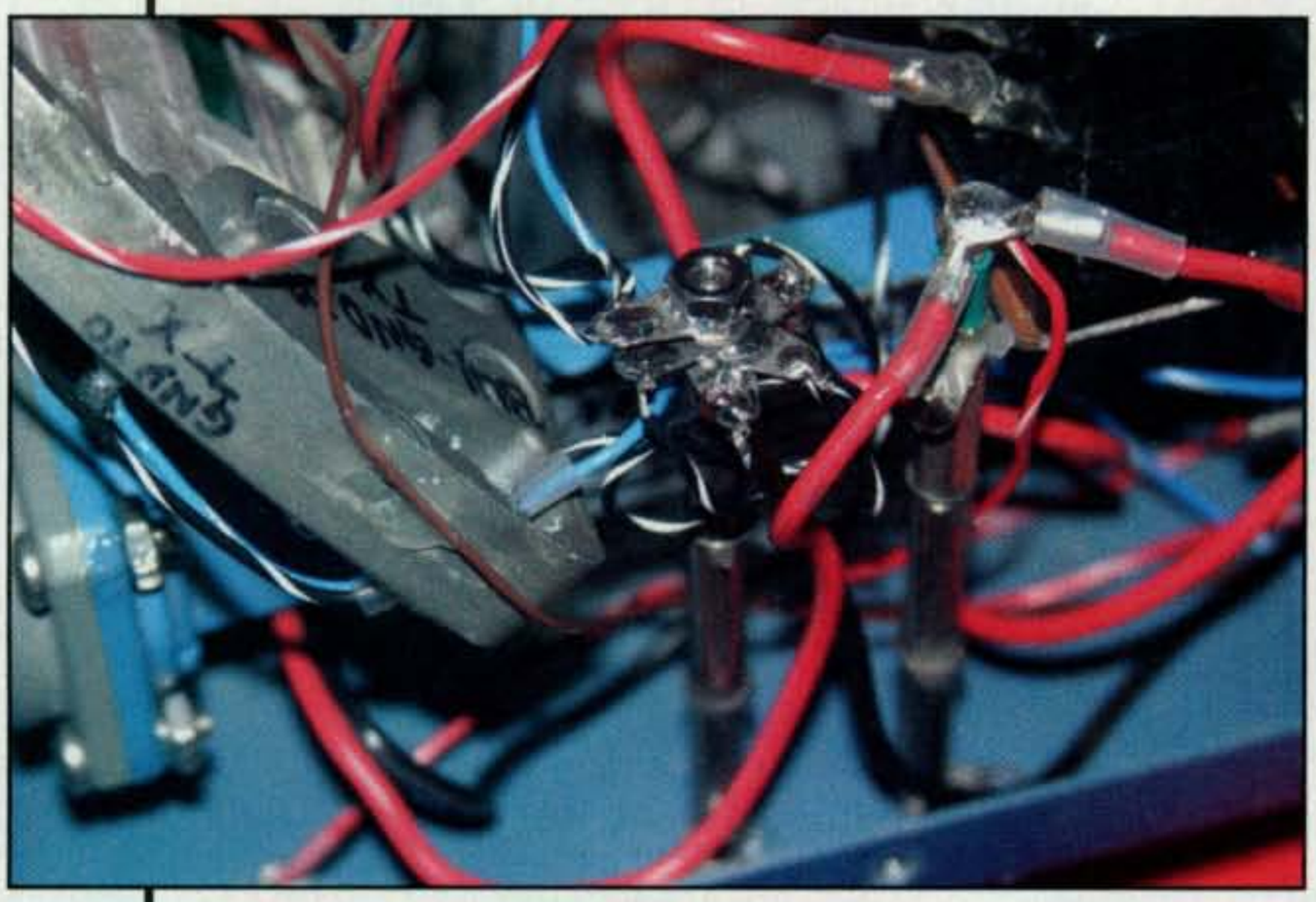

Photo A– This is a picture of my "safety ground" system inside one of my construction projects. All ground leads from the individual circuit boards come to a single point inside the chassis, and the chassis itself is connected to this location.

RF Ground

As its name states, RF ground is related to "radio frequency" energy. This can be very different from the electrical safety ground just mentioned. It can also be a "good thing" or a "bad thing" depending on the circumstances if the equipment, the equipment location, and the installation.

When we are dealing with RF energy, we also must talk about *wavelength.* As you should recall from your license exam, this is generally measured in meters and calculated using the formula 300/f, where "f" is the frequency in megahertz (MHz). A variation on this is the formula 468/f, which is used to determine the length in feet of a half-wavelength dipole antenna for a given frequency.

Another term is *resonance,* and this occurs when RF energy interacts with an electrical or electronic component,such as a piece of wire, or an inductor, which is really a wire coiled up into a certain shape. This is the electrical relationship between physical length and electrical length.

Also, when speaking of frequency, we need to know about *harmonics,* which can be thought of as siblings of the parent frequency, and occur at exact multiples of the primary, or "fundamental," frequency. You will hear discussions of odd (3×, 5×, etc.) or even (2×, 4×, etc.) multiples, because odd and even harmonics behave differently in relation to the fundamental frequency.

Since RF energy can be thought of as a very fast vibration, we can use music to demonstrate radio-frequency phenomena. A musical analogy of resonance is *sympathetic vibration.* You can

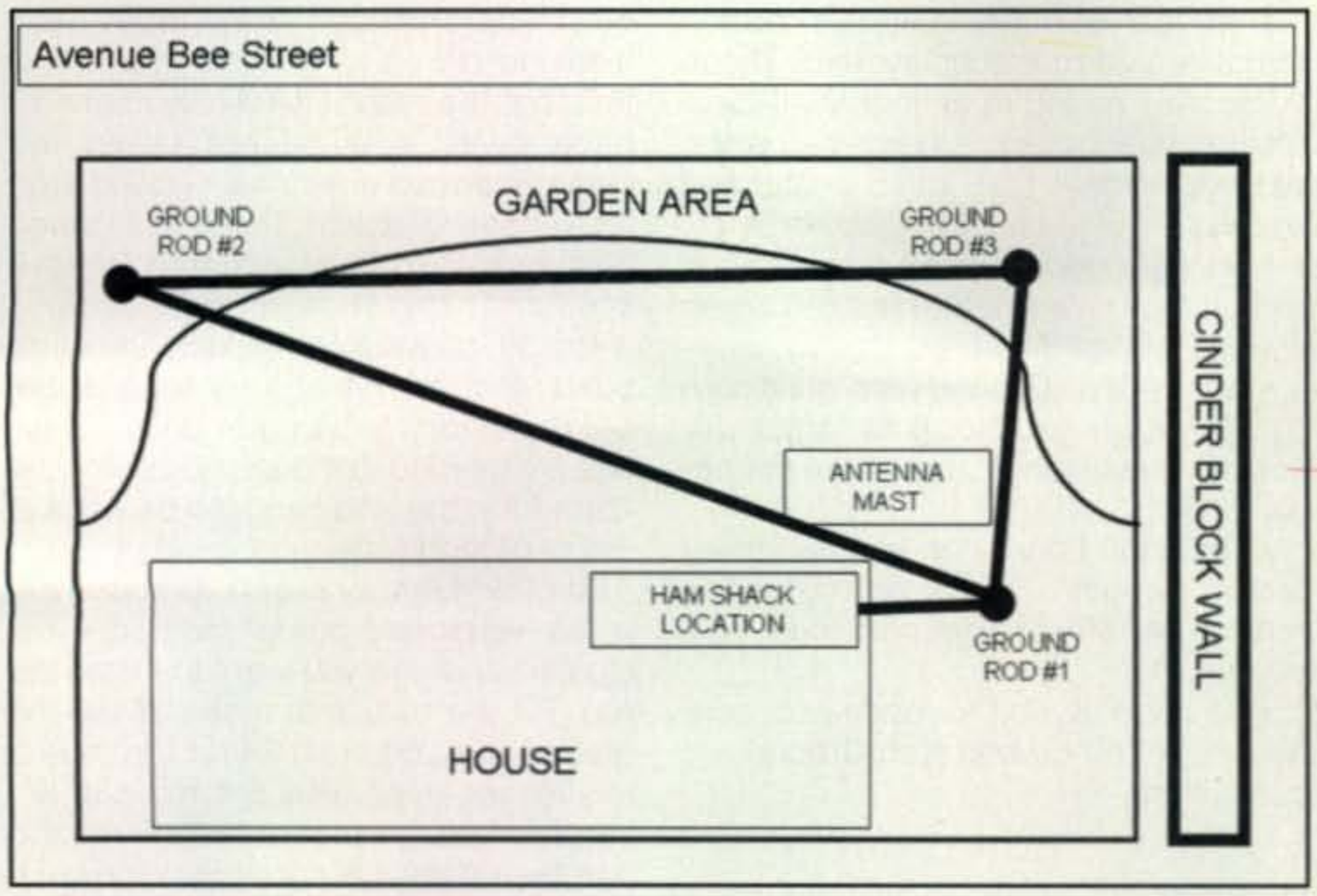

Fig. 1– A sketch will help you plan your ground system. Here is a typical southern California city lot. The ham station is located in one of the bedrooms near the back of the house. This installation was fairly easy, but underground utility cables prohibited digging close to the cinder block walls. Most of the wires are buried a few inches under the lawn.

try this experiment at home, if you have a piano, and a good singing voice, or if you have a musician friend with a piano. Open the piano's top board (the "lid"), and prop it open. Then sing a note into the piano soundboard, the area underneath the strings and hammers. If you listen carefully, you will hear the same note being played back to you from the piano.

When talking about ground systems, resonance can help or hinder performance of a radio station. Let me clarify this: When we talk about RF ground systems, we must be careful to avoid any electrical lengths that might radiate RF energy, rather than suppress it. In other words, ground wires must not act like antennas, and so must not be resonant lengths on the frequencies used at the station. Also, odd multiples are also to be avoided. To make things simple, an excellent summary of these lengths was done by Jerry Hall, K1TD. His summary is presented in table form in *The ARRL Handbook*, in the "Component Data and References" section. This list can be used to help you lay out a good RF ground system.

However, there are some cases in which we do want an RF ground system a resonant length. This is when the ground is actually a part of the antenna system. For example, a *ground-plane* vertical antenna uses a quarter-wavelength radiating element (connected to the center conductor of the coax feedline) and some ground radials (usually two or more) that are also a quarter wavelength in length. The radiating element and the ground radials work together to form an antenna one-half wavelength long. We will come back to this concept when we take a look at "problem installations."

Practical Ground Systems

OK, so much for what experts say. Most of the time, however, the real world forces us to be "creative" when making a suitable and safe ground system for our ham station equipment. This is especially true when the ham station is located in an upper floor apartment or condominium. But before we begin to tackle the challenging installations, let's look at what we need to make a suitable ground system in a "perfect" location.

For a good, practical RF ground system we must think of *mass* and *area*. In other words, the larger the surface area is, the better the ground system. Translating this into wires and other materials we need to buy, this means multiple elements that form a *system*.

In 1988, the US Army Signal Corps reported the results of an experiment to improve portable communications (*Signal*, March 1988, pages 79–80). According to a posting on the American Radio Relay League website, "...the use

of four *series-connected ground* rods, driven only a foot or two into the earth, provided the most efficient ground system." See "Assorted Grounding Hints and Kinks and Technical Correspondence," <http://www.arrl.org/tis/info/tech.html>. I have not tried this yet, but it may be a good idea to consider varying the depth of the ground rods in your installation.

It may also be a good idea to sketch out some ideas for your ground system, and if nothing else, the drawing will help take you to the next step, which is obtaining all the materials for your system (see fig. 1).

The Shopping List

A piece of wire connected to your rig's chassis and then to the cold-water pipe is not a good RF ground. (These days the cold water pipes in your house might not be a ground at all, since the plumbing may be some sort of plastic!)

Here is a list of the materials needed to make a good ground system. These items may be found at your local electrical supply house, a hardware store, or your favorite ham radio equipment dealer.

- As needed, minimum two: Ground rods, copper-clad steel, 8 feet or 10 feet, 3/4- or 5/8-inch diameter.
- As needed: Ground wire, solid copper, large gauge, No. 6 or larger (for corrosion resistance, do not use stranded wire).
- Optional: Four short lengths (three feet) of copper pipe, 3/4-inch diameter, for use as shallow ground rods; see above.
- As needed, one for each wire connection to the ground rod: Ground rod cable clamps.

Work Begins

How does one drive a metal rod that is almost twice your height into the ground quickly and safely? Many tricks have been described to perform this operation, but the most interesting method I have seen is a gadget called the Groundhawgs® Electrical Ground Rod Installation System. There is a video demonstration of this system on the website listed in the References section.

Bosch, Milwaukee, Makita, and other power-tool manufacturers have auger bits that attach to hammer-drills. These bits are used to drill deep holes into the earth for rebar and can also be used to install ground rods.

Another fun way to sink a ground rod is the "water-and-pump" method. First, dig a hole where you want to install the rod. Fill the hole with water. Take the ground rod and push it into the mud a few inches deep. Pull the rod out, letting the water go into the hole. Push and pull the rod back and forth into the hole. As the hole gets deeper and the soil absorbs the water, add more water and continue to "pump" the ground rod into

the ground. If you hit a rock, pull the rod out and try another location.

Good, old-fashioned, sledge-hammering can also be used. The Sluggo-Ox ground rod driving tool is a tapered "holder" that fits into the end of 3/4- or 5/8-inch diameter ground rod. The larger striking surface helps ensure all the hammering power goes into the ground rod and helps you to not miss the target.

Another way to install a rod is to use a post-hole digger to make a deep and narrow hole in the ground. There is also one more solution to installing a long ground rod: Hire an electrical contractor to do it for you!

Now that the rods are "planted," it's time to do the fun part. In the installation shown in fig. 1 , several small challenges needed to be addressed. First, underground utilities prohibited any digging along the rear and side walls along the property line. Second, the sprinkler system (non-conductive PVC pipe) was not to be disturbed. Third, concrete pathways surrounded the nearest entry into the first ground rod. (A hole was drilled through the concrete to accommodate the first ground rod so that it could be installed a few inches away from the house.)

Most of the ground wires run under the lawn and the garden area. Since these areas are kept moist, ground effectiveness should be quite good. An easy way to bury ground wires is to use a shovel or a garden spade and push the wires a few inches into the ground. An even easier way to do this is to use a gardeners' electric or gasoline-engine-powered lawn edger to chop a path for the wires. After the wires are placed into the grooves, you can cover the wires by pushing the lawn back together.

Problem Installations

What if the ham station is located in a second- or third-floor of an apartment building? There is no way an effective grounding system can be installed. Besides moving to another home, what can "cliff dwellers" do?

In this case, the RF ground is not going to be used. Running a number of ground wires through the walls and out of the apartment and into a 10-foot ground rod located dozens or hundreds of feet away is not only impractical, the efforts to do this are probably not worth the expense and risk!

In this case, we need to create something called a *counterpoise ground.* Remember the ground-plane antenna? Now we can bring some of this antenna into the shack, where the radio equipment is located.

The solution is quite easy and eliminates running wires to long rods pounded into the ground. The materials list is a little more modest, as all you need is some wire. Ordinary "hookup" wire can be used, and since you will be running this counterpoise wire inside the house, the wire can be thin, say No. 22 or 26 gauge. Measure out a one-quarter wavelength of wire for each frequency band on which you wish to operate, plus a few extra feet so you can connect the end of the wire to your station equipment ground terminal and allow for some experimentation. (You know the quarter-wave formula from your ham exam—234/f in MHz, or use the half-wave formula, 468/f in MHz— and then cut the wire in half. You now have two counterpoise wires!)

In this type of installation, placement of the radial wire affects the performance. I have always found it easiest to just snake the wire along the baseboard. To be safe, cover the ends of the wires with some electrical tape.

Like many things in our hobby, the term *ground* is not a simple thing, and there is plenty more to learn. Google says that there are more than 265,000 English entries just for the term *RF ground.*

Let me know if you are experiencing or have experienced a grounding challenge, and how you solved it, or what you have tried to fix your situation, and I may cover it in a follow-up installment of "Beginner's Corner.

73, Wayne, KH6WZ

References

Groundhawgs® Electrical Ground Rod Installation System—a motorized gadget that helps you install a 10-foot ground rod in seconds: <http://www.groundhawgs.com>.

"Installing Ground Rods the Easy Way" A great example of the water and pump method: <http://www.cosjwt.com/index.php?a=16>.

PolyPhaser Corporation—lightning systems and components, including a specific application note for ham radio installations: <http://www.polyphaser.com>.

Sluggo-Ox Corporation—Sluggo-Ox ground rod installer device: <http://www.sluggo-ox.com>.

"What You Should Know About Lightning Protection," by Joseph H. Reisert, Astron Wireless Technologies, Inc.: <http://208.112.70.144/2006/aboutlightning.html>.

antennas

BY KENT BRITAIN,* WA5VJB

Antenna Plots

There are several ways that the radiation pattern of an antenna can be shown graphically. These are known generically as "plots." In the plot in fig. 1 we have a typical beam antenna pattern plot that you might see in many antenna advertisements. In the next two examples, the Yagis are assumed to be in free space. That is, they are all by themselves with no other objects nearby. Very few ham installations in the real world have free-space antennas, but this is the common way to display an antenna pattern.

The most common are polar plots with the azimuth being the plot most often used. The plot in fig. 1 is a representation of how the antenna pattern looks as if you were directly above the antenna looking down. Another type is the elevation plot, which we'll discuss later. In fig. 1 we have the plot of a small Yagi on the left and a photograph of the Yagi on the right. (For construction information on this entire family of 1250–1300 MHz Yagis, see the current issue of *CQ VHF*.)

In fig. 2 we have the same Yagi as in fig. 1, but now the antenna pattern is for the antenna turned edgewise. It is a lot lumpier pattern, but this would be typical of a vertically polarized 2-meter Yagi and its coverage of local repeaters.

Ground Bounce

In most cases, the real-world pattern of an antenna includes the radio wave off the antenna and the radio wave that bounces off the ground. If the two waves are in phase, their voltages add, you get about 3 dB more signal in that direction. However, they can also be out of phase—that is, as one wave is increasing the other is decreasing. They cancel out and the signal can be weaker by 20 dB, or even more. These are called *nulls*.

In this example we have a Yagi mounted some distance from the ground like the one in fig. 3. There the direct wave from the antenna and the reflected wave off the ground come together in phase, and we have the peak of the lobes. When the direct wave and the reflected wave cancel each other, then we have the nulls. This pattern can be very complex in a typical installation. The ground is rarely perfectly flat, and how well the ground reflects is ever-changing depending on recent rains. Thus, you can't get too carried away with the math, but getting that main lobe to be at the same angle as the optimum skip angle for your favorite HF band can add many dBs to your signal.

Front-to-Back Ratio

In a typical beam antenna, radiation to the sides is minimized and most is focused to the front, but there is often a significant rear "lobe" of signal radiation (as in, "I'm getting you off the back of the beam."). Front-to-back ratio is a way of expressing how much power is going to the front of the antenna versus how much is going off the back.

Front-to-back ratio is an often-abused number in antenna advertising. In fig. 4 we have a typical

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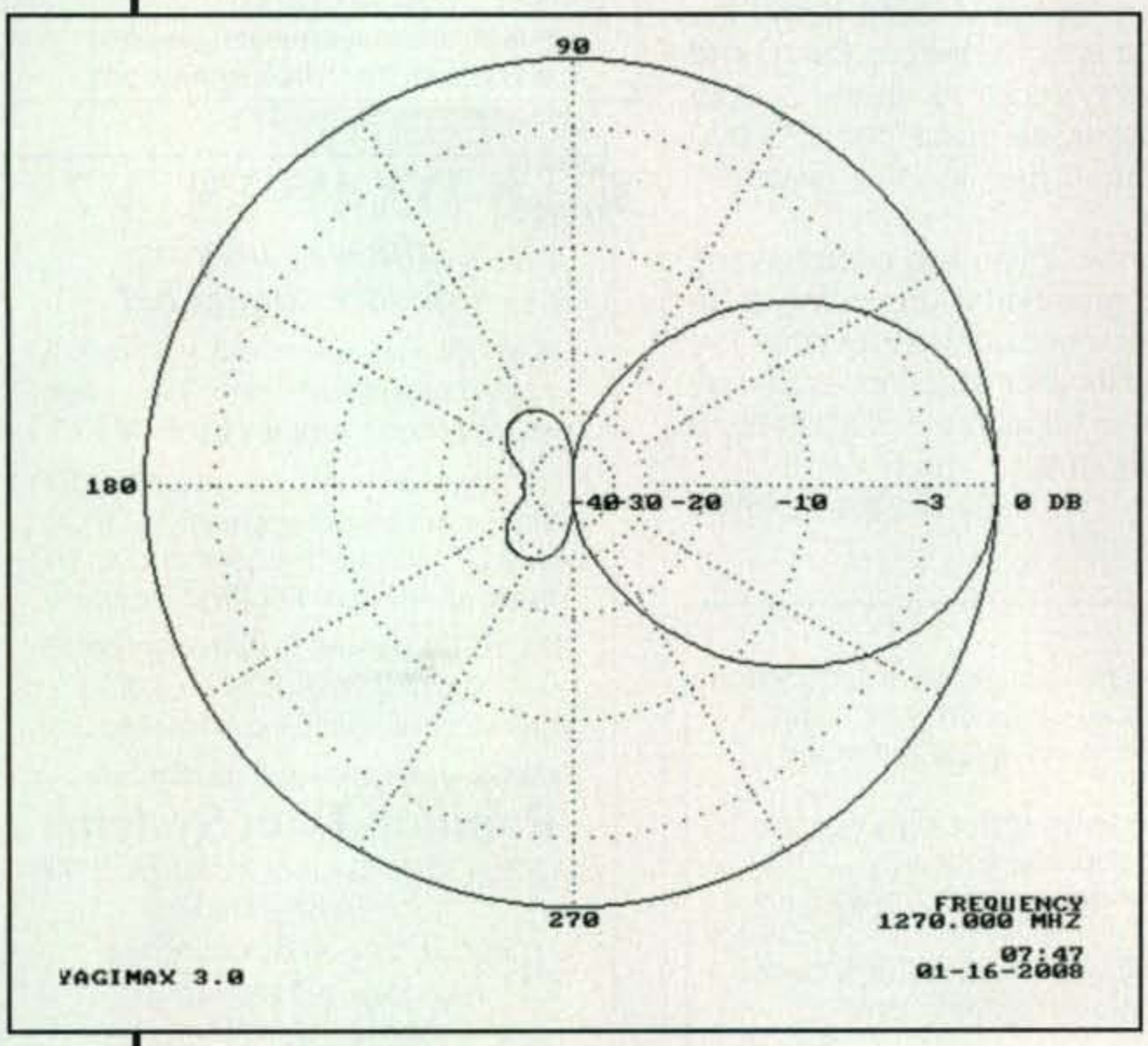


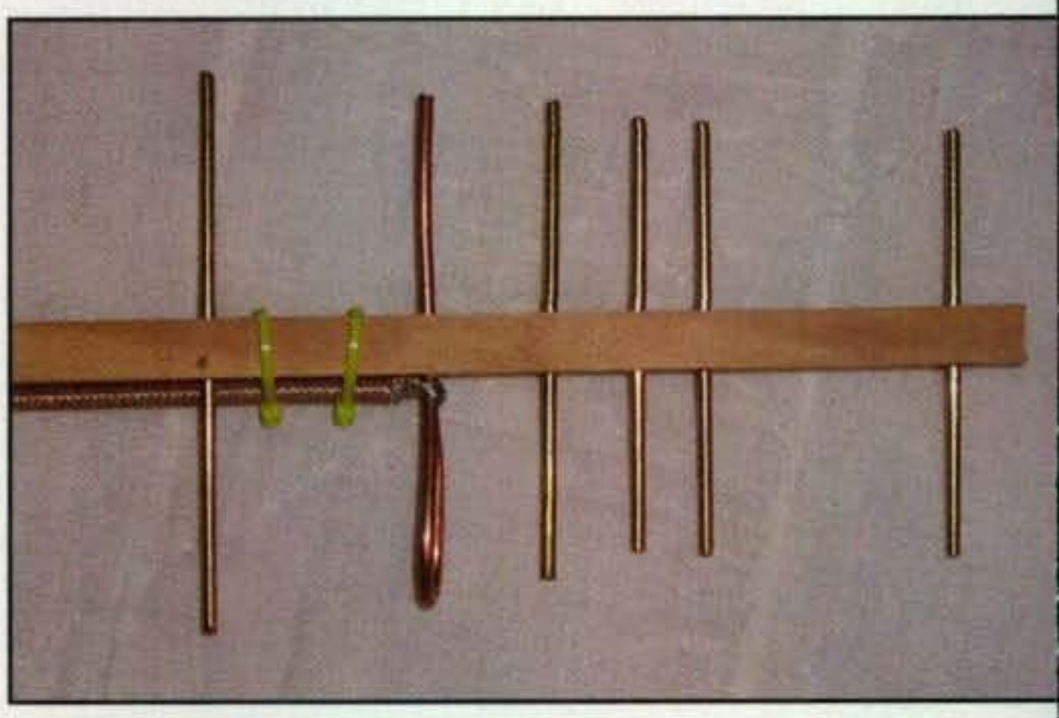


Fig. 1– On the left is a typical polar plot of a small Yagi antenna. Above is a photo looking down on a Yagi and its pattern.

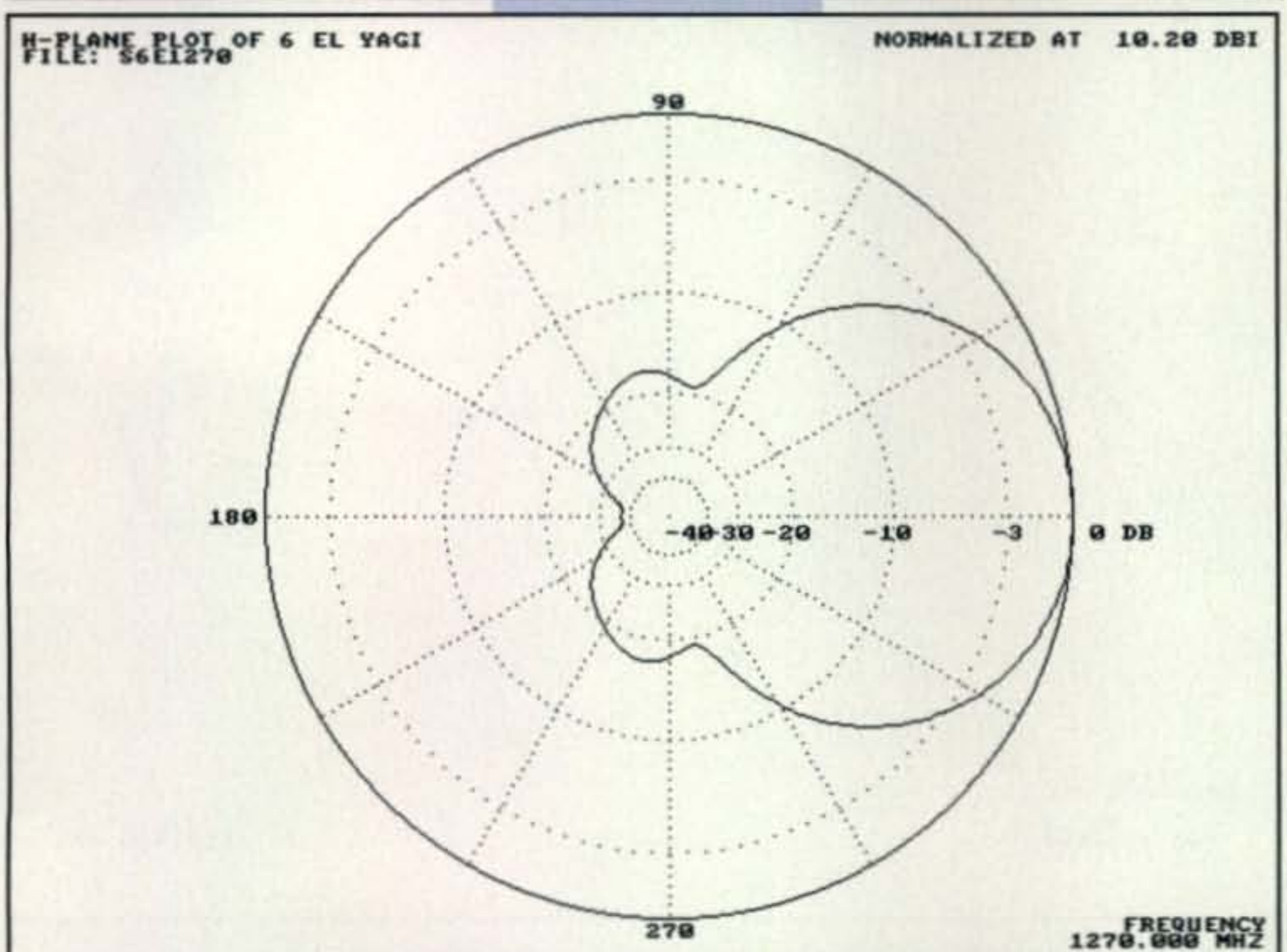
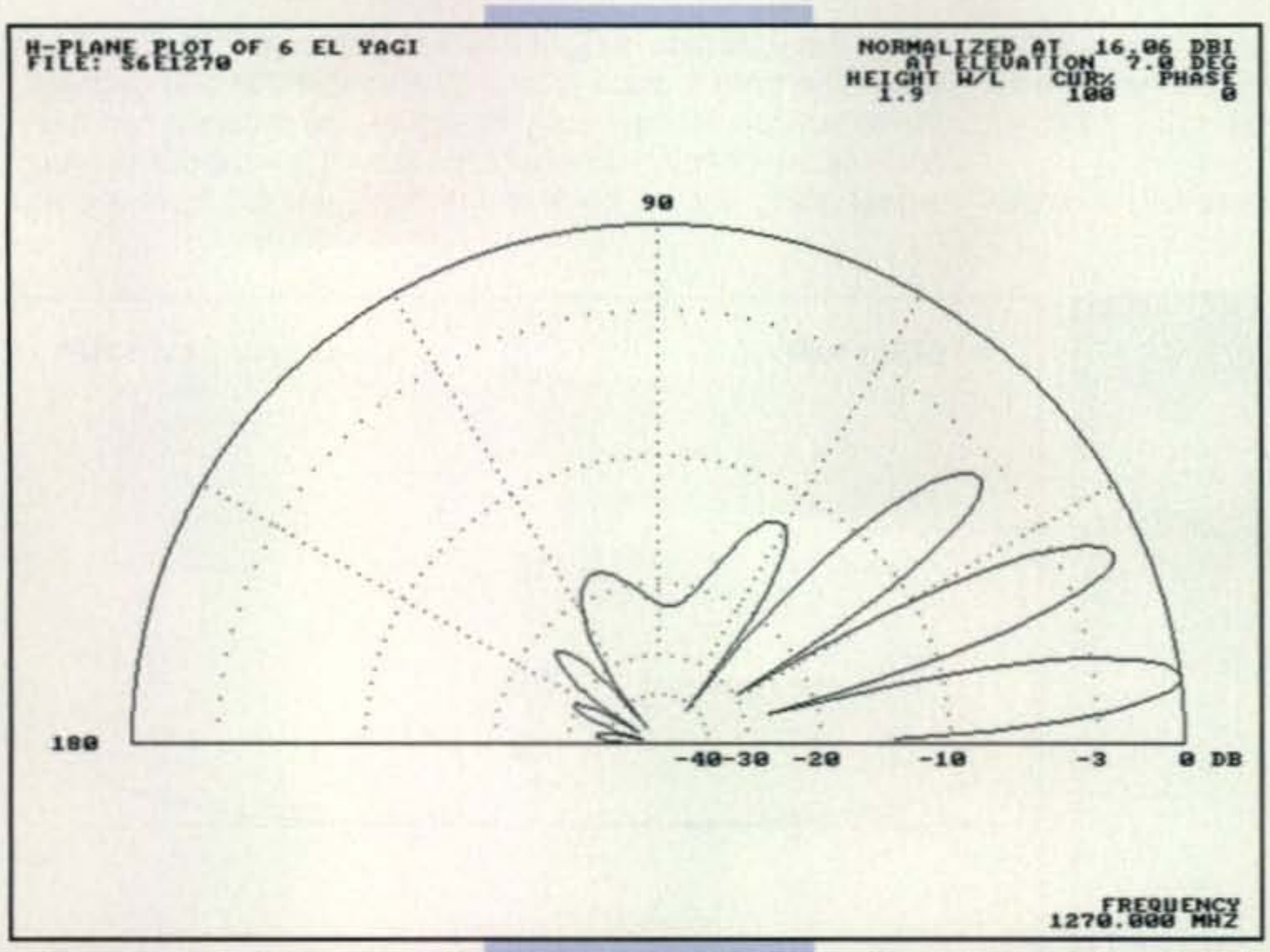


Fig. 2– Looking down on an edge view of a Yagi and its pattern



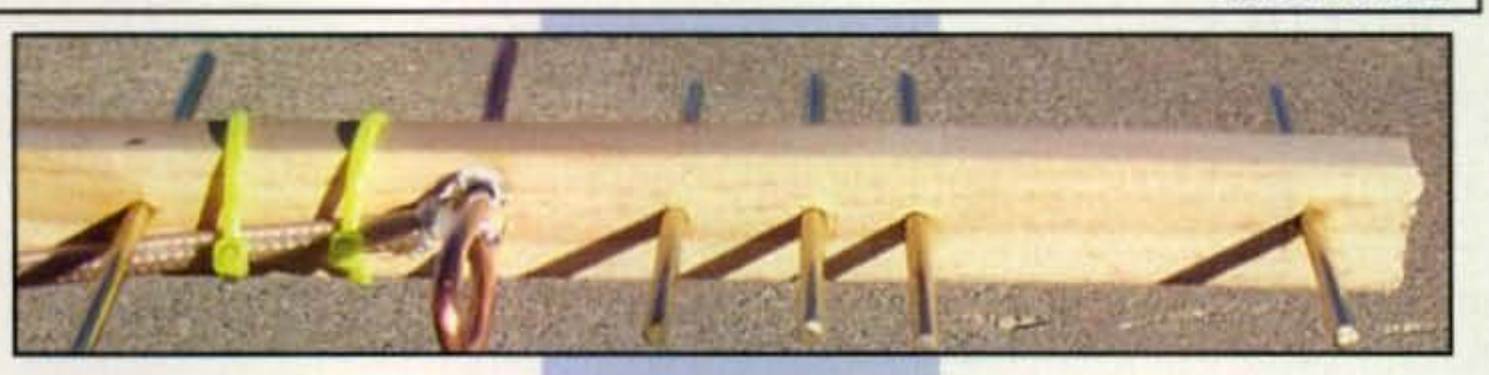


Fig. 3– Here's how the pattern looks when the Yagi is mounted above a ground plane.

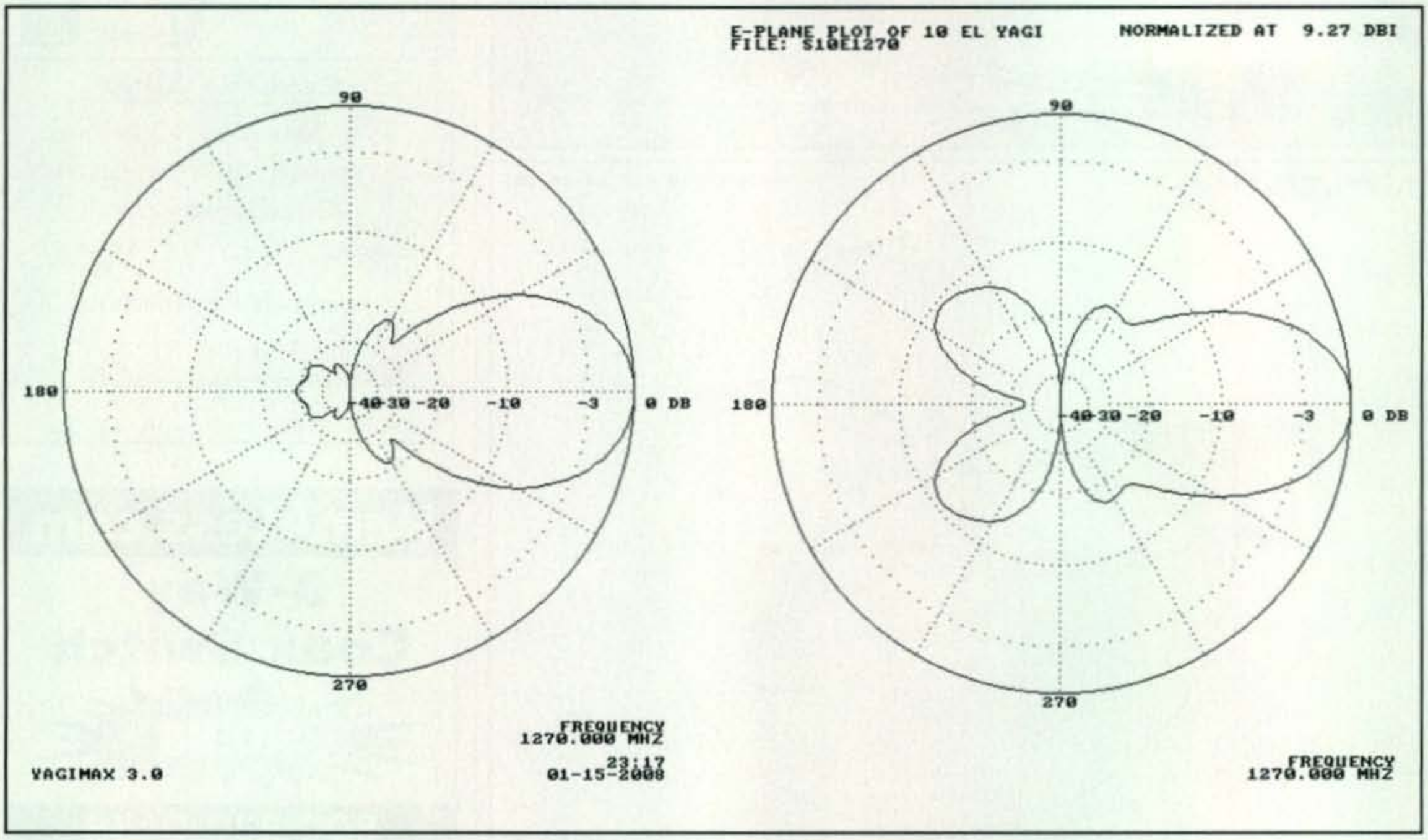
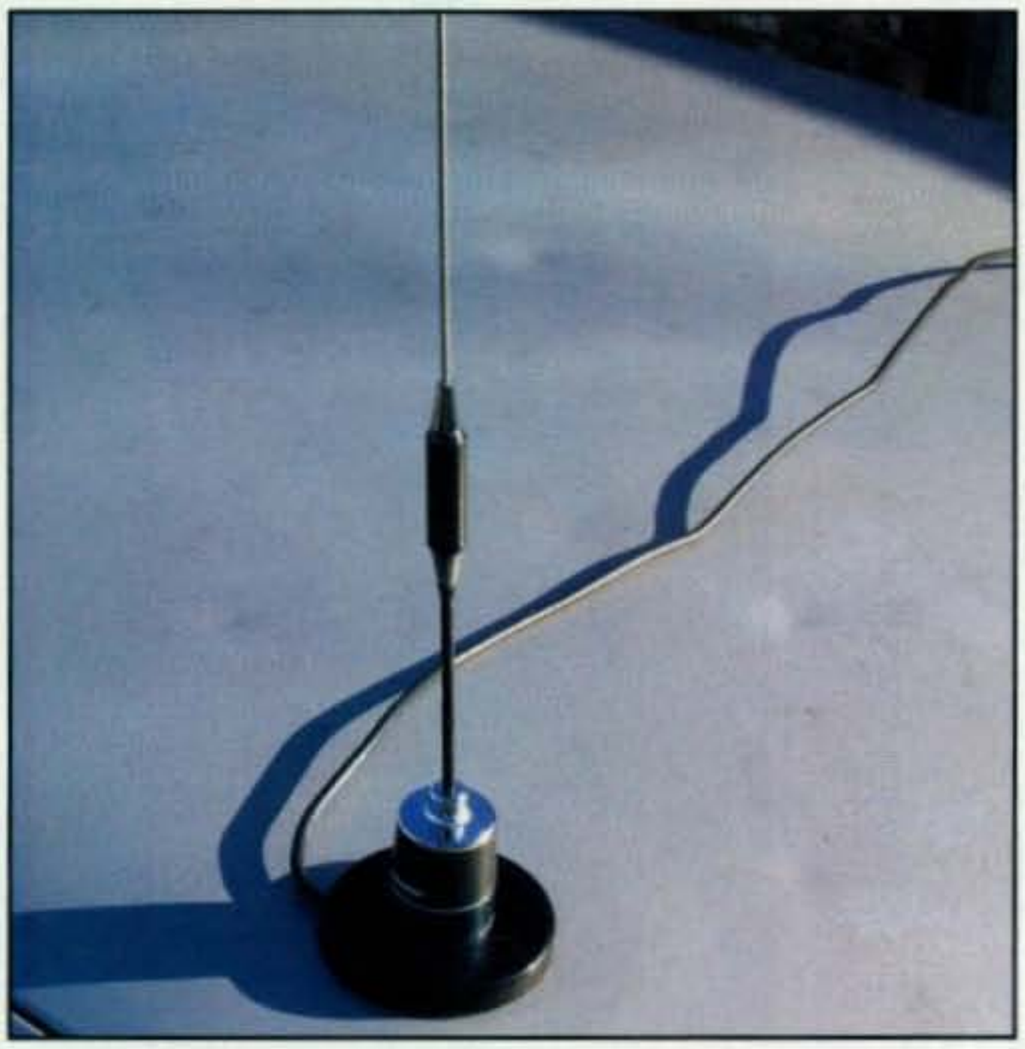


Fig. 4– These two antennas have the same front-to-back ratio, even though one has much more signal going to the rear than the other.

small Yagi. The signal going off the front is 11 dBi and the signal off the back is –30 dBi, so the antenna has about a 40 dB front-to-back ratio. The number is a pure ratio, so there is no dBi, dBd, or whatever. Just dBs.

Now I'll show how front to back can be abused. The antenna on the right side of fig. 4 has a slightly better front-to-back ratio. The front to back is usually measured at 180 degrees, the exact back of the beam. However, the antenna can have a whole bunch of horrible back lobes, with just about as much signal going out the back as the front, yet still have a great



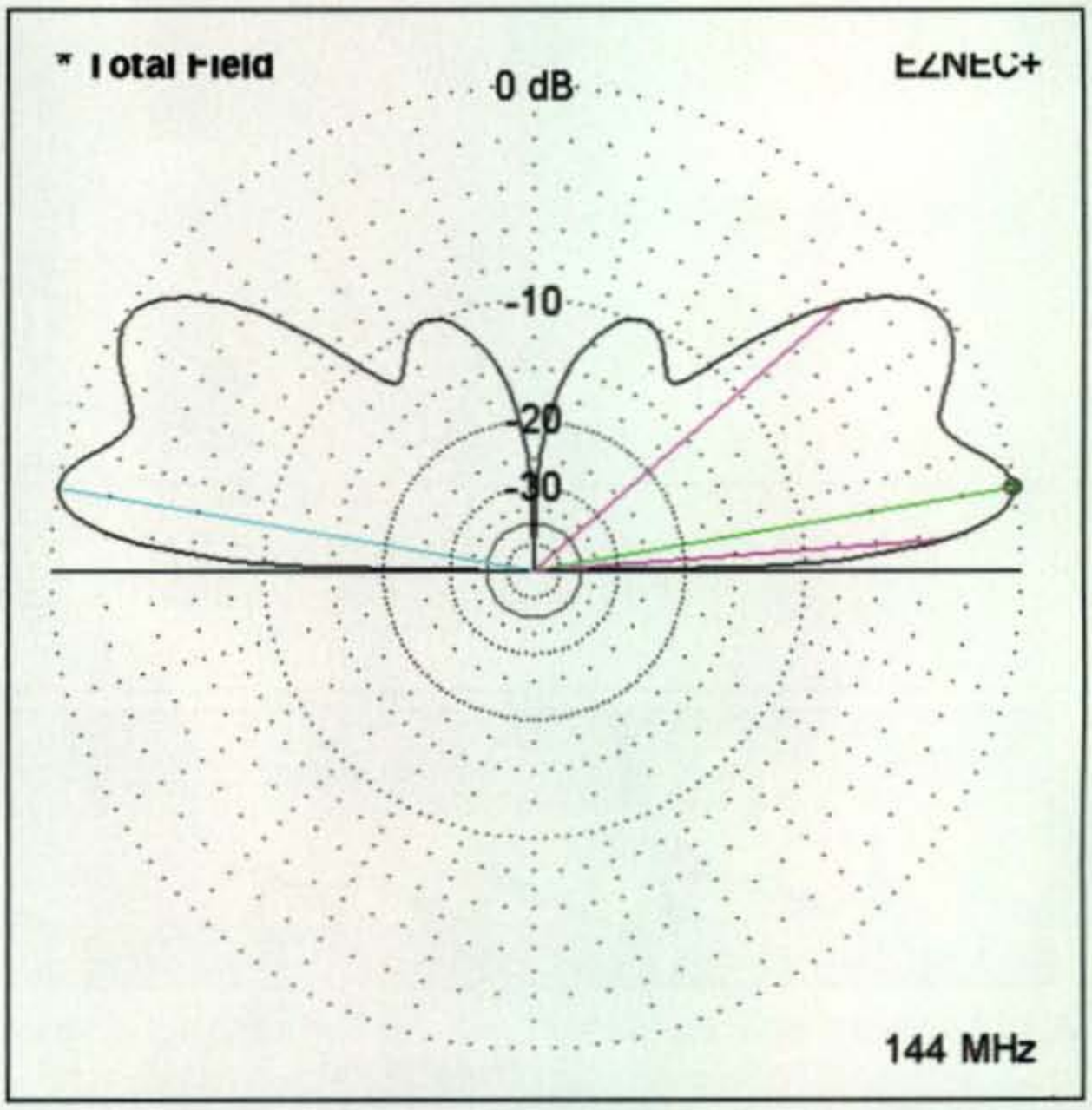


Fig. 5– Typical mobile-mount antenna and its plot.

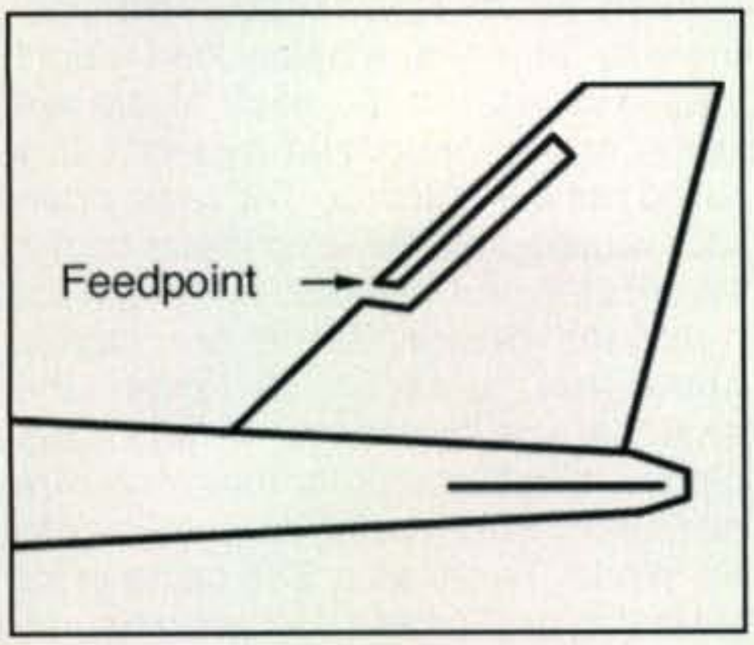


Fig. 6– Driving a vertical stabilizer as an HF antenna.

front-to-back ratio when measured in that back null.

Therefore, while the antenna on the right side of fig. 4 has a "better" front-to-back ratio, it is hardly the better antenna. In short, the FB, or front-to-back, dB number is meaningless without also showing you the real pattern of the antenna.

Elevation Plots

The elevation plot is rarely used in advertisements for Yagi antennas, mainly because most Yagis have a pretty poor elevation pattern. Where elevation plots with a ground plane *are* often used is with mobile and HF vertical antenna descriptions (see fig. 5). A single vertical tends to be omnidirectional, so the elevation plot showing the take-off angle of the main lobes is a way of comparing antenna performance. Generally speaking, lower is better.

Neat Antennas

In photo 1 is a picture of the rudder of the B-1 bomber at the Dayton Air Museum. The metal is painted bright white to help reflect the flash from a nuclear explosion, but the black area is a composite material. It's also an antenna! (FYI, you can't use carbon fiber here. Carbon fiber is electrically conductive, and to radio waves, carbon fiber pretty much looks like a sheet of aluminum.)

Using part of the rudder of an airplane as the HF antenna is very common on larger planes. Many commercial aircraft make the rudder's leading edge the antenna as shown in fig. 6. That makes sort of a loop or folded quarter wave with one side very, very fat. Yes, it does change impedance with frequency, but we are talking about mil-spec antenna tuners here.

Photo 1– Tail section of the B1 bomber and its HF antenna (black area), as seen at the U.S. Air Force Museum in Dayton, Ohio.

Years ago, many aircraft used a "trailing wire" antenna. A heavy lead weight was dropped out the back of the airplane and a motorized reel of cable rolled out the antenna. The radio operator watched the RF amp meter on the transmitter and peaked the length for maximum output. There are stories about that, since at full length, the antenna was thousands of feet long. One of those stories is that *long* wire and heavy weight being dragged across Ft. Worth, Texas as a B36 came in for a landing at Carswell Airbase when an operator forgot to reel it back in. Maybe we have a reader who used to be a B36 radio operator who can share some other stories with us.

As always, we welcome your antenna questions and suggestions for future topics to cover in this column. Just drop me a line at either my *Callbook* address or an e-mail to <wa5vjb@cq-amateur-radio.com>. For additional antenna construction projects, visit my website at <http://www.wa5vjb.com>.

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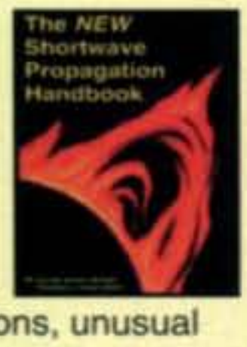

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how it works

BY DAVE INGRAM,* K4TWJ

How HF Signals Get from Here to There

As you may recall, our previous "How it Works" column discussed how world time differences, seasons of the year, and sun energy affect our ability to communicate over long distances. Continuing along that path, this month's column takes a keep-it-simple look at some popular types of ionospheric-related signal propagation, ones you may have heard mentioned in conversations, but have not had explained. As a convenient starting point, let's review the signal-influencing actions of the Earth's multi-layer ionosphere (fig. 1).

The *D*-layer of the ionosphere is the layer closest to Earth and might easily be considered more of a hindrance than a help. It appears during daylight hours, absorbs signals below roughly 40 meters, dissipates at night, and allows signals below about 40 meters to refract or skip off the *F1*- or *F2*-layer. The *E*-layer is best known for its relatively short-range sporadic-*E*, which is most noticeable during the warm summer months. The upper *F1*- and *F2*-layers are highest in the sky, most reflective to HF radio signals, and as a result support the longest range HF communications. There's more to that five-second tour, however, enough to overflow several textbooks.

First, the ionosphere's ability to refract or reflect radio signals is not fixed. It varies from "good" to "poor" according to sunspot activity, time of day, the area where signals arrive from Earth, and more. You might visualize its action as akin to the way a bathroom mirror or window reflects or steams up—all over or only in certain areas—during a hot shower.

Second, a transmitted signal hitting the ionosphere at the lowest angle or most distant spot on the far horizon will refract, or "skip," the longest distance on its most important first hop. How might you achieve that low angle of signal radiation? Installing horizontal antennas up high (75 or 100 feet) is one way. Using a vertical antenna installed with a clear horizon view is another way, and just being lucky or clever enough so your signal reaches the highest and fartherest point in the *F2*-layer before bouncing back to Earth is another possibility.

Finally, low-angle signals reflected off the ionosphere's *F1*- and *F2*-layers and returning to Earth many miles away may be reflected by salt water and once again bounce off the ionosphere for a second (or third, or fourth) hop. Hitting reflective areas of the ionosphere and reflective water on

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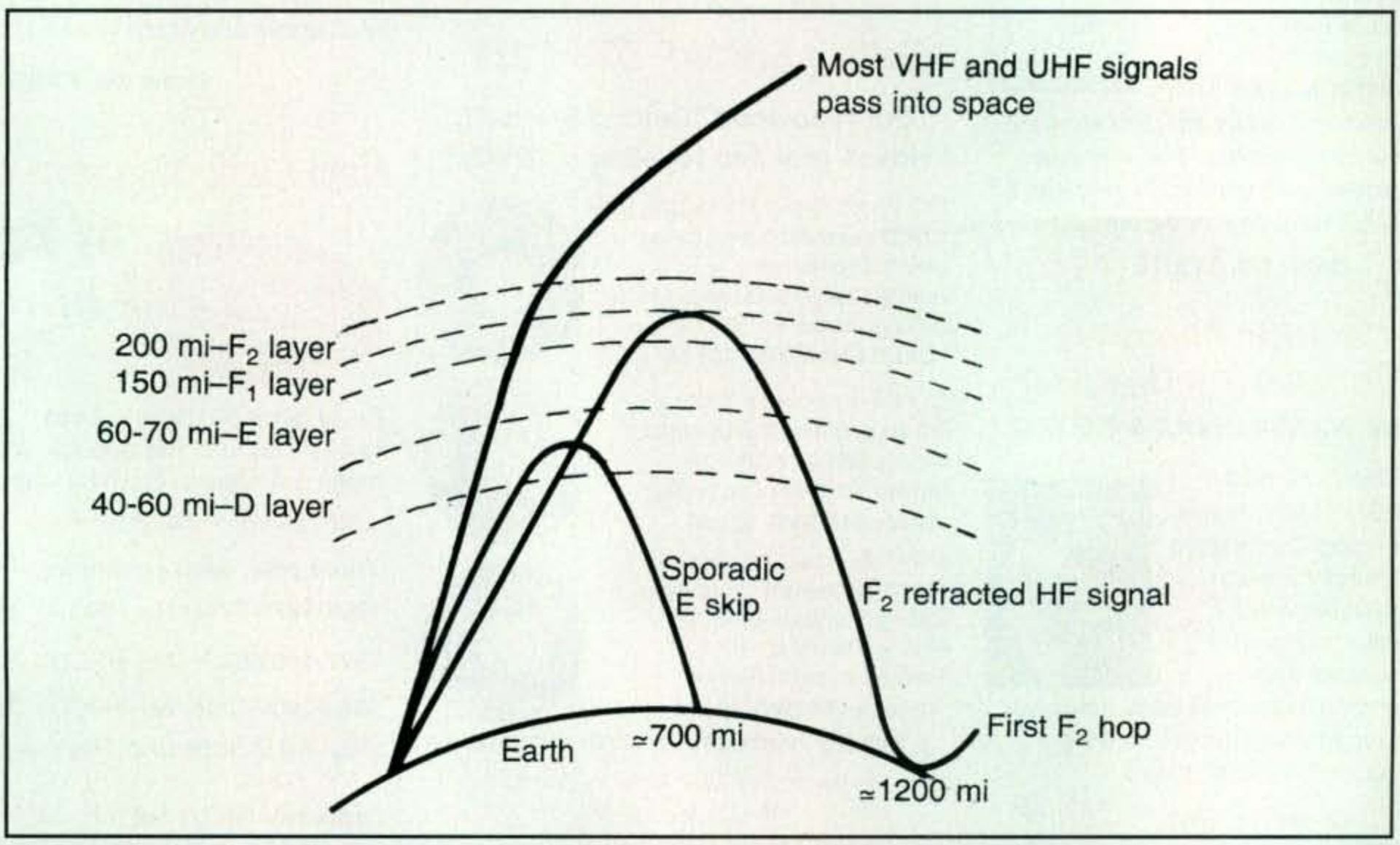


Fig. 1– Our Earth's ionosphere acts like a variable-density reflector to radio signals in the MF and HF range while passing most VHF, UHF, and microwave signals into space. Study the geometry in this figure and you will see that the longer communications distances can be achieved by getting your signal to strike the ionosphere at the lowest/most distant possible point on your horizon, and for it to travel as high as possible in the ionosphere before being reflected.

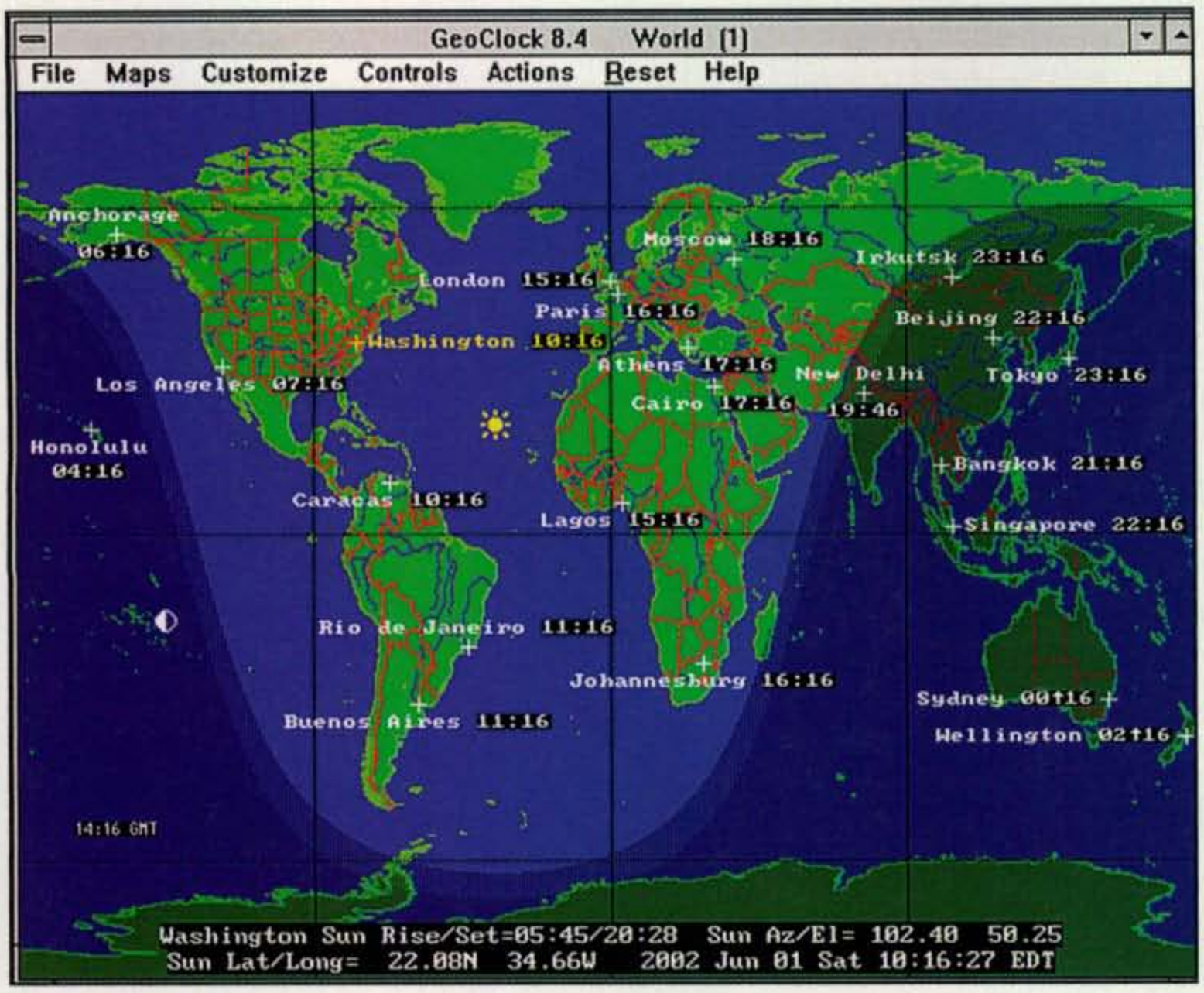


Photo A– A popular computer program for determining global position of the gray line in real time is Geoclock. It is available as shareware from <http://geoclock.home.att.net>.

Earth rather than being absorbed by gases and land masses is also a matter of knowing, sensing, or simply feeling when the time for global communications is "just right"—and when you reach that point, you are a true HF DXer!

Now let's look at the various ways signals get from point A to point B.

Traditional HF Propagation

As an all-time general rule, and good point of reference, our lower HF ham bands of 160, 80, and 40 meters support long-range communications when stations on both ends of a path are in darkness, and our upper HF bands of 15, 12, and 10 meters support long-range communications when both stations are in sunlight. Similarly, mid-positioned 20 meters is an "anytime and all-time" band that propagation forecasters often describe as open to one or more areas of the world almost any hour of the day or night.

If you operate 160, 80, or 40 meters during evening hours (before midnight), you can expect or anticipate working to your north, south, or east (such as Europe), because those areas are also in the hours of darkness. If you operate 160, 80, or 40 meters during pre-dawn hours, you can anticipate or hope to contact stations to your north, south, or west (such as Australia, Japan, etc.), because again they too are in darkness at that time.

The upper HF bands of 15, 12, and 10 meters act in an almost exact opposite manner—that is, they come alive when their associated areas/DX paths are basking in sunlight and high sunspot activity. They are traditionally "open" to Central and South America plus Europe during the late morning hours and shift toward western areas (such as Australia, Japan, etc.) during the late afternoon hours. The 160, 80, and 40 meter bands will be "flat" during most of that time because direct heat of the sun is causing the ionosphere's *D*-layer to absorb low-frequency signals.

Quickly summarized, long-distance signal propagation on 15, 12, and 10 meters is a result of sun energy heating the ionosphere (specifically its *F1*- and/or *F2*-layer), and DX propagation on 160, 80, and 40 meters results when the ionosphere cools due to lack of sun. The middle band of 20 meters is not severely affected by the ionosphere's temperature, nor are 20-meter signals absorbed by the *D*-layer, so it is the all-around most-favored DX band. The adjacent bands of 17 and 30 meters are also outstanding for long-distance communications, provided you consider 17 acts like a mix of 15 and 20 meters, and 30 acts like a mix of 40 and 20 meters—usually.

One final point warrants mention here: DX openings on the lower bands traditionally spread over wide geographic areas (during a good opening to, say, Europe, almost half the U.S. will hear the DX), whereas good openings on the upper bands are more narrow (only a few states might hear the DX). That fact often works in your favor, because you *usually* compete with fewer stations when working the upper HF bands.

Please remember, friends, that this is an "expand from here" overview to help you get started in HFing. Numerous books on antennas and propagation are available from *CQ* and *QST* for additional studies. Also check out Tomas Hood, NW7US's "Propagation" column in each issue of *CQ* magazine for coverage of many aspects of propagation and his online propagation resource at <http://propagation.hfradio.org>.

The Magic Hour for DXing Approaches!

This view of Earth from space represents approximately 4 PM in the eastern U.S. during March. Notice areas to the west (toward Hawaii) are basking in warm sunlight, and the 20-, 15-, 12-, and 10-meter bands may be "peaking" for DXing in that direction at that time—assuming sufficient sunspot activity. Meanwhile, areas to the east (such as Europe) are cooling with nightfall and will soon support good 20-, 40-, 80-, and 160-meter DXing. Approximately two hours later, the Earth will have rotated so the vague (one-hour wide) "gray line" separating day and night will be over Argentina and the northeast U.S., crossing over the North Pole and extending down into China, Mongolia, Thailand, Malaysia, and West Australia. Long-range propagation—both regular and gray line—on all nine HF bands tends to flourish at that time, and this "twilight hour" occurs twice each day. That's 365 × 2, or 730 opportunities for great global DXing per year. Give it a go!

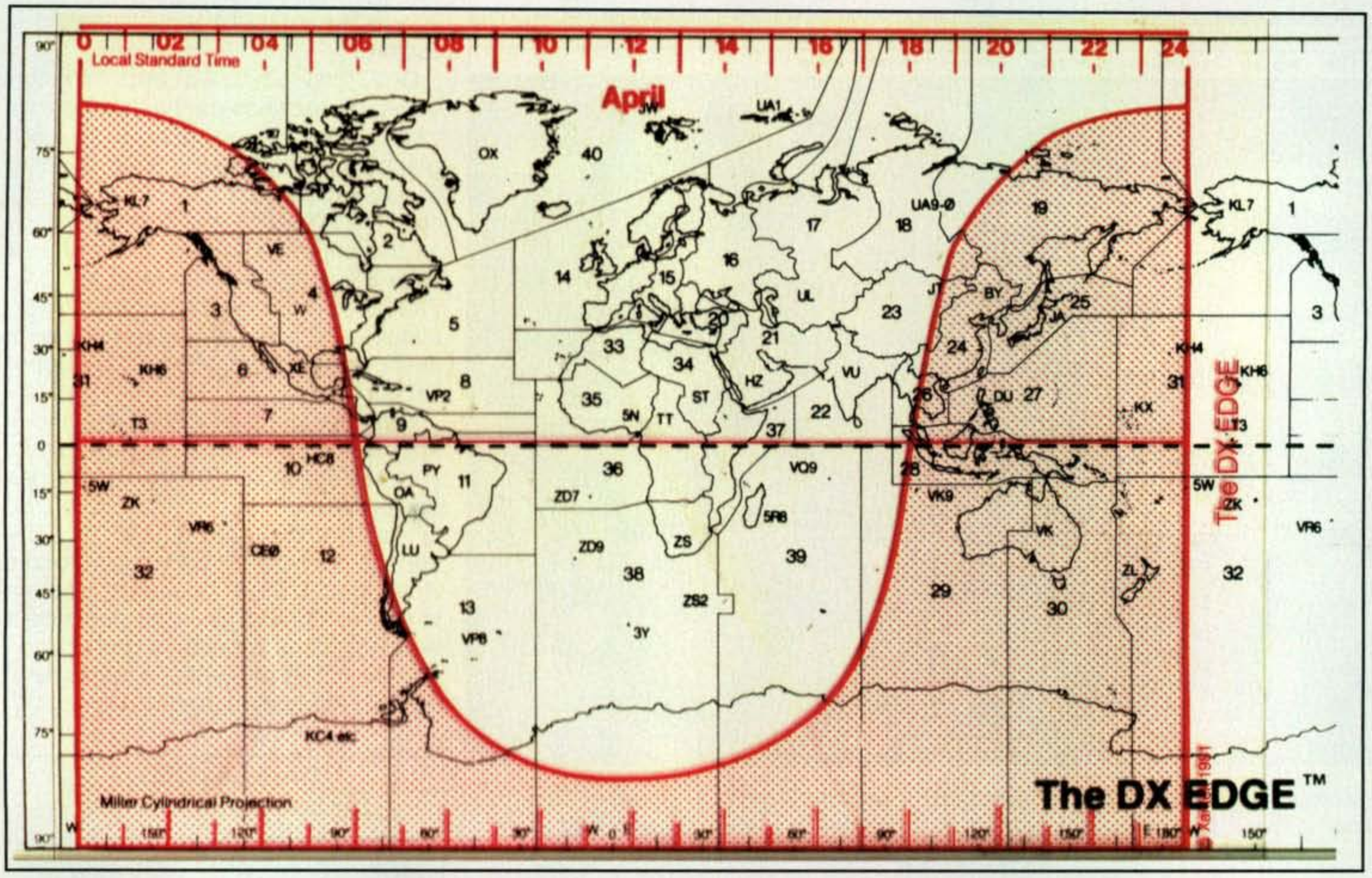


Photo B– Although no longer available, this slide-rule-type gray-line calculator made by Xantek, Inc. of New York many years ago continues to work great for prediction of gray-line times. It was supplied with 12 monthly overlays and works just like computer programs, but does not require external power. Maybe it should be brought back for an encore.

Now let's focus on some rather unique variations of HF propagation.

Long Path, Grayline, and Backscatter

As previously discussed, the usual path for working into Europe from the U.S. is via HF skip the "short way" over the North Atlantic Ocean, and the usual path for U.S. to Australia or New Zealand QSOs is "short path" over the South Pacific Ocean. Occasionally, however, sunspot activity will enhance ionospheric reflections and you can contact amateurs in Europe by transmitting a signal the long way around the world—across Australia, over the Indian Ocean, etc. Alternatively (and possibly more commonly), you can contact Australia, New Zealand, etc., by transmitting a signal across the North Atlantic, over Europe, and in the back way to Australia, etc.

How do you know when long-path openings might occur or what they sound like on the air? Read the propagation columns in magazines and follow DX alert groups/nets. Also follow hourly activities on your favorite bands. Typically, long-path openings result when skip "lengthens out" during traditional HF openings. You hear weak signals from Europe, for example, then they become stronger, then weaker (as skip stretches out), and then you hear Australians working Europeans. Next you call an Australian, and if you are fortunate, the Australian hears your call clearly and answers you. It is a very exhilarating form of communication every amateur must experience firsthand to fully appreciate it.

If you could look at the Earth from some point in space, you would see half of it is illuminated by the sun (daytime), half of it is in darkness (nighttime), and the two areas are separated by "twilight"—a *gray line* circling the globe. The ionosphere on the night side of the gray line is cool, while on the day side it is warm. HF signals traveling along this gray line reflect between warm and cool areas, and often travel very long distances—over halfway around the world—with minuscule attenuation. At 6:45 AM on the exact day I wrote this paragraph in December last year, for example, I contacted K9NW/S7 operating from the Seychelles Islands in the Indian Ocean via gray-line propagation on 30 meters. He was S9 in Alabama, I was running only 40 watts to a HyGain AV-640 vertical, and the time was 4:45 PM in the Seychelles. Fifteen minutes later his signal dropped back into the noise.

The gray line graces your QTH twice each day—once right at sunrise and again right at sunset (local times), and it typically lasts 45 minutes to an hour. The gray line also shifts each month in step with changes in the Earth's angle with respect to the sun. It shifts to a lesser extent each week, and some dedicated DXers use computer programs to visualize times and locations of gray-line openings. Try gray-line DXing. Listen to the bands' sounds and signal levels change while watching the sky change between light and dark. It is fascinating.

Another potentially mysterious term you occasionally hear mentioned during discussions of propagation is *backscatter*. This phenomenon typically occurs when unusual ionospheric conditions reflect signals from two stations back toward each other rather than forward toward distant lands. Stations in adjacent states or 200 to 500

miles apart usually cannot communicate on 10 meters, for example, but they can work each other via backscatter. The occurrence of backscatter is relatively unpredictable (and it is typically characterized by rapidly fading or fluttery signals), so staying aware of its potential surprise appearance (and using it to your benefit, as when pursuing 5 Band Worked All States) holds good merit.

Long Path vs. Gray Line

What is the difference between long-path and gray-line DXing? Long-path openings usually occur during good daytime or nighttime DX openings. Most amateurs describe them like this: You can hear the (long path) DX best when your beam is turned in the opposite direction of a regular DX opening. Without a beam, you judge by the time of day/night, the band, and in which direction the band should be open. Gray-line propagation occurs only within the hour period around your local sunrise/sunset, and its DX path follows the dawn/dusk dividing line around the world.

E_s and TEQ

If you occasionally operate 6 meters or 10 meters, you probably have heard folks discussing *sporadic-E* propagation. This phenomenon typically occurs when clouds of intense ionization form in the *E*-layer and cause relatively short skip conditions (700 to 1300 miles) with fairly strong signals at both ends—even when associated stations are running low power. The exact cause of sporadic-*E* is vague and it also occurs (well, sporadically) throughout the solar cycle. Some folks say sporadic-*E* is influenced by the solar winds. Others theorize it is related to the Earth's gravity wave paths (which, for several years, was investigated as an alternate and undetectable means of communication). Sporadic-*E* is another good means of contacting nearby states for WAS or for pursuing grid-square awards. E_s openings are brief (similar time/hours one to three days in a row), so act quickly to use them when available.

Yet another often-mentioned form of 6- and 10-meter propagation, *transequatorial propagation,* or TEP, occasionally occurs between stations located roughly the same distance apart and on opposite sides of the *magnetic* equator—such as between Texas and Peru, Chicago and Argentina, etc. Occurrence of transequatorial propagation varies, but the most often cited time is between 9 PM and midnight local time—when both 10 meters and 6 meters usually are "closed" and "dead." It is most likely to occur when a high-pressure area develops over moist air in the Gulf of Mexico or near the equator. Again, being alert to the possibility of transequatorial propagation and jumping quickly when it appears is the key to using it to your benefit.

Conclusion

We have heard that if you acquire only one good tidbit of useful information from an article or forum presentation, the time spent reading or listening was well justified. Considering the large amount of ground we covered in this month's column, I feel (and hopefully you agree) we accomplished that objective. Never assume, for example, that your signal will be stronger and you can work stations in Central America or Caribbean areas more easily than DX halfway around the world via long path, gray line, transequatorial propagation, and more. There's no limit to what you can do when the force of good signals is with you!

73, Dave, K4TWJ

vhf plus

BY JOE LYNCH,* N6CL

Proposed Geosynchronous Satellite:

Could Change Playing Field of Amateur Satellite Communications

This past October the leadership of AMSAT announced their intention to explore the possibility of partnering with Intelsat for the development of a geosynchronous satellite. The following summary of the announcement is excerpted from JoAnne Maenpaa, K9JKM's article "2007 AMSAT Symposium: A Report on the Revolution," which appears in the Winter 2008 issue of *CQ VHF* magazine (also see photo A):

The most revolutionary and exciting news coming out of the symposium was President Hambly's announcement of a proposed geosynchronous satellite. Hambly, along with Bob McGwier, N4HY, AMSAT's Vice-President of Engineering, made public the results of their recent behind-the-scenes work that will change the playing field of amateur radio satellite communications.

As a result of conversations by AMSAT's leadership with Intelsat (the world's largest commercial satellite communications services provider) concerning their communications satellites carrying our amateur radio satellites into geosynchronous orbit, an agreement between the two entities has been proposed. McGwier indicated that this potential agreement came about as a result of changes in Department of Defense policies which will require DoD-subsidized launches to allow secondary payloads to fill in excess launch capacity of the primary mission.

As if to add to what Hambly and McGwier stated in their presentation, during his subsequent talk "Where's the Launch?" Lee McLamb, KU4OS, explained factors such as the increased size and efficiency of launch vehicles now resulting in excess lift capacity. No longer is it the case that adding weight to the payload means removing fuel (weight) from the booster. Lee added that current missions have 1000–1500 pounds of excess capability of which AMSAT can easily take advantage.

Hambly pointed out that with this new commercial launch reality, AMSAT may actually be able to launch earlier to a high orbit if its satellite fits into the Intelsat ride-sharing model. He added, "We need to be ready for this event."

This new project has been designated Phase IV Lite because of the planned incorporation of much of the Phase 3, P3E, and Eagle satellites' technology in the proposed geosynchronous satellite. In discussing the engineering aspect of the proposed agreement, McGwier remarked that while the upside potential is great, many of the technical details still need to be worked out. "Even so," he stated, "there is enough in place at this time that AMSAT needs to begin planning engineering work and possible construction of a geosynchronous payload so we are ready if Intelsat says they have a ride for us."

With the incorporation of technology from satellites already under development, it will be natural for AMSAT to also proceed with the development of its planned easily accessible Earth station which will take advantage of the audio, digital messaging, and video services offered by the resulting advanced communications package (ACP). The details of the ACP appear below under the "AMSAT Eagle Update" heading.

The ACP earth station would be self-contained and would be sent with an amateur radio communications team or delivered to a disaster area in order to supply emergency communications. Such a team would be able to point a small dish at the spot in the sky where the geosynchronous satellite is "parked" and immediately begin providing disaster communication support without depending on HF propagation.

Another feature of the Phase IV Lite satellite would have a direct bearing on the ARISS (Amateur Radio aboard the International Space Station) program. For example, part of the payload could be used to provide a tracking and data-relay satellite system (TDRSS)-like relay of the ARISS communications via the Intelsat system of satellites. The advantage to the ARISS program is that a previously hopelessly short ARISS QSO could last for hours, thereby opening the possibility of student involvement with experiments onboard the ISS.

e-mail: <n6cl@sbcglobal.net>

Photo A– From left to right: Bob McGwier, N4HY, Lee McLamb, KU4OS, and Rick Hambly, W2GPS, discuss technical aspects of the planned geosynchronous satellite at the 2007 AMSAT Symposium. (N6CL photo)

VHF Plus Calendar

March 2	Very poor EME conditions
March 7	New Moon
March 9	Good EME conditions
March 10	Moon Perigee
March 14	First Quarter Moon
March 16	Moderate EME conditions
March 20	Spring Equinox
March 21	Full Moon
March 23	Moderate EME conditions
March 26	Moon Apogee
March 29	Last Quarter Moon
March 30	Very poor EME conditions

—EME conditions courtesy W5LUU.

McGwier also pointed out the advantages of Intelsat geosynchronous platform. One advantage is that Intelsat's primary payload would perform the geosynchronous transfer orbit (GTO) boost phase as well as perform station upkeep and antenna pointing once it has arrived in its orbit. Furthermore, Intelsat can drop off sub-payloads into low earth orbit (LEO), GTO, or geostationary orbit (GEO) on the way to the primary mission. Additionally, the excess power built into the design of the satellite would be able to furnish the AMSAT Phase IV Lite payload with approximately 400 watts of DC power for upwards of 15 years, thereby eliminating the need for AMSAT to provide solar cells.

The advantage to AMSAT is that AMSAT does not have to design these features into its satellite. Summarizing his points, McGwier added, "The Intelsat team would be doing all the things nearly impossible for amateurs, thereby enabling AMSAT to do what we do best, that being building a communication system that changes amateur radio for the better!"

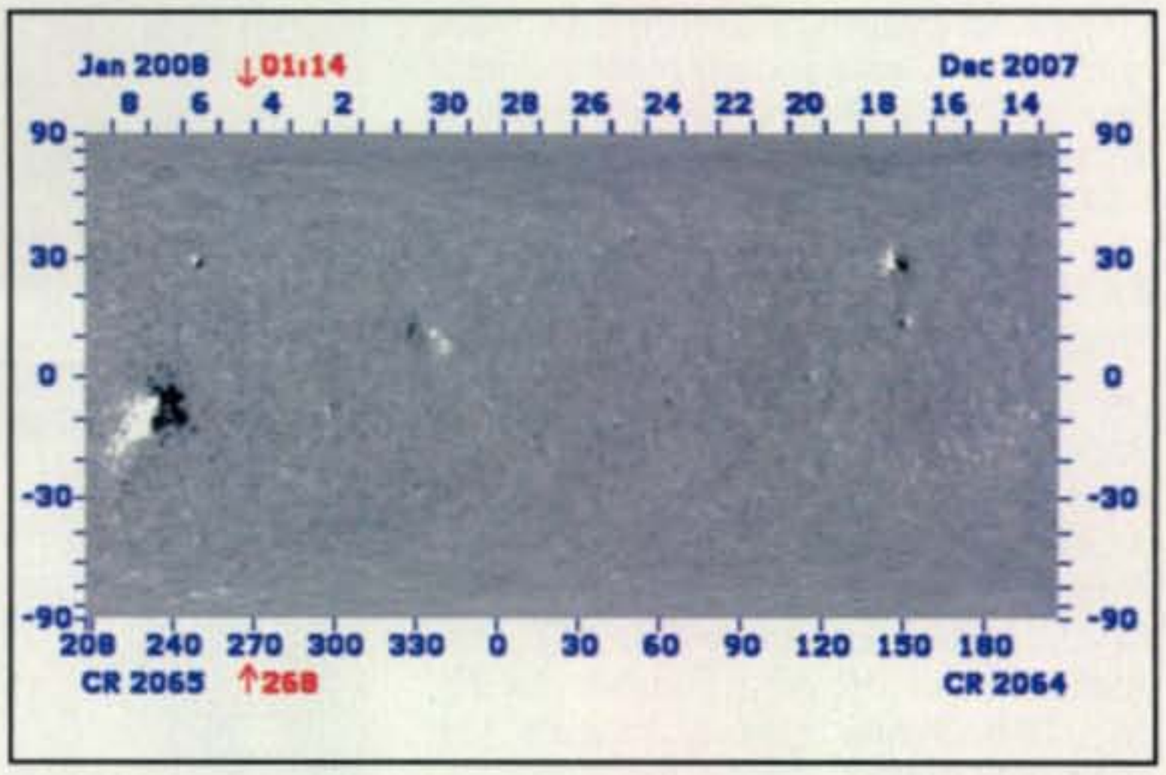


Fig. 1– This Global Oscillation Network Group (GONG) magnetogram is a latitude-longitude map of the surface fields of the whole Sun from December 14, 2007 to January 8, 2008. The magnetic pairs at 30N-145 and 30N-250 are the December and January Cycle 24 regions, respectively. The large group at 10S-240 and the small group at 10N-330 are Cycle 23 regions. Note that the white/black polarity sense of the 30N Cycle 24 regions is the opposite of the 10N Cycle 23 region. (Credit: GONG/NSO/AURA/NSF)

Sunspot Cycle 24 Beginnings

The following is from the Southgate Amateur Radio Club (http://www.southgatearc.org/news/january2008/soho_solar_cycle.htm):

SOHO: the new solar cycle starts with a "bang"

The European Space Agency (ESA) reports that the Solar and Heliospheric Observatory (SOHO) solar observation spacecraft witnessed the start of the new solar cylcle.

The appearance of a very special solar spot on the sun's surface a few days ago signalled to scientists around the world that a new solar cycle had begun. This solar spot also produced two solar blasts.

Each solar cycle lasts an average of 11.1 years. The new solar cycle, called Cycle 24, started on 4 January this year, when SOHO observed an event scientists have been anticipating for about a year.

A fairly small and, at first sight, inconspicuous sunspot on the sun's northern hemisphere showed a reversed magnetic polarity compared to sunspots of previous years. A sunspot is an area of highly organized magnetic activity on the surface of the sun. This sunspot convinced scientists that a new solar cycle had begun. Later that day, this finding was made official when the sunspot was catalogued by the US National Oceanic and Atmospheric Administration (NOAA).

SOHO was not only first in spotting this harbinger of the new solar cycle, it also observed two associated "EIT waves," blast waves that spread out from active regions on the sun like ripples from a pebble dropped into water. The new cycle started with a "bang"!

This is just the beginning, and scientists are now eagerly awaiting the activity to follow. Solar Cycle 24 is expected to build gradually, with the number of sunspots and solar storms reaching a maximum by 2011 or 2012, although intense solar activity can occur at any time.

SOHO celebrated the twelfth anniversary of its launch on 2 December 2007. The satellite has witnessed the sun change through almost a complete solar cycle, from quiet to stormy, and back.

SOHO is a project of international collaboration between ESA and NASA.

The following from Jim Kennedy, KH6/K6MIO, is excerpted from his article "Cycle 24 Begins!" which appears in the Winter 2008 issue of *CQ VHF*:

Six-meter devotees have anxiously been awaiting the peak years of solar Cycle 24 and the return of good ionospheric DX conditions. In December 2007 and January 2008 we saw the first solid indications that Cycle 24 is beginning to rev up.

At the end of one cycle and the beginning of the next cycle, there is a period of time when the two cycles overlap. Magnetically active regions and associated sunspots from both cycles are seen on the sun at the same time.

Sunspots always appear as pairs in active regions. Powerful dipolar magnetic fields connect the leading and following spot in each pair, giving the pair a characteristic magnetic polarity. In one of the sun's (north/south) hemispheres, the field will point outward from the leading spot and inward to the following spot, and in the other hemisphere it will be *exactly the opposite*—inward to the leading spot and outward from the following spot.

These characteristics make it possible to readily tell the difference between the old-cycle and new-cycle regions:

1. Old-cycle spots are *near the equator,* with their spot-pair polarities opposite in the Northern and Southern Hemispheres.
2. New-cycle spots are *near 30°* north and south latitudes, with *north and south polarities that are reversed* from that of old-cycle pairs.

The beginning of each new cycle is indicated by the sustained appearance of these *30° latitude, reversed-polarity* magnetic active regions, often with spot pairs or groups.

There was a brief appearance of a small reversed-polarity spot pair near 30° south in July 2006, but it vanished almost immediately. It was a fluke; nothing further was seen for 17 months.

That changed on December 11, 2007, when an already-formed reversed-polarity active region pair rotated over the limb into view. While no actual sunspots formed, the magnetic structure was clear. The system grew in size for a few days and then began to diminish and rotated out of view on the 23rd. Then, on January 2, 2008, another reversed-polarity magnetic region (981) emerged and produced a small sunspot group. This was a second, distinct region and *not* a recurrence of the December group (see fig. 1).

Since Northern Hemisphere activity has preceded that of the Southern Hemisphere for the last few cycles, and now two reversed-polarity northern groups have been seen, this is a good indication that Cycle 24 is finally arriving.

At this writing (early January), the R_i sunspot index has been very low (<12) since June 2007. It appears that solar minimum is very near, but may not have occurred yet. This would seem to eliminate all but three of the professional Cycle 24 predictions discussed in my previous article ("Solar Cycles and Cycle 24 Predictions," Kennedy J., Fall 2007, *CQ VHF*, pp. 10–19.), as the others called for much earlier minimum dates.

Two of the remaining predictions are those from the strongly-split NOAA panel. While both factions on the panel predicted that minimum would occur in March 2008 plus or minus six months, one group predicted a very weak maximum (R_i max approximately 90), and the other predicted one stronger than Cycle 23 (R_i max approximately 140). The panel will review its findings in March 2008.

The third remaining prediction is that made by Mausumi Dikpati and her collaborators at the High Altitude Observatory, which calls for (R_i max approximately 169), and a minimum in late 2007 or early 2008.

EA3DXU (SK) Awarded First EA 2-Meter WAS

On October 5, 2007 Josep M. Prat Parella, EA3DXU, became a Silent Key after a four-year fight with cancer. Josep's final major accomplishment in amateur radio was completing WAS on 144 MHz on September 24, 2007. His last QSO was with John Gutman, NF2V, on JT65. While it was Josep's last accomplishment, it was the first 144-MHz WAS (Worked All States) in Spain. At the time of his passing Josep had confirmed all of the contacts.

Thanks to tremendous cooperation and effort on the part of the ARRL, and in particular, President Joel Harrison, W5ZN, and the Unión Radioaficionados Españoles (URE), the Spanish national amateur radio organization, and in particular President Diego Trujillo, EA7MK, Josep's WAS award was posthumously presented to his widow, Maria, on December 8, 2007 during the 2007 URE Congress in San Fernando Cádiz, Spain. The accompanying photo of the presentation (photo B) was furnished by Xavier Paradell, EA3ALV, Editor of *CQ Radio Amateur*, our sister publication in Spain.

Photo B– The first 144-MHz WAS award in Spain was presented posthumously to Josep M. Prat Parella, EA3DXU, on December 8 during the 2007 URE Congress in San Fernando Cádiz, Spain. Left to right: Pere Espunya, EA3CUU, Vice President URE; Maria Teresa Ros, URE Auditor; Maria, widow of EA3DXU; José Diaz, EA2BPJ, General Secretary; and Diego Trujillo, EA7MK, President URE. (Official photo of the URE Congress and courtesy of Xavier, EA3ALV)

TX5C Clipperton DXpedition

Bob Grimmick, N6OX, will lead an international team to Clipperton Atoll in early March. Timed to coincide with the 30th anniversary of the 1978 FOØXA-XH DXpedition to Clipperton Atoll, the goal of this DXpedition is to make 100,000+ QSOs worldwide. More information on the 1978 DXpedition can be found at the website: <http://www.clipperton2008.org/fo0xa-h.htm>.

Organization and management of the operation is provided by John Kennon, N7CQQ, and David Anderson, K4SV. As of this writing, major sponsors include ICOM America, the Northern California DX Foundation, SteppIR, Alpha Radio Products, and the International DX Association.

Certain scientific studies will be carried out by members of the DXpedition. Among them is a study of the propagation of radio waves. The goals of this study are to: Record the different contacts according to the correspondent's emitting area, the time, the frequency, and the sun activity; and compare the data with the theoretical models—simulations—realized before the activity. Information on other studies can be found at: <http://www.clipperton2008.org/operators/scientific/clipperton_study.htm>.

A full report of all of the scientific studies can be requested from Jean-Pierre Kaeuffer, F5AHO, who is in charge of the scientific aspect of the expedition. His address is: 15 bis, chemin des Bûcherons, 68400 Riedisheim, France (e-mail: <f5aho@wanadoo.fr>. Requests must be received by July 13, 2008.

The international team of 20 operators is expected to depart February 28, 2008 for Clipperton and plans to be active between March 7–17. Activity will be on 160–6 meters CW, SSB, and RTTY. For up-to-date information, please see the DXpedition's website: <http://www.clipperton2008.org>.

Stealthy, Versatile, and Jam-Resistant Antennas made of Gas

The following by the American Physical Society is from *ScienceDaily*, 19 Nov. 2007, <http://www.sciencedaily.com–/releases/2007/11/071112135910.htm>:

A new antenna made of plasma (a gas heated to the point that the electrons are ripped free of atoms and molecules) works just like conventional metal antennas, except that it vanishes when you turn it off *(see photo C—ed.)*.

That's important on the battlefield and in other applications where antennas need to be kept out of sight. In addition, unlike metal antennas, the electrical characteristics of a plasma antenna can be rapidly adjusted to counteract signal jamming attempts.

Plasma antennas behave much like solid metal antennas because electrons flow freely in the hot gas, just as they do in metal conductors. But plasmas only exist when the gasses they're made of are very hot.

The moment the energy source heating a plasma antenna is shut off, the plasma turns back into a plain old (non-conductive) gas. As far as radio signals and antenna detectors go, the antenna effectively disappears when the plasma cools down.

The antenna design being presented at the APS Division of Plasma Physics meeting in Orlando consists of gas-filled tubes reminiscent of neon bulbs. The physicists presenting the design propose that an array of many small plasma elements could lead to a highly versatile antenna that could be reconfigured simply by turning on or off various elements.

This research was presented by T. R. Anderson and I. Alexeff at the 2007 APS Division of Plasma Physics annual meeting on November 12, 2007.

My thank you goes to Ken Decker, WA6OSB, for alerting me to this story.

EME Conference

The following is from the sponsors of the EME 2008 conference:

This is an invitation to come and join us for the 13th International EME Conference,

to be held in Florence, Italy on Friday, Saturday, and Sunday, August 8, 9, and 10, 2008. There will be a varied and interesting program and many amateurs will be attending from all over the world. The conference agenda will be posted along with other updates on our website: <http://www.ari-crt.it/EME2008>.

The conference will be held at the Telecom Italia Auditorium, Viale Guidoni, 42 Florence, Italy. Technical programs/presentations are needed. If you would like to present a topic and have your paper published in the conference proceedings, let us know. An announcement for a call for papers is on the above-mentioned website. In keeping with the traditions of the meeting since its early days, our position is that the focus of the conference should be on 432 MHz and above. Everybody is welcome, though.

EU WW EME Contest

The European Worldwide EME Contest 2008 is sponsored by DUBUS and REF. The contest is intended to encourage worldwide activity on moonbounce. Information for this contest was not available at press time. Please check with future "VHF Plus" columns in *CQ* magazine for an announcement.

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 have announced a call for papers for their forthcoming conference:

The **Southeastern VHF Society Conference** will be held April 25–26, 2008 at the Holiday Inn/UCF, Orlando Florida. The deadline for the submission of papers and presentations is February 29. All submissions should be in Microsoft Word (.doc) or alternatively Adobe Acrobat (.pdf) files. Pages are 8 1/2 by 11 inches with a 1-inch margin on the bottom and 3/4-inch margin on the other three sides. All text, drawings, photos, etc., must be black and white only (no color). Please indicate when you submit your paper or presentation if you plan to attend the conference and present there or if you are submitting just for publication. Papers and presentations will be published in bound *Proceedings* by the ARRL. Send all questions, comments, and submissions to the technical program chair, Steve Kostro, N2CEI, at <svhfs2008@downeastmicrowave.com>. For further information about the conference go to <http://www.svhfs.org>.

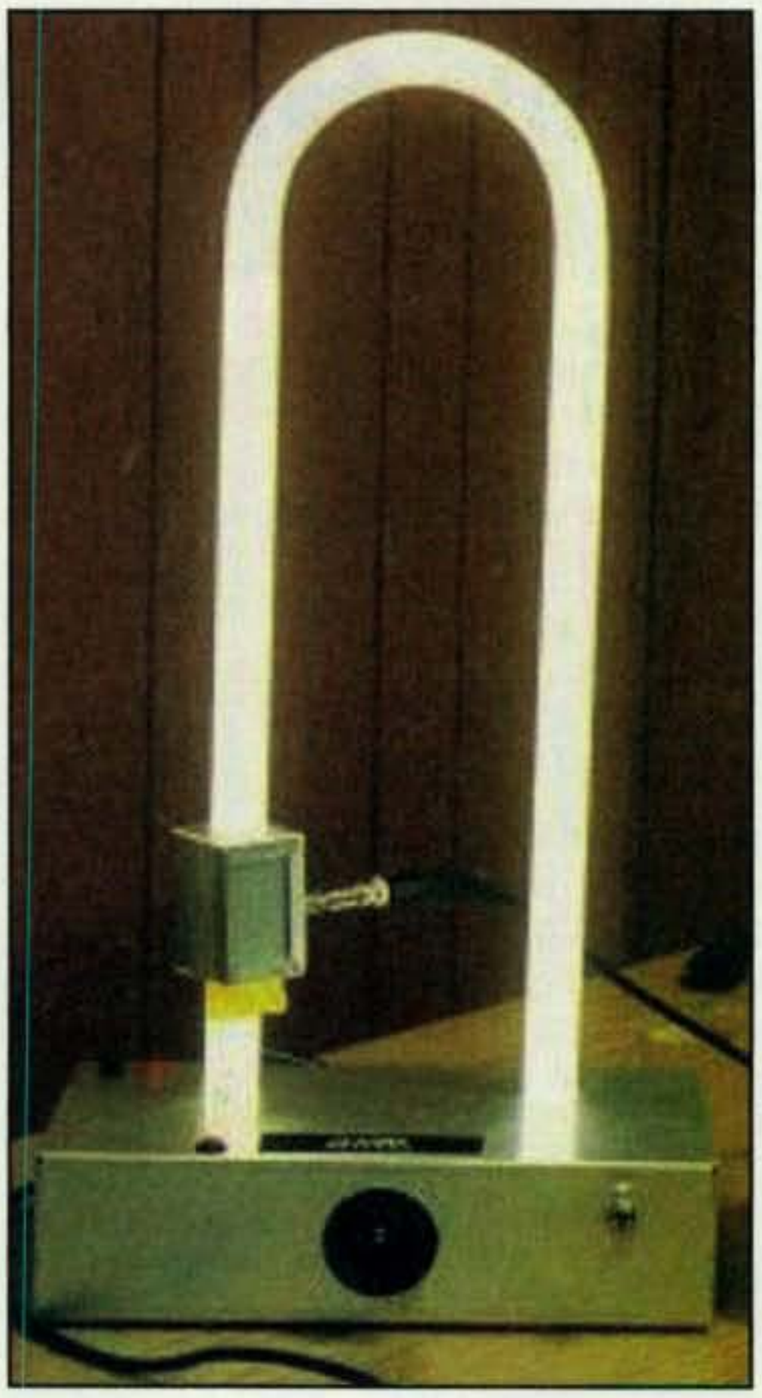


Photo C– The prototype plasma antenna is stealthy, versatile, and jam-resistant. (Credit: T. R. Anderson and I. Alexeff)

Central States VHF Society Conference: Technical papers are solicited for the 42nd annual Central States VHF Society Conference to be held in Wichita, Kansas on July 24–27, 2008. Papers, presentations, and posters on all aspects of weak-signal VHF and above amateur radio are requested. You do not need to attend the conference, nor present your paper, to have it published in the *Proceedings*. Posters will be displayed during the two days of the conference.

Non-weak signal topics such as FM, repeaters, packet radio, etc., are generally not considered acceptable. However, there are always exceptions. Please contact the folks below if you have any questions about the suitability of a topic. Strong editorial preference will be given to those papers that are written and formatted specifically for publication, rather than as visual presentation aids.

Deadline for submissions: For the *Proceedings*, June 2; for presentations delivered at the conference, June 30; and for notifying the organizers that you will have a poster to be displayed at the conference, also June 30. Bring your poster with you on July 25. Contact information: Mel Graves, WRØI, via e-mail: <wr0i@sgdrugfree.com>, or snail mail: Melvin Graves, WRØI, P.O. Box 273, Wichita, KS 67201-0273.

Submissions can be made via the following methods: Electronic formats (preferred); via e-mail; uploaded to a website for subsequent downloading; or on media (3.5-inch floppy, CD, USB stick/thumb drive).

Meteor Showers

The minor *γ-Normids* shower is expected to peak on March 13. For more information on this and other meteor shower predictions please visit the International Meteor Organization's website: <http://www.imo.net> and NW7US's "Propagation" column.

And Finally

This column was written in early January. From every respect, this year promises to be a great one for the VHF-plus operator. If you have an announcement to make or a story to tell pertaining to the wonderful world of VHF and above, please e-mail me your information at: <n6cl@sbcglobal.net>. I will endeavor to have it published here or in our sister publication, *CQ VHF*.

Until next month...73 de Joe, N6CL

awards

BY TED MELINOSKY,* K1BV

What Counts for USA-CA?

A recent e-mail asked me if contacts made in the past count for USA-CA. Like many of us, I have moved all around the country, and even out of the country (Guam and Germany) using a series of callsigns before settling down. In this respect, USA-CA rules are very liberal and allow you to use:

- Any contact you have ever made
- Using *any* callsign
- On *any* band
- On *any* mode

as long as the call, bands, and modes were permitted by your license and the regulations of your country. I think that the first USA-CA Custodian, K6BX, was a visionary in this respect, and knew that by keeping the rules as simple and liberal as possible it would encourage and assist applicants tin earning the award in the future. He was right.

The Netherlands VRZA Awards

The Vereniging van Radio Zend Amateurs (VRZA) was founded in November 1951 as a non-commercial radio society for the promotion and coordination of two-way amateur radio communication in the Netherlands. Like similar organizations, it sponsors an interesting array of certificates and awards based on contacting amateurs located in the Netherlands. About half of the awards are for VHF/UHF contacts and are not covered in this column. However, full details are available for all of the awards on the group's website located at: <http://www.vrza.org>.

General Requirements: For all awards, a GCR list, certified as correct by two amateurs, is accepted. The sponsor reserves the right to request any cards. SWL okay. All contacts must have been made from the same location or within a radius of 25 miles. Fee for each certificate is $US6, 6 IRCs, or 5 Euros. Fee for endorsement stickers is 1 IRC, $US1, or 1 Euro and SAE. Apply to: Award Manager VRZA, Ben Horsthuis, PAØHOR, Frans Halsstraat 95, 3781 EV Voorthuizen, Netherlands.

VRZA Divisional Award. Contact VRZA club stations after November 23, 1986. PA's need 15 contacts on HF and 10 on VHF; other Europeans need 8 on HF and 4 on VHF; all others need 4 on HF and 2 on VHF.

VRZA club stations: PA6VRZ/A, PI4VRZ/A, PI4CQP/A, PI4ADH, PI4AML, PI4AVG, PI4ARL, PI4DBO, PI4DHG, PI4DUI, PI4EDE, PI4EHV, PI4EMN, PI4FLD, PI4GN, PI4HVB, PI4JUT, PI4KEI, PI4KGL, PI4LMW, PI4PLM, PI4RMB, PI4SDH, PI4TWN, PI4UTC, PI4VGZ, PI4VLA, PI4VPO, PI4VRL, PI4WBR, PI4YSM, PI4YSS, PI4ZLB, PI4ZWN.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

David L. Czerniak, KE9OI
USA-CA All Counties #1164
November 30, 2007

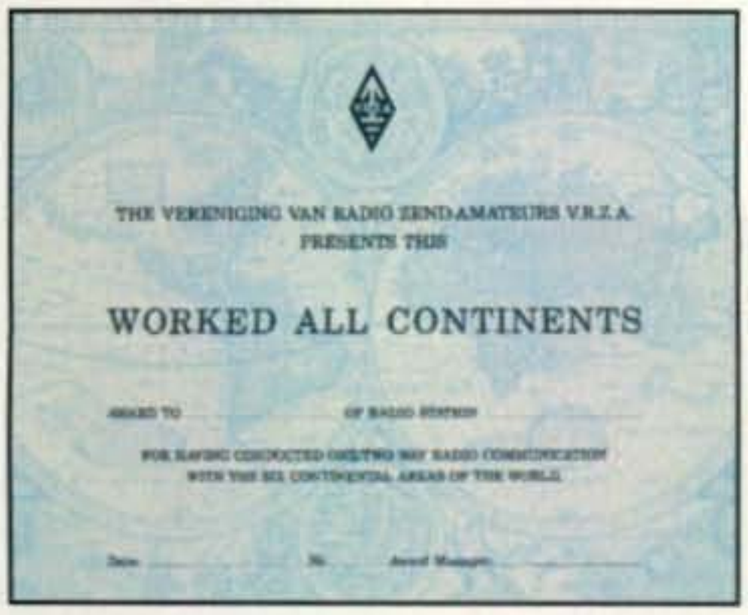
Sharon Matthew, NØLXJ
USA-CA All Counties #1165
December 8, 2007

USA-CA Honor Roll

500		2000	
NØLXJ	3426	KE9OI	1358
		NØLXJ	1359
1000		**2500**	
KE9OI	1748	KE9OI	1277
NØLXJ	1749	NØLXJ	1278
IKØAZG	1750		
1500		**3000**	
KE9OI	1466	KE9OI	1187
NØLXJ	1467	NØLXJ	1188
IKØAZG	1468		

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 Netherlands Vereniging van Radio Zend Amateurs (VRZA) Divisional Award is issued for contacting VRZA club stations.



VRZA's Worked All Continents Award.

The Worked All Provinces Award issued by the VRZA.

Worked All Continents. Contact each of the six continents: Africa, Asia, Europe, North America, South America, and Oceania. (Several countries provide their own version of this popular award, which is often the first DX award earned by beginning award seekers.)

Worked All Provinces. Contact each of the 12 Netherlands provinces: Groningen GR, Gelderland GD, Utrecht UT, Friesland FR, Flevoland FL, Noord-Holland NH, Drenthe DR, Noord-Braband NB, Zuid-Holland ZH, Overijssel OV, Limburg LB, and Zeeland ZL. The club stations PI4VRZ/A and PA6VRZ may be used to substitute for any missing province.

Identifying the provinces: Some of your Dutch cards will have the name or abbreviation of the province. Others will have a "Regio," or "Region," identifier. The following list states the province and then its associated "Regio(s)": Freisland 14; Zeeland 29, 33, 44, 47; Limburg 22, 31; N. Brabant 7, 13, 25, 35, 39; Groningen 19; N. Holland 1, 2, 4, 15, 23, 29, 45, 46; Utrecht 8, 30; Flevoland 41; Drente 11, 26, 27; Overysel 10, 32, 34, 40, 49; Gelderland 3, 5, 6, 21, 24, 35, 43, 48; Z. Holland 9, 12, 16, 17, 18, 20, 28, 36, 37, 42.

SSTV Awards

Slow Scan TV is an interesting part of ham radio. Normal television requires huge bandwidth provided in the VHF/UHF spectrum. Fixed images can be transmitted and received by using slices of the HF spectrum not much wider than traditional SSB. The distinctive warbling of SSTV digital transmissions, building an image line by line, has become a fixture on the low end of the phone bands, mostly on 20 meters. As expected, some SSTV special-interest groups sponsor awards for these video image exchanges. Awards help to generate interest in the mode.

The Danish SSTV Award was created to promote SSTV activity.

Danish DX SSTV Award. This award was created to promote SSTV activity and can be obtained by all amateurs who complete the requirements. SWL okay. GCR list accepted. All bands may be used. No use of repeaters allowed.

The number of confirmed contacts to earn this award are as follows:

Basic Award: 50 different countries.

Silver Endorsement: 100 different countries plus one OZ station.

Gold Endorsement: 150 different countries plus two OZ stations.

Diamond Endorsement: 200 different countries.

The ARRL's DXCC List is used for country identification. eQSLs are not accepted. The award manager may request single QSL cards at his option. Fee for the Basic Award is $US8 or 10 Euros, and endorsements are $US2 or 3 IRCs. Stickers are free of charge when issued in connection with the original application. The application form is available at: <http://oz6sm.qrz.dk>.

Apply to: S. K. Mogensen, OZ6SM, Rundhoejvej 8, DK-7970 Redsted, Denmark (e-mail: <oz6sm@karby.dk>).

Russian SSTV Award. The second SSTV award is sponsored by an active Russian group that maintains a very active website: <http://msstvs.ru/>.

This award is sponsored by the CRC of Krenkelya and the Moscow section SSTV to popularize the use of SSTV in Russia and other countries of the CIS. Earn 75 points by contacting Russian and CIS stations using SSTV on or after

The Russian SSTV Award is sponsored by CRC of Krenkelya and the Moscow section SSTV. ←

March 1, 1998. Foreign participants may earn the award during club contests by making at least 10 QSOs with Russian stations.

Point values:

Contacts with members of the Moscow SSTV = 5 points.

Contacts with CIS countries or stations that are not members of the Moscow SSTV = 1 point.

Send GCR list and fee of 100R for Russians, and $US5, 10 IRCs, or the equivalent for others to: Executive Secretary MsstvS, ul Ninokurova d. 22, korp. 2, kV. 4, Moscow, 117447 Russia (e-mail: <ua3agy@mail.ru>).

Members of the Moscow Section SSTV: RA2FB, RA3AGC, RA3AGM, RA3AHK, RA3AHQ, RA3AIC, RA3APQ, RA3ASX, RA3DGG, RA3DP, RA3LX, RA4AG, RA4AR, RA4FFQ, RA6CA, RA6HO, RA9JW RA9JX, RK3BL, RN3AM, RU3AI, RU3AJG, RU3APD, RU3DG, RU3DKT, RV3ADV, RV3AM, RV3AN, RV3ANP, RV3ATO, RV3BC, RV3BZ, RV3DID, RW3QBF, RW3FM, RX3AIS, RX3AMU, RZ3AF, RZ3BF, RZ3BQ, UAØOB, UAØWU, UA3AAE, UA3AAF, UA3ABH, UA3AEA, UA3AGY, UA3AIU, UA3AIW, UA3AJT, UA3ALD, UA3AUZ, UA3BL, UA3DKF, UA3DLD, UA3DVN UA3FA, UA3TBK, UA4WNH, UA9CC, UK8FF, UK9AA, USØAK, US8AR, UU1JD, MØBDQ.

We're always interested in hearing from clubs, special interest groups, or individuals who sponsor awards. Please contact me at the e-mail or snail-mail address shown on the first page of this column. 73, Ted, K1BV

Mike Strong, N9ID
USA-CA All Counties #1163, September 6, 2007

I started out life as Mike Strong, but in 1970 I became known to the ham radio world as WN8GLO. I upgraded to General a year later and held the call WB8GLO.

My first contact on a county hunters net was in 1971 on the 20-meter Emergency and County Hunters Net. I worked W5HY on the county line of Loving and Reeves, Texas. Shortly after that, I worked 127 counties in the 1971 CW County Hunters contest and I was hooked.

In 1973 I joined the Air Force and worked counties from Reese AFB in Lubbock, Texas, as WB8GLO/5 and then from Anchorage, Alaska as KL7IUN. I got my Extra Class license while I was in Alaska and got the call AB8N. After spending eight years in the Air Force, I got out and moved back to Lubbock to earn some real money and go to college.

My county hunting has gone through many ups and downs. Other things grabbed my interest in ham radio, but I always came back to county hunting. I worked counties on and off through the years and slowly my needs list grew shorter and shorter.

In 2000 and 2001 I worked a lot of counties as KT5H and even got out mobile on occasion in southeast Texas. About that time my marriage went south (no connection with county hunting), and I moved into an apartment and was off the air for two years.

In 2005 I moved from Houston, Texas to Mishawaka, Indiana and married a long-time friend from high school. She is very supportive of ham radio and county hunting and encouraged me to put up an antenna and get back on the air.

I work for a software company in Houston and telecommute from my office in Mishawaka. While I am working, I get to listen to the radio and work counties. What a deal! I got my current call, N9ID, in April 2007 because i got tired of answering questions about what a 5-lander was doing in Indiana.

I finally finished up USA-CA All Counties on July 3, 2007, when Eddie, G4KHG, got me Boundary, Idaho for my last one for the "whole ball of wax."

There are too many people to thank for helping me work them all. I had the pleasure of meeting a lot of early county hunters in the 1970s, and I thank them for being encouraging and telling me that it really was possible to work every county in the U.S. It was hard to believe when I was sitting at around 500 counties confirmed.

I want to thank all the net controls and relay stations who help out on 40, 30, and 20 meters. Without your help nobody would ever finish. I would also like to give kudos to the entire county hunting community. I have never worked with a nicer group of folks in ham radio than county hunters. There is no other group around whose members would go many miles out of their way just to get another ham (whom they probably have never met) a contact needed. I am very glad that I stumbled across county hunters in 1971. There is no better group in all of ham radio. *—73, Mike, N9ID*

St. Barthelemy, Bouvet, and more

BY CARL SMITH,* N4AA

Well now, the New Year started off with a bang. Actually, 2007 ended with a bang. *We got an all-time* new one in the form of St. Barthelemy (FJ). No sooner was that *announced* than an operation was under way over the Christmas holidays. That was quickly followed by a number of operations announced for the first three months of 2008. I understand that FJ prefix callsigns will only be assigned to residents of the island. Others will be assigned calls such as TO5FJ, which was assigned to the operation in January by F6EXV and JR2KDN. This one won't be "rare" for long, considering the ease with which one can get there. Licensing doesn't seem to be a problem either. Oh, in case you didn't realize it, St. Barthelemy *was* the same as St. Marten (FS) prior to the separation. With the addition of FJ to the DXCC list, the current total becomes 338 and for the Honor Roll one must have 329 confirmed.

There are some others that may be separated and become all-time new ones in the coming months, but I won't get into that right now. When/if it happens, it happens, and announcements will be made in all the DX news sources. As I've said before, I won't enter into speculation about these things. I prefer to deal in facts.

Bouvet

Now there's a name that brings thoughts of a very cold and desolate place. I mentioned last month that Bouvet was up to #5 on *The DX Magazine*'s Most Wanted list for 2007. In mid-December came an announcement that a Norwegian scientific team had landed on Bouvet and would stay for about three months. Included in the group is a newly licensed South African amateur, Petrus, ZS6GCM. After a temporary "glitch" about licensing, the Norwegian PTT issued a license with the call 3Y0E for Petrus on December 19. Rhynhardt, ZS6DXB, became the Pilot Station and Media Officer.

Petrus got a crash course in operating DX pileups before leaving for Bouvet, but he lacked actual "in the trenches" experience. In spite of this, he came on the air and did a respectable job of handing out those much-sought-after Bouvet QSOs. Emil, LZ3HI, is providing the QSL cards and acting as the QSL Manager for 3Y0E. A website was established at <http://www.3y0c.com> and includes a log-search feature.

As you may remember from the last operation from Bouvet by the late Chuck Brady, N4BQW/3Y0C, in 2001, the weather conditions on Bouvet are some of the worst in the world. Several of the 3Y0E group's tents and other items were lost due to severe winds shortly after the team landed on the island. Still they persevered, and Petrus continues to be on the air as his time permits. A press release on January 10 said the website had received over 50,000 hits from 16,000 unique visitors since December 19, 2007.

There has been some talk about Petrus possibly going to Marion Island (ZS8) in the near future. This would be of great interest to DXers worldwide, as it ranked only one spot below Bouvet on the Most Wanted list for 2007. Rhynhardt, ZS6DXB, says, "All the equipment that Petrus is currently using is sponsored equipment and it will need to be returned on his return from Bouvet. What will happen on his next research trip to an extreme and rare place in the world? So, as a thank you, we thought we will start a donation fund for him, where upon his return we can set up a proper radio kit for his next trip, which is just around the corner, with some decent antennas, radio, and amplifier. If you are interested, please see the website for how to make a donation."

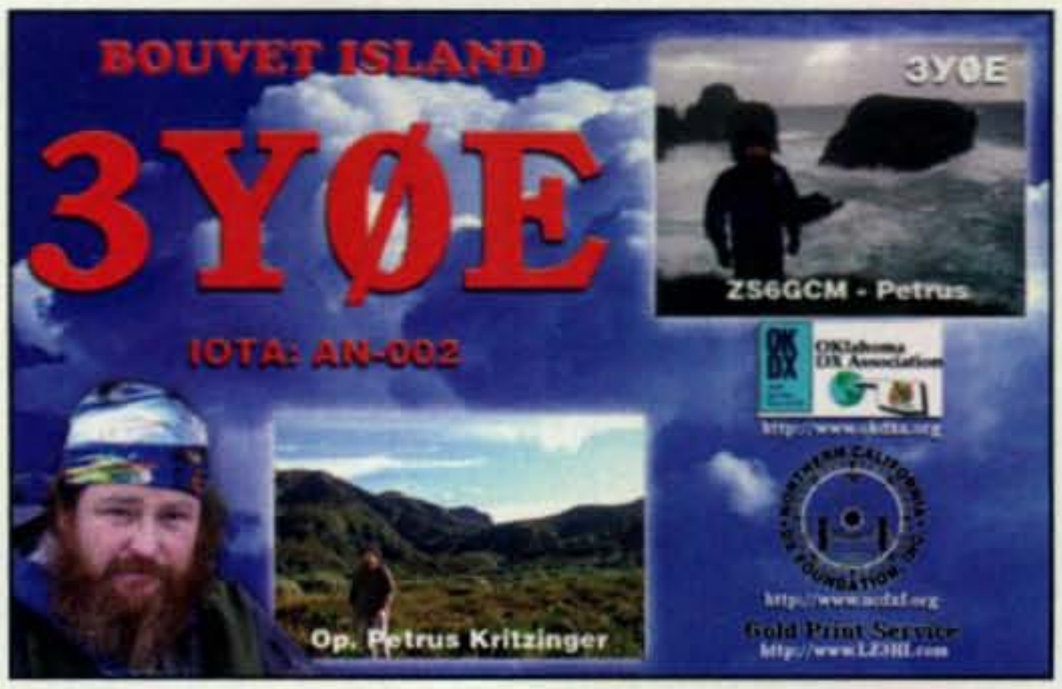
Other DX Activity

March will see not only the ARRL DX SSB Contest and the many DXpeditions that occur for that event, but a number of other DXpeditions as well. We can look forward to: Spratly Islands; CE0Z from Juan Fernandez; 7P from Lesotho; YJ0AX from Vanuatu; FJ/AH8DX from St. Barthelemy; TI5/X from Costa Rica; TX5C from Clipperton; and another FJ operation from Barthelemy.

Antonio, EA5RM, was issued a license in Rwanda, 9X0R, in mid-January. He reported that the RURA is trying to establish amateur radio rules there. A DXpedition was being planned and a website had been established (with no information at this writing): <http://www.9x0R.com>. Keep an eye on this website for details. No dates were mentioned for the operation, so it could happen at anytime.

De Don, K8MFO

Included this month is a photo of Don, K8MFO, with his vintage station. He sent along a report of



The QSL card for the current operation from Bouvet Island by Petrus, ZS6GCM. (Photo courtesy of Franz, DJ9ZB)

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

The WPX Program

CW

3195 ..... DS5JMG

CW: 500 HA5LQ. 2550 S51NR.
SSB: 1900 W6AFA.
Mixed: 1850 IV3ARJ.

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, KBØG, 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, WX3N, 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.

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, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.

*Please Note: The price of the 160 meter bar for the Award of Excellence is $6.50.

The WAZ Program

20 Meter SSB

1173 ..... I8DPP

12 Meter CW

55 ..... N6AW

30 Meter CW

82 ..... UR5IKN

40 Meter CW

261 ..... W5OZI

160 Meters

257 ..... EU1AB (36 zones)

All Band WAZ

Mixed

8491 ..... W9GE
8492 ..... NP3D
8493 ..... DH5MM
8494 ..... NA4CW
8495 ..... JT1CS
8496 ..... UX8IR

SSB

5055 ..... KA5VFU
5056 ..... KB5CSQ
5057 ..... W7YTZ
5058 ..... WB3JNC
5059 ..... NA4CW
5060 ..... IZ8EJB
5061 ..... RL3AA

CW

530 ..... DL7XU
531 ..... I4VJ
532 ..... NA4CW
533 ..... UY5EI

RTTY

181 ..... ON4CAS

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

his action with the station in the CQ WW DX CW Contest. Here's that report:

I have the classic setup in my barn/workshop. To keep myself in the "peanut whistle" category, I shot a Windom up in a tree. In the CQ WW CW Contest I let the house radios and aluminum jungle rest. Did 25 hours from the barn with the classic right. I pulled the switch in the contest at 1900Z, as I had reached my goal. My thought was to play for a bit and then come into the house to use the KW and big antennas. Surely 30 watts to a Windom would be a great deal of punishment. A funny thing happened. I did my entire 25 hour effort out in the barn.

As always, I set a goal once I saw what the conditions were like. This year the goal was exactly 500 QSOs and I spread them out like this: 160, the Windom doesn't work there; 80 meters—54 Q's, 15 zones, 36 countries; 40 meters—112 Q's, 20 zones, 69 countries; 20 meters—261 Q's, 24 zones, 89 countries; 15 meters— 72 Q's, 18 zones, 54 countries; 10 meters—1 Q, 1 zone, 1 country (K3LR on ground wave). Total: 500 Q's, 78 zones, 249 countries for a score of 443,085 points in 25 hours."

Now that's a dedicated contester with a good country count!

YASME Excellence Awards

Via Wayne A. Mills, N7NG, President, The Yasme Foundation, comes the following announcement:

The Directors of The Yasme Foundation are pleased to announce the establishment of the Yasme Excellence Awards. These awards will be given from time to time as the board feels appropriate.

The awards are categorized roughly in accord with FCC (USA) "Basis and Purpose" for amateur radio as consistent with the foundation's purposes and expertise. Those areas of amateur service include noncommercial communications service, advancement of the technical and operating arts, technical training, and international goodwill.

There is no application for these awards, but suggestions regarding deserving individuals will be considered. Each prize consists of a plaque and a monetary award. Suggestions of worthy recipients may be sent to the address shown on the foundation's website.

5 Band WAZ

As of January 1, 2008, 742 stations have attained the 200 zone level and 1575 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
JA7QFU

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W2YY, 199 (26)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
N3UN, 199 (18)
OH2VZ, 199 (31)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
SP5DVP, 199 (31 on 40)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N6HR/7, 199 (37)
JA5IU, 199 (2)
NØIJ, 199 (21)
RU3DX, 199 (6)
N4XR, 199 (27)
WØPGI, 199 (26)
HA5AGS, 199 (1)
EA8AYV, 199 (27)
VE3XN, 199 (26)
YU7GMN, 199 (10)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10m)
RX4HZ, 199 (13 on 80m)
KØGM, 199 (17)
KG9N, 199 (18)
EA5BCX, 198 (27, 39)
WØCP, 199 (18)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
F5NBU, 198 (19, 31)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W7VJ, 198 (34, 37)
K9MIE (18, 21)
W9RN (26, 19 on 40)
W5CWQ (17, 18)
WB9EEE (17, 18)

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

KØGM (199 zones))

5 Band WAZ updates:

HB9BIN (200 zones)
WB9EEE (198 zones)
K4MS (194 zones)

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

Vern, W9FAM, licensed and active as EX/W9FAM and also UN7/W9FAM. This photo of a radio club meeting was taken during his stop in Kazakhstan. Vern is easily identified by his Ten-Tec hat. (Photo courtesy of Vern, W9FAM)

Yasu, JR1AIB, is now living in Germany and has been assigned the call DJ1AIB. (Photo courtesy of Franz, DJ9ZB)

This year's awards total USD 8,000. The winners for 2007 have been selected and will be announced at the end of next week *(by the time you read this, they will have been announced—ed.)*.

For additional information about the Yasme Foundation, visit the website at <www.yasme.org>. On behalf of The Yasme Foundation, congratulations to the winners!

Solar Cycle 24 Begins

According to solar physicists, the appearance of a reversed-polarity high-latitude sunspot on January 8 signals the start of the next solar cycle. The website <http://www.spaceweather.com> reported the following on January 11, 2008:

A *new sunspot* is emerging just south of the sun's equator, and it is a curious one.

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 337 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K9BWQ 336	WB4UBD 336	DL3DXX 336	WA4IUM 334	W4MPY 333	W4UW 330	W4LI 325	PY4WS 320	RA1AOB 300
N7FU 336	K9MM 336	F3TH 335	PA5PQ 334	K5UO 333	W7IIT 330	N4OT 325	OZ5UR 320	VE7KDU 300
N4JF 336	N5FG 336	N4CH 335	K3UA 334	K8LJG 332	G3KMQ 329	N7WO 325	CT1YH 320	KT2C 300
K4IQJ 336	K4CN 336	PY2YP 335	K2ENT 334	K5RT 332	N5HB 329	YV5ANT 324	YT1AT 317	K4IE 291
K2TQC 336	W7CNL 336	N6AW 335	NC9T 334	YU1AB 332	K1HDO 329	KE3A 323	EA3ALV 317	G3DPX 284
K2FL 336	W8XD 336	K4JLD 335	W2VJN 334	HB9DDZ 332	K7JS 329	KF8UN 323	W6YQ 315	KØKG 283
N4MM 336	W4OEL 336	N4AH 335	G4BWP 334	K3JGJ 332	W6OUL 329	F6HMJ 323	UA9SG 310	N2VW 282
K4MQG 336	WØJLC 336	K9IW 335	W1JR 334	VE3XN 331	KA3S 328	IKØTUG 321	W9IL 309	DJ1YH 281
N7RO 336	EA2IA 336	K5UO 335	I4LCK 334	K2JF 331	K1FK 328	W3II 320	WA4DOU 309	XE1MD 280
W7OM 336	OK1MP 336	N5ZM 335	K7LAY 334	WA8DXA 331	K6LEB 328	IKØADY 320	YU7FW 306	WD9DZV 277
K2OWE 336	K4CEB 336	K2JLA 334	KA7T 334	K8SIX 331	SM5HV/HK7 327	WG5G/QRPp 320	LU3DSI 302	W2JLK 277
NØFW 336	K9OW 336	F3AT 334	WØHZ 333	W2UE 330	K6CU 326	F5OIU 320	N1KC 302	

SSB

K6YRA 337	XE1AE 337	K2FL 336	IK6GPZ 335	CT3DL 334	N5ORT 331	K7TCL 326	WØROB 315	RA1AOB 300
IK1GPG 337	N5FG 337	W3AZD 336	NC9T 335	VE7WJ 334	CT1AHU 331	HB9DDZ 326	IZ6CST 314	K7SAM 300
K5TVC 337	DU9RG 337	EA3BMT 336	K1UO 335	YZ7AA 334	EA3JL 331	YV4VN 326	W6NW 314	YC9WZJ 300
NØFW 337	PY2YP 337	KE5K 336	I8KCI 335	WS9V 334	K1HDO 331	SV3AQR 326	EA3ALV 313	WA1ECF 295
KZ2P 337	N6AW 337	K3JGJ 336	I8LEL 335	K5UO 334	K7HG 331	WR5Y 325	W7GAX 312	KW1DX 295
K4MZU 337	OZ5EV 337	W4UNP 336	DU9RG 335	ZL1BOQ 334	K3LC 331	KC4MJ 325	KA1LMR 312	W4EJG 295
N4JF 337	K4JLD 337	N5ZM 336	DU1KT 335	WA4WTG 334	N5YY 331	PY2DBU 325	WA5MLT 310	XE1MW 293
W4WX 337	OZ3SK 337	K8SIX 336	CT1EEB 335	4N7ZZ 333	KB2MY 330	YT1AT 325	RW9SG 310	XE1MEX 293
K2TQC 337	K9BWQ 337	K4CN 336	W1JR 335	VE1YX 333	K3PT 330	KE4SCY 325	XE1RBV 310	K1RB 292
K5OVC 337	WB4UBD 337	KØKG 336	I4LCK 335	W2JZK 333	WS9V 329	KD5ZD 325	IØYKN 310	W9ACE 291
W6BCQ 337	W8AXI 337	W4UW 336	ZL1HY 335	K8LJG 333	W9OKL 329	K6GFJ 324	AA1VX 308	W5PVE 288
DJ9ZB 337	VE2PJ 337	W2FKF 336	VE2GHZ 335	VE4ACY 333	W2FGY 329	W6WI 323	KK4TR 306	KKØDX 285
W6EUF 337	K9HQM 337	W7FP 336	AB4IQ 335	VE2WY 333	CT1CFH 329	EA3CYM 323	WB2AQC 305	VE7HAM 285
K4MQG 337	W9SS 337	DL3DXX 336	W7BJN 335	K9PP 333	EA1JG 329	WA4ZZ 322	K3BYV 303	N8LIQ 284
N7BK 337	KE5K 337	K2JLA 335	W2CC 335	EA3EQT 333	W9IL 329	WN9NBT 322	JR4NUN 303	WØIKD 283
N4MM 337	VK4LC 337	OE7SEL 335	K9IW 335	YV1KZ 333	F6HMJ 329	W6OUL 322	YV2FEQ 303	KBØRNC 282
XE1L 337	VE3MR 337	ZL3NS 335	N2VW 335	KE3A 333	KF8UN 328	CT1ESO 321	KU4BP 303	IK8TMI 281
4Z4DX 337	VE3MRS 337	K7JS 335	WDØBNC 334	YV1AJ 332	WØULU 328	KD2GC 321	VE7KDU 302	F5INJ 279
W6DPD 337	EA2IA 337	YU1AB 335	WØYDB 334	KSØZ 332	K1EY 328	VE7SMP 321	W5GZI 302	WD9DZV 278
N4CH 337	AA4S 337	PY4OY 335	W4NKI 334	LU4DXU 332	K4DXA 328	N1KC 320	W4PGC 302	W5GT 276
N7RO 337	OK1MP 337	VE3XN 335	OE2EGL 334	VE4ROY 332	LU5DV 328	W5GZI 320	N2LM 302	HSØ/EA4BKA 276
K7LAY 337	IK8CNT 337	IØZV 335	WA4IUM 334	CT1EEN 332	N1ALR 328	KD2GC 320	AC6WO 301	K9DXR 275
W7OM 337	IN3DEI 337	EA4DO 335	K5RT 334	N7WR 332	XE1MD 327	LU3HBO 317	4X6DK 301	AD7J 275
OE3WWB 337	EA4DO 337	PA5PQ 335	W6SHY 334	DL9OH 331	DK5WQ 327	WB4GMR 317	4Z5FL/M 301	
K9OW 337	K3UA 337	XE1VIC 335	W5RUK 334	YV1JV 331	CP2DL 327	N8SHZ 316	N5WYR 300	
K9MM 337	CT3BM 337	K2ENT 335	EA3KB 334	K3JGJ 331	NI5D 327	XE2NLD 315	K4IE 300	

RTTY

WB4UBD 335	K2ENT 333	N5ZM 326	OK1MP 325	EA5FKI 320	PA5PQ 311	K8SIX 300	W4EEU 297	K4CN 283
NI4H 334	N5FG 331	G4BWP 325	K3UA 321					

CQ DX Awards Program

CW

1086 YT7EC

SSB Endorsements

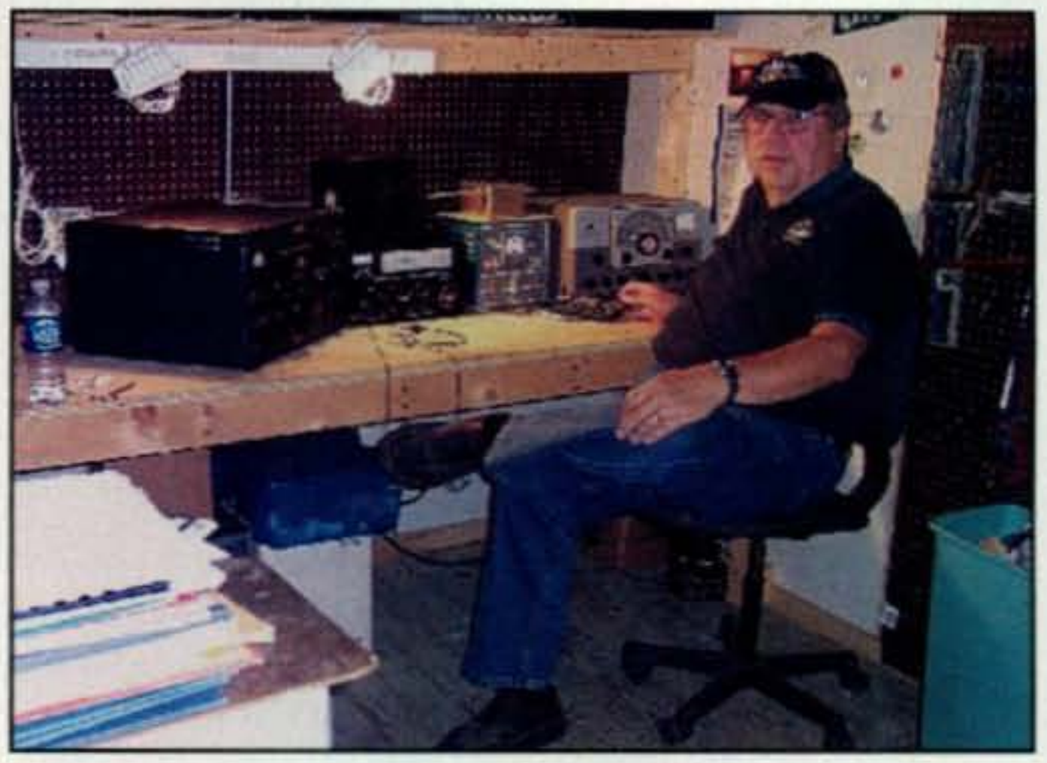
330 K3UA/337
330 IK8CNT/337
330 N5YY/331
310 WØROB/315

CW Endorsements

330 DL3DXX/336
330 W7IIT/330
150 YT7EC/165

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 337 active countries. Please make all checks payable to the award manager.

Don, K8MFO, at his vintage station. I wonder how many of you can identify all of that gear?? I'll try to remember to do it in the next issue. See the story about his contest operation with this gear. (Photo courtesy of Rick, NE8Z)



The spot's magnetic polarity is reversed compared to other nearby magnetic patches on the sun's surface. The Jan. 11th SOHO magnetogram shows the spot (circled) and its odd polarity.

Reversed-polarity sunspots are signs of a new solar cycle and, indeed, Solar Cycle 24 began just last week. So far, so good. But this spot is near the equator. New-cycle spots are supposed to be at high latitudes—hence the curiosity. Is this a genuine new-cycle spot? A weird old-cycle spot? Readers with solar telescopes are encouraged to monitor the situation.

Whatever it is, we'll take it and look forward to improving propagation, especially on the higher frequency bands. The low bands have been very good for a long time now, but I'm looking forward

to those wall-to-wall signals on 10 and 12 meters again.

That wraps it up for this time. Perhaps I'll see some of you at the Charlotte (NC) Hamfest on March 8–9. The Carolina DX Association has a great meeting/dinner on Saturday evening with lots of good fellowship, good food, and some pretty nice door prizes, too.

Until next time, enjoy the chase and Have Fun! 73, Carl, N4AA

QSL Information

1B/DL3BQA via DL3BQA
2A/DJ6AU via DJ6AU
3B8/F1BCS via F1BCS
3B8/SM6GOR via SM6GOR
3D2RJ via ZL1BQD
3E1DX via KU9C
3V8BB via DL5XL
3XY7C via DL7UFR
3Y/ZS6GCM via LZ3HI
3YØE via LZ3HI
4K2/4K4BAT via DL6ZFG
4K2/UV3CC via DL6ZFG
4K2BY via DL6ZFG
4K2CC via DL6ZFG
4K2OKV via DL6ZFG
4K4BAT via DL6ZFG
4K4BAT/A via DL6ZFG
4K4BEM via DL6ZFG
4K4BEU via DL6ZFG
4K4BG via DL6ZFG
4L1UN via EA7FTR
4L6HMC via UA6HPR
4N4GD via T98U
4N4I via T98U
4OØSRBIH via T98U
4O4BYZ via T98U
4O4EBL via T98U
4O4I via T98U
4O4SRBH via T98U
4O4SRBIH via T98U
4O4WCY via T98U
4O4ZX via T98U
4O60BH via OH2BN
4S7/PAØGAM via PG5M
4S7DXG via UR9IDX
4W/K7BV via KU9C
4W/N5KO via KU9C
4W/N6FF via KU9C
4W/W3UR via KU9C
5B/DL6RO via DL6RO
5PØMF via DH1LAO
5R8NL via PA7FM
5W1BV via KØBJ
5W1FP via ZL1BQD
5Z4YN via K0BJ
6YØB via W2GB
6Y5/DL7VOG via DL7VOG
6Y5/VE4MM via VE4MM
6Y6C via W1VE
7L3ATQ/1 via 7L3ATQ
7SØSFJ via SMØBYD
7XØMT via F5MSR
8P2K via KU9C
8P4B via KU9C
8P6AD via KU9C
8P6AL via KU9C
8P6AM via KU9C

(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>.)

our readers say *(from page 10)*

technology, learned a bit of technical history, and learned a bit of geography. Radio amateurs have simultaneously given service back to society in a variety of ways including but not limited to public assistance in times of emergency. All people of reasonably good character are welcomed into the amateur radio community.

Ham Radio's Technical Culture could have been a great book; unfortunately it is not. In some instances it seems to reflect the neuroses of the author and not the amateur radio community. There is plethora of other books concerning radio, radio history, and amateur radio. Money would be better spent on these. I am sorry that I wasted mine.

Frank Etzler, N8WXQ
New Milford, CT

W2VU replies: Haring's book is a mix of sociology and history. Her research style, as explained in our review, was that of a sociologist, not a historian. Thus, she relied entirely on the printed record rather than attempting to interview primary sources as a historian would. That is unfortunate because it led her (as also pointed out in the review) to misinterpret a good deal of what she saw in print. All that aside, though, the fact that you dislike a book and disagree with its conclusions should not preclude it from getting a fair and honest review, warts and all. We feel ours was just that.

Re: Zero Bias

Editor, *CQ*:

Just a quick note to thank you for your consistently thoughtful and thought-provoking editorials! I just read your editorial in the December 2007 issue. I have been licensed since 1954 and I'm an active DXer and contester plus very interested and active in emergency communications. Although I am an ARRL member and have been for most of those 53 years, I do realize that the ARRL is not without fault. Your ability to point out problems in a sane and rational manner, while acknowledging good points, is very unusual in these days of shrill discourse in most areas of our daily lives. Thanks so much for the great job that you and all of your staff do in furthering the goals of amateur radio! Keep up the good work.

Bill Gerth, W4RK
Jefferson City, MO

Editor, *CQ*:

First off, thank you for writing your superb "Here We Go Again" editorial in the December issue of *CQ*. You hit the nail on the head. And now, a "miffed" ARRL is yelling "foul ball." Frankly, they're the only ones off the mark right now in amateur radio.

I've said this publicly, and I mean it. I used to think Newington's clique was corrigible. No more. I've become a pessimist in that regard. It's high time for the creation of an association that will truthfully represent what the majority of US hams want. ... The 79 percent majority of US hams don't belong to ARRL (I'm in the minority, I do, still) for a reason. And, the type of antics you've described in your editorial is a *big* reason why so many don't belong or have ended their affiliation long ago.

Amateur radio needs an organization that we can trust. One that can speak for us, but yet will listen to and accept what the majority of us want. I believe *CQ* could foster such an organization. And, in the process, gain a reasonable representation of US amateurs, in view of the ever-growing laundry list of issues with League behavior. I would not only be willing to join such an organization, but to wear the soles off my shoes pounding the pavement for it. ...

Lee McVey, W6EM/4
Leeds, AL

BY JOHN DORR,* K1AR

My Dad and Contesting

March's Contest Tip

This month's contest tip is easy. Do what you can to get involved in the 2008 ConTest University at the Dayton Hamvention®. Whether you're an experienced competitor or a newcomer, you will learn something that will make you a better contester in the future, so check it out!

Calendar of Events

All year	**CQ DX Marathon**
Feb. 22–23	Russian WW PSK Contest
Feb. 23–24	**CQ WW 160M SSB Contest**
Feb. 23–24	REF SSB Contest
Feb. 23–24	UBA CW DX Contest
Feb. 23–24	Mississippi QSO Party
Feb. 23–24	North American RTTY QSO Party
Feb. 24–25	North Carolina QSO Party
Mar. 1–2	ARRL SSB DX Contest
Mar. 8	DIG QSO Party (20–10M)
Mar. 8–9	RSGB Commonwealth CW Contest
Mar. 8–9	Oklahoma QSO Party
Mar. 8–9	Idaho QSO Party
Mar. 9	North America RTTY Sprint
Mar. 9	DIG QSO Party (80–40M)
Mar. 9–10	Wisconsin QSO Party
Mar. 15	10-10 Int'l Mobile QSO Party
Mar. 15–16	Russian DX Contest
Mar. 15–17	Virginia QSO Party
Mar. 22–24	BARTG RTTY Contest
Mar. 29–30	**CQ WW DX WPX Contest**
Mar. 29–30	QCWA QSO Party
Apr. 5–6	Missouri QSO Party
Apr. 5–6	SP DX Contest
Apr. 5–6	EA RTTY Contest

I always enjoy hearing stories that describe how hams got involved in the hobby, and with contesting in particular. The reasons are varied, but ultimately they center around a family member, friend, or in rare instances, self-initiative by an individual to learn more.

This month I want to share a personal story. It stems from the fact that late last year I lost my dad to a massive stroke at the young age of 78. This month's column is dedicated to him.

Like many of you, my dad, Arthur Dorr, played a big role in my becoming a ham. Ironically, he never became one himself, but his support and enthusiasm was always there for me from my earliest years as a budding amateur radio operator.

As a youngster, I became interested in electronics and gadgets. In those pre-internet days, it was very cool to listen to shortwave radio as one outlet for kids like me. I remember spending hours and hours listening to a small, portable shortwave receiver that I picked up from a local electronics store. I didn't have a lot of money, so my dad bought it for me. That radio is what started it all. As a basic model, it didn't have fancy high-end features. For example, there was no BFO circuitry to effectively listen to CW/SSB, and the VFO control often started to manually turn before the electronics did its thing. Little did I know that 40 years later I'd be manning the controls on 20 meters at K3LR's superstation using an IC-7800 and more Yagis than the total number found in many third-world countries!

As a kid, I had very little technical knowledge. Those of us who got started in radio this way were in the same boat. We learned by trial and error. One day, I accidentally touched the receiver's whip antenna with a spool of wire and noticed that the signals were noticeably louder. It only took another week (and a little reading at our local library) to have my first outside antenna installed—a 75-foot long wire running outside my bedroom to a tree in the back yard.

Those days were really exciting. I literally spent hours each day listening to shortwave radio. It was thrilling to log stations from around the world, and after installing the external antenna, the experience was even better. I started hearing faraway stations such as All India Radio, Radio Teheran, Radio Japan, and many others. My *World Radio TV Handbook* with its dog-eared pages was always close at hand. As time went by, my QSL collection grew, covering an entire wall in my bedroom. I remember writing to stations that I could not copy requesting information about their country and culture. It seemed that every day another package would come in the mail. Perhaps one of my greatest thrills was to hear my name read over the air by a popular Radio Prague host, who took the time to answer a question I had asked a few weeks earlier.

What does all of this have to do with my dad? Well, as exciting as shortwave radio listening was to me, there was something missing. Being an SWL was, by definition, a one-way experience. In those early years (circa 1968), I had heard about ham radio, but didn't know where to go next or how to get started. Fortunately, my dad picked up on my interest.

In June of 1969, Dad came to me one evening and told me that we were going to have a special weekend together. It was a little out of character for him to do that, so obviously I wanted to know more. It turned out that his company, Amecom-Litton Industries, had a ham club and was planning an ARRL Field Day operation. Dad didn't know what Field Day was, but he knew it would be something that would excite me. Thus, off we went that weekend to a life-changing event for me. Indeed, it was my dad who facilitated my first ham radio experience, and one that changed everything in the future for me.

I remember the two of us arrived at the Field Day location and were immediately greeted by one of Dad's co-workers, Julian Fernandez, W2YX. Julian, who subsequently became my radio Elmer, took me under his wing and ushered us into one

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Announcing: ConTest University 2008

I am pleased to announce that "early bird" registration for Dayton ConTest University (CTU) 2008 is now open. The CTU staff is working hard to prepare an interesting and informative curriculum for 2008. CTU will be held in at the Crowne Plaza Hotel, Dayton, Ohio, on Thursday, May 15, 2008 from 8:30 AM to 5:30 PM. This year's event will feature some of the best contest operators and station builders ("CTU Professors") that can be found anywhere! In short, they will present state-of-the-art contesting topics that will increase your knowledge and fun. You will not want to miss the chance to attend this year's "classes," or for alumni of last year, "graduate-level classes." Thanks to ICOM for its support of CTU 2008 and contesting overall.

Although plans are still being finalized, anticipated classes include: QSO Party Strategy, SO Unassisted—Maximizing your CW and SSB Skill Set; Antennas for USA Contests—Using wire antennas for best performance; RTTY Contesting; Mobile Contesting; Antennas for DX Contests; Computers in Contesting; Hints and Kinks to Help You Win—Maximizing a station on a budget; Chokes and Filters—Multi-operator considerations; Starting out in Contesting—What works; Software Logging Programs; DXpedition Contesting—Setting goals and total concentration on winning; Logging and Accuracy & Contest History and Records; SO2R—What the future of contesting could look like; Basic Contesting—How I got started, tracking improvements & getting better; VHF Contesting; Propagation—Sunspots and what we have to look forward to; and more.

Even lunch is a learning and entertaining affair with the "Extreme Shack Makeover" slide show. Don't hesitate to reserve your spot for this year. Scholarships are available for those 25 years old or younger.

For CTU 2008 details and registration, the 2007 CTU wrap-up, and more information, go to: <http://www.contestuniversity.com>. Please make sure that you click on the registration page and indicate if you are a returning CTU graduate, "Graduate School," or if this is your first time attending CTU. Thanks to Scott, KA9FOX, and QTH.com for hosting the ConTest University website.

Based upon the tremendous attendance at CTU 2007, I expect the CTU 2008 student registration slots will fill up fast. Space is limited. I hope to see you at CTU 2008!

73, Tim, K3LR, CTU Chairman

of the operating tents a few hours before the start of the event. You can't imagine how excited I felt as I sat down in front of a Collins KWM-2 and started to tune around on the bands. I suspect that Dad may have been even more excited than I was to see me in action. Julian then told me that we were going to work someone. My very first QSO was with JH1WIX on 15 meters SSB. At that point, you couldn't have peeled me off the radio with a crowbar. I sat with Julian and worked station after station from all around the world. It was at that point I knew that my SWL career had ended and a ham license was the next stop on my radio journey.

After arriving back home from that Field Day event, I was floating about five feet above the floor. It was literally all I could think about for weeks. Dad bought me a copy of the ARRL publication *Learning the Radiotelegraph Code.* Some of you may recall its distinctive red cover. I think the book cost only 50 cents at the time. With my dad's support, I became a self-taught Morse code operator. I spent hours listening to W1AW code practice on my old SWL receiver (yes, with no BFO!). Being on the other side of the Long Island Sound from

where I lived, W1AW had a booming signal, so the lack of a BFO was not a big issue. Julian coached me through the Novice license theory, and in September of 1969, WN2LQZ was born. It all started because Dad had taken me to Field Day just three months earlier.

As a reward for getting my license, Dad bought me a Heathkit HW-16, and not only did I build it myself, but it actually worked! Those were exciting days for all of us. Quickly, however, I learned that there was more to radio than the Novice bands, and I set my sights on getting my General, Advanced, and eventually Extra class license. I may have been one of the few 14-year-old kids who actually read *The ARRL Handbook* from cover to cover.

In May of 1970, however, the pressure was on. I was ready to take my General class exam. I knew the code would be easy; it was the theory that had me rattled. Dad took a day off from work and we headed to the FCC office in Manhattan on the Long Island Railroad. It turned out to be a great day. I passed my exams and was proud to have Dad alongside me. We later celebrated by heading down to the electronics district in lower Manhattan, where he bought me a Heathkit VFO (after all, I was a General now!) to go with my HW-16.

In the years to follow, my dad supported my hobby in other ways. He let me put my first tri-bander on the roof of our house. He often took the TVI calls from neighbors and defended my contest operations. Most of all, he took pride in seeing me blossom in an activity that made me happy. You can't ask for more than that.

Even though Dad is now a silent key, he'll always be part of my ham radio experience. Most of all, he is part of who I am, and there are no contest scores that can beat that. Thanks for everything, Dad!

Final Comments

This month I want to thank my readers for giving me the opportunity to bring my personal side of contesting to you. It's an honor to be able to share what really matters in life with all of you. Of course, I'd be remiss if I didn't thank my mom, Shirley, who put up with more than her share of dealing with my passion for radio. I hope some of you will think about your dad (and others) who had a meaningful role in your early contesting experience.

See you in the next contest!

73, John, K1AR

The Ionosphere

BY TOMAS HOOD,* NW7US

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, December 2007: 10
Twelve-month smoothed, June 2007: 8

10.7 cm Flux
Observed Monthly, December 2007: 79
Twelve-month smoothed, June 2007: 73

***Ap* Index**
Observed Monthly, December 2007: 4
Twelve-month smoothed, June 2007: 8

Earth's atmosphere is a mixture of gases held to the surface of the Earth by gravity. These gases vary in density and composition as the altitude increases above the surface. As the atmosphere extends outward from Earth, it becomes thinner and blends with the particles of interplanetary space.

The first 60 miles of Earth's atmosphere consist of a homogeneous mixture of various gases. This region is called the *homosphere*. Above the homosphere where gases are no longer uniformly mixed lies the *heterosphere*. Relatively more of the heavy gas molecules such as molecular nitrogen and molecular oxygen (N_2 and O_2) are found near the bottom of the heterosphere, while relatively more of the lighter gases such as hydrogen and helium are found near the top.

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for March 2008

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 4-6, 14-26, 31	A	A	B	C
High Normal: 1-3, 7-8, 10-13, 28-30	A	B	C	C-D
Low Normal: 9, 27	B	C-B	C-D	D-E
Below Normal: N/A	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair (C) on March 1–3, good (B) on the 4–6, fair (C) on the 7th and 8th, and so forth.

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.

Cycle 24 Begins!

First Sunspot of the New Solar Cycle: Jan. 4, 2008

White light image (left) and magnetogram (right) courtesy of SOHO

On January 4, 2008 a magnetically reversed sunspot emerged at solar latitude 30 North. This marked the start of solar Cycle 24. The sunspot, numbered "981," is the first to appear since the start of the last cycle (23) with reversed magnetic polarity. The reversal is in relation to the polarity found in the sunspots occurring during Cycle 23. (Source: NASA/SOHO)

The atmosphere is also divided into four regions according to temperature trends: the *troposphere, stratosphere, mesosphere,* and *thermosphere.* The lowest region is the troposphere, and it extends from the Earth's surface up to about six miles. The gases in this region are heavier than those in higher altitudes, and include O_2 and N_2. The highest mountains are within this region, as is the high-altitude jet stream. Weather is confined to this lower region and it contains 90% of the Earth's atmosphere and 99% of the water vapor.

The atmosphere above the troposphere is called the stratosphere, starting at about six miles out. Gas composition changes slightly as the altitude increases and the air thins. Incoming solar radiation at wavelengths below 240 nanometers is able to create ozone, a molecule of oxygen consisting of three oxygen atoms, O_3, in this layer. This gas reaches a peak density of a few parts per million at an altitude of about 16 miles.

At an altitude above 50 miles, the gas is so thin that free electrons can exist for short periods of time before they are captured by a nearby positive ion. The existence of charged particles at this altitude and above marks the beginning of the *ionosphere,* a region having the properties of gas and of plasma.

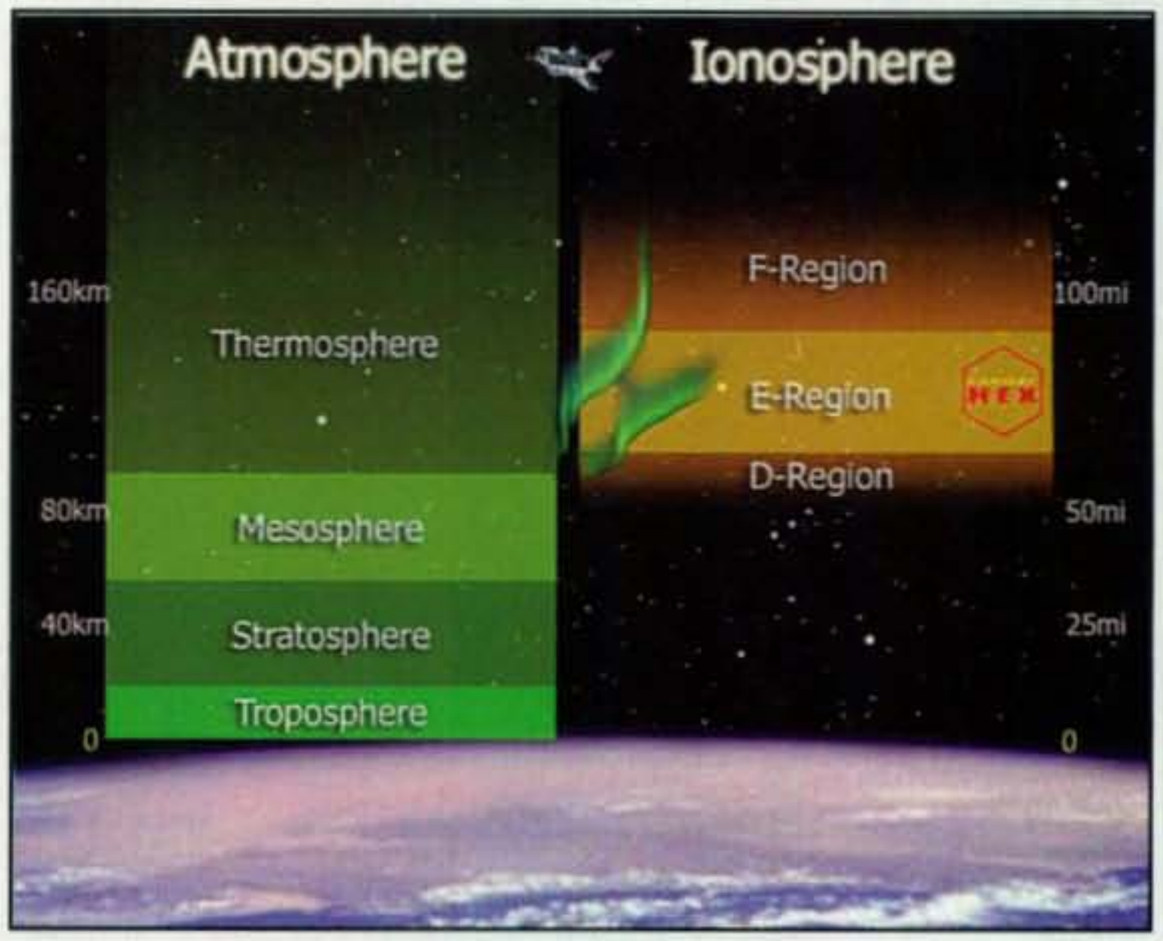
The next region extends beyond the ionosphere. Beginning at about 600 miles above the Earth's surface, the *magnetosphere,* a vast region of charged particles formed by the interaction between the solar wind and the Earth's magnetic field, extends out to a distance of about 40,000 miles on the side facing the sun, and out to even greater distances on the far side of the Earth away from the sun.

How is the Ionosphere Formed?

Much of the energy from the sun that reaches our atmosphere is absorbed. Thankfully, nearly all of the hazardous ultraviolet radiation, gamma rays, and x-rays are blocked before they reach Earth's surface. While most of the radiation from the sun is absorbed, some of it penetrates deeply into the atmosphere. Atmospheric ozone in the ozone layer is the greatest absorber of ultraviolet radiation, protecting virtually all life forms on Earth. Solar radiation at ultraviolet and shorter wavelengths is considered to be "ionizing," since photons of energy at these frequencies are capable of dislodging an electron from a neutral gas atom or molecule during a collision. We measure solar activity at the 10.7-cm frequency since it is close to the ultraviolet range, and because the stronger the energy at that frequency, the more ionization occurs. This measurement is called the *solar flux reading.*

Atoms in the ionosphere absorb the incoming solar radiation, causing them to become highly excited. When an atom is bombarded with enough of this energy, an electron may be knocked away from its orbit, producing free electrons and positively charged ions.

At the highest levels of the Earth's outer atmosphere, solar radiation is very strong but there are few atoms to interact with, so ionization is small. As the altitude decreases, more gas atoms are present so the ionization process increases. At the same time, however, an opposing process called *recombination* begins to take place in which a free electron is "captured" by a positive ion if they get too close to each other. As the gas density increases at lower altitudes, the recombination process accelerates, since the gas molecules and ions are closer together.



A side-by-side illustration of the atmospheric layers and of the ionospheric regions. Note that aurora occurs primarily in the E region. (Source: NASA)

Because the composition of the atmosphere changes with height, the ion production rate also changes and this leads to the formation of several distinct ionization regions, known as the *D, E, F1, F2,* and *F3* layers. (Yes, an outer *F3* layer has been discovered, and so far it seems that when present, it is most dense over the equatorial region at the peak of the day during the most active phase of a solar cycle). The breakdown between layers is based on the density of ions and what wavelength of solar radiation is absorbed in that region most frequently.

The *D* region is the lowest in altitude and absorbs the most energetic radiation, known as hard x-rays. The *D* region doesn't have a definite starting and stopping point, but includes the ionization that occurs below about 56 miles. This region absorbs high-frequency (HF) waves between 3 and 30 megahertz or wavelengths between 100 meters and 10 meters. It refracts frequencies in the range of 3 to 30 kilohertz, very low frequencies (VLF). The *D* region is mostly a daytime layer, because it takes the full energy of the sun to keep the very dense layer of gases ionized. Once the sunlight is removed, the free electrons quickly recombine with the gases and molecules that are so densely packed, and the ionization nearly disappears, although the layer may continue to exist and play some role in night-time propagation at some frequencies.

The next highest layer, the *E* region of the ionosphere, extends from about 56 miles to about 65 miles. The air in this region is considerably thinner than below it. As a result of this thin air there are fewer collisions of ions and electrons, resulting in a population of molecular ions. The *E* region absorbs soft x-rays. This layer is highly variable from day to night, and takes longer to recombine than the *D* layer.

The highest layer is the *F* region, which is the largest part of the ionosphere. It extends from about 65 miles up through the end of our atmosphere. Since particle densities decrease as one travels away from Earth, it is difficult to say exactly where Earth's atmosphere ends. Therefore, it is hard to say where the *F* region actually ends.

Because the *F* region is so large, and because of the way the region splits into distinct bands of density, it is divided into at least two main sections. The two most prominent layers are

the daytime layer, *F1*, and the denser *F2* layer, which exists both during the day and night. A third layer, the *F3* region, has been discovered and appears to occur during the peak solar cycle years over the equatorial region, during the middle of the day, especially prominent when there is a very high level of solar activity.

In the *F* region, gravity's effect on particles creates different layers depending on their mass. The heavier particles sink to the bottom of the *F* region and the lighter ones rise to the top. Along the day/night meridian electron numbers rise and fall. At sunset electron numbers decrease, and these particles recombine with ions throughout the night. On the sunrise meridian, electron numbers increase as neutral molecules and atoms are energized by the solar radiation, again causing ionization.

Radio Waves in the Ionosphere

As an electromagnetic wave enters the ionosphere at the *D* layer, the energy sets electrons into a vibrating motion (at the frequency of the radio wave). Because this layer is so dense, there is a high probability that the energy will be absorbed in a collision with nearby molecules. The electromagnetic energy is turned into kinetic energy (heat), and as far as radio propagation is concerned, lost. The higher the frequency and the shorter the wavelength, the higher the energy, but also there are fewer collisions between free electrons and gas molecules than at lower frequencies. As a result, lower frequency signals are attenuated far more than those at higher frequencies. It is possible that the lowest frequencies are completely absorbed, while higher frequencies will make it through to the *E* layer.

Since the *E* layer is less dense than the *D* layer, electrons are not so quickly recombined with neighboring atoms, so losses are lower. Because these electrons are not as quickly bound with other atoms, losing energy, the electromagnetic wave is re-radiated. Because the signal is traveling in an area where electron density is increasing, it will go farther.

At the same time, the wave is bent away from the denser, and higher, area of electrons. The amount of bending, or *refraction*, is dependent on the frequency of the wave and the density of the ionosphere through which the radio wave is traveling. Think of how a pencil might look if you place it into a glass of water. When you view the pencil through the side of the glass, it appears to bend right at the boundary between the air and the water. This is caused by the same principle. Light is being refracted by the difference in density of the mass through which it is traveling.

The higher the frequency, the more energy the RF wave has, making it more likely to pass through to the next higher region. When an electromagnetic wave enters the *F* layer, the same science takes place. The radio signal rides the free electrons of this layer, and if the frequency of the signal is high enough, it will pass through the layer out into space. Otherwise, it will gradually be refracted back away from the higher and denser layers of electrons to be sent back toward Earth.

Those frequencies that are refracted back to Earth have to then pass again through the lower ionospheric layers. *D*-layer absorption will attenuate the signal some more. If there is enough energy in the signal, the wave may "bounce" between the Ionosphere and Earth multiple times, thereby greatly extending the distance it can travel. Other times it might be so greatly absorbed that the wave is attenuated and no communications are possible.

An interesting twist to the propagation of radio waves by way of the ionosphere is when a radio wave enters the ionosphere, bounces off the *F* layer, but then is refracted back up away from the *E* layer, only to be refracted once again downward by the *F* layer. When this occurs multiple times, the radio wave "rides" a type of ionospheric "duct" and may travel great distances without ever interacting with the Earth, until it can punch back through the *E* layer and back to Earth at a distance not possible if such ducting did not occur. Other "twists" occur, which we will explore in upcoming months.

All of this depends on the degree of the ionization of the gases in these various regions, how dense each layer is, as well as the strength, angle of incidence (the angle at which the radio wave enters the region), and energy and frequency of the radio signal. Regarding the ionization of these gases, this depends on the direct energy from solar radiation.

When we look at the daily measurements of the 10.7-cm solar flux, we find that the higher this index, the more ionized these various layers become. When the flux is low, then the ionosphere is weaker. A strongly ionized and highly dense *F* region supports the propagation of the higher HF radio spectrum, while a weakly energized and less-dense ionospheric region will only support the lower shortwave frequencies. Of course, there are many variations during the day, between regions in daylight and darkness, and from season to season.

March Propagation

At this time the ionosphere is not being energized enough to support much propagation on the higher HF frequencies. This is because we are at the very start and the very bottom of the current 11-year solar cycle. With the reduced energy level of the ionosphere, bands such as 20 meters suffer with short openings and limited distances. Overall, signals generally are weaker over many radio circuits during this part of the solar cycle.

Even so, March is one of the optimal DX months of the year. As the Spring Equinox approaches (March 20), the boundary line (the "grey-line terminator") between daylight and darkness begins to run straight north and south. With the gradual return of sunlight to the polar north, the HF bands are improving because more of the ionosphere is being energized during the longer period of daylight each day.

Ten meters will be spotty, with the most reliable propagation along north/south paths, and mostly over shorter distances. I've been following the re-

vealing reports from the PropNET propagation research group <http://www. propnet.org/>. The group conducts daily propagation tests on 10 meters. The reports confirm that even during the lowest phase of the solar cycle, 10 meters does have life. This month we might even find occasional strong, but short openings between stations on east/west paths into Asia from the North American west coast and into Europe from the North American east coast. These paths will quickly disappear, so happy hunting.

Fifteen meters will be somewhat more usable than 10. We will find 15 opening up to more areas, and for somewhat longer periods into the evenings. Those daytime paths that do open up (certainly much less often than during the peak solar cycle years) will not degrade much until midsummer. You will see these openings mostly from regions close to the equator, as the current solar activity is not supporting the propagation of these higher frequencies via the *F* layer of the ionosphere.

Seventeen and 20 meters will remain in good shape. Both short- and long-path circuits are reliable and solid. All nighttime paths are wide open during March. Primetime evening hours in the United States are sunrise hours across Russia, Africa, and both the Near and Far East. Expect a lot of short- and long-path DX into these areas of the world. The daytime band of choice will be 20 meters, as has been proven in contests during past solar cycle minimums.

Between sunset and midnight, expect DX openings on all bands between 20 and 160 meters, with occasional openings on 15 and 17 when conditions are High or Above Normal. Conditions on 30, 40, 60, 80, and 160 meters should favor openings to the east and south. These bands should peak for openings to Europe and Africa near midnight.

From midnight to sunrise, expect optimum DX conditions on 30, 40, 60, 80, and occasionally 160 meters. Conditions should favor openings toward the west and south. Some rather good 20-meter openings should also be possible toward the south and west during this time.

The seasonal drop of daytime maximum usable frequencies (MUFs) continues and the geomagnetic activity as reported by the planetary *A* index (*Ap*) is on its seasonal rise. Take advantage of the current excellent conditions and work the world before the summer conditions create greater challenges.

VHF Conditions

The possibilities for ionospheric openings on the VHF bands usually improve during March and the spring months. Many of the solar-ionospheric relationships that can produce ionospheric openings on the VHF bands tend to maximize during equinoctial periods.

A seasonal increase in short-skip openings due to sporadic-*E* propagation generally takes place during March, and an occasional 6-meter opening may be possible during this month. Sporadic-*E* openings most often occur during the daylight hours over distances between about 1000 and 1400 miles. There is also a fair chance for an increase in widespread auroral activity during March, since we continue to experience coronal-hole activity during the solar cycle minimum. These auroras could be accompanied by auroral-scatter-type openings on 6 and 2 meters. Check the Last-Minute Forecast at the beginning of this column for those days in March that are expected to be Below Normal or Disturbed. These are days on which auroral activity is most likely to occur.

Conditions should be optimal during March for trans-equatorial scatter propagation between the southern tier states and countries deep in South America. The best time for TE openings should be between 8 and 11 PM local time. Don't forget to check out *CQ VHF* magazine for more details on VHF propagation and conditions.

Current Solar Cycle Progress

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 78.6 for December 2007. The 12-month smoothed 10.7-cm flux centered on June 2007 is 73.2. The newly released predicted smoothed 10.7-cm solar flux for February 2008 is 61.

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for December 2007 is 10.1, a very large jump up from November's 1.7 and October's 0.9. The lowest daily sunspot value of zero (0) was recorded on December 19–31. The highest daily sunspot count was 30 on December 13. The 12-month running smoothed sunspot number centered on June 2007 is 7.7. The forecast for March 2008 calls for a smoothed sunspot count of 3, reflecting a gradual start of Cycle 24.

These observed sunspot averages from October through December add weight to the declaration of the start of solar Cycle 24. When solar scientists observed the solar disc on January 4, 2008, they noticed that a small sunspot had developed with a much-anticipated feature—a reversed magnetic polarity. Such a reversal marks the start of the new solar cycle, the 24th recorded.

As reported last month in this column, the excitement actually started in December when a magnetically reversed highly active region appeared in the sun's eastern limb. Because of its reversed polarity, scientists became hopeful that the region would develop into an actual sunspot. If it had, then scientists would have declared the official start of Cycle 24. One such sunspot did finally occur on January 4, 2008.

Sunspots have a complex magnetic structure. Typically, though, a sunspot will have at least one very clearly defined set of magnetic poles, north and south. At the start of a new solar cycle, the polarities of the new cycle's sunspots are reversed from the polarities observed in sunspots belonging to the previous cycle. When the first sunspot arrives with a reversed magnetic structure, scientists declare the start of the new cycle. This occurred on January 4, 2008, and more sunspots have occurred since then that also exhibit this reversed polarity.

What is in store for 2008? Solar cycles take anywhere from two to five years to reach the point of maximum solar activity. The current consensus among most solar scientists places Cycle 24's maximum sometime between 2011 and 2013. That means we have at least a year or two before we see major solar activity of the kind useful to VHF propagation. However, that does not mean that 2008 will be a disappointment to DXers.

The observed monthly mean planetary *A* index (Ap) for December 2007 is 4, which is typical for the end of autumn and the beginning of winter. The12-month smoothed *Ap* index centered on June 2007 is 7.8. Expect the overall geomagnetic activity to vary greatly between quiet and minor storm levels during March.

I invite you to visit my online propagation resource at <http://propagation.hfradio.org/>, where you can get the latest space data, forecasts, and more, all in an organized manner. If you have a cell phone with internet capabilities, try <http://wap.hfradio.org/>.

Drop me an e-mail or send me a letter if you have questions or topics you would like to see me explore in this column. Also, I'd love to hear any feedback you might have on what I have written. Until next month . . . 73, de Tomas, NW7US

Results *(from page 30)*

VK2CCC. I could have done without the electrical storms here in Queensland . . . **VK4EJ**. G'day to all in the test. I seem to be in a propagation desert . . . **VK4TT**. This was the first time a special prefix had been authorized for use from here. Hopefully there will be more to come . . . **VQ97JC**. With the conditions, after 23 QSOs on 40m with 100W I understood I was on for hard work all band so I went SOSB 20m LP and some sleep! Three goals achieved: 1000 QSO mark and 1,000,000 pts, and have some fun! This is enough for my age! . . . **XM2FU**. Work commitments on 1st day and static noise from thunderstorm on 2nd night dramatically limited my op hours. Tks for the great ears of the superstations and a great contest. Cu agn next year . . . **YB6LD**. A tough contest with poor condx for us. Our raw Multi-Multi score of 10.8M is 10% lower than last year's Multi-Two and much lower than our OC record of 16M. The underperforming bands were 10m, 15m, and 160m with some frustrating one-way propagation . . . **ZL6QH**.

SSB & CW COMBINED CLUB SCORES

BAVARIAN CONTEST CLUB	**174,747,673**
ARAUCARIA DX GROUP	110,093,486
POTOMAC VALLEY RADIO CLUB	**108,046,668**
NORTHERN CALIFORNIA CONTEST CLUB	98,685,035
RHEIN RUHR DX ASSOCIATION	95,205,700
CONTEST CLUB ONTARIO	90,352,527
LU-CG CONTEST GROUP	72,485,682
FRANKFORD RADIO CLUB	63,914,253
YANKEE CLIPPER CONTEST CLUB	62,799,664
SLOVENIA CONTEST CLUB	61,278,501
FLORIDA CONTEST GROUP	54,933,419
CONTEST CLUB FINLAND	51,179,045
YU CONTEST CLUB	49,960,967
WORLD WIDE YOUNG CONTESTERS	41,903,638
BLACK SEA CONTEST CLUB	39,764,510
UKRAINIAN CONTEST CLUB	37,018,967
RUSSIAN CONTEST CLUB	35,444,417
URAL CONTEST GROUP	31,230,524
SOUTH EAST CONTEST CLUB	28,043,176
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	25,922,533
CROATIAN CONTEST CLUB	24,679,803
SOCIETY OF MIDWEST CONTESTERS	24,331,790
MAD RIVER RADIO CLUB	22,764,676
CT RI CONTEST GROUP	22,502,015
LZ CONTEST TEAM	22,374,867
HA DX CLUB	21,775,433
SOUTHERN CALIFORNIA CONTEST CLUB	21,435,377
CENTRAL TEXAS DX AND CONTEST CLUB	20,789,376
TENNESSEE CONTEST GROUP	20,552,405
CARIBBEAN CONTESTING CONSORTIUM	19,584,176
SP DX CLUB	19,275,905
LITHUANIAN CONTEST GROUP	18,193,920
WESTERN WASHINGTON DX CLUB	17,547,147
LATVIAN CONTEST CLUB	15,746,083
TUPY DX GROUP	15,426,523
NORTH COAST CONTESTERS	13,361,705
TARTU CONTEST TEAM	13,325,784
FOX CONTEST CLUB	12,990,745
SKY CONTEST CLUB	12,297,028
BASHKORTOSTAN DX CLUB	12,054,950
GUARA DX GROUP	11,491,584
CONTEST GROUP DU QUEBEC	11,075,121
VK CONTEST CLUB	10,227,224
MINNESOTA WIRELESS ASSOCIATION	10,144,142
SRCC (STAVROPOL REGIONAL CONTEST CLUB)	9,994,475
BRITISH COLUMBIA DX CLUB	9,824,702
EAST COAST CANADA CONTEST CLUB	8,819,488
4M5DX GROUP	8,073,455
CENTRAL ARIZONA DX ASSOCIATION	7,961,588
VRHNIKA CONTESTERS	7,276,840
KYIV CONTEST GROUP	7,250,152
NORTH TEXAS CONTEST CLUB	7,185,361
KANSAS CITY DX CLUB	6,679,505
LNDX CLUB	6,603,904
CAJUN CONTEST CLUB	6,442,316
SUCC	6,426,882
WEST SERBIA CONTEST CLUB	6,247,086
HUDSON VALLEY CONTESTERS & DXERS	6,171,576
ARUK	6,156,246
BELARUS CONTEST CLUB	5,813,857
TIKIRRIKI CONTEST CLUB	4,883,126
GRAND MESA CONTESTERS OF COLORADO	4,455,144
ORENBURG CONTEST CLUB	4,443,962
ORDER OF BOILED OWLS OF NEW YORK	4,212,785
MARITIME CONTEST CLUB	4,098,867
DX XE	3,821,214
CENTRAL SIBERIA DX CLUB (CSDXC)	3,432,040
TOP OF EUROPE CONTESTERS	3,298,890
KKKK (CONTEST CLUB KRASNODARSKOGO KRAYA)	3,289,835
SHAKHAN CONTEST CLUB	3,215,253
TEMIRTAU CONTEST CLUB	3,142,696
ALABAMA CONTEST GROUP	3,138,811
GRUPO ARGENTINO DE CW	3,012,138
ALRS SAINT-PETERSBURG	2,781,573
MOSCOW RADIO CLUB	2,430,691
CAROLINA DX ASSOCIATION	2,319,040
CZECH CONTEST CLUB	2,292,752
ROCHESTER DX ASSOCIATION	2,266,922
OMSK RADIO CLUB	2,257,297
SP CONTEST CLUB	1,975,129
SASKATCHEWAN CONTEST CLUB	1,922,313
BOSNIA-HERZEGOVINA CONTEST CLUB	1,868,225
OKLAHOMA DX ASSOCIATION	1,853,172
UTAH DX ASSOCIATION	1,806,998
NRC (NOVOKUZNETSK RADIO CLUB)	1,611,512
TERA RADIO CLUB	1,423,825
IVANOVO DX CLUB	1,405,772
CDXC	1,339,606
NOR	1,269,539
ARCK	1,246,688
ALBERTA CLIPPERS	1,107,006
POISK	1,020,498
DANISH DX GROUP	1,006,169
PODOLSK RADIO CLUB	986,807
RAAWG	893,429
MARCONI CONTEST CLUB	872,672
AUSTRIAN CONTEST CLUB	806,630
CHILTERN DX CLUB	751,693
U-DX-C	669,264
NORTHERN ILLINOIS DX ASSOCIATION	622,690
ORARI	611,982
VLADIMIR RADIO CLUB	601,652
OBNINSK QRU CLUB	584,685
ISTRITA BUZAU	526,012
SIAM DX GROUP	510,119
RU-QRP CLUB	475,507
WEST PARK RADIOPS	475,206
KENTUCKY CONTEST GROUP	470,003
HARC (HIGHWAY AMATEUR RADIO CLUB)	429,422
KOLOMNA	340,123
BAY AREA WIRELESS ASSN	329,898
SAN DIEGO DX CLUB	322,948
NOVIOMAGUM DX CLUB	273,360
SERPUKHOV CLUB	222,053
RTTYCJ(RTTY CONTESTERS OF JAPAN)	195,295
SAO PAULO CONTEST GROUP	190,105
DAUBERVILLE DX ASSN	177,173
WILLIAMSBURG AREA AMATEUR RADIO CLUB	108,777
NOGINSKY	104,328
NANAIMO AMATEUR RADIO ASSOCATION	76,925
YO DX CLUB	76,277
RADIO CLUB VENEZOLANO	74,697
METRO DX CLUB	50,670
R4F-DX-G	46,045
C.S.M CRAIOVA	18,634

USA QRM

My first WPX in a very long time. Many thanks to K5HAB and W5HAB for letting me visit and operate . . . **AA5B**. I only got to operate for an hour or two with my MFJ-9020 but I had a lot of fun! . . . **AA5TB**. Always fun. QRN a little high. Did better than last year and look forward to the next. Thanks to all . . . **AA7FK**. Slow going on Friday night and Saturday morning, but a big improvement in conditions by Saturday night. Thanks to all the ops who make it a great event . . . **AB3CX**. Condx not bad, except for the thunderstorms which came through 1.5 hrs before the end. Equipment problems abounded. Apologies to all those who had to decipher my lousy CW. Also noticed that AB3EI is a terrible contest call. See you next year (with a new call) . . . **AB3EI.** This was like two separate contests, one in EU and another in NA! . . . **AK1W**. I was all set to go with automated contesting (first time) and my computer crashed! Spent most of the weekend recovering everthing. Finally go it going again and was able to almost make my score from 2006. My setup has improved, so I'll be ready to compete next year . . . **KØLDS**. Glad to hear signals on 10 and 15! . . . **K3GW**. Had the flu and wasn't sure I was going to operate at all, but this was so much fun I managed to keep at it on and off all weekend. All S&P. Next time will try some running too. My Hexbeam started acting strange on Sunday and found a branch had snagged it . . . **K4XD**. Used WW II vintage handkey, a little sloppy at times . . . **K5BZH**. My first WPX! Elecraft K2 running 5W to Hustler 6BTV on my roof about 20 feet up. Two tuned radials for every band except 80m, which has none. My roof is too small! Good fun even if conditions made QRP very challenging . . . **K6DBG**. Great contest at the bottom of the cycle! 15 meters needed help! Nice to work the 7XØ on 80 and have the J28 call me on 20. Thanks for the great time! . . . **K8GL**. Horrible conditions. Heard many EU stations that did not hear me. Heard zero JA's or OC . . . **KC7UP**. First time in this contest. Lots of fun! Can't wait for next year! . . . **KC8SQC**. Wow. I loved this contest. A lot of fun. I'm hoping I place in the Rookie cataegory! . . . **KE5FRF**. Thanks to Ranko, YT6A/4O3A for letting me break in his new U.S. callsign . . . **KO3A**. After 13 years away it is nice to be back. Operated with only ground-mounted vertical and KW. Boy did I miss the fun! . . . **KQ8M**. If I knew that I was going to be this close to 1 million points I would have taken a shorter lunch and dinner break! . . . **KR2Q**.Here it is late May and a pipeline to West Africa on 40m from MT. Got 5D5A on first call right after QSYing from 20. Flipped the dial once and there he was. Now that's the way I like to work a new prefix! . . . **KS7T**. Some on the East Coast see the WPX as a combination of two contests, DX and SS. When the DX slows down they shift to running stateside stations. In that view the past WPX was the best of all possible worlds for them. . . . **KS9K**. With tribander 20K more points than last year! . . . **N4DXI**. Despite high line noise half-decent conditions Sunday on 20 allowed me to have a few minutes of fun for the first time in a long time . . . **N4TO**. Activity seemed down because of low sun spots and higher than normal K-index. Enjoyed using Super Duper contest program . . . **N4UH**. First ever CW contest. Had a blast. See u next time! . . . **N4VZ**. This was certainly one of the more grueling contests I've been in. Friday night I bailed at about 10 PM local as I just wasn't getting anywhere. I heard later that there was a great JA opening around midnight that I missed . . . **N6WG**. Really tough conditions with a simple shortened dipole at 35 ft. Lots of lightning/rain static Friday night with almost zero activity. Saturday night lower noise but same stations heard! In memory of Dave, W9LYA . . . **N9TF**. Great contest. I am looking forward to *better condition* next year. Thanks to all for the extra effort to pull me out of the bad conditions . . . **NA4C**. Surprised KH6ND and CX6VM came through the crashes on 160m. Surprised ZL6QH came through on 10m at all . . . **NE5D**. First time out for us. Had a great time. Hope conditions are better next year! . . . **NQ2F**. Condx bad Friday night. Much better Saturday night. Always a great contest. Rig Heath HW-9, antenna Carolina Windom . . . **NU4B**. Used the District of Columbia ARS callsign NW3DC on HF for the first time. Too many thought I was LW3DC, the curse of super check partial! . . . **NW3DC**. I thought for the first 20 some hours that this would be a NA/SA contest only as condx into EU and Asia were nil. But Saturday evening 20m opened to EU, ZL, and JA vy strong. Sunday morning another fb opening all day into EU . . . **WØETT**. It was wonderful to operate in the contest with Champ, E21EIC, who just passed his U.S. Extra class exam a few days earlier . . . **W1CU**. Bands punky, but made some good catches, especially New Zealand . . . **WA8REI**. Had fun. Couldn't work much of the contest, but hope I gave some folks some new prefixes. God bless! . . . **WJ5K**. First time with club call WQ8RP. Lousy DX antenna (67 ft. center fed dipole fed with 450 ohm line). Did surprizingly well for a "so-so" contester and marginal setup . . . **WQ8RP**.

CQ WW WPX CW CONTEST
ALL-TIME RECORDS

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

WORLD RECORD HOLDERS
Single Operator

1.8	IH9/OL5Y('98)	341,068	182
3.5	TAØ/Z33F ('02)	1,452,522	348
7.0	LU1IV('97)	7,671,456	702
14	4L8A('06)	6,083,910	870
21	ZX5J('05)	7,061,000	920
28	ZX5J('02)	6,787,440	857
AB	D4B('04)	16,619,000	1000

Multi-Operator Single Transmitter

P49V('01)		19,760,774	1034

Multi-Operator Two Transmitters

EF8M('07)		33,324,192	1256

Multi-Operator Multi-Transmitter

HC8N('99)		54,697,072	1264

U.S.A. RECORD HOLDERS
Single Operator

1.8	K1ZM('95)	40,446	107
3.5	K1ZM('93)	406,080	288
7.0	KG1D('05)	3,594,822	651
14	N2NC('06)	5,418,630	915
21	NU5A('99)	4,411,299	789
28	WW4M('01)	2,547,046	674
AB	AK1W('05)	8,650,704	916

Multi-Operator Single Transmitter

KM9P('01)		10,691,724	964

Multi-Operator Two Transmitters

KM4M('04)		16,283,745	1095

Multi-Operator Multi-Transmitter

KM3T('01)		21,103,320	1110

CLUB RECORD

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

WPX (Prefix) RECORD

HC8N('01) 1299

QRP/p RECORD

P4ØW('97) 4,018,208

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	IH9/OL5Y('98)	341,068	182
3.5	7XØRY ('07)	1,562,172	402
7.0	IG9B('04)	5,187,819	613
14	EA9LZ('98)	5,708,498	758
21	5X1Z('01)	6,362,352	782
28	ZS4TX('01)	4,602,028	722
AB	D4B('04)	16,619,000	1000

ASIA

1.8	4X4NJ('96)	259,420	170
3.5	TAØ/Z33F('02)	1,452,552	348
7.0	9K2HN('06)	4,541,970	606
14	4L8A('06)	6,083,910	870
21	A45XR('99)	6,557,697	843
28	HZ1AB('02)	3,669,994	659
AB	P3A('01)	10,723,620	870

EUROPE

1.8	SN2B('06)	323,140	302
3.5	S57AW('04)	1,333,014	489
7.0	TM7XX('06)	4,829,660	757
14	4O3T('06)	5,313,554	986
21	9HØA('02)	5,389,008	933
28	9HØA('01)	3,965,315	841
AB	CU2A('06)	8,153,512	964

NORTH AMERICA

1.8	VA1A('99)	103,680	120
3.5	FM5BH('97)	833,490	315
7.0	V26BA('97)	6,227,550	659
14	N2NC('06)	5,418,630	915
21	ZF1A('99)	5,330,129	799
28	FM5GU('01)	2,849,769	621
AB	WP2Z('99)	12,506,280	890

OCEANIA

1.8	KH6ND('07)	22,100	50
3.5	KH6ND('05)	476,928	207
7.0	ZM3A('07)	6,043,950	666
14	KH6ND('03)	4,126,690	730
21	KH6ND('99)	6,107,256	813
28	KH6ND('00)	1,523,008	424
AB	KH6ND('02)	7,996,774	862

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	LU1IV('97)	7,671,456	702
14	YW1A('91)	4,617,456	732
21	ZX5J('05)	7,061,000	920
28	ZX5J('02)	6,787,440	857
AB	P4ØW('94)	14,168,115	845

MULTI-OPERATOR SINGLE TRANSMITTER

AF	7W2OM('06)	19,164,355	1039
AS	P3A('02)	18,176,342	1046
EU	9A7A('01)	10,915,020	1044
NA	8P4A('02)	18,516,960	1056
OC	AH2R('01)	11,541,420	957
SA	P49V('01)	19,760,744	1034

MULTI-OPERATOR TWO TRANSMITTER

AF	EF8M('07)	33,324,192	1256
AS	RT9W ('03)	12,006,568	872
EU	RU1A('05)	14,648,208	1128
NA	KM4M('04)	16,283,745	1095
OC	ZL6QH('05)	13,312,768	952
SA	HC8N ('03)	30,928,268	1187

MULTI-OPERATOR MULTI-TRANSMITTER

AF	6V6U('97)	9,938,896	758
AS	A61AJ('02)	42,766,232	1244
EU	4OØA('00)	20,932,902	1143
NA	6Y2A('02)	38,821,328	1274
OC	ZL6QH('04)	16,143,840	1010
SA	HC8N('99)	54,697,072	1264

QRPp

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

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2007 WPX CW RESULTS

SINGLE OPERATOR

QRP/p

YT7TY	**A**	**1,544,732**	**1336**	**602**
TI5N	**A**	**1,430,030**	**1133**	**434**
			(Op: W8QZA)	
OK7CM	**A**	**1,002,540**	**1037**	**490**
KR2Q	**A**	**982,376**	**890**	**437**
OL4W	**A**	**738,278**	**883**	**419**
			(Op: OK1IF)	
OM7DX	**A**	**646,668**	**796**	**426**
US2IZ	**A**	**496,248**	**793**	**348**
YP8A	**A**	**462,500**	**598**	**370**
			(Op: YO8WW)	
RW6HJV/6	**A**	**453,832**	**668**	**376**
DL8MBS	**A**	**411,740**	**684**	**346**
N7IR	**A**	**357,552**	**572**	**312**
EA7AAW	**A**	**316,332**	**523**	**348**
JA1MCU	**A**	**314,944**	**465**	**266**
UA1CUR	**A**	**313,424**	**558**	**304**
RV3QX	*	237,552	493	294
HA5BA	**A**	**225,998**	**427**	**289**
LZ7H/QRP	**A**	**224,679**	**514**	**273**
F6FTB	**A**	**214,200**	**424**	**280**
LY5G	**A**	**209,376**	**497**	**288**
			(Op: LY2FE)	
K4ORD	**A**	**205,156**	**390**	**238**
WA8WV	**A**	**199,280**	**339**	**235**
YO4AAC	*	182,035	445	245
RA9AY	**A**	**167,178**	**319**	**187**
AA1CA	**A**	**166,779**	**325**	**213**
UX8ZA	*	157,542	364	231
UY5VA	*	148,608	345	216
RW3AI	*	147,705	373	229
OK2BWJ	*	144,936	396	244
W5KDJ	**A**	**140,556**	**342**	**212**
KT8K	*	139,860	354	210
HB9DAX	**A**	**136,983**	**294**	**231**
NA4BW	*	129,132	404	211
SP4DC	**A**	**118,080**	**337**	**240**
RW9RN/QRP	*	113,602	255	158
JA1NLX	*	106,928	214	164
G3YMC	**A**	**103,500**	**325**	**207**
RK4FB	*	95,004	289	182
EW1NA	**A**	**94,920**	**317**	**226**
UT2IO	*	94,248	287	198
PA1B	**A**	**91,674**	**301**	**198**
RA3FO	*	84,870	315	205
K3IU	**A**	**80,325**	**215**	**153**
RV3DBK	*	75,063	302	191
WA8REI	*	74,682	255	162
PAØADT	*	71,370	254	195
VA3RKM	**A**	**70,752**	**195**	**132**
DG8VE	**A**	**68,544**	**254**	**192**
N6WG	**A**	**67,636**	**297**	**148**
KO1H	*	56,658	175	133
8J4P/4	*	46,620	322	105
			(Op: JA4MRL)	
F5UKL/QRP	*	44,080	225	145
OM4RF	*	43,836	206	156
WA3RML	*	42,372	216	132
DL8AWK	*	38,624	197	142
KK4PQ	*	36,208	190	124
WQ8RP	*	34,770	198	122
			(Op: N8XX)	
DJ7EC	*	34,048	164	128
EU1AZ	*	33,154	156	121
IK1RAC	**A**	**32,092**	**137**	**113**
K3ATO	*	30,552	150	114
WC7S	*	28,971	192	111
UT5UUV	*	28,800	169	128
N4JF	*	27,233	135	113
VE6EX	**A**	**25,875**	**101**	**69**
IZ3GHP/QRP	*	22,680	119	105
RV9AZ	*	21,894	95	82
8J5P	*	18,565	181	79
YO2MAX	*	18,375	138	105
DL1JBE	*	17,928	124	108
LA1ENA	**A**	**17,820**	**141**	**110**
OK1OPT	*	17,069	126	101
			(Op: OK1JOC)	
DL5ASE	*	15,974	115	98
DL1LAW	*	14,276	106	86
ON3AD	**A**	**12,848**	**106**	**88**
SP2DNI	*	12,684	98	84
K5OI	*	12,551	103	77
UAØSBQ	*	9,853	74	59
BG4SGP	**A**	**9,462**	**79**	**57**
N4CYV	*	9,450	97	75
K6DBG	*	7,840	78	49
I1BAY	*	7,705	81	67
DL2SBA	*	7,630	78	70
DL9GTI	*	7,276	77	68
9A/OK1CZ	**A**	**6,206**	**66**	**58**
PA3GCV	*	5,841	63	59
K4WY	*	5,390	50	49
KD4HXT	*	4,788	60	42
SM6AHU	**A**	**4,675**	**59**	**55**
DL3BVA	*	3,795	63	55
JK1TCV	*	3,500	30	28
AF9J	**A**	**3,380**	**61**	**52**
HB9AYZ	*	3,300	55	50
DM1LM	*	3,268	52	43
SNØRQH	*	3,232	38	32
HB9IQB	*	3,050	56	50
SM5EFX	*	2,940	53	49
KC8SQC	*	2,829	47	41
W2JEK	*	2,538	33	27
DL9NDV	*	2,226	47	42
KJ4FW	*	1,995	40	35
PY4ZO	**A**	**1,064**	**20**	**19**
USØYA	*	875	25	25
AC5ZO	*	840	24	24
N4OB	*	480	16	16
VA7CPC	**A**	**324**	**11**	**9**
LZ2LE	*	1	1	1
MØBPQ	**28**	**81,952**	**258**	**197**
EW6DX	**28**	**41,040**	**218**	**152**
OM7PY	**28**	**21,960**	**150**	**122**
SQ6ELV	**28**	**21,358**	**155**	**118**
LZ1MG	**28**	**20,680**	**138**	**110**
US6IMA	**28**	**17,670**	**118**	**93**
G3WW	*	8,162	98	77
SP4TBM	*	7,854	88	77
OH6NPV	**28**	**5,984**	**82**	**68**
LY2BBF	**28**	**1,776**	**38**	**37**
JE2LPC	**28**	**48**	**6**	**6**
PW2C	**21**	**268,359**	**351**	**273**
			(Op: PY2WC)	
UX1UX	**21**	**105,300**	**350**	**234**
UU4J	*	84,920	254	220
			(Op: UU4JO)	
HG3IPA	**21**	**83,848**	**332**	**223**
			(Op: HA3JB)	
ER2RM	**21**	**10,707**	**95**	**83**
JH7RTQ	**21**	**10,064**	**94**	**68**
WA6FGV	**21**	**8,591**	**83**	**71**
JR1NKN	*	6,944	76	62
RA3XEV	**21**	**5,985**	**67**	**57**
OK1AIJ	**21**	**4,697**	**65**	**61**
LY2BNL	**21**	**2,688**	**54**	**48**
JQ6PAQ	*	900	28	25
JA1KPF	*	45	5	5
LZ1VB	**14**	**328,042**	**548**	**403**
HA6IAM	**14**	**252,350**	**583**	**350**
RU2FM	**14**	**210,904**	**459**	**328**
UA6LCJ	**14**	**147,108**	**407**	**276**
G3LHJ	**14**	**114,210**	**288**	**235**
UX2MF	**14**	**99,296**	**300**	**232**
HA7MW	*	99,051	303	241
NØLY	**14**	**59,334**	**221**	**174**
K3TW	**14**	**52,909**	**170**	**157**
OK1DSA	**14**	**48,174**	**223**	**186**
UT4MF	*	39,936	180	156
II9H	**14**	**38,394**	**197**	**162**
			(Op: IT9LNH)	
KP4FP	**14**	**26,300**	**108**	**100**
			(Op: KP3T)	
F5VBT	**14**	**23,684**	**145**	**124**
K4RDU	**14**	**14,592**	**115**	**96**
RW3VZ	*	12,879	87	81
SA8MM	**14**	**12,672**	**98**	**88**
HA5OB	*	9,296	86	83
ND3D	*	6,283	71	61
NF8M	**14**	**5,307**	**67**	**61**
VO1TA	**14**	**3,069**	**33**	**31**
W8EH	*	1,428	29	28
KC0LND	*	1,320	34	33
ZB2X	**14**	**1,216**	**32**	**32**
			(Op: OH2KI)	
AA5TB	**14**	**1,026**	**27**	**27**
KZ5OM	*	713	23	23
			(Op: K5III)	
K5III	**14**	**247**	**15**	**13**
ES1CW	**7**	**525,844**	**506**	**374**
UU2CW/QRP	**7**	**438,962**	**467**	**331**
SP1AEN	**7**	**300,196**	**433**	**299**
HA8GK	**7**	**214,148**	**335**	**249**
SP4GFG	*	140,737	272	211
K2TA	**7**	**119,850**	**200**	**170**
YU1LM/QRP	**7**	**103,104**	**234**	**192**
G4DBW	**7**	**81,480**	**195**	**168**
F5UL	**7**	**76,152**	**171**	**152**
RU3RM	**7**	**56,990**	**177**	**139**
NE6M	**7**	**44,649**	**156**	**121**
NT4D	**7**	**36,810**	**97**	**90**
N2JNZ	*	32,634	130	111
NU4B	*	29,716	101	92
LY2GW	**3.5**	**151,182**	**315**	**227**
HG6EU/QRP	**3.5**	**45,225**	**160**	**135**
			(Op: HA6VA)	
RA3WUO	**3.5**	**11,956**	**88**	**61**
RA3QH	*	7,788	72	59
JF2MBF	**3.5**	**135**	**12**	**9**
LY4BF	**1.8**	**924**	**21**	**21**
DJ3GE	**1.8**	**160**	**10**	**10**

SINGLE OPERATOR

UNITED STATES

WC1M	**A**	**5,045,832**	**2182**	**792**
KO3A	**A**	**4,980,512**	**2205**	**808**
			(Op: K1ZZ)	
WK1Q	**A**	**4,562,402**	**2092**	**758**
			(Op: K1MK @K1TTT)	
KQ2M	*	2,139,340	1297	590
AK1W	*	1,048,424	828	442
			(Op: K5ZD)	
W1EBI	*	225,982	303	206
***W2TZ**	**A**	**1,089,511**	**903**	**467**
***WB2AA**	**A**	**438,728**	**541**	**317**
***AI2N**	**A**	**256,968**	**392**	**258**
*WW2J	*	184,164	254	206
*K2MK	*	142,681	261	187
*AI2I	*	131,290	262	190
*N2FF	*	130,140	229	180
*KD2MX	*	121,128	318	196
*WA2JQK	*	107,525	253	187
*W2LE	*	78,542	198	173
*WA2EYA	*	69,003	234	153
*WA2MCR	*	62,764	179	142
*KA2D	*	48,477	160	143
*K2YLH	*	37,820	147	124
*AA1O	*	21,534	106	97
*AA2NA	*	5,800	66	58
***KR2AA**	**14**	**269,133**	**453**	**317**
*WB2ART	*	594	22	22
KC3R	**A**	**5,755,506**	**2575**	**831**
			(Op: LZ4AX)	
AA3B	**A**	**4,688,571**	**2249**	**767**
K3ZO	**A**	**3,931,785**	**1782**	**715**
N3UM	*	1,354,764	1001	493
K3WI	*	1,270,344	1080	492
W3FV	*	409,656	469	312
KE3OM	*	98,464	253	181
			(Op: K3NCO)	
K4HAL	*	436,560	593	340
AD4EB	*	403,071	661	339
NE4M	*	323,605	577	305
N4VZ	*	177,390	409	219
W4NTI	*	172,050	385	222
N4DW	*	170,984	349	232
W4NZ	*	144,000	293	200
KE1F	*	66,845	196	145
AE4EC	*	60,976	205	148
N4UH	*	33,578	123	103
NI5F	*	20,430	122	90
KA1ARB	*	13,728	96	78
K4OH	*	3,640	35	35
WN1GIV	**21**	**766,752**	**999**	**489**
			(Op: N4BP)	
W9WI	**14**	**1,178,240**	**1180**	**560**
AC4TT	**14**	**697,231**	**836**	**467**
			(Op: W1MO)	
KU8E	*	252,047	494	307
N4PJ	*	194,766	408	286
N4TO	*	66,906	180	177
WI4R	**3.5**	**176,358**	**368**	**221**
			(Op: W4SVO)	
***WJ9B**	**A**	**2,289,030**	**1751**	**615**
***WK2G**	**A**	**1,649,652**	**1344**	**556**
***K4TD**	**A**	**1,182,168**	**1005**	**468**
*N4EEB	*	709,280	814	403
*KE4R	*	677,376	750	378
*N4IG	*	577,777	630	373
*NA4K	*	532,923	674	349
*N4PSE	*	478,800	560	304
*NS4T	*	474,376	638	344
*AA4NC	*	357,028	493	287
*W4YE	*	329,294	434	301
*N3CZ	*	306,973	410	251
*WA4JUK	*	302,244	557	283
*KY4F	*	290,997	576	279
*K4MF	*	263,418	420	258
*W6UB	*	236,328	407	258
*W4MY	*	209,950	397	247
*W4ARM	*	208,864	386	244
*KE4KY	*	176,015	376	235
*W4LT	*	167,562	305	214
*KI3O	*	156,107	313	203
*K4BK	*	153,612	338	204
*WA3GNW	*	138,580	293	205
*W4RYW	*	133,168	232	203
*K4OD	*	120,712	306	191
*NA4C	*	118,272	311	192
*WA4OSD	*	97,888	297	184
*N4HXI	*	84,672	240	168
*N4WO	*	83,210	239	157
*WØQOG	*	79,254	197	153
*K4EU	*	79,218	222	162
*W4KPG	*	75,802	183	151
*K4FTO	*	72,534	211	154
*NU4I	*	70,707	206	147
*N4TB	*	69,136	222	149
*AA4SD	*	58,499	180	137
*W4RQ	*	55,440	128	110
*N4DXI	*	53,382	157	123
*W4BW	*	48,256	198	128
*WD4AHZ	*	43,776	184	144
*K4LNN	*	31,944	169	121
*KN4Y	*	25,623	165	117
*NA4RO	*	24,823	111	103
			(Op: W4BCG)	
*N3JT	*	20,340	96	90
*K4APG	*	19,344	111	93
*NK4CC	*	17,563	115	91
			(Op: K4CC)	
*K4ZH	*	14,620	98	85
*WC4J	*	7,410	72	65
*W4BCG	*	6,944	68	62
*AC4JI	*	6,750	50	45
*N4VA	*	4,576	50	44
*K6ETM	*	4,356	38	36
*K3MZ	*	4,340	41	35
*WB5NMZ	*	4,278	41	31
*W5RW	*	4,255	44	37
*AC4PQ	*	2,457	29	27
***NA4W**	**28**	**18,130**	**133**	**98**
			(Op: K4WI)	
***WB4TDH**	**21**	**67,550**	**231**	**175**
***N2WN**	**14**	**820,000**	**785**	**500**
*K4OSO	*	9,108	76	69
*KO4OL	*	2,613	40	39
*N5PU	*	1,728	37	36
*N4MM	*	1,846	26	26
***WF3C**	**7**	**145,122**	**270**	**201**
***WJ5K**	**1.8**	**3,864**	**48**	**42**
			(Op: K4EJ)	
KT2Z	**A**	**3,371,900**	**2248**	**700**
			(Op: K5NA)	
NT5C	**A**	**3,152,480**	**2237**	**680**
(Op: N3BB)				
WXØB	**A**	**2,856,216**	**2098**	**698**
			(Op: AD5Q)	
AA5B	*	1,914,204	1672	593
			(Op: @K5HAB)	
KZ5D	*	1,378,120	1423	526
WC5T	*	1,327,670	1308	515
			(Op: K5PI)	
NZ5DX	*	1,289,960	1131	542
			(Op: K5MR)	
NQ5D	*	1,152,404	1280	484
			(Op: K5NZ)	
N5PO	*	908,040	956	460
NF5T	*	712,332	1006	421
			(Op: K5BG)	
N5XZ	*	423,981	618	369
NE5D	*	389,059	520	313
			(Op: K5RX)	
KD5JAA	*	71,504	224	164
K5ER	*	5,768	60	56
WØZW	*	3,072	34	32
K5KA	**7**	**388,578**	**451**	**274**
***W5RYA**	**A**	**309,520**	**629**	**292**
***KØGEO**	**A**	**227,908**	**581**	**251**
***KC5R**	**A**	**223,872**	**470**	**264**
*NJØIP	*	69,394	251	157
*W5TD	*	60,198	245	158
*KM5PS	*	56,927	221	151
*KE5AQD	*	54,054	207	143
*W5PQ	*	53,505	219	145
*K5BZH	*	45,288	224	148
*KE5FRF	*	36,625	174	125
*KD5J	*	16,992	128	96
*K5GM	*	525	16	15
*N5EYT	*	304	16	16
NY1Q	*	157,696	363	224
			(Op: N3KCJ)	
W1UJ	*	81,830	227	167
K1KD	*	32,877	168	117
KC1F	*	26,751	124	111
NN1N	**7**	**1,623,247**	**869**	**499**
K1KI	**7**	**759,021**	**500**	**339**
NM1JY	*	476,470	492	310
***NV1N**	**A**	**2,939,640**	**1738**	**660**
			(Op: N1UR)	
***W1TO**	**A**	**459,585**	**490**	**315**
***K1TR**	**A**	**221,816**	**334**	**233**
*WA1Z	*	128,760	237	174
*W2QQ	*	94,162	261	178
*NJ1H	*	93,687	226	167
*KZ1M	*	36,864	198	128
			(Op: W1EQ)	
*N1AA	*	12,670	102	70
*K1SND	*	11,970	79	70
***W1/CT1AGF**	**14**	**25**	**5**	**5**
***KØXP**	**3.5**	**206,910**	**344**	**242**
WN2O	**A**	**2,380,242**	**1456**	**602**
			(Op: N2GC)	
AB3CX	**A**	**1,246,352**	**1008**	**488**
K2FU	**A**	**1,237,064**	**1001**	**478**
KW2O	*	506,688	604	348
			(Op: N2UN)	
N2NI	*	109,394	214	166
W2FUI	*	69,036	173	132
WT4Q	*	19,360	94	80
KC2GOW	*	8,232	55	49
K2XA	*	1,725	25	23
N2MM	**14**	**1,618,515**	**1266**	**631**
AB2MH	*	6,844	65	59
KB3P	*	57,472	160	128
N3NZ	*	35,547	164	123
W3TUA	*	24,947	121	101
W3GG	*	20,967	93	87
W3BGN	**3.5**	**379,572**	**444**	**282**
***N3XL**	**A**	**139,178**	**279**	**202**
***N8NA**	**A**	**109,560**	**214**	**166**
***NS3T**	**A**	**106,922**	**305**	**193**
*AB3EI	*	97,527	253	177
*WA1LWS	*	72,063	208	153
*WA3OFF	*	56,232	177	132
*WA2VQV	*	52,470	197	159
*W6AAN	*	29,866	128	109
*NW3DC	*	9,664	70	64
			(Op: W3DQ)	
*K3GW	*	6,944	68	56
*KB3KRW	*	2,769	41	39
*KF3CV	*	152	8	8
*N3GE	*	144	10	9
NE4AA	**A**	**6,863,606**	**2839**	**887**
			(Op: K1TO)	
K4RO	**A**	**2,757,956**	**2053**	**694**
KW3A	**A**	**2,535,060**	**1784**	**668**
			(Op: N4PN)	
N4ZZ	*	2,486,880	1906	660
WO4O	*	2,095,848	1788	626
K4PV	*	1,611,708	1548	588
			(Op: K4PV)	
K2SX	*	1,216,254	1250	503
W4QM	*	1,023,864	944	444
K4LQ	*	551,178	535	354
K4AMC	*	511,224	626	357
W7QF	*	487,508	494	322
K1GU	*	482,022	670	366

*AD5QB	*	208	15	13
*N5DO	14	551,880	756	438
*N4IJ	*	206,565	356	293
*N5ER	7	172,825	284	223
NY6N	A	4,099,354	2429	698
				(Op: N6MJ @ W6YI)
NF6A	A	2,053,200	1399	600
				(Op: K6XX)
W6TK	A	958,329	1133	457
N6AA	*	610,203	774	363
K6NA	*	414,176	566	301
W4UAT	*	396,651	617	327
AA6PW	*	348,900	746	300
NW6P	*	313,536	597	276
WF6C	*	271,794	615	291
				(Op: N6XI)
K6LRN	*	221,131	413	251
KI6T	*	104,234	265	211
NA6Q	*	101,897	304	173
				(Op: W6SJ)
W6NKR	*	86,508	224	162
KG6ZHC	*	32,656	155	104
AE6RF	*	29,290	142	101
W6VNR	*	22,176	107	84
N6AN	*	21,186	128	99
W1RH	*	20,273	139	97
KZ6D	7	1,304,794	924	449
				(Op: W6NL)
*WT6K	A	119,175	350	175
*NK6A	A	68,949	282	163
*W6IYS	A	68,250	265	150
*WA6BOB	*	62,463	217	141
*N6MUF	*	61,716	227	148
*K6DEX	*	50,688	202	132
*WDØAVV	*	29,070	177	114
*K6CSL	*	27,664	165	112
*AD6ZJ	*	24,990	145	105
*K6OWL	*	17,617	100	79
*W6SZN	*	14,784	119	88
*N6NM	*	6,944	77	62
*KG6HAF	*	6,431	67	59
*K6LE	*	5,050	61	50
*WA6L	*	4,752	67	54
*K6BBQ	*	143	12	11
*NP4IW/KM6	21	12,616	128	83
*KM6Z	14	161,336	440	268
*N6HE	*	12,408	106	88
*W6/VK2IMM	7	28,980	101	90
*N6AJR	*	2,686	38	34
WR7HE	A	1,495,920	1236	542
				(Op: K7QQ)
KC7V	A	1,477,069	1369	517
K7ZZ	A	988,524	1124	452
K7WP	*	807,708	938	422
W7ZR	*	450,208	804	352
W7OM	*	286,713	504	287
W7SW	*	207,000	449	250
NR7DX	*	107,793	343	203
				(Op: K7ABV)
NI7R	*	96,330	253	190
KS7T	*	60,792	228	149
KC7UP	*	33,900	131	113
NI7F	*	33,900	191	113
N6KW	*	32,944	168	116
K7GK	*	24,840	120	90
K7EG	*	24,096	117	96
K7LV	*	15,176	79	56
K8IA	14	1,247,992	1256	607
W7TTE	*	35,595	116	105
N7XY	*	5,734	68	61
*AB7E	A	404,999	673	329
*N7ZG	A	292,468	513	289
*NQ7R	A	251,424	597	291
*W7YAQ	*	180,223	350	229
*W3CP	*	158,180	308	220
*NE7D	*	107,450	260	175
*AB7RW	*	99,630	315	205
*W7QN	*	73,899	264	161
*NG7Z	*	64,260	272	153
*W7VXS	*	26,182	171	106
*W4LSC	*	16,100	114	92
*K7TR	*	8,778	72	57
*KJ7UN	*	3,225	46	43
*KD7GIM	*	165	13	11
*WA7LNW	21	39,585	219	145
*N7WA	14	204,057	510	287
*KN7Y	*	96,336	334	216
*N7EIE	*	1,312	36	32
*AA7AX	7	203,616	403	252
*N7MAL	*	128,152	305	193
*KN7T	*	91,332	285	177
*AA7FK	*	78,884	221	164
K8GL	A	838,008	780	452
NF8R	A	566,490	613	345
W8OHT	A	282,653	432	271
K8WDN	*	190,986	364	229
K8UT	*	156,176	290	227
N8PW	*	153,408	264	204
N4ZR	*	116,600	295	200
KQ8J	*	20,880	103	90
				(Op: K8BB)
W8TK	*	11,502	81	71
WV8JR	1.8	56,760	212	132
				(Op: W8LRL)
*KV8Q	A	980,120	1036	458
*W8IQ	A	244,237	436	259
*K8EE	A	226,028	475	242
*W8GOC	*	187,920	361	232
*W8IDM	*	116,688	298	208
*WB8JUI	*	103,776	287	184
*W8PN	*	95,930	269	181
*K8GT	*	78,720	191	164
*AA8IA	*	44,849	209	149
*NO8R	*	32,549	146	121
*K8ZIZ	*	24,289	141	107
*K8WV	*	19,975	93	85
*NG9T	14	66,774	223	186
				(Op: K8IR)
*AF8C	*	36,585	157	135
*W9JJC	*	1,170	26	26
*W8TM	7	195,120	311	240
W9OP	A	980,464	874	466
N9CK	A	722,061	839	423
N9FC	A	370,175	467	335
W9RE	*	280,674	497	279
K9UQN	*	278,409	461	309
AI9L	*	14,898	103	78
KB9YGD	*	13,689	96	81
W9SE	14	349,443	528	369
KG9N	*	111,555	321	201
AB9H	*	674,784	709	396
WX9U	*	524,160	564	360
K9NW	3.5	234,228	414	262
*KS9K	A	1,441,968	1079	528
				(Op: N4TZ)
*K9QVB	A	909,904	969	464
*KZ9O	A	772,191	1035	441
*K9OM	*	588,528	740	366
*AC9X	*	215,712	354	252
*AA9D	*	88,403	203	173
*W9OA	*	76,184	252	178
*AK9F	*	53,157	199	141
*NS9I	*	52,338	202	143
*N9LYE	*	52,050	250	150
*KC9GBX	*	27,260	111	94
*AK9I	*	22,366	133	106
*W9HR	*	5,568	50	48
*KA9VHG	*	5,141	59	53
*K9HCK	*	4,212	59	52
*WQ9T	*	1,222	30	26
*KU8T	*	378	20	18
*WD9DZV	28	6,882	84	62
*W9ILY	21	35,360	182	136
*KT3X	14	307,536	502	344
*N9LAH	7	372	12	12
*N9TF	1.8	800	25	20
KU1CW	A	3,271,225	2260	731
KOØU	A	1,494,138	1442	554
WØBH	A	1,035,119	1481	479
KTØR	*	871,624	1091	442
WT7TT	*	730,800	1226	435
				(Op: WØZA)
WRØA	*	591,429	948	411
				(Op: WØMU)
KØDEQ	*	531,112	673	394
WKØP	*	405,720	690	360
WØJPL	*	369,321	586	307
				(Op: KØJPL)
W4RK	*	236,208	521	266
KSØT	*	234,090	466	289
NØAT	*	159,772	473	236
WBØN	*	140,399	374	217
KØJJR	*	122,208	338	201
WAØMHJ	*	35,075	197	115
KJØG	*	8,308	78	67
KT5E	7	653,796	720	381
*KØPK	A	623,616	940	406
*WØETT	A	510,720	781	384
*NØBUI	A	172,788	460	242
*WØUY	*	145,520	315	214
*KØCF	*	132,840	360	205
*KØKP	*	64,218	236	154
*KØJV	*	57,222	247	153
*W8UE	*	52,848	212	144
*KØHB	*	45,966	175	141
*KØRY	*	35,508	189	132
*KSØM	*	31,750	164	125
*ADØH	*	30,186	158	117
*KØHW	*	29,640	166	120
*WS4Y	*	28,884	167	116
*NØKBD	*	28,476	128	113
*KCØVKN	*	27,501	134	103
*KØLDS	*	26,620	124	110
*WAØIAF	*	18,270	111	87
*WBØYJT	*	14,670	103	90
*NØIBT	*	12,960	115	81
*NGØK	*	11,627	102	77
*WBVM	*	2,268	30	27
*NØGOS	14	64,584	264	184
*NAØVY	*	4,425	62	59

NORTH AMERICA

BAHAMAS

*C6AYM	A	2,559,984	1512	532
				(Op: K9GY)
*C6AWL	7	1,957,122	847	486
				(Op: RA3CO)

CUBA

*CO2JD	7	365,712	368	228

PANAMA

*HP1AC	14	142,128	270	216

HONDURAS

*HR1RTF	A	16,576	90	64

ALASKA

AL1G	14	18,392	118	76

PUERTO RICO

*WP3C	28	132,200	285	200

CANADA

VY2TT	A	7,864,881	2712	883
				(Op: K6LA)
VB3A	A	6,721,527	2575	821
				(Op: VE3AT)
VE3JM	*	5,925,920	2217	770
VC2M	A	5,074,420	2031	754
				(Op: VE2TZT)
VE3EY	*	5,003,024	2039	718
VA2WDQ	*	1,934,200	1201	509
VA1MM	A	1,324,024	978	439
VC5X	A	1,221,363	1125	429
				(Op: VE5UF)
XM2FK	*	735,168	692	336
VE3CR	*	698,629	585	373
VE1MC	*	645,498	586	327
VA3EC	*	142,800	263	168
VE7VR	A	111,072	236	156
VO1HE	21	137,602	268	214
VC6Z	14	1,192,674	1051	511
VE3VO	14	25,755	119	101
N2WQ/VE3	7	1,101,594	693	377
*VE3DZ	A	3,317,688	1638	649
*VE1RGB	A	1,219,779	844	407
*VE3JAQ	*	923,910	816	390
*VE3XD	*	808,979	680	391
*VE6CNU	A	667,974	760	326
*VE7XF	A	615,285	617	339
*XM2AWR	A	601,472	605	296
				(Op: VE2AWR)
*VE3GSI	*	486,717	532	301
*XL2SG	*	477,428	546	289
*VE3KI	*	341,621	385	259
*VE3RER	*	243,718	322	233
*VE3DUS	*	207,366	303	214
*VE3TW	*	187,370	319	205
*VE3OM	*	163,125	279	225
*VE4YU	A	149,575	308	193
*VA3XOV	*	120,020	233	170
*VE3XB	*	117,047	202	161
*VA7ND	A	84,494	244	166
				(Op: VE7ALN)
*VE3XAT	*	70,821	171	129
*VA3HUN	*	57,984	179	128
*VE3RCN	*	38,592	122	96
*VE3WDM	*	33,810	128	105
*VY1EI	A	17,784	100	78
*VE3LXL	*	4,040	48	40
*VA3RJ	*	4,784	50	46
*XM2FU	14	1,205,722	1015	497
*VE2XAA	*	725,274	506	333
*VA7KOJ	14	110,192	262	194
*VE3CX	14	95,882	219	191
*VE2HLS	*	85,920	200	179
*VE3FJ	*	43,520	153	128
*VE3IAE	7	397,316	472	284

TURKS AND CAICOS

*VP5/KN6Y	A	601,338	704	318

MEXICO

6F75A	A	1,196,183	1153	401
				(Op: XE1MM)
XE2S	14	413,960	604	316
*6I2MX	A	189,771	309	183
*6I2RC	*	4,601	47	43
*6H1CT	14	551,320	707	358

AFRICA

TUNISIA

3V8BB	A	13,036,170	3812	966
				(Op: YT1AD)

GUINEA

*3XD2Z	A	2,334,607	1267	569

TANZANIA

5H3EE	A	2,864,932	1530	622

SENEGAL

6W1SE	A	1,466,800	952	475

ALGERIA

7XØRY	3.5	1,562,172	653	402

GHANA

*9G5ZS	A	69,789	151	129

MOROCCO

*CN8YR	A	12,200	52	50

CANARY IS.

EA8MQ	A	1,697,448	913	428
AM8AAG	21	704	16	16
*AO8R	A	1,484,964	825	494
				(Op: EA8BEX)
*EA8BQM	*	198,800	287	200
*AN8AUW	*	615	15	15
				(Op: EA8AUW)
*EC8ADW	*	528	12	12
*ED8AMY	28	384	12	12
*EB8BRZ	*	319	11	11
*EA8DA	14	702,240	592	399
*EF8A	*	72	6	6
*EA8NQ	7	248,970	218	193

SOUTH AFRICA

ZS4TX	A	2,159,672	957	499
ZS1EL	*	77,469	176	147
*ZS6AA	A	764,688	703	358
*ZS6C	*	112,480	229	152
*ZS4JAN	*	65	5	5

ASIA

VIETNAM

*3W9R	A	38,850	145	111

AZERBAIJAN

*4K9W	A	854,502	731	363
*4K8M	28	46,104	168	113

BRITISH BASES ON CYPRUS

ZC4LI	1.8	93,112	144	113

GEORGIA

4L8A	7	4,351,570	1314	619
*4L2M	7	935,640	502	339

ISRAEL

4X6ZK	28	144	8	8
*4Z5OQ	A	57,344	162	128
*4X1VF	28	36,462	120	103

CYPRUS

P33W	A	10,034,956	3359	842
				(Op: RA3AUU)
C4W	A	7,449,120	2801	739
*H2E	14	692,172	638	377
				(Op: 5B4AGE)

WEST MALAYSIA

9M2CNC	A	1,727,568	1243	516
				(Op: G4ZFE)
*9M4DXX	A	402,477	568	307
				(Op: 9M2TO)

UNITED ARAB EMIRATES

A61HH	A	2,504,289	1541	541
				(Op: A61M)

CHINA

BA6QD	14	26,923	151	109
*BD7KLO	A	298,116	481	273
*BD4SQ	A	221,075	500	239
*B3APX	*	71,296	387	128
				(Op: BD3APX)
*BD4ITN	*	51,240	351	120
*BD1FBV	*	4,116	54	49
*BA4ALC	*	496	18	16
*BD1DQU	14	15,750	99	90
*BD2BT	*	288	18	16
*B3AF	7	17,775	94	75
				(Op: BA3AF)

HONG KONG

VR2BG	14	482,856	702	372

KYRGYZSTAN

EX2M	A	4,702,008	2352	642
*EX2A	A	842,486	718	349
*EX8AB	*	200	8	8
*EX2X	28	305,532	439	276

SOUTH KOREA

HL2AEJ	A	1,049,526	1171	398
HL5UOG	*	44,540	192	131
*6MØV	A	64,182	349	114
				(Op: DS5DNO)
*HL9TY	*	44,704	222	127

THAILAND

HSØAC	A	440,700	700	325
				(Op: HSØ/OZ1HET)
HSØZDY	A	382,272	455	264
*HSØZEE	A	28,260	106	90

SAUDI ARABIA

HZ1EX	A	6,689,120	2578	776
				(Op: PY2ZXU)
*7Z1SJ	14	96,654	197	178

JAPAN

JH4UYB	A	3,453,177	1602	637
JE1CKA	A	1,024,296	751	392
JA7BME	A	504,594	551	306
JH7XMO	*	410,380	528	289
JA7COI	*	371,800	570	275
JA1AYO	*	128,778	278	169
JA1HP	*	89,712	306	168
JA1BNW	*	88,324	207	142
JA2XYO	*	82,795	179	145
JO1WKO	*	68,340	162	134
JE1KNT	*	40,320	171	105
7J1ABD	*	34,454	152	107
JA1TMG	*	34,380	126	90
JA2AXB	*	33,312	132	96
JA1MRE	*	16,000	73	64
JA2FSM	*	15,750	105	63
JQ2EHD	*	5,336	62	46
JF2FIU	*	3,800	48	38
JA1XZF	28	2,082	41	36
JA7NVF	21	57,462	218	157
JF1NZW	*	5,720	58	52
JR1NHD	*	4,992	58	52
JA5APU	14	176,080	340	248
JA9CWJ	14	122,590	248	205
JM4WUZ	*	95,634	264	189
JA3DAY	*	23,030	101	98
JK1LUY	*	1,029	21	21
JA6SHL	7	239,320	262	193
JR4URW	*	50,661	146	117
JI1ALP	*	41,135	105	95
JA3AVO	*	2,760	24	23
JA7ZP	*	638	11	11
JA1KVT	3.5	23,256	93	76
JH2FXK	1.8	5,775	39	35
*JF1NHD	A	885,318	808	394
*JH2NWP	A	359,910	490	270
*JH7CUO	A	354,858	488	294
*JH6QFJ	*	354,196	474	292
*JA2KVB	*	348,192	485	312
*JP1JFG	*	312,488	430	268
*JHØNEC	*	278,487	438	261
*JAØUMV	*	220,206	373	214
*JA1YAI	*	203,830	389	218
*JH6OPP	*	142,956	311	198
*JH3PTC	*	80,137	267	127
*JJ6TWQ	*	71,050	212	145
*JA6CYL/6	*	50,142	232	122
*JA2VZL	*	48,256	161	116
*JG5DHX/5	*	44,250	167	125
*JA1IE	*	43,470	141	105
*JH1FNU	*	37,664	137	107
*JA1CP	*	35,150	160	95
*JA1HNW/1	*	32,352	125	96
*JA2KKA	*	31,509	123	81
*JJ1MZH	*	27,945	123	81
*JO1SIM	*	23,765	170	97
*JAØBMS	*	21,238	102	74
*JA1AZR	*	20,088	93	72
JA1FWY	*	19,880	97	71
*JA4AQR	*	18,496	81	68
*JA4BDY	*	17,612	111	74
*JE1UKM	*	15,336	107	71
*JJ1LRD	*	13,728	103	66
*JA1HG	*	11,660	79	55
*JJ1WWL/1	*	10,032	85	57
*JH1HYC	*	8,008	65	52
*JA2QVP	*	7,791	55	49
*7N4QCQ	*	6,946	67	46
*JH1DVG	*	6,048	72	54
*JA1KEV	*	5,940	58	44
*JA3UWB	*	4,444	50	44
*JA4DER	*	4,026	34	33
*JK1NSR	*	3,627	55	39
*JI4WHS	*	3,552	40	37
*JH1NXU	*	2,759	34	31
*JL3RDC	*	1,682	39	29
*JH9BWC	*	1,450	26	25
*JI1BDQ	*	1,334	23	23
*JL8MBF	*	1,311	33	23
*JA5RB	*	836	24	19
*JJ8GFL/1	*	629	22	17
*JG1FGL	*	105	7	7
*7K1EQG	28	11,730	105	69
*JA1AAT	*	315	15	15
*JP1QDH	21	45,792	188	144
*JF3BFS	21	34,944	167	128
*JA1MVK	*	26,216	134	113
*JRØEQQ	*	19,400	118	100
*JE1JAC	*	1,300	30	26
*JQ1AHZ/6	*	814	23	22
*JQ2OUL	*	288	12	12
*JO1WIZ	*	96	8	8
*JI1LAI	*	60	6	6
*JG2KKG	14	127,510	296	205
*JHØEPI	14	52,164	186	138
*JF3IYW	*	41,910	158	127
*JR4GPA	*	30,495	141	107
*JE1RRK	*	3,071	41	37
*JR1UMO	*	133	7	7
*JH9AMJ	7	102,102	212	154
*JL6IPK	7	64,885	170	119
*JA2PFO	*	58,995	150	115
*JA2GTW	*	22,110	71	67
*JA3PYC	*	20,252	64	61
*JA1VVH	*	8,134	52	49
*JA1XRH	*	2,394	21	21
*JE1SPY	1.8	760	25	20

KUWAIT

9K2HN	21	2,781,509	1643	673
				(Op: 9K2RR)

MONGOLIA

*JT1BV	7	20,944	80	68

OMAN

*A45WG	21	1,904	28	28
*A45WD	14	653,796	612	381
				(Op: YO9HP)

THAILAND

*E2ØYLM	14	7,112	61	56
*HS8KGG	*	684	20	18
*HS8KAY	7	810	15	15

TURKEY

TA2ZAF	28	1,754,830	1270	473
				(Op: OK1MU)
*TC3D	A	3,756,288	1785	584
				(Op: TA3D)
*TC3A	7	2,371,823	850	493
				(Op: LZ1NK)
*YMØT	1.8	117,250	160	125
				(Op: TA2RC)

ASIATIC RUSSIA

UA9CLB	A	7,880,040	2766	795
RU9CK	A	3,778,320	1810	624
RT9S	A	2,763,420	1631	530
				(Op: UA9SP)
RX9AF	*	2,587,116	1322	532
UA9BS	*	2,175,327	1258	511
UA9CDC	*	1,333,152	999	432
UA9UCK	*	491,400	481	300
RV9XM	*	140,895	251	155
RU9UC	*	117,478	169	151
RA9JX/9	*	100,566	228	151
RX9SA	*	89,745	209	155
RX9TX	*	59,292	169	122
RK9UE	*	41,403	141	111
UA9HR	*	39,648	126	96
RW9UOB	*	29,360	103	80
UA9FEG	*	27,636	110	98
UA9QA	28	130,830	271	178
UA9QM	21	308,187	429	283
RA9JM	14	217,248	392	248
RX9LW	*	17,252	85	76
				(Op: RV9LM)
RX9FM	7	1,357,615	646	395
RV9SV	3.5	269,147	285	181
*UA9TF	A	1,114,773	978	407
*RU9CD	A	924,451	734	341
*UA9BX	A	819,666	721	353
*UA9FGJ	*	701,490	590	335
*UA9OA	*	651,880	641	344
*UA9AOL	*	629,970	637	330
*RK9CR	*	622,810	638	305
*UA9APA	*	589,303	532	317
*UA9XS	*	565,425	551	315
*RU9WZ	*	513,590	561	290
*RX9FB	*	493,350	548	325
*UA9FEX	*	390,632	430	253
*UA9MQR	*	390,222	487	266
*UA9OLD	*	374,400	452	260
*RZ9OJ	*	329,280	456	280
*RX9DJ	*	311,190	433	246
*UA9WIK	*	264,096	331	224
*RA9UN	*	253,215	402	255
*RX9WN	*	151,683	259	217
*UA9DD	*	126,063	236	189
*UA9AL	*	23,004	100	81
*RA9SC	*	19,738	90	71
*UA9UX	*	16,279	83	73
*RU9UG	*	7,896	63	56
*RX9CNN	*	4,031	39	29
*UA9AFS	21	363,858	445	298
*UA9QF	*	7,992	58	54
*RV9UF	*	6,552	63	56
*RW9UU	14	801,804	709	436
*RA9KM	14	746,790	665	438
*RV9CP	14	480,469	521	341
*RA9AP	*	452,808	498	342
*RA9XF	*	428,400	508	315
*UA9ALE	*	261,000	386	261
*RA9UT	*	256,425	389	263
*RV9YK	*	252,280	402	265
*RZ9AN	*	132,867	257	189
*UA9JJG	*	123,213	247	201
*RW9SZ	*	54,375	175	125
*RU9HM	*	30,400	130	95
*RK9QWZ	*	15,801	85	69
				(Op: RW9QA)
*UA9QFF	*	3,040	37	32
*RA9SN	*	1,700	26	25
*RV9LM	3.5	610	11	10
RUØLL	A	818,048	1171	352
RVØAL	A	404,319	528	307
RKØAB	A	364,102	463	307
RAØAA	*	361,391	504	283
RUØAW	*	307,021	353	247
UAØALJ	*	301,938	450	273
UAØACG	*	297,122	424	266
UAØFAI	*	249,249	513	273
UAØZAM	*	194,832	412	198
RAØQD	*	113,274	293	186
RXØQA	*	106,972	253	188
RWØUZ/4	*	82,839	197	159
RWØLQ	21	27,354	224	97
RKØUT	14	829,008	762	456
RNØSA	*	113,629	291	199
RAØAM	*	82,212	201	156
UAØSR	7	105,228	194	148
*UAØCNX	A	195,951	573	217
*UAØUV	A	20,076	101	84
*RWØUM	*	18,032	125	92
*RUØST	*	13,380	68	60
*UAØABB	*	7,150	56	55
*RUØAE	*	3,700	38	37
*UAØFDX	*	2,856	45	34
*UAØWL	28	322	15	14
*RAØAQL	14	45,720	148	127
*RWØAA	*	26,936	123	104
*RWØAJ	3.5	29,054	104	73

KAZAKHSTAN

UP0L	A	6,779,520	2763	704
			(Op: UN9LW)	
UN7PV	"	20,910	112	85
***UN6T**	A	999,180	824	390
***UN8GA**	A	228,330	361	215
*UO50F	"	174,472	284	193
*UN0C	"	4,123	40	31
***UP8A**	21	675,220	684	371
*UN4PG	"	158,508	300	222
***UN9L**	14	1,619,628	1095	556
***UN6LN**	14	933,401	813	443
*UN4PD	"	207,080	323	248
***UN7CN**	3.5	48,298	118	82

EUROPE

SICILY

IT9/S52A	A	2,367,590	1832	646
IT9ZAU	"	117,000	441	234
IU9S	28	673,524	1154	477
			(Op: IT9BLB)	
***IT9RZU**	A	164,754	349	226
***IT9ORA**	21	11,340	94	81
*IT9LWP	"	3,060	48	45

MONTENEGRO

4O5A	A	5,056,610	2825	802
4O2A	21	1,255,484	1436	629
			(Op: YT1NP)	
4O4A	14	829,864	1068	511
			(Op: YT6Y)	
***4O3Z**	A	201,432	416	231

CROATIA

9A1A	A	6,266,028	3031	876
			(Op: 9A9A)	
9A3ST	"	74,592	202	168
9A7R	21	788,956	977	532
9A5W	14	2,643,053	1817	769
9A5K	3.5	657,672	701	402
9A2VR	3.5	332,568	503	298
9A/T94DX	"	255,550	403	269
			(Op: DJ2MX)	
***9A4KW**	A	409,032	598	342
***9A2NO**	A	333,597	488	363
***9A2EY**	A	159,576	355	244
*9A8A	"	25,875	134	115
*9A5YY	"	1,464	30	24
***9A3VM**	28	357,930	800	369
***9A4RV**	21	83,888	318	214
***9A3B**	14	1,751,656	1446	694
			(Op: 9A1AA)	
***9A3MA**	7	230,336	303	236

PORTUGAL

***CT6A**	A	4,562,776	2459	808
			(Op: CT1ILT)	
***CT1AOZ**	28	44,436	156	138
***CS1GDX**	14	566,244	767	428
			(Op: CT1DRB)	
*CT1BQH	"	45,592	160	139
***CT/UA4WEC**	7	8,820	46	45

GERMANY

DJ5MW	A	5,432,754	2679	838
DL3TD	A	4,699,936	2411	772
DJ1YFK	A	4,579,388	2239	796
DL3YM	"	4,326,926	2272	787
DG4R	"	1,703,140	1301	620
			(Op: DL1RG)	
DL5YM	"	1,614,798	1361	566
DA0I	"	1,298,990	1280	539
			(Op: DK1II)	
DJ0IF	"	1,203,184	1229	556
DL7JV	"	735,680	882	440
DJ6QT	"	562,000	706	400
DL4HRM	"	463,240	691	370
DK8EY	"	398,430	588	342
DL5RMH	"	392,718	657	366
DL1DTC	"	386,712	587	369
DL4ME	"	356,487	623	331
DK3YD	"	322,014	538	357
DL3BPC	"	188,206	409	278
DR7T	"	161,931	339	231
DK7AN	"	119,340	299	221
DF8AA	"	118,104	314	222
DL5RBR	"	100,782	264	198
DL1YFF	"	61,985	195	161
DL7BA	"	26,100	122	90
DL9UJF	"	21,567	101	91
DL6DVU	"	16,554	105	93
DL5JAN	"	1,643	31	31
DK9IP	"	1,139	20	17
DL2SWN	28	27	3	3
DR5N	14	1,654,439	1371	643
			(Op: DJ9DZ)	
DQ5Q	7	138,580	310	205
			(Op: DJ2RG)	
DF2UU	1.8	82,896	251	176
***DD5M**	A	1,337,320	1221	536
			(Op: DJ0ZY)	
***DK5DQ**	A	1,046,528	1056	512
***DL5KUD**	A	863,330	994	458
*DL7UMK	"	768,564	970	444
*DL1ARJ	"	580,548	706	404
*DF3AX	"	423,030	700	354
*DJ8UV	"	406,896	590	346
*DL3KWF	"	391,440	645	336
*DK5IM	"	360,790	632	331
*DL3ZM	"	350,455	574	323
*DR5S	"	343,710	594	335
			(Op: DK7VW)	
*DL3ZAI	"	338,198	574	343
*DL5CD	"	297,672	573	316
*DF5LW	"	263,004	551	303
*DL4FN	"	262,724	531	308
*DL2NBY	"	251,868	561	302
*DL1NEO	"	222,084	368	279
*DL3KWR	"	216,932	413	281
*DL7UIO	"	212,533	471	283
*DL9LM	"	206,581	407	337
*DL8DWW	"	204,450	414	282
*DL8UGF	"	158,916	394	246
*DJ2IA	"	140,811	368	251
*DL2ANM	"	134,568	312	216
*DL3BRA	"	131,588	345	268
*DK5ZX	"	119,370	387	230
*DL9NEI	"	112,998	319	222
*DL2YCA	"	105,861	357	213
*DL4XU	"	87,168	259	192
*DL5SWB	"	81,608	328	202
*DJ4EJ	"	77,400	293	200
*DL8UFO	"	75,270	254	195
*DK2BJ	"	74,226	235	178
*DH9SB	"	68,499	247	177
*DJ3IW	"	61,614	172	163
*DL7VRG	"	45,662	188	158
*DL1ARD	"	45,600	196	150
*DL2AL	"	39,783	203	149
*DJ6UP	"	38,324	182	143
*DF1MA	"	37,808	159	136
*DH3RB	"	37,506	203	141
*DK1LRS	"	35,000	188	140
*DL6RBH	"	34,716	153	132
*DL1BUT	"	34,194	171	139
*DL5KUR	"	32,193	157	147
*DL6UYA	"	29,900	150	130
*DL3DBY	"	28,854	163	126
*DF2PH	"	23,200	139	116
*DF0HRB	"	22,800	145	114
			(Op: DL3BBY)	
*DK1KC	"	19,680	119	96
*DL7UM	"	17,888	118	104
*DL6UAM	"	17,346	114	98
*DK3WJ	"	16,254	105	86
*DH6AB	"	15,040	112	94
*DH6BH	"	13,920	111	96
*DL3KVR	"	13,524	97	92
*DL4RCK	"	12,600	95	84
*DJ3EF	"	12,384	103	86
*DJ4TS	"	12,298	93	86
*DC8HF	"	11,840	88	80
*DJ1HA	"	8,378	75	71
*DK0UW	"	8,183	51	49
*DL5BCF	"	7,956	86	78
*DL9ZWG	"	6,402	72	66
*DL5KMS	"	4,235	56	55
*DL2EF	"	1,590	32	30
*DL2DYL	"	1,300	26	26
*DL1DQJ	"	858	29	26
*DL2MLU	"	35	5	5
***DL7BY**	28	80,348	309	212
*DL2MIH	"	11,316	101	92
*DL6OCK	"	81	9	9
***DJ6TK**	21	12,610	108	97
*DO1AYJ	"	5,146	67	62
*DL6RCD	"	273	13	13
***DO4B**	14	1,019,898	1126	561
			(Op: VE3ZIK)	
***DD1IM**	14	226,476	413	324
*DK7GH	"	170,775	357	297
*DJ5GG	"	114,242	276	239
*DL1KLO	"	21,669	97	93
*DL1THB	"	15,087	121	107
***DF7GG**	3.5	122,320	272	220
*DL5ANS	"	630	19	18
***DJ8OG**	1.8	7,392	68	56

SPAIN

EA5FV	A	3,073,029	2233	727
EA1DR	A	531,744	654	382
EA1JO	"	349,592	618	356
EA7CA	"	300,160	437	280
EA7HY	"	34,750	166	125
AO7SIX	14	1,246,587	1305	579
			(Op: EA7AJR)	
EA5YU	7	1,064,200	691	425
***EA1FAQ**	A	2,903,784	2022	681
***EA7TN**	A	2,426,248	1882	698
***EA5CP**	A	298,915	565	313
*EA3CEC	"	155,949	315	229
*AN2R	"	139,305	403	251
			(Op: EA2TO)	
*EA1CRL	"	129,947	281	199
*EA5VN	"	129,375	328	225
*EA7OR	"	101,996	235	172
*EA4CJI	"	77,106	247	181
*EA2KV	"	76,985	208	173
*EA3AVV	"	74,700	210	166
*EA7CWA	"	72,504	233	171
*AN1CBX	"	63,189	221	153
*EA4OA	"	35,588	151	124
*EA3GHZ	"	13,175	94	85
*EA5GTQ	"	8,379	69	63
*EA4BGM	"	7,840	78	70
*AO5ABH	"	2,898	49	46
			(Op: EA5ABH)	
*EA7EYQ	"	2,464	35	32
*AO5GS	"	1,674	32	27
			(Op: EA5GS)	
*EB2CYQ	"	696	25	24
*EB1ISN	"	264	12	11
***EA7MT**	28	7,630	75	70
***EA4BF**	14	133,874	338	271
*EA1ND	"	35,074	163	142
*EA5FQ	"	25,326	133	126
*EC2DM	"	2,318	39	38
***AO5KXA**	7	497,952	458	336
			(Op: EC5KXA)	
***EA3ALV**	7	114,018	209	186
*EC7ABV	"	101,913	186	161
*EA2SW	"	390	13	13

BALEARIC IS.

EA6FO	A	5,191,680	2976	845
			(Op: EA3ALZ)	
EA6ZS	"	16,335	117	99

IRELAND

***EI4CF**	21	22,990	126	121
***EI4HQ**	7	150,136	227	196

MOLDOVA

ER3DW	A	168,960	442	256
***ER1RR**	28	161,560	493	280
*ER1OO	"	20,952	154	108

ESTONIA

ES8DH	A	132,840	356	270
ES7FU	"	12,844	85	76
ES4RD	14	124,080	283	240
***ES1GF**	A	517,504	794	416
***ES4MM**	28	53,630	251	173
***ES1CN**	21	43,788	207	164
*ES1CR	"	22,743	157	133
***ES5NC**	1.8	760	20	19

BELARUS

EV1R	A	2,034,576	1804	639
			(Op: EU1PA)	
EW8DX	A	1,769,454	1778	591
EV2A	A	1,682,289	1532	621
			(Op: EW2AA)	
EU1FC	"	1,671,722	1685	569
			(Op: EU1FC)	
EW8CY	"	644,688	795	396
EW7LO	7	1,004,281	806	443
EW3LN	"	475,368	501	348
EV2M	1.8	7,830	65	54
			(Op: EW1CQ)	
***EW4AB**	A	682,773	889	427
***EW1KT**	A	118,720	321	224
*EW6MM	"	46,158	193	157
*EU6AA	"	3,956	56	46
***EU1AI**	21	68,748	255	204
***EV6M**	3.5	268,125	433	275
*EU1DZ	"	39,312	144	126

FRANCE

TM6X	A	4,211,314	2312	778
			(Op: F5VHY)	
TM3C	A	3,607,296	2293	732
(Op: F6IFY)				
F5BBD	A	376,656	597	326
F8BUO	"	170,752	347	232
F5CQ	"	161,728	320	224
F4DNW	7	76,014	140	123
***F8CRS**	A	387,400	601	325
***F5SGI**	A	178,684	391	262
***F5LCU**	A	150,423	357	247
*F5QF	"	142,320	306	240
*F6ABI	"	118,360	327	220
*F6AUS	"	104,304	292	212
*F/G4BJM	"	88,430	292	185
*F6CNM	"	78,765	264	177
*F5AQB	"	75,180	242	179
*F8DGF	"	36,708	178	138
*F5GGL	"	2,368	41	37
*F5MLJ	"	750	28	25
*F1OK	"	15	3	3
***F8AKC**	28	97,627	363	233
***F5OGG**	28	18,306	142	113
*F5PHW	"	16,224	148	104

ENGLAND

G3TXF	A	2,483,200	1659	640
G0WKW	A	664,216	814	409
G3RXP	A	318,947	481	313
G9A	"	253,935	587	297
			(Op: G4RCG)	
G4HZV	"	156,996	344	267
G3ZHE	"	78,554	244	181
MX0AAA	14	50,630	197	166
			(Op: G0VQR)	
***G0MTN**	A	1,421,763	1481	553
***2E0CVN**	A	1,054,500	1203	475
***M0DHO**	A	942,333	937	483
*G4FOC	"	422,370	632	390
			(Op: G3LIK)	
*G3RWF	"	153,925	372	235
*G3JJZ	"	139,200	341	232
*G3RSD	"	68,470	231	167
*G3GLL	"	67,704	252	186
*G2HDR	"	11,970	101	90
*GX0SAC	"	11,970	107	90
			(Op: G4WGE)	
***G4ZOB**	14	188,802	395	306
*G0MRH	"	12,600	98	90
***G3ZRJ**	7	327,712	528	304

ISLE OF MAN

MD0CCE	A	419,558	649	362

NORTHERN IRELAND

GI4FUE	A	94,400	202	160

SCOTLAND

GM0F	A	2,137,530	1887	645
			(Op: GM4AFF)	
GM4SID	"	622,380	793	410
GM3WUX	"	576,548	839	413
GM4FDM	28	15,741	157	99
***GM0IIO**	14	329,175	661	385

GUERNSEY

***MU0FAL**	A	303,660	683	315

WALES

***GW3KDB**	A	304,712	500	328

HUNGARY

HG8R	A	3,532,632	2066	762
HG8K	A	1,476,910	1204	565
HA5UX	A	1,193,255	1081	515
HA7LW	"	566,544	778	407
HA8TI	"	445,831	606	397
HA5NB	"	371,800	583	338
HA7PO	A	177,859	358	253
HA8VK	14	867,249	971	557
HG1A	7	2,528,238	1304	618
			(Op: HA1ZN)	
***HA3NU**	A	1,982,408	1618	647
***HG5Y**	A	1,401,740	1297	545
***HA5LZ**	A	962,481	999	481
*HA2MN	"	541,676	697	382
*HA3OU	"	408,782	519	374
*HA2EQD	"	392,504	574	344
*HA2ESM	"	212,898	404	274
*HA8CQ	"	173,104	385	248
*HA1Q	"	159,800	339	235
			(Op: DH8VV)	
*HA8KW	"	12,462	73	62
***HA8FK**	28	186,588	517	292
***HA8TP**	28	171,680	504	296
*HA9PP	"	19,936	136	112
***HA8MD**	14	1,492,614	1352	633
***HG4F**	14	1,051,680	1108	560
*HA0DW	"	1,271	33	31
***HA3MU**	7	567,008	572	376
***HA8BE**	7	393,128	468	314
***HA6FQ**	3.5	233,112	413	264

SWITZERLAND

HB9DHG	A	267,246	530	303
HB9FBS	1.8	8,003	76	53
***HB9ARF**	A	675,234	917	414
*HB9HQX	"	21,364	125	98
*HB9QA	"	17,019	101	93
***HB9LCW**	14	60,997	207	181

ITALY

IR2A	A	993,010	1060	499
			(Op: I2UIY)	
IK2AHB	A	693,000	849	450
I0ZUT	"	100,098	286	201
IK3SCB	"	3,780	46	42
IU3X	21	305,045	595	361
			(Op: IV3SKB)	
I5JFG	"	10,640	85	80
II7M	14	2,710,380	1951	796
			(Op: IK7JWY)	
I1NHR	"	5,124	62	61
IK2SND	"	992,320	818	443
IZ1GAR	"	930,030	769	435
IO3N	3.5	138,276	265	207
***I2WIJ**	A	1,163,006	1013	533
***IZ3DBA**	A	670,335	865	435
***IQ5AA**	A	378,378	655	378
			(Op: IK5TUZ)	
*I6FDJ	"	294,150	582	318
*IZ1LBG	"	208,565	429	295
*IZ1DXS	"	111,940	282	193
*I2AZ	"	106,454	285	202
*IZ0KBW	"	63,027	178	149
*IK2IKW	"	35,072	176	128
*IK2WXV	"	33,480	155	120
*IK5FKF	"	33,158	148	118
*IK3OII	"	31,863	156	129
*IZ0FZM	"	28,842	146	114
*IK2NCF	"	21,944	132	104
*IZ0GYP	"	6,864	78	66
*IK2NUX	"	6,864	68	66
*IZ5HQB	"	6,380	66	58
*IV3DYS	"	4,747	48	47
***IK1PMR**	28	260,090	463	310
*IK2WXQ	"	38,203	209	151
*IK5YJK	"	308	16	14
***IK6MNB**	14	522,712	774	446
*IZ0FVD	"	6,667	65	59
*IZ5GRS	"	299	13	13
***IQ3UD**	3.5	49,868	168	137
			(Op: IV3ZXQ)	

SARDINIA

IM0/K7QB	A	918,158	1203	502
***IS0XDA**	A	89,760	275	204
***IS0UWX**	14	30,392	144	131

SVALBARD

***JW/OZ7BQ**	A	230,421	370	267

NORWAY

LA2AB	A	147,840	340	220
LA3BO	28	45,725	249	155
LN5O	7	1,856,358	1147	567
LN9Z	3.5	650,880	718	384
			(Op: LA3BO)	
***LA2MOA**	A	441,760	670	352
***LA6CF**	A	405,270	619	342
*LA8OM	"	225,432	530	303
***LA1YE**	14	20,535	139	111

LUXEMBOURG

LX5T	7	405,020	528	308
***LX1ER**	A	19,224	104	89

LITHUANIA

LY2MM	A	1,185,696	1241	537
LY2VA	A	371,966	615	326
LY3CY	"	335,352	630	314
LY1CM	"	185,008	407	248
LY2IC	7	1,137,794	891	469
LY2FN	3.5	141,702	303	209
LY2IJ	1.8	193,920	374	240
LY4T	"	40,713	166	123
***LY9A**	A	2,293,473	1972	651
			(Op: LY3BA)	
***LY6M**	A	2,200,308	1890	633
***LY2TS**	A	889,200	979	475
			(Op: LY2TS)	
*LY2DV	"	335,175	612	327
*LY1BX	"	258,440	529	284
*LY3W	"	16,555	94	77
*LY2CG	"	54	3	3
***LY2T**	14	383,672	746	398
***LY1C**	7	317,033	430	289
***LY3CW**	3.5	280,686	457	287
***LY2OU**	1.8	10,176	76	64

BULGARIA

LZ8A	A	4,707,248	3299	854
			(Op: LZ2BE)	
LZ3FN	A	4,466,660	2816	790
LZ1QZ	"	37,260	210	138
LZ9W	14	2,641,924	1883	796
			(Op: LZ1RGM)	
LZ4TX	7	205,184	305	229
LZ3YV	"	4,182	43	41
LZ7J	3.5	478,130	571	349
			(Op: LZ1YQ)	
LZ1PM	"	75,330	208	155
***LZ4UU**	A	1,518,228	1496	543
***LZ07KM**	A	1,508,870	1595	605
			(Op: LZ3YY)	
***LZ5XQ**	A	1,088,640	1204	504
*LZ1IKY	"	369,978	562	322
*LZ1JZ	"	221,382	467	294
*LZ1ONK	"	128,104	350	239
*LZ1AQ	"	64,619	222	179
*LZ2DF	"	29,539	129	109
*LZ2UZ	"	29,391	151	101
*LZ1BJ	"	60	6	6
***LZ5PL**	21	28,854	150	126
***LZ9X**	14	637,540	833	508
			(Op: LZ1RB)	
*LZ2CE	"	242,136	468	342
***LZ1DNY**	7	215,520	322	240

AUSTRIA

OE3KAB	A	290,575	393	295
***OE8CCQ**	A	26,712	124	106
***OE5CWL/6**	14	446,927	723	403

FINLAND

OF3F	A	4,698,980	2634	806
			(Op: OH6KZP)	
OH1PS	A	2,961,664	2029	736
OH6M	A	1,735,269	1583	571
			(Op: OH6LBW)	
OH1RX	"	1,430,422	1312	581
OH5NE	"	375,592	722	353
OH2VZ	"	173,475	400	257
OH1EB	"	10,792	81	71
OH3BU	28	99,615	401	229
OH8A	14	1,666,808	1438	682
			(Op: OH8LQ)	
***OH1ZE**	A	213,860	463	289
*OH8GZN	"	15,288	139	104
***OH6RC**	14	60,873	227	197
***OH2BPA**	7	61,120	160	160

ALAND IS.

OH0X	7	1,463,000	925	500
			(Op: OH2TA)	

CZECH REPUBLIC

OK2PDT	A	1,219,603	1232	517
OL4M	A	834,326	1001	463
OK5MM	A	753,100	904	443
OK1AYY	"	333,670	491	305
OK1FRO	"	268,554	506	313
OK1TFH	"	46,190	170	155
OK2ABU	28	11,790	113	90
OK1VD	21	503,880	755	456
OL8M	14	1,992,870	1429	726
OK3R	3.5	789,090	751	435
			(Op: OK1DVM)	
***OL1M**	A	1,543,998	1421	554
			(Op: OK1EW)	
***OK3C**	A	1,536,427	1470	563
***OK6Y**	A	1,296,376	1216	524
			(Op: OK2PTZ)	
*OK2MBP	"	1,082,430	1124	513
*OK1HX	"	1,024,884	1028	498
*OK1FCA	"	946,288	955	476
*OK1TC	"	925,775	969	475
*OK1BA	"	558,728	728	422
*OK1ZP	"	535,052	722	394
*OK4N	"	494,070	706	383
*OL7P	"	429,619	567	349
			(Op: OK1CRM)	
*OK2KFK	"	345,704	593	316
			(Op: OK2ABU)	
*OK1DUT	"	281,450	530	325
*OK1GS	"	266,107	393	281
*OK1LO	"	207,666	417	278
*OK1AUP	"	199,404	414	261
*OK1MKU	"	188,703	327	261
*OK2PBG	"	182,502	446	258
*OK2SAR	"	160,082	382	262
*OK5OK	"	118,728	292	204
*OK2BND	"	74,976	240	176
*OK2BFN	"	73,235	181	151
*OK7U	"	52,235	197	155
			(Op: OK1HDU)	
*OK4MM	"	26,289	153	127
*OK2BJ	"	20,800	110	100
*OK1ANP	"	19,764	89	81
*OK7N	"	7,140	56	51
*OK2PHI	"	2,480	44	40
*OK2SWD	"	946	23	22
***OK1KZ**	28	2,736	53	48
***OK6DJ**	14	10,950	80	73
*OK1MMN	"	4,746	45	42
***OL6P**	7	1,042,794	774	471
			(Op: OK2WTM)	
***OK6AY**	7	467,104	502	352
*OK1UG	"	394,240	409	320
***OK1IBP**	3.5	115,400	264	200
*OK1SI	"	15,604	98	83
***OK1JOK**	1.8	15,563	98	79
*OK1DXK	"	1,674	29	27

SLOVAKIA

OM7CW	A	2,365,860	1940	655
OM3IAG	A	472,895	708	349
OM8DD	28	222,132	548	321
OM3CGN	7	2,617,269	1259	629
***OM5CD**	A	2,081,992	1645	649
***OM8ON**	A	993,840	967	505
***OM8AQ**	A	857,120	1060	487
*OM4DN	"	605,980	865	410
*OM3PQ	"	312,897	580	339
*OM5UM	"	229,215	479	295
*OM1AF	"	209,615	405	265
*OM6AL	"	194,740	404	260
*OM7YC	"	175,440	376	255
*OM4DA	"	159,621	348	231
*OM3BA	"	110,322	293	243
*OM7AG	"	102,336	292	208
*OM2AK	"	100,405	297	215
*OM3TLE	"	43,416	177	134
*OM5NL	"	10,120	93	88
*OM1TD	"	8,804	76	71
***OM8HG**	14	224,826	423	318
*OM2AW	"	198,448	426	316
***OM3CDN**	7	30,992	176	149

BELGIUM

OT4A	A	211,204	428	266
ON5ZO	28	27,084	172	122
OQ5M	7	241,544	448	277
***ON5SV**	A	694,400	856	434
***ON4CT**	A	251,400	495	300
*OS5N	"	111,356	259	194
*ON50EU	"	43,650	187	150
			(Op: ON4ACA)	
*ON5WL	"	23,324	142	119
*ON5JD	"	12,150	98	75
***ON60MCL**	14	15,485	109	95
			(Op: ON5WL)	

FAROE IS.

OY1CT	A	709,251	1160	437

DENMARK

5P7Y	A	900,852	983	492
			(Op: OZ7AM)	
OU4O	A	9,163	79	77
OZ0TE	"	1,029	22	21
*OV3X	"	717,344	846	464
			(Op: OZ8AE)	
*OZ6TL	"	127,600	360	232
*OZ4DR	"	33,839	173	137
*OU3A	"	14,697	78	71
*OZ1DGQ	"	13,464	115	88
*5Q8A	"	11,011	97	77
(Op: OZ8A)				
*OZ4RT	"	7,704	81	72
***OZ7NB**	14	36,176	150	136

THE NETHERLANDS

PA4A	A	732,290	1035	430
PA3AAV	A	683,424	927	432
PA0LOU	A	631,743	877	449

PAØLSK	*	113,400	320	216
PAØGRU	*	108,378	328	223
PAØBWL	*	86,327	207	173
PA9CW	*	40,470	189	142
PA2ALF	*	32,900	157	140
PA7RA	*	19,224	132	108
PA3GVI	*	18,312	108	84
PA5WT	28	55,874	252	182
PAØQX	21	7,150	72	65
*PG7V	A	1,003,940	1236	497
*PA3ARM	A	503,874	669	387
*PA3BFH	A	459,798	645	389
*PA3AM	*	212,534	406	266
*PAØKHS	*	204,732	459	282
*PA5TT	*	174,654	394	279
*PG2AA	*	111,830	298	211
*PAØADP	*	107,712	275	204
*PA3EBP	*	99,360	319	207
*PA3CDN	*	57,288	218	168
*PAØFAW	*	52,397	216	151
*PA3DBS	*	49,120	222	160
*PA3HGF	*	38,778	198	138
*PAØATG	*	35,550	188	150
*PAØWKI	*	28,270	143	110
*PAØRBA	*	24,182	126	107
*PA3CWQ	*	20,685	123	105
*PA3GBI	*	13,616	112	92
*PA1BX	*	11,396	99	77
*PA/DL1EAL	*	6,532	76	71
*PA3AFF	*	3,619	50	47
*PA7HPH	14	4,836	66	62
*PAØMIR	3.5	343,403	539	337

SLOVENIA

S58A	A	5,243,836	2572	806
S59ABC	A	3,089,580	1949	699
			(Op: S51DS)	
S56A	A	2,602,842	1808	698
S57M	*	1,950,208	1500	586
S5ØR	*	1,767,524	1267	578
S58P	*	1,619,574	1358	583
S51DX	*	167,040	430	240
S53M	*	104,104	222	169
			(Op: S51FB)	
S57S	28	370,832	774	392
S57DX	14	2,582,755	1761	763
S5ØK	14	1,790,775	1467	675
S54K	14	1,523,184	1291	624
			(Op: S51NZ)	
S51J	*	345,168	596	376
S57AW	7	4,248,735	1641	745
S52AW	3.5	767,600	674	404
S52OM	*	105,571	234	193
*S51F	A	1,815,192	1460	612
*S57U	A	1,244,250	1271	553
*S51AY	A	726,327	918	441
*S58MU	*	396,000	658	375
*S52OT	*	345,384	488	328
*S53AU	*	189,486	403	261
*S58RU	*	135,660	343	238
*S59T	*	442	18	17
*S57Z	14	1,441,440	1220	585
*S53DIJ	*	143	11	11
*S54A	7	1,336,944	878	519
*S59N	3.5	281,281	473	281
*S55O	*	9,408	72	64

SWEDEN

SD4ØJZ	A	581,790	886	410
SM5QU	A	310,040	559	337
SM6XKB	*	26,448	129	116
SK2T	28	126,444	452	246
			(Op: SM2LIY)	
SJ3W	3.5	505,926	550	347
			(Op: SM5IMO)	
*SC3N	A	964,224	1070	496
			(Op: EA8CN)	
*SM6BSK	A	396,720	606	348
*SJØWPX	A	375,390	830	387
			(Op: SMØOGO)	
*SM7EH	*	147,010	384	241
*SC5L	*	99,330	291	215
			(Op: SM5BKK)	
*SIØE	*	78,324	294	183
*SM3Q	*	49,202	175	146
*SM7BQX	*	47,223	222	159
*SE6C	*	36,942	205	141
			(Op: SM6CDN)	
*SM7BJW	*	34,036	169	134
*SMØBDS	*	24,307	143	109
*SF3E	*	20,330	109	95
			(Op: SM3EAE)	
*SM6Z	*	5,049	57	51
*SM3AF	*	4,368	55	52
*8S6T	*	2,240	43	40
*SA6R	*	2,109	39	37
*SMØJ	*	918	17	17
			(Op: SMØDZH)	
*SM5BDV	*	1	1	1
*SFØF	14	773,949	967	499
			(Op: SMØPSO)	
*SM5BRG	*	199,020	410	310
*SM2IEN	*	713	27	23
*8S6A	7	77,989	210	167
			(Op: SM6DPF)	
*SLØW	1.8	8,618	69	62
			(Op: SMØAJU)	

POLAND

SP5WA	A	1,979,295	1634	635
SQ7B	A	183,480	429	264
SQ4MP	A	147,620	372	244
SP8HXN	*	135,520	338	224
SP6IEQ	*	39,325	191	143
SP3KPN	*	1,885	41	29
SP1GZF	28	99,653	369	227
SP5GH	28	54,136	208	202
SP1NY	21	164,124	408	291
SN7Q	7	3,016,546	1386	641
SO2R	3.5	1,078,725	903	475
			(Op: SP2FAX)	
3Z5ØKCR	3.5	460,625	622	335
			(Op: SP5JTF)	
SN2K	1.8	45,619	171	133
			(Op: SP2FWC)	
SP6AEG	*	480	15	15
*SP4Z	A	1,802,450	1315	611
*SP4JCQ	A	1,635,300	1565	575
*SQ9UM	A	1,090,974	1169	521
			(Op: SQ9UM)	
*SP5ATO	*	707,442	768	471
*SP6LV	*	514,560	727	402
*SN7F	*	298,320	622	339
			(Op: SP7LFT)	
*SP3DIK	*	272,646	493	306
*SP2UKB	*	245,311	470	319
*SP8AJK	*	213,548	411	271
*3Z8Z	*	204,612	399	289
*SP5EOT	*	198,609	422	277
*SP9FT	*	183,870	433	270
*SP2IKP	*	173,259	324	243
*SP2MHC	*	126,232	389	248
*SN9K	*	113,735	283	215
*SP7FBQ	*	103,896	298	216
*SNØFWQ	*	99,220	280	205
			(Op: SP9FWQ)	
*SP3DOF	*	72,930	269	187
*SP2GCE	*	49,440	188	160
*SP1KV	*	36,210	193	142
*SQ1EUG	*	33,402	149	114
*SP8LNE	*	31,089	155	129
*SP3AOT	*	16,815	121	95
*SP6BEN	*	13,616	76	74
*SP3GRQ	*	9,153	93	81
*SP2AYC	*	8,560	97	80
*SP2DKI	*	7,548	74	68
*SP8FHJ	*	7,442	69	61
*SP9IBJ	*	5,544	74	66
*SP5ELW	*	2,204	30	29
*SN5J	28	114,729	330	229
			(Op: SP5JXK)	
*SP9DLY	28	30,222	183	138
*SP5XO	*	22,204	159	122
*SP8TJU	*	16,014	113	102
*SP6IHE	*	13,439	105	89
*SN6A	*	7,107	79	69
			(Op: SP6CES)	
*SP2AVE	21	199,662	510	321
*SP2EXN	21	66,360	220	210
*SP6EIY	*	33,176	176	143
*SP6DMI	*	31,464	164	138
*SP9IKN	*	1,525	29	25
*SP2HPD	14	337,725	599	395
*SP9GKM	14	140,800	342	275
*SP8BAB	14	135,135	353	273
*SP9RI	*	100,716	274	231
*SQ9BDN	*	94,300	244	230
*SN9U	*	91,000	275	200
			(Op: SP9UMJ)	
*SQ9IWT	*	27,594	139	126
*SP4AVG	*	17,655	117	107
*SP1BLE	*	5,809	131	37
*SN2N	7	967,572	768	459
			(Op: SP2ASJ)	
*SP2FAP	7	822,150	712	435
*SP5CNA	7	551,688	629	362
*SP9EMI	*	140,148	237	204
*SP5ELA/8	3.5	310,063	490	299
*SN3C	3.5	174,685	329	245
			(Op: SP3ASN)	
*SP9DUX	*	75,032	218	166
*SP4DNX	*	46,182	161	129

GREECE

SZ1A	14	1,010,724	1245	572
			(Op: SV1DPJ)	
SV1RP	7	1,139,448	849	482
SV2FWV	*	463,712	500	344
*SV1ENG	A	1,030,095	1240	495
*J48HW	A	233,128	544	322
			(Op: HAØHW)	
*SV1DPI	*	176,364	415	276
*SV1HEM	*	48,050	188	155
*SV1BJW	14	683,943	881	507
*SY8JG	3.5	23,424	107	96
			(Op: SV1JG)	

BOSNIA & HERZEGOVINA

T97M	28	400,158	872	387
T99W	3.5	664,056	686	401
T93C	3.5	464,715	586	345
*T94WF	A	2,060,215	1654	631
			(Op: S56M)	
*T92M	28	24,625	149	125
*T99D	7	1,003,352	781	437
*T94LZ	*	29,484	97	91

ICELAND

TF3YH	A	90,486	254	198
TF3AM	*	66,332	213	161

CORSICA

*TK/DF4SA	7	1,408	18	16

EUROPEAN RUSSIA

RM3F	A	4,514,285	2768	815
			(Op: UA3DPX)	
RW6HX	A	3,292,128	2253	736
RS3A	A	3,152,072	2150	748
			(Op: RA3CW)	
RN3BD	*	2,463,945	2092	685
RG3K	*	2,316,907	2120	647
			(Op: UA3QDX)	
RT3T	*	2,260,256	1878	664
			(Op: UA3TU)	
RN4WA	*	1,982,613	1986	641
RU6FA	*	1,922,967	1772	603
			(Op: RU6FA)	
UA4WKW	*	1,920,875	1867	605
RW4PL	*	1,817,673	1580	627
UA4SU	*	1,644,692	1501	604
UA6AF	*	1,572,186	1495	574
RW6FO	*	1,538,116	1421	563
RA3UT	*	1,236,962	1197	562
UA4SMM	*	1,027,629	1002	503
RK3QS	*	828,996	1187	426
RU3UR	*	776,914	983	463
UA1PAC/1	*	728,000	896	400
RK4HD	*	580,723	741	403
RA6EE	*	366,212	555	308
UA4NCI	*	252,280	462	280
RA4YW	*	226,860	467	285
UA3DAM	*	224,010	503	285
UA3DPM	*	204,820	438	266
RA1AGL	*	165,205	393	235
RN3GA	*	124,215	317	195
UA3DUJ	*	94,886	322	209
RX3AGD	*	81,674	276	194
RU3LA	*	12,546	91	82
RA3SS	*	11,340	73	60
RX4HX	*	10,710	96	85
UA3TCJ	*	5,750	49	46
RA3NC	*	1,160	34	29
RU6CQ	28	754,290	1115	510
UA4LU	28	251,604	575	348
RU3RQ/3	*	6,120	74	60
UA3DEE	21	175,357	461	287
RZ3AV	*	52,486	214	163
RA6AFB	*	2,301	39	39
UA4LCH	14	1,755,012	1420	714
RA3DH	14	279,414	495	342
RU4WE	*	190,890	416	303
UA4LL	*	178,024	418	308
RW6BN	*	43,292	202	158
UA6LCN	7	922,695	740	449
UA4SAW	3.5	71,883	210	147
RK3XWO	1.8	7,144	92	76
			(Op: UA3XAO)	
*UA4FER	A	2,500,020	1879	684
*RU4SS	A	1,031,180	1149	470
*UA3SAQ	A	801,800	898	475
*RW6FZ	*	793,800	925	420
*UA1CEC	*	790,587	1042	423
*RN3QP	*	671,852	1098	404
*RW6AHO	*	665,448	979	408
*RA6MQ	*	659,344	766	406
*UA4AGO	*	584,078	888	382
*RX3ZX	*	552,124	743	388
*RN4SS	*	544,257	815	371
*RV3ZN	*	535,987	822	359
*UA4ALI	*	527,250	848	375
*RU3VD	*	473,099	508	451
*UA4PJM	*	469,758	686	354
*RW1CX	*	457,135	748	353
*UA3PW	*	437,052	737	363
*UA6HFI	*	421,245	695	345
*UA3ABJ	*	382,072	552	326
*RV3LO	*	344,792	600	329
*RA3QN	*	271,478	547	298
*RW6CW	*	223,686	453	289
*RN4CA	*	216,270	442	270
*RA1QN	*	202,340	457	268
*RA6DT	*	161,294	374	281
*UA6YH	*	149,961	363	259
*RZ6HF	*	143,013	418	247
*RZ6AK	*	136,752	339	231
*RU3MW	*	132,468	350	228
*RX3MM	*	130,112	304	214
*RN6AH	*	123,563	437	239
*RW3TA	*	115,536	339	232
*RA6FSZ	*	115,400	413	200
*UA3AKI	*	114,862	368	227
*UA3XAC	*	114,600	313	200
*RA1QD	*	109,200	290	208
*RA1OK	*	100,656	308	216
*UA3RW	*	99,902	300	209
*UA6LJU	*	99,645	310	219
*UA4WMA	*	99,345	310	185
*RU3WR	*	97,520	313	184
*RW4AD	*	88,580	291	172
*RU3XY	*	78,225	242	175
*RA6YJ	*	71,136	198	171
*RU3DKW	*	65,985	213	159
*RV3RM	*	65,800	282	175
*RU3FT	*	62,700	203	165
*UA3DOM	*	62,083	251	181
*RX4HB	*	58,144	212	158
*RW3DY	*	54,060	228	159
*RU6CO	*	50,908	198	143
*RA6FV	*	45,426	164	134
*RA3VR	*	40,425	205	147
*RU3DM	*	37,064	153	113
*UA4ANZ	*	36,480	159	114
*RX3VF	*	35,242	167	134
*RW3QF	*	29,715	120	105
*RU3UW	*	29,346	240	73
*RA3VE	*	28,296	145	108
*RZ3DA	*	25,839	112	99
*RK6AQM	*	25,620	142	122
*RV4LC	*	22,506	116	93
*UA4AAC	*	22,040	113	95
*RD3DT	*	13,515	105	85
*UA4FUW	*	12,877	99	79
*RV3WD	*	12,744	96	72
*RK6LP	*	10,080	64	60
*RA6AAW	*	6,048	47	42
*RW4PY	*	2,772	44	42
*RA3BQ	*	377	16	13
*RX6AH	28	168,487	459	289
*UA3QG	28	134,318	388	239
*RK6CM	28	62,715	281	185
*RL3AB	*	39,060	207	140
*RN4AM	*	13,446	108	81
*RZ3VA	*	3,234	54	49
*UA3YDN	*	1,820	40	35
*RA4NCC	*	1,595	35	29
*UA3AO	21	157,794	426	273
*RW6AH	21	89,539	297	229
*RA3AN	*	54,180	223	180
*UA4LW	*	51,731	197	179
*RU3XB	*	5,664	68	59
*RV3FI	14	357,300	554	397
*UA1ZZ	14	245,985	478	345
*RW4NY	14	240,865	487	335
*RA3UAG	*	146,605	349	269
*RU4WD	*	138,601	341	263
*RA6MS	*	115,650	342	257
*RN6HZ	*	63,504	222	189
*UA1ODM	*	47,600	192	170
*RA6DE	*	20,570	142	121
*RL3DD	*	9,775	93	85
*RW1AI/MM	*	9,620	68	65
*RX3AEX	*	207	9	9
*UA6LTI	7	593,217	590	381
*UA6BFE	7	264,638	316	253
*UA1ANA	7	188,880	338	240
*RU3PU	*	114,018	225	186
*RZ3AUL	*	72,209	181	163
*UA4WAV	*	59,136	158	128
*RA4LBS	*	24,900	100	83
*RU4CO	*	20,995	105	85
*RV3MR	*	9,548	65	62
*UA3UHZ	*	5,831	52	49
*RW3AFY	3.5	229,250	400	250
*RA3ZC	3.5	153,870	333	223
*RV3MI	*	122,816	280	202
*RA6XO	1.8	640	16	16

KALININGRAD

RV2FW/1	28	159,030	484	279
*RN2FA	A	24,453	147	117
*UA2FL	7	614,660	694	365

UKRAINE

UW2M	A	4,490,160	2489	848
			(Op: URØMC)	
UYØZG	A	2,145,008	2008	632
UW5U	A	2,039,578	1913	634
			(Op: UY2UA)	
UV5U	*	1,440,750	1397	565
			(Op: UX1UA)	
UT2UB	*	1,054,387	1156	499
UV2M	*	885,924	1166	468
			(Op: UR5MW)	
UTØIL	*	680,862	884	406
UT4XU	*	672,840	822	420
USØSY	*	201,135	430	265
UT4ZG	28	178,350	519	290
UY5ZZ	28	135,405	389	255
UT5ECZ	*	71,370	294	195
UR8RF	*	61,305	259	183
UR6F	21	1,132,216	1310	614
			(Op: UXØFF)	
US9QA	*	18,483	113	101
US7IID	14	1,010,800	1103	560
UX6F	14	926,840	1124	580
			(Op: UX3FW)	
UR4EI	*	891	29	27
UX5I	3.5	292,521	470	281
(Op: UT5IZ)				
UT7DK	3.5	274,455	458	285
*UT2UZ	A	1,881,130	1645	626
*UR6QS	A	1,211,265	1299	495
*UY7C	A	928,746	1069	441
			(Op: UR3CMA)	
*UT5UN	*	791,595	994	441
*UY8IF	*	554,975	828	395
*UY2RA	*	519,570	774	414
*UY5TE	*	516,152	860	364
*UU5JIB	*	473,499	679	351
*UR5QA	*	429,040	687	346
*UT3N	*	426,216	764	344
			(Op: UT3NK)	
*US3IUK	*	322,476	562	308
*UR5WX	*	282,953	539	319
*UTØRM	*	234,780	587	301
*UT4NY	*	226,782	433	293
*UW8SM	*	220,110	513	290
*UY5ZI	*	198,621	457	261
*US6EX	*	195,489	470	261
*US8MX	*	171,100	442	236
*UR3IQO	*	162,597	344	249
*US5EEK	*	150,176	414	247
*UX8IW	*	122,604	355	204
*US8IB	*	104,608	281	224
*US1IV	*	103,824	294	206
*UU2JG	*	46,728	132	99
*US5VX	*	46,189	161	143
*URØQX	*	23,504	138	113
*US3LX	*	6,466	61	53
*UR5ZVP	*	4,212	36	36
*UR5ZVJ	*	2,430	27	27
*UZ5UA	28	223,380	561	306
*UX4FC	28	161,568	445	288
*UU7JM	28	124,241	407	247
*UT3FM	*	66,885	267	195
*UX1IL	*	37,008	189	144
*UR7QM	*	23,111	155	121
*UR5IKN	*	5,782	64	59
*US5IVD	*	4,959	61	57
*UT5MB	*	3,300	55	44
*UR6IJ	14	752,960	898	520
*UR7EQ	14	547,729	813	463
*UX7QD	*	271,364	588	358
*UR8QR	*	143,377	349	269
*UX5EF	*	90,346	296	227
*UY5YA	*	67,260	240	190
*UW2F	7	577,940	576	370
			(Op: UTØFT)	
*USØHZ	7	515,380	537	353
*UY2ZZ	*	38,390	132	110
*UR3LTD	*	15,276	84	76
*UT5KO	3.5	67,210	206	143
*UR5IHQ	3.5	28,270	133	110
*UY3AW	*	9,316	72	68

LATVIA

YL6W	A	2,442,186	1715	694
YL9T	A	1,798,186	1849	598
YL7A	A	913,444	974	476
			(Op: YL2GM)	
YL5T	*	382,702	663	358
			(Op: YL3DQ)	
YL8M	*	1,539	29	27
			(Op: YL2GM)	
YL2BJ	14	360,240	636	395
YLØA	3.5	756,288	797	404
YL5W	*	83,520	215	180
*YL2TB	A	1,035,025	1204	475
*YL2CV	A	912,674	1121	469
*YL3FT	A	685,536	975	444
*YL3GCU	*	338,580	651	330
*YL2PJ	*	151,589	389	241
*YL2IU	*	120,991	356	227
*YL2TQ	*	99,348	317	204
*YL2IP	*	38,994	160	134
*YL2II	*	32,208	150	122
*YL2IS	*	11,440	105	88

ROMANIA

YO5PBF	A	1,116,876	1318	489
YO6BHN	A	902,208	1173	508
YR1C	A	670,136	1050	422
YO7BGA	*	116,095	342	217
YQ9W	*	84,376	310	199
YO7ARY	*	32,250	165	129
YO9HG	*	8,954	84	74
YR7M	3.5	800,321	759	421
			(Op: YO9GZU)	
YO5AJR	1.8	33,580	143	115
*YO3APJ	A	2,097,900	1828	675
*YR8B	A	1,517,202	1620	558
			(Op: YO8DOH)	
*YO8KAE	A	981,120	1104	480
			(Op: YO8BIG)	
*YO7FB	*	340,942	667	343
*YO3BWK	*	334,280	491	305
*YO6MT	*	278,034	522	311
*YO5DAS	*	252,108	483	298
*YO4SI	*	224,731	440	293
*YO9CWY	*	212,773	500	253
*YO7LGI	*	164,700	400	244
*YO2CJX	*	151,536	385	246
*YO7BGB	*	26,862	152	121
*YO3JV	*	13,221	88	77
*YO4RST	*	845	14	13
*YO7LTQ	*	750	26	25
*YO3CTK	28	276,340	576	337
*YO6CFB	*	24,321	143	121
*YO4MM	21	39,564	200	157
*YO9AGI	*	29,014	270	89
*YO5KIP	14	696,150	965	510
			(Op: YO5OHO)	
*YO4AB	14	574,695	791	473
*YO8KOS	14	436,770	791	422
*YO9CXE	*	85,579	281	227
*YO4PX	*	69,344	236	197
*YO9FBB	*	23,188	145	124
*YO4CSL	*	20,736	115	108
*YO9FYP	7	63,640	181	148
*YO6ADW	3.5	188,175	243	193
*YO/OE3BCA	*	61,776	196	144

SERBIA

YU2A	A	192,763	551	289
			(Op: YT7AW)	
YZØZ	21	1,064,202	1234	579
			(Op: YU1ZZ)	
YT2T	14	3,119,402	2050	839
			(Op: 4N1JA)	
4N8A	14	2,926,865	2041	821
			(Op: YU1EA)	
YT5G	14	2,222,960	1740	740
YU1LA	7	3,783,546	1553	703
YT5A	7	3,455,760	1474	680
YU1KR	3.5	682,443	711	397
*YU1EQ	A	466,422	723	382
*YU7DP	A	429,516	651	369
*YT1BX	A	192,618	435	246
*YU7FN	*	127,912	326	236
*YT1AD	21	732,366	1009	522
			(Op: YU1DX)	
*4N1GM	14	435,960	734	420
*YT7N	*	49,000	206	175
			(Op: YU7QL)	
*YT1YV	7	182,192	289	236
*YTØA	3.5	468,184	573	344
			(Op: YU7FU)	
*YZ8A	*	245,220	409	268

MACEDONIA

*Z35G	A	316,185	528	321
*Z33F	14	222,912	434	344
*Z35T	7	2,102,298	1136	601

OCEANIA

FIJI

*3D2EE	A	141,588	215	138

THE PHILIPPINES

*4FTO	A	153,075	222	157

EAST MALAYSIA

*9M8DX	21	610,056	624	333
			(Op: VK6DXI)	

SAIPAN

*WHØS	A	83,139	224	107

GUAM

KG6DX	A	1,514,412	1127	372
*WH2D	A	335,552	417	196
			(Op: K3UOC)	

HAWAII

KH6WT	A	4,120,146	1974	522
			(Op: K3TM)	
AH7C	A	865,161	776	297
KH6FI	*	63,365	162	115
KH6ND	1.8	22,100	77	50

PALAU

T88NN	A	1,463,161	1315	301

AUSTRALIA

VK2AEA	A	1,539,297	954	423
VK4BUI	14	181,940	291	220
*VK2GR	A	88,655	169	119
*VK4TT	A	45,270	122	90
*VK4EJ	14	37,290	122	113
*VK8AV	7	153,102	175	158

INDONESIA

*YB4IR	A	103,888	208	151
*YBØECT/Ø	*	3,658	41	31
*YB2EMK	28	2,184	28	26
*YBØYAD	21	17,219	89	67
*YD3KWR	*	11,495	71	55
*YC1UUU	*	6,072	48	46
*YB6LD	14	39,162	132	107
*YC2MXV	3.5	845	13	13
*YCØLOW/Ø	1.8	96	4	4

NEW ZEALAND

ZL3TE	A	311,805	379	195
			(Op: W3SE)	
ZM3A	7	6,043,950	1547	666
*ZL2AL	A	109,492	168	124

SOUTH AMERICA

CHILE

CE4CT	A	2,656,012	1361	562
			(Op: XQ4CW)	

GALAPAGOS IS.

HC8N	A	12,530,262	3545	899
			(Op: K6AW)	

COLOMBIA

HK1X	14	2,785,476	1456	643
*HK3BVD	7	56,240	102	95

ARGENTINA

LU7HN	A	5,434,898	1959	721
LR4E	A	4,439,966	1899	734
			(Op: LU5DX)	

LU1DZ	*	33,312	121	96
LW9DA	**28**	**1,726,452**	**1068**	**546**
LS1D	**21**	**1,836,510**	**1129**	**554**
			(Op: LW9EOC)	
***LW1E**	**A**	**379,561**	**429**	**301**
***LW5HBR**	**A**	**354,342**	**420**	**219**
***LR1F**	**A**	**119,100**	**199**	**150**
			(Op: LU5FD)	
*LW5EE	*	111,202	219	169
*LV5V	*	89,376	190	152
*LU5YF	*	59,148	154	124
*LU3FID	*	1,452	22	22
***L55D**	**28**	**232,301**	**341**	**233**
			(Op: LW1EXU)	
***LU8EOT**	**21**	**308,257**	**377**	**281**
***LU4MHQ**	**7**	**88,893**	**130**	**119**

PERU

OA4SS	**14**	**1,320,198**	**925**	**482**

ARUBA

P40A	**7**	**6,114,276**	**1508**	**684**
			(Op: KK9A)	

NETHERLANDS ANTILLES

PJ2T	**A**	**8,288,055**	**2652**	**783**
			(Op: WI9WI)	

BRAZIL

PS2T	**A**	**8,440,276**	**2606**	**841**
			(Op: N5ZO)	
PR5R	**14**	**458,016**	**496**	**312**
			(Op: PY5AKW)	
PY3AU	*	107,400	210	179
PY7ZY	**1.8**	**680**	**12**	**10**
***PV8DX**	**A**	**2,314,098**	**1167**	**531**
***PY2NY**	**A**	**2,146,688**	**1157**	**541**
***PY3DX**	**A**	**826,560**	**630**	**369**
*PS7DX	*	69,083	161	139
*PY2IQ	*	52,598	160	119
*PY7QJ	*	13,122	60	54
*PY4PW	*	3,060	33	30
*PP7ZZ	*	1,302	23	21
*PT8CWA	*	72	6	6
***PT7CG**	**21**	**840,650**	**677**	**430**
*PQ4F	*	66,722	165	146
			(Op: PY4FQ)	
*PT4C	*	24,206	98	91
			(Op: PY4CEL)	
*PU8TFA	*	325	13	13
***PR7AR**	**3.5**	**1,014**	**13**	**13**

VENEZUELA

***YV7QP**	**28**	**6,006**	**51**	**42**
***YV5AAX**	**14**	**287,560**	**347**	**280**

PARAGUAY

***ZP9EH**	**14**	**11,904**	**66**	**64**

TRIBANDER/SINGLE ELEMENT

UNITED STATES

KW3A	**A**	**2,535,060**	**1784**	**668**
			(Op: N4PN)	
WN2O	**A**	**2,300,242**	**1456**	**602**
			(Op: N2GC)	
AA5B	**A**	**1,914,204**	**1672**	**593**
			(@K5HAB)	
K4PV	*	1,611,708	1548	588
			(Op: K4PV)	
KZ5D	*	1,378,120	1423	526
N3UM	**A**	**1,354,764**	**1001**	**493**
K2SX	*	1,216,254	1250	503
W0BH	**A**	**1,035,119**	**1481**	**479**
W6TK	**A**	**958,329**	**1133**	**457**
KW2O	*	506,688	604	348
			(Op: N2UN)	
K4HAL	*	436,560	593	340
AD4EB	*	403,071	661	339
WØJPL	*	369,321	586	307
			(Op: KØJPL)	
K9UQN	**A**	**278,409**	**461**	**309**
KSØT	*	234,090	466	289
W4NTI	*	172,050	385	222
N8PW	**A**	**153,408**	**264**	**204**
N2NI	*	109,394	214	166
NA6Q	*	101,897	304	173
			(Op: W6SJ)	
KE3OM	*	98,464	253	181
			(Op: K3NCO)	
W6NKR	*	86,508	224	162
WAØMHJ	*	35,075	197	115
KC7UP	**A**	**33,900**	**131**	**113**
N6KW	*	32,944	168	116
AE6RF	*	29,290	142	101
W1RH	*	20,273	139	97
K7LV	*	15,176	79	56
WØZW	*	3,072	34	32
WN1GIV	**21**	**766,752**	**999**	**489**
			(Op: N4BP)	
K8IA	**14**	**1,247,992**	**1256**	**607**
KU8E	**14**	**252,047**	**494**	**307**
AB2MH	**14**	**6,844**	**65**	**59**
***KV8Q**	**A**	**980,120**	**1036**	**458**
***KZ9O**	**A**	**772,191**	**1035**	**441**
***N4EEB**	**A**	**709,280**	**814**	**403**
***KØPK**	**A**	**623,616**	**940**	**406**
*NA4K	*	532,923	674	349
***W1TO**	**A**	**459,585**	**490**	**315**
***WB2AA**	**A**	**438,728**	**541**	**317**
***AB7E**	**A**	**404,999**	**673**	**329**
*N3CZ	*	306,973	410	251
*WA4JUK	*	302,244	557	283
*NQ7R	*	251,424	597	291
*W8IQ	*	244,237	436	259
***KØGEO**	**A**	**227,908**	**501**	**251**
*KC5R	*	223,872	470	264
*K1TR	*	221,816	334	233
*W8GOC	*	187,920	361	232
*WW2J	*	184,164	254	206
*NØBUI	*	172,788	460	242
*K4BK	*	153,612	338	204
*AI2I	*	131,290	262	190
*K4OD	*	120,712	306	191
***AB3EI**	**A**	**97,527**	**253**	**177**
*W8PN	*	95,930	269	181
*WØQQG	*	79,254	197	153
*K4EU	*	79,218	222	162
*W4KPG	*	75,802	183	151
*WA1LWS	*	72,063	208	153
*W5TD	*	60,198	245	158
*N4DXI	*	53,382	157	123
*WD4AHZ	*	43,776	184	144
*KZ1M	*	36,864	198	128
(Op: W1EQ)				
*K4LNN	*	31,944	169	121
*ADØH	*	30,186	158	117
*KØHW	*	29,640	166	120
***K6CSL**	**A**	**27,664**	**165**	**112**
*AK9I	*	22,366	133	106
*K8WV	*	19,975	93	85
*NW3DC	*	9,664	70	64
			(Op: W3DQ)	
*K7TR	*	8,778	72	57
*N6NM	*	6,944	77	62
*K3GW	*	6,944	68	56
*KG6HAF	*	6,431	67	59
*K9HCK	*	4,212	59	52
*K5GM	*	525	16	15
*KU8T	*	378	20	18
***N5PU**	**14**	**1,728**	**37**	**36**
***N6AJR**	**7**	**2,686**	**38**	**34**

DX

LZ8A	**A**	**4,707,248**	**3299**	**854**
			(Op: LZ2BE)	
LZ3FN	*	4,466,660	2816	790
LR4E	**A**	**4,439,966**	**1899**	**734**
			(Op: LU5DX)	
RU9CK	**A**	**3,778,320**	**1810**	**624**
S59ABC	**A**	**3,089,580**	**1949**	**699**
			(Op: S51DS)	
EA5FV	**A**	**3,073,029**	**2233**	**727**
5H3EE	**A**	**2,864,932**	**1530**	**622**
RT9S	*	2,763,420	1631	530
			(Op: UA9SP)	
CE4CT	**A**	**2,656,012**	**1361**	**562**
			(Op: XQ4CW)	
S56A	*	2,602,842	1808	698
IT9/SS2A	**A**	**2,367,590**	**1832**	**646**
EV1R	**A**	**2,034,576**	**1804**	**639**
			(Op: EU1PA)	
SP5WA	**A**	**1,979,295**	**1634**	**635**
S57M	*	1,950,208	1500	586
VA2WDQ	**A**	**1,934,200**	**1201**	**509**
YL9T	**A**	**1,798,186**	**1849**	**598**
9M2CNC	**A**	**1,727,568**	**1243**	**516**
			(Op: G4ZFE)	
EV2A	*	1,682,289	1532	621
			(Op: EW2AA)	
S58P	*	1,619,574	1358	583
DL5YM	**A**	**1,614,798**	**1361**	**566**
VK2AEA	**A**	**1,539,297**	**954**	**423**
KG6DX	**A**	**1,514,412**	**1127**	**372**
HG8K	**A**	**1,476,910**	**1204**	**565**
OH1RX	**A**	**1,430,422**	**1312**	**581**
UA9CDC	*	1,333,152	999	432
VC5X	**A**	**1,221,363**	**1125**	**429**
			(Op: VE5UF)	
LY2MM	**A**	**1,185,696**	**1241**	**537**
IMØ/K7QB	**A**	**918,158**	**1203**	**502**
5P7Y	**A**	**900,852**	**983**	**492**
			(Op: OZ7AM)	
RU3UR	**A**	**776,914**	**983**	**463**
DL7JV	*	735,680	882	440
XM2FK	*	735,168	692	336
UA1PAC/1	*	728,000	896	400
OY1CT	**A**	**709,251**	**1160**	**437**
VE3CR	**A**	**698,629**	**585**	**373**
GØWKW	**A**	**664,216**	**814**	**409**
VE1MC	**A**	**645,498**	**586**	**327**
GM4SID	**A**	**622,380**	**793**	**410**
SD4ØJZ	**A**	**581,790**	**886**	**410**
MDØCCE	**A**	**419,558**	**649**	**362**
JH7XMO	**A**	**410,380**	**528**	**289**
DK8EY	*	398,430	588	342
HA5NB	*	371,800	583	338
JA7COI	*	371,800	570	275
OE3KAB	**A**	**290,575**	**393**	**295**
LY1CM	*	185,008	407	248
OH2VZ	*	173,475	400	257
S51DX	*	167,040	430	240
G4HZV	*	156,996	344	267
LA2AB	**A**	**147,840**	**340**	**220**
IØZUT	**A**	**100,098**	**286**	**201**
GI4FUE	**A**	**94,400**	**202**	**160**
JA1HP	*	89,712	306	168
ZS1EL	**A**	**77,469**	**176**	**147**
SM6XKB	*	26,448	129	116
PA3GVI	*	18,312	108	84
OU4O	*	9,163	79	77
OH3BU	**28**	**99,615**	**401**	**229**
ON5ZO	**28**	**27,084**	**172**	**122**
JR1NHD	**21**	**4,992**	**58**	**52**
PR5R	**14**	**458,016**	**496**	**312**
			(Op: PY5AKW)	
JA9CWJ	**14**	**122,590**	**248**	**205**
JA3DAY	*	23,030	101	98
SV1RP	**7**	**1,139,448**	**849**	**482**
IK2SND	**7**	**992,320**	**818**	**443**
OQ5M	**7**	**241,544**	**448**	**277**
JR4URW	*	50,661	146	117
YU1KR	**3.5**	**682,443**	**711**	**397**
***VE3DZ**	**A**	**3,317,688**	**1638**	**649**
***EA7TN**	**A**	**2,426,248**	**1882**	**698**
***3XD2Z**	**A**	**2,334,607**	**1267**	**569**
***T94WF**	**A**	**2,060,215**	**1654**	**631**
			(Op: S56M)	
***S51F**	**A**	**1,815,192**	**1460**	**612**
*OL1M	*	1,543,998	1421	554
			(Op: OK1EW)	
***OK3C**	**A**	**1,536,427**	**1470**	**563**
*LZØ7KM	*	1,508,870	1595	605
			(Op: LZ3YY)	
***GØMTN**	**A**	**1,421,763**	**1481**	**553**
*S57U	*	1,244,250	1271	553
***I2WIJ**	**A**	**1,163,006**	**1013**	**533**
***SQ9UM**	**A**	**1,090,974**	**1169**	**521**
			(Op: SQ9UM)	
***DK5DQ**	**A**	**1,046,528**	**1056**	**512**
***RU4SS**	**A**	**1,031,180**	**1149**	**470**
*OK1HX	*	1,024,884	1028	498
***PG7V**	**A**	**1,003,940**	**1236**	**497**
*UN6T	*	999,180	824	390
*MØDHO	*	942,333	937	483
***UY7C**	**A**	**928,746**	**1069**	**441**
			(Op: UR3CMA)	
*VE3XD	*	808,979	680	391
*S51AY	*	726,327	918	441
***DV3X**	**A**	**717,344**	**846**	**464**
			(Op: DZ8AE)	
***EW4AB**	**A**	**682,773**	**889**	**427**
*VE6CNU	*	667,974	760	326
*UY8IF	*	554,975	828	395
*UY2RA	*	519,570	774	414
*OK4N	*	494,070	706	383
*VE3GSI	*	486,717	532	301
*RU3VD	*	473,099	508	451
***YU1EQ**	**A**	**466,422**	**723**	**382**
***SM6BSK**	**A**	**396,720**	**606**	**348**
*UA3ABJ	*	382,072	552	326
***JH7CUO**	**A**	**354,858**	**488**	**294**
*JA2KVB	*	348,192	485	312
*S52OT	*	345,384	488	328
*LY2DV	*	335,175	612	327
***RX9DJ**	**A**	**311,190**	**433**	**246**
*SN7F	*	298,320	622	339
			(Op: SP7LFT)	
*JHØNEC	*	278,487	438	261
***YO6MT**	**A**	**278,034**	**522**	**311**
*RA9UN	*	253,215	402	255
*DL2NBY	*	251,868	561	302
***ON4CT**	**A**	**251,400**	**495**	**300**
*UTØRM	*	234,780	587	301
***J48HW**	**A**	**233,128**	**544**	**322**
			(Op: HAØHW)	
*LA8OM	*	225,432	530	303
*DL1NEO	*	222,084	368	279
***OH1ZE**	**A**	**213,860**	**463**	**289**
*VE3DUS	*	207,366	303	214
*3Z8Z	*	204,612	399	289
*K2NV/VE3	*	196,560	268	195
*VE3TW	*	187,370	319	205
*EA3CEC	*	155,949	315	229
*G3RWF	*	153,925	372	235
***YL2PJ**	**A**	**151,589**	**389**	**241**
*US5EEK	*	150,176	414	247
*JH6OPP	*	142,956	311	198
***3D2EE**	**A**	**141,588**	**215**	**138**
*EA1CRL	*	129,947	281	199
*YU7FN	*	127,912	326	236
*UA9DD	*	126,063	236	189
*YL2IU	*	120,991	356	227
*VA3XOV	*	120,020	233	170
*PG2AA	*	111,830	298	211
***YB4IR**	**A**	**103,888**	**208**	**151**
*US1IV	*	103,824	294	206
*SC5L	*	99,330	291	215
			(Op: SM5BKK)	
*ISØXDA	*	89,760	275	204
***VK2GR**	**A**	**88,655**	**169**	**119**
*JJ6TWQ	*	71,050	212	145
*VE3XAT	*	70,821	171	129
*G3GLL	*	67,704	252	186
*RU3DKW	*	65,985	213	159
*DJ3IW	*	61,614	172	163
*PY2IQ	*	52,598	160	119
*PA0FAW	*	52,397	216	151
*JA6CYL/6	*	50,142	232	122
*SP2GCE	*	49,440	188	160
*DL1ARD	*	45,600	196	150
*VK4TT	*	45,270	122	90
*VE3RCN	*	38,592	122	96
*SE6C	*	36,942	205	141
			(Op: SM6CDN)	
*RW3QF	*	29,715	120	105
*DL3DBY	*	28,854	163	126
*JO1SIM	*	23,765	170	97
*JA4AQR	*	18,496	81	68
*DL7UM	*	17,888	118	104
*JA4BDY	*	17,612	111	74
*SP3AOT	*	16,815	121	95
*DL3KVR	*	13,524	97	92
*JJ1WWL/1	*	10,032	85	57
*DL5BCF	*	7,956	86	78
*OK7N	*	7,140	56	51
*DL9ZWG	*	6,402	72	66
*JH1DVG	*	6,048	72	54
***6I2RC**	**A**	**4,601**	**47**	**43**
*JI4WHS	*	3,552	40	37
*PY4PW	*	3,060	33	30
*JL3RDC	*	1,682	39	29
*AO5GS	*	1,674	32	27
			(Op: EA5GS)	
*DL2EF	*	1,590	32	30
*JH9BWC	*	1,450	26	25
*JI1BDQ	*	1,334	23	23
*YO4RST	*	845	14	13
*JA5RB	*	836	24	19
*YO7LTQ	*	750	26	25
***BA4ALC**	**A**	**496**	**18**	**16**
*S59T	*	442	18	17
***SN5J**	**28**	**114,729**	**330**	**229**
			(Op: SP5JXX)	
***UR5IKN**	**28**	**5,782**	**54**	**59**
***DL6OCK**	**28**	**81**	**9**	**9**
***9M8DX**	**21**	**610,056**	**624**	**333**
			(Op: VK6DXI)	
***9A4RV**	**21**	**83,888**	**318**	**214**
***JP1QDH**	**21**	**45,792**	**188**	**144**
***DO1AYJ**	**21**	**5,146**	**67**	**62**
*JO1WIZ	*	96	8	8
***DO4B**	**14**	**1,019,898**	**1126**	**561**
			(Op: VE3ZIK)	
***VE2XAA**	**14**	**725,274**	**506**	**333**
***CS1GDX**	**14**	**566,244**	**767**	**428**
			(Op: CT1DRB)	
***OE5CWL/6**	**14**	**446,927**	**723**	**403**
***YT7N**	**14**	**49,000**	**206**	**175**
			(Op: YU7QL)	
***S54A**	**7**	**1,336,944**	**878**	**519**
***UA6LTI**	**7**	**593,217**	**590**	**381**
***UW2F**	**7**	**577,940**	**576**	**370**
			(Op: UTØFT)	
***VE3IAE**	**7**	**397,316**	**472**	**284**
***G3ZRJ**	**7**	**327,712**	**528**	**304**
*UA6BFE	*	264,638	316	253
***9A3MA**	**7**	**230,336**	**303**	**236**
*UA1ANA	*	188,880	338	240
***EI4HQ**	**7**	**150,136**	**227**	**196**
***JH9AMJ**	**7**	**102,102**	**212**	**154**
***EC7ABV**	**7**	**101,913**	**186**	**161**
*JA2PFO	*	58,995	150	115
*JA1XRH	*	2,394	21	21
***PAØMIR**	**3.5**	**343,403**	**539**	**337**
***S59N**	**3.5**	**281,281**	**473**	**281**

ROOKIE

UNITED STATES

***NE7D**	**A**	**107,450**	**260**	**175**
KB3P	**A**	**57,472**	**160**	**128**
***W4BW**	**A**	**48,256**	**198**	**128**
***KE5FRF**	**A**	**36,625**	**174**	**125**
KG6ZHC	**A**	**32,656**	**155**	**104**
***KCØVKN**	**A**	**27,501**	**134**	**103**
***KT3X**	**14**	**307,536**	**502**	**344**
***K4OSO**	**14**	**9,108**	**76**	**69**
***W9JJC**	**14**	**1,170**	**26**	**26**

DX

***RU9CD**	**A**	**924,451**	**734**	**341**
***F8CRS**	**A**	**387,400**	**601**	**325**
***BD7KLO**	**A**	**298,116**	**481**	**273**
***IZ1LBG**	**A**	**208,565**	**429**	**295**
*B3APX	*	71,296	387	128
			(Op: BD3APX)	
*BD4ITN	*	51,240	351	120
***RX3VF**	**A**	**35,242**	**167**	**134**
***VY1EI**	**A**	**17,784**	**100**	**78**
***OH8GZN**	**A**	**15,288**	**139**	**104**
***DH6BH**	**A**	**13,920**	**111**	**96**
*IZ5HQB	*	6,380	66	58
***JL8MBF**	**A**	**1,311**	**33**	**23**
***SM5BDV**	**A**	**1**	**1**	**1**
***SP5XO**	**28**	**22,204**	**159**	**122**
***US5IVD**	**28**	**4,959**	**61**	**57**
***PU8TFA**	**21**	**325**	**13**	**13**
***EC2DM**	**14**	**2,318**	**39**	**38**
***IZ5GRS**	**14**	**299**	**13**	**13**
***BD2BT**	**14**	**288**	**18**	**16**

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

KT3Y	**6,642,608**	**2582**	**889**
NY4A	6,242,823	2433	873
WU3A	**5,636,150**	**2327**	**845**
WA5Y	**4,629,122**	**2476**	**817**
W1CU	3,267,781	1800	709
NQ2F	**3,056,631**	**1743**	**713**
AI6V	**2,847,427**	**1869**	**683**
WE4OJ	2,266,880	1500	640
AC8W	**1,873,640**	**1338**	**620**
AD6E	1,818,170	1607	565
KEØUI	**1,434,762**	**1276**	**531**
KV7DX	**1,327,246**	**1400**	**538**
NN7SS	800,088	921	444
KZ5P	562,111	771	373
N6RC	361,908	664	324
WC8VOA	264,792	426	264
W6YRA	21,216	132	104

AFRICA

EE8A	**15,521,385**	**3773**	**1045**
5D5A	**15,165,971**	**3849**	**977**

ASIA

JA5FDJ	**2,674,649**	**1410**	**589**
8N7TU	2,245,156	1644	548
JM1LPN	1,844,426	1154	542
RWØLT	**1,595,810**	**1376**	**454**
RZ9OZO	**1,519,632**	**993**	**519**
RK9XWO	1,479,408	964	408
JA8RWU	1,113,476	852	437
B4R	**1,002,976**	**1188**	**416**
B5A	517,786	817	314
RU9SWW	337,040	357	220
JA3YKC	281,530	432	235
UA9AZA	31,200	115	96
RZ9WXK	27,639	100	83
8N3HAM	3,220	69	35

EUROPE

TM7XX	**10,363,000**	**3787**	**1075**
OL3Z	**7,317,024**	**2982**	**984**
EC2DX	**7,085,192**	**3440**	**1003**
HG1S	**7,074,978**	**3062**	**1011**
OL7R	6,402,570	2775	914
TMØR	6,068,125	3059	875
OE2S	**5,984,278**	**2755**	**943**
DR8BAMA	**5,370,768**	**2810**	**906**
UA3R	**4,957,506**	**3174**	**867**
DR4A	4,795,458	2486	906
RF3A	4,788,742	2967	853
SN6Z	**4,627,085**	**2295**	**839**
DLØCS	**4,541,348**	**2461**	**826**
UT7L	**3,934,628**	**2541**	**796**
LN3Z	**3,893,760**	**2377**	**845**
YUØ7HST	**3,631,365**	**2165**	**727**
SQ9Q	3,454,304	2130	784
RT4D	3,102,075	2358	765
DA3X	2,892,175	1984	715
9A95ØDM	**2,560,896**	**1815**	**648**
OM3KWZ	**2,438,100**	**1804**	**675**
OM3RKA	2,260,463	1603	667
DL4WA	2,247,400	1715	680
LZ2SX	**2,179,313**	**1940**	**659**
SI9AM	**2,166,555**	**1956**	**645**
RK3QWW	1,980,517	1644	623
RK3QWM	1,694,763	1721	549
LY4U	**1,502,898**	**1543**	**541**
HE7ØFG	**1,478,048**	**1469**	**572**
OK2KPS	1,474,279	1273	569
G6M	**1,301,832**	**1343**	**567**
DJ7LH	1,253,206	1242	527
R3TWA	1,100,495	1144	535
UZ1I	1,042,884	1300	491
UWØL	952,176	1077	478
OL2U	830,560	954	464
OH2K	**733,360**	**1174**	**445**
OM3RRC	682,080	788	420
RK3DZF	512,837	751	383
RK3DXS	492,474	730	389
DD3D	375,550	583	350
UX4E	259,722	574	307
OL1C	233,232	424	258
DLØMB	198,135	400	259
DH150HZ	119,082	326	223
GB6GW	104,200	267	200
RZ3AWM/3	80,408	284	184
F6KRK	72,980	204	178
EW8WW	**21,808**	**148**	**116**
OK5SWL	4,606	56	49
YL1ZS	**1,620**	**27**	**27**
RK3RWQ	756	28	27

NORTH AMERICA

ZF1A	**14,054,082**	**3807**	**1029**
VE3EJ	**9,111,024**	**2856**	**942**
VE8CDX	**4,692,913**	**2108**	**719**
VC7GL	**4,377,600**	**1898**	**684**
VE3YAA	2,279,896	1311	547
T4BC	**1,822,950**	**1243**	**450**
VE3MIS	1,520,558	1049	466
KL2R	**108,057**	**263**	**181**

OCEANIA

ZM1A	**5,163,520**	**1849**	**640**
YE1ZAT	**3,777,600**	**1803**	**600**
DX1DBT	**575,960**	**648**	**242**

SOUTH AMERICA

P4BL	**15,992,050**	**3931**	**1025**
LR2F	**8,819,720**	**2566**	**910**
4M5DX	**6,272,656**	**2037**	**689**
PR5Z	**658,482**	**566**	**363**
PY2NA	513,500	523	316
AY7X	14,994	71	63

MULTI-OPERATOR TWO TRANSMITTER

UNITED STATES

KD4D	**10,228,761**	**3863**	**999**
AB1HZ	**6,168,204**	**3082**	**861**
WX5S	**3,372,376**	**2156**	**686**
AC8W	**3,043,222**	**2165**	**727**
NG3U	2,184,593	1418	607

AFRICA

EF8M	**33,033,312**	**6838**	**1248**

ASIA

C4I	**9,504,810**	**3230**	**846**
B7P	**3,578,520**	**2180**	**660**
VR2C	**2,570,490**	**2049**	**585**
DTØHF	**628,368**	**1195**	**394**

EUROPE

OM8A	**13,312,400**	**5015**	**1150**
9A7A	**12,907,656**	**5160**	**1116**
ES5Q	**11,700,700**	**5421**	**1100**
LX7I	**10,585,151**	**4372**	**1033**
RU1A	**10,186,356**	**4955**	**1039**
IR4X	**10,055,650**	**4146**	**1034**
HG6N	**8,515,310**	**4083**	**1010**
DKØED	**8,259,680**	**3847**	**988**
OL7D	**5,389,736**	**3010**	**839**
DR5L	5,294,570	3120	830
S52ZW	**4,931,365**	**2596**	**865**
OZØKD	**1,843,200**	**1671**	**576**
LN1K	**720,399**	**986**	**439**
DFØSAX	613,722	834	439

OCEANIA

KH6LC	**9,226,647**	**3284**	**711**

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

NO4I	**11,097,060**	**4688**	**1041**
NR4M	7,943,488	3139	952
NX5M	**6,656,382**	**3939**	**906**
NØNI	**5,188,376**	**3342**	**839**
KF7NN	**4,946,289**	**2345**	**811**
WQ2N	**1,523,834**	**1156**	**559**
W9VT	**266**	**17**	**14**

ASIA

JA3YBK	**5,736,120**	**2376**	**780**
BY1TX	**838,040**	**1027**	**365**

EUROPE

DR1A	**16,999,872**	**6738**	**1184**
OM7M	**15,780,980**	**6398**	**1172**
LY7A	**9,039,801**	**5175**	**969**
SC3ØØVL	**1,647,720**	**1606**	**597**

OCEANIA

ZL5QH	**10,482,368**	**2901**	**832**

CHECK LOGS

The following logs were used as check logs. Check logs are always appreciated.

5Q1CW, CX6VM, DF9KF, DH5MM, DJ3XA, DL3SEM, DQ4M, EA4KA, ER3DX, EW1CQ, G3RWL, G4ERW, GMØNBM, LZ1QV, N5CRO, OK2QX, OM4AA, OZ1KWG, PYØFF, RK6DL, RK9CZO, RN3AKK/3, RUØAT, RU3EJ, RW3CW, RZ3ABC, SN9N, SP2EWQ/2, UA3LIZ, UA4NAL, UA4WLI, UA6GC, UA9CMQ, UN7TW, UX1IM, VE3FDT, W6RK, XL2RAQ, YO2RR, YO9FNP.

DISQUALIFIED: UU7J (Op: UUØJM) – Violations of rule IV.1. (a)

Oops...

We seem to have lost track of time in K4TWJ's January "How it Works" column. Contrary to evidence, we really *do* know that the first 12 hours of a day "(from one minute past midnight until 12 noon)" actually begin at 0001 and end at 1159, not 1259; and that the second 12 hours begin at 1200, not 1300, and run through 2359 (and 59 seconds). We apologize for any confusion, and accept no responsibility for resultant time travel complications.

In addition, February's "Zero Bias" made reference to something discussed "in our editorial last month." Actually, it should have referred back to our December 2007 editorial. January's "ZB" had a couple of errors as well, but they are addressed in great detail in K2RIW's "Magic of Wireless" article elsewhere in this issue.

Looking Ahead in CQ

Here are some of the stories we're working on for upcoming issues of *CQ*:

- "Results, 2007 CQ WW Foxhunting Weekend," by KØOV
- "*CQ* Interviews: Eric Haseltine, AB3DI, former Associate Director of National Intelligence," by W2VU
- "Talk is Cheap!" by W4UW
- "Six Meters at Last," by W4YO

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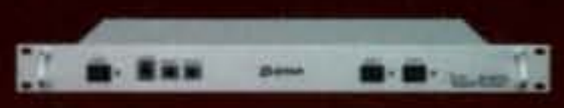

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