45241

Amateur Radio

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

COMMUNICATIONS & TECHNOLOGY

SEPTEMBER 2008

CQ

- CW Results, 2007 CQ WW DX Contest, p. 13
- CQ Reviews: TW Antennas TW-2010 Traveler, p. 24
- More New Goodies from Dayton, p. 32

On the Cover: Tommy Tow, WD4K, on his tower outside his station in Joelton, Tennessee. Details on page 98.

KENWOOD

Listen to the Future

All-Terrain Performance

On or off the road, Kenwood's new TM-271A delivers powerful mobile performance with 60W maximum output and other welcome features such as multiple scan functions and memory names. Yet this tough, MIL-STD compliant transceiver goes easy on you, providing high-quality audio, illuminated keys and a large LCD with adjustable green backlighting for simple operation, day or night.

144MHz FM TRANSCEIVER

TM-271A

▮ 200 memory channels (100 when used with memory names) ▮ Frequency stability better than ±2.5ppm (-20~+60°C) ▮ Wide/Narrow deviation with switchable receive filters ▮ DTMF microphone supplied ▮ NOAA Weather Band reception with warning alert tone ▮ CTCSS (42 subtone frequencies), DCS (104 codes) ▮ 1750Hz tone burst ▮ VFO scan, MHz scan, Program scan, Memory scan, Group scan, Call scan, Priority scan, Tone scan, CTCSS scan, DCS scan ▮ Memory channel lockout ▮ Scan resume (time-operated, carrier-operated, seek scan) ▮ Automatic repeater offset ▮ Automatic simplex checker ▮ Power-on message ▮ Key lock & key beep ▮ Automatic power off ▮ Compliant with MIL-STD 810 C/D/E/F standards for resistance to vibration and shock ▮ Memory Control Program (available free for downloading from the Kenwood Website: ***www.kenwoodusa.com***)

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

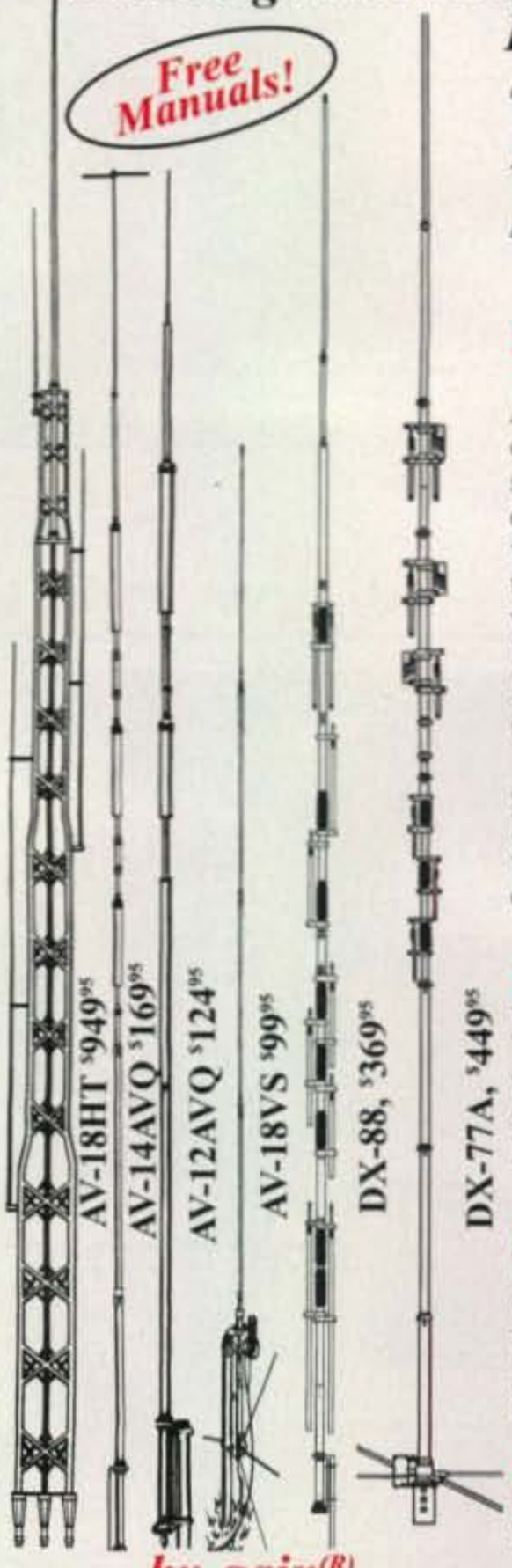
www.kenwoodusa.com

ADS#47107

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® 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.

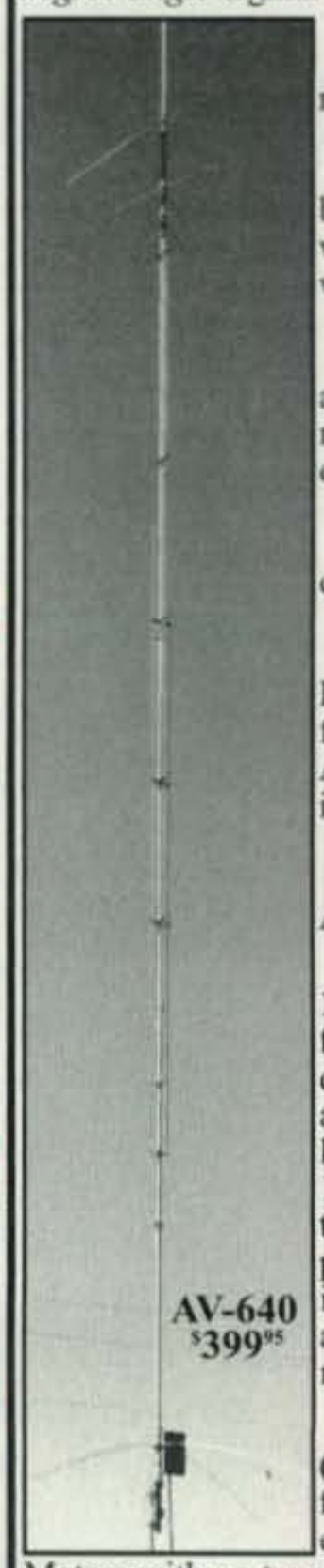
DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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	$124.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$99.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 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.

Free Hy-Gain Catalog

and Nearest Dealer . . . 800-973-6572

Call your dealer for your best price!

hy-gain®

Antennas, Rotators & Towers

308 Industrial Park Road, Starkville, MS 39759 USA

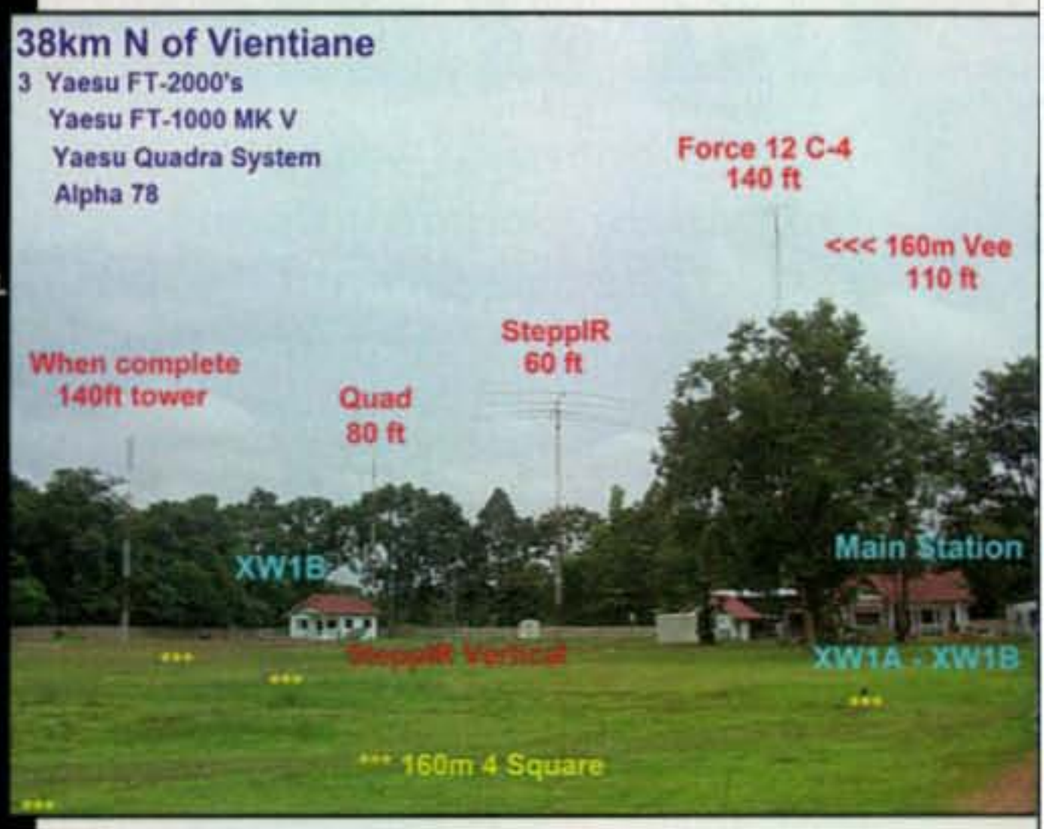
Toll-free Customer Sales Hotline: 800-973-6572

• TECH: 662-323-9538 **• FAX:** 662-323-6551

http://www.hy-gain.com

CQ contents

SEPTEMBER 2008



p. 84

p. 88

features

Vol. 64 No. 9

p. 24

departments

p. 13

Alinco would like to hand it to you!

DJ-V17 5 WATT 144MHz
Frequency range:
TX 144 - 147.995MHz
RX 130 - 173.995MHz

DJ-V27 5 WATT 220MHz
Frequency range:
TX 222 - 224.995MHz
RX 216 - 249.995MHz

DJ-V47 4.5 WATT 440 MHz
Frequency range:
TX 430 - 449.995MHz
RX 410 - 470MHz approx

These "new generation" handhelds are loaded with features, including:

- Rugged polycarbonate body resists dirt, dust and moisture
- Highly visible backlit alphanumeric display
- Direct frequency input through illuminated keypad
- DTMF Autodialer with Memory includes nine autodial memories plus redial function
- 200 Memories and one call channel
- VFO, Memory and Scan modes
- Ultra-flexible antenna with SMA connector avoids breakage
- 39 CTCSS tone squelch (encode+decode) settings
- Tone burst function (1,000, 1450, 1750 and 2100Hz)
- Battery-drain function avoids memory-effect
- Ergonomic design, fits in the palm of your hand
- Wire cloning capability
- Ni-MH standard and varieties of optional batteries including Li-ION packs
- 2-level attenuator
- Single pin speakermic/programming jack

Included Accessories:

- Ni-MH battery pack EBP-65 (7.2V 700mA)
- Wall-charger
- Flexible whip antenna
- Belt clip
- Hand strap
- Instruction manual

Specifications subject to change without notice or obligation. Specifications apply to Amateur Radio bands only. Permits required for MARS use. CAP use subject to equipment approval. Product intended for use by properly licensed operators

Distributed in North America by Ham Distributors,
1775 North Loop 336 East, Suite 8, Conroe, Texas 77301
Phone: 936-649-1497 • Fax: 800-824-3128 • email: USrep@Hamdistributors.com

ALINCO

www.alinco.com

NASA: Nothing's Wrong With the Sun

Responding to reports that the current solar minimum is lasting "longer than it should," and that this might be the beginning of another "Maunder Minimum"—a 70-year stretch from the mid-1600s to the late 1700s during which there were very few sunspots—NASA solar physicist David Hathaway says there is nothing to worry about. "The ongoing lull in the sunspot number is well within historic norms for the solar cycle," he told NASA Science News. He dismissed talk of a second Maunder Minimum, noting that "we have already observed a few sunspots from the next solar cycle … This suggests that the solar cycle is progressing normally." Hathaway predicts the next solar maximum will be just three or four years away.

Trouble with HF Digital Voice Programs

This story was still developing as we went to press, but it appears that a significant legal issue has arisen regarding hams' rights to use the engine behind several new HF digital voice modes, including WinDRM, DRMDV and FDMDV. According to Gary Pearce, KN4AQ, of "Amateur Radio // Video News," all of these programs use a "codec," or coding and decoding algorithm, known as MELP, which was designed for the U.S. military and for NATO, but apparently never licensed for free distribution to or use by hams.

In response, the original versions of the software were pulled out of distribution and developers quickly changed WinDRM and FDMDV to work around an open-source code. At press time, the revised version of FDMDV was back online, and an updated WinDRM program was expected soon (DRMDV, which never really caught on, has been dropped). Pearce says users of these programs will need to download the new versions to stay compatible … and legal. He also notes that the audio quality is not as good in the newer version as in the original, because the original codec was designed specifically for HF use. (Note that a different codec is used by the AOR digital voice modems and by D-Star, so they were not affected by this situation.)

Riley Retires … For Real This Time

The man who brought law and order back to amateur radio has retired. FCC Special Counsel Riley Hollingsworth, K4ZDH, wrote his final warning notice on June 26 (to a coal mining company using 2-meter radios in its mines), then hung up his pink slips on July 3. He had originally planned to retire this past January, but changed his mind when an interference problem cropped up between several hundred 70-centimeter amateur repeaters and the Air Force "PAVE PAWS" radar system. Not wanting to drop such a sensitive matter into the lap of a newcomer, Hollingsworth decided to delay his retirement until the immediate problems were resolved and a mechanism was in place to deal with future problems.

For the past ten years, Hollingsworth has been the "face" of FCC enforcement in the Amateur Service, assigned to be the chief enforcer of Part 97 of the FCC rules as part of a commission-wide effort in the late 1990s to put teeth back into its enforcement efforts. The ham bands, in particular, had been a virtual enforcement void since the mid-1980s. Riley is quick to assure anyone who asks that his departure will not mean an end to amateur enforcement, and that a qualified successor (not yet named at press time) will pick up where he left off. Riley plans to remain involved in amateur radio, starting by spending more time on the air.

ARRL, FCC Meet on BPL

Top officials of the ARRL met with staff members of the FCC's Office of Engineering and Technology (OET) in July to discuss "a possible regulatory approach" for Broadband over Power Lines, or BPL, after the U.S. Court of Appeals sent the FCC's BPL rules back to the Commission after deciding that two of ARRL's major complaints were correct. According to the *ARRL Letter,* League President Joel Harrison, W5ZN; Chief Executive Officer Dave Sumner, K1ZZ, and General Counsel Chris Imlay, W3KD, made proposals that "would address the needs and concerns of Amateur Radio operators in avoiding harmful interference … while imposing the minimum necessary regulatory obligations on BPL deployments." There was no indication as to whether the FCC staff was receptive to those proposals.

Meanwhile, the Court of Appeals ordered the FCC to reimburse a portion of the ARRL's expenses relating to the suit over the BPL rules.

ARRL to Red Cross: Still Some Problems with Background Checks

The ARRL has notified the American Red Cross that a few sticking points remain with regard to the Red Cross policy requiring background checks for all volunteers, including those volunteering indirectly, through ARRL's Amateur Radio Emergency Service. In a letter, ARRL President Joel Harrison, W5ZN, says the language in the Authorization for Background Investigation consent form and the Disclosure Regarding Background Investigation form is still overly broad and may "discourage substantial numbers of radio amateurs from participating." However, he also made a point of saying that discussions on a renewed Statement of Understanding between the two organizations should not be delayed while these matters are resolved. The formal agreement between ARRL and Red Cross expired in 2007. Renewal talks were initially put on hold until the dispute over the background checks could be resolved.

Kansas Ham, Son, Killed During Antenna Installation

Edward Thomas, KCØTIG, and his son, Jacob, both of Kansas City, Kansas, were killed July 13th when an antenna they were installing apparently came in contact with high voltage overhead electrical lines. According to the *ARRL Letter,* Thomas_a ham since 2004—was declared dead at the scene from electrocution. His son died later in the day at the hospital. A local ham who works for the power company and says he built and maintained the substation that served Thomas' neighborhood says the overhead line carried 7620 volts. He noted that the antenna they were installing was fiberglass , but pointed out that the fiberglass merely covers a metal radiating element and that a thin coating of fiberglass is no match for 7000 volts. He reminds everyone—and we join him—that antennas and power lines do not mix. Any antenna should be installed far enough away from any power line that it can fall in any direction without making contact, or even coming close.

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.

TOKYO HY-POWER

Two of the LIGHTEST and MOST COMPACT Amplifiers in the Industry!

HL-1.5KFX

HF/50MHz Linear Power

Features

- Solid State.
- The amplifier's decoder changes bands automatically with most ICOM, Kenwood, Yaesu.
- The amp utilizes an advanced 16 bit MPU (microprocessor) to run the various high speed protection circuits such as overdrive, high antenna SWR, DC overvoltage, band miss-set etc.
- Built in power supply.
- AC (200/220/235/240V) and (100/110/115/120V) selectable.
- Equipped with a control cable connection socket, for the HC-1.5KAT, auto antenna tuner by Tokyo Hy-Power Labs.

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:
Auto Antenna Tuner (HC-1.5KAT)
External Cooling Fan (HXT-1.5KF for high duty cycle RTTY)
Accessories Included:
Band Decoder Cables included for Kenwood, ICOM and some Yaesu

HL-1.2KFX

750W PEP Desktop Linear

Features

- Solid State.
- This world-class compact 750W HF amplifier is the easiest to handle and operate.
- The amplifier's broadband characteristics require no further tuning once the operating band is selected.
- The amplifier allows operation in full break-in CW mode due to the use of the amplifier's high speed antenna relays
- Quiet operation allows for even the weakest DX signals
- The amp utilizes a sophisticated circuit to run the various high speed protection circuits.

Specifications

Frequency:
1.8 - 28MHz all amateur bands including WARC bands
Mode:
SSB, CW, RTTY
RF Drive:
75 - 90W
Output Power:
SSB 750W PEP max.,
CW 650W, RTTY 400W
Circuit:
Class AB parallel push-pull
Cooling Method:
Forced Air Cooling
AC Power:
1.4kVA max. when TX
AC 100/110/115/120V,
AC 200/220/230/240V
Dimensions:
9.1 x 5.6 x 14.3 inches (WxHxD)
Weight:
Approx. 33lbs.

More Fine Products from TOKYO HY-POWER

HC-1.5KAT
HF 1.5KW Auto Tuner

HL-350VDX
VHF 330W Amplifier

HC-200AT
HF/6m 200W Auto Tuner
Lightning Tuning Speed

TOKYO HY-POWER

TOKYO HY-POWER LABS., INC. – USA
Technical Support
28301 Tomball Parkway, Suite #500-210
Tomball, TX 77375
Phone 713-818-4544
e-mail: thpsupport@airmail.net

TOKYO HY-POWER LABS., INC. – JAPAN
1-1 Hatanaka 3chome, Niiza Saitama 352-0012
Phone: +81 (48) 481-1211 FAX: +81 (48) 479-6949
e-mail: info@thp.co.jp
Web: http://www.thp.co.jp

HAM RADIO OUTLET

Exclusively from Ham Radio Outlet!

www.hamradio.com

Western US/Canada	Southeast	Northeast
1-800-854-6046	1-800-444-7927	1-800-644-4476
Mountain/Central	Mid-Atlantic	New England/Eastern Canada
1-800-444-9476	1-800-444-4799	1-800-444-0047

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℠

Vertex Standard
US Headquarters
10900 Walker Street
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 External Data Management Unit (DMU-2000) Provides Many Display Capabilities

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

COMPACT HF/50 MHz TRANSCEIVER WITH IF DSP

A superb, compact HF/50 MHz radio with state-of-the-art IF DSP technology configured to provide YAESU World-Class Performance in an easy to operate package.
New licensees, casual operators, DX chasers, contesters, portable/field enthusiasts, and emergency service providers - *YAESU FT-450...This Radio is for YOU!*

HF/50 MHz 100 W All Mode Transceiver

FT-450 Automatic Antenna Tuner ATU-450 optional
FT-450AT With Built-in ATU-450 Automatic Antenna Tuner

Compact size : 9" X 3.3" x 8.5" and Light weight : 7.9 lb

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

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

YAESU
Choice of the World's top DX'ers

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

zero bias – a CQ editorial

BY RICH MOSESON,* W2VU

Vanishing Act?

What does ham radio have in common with wild horses and pit toilets? Well, according to America Online, all three are among the "Top 25 Things Vanishing from America." Unfortunately, there is no indication from the editors of "Walletpop.com," part of AOL Money & Finance, as to what their criteria were for selecting items for the list or for assessing the qualifications of the writers of each segment. Also unfortunately, the piece was a "main page feature" on AOL the day it appeared, so it was promoted to several million AOL users. Also unfortunately (well, fortunately in the larger sense), the story was wrong, at least in certain key points.

Author Tom Barlow, N8NLO, whose credentials appear to include being a writer and holding a ham license, says that in the past five years, "the number of people holding active licenses has dropped by 50,000..." He follows that by saying, "(a)s cell phones and the Internet siphon off much of what once attracted people to amateur radio, the nation's ham radio population is graying rapidly... All these elements speak to a long, slow diminishment of a pastime that began with Marconi."

There is no denying that our total licensing numbers have fallen in the past five years, and I won't even quibble too much with Tom's numbers (the actual drop was 33,000 from 2003–2007, with growth of 4,000 from 2007–2008, so he's only off by roughly a factor of two). But let's look at some important background to these numbers. The total number of licensees started falling in May of 2003, after reaching an all-time high of nearly 688,000, according to the AH0A website. That date is significant because it is just over 12 years from February 1991, when the first codeless Technician licenses were issued.

At that time, there were indeed many people who were attracted to ham radio by repeater autopatches for making phone calls from their cars and "free" e-mail via packet that operated at about the same speed as (or faster than) your typical dial-up computer modem of the day. As cell phones became ubiquitous and internet connections became faster and faster, many of the people who became hams solely to make phone calls or send e-mails did indeed drop out. Most of them had never really become part of the ham community, but their licenses remained on the FCC's books for a full ten years, plus a two-year grace period for renewal. Those first codeless Tech licenses that were not renewed began falling off the FCC's rolls in early 2003, exactly the point at which our overall numbers began to drop. Over the same period, though, there have been between 20,000 and 30,000 new licensees each year, so in the four years in which we lost 33,000 licensees overall, we also gained about 100,000 new real people. And now the overall trend is upward.

An interesting page to look at on the AH0A website is his "Average Months to Expiration" page. This is a figure that resets when a license is renewed. Anyone with more than 60 months remaining has either renewed or been issued a new license within the past five years. Between late 2000 and mid-2004, the trend was negative, with the average licensee being less than five years away from expiration. But the numbers have been climbing steadily since the middle of 2004, and except for Novice licensees, all license classes have been over 60 months since October 2006. In the most recent three months (April, May, June 08), the average ham was about 68.2 months away from license expiration—an all time high since AH0A began tallying these figures in 1999. What this means is that the average ham today is operating with a license that has been issued or renewed within the past five years, and this is a very healthy sign for our future.

Shooting Ourselves in the Foot

What *does* worry me, though, is our collective tendency to shoot ourselves in the foot, especially when we create a negative image of ham radio in an effort to promote it. A recent article in the Rochester *Democrat Chronicle* newspaper about a high school radio club quoted its adviser as saying, "There's no secret that ham radio is an older man's hobby ... If we can get young kids interested, maybe we'll save the hobby from extinction." Of course, we don't really know how many young people are getting into ham radio these days because the FCC no longer releases birthdate information. Many of us who are active today got our starts as teenagers and we tend to think that there was much greater interest in ham radio among teens 30 or 40 years ago than there is now. I'm not so sure about that. My high school radio club had about 10 members and a half dozen licensed hams, out of several hundred students in the school. One of our local radio clubs made a point of inviting us to attend its meetings and join its activities, but we were the only kids there, maybe two or three at a time. The rest of the club was made up of "older men."

Elsewhere in this issue, you will see our report on this year's Newsline Young Ham of the Year, Emily Stewart, KCØPTL, who is neither old nor a man. Neither are the six other young women among this year's 30 YHOTY nominees. The article also includes a rundown of this year's scholarship winners from the Foundation for Amateur Radio. Of the 49 winners, 14 are young women. Last month, we pointed out the work done by ARRL Membership Manager Katie Breen, W1KRB, on revitalizing the ARRL staff radio club. Katie, again, is neither old nor a man. I think we're seeing a trend here, but it's not the one that's being shared with the media by so many other hams.

N8NLO (the author of the AOL piece), responding to the many comments disagreeing with his perspective, said he hopes they are right but that "I've seen local clubs no longer able to field volunteers for events or hold Field Day." That may be so, and one could argue that the hobby is in trouble if the staff radio club at its national organization headquarters was falling into inactivity, but the real story there is how two of those staff members, one young and inexperienced as a ham, managed to turn it all around. On a similar note, Ted Randall, WB8PUM, who produces a radio program about ham radio on international shortwave, has a story on his website, <http://www.tedrandall.com/pages/good-stuff.php>, about a new, young, ham in Tennessee who was looking forward to attending his first hamfest when he learned that the sponsoring club had been disbanded and that the hamfest would be cancelled. John Rhoades, KJ4EVN, got in touch with another young ham, Matt Klimkowski, KG4WXX, and along with a couple of other young hams, decided to try to run the hamfest on their own. When word of the effort reached Dr. Michael Barrett, President of TW Antennas in nearby Cookeville (see review of the TW 2010 in this issue), he immediately agreed to sponsor the hamfest and cover the costs, so not only was admission free, but so was the food! Attendance wasn't great, as there was still confusion over whether the event was on or not. What really matters, though, is that this group of young hams is already hard at work planning next year's hamfest!

Final item: One of my son's friends from high school is a film major in college. Assigned to produce a mini-documentary for a class, he picked ham radio as his topic. I don't know if he ever finished the program, but along the way, he went out and got his Tech license and last I heard, he was teaching himself Morse code!

You know, maybe they're right ... maybe this hobby of old men *is* dying ... and being replaced by a hobby led increasingly by young men and women who aren't always satisfied to play with toys that other people have built, but want to build and design their own toys for the rest of us to play with. Ham radio is dead! Long live ham radio!

73, W2VU

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

hy-gain® ROTATORS

. . . the first choice of hams around the world!

HAM-IV

HAM-IV
$559.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of $2^{1}/_{16}$ inches.

HAM IV and HAM V Rotator Specifications	
Wind Load capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power	800 in.-lbs.
Brake Power	**5000 in.-lbs.**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	26 lbs.
Effective Moment (in tower)	**2800 ft.-lbs.**

TAILTWISTER SERIES II

T-2X
$699.95

T-2XD
$1129.95
with DCU-1

For large medium antenna arrays up to 20 sq. ft. wind load. Available with *DCU-1 Pathfinder* digital control (T2XD) or standard analog control box (T2X) with *new* 5-second brake delay and *new* Test/Calibrate function. Low temperature grease, alloy ring gear, indicator potentiometer, ferrite beads on potentiometer wires, *new* weatherproof AMP connectors plus 8-pin plug at control box, triple bearing race with 138 ball bearings for large load bearing strength, electric locking steel wedge brake, North or South center of rotation scale on meter, low voltage control, $2^{1}/_{16}$ inch max. mast.

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

CD-45II

CD-45II
$389.95

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

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

HAM-V

HAM-V
$1049.95
with DCU-1

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!*

AR-40

AR-40
$289.95

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

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

HDR-300A

HDR-300A
$1379.95

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

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

ROTATOR OPTIONS

MSHD, $99.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $39.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

Digital Automatic Controller

DCU-1
$749.95

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

AR-35 Rotator/Controller

AR-35
$79.95

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

RBD-5
$29.95

NEW! Automatic Rotator Brake Delay

Provides automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents accidentally engaging brake while rotator is moving. Use with HAM II, III, IV, V, T2Xs. Easy-to-install. Includes pre-assembled PCB, hardware.

http://www.hy-gain.com
Nearest Dealer, Free catalog, To Order . . .
800-973-6572
Voice: 662-323-9538 **Fax:** 662-323-6551

hy-gain®

Antennas, Rotators & Towers
308 Industrial Park Road,Starkville, MS 39759, USA

announcements

Ohio State Parks On The Air Contest – Sponsored by the Portage (OH) County ARS, this event will take place September 6 from 1600–2400 Z on CW, SSB, FM, AM, and Digital miodes on 80, 40, 20, 15, 10, and 6 meters. Activate one of the 73 Ohio State Parks. For information, rules, log sheets, and park information go to: <http://parks.portcars.org>.

Southeastern DX Club 50th Anniversary Celebration Contest – September 20–21 from 1800–0200Z, Atlanta, Georgia. Open to stations worldwide. Members will sign their call/50. For rules, times, exchange, etc., go to: <http://www.sedxc.org/50thcontest>.

The following special event stations are scheduled for Sept.:

N2UL, from CQ Labor Day, Nutley, New Jersey; Robert D. Grant United Labor ARA; 1200–2400Z Sept. 1 on 28.420, 21.360, 14.260, 449.975 (W2LI) MHz. For certificate send QSL and SASE to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

W2FHA, from10th anniversary of the Town of German Flatts, Living History Weekend, Fort Herkimer Church, Dolgeville, NY; Ft. herkimer ARA; Sept. 27 from 12–5 PM EST on 7.240 and 14.240 MHz. For certificate send QSL and SASE to: Ft. Herkimer ARA, 28 West State St., Dolgeville, NY 13329. <www.fhara.net>

W4PL, from activation of Hattaras Island (North Carolina State East group, IOTA NA-067; Tennessee Valley DX Association; 1900Z Sept. 27 to Oct. 4 on 80 meters HF (SSB, CW, with some PRK and RTTY), and 6 meters SSB and CW. QSL via K4KWK direct (SASE) or via the bureau. <www.tvdxa.com>

K5R, commemorating the landfalls of Hurricanes Katrina and Rita in 2005, Louisiana; Southeast Louisiana ARC; 1400–2000Z Sept. 13 on 7.250 and 14.250 MHz ±QRM. For QSL send QSL and SASE to Scott Hernandez, K5R, 957 Nancy St., Mandeville, LA 70448. <http://groups.yahoo.com/group/K5R>

W5SLA, from 44th birthday of the Ozone ARC, Lousiana; 8 AM to 5 PM CDT on CW 7.120 MHz and SSB 14.257 MHZ, ±QRM. For certificate send QSL and 9×12 SASE to Michael White, 404 Holmes Dr., Slidell, LA 70460.

K6P, in recognition of National POW-MIA Day, Santa Ana, California; Sept. 18–21 on 14.253, 21.350, 18.150, 7.250 MHz. Send QSL and SASE to Mark McMullen, KM6HB, P.O. Box 27271, Santa Ana, CA 92799.

K7T, from 81st anniversary of the Invention of the Electronic TV by Philo Farnsworth, Utah; Utah DX Assn.; Sept. 1–15 on 14.260 and 7.260 MHz. For QSL send QSL and SASE to Wesley Wilkinson, W7WES, 7363 Galazy Hill Rd., West Jordan, UT 84081.

W9UVI, from 50th anniversary of Peoria Superfest, Peoria, Illinois; 1600–0000Z Sept. 20–21 on 14.240 and 7.240 MHz. For certificate send QSL and SASE to PAARC, P.O. Box 3508, Peoria, IL 61612-3508. <www.w9uvi.org>

The following hamfests, etc., are slated for Sept.:

Sept. 6, **Grand Rapids Area Hamfest**, Kent County Fairgrounds, Lowell, Michigan. Contact Jack Amelar, NY8D, e-mail <grahamfest08@w8dc.org>, phone evenings 616-897-6885, <http://www.grahamfest.org>. (Talk-in 147.26+ [94.8 Hz], 146.52; exams 10 AM)

Sept. 13–14, **Radio Expo 2008**, Boone County Fairgrounds, Belvidere, Illinois. Information call 708-457-0966; <http://www.chicagofmclub.org>. (Talk-in 146.76– [107.2 PL], 147.255+ [114.8 PL], 444.725+ [118.8 PL], exams)

Sept. 14, **Western CT Hamfest**, Edmond Town Hall, Newtown, Connecticut. Contact Joe de Groot, AB1DO, e-mail <ab1do@arrl.net>, phone 203-938-4880, <www.danbury.org/cara/hamfest.html>. (Talk-in 147.30+ PL 100)

Sept. 20, **W9DXCC Convention & Banquet**, Holiday Inn, Elk Grove Village, Illinois. Contact Bill Smith, W9VA, e-mail <w9va@aol.com>, phone 847-945-1564, <www.w9dxcc.com>.

Sept. 20, **RI FM Repeater Service '76 Auction & Fleamarket**, VFW Post 6342, Forestdale (N. Smithfield), Rhode Island. Contact Rick Fairweather, K1KYI, e-mail <k1kyi@arrl.net>, phone 401-864-9611 (7–8 PM only). (Talk-in 146.76)

Sept. 20–21, **Peoria Superfest 2008**, Exposition Gardens Fairgrounds, Peoria, Illinois. Information call 309-692-3378, e-mail <w9uvi@arrl.net>, <http://www.peoriasuperfest.com>. (Talk-in 147.075+ PL 103.5; exams Saturday)

Sept. 21, **Gloucester County ARC Hamfest**, 4H Fairgrounds, Mullica Hill, New Jersey. Information: <http://users.tellurian.com/freddie/w2mmd /hamfest.html>.

Sept. 26–28, **2008 ARRL/TARPR Digital Communications Conference**, Holiday Inn, Elk Grove Village, Illinois. Information call TAPR, 972-671-8277; <www.tapr.org/dcc/>

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

CQ Amateur Radio (ISSN 0007-893X) is published monthly by CQ Communications, Inc., 25 Newbridge Rd., Hicksville, NY 11801, Telephone 516-681-2922; Fax 516-681-2926. E-mail: cq@cq-amateur-radio.com. Web site: www.cq-amateur-radio.com. Periodicals Postage Paid at Hicksville, NY 11801 and at additional mailing offices. Subscription prices (all in U.S. dollars): Domestic-one year $36.95, two years $66.95, three years $96.95; Canada/Mexico-one year $49.95, two years $92.95, three years $135.95; Foreign Air Post-one year $61.95, two years $116.95, three years $171.95. U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government including military services, only on a cash with order basis. Requests for quotations, bids, contracts, etc., will be refused and will not be returned or processed. Entire contents copyrighted by CQ Communications, Inc. 2008. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address.

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

The FLEX-5000 Series

HF-6m Transceivers

Innovation...

Exhilaration...

POWER

True Software Defined Radio...

FLEX-5000A - $2799.00
FLEX-5000C - $5299.00

Optional RX2 - $649.00
Optional ATU - $299.00

Demo and Refurbished Units Currently Available Call for Discounted Prices

For Detailed Specifications and Features
www.flex-radio.com sales@flex-radio.com
512-535-5266

FlexRadio Systems®
Software Defined Radios

All Prices and Specifications are Subject to Change Without Notice

Results of the 2007 CQ WW DX CW Contest

BY BOB COX,* K3EST

Expanded CQ WW Contest Results on the Web

Several elements of our contest reporting are on the CQ website, including Station Operators of Multi-Op stations and expanded QRM.To view them go to <http://www.cq-amateur-radio.com/cqwwhome.html>, then click on "Expanded results, 2007 CQ WW CW" and select the category you want to see. You may also get there by going to our home page at <http://www.cq-amateur-radio.com>, clicking on "Contest Rules & Info," then clicking on "CQ World Wide DX Contest" and selecting "Expanded Results, 2007 CQ WW CW."

The 2007 CQ WW DX CW Contest is always an event looked forward to by many contesters around the world. You never know what propagation will provide, but you can be sure the CQ WW will provide activity from stations located in exotic locations. Lots of activity was heard as contesters filled the airwaves. Once again the propagation favored the low bands. One-sixty really showed what it could provide with several stations working over 100 countries. Look at the scores on the low bands and you will see many new records were set. Still, the high bands provided everyone with plenty of contacts. It was a real challenge to be on 10 or 15 meters at the right time to catch the 10-minute opening to somewhere. This "magic" is what makes radio and contesting so much fun. You just never know what the conditions will provide. The sun is taking its time to ramp up the next cycle. Even with a low solar flux index, a new CW logs received record was set. The number of CW entrants is growing right along with SSB.

The CQ WW has something for everyone: contesting, DX hunting, prefix hunting, IOTA activations, club participation and much more. All you have to do to take part in the biggest ham radio contesting event of the year is turn on your radio and listen. If you do that you soon will be drawn into the excitement of making QSOs. Once you jump into the contest, it is very hard to get out of the QSO pool. This year there was activity from over 240 DXCC countries.

As has been mentioned before, the CQ WW is a fantastic competition which brings out the best in amateur radio: team work, station construction, antenna erection, operating skill, and most of fun. The CQ WW is a celebration of ham radio skill and effort. New hams and old timers who participate in the CQ WW become hooked. What follows are the results of the 2007 CQ WW CW contest. Everyone who enters is a winner!

High Power

The High Power Single Operator category is a real challenge. The competition is intense and causes entrants to bring all their skills to the event. Again this year propagation favored the low bands. Conditions on 160 meters were really outstanding. To take advantage of this unexpected windfall, the top operators had to catch the right band openings, especially on 10 meters. The three operators who finished on top of the world are all well-established contesters. After all the log checking was completed, Hrane, YT1AD, operating from 3V2A, had the world's highest score. Hrane put eastern zone 33 on the map. Second place went to John, W2GD, P40W. John put his considerable contesting talent to great use. John said, "I actually enjoy the bottom of the sunspot cycle with its enhanced propagation on 160/80/40. On the other hand, I miss the endless runs of EU and NA on 10 meters. Hopefully next year *both* will be true as the spots begin their return." Third place world went to V47NT operated by Andy, N2LT. He observed, "It's all in the location." This explains all the wonderful DXpeditions during the contest. Travel to a DX location and you too can run them all the time.

In the U.S., Randy, K5ZD/1, continued his dominance of in this category. He sure took advantage of the band openings to overpower his competitors. Second place in the U.S. went to Alexander, LZ4UU, putting K3CR in central Pennsylvania on the map. Third place U.S. was taken by Krassy, K1LZ. He noted, "I am glad that there are still a lot of SO2R operators and friends who gave me a lot of drive for future contests."

In Europe, top honors again were taken by the Azores' station CU2A located in far western Europe. Toni, OH2UA, keyed CU2A to outdistance all competitors. Second place in Europe went to Ben, DL6FBL, who operated from SV9CVY. Ben had a it right when he said, "I knew that with existing propagation most of my QSOs in the contest would be with Europe. The signal path to W/VE is directly over EU, and without sunspots W/VE is far away from here, so chances for good W/VE runs were marginal. Being closer to Asia surely helped regarding signal strength, but QSO numbers are no longer high from that part of the world." Third place in Europe went to Ranko, 4O3A. Special mention must be made of A45XR, who was 5th in the world from Asia. The fine jobs turned in by CN3A (IK2QEI), 9K2HN (KL2A), 6W1RW (F6BEE), and 4LØA (UU4JMG) are all to be commended.

The continental winners were: North America: V47NT (N2NT), Africa: 3V2A (YT1AD), Asia: A45XR, Europe: CU2A (OH2UA), Oceania: VK9AA(VK2IA), South America: P40W (W2GD), Japan: JH4UYB, and U.S.: K5ZD/1.

Low Power

Low Power is the most popular CQ WW category. Anyone with a transceiver and an antenna can enter the low power group. To end up on top in LP takes skill, planning, and operating from the right location. The saltwater enhancement provided by an island location sure makes up for monster antennas. However, if you want to try to finish near the top of the Low Power category, you will have to put in a real effort.

Perennial low power winner Bud, AA3B, again keyed V26K to number one world. Second place world went to Dimitri, RA3CO, who traveled to Colombia to activate HK1AR. Great job, Dimitri. Third place in this tough category went to H7/K9NW. Mike says, "Spent very little time tuning for mults but ultimately a decent number found me and I ended up with a reasonable score to boot." You sure did!

Reprising his SSB win, Art, K1BX, took top U.S. honors. He put together the right strategy to win. Still he commented, "Gave up lots of 20-meter QSOs to get mults on 10 and 15." A lot of people probably did the same thing. Second place U.S. went to Paul, K1PT. Third place went to Marvin, N5AW. Marv had over 100 countries on 40 meters low power. That is not easy.

The top European scorer was CT6A operated by Filipe, CT1ILT. Filipe had this to report, "160 meters was great to USA. I just don't understand how USA could hear me quite well and Europeans couldn't! I was just sorry not

Dani, EA5FV, was #1 All Band, High Power for Spain.

Darko, J28OO (T95A), gave out a new one, Djibouti, to many.

**e-mail: <k3est@cqww.com>*

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
ALL BAND
World
3V2A (Opr.: Hrane Milosevic, YT1AD)
Donor: K4FW Memorial (Scott Robbins, W4PA)

World Low Power
V26K (Opr.: Joseph Trench, AA3B)
Donor: Slovenia Contest Club

World QRPp
6V7D (Opr.: Paul Young, K1XM)
Donor: Gene Walsh, N2AA

World Assisted
ER8WW (Opr.: Sergiy Rebrov, UT5UDX)
Donor: Robert McGwier, N4HY

USA
Randy Thompson, K5ZD/1
Donor: Frankford Radio Club

USA Low Power
Arthur Hambleton, K1BX
Donor: North Coast Contesters

USA QRP
K8CC (Opr.: Ulrich Ann, KK8I)
Donor: Gene Zimmerman, W3ZZ

USA - Zone 3
Glenn Rattmann, K6NA
Donor: Central Arizona DX Association

USA - Zone 4
Alex Tkatch, KU1CW/8
Donor: The Society of Midwest Contesters

Canada
Jeffrey Briggs, VY2ZM
Donor: John Sluymer, VE3EJ & Jim Roberts, VE7ZO

Carib./C.A.
V47NT (Opr.: Andrew Blank, N2NT)
Donor: Chuck Shinn, W7MAP

Europe
CU2A (Opr.: Toni Linden, OH2UA)
Donor: W3AU Memorial (Pete Raymond, N4KW)

Europe - Low Power
CT6A (Opr.: Filipe Monteiro Lopes)
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

Scandinavia
OF8X (Opr.: Marko Holmavuo, OH4JFN)
Donor: W3FYS Memorial (Chas Weir, Jr., W6UM)

Russia
Vadim Ovsiannikov, UA9CLB
Donor: Roman Thomas, RZ3AA

Africa
CN3A (Opr.: Stefano Brioschi, IK2QEI)*
Donor: Gordon Marshall, W6RR

Asia
Chris Dabrowski, A45XR
Donor: Chuck Shinn, W7MAP

Japan
Masaki Masa Okano, JH4UYB
Donor: Tack Kumagai, JE1CKA

Japan - Low Power
Nobuhiro Iwasa, JH8SLS
Donor: Western Washington DX Club

Oceania
VK9AA (Opr.: Bernd Langer,VK2IA)
Donor: Chris Tran, ZL1CT

South America
P40W (Opr.: John Crovelli, W2GD)
Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND
World - 28 MHz
Juan Manuel Morandi, LU1HF
Donor: Joel Chalmers, KG6DX

World - 21 MHz
ZX5J (Opr.: Cark Cook, AI6V)
Donor: Lew Sayre, W7EW

World - 14 MHz
CN2AW (Opr.: Andrei Karpov, RV1AW)
Donor: W2JT Memorial (North Jersey DX Assn.)

World - 7 MHz
9Y4AA (Opr.: James Neiger, N6TJ)
Donor: Alex M. Kasevich, VP2MM

World - 3.5 MHz
CN2FB (Opr.: Dmitri Gorshkov, UA2FB)
Donor: Fred Capossela, K6SSS

World - 1.8 MHz
CN2FF (Opr.: Vladimir Gumennikov, UA2FF)
Donor: Kenneth Byers, Jr., K4TEA

USA - 28 MHz
Courtney Judd, K4WI
Donor: Wireless Institute of the Northeast

USA - 21 MHz
John S. Jarrett, K4FJ
Donor: Wayne Carroll, W4MPY

USA - 14 MHz
Ralph W. Bradford, Jr, K5GA
Donor: Northern Illinois DX Association

USA - 7 MHz
Paul H Newberry, Jr., N4PN
Donor: W6AM Memorial (Jan Perkins, N6AW)

USA - 3.5 MHz
Robye Lahlum, W1MK
Donor: Bill Feidt, NG3K

USA - 1.8 MHz
Theodore J. Demopoulos, KT1V
Donor: Jeff Briggs, K1ZM

Canada (14 MHz)
Christopher Llewellyn Allingham, VE3FU
Donor: John Sluymer, VE3EJ

Carib./C.A.(14 MHz)
HP1/DJ7AA (Opr.: Wilfried Gottschald, DJ7AA)
Donor: Bill Hein, NT1Y

Europe - 28 MHz
Meho Omerbasic, T93O
Donor: Jay Pryor, K4OGG

Europe - 21 MHz
Kresimir Kovarik, E7/9A5K
Donor: Robert Naumann, W5OV

Europe - 14 MHz
CT8T (Opr.: Timo Klimoff, OH1NOA)
Donor: G3FXB Memorial (Maud Slater)

Europe - 7 MHz
OK5C (Opr.: Jiri Pesta, OK1RF)
Donor: Ivo Pezer, 9A3A

Europe - 3.5 MHz
ZB2X (Opr.: Jorma Saloranta, OH2KI)
Donor: K3VW Memorial (Frankford Radio Club)

Europe - 1.8 MHz
Jerzy Stanisz, SP3BQ
Donor: Pat Barkey, N9RV & Terry Zivney, N4TZ

Japan - 21 MHz
Yasuji John Okamoto, JR3EOI
Donor: CQ magazine

Japan - 14 MHz
Kenji Koishi, JH3AIU
Donor: Chris Terkla, N1XS

Asia – 14 MHz
Steve Hodgson, ZC4LI
Donor: Andei Stchislenok, NP3D

MULTI-OPERATOR, SINGLE TRANSMITTER
World
C4N (Oprs.: 5B8AD, RV6LNA, RW4WR, UA9CDV, RN3QY)
Donor: Anthony Susen, W3AOH

U.S.A.
W3BGN (Oprs.: W3BGN, K2TW, NO2R)
Donor: Douglas Zwiebel, KR2Q

Canada
VE3HG (Oprs: VE3HG, VE3KZ, VE3JAQ, VA3EC, VA3HJ, VA3GGF, VE3RZ)
Donor: Eastern Canadian DX Assn.

Carib./C.A.
6Y1V (Oprs.: KY1V, W4OI, OH3RB)
Donor: Lone Star DX Association

Africa
S79UU (Oprs.: UA3AB, RA3AUU)
Donor: Harry Booklan, RA3AUU

Asia
RT9W (Oprs.: RU9WX, RX9WR, RW9WW, UA9WFM, RV9WHZ, RA9WW, R9W-498, RA9WR)*
Donor: Steve Merchant, K6AW

Europe
9A7A (Oprs.: 9A2X, 9A3TR, 9A3OS, 9A5X, 9A7V)
Donor: Bob Cox, K3EST

Japan
8N7TU (Oprs.: JE7HLZ, JG7PSJ, JO7JID, JO7DJT, JI5RPT, JJ5DWF, JH8NZN)
Donor: Madison Jones, W5MJ

Oceania - Pacific Rim
AH2R (Oprs.: JI3ERV, JR7OMD, JR8VSE, JE8KKX, JK3GAD)
Donor: Junichi Tanaka, JH4RHF

South America
PS2T (Oprs.: PS2T, PY2NDX, PY2YU, PY2EX)
Donor: Araucaria DX Group

MULTI-OPERATOR, TWO TRANSMITTER
World
HC8N (Oprs.: N5KO, K6AW, N5OT, W9RE)
Donor: Array Solutions

USA
N3RS (Oprs.: N2SR, N3RD, N3ED, N3NA, N3RS, WA3LRO, W2UP, W8FJ)
Donor: Eric Scace, K3NA

Europe
EA6IB (Oprs.: EA3AIR, EA3ALZ, EA3AVV, EA5BM, EA5GX, EA6BF, EA6FB, EA6FO, OZ1AA)
Donor: Aki Nagi, JA5DQH

MULTI-OPERATOR, MULTI-TRANSMITTER
World
3X5A (Oprs.: AA7A, G3SXW, G4BWP, G4IRN, GM3YTS, K4UEE, KC7V)
Donor: K2GL Memorial (Doug Zwiebel, KR2Q)

USA
W3LPL (Oprs.: W3LPL, K1HTV, NI1N, N2YO, ND3A, WX3B, N3KS, AI3M, K3MM, N3OC, K3RA, K3RV, N3UA, WR3Z, W3ZZ, KD4D, K4ZA, AC6WI)
Donor: N6RJ Memorial (Bob Ferrero, W6RJ)

Europe
LZ9W (Oprs.: LZ1PM, LZ1ZD, LZ1ANA, LZ1RGM, LZ1UQ, LZ1FG, LZ1PJ, LZ1GC, LZ1ZF, LZ4UU, LZ2CJ, LZ2FV, LZ2PO, LZ2UU, LZ2UZ, LZ3FN, LZ3FM, LZ3UM, LZ3SM, LZ4TX)
Donor: Finnish Amateur Radio League

Japan
JA5FDJ (Oprs.: JA1VQN, JM1UWB, JA5FDJ, JA5JCC, JH5FIS, JH5FXP, JH5RXS, JR5JAQ, JR5VHU. JJ6WYS)
Donor: Ryozo Goto, JH3JYS

WORLD – MULTI-MULTI SSB/CW COMBINED
K3LR: 29,908,123 Points
Donor: WØID Alpha Award

USA - MULTI-MULTI SSB/CW COMBINED
K3LR: 29,908,123 Points
Donor: N8SM Memorial (Operators of K3LR)

CONTEST EXPEDITIONS
World Single Operator
VK9AA (Opr.: Bernd Langer, VK2IA)
Donor: Friends of Phil Goetz, N6ZZ

WORLD MULTI-OP
3X5A (Oprs.: AA7A, G3SXW, G4BWP, G4IRN, GM3YTS, K4UEE, KC7V)
Donor: Carl Cook, AI6V

SPECIAL - SINGLE OPERATOR AWARD
World SSB/CW Combined
8P5A (Opr.: Thomas Georgens, W2SC)
20, 613,468 Points
Donor: Hrane Milosevic, YT1AD

CLUB
World SSB/CW
Frankford Radio Club (266,909,574)
Donor: W1WY Memorial (CQ magazine)

Non-USA SSB/CW
Bavarian Contest Club (258,978,970)
Donor: N6AUV Memorial
(Northern California Contest Club)

** Second Place*

It shouldn't feel like work.

OMNI-VII. It's that simple.

So sit back in your chair and relax. The Omni-VII not only has top of the line receiver performance and everything else you need in a high-end transceiver -- it's also very easy to use. Spend your time on the air instead of reading the operator's manual. For complete information on the Omni-VII and our Amateur Radio product line, visit our website or call (800) 833-7373 for our current catalog.

Proudly made in Sevierville, Tennessee USA

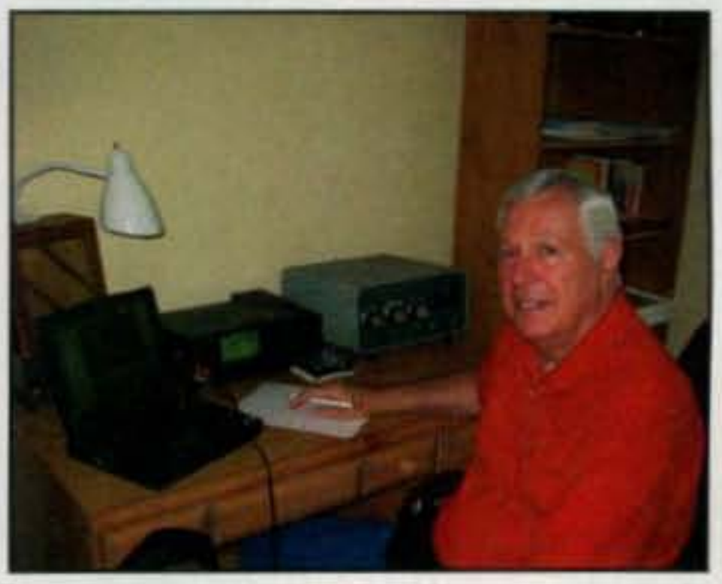
TEN-TEC

www.tentec.com

1185 Dolly Parton Pkwy., Sevierville, TN 37862. Sales: 800-833-7373 M-F 8:00-5:30 (Eastern Time) sales@tentec.com. Office: (865) 453-7172. FAX: (865) 428-4483.
Service: (865) 428-0364 M-F 8:00-5:00 (Eastern Time), service@tentec.com. We accept Visa, MC, American Express and Discover.

Nodir, EY8MM, was #3 World on 1.8 MHz.

World #3, 28 MHz, was Rene, LU7HN.



Kevin, K4PG, did a fine job on 7 MHz.

having made a single QSO on 10 meters." Second place in Europe went to John, OM5XX. Third place went to OL6P, operated by Petr, OK2WTM. Special mention is made of the efforts of Willy, UA9BA, who was #5 in the world from zone 17! Turning in fine efforts were J88DR, C6AQQ, and EA8CN.

The continental winners were: North America: V26K (AA3B), Africa: EA8CN, Asia: UA9BA, Europe: CT6A (CT1ILT), Oceania: 9M6AAC (N1UR), South America: HK1AR (RA3CO), Japan: JH8SLS, and U.S.: K1BX.

QRP

The QRP category sure sharpens your search-and-pounce skills. Five watts can be lost in the QRM unless you happen to time your calls just right. Paul, K1XM, traveled to Senegal and activated 6V7D to take the top world QRP position. Paul commented, "Thanks to everyone who heard my weak signal, and especially to Francois, 6W7RV, for his help. Maybe this wasn't the best year to try QRP, but I operated low power last year and wanted to do something different." Congratulations, Paul! Second place world went to Didier, FY5FY. He said he had "poor 10 meters this year but some amazing QSOs on 160 with 5 watts." Rounding out the top world three was K8CC operated by Uli, KK8I. K8CC was also number one in the U.S. Uli made an interesting observation: "Propagation for a QRP station differs from propagation when running high power. While this seems to be obvious, a certain fluttery (I called it 'glazing') sound on the signals indicates that you will not get through with QRP despite a strong signal of the station you are trying to reach. You have to find the good waves in the ocean and ride them as long as you can. Typically, a good propagation situation does not last long for a QRP station, and you have to frequently look for opportunities on other bands."

Second place in the U.S. went to Doug, KR2Q, from northern New Jersey. Third place went to Tom, N1TM. Apparently Tom's antenna could only rotate between 0 and 115 degrees! QRP and 115 degrees to work with, wow!

In Europe, Antonin, OK7CM, keyed his way to first place. Just to the west was second place, Stefan, OM7DX, while third place went to Milan, OL4W (OK1IF), who rightly states the converse of the common idiom: "Life isn't so long to spend it with QRO." A special mention is made of the fine efforts of JR4DAH, SU8BHI, RA9SC, W6JTI, and V73NS.

The continental winners were: North America: K8CC (KK8I), Africa: 6V7D (K1XM), Asia: JR4DAH, Europe: OK7CM, Oceania: V73NS, South America: FY5FY, Japan: JR4DAH, and U.S.: K8CC (KK8I).

Assisted

The traditional QSO-alerting system has undergone a technical leap since the 2007 contest. The availability of CW decoding devices over a wide spectrum has stirred up a lot of interest. It will be interesting to see how "Skimmer or Skimmer-like" technology will change how assisted stations operate. As the rules indicate (see the 2008 contest rules elsewherein this issue), use of these devices places the entrant in the Assisted category. *CQ* embraces these exciting new technologies.

This year's world top score went to Sergey, UT5UDX. He keyed ERØWW to #1 world and #1 Europe. Sergey commented, "Enjoyed the contest a lot. Congratulations to all my friends who made a good score under difficult conditions." Second place world and second place in Europe went to Manfred, operating from beautiful southern Germany. Manfred said, "Quite astonishing what can be worked during the bottom of the sunspot cycle, but CQWW has its own rules with great activity. Long live CW!" We second that opinion! Third place in the world went to Ricardo, CT3KN. Third place in Europe went to HG3DX, operated by HA3MY. Here in the U.S., the Frankford Radio Club prevailed by taking all three top slots. Charles, K3WW, who constantly finishes in the top two U.S. Assisted, took top honors. Second place in the U.S. went to Rick, K3OO, and third place went to Noah, K2NG. Special mention is made of the trio of assisted stations who gave everyone nice multipliers: IH9U, IH9R, and IH9M. Also, XW1B and T88FY sure put in real FB efforts from nice DXCC multipliers.

The continental winners were: North America: K3WW, Africa: CT3KN, Asia: 4L8A, Europe: ERØWW (UT5UDX), Oceania: T88FY (JK2VOC), South America: CE4CT, Japan: JH3PRR, and U.S.: K3WW.

Multi-Single

With special permission from the Cyprus PTT, the callsign C4N was put on the air and boy did they do a good job. This all-Russian team took the top world honors in this very competitive category. It took a lot of work and coordination to put their effort together. Congratulations! Second place world went to the PS2T team. They sure had the right idea when they said, "The operators maintained during all the contest a high level of sport spirit and motivation." World third place and #1 in Europe went to

Making the top ten USA, High Power was Lew, N2LT.

9A7A. Their very first activity from their new location was in 1989, and their special contest callsign (9A7A) was issued in 1992. They summed up a lot of feelings that we share when they said, "Everything we have achieved in the contests is the result of our friendship, as well as a love for our hobby." Second in Europe went to the team at OM8A, the Slovak Contest Group. What a great job they put together. Third place in Europe went to 9A1P. We think they summed up the thoughts of most contesters when they said, "Another great weekend with lot of fun. Conditions were bad on the upper bands, 10 meters almost completely closed, 15 meters had very short openings, and 20 meters was closed pretty early. On the other hand, 40 and 80 meters were quite good and 160 was excellent." In the U.S., last year's top two finishers reversed positions. Frankford Radio Club's W3BGN took top honors, while Tom's team at K8AZ took second. Moving into third place was the all-wires-in-trees team at KT3Y/4. All top three U.S. teams broke the 5-million point barrier.

The continental winners were: North America: 6Y1V, Africa: S79UU, Asia: C4N, Europe: 9A7A, Oceania: AH2R, South America: PS2T, Japan: 8N7TU, and U.S.: W3BGN.

Multi-Two

The Multi-Two category is a way to have a lot of fun and make a lot of QSOs. The three top world stations all operated from island QTHs. The famous station HC8N operators once again demonstrated their operating and copying skills by taking first place. They commented, "Nice weekend working the world. Great competition in the M2 category. Thanks to all the ops who go to special places to make this such a fun event." Second place went to the

EF8M Russian team. We heard a lot from EF8M during the CQ WW CW and their newly upgraded station. Third place in this increasingly interesting category went to D4C, an Italian, Latvian and Lithuanian team. They commented, "First try from Monteverde and it was a great experience which we never had experienced in the past." In the U.S. Sig's team at N3RS took top honors from just west of Philadelphia. Second place went to K1AR operating from the K1EA QTH. Third went WE3C, who commented, "We were pleased with the results of our first CW Multi-Two effort." Over in Europe, top honors went to EA6IB. They put on another effort from the lovely island of Ibiza. EA6IB said, "Thanks to all of you and especially to the European M2 groups for a great and competitive weekend." Second place in Europe went to the long-time famous team from IR4X. They said, "Thanks to all for calling us and to all the contesters traveling around the world to activate such a great numbers of countries." Third place in Europe went to T93J, whose 160- and 80-meter antennas seemed to perform very nicely. They said, "The Beverage redesign helped us to hear many more multipliers on 80 and 160 meters."

The continental winners were: North America: HI3A, Africa: EF8M, Asia: P3F, Europe: EA6IB, Oceania: KH6LC, South America: HC8N, Japan: JA1YPA, and U.S.: N3RS.

Multi-Multi

Top honors in this difficult category went to 3X5A. Their DXpedition included a long two-day drive from Bamako, Mali to Conakry, Guinea and four long work days in the heat and humidity to be ready in time for the contest. Great job, guys! Taking second place in the world was the Rhein-Ruhr DX Association DXpedition station, ED8A. The RRDXA always brings enthusiasm and expertise to anything it does. Finishing third in the world and first in Europe was LZ9W. They commented, "Building a competitive M/M station is a *big* task. Rebuilding it, is in some aspects, an even bigger one. It took one *loong* year to rebuild LZ9W." It paid off. In the U.S., first place in this very tough category really means something. In 2007 the winner was W3LPL with the Potomac Valley Radio Club crew. Quite a lot of local talent under one roof! Second place went to K3LR. Tim's doors are always open to available talent and his team did a superb job as usual. K3LR also received the World and U.S. Combined SSB/CW trophies, quite an honor. Third place in the U.S. went to Matt's team at KC1XX. His 20-meter operator was KC1F, who became a SK in 2008. Stu was a gentleman and dedicated contester. He will be missed. Second place in Europe went to DFØHQ of the RRDXA. They expressed a wish we all hope for, "It was fun but we hope there will be some sunspots in 2008!" Third place in Europe went to DR1A of the BCC. They are hoping for more sunspots in 2008 as well.

A special mention must be made of the fine crew from China, B1Z. All of us hope to see them back this year. Finally, the competition in Japan for MM top honors for the last decade has been between two fine stations,one located in Shikoku (JA5FDJ) and the other in Nara (JA3YBK). Sadly, the leaders of both teams became SKs recently. It is a tribute their memory that these teams continue their excellent tradition.

The continental winners were: North America: J3A, Africa: 3X5A, Asia: JA5FDJ, Europe: LZ9W, Oceania: KH7X, South America: No Entrant, Japan: JA5FDJ, and U.S.: W3LPL.

Club Scores

The social life-blood of ham radio is radio clubs. By belonging to a radio club you have a front-row seat to many sources of information on all radio subjects, including contesting. As you know, it is no trouble to linger around after a club meeting and talk about contesting for hours. "Did you work that opening to Asia on 21 MHz at midnight?" could be just one of hundreds of topics covered everyday by contesters.

The combined scores of the top four world club scores topped a billion points! Many of the DXpeditions are initiated to help a club's bottom line. The world's top club score was the Frankford Radio Club. With 145 entrants, the club sure had a big point total per entrant: 1.5-million points. What a great job. Second place in the world went to perennial powerhouse the Yankee Clipper Contest Club. Third place U.S. went to the Potomac Valley Radio Club. Each of these clubs has a long tradition of full commitment to the contest. Clubs encourage activity and that is good for amateur radio and contesting.

For many years now, there has been a friendly rivalry in Germany between the RRDXA and the BCC. This year the Bavarian Contest Club edged out the Rhein-Ruhr DX Association for first place non-U.S. and third place world. Third place non-U.S. went to Contest Club Finland.

Thanks to all the clubs that sent in scores. Clubs can help us a great deal by making sure that all their entrants use the same name for their club on their Cabrillo submission. One major club had 15 variations of its club name! To arrive at a correct score total for a club is a *lot* of extra work when we encounter variations of club names.

Team Contesting

Get together five contesters from anywhere in the world to form a team. As you can see below, the Phil Goetz Memorial Team took away top honors. The team had some top finishers in the contest. Second place went to the Pile-up Survivors made up of calls that are very recognizable. Third place went to the Code Sharks. You can send your team registration via e-mail to <teams@cqww. com>, or fax or mail to CQ magazine. You will receive an acknowledgement when sending via e-mail.

Here is the 2007 lineup:

1. Phil Goetz Memorial Team: CT3NT (CT1BOH), 9Y4AA (N6TJ), V47NT (N2NT), HQ2A (N6AA), 9K2HN (KL2A): 27,487,938

2. Pile-up Survivors: 8P5A (W2SC), ERØWW (UT5UDX), P49Y (AE6Y), VC3J (VE3EJ), VE2IM (VE3DZ): 25,655,284

3. Code Sharks: ZS1EL, ZS9X (ZS4TX), V26K (AA3B), VE1OP, PZ5X (K5UN): 19,123,352

TOP SCORES

World

Single Operator All Band

3V2A	13,112,736
P4ØW	10,673,421
V47NT	9,695,355
8P5A	9,040,800
A45XR	8,684,269
CN3A	8,353,488
9K2HN	8,287,614
CU2A	7,400,808
6W1RW	7,400,808
4LØA	7,297,524

28 MHz

LU1HF	198,275
YM2W	54,595
T930	47,700
YU2A	18,450
OGØZ	17,325
9A5MT	14,508

21 MHz

ZX5J	1,384,497
LS1D	1,194,638
LU7HN	1,060,663
ZPØR	972,332
E7/9A5K	491,400
KH7Y	478,084

14 MHz

CN2AW	1,387,176
ZC4LI	1,294,033
HP1/DJ7AA	1,244,796
C4I	1,219,239
CT8T	984,370
S57AL	779,436

7 MHz

9Y4AA	1,674,456
EA8/OH4NL	1,595,698
P49Y	1,411,840
E7/9A8A	1,103,256
OK5C	1,100,486
CW6V	984,872

3.5 MHz

CN2FB	1,590,288
ZB2X	683,240
TM6A	598,884
UN4L	588,846
C4M	575,100
OHØR	537,695

1.8 MHz

CN2FF	618,849
CN2R	559,860
EY8MM	343,012
SP3BQ	268,499
LY2IJ	266,124
SN7Q	260,064

Low Power All Band

V26K	7,220,340
HK1AR	6,913,397
H7/K9NW	6,065,800
CT6A	4,987,632
UA9BA	3,215,660
J88DR	3,066,388
C6AQQ	2,978,024
OM5XX	2,387,938
EA8CN	2,375,460
ZS6AA	2,362,222

28 MHz

LW6DW	21,840
PU2MTS	19,278
OM3OM	9,322
PY2SRB	8,112
9A3VM	7,440
IZ8DVD	6,292

21 MHz

9G5XA	492,282
PY2NA	397,600
CO8LY	346,203
EA8FT	280,125
XR3A	257,982
A35RK	234,960

14 MHz

C6AKX	807,696
WP3C	785,188
OH1VR/VP9	546,763
9G5ZZ	527,730
LZ9X	505,158
9A3B	474,320

7 MHz

TC3A	1,423,800
C6ATA	1,142,803
6W1SJ	920,880
VP2EDL	513,291
OK1TN	297,360
ZL4LW	293,760

3.5 MHz

HA8KW	195,707
9A6M	181,170
9A4C	180,264
4L2M	169,400
EA7RM	150,282
YT8T	139,480

1.8 MHz

TA2RC	129,204
YL4U	70,490
OE3BCA	64,200
SQ1K	43,200
G3WPH	37,961
SM5MX	36,381

QRP All Band

6V7D	2,602,192
FY5FY	2,033,714
K8CC	973,588
OK7CM	777,362
KR2Q	692,982
OM7DX	608,190
OL4W	511,368
US2IZ	429,351
HA6IAM	411,201
JR4DAH	401,250

Assisted All Band

ERØWW	6,272,022
DJ5MW	5,225,924
CT3KN	5,213,853
4L8A	4,824,600
HG3DX	4,529,600
K3WW	4,513,465
K3OO	4,221,000
CE4CT	4,167,392
K2NG	3,876,374
YO9HP	3,635,916

Multi-Operator Single Transmitter

C4N	17,015,112
PS2T	14,239,493
9A7A	10,575,896
6Y1V	10,377,640
OM8A	10,127,145
ZY7C	9,593,955

Multi-Operator Two Transmitter

HC8N	28,736,800
EF8M	27,660,420
D4C	23,954,832
PJ2T	20,759,622
PJ4A	20,715,138
P3F	20,468,448

Multi-Operator Multi-Transmitter

3X5A	36,547,280
ED8A	18,146,604
LZ9W	16,177,421
J3A	15,100,800
W3LPL	13,939,191
K3LR	13,247,624

United States

Single Operator All Band

K5ZD/1	6,399,360
K3CR	5,330,100
K1LZ	5,093,565
K1DG	5,001,120
W1KM	4,433,030
K4ZW	3,900,600
AA1K/3	3,864,576
N2IC/5	3,838,352
N2LT	3,538,836
K1ZZ	3,112,416

28 MHz

W2RR	4,144

21 MHz

K4FJ	159,616
W6YA	92,977
KT8X	34,629
K4PIC	16,425
AI9T	15,792
K4CEB	9,666

14 MHz

K5GA	424,960
K8DD	344,904
W7WA	320,850
K1IM	262,409
KK9A/4	246,192
W8TWA	126,362

7 MHz

N4PN	665,533
N2MF	413,660
K7AO	190,057
W1XX	149,688
K5NZ	144,305
KT5E	115,115

3.5 MHz

W1MK	426,313
K6OY	172,386
W3NO	109,215
AA7JV	101,660
W9GE	79,911
K3FN	78,369

1.8 MHz

KT1V	117,165
K4PI	71,583
WF2W	43,788
K5RX	31,752
W3GH	25,972
W2VO	21,409

Low Power All Band

K1BX	2,056,800
K1PT	1,596,232
N5AW	1,506,560
N4TZ/9	1,450,400
K2PS	1,294,272
N2MM	1,270,320
W3AU/4	1,246,768
K3AU	1,178,739
KS1J	1,175,853
N8AA	985,886

28 MHz

K4WI	4,392
K9WZB	1,998

21 MHz

W4IX	124,740
WB4TDH	86,760
N1NK	63,547
WØPC	1,275
W3EH	638

14 MHz

W1MU	446,090
KD2RD	339,880
N4MO	181,090
N4IJ	172,205
K2MFY	162,347
N5DO	155,774

7 MHz

N4PSE	80,040
W4/KH6NF	56,571
K4PG	40,420
N5ER	27,412
WA2ASQ/4	18,576
AA7AX	18,318

3.5 MHz

NS3T	54,390
K2RR	31,648
W8GG	22,590
KØPJ	20,746
W1NK	11,610

1.8 MHz

N2WN	27,846
W8LRL	21,939
K8BL	4,715
W7RH	2,695
K3BU	1,200
KR4OW	260

QRP All Band

K8CC	973,588
KR2Q	692,982
N1TM	295,293
W6JTI	288,024
AA1CA	147,180
K8ZT	128,896
KT8K	120,288
NU4B	97,194
WA3NKO	79,744
KIØG	69,102

Assisted All Band

K3WW	4,513,465
K3OO	4,221,000
K2NG	3,876,374
N3AD	3,154,104
KI1G	3,030,880
K3PH	2,674,812
N4WW	2,655,576
N2NL	2,655,240
W1AO	2,586,875
N1DG	2,181,912

Multi-Operator Single Operator

W3BGN	5,606,054
K8AZ	5,251,870
KT3Y/4	5,115,558
K1IR	4,497,520
K2LE/1	4,092,351
W3UA	3,976,562

Multi-Operator Two Transmitter

N3RS	10,871,328
K1AR	9,665,3624
WE3C	9,374,886
NY4A	8,377,544
K1RX	5,841,844
KØTV	4,633,848

Multi-Operator Multi-Transmitter

W3LPL	13,939,191
K3LR	13,247,624
KC1XX	12,761,902
NQ4I	9,702,672
K1TTT	9,144,404
W2FU	7,830,540

Europe

Single Operator All Band

CU2A	7,400,808
SV9CVY	6,986,736
4O3A	6,942,915
9A1A	5,765,256
S5ØA	4,851,392
UU7J	4,815,774
HA8JV	4,447,950
M6T	4,122,914
YQ9W	4,032,426
TM6X	3,951,600

28 MHz

T93O	47,700
YU2A	18,450
OG0ØZ	17,325
9A5MT	14,508
S57S	14,124
LZ1NG	6,820

21 MHz

E7/9A5K	491,400
S5ØK	419,136
YT9X	371,112
YU1OJ	359,595
9A4D	351,354
9A5D	305,322

14 MHz

CT8T	984,370
S57AL	779,436
YT5G	755,790
YT3M	659,502
G3TXF	624,024
GW8GT	588,756

7 MHz

E7/9A8A	1,103,256
OK5C	1,100,486
ISØN	882,266
S52AW	826,020
UT7QF	740,684
OH2BH	718,718

3.5 MHz

ZB2X	683,240
TM6A	598,884
OHØR	537,695
YT3A	521,420
S53MM	500,856
OK2BYW	466,439

1.8 MHz

SP3BQ	268,499
LY2IJ	266,124
SN7Q	260,064
OHØM	192,720
DJØMDR	169,740
YLØA	162,996

Low Power All Band

CT6A	4,987,632
OM5XX	2,387,938
OL6P	2,301,740
LY6M	1,833,720
F6HKA	1,717,242
OM5CD	1,697,688
DC4A	1,563,588
YT2RX	1,476,096
S51F	1,473,960
EA2AZ	1,466,082

28 MHz

OM3OM	9,322
9A3VM	7,440
IZ8DVD	6,292
LZ1AG	1,872
HA3GQ	1,120
YO5ALI	1,050

21 MHz

YT5C	194,552
ISØ/OLØA	153,912
OK2N	120,150
RA6YY	104,412
EA6UP	99,576
RX6AH	87,468

14 MHz

LZ9X	505,158
9A3B	474,320
EA7TN	442,776
HA8IH	405,275
LZ6W	291,336
HA3LN	289,488

7 MHz

OK1TN	297,360
T99W	283,200
S54A	270,254
YO5KDX	227,694
SN3X	214,720
SP6OJE	196,544

3.5 MHz

HA8KW	195,707
9A6M	181,170
9A4C	180,264
EA7RM	150,282
YT8T	139,480
GU4YOX	135,729

1.8 MHz

YL4U	70,278
OE3BCA	64,200
SQ1K	43,200
OMØTT	41,683
G3WPH	37,961
SM5MX	36,381

QRP All Band

OK7CM	777,362
OM7DX	608,190
OL4W	511,368
US2IZ	429,351
HA6IAM	411,201
YO3APJ	350,030
DF1DX	342,608
OK1JOC	293,440
UA6LCJ	269,010
S59D	263,384

Assisted All Band

ERØWW	6,272,022
DJ5MW	5,225,924
HG3DX	4,529,600
YO9HP	3,635,916
YT5A	3,510,340
S57DX	3,389,244
RW6HX	3,252,200
DL7ON	2,896,656
S59ABC	2,859,696
F8CMF	2,784,250

Multi-Operator Single Operator

9A7A	10,575,896
OM8A	10,127,145
9A1P	9,331,833
OM7M	8,529,392
T93M	7,762,080
HG1S	7,654,339

Multi-Operator Two Transmitter

EA6IB	14,179,922
IR4X	12,704,006
T93J	9,674,577
RU1A	9,424,382
EE2W	8,790,136
Z37M	8,601,198

Multi-Operator Multi-Transmitter

LZ9W	16,177,421
DFØHQ	13,115,189
DR1A	11,909,092
OE2S	7,640,938
SK3W	6,449,720
LY7A	5,508,506

LDG ELECTRONICS

The #1 Line of Autotuners

NEW! AT-1000Pro

Building on the success of the AT-1000, LDG Electronics has refined and expanded its 1KW tuner. The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Other features include:

- Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts.
- 2 Antenna connections
- Tunes from 1.8 to 54.0 MHz (inc. 6 meters)
- Tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds.
- 2000 memories.
- All cables included.

Suggested Price $599

radio not included

AT-897 for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897 Autotuner mounts on the side of your FT-897 just like the original equipment. We even added the ability to mount the "feet" on the side of the tuner so when you're transporting your rig by the handle, you can safely set it down and not worry about scratching the case. The AT-897 takes power directly from the CAT port of the FT-897 and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier. ***Suggested Price$199***

Z-11Pro

The original portable Z-11 was one of LDG's most popular tuners, accompanying adventurous hams to their backyards, or to the ends of the earth. Now meet the Z-11Pro, everything you always wanted in a small, portable tuner. Designed from the ground up for battery operation. Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 - 6 meters.

"With 8,000 memories in LDG's exclusive "3-D Memory" array, the Z-11Pro uses LDG's state-of-the-art processor-controlled Switched-L tuning network. It will match dipoles, verticals, inverted-Vs or virtually any coax-fed antenna. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line. All cables included. ***Suggested Price $179***

AT-100Pro

This desktop tuner covers all frequencies from 1.8 – 54 MHz (including 6 meters), and will automatically match your antenna in no time. It features a two-position antenna switch, allowing you to switch instantly between two antennas. The AT-100Pro requires just 1 watt for operation, but will handle up to 125 watts. All cables included.
Suggested Price $219

AT-200Pro

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

radio not included

AT-7000

The AT-7000 is the ideal tuner for IC-7000 & other Icom Radios: Covers all frequencies from 1.8–54 MHz (including 6 meters), and will automatically match your antenna. Requires just 0.1W for operation, but will handle up to 125W (100 W on 6 m), making it suitable for everything from QRP (IC- 703 Plus) to a typical 100 W Icom transceiver. All cables included. ***Suggested Price $169***

Z-100

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***

Call or visit your favorite dealer today!

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

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

LDG

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs/Zones/Countries on each band

WORLD TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
3V2A	322/12/59	1231/24/86	1925/30/103	2148/30/94	1599/31/94	190/8/37
P4ØW	428/16/68	1009/24/92	1251/28/98	1637/28/104	1679/25/103	102/14/27
V47NT	239/14/45	555/21/80	2373/32/113	1972/31/109	1789/22/94	68/12/18
8P5A	367/14/51	841/24/83	1589/31/101	1782/31/104	1773/28/93	213/13/27
A45XR	157/14/52	553/22/76	1723/33/118	1397/33/111	1169/31/103	64/18/38
CN3A	221/12/49	896/24/75	1291/25/92	1224/28/91	1381/25/96	248/12/43
9K2HN	247/12/55	1065/25/86	1346/32/105	1137/34/105	1155/28/96	36/18/30
6W1RW	25/10/23	344/20/66	815/26/80	1318/30/103	1897/29/111	223/13/53
4LØA	263/11/53	1033/25/85	1532/27/92	864/24/75	853/29/87	315/9/41
V26K	186/11/28	565/19/72	1818/28/102	1422/29/98	1434/23/91	101/13/26

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
K5ZD/1	220/17/68	639/25/101	773/30/115	1293/31/118	501/24/100	29/11/20
K3CR	110/18/61	667/26/97	566/30/111	1176/32/122	467/26/95	35/10/24
K1LZ	205/14/66	701/25/103	699/34/122	1088/30/113	313/21/97	21/8/12
K1DG	147/18/73	571/22/87	747/29/103	1276/27/102	277/24/94	21/9/16
K3WW	117/18/71	468/25/103	632/34/125	862/31/125	388/23/94	29/12/24
W1KM	152/15/62	676/25/92	607/28/105	1012/25/104	314/23/81	14/9/12
K3OO	107/16/59	407/25/98	463/32/119	958/30/123	301/27/103	35/12/26
K4ZW/3	81/17/47	439/25/75	579/31/104	1351/30/112	154/21/70	14/8/10
K2NG	111/18/76	260/27/113	462/39/142	534/36/145	442/27/119	53/11/29
AA1K/3	143/20/62	447/21/85	471/28/101	1034/29/107	361/22/87	27/10/20

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

C4N	384/18/75	759/31/105	2431/38/138	2086/38/144	1379/32/136	429/16/70
PS2T	29/13/28	182/25/97	1440/38/137	1861/39/150	2175/36/151	501/26/77
6Y1V	149/16/68	538/27/100	2036/35/126	1854/37/135	1548/30/120	23/12/22
ZY7C	20/8/20	173/22/89	1357/35/124	1495/38/137	2220/30/122	53/18/44
AH2R	86/16/27	394/30/72	1385/35/115	1437/37/120	980/36/98	179/13/19
RT9W	283/12/61	837/29/110	1113/35/146	989/33/140	766/27/103	15/8/13

USA MULTI-OPERATOR SINGLE TRANSMITTER

W3BGN	173/21/82	366/27/101	684/34/126	1152/34/134	340/26/109	41/11/34
K8AZ	87/17/63	524/27/105	569/37/130	1408/34/132	132/24/97	32/14/30
KT3Y/4	72/15/52	433/25/97	925/31/120	1389/35/134	156/23/98	12/9/12
K1IR	92/15/55	436/28/104	636/35/130	1197/29/128	269/23/100	21/13/20
K2LE/1	54/14/41	281/21/93	524/29/122	1246/34/135	190/24/102	32/11/27
W3UA/1	102/14/59	249/21/95	819/32/129	1181/30/123	130/24/97	7/5/7

WORLD MULTI-OPERATOR TWO TRANSMITTER

HC8N	431/19/72	1412/30/111	3107/35/134	2992/38/145	3198/35/145	775/24/62
EF8M	493/16/76	1842/30/118	3521/35/140	3001/37/145	2639/36/142	353/17/57
D4C	333/15/70	1150/26/102	2564/34/120	3353/33/133	2936/32/127	558/21/79
PJ2T	662/20/83	1359/26/107	2853/36/139	2586/36/130	2115/27/114	166/15/34
PJ4A	533/16/72	945/25/98	3371/34/131	2803/34/127	2344/27/118	169/16/29
P3F	450/17/72	1846/28/108	3246/36/151	2151/36/133	1416/35/117	268/11/48

USA MULTI-OPERATOR TWO TRANSMITTER

N3RS	131/19/73	1025/29/110	1271/38/145	1845/36/149	804/27/125	63/15/40
K1AR	240/21/77	697/29/113	1095/38/139	1885/35/145	642/27/128	40/13/29
WE3C	108/18/77	1089/28/117	1016/31/127	1514/35/141	790/27/116	41/13/32
NY4A	139/16/65	756/26/107	1505/37/138	1404/32/133	689/27/119	5/5/4
K1RX	90/14/51	579/29/112	847/36/134	1327/33/132	407/26/112	44/12/25
KØTV/1	85/14/47	362/27/101	628/30/125	1233/31/129	361/23/98	30/9/14

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

3X5A	953/21/79	1735/25/99	2734/37/128	4472/38/154	3725/38/146	1023/22/93
ED8A	192/10/47	1338/23/94	2326/29/113	2604/33/110	2493/34/126	343/18/61
J3A	298/13/47	1903/26/112	2766/33/124	2657/35/132	1734/26/95	332/18/43
KH7X	414/22/28	1274/34/86	1498/36/106	1908/37/91	1674/30/72	359/19/30
JA5FDJ	310/23/56	1057/33/98	1582/37/132	1445/36/135	963/35/108	116/22/40
JA3YBK	387/23/57	757/33/99	1787/38/142	1383/36/142	719/36/103	114/15/28

USA MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	432/24/96	1314/32/122	1373/38/152	2080/38/152	991/29/138	132/14/38
K3LR	293/25/94	1118/32/121	1297/39/159	2296/39/159	679/30/132	99/14/40
KC1XX	395/20/85	1393/34/121	1456/38/147	1907/36/151	680/27/125	151/16/38
NQ4I	270/20/79	740/28/107	1380/39/149	1773/35/149	703/27/119	103/18/34
K1TTT	283/18/76	835/29/114	942/36/141	1728/34/145	668/29/125	127/16/39
W2FU	230/19/77	863/30/115	886/36/131	1559/33/138	400/26/111	105/12/37

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

K6NA.....1,894,742
N6TV.....1,872,780
KO7AA.....1,839,328
K6XX.....1,826,437
WC6H.....1,738,317
K7GK.....1,437,056
W2VJN/7.....1,427,819
W6PH.....1,332,873
K7RL.....866,550
N7TT.....720,513

Zone 4

VC3A.....4,968,440
VC3J.....4,853,208
VE3EY.....3,611,762
VE3NE.....2,503,250
KU1CW/Ø....2,392,704
WXØB/5.....2,245,120
K8GL.....1,736,658
KØSR.....1,504,116
*N5AW.....1,506,560
N4TZ/9.....1,450,400

Zone 5

VY2ZM.....6,885,168
K5ZD/1.....6,399,360
VY2TT.....6,072,935
K3CR.....5,330,100
K1LZ.....5,093,565
K1DG.....5,001,120
W1KM.....4,433,030
K4ZW.....3,900,600
AA1K/3.....3,864,576
N2LT.....3,538,836

Zone 14

CU2A.....7,400,808
*CT6A.....4,987,632
M6T.....4,122,914
TM6X.....3,951,600
DJ1YFK.....3,711,576
DL3YM.....3,550,858
EA5FV.....2,950,400
GM7V.....2,539,832
AO7AJR.....2,095,104
PA3AAV.....2,011,530

Zone 15

4O3A.....6,942,915
9A1A.....5,765,256
S5ØA.....4,851,392
HA8JV.....4,447,950
ES5TV.....3,228,610
OF8X.....2,727,276
*OM5XX.....2,387,938
*OL6P.....2,301,740
YL6W.....2,258,815
*LY6M.....1,833,720

Zone 16

UU7J.....4,815,774
UT5UGR.....2,764,480
RS3A.....2,739,924
RG3K.....2,510,749
UA4FER.....2,066,076
RM3F.....2,043,500
UA4CCG.....1,547,666
UR7EU.....1,250,232
RW1ZA.....1,181,601
*RV6LFE.....1,226,434

Zone 20

SV9CVY.....6,986,736
YQ9W.....4,032,426
4Z5TA.....1,576,155
*TC3A.....1,423,800
*LZ9R.....1,295,111
ZC4LI.....1,294,033
C4I.....1,219,239
YO6BHN.....1,061,286
SV1ENG.....1,033,708
*YO3FRI.....1,031,800

Zone 25

JH4UYB.....3,752,242
HL2AEJ.....1,216,334
JF1PJK.....1,146,915
JK1OPL.....1,025,060
JF2QNM.....968,803
*JH8SLS.....930,369
JA5DQH.....861,713
*JI1RXQ.....804,678
JR3NZC.....790,359
JN2AMD.....686,350

**Low Power*

4. Team Mannerheim: T88WV (OH7WV), CU2A (OH2UA), OA4WW (OHØXX), OF8X (OH4JFN), OF6NIO: 18,611,704

5. RRDXA Team 1: CN3A (IK2QEI), OQ5M (ON5ZO), OT1A. DJ2YA, DL3YM: 16,967,895

6. Carolina DX Association: AA4NN, AA4S, ISØ/K7QB (IN3QBR), N2TU, WA4DOU: 6,679,728

7. Strausberg Re-united: 5H3EE (DL4SM), 9G5ZZ (DL1CW), DL4ME, DL5YM, DL6JZ: 5,981,305

8. Contest Group Quebec #1: VE2TZT, VA2WDQ, VE2AWR, VA2SG, VE2SG: 3,637,804

9. Team Sisu: OF5A (OH5BM), OH1MM, OHØZ (OH5DX), OH6BG, OH2BH (OH1WZ): 3,172,259

10. DXXE Full Vitamins: XE1MM, XE1CT, XE1NW, XE2S, XE2WWW: 2,392,377

11. Team Terva: OGØZ (OH1RX), CT8T (OH1NOA), ZB2X (OH2KI): 1,669,147

12. Contest Group Quebec #2: VE2FWW, VE2FK, VE2FU, VE2FFE, VE2HLS: 1,156,558

13. DXXE Vitamins: 6H1ZVO, 6I2AUB, XE1AY, XE1ZW, DL6KAC: 102,270

Records

You can QSY to <cqww.com> to check the records for every country that has entered the CQ WW since 1948. If you discover an error, please let us know at <questions @cqww.com>. Below are the outstanding efforts of super operators which resulted in setting new CW records during the 2007 contest. Congratulations!

World: 3.5 CN2FB (UA2FB), 1.8 CN2FF (UA2FF), L7 TC3A, L1.8 TA2RC, Q1.8 C6ARR (N6BT), A3.5 IH9M (IK7JWY); **North America:** L14 C6AKX(KE7X), Q1.8 C6ARR(N6BT), MS HI3A; **Africa:** CN2FB (UA2FB), 1.8 CN2FF (UA2FF), L7 6W1SJ (T98A), QA 6V7D (K1XM), Q21 SU8BHI (HA3JB), A7 IH9U (I1NVU), A3.5 IH9M (IK7JWY); **Asia:** 14 ZC4LI, 3.5 UN4L, 1.8 EY8MM, L7 TC3A, L1.8 TA2RC, Q7 RW9LL; **Europe:** A3.7

EUROPE TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
CU2A	288/15/61	1013/24/92	1783/31/109	1129/31/108	1673/27/107	59/13/30
SV9CVY	293/12/59	1094/23/81	2088/34/120	1688/33/107	1245/33/101	163/7/38
4O3A	353/12/59	1149/24/88	2005/34/115	1455/34/97	934/33/109	179/12/34
ERØWW	328/10/57	867/29/98	1439/38/137	1515/38/136	545/35/131	69/10/43
9A1A	179/12/59	1028/30/106	1461/38/146	1103/36/119	344/33/121	176/10/46
DJ5MW	238/16/66	812/29/106	994/36/144	932/37/132	457/35/130	104/13/59
CT6A	282/11/57	773/21/86	1266/29/117	955/29/102	782/29/101	147/9/33
S5ØA	254/14/59	878/24/85	1045/34/111	1192/35/101	580/34/100	46/9/31
UU7J	346/23/76	872/30/103	1215/34/127	943/36/99	632/33/108	167/11/49
HG3DX	224/15/61	611/23/82	979/34/135	982/36/127	452/35/128	67/17/67

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

9A7A	255/20/81	1282/32/124	1664/38/156	2236/39/155	624/36/144	104/12/67
OM8A	342/24/101	1073/31/124	1655/37/144	2044/39/149	659/34/146	79/13/61
9A1P	380/21/90	1146/30/114	1557/37/146	1584/39/150	849/37/144	111/17/64
OM7M	416/25/93	1011/32/118	1507/38/151	1586/40/152	467/35/139	58/12/52
T93M	219/16/69	846/26/101	1458/36/143	1768/39/142	756/37/144	138/16/55
HG1S	203/13/70	1112/32/124	1681/36/158	1571/38/143	317/36/133	128/12/52

EUROPE MULTI-OPERATOR TWO TRANSMITTER

EA6IB	708/18/79	1865/30/115	3000/38/154	2454/38/139	1243/36/138	362/13/59
IR4X	260/19/76	1839/34/125	2080/38/156	1973/38/153	1035/36/145	129/14/64
T93J	777/25/90	1545/31/118	1748/38/152	1490/37/137	1011/38/146	54/15/42
RU1A	769/26/91	1660/36/130	1670/37/143	1706/39/151	443/37/138	94/10/48
EE2W	331/11/61	1797/26/101	1871/35/125	1683/36/126	1242/36/118	189/14/44
Z37M	518/14/73	1899/33/119	2140/38/138	1681/36/125	634/36/135	59/10/29

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

LZ9W	1137/21/87	2257/35/129	3052/38/155	2819/38/148	1294/37/148	257/17/70
DFØHQ	1093/22/91	2033/33/125	2673/37/158	1901/39/155	677/35/146	317/15/81
DR1A	997/22/86	1870/32/123	2134/38/153	1844/38/145	813/32/138	243/14/71
OE2S	624/10/67	1951/31/113	1596/36/141	1401/39/141	331/34/135	129/14/57
SK3W	837/15/72	1330/29/110	1698/34/133	1305/38/136	495/30/119	113/10/40
LY7A	1034/17/74	1457/24/89	1592/35/132	1287/36/136	376/30/112	97/9/45

SO2R (SP2FAX); **Oceania:** Q14 V73NS, A21 VK4AN, A7 ZM3A, A3.5 ZL2IFB; **South America:** 7 9Y4AA (N6TJ); **USA:** L1.8 N2WN/4, Q1.8 W2MF; **Japan:** L14 JA1BPA, Q14 JA6GCE, A14 JG2KKG

Special Mention

As G3SXW commented in his book *Contesting in Africa,* "for Homebound Contesters and DXers alike, there is no thrill in amateur radio to match that of hearing your call come back from a new multiplier or a new country. But imagine the thrill of *being* the new multiplier or country for literally thousands of stations!" For the many of us, this means participating in a DXpedition. The following stations are some of the many who made the contest more interesting for everyone by going on DXpeditions:

VP2EDL, V26K, C6ADQ, C6AGY, C6AKX, C6ATA, 8P5A, 8PØP, 8P9MN, V31DF, OH1VR/VP9, YA/K9GY, HQ2A, HQ9R, FM5BH, H7/K9NW, HP1/DJ7AA, PJ7/DJ5HD, V47NT, J88DR, D2NX, 7XØRY, VQ9LA, J28OO, 9G5XA, 9G5ZZ, 5R8NL, 3B8GT, CN2AW, CN2FB, CN2FF, V5/DJ4SO, 6W1RW, 6W1SJ, 6W1SE, 3DAØZO, 5H3EE, 3V2A, S21ZDX, C4I, C4M, C4Z, 4LØA, VR2/AA1ON, XU7MWA, 9K2HN, HSØZAR, YM2W, 9M2CNC, OHØZ, OHØR, OHØM, CU2A, SV9CVY, ZB2X, J43J, 4U1ITU, EI/W5GN, MD/DL3KNF, MD/DL3KWR, GI6YM, CT8T, ISØ/K7QB, ISØN, ISØ/OLØA, MZ5A, MZ5B, VK3TDX, VK9AA, 9M8YY, 9M6AAC, FO5RY, WH2D, KH2/KI3DNN, C6ARR, KH6/NØCO, ZL3TE, T88RJ, T88WV, A35MJ, P40W, P49Y, ZX5J, HK1AR, HK7/VK6DXI, ZPØR, ZP6/IK1PMR, PZ5X, 9Y4AA, 6V7D, JD1AHC, HR2/LTØE, ISØ/OK1CZ, SU8BHI, EA8/OH2BEM, KL2R, IH9U, IH9R, IH9M, 3B8/SM6GOR, OHØE, 9H3HH, ERØWW, T88FY, DX1M, TI5N, 6Y1V, 5JØA, S79UU, C4N, AH2R, ZF1A, HI3A, VP2MSC, VP5W, EF8M, D4C, CT9L, P3F, GJ2A, LX7I, E51A, HC8N, PJ2T, PJ4A.

Why not do a little work and find out about an overseas location? You can jump on a plane for a few hours and experience never-ending pile-ups. You will find that it will be an experience to remember.

Comments

The 2007CQ WW CW resulted in the highest number of CW logs ever received. With code requirements around the world almost eliminated, it is very heartening to see that many newcomers are taking the time to learn CW and join in the fun. With 10 meters almost totally closed, the CQ WW CW still generated 4867 logs.

For the 2007 logs, the CQ WW log-checking process underwent a considerable amount of change. After many years of developing the log checking process Dick, N6AA, turned over the process to Ken, K1EA. This was a major change in procedure. We welcome Ken and his log-checking software to the CQ WW. In addition, the CQ WW acquired a new server dedicated to it. Both of these changes have brought new challenges to the CQ WW CC. We appreciate all the input we have received from the entrants in the contest. Your input is always welcomed. As before, with a new processes in place, we will continue to provide the best log checking available. Please remember, that the purpose of log checking is to certify the winners. A side product of this process is the UBN/NIL reports, which are supplied to all entrants. The UBN/NIL reports are an aid to improve your skills.

Since the 2007 contest season concluded, there have been ongoing discussions concerning remote operating and skimmer technology on various reflectors. Remote contesting is addressed in the existing rules. All TXs and RXs must be contacted by wires to antennas and located within a single 500-meter diameter circle or the owner's property which ever is larger. The operator can be anywhere, but the remote station he (she) uses must obey the CQ WW rules and the rules of the country in which he is remotely operating. All remote RXs must be in a 500-meter station circle—nowhere else. A single operator using skimmer or skimmer-like technology places the entrant in the Assisted Category. Use of any QSO alerting technology places the entrant in the Assisted Category.

In accumulating the scores, considerable effort is put into collecting all the names used by a club's entrants. One famous club had over 15 variations of its club name, as mentioned earlier. Clubs can help out the CQ WW CC a great deal by making sure that all their entrants use the same club name on submitted documents. When you submit your log, please take the time to look at your Cabrillo header page. Check to see that the call you used during the contest is the one that appears as your

entry call. In addition, look your log over to make sure you really logging the right band. On CW there were several entrants who forgot to change bands on their computer logging program. Please be careful to log all your QSOs on the correct band.

The Multi-Single category is very popular. Please remember to designate the run and multipler station within your logging software. You can designate the run as station 0 and the multiplier station as 1. It is easy to do and all contesting programs can do it. By doing this, MS checking becomes much easier for the CQ WW CC.

The CQ WW CC uses the same .cty file to check all the logs. In this way all the logs are treated equally. The CQ WW CC has known for a very long time that a large number of CQ WW entrants have limited operating time. It is precisely these operators having fun who give the continuing runs available during the contest. No matter how your time might be limited because of other demands, get on in the CQ WW and have fun. The CQ WW CC wants to thank and recognize the causal operator as a major contributor to everyone's good time.

As has been mentioned many times before, your UBN/NIL report is just an aid to help you pinpoint how to improve your copying skills. Submitting an electronic log is easy. Send your SSB log and summary to <ssb@cqww.com>, CW to <cw@cqww.com>. Please send your log in Cabrillo format. If you have any problems, we can help you at <questions @cqww. com>. It bears repeating that if you make a mistake on your first submission, you can resubmit your log. It will replace the first submission.

Thanks

The CQ WW Contest Committee wants to thank all the entrants who make the CQ WW the event of each year. We try to do our best to assure that the results are true and accurate. The results require hundreds of hours of work by a lot of people. The members of the CQ WW CC who provided labor and insight in creating these results were: K1DG, K1AR, K3WW, K3ZO, K3LR, K5ZD, KR2Q, N2AA, N2NC, N2NT, N3ED, N6AA, N6TR, N9RV, W3ZZ, K1AR, KM3T, KT3Y, W5OV, N5KO, K6AW, and N8BJQ. The logs were received and processed by Larry, N6TW, and the scores developed by Ken, K1EA. K1EA has done a great job learning all the CQ WW log-checking procedures. The CQ WW records are maintained by N2NC and K3EST.The All-Time Records are maintained by K6SSS. Thanks to KM3T, K5TR, and N5KO, who do the hard work to keep the servers working. Thanks to John, K1AR, for his advice and hard work to make the CQ WW so successful. Very special thanks to Barry, W5GN, who helps on many levels, but especially with the book keeping and development of the CQ WW certificate program. Our CQ WW CC members who are DX advisors were very helpful in offering advice, providing information, and sorting out potential problems: CT1BOH, DL6RAI, EA3DU, F6BEE, G3SXW, I2UIY, JE1CKA, OH2KI, OH2MM, PY5EG, S50A, UA9BA, VA7RR, VE3EJ, and E21EIC.

If you plan to participate in the 2008 CQ WW contests, you are on the track to having a lot of fun. Congratulations to all the 2007 participants on all levels! CU this fall in the 2008 contests! 73, Bob, K3EST

DX QRM

Only a part time effort, in between work and the weekend activities! Very happy with score ... **2E0CVN**. Great Contest! See you all again! ... **4L0A**. 10m poorer than 2006. Many thanks to Graham, 5X1GS, for use of his shack. Hard work on 40 and 80 with low power ... **5X1NH**. Nice contest. Tnx all 6H1IM operators XE1IM ... **6H1IM**. Operated from a bush in Tongatapu island. Mosquitoes and Tongan wasps were my only companions ... **A35MT**. What a terrific contest! We certainly enjoyed the pile-ups and all the terrific multipliers. Thanks to all who traveled to distant places for the weekend ... **A71EM**. Working with a special callsign was indeed difficult. Many said I was UA1 and had to go very slow CW telling them AU1, India. It was very nice so many responded with their numbers to us ... **AU1JCB**. Great contest as always but faced computer failure on first day and antenna down on second day, missed most of time during the contest. Very happy to know that B1Z, B3C, and B7P did good results! See you next year! ... **B4TB**. Cinnamon rolls from Florence's bakery, beach walks, power failure, great football. Treasure Cay beach is one of the top 5 in the world! You'll agree! Forget the Qs; please pass the SPF 60! ... **C6AGY.** Many thanks for all who took a lot of time to take me out of QRM. Every QSO was a fantastic experience. I'm sorry E51A didn't copy me. The day before contest I worked them. Signal was very stable all over 30 minutes. Tks to the JA's for the fantastic good ears to copy me. See all of you in next contest. 73 and good luck for everybody ... **CT1AOZ**. Don't forget, the fun is the power! ... **DK3RED**. CQWW shows how the conditions really are. The daily use makes you think that the conditions are bad when it in fact really is low activity. Great condx on Saturday, not so good on Sunday ... **EI4CF**. Lots of fun just being able to work a contest in the casual mode instead of trying to be in the top ten. Biggest thrill was working BZ1Z on 40 ... **F5VHJ**. With a station "optimized for Europe" and a brain "optimized for sleep," this was always going to be tough ... **G0MTN**. It's 40 years since G3TXF first took part in CQWW CW. Only three have been missed in the intervening years. Roll on the next sunspot cycle! ... **G3TXF**. Was a bit under the weather in the summmer for few months. Knocked guts out of me, and what you need in this contest is GUTS! Conditions fair, especially on LF. What is certain is that CW is far from dead! ... **GW3JXN**. It was a really good propagation and outstanding activity. 15m opened unexpectedly for USA and resulted in good sigs on my wire. The contest was fun and running high. Thanks for Q's. See you next year! ... **HA2MN**. I didn't check antenna. It was lying on the floor of the terrace. Therefore some hams must have special ears to hear me. I hope to survive and see sunspots again. FT-920 100 with horizontal loop ... **IK2AIT**. QTH north Sardina, about 100m from the sea. Rig Elecraft K2/100, ant 2-ele mini beam, 8m high. Good fun even if condx were rather poor ... **IS0/OL0A**. Many thanks to all who worked us. Great contest, great fun ... **J42WT**. I heard HC8, South American station on 1831.2 kHz but no JA freq. It was the first time to hear SA station on 160m in my 30 years of amateur radio life. Look for him in next contest! ... **JO7KMB**. A big "mahalo" to all who worked us or tried. Everyone here worked hard before and during the contest. Still a new station, improvements coming, especially on the low bands. 73 & Aloha ... **KH6LC**. High solar wind and very poor conditions through Sunday afternoon made this contest rough. Even with poor band conditions this contest is by far my favorite. Lots of great DX to be found, not to mention I finished up my WAS award, too. Thanks for a great contest! ... **KL8DX**. Good condx on 40m. Worked many new Central American and Caribean countries. Best 73's to contest committee ... **LY3X**. Very poor conditions up here in Shetland at 60 degrees north ... **MZ5A**. Pain with 100W and Beverage and untuned loaded vertical! ... **OH8VJ**. Nice condition on 80mtrs ... **OK1TC**. As usual, PRIMA ... **OL4M**. Rig Elecraft K2 and dipole for 20 meters and up, and a short vertical for 40 meters and down. With 560 QSOs and a claimed score of 194,000 I made a new personal QRP record ... **OZ7BQ**. M2 is a great category for those of us who enjoy multi-op contesting but don't have the facility for a full MM setup. LF conditions were good but not quite so good as in 2006. At least it seemed that way. 10m barely opened at all but with zero sunspots we can't complain ... **P3F**. Thank for the great show again. Worked several new bandpoints on the 80m band. Here with my dipole always difficult and need the CQ contest! ... **PG2AA**. Thank you for FB contest! It's been big fun though condx on 10 meters was poor ... **RA3BQ**. CIDR Cyclone struck Friday before the contest, and that was it for me after all the preparations done for a serious contest effort. Anyway, managed to operate a few hours with a single 40m dipole to give out a multiplier. Worked a few QSOs on 15m and 20m as well ... **S21ZDX**. Great fun as always. The low band conditions were no good and the old trustworthy 20m did

SUCH A HAM

SH-004

I bought you a beautiful pair of earrings, Mavis.
Put them on, I'd like to try something.

CLUB SCORES

USA

Frankford Radio Club	266,909,574
Yankee Clipper Contest Club	260,552,723
Potomac Valley Radio Club	139,642,195
Northern California Contest Club	75,488,405
Florida Contest Group	60,754,161
North Coast Contest Club	38,498,561
Society of Midwest Contesters	34,860,384
Carolina DX Association	34,784,070
Minnesota Wireless Association	30,796,748
Southern California Contest Club	24,248,185
South East Contest Club	24,170,938
Mad River Radio Club	20,182,018
Western Washington DX Club	20,050,938
Rochester DX Association	14,431,175
Central Texas DX and Contest Club	14,086,887
Central Arizona DX Association	14,011,476
CT RI Contest Group	12,709,622
Hudson Valley Contesters and DXers	9,733,694
Alabama Contest Group	9,626,274
Mother Load DX & Contest Club(W6)	7,158,524
North Florida DX Association	7,108,265
North Texas Contest Club	7,094,998
Willamette Valley DX Club	6,195,615
Oklahoma DX Association	4,155,279
Kansas City DX Club	3,842,499
Low Country Contest Club	3,234,334
Delaware Amateur Radio Assn	2,606,347
Spokane DX Association	2,087,073
Texas DX Society	1,709,275
Utah DX Assn	1,631,803
South Florida DX Assn	1,519,213
Southwest Ohio DX Assn	1,319,984
Southern California DX Club	969,673
Sterling ARC	965,792
NorthEast Wisconsin DX Assoc.	887,004
Western New York DX Assn	803,725
Metro DX Club	725,328
West Park Radiops	715,857
Salt City Dx Assn	551,454
Northern Arizona DX Assn	447,157
Northern Illinois DX Assn.	349,975
Kentucky Contest Club	302,073
Alamance Amateur Radio Club	248,137
Eastern Iowa DX Assn	244,595
Magnolia DX Association	240,782
Bergen Amateur Radio Association	211,340
Mississippi Valley DX & Contest Club	198,912
Great South Bay ARC	194,579
Southeastern DX Club	194,293
Redmond Top Key Contest Club	175,856
ARROW Communications Assoc. Inc.	167,111
Tri-Town Radio Amateur Club	45,892

DX

Bavarian Contest Club	258,978,970
Rhein Ruhr DX Association	228,914,196
Contest Club Finland	87,361,420
Contest Club Ontario	70,890,904
Yu Contest Club	52,025,083
Araucaria DX (PY)	51,829,933
LU Contest Group	50,292,163
Ural Contest Group (UA9)	49,726,580
Slovenia Contest Club	47,897,732
Croatian Contest Club	38,827,929
*World Wide Young Contesters	38,696,386
Black Sea Contest Club	37,872,164
Bosnia and Herzegovina Contest Club	37,851,018
HA DX Club(HA)	35,088,138
Caribbean Contesting Consortium(PJ)	33,812,996
Ukrainian Contest Club	28,506,942
Chiltern DX Club(G)	24,320,277
SP DX Club	22,813,202
VK Contest Club	21,425,649
Kaunas Univ. of Tech. Radio Club(LY)	19,129,766
LZ Contest Team	18,383,754
UA2 Contest Club	15,802,077
Kiev Contest Club	15,036,119
Central Arizona DX Association	14,011,476
British Columbia DX Club	13,040,452
South Ural Contest Club(UA9)	12,755,800
Latvian Contest Club	11,934,843
Lithuanian Contest Group	8,976,258
LA Contest Club	8,779,565
Central Siberia DX Club(UAØ)	8,228,521
Bashkortostan Dx Club(UA9W)	7,870,773
TuPY DX Group(PY)	7,719,608
Tartu Contest Club(ES)	7,398,734
Vrhnika Contesters(S5)	7,362,782
Tikirriki Contest Club(IT9)	7,343,018
Kemerovo RC(UA9U)	7,113,011
Maritime Contest Club(VE1)	6,526,230
Les Nouvelles DX(F)	5,554,229
ATCC(EY)	5,436,712
Michurinsk Contest Group(UA3R)	5,351,016
Danish DX Group	5,295,316
Orenburg Contest Club(UA9S)	5,238,827
Cockenzie & Port Seton ARC(GM)	4,773,706
Contest Group Du Quebec	4,762,669
LYNX DX Group(EA)	4,247,297
Radioclub Radu Bratu(YO)	4,178,341
Austrian Contest Club	4,158,404
Top of Europe Contesters(SM)	4,130,723
Moscow Contest Club	3,993,815
East Coast Canada Contest Club(VO1)	3,980,470
Weast Serbia Contest Club	3,826,796
Low Land Crazy Contesters	3,601,162
Fox Contest Club(YU)	3,571,946
Grimsby ARC(G)	3,300,120
Belokranjec Contest Club(S5)	2,890,360
Belarus Contest Club	2,779,570
Siam DX Group	2,608,391
Sheffield Amateur Radio Club(G)	2,168,308
Guara DX Group(PY7)	1,947,940
North Greece Contest Team	1,945,860
Perm Club	1,856,899
SPCC(SP)	1,721,847
Rio DX Group	1,605,133
Czech Contest Club	1,582,307
Radio Club Honduras	1,575,064
South German DX Group	1,542,478
Jiangsu DX Club(BY)	1,539,376
Temirtau Contest Club(UN)	1,481,044
Omsk Radio Club	1,472,814
Grupo DX Grande Canary	1,462,308
Novokuznetck(UA9U)	1,403,461
Gronau Contest Club(DL)	1,396,059
ALRS(UA1)	1,367,134
CC Krasnodarskogo Kraya(UA6A)	1,222,053
Bekasi DX Contest Club(YB)	1,179,504
Calgary Amateur Radio Association	1,152,864
LA DX-Group	1,142,759
Podolsk Radio Club(UA3D)	1,135,971
OK DX Foundation	1,134,694
YO-DX-Club	1,128,712
Falkopings Radioklub(SM)	895,630
Grupo Argentino de CW	802,040
Mykop Radio Club(UA6Y)	762,730
Vladimir Radio Club(UA3V)	743,203
Noginsky Radio club(UA3D)	691,387
Shakhan Contest Club(UA6A)	600,144
GM DX Club	580,904
Kiel Canal Activity Group(DL)	568,802
São Paulo Contest Group	555,606
Ivanovo DX Club(UA3U)	495,441
Orenburg Contest Club(UA9S)	480,150
Jablanik Bears(YU)	471,976
Bryansk SW club(UA3Y)	471,249
University of Tokyo Contest Club	468,684
Yaroslava Contest Club(UA3M)	462,861
YO Antenna DX Group Deva(YO)	461,986
Obninsk QRU Club(UA3X)	449,224
Stavropolskiy Contest Club(UA6H)	444,862
Saskatchewan Contest Club	394,340
Novosibirsk Contest Club	385,551
DX Club Oradea(YO)	372,948
Irkutsk Radio Club(UAØS)	310,356
Amsterdam DX Contest Club	294,204
POISK Club (UA9A)	293,047
Bracknell ARC(G)	280,111
Kirov Radio Club	227,645
CSM Craiova(YO)	153,620
YO5KAD	151,341
Serpuhov Radio Club(UA3D)	142,231
Noviomagum DX Club(PA)	140,719
Shizuoka DXRA	140,067
Shetland Contest Group(GM)	111,100
Radio Club de Panama	102,805
Kurgan Radio Club(UA9Q)	74,280
Lake Wettern DX Group(SM)	48,246
Sport Club M-Ciuc(YO)	32,795

*Not a qualifying club

(Continued on page 100)

Gordo tests the new five-band portable "Traveler" from TW Antennas in his back yard with promising results...

CQ Reviews:

TW Antennas TW-2010 Traveler™ Portable HF Antenna

BY GORDON WEST,* WB6NOA

Here is a compact, five-band, high-frequency antenna that swings open in seconds and is fully deployed, with its own ground system, in less than five minutes. The TW-2010 Traveler™ covers the 10, 12, 15, 17, and 20 meter bands, with a signal takeoff angle of approximately 27 degrees above the horizon.

This is a center-fed, modified-H design, double vertical dipole with a relay switch box at the feedpoint to click in coil inductance to cancel the capacitive reactance. The matching system naturally rests on 20 meters, so you don't even need to take along the tiny controller if you just plan to operate on 20 out in the park.

I was shipped the Traveler™ with the nifty and sturdy "Quadpod," which features four spring-loaded legs that swing out for a rock-solid platform onto which the heavy-duty 6061-T6 aluminum antenna network slides. When the wind picked up, the Quadpod encountered no problems. Some simple weights on each flat leg did the trick nicely. The Quadpod and antenna radiating elements are powder coated with a matte-black finish for stealth performance and for safety in case someone decides to touch the lower dipole element.

The TW-2010 controller is housed in an extruded-aluminum enclosure with a bright, easy-to-read, multi-colored LED front panel with a band-selector switch. The controller runs on 12 volts DC with a common power plug with center hole positive and a white stripe positive on the other end of the cable. I added Anderson connectors to the far end.

A control cable—an amazing 65 feet in length—comes with the antenna. One end plugs into the back of the controller and the other end plugs into the antenna relay box from the outside. You add your own coax cable, and I would recommend RG-8X rather than any larger cable. (I will explain shortly why smaller cable is preferred.)

The lower and upper dipole elements simply snap open. Large plastic knobs keep everything absolutely tight, straight, and aligned. The upper and lower elements slip into the relay control-box tube, and you are ready to go on the air on 10 through 20 meters.

The antenna incorporates a pre-tuned inductance switching array box which likely will have no need for internal adjust-

The TW-2010 arrives well-packed in several packages. The carrying case is visible at the top.

*CQ Contributing Editor, 2414 College Dr., Costa Mesa, CA 92626
e-mail: <wb6noa@cq-amateur-radio.com>*

MFJ *giant* SWR/Wattmeter

World's *largest HF SWR/Wattmeter has* ***giant*** *6½ inch meter!*

This one you can SEE! Extra-long scales gives you highly accurate SWR and power measurements. Huge numbers makes reading easy across your shack.

Like your analog watch, one glance at the meter needle gives you fast and accurate readings without actually examining the scale. New!

MFJ's exclusive *TrueActive*™ peak reading circuit captures *true* peak or average forward and reflected power readings.

MFJ-868 **$149.95**

Has 20/200/2000 Watt ranges for accurate QRP or QRO operation.

Exclusive MFJ Wattmeter *Power Saver*™ circuit turns on meter only when RF power is being measured.

Covers 1.8-30 MHz. Use 9 volt battery or 12 VDC or 110 VAC with MFJ-1312D, $15.95. 7Wx5½Hx5D in. SO-239 connectors.

New!
Giant 144/220/440 MHz SWR/Wattmeter
MFJ-867, $159.95. Like MFJ-868 giant SWR/Wattmeter, but for 144/220/440 MHz.

MFJ *Weather-Proof* Antenna *Feedthrough Panel*

Bring three coax-fed HF/VHF/UHF antennas, balanced line, random wire and ground into your hamshack without drilling through walls . . . **New!** MFJ-4602 **$69.95**

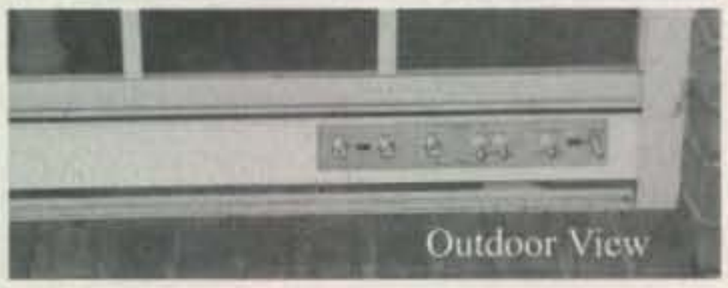
MFJ's Weather-proof *Antenna Feedthrough Panel* mounts in your window sill. Lets you feed three coax-fed antennas, balanced line, random wire and ground without drilling through walls.

Simply place in window sill and close window. One cut customizes it for any window up to 48 inches. Use horizontally or vertically. High-quality pressure-treated wood with excellent 3/4 inch thick insulating properties is painted with heavy coat of white outdoor enamel paint. Edges sealed by weather-stripping. Seals and insulates against all weather conditions. Gives years of trouble-free service. ¾Dx3½Hx48W in.

Inside/outside stainless steel plates bond all coax shields to ground. Stainless steel ground post brings outside ground connection inside. Three *Teflon*® SO-239 coax connectors, *ceramic* balanced line/randomwire feedthru insulators.


Stainless Steel Bonding Plate


Indoor View


Outdoor View

6-Band *Rotatable* mini-Dipole for 40,20,15,10,6,2 M

Low profile 14 ft . . . 7 ft. turning radius . . . 1.5 kW . . . Directivity focuses signal, reduces QRM/noise . . .

You can hardly see this mini 14 foot rotatable dipole from across the street!

Tiny 7-foot turning radius fits the smallest roof – perfect for houses, apartments/condos.

The low-profile MFJ-1775 is not much bigger than a TV antenna and nicely blends into the sky. It's easily turned by a lightweight TV rotator.

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

Operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters. Run *full 1500 Watts* SSB/CW on all HF bands!

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

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

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

80/40/20 Meter Rotatable Dipole

MFJ-1785, $369.95. DX the *low bands* on 80, 40, and 20 Meters with an efficient full 33 foot *rotatable* dipole! Handles a full 1500 Watts. Balun included. 6063 T-6 aircraft strength aluminum tubing with a solid center fiberglass insulator. Requires a medium-duty rotator such as Hy-gain's AR-40.

Compact SWR/Wattmeter

MFJ-822
MFJ-842
$59.95
New!

Compact SWR/Wattmeter has huge 3 inch *lighted* Cross-Needle Meter, easily viewable from across shack. Read forward/reflected power, SWR *simultaneously*. 3¼Wx3¼Hx3¼D in.

MFJ-822 for 1.8-200 MHz, 30/300 Watts.
MFJ-842 for 140-525 MHz, 15/150 Watts.

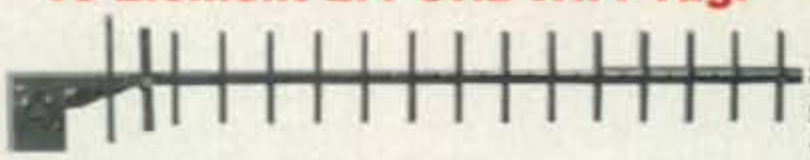
2-Position *Remote* Ant. Switch

MFJ-4712 **$79.95**

Switch any two antennas remotely!

Single coax feeds two antennas, DC power, control signals -- *no extra cable needed*. Use 1.8-150 MHz antennas. 1500 Watts. 50-75 Ohms. 4W x2⅛Hx1½D in. fully enclosed, *weather protected* outside switch box has stainless steel bracket for 1½ in. mast. 3 *Teflon*® SO-239s.

16-Element 2.4 GHz WiFi Yagi



MFJ-1800 **$29.95**

16-element WiFi Yagi antenna greatly extends range of 2.4 GHz, 802.11b/g WiFi signals. Turns slow/no connection into fast, solid connection. Highly directional -- minimizes interference. N-female connector. Tripod screw-mount. Wall/desk/shelf mounts. Use vertically or horizontally. 18Wx2¾Hx 1¼D in. 2.9 oz.

MFJ-5606SR, $24.95. Cable connects MFJ-1800/WiFi antennas to computer. Reverse-SMA male to N-male, 6 ft. RG-174.

MFJ-5606TR, $24.95. Same as MFJ-5606SR but Reverse-TNC male to N-male.

Glazed Ceramic Insulators

MFJ-16C06, $4.56, package of 6 authentic *glazed ceramic* antenna insulators. Extra-strong -- long antennas will not break, will not arc over or melt under full legal power. Extra-long ridges prevent high-voltage breakdown. Smooth wire holes prevent wire damage.

Dealer/Catalog/Manuals

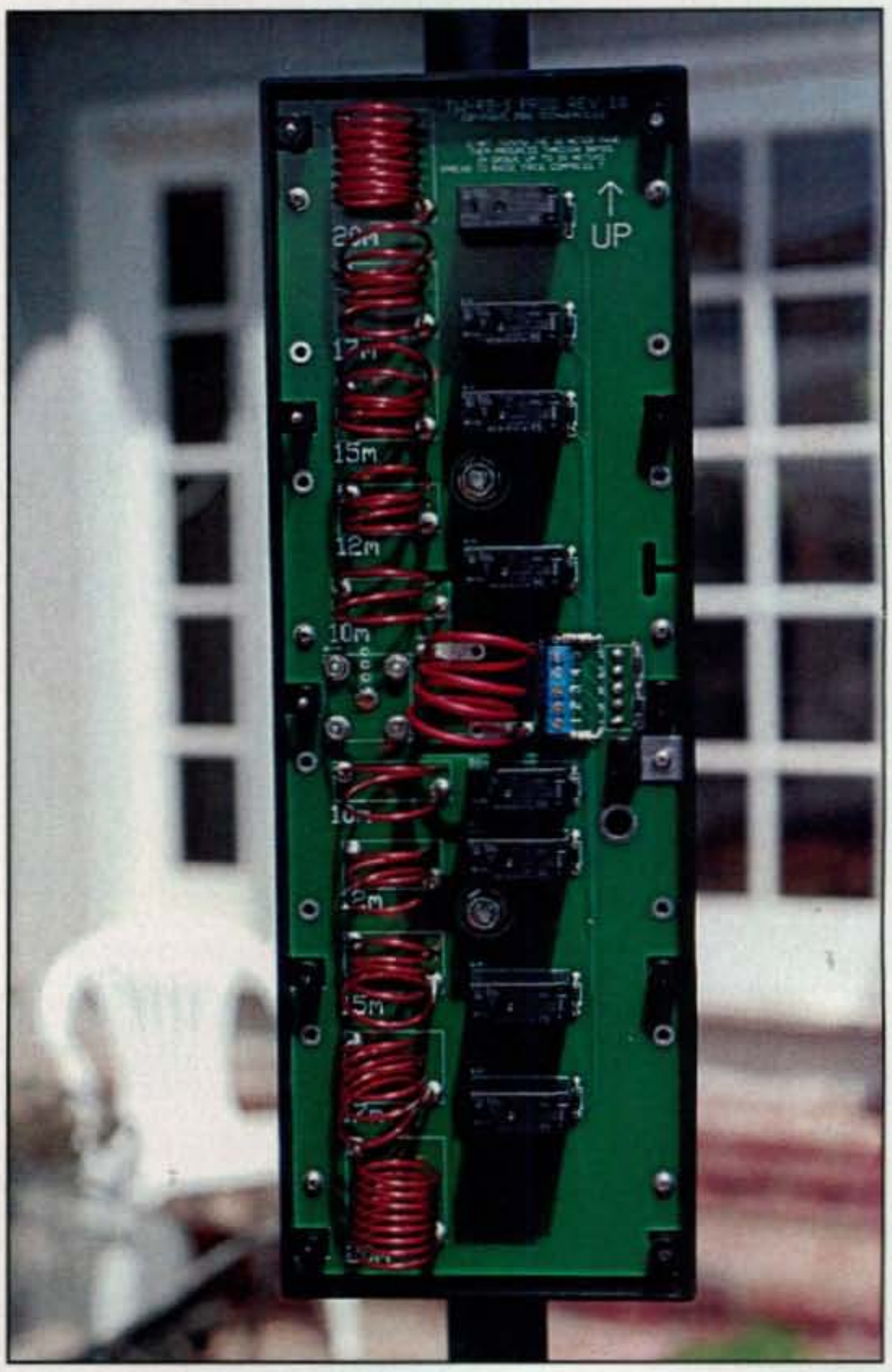
Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

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

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

MFJ . . . the World Leader in Ham Radio Accessories!

This is the optional "Quadpod" portable base for the Traveler antenna. Also visible is the lower dipole element, just a foot off the ground.



A peek into the inductance matching box. Various band coils are to the left and the black relays are on the right. The relays switch in different coils for different bands.

ments because the antenna is a pre-balanced dipole array. Like all good hams, though, I *had* to see what was on the inside, so I opened up the box, per the instructions, and quickly spotted a simple design of relay-switched series coils to resonate the top and bottom elements for minimum SWR and little, if any, heat lost in the large element coils themselves. The instruction manual warned me not to lose the non-magnetic (no rust) screws, which, of course, I lost immediately in the wet lawn. Screw *keepers* would have been nice, along with an additional rubber seal around the edge of the plastic black box lid. Richard Rhodes from TW Antennas tells me that "there's no gasket for the box because nothing inside the box really cares if it gets damp except the relays, and they're individually sealed, so no worries. The box alone will keep the insides from drowning. Also, there's no bare metal inside the box that can corrode under normal circumstances."

A quick check of TW Antennas' internet support group gave me same-day answers to some technical questions about those pesky screws holding on the back of the black box. I worked with Hollie, who usually got back to me with answers within an hour.

I added 12 volts from a small battery, hooked up my Yaesu FT-817, and the system sprang to life. Optional Yaesu and ICOM control cables are available in case one is too lazy to push the button to select the correct band. ICOM and Yaesu offer band data out that will let the Traveler™ control box automatically switch in the correct relays for the desired band of operation. I tried both cable kits, one on an ICOM IC-7000 and the other on several portable battery-operated Yaesu HF transceivers, and magically the controller followed the bands perfectly.

Next was the SWR check. I started out with the handy MFJ SWR analyzer, and ran more comprehensive Smith chart checks with the portable TimeWave LCD analyzer. I also triple-checked SWR by noting the output indicator on each of the transceivers.

While the antenna did offer a peak in receiver background noise reception for the specific band I was on, the initial SWR checks were *terrible*! Ten and 12 meters were fair, but 15, 17, and 20 meters were SWR whacko. Check the book, I thought, but I was far away from the side of the house, which is built of stucco and chicken wire. I tested with the permanent mounting assembly in wet grass and still had high SWR.

A drawing on page 17 of the well-illustrated instruction manual gave me the answer. It showed the coax and controller cables coming off the center of the antenna at a 45-degree angle. Presto! All bands dropped right in and the SWR was now stable! However, I had to switch from RG-8 coax

AMERITRON *True Legal Limit*™ Tuner

Easily handles 1500 Watts continuous carrier even on 160 Meters . . . High-current edge-wound silver plated Roller Inductor . . . Two 500 pf high capacitance tuning capacitors with 6:1 vernier reduction drives . . . 3 core choke balun . . . Six position antenna switch . . . True peak reading Cross-Needle SWR/Wattmeter . . .

Call your dealer for your best price!

AMERITRON ATR-30

$599.95

Suggested Retail

- ***Handles 1500 Watts carrier***
- ***Super High Current edge-wound silver plated Roller Inductor***
- ***500 pf tuning capacitors with 6:1 vernier reduction drives***
- ***3 core choke balun***
- ***6 position antenna switch***
- ***True peak reading meter***

AMERITRON's ATR-30 *True Legal Limit*™ roller inductor antenna tuner is ham radio's toughest! It'll handle 1500 Watts *continuous carrier output* on *all* modes and *all* HF bands into most antennas -- even on 160 Meters where most antenna tuners fail.

It's perfect for Ameritron's most powerful amplifiers where the ATR-30 just loafs.

All band coverage lets you operate 1.8-30 MHz including all MARS and WARC bands.

Super High Current Roller Inductor

You'll see Ameritron's *new super high current* air core roller inductor. It's *edge wound* from a thick solid copper strip and silver plated. This produces a large surface area and a massive conductor. It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn ordinary roller inductors.

A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

6:1 vernier reduction drives makes capacitor tuning smooth and easy.

Super Balun, 6 position Antenna Switch

Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

Read *true* Peak Power

Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

Roomy Cabinet maintains High-Q

Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅜Hx17½D inches.

AMERITRON ATR-20 Antenna Tuner

ATR-20, $459.95 Handles a full 1.2 kW SSB and 600 Watts CW. It's designed to safely handle the full SSB power of Ameritron's AL-811/811H/80B, ALS-500M/600 and other 1.2 kW SSB amplifiers.Has vernier reduction drives.

Ameritron has the best selection of *True Legal Limit*™ HF Amplifiers

AMERITRON's legal limit amplifiers use super heavy duty Peter Dahl Hypersil® power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with 3CX1500/8877 ceramic tube

AL-1500

$3495

Eimac® tube

AL-1500F

$3095

Imported tube

Suggested Retail *TrueLegalLimit*™

Ameritron's *most powerful* amplifier uses the *herculean* 3CX1500/8877 ceramic tube. 65 Watts drive gives you full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 lbs., 17Wx10Hx18½ in.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 toughest tube

AL-1200

$3459

Suggested Retail *TrueLegalLimit*™

Get ham radio's *toughest* tube with AL-1200. The *Eimac*® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 17Wx18½Dx10H in.

Ameritron's *classic* Amp

with 2 graphite plate classic® 3-500G tubes

AL-82

$2645

Suggested Retail *TrueLegalLimit*™

Most linears using 3-500Gs *can't* give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500G amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 17Wx10Hx18½D inches.

Desktop Kilowatt

with classic 3-500G tube

AL-80B, $1399. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk-top linear. 14Wx8½Hx 15½D inches. Plugs into 120 VAC outlet. Graphite plate *genuine* 3-500G tube. Nearly 70% efficiency. Weighs 48 lbs.

AMERITRON *no tune* Solid State Amplifiers

500 Watt Mobile Amp

ALS-500M, $849. 500 Watts PEP/400W CW output, 1.5-22 MHz, instant bandswitching, no tuning, no warm-up. SWR, load fault, thermal overload protected. Remote on/off control. DC amp meter. Extremely quiet fan. 13.8 VDC. 9W x3½Hx15D in., 7 lbs. **ALS-500RC, $49,** Remote Head.

600 Watt FET Amp

ALS-600, $1299. ***No tuning****, no fuss, no worries -- just turn on and operate.* 600 Watts PEP/500W CW, 1.5-22 MHz, instant bandswitching, SWR protected, extremely quiet, SWR/Wattmeter, ALC control. 120/220 VAC. Inrush protected. 9½Wx6Hx12D in. **ALS-600S, $1428,** ALS-600 with 10 lb., very low RF noise switching power supply.

Precision SWR/Wattmeter

AWM-30, $149.95 suggested retail. Active circuit gives *true* peak/average readings on lighted Cross-Needle meter. 3000/300 Watt ranges. Remote sensor.

Call your dealer for your best price!

Free Catalog: 800-713-3550

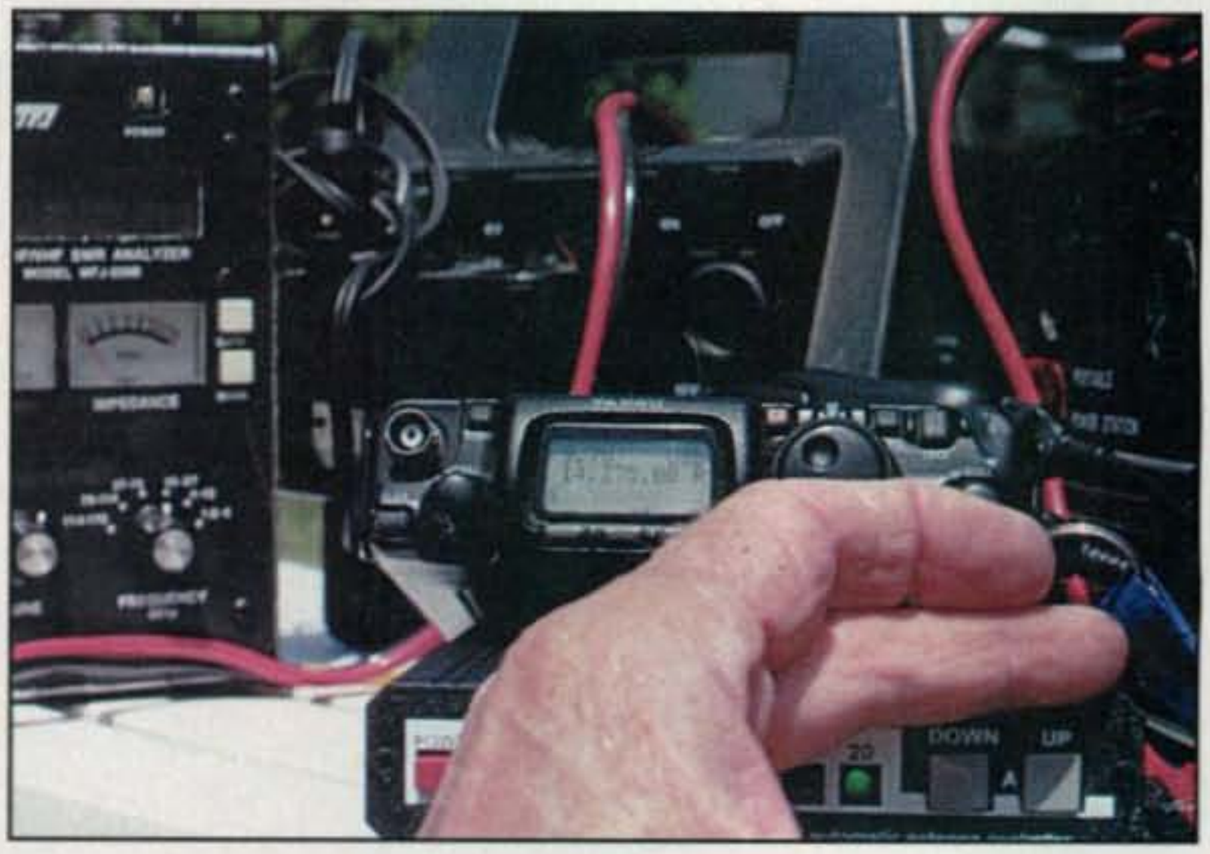
AMERITRON®

. . . the world's high power leader!

116 Willow Road, Starkville, MS 39759
TECH (662) 323-8211 • **FAX** (662) 323-6551
8 a.m. - 4:30 p.m. CST Monday - Friday
For power amplifier components call (662) 323-8211
http://www.ameritron.com

Ameritron . . . the world's high power leader!

The TW-2010 set up and on the air for testing, with the coil/relay box open. Note the control cable and feedline coming away from the box at an approximately 45-degree angle. This is essential for keeping the SWR low (see text for details).



The green LED on the control box (shaded by Gordo's hand so you can see it in the bright sunlight) shows that the relays rest on 20 meters with the controller turned off. The up/down buttons are used to select the other bands, and the LED switches to indicate which band is in use.

to lighter-weight RG-8X to keep the antenna from leaning; RG-8X is fine below 30 MHz, but the cables must *not* run down the lower mast.

My first on-the-air 20-meter check was with a station in Florida, indicating that my signal was good, especially for a back-yard ground-mounted antenna. On 17 and 15 meters, I snagged some mobiles, 1500 miles away via skywave, and they, too, reported a nice signal. In comparison to single-band inverted-V dipoles (not multiband), the physically longer, naturally resonant dipoles with slightly higher feedpoint elevation gave me increased performance at the other end of the circuit by about 1 S-unit, or 6 dB. The best aspects of the portable Traveler™ antenna are its ultra-compact design, instant relocation to get it away from nearby cable-television drops, instant band switching, and no need for any additional mounting poles.

Finally, after running the ICOM 7000 into it for a rather long QSO, I put down (actually disconnected) the mic and immediately went over to feel the open 20-meter coils. They were hardly warm, not hot, indicating minimal current loading to achieve resonance in the upper and the lower radiating elements. (Actually, according to Richard at TW, the 2010 is physically sized for 10 meters, but with all coils engaged, it goes to 20 meters. In that range "good match" bandwidth is pretty small, and any further loading will cause subsequent bands to match across a very narrow range of frequencies.)

Keep the supplied multi-conductor control line and your supplied lightweight coax *away* from the lower radiating element and your SWR will drop to near zero. I tried rotating the antenna to see if it was directional, but couldn't tell much difference, other than some nice incoming strong signals. Most important, everyone I could hear, I could work.

For portable operation, the TW antenna was a kick to play with in my backyard, as well as at other locations in the California sun.

The list price for the TW-2010 Traveler is $399.95; a complete package, which includes the antenna plus the Quadpod stand and a deluxe carrying case, is $549.85, both plus shipping. For more information, visit <http://www.TWantennas.com> on the web and look for product number TW-2010.

A Second Test

A friend of Gordo's, Paul Bailey Gates, KA6GEM, recently purchased his own TW-2010 and recounted his initial impressions:

I set up the TW-2010 this afternoon in my front yard just to test it out. I soldered a set of Anderson PowerPoles® onto the controller power line and grounded everything as recommended. I'm using a new 75-foot length of RG-8X from Cable X-Perts. Everything worked as expected, but the bands were dead so I didn't make a single contact or hear any activity. The SWR meter on my FT-897D didn't move *at all*! In fact, my first impression was that something wasn't working.

The only problem I had was in the "Auto" mode, using the accessory Yaesu interface cable with my FT-897D. It switched OK for the 10- and 12-meter bands, but when I switched to 15, it jumped back to 10 meters... same for 17 and 20 meters. But the manual mode works so well that the auto mode almost seems unnecessary.

This antenna could prove to be a major game-changer. Its set-up was super simple and there was *no* tuning. With the growing number of very portable HF transceivers (ICOM'S new IC-7000 and the venerable 706, Yaesu's FT-897 and 857, and Kenwood's TS-2000, among others), there is, I think, a lot of demand for an antenna like this.

The quantity of young people in ham radio may not be as high as many of us would like, but there is no problem with the quality of those young hams, representing tomorrow's leaders not only of our hobby but of their professions as well.

Young Hams Shine with Awards, Scholarships

BY RICH MOSESON,* W2VU

The accomplishments of young people in amateur radio were highlighted in late June and early July by two separate announcements—one the winner of this year's Newsline Young Ham of the Year (YHOTY) award, and the other the more than four dozen young amateurs honored with scholarships administered by the Foundation for Amateur Radio (FAR).

Emily M. Stewart, KCØPTL

Seventeen-year-old Emily Stewart, KCØPTL, was chosen from a record field of 30 nominees to be the 2008 Newsline Young Ham of the Year. Emily is entering her senior year in Leavenworth (KS) High School and hopes to become a pharmacist in the future. She has been a ham for five years, and has been involved with promoting and demonstrating amateur radio for nearly as long. In 2006, she was appointed ARRL Assistant Section Manager for Youth in Kansas, and helped organize and run the Youth Lounge and Youth Dinner at the Dayton Hamvention® in both 2007 and 2008.

At a section leadership meeting in 2007, Emily asked how many of the attendees had persuaded their children or grandchildren to become hams. Very few hands were raised. As a result, she and Brian Short, KCØBS, developed the Kansas Legacy Project, a program designed to encourage licensed hams to get their younger family members involved in the hobby. Emily herself is the daughter of a ham, Mike Stewart, KØMDS.

At a ceremony at the Huntsville Hamfest in August, Emily was due to be presented with a plaque from Amateur Radio Newsline, along with a Yaesu transceiver from corporate co-sponsor Vertex-Standard and a week at SpaceCamp Huntsville from *CQ* magazine, also a corporate co-sponsor.

FAR Scholarship Winners

In early July, the Foundation for Amateur Radio announced the winners of the 55 scholarship awards that it administers. FAR has been administering scholarship programs since 1961, according to Scholarship Committee Chairman Diane Zimmerman, AA3OF. She notes that there are 49 individual winners this year, with six students winning more than one scholarship. Awards range from $500 to $3000, with $1000 as the typical amount. The total value of all of the 2008 scholarships is over $72,000. The 2008 winners are:

Emily M. Stewart, KCØPTL, Newsline Young Ham of the Year, 2008.

Ralph V. "Andy" Anderson, KØNL, Memorial Scholarship, $1000: David T. Clark KD7NZK, Phoenix, AZ

Baltimore Amateur Radio Club Scholarships (5 total) $1000 each: Elizabeth Albert-Bruninga, WE4APR, Glen Burnie, MD; Victor Curtis, KB3BTD, Cheltenham, MD; Christa McClenny, KB3JIU, Glenwood, MD; Rebecca Milton, KB3GFG, Sykesville, MD; **Ernie Dobos Memorial Scholarship, $1500:** Andrew Bruninga, KB3GLF, Glen Burnie, MD

Rose Ellen Bills Memorial Scholarships, $2000: Michael Volz, W2NRL, East Lansing, MI

Richard G. Chichester, Memorial Scholarship, $2000: Tamara Sevier KE5DJZ, Austin, TX

Columbia Amateur Radio Association Scholarship, $1000: Derek Wood, KB3NXY, Columbia, MD

FAR Silent Key Memorial Scholarships, 3 at $3000 each: Derek Wood, KB3NXY, Columbia, MD; Patricia Dobson, N3DUH, Reisterstown, MD; HaoQi Li, KI4LJD, Fairfax, VA

Frederick Amateur Radio Club Scholarship, $1000: Robert Crook, KB3JYR, Monrovia, MD

Free State Amateur Radio Club Scholarship, $500: Amy Johnson, KB3HXF, New Castle, PA

Murgas Amateur Radio Club Scholarship, $500: Patricia Ward, KB3QLI, Pittsburgh, PA

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

Nanticoke Amateur Radio Club Scholarship, $1000: Benjamin R. Frye, KI4BAW, Roanoke, VA

Lawrence E. and Thelma J. Norrie Memorial Scholarship, $2500: Rebecca Rich, KBØVVT, Raytown, MO

Old Old Timers Club Scholarship, $1000: Alex Brech KCØYLD, Curie, MN

Ozaukee Radio Club Scholarship, $1000: Natalie Harding, KC9KIR, Burlington, WI

Kevin and Kelly Perdue Memorial Scholarship, $2000: Steven Hughes, KI4EBV, Brighton, TN

Phil-Mont Mobile Radio Club Memorial Scholarships, $2000 each: Steven R. Chimel, KA3SRC, Clarks Summit, PA; Diana Mitchell, KB3QDW, Mechanicsburg, PA

QCWA Named Memorial Scholarships, 6, amounts vary: Bryce T. Salmi, KB1LQC, Chelmsford, MA; Grant Morine, W4GHM, Wilmington, NC; Stephen Oi, NV6A, Brentwood, TN; Brenton J. Salmi, KB1LQD, Chelmsford, MA; Nicholas Bauer, KC9GZY, Bloomington, IN; Alex Brech, KCØYLD, Curie, MN

QCWA Silent Key Memorial Scholarships, 12 at $1000 each: Daniel Ellis, KG4IVC, Pikeville, NC; William Joshua Fisher, W4WJF, Vale, NC; Kyle Fox, W4KTF, Warrenton, VA; Catherine Jones, KI4EVA, Vinton, VA; Blake McCabe, KC2GQX, Vestal, NY; Wayne McNamar, KD7PVY, Everett, WA; Reid Morine, W4RSM, Wilmington, NC; Sabra Perry, KD7JPR, Sweet Home, OR; Matthew Poppe, AD7HF, Spokane Valley, WA; Sarah Schneider-Firestone, KB3QJR, Columbia, MD; Stephen M. Sciarini, KC8IDJ, Dover, OH; Stephen T. Simpson, KC8IOY, Ocala, FL

Radio Club of America Scholarships, 3 at $1000: William Joshua Fisher, W4WJF, Vale, NC; Michael Volz, W8KAR, East Lansing, MI; Caleb Braff, KCØFKO, St Paul, MN

Chuck Reville K3FT Memorial Scholarship, $1000: Chris Renfrow, KD7TDC, Ellensburg, WA

10-10 International Net Scholarships, 4 at $1500 each: James Dunn, KCØKTP, Overland Park, KS; Francis T. Gradijan, KD5HTB, Carrollton, TX; Nathaniel Heatwole, WZ3AR, Pittsburgh, PA; Jacob Wagner, KD8CDC, Rocky River, OH

Robert E. True Memorial Scholarship, $1000: Stephen M. Sciarini, KC8IDJ, Dover, OH

Tulare County Memorial Scholarship, $1000: Nathan Hager, KI6LZA, Cedarpines Park, CA

Ernest L. Walker, WB3DVL Memorial Scholarship, $1000: Thomas Christovich, KB3HUR, Baltimore, MD

Dwight Weller Memorial Scholarship, $1000: Joshua Young, KJ4AVW, Fuquay Varina, NC

WARAC Memorial Scholarship, $1500: Patrick Weeks, KB9ULT, West Allis, WI

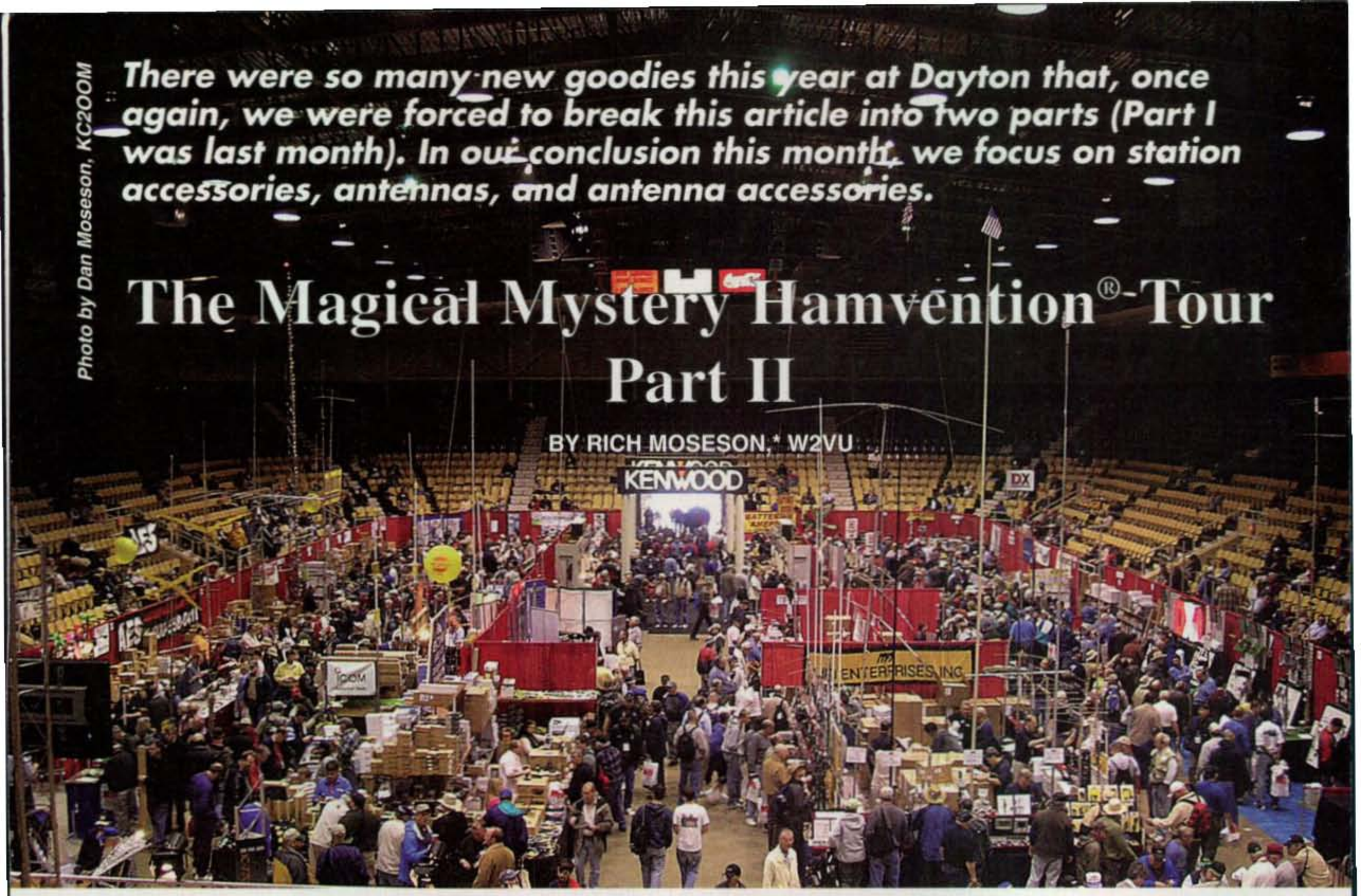
Young Ladies' Radio League Scholarships, $1500: Rebecca Rich, KBØVVT, Raytown, MO; Stephanie Schaefer, KC2NSA, Binghamton, NY

There were so many new goodies this year at Dayton that, once again, we were forced to break this article into two parts (Part I was last month). In our conclusion this month, we focus on station accessories, antennas, and antenna accessories.

Photo by Dan Moseson, KC2OOM

The Magical Mystery Hamvention®-Tour Part II

BY RICH MOSESON,* W2VU



The blending of computer technology with ham radio technology continues, and it was most evident this year at the Dayton Hamvention® in the many new station accessories on the market, from software to automatically detect what band you're on and switch you automatically to the right antenna to several Bluetooth® devices to make it easier for us to operate hands-free while mobile. Our tour continues now with a look at station accessories, antennas, and antenna accessories.

Station Accessories

Array Solutions starts out our list of manufacturers offering new accessories for your ham shack (antenna-related accessories are listed with antennas). We've got three new offerings from Array Solutions this year, beginning with the BandMaster, a "universal radio band decoder" that relays band information between rigs without RS-232 ports and an external device, such as a computer logging program. It is compatible with Elecraft, ICOM, Kenwood, Ten-Tec, and Yaesu radios. Next up is the QSK-Master, which allows any radio/amplifier combination to use full break-in keying (QSK), and the Hamation Filter MAX (sold through Array Solutions), which contains six W3NQN bandpass filters in one case. Designed primarily with multi-transmitter contest stations in mind, the removable filters cover each of the traditional HF ham bands (160, 80, 40, 20, 15, and 10 meters). It's easy to replace a filter if necessary or substitute ones for 12, 17, or 30 meters if you're not using it for contesting. All of the filters are rated for up to 200 watts.

The QSK-Master, one of several new products from Array Solutions, allows any radio/amplifier combination to use full break-in keying (QSK), even if the units weren't designed to work together.

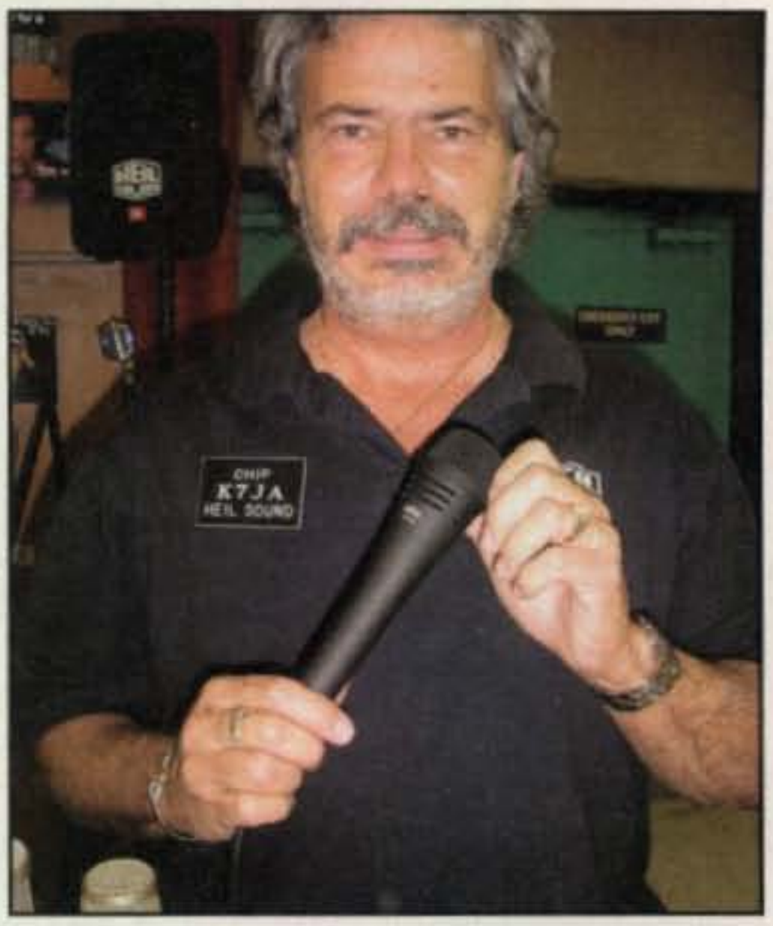
bhi introduced its "CAT-MATE" electronic "Y" splitter for the Yaesu FT-817, 857, or 897. This allows you to use the company's RadioMate compact keypad (see review, June 2008 *CQ*) as well as another remote device that connects through the radio's computer (CAT) port.

Creative Services Software has released a new Windows® version of its classic PacTerm (for Timewave/AEA TNCs) and PKTerm (for Kantronics TNCs) software, taking full

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

The CAT MATE from bhi, ltd., is an electronic "Y" splitter that lets you use two devices through the computer port of certain Yaesu transceivers.

Heil Sound Marketing Manager Chip Margelli, K7JA (a 2008 inductee to the CQ Amateur Radio Hall of Fame) demonstrates Heil's new PR-35 microphone. Designed for vocalists, it helps enhance ham audio as well. →



advantage of the multitasking power of Windows. This rig control software allows operators not only to control radio transmissions, but to simultaneously run additional programs, such as logging programs, callsign lookup programs, or any other Windows® application. It also supports Timewave's latest DSP-232+ terminal node controller (TNC) and will simultaneously run two TNCs, allowing the operator to operate both HF digital and VHF packet at the same time.

The Courage HandiHam System, which helps develop assistive technology for hams with disabilities, as well as helping them get licensed and on the air, featured a new "Command and Control" system for users with limited muscle control and/or blindness. Designed by KØLR and WB5KIA (who previously developed the Talking Logbook), this system lets the user communicate with the radio through a lightweight computer headset, telling it to change frequency, mode, etc., and then—by flipping one switch—the headset becomes a VOX headset mic for talking on the radio.

Heil Sound introduced two new microphones, the PR-35 and PR-781. The PR-35 was primarily intended for broadcast, recording, and live-sound use (Bob Heil tells us it was designed for folk singer Joan Baez), but is also good for ham use where you want a smooth, flat response over a wide frequency range. One particular item of interest to hams with computers all over their shacks is that the 35 was designed to be used close in to video monitors without hum or buzz. The PR-781 comes out of the ham radio side of the Heil Sound shop, and is a refinement of the PR-780, which was originally designed for the ICOM IC-7800. The 781 is compatible with all major-brand transceivers, offering a dynamic element with wide frequency response (50 Hz to 16 kHz) and a cardioid pattern.

Speaking of audio, Idiom Press has introduced an outboard SSB speech processor called the LogiKlipper, employing RF clipping to keep your transmitter operating at peak power without introducing distortion. It offers three modes: "Punch," which makes your *signal sound* fuller and louder; "Extreme Punch," described as a more aggressive version of punch designed to give you a dominating sound to help you hold a frequency while contesting or running a net; and "Penetrate," which adds a high-frequency boost to help your signal get through even the worst band conditions. It won't sound pretty—the literature describes the output as "a near-shrill, piercing, penetrating sound"—but you will get through if at all possible.

The LogiKlipper from Idiom Press is an SSB speech processor that offers three settings—"Punch," "Extreme Punch" and "Penetrate"—to help your signal get through in even the worst conditions.

We'll briefly break away from alphabetical order here to finish up the audio category. W2IHY Technologies brought its new iPlus audio switch to the Hamvention. This lets you use a single box to connect either your IHY audio gear or commercial rack-mounted audio gear to as many as three separate radios (or speaker systems if you're also into non-radio audio). There are separate level controls feeding each output, plus you can connect one speaker to the unit for all of your station audio. You can also connect amplifier keying lines and, in tandem with Top 10 Devices' antenna switch, provide one-switch switching of all external devices between different radios.

Kenwood's new entry for this year is the RC-D710. It's a replacement control panel for the TM-D710A or the TM-V71A and it includes a 1200/9600 baud AX.25 TNC for no-computer APRS operation (APRS® is the Automatic Position Reporting System). Other packet operation does require a computer. The RC-D710 also is set up to accept NMEA-183 output from a GPS receiver, can output waypoint position data to your GPS unit, and allows you to store a list of up to 100 APRS stations. It also supports several earlier Kenwood mobile rigs, including the TM-D700, V708, G707, V7, 733, 255, and 455.

MFJ had its usual array of new products on display at the show. If we listed everything, we'd fill up this whole article, so we asked company president Martin F. Jue, K5FLU, to pick a handful that he thought would be of interest to the greatest number of our readers. He immediately led us over to a display of window feedthrough panels. The concept was introduced a few years ago, but the new ones greatly expand their versatility.

Besides offering a variety of different connectors for different types of antennas, several of them also include MFJ's new "AdaptiveCable" wall plates that slip open to let you pass through cables that already have connectors on them (such as rotor control cables), then slide back over the cable to form a weather-tight seal. MFJ also offers through-wall and through-soffit versions for those who don't want to run their cables through a window frame. Next up was the model 826 digital SWR/wattmeter. It covers 1.8–54 MHz, QRP to the legal limit, has an analog scale, and can be operated remotely. The software can be updated online as new versions are released.

Martin's next highlighted new product was the MFJ-1251 universal microphone converter, which lets you use your favorite microphone (with either a modular or 8-pin round plug) with any rig that has either a modular or 8-pin mic input. A series of jumpers inside the box lets you re-route the cabling from your microphone to match the cabling needed by your rig. The rest of MFJ's best of the new stuff list will be found in the next section, covering antennas and antenna accessories.

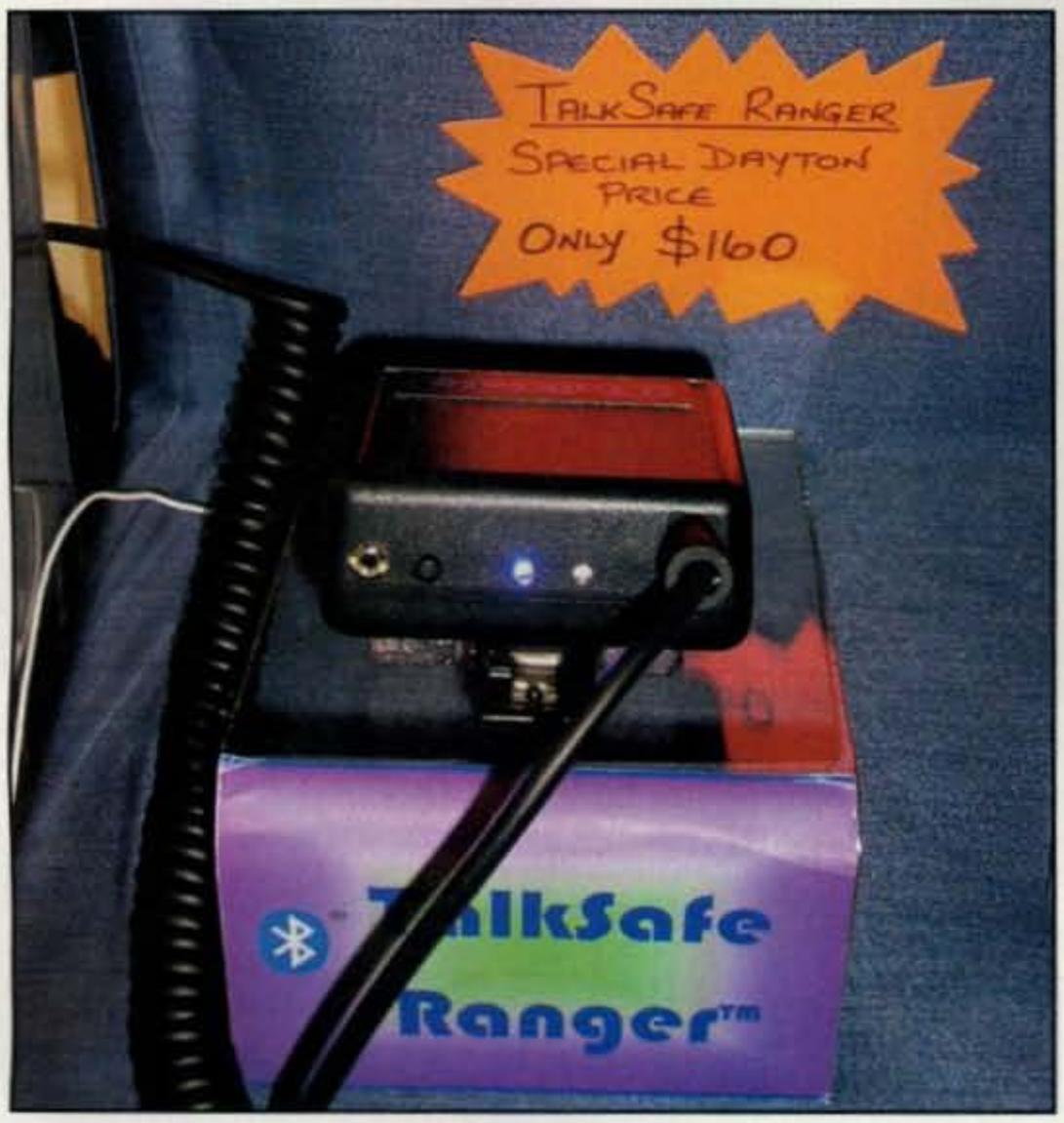
British manufacturer RPF Communications paid a visit to Dayton and showcased its two "TalkSafe" products. These are outboard units that let you operate virtually any radio hands-free, using a Bluetooth® headset. The basic TalkSafe is designed for mobile use with mobile rigs, and features a speaker override switch so that anyone else in the vehicle can hear the received signals. You use the call/end-call switch on your Bluetooth® headset to key and unkey the mic. The TalkSafe Ranger is a similar unit designed for handhelds, minus the speaker override switch. Both units can operate alongside other Bluetooth® devices without interference.

Another set of Bluetooth® adapters comes from Timewave Technology, the HamLinkBT-BTH and BT-RC. The BT-BTH attaches to most recent ham rigs through the mic and speak-

W2IHY's iPlus audio switch lets you consolidate audio gear through this one box to feed as many as three different radios with the flip of a switch.

The RC-D710 from Kenwood replaces the control head of existing Kenwood VHF/UHF mobile rigs and includes a built-in packet TNC as well as software for no-computer APRS operation.

MFJ's expanded line of window feedthroughs for all sorts of radio cables includes new "adaptive cable" wall plates that slide open then provide a weatherproof seal for cables that already have connectors on them.



The TalkSafe Ranger from RPF Electronics (left) and the HamLink BT from Timewave Technology (right) are among several Bluetooth® adapters introduced at Dayton this year with the goal of promoting hands-free hamming while driving.

er connectors and offers three different ways of keying your transmitter on and off. First, if your rig is equipped for VOX (voice operated switching), then you just talk and it switches into transmit mode. If not, then you can tap the switch on your earpiece to toggle the transmitter on and off. The BTH also offers an optional pushbutton switch that activates its FastPTT system. When used with a second Bluetooth® unit, you can use the BT-PTT switch in your hand, on your belt, or connected to a footswitch to manually activate the PTT circuit. The BT-RC is a wireless controller for remotely operating ham rigs with computer-control inputs (including RS-232, CAT and Ci-V). This lets you use your computer control program without a physical link to the rig. There is also an audio link that lets you talk through a computer headset/mic or operate digital modes through a soundcard program or an external TNC.

West Mountain Radio brought three new products to Dayton, a flexible mobile mount for the Yaesu FT-817; the

West Mountain Radio's RIGblaster duo is designed to provide all the benefits and convenience of the original RIGblaster to two rigs. Plus, it lets you share a mic, speaker, headphones. and digital-mode software between two radios. →

new RIGrunner 4004, which in addition to providing 12-volts DC for powering various radios includes USB ports carrying 5 volts so you can plug in portable computing devices, such as MP3 players, that are powered via USB cables; and the RIGblaster duo—which basically lets you use a single RIGblaster for two radios—one mic, one pair of headphones, one computer, one soundcard interface … all of which feed two separate outputs so you can switch between rigs simply by throwing a switch. The duo also includes a dual USB-to-serial converter to let you use two ham software applications at once.

Buddipole Antennas has added a non-antenna accessory to its line—a miniature 40 amp power supply. It's actually an "ultra capacitor," which stores a large amount of energy per charge.

W4RT Electronics has introduced a small (in size and price) vector network analyzer. The miniVNA Antenna Analyzer uses the power of a laptop computer (not included) to view the parameters of any antenna over any portion of spectrum between 100 kHz and 180 MHz in real time. The miniVNA comes with a USB cable and a CD with the analyzer software.

The miniVNA from W4RT Electronics, plus your own computer, gives you the power of a professional-grade network analyzer at a fraction of the price.

Antennas & Antenna Accessories

As usual, there were a great number of new antennas and antenna accessories introduced this year at Dayton. We'll get started with Bencher's new Skylark Yagi for 12 and 17 meters, which can be looked at as a companion to the company's Skyhawk Yagi for 20, 15, and 10 meters. With seven elements on a 16-foot boom, you will be heard! The antenna weighs in at just 38 pounds, requires no tuning, and has an SWR of 1.3:1 or less across all of both bands.

DX Engineering has a new 43-foot vertical consisting of 16 self-nesting 3-foot tubes for easy assembly and disassembly where you can't or don't want to put up a permanent antenna. The tubes are aluminum, and the antenna comes with a stainless-steel tilt base included, as well as all stainless-steel hardware and fiberglass insulation at the base. The antenna is resonant on 40 meters and can be used on all HF bands with a current balun and wide-coverage tuner.

M² Antenna Systems has two new entries this year. The KT-31D triband dipole is a companion to its existing KT-series of Yagis for 20, 15, and 10 meters. On the VHF/UHF side of things (M²'s original specialty), the company has the 2M-440XP-SS, a dual-band Yagi with a handle for 2 meters and 70 centimeters. This type of antenna is ideal for making portable satellite contacts using the FM "birds" and a dual-band handheld.

MFJ also has a rotatable dipole for the upper HF bands. The MFJ-1769 covers 20, 15, 10, and 6 meters. It's 26 feet long (13-foot turning radius) and weighs only 9 pounds, so it can be turned with a lightweight TV rotor. It's a full half-wavelength at 20 meters, and 6-meter operation is via an add-on dipole attached above the main element. The 6-meter kit is also sold separately as an add-on for any Yagi or rotatable dipole.

From the one-element rotatable dipoles, we step up to SteppIR's new "Dream Beam 36." This antenna covers 40–10 meters (80–6 with optional add-ons) but is only 60% of the size of a full-size Yagi on 40 meters. The longest element (the driven element in this case) is 49 feet long and the boom is 36 feet long. Of course, it uses SteppIR's famous motorized tuning to change element length within the element tubes in order to maximize performance on a given band.

The M² KT-31D rotatable triband dipole is the newest addition to the company's line of antennas for 20, 15, and 10 meters. (Photo courtesy M²)

MFJ *Speech Intelligibility* Enhancer

. . . makes barely understandable speech highly understandable!

MFJ-616
$189.95

"What did you say?" Can you hear but . . . just can't always understand everything people are saying?

As we get older, high frequency hearing loss reduces our ability to understand speech. Here's why . . .

Research shows that nearly *half* the speech intelligibility is contained in 1000 to 4000 Hz range, but contains a miniscule 4% of total speech energy.

On the other hand, the low frequencies, 125 to 500 Hz have most of the speech energy (55%) but contribute very little to intelligibility -- only 4%.

To dramatically improve your ability to understand speech, you must:

First, drastically increase the speech energy above 500 Hz, where 83% of the speech intelligibility is concentrated.

Second, drastically reduce speech energy below 500 Hz where only 4% of speech intelligibility lies.

The MFJ-616 splits the audio speech band into four overlapping octave ranges centered at 300, 600, 1200 and 2400 Hz. You can boost or cut each range by nearly 20 dB.

A balance control and separate 2½ Watt amplifiers let you equalize perceived loudness to each ear so both ears help.

By boosting high and cutting low frequencies and adjusting the balanced control, speech that you can barely understand become highly understandable!

Even if you *don't* have high frequency hearing loss, you'll dramatically improve your ability to understand speech. You'll get an edge in contesting and DXing and enjoy ragchewing more.

Here's what *QST* for April, 2001 said . . . *"I expected a subtle effect at best, but I was astonished . . . The result was remarkably clean, understandable speech without hissing, ringing or other strange effects . . . made a dramatic improvement . . ."*

Immuned to RFI. Has phone jack, on/off speaker switch, 2 inputs, bypass switch. 10Wx2½Hx6D". Needs 12 VDC.

MFJ-1316, $21.95. For 110 VAC operation. Provides 12 VDC/1.5 Amps.

MFJ-72, $69.80. *All-in-one MFJ-616 Accessory Pack.* Includes MFJ-392 headphones, two MFJ-281 speakers and MFJ-1316 power supply. ***Save $7!***

Try it for 30 Days

Order from MFJ and try it -- No obligation. If not delighted, return it within 30 days for refund less shipping.

MFJ Contest Voice Keyer

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Records received audio . . .

MFJ-434B
$199.95

Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own natural voice!

Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" . . . Contest by pressing a few buttons and save your voice.

Record and playback 5 natural sounding messages in a total of 75 seconds. Uses *eeprom* -- no battery backup needed. Use your mic or its built-in mic for recording.

You can repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes a great voice beacon and calling CQ is *so* easy.

You can also record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by the *Stop Button*, your microphone's PTT/VOX, remote control or computer.

Has jack for remote or computer control (using CT, NA or other program). Lets you select, play and cancel messages.

Your mic's audio characteristics do not change when your MFJ-434B is installed.

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

New! **It's** easy to use -- just plug in your 8 pin round or modular mic plug, set the internal jumpers for your transceiver and plug in the appropriate (included) cable for your rig.

Built-in speaker-amplifier. Speaker/phone jack. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312D, $15.95. 6½Wx2½Hx6½D in.

MFJ-73, $34.95. MFJ-434B Remote Control with cable.

60 dB Null *wipes out* noise and interference

MFJ-1026
$199.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker! Interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network.* You can combine two antennas to give you various directional patterns. Null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312D, $15.95. 6½x1½x6¼ in.

MFJ-1025, $179.95. Like  MFJ-1026 less built-in active antenna, use external noise antenna.

MFJ *tunable* Super DSP filter

MFJ-784B
$279.95

Only MFJ gives you *tunable* and *programmable* "brick wall" DSP filters.

You can continuously *tune* low pass, high pass, notch and bandpass filters and continuously *vary* bandwidth to pinpoint and eliminate interference.

Only MFJ gives you 5 factory pre-set and 10 programmable pre-set filters you can customize. **Automatic** notch filter searches for and eliminates multiple heterodynes. Advanced adaptive noise reduction silences background noise and QRM.

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

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

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

http://www.mfjenterprises.com for instruction manuals, catalog, info

Stand up and salute! This flagpole is also a vertical antenna that can handle full legal power on 40–10 meters. It's made by ZeroFive Antennas and distributed by Array Solutions.

Two new accessories from Buddipole Antennas are a mini rotor control (left) and a mini 40-amp power supply (right) that uses an ultra capacitor to store power.

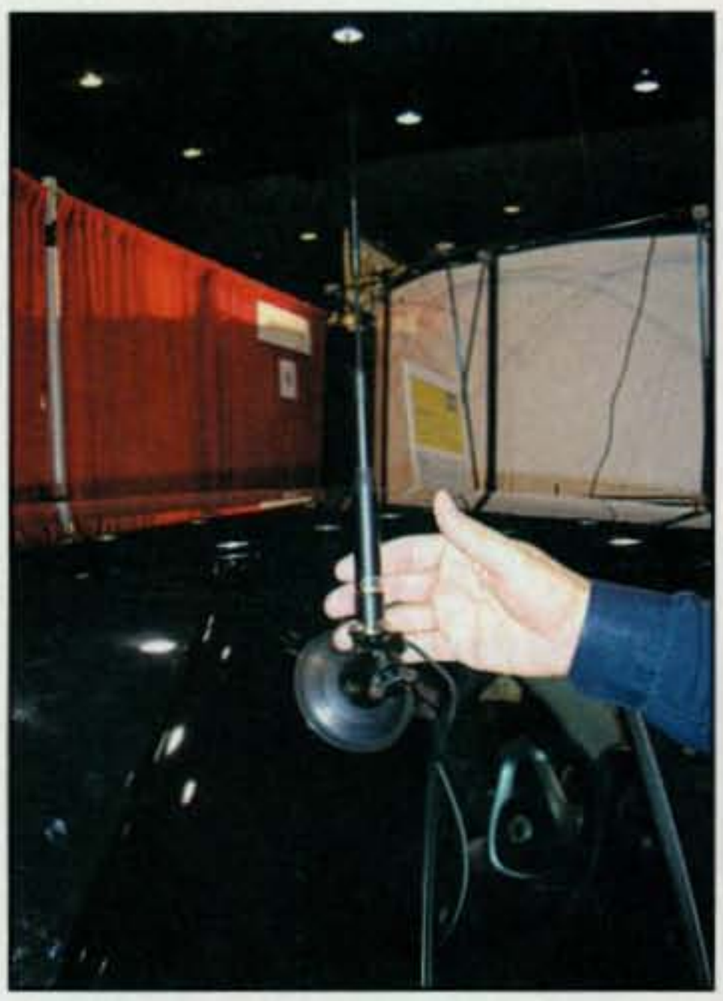
Finally, ZeroFive Antennas offers a new 24-foot flagpole antenna for those who need an antenna that doesn't look like an antenna. It covers 10–40 meters at full legal power, and the company says you can landscape around it without affecting performance. And yes, it comes with rope and a flag!

Moving on to antenna accessories, we start with Array Solutions' StackMatch Plus, the latest addition to the StackMatch line of control units for selecting, phasing, and sharing power between stacked antennas.

Next up are two new products from the Buddipole folks, who have helped make on-foot HFing popular. First is a mini rotor control for a rotatable dipole, and the second is an 8-foot shock-corded mast that folds up and can be packed away in the included carrying case.

If you're in your car rather than on foot, Comet has its new MRS4M articulating mag mount. It's a combination suction cup and magnetic mount and lets you mount an antenna in a variety of places and then twist the mount into the best position. Comet's distributor, NCG Company, also introduced the CN801 SWR and power meter from Daiwa. This meter covers 900–1300 MHz and is focused on meeting the needs of D-Star system users and repeater/gateway operators.

DX Engineering brought out its TFS4, a hybrid controller for four-square ar-



The Comet MRS4M is a combination mag-mount/suction-cup mount that lets you twist the antenna base in nearly any direction.

The new Daiwa cross-needle SWR/Power meter.

The RT-21 universal rotor controller from Green Heron Engineering comes in two models, the standard version (shown here) and the deluxe version, Model RT-21D, which includes satellite tracking and internet networking with optional software.

LDG's KT-100 antenna tuner is designed as a replacement for Kenwood's discontinued AT-300, which was a favorite among many fans of the Kenwood rigs with which it was designed to operate.

rays (there are versions for 40, 80, and 160 meters). The TFS4 will send power to any of the four antennas in the array, or split it among all of them for an omni-directional pattern. The same applies on receive as well, allowing you to listen in all directions and then focus the antenna's pattern on a station you want to contact.

Green Heron Engineering has introduced two new universal digital rotor controllers. The Standard RT-21D includes both USB and RS-232 ports, accuracy to one-tenth of one degree, and an improved computer interface. The Deluxe model has all of the features of the standard one, plus a vacuum fluorescent display, IP networking, and satellite tracking (each with optional software).

On the topic of rotors, Idiom Press has rolled out a Rotator Illuminator, a small device you can build to replace the always-burning-out-and-getting-harder-to-replace lightbulbs in your rotor controller with longer-lasting and more energy-efficient light-emitting diodes (LEDs).

About the time you read this, LDG should be bringing out its KT-100 tuner, which is billed as a replacement for Kenwood's discontinued AT-300 tuner for the TS-2000, TS-50, TS-480, and other Kenwood rigs. With an AT-300 compatible Kenwood radio, using the KT-100 is as easy as pushing the "tune" button on the radio. The unit includes 2000 memories for instantly recalling the parameters for your 2000 favorite frequencies.

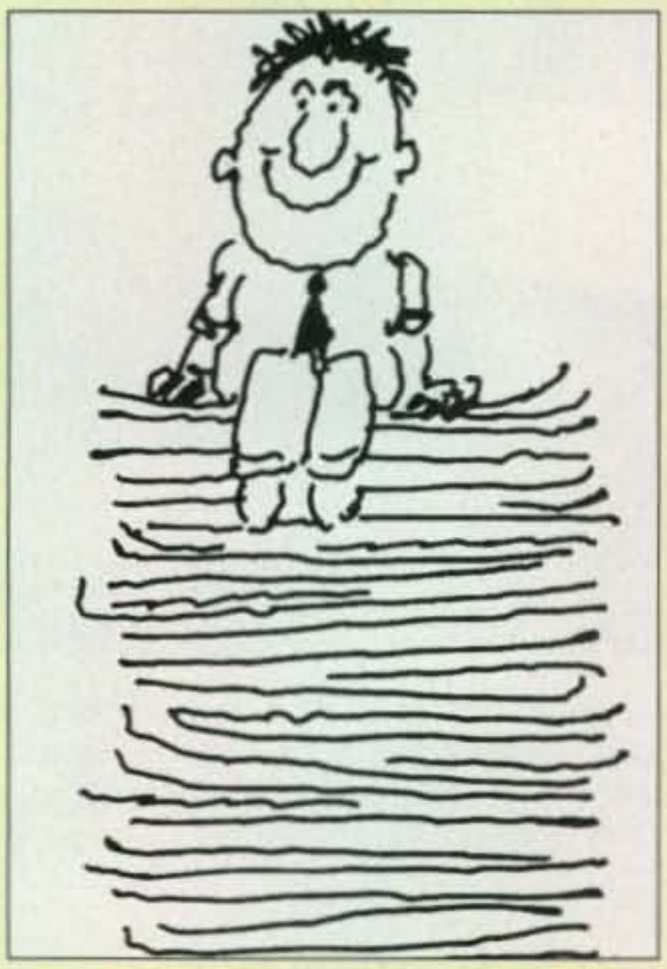
M² gets into the antenna accessory act as well, this year introducing the 2M-440-DPX dual-band duplexer for 2 meters and 70 centimeters. It has a variety of mounting options and may even be used outdoors.

Moving on ... we come to MFJ's new telescoping fiberglass masts. They come in two versions, one 33 feet high and the other 43 feet high. They are strong enough to hold three full-size antennas, yet they collapse to 7 and 9 feet, respectively. MFJ also offers a variety of aluminum masts, one of which is 65 feet high ... which just happens to be a quarter-wavelength on 80 meters.

And if you think 43 feet is long for a push-up antenna support, check out Super Bertha's "Ultimate Antenna Tower." It can be pushed up from a collapsed height of 10 feet to as high as 215 feet! The rotor is at the bottom and the whole tower turns. There is also the option to let the top section rotate independently, a feature that some contesters and DXers will find handy for listening in two directions at once.

Wrap-Up

That about wraps up our annual tour of Dayton's newest products. More information on most of these products is available from dealers or from the manufacturers' websites. The only ones missing will be those that were still in the prototype stage at Dayton and are not yet ready for general sale. Enjoy your toys!



What You've Told Us...

Our June survey asked several questions about the time you spend operating ham radio. Interestingly, 44% of those who replied said they currently get enough time to operate (although 74% said they'd like to have more operating time than they have now), while 38% said they don't get enough time, 15% said sometimes yes, sometimes no, and 2% circled "Is there such a thing?"

Asked how often they currently operate, 38% said at least once a week (but not every day); 22% said several times a day; 18% said once a day, 10% answered a few times a month (but not every week); 9% are on the air less than once a month, and 3% are not currently active. Given the same choices in an ideal world with no other demands on their time, 50% said they would like to operate several times a day, followed by 30% at once a day, 18% at least once a week, 1% more than 24 hours a day, 1% a few times a month, and zero—nobody—looks forward to operating less than once a month.

Finally, we asked what currently are the greatest obstacles to spending more time on the radio. Number one—no surprise here—was family obligations at 43%, followed by household obligations (39%), work/school obligations (28%), lack of sunspots (21%), other (15%), other hobbies (14%), antenna restrictions (11%), health/mobility restrictions (10%), religious obligations (8%), lack of motivation (8%), lack of equipment (5%), and operating prohibitions (1%). In addition, 18% of those responding said there are no major obstacles and they are happy with the on-air time they have.

This month's free subscription winner is Eric Brandariz, N2BRC, of Brooklyn, New York.

Reader Survey September 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 hear your views on where you think our hobby is headed.

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

1. Do you agree with the inclusion of amateur radio on AOL's list of "Top 25 Things Vanishing from America"?

Yes 29
No 30
Unsure 31

2. What is your perception of the current state of amateur radio in the United States?

Healthy and vibrant 32
Stable but static 33
On a downslope 34
Irretrievably sinking into oblivion 35

3. What is your perception of the current state of amateur radio technology?

Cutting edge 36
State of the art 37
Somewhat behind the leading edge 38
Far behind the leading edge 39
A mix of new and old 40

4. What is your perception of the current state of technical knowledge and skill among your fellow hams?

Excellent 41
Good 42
Mediocre 43
Poor 44
Mix of skill levels 45

5. What is your perception of your own technical knowledge and skills compared with your fellow hams?

I know more than most other hams I know 46
I know more than some other hams I know 47
I know about the same amount as most hams I know 48
I know less than most other hams I know 49
Everybody I know knows more than I do 50

6. What have you done in the past year to help keep ham radio viable and growing? (Circle all that apply)

Helped recruit one or more new hams 51
Helped train one or more new hams 52
Presented a program at a club meeting 53
Demonstrated ham radio for young people or the general public 54
Wrote an article for a magazine or newsletter 55
Invited others to my shack to visit/operate 56
Held a leadership position in a club or other ham organization 57
Improved my own knowledge and skills 58
Other 59
Nothing 60

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

Life is a JOURNEY. Enjoy the ride!

MINI COOPER SHOWN WITH CP-5M UNIVERSAL LIP MOUNT ON THE DOOR EDGE.

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

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

For Small Antennas & Limited Space

MODEL / ANT CONN / COAX CONN

Maldol EM-5M SO-239 / PL-259

Footprint: 1.1"x .75"

Max Antenna: 40"

For Medium Size Antennas

MODEL / ANT CONN / COAX CONN

COMET CP-5M SO-239 / PL-259

COMET CP-5NMO NMO / PL-259

Footprint: 3.4" x 1.25"

Max Antenna: 60"

For Tall or Multi-band HF Antennas

MODEL / ANT CONN / COAX CONN

COMET HD-5M SO-239 / PL-259

COMET HD- 5 3/8-24 3/8-24 / PL-259

Footprint: 3.75" x 1.1"

Max antenna: 80"

COMET BNC-24 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz
• Gain: 2.15/3.5dBi • Length: 17" • Conn: BNC Super flexible featherweight whip

COMET SMA-24 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz
• Gain: 2.15/3.5dBi • Length: 17" • Conn: SMA Super flexible featherweight whip

COMET SMA-503 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz
• Length: 8.75" • Conn: SMA

Maldol MH-209 *(BNC Conn)* **MH-209SMA** *(SMA Conn)* **2M/70CM DUAL-BAND HT ANTENNAS**
3" length, soft rubber cover. Good performance in a small package!

COMET NEW! CSB750A DUAL-BAND 2M/440MHZ W/FOLD-OVER
Gain & Wave: 146MHz 3.6dBi 1/2 wave, 446MHz 6.1dBi, 5/8 wave x 2 • VSWR: 1.5:1 or less • Length: 42"
• Conn: PL-259 • Max Pwr: 150W

COMET NEW! CSB770A DUAL-BAND 2M/440MHZ W/FOLD-OVER
Gain & Wave: 146MHz 4.4dBi 5/8 wave center load, 446MHz 6.9dBi 5/8 wave x 2 center load • VSWR: 1.5:1 or less • Length: 51" • Conn: PL-259 • Max Pwr: 150W

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

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

Maldol AX-75 DUAL-BAND 2M/440MHz W/FOLD-OVER
Gain & Wave: 2M 1/2 wave center load 3.2dBi • 70cm 5/8 wave x 2 5.7dBi • Length: 30" • Conn: PL-259 • Max Power: 60W

Maldol AX-95 DUAL-BAND 2M/440MHz W/FOLD-OVER
Gain & Wave: 2M 1/2 wave center load 3.3dBi • 70cm 5/8 wave x 2 5.8dBi • Length: 38" • Conn: PL-259 • Max Power: 60W

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

COMET SBB-2 / SBB-2NMO DUAL-BAND 2M/440MHz
Gain & Wave: 146MHz 2.15dBi 1/4 wave • 446MHz 3.8dBi 5/8 wave center load • VSWR: 1.5:1 or less • Length:29"
• Conn: SBB-2 PL-259 • SBB-2NMO NMO style • Max Pwr: 60W

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

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

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

COMET and Maldol Mobile

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

math's notes

BY IRWIN MATH,* WA2NDM

Are You Really Operating On Frequency?

These days with digital readouts on almost all amateur radio gear it is easy to know where you are in a particular band . . . or do you really know? Just because the digits tend to indicate that you are on a particular frequency, you might not actually be where you think you are. This, of course, is totally dependent on the accuracy of your readout. How can you check the accuracy? A simple answer is to build a low-cost calibration oscillator, the topic of this month's column.

In the "old days" before digital readouts, most amateur radio equipment came equipped with an internal crystal calibrator. This device produced RF harmonics at fixed intervals throughout the entire pass band of the receiver. These harmonics were usually spaced at intervals of 100 kHz or 1 MHz. To use this feature you turned on the calibrator, set the dial in the vicinity of your desired operating frequency, and then tuned to the nearest harmonic. You could then determine your exact operating frequency by extrapolating between two harmonics.

These circuits were first built with vacuum tubes, then transistors. A feature also was usually incorporated to allow exact calibration (zero beating) with one of the standard radio frequency signals broadcast by the U.S. government. Once digital displays came on the market, however, these accessories went by the wayside, and users assumed that the digital-dial reading was perfect. The accuracy of a digital display, however, is only as good as its internal reference crystal, so although the digits look nice, the question still remains as to how accurate they really are.

*c/o CQ magazine

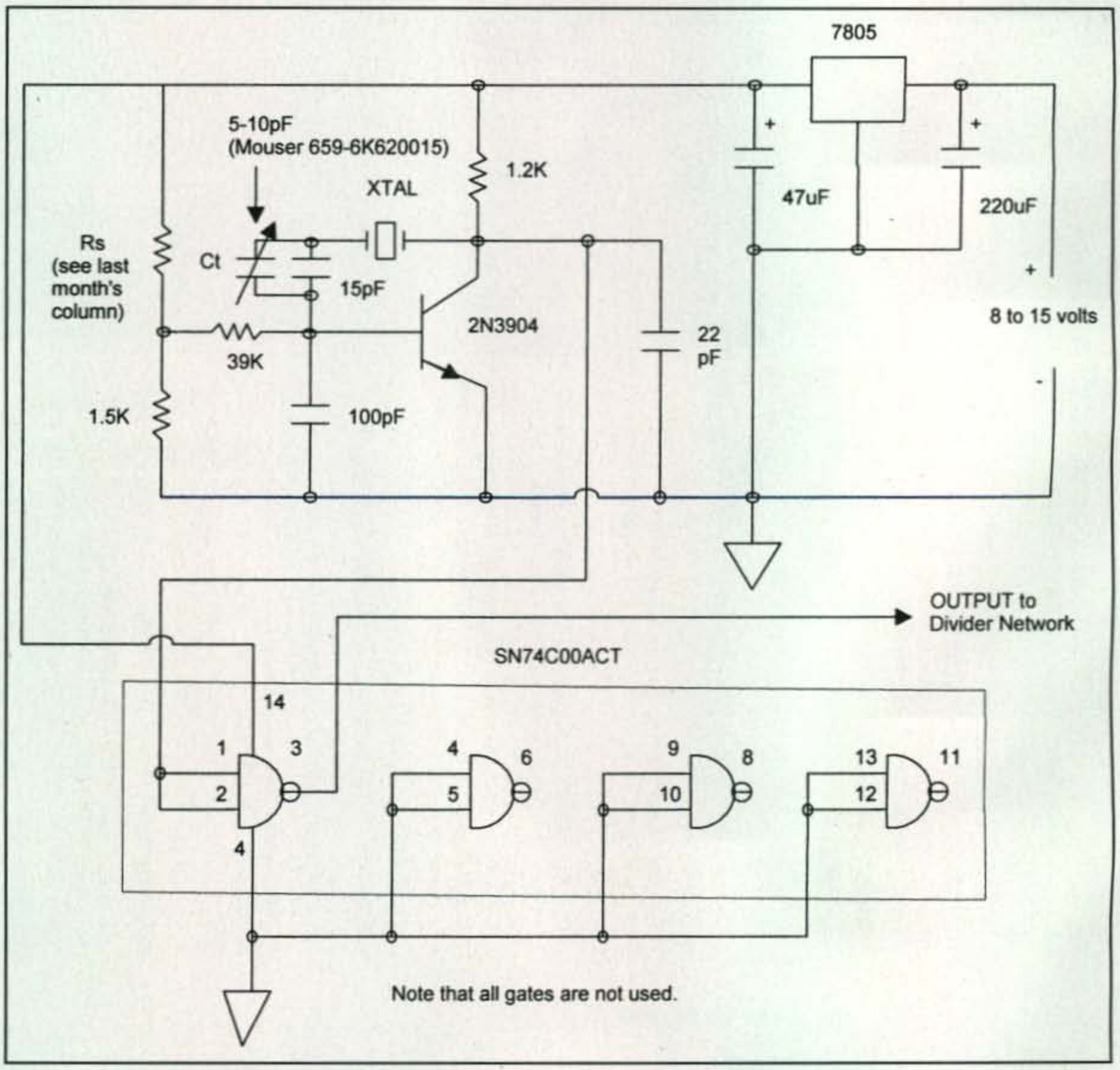


Fig. 1– Basic oscillator and driver schematic.

The calibrator to be described here uses a quartz crystal for stability and has the ability to allow it to be fine-tuned to one of the standard frequency stations just mentioned. Since these stations are extremely accurate, you can easily check on the degree of calibration of your receiver. To encourage you to experiment and actually build something, I have provided the schematic in four parts. Fig. 1 is the basic oscillator and power supply. Fig. 2 is a divider to obtain additional frequencies, as we will see. Fig. 3 is a flip-flop circuit that divides by a factor of four, and fig. 4 is a pulse-shaping circuit that will provide useful harmonics well into the VHF region (and possibly higher) if you need this. Let's start with fig. 1.

The basic circuit consists of a Pierce-type crystal-controlled transistor oscillator. A discrete transistor circuit was chosen, as it tends to be more stable than an all-IC version in terms of constant drive and load on the crystal. Since the oscillator is untuned, the crystal chosen can be at any frequency from 1 MHz to 10 MHz, and the trimmer capacitor (Ct) connected in series with the crystal is used to set it exactly on frequency. The output of the oscillator is then connected to one gate of a 74ACT00 quad logic CMOS gate array. The gate is used to buffer the oscillator in addition to providing a TTL level for additional circuits. The ACT version, by the way, was chosen for its high-speed capabilities, high input impedance, and high-output-drive capabilities. The basic circuit uses only one gate, so the others are disabled for the moment. You can build the circuit on a

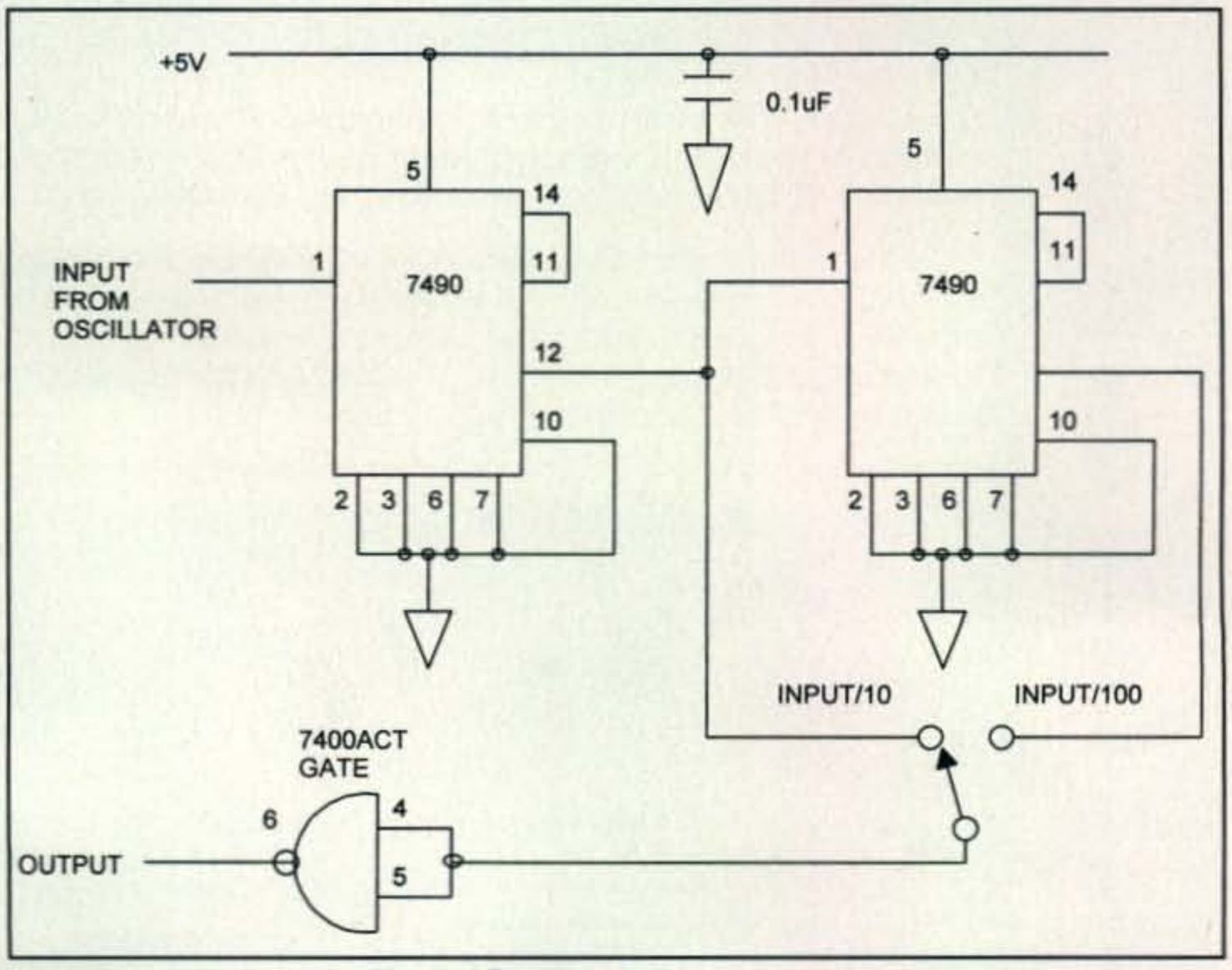


Fig. 2– Oscillator divider network.

piece of perf-board or scrap of PC material (using "ugly construction"), as layout is not too critical.

After building the circuit in fig. 1, apply power, and if you have a scope, look at pin 3 of the 74ACT00. Adjust the value of Rs for a roughly square-wave shape. Rs can go as low as 2.2K, but if you drop it too far, you must make sure that the oscillator will start every time power is removed and reapplied. When you have a reasonable square wave (remember it doesn't have to be perfect), solder a 1 to 2 foot length of wire to pin 3 to act as a temporary antenna.

Now depending on the crystal you have chosen, turn on your station receiver and tune it to WWV at 2.5, 5, or 10 MHz. You should hear the oscillator signal as well as WWV, and there will be a beat note as the two mix. Adjust the trimmer capacitor, Ct, until the beat note is zero. The values of Ct and the 15-pF capacitor were chosen to allow most common microprocessor crystals to be adjusted. If you cannot achieve a zero beat, vary the value of the 15-pF capacitor (from 10 pF to 20 pF) until you can. If you have chosen a 1-MHz crystal, you now will have harmonics every 1.0 MHz. If this is adequate for your needs, you can stop now. If you wish finer steps, or *cannot find* a 1-MHz crystal, proceed to fig. 2.

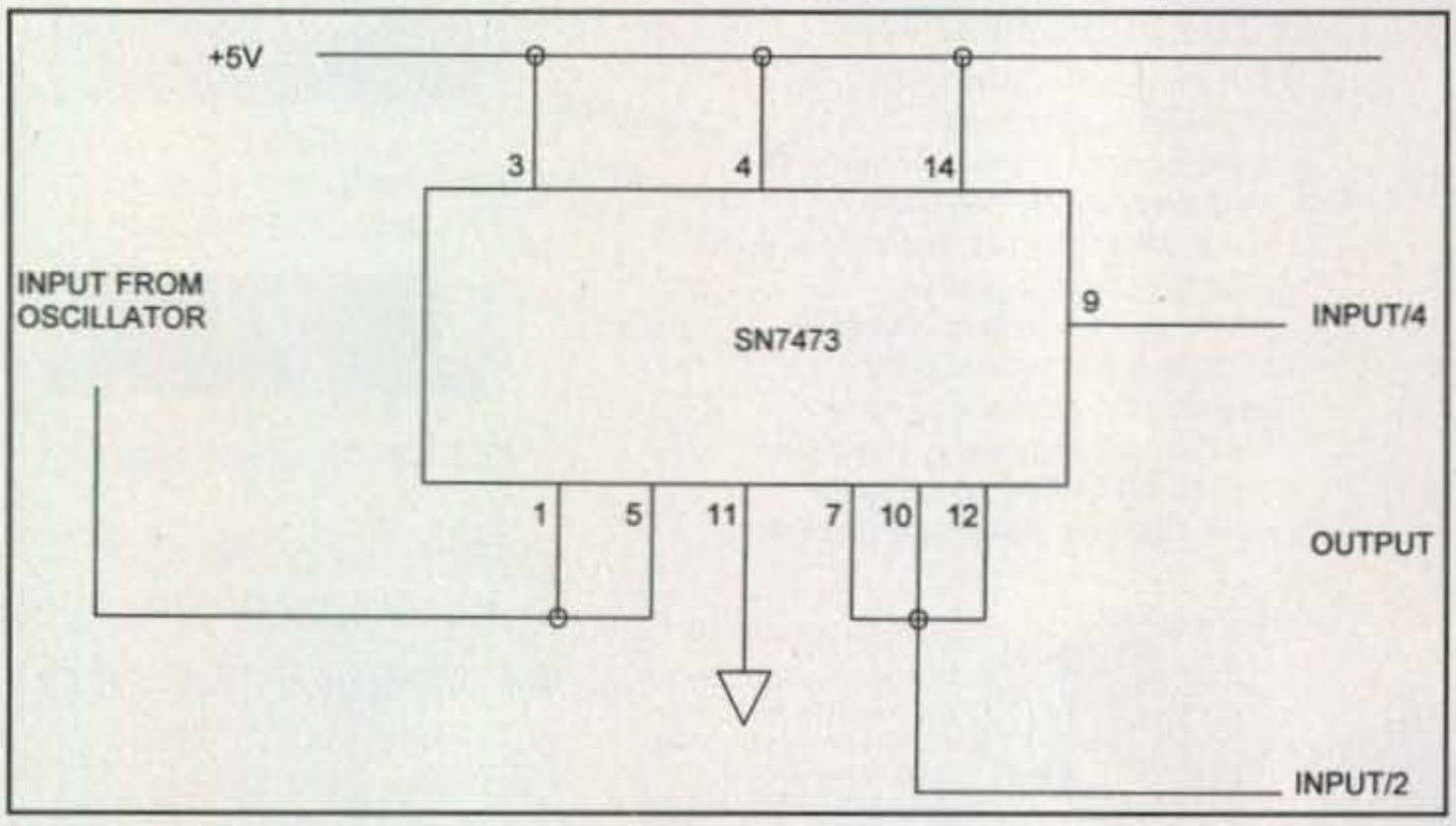


Fig. 3– The flip-flop circuit.

Fig. 2 shows the use of a couple of common 7490 decade counters to divide a 10-MHz crystal to first 1 MHz (as above) and then to 100 kHz. Since these are also TTL chips, they can be connected directly to the output of the 74ACT00. Note that we have used the second gate as an output driver. Now with the flip of a switch you can have markers at either 1-MHz or 100-kHz intervals. In use, you would first set the switch to the 1-MHz position and line up your dial to the appropriate frequency. Next you would switch to the 100-kHz position and calibrate even further. The purists may wish to add a third 7490 and obtain 10-kHz markers, but this is probably overkill.

By the way, if you only want 1-MHz markers but have to use a 10-MHz crys-

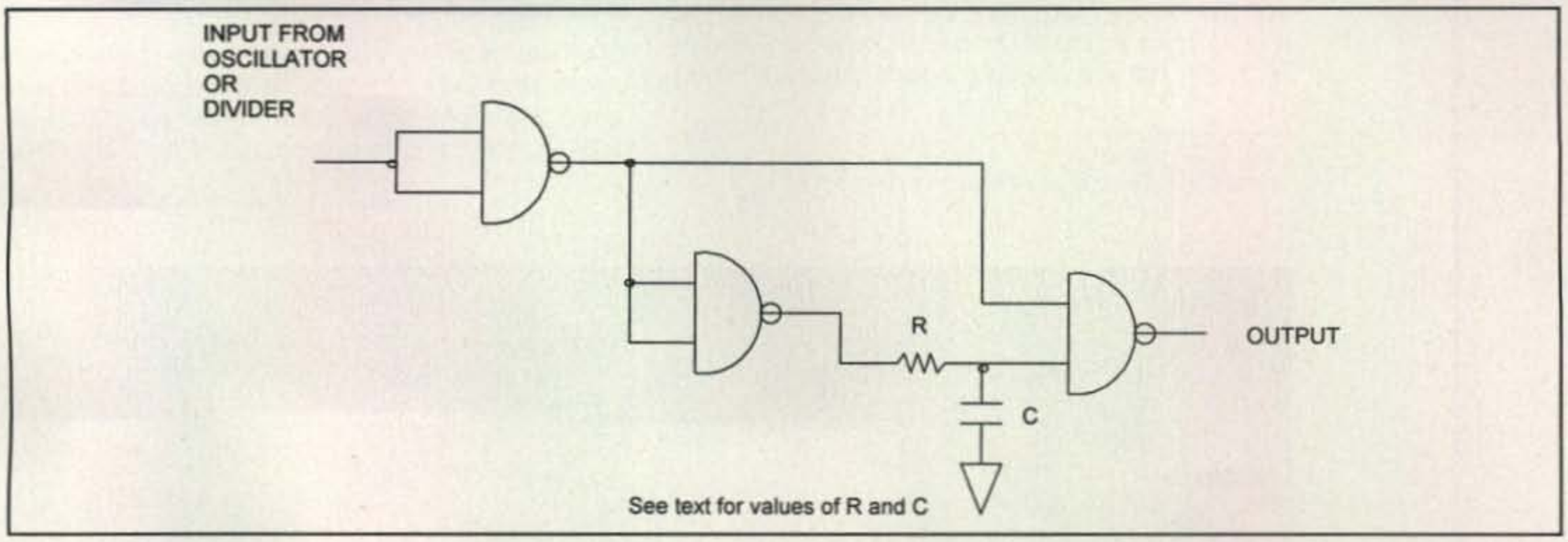


Fig. 4– The pulse-shaping network.

tal, simply leave off the second 7490. If for some reason you cannot obtain a 10-MHz crystal, you might consider using a 4-MHz unit (also quite common) and replace the first 7490 with a 7473 dual JK flip flop as shown in fig. 3. This will also give you a 1-MHz signal. However, whichever crystal you use, it is important that you zero beat it in accordance with the method described above (with one of the standard frequency stations) for best accuracy.

Once everything is working properly, you might find that the various harmonics are not as strong as you would like. Fig. 4 is a schematic of a pulse-shaping network that will strengthen the higher frequency harmonics. It consists of the remaining gates that were not used in fig. 1. If you build this portion, initially eliminate C and replace R with a short jumper. When you do that you will note that the circuit seems strange, since the second gate always receives opposite logic levels causing its output to never change. In reality, however, there is always a delay in the signal being received to one of the gates compared to the other due to the delay through the gate used as an inverter. This results in a narrow, fast rise-time pulse. The width of this pulse can be varied by adding R in the range of 0 to 1K and C in the range of 0 pF to 30 pF. The narrower the pulse, the stronger the harmonics.

When everything works to your satisfaction, you should mount the circuit in an aluminum minibox, and you then can use it as a stand-alone accessory or mount it in a corner of your receiver if there is room.

73, Irwin, WA2NDM

public service

BY BOB JOSUWEIT,* WA3PZO

Public Service at Global Opposites

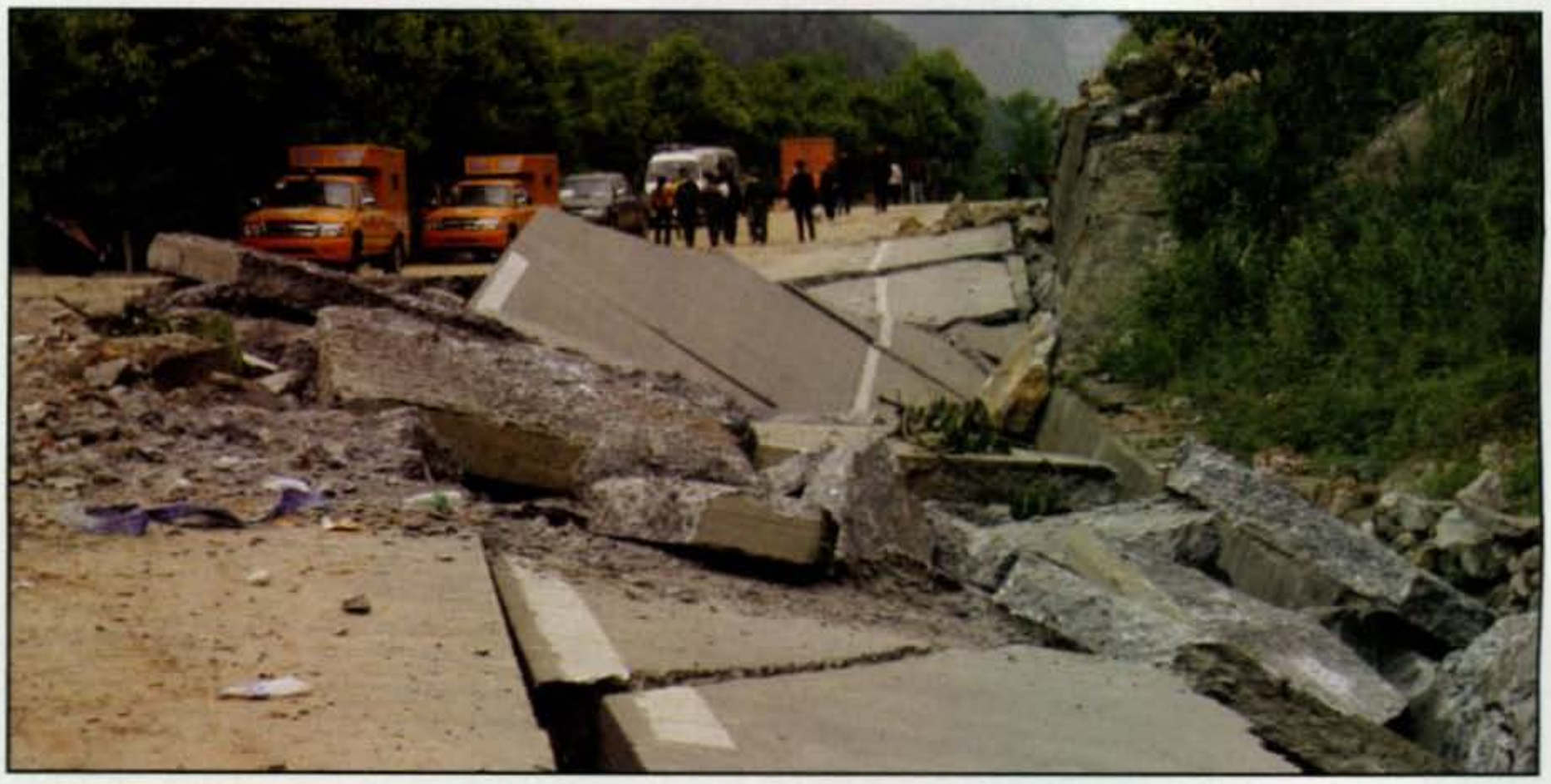
Last month we reported on the devastating earthquake that struck China in May. Over 69,196 people were killed, 374,000 injured, and 18,379 still missing two months after the earthquake struck Sichuan province. This month, we will follow up with more news from China and take a look at a rather unique form of public service that receivd praise from the news media and the public as well.

No Drill, No Exercise, No Plan

"Amateur Radio was a mere hobby here in China," said Michael Chen, BD5RV/4, from his home near Shanghai. "No drill, no exercise, no plan at all. We paid too little attention to the emergency service in the past." Yet the ham radio operators in China responded to the disaster and provided vital emergency communication links when all else failed.

Chen said, "The best thing was radio amateurs were responsible and willing to help. Amateurs in Chengdu organized themselves immediately after the quake. They went to many counties in Sichuan around the epicenter to support local governments in communications in the first week after the quake. Some critical information was transferred through the amateur radio." International Amateur Radio Union (IARU) Region 3 Chinese Radio Sports Association (CRSA) disaster communication liaison Fan Bin, BA1RB, said the main organizer of local amateur radio traffic was Luo Minglin, BY8AA. "He continuously coordinated VHF/UHF

Chengdu is about 100 km from the quake's epicenter and was affected. Its main repeater survived and more repeaters were put up to provide 100- to 200-km communication. (Photo courtesy of CRSA)



Chinese amateur radio operators and rescue personnel had trouble reaching the earthquake area since many roads, including this one to Beichuan, were impassible. (Unless otherwise noted, China photos courtesy of BG8AAS and BA4RS)

*c/o CQ magazine
e-mail: <wa3pzo@cq-amateur-radio.com>

An amateur radio emergency communications command center was established in Chengdu. (Photo courtesy of CRSA)

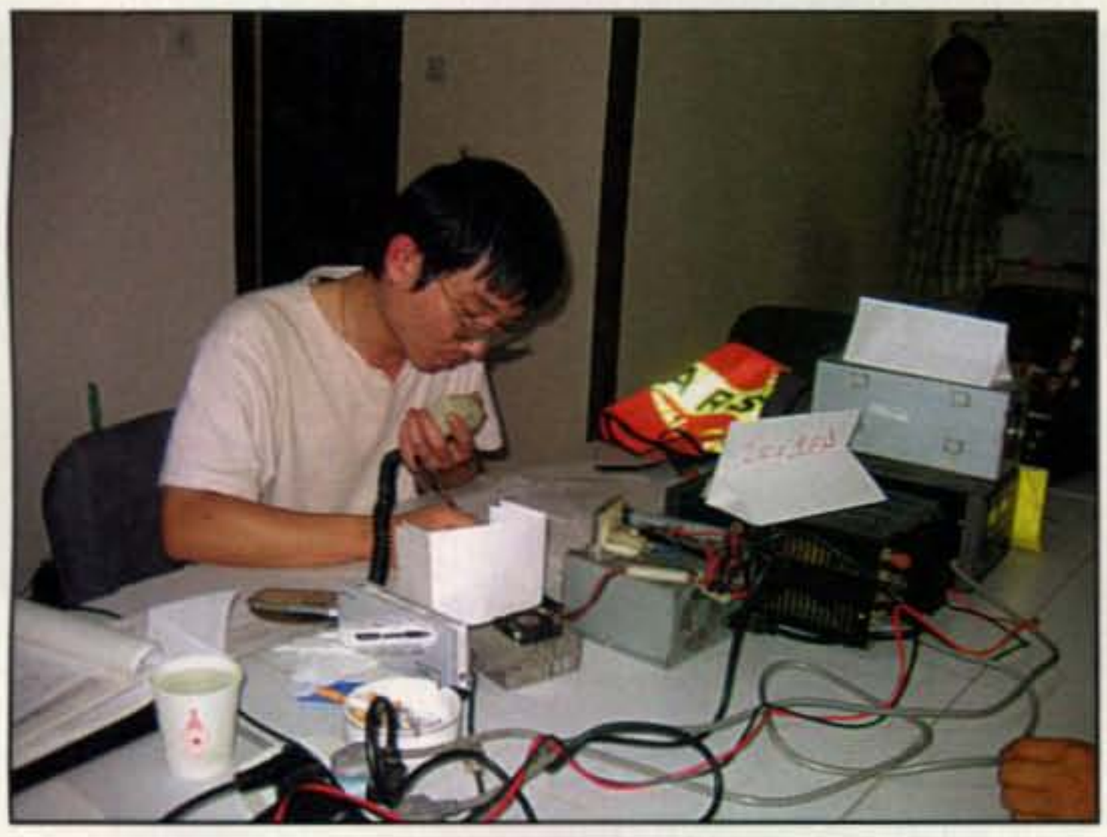
communications for a 100 km radius from Chengdu, the capital of southwest China's province of Sichuan. More repeaters were set up in both Beichuan and Mianyang—among the worst hit areas outside the epicenter—to form an effective amateur radio communication network."

Skills Helped. Chen continued by saying that local amateur radio clubs worked with automobile clubs to transport food, water, and injured. He said, "Thousands of vehicles were dispatched and countless materials were transported." The epicenter of the earthquake is a mountainous area. The skills of the radio amateurs helped a lot. Chen said that VHF/UHF HTs and some military radios (mostly in the 6-meter to 10-meter range) became useless in those mountains. Radio amateurs carrying portable HF stations helped a lot in these situations. He said two key skills that were useful were the hams' knowledge of portable operation and radio propagation. "Guys in Sichuan had to set up stations based on wherever they were and choose the right band for communication. It turned out that lower frequencies were more efficient for communication across a range from 10 to 100 kilometers. The CRSA, the national amateur radio society in China, reported that immediately following the earthquake, the long-distance telephone lines were either cut or congested and this is where amateur radio HF links, including one in the provincial city of Chengdu, were able to provide a communication link to Beijing for the Red Cross. VHF and UHF repeaters were in heavy use, both those which survived the quake and others pressed into service to provide much-needed local communications, including front-line rescue and recovery activity.

He said, "Radio amateurs could have been more helpful, but the lack of previous training and co-operation with government and other resources limited the functioning of amateur radio service. Amateur radio did quite well in the first week after the quake." CRSA reported that amateur radio emergency communications support continued for up to one month in some areas. Then, commercial communication services gradually recovered in most areas and amateur radio operators finished their jobs.

Amateurs Get Publicity. "The efforts of radio amateurs in Sichuan attracted quite a lot of publicity," said Chen. "They were reported by many local TV and radio stations. Stories could be seen in many newspapers across China, including some in Hong Kong. CCTV (China Central Television) had a report on amateur radio in its special news about the Sichuan earthquake. Above all, people became aware of amateur radio and the role it can play in an emergency. At the same time, we radio amateurs learned the shortcomings we had from this event and will try to fix them in the near future."

Moving Forward. Chen said, "We became aware of the importance of



Critical communication to and from the disaster area was passed by operators at BY8AA.

Radio amateurs from the Mianyang Amateur Radio Club (MARC) set up a communication center at a local square.

Amateurs operating at BY4RSA served as the net control operators for the HF ARES network. The network was activated immediately after the earthquake. (Photo courtesy of Win Wang, BA4RS)

Amateurs kept BY4RSA activated 24 hours a day immediately following the disaster. (Photo courtesy of BA4RS)

ARES after the quake. We used to talk a lot but do little. Now the situation is changing." He is working with other radio amateurs to establish a provincial amateur radio emergency service network in Jiangsu. Jiangsu is one of the most active provinces on the air. He says that if they are successful, their organization and operational plans will be introduced nationwide. There are also similar efforts in Beijing. Chen, who serves as the liaison officer for the International Radio Emergency Support Coalition (IRESC), is gathering information on amateur radio emergency service programs in South Africa, Taiwan, Hong Kong, the United States and other countries.

The CRSA has been asked to help set up school club stations in the Sichuan area, promote amateur radio, and train more people in amateur radio communication skills. It is going to encourage participating in the Simulated Emergency Test sponsored by the International Amateur Radio Union (IARU), field-day-type operations, and promote simple antenna and equipment setup skills. Finally, the CRSA will be working on establishing disaster communication procedures and organizations. It is going to study domestic and international experiences and documents, and will work with the Chinese Red Cross Foundation and other government organizations active in disaster relief.

Philadelphia Area Hams Provide Unique Public Service

Shoppers at a local department store outside Philadelphia, Pennsylvania, were upset recently that their remote car-door entry devices were not working properly in the store's parking lot. They complained that they locked their cars with their remote controls, went in shopping, and came out only to find that items were missing from their cars. It turned out that the remote controls were not locking the cars and the shoppers wanted to know why! They complained to Philadelphia's NBC television station, WCAU.

Investigative reporter Lu Ann Cahn said, "(t)he mystery problem repeatedly occurred outside the Kohl's department store in Royersford. When I went into Kohl's, they told me they had no idea." She said shoppers had told her that this has been going on for more than a year, and that some shoppers don't realize they might have to manually lock their doors. "One woman reported her laptop was stolen from her car after she thought she had locked it," Cahn reported.

Some shoppers thought that it was the local power plant causing the interference. Others thought that cellular telephone towers might be the culprit, but there are no cell towers in the area. Cahn said that even the police couldn't figure out the problem. Finally, an American Automobile Association (AAA) mechanic suggested that Cahn contact a ham radio guy.

Contact! Cahn contacted the ARRL, which put her in touch with Reginald Leister, N3KAS, a member of the Pottstown Area Amateur Radio Club (PAARC), and an ARRL Public Information Officer. Leister explained that the problem could not be caused by the local nuclear power plant or cell towers since "keyless car-entry systems only work on three certain frequencies here in the U.S."

Leister was anxious to help out, but he was also cautious. He knew that investigative reporters can be hard hitting and he didn't want amateur radio to be portrayed in a bad light. As it turned out, the hams were able to help identify the problem, and they were portrayed in a very positive light.

Leister and Bob Rex, K3DBD, Vice President and Senior Technical Advisor for PAARC, met Cahn in the department store's parking lot. Both Rex and Leister are active in fox-hunting activities. Leister explained that they knew what the car remote frequency was (315 MHz). Rex had fabricated and optimized a 3-element Yagi scaled from a 2-meter design that they used in transmitter-hunting activities that their club conducts year round. Rex also set up a Hewlett-Packard spectrum analyzer in the back seat of his car. The analyzer was powered by the car battery through an inverter. The antenna was assembled from a 1/2-inch wooden dowel and aluminum tubing held together with some plastic conduit clamps and wire ties. Rex also had a frequency counter.

Leister said they did other prep work about the situation by contacting the company that manufactures Kohl's anti-shoplifting detection equipment to verify some engineering details. They also researched reports of other Kohl's door-lock jamming incidents. They found several nationwide, including incidents in St. Petersburg (Florida), Boston, Arizona, and a few in Pennsylvania and New Jersey.

When shoppers at a Kohl's department store were unable to use their remote car-entry systems, they contacted TV reporter Lu Ann Cahn (center), who ended up calling local ham radio operators Reg Leister, N3KAS (left), and Bob Rex, K3DBD (right). (Photo courtesy of N3KAS)

According to the Kohl's website the company has stores in over 40 states. Finally, they learned as much as they could about Kohl's and its corporate culture so they would know the best approach to offer "our 'public service' to their problem."

When everything was set up, Leister aimed the antenna in the direction of the Kohl's store and immediately found where the signal was coming from. Rex said, "There are actually two signals there. It looks like they're coming from the building." As Leister and Rex moved closer to the front of the building, they determined that one signal was coming from one entrance to the store and the other signal was coming from another entrance at the other end of the building. When Cahn approached Kohl's management with their findings, she was told that "they will look into it."

Once the outside filming was done by the news crew, they went into the store

Every Ham is a PIO

CQ asked Leister how he prepared for press relations. He responded:

As a Public Information Officer (PIO) I always have a press kit handy, but this required some specialized upgrades specific to the situation. So I excerpted some Part 15 details from the ARRL website without citing too much technical information.

The Press Kit explains what RACES and ARES are. It has a slot for my business card and on the right side, a backgrounder about amateur radio and any event-specific info or information on the club. I adapt to the situation. It might contain some articles about ham radio. In general, I keep generic info handy to "stuff" these folders which are very durable. Inside the folder there is a slot for a CD, so if I have a public service announcement or something similar, such as a PowerPoint® presentation, I can insert it there. It costs a few bucks to prepare these, but it is well worth the investment to have an organized means of controlling and preparing your story. It just looks "professional" to hand a media person this information and let them fill in their facts from a resource that I have prepared. It also saves them time trying to figure out all the details. They will remember your courtesy of respecting their time.

The timing could not have been better—Amateur Radio Week leading up to Field Day! Always be prepared when dealing with the press! Leister said the station was so impressed with us that their staff "is already looking for another project to work on with us."

The ARRL Public Information web page has a variety of tools that will help you be a successful Public Information Officer. They include a "Talk on a Disk," which is a presentation you can deliver at a meeting when you are asked to speak about ham radio. The Swiss Army Knife CD contains information on writing press releases, working with the news media, and other valuable information. For more information go to <http://www.arrl.org/pio>.

Bob Rex, K3DBD, built an antenna for finding signals at the remote key operating frequency of 315 MHz. In the course of normal "fox hunting" activities, you just track down a signal on an amateur radio band, such as 2 meters. In this case, hams had to identify the exact frequency and then build the antenna to match it. (Photo courtesy of Jim Toth, K3CHJ)

to meet with the store manager. Cahn explained that a Kohl's representative never called her back. She explained that the problem was still evident. According to Leister, the store manager was eying "Bob and me and Bob's antenna and the ARRL insignia and my name on my logo shirt." He said Cahn pleaded the case with no cameras or microphones turned on. She told the manager that these dedicated amateur radio operators had taken time out of their daily schedules to come "free of charge" and identify the source of this problem "which we know exists in your store." She told the manager that "you can no longer deny it. They have satisfied us beyond any doubt that it is originating from each of your doors. When it comes to tracking radio signals they are tops in their field."

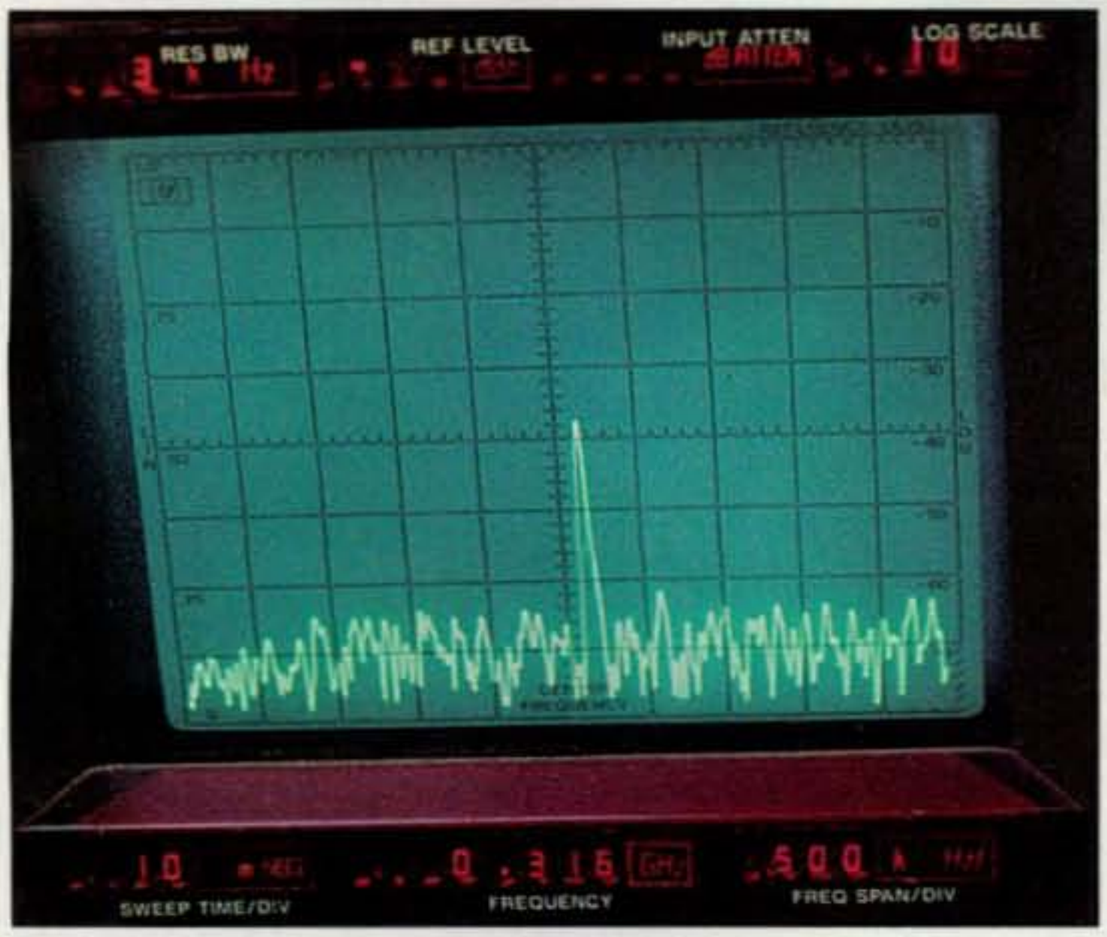
Leister said the manager continued to deny any knowledge or responsibility and that Rex then explained how this is a federal regulatory matter and that some serious fines could result. They were not there as part of an enforcement action, he noted, but to prevent one as a public service. She still would not budge, saying that their national management handles all issues of this type. Cahn said that their story would run with or without Kohl's input. "We all gave the Kohl's manager our business cards and left, pausing (for theatrical effect) at the anti-shoplifting scanners at the door," said Leister. There were several shoppers inside and outside the store who wanted "to talk" to them as they left. (*CQ* contacted Kohl's for comment and an update, but had not received a response as of this issue's deadline.)

"The FCC licenses radio signals and these ham radio operators say the fact that some signal is interfering with remote locks isn't good," Cahn said in her report. Rex concurred, saying, "The FCC rules are pretty clear on that. It might be something that's broken." Leister and Rex agreed that the store security sensors located at each set of doors might be the culprit.

Three days after Leister and Rex located the source of the interference, remote car-door lockers worked again. "Kohl's will only say that they're working on it," Cahn said. Leister later told *CQ* that he and Rex did not think the anti-shoplifting detectors at the store entrances were the problem in and of themselves. "What we are guessing here is that they are probably connected to some kind of device that triggers a security camera to come on if there is a breach, except instead of just sending out a quick 2–5 second blip, these seem to be on continuously and exceeding the permissible signal levels under Part 15 of the FCC rules."

Praise from the Reporter. Despite Leister's initial reluctance to get involved with a TV investigative reporter, he said that Cahn said the story had turned into one about ham radio. According to Leister, she had already gotten the "corporate 2 step" treatment from the local Kohl's store and its national offices. To her, he said, the real story was that the ham radio operators were actually able to identify the source of the signal and they had a complete resource of information about the problem. In addition, the hams could authoritatively

Bob Rex, K3DBD, adjusts a spectrum analyzer while Reg Leister, N3KAS, points the antenna towards the front of the store. They were able to detect two separate signals, one near each of the front doors. (Photo courtesy of K3CHJ)



A signal coming from the left door of Kohl's was easily identifiable on the spectrum analyzer. (Photo courtesy of N3KAS)

address all the issues involved. "We really were the whole package in a sense," said Leister.

Cahn also gave credit on the air to the local hams who helped solve the mystery. She said, "I have to give kudos to Reggie Leister and Bob Rex with the Pottstown Area Amateur Radio Club. They were so great and so excited. You don't know how many people we called—police, Triple A, car dealerships—we called so many people trying to figure this out and nobody knew anything until we talked to these ham radio operators. They were so wonderful and they knew all about radio signals. They created their own gadgets to help us figure this out. We really want to thank them for their help with this."

Accolades! Aside from all the local and national accolades from the amateur radio community, Leister said it was very gratifying to have performed this different kind of public service for our community. "It was obvious from the news accounts and those of the people we spoke with in the parking lot (and on-line afterwards) that this interference to their keyless entry systems was very frustrating for them—and worse yet, expensive to the contents that were being stolen from the cars that were not being properly secured." The other side of the coin was the immense pride resulting from the fact that they came to the amateur radio service to solve this mystery."

Recap

For the past two months we have reported on how China's amateur radio operators responded to the massive earthquake there. It is one of the few times that members of the press have been allowed to cover a major disaster in China. This month we couldn't have brought you this story without the help of Michael Chen, BD5RV/4, and the CRSA. Chen has asked for our assistance in providing information on emergency communications in the United States. We will help where we can.

Finally. I would like to thank Reginald Leister, N3KAS, for providing information on the Kohl's parking lot "activation" and this unique form of public service. Until next time . . .

73, Bob, WA3PZO

world of ideas

BY DAVE INGRAM,* K4TWJ

Giving HF A Go – Part II

Last month in this column we looked at some of the unique attractions of HF operation and discussed setting up an affordable and delightful to use HF station. We explained that the three main requirements for successful HFing are a smooth-functioning indoor setup, the best outdoor antenna system you can install according to your particular location and budget, and a liberal amount of good operating savvy. This time, we continue with a collection of tried-and-proven operating tips and notes to hopefully ensure top HFing results right from the start. These suggestions may or may not prove the ideal answer to everyone's needs or questions, but reading and thinking about them will surely spin off some ideas you can use to your benefit. Also, numerous amateurs have proven even shortcomings in gear and antennas can be offset with good operating techniques. Bearing that thought in mind, let's begin with some helpful operating notes.

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

A Good Start

After setting up your HF station, devote a couple of days to just listening and becoming familiar with the general aspects of various bands. A band-plan chart is available in CQ's "HF Operator's Survival Guide" booklet (available from CQ for $2.00 plus $2.00 shipping) or on the web at: <http://www.icomamerica.com/en/downloads/Default.aspx?Category=181>.

You probably will find 80/75 meters favors local-area QSOs and net activities, for example. Twenty meters is always popular for nationwide and worldwide contacts. Forty meters is a mix of everything imaginable—that is, you will hear casual and ultra-pro operators running everything from QRP (5 watts or less) to full kilowatts sandwiched in between international shortwave broadcast stations. The upper bands are somewhat quiet at the present

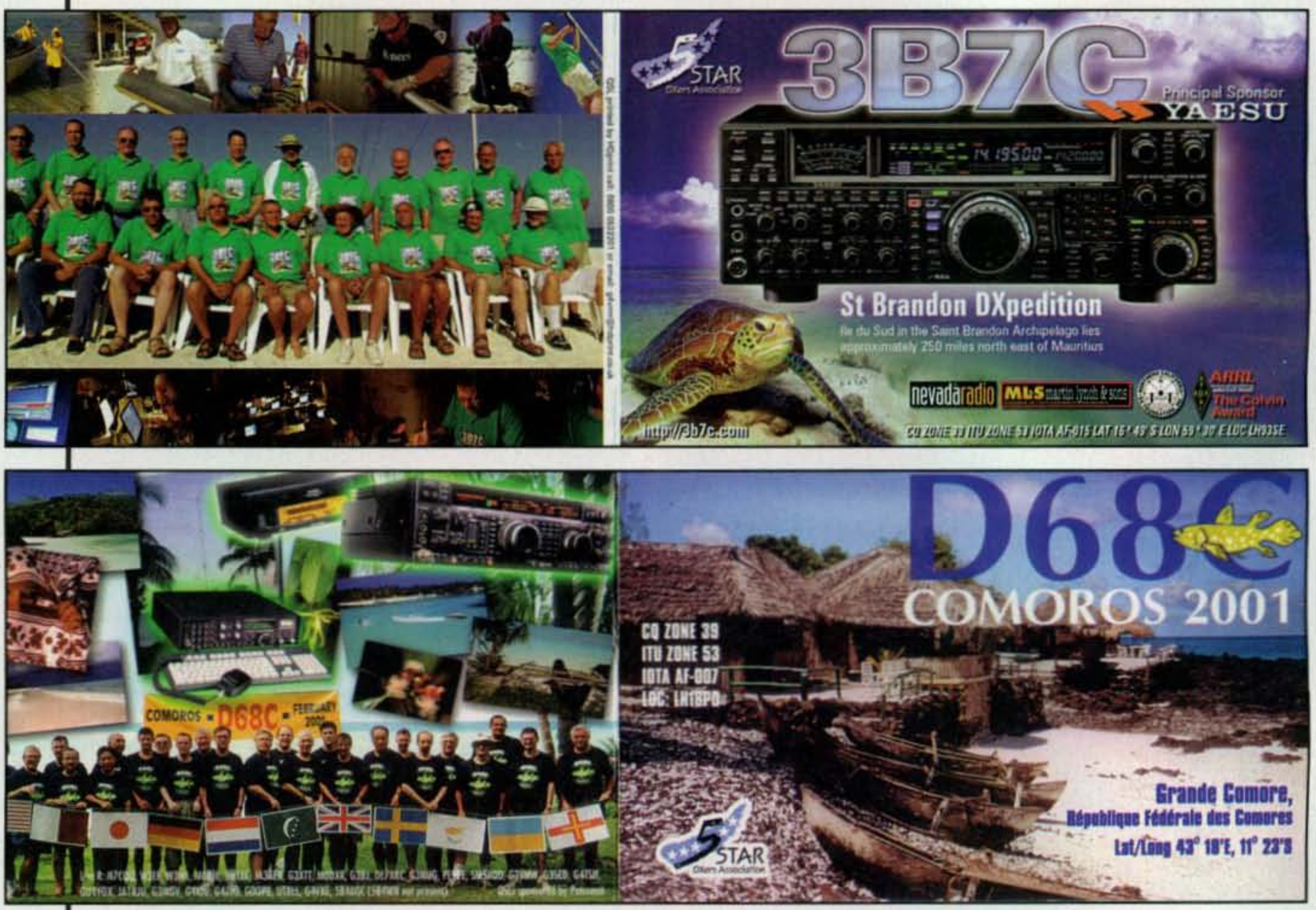


Photo 1– Increasing postal rates continue to threaten our proud tradition of exchanging QSL cards, but they will always stand as tangible memories of special contacts. QSLs shown here are from two of the top DXpeditions of recent times. Both (5 Star DX Association) groups also made a dedicated effort to contact amateurs running 100 watts with basic antennas and slow-speed CW.

time, but watch for 17, 15, 12, and 10 meters to literally explode with DX excitement as the sunspot counts increase during the coming months and years. Even today, 17 and 15 meters often support global communications with basic 100-watt gear, and during brief 10- or 12-meter openings even simple mobile setups can reach out worldwide.

A number of amateurs tell us that although they talk with friends daily on 2 meters, they feel hesitant about talking on HF ("The whole world is listening to me!"). Relax. We all have been in your shoes. We know how it feels and we are pulling for you. Some of us even relive our own first days on the air by listening to your transmissions. Do you feel awkward calling CQ? Just answer others' CQs. Remember that there are no squelch tails on HF and brief fades are common, so indicate the end of your transmissions with an exchange of call letters or say "go ahead" so the other station can recognize when you switch from transmit to receive. Do not become discouraged if you do not receive a reply to every call, but do start checking if you do not receive a reply to *any* calls. Ensure your output power is normal, SWR is low, RIT is off, and you are transmitting and receiving on the same frequency. Maintain a positive attitude, and you soon will be HFing in high style. Now let's assume you have some HF experience to your credit and discuss the fine art of DXing.

Reaching Out

When chasing DX, the main factors to watch are ensuring you call on the exact frequency and at the exact time the DX station is receiving and listening for calls. That sounds easy, but it is surprising how many amateurs (new and experienced) start slowly and end up calling right as the DX station begins another transmission—or call slightly off-frequency so the DX station hears bass rumble or treble squeaks that sound like QRM. Then you have alerted other near-frequency stations to the existence of DX and an ever-increasing pile-up capable of drowning out your 100-watt signal can ensue. That's why I say make your first call (or two, or maybe three) your best so you don't become unnoticed background noise in a pile-up. If the pile-up is already in full swing when you tune on frequency, you will be the fresh new signal in the mob, so again I say go for accuracy. Your first calls stand the best chance of being noticed. If you can't get through, be aware that as you continue calling in

vain, other possibly easier to contact DX may be calling CQ after CQ unnoticed 10, 20, or 30 kHz up the band or on another band.

While checking out a new Carolina Windom wire antenna from The Radio Works a few years ago, for example, I became lulled into a 20-meter SSB pile-up centered on an HR2 in Honduras. That should be easy to work from Alabama, right? No. Call after call, the "big guns" got through right over me. I stored the station's frequency in memory, quickly switched to check 15 meters CW, and lo and behold there was a BY in China calling CQ with no takers. He answered me on my first call. Twenty seconds later I was walking two feet above the floor and grinning from ear to ear. DXing is a blast regardless of your rig, antenna, or mode!

If a DX station you wish to contact is calling CQ with few answers, check to determine if he (she) is listening on-frequency or "working split" (listening up 2, 3, or 5 kHz) and then call quickly and briefly before a pile-up develops. If you experience exceptional difficulty working DX, incidentally, relax and study the scenario. If the DX operator is sharp and band conditions are good, he probably will be working stations rapid-fire style. In that case, he may hear you but reply to others because your calling procedure is too long. Shorten your transmit time. Note the stations making and missing contacts and analyze their strategy. Listen for that magic moment when the DX station is receiving and others are confused (deafened?) and not calling. Strive for precision here, and then insert your call *only once* in the opening. This technique works very well, but only once or twice, as others usually follow your lead.

If the DX station is slow to reply to callers and allows the pile-up to become unruly (many seem to call over and over without a reply), band conditions may be poor, the operator may be inexperienced, or both. (Being a DX station does not instantly make one a good operator!) Again, this is the time to check activity on other frequencies/ bands. One good suggestion (well, maybe two or three) warrants mention here. If you use a multiband antenna with the capability of setting each band's adjustment for the lowest possible SWR, you can jump between favored bands with only a single button

Now Read This!

Need a little help learning Morse code for copying off-the-air CW? Would you like the ability to send CW from your own keyboard-type messages? This MFJ-464 Morse Reader/Keyer does both. Just connect it to the speaker and key sockets of your transceiver, plug a computer keyboard into it, tune to the CW portion of a band, and read code as it is displayed on the MFJ-464. It is not a substitute for knowing code, but it is a good "crutch" when coming up to speed.

An MFJ-464 Morse code reader/keyer is usually set atop a station transceiver so you can watch its "code lock" LED and Morse readout while tuning in signals. A keyboard for transmitting your own CW messages plugs into the socket on the rear of the MFJ-464. If preferred, you can also use a paddle for transmitting CW messages in real time or for loading memories for instant pushbutton replay.

If you need a helpful aid for learning the Morse code and operating CW, check out the MFJ-464 Morse code keyer/reader (photos 2 and 3). Connect this gem to the external speaker socket on your transceiver, tune in a station sending good CW (we call it a good "fist"), turn up the receiver's volume until the reader's "Lock" LED blinks in sequence with the CW, and the unit's display will read out the messages/code. Connect another cable from the MFJ-464 keyer/reader to the input key socket of your transceiver, add a spare computer keyboard (not a computer; just a keyboard), and you can hand-type your CW messages/transmissions, such as RST, QTH, name, etc. The general concept is similar to operating a data mode such as RTTY or packet, except you can reach out better and work more DX on CW.

Not all CW operators send letter-perfect code (in which case the reader's "lock" LED will not blink properly and the display will produce a string of incoherent letters), but that's okay, because the reader is only an aid, not an ultimate alternative solution. Factually speaking, no Morse reading/copying unit or system can equal the human brain in deciphering dots and dashes—in copying weak signals, poor "fists," etc. That is a skill acquired only through use and practice. Ah, but a reader/keyer can also help you learn/practice (off the air, naturally). Just type in exactly what you wish to hear in a typical QSO: "UR RST 579 579 QTH NY NY AND NAME IS RALPH RALPH" (substitute your data as desired), then view each letter on the display as it is produced. Your "read along" skills will swing into action after 20 or 30 runs and then you can up the speed and repeat the practice. Within a few days, you will be recognizing your own call letters plus the letters for RST and QTH at a fairly high speed. Then for quick DX or contest QSOs you simply focus on hearing your own call letters and "filling in the blanks" for RST, etc. It is akin to learning code the easy way!

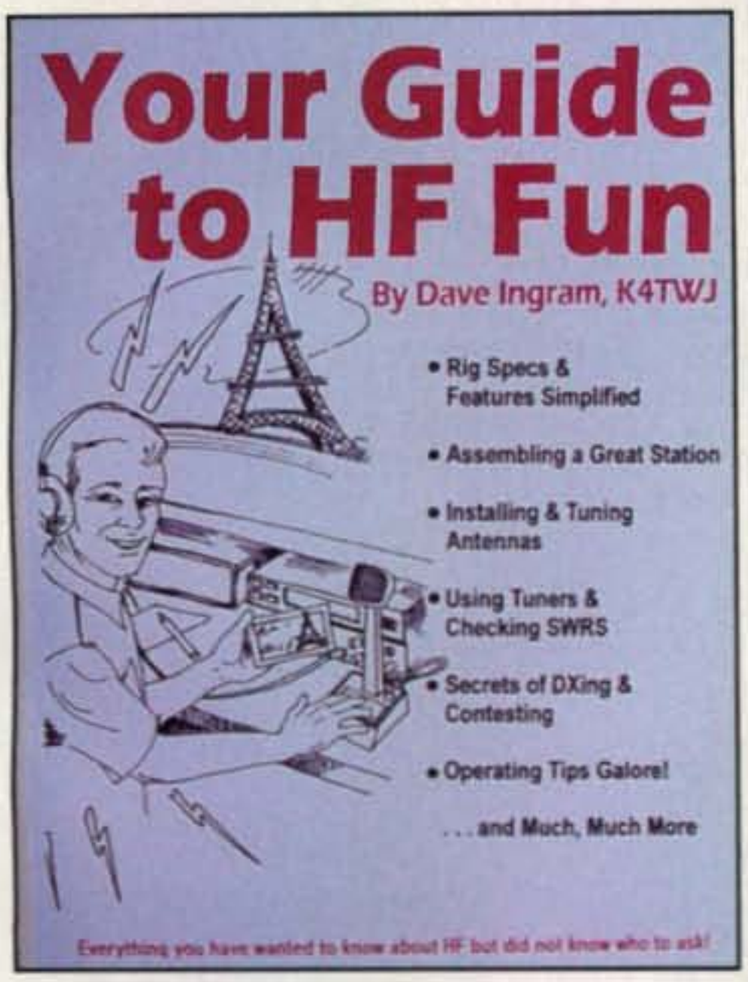


Photo 2– Need more helping Elmer guidance for joining HF action? Check out my full-size Your Guide to HF Fun *book. It is loaded with useful information, and it is available direct to your house from mine: Dave Ingram, K4TWJ, 3994 Long Leaf Drive, Gardendale, AL 35071 for $16 plus $3 postage.*

tap (no tuner required). You can then double or triple your DXing fun.

There are two prime times every day for multiband DXing—dawn and dusk, or the approximate hours around your local sunrise and sunset. Stay alert to that fact, remember the times change with the seasons, and the weeks around the spring and fall equinox are the best *for long*-range or intercontinental QSOs. Now I will (seemingly) contradict that statement. Over the long run, strive to avoid always operating the same bands and modes every time you switch on your rig. Why? Because you typically will hear what you have always heard *rather* than expanding your horizons. Sometimes the bands are active with contesters, sometimes young amateurs are on the air, and other times the old pros are ragchewing. Plan your operations and DXing pursuits accordingly. If you would like to improve your DXing success even more, read on!

Morse Magic

Call it reverse psychology if you wish, but since Morse code proficiency has been dropped from license exams, learning the code and operating CW have become more popular than ever before. Why? Numerous comparisons confirm a 100-watt CW signal has the communications ability comparable to a

YOUR NUMBER FOR SAVINGS (800) 272-3467

TEXAS TOWERS
Savings As Big As Texas!

- Great Gear
- Great Deals
- Great Service
- Free UPS S/H!*

*On all radio orders shipped within the contiguous USA.

Alfa-Spid • Alpha-Delta • Ameritron • ARRL • Astron • Bencher • Butternut • Cal-Av • Comet • Cushcraft • Daiwa • Diamond • Force 12 • Gap • Glen Martin • Hustler • Hygain • Icom • Kantronics • Kenwood • Lakeview • Larsen • LDG Electronics • M2 • MFJ • Mirage • Palstar • Polyphaser • Phillystran • Rohn • Tex-Com • Times Microwave • Unadilla • Universal Tower • US Tower • Van Gorden • Vectronics • Vibroplex • Yaesu

YAESU FT-7800R
Mobile 2m/70cm FM XCVR, 50/40 Watts, Built-in CTCSS Tone Encode/Decode/Scan, 1000 Memories Channels, and More!
$10 YAESU COUPON!

YAESU

YAESU FT-1802M
Mobile 2m FM XCVR, 50 Watts, Built-in CTCSS Tone Encode/Decode/Scan, 221 Memories Channels, and More!
$10 YAESU COUPON!

ICOM IC-208H
Mobile 2m/70cm FM XCVR, Data Jack, Extended RX, CTCSS Tone Encode/Decode/Scan, DTCS Encode/Decode, 500 Memory Channels, More!
NEW $20 ICOM COUPON!

ICOM

ICOM IC-V8000
Mobile 2m FM XCVR, 75 Watts, CTCSS Tone Encode/Decode/Scan, 200 Memories, More!
CALL FOR YOUR LOW PRICE!

YAESU

YAESU FT-2000D
Competition Class, All Mode HF/6m XCVR, 32-Bit DSP, Automatic Tuner, CW & SSB Memory Keyers, 200 Watts, and More!
$200 INSTANT YAESU COUPON!

YAESU FT-2000
Built-In Power Supply, 100 Watts!
$100 INSTANT YAESU COUPON!

YAESU FT-950
World Class Performance, HF/6m XCVR, 32-Bit Floating Point DSP, High Speed Auto Tuner, Built-in CW Keyer, and Much, Much More!
IN STOCK FOR FAST DELIVERY!

YAESU FT-450AT
Affordable Performance. Covers HF/6m. IF-Level DSP, Multi-color LCD Display, CW Keyer, Auto Tuner, and More.
NEW $120 YAESU COUPON!

YAESU VX-7R
6m/2m/220MHz/70cm HT XCVR, Built to MIL-STD 810, Dual RX, Extended RX, CTCSS Encode/Decode/Scan, 900 Memory Channels, Li-Ion Battery, and More!
$40 YAESU COUPON!

YAESU VX-6R
2m/220 MHz/70cm Triband FM XCVR, Backlit DTMF Keypad, Extended RX, Built-in CTCSS Tone Encode/Decode, 900 Memories, Li-Ion Battery Pack, and Much More!
GREAT LOW PRICE!

ICOM IC-91AD
Hand Held 2m/70cm D-Star XCVR, Backlit Keypad, Extended RX (500 kHz–999 MHz), CTCSS Tone Encode/Decode/Scan, Over 1300 Memories, Li-Ion Battery, and More!
GREAT LOW PRICE!

ICOM IC-T90A
Hand Held 6m/2m/70cm FM XCVR, Backlit Keypad, Extended RX (500 kHz–999 MHz), CTCSS Tone Encode/Decode/Scan, 555 Memories, Li-Ion Battery, and More!
GREAT LOW PRICE!

ICOM

ICOM IC-7800
Serious World Class Performance. All Mode HF/6m XCVR, Massive 7" Color TFT-LCD Display with Bandscope Function, 32-Bit DSP, Automatic Tuner, 200 Watts Output, CW & SSB Memory Keyers, and Much More!
CALL FOR YOUR LOW PRICE!

ICOM IC-756PROIII
Competition Class Performance. All Mode HF/6m XCVR, Big 5" Color TFT-LCD Display with Bandscope, 32-Bit DSP, Auto Tuner, and Much More!
NEW $300 ICOM COUPON!

ICOM IC-7000
Mobile All Mode HF/6m/2m/70cm XCVR, 2.5" TFT-LCD Color Display, DSP, Voice Synthesizer, and Much More!
NEW $200 ICOM COUPON!

TEXAS TOWERS

1108 Summit Avenue, #4 • Plano, TX 75074
Hours: M-F 9 AM–5 PM Central Time
Email: sales@texastowers.com

MASTERCARD
VISA • DISCOVER

TOLL FREE **(800) 272-3467**

Proudly Serving Ham Operators Since 1978!
Visit Our Website for More Great Deals:
http://www.texastowers.com

MORE DEALS THAN YOU CAN SHAKE A STICK AT!

Call or email for our new Ham Radio Catalog!

TEXAS TOWERS

Savings As Big As Texas!

Alfa-Spid • Alpha-Delta • Ameritron • ARRL • Astron • Bencher • Butternut • Cal-Av • Comet • Cushcraft • Daiwa • Diamond • Force 12 • Gap • Glen Martin • Hustler • Hygain • Icom • Kantronics • Kenwood • Lakeview • Larsen • LDG Electronics • M2 • MFJ • Mirage • Palstar • Polyphaser • Phillystran • Rohn • Tex-Com • Times Microwave • Unadilla • Universal Tower • US Tower • Van Gorden • Vectronics • Vibroplex • Yaesu

KENWOOD

KENWOOD TS-2000

Huge Band Coverage, All Mode HF/6m/2m/70cm, Auto Tuner, CW Memory Keyer, Dual RX, Dual DSP, Built-In 1200/9600 bps TNC, TCXO, and Much More!

NEW $80 KENWOOD COUPON!

KENWOOD TS-480SAT

Mobile Performance, *All Mode* HF/6m, Auto Tuner, Separate Front Control Panel, 16-Bit DSP, CTCSS Encode/Decode, More!

NEW $180 KENWOOD COUPON!

KENWOOD TM-D710A

Mobile 2m/70cm FM XCVR With Built-In TNC, Separate Front Control Panel, CTCSS Encode/Decode, 1000 Memory Channels, and Much More!

CALL FOR YOUR LOW PRICE!

TIMES LMR COAX

High performance coax cable. Offers lower loss than RG-213/U without the water displacement problems common to 9913 and 9086 types.

HUGE LMR STOCK, CALL!

cushcraft

CUSHCRAFT A3S

Three element triband beam with optional 30/40m kit. Compact yet rugged design with all stainless steel hardware. Perfect for limited space application.

CALL FOR MORE CUSHCRAFT!

ALUMINUM TUBING

O.D.	WALL	COST/FT.
6063-T832 DRAWN ALUMINUM TUBING		
.375"	.058"	$1.00
.500"	.058"	$1.10
.625"	.058"	$1.20
.750"	.058"	$1.30
.875"	.058"	$1.40
1.000"	.058"	$1.50
1.125"	.058"	$1.65
1.250"	.058"	$1.85
1.375"	.058"	$2.05
1.500"	.058"	$2.25
1.625"	.058"	$2.55
1.750"	.058"	$2.80
1.875"	.058"	$3.05
2.000"	.058"	$3.30
2.125"	.058"	$3.80

M2 KT-34M2

Four element, short boom triband beam is long on performance! Rugged design with all stainless steel hardware offers broad gain, high F/B ratio, and flat match. Supplied with broadband ferrite balun rated at 3000 Watts.

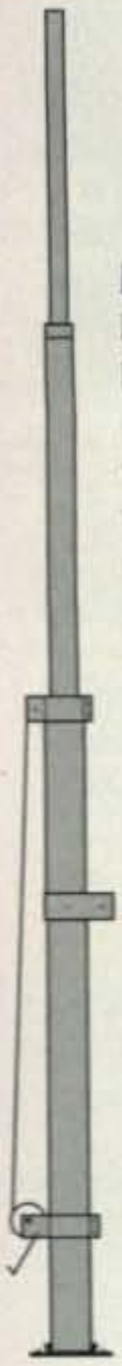
CALL FOR M2 ANTENNAS!

Yaesu G-1000DXA

ANTENNA ROTATORS

Hygain, CD-45II	$369
Hygain, Ham-IV	$509
Hygain, Ham-V	$849
Hygain, T2X	$569
Hygain, T2X Digital	$929
Hygain, HDR-300A	$1269
M2, OR-2800PX	$1379
Yaesu, G-450A	$249
Yaesu G-550	$299
Yaesu, G-800SA	$329
Yaesu, G-800DXA	$409
Yaesu, G-1000DXA	$499
Yaesu, G-2800DXA	$1089
Yaesu G-5500	$599

ROTOR CABLE IN STOCK, CALL!



US TOWER CORPORATION

MA SERIES

Neighbor Friendly Design offers a flagpole-like appearance, while supporting antenna loads up to 22 square feet. Models range from 40–85 *feet* in height and come with a hand winch and house bracket. Optional self supporting bases are also available.

TOWER EXPERTS

We Ain't Braggin'...

But we've helped so many Hams order US Towers over the years that we've become the US Tower experts. Please call for help selecting the perfect US Tower for your QTH!

Universal

B-18 SERIES

Light Duty Aluminum Self Supporting Towers. Five models range from 30–50 feet in height, and support up to 12 sq. ft. of antenna load.

CALL FOR MORE INFO!

B-26 SERIES

Medium Duty Aluminum Self Supporting Towers. Thirteen models range from 30–90 feet and support up to 34.5 sq. ft. of antenna wind load.

CALL FOR MORE INFO!

B-30 SERIES

Heavy Duty Aluminum SelfSupportingTowers. Nineteen models range from 40–100 feet, and support up to 34.5 sq. ft. of antenna wind load.

CALL FOR MORE INFO!

TEXAS TOWERS

1108 Summit Avenue, #4 • Plano, TX 75074
Hours: M-F 9 AM–5 PM Central Time
Email: sales@texastowers.com

MASTERCARD
VISA • DISCOVER

TOLL FREE **(800) 272-3467**

Proudly Serving Ham Operators Since 1978!
Visit Our Website for More Great Deals:
http://www.texastowers.com

400- or 500-watt SSB signal. Further, the combination of Morse code and regularly used Q codes produces a universal language understood by amateurs of all lands and tongues. That's right, friends, you may not speak Spanish, French, Russian, etc., but you can easily exchange greetings with amateurs in South America, France, Russia, and more using CW and Q codes. I should also point out that many of the more remote and "rare" DX locations are not financially able to purchase expensive SSB gear and are limited to using CW—often with homebrew transmitters. Contacting amateurs in such "exotic" lands may by necessity require using CW.

Knowledge of Morse code has a number of additional benefits. Only a few years ago, for example, Morse code taps on the hull of a submarine that sank in the Barents Sea were the sole means of communicating with crew members. It has also been used for passing messages by earthquake victims, the severely handicapped, and by prisoners of war using pipe taps, straw sips, eye blinks, and more.

In one of many examples, a nurse at a leading U.S. hospital helped a totally paralyzed woman learn Morse code—in only two weeks. Within two months, the woman was eye blinking beautiful poems to complement church services. A few months later, still paralyzed from head to toe, she was blinking a full book of religious poems for worship. What an amazing contribution to society—and there's more!

Realizing Morse code's endless capabilities, an increasing number of radio amateurs are carrying medic alert-cards showing the Morse code and explaining that if they are severely injured but able to move any body part, they may be able to communicate via Morse code. Could Morse code someday prove useful for helping save your life or the lives of others around you? No one knows for sure, but you must agree it is definitely worth learning!

Conclusion

Once again we have filled available space and must bow out for another month. I sincerely hope this two-part series has inspired you to give HF a go and I urge you to include CW in your activities, even if only occasionally. It could easily prove to be one of the most personally gratifying (and, yes, fun) endeavors you pursue.

73, Dave, K4TWJ

Building 12-meter Traps for a 12/17-meter Trap Dipole

BY PHIL SALAS,* AD5X

Last month I showed how to build simple and cheap 35-pF high-voltage capacitors suitable for use in 12-meter antenna traps for a 12/17-meter rotatable dipole. Why a 12/17-meter rotatable dipole? Well, I have a Hy-Gain AV-6160 43-foot vertical that works great for me on 160–20 meters. I also have a Hy-Gain TH-1 rotatable dipole for 20/15/10/6 meters, as a dipole at a reasonable height generally outperforms a vertical on the higher bands. Therefore, I wanted a 12/17-meter self-supporting rotatable dipole for best performance on these two bands as well.

A 12/17-meter trap antenna consists of a pair of traps resonant at or about 12 meters placed within a 17-meter dipole. The 12-meter traps look like open circuits at 12 meters, so the outer sections of the antenna effectively are disconnected, making a resonant 12-meter dipole when operating on this band. On 17 meters the traps look inductive, effectively shortening the overall length of the antenna.

To build the traps, we'll parallel last month's capacitors with home-made inductors to parallel-resonate the traps on 12 meters (approximately 24.9 MHz). From *The ARRL Handbook*:

$$L = \frac{1}{C\,(2 \times PI \times F)^2}$$

$$= \frac{1}{35 \times 10^{-12}(6.28 \times 24.9 \times 10^{-6})}$$

$$= 1.1\ \mu Hy$$

*1517 Creekside Drive, Richardson, TX 75081
e-mail: <ad5x@cq-amateur-radio.com>

The following equation can be used to calculate the inductance of an air core inductor:

$$L = \frac{(d^2 \times n^2)}{(18d + 40l)}$$

where: L is inductance in micro-Henrys, d is coil diameter in inches, *l* is coil length in inches, and n is number of turns. Again, this info is in *The ARRL Handbook*.

Table I lists all the parts necessary for the traps and resulting antenna. If you choose to build a wire version of this antenna, you can eliminate the aluminum tubes. The 8-foot fiberglass tube length is oversize, so pay 50 cents to have Max-Gain Systems cut the fiberglass tube in half to keep your shipping charges reasonable. Using the 1" OD fiberglass rod as the coil form, a 9-turn coil over 1.5" of length gives the required inductance. See fig. 1 and photo A for the trap details.

Next we must make sure the traps are resonant where we want them to be. For minimum trap loss, W8JI (http://www.w8ji.com) and others have shown that you should resonate the traps slightly out of band, so I chose 24.5 MHz for my resonant trap frequency. This is not that important; more important is that both traps are resonant close to the same frequency. Trap resonance is measured with no aluminum tubing connected.

The resonant frequency of the trap is easily checked and adjusted with a grid dip oscillator, or GDO. Just hold the GDO coil close to the trap and tune the GDO for a "dip" in the meter reading. The GDO analog frequency readout is probably inaccurate, so check the GDO frequency by listening to the GDO on a receiver and noting any frequency offset.

Description	Source/Part No.	Price ea.
U-Bolt/Clamp Set	Radio Shack 15-826	$5.49
8' x 1" OD fiberglass tube	Max-Gain Systems RT-1-8	$10.00 (pay $0.50 extra to have the 8' tube cut in half)
3/4"OD x 6' aluminum tube (4 pieces)	Texas Towers	$1.50/ft
5/8"OD x 6' aluminum tube (1 piece)	Texas Towers	$1.30/ft
#6 solder lugs (14)	Mouser 534-7326	$0.14 ea.
6 ft #14 insulated house wire	Home improvement store	
#6 ×1.5" SS machine screw (4)	Home improvement store	
6-32 SS nuts (4)	Home improvement store	
#6 SS split lock-washers (12)	Home improvement store	
#6 ×1/2" SS sheet metal screw (8)	Home improvement store	

Source contact information
Max-Gain Systems: <http://www.mgs4u.com>
Texas Towers: <http://www.texastowers.com>
Mouser: <http://www.mouser.com>

Table I– Parts list for a 12/17-meter trap dipole.

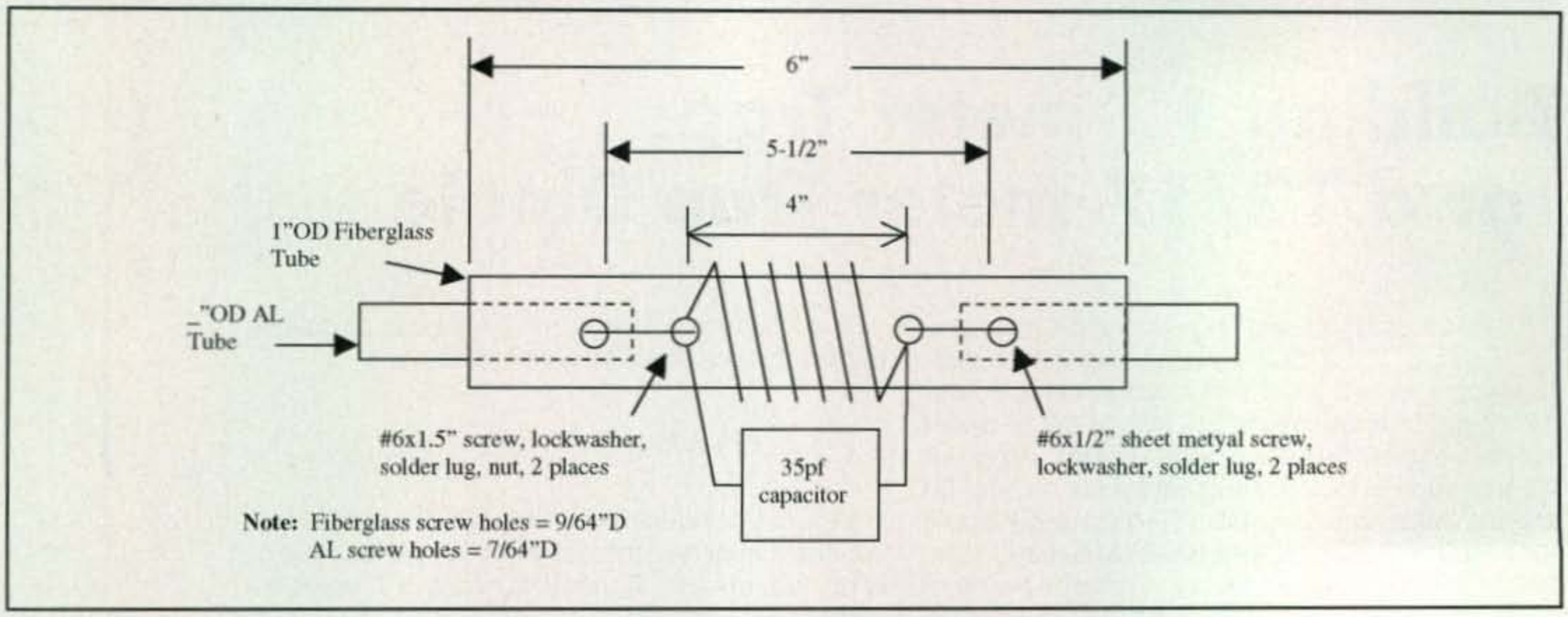


Fig. 1– Trap details.

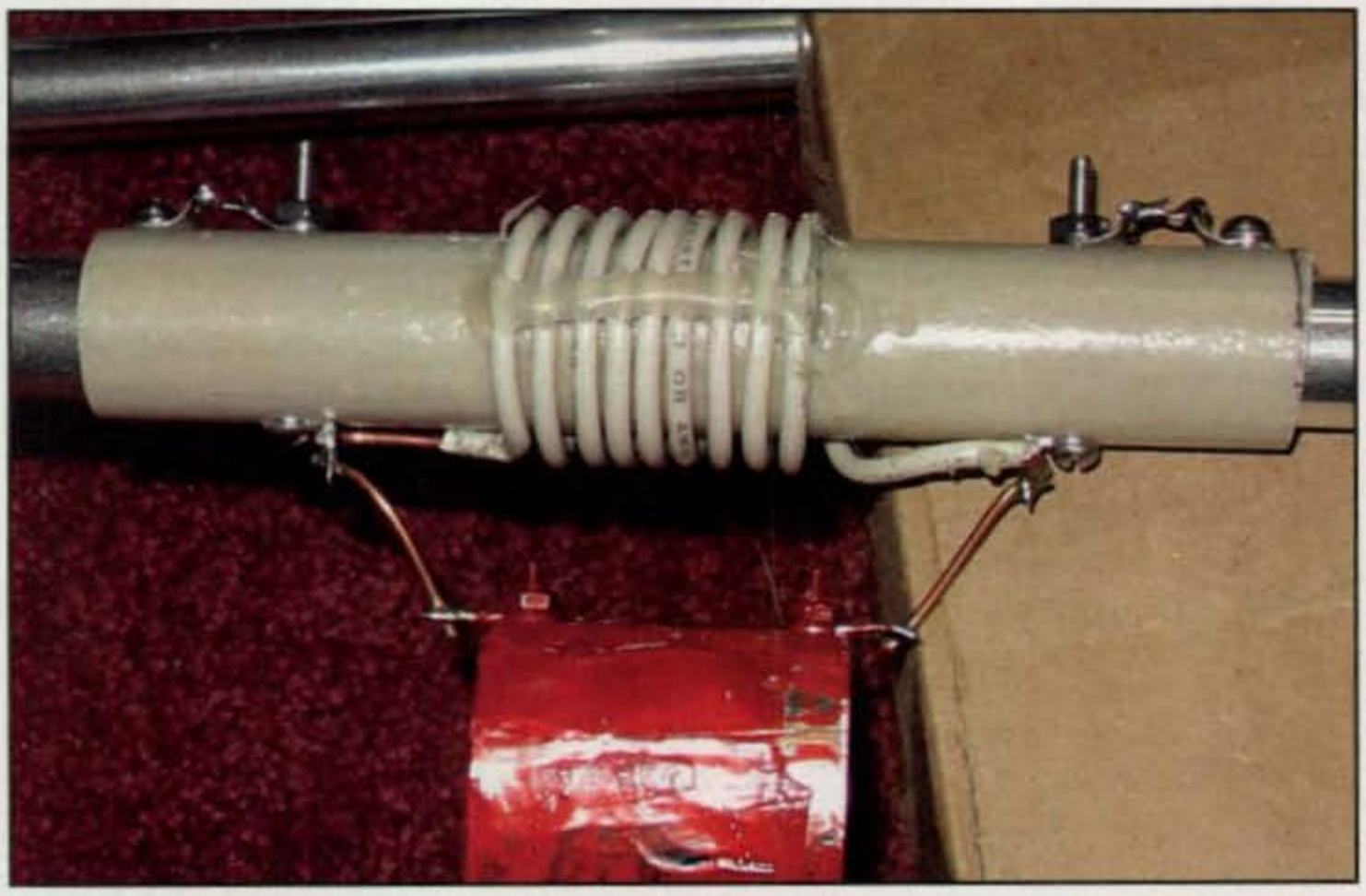


Photo A– A completed 12-meter trap using the homebrew capacitor and coil.

Since I do a lot of trap work, I prefer to use a GDO. When I was a kid back in the '60s, it seemed that everyone made GDOs—Heathkit, Knightkit, Lafayette Radio, Eico, and probably a dozen other manufacturers. Today, the only source I could find for a new GDO was MFJ (the MFJ-201, see photo B). For older GDOs, a good source would probably be through an on-line auction site. However, you can also use an antenna analyzer to find resonant frequency by opening one end of the tuned circuit (turning it into a series-resonant circuit) and connecting the open ends across your antenna analyzer. Tune the analyzer until you see a very low impedance, which indicates series resonance. It's not as convenient as using a GDO, but it is just as effective.

Whichever method you use, compress or expand the inductor windings until the resonant frequency of each trap is relatively close to that of the other (preferably within 200 kHz). Once this is done, use hot glue, epoxy, or liquid electrical tape to hold the coil turns in place.

We're out of space (and time) for this month. Next month we'll build the complete antenna. You won't be disappointed! Until then...

73, Phil, AD5X

Photo B– The MFJ-201 grid dip oscillator.

ASTRON CORPORATION
9 Autry Irvine, CA 92618
(949) 458-7277 • (949) 458-0826
www.astroncorp.com

E151765 E151765

...POWER ON WITH ASTRON

SWITCHING POWER SUPPLIES...

MODEL SS-10TK

MODEL SS-12IF

SPECIAL FEATURES:

- HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT, FOR ALL FREQUENCIES INCLUDING HF
- HEAVY DUTY DESIGN
- LOW PROFILE, LIGHT WEIGHT PACKAGE
- EMI FILTER
- MEETS FCC CLASS B

PROTECTION FEATURES:

- CURRENT LIMITING
- OVERVOLTAGE PROTECTION
- FUSE PROTECTION.
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 115 VAC 50/60HZ OR 220 VAC 50/60HZ SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8VDC

AVAILABLE WITH THE FOLLOWING APPROVALS: UL, CUL, CE, TUV.

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	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3⅜ x 7 x 9⅝	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	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3⅜ x 7 x 9⅝	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 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	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 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	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

washington readout

BY FREDERICK O. MAIA,* W5YI

Letters to the Editor: Your Amateur Radio Questions Answered

We get many letters, e-mails, and phone calls inquiring about ham radio procedures and rules. Every so often we respond to the questions that are of general interest. We haven't done this in a while, so this month let's cover some of your queries. We can't cover them all, but here are some that are of more than routine interest.

Q: There are 2×3 callsigns beginning with K and W. Why aren't any 2×3 callsigns beginning with A or N assigned in the U.S. Amateur Service?

A: Because they are not needed. There are already more than 8-million 2×3 format callsign combinations available using KA through KZ and WA through WZ prefixes. They could, however, be assigned some time in the future. All U.S. callsign assignments are governed by Part 2, Subpart D, of the FCC rules. Also, the AA1AAA through AL0ZZZ and NA1AAA through NZ0ZZZ callsign blocks are allocated to the Amateur Service—another 6-million possible callsigns.

It is interesting to note that the prefixes WC, WK, WM, WR, and WT 2x3s are also not available. These so-called "Group E" 2×3 callsigns were reserved for RACES (Radio Amateur Civil Emergency Service), club, military recreation, repeater, and temporary licenses back in 1978 when the Group Callsign System was developed. However, the new WC, WK, WM, WR, and WT×3 callsign program did not make it to FCC rulemaking and was never implemented. These 2×3s (unless you already had one prior to 1978) remain unavailable to this day.

Q: For several years now a group of us has been meeting weekly on 80 meters. Lately, other stations have been interfering with us. What can we do to stop this?

A: One of the cornerstones of ham radio use is that no one can claim the exclusive use of any particular frequency. Priority is given only to emergency traffic. Nothing in the rules recognizes the special privilege of any net, group, or individual to any specific frequency.

Section 97.101(b) of the rules states that "Each station licensee and each control operator must cooperate in selecting transmitting channels and in making the most effective use of the amateur service frequencies. No frequency will be assigned for the exclusive use of any station." In short, no one "owns" a frequency. It is also important to observe band plans that traditionally assign various band segments to certain types of communications.

It's good practice, and plain common sense, for any operator, regardless of band or mode, to check to see if the frequency is in use before transmitting. If you are there first, other operators should make an effort to operate on other frequencies.

It is, however, an unrealistic expectation to have totally interference-free operation on today's congested bands. In addition, due to the uncertainty of signal propagation, be aware that not all stations can hear all others on a particular frequency. It is usually best to change your frequency rather than have an on-the-air confrontation,

Q: I note that the FCC levies fines of different amounts against violators of its rules. How does it determine the amount?

A: The amount of a "forfeiture penalty" (an FCC administrative fine) is governed by the FCC's Forfeiture Policy guidelines contained in Part 1, Subpart A, Section 1.80(a) of the Commission's Rules. However, these are guidelines only. The FCC evaluates each case individually, taking into account the nature, circumstances, extent, and gravity of the offense.

There are specific dollar-amounts recommended in the "Guidelines for Assessing Forfeitures" that may be imposed, but the FCC may also use its discretion to issue a higher or lower penalty amount than contained in the guidelines, or to issue no forfeiture at all. Fines can be adjusted up over the guidelines if the infraction is flagrant, intentional, causes substantial harm, or if there is a history of repeated or prior violations.

Downward adjustments can be made if the violation is relatively minor, or the violator cooperates with the FCC or has a history of overall rules compliance. Fines can also be reduced if the violator provides financial records demonstrating an inability to pay a higher amount. Forfeitures can run as high as $16,000 for each violation or each day of a continuing violation.

Rule violators usually have 30 days to show, in writing, why a forfeiture penalty should not be imposed or should be reduced , or to pay the fine. Periodically the FCC increases the amounts of its "Base Forfeitures" based on inflation.

Q: How do I get one of those 1×1 callsigns I sometimes hear on the air?

A: Those are temporary calls issued under the FCC's "Special Event" callsign system to commemorate a certain occasion. A 1×1 callsign consists of a single letter (K, N, or W), a numeral Ø through 9, and one suffix letter—A to W and Y to Z. Government regulations do not permit 1×1 callsigns with the suffix letter "X." An example of a 1×1 callsign is K1A. There are 750 of these callsigns.

When transmitting, the special event station simply substitutes his or her regular station callsign with a 1×1 callsign which choosen. The special event station must also transmit its assigned

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

callsign at least once per hour during the temporary operation.

The 1×1 callsign program began in 1997 after the FCC approved five different volunteer Special Event callsign Coordinators who are also VECs (Volunteer Examiner Coordinators). They collectively maintain a common online database identifying who is using a certain 1×1 callsign during specific dates. You can access this database and the 1×1 callsign procedures on the internet at: <http://www.ncvec.org/1x1.php>. You can also review the FCC rules covering the program by going to: <http://wireless.fcc.gov/services/index.htm?job=call_signs_2&id=amateur>.

It works like this: You apply online indicating the 1×1 callsign you want (and alternates in the event the one you request is not available), the beginning and ending date of your special event operation (which ordinarily should not exceed 15 days), the name of your "special event" (such as your city's anniversary or whatever), your name, station callsign, your current mailing and e-mail addresses, and your daytime telephone number. Once you "submit" the information, your request is sent to the coordinator, who will immediately post your reservation. Once the callsign is reserved, *no one else will* be able to reserve that 1×1 callsign during the same time period.

Anyone may reserve a special event 1×1 callsign. Unlike the vanity callsign program, there is no "pecking order." A Technician Class operator has just as much right to reserve a 1×1 callsign as an Amateur Extra Class.

An event of "special significance to the amateur community" is whatever a radio amateur thinks is important to them, their community, state, or country. Even a neighborhood amateur radio demonstration qualifies. The Special Event callsign Coordinators have very wide latitude in the acceptance, rejection, or cancellation of 1×1 callsign reservations.

Q: How can I find out who held my callsign before me?

A: The FCC began switching to a computerized Universal Licensing System (ULS) in 1998. ULS also provided the public with on-line access to licensing information which is obtainable online by using an internet browser.

Amateur radio callsign history is easily available online for all licensing activity after the early 1990s. To get callsign information, just go to ULS home page at <http://www.fcc.gov/wtb/uls> and click on the Archives button. Scroll down to the callsign blank and enter the callsign about which you want information and click the Search button at the bottom of the page. All activity on a specific callsign over the last ten years will be displayed.

QRZ.com has posted an old FCC Amateur Service database online at <http://www.qrz.com/search1993.html> which shows callsigns going back to the 1980s. For callsign information before that, I suggest you contact the Quarter Century Wireless Association headquarters at 508-405-1930. The QCWA has a complete set of old *Callbooks,* and they can look up your callsign for you. They also have an online contact form at <http://www.qcwa.org/contact-hq.htm>. This is not a service they regularly offer, so I would send them a donation.

Another option is to contact the FCC's information contractor: Best Copy and Printing, Inc., Portals II, 445 12th St. S.W., Room CY-B402, Washington, DC 20554, telephone 202-488-5300 or 800-378-3160. It charges a research fee for the service which could be substantial.

Q: Why does a person have to pass lower class ham radio written license examinations if they can pass the higher ones?

A: In a nutshell, because the written ham license examinations are "additive." That is, most of the question pools from which the written examinations are constructed relate to a specific license.

For example, the Technician Class license questions cover beginning privileges, practices, and equipment and are more oriented to VHF operation, while the General Class concentrates on HF operation. The Amateur Extra Class pool is more technical and covers advanced construction practices and examining others for ham tickets, and so forth.

You need to know all of the subject matter included in the lower class exams, not just the material covered in the Extra Class exam. Thus, the question pools serve as an outline of what you need to know to advance up the ham radio ladder. You can't start at the top. You need to climb up one rung at a time, learning as you go.

Each written exam question pool is revised every four years. On July 1, 2008 a new Element 4 (Extra Class) question pool was implemented. There are more than 1600 different questions in the three (Element 2, Technician; Element 3, General; and Element 4, Extra Class) question pools.

Q: I hold an Extra Class license. Why can't I get certain 2×2 format callsigns beginning with K under the vanity callsign program?

A: There are many callsign exclusions. The KA2AA–KA9ZZ, KG4AA–KG4ZZ, KC6AA–KC6ZZ, KX6AA–KX6ZZ, and KL9KAA–KL9KHZ blocks are allocated to the military. The following 2×3 format callsigns are also unavailable: callsigns having the letter X as the first letter of the suffix (these are non-amateur experimental callsigns) and callsigns having the letters AF, KF, NF, or WF as the prefix and the letters EMA as the suffix (allocated to U.S Government FEMA stations). The FCC also will not assign any callsign having the letters SOS or QRA through QUZ as the suffix (to eliminate confusion with distress or CW Q-signals).

Q: I have heard questionable communications on the ham bands. Are those communications legal? What is considered indecent or obscene?

A: You determine for yourself whether your communications should be transmitted on Amateur Service frequencies. Section 97.113 provides four general standards for you to observe. In general, any amateur-to-amateur communication is permitted unless it is specifically prohibited, transmitted for compensation, or the station control operator or his employer benefits financially. You may, however, notify other amateur operators of the availability for sale or trade of equipment normally used in an amateur station, provided that such activity is not conducted on a regular basis.

Also prohibited on the ham bands are transmitted music; communications intended to facilitate a criminal act; secret messages; false station identification and communications, on a regular basis, which could reasonably be furnished alternatively through other radio services; and obscene or indecent language. In the Part 97 Amateur Radio Rules the FCC has chosen to lump together indecency and profanity as simply being indecent.

To be obscene, speech must meet a three-prong legal test (developed for broadcasters but applied to amateurs as well: (1) an average person, applying contemporary community standards, must find that the communications, as a whole, appeals to the prurient interest (i.e., material having a tendency to excite lustful thoughts); (2) the material must depict or describe, in a patently offensive way, sexual conduct; and (3) the material, taken as a whole, lacks literary, artistic, political, or scientific value. Indecent communications contain sexual or excretory material that does not rise to the level of obscenity. Profane language includes highly offensive words, such as cursing or swearing.

Q: Our group is looking into conducting a DXpedition to Desecheo and Navassa Islands in the Caribbean. How do we go about getting a KP1 or KP5 callsign?

A: You can't. According to FCC rules, all amateur stations must have a way of receiving mail. Neither Desecheo nor Navassa Island has U.S. postal system delivery. Both Navassa (near Haiti) and Desecheo Islands (near Puerto Rico) are very small, remote uninhabited islands. Radio amateurs wishing to operate from such locations must either use their regular callsign followed by a location identifier or a 1×1 special event callsign such as K7K, which was used during the October 1997 Kure Island DXpedition.

However, and this is a big however, Desecheo and Navassa are administered by the U.S. Fish & Wildlife Service, an agency of the U.S. Department of the Interior, and *it is not currently allowing amateur radio operations.* There is an attempt in Congress to change that situation, but unless and until that legislation is passed, no amateur operation from these islands is permitted.

There are also several other uninhabited U.S. island possessions that lack mail service. They include Baker and Howland Island (KH1); Kingman Reef, Palmyra Atoll, and Jarvis Island (KH5); Wilkes and Peale Island (KH9) and Kure Atoll (KH7 followed by the letter K). Johnston Atoll (KH3); Northern Mariana Islands (KHØ); Guam (KH2); American Samoa (KH8); Midway Atoll (KH4); and Wake Island (KH9) all have permanent residents and a means of mail delivery. Therefore these callsigns are available.

Q: I previously held a Technician Plus Class license. Why, when I renewed my license, was it lowered to Technician Class?

A: The Technician Plus Class operator license was issued to Technician Class licensees, between 1991 and 2000, who, in addition to passing a written test, also had passed a Morse code exam. At first, Tech Plus was not a formal license class, but it later became one. A Technician Plus Class licensee was authorized the privileges of a Technician Class operator plus the privileges of a Novice Class amateur.

Effective April 15, 2000, the FCC streamlined the Amateur Service by reducing the number of amateur license classes from six to three. Under the FCC plan no new Novice, Technician Plus, and Advanced Class licenses would be issued, but existing licenses could continue to be renewed.

Tech Plus licenses, however, were renewed as Technician but retained the Tech Plus privileges. Technicians who passed the 5-wpm Morse code exam after that date had Technician Plus privileges, although their license said Technician. They had to retain the code test Certificate of Successful Completion of Examination (CSCE) they received from their VE team as proof. This all became a moot point on February 23, 2007 when the FCC stopped requiring demonstrated telegraphy knowledge in the Amateur Service and Novice Class HF privileges were extended to all Technicians.

Q: One of our club members died. How do we change our club callsign to that of the deceased member?

A: The FCC rules covering obtaining "Club callsigns In Memoriam" under the vanity callsign program require that three points be met:

(1) The trustee of a club station may request "in memoriam" the callsign of a deceased member even when it has been less than two years following the club member's death. The trustee must hold a callsign from a callsign Group equal to, or higher than, the deceased.

(2) If it has been less than two years following the death of the club member, the callsign of the deceased holder is immediately assignable providing the club has in its station records a written statement (do not send to the FCC unless requested) from a close relative of the deceased confirming (a) the deceased person's membership with the club and (b) showing consent of the relative to your request. Recent rule changes also permit a club member, while still alive, to grant consent for the club to be assigned his/her call after death.

(3) If the callsign is active or expired less than two years, the FCC requires a copy of the death certificate or a newspaper obituary of the deceased member so that the callsign may be cancelled prior to assignment to the club. The FCC also accepts death listings in the Social Security Death Index (SSDI).

Q: Why are paper-document licenses needed when an amateur can oper-

ate his station when the licensing information appears in the FCC database.

A: Actually they are not needed; listing in the FCC's Amateur Service database is all that is needed. The FCC has never asked a radio amateur to produce a hard copy of a license. However, a hard copy of the ham ticket is important to many radio amateurs, so the FCC makes them available.

If you have lost your paper license copy, you can get another by logging into Universal Licensing System with your FRN (FCC Registration Number) and Password. Choose Request Duplicate from the Work on This License menu on the right-hand side of your License At A Glance screen. There is no charge for a duplicate license.

Q: I heard a boater on a local lake calling for help on the Extra Class portion of the ham bands. I hold a General Class license. Can I answer his call?

A: Yes. Section 97.403 states that no provision of the rules prevents the use by an amateur station of any means of radio communication at its disposal to provide essential communications in connection with the immediate safety of human life and immediate protection of property when normal communication systems are not available

Section 97.405 states that no provision of the rules prevents the use by an amateur station of any means at its disposal to assist a station in distress.

Q: I filed a vanity callsign application online to change my callsign. How do I know if the FCC got it and when will my callsign be changed?

A: Beginning on the next business day following the filing of any application, you can check an application's status to ensure a successful submission. Go to <http://wireless.fcc.gov/uls/> and click on the Applications button. On the following Application Search screen select from the drop-down box the fields you want to search by (for example, enter your callsign) and click on Search. You can also search by FRN or Licensee Name.

It takes 18 days from the date of an online application for a new vanity callsign to be issued. The delay is caused by the FCC's need to simultaneously process mailed-in vanity applications with those filed online so that online-filed applications do not have an unfair advantage. The FCC goes by the postmark date on the envelope. Example: A mail application containing an August 15, 2008 postmark is processed with the online applications submitted on that same date. It amounts to the FCC delaying online applications a couple of weeks to allow time for a mailed-in paper-document vanity callsign application to be received by the FCC.

Q: I want a specific vanity callsign. How do I know when it becomes available?

A: We have covered this before, but it keeps cropping up. As a general rule, a callsign becomes available two years following license expiration, license cancellation, or death of the previous holder. The callsign you are requesting may not already be actively assigned. Keep in mind that an amateur license is active for 12 years—the 10-year license term plus the 2-year grace period in which a license may be renewed.

To determine if a callsign is available, go to the online Universal Licensing System at <http://wireless.fcc.gov/uls/> and select the search Licenses button. Enter the callsign you are interested in and click Search. Click on the callsign on the next screen to get to the FCC record for this callsign.

If the callsign has expired by more than two years, it is immediately available as of the indicated Cancellation date. If the license has not expired, but shows as cancelled (the previous holder may be deceased or has gotten another callsign), the callsign is available two years plus one day following the Cancellation date. Be very careful with this, since timing—especially for a much sought after callsign—is very important!

If more than one application is filed during a specific 24-hour day, the FCC's computer awards the callsign randomly. It makes no difference whether the application is filed one minute past midnight or one minute before midnight nearly 24 hours later. All applications for the same callsign requested during that day are lumped together.

We strongly suggest that you read the FCC's write-up on the vanity callsign rules. You can find it at <http://wireless.fcc.gov/>; click on Amateur Service under Wireless Services. This will take you to the FCC's Amateur Service section. Then click on Vanity on the left side of the page.

Do you have a question? Send it to us and we will try to answer it in an upcoming column.

73, Fred, W5YI

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Do We Have the Wrong Stuff or the Right Stuff when on the Radio?

I was in my favorite coffee shop having breakfast with a friend on a recent Sunday morning. We were discussing our latest home-improvement projects and various other topics.

Suddenly, our conversation was interrupted by an obnoxiously loud and irritatingly poor ringtone somewhere behind us. We had to endure several seconds of the "song" and then a woman answered the phone. She must have had a hearing problem, because even though she was at least eight or so feet away, we clearly heard every word she said.

The cell-phone lady carried on about some real-estate property deal and how much she knew the person on the other side of the phone would love it. Ms. Cell Phone had a breakfast partner, who had to silently eat her meal as she was being ignored by her real-estate friend. I was rather offended by several things in this intrusive behavior: First, Ms. Cell Phone's ring tone was so loud that it must have been on the highest volume setting, and she actually waited to hear the completion of the tune, as though she wanted all of us to hear the complete song. Next, she spoke so loudly that many others in the restaurant had to listen to her side of the conversation. Finally, I felt sorry for the person who was sitting with her, who also had to bear with the one-sided conversation.

I wonder if the cell phone has invaded our society so much that good manners and common sense have been over-ridden by selfish habits and high-technology gadgets. In a "water cooler survey" at the office, the two-way radio feature of certain cell phones seems to be the most irritating feature that was ever invented. Recently, a friend sent me an e-mail message with a link to an online quiz about cellular-phone etiquette. Although a little out-dated (2005), you might want to take a look at the technological *faux pas* and the ways to avoid such negative behavior when talking on the cell phone (or radio). Here is the URL: <http://reviews.cnet.com/4520-10779_7-5843439-1.html>.

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

It's an Image Thing

This brings us to ham radio and our ability to instantly communicate with our fellow hams via VHF or VHF/UHF mobile and portable radios (also known as handie-talkies, or HTs). While the portable two-way radios that are carried by police

Handy accessories for HTs include the speaker-microphone (on the left) and the boom-microphone headset. When using a speaker-mic, try not to crank up the volume too high. The headset enables hands-free operation, but should be used in the PTT mode (see text).

officers and fire fighters are usually viewed as "cool gadgets," for some reason the same or similar equipment on "civilians" (and hams) seems to be viewed as being "nerdy."

When in public view, or when we are with non-ham friends, let's see if we can be polite and courteous to those around us by limiting the noise we make if we use our transceivers in public areas. Certainly, this can be an easy thing for us to do; we can just turn off the radio and conserve battery power.

If we must communicate while in public places, accessory items such as external speaker/microphones or headsets with boom-mounted microphones can be very useful tools to have (see photo). However, just like all good tools, these accessory items are only good if used correctly. Let's take a look at what these accessories can do and how to properly adjust and use these items.

The speaker-microphone (speaker-mic) is exactly what it sounds like. It is a unit that includes a speaker for the receiver and a microphone for the transmitter in a single housing. These units look like miniature versions of a microphone intended for use with mobile radios. Some units include a volume control. Speaking of volume, when using these units, please do not crank up the volume so loud that the speaker distorts the sound and becomes an irritating noise to others around you. All speaker-mics have a clip on the back so that you can clip the unit to your clothing. A good place to hold a speaker-mic is on your shoulder so you can hear it and easily reach it when you are ready to transmit.

The boom-microphone headset provides an additional level of convenience and function. These units have a single- or double-sided headphone for receiving and a microphone on a tube (the boom) so you can locate the microphone close to your mouth. All of these units include a push-to-talk (PTT) button, and many have a feature called voice-operated switching, or VOX. If you have ever seen the television commercial for a product called the "Clapper," then you know what VOX operation is. The Clapper is a sound-activated switch.

At first this VOX function seems to be a good feature to have, since it enables hands-free operating; you do not have to push the button on the microphone or touch the radio in order to transmit. However, VOX control can be difficult to adjust properly, and it will allow unwanted noises to make the radio go into transmit mode unexpectedly. Since your voice is the trigger that puts the radio into transmit, you must always be aware of what you are saying, because it will be transmitted over the air. Can you imagine what could happen if you had your VOX-enabled microphone on and something heavy fell on your foot? The normal reaction to this pain would be something most likely inappropriate for a "radio audience," and possibly a violation of FCC Rule 97.113 (prohibited transmissions).

By the way, this is also exactly what is wrong with the Clapper. Sometimes the switched item can be made to turn on or off unexpectedly because of some stray noise, such as a barking dog.

Another bad thing about VOX operation is the "hold" time adjustment. It is possible to improperly adjust this control so that once triggered to transmit, the radio could go into "lock" mode and key the transmitter continuously, jamming the frequency.

A much better solution to this VOX is an external switch for push-to-talk. This is the normal "button" on the microphone. Just about all of the boom-microphone headsets available have a little

signal in order to access the repeater system. Sometimes this is because the repeater is maintained by a club or group and the use of the repeater systems is limited to members only, and sometimes a sub-tone is used to prevent interference from another repeater system on the same or another nearby frequency.) Another term for sub-tone is Continuous Tone-Coded Squelch System (CTCSS), and also Motorola's trademark called "PL" or Private Line.

Therefore, rather than shouting into the microphone when you are in a noisy environment, try to speak in a normal voice. Tom Wolfe, in the 1979 book and the 1983 movie *The Right Stuff*, describes how test pilot Chuck Yeager's cool and relaxed southern drawl remains controlled even under the most demanding life-and-death situations. Yeager was so well-respected that other pilots imitated his calm and controlled tone while communicating to the ground crew. Even today I think this may be true, because over the last 20-plus years, in 100 percent of the flights I have taken for business or pleasure, the captain's voice over the airplane public-address system has that calm and reassuring tone. This should also be our model when communicating on the radio.

If you must use your radio in noisy environments, such as along a parade route or in a crowded restaurant, you may want to check your radio's operating manual to see if the microphone gain can be adjusted (or have this done for you). A lower microphone gain setting will help reduce the amount of unwanted ambient noise around you. However, when you do this, you will have to speak louder or talk closer to the microphone every time you use your radio. An alternative to decreasing microphone gain is to hold the microphone so that it is as close as possible to your mouth. You will have to experiment to find the best mouth-to-microphone distance. The foam wind guard (if it has one) should be kept in place at all times.

Our society is being invaded with over 200-million cell-phone users in the U.S. The ham radio population is several hundred thousand. Many hams own a portable 2-meter radio or a multiple-band type of HT, and some hams have more than one. When these two communication tools combine (or shall I say collide?), there can be an increase in the irritation factor that ham radio sometimes generates. Let's try to be as considerate as possible with our portable operations, and make sure we display the right stuff when communicating with our radios while in public view.

73, Wayne, KH6WZ

control box that allows you to select either VOX or PTT. Thus, if you decide to get a headset, use the PTT function most often and use the VOX feature only when you truly must have hands-free operation. For example, if you are climbing a tall tree to install a wire antenna and you want to use your HT to communicate with some helpers below, you may want to have the VOX control enabled.

Can You Hear Me?

It is very natural to talk louder in noisy environments, such as a crowded restaurant or a busy industrial area. You have to overcome the noise around you so the person you are talking to can hear as well as understand what you are saying. However, this is not the case when talking over the radio.

Talking louder on the radio generally makes your signal more difficult to understand, because the transceiver circuitry can limit (or "clip") the sound of your voice, causing distortion. In addition, if the repeater you are using requires sub-tone access, talking too loudly into the microphone may distort the tone, and the repeater system may not let your signal through. (In some repeater systems, a subaudible tone must be transmitted along with the radio

how it works

The What and Why of Oscilloscopes

BY DAVE INGRAM,* K4TWJ

A fair number of newcomers in amateur radio have seen license exam test questions relating to oscilloscopes and probably have also noticed used oscilloscopes at hamfest flea markets. However, some are a bit confused about their actual purpose and use. Hopefully, this month's column will help clear the air with a "keep it simple" explanation of what oscilloscopes are, how they function, and how you use them. Along the way, our discussion may also spin off some additional tidbits of information you will surely find interesting. Expanding your knowledge is always beneficial!

Meet the Oscilloscope

Described in 20 words or less, the visual display of an oscilloscope is used to analyze and compare signals, waveforms, and voltage levels. Couldn't this be done with a regular multimeter? Not really. Multimeters are quite useful and versatile items, but they cannot show instantaneous changes in voltages, overmodulation, distortion, and glitches on transmitted signals, etc. Such information is beneficial in an endless number of ways, such as checking linearity of power amplifiers, analyzing transceiver passbands, and much more. You may have noticed reproductions of oscilloscope-displayed pictures from transceivers reviewed in magazines, and you also may have pondered exactly how they were obtained and what they indicate (what's good and what's poor, so to speak). Maybe our upcoming discussion will help.

As a convenient starting point, let's look at the components and circuits that comprise a typical oscilloscope. Once their purpose and operation is understood, visualizing overall 'scope operation and use should prove much easier.

As shown in fig. 1, an oscilloscope is made up of a vertical section, a horizontal section, a power supply, and an image-displaying cathode ray tube (*CRT*). Looking closer, we see the horizontal section has two main circuits: an adjustable frequency oscillator that generates sawtooth waves and an amplifier that boosts and conditions those waves for driving the CRT's horizontal deflection plates. This overall action produces a horizontal line on the screen. The (horizontal) sweep oscillator frequency is set by the oscilloscope's *horizontal sweep control* (sometimes called a time base control). It usually has a coarse and a fine frequency adjustment plus accompanying switch for selecting internal sweep, external sweep, or external triggering of the horizontal sweep from an outside source. In the latter case, vertical wave peaks of incoming/signal under test set the exact starting point of each horizontal sawtooth wave. The resultant sawtooth wave is then amplified by an amount set by the *horizontal gain control*, split into nearly equal positive- and negative-going portions (adjustable with the *horizontal line position control*), and applied to the CRT's horizontal deflection plates to produce a horizontal trace line on the CRT. We will explain sawtooth waves, horizontal positioning, and sweep triggering later rather than breaking your focus at this point.

The oscilloscope's vertical section contains an input signal amplifier which actually consists of two (or more) stages; the latter one also shifts the signal more positive or more negative for *vertical positioning*. In addition to controls for setting *vertical amplifier gain* and vertical signal position, this section may also include/have an optional direct vertical input so high-frequency radio signals can be routed past the vertical amplifier and -displayed on the CRT screen. Other options in vertical sections include a DC input for measuring voltages of power supplies, batteries, etc., and an AC voltage calibrator for referencing how many CRT screen divisions equal how much voltage being measured. If the vertical gain is set too low, incidentally, the scope will only display a horizontal line. If the vertical gain is set too high or the incoming signal level is excessive, displayed waves will exceed screen size and only CRT reflections will be noticeable.

Photo A– You probably have seen traditional analog oscilloscopes. Now take a look at the latest and most innovative design unit, Tektronix's new Digital Phosphor Oscilloscope. It is a deluxe four-input/four-channel gem with each channel displayed as a separate color (which is also color-coordinated with its front-panel controls). (Photo courtesy of Tektronix Corp., a leading name in oscilloscopes)

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

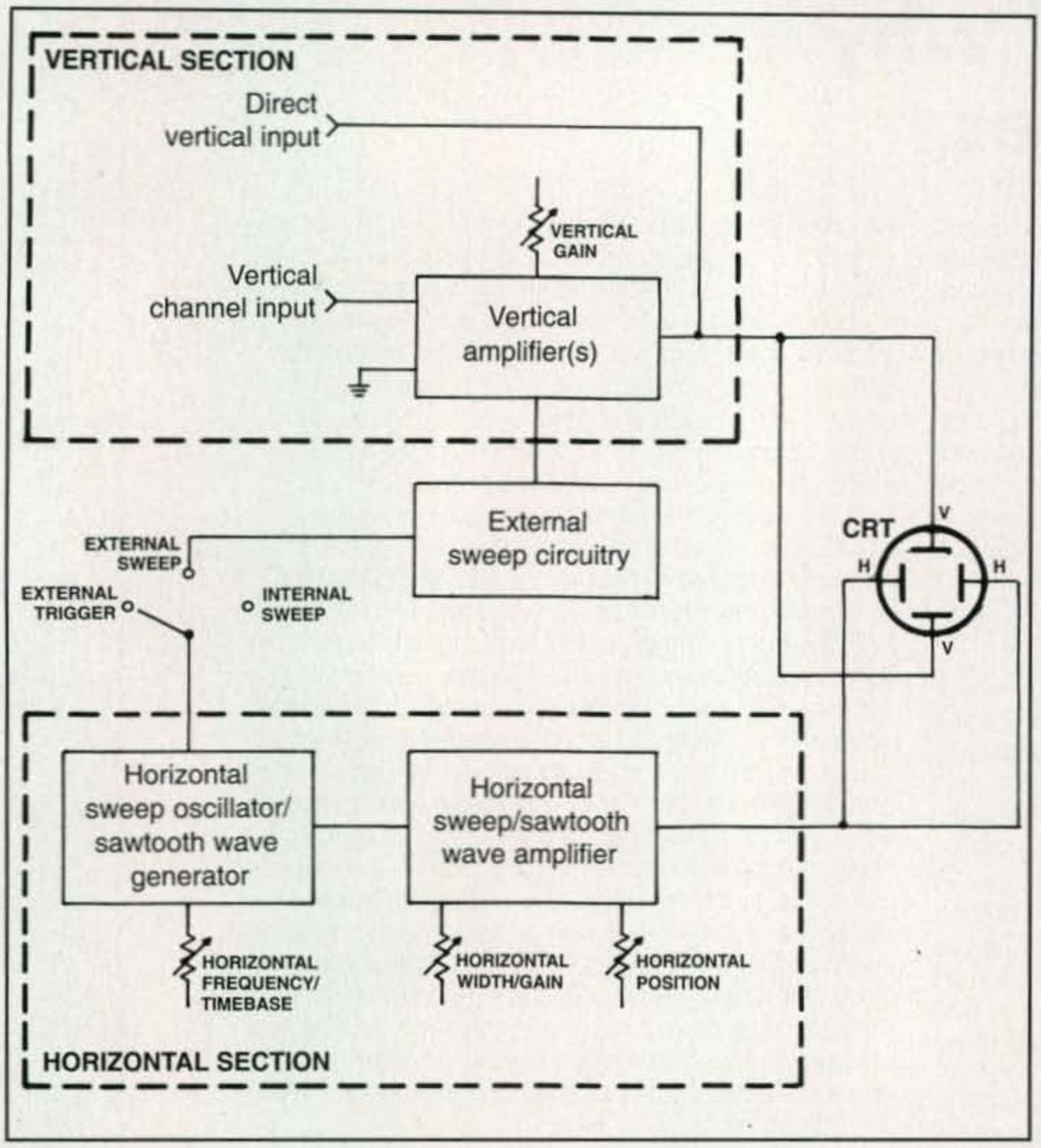


Fig. 1– Simplified block diagram of a basic-style oscilloscope as described in the text. Several amplifier stages are usually included in block-labeled "vertical amplifier" and several inputs are usually included for both vertical and horizontal sections. This basic guide, however, should help you understand the general operation of most oscilloscopes.

With the exception of physical size, use of electrostatic deflection plates rather than an electromagnetic deflection yoke, and a shorter persistence screen, the CRT in an oscilloscope is similar to the picture tube in a TV set. It has an electron gun that "fires" electrons through focusing and accelerating grids at a fluorescent screen while being moved or swept side-to-side by sawtooth voltage on the horizontal plates and deflected vertically by signal voltage on the vertical plates. Adjusting a scope's *focus control* varies the size of the CRT's trace line (or center dot, if no sweep), and adjusting its *brightness* control varies acceleration/force of electrons hitting the screen.

The time a screen continues glowing after being hit with electrons is called its "persistence," and also warrants mention. A scope's CRT usually has a short or "P1" persistence; it stops glowing almost immediately after electron excitation. A regular black-and-white picture tube has a slightly longer, or "P4," persistence, and old-style radar sets that display a rotating sweep with dots left behind showing positions of airplanes, etc., use a very long "P7" persistence. Interestingly, color picture tubes do not follow sequence, but have their exclusive "P22" designation—possibly not too relative, but I am sure you appreciate knowing such valuable facts. An oscilloscope's power supply, incidentally, supplies operating voltages to the CRT and other circuits in the unit.

Scanning and CRTs

Earlier in this discussion I mentioned sawtooth waves are used to produce scanning or sweep lines on an oscilloscope's CRT. Lacking that capability, the oscilloscope would only show a small dot resulting from the CRT's electron gun firing a steady stream of electrons at the center of its screen. This concept of scanning may seem difficult to visualize, so let's clarify it with some drawings of related waveforms (fig. 2).

Waveform H represents the horizontal sawtooth wave generated and amplified by the scope's horizontal circuitry. Waveform V represents a sine wave under study and applied to the scope's vertical circuitry. The CRT's resultant display is labeled, well, CRT. Now let's define screen area. As discussed, a non-deflected electron beam strikes the screen's center at Time 1/ (T1). Applying a high negative voltage between the horizontal plate moves the beam/ dot to the screen's left middle side (T0). Applying a high positive voltage moves the dot to the screen's right middle side (T2). Similarly, a positive voltage applied between the vertical plates moves the dot toward the screen's top and the negative voltage between the vertical plates moves the dot toward the screen's bottom. Now let's combine vertical and horizontal actions.

The ramp, or negative to positive climb, of a horizontal sawtooth begins at T0, and at that point the CRT's sweep line is on the left middle side. Also at T0 the incoming sine wave (on vertical input) is at 0 and consequently does not move the scan line up or down. By that time T.5, the incoming sine wave, has progressed from 0 to its most positive point—which also coincides with the highest vertical position on the CRT screen for that signal. At T.5, the horizontal sawtooth has also moved the dot slightly to the right. A portion of a sine wave appears on the CRT screen at that time. By T1, the sine wave has progressed downward through 0 and its most negative point (coinciding with the lowest vertical point for this signal) and moved back to 0. The horizontal sawtooth's ramp is crossing 0 at that time (T1), so the dot is in the screen middle of the CRT. Then from T1 to T2, the horizontal sawtooth instigates right side of screen scanning while the vertical sine wave completes a second 360-degree cycle. A super-fast retrace is initiated at T2, the CRT's dot quickly flies back to the left side of the screen (from T2 to T3), and the sequence repeats. The dot moves very fast during scanning, but due to screen persistence and our own persistence of viewing, we see a trace line rather than a fast moving dot—and the retrace is so super fast that it is not even visible to the eye.

Now let's add some brief notes.

Remember the horizontal and vertical centering controls mentioned earlier? They shift the sine wave's and sawtooth wave's "zero crossing point" to move the display *up*/down, left/right on the CRT *screen*. If free-running horizontal sweep is used, you adjust its frequency so vertical sine waves appear stationary rather than sliding left or right. If triggered sweep is selected, the incoming sine wave sets, or "triggers," the start of the horizontal sawtooth so the display stays stationary rather than move. Finally, notice fig. 2 illustrates two sine waves occurring during one sawtooth wave (one from T0 to T1 and another from T1 to T2). That equates to a vertical deflection frequency of two times the horizontal frequency,or depending on your point of view, a horizontal frequency of half the vertical frequency.

Using Oscilloscopes

Since oscilloscopes vary in their capabilities and even in the names associated with their controls, your best first step is reading the 'scope's manual and becoming familiar with each control. Remember that no one knows the scope better than the company that made it. Follow manual guidance until you can perform measurements like the manual illustrates, and then use your acquired knowledge to perform your own desired measurements.

As a simple first test, hold the vertical input probe's tip and increase the vertical amplifier's gain until you see 60-Hz

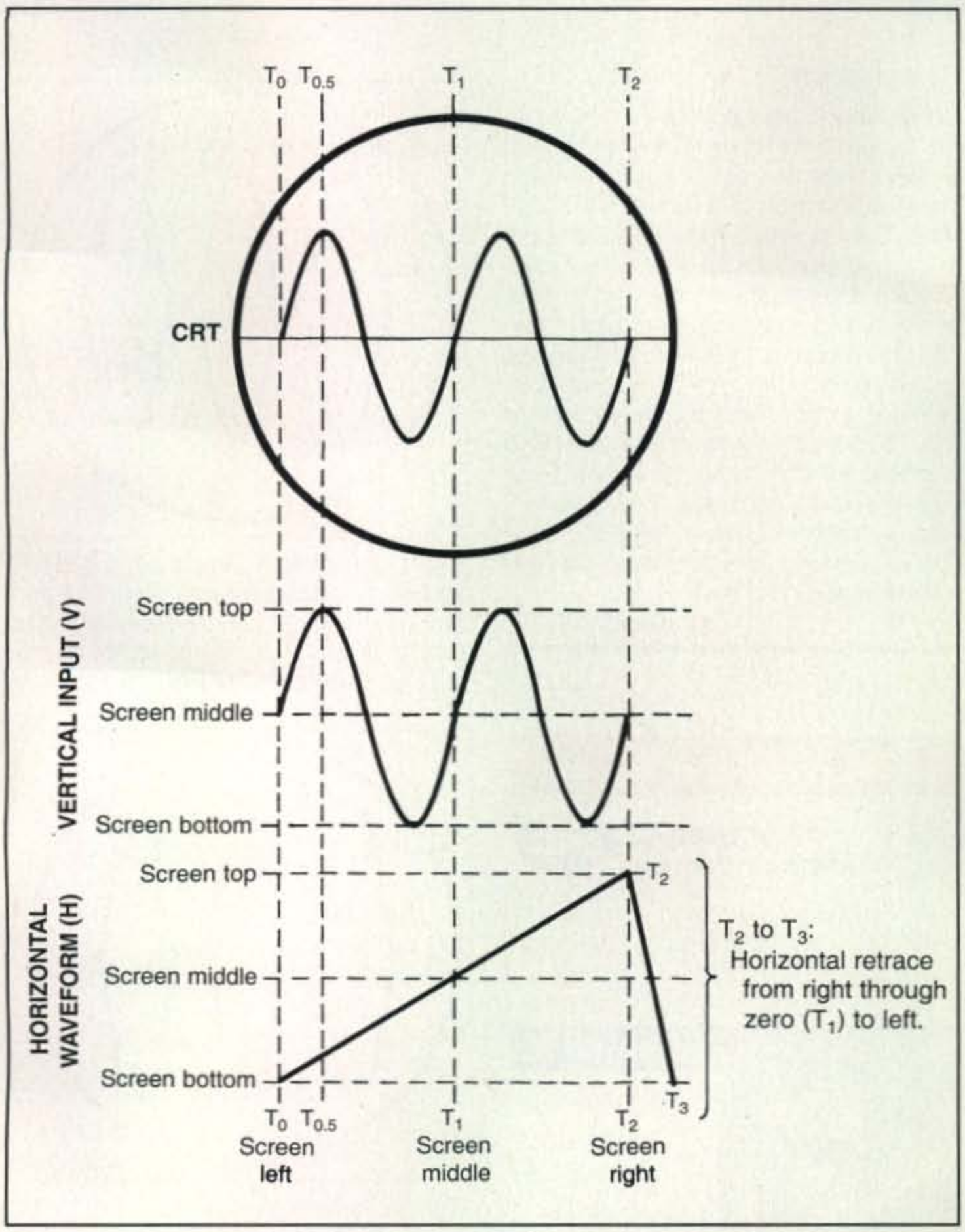


Fig. 2– Time-synchronized outline of beam-deflecting waves applied to horizontal and vertical plates of an oscilloscope's CRT and the resultant display on the screen (explanation in text).

waves (probably filled with glitches!) on the screen. In this case, your body acts like an antenna for the scope. If the scope's vertical amplifier has capacitive/DC-blocked input and also a vertical AC voltage calibrator, you can touch the probe's tip to the calibrator's output and adjust vertical gain so 1 volt, 100 millivolts, 10 millivolts, etc., fill the screen or fill one or two or three division grids overlaying the screen (you designate the range of measurements). This technique can be used for measuring AC ripple in a DC power supply, and knowing the DC and AC levels, you can then calculate the (supply's) overall percentage of AC ripple.

Does your scope's vertical section also have a DC input? Connect its probe to a 9-volt battery, watch the horizontal trace/line move up or down (again the gain control sets the amount of movement or deflection), and then reverse the battery connections and watch the horizontal trace move an equal amount in the opposite direction. Do you have a crystal or dynamic mic that operates without transceiver-supplied voltage? Connect the scope's probe to its output terminals, increase vertical channel input gain, and watch the displayed waves as you talk. Menial exercises? No. You are learning!

Do you remember your license exam test questions regarding use of oscilloscopes for checking the quality of SSB signals? Basically, a two- or three-turn pickup loop or a signal probe is used to couple a sampling of the rig's output signal to the scope's vertical plates and external triggering is used to stabilize the display. A test signal comprised of two non-harmonically related tones within the transceiver's audio passband (such as 700 Hz and 1200 or 1500 Hz, which are between 300- and 2800-Hz filter limits) are then used to modulate the rig. Assuming a properly operating rig and a mic gain setting of not over 100-percent modulation, the oscilloscope display will look akin to fig. 4. If the mic gain or RF drive is too high, the transceiver or linear amplifier's output will reach maximum before the two-tone test signal reaches maximum and will not be able to follow sine-wave peaks. The scope's waves will then "flat top" as shown in fig. 5. Flat topping indicates distortion and excessive bandwidth. Hopefully, it is the result of excessive mic gain (which is easily corrected) rather than a more serious problem requiring rig repair.

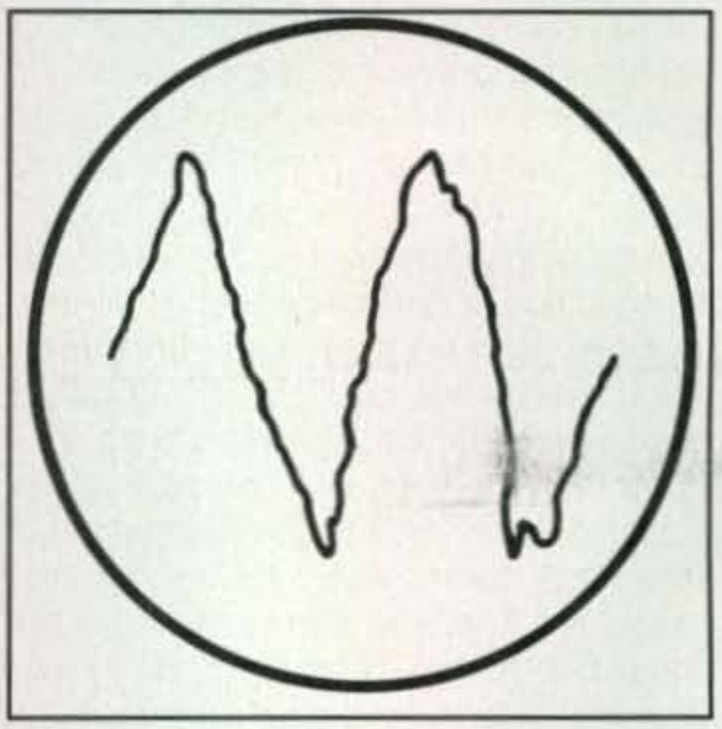


Fig. 3– Typical display of a stray 60-Hz signal picked up "through the air" by holding the input probe to an oscilloscope in hand. This display is a real-life example of high vertical amplifier section sensitivity.

Conclusion

In addition to being complex in design, the applications for oscilloscopes are so extensive that we could only squeeze a brief introduction into this month's column. Stay tuned, however, as we plan to include more useful notes on oscilloscopes and understanding the concept of electronic scanning in our next "How It Works" column. I also sense many old pros saying I left out a full explanation of this, that, etc,. and I again emphasize this is strictly an introductory look at oscilloscopes for newcomers, not a college thesis on the subject. Hopefully, I removed some of the intimidating mystery of oscilloscopes so newcomers will further investigate them.

73, Dave, K4TWJ

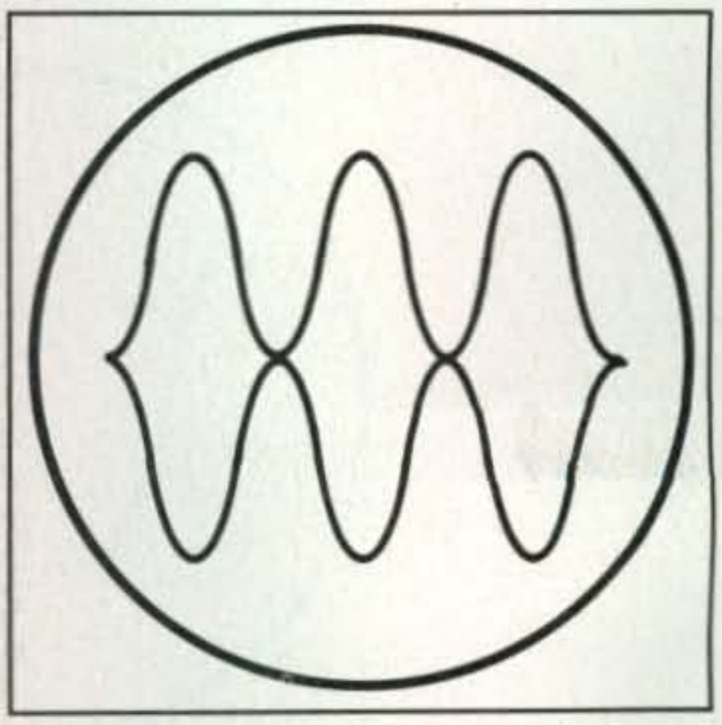


Fig. 4– A typical oscilloscope-displayed waveform for a properly adjusted and smooth-forming SSB transceiver with a two-tone audio signal applied to its mic input (explanation in text).

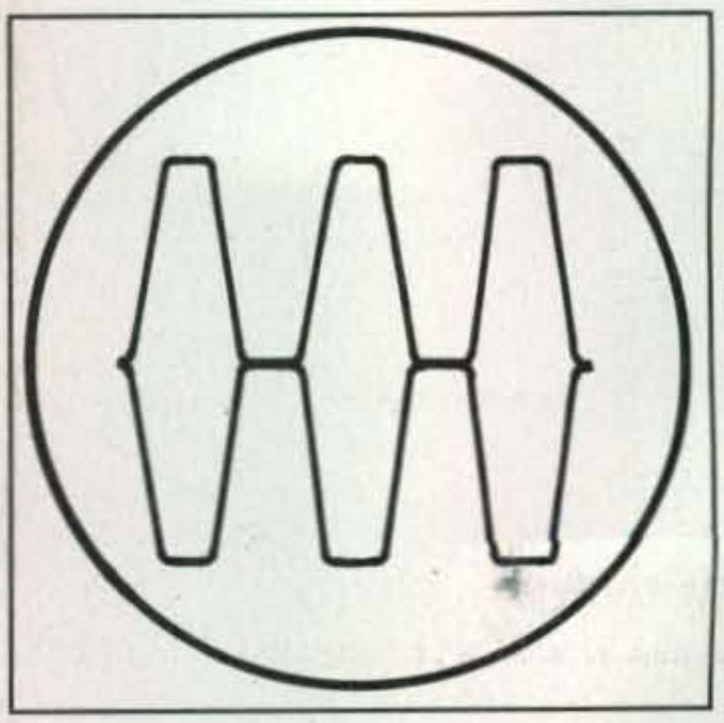


Fig. 5– Typical oscilloscope-displayed waveform for an SSB transmitter with mic gain or excessive RF output driving a linear amplifier. Note "flat topping" on the peaks of the sine waves (see text).

what's new

BY ANTHONY A. LUSCRE,* K8ZT

Radio Control Software, Ham Radio Gifts, Copper Strap, Log Analysis Software

This month's items include a look at the N4PY Rig Control Software, a variety of ham gifts, copper grounding strap, and contest log analysis software. Finally, we visit *The* Amateur Radio Website of the Month.

N4PY Rig Control Software

Carl Moreschi, N4PY, has been producing a variety of radio-control software products for over nine years, but is always adding new features. Carl also has been quick to add support for new radios to existing programs. He currently has three software programs, and they each support a number of different radios, totaling over 40. The first program is designed to control the Ten-Tec Pegasus, Jupiter, Omni VII, Argonaut V, RX-350, RX-320 and RX-340, the Elecraft K2 and K3, and a large variety of Kenwood rigs. The second program supports Ten-Tec Orion and Orion II (photo A). The final program supports a wide variety of *ICOM radios*.

Each of the programs not only provides almost all of the controls on the actual radio on your computer screen, but Carl has been able to add even more features than can be accessed from the radios themselves. These include spectrum-sweep displays, additional memory slots, and scan modes. The programs provide the ability to use a separate receiver along with your transceiver to provide additional receive capability. The programs also fully support the LDG AT-200PC Autotuner. By using this tuner, tuning your antenna has never been easier. This allows the program to recall tuner settings when going to a new band without the need to transmit.

The software also has support for the Griffin Technology Powermate. This is a knob that is connected to the USB port and can be used as a software-controlled tuning knob. This is very helpful for radios that do not have a remote tuning pod, as this allows knob tuning while using full software control of the radio.

All the software runs on all Windows® operating systems starting with Windows 3.1 and including Windows 95, 98, 98SE, ME, NT, 2000, XP, and Vista (but not the 64-bit versions of XP and Vista). Price per program is $65 for initial registration and $30 for optional updates. For more details visit <www.ralabs.com/n4py> or e-mail Carl at <n4py @arrl.net>.

Ham Radio Gifts

If you are an early bird, unlike me, you may already be planning holiday gifts for ham friends or family, or leaving hints for your family on what you might like to receive. Therefore, over the next few issues I will try to include a few gift ideas.

This month we visit the TNT (TechNote Time) Electrical Trades Gift Store. It has a number of gifts for radio and electronics enthusiasts, including T-shirts, Christmas ornaments, clocks, decals, watches, mugs, and trophies. Many items can be customized with your callsign or other messages. Prices range from less than $1 to $65.

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

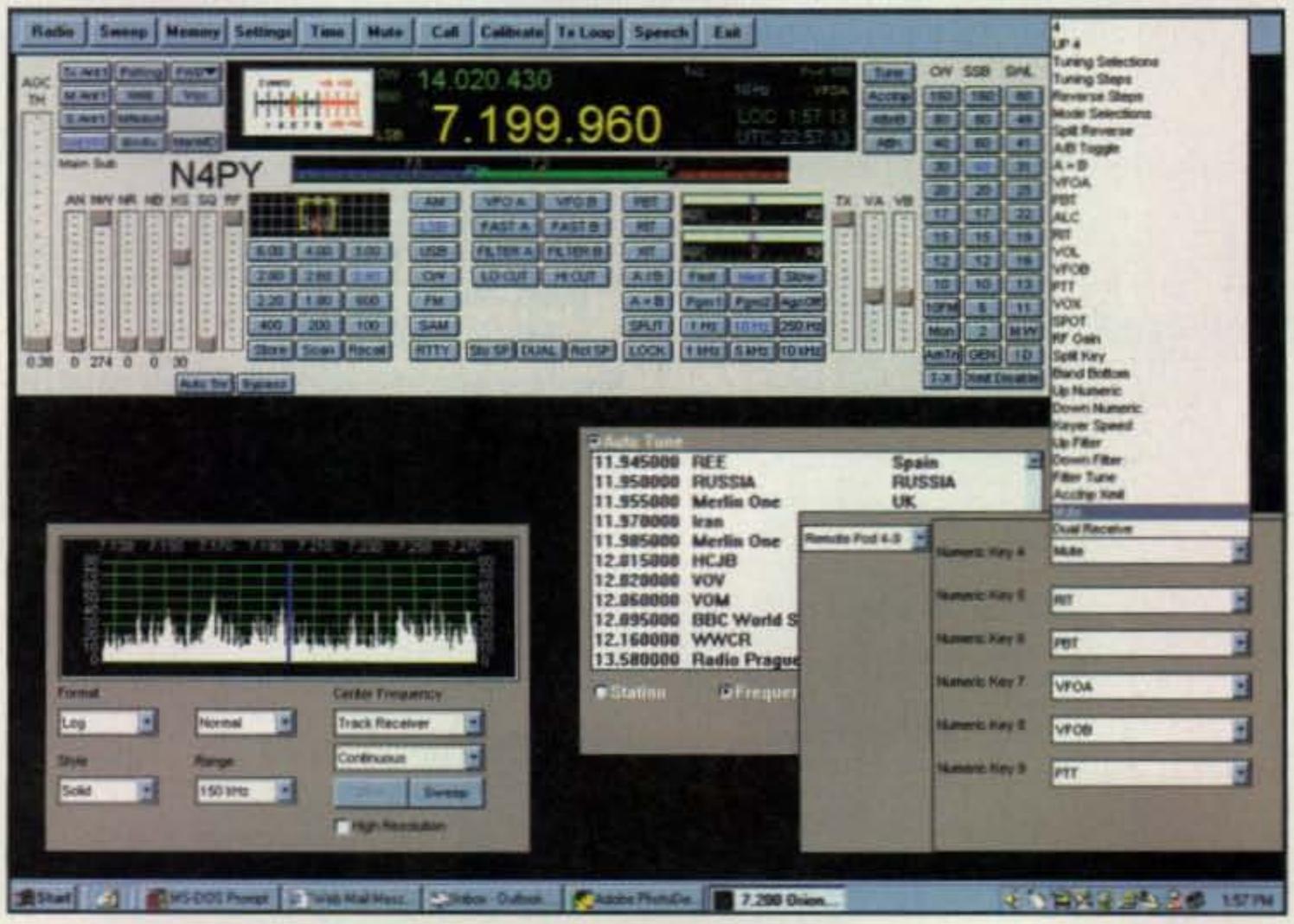


Photo A– N4PY Rig Control Software. Here it is shown controlling the Ten-Tec OrionII.

Photo B– Customized "caution signs" for your shack are just one of the many ham radio gifts available from TNT Electrical Trades Gift Store.

One that caught my eye was the personalized "Caution" sign (photo B). "Just indicate in the fields provided on the site what you would like your custom metal ham radio caution sign to say!" These 14" × 14" caution signs are made from baked caution-yellow, enamel-finished, diamond-shaped .040 aluminum with rounded corners, pre-punched holes for mounting, and high-performance vinyl, making these high-quality signs perfect for indoor or outdoor use. Price is $27. To take a look at the over 75 items in the ham radio area, visit <www.technotetime.com> and then look for the Ham Radio link on left of the page.

SH5 Log Analysis Software

This is a good month to go back and review your logs from last year's CQ World-Wide DX Contest. Reviewing last year's logs and results are a great way to improve your 2008 scores in both the SSB and CW contests. I suggest you do four things:

• Read the results of the 2007 contest in the August issue and this issue of *CQ*.

• Check out the historical information in logs and records for previous years at <www.cq-amateur-radio.com/cqwwhome.html>.

• Use your access code (received via e-mail if you sent in last year's log via e-mail) to review your UBN Report (see <www.cqww.com> for more information on interpreting these reports.)

• Use computer software to analyze your logs from last year.

I have used spreadsheet software to analyze my logs for a number of years. I found a new, free software program, the SH5 Post Contest Utility from Dmitriy Gulyaev, UA4WLI (see figs. 1–3). SH5 is available for download from <http://tr4w.qrz.ru>. Once you download and install the software, you will need to update its supporting files: K5ZD's Super Check Partial (SCP) database from <www.k5zd.com/scp> and AD1C's Amateur Radio Country List from <www.country-files.com/cty>. After you have updated these files, you are ready to open your log files from last year(s). SH5 allows you to open or import a variety of log files.

SH5 can analyze your log in a myriad of ways, including: log by band; distribution by band, time, or continent; rates; suspicious callsigns; and much more. Give it a try, as I think you might find it to be a new useful tool in planning your strategy for this year's contests.

Georgia Copper

Because of the "skin effect," radio-frequency currents tend to conduct along the surface of a conductor rather than through the middle. Because of this effect, copper strap is

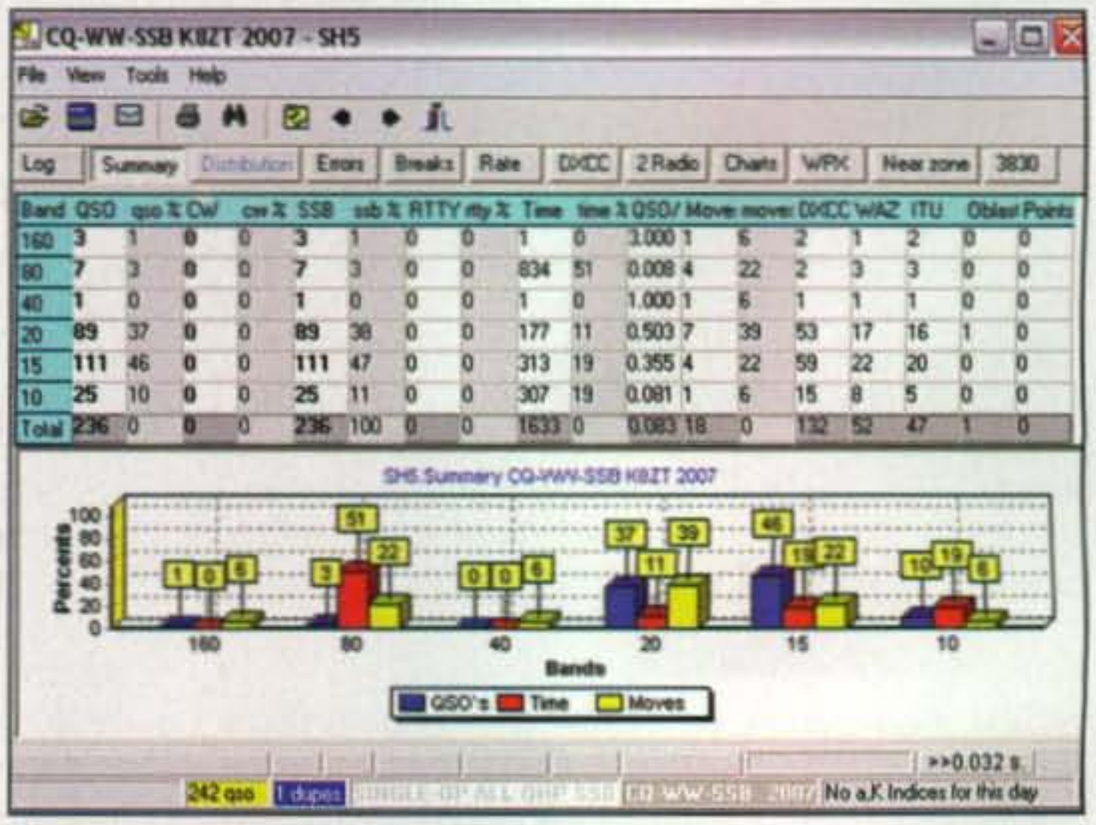


Fig. 2– SH5 Log Analysis software showing log summary.

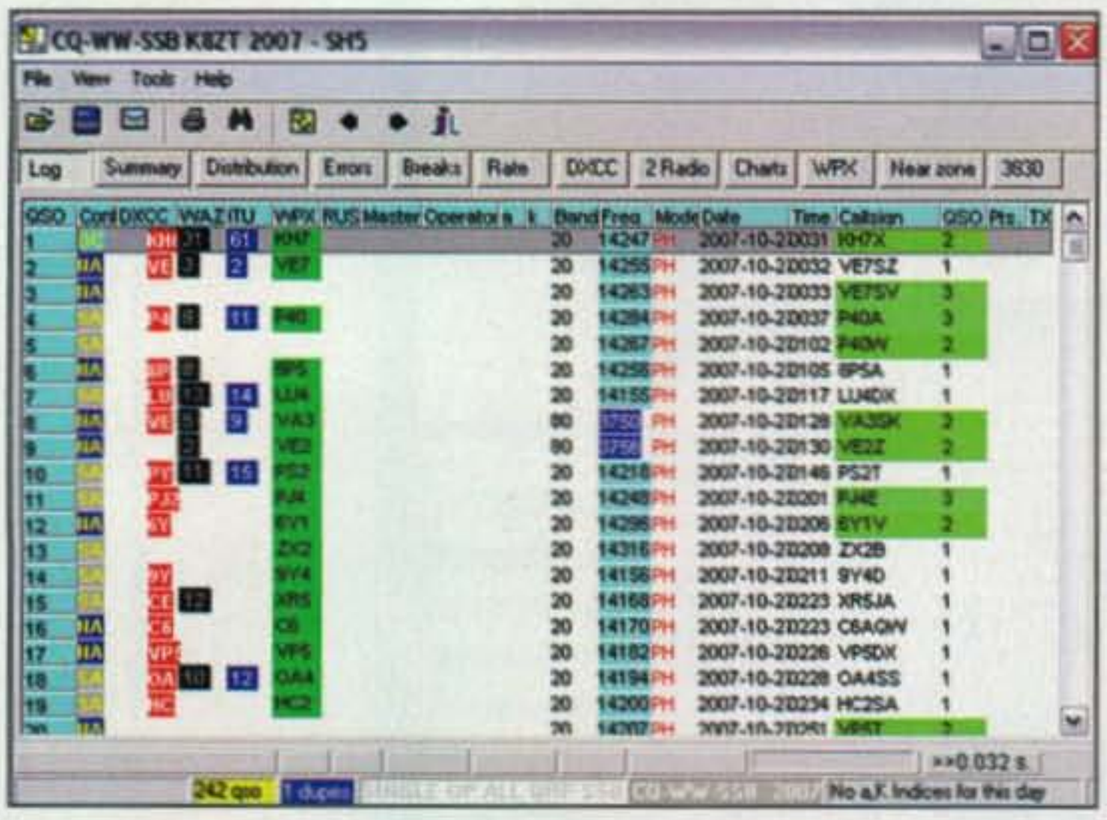


Fig. 1– SH5 Log Analysis software showing contest log.

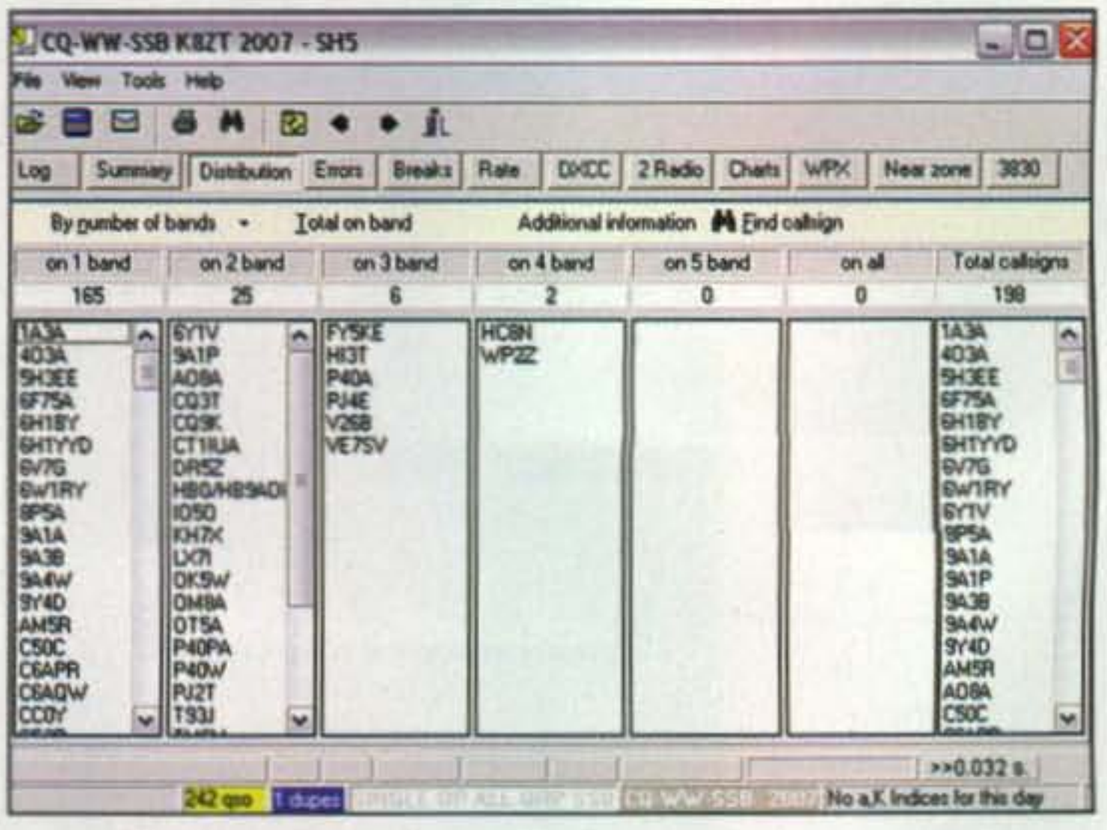


Fig. 3 – SH5 Log Analysis software showing distribution of stations worked.

Photo C– Georgia Copper's 032-inch copper strap, 2 inches × 25 feet, $60.

more efficient than an equal weight of copper wire for handling high-frequency currents. This makes copper strap a logical choice in RF-grounding applications. Copper strap has also proven extremely effective in applications *requiring* bonding and grounding for lightning protection. Currents encountered during a lightning strike can be compared to high-level RF currents. Copper strap handles these currents more effectively and with less inductance than round wire.

Georgia Copper sells copper straps (photo C), sheets, screens, and foil in a variety of thickness, widths, lengths, and shapes. For more info on the entire Georgia Copper product lineup or to order visit <www.gacopper.com>.

The Amateur Radio Website of the Month

This month's Amateur Radio Website is the newly revised DX Summit (fig. 4). The venerable site that has served DX for a number of years is getting a facelift, new more powerful server resources, and a new address: <www.dxsummit.fi>. The original OH2AQ DX Summit was launched in 1998 by Jukka Salomaa, OH2BUA, and Antti Kantola, OH5TB (OH2AQ is the callsign of the Radio Club of Elisa). The New DX Summit is operated by Arcala Extremes, OH8X, and supported by the Yasme Foundation Inc. (www.yasme.org).

DX Summit offers hams DX Spots, Announcements, Custom Sorting of Spots, Search of Previous Spots, and the ability to Send a New Spot. In addition to the current features, many new features utilizing the increased computing power are currently on the drawing board.

Wrap-up

That is all for this month's column. A few months ago I started a new feature—a web page with all of the links given in my columns. This will allow you to click on each link instead of having to type them from the written page. It will also allow me to update links as they change over time. The page will include links from all *CQ* articles I have written since my first, in the September 2007 issue. To reach the page, visit <www.k8zt.com/cq>.

Remember, I welcome your feedback, questions, and/or comments. If you are a producer of a new product for amateur radio, please feel free to e-mail me or use the 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.*

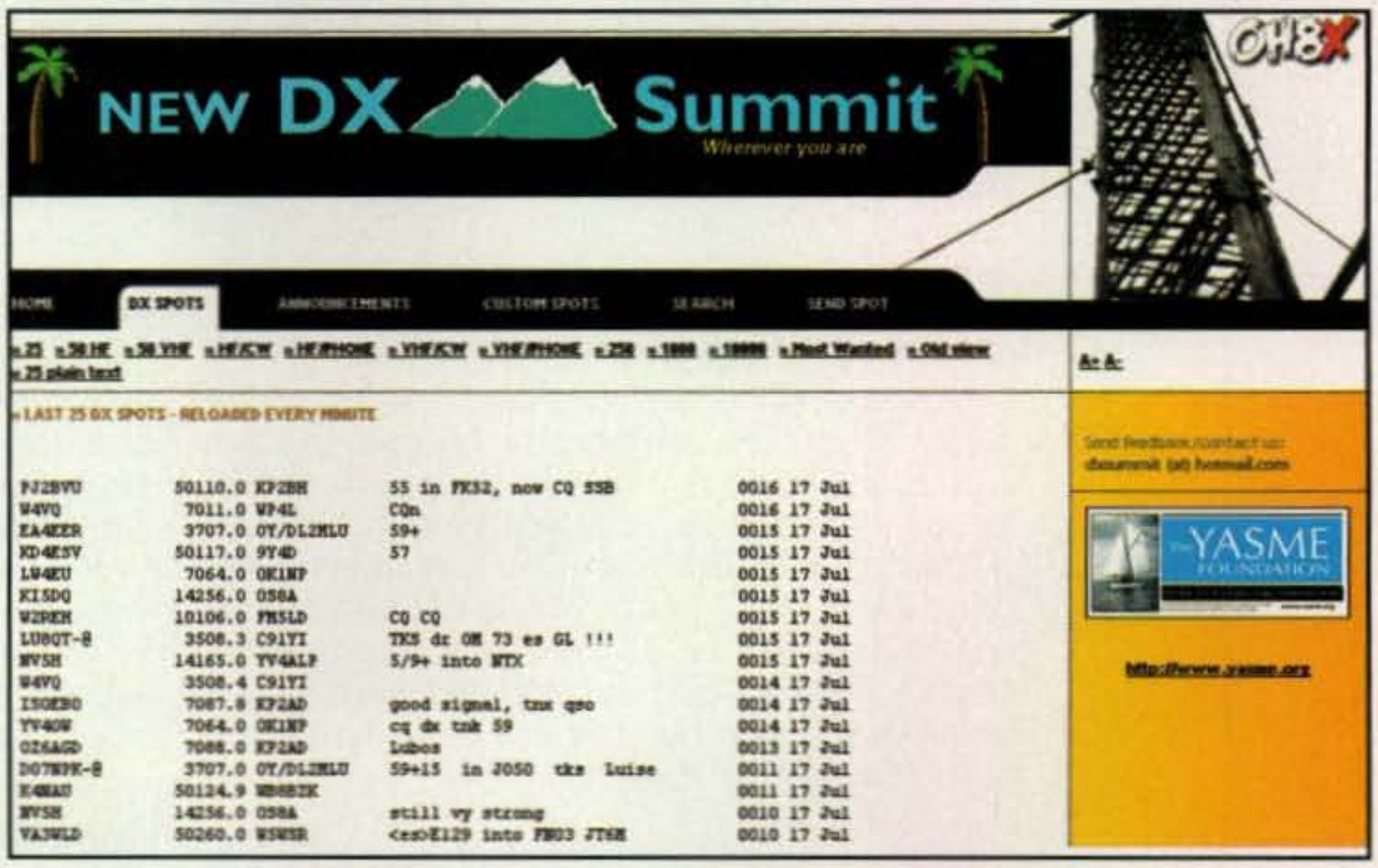


Fig. 4– Screenshot of the DX Summit website showing DX spots.

awards

BY TED MELINOSKY,* K1BV

Q&A and the DARC Awards

This month we start out by answering some questions asked by county hunters. We then present the series of awards offered by the Deutscher Amateur Radio Club.

Q: I worked W4XYZ and he sent me two QSLs for the same contact. County identification was different on both cards. He says I can use the contacts as a "county line" because "my shack straddles the county line." He used as additional proof the fact that he pays property taxes in the two counties. Can I count both?

A: The station says that his shack/antennas/feedlines bracket two counties. We permit mobile stations to straddle a county line and count both with one QSO. (I personally have a queasy feeling about this, but that's just an opinion, not a rule.) This kind of situation is unique, so I can't see it causing a problem. As the USA-CA Award custodian, I would allow each of the counties. Paying property taxes in two jurisdictions as claimed is pretty good evidence.

Q: (1) Some independent cities in Virginia are not adjacent to any county—e.g. Chesapeake, VA is adjacent only to other independent cities. What does this count for?

(2) The independent city of Lynchburg, VA is adjacent to Amherst, Bedford, and Campbell counties. If I had three different QSOs with different stations/different callsigns but all in Lynchburg, could I count each of them for a different adjacent county?

A: (1) Most independent cities are located within counties and the borders of that city do not touch any other bordering county. When you work that independent city, you get credit for that one county which surrounds it. There are four independent cities along the Atlantic Coast that don't touch anything but each other. These are Chesapeake, Norfolk, Portsmouth, and Virginia Beach. The USA-CA program handles this odd situation by noting that each of them counts for "Isle of Wight" county.

(2) The interesting independent cities have city boundaries that touch the borders of one, two, or more surrounding counties. Example: The City of Petersburg, VA borders Chesterfield, Dinwiddie, and Prince George counties. If you contact a Petersburg station, you get to choose *any one* of those three counties. However, if you later work another station in the city of Petersburg, *you cannot count it for anything else.*You get to choose one time, and that's it.

DARC Awards

The Deutscher Amateur Radio Club e. V. (DARC) is the equivalent of our American Radio Relay League here in the United States. It offers a broad series of awards, and we are happy to present the rules of several of the most popular ones.

General Requirements: Available to all amateurs and SWLs. All contacts must have been made from the same country. DARC DX Awards are based on the European Country List and the ARRL DXCC List. All bands may be used. Application forms are available for 1.53 Euros (or stamps) from Eberhard Warnecke, DJ8OT, Postfach 10 12 44, Velbert D-42512, Germany. They are also available on the DARC internet site (http://www.darc.de/diplome/index.html). Use of these forms is mandatory. QSLs for all contacts claimed must be submitted with the application. Fee for each award is 5 Euros. En-

USA-CA Special Honor Roll

James H. Rice VA6JR
USA-CA All Counties #1166
May 30, 2008

USA-CA Honor Roll

500

CT3MD 3435

1000

CT3MD 1752

3000

VA6JR 1190

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.

To earn the DARC's WAE I Award contact at least 60 countries and earn 200 points.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

dorsements are 5 Euros. Trophy and plaque cost is 20 Euros; endorsements are for the trophies and plaques are free. Payment in U.S. dollars or IRCs is currently accepted at the rate U.S. $1.00 equals 0.75 Euro; 1 IRC = 0.75 Euro.

The DARC uses volunteer award managers for the award. They are:

Europa Diplom: Franz Berndt, DL9GFB, Heinrich-Heine-Str. 1, D-18209 Bad Doberan, Germany.

EU-DX-D: Dietmar Kasper DL3DXX, Birkenweg 3, Pirna-Jessen D-01796, Germany.

WAE I, II, and III: Hajo Weigand, DJ9MH, Altensteiner Weg 1, D-97437 Hassfurt, Germany.

The European Country List, used in the DARC awards series, is as follows:1A, 3A, 4O, 4U1I, 4U1V 9A, 9H, C3, CT, CU, DL, E7, E7, EA, EA6, EI, ER, ES, EU, F, G, GD, GI, GJ, GM, GM*, GU, GW, HA, HB, HBØ, HV, HV, I, IS, IT, JW/B, JW, JX, LA, LX, LY, LZ, OE, OH, OHØ, OJØ, OK, OM, ON, OY, OZ, PA, R1F,R1M, S5, SM, SP, SV/A, SV, SV5, SV9, T7, TA1, TF, TK, UA, UA2, UR, YL, YO, YU, YU8†, Z3, ZA, ZB.

** GM, Shetlands*

† YU8B, Kosovo

Sharon Matthew, NØLXJ
USA-CA All Counties #1165, December 8, 2007

Sharon Matthew, NØLXJ, USA-CA #1165.

Hooray! I did it . . . I finally finished working all 3077 counties in the good old U.S. of A. It took me four years to do it thanks to the declining sunspot cycle and the fact that I'm still working. However, with the help of all the good folks out there and the encouragement of my husband Matt, WØNAC, I now have my USA-CA All Counties award framed and hanging on the wall next to his.

Neither of us had ever heard of county hunting back in 1960 when at matt's urging I got my Novice ticket (KN8WHW) in dayton, Ohio. He's a hard task master as an Elmer. He insisted I not just memorize answers to exam questions, but that I actually learn and understand radio theory, etc. By the time I got my code speed up to the required 5 wpm and passed my test I was able to design and build my own transmitter, even down to fabricating the chassis!

I had a couple of memorable experiences during that year, both having to do with CW contacts. One evening I answered a CQ and in the course of our "Chat," the ham on the other end told me his roommate was from the same hometown as mine and he turned the key over to him. Imagine my surprise (and shock) to discover that his roommate was an old boyfriend from several years earlier! On another occasion I was awarded a Rag Chewer's Certificate for a CW contact that lasted an hour or more.

About the time I needed to be studying to upgrade my license, the Air Force put Matt back in the cockpit and he was gone most of the time. I had two babies in diapers then, and I didn't have the time nor the energy left to pursue radio, so my Novice license expired and life went on.

After matt retired from the Air Force, we moved home to Colorado. Around 1999 he discovered county hunting and set up a mobile rig, as well as the base station at home, and I became the official logger on the road. It didn't take long before he began nudging (nagging) me to get my license so we could work as a team. I'm the minister to the senior adults at South Suburban Christian Church in Littleton, and I kept telling him I didn't have the time to devote to studying for the exams. Remember the old saying "If you can't fight 'em, join 'em"?

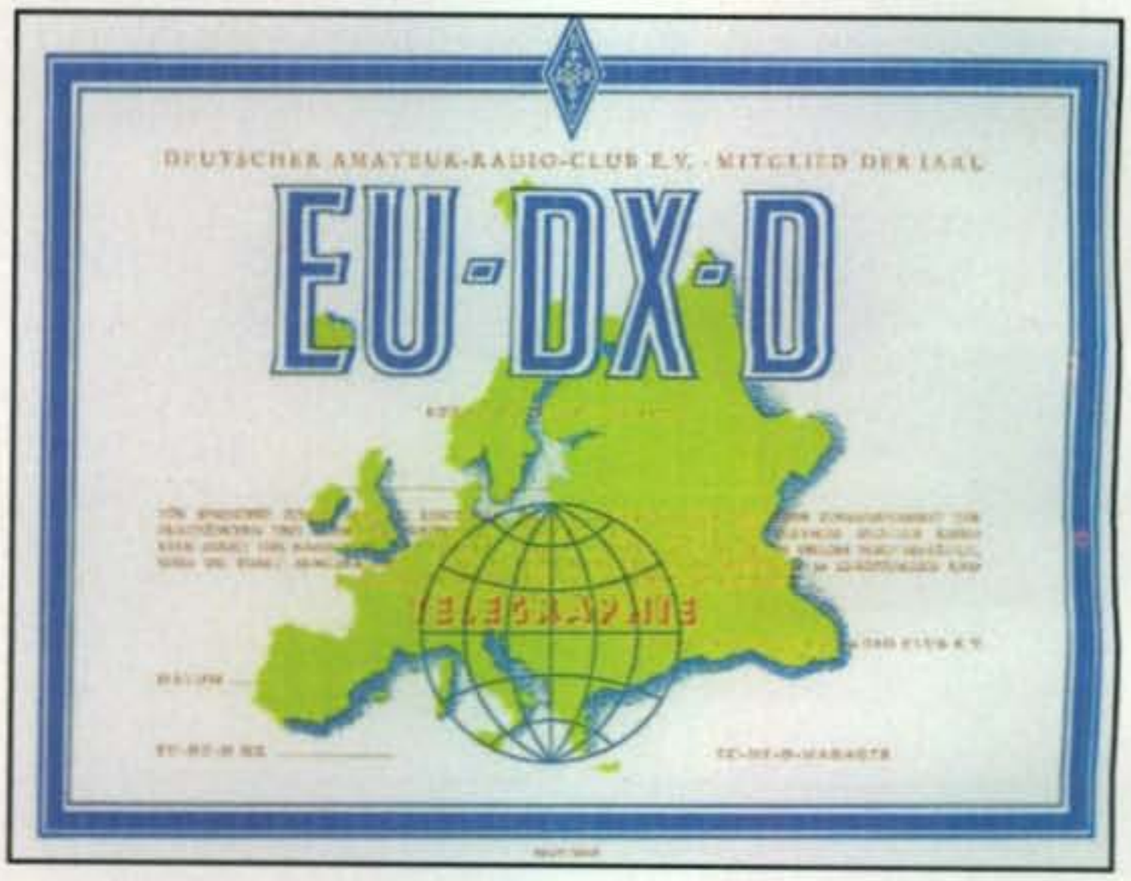
Well, the same rule applied as before—learn it, don't memorize.I received my Technician license in June of 2003 and a month later passed the General exam, and KCØQER took to the airwaves as a full-fledged county hunter and member of an OM/YL team. My current call is NØLXJ.

I'm still the official on-the-road logger. That's quite a feat with a little dog on my lap, a three-ring notebook and microphone in my left hand, and writing furiously with my right hand, especially if we're putting out a county on the fly.

What a great hobby this is. I wouldn't take a million for the fun and unusual and sometimes alarming experiences we've had over the miles we've traveled. In August 2007 Matt and I celebrated our 50th wedding anniversary in Hawaii putting out five counties while enjoying gorgeous scenery.

Many, many thanks to the fine folks out there who have become good friends!

73, Sharon, NØLXJ



The EU-DX-D award may be earned annually and is issued for CW, SSB, and Mixed modes.

Worked All Europe (WAE) Award. Contact European countries on different bands. The award is issued in all modes. Mixed mode okay. Each European country counts one point on each band. For stations outside of Europe, contacts on 80 and 160 meters count two points. A maximum of five bands per country may be used.

Classes: WAE III—at least 40 countries and 100 points; WAE II—at least 50 countries and 150 points; WAE I—at least 60 countries and 200 points. Holders of WAE I get a special WAE badge.

WAE Trophy: Work at least 73 countries and earn 365 points. All countries that are listed on the WAE country list at the time of application are valid. Deleted countries may not be counted. To apply for the WAE Trophy, confirmation of contacts with every country on the WAE country list is required on any five bands. All amateur radio bands are allowed. Stickers will be issued for the confirmation of contacts with each country on six or more bands. Candidates for this trophy may participate in a Top List (list of missing countries), which can be accessed at the homepage of the DARC Committee for DX and HF-Contesting.

WAE Top Trophy (plaque): Work at least 70 countries and earn 300 points. Deleted countries may not be counted towards the plaque.

EU-DX-D. This award may be earned annually. It is issued in the following classes: CW, SSB, and Mixed modes. A minimum of 50 points per year is required for the EU-DX-D basic award or any annual sticker. Twenty points must be obtained by contacts with European countries, and 30 points by contacts with countries outside Europe. All bands may be used. Each country counts one point, except on 80 and 160 meters, two points. Stickers are available for each additional block of four European and six non-European points within the same calendar year. For example:

20 EU points in 2004 + 30 DX same year = 50 pts for 2004
28 EU points in 2003 + 42 DX same year = 70 pts for 2003
32 EU points in 2002 + 48 DX same year = 80 pts for 2002
Total of 200 points, or four stickers.

Each year's score may be added to obtain the EU-DX-D 500 badge and the EU-DX-D Trophy. There is no limit to the number of years you accumulate.

Special stickers are available per year and mode for each of the following bands: 10, 18, and 24 MHz.

EU-DX-1000 plaque is awarded for earning a total of 1000 points, regardless of how many years are involved.

The Europa Diplom is awarded for working/hearing amateurs in different European countries. Applicants must prove a total score of at least 100 points.

EU-DX-1000 Trophy (plaque): This plaque is awarded for earning a total of 1000 points, regardless of how many years are involved.

Europa Diplom. Awarded for working/hearing amateurs in different European countries. Applicants must prove a total score of at least 100 points. Annual score is as follows: each confirmed European country counts one point per year on each amateur band (including 10/18/24 MHz and VHF). All bands and modes. Total score equals sum of the annual score for the year of application and the five preceding years.

Europa Diplom-300 Plaque. Europa Diplom recipients can receive this plaque under the same conditions as listed for the Europa Diplom, if they earn 300 points. However, contrary to the the Europa Diplom, each country per band may be used only once.

Examples: 50 countries on 6 bands = 300 points; or 10 countries on 9 bands plus 20 countries on 6 bands plus 15 countries on 5 bands plus 5 countries on 4 bands = 300 points.

We're always interested in hearing from clubs, special-interest groups, or individuals who sponsor an award. Please contact me at the e-mail r snail-mail address shown on the first page of this column. 73, Ted, K1BV

BY CARL SMITH,* N4AA

The "Magic Band"

What do you do when the propagation on the HF bands is just not very good? Well, I can think of a lot things, but they are not radio related and would involve manual labor—stuff such as yard work, painting the house, etc.

However, during the month of June and extending into July there was an amazing amount of activity on the "Magic Band," 6 meters. I can say amazing, because that is what the "experts" were saying. Records were set, or broken, with Japanese stations being worked from all across the U.S. Europe was well represented working into the U.S., too. You just never know what might happen on 6 meters. Last year we were treated to some great openings, but this year it was even better. You aren't on 6? Many of the radios on the market these days include 6 meters, even less-expensive ones such as my IC-706, which puts out 100 watts. Antennas are really quite small and easy to put up; they don't have to be big for you to have some fun and maybe put some interesting entries in your log. If you are interested in the ARRL's Challenge Award, those 6-meter contacts will add to your totals, too.

There have been some "DXpeditions" that were primarily for 6 meters as well. Dennis, K7BV, was active from Belize and the Galapagos in June/July, CYØX from Sable Island was primarily a 6-meter operation, and TO5E was on from St. Barthelemy. All of these did operate some HF, but just to have something to do while waiting for 6 meters to open up.

We talk of getting youth involved in amateur radio. Franz, DJ9ZB. has taken action. Here his grandson is working to learn CW. In a few years he will accompany "grandpa" on DXpeditions, where Franz will work SSB and his grandson will handle CW. (Photo courtesy of Franz, DJ9ZB)

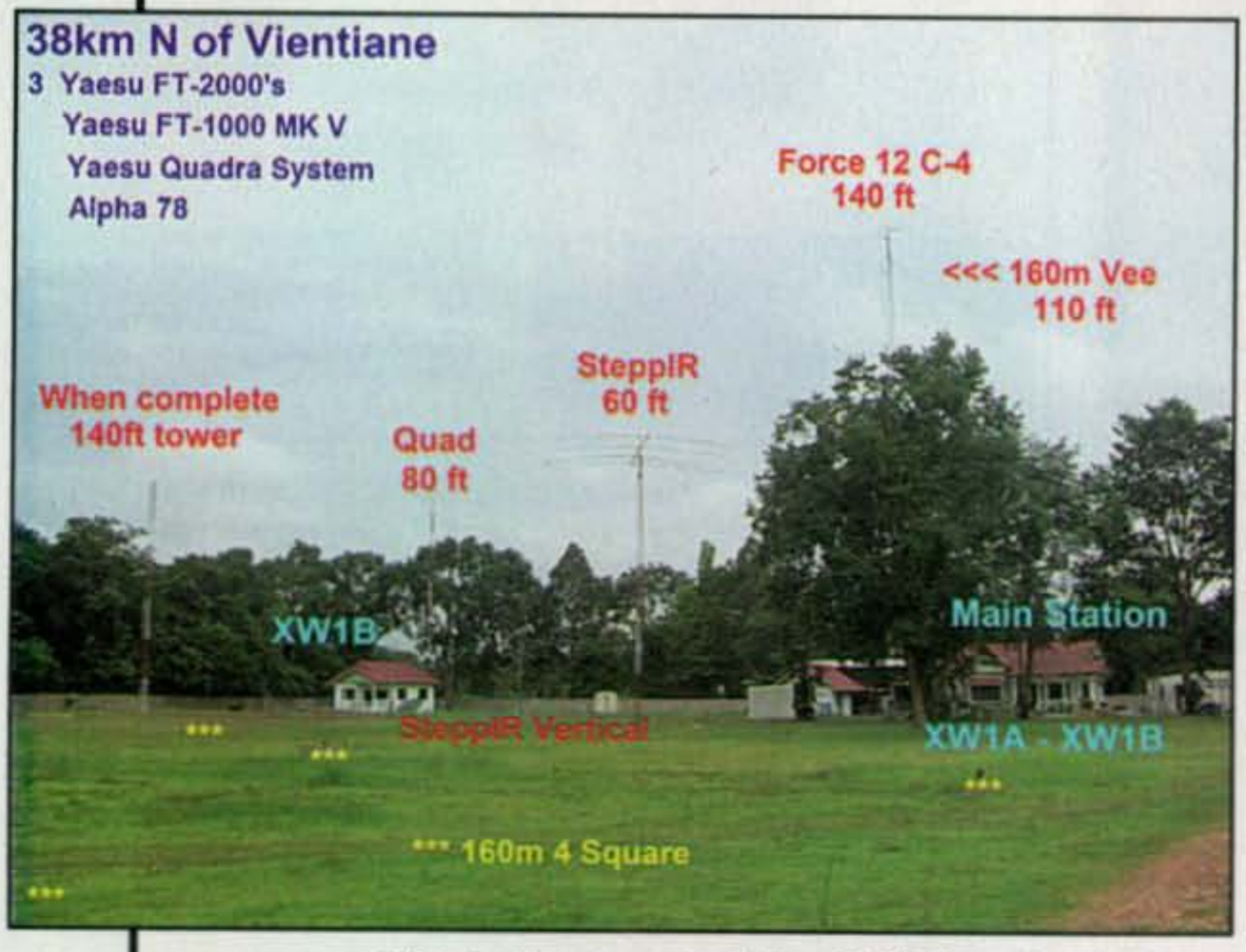
Upcoming DXpeditions

In checking my calendar of upcoming operations, I note the French operation from Glorioso is still being "hoped for" in the September/October time frame. As of early July no new information had been posted. Sigi, DL7DF, and his team are scheduled to be active as A25/DL7DF September 23 to October 6.

I'm not sure why, but Willis Island, VK9W, was ranked at #12 on *The DX Magazine*'s Most Wanted survey for 2007. There have been operations from Willis in the past, but apparently they failed to meet the demand. A team of nine German operators and one Polish op will be on Willis in October. The website says they plan to be on the air from October 9 to the 27 with four stations, all with amplifiers, and the antennas will be the verticals that have become so popular with DXpeditioners. There is no information concerning an on-line log as of this writing. If you want to keep up with the plans, check: <http://www.vk9dwx.de>.

Lots of operations are already being announced for the CQ WW DX Contests in October (SSB) and November CW). A group of at least five, led by Joe, W8GEX, will be going to St. Barthelemy. His group will be using the special call TO5DX, primarily for the CQ WW SSB Contest. Before/after the contest they will be active on CW/SSB/RTTY. There are many others who are planning operations for the CQWW, and you check them out on the website of Bill Feidt, NG3K, who does an out-

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>



This is the layout of the XW1B station in Laos. Bruce Ault has created an outstanding station in this remote part of the world. (Photo courtesy of Larry, KJ4UY)

CQ DX Awards Program

SSB Endorsements

330	K4JLD/339	330	YU3AA/337
330	XE1AE/339	330	AB4IQ/336
330	OZ3SK/338	330	HB9DDZ/334
330	WS9V/338	310	WØROB/317
330	EA3BMT/338	150	WA6JJB/197
330	K2FL/337		

CW Endorsements

330	WØJLC/337	310	W6YQ/318
330	HB9DDZ/335	310	WA4DOU/315

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 338 active countries. Please make all checks payable to the award manager.

standing job of posting all this information for our benefit. Check it out at: <http://www.ng3k.com/>.

A bit further on in the calendar we find an operation from Papua, P2, late in October. This was announced back in April and little has been heard since. No website was announced, so just keep watching/listening after mid-October.

The Most Wanted Survey

I mentioned the *The DX Magazine* Most Wanted Survey above, and I invite you to visit the DX Publishing website, <http://www.dxpub.com>, after September 1 and submit your own "most wanted." This annual survey is used by DXpeditioners, DX Foundations, clubs, *etc.*, to help them decide which DXpeditions to help financially. The survey is conducted during September and October each year with the results published in the January/February and March/April issues of *The DX Magazine*. This year the list has been expanded to include some 300 possible entities for you to choose from. Also, an extra column has been included for you to check if you need/want that entity on 160–30 meters. Both of these additions were made after careful consideration of suggestions made over the past several years.

Logbook of The World

Now here is an interesting item from page 8 of the ARRL Annual Report for 2007:

"Despite another year without many sunspots to spark the ionosphere, interest in awards chasing is increasing. Participation in the DX Century Club (DXCC) is up more than 1,000 applications over 2006, and is the highest it has been since 2001 when the last solar cycle peaked. Much of the interest in DXCC and ARRL's Worked All States (WAS) award can be attributed to the strong use and performance of ARRL's Logbook of The World (LoTW) on-line QSO confirmation system, which links directly into those two awards. More than 150-million contacts have been loaded into LoTW."

Indeed, I am seeing more and more reports of logs being uploaded to the LoTW. I personally use it every few months to keep up to date for the band/mode confirmations that could be there. In case you missed it in the DX news sources recently, the logs for 4U1UN for the last few years have been uploaded and prior years were being worked on to get them uploaded as well. I applaud anyone using the LoTW system. With the ever-increasing cost of postage, most notably from Europe to the U.S., using the LoTW is "dirt cheap" in comparison. Sure it's a little work, but after you have been through the process a few times it isn't all that difficult. When you consider the cost of just *one* return envelope from some

The WAZ Program

80 Meter SSB

90 ..... EA5GPQ

30 Meter CW

85 ..... K5KC

40 Meter CW

263 ..... JA1DIO

160 Meters

279 ..... EU7SA (33 zones)

All Band WAZ

Mixed

8515	W9CPV	8518	K4XD
8516	UYØMM	8519	OE3JAG
8517	JA5NPV	8520	CT3MD

SSB

5078	VE7SAG	5080	VK2RO
5079	N6JOJ		

RTTY

187 ..... K5KC 188 ..... JR3UIC

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>.

5 Band WAZ

As of July 1, 2008, 753 stations have attained the 200 zone level and 1605 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
K5KC

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

SU1U, 199 (27)
N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W2YY, 199 (26)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
WØCP, 199 (18)
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)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
VE3XN, 199 (26)
YU7GMN, 199 (10)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10m)
RX4HZ, 199 (13)
KØGM, 199 (17)
S58Q, 199 (31)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
F5NBU, 198 (19, 31)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W7VJ, 198 (34, 37)
K9MIE, 198 (18, 21)
W9RN, 198 (26, 19on40)
W5CWQ,198 (17, 18)
WB9EEE, 198 (17, 18)
K9OW,198 (34on10, 2on15)
I5KKW, 198 (31, 23 on 20)
JT1BV. 198 (4, 11)

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

UYØMM (170 zones)
DK8MCT (161 zones)
G3WW (161 zones)
S59U (187 zones)

5 Band WAZ updates:

K5PC, 200 zones
I5KKW, 198 zones
K5AC, 200 zones
G3VKW, 195 zones

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WPX Program

CW

3204 ..... IKØYUO

SSB

3008 ..... JH7BBK
3009 ..... SV7CUD
3010 ..... AA4FU
3011 ..... KD4QMY

Mixed

2011 ..... W3LL
2012 ..... AA4FU

Digital

13 ..... W3LL

CW: 1250 AA4FU. 4300 N4NO.
SSB: 750 JH7BBK. 1400 IAØBNR. 3600 N4NO..
Mixed: 2150 W3LL.. 3950 WB2YQH. 4850 N4NO.
Digital: 1100 W3LL.

160 Meters: AA4FU
30 Meters: N4NO
17 Meters: N4NO
12 Meters: N4NO

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, UT3UY, WA5VGI.

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, UT3UY, WA5VGI.

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 bars for the Award of Excellence are $6.50 each.

European countries costing at least $3.00 U.S. (and it will get higher), I think you could spend a little time and effort to learn how to use the LoTW, don't' you?

Oh no, some DXpeditioners might say. There goes our money for QSLing! I really don't think that is going to be a problem. DXpeditions are not in the business of "selling" QSL cards anyway. Major DXpeditions are using online donation systems with PayPal, etc., and I hear it is working just fine.

In many cases the QSL cards are being donated, and the only expense to a DXpedition would be the uploading of their logs to LoTW. Also, just think of all the time they would save by not having to handle all those paper requests.

Rumors

Now for a few words on rumors, etc. From time to time someone will say to me, "Hey I hear there's gonna be an operation from 'xxxyyyzzz.' What's the deal? I know you hear about these things before we do." Well, let me tell you about those kinds of things. Yes, many times I am told of pending operations. Often I am asked to keep it to myself for the moment. The organizers of many of these operations are dealing with gov-

Here is the club station at Addis Ababa, ET3AA. It's always interesting to know what is on the other side of a QSO. (Photo courtesy of Franz, DJ9ZB)

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5710 9A2AA	4148 VE3XN	3635 KF2O	3294 W9OP	2704 K2XF	2271 VE6BF	1826 W7CB	1511 KC9ARR	815 KL7FAP
5152 W1CU	4080 I2PJA	3619 WB2YQH	3227 K9BG	2673 JN3SAC	2162 W3LL	1741 AB5C	1330 K6UXO	726 K5IC
4983 W2FXA	3916 N9AF	3485 IK2ILH	3091 9A4W	2503 K1BV	2116 AE5B	1739 KX1A	1322 AA4FU	682 AI8P
4551 EA2IA	3821 I2MQP	3483 YU7BCD	3007 W2WC	2486 N8BJQ	2192 N2SS	1705 W2EZ	1269 K5WAF	644 KWØH
4494 N4NO	3791 S53EO	3481 WA5VGI	2965 OZ1ACB	2455 W6OUL	1951 KØKG	1662 SV1DPI	1016 RA1AOB	636 ZS2DL
4447 9A2NA	3801 KØDEQ	3325 SM6DHU	2946 W9IL	2410 K5UR	1891 VE9FX	1643 N1KC	976 KM6HB	
4295 YU1AB	3703 I2UIY	3332 ON4CAS	2873 W2ME	2358 I2EAY	1847 W2FKF	1556 W2OO	964 K8ZEE	

SSB

4807 IØZV	3457 9A2NA	2711 LU8ESU	2300 SM6DHU	2076 K2XF	1821 W2FKF	1591 JN3SAC	1258 N1KC	864 VE6BF
4310 VE1YX	3198 CT1AHU	2672 KF7RU	2250 I3ZSX	2071 N6FX	1765 KQ8D	1525 N8BJQ	1232 AG4W	806 K7SAM
4000 I2PJA	3155 I2UIY	2595 EA1JG	2238 WA5VGI	2046 K5UR	1754 DL8AAV	1480 AB5C	1145 EA3EQT	637 K5WAF
3900 F6DZU	3133 OE2EGL	2591 IN3QCI	2209 IK2QPR	1946 W3LL	1729 W6OUL	1464 VE7SMP	1045 KX1A	
3889 OZ5EV	3108 I4CSP	2552 YU7BCD	2178 NQ3A	1935 SV1EOS	1714 IK2DZN	1463 I2EAY	1042 IZØBNR	
3544 I2MQP	2970 KF2O	2451 EA3GHZ	2135 W9IL	1927 AE5B	1688 KI7AO	1386 IK4HPU	1031 IK8OZP	
3473 EA2IA	2857 4X6DK	2431 G4UOL	2094 I8LEL	1866 SV3AQR	1623 VE9FX	1377 EA3NP	978 EA7HY	
3458 N4NO	2726 KØDEQ	2326 CX6BZ	2093 W2WC	1849 K3IXD	1611 W2ME	1338 AE9DX	951 KU4BP	

CW

4953 K9QVB	3046 9A2NA	2623 SM6DHU	2324 OZ5UR	2089 K2XF	1804 EA7AAW	1250 WA2VQV	1030 AA5JG	
4947 WA2HZR	2999 WA5VGI	2606 YU7BCD	2309 JN3SAC	1967 I2MQP	1465 AC5K	1220 AA4FU	915 N1KC	
4042 N4NO	2927 KØDEQ	2586 EA7AZA	2246 N6FX	1953 N8BJQ	1445 EA2CIN	1209 W9HR	824 VE9FX	
3685 VE7DP	2688 I2UIY	2582 I7PXV	2244 IK3GER	1945 K5UR	1364 WO3Z	1147 KX1A	749 AE5B	
3557 LZ1XL	2636 KF2O	2551 KA7T	2175 W9IL	1895 W6OUL	1334 RUØLL	1086 VE1YX	608 IK2SGV	
3412 EA2IA	2632 W2ME	2415 W2WC	2111 VE6BF	1848 I2EAY	1310 K6UXO	1053 K5WAF		

DIGITAL

1107 W3LL	1009 GUØSUP	744 N8BJQ

ernmental agencies, some friendly and some not so friendly. It is possible that if the "agency" starts being asked about it, they could begin to question whether they should allow it to happen. Such things have happened and could happen again. DXpeditions to the Top Ten Most Wanted places don't just happen. They have to be worked at, sometimes for months, or even years. Much time and money is spent to allow these places *to be put on the air . . .* for *you.*

So, to answer the initial question… sure I know things, but I am asked to keep quiet until the time is right. When that time comes, official announcement will be made and then we will all know the same thing at the same time. There will be plenty of time to make donations, plan time off from work, etc. Please don't ask me to give up confidential information. I won't do it.

Nellie, XE1CI, SK

Last month I mentioned that Nellie, XE1CI, was inducted into the CQ DX Hall of Fame this year. Sadly, Nellie was suffering from cancer and she passed away on June 16th. Nellie was a consummate DXer, and well-liked and respected by all who knew her. She will be missed. May she rest in peace .

Until the next time, enjoy the chase and Have Fun!
73, Carl, N4AA

In May these gentlemen got together in Strasbourg, France at TP2CE. Left to right: F5LGF, DJ9ZB, and F5PAC. (Photo courtesy of Franz, DJ9ZB)

QSL Information

D68TK via JA1ELY
DAØQS via DL5KUA
DD4B via DL3PS
DF50PAMIR via DF9YG
DH150HZ via DL5KUA
DLØAS via DL5KUA
DL2008DKT via DL8BEH
DL5A via DL5KUA
DM152ZYA via DJ7AL
DR150HZ via DL3PS
DR5L via DK3QZ
DS5WKW via IK2DUW
E7/DL1MGZ via DL1MGZ
EA6/OZ7BQ via OZ7BQ
EA6/RW3GW via RW3GW/3
EA8/EC1KR via EC1KR
EA8/HA7TM via HA7TM
EA8/IK1JPV via IK1JPV
EA8/IZ2DPX via IK2DUW
EG4DCM via EA4CT
EG7CDG via EA7DK
EH4EI via EA4CT
EH7CE via EA7URM
EI4LRC via EI8EM
EI4TLH via EI8EM
EI60LRC via EI8EM
EI70FOY via EI8EM
EJØA via EI8EM
EK6LP via IK2DUW
EK6LV via IK2DUW

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>; <http://golist.net/>.)

BY JOE LYNCH,* N6CL

The Earth's Magnetotail: The Aurora-Moon Connection

This is now the third installment of my research into the Earth's magnetotail. This time I will explore the THEMIS project and how it will be used to explore the Moon beginning with two of its farthest satellites being dislodged from their present orbits starting in October 2009. First, however, some background of the Earth's aurora and of the THEMIS project.

Aurora Propagation

For those of us serious weak-signal operators who take advantage of any and all forms of propagation, we know that the aurora produces an exciting form of propagation that affects both the HF and VHF ham bands. Auroras occur when the currents flow between the magnetotail and upper atmosphere and light up Earth's gases because of ionization of electrons associated with oxygen and nitrogen. The green and red aurora lights are caused by the oxygen electrons being ionized. The blue light is a result of the nitrogen electrons being ionized.

Aurora propagation occurs as a result of the ionization that takes place during aurora activity. Sometimes this ionization takes place in the *E*-layer, which is at a height of about 60–70 miles. It is the *E*-layer that we most often associate with sporadic-*E* and meteor-scatter propagation. Hence, the similarity among the distances associated with sporadic-*E*, meteor scatter, and some types of aurora propagation.

Particularly important for us in weak signal are the 50-MHz through 222-MHz ham bands. Even though aurora propagation has been detected as high as 903 MHz, it is very rare. The current record holders of DX contacts on 432 MHz and 903 MHz respectively are Al Ward, WB5LUA (now W5LUA), EM13qc, and Mike Cresap, W3IP, FM19pd (who made their QSO on February 8, 1986); and Harry Price, K3HZO (now K3AX), FM18qp, and Paul Rose, WA3NZL (now W3NZL), FM19jg (who made their QSO on November 8, 1991).

As these two records illustrate, while the distance associated with aurora propagation is usually similar to the distance associated with sporadic-*E* and meteor-scatter propagation, not all aurora propagation can be categorized as such. Because of the curtain effect of the aurora and its resultant propagation, propagation often occurs when two amateur radio operators point their respective antennas at the curtain at angles off center from a head-on bearing. For example, for the 432-MHz record QSO, the curtain effect of the aurora propagation made it possible for Ward and Cresap to make the extraordinarily long-distance QSO because Ward's antenna was angled to the east of a head-on bearing, while Cresap's antenna was angled to the west of a head-on bearing, thereby using the curtain effect as a reflector of their respective transmissions.

The same explanation goes for the extraordinarily short-distance 903-MHz QSO between Price and Rose. Price, who was living in Huntingtown, Maryland, angled his antenna very slightly to the west of a head-on bearing, while Rose who lives in Damascus, Maryland, angled his antenna very slightly to the east of a head-on bearing. While the land distance between them is only about 85 miles, their signals traveled a much greater distance to the aurora curtain and back. It was their observation of the characteristic Doppler shift and buzzing sound associated with aurora QSOs that caused them to believe their propagation was by way of aurora.

Signals have also been known to travel along the aurora curtain. For example on December 15, 2006, Al Noe, KL7NO, worked several stations in W9-land via the aurora curtain during aurora propagation associated with intense geomagnetic activity on that date. While Noe was working those stations, he was also being heard by Jon Jones, NØJK, who was using a portable 2-element beam atop a parking garage in Salina, Kansas.

By simply operating on the VHF-plus ham bands, much has been learned about aurora propagation. However, much is still to be learned. While we are in the lull of sunspot activity, it is less likely that we will be seeing aurora propagation. Even so, this month and next, along with March and April, are typical months of increased aurora propagation.

Some History of the Aurora

From its earliest observations, the aurora has received both mythical and scientific explanations and associations for its existence. The oldest known aurora sighting was in 2600 B.C. in China. It was in 1619 A.D. that Galileo Galilei gave the phenomena the term *aurora borealis*, naming it

VHF Plus Calendar

Sept. 7	Moon Apogee and First Quarter Moon Poor EME conditions
Sept. 13–15	The ARRL Sept. VHF QSO Party
Sept. 14	Moderate EME conditions
Sept. 15	Full Moon; The 144 MHz Fall Sprint
Sept. 20	Moon Perigee
Sept. 20–21	ARRL 10 GHz and Above Cumulative Contest, second weekend ARRL 2304 MHz and Above EME Contest
Sept. 21	Moderate EME conditions
Sept. 22	Last Quarter Moon and Fall Equinox
Sept. 23	The 222 MHz Fall Sprint
Sept. 28	Good EME conditions
Sept. 29	New Moon

—EME conditions courtesy W5LUU.

e-mail: <n6cl@sbcglobal.net>

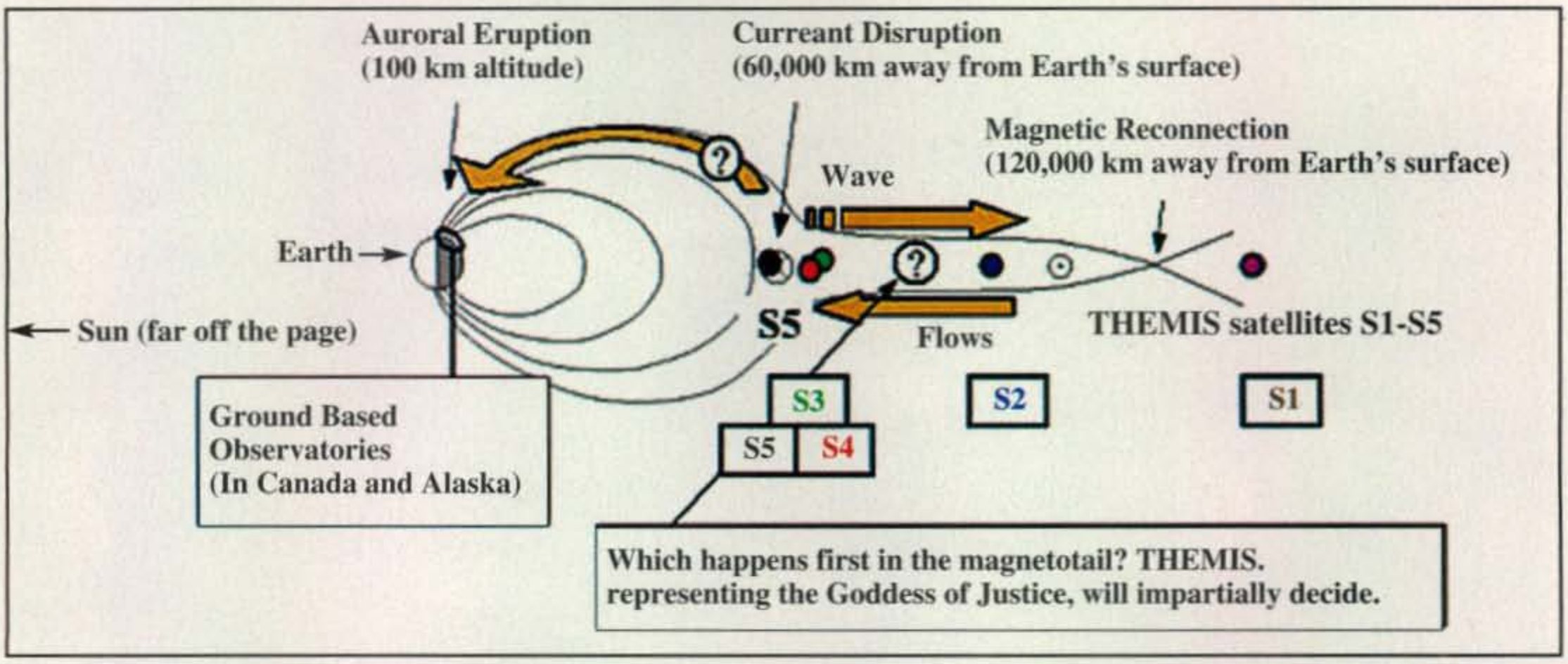


Fig. 1– Stage 3 of the THEMIS project. (Courtesy NASA)

after Aurora, the Roman goddess of morning. Unfortunately, he thought that the auroras he saw were caused by sunlight reflecting from the atmosphere. *Even so*, the nomenclature stuck.

In 1790 A.D. Henry Cavendish made what has turned out to be fairly accurate observations of the aurora. In particular, using a technique known as *triangulation*, he was able to estimate that the aurora light is produced around 100–130 km in altitude (about 62–80 miles above Earth's surface).

The THEMIS Mission Project

It is in the study of the magnetotail that we find another reference to mythology, this time a Greek goddess, Themis, which means the law of nature, or the goddess of justice. As such, according to Greek mythology, this goddess embodied divine order, law, and custom. It is fitting, then, that the NASA mission designed to find the trigger point of geomagnetic substorms that can spring up *within* minutes to brighten auroras and release bursts of potentially damaging radiation is named THEMIS, which is the acronym for Time History of Events and Macroscale Interactions during Substorms. It is the purpose of this mission to determine the natural order of events during substorms. In the process of determining this order of events, the Earth's magnetotail naturally is being swept up in this study (pun intended).

The THEMIS mission is a five-identical-satellites project that was launched February 15, 2007. After launch, each of these satellites was to be placed into an elliptical orbit according to the various stages of the mission. See <http://themis.ssl.berkeley.edu/orbits.html> for an explanation of each of the stages of the mission. See fig. 1 for an illustration of Stage 3, which put the satellites' apogees inside the magnetotail. On October 15, 2008 the mission will conclude Stage 5, which is the Dayside Science Phase.

This past May, NASA headquarters announced that because of the overall success of the mission, it has been extended until fiscal 2012. Additionally, the principal researchers have received approval to explore the possibility of using the remaining propellant of the two outermost satellites (see satellites 1 and 2 in fig. 1) out to the Moon. This proposal is subject to one more technical review before final approval.

In order to get to the Moon, the thrusters of satellites 1 and 2 will be used to slowly raise the apogee high point to a point in which the Moon's gravity will be strong enough to pull them away from Earth. It is a process that will take about a year to complete.

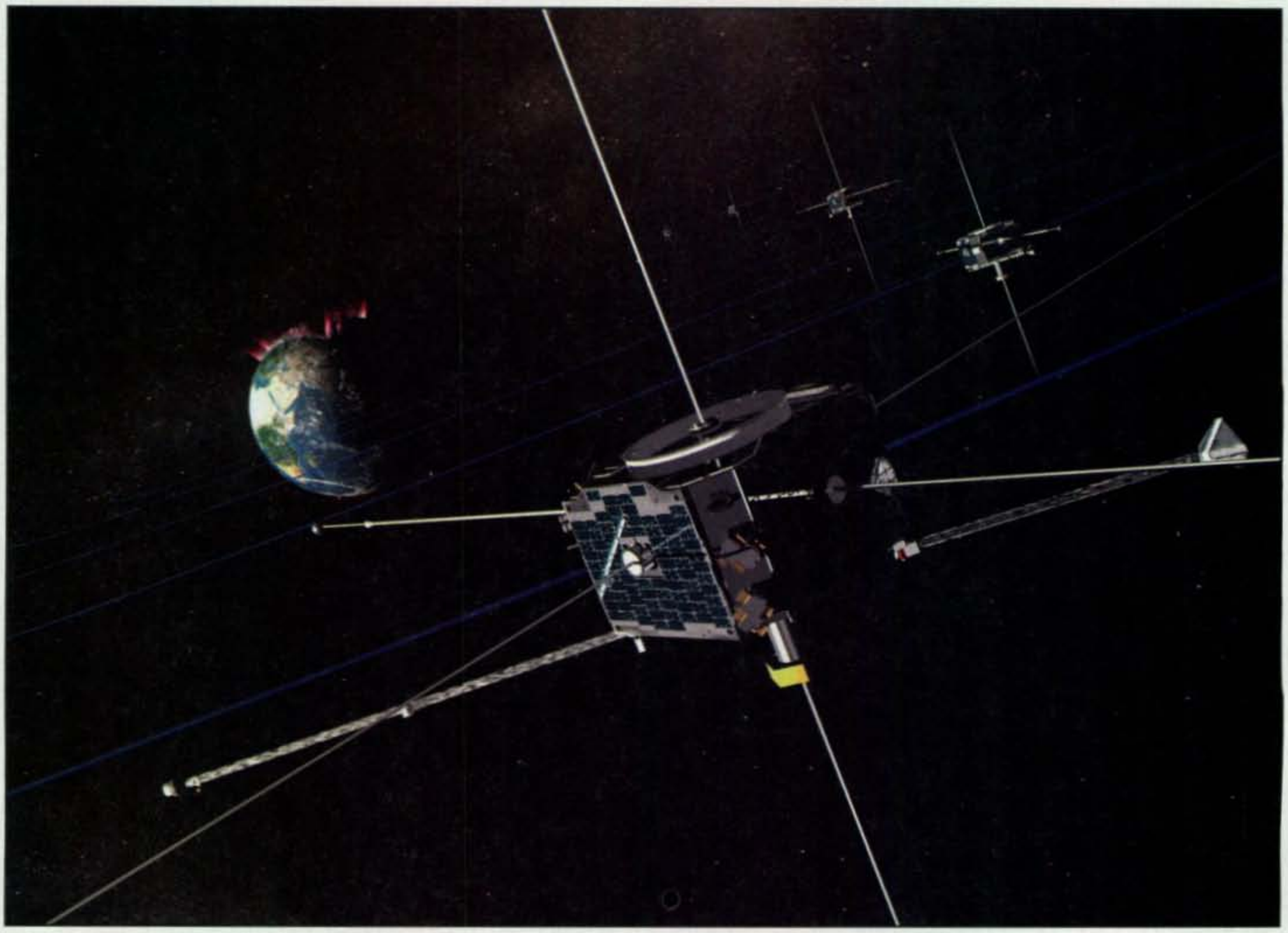
The complexity of moving these satellites into orbits around the Moon involves maneuvering that has never been done before. Particularly problematic is the Earth's gravitational effect on objects in circular orbits around the Moon that are more than 430 miles out from the Moon's surface. Accordingly, it will be necessary to place these satellites into elliptical orbits in order to minimize the Earth's influence on them. For more information on circular versus elliptical lunar orbits, see: <http://www.physorg.com/news84202564.html>.

At the same time that attention is being paid to the type of orbit that minimizes the Earth's influence, the balancing act will be maintaining the effectiveness of these satellites to do the research for which they are intended, that being the influence of the Earth's magnetotail on the Moon.

My Hypothesis

As I previously pointed out (see the July and August 2008 "VHF Plus" columns), it is my hypothesis that it is the Earth's magnetotail that was and will be responsible for huge sandstorms, the most notable during June 20–30, 1975, and a potential series of sandstorms taking place during the dates prior to and just after June 20–21, 2016.

I commented on the various pieces of the puzzle that have led me to believe that the Earth's magnetotail was and will be responsible for huge storms. I would like to add one other factor that might be influential, that being the combined effect of the Moon's and Sun's gravitational pull on the Earth's magnetotail. While it has already been shown that the Moon gets a lashing from the Earth's magnetotail (http://www.sciencedaily.com/releases/2008/04/080420123319.htm), it is my hypothesis that during certain timeframes, such as during tJune 20–30, 1975, with the Moon phase at full and the summer solstice on nearly the same date, the influence of the Moon's gravity, combined with the Sun's, was exceptionally strong, thereby exerting very strong pull on the Earth's magnetotail, which in turn caused an exceptionally strong sandstorm, the likes of which have not previously been recorded. Further, for the same reasons, another potential problematic timeframe could be the days



Artist's conception of the five satellites of the THEMIS project as they orbit Earth while Earth is experiencing an auroral event. (Courtesy NASA.)

immediately before and after June 20–21, 2016. Such sandstorms could be catastrophic for astronauts who are colonizing the Moon without the appropriate preparation.

Last month I mentioned that I expected to include my paper in the *Proceedings* of this year's Central States VHF Society's conference, as well as the Summer 2008 issue of *CQ VHF* magazine. I did write about the essence of my pieces in the July and August 2008 "VHF Plus" columns. However, I did not have my paper in the Summer 2008 issue of *CQ VHF* magazine. At this point I intend to publish the essence of the now three columns in the *Proceedings* of the 2008 AMSAT Symposium, as well as make a presentation concerning my paper. That symposium is scheduled for next month in Atlanta, Georgia.

On the Air

Since my last column, I received the following propagation reports:

From **Paul Trotter, AA4ZZ**: "While 6 meter sporadic-*E* will no doubt have the most impact on the June 2008 scores, it's hard to beat the excitement we had at the AA4ZZ contest team from the 144 MHz sporadic-*E* contacts with Colorado and New Mexico and the 222 MHz contact with W5DDR in New Mexico."

From **Ken Neubeck, WB2AMU**: "Here is a short report on some activity that occurred on July 7, 2008. I set up at my work QTH in North Amityville , Long Island, NY using a 2-element Yagi mounted on the roof of my car and 40 Wwatts and I was able to make a SSB QSO with EA8/DL6FAW on 50.115.

"When I got home to Patchogue at 4:40 EST, I found many signals from Spain in the CW portion. Using my 3-element Cushcraft and 150 watts, I was able to work EA3AKY (JN11), EA7RM (IM87), EA5HT (IM98) and EA1DR (IN83) from 2042 to 2055. Signals were decent, ranging from 559 to 579. During this time, I also heard EA7KW (IM67) very weakly, and AO5FX (IM99), who gots bits of my call but mentioned QRN. Later, I worked CYØX (FN93) at 2057 and CT1HZE (IM57) at 2128.

"What was very interesting about this opening was how wide it was, as normally I would only hear a small portion of southern Spain and Portugal during a trans-Atlantic opening. Filling in the Western Europe grid map from my 6 meter book on page 69, I was surprised that EA3AKY in JN11 was near the French border and EA1DR in IN83 was on the northern coast of Spain, two areas that I normally do not hear."

From **Sam Whitley, K5SW**: "It's been a big day for me CT3FQ Madeira Is. at 1421 UTC for country #143. From that time until 0300Z on the 9th there has been DX on the band. EA8/DL6FAW, EA8BPX from Canary Is. CT3FT on CW from Madeira Is., EA7KW plus CYØX in the morning, afternoon, and evening. Then the West Coast began working EU in the afternoon, followed by CT1APE, EA8BPC, and CT1HZE in late afternoon 21–2200Z. Then JAs: JE1BMJ, JHØRNN, JH7MSB, with Han JE1BMJ still in at 0300Z (10PM local 9 July). I've

never seen JAs in this late. Still plenty of stateside going on after 0340 UTC as I write. The 7th of July was good also, with ZB3B Gibraltar being the brightest spot.

From **Chip Margeli, K7JA**: "Well, it has been an interesting 24 hours. On July 7, 2008 I worked the following: CYØX, JE1BMJ, JR6EXN, and JA7QVI. On July 8, 2008 I worked the following: EA8/DL6FAW, CT3FT, KL7RA, EA7RM, and (again) CYØX, this time on SSB. I think the first CYØX (CW) QSO was the first for them into Southern California (K6QXY was their first California QSO, earlier). Then on the 8th, they actually got some propagation to this area and worked a bunch of W6/7 stations. CT3FT and EA7RM both were new countries. Long haul on *E*!

"The JAs were probably regular multi-hop *E*, not JE1BMJ's "W4 Express" SSSP propagation, which always seem to fall far north of here (due to the auroral zone component of the path formation). Haven't had much of anything to JA this year. A good 24 hours!

I also received extensive logs from **Julio Medina, NP3CW**, which showed numerous openings to North and South America and Europe. Dozens of contacts were made during these openings that occurred during most of June and extending into mid-July.

Current Contests

The **ARRL September VHF QSO Party** is September 13–15. The second weekend of the **ARRL 10 GHz and Above Cumulative Contest** is September 20-21. The **ARRL 2304 MHz and Above EME Contest** is September 20–21. The following dates for the **Fall Sprints** are based on last year's dates. Please check with the sponsor for the exact dates. The **144 MHz Fall Sprint** is September 15, 7 PM to 11 PM local time. The **222 MHz Fall Sprint** is September 23, 7 PM to 11 PM local time.

For ARRL contest rules, see the issue of *QST* prior to the month of the contest or: <http://www.arrl.org.> For Fall Sprint contest rules, see the Southeast VHF Society URL: <http://www.svhfs.org>.

Current Conference

The 2008 **TAPR/ARRL Digital Communications Conference** will be held September 26–28 in Chicago, Illinois, at the Holiday Inn Hotel Elk Grove Village, Illinois. For more information, see: <http://www.tapr.org/dcc.html>.

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:

Microwave Update. A call for papers has been issue for the 2008 Microwave Update conference, to be held in Bloomington, Minnesota. The deadline for submission is August 31, 2008. If you are interested in submitting a paper for publication in the *Proceedings*, contact Jon Platt, WØZQ, at <w0zq@aol.com> for additional information.

AMSAT-NA 2008 Space Symposium: Technical papers are solicited for the 2008 AMSAT Space Symposium and Annual Meeting to be held October 23-26 in Atlanta, Georgia. Proposals for papers, symposium presentations, and poster presentations are invited on any topic of interest to the amateur satellite program. Papers on the following topics are solicited: Students & Education, ARISS, AO-51, P3E, Eagle, and other satellite-related topics. Camera-ready copy on paper or in electronic form is due by September 1 for inclusion in the printed symposium *Proceedings*. Papers received after this date will not be included in the printed *Proceedings*. Abstracts and papers should be sent to: Daniel Schultz, N8FGV, by e-mail to: <n8fgv@amsat.org>.

K6MXI Silent Key

It is with deep sadness that I announce the passing of Al Ferrera, K6MXI. Al succumbed to a rare form of cancer. Al partnered with Bob Magnani, K6QXY, on a number of projects, both business and amateur-radio related. Regarding the latter, most notably were Bob's various multi-element antenna projects that they constructed. Our sympathy goes to Bob for his loss of a good friend.

And Finally . . .

It seems that with each passing month I find more to write about the Earth's magnetotail. My research has reconfirmed for me that there is much more to learn about how everything is interconnected.

I hope to see some of you next month at the annual AMSAT Symposium in Atlanta. For more information, go to: <http://www.amsat.org>.

Until next month . . .73 de Joe, N6CL

contesting

BY JOHN DORR,* K1AR

Slow CW: Is There Room for it in Contesting?

September's Contest Tip

The computer in your shack is one of your best friends in contesting. Make sure everything is up-to-date well before the contest season, whether it's the latest revisions of logging software, country files, or any other tools of the trade. You certainly don't want to be fooling around with computers right before a contest. A little planning will give you a competitive edge over those who leave such things to the last minute!

Sending and receiving CW is one of the long-standing traditions of ham radio. Even though commercial applications for Morse code have dwindled to virtually zero and its requirement for licensing is gone, the sport is still alive and well when one tunes the bands. I silently laugh at the cynics who claim CW is dead as I think about the 5000+ entries in the 2007 CQ WW DX CW Contest (with over 60,000 unique callsigns)! Indeed, CW is far from being a "silent key."

A similar aspect of our hobby is the fact that contest operators have the reputation of pushing CW speeds to super-human limits, much to the chagrin of the casual operators who haven't yet developed the CW skills of an Intel® Core™2 Quad Processor. This month we're going to explore whether or not there is a role for slow-speed CW in contesting. Is CW contesting only for the elite operator, or is there opportunity for the newbie as well?

A Conversation

The following is a dialog between *CQ* Editor Rich Moseson, W2VU (representing the "little pistol" contester who also isn't a high-speed CW operator) and *CQ*'s "Contesting" column Editor John Dorr, K1AR (representing the "big gun" contester, who has been copying/sending high-speed CW since he was a kid).

W2VU: There were several comments in the "QRM" (some of which appears elsewhere in this issue) of this year's CQ World-Wide DX Contest CW results about the difficulty that newcomers to CW contesting face in making contacts with more experienced operators sending code at very high speeds. Some examples:

GM4UYZ: If I have any complaint it is the speed at which lots of operators send CW. Not everyone is capable of receiving CW at 25+ words per minute. It is certainly off putting and I know that possible CW operators at slower speeds are definitely put off. Don't these operators appreciate that they are losing lots of calls due to this? You are also losing future potential CW contesters. I know the argument will come back and that is get your speed up, easier said than done. Thought I would throw in my twopence worth.

HL5YI: Hi OM ! So pse QRS!! QRS !! Am baby in CW and barefoot!

K4DGW: I'm glad I did the Assisted. Helped me with trying to understand the CW that was too fast for me. I at least knew what to listen for.

All indications are that interest in CW operating is *increasing* since the code test was dropped from our license exams and those of many countries around the world, and contesters in general are doing their best to attract new people to on-the-air competition, CW as well as SSB. However, every CW operator starts out as slow, and there's no more Novice Roundup contest to let newer CW ops build up their skills in a competitive environment. Therefore, one wonders where the new CW op/CW contester can get started.

K1AR: Any form of high-speed operating (voice or CW) can be a challenge to a new operator. Naturally, CW adds another layer of complexity, because it requires a translation step that doesn't exist on phone (unless you're working someone from my home area of Boston). I have always advocated jumping into the deep end of the pool for any mode of operation in our hobby. In the case of contesting, entering the fray as a new operator will be discouraging at first, but you'll be amazed at how quickly your skills will develop over time—capabilities that you didn't think were possible.

There are several other techniques to consider in getting started. CW is an acquired skill that can take place at any time, not just during a contest. If you want to improve your CW capabilities, get on the air in between contests and work hard at it. Work stations that are sending at your upper speed

Calendar of Events

All year	**CQ DX Marathon**
Aug. 30–31	ALARA Contest
Aug. 30–31	SCC RTTY Championship
Aug. 30–31	YO DX HF Contest
Aug. 30–31	Ohio QSO Party
Aug. 31	SARL HF CW Contest
Sept. 6	Russian RTTY WW Contest
Sept. 6–7	All Asia SSB DX Contest
Sept. 6–7	IARU R1 Field Day
Sept. 7	North American CW Sprint
Sept. 7–8	Tennessee QSO Party
Sept. 13–14	Worked All Europe SSB Contest
Sept. 13–15	ARRL VHF QSO Party
Sept. 14	North American SSB Sprint
Sept. 18–20	YLRL Howdy Days
Sept. 20–21	Colorado QSO Party
Sept. 20–21	CIS DX Contest
Sept. 20–21	SAC CW Contest
Sept. 20–21	Washington Salmon Run
Sept. 20–21	QCWA QSO Party
Sept. 20–21	SEDXC 50th Anniversary Contest
Sept. 25	BCC QSO Party
Sept. 27–28	**CQ WW RTTY DX Contest**
Sept. 27–28	SAC SSB Contest
Sept. 27–28	Texas QSO Party
Oct. 4–5	California QSO Party (CQP)
Oct. 25–26	**CQ WW DX SSB Contest**

*2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

limit and push your copying envelope. Also, consider taking advantage of the ARRL's W1AW code practice sessions that are still available on a daily basis. For me, being a participating ham was the single most effective tool in improving my CW skills as a young ham. Lastly, operate in some of the more casual contests to build up your capabilities. The CQ WW contest can be described as 48 hours of ham radio chaos. It's probably not the best place to build your CW skills. Smaller events such as state QSO parties, country-specific DX contests, and even the ARRL Sweepstakes are a great place to work guys at a slower rate that is more suitable to your current abilities as an operator.

W2VU: As John well knows, I won't operate in CW contests, and it's all because of speed. I passed a 20-wpm code test, but I'm most comfortable in the 15–18 range—which is about half the speed of a typical CW contester, who runs at about 35 wpm. If you ask someone to QRS (slow down, for the uninitiated), he or she will drop back to about 30. If you ask again, they'll move on to the next contact. One wonders: If a "20-wpm Extra" can't keep up with the CW contesters, what hope is there for the newbie?

K1AR: I believe that this scenario is more the exception than the rule. While is it absolutely true that CW sending rates are high in contests overall, the drive to work guys prevails for most operators. In my view, the challenge isn't getting someone to slow down as much as convincing stations to take the time to send slowly when calling CQ in the first place. Most experienced CW contesters send at higher speeds as a "default" position. It really doesn't make sense to do anything else from a strategic standpoint. As long as you're willing to adjust to how a caller answers you, we can make progress. Frankly, if I were a slower operator and the "CQ-er" didn't adjust, I'd spin the dial.

W2VU: In discussions about the CW speed question among members of the CQWW Contest Committee, one member suggested that what he termed the "QRS guys" should "start the contest on day two or find a 'nearly dead' band with few stations left ... the CQer will QRS for sure." But is it fair to tell the new CW contester that he can only operate half the contest and hope to make contacts? Or should only work "nearly dead" bands? How will that encourage people to continue taking part in CW contests?

K1AR: I disagree with this approach. Creating tiers of operators or times is not the solution. Rather, the goal should be for everyone to strive to improve. For the experienced contesters, their skills are not measured by how fast they can send. There are no contests where your score increases based on average sending speed. It's all about working guys and putting them in your log. A more realistic approach is to adjust operating speeds based on the rate of stations you are working. In a 48-hour DX contest, for example, there are really only a few hours when a USA station's rate is relatively high—and that tends to be limited to the big guns. Obviously, for a DX operator this is less the case, but surprisingly, DX operators have slow times, too. As an experienced operator, it's not a bad idea to consider slowing down to reflect your rate and attract new callers. This is an old and proven technique in the ARRL Sweepstakes, where QSO rates drop to a crawl on Sunday afternoon.

W2VU: What are your suggestions, John, for the new CW contester with limited skills, including those of us old-timers who can operate comfortably only at speeds below 20 wpm?

K1AR: As I've mentioned, not every contest is a run-and-gun affair with no hope for the slower operator. For example, if you look at this month's contest calendar on the first page of the column, events such as the Ohio, California, Texas, Tennessee, and Washington QSO parties are great events to more casually use your CW skills and begin to grow them. While there are some operators who have truly maximized their CW abilities, I firmly believe that nearly everyone can improve if they really want to do so. It takes time and commitment. The best way to develop your skills is to be on the air and not necessarily just during a contest. Whether it's casual rag chewing, working a DXpedition, getting involved in traffic nets, or operating in many of the hundreds of "casual" contests that are offered each year, the opportunities to make significant progress are there. Improving your CW rate by only 5 wpm can make a world of difference, and you'll feel great about it, too. Give it a try!

We'd like to hear your thoughts on this subject — from the "QRS guys" as well as the "blazers" whose fingertips smoke after sending CW. Send your e-mail comments and suggestions to K1AR at <k1ar@contesting.com> or to W2VU at <w2vu@cq-amateur-radio.com> (or preferably, to both of us), or by snail mail to CQ magazine, Attn. Slow CW, 25 Newbridge Rd., Hicksville, NY 11801.

Final Comments

Contesters' operating habits tend to dart around on the bands like a pinball machine. For some of us, we've forgotten the art of the QSO. The next time you hear me on the bands outside of a contest, raise the red flag and give me a call. I hope to work you on the air in the future – especially on CW and at a speed we can both enjoy. See you in the next one! 73, John, K1AR

Announcing:

The 2008 CQ WW DX Contest

Phone: October 25–26 CW: November 29–30
Starts 0000 GMT Saturday Ends 2400 GMT Sunday

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.

II. BANDS: All bands, 1.8 through 28 MHz, except for WARC bands.

III. TYPE OF COMPETITION (choose only one):

For all categories: All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. *All high power categories must not exceed 1500 watts total output power, or the output power of their country, whichever is less, on any band.* All transmitters and receivers used by the entrant must be located within a single 500-meter diameter circle or within the property limits of the station licensee's address, whichever is greater. All antennas used by the entrant must be physically connected by wires to the transmitters and receivers used by the entrant. Only the entrant's callsign can be used to aid the entrant's score. A different callsign must be used for each CQ WW entry. An entrant's remote station is determined by the physical ocation of the transmitters, receivers, and antennas. A remote station must obey all station and category limitations of Rule III.

A. Single Operator categories: For all single operator categories, only one person (the operator) can contribute to the final score during the official contest period. **QSO alerting assistance of any kind (this includes, but is not limited to, packet, local or remote Skimmer and/or Skimmer-like technology, Internet) places the entrant in the Single Operator Assisted category.**

1. Single Operator High (All Band or Single Band): One person. One signal at any one time. QSO alerting assistance of any kind is not allowed. Self-spotting or asking to be spotted is not allowed. Total output power per band must not exceed 1500 watts or the output power regulations of the country in which the entrant is operating, whichever is less.

2. Single Operator Low (All Band or Single Band): One person. One signal at any one time. QSO alerting assistance of any kind is not allowed. Self-spotting or asking to be spotted is not allowed. Total output power per band must not exceed 100 watts.

3. Single Operator QRP (All Band or Single Band): One person. One signal at any one time. QSO alerting assistance of any kind is not allowed. Self-spotting or asking to be spotted is not allowed. Total output power per band must not exceed 5 watts.

4. Single Operator Assisted (All Band or Single Band): One person. One signal at any one time. QSO alerting assistance is allowed (this includes, but is not limited to, packet, local or remote Skimmer and/or Skimmer-like technology, Internet). Self-spotting or asking to be spotted is not allowed. Total output power per band must not exceed 1500 watts or the output power regulations of the country in which the entrant is operating, whichever is less.

B. Multi-Operator (all band operation only):

1. Single Transmitter (*MS*): Only one transmitter and one band permitted during any 10-minute period. Exception: One—and only one—other band may be used during any 10-minute period if—and only if—the station worked is a new multiplier. Ten-minute periods are defined as starting with the first logged QSO on a band. Logs found in violation of the 10-minute rule will automatically be reclassified as M2. If electronic logging is used (Cabrillo), for each QSO the run transmitter or multiplier transmitter must be indicated in the log.

2. Two Transmitter (*M2*): A maximum of two transmitted signals at any time on different bands. Both transmitters may work any and all stations. A station may only be worked once per band regardless of which transmitter is used. Each of the two transmitters used must keep a separate chronological log for the entire contest period, or if electronic logging is used, the electronic log submittal (Cabrillo) must indicate which transmitter made each QSO. Each transmitter may make a maximum of 8 band changes in any clock hour (00 through 59 minutes).

3. Multi-Transmitter (*MM*): No limit to transmitters, but only one signal and running station allowed per band.

C. Team Contesting: A team consists of any five radio amateurs operating in the single operator category. A person may be on only one team per mode. Competing on a team will not prevent any team member from submitting his/her personal score for a radio club. A team score will be the sum of all the team member scores. SSB and CW teams are totally separate. That is, a member of an SSB team may be on a totally different CW team. A list of a team's members must be received at CQ Headquarters by the time the contest begins. E-mail to <teams@cqww.com>, or mail or fax the list to CQ, Att: Team Contest, 25 Newbridge Road, Hicksville, NY 11801 U.S.A.; fax 516-681-2926. Awards will be given to the top teams on each mode.

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e., 5705). CW: RST report plus zone (i.e., 57905).

V. MULTIPLIER: Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The CQ Zone Map, DXCC country list, WAE country list, and WAC boundaries are standards. Maritime mobile stations count only for a zone multiplier.

VI. POINTS:

1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multipliers. *Example:* 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

VIII. AWARDS: First-place certificates will be awarded in each category listed under Sec.III in every participating country and in each call area of the United States, Canada, European Russia, Spain, and Japan.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates/plaques will be issued to the licensee of the station used.

IX. TROPHIES AND PLAQUES:

Plaques and trophies are awarded for top performance in a number of categories. They are sponsored by individuals and organizations. For a current list of plaques and sponsors, or to learn how to become a sponsor, see the CQ website: <http://www.cq-amateur-radio.com/cqwwhome.html>. A station winning a World trophy will not be considered for a sub-area award; the trophy will be awarded to the runner-up in that area.

X. CLUB COMPETITION:

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area defined as within a 275 km radius from center of club area (except for DXpeditions specially organized for operation in the contest; club contributions of DXpedition scores are percentaged to the number of club members on the DXpedition).

3. To be listed, a minimum of 3 logs must be received from a club, and an officer of the club must submit a list of participating members and their scores, both on phone and CW.

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.

2. All sent and received exchanges are to be logged.

3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

4. **Electronic log submission:** We want your electronic log. The Committee ***requires*** an electronic log for any possible high-scoring log. By submitting a log to the CQ WW Contest, the entrant agrees to have the log open to the public. If possible, we would appreciate complete frequencies in the log.

E-mail Required Content: *Please submit your log in the Cabrillo file format created by all major logging programs.* Be sure to put the STATION CALLSIGN and the MODE in the "Subject:" line of each message. Your e-mail log will automatically be acknowledged by the server. You will also receive a personal access code from the server at a later time. Electronic submission implies a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed. Submit your CQ WW SSB log to **<ssb@cqww.com>** and your CQ WW CW log to **<cw@cqww.com>**.

5. **Paper log submission:** For paper logs, use a separate sheet for each band. Each paper log entry MUST be accompanied by a summary sheet showing all scoring information, category of competition, and contestant's name and address in BLOCK LETTERS. Sample log and summary sheets and zone maps are available from *CQ*. A large, self-addressed envelope with sufficient postage or IRCs must accompany your request. If official forms are not available, make up your own, 80 contacts to the page on 8 1/2" × 11" paper. All paper log entrants are required to submit cross-check sheets (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made.

6. Bad QSO: The bad QSO is removed and a penalty of three more equivalent QSOs is applied to the points only.

7. QRPp and Low Power stations must indicate their category on their summary sheets and state the actual maximum power output used, with a signed declaration.

XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest; unsportsmanlike conduct; taking credit for excessive unverifiable QSOs or unverifiable multipliers will be deemed sufficient cause for disqualification. Incorrectly logged calls will be counted as unverifiable contacts.

An entrant whose log is deemed by the Contest Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within five years, he/she will be ineligible for any *CQ* contest awards for three years. ANY use by an entrant of any non-amateur means including, but not limited to, telephones, telegrams, internet, Instant Messenger, chat rooms, VoIP, or the use of packet to SOLICIT, ARRANGE, or CONFIRM any contacts during the contest is unsportsmanlike and the entry is subject to disqualification. Action and decisions of the CQ WW Contest Committee are official and final.

XIII. DEADLINE:

1. All entries must be postmarked NO LATER than December 1, 2008 for the SSB section and January 15, 2009 for the CW section. **Indicate SSB or CW on the envelope and/or disk.**

2. An extension of up to one month may be given if requested by e-mail (questions@cqww.com). The granted extension must be confirmed by the Contest Director, must state a legitimate reason, and the request must be received before the log mailing deadline. Logs postmarked after the extension deadline may be listed in the results but will be declared ineligible for an award.

Both Phone and CW mailed logs should be sent to CQ Magazine, 25 Newbridge Road, Suite 309, Hicksville, NY 11801. Please mark SSB or CW on the envelope.

BY TOMAS HOOD,* NW7US

Speculation plus NVIS

A Quick Look at Current Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, June 2008: 3
Twelve-month smoothed, December 2007: 5

10.7 cm Flux
Observed Monthly, June 2008: 66
Twelve-month smoothed, December 2007: 71

***Ap* Index**
Observed Monthly, June 2008: 7
Twelve-month smoothed, December 2007: 8

There is a lot of speculative talk going around various amateur radio blogs, forums, and in on-the-air roundtables regarding the current solar cycle activity—or, more accurately, "non-activity." Some are speculating that we are entering a period during which the Sun will be very quiet, and we'll end up in a mini ice age. Others are saying that the new cycle is late, but will start to pick up energy. However, they think that the delayed start indicates a weak cycle. Others hold that while late, the new cycle will still bring exciting activity in a few years. Who's right?

Science Observes

Forecasting the future solar cycle activity is nothing but an educated guess, where the "educated" simply means applying some math to the past. We're dealing with a dynamic, "living" star, our Sun. While some patterns have revealed themselves during the course of our short history of observations, we cannot be sure that any pattern is, in the larger scope of the Sun's history, the way things always occur.

The delay of the new solar cycle has many scientists holding onto their seats. They are not sure what to say, or how to read it. Also, the amateur radio community is just as confounded. However, activity on the amateur bands has not diminished. Ham operators all over the world are discovering what some have always known: HF propagation can exist even during the solar minimum years. While there may be more challenges, radio is going strong, and new discoveries about how propagation works are being made by the newer amateurs who've only recently joined the HF ranks.

We will keep up with the latest research and news regarding the new solar cycle. Stay tuned!

NVIS

One of the modes of propagation enjoyed on HF, during any season, is NVIS, or Near Vertical Incident Skywave propagation. NVIS is pronounced *niv-iss*. Another loving descriptive name for NVIS propagation is "cloud burning." (Hence "Burning up the 'nimbus' with NVIS").When HF conditions are terrible, and the ionosphere does not support bouncing a 20-meter signal into exotic lands on the other side of the world, it is still possible to have communications with closer stations.

This radio propagation mode involves using antennas that radiate most of the radio energy at very high radiation angles, approaching or reaching 90 degrees (straight up), at a frequency below the critical frequency of the ionosphere (that frequency that is just lower than what would punch through the ionosphere rather than be refracted back toward the origin of the radio wave). Using NVIS, it is possible to establish reliable communications over a radius of out to about 200 miles or so, give or take 100 miles.

If you've spent time on 160 or 80 meters at night, talking with others within a 300-mile area, you might have thought you were working them via groundwave propagation, where the radio signal hugs the ground as it spreads out away from your antenna. However, often, the case is quite different.

In the part of the country where I live (Montana), there are very tall mountains nearly all around me. Yet using NVIS, I am able to establish communications with stations between 50 to 300 miles away as if they are line-of-sight from my antenna. Ground wave is not possible (I've tried to contact them on frequencies above the critical frequency, such as on 20, 15, or 10 meters, with no success), yet on

*P.O. Box 9, Stevensville, Montana 59870-0009
e-mail: <nw7us@hfradio.org>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 2008

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 1-3, 11-14, 21-24, 26-30	A	A	B	C
High Normal: 7-10, 17-20, 25	A	B	C	C-D
Low Normal: 4-6, 15-16	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 1 will be fair (C) on Sept 1st through the 3rd, poor (D) to non-existent on Sept. 4th through the 6th, etc.

3. As an alternative, the Last-Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet and space weather should be mild. On the other hand, days marked as Disturbed will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the path is ionospherically supported.

frequencies below the critical cutoff, we are able to communicate with reliable signals.

One way of picturing how NVIS works is to imagine taking a flashlight and aiming its light beam toward a white, reflective wall (or mirror). If you were to shine it straight at the wall at a 90-degree angle, you would see the light reflected back at you. This is much like how we discover the ionosphere's ever-changing ability to reflect a radio wave at any given frequency. Ionospheric sounding is done by sending pulses of radio waves straight up at the ionosphere, and measuring at what frequency the reflections cease. The highest frequency that is reflected is the critical frequency at that location.

Now slowly re-aim the flashlight so that you are angled about 10 degrees to the left. What happens to the reflected light? The beam's azimuth changes, resulting in the light to illuminate an area just to your left. The more of an angle, the farther away from you the reflected light radiates. Call that distance the "skip zone." In radio, the same thing happens with a radio wave that is refracted. The angle at which the radio energy arrives at the reflective ionospheric layer dictates how far away the reflection will end up. The more of an angle of radiation, the farther the distance.

One then can see that NVIS is all about reducing the angle so that the reflected radio energy returns at locations much closer to the originating antenna, rather than if we were trying to shoot the radio wave far out to the low horizon so we could work very distant DX.

How do you make an antenna so that it radiates most of its energy toward the overhead sky, rather than out to the low horizon? Part of the answer is in how high above the ground you deploy your antenna. Most NVIS antennas are horizontal in polarization, and kept much lower than the height typically sought when attempting DXing. The closer to the ground an antenna is positioned, the higher the angle of its main radiation. For this reason, it is common to see a dipole cut for 5 MHz only up at 8 feet.

A great introduction to NVIS is found at WB5UDE's page <http://www.qsl.net/wb5ude/nvis/>. Additional resources include KV5R's page <http://athensarc.org/nvis.asp>, and an interesting collection of information at <http://www.tactical-link.com/nvis_discussion_page.htm>.

September HF Propagation

September is a month of radical improvement in radio propagation condi-

On the Cover

This month's cover features Tommy Tow, WD4K, on his tower in Joelton, Tennessee, outside Nashville. His stack of antennas includes Force 12 C31XRs at 35, 70, and 117 feet; a Force 12 Mag 340N at 100 feet; and a Force 12 80-meter rotatable dipole at 127 feet. At the base of the tower is a custom-built switching system of Tommy's own design. His shack is equipped with a full set of computers, Alpha amplifiers, a full audio rack, a computerized switching system that he built, and a unit from Top Ten Devices to run the switching network.

Tommy is a founding member of the Tennessee Contest Group (TCG) and used to be a serious contester. He particularly enjoyed having ham buddies join him at his home QTH for contests. He says friends such as Don Binkley, N4ZZ, Scott Robbins, W4PA, and Mark Speck, KØEJ, all had good contest runs at his station. These days he operates more casually, as his family and his business take up more of his time. Tommy says he gets the most enjoyment from what he calls "going back to basics . . . just getting on the air and talking to somebody you've never talked to before" and chasing DX.

Tommy also spent many years as a touring and studio musician, playing bass guitar with some of the biggest artists in music, including James Brown, B.B. King, Chet Atkins, Johnny Mathis, and Sammy Davis Jr. He played on the Dolly Parton Show and in Bob Hope's USO shows, and estimates that he was on television for 15 years. He was on the road from 1966 until 1980. Last December, Tommy and Waldo Weathers, James Brown's saxophone player, assembled a 12-piece funk band for a show at B.B. King's in Nashville—a good alternative when there's no action on the ham bands! *(Cover photo by Larry Mulvehill, WB2ZPI; On the Cover text by Dan Moseson, KC2OOM)*

tions. On September 22, 2008, the Sun will be directly over the equator. This happens twice a year, in the spring and fall, and is called an "equinox." The fall, or "autumnal," equinox is the day on which the Sun will cross the equator, as it appears to travel from northern to southern skies. On this day, over much of the Earth the hours of daylight are equal to the hours of darkness. Sunrise should take place at approximately 6 AM local time and the Sun should set around 6 PM local time, except at the high latitudes.

This results in an ionosphere of almost similar characteristics over large areas of the world and is usually the best time of the year for long DX openings between the temperate regions of the Northern and Southern Hemispheres on all HF bands. Expect improvement on 20 meters, with more frequent openings from mid-September through mid-October between North America and South America, the South Pacific, South Asia, and southern Africa. The strongest openings will occur for a few hours after sunrise and during the sunset hours.

Long-path openings improve during the equinoctial periods. A variety of paths open up on 20 meters. Expect a path to southern Asia around sunset, and daily morning openings to southern Asia and the Middle East, expanding to Africa. Also look for Antarctic short path, and signals from the Indian Ocean region long-path over the North Pole. Afternoons will fill with South Pacific long-path, and then extend to Russia and Europe. Look for possible long-path openings on 30, 40, and 80 meters for an hour or so before sunrise and just before sunset.

The winter DX season is about to open up, making for exciting DX conditions. While the weather is still warm and fair, tighten hardware on your antenna system, check coax cables, and fine-tune your radio station. Get ready to reap the DX.

The 15-meter band will supply day-path propagation even over the polar paths, although these polar openings are rare during this lull in solar activity. A considerable improvement is expected for DX propagation on 17 meters, opening shortly after sunrise and remaining open until after sundown. Openings will be best toward Europe and the northeast before noon, and to the rest of the world during the afternoon hours. Openings toward the South Pacific, Australia, New Zeal, and the Far East should be possible well into the early evening. Remember, though, that openings are dependent on the strength of the ionosphere, which in turn is dependent upon an active Sun. During this part of the solar cycle, activity is minimal. Openings may be rare and short-lived.

Twenty meters will be the best daytime DX band this month. Look for 20 to open for DX at sunrise and remain open in all directions for a few hours. It should be possible to work into many areas of the world throughout the daylight hours, with a peak in the afternoon. Nighttime conditions will favor openings toward the south and to tropical areas, but some openings will also be possible to other areas, especially during High Normal or better days. Look for polar gray-line propagation into Asia. Long-path is common on 20 to southern Asia, the Middle East, and northeastern Africa as well as the Indian Ocean region via the north polar path.

Expect an improvement in nighttime DX conditions on 30 through 160 meters during September and October. This is due to the increasing hours of darkness and a seasonal decrease in the static level. Thirty and 40 meters should be best for worldwide DX from sunset to sunrise. Sixty meters should become more reliable for those farther contacts. Working all states on 60 is very possible during this season. Eighty and 160 meters will become hot bands during the hours of darkness, especially for an hour or so before local sunrise.

For short-skip propagation during September and early October, use 60 and 80 meters during the day for openings shorter than 250 miles, and either 80 or 160 at night. For distances between 250 and 750 miles try 30, 40, and possibly 60 meters during the day and 80 meters at night. For openings between 750 and 1300 miles, 20 meters should work during the day; 30, 40, and 60 from sundown to midnight; and 60 and 80 from midnight to sunrise. For openings greater than 1300 miles try 15, 17, or 20 meters during the day, and 30, 40, and even 60 during the hours of darkness. Check 10 and 12 meters for some fairly good openings beyond 1300 miles in the afternoon hours, especially when conditions are High Normal or better, and for paths into South America and the South Pacific.

VHF Conditions

The month of September statistically has the lowest amount of sporadic-*E* propagation activity. Toward the end of September trans-equatorial (TE) propagation will begin to occur between southern North America and northern South America. Openings will generally occur in the late afternoon to early evening.

Troposcatter conditions are generally very good for many of the VHF bands up to 440 MHz during September with the appearance of different weather fronts. This will be the primary mode for working up to 300 miles. A very useful internet resource for viewing tropospheric conditions is available at William Hepburn's "VHF /UHF Tropospheric Ducting Forecast" site (http://www.dxinfocentre.com/tropo.html).

Don't forget to check out *CQ VHF* magazine as well as the "VHF Plus" column in this issue for a more in-depth look at VHF propagation. However, no matter what, get on the radio and try working the many modes. The more people active on these bands, the more we can unlock the mysteries of VHF propagation.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for June 2008 is 3.1. The lowest daily sunspot value recorded was zero (0) on June 1–4, 6–9, 12, 14, and 23–30. The highest daily sunspot count was 9 on June 5 and June 10. The 12-month running smoothed sunspot number centered on December 2007 is 5.0. A smoothed sunspot count of 9, give or take 2 points, is expected during September 2008.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 65.9 for June 2008. The 12-month smoothed 10.7-cm flux centered on December 2007 is 70.5. The predicted smoothed 10.7-cm solar flux for September 2008 is 66, give or take about 5 points.

The observed monthly mean planetary *A*-index (*Ap*) for June 2008 is 7. The 12-month smoothed *Ap*-index centered on December 2007 is 7.8. Expect the overall geomagnetic activity to vary greatly between quiet to disturbed during September.

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 of the 2007 CQ WW DX CW Contest *(from page 23)*

John, OM5XX, was #2 All Band, Low Power in Europe.

Tina, YO3FRI, was the top Romanian All Band, Low Power.

the job once more. Half of all QSOs were from USA and half from EU. The farthest away was propably Lloyd, KH6LC, in Hawaii, but the closest one was my old friend Bjarni, TF3GB. Thanks for organizing this great event ... **TF3AM**. Slowly the reliablility of the station grows up. Now we must find some more operators. Some more technical things to achieve before 2008 edition! Which station in the world can claim to eat rabbit civet, deer, wild pig, cow tongue, and drink 18 and 21 year-old Knockando? See you next year with less food and more multipliers! ... **TM4Q**. Had not planned on QRP but the main rig failed in early October and then 21 November the 706MKIIG became a door stop. All I have left is the IC-703 and a G5RV flat top at 60 feet and a lot of saltwater! Rather than "hunt & peck" I picked a freq. and would call until someone noticed me, then the fun begins! Difficult to manage QRM as the 703 only has one filter so it was a challenge. I often had to QSY when high power stations squeezed me out. Still I am thrilled with the QRP results! Yes, it does help to have a rare callsign too! I might run QRP next year too, except with the 746Pro's receiver! ... **V73NS**. Low power and a simple wire antenna. Is the glass half empty or half full? Is it "you pretty much work all you hear" or "you can't get no satisfaction"? Still undecided ... **VE3FDT**. Had to work on the roof and then lay new hardwood flooring the next day. Low score, nice floor! ... **VE3RCN**. I got a little more serious about this contest to improve on the last two years efforts. Friday evening and Saturday I used my FT-757GX I inherited earlier this fall. Sunday I used my IC-751A with the FL-53A narrow filter to get more serious. I still had a lot of fun. You don't have to have the latest rigs to have fun contesting. The QSK on that FT-757 blew me away in the contest. It's that nice. ... **VE7BGP**. A very fine contest where even the slow operator has a chance. many DX ops gave me a QSO in slow speed. That was very fine of them ... **VU2LYX**. I am not a CW op. That is, I am not a CW contester. Just ask the 30 stations who worked me. However, this may have been a baby step, thanks to Robby, VY2SS. Outside of a feeble effort in a RAC Winter contest, I have never entered a CW contest. We'll see where this goes ... **VY2LI**. Tnx for contest QSOs! ... **YL1S**. Had a lot of fun on my first WW CW contest expedition! ... **YS/K9GY**. We had a lot of fun and in this Macedonian-German Contest Team. We Germans enjoyed it very much to be guests in Macedonia. The hospitality was overwhelming ... **Z37M**. Grateful thanks to Les for the use of his QTH for the weekend.Very poor condx for the first 12 hours or so, then much improved, but deteriorated again towards the end. Never a dull moment!! As part of the ZL6QH gang we had to be there come hell or high water! ... **ZL2AGY**.

USA QRM

Highlight was having XW1A call me at 1405Z on 15 meters the second day. Wasn't expecting that kind of opening the way conditions have been ... **AA1K**. Great band opening on 40 meters in early morning. Worked only a few hours but had a ball working DX all over the world ... **AF4Z**. No problems from Murphy here, just a problem with the alarm clock (the Murphy Bed)? Overslept two hours Sunday morning, missing a good part of the EU opening, an inexcusable lapse for an East Coast station. Fell short of last year's totals, and I could blame the difference in 15m propagation, but I probably would have matched last year but for the alarm clock ... **K2PS**. I entered mainly to complete the NAQCC November challenge, but after I finished, I was having so much fun I kept going. The sunspot minimum certainly made it rough compared to when I was making 500+ QSOs at the maximum. But I'm happy with my results with my QRP 5 watts and simple wire antennas. I enjoyed working CN2FB on 80m for a new band country and SV9CVY on 20m for another one. Also a thrill to work New Zealand on 40m thanks to ZM3A's good ears ... **K3WWP**. Conditions really difficult. Thunderstorms in area kept me off 160 and very few contacts on 80. 10 was almost dead and 15 not very good. Everybody was on 40 and 20 so they were pretty busy. We had rain all day Saturday and Sunday. If it was not for the contest I would have had everything unplugged and watched TV (ugh)... **K5EWJ**. Bands were better than expected, plenty of stations to work (other than on 10). 80 was great to Europe Friday night. Operated the whole contest remotely using my station located 80 miles away. Fortunately the network and control equipment cooperated this time. Worked HC8N, KH7X, and KH6LC on 6 bands ... **K6NR**. New antenna that didn't get fully installed, new software that I never used before, limited time to contest, reworked the shack the day before, and mixed band conditions made for an interesting contest. Missed the guy in Hanoi but worked my first Laos station with a few minutes left in the contest ... **K7DD**. Two men and a truckload of dipoles. Great fun! ... **K8DO**. Wish I had more time to operate. Nice 10 meter opening Sunday morning. Happy to get 100+ countries on 20. Zone 33 stations need to sign their calls more. Great expeditions: 3X5A, D2NX, CT9L, 5J0A, 5X1NH, D4C. Some of these folks can REALLY send code. What an art form! ... **K8GL**. Big thrill was working 102 countries on 80 from far NW Wisconsin ... **NØIJ**. This turned out to be a much better event than I had expected. In spite of zip sunspots and somewhat noisy bands, the DX just kept coming. It was great. My (in)famous WimpyWire antenna system was on its best behavior this weekend, allowing me to get around the bands quickly, looking for new stations. I even worked three Chinese stations. Wow, the first and only time I've worked China before was back in 1998. N6WG, The Little Station with Attitude ... **N6WG**. I only made a few QSOs during the contest but it was a great way to shake out the two Elecraft K1s I assembled this month! ... **NE1RD**. Money band was 20m with openings to all parts. 40m was mostly SA, AF, and Asia, little EU here. Fun to work EU, Carribean, KH6, ZL, VK on 80m. Even got 3 JAs, CN2R, CN2FF, and Carribean on 160m. Thanks to those who have great ears to hear my 100W and 65 ft vertical w/45 radials on the ground. Thanks to DXpeditions who put many countries on in AF, SA, and Asia! ... **WØETT**. This was the first CW contest I didnt touch the key in. Very strange feeling for a CW op ... **W6XI**. No Spots, No Problem, No 10 Meters, No Kidding. It'll all be better next year! ... **W7AT**. Search and Pounce from Arizona Ranch using 100W always presents a challenge to both new and old members of the contest. Conditions this year were as good as they can get. ... **W7RH**. All-time record for us. Had a very good time ... **W9NGA**. With fair conditions few Europeans were heard except for 20 meters, but there were big local problems: (1) Very strong power line noise to the NE, (2) Remote relay box failed, so we ran 250 ft. of coax at night for the 40 meter antenna, (3) Bad QRM from close-by 50 KW BC station really hurt 160 meters, (4) Ten minutes in the local RF packet node transmitter failed ... **WA7LT**.

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in bold. (All country terminology reflects the DXCC list at the time of the contest.)

2007 CW RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K5ZD/1	**A**	**6,399,360**	**3455**	**138**	**522**
K1LZ	**"**	**5,093,565**	**3027**	**132**	**513**
K1DG	**"**	**5,001,120**	**3039**	**129**	**475**
W1KM	**"**	**4,433,030**	**2775**	**125**	**456**
K1ZZ	**"**	**3,112,416**	**1837**	**127**	**479**
WC1M	**"**	**3,077,464**	**2245**	**111**	**397**
W1WEF	*	2,828,700	2016	112	413
W1FJ	*	1,627,444	1307	102	374
W1GQ	*	1,075,355	956	100	379
K1JB	*	891,808	720	106	358
W1EBI	*	822,908	776	96	313
K1RM	*	805,464	953	87	237
K2KQ/1	*	735,013	627	95	354
KQ2M/1	*	694,683	860	72	225
KB1W	*	496,341	714	70	209
K1VV	*	404,544	509	67	227
W1HIS	*	396,644	524	85	238
W1UK	*	294,930	344	77	262
W1BYH	*	252,120	317	86	244
NS1L	*	176,120	296	75	184
W5WMU/1	*	111,910	299	36	119
K1KU	*	102,789	209	66	177
W3IZ/1	*	61,202	164	40	102
N1JW	*	45,500	146	37	93
K1SND	*	37,647	144	39	102
W1YRC	*	32,258	105	42	85
KB1ODO	*	31,320	137	39	69
K1IM	**14**	**262,409**	**755**	**29**	**104**
W1XX	**7**	**149,688**	**475**	**30**	**102**
W1MK	**3.5**	**426,313**	**1156**	**30**	**109**
K3FN/1	**"**	**78,369**	**453**	**21**	**76**
KT1V	**1.8**	**117,165**	**501**	**21**	**86**
***K1BX**	**A**	**2,056,800**	**1547**	**109**	**371**
***KS1J**	**"**	**1,175,853**	**1091**	**88**	**311**
*W1JQ	*	949,062	846	97	334
*W2JU/1	*	670,712	616	99	314
*K1IB	*	607,695	729	75	244
*K1HT	*	491,980	545	87	253
*KB1T	*	402,458	493	84	239
*AB1FY	*	365,574	457	76	243
*N1DC	*	342,550	450	75	235
*K1ZE	*	315,892	383	73	229
*AK1Q	*	296,390	413	65	212
*W1ECH	*	242,946	369	76	221
*W1VB	*	213,153	353	53	174
*K7JE/1	*	206,448	322	72	181
*K1RO	*	191,505	296	68	187
*AE1T	*	175,824	310	50	166
*AB1J	*	158,207	266	58	175
*K1VSJ	*	121,397	234	54	139
*W2QQ/1	*	50,786	152	38	96
*W1HI	*	48,510	195	19	80
*K1GPL	*	19,097	207	42	71
*K1QQ	*	17,876	95	38	71
*W1HBR	*	15,224	242	42	131
*WB1FLA	*	11,610	88	32	54
*W1OHM	*	10,792	75	22	49
*K1KNJ	*	9,440	64	16	43
*K1HTJ	*	9,348	54	25	51
*K1EP	*	8,540	56	29	41
*AA1M	*	3,600	36	12	27
*KM1Z	*	2,989	76	26	35
*KA1VMG	*	588	14	9	12
*K1KAV	*	416	10	6	10
*NJ1Q	*	84	10	4	3
***N1NK**	**21**	**63,547**	**220**	**22**	**87**
***W1MU**	**14**	**446,090**	**1026**	**32**	**123**
*K1EFI	*	57,327	219	18	79
***W1NK**	**3.5**	**11,610**	**85**	**14**	**40**
N2LT	**A**	**3,538,836**	**2112**	**134**	**470**
W2RU	**"**	**2,262,904**	**1805**	**111**	**365**
K2NV	**"**	**1,547,658**	**1114**	**117**	**402**
W2LC	*	1,057,137	1010	96	323
K2FU	*	873,016	782	98	326
N2GC	*	723,788	668	95	308
W2XL	*	357,840	485	71	213
WA2VYA	*	272,734	397	61	192
KW2J	*	240,300	342	73	194
W2TB	*	203,346	330	50	187
AB2E	*	188,955	298	69	186
KM2L	*	157,178	298	54	152
WA2YSJ	*	142,480	271	60	148
W2FUI	*	98,032	202	52	124
WW2DX	*	85,617	201	59	130
KC2NB	*	85,084	222	50	128
W2YJ	*	69,388	179	50	116
N2BEE	*	62,835	235	52	125
N2CG	*	61,560	147	52	119
NG2P	*	49,491	142	37	104
N2VM	*	28,408	127	30	76
K2RET	*	19,100	105	30	70
N2RJ	*	10,530	54	29	49
N2BZP	*	9,375	70	26	49
WA2EMF	*	9,216	62	20	44
WB2JEP	*	1,798	34	11	20
W2KKZ	*	440	24	10	12
W2RR	**28**	**4,144**	**58**	**11**	**25**
KE2WY	**14**	**99,600**	**375**	**23**	**97**
N2MF	**7**	**413,660**	**985**	**38**	**134**
KZ2I	*	35,595	146	24	81
NQ3N/2	*	6,278	97	19	54
NA2X	**3.5**	**39,867**	**161**	**21**	**76**
W2TX	*	10,416	67	17	45
WF2W	**1.8**	**43,788**	**225**	**18**	**64**
W2VO	*	21,409	131	17	62
***K2PS**	**A**	**1,294,272**	**1152**	**91**	**337**
***N2MM**	**"**	**1,270,320**	**1101**	**108**	**366**
*K2UF	*	555,360	619	86	270
*NP3D/W2	*	498,348	538	86	295
			(OP: EW1AR)		
*NX2X	*	401,685	520	73	232
*W2CVW	*	185,650	300	60	175
*KD2MX	*	172,270	327	66	164
*K2TWI	*	144,200	273	42	158
*WA2VZQ	*	127,710	236	52	146
*K3GYS/2	*	121,472	294	50	158
*AI2N	*	119,973	236	59	144
*N2US	*	109,804	233	45	149
*WB2OQQ	*	100,190	204	53	162
*N2SQW	*	89,388	204	54	137
*KD2JC	*	77,044	239	58	129
*K2MK	*	75,843	202	46	113
*K2CJ	*	66,452	172	36	112
*WA2BMH	*	50,592	154	37	99
*W2CCC	*	50,540	155	38	95
			(OP: K2CS)		
*WA2MCR	*	47,840	167	55	105
*N2RI	*	36,890	157	54	101
*K2EKM	*	29,362	110	27	79
*WA2VQV	*	22,620	103	29	58
*K2IZ	*	21,070	98	28	70
*WB2AA	*	12,516	60	34	50
*N2UM	*	10,780	63	21	56
*N2JSO	*	3,726	35	21	33
*K2VX	*	3,542	41	16	30
*N3SY/2	*	2,379	24	15	24
*WA2IAU	*	425	14	5	12
***KD2RD**	**14**	**339,880**	**838**	**29**	**116**
*K2MFV	*	164,347	412	28	121
*W2AW	*	127,680	418	23	91
*W2DXA	*	41,895	157	21	84
			(OP: W2KKZ)		
***K2RR**	**3.5**	**31,648**	**138**	**20**	**66**
*K3BU/2	1.8	1,200	32	9	11
K3CR	**A**	**5,330,100**	**3021**	**142**	**510**
			(OP: LZ4AX)		
AA1K/3	**"**	**3,864,576**	**2483**	**130**	**462**
NY3A	**"**	**2,363,816**	**1971**	**100**	**342**
N1WR	*	1,579,390	1342	98	332
K3TC	*	1,009,757	870	111	358
K3MSB	*	630,338	623	88	298
N3RJ	*	561,132	711	80	247
N3UM	*	546,060	713	66	219
K3IE	*	423,964	519	82	250
N3KR	*	386,880	487	72	238
K3PU	*	308,160	383	84	237
N3KCJ	*	169,604	348	54	164
NA3F	*	82,212	209	56	130
W3FVT	*	66,256	207	45	119
W3RJ	*	64,064	173	44	99
N3BNA	*	58,440	197	33	87
N3EHY	*	47,736	178	44	109
AA3VA	*	40,192	131	39	89
W3FAF	*	30,058	128	37	76
K3YG	*	29,700	111	32	76
W6AAN/3	*	24,075	90	34	73
N3NZ	*	21,627	98	23	66
W6NRJ/3	*	14,097	96	45	82
K3GW	**14**	**125,629**	**353**	**26**	**105**
K3ATO	7	16,133	107	18	55
W3NO	**3.5**	**109,215**	**304**	**29**	**106**
W9GE/3	*	79,911	271	23	94
NA3M	*	50,900	210	21	79
W3GH	**1.8**	**25,972**	**124**	**18**	**68**
***K3AU**	**A**	**1,178,739**	**1046**	**104**	**343**
			(OP: K2YWE)		
***WF3M**	**"**	**307,851**	**437**	**60**	**207**
*W3IUU	*	253,232	365	68	204
*WA3GNW	*	178,710	317	55	175
*KI3O	*	178,210	291	68	183
*WO3Z	*	148,144	286	55	142
*WB8YYY/3	*	141,900	302	56	164
*W3DQN	*	126,350	262	47	143
*WA3OFF	*	89,056	203	54	130
*K3KU	*	58,140	149	45	108
*W3TB	*	54,826	164	55	103
*N3TG	*	47,002	148	46	96
*W3TUA	*	45,844	197	43	103
*KN3A	*	41,720	138	57	92
*N3XL	*	38,646	156	34	79
*N3WU	*	37,710	147	21	69
*N8NA/3	*	31,625	106	41	84
*W3CB	*	17,138	89	27	55
*KA3DRR	*	14,904	90	29	40
*K3PG	*	12,152	82	35	63
*W3RT	*	4,900	88	39	59
*AF3Z	*	3,520	39	22	33
*AA3II	*	1,700	18	16	18
*KF3CV	*	100	3	3	3
*W3EH	21	638	15	8	14
*W3OD	*	2,304	29	12	24
***N3ST**	**3.5**	**54,390**	**229**	**19**	**79**
K4ZW	**A**	**3,900,600**	**2618**	**132**	**418**
W4RX	**"**	**2,230,872**	**1584**	**126**	**407**
N6AR/4	**"**	**1,948,520**	**1315**	**125**	**439**
N4TB	**"**	**1,706,232**	**1333**	**118**	**388**
WO4O	*	1,380,288	1218	112	336
W4QM	*	1,017,904	865	103	349
K4LTA	*	924,320	1032	107	329
K4RO	*	908,776	781	110	339
KC4HW	*	27,136	104	26	80
KZ1X/4	*	26,250	99	30	75
KI4FZY	*	23,711	127	47	84
K1ZW/4	*	17,860	90	30	64
W4PV	*	5,329	51	27	46
W4OJC	*	4,896	83	39	57
K4FJ	**21**	**159,616**	**473**	**24**	**104**
K4PIC	*	16,425	102	17	56
K4CEB	*	9,666	73	16	38
K4RV	*	627	12	7	12
KK9A/4	**14**	**246,192**	**636**	**30**	**108**
K4RDU	*	53,025	198	22	83
AI4WW	*	1,100	19	9	13
N4PN	**7**	**665,533**	**1466**	**38**	**149**
N4QV	*	100,415	298	27	106
W4YA	*	49,926	203	24	82
AF4Z	*	7,216	84	23	65
AA7JV/4	**3.5**	**101,660**	**361**	**23**	**92**
K4PI	**1.8**	**71,585**	**300**	**20**	**83**
W9XX/4	*	1,242	27	8	19
***K1PT/4**	**A**	**1,641,413**	**1273**	**114**	**377**
***W3AU/4**	**"**	**1,246,768**	**978**	**107**	**357**
			(OP: K4GKD)		
***N4YDU**	**"**	**968,814**	**960**	**108**	**354**
*WK2G/4	*	952,614	1160	85	269
*N4IG	*	773,817	769	93	300
*NA4K	*	769,120	728	104	314
*WA4DOU	*	637,007	643	88	283
*WA1FCN/4	*	632,024	725	105	292
*WD4AHZ	*	601,370	634	94	261
*W4YE	*	573,903	611	89	274
*NA4CW	*	337,876	420	85	223
*N4JF	*	333,540	476	84	243
*W4RQ	*	216,056	354	58	181
*AA4LR	*	210,058	361	68	186
*N4ARO	*	209,560	344	64	196
*WJ9B/4	*	156,275	369	52	123
*W4ARM	*	155,742	332	56	146
*N4WO	*	150,308	302	60	152
*K7CS/4	*	147,288	273	67	161
*N4EK	*	143,613	290	56	141
*WR4F	*	126,430	245	68	201
*W4EEH	*	112,670	227	59	131
*W4NBS	*	102,410	251	58	151
*KN4Y	*	95,904	248	63	153
*NU4I	*	93,730	216	53	129
*K4HAL	*	92,415	208	59	124
*KAJAF	*	90,525	192	70	143
*W4ZYT	*	83,000	197	51	115
*N5VV/4	*	76,557	201	46	123
*W4TMO	*	73,040	178	54	122
*N4UFP	*	71,410	194	57	128
*WØBUH/4	*	62,967	212	37	102
*K3CQ/4	*	61,812	211	39	114
*W3TB/4	*	59,148	164	55	104
*K6ETM/4	*	55,421	149	56	101
*WB4SQ	*	50,512	192	48	116
*AF4PP	*	39,585	142	56	89
*W7IY/4	*	39,168	126	43	101
*KI4CBN	*	37,252	130	42	92
*K4UK	*	36,850	133	47	87
*N4LF	*	33,178	119	28	78
*K3MZ/4	*	26,499	103	42	79
*W4DEC	*	25,320	106	44	76
*N4AO	*	24,947	99	32	69
			(OP: WC4E)		
*K4BK	*	24,396	102	39	68
*NA4C	*	24,380	133	44	71
*N4AU	*	23,653	94	39	70
*AI4RJ	*	23,005	103	39	68
*KS4S	*	22,977	107	34	77
*KI4EZC	*	22,275	105	33	66
*K4BX	*	21,400	99	35	65
*K4FTO	*	15,244	91	37	66
*N4HH	*	11,880	59	38	52
*N4LS	*	11,858	60	35	42
*KI4EGT	*	11,397	93	32	55
*WA4OSD	*	9,750	61	32	43
*W4EBA	*	9,576	62	26	46
*WA4EUL	*	8,976	58	23	43
*K3QC/4	*	8,140	47	21	34
*W4IEI	*	8,030	86	25	47
*W4WNT	*	6,864	60	30	48
*K4AGT	*	5,238	39	18	36
*N4MIO	*	5,029	89	38	69
*WN4DX	*	2,774	29	12	26
***K4WI**	**28**	**4,392**	**58**	**14**	**22**
***W4IX**	**21**	**124,740**	**364**	**26**	**106**
*WB4TDH	*	86,760	273	27	93
***N4MO**	**14**	**181,090**	**532**	**26**	**104**
*N4ECJ	*	123,291	389	28	105
*K4NVJ	*	19,890	97	24	61
***N4PSE**	**7**	**80,040**	**261**	**25**	**91**
*W4/KH6NF	*	56,571	214	24	85
			(OP: KH6SH)		
*K4PG	*	40,420	180	22	72
*WA2ASQ/4	*	18,576	95	19	53
*NQ4K	*	9,512	81	16	42
*KT4MM	*	1,480	59	13	24
***NZWN/4**	**1.8**	**27,846**	**172**	**17**	**61**
*KR4OW	*	260	19	8	12
N2IC/5	**A**	**3,838,352**	**2378**	**153**	**449**
WX8S/5	**"**	**2,245,120**	**1847**	**127**	**385**
					(OP: AD5Q)
W5KFT	*	917,244	1251	103	239
					(OP: N1XS)
WD5K	*	847,430	792	105	310
N5PO	*	621,632	712	91	261
WA5VGI	*	325,752	446	96	198
K5EWJ	*	238,392	385	81	183
K7IA/5	*	221,914	370	86	176
N5TU	*	150,804	308	69	167
N5PHT	*	103,872	229	55	137
KD5JAA	*	98,256	224	67	117
N5UL	*	97,196	198	64	124
WØZW/5	*	53,352	158	52	100
N5DY	*	38,121	114	42	89
K5HP	*	6,767	55	27	40
W5MJ	*	5,934	101	16	30
K5GA	**14**	**424,960**	**927**	**35**	**131**
K5NZ	**7**	**144,305**	**446**	**34**	**99**
K5RX	**1.8**	**31,752**	**157**	**19**	**65**
***N5AW**	**A**	**1,506,560**	**1080**	**130**	**405**
***K5KLA**	**"**	**518,396**	**546**	**89**	**270**
*KC5R	*	483,564	538	96	256
*W5GAI	*	281,358	405	90	204
*K5FP	*	275,772	387	85	183
*WA5SOG	*	165,567	288	73	168
*W5ZL	*	110,019	202	74	143
*W5RYA	*	87,615	202	59	118
*WK5X	*	86,955	215	52	135
*KØGEO/5	*	66,836	178	50	104
*NN5T	*	61,344	161	54	88
*KE5LQ	*	25,506	104	44	65
*N5PU	*	24,840	101	34	74
*K5BZH	*	22,705	105	33	62
*AC5ZQ	*	17,017	55	31	42
*W5IL	*	14,490	90	37	68
*KE5OG	*	14,194	78	38	56
*KD5D	*	12,324	66	31	48
*W5PQ	*	10,570	66	27	43
*WB5NMZ	*	7,553	56	32	51
*AC5AA	*	5,244	39	25	32
*NM5M	*	1,862	27	14	24
*AA5VU	*	250	52	26	24
***N4IJ/5**	**14**	**172,205**	**427**	**33**	**122**
*N5DO	*	155,774	415	32	110
***N5ER**	**7**	**27,412**	**127**	**22**	**67**
K6NA	**A**	**1,894,742**	**1430**	**139**	**343**
N6TV	**"**	**1,872,780**	**1687**	**116**	**304**
K6XX	**"**	**1,826,437**	**1502**	**131**	**336**
WC6H	**"**	**1,738,317**	**1550**	**125**	**302**
					(OP: NU6S)
W6PH	*	1,332,873	1190	124	299
W6UM	*	582,498	540	118	296
K6NR	*	417,956	524	101	207
KC6X	*	413,336	549	91	217
N6VI	*	353,010	497	95	192
K6LRN	*	337,212	433	95	211
AJ6V	*	163,178	399	63	103
NF6R	*	160,056	306	73	143
K6YK	*	123,000	241	69	131
WO6M	*	94,520	240	61	109
N6MA	*	89,512	235	67	100
W6KC	*	47,500	138	48	77
K6TD	*	43,296	145	46	86
WS6X	*	42,568	138	53	83
KN6Y	*	37,288	155	57	101
NO6X	*	31,122	116	42	75
W6SX	*	22,041	101	43	50
W6GMU	*	17,763	99	38	55
W6DRX	*	14,104	79	39	43
W6ISO	*	1,260	21	15	20
K6RAD	*	1,196	19	12	14
N6AA	*	968	17	10	12
					(OP: N6TR)
AE6RR	*	12	2	2	2
W6YA	**21**	**92,977**	**331**	**28**	**81**
W4UAT/6	**14**	**54,945**	**221**	**30**	**69**
N6AW	**7**	**95,700**	**234**	**35**	**110**
K5KT/6	**"**	**62,620**	**206**	**30**	**94**
W6DCC	*	14,972	113	27	49
K6OY	**3.5**	**172,386**	**564**	**33**	**89**
***N6RV**	**A**	**328,539**	**536**	**97**	**194**
***N6OR**	**"**	**287,640**	**473**	**73**	**209**
*KM6Z	*	220,220	363	79	163
*W6/VK2IMM	*	212,060	392	80	150
*W6ZL	*	176,440	308	79	141
*W6RFF	*	168,181	314	78	143
*AA6EE	*	113,700	286	58	92
*KA6NGR	*	104,823	241	63	108
*K6AAB	*	76,479	195	60	99
*N6EM	*	48,909	183	51	68

*WW6D	*	41,745	140	49	72
*AA6DX	*	18,144	92	38	46
*K6CSL	*	16,109	115	37	52
*KØNW/6	*	15,604	103	37	46
*W6UR	*	14,700	83	34	50
*K6CSL	*	13,175	115	37	48
*NA6G	*	5,757	86	28	29
*KA6GDT	*	4,116	55	23	26
*K6RM	*	3,936	36	20	21
*N6QZS	*	3,648	41	15	17
*N6ERD	*	200	7	5	5
***K6CU**	**14**	**19,241**	**114**	**24**	**47**
KO7AA	**A**	**1,839,328**	**1547**	**124**	**334**
K7GK	**"**	**1,437,056**	**1298**	**126**	**310**
WZVJN/7	**"**	**1,427,819**	**1308**	**121**	**288**
K7RL	*	866,550	1012	107	220
N7TT	*	720,513	860	110	249
WY7I	*	588,506	761	94	229
N7ZG	*	503,728	685	100	204
W7AT	*	405,224	611	114	182
			(OP: W7EW)		
K7ZA	*	390,544	507	98	210
KG7H	*	389,355	540	94	209
N6TW/7	*	309,636	466	98	184
K7MM	*	308,700	521	79	166
W7YS	*	292,400	426	85	187
K7GQ	*	233,761	332	82	187
NQ7R	*	220,332	429	80	164
K7EG	*	175,840	315	65	159
K7HC	*	161,766	314	81	177
N8GZ/7	*	161,508	350	99	159
KB7N	*	150,520	295	73	139
W6AEA/7	*	112,424	259	59	125
KN7T	*	108,500	265	66	109
NI7R	*	104,823	236	59	112
N6MA/7	*	99,588	235	67	105
W7SYJ	*	98,334	242	50	112
N6KW/7	*	98,280	229	59	109
WA1PMA/7	*	90,804	201	61	127
KS7T	*	84,645	216	58	107
KF7PG	*	84,409	220	59	92
W7IIT	*	76,916	212	46	88
W7/DL1UF	*	37,908	111	65	91
W7XA	*	26,069	108	46	85
W7LKG	*	17,732	105	22	40
W7TTE	*	12,155	54	32	53
K7DD	*	10,640	75	40	55
W8TK/7	*	6,758	48	26	36
NE7X	*	100	8	8	8
N6MZ/7	*	6	1	1	1
W7WA	**14**	**320,850**	**841**	**36**	**114**
W7KKR	*	20,435	115	23	44
KC7UP	*	11,152	72	22	46
K7AO	**7**	**190,057**	**507**	**32**	**101**
W9PL/7	*	15,312	97	18	40
W8AEF/7	**3.5**	**48,287**	**175**	**28**	**81**
K8BN/7	**"**	**47,508**	**176**	**28**	**79**
K7OX	**1.8**	**4,082**	**67**	**12**	**14**
***K7JE**	**A**	**193,772**	**322**	**72**	**179**
***W3CP/7**	**"**	**193,276**	**352**	**78**	**151**
***K7ACZ**	**"**	**187,935**	**316**	**89**	**166**
*K7HBN	*	174,045	318	66	139
*N7LOX	*	171,496	375	70	124
*NG7Z	*	141,531	309	70	121
*W7RV	*	104,804	218	75	122
*NE7D	*	104,652	255	64	98
*AB7RW	*	97,173	243	66	111
*W7TMT	*	68,292	220	48	78
*NW7E	*	58,984	159	52	94
*W7QN	*	55,083	188	53	76
*W7QDM	*	51,408	169	43	93
*K7GS	*	46,990	181	42	85
*K6UM/7	*	38,808	149	36	62
*W7HS	*	35,340	115	43	71
*WAØWWW/7	*	30,015	150	43	72
*N7VS	*	29,532	140	49	58
*K7MO	*	28,527	119	44	67
*N7EPO	*	25,810	115	37	52
*N7WI	*	24,648	115	29	49
*K7TR	*	23,958	154	51	70
*W4LSC/7	*	23,433	92	37	70
*KE7YF	*	21,870	106	35	46
*K7XV	*	20,580	98	35	63
*W9CF/7	*	19,320	89	35	49
*NS7K	*	18,849	92	43	60
*WØXR/7	*	18,810	105	41	58
*AA7IH	*	17,088	174	25	39
*N7EIE	*	14,848	99	32	32
*W7DIT	*	10,024	83	25	31
*W7GT	*	9,724	83	24	28
*W7VXS	*	9,120	83	19	29
*W7GH	*	8,073	50	31	38
*K7ARJ	*	7,560	64	25	31
*KU7T	*	5,499	67	24	23
*N7QS	*	4,212	42	16	20
*N7TL	*	3,843	68	30	31
*AB7CF	*	2,209	37	22	25
*KJ7UN	*	594	12	9	8
***N7WA**	**14**	**95,970**	**360**	**27**	**78**
*K7AV	*	220	11	6	5
***AA7AX**	**7**	**18,318**	**135**	**21**	**50**
*N7IE	*	2,268	34	12	16
*WA7BME	*	228	7	5	7
***W7RH**	**1.8**	**2,695**	**44**	**14**	**21**
N8II	**A**	**1,950,036**	**1506**	**113**	**361**
K8GL	**"**	**1,736,658**	**1186**	**128**	**409**
K8MP	*	1,055,876	962	110	318
W8ERD	*	911,360	850	112	333
NF8R	*	459,068	538	75	239
N8MZ	*	429,624	474	93	258
N4ZR/8	*	368,771	539	70	177
W8UD	*	352,086	448	82	221
W3IQ/8	*	323,306	489	53	204
KT8Y	*	302,016	433	78	208
W8TE	*	271,744	337	104	248
W8OHT	*	142,880	299	61	174
W8PN	*	141,570	298	57	138
K8OT	*	17,000	97	31	69
W8EJK	*	12,416	73	38	59
W8ZU	*	8,520	92	27	44
W8TK	*	5,782	48	26	33
W8MET	*	1,204	18	12	16
KT8X	**21**	**34,629**	**152**	**21**	**76**
K8OD	**14**	**344,904**	**768**	**33**	**135**
W8TWA	*	126,362	354	27	107
AC8W	**7**	**111,895**	**362**	**38**	**109**
W8JGU	*	74,802	210	34	103
K8MD	**3.5**	**37,673**	**194**	**21**	**80**
N8EA	**1.8**	**20,424**	**117**	**18**	**56**
***N8AA**	**A**	**985,886**	**842**	**103**	**348**
***WB8JUI**	**"**	**712,218**	**695**	**95**	**302**
*KV8Q	*	500,094	569	82	261
*W8GOC	*	268,464	396	65	207
*WB8TLJ	*	213,213	318	75	198
*W8IDM	*	121,576	254	52	130
*K3XO/8	*	102,024	257	35	121
*N9AUG/8	*	101,990	262	69	166
*W8KX	*	97,216	176	60	164
*K8VUS	*	85,500	198	59	121
*K8EE	*	80,115	273	39	108
*WBØKWJ/8	*	78,480	222	53	127
*K8AB	*	63,318	207	58	125
*NF8M	*	50,736	137	54	97
*WD8KRV	*	42,395	165	51	88
*W8KTQ	*	33,180	215	45	113
*KD8RB	*	28,583	110	33	68
*N8WS	*	23,280	110	37	83
*W8TM	*	17,072	78	26	62
*W8AN	*	17,020	111	41	74
*K8WV	*	16,920	79	35	59
*K8ZIZ	*	16,320	85	35	61
*W8EH	*	11,200	63	20	50
*W8ASA	*	2,091	29	18	23
*N8KV	*	1,504	23	14	18
*N8CX	*	85	11	8	9
*W8CR	*	1089	18	14	13
***K8IR**	**14**	**54,648**	**210**	**23**	**76**
*AF8C	*	17,301	100	19	54
***W8GG**	**3.5**	**22,590**	**117**	**21**	**69**
***K8BL**	**1.8**	**4,715**	**59**	**12**	**29**
W9OP	**A**	**746,823**	**791**	**88**	**283**
K9VV	**"**	**669,086**	**715**	**90**	**284**
WI9WI	*	545,650	651	92	258
N9FC	*	342,798	463	75	216
AB9H	*	281,397	391	78	213
N9AKR	*	181,492	251	82	232
W9SE	*	176,412	311	73	171
W3HDH/9	*	171,288	298	63	171
NO9E	*	145,728	233	79	174
W9GXR	*	122,728	248	50	134
WT9U	*	122,591	251	62	149
K9ZU	*	82,164	214	41	123
K9CAN	*	77,292	242	27	77
KK9H	*	66,216	228	62	124
K9JM	*	62,155	155	56	99
NE9Z	*	55,870	182	64	121
N9NA	*	17,098	85	38	65
K9OT	*	15,930	81	34	56
WB9AYW	*	754	17	13	13
AI9T	21	15,792	80	21	63
K9CJ	**7**	**84,870**	**268**	**26**	**97**
***N4TZ/9**	**A**	**1,450,400**	**1073**	**119**	**399**
***K9QVB**	**"**	**724,176**	**743**	**94**	**282**
*W9ILY	*	286,113	425	78	205
*AC9X	*	275,280	406	84	212
*K9OM	*	240,464	366	69	197
*W9OA	*	203,634	341	70	173
*K1TN/9	*	201,824	335	61	177
*K9JE	*	136,112	276	50	138
*NA9U	*	37,500	167	52	98
*W9YO	*	37,083	133	46	95
*KC9GQN	*	32,760	139	41	79
*K9UIY	*	26,255	119	25	64
*KD9MS	*	19,030	96	40	70
*N9LYE	*	17,856	79	35	61
*K9PY	*	17,628	92	42	71
*KC9GBX	*	17,458	88	31	55
*N9TTX	*	13,112	67	35	53
*W9VQ	*	12,556	65	32	54
*N9ID	*	12,325	67	28	57
*N9RC	*	11,193	75	36	55
*NV9X	*	6,324	53	28	40
*N9GBB	*	6,164	56	15	31
*K9QH	*	6,104	48	18	38
*N9TF	*	5,856	38	27	34
*KC9HGW	*	4,558	55	23	30
*WR9Y	*	4,300	47	22	28
*W9UM	*	2,146	25	16	21
*WB8BZK/9	*	1,360	23	15	19
*W9HR	*	1,161	38	11	28
*KB9YGD	*	1,152	25	18	18
*N9LGP	*	315	11	9	6
*AB9LA	*	105	22	8	7
***K9WZB**	**28**	**1,998**	**31**	**12**	**15**
***N9LJX**	**14**	**28,135**	**199**	**19**	**66**
*W9/DM5TI	*	16,864	172	17	51
*N9IH	7	48	25	3	3
KU1CW/B	**A**	**2,392,704**	**1587**	**136**	**440**
KØSR	**"**	**1,504,116**	**1144**	**121**	**392**
KØDEQ	*	401,835	490	84	217
WØTT	*	394,362	473	75	252
KØMD	*	331,574	477	96	290
WØJPL	*	314,314	397	88	226
NØRN	*	261,702	357	79	200
WØHBH	*	139,328	236	68	156
KØJJR	*	125,008	264	63	145
WKØP	*	103,408	247	58	126
WØUY	*	92,880	208	58	122
WØBH	*	90,852	205	67	134
KJØG	*	78,624	211	67	115
WØHW	*	76,076	196	60	122
WBØN	*	55,942	175	51	115
KGØUA	*	42,705	139	37	80
WØML	*	41,667	139	40	89
NØUY	*	40,171	160	45	94
KØPC	*	12,936	65	32	56
WØKU	*	8,806	52	32	42
KT5E/B	**7**	**115,115**	**430**	**30**	**85**
KØOD	*	60,420	221	27	87
KØRI	*	20,250	120	21	54
KØGT	1.8	63	4	4	3
***WØETT**	**A**	**412,128**	**524**	**92**	**226**
***NØSXX**	**"**	**211,544**	**404**	**76**	**172**
*NØHR	*	173,304	304	75	174
*KØPK	*	162,192	317	71	147
*KNØV	*	106,971	211	64	133
*NGØT	*	79,610	184	65	125
*WBØKWJ	*	76,320	222	53	127
*NAØN	*	73,788	172	54	118
*KCØVKN	*	51,765	141	47	98
*KØALT	*	48,384	154	56	88
*WØQQG	*	35,532	161	46	95
*ADØH	*	35,136	134	45	77
*AAØAW	*	34,194	138	50	89
*KSØM	*	24,780	127	43	75
*K6MJ/Ø	*	23,919	112	41	78
*WØRAA	*	23,896	121	49	67
*N1WQ/Ø	*	23,391	153	40	73
*NØBUI	*	22,892	101	30	67
*NØGOS	*	20,174	114	27	50
*WØZQ	*	19,040	84	44	68
*NØBK	*	17,425	85	35	50
*NBØZ	*	11,360	55	31	49
*NAØBR	*	8,103	76	34	39
*KIØJ	*	7,991	66	28	33
*KØRY	*	6,318	95	35	43
*WAØIAF	*	5,040	71	32	48
*K2HT/Ø	*	2,436	21	17	25
*KØXTR	*	1188	32	13	10
*WAØBNX	*	792	17	10	14
*WYØV	*	462	47	26	40
***WØPC**	**21**	**1,275**	**20**	**9**	**16**
***KØPJ**	**3.5**	**20,746**	**133**	**20**	**62**

Alaska

KL7WV	**A**	**300,690**	**1191**	**49**	**81**
			(OP: W3YQ)		
KL8DX	**14**	**27,258**	**304**	**19**	**23**
*KL7NC	A	4,332	88	20	18

Anguilla

***VP2EDL**	**7**	**513,291**	**1699**	**26**	**103**
			(OP: DL5CW)		

Antigua & Barbuda

***V26K**	**A**	**7,220,340**	**5526**	**123**	**417**
			(OP: AA3B)		

Bahamas

***C6AQQ**	**A**	**2,978,024**	**3270**	**99**	**329**
			(OP: ND3F)		
*C6AGY	*	44,821	293	52	81
			(OP: ND6S)		
***C6AKX**	**14**	**807,696**	**2475**	**31**	**111**
			(OP: KE7X)		
***C6ATA**	**7**	**1,142,883**	**3133**	**33**	**124**
			(OP: K2KW)		

Barbados

8P5A	**A**	**9,040,800**	**6565**	**141**	**459**
			(OP: W2SC)		
8PØP	*	157,140	426	57	123
			(OP:8P9NX)		
*8P9MN	A	64,581	195	25	60
			(OP: DF8AN)		

Belize

V31DF	**A**	**1,747,040**	**2856**	**88**	**217**
			(OP:WJ2O)		

Bermuda

***OH1VR/VP9**	**14**	**546,763**	**2016**	**28**	**185**

Canada

VY2ZM	**A**	**6,885,168**	**4708**	**124**	**449**
			(OP: K1ZM)		
VY2TT	**"**	**6,872,935**	**4552**	**115**	**430**
			(OP: K6LA)		
VO1HE	**"**	**414,072**	**498**	**73**	**251**
VE1MC	**"**	**372,960**	**601**	**61**	**198**
***VE1RGB**	**A**	**977,262**	**1102**	**82**	**292**
***VA1MM**	**"**	**803,979**	**1256**	**77**	**220**
***VY2SS**	**"**	**733,410**	**1307**	**68**	**193**
*VE1DT	*	565,110	883	61	209
*VO1TA	*	60,024	301	20	62
*VE1JS	*	31,473	121	37	80
*VO1BQ	*	1,587	38	9	14
*VY2LI	*	918	27	14	13
VE2IM	**A**	**4,325,664**	**3941**	**108**	**384**
			(OP: VE3DZ)		
VE2TZT	**"**	**2,370,400**	**2596**	**103**	**297**
VE2FK	*	506,788	897	67	177
VE2AYU	*	157,080	437	36	118
VE2LG	*	17,404	95	22	54
VA2WDQ	**3.5**	**158,050**	**714**	**19**	**90**
***VE2AWR**	**A**	**511,344**	**825**	**66**	**202**
*VE2SG	*	363,135	987	59	156
*VA2SG	*	274,890	691	51	136
*VE2AXO	*	79,800	278	45	95
*VE2FFE	*	69,938	283	39	82
*VE2SB	*	61,005	200	49	98
*VE2LX	*	13,871	148	36	61
***VE2HLS**	**14**	**28,548**	**171**	**17**	**61**
VC3A	**A**	**4,968,440**	**3908**	**125**	**432**
			(OP: VE3AT)		
VC3J	**"**	**4,853,208**	**3877**	**128**	**423**
VE3EY	**"**	**3,611,762**	**3157**	**117**	**382**
VE3NE	*	2,503,250	2359	114	361
VE3CX	*	507,185	695	97	240
VE3IQ	*	55,328	146	42	110
VE3IAY	**21**	**50,255**	**224**	**20**	**75**
			(OP: VE3KI)		
VE3FU	**14**	**709,440**	**1800**	**32**	**126**
VE3KI	**7**	**334,260**	**1101**	**25**	**110**
VE3XN	*	73,320	270	24	96
VE3ZI	**1.8**	**170,128**	**717**	**25**	**87**
VE3CUI	*	3,530	199	5	5
***VA3NR**	**A**	**739,882**	**1268**	**81**	**205**
***VE3GSI**	**"**	**553,828**	**777**	**77**	**230**
***VE3JM**	**"**	**503,620**	**900**	**72**	**188**
*VE3FDT	*	288,580	565	67	168
*VE3XD	*	228,661	395	69	182
*VE3OM	*	129,056	247	60	158
*VE3TW	*	125,440	329	50	110
*VE3GLO	*	118,854	304	60	126
*VE3FH	*	118,404	256	63	135
*VA3ATT	*	57,620	204	38	96
*VA3OBR	*	57,023	227	45	82
*VE3OX	*	35,052	153	52	86
*VE3XAT	*	26,790	129	32	62
*VE3OBU	*	22,712	114	47	89
*VA3HUN	*	15,906	135	27	39
*VA3SWG	*	8,424	142	31	50
*VE3LXL	*	6,784	59	23	30
*VE3IGJ	*	5,184	68	12	24
*VE3NCQ	*	3,948	43	19	23
*VE3RCN	*	350	13	7	7
***VE3FJ**	**14**	**30,780**	**147**	**18**	**63**
*VE3IAE	*	21,588	103	19	65
*VE3THX	*	12,928	93	16	48
***VA3SY**	**7**	**14,658**	**266**	**15**	**27**
***VE3OSZ**	**1.8**	**25,262**	**376**	**11**	**23**
***VE4YU**	**A**	**36,295**	**124**	**36**	**83**
VE5CPU	**A**	**14,820**	**102**	**28**	**48**
***VE5SF**	**A**	**62,580**	**389**	**30**	**54**
VE6EX	**A**	**723,620**	**1880**	**73**	**121**
VA6IK	*	137,104	340	55	121
VE6EPK	*	14,835	116	26	43
VE6JY	**14**	**457,064**	**1395**	**35**	**117**
			(OP: VA7RR)		
VE6WQ	**7**	**125,337**	**486**	**31**	**92**
***VE6BF**	**A**	**70,358**	**255**	**58**	**69**
***VE6CNU**	**14**	**112,746**	**647**	**27**	**59**
VA7ST	**A**	**571,155**	**1449**	**68**	**127**
VE7SQ	*	148,088	465	61	112
VA7RN	*	124,244	307	66	112
***VE7NH**	**A**	**320,292**	**676**	**80**	**137**
*VA7KOJ	*	90,630	245	62	109
*VE7JKZ	*	87,057	238	63	90
*VE7BGP	*	17,848	112	43	49
*VY1EI	A	6,080	167	11	9

Cuba

CO8ZZ	**3.5**	**232,680**	**1061**	**21**	**84**
***CO8LY**	**21**	**346,203**	**1397**	**25**	**92**
***CO8TW**	**14**	**19,030**	**137**	**25**	**85**
***CO2WF**	**7**	**75,297**	**687**	**16**	**41**
***CO6LP**	**3.5**	**78,810**	**630**	**18**	**56**

Dominican Republic

***HI8RV**	**A**	**311,805**	**742**	**61**	**144**

El Salvador

***YS/K9GY**	**A**	**1,711,970**	**2459**	**100**	**238**

Grenada

*J39BS	A	13,875	91	32	43
*J37T	*	10,773	121	17	40
			(OP:VE3EBN)		

Guadeloupe

FG/F6ARC	**7**	**308,566**	**1221**	**25**	**81**

Honduras

HQ2A	**A**	**4,329,555**	**4683**	**107**	**328**
			(OP: N6AA)		
***HQ9R**	**A**	**296,829**	**887**	**59**	**118**
			(OP: WQ7R)		
*HR2DX	7	6,992	97	12	26
*HR2DMR	1.8	140	19	3	2

Martinique

FM5BH	**A**	**6,441,472**	**5093**	**130**	**417**
			(OP: JE1JKL)		

Mexico

XE2GG	**A**	**2,398,935**	**3354**	**110**	**231**
XE1MM	**"**	**1,163,350**	**2180**	**78**	**187**
XE2S	*	398,250	880	85	140
XE1V	*	288,896	604	82	162
***6H1IM**	**A**	**851,400**	**2337**	**72**	**128**
			(OP: XE1IM)		
*XE1NW	*	518,175	1145	73	152
*XE2MX	*	134,400	346	77	147
*XE2AI	*	12,390	185	18	17
***XE3WAO**	**21**	**30,975**	**261**	**17**	**42**
***XE1CT**	**14**	**276,804**	**1312**	**28**	**80**

Nicaragua

***H7/K9NW**	**A**	**6,065,800**	**5271**	**122**	**398**

Panama

HP1/DJ7AA	**14**	**1,244,796**	**3106**	**37**	**137**
***HP1AC**	**21**	**92,655**	**529**	**22**	**65**
*HP1DCP	7	1,612	33	11	20

Puerto Rico

KP4JRS	21	1,518	29	8	15
***WP3C**	**14**	**785,188**	**2266**	**30**	**116**
*NP3CW	3.5	726	17	7	14

Sint Maarten

***PJ7/DJ5HD**	**A**	**128,594**	**312**	**65**	**161**

St. Kitts & Nevis

V47NT	**A**	**9,695,355**	**6996**	**132**	**459**
			(OP: N2NT)		

St. Vincent

***J88DR**	**A**	**3,066,388**	**3164**	**101**	**335**
			(OP: G3TBK)		

U.S. Virgin Islands

KV4FZ	**1.8**	**144,987**	**805**	**20**	**73**

AFRICA

Algeria

7XØRY	**A**	**1,236,000**	**1494**	**64**	**236**

Angola

***D2NX**	**A**	**1,581,954**	**1564**	**93**	**270**
			(OP: JM1CAX)		

Canary Islands

EA8MQ	**A**	**1,096,470**	**1677**	**73**	**197**
EA8/OH4NL	**7**	**1,595,698**	**3306**	**36**	**133**
***EA8CN**	**A**	**2,375,460**	**2022**	**88**	**327**
***EA8OM**	**"**	**1,799,204**	**1583**	**87**	**310**
*EA8EY	*	126,973	277	43	144
*AO8AY	*	52,197	183	39	98
			(OP: EA8AY)		
*EA8/PC8E	*	12,672	71	25	41
*EA8AG	*	2,862	147	45	114
***EA8FT**	**21**	**280,125**	**793**	**27**	**98**
*AO8DA	*	77,430	309	19	70
*EA8BVP	*	14,355	108	15	40
***EA8AVK**	**14**	**85,162**	**434**	**16**	**61**
*EA8/DL8NU	*	37,392	206	18	64
***AO8NQ**	**7**	**85,054**	**349**	**17**	**69**
			(OP: EA8NQ)		

Chagos Islands

VQ9LA	**A**	**520,161**	**821**	**75**	**174**

Djibouti

***J28OO**	**A**	**1,166,956**	**1513**	**73**	**211**
			(OP: T95A)		

Ghana

***9G5XA**	**21**	**492,282**	**1369**	**27**	**99**
			(OP: G3XAQ)		
***9G5ZZ**	**14**	**527,730**	**1303**	**31**	**116**
			(OP: DL1CW)		
***9G5ZS**	**7**	**11,316**	**129**	**20**	**49**

Madagascar

5R8NL	**A**	**522,111**	**831**	**66**	**171**

Madeira Islands

CT3NT	**A**	**3,755,805**	**2927**	**110**	**355**
			(OP: CT1BOH)		
CT3AS	*	719,495	786	76	261
CT3BD	**7**	**21,024**	**123**	**15**	**58**
***CT3KU**	**14**	**32,336**	**139**	**19**	**75**

Mauritius

***3B8GT**	**A**	**141,108**	**471**	**39**	**93**

Morocco

CN3A	**A**	**8,353,488**	**5261**	**126**	**446**
			(OP: IK2QEI)		
CN2AW	**14**	**1,387,176**	**2904**	**38**	**139**
			(OP: RV1AW)		
CN2FB	**3.5**	**1,590,288**	**3244**	**35**	**133**
			(OP: UA2FB)		
CN2FF	**1.8**	**618,849**	**1599**	**26**	**107**
			(OP: UA2FF)		
CN2R	**"**	**559,860**	**1568**	**26**	**98**
			(OP: W7EJ)		

Mozambique

C91KDJ	**A**	**950,790**	**1496**	**61**	**185**
			(OP: W5KDJ)		

Namibia

V51AS	**A**	**3,092,630**	**2815**	**98**	**312**
***V5/DJ4SO**	**A**	**522,592**	**824**	**70**	**154**
*V51YJ	*	15,990	92	23	42

Senegal

6W1RW	**A**	**7,400,808**	**4622**	**128**	**436**
			(OP: F6BEE)		
6W1SE	**21**	**143,543**	**657**	**21**	**58**
			(OP: JK1UWY)		
***6W1SJ**	**7**	**920,880**	**2207**	**32**	**112**
			(OP: T98A)		

South Africa

ZS4TX	**A**	**5,974,229**	**4059**	**127**	**396**
ZS1EL	*	1,065,065	1412	73	204
***ZS6AA**	**A**	**2,362,222**	**2717**	**73**	**241**
*ZS6C	*	43,818	146	48	86
*ZS5NK	*	5,170	84	24	31
***ZS4U**	**21**	**145,782**	**797**	**19**	**59**
*ZS6CCW	*	130,566	512	22	72
*ZS4JAN	7	5,588	71	14	30

Swaziland

3DA0ZD	**A**	**4,708,092**	**3491**	**124**	**365**
			(OP: N5ZO)		

Tanzania

5H3EE	**A**	**3,739,790**	**2770**	**119**	**351**
			(OP: DL4SM)		

Tunisia

3V2A	**A**	**13,112,736**	**7415**	**135**	**473**
			(OP: YT1AD)		

Uganda

***5X1NH**	**A**	**784,728**	**1463**	**68**	**184**
			(OP: G3RWF)		

ASIA

Asiatic Russia

UA9CLB	**A**	**5,555,004**	**3

*UA9AOL	*	90,270	255	44	126
*UA9TZ	*	69,760	199	42	118
*RV9CQ	*	55,085	193	28	87
*RK9XX	*	53,613	258	28	83
*RU9AZ	*	45,344	164	31	78
*UA9FEG	*	31,862	165	25	64
*RA9SN	*	29,900	188	27	88
*RV9UB	*	26,335	143	47	68
*UA9KB	*	25,024	109	33	59
*UA9OV	*	22,265	122	24	49
*RU9BS	*	14,520	159	33	77
*RA9SAS	*	3,293	51	15	22
*UA9UX	*	16	2	2	2
RW9RA	**21**	**46,240**	**234**	**19**	**66**
*RV9YK	*	26,670	156	18	52
*UA9QQ	*	20,650	145	12	47
*UA9QF	*	19,110	161	17	53
*UA9OMT	*	3,663	52	10	23
RW9DX	**14**	**269,568**	**843**	**32**	**112**
*RV9JR	*	107,217	458	23	76
*RA9JG	*	73,744	356	19	69
*RW9UY	*	61,659	321	21	72
*RW9SZ	*	23,166	146	14	52
*RA9AFZ	*	22,857	162	12	45
*RZ9HK	*	22,572	197	18	48
*RA9YQA	*	8,788	90	15	37
*RA9SKL	*	5,635	86	8	27
RK9AX	**7**	**158,873**	**520**	**28**	**93**
*RK9AJZ	*	146,048	525	28	84
RW9QA	**3.5**	**40,238**	**257**	**12**	**47**
RV9YZ	**1.8**	**14,688**	**171**	**11**	**37**
*UA9OS	*	352	23	7	9
RWØLT	**A**	**1,018,920**	**1210**	**131**	**289**
RVØAL	**"**	**768,339**	**1003**	**84**	**267**
UAØYAY	**"**	**601,082**	**799**	**97**	**261**
UAØFAI	*	523,120	1119	99	161
UAØAZ	*	487,084	750	85	238
RKØUT	*	249,912	569	80	154
UAØACG	*	223,608	578	78	153
UAØFDX	*	191,678	443	81	158
UAØZAM	*	171,661	756	60	77
UAØSC	*	141,542	433	60	121
UAØYM	*	89,676	321	50	109
RAØOC	*	65,280	507	31	65
UAØWL	*	11,390	103	26	41
UAØCW	*	3,354	32	16	27
RABAA	**21**	**84,780**	**393**	**23**	**57**
UABAGI	**14**	**390,998**	**1368**	**32**	**105**
RAØQD	*	159,952	822	27	77
RUØUA	*	4,859	76	12	31
RUØLL	**3.5**	**173,988**	**896**	**28**	**80**
RWØCF	*	5,832	62	19	35
UAØANW	**1.8**	**74,400**	**458**	**17**	**58**
RZØSR	*	16,359	153	15	42
UAØCA	*	9,200	96	19	31
RWØCN	*	2,970	70	15	15
RAØAQL	**A**	**346,500**	**561**	**69**	**183**
*UAØSDX	*	252,992	548	69	167
*UAØAKY	*	198,848	484	66	142
*UAØCNX	*	198,300	897	52	98
*UAØABB	*	197,398	364	61	168
*UAØSR	*	126,528	352	54	138
*RAØAY	*	126,204	327	45	111
*RWØAA	*	68,295	246	47	98
*UAØOD	*	55,937	256	44	87
*UAØSBQ	*	50,874	206	43	79
*RNØSS	*	25,155	104	36	81
*RZØCQ	*	18,662	99	37	49
*UAØSJ	*	1,008	29	8	13
*RNØCW	21	987	28	9	12
*RNØJM	14	8,478	73	18	36
***UAØSAD**	**7**	**47,047**	**221**	**24**	**67**
***RXØAE**	**1.8**	**345**	**20**	**7**	**8**

Asiatic Turkey

YM2W	**28**	**54,595**	**323**	**11**	**50**
			(OP: OK1MU)		
TA3DD	**21**	**3,672**	**43**	**11**	**25**
***TC3A**	**7**	**1,423,800**	**3124**	**36**	**139**
***TA2RC**	**1.8**	**129,204**	**648**	**11**	**63**

Azerbaijan

***4K9W**	**A**	**370,992**	**544**	**67**	**195**
*4K6DI	3.5	7,074	62	12	42

Bangladesh

***S21ZDX**	**7**	**115,260**	**543**	**29**	**73**
			(OP: LA7JO)		

China

BA7IO	**A**	**319,088**	**768**	**78**	**181**
BA5HAM	"	234,740	717	82	138
BA4DW	14	6,084	50	16	36
***BD5WW**	**A**	**663,663**	**1341**	**91**	**182**
***B4VE**	**"**	**342,702**	**1041**	**83**	**158**
			(OP: BA4VE)		
*BA6QD	*	275,366	677	69	152
*BD6IVX	*	225,134	795	61	121
*BD5CFB	*	183,064	544	72	124
*BG4DVK	*	101,943	342	44	97
*BY1DX	*	58,760	506	41	63
*BD4IZL	*	55,424	408	52	76
*BD4ITN	*	54,390	397	45	60
*BD4IBW	*	53,648	327	42	70
*BD4SX	*	44,016	174	50	81
*BD1FBV	*	34,720	182	48	76
*BG7NWF	*	7,344	61	22	32
*BG3OAK	*	1,085	29	14	17
*BG1FVL	*	432	32	15	21
***BD4SI**	**21**	**28,425**	**236**	**24**	**51**
***BD4IXA**	**14**	**48,447**	**424**	**15**	**48**
*BD4QD	*	8,880	85	20	28

Cyprus

C4I	**14**	**1,219,239**	**2474**	**39**	**150**
			(OP: LZ2HM)		
C4M	**3.5**	**575,100**	**1632**	**29**	**106**
			(OP: 5B4AGM)		
***C4Z**	**14**	**348,357**	**943**	**34**	**117**
			(OP: G4ODV)		

Drifting Ice Station (Zone 18)

*R35NP	A	9,263	76	20	39
			(OP: RW1AI)		

Georgia

4LØA	**A**	**7,297,524**	**4860**	**125**	**433**
			(OP: UU4JMG)		
4L6X	*	984,786	1449	62	196
***4L2M**	**3.5**	**169,400**	**769**	**17**	**71**

Hong Kong

***VR2/AA1ON**	**A**	**466,336**	**1241**	**85**	**151**
*VR2ZUY	*	2,142	33	15	19

India

***VU2PTT**	**A**	**486,573**	**671**	**75**	**218**
*VU2JOS	*	4,232	92	20	26
***VU3DJQ**	**21**	**8,619**	**99**	**14**	**37**
*VU2NIS	14	418	18	9	13

Israel

4Z5TA	**A**	**1,576,155**	**1701**	**87**	**270**
***4Z5QQ**	**7**	**35,630**	**216**	**14**	**56**

Japan

JF1PJK	**A**	**1,146,915**	**1460**	**111**	**220**
JK1OPL	**"**	**1,025,060**	**961**	**129**	**299**
JH1FSF	*	237,468	390	89	168
JA1AYO	*	186,780	403	86	134
JH1EVD	*	170,820	354	71	124
JA1QOW	*	167,409	378	67	104
JA1HP	*	152,586	372	57	116
JR1LEV	*	125,650	319	65	110
JN1WFF	*	68,976	194	60	84
7J1ABD	*	38,170	153	50	60
JN1RQV	*	21,917	85	42	59
JF1NZW	*	13,237	83	26	35
7N4KDU	*	12,716	72	26	42
JH1NXU	*	7,590	54	29	37
JA1FWY	*	6,533	89	24	23
JS1IFK	21	1,764	33	12	16
JF1SQC	**14**	**509,878**	**1308**	**35**	**114**
JS1OYN	*	205,436	724	32	84
JK1LUY	*	4,340	50	10	25
JH1RFM	**7**	**73,476**	**312**	**33**	**84**
JH1OGC	**3.5**	**231,732**	**875**	**31**	**92**
JK1LEE	*	12,264	104	19	37
JA1KVT	**1.8**	**3,200**	**58**	**13**	**19**
***JI1RXQ**	**A**	**804,678**	**1018**	**108**	**214**
***JH1RNI**	**"**	**421,960**	**639**	**94**	**180**
***JF1NHD**	**"**	**419,265**	**802**	**84**	**147**
*JP1JFG	*	397,540	574	93	193
*JP1QDH	*	338,985	594	80	163
*JG1TVK	*	193,351	332	84	155
*JA1JQY	*	151,424	354	66	116
*JA1HNW	*	124,236	308	72	102
*JA1BPN	*	115,928	308	64	108
*JG1OWV	*	111,888	226	86	136
*JA1BNW	*	98,700	253	70	118
*JA1XPU	*	81,702	245	60	93
*JP1SRG	*	78,566	222	70	93
*7N1BHO	*	77,765	247	69	82
*JF1OIJ	*	72,864	242	72	104
*JA1AZR	*	72,030	224	59	88
*JA1PJS	*	70,756	233	54	79
*JA1FRQ	*	64,400	200	73	102
*JH1TXG	*	59,682	202	61	86
*JJ1MZH	*	53,818	188	62	80
*JE1RRK	*	53,130	226	43	67
*JA1BUI	*	49,368	194	53	68
*JA1PTO	*	44,472	190	50	59
*JI1AVY	*	43,848	158	49	67
*JE1REU	*	40,370	153	51	59
*JH1FNU	*	36,256	161	42	61
*JA1HG	*	33,864	135	47	55
*JH1MTR	*	31,779	132	46	61
*JM1KNI	*	30,960	152	41	49
*JR1ATA	*	30,906	132	46	55
*JA1MVK	*	28,832	139	43	63
*JA1HTG	*	27,876	139	41	51
*JA1CP	*	25,025	137	35	42
*JK1WXM	*	22,176	114	37	47
*JA1IZ	*	21,244	108	40	54
*JH1OLB	*	19,380	131	30	46
*JO1SIM	*	17,222	121	30	49
*JA1IWP	*	16,954	90	42	56
*JA1CPZ	*	16,766	81	34	49
*JQ1AHZ	*	16,330	105	30	41
*JK1NSR	*	15,372	79	38	46
*JA1WHG	*	13,363	112	39	44
*JJ1IVX	*	12,426	85	26	31
*JJ1LRD	*	10,150	84	26	32
*JA1PKS	*	10,005	84	31	38
*JA1WQX	*	8,990	62	29	33
*JH1HYC	*	8,514	62	30	36
*JF1HJX	*	7,191	64	20	31
*JK1ATT/1	*	7,068	56	25	32
*JA1ANG	*	5,346	61	30	36
*JE1NVD	*	5,335	46	22	33
*JG1FGL	*	5,202	50	22	29
*JH1APK	*	4,750	48	19	19
*7N4CLI	*	4,662	50	21	21
*JK1SDQ	*	3,400	59	22	28
*JR1UMO	*	3,040	30	18	20
*7K1EQG	*	2,958	35	17	17
*JI1UDD	*	2,262	32	11	18
*JN1BBO	*	1,215	19	13	14
*JA1ANF	*	814	13	10	12
*JJ1WWL	*	630	13	9	9
*JA1PS	*	585	18	5	10
*JH1XOQ	*	345	13	11	12
*JE1UKM	*	176	8	5	6
*JN1HYU	*	126	6	4	3
*JE1FWI	*	63	7	5	4
*JA1BFN	*	48	8	4	8
*JH1DMC	*	8	2	2	2
***JJ1GQH**	**21**	**24,010**	**137**	**23**	**47**
*JA1CTB	*	17,850	115	26	49
*JI1BBN	*	9,006	84	21	36
*JA1DBG	*	4,560	56	15	25
*JI1LAI	*	6	1	1	1
***JA1BPA**	**14**	**353,484**	**866**	**38**	**124**
*JA1YAI	*	86,314	337	30	73
*JF1TEU	*	3,872	44	19	25
*JF1FNT	*	1,672	39	10	9
***7N2DAB**	**7**	**102,487**	**367**	**32**	**89**
*JH1HTQ	*	14,170	126	24	41
*7N2JNN	*	9,850	39	13	23
*JE1JAC	*	795	25	8	7
*JA1AAT	*	560	13	5	11
*JJ1PTI	*	24	4	1	1
*JA1DCL	*	16	2	2	2
*JG1FMA	*	8	9	4	4
***JH1APZ**	**3.5**	**24,150**	**144**	**25**	**50**
***JM1NKT**	**1.8**	**4,428**	**66**	**14**	**22**
*JE1SPY	*	2,407	50	13	16
JF2QNM	**A**	**968,803**	**1243**	**117**	**202**
JN2AMD	**"**	**686,350**	**1262**	**99**	**160**
JA2HO	*	95,274	229	71	87
JO2SLZ	*	4,343	45	20	23
JF2FIU	7	288	9	8	8
***JA2AXB**	**A**	**541,994**	**718**	**113**	**210**
***JH2NWP**	**"**	**530,178**	**716**	**107**	**212**
*JA2KVB	*	406,252	563	98	210
*JA2VZL	*	128,432	302	77	107
*JA2KKA	*	68,572	221	49	75
*JA2QVP	*	48,190	179	50	72
*JA2KPW	*	41,360	158	45	65
*JQ2EHD	*	20,740	101	36	49
*JH2XTV	*	5,724	48	24	30
*JA2KCY	*	5,376	49	21	27
***JH2MYN**	**28**	**770**	**19**	**9**	**13**
*JQ2OUL	21	576	17	6	10
***JL2LPX**	**14**	**63,388**	**276**	**26**	**66**
*JR2TMB	"	6,688	77	16	22
*JE2DJC	*	3,901	43	20	27
*JA2PFO	7	11,700	100	21	31
***JF2WXS**	**3.5**	**9,798**	**98**	**22**	**47**
JR3NZC	**A**	**790,359**	**957**	**105**	**222**
JN3SAC	**"**	**311,240**	**541**	**75**	**176**
JA3EGZ	*	153,252	646	28	58
JR3XEX	*	122,844	350	65	109
JH3AIU	**14**	**526,953**	**1283**	**36**	**125**
JA3DAY	*	61,655	245	30	65
JI3KDH	**1.8**	**8,400**	**94**	**17**	**31**
***JH3CUL**	**A**	**380,520**	**598**	**96**	**184**
***JH3PTC**	**"**	**258,489**	**490**	**83**	**148**
*JA3JM	*	184,871	444	69	130
*JA3AA	*	154,215	373	74	133
*JG3LGD	*	89,910	201	75	110
*JA3UWB	*	81,026	294	43	84
*JM3AVI	*	74,000	227	59	89
*JH3JYS	*	35,991	124	58	71
*JO3EVM	*	3,960	47	20	24
***JL3RDC**	**28**	**66**	**5**	**2**	**4**
***JR3EOI**	**21**	**152,097**	**557**	**33**	**88**
***JI3BFC**	**14**	**185,380**	**577**	**34**	**96**
*JK3GWT	*	107,576	443	31	82
*JN3DSH	*	24,024	124	29	49
***JF3IYW**	**7**	**22,320**	**139**	**25**	**47**
*JQ3UWK	*	1,407	28	11	10
*JG3EHD	*	120	10	3	1
***JA3GN**	**3.5**	**20,370**	**148**	**23**	**47**
*JF3LOP	*	7,546	72	19	30
JH4UYB	**A**	**3,752,242**	**2585**	**162**	**392**
JA4AQR	*	9,204	83	13	26
JM4WUZ	**14**	**90,092**	**381**	**30**	**71**
JH4UTP	**7**	**104,670**	**525**	**28**	**82**
***JE4MHL**	**A**	**222,610**	**421**	**82**	**144**
*JF4XUT	*	6,958	67	21	28
*JA9DJG/4	*	1,920	27	14	16
*JA4CBX	21	84	4	3	4
***JR4GPA**	**14**	**109,182**	**470**	**27**	**66**
*JR4FLW	*	86,595	333	32	83
***JR4URW**	**7**	**14,307**	**108**	**22**	**35**
JA5APU	**14**	**47,696**	**298**	**28**	**60**
JA5DQH	**7**	**861,713**	**1850**	**37**	**136**
JA5JGV	1.8	513	18	8	11
***JR5HXU**	**A**	**335,688**	**519**	**97**	**187**
*JJ5ECZ	*	1,748	27	21	25
***JG5DHX**	**14**	**26,013**	**159**	**20**	**49**
JA6WIF	**28**	**12,993**	**138**	**22**	**39**
JA6SHL	**14**	**300,074**	**1009**	**32**	**86**
JA6BZI	**7**	**217,288**	**561**	**36**	**121**
JA6VU	**1.8**	**6,364**	**71**	**16**	**27**
***JA6CYL**	**A**	**178,920**	**369**	**75**	**135**
*JH6WXF	*	480	19	9	11
***JH6WHN**	**28**	**2,822**	**43**	**14**	**20**
***JA6FFK**	**14**	**37,960**	**213**	**24**	**49**
***JA6WW**	**"**	**12,261**	**67**	**19**	**31**
*JA6FCL	"	4,477	43	12	25
***JL6IPK**	**7**	**13,255**	**106**	**22**	**33**
*JS6RXB	"	1,224	19	10	14
JA7BME	**A**	**636,103**	**884**	**107**	**186**
JA7COI	**"**	**629,958**	**857**	**118**	**200**
JA7IC	**"**	**629,442**	**842**	**112**	**194**
JA7ZP	*	110,744	266	84	134
JA7OWD	**28**	**1,200**	**25**	**9**	**15**
JH7XMO	**21**	**69,286**	**311**	**32**	**66**
JH7XGN	**14**	**338,982**	**930**	**35**	**112**
JA7AKH	*	90,118	473	26	56
JA7MJ	**3.5**	**40,572**	**236**	**27**	**57**
JA7EU	*	16,506	130	22	41
***JH7QXJ**	**A**	**145,152**	**322**	**72**	**117**
*JA7LMZ	*	125,257	293	69	124
*JA7AEM	*	24,723	160	31	36
*JA7VEI	*	18,320	98	34	46
*JA7AXP	*	2,613	29	18	21
*JL7FBV	21	3,663	44	15	22
***JA7EDZ**	**14**	**15,120**	**129**	**21**	**33**
*JF7GDF	14	6,273	71	19	22
*JN7OJA	7	11,088	96	19	29
*JE7KCI	*	10,309	77	22	39
JA8NFV	**1.8**	**2,604**	**48**	**13**	**15**
***JH8SLS**	**A**	**930,369**	**1056**	**117**	**246**
*JA8AJE	*	109,044	293	58	98
*JL8MBF	*	19,402	121	37	52
*JA8UON	*	9,322	67	22	37
*JJ8GFL	*	6,396	58	26	26
*JE8NTJ	*	5,875	72	20	27
*JK8JIC	*	760	14	8	12
JF9JTS	**A**	**120,120**	**347**	**53**	**87**
JA9BGL	*	41,846	178	41	81
JA9CWJ	**14**	**139,955**	**479**	**30**	**85**
JR9NVB	**7**	**81,314**	**281**	**32**	**77**
*JA9RO	A	7,560	76	6	30
*JA9DOF	3.5	493	13	9	8
JJ8JML	**A**	**468,559**	**782**	**89**	**158**
JA8UMV	**"**	**401,375**	**706**	**90**	**157**
JRØWZR	*	107,706	275	64	110
JAØGZ	*	2,304	33	17	19
JAØUH	**3.5**	**4,956**	**52**	**15**	**27**
JAØLHU	*	2,254	55	20	29
JAØDAI	**1.8**	**11,502**	**99**	**18**	**36**
***JHØNEC**	**A**	**419,321**	**671**	**91**	**168**
*JHØCCK	*	49,312	145	49	85
*JAØBMS	*	44,220	182	44	66
*JHØBLI	*	16,192	84	35	53
*JAØAVS	*	364	20	13	13
*JGØGGI	*	243	33	15	12
***JRØEQQ**	**21**	**27,468**	**156**	**28**	**56**
*JFØVMJ	*	6	1	1	1
***JHØEPI**	**14**	**124,320**	**434**	**32**	**79**
*JAØIOF	*	12,540	103	21	34
*JHØXUP	*	5,040	65	15	21
***JHØNVX**	**7**	**14,210**	**102**	**20**	**38**
*JAØGEY	*	4,255	51	17	20
*JAØNFP	*	2,356	41	14	17
*JAØDOW	*	2,130	32	13	17
***JHØNBN**	**3.5**	**3,564**	**67**	**21**	**33**

Kampuchea

XU7MWA	**A**	**1,133,150**	**1578**	**102**	**244**
			(OP: KMØO)		

Kazakhstan

UPØL	**A**	**5,614,400**	**3995**	**126**	**424**
			(OP: UN9LW)		
UN7QF	*	23,200	114	35	65
UN7ECA	*	19,824	92	27	57
UN5J	**21**	**153,906**	**626**	**28**	**85**
UN2BB	**14**	**80,427**	**408**	**21**	**62**
UN7PL	*	73,794	351	24	74
UN2E	**7**	**117,362**	**449**	**22**	**79**
UN4L	**3.5**	**588,846**	**1637**	**30**	**108**
***UN6P**	**A**	**1,301,250**	**1480**	**96**	**279**
*UN6G	*	404,041	671	65	188
*UN7PV	*	389,031	689	77	232
*UN8FM	*	37,177	161	39	74
*UNØC	*	12,298	76	29	57
			(OP: UN9C)		
***UN4PG**	**21**	**19,158**	**133**	**17**	**45**
***UN6LN**	**14**	**348,300**	**1056**	**29**	**106**
*UN8PT	*	38,760	242	17	51
*UN4PD	*	36,404	207	19	57
***UN7CM**	**3.5**	**61,712**	**319**	**15**	**61**
*UN7CN	*	55,543	342	12	55
*UN7BN	*	30,429	205	14	49

Kuwait

9K2HN	**A**	**8,287,614**	**4986**	**149**	**477**
			(OP: KL2A)		

Kyrgyzstan

EX2A	**A**	**942,019**	**1321**	**77**	**234**

Laos

XW1A	**A**	**1,915,975**	**2230**	**130**	**313**

Mongolia

JT1BH	**A**	**501,120**	**1268**	**75**	**186**
JT1T	*	496,222	1484	77	150
JT1BV	*	51,712	258	47	81
***JT1CO**	**A**	**2,322,936**	**3061**	**111**	**308**

Oman

A45XR	**A**	**8,684,269**	**5063**	**151**	**498**

Saudi Arabia

HZ1EX	**A**	**2,623,446**	**2329**	**102**	**321**
***HZ1IK**	**7**	**21,312**	**126**	**18**	**54**

Singapore

9V1YC	**A**	**1,661,088**	**2008**	**115**	**301**

South Korea

HL2AEJ	**A**	**1,216,334**	**1852**	**93**	**214**
HL5UOG	**"**	**291,341**	**530**	**81**	**158**
6K2ABX	*	234,430	935	75	122
HL2FDW	**14**	**157,858**	**801**	**32**	**86**
***HL2SQQ**	**A**	**92,016**	**317**	**53**	**91**
***HL1VAU**	**"**	**79,488**	**331**	**58**	**86**
*D9K	*	39,249	343	39	50
			(OP: DS3MLG)		
*HL5YI	*	15,834	104	41	50
***DS5KJR**	**14**	**18,864**	**262**	**20**	**28**

Taiwan

BU2AI	**A**	**337,050**	**1001**	**76**	**134**

Tajikistan

EY8CQ	A	12,224	68	19	45
EY8DQ	**21**	**14,628**	**194**	**14**	**32**
EY7AF	**7**	**949,548**	**2358**	**34**	**125**
EY8MM	**1.8**	**343,012**	**1251**	**27**	**89**

Thailand

HSØZAR	**A**	**2,923,600**	**3305**	**118**	**282**
			(OP: K3ZO)		
HSØZDR	**21**	**32,648**	**177**	**24**	**64**
***HSØZGL**	**A**	**137,825**	**348**	**51**	**134**
*HSØZEE	*	55,145	236	70	135
*E2ØYLM	*	42,334	187	50	72
***HSØEHF**	**21**	**23,652**	**137**	**23**	**58**
***HS8KAY**	**14**	**5,152**	**76**	**18**	**28**

UK Bases on Cyprus

ZC4LI	**14**	**1,294,833**	**2881**	**36**	**133**

Uzbekistan

UK9AA	**1.8**	**128,138**	**681**	**14**	**65**
***UK8AKX**	**A**	**262,080**	**501**	**69**	**165**
***UK7F**	**3.5**	**9,553**	**96**	**10**	**31**

West Malaysia

9M2CNC	**A**	**2,347,127**	**2549**	**115**	**322**
			(OP: G4ZFE)		
9M2GCN	7	368	9	7	9
***9M5ØMP**	**A**	**885,300**	**1887**	**86**	**214**
			(OP: 9M2TO)		
***9M5ØMB**	**21**	**61,770**	**558**	**21**	**66**

EUROPE

Aland Islands

OGØZ	**28**	**17,325**	**237**	**10**	**53**
			(OP: OH1RX)		
OHØZ	**21**	**224,353**	**901**	**32**	**125**
			(OP: OH5DX)		
OHØR	**3.5**	**537,695**	**2417**	**36**	**119**
			(OP: OH2PM)		
OHØM	**1.8**	**192,720**	**1381**	**22**	**88**
			(OP: OH1JT)		

Andorra

***C31CT**	**A**	**21,375**	**171**	**32**	**93**

Austria

OE2BZL	**A**	**1,184,758**	**1784**	**87**	**307**
OE3KAB	*	373,096	739	67	231
OE3DXA	*	322,164	618	74	240
OE6MDF	*	229,957	417	71	176
OE9SLH	*	60,588	294	41	121
OE3GSA	**7**	**265,350**	**1171**	**32**	**118**
***OE5CWL**	**A**	**658,746**	**1669**	**73**	**224**
*OE1TKW	*	56,400	216	37	113
*OE8CCQ	*	19,412	151	22	70
***OE6IMD**	**7**	**109,552**	**358**	**33**	**125**
*OE2UKL	*	55,224	337	23	81
***OE3BCA**	**1.8**	**64,200**	**865**	**12**	**63**

Azores

CU2A	**A**	**7,400,808**	**5945**	**141**	**507**
			(OP: OH2UA)		
***CU2AF**	**A**	**4,602**	**59**	**27**	**51**

Balearic Islands

EA6AZ	A	2,958	45	20	38
EA6SX	**1.8**	**84,740**	**857**	**19**	**76**
***EA6ZS**	**A**	**9,506**	**129**	**10**	**39**
*EA6DM	*	140	20	7	13
***EA6UP**	**21**	**99,576**	**632**	**29**	**79**
***EA6NB**	**7**	**91,567**	**663**	**22**	**81**

Belarus

EWØKY	**A**	**557,220**	**1077**	**84**	**286**
EU7SA	*	35,088	109	50	86
EU4LY	*	18,150	151	23	87
EW6GL	*	3,696	37	15	27
EW7LO	**7**	**291,688**	**1419**	**34**	**118**
EW3LN	*	71,688	425	27	89
EV1Z	**3.5**	**377,146**	**1764**	**33**	**121**
			(OP: EU1UN)		
EW8EW	*	217,833	1490	24	99
EW8DX	*	162,863	1432	19	78
EW2DN	*	23,936	314	11	53
EU3AR	**1.8**	**89,991**	**1053**	**14**	**67**
***EWØCY**	**A**	**912,924**	**1384**	**97**	**331**
*EU4CQ	*	198,653	530	62	197
*EW1KT	*	58,720	240	48	112
*EU6AA	*	42,840	236	36	100
***EU2MM**	**21**	**34,300**	**149**	**25**	**75**
***EU1DX**	**14**	**269,280**	**808**	**35**	**130**
*EW6EW	*	94,560	514	25	95
*EW6MM	*	22,050	211	16	59

Croatia

9A1A	**A**	**5,765,256**	**4291**	**159**	**597**
9A5MT	**28**	**14,508**	**161**	**18**	**60**
9A4D	**21**	**351,354**	**954**	**37**	**149**
			(OP: 9A7DX)		
9A5D	**"**	**305,322**	**1199**	**34**	**117**
			(OP: 9A3DU)		
9A2VR	**3.5**	**174,624**	**1257**	**20**	**87**
9A4W	**1.8**	**95,914**	**906**	**17**	**74**
***9A3SM**	**A**	**224,664**	**568**	**71**	**225**
*9A2EY	"	176,176	485	58	184
*9A2TN	"	174,432	389	63	174
*9A5ANB	"	142,044	334	57	171
*9A6C	"	106,774	469	50	147
*9A2BW	"	83,936	346	42	130
*9A2OU	"	10,309	108	21	40
*9A5YY	"	1,092	30	6	7
***9A3VM**	**28**	**7,440**	**181**	**10**	**30**
*9A2DI	"	1,035	22	8	15
***9A3B**	**14**	**474,320**	**1407**	**39**	**137**
			(OP: 9A1AA)		
***9A6M**	**3.5**	**181,170**	**1075**	**24**	**98**
***9A4C**	**"**	**180,264**	**1472**	**25**	**86**
			(OP: 9A3TF)		
*9A3TU	"	11,102	115	11	50
*9A5BB	1.8	1,792	61	5	27

Czech Republic

OL1M	**A**	**1,096,146**	**2650**	**79**	**239**
			(OP: OK1EW)		
OK1AOV	"	636,174	771	104	355
OK1AYY	"	595,289	1279	70	253
OL4M	"	589,600	1194	75	260
OK2ABU	"	543,504	1003	79	259
OL6W	"	470,020	851	74	257
			(OP: OK2FB)		
OK2BZ	"	460,944	825	94	294
OK5XX	"	288,260	776	59	231
OK1EP	"	286,858	544	54	167
OK1FRO	"	218,900	835	38	161
OK1AXB	"	170,225	576	67	208
OK7MT	"	72,488	202	42	122
OK2KFK	"	38,664	258	30	78
			(OP: OK2ABU)		
OK2QA	"	28,750	145	32	83
OK2EQ	"	27,588	85	47	74
OK1VD	**14**	**264,508**	**783**	**39**	**139**
OK5C	**7**	**1,100,486**	**2829**	**38**	**155**
			(OP: OK1RF)		
OK5MM	"	76,250	471	25	100
			(OP: O5MM)		
OK1DIB	"	70,912	356	25	103
OK2BYW	**3.5**	**466,439**	**1889**	**34**	**117**
OK1XC	"	112,424	879	22	82
OK1NE	**1.8**	**18,483**	**285**	**8**	**53**
OK1DWJ	"	2,448	48	5	43
***OL6P**	**A**	**2,301,740**	**2212**	**116**	**458**
			(OP: OK2WTM)		
***OK6Y**	**"**	**1,109,670**	**1411**	**111**	**359**
			(OP: OK2PTZ)		
***OK1BA**	**"**	**737,660**	**1058**	**79**	**306**
*OK1TC	"	730,296	1291	84	330
*OK1HX	"	642,674	1052	78	305
*OK1CD	"	442,242	1020	67	244
*OK1DKR	"	390,949	518	88	289
*OK1ZP	"	365,721	867	68	235
*OK1SI	"	323,744	718	59	243
*OK2LW	"	298,025	655	74	251
*OK1DUT	"	281,325	663	66	209
*OK2KPS	"	232,580	550	67	223
			(OP: OK2PTS)		
*OK1AUP	"	230,154	525	62	205
*OK5TM	"	199,796	450	62	189
*OK2SGY	"	186,406	629	43	186
*OK1MZO	"	178,794	518	46	185
*OK1CRM	"	177,968	455	63	164
*OK2BRV	"	159,216	482	57	191
*OK1DKO	"	138,316	453	54	175
*OK2BJ	"	136,944	306	66	150
*OK2CLW	"	135,136	338	57	149
*OK1ABF	"	120,991	395	45	182
*OK1BMW	"	116,644	337	53	189
*OK2BNC	"	113,322	324	47	140
*OK2PAD	"	103,255	416	43	150
*OK1HCG	"	100,632	538	32	136
*OK2PQS	"	93,436	377	41	147
*OK2BV	"	87,890	453	36	134
*OK2BND	"	78,183	355	38	115
*OK2SAR	"	76,720	205	44	93
*OK1MNV	"	64,056	171	48	109
*OK1TFH	"	59,444	185	55	99
*OK1JL	"	55,926	450	24	93
*OK1DXU	"	41,923	295	22	91
*OK1DOZ	"	33,020	148	42	85
*OK1LO	"	26,040	141	32	73
*OK2PHI	"	19,720	141	23	62
*OK1DNJ	"	15,680	74	37	61
*OK2PCL	"	11,475	60	25	50
*OK2SWD	"	4,500	63	15	30
***OK2N**	**21**	**129,150**	**359**	**33**	**117**
			(OP: OK2NN)		
*OK2BUT	"	24,400	148	24	56
*OK1KI	"	19,050	113	24	51
*OK1ARO	"	9,342	90	20	34
***OK2TBC**	**14**	**86,868**	**354**	**29**	**98**
*OK2FUG	"	22,649	164	18	53
*OK1MMN	"	13,640	128	14	41
***OK1TN**	**7**	**297,360**	**1059**	**36**	**144**
*OK1UG	"	110,856	472	30	119
*OK1AY	"	66,124	369	25	97
*OK1FCA	"	28,251	362	10	63
*OK1IWN	"	10,176	194	13	51
***OK7FL**	**3.5**	**113,646**	**1034**	**21**	**72**
*OK1IBP	"	31,390	342	12	61
*OK2BIU	"	9,126	189	8	46
***OK1NI**	**1.8**	**29,049**	**413**	**10**	**59**
*OK1MNW	"	26,980	331	9	62
*OK1MCW	"	16,951	242	9	58
*OK2BWC	"	13,552	234	7	49
*OK1KZ	"	5,292	129	5	37
*OK1DST	"	3,432	87	7	32
*OK2AJ	"	3,224	104	4	27
*OK2BWM	"	936	21	10	16

Denmark

OZ1LO	**A**	**1,979,450**	**2263**	**120**	**430**
OZ7AM	"	439,736	1193	69	194
OZ1JTE	"	385,749	699	83	268
OZ8SW	"	229,472	453	63	221
OZ7EA	"	36,176	298	25	94
OZ6EI	"	30,160	139	35	81
OZ7YL	21	9,982	70	17	45
OZ8A	**14**	**10,878**	**133**	**15**	**34**
OZ4O	**1.8**	**11,872**	**177**	**7**	**49**
***OV3X**	**A**	**692,835**	**1021**	**95**	**334**
			(OP: OZ8AE)		
*OV5A	"	127,926	468	47	160
*OU3A	"	75,600	300	38	130
*OZ4RT	"	31,365	161	32	91
*OZ4FF	"	16,008	84	34	58
*OZ1DGO	"	15,120	120	21	59
*OZ1JFK	"	2,294	34	13	24
*5P4RT	"	840	16	9	12
***OZ7RQ**	**7**	**112,200**	**673**	**28**	**108**
*5Q4A	"	1,116	30	8	23
***OZ7TTT**	**3.5**	**25,970**	**339**	**13**	**57**
			(OP: OZ5WQ)		

England

M6T	**A**	**4,122,914**	**4273**	**136**	**421**
			(OP: G4PIQ)		
G4BJM	**"**	**944,234**	**1650**	**80**	**266**
G3RXP	"	826,551	1490	75	288
G4FAL	"	568,848	1243	67	269
G3UFY	"	346,026	675	64	239
G3ZGC	"	270,600	692	57	207
G4SGI	"	264,638	621	52	201
G4WFQ	"	254,184	788	58	209
G4KFT	"	251,199	520	60	187
G7VJR	"	224,112	529	60	172
G4HZV	"	198,654	442	55	171
G4AMT	"	185,840	496	51	151
GBAZH	"	160,083	521	52	179
G3KLH	"	156,650	1064	27	103
GØBNR	"	139,384	342	64	198
MØAJT	"	126,492	497	37	129
G4MKP	"	100,464	524	35	133
G4IUF	**21**	**34,560**	**218**	**22**	**74**
G3TXF	**14**	**624,824**	**1937**	**36**	**126**
G3RAU	"	303,017	1106	33	110
G4ERW	"	109,964	703	18	56
M4T	"	91,233	657	21	72
			(OP: GØVQR)		
G5LP	**1.8**	**101,000**	**728**	**20**	**81**
G3GLL	"	5,088	101	8	40
***G3WW**	**A**	**505,636**	**1075**	**67**	**265**
***G4FKA**	**"**	**443,001**	**1050**	**60**	**247**
***G3KKP**	**"**	**356,680**	**737**	**65**	**231**
*G4WGE	"	262,890	739	50	204
*G3VQO	"	252,992	745	47	189
*2EØCVN	"	230,048	788	46	178
*G4DDL	"	208,290	616	53	212
*G4DDX	"	205,530	690	47	174
*MØRTI	"	205,359	599	48	183
*GØHDB	"	149,340	443	48	180
*G3RSD	"	127,200	433	47	165
*G4EBK	"	125,820	533	35	145
*G4LPD	"	113,565	408	47	154
*MØVBY	"	92,612	332	41	128
*G3MPB	"	87,204	286	42	130
*G3MIR	"	82,824	218	62	170
*G4GOY	"	79,716	388	32	124
*G3WRR	"	54,612	227	39	109
*G4DBX	"	45,584	206	31	81
*MØPCB	"	42,066	235	30	93
*G3JIR	"	34,463	229	32	111
*G6CSY	"	33,390	221	23	82
*GØAZS	"	19,500	165	23	77
*GØMRH	"	12,615	139	21	66
*GØTKZ	"	12,324	117	22	56
*GØTMX	"	10,686	109	21	57
*G4RKO	"	10,512	75	16	45
*GØRDO	"	9,804	81	24	52
*MØCOP	"	3,422	51	12	47
***G4ZOB**	**21**	**24,153**	**165**	**20**	**63**
***GØCKV**	**7**	**130,650**	**665**	**26**	**108**
***G3KMQ**	**3.5**	**40,743**	**338**	**12**	**69**
***G3WPH**	**1.8**	**37,961**	**417**	**14**	**63**
*G3VYI	"	6,360	120	8	45

Estonia

ES5TV	**A**	**3,228,610**	**3617**	**143**	**456**
***ES2BH**	**A**	**74,646**	**368**	**45**	**153**
***ES4MM**	**21**	**27,846**	**153**	**24**	**67**
*ES8DH	7	5,984	95	13	55
*ES6CO	3.5	3,195	76	10	35

European Russia

RS3A	**A**	**2,739,924**	**2535**	**143**	**523**
			(OP: RA3CW)		
RG3K	**"**	**2,510,749**	**2622**	**131**	**500**
			(OP: UA3QDX)		
UA4FER	**"**	**2,066,076**	**2455**	**121**	**401**
RM3F	**"**	**2,043,500**	**2712**	**120**	**380**
			(OP: UA3DPX)		
UA4CCG	"	1,547,666	1994	110	392
RW1ZA	"	1,181,601	1639	99	310
RN4WA	"	1,090,657	2121	95	324
RU3UR	"	1,035,251	1339	111	386
RV3FI	"	920,640	1507	89	322
RU3FF	"	743,688	1373	91	305
UA4SU	"	610,731	1091	79	262
UA1QM	"	607,872	1172	82	302
RK3DK	"	553,772	1180	81	253
UA6GP	"	505,386	876	87	291
RA3UT	"	436,100	553	101	344
RW4HP	"	431,225	996	61	174
RU6MD	"	250,660	501	78	224
RV1CC	"	247,680	543	66	222
UA6GM	"	208,800	569	64	176
UA4LA	"	170,478	432	74	213
RX3AJ	"	160,650	381	85	230
RZ3DA	"	146,880	317	74	198
UA3ICK	"	134,292	451	39	147
RA1OD	"	115,824	234	65	163
UA3DEE	"	113,850	350	43	122
RA3QN	"	113,295	431	51	144
UA3KW	"	112,710	201	85	170
RA3SS	"	112,176	230	69	177
UA1PAC	"	108,783	262	61	176
RN1NU	"	68,796	211	58	138
UA3TCJ	"	62,296	316	33	71
RV3TG	"	32,640	188	30	98
UA3QFU	"	26,136	100	45	76
UA3DPM	"	24,308	98	39	79
RU3SD	"	21,294	81	46	71
RU3MJ	"	19,481	96	46	75
UA4NCI	"	15,960	92	33	62
UA6HO	"	14,480	111	20	60
RW3MA	"	13,416	116	46	83
RX4HX	"	12,816	107	19	70
RW4PK	"	12,075	90	28	77
RX3RC	"	9,120	76	20	40
RK6HG	"	8,176	108	12	44
RN3DY	"	4,136	38	17	30
UA3QR	"	1,316	34	20	27
RN1CC	"	1,056	28	6	18
RA3TT	"	6	1	1	1
RC4Q	**21**	**199,375**	**855**	**30**	**115**
			(OP: UA4RC)		
UA6AAY	"	71,775	296	31	114
RA6AFB	"	13,050	97	19	56
UA4LCH	**14**	**389,662**	**1203**	**36**	**146**
UA3EDQ	**"**	**264,106**	**911**	**35**	**131**
UA6LFQ	"	172,085	829	31	96
RU3AA	**7**	**237,532**	**1027**	**35**	**137**
RW6CF	**"**	**199,512**	**875**	**35**	**128**
RZ3GU	"	15,180	166	15	51
RW4PL	**3.5**	**290,700**	**1281**	**30**	**120**
UA3MIF	**"**	**132,348**	**725**	**26**	**97**
UA1OMS	"	123,808	892	24	82
RU6FA	"	99,396	793	20	79
UA4LU	"	89,082	643	24	77
UA6LCN	"	80,454	714	23	83
UA3AP	"	50,052	463	21	76
RZ3AV	"	32,047	368	12	61
RK3BA	"	15,946	214	11	56
R3AWA	**1.8**	**87,414**	**631**	**21**	**81**
RU4PU	**"**	**84,096**	**567**	**21**	**75**
UA4RZ	"	41,496	362	16	68
RV3BQ	"	18,459	246	9	54
RA4YW	"	4,896	130	8	28
***RV6LFE**	**A**	**1,126,434**	**1583**	**103**	**379**
***RN6FA**	**"**	**789,140**	**1251**	**99**	**323**
***RV3QX**	**"**	**660,912**	**1154**	**87**	**305**
***RN3QP**	**"**	**578,588**	**1328**	**68**	**263**
*RZ6BU	"	564,330	982	86	304
*RZ3QZ	"	531,200	1113	92	323
*RV3LO	"	517,244	926	79	298
*UA4FRL	"	445,440	785	89	295
*RU3UN	"	428,644	563	85	319
*RX3ZX	"	395,270	843	73	217
*UA1CEC	"	395,199	1126	55	232
*RW1CX	"	381,843	824	66	253
*RK3IM	"	357,390	645	83	247
*RV3ZN	"	355,926	1027	58	216
*RV4LC	"	353,136	733	67	269
*UA1CUR	"	336,076	835	61	238
*UA4ALI	"	323,708	702	68	240
*UA3DAM	"	310,464	714	67	221
*UA6HCA	"	300,672	505	92	232
*UA6HFI	"	300,273	765	69	234
*RA1QD	"	295,005	724	62	215
*RU3ZV	"	283,920	745	74	206
*RV3QO	"	267,920	739	61	211
*UA4FEN	"	264,404	701	64	220
*RU4WE	"	256,332	716	53	193
*RN4SS	"	251,304	818	58	225
*RK4PB	"	243,726	601	70	224
*RU4WD	"	237,050	596	67	208
*UA1CE	"	232,848	772	44	172
*RU3XY	"	231,795	679	52	203
*RZ3DXR	"	226,872	575	71	203
*UA6YH	"	225,649	585	56	195
*RA3SL	"	222,768	653	51	201
*RU4SM	"	219,915	686	51	192
*RW6MT	"	209,911	644	46	195
*RK3AQW	"	208,800	641	55	185
*RA3ST	"	206,054	501	63	206
*UA1ZZ	"	200,254	633	45	178
*RW4AO	"	193,116	580	53	175
*RW3VZ	"	192,960	457	64	204
*RA3BQ	"	190,080	486	57	207
*RW3TA	"	176,900	543	57	187
*UA3DGG	"	173,484	513	60	184
*UA3VLO	"	173,279	405	52	189
*UA4QK	"	171,315	457	56	179
*RN3ZKD	"	159,600	661	50	160
*RW6HP	"	159,536	482	59	177
*RX4YY	"	150,780	952	43	167
*UA4AAC	"	140,058	586	37	149
*UA4AGO	"	138,897	454	47	160
*RV3YR	"	137,572	472	52	159
*RD3AB	"	136,895	485	51	158
*UA3TN	"	133,809	489	46	173
*UA3DKN	"	127,800	475	42	138
*RU3MW	"	127,015	482	44	147
*RA3RN	"	121,992	442	43	161
*RK6AQM	"	114,636	323	53	180
*RA4ST	"	114,432	472	43	149
*RN4CA	"	114,332	400	54	148
*RA1QN	"	112,039	506	35	146
*RX3RB	"	111,153	417	43	158
*RW4PY	"	111,150	331	60	165
*RX6LD	"	109,600	514	29	131
*RV6BC	"	109,053	346	49	140
*RA3BB	"	108,072	465	44	114
*RN4NF	"	102,900	250	64	146
*UA4YA	"	96,543	406	36	139
*RU3XB	"	95,700	398	36	138
*RA3XO	"	94,545	188	72	119
*RN3ZC	"	92,659	312	58	159
*RX3MM	"	91,455	280	50	145
*RU6BR	"	90,090	316	54	141
*RA3MB	"	88,220	261	51	169
*RZ1OK	"	84,868	362	42	154
*UA1ORL	"	80,556	414	31	116
*UA3DSS	"	79,755	264	61	134
*UA4AN	"	78,374	257	45	104
*RA4NCC	"	77,792	351	31	112
*RW3DOX	"	72,787	353	33	110
*RD3BE	"	67,032	180	46	122
*UA3ACL	"	64,974	300	38	144
*RV3MR	"	61,548	385	29	109
*UA3PPP	"	57,960	272	37	131
*RU3DM	"	57,594	145	55	119
*RA3NC	"	57,196	250	46	112
*RN1NW	"	54,362	306	35	119
*RN3FA	"	46,690	159	50	95
*UA3DFM	"	46,560	290	36	124
*RA1OK	"	44,405	239	31	76
*RU3WR	"	38,556	270	25	94
*UA3RW	"	38,079	139	40	101
*UA4WAG	"	36,549	206	34	97
*UA4FUW	"	36,356	160	45	104
*RV3BZ	"	36,352	268	30	112
*RZ6FA	"	36,120	109	44	85
*UA1AAR	"	35,644	193	31	102
*UA3UHZ	"	35,264	269	41	111
*RU3PU	"	33,522	134	46	105
*UA6FW	"	32,144	199	29	83
*RU3BU	"	31,414	237	35	104
*UA3UBT	"	30,012	209	30	93
*UA4PAY	"	27,081	139	48	105
*RV3QG	"	26,559	253	28	89
*RL3AB	"	25,676	102	45	86
*RA6XB	"	21,336	101	40	87
*RW4FX	"	20,564	129	34	72
*UA3YAA	"	20,090	87	39	59
			(OP: UA3YQL)		
*RD3QG	"	18,142	131	27	67
*RX3MX	"	16,463	109	39	62
*RK3FM	"	15,980	147	21	64
*RN3ARU	"	13,832	73	34	42
*RA6FUZ	"	13,248	158	15	54
*UA6JFG	"	12,879	115	19	62
*RX6ADB	"	12,212	59	31	55
*RA1WU	"	12,087	61	30	49
*RX3VF	"	9,960	106	18	65
*UA3YCX	"	9,828	128	19	59
*RA3YAO	"	9,240	147	12	48
*UA3YQL	"	8,343	54	32	49
*UA3AMZ	"	6,528	93	13	51
*UA6LPY	"	5,734	58	19	42
*RA6MQ	"	5,162	77	14	44
*RN4AM	"	4,888	42	19	28
*RW4NN	"	4,725	40	26	37
*RK3DSW	"	4,466	50	18	40
*RA3XE	"	3,894	49	18	41
*RU6AI	"	3,024	33	25	29
*UA3QG	"	2,448	26	13	21
*UA3XGM	"	2,135	24	14	21
*RK4PC	"	1,677	29	14	25
*UA6BUX	"	1,551	32	9	24
*RN3AAB	"	1,548	29	16	27
*RU4LM	"	1,476	18	18	18
*UA9OCP	"	1,147	34	9	22
*UA3SKV	"	870	17	13	17
*RA1QKO	"	616	14	8	14
*UA3OB	"	598	19	9	17
*RL3FO	"	418	12	7	12
*RW4NQ	"	54	5	4	5
*UA3RN	28	42	3	3	3
***RA6YY**	**21**	**104,412**	**406**	**32**	**122**
***RX6AH**	**"**	**87,468**	**334**	**33**	**115**
*RA3AN	"	68,901	334	27	92
*RN4AO	"	24,000	252	18	57
*UA4LW	"	18,905	131	22	73
*RW4LQ	"	14,892	75	25	48
*UA3AKI	"	9,828	103	16	47
*RX4HJ	"	4,851	139	10	39
*RW3PN	"	4,368	44	17	31
*RZ3VA	"	3,861	59	13	26
*RA3ZOM	"	360	26	17	23
***RU4SS**	**14**	**131,740**	**567**	**29**	**111**
***UA3ABJ**	**"**	**106,384**	**521**	**31**	**91**
*RA3UAG	"	74,691	352	30	99
*RW6AH	"	72,459	528	24	73
*UA4HAM	"	70,286	376	26	87
*RK6CM	"	63,280	302	26	86
*RU3YA	"	29,120	202	19	61
*UA6LJU	"	26,208	223	17	55
*RU3UW	"	25,875	223	16	53
*RV4AS	"	25,515	221	20	61
*RA6MS	"	17,344	176	13	51
*RV3AQN	"	13,420	186	8	47
*RD4WZ	"	10,710	151	15	48
*RZ3FQ	"	5,664	94	10	38
*RA3OE	"	3,939	48	13	26
*UA3DFR	"	238	18	4	10
*RX3AU	"	54	3	3	3
***RZ4AG**	**7**	**158,064**	**673**	**32**	**116**
***RK4SA**	**"**	**151,776**	**740**	**30**	**106**
*UA3RF	"	52,520	345	22	82
*UA4FFF	"	51,504	290	23	88
*RK6ASY	"	38,570	338	21	74
*UA6HCE	"	36,636	271	17	69
*RA3DTN	"	21,840	103	26	79
*RV3ZQ	"	17,204	198	12	56
*RA3GFG	"	11,368	164	12	46
*RA6FRL	"	9,638	245	14	47
*RA4HVX	"	9,438	171	18	48
*RD3ZW	"	5,016	107	9	35
*UA4ACP	"	4,429	90	10	33
*RU4SW	"	1,850	72	8	29
***RZ3AUL**	**3.5**	**55,803**	**486**	**18**	**71**
***RA3ZC**	**"**	**39,146**	**507**	**14**	**60**
*RK3FY	"	34,952	404	12	56
*RX4HB	"	29,568	226	18	66
*U3DI	"	22,326	314	8	53
*RA3LO	"	8,601	102	12	49
*UA3DTT	"	2,772	53	9	33
*UA6ATG	"	442	14	7	10
***RN4AK**	**1.8**	**35,309**	**387**	**12**	**55**
*RN3AHL	"	6,096	89	10	38
*RU3FT	"	5,687	93	8	39

Faroe Islands

***OY4M**	**A**	**42,660**	**180**	**17**	**62**

Finland

OF8X	**A**	**2,727,276**	**3265**	**119**	**374**
			(OP: OH4JFN)		
OF3OJ	"	359,766	1580	41	166
OH5NE	"	271,421	939	52	217
OH2CK	"	252,748	397	89	269
OH2VZ	"	218,880	550	59	181
OH2XF	"	96,180	256	54	175
OH3MC	"	29,760	204	22	74
OH1BV	"	16,640	255	34	126
OH3QN	"	589	15	7	12
OH6BG	**21**	**133,705**	**485**	**31**	**112**
OF8L	**14**	**555,885**	**1826**	**36**	**129**
			(OP: OH8LQ)		
OH3LQK	"	178,365	609	36	129
OH5NS	"	1,218	23	9	20
OH2NIK	"	24	2	2	2
OH2BH	**7**	**718,718**	**2397**	**36**	**146**
			(OP: OH1WZ)		
OH6R	"	284,292	1457	31	118
			(OP: OH3FM)		
OH3XA	**3.5**	**15,914**	**155**	**14**	**59**
OH3JR	"	10,653	111	10	57
OH2TA	**1.8**	**101,790**	**1018**	**17**	**70**
OF4MFA	"	24,480	283	11	61
OH5NZ	"	5,940	122	8	36
OH2NRG	"	2,550	69	7	27
			(OP: OH2LRE)		
***OH6XY**	**A**	**184,497**	**482**	**70**	**197**
*OH2LP	"	88,530	363	45	150
*OH5JT1	"	70,525	412	38	117
*OH2BBT	"	56,457	291	37	116
*OH8VQ	"	49,920	252	36	124
*OF4NSG	"	44,958	190	41	136
			(OP: OH3WS)		
*OH6FA	"	38,086	280	35	104
*OH6MBQ	"	37,488	241	32	110
*OH3HS	"	33,462	158	37	132
*OH2LO	"	26,718	117	38	108
*OH7YN	"	23,507	125	22	62
*OF8GZN	"	14,616	127	22	65
*OH6KW	"	7,375	104	12	47
***OH3WR**	**21**	**15,884**	**112**	**21**	**55**
***OH2K**	**14**	**112,336**	**665**	**27**	**85**
			(OP: OH5YU)		
*OH2FS	"	11,954	74	20	66
*OH6RC	"	8,400	69	16	54
***OH2BPA**	**3.5**	**14,573**	**200**	**9**	**50**
*OH6HOP	"	1,224	42	5	19
***OH5UFO**	**1.8**	**18,270**	**205**	**12**	**58**
*OH3GIF	"

DK9IP	**7**	**552,231**	**1862**	**37**	**144**	*DL1KUR	*	95,472	279	54	154	*DL1TPY	*	22,000	280	17	83	*DL9LM	*	106,821	500	27	90	*HA8TP	*	152,856	621	30	102
DJ7IK	*	248,788	1009	35	129	*DL9ABM	*	94,760	228	54	130	*DL7BD	*	21,735	122	37	78	*DL2DXA	*	91,770	370	29	86	*HG8C	*	129,903	403	34	125
DL7AU	*	170,166	745	33	125	*DL8NBJ	*	94,668	390	36	160	*DC8HF	*	21,588	169	20	64	*DL4YR	*	58,962	324	22	71				(OP: HA8EK)		
DL8MFS	*	14,952	91	23	66	*DL8JDX	*	91,739	225	56	143	*DL3DBY	*	20,972	168	29	78	*DF7EM	*	43,055	374	18	61	*HA7MW	*	72,471	322	29	90
			(OP: DJ6TK)			*DJ3XA	*	90,922	418	31	138	*DL5HP	*	19,560	186	24	96	*DL2MIH	*	2,030	41	10	25	*HA7NK	*	65,400	327	25	84
DL2AMD	3.5	100	6	4	6	*DL2ANM	*	90,753	350	43	136	*DJ2FR	*	19,332	163	25	83	***DL2HQ**	**7**	**101,600**	**546**	**23**	**104**	*HA6FQ	*	65,303	299	28	105
DJ0MDR	**1.8**	**169,740**	**1147**	**22**	**93**	*DL0DWD	*	88,871	426	33	148	*DL6RCK	*	19,012	135	26	72	*DJ2XC	*	61,000	391	23	102	***HA3MU**	**7**	**119,328**	**660**	**26**	**106**
DK2FG	*	50,572	403	19	75				(OP: DF6QC)			*DL2ZA	*	19,008	188	19	80	*DF9CY	*	14,238	179	12	51	***HA8KW**	**3.5**	**195,787**	**1206**	**26**	**101**
DJ6OZ	*	27,193	317	10	61	*DL0IH	*	88,164	440	33	153	*DL4NT	*	18,656	132	24	64	*DG0DG	*	7,424	71	13	45	*HG5Y	1.8	418	22	4	15
DM3ML	*	11,584	185	10	54				(OP: DF6QC)			*DL1THB	*	18,480	189	18	66	***DF7GG**	**3.5**	**67,907**	**603**	**15**	**74**				(OP: HA1CW)		
***DC4A**	**A**	**1,563,588**	**1712**	**112**	**402**	*DL4KUG	*	86,317	341	51	158	*DJ4DY	*	18,288	108	28	44	*DL9UDS	*	44,455	436	16	69						
			(OP: DL4NAC)			*DL4SL	*	85,262	326	43	135	*DL1ARD	*	18,126	95	39	67	*DL6KWN	*	43,725	505	12	63			ITU HQ Geneva			
***DD5M**	**"**	**1,146,680**	**1645**	**96**	**340**	*DF5AN	*	83,130	355	33	130	*DF1HF	*	17,407	101	32	71	*DL2RUG	*	26,496	309	11	61	**4U1ITU**	**A**	**702,506**	**1716**	**70**	**208**
			(OP: DJ0ZY)			*DL3SEM	*	79,860	363	38	127	*DL2FK	*	17,143	134	24	55	***DK3UA**	**1.8**	**11,776**	**170**	**9**	**55**				(OP: RW3AH)		
***DL1NKS**	**"**	**793,950**	**1359**	**78**	**317**	*DK2BJ	*	78,126	300	43	131	*DL8UFO	*	16,415	97	25	42	*DF3IS	*	5,763	113	7	44						
***DL9GFB**	**"**	**777,308**	**1064**	**101**	**375**	*DR0R	*	76,800	337	49	143	*DL6DVU	*	16,366	150	19	79	*DK3AX	*	2,952	73	7	34				Iceland		
***DK5DQ**	**"**	**776,586**	**1233**	**85**	**288**				(OP: DJ5BWD)			*DL3XM	*	16,275	74	41	64							**TF3AM**	**A**	**9,964**	**108**	**15**	**32**
*DL5RMH	*	755,438	1241	84	305	*DF1SZ	*	76,500	325	41	139	*DO1UZ	*	16,019	193	15	68				Gibraltar			TF3CW	*	1,728	46	10	26
*DL5KUD	*	616,911	985	88	323	*DF6WE	*	71,424	391	39	147	*DG4YGW	*	15,228	112	30	64	**ZB2X**	**3.5**	**683,240**	**2680**	**34**	**121**	***TF3GB**	**A**	**164,650**	**669**	**37**	**141**
*DL6JZ	*	474,175	983	69	256	*DH3RB	*	69,960	331	36	129	*DL1RLB	*	12,935	90	23	42				(OP: OH2KI)								
*DL7UMK	*	468,350	1043	66	257	*DK3WJ	*	68,572	210	45	113	*DK2ZO	*	12,397	103	20	57										Ireland		
*DL4FN	*	464,877	957	66	263	*DL1TS	*	67,470	238	43	152	*DL1AWM	*	12,328	90	34	58				Greece			**EI2JD**	**A**	**673,752**	**1262**	**86**	**333**
*DL1SAN	*	381,780	834	71	244	*DM2RN	*	62,790	323	39	122	*DL8UAT	*	12,282	56	33	56	**SV1ENG**	**A**	**1,033,708**	**1914**	**87**	**299**	**EI4CF**	**21**	**53,820**	**310**	**26**	**89**
*DL4TJ	*	367,352	662	88	288	*DL5KM	*	61,608	249	37	114	*DK5EZ	*	11,392	82	24	65	**SX1L**	**14**	**411,942**	**2117**	**31**	**111**	**EI2CN**	**1.8**	**41,925**	**502**	**11**	**54**
*DF3AX	*	352,275	856	57	218	*DH8MS	*	60,882	275	29	110	*DL8HCO	*	11,016	127	18	63				(OP: SV1RP)			***EI/W5GN**	**A**	**782,236**	**1547**	**60**	**247**
*DL8CKL	*	349,700	695	75	250	*DL7FA	*	60,830	304	38	120	*DL7VRG	*	10,212	110	24	68	SV2BFN	*	293,208	1294	35	117	*EI7CC	*	302,498	641	61	226
*DL7DZ	*	348,986	693	72	247	*DL5ZB	*	60,802	157	61	141	*DL2AL	*	10,206	115	31	50	**J43J**	**3.5**	**221,552**	**1301**	**27**	**95**	*EI4HQ	*	80,910	459	32	142
*DL5ARM	*	342,790	828	68	227	*DL9CW	*	59,262	220	46	120	*DL3JRA	*	9,360	83	17	35				(OP: DJ5JH)			*EI5DI	*	32,072	189	24	52
*DF3KV	*	334,480	648	87	283	*DL7UXG	*	57,933	248	40	117	*DA3T	*	9,288	90	24	62	**SV3RF**	**1.8**	**126,300**	**905**	**21**	**79**				Isle of Man		
*DL1EFD	*	315,153	697	62	229	*DL6YRM	*	55,257	194	50	113	*DH5NT	*	9,020	117	18	64	SV1GRD	*	9,480	158	10	50						
*DJ8UV	*	312,244	767	63	248	*DL1SBF	*	54,300	242	35	115	*DG0ETE	*	8,176	105	17	56	***SV1PS**	**A**	**26,418**	**179**	**28**	**74**	**MD0CCE**	**A**	**1,792,912**	**2362**	**95**	**393**
*DH6JL	*	303,072	633	65	181	*DF2PH	*	53,676	271	30	112	*DL9GMC	*	7,128	104	19	53	*SV3GKY	*	23,229	186	23	64	*MD/DL3KWF	A	36,934	236	27	91
*DL1NUX	*	294,656	685	56	200	*DJ7EC	*	52,403	229	35	104	*DO9KT	*	6,930	106	17	60	***SV1BJW**	**14**	**217,494**	**1122**	**30**	**99**	*MD/DL3KWR	*	25,704	225	28	108
*DF1HE	*	289,608	809	49	215	*DL2DWP	*	49,335	195	40	103	*DJ6KV	*	6,853	75	29	60	***SV2BFL**	**7**	**40,500**	**439**	**16**	**65**						
*DL3BRA	*	277,560	694	55	215	*DL5MO	*	48,216	188	30	138	*DL5KMS	*	6,300	65	22	48	*SV1MF	*	11,900	122	14	54				Italy		
*DL2NBY	*	261,280	736	50	180	*DJ7LH	*	47,838	226	31	103	*DL1CI	*	5,576	94	19	49	***SV2BOH**	**1.8**	**20,196**	**384**	**8**	**58**	**IR2A**	**A**	**1,020,996**	**2527**	**62**	**175**
*DL5JRA	*	253,232	621	61	205	*DL2HWI	*	45,560	162	42	92	*DL1DXL	*	4,949	43	20	29										(OP: I2UIY)		
*DF3OL	*	224,624	401	72	206	*DJ6NH	*	44,880	150	47	123	*DF5BM	*	4,717	65	15	38				Guernsey			**IV3UHL**	*	**267,650**	**886**	**55**	**147**
*DL1VJL	*	222,961	425	65	168	*DL5KUR	*	43,778	164	38	80	*DL2EF	*	4,158	94	13	41	***MU0FAL**	**A**	**436,455**	**1844**	**52**	**213**	IK0TUM	*	130,036	263	63	173
*DF1MM	*	217,118	518	67	211	*DL3KVR	*	43,011	144	55	122	*DL5LWM	*	3,990	68	16	41	***GU4YOX**	**3.5**	**135,729**	**950**	**20**	**79**	IK3OII	*	108,750	330	51	123
*DL4HWI	*	207,788	445	62	225	*DL1KSE	*	41,480	427	28	108	*DH1OK	*	3,640	53	16	36							IK7FMQ	*	39,767	256	55	106
*DL3ZAI	*	205,155	557	48	187	*DL1DQW	*	40,500	186	47	115	*DK0SU	*	3,172	65	11	41				Hungary			IK2IKW	*	31,050	169	36	99
*DL2HWB	*	190,518	523	48	178	*DL6NDK	*	39,345	144	36	93				(OP: DF7SA)			**HA8JV**	**A**	**4,447,950**	**3928**	**152**	**498**	I2TFJ	*	25,632	209	25	64
*DL5ASE	*	190,112	580	51	157	*DL9GMM	*	38,880	113	52	92	*DL6UAM	*	3,050	83	6	44	HA3OU	*	785,295	1196	91	314	I5YKQ	*	21,567	139	23	68
*DL8UKE	*	183,727	412	72	197	*DL6RBH	*	37,506	207	39	102	*DL6NWA	*	3,024	81	16	47	HA7LW	*	343,976	794	56	192	IZ7CDB	*	19,800	210	20	52
*DK8AX	*	179,324	423	64	190	*DL8ULF	*	37,177	258	25	88	*DL4SUN	*	2,760	33	19	27	HA5LQ	*	4,760	33	23	33	IK2RLS	*	16,430	113	33	73
*DL8ZAJ	*	170,640	410	56	184	*DJ0YI	*	36,992	254	29	99	*DL5SVB	*	2,440	66	9	31	**HA3GJ**	**28**	**4,095**	**64**	**10**	**35**	**IZ8GGF**	**21**	**234,752**	**1048**	**31**	**97**
*DL1ARJ	*	160,284	473	52	176	*DK3WN	*	36,387	219	31	86	*DL9DBZ	*	2,360	71	21	38	**HG8K**	**7**	**330,704**	**1206**	**36**	**140**	**I7RIZ**	**14**	**118,209**	**703**	**20**	**71**
*DL5XAT	*	159,004	394	56	198	*DK3PM	*	36,195	232	24	103	*DL2DYL	*	2,173	38	19	34	HA1RS	*	117,000	919	27	93				(OP: I7ALE)		
*DL5JS	*	151,140	437	50	179	*DL1RTL	*	35,880	157	37	83	*DK7CH	*	2,135	88	14	47	**HA8IB**	**1.8**	**122,109**	**1075**	**19**	**82**	IW1GGN	*	24	2	2	2
*DL1RTS	*	149,648	495	48	151	*DJ6OL	*	35,075	204	32	83	*DL2AXM	*	2,064	49	13	35	***HA1ZH**	**A**	**718,740**	**1257**	**91**	**272**	**IR2W**	**7**	**42,252**	**374**	**18**	**66**
*DL5CD	*	146,664	518	51	165	*DK8RE	*	34,102	200	30	88	*DJ5KX	*	2,014	62	17	36	*HA7PO	*	664,200	1030	97	308				(OP: IK2EGL)		
*DL8ULO	*	141,264	450	48	168	*DF3QG	*	32,818	110	40	82	*DJ5GK	*	1,975	48	10	15	*HA2MN	*	437,250	795	76	242	IK8SEU	*	8,040	136	11	49
*DF2CH	*	129,913	397	63	214	*DL2YED	*	32,452	187	32	90	*DL5SWB	*	1,200	21	11	13	*HA2ESM	*	261,888	699	60	188	**IK2SND**	**3.5**	**186,004**	**1407**	**24**	**74**
*DK7KR	*	123,977	388	55	144	*DK5PF	*	31,248	196	28	96	*DO1SAJ	*	972	32	7	20	*HA5AZC	*	188,748	516	54	198	IK0YVV	*	107,781	699	23	88
*DL8YR	*	123,319	398	46	177	*DJ7JC	*	30,646	196	35	119	*DL2VB	*	644	13	11	12	*HA7YS	*	165,336	508	55	194	IK5VLO	*	44,478	551	9	54
*DL8UGF	*	113,229	321	50	157	*DL1DBR	*	30,378	174	33	89	***DB7MA**	**28**	**110**	**7**	**4**	**7**	*HA8CQ	*	130,732	432	48	148	**IU1A**	**1.8**	**128,232**	**1018**	**22**	**82**
*DL2MWB	*	106,547	297	40	177	*DO9ST	*	29,400	236	26	79	***DL4UL**	**21**	**40,365**	**179**	**27**	**88**	*HA7QW	*	23,433	198	29	78				(OP: IK1SPR)		
*DL0KB	*	105,276	320	44	142	*DL8DWW	*	29,393	171	33	86	*DK5ZX	*	24,336	164	18	60	***HA3GQ**	**28**	**1,120**	**23**	**9**	**23**	IK2AOO	*	11,408	250	6	40
*DL5DSA	*	102,342	288	61	161	*DL1EHR	*	25,048	208	31	93	*DH8BQA	*	2,016	31	11	17	*HA3FRE	*	560	19	9	19	IR7A	*	11,323	140	9	58
*DF6QC	*	101,460	461	35	155	*DJ6UP	*	24,725	164	29	86	***DL3DTH**	**14**	**194,910**	**676**	**34**	**112**	***HA8IH**	**14**	**485,275**	**1627**	**35**	**110**				(OP: I7ALE)		
*DK7GH	*	95,675	349	51	164	*DL8UVG	*	22,509	164	33	90	*DL4AAE	*	125,250	508	27	98	*HA3LN	*	289,488	1050	34	114	***I2WIJ**	**A**	**933,162**	**1070**	**109**	**410**

***IK2UCK**	*	**672,000**	**1022**	**80**	**320**
***IK4EWX**	*	**609,535**	**1066**	**82**	**273**
*IK4UNH	*	308,226	643	61	221
*IZ2EJU	*	295,936	638	69	220
*IZ3DBA	*	235,365	811	52	169
*I6FDJ	*	222,130	704	50	179
*I4FGG	*	210,168	573	61	191
*I2AZ	*	182,546	480	57	181
*IZØEHL	*	178,198	384	67	211
*IZ2GMT	*	118,650	481	37	138
*IV3ARJ	*	93,472	420	41	143
*IV3DYS	*	92,560	320	42	136
*IN3FHE	*	83,125	269	45	130
*IZ1DXS	*	81,838	349	37	129
*IK2NUX	*	73,414	226	46	96
*IZ3GHP	*	64,222	222	52	111
*IK5FKF	*	59,160	292	32	104
*IK2AIT	*	55,413	281	35	106
*IK2CFD	*	53,317	231	37	94
*IZ2EWR	*	46,632	294	30	104
*IZ1GLX	*	44,403	215	40	83
*IZ3DVU	*	42,705	173	39	78
*IK1WEG	*	35,632	226	39	92
*IK2NCF	*	32,912	163	35	86
*IK2CZQ	*	30,030	141	39	71
*IZ1DUG	*	28,908	187	29	103
*IK3MLF	*	28,560	177	32	88
*IZ5GRS	*	28,416	159	32	79
*IK2YXP	*	24,395	176	38	81
*IZ4DYX	*	24,045	204	24	81
*I4HRH	*	23,904	165	28	68
*IZ5EBL	*	16,740	95	36	72
*IK2DKX	*	9,636	109	21	45
*IZ6BTN	*	6,710	77	19	36
*IZ8DWL	*	5,022	61	19	35
*IK2WXV	*	4,340	88	12	23
*IK5YJK	*	1,500	26	14	16
*IZ3KMW	*	783	22	9	18
*IZ6FCK	*	130	5	5	5
*IZ5HOB	*	42	17	4	10
***IZ8DVD**	**28**	**6,292**	**69**	**14**	**30**
***IR8M**	**21**	**31,620**	**246**	**26**	**67**
			(OP:IZ8CCW)		
***IK6MNB**	**14**	**230,087**	**1077**	**32**	**111**
*IK2HDF	*	117,360	682	28	92
*IN3OWY	*	17,136	173	14	49
*IKØUUM	*	6,630	62	15	36
***IK2WXQ**	**7**	**31,820**	**279**	**17**	**69**
*IØYQV	*	10,620	95	16	44
*IZ4GOL	*	4,560	78	14	43
*I3MU	*	3,456	90	11	37
*I7PLY	*	640	24	7	13
***IV3AZV**	**3.5**	**44,702**	**671**	**10**	**52**
*I5VXG	*	28,718	332	16	67
*I4JEE	*	15,183	213	8	55
*IQ8LR	*	9,702	118	11	55
			(OP: KI4RME)		
***IK3SSO**	**1.8**	**20,894**	**318**	**9**	**53**
*IKØMHR	*	17,816	276	11	57
*IZ1BII	*	7,995	84	9	56
*IZ3FJV	*	28	5	2	5

Kaliningrad

UA2CZ	**A**	**307,020**	**605**	**68**	**233**
*RK2FXG	21	3,393	52	13	26
			(OP: RA2FIR)		
***RK2FWN**	**A**	**37,962**	**259**	**21**	**93**
***UA2FL**	**3.5**	**131,118**	**1358**	**15**	**67**
*RA2FW	*	28,512	407	10	56
*RA2FB	*	2,701	72	6	31

Latvia

YL6W	**A**	**2,258,815**	**2589**	**137**	**452**
			(OP: YL2GD)		
YL2PP	*	4,788	36	24	33
YL2BJ	**14**	**76,908**	**408**	**27**	**89**
YL7A	**7**	**31,188**	**155**	**24**	**89**
YL7X	**3.5**	**14,706**	**220**	**10**	**47**
			(OP: YL2LY)		
YL8A	**1.8**	**162,996**	**1271**	**21**	**81**
			(OP: YL2KA)		
YL2SM	*	**130,662**	**1008**	**21**	**81**
***YL2TB**	**A**	**751,680**	**1511**	**71**	**289**
***YL2CV**	*	**625,869**	**1221**	**74**	**279**
*YL2TQ	*	324,576	601	78	244
*YL2CR	*	156,804	625	46	173
*YL3CU	*	143,748	564	42	156
*YL2IP	*	91,104	326	49	159
*YL2HK	*	61,320	385	29	117
*YL2IU	*	50,071	293	36	125
*YL3GDY	*	11,270	173	13	57
*YL2IS	*	9,867	112	19	50
***YL5W**	**7**	**164,592**	**875**	**38**	**114**
***YL3FT**	**3.5**	**105,840**	**850**	**23**	**82**
*YL2GQT	*	27,648	313	13	59
*YL2II	*	2,448	84	5	31
***YL4U**	**1.8**	**70,590**	**796**	**11**	**67**
			(OP: YL1ZF)		

Lithuania

LY2MM	**A**	**784,454**	**1271**	**88**	**306**
LY4T	*	**754,820**	**1382**	**79**	**286**
LY2VA	*	345,488	801	75	227
LY1CX	*	300,300	551	60	226
LY2KM	*	130,569	463	54	159
LY2NK	*	127,908	474	50	154
LY3W	*	90,870	273	44	151
LY3X	*	82,896	357	38	138
LY3CY	*	40,940	279	23	92
LY1CM	**21**	**27,257**	**156**	**28**	**69**
LY1CT	**3.5**	**46,240**	**515**	**13**	**67**
LY2IJ	**1.8**	**266,124**	**1402**	**27**	**107**
LY2OU	*	71,568	717	14	70
***LY6M**	**A**	**1,833,720**	**2312**	**118**	**437**
***LY6A**	*	**1,267,660**	**1785**	**106**	**376**
			(OP: LY2BM)		
*LY2OO	*	457,989	1074	74	265
*LY2DV	*	141,930	491	64	185
*LY2TX	*	56,980	289	32	108
*LY2OM	*	42,194	219	36	110
***LY2LF**	**14**	**34,732**	**254**	**19**	**57**
***LY2AT**	**7**	**16,425**	**222**	**12**	**61**
***LY2T**	**3.5**	**64,540**	**826**	**11**	**59**
*LY4CW	*	16,184	263	11	45
*LY2TS	*	3,827	78	7	36

Luxembourg

*LX1ER	A	8,142	63	23	46
***LX1NO**	**1.8**	**6,072**	**138**	**6**	**38**

Macedonia

Z35M	**A**	**539,082**	**1282**	**63**	**235**

Malta

***9H1XT**	**A**	**95,452**	**533**	**43**	**153**

Moldova

ER5WU	**21**	**73,710**	**274**	**31**	**104**
***ERØFEO**	**A**	**294,886**	**705**	**56**	**227**
***ER1OO**	**28**	**850**	**16**	**9**	**16**
***ER3MM**	**21**	**28,106**	**170**	**27**	**67**
***ER1WK**	**14**	**59,800**	**382**	**19**	**73**
*ER5DX	7	3,848	48	14	38
***ER1RR**	**3.5**	**48,370**	**575**	**10**	**60**

Montenegro

4O3A	**A**	**6,942,915**	**6075**	**149**	**502**

Netherlands

PA3AAV	**A**	**2,011,530**	**2076**	**115**	**455**
PA4A	*	**1,858,950**	**2793**	**99**	**351**
PAØABM	*	698,895	855	104	397
PAØJNH	*	324,531	625	66	255
PA1T	*	220,002	769	54	168
PA5WT	*	204,402	625	51	158
PA2ALF	*	120,184	399	45	136
PAØGRU	*	66,332	329	36	125
PA9CW	*	23,230	190	24	91
PA1BX	*	17,056	145	24	80
PA7FA	*	16,704	85	46	70
PA2R	**21**	**25,460**	**162**	**24**	**71**
PAØBWL	**7**	**120,048**	**773**	**28**	**94**
PA3GVI	*	16,224	160	16	62
PA3GCV	**1.8**	**21,320**	**242**	**17**	**65**
***PA3BFH**	**A**	**739,630**	**1286**	**74**	**296**
***PG7V**	*	**612,666**	**1293**	**63**	**274**
*PA3DJY	*	470,507	1340	55	208
*PA3EMN	*	211,255	655	51	202
*PA3ARM	*	154,160	536	46	159
*PA2W	*	133,118	454	39	163
*PAØFAW	*	131,138	543	38	165
*PC7T	*	118,770	310	58	164
*PA7RA	*	94,192	400	50	153
*PAØMBD	*	91,999	348	47	150
*PA3DBS	*	90,072	384	37	125
*PA5GU	*	70,716	247	42	100
*PE2JMR	*	65,816	344	32	120
*PA3HGF	*	61,155	253	34	117
*PA3CLQ	*	48,657	365	28	119
*PAØCOR	*	44,688	234	40	107
*PA3BGQ	*	43,524	313	38	118
*PA7LV	*	31,622	148	33	64
*PA3BWK	*	27,336	150	34	100
*PAØB	*	25,074	243	25	101
*PAØWKI	*	21,756	167	26	85
*PA3FMC	*	16,684	146	23	74
*PA3AQL	*	15,618	194	24	90
*PA3GBI	*	14,608	126	21	62
*PA7HPH	*	10,692	104	21	60
*PA3CDN	*	4,347	93	16	53
*PAØRBA	*	1,363	37	15	32
***PAØRRS**	**14**	**16,956**	**161**	**13**	**41**
*PA3CAL	*	4,699	71	11	26
***PG2AA**	**3.5**	**63,550**	**686**	**14**	**68**
*PAØMIR	*	9,911	165	8	45

Northern Ireland

GI4VIV	**A**	**329,670**	**648**	**70**	**260**
***GI6YM**	**A**	**344,565**	**900**	**59**	**220**
			(OP: GI/VE7ALN)		
*GI4SJQ	*	9,867	92	20	49

Norway

LA2AB	**A**	**300,672**	**855**	**71**	**253**
			(OP: LA6GF)		
LA2QM	*	101,952	652	31	113
LA7SI	*	80,995	341	39	128
LA9TJA	*	46,800	312	28	122
LA8AW	*	23,520	125	33	107
LA5YJ	*	7,254	177	14	48
LA2OKA	*	2,923	84	21	58
LA1QDA	**14**	**25,315**	**156**	**18**	**65**
LA8XM	**7**	**48,635**	**174**	**30**	**107**
LA7AFA	*	9,317	93	16	61
LN9Z	**3.5**	**296,977**	**1888**	**29**	**102**
			(OP: LA9HW)		
LA2O	*	18,774	409	10	53
***LA3S**	**A**	**645,354**	**1409**	**66**	**276**
			(OP: LA3BO)		
*LA6CF	*	297,065	765	54	211
*LA8OM	*	130,732	584	37	159
*LA3ZA	*	97,695	386	41	154
*LA6DW	*	72,708	385	32	114
*LA6ZFA	*	61,685	328	35	134
*LA/LY2FN	*	48,824	323	32	104
*LA7TO	*	15,150	135	26	75
*LA9DK	*	6,120	68	17	34
*LA5MDA	*	3,182	50	14	29
*LA1YE	14	4,653	74	9	38
*LA/LY2W	3.5	1,085	60	5	26

Poland

SP6A	**A**	**1,508,220**	**1885**	**115**	**375**
SP6T	*	**1,294,850**	**1370**	**122**	**429**
SP4R	*	**1,213,209**	**1615**	**111**	**378**
SN8F	*	824,970	1786	81	240
			(OP: SP8FHK)		
SP3GTS	*	723,472	1133	91	321
SP6IEQ	*	460,416	684	82	270
SP4BEU	*	429,552	853	73	241
SQ4MP	*	283,725	1079	50	145
SP9LJD	*	273,604	606	66	226
SP2GWH	*	244,536	566	64	212
SP1NQN	*	203,736	822	41	115
SP2FGO	*	126,357	503	52	179
SQ7B	*	82,175	408	34	139
SNØFWQ	*	47,872	313	27	109
			(OP: SP9FWQ)		
SN1A	*	13,590	125	19	71
			(OP: SP1EG)		
SP9ATE	*	8,687	138	15	58
SP5GH	**28**	**3,400**	**40**	**11**	**29**
SP9DLY	*	2,709	47	10	33
SN7C	**21**	**109,076**	**378**	**33**	**115**
			(OP: SP7CHS)		
SP4JTJ	**14**	**94,521**	**282**	**33**	**114**
SP5ELA	**7**	**176,018**	**839**	**32**	**135**
SP2QG	*	119,808	642	29	115
SP2FAP	*	104,656	663	21	103
SN7F	*	91,388	480	24	100
			(OP: SP7LFT)		
SP3FYX	*	69,832	493	26	90
SP9JZT	*	28,160	161	26	84
SNØADV	*	9,480	105	11	49
SN3C	**3.5**	**210,868**	**1296**	**26**	**93**
			(OP: SP3ASN)		
SP9BGL	*	68,997	533	19	90
SP3BQ	**1.8**	**268,499**	**1454**	**27**	**94**
SN7Q	*	**260,064**	**1435**	**27**	**102**
SP9DWT	*	16,112	145	15	61
***SQ9E**	**A**	**722,552**	**1398**	**75**	**287**
***SP3LWP**	*	**685,156**	**1162**	**81**	**313**
***SP4JCQ**	*	**518,384**	**1306**	**85**	**273**
*HF6ØKAB	*	455,682	869	74	272
			(OP: SP5ATO)		
*SN5G	*	414,225	1013	79	236
			(OP: SP5JTF)		
*SN9U	*	343,018	604	80	254
			(OP: SP9UMJ)		
*SP6LV	*	331,100	827	63	238
*SP3DOF	*	260,485	593	67	228
*SP2IU	*	235,620	600	61	194
*SP2IKP	*	214,008	535	63	233
*SP3HC	*	208,886	595	54	185
*SP7JOA	*	179,280	467	58	182
*SP8EEX	*	144,372	417	49	163
*SP3DSC	*	141,934	449	52	154
*SQ9BDN	*	141,570	427	53	181
*SP3IOE	*	140,585	423	64	185
*SP9FT	*	129,376	321	59	149
*SP9LAS	*	128,772	345	58	194
*SP1DPA	*	127,224	307	54	162
*3Z8Z	*	117,888	327	57	135
*SP7FBQ	*	116,522	404	52	151
*SP9CV	*	106,296	458	50	156
*SP6EKS	*	105,542	367	53	173
*SP9GKM	*	94,317	498	31	118
*SP2HXY	*	90,216	349	36	143
*SP9CTW	*	89,232	216	55	153
*SN6A	*	87,450	324	43	122
			(OP: SP6CES)		
*SP5MBA	*	82,386	295	44	155
*SP1MHZ	*	77,844	279	39	117
*SP2IW	*	69,874	270	58	159
*SP5CJQ	*	67,760	345	41	135
*SP8LNE	*	58,968	308	36	120
*SO6I	*	52,731	282	48	141
*SP2DKI	*	52,128	311	27	117
*SP6BEN	*	44,536	127	46	106
*SP5ELW	*	44,115	173	50	123
*SO9R	*	42,775	208	38	107
*SP2MHC	*	35,190	244	26	89
*SP1DTG	*	26,845	105	34	57
*SP4TKO	*	25,414	204	26	71
*SQ8LEC	*	25,149	195	24	77
*SP7BDS	*	15,423	159	20	77
*SP8HDP	*	13,600	106	25	60
*SP2HFH	*	10,795	133	21	64
*SP3MEP	*	9,450	112	19	51
*SQ1EUG	*	8,712	105	19	53
*SO9Y	*	8,195	102	16	39
			(OP: SP9BRP)		
*SP7TES	*	7,735	43	28	37
*SP5CQI	*	6,510	58	23	47
*SP9JZU	*	3,942	53	13	41
*SP9IHP	*	3,640	38	21	31
*SP7TEX	*	3,312	61	13	35
*SP8BWE	*	2,728	124	22	66
*SP7EXJ	*	2,378	23	18	23
*SP4IRS	*	828	39	5	18
*SP7CXV	*	702	29	5	21
*SP6BSL	*	627	11	9	10
*SP9OEM	*	396	11	7	11
***SP4DC**	**28**	**486**	**12**	**8**	**10**
***SP2AVE**	**21**	**45,279**	**209**	**27**	**90**
*SP2EXN	*	33,855	160	26	85
*SP5ENG	*	4,368	67	19	37
***SP2HPD**	**14**	**128,640**	**530**	**28**	**100**
*SN9N	*	73,248	375	26	70
			(OP: SQ9ZM)		
*SP3JUN	*	64,190	330	23	75
*SP2AYC	*	61,560	323	27	81
*SP2JLR	*	59,170	328	24	73
*SP9RI	*	47,396	309	18	64
*SP9DUX	*	39,100	231	23	62
*SP2UKB	*	36,188	204	17	66
*SP8BAB	*	28,008	194	19	53
*SP3AZO	*	18,970	152	17	53
*SQ8JLU	*	15,080	144	13	39
*SP4BOS	*	12,495	165	11	40
*SP2AEK	*	9,750	173	18	60
*SP6XP	*	2,992	46	13	21
*SP4AAZ	*	1,590	36	8	22
*SN9K	*	145	11	3	2
***SN3X**	**7**	**214,720**	**1060**	**35**	**125**
***SP6OJE**	*	**196,544**	**937**	**31**	**117**
*SP5CNA	*	119,966	560	32	122
*SP5XO	*	57,112	343	22	96
*SP9JOA	*	50,076	287	21	86
*SP5CGN	*	33,405	311	16	69
*SP9EML	*	9,750	93	16	49
*SP8LZC	*	7,205	84	13	42
*SP5NN	*	1,216	88	5	33
*SP9GPW	*	1,025	22	10	15
*SP9IKN	*	608	22	7	12
***SP8BVN**	**3.5**	**44,590**	**601**	**10**	**55**
*SP3CYY	*	43,617	351	17	76
*SP2PUT	*	43,200	504	13	59
			(OP: SQ2GXO)		
*3Z3ØP	*	39,772	629	10	51
			(OP: SP3DIK)		
*SP9DTH	*	27,450	500	10	47
*SP3FLQ	*	8,480	177	9	44
*SP5MNJ	*	3,400	41	10	30
***SQ1K**	**1.8**	**43,200**	**591**	**12**	**60**
***SN5J**	*	**26,599**	**349**	**9**	**58**
			(OP: SP5JXK)		
*SP4GL	*	10,452	224	7	45
*SP5CJY	*	7,755	144	9	46
*SP3MGM	*	6,160	166	6	38
*SN2M	*	3,572	89	7	31
			(OP: SP2XF)		
*SN2N	*	1,247	46	6	23

Portugal

CT8T	**14**	**984,370**	**3095**	**38**	**135**
			(OP: OH1NOA)		
***CT6A**	**A**	**4,987,632**	**4205**	**128**	**496**
			(OP: CT1ILT)		
***CT1BNW**	**14**	**13,462**	**120**	**13**	**40**
*CT4DX	*	1,908	40	14	39

Romania

YO9W	**A**	**4,032,425**	**4046**	**141**	**481**
			(OP: YO9GZU)		
YO6BHN	*	**1,061,286**	**1496**	**109**	**365**
YO7BGA	*	296,577	718	63	216
YO7ARY	*	168,370	653	54	172
YO5BBO	*	158,720	549	64	192
YO7LGI	**7**	**62,944**	**360**	**22**	**90**
YO5AJR	**1.8**	**33,552**	**451**	**11**	**61**
***YO3FRI**	**A**	**1,031,800**	**1238**	**118**	**418**
***YO9OC**	*	**510,840**	**1038**	**79**	**251**
*YO4CAH	*	342,512	707	64	220
*YO9FNP	*	299,663	956	53	206
*YO8KVS	*	259,623	705	69	204
*YO4KCC	*	250,614	730	67	206
*YO5DAS	*	233,640	707	49	187
*YO8RFS	*	204,820	670	60	206
*YO2QY	*	175,492	384	75	217
*YO7NW	*	134,387	408	53	156
*YO6MT	*	117,997	535	37	150
*YO3CVG	*	94,350	310	46	176
*YO8BPY	*	78,692	307	45	146
*YO4SI	*	65,872	246	52	127
*YO9IF	*	60,552	309	43	131
*YO2MAX	*	58,078	197	42	100
*YO6UO	*	49,572	281	43	119
*YO5TP	*	44,814	220	46	108
*YO6CFB	*	30,552	157	36	78
*YO4ASG	*	23,400	128	38	79
*YO7LTQ	*	5,280	45	15	32
*YO7LYM	*	4,658	45	15	32
*YO5OYR	*	972	11	9	11
***YO5ALI**	**28**	**1,050**	**21**	**9**	**16**
*YO5CRQ	*	216	8	6	6
*YO2AOB	*	147	19	7	14
***YO9AGI**	**21**	**25,915**	**180**	**20**	**51**
*YO5OED	*	13,266	98	22	45
***YO3BL**	**14**	**47,000**	**291**	**24**	**76**
*YO9CWY	*	42,660	313	18	61
*YO7BGB	*	7,200	160	8	37
*YO6KNY	*	4,536	56	15	21
*YO8DHD	*	2,376	88	8	28
***YO5KDX**	**7**	**227,694**	**1359**	**28**	**109**
			(OP: YO5OAG)		
*YO2LEA	*	49,840	335	22	90
*YO2ARV	*	47,380	318	24	91
*YO9FBB	*	23,268	189	18	66
*YO3BBW	*	3,956	67	8	38
***YO9FYP**	**3.5**	**6,800**	**134**	**7**	**43**
***YO2IS**	**1.8**	**6,076**	**135**	**6**	**43**
*YO4AUL	*	6,016	134	7	40
*YO6ADW	*	1,710	53	4	26

Sardinia

ISØN	**7**	**882,266**	**2671**	**38**	**149**
			(OP: OL5Y)		
***ISØ/K7QB**	**A**	**1,347,777**	**2041**	**91**	**300**
*ISØOMH	*	67,360	251	48	112
*ISØILP	*	6,048	125	25	59
***ISØ/OLØA**	**21**	**153,912**	**695**	**29**	**103**
			(OP: OK1CZ)		
***ISØ/DK8FD**	**14**	**161,816**	**951**	**22**	**91**
*ISØSDX	*	78,408	443	24	75
*ISØMYN	*	8,046	96	15	39
*ISØUWX	*	2,666	73	9	34
***ISØRDY**	**7**	**44,847**	**260**	**18**	**81**
*ISØXDA	3.5	3,306	79	5	33

Scotland

GM7V	**A**	**2,539,832**	**3426**	**111**	**361**
GM3WUX	*	**844,536**	**2060**	**66**	**242**
GM3W	*	596,960	1567	60	220
			(OP: GM3JKS)		
GMØGAV	*	287,278	691	63	176
***GMØNBM**	**A**	**132,164**	**484**	**40**	**148**
*GM4SID	*	29,832	171	27	86
*MMØRKT	*	21,032	183	19	69
*GM6NX	*	16,016	125	23	65
***GMØIIO**	**14**	**111,825**	**699**	**21**	**84**
*GMØOGN	*	59,682	345	18	69
*GM3YS	*	33,284	329	15	38
			(OP: GM4OSS)		
*MMØDHQ	*	7,585	113	8	33

Serbia

YT7R	**A**	**1,317,792**	**1851**	**103**	**321**
YU1JF	*	181,260	397	67	161
YU2A	**28**	**18,450**	**268**	**15**	**60**
YT9X	**21**	**371,112**	**1040**	**38**	**150**
			(OP: YU1ZZ)		
YU1OJ	*	359,595	997	38	145
YT7Z	*	198,706	627	35	111
			(OP:YU7SK)		
YT5G	**14**	**755,790**	**2374**	**38**	**139**
YT3M	*	**659,582**	**2137**	**37**	**125**
			(OP: YT1NP)		
YU1KT	**7**	**124,800**	**827**	**24**	**96**
YT3A	**3.5**	**521,420**	**2157**	**34**	**121**
YU1KR	*	299,264	1684	28	100
YT1VP	*	251,640	1477	31	104
YU1WS	*	212,496	1464	29	85
YT6ØW	*	170,937	1170	26	91
			(OP: YU7AU)		
YU1TT	*	86,344	1088	17	69
YT2AA	*	66,040	491	21	83
4N7ZZ	**1.8**	**32,824**	**358**	**18**	**70**
***YT2RX**	**A**	**1,476,096**	**1760**	**112**	**400**
*YU1CC	*	108,953	420	47	174
*YU1JW	*	87,622	448	51	142
*YU1ED	*	27,348	119	36	70
*YU7FN	*	17,010	126	25	65
*YT1YV	*	15,833	113	19	52
*YT2PFR	*	1,530	57	7	27
***YT5C**	**21**	**194,552**	**555**	**35**	**131**
			(OP: YU7WW)		
***YU7BJ**	**14**	**128,270**	**633**	**32**	**82**
*YT1B	*	6,464	179	19	45
			(OP: YU1ADO)		
*YU1NSK	*	4,726	89	8	26
***YT1BX**	**7**	**26,625**	**252**	**15**	**60**
***YU7WWW**	*	**25,800**	**213**	**18**	**68**
*YT1NN	*	7,755	120	12	43
***YT8T**	**3.5**	**139,480**	**1079**	**25**	**85**
*YU5T	*	52,644	576	13	69
			(OP: YU1JU)		
***YT1AA**	**1.8**	**30,576**	**339**	**11**	**67**

Shetland Islands

MSØZCG	21	1,023	30	9	22
			(OP: MMØXAU)		
MZ8A	**14**	**71,148**	**512**	**21**	**63**
			(OP: MMØXAU)		
MMØXAU	**7**	**9,880**	**172**	**10**	**42**
MZ5B	**3.5**	**257,546**	**1536**	**23**	**108**
			(OP: G3WVG)		
MM5PSL	**1.8**	**2,080**	**88**	**8**	**34**
*MZ5A	28	70	7	2	5
			(OP: GW4BLE)		

Sicily

IT9ZAU	**A**	**319,488**	**1329**	**50**	**158**
***IT9LKX**	**A**	**49,926**	**273**	**41**	**116**
***IT9IZY**	**28**	**342**	**50**	**5**	**14**
***IT9RKR**	**21**	**8,415**	**97**	**15**	**40**
***IT9ESW**	**14**	**23,760**	**304**	**27**	**61**
*IW9HLM	*	286	8	6	7

Slovakia

OM7CA	**A**	**298,792**	**421**	**86**	**252**
OM3DX	**28**	**5,885**	**74**	**12**	**43**
OM3RRC	**3.5**	**173,013**	**1386**	**21**	**80**
			(OP: OM4TQ)		
***OM5XX**	**A**	**2,387,938**	**2281**	**146**	**461**
***OM5CD**	*	**1,697,688**	**1663**	**126**	**486**
*OM7AG	*	531,454	1226	65	254
*OM7OM	*	457,373	1122	51	242
*OM3FZ	*	429,951	807	83	278
*OM8AQ	*	391,389

*EA4CRP	*	34,800	166	32	88	SM2JEB	*	36,186	249	20	54	UR2VA	*	312,998	577	70	213	*UY5ZI	*	122,664	318	57	171	*UY7LM	*	14,162	257	14	59
*EA4MA	*	33,945	110	47	108	**SM5CIL**	**7**	**44,946**	**304**	**21**	**78**	UY2UQ	*	281,478	747	57	209	*UR5LO	*	106,722	291	70	172	*UT2QQ	*	7,440	102	15	45
*EA4AYD	*	33,372	177	28	75				**(OP: SM7CIL)**			UX2MF	*	223,104	382	94	242	*UX3IO	*	99,093	192	72	129	***US5XD**	**3.5**	**79,700**	**715**	**28**	**80**
*EA1DIW	*	32,116	186	38	110	**SM5W**	**1.8**	**54,999**	**565**	**17**	**64**	UT0RM	*	133,056	445	58	134	*UR5AW	*	81,940	344	35	135	*UT5KD	*	42,112	586	11	53
*EA7CA	*	30,184	156	33	65	***SM6NET**	**A**	**128,115**	**417**	**46**	**173**	UR4EI	*	68,796	333	33	123	*UT5IZ	*	72,141	360	39	134	*US2WU	*	41,904	493	17	80
*EB3CML	*	28,440	170	34	86	***SM7BJW**	*	**119,133**	**371**	**45**	**138**	UR7VA	*	64,010	156	60	113	*UT2LU	*	71,760	370	38	146	*UR5IHQ	*	23,994	331	10	52
*EA1CBX	*	18,190	159	27	80	*SF3E	*	108,049	494	37	130	UY5QO	*	59,595	163	48	97	*US8MX	*	70,380	282	44	136	*UT5DJ	*	20,679	325	9	52
*EC7AKV	*	18,090	117	32	58				(OP: SM3EAE)			UR5HAC	*	55,200	170	56	104	*UT5UQN	*	66,960	303	47	139	*UT5KTT	*	17,922	267	9	49
*EA1CGK	*	14,805	82	33	72	*SM7EH	*	101,600	417	42	158	UT2M	*	52,059	146	75	126	*UX8IW	*	65,764	327	32	132	*UR5IKN	*	14,824	152	13	55
*EB2CYQ	*	13,272	99	27	57	*SM2KAL	*	98,235	363	39	146	UU4J	*	10,611	105	19	62	*UT8EL	*	64,620	315	41	139	*UR8IDX	*	13,629	128	13	64
*EA1AUS	*	10,507	57	27	52	*SM3RL	*	63,756	281	39	122				(OP: UU4JO)			*US0KW	*	59,189	174	47	110	***UT8IT**	**1.8**	**33,225**	**354**	**12**	**63**
*EA7EYQ	*	6,728	60	21	37	*SMØBDS	*	43,885	253	30	101	US7VL	*	5,880	38	24	36	*UU5JKY	*	56,033	294	32	105						
*EC2ADT	*	4,620	58	16	39	*SE6C	*	38,041	244	28	81	UT4PZ	*	4,420	31	24	28	*UR5EIT	*	54,560	196	47	129			**Wales**			
*EA3AXM	*	4,514	43	22	39				(OP: SM6CDN)			**UW1M**	**14**	**262,405**	**984**	**36**	**107**	*UT3UV	*	54,054	314	32	122	**GW3JXN**	**A**	**262,704**	**768**	**54**	**154**
*EA1FCH	*	3,888	56	13	35	*SM7YIN	*	35,483	194	37	100							(OP: UR5MW)		*UW1I	*	52,728	274	37	132	GW3NJW	*	183,600	610	52	164
*EA1CRL	*	3,774	57	17	34	*SI7T	*	24,075	196	21	86	US7IID	*	70,224	323	30	84						(OP: US6IMA)	**GW8GT**	**14**	**588,756**	**1853**	**37**	**135**
*EA4BNQ	*	3,403	48	17	24				(OP: SM7LZQ)			UR8QR	*	37,920	288	18	62	*UT4EU	*	50,213	283	31	118					(OP: GW3YDX)	
*EA5GIE	*	2,992	45	16	28	*SM7CWI	*	23,999	124	32	71	UX4LA	*	8,100	133	7	43	*UT1IF	*	48,821	126	54	104	**GW7X**	**3.5**	**276,120**	**1681**	**23**	**94**
*EA5FQZ	*	2,907	49	17	40	*SM7BVO	*	16,352	110	22	51	**UT7QF**	**7**	**740,684**	**2233**	**38**	**158**	*UT7HM	*	47,885	191	46	111					(OP: GW3SQX)	
*EA4WD	*	1,984	91	16	48	*SM3JUR	*	10,384	144	20	68	UX3MZ	*	584,188	2079	37	150	*UX1RX	*	47,120	251	38	114	**GW8IZR**	**1.8**	**21,546**	**257**	**12**	**51**
*EA3KN	*	1,064	24	14	24	*SM5BJT	*	585	57	15	30	UU5WW	*	583,038	2161	36	147	*UT3IB	*	45,760	150	45	131	***GW3KDB**	**A**	**526,932**	**934**	**76**	**293**
*EA1EVR	*	702	19	9	17	*SMØCVI	*	0	16	9	13	UR5WMM	*	189,656	787	31	120	*UR5TGK	*	44,400	198	31	89	*MWØYDX	*	56,980	269	35	113
***EA2BOV**	**21**	**42,484**	**309**	**22**	**64**	***SMØQ**	**14**	**54,096**	**459**	**16**	**68**	UT4ZG	*	130,200	494	33	122	*US5IVD	*	42,778	188	36	110	*GB6GW	*	39,520	195	34	96
*EA7GYS	*	18,286	153	24	58				**(OP: SMØOGQ)**			UT5ECZ	*	37,620	245	21	74	*UR2MO	*	40,424	142	43	120					(OP: GW4HBK)	
***EA7TN**	**14**	**442,776**	**1605**	**32**	**129**	*SM3AF	*	2,183	66	11	26	UT5SA	*	30,400	269	20	80	*UX3IA	*	39,712	122	51	95	*MWØCWJ	*	35,750	179	30	95
***EA5/UT2XD**	*	**256,278**	**1395**	**30**	**91**	*SC3ØØVL	*	24	8	4	8	US0MM	*	25,428	294	19	59	*UXØUW	*	38,646	220	34	80	*GW3INW	*	14,276	185	19	67
*EA2IF	*	148,924	620	28	96				(OP: 8S6T)			UY2ZZ	*	11,492	125	15	53	*URØIQ	*	36,750	170	49	98	*GW4EVX	*	7,770	94	20	54
*AD7KJ	*	112,035	750	23	82	***8S6A**	**3.5**	**17,034**	**383**	**8**	**43**	**UT2II**	**3.5**	**241,529**	**1557**	**30**	**119**	*US7LM	*	36,000	233	24	66						
*EA3FAR	*	19,034	206	14	48				(OP: SM6DPF)			**UW5U**	*	**229,628**	**1398**	**28**	**101**	*UXØZL	*	35,478	193	34	112			**OCEANIA**			
*EA4CWN	*	15,720	186	11	29	*SM7ATL	*	9,246	208	7	39				**(OP: UY2UA)**			*US5NQ	*	31,785	506	9	56						
*EA4BF	*	3,645	55	4	23	*SMØJ	*	6,486	136	7	40	UZ7U	*	184,785	1144	27	100	*US7QQ	*	30,627	111	34	89			**Australia**			
*EA3FHP	*	110	10	4	7				(OP: SMØQZH)						(OP: UT3UA)			*US2YW	*	28,700	211	35	105	**VK2NU**	**A**	**1,392,112**	**1515**	**98**	**236**
***AN3N**	**7**	**61,085**	**416**	**19**	**76**	***SM5MX**	**1.8**	**36,381**	**521**	**9**	**58**	UT1IR	*	139,568	949	26	96	*UT5UKY	*	27,594	156	36	90	VK3TDX	*	277,488	588	67	121
			(OP: EA3DU)			*SM6C	*	8,322	122	10	47	UT8IM	*	137,529	981	24	87	*US1IV	*	24,038	121	32	87					(OP: NF6V)	
*EA4DRV	*	27,389	250	15	46							UR7QC	*	97,300	789	22	78	*UR5WX	*	20,203	172	21	68	VK7GN	*	111,996	276	55	98
*EA2CCJ	*	5,664	90	11	37				**Switzerland**			UT7DK	*	66,123	790	15	64	*UU2JG	*	9,912	54	36	48	VK3FM	*	53,392	189	56	86
*EA7OR	*	5,096	169	13	43	**HB9LCW**	**A**	**476,403**	**634**	**105**	**314**	UR8QM	*	10,608	189	10	41	*UY3AW	*	8,892	107	15	63	***VK4XY**	**A**	**283,402**	**532**	**80**	**137**
***EA7RM**	**3.5**	**150,282**	**995**	**16**	**83**	HB9CIC	*	367,232	947	67	235	**UV5U**	**1.8**	**76,446**	**694**	**17**	**76**	*US3QQ	*	4,472	32	26	26	***VK4TT**	*	**245,000**	**532**	**57**	**118**
*EA7NW	*	34,839	298	12	67	HB9AZZ	*	282,564	447	83	251				**(OP: UX1UA)**			*UT2VU	*	2,881	29	18	25	*VK2BJ	*	148,304	314	70	114
*EA2SW	1.8	1,120	43	4	24	HB9CQL	*	171,351	514	55	186	**UYØZG**	*	**75,764**	**661**	**16**	**78**	*US4IXT	*	2,728	34	15	29	*VK2GR	*	107,387	295	64	97
		Sweden				HB9CZF	*	141,688	442	45	133	UT3N	*	14,617	295	6	41				(OP: UR5IHQ)			*VK6HG	*	87,318	215	55	99
						HB9AUS	*	88,382	195	55	159				(OP: UT3NK)			*UY2RZ	*	2,088	44	9	27	*VK3TZ	*	37,406	140	48	70
SM7YEA	**A**	**682,184**	**1462**	**71**	**246**	**HB9CPS**	**21**	**11,092**	**112**	**16**	**43**	US7IA	*	12,792	198	8	44	***UT5PW**	**21**	**41,104**	**175**	**28**	**84**	*VK2PN	*	14,520	133	26	29
SM5Q	*	**573,674**	**928**	**82**	**291**	*HB9ARF	**A**	**587,334**	**939**	**80**	**283**	UT2IW	*	11,346	124	10	51	*UR5IPD	*	13,986	118	16	58						
SE6Y	*	477,090	1008	68	274	*HB9BXE	*	301,794	832	67	214	***UW8SM**	**A**	**758,368**	**1178**	**98**	**318**	*UX5EF	*	9,116	88	17	36			**Cocos-Keeling**			
SM5QU	*	240,672	608	65	211	*HB9DCM	*	255,248	447	83	218	***UR7EQ**	"	**666,783**	**1292**	**77**	**292**	*UX7UN	*	8,881	139	24	59	**VK9AA**	**A**	**5,551,728**	**3398**	**137**	**437**
SM5AOG	*	198,376	431	59	215	*HB9BGF	*	1,927	31	16	31	***US0SY**	"	**609,750**	**982**	**85**	**290**	*UY5QZ	*	6,612	56	20	38					**(OP: VK2IA)**	
SM7C	*	146,642	497	51	176	***HB9EHQ**	**7**	**93,600**	**613**	**22**	**98**	*UR7GO	*	535,600	937	103	297	*UT5CY	*	3,660	83	16	44						
			(OP: SM7CFZ)									*US3IZ	*	324,260	897	65	245	***UR6QS**	**14**	**94,656**	**438**	**27**	**89**			**East Malaysia**			
SM7E	*	127,218	410	52	181				**Ukraine**			*URØQX	*	270,368	614	65	219	*UX7QD	*	72,036	533	22	70	**9M6XRO**	**A**	**1,899,686**	**1768**	**108**	**274**
			(OP: SM7BHM)			**UU7J**	**A**	**4,815,774**	**4175**	**167**	**562**	*UT2IO	*	256,669	733	51	208	*UY5LQ	*	71,864	462	25	79	**9M8YY**	**14**	**517,300**	**1303**	**34**	**105**
SM3Q	*	125,304	463	47	180				**(OP:UUØJM)**			*US3IUK	*	256,300	722	56	219	*UT5ZY	*	30,555	223	22	75					**(OP: JR3WXA)**	
			(OP: SM3BFH)			**UT5UGR**	*	**2,764,480**	**2767**	**141**	**511**	*UY2RA	*	234,220	680	51	194	*UT1PO	*	29,337	290	17	60	***9M6AAC**	**A**	**618,280**	**934**	**84**	**176**
SM7BZV	*	87,912	388	53	163	**UR7EU**	*	**1,258,232**	**1844**	**106**	**355**	*UY5TE	*	233,662	698	52	195	*UR5EU	*	26,163	214	17	64					**(OP: N1UR)**	
SM3X	*	56,700	210	43	119	UT2UB	*	911,872	1212	118	394	*UT3UZ	*	229,414	556	56	195	*UY5YA	*	22,000	211	17	63	*9M6YBG	*	124,080	381	48	72
			(OP: SM3CVM)			UT4EK	*	901,320	1314	92	352	*UU2JA	*	204,756	397	65	237	*UT5EO	*	16,016	203	19	58						
SM6BGG	*	33,904	199	43	120	UU7JM	*	813,384	1130	104	370	*UT5UN	*	201,690	538	61	182	*UT1UW	*	4,582	69	8	21			**French Polynesia**			
7S6R	*	11,972	95	25	48	UR3IQO	*	692,070	992	93	298	*UR7HCX	*	201,592	773	46	180	***UT8EU**	**7**	**176,094**	**741**	**34**	**128**	***FO5RU**	**A**	**160,664**	**523**	**59**	**74**
SMØKV	**21**	**10,220**	**97**	**18**	**52**	UU5JIB	*	682,998	1174	92	310	*UT4EN	*	151,866	576	46	152	*US0HZ	*	126,291	729	25	104					**(OP: F5IRO)**	
SLØW	**14**	**149,641**	**538**	**32**	**119**	UR8RF	*	499,800	991	80	260	*US4LGF	*	148,580	479	54	176	*UX7UA	*	63,612	461	23	85			**Guam**			
			(OP: SMØAJU)			UR7QM	*	489,195	1049	73	242	*UX8IR	*	135,072	424	50	174	*UT4NW	*	37,151	258	19	78	**KG6DX**	**A**	**3,078,600**	**2668**	**136**	**284**
SM2CVH	*	37,401	188	17	74	UXØLL	*	340,360	642	90	245	*UR5XMM	*	127,766	419	52	141												

*WH2D	A	434,948	794	74	120	(OP: K3UOC)
*KH2/KI3DNN	*	11,165	141	15	14	
Hawaii						
KH6YR	A	3,599,360	4089	126	194	(OP: K1YR)
AH7C	*	2,871,149	3313	116	197	
KH7Y	21	478,084	1870	28	66	
KH7B	3.5	321,636	1155	31	67	(OP: K4XS)
*KH6/NØCO	A	78,980	300	49	61	
Indonesia						
YB3JZ	14	58,401	382	22	41	
*YC1KAF	A	475,692	918	50	146	
*YBØDPO	*	380,799	535	82	179	
*YE1AA	21	24,525	126	24	51	
*YBØZDA	*	20,435	123	16	51	(OP: YCØLWX)
*YC2UTX	*	18,836	131	21	47	
*YD1HUH	*	16,704	119	23	49	
*YBØWWW	14	3,680	50	11	21	
*YBØECT	*	2,163	42	9	12	
*YD3KWR	7	26,163	189	18	39	
*YC2BG	*	2,120	45	15	25	
*YC2MXV	3.5	12,663	100	19	44	
*YC2WWW	*	9,728	90	20	44	
Mariana Islands						
*WHØS	A	124,660	479	42	73	
New Caledonia						
*TX3SAM	A	154,896	547	42	70	(OP: FK8DD)
New Zealand						
ZL1BHQ	7	20,088	169	19	43	
ZM1K	3.5	70,917	376	23	54	(OP: ZL1AIH)
*ZL4JB	A	3,864	54	20	22	
*ZL3TE	21	62,222	425	23	30	(OP: W3SE)
*ZL/VK4BAA	*	28,215	249	19	26	
*ZL4LW	7	293,760	790	33	102	
Palau						
T88RJ	A	2,339,260	2782	96	214	(OP: JJ1RJR)
T88WV	*	1,407,045	1799	100	185	(OP: OH7WV)
Philippines						
DU3NXE	A	302,872	832	60	71	
Tonga						
*A35RK	21	234,960	955	29	59	
*A35MT	3.5	28,538	310	16	22	(OP: LY1F)

SOUTH AMERICA

Argentina						
LU1HF	28	198,275	720	24	79	
LS1D	21	1,194,638	2680	34	124	(OP: LW9EOC)
LU7HN	*	1,060,663	2294	35	138	
LW4DYI	3.5	26,068	129	23	53	
LU6QI	1.8	154	8	5	6	
*LU7EE	A	795,000	997	93	207	
*LW1E	*	649,950	1084	79	131	(OP: LU1EWL)
*LW5EE	*	460,814	788	70	156	
*LU5YF	*	62,156	187	65	99	
*LU/DC2IP	*	7,040	59	30	34	
*LU6FEH	*	320	15	10	10	
*LW6DW	28	21,840	157	20	36	
*LU2FLN	21	84,745	466	22	63	
*LU4MHQ	7	59,897	271	25	64	
Aruba						
P4ØW	A	10,673,421	6106	135	492	(OP: W2GD)
P43JB	*	1,244,497	1338	95	272	
P4ØY	7	1,411,840	3191	34	126	(OP: AE6Y)
Brazil						
PY2NY	A	3,541,344	2886	118	326	
PP1CZ	*	1,372,686	1849	82	212	
PY5BLG	*	222,288	1263	63	113	
PY2KP	*	120,745	251	70	135	
PV8AA	*	5,564	82	12	14	
PY2NFE	*	1,935	48	20	25	
PP5KR	28	858	23	14	12	
ZX5J	21	1,384,497	3114	34	119	(OP: AI6V)
PP5BZ	14	128,029	491	29	84	
PY3AU	*	86,815	329	25	72	
PV8DX	3.5	122,728	499	21	71	
PP5JR	*	81,370	314	24	79	
PY7ZY	1.8	726	26	8	14	
PY3PR	*	4	3	2	2	
*PY1DX	A	202,270	459	74	152	
*PR2A	*	104,746	291	52	114	(OP: PY2OE)
*PR7HR	*	100,422	339	47	79	
*PY3DX	*	63,099	212	38	85	
*PY3CAL	*	13,123	66	32	39	
*PP7LL	*	11,392	67	20	26	
*PY4PW	*	7,738	72	24	49	
*PY3SB	*	6,600	69	26	29	
*PT8CWA	*	3,808	51	20	36	
*PP5JY	*	2,046	57	23	39	
*PY1CMT	*	1,320	51	21	23	
*PY3UA	*	520	59	19	33	
*PU2MTS	28	19,278	157	18	33	
*PY2SRB	*	8,112	68	20	32	
*PY2NA	21	397,600	1016	31	111	
*PY4CEL	*	35,052	210	20	49	
*PY4FQ	*	13,736	80	24	44	
*PY1NB	7	83,950	413	21	52	
*PY7QJ	*	22,436	114	19	60	

*PP5DA	*	495	19	5	4	
*PR7AR	3.5	36,515	291	15	52	
*PU8TFA	1.8	16	2	2	2	
Chile						
3G1X	7	416,745	1223	33	114	(OP: XQ1IDM)
*XR3A	21	257,982	882	26	88	(OP: CE3DNP)
Colombia						
HK3O	A	736,376	955	96	236	
HK6K	*	157,552	421	56	116	
HK3Q	*	72,540	196	56	130	
HK3J	*	17,808	103	27	57	
*HK1AR	A	6,913,397	4439	130	421	(OP: RA3CO)
*HK1AA	*	89,010	394	31	59	
*HK7/VK6DXI	7	211,998	861	20	69	
*HK3WPC	*	741	27	8	11	
Paraguay						
ZPØR	21	972,332	2138	33	125	(OP: IK1PMR)
*ZP9EH	A	68,256	198	61	97	
*ZP6/IK1PMR	7	5,950	60	14	21	
Peru						
OA4WW	A	5,702,269	3988	140	383	
OA4SS	14	568,540	1611	30	94	
*OA4DJW	A	51,156	179	56	91	
Suriname						
PZ5X	A	2,832,285	2820	91	292	(OP: K5UN)
Trinidad & Tobago						
9Y4AA	7	1,674,456	3525	35	133	(OP: N6TJ)
Uruguay						
CW6V	7	984,872	2068	38	134	(OP: CX6VM)
Venezuela						
YW4D	A	6,290,040	3591	143	493	(OP: YV1DIG)
*YW7A	A	128,110	497	69	161	(OP: YV7QP)
*YV5NWG	*	59,508	137	62	112	
*YV1FM	14	14,952	167	18	38	
QRP						
6V7D	A	2,602,192	2208	95	317	(OP: K1XM)
FY5FY	*	2,033,714	1961	95	284	
K8CC	*	973,588	835	103	333	(OP: KK8I)
OK7CM	*	777,362	1242	87	307	
KR2Q	*	692,982	708	82	287	
OM7DX	*	608,190	967	105	313	
OL4W	*	511,368	1242	58	240	(OP: OK1IF)
US2IZ	*	429,351	1048	60	243	
HA6IAM	*	411,201	894	66	255	
JR4DAH	*	401,250	681	86	164	
YO3APJ	*	350,030	865	58	232	
DF1DX	*	342,608	795	58	208	
N1TM	*	295,293	447	61	196	
OK1JOC	*	293,440	833	51	211	
W6JTI	*	288,024	427	85	179	
RA9SC	*	277,512	504	61	187	
UA6LCJ	*	269,010	659	59	235	
VE3RSA	*	264,972	520	49	164	
SS9D	*	263,384	674	73	255	
G3YMC	*	239,000	775	44	206	
SP5DDJ	*	217,490	595	58	181	
JA1NLX	*	206,460	462	68	117	
SP9RQH	*	193,116	521	58	170	
UYØMM	*	179,256	362	76	215	
OZ7BQ	*	177,285	547	43	180	
G4OBW	*	173,231	594	42	169	
SM6EQO	*	160,965	561	39	180	
LZ2LE	*	156,876	541	46	174	
UX8ZA	*	151,620	494	55	173	
RW6FO	*	148,304	532	42	166	
AA1CA	*	147,180	286	65	158	
RW3AI	*	145,406	524	44	174	
AO7AAW	*	137,566	456	37	132	
SP5AKG	*	137,350	487	41	164	
IØZUT	*	136,912	485	56	143	
RX1CQ	*	131,100	466	53	177	
K8ZT	*	128,896	274	65	147	
ZF2AH	*	128,064	799	39	57	
KT8K	*	120,288	282	49	130	
YP8A	*	118,494	348	65	162	(OP: YO8WW)
VA3SB	*	100,513	264	51	122	
VE1AI	*	98,982	276	48	114	
YO4AAC	*	97,350	424	41	136	
NU4B	*	97,194	199	55	139	
HB9DAX	*	94,468	529	44	165	
LZ1MG	*	92,480	280	44	152	
SM6CRM	*	81,375	315	37	138	
HB9AYZ	*	79,344	396	31	113	
YU2M	*	71,340	334	36	109	
UA3FY	*	70,470	314	37	125	
KIØG/S	*	69,102	224	68	130	
EI8FH	*	66,901	316	33	116	
SP9AJM	*	62,400	307	37	119	
N6WG	*	61,500	214	49	76	
JA5DIM	*	60,360	213	46	74	
VE3CW	*	59,776	227	44	84	
K4ORD	*	56,684	150	46	102	
EW1NA	*	51,208	216	37	111	
DHØJAE	*	50,666	246	39	115	
RK4FB	*	50,552	298	25	117	
W9LHG	*	45,752	174	45	88	
NDØC	*	41,600	147	42	88	
VE3QDR	*	40,152	357	28	56	
HA7AVU	*	39,184	246	32	92	
GM4HQF	*	38,025	229	24	93	
EA1GT	*	32,373	233	31	78	
OK4MM	*	31,635	161	30	81	
UT5UUV	*	31,270	256	23	95	
RN3AU	*	30,411	197	29	80	
LUØEHR	*	30,081	120	51	60	
RA3XCW	*	29,800	140	37	112	

JK1TCV	*	29,744	114	46	58	
DL4EAX	*	29,524	193	26	96	
N3HU	*	28,288	118	32	72	
KD4HXT	*	27,913	142	39	64	
OK2BWJ	*	26,208	209	24	88	
OE8NTK	*	26,078	155	29	89	
JD1AHC	*	23,872	334	28	36	
KØCO	*	23,859	105	40	59	
I1COB	*	22,848	172	27	85	
K3WWP	*	21,840	93	24	67	
RV3DBK	*	21,476	226	14	77	
YU2CV	*	21,306	152	26	80	
US8ICM	*	21,090	136	35	79	
G4ILO	*	19,197	173	18	61	
DM1LM	*	19,080	166	24	82	
PA1B	*	18,795	207	22	83	
AI2P	*	18,480	102	40	65	
ON7CC	*	18,200	217	22	78	
RA6DB	*	17,568	140	25	71	
JA1KEB	*	16,796	91	34	40	
NØLY	*	13,832	84	28	63	
DJ5QK	*	13,200	132	21	79	
HR2/LTØE	*	13,416	123	30	48	(OP: LU1DY)
DL6OZ	*	13,188	125	26	58	
RX3ALL	*	12,826	114	29	77	
VE9QRP	*	12,814	71	36	50	
7K1CPT	*	12,636	87	35	43	
F5MPS	*	12,012	127	18	66	
N8XA	*	11,988	71	33	48	
PY4ZO	*	11,929	84	32	47	
YO6AEI	*	11,780	150	25	70	
ON3AD	*	10,738	136	22	69	
YL1ZF	*	10,400	112	19	61	
F5UKL	*	9,900	109	23	43	
YO5OHY	*	9,790	95	17	38	
W4QO	*	9,620	58	29	45	
SP4DZT	*	9,266	49	35	47	
HA5OB	*	8,777	98	19	48	
W3AG	*	8,330	54	29	41	
G8MIA	*	8,134	95	22	61	
VK5MAV	*	7,176	56	31	38	
K6DBG	*	6,944	57	27	35	
AI2T	*	6,832	45	26	35	
EU1UA	*	5,886	85	20	34	
SM6AHU	*	5,742	82	17	49	
N2JNZ	*	5,141	48	20	33	
MØERA	*	5,092	68	17	50	
USØYA	*	4,920	42	18	23	
HS8KGG	*	4,770	51	19	34	
N5IE	*	4,600	36	19	31	
K1EQA/Ø	*	4,290	49	19	20	
DF7IS	*	4,212	65	15	37	
RV3DCZ	*	3,795	69	15	40	
SM5EFX	*	3,608	67	10	31	
NO2D	*	3,536	44	19	33	
W5YA	*	3,332	36	17	17	(OP: KT5X)
SQ9FCH	*	2,736	49	16	32	
W2JEK	*	2,480	26	18	22	
WC7S	*	2,448	46	23	28	
K6MI	*	2,145	36	14	19	
N6JRL	*	2,142	155	43	76	
HB9QA	*	2,040	29	16	24	
AC2N	*	1,386	28	20	22	
SQ9IVD	*	1,144	39	7	19	
DL3BVA	*	968	28	8	14	
ISØ/OK1CZ	*	962	24	9	17	
AA5TB	*	888	25	16	21	
AF9J	*	864	19	12	15	
N5KEV	*	616	35	15	13	
RAØJEP	*	500	22	9	11	
ON4ANE	*	420	43	6	29	
DL2TM	*	336	8	7	7	
RV6LFN	*	300	17	5	15	
EB2FWD	*	253	7	4	5	
OM7JN	*	232	30	9	20	
JA1HII	*	216	8	6	6	
NE1RD	*	140	7	4	6	
AA4Q/7	*	130	4	3	3	
JF2MBF	28	1,600	29	9	16	
UR5ZQV	*	182	8	6	8	
UA6AK	*	42	8	6	7	
SU8HI	21	324,244	1173	26	77	(OP: HA3JB)
YT2B	*	123,861	388	36	123	
CT1AOZ	*	92,672	325	29	99	
OM5NL	*	45,942	221	26	67	
JI1AQY	*	24,495	159	25	46	
JH7RTQ	*	22,849	152	25	48	
IZ8EDL	*	20,383	115	24	55	
SP4GFG	*	16,043	120	15	46	
LU5FZ	*	12,818	99	17	41	
JR1NKN	*	12,656	121	21	35	
VU2LYX	*	12,078	79	19	47	
EW6CU	*	10,615	120	14	41	
WA6FGV	*	10,325	72	19	40	
JL3SBE	*	9,646	86	20	33	
ES1CR	*	8,910	87	16	38	
YD2YTH	*	8,280	80	15	31	
US5VX	*	7,740	53	17	43	
JA1KPF	*	7,110	69	19	26	
JQ6PAQ	*	6,407	79	17	26	
I2IAL	*	5,845	80	12	23	
RV9YW	*	4,114	74	11	23	
SP2FMN	*	2,958	41	11	23	
IK3TZB	*	2,618	48	13	21	
IØUZF	*	2,052	78	12	24	
G4MEM	*	1,344	31	11	17	
SO4HRN	*	928	53	11	18	
OK1AIJ	*	828	34	7	11	
KK9V	*	810	18	11	16	
AB8FJ	*	240	8	5	7	
SM7RPU	*	156	8	5	7	
JK3AHS	*	24	2	2	2	
V73NS	14	292,552	1089	31	73	
EU8RZ	*	170,370	712	28	107	
DL9ZP	*	142,709	594	29	104	
DL1DQY	*	131,670	400	34	120	
JA6GCE	*	131,193	421	33	96	
S52P	*	106,400	541	28	84	
LY4BF	*	92,127	408	31	92	
WA3NKO	*	79,744	257	21	91	
LZ1VB	*	75,710	376	27	86	
I1BAY	*	53,393	373	26	81	
RU2FM	*	51,980	314	19	73	

RU3RM	*	46,545	349	19	68	
G3LHJ	*	44,455	319	17	68	
JA4DQX	*	33,072	200	25	53	
FM5CW	*	31,536	176	15	58	
E21AOY	*	31,400	131	22	46	
UA4WK	*	28,035	229	19	70	
EW6DX	*	25,862	218	16	51	
MØO	*	22,800	257	12	48	(OP: G4JZO)
I4KRF	*	20,234	212	17	50	
DL4HG	*	17,922	165	17	41	
N4PJ	*	15,912	95	19	53	
VU2UR	*	13,317	87	20	49	
K8CN	*	12,393	105	11	40	
W7JI	*	10,218	155	21	57	
DL4DQA	*	8,784	122	11	37	
JRØGFM	*	8,742	87	20	27	
9A8MM	*	5,967	108	9	30	
PAØATG	*	4,730	114	9	34	
RA3XEV	*	3,910	67	8	26	
YO4BII	*	3,096	73	8	28	
ND3D	*	2,904	40	12	21	
JH8DBI	*	1,250	24	11	14	
ER3AU	*	828	29	5	7	
KVØK	*	608	30	15	23	
JA1GTF	*	576	16	8	10	
YO4ATW	*	576	16	7	11	
K6BBQ	*	209	19	6	5	
UA1CEG	*	80	10	2	6	
EA8/OH2BEM	*	6	1	1	1	
YO6EX	7	139,440	783	30	110	
F5LEN	*	129,844	565	27	116	
HAØGK	*	56,306	407	17	77	
RW9LL	*	50,025	270	15	60	
T99T	*	44,863	370	16	75	
YU1LM	*	43,521	410	15	74	
F5UL	*	35,904	352	18	70	
RA9SO	*	32,499	178	16	53	
SP1AEN	*	31,006	377	10	64	
HB9CEY	*	29,988	252	14	70	
SP4JFR	*	26,640	325	12	60	
W5JBV/4	*	17,287	127	15	43	
SP7BCA	*	15,163	274	8	51	
ON5JT	*	12,032	214	12	52	
RA4SMM	*	11,780	153	11	51	
F5MBM	*	9,720	121	11	49	
KO1H	*	8,190	62	19	46	
RA9QCE	*	7,990	114	10	37	
UA9UHN	*	7,248	78	13	35	
OM4PD	*	5,876	99	11	41	
JF3WNO	*	3,420	51	12	18	
JH8FAJ/7	*	1,170	30	9	9	
RN3QKG	*	1,102	28	5	19	
F8BBL	*	1,064	48	5	23	
KC2LYO	*	572	21	6	16	
8A6QA	*	513	45	10	17	
KA6SGT	*	464	30	8	21	
YU1ANO	*	392	13	6	8	
UZ5UA	*	288	8	4	8	
DR7R	*	77	10	3	8	(OP: DL7RBI)
LY2GW	3.5	55,425	545	11	64	
SP9NSV	*	53,040	622	12	66	
HA1WD	*	52,650	558	14	67	
F5VBT	*	46,425	523	11	64	
G4CWH	*	28,609	400	10	57	
LA8WG	*	12,595	199	9	46	
K3TW	*	10,800	82	12	42	
HG6V	*	6,696	139	8	54	(OP: HA6VA)
IZ1DGG	*	4,592	129	6	35	
W8QZA/6	*	2,184	36	11	13	
5Q8A	*	176	14	3	13	(OP: OZ8A)
RN9AA	*	54	3	3	3	
C6ARR	1.8	129,480	773	17	66	(OP: N6BT)
OK1IW	*	16,878	309	7	51	
ER2RM	*	13,983	215	9	50	
ES1CW	*	13,364	266	7	45	
W2MF	*	11,742	86	13	44	
UY5VA	*	9,384	176	7	39	
T94LW	*	8,437	150	7	52	
SQ7FPD	*	8,300	180	7	43	
OH7FF	*	6,084	167	5	31	
DJ3GE	*	2,848	98	3	29	
N7IR	*	1,892	40	11	11	
UTØET	*	1,764	106	6	36	
SP8TJU	*	1,617	59	5	28	
UA3AAP	*	665	34	4	15	
WD2N	*	80	20	2	2	

ASSISTED

NORTH AMERICA

United States

KI1G	A	3,030,880	1850	132	476	
W1AO	*	2,586,875	1526	127	498	
N1DG	*	2,181,912	1148	142	545	
W1CSM	*	2,060,058	1413	123	416	
N1BAA	*	1,600,560	1110	115	455	
K2TE/1	*	1,529,634	1257	104	343	
AA1V	*	1,281,288	800	120	471	
W1GD	*	1,276,793	946	112	385	
NT1Y	*	995,319	712	109	434	
W1QK	*	977,774	889	91	331	
K1KP	*	974,100	1034	89	293	
W1NT	*	946,944	911	95	316	
W1RZF	*	894,894	911	89	340	
N4XR/1	*	639,576	611	96	327	
KZ1M	*	622,251	645	83	274	(OP: W1EQ)
W1TO	*	614,514	525	100	338	
K1QX	*	529,641	469	97	344	
W1RM	*	453,680	394	103	325	
WB1DX	*	374,900	453	80	246	
W1NG	*	312,852	330	89	283	
W1ZZ	*	311,236	317	90	301	
K1LD	*	300,980	410	66	232	
KE1FO	*	300,440	447	64	216	
N1MD	*	223,925	341	60	205	
K1RV	*	218,960	306	75	205	
WB1EDI	*	193,700	300	66	194	
W1KQ	*	161,667	302	67	186	
KV1J	*	160,254	250	76	185	
K1SEZ	*	120,000	252	57	143	
K1NU	*	119,380	191	63	172	
W1NR	*	87,568	157	62	146	
N1API	*	79,599	217	39	118	

AA1QD	*	67,886	141	47	135	
W1ZR	*	56,072	184	48	115	
WJ1B	*	37,410	149	43	86	
N1AU	*	22,200	84	33	78	
K1TR	*	17,195	73	33	62	
WA1ZYX	*	7,360	47	21	43	
W1MAT	*	1,071	19	6	15	
NE1B	*	726	17	11	11	
KC1F	14	97,240	280	28	102	
K1LT	1.8	42,873	196	17	76	
K2NG	A	3,876,374	1862	158	624	
N2NL	*	2,655,240	1484	155	541	
K2DM	*	1,708,720	1217	124	396	
N2WK	*	1,392,384	906	128	464	
N2ED	*	1,225,947	1080	115	386	
K2ONP	*	1,101,397	920	99	350	
W2LE	*	1,100,223	872	102	357	
K2EK	*	1,026,630	796	126	384	
WQ2N	*	987,309	852	107	352	
W2GDJ	*	797,895	700	102	345	
KA2D	*	782,034	655	97	354	
K2TTT	*	761,057	709	110	363	
W2RD	*	569,452	497	111	355	
N1JP/2	*	353,160	438	72	252	
K2SG	*	292,657	520	50	161	
W2REH	*	291,618	393	69	237	
KE2SD	*	254,092	476	74	204	
K2QPN	*	245,619	356	78	219	
K2XF	*	233,772	307	84	224	
K2BX	*	211,312	299	64	217	
K2SQS	*	200,168	327	67	195	
WK2H	*	198,588	307	64	183	
N2VW	*	180,684	293	65	187	
N2YO	*	167,960	298	57	164	
W2RZS	*	157,520	327	60	160	(OP: WB2NVR)
K2EP	*	162,361	278	58	171	
WA2JQK	*	145,678	352	79	259	
W2EQ	*	56,206	140	52	105	
K2DBK	*	5,304	39	19	33	
WF2B	*	4,760	39	31	37	
KS2G	*	3,920	37	22	34	
KF2O	*	2,318	24	16	22	
WA3AFS	*	24	2	2	2	
W2VQ	21	19,039	95	20	59	
W1TY/2	7	26,117	121	21	70	
N2LQ	1.8	5,424	51	14	34	
K3WW	A	4,513,465	2496	143	542	
K3OO	*	4,221,000	2271	142	528	
N3AD	*	3,154,104	1902	139	500	
K3PH	*	2,674,812	1657	123	465	
N3AM	*	1,490,482	1159	103	366	
K3QF	*	1,488,027	1047	121	416	
K3ZZ	*	1,340,700	1150	112	380	
K3ND	*	1,288,800	900	120	417	
KQ3F	*	1,258,002	1096	93	330	
K9RS/3	*	1,230,120	837	125	411	
N3ZA	*	908,088	714	111	371	
AB3CX	*	886,968	845	89	299	
W3EKT	*	600,928	654	90	332	
NE3H	*	547,596	610	86	285	
W3GG	*	394,476	531	69	215	
K3CT	*	379,040	401	92	276	
W2RF/3	*	306,892	398	74	218	
N3ST	*	290,440	394	65	209	
K3SV	*	224,272	351	66	197	
WX3B	*	200,119	263	66	227	
NQ3X	*	133,722	275	57	150	
N3GNW	*	106,169	205	50	153	
W2UP/3	*	99,552	286	31	105	
K3II	*	97,034	233	59	144	
W2CDO/3	*	84,600	187	61	139	
W3OU	*	65,031	168	44	115	
K3STX	*	55,360	148	52	108	
K3PP	*	48,085	118	53	110	
N1SZ/3	*	9,039	51	21	48	
WA3AAN	14	48,136	196	18	70	
N3CZ	7	252,615	617	34	131	
WA3C	*	55,500	217	27	98	
N4WW	A	2,655,576	1480	150	543	
AA4S	*	1,792,840	1289	118	414	
K4SAV	*	1,432,325	935	127	448	
N4KG	*	1,393,080	918	128	442	
AA4V	*	1,258,575	927	106	413	
N4CJ	*	1,236,413	1114	98	345	
N2TU/4	*	1,225,588	922	118	400	
K4XD	*	1,051,535

K4WW	*	93,920	226	47	113
W4DFW	*	93,177	189	61	128
K4GMH	*	85,952	294	36	100
W4LT	*	76,466	196	50	123
W4ZE	*	71,410	152	52	133
KJ4TZ	*	66,198	177	51	126
KØCOP/4	*	61,560	145	57	114
N4TL	*	52,920	160	38	97
W4MY	*	48,015	130	58	107
AD4YQ	*	44,496	135	44	100
NV4B	*	38,550	109	53	97
W4OV	*	35,358	113	50	92
KU4G	*	34,001	116	36	85
K4DGW	*	21,364	93	37	72
K2SD/4	*	11,550	93	36	69
K4APG	*	10,512	55	26	47
WG4M	*	6,305	49	28	37
N4NM	*	3,740	37	16	28
N4PQX	**21**	**29,070**	**123**	**21**	**69**
W4SO	**14**	**433,485**	**1058**	**34**	**135**
KU5B/4	**7**	**303,564**	**882**	**36**	**128**
K1ZZI/4	**"**	**246,789**	**661**	**31**	**122**
K4CZ	**3.5**	**50,508**	**201**	**19**	**73**
W6IZT/4	*	14,742	98	21	57
W4DR	**1.8**	**38,496**	**157**	**18**	**78**
K7CMZ/4	*	10,915	105	13	46
N5JR	**A**	**555,764**	**553**	**84**	**290**
W5GA	**"**	**487,009**	**591**	**90**	**277**
WT5U	*	166,712	329	64	165
W5KI	*	154,346	261	66	163
N5ZK	*	125,851	288	48	139
			(OP: W5ASP)		
KA5M	*	113,206	205	66	148
K5GM	*	111,168	244	64	128
K5HDU	*	80,960	198	52	108
N1CC/5	*	63,750	173	57	113
WA5VSK	*	60,144	173	60	119
W5TB	*	56,108	154	57	109
AF5Z	*	48,654	139	60	93
N5XJ	**28**	**7,379**	**78**	**15**	**32**
WØVX/5	**21**	**39,168**	**161**	**24**	**72**
KU5B	**7**	**296,622**	**882**	**36**	**126**
N5JB	**"**	**113,337**	**324**	**34**	**113**
AD5VJ	*	9,240	66	21	49
W5ZO	**3.5**	**16,274**	**92**	**22**	**57**
NX5M	**1.8**	**20,514**	**109**	**18**	**60**
K6TA	**A**	**1,205,100**	**1016**	**127**	**323**
K6XT	**"**	**766,476**	**671**	**132**	**321**
N6WS	**"**	**792,688**	**730**	**118**	**294**
K6RIM	*	507,600	547	102	274
N2NS/6	*	455,264	540	103	225
N6QQ	*	441,214	556	98	236
N6XI	*	353,428	445	94	204
W6TK	*	339,563	500	87	184
N6DA	*	220,248	371	79	149
N6NG	*	178,087	296	79	168
K6III	*	176,358	325	73	148
W6SR	*	145,416	289	73	146
WT6K	*	137,562	327	75	127
KQ6ES	*	123,420	263	72	115
N6VH	*	108,336	228	62	121
WA6L	*	108,252	268	71	123
N6NC	*	102,097	251	70	123
K6RR	*	99,630	263	76	129
AD6ZJ	*	99,330	224	72	138
WB6JJJ	*	84,436	199	68	134
K6GEP	*	80,454	200	65	94
N6RK	*	56,950	132	54	116
NK6A	*	50,094	171	43	78
WX6V	*	35,360	106	41	89
W6SC	*	30,996	110	38	70
K6JEB	*	22,185	107	38	49
KD6WKY	*	21,576	119	50	74
K6DGW	*	16,562	80	39	52
W1RH/6	*	9,112	59	28	39
K6ST	*	7,056	51	27	36
NU6T	*	2,795	42	20	23
W6RKC	**7**	**19,520**	**117**	**20**	**44**
W6SJ	*	15,552	103	25	47
W6NV	**3.5**	**44,717**	**192**	**30**	**67**
N6IG	**1.8**	**8,177**	**111**	**14**	**23**
N7CW/6	**A**	**986,776**	**801**	**132**	**337**
K7WP	**"**	**755,006**	**800**	**114**	**284**
W7ZR	**"**	**728,838**	**717**	**124**	**285**
K7UA	*	563,214	631	100	254
NN7ZZ	*	472,374	619	93	229
			(OP: N5LZ)		
NN7SS	*	309,582	441	84	210
			(OP: K6UFO)		
W7SW	*	277,343	517	69	140
KF7E	*	257,400	333	110	215
K7XC	*	219,765	342	98	175
K7ABV	*	191,520	339	68	156
K7BTW	*	182,020	366	65	125
W7CT	*	149,248	273	68	144
N7RK	*	147,096	276	68	148
AB7E	*	134,692	253	68	155
W7WHY	*	117,786	266	70	131
W7QQQ	*	114,869	211	65	168
KT7G	*	41,344	154	54	82
WE7K	*	23,730	106	38	75
N7AZ	*	21,948	101	38	55
K7VIT	*	20,520	78	39	56
N7XY	*	16,863	85	31	46
WO7T	*	5,772	46	32	46
N7RQ	*	2,655	24	21	24
W7UT	**21**	**55,056**	**232**	**24**	**69**
K8IA/7	**7**	**388,596**	**945**	**34**	**122**
W6XI/7	*	129,504	354	33	109
N7MAL	*	22,437	100	24	57
N7RT	**3.5**	**33,900**	**141**	**30**	**83**
W8MJ	**A**	**1,624,590**	**1226**	**124**	**423**
N8TR	**"**	**973,323**	**611**	**130**	**481**
N4TX/8	*	768,660	702	115	345
N8BJQ	*	596,106	595	95	283
AA8LL	*	535,248	553	85	293
W8JY	*	483,365	540	84	265
K5ZG/8	*	345,075	440	81	240
N8IW	*	237,316	291	75	241
K8GT	*	203,187	302	80	187
AJ1M/8	*	160,704	268	69	179
K8WDN	*	139,974	248	74	172
W8FAX	*	104,152	204	49	139
K3WA/8	*	44,020	120	43	112
N8ET	**14**	**378,962**	**802**	**34**	**144**
K8AQM	**3.5**	**92,250**	**319**	**25**	**100**
W8CZN	*	18,920	114	18	70
W8UVZ	**1.8**	**37,400**	**248**	**22**	**78**
W8TN	*	6,890	67	15	38
W8SZ	**A**	**1,574,716**	**1122**	**139**	**433**
W9XT	**"**	**1,390,109**	**1057**	**118**	**379**
K9IMM	**"**	**1,231,452**	**1010**	**113**	**361**
N9CK	*	1,140,544	853	115	387
N9XX	*	541,413	534	91	296
N9FH	*	508,725	530	95	304
K9CT	*	462,560	451	99	293
KI9A	*	447,020	430	101	311
NS9I	*	440,325	602	84	225
KA9FOX	*	430,400	419	108	292
WE9V	*	421,056	419	96	291
NZ9R	*	403,920	476	93	247
K9XV	*	373,464	462	76	266
WE9R	*	323,505	437	84	231
K9OR	*	310,310	361	86	255
K9UQN	*	266,060	404	71	180
N2BJ/9	*	185,571	320	56	181
N9CO	*	127,920	225	51	154
KA9O	*	116,352	241	56	146
W9FX	*	96,600	211	48	127
N7US/9	*	93,147	210	51	132
W9SN	*	46,629	133	54	103
W9IL	*	34,086	106	32	82
W9RN	*	32,760	113	49	77
AA9OY	*	5,605	77	22	37
N9SDT	*	2,277	74	32	37
N9AU	**7**	**106,455**	**277**	**30**	**111**
N9FN	3.5	1,677	27	14	25
KØKX	**A**	**1,324,927**	**972**	**117**	**392**
WAØMHJ	**"**	**648,645**	**639**	**102**	**313**
KØUK	**"**	**625,560**	**708**	**112**	**278**
WBØHCH	*	465,360	560	86	250
N5IN/Ø	*	400,932	417	108	279
KØRC	*	369,510	447	91	236
KØOB	*	347,454	493	75	216
KEØUI	*	345,952	476	88	216
KØAD	*	257,580	429	78	187
KSØT	*	228,780	329	75	204
KØYR	*	166,413	311	67	154
NØIM	*	158,625	273	70	165
ACØW	*	132,158	267	73	148
WA2MNO/Ø	*	131,080	235	65	167
KEØL	*	109,151	216	64	153
NRØL	*	99,000	222	65	133
KØHB	*	98,193	189	66	147
KØMPH	*	89,199	219	53	134
WØGJ	*	82,782	240	74	145
W4RK/Ø	*	78,581	215	58	121
KØCOP	*	57,967	145	57	112
NIØC	*	57,240	140	46	113
WGØM	*	45,600	134	43	107
N5ØB	*	28,182	96	45	77
ACØDS	*	21,008	106	41	63
WØAD	*	18,165	87	42	63
WØLM	*	12,936	67	29	59
KØXQ	*	7,424	59	24	40
NUØJ	*	2,160	31	13	23
NØKBD	*	1,419	25	21	22
KØKT	**3.5**	**52,839**	**201**	**23**	**80**
Alaska					
KL2R	**A**	**75,240**	**456**	**35**	**41**
			(OP: N1TX)		
Canada					
VE1OP	**A**	**2,140,450**	**2126**	**94**	**351**
VE2FU	**A**	**567,712**	**813**	**81**	**233**
VA2AM	*	252,054	389	80	262
VE3UTT	**A**	**1,401,728**	**1207**	**105**	**361**
			(OP: W1AJT)		
VE3KF	*	1,233,696	1720	94	268
VA3DX	*	801,021	822	107	330
VA3PL	*	292,448	492	69	178
VE3NWA	*	249,561	463	73	170
VE3CFK	*	218,112	497	78	206
VE3UW	*	193,648	493	53	143
VE3ZZ	*	88,920	199	58	132
VE3MM	*	3,498	34	21	32
VE3MGY	**1.8**	**24,025**	**397**	**10**	**21**
VA6XDX	**A**	**125,120**	**396**	**60**	**100**
			(OP: VE6LB)		
VE6DJT	*	1,053	26	14	13
VE7KET	**A**	**255,633**	**422**	**81**	**178**
Mexico					
6H1ZVO	**A**	**59,444**	**214**	**46**	**108**
			(OP: XE1ZVO)		
XE1ZW	*	45,194	332	48	70
XE2WWW	**14**	**97,278**	**559**	**27**	**66**
Puerto Rico					
WP3F	**7**	**691,864**	**2206**	**31**	**108**
AFRICA					
African Italy					
IH9GPI	**A**	**416,120**	**792**	**43**	**159**
IH9U	**21**	**507,195**	**1212**	**33**	**120**
			(OP: I1NVU)		
IH9R	**7**	**1,268,302**	**3083**	**32**	**114**
			(OP: IZ1GAR)		
IH9M	**3.5**	**1,099,296**	**2623**	**32**	**112**
			(OP: IK7JWY)		
Canary Islands					
EA8BEX	**A**	**1,221,332**	**1201**	**91**	**280**
EA8BQM	*	156,880	349	46	139
EA8CAC	*	35,741	151	35	68
Madeira Islands					
CT3KN	**A**	**5,213,853**	**3507**	**116**	**433**
Mauritius					
3B8/SM6GOR		A 6,552	59	20	32
ASIA					
Asiatic Russia					
UA9APA	**A**	**3,134,640**	**2085**	**125**	**430**
UA9MC	**"**	**1,245,387**	**1199**	**102**	**327**
RM9RZ	*	702,944	797	85	267
RV9CX	*	632,523	788	79	230
RA9KM	*	447,552	698	67	192
UA9OC	*	158,364	326	63	149
RV9UP	*	140,556	315	66	146
RA9MC	*	133,704	271	60	156
RA9MX	*	107,004	214	61	161
UA9CBR	*	65,052	172	41	115
UA9UR	**28**	**247**	**15**	**6**	**7**
UA9UCK	**21**	**28,890**	**168**	**25**	**65**
UA9PM	**14**	**603,100**	**1645**	**31**	**117**
RZ9HG	**7**	**358,386**	**1212**	**34**	**104**
UA9PC	**3.5**	**511,872**	**1600**	**28**	**100**
RW9USA	**"**	**349,776**	**1130**	**27**	**99**
RT9S	*	330,660	958	29	103
			(OP: UA9SP)		
RA9AC	*	309,858	860	30	99
RK9AD	*	255,623	969	24	83
RU9TO	**1.8**	**43,216**	**256**	**13**	**60**
RUØAW	**A**	**1,198,305**	**1081**	**118**	**347**
RWØUM	*	284,410	691	74	164
RAØJF	*	2,838	57	16	27
RKØAB	**7**	**109,271**	**538**	**29**	**84**
China					
BA4RF	**A**	**1,894,150**	**2093**	**116**	**314**
BD4SP	*	100,155	332	58	107
B4TB	*	98,784	348	63	105
			(OP: BA4TB)		
Georgia					
4L8A	**A**	**4,824,600**	**4582**	**93**	**315**
Japan					
JA1XRH	**A**	**176,381**	**329**	**89**	**144**
JE1EKT	*	145,812	528	48	68
JO1WKO	*	95,424	191	64	128
JI1ALP	**7**	**42,750**	**191**	**28**	**62**
JA2PAC	**A**	**38,412**	**196**	**78**	**116**
JR2PMT	*	33,448	135	50	63
JG2KKG	**14**	**296,660**	**869**	**36**	**104**
JH3PRR	**A**	**991,051**	**811**	**134**	**345**
JA3PYC	*	248,490	417	95	156
JO3DDD	*	69,102	200	76	122
JS3CTQ	*	58,016	181	58	90
JA3VUI	*	26,265	107	45	58
JA3RAZ	*	4,508	54	22	27
JR3RIY	**21**	**18,270**	**125**	**23**	**47**
JL3MCM	**7**	**18,304**	**114**	**24**	**40**
JH1GUO/4	A	60,680	188	57	91
JO7KMB	**A**	**408,995**	**582**	**188**	**177**
JE7YSS	*	5,992	77	14	14
			(OP: 7N4TEN)		
JA7ARW	*	4,830	59	17	18
JH7MEX	**3.5**	**8,151**	**61**	**21**	**36**
JH9KVF	**21**	**61,013**	**292**	**32**	**65**
JA9XBW	**1.8**	**285**	**26**	**6**	**9**
JAØFVU	**14**	**162,360**	**525**	**35**	**97**
Kazakhstan					
UN9L	**A**	**365,650**	**1086**	**29**	**113**
UP1G	**21**	**338,883**	**1086**	**28**	**101**
			(OP: UN7QX)		
UP4L	**14**	**508,515**	**1275**	**34**	**133**
			(OP: UN7LZ)		
Laos					
XW1B	**A**	**533,478**	**1047**	**84**	**190**
EUROPE					
Aland Islands					
OHØE	**14**	**665,907**	**1965**	**39**	**148**
			(OP: OH2MM)		
Austria					
OE4VIE	**7**	**187,850**	**1071**	**29**	**101**
Belarus					
EW2AA	**A**	**1,623,944**	**1579**	**129**	**488**
EU1AZ	**7**	**262,440**	**1239**	**33**	**129**
EV1R	*	242,190	1224	33	129
			(OP: EU1PA)		
EW1CQ	**1.8**	**69,836**	**761**	**13**	**66**
Belgium					
OQ5M	**A**	**2,678,976**	**2824**	**121**	**455**
			(OP: ON5ZO)		
OT1A	*	1,916,761	2097	99	412
			(OP: ON4CCP)		
ON6FC	*	6,880	90	22	58
OR2T	**21**	**195,926**	**533**	**33**	**130**
			(OP: ON4ATW)		
Bulgaria					
LZ1IKY	**A**	**213,444**	**563**	**58**	**194**
Croatia					
9A7T	**A**	**1,264,536**	**1257**	**133**	**446**
9A3KS	*	82,621	217	58	145
9A2U	**7**	**388,892**	**1498**	**34**	**138**
			(OP: 9A3ZA)		
Czech Republic					
OK7Y	**A**	**1,689,192**	**2057**	**106**	**416**
			(OP: OK1FDY)		
OK3C	*	874,248	956	104	395
			(OP: OK2ZC)		
OK2PF	*	144,342	495	54	189
OK2HZ	**21**	**54,895**	**209**	**31**	**82**
OL5M	*	47,495	193	30	85
OK4RQ	**7**	**730,884**	**2144**	**38**	**158**
OK1DG	**"**	**367,314**	**1448**	**34**	**140**
OK1FZM	*	174,900	657	34	131
OK1ZE	*	28,704	232	16	76
OK1CW	**3.5**	**231,150**	**1390**	**30**	**104**
OK3R	*	119,280	622	19	61
			(OP: OK1DVM)		
OK1TD	*	26,790	185	16	79
OL5K	**1.8**	**105,084**	**822**	**19**	**89**
			(OP: OK1NY)		
OK1TP	*	68,716	829	16	66
Denmark					
5Q2T	**14**	**57,720**	**356**	**25**	**79**
England					
G4IIY	**A**	**1,957,515**	**2049**	**100**	**443**
GØMTN	**"**	**1,323,162**	**2006**	**89**	**369**
G3NKC	*	710,790	998	84	351
MØBPQ	*	117,165	311	54	165
G3YBY	*	112,860	298	55	165
G4FSU	*	102,960	294	50	148
G4OBK	*	68,068	157	64	157
G3VKW	*	52,824	164	59	127
G6OKU	*	17,654	151	22	69
MØOKT	*	16,830	136	23	62
G4EHT	*	4,365	45	19	26
G9A	**14**	**193,614**	**985**	**30**	**108**
			(OP: G4RCG)		
Estonia					
ES2DJ	**A**	**611,040**	**1133**	**90**	**312**
ES5MC	*	320,460	770	72	222
ES5DB	*	81,989	320	38	125
ES1GF	*	65,254	313	49	109
ES5RY	**14**	**385,910**	**1082**	**37**	**148**
ES4RD	*	218,686	701	37	132
ES5QX	**1.8**	**201,105**	**1206**	**27**	**96**
European Russia					
RW6HX	**A**	**3,252,200**	**3128**	**146**	**554**
RA3CM	**"**	**2,095,600**	**2182**	**133**	**487**
RN3QO	**"**	**1,877,208**	**1803**	**139**	**583**
RD4WA	*	1,518,480	1992	116	424
RV3FF	*	1,196,772	1320	126	425
UA6LTI	*	1,118,325	1181	127	428
UA4WKW	*	588,468	990	92	256
RA3NZ	*	576,887	1045	80	309
RX3AEX	*	370,175	718	76	259
RZ6HF	*	280,462	608	72	227
RA3DNC	*	259,985	536	77	242
RA3FD	*	221,536	723	44	180
UA4WMA	*	219,776	682	60	212
UA1NFA	*	200,438	426	71	207
RV6YB	*	188,700	564	52	170
RN3RFX	*	164,736	605	60	204
UA3MEJ	*	147,554	408	67	142
RD3AD	*	144,060	568	42	154
RZ6AK	*	123,348	559	48	180
RK3QS	*	107,172	546	35	121
UA6YW	*	85,410	210	67	128
RW3AFY	*	74,500	336	40	109
RU3VD	*	61,415	127	68	105
UA4PAQ	*	53,214	252	39	108
UA3AGW	*	39,690	100	59	88
RA1WZ	*	34,416	170	38	106
RA6AX	*	26,789	285	24	65
UA6XDX	*	26,429	215	27	80
UA3DLD	*	15,925	149	20	71
RU6DX	*	14,673	151	24	43
UA4FCO	*	12,710	134	21	61
UA3DUJ	*	12,136	115	29	53
UA3XAC	*	8,710	72	16	49
RL3BM	*	7,192	50	19	39
UA3FX	*	1,849	30	18	25
UA4ARL	*	1,665	19	18	19
UA6AA	**21**	**102,753**	**429**	**32**	**115**
RA6YJ	*	6,148	42	24	34
RK3XWO	**14**	**189,255**	**792**	**34**	**131**
			(OP: RA3XAR)		
UA1ANA	*	109,556	602	26	96
UA1OEX	*	5,368	91	9	35
UA3SAQ	**7**	**204,925**	**770**	**35**	**140**
RU6AV	*	111,159	344	35	144
RA6YDX	*	87,720	421	28	108
UA6AKD	*	46,436	409	20	74
UA3BS	**3.5**	**255,450**	**1236**	**33**	**117**
RV3MI	*	103,740	775	22	83
RN4CU	*	11,424	248	8	43
UA6LV	**1.8**	**190,672**	**981**	**29**	**107**
RN3GM	*	53,550	522	15	70
Faroe Islands					
OY1CT	**A**	**272,223**	**828**	**50**	**211**
Finland					
OF5A	**A**	**1,917,096**	**2351**	**128**	**424**
			(OP: OH5BM)		
OF6NIO	**"**	**1,527,920**	**1653**	**123**	**445**
OH6MW	*	721,594	1302	85	336
OH2XX	*	209,062	467	67	207
OH1MM	*	182,928	299	72	237
OH6DX	*	180,768	290	84	252
OH3NDH	*	88,288	303	44	134
OH2BN	**14**	**29,618**	**128**	**27**	**91**
OH6GAW	**3.5**	**89,856**	**794**	**18**	**78**
OH2BO	**1.8**	**50,138**	**304**	**23**	**83**
OH3BU	*	2,870	40	10	31
France					
F8CMF	**A**	**2,784,250**	**2305**	**129**	**473**
F8CRS	*	449,550	878	72	261
F5VHJ	*	235,960	452	83	257
F5UTN	*	228,784	385	83	233
F5VJC	*	177,548	478	52	186
F5VJK	*	51,834	222	32	127
F5IQJ	*	18,824	126	31	73
F1OK	*	8	2	2	2
F8AKC	**28**	**4,884**	**82**	**12**	**32**
F8DBF	**14**	**871,812**	**2278**	**36**	**147**
F5UFX	*	98,865	393	22	95
F5OTZ	*	39,330	260	20	75
F5PHW	**7**	**72,252**	**486**	**19**	**89**
F1AKK	**3.5**	**489,744**	**2055**	**29**	**115**
F4DNW	*	161,504	1058	21	82
F5IN	**1.8**	**69,048**	**635**	**14**	**70**
Germany					
DJ5MW	**A**	**5,225,924**	**3537**	**156**	**637**
DL7ON	**"**	**2,896,656**	**2198**	**150**	**539**
DJ2YA	**"**	**2,488,570**	**1674**	**150**	**580**
DK3GI	*	2,333,676	1856	145	533
DL8DYL	*	1,438,008	1297	117	455
DL5KUT	*	1,164,000	1262	99	381
DL1EJA	*	1,038,750	928	123	502
DD1LD	*	1,015,560	1467	98	336
DL4CF	*	966,424	1375	99	329
DL8QS	*	952,704	1039	126	450
DHØGHU	*	922,823	1103	98	375
DJ6QT	*	885,929	1130	104	369
DL8DAZ	*	885,768	1003	106	395
DH8VV	*	850,690	843	109	376
DL6NCY	*	713,450	811	110	365
DL5YM	*	693,864	1117	96	323
DJ3WE	*	678,000	907	94	358
DM1TT	*	619,347	816	109	322
DL4ME	*	565,250	1147	75	275
DF5ZV	*	524,172	688	92	326
DJ8QP	*	515,812	783	95	323
DL1NEO	*	503,412	903	79	285
DL1REM	*	476,619	1191	64	239
DG7RD	*	453,700	840	63	262
DF6QV	*	442,520	694	76	294
DL6KVA	*	373,722	503	98	300
DL3EBX	*	366,165	749	63	246
DD1JN	*	363,370	808	61	229
DM3PKK	*	329,703	653	69	222
DM5Z	*	319,370	855	59	234
					(OP: DM5JBN)
DK1FW	*	312,480	423	76	284
DK1NO	*	282,720	741	60	180
DL1ECG	*	280,291	503	71	236
DL9MRF	*	279,754	640	60	214
DF1QQ	*	264,661	570	64	247
DL5MX	*	240,097	545	66	233
DL2KCK	*	238,334	462	72	197
DL7UIO	*	218,880	518	56	172
DL5AWI	*	191,958	297	84	215
DL7JOM	*	190,440	528	53	177
DF5UL	*	188,000	337	65	170
DL1ELY	*	180,648	407	59	175
DJ2SL	*	178,794	374	62	196
DK7ZH	*	164,260	481	49	166
DJ7YT	*	161,564	426	50	189
DL7JAN	*	158,172	254	81	213
DK3DUA	*	151,740	309	70	200
DJ4KW	*	145,396	491	45	178
DL9NDV	*	143,815	330	50	195
DL4RCK	*	138,752	319	68	203
DJ8EW	*	138,720	332	55	149
DK6CQ	*	129,870	333	66	168
DL5KUA	*	122,320	405	46	174
DJ1AA	*	110,682	333	51	147
DKØAE	*	107,212	331	50	146
					(OP: DJ1AA)
DJ8OG	*	106,288	321	52	156
DL4ØRRDXA	*	97,079	327	50	143
					(OP: DJ1AA)
DG8VE	*	61,335	198	37	104
DL9GTI	*	43,274	135	48	106
DK5TX	*	43,197	190	33	86
DL3DRN	*	31,460	137	38	83
DL4FDI	*	26,862	186	29	92
DK1TF	*	23,634	103	41	76
DF2QZ	*	14,322	83	31	62
DL5XL	*	13,855	55	34	51
DJ2SX	*	12,528	112	28	80
DL9NCR	*	10,472	86	28	60
DJ8HB	*	7,440	96	31	62
DH6DAO	*	6,720	48	26	38
DK1MM	*	4,042	58	13	30
DK9HE	*	3,540	57	19	40
DL6KAC	*	1,190	31	6	11
DK2PH	**28**	**3,634**	**44**	**11**	**35**
DO4DXA	*	726	18	6	12
DQ4Q	**21**	**92,000**	**309**	**34**	**126**
					(OP: DF9ZP)
DL3ARK	*	7,579	73	15	38
DL1IAO	**14**	**770,364**	**1862**	**39**	**150**
DK1QH	*	153,328	602	34	114
DLØYE	*	61,048	306	25	79
					(OP: DL1LH)
DD1IM	*	20,424	167	16	53
DK1BN	**7**	**334,755**	**1179**	**35**	**138**
DFØCI	**"**	**261,483**	**1205**	**35**	**138**
					(OP: DL8AKI)
DL7BY	*	146,616	718	30	119
DLØKF	*	131,376	625	31	130
					(OP: DJ7SW)
DJ6TK	*	32,086	152	27	95
DL4MFM	*	21,320	194	13	69
DJ4PI	*	12,556	81	20	66
DF9OX	**3.5**	**337,144**	**1599**	**30**	**104**
DL5XJ	*	82,576	625	21	83
DL1RG	*	73,851	520	21	82
DL6ZXG	*	37,318	299	23	71

IZ3KKE	*	47,995	173	48	97
IZ1HIV	*	21,183	263	15	54
IK2ECP	*	9,240	102	16	39
IK1QBT	**28**	**5,358**	**91**	**11**	**36**
IQ2CJ	**14**	**763,045**	**1974**	**38**	**153**
			(OP: IK2JUB)		
I2GPT	*	77,300	378	26	74
IO3P	**7**	**670,605**	**2215**	**36**	**145**
			(OP: IV3NVN)		
IZ4GWE	*	43,754	209	29	102
IO3N	**3.5**	**375,570**	**1796**	**31**	**104**
			(OP: IV3RLB)		
IO4T	*	**232,848**	**1553**	**26**	**86**
			(OP: IZ4EFN)		
IR2C	*	159,962	830	25	96
			(OP: IK2PFL)		
IK1YDB	**1.8**	**137,360**	**1019**	**20**	**81**

Kaliningrad

RN2FA	A	266	7	7	7

Latvia

YL2KO	**A**	**2,661,352**	**2695**	**146**	**486**
YL5T	*	919,484	1098	113	344
			(OP: YL3DQ)		
YL9T	*	765,496	1311	90	322
YL2KF	*	4,784	60	17	35
YL2VW	**1.8**	**129,987**	**1022**	**20**	**79**

Lithuania

LY2IC	**A**	**954,492**	**1373**	**95**	**367**
LY4U	*	35,264	357	20	56
LY3BA	*	18,144	93	29	83
LY1R	*	12,772	118	26	77
LY8O	**14**	**699,916**	**1769**	**40**	**156**
LY4G	*	78,546	316	26	88
LY1C	**7**	**60,528**	**544**	**17**	**80**
LY7M	**3.5**	**249,480**	**1548**	**27**	**99**
LY3M	*	102,690	997	22	68

Luxembourg

LX5T	**7**	**347,424**	**1558**	**35**	**141**
			(OP: LX1KC)		

Malta

9H3HH	**A**	**1,582,452**	**3126**	**82**	**307**
			(OP: DJ9RR)		

Moldova

ER8WW	**A**	**6,272,022**	**4763**	**160**	**602**
			(OP: UT5UDX)		

Netherlands

PA1CC	**A**	**955,185**	**1505**	**81**	**304**
PA0LOU	*	391,300	644	82	282
PA5TT	*	276,300	545	63	244
PF5X	*	250,436	451	70	204
PA0WRS	*	220,578	438	67	224
PB2JJ	*	138,054	494	44	129
PA1TT	*	112,093	387	40	157
PG3N	*	110,592	389	48	144
PA0KHS	*	98,880	415	40	120
PA5KT	*	45,440	192	38	104
PA5O	*	38,467	217	33	110
PA3GRM	*	26,133	202	29	64
PA3EWP	**14**	**457,184**	**1405**	**38**	**144**
PA3C	*	51,625	255	30	95
PA8JED	**7**	**81,312**	**404**	**26**	**106**
PA2AWU	*	29,870	197	21	82
PA5R	*	17,095	229	16	49
PA4VHF	**3.5**	**375,636**	**1779**	**32**	**106**

Northern Ireland

GI4NKB	**A**	**431,673**	**986**	**63**	**246**

Norway

LA6FJA	7	204	17	5	12

Poland

SQ9UM	**A**	**2,302,022**	**2022**	**127**	**495**
SP2EWQ/2	*	728,334	1123	81	306
SP2LNW	*	720,324	1084	92	336
SQ5M	*	224,992	430	74	242
SQ9FMU	*	213,601	544	54	197
SP7LJ	*	174,370	533	64	201
SP8HXN	*	123,617	258	74	183
SP7HKK	*	104,980	552	30	115
SQ3RX	*	98,658	338	47	127
SP6EIY	*	64,938	236	47	111
SO7O	*	1,880	27	15	25
			(OP: SP7DQR)		
SQ9NRY	*	442	10	7	10
SP8RHC	*	234	12	7	11
SQ5EK	*	54	3	3	3
SN3A	**21**	**194,940**	**522**	**34**	**146**
			(OP: SP3GEM)		
SN2J	*	2,530	13	11	12
			(OP: SP2JMB)		
SP1NY	**14**	**328,512**	**974**	**37**	**137**
SP3OCC	*	111,520	494	28	108
SN8R	**7**	**575,112**	**2103**	**36**	**150**
			(OP: SP8ONZ)		
SP4Z	*	432,042	1243	36	155
SO2R	**3.5**	**716,661**	**2500**	**36**	**135**
			(OP: SP2FAX)		
SN9Z	*	113,625	1064	19	82
			(OP: SP6EQZ)		
SP1S	*	5,208	56	12	44
SP8FNA	*	4,550	68	12	38
SN3R	**1.8**	**201,956**	**1231**	**22**	**94**
SO8A	*	161,124	1066	25	91
			(OP: SP8BRQ)		
SP6GCU	*	47,346	554	12	66
SP8LBK	*	8,200	171	6	44

Romania

YO9HP	**A**	**3,635,916**	**2991**	**152**	**551**
YR8B	*	835,440	1554	81	273
			(OP: YO8DOH)		
YO7FB	*	218,530	880	45	160
YR8D	*	158,155	610	46	189
			(OP: YO8BDQ)		
YO5IR	*	49,771	609	11	60
YO9HG	*	34,816	252	28	100
YO9BXC	*	27,810	133	38	65
YO8RIJ	*	11,200	73	32	48
YO4RST	*	9,940	75	22	48
YP3A	**21**	**291,190**	**846**	**35**	**150**
			(OP: YO3XX)		
YO5CBX	**14**	**259,120**	**933**	**36**	**122**
YO3JW	**7**	**177,264**	**1032**	**32**	**112**
YO3JOS	*	157,872	882	30	108
YO5KIP	*	85,786	553	23	95
			(OP: YO5OHO)		

San Marino

T77C	**A**	**25,877**	**176**	**32**	**81**

Scotland

GM4EVS	**A**	**229,977**	**527**	**49**	**204**
GM0EGI	*	**200,790**	**396**	**64**	**227**
GM4UYZ	*	5,394	70	17	45
GM2T	**21**	**85,323**	**492**	**26**	**93**
			(OP: M5FUN)		
GM3SEK	**7**	**197,862**	**987**	**32**	**115**
GM5A	**3.5**	**266,541**	**1466**	**27**	**96**
			(OP: MM0CCC)		

Serbia

YT5A	**A**	**3,510,340**	**2963**	**148**	**520**
			(OP: YT3W)		
YU2FG	*	**1,226,046**	**1694**	**99**	**367**
YU9VK	*	691,878	1093	85	278
YT2U	*	164,754	476	52	174
YU1LA	**7**	**950,404**	**2805**	**38**	**158**
YT8A	*	**866,745**	**2867**	**37**	**150**
			(OP: YT3WW)		
YT1R	*	455,286	1875	37	132
			(OP: YU1UN)		
YU7BH	*	321,900	1279	36	138
YU8U	**3.5**	**50,098**	**606**	**12**	**62**
YZ7A	**1.8**	**157,953**	**1181**	**22**	**89**
			(OP: YU7CM)		
YT2T	*	97,970	881	20	81

Sicily

IT9GAC	**A**	**496,640**	**682**	**98**	**290**
IT9BLB	**21**	**59,048**	**314**	**38**	**91**
IT9ORA	**7**	**67,210**	**500**	**16**	**78**
IT9ZGY	**1.8**	**61,857**	**629**	**13**	**74**

Slovakia

OM7CW	**A**	**2,429,301**	**2322**	**139**	**470**
OM8AG	**28**	**8,896**	**92**	**14**	**50**
OM3CGN	**21**	**335,040**	**850**	**37**	**155**
OM7PY	**14**	**37,062**	**240**	**17**	**70**
OM5CW	**7**	**22,444**	**110**	**28**	**96**
OM5M	**3.5**	**524,547**	**2002**	**35**	**132**
			(OP: OM2IB)		
OM0M	**1.8**	**197,152**	**1179**	**29**	**93**
OM6KW	*	110,642	989	20	78

Slovenia

S57DX	**A**	**3,389,244**	**3102**	**140**	**496**
S59ABC	*	**2,859,696**	**3045**	**121**	**383**
			(OP: S51DS)		
S58M	*	**1,948,032**	**2263**	**120**	**414**
S51AY	*	816,772	1271	89	329
S54O	*	491,130	995	73	248
S51TA	*	367,164	650	68	261
S53FO	*	287,308	524	79	252
S59W	*	181,744	368	69	238
S53APR	*	15,900	120	27	48
			(OP: S55O)		
S57EA	*	5,612	103	8	38
S56X	**7**	**561,768**	**2056**	**36**	**142**
S51DX	*	36,490	353	20	69
S57XX	**3.5**	**68,724**	**659**	**13**	**70**
S530	**1.8**	**139,590**	**1118**	**22**	**88**
S59A	*	28,184	136	22	82

Spain

EA1WX	**A**	**1,228,964**	**1854**	**84**	**290**
EA1DR	*	**688,905**	**910**	**88**	**317**
EA5DKU	*	607,807	879	87	310
EA5RS	*	563,248	904	88	288
EB1ISN	*	503,538	1202	62	204
			(OP: EA4SV)		
EA3CHZ	*	321,885	666	65	246
EA4KA	*	319,077	639	62	231
AO5W	*	224,128	815	49	157
EA2NN	*	190,841	597	43	156
EA3EJI	*	82,782	219	56	163
EA1CS	*	72,270	449	25	85
EA1JK	*	65,880	188	44	136
EA5EU	*	51,305	264	42	113
EA3GE	*	18,984	134	29	84
EA5AX	*	15,416	141	23	59
EC2AUD	*	7,301	118	12	37
EA7UU	**28**	**2,016**	**40**	**11**	**25**
EA7OT	**21**	**130,338**	**621**	**27**	**90**
EA3KU	**14**	**618,408**	**1793**	**39**	**150**
EA4ZK	*	193,050	670	35	130
EA4BF	*	2,700	55	4	23
EA4KD	**7**	**503,650**	**1564**	**36**	**139**
EA5FID	*	199,746	975	29	108
EA7GV	*	82,915	540	19	84
EA5GS	*	60,781	317	27	106

Sweden

SM6CNN	**A**	**1,593,561**	**1405**	**131**	**516**
SM5D	*	690,650	952	101	374
			(OP: SM5DJZ)		
SM6WET	*	385,242	561	92	337
8S0W	*	205,516	426	77	192
			(OP: SM0NJO)		
7S0X	*	90,944	295	59	165
			(OP: SM0MDG)		
SA1A	*	30,381	195	25	98
			(OP: SM1TDE)		
SM5LSM	*	5,658	87	18	51
SI5A	**21**	**27,742**	**118**	**23**	**74**
			(OP: SM6JSM)		
SM5FUG	**1.8**	**20,352**	**312**	**10**	**54**

Switzerland

HB9FBS	**3.5**	**75,932**	**824**	**15**	**67**

Ukraine

UY5ZZ	**A**	**1,477,495**	**1815**	**115**	**430**
UR5QA	*	359,693	793	61	222
UT7UJ	*	313,124	450	94	277
UY7C	*	308,352	641	69	223
UR4U	*	42,757	126	61	108
			(OP: UR4UDI)		
UT3WX	*	35,075	215	28	87
UT7ET	*	22,673	368	14	65
UU2JQ	*	11,645	57	28	57
UT1IA	**28**	**12,127**	**138**	**14**	**53**
U5WF	**14**	**245,354**	**976**	**29**	**105**
UW5Q	**7**	**720,330**	**2279**	**38**	**157**
UU1CW	*	4,998	76	10	39
UR5E	**1.8**	**16,579**	**244**	**9**	**50**
			(OP: UR5EDX)		

OCEANIA

Australia

VK4AN	**21**	**436,494**	**1134**	**34**	**104**
VK1AA	**7**	**641,390**	**1469**	**35**	**120**
VK6DU	*	19,440	170	19	26

Hawaii

AH6NF	14	1,040	22	9	11

Indonesia

YB3MM	**A**	**55,297**	**193**	**41**	**80**
YB3IZK	*	299	21	9	14
YD0NGA	**21**	**11,592**	**98**	**12**	**34**

New Zealand

ZL1BYZ	**A**	**1,361,700**	**1628**	**98**	**202**
ZL2BSJ	*	**961,324**	**1392**	**85**	**181**
ZL1TM	*	728,676	769	102	249
ZL4PW	*	568,140	877	94	161
ZL1KMN	*	277,722	492	78	144
ZM3A	**7**	**981,392**	**2073**	**35**	**131**
			(OP: ZL3WW)		
ZL2IFB	**3.5**	**202,895**	**642**	**32**	**87**

Palau

T88FY	**A**	**1,900,398**	**2380**	**93**	**189**
			(OP: JK2VOC)		

Philippines

DX1M	**A**	**572,443**	**983**	**72**	**139**
			(OP: DL2JRM)		
DU1IST	**3.5**	**29,645**	**263**	**17**	**32**

SOUTH AMERICA

Argentina

LW5HBR	**21**	**45,952**	**291**	**19**	**45**

Brazil

PY2WC	**A**	**2,116,575**	**2044**	**119**	**290**
PY2IQ	*	165,600	395	50	110
PY5AKW	*	156,523	342	61	132
PY3OL	*	75,922	195	50	104
PY2MTV	21	9,296	66	19	37
PY2NQ	7	6	1	1	1
PY2EMC	**1.8**	**782**	**19**	**12**	**15**

Chile

CE4CT	**A**	**4,167,392**	**3138**	**120**	**376**
			(OP: XQ4CW)		

Colombia

HK3TU	**A**	**166,944**	**490**	**49**	**92**

MULTI-OPERATOR SINGLE TRANSMITTER

NORTH AMERICA

United States

K1IR	**4,497,520**	**2651**	**143**	**537**
K2LE/1	**4,092,351**	**2327**	**133**	**520**
W3UA/1	**4,030,332**	**2488**	**126**	**510**
W1HR	2,167,820	1486	116	419
K1KI	1,643,772	1137	118	415
W1FM	181,232	317	62	179
K2QMF	**3,854,796**	**2268**	**123**	**504**
W2ZQ	**2,797,092**	**1793**	**120**	**462**
N2LBR	865,280	782	95	321
N2KPB	630,264	414	78	234
NA2M	164,206	251	78	181
W3BGN	**5,606,054**	**2756**	**153**	**586**
K3MD	**1,827,900**	**1392**	**121**	**419**
W3LJ	328,925	451	74	221
KD3TB	100,800	243	54	146
KT3Y/4	**5,115,558**	**2987**	**138**	**513**
W3GQ/4	**1,437,856**	**1056**	**115**	**409**
K4FK	1,303,400	974	117	415
K4JLD	1,129,240	1002	102	334
AC4TT	405,576	561	84	260
K5NA	**3,301,641**	**1896**	**158**	**571**
K2BA/5	**2,146,716**	**1420**	**137**	**457**
KZ5P	443,625	555	88	237
W7DR/6	**942,456**	**1004**	**119**	**248**
W6YRA	17,384	92	39	43
W7VJ	**1,751,228**	**1474**	**132**	**334**
W9NGA/7	**1,176,020**	**1083**	**122**	**341**
WA7LT	515,242	773	97	201
AF7Y	64,875	177	60	113
K8AZ	**5,251,870**	**2752**	**153**	**557**
K8DO	262,773	432	78	213
WN9O	**1,759,998**	**1193**	**135**	**456**
KG9N	144,333	282	66	137
N0UV	1,764	26	14	22

Alaska

KL7CQ	**319,188**	**1243**	**52**	**82**

Canada

VE2DWA	88,550	295	54	100
VE3HG	**1,956,708**	**1996**	**106**	**346**
VE3YAA	**1,348,620**	**1878**	**90**	**274**
VE3CR	985,251	1108	94	299
VE3MIS	839,342	1192	91	268
VC6S	**1,266,911**	**1838**	**105**	**254**
VE6AO	359,653	971	59	132

Costa Rica

TI5N	**6,617,427**	**5361**	**133**	**458**

Jamaica

6Y1V	**10,377,640**	**6148**	**157**	**571**

San Andres/Providencia

5J0A	**5,634,708**	**5288**	**116**	**383**

AFRICA

Seychelles

S79UU	**5,249,490**	**4036**	**113**	**353**

South Africa

ZS1FZ	**819,766**	**1258**	**70**	**181**

ASIA

Asiatic Russia

RT9W	**7,277,550**	**4003**	**144**	**573**
RK9CWA	**4,441,080**	**3139**	**129**	**456**
RK9CWW	**4,415,580**	**2805**	**128**	**484**
RK9AWN	**3,958,722**	**2659**	**127**	**451**
UA9UZZ	3,327,104	2641	122	434
RK9LWA	3,179,232	2115	124	457
RK9CZO	3,052,758	2373	114	405
RU9SWW	2,824,640	2033	115	405
RZ9UWZ	1,094,058	1352	80	262
RU9UZM	915,525	1270	80	245
RK9XWO	893,669	1245	67	234
RK9JWV	872,074	1148	88	246
RK9CXC	602,330	883	77	258
RK9CYA	597,908	954	60	208
RK9SWF	144,705	354	42	123
RZ8LWA	**405,426**	**827**	**103**	**191**
RK8AWQ	3,813	61	11	20

China

B3C	**2,427,084**	**2539**	**130**	**356**
B1C	**81,280**	**485**	**60**	**100**

Cyprus

C4N	**17,015,112**	**7468**	**173**	**668**

India

AU1JCB	33,356	138	44	80

Israel

4X6O	**5,785,450**	**4047**	**125**	**425**

Japan

JA2ZJW	**1,519,380**	**1830**	**115**	**230**
JA3YKC	**507,484**	**816**	**99**	**190**
JJ3YBB	219,556	732	43	88

Qatar

8N7TU	**2,611,710**	**2237**	**147**	**363**
JA8RWU	**2,423,545**	**1952**	**147**	**338**
A71EM	**7,077,674**	**4285**	**150**	**524**

Vietnam

3W3W	**954,246**	**1566**	**85**	**229**

EUROPE

Belarus

EW8ZO	**84,040**	**359**	**45**	**146**
EW2ZC	1,410	31	7	10
EW8ZZ	736	23	13	19

Belgium

OT5P	**1,397,872**	**2458**	**94**	**298**

Bosnia-Herzegovina

T93M	**7,762,080**	**5185**	**170**	**654**

Bulgaria

LZ1ABC	**389,576**	**1000**	**53**	**180**
LZ1KSC	85,284	799	19	73

Croatia

9A7A	**10,575,896**	**6165**	**177**	**727**
9A1P	**9,331,833**	**5627**	**181**	**708**
9A8M	1,559,481	2159	108	363

Czech Republic

OK5W	**6,958,925**	**4207**	**175**	**690**
OL7R	**6,502,752**	**4370**	**161**	**643**
OL3Z	**6,036,642**	**4466**	**156**	**566**
OL1C	3,366,384	3210	126	476
OL7T	1,582,002	2087	107	430
OK6DX	1,222,175	1585	104	371
OL2U	681,274	1477	71	275
OL2A	194,740	528	55	159

Denmark

5P3WW	**2,271,032**	**3161**	**113**	**423**

England

G5W	**6,322,806**	**4502**	**153**	**621**
G8PZ	**5,893,052**	**4423**	**146**	**591**
G5XV	893,741	2157	70	253
M2T	14,694	137	28	65
M5T	5,668	133	34	75

European Russia

RT6A	**6,063,980**	**4685**	**169**	**661**
RL3A	**5,758,932**	**4325**	**168**	**654**
RT4M	**4,333,496**	**3436**	**157**	**582**
UA3R	2,904,600	3472	134	484
RK3QWW	2,267,460	2628	129	483
RW3WWW	2,073,890	2569	130	472
RT4D	1,890,800	2361	126	454
RK3QWM	721,305	1247	98	313
RK3DXS	466,823	929	74	269
RK3RWA	445,280	965	84	268
RK3DZF	357,889	808	71	230
RK4HYT	213,030	642	56	207
RZ3AWM	90,270	466	37	133
RK3AWK	41,118	286	32	122
RK3FWE	22,458	82	44	70

Finland

OF4A	**3,433,430**	**3308**	**152**	**534**
OF6M	**1,814,067**	**2231**	**116**	**455**
OH4XX	**1,160,397**	**1582**	**108**	**381**
OH2BJ	236,402	896	68	221

France

TM2Y	**6,564,192**	**4371**	**169**	**639**
TM2S	**4,848,102**	**3828**	**144**	**562**
TM4Q	**4,233,255**	**3830**	**139**	**524**
F6KNB	2,337,270	2809	108	353

Germany

DP4T	**6,465,756**	**4260**	**167**	**636**
DF3CB	**5,032,102**	**3296**	**162**	**637**
DR4A	**3,839,238**	**3239**	**157**	**545**
DP9A	3,215,788	2846	145	577
DA3A	2,825,104	2704	118	439
DR5N	2,105,075	2283	127	448
DL4WA	1,418,162	1770	108	413
DK8MN	1,043,860	1505	93	317
DF5RF	888,160	1414	98	357
DM5A	284,992	633	65	227

Greece

J42WT	**636,230**	**1553**	**72**	**226**

Hungary

HG1S	**7,654,339**	**5012**	**167**	**680**
HG6N	**6,822,816**	**4397**	**171**	**681**
HG6M	3,068,000	2899	146	504
HA6KZS	84,960	456	35	125

Iceland

TF4M	**819,322**	**1965**	**54**	**247**

Italy

IR4M	**6,935,280**	**4371**	**169**	**645**
IC8R	**3,311,790**	**3558**	**131**	**475**
IQ2LS	220,445	586	56	166

Kaliningrad

RW2F	**7,232,223**	**4936**	**174**	**683**

Latvia

YL1S	**648,969**	**1063**	**95**	**316**

Netherlands

PI4ZOD	28,290	240	30	93

Norway

LN8W	**4,280,736**	**3803**	**150**	**581**
LN3Z	**3,252,308**	**3279**	**137**	**540**

Poland

SO9Q	**3,955,566**	**3095**	**141**	**557**
SP7POS	**2,925,819**	**2553**	**143**	**520**
SN2K	**2,779,650**	**2317**	**151**	**559**
SN3T	854,742	1375	95	338
SN1I	357,294	868	73	256
SP9ZHR	351,946	695	68	254
SP9KRT	252,510	723	61	224

Romania

YR1C	**2,726,783**	**3673**	**117**	**376**

Scotland

MM8GPZ	**374,402**	**973**	**66**	**263**
MM0DWF	92,555	410	35	138

Serbia

YU7W	**565,995**	**1458**	**73**	**218**

Slovakia

OM8A	**10,127,145**	**5852**	**178**	**725**
OM7M	**8,529,392**	**5045**	**182**	**705**
OM3KWZ	937,344	1687	79	305
OM3KTP	240	19	3	13

Slovenia

S50G	**5,930,779**	**3968**	**160**	**649**

Spain

EA4OA	**288,530**	**762**	**72**	**233**

Sweden

7S2E	**2,614,704**	**3006**	**117**	**447**
SK3BG	33,535	180	24	71

Switzerland

HB9CIP	**2,138,292**	**2911**	**100**	**368**

Ukraine

UZ2M	**7,123,680**	**5057**	**178**	**695**
UT7L	**3,729,024**	**3300**	**156**	**591**
UT9FJ	2,241,577	2265	134	507
UW4E	1,218,228	1666	107	377
UT0AZA	1,148,206	1903	104	354
UW0L	543,486	984	86	293
UR6EO	199,000	594	61	189
UX4E	164,480	450	65	192
UR4PWC	4,720	55	10	26

OCEANIA

Guam

AH2R	**7,737,360**	**4461**	**157**	**451**

Hawaii

KH6MB	**2,094,944**	**2816**	**108**	**164**

New Zealand

ZL2AGY	**529,728**	**837**	**89**	**159**

SOUTH AMERICA

Argentina

LU1DK	**4,095,154**	**3040**	**135**	**376**
LU8YE	**2,495,625**	**2562**	**109**	**266**
AY7X	327,385	798	59	146

Brazil

PS2T	**14,239,493**	**6188**	**177**	**640**
ZY7C	**9,593,955**	**5318**	**151**	**536**
ZX3S	1,813,556	1791	107	297
PQ8KL	7,590	69	27	39

Uruguay

CX5BW	**6,995,640**	**4404**	**152**	**449**

MULTI-OPERATOR TWO TRANSMITTER NORTH AMERICA

United States

K1AR	**9,665,362**	**4599**	**163**	**631**
K1RX	**5,841,844**	**3294**	**150**	**566**
KØTV/1	4,633,848	2699	134	514
K2AX	**3,164,980**	**2050**	**128**	**483**
W2CG	**2,377,817**	**1595**	**121**	**456**
W2YC	2,047,908	1432	129	499
K2UA	1,259,190	930	114	396
N3RS	**10,871,328**	**5139**	**164**	**642**
WE3C	**9,374,886**	**4558**	**152**	**610**
NE3F	2,268,408	1709	119	445
K3DI	931,385	792	103	342
NY4A	**8,377,544**	**4498**	**143**	**566**
AI6V	**2,485,161**	**2151**	**137**	**350**
W6OAT	545,514	600	116	286
W7RN	**3,632,970**	**2701**	**151**	**394**
WC8VOA	**85,554**	**233**	**58**	**136**
W9MU	**881,166**	**790**	**112**	**362**
NØNI	**3,534,195**	**2124**	**150**	**529**
NØUJ/9	**1,502,033**	**1124**	**128**	**431**
KØDXC	46,452	163	52	106

Canada

VE7SV	**4,425,987**	**4361**	**133**	**338**
VE7GL	**2,712,406**	**3377**	**113**	**270**

Cayman Islands

ZF1A	**16,198,712**	**9981**	**148**	**564**

Dominican Republic

HI3A	**18,467,722**	**10600**	**160**	**594**

Montserrat

VP2MSC	**3,068,480**	**3340**	**104**	**342**

Turks & Caicos

VP5W	**12,017,160**	**8350**	**139**	**509**

U.S. Virgin Islands

KP2M	**10,082,510**	**7533**	**132**	**458**

AFRICA

Canary Islands

EF8M	**27,660,420**	**11849**	**171**	**678**

Cape Verde

D4C	**23,954,832**	**10894**	**161**	**631**

Madeira Islands

CT9L	**17,428,866**	**8836**	**146**	**553**

ASIA

Asiatic Russia

RK9CWB	1,485	23	9	18

China

B7P	**4,219,101**	**4036**	**134**	**375**
B4B	**420,510**	**1149**	**75**	**139**

Cyprus

P3F	**20,466,448**	**9377**	**163**	**629**

Japan

JA1YPA	**1,461,513**	**1914**	**104**	**217**
JR1CBC	1,073,189	1229	127	276
JA6ZPR	**1,026,033**	**1139**	**121**	**260**

Thailand

HSBAC	**1,456,320**	**1882**	**125**	**319**

EUROPE

Balearic Islands

EA6IB	**14,179,922**	**9632**	**173**	**684**

Bosnia-Herzegovina

T93J	**9,674,577**	**6625**	**184**	**685**

Denmark

OZ5E	**3,729,890**	**3891**	**138**	**532**

England

G5O	**2,985,462**	**3609**	**117**	**432**

European Russia

RU1A	**9,424,382**	**6342**	**185**	**701**
RK4WWF	1,312,850	2398	91	343

Finland

OF5Z	**4,856,088**	**4700**	**153**	**579**

France

F5ODA	**905,160**	**1976**	**94**	**286**

Germany

DQ4W	**6,634,400**	**4719**	**165**	**635**
DLØCS	**5,440,680**	**4373**	**157**	**608**
DLØAO	4,405,220	3297	149	591
DKØED	1,457,064	1798	103	401
DLØWH	476,280	727	88	290

Italy

IR4X	**12,704,006**	**7316**	**179**	**719**

Jersey

GJ2A	**4,866,763**	**4736**	**134**	**537**

Luxembourg

LX7I	**8,286,410**	**6294**	**159**	**622**

Macedonia

Z37M	**8,601,198**	**6931**	**167**	**619**

Norway

LA8G	101,702	297	52	189

Portugal

CS5NRA	**388,877**	**1545**	**48**	**185**

Serbia

YU1ARC	**2,287,190**	**2795**	**118**	**403**

Slovenia

S52ZW	**5,803,138**	**4594**	**159**	**578**

Spain

EE2W	**8,790,136**	**7113**	**158**	**575**
AM5R	**5,387,556**	**5422**	**134**	**502**

Sweden

SK5M	**4,722,525**	**4643**	**144**	**551**

Switzerland

HB9CT	**6,621,460**	**5488**	**146**	**564**

Wales

GW8GEI	**2,228,490**	**3123**	**109**	**395**

OCEANIA

Hawaii

KH6LC	**8,379,000**	**6341**	**155**	**320**

Philippines

DX1DBT	157,200	525	45	75

South Cook Islands

E51A	**5,968,604**	**5452**	**140**	**248**

SOUTH AMERICA

Argentina

LT1F	**11,817,362**	**6588**	**161**	**501**

Galapagos Islands

HC8N	**28,736,800**	**11915**	**181**	**669**

Netherlands Antilles

PJ2T	**20,759,622**	**9741**	**160**	**607**
PJ4A	**20,715,138**	**10165**	**152**	**575**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

United States

W3LPL	**13,939,191**	**6322**	**175**	**698**
K3LR	**13,247,624**	**5782**	**179**	**705**
KC1XX	**12,761,902**	**5982**	**171**	**667**
NO4I	**9,702,672**	**4969**	**167**	**637**
K1TTT	**9,144,404**	**4583**	**162**	**640**
W2FU	**7,830,540**	**4043**	**156**	**609**
NR4M	**6,930,000**	**3770**	**158**	**592**
W3PP	6,239,482	3436	145	574
K5GO	**6,150,760**	**3566**	**163**	**607**
KB1H	6,083,392	3324	151	583
W4MYA	**5,742,647**	**3027**	**153**	**590**
KØRF	**5,443,026**	**3059**	**170**	**561**
W8AV	**3,747,769**	**2226**	**147**	**550**
N6RO	**3,554,880**	**3155**	**155**	**405**
WØAIH/9	**2,350,135**	**1701**	**145**	**490**
KD1EU	1,583,225	1234	116	429
W6UE	266,500	451	82	178

Canada

VE7UF	**1,935,594**	**2411**	**106**	**276**

Grenada

J3A	**15,100,800**	**9690**	**151**	**553**

AFRICA

Canary Islands

ED8A	**18,146,604**	**9296**	**147**	**551**

Guinea

3X5A	**36,547,280**	**14642**	**181**	**699**

ASIA

Asiatic Russia

RWØA	**4,938,228**	**3913**	**142**	**470**

China

B1Z	**4,441,444**	**4743**	**135**	**373**

Japan

JA5FDJ	**10,382,375**	**5473**	**186**	**569**
JA3YBK	**9,627,104**	**5147**	**181**	**571**

EUROPE

Austria

OE2S	**7,640,938**	**6032**	**164**	**654**

Bulgaria

LZ9W	**16,177,421**	**10816**	**186**	**737**

European Russia

RK4FWX	**812,040**	**1673**	**82**	**253**

Finland

OF2BAH	**1,236,663**	**1705**	**104**	**335**

Germany

DFØHQ	**13,115,189**	**8694**	**181**	**756**
DR1A	**11,909,092**	**7901**	**176**	**716**
DK3W	1,283,927	1552	100	399

Lithuania

LY7A	**5,508,506**	**5843**	**151**	**588**

Netherlands

PI4ZI	29,356	266	36	128

Sweden

SK3W	**6,449,720**	**5778**	**156**	**610**

Ukraine

UV2L	**1,484,850**	**2264**	**116**	**405**

OCEANIA

Australia

VK2ATZ	**2,231,704**	**2498**	**102**	**230**

Hawaii

KH7X	**11,469,537**	**7127**	**178**	**413**

CHECK LOGS

The following logs were used as check logs. Check logs are always appreciated: 4Z5MU, 4Z8DT, AB3AI, BD3BSV, DD5KG, DF9KF, DH5MM, DJ3RA, DK3RED, DLØXM, DL1DUO, DL1KLO, DL1LRA, DL1RNT, DL1VRL, DL2WRJ, DL4SVA, DL6AP, DL6DSA, DL7HT, DL7VAF, DL7VBJ, DL8WBB, EA2RU, EA7GBD, EW3WO, GØKDZ, G3RWL, G3UHU, HA1SN, HB9EP, HS0GBI, J45KLN, JAØHC, JA3YPL, JY4NE, K2QD, K4DXU, K9MI, KJ6YK, LA4NE, LA4RT, LA8HGA, LA9Z, LY2BWL, LY3BY, LZ2RS, NØFW, N1NN, N5AU, N5ESA, N7UA, N9LF, N9SF, NN3W, NX2PX/W4, OGØZ, OHØMM, OH1PY, OH2BAI, OH3WD, OH5PT, OK1DMP, OK1DSU, OK1KT, OK1KW, OK2BDF, OK2SG, OK7RJ, OL5Q, OM4F, ON7SS, OZ1TL, OZ7YL, PAØRBO, PHØAS, RA4HO, RA4NAJ, RA4UVK, RA6FV, RK3SWB, RL3DF, RL3WX, RL3ZZ, RN3AKK, RN6FK, RU1AT, RU6DI, RU6YY, RV3FU, RV3PN, RW0BG, RW3CW, RW6AF, RX6AY, RX9WN, RZØAF, RZ3DSN, RZ3FW, SF7WT, SJ4F, SK5PZ, SM5APS, SM5ENX, SM5GMZ, SM6BSK, SP1DMD, SP2EXE, SP2FOV, SP3AMZ, SP4GDC, SP4KDX, SP5ELM, SP5ICS, SP6CZ, SP7CVW, SP7FGA, SP7GAQ, SP7JLH, SP7XK, SP8AJK, SP8HKT, SP9CVY, SQ1BVG, SQ2DYL, SQ2GXO, SQ6MS, UA1AKE, UA1AUW, UA1OM, UA2FT, UA3AVR, UA3MNB, UA4NU, UA4WLI, UA9CCL, UA9CEP, UA9JJG, UA9MD, UN7TS, UT1IWA, UT3NF, UT7WZ, UT8LO, UUØJC, UV3RT, UW7W, UX1IL, W5ZH, WS4C, YL2PJ, YL2TD, YO2GL, YO3FF, YO4AB, YO4DIJ, YO6LV.

Oops...

We had a city substitution in K8ZT's WPX crossword puzzle (July issue), which may have caused some head-scratching. What should have been Bucharest (in YO) appeared as Budapest (in HA), making for some clue confusion. We apologize for the error.

ham shop

Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are $1.00 per word. Boldface words are $1.50 each (specify which words). Minimum charge $2.00. No ad will be printed unless accompanied by full remittance. All ads must be typewritten double-spaced.
Closing Date: The 10th day in the third month preceding date of publication (example: Jan. 10th for the March issue). Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of *CQ* cannot vouch for the merchandise listed therein. The publisher reserves the right to reject any advertisement. Direct all correspondence and ad copy to: CQ Ham Shop, 25 Newbridge Road, Hicksville, NY 11801 (fax: 516-681-2926; e-mail: <hamshop @cq-amateur-radio.com>.

CB-TO-10M CONVERSIONS: Frequency modifications, FM, books, plans, kits, high-performance CB accessories. Catalog $3. CBCI, Box 30655CQ, Tucson, AZ 85751. <www.cbcintl.com>

At **www.HamRadioExpress.com** we know you can't afford to waste time looking for Ham Radio Antennas & Accessories. With **over 3,000 products in our four warehouses**, you can rely on **Ham Radio Express** to have the parts you need, in stock, especially those special, hard-to-find parts, fixed station antennas, baluns, mobile antennas, mobile antenna mounts, accessories, and RF connectors. **Custom Built Cable Assemblies** for your Packet TNC/KPC to radio interface devices. We stock interface cables for all amateur radio makes and models: AEA, Kantronics, MFJ, PacComm, and more Packet Controllers. All cables are in stock or can be built in one day. All cable assemblies are double-checked before they are shipped. Toll-Free Order Lines: M–F 9 AM to 4 PM: **1-800-726-2919** or **1-866-300-1969**; Fax **1-434-525-4919**. **Help and Tech Support:** *Not sure what model you need?* At **www.HamRadioExpress.com** our Technical Support staff (1-434-509-4666, 9 AM to 4 PM weekdays) can help you decide what you need, and all available for same-day shipment. On-line visit: **www.HamRadioExpress.com**

QSLing SUPPLIES. e-mail: <plumdx@msn.com>.

QSLs FOR DX STATIONS: Our new "International Division" was established to handle QSL needs of DX hams. We understand the problems of packaging, shipping, and dealing with the customs problems. You can trust us to deliver a quality QSL, usually much cheaper than you can find locally. Write, call, or FAX for free samples and ordering information. "The QSL Man—W4MPY," 682 Mount Pleasant Road, Monetta, SC 29105 USA. Phone or FAX 803-685-7117.

"QRZ DX"—since 1979: Available as an **Adobe PDF file** each Wednesday or by regular mail. Your best source for weekly DX information. Send #10 SASE for sample/rates. **"The DX Magazine"—since 1989:** Bimonthly – Full of DXpedition reports, QSL Information, Awards, DX news, technical articles, and more. Send $3.00 for sample/rates. DX Publishing, Inc., P.O. Box DX, Leicester, NC 28748-0249. Phone/Fax: 828-683-0709; e-mail: <DX@dxpub.com>; WEB PAGE: <http://www.dxpub.com>.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

TRYLON SELF-SUPPORTING TOWERS: Delivered **ANYWHERE** in the US for **ONLY** $261.00. This is the **BEST** tower value around – 96 feet for only $2451.00 **DELIVERED TO YOUR QTH!** Go to <www.championradio.com> or call 888-833-3104 for more information.

MAUI, HAWAII: vacation with a ham. Since 1990. <www.seaqmaui.com>, telephone 808-572-7914, or <kh6sq@seaqmaui.com>.

ALUMINUM CHASSIS AND CABINET KITS, UHF-VHF Antenna Parts, Catalog. E-mail: <k3iwk@flash.net> or <http://www.flash.net/~k3iwk>.

NEAT STUFF! DWM Communications— <http://qth.com/dwm>

NAME BADGES BY GENE: In full color, our artwork or yours. See our web page for samples and prices. **www.hampubs.com** Harlan Technologies 815-398-2683.

REAL HAMS DO CODE: Move up to CW with **CW Mental Block Buster III.** Succeed with hypnosis and NLP. Includes two (2) CDs and Manual. Only $29.95 plus $5.00 s/h US. FL add $2.14 tax. Success Easy, 160 West Camino Real #128, Boca Raton, FL 33432, 800-425-2552, <www.success-is-easy.com>.

WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear—new, old, in any condition—to the Radio Club of Junior High School 22, the Nation's only full time non-profit organization working to get Ham Radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 28th year of service. It is always easier to donate and usually more financially rewarding, BUT MOST IMPORTANT your gift will mean a whole new world of educational opportunity for children nationwide. Radios you can write off; kids you can't. Make 2008 the year to help a child and yourself. Write, phone, or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Twenty-four hours call 516-674-4072; fax 516-674-9600; or e-mail <crew@wb2jkj. org>. Join us on the WB2JKJ Classroom Net, 7.238 MHz, 1200–1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 1:00–3:00 PM Eastern. Sr. Noreen Perelli, KE2LT, 2755 Woodhull Ave., Bronx, NY 10469.

PHASED ARRAY NETWORKS by COMTEK SYSTEMS deliver gain and front to back. Call 704-542-4808; fax 704-542-9652. COMTEK SYSTEMS, P.O. Box 470565, Charlotte, NC 28247.

HF VERTICAL COMPARISON REPORT: K7LXC and NØAX test Cushcraft, Butternut, MFJ, Force 12, Hustler, Gap, and Diamond verticals. 64-page report includes protocol, data sets, and summaries. $17 plus $4 s/h. <www.championradio.com>, 888-833-3104.

3200+ DIFFERENT AWARDS from 128 DXCC countries. Complete data online at <http://www.dxawards.com>. One year full access just $6. Ted Melinosky, K1BV, 12 Wells Wood Road, Columbia, CT 06237-1525.

CASH FOR COLLINS, HALLICRAFTERS SX-88, & DRAKE TR-6. Buy any Collins equipment. Leo, KJ6HI, phone/fax 310-670-6969, e-mail: <radioleo@earthlink.net>.

MicroLog by WAØH
Free download . . . www.wa0h.com

advertiser's index

now including websites

10-10 International Net, Inc.	31	www.10-10.org
A&A Engineering	99	www.a-aengineering.com
Advanced Specialties Inc.	99	www.advancedspecialties.net
Alinco	3	www.alinco.com
Alpha Delta Communications, Inc.	69	www.alphadeltacom.com
Ameritron	27	www.ameritron.com
Amidon Associates	107	www.amidon-inductive.com
Antique Radio Classified	95	www.antiqueradio.com
Array Solutions	85	www.arraysolutions.com
Astron Corporation	63	www.astroncorp.com
Atomic Time, Inc.	70	www.atomictime.com
BATTERIES AMERICA/Mr. Nicd.	115	www.batteriesamerica.com
Bilal Co./Isotron Antennas	79	www.isotronantennas.com
Buddipole Antennas	47	www.buddipole.com
Butternut Antennas	65	www.bencher.com
CQ Amateur Radio Calendars	46	www.cq-amateur-radio.com
CQ Bookstore	60	www.cq-amateur-radio.com
Cable X-PERTS, Inc.	111	www.cablexperts.com
CheapHam.com	97	www.CheapHam.com
Clear Signal Products, Inc.	95	www.coaxman.com
Coaxman, The	95	www.coaxman.com
Comet Antennas/NCG	43	www.natcommgroup.com
Command Productions	73	www.LicenseTraining.com
Communication Concepts, Inc	91	www.communication-concepts.com
Cutting Edge Enterprises	79	www.powerportstore.com
DX4WIN (Rapidan Data Systems)	74	www.dx4win.com
DZ Company	99	www.dzkit.com
Daytona Sensors LLC	91	www.daytona-sensors.com
Diamond Antenna	51	www.diamondantenna.net
FlexRadio Systems	11	www.flex-radio.com
Green Heron Engineering LLC	21	www.greenheronengineering.com
Ham4Less.com	99	www.ham4less.com
Hagerty Radio Company	73	www.wa1ffl.com
Ham Radio Outlet	12,116	www.hamradio.com
Ham Station	97	www.hamstation.com
HamTestOnline	113	www.hamtestonline.com
Hy-Gain	1,9	www.hy-gain.com
ICOM America, Inc	55,57,101,Cov IV	www.icomamerica.com
KJI Electronics, Inc.	99	www.kjielectronics.com
Kenwood U.S.A. Corporation..	Cov. II	www.kenwoodusa.com
LDG Electronics, Inc.	19	www.ldgelectronics.com
MFJ Enterprises, Inc.	25,37	www.mfjenterprises.com

our readers say

Making His Day... and Ours

Editor, *CQ*:

In the Dr. Haseltine interview article published in the April issue, Dr. Haseltine mentions a Lloyd Brubaker, WA6KZV, as one of his mentors. The attached letter to *CQ* was written by Lloyd's daughter Sherry, and she has asked me to send it on to you.

Harry Hodges, W6YOO

Editor, *CQ*:

My dad taught junior high science for 30-plus years. Besides science he also taught ham radio. The printing of the article on Dr. Eric Haseltine, AB3DI (April 2008) was a real "day maker" for Dad, right up there with ham radio calls followed by, "Mr. Brubaker, is that you?" Dad, the Lloyd Brubaker Eric had as a science teacher way back in junior high, has been sharing these kinds of success stories with his ham buddies, fellow teachers, and friends. "This," he says, "is what made teaching worth while."

Dad, now retired from teaching, has spoken of the fondly of his Haseltine students (dinner table conversation not withstanding), stating that he always knew each would go on be a success in their chosen field.

Thank you, for printing the article and making Dad's day.

Sherry Brubaker
Daughter of Lloyd Brubaker, WA6KZV

Those *CQ* Interviews

Editor, *CQ*:

Some hams can really be boring sometimes. I refer to those complaining about the excellent feature interview articles you have been doing with hams in senior positions. My favourite of these articles so far was the story on Mr. Scott Redd, who is burned into my memory banks as XE1IIJ (was his mentor KH6IJ?) from my early operating years. These articles are probably the most interesting journalism that has appeared in any amateur radio magazine in recent years. The reason? They tell the human side of the story of successful hams who should be our role models instead of just talking about components and schematics. Keep using your gut to decide what is best to publish and don't always listen to what some readers say.

Murray Lycan, VE7HA/7J1AQH

And for a different point of view...

Editor, *CQ*:

I'm really surprised you published Jim Aguirre's comments (Our Readers Say, April 2008) on your chronic publishing of long interviews with government officials. I agree with Jim completely. These articles are too long, boring, and mostly irrelevant. I have nothing against the individuals you interview, but much of what you print has nothing to do with amateur radio. You could sum up such interviews in a quarter-page article and then use the saved space to talk about radio.

How about it? Can we see more articles on the technical and operational aspects of radio? ... Forget the useless narratives and gross generalizations that we see too much of in magazines like yours. Let's see some block diagrams, schematics, and photos of actual stuff for a change. Thanks for listening.

Whitham Reeve

RTTY vs. CW

Editor, *CQ*:

I love *CQ* magazine, however I want to comment on an article in the May edition: CQ WW RTTY DX Contest. There is nothing wrong with RTTY; however, did anyone forget that there are avid CW operators on (e.g.) 7.025 to 7.060 MHz? When these guys come on, they have no regard for us CW guys . . . since many of us non Extra Class operators are [barred from] the lower, lower ends of these bands, why can't these guys do their RTTY thing, say, from 7.050 up? Also, isn't it time that the FCC eliminates the lower end of the CW bands exclusively to Extras, since there is no longer a CW requirement? We need the room. I was hoping you guys could start a petition to the FCC to do that. I personally have no idea how to petition the FCC to make those changes so we all can have more room.

In summary, it's awful listening to big RTTY signals battling it out with CW guys during these many RTTY contests. By the way, I operate CW only!

Don Lampkin, WA2HMB

W2VU replies: It seems that operators of whatever mode is *not* having a contest on a given weekend object to the "interference" caused by operators participating in whatever contest it happens to be. All of our frequencies are shared, and it is the responsibility of all hams to make sure they are not interfering with other stations. While there are recommended "centers of activity" for certain modes, when activity rises above a certain level, people spread out. RTTY activity is legal on all CW subbands. A contest sponsor may suggest certain frequencies (we generally recommend compliance with established band plans) but it is impossible to enforce any limitations of the use of specific frequencies.

The Extra Class subbands have nothing to do with whether there is a code test. They are additional frequencies granted in recognition of the additional work a licensee has done to study and upgrade his/her license.

advertiser's index

now including websites

It's easy to advertise in CQ. Let me know what I can do to help.
Don Allen, W9CW
(217) 344-4570 or FAX (217) 344-4575
e-mail:ads@cq-amateur-radio.com
Please direct subscription questions to 516-681-2922

12 STORE BUYING POWER

HAM RADIO OUTLET

WORLDWIDE DISTRIBUTION

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

BURBANK, CA
1525 W. Magnolia Blvd, 91506
(818) 842-1786
(800) 854-6046
Eric, K6EJC, Mgr.
Magnolia between
S. Victory & Buena Vista
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102, 94085
(408) 736-9496
(800) 854-6046
Dan, K6DN, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
newcastle@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Leon, W7AD, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
John, N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

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

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

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Chuck, N1UC, Mgr.
sales@hamradio.com
Exit 1, I-93;
28 mi. No. of Boston
salem@hamradio.com

HRO Specials & Yaesu coupons good thru 10/31

YAESU

FT-897D VHF/UHF/HF Transceiver

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

Call Now For Our Low Pricing!

FT-950 HF + 6M TCVR

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

NEW!

Call Now For Low Pricing!

FT-8800R 2M/440 Mobile

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

Call Now For Low Pricing!

Competitive pricing!

VX-3R 2M/440 HT

- Ultra-Compact Dual-Band HT w/ Wide band RX
- 1.5W RF out 2m/ 1w RF out 440
- WiRES Compatible
- 1000 Memory channels
- AA Battery compatible w/Optional FBA-37

NEW!

Call For Low Intro Price!

FT-60R

- 2m/440 HT
- 5W Wide-band receive
- CTCSS/DCS Built-in
- Emergency Auto ID

Low Price!

VX-7R/VX-7R Black

50/2M/220/440 HT

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

Now available in Black!

VX-6R

2M/220/440HT

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

NEW Low Price!

VX-150

2M Handheld

With new high capacity battery!

- Direct Keypad Entry
- 5w output
- 209 memories
- Ultra Rugged

Call Now For Special Pricing!

FT-857D

Ultra compact HF, VHF, UHF

with FREE YSK-857

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

Call for Low Price!

FT-7800R 2M/440 Mobile

FREE YSK-7800

- 50w 2m, 40w on 440mHz
- Weather Alert
- 1000+ Mems
- WIRES Capability
- Wideband Receiver (Cell Blocked)

Call Now For Your Low Price!

FT-2000/FT2000D HF + 6M tcvr

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

Call For Low Pricing!

NEW!

FT-450AT HF + 6M TCVR

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

Call Now For Special Pricing

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

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

#1 in Customer Service

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

Ride Cycle24 to the Top with Yaesu

Photograph depicts after-market keyboard, keyer paddle, and monitor, not supplied with transceiver. Display image simulated and may differ in actual use.

HF/50 MHz Transceiver
FT DX 9000MP
Two Pairs of Meters, plus LCD Window; Data Management Unit and Flash Memory Slot Built In. Main/Sub Receiver VRF, plus Full Dual Receive Capability, External 50 V/24 A Switching Regulator Power Supply and Speaker with Audio Filters

Display color (Umber or Light Blue) may be selected at the time of purchase. Modification from 400 to 200 W not possible.

HF/50 MHz Transceiver
FT DX 9000D 200 W Version
Large TFT, Data Management Unit and Flash Memory Slot Built In, Main/Sub Receiver VRF, plus Full Dual Receive Capability, Three µ-Tuning Modules for 160 - 20 M, 50 V/12 A Internal Switching Regulator Power Supply

HF/50 MHz Transceiver
FT DX 9000 Contest
Custom-Configurable Version
Two Pairs of Meters, plus LCD Window, VRF Input Preselector Filter, Three Key Jacks, and Dual Headphone Jacks, 50 V/12 A Internal Switching Regulator Power Supply

Display color (Umber or Light Blue) may be selected at the time of purchase. Modification from 200- to 400-Watt version not available.

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

Shown with after-market keyboard, and monitor (not supplied).
Optional Data Management Unit (DMU-2000)

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

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

"The Best of the Best Just Got Better"

Contact Dennis Motschenbacher K7BV at k7bv@vxstdusa.com for details

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

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

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

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

D-STAR:
CONNECT ACROSS MILES INSTEAD OF METERS!

ANALOG + DIGITAL
All in one!

D-STAR optional

IC-2820H & UT-123

D-STAR UPGRADEABLE 2m & 70cm & GPS MODULE AND ANTENNA

- 50/15/5 Watt Output Power
- RX: 118-173.995, 375-549.995, 810-999.99MHz**
- Analog/Digital Voice with GPS (Optional UT-123)
- 500 Alphanumeric Memory Channels
- Diversity Receive Capable

DIGITAL

D-STAR ready

IC-92AD & HM-175GPS

MILITARY RUGGED AND SUBMERSIBLE

- 5/2.5/0.1 Watt Output Power
- RX: 0.495-999.990MHz**
- Shown with Optional GPS Speaker Mic (HM-175GPS)
- 1304 Alphanumeric Memory Channels
- IPX7 Submersible*

ANALOG + DIGITAL
All in one!

ID-RP2C
REPEATER CONTROLLER

The cornerstone of the D-STAR system. Handles up to four RF modules. Basic in-band or cross-band operation. Linking capabilities through the internet and future 10GHz backbone products.

ID-RP2D
1.2GHZ DATA MODULE

Access point with a data rate of up to 128kbps. Depending on the system setup, set up an email and/or file server for EmComm support. Perfect for web applications or support via internet connection.

ID-RP2V
1.2GHZ DIGITAL VOICE MODULE

ID-RP2000V
2M DIGITAL VOICE MODULE

ID-RP4000V
70CM DIGITAL VOICE MODULE

Finally, commercially available crossband systems! Together, with proper call sign programming in any D-STAR compatible mobile or portable, the Icom D-STAR system will automatically route your signal to any other RF module connected to a common RP2C. With simple system commands, you can direct your communications through any of the RF modules or across the world via the gateway.

Visit your Icom dealer today!

Free literature: 425.450.6088

or www.icomamerica.com

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

ICOM