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Amateur Radio

COMMUNICATIONS & TECHNOLOGY

CQ

SEPTEMBER 2005

FLASH! FCC Calls for End to Code Testing! See pg. 8

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1945 *Our 60th Anniversary* 2005

On the Cover: Brian Neilson, W7BJN, and Leigh Ann James, W7LEA, at their QSL-vered shack in Moses Lake, Washington. etails on page 84.

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RADIO AMATEUR'S JOURNAL

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For a limited time only, purchase the TM-D700A along with an AvMap GPS and save $60.00 instantly.

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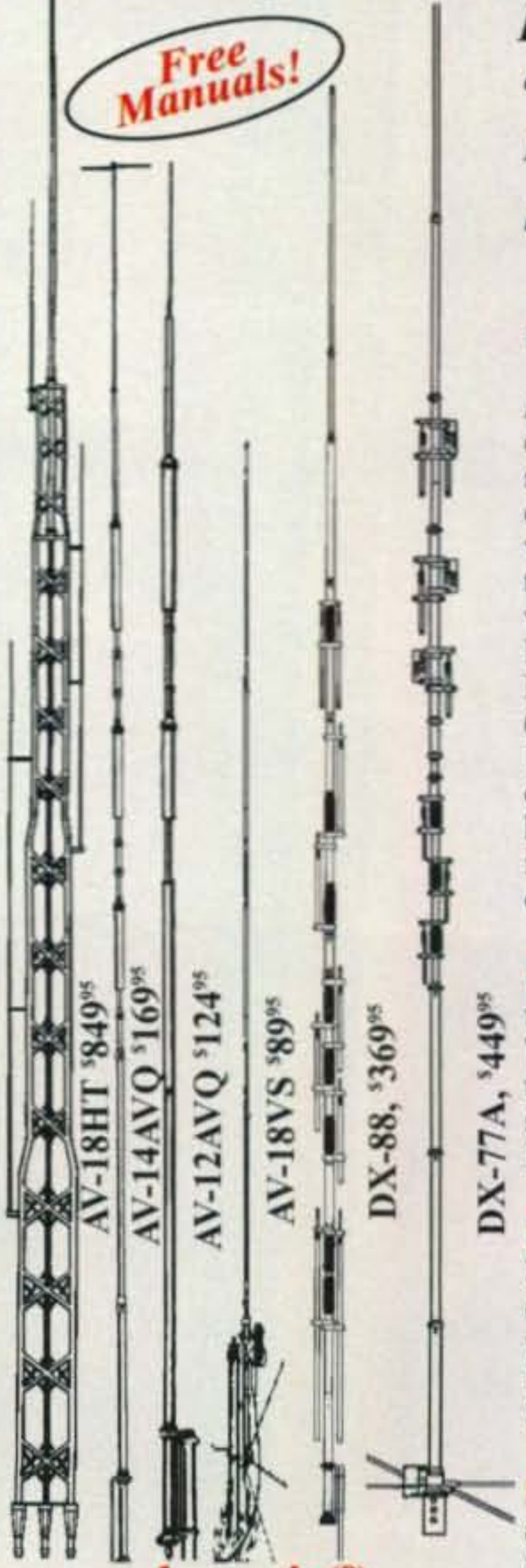
Self-supporting -- no guys required . . . Remarkable DX performance -- low angle radiation, omnidirectional . . . Handles 1500 Watts . . . Low SWR . . . Automatic band switching . . . Aircraft quality aluminum tubing . . . Stainless steel hardware . . . Recessed SO-239 connector . . . Two year limited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



hy-gain(R) Classics

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

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

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

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

AV-18HT, $849.95. (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, $89.95. (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, $189.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

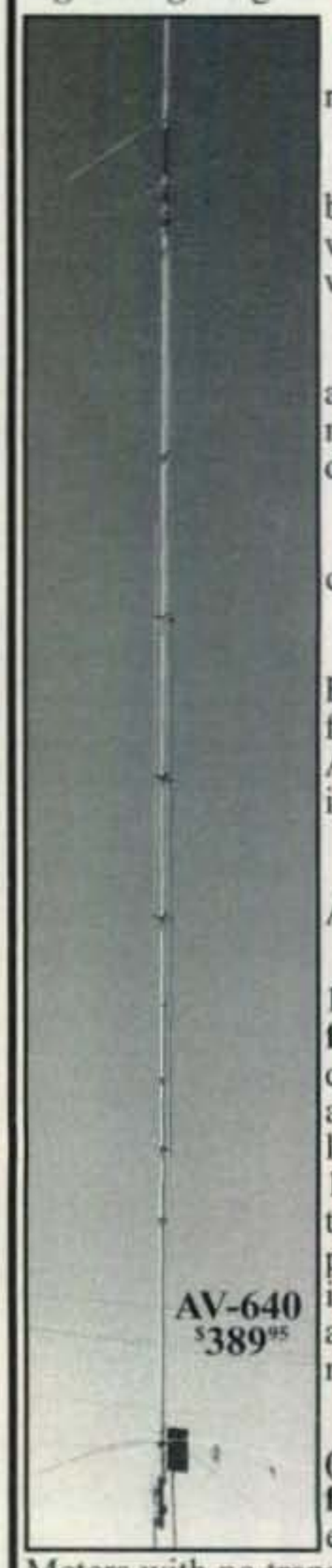
DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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	$849.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph w/ guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph w/ 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, $389.95. (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, $289.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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Are you still out here?!?

With two DSP processors , 100 Watts of output power, and a 2.5" color TFT display that you can watch TV on, it's no wonder you're in the doghouse. Introducing the new IC-7000*. Coming soon to your authorized Icom dealer.

*This device has not been approved by the FCC. It may not be sold or leased, or offered for sale or lease, until approval by the FCC has been obtained. Covers VHF TV band - NTSC M or PAL B depending on version. Not available in all versions.

INTRODUCING THE NEW IC-7000

HF/6M @ 100W (40W AM), 2M @ 50W (20W AM), 70CM @ 35W (14W AM) • DSP² - Dual DSP Processors

• Digital IF Filters • Twin Pass Band Tuning • Multiple AGC Loops • MNF² - Dual Manual Notch Filters

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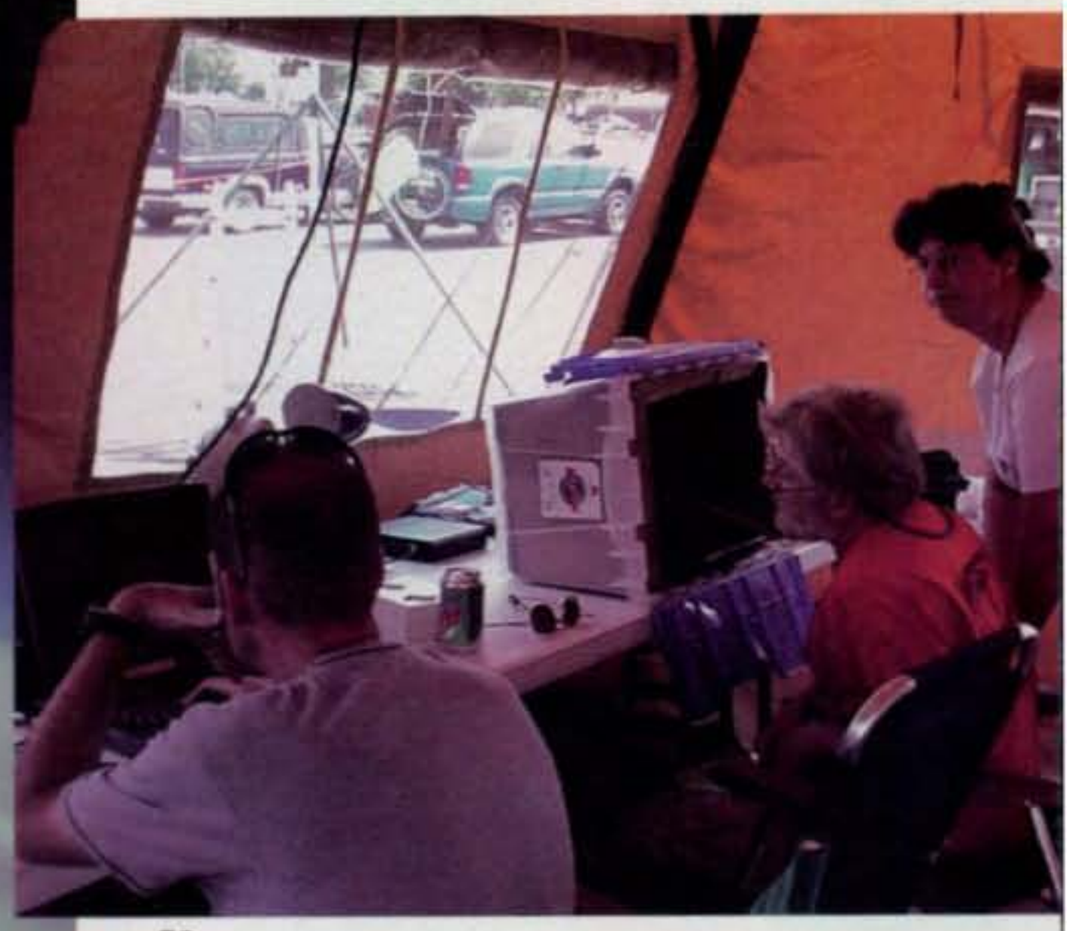

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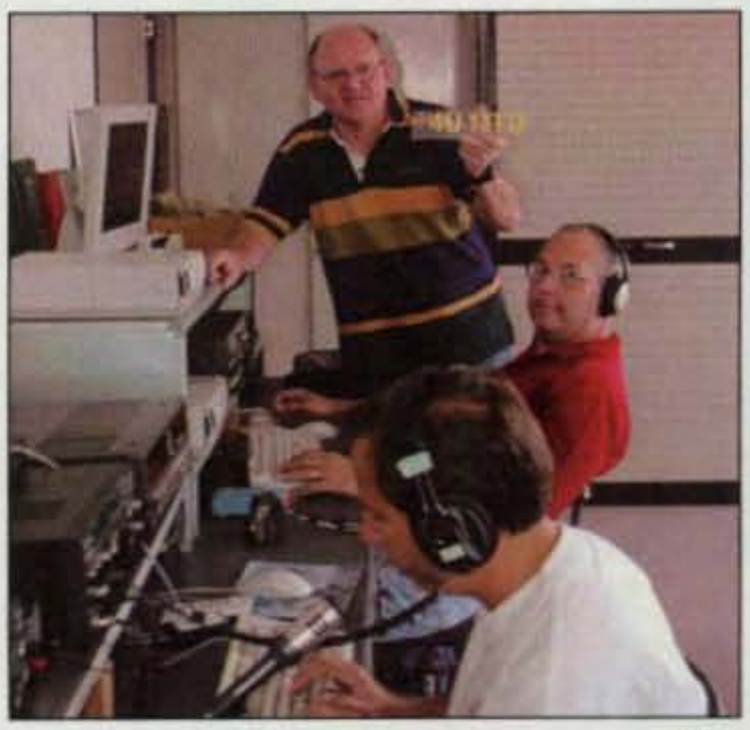

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departments

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

TAILTWISTER SERIES II

T-2X
$649.95

T-2XD
$1029.95
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 (in lbs.)	1000
Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
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 (in lbs.)	600
Brake Power (in lbs.)	**800**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	22
Effective Moment (in tower)	**1200 ft/lbs.**

HAM-V

HAM-V
$949.95
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!*

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.

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 (in lbs.)	350
Brake Power (in lbs.)	**450**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight (lbs.)	14
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 (in lbs.)	5000
Brake Power (in lbs.)	**7500**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight (lbs.)	61
Effective Moment (in tower)	**5000 ft/lbs.**

Digital Automatic Controller

DCU-1
$649.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1 degree 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
$69.95

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.

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TCXO DSP 60 m Band

HF/VHF/UHF Multimode Mobile Transceiver, now Including Built-in DSP and 60-Meter Coverage!

FT-857D

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

DSP 60 m Band

REAL PERFORMANCE, REALLY PORTABLE

FT-817ND

HF/50/144/430 MHz
5 W All Mode Transceiver (AM 1.5 W)

60 m Band

Automatic Matching for FT-897/857 Series Transceivers

- Operational on 1.8 – 54 MHz when used with 66' (or longer) wire, or 7– 54 MHz with standard 8.2' whip antenna (wire/whip antenna not supplied).
- Required Drive Power: 4 – 60 Watts. Maximum TX Power: 100 Watts.

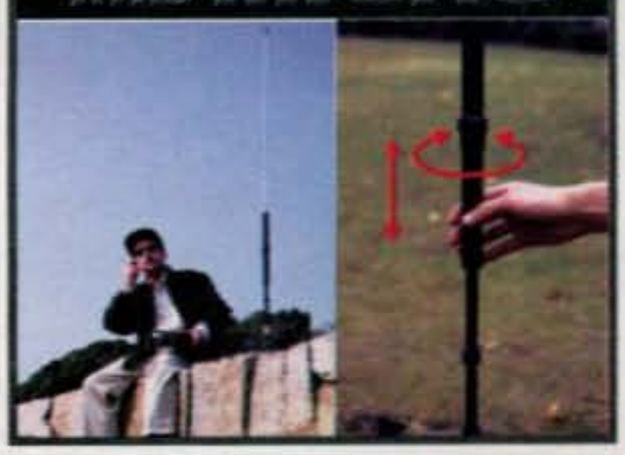
FC-40
Automatic-Matching 200-Memory Antenna Tuner

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

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

ATAS-25
Manually-Tuned Portable Antenna

ATAS MICRO



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WIRES-II

Wide-Coverage Internet Repeater Enhancement System

VoIP BRINGS AN EXCITING NEW DIMENSION TO LONG-DISTANCE COMMUNICATION!

If your club uses two or more repeaters to cover a wide area, these repeaters may be linked, using WiRES-II, to yield multi-site coverage as though it were one repeater. Now your hand-held or mobile can be your link to the world!

Thanks to the flexibility of the WiRES-II operating modes, you can operate in a closed system of selected node stations, or you may open your repeater to access by other WiRES-II nodes anywhere in the world, depending on your preferences.

Work Worldwide DX from Your Hand-held!

Because of the large user base, you can enjoy DXing while driving to work, or from your back yard, using your hand-held radio; our VoIP technology brings you to other WiRES-II users worldwide. Just call CQ, and you will be heard in London, Tokyo, or Miami, with audio quality identical to what you'd enjoy in a local simplex contact. But thanks to VoIP, this excellent quality can be enjoyed even though the stations are separated by thousands of miles!

Minimal Equipment Requirements.

Once you set up WiRES-II in your station or repeater, all you need for access is the DTMF pad on your radio. The system will work with any DTMF-equipped rig.

Simple Configuration and Easy Set-up.

Yaesu's experienced engineering team has made the computer interface box HRI-100 easy to set up and easy to operate, thanks to user-friendly software. The configuration requirement for WiRES-II is only a personal computer with sound card, HRI-100, mobile radio, and an Internet line; we recommend a DSL or ISDN line. WiRES-II updates for more features are occasionally provided by Yaesu, and are free of charge to download from the Yaesu Web site.

Expand the coverage area of your hand-held or mobile with WiRES™-II.

WiRES-II can link repeaters and base stations anywhere, using our advanced VoIP technology. Expand your club repeater's range across the nation, or even to Europe and Asia.

YOU'RE READY FOR EVERYONE-OR A SELECT FEW. WIRES-II OPEN ARCHITECTURE LETS YOU DECIDE.

Friends' Radio Group (FRG) connects multiple repeater sites using VoIP Internet linking, allowing you to communicate with anyone, anywhere.

Sister Radio Group (SRG) gives you more exclusivity, letting you limit the sites you want to talk to.

WIRES™-II Amateur Radio Internet Linking Kit

HRI-100 Interface Box (Requires 12 V DC Input)

Components

- AP01 CD-ROM (Including Manual)
- Power Cable
- Data Cable (RS-232C DB-9 Plug)
- Data Cable (8-pin Mini-DIN Plug)
- Audio Cable (3.5 mm Plug) (2)
- WiRES™-II User/Server Agreement
- •Optional Accessory: NC-72B AC Adapter

Work the world from your HT or mobile with WiRES™-II

- •Yaesu's advanced, high-quality VoIP Internet linking system.
- •Easy connections to your PC.
- •No subscription fees.
- •Link repeaters across the continent or around the world.
- •Excellent voice quality.
- •Worldwide DX coverage: Nodes in over 700 locations worldwide.

(*some repeaters are for exclusive use only (SRG) and may not be accessed).

Free Original WiRES-II Cap

with V/UHF FM Transceiver or HRI-100 purchase

Buy a new VX-7R/VX-6R/FT-60R/VX-2R/VX-120/VX-170/FT-8900R/FT-8800R/FT-7800R/FT-2800M/HRI-100 between now and September 30, 2005 and receive an original WiRES-II Cap free! See your Authorized YAESU Amateur Products Dealer for details.

WiRES™-II Internet Linking System Requirements

- •HRI-100 interface with AP CD-ROM software, data cable, audio cables.
- •Compatible UHF transceiver or repeater.
- •Intel MMX200 MHz CPU or faster.
- •An Internet connection (56 K dial-up, ISDN, DSL, etc).
- •Microsoft Windows 98SE or later operating system.
- •30 MB of hard drive space.
- •64 MB of RAM (or more).
- •CD-ROM drive.
- •Monitor with 256-bit color, 640 x 480 support on video card.
- •Modem (for dial-up connections).
- •Sound card with 8 kHz sampling rate (some cards may not work).

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WiRES™ E-Mail Inquiries: wires@vxstdusa.com

Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Check with your local Yaesu Dealer for specific details.

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FCC Proposes End to Code Tests

The FCC has proposed eliminating Morse code testing as a requirement for any class of U.S. amateur license. In a Notice of Proposed Rule Making (NPRM) issued in mid-July, the FCC said that comments already received indicated that the majority of amateurs support eliminating the code test for the General Class license and added that it believes maintaining code exams for Extra Class "would not be in the public interest." The Commission declined to propose any additional changes suggested—including two proposals for a new entry-level license class—in any of the 18 petitions received after the International Telecommunications Union (ITU) dropped the international requirement for Morse code proficiency as a condition of issuing ham licenses with privileges below 30 MHz.

The NPRM is WT Docket 05-235, and may be downloaded in Adobe Acrobat format at <http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-143A1.pdf>. The NPRM may also be downloaded in Word and text formats by substituting .doc or .txt for .pdf in the above address. Comments may be filed for 60 days after publication in the Federal Register (which hadn't happened as of press time), with an additional 15 days for reply comments.

The FCC's proposal was released just as this issue was about to go to press. *CQ* will provide full coverage of the proposal and initial responses in next month's issue.

Senator Praises Ham Radio in Magazine Article

U.S. Senator Michael Crapo (R- Idaho) has written an article praising amateur radio in a Capitol Hill magazine, and urging support for the Amateur Radio Spectrum Protection Act of 2005, of which he is the Senate sponsor. According to the *ARRL Letter*, Crapo's article, titled "Amateur Radio: A Voice in the Storm," appears in the July 13 issue of *The Hill*, a magazine for and about Congress. In the article, Crapo notes that "Amateur Radio still serves a vital purpose, especially in our post Sept. 11 world," but points out that since 1982 hams have lost 107 MHz of spectrum, "the equivalent of 18 television channels," and that an additional 145 MHz are in danger of being reallocated. Crapo's bill, S-1236, which is identical to a House version (HR-691) introduced by Florida Rep. Michael Bilirakis, would require the FCC to provide hams with "equivalent replacement spectrum" anytime current amateur frequencies are reallocated. The bill is in committee in both the House and Senate. The ARRL has been urging hams to contact their Congressional representatives to urge their support of the bills and to move them out of committee to a vote. Crapo's article is available online at <http://www.thehill.com/thehill/export/TheHill/News/Frontpage/071305/ss_crapo.html>.

BPL Gets Big Corporate Boost

Three big names in corporate America are throwing a ton of cash into Broadband over Power Lines, or BPL, the high-speed internet technology that uses electric lines for transmission, and which hams have argued will cause unacceptable interference across the HF spectrum. According to *Newsline*, search-engine king Google, investment bankers Goldman Sachs, and publishing mogul Hearst Corporation are jointly investing $100 million in BPL operator Current Communications Group, based in Germantown, Maryland. A company spokesman said the cash would help Current roll out BPL services more quickly. No comment so far from the ARRL.

ARRL Board Adopts Modified Bandwidth Regulation Proposal

The ARRL Board of Directors made minor modifications in its planned FCC petition on subband regulation by bandwidth rather than by mode, and authorized its Executive Committee to approve the final wording and submit the petition to the FCC. According to the ARRL, the Board devoted most of its discussions to this issue at its July meeting, and decided to increase its proposed maximum bandwidth for signals below 29 MHz from 3 kHz to 3.5 kHz and to define "maximum permitted bandwidth" in terms of *necessary* rather than *occupied* bandwidth. It retained an exception for double-sideband AM with a maximum bandwidth of 9 kHz but dropped an exception for Independent Sideband (ISB). The modified plan also includes a stipulation that the ARRL will begin working promptly on "a procedure to establish a band plan to be utilized with the proposed subband allocation petition," and that current band plans would remain in place until a new set is adopted.

(Continued on page 98)

WG4Y Named Young Ham of the Year

Rebekah Anne Dorff, WG4Y, has been named Newsline Young Ham of the Year for 2005. Dorff, age 12, of Hoover, Alabama, holds an Extra Class license (which she earned at age 9) and earned the ARRL's DXCC Award by age 10. Rebekah is the ARRL Assistant Section Manager for Youth Activities in Alabama, led a toy drive for her state's victims of Hurricane Ivan last year, and founded a kids' net and the Birmingham Amateur Radio Kids' Club.

The award, sponsored by Amateur Radio Newsline, with corporate underwriting from Vertex-Standard and *CQ* magazine, was to be presented at this year's Huntsville Hamfest, where Rebekah has also participated in several forums in recent years.

2005 Newsline Young Ham of the Year Rebekah Anne Dorff, WG4Y, at the 2004 Dayton Hamvention®. (W2VU photo)

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.

Orientation

zero bias — a CQ editorial

BY RICH MOSESON,* W2VU

My son, Dan, is beginning college this month and I've been amazed at how the process has changed since I started college 33 years ago. First of all, there *is* a process. When I went to school, the only communications I had from the university after I told them I was coming were when to show up and when they had to have your money. It's very different now.

First of all, college admissions has become a two-way street. We started hearing from college—even colleges we'd never heard of —as far back as 10th grade. As soon as the college Dan chose received his acceptance of its admission offer (and our deposit), he was notified of required pre-orientation, placement testing, honors program orientation and general new student orientation (a two-day overnight event). He was also encouraged to choose a "learning community" with students who share similar interests.

According to the *Detroit Free Press,* a 2003 study by the National Resource Center for The First Year Experience and Students in Transition showed that nearly two-thirds of more than 600 schools contacted have some form of program in place for first-year students. Today, according to Tracy Skipper, the Center's Editorial Projects Coordinator, 75–90% of college campuses have a first-year seminar course, which she says "prepare students academically for college-level work, helps them make social contacts, and introduces them to the academic culture—such as what professors expect and how to succeed."

Is all this really necessary? Or is it another example of society "dumbing down" standards and coddling kids? Dr. Larry Kruse, Vice President for Student Services at Cameron University in Oklahoma, says it *is* needed, noting that "we have a huge dropout problem" in American colleges. The goal of these programs, he says, is "keeping students in school and allowing them to be successful, giving them the tools to navigate through higher education."

Not So New After All

According to Dr. Randy Swing, Co-Director and Senior Scholar at the Policy Center on the First Year of College (an offshoot of the National Resource Center with the too-long name), some new-student programs actually go back to the 1800s, when college generally was only for the children of the elite and nearly everyone who attended graduated. "The college president generally did the seminar," explained Swing. "He ... would try to get these unruly young men to think about their place in the world."

The goals of these programs changed with changing times, he noted, explaining that the end of World War II and the G.I. Bill changed the picture of who went to college. "We started to see higher education move toward ... 'massification,' or mass higher education," Swing continued. "Colleges were no longer working with only the elites, so failure rates climbed."

The current movement toward new-student orientation and first-year seminars started in the late 1970s and 1980s, when, according to Skipper, "a series of reports (came out) on how higher education was failing college students ... students weren't staying." As a result, she said, colleges started paying more attention to the students, especially incoming freshmen.

Swing says it was more a matter of economics at that time - we were at a low point in the number of high school graduates in the population (before the baby boomers' children started reaching college age) and there was more competition among the colleges for students. "Colleges wanted to make sure that their recruiting dollars were put to the best use by keeping as many students as possible to graduation." Demographics have changed again and high school graduates are now plentiful again, Swing noted, but said that "even today, about half of all students entering college will graduate from a different school than the one where they start out ... (a college's) big investment in recruiting a student doesn't pay off if the student transfers or drops out."

Do these programs succeed? That depends on who you talk to. A 1996 paper written for the ERIC Clearinghouse for Community Colleges in Los Angeles cited a North Carolina study that "found that completion of an orientation program during the first term of enrollment promotes and improves student performance regardless of age, gender, race, major, entrance exam scores, or employment status." Yet the National Resource Center's Skipper said that while research has pointed to higher retention rates and higher grades among students who take new-student seminars than those who don't, overall retention rates have not really changed. On the other hand, she says, most universities with first-year programs perceive them to be successful and plan to continue them.

The current focus of orientation programs, says Swing, has moved away from trying to teach practical skills like note-taking toward motivation and goal-setting, "getting them to decide that they want to be successful college students," adding, "Once they've made that decision, we've found that they can learn the skills on their own." Swing points out that the latest approach to new-student programs is really the first that's actually trying to benefit the student rather than the school.

And the Ham Radio Connection?

So what's the ham radio connection? I hadn't realized there was one until I was listening to a fellow panelist on the Newsline Ham Radio Town Hall forum at this year's Dayton Hamvention®. Dee

(Continued on page 98)

FCC Code Proposal

The FCC's proposal to eliminate the code test requirement for all classes of amateur licenses (see News, page 8) came out just as we were going to press. We'll provide full coverage of the proposal and early responses to it next month, after we've had a chance to carefully read and digest the entire proposal.

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

announcements

• The following special event stations are scheduled for Sept.:

N2UL, from CQ Labor Day celebration, Nutley, NJ; Robert D. Grant United Labor ARA; 0400–2300Z Sept. 5 on 28.420, 14.260, 7.260, 449.975 MHz. For certificate QSL to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

W2IK/WTC911, to honor vistims and workers of 9/11, proposed site San Antonio 9/11 Memorial, Texas; W2IK in conjunction with Radio Operators of South Texas; Sept. 11, 8 AM to 10 PM EST near 14.250 and 7.230 MHz. For certificate send 9×12 SASE and QSL to Callbook/ QRZ address of W2IK.

W5SLA, from 41st anniversary of Ozone ARC, Slidell, LA; 1000–1900Z Sept. 17 on 14.250 and 7.250 MHz ±QRM. For QSL, send QSL and SASE to Michael White, 404 Holmes Dr., Slidell, LA 70460.

W6A–W6Q, from 6th annual Route 66 On the Air (15 clubs across the U.S. and two rover stations participating); 0001Z Sept. 10 to 2400Z Sept. 18; SSB and CW freqs. from 3.566–28.466 MHz. For more info and QSL route go to the Citrus Belt ARC website, <www.qsl.net/w6jbt>.

W6APD, from POW-MIA Recognition Week, Anaheim, CA; Anaheim Police ARC; Sept. 11–18 on 14.253, 18.150, 21.350, 28.450 MHz. QSL with SASE to Mark McMullen, KM6HB, P.O. Box 27271, Santa Ana, CA 92799.

KE4ZXW, from celebration of ten years of VASC AR Group radio communications exhibit at the Virginia Air & Space Center, Hampton, VA; Sept. 18–24 on the hour and half hour on 7.265, 14.265, 28.365 MHz. For certificate send QSL and SASE to Ed Brummer, W4RTZ, 108 Oyster Cove Rd., Yorktown, VA 23692.

W7PX, from Lewis & Clark Expedition Bicentennial, Lolo Pass, ID; Hellgate ARC; 1500Z Sept. 10 to 0000Z Sept. 12 on 7.255, 14.255, 21.355, 28.355 MHz. For certificate send QSL and $2.00 to HARC, P.O. Box 3811, Missoula, MT 59806-3811.

KB8UUZ, from POW/MIA Recognition Day, Freedon Township, OH; 1200Z Sept. 16 to 0100Z Sept. 19 on 7.265, 14.265, 21.365, 28.365 MHz. For 8-1/2 × 11 certificate send QSL and SASE to Tom Parkinson, 9992 State Route 700, Mantua, OH 44255.

W9BXR, from from 50th anniversary of the Montgomery County AR Emergency Corp., Hillsboro, IL; 1400–2000Z Sept. 24 on 7.270, 14.270, 21.340, 18.150, 146.820 MHz. For certificate send 9×12 SASE and $1.00 to Judy Reynolds, 620 Chase St., Hillsboro, IL 62049.

W9JOZ, from Hoosier Valley Railroad Museum, North Judson, IN; Starke County ARC; 1300–2100Z Sept. 10 on 7.240, 14.240 MHz. QSL with SASE to W9JOZ, Starke County ARC, 405 W. Jackson St., Knox, IN 46534.

VE3MIS, from Halton County Railroad Museum, Milton, ON, Canada; Mississauga ARC; 1400–2000Z Sept. 24 & 25 on 7.227, 14.240, 21.315, 28.480 ±QRM. For QSL send QSL (non-Canadians need to send 2 green stamps or 2 IRCs) to MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Crescent, Mississauga, ON, Canada L5N 1X6.

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

Sept. 3, **Uniontown ARC Gabfest,** club grounds, Old Pittsburgh Rd., Morgantown, WV. Contact Carl, WA3HQK, 304-594-3779. (Talk-in 147.045+)

Sept. 3–4, **Shelby Hamfest,** Cleveland County Fairgrounds, Shelby, NC. For info go to <http://www.shelbyhamfest.org>.

Sept. 9–11, **ARRL Southwestern Division Convention**, Riverside Convention Center, Riverside, CA. For info: <http://arrlswdconv.org>.

Sept. 10, **Grand Rapids ARA Hamfest,** Kent County Fairgrounds, Lowell, MI. Contact Jack Amelar, NY8D, e-mail: <grahamfest05@w8dc.org>, evenings 616-897-6885, <http://www.w8dc.org/swap.htm>. (Talk-in 147.26+ [94.8 Hz], 146.52; exams 10 AM)

Sept. 10–11, **Melbourne Hamfest,** Melbourne Auditorium, Melbourne, FL. Contact Jeff Hildreth, 321-258-7065 or 321-258-4943, or e-mail: <hamfest@pcars.org>; <www.pcars.org> (Talk-in 146.850–)

Sept. 11, **Findlay Radio Club Hamfest,** Hancock County Fairgrounds, Findlay, OH. Contact Bill Kelsey, N8ET, 3521 Spring Lake Dr., Findlay, OH 45840 (419-423-5643); <www.findlayradioclub.org>. (Talk-in 147.150, 444.150)

Sept. 17, **Kingman Hamfest,** Mohave Community College, Kingman, AZ. Contact Bill Beaman, KAØIYS, 928-758-6780. (Talk-in 146.76, PL 131.8; exams)

Sept. 17, **Northern Colorado ARC Fall Hamfest,** McMillen Building, Loveland, CO. Contact Willis Whatley, WA5VRL, 970-407-6599, e-mail: <willis.whatley@AEI.com>; <www.qsl.net/ncarc>. (Talk-in 145.115 [–100 Hz CTCSS], 146.520; exams 10 AM sharp)

Sept. 17, **Rhode Island Amateur FM Repeater Service Fleamarket & Auction,** VFW Post 6342, Forestdale, RI. Contact Rick Fairweather, K1KYI, e-mail: <k1kyi@arrl.net>, phone 401-864-9611 (7–8 PM only).

Sept. 17, **W9DXCC Convention & Banquet,** Holiday Inn, Elk Grove Village, IL. Contact Mark Potter, W9UZ, e-mail: <w9uz@arrl.net>, phone 630-682-4678; <www.w9dxcc.com>.

Sept. 17, **Radio Amateurs of Greater Syracuse Hamfest,** Pompey Hills Fire Dept., Syracuse, NY. Phone 315-698-4558, e-mail: <www.ragsonline@hotmail.com>; <www.ragsinreview.com>. (Talk-in 147.90/30; exams 11 AM)

Sept. 17–18, **ARRL Roanoke Division Convention/Virginia Beach Hamfest,** Conventions Virginia Wesleyan College, Roanoke, VA. Go to: <http://www.vahamfest.com>.

Sept. 18, **LIMARC 40th Anniversary Dinner-Dance,** Maine Maid Inn, Jericho, NY. Contact Diane Ortiz, K2DO, e-mail: <K2DO@limarc.org>.

Sept. 18, **Western CT Hamfest,** Edmond Town Hall, Newton, CT. Contact Bill Schaefer, N1PJG, 203-798-2831.

Sept. 24, **Elmira International Hamfest/Computerfest,** Chemung County Fairgrounds, Horseheads, NY. Info: <http://www.arast.org>.

Sept. 25, **LIMARC Hamfest,** Briarcliffe College, Bethpage, LI, NY. Info: <http://www.limarc.org/fest.htm>.

Sept. 30–Oct. 2, **2005 Pacific Northwest VHF+ Convention,** Shilo Inn and Oceanfront Resort, Seaside, OR. Info: <www.pnwvhfs.org>.

A publication of

CQ Communications, Inc.
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Hicksville, NY 11801 USA.

Offices: 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. CQ (ISSN 0007-893X) is published monthly by CQ Communications, Inc. Periodical postage paid at Hicksville, NY 11801 and additional offices. Subscription prices (all in U.S. dollars): Domestic-one year $31.95, two years $57.95, three years $83.95; Canada/Mexico-one year $44.95, two years $83.95, three years $122.95; Foreign Air Post-one year $56.95, two years $107.95, three years $158.95. 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. 2005. CQ does not assume responsibility for *unsolicited* manuscripts. Allow six weeks for change of address.

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AL-1500

$3045

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AL-1200

$2645

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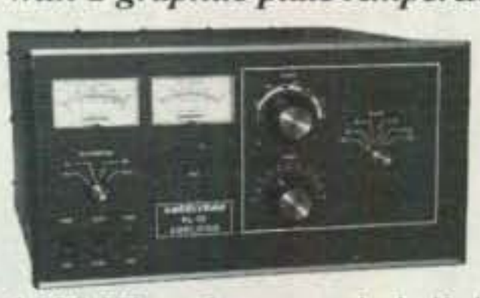
with 2 graphite plate Amperex (R) 3-500G tubes



AL-82

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Results of the 2004 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 these additional and expanded elements of this year's CQ WW results, go to <http://www.cq-amateur-radio.com/cqwwhome.html>, then click on "Expanded results, 2004 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, 2004 CQ WW CW."

The sunspots were really going down and depressed conditions were expected for the 2004 CQ WW DX CW Contest. What happened gives truth to the saying "The CQ WW makes its own propagation." The 2004 CW test was a real surprise. Yes, conditions were suppressed. The CQ WW was not. The 2004 contest marks the highest number of submitted CW logs in radio history. Over 4040 logs were received. Contesters got in on the action in droves from all over the world.

New records were set. Hundreds of contesters left home to try an adventure from a DX location. The CQ WW is a fantastic competition, and it brings out the best in operators. Months of preparation, trying out new antennas and equipment, and finally the celebration of ham radio skill and effort come to fruition during 48 fun-filled hours. If you operate in the CQ WW, you can't lose. It draws you in with its siren call. As has often been said, it's a world-wide party . . . and all of you are invited!

All Band, High Power

The category that has always stood high on the prestige ladder is Single Operator, All Band, High Power. It is really tough. D4B operated by Al, 4L5A, took the top prize. Almost everyone is now familiar with D4B's big signal and operating skill (http://www.qsl.net/d44tt). Al is an enthusiast contester. He had to retire from the contest late on Sunday because of illness. However, he still managed to take first place! EA8ZS operated by many-time world champion Jose, CT1BOH, took the number two position (http://www.qsl.net/ct1boh). Jose was signing "dit dit" after every QSO as a thank you to Aruba (P40E and P43E). Third place went to Scott, KØDQ, who operated at P40Q (P43P's QTH).

Randy, K5ZD/1, pushed the pedal to the floor and took the number one position in the U.S. (http://www.k5zd.com/). His skill plus station allowed him to edge out Pat, N9RV, from Indiana (http://www.qrz.com/n9rv). Pat lost most of antennas soon after the contest and hopefully they will be rebuilt by the 2005 contests. Third place was taken by Alex, LZ4AX, operating from the Penn State station of K3CR (http://www.clubs.psu.edu/up/k3cr/).

In Europe it was a real fight. After detailed log checking, CT8T, operated by OH1NOA, was declared the winner. Second place went to GI1W with GIØNWG at the key, and third place went to RK4FF. The number one scorer from the far west U.S. was Glenn, K6NA, followed by Steve, N2IC/5, from SW New Mexico.

Special mention should be made of A45XR, 6W1RW (F6BEE), S9A (OH2PM), and 9M6NA (JE1JKL). They made the maximum effort from rare locations.

The continental winners were: North America 8P5A (W2SC), USA K5ZD/1, Africa D4B (4L5A), Asia A45XR, Japan JH4UYB, Europe CT8T, Oceania 9M6NA (JE1JKL), South America P40Q (KØDQ).

All Band, Low Power

Running barefoot is fun. Most of the entrants in the CQ WW run 100 watts or less. The Low Power category is the largest by far. To win this category for your country is not easy. Winning for the world is *very* difficult. Reprising his win from SSB was Thomas, SU9NC. He was easy to work and active on all bands. In addition, he set a new Africa low power record. Second place went to long-time low power advocate Joe, AA3B, who pushed V26K up the rankings. Third place went to CT9M (http://www.ct3ee.net) operated by Jon, KL2A (http://www.kl2a.com/). Special mention is made of 3V8SQ operated by DL2OBF, who finished fourth in the world.

The number one score in Europe and number six in the world was CT7B, operated by 18-year-old Felipe, CT1ILT. CT1ILT is a callsign to keep your eyes on. He is going places (http://ct1ilt.cybton.com/)! Another Iberian peninsular station took second-place honors; Manuel, EA7RM, also pushed the key to ninth place in the world. Third place in Europe went to Goran, YT7AW, who operated from 4NØW. In the U.S., Michael, W1MU, led the pack with 2.2+ million points. Second was Ed, N1UR, and third was Marvin, N5AW.

The continental winners were: North America V26K (AA3B), USA W1MU, Africa SU9NC, Asia UO2M (UN7MO), Japan JI1RXQ, Europe CT7B (CT1ILT), Oceania VK2IMM, South America XQ4ZW.

QRP

If you want to practice your contesting skills, the QRP category is the way to do it. Finding new stations and knowing when to call a station or give up and move on are what QRP is all about. It is surprising what you can work with 5 watts. If you want to improve your contesting skills, the QRP category could be the refresher course you need. The number one score was John P40A (KK9A). Travelling to a great location and placing a great op behind the key resulted in the biggest small signal in the contest. Second place went to Bosko, YT7TY, located at the Serbian-Hungary border. He took top honors in Europe. You had to travel to the beautiful country of Costa Rica to find TI5N operated by NØKE, who finished number three worldwide (http://www.qsl.net/ti5kd/contest.htm). KT8X , operated by KK8I (aka DL2HBX), Uli, took top U.S. honors. Almost breaking a thousand QSOs in the small-signal category means you are doing something right. Taking second place was Tom, N4KG, from northern Alabama. Bill, N8ET, took third place. In Europe, YT7TY took top honors. Second place went to HG5Z operated by HA1CW, and third to LY4XX (LY2MW; http://www.qsl.net/ly2mw/).

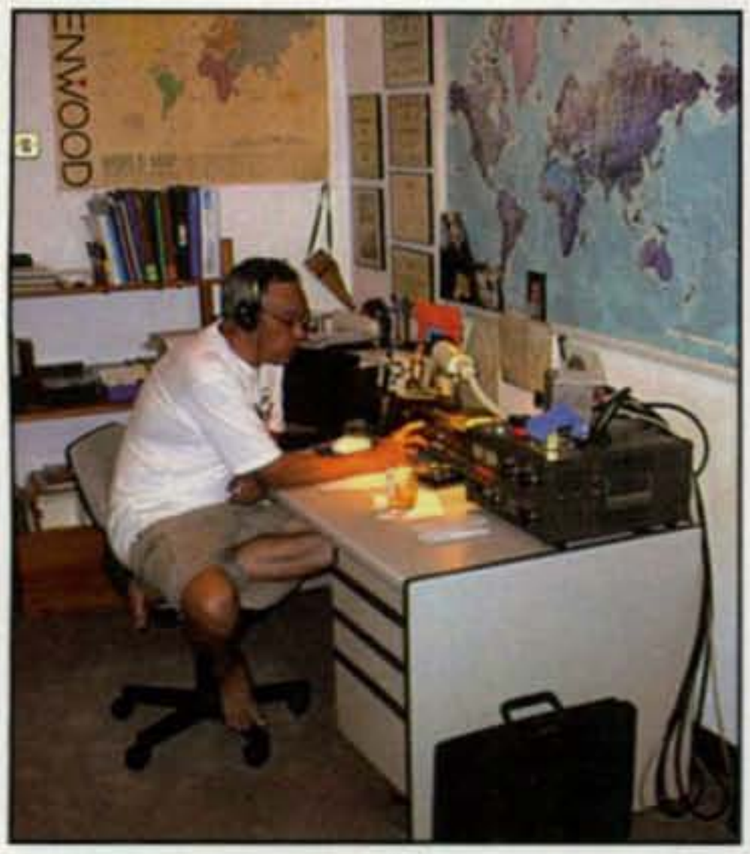
The continental winners were: North America TI5N (NØKE), USA KT8X (KK8I), Africa no entry, Asia UA9SG, Japan JR4DAH, Europe YT7TY, Oceania VK8AN, South America P40A (KK9A).

4M5X, operated by W4SO.

Assisted

When a single op receives QSO/multiplier spotting assistance from some source in any form, he or she is in the Assisted category. There are lots of reasons to try the Assisted category, and helping your club is one. You have to make the best use of spots without it affecting your QSO total. This is not easy to do. This year's world top scorer was 9Y4ZC, operated by Bernd, DL6FBL. Bernd did so well that he keyed his way to a new world record. Second place went to 5B/AA1TN, and third place went to John, W2GD, who put P40W through a workout. Way over in Tanzania, Mas made a lot of people happy as 5H3KK. Contesting from Germany`s

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



Chris, A45SR, put Oman on the map.

most southern corner, Manfred, DJ5MW, submitted the the number one score from Europe (http://www.dj5mw.de). Two Zone 16 callsigns battled for second and third place. Finishing number two was Vlad, RX4HZ. Third place in Europe was taken by UW8M, operated by UR5MID (http://uw8m.narod.ru/index.html).

If you are familiar with U.S. Assisted operators, you know the callsign K3WW. This year Charlie again took the top spot as number one USA (http://www.k3ww.com/). Not too far away geographically was Noah, K2NG, who took second place. The third-place position went to NI1N located in southwestern Virginia.

The continental winners were: North America K3WW, USA K3WW, Africa 5H3KK (JE3MAS), Asia 5B/AA1TN, Japan JF1PJK, Europe DJ5MW, Oceania VK1AA, South America 9Y4ZC (DL6FBL).

Multi-Single

Each year contesters band together and travel to compete in a multi category, of which Multi-Single is the most popular. A real battle occurred in this category in the 2004 contest. Three FB stations with top operators went head to head. Three different continents took top honors. Putting Aruba on the map, P40L was a three-man team from northern California. They keyed their way to the top. Second place went to EA6IB located on Ibiza among the Balearic islands. Ideally located from a holiday and contesting perspective, EA6IB is always loud (http://www.qsl.net/ea6ib). Third place went to long-time Asian top scorer UA9AYA. Located on the outskirts of Chelyabinsk, UA9AYA put Zone 17 in a lot of logs.

The top Oceania score was the Japanese team at AH2R. They set a new Oceania record. Another team that deserves special mention is the Russian team at 8Q7DV (http://www.fotki.com/8q7dv). They provided a double multiplier for lots of people. First place in Japan was JA7YAA, who took away the combined SSB/CW MS trophy (http://www.ja7yaa.org.tohoku.ac.jp/index.html).

The number one scorer in Europe was the above-mentioned EA6IB. That team was followed by two Slovakian teams. At number two in Europe was the HF contest station situated in the heart of Europe, OM7M (http://www.qsl.net/om7m). They started seriously operating MS in 1999 and their results prove their skill. Just a little behind in third place was OM8A (http://www.qsl.net/om8a).

In the U.S. the number one score was submitted by K1IR. Jim's team from Sudbury, Massachusetts led all the rest to reach the top of the scores list. Second place went to K8AZ. Tom's crew is always competitive and his northeastern Ohio station did its usual fine job. Third place in the U.S. went to W2FU in New York.

The continental winners were: North America VP2MZM, USA K1IR, Africa C91F, Asia UA9AYA, Japan JA7YAA, Europe EA6IB, Oceania AH2R, South America P40L.

Multi-Two

The M2 category continues to grow in popularity. You have to have a good plan and operators if you want to try for the top spot. You cannot do better than to set a new world record the first time you enter a new category. The multinational team of HC8N would make Darwin proud, as it evolved to new heights and set a new Multi-Two world record. Operating from the heights of an extinct volcano with antennas really in the clouds, HC8N is to be congratulated (http://hc8n.info/). The Caribbean Contesting Consortium, PJ2T, took second place from the island of Curacao (http://www.pj2t.org). Third place went to CT9L representing the Rhein-Ruhr DX Association team. Three European teams have taken up the M2 challenge. Finishing number one was club station RU1A. Founded in 1956, this callsign has been a beacon from northern Europe. Did you ever wonder where IQ4A went? They changed into IR4X. Sitting on a mountain overlooking the plains of central Italy, IR4X tooksecond place. Third place in Europe went to the UU7J contest team in the Crimea (http://www.uu7j.com).

The number six world score and number one USA M2 score was submitted by K4JA. This was Paul's last contest from his location located in northeastern Virginia (http://www.k4ja.com). What a way to go out! Second place went to Sig's N3RS team from the Philadelphia area. Made up of seasoned veterans, this Frankford Radio Club powerhouse always finishes near the top. Third place went to K1AR. John's team ventured into M2 and found they had lots of fun. Finally, Akira, JA8RWU, decided to try his luck in the M2 category and ended up with the new Japan record.

The continental winners were: North America K4JA, USA K4JA, Africa CT9L, Asia RT9W, Japan JA8RWU, Europe RU1A, Oceania no entry, South America HC8N.

Multi-Multi

What makes up a good Multi-Multi team? Take a lot of work, a lot of planning, and friends coming together from all corners of the world and you have a Multi-Multi effort. Usually planning begins early in the year, as was the case with this year's winner, 5U5Z, the Voodoo Contest Club. This group of friends has placed western Africa on the map for a decade or more. They are to be congratulated for their dedication. The 5U5Z gang made it into almost everyone's log.

It is quite unusual for the second- and third-place winners to be from the U.S. Second in the world and number one in the USA was K3LR (http://www.k3lr.com). This was K3LR's first CW win in the CQ WW and it is very special to all the team members! Wow, number two world and number one U.S.! Tim's team from western Pennsylvania just edged out the number-three world score of W3LPL. This was a real competition. Third place in the U.S. went to KC1XX, who experienced some aurora-like conditions (http://www.kc1xx.com).

The number one scorer from Europe was the DFØHQ club call of the Ilmenau Contest Club. The number world IARU champion certainly showed its skills in the CQ WW (http://www.df0hq.de). Second place went to the LZ9W Contest Team. They were loud and they could hear. The GMDX Group Contest Team, GM5A, made Scotland proud by finishing third in Europe (http://www.gmdx.org.uk/).

The continental winners were: North America K3LR, USA K3LR, Africa 5U5Z, Asia UP5G, Japan JA3YBK, Europe DFØHQ, Oceania ZL6QH, South America no entry.

Clubs

Radio clubs are an important glue in contesting. They provide friendships, construction skills, and advice. Contesters can talk for days about their contesting experiences, a feature for which clubs are well suited. To end up with the huge scores achieved by the winners takes an enormous effort.

The 2004 winners amassed many of top scores in the world. The world's highest club score came from the Frankford Radio Club. This famous club draws upon a winning strategy every year. Second place was taken by the Yankee Clipper Contest Club. Getting all your members on the air helps everyone. Third place went to another East Coast powerhouse, the Potomac Valley Radio Club.

Every year in Europe there is a friendly battle in Germany for the top DX club score. The 2004 top DX club score came from a club in southern Germany, the Bavarian Contest Club. Second place was taken by the club from central Germany, the Rhein-Ruhr DX Association. Third place went to Contest Club Finland.

The total points accumulated by the six clubs was over 1.48 billion! That's a lot of people on the air. A great job was done by all the clubs.

Team Contesting

What do five contesters from anywhere in the world have in common? Besides the fun of contesting, they can make a team. Register your team before the contest and you are all set to enter the Team Contesting category. As you can see in these results, the teams can be made up of members from all over the world.

1. Neiger's Tigers Team No. 1 (51,375,582): 8P5A (W2SC), EA8ZS (CT1BOH), D4B (4L5A), P40Q (KØDQ), TO4A (N6TJ).

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2. Team Horizontal (27,029,341): K1DG, K5ZD/1, K2UA, N9RV, VY2NT (K6LA).

3. Neiger's Tigers Team No. 2 (20,907,259): KQ2M/1, K1ZZ (N6ZZ), K6NA, 6W1RW (F6BEE), IR7G (N6AA).

4. CCF Team Sibelius (17,874,372): CT8T (OH1NOA), ES5TV, OH1F (OH1MDR), OH6NIO, 8R1K(OHØXX).

5. WWYC The Big 5 (11,697,680): CT7B (CT1ILT), ON5ZO, OZ1AA, DJ1YFK.

6. Have-CW – Will Contest (6,410,105): ZS1EL, ZS4TX, VE1OP, N5KA, K5UN.

7. VKCC East (6,349,200): VK2NU, VK9AA, VK2BAA, VK2IMM.

8. VKCC North-East (6,223,522): VK4DX, VK1AA/4, VK1KI (K1KI).

9. CCF Team Nurmi (3,540,900): EA8EW (ES2RR), OHØV (OH6LI), OH6AC (OH6CS), OH6BG.

10. CCF Team Sauna (2,713,381): OHØB (OH2UA), OHØI (YL2KL), OH2U (OH2IW), OH4A (OH6QU).

11. CCF Team Finlandia (2,096,246): EA8EA (OH2MM), OHØZ (OH5DX).

12. N1MM Logger Users Group (1,510,539): KE5CTY, ZZ8Z (PY8AZT), VA7ST, N7OR.

13. VKCC South-West (1,581,689): VK6LW, VK3YB, VK4AN, VK6DXI.

14. CCF Team Sisu (948,825): OH2LU, OH4MFA.

15. CCF Team Terva (943,730): OHØM (OH1MM), OH2BH (OH1WZ), OH4MCV, OH6XX.

16. CCF Team Mannerheim (762,684): OH2BO, OH6KXL, OH6OS, SMØW (SMØWKA).

Records

On the CQWW.com web page are the all-time records for each continent and country. Setting a new record is difficult and challenging. Take a look at your country's records and choose a record you can try to beat. Congratulations to the following stations which set new world and continental records.

World: 14 CN2KM(SM2EKM), 1.8 IH9U (IN3QBR), Q1.8 LY5A (LY2PAJ), AA 9Y4ZC (DL6FBL), A3.5 HA5A (HA7ANT), M2 HC8N.

Africa: 14 CN2KM (SM2EKM), 1.8 IH9U (IN3QBR), LA SU9NC, L3.5 6W7RV (F5CW).

Asia: 14 A61AJ (N2AA), 7 A61AJ (S53R), AA 5B/AA1TN (RW3QC), A1.8 UA9AT.

Europe: 7 T9/9A5E, L3.5 OHØI (YL2KL), Q7 OM7DX, Q3.5 SP6GCU, Q1.8 LY5A (LY2PAJ), A3.5 HA5A (HA7ANT).

Japan: M2 JA8RWU.

North America: 14 3E1A (DJ7AA).

USA: L3.5 N4IJ,

Oceania: 14 KH7X (KH6ND), A14 VK1AA, A1.8 VK6VZ, MS AH2R.

South America: AA 9Y4ZC (DL6FBL), A7 PY2WC, A3.5 PY2NDX, M2 HC8N.

Special Mention

The CQ WW sure brings out the desire to travel for many ops. Thanks to the many DXpeditions and the efforts of hundreds of contesters who made the contest experience more interesting for all of us this time. Here are some calls you probably worked:

VP2ETL, V26K, C6AKQ, C6AOQ, C6AWS, SU9NC, 8P5A, V31JP, VY2NT, VE6JY, J79A, HI3KM, TO4A, 3E1A, KP4KE, KP3/VE7AHA, V47KP, PJ7/K4MA, IH9P, IH9U, EA8EW, EA8EA, EA8/OH4NL, EA8/DJ1OJ, EA8/PC8E, EA8/LY1DF, D4B, SU8BHI, CN2KM, CN2R, V51/DL5XL, S9A, 6W1RW, 6W7RV, ST2T, 3V8SQ, 3V8SF, R9/UT7CR, XU7ADE, XU7ADF, 5B/KIØBP, VU2WAP, HL2/JH1FXF, XW8KPL/RU3DX, HSØZAR, HSØZDR, A61AJ, UK/JI2MED, 9M2/G3TMA, 9M2/G4ZFE, OHØZ, OHØV, OHØB, OHØM, OHØI, OHØRB, ZA/Z35M, OE2G, T9/9A5E, 9A9D, J45KLN, SX5R, J43J, JI1NJC/TF, EI/SP4Z, IR7G, IØ/N6CY, LX/G3VQO, CT8T, YO2/DL1CW, MW5A, VK1KI, 9M6NA, 9M8YY, KH2/WX8C, K1ER/KH6, KH6/NØCO, KH6/WØCN, YEØX, VK9AA, VK9NW, DU9/NØNM, ZK1DRA, P40Q, P40J, 5K5Z, 8R1K, CW2A,

EA8ZS, operated by Jose, CT1BOH.

TI5N, 5H3KK, 5B/AA1TN, HSØZDJ, 4U1ITU, EI/AB2E, P40W, PJ4M, 9Y4ZC, 4U1UN, VP2VVV, VP2MZM, C91F, 8Q7DV, LX7I, AH2R, P40L, VP8WWW, J7OJ, VP9I, V31RM, VP5W, CT9L, YI9KT, OD5/DJ5CL, 9N7BCC, GJ2A, HC8N, PJ2T, 5U5Z, HS72B, 3D2XA, 9Y4TBG, EA6/DH5CM, and HP1/DL6MYL.

One fun aspect of the contest is the competition that takes place within a country or other locality. Two friends or more go at it to see who will come out on top. By looking carefully at the results you can see many such competitions.

Comments

The number of CW logs received for the 2004 contest reached an all-time high mark of approximately 4040. Over the years the number of CW logs has not declined; it has grown. The activity on CW is most apparent to anyone who tunes across the spectrum during the CQ WW CW contest. There is activity wall to wall on all the bands. CW is certainly an eloquent mode.

The percentage of electronically received logs continues to rise. The CQ WW Contest Committee wants to thank all of the entrants who took the time to submit their log via the CQWW robot. Your effort to submit an electronic log allows for a fairer adjudication process (please send in your log no matter how small). Submitting an electronic log is easy. Send your SSB log and summary to <cw@cqww.com> (SSB to <ssb@cqww.com>). Please send your log in Cabrillo format. If you did everything okay, you will get back an acknowledgment and a tracking number. The number of entrants who have a problem with log submission has decreased greatly.

Thanks to the sharp eyes of you, the CQ WW entrants, several corrections were made to the final UBN/NIL reports which are available at CQWW.com. We appreciate your input. It helps make the contest as accurate as possible.

In the CW section of the 2004 contest there were several stations that were flagged as having potential problem logs. It takes a great deal of time to research a "flagged" log to find out what the entrant was doing. The CQ WW Contest Committee has a lot of data at its figure tips. We have compiled averages for the number of packet hits that should occur in a non-packet vs. an Assisted log for each category for Europe, the U.S., and DXpeditions. Each has its own average. Using this information plus some very sophisticated software, we run all the logs through several programs to create a list of logs that require further inquiry. The

(Continued on page 99)

Writing about historical events in magazines such as CQ or Air & Space/Smithsonian presents an author with a special combination of risk and benefit, in that there's bound to be at least one reader out there who was personally involved in an event you've described and has different, or additional, information. That was the case with W4YO's "Geopolitics and Amateur Radio" article in June CQ, and following up on that new information has become a story in itself.

Sleuthing the Neutral Zones

9K3, 8Z4, and 8Z5 Revisited

BY EDMUN B. RICHMOND,* W4YO

Who was the first? This question invariably pops up when there is a dispute or a challenge to an event. Questions such as . . . Who was the first to break the sound barrier? Who was the first to reach the North Pole? Who was the first to receive an artificial heart? . . . are quite common. These questions can be heard everywhere in the pursuit of ultimate truth. Such a question popped up after the publication of my article "Geopolitics and Amateur Radio: A Brief Look at the FCC Banned List and the ARRL Deleted Countries List," which appeared in the June 2005 issue of *CQ* magazine.

The Dispute

In that article I stated that Vic Crawford, W1TYQ, conducted the first legitimate operations from both the Saudi-Kuwaiti Neutral Zone, as HZ3TYQ/8Z5, and the Saudi-Iraqi Neutral Zone, as HZ3TYQ/8Z4, in 1965. This statement was challenged within days of publication and came to my attention by way of Rich Moseson, Editor of *CQ*. Jeff Poston, WØIKD, informed Rich, and later in a telephone conversation told me, that the first DXpedition to the Saudi-Kuwaiti Neutral Zone actually took place in 1961, and that he (Jeff) had first-hand knowledge of the operation because at the time he was stationed in Dhahran, Saudi Arabia, with the USAF as an operator at HZ1AB.

Jeff recounted the story to me. In January 1961 Jakob Laib, HB9TL, led a group of amateurs, including L. M. "Rundy" Rundlett, OD5CT; Vic Crawford, HZ3TYQ; and Bryan Bisley, G3OFL, in a DXpedition to the Saudi-Kuwaiti Neutral Zone. Vic was in that part of the world because he was employed by Arabian-American Oil Company (Aramco) as a pilot. Jeff was in constant communication with Vic, who decided to drive a radio-equipped Land Rover to the expedition site and join the others. Unfortunately, his vehicle broke down in the middle of nowhere and Vic was stranded for two days before help arrived. Jeff, at HZ1AB, was Vic's only point of communication with the outside world.

After making repairs, Vic continued on his journey and finally joined the other expeditioners who then began their radio

A QSL from the actual first accredited operation from the Saudi/Kuwait Neutral Zone in 1961. (QSLs courtesy hamgallery.com)

operations with the callsign 9K3TL/NZ. Vic independently confirmed this in an e-mail to me, along with the dates of the operation. A third confirmation was received in a June 2nd e-mail from Bryan Bisley, who added, "HB9TL, myself, (and) Lyman Rundlett . . . flew to Kuwait from Beirut and got the license and visas from the Kuwaiti authorities." As a result, this DXpedition had the necessary authorizations and was duly approved by the ARRL.

Rich Moseson told me that there was an image of a QSL card at the website of K8CX which might bear scrutiny.[1] This card was sent out by Angus Murray-Stone, HZ2AMS/8Z4, from the Saudi-Iraqi Neutral Zone with 1964 as the date of the operation. That date would have preceded the operation of Vic Crawford from that zone in 1965. This DXpedition was also approved by the ARRL. My statement of Vic's two operations in 1965 being the first legit ones started to look a little shaky!

The Sleuthing Begins

This required some detective work! First, let's review some history from my original article. In the 1920s, international boundaries were established by treaty among Saudi Arabia,

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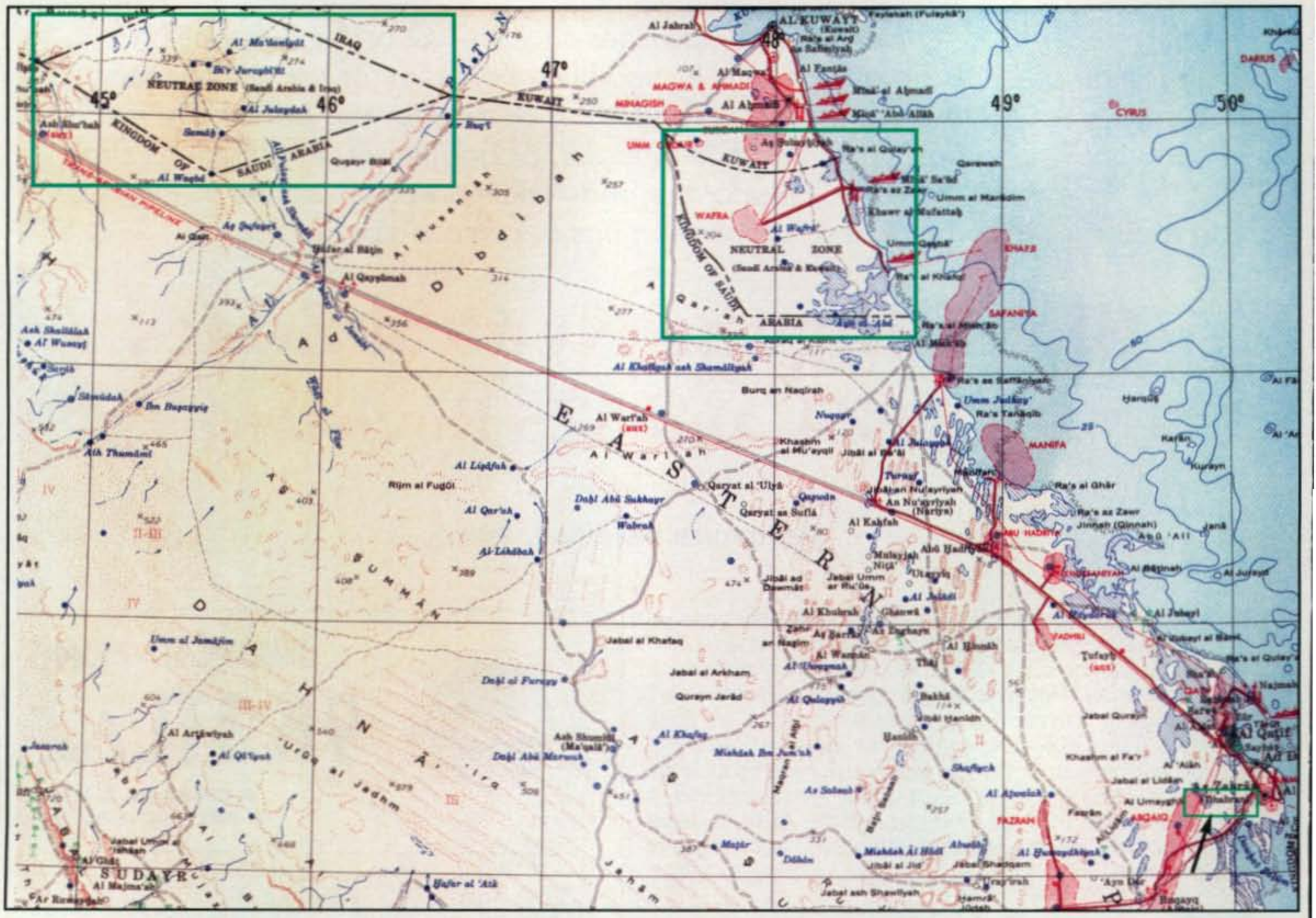


This map of northeastern Saudi Arabia from the 1960s shows both the Saudi-Iraq Neutral Zone (left-hand box) and the Saudi-Kuwait Neutral Zone (right-hand box), as well as Dhahran (arrow). (Map courtesy W4YO)

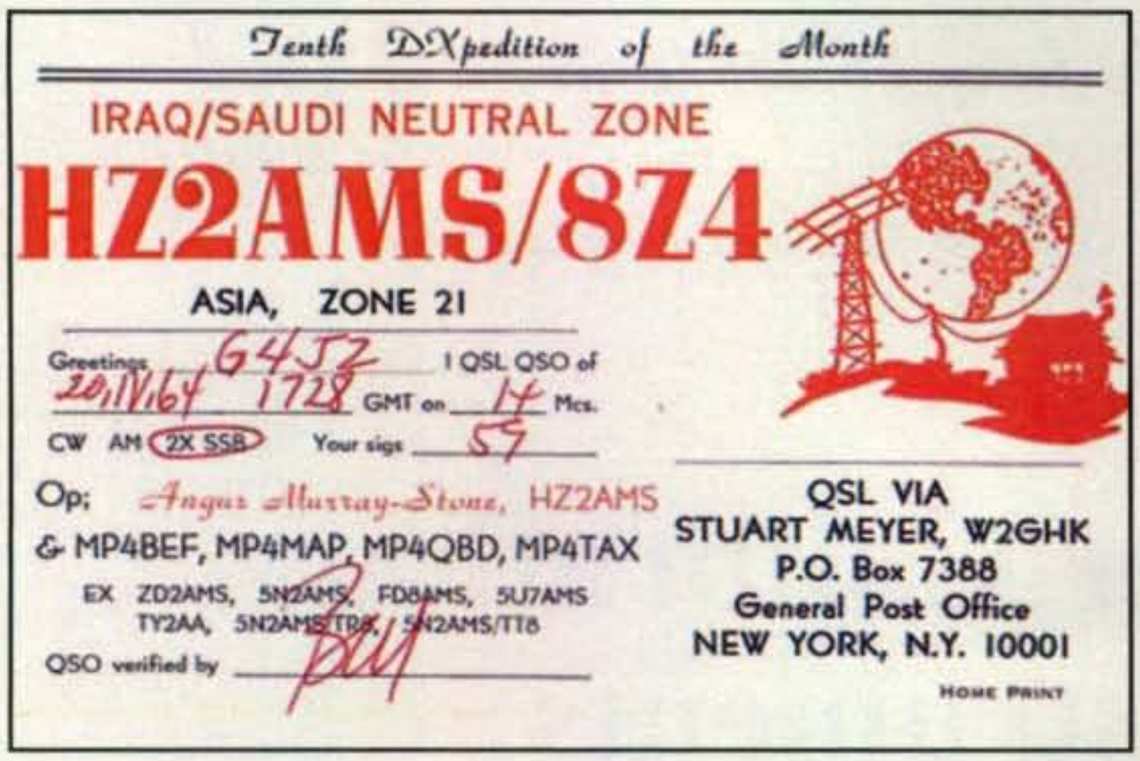
Jordan, Iraq, and Kuwait. Two neutral zones were also established in disputed areas, one between Saudi Arabia and Kuwait and the other between Saudi Arabia and Iraq. The Saudi-Kuwaiti Neutral Zone was partitioned in 1971. Tentative agreement for partition of the Saudi-Iraqi Neutral Zone was made in 1981 and finalized in 1983. Both Neutral Zones were added to the DXCC Country List on October 1, 1964. After partition, the Saudi-Kuwaiti Neutral Zone was deleted as of December 15, 1969. The Saudi-Iraqi Neutral Zone was deleted as of December 26, 1981.

A good place to start sleuthing was the DXCC Desk at the ARRL. I contacted Bill Moore, NC1L, the DXCC Manager, and asked for his assistance. He confirmed that both 9K3TL/NZ and HZ2AMS/8Z4 indeed had been accepted for DXCC credit. I asked him to check the DXCC data base to ascertain if any operations earlier than 9K3TL and HZ2AMS were on the records. In a May 25th e-mail to me Bill wrote, "Documentation was not formally required for some operations until September 1967, so anything before that date may not be recorded unless it is a specific reject, and I do not see any rejects for 8Z4." He further wrote, "I believe you are correct about HZ2AMS/8Z4 as that is the earliest proper date I show for a QSO here in the DXCC database."

In addition, I learned that Murray-Stone's Neutral Zones operation was the Hammarlund "DXpedition of the Month" for April 1964. This was a program to encourage DXing and DXpeditioning put together by then Hammarlund President Stu Meyer, W2GHK (SK). *(Stu was also a president of the Quarter Century Wireless Association and is member #7 of the CQ DX Hall of Fame.—ed.)*

However, as I continued digging and made contact with several people who had been there at the time, bits and pieces of information from diverse sources[2] began leading to questions of whether Angus Murray-Stone actually operated from the Neutral Zones, and specifically from both. From the information I was able to gather, it appears that he did secure authorization from the Saudi government "to carry out radio frequency propagation studies" in the two Neutral Zones, adding an /8Z5 suffix to his Saudi call of HZ2AMS while operating in the Saudi/Kuwait Neutral Zone, and /8Z4 in the Saudi/Iraqi Neutral Zone. The two separate authorizations were dated April 11 and 12, 1964, respectively.

Next, the only uncontested fact is that Murray-Stone left his home in Riyadh, on the first leg of his DXpedition by car (a Volkswagen), bound for Dhahran on April 16, 1964. That's where the trail runs cold. Apparently, there was no record of his boarding a flight with landing rights in Kuwait or Iraq, and he never signed in at any of the Aramco field



A QSL from the Saudi/Iraq Neutral Zone operation by Angus Murray-Stone, HZ2AMS, in April 1964. Questions have arisen as to whether Murray-Stone actually operated from the zone, which was added to the ARRL's DXCC List in October 1964, even though this April operation was approved.

camps in either of the Neutral Zones from which he probably would have operated. Further, if he had attempted to drive his VW to the Neutral Zones from Dhahran, he reportedly would have found the journey to be extremely difficult given the type of terrain and the distances to be covered. Yet QSL cards show contacts from the two zones on April 20–22, 1964.

As far as I can tell, Angus Murray-Stone never published anything about his operation in the ham literature, and exhaustive searches on the internet revealed only some minor references to Murray-Stone's ham activities in the early 1960s. E-mails and letters to several amateurs, contemporaries of Murray-Stone, were also sent out, but only one unconfirmed report was received. The report placed him on the Caribbean island of Saba about ten years ago. Attempts to reach Murray-Stone on Saba were unsuccessful. The present location of Angus Murray-Stone is still unknown; as of this writing (July 2005) he could not be reached for comment or clarification.

So Who's on First?

Which operation was first? Based solely on the fact that the ARRL accepted for DXCC credit the 9K3TL/NZ operation from the Saudi-Kuwaiti Neutral Zone in 1961, and HZ2AMS/8Z4 in the Saudi-Iraqi Neutral Zone in April 1964, then it appears that they were indeed the first from each zone, respectively. Thus, my statement about Vic Crawford's operations in 1965 was incorrect (although Vic was, in fact, involved with the 9K3TL/NZ operation in 1961, and 8Z4 was not formally added to the ARRL DXCC list until October 1, 1964).

While the legitimacy of the 9K3TL/NZ operation was well-documented, there do indeed appear to be questions about Murray-Stone's sojourn to both neutral zones, the answers to which are obscured by some holes in the historical data and the passage of time. There is also some conflicting information which has turned out to be virtually impossible to clarify or corroborate, since the amateurs who had first-hand knowledge of the situation are now Silent Keys.

Nevertheless, HZ2AMS/8Z4 was accredited by the ARRL, and even if some compelling evidence to the contrary is uncovered and independently verified, this will always be considered the first operation *of record* for 8Z4. Since both Neutral Zones are now deleted entities, it has come down to a purely academic question at this date. However, it certainly would be nice to know in the continuing search for the ultimate truth!

Notes

1. <www.hamgallery.com/qsl>
2. Many thanks to the amateurs who provided information and recollections in the course of my research, some of whom agreed to be identified and some of whom declined, and particularly to ARRL DXCC Manager Bill Moore, NC1L, for his repeated help in researching old records.

Tannu Tuva, Too

In addition to his first-hand knowledge of the 1961 9K3TL operation in the Saudi-Kuwaiti Neutral Zone, Jeff Poston, WØIKD, reported that Tannu Tuva was also activated in the same year. According to Jeff, Siva, UA3FE, made a DXpedition to Tannu Tuva between January 26 and February 18, 1961, in the process putting the region on the air on SSB for the first time. Jeff says the DXpedition was well publicized at the time, that he worked UA3FE/Ø twice, once on January 27 and again on February 15, and that his QSL card was accepted by CQ for Zone 23 credit for the Worked All Zones (WAZ) Award. ARRL DXCC Manager Bill Moore, NC1L, says there is no record of any submission to the ARRL for DXCC credit for the operation. In addition, says Bill, at that point in time it would only have counted for Asiatic Russia (UAØ).—*W2VU*

If you can receive at least three WWV frequencies (and have good ears!), you can accurately calibrate most synthesized general-coverage HF transceivers (and receivers). With a little common test equipment, you can do even better!

HF Transceiver Calibration *Without* Instruments

BY GARY A. GEISSINGER,* WAØSPM

Is your HF transceiver calibrated? To find out, try this little test. Program these frequencies into adjacent memory channels, all in Lower Sideband (LSB): 2.501, 5.001, 10.001, 15.001, 20.001 MHz. (If you have interference problems on these frequencies, the USB equivalents will also work: 2.499, 4.999, 9.999, 14.999, 19.999 MHz.) Note that these are all 1 kHz, or 1000 Hz, off WWV standard frequencies. You should hear a 1000-Hz tone on the WWV signal. As you quickly change from one WWV frequency to another, note the frequency of the 1000-Hz beat note. Can you hear the frequency consistently change as you tune from the lowest WWV frequency to the highest? If so, your radio's frequency readout may be slightly off, but you may also have the opportunity to calibrate your radio without any instruments.

Why This Works

The two most common circuits used to synthesize oscillators are phase locked loops (PLLs) and direct digital synthesizers (DDSs). Both use a reference frequency derived from a master crystal oscillator.

In the case of PLL circuits the reference is usually divided down to a low frequency that sets the step size (see fig. 1).

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e-mail: <ggeissinger@digitalglobe.com>

This frequency is compared to a copy of the synthesizer output frequency that is divided down to the reference frequency. The division ratio sets the output frequency.

As a result, if the reference frequency is exactly correct, then the output frequency will simply be the reference frequency times the division ratio. However, if the reference frequency is not exactly correct, then the error in the reference frequency will be multiplied by the division ratio. This is also true for more advanced PLL designs, such as fractional N synthesizers and multiple loop PLLs.

Although DDS circuits operate differently (fig. 2), they behave in the same way when the reference is not exactly correct. A DDS adds the constant value stored in the tuning word register to the phase accumulator register at the reference frequency rate. The larger the number stored in the tuning word register, the faster the phase accumulator register adds up. Each time the phase accumulator register "rolls over," a new output cycle is started. If there is an error in the reference frequency, the update rate of the phase accumulator register changes by the amount of the error. As a result, the output frequency changes as well.

A Real World Example: The ICOM IC-706

The IC-706 uses a double-conversion, high-IF design in USB/LSB mode; the IF frequencies are 69.0115 MHz and 9.0115 MHz. In this case three oscillator frequencies are

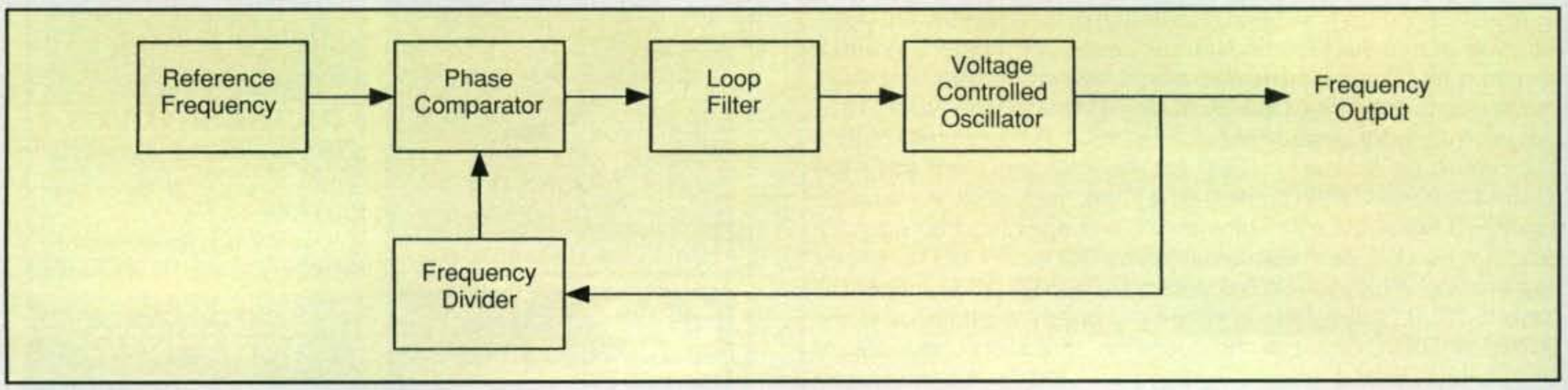

Fig. 1– Single-loop PLL block diagram.

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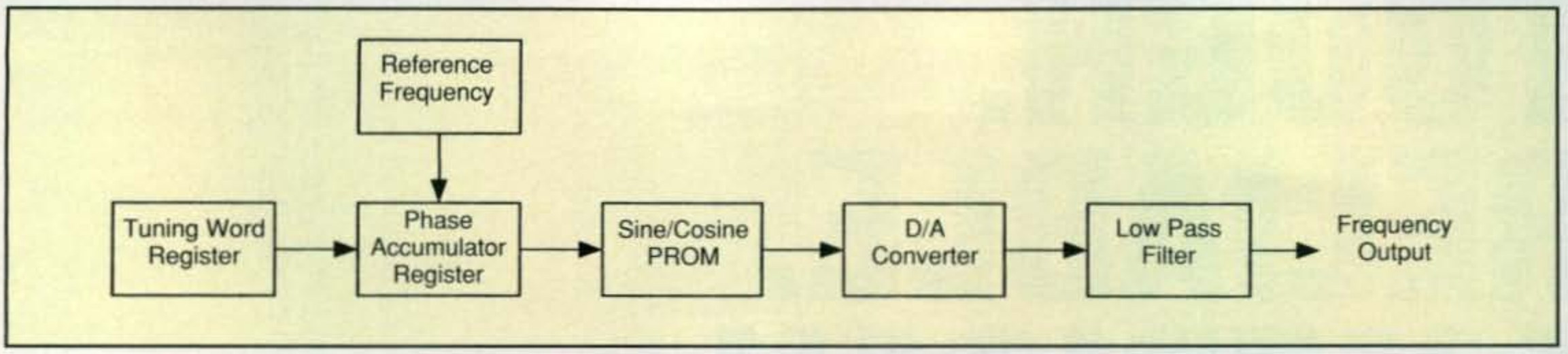


Fig. 2– DDS block diagram.

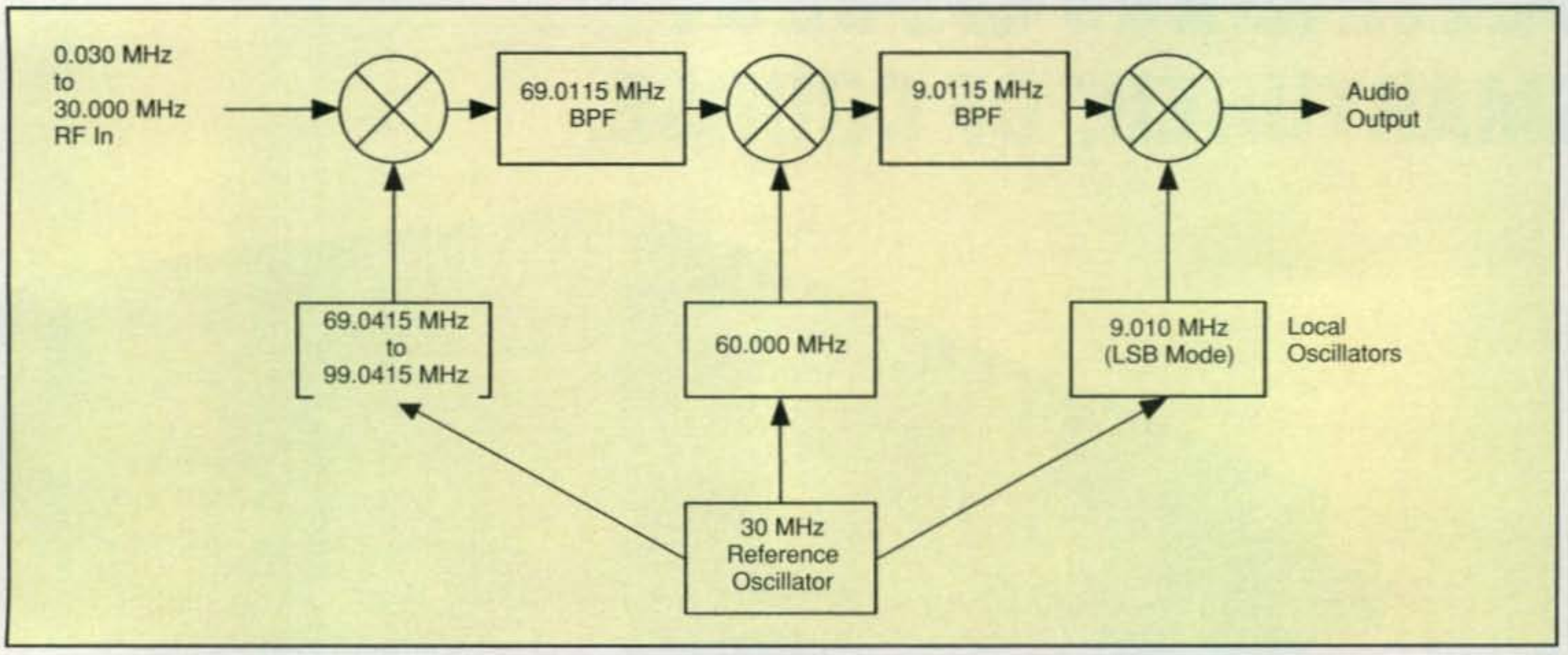


Fig. 3– IC-706 block diagram.

needed (fig. 3). The high-frequency oscillator tunes in 1-Hz steps from 69.0415 MHz to 99.0415 MHz to receive in the range of 30 kHz to 30 MHz. This seems pretty simple, until the tuning offsets for LSB and USB are factored in. Let's look at what happens inside the radio in each of three scenarios:

10-MHz Reception of WWV—The Usual Case: Consider receiving 10-MHz WWV with an IC-706 in the LSB mode. If you assume that an SSB signal is about 3 kHz wide, then the center of the lower sideband is actually about 1.5 kHz below the carrier (fig. 4). As a result, the first LO (local oscillator) would be set to 79.010 MHz by the microprocessor in the radio when the dial indicates 10.000000 MHz. This would put the lower sideband signal right down the center of the 69.0115-MHz bandpass filter with the carrier at 69.010 MHz. After a 60-MHz down-conversion by the second mixer, the lower sideband energy would be centered in the 9.0115 MHz filter. The third mixer converts this to baseband by applying a 9.01-MHz signal. The carrier vanishes as it is converted to 0 frequency.

10-MHz Reception of WWV—with a 1-kHz Offset and No Error: Move the dial to indicate 10.001000 MHz. This moves the first local oscillator to 79.011 MHz. The carrier would be converted to 69.011 MHz. After the next two conversions, the audio beat note would be at 1000 Hz.

10-MHz Reception of WWV—with a 1-kHz Offset *and* Calibration Error: With the reference high by one part per million (ppm), the oscillators all shift high, as shown below:

79.011 MHz (1 ppm high) = 79.011079011 MHz
60.000 MHz (1 ppm high) = 60.000060000 MHz
9.01 MHz (1 ppm high) = 9.0100090100 MHz

The result is a beat note at 1010 Hz. At all the HF WWV frequencies, with a +1 ppm reference error, the beat notes would be:

WWV Frequency	Actual 1st LO Frequency	Beat Note
2.5 MHz	71.51107151 MHz	1002.5 Hz
5.0 MHz	74.01107401 MHz	1005.0 Hz
10.0 MHz	79.011079011 MHz	1010.0 Hz
15.0 MHz	84.01108401 MHz	1015.0 Hz
20.0 MHz	89.01108901 MHz	1020.0 Hz

As you can see, the trend is pretty obvious. If the reference oscillator had been low, then the beat notes would have decreased as higher WWV frequencies were tuned.

Alignment Hints

If it turns out that your transceiver is slightly out of alignment, the simplest procedure is to use an alignment tool and *slowly* adjust the master oscillator until the beat note is the same at all WWV frequencies. Some hints are in order:

1. Turn off any computers, frequency counters, TVs, or other sources of birdies. You need to hear the WWV beat notes, not some local interference.

2. The errors should be systematic. If you hear something besides the regular change in beat-note frequency as you tune WWV frequencies, then there is something wrong (QRM?) and the adjustment should not be attempted.

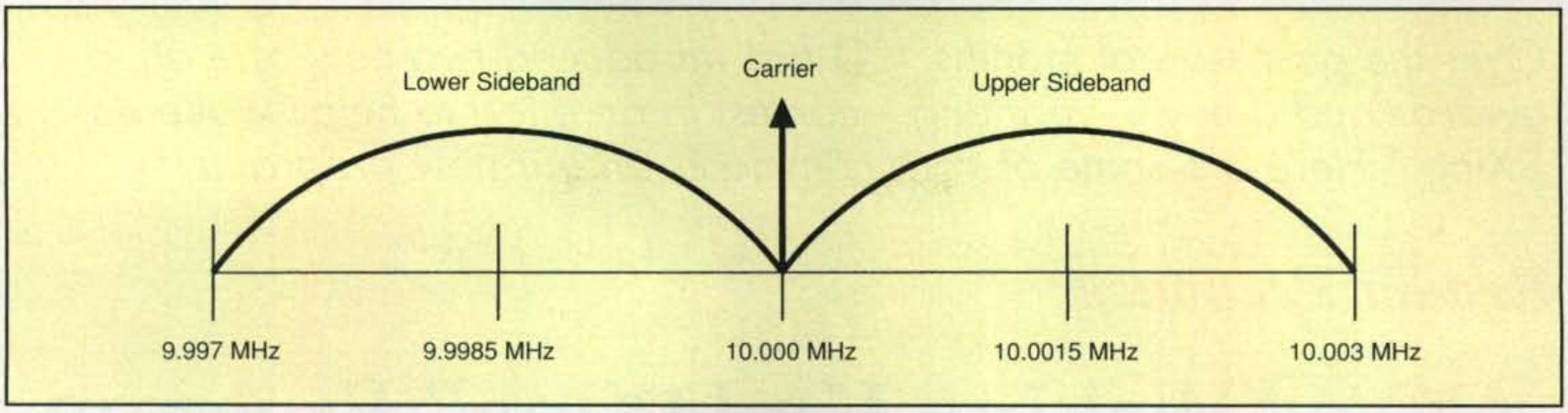


Fig. 4– WWV at 10 MHz.

3. A tuning offset of 1000 Hz was used for illustration purposes. The lower the tuning offset (maybe 500 or 600 Hz), the more obvious the errors become. You may want to use whatever CW pitch you use when copying code. You are "trained" there!

4. Remember that WWV transmits tones; these can really confuse the effort. Try to time your use of WWV to the times when only voice or "ticks" are present.

5. If you can't hear a standard frequency signal, don't be temped to use local radio or SW radio stations. They are seldom accurate enough for this type of alignment.

6. Make sure your radio can be aligned using this method (see below and check the service manual; if you don't have a service manual, one may be available online from the manufacturer's website).

This Won't Work on All HF Rigs

Some radios don't use synthesizers that can be adjusted using this approach. The Elecraft K2 is a good example. In this case, the procedure in the manual should be used. Also, some older radios aren't fully synthesized. While you can adjust the master oscillator using this approach, the unlocked oscillators still will need to be adjusted separately. The ICOM R-71A is a good example of a radio that requires separate adjustment of an unlocked oscillator. Check your manual before you try this. This procedure has been tried with good results on the following radios (some aren't fully synthesized): ICOM IC-706, IC-735, IC-756, IC-756 PRO, R-71A, R-9000, IC-7800; Drake R-8B; Watkins-Johnson HF-1000, WJ-8712.

Overall, this procedure gives you the opportunity to find out if your transceiver is correctly aligned, to fix it if it isn't (in line with the guidance above), and as a side benefit, to learn a little more about the inner workings of your radio.

Can This Procedure be Improved?

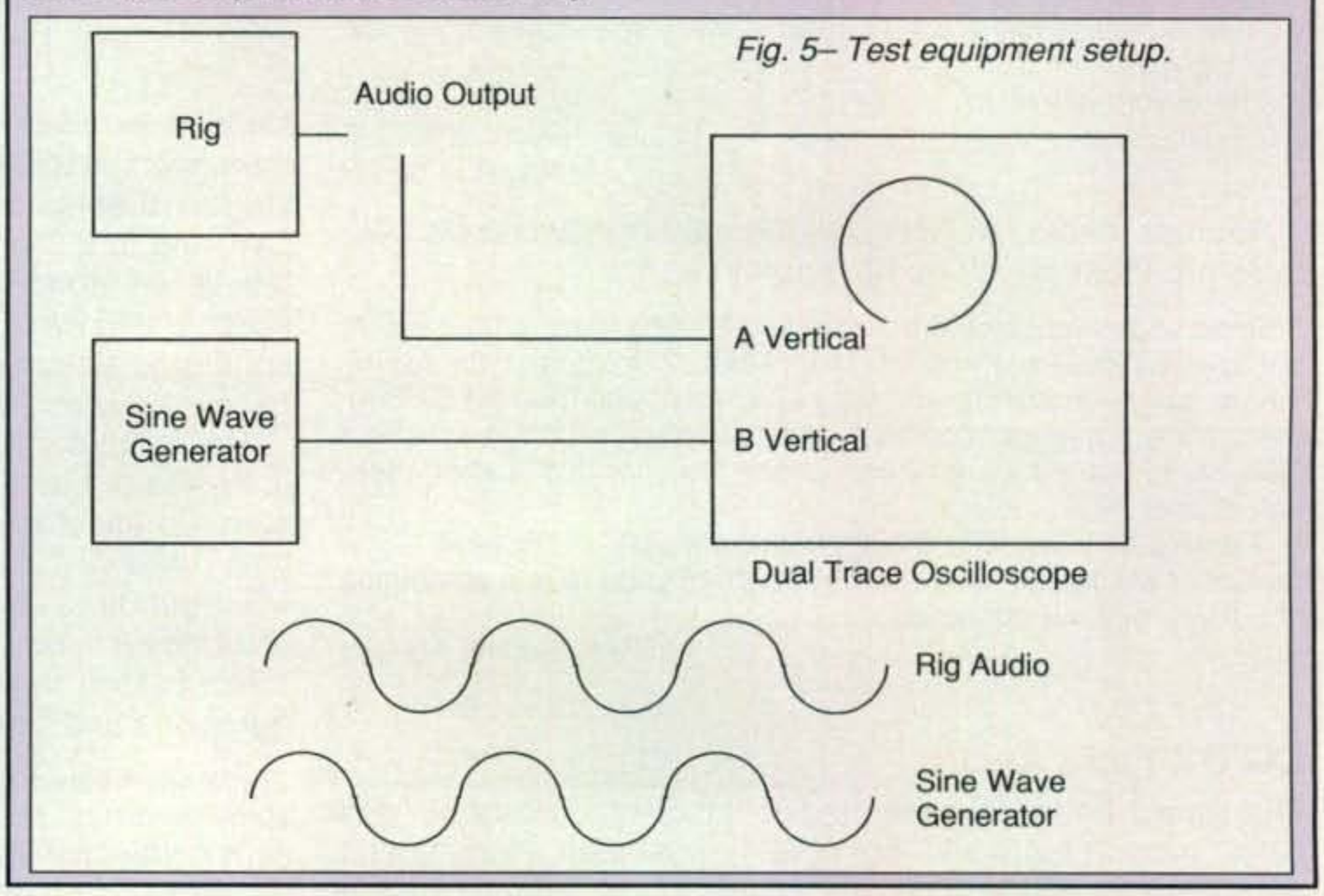
Depending on your ear, you can adjust your rig to have quite good calibration. CW and RTTY ops can likely set their calibration as well using this procedure, as when using a counter on the master oscillator. However, if your ears are not up to the task, or if you want even more precise results, try the procedure given below and shown in fig. 5.

Many hams have or can gain access to a simple dual trace oscilloscope with triggered sweep and an audio oscillator. If you only have a single trace oscilloscope with triggered sweep, you can use the sine-wave generator to externally trigger the oscilloscope and achieve the same results. A really fun way to do this is by using an XY display or an oscilloscope configured to display a Lissajous Pattern. Unfortunately, many modern oscilloscopes can't do this. (Why? This is the classic approach to solving many problems with a 'scope!) While it is possible to perform this alignment using a single trace recurring sweep oscilloscope without an audio oscillator, it is not recommended. Most oscillators in recurring sweep oscilloscopes just aren't stable enough to do this alignment when they are allowed to free-run.

The oscilloscope and the sine-wave generator do not need to be calibrated … just stable. If you warm them up for a few hours, most are adequate. Trigger the oscilloscope on the sine-wave generator and set up the sweep so that several cycles can be viewed. Adjust the frequency of the sine-wave generator until it matches the beat note out of the receiver. When this occurs, the two waveforms will be stable and not moving with respect to one another. As you tune to different WWV frequencies, note if the rig audio waveform moves to the left or the right compared to the reference sine wave. A correctly calibrated rig will have the beat note match the sine-wave generator for all WWV frequencies. Of course, due to variable propagation you may see some short-term drifts in frequency. It's best to watch the oscilloscope for several seconds so that you can see the true comparison between the signal generator and WWV.

How good can this be? Well, if you warm up both the radio and the test equipment, the results can be impressive. It depends on how long it takes the reference sine wave to move with respect to the received signal. For 10-MHz WWV, one slipped cycle per second is 0.1 ppm at the reference oscillator. Of course, due to variability in the received WWV signal, you will have to "average by eye" the position of the cycles over long periods of time to get that kind of accuracy.

Fig. 5– Test equipment setup.



Over the past several months, CQ has introduced two new operating awards and a new—yearlong—contest in an effort to help "wake up DXing." Here are some of your comments on our new programs.

Reader Feedback:

CQ's "Waking Up DXing" Program

Earlier this year, *CQ* announced three new operating programs with the shared goal of "Waking Up DXing": the CQ DX Field Award, the revival of the CQ DX Marathon, and the CQ iDX Award. The response to all of these has been overwhelmingly positive, including the award we knew would be most controversial, the CQ iDX Award, which recognizes contacts made using internet links. Of course, not everyone agreed. Much of the feedback we received was verbal, either at hamfests and conventions or over the phone. We also received a fair amount of written correspondence, though, and we'd like to share some of it with you here.

Waking Up DXing

A couple of readers had general comments on the whole "Waking Up DXing" program. One of the comments we made in introducing the CQ iDX Award was that many of the traditional newcomers' awards, including the ARRL's Rag Chewer's Club (for a contact of 30 minutes or longer), had been discontinued. KB9KHF wrote to tell us the RCC is still available, although under different sponsorship:

Thank you for a fine editorial. I wanted to make mention of one item though. An organization has re-introduced the Rag Chewer's Club. The Society for Preservation of Amateur Radio is offering its version of the award. Its requirements are close to the requirements of the original.

Here is the website of the organization: <www.spar-hams.org>

Here is the link to the actual award: <www.spar-hams.org/index.php?pg=10>

Thank you very much.

William Howey, KB9KHF
Member of SPAR

Another reader, AG4HY, felt the only worthwhile DX contacts are those which go beyond the basics:

Read your treatise on the "wonders of DXing." I have tried to DX, but when all (that) is wanted is (1) your call, (2) a signal report (which means exactly nothing), and (3) a QSL card, and then (4) QRZed, then I have not made a contact, and I certainly *will not* ever send a QSL card, to anyone, nowhere, at any time, for this kind of, heh, heh, "contact???"

If that is all there is to DXing, count me out . . . because if you cannot or will not tell me a little about where you live and something about yourself, fugedaboutit. . . .

Willie L. Brown, AG4HY

CQ DX Field Award

This award, based on confirmed contacts with at least 50 "grid fields" around the world (out of 324), has been an instant hit since its introduction in the April 2005 issue of *CQ*. In its first three months more than 100 awards were authorized, including (as of early July) 49 mixed awards, 32 SSB awards, 24 CW, and four Digital. In addition, 11 stations are already on the Mixed Honor Roll (for 175 or more 10×20-degree grid fields)—with HAØDU and VE3XN tied for the top spot with 217 confirmed fields—and two (VE7SMP/182 and NØFW/176) have made the SSB Honor Roll.

The initial certificate numbers were chosen by a drawing at the North Florida Amateur Radio Society meeting on May 12th. Certificates with #1 went to WD9DZV (Digital), VE3CR (CW), NØFW (SSB), and WD9DZV (Mixed). CQ DX Awards Manager Billy Williams, N4UF, noted that Tim, WD9DZV, had astounding luck!

Most of the correspondence we've received has to do with questions and clarifications. Here's a sampling:

Just read your rules for the CQ Field Award. Getting the field on some cards can be a problem. If the online callsign databases do not show the call but a QTH is indicated on the card, could the lat/long

of the QTH be used to determine the field?
73, Jim, W5ODD

I think this award is a good innovation and I'd like to get involved. However, I'm a bit worried about Rule #11. This says that if the Grid Locator isn't shown on the QSL card, then it will have to be proved by using online callsign databases.

The problem with that is that many QSL cards dating from the 1980s and early '90s don't display Grid Locators, and the callsigns either predate online databases or don't appear now simply because they no longer exist (for many natural reasons).

Surely the geographical location (i.e., town, city, district, island, etc.) which usually is declared on QSL cards should be good enough from which to determine (prove) most Grid Locators?

Could you please confirm whether that is going to be acceptable to CQ award checkers? If so, could the rule be updated to be more explicit, please, to avoid disputes with card checkers?

Tnx es 73 de Dave, G4GED

Both of these gentlemen brought up a valid point and we revised Rule 11 to clarify that, in most cases, the QTH printed on the QSL card would be sufficient for determining the grid field. In the rare cases in which a city is bisected by a field line, the Award Manager will determine whether a particular contact is acceptable.

Some other readers want to see the scope of the award expanded:

I want to compliment you for starting the CQ DX Field Award. I remember W1JR commenting back in 1983 about who will be the first to work all 324.

I have already applied for the 6-meter award with 60 fields to start. With increasing activity on the EME path, perhaps you might consider expanding band awards to include 2 meters and 70 centimeters. I and probably many others have at least 25 fields on one or more of those bands.

73, John, W8PAT

I wish to commend you on your efforts to generate more interest in DX and operating in general. In my experience, one aspect of amateur radio that generates a lot of interest, especially with young people, is satellite operation. It is high tech and cool. Satellite operation is, however, different and unique. Your DX Field Award does not reflect this but is classified as mixed. The ARRL DXCC and CQ WAZ have separate categories for satellite which do not differentiate on the basis of mode.

Perhaps you felt that there would be so few Field Awards for satellite that it was not warranted—i.e., you had to reduce the criteria for the satellite WAZ. (I have #12.) However, in the future with high orbiters going up, interest could very well be much higher.

I have been promoting the Field Award during my satellite QSOs, but without a separate category or at least a higher recogni-

tions of the satellite endorsement I think the interest and response will be very low.

Clare Fowler, VE3NPC

VE3NPC's concerns were addressed in the original rules, which include an OSCAR endorsement for satellite contacts with at least 25 grid fields. Clare was issued the first of two mixed awards with OSCAR endorsements (W9HR has the other). While we do not currently have separate awards or endorsements for EME, 2 meters, or 70 centimeters, we will consider adding them if there is sufficient demand. The 6-meter endorsement is already popular, with eight hams (including W8PAT) qualifying for it for the mixed award, along with six 6-meter endorsements on SSB awards and two on CW awards (N4MM has all three!).

Two other letters relating to the CQ DX Field Award, from K2YOF and N6QQ, appeared in last month's "Our Readers Say" column. CQ DX Awards Manager Billy Williams, N4UF, has put together and posted on his website a tremendous number of resources related to the DX Field Award, as well as a regularly updated listing of awards and endorsements issued and Honor Roll standings. Billy's DX Field Award website is at <http://home.earthlink.net/ ~bfwillia/gridfield.html>. You may also link there from the DX Field Award page on the CQ website at <http://www.cq-amateur-radio.com/cqfieldaward. html>.

CQ DX Marathon

Response to the CQ DX Marathon has also been very positive. This is a year-long operating activity that starts over again each January 1 (see May 2005 *CQ* or our website for details). Comments such as those received from CO2KK and K3BZ are typical:

My congratulations on the revival of the DX Marathon, a quite challenging goal to achieve now that solar Cycle 24 is apparently going to peak at very low levels!

You will surely see at least several members of the Grupo DX de Cuba participating as soon as it starts!

73 and DX, Arnie Coro, CO2KK

Congrats, Rich. This idea is a definite *winner*! Count me in. I love this idea.

73, Jerry, K3BZ

One reader added a local element to the Marathon (which we applaud and encourage):

I was very interested in your efforts to revitalize DXing, especially the CQ Marathon contest. So much so that I initiated a MARC Marathon Challenge at our club, the Meriden (CT) Amateur Radio Club, with a similar goal,—to stir the DX blood in our members and give the "little" guy a chance at some bragging rights.

Enjoy your magazine. Keep up the good work.

73, Dan, W1DMM

A few readers took issue with our decision to exclude 60 meters and the traditionally contest-free "WARC bands" of 30, 17, and 12 meters:

I am excited to see the New CQ DX Marathon. I have the CQ DX Award for mobile CW with 150 countries. With the decline in the (sunspot) cycle, it has been a lot harder to get DX from the mobile, and I have spent less time chasing DX. This has now given me a shot in the arm to get back on the road and go after those pile-ups.

I counted my DXCC list today and I have 83 countries. Now the kicker, all my 83 countries are on 30, 17, and 12. These are my favorite bands as a General. By not allowing these bands you are eliminating General class hams from really doing much in this marathon. Very rare is a good DX station in the General bands.

So I will go with gusto on my own even though you will not allow my score to count.

Love your magazine

Dave Formet, KD5JWC/M

It's no secret that the amateur spectrum allocations are under siege and we will lose our HF privileges if we don't use them. *All* of them. That's why I am baffled by the decision to exclude the 60, 30, 17, and 12 meter bands from the CQ DX Marathon announced in the May 2005 issue of *CQ*.

These bands are traditionally excluded from contesting, but the Marathon is not a contest; it is an awards program akin to the CQ WAZ or DXCC or WAS programs, all of which cover all the amateur bands.

One hopes that the Marathon rules will see a last-minute modification to include the important WARC bands. If not, we may find that we don't even have the option of including them in the future.

George Diekhoff, KC5TJG

For a number of years I have enjoyed reading *CQ* magazine, taking part in CQ WPX and sometimes CQ WW and collecting those zones for the WAZ award. And the new CQ WW Grid award is a real nice idea (even more so as I managed to get my application ready in time for the drawing of the low award numbers!). So I was looking forward to the other announcements to come.

Looking at the DX Marathon announcement, I was rather thrilled. But then reading through the rules I was a little disappointed to find out that the WARC bands are excluded. I wonder what the reason for that decision was.

While I fully agree that we should keep WARC bands free of contests, we have seen an increasing activity on the WARC bands over recent years, and very often these bands are the only chance for stations with limited antennas and/or power to work a new one. The conclusion for myself is that DX Marathon on the classic bands only is just not attractive enough to spend the time.

Thanks for all the interesting work done at *CQ* magazine,

73, Stephan Walder, HB9DDO
Baden, Switzerland

The decision to exclude these bands from the DX Marathon was made after lengthy discussion among all involved. We *do* consider the DX Marathon to be a contest, albeit a year-long one rather than a traditional competition that is squeezed into a single weekend. The much higher-than-usual band usage resulting from traditional contests is what led to the "gentlemen's agreement" that the WARC bands (and later 60 meters) were to be "no contest zones." In the DX Marathon, the "contest operations" theoretically will be spread across the entire year. But we're not sure how that will play out in reality. Our final decision was to start out without these bands included, and to revisit the question in the future if the demand seemed to justify it, along with other areas, such as whether

Help Wanted: DX Marathon Director

At press time, we were still looking for a very active DXer to be Director of the CQ DX Marathon and to recruit and coordinate a team of volunteers to take on the tasks of completing the final organization and ongoing administration of the program. (Don't worry; the Marathon will begin as planned on January 1 even if all the behind-the-scenes pieces are not yet in place.) It would be an ideal project for a DX-oriented club, with responsibilities spread among members. The biggest ongoing time commitment would be in the early months of each year, as logs are submitted and processed. Anyone seriously interested is urged to contact *CQ* Editor Rich Moseson, W2VU, via e-mail at <w2vu@cq-amateur-radio.com>, or via "snail mail" or phone to the *CQ* offices (25 Newbridge Rd., Hicksville, NY 11801; 516-681-2922), to discuss the specifics.

we need a mobile category, and whether the operating patterns were indeed spread evenly across the year or were concentrated in the first and last few weeks of each year.

One note of clarification: The CQ DX Marathon uses the CQ World-Wide DX Contest country list, which includes both the ARRL DXCC list and the WAE (Worked All Europe) DX Contest list. Thus, for example, TA1, European Turkey, counts separately from the rest of Turkey (which is in Asia) and the Shetland Islands count separately from Scotland—plus "African Italy," the islands of Lampedusa (IG9), and Pantalleria (IH9), which are in CQ Zone 33.

The CQ iDX Award

We knew way ahead of time that this award would generate controversy, but were pleasantly surprised at the near-unanimous support it received in our informal previews to several "key players" in ham radio, particularly after we explained the thinking behind the award, both in person and in our June editorial. Many of our readers agreed . . . but some disagreed, well, strongly. A sampling of both sides:

Just read your "new brainchild" of the iDx Award! I must say it is a very clever way of attracting the younger generation into amateur radio, and the fact that the bases of the award are well written, requiring one end of the QSO to be via radio, will keep criticism to a minimum. But be prepared for some of the "traditionalists" to criticize the new idea!

Keep up the good work promoting amateur radio in general and VHF and ham radio contests in particular.

Your friend in Havana
Arnie Coro, CO2KK

I really do not think this is where amateur radio needs to be going! There is a huge difference between using DX clusters to spot DX stations and this so-called mode of communication. You actually have to work the station over the air . . . not "partially," or better stated, "mainly," over the internet. I guess the next thing we can expect is the iDX Honor Roll. Come on . . . *CQ* is a good magazine with great contests and operating awards (besides this dog). Please don't pollute ham radio by promoting this so-called mode of operation.

Dick, W5AK

A DX award for internet contacts? I had to look and make sure it wasn't the April issue I was reading. I can hardly wait for your next set of awards . . . 50 countries contacted by cell phone? E-mailed All States?

Perhaps you should change the magazine name to "CQ Amateur Networking."

John Brewer, K5MO
Clayton, NC

This is great. . . . *CQ* Introduces "iDX Award" to Help "Wake Up DXing." The Marathon idea is wonderful as well. . . . I got my June issue of *CQ* today and I also belong to "Daily DX" by Bernie@dailyDX.com and he sent us a preview of the "iDX Award."

Keep up the good work. I am probably a tiny bit prejudiced, but *CQ* is the best mag!

Paul Gates, KD3JX
Elecraft K1 #231

Well, since *CQ* has asked the question ("But Is It Radio?"—June editorial title), my answer would be no, it's not radio, in my humble opinion. Not that my opinion really matters anyhow, but since *CQ* asked . . .

This whole thing reminds me of my 16-yr-old boy who plays the game "Halo" on the internet through his X-Box and controls a character plus is able to hear and talk to the other players in real time with a headset and mike and these other players are scattered all over the country. So *CQ* has some young person sitting at a computer with a headset on, talking to a ham in England over the internet, and this is supposed to be ham radio and get him interested in DX. I wonder what would interest him to the extent that he would go to all the trouble to set up a ham station and repeat the event, this time with a radio (propagation willing)?

This is supposed to be a radio award; that's a fact because *CQ* says so. Well, I guess so. If it's a real radio award, let it count toward CQ DX awards.

I am not a progressive or a purist or a traditionalist or any other label that's out there. I am an amateur radio operator, not an internet operator.

CQ is grasping at straws just as ARRL is. Neither group is happy about the long-term prospects for ham radio, but I believe that there is not much anyone can do about it. Ham radio is just a hobby and they come and go. It may be time for ham radio to just die away. It's already changed into something that I don't hardly recognize anymore.

Of course I knew this internet absorption of ham radio was coming. Some two years or more ago I heard a local tech bragging about the 250 contacts he made on the internet and I was shocked to hear how proud he was of what he had done. For all I know, someone is already giving out WAS and DXCC for IRLP, Echolink, etc., contacts.

Let us not despair; there is still CW and QRP, which is still real radio point to point and uncontaminated with this internet pretend radio. Under *CQ*'s rules a Tech could get a DXCC award (the iDX) and not even own or have so much as a PL259! Please—let's not try to justify this as ham radio. At least one of the requirements should be that they own a PL259 or a pair of wire cutters.

CQ of course can do anything it wishes and so can I. When my subscription comes up for renewal I will not do so. I will still check *CQ* on the newsstand because sometimes *CQ* has a good antenna article that really catches my interest, but I have no interest in *CQ*'s hybrid internet ham material or awards. I wish the best of luck to *CQ* and its internet programs that I am sure will increase in scope in the coming years. But as far me, I will continue to do what I enjoy, which is QRP and CW with my trusty MFJ-9020 and Kent paddles.

73, CUL es GL de
Larry, W5WLB

I just read with shock and horror the announcement of the new iDX award on the ARRL website. How stupid does someone have to be to believe they're actually accomplishing anything by using VoIP in an amateur radio contact? Amateur radio should not rely on a twisted pair or worldwide "pay" network to accomplish a contact. Making believe that VoIP is good for the hobby is counterproductive. To support such an atrocity is just as bad. You should be ashamed of yourselves! I'm glad I stopped supporting *CQ* magazine last year. This is another valid reason for me to feel comfortable that I made the right decision. This is just more "touchy-feely-feelgood-hug-me" hogwash to placate the masses who want things given to them without having to work for them. Look in the dictionary under "entitlement" and "lazy."

No 73 from here,
Web Williams, KR4WM

Re: The so-called CQ iDX Award

This so-called award is not a part of ham radio and I understand that the only reason for this "action" is the award fees to be paid for it!

Amateur radio has certain conditions: communication from operator to operator, from amateur station to amateur station, using frequencies open for the Amateur Radio Service, by wireless links established by amateur operators—i.e., transmissions from antenna to antenna or via means operated by amateur radio, (such as) satellites, packet radio (and). repeaters of different kinds.

You try to tell us that "all is (amateur) radio," but this is definitely not true. The internet is a paid public service, similar to the ordinary mail handled by post offices and telephone services. Telephones and internet services of course are using wireless links. However, these are neither established nor operated by amateur radio operators and they do not use amateur radio frequencies.

The "next step" would mean an award "worked" by using telephone or letter!? These are ugly jokes, a pure nonsense.

73, Otto A. Wiesner, DJ5QK
Heidelberg, Germany

I have used EchoLink exclusively for almost two years from my HT and laptop but always to a distant RF repeater and link. As someone under antenna restrictions, etc., it has proved a wonderful way to keep in touch with fellow hams (including my old radio club and others in the U.K.) across the world on repeaters.

I have had meaningful QSOs with 88 countries and all states. Just this morning a new one popped up—FR1OB (Reunion Island!). I had to use a little French but had a solid, meaningful QSO with Osman.

It has always been "understood" that no one really QSLs on these VoIP modes. I certainly don't have any, since I don't operate HF anymore. I don't even have details on my QRZ site because of my call being pirated some time ago.

Your suggested award is noble in intent but I can just hear the ionosphere (both HF and VHF nets) "crackling" with heated discussions over it. I just don't think it will go down well with a significant percentage of hams for obvious reasons.

The code/no-code debate has now turned into a VoIP/No-VoIP debate.

Paul Perretta, KH6/G3SEA

Our only comment to those who feel the iDX Award is a step in the wrong direction is to please remember that our goal is not so much to encourage "VoIP DXing" (which is going to happen with or without us) as to build interest in DXing overall and to use VoIP DXing as a stepping-stone to traditional DXing for hams currently limited to VHF and above once they gain HF operating privileges.

Many thanks to all of you who commented, contributed, and made suggestions, both informally and formally. We value your input (even when you disagree with us). ■

The Return of a Legend

LDG Electronics Introduces the **NEW** Z-11Pro

The Return of a Legend. Our 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 to 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. **List price $179.**

LDG ELECTRONICS 2 YEAR WARRANTY

Specifications:

- 0.1 to 125 watt power range (SSB and CW), 100W on 6M.
- Tuning time: 0.1 to 6 seconds full tune, 0.1 seconds memory tune.
- 1.8 to 54.0 MHz coverage. Built-in frequency sensor.
- Optional interfaces for Icom, Alinco, Kenwood and Yaesu available.
- Power requirements: 7 to 16 volts DC at 300 mA maximum, 25 µA standby current.
- User installable 6 or 8 x AA or AAA holder lasts over 2 years.
- Small Size Enclosure: 7.7" x 5.0" x 1.5".
- Weight: 1.5 pounds.

The Z-11Pro is waiting for your next portable adventure. Where will you go next... ?

The 200 Watt AT-200Pro with 16,000 "3-D Memories"

Our first auto tuner specifically designed for today's high-powered transceivers.

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 to 30 MHz, and 100 watts on 54 MHz.

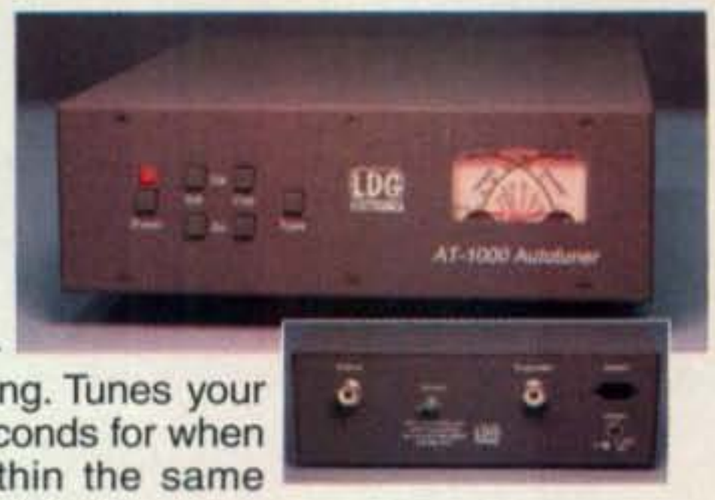
Rugged and easy-to-read LED bar graphs show power and SWR, and a function key on the front panel allows you to access data such as mode and status.

The AT-200 is the latest in a long line of innovative LDG tuners. Get the most out of your Kenwood, Yaesu, Ten-Tec or Icom radios that operate at higher power. **List price $249.**

LDG ELECTRONICS 2 YEAR WARRANTY

The AT-1000 An Automatic Antenna Tuner that can handle the power of your Amplifier!

1000 Watts SSB
750 Watts CW
500 Watts Digital
Now with 200 Memories



No more knob spinning or inductor rolling. Tunes your antenna in 1 to 8 seconds for when you QSY either within the same band or to a different band!

Just about any antenna can be tuned with the AT-1000. The antenna must present between 6 and 800 ohms (Note: approximately 10:1 SWR – in order to bring the SWR down to 1.5:1).

Easy installation and use make this the choice for any Amateur Radio Operator with an amplifier. **List price $599.**

LDG ELECTRONICS 2 YEAR WARRANTY

To order, contact your favorite dealer.

LDG ELECTRONICS

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Phone: 410-586-2177
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Visit our Web site for the mail-in rebate form:

www.ldgelectronics.com

Offer expires September 30, 2005

Prices and specifications are subject to change.

The benefits of ham radio for young people can go far beyond its hobby aspects or the opportunity to provide community service. KB5RYE shares her own story of how being a ham has helped shape her life and career.

Growing Up a Ham

BY TAMARA WILHITE,* KB5RYE

Growing up a ham was never easy. One of my earliest memories is sitting in my father's ham shack wearing large ear phones and flipping switches and turning dials. I am told that on one particular occasion the signal was aimed at California. While I yelled "See-eh-goo" (baby talk for CQ) into the microphone, two idiots in California were trying to home in and make a contact. One said, "Bob, I'm getting a signal but I just can't get through." They were still trying even after I had been pulled away from the equipment to play with other toys.

Many of my classmates had seen the antennas on our roof. One asked me, "Do you guys get great cable reception with those antennas or what?"

I answered, "The only cable we have is coaxial." All I knew was that it did *not* interfere with pacemakers, cable television, and all of the other electronics that people would randomly show up and say our equipment was interfering with.

When I took a picture of my father's ham shack to class one day, many could hardly believe the number of rigs in the photo. A few thought it was an April Fool's joke, but it was not. It took a long time to explain, "No, no, that's just the *north* wall." Invariably the response was "There's more?" and then "What do you *do* with it?"

*e-mail: <tamarawilhite@hotmail.com>

The author's daughter, Renee (no call yet), following in her mother's footsteps and getting an early introduction to ham radio. For KB5RYE, that introduction led to her own ham license, an engineering degree, and a career in radar technology. Renee's grandfather (and Tamara's father), by the way, is CQ Antennas Editor Kent Britain, WA5VJB.

Ham Radio—Hobby to a Job?

Those who want to introduce amateur radio to would-be hams, particularly young people, often encounter one question that's difficult to answer: "How will this help me in the real world?" Here are a few good answers:

If you like...	Profession	Average Starting Salary	Source
Building your own radios or antennas	Electronics technician	$27,000	www.monster.com
	Wi-Fi systems designer	$40–50,000	www.monster.com
Designing your own radios or antennas	Electrical engineer	$47,000	www.graduatingengineer.com
	RF design engineer	$45,000	www.monster.com
Repairing rigs	Electronic repair technician	$22,000	www.monster.com
	PC repair technician	$25–35,000	www.collegeview.com/career
Sending out signals across the world	Radio station broadcast technician	$28,000	www.collegegrad.com
	Air traffic controller	$50–60,000	www.collegegrad.com
Amateur TV	TV station broadcast engineer	$36,000	www.collegegrad.com
	Camera operator	$20–25,000	www.collegegrad.com
Watching weather patterns on your own Doppler radar	Meteorologist	$80,400	http://swz.salary.com
	Radar systems engineer	$40,000	www.monster.com
SETI@HOME or Project Argus	Astronomer	$54,000	www.collegegrad.com
	NOAA Atmospheric Scientist	$30–35,000	www.collegegrad.com

You Know You're Raising a Ham if...

- You start teaching Morse code to the toddler banging away with wooden spoons.
- Your children assume everyone's name has a callsign after it.
- Your children do not assume that a big antenna on the roof means someone gets 1001 cable channels.
- They *do* wonder why neighbors with big antennas don't do moonbounce.
- You explain circuit diagrams to them as you repair their broken toys.
- They learn how to read schematic symbols before words.
- Your preschooler mishears "I see you" as "CQ" when you're playing peek-a-boo with the baby.
- They do not assume you need a cell phone to talk to Grandpa on the other side of the country.
- They have used Morse code with friends to cheat on a test—and didn't get caught because the teacher was on the lookout for camera phones instead.
- Instead of a gymnastics class for your kids who like to climb, you get junior-size safety harnesses and take them up the tower with you.
- You know they have finished a sentence when you hear "Over."
- CB = Citizens Band, not CB = call back.
- Your children insist you buy coffee in metal cans that can be used for building antennas when they're empty.
- Coffee cans in your house don't last long enough to hold loose change.
- Your child understands enough of the concept of radio waves and radar to argue with the cop that the reading must be wrong, based solely on the physics of the situation.
- You put a ham rig in the car for them because, unlike cell phones, using them has not been banned for teenage drivers.
- Extra points if they request it so they can use the "make your own static" trick to duck out of parental questions.
- They not only go out to play GPS scavenger hunts but understand how GPS works.
- They watch old *Star Trek* episodes and can identify the set designers from the Morse code built into the black computer screens.
- They grew up wanting to tour Arecibo just to see the big dish.
- They went to <www.talktoaliens.com/> and laughed because they know that their antenna won't get your "call" to space past the atmosphere.

"I received my Technician class license six weeks before my driver's license. Considering the number of times I came close to giving the driving instructor a heart attack, that may not have been all bad."

When I entered elementary school, I wondered if it would be easier for my classmates to cheat on tests if they tapped their fingers or feet in Morse code instead of the more awkward (and more easily caught by the teachers) methods. They all thought it would be easier to actually study for the test than to learn Morse code in order to cheat, so there weren't any takers. These days, video cell phones make such low-tech options seem both boring and too complicated to learn.

Becoming a Ham Myself

I received my Technician class license six weeks before my driver's license. Considering the number of times I came close to giving the driving instructor a heart attack, that may not have been all bad.

The most obvious practical side of getting my ham license as a teenager—keeping in touch with family no matter where I was—essentially has been eliminated by the widespread adoption of the cell phone. However, the ramifications of having that ham license still echo throughout my life. My understanding of radio led to a strong understanding of radar, four high school science fair wins with radar-based projects, two modest engineering scholarships in college (including one from the ARRL), an engineering degree, and four years spent in technical research and development at an engineer's salary.

I'm no longer doing anything quite as exciting; now I am writing user guides and training materials for the systems I helped take from concept to prototype. Yet this is the greatest reason to encourage amateur radio in the next generation—to plant both the seeds of interest and build the practical skills that grow into the next generation of technicians and engineers.

Lots of kids today are learning the code to write the software to do all sorts of things. However, those fantastic devices of the future can only come into being under the guidance of those with the hardware skills, especially those developed soldering your own circuits and building your own antennas in amateur radio. This is why my daughter will be exposed to amateur radio. ■

Announcing:

The 2005 CQ WW DX Contest

Phone: October 29–30 CW: November 26–27
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 on any band.* Transmitters and receivers must be located within a 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.

A. Single Operator Categories: Single band or all band; only one signal allowed at any one time; the operator may change bands at any time.

1. Single Operator High: Those stations at which one person performs all of the operating, logging, and spotting functions. The use of DX alerting assistance of any kind places the station in the Single Operator Assisted category.

2. Single Operator Low: Same as III A 1 except that the output power shall not exceed 100 watts (see rule XI.11).

3. QRPp: Same as III A 1, except that the power output must not exceed 5 watts (see rule XI.11).

B. Single Operator with DX Spotting Net: Same as III A 1 except the passive (self-spotting not allowed) use of DX spotting nets is allowed.

C. Multi-Operator (all band operation only):

1. Single Transmitter (*MS*): Only one transmitter and one band permitted during any 10-minute period, defined as starting with the first logged QSO on a band. 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. Logs found in violation of the 10-minute rule will automatically be reclassified as multi-multi.

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.

D. 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. 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:

MFJ tiny Travel Tuner

Tiny 4½x2¼x3 inch tuner handles full 150 Watts! Covers 80-10 Meters, has tuner bypass switch, tunes nearly anything!

MFJ brings you the *world's smallest* full power 150 Watt 80-10 Meter Antenna Tuner. Extra wide matching range lets you tune nearly any antenna.

It's no toy, its got guts! Built with real *air* variable capacitors (600 Volt, 322 pF) and *three* stacked powder iron toroids to handle real power -- not just QRP. Bypass switch lets you bypass tuner when you don't need it.

You can use nearly any transceiver at full power with nearly any coax fed or random wire antenna for portable, home or mobile operation.

It's perfect for compact rigs like Icom IC-706MKIIG, Yaesu FT-100D, Kenwood TS-50, QRP rigs and others with a built-in SWR meter.

Operate anywhere, anytime with a quick easy set-up! Tune out SWR on your mobile whip from inside your car. Operate in your apartment with a wall-to-wall antenna or from a motel room with a wire dropped from a window or from a mountain top with a wire over a tree limb. Great for DXpeditions or field day. Be prepared for emergencies.

MFJ-902 is so small and handy, you'll rely on it wherever you go! It's easy to pack away in your briefcase, suitcase, backpack, glove compartment or desk drawer. It's tiny enough to slide in your back hip pocket! 4½Wx2¼Hx3D in.

MFJ-902
$79.95

New!

Tiny Travel Tuner with 4:1 Balun

MFJ-902H, same as MFJ-902 *Tiny Travel Tuner* but has *4:1 balun* for balanced lines and 5-way binding posts for balanced lines and random wire. 5¾Wx2¼Hx 2¾D inches.

MFJ-902H
$99.95

Tiny Travel Tuner with Cross-Needle SWR/Wattmeter

MFJ-904, same as MFJ-902 *Tiny Travel Tuner* but has *Cross-Needle SWR/Wattmeter.* Read SWR, forward and re-flected power all at a glance in 300/60 and 30/6 Watt ranges. 7¼Hx2¼Hx2¾D in.

MFJ-904
$109.95

ALL-in-one Tiny Travel Tuner with 4:1 Balun and SWR/Wattmeter

ALL-in-one! MFJ-904H, same as MFJ-902 *Tiny Travel Tuner* but has *4:1 balun for balanced lines* and Cross-Needle SWR Wattmeter. Read SWR, forward and reflected power all at a glance in 300/60 and 30/6 Watt ranges. Has 5-way binding posts for balanced lines and random wire. 7¼Hx2¼Hx2¾D inches.

MFJ-904H
$129.95

Long 10/12 foot Telescoping Whips

MFJ-1954 **$19.95** 10 Feet

MFJ-1956 **$29.95** 12 Feet

10 foot extended, 19 inches collapsed, MFJ-1954, $19.95. 12 foot extended, 22.5 inches collapsed. MFJ-1956, $29.95. Standard 3/8 inch by 24 threaded stud for use with all standard mounts. Durable 1/2 inch diameter plated brass. Telescopes for full 1/4 wave operation 2 to 12/15 Meters. Cover 17, 20, 30, 40, 60, 80, 160 Meters with loading coil. Use two for multi-band dipoles. Replace screwdriver antenna whip for highly efficient *fixed* mobile operation.

MFJ RF Isolator

MFJ-915 *RF Isolator*

MFJ-915 **$29.95**

prevents unwanted RF from traveling on the outside of your coax shield into your transceiver. This unwanted stray RF can cause painful RF "bites" when you touch your microphone or volume control, cause your display or settings to go crazy, lock up your transceiver or turn off your power supply. In mobile installations, stray RF could cause your car to do funny things even blow your car computer. Clear up these problems, plug an MFJ-915 between your antenna and transceiver. *Don't operate without one!* 5x1½ inches. For 1.8 to 30 MHz.

Portable Collapsible Antenna Tri-Pod

Holds 66 pounds of antenna steady. Black *steel* base forms strong braced equilateral triangle 40 inches on a side. Non-skid feet. One inch diameter steel mast extends height to six feet. Strong base and mast locks. Easily add antenna mount or mast extension for greater heights. Collapses to 38 inches by 4 inch diameter. 6¾ pounds.

MFJ-1918 **$39.95**

40-10M G5RV Junior
MFJ-1778M, $34.95.
Half-size 52 foot *G5RV Jr* 40-10 Meters, 1500 Watts.

1500 Watt Lightning Surge Protector

Protect your expensive transceiver from static electricity and lightning induced surges with an ultra-fast gas discharge tube. Plug between rig and antenna, attach ground. DC to 1000 MHz. SO-239s.

MFJ-272 **$39.95**

All-Band G5RV Antenna

Cover all bands, 160-10M with tuner. 102 ft. long, 1.5kW. Custom fiberglass insulator stress relieves 450 Ohm ladder line. Use horizontally, as inverted vee or sloper. Marconi on 160M.

MFJ-1778 **$39.95**

Glazed Ceramic Antenna Insulator

MFJ-16C06 **$3.95** Package of six. (69 cents each)

Authentic *glazed ceramic* antenna insulator. Extra-strong -- will not break with long antennas and will not arc over or melt even under full legal power. Molded ridges give extra-long high voltage path to prevent high-voltage breakdown. Smooth wire holes prevent wire damage. Use as center or end insulator for dipoles, doublets, G5RVs, guy wires and others.

Current Balun/Center Insulator

True *1:1 Current Balun/Center Insulator* forces equal currents into dipole halves to reduce coax feedline radiation and field pattern distortion. Reduces TVI, RFI and RF hot spots in your shack. 50 ferrite beads on *Teflon*(R) coax. 1.5kW, 1.8-30 MHz. Stainless steel hardware. *Direct* antenna connection. 5x1½ in.

MFJ-918 **$24.95**

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<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. Logs must be checked for duplicate contacts, correct QSO points, and multipliers.

5. *We want your electronic log. The Committee* ***requires*** *an electronic log for any possible high-scoring 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 software may automatically encode your log as an attachment. Your e-mail log will automatically be acknowledged by the server. You will also receive a personal access code from the server. Use this code to view your log for completeness and later to retrieve your computer analysis. Submit your CQ WW SSB log to **<ssb@cqww.com>** and your CQ WW CW log to **<cw@cqww.com>**.

DISKS: Please send your IBM, MS-DOS compatible computer disk. A disk containing your Cabrillo file may be submitted in lieu of a paper log. Label your disk clearly with YOUR CALL, files included, the mode (SSB or CW), and your category. Name your disk file correctly (for example, HSØAC.log).

6. For paper logs, use a separate sheet for each band.

7. 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. Electronic submission implies a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

8. 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 $8^1/2" \times 11"$ paper.

9. 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.

10. Bad QSO penalty: three (3) additional contacts removed.

11. 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.

The use by an entrant of any non-amateur means such as telephones, telegrams, internet, or the use of packet to SOLICIT 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, 2005 for the SSB section and January 15, 2006 for the CW section. **Indicate SSB or CW on the envelope, disk, or e-mail.**

2. An extension of up to one month may be given if requested by letter or other means. The granted extension must be confirmed by letter sent to the attention of 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, Hicksville, NY 11801. Please mark SSB or CW on the envelope.

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- 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	1⅝ x 6 x 9	3.2
SS-12	10	12	1⅝ x 6 x 9	3.4
SS-18	15	18	1⅝ x 6 x 9	3.6
SS-25	20	25	2¾ x 7 x 9¾	4.2
SS-30	25	30	3¾ x 7 x 9¾	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

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

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

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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

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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

math's notes

BY IRWIN MATH,* WA2NDM

The Micro-Oscillator Revisited

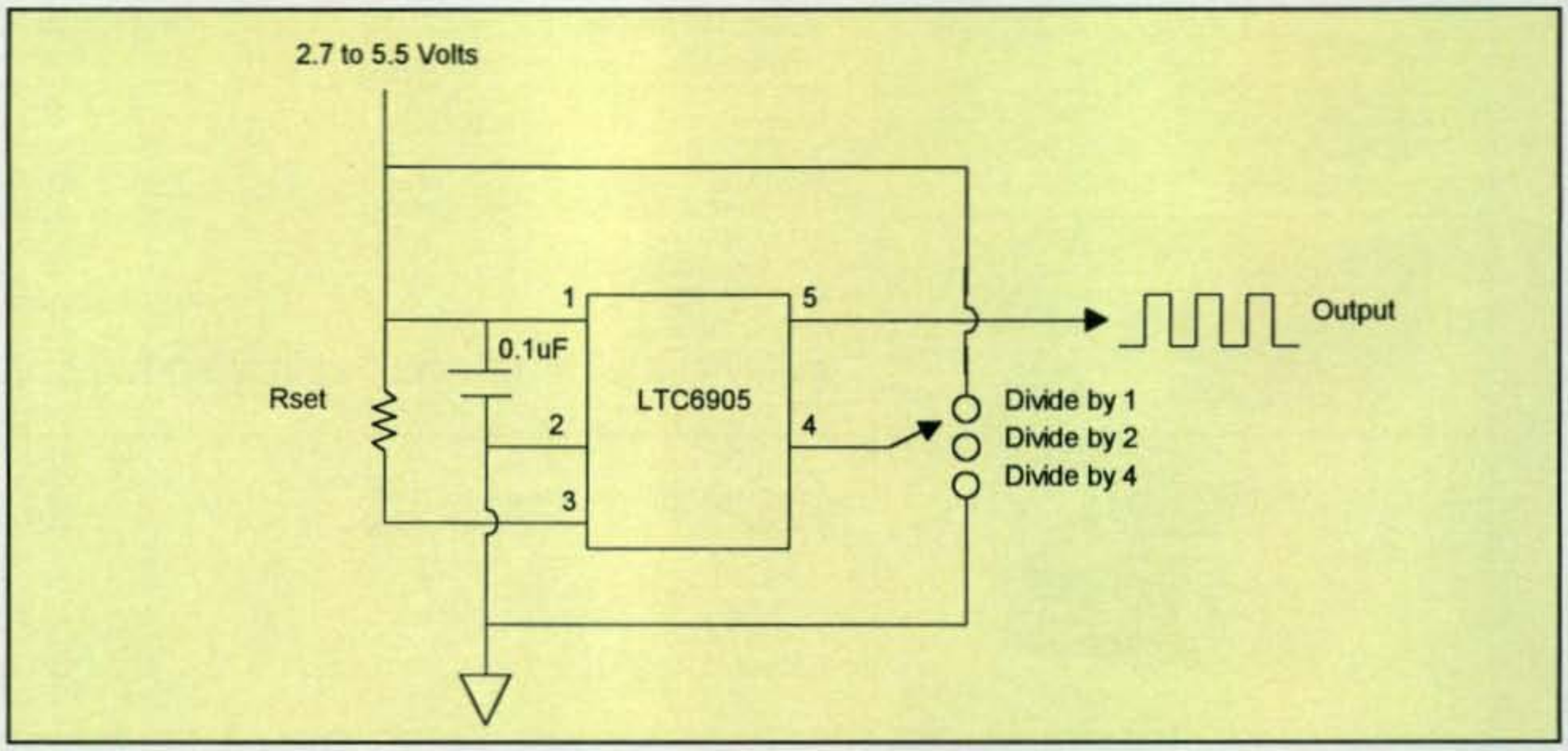

Fig. 1– Basic circuit of the LTC6905 oscillator.

Several months ago we described the LTC1799, a tiny programmable oscillator manufactured by Linear Technology Corporation that was designed to replace crystal oscillators in a wide range of applications at frequencies up to 33 MHz. At that time we described how to choose the proper resistor to select the desired output frequency and even how to FM modulate the device. Recently, Linear Tech has added to the line with the LTC6905, a similar oscillator that extends the frequency range from 17 to 170 MHz, making it ideal for 6- and 2-meter applications. This month we will look at how one might use this device.

Fig. 1 is the schematic of the operating circuit for the basic oscillator, which, like the LTC1799, is simplicity in itself. Operating voltage is anywhere from 2.7 to 5 volts, and a single resistor plus the status of one pin is used to determine the oscillator's frequency. With power-supply voltages between 3 and 5.5 volts, the output is CMOS TTL compatible and will drive loads as low as 1.2K ohms. With operating voltages below 3 volts, the unit will produce about 2.5 volts peak-to-peak of output into loads as low as 500 ohms. Operating current at 100 MHz is only 10 ma with a 5-volt supply, and the package is a very tiny 1-mm thick SOT-23.

To determine the operating frequency of the LTC6905 one must use the following formula to calculate the value of R_{set}:

$$F = (168.5\ MHz \times 10K\ ohms/R_{set} + 1.5\ MHz) \times 1/N$$

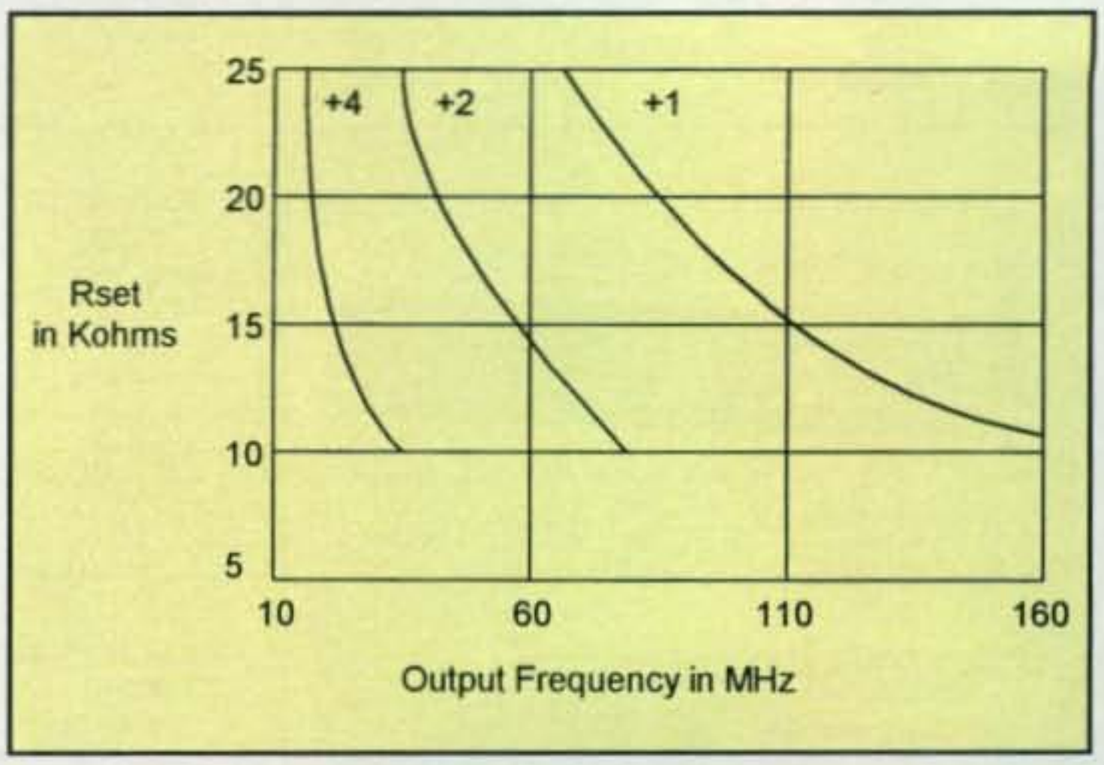

Fig. 2– R_{set} versus output frequency.

where F = the output frequency; N = 1, 2, or 4; and R_{set} is the resistor value in Kohms.

Note that the value of R_{set} must fall within the range of 10K to 25K for best stability. For rough approximations the chart of fig. 2 can be used as a starting point and then the value of R_{set} trimmed to produce the exact desired frequency. As an alternative, R_{set} can be made up of a fixed resistor in series with a stable multi-turn trimmer potentiometer.

An example: If R_{set} = 10K and pin 4 is set to divide by 1 (by connecting it to Vcc), the output frequency will be 168.5 MHz × 10K/10K + 1.5 MHz, or 170 MHz.

In operation, the frequency of a master oscillator within the chip is basically controlled by the

*c/o CQ magazine

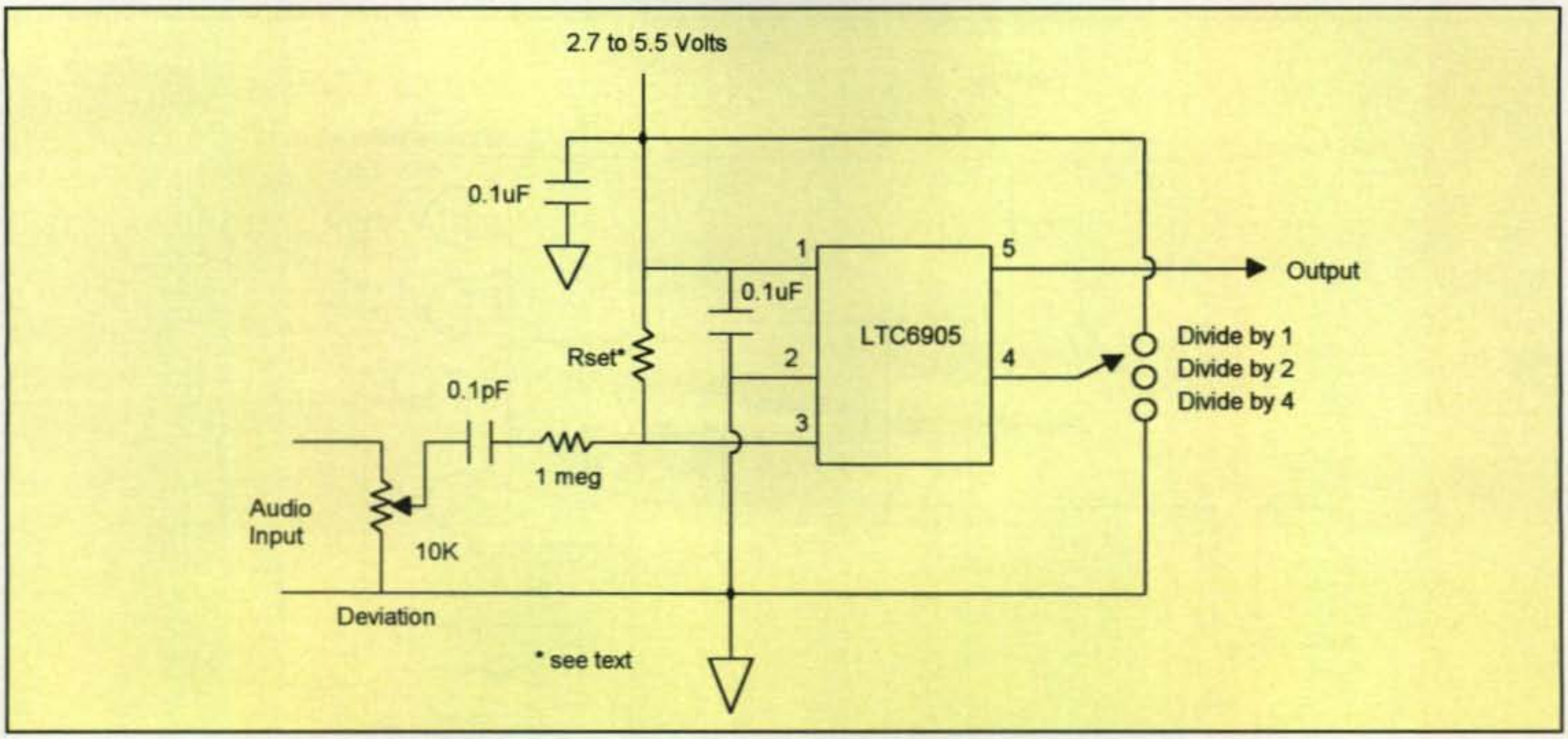

Fig. 3– A method of FM modulating the LTC6905 oscillator.

current entering pin 3 via the R_{set} resistor. The output of this oscillator is then sent to a programmable divider (also within the chip) which divides the frequency by a factor of 1, 2, or 4. Since the value of R_{set} is the main frequency-determining element, it obviously should be a good-quality resistor (such as a carbon-film variety), since it will not only set the output frequency but will play a major role in the long- and short-term stability as well. With decent components, an overall stability of ±20 ppm/°C can be achieved.

As we just saw, the output frequency is controlled by the

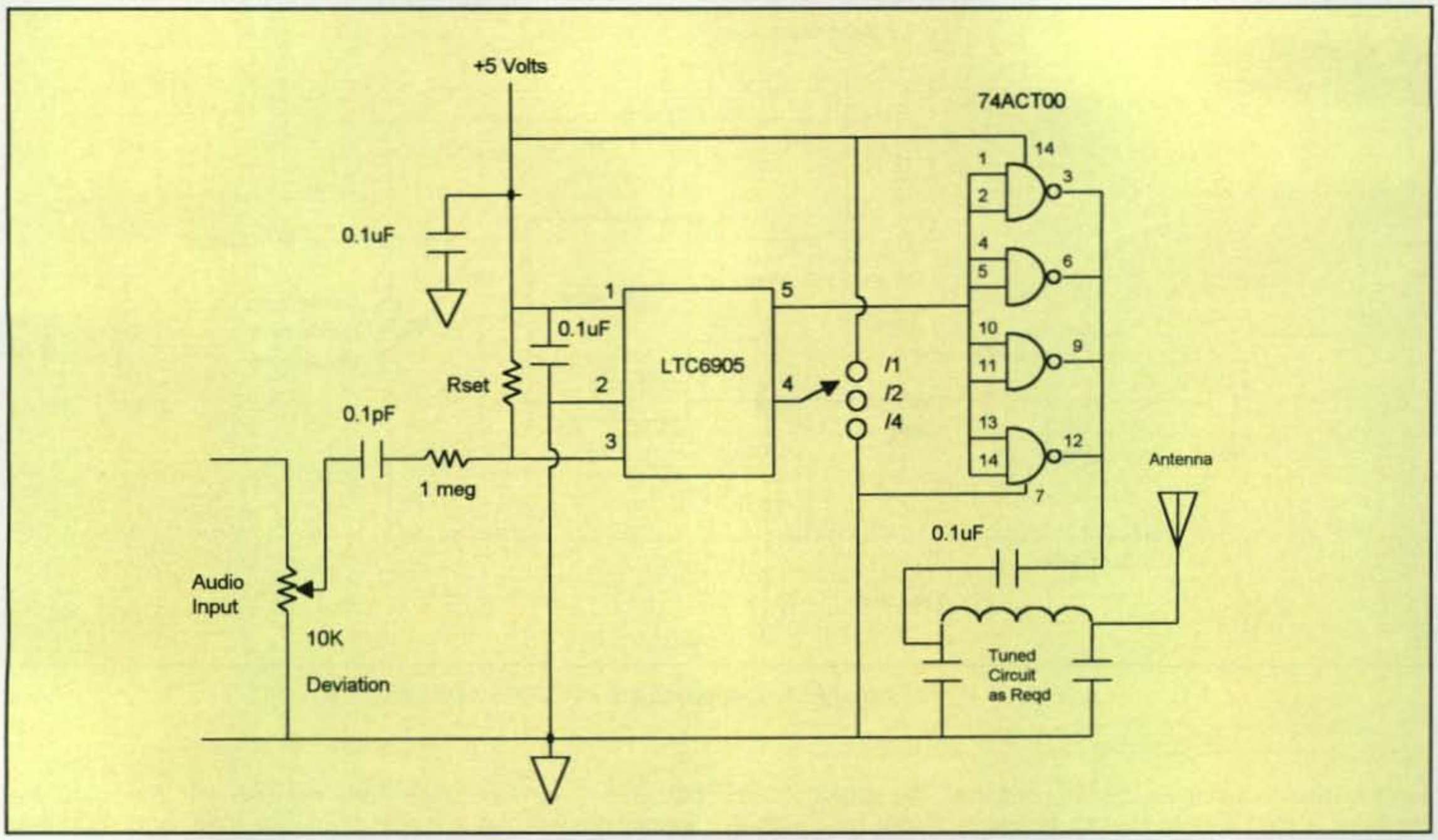

Fig. 4– A micro-power FM transmitter using the LTC6905 oscillator.

current through R_{set}. Thus, if we were to vary this current in some manner, the output frequency obviously also would vary. This fact leads to a simple way to easily FM modulate the oscillator, and fig. 3 shows one way to accomplish this. Audio is applied to pin 3 via the 1-megohm resistor, where it adds to, or subtracts from, the quiescent current. The high-value series resistor is used so that the input current point will be loaded as little as possible. However, the value of R_{set} still will have to be trimmed to compensate for even this small degree of loading. Such a high value is also used as the current that we are controlling, which is very small (in the microampere range). A potentiometer is then used to adjust the amount of audio applied to control the degree of FM deviation achieved.

If one sets the circuit of fig. 3 to a point within the 6- or 2-meter amateur band (or any amateur band within its range, for that matter) and adjusts the deviation to 5 kHz, one comes up with a very simple micro-power, narrow-band FM transmitter. According to the data sheet, with a V_{cc} supply of 5 volts and an output load resistor of 1.2K, the peak-to-peak output will be about 20 mv. This means that if one were to use the chip "barefoot," one would have to match the antenna impedance accordingly, or at least shorten it to the point where its effective impedance is 1.2K. As an alternative, one could fabricate a 1.2K to 50-ohm RF step-down transformer and drive a traditional antenna directly. A somewhat better approach would be to fabricate a simple power stage using a transistor or even a 74ACT00 logic gate array as shown in fig. 4. This will provide more output power, and the use of a tuned circuit in such a circuit will then also tend to improve matching and reduce any objectionable harmonics. Since all levels and voltages are quite low, this is a good area for experimentation without the risk of damaging any expensive components.

I hope the above has given you some food for thought. If you are interested, I would suggest that you download the full data sheet for the LTC6905 from the Linear Technology website at <www.linear.com>.

73, Irwin, WA2NDM

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Operate PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW, high speed CW Meteor Scatter and many others. Also use as Contest Voice Keyer and CW Contest Memory Keyer.

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Select the ON digital mode -- all connections are made between your rig and computer for instant digital operation.

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What You've Told Us...

Our June survey asked about your participation in the ARRL's annual Field Day exercise, and it continues to be a massively popular operating activity, with 90% of readers who responded indicating that they'd participated at least once. Thirty-nine percent of you take part in Field Day every year and 16% participate most years, while 20% responded "sometimes," 17% said "rarely" and 9% said "never." More than seven in ten readers (71%) belong to a club that runs a Field Day operation.

CQ readers are involved in all parts of Field Day operation, with 77% saying they've been operators, 70% involved in set-up, 59% in tear-down, 43% in planning, 42% in socializing and 24% each in logistics (such as cooking) and public relations. Only 12% said they've had no particular role in FD operations.

We next asked how you'd rank the effectiveness of your Field Day group in the past three years in several areas. Most did pretty well, with "building social cohesion within your group" coming out on top (45% very effective, 31% somewhat effective, 11% not particularly effective), followed by "welcoming new operators and visitors to your operation" (44% very effective, 32% somewhat effective, 14% not particularly effective), "building emergency preparedness" (37%, 43%, 10%), "scoring points" (31%, 39%, 18%), and "promoting amateur radio to the public" (26%, 44%, 19%), and "promoting amateur radio to government officials" (20%, 37%, 31%). This would suggest that despite ARRL's promotion of Field Day as primarily an emergency preparedness and public relations exercise, the reality is that it is primarily a social event, then an emergency preparedness exercise, then a contest, and finally a tool for promoting amateur radio to the public and to government officials.

The winner of this month's free *CQ* subscription is Tom Murray, KB9WSL, of Rochester, Indiana.

Reader Survey September 2005

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 an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

One of the most common requests we get from readers at hamfests is for more project articles, and we'd like to bring you more of them, subject to available space. But first we'd like to know if what we're hearing at hamfests is representative of *CQ* readers in general, and if so, what type(s) of project articles you'd like to see.

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

1. Would you like to see more project articles in *CQ*?
- Yes 1
- No 2
- No opinion 3

2. Have you ever built a project from a magazine article?
- Yes 4
- No 5
- Don't remember 6

3. Where do you classify your own skill level in building electronic projects (choose one)?
- No experience/no interest 7
- No experience but interested in learning 8
- Beginner 9
- Intermediate 10
- Advanced 11
- Expert 12
- Professional 13

4. What types of projects would be of interest to you (circle all that apply)?
- Transmitters 14
- Receivers 15
- Transceivers 16
- Station accessories 17
- Antennas 18
- Antenna accessories 19
- Vintage/Tube projects 20
- PIC microcontroller projects 21
- Surface-mount projects 22
- Other 23
- None 24

5. What level of project articles would be of greatest interest to you (choose one)?
- Beginner 25
- Intermediate 26
- Advanced 27

7. Would you be interested in contributing project articles as well as reading them?
- Yes 28
- No 29
- Don't know 30
- Not interested in projects 31

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

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DR-635T 2M/440MHZ Mobile/Base Transceiver

Dual Band Transceiver with Full Duplex Capability

Alinco's new DR-635T is an easy-to-use, high-quality transceiver for simplex and repeater operations on the VHF and UHF bands. With cross-band repeat, full duplex capability and a remote mountable control head, the DR-635T features newly designed RF circuitry that delivers increased resistance to interference from adjacent signals. Plus, a new protection circuit automatically lowers the power setting whenever the internal temperature rises. This protects the radio when used as a cross-band repeater. But, that's just the beginning:

- Large, 6 character alphanumeric display with freely and separately selectable three color display illumination in blue, violet or orange for TX/RX/stand-by
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- Multiple scan modes and extended receive capabilities including broadcast FM
- Backlit DTMF microphone allows direct frequency entry and more
- VHF: 50/20/5, UHF: 35/20/5 watt power output settings
- 200 Memory channels that can operate in splits of 80ch/VHF, 80ch/UHF and 40ch freely programmable with 1 call channel each for VHF and UHF operation
- Extended receive from 108.000 ~173.995MHz / 335.000 ~ 479.995MHz / 87.5 ~ 107.995MHz, transmits from 144.000 ~ 147.995MHz / 430.000 ~ 449.995MHz, plus reception on AM aircraft band and the ability to operate on MARS frequencies
- Can also operate with Alinco's optional EJ-50U digital data packet board that fits inside or the EJ-47U digital voice board

Thanks to Alinco, you can have a dual band dynamo in your pocket AND in your car!

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Hams are packing some serious radio power in their pockets with the DJ-C7T, the new dual band mini HT. Alinco led the way in breakthrough miniature electronics technology with its revolutionary "credit card" size transceivers. Now, the DJ-C7T offers a "pocket size" HT that's small in size but BIG in added memories and modes.

Check out the features of this "new generation" DJ-C7T

- Internal speaker with great audio!
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- VFO, Memory and Scan modes
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- Split function
- SMA antenna port
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- Cloning feature
- Lithium-ion battery
- Wide-band receive; includes FM broadcast and AM aircraft bands
- Auto repeater setting

The DJ-C7T can fit in a pocket or purse, but it's a versatile dual band HT with an enhanced receiver. So, you can enjoy twice the operating fun in half the size.

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what's new

BY KARL T. THURBER, JR.,* W8FX

Control Board, Low-Profile 80–6m Vertical, HamLookup CD, and more

This month we'll focus on some noteworthy radio hamshack accessories, antennas and antenna accessories, computer software, what's new on the net and on the bookshelf; radio resources; and more things of timely interest.

Accessories for the Shack

AMPSEQUENCER from Netcertus. Netcertus, Inc. has announced the AMPSEQUENCER (photo A), a microprocessor-driven CW buffer, amplifier, and transceiver control board. The primary function of the AMPSEQUENCER is to buffer the CW paddle, straight key computer-generated CW, or external keyer signals to allow amplifier relays to fully settle before transmitting. Buffering, and consequently delay time, can easily be adjusted from 10 to 80 milliseconds (ms). Amplifiers having quiet relays with turnaround time less than 20 ms can be operated QSK (full break-in), depending on the CW speed.

The AMPSEQUENCER's amplifier control input requires just a few microamps and can be used to safely drive the amplifier switching relay, protecting the rig's driving circuit from relay currents and back EMF transients. Besides preserving your station components, the AMPSEQUENCER will help keep your signal clean from harmonic distortion caused by "hot switching." It's also possible to protect your amplifier even during computer-generated CW operation.

When using RTTY, you'll find that most RTTY programs and interfaces will simultaneously key the transmitter while providing the audio signal, causing your amplifier to hot switch. By routing the computer PTT through the AMPSEQUENCER, your amplifier will be protected from this type of hot switching. External electronic "voice parrots," or message recorders, that are used during contests can be used with the AMPSEQUENCER as long as they provide means for PTT use with the radio.

Current-handling capabilities are 40V @ 800 mA for the amplifier and PTT-out (which are back-EMF protected), and 40 V @ 400 mA for the CW key-out and PRE-out lines. The AMPSEQUENCER's price is $39.00, and its dimensions are 35 mm × 50 mm. For more information, contact Netcertus, Inc., 8004 NW 154th St., #354, Miami Lakes, FL 33016-5814 (206-984-2604; customer contact web-form: <http://contact.netcertus.com>; on the web: <http://ampsequencer.netcertus.com>). The Netcertus website offers additional technical details, including timing diagrams, and explains in detail some of the many benefits you may expect to realize by using the device.

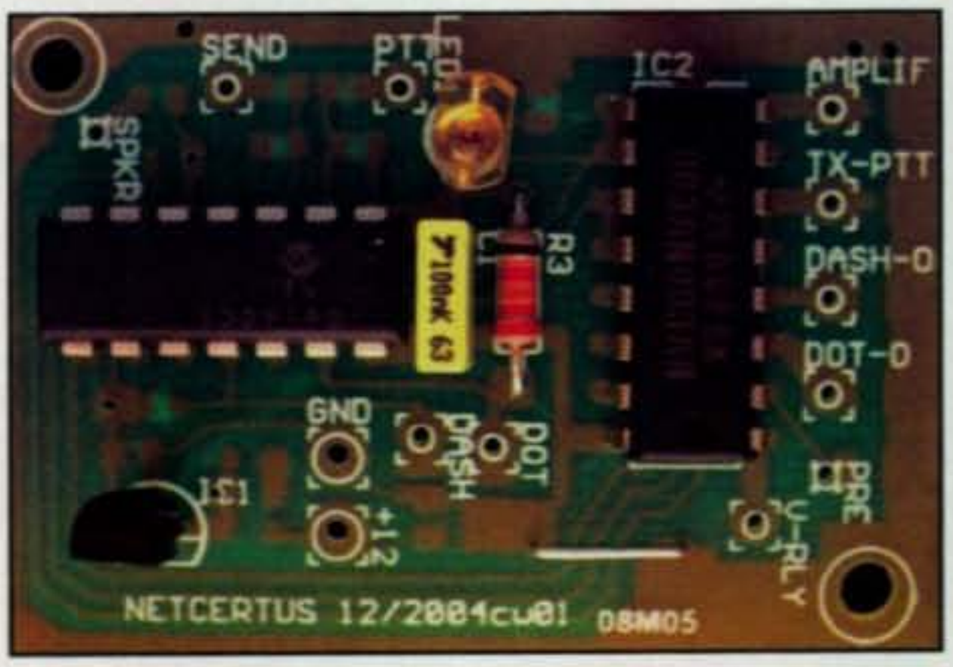


Photo A– Netcertus offers AMPSEQUENCER, an advanced microprocessor-driven control board designed to buffer CW signals while switching the amplifier to transmit; it also can be used to provide proper transmit delay for RTTY. The device helps keep your signal clean from harmonic distortion caused by hot switching. (Photo courtesy of Netcertus, Inc.)

Photo B– Comet has introduced a new 80–6-meter vertical antenna that does not require ground radials. The CHA-250B is said to be very easy to assemble, installs easily, and eliminates the need for ground radials. Details are in this month's column. (Photo courtesy of NCG Companies)

*289 Poplar Drive, Millbrook, AL 35054-1674
e-mail: <w8fx@cq-amateur-radio.com>

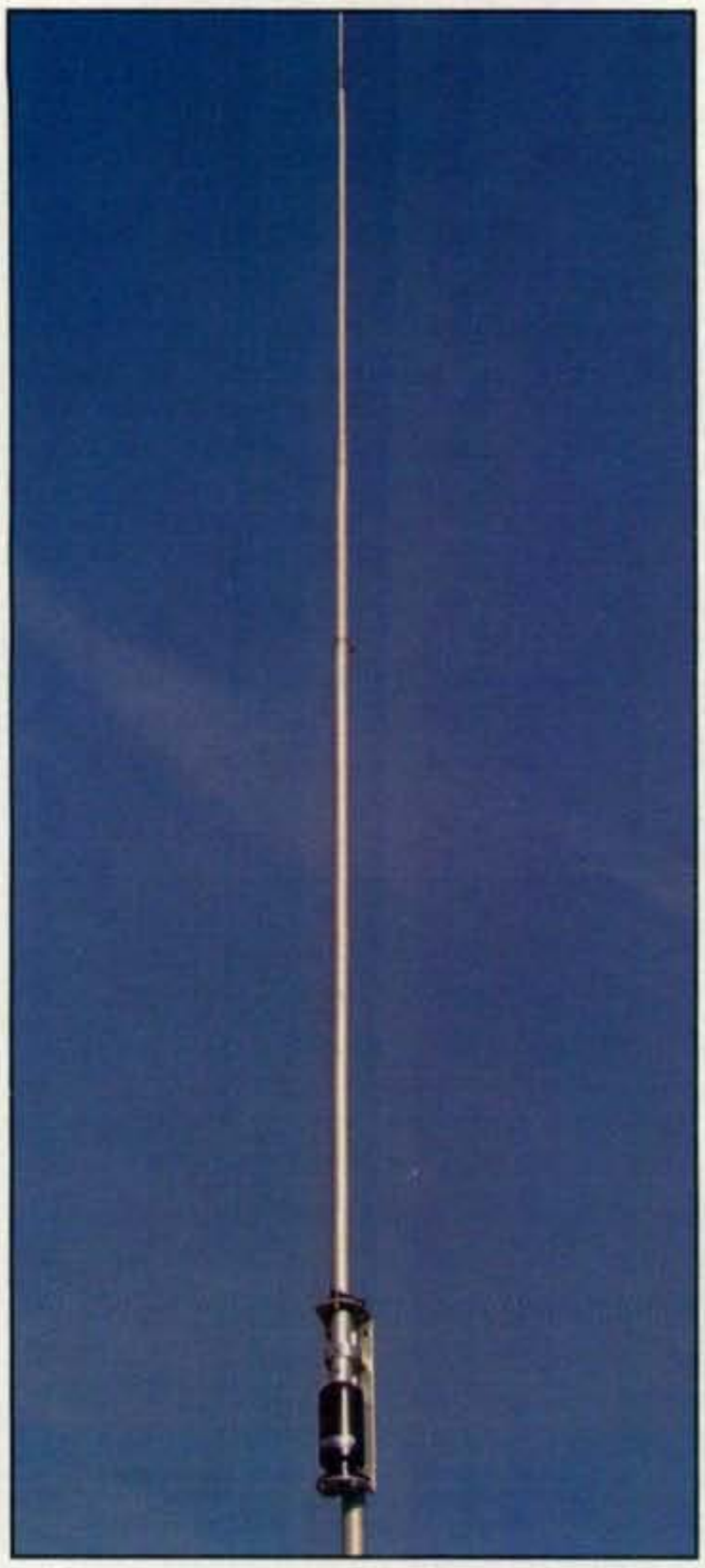


Photo C– Here's the base of the new Comet CHA-250B antenna. The antenna has a low-wind footprint; notice the exceptionally small matching network (the black cylindrical section of the antenna). (Photo courtesy of NCG Companies)

Antennas and Antenna Accessories

New Comet CHA-250B Low-Profile, No Radial, 80–6-meter Vertical Antenna. Comet has introduced a new 80–6-meter vertical antenna that does not require ground radials. The CHA-250B (photo B) is said to be very easy to assemble in less than 10 minutes, installs easily, and eliminates the need for ground radials. Claimed SWR is 1.5:1 or less from 3.5 MHz to 57 MHz. An antenna tuner is not needed, thus facilitating portable operation. The antenna is especially suitable for those hams who live in developments or areas that frown upon large antennas.

The CHA-250B consists of five sections of aluminum tubing of various diameters. These five sections slide into

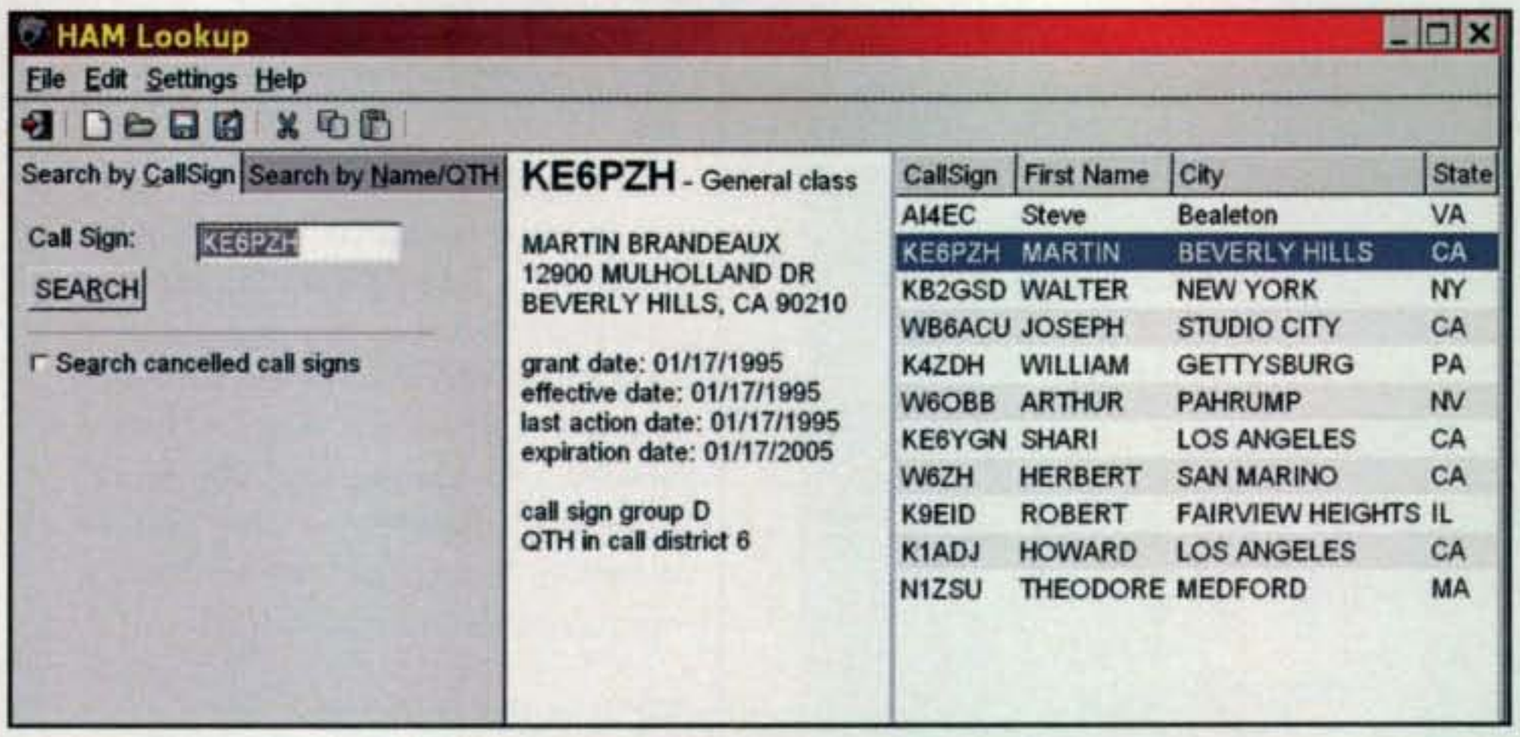


Photo D– This HamLookup Windows® XP screen shot illustrates the program's "Search by CallSign" tab. Simply type in the callsign in the field on the left and press Enter or click the Search button. You'll see a display similar to that depicted here. (Photo courtesy of DVD Industries)

one another, and they are fastened by either a hose clamp, self-tapping screws, or Allen screws. The bottom section of aluminum tubing is supplied with the matching network already mounted, minimizing installation time.

There are only two length measurements that need to be taken when fastening the sections together. The 7-lb. antenna is designed to mount to a mast with a diameter ranging from 1 inch to 2 inches and is furnished with an SO-239 connector. Hoisting the antenna into position is a breeze, thanks to the antenna's lightweight construction. The antenna has a low-wind footprint; especially notice the exceptionally small matching network (the black cylindrical section of the antenna), as depicted in photo C.

Another nice feature is that the antenna not only is resonant on the ham bands, but also is resonant on the popular shortwave broadcast bands. Thus, the CHA-250B does an admirable job as a receiving antenna for the shortwave broadcast bands with good signal levels on the major SWBC and UTE (utility) bands. The CHA-250B is not designed to replace a Yagi or any other full-size antenna, but rather is intended to assist a specific segment of the amateur and SWL market that is forced to manage with harsh antenna restrictions. The antenna also is a good choice for portable and DXpedition operation.

More information on the CHA-250B, priced at about $425, can be obtained by contacting Comet's North American distributor: NCG Companies, Inc., 1275 North Grove St., Anaheim, CA 92806 (phone 1-800-962-2611; e-mail: <sales @natcommgroup.com>; on the web: <http://www.cometantenna.com>). You'll find a full user's report on the new Comet antenna on the website.

Software and Computers

HamLookup from DVD Industries. DVD Industries, LLC has announced HamLookup Callbook CD-ROM for Windows® and Linux. HamLookup provides the ability to quickly find licensed hams in the U.S. FCC database in a modern and easy-to-use graphical user interface (GUI) application (photos D and E).

"The computer is rapidly becoming an integral component in the hamshack," said Steve Legge, AI4EC, lead developer of HamLookup. "There's a lot of untapped potential in the average, reasonably priced home computer or laptop. HamLookup leverages that power, resulting in an exciting complement to amateur radio operating activities."

Every HamLookup CD-ROM contains the latest freely available raw callbook data produced regularly by the FCC. After a few months, the average callbook CD-ROM becomes obsolete as a result of the issuance of new callsigns, upgrades, renewals, and changes of address for existing licensees. HamLookup offers radio amateurs the ability to update the callbook data at no cost by downloading the latest database files from the FCC's website.

The HamLookup Callbook CD-ROM is available now for $17.95 delivered. Minimum requirements are: Windows® XP or Linux operating system, 512MB RAM, and 1.6-GHz processor.

To find out more about the HamLookup Callbook CD-ROM, contact DVD Industries, LLC, P.O. Box 440, Bealeton, VA 22712 (540-270-7878; e-

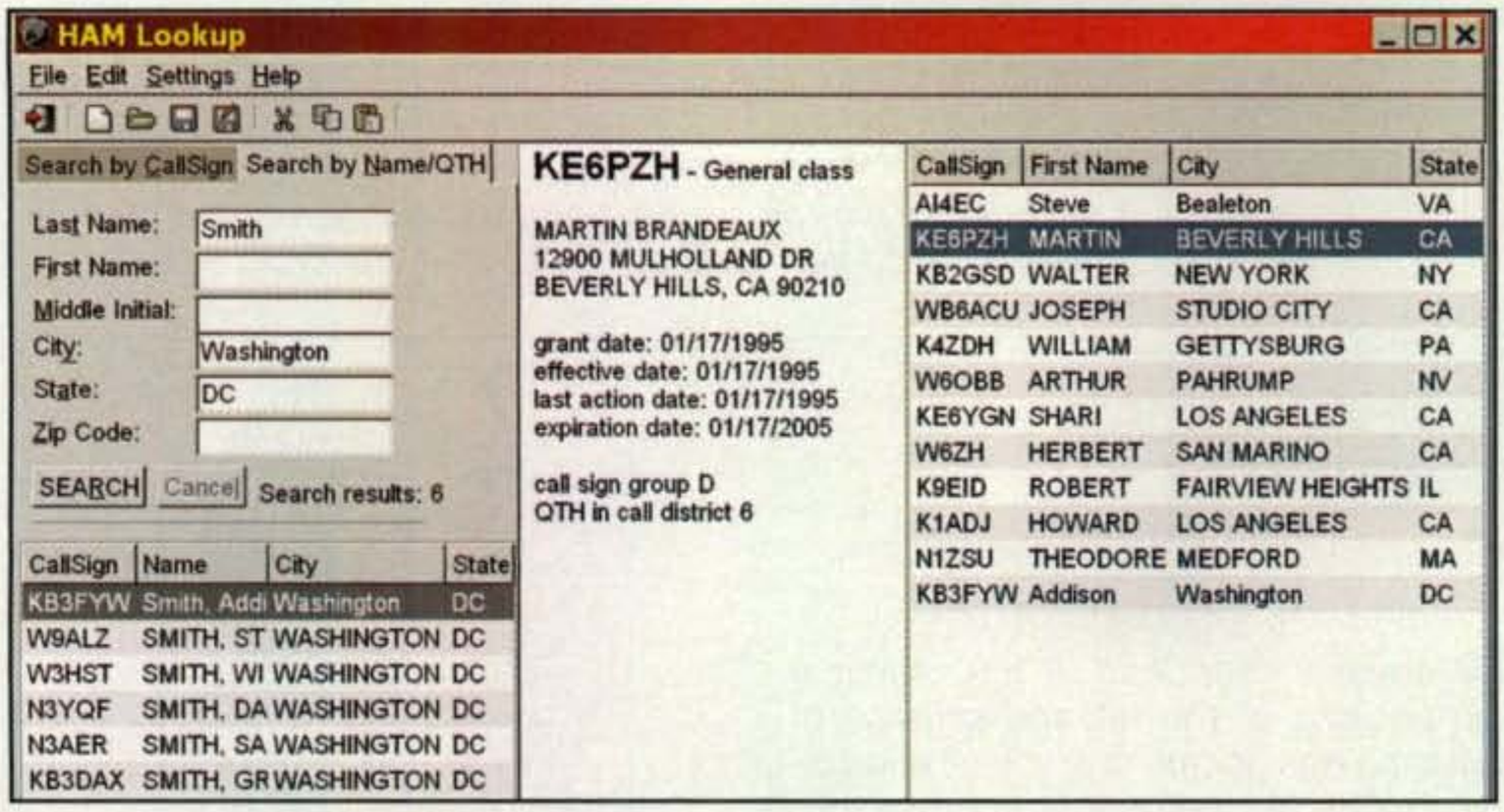


Photo E– This HamLookup Windows® XP screen shot illustrates the program's "Search by Name/QTH" tab. Simply fill in the fields as desired and press Enter or click the Search button. The example shows a search for hams with the last name "Smith" in city/state "Washington, DC"; the query results are shown at the lower left. (Photo courtesy of DVD Industries)

mail: <info@hamlookup.com>; on the web: <http://www.hamlookup.com>).

New on the Net

New SGC Website. SGC, Inc., a leading manufacturer of HF communications products, has launched its new, interactive website at <http://www.sgcworld.com>. The new site (see fig. 1) features comprehensive product information, installation recommendations, and an online store, as well as company, customer, and dealer news. The new website is a dramatic upgrade from the original site developed in 1997 and goes hand-in-hand with the new SGC marketing program implemented in 2005.

Pamela Goral, who took over leadership of SGC after the sudden death of her husband and the company's founder, Pierre Goral, explained, "We *are redefining our goals* and restructuring SGC's product line. Our new advertising, website, and packaging reflect our serious commitment: You use HF. We make HF better."

SGC's mission is to build solid, reliable HF products, provide exceptional service, reinvest in technology, and make a dedicated effort to understand the needs of customers. SGC has been manufacturing HF equipment for more than 30 years and has a worldwide reputation for quality and dependability—for what it calls "no compromise communications."

For more information, contact SGC Inc., 13737 SE 26th St., Bellevue, WA 98005 (1-800-259-7331; e-mail: <sgc@sgcworld.com>; on the web: <http://www.sgcworld.com>). Be sure to check out SGC's new website.

Have You Tried Wikipedia? Wikipedia (a combination of the words "wiki" and "encyclopedia") is a free online encyclopedia packed with content. It's constantly evolving and can be edited by anyone at <http://en.wikipedia.org> (fig. 2). Besides typical encyclopedia entries, Wikipedia includes information more often associated with almanacs, gazetteers, and specialist magazines, as well as coverage of current events. Your columnist is surprised by the quantity and quality of current articles of amateur radio and electronic interest available on Wikipedia.

Begun as an English-language project, Nupedia, in March 2000, it quickly became a multilingual enterprise. Now known as Wikipedia, it encourages contributors to fairly present all views on an issue and welcomes participation of users worldwide. Entries likely to contain controversial content are flagged as such, and it's occasionally necessary to freeze the option of editing certain topics when their neutrality is compromised.

Hosted and supported by the nonprofit Wikimedia Foundation, this open-source resource is collaboratively created, edited, and maintained by thousands of users worldwide via the Wiki software, an open-source program. Any articles that users contribute to Wikipedia become free content that may be used,

Fig. 1– SGC, Inc., a leading manufacturer of HF communications products, has launched its new interactive website, which you'll find at <http://www.sgcworld.com>. The site features comprehensive product information, installation recommendations, and an online store, as well as company, customer, and dealer news. (Graphic from the SGC website)

edited, copied and redistributed by users. All materials contributed to Wikipedia must be verifiable by other users. Since pages are always subject to editing, no article is ever finished.

Wikipedia is growing every day. There are well over 1.5-million articles in more than 195 independent language editions, with over 2500 articles being added daily—perhaps ten times this number are updated each day. Wikipedia also has a number of sister projects, which include Wiktionary, a free dictionary; Wikibooks, free textbooks; Wikiquote, a free encyclopedia of quotations; and Wikisource, a repository of source texts in the public domain.

Be sure check out this interesting and exceptionally useful website at <http://en.wikipedia.org>. There's even a new Wikipedia "quick index" search engine, WikiWax™,from SurfWax®, Inc., which you'll find at <http://www.wikiwax.com>; it gives you access to over 800,000 Wikipedia terms. Also, while you're at it, consider creating or contributing to Wikipedia encyclopedia articles dealing with our radio hobby.

From the Bookshelf

Antennas and Antenna Modeling: The Works. Described as a treasure for any library, all of noted antenna expert LB Cebik, W4RNL's books now are available on a single CD-ROM, published by antenneX. With 13 book volumes of antenna and antenna-modeling information, the CD-ROM is said to be an indispensable reference for antenna builders, as well as an inexpensive way to own in-depth works, written for the working radio amateur, on many types of antennas. The CD includes more than 3600 pages, thousands of illustrations, and hundreds of computer models and program listings. The collection includes three volumes of notes on antenna modeling with NEC and MININEC.

Antennas and Antenna Modeling: The Works also makes a handsome gift for anyone interested in the practical dimensions of the art and science of antenna design and analysis. Each volume uses plain language for easy comprehension, with extensive illustrations. The eBook in PDF format offers easy on-screen reading and high-quality printing of selected pages. The $225.95 CD-ROM package is self-starting on most computers.

Contact antenneX Online Magazine, P.O. Box 271229, Corpus Christi, TX 78427-1229 (1-888-855-9098; e-mail: <info@antennex.com>; on the web: <http://www.antennex.com>). Be sure to check out the antenneX website, which is replete with e-books, CD-ROM collections, antenna articles, software, modeling files, and other authoritative antenna information.

For more details on the W4RNL CD-ROM and other new products, visit the website above and check the announcements page at <http://www.antennex.com/announcements.htm>.

Two New XP Books from Peachpit Press. Enter two new Windows® XP books from Peachpit Press, an imprint of Pearson Education.

First up is *Customizing Windows XP: Visual QuickProject Guide* by John Rizzo. It's a highly graphic, plain-English book that helps you personalize your Windows® XP computer fast, without getting bogged down in the details. The indexed, ten-chapter book lets you explore XP customization; personalize the desktop, toolbars, and taskbar; customize the start menu; rearrange desktop items; customize folders, windows, internet access, and hardware; set up multiple users; and more. The 144-page, quick-reference guide is $12.99.

Next up is *Microsoft Windows XP: Visual QuickStart Guide, Second Edition,* by Chris Fehily (fig. 3). The indexed, 584-page, 19-chapter guide is designed to let you teach yourself Windows® XP the quick and easy way. The guide effectively uses pictures rather than lengthy explanations to help guide you through the software and show you what to do so that you're up and running in no time. The new book covers the XP Home and Pro editions, Internet Explorer, Outlook Express, Windows Messenger, digital photos, Media Player, Movie Maker, internet connections, network setup, remote connections, privacy and security, troubleshooting, and considerably more. The price? A modest $21.99.

Fig. 2– Wikipedia is a free online encyclopedia packed with content. It's constantly evolving and can be edited by anyone at <http://en.wikipedia.org>. You'll be surprised by the quantity and quality of current articles of amateur radio and electronics interest available on Wikipedia. Also check out the impressive new Wikipedia search engine, WikiWax™, from SurfWax®, Inc., at <http://www.wikiwax.com>. (Graphic from the Wikipedia website)

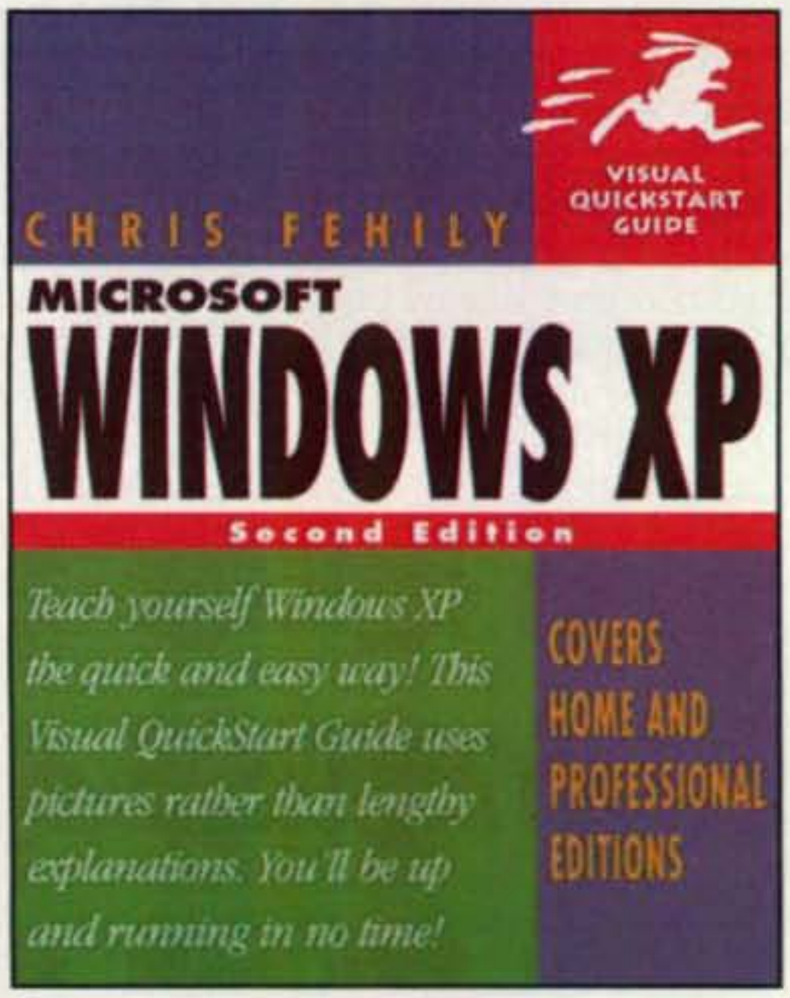


Fig. 3– This new Peachpit Press Visual QuickStart Guide by Chris Fehily is an indexed, 584-page, 19-chapter guide that's designed to let you teach yourself Windows® XP the quick and easy way. Check it out at the publisher's website, which you'll find at <http://www.peachpit.com>. (Graphic from the Peachpit Press website)

Visit your local bookstore, or contact Pearson Education, 200 Old Tappan Road, Tappan, NJ 07675 (1-800-283-9444 or 1-800-922-0579; e-mail: <info@peachpit.com>; on the web: <http://www.peachpit.com>).

Radio Resources

"Amazing Products and Devices Catalog" from Information Unlimited. About 15 years ago, we profiled this mail-order firm's very interesting, and we find that the firm is going strong today. The current "Amazing Products and Devices" catalog certainly has many unusual items described in its 37 pages that welcome you to a world of amazing scientific and electronic products. Although not particularly oriented to amateur radio, the catalog nevertheless is a treasure trove of information for electronics hobbyists and experimenters—and that certainly includes many of us.

Some of the many products covered in the fascinating catalog include lasers, Tesla coils and accessories, plasma display devices, high-energy pulsers, wireless security devices, night-vision devices, video cameras, solar cells, neon-tube displays, antigravity devices, hard-to-find parts, and more esoterica. The catalog also lists books, videos, and device plans booklets.

For a copy of the catalog, contact Information Unlimited, Box 716, Amherst, NH 03031-0716 (1-800-221-1705; web: <http://www.amazing1.com>). Visit the website to order a printed catalog ($3.00), or download a free online catalog in PDF format.

Wrap-Up

That's all for this time, gang. Next time more "What's New." See you then.

Overheard: One thing I've learned in more than a few decades on this planet is that neither success nor failure can be attributable to accidents. 73, Karl, W8FX

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

BY BOB JOSUWEIT,* WA3PZO

International Hobby Shows International Response

Amateur radio, as we all know, is an international hobby. The summer months featured amateur radio operators from around the world meeting to discuss emergency communications. Others tested their skills during Field Day and within two weeks were putting their skills to the test as a terrorist attack occurred in London and Hurricane Dennis ripped through the Gulf of Mexico. This month we'll highlight a common international response in times of need.

London Bombing

In early July three bombs exploded in London's subway system and a fourth on a double-decker bus. At least 52 people were killed and about 700 people injured during the early morning blasts. Reports indicated that cellular telephone service was overloaded.

Amateur Radio Put on Standby. Several of Great Britain's Radio Amateurs' Emergency Network (RAYNET) groups were put on standby following the bombings. RAYNET is the United Kingdom's national voluntary amateur radio communications service, affiliated with the Radio Society of Great Britain (RSGB). Groups in Buckinghamshire, Berkshire, and East Sussex were alerted during the morning and stood down in the late afternoon. Mobile-phone coverage was badly affected and many groups operated "listening watches" on designated frequencies and local repeaters.

According to the RSGB, other groups were kept informed of developments via e-mails from government offices in their respective regions. Just a week before, RAYNET was called out to provide shelter communications following a firearms incident in Lancashire.

Tunnel Communications. Hams in the UK have had experience responding to emergency incidents involving tunnels. In Scotland, members of the Greater Glasgow RAYNET Group recently carried out a series of communications checks on the Glasgow Subway (underground railway) for the City Emergencies Planning Officer. In preparation for an upcoming exercise, group members met at the Govan Subway Station and were taken by a special train to the drill site. Under the supervision of a subway official they walked through the tunnel to the next station. They found communications hindered by the tunnel's dipping and turning, which prevented line of sight communications.

Earlier this year the Gwent and South Glamorgan RAYNET groups in Wales participated in an emergency preparedness exercise based around the 2-kilometer long Caerphilly Railway Tunnel. According to the RSGB, the exercise involved major incident control and management in the tunnel. Local hams found that radios operating inside the tunnel on 23 cm (1297 MHz) provided better communications than radios operating on 144 MHz or 430 MHz. They reported that while there was some noise on the signals from inside the tunnel, communications were maintained with others outside the tunnel.

Steve, GW6CUR (left), and Roy, GW1XZI (right), maintain contact with RAYNET members in the tunnel at the old railway station at Cefn Onn near Caerphilly, Wales. They are using a 23-centimeter aerial on a tripod pointing at the southern tunnel entrance. (Photo courtesy of Terry, GW8JOY)

Inside the tunnel the operator used a .5-watt handheld radio. Outside the tunnel operators used a 1-watt mobile rig feeding an 11-element vertically polarized beam that was pointed directly into the tunnel entrance. VHF and UHF frequencies were used for communications between various locations outside the tunnel.

Future Objectives. Gwent Raynet coordinators realized that if the drill had been an actual emergency their members probably would not have been allowed to get as close to the tunnel entrance as they did. In future drills they want to test their communications from points at which they will be able to safely operate in a real emergency. They also want to demonstrate an amateur radio link among the tunnel area, the local emergency planning office, and the police department headquarters.

Global Emergency Communications Conference

The first Global Amateur Radio Emergency Communications Conference, GAREC-2005, took place in June in Tampere, Finland. Forty-two participants from 17 countries and representatives of all three IARU Regions exchanged and discussed information on the role of radio amateurs in emergency communications.

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

Major topics covered were the cooperation between hams and served agencies on the national level, and recent national and international disasters such as last year's tsunami. The presentations showed how hams support the emergency response agencies, both as skilled volunteer radio operators and in being able to provide their own global networks.

The conference discussed ways to improve and facilitate the work of emergency communications networks. It concluded that the establishment of a "Center of Activity Frequency" for emergency traffic would be desirable.

South African representatives explained a system in which 7.070 MHz is regarded as a "preferred" emergency frequency, and how with the call of "traffic" the frequency is cleared for use by the parties involved with an incident. In Region 3 several countries routinely use 7.0 MHz for emergency communications. However, when a disaster such as last year's tsunami affects many countries, there is a need to coordinate spectrum usage so that all countries can use the same amateur radio band.

The word "traffic" may not necessarily be adopted internationally. Mark Wood, G4HLZ, from the RSGB, indicated that words like "Priorité, Pan Pan and Emergency" could also be used. Other countries described the use and development of Echolink and WinLink 2000 networks.

GAREC-2005 did not make any proposals for actual center-of-activity frequencies. Such suggestions for actual frequencies will require careful consideration by those most familiar with band plans. In order to be useful for global emergency networks the frequencies need to be acceptable in all three IARU regions, and frequencies that may be considered this year in Region 1 will need to be reviewed in all three regions. In Regions 2 and 3 conferences to consider the issue will take place only in the following two years.

In a separate statement, the conference summarized the value of the amateur radio services in emergency communications. This statement will be submitted as an input document to the World Summit of the Information Society taking place in Tunis, Tunisia in November. As a follow-up to the earlier events as well as to GAREC-2005, plans for a conference in 2006 are now under discussion.

South African Exercise Provides Training

Exercise Double Barrel was the first emergency radio communications exercise to be held jointly by a Reserve Force Signals Unit and HAMNET Western Cape over a three-day period. HAMNET is the South African amateur radio emergency service organization.

A simulated massive earthquake wreaked havoc in the Winelands and Boland region, destroying tunnels, bridges, buildings, dams, electrical, and telecommunication infrastructures, and preventing the effective flow of information to and from the affected area. The 71st Signal Unit was tasked with providing HF communications from the disaster area back to its tactical headquarters. Dr. Johan Johnson, ZR1JHN, requested HAMNET Western Cape to assist and complement his unit with HF communications. Twenty-five ham radio operators were deployed to various locations in seven towns and cities. In some cases the hams were able to supervise military signalers on amateur radio frequencies.

The deployed radio operators provided detailed situation reports (SITREPs) and requests regarding the earthquake

Mrs. D. Bharathi Prasad, VU2RBI, and Hans Zimmermann, F/HB9AQS, IARU International Coordinator for Emergency Communications, catch up on the latest emergency communications news in CQ while attending the first Global Amateur Radio Emergency Conference in Finland. (Photo courtesy of Seppo, OH1VR)

damage. Simulated damage included an old-age home that had collapsed, a tanker that caused a HAZMAT spillage, 800 people injured in Worcester, people trapped under buildings, collapsed bridges, and impassable roads.

Command and Control. Pierre D. Tromp, ZR1PDT, described the main operational room as having three amateur HF radios for command and control, a digital network using Winlink, a C21 HF military radio, and a tactical VHF B46 linked to the deployed callsigns that acted as an engineering channel. He said, "The Ops Room controlled and managed the complete exercise, providing a platform for participation role players to interact with each other."

The Ops Room managed various resources ranging from helicopters and transport planes for CASEVAC (CASualty and EVACuation) and air requests, take-off, and landing times; availability and support from hospitals, paramedics, trauma doctors, ambulances, etc.; while balancing feedback and operational requirements on the various radio networks.

Opportunities. Following the drill, HAMNET members saw the need for better voice procedures, especially when working with the military, and better liaison between the hams and the various agencies. They need to investigate different HF antennas for different locations and distances, and investigate a practical and cost-efficient manner of transferring data and HF e-mail.

Patient Tracking in Colorado

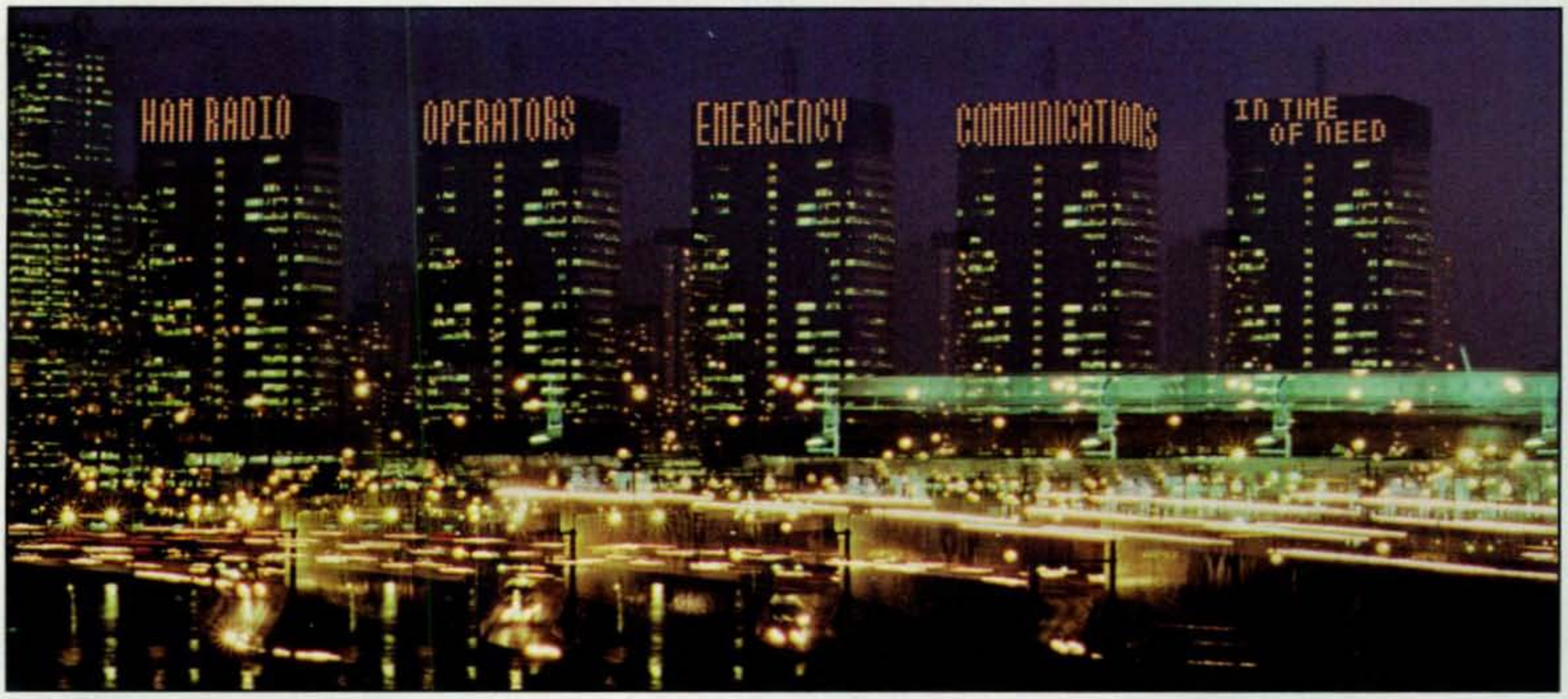
Back in the U.S., more than 100 volunteers from seven ARES (Amateur Radio Emergency Service) districts in the Denver, Colorado area were deployed to 26 area hospitals in a National Disaster Medical System mass-casualty, patient /record-handling drill. The objectives of the exercise were to track all patients to hospitals with 100% accuracy, ensure safe return of all volunteers to the Denver International Airport (DIA) upon conclusion of the exercise, and record and communicate receipt of patients at hospitals back to DIA.

The National Disaster Medical System's mission is to design, develop, and maintain a national capability of delivering quality medical care to the victims of, and responders to, a domestic disaster. This exercise tested NDMS's ability to move patients from a disaster site to unaffected areas of the nation.

Local amateurs tracked the arrival and departure of mock evacuees using several radio methods and techniques to ensure compliance with medical privacy (HIPPA) regulations, all done over the airwaves to demonstrate secure record and patient handing. Packet was used to transmit patient information to the hospitals prior to transport.

Field Day 2005

Hazy, hot, and humid were the key words along the east coast for this year's ARRL Field Day on June 25 and 26. With temperatures near 100 de-grees amateur radio operators tried to stay cool while making contacts. This year more stations



Philadelphia area hams deliver the message to visitors during Amateur Radio Week, as seen in this composite photo of the PECO Building. (Photo courtesy of Edward Savaria, Jr., New Communications, Inc.)

operated out of Emergency Operation Centers. These stations stayed comfortable and had the opportunity to give their radio equipment a good workout. Field Day is an annual exercise aimed at developing skills to meet the challenges of emergency preparedness as well as acquainting the general public with the capabilities of amateur radio.

President George W. Bush sent greetings to everyone participating in this year's ARRL Field Day:

Across our country, radio plays a vital role in relaying important information to the public and emergency service personnel in times of need. By providing emergency communications at the federal, state, and local level, licensed amateur radio operators help first responders and law-enforcement officials save lives and make our country safer. Your efforts help ensure the right assistance gets to the right people at the right time. I appreciate all ham operators who give their time and energy to help make our citizens more secure. Your good work reflects the spirit of America and contributes to a culture of responsibility and citizenship that strengthens our nation. Laura and I send our best wishes.

Tom Rutter, KF4HJX, Earl Moore, KR4MA, and his wife Carol, KE4YFV, operate the 6-meter APRS station and packet station during Hampton Roads Field Day 2005. (Photo courtesy of Joe Safranek, K4JJS, VA ARES Distinct 7 PIO)

Joint Effort in Virginia. For the first time in the Hampton Roads, Virginia, area five amateur radio-related organizations joined forces and operated from one Field Day location. Amateurs from the Hampton Public Service Team supplied the callsign W4HPT and were joined by members of Peninsula Amateur Radio Club (PARC), the Peninsula Electronic Amateur Radio Society (PEARS), the Southern Peninsula Amateur Radio Klub (SPARK), and Virginia ARES District 7 members. Approximately 55 hams and their families and guests participated in the event. The team operated category 5A, plus a Get on the Air (GOTA) station, and had

Ten-year-old Emily Bishop, KI4CHK, of Cleveland, Tennessee, meets MARS Chief Robert Sutton at this year's Dayton Hamvention®.

demos of slow-scan TV, packet radio, APRS, and the "AirMail" e-mail system. The staff of Coliseum Mall in Hampton provided the facilities and other logistical support. A large portion of the mall's parking lot was roped off to use as the antenna field, and inside mall space was given to the group to set up display boards, videos, slide presentations, and in general present amateur radio to the public. Numerous handouts were available from the ARRL, the various participating organizations, and the Cities of Hampton and Newport News. The mall's public-relations staff provided advertising of the event as well as signage inside the mall and on the outdoor marquee. Electronic and print media were on scene to cover the event. The Cities of Hampton and Newport News and NASA Langley Research Center also provided logistical support with large commercial generators, trailer-mounted mobile towers, etc.

Early Start to Hurricane Season

July made weather history with at least five named storms in the Caribbean and the Gulf of Mexico. Dangerous Hurricane Dennis struck the Florida panhandle near Pensacola, and as this is written in mid-July, very dangerous Category 3 Hurricane Emily was forecast to become a Category 4 hurricane.

The Hurricane Watch Net, WX4NHC at the National Hurricane Center, the VoiP Weather Nets, and others have been active as the storms threaten land. During one attempted activation propagation was so bad on 20 meters that communication with the watch area was impossible.

The Hurricane Watch Net is only interested in personal observations, preferably measured by calibrated instrumentation. It is not interested in local news media reports. Throughout each event, the HWN is "available to provide backup communications facilities to official agencies such as Emergency Operations Centers and Red Cross officials in the affected area. They are also interested in collecting and reporting significant damage-assessment data back to FEMA officials stationed in the National Hurricane Center.

Youngest MARS Member Meets the Chief

At 10 years of age, Emily Bishop, KI4CHK, is the youngest member of the Army Military Affiliate Radio System, and she was proudly greeted at the Dayton Hamvention® this spring by MARS Chief Robert Sutton.

Emily, daughter of MARS member Michael Bishop, KI4AME, of Cleveland, TN, holds auxiliary membership with the MARS callsign AUX4EB. This permits under-17-year-old hams to operate on MARS nets—and Emily's a regular—while under "direct personal control of a licensed MARS operator." With her "Elmer" right in the family, Emily has been FCC-licensed since she was eight years old. Ten is the minimum age for a MARS auxiliary.

"Her very positive 'can do' attitude has allowed her to achieve a great deal," says Sutton. "She actively participates in our Tennessee nets, creates and sends an above-average number of incident reports, participates in exercises, and has recently mastered the use of Pactor and sends message traffic over our digital network. She set a high standard."

"Who knows," Sutton told her, "you may be a future Chief Army MARS. Keep up the excellent work."

One World, One Hobby

This month we took a look at amateur radio emergency communications around the world, each person ready to help fellow citizens in times of need. We wouldn't have been able to tell this international story without the help of Kevin Snelling, GW7BSC, Controller, Gwent RAYNET Group; Reino Rehn, OH3LG, the IARU; Pierre D. Tromp, ZR1PDT, Hamnet Regional Director; Ann Foster, KØANN; Joe Safranek, K4JJS; Bill Sexton, N1IN/AAA9PC; and Fred Serota, K3BHX. My thanks to all.

Do you have a story to tell? Drop us a note and let us know how your group is serving in the public interest. Until next time . . .

73, Bob, WA3PZO

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how it works

BY DAVE INGRAM,* K4TWJ

Noise Blanking and DSP Noise Reduction

As everyone will surely agree, noise is an unfortunate yet quite familiar obstacle challenging our enjoyment of amateur radio. Most of us also think (or hope!) noise is something that only affects the other person rather than us. That fact can change on a moment's notice, however: an insulator or high-voltage clamp on a power pole near our QTH cracks or works loose, a neighbor's doorbell transformer or fish-tank heater starts arcing, geomagnetic storms increase band noise, the list is endless. Sometimes the resultant noise is mild and not too objectionable; sometimes it is quite intense and a formidable problem. Realizing the limitations noise imposes on radio communications, most equipment manufacturers include at least two means of minimizing noise in their transceivers. This month's column looks at the two most common types of noise and the two most popular rig features for minimizing or eliminating that noise. Let's begin by considering similarities and differences in types of noise.

Intermittent vs. Continuous Noise

Generally speaking, noise falls into one of two categories: the intermittent or pulse type normally associated with spark plugs and ignition systems in automobile engines—on which a *noise blanker* is most effective—and the constant type such as background noise or hash on a band—best reduced by DSP (digital signal processing) noise reduction. Spark plugs fire or arc between their electrodes many times per second and produce a "popping" sound in a radio receiver. Automobile manufacturers strive to minimize this noise by using high-resistance plugs and wiring, and the approach works fairly well. In most vehicles, however, hard-rubber mounts and hangers support the engine and tailpipe. As a result, any engine-related noise is radiated by the equivalent of an underbody antenna. The end and maximum radiating section of that phantom antenna is also positioned close to your mobile antenna's mount, further aggravating the situation. Even if you work diligently and "clean up" your vehicle's ignition noise, it does not prevent noise produced by other automobiles from "deafening" your mobile (or home!) rig.

Although power-line noise is usually constant in nature (a "frying" sound), it often begins with an intermittent arc that can be minimized by a transceiver's noise blanker. The arc soon develops a carbonized path and becomes a constant noise, however, that cannot be blanked. While continuous noise such as power-line noise and band hash cannot be eliminated by a noise blanker, it can often be reduced to an acceptable level by DSP noise reduction. Naturally low-level noise is easier to eliminate or minimize than high-level noise and there are always trade-offs or sacrifices associated with all forms of noise elimination. These facts will become apparent as our study continues.

Noise Blankers

As discussed, a transceiver's noise blanker works for minimizing pulse-type noise and/or static that would otherwise mask signals and make them unreadable. It does this by instantaneously interrupting or gating off signal flow through a transceiver's IF stages during the precise time of each noise pulse (fig. 1). That time is only a few milliseconds, so the interruptions to speech or coded signals generally go unnoticed. Since signal flow is gated off before it reaches the detector and develops a related AGC voltage, it prevents static crashes from reducing RF gain and lowering overall receiver sensitivity. That was the main drawback of older style noise limiters; they worked after signal detection and sampling of AGC voltage took

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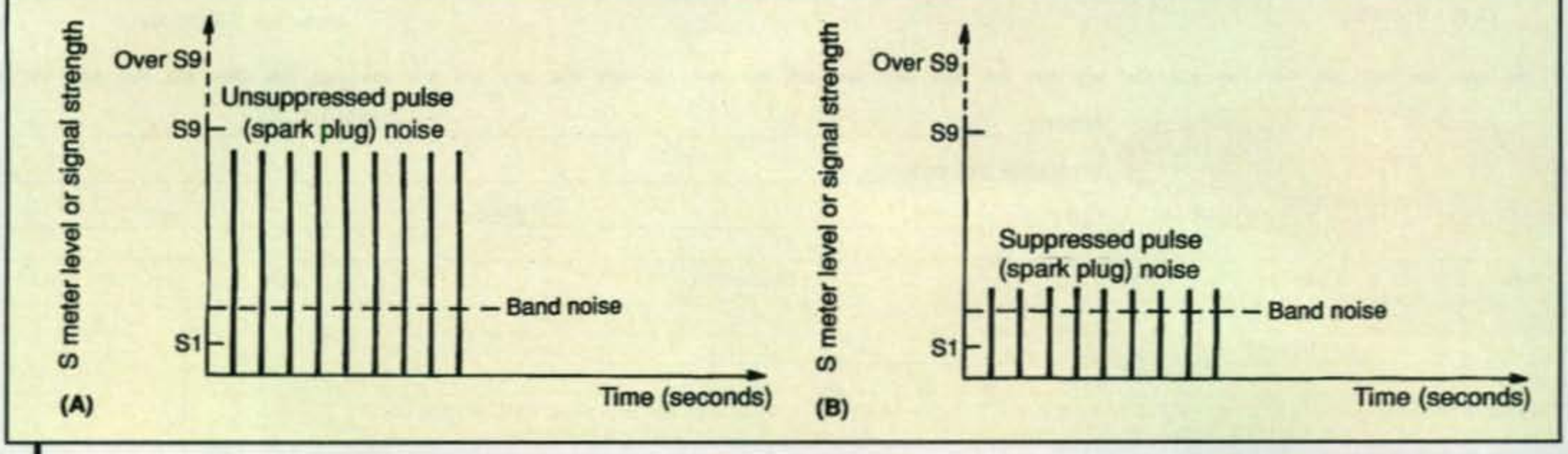

Fig. 1– Before and after, or on and off, comparisons of a noise blanker's effect on pulse-type noise (as associated with automobile spark plugs). (A) shows unsuppressed pulses occurring at regular intervals. (B) shows suppressed pulses with noise blanker on and operational.

Photo A– Most mid-range to high-end HF transceivers include a very effective noise blanker with front-panel level adjustment. The older ICOM IC-761 shown here also sports both wide and narrow noise blankers. Wide blankers were originally designed to minimize "Woodpecker" or over-the-horizon radar noise, but they also help minimize raspy BPL-type noise.

place, so receiver sensitivity was noticeably compromised.

Most noise blankers used in today's SSB/CW transceivers include a front-panel or menu-accessible level adjustment. Basically, it sets the point or threshold where blanking action begins. When set too low, it has miniscule effect and barely lowers the noise level. When set too high, it introduces distortion or "cracking" on audio and "buckshotting" on signals at and within 10 or 20 kHz of your receive frequency. The keynote to effective noise blanking thus is using only enough level to reduce the noise of the time, not expecting miracles in performance, and remembering to switch the blanker off when not needed. If your noise level is exceptionally high and your rig's noise blanker cannot minimize it, incidentally, try also switching in the transceiver's *receive attenuator.* It may cut all incoming signal levels by 10 or 20 dB, but it will also "even the odds" and give your noise blanker a fighting chance to prove its merit.

If your transceiver has an *IF level notch filter,* give it a good old college try, too. You may be able to set it and notch out just enough noise so your rig's noise blanker can work better. Just be sure it is an IF notch filter, not an AF notch filter. How can you spot the difference? Watch your receiver's S-meter while adjusting the notch filter. If it works at the IF level, meter readings will vary with adjustments (good!). If it works at the AF level, meter readings (and receiver desensing by noise) will not change.

If you have a deluxe older model transceiver such as an ICOM IC-761 or IC-781 with both regular and wide noise blankers, incidentally, try using the wide blanker to reduce those raspy digital-type signals often heard on 40, 30, and 20 meters. I understand this multi-frequency hash kHz after kHz spreading from 5 or 6 MHz to 20 or 21 MHz is associated with BPL (Broadband over Power Lines) or remote-control signals sent via power lines—possibly propagated over long distances. It is the worst of the worst interference, and the only solution I have found to even partially minimize it is combining wide and narrow noise blankers with IF notch filtering and an RF attenuator. As one who has experienced this politically backed interference first hand, I can truthfully say it is the most blind endangerment of our planets greatest natural resource (global HF communication via the ionosphere) ever attempted. Since we are a capitalist society, I urge equipment and product manufacturers worldwide to join forces and oppose BPL and its spin-offs now, before you lose the markets for your products. Will a word to the wise suffice?

DSP Noise Reduction

This is one of the latest and greatest technical innovations in our amateur radio world, and it too has proven its worth for copying weak signals under adverse (noisy) conditions. It differs from a noise blanker in that it works on

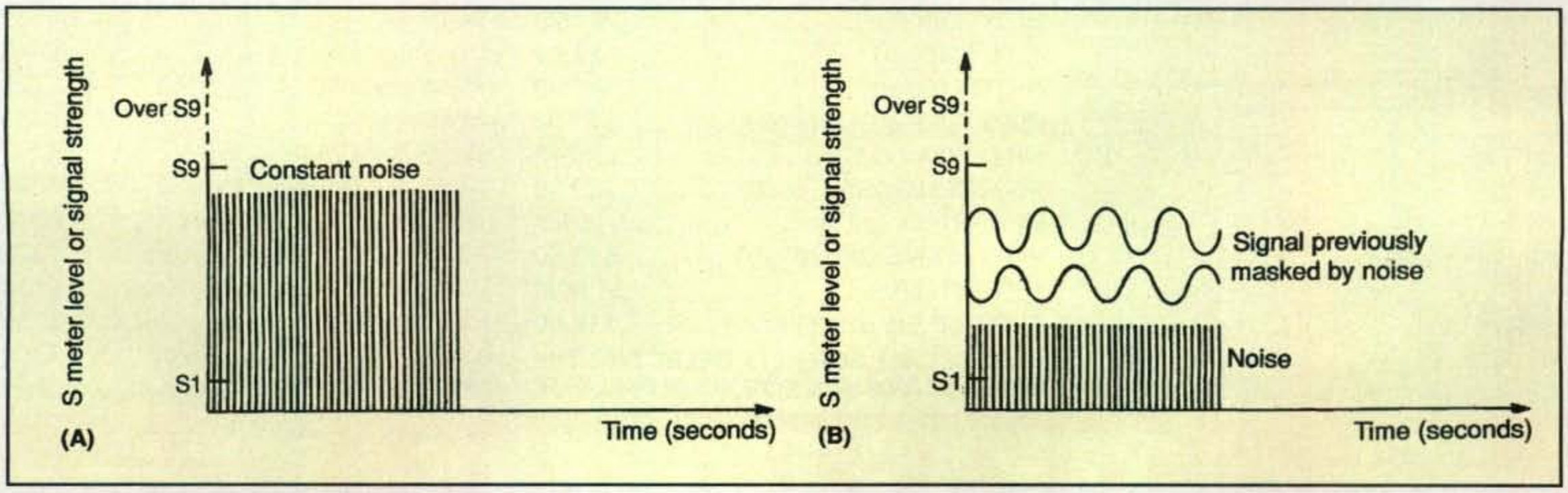

Fig. 2– Before and after, or on and off, comparison of DSP noise reduction's effect on constant noise or general band "hash." (A) shows unsuppressed noise that covers weak signals. (B) shows a weak signal that is unmasked when noise level is reduced.

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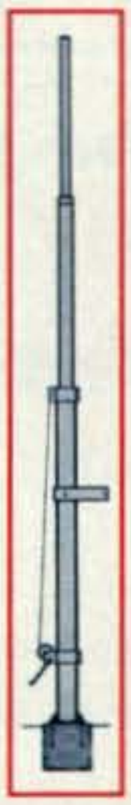

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• Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

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TMM-541SS	41'	12'	430	$2,135	$1,939

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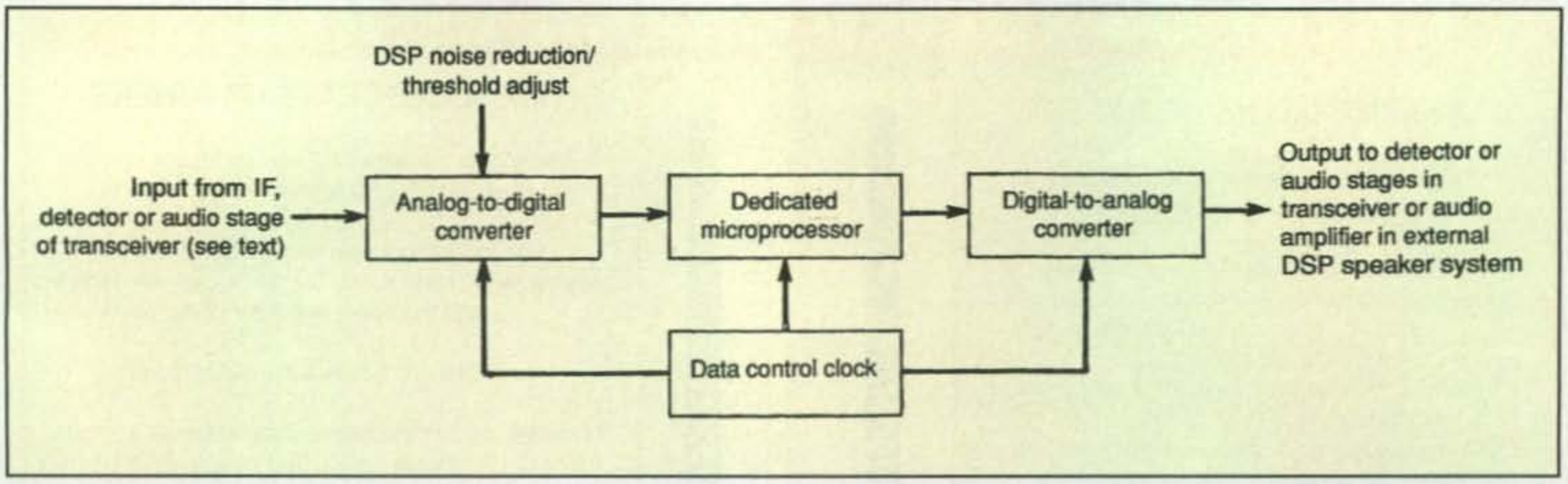

Fig. 3– Highly simplified block diagram of a DSP noise-reduction system. Incoming signals are converted to digital equivalents, continuously checked for similarity and differences in their data stream flow, and then deleted or passed on to the D/A converter, which outputs to following stages. (Discussion in text.)

or minimizes constant background noise or band noise rather than intermittent or automobile spark-plug-type noise (fig. 2). It is also available in two forms: IF-level DSP noise reduction like that included in many upper-end HF transceivers, and AF-level DSP noise reduction that may be built in or available as an add-on accessory for almost any transceiver. As with a noise blanker, IF-level noise reduction is the most effective, as it reduces noise prior to signal detection. As a result, the receiver's AGC circuit is not "blocked" or its sensitivity is not unnecessarily reduced by the noise. AF-level noise reduction is less expensive and easily added to a transceiver (just plug it in or install a small module), but it cannot correct for reduced RF/IF gain due to a high noise level. Both types do their job well, however, and both are truly worth their cost.

How can you recognize the difference between IF- and AF-level DSP noise reduction? The same as you would for a notch filter: Switch it on and off, in and out (while allowing a few seconds for it to sense band noise and become fully functional), and notice your transceiver's S-meter while also listening to signals from the speaker. If the S-meter reading drops in step with a decrease in noise from the speaker, it is IF-level noise reduction. If noise from the speaker drops but S-meter readings stay up, it is audio-level noise reduction.

Photo B– A shining example of add-on/audio-level DSP is SGC's self-contained ADSP2 speaker. It plugs into the speaker socket of any transceiver and features two levels of noise reduction, selectable by a top-mounted switch. Nice! Details (and speakers!) available at <www.sgcworld.com>.

That is, assuming your transceiver's front-panel RF gain control is set high enough for the S-meter to work—and it registers a noticeable level of band noise before you activate the DSP noise-reduction system. If this is questionable, switch your transceiver's RF attenuator in/out while watching for a change in S-meter readings corresponding to the owners' manual listed dBs of attenuation.

Sidestepping the fine details, DSP noise reduction basically works by converting incoming signals (and noise) to digital equivalents, passing that data through a special microprocessor, and then converting the results back to analog signals for detection and/or amplification and reproduction (fig. 3). The microprocessor continuously performs a series of high-speed comparisons on its sampled data. The data that changes is categorized as speech or intelligence and passed on to the output. Data that stays the same is categorized as noise and deleted. It is difficult for most people to visualize such high-speed and repetitive comparisons, but the technique really works—and works quite well. DSP noise reduction is also adjustable. Basically, the adjustment tells the microprocessor where to "draw the line" on repetitiveness of data.

Just like using a noise blanker, setting the level of DSP noise reduction according to needs of the moment is very important for successful use. If the level is set too low, noise barely will be reduced. If the level is set too high, all signals passing through the DSP system will sound watery, fluttery, and artificial. Always use only as much noise reduction as necessary. Finally, remember that in addition to reducing general band noise, DSP is also beneficial for minimizing automobile ignition noise for both your vehicle and others, and DSP can also be used in conjunction with your rig's noise blanker.

Conclusion

That wraps up this month's views, and we trust it helped expand your general knowledge of circuits and techniques for eliminating or minimizing received noise. We also invite you to review this month's "World of Ideas" column, as it discusses interference related to the "transmit side" of amateur radio communications. Meanwhile, remember to get on the air often and enjoy our wonderful world of amateur radio!

73, Dave, K4TWJ

BY FREDERICK O. MAIA,* W5YI

Glenn A. Baxter, K1MAN, Socked with $21,000 Fine

Controversial amateur Glenn A. Baxter, K1MAN, has received a huge fine from the FCC. It was not unexpected. Baxter's license expires next month and this "monetary forfeiture" will no doubt be a major factor in whether his license will be renewed by the FCC. Baxter is a registered professional engineer and executive director of the American Amateur Radio Association (AARA). His station transmits "bulletins," often quite lengthy, on a regular schedule on specific frequencies that he has selected.

The $21,000 fine is for what the FCC alleges are the transmission of willful and repeated interference, willful and repeated communications in which he had a pecuniary interest; willful broadcasting, willful and repeated failure to file requested information pursuant to an Enforcement Bureau directive, and willful failure to exercise control of his station. The Notice of Apparent Liability for Forfeiture (NAL) was issued by the FCC's Boston District Office on June 7.

Interference to Ongoing Communications

Section 97.101(d) of the FCC rules states, "no amateur operator shall willfully or maliciously interfere with or cause interference to any radio communication or signal."

Responding to numerous complaints from the ham radio community, the FCC issued a Warning Notice to Baxter a year ago for "deliberate interference to ongoing communications," including stations participating in the Salvation Army Team Emergency Radio Net. The Commission wanted to know what remedial action Baxter was taking in response to the alleged interference complaints. The Warning Notice also reminded Baxter that the FCC previously warned him six months earlier that enforcement action would be taken if he failed to correct the deliberate interference being caused by his station.

Baxter answered the Warning Notice by saying that "no corrective actions are necessary" and that "K1MAN is in full compliance with all FCC rules, state laws, and federal laws." Baxter even encouraged the FCC to take enforcement action against him and said he looked forward to seeing them in court.

The FCC issued a second Warning Notice to Baxter explaining that his response to the first one was insufficient and that the FCC had received still more complaints of deliberate interference caused by his station. The FCC asked for the identity of the control operator and method of station control on the dates and times specified in the most recently received interference complaints.

Baxter responded by saying that his earlier letter "...provided all the information required by FCC rules and by federal law." During November and December 2004 and March 2005, according to the NAL, Commission personnel monitored K1MAN beginning his bulletin transmissions on top of ongoing communications on 3.890 MHz, disrupting the communications by the other licensees.

Business Use of Ham Radio

The amateur radio rules (Section 97.113(a)(3)) ban any communications in which the station licensee or control operator has a business interest. The FCC charged that Baxter repeatedly uses his amateur station to make transmissions over the ham airwaves to advertise his website at <www.K1MAN.com>, which offers various items for sale.

The Commission had cautioned Baxter more than a year ago that if he continued to use his station to promote his website he could be subject to further enforcement action. However, the on-the-air promotion did not stop, the Commission charges, and FCC monitoring personnel said they observed station K1MAN advertising the website on the air numerous times this past March.

One of the products on the website is a monthly newsletter that appears to be mostly ARRL-produced news. Glenn Baxter sells a subscription to this online publication for $45 per year. The FCC also stated in the NAL that Baxter promoted "Baxter Associates," an employment-search firm he owns, during an on-the-air interview which lasted more than an hour.

Broadcasting to the General Public

Amateur radio operators are prohibited by Section 97.113(b) of the rules (with limited exceptions not applicable to Baxter) from broadcasting or transmitting one-way transmissions. "...the rules define broadcasting as 'transmissions intended for reception by the general public.'"

The FCC charged in the NAL that a December pre-recorded interview made by K1MAN on 3.975 and 14.275 MHz with a "Jeff Owens" who was interested in retaining Baxter Associates "...constituted a broadcast and an impermissible one-way transmission."

During the broadcast, Baxter explained that Baxter Associates is a firm that engages in "management consulting, executive search, and executive career management." The FCC noted that during the transmission Baxter "...explained the fees involved, how Owens could invest in franchises of Baxter Associates, and how [he] planned to market the franchises...."

Section 97.3(a)(26) defines an information bulletin as "A message directed only to amateur oper-

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ators consisting solely of subject matter of direct interest to the Amateur Service." Nothing in the program related to amateur radio as required by the rules, the FCC said.

Furthermore, the NAL alleges that this broadcast was made without the required station ID until the conclusion of the 70-minute program, a violation of Section 97.119(a), which requires station identification at least once every 10 minutes during a communication.

Failing to Adequately Respond to Information Requests

Section 308(b) of the Communications Act provides that the FCC "...may require ... written statements of fact from a licensee to determine whether a license application should be granted, denied or revoked...." Although Baxter replied to the FCC's demand for information in various Warning Notices, the NAL noted that "Mr. Baxter failed to provide information regarding how the station is controlled and the identity of the control operator." The Commission stated that Baxter's statements "no corrective actions are necessary" and "no changes are needed with regard to station control" are insufficient.

Failure to Exercise Station Control

Section 97.105(a) of the rules provides that the control operator must ensure the proper operation of the station. The Commission had asked Glenn Baxter about his station control procedures earlier, but his response did not provide the required information requested. Thus, last November agents from the FCC's Boston Office conducted an inspection of Mr. Baxter's amateur station K1MAN.

The NAL states that the method of station control appeared to be a telephone line connected to an interface board, which was connected to the transmitter. Baxter said he monitors the station from a mobile receiver when not at the transmitter and that he can control the transmitter through a land-line or cellular phone. During the inspection Mr. Baxter demonstrated that he could control the transmitter.

On December 19, 2004, however, the FCC monitored station K1MAN repeating the same nine-word phrase over and over for 45 minutes on 3.975 MHz using an apparently defective prerecorded audio tape, after which the transmissions ended abruptly in mid-sentence without any station identification. The FCC believes that continuous repeated transmissions without any intervention by a control operator and without station identification suggest that Baxter was not properly exercising control of his station.

How the Fine was Determined

Section 503(b) of the Communications Act provides that any person who "willfully or repeatedly fails to comply substantially with the terms and conditions of any license ... or any rule, regulation or order" shall be liable for a forfeiture penalty, also known as a fine.

The Commission's Forfeiture Policy Statement in Section 1.80 of the rules provides guidance to the FCC in assessing fines. The base forfeiture amount is $7000 for willful or malicious interference, $3000 for failure to file required information, and $3000 for violation of transmitter control. There are no base forfeiture amounts for violations of the rules prohibiting broadcasting or pecuniary interest in the Amateur Service.

The Commission concluded, however, that violations of the Part 97 rules prohibiting broadcasting and the transmission of any communication in which the operator has a pecuniary interest "...are similar to violations of the Commission's requirements pertaining to

Group Seeks to End Mode Subbands in the Amateur Service
Petition For Spectrum Deregulation Filed with FCC

A group of ham operators calling themselves the Communications Think Tank has filed a very professionally prepared Petition for Rulemaking seeking to end the segregation of emission modes in the Amateur Service.

The petitioners propose to substitute a voluntary band-plan system "...to achieve greater, more efficient utilization of [Amateur Radio] frequency allocations." They believe "Spectrum utilization would be improved, because amateur radio operators would dynamically select from among the entire range of frequencies available in a given band."

The group appears highly qualified, most having been licensed more than 35 years and listing CW as one of their amateur radio pursuits. All are current or retired communications professionals.

The petition was signed by:

Dave Antler, W9AD, Barrington Hills, IL (retired Broadcaster)

Bud Chiller, WD8BIL, Sheffield Township, OH (Sr. Technician)

Paul Courson, WA3VJB, West Friendship, MD (Technology Author)

Rob Peebles, W8LX, Dublin, OH (RF/Telecommunications Engineer)

Art Pightling, K3XF, New Cumberland, PA (retired Communications Engineer)

Larry Robison, W8ER, Vermilion, OH (retired Broadcasting Chief Engineer)

Michael Wingfield, W8MW (Technical Writer)

The group wants the ham bands to no longer have segments allocated to specific modes or allocated by federally mandated occupied bandwidths. The bands still would be allocated frequencies by license class, however, "...to maintain motivation for basic licensees to improve their knowledge and skill." In a nutshell, the various subbands allocated to each license class would be retained where all modes of operation would be permitted.

According to the petition, the proposed change "...addresses an imbalance in an operator's ability to use amateur allocations in the high-frequency 'shortwave' bands."

Included was an analysis showing that operation on the ham bands is predominantly phone. "In the past few years there has been a growing observation that the lower portions of the bands are becoming less and less populated. Conversely, the upper sections are becoming more active with new licensees trending toward phone modes."

A "statistically accurate" survey with information gathered using a spectrum analyzer was conducted on Saturday, June 4, 2005 for a 12-hour time period from 1200Z to 2359Z. The observed ratio of phone to CW QSOs in progress during this period was 421 phone to 241 CW, or 1.75:1.

The group concluded: " there is a chronic need to allow greater leeway in selecting a place to operate.... Such flexibility is currently constrained by FCC regulations defining subband frequency allocation by mode of operation. The federally regulated zones do not match today's typical level of use by enthusiasts of Morse code as compared to phone operation.

"Our proposal, to discontinue the system of subband definition by mode in the Amateur Service, supplies a way to address contemporary patterns of use while retaining and encouraging expansion of traditional voluntary agreements on mode utilization in subsets of the frequency spectrum.

"We believe the ideal band plan is one where good judgment on the operator's part supports use of any mode and any frequency available within their license class. Good judgment is centered on cooperative, flexible use of frequencies, with a specific goal of avoiding and/or resolving interference to others at a direct and low level, avoiding escalation and any need for outside enforcement." The petitioners added, "A certain amount of unintentional interference must be accepted in a hobbyist communications system."

"We contend that the goal of voluntary selection of operating frequencies for improved spectrum use is best achieved through real-time assessment of variables in propagation and radio traffic load. Efforts to improve spectrum use are currently constrained because these variables cannot be accommodated with full-time, rigidly defined sub-bands.

"This proposal also provides for better international coordination of amateur frequencies [and]... also aligns U.S. amateur radio operator privileges with the rest of the world," the petitioners said in their 16-page document.

"By demonstrating improved utilization of our range of frequencies, we can forestall any proposals for use of the amateur radio spectrum by other services. These potential rivals now can see a portion of our bands appear deserted much of the time under today's allocation-by-mode. In reality other modes are quite active and crowded into the top section of the bands.

"In sum, greater operating flexibility will significantly relieve conditions of over-crowding attributed to regulatory divisions of available spectrum against popular operating interests."

The petition retains the same HF bands between 10 and 160 meters for the various license classes as outlined in the current Section 97.301 and eliminates the "authorized emission types" listed by band in Section 97.305.

The Petition was acknowledged by the FCC on June 20. It has not yet been assigned a Rulemaking (RM) File Number.

broadcasting of lotteries and contests, which carry a base forfeiture amount of $4000 for each such violation." Therefore, the total penalty warranted is $21,000, the FCC said.

The FCC is also required to take other factors into consideration when assessing a fine, including gravity of the violations, history of prior offenses, and ability to pay. Glenn Baxter was ordered to pay the full $21,000 within 30 days or file a written statement with the FCC's Enforcement Bureau seeking reduction or cancellation of the proposed forfeiture.

The FCC said it would not consider reducing or canceling the fine due to a claim of inability to pay without (1) federal tax returns going back three years, (2) personal financial statements, or (3) some other reliable and objective documentation that accurately reflects current financial status.

Response from K1MAN

Glenn Baxter responded on June 12, 2005 to the Notice of Apparent Liability with a press release. He said he welcomed the proceeding since he "...has been trying to 'face off' with the Commission for over 15 years."

Baxter denied "any apparent liability for forfeiture in the amount of $21,000 or any other violations of FCC rules, state law, or federal law." He said that he "has received three identical NALs (fines) in years past" and the FCC has blocked "...his rights to and desired access to the Washington, D.C. Court of Appeals in the pursuit of due process of law as guaranteed by the United States Constitution."

K1MAN believes it is he that is being interfered with and that his bulletins are styled after W1AW, the ARRL headquarters ham station. He also feels that "actions and inactions" by the FCC have encouraged intentional interference to his information bulletins over the years.

Baxter requested that the FCC supply him with all documentation concerning the NAL and criminal violations for use during a trial-like FCC hearing and for the other court actions. He said he "...will be calling witnesses (and) introducing affidavits...."

73, Fred, W5YI

60 Great Things About Ham Radio

In celebration of *CQ*'s 60th anniversary in 2005, we've come up with 60 great things about ham radio which we'll bring you each month, five at a time. We're sure you'll have more great things that we haven't thought of, so when we're all done, we'd love to compare our list with yours.—*W2VU*

This month, we'll focus on some of the ancillary benefits offered by ham radio:

41. Introduces a variety of career paths. Ham radio, particularly for a young person, provides opportunities for exploring and developing skills in a wide variety of career paths. The most obvious ones are technical and scientific, but there are numerous non-technical career paths with which ham radio can help as well. Ask any five hams who got started young in the hobby if ham radio has helped them in their careers, and we're pretty sure at least three will answer "yes." (For us here at *CQ*, for example, early involvement in ham radio opened doors to careers in journalism and publishing.)

42. Offers unparalleled opportunities for career networking. This follows the previous point. Once you've chosen a career, you're bound to find fellow hams who are already well-established in your field, and the bond of ham radio can be very helpful in making additional career-related contacts and climbing the ladder of success. In this way, being a ham is much like being a member of a fraternity and making networking contacts with fellow "brothers."

43. Opportunities for competition in contesting and foxhunting. There are those among us with very strong competitive spirits but whose bodies may not be up to the task of strenuous physical competition. Ham radio provides opportunities to exercise that competitive spirit with little or no physical exertion required. Contesting requires sitting in front of a radio and operating (yes, there may be towers to climb but it shouldn't be too hard to find help if you need it); foxhunting—searching for hidden transmitters—can often be done entirely by car, or with minimal walking once you've driven as close as you can get.

44. A good way to collect really cool postcards from around the world. QSL cards are good for more than award credit. A good QSL collection is a treasure-trove of postcards from all over the world, of interest to many people with no real interest in ham radio. Many cards tend to be distinctive or reflective of the culture from which they are sent. The QSL collection of a deceased ham became the centerpiece of the successful book *Hello, World: A Life in Ham Radio*, by Danny Gregory (KC2KGT) and Paul Sahre (KC2KHN), which looked at the cards as folk art from around the world. The authors became hams only after immersing themselves in the world of amateur radio while researching the book.

45. Nearly endless variety of different things to do, on and off the air. You really have to work hard at being bored if you're an active ham. Virtually nobody's "done everything" in ham radio, so there's always some new mode or new band to try out, or some new award or contest to go after. Off the air, it's the rare ham whose station is ever "just right," so there are improvements to be made as time and budget permit. You can spend pleasant hours organizing your QSL cards or seeing if you qualify for some new award. Plus, there are club meetings, hamfests, and conventions to attend, public-service events to help with, or vacation spots from which to operate. Even if you're homebound, ham radio can keep you in touch with friends—both old and new—in the outside world.

We'll be back next month with another installment...

BY DAVE INGRAM,* K4TWJ

Stop That Interference!

This month's column is part 2 of a unique double feature to help ensure your maximum enjoyment of amateur radio during the good times and not-so-good times both now and later—an "interference special," so-to-speak. The receive part of this combo appears in our "How It Works" column in this issue and considers noise-related interference that can limit your ability to hear or copy other stations. The transmit part here in this "World of Ideas" column looks at modern items and techniques for minimizing interference to TVs, telephones, etc., resulting from your transmission of RF energy and shortwave signals. Between the two columns you should acquire some good problem-solving reference material useful for many years hence. Earmark this issue of *CQ* and keep it handy. The month after you misplace it is always when you most need it!

Have you not considered external noise or RF interference a problem because you have lived in the same ham-friendly location for many years or because your QTH is in a semi-isolated area? Think again. All it takes for situations to change is a new neighbor installing a large TV antenna near your antenna and trying to receive fringe area stations while you are working a DX contest. Then, too, a local telephone company may route new lines exceptionally close and parallel to your antenna. The result? An open-air transformer coupling your signal directly into the telephone line (fig. 1). As radio amateurs we are also vulnerable to neighbors and even cable TV companies interconnecting everything from stereos to line amplifiers with poorly shielded and/or half-grounded cables. The result? More cases of RFI, not because we are "doing anything wrong," but simply because one device is deafened by a strong nearby signal while listening for a weak signal from afar. Installing a traditional low-pass filter at your transmitter here has a slight effect. That's because a low-pass filter passes fundamental frequency RF energy between 160 and 10 meters but attenuates high frequencies and harmonics above 10 meters (the frequencies used for TV broadcast[s]).

But wait, you say: My amateur radio setup is of modern design, very well filtered and spectrally clean, so the problem could not be at my end (unless my own computer or TV is being affected). True indeed, but that fact does little to prevent a landlord or newly formed Home Owner's Association (HOA) from branding you as "undesirable" and making your life miserable. No HOAs or CC&R (restrictive covenants) in your area? Watch your back. They are gaining momentum—in cities and rural areas alike day by day. Bulldozers clear uninhabited land. The heavy artillery moves in and soon folks are living in condos right beside (or below) your antenna. Offering assistance in minimizing interference from your clean, legal transmissions may have its rewards here, but you may be treading on thin ice and diplomacy is paramount. Ensure folks understand that your suggestions and help are strictly voluntary and that your budget is limited. Where to start? Let's consider the possibilities, beginning with the analysis (see fig. 2 for a "flow chart").

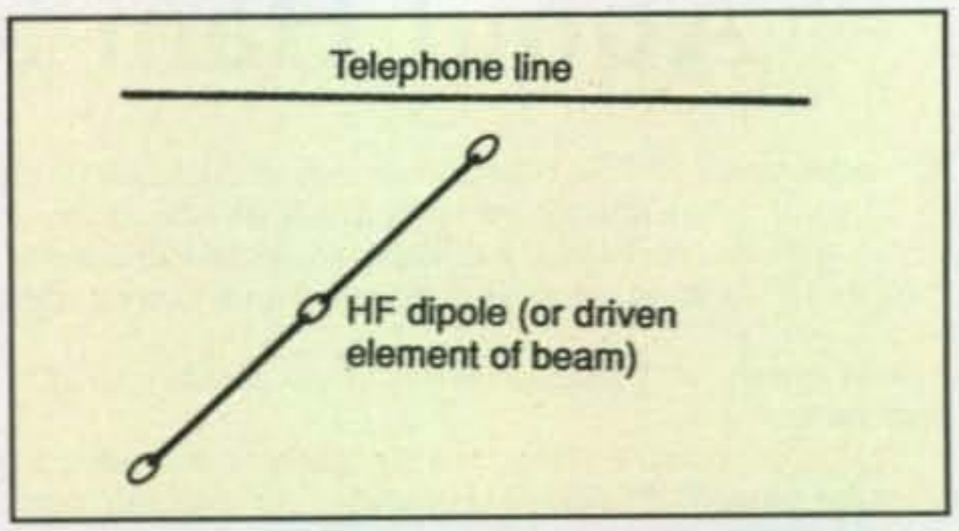

Fig. 1– Antenna elements and telephone or AC power lines near and/or parallel to one another can form an open-air transformer capable of coupling signals from one wire into the other wire.

Spurs or Overload?

A logical first step in evaluating any form of RFI is considering whether it is related to spurious radiation or sheer RF overload, and good electronic reasoning plays a big role here. If you are using old or trouble-prone gear, there is a good possibility it generates "spurs." If your antenna is old with rusted or corroded connections and/or frayed coax, it too can produce spurs—even if you are using a new rig delivering a squeaky clean signal. Spurious radiation, incidentally, is the major cause of classic TVI. "Spurs" are not multiples of a fundamental frequency like harmonics, but rather random signals on unrelated frequencies often extending into the VHF and UHF range. If spurs are being generated, your best bet is repairing the gear or antenna before proceeding.

Spurs typically result from overdrive and nonlinear operation between stages of older transmitters. It can also result from overdriving a linear amplifier connected to a modern transceiver or even from excess mic gain with an SSB rig.

After cleaning up your signal, installing a classic low-pass filter (which passes 160-10 meter signals but attenuates higher frequencies) at the transmitter and a high-pass filter (which passes VHF/UHF TV signals but reduces HF signals) at the TV minimizes remaining TVI. There is one exception, however: A low-pass filter (which connects at the output of your transceiver) cannot correct antenna problems. You must do that the hard way through actual repairs or replacement. On the favorable side, however, a TV-installed high-pass filter often reduces mild antenna-related TVI.

If the strength of your (fundamental frequency) signal is high compared to the level of incoming

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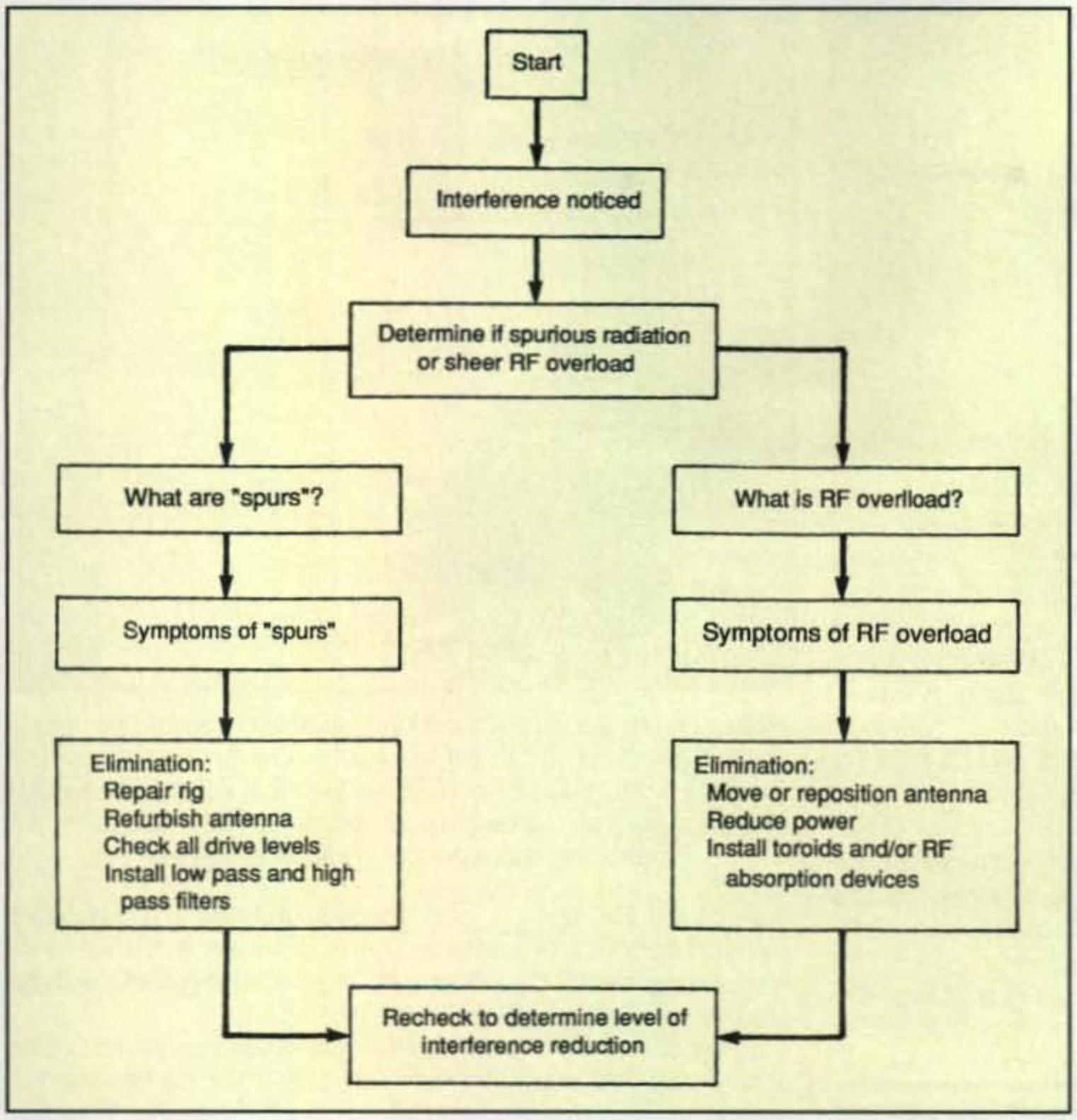

Fig. 2– "Keep It Simple" flow chart for locating, defining, and curing RF-related interference as discussed in the text.

TV signals, interference in the form of sheer RF overload may occur. As previously mentioned, this is a situation where a TV (or even a telephone) listening for a weak signal is blown away by a stronger signal. Several factors can contribute to this scenario: The amateur signal can be extra strong, the TV signal can be extra weak (or both), or the antennas may be physically located extra close to one another. That's enough background on "causes"; now let's consider some "cures."

Modern Solutions for Modern Problems

While today classic TVI continues alive and well in many amateur circles, the more often-noted problem is interference from strong-signal RF overload—and that includes both TVs and telephones. The most logical means of minimizing such interference obviously is reducing the strength of your transmitted signal at or near the TV antenna (or telephone, if affected). That is really not as difficult as it seems, especially when we remember field strength decreases rapidly when antennas are moved farther apart. Remember, too, that minimum radiation and signal pickup occur off element ends of regular antennas such as dipoles and beams.

If feasible, consider moving your ham antenna so it is farther from the affected TV antenna. That is a challenge for sure, so before making big changes, you might consider reorientation of your ham antenna so its end or side points toward the affected TV antenna or telephone line. Notice 300-ohm TV lead-in wires and telephone lines, too; both are unshielded and susceptible to coupling your signal into their connected devices. Also remember some telephones are extra-sensitive to RF overload.

If relocating or reorientation of antennas is still not an acceptable option or if you need a more quick-fix solution, an RF absorption-type filter on the affected receiver may be a better bet. Just snap it in place and bingo. RFI is eliminated or noticeably reduced (usually, although there are always exceptions). The unquestioned best absorption-type

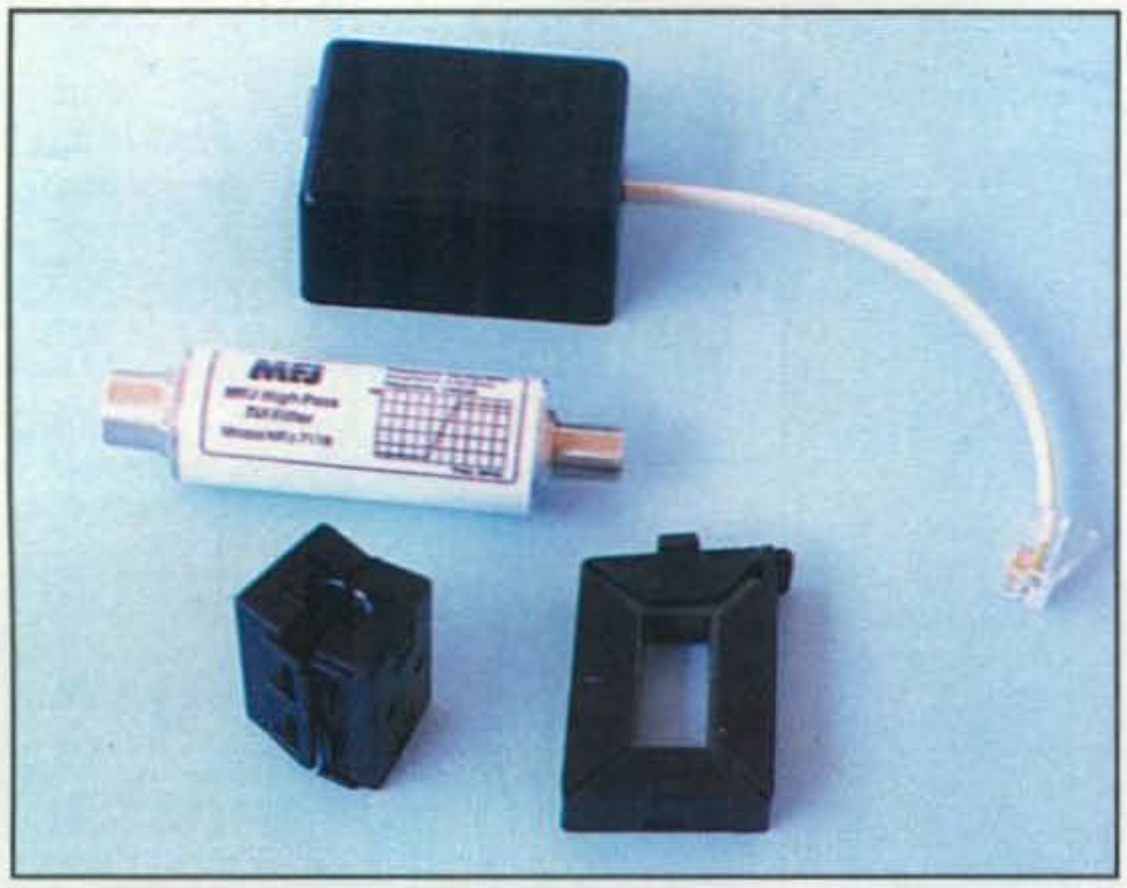

Photo A– Modern items for reducing RFI/TVI-related interference. Clockwise from the top/12 o'clock is the KY telephone filter, square MFJ snap-on toroid (sold in packs of four), computer monitor/coax cable-type snap-on toroid, and MFJ-7118 RF absorption/high pass filter.

Photo B– In addition to making excellent telephone filters, John Browne, KI6KY, offers some outstanding advice on locating and minimizing RF interference. Check <www.ky-filters.com> for details. Our compliments to John for providing this service to radio amateurs.

filter I have ever seen was made by TCE Labs in Texas. When TV reception was totally blacked out by a really close-by and high-power/900-watt signal, this device cleared it up—completely. Unfortunately, TCE filters have now vanished. The only close equivalent today is MFJ's 7118, as shown in photo A. I understand this device is a combination high-pass filter and common-mode (absorption-type) choke for reduction of high-power HF signals, and it works quite well. It has cable TV-type connectors and attenuates RF energy in the 5 to 40 MHz range by 45 dB while passing 54 to 950 MHz without attenuation. Impressive!

Large clamp-on toroids like those installed on video cables of computer monitors also work great for minimizing stray RF energy on key, mic, and station control cables. You may find these toroids in various sizes at hamfest fleamarkets. MFJ also produces a package of four snap-on toroid forms that are very effective for minimizing stray RF energy "riding" on AC power cords. I mention these snap-on toroids here because unshielded AC/power lines can act like phantom antennas and radiate your signal in undesired ways, and these toroids prevent such radiation. You can order them direct from MFJ at 1-800-647-1800.

The unquestioned best remedy we have found for telephone interference is the "KY filter" made by John Browne, KI6KY, and shown in photo B. You simply plug this little gem into a telephone's rear socket, plug the telephone line into the filter, and in 95 percent of the cases interference disappears. In severe or exceptionally high-power cases, installing two filters in series may be necessary, but the technique works! Going a couple of steps further, John has researched causes and cures of RFI and includes some good troubleshooting information with his telephone filters. He also offers several pages of helpful advise on reducing RFI on his website, www.ky-filters.com. You can direct-order KY filters from John Browne, KI6VY, 3010 Grinnel Place, Davis, CA 95616, phone 1-530-757-6873, or e-mail <ki6ky@ix.netcom.com>.

Conclusion

As you probably surmised, the overall message in both this month's "World of Ideas" column and our "How it Works" is do not let interference—on receive or on transmit—preempt your enjoyment of amateur radio. Just follow a logical path of analysis and cures, do all you can to minimize the interference, and keep on hamming. Amateur radio needs you during the good times and emergencies alike. Stay with us!

73, Dave, K4TWJ

our readers say

Professor Heisseluft

It seems like this year's April issue contribution from Professor Heisseluft (German for "hot air") on radio rage was a little too close for comfort for some of our readers ... but fortunately, not for all...

Editor, *CQ:*

Rage? What rage ... only on April 1st! Danke, Gutes Professor Heisseluft.

How soon will the contest station from the Lauton Institute be on the air? Will it operated QRS or QRU? When will *CQ* come out with a new RAGE award?

Carson Bell, WAØRSX

Editor, *CQ:*

I was delighted to see the article regarding the new requirement for licensing in the April issue—psychological testing. I told an old-time ham about it and he informed me it was an April Fool's joke. As you can tell, I bit. Is he correct? If he is, you "got" one reader.

Elsie Finkelstein, KA2CLX

Editor, *CQ:*

I'm assuming that this article by Professor Emil Heisseluft in the April 2005 issue is an April Fool's trick on us?

Otherwise, present company excluded, I seriously doubt that after ten years there will be any ham radio operators left in the USA!

Kris Harrison, NK4K

Editor, *CQ:*

I would like to believe that the article in the April 2005 *CQ* about the FCC requiring psychological testing was an April Fool's joke because if it wasn't, the FCC really wants to completely kill amateur radio. It seems that this testing is like burning down the house to kill a fly. How many people are actually a problem versus the number of licensed hams? Amazingly I can get a driver's license, get a pilot's license, or even buy a gun without psychological testing. So is amateur radio so critical that *all* of its members must submit to an intrusive test in the hopes of maybe finding a few unstable persons? Whatever happened to "innocent until proven guilty"? Does anyone honestly think that if for whatever reason someone fails this test that they will still be interested in trying again in a year?

Amateur radio operators need to realize that there is strength in numbers and if every effort keeps being made to make it harder to participate, there will be so few of you left that the FCC will eventually figure that your frequencies are worth more to someone else. I have been studying along with eight friends to become hams, but we all agree if we have to take this psychological test, we'll find something else to do. Why doesn't the FCC concentrate on trying to catch the bad guys instead of punishing all of the good guys?

Edwin J. Pyles

Editor, *CQ:*

I love the article by the highly regarded Dr. Heisseluft and oh, how I wish it were true!

Tim Lewallen, KD5ING

And Speaking of April...

The following letter was addressed to "Math's Notes" editor Irwin Math, WA2NDM, regarding his April column:

Hello Irwin,

Just a comment or two on the article, "Optical FM." Wondering how to find a stable platform to construct such a device without going to a large cast-iron mounting, to maintain such tolerances in alignment, etc., as described in the article. Also a parts list and suppliers are missing. But then the article appeared in the April issue and you mentioned that test results should be withheld until the following April, making such a device suspect.

A couple of years ago, *QST* published a device for projecting a Yagi antenna into the sky using laser light and had a similar absence of parts or suppliers. Even further back in *Radio-Electronics,* a Gernsback magazine, dating to maybe 1950 or so, a Dr. Mohammed Ulysses Fips proposed a device using crystallized steam developed by boiling Jan-issued crystals and condensing the distillate. Can't remember what the end result was Also an April issue.

Such monkey business shows up time and again and is entertaining, but some readers are following seriously.

Jovially and in best regards,
Bob Krueger, WB9UKQ

WA2NDM replies:

Hi Bob,

Thank you for your comments. This is indeed a "tongue-in-cheek" April column and is the only time during the year that I write one like this. At all other times I do write about odd applications on occasion but they are all true or at least plausible.

The main problem with optical FM using the Doppler shift is that if you could actually implement it, the change in frequency would be so small that you could never hope to recover it using slope detection nor could you ever build a stable enough mechanical platform. Remember, the frequency is in the THz region and a few kHz of deviation is well beyond the stability of even the best of temperature controlled, feedback stabilized lasers.

When I do write my April column I always try to make it as realistic as possible and many times do manage to fool a number of quite technically adept readers. This is my sort-of pleasurable feedback. Also, I try to make all of my columns of this sort border on principles that in some manner might just be possible.

Thank you once again for your comments.

Field Award

Editor, *CQ:*

I want to compliment you for starting the CQ DX Field Award. I remember W1JR commenting back in 1983 about who will be the first to work all 324.

I have already applied for the 6-meter award with 60 fields to start. With increasing activity on the EME path, perhaps you might consider expanding band awards to include 2 meters and 70 centimeters. I and probably many others have at least 25 fields on one or more of those bands.

John Fridenstine, W8PAT

John: Thanks for the support and encouragement. We will consider adding more bands in the future if the demand justifies it.

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Going Back to School: Time to Upgrade!

As the summer draws to a close and the kids go back to school, now might be a good time to think about doing some new learning in ham radio and upgrading your license. Upgrading is useful on several levels. If you do any contesting or DX-chasing, the extra frequency allocations you get with more advanced license classes are worth going after. If you are a club officer, you may want to consider going for an Amateur Extra license, since you may be called upon to be the Field Day captain, or the control operator of a special event station, and having the "Extra edge" might be very useful.

In the U.S., there are three amateur radio license classes granted by the Federal Communications Commission: Technician, General, and Amateur Extra.

Most ham radio clubs have helpful folks who can assist you in studying for a license upgrade. Some clubs even hold study sessions and have members who are registered Volunteer Examiners. Many clubs have a library, which may include license manuals. There are also videos and even on-line courses (see additional information below).

I've always found that it is best to study in many short bursts, rather than a few long and drawn-out marathon sessions (although your learning style may be different). Take your time and pace yourself. It may be best to check for the schedules of examination dates and times before you begin. This way you can set a schedule and set a goal for taking (and passing) your test. A reasonable goal would be anywhere from several weeks to several months to prepare, depending on how ready you feel and when the exam sessions are scheduled. If you want to get this done quickly, you may have to push yourself a little harder. Since most of us have "day jobs," we should allow enough time for non-ham studying and other work.

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Relax and Enjoy, but Focus on the Goal: Passing the Test

Remember that this is our hobby and pastime; we are not doing this for payment or employment. We should do the best we can and have fun doing it because we want to do it. Also, we should have one focus—to simply pass the exam. We do not need to dwell on the score *per se*; we just want to get our "ticket" to gain more enjoyment on the bands.

Speaking of increasing enjoyment, perhaps the best way to have more fun with studying is to get a partner to join you. Check with your fellow club members or other ham acquaintances. Usually, the idea of upgrading catches on if you discuss the topic with others. You will be able to share and exchange ideas, quiz one another, and share your victory when you pass the test. Also, by quizzing one another, one becomes the "teacher" and the other becomes the "student," making each of you experience other ways to work with facts. This helps to increase learning effectiveness.

Another thing to remember is that the exams include questions on all aspects of ham radio, including a mix of technical and non-technical topics, from determining the effective radiated power of a repeater system, to FCC rules and regulations and operating practices. However, do not let this scare you into thinking passing the exams is impossible. There are many thousands of "regular people" who have successfully passed their exams along the path to the Amateur Extra class.

For example, my knowledge is mostly word-

When studying for an exam, try to involve as many of the senses as you can, including reading and writing. If you have a study partner, you can discuss the questions and answers and can help and challenge one another, getting even more "sensory input" for the learning process.

based. In other words, my skills with numbers and calculations are not the best. However, very much like many "government" exams, such as drivers' licenses, people can maximize their knowledge strengths and do very well in the areas they are more comfortable with and can "afford" to miss a few others.

By the same token, you must not take this for granted. You really must prepare for the worst-case exam and try to get as many right as you can. Here are some study tips I have used over the years, and I think it may be worth passing these techniques along to you as you study for your next license exam.

Many of the things you need to know to pass the test are facts and figures. A good example of this is the list of frequency and mode assignments, called "segments," for the various ham bands. In my opinion, the only way to learn these bits of knowledge is to memorize them. The only way to memorize something is to practice, use, and read and re-read the information over and over. This is sometimes called "rote memorization," and is also known by other terms such as "brainwashing" and other things I cannot repeat here. Most of us reading this article have experienced this method of learning—for example, when we had to memorize the Gettysburg Address and the multiplication tables in elementary school.

A very convenient way to do some rote memorizing is to make "flash cards" so that you can study anywhere and at any spare moments you may have during the day or evening. Use any spare "dead time" to read and re-read the cards so you can memorize these FCC-requested facts. Keep your cards with you wherever you go so that you can take them out and test yourself at any time. For example, instead of staring at the walls at the post office while waiting your turn, you can take out your flash cards and get a few minutes of studying done.

When using the flash cards, expand their utility by turning the cards and the questions and answers backwards, and look at the answer and come up with the question, very much like a television game show. Come up with different ways to ask the question, leading to the same answer. Get a friend to quiz you. Then switch and you can quiz your friend. You may even want to swap flash cards and mix them up.

Use All Sensory Input

Making flash cards sounds like a chore, but remember that learning becomes more effective for most people as we increase sensory input. In other words, it is not enough to simply read the FCC rule books and then know or recall facts to answer a test question. Thus, for those of you who are leaning towards doing all this license preparation on your computer, you may want to consider including flash-card making the old-fashioned way. Get some recipe or file cards and write a handful of them by hand. The action of taking pen or pencil to paper and scribbling down these facts forces your mind to take in additional sensory input and more effective learning.

Going back to our frequency chart example, you may want to make flash cards for frequencies and modes in both a bar-chart format and a table, and finally an all-word format. This way you will get some "visual input" in addition to "text input." All this practice will pay off in burning this knowledge into your brain so you will be able to reel off the frequency and mode allocations to answer an exam question.

The ARRL has a newly expanded line of license study guides, including question-and-answer format books, as well as a video (for the Technician class license). Read and re-read these books

(or other study guides, such as the Gordon West books available from W5YI.org), make notes in the margins, and develop your flash cards from these references.

Math is Your Friend (?)

As far as the technical and calculating parts of the exam are concerned, once again, the only way for you to know this information is to "practice" it. Like learning a foreign language, the best way to learn and retain math skills is to practice. Most license guides include technical sections such "electrical principles" and "circuit components," where the technical and math stuff comes in.

As I mentioned, math and I never got along too well, and so I have to force myself to practice using equations and solving the problems.

Therefore, as you jump from learning and memorizing the non-technical stuff such as FCC regulations and operating practices, you need to take pencil and paper and perform the calculations needed to answer a problem on circuit behavior.

Make notes in your manual as the text explains how to solve the problem. Make flash cards that will help you memorize the proper formulas. Remember, though, it is usually not enough to just memorize the formula. You must be able to plug in the numbers (variables) and perform the calculations to solve the problem.

An Interesting Thing Happened Today . . .

As I was writing this article, I received an e-mail from a coworker. Dan Barsell, KAØWXF, who holds a Technician Plus license, just noticed that his license is about to expire. He asked me about renewal procedures. This gave me the opportunity to nag Dan into thinking of getting an upgrade.

As I helped him look for renewal procedures and license upgrading, we noticed that he might have one of the easiest paths to a license upgrade—the "paperwork upgrade," since he has had the license since May 1986. In other words, in order for Dan to go from a Tech Plus to a General, all he has to do is fill out the proper paperwork and pay the proper fee—no test is needed at all!

It turned out to be a good thing that we checked. After all, after almost 20 years of having that Tech Plus, how can you beat the easiest upgrade of all?

73, Wayne, KH6WZ

References

The American Radio Relay League (ARRL) publishes license guides and manuals for all license classes. Check with your favorite radio dealer, or the advertisers in this magazine, or take a look on-line <http://www.arrl.org>.

The W5YI Group also publishes manuals for all amateur license classes. They are available from *CQ*, your favorite dealer, or directly from the W5YI Group <http://www.w5yi.org/>.

FCC Amateur Radio Service page: <http://wireless.fcc.gov/services/amateur/about/operatorclass.html>.

The ARRL website has information on license restructuring: <http://www.arrl.org/news/restructuring>.

Here is an interesting paper from NASA on memorizing versus learning: Casner, Stephen M., et. al, "FAA Pilot Knowledge Tests: Learning or Rote Memorization?" National Aeronautics and Space Administration Ames Research Center, Moffett Field, California, Jan. 2004, NASA/TM—2004–212814,<http://automation.arc.nasa.gov/aeroknowledge/pktTM.pdf>.

BY JOE LYNCH,* N6CL

Remembering W2UK

This summer Chip Angle, N6CA, and Paul Lieb, KH6HME, were working on setting a new 10-GHz record between California and Hawaii via the now well-known tropospheric duct between the U.S. West Coast and Hawaii. As I write this column (in mid-July) it is not known if their attempt has been successful. Whether or not it is, it was made possible because of the pioneering work of John Chambers, W6NLZ, and Harold "Tommy" Thomas, W2UK.

It was on July 8, 1957 that John and Tommy (using the call KH6UK) made contact on 2 meters. It would be about two years later, on June 22, 1959, when they again would set a record by making another contact, this time on 220 MHz.

Who was Tommy Thomas, and how was it that he ended up in Hawaii to set these records? What follows are the results of some sleuthing and at least one fortunate coincidence of history.

Ralph E. "Tommy" Thomas was born on December 22, 1903, in New Brunswick, New Jersey, the son of Mr. and Mrs. Robert L. Thomas. Tommy's ham radio accomplishments were first on HF. According to Philip Peterson, W2DME, Tommy started his ham radio career in the spark-gap days. During the 1920s and '30s Tommy "was constantly improving his equipment and was recognized for his special ability in radio communications" (source: <http://www.infoage.org/p-43W2uk.html>). According to *The Sunday Home News,* New Brunswick, NJ, Sunday August 4, 1957, these accomplishments included:

> . . . his 1926 feat of communicating with the George Miller Dyott expedition at the River of Doubt in Brazil, when all commercial efforts to reach the party had failed; and the July 1938 effort when he was one of three amateurs to provide up-to-the-minute weather data for Howard Hughes in his historic globe-girdling flight. *(Of the River of Doubt contact,* The New York Times *termed it "an almost impossible feat."—N6CL)*
>
> There are few better known amateur radio operators in the world than Thomas, whose reputation has been enhanced by the years running in 1938 by virtue of making 329 contacts in 70 countries. Prior to that he had finished second and third and since then has been among the leaders many times.

After World War II Tommy's interest in the hobby turned toward VHF. Again quoting Peterson, "Tommy said, 'I wanted to try something new after World War II. I started to explore the possibilities of increasing the communications distance range of the VHF and UHF spectrum.'" Tommy entered that spectrum with the same enthusiasm that he showed on HF before the war.

One of Tommy's early accomplishments was participating in the first amateur transmission using transistors. This was in late 1952, when K2AH, using a one-transistor transmitter, worked Tommy on 2 meters some 25 miles away. The power output of that single-transistor transmitter was 50 microwatts (source: *QST,* February 1953, p. 65).

By December 1952 Tommy was listed in *QST*'s "World Above 50 Mc." 2-meter Worked All States standings as having worked 21 states in 7 call areas, with the greatest distance being 1075 miles. Tommy would make history beginning the next year, when he and Paul Wilson, W4HHK, began running schedules on 2 meters leading up to the first 2-meter meteor-scatter contact – an accomplishment that would earn both of them the ARRL's 1955 Award of Merit.

According to interviews I had with Paul and Tommy, their interest in the challenge of making a 2-meter meteor-scatter contact began in June 1953, when Paul and Ross, W4AO, were in contact via a tropo path. After the path fell apart, Paul continued to hear signal bursts. Ross advised Paul that these were meteor bursts. Within a few days of this contact Paul received a letter from Tommy asking him to set up schedules for a possible 2-meter contact via *any* mode of propagation. Paul responded that he'd like to try to work him via meteor scatter.

Over the next several months schedules were set without success. Then on the morning of October 22, 1954 it all came together. Tommy copied more than two minutes of transmission from Paul, and Paul in turn was able to copy Tommy's confirmation and signal report. With that exchange they snagged the first complete 2-meter QSO via meteor scatter.

It is interesting to note that because this mode of propagation was experimental, there was no definition of what was considered a QSO. Therefore, Paul and Tommy looked to the League—specifi-

VHF Plus Calendar

Sept. 1	Moon Apogee
Sept. 3	New Moon
Sept. 4	Moderate EME conditions
Sept. 10-12	ARRL September VHF QSO Party
Sept. 11	First Quarter Moon; very poor EME conditions
Sept. 16	Moon Perigee
Sept. 17–18	Second weekend of the ARRL 10 GHz and Above Cumulative Contest
Sept. 18	Full Moon; very good EME conditions
Sept. 19	The 144 MHz Fall Sprint
Sept. 22	Fall Equinox
Sept. 23–25	The 2005 TAPR/ARRL Digital Communications Conference (see text for details)
Sept. 24–25	ARRL 2304 MHz & Above EME Contest.
Sept. 25	Last Quarter Moon; very poor EME conditions
Sept. 27	The 222 MHz Fall Sprint
Sept. 28	Moon Apogee

EME conditions courtesy of W5LUU.

e-mail: <n6cl@sbcglobal.net>

cally to Ed Tilton, W1HDQ, then editor of *QST*'s "World Above 50 Mc." column—to define what was necessary for a completed contact. Ed determined that both operators had to acknowledge to each other that they had received both calls and the correct signal report; the latter had to be confirmed by repeating the signal report received back to the other operator.

Reliance on Ed's definition led to the rejection of their first claimed contact in August 1954. It wasn't until the second contact that both Paul and Tommy received enough information from one another for Ed to consider the QSO complete.

Their QSO was considered such a breakthrough in propagation that Paul's audio tapes of the meteor-scatter contacts were played at a meeting of propagation physicists of the International Scientific Union (URSI) in Washington, DC, in May 1954.

According to *QST* of October 1956 (page 62), as a result of this presentation Ed Tilton, W1HDQ, was asked to prepare a summary of the work and supply some samples of the recorded signals for presentation at the General Assembly of the URSI to be held in The Hague in September 1954. The presentation also included a talk by Dr. J. T. de Bettencourt of MIT's Lincoln Laboratory. The audience was made up of the leading propagation physicists from most of the countries of the world, prompting the *QST* author to comment: "Thus, scientific attention was focused on one of the worthwhile aspects of amateur radio that has had too little recognition—our ability to contribute to man's knowledge of wave propagation phenomena."

All told, it took Paul and Tommy two years of constant scheduling to finally make the contact. In their experimentation they tried high-speed keying and tape recorded playback in their efforts to complete a QSO. Each station was running near-legal-limit power into high-gain antennas and preamps that had a noise-figure measurement of nearly 2 dB. During their experiments they were convinced by the regularity of the bursts that they were dealing with meteor-scatter propagation.

One needs to realize that in those days we did not have WSJT software, and the mode of communication was CW. In addition, the sophistication of the radios was such that each operator had to tune the receiver with its analog dial in order to locate the signal. In spite of these restrictions, Tommy and Paul eventually were able to complete their QSO and make their entry into the history of VHF communications.

At the time of their QSO Tommy was working for RCA as the engineer-in-charge at the RCA transmitter station on outer Easton Avenue in New Brunswick, New Jersey. Operations ceased there in 1955, and Tommy was transferred to a similar post in Kahuku, Oahu, of the Territory of Hawaii. At that QTH he acquired the KH6UK callsign as a second station license. There is no evidence that he ever relinquished the W2UK callsign. Rather, there is evidence that in the early 1960s the KH6UK callsign became history for him when he was making EME contacts using W2UK/KH6 (source: *QST*, September 1964, p. 96). More on his EME exploits follows below.

Tommy's transfer to Hawaii might have seemed a setback to others due to the limited opportunities to make contacts on the VHF+ frequencies. For Tommy, however, it proved to be a new challenge.

Contacting VHF enthusiast John Chambers, W6NLZ, Tommy set about duplicating his fete with Paul, this time between Hawaii and California. Knowing little about the actual propagation mode of meteor scatter (that being the ionization of the *E*-layer and its characteristic limitations on distance to approximately 1300 miles), Tommy assumed that there was no reason why he could not complete a QSO with John.

It would be two years of 20-meter skeds before Tommy and John would make contact. The QSO took place on July 8, 1957. Coincidentally, the contact took place "at virtually the same time a massive meteor flared in the Hawaiian skies." (Source: *The Sunday Home News,* New Brunswick, NJ Sunday August 4, 1957.) This coincidence led Tommy and John to believe that their contact could have occurred as a result of meteor-scatter propagation. Even so, they also thought that it might have been a freak atmospheric effect.

Setting out to determine what might have been the cause of the successful contact, they started making skeds on 220 and 432 MHz. It would be nearly two more years, on June 22, 1959, before they completed a contact on 220 MHz. John reported that he did hear Tommy on 432 MHz; Tommy heard nothing. It was later determined that a receiver problem on the Hawaii end probably prevented a two-way QSO (source: *QST,* September 1960, p. 78). Incidentally, their 220-MHz QSO has never been bested, thereby making it the first tropospheric contact on that band, and the longest lasting VHF DX record to date.

For their accomplishments, Tommy and John won 1960 ARRL Merit Award and the 1961 Edison Award. For the latter, each received a trophy and split a $500 cash award (source: *The Home News,* January 21, 1961).

Not much is known about Tommy subsequent to his EME accomplishments in the 1960s. He is in the record books for having made contact with W1BU on July 31, 1964 (source: *QST,* September 1964, p. 96). It appears that after his retirement from RCA he moved back to New Jersey, settling in Farmingdale.

In an exchange of e-mail with Tommy's nephew, Mark Shultise, WA3ZLB, he advised me, "Years before his death I visited him in New Jersey and surprised him with the information that I was now a ham. We chatted about some of his accomplishments and so on. We talked about his providing weather reports for Howard Hughes's around-the-world flight. He was quite a good friend of Howard, it seemed."

Concerning Tommy's VHF+ accomplishments, Mark wrote: "As for the Hawaii to California contact, they made the attempt a number of times and just happened to get the call through.

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The CAPNSPACE (Civil Air Patrol Near Space) ballon is aloft, awaiting release by the ground crew as they play out the payload line. (Photo courtesy Deb Kaiser)

Mike Hackley, KCØSGD (foreground), plays out the payload line while Troy Campbell,KCØMIC, prepares to release the payload. (Photo courtesy Deb Kaiser) ⟶

"He also had performed some moonbounce in his experiments. When I asked why try to bounce a signal off the moon, his answer was pretty much 'because it was there.' It was not the best reflector, but its position in the sky was pretty easy to track."

Mark added: "I'm not sure where Ralph was at the time, but I believe it was Hawaii. Ralph answered the door and there was a truck driver with a big dish on it. 'For me?' was his question. Yes, it appears RCA thought he might like a bigger antenna to play with. When he moved, the antenna stayed put! Some of his tubes came from the Varian brothers, who thought he might like some extra power to play with."

Tommy became a Silent Key on May 8, 1996. Commenting on Tommy's death, Mark stated: "I'm not sure why, but even members of his family learned of his death after the fact. His equipment may have been donated to friends or the local ham club. I don't even know where his logbooks ended up. To my knowledge, he only lived in two towns in New Jersy in the years before his death, Colts Neck and Farmingdale."

I am deeply indebted to Mark for supplying me with text of the two New Jersey newspaper articles. I came across Mark thanks to a bit of assistance from Fred Lloyd, AA7BQ, the owner of the QRZ.com website. Making contact with Mark has been a wonderful window into Tommy's life.

Mark's initial e-mail intrigued me because he began it by writing "Aloha Joe." Who else but someone living in Hawaii would greet someone else with the word "aloha"? It turns out that after an initial vacation trip to Hawaii in 2002, Mark decided to return there for good. He has become a Kona coffee farmer

View of the edge of the Earth from the CAPNSPACE balloon. (Photo courtesy KCØMIC)

Recovery teams of the CAPNSPACE balloon. Left to right: George Karwal (farm owner); his son Kirby; Keith Kaiser, WAØTJT; Deb Kaiser; Troy Campbell, KCØMIC; and Cindy Campbell, KCØRRW. The payload is sitting on the bumper between Deb and Troy. The parachute is on the ground next to Cindy. (Photo courtesy KCØMIC)

and lives on the big island of Hawaii. His QTH is Captain Cook, which is a two-hour drive from Pahoa, the QTH of Paul, KH6HME, who is the Hawaiian-side contact for the potential 10-GHz QSO this summer. What an incredibly small world we live in!

I have forwarded Paul's phone numbers to Mark and will leave it up to them to make contact with one another. Hopefully, the nephew of the pioneer of the California to Hawaii duct might be a witness to another pioneer setting yet another record between California and Hawaii. Whatever happens, you will read about it here in this column.

Ten Balloon Launches: One of The Stories

On July 2 this year, in the Traynor, Iowa High School parking lot, the ten participants in this year's Great Plains Super Launch sent their balloons aloft. Among the teams was one from the Civil Air Patrol Near Space Program (CAPNSPACE). The following is the team's story, written by Troy Campbell, KCØMIO:

This Year's Launch

We had three "firsts" this year: (1) This flight marked the first flight made at a GPSL. Last year we were observing at GPSL-2004 in hopes of starting a program. (2) This flight marked the first flight CAPNSPACE made as a member of the Near Spaces Ventures group. In conjunction with that, we worked with a BSA venture group. (3) This flight marked the first flight that we recovered without any "outside assistance" (i.e., the farmer didn't find it before we did and call us).

The Launch. At 7:00 AM we arrived at Traynor High School and began setting up. The winds were still light and it was about 70° F. After another group had began to fill their launcher (balloon), we noticed that the wind was just starting to pick up and decided that we'd fill our balloon and be ready for launch should the wind start to pick up any more.

It was decided that we'd put in more lift the we normally would to get the package out of the ground winds and past 40,000 ft. quicker than normal.

We launched at 8:10 AM, about five minutes after the first launch. The climb rate was about 1100 fpm. (That is an estimate until the data from the flight recorder can be analyzed.) We then packed and split into three teams: Team 1, Troy Campbell, KCØMIC, and Cindy Campbell, KCØRRW; Team 2, Keith Kaiser, WAØTJT, and Deb Kaiser; and Team 3, Mike Hackley, KCØSGD. We then left the launch area right after five more teams launched.

Tracking. The APRS telemetry showed that the flight path was following the flight projection fairly closely. Almost immediately after takeoff the tracking system froze up for chase Team 1. Team 3's tracking equipment never did work. Team 1 rebooted and got some limited functionality for maps and vehicle location, but the KPC 3+ TNC stopped working altogether. Chase Team 2's equipment was working perfectly.

At this point, Teams 1 and 2 departed east on highway 92 to highway 71 to stay ahead of the balloon. Team 3 remained to try to get the tracking system working. The 2-meter simplex repeater on board the spacecraft worked great so all the teams stayed in contact—up to a point.

The spacecraft is equipped with an ELT (emergency location transmitter) on a practice frequency of 121.775 MHz. Every five minutes the flight-control computer would turn the ELT on for one minute. When the spacecraft neared apogee, the flight controller latched the ELT on so that it could be tracked on the way down.

The problem was that the ELT would modulate the 2-meter simplex repeater. We still don't know if the issue was the proximity of the antennas or if the ELT or 2-meter transmitter need to be shielded, or both, or all three. In any case, when the ELT latched "on," the simplex repeater became pretty much useless. It would still key-up, but what-

Not exactly your field of dreams, this corn field provided excellent camouflage for concealing the payload, while the nearby fence, acting like an RF reflector, gave many false readings to Troy as he attempted to locate the downed payload. (Photo courtesy KCØMIC)

ever voice traffic was on it was drowned out by the ELT. Because of that Teams 1 and 2 lost contact with Team 3 about an hour into the flight.

Team 2's tracking equipment was still working fine, so Team 1 stayed within simplex range and both teams stopped just outside Grant. The balloon had pretty much stopped forward motion over Elliot and climbed to 95,082 ft. and burst just a little west of Elliot. What was interesting was that if you keep the meter on the ELPER (a direction-finding receiver with phased antennas) "centered" you can get a fair sense of the elevation as well as the direction. The DFing fixes agreed with the APRS data, which was gratifying. I was worried that we wouldn't be able to track it with only one set of APRS equipment. The ground teams departed for a position between Elliot and Grant.

Recovery. Keith on Team 2 had binoculars and spotted it at about 3,000 ft. after it had passed over us but lost it over a hill. The last APRS posit was from 2,400 ft. at a little past 10:00 AM. We made for that spot. Team 2 was already there and searching a corn field (Iowa equals corn). I probably should have guessed the landing obstacles! Joe Lynch, N6CL, editor of *CQ VHF* magazine was also on the scene to help search.

After a bit of that, I broke out the ELPER and took a couple of fixes on the ELT. It was still strong, showing the signal coming from farther north but basically straight up the road. If you look at the track from the APRS data, you'll see that the package flew up the road and landed within 20 ft. of it. Unfortunately, the corn was taller than I was and the fence propagated the signal in many wonderful ways.

Even though the ELPER was pointing to the package correctly, the terrain was very hilly with intermittently spaced tree lines, creeks, and terrace ridges. The owner of the farm arrived about midway through the search and attempted to help from the top of his almost two-story harvester, but it was on the ground in the tall corn and just couldn't be seen.

After about 2.5 hours, we isolated it to a 50 ft. patch of corn using an aircraft radio and "body nulling." When I couldn't get a null any longer, I took the antenna off the radio, held it away from me and parallel to the ground, and started walking the rows until the signal indicated I was within a few feet of it. I literally tripped over the package.

It was 12:30 PM now and everyone was hot, tired, and hungry. Team 3 arrived while I was searching around the corn field. After we'd recovered the near-spacecraft, Mike and I shut everything down, retrieved the flight recorder, the RAM card from the digital camera, and the film from the film camera. The digital camera looked like it had impacted something pointy and we had to pry the RAM card out of it. The camera will have to be replaced.

We then drove back toward Omaha, stopping at The Rose family restaurant in Traynor.

The following are things that we learned and that need improvement:

Recovery Operations. The ground tracking equipment in the chase vehicles needs to be "hardened" and tested.

We need to practice as a team more. When the teams become separated, common frequencies and contact procedures need to be used.

Standard DFing procedures need to be documented and practiced.

Several other "standards" need to be discussed. Simple things such as "what notation should everyone use for latitude/longitude?"

Flight Operations. An additional crew is needed for coordination of the flight phase, from launch to just after burst.

When we launch a package for a group or a specific science or instrument package (ala the 2-meter simplex repeater), a person dedicated to controlling the package needs to be on the team. For example, the 2-meter simplex repeater was enabling contacts in Champaign, Illinois and Independence Missouri, but there was nobody to log the traffic.

Launch Operations. This went pretty smoothly, except that while we had decided to use more lift than we normally would, we used too much. We'd wanted 2.5 lbs. and ended up with 3.8 lbs. We need to add a check list for the launch vehicle (balloon) similar to the payload power-up and attachment checklist.

While we want to encourage visitors and participants, there is a time when it would be really useful to have a "sterile" launch area. (This is also a safety issue.) Stanchions and tape or orange rope might work.

Engineering. The CAPSTAR-1A near-space frame is nearing its end-of-life. It's getting pretty beat up. Another one or two frames need to be built and readied to fly.

The RF crosstalk between the ELT and the 2-meter FM RF sections needs to be addressed.

A commanded cut-down device needs to be installed so that we can fly larger payloads.

GPSL Suggestions. GPSL-2005 was great! Mark Conner, N9XTN, did a super job pulling it all together. The conference topics and speakers were *very* interesting and informative. There were ten balloons launched and over 65 people attended. It was great to work with everyone I met last year and meet new groups.

I did hear a good suggestion that at the next GPSL there be a "net control station and operator." The controller's job wouldn't necessarily be to coordinate a net. (There was very little congestion on the local repeater.) However, the controller *could* facilitate communication between different groups when, for example, a group needs help with recovery operations or they want to crosscheck their own tracking with another group.

Current Contests

The **ARRL September VHF QSO Party** is September 10-12. The second weekend of the **ARRL 10 GHz and Above Cumulative Contest** is September 17–18. The **144 MHz Fall Sprint** is September 19, 7 PM to 11 PM local time. The **ARRL 2304 MHz and Above EME Contest** is September 24–25. The **222 MHz Fall Sprint** is September 27, from 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 Conventions and Conferences

The 2004 **TAPR/ARRL Digital Communications Conference** will be held September 23–25 in Santa Ana, California, at the Embassy Suites Hotel, Orange County Airport North. For more information, go to <http://www.tapr.

org/dcc/>. The **Mid-Atlantic States VHF Conference** will be held Saturday, September 24 at the Courtyard Marriott, Bensalem, PA 19020 (phone 215-639-9100). For further information, contact conference chairperson Jim Antonacci, WA3EHD, phone 215-659-4359; e-mail: <jantonacci@worldnet.att.net>, or Rick Rosen, K1DS, 610-270-8884, e-mail: <rick1ds@hotmail.com>. The website for more information and maps is: <http://members.ij.net/packrats/latest.htm>.

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. To date this year the following organizations or conference organizers have announced calls for papers for their forthcoming conferences:

Microwave UpDate: The deadline for inclusion in the *Proceedings* is September 5. If you are interested in writing and/or presenting a paper for the 2005 Conference, contact Chip Angle, N6CA, P.O. Box 35, Lomita, CA 90717-0035; or via e-mail: <n6ca@ham-radio.com>. For more information about the Microwave UpDate 2005 see <http://www.microwaveupdate.org>.

And Finally . . .

I focused on Tommy Thomas's story this month because I am very concerned that our history is slipping away. As you read, it was only by an accidental contact with Tommy's nephew, Mark, WA3ZLB, that I was able to fill in several holes—but not nearly enough holes, as Mark has only limited recollection due to infrequent contact with his uncle. I am sure that there is more to tell about Tommy's legacy. If you have something to add, please get in touch with me at <n6cl@sbcglobal.net> so that I can publish your recollections. Thank you.

Thank you also for your continued support of this, your column. It would not contain the information that it does without your input.

Because of the length of this month's column, on-the-air reports will appear next month. Thank you for your continuing to send in those reports.

Until next month...

73, Joe, N6CL

dx

BY CARL SMITH,* N4AA

Kure Atoll, K7C, This Month

It seems a little strange to be writing for the September issue of *CQ* in July, but here we are. The fall operating season is upon us and we can only hope for decent propagation through the remainder of the year. As we descend into the bottom of this solar cycle, we can reflect on what it has been like this time around.

I've been through a number of these 11-year cycles over the past 51 years and can remember what it is like at this point in the curve. With more computer aids available to us now we get a better "feel" for what is happening on a daily basis . . . hourly if you want to spend the time looking at it. However, looking at "it" won't change it, now will it? In past cycles we had to just turn on our radios and listen to see what we could hear. Now we spend perhaps too much time scanning the internet looking for some inkling of what we might expect to hear on a particular band. All the theory in the world can't make up for actually listening on the bands to see what is there, and theory doesn't always relate to reality. Bigger antennas will help "create" some of our own propagation possibilities, but we all don't have that luxury.

Les, SP3DOI, operating as TJ3SP (Cameroon). (Photo courtesy of Lenny, K5OVC)

Upcoming DXpeditions

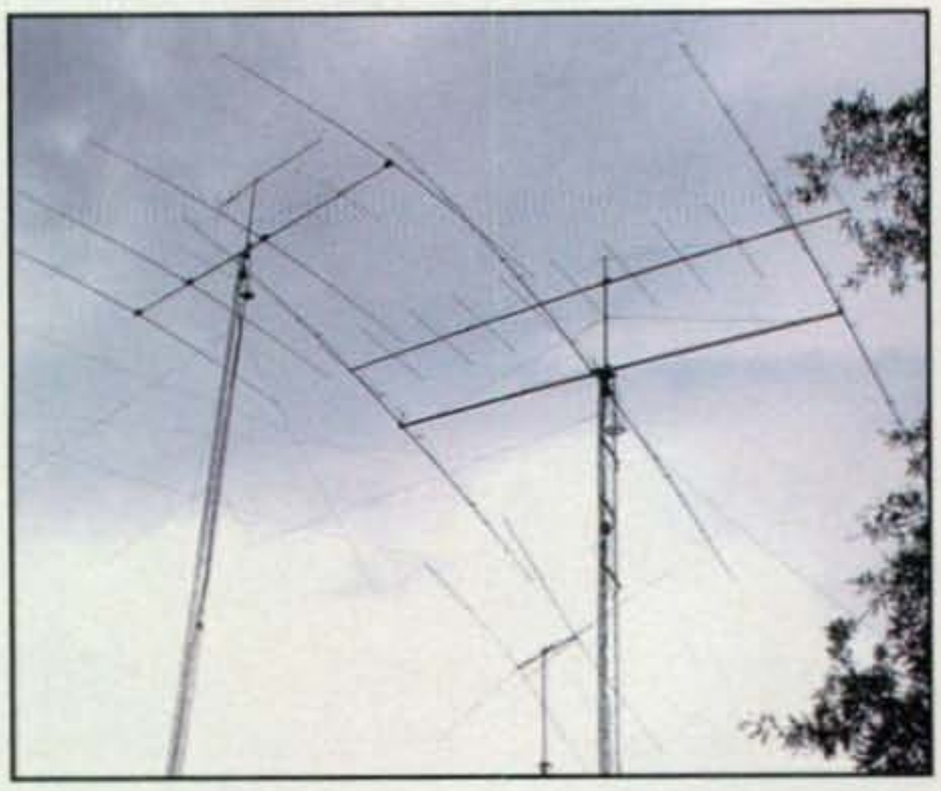
There are some DXpeditions planned for the next few months, and that could liven up the bands for us, still taking into account the actual propagation conditions.

A major DXpedition to Kure Atoll, K7C is scheduled for late September. This is a very ambitious project led by Robert Schmieder, KK6EK, with the assistance of ICOM America. Here's a news release that gives details of their plans:

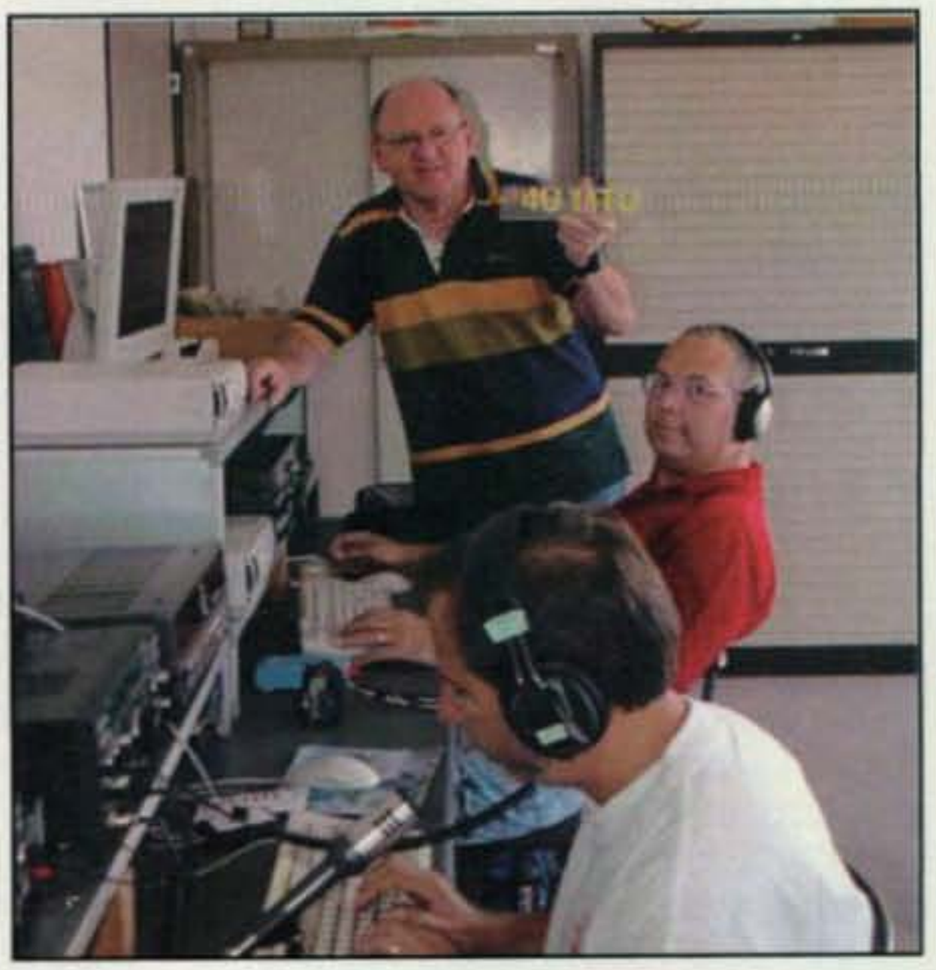
Amateur Radio Expedition Puts Pacific Atoll Online Real-time

Walnut Creek, CA: A remote atoll in the Pacific Ocean is about to suddenly gain worldwide attention as a group

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>



Larry, KJ4UY, lost most of his antennas in the hurricanes last year. Here are the replacements: On the left is the 4-element SteppIR at 110 ft. with an 8-element 2-meter Telrex. Front right is the 3-element M² 30-meter/40-meter beam with an 11-element Telrex 6-meter beam. In the back is 2-element Lightning Bolt quad for 6–20 meters. Seventy-five-, 80-, and 160-meter dipoles are under the M² 30/40-meter beam. That's a lot of aluminum! (Photo courtesy of Larry, KJ4UY)



On the air from 4U1ITU HQ in Geneva, Switzerland, here we see Gerard, F2JD (standing); seated are Dave, K4SV, and Bill, N2WB, in front. They stopped in Geneva after attending the Friedrichshafen ham convention in Germany. (Photo courtesy of Bill, N2WB)

The WPX Program

CW

3154	W3UTD	3156	SP5JXK
3155	DL3HSC	3157	IK5TTA

SSB

2934	AL9A	2937	OK2UGY
2935	EA1TI	2938	YV5IAL
2936	EA6BZ	2939	YBØQO

Mixed

1955 ..... WV1K

CW: 400 IK5TTA. 650IZ3ETU. 700 SP5JXK. 750 AA4FU. 850 DL3HSC. 1580 AA1KS. 4950 N4NO.
SSB: 400 EW1ABF. 500 YV5IAL. 700 7N1NXF. 750 SV1EOS. 800 EA6BZ. 900 VE3NQK. 1200 EA1TI. G3TSZ. 1250 AG4W. 2100 IT9YSW, AA1KS. 2400 OZ5UR. 3400 N4NO.
Mixed: 650 W3UTD. 1400 WD8ANZ. 1450 WA6CKT. 1650 CE1YI. 1950 WZ4P. 2100 JA6GWU. 4550 N4NO.

15 Meters: K4HB
20 Meters: SP5JXK
40 Meters: SP5JXK
80 Meters: SP5JXK
160 Meters: SP5JXK, OZ5UR

Asia: SP5JXK
So. America: K4HB
Europe: SP5JXK

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.

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, 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.

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 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.* ***Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.***

of amateur radio operators implements an innovative internet system for monitoring their activities in near real-time.

Kure Atoll is a tiny speck at the far end of the Hawaiian Islands, 1200 miles northwest of Honolulu, only 60 nautical miles from Midway Island, site of the WW II naval battle that was a turning point of the Pacific War. Kure is now home to seabirds such as alba-

The Palmyra Atoll Yacht Club. Bev, AH6NF, spent ten days on Palmyra last February as a volunteer for The Nature Conservancy. In her spare time she was able to make 750 QSOs, many with European stations. (Photo courtesy of Bev, AH6NF)

CQ DX Awards Program

SSB

2463	XE1MD	2465	W1JR
2464	KB4SAD	2466	OK2UGY

CW

1071	XE1MD	1072	W1JR

SSB Endorsements

320	W4WX/335	320	K9IW/332
320	W1JR/335	320	KD5ZD/322
320	N4CH/335	28 MHz	EW1ABF

CW Endorsements

320	G4BWP/334	320	K9IW/332
320	W1JR/334	320	WB4UBD/332
320	N4CH/333	275	WA4DOU/289

RTTY Endorsements

320	WB4UBD/332	320	G4BWP/325
320	N5FG/325		

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

On The Cover

In this month's cover photo, Leigh Ann James, W7LEA, and Brian Nielson, W7BJN, at home in Moses Lake, Washington, pose in their QSL-card-wallpapered shack. Brian, who has been a ham since 1978, has more than 3,000 QSL cards, and he displays about 1,200 of the more special ones on the walls and ceiling of their shack. He says he needs only VU7—the Laccadive or Lakshadweep Islands in the Indian Ocean—to have a QSL card from every recognized country on Earth. The cards on the ceiling are only from USSR and Japanese contacts, and contest certificates are visible on the wall to the right.

One of Brian's more treasured cards is one he received from Eagles guitarist and fellow ham Joe Walsh, WB6ACU. He met Walsh while working security at the Gorge Amphitheater in Washington State and later spoke to him when Walsh was a guest operator with Bob Heil, K9EID, at W1AW, at ARRL headquarters station in Newington, Connecticut.

Nielson has won the Eastern Washington section of the ARRL International DX and 10 Meter Contest six times, placing third in the United States and seventh in the world.

He got Leigh Ann interested in ham radio around April of 2004, and she had her Extra Class license by August. Within eight months she had accumulated enough DX contacts for DXCC, and she has also won the Eastern Washington section of the ARRL's International DX Contest.

Brian and Leigh Ann's antennas include a 100-foot 4-element SteppIR covering 6, 10, 12, 15, 17, and 20 meters and inverted V's for 40 and 80 meters.

In real life, Leigh Ann is a schoolteacher and a baseball and softball umpire, and Brian is retired but still works as a fishing guide. (Cover photo by Larry Mulvehill, WB2ZPI)

—Dan Moseson

5 Band WAZ

As of July 1, 2005, 681 stations have attained the 200 zone level and 1462 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:

UY5EG PY2OW

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
WAØQH, 199 (26)
N4PQX, 199 (26)
JA5IU, 199 (2)
N6HR/7, 199 (37)
CT3DL, 199 (26)
NØIJ, 199 (21)
RU3DX, 199 (6)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
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)
N4XR, 198 (22, 27)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
HA9RT, 198 (1, 31)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
RX9TX, 198 (2, 6)
F5NBU, 198 (19, 31)

The following have qualified for the basic 5 Band WAZ Award:

SV1DPI (180 zones)
KØTHN (170 zones)
W7AV (160 zones)
DL2CHN (180 zones)
HLØC (174 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

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 WAZ Program

15 Meter SSB

620 ..... N4BAA

20 Meter SSB

1138 ..... K6LD
1139 ..... UA1CKC
1140 ..... K2JGL

12 Meter CW

49 ..... PY2OW

17 Meter CW

59 ..... PY2OW

30 Meter CW

68 ..... VE7IG
69 ..... PY2OW

All Band WAZ SSB

8365 ..... DK8MCT
8366 ..... PY2OW
8367 ..... HA7TM

Mixed

8362 ..... SV1DPI
8363 ..... NF6V
8364 ..... K6LD
8365 ..... DH5WB
8366 ..... K1LPS
8367 ..... PY3CQ
8368 ..... IKØCNA

All CW

462 ..... JH1QAE
463 ..... W7UDH
464 ..... K3DQ
465 ..... NQ7R

RTTY

159 ..... WB9CIF

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>.

tross, and the highly endangered monk seal, and is the focus of an intense effort by the State of Hawaii to rid it of alien invasive species and return it to its former natural state.

For two weeks in September and October 2005 a group of 12 radio amateurs will occupy Kure and will make thousands of radio communications with other amateurs worldwide using the radio callsign K7C.

What distinguishes this expedition from all others preceding them is that this one will be seen in real time on the internet, using only a conventional browser. The system that makes this possible is called DXA, and you can see it working at <www.cordell.org/DXA>.

DXA is the result of collaboration between ICOM America, distributor of amateur radio products, and Cordell Expeditions, a nonprofit group that carries out expeditions to remote sites for research and conservation. In 1995, Cordell Expeditions was the first to have a live internet connection from an expedition (Easter Island) and to implement data uploading from the remote site. DXA is an extension of that technology, enabling data reporting in nearly real time.

"The DXA system is a perfect example of innovation using commercially available technology in new ways to create a new capability accessible to groups with limited resources," says Ray Novak of ICOM America. "ICOM is committed to working with the amateur radio community to advance the capabilities for events such as the Kure expedition, and thereby bringing benefits to non-radio activities as well."

The DXA system makes use of an Inmarsat communications satellite, networked radios supplied by ICOM on Kure, and software developed by Cordell Expeditions. The key to making it available for amateur radio was the networking capability and designing the data format and transfer rates to make the satellite link affordable.

Anyone will be able to follow the activities of the expedition simply by looking at the website with an ordinary web browser. The

site is updated once each minute, showing information such as the most recent radio contacts, the locations of the contacts on a world map, the time elapsed and time remaining in the expedition, and pictures of the expedition site and personnel.

Another novel aspect of DXA is the use of "Relay Stations." This is a group of amateur radio operators distributed around the world who will capture content such as audio recordings and forward it to the DXA site to be displayed in the DXA pages. This is but one example of the potential for enhancing and extending the DXA system.

"DXA has the potential for revolutionizing radio operations from remote sites," say Dr. Robert Schmieder, founder and Director of Cordell Expeditions, and the principal developer of DXA. "It will enable both amateur radio operators and the public in general to effectively participate in the expedition. The system will allow a vast range of activities that will change the expedition from a remote adventure to a shared cooperative activity."

As part of the activities on Kure, the Cordell group will participate in studies to devise ways to rid the atoll of an invasive pest ant that threatens the indigenous wildlife. DXA could be a significant factor in communicating with other groups facing similar problems on islands and atolls.

The Kure expedition is scheduled for Sept. 15 – Oct. 15, 2005, with the activities on the atoll during 12 days centered on Oct. 1. Details of the project can be seen at <www.cordell.org/KURE>.

October/November is the time frame for the DXpedition by a French group to Glorioso (FR/G). This one ranks quite high on the Most Wanted lists and should provide activity for hungry DXers.

The postponed DXpedition to Peter I has been rescheduled for the January/February 2006 time period. Bob Allphin, K4UEE, and Ralph Fedor, KØIR, will be heading up the team who will bring this Most Wanted country to us early next year. Check <http://www.peterone.com> frequently for the latest details on this one.

Of course we can't forget the contesting season for the next several months. There will be lots of activity, if that mean old sun will be kind to us.

DX Conventions

The 53rd annual W9-DXCC Convention will take place September 17th at the Holiday Inn in Elk Grove, Illinois. I'll again host the Friday evening welcome reception and I hope to see many of you there. Last year the hurricanes kept me from getting there, but I'm hoping that won't happen this year.

A brand new DX/Contest Conference has been announced for October 1st in

QSL Information

9A/VE3ZIK via DL3PS
9AØIARU via 9A6AA
9A8DST/P via ON4AMM
9G/DL7DF via DL7DF
9G5SP via DL7DF
9H3ZJ via DL4ZJ
9H9JR via DJØQJ
9J2BO via G3TEV
9J8ØIARU via G3TEV
9M2RY via N4JR
A35/VE7YL via VK3DYL
A35/VK3DYL via VK3DYL
A52JO via LA7JO
A61AV/P via ON5NT
A92WHD via A92GR
AH2J via JR1VAY
AM8AH via YL2KL
AN1COZ via EA1COZ
AN9IE via EA9IE
AX3ITU via VK3WI
AX9YL via VK3DYL
AY1ZA via LU4DXU
B3C via BA3CE
B7K via W2AY
BA1RB/2 via EA7FTR
BA7NQ via W2AY
BI4Q via BA4RD
BPØA via BV2KI
BV5ØCRA via BV2KI
BX3AC via G3SWH
C21TA via VK3DYL
C37URA via C31LM
C39DR via C33DR
C39JS via C31JS
C39LJ via VE3GEJ
C56M via PG5M
C6AKA via DL7VOG
C6AKU via K9VV
C93Q via W3/VK4VB
CEØXT via CE6TBN
CEØZ via CE6TBN
CE1HBI via EA5KB
CE1YI via EA5KB
CE5R via CE3HDI
CE6TBN/7 via CE6TBN
CM6MAM via EA7JX
CN2BC via DL7BC
CN2HAD via CN8JV
CN2US via NJ2D
CN8SG via EA7FTR
CO5FR via EA5KB
CO6MAB via EA7JX
CQ14ELF via CT1ELF
CQ1M via CT1ITZ
CQ6STR via CT1BXT

(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>.)

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 335 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 334	N4JF 334	YU1HA 333	YU1AB 332	VE7CNE 330	K8PV 327	W6SR 323	PY4WS 319	K4IE 291
K2FL 334	K4MQG 334	IT9QDS 333	NØFW 332	4N7ZZ 330	W4QB 327	N5ZM 323	G3KMQ 317	WA4DOU 289
K9BWQ 334	EA2IA 334	K4CEB 333	N4AH 332	W6DN 330	DL8CM 327	KE3A 323	YT1AT 317	G3DPX 284
K9MM 334	PA5PQ 334	K4IQJ 333	HB9DDZ 332	YU1TR 330	W6OUL 327	KE5PO 322	K8JJC 315	EA3BHK 282
W7OM 334	K3UA 334	WØHZ 333	WB4UBD 332	W4UW 330	SM5HV/HK7 327	HA5DA 321	W6YQ 314	YC2OK 282
K2JLA 334	DL3DXX 334	N5FG 333	K6LEB 331	N6AW 330	IT9TQH 326	IKØTUG 321	CT1YH 313	DJ1YH 281
N7FU 334	K2ENT 334	K4CN 333	VE3XN 331	G3KMQ 329	I2EOW 326	VE7DX 320	N1HN 313	XE1MD 280
K2OWE 334	OK1MP 334	W4MPY 333	W1WAI 331	KZ4V 329	W7IIT 326	IKØADY 320	UA9SG 310	WD9DZV 277
N4MM 334	NC9T 334	PY2YP 333	K2JF 331	N5HB 329	K6CU 326	WG5G/QRPp 320	EA3ALV 306	I3ZSX 276
F3TH 334	W2VJN 334	W8XD 333	K3JGJ 331	W9IL 329	W4LI 325	N7WO 320	YU7FW 306	
F3AT 334	G4BWP 334	KA7T 332	WA8DXA 331	K1HDO 329	9A2AA 325	W3II 321	LU3DSI 302	
DJ2PJ 334	N7RO 334	WØJLC 332	K9IW 331	K7JS 329	N4OT 325	F5OIU 320	N1KC 302	
WA4IUM 334	W1JR 334	K8LJG 332	K7LAY 331	K5UO 329	K1FK 324	KA3S 320	RA1AOB 300	
W4OEL 334	WB5MTV 333	YU1AB 332	W2UE 330	K9OW 328	YV5ANT 324	F6HMJ 319	VE7KDU 300	
W2FXA 334	W7CNL 333	K5RT 332	I4LCK 330	K4JLD 328	9A2AJ 323	OZ5UR 319	WG7A 295	

SSB

K6YRA 335	K5TVC 335	K2FL 334	CT3BM 334	DL9OH 331	CT1CFH 329	KC4MJ 325	YV4VN 317	N5WYR 300
K2TQC 335	N5FG 335	WØYDB 334	N6AW 334	N2VW 331	EA1JG 329	PY2DBU 325	K6RO 316	K4IE 300
W6EUF 335	DJ9ZB 335	W4UW 334	WS9V 334	YV1JV 331	KE4VU 328	IKØIOL 325	N8SHZ 316	WØROB 296
K2JLA 335	PY4OY 335	K9BWQ 334	4N7ZZ 333	WA4WTG 331	KF8UN 328	YT1AT 325	WZ3E 314	WA1ECF 295
K4MQG 335	VE3XN 335	W4NKI 334	KE5PO 333	W8KS 331	WØULU 328	K7HG 324	IZ6CST 314	KW1DX 295
IK1GPG 335	4Z4DX 335	WB4UBD 334	VE1YX 333	YV5IVB 331	K1EY 328	K4JDJ 323	W7GAX 312	K7ZM 292
K5OVC 335	N7RO 335	W4UNP 334	I4LCK 333	KX5V 331	KZ4V 328	W6WI 323	CT1YH 311	OA4EI 292
NØFW 335	IØZV 335	W8AXI 334	W2JZK 333	K3JGJ 331	XE1D 328	EA3CYM 323	YV5NWG 311	K7ZM 292
K9MM 335	EA2IA 335	VE2GHZ 334	K8LJG 333	N5ORT 331	W9IL 328	K6CF 322	LU3HBO 310	K1RB 292
W6BCQ 335	IN3DEI 335	OE2EGL 334	VE4ACY 333	PT2TF 331	K3LC 328	LU7HJM 322	WA5MLT 310	KØOZ 291
XE1AE 335	EA4DO 335	WA4IUM 334	KØKG 333	CT1AHU 331	K4DXA 328	K5NP 322	XE2NLD 310	W9ACE 291
W7OM 335	PA5PQ 335	K5RT 334	VE2WY 333	EA3JL 331	LU5DV 328	WA4ZZ 322	VE7SMP 310	I3ZSX 290
KZ2P 335	K9OW 335	W2FXA 334	WB3DNA 333	K1HDO 331	I1EEW 327	WN9NBT 322	RW9SG 307	N2LM 286
IK8CNT 335	W6DPD 335	W6SHY 334	K9PP 333	K5UO 331	SV1ADG 327	WW1N 322	W9IL 306	KKØDX 285
VK4LC 335	XE1VIC 335	W5RUK 334	W2CC 333	W6DN 330	DL8CM 327	W6OUL 322	XE1MDX 305	VE7HAM 285
OE7SEL 335	K2ENT 335	K4CN 334	DL3DXX 333	YV1CLM 330	F9RM 327	KD5ZD 322	EA5OL 305	N8LIQ 284
VE3MR 335	OK1MP 335	EA3KB 334	EA3BMT 333	AB4IQ 330	XE1MD 327	XE1CI 321	WB2AQC 305	WØIKD 283
VE3MRS 335	IZ6GPZ 335	K3UA 334	EA3EQT 333	AE5DX 330	IØSGF 327	CT1ESO 321	KK4TR 305	K7SAM 283
K4MZU 335	K1UO 335	K4JLD 334	YV1KZ 333	KB2MY 330	IT9TGO 327	EA8TE 321	K3BYV 303	KBØRNC 282
OZ5EV 335	I8KCI 335	N5ZM 334	KE3A 333	K3PT 330	IT9TQH 327	KØFP 320	YC2OK 303	IK8TMI 281
N7BK 335	I8LEL 335	PY2YP 334	YV1AJ 332	ZL1BOQ 330	DK5WQ 327	EA7TV 320	JR4NUN 303	F5JSK 281
K7LAY 335	DU9RG 335	AA4S 334	KSØZ 332	N7WR 330	KE5K 327	SV1RK 320	VE7KDU 302	KA5OER 280
ZL3NS 335	DU1KT 335	CT3DL 334	LU4DXU 332	WS9V 329	CP2DL 327	N1KC 320	W5GZI 302	F5INJ 279
N4MM 335	N4JF 335	NC9T 334	VE4ROY 332	K2JF 329	NI5D 327	W5GZI 320	W4PGC 302	WD9DZV 278
OZ3SK 335	CT1EEB 335	W9SS 334	W7FP 332	ZL1AGO 329	K7TCL 326	SV3AQR 320	YV2FEQ 301	W5GT 276
K7JS 335	W4WX 335	VE7WJ 334	K9HQM 332	W9OKL 329	W9HRQ 326	KD2GC 320	AC6WO 301	4Z5FL/M 275
XE1L 335	W1JR 335	VE2PJ 334	W2FKF 332	I2EOW 329	DL6KG 326	KE4SCY 319	4X6DK 301	
YU1AB 335	N4CH 335	W3AZD 334	CT1EEN 332	VE7DX 329	HB9DDZ 326	CE1YI 318	SV2CWY 300	
OE3WWB 335	WDØBNC 334	YZ7AA 334	K9IW 332	W2FGY 329	WR5Y 325	W5OXA 317	4X6DK 300	

RTTY

K2ENT 333	K3UA 328	N5FG 325	EA5FKI 320	OK1MP 312	KE5PO 297	I2EOW 291
WB4UBD 332	NI4H 325	G4BWP 325	W2JGR 316	PA5PQ 311	W4EEU 297	YC2OK 280

Here is Bev, AH6NF, in action from Palmyra in February 2005. (Photo courtesy of Bev, AH6NF)

Pigeon Forge, Tennessee. It is being sponsored by the SouthEastern DX/ Contest Organization (SEDCO), in cooperation with Ten-Tec. Ten-Tec has been sponsoring an annual hamfest for several years, and the SEDCO DX/ Contest Conference will be held following that hamfest. A great lineup of speakers from the DX and contesting communities has been established, and we look forward to seeing a lot of you in east Tennessee. For more details on the SEDCO event go to <http://www. sedco.homestead.com/>. You can find information on the Ten-Tec hamfest at <http://TenTec.com>.

That's it for this time. I hope to see you at the events mentioned above, in the fall contests, and on the air in a casual QSO, too.

73, Carl, N4AA

BY JOHN DORR,* K1AR

The 2005 CQ Contest Survey

September's Contest Tip

It may seem obvious to some, but minimizing the information you send in a contest exchange is a good practice for efficiency and more QSOs. For example, there is no reason to repeat the other station's exchange. After all, he already knows it; he just sent it to you! While it's a great practice for a running station to repeat the other guy's call (especially if it's initially incomplete), you certainly don't need to do that when calling someone. My guess is that he probably already knows his call; he's been using it all weekend! You get the idea. Transmit what you need for a QSO and save the rest for a rainy day.

There is no better way to understand what's on readers' minds than to ask them. Unfortunately, it's not practical to do that on an individual basis, so approximately ten years ago I started my CQ Contest Surveys. While professional surveyors need not worry about my stealing their frequency, your input does provide valuable insight into your views of contesting and some of our challenges. With that being said, thank you in advance for participating this year as well.

This year's questions represent a potpourri of topics ranging from computer logging to investment levels of skill. Certainly one survey isn't going to change the world, but it will give us some clue as to what's important in contesting as we look forward. As I read the e-mail reflectors, I often silently smile over the "heat" that is generated from seemingly meaningless topics. It's important to understand that what may seem irrelevant to one individual may be a high priority to another. That diversity is what makes ham radio, and contesting in particular, so dynamic.

Well, enough of the preamble. I encourage you to take a few minutes and voice your opinions. You'll find that in addition to being published in *CQ* magazine, I'll be making this survey available on most of the popular internet e-mail reflectors and other electronic sources. An on-line response is strongly preferred, as it makes

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e-mail: <K1AR@contesting.com>

Calendar of Events

Aug. 27–28	ALARA Contest
Aug. 27–28	SCC RTTY Championship
Aug. 27–28	YO DX HF Contest
Aug. 27–28	Ohio QSO Party
Aug. 28	SARL HF CW Contest
Sept. 3–4	All Asian SSB Contest
Sept. 3–4	IARU Region 1 SSB Field Day
Sept. 10–11	WAE DX SSB Contest
Sept. 11	North American CW Sprint
Sept. 11–12	Tennessee QSO Party
Sept. 10–12	ARRL September VHF QSO Party
Sept. 14–16	YLRL Howdy Days
Sept. 17–18	Scandinavian CW Activity Contest
Sept. 17–18	Washington State Salmon Run
Sept. 17–18	QCWA Fall QSO Party
Sept. 18	North American SSB Sprint
Sept. 24	AGCW VHF/UHF Contest
Sept. 24–25	**CQ WW RTTY DX Contest**
Sept. 24–25	Scandinavian SSB Activity Contest
Sept. 24–25	Texas QSO Party
Oct. 1–2	California QSO Party (CQP)
Oct. 1–2	Oceania SSB DX Contest
Oct. 29–30	**CQ WW DX SSB Contest**
Nov. 26–27	**CQ WW DX CW Contest**

for much easier tabulation. With the assistance of Tom Roscoe, K8CX, your responses can be submitted by logging onto <http://hamgallery.com/survey/>. Of course, if you must, you can still "snail mail" your replies to: John Dorr, K1AR, 2 Mitchell Pond Road, Windham, NH 03087.

Enjoy completing the survey! If all goes according to plan, the results will be tabulated and ready for public consumption in a few months.

Final Comments

Can you believe that the fall contest season is almost here already? It seems like just a few hours ago that I was writing about the anticipation of the upcoming summer. Well, that's nothing new on the accelerating clock front.

Considering where we are in the solar cycle, there have been some on-the-air highlights over the past few months. One of the strengths of our hobby is that it consistently offers surprises in the form of interesting propagation. Keep an eye on the sun's activities. There are still plenty of interesting QSOs in our future.

Well, that's it for now. I look forward to hearing from many of you over the next few weeks as your survey responses pour in from around the world. Thanks again! 73, John, K1AR

2005 CQ Contest Survey

Your Callsign (optional): _____
Contesting Experience (years): _____
Age: _____

1. What contest logging program did you first use?
   A) CT
   B) TR-Log
   C) WriteLog
   D) NA
   E) N1MM
   F) Other (please specify) _____
   G) I don't use a computer for contest logging

2. What contest logging program do you use today?
   A) CT
   B) TR-Log
   C) WriteLog
   D) NA
   E) N1MM
   F) Other (please specify)

3. Which of the following best describes your view of the World Radiosport Team Championship concept?
   A) I believe it is an accurate method of determining the best contesters in the world.
   B) WRTC is only one factor in identifying the hobby's best contesters.
   C) WRTC is nothing more than a closed party for contesting's elite and contributes little to the sport.
   D) I'm not familiar with WRTC.

4. With e-mail and computer automation, many believe that contest log deadlines should be substantially reduced. What should the timeframe be between the end of a contest and the log deadline?
   A) 24 hours
   B) One week
   C) Two weeks
   D) 30 days
   E) Other (please specify) _____

5. How much did you spend on ham radio over the past 12 months?

6. Which of the following best describes your view of contest awards (e.g., certificates, plaques, medals)?
   A) They are the primary reason why I operate contests.
   B) When I receive them, I throw them into a drawer.
   C) I operate contests to have fun, not to receive "paper."
   D) I've never won an award.

7. What is your opinion of the level of cheating in contesting today (e.g., high power, rubber clocking, packet abuse, etc.)?
   A) Contest cheating seems to be on the decline due to improved log checking and peer pressure.
   B) There isn't a notable change in the level of cheating. It's pretty much stayed at the same level that it's been for years.
   C) Contest cheating is out of control and needs immediate attention.
   D) I've never viewed cheating to be much of an issue.

8. What aspect of contesting have you tried for the first time in the past 12 months (identify all that apply)?
   A) VHF/UHF
   B) RTTY/Digital modes
   C) QRP
   D) CW
   E) None
   F) Other _____

9. What is the most significant challenge facing contesting today?
   A) Lack of young contesters
   B) View of contesting by the non-contesting amateur community
   C) Cheating
   D) The expense to build a competitive station
   E) Other _____

10. How would you describe your contest operating skills?
   A) Improving
   B) Declining
   C) No Change

Additional Comments (use extra paper if necessary): _____

Please return your survey responses to:
John Dorr, K1AR, 2005 Contest Survey, 2 Mitchell Pond Road, Windham, NH 03087 USA, or submit via the internet at: **http://hamgallery.com/survey. Deadline: October 30, 2005.**

BY TED MELINOSKY,* K1BV

Wireless Institute of Australia Awards

It's late June as I write this column. I'm looking forward to attending the MARAC County Hunters Convention in Roanoke, Virginia in late July. Such gatherings are a great way to meet the owners of all of those voices (and CW fists) you hear on the county hunter frequencies. I've been a part of the 14336 county hunters net since the late 1960s, and even though the cast of characters continually changes, the attraction of county hunting has kept the high end of 20 meters a stronghold of net-based activity. During every part of the sunspot cycle, you can tune to 14336 and almost be assured of hearing a mobile being run or a net control asking if any mobile is ready to run. Even if the rest of the band is "dead," someone is always listening to this magic frequency. (*Note:* Most of these comments also apply to 14056, and now 10.114).

The conventions feature interesting tours, seminars on county hunting software, CW interest sections, and on the last day a great banquet accompanied by a drawing for gifts and some really useful ham-oriented prizes. The sponsors usually arrange special rates with reasonably priced hotels. If you haven't attended a county hunters convention, I'd highly recommend you give it a try.

USA-CA Special Honor Roll

David Zulawski, KA5TQF
USA-CA All Counties #1123
June 21, 2005

USA-CA Honor Roll

500	1500	3000
DH5WB 3354	KA5TQF ...1420	KA5TQF ...1145
K3HKS 3355		
UA9YC 3356	**2000**	
	KA5TQF ...1315	
1000		
K4IJQ 2696	**2500**	
KA5TQF ...1697	KA5TQF ...1236	

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

Wireless Institute of Australia Awards

This month we feature the awards series from the Wireless Institute of Australia. The average North American DXer will probably have the required cards for one or two of these certificates. However, chances are you're going to have to concentrate on your "down under" contacts in order to earn others.

Mal Johnson, VK6LC, has done a great job of reorganizing the program, getting all data on the internet and introducing several new awards. We will not cover all of the awards offered by WIA, since a number of them are strictly VHF oriented and of interest only to VK amateurs. The group's website provides great support for the awards program, including applications for each award in both ZIP and XLS spreadsheet format. This makes applying for each award quite easy.

General Requirements. Indicate if you are a WIA member or not, and if you are, provide your membership number. No crossband contacts permitted, nor those made via terrestrial repeaters, aircraft, IRLP, or sea-going vessels. All contacts must have been made after 1 January 1946 unless otherwise stated.Applicants must hold unaltered cards for each award. Do not send cards; send GCR list certified by a WIA affiliated official or two licensed radio amateurs. The awards are free to WIA members; VK non-members pay $A10. For others the fee for each award is $A12, $US12, or 10 valid IRCs. Apply in hard copy or computer file, including callsign, date, time, mode, and band for each contact to: Federal Awards Manager, Malcolm K. Johnson (VK6LC), P.O. Box 196, Cannington, Western Australia 6987, Australia. Internet: <http://www.wia.org.au/awards/>; e-mail <awards@wia.org.au>

WIA Antarctic Award. Contact 10 stations operating in Antarctica, including stations authorized by at least six different national licensing authorities, one of which must be a VKØ. Contacts after 23 February 1988, the 75th anniversary of the first two-way radio contact between Antarctica and the outside world, count for this award. Antarctica is defined as the land mass, islands, and permanent ice shelf below latitude 60° south. SWL okay. All bands okay, no crossband contacts.

WIA DXCC Award. Submit evidence of having worked 100 countries. May be endorsed for various

The Wireless Institute of Australia's Antarctic Award requires contacts with ten stations operating in Antarctica.

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e-mail: <k1bv@cq-amateur-radio.com>

Submit evidence of having worked 100 countries to earn the WIA DXCC Award.

The Worked All VK Call Areas award is also sponsored by the Wireless Institute of Australia.

bands and modes. Acceptable countries are determined by the WIA (in practice, this list is the same as that of the ARRL, with the WIA reserving the right to make variations). Contacts are valid from 1 January 1946, and contacts with satellites from 1 March 1965. No "stickers" are available, but award holders' calls will be published in recognition of higher totals. Submit additional country GCRs in multiples of 25 up to 200, then by tens up to 325, and after that, by single additional countries. Records are maintained for current and deleted countries: i.e., 200/220 means 200 current, and 220 including deleted ones. Starting dates for new countries are the same as the ARRL's dates, with WIA reserving the right to make a different decision. All claimed countries must be made from the same DXCC country.

Worked All VK Call Areas. Confirmed contacts as follows since 1 January 1946. Applicants must be members of an IARU-affiliated society. (No repeat contacts made after 14 February 1990 will count. Special prefixes AX and VI also qualify.)

VK stations need 73 QSOs as follows:

VKØ—three QSOs from at least two different areas.
VK1—three QSOs on at least two different bands.
VK8—three QSOs on at least two different bands.
VK9—four QSOs from at least three different areas (special prefix VK9R qualifies).
VK2,3,4,5,6,7—ten QSOs from each call area on at least three different bands.

VK's do not have to possess the QSLs.

DX applicants must have 22 contacts as follows:

VKØ, VK1—one contact from each call area.
VK2, 3, 4, 5, 6, and 7—three contacts from each call area.
VK8, VK9—one contact from each call area (special prefix VK9R qualifies).

Heard All VK Call Areas. This award is specifically designed for SWLs, and the call-area requirements are the same as for any licensed amateur, except that SWL cards instead of QSLs are needed.

WIA Grid Square Award. Contact Maidenhead grid-square locators as indicated below on or after 1 January 1990. Grid-square fields are designated by combination of two letters (AA– RR), the squares by two numbers (00–99), and two sub-square letters (aa–xx). For example, QF56od is the proper designation for Sydney, Australia. The application must also quote the location or field where the contact was made—i.e., home base station, portable or mobile, meaning from one location only. Only contacts made on or after 1

The Heard All VK Call Areas award is designed specifically for shortwave listeners.

Contact Maidenhead grid locators to earn the WIA's Grid Square Award.

Don Wolfe, AA4VN, USA-CA All Counties #1114 (March 1, 2005)

Back in the early 1990s, every weekend I was driving 200 miles from my home in Alabama to my "home place" farm in west Tennessee. I was an avid DXer and eventually got the idea of trying a little mobile hamming. I had a Yaesu FT-902DM, so I strapped it into the front seat, got an HF whip, and I was all set. Well, needless to say, this was not the ideal setup for DXing, and I was not having much success.

Then a fellow ham told me about the County Hunters Net. I started listening to it and was soon putting out the counties I went through on my weekly trip, finding alternative routes that would take me through different counties whenever time would allow. I was hooked.

At the next hamfest I got a good mobile rig and antenna. After that, every trip anywhere was carefully planned to see how many new counties I could go through on the way there and back. Staying on the Interstate was a luxury of the past, as the first time through got all the counties along that route.

The next logical step had to be collecting the counties myself, and I went through old logs and QSL cards to see how many I already had. the quest had begun. About ten years later, here I am with all 3077 confirmed. many thanks for the assistance of the net controllers and to many other mobiles, some of whom made special trips to help me get my last few. Thanks so very much, guys and gals!

Even though that last county was a thrill, I think the more enjoyable part of county hunting is being mobile and giving needed counties to others. I've had the honor of giving out one last county myself, and it was great.

I would eventually like to get to every county. I've completed my home state of Alabama and several other states, including Alaska. My poor children had to endure a several hundred mile trip up the Pipeline Highway during our vacation just so I could put out the 2nd district. Even then I almost missed the opportunity because conditions were bad and it took quite a while before anyone heard me calling. However, "ears" were finally turned north and I was able to make numerous contacts, both SSB and CW.

Now that the USA-CA All Counties goal has been reached, it's time to start over, and the best way is to get back on the road again. Listen for AA4VN/Mobile. I'll be out there trying to help others get their last counties and adding to my own count of counties given out. *—73, Don, AA4VN*

January 1990 qualify for this award and the contacts must be from land-based stations.

(This award is similar but not quite the same as the new CQ DX Field Award, but since it breaks down each of the 324 squares into 100 smaller squares, and each of these into 650 sub-square letters, there's a total of 324 × 100 × 650 = 21,060,000 possibilities worldwide, although only land-based contacts will count.—ed.)

Minimum requirements are:

All HF bands (including WARC)—100 grid squares
50 MHz—50 grid squares
144 MHz—30 grid squares
432 MHz—25 grid squares
1296 MHz—10 grid squares
13 cm and above—5 grid squares
2300–2450 MHz, SHF and EHF 248–250 GHz—5 different locators

In Closing . . .

Looking for award publicity? *CQ* magazine is the only U.S. amateur magazine with a monthly awards column. We can help you. Send me the details and let's see what can be done to put the rules in front of thousands of *CQ* readers.

73, Ted, K1BV

BY TOMAS HOOD,* NW7US

Who Said the Sun is Dead?

A Quick Look at Current Cycle 23 Conditions
(Data rounded to nearest whole number)

Sunspots
Observed Monthly, June 2005: 40
Twelve-month smoothed, December 2004: 35

10.7 cm Flux
Observed Monthly, June 2005: 94
Twelve-month smoothed, December 2004: 101

***Ap* Index**
Observed Monthly, June 2005: 13
Twelve-month smoothed, December 2004: 15

Despite how close we are to the end of current solar Cycle 23 and the period of least activity (see fig. 1), the sun continues to spice up things from time to time. The current solar cycle, the 23rd cycle since records have been kept, is expected to reach an end sometime during 2007, when the sun's activity will be at the lowest level in its average 11-year cycle. This means that we will see significant activity levels less often and further apart than during the peak years. Major flares and CMEs (coronal mass ejections) will occur, but not very often. During the peak years we see such events several times a day. Now, during the end of the decline in activity, we may see such events once a month or so. When they occur, they bring a bit of excitement, either to VHF enthusiasts, or sometimes when it is a flare-up of sunspot activity, to the HF DXer. We've seen a few periods of moderately active sunspot development, which tend to drive up the solar flux index, which in turn wakes up the higher HF frequencies.

An example of that occurred during July. The month started out with the daily SESC sunspot number reaching 122 on the 1st and 168 on the 2nd, finally peaking at 192 on the 4th of July. (I am writing this column during July, so we don't yet have all the numbers from the last half of the month). This particular period of activity is a jump up from the typically quiet periods that were observed for several months prior. The highest daily peak during the second quarter of 2005, prior to the July burst, was 117. Of course, this peak is not sustained, so the monthly average is not going to show much of a rise in the trend toward the solar cycle minimum. However, it does result in some spice in radio propagation.

With the burst of sunspot activity came a series of flares, too. On July 14, 2005, for example, we witnessed three C-class flares, four M-class flares, and one X-class flare! The day prior had six C-class flares and five M-class flares. Some of these resulted in CMEs that later triggered moderate geomagnetic storms and even a bit of aurora.

Solar Wind and CMEs

Space is not a vacuum, at least in our solar system. The sun's atmosphere actually extends very far out from the sun. Space in our system is filled with plasma, a low-density gas in which the individual atoms are charged. The temperature of the sun's atmosphere is so high that the sun's gravity cannot hold on to it. The plasma streams off the sun in all directions at speeds of about 200 to 400 kilometers per second (about 1 million miles per hour) during typical "quiet" days. This is known as the *solar wind.*

When a CME bursts out away from the sun, its speed can reach as much as approximately 2000 kilometers per second. As the CME moves outward from the sun, it generates a shock wave that can accelerate particles in interplanetary space to high energies. When a CME or its shock wave passes the Earth, geomagnetic storms are triggered. The majority of large, major geomagnetic storms are generated by the encounter with both the interplanetary shock and the CME that drives it. Their ability to disturb the Earth's magnetosphere is a function of their speed, the strength of their magnetic field, and the presence of a strong southward magnetic-field component. During the declining years of a solar cycle, such as where we are this month, we see far fewer CMEs, since flaring has declined, than during the peak years of a cycle.

The Earth's magnetosphere is formed from two essential ingredients—the Earth's magnetic field (which has much the same form as that of a bar magnet, and is from pole to pole) and the solar wind. When the solar wind and magnetic fields combine with the Earth's magnetic field, they alter the shape and intensity of this shield around the Earth. The ionosphere is affected by these changes, either by an increase in ionization or a decrease or even a depletion of ionization. Depressions in ionospheric density cause major

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 2005

	Expected Signal Quality			
Propagation Index	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 1, 8-9, 11-12, 16-20, 24-28	**A**	**A**	**B**	**C**
High Normal: 2, 7, 14-15, 21-23, 29	**A**	**B**	**C**	**C-D**
Low Normal: 4, 6, 10	**B**	**C-B**	**C-D**	**D-E**
Below Normal: 5	**C**	**C-D**	**D-E**	**E**
Disturbed: 3, 13, 30	**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 on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be excellent (A) on Sept. 1st, good (B) on the 2nd, fair-to-poor (C-D) on the 3rd, etc.

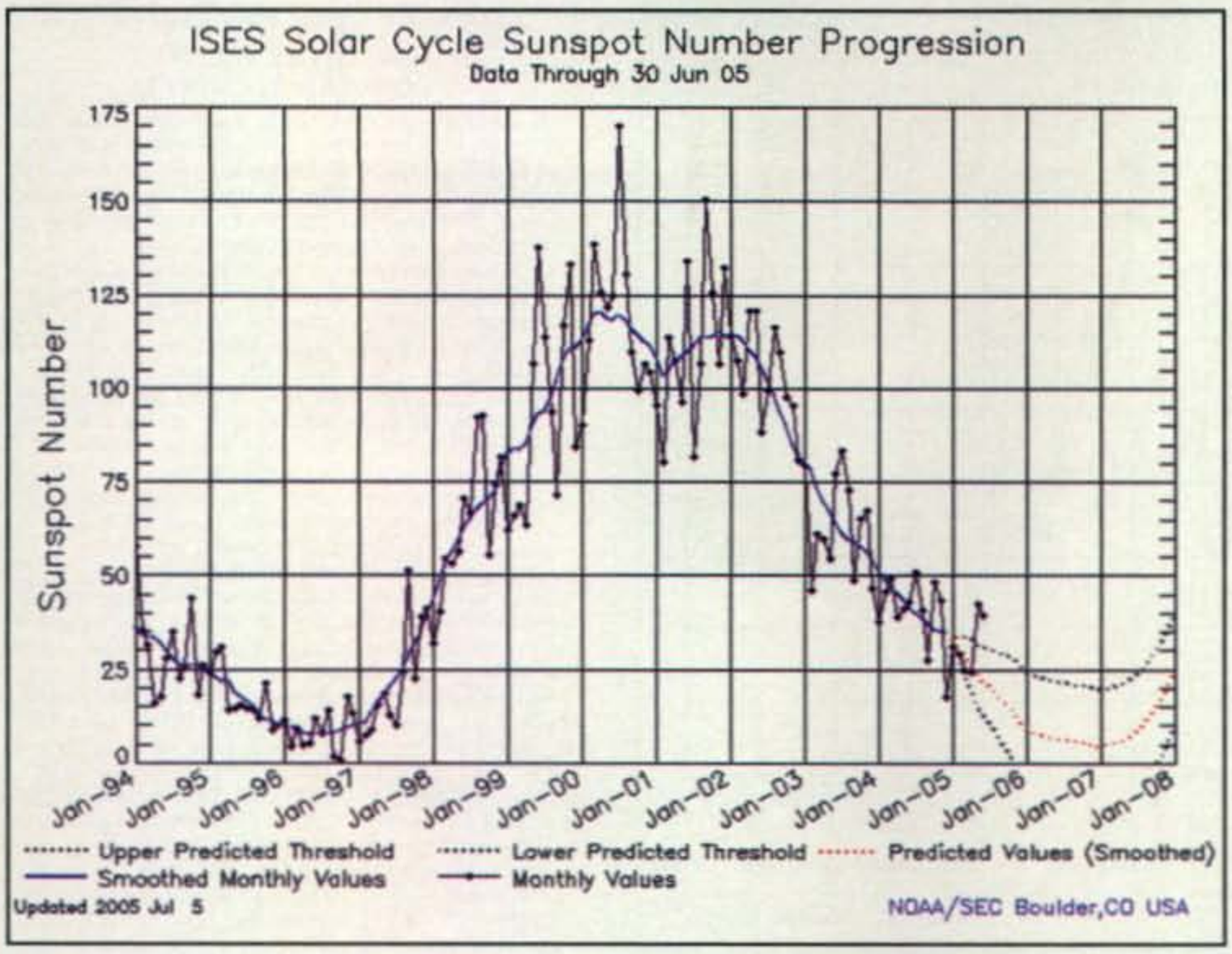

Fig. 1– Solar Cycle 23 sunspot number progression. (NOAA/SEC Boulder, CO)

communications problems, because radio frequencies that previously had been refracting off the ionosphere now punch through. The MUF (maximum usable frequency) on a given radio signal path can be decreased by a factor of two during an ionospheric storm event. Storm effects are more pronounced at high latitudes.

Most of the time during these months near the end of the current cycle we will see coronal holes peppering the sun, causing geomagnetic disturbances, not flares and CMEs. We'll see occasional, if any, CME activity.

September HF Propagation

September is a month of radical improvement in radio-propagation conditions. On September 22 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 crosses 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 at around 6 PM local time.

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 a vast improvement on 15 through 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. Get ready to reap the DX.

The 15-meter band usually will supply day-path propagation even over the polar paths, although these will become more rare than during peak cycle years. Watch 15 meters for many long-path opportunities. A considerable improve-

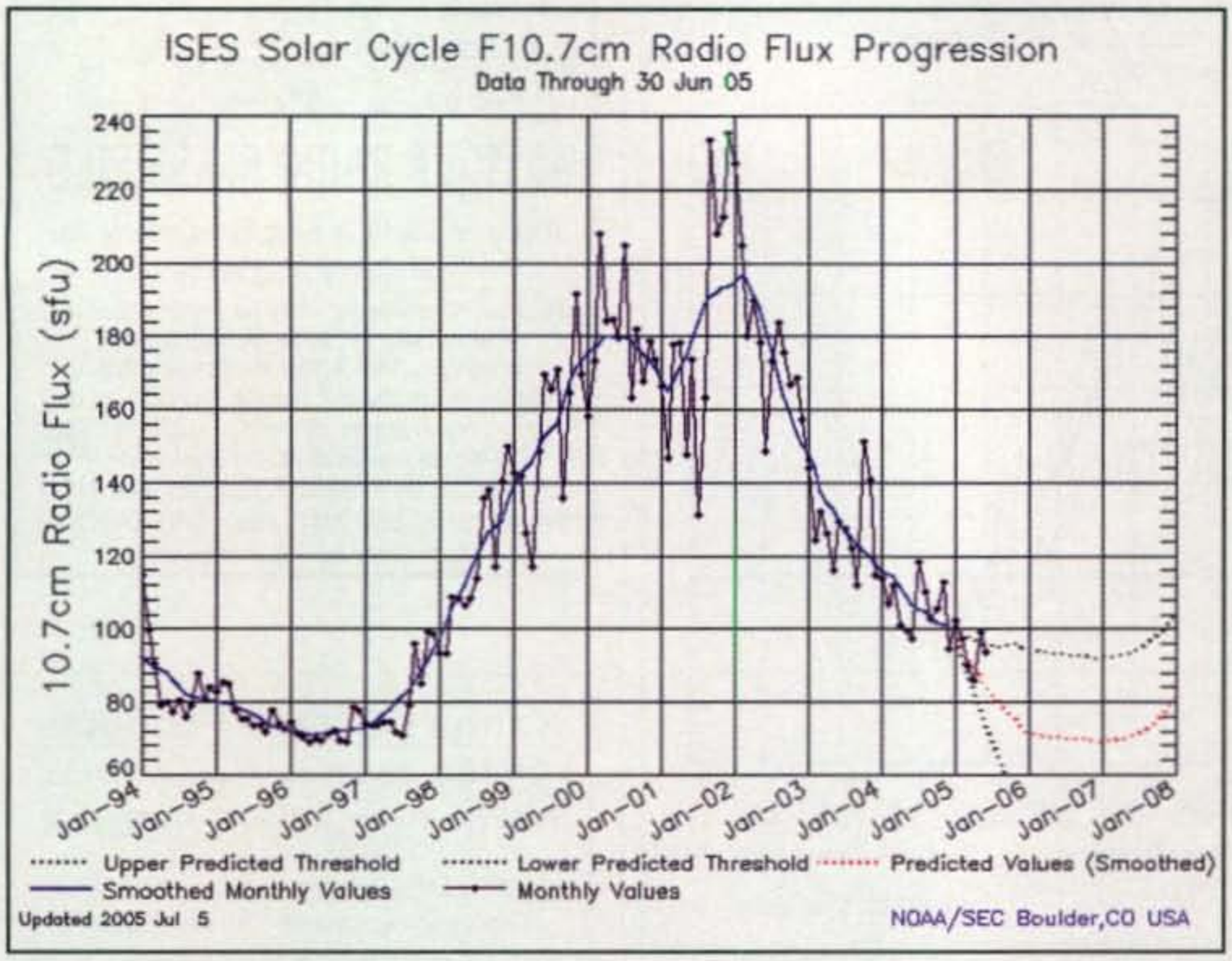

Fig. 2– Solar Cycle 23 F10.7-cm radio flux progression (NOAA/SEC Boulder, CO)

ment is expected for DX propagation on 15 and 17, both opening shortly after sunrise and remaining open until after sundown. However, 15 will not stay open late into the night as it does during the spring. Openings should be possible to all areas of the world, with conditions 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 Zealand, and the Far East should be possible well into the early evening, particularly when propagation conditions are High Normal or better.

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 meters 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 meters 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 meters during the hours of darkness. Check 10 and 12 meters for some fairly good openings beyond 1300 miles in the afternoon hours, especially with conditions are High Normal or better, and for paths into South America and the south Pacific.

VHF Conditions

Expect some possible aurora conditions caused by recurring coronal holes. The end of September and all of October are the start of the seasonal autumnal aurora season. Geomagnetic storms that ignite auroras occur more often during

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

DX Charts
September 15–October 15, 2005
Time Zone: EDT
(24-Hour Time System)
EASTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Western & Central Europe & North Africa	11-14 (1)	10-11 (1) 11-15 (2) 15-16 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-21 (2) 21-23 (3) 23-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 20-22 (1)* 22-01 (2)* 01-04 (1)*
Northern Europe & European CIS	10-12 (1)	10-13 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (1) 14-16 (2) 16-18 (1)	18-20 (1) 20-04 (2) 04-05 (1) 21-04 (1)*
Eastern Mediter-ranean & Middle East	11-13 (1)	10-11 (1) 11-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	14-16 (1)	09-11 (1) 11-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	08-10 (1) 13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1) 23-02 (2) 02-04 (1) 01-03 (1)*
Eastern & Central Africa	13-15 (1)	11-13 (1) 13-15 (2) 15-16 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	21-02 (1)

Southern Africa	11-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	08-10 (1) 13-15 (1) 15-18 (2) 18-19 (3) 19-20 (2) 20-21 (1) 23-01 (1)	19-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	*Nil*	09-11 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-22 (1)	05-07 (1) 20-23 (1)
Southeast Asia	*Nil*	10-12 (1) 14-16 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 16-18 (1) 20-22 (1)	06-08 (1)
Far East	*Nil*	09-11 (1) 18-20 (1)	08-09 (1) 09-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1)
South Pacific & New Zealand	15-18 (1)	11-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-14 (1) 16-20 (1) 20-00 (2) 00-04 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-09 (2) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	17-19 (1)	14-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 14-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	02-04 (1) 04-06 (2) 06-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America, & Northern Countries of South America	11-14 (1) 14-17 (2) 17-18 (1)	09-10 (1) 10-13 (2) 13-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (3) 09-10 (4) 10-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (4) 04-06 (3) 06-07 (2) 07-08 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	14-15 (1) 15-17 (2) 17-18 (1)	09-10 (1) 10-11 (2) 11-14 (1) 14-16 (2) 16-18 (3) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	21-00 (1) 00-05 (2) 05-07 (1) 01-06 (1)*
McMurdo Sound, Antarctica	*Nil*	16-18 (1)	18-20 (1) 20-23 (2) 23-01 (1) 08-09 (1)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zones: CDT and MDT (24-Hour Time System) CENTRAL USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Western & Central Europe & North Africa	10-14 (1)	10-14 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 21-23 (1)* 23-01 (2)* 01-02 (1)*
Northern Europe & European CIS	*Nil*	10-13 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	10-13 (1)	10-13 (1)	07-08 (1) 08-09 (2) 09-15 (1) 15-17 (2) 17-18 (1) 21-23 (1)	20-23 (1) 21-23 (1)*
Western Africa	12-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	*Nil*	12-16 (1)	07-09 (1) 13-16 (1) 16-19 (2) 19-20 (1)	21-00 (1)
Southern Africa	11-13 (1)	09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*
Central & South Asia	*Nil*	18-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-21 (1)	06-08 (1) 19-21 (1)
Southeast Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-22 (1)	05-08 (1)
Far East	*Nil*	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-13 (1) 17-19 (1) 19-22 (2) 22-00 (1)	03-05 (1) 05-07 (2) 07-09 (1) 06-08 (1)*
South Pacific & New Zealand	14-18 (1)	10-13 (1) 13-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-08 (1) 08-10 (3) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	00-01 (1) 01-07 (3) 07-08 (2) 08-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	16-18 (1)	13-16 (1) 16-19 (2) 19-21 (1)	05-07 (1) 07-08 (2) 08-10 (3) 10-13 (2) 13-17 (1) 17-18 (2) 18-20 (1) 20-23 (2) 23-01 (1)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1) 05-06 (1)* 06-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	11-13 (1) 13-16 (2) 16-18 (1)	09-10 (1) 10-11 (2) 11-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-01 (3) 01-05 (4) 05-06 (3) 06-07 (2) 07-08 (1) 20-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-15 (1) 15-17 (2) 17-18 (1)	09-10 (1) 10-11 (2) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 13-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	21-00 (1) 00-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	*Nil*	16-18 (1)	17-20 (1) 20-23 (2) 23-01 (1) 08-10 (1)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zone: PDT (24-Hour Time System) WESTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Western Europe & North Africa	*Nil*	10-12 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European CIS	*Nil*	10-12 (1)	08-09 (1) 09-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-00 (1)
Eastern Mediter-ranean & Middle East	*Nil*	10-12 (1)	08-12 (1) 12-14 (2) 14-16 (1) 20-22 (1)	20-23 (1)

Western & Central Africa	12-14 (1)	10-13 (1) 13-15 (2)	07-08 (1) 08-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	21-00 (1)
Eastern Africa	*Nil*	13-15 (1)	07-09 (1) 13-15 (1) 15-17 (2) 17-19 (1) 21-23 (1)	20-22 (1)
Southern Africa	11-15 (1)	11-15 (1)	07-09 (1) 12-14 (1) 14-18 (2) 18-19 (1) 22-00 (1)	19-22 (1)
Central & South Asia	*Nil*	17-19 (1)	08-09 (1) 09-11 (2) 11-13 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 19-21 (1)
Southeast Asia	*Nil*	16-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	16-19 (1)	14-16 (1) 16-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-13 (2) 13-20 (1) 20-21 (2) 21-22 (3) 22-23 (2) 23-01 (1)	01-03 (1) 03-08 (2) 08-09 (1) 03-07 (1)*
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-18 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-01 (2) 01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1)	21-22 (1) 22-23 (2) 23-00 (3) 00-05 (4) 05-07 (3) 07-08 (2) 08-09 (1) 23-02 (1)* 02-06 (2)* 06-07 (1)*
Australasia	15-17 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	17-19 (1) 19-20 (2) 20-00 (3) 00-03 (2) 03-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-13 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-13 (1) 13-15 (2) 15-17 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	19-21 (1) 21-02 (3) 02-04 (2) 04-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	09-10 (1) 10-11 (2) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	08-10 (1) 13-15 (1) 15-17 (2) 17-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	21-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
McMurdo Sound, Antarctica	*Nil*	16-19 (1)	07-10 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-01 (1)	01-03 (1) 03-05 (2) 03-05 (2) 03-06 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of these charts.
Note: Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.
* Indicates best times to listen for 80 meter openings.
Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.
Charts prepared by George Jacobs, W3ASK

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates possible 10 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last-Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *daylight* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 PM in Los Angeles; 18 or 6 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

CQ Short-Skip Propagation Charts
September & October 2005
Local Daylight Savings Time
At Path Mid-Point

Meter Band	*Distance Between Stations (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	10-21 (0-1)	08-10 (1) 10-15 (1-2) 15-22 (1)	08-10 (1-0) 10-14 (2-0) 14-18 (1) 18-22 (1-0)
15	*Nil*	08-10 (0-1) 10-14 (0-2) 14-22 (0-1)	08-10 (1) 10-14 (2) 14-17 (1-3) 17-18 (1-2) 18-22 (1) 22-00 (0-1)	08-10 (1) 10-14 (2) 14-17 (3) 17-18 (2-1) 18-20 (1) 20-00 (1-0)
20	12-20 (0-1)	08-10 (0-1) 10-12 (0-2) 12-15 (1-4) 15-17 (1-3) 17-20 (1-2) 20-07 (0-1)	08-10 (1-2) 10-12 (2-4) 12-15 (4) 17-19 (2-4) 17-19 (2-4) 19-20 (2-3) 20-21 (1-3) 21-23 (1-2) 23-08 (1)	08-09 (2-1) 09-10 (2) 10-14 (4-2) 14-16 (4-3) 16-19 (4) 19-21 (3) 21-23 (2) 23-01 (1) 01-06 (1-0) 06-08 (1)

the months around the equinoxes during early autumn and spring. This seasonal effect has been observed for more than 100 years. When the *Kp*-index is greater than 5, you can expect possible aurora. The higher the *Kp*-index, the more intense the aurora can become. While I don't expect there to be many periods of stormy geomagnetic activity, there is still a strong chance for a few potential storms. Keep your eye on the geomagnetic conditions (you may viisit my propagation page, <http://prop.hfradio.org/> to view current conditions, including aurora activity) for periods where the *Kp* rises above 5 for more than six hours.

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 generally will 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.iprimus.ca/~hepburnw/tropo_nat.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 the bands, the more we can unlock the mysteries of VHF propagation.

40	08-10 (0-2)	08-10 (2-3)	08-10 (3-2)	08-10 (2-1)
	10-12 (2-4)	10-12 (4-3)	10-12 (3-1)	10-16 (1-0)
	12-16 (3-4)	12-16 (4-2)	12-16 (2-1)	16-18 (2-1)
	16-18 (2-3)	16-18 (3)	16-18 (3-2)	18-20 (3-2)
	18-20 (1-2)	18-20 (2-4)	18-20 (4-3)	20-21 (4-3)
	20-22 (0-1)	20-22 (1-4)	20-22 (4)	21-00 (4)
		22-00 (0-3)	22-00 (3-4)	00-03 (3-4)
		00-03 (0-2)	00-03 (2-3)	03-06 (2-3)
		03-06 (0-1)	03-06 (1-2)	06-08 (4-2)
		06-08 (0-2)	06-08 (2-4)	
80	07-09 (3-4)	07-09 (4-2)	07-09 (2-1)	07-09 (1)
	09-12 (4)	09-12 (4)	09-17 (1-0)	09-17 (0)
	12-19 (4-3)	12-17 (3-1)	17-19 (2-1)	17-19 (1)
	19-22 (4)	17-19 (3-2)	19-21 (3-2)	19-21 (2)
	22-04 (3-4)	19-21 (4-3)	21-22 (4-3)	21-22 (3-2)
	04-07 (2-3)	21-04 (4)	22-04 (4)	22-04 (4-3)
		04-06 (4-2)	04-06 (4-2)	04-06 (2)
		06-07 (3)	06-07 (3-2)	06-07 (2-1)
160	17-19 (1-0)	18-20 (1-0)	20-21 (1-0)	21-23 (1-0)
	19-21 (2-1)	20-21 (1)	21-23 (3-1)	23-03 (3-2)
	21-06 (4)	21-03 (4-3)	23-03 (3)	03-06 (1)
	06-08 (3-2)	03-06 (3-2)	03-06 (2-1)	06-08 (1-0)
	08-10 (2-1)	06-08 (2-1)	06-08 (1)	
	10-12 (1-0)	08-10 (1-0)		

ALASKA
Openings Given in GMT #

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Eastern States	*Nil*	21-23 (1)	12-14 (1)	08-12 (1)
			18-21 (1)	
			21-00 (2)	
			00-02 (1)	
Central States	*Nil*	21-01 (1)	13-15 (1)	08-13 (1)
			19-22 (1)	
			22-01 (2)	
			01-03 (1)	
Western States	*Nil*	20-21 (1)	17-18 (1)	08-11 (1)
		21-23 (2)	18-22 (2)	11-14 (2)
		23-01 (1)	22-01 (3)	14-16 (1)
			01-03 (2)	11-14 (1)*
			03-05 (1)	

HAWAII
Openings Given In Hawaiian Standard Time #

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Eastern States	*Nil*	07-12 (1)	11-13 (1)	17-19 (1)
		12-15 (2)	13-14 (2)	19-21 (2)
		15-16 (1)	14-16 (3)	21-00 (3)
			16-17 (2)	00-02 (2)
			17-19 (1)	02-03 (1)
			03-05 (1)	19-20 (1)*
			05-07 (2)	20-23 (2)*
			07-08 (1)	23-01 (1)*
Central States	09-13 (1)	07-11 (1)	05-06 (1)	17-19 (1)
		11-12 (2)	06-09 (2)	19-21 (2)
		12-14 (3)	09-13 (1)	21-02 (3)
		14-15 (2)	13-15 (2)	02-04 (2)
		15-17 (1)	15-17 (4)	04-05 (1)
			17-18 (2)	19-20 (1)*
			18-20 (1)	20-00 (2)*
				00-02 (1)*
Western States	10-15 (1)	07-10 (1)	06-07 (1)	17-18 (1)
		10-12 (2)	07-10 (3)	18-19 (2)
		12-15 (3)	10-12 (2)	19-01 (4)
		15-16 (2)	12-14 (3)	01-03 (3)
		16-18 (1)	14-16 (4)	03-06 (2)
			16-18 (3)	06-07 (1)
			18-19 (2)	19-20 (1)*
			19-21 (1)	20-22 (2)*
				22-03 (3)*
				03-04 (2)*
				04-06 (1)*

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for June 2005 is 39.6, a decrease from May's 42.6. The lowest daily sunspot value was recorded on June 26, a day of zero observable sunspots. The highest daily sunspot count was 73 on June 7. The 12-month running smoothed sunspot number centered on December 2004 is 35.3, not even a full point below November's 35.4 or October's 35.9. A smoothed sunspot count of 18, give or take about 12 points, is expected for September 2005.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada reports a 10.7-cm observed monthly mean solar flux of 93.7 for June 2005, down from May's 99.5. The 12-month smoothed 10.7-cm flux centered on December 2004 is 101.3, barely down from November's 101.5. The predicted smoothed 10.7-cm solar flux for September 2005 is 79, give or take about 16 points.

The observed monthly mean planetary *A*-index (*Ap*) for June 2005 is 13, a nice drop from May's 20. The 12-month smoothed *Ap*-index centered on December 2004 is 14.8, about the same as it was for November. Expect the overall geomagnetic activity to vary greatly between quiet to active during most days in September, as we are at the start of the equinoctial season. There is even a chance of isolated periods of stormy activity. Refer to the Last-Minute Forecast for the outlook on what days this might occur.

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. I'd also love to hear any feedback you might have on what I have written. Until next month . . .

73, Tomas, NW7US/AAAØWA

zero bias *(from page 9)*

Logan, W1HEO, was describing a program he helped start in Cleveland to both recruit and retain new hams. A key element of the retention part is a half-day orientation session for new hams. Having just started the college orientation process with Dan, it struck me that this was a great idea for new hams! After all, we're facing a retention problem—the number of new hams getting their licenses each year is relatively steady at about 20,000, and death rates are pretty stable, too, yet our overall numbers are declining (only slightly, but declining nonetheless). This means that more hams are not renewing their licenses when they expire than are being replaced by new amateurs. Were these hams ever active? Far too many ham clubs offer licensing courses and test sessions, but nothing beyond. Could a new-ham orientation program help?

Tracy Skipper of the National Resource Center—whose father happens to be a ham—thinks it can, but feels the focus needs to be mostly on what being a ham is all about. "You have to teach them the culture, the rules of the road, what's acceptable and what's not," she says. "Then you need some kind of mechanism for connecting them with others, either other new operators or more experienced operators as mentors, to help connect them to a community."

Randy Swing agrees, noting that teaching the nuts and bolts should take a back seat to "building advocates for the hobby" and creating motivation. "Getting people motivated is the key to getting them to succeed in any learning experience," he explains. "The trick for you in developing an appropriate orientation program would be that people are left knowing where to go for help and more information, but not trying to teach everything at once. You have to decide what's important." He says teaching people how to put up an antenna is less important than showing them why they should *want* to put up an antenna. "If people decide that something is important to do, is fun to do and has real value," Swing concluded, "they'll figure out how to do it."

Will the colleges' formula work for hams? Maybe, in some places. Maybe not, in others. We'll need to customize our retention programs to fit our clubs, our locales and the people involved. But first, we need to realize that we need retention programs. We need to decide collectively that getting new hams active and keeping them interested is important to do, is fun to do and has real value. Then, we'll figure out how to do it.

73, W2VU

ham radio news *(from page 8)*

ARRL Adds to Anti-BPL Filing

The ARRL has filed additional comments with the FCC as part of its Petition for Reconsideration of the Commission's order last fall which established rules for Broadband over Power Lines, or BPL. The "Citation of Additional Authority," according to the *ARRL Letter,* cites conclusions of a study by the United Kingdom's telecommunications regulatory agency, as well as a December FCC decision on "ultrawideband," to further support its request that the FCC "reconsider, rescind and restudy" its BPL rules. The full text of the League's additional filing is on the web at <http://www.arrl.org/tis/info/HTML/plc/filings/BPL-Reconsideration-Citation-of-Additional-Authority.pdf>.

Shuttle Mission Carries Hams, Ham Satellite

NASA's "return to space" shuttle mission, which at press time was scheduled for launch in late July, included six licensed hams among its seven crew members and carried a new ham radio satellite into orbit. *Newsline* reports that Mission Commander Eileen Collins, Pilot James Kelly, and four of the five Mission Specialists all hold ham licenses. In addition, the AMSAT News Service says part of the shuttle's payload is a ham radio satellite known as MISSE5/PCSAT2, which was to be placed on the exterior of the International Space Station during a spacewalk. The satellite was built by cadets at the US Naval Academy. More information is available at <http://web.usna.navy.mil/~bruninga/pcsat2.html>.

On the topic of the resumption of shuttle flights, the Goddard Amateur Radio Club, WA3NAN, also planned to resume its tradition of retransmitting shuttle communications in real time on various amateur frequencies.

AMSAT-Italy Wants Your DX Logs

Italy's AMSAT organization is asking HF DXers around the world to share their log files for HF contacts made between September 1, 2003 and April 30, 2005, as part of a propagation research study. According to the AMSAT News Service, the "Ionosfera" project is trying, among other things, to correlate DX activity with the various space weather indices. AMSAT-Italia is working on the project in conjunction with the European Space Agency's "Space Weather" program. See <http://esa-spaceweather.net/sda/ionosfera/index2.htm> for details.

Callsign Identity Theft?

You're probably aware (or should be if you're not) that identity theft is one of the fastest-growing crimes in the United States. But here's a new twist, courtesy of the enforcement files of the FCC:

According to a letter from FCC Special Counsel Riley Hollingsworth, K4ZDH, Joseph W. Hartmann, Jr., of Youngstown, Ohio, allegedly tried to take over the callsign of Joseph V. Hartman, Sr., K3GUX, of Oceanview, Delaware. It's noteworthy that the middle initials are different and the spellings of the last names are different, so it's unclear whether the Ohio Hartmann is related to the Delaware Hartman.

The FCC says the Ohio Hartmann provided the Wireless Bureau with a date of birth in September, 1969, and in 2000, filed an application to associate his FCC Registration Number (FRN) with callsign K3GUX, which is issued to the Delaware Hartman who was born in January, 1919, according the FCC records. The letter continues that Hartmann, Jr. later applied for a name and address change for K3GUX, changing both the name and address to his. Now the FCC wants to hear Hartmann, Jr.'s explanation of why he obtained an FRN for someone other than himself, and his justification for trying to have K3GUX essentially transferred to him.

Testing on a Train

Here's a unique setting for a ham radio license exam: the caboose of a vintage steam train, on Field Day, during a ride through the Texas State Railroad Park. W5YI-VEC President Larry Pollock, NB5X, reported that the unique test session resulted in four new Technician licenses and two upgrades being issued. The overall event drew more than 100 hams from all over Texas to operate separate stations—N5R and W5R—in the park and on board the train, during Field Day. The event was organized by Jim (N5MIJ) and Lisa (K5LRM) McLellan, of Rockwall, Texas.

Vanity Call Fee Increases to $21.90

The FCC is increasing the fee for amateur vanity callsigns by $1.10 for the coming fiscal year, from the current $20.80 to $21.90. The new fee takes effect 30 days after publication in the Federal Register, which had not happened as of press time. Fee changes usually take place in August or September, so check the FCC's vanity call website at <http://wireless.fcc.gov/services/amateur/callsigns/vanity/index.html> *before* filing.

CW TROPHY WINNERS AND DONORS

SINGLE OPERATOR
ALL BAND
World
D4B (Opr: Alexander Teimurazov, 4L5A)
Donor: W9IOP Memorial (Albert Kahn, K4FW)

World Low Power
Thomas Poland, SU9NC
Donor: Slovenia Contest Club

World QRPp
P40A (Opr: John Bayne, KK9A)
Donor: Gene Walsh, N2AA

World Assisted
9Y4ZC (Opr: Bernd Och, DL6FBL)
Donor: Robert McGwier, N4HY

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

USA Low Power
Michael Zak, W1MU
Donor: North Coast Contesters

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

USA – Zone 4
Patrick Barkey, N9RV
Donor: The Society of Midwest Contesters

Canada
VC3L (Opr: Ron Vander Kraats, VE3AT)
Donor: *CQ* magazine

Carib./C.A.
8P5A (Opr: Tom Georgens, W2SC)
Donor: Chuck Shinn, W7MAP

Europe
CT8T (Opr: Timo Klimoff, OH1NOA)
Donor: W3AU Memorial (Pete Raymond, N4KW)

Europe – Low Power
CT7B (Opr: Filipe Monteiro Lopes, CT1ILT)
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

Scandinavia
OH1F (Opr: Timo Pohjola, OH1MDR)
Donor: W3FYS Memorial (Chas Weir, Jr., W6UM)

Russia
RK4FF
Donor: Roman Thomas, RZ3AA

Africa
EA8ZS
(Opr: Jose Carlos Cardoso Nunes, CT1BOH)*
Donor: Gordon Marshall, W6RR

Asia
Chris Dabrowski, A45XR
Donor: Chuck Shinn, W7MAP

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

Japan – Low Power
Hiroyuki Ueno, JI1RXQ
Donor: Western Washington DX Club

Oceania
9M6NA (Opr: Saty Nakamura, JE1JKL)
Donor: Chris Tran, ZL1CT

South America
P40Q (Opr: Scott Redd, KØDQ)
Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND
World – 28 MHz
Pedro Alberto Cano Pereira, CX5BW
Donor: Joel Chalmers, KG6DX

World – 21 MHz
Bernie Van Der Walt, ZS4TX
Donor: Lew Sayre, W7EW

World – 14 MHz
CN2KM (Opr: Jan Erik Holm, SM2EKM)
Donor: W2JT Memorial (North Jersey DX Assn.)

World – 7 MHz
Robert Orehoci, T9/9A5E
Donor: Alex M. Kasevich, VP2MM
World – 3.5 MHz
CN2R (Opr: James Sullivan, W7EJ)
Donor: Fred Capossela, K6SSS

World – 1.8 MHz
IH9U (Opr: Mauro Tomazzoni, IN3QBR)
Donor: Kenneth Byers, Jr., K4TEA

USA – 28 MHz
Bill Tippett, W4ZV
Donor: Wireless Institute of the Northeast

USA – 21 MHz
Bertram Aaron, K2BA/5
Donor: Wayne Carroll, W4MPY

USA – 14 MHz
Saul Abrams, K2XA
Donor: Northern Illinois DX Association

USA – 7 MHz
Bill Kollenbaum, K4XS
Donor: W6AM Memorial (Jan Perkins, N6AW)

USA – 3.5 MHz
K7RAT (Opr: Tree Tyree, N6TR)
Donor: Bill Feidt, NG3K

USA – 1.8 MHz
David Patton, NN1N
Donor: Kat Obermann Memorial
Dave Patton, NT1N & Mark Obermann, AG9A

Canada (14 MHz)
VE6JY (Opr: Gary Caldwell, VA7RR)
Donor: Radio Amateurs of Canada

Carib./C.A.(14 MHz)
C6AKQ (Opr: Robert Patten, N4BP)
Donor: Bill Hein, NT1Y

Europe – 28 MHz
OHØZ (Opr: Ari Korhonen, OH5DX)
Donor: Jay Pryor, K4OGG

Europe – 21 MHz
9A8ØA (Opr: Zdravko "Emil" Balen, 9A9A)
Donor: Robert Naumann, N5NJ

Europe – 14 MHz
Ranko Boca, YT6A
Donor: G3FXB Memorial (Maud Slater)

Europe – 7 MHz
OHØB (Opr: Toni Linden, OH2UA)*
Donor: Ivo Pezer, 9A3A

Europe – 3.5 MHz
SN3A (Opr: Czeslaw Dubicki, SP3HLM)
Donor: K3VW Memorial (Frankford Radio Club)

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

Japan – 21 MHz
Akito Nagi, JA5DQH
Donor: DX Family Foundation

Japan – 14 MHz
Hiroyuki Inaba, JS3CTQ
Donor: Chris Terkla, N1XS

Asia – 14 MHz
A61AJ (Eugene Walsh, N2AA)
Donor: JA4WFM Memorial
(Alexander Teimurazov, 4L5A/D4B)

MULTI-OPERATOR, SINGLE TRANSMITTER
World
P40L (Oprs: KX7M, N6XI, W6LD)
Donor: Anthony Susen, W3AOH

U.S.A.
K1IR (Oprs: K1IR, K1LZ, K1OA, K1VR, KE1J, W1VE)
Donor: Douglas Zwiebel, KR2Q

Canada
VE7GL (Oprs: VE7GL, VA7OO, VA7AO, VE7IJH, VA7VZZ, VE7HJJ)
Donor: Eastern Canadian DX Assn.

Carib./C.A.
VP2MZM (Oprs: K2DM, K3ZM)
Donor: Lone Star DX Association

Africa
C91F (Oprs: AA4NN, W4GMY)
Donor: Harry Booklan, RA3AUU

Asia
UA9AYA (Oprs: RA9AB, RW9MG/9, RZ9AZ, UA9AR, UA9BA, UA9CDV, UN4L, UNØL)
Donor: Steve Merchant, K6AW

Europe
EA6IB (Oprs: EA3AIR, EA3AVV, EA3KU, EA5BM, EA5GX, EA6BF, EA6FB, EA6FO)
Donor: Bob Cox, K3EST

Japan
JA7YAA (Oprs: JE7HLZ, JHØNZN, JG7PSJ, 7M1JAS, JO7DJT, JO7FTJ, JI5RPT)
Donor: Vienna Int'l Amateur Radio Club – 4U1VIC

Oceania – Pacific Rim
AH2R (Oprs: JI3ERV, JR7OMD, JR3RVO, JO1DFG)
Donor: Junichi Tanaka, JH4RHF

South America
CP6CW (Oprs: CP6UH, KMØO, NØAT, NØSTL, WØOR, WØZR)
Donor: Araucaria DX Group

MULTI-OPERATOR, TWO-TRANSMITTER
World
HC8N (Oprs: N5KO, K6AW, HA1AG, K1TO)
Donor: Ranko Boca, YT6A

USA
K4JA (Oprs: K4JA, AJ9C, K7SV, KA9FOX, KE9I, KO9A, WE9V)
Donor: Northern Neck Contest Club

Europe
RU1A (Oprs: RU1AA, RW1AC, RV1AW, RA1AIP, RK1AM, UA1ARX, RA1AR, RN1AM)
Donor: Aki Nagi, JA5DQH

MULTI-OPERATOR, MULTI-TRANSMITTER
World
5U5Z (Oprs: GØMTN, G3PJT, G3SXW, G4BWP, G4PIQ, K5VT, KC7V, N7NG)
Donor: K2GL Memorial (Doug Zwiebel, KR2Q)

USA
K3LR (Oprs: K3LR, K3UA, K0RF, N2NC, K3EST, WØUA, N5RZ, K8CX, N3SD, KL9A, W2AU)
Donor: N6RJ Memorial (Bob Ferrero, W6RJ)

Europe
DFØHQ (Oprs: DL1AUZ, DL1DTL, DL3OI, DL3TD, DL4MM, DL5ANT, DL5AXX, DL5YY, DL7VOA, DL8WAA)
Donor: Finnish Amateur Radio League

Japan
JA3YBK (Oprs: JH3PRR, JG3KIV, JI3OPA, JP3PZD, JO3LDN, JH3AIU, JH4NMT, JR4ISF, JF4FUF)
Donor: Ryozo Goto, JH3JYS

Oceania
ZL6QH (Opr: ZL1AZE, ZL1BYZ, ZL2AGY, ZL2BSJ, ZL1CT, ZL1TM)
Donor: Prairie DX Group

WORLD - SSB/CW COMBINED
HC8L/HC8N (69,753,125)
Donor: WØID/WØUN Alpha Award

USA - MULTI-MULTI SSB/CW COMBINED
W3LPL (34,641,108)
Donor: N8SM Memorial (Operators of K3LR)

JAPAN - MULTI-SINGLE SSB/CW COMBINED
JA7YAA (8,083,290)
Donor: Vienna Int'l Amateur Radio Club – 4U1VIC

CONTEST EXPEDITIONS
World Single Operator
S9A (Opr: Pertti Simovaara, OH2PM)
Donor: Yankee Clipper Contest Club

World Multi-Single
8Q7DV (Oprs: RA9CKQ, RW6AN, UA9CDC, UA9CLB, UA9DD, UN9LW)
Donor: Carl Cook, AI6V

World Multi-Multi – Jim Neiger, N6TJ Award
3D2XA (Oprs: K2KW, N6BT, KE7X, AG9A, WA6O, W2VJN)
Donor: Alexander Teimurazov, 4L5A/D4B

SPECIAL – SINGLE OPERATOR AWARD
World SSB/CW Combined
D4B (Opr: Alexander Teimurazov, 4L5A/D4B)
(34,038,802 points)
Donor: Hrane Milosevic, YT1AD

World All Band: Under 21 years old
CT7B (Opr: Filipe Monteiro Lopes, CT1ILT)
Donor: Chuck Shinn, W7MAP

CLUB
World SSB/CW
Frankford Radio Club
(387,506,863)
Donor: W1WY Memorial (CQ magazine)

Non-USA SSB/CW
Bavarian Contest Club
(263,199,539)
Donor: N6AUV Memorial
(Northern California Contest Club)

**Second place*

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
D4B	91/13/47	186/17/48	1478/27/93	1470/34/112	1952/33/114	2062/31/105
EA8ZS	144/7/33	569/17/66	1886/33/103	1144/28/98	1248/34/99	1361/33/103
P40Q	94/11/23	459/21/69	1885/26/92	981/31/92	2016/27/9	971/25/78
A45XR	141/12/43	466/22/68	1336/33/100	1010/36/109	1757/38/111	837/32/102
8P5A	151/11/22	672/22/76	1079/28/85	1434/35/94	1810/30/91	1376/26/89
VY2NT	340/13/53	984/21/87	1369/28/94	1478/33/106	798/23/86	251/20/47
S9A	24/7/17	53/15/35	450/24/74	1086/35/111	1556/33/100	1559/25/86
CT8T	181/8/49	732/18/70	1526/26/92	882/28/97	1220/29/99	896/30/96
6W1RW	9/5/9	77/11/38	437/23/72	1122/30/95	1509/33/108	1109/27/91
9M6NA	38/10/12	270/19/53	1008/31/9-	826/35/85	1282/35/95	502/26/73

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
K5ZD/1	62/13/34	418/21/83	616/29/106	1174/37/124	803/31/108	131/23/68
N9RV	33/8/16	258/21/72	852/35/102	1125/40/116	889/32/113	175/24/71
K3CR	60/11/31	333/21/80	486/26/97	952/38/118	860/30/105	130/23/64
W1KM	46/11/24	692/21/79	487/24/80	840/32/96	684/26/91	132/23/65
K1DG	42/11/25	253/20/75	514/30/104	913/34/111	675/29/101	157/25/76
AA1K/3	45/11/29	357/19/70	537/24/86	776/37/112	890/26/98	117/20/59
KT1V	56/11/34	412/21/72	647/27/90	829/33/98	613/25/90	139/23/68
N2IC/5	32/12/16	229/25/63	785/34/88	477/38/107	674/32/103	276/29/61
K1ZZ	40/10/24	300/24/79	483/29/101	655/31/100	645/27/90	225/26/85
K5GN	37/11/20	206/20/71	563/35/86	548/37/107	862/33/111	238/26/69

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

P40L	115/11/29	731/25/85	1631/33/121	1229/40/130	1758/32/117	1226/28/96
EA6IB	69/16/67	1095/32/109	1769/37/138	1643/38/144	1558/37/135	571/34/116
UA9AYA	24717/57	917/26/92	1219/35/125	960/37/121	980/36/122	725/31/96
AH2R	21/15/20	297/28/65	1261/33/105	980/39/119	2016/37/115	704/36/88
8Q7DV	35/13/30	433/21/68	1526/32/106	653/35/122	1391/33/117	1217/31/98
OM7M	333/21/83	1133/32/118	1428/39/144	1009/39/138	806/37/138	215/34/108

USA MULTI-OPERATOR SINGLE TRANSMITTER

K1IR	37/13/34	489/21/85	766/33/120	1094/37/134	709/31/120	114/24/77
K8AZ	42/15/39	240/24/87	795/38/132	919/40/145	764/32/127	104/26/85
W2FU	34/12/31	447/22/86	544/34/118	706/40/138	827/35/124	105/24/75
K3OO	22/36/12	341/24/86	540/29/98	730/38/141	832/31/115	88/24/76
N4RV	28/10/26	166/21/80	406/31/112	695/38/129	826/32/122	116/23/74
NØNI	27/12/26	121/23/65	355/34/106	678/39/128	726/35/128	110/26/72

WORLD MULTI-OPERATOR TWO TRANSMITTER

HC8N	276/14/39	1114/28/94	2552/38/131	2219/40/140	3585/39/143	2683/37/132
PJ2T	329/16/45	720/25/89	2520/33/122	2224/39/136	2493/34/115	1902/30/102
CT9L	237/10/51	1189/22/87	2534/32/108	1717/37/129	2383/33/123	2215/31/109
RT9W	362/15/57	1016/26/103	1501/36/129	1211/37/125	1353/33/124	960/31/99
RU1A	634/22/74	879/33/124	1791/39/148	1995/40/140	1443/40/135	412/34/107
K4JA	132/13/51	652/27/97	1598/38/141	1488/40/146	1478/34/137	389/30/102

USA MULTI-OPERATOR TWO TRANSMITTER

K4JA	132/13/51	652/27/97	1598/38/141	1488/40/146	1478/34/137	389/30/102
N3RS	81/12/46	644/25/86	1259/38/129	1194/39/141	1408/35/132	292/26/92
K1AR	46/12/27	346/23/87	994/38/129	900/39/136	967/33/126	186/24/83
N4WW	36/11/25	252/21/84	813/37/121	783/39/120	997/34/128	296/24/83
W6YI	29/12/16	239/27/56	1154/38/125	654/39/131	695/35/113	313/30/66
W8AV	47/10/28	215/21/79	422/33/116	1022/40/131	762/33/123	154/24/78

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

5U5Z	333/16/59	929/30/87	2062/36/129	4276/39/155	4045/39/153	2602/36/137
K3LR	160/16/58	654/31/103	1441/40/152	1988/40/158	1411/38/147	568/33/112
W3LPL	228/15/54	909/29/101	1575/37/139	1814/40/160	1548/37/149	613/32/109
DFØHQ	878/18/70	1968/35/121	2531/40/158	1905/39/145	1243/38/144	502/33/114
LZ9W	852/17/70	1407/30/106	2749/36/141	2173/36/132	1835/36/137	636/34/115
KC1XX	225/14/50	958/27/103	1322/39/139	1811/40/153	1285/34/136	468/31/109

USA MULTI-OPERATOR MULTI-TRANSMITTER

K3LR	160/16/58	654/31/103	1441/40/152	1988/40/158	1411/38/147	568/33/112
W3LPL	228/15/54	909/29/101	1575/37/139	1814/40/160	1548/37/149	613/32/109
KC1XX	225/14/50	958/27/103	1322/39/139	1811/40/153	1285/34/136	468/31/109
K9NS	179/20/52	533/29/94	1113/39/135	1414/40/150	1331/36/138	477/31/102
K1TTT	125/14/53	662/25/96	584/34/123	1716/40/155	1185/35/127	354/26/94
K1RX	121/13/43	679/26/94	800/37/125	1626/40/148	1058/34/131	339/26/89

good news is that very few logs are flagged. Out of approximately 4040 CW logs only 40 were flagged. The great majority of the 40 were stations that innocently forgot to claim the Assisted category. The remaining logs remained suspicious. More sophisticated checking techniques were needed to prove that something was amiss. As you can imagine, this creates a lot of work. Fortunately, the CQ WW CC has dedicated members who are in the highest levels of contesting.

A problem that has been emerging over the last few years is the use of help in the contest. If you are single operator in *any* category, you cannot receive help in *any* way from another person. Each year we receive reports of someone allegedly having another operator spot or work QSOs for him. This is against the rules, and we will enforce CQ WW DX Contest Rule XII in such cases (see the 2005 rules elsewhere in this issue).

Thanks

Thanks to the dedicated CQ WW log checkers who help make the CQ WW the standard of contest log checking. Here is the present list: K1DG, K3WW, K3ZO, KR2Q, N2AA, N2NC, N3ED, N6ZZ, N9RV, W3ZZ, K1AR, KM3T, KT3Y, N5TJ, N5NJ, K6AW and N8BJQ. The DX advisors offered advice and sorted out potential problems: CT1BOH, DL6RAI, EA3DU, F6BEE, G3SXW, I2UIY, JE1CKA, OH2KI, OH2MM, PY5EG, S50A, UA9BA, VA7RR, VE3EJ, RA3AUU, E21EIC.

Dick, N6AA, and Larry, N6TW, once again spent countless hours dealing with incoming logs and making the CQ WW database the best in contesting. The CQ WW uses the software developed by Tree, N6TR. Additional software provided by WT4I was used. The CQ WW records are maintained by John, N2NC, and K3EST. Phil, N6ZZ, put in lots of hours making sure the database was as clean as possible. Thanks as always to John, K1AR, for his advice.

Congratulations to all the participants! See you in the 2005 contests.

73, Bob, K3EST

VK9AA, operated by Bernd, VK2IA.

DX QRM

Great fun! A big thank you to my hosts, the Scouts of Monastir! . . . **3V8SQ.** Definitely the most fun one can have in a contest with just one dipole! Hats off to all the great CW op callers who let us keep the rate up despite our weak signal. . . . **4U1UN.** Huge pile-ups at times made run tough, but it was a great contest. Poor antennas on low bands. I'll be back with a real setup! . . . **6W1RW.** First time on 160m in CQWW. Happy with the result considering I was using an inverted Vee antenna. . . . **7S2E.** Wow, as usual the WW DX contest is the king of the contests! . . . **B4TB.** My 1st SOAB contest. Feels good, although met the tribander problem. See you next year! . . . **BA4RF.** What a hoot! First time as DX in CQ WW CW! . . . **C91F.** My fourth trip to CT8T. Again thanks to Santos family! . . . **CT8T.** Biggest thrill was working CX5AO and LU5FF on an almost dead 20m band Sunday night as country multipliers #100 and #101! . . . **DL4AAE.** Great to work my second CQWW CW on 160m and enjoyed the nice but different condx. Improved my antennas with a helium balloon and DX rate improved more than I thought. . . . **DL7CX.** Special thanks to my host John, EI7BA, for his hospitality, making it a wonderful contest. . . . **EI/AB2E.** Sunday saw the band close down very early here but it was interesting to see 10m during low sunspots. . . . **EI4CF.** In my 40th year of contesting, and CQ WW is still the top event. A real pleasure to operate from home for a change, but will hit the road again next year year. . . . **F5VHJ.** This was my first serious entry in a contest for some years and it was a chance to test my new antenna. The conclusion: it needs improvement! It was a joy to listen to D4B run the 40 metre pile-ups in the wee hours of Sunday morning, and a wonder how he can keep such a mess flowing so smoothly. . . . **GØRTN.** Enjoyable contest, even though conditions were a bit marginal for QRP, and 10m didn't really open. As usual the K2 worked superbly; it really is an ace contest rig. . . .**G3YMC.** Many thanks to the Jersey club GJ3DVC for letting us rearrange the shack and change all the antennas! No antenna was higher than 45 ft., but we

EUROPE TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
CT8T	181/8/49	732/18/70	1526/26/92	882/28/97	1220/29/99	896/30/96
GI1W	518/9/50	1014/22/75	1156/29/109	1170/29/95	884/27/104	167/21/64
RK4FF	192/12/47	786/24/94	1297/34/129	773/33/110	559/32/101	284/29/80
YP3A	155/7/38	607/18/78	1100/35/115	975/33/106	969/34/113	164/30/ 84
IR7G	209/10/50	506/20/67	1227/31/100	649/30/91	759/34/104	347/25/59
EA5FV	43/6/31	236/14/67	1255/29/106	635/33/102	1108/31/103	532/28/75
TM6X	119/10/52	431/21/74	810/27/103	791/31/88	647/34/99	240/25/77
ES5TV	363/15/53	572/25/84	1019/33/110	761/30/80	566/35/93	256/21/65
HA8A	199/10/49	514/19/70	897/34/104	753/31/105	570/35/116	200/32/73
OH1F	201/7/46	335/20/73	669/30/92	1019/35/98	734/31/92	159/19/60

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

EA6IB	69/16/67	1095/32/109	1769/37/138	1643/38/144	1558/37/135	571/34/116
OM7M	333/21/83	1133/32/118	1428/39/144	1009/39/138	806/37/138	215/34/108
OM8A	278/17/68	1085/34/119	1311/36/138	1323/38/135	783/36/129	255/33/110
S50A	159/13/60	681/32/109	1497/36/143	869/37/134	1099/37/126	135/33/96
HG1S	167/10/53	1091/29/99	1318/37/137	1334/37/133	826/36/123	139/31/104
RW2F	748/25/81	1008/31/113	1169/38/139	988/36/134	490/34/128	180/32/110

EUROPE MULTI-OPERATOR TWO TRANSMITTER

RU1A	634/22/74	879/33/124	1791/39/148	1995/40/140	1443/40/135	412/34/107
IR4X	300/14/66	1301/32/113	2016/38/144	1836/38/136	1386/37/131	387/34/105
UU7J	515/19/70	1407/33/118	2140/36/138	2247/40/141	1586/35/128	681/33/127
ES6Q	676/16/67	1374/29/108	1502/38/138	1651/39/133	928/34/134	237/28/86
HG6N	582/16/66	1112/30/106	1236/37/137	1114/36/126	978/35/119	305/32/98
GJ2A	817/12/58	1440/16/80	1372/31/111	1408/33/107	1350/32/123	424/26/92

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

DFØHQ	878/18/70	1968/35/121	2531/40/158	1905/39/145	1243/38/144	502/33/114
LZ9W	852/17/70	1407/30/106	2749/36/141	2173/36/132	1835/36/137	636/34/115
GM5A	1022/14/63	1720/26/104	1920/35/128	2159/39/134	1350/32/124	347/26/92
LY7A	843/13/59	1321/25/88	1464/33/133	1201/35/121	735/35/120	350/32/96
OZ5E	613/10/51	1073/25/96	838/31/115	894/34/108	348/27/101	89/21/50
UV2L	318/10/50	822/17/75	567/28/90	1022/33/114	382/31/98	140/25/61

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

K6NA.....2,249,808
K6XX.....2,094,344
N7TT.....1,534,764
WA7LT.....1,243,032
KO7X.....956,940
KG7H.....942,630
W6UM.....800,442
*K6XV.....693,294
K7ZA.....671,606
VA7ST.....669,892

Zone 4

N9RV.....5,847,400
VC3L.....5247550
VE3EJ.....4,322,120
N2IC/5.....4,050,496
K5GN.....3,761,008
VE3JM.....3,286,754
VE3EY.....3,034,010
K8GL.....2,781,914
WXØB/5.....2,584,944
*VE3DZ.....2,537,536

Zone 5

VY2NT.....7,789,028
K5ZD/1.....6,070,659
K3CR.....4,976,188
W1KM.....4,513,080
K1DG.....4,334,442
AA1K/3.....4,214,421
KT1V.....4,209,712
K1ZZ.....3,940,670
KQ2M/1.....3,649,088
W1WEF.....3,572,316

Zone 14

CT8T.....6,646,626
GI1W.....5,215,284
*CT7B.....4741380
EA5FV.....4,448,125
TM6X.....4,246,625
DL3YM.....3,530,565
MW5A.....3,378,080
TM2Y.....3,242,400
DJ1YFK.....3,233,508
*EA7RM.....3,152,800

Zone 15

IR7G.....4,456,917
ES5TV.....3,848,544
HA8A.....3,829,344
OH1F.....3,7253,34
S57DX.....3,675,246
OH6KN.....3,331,664
*4NØW.....2,551,060
S53XX.....2,077,634
OK1AVY.....2,066,474
*SP4R.....1,909,200

Zone 16

RK4FF.....4,771,950
RW1ZA.....2,479,598
*UA4FER.....2,183,800
UV5U.....2,001,926
*RW3GU.....1,766,682
*UR3HC.....1,657,436
RT3T.....1,627,909
*RZ4AG.....1,248,102
UY5HF.....1,174,500
RN6FA.....1,152,039
RD4WA.....1,131,140

Zone 25

JH4UYB.....5,048,535
JA6GCE.....3,437,497
JE1CKA.....2,302,366
JHØFUW.....2,161,614
JH7XGN.....1,917,552
*JI1RXQ.....1,369,695
JS1OYN.....1,218,736
JK1OPL.....1,172,600
*JA2AXB.....1,009,800
JR3NZC.....890,109

*Low Power

had a lot of fun with a small Multi-2 team. . . . **GJ2A.** This was my third QRP entry in CQ WW. It was great to make nearly 1000 QSOs with just 5 watts to simple antennas. . . . **GW4ALG.** A good time to be in HC8. For some reason, we really struggled to work EU on 20. . . . **HC8N.** Had fun, most at the end the last 90 minutes. My first CQWW November 1954 as I1YCZ/Trieste, license 5 months old. . . . **IK2AIT.** 20m is still new to me since until February 2003. I wasn't allowed to transmit there because of my past license privilege, so I'm still learning the propagation using this good opportunity of CQWW contest. . . . **JJ1BDX/3.** What a contest! Had great fun. Loads of DX to be worked. First attempt at a big CW contest. See you all next time. . . . **M3CVN.** Tnx for another nice contest weekend. Unusual: no soldering iron during whole contest. . . . **OE3GSA.** Contest QTH went QRT just in time for the CW leg. Made some QSOs with indoor dipole for 15/20m. Great fun anyway! . . . **OE5OHO.** Second time ever I made over 1,100 QSOs during a single weekend, hi. Running 100W keeps my neighbors happy, hi. No CQ's, only S&P. Did I ever mention my shack is part of the bedroom? Tnx to my XYL. She must be getting used to have dits and dashes as a lullaby. CU agn in the next contest. Pse don't forget the QSL chore, guys! . . . **ON4CAS.** Great contest for little pistol. Low noise from aurora and nice to give out double mult! . . . **OX2KAN.** Great fun. Jacky, P43P, was the consummate host, as always. Spent most of pre-contest time repairing and setting up Jacky's station after separate lightning and tornado strikes. 168 second radio QSOs but still managed to miss lots of easy multipliers. . . . **P40Q (op KØDQ).** Being a 160m DXer is not good for overall score. . . . **P40W (op W2GD).** Had a great contest. Worked with my Banaba K2/100 and that little rig performed outstanding. Great filters which is needed on a crouded band. Little concerned about the impact of a packe cluster on a DX station. Not everyone can handle that big pile-up after being spotted. . . . **PA2R.** Thanks to Atilano (PY5EG/PY2OMS) who gave your unbelievable station at my hands. Really hard to work under these special situation, listening pratically to everybody, hi! . . . **PS2T.** 10m was alive and kicking in spite of low solar flux. Saturday was better then Sunday, but Sunday offered some skewed paths and good EU backscatter for many multipliers. . . . **SM6FHZ.** I used the station of Martin, V51WM, on farm Otjikoko near Omaruruin the northern part of Namibia. I'd like to thank Martin and his wife Ursi for their generous hospitality. During the contest, a heavy thunderstorm with 45mm of rain hit the farm. It was really pouring! So I suffered very strong QRN on all bands during the contest weekend, particularly on the low bands. I am sorry to those callers that did not make it through the static. . . . **V51/DL5XL.** Awesome time! I just missed the 1m point mark, so something to shoot for next year. My kingdom for another hour! See everyone again next year. . . . **VE6TN.** Murphy's Law . . . who needs it when you can have an 8 hour power outage on Friday night and Saturday morning, and then have your neighbour switch on an electric blanket on Saturday night just when the 160, 80, and 40 meter bands were in good condition, and completely wipe signals out, (except for the strongest stations). On top of that, you have to call in an arborist to top three trees which were preventing you from rotating the beam. Other than that really enjoyed the contest. . . . **VE7NH.** Many equipment failures, hence a small entry! Good fun while it lasted! ICOM IC735, tuned rain guttering on the side of the house as an antenna! . . . **VK2BAA.** I have enjoyed operation on 80m during this contest very much. It is a band I started my hamming on, some 30 years ago. Time flies. . . . **VK6DXI.** Great fun as always. Nice conditions into Europe on the first nite but poor to North America. Roll on CQWW CW 2005! . . . **VK6VZ.** Fun to be one of three (3!) VK9s active for the event! . . . **VK9NW.** What a thrill it was to operate from Montserrat! . . . **VP2MZM.** Good long path conditions. . . . **WH2A.** Team contesting "Aztecas II" first time operation in the 80m band. Conditions were better on Friday night. Saturday night the band had more noise and opening to Europe was shorter. Many thanks to XE1V and XE3KKT for being great hosts. . . . **XE1NW.** I used small equipments in this year but Vy fun. Thanks to all QSOs. . . . **XU7ADE (op E21EIC).** First time to participate in 40m band. Hello USA! . . . **YC3MM.** Nice contest and good propagation on 80m. I was very surprised by the number of U.S. station that came on my CQ. I operated from my house located on mount of Zlatibor (at 889m ASL). It was very cold and windy before the contest and the antennas were damaged but I managed to fix it before the contest. . . . **YT2A.** Two young kids and wife, but managed 1100 QSOs on 40m! . . . **YU1LA.** Great contest. Few hours before the contest we decided to work Multi-2, without cluster, multiplier stations etc.. We have a nice fun as usual. Thanks to all who called us. . . . **Z37M.** Think that I broke my dupe record 120. Auto Morse "ain't what it used to be." Thanks to all concerned for running the contest. . . . **ZC4LI.** To stations far away (from ZK1): We hear you! We always don't answer because of QRM, so send your call only once, as we have to wait until everybody is finished sending before we can respond. Remember, if we are 459 to you (W, JA, even EU) you are 589+ to us. 747 contacts using a J38 key and a ballpoint pen. . . . **ZK1DRA.** Great contest as always! Lost power to the QTH for 3 days before the event. Conditions down since 2003. Highlights: being called by ZS6MG on 80m and 5U5Z on 10m. . . . **ZL6QH.** My second CQWW contest. This time using a vee beam directed towards North America. Two days of fun and madness! . . . **ZS1AN.**

USA QRM

Here's a tip from experience: Don't break a tooth right before the contest, and spend four hours Saturday morning in the dentist's chair, especially when working single band on a daylight-only band. . . . **AE9F/6.** 15 meters still the band to be on. . . . **KØBX.** Biggest thrill was working several JA's in the last two hours of the contest to bump my contact total above my goal of 1200. I also got a kick out of some rare DX that called me on my frequency, including S9, KH2, KL (not really rare, but sometimes hard to get zone 1 on several bands), TK, and HS. . . . **K1KD.** Special thanks to those who took the time for a QSO with a weak signal instead of hitting the CQ button again! . . . **K2TA.** It's always a great experience to operate with the best CW contest operators in the world. . . . **K2ZR.** Thanks to all the great ops with great ears! . . . **K3UW.** First, the computer crashed. Then by the time I had the laptop working (several hours later) the transmitter smoked and died. Hooked up another rig and managed to get in a couple of hours. . . . **K4GM.** This was a tough contest if you had the overnight shift on 160 and 20 meters. Slow! Breaking in a few new ops and still enjoying the company of all. Thanks to all for

the QSOs and spots. . . . **KB1H.** I ran a homebrew amp (25–50 watts) to a low (10m) dipole fed with ladder line. Not the best setup, but I had a lot of fun. The skill of most of the ops is simply amazing. . . . **KD5CMN.** The conditions this year were incredible for being so near the sunspot minimum. Put up a portable tower this year on top of a mountain. Unfortunately, punctured. Murphy is getting a sense of humor! . . . **KP4US.** Special thanks to A61AJ (op N2AA) for being extra patient and correcting "KI" to "KS" for my only new 40m DX on a wire vertical! . . . **KS7T.** CQWW CW is the contest! . . . **KT1V.** Was glad to finish 80m 4-square 10 minutes into the contest, but was so happy about it that forgot to run 40 meters. . . . **KU1CW/Ø.** With 4-week-old infant, bottle, burp cloth in one arm, his first contest. A truly single-handed effort! . . . **N2NI.** Now that was a good reason to have been working on my code speed! . . . **N3GNW.** Conditions not as good as CQWW SSB. More hours in the chair almost the same score. Have to work on my three S's: improve skills, improve strategy, stay in the seat! . . . **N3MX.** No chance to make a full effort this year, but this is one contest you just can't stay away from! . . . **N4GN.** If you're not moving ahead, you're falling behind. My low-power competitors seemed to be following this adage. N5AW added a 4-element SteppIR. N1UR replaced his Field-Day type setup with real towers. W1MU goes to his Maine QTH to be closer to the DX. I, on the other hand, just barely got back to my standard antenna setup by erecting my 80 and 160 antennas the week before the contest. So, while the leaders were falling only 300k or 600k off their last year's scores due to the declining propagation, my score dropped by 1 meg. I like to feel I'm performing a public service by not changing my station; that permits others to more accurately gauge their station improvements despite changing propagation. . . . **N4TZ/9.** What is with the

TOP SCORES

World
All Band

D4B	13,605,364
EA8ZS	11,484,894
P40Q	10,597,877
A45XR	10,488,336
8P5A	9,447,417
VY2NT	7,789,028
S9A	7,499,328
CT8T	6,646,626
6W1RW	6,610,774
9M6NA	6,316,800

28 MHz

CX5BW	1,196,103
CX6VM	1,133,008
5B/KIØBP	528,220
PS2E	415,758
OHØZ	263,238
RF4R	239,612

21 MHz

ZS4TX	1,606,140
EA8EW	1,566,126
IH9P	1,480,720
8R1K	1,316,412
ZC4LI	993,876
WH2A	900,136

14 MHz

CN2KM	2,023,740
EA8EA	1,833,008
3E1A	1,577,532*
4M5X	1,304,206
A61AJ	1,245,904
4L8A	1,162,560

7 MHz

A61AJ	1,655,109
T9/9A5E	1,048,017
P40J	936,720
OHØB	898,275
EA8PP	826,354
F6ARC	778,260

3.5 MHz

CN2R	1,037,704
EA8/OH4NL	693,264
SN3A	541,650
OK2RZ	511,820
A61AJ	432,279
OH2BH	408,455

1.8 MHz

IH9U	274,032
SP3BQ	155,870
ON4WW	151,368
YR2I	125,557
S57M	118,464
HA8BE	117,059

Low Power
All Band

SU9NC	8,411,944
V26K	7,468,593
CT9M	7,165,665
3V8SQ	5,446,230
KP4KE	5,086,719
CT7B	4,741,380
HI3K	4,092,192
J79A	3,596,216
EA7RM	3,152,800
UO2M	2,804,358

28 MHz

LT7W	506,883
CT1AOZ	163,215
9A3VM	130,458
9A7D	114,720
RA9SO	94,168
RU4SS	80,586

21 MHz

V31LZ	748,500
EA8NN	705,012
LU5FC	664,724
LO2F	661,149
CO8LY	567,936
EA8/LY1DF	515,247

14 MHz

CX5AO	799,444
3V8SF	708,246
5K5Z	618,788
SU8BHI	571,956
ZZ8Z	560,120
CX9AU	504,668

7 MHz

YZ1W	515,732
4N1FG	508,680
VE7SV	464,310
A45WD	403,795
LZ9R	293,832
JA6WFM/HI8	296,370

3.5 MHz

C6ATP	235,000
OHØI	231,516
YU7CB	192,572
YT2A	159,430
SP5KEH	141,350
YZ5W	138,075

1.8 MHz

OHØRB	56,355
ER5GB	41,210
ES6PZ	35,264
9A3RE	33,600
UT1FA	29,504
OL6T	29,315

QRP

P40A	4,078,977
YT7TY	1,348,496
TI5N	1,295,256
HG5Z	1,159,878
KT8X	953,520
LY4XX	905,464
N4KG	782,768
RN6AL	739,276
YT2T	695,622
OK1VBA	651,024

Assisted, All Band

9Y4ZC	14,581,665
5B/AA1TN	13,715,573
P40W	9,488,012
5H3KK	5,470,958
DJ5MW	5,004,964
PJ4M	4,645,888
K3WW	4,435,981
RX4HZ	3,622,592
K2NG	3,522,717
RG9A	3,455,097

Multi-Op, Single Trans

P40L	13,592,412
EA6IB	11,026,533
UA9AYA	10,647,435
AH2R	10,283,700
8Q7DV	9,244,364
OM7M	9,028,838

Multi-Op, Two Trans

HC8N	30,971,500
PJ2T	22,440,300
CT9L	22,157,172
RT9W	13,556,710
RU1A	13,021,632
K4JA	12,901,632

Multi-Op, Multi-Trans

5U5Z	36,651,908
K3LR	15,170,944
W3LPL	15,067,008
DFØHQ	14,652,565
LZ9W	13,875,100
KC1XX	13,408,500

Europe
All Band

CT8T	6,646,626
GI1W	5,215,284
RK4FF	4,771,950*
YP3A	4,670,469*
IR7G	4,456,917
EA5FV	4,448,125
TM6X	4,246,625
ES5TV	3,848,544
HA8A	3,829,344
OH1F	3,725,334

28 MHz

OHØZ	263,238
RF4R	239,612
LZ9X	174,178
EA5HT	154,854
9A6A	146,765
HG8Z	108,406

21 MHz

9A8ØA	760,416
OH0V	670,806
T97M	590,226
IU3X	491,508
YZ5Z	449,226
UR5IAW	294,600

14 MHz

YT6A	901,458
OH4A	826,200
9A5W	812,337
SO2R	788,072*
YZ9A	704,802
G3TXF	699,524

7 MHz

T9/9A5E	1,048,017
OHØB	898,275
F6ARC	778,260
YT7A	771,711
OH2U	757,390
SK3W	748,744

3.5 MHz

SN3A	541,650
OK2RZ	511,820
OH2BH	408,455
YU7AV	389,536
OHØM	381,545
GØIVZ	376,740

1.8 MHz

SP3BQ	155,870
ON4WW	151,368
YR2I	125,557
S57M	118,464
HA8BE	117,059
LY3UM	114,777

Low Power
All Band

CT7B	4,741,380
EA7RM	3,152,800
4NØW	2,551,060
YO3APJ	2,257,668
UA4FER	2,183,800
SP4R	1,909,200
RW3GU	1,766,682
EA4NP	1,721,937
LY9A	1,672,825
UR3HC	1,657,436

28 MHz

CT1AOZ	163,215
9A3VM	130,458
9A7D	114,720
RU4SS	80,586
4N1N	80,228
SX5R	72,675

21 MHz

YT7Z	454,020
J43J	424,760
EA4KR	344,410
HG8I	304,022
S57L	209,166
YT1RA	192,172

14 MHz

YZ2A	489,372
G6M	320,951
US7IGF	275,710
OK1EP	270,413
DL1LH	256,247
SV1BJW	239,136

7 MHz

YZ1W	515,732
4N1FG	508,680
LZ9R	293,832
T94FC	263,790
S54A	249,312
YU1LA	228,816

3.5 MHz

OHØI	231,516
YU7CB	192,572
YT2A	159,430
SP5KEH	141,350
YZ5W	138,075
HA8MD	132,114

1.8 MHz

OHØRB	56,355
ER5GB	41,210
ES6PZ	35,264
9A3RE	33,600
UT1FA	29,504
OL6T	29,315

QRP, All Band

YT7TY	1,348,496
HG5Z	1,159,878
LY4XX	905,464
RN6AL	739,276
YT2T	695,622
OK1VBA	651,024
S52P	594,688
LY5G	531,456
HB9DAX	461,898
OH4MFA	440,176

Assisted, All Band

DJ5MW	5,004,964
RX4HZ	3,622,592
UW8M	3,288,976
DK3GI	3,249,372
RA6CM	3,178,300
LY9Y	3,023,943
UW5Q	2,982,554
UA6LV	2,880,889
SN8F	2,754,000
RZ3AZ	2,659,377

Multi-Op, Single Trans

EA6IB	11,026,533
OM7M	9,028,938
OM8A	8,877,313
S50A	8,046,400
HG1S	7,440,275
RW2F	7,225,119

Multi-Op, Two Trans

RU1A	13,021,632
IR4X	12,791,640
UU7J	12,076,290
ES6Q	8,842,550
HG6N	7,884,742
GJ2A	7,638,274

Multi-Op, Multi-Trans

DFØHQ	14,652,565
LZ9W	13,875,100
GM5A	10,975,578
LY7A	6,915,660
OZ5E	3,842,067
UV2L	2,979,880

USA
All Band

K5ZD/1	6,070,659
N9RV	5,847,400
K3CR	4,976,188
W1KM	4,513,080
K1DG	4,334,442
AA1K/3	4,214,421
KT1V	4,209,712
N2IC/5	4,050,496
K1ZZ	3,940,670
K5GN	3,761,008

28 MHz

W4ZV	237,600
K4MM	67,574
W9YYG	24,057

21 MHz

K2BA/5	413,624
W6YA	291,688
K4OAQ	264,465
K2AAW/9	178,158
K8JM	175,558
NØVD	172,692

14 MHz

K2XA	662,742
N2MF	595,170
W7WA	486,066
KØAV	170,956
W8TWA	141,932
K0RI	105,868

7 MHz

K4XS	534,842
KT3Y	473,026
W6NV	293,112
AA7A	280,460
K7AO	251,328
N4CC	225,120

3.5 MHz

K7RAT	191,309
K1LZ	140,990
K6OY	128,520
K5RX	110,094
W5UN	92,773
N2GC	62,792

1.8 MHz

NN1N	27,432
W2VO	7,350
W3GH	5,040
K7OX	2,784
KJ7WY	1,020
K4PIC	860

Low Power
All Band

W1MU	2,125,404
N1UR	1,822,503
N5AW	1,728,720
AK2P	1,668,080
KØEJ/4	1,612,840
W1AO	1,570,465
K2PS	1,542,238
N4TZ/9	1,486,448
N2NL	1,439,616
W3EF	1,427,736

28 MHz

KM6Z	35,550
KW4CW	25,755
W5GAI	21,097
AA1ZT	18,200
W1END	13,504
K4WI	11,592

21 MHz

WB4TDH	238,176
N2BA	220,159
N4MO	182,130
K2MFY	134,563
KA7T	122,484
K9WA	98,413

14 MHz

N7WA	145,250
K9AW/4	84,600
K1VSJ	24,882
N1LW	15,762
WA2ASQ	12,154
WAØKDS/7	11,250

7 MHz

W1RM	264,920
K3BU/2	143,550
K7WP	62,964
WA1FCN/4	47,088
AA4GA	41,356
AD8J/3	33,575

3.5 MHz

N4IJ	67,728
NØAX/7	30,128
K2TA	27,010
W7AT	24,367
K8DO	9,324
NS3T	8,967

1.8 MHz

NA4W	774
K1IB	30

QRP, All Band

KT8X	953,520
N4KG	782,768
N8ET	631,220
KA1IS	457,146
W6JTI	431,235
N1TM	216,381
KG5U	210,154
K4ORD	156,524
NU4B	145,842
K2JT	140,822

Assisted, All Band

K3WW	4,435,981
K2NG	3,522,717
NI1N	3,051,100
KU1CW/Ø	3,024,558
W2RE	2,972,365
N1EU/2	2,875,640
K2KQ/1	2,846,528
K3PH	2,689,206
KQ3F	2,658,225
W2UP/3	2,640,330

Multi-Op, Single Trans

K1IR	6,249,717
K8AZ	5,732,240
W2FU	4,897,353
K3OO	4,710,015
N4RV	4,143,328
NØNI	3,516,498

Multi-Op, Two-Trans

K4JA	12,901,632
N3RS	9,921,186
K1AR	6,675,226
N4WW	5,658,241
W6YI	5,561,792
W8AV	4,636,816

Multi-Op, Multi-Trans

K3LR	15,170,944
W3LPL	15,067,008
KC1XX	13,408,500
K9NS	10,441,362
K1TTT	9,651,102
K1RX	9,397,960

CLUB SCORES

DX

Bavarian Contest Club (DL)	263,199,539
Rhein-Ruhr DXA (DL)	226,830,817
Contest Club Finland	116,455,732
Contest Club Ontario	107,670,337
Slovenian Contest Club	71,633,922
Russian Contest Club	54,895,893
Ural Contest Group	51,215,002
Araucaria DX Group (PY5)	48,119,972
Croatian Contest Club	45,275,314
Mt. RF (JA3)	35,451,100
Kaunas Techology University (LY)	35,023,776
Central Siberia DX Club (UAØA)	33,254,835
YU Contest Club	30,432,106
Bashkortostan DX Club (UA9W)	30,343,792
BC DX Club (VE7)	29,949,395
Tartu Contest Team (ES)	27,467,295
VK Contest Club	26,750,405
Crimean Contest Club (UU)	24,990,702
Tikirriki Contest Club (I)	24,295,101
Bad Power (LU)	24,152,709
GMDXC (GM)	24,022,665
Latvian Contest Club	22,839,359
Marconi Contest Club (I)	21,731,104
HA DX Club	19,241,018
Maritime Contest Club (VE1/9VY2)	19,190,125
SP DX Club	18,832,104
East Coast Canada CC (VO)	15,693,078
Ukrainian Contest Club	15,660,251
Vrhnika Contesters (S5)	13,594,396
Lithuanian Contest Group	13,302,065
Bosnia-Herzogovina CC	13,076,466
South Ural Contest Club (UA9A)	12,641,320
Southwest Ohio DXA	12,275,643
LNDX (F)	11,983,490
Chiltern DX Club (G)	11,853,036
Top of Europe Contesters	10,432,940
LU Contest Group	9,888,387
Beemster Contest Club (PA)	8,873,375
Aruk (EX)	8,438,276
UA2 Contest Club	7,612,752
Danish DX-Group	6,876,316
Kiev Contest Group	6,539,847
Sky Contest Club (YU)	5,470,757
Guara DXG (PY7/8)	5,150,971
RAAWG (SV)	4,916,904
University of Tokyo Contest Club	4,817,109
GACW (LU)	4,728,666
Orenburg Contest Group (UA9S)	4,587,203
Moscow Contest Club	4,339,282
Temirtau Contest Club (UN)	3,765,124
LYNX (EA5)	3,334,192
Mother Lode DXCC (W6)	3,213,941
ATCC (EY)	3,197,197
KKKK (UA6A)	3,159,904
Udmurtia (UA4W)	3,049,433
Z30M Contest Team	2,782,384
Belarus Contest Club	2,781,325
TuPY DX Group (PY2)	2,717,036
Aztecas II (XE)	2,496,982
South German DXG	2,440,347
Pizza & Pasta CC (I2)	2,359,670
Alberta Clippers (VE6)	2,323,754
Ivanovo DX Club (UA3U)	2,316,100
SP Contest Club	1,999,007
Bloemfontein ARC (ZS)	1,954,143
Jiangsu DX Club (BY)	1,923,254
Fox Contest Club (YU)	1,872,440
KRS (UR-H)	1,736,248
Sao Paolo Contest Group	1,717,888
Brimham Contest Group (G)	1,567,859
Venezuela DX Club	1,512,576
Amateur Radio Club of Saipan	1,445,120
Kemerovsky RC (UA9U)	1,426,423
Banat DX Group (YU7)	1,417,984
ADXC (PA)	1,163,975
Siam DX Group (HS)	1,063,280
Kiel Canal Activity Group (DL)	964,124
Uirapuru DX Club (PY8)	823,617
Belokranje Contest Club (S5)	808,712
Low Land Crazy Contesters (PA)	730,059
Serpukhov RC (UA3)	722,684
Obninsk-QRU-Club (UA3X)	693,881
Vladimir Radio Club (UA3V)	616,203
ARCK (UAØ)	601,465
Far East ARC (UA0C)	591,034
Yaroslavl Club (UA3M)	581,329
SK6AW Club	572,560
BFRR (EU)	568,443
Mediterraneo DX Club (I8)	558,245
RKØBWW Team	556,242
YO DX Club	521,703
Pushkino (UA3)	520,399
West of Scotland ARS	430,402
ALRS St. Petersburg	426,451
URE Cartagena (EA5)	399,144
Taganrog RC (UA6L)	368,129
Noviomagnum DX Club (PA)	328,874
ARM (ER)	325,235
HA6KNX Club	298,797
Cocosolo Sibichi Club (V4)	287,806
Club 22 (UA3I)	180,794
Wythall Radio Club (G)	159,530
SK4BX Club	133,014
Russian QRP Club	127,579
Krivbass (UT)	62,129
Arrow Communications (W8)	54,180
Parnu RC (ES)	45,655
CSM Craiova (YO)	35,129
SK6HD Club	15,805
CSM YO7KFA	14,352

USA

Frankford Radio Club (W3)	387,506,863
Yankee Clipper Contest Club	331,489,157
Potomac Valley Radio Club (W3/4)	169,644,326
Northern California CC	116,712,815
Florida Contest Group	71,416,703
North Texas Contest Club	60,216,014
Southern California Contest Club	50,222,126
Society of Midwest Contesters (W9/Ø)	49,255,436
North Coast Contesters (W3)	48,707,192
Minnesota Wireless Assn	45,082,827
Southeast Contest Club (W4)	43,925,777
Mad River RC (W8)	27,515,488
Western Washington DX Club	24,430,389
Willamette Valley DX Club (W7)	24,430,389
Carolina DX Assoc. (W4)	23,246,423
Hudson Valley DXCC (W2)	20,877,990
Central Texas DX & Contest Club	20,611,505
Tennessee Contest Group	16,932,596
Grand Mesa Contesters (WØ)	13,415,575
Rochester DXA (W2)	11,152,776
Texas DX Society	6,042,677
Kansas City DX Club	5,844,893
Central AZ DXA	5,255,175
Spokane DXA (W7)	4,263,065
Eastern Iowa DXA	3,836,154
Northern Illinois DXA	3,658,372
Kentucky Contest Group	3,206,487
Oklahoma DXA	2,621,279
North Alabama DXC	2,601,155
Western NY DXA	2,303,243
Sterling Park ARC (W4)	1,922,490
North Florida DXA	1,375,887
Northern Rockies DXA (W7)	1,323,333
Salt City DXA (W2)	1,268,991
Bergen ARA (W2)	1,196,225
Redwood Empire DXA (W6)	731,940
Northern Arizona DXA	559,550
West Park Radio Ops (W8)	523,666
Order of Boiled Owls of NY	402,239
South Jersey DXA (W2)	394,398
Metro DX Club (W9)	385,864
Northern Ohio DXA	302,387
Great South Bay ARC (W2)	295,817
South Texas DXCC	235,711
Boring ARC (W7)	223,631
Central Oregon DX Club	189,274
Southeastern DX Club (W4)	142,116
CT RI Contest Group	132,135

A index going to 60! Wow! . . . **N6IC.** This was an amazing contest, full of surprises. . . . **N6WG.** Strange propagation. I could easily work ZL and 3D2 from Florida with 4 watts but had trouble into the normally easy parts of Europe! . . . **NA4CW.** My first time in WW DX CW, and I had a blast! Thanks to the many ops who were understanding about my sending. . . . **NO6E.** What strange conditions! 78 countries with only 75 watts and an aluminium rain gutter for an antenna. I love CW! . . . **W3UTD.** A great team. Integrated networking made a difference. A special hats off to AA7CQ for his low band efforts! . . . **W7VJ.** Small problem: XYL left the microwave oven door open; picked up RF and acted as a monitor. First case I ever heard of MOI! . . . **W9LYA.** Fifty-four years of contesting and I still enjoy putting in 40 hours in this one. . . . **WA7LT.** My first time using N3FJP contest software. Slick! Propagation was strange here in Michigan with aurora flutter and sigs in and out like twinkling stars! Wkg Madeira Island on 10 meters QRP through a pile-up using a dipole 6 feet off the ground was a huge thrill. Special tnx to several DX stns who hrd my weak sig and sent an as to other stns in order to complete the exchange. . . . **WA8REI.** Full-size 80 meter vertical not finished but did well with only four radials! Had lots of interruptions from kids and guests. Murphy hit hard when I was in the shower Sunday AM, though. Water pressure died! Only got washed on the right side (no kidding) before the pressure went to zero. Seems the windmill overcharged the batteries and the system shut down during the night! Had it rewired and operational in about an hour, but never made it back to the shower — after all, the bands were open and I was actually dressed. Spent the rest of the day precariously favoring the clean side. Quick note for next year: Turn the lights on when you enter the shack so when it gets dark and the action is hot you don't have to sit in the dark hoping the XYL will look in so she can turn them on! PS: Put deoderant in the shack for emergency usage. . . . **WT6G.** The ops from Croatia had excellent fists! Best I heard all weekend. . . . **WW9R.**

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.)

2004 CW RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K5ZD/1	**A**	**6,870,659**	**3204**	**154**	**523**
W1KM	*****	**4,513,080**	**2881**	**137**	**435**
K1DG	*****	**4,334,442**	**2554**	**149**	**492**
KT1V	*****	**4,209,712**	**2696**	**148**	**452**
K1ZZ	*****	**3,940,670**	**2348**	**147**	**479**
				(OP: N6ZZ)	
K02M/1	A	3,649,088	2350	141	451
W1WEF	*	3,572,316	2266	140	454
WC1M	*	2,912,970	2045	137	397
W1FJ	*	1,915,086	1518	117	354
K1JB	*	1,819,184	1261	127	409
W1CU	*	1,660,606	1057	137	440
K5MA/1	*	1,501,007	1250	114	335
K1NQ	*	1,461,908	1265	114	365
W1ECT	*	1,353,352	1377	90	274
W1UK	*	1,263,988	998	120	386
W1ZK	*	586,608	613	100	263
N1RR	*	502,590	614	91	239
K1BV	*	347,643	551	64	209
N1ZZ	*	342,684	544	96	246
W1FM	*	254,196	411	74	202
K1KO	*	218,280	380	71	184
K1PH	*	210,474	408	44	154
KG1E	*	210,080	325	75	185
W1IA	*	145,470	345	49	146
W6ZF/1	*	105,872	218	56	152
W1YRC	*	95,207	214	66	137
WA1JMP	*	91,196	180	77	149
K1IM	*	83,888	373	57	139
W1ZT	*	44,289	135	49	84
AA1QD	*	18,432	75	35	61
K1LZ	**3.5**	**148,990**	**572**	**22**	**93**
K3FN/1	*	28,613	150	18	70
NN1N	**1.8**	**27,432**	**178**	**15**	**57**
***W1MU**	**A**	**2,125,404**	**1468**	**122**	**394**
***N1UR**	*****	**1,822,503**	**1474**	**117**	**372**
***W1AO**	*****	**1,570,465**	**1196**	**112**	**369**
*KS1J	*	1,318,296	1191	96	317
*W2JU/1	*	918,892	804	103	328
*W1JQ	*	782,866	779	92	306
*K1HT	*	696,136	634	109	292
*W1EQ	*	605,556	638	92	264
*W1KT	*	439,838	462	89	264
*N1DC	*	397,210	530	80	234
*K1TN	*	369,404	482	87	229
*K1EP	*	349,256	486	76	222
*N1IW	*	301,624	439	89	207
*K1KU	*	152,852	291	58	154
*AE1T	*	121,604	243	63	139
*W1ECH	*	60,040	170	53	99
*KY1B	*	43,520	158	55	115
*KX1E	*	17,100	90	20	56
*K1RB	*	13,446	72	34	49
*K1KAV	*	12,994	61	37	52
*AE1D	*	9,800	63	27	43
*K1SWG	*	3,752	35	24	32
*W1LEE	*	2,940	35	12	23
*N1HRA	*	2,520	29	17	28
*KZ1O	*	60	11	3	3
***AA1ZT**	**28**	**18,200**	**167**	**20**	**50**
*W1END	*	13,504	81	18	46
*KA1RFD	21	6,095	61	15	38
*K1UQT	*	1,100	20	11	14
				(OP: W7OT)	
***K1VSJ**	**14**	**24,882**	**114**	**26**	**70**
*N1LW	*	15,762	88	21	50
***W1RM**	**7**	**264,920**	**708**	**33**	**115**
*K1IB	1.8	30	4	2	3
N2LT	**A**	**3,540,320**	**2264**	**134**	**446**
K2UA	*****	**2,987,812**	**1903**	**139**	**460**
WW2Y	*	2,788,113	2113	128	395
K2TW	*	2,408,280	1867	122	366
W2LC	*	2,242,385	1620	126	401
W2XL	*	1,488,606	1203	119	350
K2NV	*	1,427,712	1077	129	378
N2CU	*	1,401,708	1115	118	344
K2FU	*	949,272	822	111	333
K2UOP	*	891,096	821	109	319
WA2VYA	*	562,103	640	102	296
WE2F	*	544,687	718	78	215
N2MR	*	507,384	538	92	256
W2VI	*	366,047	496	77	234
KE2WY	*	271,751	485	94	237
WB2HJV	*	259,116	348	71	215
KD2HE	*	192,525	321	66	189
W2CVW	*	144,064	278	62	173
W2UDT	*	125,079	309	72	169
W2LK	*	119,637	241	61	128
N2CG	*	94,116	211	53	133
W2GB	*	93,860	259	61	129
WB2TPS	*	77,231	158	54	133
N2VM	*	41,728	143	37	91
K2SX	*	39,168	140	46	82
W2KP	*	33,020	117	38	89
K2XA	**14**	**662,742**	**1491**	**38**	**124**
N2MF	*****	**595,170**	**1376**	**40**	**130**
N2GC	**3.5**	**62,792**	**269**	**19**	**75**
K2LP	*	7,876	154	13	57
NA2X	*	3,515	41	10	27
W2VO	**1.8**	**7,350**	**68**	**14**	**36**
***AK2P**	**A**	**1,668,080**	**1387**	**132**	**448**
***K2PS**	*****	**1,542,238**	**1240**	**109**	**345**
***N2NL**	*****	**1,439,616**	**2040**	**92**	**234**
*WB2AA	*	1,085,802	957	101	337
*W2TZ	*	819,315	806	97	308
*W2REH	*	708,855	577	111	360
*NT2A	*	648,674	671	103	306
*N2RD	*	512,172	589	95	252
*WB2DVU	*	266,676	380	78	206
*NC2N	*	224,276	367	70	177
				(OP: EW1AR)	
*K2UF	*	218,240	344	73	175
*WA2YSJ	*	158,057	285	64	185
*K2ZR	*	129,408	282	58	134
*N2MT	*	98,056	198	63	143
*WA2VZQ	*	94,507	212	61	138
*K2TV	*	88,704	208	64	128
*WA2JQK	*	81,204	232	74	194
*WR2G	*	72,674	233	57	146
*WA2BMH	*	71,968	167	55	118
*K2UT	*	71,434	163	56	131
*K2YLH	*	68,904	201	61	113
*N2ZN	*	64,796	172	52	115
*K2MK	*	46,434	193	53	89
*KM2L	*	44,694	135	36	81
*WW2P	*	40,963	119	46	91
*N2OOR	*	31,104	126	38	90
*N2CK	*	28,702	102	41	72
*W2EZ	*	27,776	125	42	86
*W2TX	*	25,620	95	42	63
*KX2S	*	13,284	63	27	55
*KC2NGC	*	6,097	111	35	56
*WB2AIV	*	4,554	52	27	39
*W2BVH	*	4,353	37	20	31
*N2OPW	*	2,464	29	16	28
*K2YR	*	2,196	24	14	22
*K2YW	*	2,009	42	12	29
*WA2VQV	*	1,276	20	13	16
*K2GWL	*	1,049	20	10	16
*WB2SXY	*	858	15	11	15
***N2BA**	**21**	**220,159**	**588**	**30**	**107**
***K2MFY**	*****	**134,563**	**357**	**31**	**112**
*KR2AA	*	37,583	173	21	70
*WA2ASQ	14	12,154	76	16	53
*NR2I	*	880	34	9	13
*NS2P	*	580	11	10	10
***K3BU/2**	**7**	**143,550**	**393**	**33**	**117**
***KZ1A**	**3.5**	**27,010**	**147**	**14**	**60**
*K2SZ	*	70	5	3	4
K3CR	**A**	**4,976,188**	**2821**	**149**	**495**
				(OP: LZ4AX)	
AA1K/3	*****	**4,214,421**	**2722**	**137**	**454**
W3BGN	*****	**3,499,650**	**2283**	**148**	**458**
N3AD	*	3,141,226	1950	146	483
NY3A	*	2,231,598	1844	118	353
N3UM	*	1,188,568	1117	99	305
W9GE/3	*	529,995	510	102	295
K3TC	*	480,797	509	105	268
N3KR	*	439,488	530	86	241
W3PT	*	415,380	421	105	315
W3RJ	*	361,746	568	70	191
N3RJ	*	351,616	505	84	244
W3AP	*	301,716	432	90	216
KB3TS	*	211,400	274	76	226
W3KV	*	170,683	328	69	167
W3CC	*	153,952	239	72	200
W3HVQ	*	141,932	336	79	195
N3RW	*	107,868	247	60	142
W3FVT	*	99,552	277	60	144
W3BYX	*	48,664	144	53	105
N3NZ	*	38,750	119	39	86
WB3AVN	*	34,224	119	35	89
K3WT	*	20,720	96	42	70
W3FQE	*	9,625	84	22	55
W3ELA	*	9,153	70	25	56
WA3AAN	**21**	**61,672**	**240**	**24**	**80**
AI3Q	*	14,616	88	16	47
KT3Y	**7**	**473,026**	**1109**	**35**	**128**
W3MC	*	43,990	219	20	63
K3JGJ	**3.5**	**46,872**	**282**	**19**	**74**
W8PT/3	*	18,130	123	17	57
W3AZ	*	5,499	58	13	34
W3GH	**1.8**	**5,040**	**53**	**11**	**29**
***W3EF**	**A**	**1,427,736**	**1245**	**117**	**339**
***K3XO**	*****	**640,683**	**694**	**103**	**286**
*N3II	*	399,655	472	90	245
*KB3MM	*	302,470	429	76	214
*W3IUU	*	246,339	343	81	190
*K1EFI/3	*	215,512	331	65	183
*N3KCJ	*	163,317	294	63	168
*W3BBO	*	122,400	257	62	142
*NY3C	*	100,716	210	66	152
*W2GG/3	*	22,227	98	35	58
*AA0CY/3	*	10,656	60	27	47
*NF3R	*	8,736	80	29	55
				(OP: K3ASK)	
*W3EH	*	5,500	48	18	37
*KB3KYZ	*	1	2	2	2
***WR3Y**	**28**	**6,240**	**53**	**17**	**35**
***AD8J/3**	**7**	**33,575**	**150**	**19**	**66**
***NS3T**	**3.5**	**8,967**	**86**	**10**	**39**
W4RX	**A**	**2,023,364**	**1531**	**124**	**384**
N4TB	*****	**1,385,268**	**1112**	**114**	**368**
K9OM/4	*	1,253,331	1061	121	350
K4SV	*	1,230,576	944	120	376
W9WI/4	*	1,217,111	1096	111	302
K1GU/4	*	1,072,568	950	116	312
W4RQ	*	949,500	841	112	338
N4GN	*	740,922	679	119	294
N4XM	*	733,096	726	116	308
KD5M/4	*	732,475	694	110	305
N4RA	*	676,984	694	99	293
WF3J/4	*	629,748	668	97	260
N4XR	*	606,726	677	87	246
N4AA	*	566,400	537	111	273
W4ARM	*	556,368	645	90	256
N4GI	*	524,520	636	77	233
W4YE	*	466,147	520	90	251
N4ZZ	*	408,774	810	53	140
W2OO/4	*	403,788	484	90	232
K4AMC	*	398,750	491	78	212
K4DJ	*	382,764	468	91	243
KR4M	*	353,508	418	99	232
K7CS/4	*	343,824	596	81	231
W4EI	*	329,912	450	96	230
N4MM	*	325,783	391	83	221
W7QF/4	*	248,251	364	88	201
K4PB	*	237,943	337	88	189
K4CC	*	127,144	259	50	134
AA3VA/4	*	121,549	259	62	135
W4/G4BUE	*	87,756	275	42	100
W4IR	*	83,898	178	54	123
K6ETM/4	*	71,158	195	53	121
K4CEB	*	69,531	186	51	96
K4DGJ	*	66,552	154	61	127
KØCOP/4	*	66,265	193	42	103
WV4I	*	58,926	159	51	110
WD4LBR	*	55,645	167	43	112
W4ZYT	*	48,960	145	43	93
N4UH	*	35,224	130	37	82
W4ATL	*	26,790	121	33	61
K4OH	*	100	194	67	134
W4ZV	**28**	**220,296**	**678**	**31**	**103**
K4MM	*	67,574	231	27	86
K4QAQ	**21**	**264,465**	**786**	**38**	**105**
K4RV	*	60,800	164	35	125
K4XS	**7**	**534,842**	**1357**	**34**	**117**
N4CC	*****	**225,120**	**495**	**40**	**128**
AA4VV	*	58,716	177	28	98
W4YA	*	27,200	133	21	64
K4DLJ	**3.5**	**27,232**	**157**	**28**	**72**
N4NX	*	24,055	118	18	67
K2XX/4	*	15,204	70	15	69
K4PIC	1.8	860	30	7	13
KK4SI	*	100	33	9	22
***K8EJ/4**	**A**	**1,612,840**	**1272**	**126**	**362**
***N4YDU**	*****	**1,075,548**	**1053**	**111**	**337**
***WK2G/4**	*****	**836,739**	**943**	**104**	**285**
*K4GKD	*	772,954	724	107	296
*K4IE	*	647,872	675	103	279
*NA4K	*	637,949	607	106	297
*AF4OX	*	531,480	626	91	253
*N2WN/4	*	504,686	600	115	298
*N4PSE	*	455,532	509	97	251
*AA4FU	*	450,802	523	95	246
*W1MO/4	*	424,780	474	87	248
*WA4DOU	*	389,124	449	92	232
*K4LTA	*	304,427	459	86	207
*K7CMZ/4	*	295,637	424	81	212
*KE1F/4	*	242,274	409	77	194
*KI3Q/4	*	210,210	347	77	196
*KN4Y	*	204,510	375	75	180
*N4TN	*	170,030	280	73	172
*N4EK	*	145,950	286	56	154
*WD4AHZ	*	132,088	254	60	149
*WD4GBW	*	92,660	207	45	119
*K4JAF	*	85,648	203	68	144
*K1AA/4	*	70,848	178	53	111
*W4JSI	*	70,125	334	59	128
*KØBHC/4	*	65,520	224	48	120
*AA4KD	*	60,532	180	45	103
*N2UM/4	*	58,460	171	43	105
*KJ4UC	*	58,201	234	36	107
*AE4Y	*	54,750	145	41	105
*AD4AX	*	52,895	162	51	98
*N4JED	*	50,193	149	47	96
*K4LW	*	49,075	144	50	101
*WA4OSD	*	48,678	153	44	89
*AA4NO	*	47,950	150	45	92
*K4GHS	*	47,565	119	52	99
*K4OGG	*	39,825	129	51	84
*WF4W/4	*	37,466	125	48	83
*AB4GG	*	32,964	111	37	86
*W4DEC	*	32,364	113	52	72
*K5GM/4	*	30,744	137	48	78
*K3MZ/4	*	22,866	84	38	65
*KI4FDF	*	22,366	90	36	70
*K4AGT	*	22,344	86	42	72
*W4TDB	*	20,670	126	48	82
*KS4YX	*	20,412	106	37	71
*WA4WPD	*	20,099	79	28	73
*W4KAZ	*	19,875	127	43	82
*KTØP/4	*	19,845	82	40	65
*N4WD	*	16,884	127	51	83
*AA4CF	*	15,444	66	48	60
*N5VI/4	*	15,219	114	33	56
*AE4FA	*	15,054	99	22	56
*KE6QR/4	*	13,338	98	24	30
*W4BCG	*	12,804	79	35	62
*K4GM	*	9,438	64	29	49
*K4FTO	*	7,452	73	28	53
*N8JE/4	*	5,586	80	40	58
*AE4EC	*	3,108	58	26	48
*N4NTO	*	2,993	31	14	27
*N8IK/4	*	2,072	26	14	23
*W4OGG	*	855	23	8	11
*WA4FXX	*	748	14	8	14
*N8UX/4	*	380	11	8	11
***KW4CW**	**28**	**25,755**	**121**	**24**	**61**
				(OP: N4GM)	
*K4WI	*	11,592	76	19	37
***WB4TDH**	**21**	**238,176**	**597**	**30**	**114**
***N4MO**	*****	**182,130**	**540**	**28**	**102**
*K4RDU	*	61,110	209	25	80
*AA4LR	*	6,578	57	16	30
*K4GA	*	119	14	8	9
***K9AW/4**	**14**	**85,200**	**218**	**33**	**109**
***WA1FCN/4**	**7**	**47,088**	**213**	**27**	**82**
***AA4GA**	*****	**41,356**	**159**	**22**	**76**
*W2BHK/4	*	30,749	175	22	75
*WØYR/4	*	17,538	119	20	54
*KC4WQ	*	11,605	97	12	43
*NN3W/4	*	6,076	63	13	36
*K3CQ/4	*	1,458	34	7	20
*K5VG/4	*	400	9	7	9
*KI4EGT	*	1	2	2	1
***N4IJ**	**3.5**	**67,728**	**276**	**22**	**80**
*K4YJ	*	2,944	48	9	23
*NA4W	1.8	774	20	6	12
				(OP: K4WI)	
N2IC/5	**A**	**4,050,496**	**2473**	**170**	**438**
K5GN	*****	**3,761,008**	**2454**	**162**	**464**
WXØB/5	*****	**2,584,944**	**1932**	**137**	**385**
				(OP: AD5Q)	
K5YA	*	2,333,658	1793	134	367
K5BG	*	702,780	671	112	278
N5PO	*	664,464	695	104	277
N5ZK	*	573,984	775	84	204
				(OP: W5ASP)	
K5YAA	*	573,480	760	82	213
N5KA	*	434,016	488	101	251
W5FO	*	429,656	533	103	241
W5KI	*	372,718	466	84	230
K5SF	*	158,207	261	78	155
NI5F	*	154,869	344	83	164
K7IA/5	*	90,312	241	77	136
N5PU	*	69,488	215	58	114
WT5U	*	41,237	154	49	88
AB5C	*	33,768	128	49	77
NA5Q	*	21,780	111	43	78
K5IB	*	10,230	71	27	39
W5THT	*	7,584	70	31	48
W5SL	*	5,901	40	26	39
K2BA/5	**21**	**413,624**	**1139**	**34**	**115**
N5DO	*	48,692	206	26	68
KN5G	**7**	**161,280**	**473**	**33**	**111**
KK7JS/5	*	72,102	372	30	92
K5TA	*	38,007	142	29	74
K5RX	**3.5**	**110,094**	**374**	**28**	**90**
W5UN	*	92,773	361	28	85
K5UZ	**1.8**	**100**	**177**	**15**	**25**
***N5AW**	**A**	**1,728,720**	**1160**	**152**	**408**
***K5KLA**	*****	**988,281**	**837**	**112**	**329**
*WD5K	*	881,580	813	112	308
*WØVX/5	*	880,686	809	115	308
*WQ5C	*	647,309	686	102	275
*N5CHA	*	252,525	407	77	182
*K5UV	*	199,134	352	70	164
*WA5SOG	*	174,096	313	84	164
*K5WAF	*	125,610	215	70	167
*KØCIE/5	*	93,074	233	63	110
*KE5LQ	*	82,058	181	65	113
*KU5B	*	34,170	109	46	88
*W5RW	*	27,938	105	44	78
*K5SV	*	24,395	111	31	54
*AK5X	*	24,265	105	46	69
*WK5K	*	18,914	96	40	58
*ND5Q	*	17,013	81	43	64
*KD5CMN	*	8,600	68	36	50
*K5EJL	*	3,136	39	25	31
*W5BL	*	2,214	28	17	24
*W5WZ	*	1,750	79	21	29
*KE5CTY	*	749	113	41	66
***W5GAI**	**28**	**21,097**	**131**	**23**	**50**
*W5AJ	*	130	5	5	5
K6NA	**A**	**2,249,808**	**1660**	**164**	**364**
K6XX	*****	**2,094,344**	**1529**	**148**	**354**
W6UM	*	800,442	617	147	339
N6AD	*	545,248	630	104	248
K6LRN	*	475,345	526	119	236
WA5VGI/6	*	323,136	434	101	196
W6NKR	*	274,176	389	93	179
NF6V	*	269,360	427	97	162
K6TA	*	213,446	299	107	167
W6MVW	*	152,200	319	68	132
AJ6V	*	88,800	258	58	92
K6YK	*	53,454	172	51	67
W6KNB	*	34,668	122	47	60
N6PE	*	33,930	118	51	66
WA6BOB	*	18,568	96	39	49
K6XC	*	10,140	59	26	34
NY6Y	*	5,712	72	29	39
KJ6IV	*	5,280	104	51	69
KO6LU	*	3,650	31	23	27
W6ZZZ	*	2,200	28	19	21
W6YA	**21**	**291,688**	**761**	**36**	**116**
K6CTA	*	39,324	203	29	58
W6DCC	14	32,064	161	25	71
W6NV	**7**	**293,112**	**870**	**34**	**104**
W4UAT/6	*	188,328	646	31	87
K6OY	**3.5**	**128,520**	**501**	**31**	**77**
AC6DD	*	39,675	250	24	51
***K6XV**	**A**	**693,294**	**771**	**121**	**236**
***WN6K**	*****	**458,388**	**742**	**87**	**165**
*N6NF	*	271,122	469	81	138
*W6RCL	*	240,084	401	87	147
*W6ZL	*	210,168	381	78	138
*N6TW	*	178,842	311	85	161
*N6YEU	*	153,874	279	74	129
*AA6EE	*	140,513	315	80	126
*W6RFF	*	118,600	251	74	126
*N6WK	*	95,275	205	73	112
*AC6WY	*	90,246	231	74	104
*W6IYS	*	61,880	211	60	80
*WW6D	*	60,360	190	52	68
*NK6A	*	59,309	178	46	81
*K6RAD	*	32,818	151	53	69
*N7FF/6	*	25,650	131	39	56
*K6CSL	*	25,065	130	43	57
*W1MVY/6	*	23,661	121	43	56
*NE6I	*	12,474	78	25	41
*NI06E	*	12,210	148	48	63
*K3KDA/6	*	7,992	60	23	31
*N6NC	*	3,792	39	24	24
*AA6DX	*	3,193	44	15	16
*AB6E	*	643	12	11	12
*AD6ZJ	*	100	76	36	39
***KM6Z**	**28**	**34,456**	**184**	**23**	**50**
*K6EY	*	1,890	35	6	12
***AE9F/6**	**21**	**55,080**	**250**	**27**	**58**
*KU6T	7	5,248	64	16	25
N7TT	**A**	**1,534,764**	**1352**	**144**	**309**
WA7LT	*****	**1,243,032**	**1334**	**127**	**265**
KO7X	*	956,940	897	119	291
KG7H	*	942,630	984	120	270
K7ZA	*	671,606	736	112	226
K7BG	*	588,849	732	110	221
N6HR/7	*	297,528	393	103	191
AF7O	*	241,562	564	95	174
N7RO	*	240,580	407	78	152
W7YS	*	225,720	387	81	147
K7LJ	*	208,413	323	85	164
N7BF	*	202,349	381	77	134
W7IIT	*	189,322	341	92	151
W7QN	*	156,450	320	78	132
K7LAZ	*	144,692	282	92	152
W7HS	*	81,261	212	73	113
KS7T	*	57,754	168	49	85
K7KAR	*	44,902	215	55	88
N7TL	*	38,571	146	53	76
N9ADG/7	*	25,833	142	47	62
W9PL/7	*	14,322	82	23	39
WM7A	*	8,360	50	30	46
N7BV	**21**	**96,960**	**487**	**32**	**64**
W7AYY	*	24,460	140	26	53
W7WA	**14**	**486,066**	**1109**	**39**	**124**
W7KKR	*	33,690	160	25	70
AA7A	**7**	**280,460**	**724**	**37**	**111**
K7AO	*****	**251,328**	**704**	**37**	**99**
K7ZZ	*	83,692	442	29	69
AB7E	*	27,740	154	26	69
KØTO/7	*	19,045	134	24	41
K7RAT	**3.5**	**191,309**	**676**	**32**	**81**
				(OP: N6TR)	
K7OX	**1.8**	**2,784**	**87**	**12**	**12**
KJ7WY	*	1,020	26	8	12
***W7ZMD**	**A**	**334,068**	**497**	**97**	**194**
***N7ZG**	*****	**254,013**	**477**	**77**	**150**
*W7TMT	*	239,274	435	78	133
*N7LOX	*	236,856	457	81	132
*W3CP/7	*	185,752	335	79	138
*K2DI/7	*	167,889	336	70	121
*AB7RW	*	113,864	254	62	110
*NQ7R	*	55,836	188	52	89
*KC7UP	*	46,280	155	43	87
*KX7J	*	45,908	97	49	96
*K6UM/7	*	34,782	131	46	56
*KZ7N	*	34,624	108	57	82
*K7ARJ	*	32,400	153	42	66
*K7TR	*	26,199	134	52	71
*NB7F	*	25,032	115	38	46
*N6KW/7	*	14,670	79	42	48
*K7EKM	*	13,962	87	37	41
*K7UIR	*	13,783	85	31	46
*NG7Z	*	3,010	25	20	23
*WV7G	*	288	18	8	10
*KF7VG	*	88	15	5	3
*W07T	*	54	3	3	3
*N7XY	*	54	7	5	4
*K7AWB	*	4	1	1	1
***KA7T**	**21**	**122,484**	**421**	**32**	**86**
***N7WA**	**14**	**145,258**	**464**	**33**	**92**
*WAØKDS/7	*	11,250	104	30	60
***K7WP**	**7**	**62,964**	**252**	**28**	**78**
*W7OT	*	10,797	94	12	47
*K7WA	*	2,730	41	12	14
*AE7DX	*	540	16	8	7
*NG1Q/7	*	100	42	11	13
***NBAX/7**	**3.5**	**38,128**	**246**	**18**	**38**
***W7AT**	*****	**24,367**	**211**	**22**	**37**
*N6MZ/7	*	8,400	98	15	27
K8GL	**A**	**2,781,914**	**1776**	**145**	**433**
K8IR	*****	**685,072**	**706**	**102**	**274**
K8JQ	*	431,288	520	94	244
W8UD	*	366,244	445	94	222
N8MZ	*	358,853	444	93	230
W8JY	*	283,968	414	76	196
W8FAX	*	211,410	308	68	193
WA8TNO	*	177,374	256	85	177
K8ZZ	*	30,870	132	49	98
W8NF	*	27,742	120	44	53
W8TK	*	17,000	70	28	57
K8VUS	*	10,164	59	26	51
K8JM	**21**	**175,558**	**516**	**28**	**94**
W8TWA	**14**	**141,932**	**389**	**34**	**103**
KB8NNU	*	2,220	36	11	19
W8JGU	**7**	**125,179**	**303**	**36**	**115**
N8XP	*	100	73	11	32
W8AEF	**3.5**	**28,800**	**181**	**25**	**47**
K8MD	*	28,552	172	20	66
***

AE9B/Ø	**7**	**15,688**	**80**	**21**	**53**	
KHØR	*	4,779	90	11	16	
***WØETT**	**A**	**389,064**	**519**	**102**	**210**	
***K7RE/Ø**	**A**	**222,215**	**370**	**73**	**172**	
*KØSQ	*	180,560	309	76	168	
*AKØM	*	180,509	303	82	159	
*WØPI	*	146,496	262	73	151	
*KØRAY	*	116,050	278	67	144	
*NØBUI	*	111,672	310	57	131	
*NN7A/Ø	*	63,550	158	61	94	
*NØRA	*	53,592	160	48	84	
*NAØN	*	53,066	130	55	102	
*K2HT/Ø	*	41,165	138	62	90	
*WA2MNO/Ø	*	34,263	131	51	90	
*KØRY	*	30,240	144	40	65	
*NØIBT	*	14,768	82	34	37	
*WGØM	*	12,784	71	37	57	
*WAØBNX	*	7,884	75	32	41	
*NØBM	*	7,682	52	30	36	
*KØKGS	*	6,372	48	20	39	
*WØQQS	*	6,222	54	26	35	
*NØAC	*	4,389	72	30	47	
*KBØNES	*	4,056	49	23	29	
*WAØIAF	*	3,328	42	22	30	
*KAØBHO	*	2,226	53	20	33	
*NØPFY	*	1,107	22	11	16	
		ALASKA				
KL7WV	**A**	**370,812**	**1137**	**67**	**89**	
						(OP: W3YQ)
		ANGUILLA				
VP2ETL	**A**	**852,274**	**1871**	**76**	**163**	
						(OP: DL2RUM)
		ANTIGUA				
***V26K**	**A**	**7,468,593**	**5437**	**135**	**426**	
						(OP: AA3B)
		BAHAMAS				
C6AKQ	**7**	**762,542**	**2445**	**33**	**104**	
						(OP: N4BP)
***C6AQQ**	**A**	**2,361,195**	**2740**	**108**	**303**	
						(OP: ND3F)
*C6AWS	*	180,115	558	53	110	
						(OP: W6SJ)
***C6ATP**	**3.5**	**235,000**	**1188**	**19**	**75**	
		BARBADOS				
8P5A	**A**	**9,447,417**	**6522**	**152**	**457**	
						(OP: W2SC)
		BELIZE				
V31JP	**7**	**743,960**	**2319**	**34**	**106**	
						(OP: K8JP)
***V31LZ**	**21**	**748,500**	**2197**	**32**	**118**	
		CANADA				
VO1AU	**A**	**3,533,382**	**3226**	**110**	**349**	
VO1MP	*	1,380,672	1364	106	326	
***VE9DX**	**A**	**1,054,956**	**1204**	**92**	**307**	
*VO1TA	*	916,400	1376	70	220	
*VO1HP	*	749,250	885	84	286	
*VE1AWP	*	474,243	983	66	165	
*VO1HE	*	44,588	128	50	92	
VY2NT	**A**	**7,789,828**	**5220**	**138**	**473**	
						(OP: N2NT)
VY2TT	*	2,905,089	2741	109	344	
						(OP: K6LA)
VE2AYU	*	947,140	1133	95	260	
***VE2UJ**	**A**	**579,554**	**910**	**82**	**211**	
*VE2FK	*	343,350	788	61	149	
*VE2FFE	*	104,076	341	47	100	
*VY2SS	*	37,485	188	35	70	
*VA2SG	*	33,354	189	37	65	
*VE2OWL	*	22,042	108	40	67	
*VE2DSK	*	7,695	81	24	33	
*VY2DM	*	5,120	75	28	36	
***VE2DWA**	**28**	**1,100**	**21**	**10**	**15**	
VC3L	**A**	**5,247,550**	**4167**	**142**	**408**	
						(OP: VE3AT)
VE3EJ	*	4,322,120	3639	132	385	
VE3JM	*	3,286,754	2918	130	361	
VE3EY	*	3,034,010	2759	129	358	
VE3JAQ	*	811,797	1508	81	220	
VE3NE	*	650,256	1064	94	210	
VE3XAT	*	319,923	538	79	210	
VE3MM	*	124,740	569	45	81	
VE3KZ	**28**	**113,442**	**472**	**25**	**86**	
VE3CR	**14**	**222,984**	**568**	**37**	**115**	
VE3PN	**3.5**	**43,953**	**331**	**15**	**54**	
VE3ZI	**1.8**	**80,264**	**584**	**19**	**60**	
***VE3DZ**	**A**	**2,537,536**	**2257**	**121**	**375**	
***VE3KP**	**"**	**874,588**	**1459**	**82**	**204**	
*VA3PL	*	530,216	617	87	260	
*VA3NR	*	477,662	988	77	164	
*VE3FWA	*	424,692	712	77	205	
*VE3WO	*	333,486	765	50	141	
*VA3EC	*	237,968	477	58	156	
*VE3OM	*	230,434	328	75	199	
*VA3XRZ	*	185,625	383	74	151	
*VE3RSA	*	157,976	398	57	139	
*VE3TW	*	77,184	296	44	100	
*VE3LFA	*	70,470	221	56	106	
*VE3HLS	*	44,240	202	53	105	
*VE3EBN	*	39,072	194	46	65	
*VE3RCN	*	30,450	170	37	50	
*VA3JNO	*	27,900	131	39	61	
*VE3GLO	*	10,912	123	20	24	
*VE3RER	*	7,425	55	18	37	
*VA3HUN	*	5,432	44	22	34	
***VE3UKR**	**21**	**59,192**	**244**	**21**	**77**	
*VA3RJ	*	11,580	80	20	40	
***VA3SY**	**14**	**31,978**	**402**	**17**	**42**	
***VE3XB**	**3.5**	**126,540**	**725**	**18**	**72**	
*VE3MGY	*	28,250	298	14	36	
VE5UA	**A**	**784,904**	**1171**	**104**	**224**	
***VE5SF**	**A**	**125,476**	**473**	**46**	**81**	
***VE5ZX**	**21**	**137,733**	**775**	**25**	**68**	
VE6JY	**14**	**698,706**	**1817**	**38**	**124**	
						(OP: VA7RR)
VE6AKY	*	88,941	762	22	47	
VE6WQ	**7**	**245,760**	**903**	**32**	**96**	
***VE6TN**	**A**	**845,640**	**1218**	**105**	**219**	
*VE6CNU	*	21,434	123	32	44	
*VE6GJ	21	16,006	158	18	35	
***VE6EX**	**14**	**211,432**	**1014**	**27**	**77**	
VE7VR	**A**	**479,603**	**1080**	**76**	**135**	
VE7XR	**14**	**464,690**	**1313**	**40**	**115**	
VE7CC	**3.5**	**162,748**	**761**	**30**	**62**	
VE7ZBK	1.8	1,243	79	6	5	
***VA7ST**	**A**	**669,892**	**1410**	**80**	**143**	
***VE7NH**	**"**	**595,875**	**1146**	**88**	**139**	
*VA7LC	*	192,049	455	77	110	
*VE7ALN	*	157,766	435	77	114	
*VE7CI	*	78,840	268	54	81	
*VE7WU	*	17,860	72	35	60	
*VE7YU	*	14,348	90	31	37	
*VA7CAB	*	13,600	138	24	26	
***VE7IN**	**21**	**54,739**	**353**	**23**	**44**	
*VE7NI	*	23,541	195	19	38	
***VE7SV**	**7**	**464,310**	**1486**	**33**	**101**	
VY1JA	**A**	**5,016**	**74**	**14**	**19**	
		COSTA RICA				
***TI3M**	**A**	**1,785,875**	**3060**	**91**	**234**	
						(OP: TI3TLS)
		CUBA				
CO8ZZ	**7**	**311,436**	**1162**	**26**	**97**	
***CO8LY**	**21**	**567,936**	**2043**	**31**	**97**	
***CO2JD**	**7**	**229,112**	**1212**	**26**	**78**	
*CO2UG	*	54,495	685	15	30	
***CO8DM**	**3.5**	**121,905**	**769**	**17**	**64**	
		DOMINICA				
***J79A**	**A**	**3,596,216**	**3504**	**115**	**343**	
						(OP: K7GK)
		DOMINICAN REPUBLIC				
HI8RV	**A**	**472,269**	**716**	**90**	**211**	
***HI3K**	**A**	**4,092,192**	**4006**	**121**	**347**	
						(OP: AD4Z)
*HI3LFE	*	207,490	766	58	98	
***JA6WFM/HI8T**		**296,370**	**1453**	**26**	**85**	
		GREENLAND				
***OX2KAN**	**A**	**118,150**	**379**	**40**	**99**	
		MARTINIQUE				
TO4A	**A**	**6,244,030**	**5075**	**139**	**420**	
						(OP: N6TJ)
*FM5FJ	21	2,016	95	10	14	
***FM5JC**	**14**	**336,768**	**1227**	**32**	**96**	
		MEXICO				
XE1MM	**A**	**1,516,563**	**3006**	**82**	**161**	
XE1NW	**3.5**	**127,251**	**761**	**21**	**60**	
***XE2MX**	**A**	**394,359**	**827**	**95**	**172**	
*XE1NK	*	13,230	178	38	67	
***XE3WAO**	**21**	**210,700**	**1049**	**23**	**75**	
		NICARAGUA				
***YN4SU**	**A**	**1,230,820**	**2452**	**84**	**205**	
		PANAMA				
3E1A	**14**	**1,577,532**	**3563**	**40**	**147**	
						(OP: DJ7AA)
		PUERTO RICO				
***KP4KE**	**A**	**5,086,719**	**4472**	**134**	**385**	
						(OP: DK8ZB)
KP3/VE7AHA		995,120	1651	79	201	
*KP4JRS	*	46,306	145	47	90	
*WP4JBG	*	100	131	27	34	
*WP4BH	28	220	43	6	5	
		ST. KITTS & NEVIS				
V47KP	**A**	**1,903,476**	**2506**	**97**	**284**	
						(OP: W2OX)
		ST. MAARTEN				
***PJ7/K4MA**	**7**	**43,434**	**362**	**12**	**45**	
		U.S. VIRGIN ISLANDS				
KV4FZ	**1.8**	**46,632**	**491**	**15**	**43**	
***NP2L/KP2**	**A**	**269,449**	**581**	**63**	**164**	

AFRICA

		AFRICAN ITALY				
IH9P	**21**	**1,480,720**	**3092**	**37**	**129**	
						(OP: OL5Y)
IH9U	**1.8**	**274,032**	**1127**	**16**	**72**	
						(OP: IN3QBR)
		ALGERIA				
7XBAD	**1.8**	**6,549**	**70**	**6**	**31**	
		CANARY ISLANDS				
EA8ZS	**A**	**11,484,894**	**6252**	**152**	**502**	
EA8EW	**21**	**1,566,126**	**3232**	**36**	**131**	
						(OP: ES2RR)
EA8EA	**14**	**1,833,008**	**3418**	**39**	**145**	
						(OP: OH2MM)
EA8PP	**7**	**826,354**	**2290**	**34**	**115**	
EA8/OH4NL	**3.5**	**693,264**	**1834**	**31**	**112**	
EA8AH	**1.8**	**50,589**	**353**	**12**	**61**	
***EA8/DJ1OJ**	**A**	**1,854,400**	**1711**	**85**	**295**	
*EA8CN	*	1,197,756	1424	72	222	
*EA8AY	*	133,272	315	65	151	
*EA8/PC8E	*	66,308	191	44	93	
***EA8NN**	**21**	**705,812**	**1697**	**32**	**115**	
*EA8/LY1DF	*	515,247	1656	27	96	
***EA8DA**	**14**	**132,468**	**431**	**28**	**86**	
*EA8NQ	*	108,808	332	27	89	
*EA8AVK	*	87,750	389	22	68	
*EA8BBJ	*	11,658	73	17	41	
		CAPE VERDE				
D4B	**A**	**13,605,364**	**7239**	**155**	**519**	
						(OP: 4L5A)
		EGYPT				
***SU9NC**	**A**	**8,411,944**	**4848**	**136**	**460**	
***SU8BHI**	**14**	**571,956**	**1741**	**32**	**100**	
						(OP: HA3JB)
		MADAGASCAR				
***5R8FU**	**14**	**47,096**	**172**	**31**	**85**	
		MADEIRA ISLANDS				
***CT9M**	**A**	**7,165,665**	**4426**	**136**	**449**	
						(OP: KL2A)
*CT3KN	14	31,550	230	18	32	
		MOROCCO				
CN2KM	**14**	**2,023,740**	**3899**	**38**	**142**	
						(OP: SM2EKM)
CN2R	**3.5**	**1,837,704**	**2410**	**34**	**118**	
						(OP: W7EJ)
*CN8YR	21	3,045	36	9	20	
		NAMIBIA				
V51/DL5XL	**A**	**5,440,480**	**4014**	**121**	**343**	
		REUNION				
***FR1HZ**	**A**	**135,534**	**442**	**50**	**97**	
		SAO TOME & PRINCIPE				
S9A	**A**	**7,499,328**	**4728**	**139**	**423**	
						(OP: DH2PM)
		SENEGAL				
6W1RW	**A**	**6,610,774**	**4263**	**129**	**413**	
						(OP: F6BEE)
***6W7RV**	**3.5**	**125,125**	**566**	**22**	**69**	
						(OP: F5CW)
		SOUTH AFRICA				
ZS1EL	**A**	**1,225,135**	**1507**	**77**	**218**	
ZS4TX	**21**	**1,606,140**	**3070**	**39**	**141**	
***ZS1AN**	**A**	**570,015**	**844**	**85**	**180**	
*ZS1AJS	*	86,064	280	41	91	
*ZS4JAN	*	30,056	216	37	67	
		SUDAN				
*ST2T	7	480	30	9	15	
						(OP: S57CQ)
		TUNISIA				
***3V8SQ**	**A**	**5,446,230**	**3958**	**102**	**377**	
						(OP: DL2OBF)
***3V8SF**	**14**	**708,246**	**1770**	**33**	**113**	
						(OP: DJ7IK)

ASIA

		ASIATIC RUSSIA				
RA9SG	**A**	**3,392,485**	**2649**	**123**	**386**	
UA9FM	**"**	**1,182,336**	**1235**	**92**	**292**	
RV9XM	*	1,025,818	1259	88	265	
RV9XX	*	829,594	1116	76	226	
RW9UW	*	718,242	950	65	229	
RX9TX	*	492,880	768	63	181	
UA9MC	*	399,000	376	113	343	
RA9ST	*	261,856	666	42	154	
RV9XO	*	209,710	295	83	252	
UA9QM	*	203,159	626	72	181	
RV9XJ	*	142,545	261	60	161	
UA9OS	28	5,225	56	19	36	
RK9AY	**21**	**188,978**	**644**	**28**	**94**	
R9/UT7CR	*	29,140	288	11	36	
RV9JR	**14**	**408,832**	**1379**	**34**	**94**	
UA9AFZ	*	248,520	987	28	81	
RK9KWI	*	202,692	698	34	99	
RA9JM	*	139,800	571	26	74	
RK9WZZ	7	192	8	8	8	
UA9SP	**3.5**	**263,580**	**898**	**23**	**92**	
UA9KJ	*	109,998	540	22	75	
RU9TO	**1.8**	**59,839**	**412**	**18**	**59**	
***RX9AM**	**A**	**1,743,273**	**1570**	**106**	**335**	
***UA9AX**	**"**	**1,416,936**	**1105**	**121**	**395**	
*UA9JLL	*	1,158,832	1176	93	283	
*UA9AFS	*	980,463	1092	82	281	
*UA9FGJ	*	912,870	1002	78	267	
*RA9AE	*	896,520	1087	66	244	
*RK9CR	*	807,837	965	76	263	
*RA9XF	*	731,380	1005	69	221	
*UA9XF	*	723,450	813	72	253	
*UA9OA	*	691,377	895	84	233	
*UA9AOL	*	652,509	890	63	234	
*UA9CR	*	590,640	714	80	241	
*RZ9OJ	*	563,376	831	76	215	
*RA9DZ	*	498,513	637	88	233	
*UA9MQR	*	438,780	568	78	231	
*UA9OG	*	421,094	681	83	228	
*UA9MFB	*	284,394	642	50	136	
*UA4LCQ/9	*	250,977	720	76	235	
*RK9AX	*	223,992	441	57	159	
*RU9AZ/9	*	190,744	399	58	153	
*UAØSDX	*	179,568	384	72	210	
*RX9FB	*	146,740	322	81	172	
*RV9UD	*	134,048	400	39	103	
*RA9UN	*	132,675	432	51	132	
*RV9UP	*	126,658	277	72	146	
*UA9OV	*	115,596	300	54	115	
*RV9CLF	*	112,320	267	45	135	
*UA9CIR	*	109,557	282	28	113	
*RU9UC	*	80,991	204	63	147	
*RZ9OS	*	69,600	222	50	95	
*RU9UG	*	60,885	191	58	107	
*RV9AZ	*	54,890	216	26	84	
*RW9UVB	*	36,920	268	41	101	
*RA9DA	*	28,194	110	38	73	
*RX9WN	*	26,167	95	50	87	
*RK9XX	*	22,725	146	30	71	
*UA9CNX	*	20,223	87	38	69	
*RX9DJ	*	17,724	92	24	60	
*UA9XMB	*	12,012	72	16	50	
*RW9UEW	*	9,338	138	21	37	
*RX9FW	*	3,784	45	14	30	
*RL9FYL	*	24	3	3	3	
***RA9SO**	**28**	**94,168**	**442**	**22**	**57**	
*RW9RA	*	55,428	274	26	67	
*UA9LAO	*	13,005	120	15	36	
***RZ9AN**	**21**	**162,384**	**662**	**25**	**77**	
***RA9KM**	**14**	**242,046**	**798**	**32**	**87**	
*RW9UX	*	183,762	718	32	91	
*RW9MD	*	151,984	507	26	92	
*UA9OR	*	136,095	432	32	97	
*RZ9OF	*	110,313	476	28	75	
*RU9WZ	*	108,264	545	26	78	
*RX9JW	*	76,516	438	17	57	
*UA9CCL	*	70,840	277	23	69	
*RV9MZ	*	66,130	354	20	65	
*RA9XU	*	63,588	303	19	65	
*RV9UF	*	58,847	447	20	63	
*RV9CQ	*	40,089	222	20	63	
*UA9LGL	*	22,173	174	13	44	
*RA9YA	*	15,176	153	14	42	
*UA9CEP	*	630	28	5	5	
***RX9AF**	**7**	**202,864**	**689**	**29**	**95**	
*RN9AA	*	75,192	292	24	80	
*RA9MLL	*	40,768	303	27	77	
***RK9AD**	**3.5**	**122,130**	**575**	**19**	**71**	
*UA9WQK	*	68,900	403	11	54	
*UA9OAL	*	59,976	368	14	54	
*RW9MJ	*	10,614	74	13	45	
*RW9QA	*	6,501	80	7	26	
*UA9LAU	1.8	4,576	69	9	23	
*UA9CL	*	396	24	5	17	
RUØAW	**A**	**1,764,456**	**1607**	**118**	**326**	
UAØAZ	**"**	**999,648**	**1040**	**116**	**316**	
UAØACG	*	720,296	1023	108	250	
RKØUT	*	414,450	1009	69	156	
RWØUM	*	329,226	849	79	143	
UAØYAY	*	173,817	333	85	182	
RWØWR	*	10,800	73	26	49	
UAØCW	*	3,808	35	33	35	
RZ8ZWA	**28**	**8,874**	**148**	**16**	**18**	
						(OP: UAØZAS)
RAØAA	**21**	**263,327**	**1078**	**27**	**80**	
RUØLL	**7**	**351,000**	**1389**	**36**	**94**	
UAØSC	*	240,500	899	31	99	
RAØBA	**3.5**	**1,932**	**47**	**8**	**15**	
***RUBAE**	**A**	**325,584**	**531**	**91**	**181**	
*UAØABB	*	221,098	400	61	166	
*RAØZD	*	197,106	340	102	171	
*UAØAKY	*	195,702	488	53	140	
*RAØAY	*	174,420	342	65	163	
*UAØFGN	*	94,435	219	80	107	
*RKØSA	*	81,238	235	41	110	
*UAØUV	*	72,735	206	72	123	
*UAØQNV	*	68,904	238	51	81	
*RAØSDW	*	37,884	158	53	79	
*RWØLIA	*	36,448	124	57	77	
*RVØAX	*	18,711	97	33	66	
*RAØJX	*	10,725	116	32	43	
*RUØBW	*	8,288	59	18	38	
*UAØLMO	*	8,140	76	23	32	
*RAØSS	*	1,080	26	14	16	
***RWØLZ**	**28**	**19,592**	**172**	**22**	**40**	
***RUØUQ**	**21**	**29,951**	**379**	**18**	**43**	
*RAØFLP	*	7,526	71	19	34	
*RAØCDF	*	180	17	5	7	
***UAØSAD**	**14**	**207,708**	**735**	**32**	**82**	
*RWØUZ	*	19,631	184	21	46	
***UAØFDX**	**7**	**67,431**	**488**	**30**	**61**	
*RUØSN	*	32,806	160	23	71	
*RUØST	*	20,148	90	23	69	
*UAØOD	*	14,471	107	18	36	
***RWØAJ**	**3.5**	**53,218**	**327**	**19**	**63**	
		ASIATIC TURKEY				
***TA3DD**	**A**	**795,429**	**1047**	**70**	**209**	
		AZERBAIJAN				
*4K6DI	3.5	714	18	8	13	
		CAMBODIA				
***XU7ADE**	**A**	**653,913**	**1068**	**104**	**247**	
						(OP: EZ1EIC)
*XU7ADF	3.5	2,520	58	14	28	
						(OP: AA4XR)
		CHINA				
BA7NQ	**A**	**1,761,547**	**1942**	**125**	**312**	
		CYPRUS				
P3J	**A**	**2,239,138**	**2326**	**96**	**278**	
						(OP: 5B4AHJ)
5B/KIØBP	**28**	**528,220**	**1546**	**32**	**108**	
						(OP: 5B8AD)
***C4M**	**A**	**3,157**	**60**	**13**	**28**	
						(OP: 5B4AGM)
		GEORGIA				
4L8A	**14**	**1,162,560**	**2701**	**39**	**129**	
***4L2M**	**21**	**194,922**	**725**	**29**	**88**	
		HONG KONG				
VR2BG	**A**	**3,517,151**	**3172**	**147**	**370**	
VR2XLN	*	50,622	159	51	92	
***VR2JN**	**21**	**72,103**	**492**	**24**	**65**	
***VR2KW**	**7**	**69,894**	**456**	**27**	**72**	
		INDIA				
VU2WAP	**A**	**4,351,680**	**3136**	**147**	**429**	
						(OP: OH2KI)
***VU2BGS**	**3.5**	**14,384**	**155**	**16**	**42**	
		IRAN				
***EP3PTT**	**14**	**69,174**	**439**	**14**	**49**	
		ISRAEL				
4X1VF	**28**	**40,880**	**280**	**15**	**45**	
4Z5LA	**3.5**	**361,771**	**1270**	**23**	**86**	
***4Z4TL**	**A**	**100,110**	**207**	**73**	**140**	
*4X6UU	*	14,080	65	35	53	
*4Z5LV	28	7,987	69	15	34	
		JAPAN				
JE1CKA	**A**	**2,302,366**	**1943**	**158**	**307**	
JS1OYN	**"**	**1,218,736**	**1296**	**122**	**239**	
JK1OPL	**"**	**1,172,608**	**1054**	**145**	**306**	
JA1BNW	*	538,278	697	101	208	
JA1TMG	*	481,806	788	81	153	
JA1HP	*	366,268	617	87	167	
JA1QOW	*	342,624	512	88	161	
JA1AYO	*	101,595	317	79	116	
JH1EVD	*	81,855	207	65	88	
JR1LEV	*	71,064	207	56	85	
7J1ABD	*	63,240	178	56	80	
JL1XMN	*	34,680	129	43	59	
JL1LNC	*	22,176	103	50	62	
JO1QZI	*	18,708	114	29	53	
JA1MZM	**14**	**28,203**	**145**	**28**	**51**	
7M4AOE	*	11,175	92	25	50	
JK1LUY	*	4,332	42	15	23	
JA1FWY	*	1,230	55	5	5	
JH1AEP	**7**	**354,176**	**1115**	**36**	**92**	
JA1JKG	*	97,119	492	26	55	
JA1KFX	*	29,156	165	25	49	
JH1SBE	*	15,910	118	28	58	
JH1OGC	**3.5**	**191,516**	**685**	**33**	**83**	
JE1LFX	*	11,077	100	22	31	
7L1JHN	*	7,992	97	19	35	
***JI1RXQ**	**A**	**1,369,695**	**1383**	**129**	**252**	
***JM1LRQ**	**"**	**826,897**	**924**	**126**	**257**	
*JA1XUY	*	372,711	516	101	182	
*JN1NOP	*	324,792	561	89	145	
*JA1PS	*	308,772	505	103	179	
*JG1OWV	*	248,469	342	120	179	
*JA1BUI	*	232,069	422	94	145	
*JA1JQY	*	200,529	408	72	117	
*JG1TVK	*	193,375	378	86	155	
*7K3OWM	*	189,056	417	73	138	
*JA1IZ	*	166,140	345	83	130	
*JA1CP	*	145,824	324	73	113	
*JA1EMQ	*	140,010	308	74	121	
*JE1COB	*	133,003	370	63	106	
*JM1GHT	*	121,581	280	61	110	
*JH1FNU	*	104,340	248	71	117	
*JA1HG	*	102,375	254	73	102	
*JP1SRG	*	100,536	246	70	107	
*JA1TCF	*	97,774	239	71	95	
*7N2SPK	*	92,508	258	62	94	
*JA1CPZ	*	89,798	324	48	70	
*JJ1JGI	*	82,422	209	67	104	
*JA1XPU	*	81,168	228	62	90	
*JE1SLP	*	63,717	203	62	10	
*JA1IE	*	63,492	185	68	80	
*JA1HNW	*	60,676	201	58	96	
*JA1HFY	*	56,115	189	59	86	
*JG3NKP/1	*	55,719	148	53	98	
*JG1GGF	*	55,625	173	59	66	
*JA1BFN	*	49,476	162	59	83	
*JA1EJD	*	49,457	173	54	83	
*JH1WFK	*	47,784	166	57	75	
*7K1EQG	*	39,372	169	48	65	
*JA1WQX	*	37,734	144	48	66	
*7J1AIL	*	27,013	141	51	68	
*JA1APX	*	26,487	120	48	61	
*JA1WHG	*	23,058	133	56	66	
*JM1KNI	*	22,752	116	36	43	
*JR1UMO	*	18,879	83	40	53	
*JO1VRL	*	17,520	108	31	42	
*JH1OLB	*	16,544	83	38	50	
*JE1UKM	*	14,013	78	36	45	
*7N4CLI	*	9,372	79	22	22	
*JA1LPV	*	9,333	61	28	33	
*JE1CAC	*	9,072	73	37	44	
*7N1BHO/1	*	5,720	54	30	35	
*JP1IOI	*	4,030	82	30	35	
*JG1FGL	*	3,520	54	17	19	
*JA1IZZ	*	3,294	35	26	28	
*7K2KJX	*	3,192	34	19	23	
*JI2WYI/1	*	2,520	30	19	16	
***JH1AZO**	**28**	**56,706**	**335**	**25**	**53**	
*JHØSDA/1	*	32,435	209	26	39	
*JA1NLX	*	26,137	194	24	35	
*JI1HFJ	*	22,680	134	26	46	
*JH1TXG	*	11,660	98	20	33	
*JA1AAT	*	3,976	47	16	26	
*7K2PBB	*	2,706	37	14	19	
***JA1BPA**	**21**	**295,097**	**831**	**38**	**101**	
***JS1IFK**	**"**	**246,318**	**782**	**34**	**88**	
*7K4XNN	*	178,605	704	30	75	
*JG1UKW	*	32,879	183	26	51	
*JA1IWP	*	12,508	98	20	33	
*7L3KJV	*	11,713	83	23	30	
*JA2EAB/1	*	10,485	108	22	37	
*JG1WIZ	*	10,250	101	18	33	
*JA1DBG	*	7,934	80	17	31	
*JE1JAC	*	4,920	55	14	27	
***7K4QOK**	**14**	**163,215**	**479**	**36**	**99**	
						(OP: JR2SNF)
*JM1RPV

*JK3AHS	*	60	4	3	3
***JN3DSH**	**14**	**26,100**	**140**	**30**	**57**
*JJ1BDX/3	*	15,980	99	24	44
*JA3AYX	*	7,725	75	20	35
*JL3OXR	*	1,392	21	14	15
***JK3DGX**	**7**	**39,788**	**174**	**28**	**70**
*JA3HC	*	6,946	71	18	28
***JG3LGD**	**3.5**	**18,590**	**127**	**23**	**42**
*JA3GN	*	16,813	126	22	47
JH4UYB	**A**	**5,848,535**	**3144**	**183**	**432**
JA4EZA	*	303,858	461	105	201
JM4WUZ	*	229,414	388	92	159
JA4AQZ	**14**	**25,492**	**142**	**23**	**50**
***JA4BAA**	**A**	**137,096**	**341**	**74**	**121**
*JA4AQR	*	105,820	292	55	93
*JH1MTR/4	*	94,520	233	69	101
*JA4AZS	*	15,400	104	46	54
*JH4OYA	*	7,776	61	25	35
*JA4CZM	*	6,716	57	18	28
*JH4JUK	*	225	9	5	4
***JJ4CDW**	**28**	**4,981**	**54**	**18**	**31**
***JR4GPA**	**21**	**116,688**	**503**	**29**	**59**
*JM4MGM	*	40,115	287	24	47
JA5DQH	**21**	**746,346**	**1707**	**37**	**122**
JA5APU	**14**	**163,471**	**745**	**34**	**87**
*JA5RB	A	42,588	159	51	66
*JG5DHX	14	9,396	76	20	34
***JA5ATN**	**3.5**	**6,194**	**77**	**15**	**23**
*JA5JGV	1.8	196	6	6	6
JA6GCE	**A**	**3,437,497**	**2657**	**157**	**354**
***JA6CYL/6**	**A**	**389,462**	**570**	**95**	**182**
*JA6VU	*	165,912	364	83	165
*JA6BWB	*	16,568	126	42	61
*JA6AKW	*	3,906	42	17	14
*JH6KDY	*	2,825	42	28	23
***JH6WHN**	**28**	**62,376**	**294**	**31**	**61**
***JA6BIF**	**21**	**26,784**	**169**	**24**	**48**
*JS6OFT	14	8,517	81	24	32
***JA6SHL**	**3.5**	**7,529**	**91**	**19**	**28**
JH7XGN	**A**	**1,917,552**	**1663**	**149**	**290**
JA7IC	*	3,000	29	20	20
JH7XMO	**28**	**77,964**	**389**	**29**	**60**
JI7NUF	**21**	**360,045**	**1055**	**36**	**91**
JA7NVF	*	317,897	1224	33	74
JA7COI	**14**	**64,500**	**248**	**34**	**66**
JA7MJ	**3.5**	**16,576**	**114**	**20**	**44**
***JA7BME**	**A**	**153,510**	**285**	**91**	**147**
***JA7DNO**	*****	**151,076**	**339**	**57**	**122**
*JA7AEM	*	52,304	208	51	61
*JH7QNG	*	16,740	115	36	57
*JA7CPW	*	12,166	65	34	45
*JN7NSV	*	8,704	52	32	36
*JN7OJA	*	3,436	42	17	19
*JA7ARW	*	480	12	8	7
*JA7AXP	*	380	12	6	8
***JH7CJM**	**21**	**90,873**	**379**	**34**	**77**
*JH7VIB	*	24,024	130	31	47
*JF7GDF	*	5,181	55	15	18
***JA7EMH**	**3.5**	**4,300**	**81**	**21**	**29**
JA8LN	7	6,593	62	18	41
JA8DNV	**3.5**	**16,513**	**123**	**26**	**44**
***JA8AJE**	**A**	**228,752**	**410**	**87**	**132**
*JG8HVD	*	1,560	22	15	15
JF9JTS	**A**	**235,265**	**431**	**86**	**137**
JA9CWJ	**14**	**285,870**	**824**	**33**	**97**
***JA9RPU**	**28**	**23,100**	**152**	**26**	**40**
***JR9NVB**	**7**	**62,612**	**281**	**29**	**70**
JH0FUW	**A**	**2,161,614**	**1764**	**144**	**337**
JA0QWO	*	355,028	604	80	147
JH0EON	**28**	**11,275**	**85**	**22**	**33**
JR0PJR	**7**	**25,536**	**123**	**29**	**55**
JE0EHE	*	6,247	61	20	30
JE0VJV	**3.5**	**17,600**	**100**	**28**	**53**
***JI0NXA**	**A**	**129,440**	**368**	**62**	**98**
*JA0BMS	*	113,724	310	66	90
*JH0SGG	*	65,383	174	60	91
*JA0XZD	*	33,734	135	39	62
*JA0DOW	*	24,480	108	42	54
*JA0RCK	*	16,560	73	35	57
*JA0GEY	28	385	10	8	8
***JA0BJY**	**21**	**40,488**	**201**	**26**	**58**
***JH0NEC**	**14**	**211,332**	**651**	**36**	**96**
*JH0EPI	*	140,455	531	33	84
***JH0NVX**	**7**	**44,704**	**199**	**28**	**60**

KAZAKHSTAN

UN7TX	**A**	**345,254**	**916**	**46**	**136**
UN7CW	**3.5**	**389,375**	**1374**	**27**	**98**
***UO2M**	**A**	**2,804,358**	**2364**	**106**	**348**
			(OP: UN7MO)		
***UP8P**	*****	**2,187,714**	**1937**	**126**	**372**
			(OP: UN6P)		
*UN2E	*	391,680	602	63	192
*UN7PV	*	78,000	206	57	151
*UN0C	*	6,132	50	28	45
***UN7EX**	**28**	**25,724**	**163**	**24**	**61**
*UN7BN	21	6	1	1	1
***UN6LN**	**14**	**408,960**	**1166**	**35**	**107**
*UN7JX	*	209,748	716	34	98
*UN7QF	*	8,150	99	17	33

KOREA

HL2WP	**28**	**97,279**	**471**	**28**	**63**
HL5UOG	**14**	**113,768**	**479**	**35**	**84**
***HL2SQQ**	**A**	**137,416**	**360**	**71**	**122**
*DS5DNO	*	72,100	239	56	84
***HL5AP**	**28**	**3,212**	**40**	**14**	**25**
***HL2FDW**	**21**	**75,383**	**426**	**27**	**62**
***HL2/JH1FXF**	**14**	**21,708**	**235**	**30**	**37**
***DS5KJR**	**1.8**	**420**	**82**	**3**	**4**

KYRGYZSTAN

EX2M	**A**	**5,069,571**	**4052**	**141**	**418**
EX8O	*	27,244	130	58	81
***EX2A**	**A**	**1,589,542**	**1830**	**93**	**269**
***EX2X**	*****	**1,282,624**	**1314**	**88**	**280**

LAOS

***XW8KPL/RU3DX**	**A**	**147,343**	**538**	**81**	**136**
				(OP: RU3DX)	

LEBANON

OD5NJ	**A**	**247,632**	**572**	**41**	**127**

MONGOLIA

JT1DA	**A**	**418,692**	**1245**	**68**	**154**
JT1CD	*	101,660	485	38	92
JT1BH	**28**	**154,245**	**932**	**29**	**76**
***JT1BJ**	**A**	**553,340**	**1215**	**109**	**256**

OMAN

A45XR	**A**	**10,488,336**	**5547**	**173**	**533**
*A45WG	A	37,985	183	32	75
***A45WD**	**7**	**483,795**	**1218**	**34**	**185**
			(OP: YO5HP)		

SINGAPORE

9V1YC	**A**	**3,546,724**	**2981**	**150**	**406**
***9V1GO**	**A**	**66,063**	**243**	**71**	**112**
*9V1CW	*	27,258	110	45	73

SRI LANKA

*4S7NI	14	81	5	4	5

TAIWAN

***BU2AI**	**A**	**126,732**	**357**	**69**	**108**

TAJIKISTAN

EY8MM	**14**	**917,000**	**2006**	**38**	**137**
EY8CQ	**7**	**695,310**	**1688**	**36**	**129**
EY7AF	**3.5**	**292,880**	**1094**	**24**	**88**
***EY7AB**	**21**	**130,462**	**774**	**21**	**65**

THAILAND

HS8ZAR	**A**	**1,396,992**	**1625**	**116**	**292**
			(OP: K3ZO)		
HS8ZDR	**21**	**115,115**	**442**	**30**	**85**
			(OP: N4CT)		
***HS8KGS**	**A**	**6,560**	**62**	**34**	**45**
*HSØEHF	*	3,456	31	24	30
*HS1OVH	*	3,190	47	29	29
*E2ØYLM	*	1,836	45	19	32
*HS8ZDY	*	1,748	21	18	20
			(OP: SM3OYU)		

TURKMENISTAN

***EZ4XX**	**A**	**449,328**	**963**	**43**	**133**
*EZ8CW	14	251	8	5	7

UK BASES ON CYPRUS

ZC4LI	**21**	**993,876**	**2889**	**34**	**104**

UNITED ARAB EMIRATES

A61AJ	**14**	**1,245,904**	**2830**	**38**	**138**
			(OP: N2AA)		
A61AJ	**7**	**1,655,109**	**3690**	**37**	**134**
			(OP: S53R)		
A61AJ	**3.5**	**432,279**	**1638**	**30**	**99**
			(OP: SM7PKK)		
***A61AV**	**A**	**14,208**	**175**	**33**	**78**

UZBEKISTAN

UK9AA	**14**	**683,145**	**1842**	**36**	**117**
***UK/JI2MED**	**A**	**988,470**	**1354**	**80**	**235**

WEST MALAYSIA

9M2/G4ZFE	**A**	**3,359,444**	**3066**	**129**	**355**
***9M2TO**	**A**	**459,774**	**1204**	**76**	**191**
*9M2/G3TMA	*	155,618	500	72	127

EUROPE

ALAND ISLANDS

OHØZ	**28**	**263,238**	**1035**	**33**	**113**
			(OP: OH5DX)		
OHØV	**21**	**670,806**	**1817**	**38**	**128**
			(OP: OH6LJ)		
OHØØ	**7**	**898,275**	**2886**	**39**	**136**
			(OP: OH2UA)		
OHØM	**3.5**	**381,545**	**2129**	**29**	**108**
			(OP: OH1MM)		
***OHØI**	**3.5**	**231,516**	**1656**	**22**	**96**
			(OP: YL2KL)		
***OHØRB**	**1.8**	**56,355**	**904**	**11**	**54**
			(OP: YL2GM)		

ALBANIA

ZA/Z35M	**A**	**749,406**	**1820**	**65**	**229**

AUSTRIA

OE2G	**A**	**1,586,250**	**2103**	**107**	**343**
			(OP: DK5AD)		
OE3GSA	*	1,097,628	1541	120	318
OE1TKW	*	26,520	152	35	85
OE3I	**3.5**	**294,350**	**1266**	**26**	**96**
			(OP: OE1JNB)		
***OE5CYL**	**A**	**75,075**	**315**	**41**	**134**
*OE1WIU	*	40,698	158	41	78
*OE1BKA	*	21,604	125	31	56
***OE5CWL/6**	**3.5**	**103,656**	**1090**	**15**	**69**

AZORES

CU3AA	**7**	**541,107**	**2165**	**31**	**116**
***CU2JT**	**7**	**159,547**	**796**	**21**	**82**

BALEARIC ISLANDS

***EA6AFF**	**A**	**542,538**	**1298**	**78**	**228**
*EA6NB	*	296,155	709	81	224

BELARUS

EW7LO	**A**	**819,376**	**1965**	**81**	**251**
EU4LY	*	613,696	1233	83	261
EW6AF	*	405,944	990	73	235
EW3LN	*	386,799	689	86	253
EU4CQ	*	89,370	432	69	201
EU7SA	*	4,880	36	27	34
EU1DX	**14**	**316,100**	**1159**	**36**	**109**
EW8EW	**7**	**411,346**	**1841**	**35**	**134**
EU1PA	**3.5**	**100,298**	**903**	**20**	**77**
EU6EU	**1.8**	**96,140**	**906**	**22**	**70**
***EW1CQ**	**A**	**541,516**	**993**	**84**	**247**
*EW6GL	*	239,852	606	61	183
*EW8DS	*	235,804	478	75	259
*EW1KT	*	110,168	371	55	133
*EW4CN	*	48,120	328	28	72
***EW6DX**	**28**	**18,688**	**75**	**20**	**40**
***EW5EW**	**21**	**49,290**	**250**	**25**	**81**
*EU6AA	*	22,046	164	18	55
***EV6Z**	**14**	**21,597**	**200**	**16**	**53**
*EW2AA	*	8,517	83	17	34
*EW6MM	*	5,198	69	12	34
***EU1AI**	**3.5**	**78,284**	**715**	**19**	**80**
*EW2EG	*	5	3	1	2
***EW8DX**	**1.8**	**27,432**	**486**	**8**	**45**
*EV6M	*	8,280	204	8	32

BELGIUM

ON4AEK	**A**	**370,173**	**1701**	**36**	**127**
ON4WW	**1.8**	**151,368**	**1153**	**23**	**83**
***ON5ZO**	**A**	**1,039,350**	**1609**	**94**	**316**
*ON4CAS	*	668,507	1152	80	263
*ON5SV	*	246,648	690	62	177
*ON4XG	*	176,152	454	63	187
*ON6LY	*	112,955	419	47	158
*ON4LDP	*	54,665	284	38	107
*ON6UO	*	14,391	179	30	87
*ON4KVA	*	12,096	125	21	63
***ON6TJ**	**7**	**32,277**	**262**	**17**	**70**
*ON4MIC	*	507	70	7	32
*ON4AAM	1.8	4,576	131	6	38

BOSNIA-HERZEGOVINA

T97M	**21**	**590,226**	**1722**	**36**	**125**
T9/9A5E	**7**	**1,048,817**	**3295**	**39**	**138**
T99W	*	748,494	2814	37	129
***T94GZ**	**A**	**65,534**	**334**	**40**	**111**
***T98R**	**28**	**11,780**	**84**	**19**	**43**
***T92M**	**21**	**78,300**	**371**	**31**	**85**
***T94FC**	**7**	**263,790**	**1236**	**30**	**105**
*T94KW	*	68,142	411	23	93

BULGARIA

LZ1ABC	**A**	**2,508,996**	**2578**	**135**	**453**
LZ1BJ	*	1,579,604	1988	115	366
LZ2PL	*	563,745	1193	76	197
LZ1RW	*	121,336	328	67	165
LZ1EP	*	14,808	304	44	197
LZ9X	**28**	**174,178**	**594**	**33**	**113**
			(OP: LZ1RW)		
LZ5W	**21**	**263,228**	**963**	**35**	**123**
LZ1YG	*	5,425	103	12	23
LZ2SSB	**14**	**304,732**	**1611**	**38**	**104**
LZ1V	*	266,412	1241	35	114
***LZ1QV**	**A**	**980,208**	**1568**	**106**	**325**
*LZ2BE	*	241,942	433	77	197
*LZ1VQ	*	27,453	262	26	72
*LZ1FJ	*	18,050	185	17	78
*LZ1MC	*	16,560	83	28	62
*LZ1GU	*	15,035	62	38	59
*LZ1IA	*	8,050	47	30	40
*LZ5PL	*	7,616	81	22	46
*LZ4BU	*	5,278	39	25	33
***LZ1AG**	**28**	**21,526**	**103**	**29**	**65**
*LZ2JA	*	19,564	131	23	50
***LZ4AE**	**14**	**105,896**	**540**	**30**	**94**
*LZ3SM	*	46,828	287	24	68
***LZ9R**	**7**	**293,832**	**1275**	**32**	**122**
			(OP: LZ3YY)		
*LZ7H	*	12,503	117	11	65
*LZ1FH	*	1,056	53	8	25

CRETE

***SVØXAI/9**	**A**	**390,000**	**1366**	**56**	**184**
*SV9/DJ9RR	*	276,130	891	55	210

CROATIA

9A2VR	**A**	**970,536**	**1303**	**104**	**320**
9A8A	*	283,335	590	56	139
9A3ST	*	67,940	201	54	104
9A6A	**28**	**146,765**	**575**	**34**	**115**
9A88A	**21**	**760,416**	**2005**	**37**	**141**
			(OP: 9A9A)		
9A5W	**14**	**812,337**	**2362**	**39**	**144**
9A9D	*	529,424	1746	37	126
			(OP: HA3LN)		
9A5MT	**7**	**492,854**	**1795**	**36**	**130**
9A4WW	**3.5**	**247,256**	**1300**	**28**	**96**
9A8W	**1.8**	**108,194**	**1022**	**28**	**74**
***9A6XX**	**A**	**265,568**	**992**	**40**	**132**
*9A4RC	*	181,692	624	53	153
*9A7V	*	118,498	351	55	124
*9A3KS	*	31,339	111	47	74
***9A3VM**	**28**	**130,458**	**519**	**29**	**73**
*9A7D	*	114,720	408	33	87
*9A7DM	*	58,000	210	31	85
*9A4RV	21	20,709	130	22	37
*9A4KL	*	12,100	101	19	31
***9A1AA**	**14**	**77,168**	**420**	**27**	**85**
***9A3RE**	**1.8**	**33,600**	**565**	**9**	**51**

CZECH REPUBLIC

OK1AVY	**A**	**2,066,474**	**2178**	**131**	**431**
OK2POT	*****	**1,187,934**	**1504**	**109**	**342**
OK1TN	*	992,580	1193	114	352
OK2PBM	*	938,410	1170	107	342
OL4M	*	634,180	1173	89	281
OK1AXB	*	420,640	776	90	262
OKBANM	*	320,264	606	82	219
OK1AYY	*	296,406	635	77	220
OK2SG	*	228,852	302	107	244
OK1DVK	*	169,634	323	81	240
OK1FRO	*	7,171	88	14	57
OK1FPG	**21**	**176,821**	**568**	**33**	**118**
OK1EV	*	40,040	358	29	75
OK2PVF	**14**	**221,368**	**1034**	**34**	**100**
OK1DG	**7**	**342,684**	**1213**	**34**	**133**
OL1A	*	293,820	1153	35	131
			(OP: OK1DF)		
OL7X	*	180,830	1058	28	102
OK2FB	*	50,016	337	23	73
OK2RZ	**3.5**	**511,820**	**1990**	**34**	**123**
OK1FZM	*	125,545	783	25	94
OK1TD	*	73,784	666	16	76
OK2BZ	**1.8**	**22,059**	**393**	**7**	**50**
OK1DWJ	*	117	5	4	5
***OK2ZC**	**A**	**1,634,932**	**1698**	**132**	**466**
***OL6P**	*****	**1,524,582**	**1835**	**110**	**376**
			(OP: OK2WTM)		
***OK2TCW**	*****	**1,031,745**	**1327**	**95**	**334**
*OK2DU	*	1,012,419	1578	100	331
*OK1DOL	*	1,010,699	1388	99	350
*OK2QX	*	999,900	1233	121	374
*OK1HX	*	941,227	1430	98	315
*OL8R	*	765,450	1172	105	345
			(OP: OK1FCJ)		
*OK1TC	*	712,400	1271	90	310
*OK2MBP	*	708,100	1291	76	289
*OK1VD	*	575,976	951	97	315
*OK2EC	*	491,729	823	84	269
*OK1DKR	*	468,790	752	90	280
*OK1MLP	*	439,956	858	71	232
*OK1DKO	*	355,524	634	81	237
*OK1AJR	*	352,928	573	85	243
*OK1FCA	*	330,165	970	54	199
*OK2PTS	*	324,666	709	74	232
*OK1DOR	*	296,751	813	65	208
*OK2BPL	*	288,705	546	70	215
*OK2BH	*	286,754	586	73	196
*OK1FID	*	242,760	706	67	222
*OK2BNC	*	216,530	495	71	210
*OK2PBG	*	182,009	380	75	232
*OK2BDF	*	169,884	404	65	177
*OK1FWW	*	155,875	530	50	165
*OK2VP	*	149,856	458	50	173
*OK1MZD	*	147,371	390	63	196
*OK2BJ	*	143,136	352	61	163
*OK1KZ	*	129,833	505	55	179
*OK2BND	*	129,684	426	52	162
*OK2VX	*	123,375	403	49	126
*OK1BMW	*	120,782	295	66	196
*OK2NO	*	108,580	364	48	130
*OK1SF	*	99,892	239	69	152
*OK1AOU	*	92,429	283	71	144
*OK2TRN	*	85,635	382	42	131
*OK2SWD	*	60,828	289	36	112
*OK2BQL	*	47,950	275	34	103
*OK2PCL	*	47,250	164	48	77
*OK2AB	*	20,244	195	23	61
*OK1AKB	*	15,960	130	29	91
*OK1CJN	*	10,165	61	39	56
*OK1WWJ	*	3,920	39	15	20
*OK1FPE	*	2,654	67	15	45
***OK2HZ**	**28**	**44,720**	**183**	**30**	**74**
*OK1GI	*	38,214	157	29	70
*OK1DJS	*	3,552	47	14	23
***OK2NN**	**21**	**175,595**	**575**	**32**	**113**
***OK1ZP**	*****	**146,205**	**554**	**32**	**103**
*OK1CZ	*	117,652	416	31	103
*OK2KJ	*	77,418	330	28	71
*OK2PO	*	53,204	258	27	67
*OK1DMO	*	21,942	162	22	47
*OK2QR	*	9,957	97	14	33
*OK1ARO	*	9,636	111	15	29
*OK1BLU	*	7,336	113	16	40
*OK1DLD	*	3,496	33	16	30
***OK1EP**	**14**	**278,413**	**1019**	**32**	**111**
*OK2TBC	*	120,228	523	32	97
*OK1DSA	*	68,908	383	27	80
*OK2BRA	*	47,502	297	24	67
*OK1MKI	*	41,625	323	22	75
*OK1MMN	*	29,607	252	15	56
***OK2BYW**	**7**	**116,176**	**547**	**28**	**109**
*OK2HI	*	92,436	438	32	111
***OL4W**	**3.5**	**88,401**	**1020**	**11**	**68**
			(OP: OK1IF)		
*OK1FHI	*	84,817	812	16	73
*OK2PWJ	*	60,456	539	17	71
*OK2PXD	*	36,564	478	11	55
*OK1FOG	*	28,084	429	9	50
***OL6T**	**1.8**	**29,315**	**559**	**8**	**47**
			(OP: OK1DCF)		
*OK1JOK	*	23,688	457	6	50
*OK1YO	*	17,704	312	10	51
*OL6M	*	4,748	120	7	39

DENMARK

OZ1AA	**A**	**2,683,450**	**2912**	**132**	**418**
OZ1LO	*****	**2,334,409**	**2773**	**125**	**414**
OZØKD	*	1,105,610	2026	103	315
OZ4RT	*	295,515	675	65	232
OZ8SW	*	293,748	435	86	278
OZ4O	**1.8**	**30,816**	**524**	**8**	**48**
***OZ8AE**	**A**	**862,687**	**1017**	**116**	**375**
*OZ1CBW	*	279,900	633	72	228
*OZ1BMA	*	186,450	495	60	166
*OZØRS	*	163,982	542	49	172
*OZ7NB	*	129,064	91	21	60
*OZØF	*	68,992	387	35	119
*OZ4FF	*	49,964	200	48	99
*OZ1DUG	*	39,456	298	31	106
*OZ7AEI	*	3,584	52	22	42
*OZ1DGQ	*	100	64	13	29
*OZ7YL	3.5	6,711	166	8	38

DODECANESE

***J45KLN**	**A**	**652,026**	**2005**	**64**	**207**
			(OP: SMØCMH)		
***SX5R**	**28**	**72,675**	**591**	**25**	**70**
			(OP: SV5DKL)		

ENGLAND

M7M	**A**	**1,113,216**	**1503**	**95**	**289**
			(OP: GØCKP)		
G8D	*****	**996,628**	**1412**	**99**	**313**
			(OP: G3SJJ)		
G4IIY	*	987,552	1399	94	338
GØWKW	*	884,941	2002	67	216
M4A	*	307,200	1016	56	200
			(OP: MØBBB)		
MØCCE	*	266,936	740	58	186
G3VPS	*	260,072	727	54	178
G4BJM	*	204,078	544	62	196
G4FAL	*	198,744	510	70	203
G4HZV	*	151,620	370	60	168
G4OWT	*	136,591	392	64	183
M8C	*	122,008	405	56	146
			(OP: G4DBL)		
G4IRN	*	111,864	358	69	168
GØDAY	*	71,421	394	40	139
G3BFP	*	69,190	259	50	135
M1SMH	*	56,564	219	44	114
G3TXF	**14**	**599,524**	**1967**	**40**	**132**
M3C	*	147,288	990	25	77
			(OP: GØVQR)		
G5LP	**7**	**304,140**	**1617**	**30**	**118**
GØIVZ	**3.5**	**376,740**	**1810**	**31**	**95**
G4WFQ	*	29,574	390	14	48
G3GLL	**1.8**	**25,315**	**411**	**9**	**52**
MØAJT	*	4,687	115	6	37
***G3RSD**	**A**	**300,573**	**773**	**62**	**211**
***G3KKP**	*****	**295,360**	**676**	**66**	**218**
*G4KFT	*	288,540	614	62	190
*G6EFX	*	254,610	708	54	176
*GØRTN	*	246,888	724	50	193
*G4DDX	*	231,768	690	51	181
*G/LY3BQ	*	198,030	676	56	174
*GØUKX	*	151,515	439	43	142
*G4GOY	*	150,136	574	44	152
*M5FUN	*	143,010	467	50	177
*G4DDL	*	133,272	460	51	165
*M3CVN	*	89,646	657	42	181
*G4SLE	*	39,525	268	41	114
*GØHDB	*	36,352	187	30	98
*G3JJZ	*	27,552	145	35	89
*MØGMB	*	27,459	188	28	85
*G3NKS	*	24,628	141	26	68
*GØMRH	*	23,088	240	21	90
*G2HDR	*	15,840	133	24	66
*MØCOP	*	13,158	130	32	70
*G4MKP	*	4,928	89	28	49
*G6OKU	*	3,416	65	18	38
*G3VCP	*	2,673	118	23	58
*GØRDO	28	3,515	44	13	24
***GØLZL**	**21**	**117,360**	**425**	**30**	**90**
*G3ZRJ	*	55,419	284	24	67
*G3KKJ	*	22,981	244	18	49
***G6M**	**14**	**320,951**	**1274**	**32**	**107**
*G3VYI	*	18,480	155	20	50
***MØIPX**	**3.5**	**56,188**	**676**	**16**	**67**
*G4ZOB	*	31,800	324	12	63
*G4EBK	*	26,733	373	9	58
*G4KIV	1.8	1,568	63	4	24

ESTONIA

ES5TV	**A**	**3,848,544**	**3537**	**159**	**485**
***ES2DJ**	**A**	**641,802**	**990**	**94**	**319**
*ES4MM	*	115,280	252	72	190
*ES6KW	*	1,161	35	17	26
*ES4RC	28	4,312	53	16	28
***ES6DO**	**7**	**124,474**	**828**	**27**	**92**
*ES8DH	*	28,179	311	21	72
*ES3VI	3.5	3,132	96	6	30
*ES6CO	*	2,220	51	7	30
***ES6PZ**	**1.8**	**35,264**	**504**	**11**	**53**

EUROPEAN RUSSIA

RK4FF	**A**	**4,771,950**	**3891**	**164**	**561**
RW1ZA	*****	**2,479,598**	**2605**	**115**	**336**
RT3T	*	1,627,909	1978	127	442
			(OP: UA3TU)		
RN6FA	*	1,152,039	1770	112	349
RD4WA	*	1,131,140	1832	108	352
RA3SL	*	807,139	1277	110	327
UA3TCJ	*	805,239	1069	103	220
RK3BA	*	751,308	1204	99	358
RV1AT	*	706,

*RU3WR	*	174,736	554	61	207
*UA3VLO	*	163,215	337	61	218
*RD3AD	*	161,231	522	49	168
*RV6YB	*	159,600	527	51	177
*RA6MS	*	151,424	500	48	176
*RZ6HF	*	149,048	348	66	182
*RV3MI	*	148,350	408	61	169
*UA4QK	*	147,930	402	76	165
*RA3MB	*	135,361	391	56	167
*RA1OK	*	134,871	384	51	132
*RN3FA	*	128,400	330	64	150
*RU3XB	*	126,988	398	56	156
*RX3AW	*	126,976	347	64	184
*UA3TN	*	125,426	395	49	168
*RW3PN	*	124,584	326	58	174
*RV3ZN	*	121,197	498	59	154
*RV3RM	*	121,000	421	50	170
*RW3TA	*	109,180	412	53	153
*UA3EAY	*	108,784	307	54	154
*RV3LQ	*	107,501	353	44	149
*RX3MM	*	105,340	302	62	157
*RW4AD	*	102,114	383	44	142
*UA6AK	*	99,867	312	58	183
*UA1CBM	*	99,400	414	39	136
*RX4HX	*	96,131	331	52	165
*UA4HJ	*	95,200	243	71	167
*UA6LFQ	*	91,014	249	71	160
*RA3MU	*	88,506	294	53	145
*RN6FK	*	87,185	198	81	154
*RA4NCC	*	86,271	307	45	148
*UA3LEL	*	72,285	185	59	124
*RU6MD	*	70,240	278	45	115
*UA4AAC	*	65,280	336	42	128
*RZ1CXS	*	62,757	250	34	137
*RA3BB	*	55,704	289	40	92
*RA1ACY	*	54,776	278	36	131
*RA3XCW	*	52,326	205	46	125
*UA3AKI	*	50,490	207	38	97
*UA4AGO	*	49,141	253	41	116
*UA1CUR	*	47,596	182	45	118
*RV3YR	*	45,960	202	38	82
*RA4FJV	*	40,502	138	61	93
*RU3FT	*	39,150	118	58	92
*UA3UBT	*	38,403	194	35	118
*UA4FRL	*	38,324	168	44	99
*RW4HM	*	36,654	138	48	101
*RA3TLA	*	35,292	229	20	82
*RW3CW	*	35,076	106	56	92
*UA4CIF	*	34,444	143	42	116
*RA1QX	*	30,988	121	50	77
*RA6DE	*	30,492	157	41	80
*RD3AN	*	28,764	147	37	116
*RZ3FR	*	27,060	242	39	126
*RA6FOT	*	20,819	102	38	71
*UA3VFI	*	18,432	195	16	80
*UA3QCB	*	17,980	94	44	80
*UA3XGM	*	17,388	99	33	59
*RD3FT	*	16,434	128	24	75
*UA6AGK	*	10,125	58	31	50
*RW3SU	*	9,790	70	32	57
*RD3AB	*	9,727	103	18	53
*RA4SD	*	7,029	62	26	45
*RW4FX	*	6,608	62	18	41
*RX1AP	*	4,819	32	29	32
*UA4CC	*	858	15	10	12
*UA1QBE	*	585	18	7	8
***RU4SS**	**28**	**80,586**	**372**	**30**	**91**
*RW6BN	*	16,745	121	24	61
*UA6ADC	*	14,484	101	21	50
***RV3ACA**	**21**	**170,928**	**686**	**33**	**111**
*UA1OMZ	*	139,251	611	33	100
*RN6HZ	*	115,192	652	29	92
*RW3DW	*	81,529	330	31	102
*RW4FZ	*	75,276	465	28	80
*RZ3VA	*	63,344	316	26	81
*RW3AFY	*	48,768	259	26	70
*UA4ACP	*	17,400	274	13	45
*RV3PN	*	15,702	168	14	53
*RW4LQ	*	6,893	40	24	37
***RX6AH**	**14**	**57,772**	**436**	**25**	**76**
***RU3GA**	*****	**51,600**	**450**	**18**	**68**
*UA3URD	*	46,583	404	21	69
*RW6AH	*	32,153	266	20	59
*RN6AT	*	23,040	175	25	65
*UA3RW	*	21,632	283	14	50
*UA4PAY	*	17,640	186	21	63
*UA3PPP	*	5,220	68	12	48
***RU6FA**	**7**	**172,200**	**825**	**34**	**116**
*RN3DY	*	53,106	430	24	82
*RK6MY	*	45,024	328	21	75
*RK6BZ	*	35,014	296	19	63
*RN4ACQ	*	13,950	228	16	59
***RU3FM**	**3.5**	**72,332**	**532**	**21**	**86**
*UA6LCN	*	53,900	451	24	74
*UA3SAQ	*	49,280	448	16	72
*RW3WM	*	26,910	330	16	62
*RN6AI	*	26,841	320	10	59
*RA6CZ	*	16,380	258	11	49
*UA3DTT	*	9,918	130	10	47
*UA3EKG	*	9,648	92	11	61
***UA6BAE**	**1.8**	**12,595**	**256**	**8**	**47**
*RN6HI	*	8,976	169	10	41
*RV3LO	*	6,987	123	9	42
*RK6AIQ	*	180	29	5	15

FAROE ISLANDS

OY1CT	**A**	**1,015,488**	**2272**	**71**	**298**
*OY4M	A	27,950	131	21	66

FINLAND

OH1F	**A**	**3,725,334**	**3117**	**142**	**461**
			(OP: OH1MDR)		
OH6KN	*****	**3,313,664**	**3063**	**137**	**375**
OH2RA	*	1,311,978	1931	118	331
OH2LU	*	508,649	901	84	277
OH1BOI	*	374,400	618	84	276
OH3WS	*	342,063	497	95	274
OH1EB	*	336,518	722	74	227
OH3RR	*	322,770	496	93	278
OH5NE	*	318,318	982	65	221
OH2BR	*	313,664	500	98	279
OH2VZ	*	120,716	351	57	149
OH1MA	*	91,080	201	76	131
OH3JR	*	75,960	197	66	145
OH2CI	*	51,832	200	38	114
OH2XF	**21**	**57,250**	**221**	**31**	**94**
OH4A	**14**	**826,200**	**2319**	**38**	**132**
			(OP: OH6QU)		
OH4MDY	*	416,521	1861	35	122
OH2U	**7**	**757,390**	**2329**	**38**	**140**
			(OP: OH6UM)		
OH2BH	**3.5**	**408,455**	**1830**	**33**	**118**
			(OP: OH1WZ)		
OH2FT	*****	**313,161**	**1524**	**32**	**109**
OH5LF	*	228,201	1328	27	102
OH6XX	*	147,744	1072	26	88
OH3WD	*	23,774	175	19	73
***OH6OS**	**A**	**577,752**	**809**	**97**	**302**
***OH2FS**	*****	**251,316**	**409**	**82**	**269**
*OH2KM	*	157,620	541	53	160
*OH2LO	*	129,732	344	56	172
*OH2LP	*	117,094	362	80	176
*OH6RC	*	100,514	250	66	191
*OH6MBQ	*	65,096	316	38	120
*OH2EV	*	63,450	319	37	113
*OH2BPA	*	31,731	289	19	75
*OH3HS	*	15,244	84	37	66
*OH8VQ	*	6,136	79	17	42
*OH5NS	*	1,320	47	14	30
*OH1TN	28	3,108	32	13	29
***OH7FF**	**21**	**26,448**	**228**	**17**	**59**
***OH4TY**	**14**	**60,334**	**362**	**24**	**73**
*OH1EE	*	10,044	239	12	42
***OH7MA**	**7**	**104,980**	**395**	**33**	**112**
*OH6ZH	*	19,952	149	18	68
*OH6KXL	*	5,978	106	11	38
*OH6TN	*	2,700	71	10	35
*OH2PV	*	152	8	6	8

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***OH5UFO**	**3.5**	**33,397**	**282**	**17**	**74**
***OH3MEP**	**1.8**	**28,386**	**511**	**9**	**48**
*OH4MCV	*	5,986	152	6	35

FRANCE

TM6X	**A**	**4,246,625**	**3838**	**148**	**493**
			(OP: F5VHY)		
TM2Y	*****	**3,242,400**	**3019**	**127**	**398**
			(OP: F8CRH)		
F5NBX	*	962,368	1500	92	260
F5BBD	*	330,720	806	77	235
F5RAB	*	247,292	569	70	223
F5CQ	*	243,540	408	69	228
F6DZD	*	3,710	55	16	37
TM4Q	**21**	**255,343**	**1078**	**35**	**104**
			(OP: F6FYA)		
F5CWU	**14**	**281,398**	**1135**	**36**	**122**
F6ARC	**7**	**778,260**	**2493**	**38**	**132**
F5IN	**1.8**	**62,139**	**736**	**16**	**61**
F8BPN	*	38,592	558	11	56
F6CWA	*	21,120	305	10	54
***F5TNI**	**A**	**1,171,512**	**1448**	**116**	**361**
***F6HKA**	*****	**1,109,965**	**1688**	**87**	**278**
*F6FTB	*	959,512	1359	102	322
*F6EYB	*	918,170	1000	116	375
*F5PHW	*	917,524	1300	98	314
*F5QF	*	633,075	1015	89	278
*F6DYX	*	418,392	925	63	235
*F5NQL	*	386,848	871	74	240
*F8AQK	*	285,384	701	63	201
*F5ICC	*	264,453	508	62	195
*F5UKL	*	263,375	478	80	165
*F2AR	*	207,400	586	60	184
*F5INJ	*	178,776	600	46	145
*F5SGI	*	161,364	472	57	169
*F5POJ	*	144,396	485	50	141
*F8EEQ	*	88,795	351	64	151
*F6ABI	*	42,450	236	37	113
*F6CZV	*	24,206	190	28	70
*F4DXX	*	14,938	105	30	67
*F8DNX	*	12,078	153	38	84
*F5BTH	*	100	71	14	35
***F8AKC**	**28**	**43,329**	**241**	**26**	**75**
***F5JY**	**21**	**119,730**	**449**	**31**	**99**
*F5SDD	*	15,691	132	21	50
***F8PDR**	**14**	**102,690**	**464**	**28**	**98**

GERMANY

DL3YM	**A**	**3,538,565**	**3097**	**147**	**456**
DJ1YFK	*****	**3,233,508**	**3083**	**135**	**442**
DL2JRM	*****	**1,007,650**	**1993**	**84**	**266**
DL2DX	*	1,005,984	1035	139	365
DL5YM	*	907,410	1345	103	332
DF5UL	*	727,592	804	107	305
DL1VDL	*	647,400	947	106	309
DL2MDZ	*	619,311	874	104	279
DL1RG	*	561,000	824	92	282
DL9AWI	*	522,345	685	102	257
DL3AMA	*	491,376	1095	86	262
DJ8IP	*	484,930	915	90	265
DJ8IF	*	482,400	721	103	257
DF1DV	*	232,832	563	77	195
DH1TW	*	212,636	458	64	172
DL2MDU	*	206,981	362	78	185
DL8KJ	*	193,715	478	67	198
DL3YA	*	123,000	295	65	140
DJ1AA	*	118,737	315	67	170
DJ1TU	*	110,058	339	57	164
DL1ZU	*	102,666	260	70	171
DL2JV	*	99,864	218	63	156
DL8PG	*	91,124	208	71	147
DK8RE	*	79,473	275	47	130
DJ2ZS	*	58,880	197	51	133
DL9UBF	*	47,850	207	53	121
DD4DA	*	39,516	246	37	111
DL6NCY	*	28,080	100	37	80
DJ2SL	*	25,938	108	44	87
DL1NEO	*	19,604	101	34	82
DK2DQ	*	9,086	99	27	50
DL2HRN	*	8,342	109	18	68
DL6DVU	*	8,190	100	20	58
DL1ECG	*	8,181	127	21	60
DF5AU	*	3,120	35	19	33
DL5SDK	*	2,394	36	16	22
DK2GZ	**21**	**259,752**	**786**	**35**	**123**
DL5KUT	**14**	**222,138**	**893**	**31**	**98**
DL3NCI	**7**	**248,624**	**1032**	**35**	**129**
DL1GGT	*	83,125	359	33	92
DL5JS	**3.5**	**89,335**	**853**	**17**	**68**
DJ0MDR	**1.8**	**81,079**	**906**	**18**	**71**
***DL2ZAE**	**A**	**1,141,278**	**1510**	**121**	**380**
***DL1EFD**	*****	**979,440**	**1458**	**100**	**340**
***DL7BY**	*****	**889,080**	**1146**	**115**	**363**
*DF1IAQ	*	726,066	1175	93	325
*DL6UNF	*	673,060	1211	87	278
*DK5DQ	*	657,650	997	90	260
*DL1YAW	*	580,692	674	107	327
*DL9MRF	*	545,240	1106	77	267
*DL5KUD	*	535,221	860	91	296
*DL4FN	*	500,588	831	83	258
*DL1DSW	*	447,228	733	102	302
*DM5JBN	*	422,436	742	80	241
*DL8UAT	*	415,614	693	88	251
*DF6LQ	*	383,860	697	82	258
*DL2RTC	*	351,101	721	72	251
*DL1ARJ	*	316,344	736	71	223
*DL8UFO	*	298,480	654	63	197
*DK7ZH	*	297,570	672	68	205
*DL8HCO	*	287,272	682	70	228
*DL1SAN	*	273,798	586	73	214
*DL7UXG	*	249,500	607	61	189
*DL3KWF	*	243,525	692	55	200
*DL6ZNG	*	228,208	542	68	204
*DJ8UV	*	211,416	530	59	217
*DK3WJ	*	210,910	490	72	190
*DL4HWI	*	197,640	402	72	233
*DL5ASE	*	194,322	604	59	174
*DL9UJF	*	193,305	578	64	181
*DL2HYH	*	191,590	475	62	176
*DL1NKS	*	190,680	582	49	178
*DL8UNF	*	185,546	541	59	167
*DL3KUM	*	182,850	497	62	203
*DL1JF	*	171,300	487	73	227
*DF8IT	*	171,063	661	47	182
			(OP: DF6QC)		
*DK3WM	*	167,643	546	46	143
*DL8DWW	*	158,750	453	63	187
*DL2IAN	*	157,548	402	60	168
*DL3ZAI	*	156,150	534	53	172
*DJ4PT	*	152,888	423	56	176
*DL8UKE	*	148,404	309	82	167
*DK8FD	*	142,688	283	68	156
*DL8NBJ	*	137,776	504	51	167
*DL3EBX	*	133,152	403	58	170
*DL2FDL	*	127,776	785	70	194
*DL3BUE	*	123,170	341	62	164
*DL1TPY	*	118,489	416	57	179
*DL1RTL	*	117,585	387	55	146
*DL2HWI	*	113,984	272	65	143
*DK4RL	*	113,740	296	59	129
*DF1QQ	*	113,322	370	47	155
*DL5KUA	*	105,316	295	61	165
*DL5CD	*	102,921	383	52	151
*DL2NBY	*	102,570	401	49	146
*DL3KWR	*	101,695	410	48	167
*DL2EBX	*	101,689	279	59	140
*DH8AF	*	99,552	326	68	176
*DL7UMK	*	90,090	414	53	157
*DL5ARM	*	89,112	389	46	142
*DL5YL	*	88,264	382	46	141
*DF1LON	*	86,580	359	44	141
*DK2BJ	*	82,593	387	40	149
*DL1KUR	*	79,388	223	54	124
*DK5JM	*	77,437	280	47	164
*DL3OAU	*	76,639	267	48	125
*DL9NDS	*	75,922	202	59	128
*DL4NT	*	75,852	296	42	130
*DL2YED	*	75,430	382	44	146
*DK7AN	*	69,954	221	54	124
*DL8UVG	*	64,032	317	45	129
*DF6WE	*	62,084	407	46	141
*DL6DSA	*	58,136	204	52	120
*DL5ASK	*	57,967	161	60	109
*DL8CA	*	56,474	201	42	109
*DL3BZZ	*	54,936	176	49	119
*DD1IM	*	54,386	283	37	105
*DL1BUG	*	52,812	224	47	115
*DL1IA	*	52,780	171	57	125
*DL3DBY	*	45,484	270	47	119
*DF5AN	*	43,769	202	46	127
*DJ7LH	*	43,186	180	46	97
*DJ6TK	*	39,508	166	43	123
*DK5XG	*	38,936	149	53	104
*DL2RTJ	*	36,751	237	33	110
*DJ1UR	*	35,938	205	42	109
*DL6RBH	*	34,048	197	36	97
*DJ6OL	*	32,680	273	40	112
*DK5ZX	*	26,215	136	35	72
*DL3HSC	*	24,933	105	34	85
*DJ5UZ	*	24,840	233	32	106
*DL1AWM	*	23,381	151	28	75
*DK3AX	*	23,166	143	37	80
*DL7DZ	*	23,052	136	35	67
*DL4KUG	*	22,848	153	32	80
*DJ6UP	*	21,476	161	33	85
*DL1DWR	*	21,390	141	24	69
*DF3QG	*	21,168	94	38	70
*DL9ABM	*	19,500	89	36	64
*DL5SWB	*	17,711	179	19	70
*DH8TOM	*	17,415	122	28	53
*DL5NDX	*	17,226	148	24	63
*DL8UGF	*	16,400	77	30	50
*DL5AZZ	*	15,921	152	24	63
*DL7VRG	*	13,700	120	26	74
*DL2AHA	*	12,960	114	28	62
*DJ3EF	*	11,532	77	39	54
*DL1AWC	*	11,088	91	24	48
*DL6UAM	*	9,295	145	9	56
*DL5ANS	*	8,418	65	24	45
*DL2KWW	*	7,102	43	28	39
*DK9IP	*	6,976	58	25	39
*DL7BA	*	6,716	61	25	48
*DL1ET	*	6,016	43	25	39
*DL2ASK	*	5,278	65	24	34
*DL5MG	*	4,800	42	19	31
*DF7SA	*	3,410	53	12	19
*DJ6XG	*	2,150	30	16	27
*DG0DG	*	1,457	21	12	19
*DL2BOV	*	6	1	1	1
***DL4LBK**	**28**	**28,124**	**156**	**23**	**66**
*DJ4FZ	*	13,518	103	20	45
*DJ7PT	*	13,320	110	22	50
*DL5RBR	*	8,757	80	19	44
*DH8WE	*	60	10	3	4
***DL3BRA**	**21**	**79,911**	**313**	**31**	**86**
*DL2MIH	*	3,960	55	14	19
***DL1LH**	**14**	**256,247**	**929**	**35**	**116**
*DL4AAE	*	129,480	559	29	101
*DL3DTH	*	85,541	432	28	85
*DL9LM	*	69,443	359	26	93
*DL8DXL	*	748	24	9	13
***DJ2XC**	**7**	**52,826**	**333**	**27**	**95**
*DK5IM	*	22,632	288	12	57
*DJ2YE	*	19,950	234	11	59
*DL1TS	*	14,630	156	16	61
*DL2QT	*	11,100	149	12	48
*DJ4IC	*	8,820	173	13	50
***DJ5GG**	**3.5**	**35,096**	**361**	**17**	**65**
*DK8JH	*	9,333	173	7	44
*DL3DRN	1.8	4,042	89	6	37
*DF3IS	*	1,800	76	5	31
*DL2AXM	*	1,225	58	3	22

GREECE

SV1DPI	**A**	**110,432**	**288**	**68**	**170**
SV8CS	*	11,520	72	32	64
SV1RP	**1.8**	**20,769**	**516**	**11**	**58**
***SV1BUU**	**A**	**250,190**	**1204**	**50**	**147**
*SV1JA	*	51,495	190	58	100
***J43J**	**21**	**424,760**	**1770**	**34**	**114**
					(OP: DJ5JH)
*SV1ENG	*	133,488	938	26	82
***SV1BJW**	**14**	**239,136**	**1267**	**33**	**108**

GUERNSEY

GU4CHY	**14**	**487,832**	**2076**	**34**	**102**
GU4YOX	**7**	**321,536**	**1645**	**28**	**100**
GU4EON	**3.5**	**20,286**	**307**	**11**	**52**
*2U0GSY	A	480	32	7	25
***MU0FAL**	**21**	**44,268**	**292**	**29**	**64**
***GU0SUP**	**14**	**43,076**	**279**	**22**	**67**

HUNGARY

HA8A	**A**	**3,829,344**	**3133**	**161**	**517**
HA0HW	*	814,645	1120	96	319
HG8Z	**28**	**108,406**	**380**	**34**	**180**
					(OP: HA8UT)
HA8LP	**14**	**65,572**	**534**	**23**	**77**
HA8DU	**7**	**714,444**	**2494**	**38**	**136**
HG8R	*	711,525	2332	36	143
HA8GY	*	199,510	927	30	112
HA6NL	**3.5**	**180,177**	**1267**	**24**	**85**
HA8BE	**1.8**	**117,059**	**1025**	**21**	**80**
***HA7WT**	**A**	**107,899**	**463**	**46**	**141**
*HA2MN/5	*	102,074	399	48	113
*HA1SN	*	58,812	242	50	124
*HA7PL	*	47,616	209	36	88
***HA3GJ**	**28**	**25,676**	**128**	**28**	**70**
*HA3GQ	*	5,445	43	23	32
*HA6QD	*	646	15	8	11
***HG8I**	**21**	**304,022**	**1028**	**34**	**108**
*HA6NW	*	96,660	363	28	80
*HA5X	*	58,512	293	26	66
*HA5AO	*	49,179	227	27	70
*HA8UH	*	10,017	132	17	46
***HG4F**	**14**	**215,011**	**1049**	**34**	**93**
					(OP: HA4FF)
*HA8FK	*	202,184	910	32	95
*HA1VE	*	129,493	660	24	78
***HA6IAM**	**7**	**81,634**	**547**	**26**	**93**
*HA6QT	*	7,155	102	12	41

***HA8MD**	**3.5**	**132,114**	**1139**	**20**	**77**
*HA8CQ	*	4,452	101	7	35
		ICELAND			
TF3CW	**A**	**922,863**	**1831**	**69**	**214**
JI1NJC/TF	*	577,915	1602	55	166
***TF3GB**	**A**	**392,778**	**1070**	**49**	**168**
*TF3MA	*	3,724	43	16	22
		IRELAND			
EI4DW	**A**	**531,335**	**816**	**79**	**250**
EI2JD	*	188,160	592	62	183
***EI/SP4Z**	**A**	**1,154,550**	**1785**	**91**	**339**
***EI5DI**	*	**1,075,629**	**1619**	**82**	**308**
*EI7CC	*	62,643	199	48	109
*EI7JK	*	29,882	215	34	100
*EI9ES	*	2,009	45	10	31
***EI4CF**	**28**	**15,785**	**109**	**20**	**57**
***EI9JN**	**7**	**89,395**	**269**	**8**	**45**
		ITALY			
IR7G	**A**	**4,456,917**	**3697**	**150**	**471**
					(OP: N6AA)
IØ/N6CY	*	580,320	931	98	262
IK2UCK	*	472,056	747	85	227
IV3RLB	*	45,580	392	21	85
IO2A	*	39,114	173	46	113
			(OP: IK2RZP)		
IK1WEG	*	100	34	8	20
IU3X	**21**	**491,508**	**1394**	**35**	**127**
			(OP: IV3SKB)		
IK2AOO	*	44,737	264	22	61
IKØYUT	**14**	**52,164**	**494**	**15**	**48**
IK2AHB	**7**	**35,530**	**303**	**17**	**68**
IZ1GAR	**3.5**	**108,066**	**1153**	**17**	**66**
***IK4EWX**	**A**	**786,361**	**1142**	**98**	**303**
***IZ8DVD**	*	**419,040**	**814**	**93**	**267**
*IK4UNH	*	358,785	640	76	239
*IK2SND	*	169,890	645	53	157
*IK1YLL	*	163,750	418	69	193
*IK3ORD	*	145,934	363	72	190
*IK2AIT	*	116,242	401	46	115
*I2AZ	*	82,967	333	41	122
*IK5TUZ	*	63,794	302	45	122
*IN3ZWF	*	49,300	297	31	114
*IZ1DUG	*	46,782	179	38	100
*IK2NCF	*	43,977	200	39	98
*IZ1DXS	*	41,648	194	47	90
*IZ4DYX	*	38,252	281	29	102
*II2B	*	33,858	199	61	101
			(OP: IZ2BKC)		
*IK2WYI	*	28,282	142	29	50
*IK4ZHH	*	26,269	116	40	69
*IK2NUX	*	25,920	130	28	44
*IK8UND	*	25,132	166	38	84
*IK2RLS	*	22,790	108	34	72
*IZ2EJU	*	21,297	113	32	61
*IZ7EUB	*	20,634	107	40	74
*IK3OII	*	18,540	126	41	62
*IK2SAE	*	15,552	104	32	64
*IV3ARJ	*	11,938	110	27	67
*IV3IPS	*	8,352	48	29	43
*I5NOH	*	5,445	76	17	38
*IK2YSE	*	5,025	51	28	39
*IK5YJK	*	3,906	56	14	17
*IV3KSE	*	1,037	29	8	9
*IZ2FME	*	416	22	9	17
*IKØVAQ	*	198	6	5	6
***IR8M**	**28**	**943**	**15**	**11**	**12**
			(OP: IZ8CCW)		
***IØQM**	**21**	**76,960**	**376**	**27**	**77**
*IZ2FDU	*	24,414	192	25	53
***IU1A**	**14**	**162,810**	**781**	**34**	**100**
			(OP: IK1SPR)		
***IK3SSO**	**7**	**125,415**	**690**	**30**	**105**
***IR5B**	**3.5**	**17,344**	**260**	**12**	**52**
			(OP: I5VXG)		
		JERSEY			
***MJØASP**	**21**	**52,470**	**273**	**22**	**77**
		KALININGRAD			
UA2CZ	**A**	**111,456**	**326**	**47**	**169**
***UA2FT**	**A**	**201,544**	**695**	**42**	**194**
***RK2FXG**	**14**	**18,224**	**195**	**15**	**53**
		LATVIA			
YL6W	**A**	**1,865,860**	**1970**	**147**	**433**
					(OP: YL2GD)
YL2PQ	*	**1,708,200**	**2904**	**106**	**344**
YL2BJ	*	667,290	1213	97	293
YL2PA	*	200,020	539	66	208
YL2VW	**1.8**	**68,080**	**709**	**17**	**63**
***YL5M**	**A**	**1,449,053**	**2297**	**120**	**311**
					(OP: YL2UZ)
***YL5W**	*	**902,825**	**1322**	**111**	**358**
*YL2CV	*	406,224	645	85	318
*YL2PJ	*	287,100	532	83	236
*YL2TW	*	248,496	492	83	251
*YL2CZ	*	206,032	454	75	251
*YL2CR	*	155,262	609	52	177
*YL2IP	*	92,340	247	68	175
*YL2PN	*	86,963	307	49	150
*YL3GFR	*	65,626	372	35	122
*YL3GCU	*	35,814	328	28	113
*YL2II	*	29,729	229	32	105
***YL2HK**	**14**	**8,760**	**169**	**12**	**48**
***YL3DX**	**7**	**75,920**	**611**	**21**	**83**
***YL2NK**	**1.8**	**15,190**	**341**	**8**	**41**
		LITHUANIA			
LY1CX	**A**	**822,312**	**1301**	**95**	**328**
LY2MM	*	**821,844**	**1171**	**110**	**334**
LY3BU	*	444,144	1106	74	230
LY2OX	*	103,376	390	56	152
LY5R	*	98,196	305	59	137
LY3BH	*	21,306	132	39	95
LY3BN	**21**	**222,530**	**645**	**34**	**120**
LY7Z	**7**	**734,635**	**2332**	**38**	**147**
					(OP: LY2TA)
LY7M	**3.5**	**220,456**	**1311**	**30**	**106**
					(OP: LY2BW)
LY3UM	**1.8**	**114,777**	**991**	**26**	**83**
LY2KM	*	10,387	226	7	40
LY2LE	*	8,874	130	9	49
***LY9A**	**A**	**1,672,825**	**1852**	**129**	**424**
					(OP: LY3BA)
*LY2OO	*	439,956	956	86	277
*LY2OM	*	323,129	765	78	233
*LY1BX	*	244,557	675	66	195
*LY2AT	*	122,688	403	56	157
*LY2BOS	*	102,109	406	52	151
*LY2TX	*	92,901	425	40	133
*LY2DX	*	27,720	146	36	90
*LY3RA	*	19,503	103	32	67
*LY2BNL	*	17,622	216	15	74
*LY1DM	*	11,316	61	28	54
*LY2FF	21	7,742	103	13	36
***LY2TE**	**14**	**161,280**	**952**	**27**	**85**
*LY1DT	*	145,435	638	35	110
*LY2LF	*	61,655	404	24	71
*LY3ID	*	38,790	267	23	67
***LY6A**	**7**	**210,648**	**1120**	**31**	**103**
					(OP: LY2BM)
*LY2CJ	*	62,604	562	19	75
***LY1CT**	**3.5**	**104,742**	**930**	**19**	**80**
*LY2GW	*	84,830	862	15	70
*LY3CW	*	67,235	709	15	70
*LY2FN	*	18,444	401	9	44
***LY2OU**	**1.8**	**6,740**	**175**	**8**	**37**
		LUXEMBOURG			
LX1NO	**A**	**129,087**	**440**	**59**	**130**
***LX/G3VQO**	**A**	**717,282**	**1208**	**86**	**273**
*LX1JH	*	51,207	234	39	130
*LX1RQ	*	16,896	104	28	68
***LX1KC**	**7**	**11,396**	**119**	**16**	**61**
		MACEDONIA			
Z32AF	**3.5**	**36,982**	**354**	**15**	**67**
		MOLDOVA			
***ER5GB**	**1.8**	**41,210**	**636**	**18**	**55**
		NETHERLANDS			
PA3AAV	**A**	**1,756,950**	**2192**	**113**	**397**
PA5TT	*	768,587	896	113	380
PAØLOU	*	515,352	878	100	294
PA5KT	*	409,676	952	81	211
PA4T	*	112,424	270	58	130
PA2R	**14**	**282,480**	**964**	**37**	**128**
PA5WT	**7**	**55,104**	**458**	**19**	**77**
PAØBWL	*	18,544	194	17	59
***PA3BFH**	**A**	**649,571**	**1236**	**80**	**297**
***PAØADP**	*	**444,664**	**957**	**81**	**268**
*PA3EMN	*	415,324	818	74	252
*PAØJNH	*	403,544	958	60	232
*PA3DJY	*	222,640	798	56	164
*PA2W	*	128,594	421	55	171
*PA5O	*	120,780	366	48	132
*PA3ADJ	*	97,440	312	54	156
*PG7V	*	79,857	246	53	118
*PA5V	*	76,300	316	48	123
*PA3GBI	*	57,771	264	35	112
*PA5GU	*	41,401	202	37	80
*PA2ALF	*	31,408	160	36	68
*PA3GVI	*	29,718	201	32	85
*PAØFAW	*	28,462	241	32	101
*PAØLSK	*	21,632	158	28	76
*PA1BX	*	15,435	101	34	71
*PA3HGF	*	14,208	113	30	66
*PE1HWO	*	14,168	78	34	58
*PC2T	*	4,995	76	10	17
*PA3EZC	*	4,176	77	19	53
*PA3AQL	*	4,118	71	18	53
*PA3FGJ	*	390	10	7	8
***PABRRS**	**21**	**43,992**	**227**	**23**	**71**
*PA1XA	*	14,145	92	20	49
***PG4I**	**14**	**69,190**	**362**	**25**	**84**
*PAØB	*	6,480	110	12	36
***PA7XG**	**7**	**13,662**	**199**	**11**	**55**
*PA2CHM	*	3,619	93	10	34
***PAØMIR**	**3.5**	**24,960**	**346**	**10**	**55**
		NORTHERN IRELAND			
GI1W	**A**	**5,215,284**	**4909**	**137**	**497**
					(OP: GIØNWG)
		NORWAY			
LA3ANA	**A**	**650,167**	**1572**	**77**	**240**
LA7SI	*	140,454	397	65	178
LA8XM	*	67,076	199	43	121
LA2IJ	*	37,668	151	42	104
LA4LN	*	33,519	120	48	90
LA2O	**3.5**	**18,816**	**430**	**8**	**48**
***LA3S**	**A**	**839,016**	**1494**	**81**	**306**
					(OP: LA3BO)
*LA8OM	*	152,872	519	47	150
*LA7TO	*	37,366	223	31	88
*LA1PHA	*	27,126	151	29	70
*LB8AE	*	17,500	145	25	75
*LA8GK	*	7,668	58	29	42
*LA4NE	*	6,829	49	35	45
*LA5XQ	*	6,210	98	23	67
*LA9AU	*	1,491	36	10	11
*LA9DK	21	9,614	135	11	27
***LA1YE**	**14**	**53,010**	**394**	**22**	**68**
*LA1QDA	*	27,740	265	15	61
***LA8WG**	**1.8**	**8,008**	**195**	**7**	**41**
		POLAND			
SP4BEU	**A**	**883,680**	**1164**	**107**	**313**
SP2QG	*	**802,872**	**1318**	**96**	**317**
SP6A	*	535,600	979	97	303
SP6IEQ	*	410,696	536	98	261
SP2IU	*	334,800	707	81	229
SP9KRT	*	272,640	944	83	272
SP2HYO	*	108,454	270	64	147
SQ3A	*	60,680	357	37	111
SQ7B	*	57,984	254	47	145
SP4AVG	*	53,682	217	35	103
SP9ATE	*	40,600	530	23	77
SP3CUG	*	13,959	91	39	60
SP2BKX	*	660	93	18	48
SP6EQZ	**28**	**28,210**	**161**	**27**	**64**
SP5GH	*	11,963	63	30	64
SP2FWC	**21**	**99,036**	**380**	**30**	**101**
SO2R	**14**	**788,072**	**2104**	**40**	**144**
					(OP: SP2FAX)
SP9NLK	*	360,360	1276	35	120
SO4MP	*	150,420	754	26	89
SP4DEU	**7**	**319,113**	**1315**	**34**	**125**
SP9W	*	59,623	422	26	83
SP9QJL	*	26,330	223	18	69
SN3A	**3.5**	**541,650**	**2065**	**33**	**124**
SP5DIR	*	78,960	622	22	83
SP3BQ	**1.8**	**155,870**	**1167**	**27**	**82**
					(OP: SP8NR)
SP7JQQ	*	52,224	761	12	56
SP2GJV	*	38,927	581	12	55
***SP4R**	**A**	**1,909,200**	**1972**	**145**	**447**
***SP9DAE**	*	**842,996**	**1520**	**85**	**289**
***SP4JCQ**	*	**824,772**	**1557**	**107**	**335**
*SP9GFI	*	561,792	1088	78	274
*SP2DNI	*	553,602	1133	82	261
*SP6LV	*	506,726	1099	78	263
*SQ9FMU	*	485,082	884	81	270
*SP2HPD	*	445,484	995	78	260
*SP3ASN	*	433,225	839	73	252
*SN6A	*	383,724	856	84	222
			(OP: SP6CES)		
*SQ9MZ	*	367,291	722	85	226
*SP5LGS	*	313,617	779	75	246
*SP3DIK	*	293,664	671	74	202
*SP6BEN	*	259,558	520	77	221
*SP3V	*	219,457	414	81	212
*SP6TRX	*	199,515	488	73	210
*3Z8Z	*	190,896	447	69	177
			(OP: SP8AJC)		
*SP1NY	*	185,261	572	59	170
*SP2GMA	*	177,475	424	64	165
*SP3OL	*	173,880	578	56	174
*SQ9DXN	*	163,098	467	56	165
*SP8EDD	*	149,868	508	55	152
*SP9ODL	*	145,644	386	62	150
*SP5MBA	*	142,680	359	64	182
*SP8FHJ	*	136,800	525	58	182
*SP3DOF	*	135,876	349	60	141
*SP9LAS	*	132,132	341	62	180
*SP9FT	*	126,166	364	53	146
*SP8JUS	*	122,562	480	46	152
*SP7FAH	*	120,802	352	62	147
*SP3JUN	*	112,012	354	48	116
*SP9IHP	*	104,228	259	51	91
*SP9UMJ	*	101,430	313	46	101
*SP2AYC	*	96,695	227	54	179
*SQ6NES	*	93,526	269	64	138
*SP3HC	*	86,320	365	45	121
*SP3DSC	*	74,185	390	50	135
*SP3XR	*	70,839	322	39	114
*SP9IBJ	*	56,154	295	37	110
*SP9ODY	*	54,014	194	43	70
*SP9GKM	*	52,390	185	42	127
*SO1RON	*	49,612	278	40	117
*SP4AAZ	*	45,600	272	50	150
*SP1DTG	*	41,888	135	52	102
*SP7FBQ	*	40,086	226	29	102
*SP9MCU	*	37,629	196	33	78
*SP2HXY	*	36,352	196	41	101
*SP2IW	*	35,866	193	48	110
*SP7CXV	*	31,320	92	60	85
*SP3MEP	*	30,629	225	30	79
*SP1DOZ	*	28,194	139	36	91
*SP6GJY	*	22,018	153	31	78
*SP7BDS	*	20,952	194	24	84
*SP2MKI	*	19,594	107	35	66
*SP1DPA	*	17,500	76	34	66
*SP5ULV	*	17,025	84	30	45
*SP7EXJ	*	14,688	76	44	64
*SP6DNZ	*	11,132	59	36	56
*SP5CGN	*	9,798	53	30	41
*SP3PLD	*	9,744	52	38	49
			(OP: SP3IBM)		
*SP6BSL	*	5,561	37	30	37
*SP5ELW	*	3,630	60	29	37
*SP9KJU	*	3,002	35	14	24
*SP3CDQ/2	*	1,704	28	10	14
*SP2DKJ	*	1,650	29	12	18
*SP9SOU	*	1,386	22	13	20
*SP3JIA	*	1,147	33	9	22
*SP3BJK	*	432	12	12	12
*SP3SLA	*	325	9	6	7
*SP1RWA	*	96	4	4	4
***SQ4NR**	**28**	**60,393**	**278**	**29**	**94**
*SQ6ELV	*	28,170	134	27	63
*SP2EXN	*	9,360	105	27	63
***SP2AVE**	**21**	**84,478**	**382**	**31**	**95**
*SP3PL	*	78,125	291	31	94
*HF7ØAOT	*	17,816	159	23	45
			(OP: SP3AOT)		
*SP6DMI	*	9,116	83	14	39
*SP7ENU	*	4,516	92	20	40
*SP5ENG	*	4,042	46	16	27
*SP6DHH	*	3,151	72	10	19
*SP8DHJ	*	2,039	27	13	23
***SN5Z**	**14**	**167,532**	**687**	**31**	**107**
					(OP: SP7NJX)
*SP8BAB	*	105,462	448	29	97
*SP9IKN	*	1,255	34	7	14
*SP1BLE	*	916	56	4	20
*SQ5EK/6	*	540	10	8	10
***SP3CCT**	**7**	**152,615**	**921**	**29**	**102**
*SP9EMI/9	*	51,615	270	26	85
*SP5CNA	*	34,594	290	21	77
*SP4GHL	*	16,416	228	18	58
*SP5BNB	*	11,935	118	19	58
*SP7FGA	*	4,903	56	14	40
*SP6LMX	*	3,822	106	8	41
*SP9LWH	*	425	13	6	11
***SP5KEH**	**3.5**	**141,350**	**1100**	**23**	**87**
					(OP: SP5JTF)
*SN2N	*	120,696	1067	24	83
			(OP: SP2ASJ)		
*SP9XCN	*	109,564	1007	16	75
*SP3VT	*	90,489	862	18	75
*SQ9IET	*	57,096	701	10	68
*SP8BVN	*	52,516	635	13	63
*SN5J	*	36,500	467	10	63
			(OP: SP5JXK)		
*SP7JOA	*	28,470	298	15	58
*SP9DUX	*	12,320	199	8	48
*SP9UOP	*	6,864	156	8	40
***SP7HKK**	**1.8**	**12,685**	**333**	**6**	**37**
*SP2HMT	*	8,832	179	8	40
*SP6IHE	*	7,392	160	7	41
*SP9PZU	*	7,348	193	6	38
			(OP: SP9WR)		
*SQ7FPD	*	5,890	155	5	33
		PORTUGAL			
CT8T	**A**	**6,646,626**	**5437**	**139**	**503**
					(OP: OH1NOA)
***CT7B**	**A**	**4,741,380**	**3966**	**137**	**502**
					(OP: CT1ILT)
*CT1EEN	*	417,788	677	82	265
*CT1DJE	*	76,440	207	51	131
***CT1AOZ**	**28**	**163,215**	**596**	**38**	**87**
***CT4DX**	**14**	**21,525**	**148**	**26**	**79**
*CT1FNT	3.5	7,832	82	7	37
		ROMANIA			
YP3A	**A**	**4,670,469**	**3970**	**157**	**534**
					(OP: YO9GZU)
YR7M	*	**2,669,651**	**3758**	**111**	**350**
					(OP: YO3JR)
YO7BGA	*	686,154	1267	87	270
YO9BGV	*	8,694	90	18	36
YO6BHN	**14**	**346,860**	**1278**	**36**	**128**
YO2AQB	**3.5**	**34,385**	**466**	**17**	**56**
YR2I	**1.8**	**125,557**	**1083**	**22**	**81**
					(OP: YO2LDC)
YO2RR	*	15,552	338	7	41
***YO3APJ**	**A**	**2,257,668**	**2267**	**138**	**440**
*YO5CBX	*	319,056	758	74	215
*YO7LGI	*	259,000	599	65	194
*YO3FRI	*	234,256	480	84	242
*YO5CRQ	*	198,004	492	71	165
*YO4AAC	*	195,803	579	58	200
*YO8KGA	*	149,295	686	42	143
*YO3BL	*	117,208	385	57	139
*YO4GDP	*	94,830	400	45	129
*YO2GL	*	80,030	284	47	104
*YO4CSL	*	75,294	354	36	155
*YO8MI	*	49,586	324	37	120
*YO3RZ	*	45,731	149	48	91
*YO8RFS	*	30,459	233	36	107
*YO7AWZ	*	28,457	229	37	106
*YO9FYP	*	27,615	186	31	74
*YO8MF	*	21,448	124	23	88
*YO3FN	*	7,235	60	23	40
*YO7HHI	*	5,328	100	23	49
*YO7ARY	*	5,070	89	28	50
*YO7BGB	*	2,706	57	14	27
*YO7LTQ	*	1,540	55	16	28
*YO7ARZ	*	1,104	22	10	13
*YO7LYM	*	1,014	56	14	25
***YO3JW**	**28**	**5,060**	**57**	**14**	**30**
***YO9AGI**	**21**	**75,544**	**399**	**29**	**81**
*YO6EZ	*	8,250	117	15	40
*YO4AH	*	6,519	82	15	38
***YO6EX**	**14**	**88,258**	**604**	**29**	**88**
*YO8BIG	*	87,714	695	22	77
*YO4BBH	*	31,463	283	21	64
*YO8RIX	*	19,050	194	17	58
***YO2/DL1CW**	**7**	**68,432**	**537**	**25**	**79**
*YO2CJX	*	49,632	422	20	74
*YO8BPY	*	27,544	248	21	67
*YO6CFB	*	19,180	231	14	56
*YO8OT	*	2,770	45	11	31
*YO2LGW	*	1,972	59	6	28
		SARDINIA			
ISØHQJ	**A**	**483,000**	**1124**	**65**	**185**
***ISØSDX**	**21**	**110,288**	**544**	**31**	**91**
***ISØUWX**	**14**	**11,440**	**122**	**28**	**50**
***ISØRDY**	**3.5**	**11,448**	**216**	**6**	**47**
		SCOTLAND			
GMØF	**A**	**1,484,366**	**1948**	**112**	**369**
					(OP: GM4AFF)
GM2Z	*	**1,022,925**	**1962**	**78**	**267**
					(OP: MMØDFV)
GM4SID	*	414,936	947	60	246
MMØMSS	*	50,384	160	52	136
GM4YXI	**3.5**	**197,496**	**1386**	**22**	**82**
***GM4FAM**	**A**	**1,282,560**	**1593**	**108**	**393**
*GM7TUD	*	24,150	119	35	70
***GM3CFS**	**21**	**49,985**	**269**	**24**	**83**
		SICILY			
***IT9ORA**	**A**	**537,294**	**981**	**82**	**274**
*IT9GXE	21	2,176	60	10	22
		SLOVAK REPUBLIC			
OM3DX	**A**	**209,135**	**390**	**59**	**218**
OM3MB	21	17,446	109	22	39
OM7PY	**7**	**54,556**	**560**	**21**	**71**
OM6NM	**3.5**	**129,066**	**1052**	**18**	**80**
***OM8AQ**	**A**	**836,836**	**1196**	**104**	**314**
*OM8ON	*	830,793	861	116	351
*OM7CA	*	811,642	1339	102	301
*OM4DN	*	723,026	1196	82	277
*OM6RM	*	608,047	1281	72	259
*OM7AG	*	544,255	1111	73	250
*OM5NL	*	436,840	868	77	249
*OM4WW	*	419,263	885	80	256
*OM7YC	*	254,856	553	73	186
*OM3TZO	*	204,580	654	55	157
*OM7AT	*	204,077	534	47	110
*OM3BA	*	143,226	463	52	167
*OM1AW	*	140,526	468	51	171
*OM5UM	*	130,168	516	44	168
*OM4DA	*	112,704	446	42	150
*OM3TLE	*	105,123	385	46	155
*OM3GB	*	54,264	182	43	71
*OM6AL	*	52,608	416	44	148
*OM3CFR	*	23,377	209	31	66
*OM7VF	*	20,048	108	37	75
*OM1TD	*	7,854	131	21	56
***OM3OM**	**21**	**170,952**	**563**	**33**	**103**
*OM8HG	*	33,440	178	25	51
***OM2AK**	**14**	**83,780**	**426**	**30**	**88**
*OM3ROM	*	62,100	382	21	71
			(OP: OM4TQ)		
*OM5NA	*	61,152	348	24	80
***OM6TX**	**7**	**44,620**	**358**	**20**	**72**
*OM8AG	*	1,288	25	10	18
***OM7RU**	**3.5**	**65,373**	**753**	**13**	**64**
***OMØTT**	**1.8**	**23,517**	**497**	**9**	**46**
*OM7TJ	*	7,409	200	7	37
		SLOVENIA			
S57DX	**A**	**3,675,246**	**3293**	**158**	**468**
S53XX	*	**2,077,634**	**2092**	**139**	**394**
S52OP	*	1,411,611	1830	104	315
S52EZ	**3.5**	**269,862**	**1545**	**28**	**95**
S52W	*	119,082	1028	18	71
S57M	**1.8**	**118,464**	**1139**	**20**	**76**
***S57U**	**A**	**1,278,536**	**1537**	**106**	**370**
***S54X**	*	**1,081,080**	**1332**	**111**	**357**
*S51RJ	*	925,760	1183	106	334
*S51MF	*	226,443	387	90	197
*S51DX	*	57,440	331	43	117
*S58RU	*	52,536	408	51	148
***S57L**	**21**	**209,166**	**647**	**35**	**107**
*S53AK	*	120,756	579	30	86
***S52GO**	**14**	**90,132**	**490**	**29**	**87**
***S54A**	**7**	**249,312**	**1140**	**33**	**126**
*S57Z	*	211,068	1148	33	110
*S51NM	*	26,350	157	22	63
***S53F**	**3.5**	**129,164**	**1126**	**19**	**79**
*S59N	*	97,064	1131	17	71
***S58J**	**1.8**	**6,854**	**157**	**6**	**40**
		SPAIN			
EA5FV	**A**	**4,448,125**	**3809**	**141**	**484**
EA2URD	*	**1,632,280**	**2283**	**107**	**323**
EA4KA	*	928,620	1460	75	233
EA1JO	*	515,970	845	84	267
EA1FD	*	442,555	987	75	230
EA7CA	*	124,218	361	51	150
EA3NB	*	13,260	71	31	54
EA5HT	**28**	**154,854**	**644**	**31**	**95**
EA3AKY	**14**	**637,920**	**2219**	**39**	**121**
***EA7RM**	**A**	**3,152,800**	**2861**	**124**	**439**
***EA4NP**	*	**1,721,937**	**2062**	**115**	**386**
***EA4DRV**	*	**1,590,105**	**2239**	**97**	**322**
*EA7TG	*	1,391,688	1763	99	309
*EA2AZ	*	1,344,688	2071	106	352
*EA7AJR	*	955,240	1392	85	249
*EA7WA	*	751,365	1425	71	212
*EA2BNU	*	727,583	1187	81	256
*EA2PA	*	659,543	1518	71	222
*EA7MT	*	388,800	710	76	244
*EA5EOH	*	243,651	439	72	169
*EA1CXH	*	212,298	505	57	189
*EA3BOW	*	156,844	515	57	169
*EA3ESE	*	137,144	383	61	156
*EA7CWA	*	131,502	328	58	144
*EA4TX	*	99,704	423	39	64
*EA5DCL	*	91,125	210	74	169
*EA3ALV	*	85,020	260	52	143

*SM3D	*	117	8	6	7	
			(OP: SM3WMU)			
***7S7V**	**14**	**166,500**	**618**	**36**	**114**	
			(OP: SM7VZX)			
***SM3JUR**	**7**	**10,416**	**176**	**10**	**46**	
***SM5AQI**	**3.5**	**2,300**	**66**	**6**	**32**	
		SWITZERLAND				
HB9CPS	**A**	**362,260**	**751**	**67**	**240**	
HB9APJ	*	172,702	530	63	160	
HB9IQB	**14**	**167,314**	**715**	**32**	**101**	
***HB9CZF**	**A**	**1,123,402**	**1476**	**107**	**299**	
*HB9ARF	*	904,285	1196	103	312	
*HB9DCM	*	582,912	814	109	305	
*HB9HQX	*	90,246	456	33	136	
*HB9AUS	*	7,344	66	26	42	
***HB9CBR**	**14**	**45,632**	**294**	**23**	**69**	
		UKRAINE				
UV5U	**A**	**2,001,926**	**1976**	**141**	**430**	
			(OP: UX1UA)			
UY5HF	*	**1,174,580**	**1402**	**120**	**402**	
UY5ZZ	*	888,000	1226	121	359	
UR6QS	*	857,120	1293	108	332	
US5II	*	777,096	1024	122	380	
UT2UB	*	651,744	1110	107	331	
UR7EQ	*	627,900	1330	76	274	
UT4EK	*	611,292	986	93	270	
UT5ECZ	*	216,916	620	59	195	
UY3OW	*	132,924	745	31	128	
UTØIL	*	56,924	298	32	101	
US7IB	*	39,295	163	45	100	
UR5IAW	**21**	**294,600**	**1226**	**35**	**115**	
UU5WW	*	110,998	534	32	95	
U5WF	**14**	**305,456**	**1269**	**31**	**105**	
UU1JO	*	16,605	166	18	52	
UT4ZG	**3.5**	**75,050**	**771**	**16**	**63**	
US2WU	*	70,406	665	21	86	
UX7IA	*	56,120	484	20	72	
UR4ZWL	*	43,384	572	12	56	
			(OP: UT5ZA)			
UT7NY	*	18,323	184	19	54	
UY8ZG	**1.8**	**45,372**	**547**	**12**	**64**	
***UR3HC**	**A**	**1,657,436**	**1777**	**132**	**424**	
***UT2UZ**	*	**1,029,000**	**1230**	**115**	**375**	
*UY8IF	*	942,208	1021	125	419	
*UV1G	*	712,391	1541	82	265	
			(OP: UT7GX)			
*UX4UA	*	642,948	989	95	298	
*UW5U	*	570,044	1190	78	254	
			(OP: UY2UA)			
*UY5TE	*	464,224	1021	73	253	
*US0KW	*	384,395	902	84	235	
*UY5ZJ	*	369,555	666	93	254	
*US3QQ	*	310,156	726	71	237	
*UR8IDX	*	288,904	655	76	232	
*US6IMA	*	284,484	678	78	236	
*UR5FAV	*	191,111	549	64	159	
*UT7WR	*	167,958	496	53	164	
*UR5FS	*	107,282	307	60	134	
*UX8IR	*	98,072	276	54	130	
*UT2QQ	*	94,920	342	68	158	
*UU7JN	*	94,552	271	71	141	
*UX3MZ	*	84,318	387	34	107	
*UR3IQO	*	82,824	304	39	135	
*US7IID	*	77,385	268	44	121	
*UTØRM	*	31,428	210	30	78	
*UT1IA	*	24,592	138	27	79	
*UT8EL	*	5,244	106	18	58	
*UR7MA	*	4,002	53	24	34	
*UR7EM	*	3,432	50	14	38	
***UY5YA**	**28**	**11,470**	**107**	**24**	**50**	
***UT3FM**	**21**	**141,960**	**578**	**30**	**100**	
*UX5EF	*	56,487	257	28	80	
*UX3HA	*	12,739	163	14	40	
***US7IGF**	**14**	**275,710**	**1088**	**35**	**123**	
***UXØZX**	*	**165,688**	**744**	**34**	**105**	
*UY5LQ	*	118,000	842	24	76	
*UX7QD	*	101,280	718	18	78	
*UT5KO	*	90,480	532	26	78	
*UT4NY	*	88,704	515	24	88	
*UT1IR	*	59,706	297	24	83	
*UY5OQ	*	29,484	249	18	60	
*UT5JAB	*	18,634	423	19	58	
*UR7QM	*	18,200	144	18	52	
*UT3EK	*	4,214	73	10	39	
*UT5EPP	*	1,040	34	6	20	
***USØHZ**	**7**	**53,447**	**386**	**20**	**77**	
*UY7LM	*	29,400	347	20	80	
***UY6IM**	**3.5**	**99,064**	**756**	**26**	**90**	
*UR5IKN	*	26,676	235	13	63	
*UR8QR	*	18,239	302	9	52	
***UT1FA**	**1.8**	**29,504**	**461**	**10**	**54**	
*US4EX	*	23,838	422	8	50	
*UR8RF	*	15,930	246	10	49	
*USØIV	*	12,173	273	9	38	
*UT3NK	*	9,870	259	6	36	
*US8ICM	*	6,952	197	8	36	
		WALES				
MW5A	**A**	**3,378,080**	**3599**	**116**	**375**	
			(OP: G3WVG)			
GW3NJW	*	1,549,583	2253	91	336	
GW3JXN	*	252,120	513	80	184	
***GW4MVA**	**A**	**240,240**	**402**	**68**	**240**	
*GWØETF	*	127,624	365	47	125	
*MWØYDX	*	48,100	225	38	92	
*GW3KJN	*	31,815	205	26	79	
***GW3INW**	**28**	**9,384**	**109**	**20**	**48**	
		YUGOSLAVIA				
YZ1V	**28**	**60,255**	**239**	**29**	**74**	
			(OP: YZ1ZV)			
YZ5Z	**21**	**449,225**	**1527**	**37**	**125**	
YT6A	**14**	**901,458**	**2750**	**40**	**143**	
YZ9A	*	704,802	2172	39	134	
YU7CF	*	270,340	1143	34	106	
YT9M	*	173,007	898	34	107	
YT7A	**7**	**771,711**	**2497**	**38**	**145**	
YTØA	*	697,048	2277	38	140	
			(OP: YZ1BX)			
YU7AV	**3.5**	**389,536**	**1846**	**33**	**115**	
4N8A	*	122,995	1265	21	64	
			(OP: YU1KR)			
YU1CC	*	42,675	505	13	62	
YZ7A	**1.8**	**100,905**	**1041**	**20**	**73**	
			(OP: YU7KC)			
YU7BW	*	26,775	403	12	51	
***4NØW**	**A**	**2,551,060**	**2876**	**134**	**423**	
			(OP: YT7AW)			
*YU1EQ	*	719,940	998	107	319	

*YU8/OK1CRM	*	505,254	1166	82	239	
*YU7AM	*	480,004	842	82	234	
*YU1ED	*	68,322	255	46	131	
*YU1JW	*	14,464	213	34	94	
***4N1N**	**28**	**80,228**	**337**	**31**	**93**	
***YT7Z**	**21**	**454,020**	**1369**	**36**	**125**	
			(OP: YU7EE)			
*YT1RA	*	192,172	973	25	82	
*YU1IG	*	158,873	551	33	110	
*YU1EL	*	130,698	504	32	105	
*YU1HH	*	27,141	200	23	60	
*YZ1EZ	*	18,928	473	30	82	
***YZ2A**	**14**	**489,372**	**1783**	**37**	**119**	
			(OP: YZ1AU)			
*YU7KM	*	52,042	343	25	76	
***YZ1W**	**7**	**515,732**	**2204**	**35**	**128**	
			(OP: YZ1TT)			
*4N1FG	*	508,680	1975	32	125	
*YU1LA	*	228,816	1064	31	113	
*YT6Y	*	107,734	640	23	95	
*YU2A	*	30,515	289	17	68	
*YU7HC	*	11,214	138	12	51	
***YU7CB**	**3.5**	**192,572**	**1186**	**29**	**95**	
***YT2A**	*	**159,430**	**1225**	**21**	**86**	
*YZ5W	*	138,075	1169	22	83	
			(OP: YZ1EW)			
*YU1BN	*	23,622	373	10	52	
***YU1RA**	**1.8**	**25,515**	**417**	**9**	**54**	
*YU1AST	*	8,976	217	6	38	

OCEANIA

AUSTRALIA

VK1KI	**A**	**5,137,182**	**3622**	**161**	**352**
VK4BUI	*	178,996	241	90	202
VK7GN	*	43,648	195	40	48
VK2CZ	**28**	**15,540**	**95**	**24**	**46**
VK6LW	**14**	**1,055,835**	**2236**	**39**	**126**
VK6DXI	**3.5**	**103,140**	**487**	**25**	**65**
***VK2IMM**	**A**	**621,960**	**782**	**95**	**197**
*VK2NU	*	391,552	535	92	212
*VK8AV	*	371,841	435	99	218
*VK2GR	*	111,162	298	67	124
*VK3DBQ	*	27,474	139	45	69
*VK3YB	*	8,064	64	26	38
***VK4AN**	**21**	**96,390**	**281**	**30**	**96**
***VK4DX**	**14**	**138,496**	**390**	**32**	**96**

COCOS-KEELING ISLAND

VK9AA	**A**	**5,341,410**	**3548**	**137**	**405**
			(OP: VK2IA)		

EAST MALAYSIA

9M6NA	**A**	**6,316,800**	**3926**	**156**	**408**
			(OP: JE1JKL)		
9M8YY	**7**	**370,370**	**989**	**35**	**95**
			(OP: JR3WXA)		

GUAM

KH2/WX8C	**A**	**2,089,278**	**2126**	**124**	**218**
WH2A	**21**	**900,136**	**2209**	**35**	**113**
			(OP: KG6DX)		

HAWAII

KH6NF	**A**	**1,492,504**	**2130**	**101**	**153**
			(OP: KH6SH)		
KH6BK	*	495,948	809	92	130
K1ER/KH6	*	25,560	116	42	48
KH7Q	**21**	**879,573**	**2621**	**37**	**86**
KH7X	**14**	**1,156,809**	**2487**	**38**	**129**
			(OP: KH6ND)		
AH6OZ	**3.5**	**98,766**	**751**	**21**	**33**
***KH6/NØCO**	**A**	**64,630**	**241**	**53**	**62**
*KH6/WØCN	*	54,064	195	49	60
*AH6HH	*	47,594	176	48	58
*KH6FI	*	18,837	82	43	48

INDONESIA

YEØX	**3.5**	**58,872**	**311**	**24**	**64**
			(OP: OK1JR)		
***YBØWWW**	**A**	**258,852**	**495**	**74**	**148**
*YB7XO	*	12,068	96	24	30
***YB5QZ**	**28**	**64,872**	**363**	**21**	**51**
***YD3KWR**	**21**	**23,668**	**212**	**19**	**42**
*YB2OBL	7	11,200	88	23	41

MARSHALL ISLANDS

***V73NS**	**A**	**235,320**	**609**	**78**	**81**

NEW ZEALAND

ZL2AZ	**A**	**281,939**	**443**	**102**	**172**
ZL3JT	*	152,272	271	93	155
ZL2BR	**7**	**417,571**	**1274**	**30**	**89**
***ZL3TE**	**A**	**979,803**	**1220**	**104**	**193**

NORFOLK ISLAND

***VK9NW**	**A**	**994,994**	**1268**	**96**	**190**
			(OP: K9NW)		

NORTHERN MARIANAS

WHØV	**A**	**898,450**	**1142**	**117**	**185**

PHILIPPINES

DU3NXE	**A**	**798,684**	**1163**	**84**	**168**
DUØ/NØNM	*	**751,917**	**1079**	**96**	**167**

SOUTH COOK ISLANDS

***ZK1DRA**	**7**	**115,215**	**673**	**25**	**51**
			(OP: W7DRA)		

SOUTH AMERICA

ANTARCTICA

EM1HO	**A**	**978,287**	**1344**	**79**	**184**
			(OP: UX2UO)		
***R1ANB**	**A**	**227,056**	**496**	**53**	**131**

ARGENTINA

LU7EE	**A**	**2,127,788**	**2096**	**112**	**265**
LU7DIR	*	229,008	611	50	106
LPØH	**21**	**762,682**	**2113**	**35**	**107**
			(OP: LU7HN)		
***LW5EE**	**A**	**788,914**	**1143**	**81**	**178**
*LU1EWL	*	526,452	1132	73	121
*LU2XX	*	320,494	925	40	102
***LT7W**	**28**	**506,883**	**1477**	**29**	**94**
*LW2DX	*	20,916	198	15	27
***LU5FC**	**21**	**664,724**	**1769**	**33**	**104**
***LO2F**	*	**661,149**	**1852**	**35**	**106**
			(OP: LW9EOC)		
*LU8HZ	*	183,582	742	25	68
*LW5DD	*	11,160	117	21	41
***LU5FF**	**14**	**331,835**	**1006**	**33**	**100**

*LU4HKN	*	57,015	345	23	40
*LU8ADX	3.5	864	18	11	13
		ARUBA			
P4ØQ	**A**	**10,597,877**	**6406**	**141**	**448**
			(OP: KBØQ)		
P43JB	**21**	**176,815**	**743**	**26**	**81**
P4ØJ	**7**	**936,720**	**2465**	**33**	**111**
			(OP: WX4G)		
		BRAZIL			
PT2ZEG	**A**	**39,298**	**194**	**35**	**63**
PS2E	**28**	**415,758**	**1186**	**34**	**99**
			(OP: PY2EX)		
PX2A	**21**	**365,864**	**861**	**38**	**114**
			(OP: PY2WB)		
PS2T	**14**	**994,004**	**2237**	**38**	**125**
			(OP: PY2NY)		
PY7ZY	**7**	**349,568**	**1032**	**29**	**99**
***PY3DX**	**A**	**430,650**	**635**	**90**	**185**
***PY5BLG**	*	**336,564**	**756**	**68**	**120**
*PY3OL	*	296,370	468	83	184
*PY7GK	*	167,528	434	57	115
*PY7EG	*	160,083	427	51	96
*PY3AU	*	138,075	311	61	114
*PT2BW	*	129,398	286	66	128
*PP2JT	*	97,410	238	56	114
*PY8DAN	*	68,607	287	42	79
*PY7OJ	*	31,496	107	51	73
*PP7CW	*	26,536	139	39	68
*PY4PW	*	19,598	164	36	46
*PR7NJ	*	12,155	100	31	54
*PY2BRZ	*	6,908	61	22	22
*PR7HR	*	5,616	57	22	26
*PT7VB	*	1	2	2	2
*PW8OO	*	1	1	1	1
***PY4CEL**	**28**	**39,748**	**211**	**24**	**52**
*PY1MK	*	11,592	173	12	16
*PT2IW	*	8,548	66	18	36
***PY2NA**	**21**	**498,641**	**1299**	**33**	**110**
*PY8MGB	*	134,865	629	20	61
*PY4FQ	*	103,272	372	27	77
*PY3FBI	*	93,156	428	26	58
*PY2IQ	*	11,562	98	19	28
*PY4MVL	*	1,959	41	9	16
***ZZ8Z**	**14**	**560,120**	**1364**	**35**	**117**
			(OP: PY8AZT)		
*PY3CGX	*	100	13	7	8
***PV8DX**	**7**	**272,160**	**892**	**24**	**84**
*PV8AA	3.5	2,184	58	6	7
		CHILE			
***XQ4ZW**	**A**	**1,555,245**	**1776**	**99**	**222**
		COLOMBIA			
HK1XX	**14**	**910,364**	**2152**	**39**	**125**
***5K5Z**	**14**	**618,788**	**1540**	**35**	**113**
			(OP: N7BG)		
		GUYANA			
8R1K	**21**	**1,316,412**	**3145**	**34**	**119**
			(OP: OH8XX)		
		URUGUAY			
CX5BW	**28**	**1,196,183**	**3134**	**34**	**107**
CX6VM	*	1,086,192	2492	35	117
CX7BY	**21**	**612,549**	**1486**	**36**	**111**
CX7CO	**7**	**152,110**	**603**	**28**	**78**
***CW2A**	**21**	**438,216**	**1250**	**31**	**93**
			(OP: SM4DHF)		
***CX5AO**	**14**	**799,444**	**1847**	**38**	**119**
*CX9AU	*	504,668	1317	33	109
		VENEZUELA			
4M5X	**14**	**1,304,206**	**2968**	**39**	**139**
YV5OHW	**3.5**	**258,156**	**1025**	**23**	**78**
4M5F	*	127,131	701	22	71
			(OP: YV5GRV)		
***YV5LIX**	**A**	**60,653**	**196**	**43**	**88**
*YV5KG	*	9,625	86	30	47
*YV5NWG	*	725	13	12	13
***YV6BTF**	**14**	**38,400**	**149**	**30**	**90**
***YV7QP**	**7**	**25,256**	**252**	**20**	**62**

QRP

P4ØA	**A**	**4,078,977**	**3566**	**109**	**290**
			(OP: KK9A)		
YT7TY	*	**1,348,496**	**1520**	**127**	**415**
TI5N	*	**1,295,256**	**1786**	**100**	**248**
			(OP: NØKE)		
HG5Z	*	**1,159,878**	**1610**	**115**	**359**
KT8X	*	**953,520**	**870**	**100**	**311**
			(OP: KK8I)		
LY4XX	*	**905,464**	**1365**	**103**	**334**
N4KG	*	**782,768**	**738**	**110**	**296**
RN6AL	*	**739,276**	**1196**	**98**	**323**
YT2T	*	**695,622**	**1310**	**89**	**293**
			(OP: 4N1JA)		
OK1VBA	*	**651,024**	**911**	**101**	**295**
UA9SG	*	**635,987**	**849**	**77**	**246**
N8ET	*	**631,220**	**689**	**96**	**274**
S52P	*	**594,688**	**1092**	**89**	**279**
LY5G	*	**531,456**	**1071**	**75**	**271**
			(OP: LY2FE)		
JR4DAH	*	**494,910**	**699**	**92**	**190**
HB9DAX	*	**461,898**	**562**	**49**	**180**
KA1IS	*	**457,146**	**540**	**85**	**242**
OH4MFA	*	**440,176**	**898**	**79**	**249**
SM3C	*	**439,227**	**904**	**80**	**253**
			(OP: SM5CCT)		
W6JTI	*	**431,235**	**529**	**107**	**208**
YU1LM	*	**417,880**	**887**	**78**	**232**
UA4ARL	*	**386,182**	**691**	**86**	**257**
OK1JOC	*	380,770	1041	58	232
HAØGK	*	369,460	791	68	222
DF3AX	*	354,622	847	64	217
VA3DF	*	**349,001**	**562**	**74**	**189**
DF1DX	*	346,250	736	63	214
DK5WL	*	333,606	750	62	211
GW4ALG	*	**313,722**	**959**	**53**	**208**
RL3DZ	*	307,743	550	72	234
G3YMC	*	**291,460**	**832**	**50**	**210**
OK1ES	*	253,680	499	84	252
S59D	*	241,890	669	79	251
UA6LCJ	*	236,645	634	53	212
RW3AI	*	227,304	563	63	224
GØDCK	*	225,423	728	57	196
EA3IW	*	224,352	555	63	183
HA1BC	*	221,742	512	64	190
N1TM	*	216,381	350	67	182
US2IZ	*	211,024	692	50	192

KG5U	*	**210,154**	**364**	**75**	**163**
EA2CAR	*	206,448	373	72	200
EA7AAW	*	205,842	581	39	135
G4DBW	*	195,567	606	49	170
OL3M	*	192,768	729	52	199
			(OP: OK1TGI)		
IØZUT	*	178,294	439	62	177
I1BAY	*	170,522	551	63	190
K4ORD	*	156,524	283	65	153
NU4B	*	145,842	277	64	154
LA5EKA	*	142,847	500	44	167
DL2ANM	*	141,984	401	62	170
K2JT	*	140,822	300	55	157
NO8C	*	138,012	245	66	146
DK6AJ	*	135,374	358	60	166
K8ZT	*	127,813	260	69	148
WB8RTJ	*	117,810	234	54	144
AA1CA	*	116,484	245	63	141
RU2FM	*	116,116	422	41	141
DL8MBS	*	115,455	470	44	171
OK1SI	*	107,915	486	43	148
EA1FAQ	*	107,642	649	52	162
HB9AYZ	*	105,468	442	43	144
KT8K	*	102,432	241	52	142
WØETC	*	101,080	223	67	123
W5KDJ	*	100,608	277	53	139
RX9JM	*	100,062	271	38	115
DL1LAW	*	95,206	482	34	147
SM6CRM	*	93,684	261	54	157
NØUR	*	93,472	215	56	128
DL2YMR	*	85,560	336	44	140
W8VE	*	79,352	211	55	127
LA2MOA	*	79,285	442	34	123
ES1UA	*	72,900	384	33	117
Z32ZM	*	70,455	239	46	137
VC3W	*	70,195	244	45	94
			(OP: VA3JFF)		
EA1GT	*	66,960	336	36	108
7K1CPT/1	*	66,720	196	62	77
RV6LA	*	63,080	339	37	115
K3WWP	*	62,800	166	47	110
LZ2ITU	*	59,597	453	40	80
VE3QDR	*	59,214	266	45	94
N6WG	*	56,500	204	49	76
VE3XL	*	53,046	200	48	78
K7TQ	*	52,910	220	44	66
WA8REI	*	49,649	188	44	87
RV3DBK	*	46,996	280	25	99
RW6CW	*	46,813	224	43	126
K2EKM/4	*	45,760	141	48	95
GM4HOF	*	42,946	236	30	79
OK2NA	*	39,893	190	41	98
VE6BF	*	37,351	154	50	77
K4GT	*	37,281	142	42	87
AA5CK	*	35,853	146	45	66
US3QW	*	34,720	249	35	120
ON7CC	*	34,104	281	25	91
N5ZE	*	31,548	107	52	80
LZ2KLE	*	29,488	301	20	75
IT9LNH/1	*	29,464	233	24	92
K4AQ	*	28,044	123	45	69
RV9CDI	*	24,568	114	23	60
PA1B	*	24,309	253	21	90
DL2WRJ	*	24,165	196	34	101
USØYA	*	23,712	98	36	60
F6BFH	*	21,962	110	35	71
W1AMF	*	21,200	82	36	64
JA1GTF	*	21,114	109	40	51
W2JEK	*	20,931	104	43	68
VK8AN	*	18,480	94	43	62
W7VXS	*	16,170	113	40	58
HB9QA	*	15,750	113	38	88
JK1TCV	*	15,340	84	31	34
DJ5QK	*	15,295	102	21	69
NI8W	*	13,528	84	23	53
DHØJAE	*	12,998	109	23	74
DL3NGN	*	11,390	203	37	97
LA8PV	*	11,135	84	26	59
NA4BW	*	10,735	88	33	62
PAØATG	*	10,396	153	20	72
W5TVW	*	9,280	98	46	70
DL2BQD	*	9,266	100	25	57
VE3IGJ	*	8,910	130	21	24
G3KKQ	*	8,142	75	21	38
G4ZME	*	7,251	117	12	52
EA3FHC	*	7,238	106	21	56
AI2P/4	*	6,237	65	28	35
KE2WB/4	*	6,016	49	23	41
PAØRBO	*	6,006	110	26	52
KB9TQO	*	5,824	47	28	36
UR5ZQV	*	5,192	64	18	41
SM5CJW	*	4,416	56	13	19
NV9Z	*	4,240	39	21	32
KI4FWE	*	3,944	47	24	34
AB8DF	*	3,750	41	17	33
UN7CX	*	3,060	39	19	32
JH1NXU	*	2,863	42	17	24
K1XS	*	2,852	35	18	28
K6MI	*	2,784	41	24	24
N7RVD	*	2,660	48	13	15
OH9VM	*	2,288	38	16	28
JA6RJD	*	2,244	31	16	18
KD9B/4	*	2,166	25	14	24
UAØLOD	*	2,052	44	18	20
DL3BVA	*	1,920	34	12	28
HB9DOZ	*	1,881	32	15	18
KX7L	*	1,830	28	15	15
VE3WMB	*	1,596	27	16	22
SP2MHC	*	960	23	14	16
IK1RAC/1	*	600	20	10	14
PA1W	*	420	24	5	16
SP1EK	*	204	14	6	11
NU7T	*	192	9	6	6
K4DXU	*	100	23	9	11
WG4S	*	10	8	4	4
YO8KOS	**28**	**34,650**	**172**	**28**	**77**
			(OP: YO4BII)		
SQ9UM	*	**33,616**	**153**	**26**	**62**
JR3RWB	*	**27,380**	**169**	**25**	**49**
NA4CW	*	**24,563**	**124**	**23**	**54**
RA6FQL	*	**14,514**	**199**	**16**	**43**
UT8QQ	*	**12,834**	**106**	**20**	**42**
SN8A	*	12,702	92	26	47
			(OP: SP8AQA)		
OK1TNM	*	6,045	73	15	24
KO1H	*	4,730	63	16	39
SN8M	*	1,485	28	14	15
MMØQ	*	1,344	29	9	15
			(OP: MMØBQI)		
RV3GM	*	192	11	5	7
DL9ZP	**21**	**112,560**	**400**	**33**	**101**

RZ6HX	*	**107,457**	**481**	**32**	**97**
JI1AQY	*	**98,208**	**404**	**31**	**68**
UA9MAZ	*	**96,480**	**472**	**20**	**60**
SP9H	*	**91,728**	**347**	**30**	**87**
K7ZD	*	**86,536**	**282**	**32**	**84**
JQ1NGT	*	**74,841**	**340**	**29**	**72**
JR1NKN	*	61,337	303	25	58
W9JUV	*	**49,653**	**205**	**24**	**83**
JA4DQX	*	**44,240**	**236**	**23**	**56**
JL3SBE	*	**32,682**	**178**	**21**	**57**
EW6CU	*	**30,189**	**206**	**23**	**64**
JM2RUV	*	28,211	146	29	54
JE7RIT	*	24,336	168	27	51
MØO	*	**20,706**	**194**	**17**	**41**
			(OP: G4JZO)		
ES1CR	*	**19,572**	**156**	**22**	**53**
LW5DR	*	18,574	144	22	52
KR2Q	*	16,796	91	17	51
EA1BP	*	15,180	129	15	31
WA6FGV	*	14,250	112	18	32
GU4YBW	*	11,826	118	14	40
F5VBT	*	10,927	132	16	33
BD4ALC	*	8,112	81	19	29
JA7JNF	*	6,383	66	18	29
DH6NPV	*	4,639	54	19	30
OK1AIJ	*	3,973	81	10	19
YO4ATW	*	3,234	44	11	22
DU1SDT	*	1,462	36	7	10
KL7GN	*	937	24	8	9
IZ1DBY	*	330	18	3	8
SP2FAP	*	320	12	7	9
JM6XXU/1	*	210	10	7	8
S56A	**14**	**201,035**	**724**	**35**	**120**
G4EDG	*	**139,656**	**609**	**31**	**101**
DK1MAX	*	**129,270**	**507**	**31**	**108**
OK2VWB	*	**115,080**	**504**	**27**	**93**
HA3NU	*	**104,535**	**544**	**29**	**86**
DL1DQY	*	**78,711**	**327**	**30**	**94**
G3LHJ	*	**72,362**	**423**	**21**	**76**
LY4BF	*	**65,439**	**405**	**22**	**77**
YL2PP	*	**61,005**	**349**	**25**	**80**
RA1ZZ/3	*	**54,824**	**415**	**18**	**70**
PG2AA	*	**49,491**	**378**	**18**	**63**
EU8RZ	*	**47,793**	**337**	**20**	**69**
RU4WE	*	40,764	402	15	64
SP6T	*	**37,412**	**211**	**23**	**71**
T93R	*	**34,800**

K1MZ	*	338,365	429	76	219
K1NU	*	322,870	311	103	286
K1BD	*	294,752	403	75	227
NC1N	*	231,312	364	67	170
K1TW	*	225,071	319	70	189
W1HR	*	216,550	264	83	222
				(OP: K1QX)	
N1AU	*	162,526	257	73	174
K1AE	*	125,994	190	74	179
KV1J	*	103,917	216	65	136
N1API	*	63,448	172	48	106
W1NK	*	10,530	51	29	49
W1MAT	*	7,345	48	27	38
W1AWB	*	5,475	44	33	42
K2NG	**A**	**3,522,717**	**1682**	**170**	**613**
W2RE	*	**2,972,365**	**2000**	**135**	**470**
N1EU/2	*	**2,875,640**	**1564**	**152**	**518**
N2MM	*	2,269,326	1527	143	474
NO2R	*	2,173,444	1284	142	495
NA2U	*	1,944,075	1269	134	441
N2ED	*	1,920,696	1452	136	437
W2EN	*	1,759,835	1241	134	405
W1GD/2	*	1,443,344	990	123	403
K2SG	*	1,341,198	1090	116	371
K2TE	*	1,322,692	1030	115	372
W2CG	*	1,176,946	1001	114	349
W2GDJ	*	1,013,592	823	116	355
W2LE	*	974,398	855	103	319
K2EP	*	859,500	696	105	345
K2SB	*	772,926	689	111	351
N1JP/2	*	748,200	728	108	322
K2GN	*	682,500	688	98	292
K2XF	*	615,445	588	101	314
N2AB	*	612,122	696	71	251
KA2D	*	573,650	571	89	296
K2ONP	*	514,285	527	93	272
N2NI	*	358,772	404	92	257
NJ1F/2	*	346,112	419	93	245
N2CQ	*	258,189	378	73	194
WK2H	*	247,968	380	69	219
AJ3K/2	*	221,709	324	77	204
W2RD	*	183,376	239	95	219
K2BX	*	170,269	267	66	187
WA2PIP	*	154,377	252	83	207
N2FF	*	119,706	222	55	158
NJ2OM	*	114,480	230	65	151
AA2GF	*	61,359	156	58	123
N2SS	*	50,711	122	53	104
W2NRA	*	11,664	60	19	53
KF2O	*	513	10	9	10
K3WW	**A**	**4,435,981**	**2522**	**154**	**517**
K3PH	*	**2,689,206**	**1668**	**136**	**462**
KQ3F	*	**2,658,225**	**1701**	**138**	**445**
W2UP/3	*	**2,640,330**	**1687**	**138**	**456**
W3FV	*	2,204,410	1483	122	425
N3AM	*	2,167,452	1405	135	429
WE3C	*	1,792,752	1102	153	510
W3GG	*	1,623,942	1217	121	401
K3ND	*	1,399,080	999	125	409
NN3Q	*	1,397,925	1012	124	389
N3NA	*	1,349,759	997	124	367
K3NM	*	1,126,820	829	143	404
K3TW	*	1,120,878	950	121	338
W2CDO/3	*	914,175	843	97	328
W3CF	*	879,370	783	109	361
N3ZA	*	855,807	701	110	361
W3IQ	*	727,232	783	84	268
N3GJ	*	645,183	605	108	291
W4ZE/3	*	639,516	620	103	308
N3NR	*	507,078	533	101	293
K3SV	*	452,244	524	87	251
K3CP	*	425,722	435	96	311
W3EA	*	295,596	356	96	261
AA3YV	*	230,124	342	60	194
N3KN	*	206,916	301	68	190
K3UW	*	135,585	254	54	153
WA3RHW	*	89,199	217	56	131
N3GNW	*	72,000	179	60	120
NZ3O	*	70,920	148	59	121
W3UTD	*	57,967	152	52	117
KD3TB	*	52,788	152	49	117
K3JG	*	39,730	120	30	107
K3DNE	*	26,496	104	29	63
AJ3M	*	20,235	89	31	64
N3SD	*	4,500	36	20	30
NA3M	**7**	**19,968**	**111**	**17**	**61**
NI1N/4	**A**	**3,051,100**	**1750**	**150**	**500**
N3JT/4	**A**	**1,803,732**	**1231**	**137**	**454**
K8AC/4	*	1,764,201	1294	135	406
N4DW	*	1,280,680	939	120	385
K3KO/4	*	1,017,343	759	115	372
N4VV	*	739,758	657	107	310
N4HB	*	676,656	621	108	336
K4TD	*	571,740	597	102	288
W4NZ	*	567,756	553	99	279
W3GQ/4	*	523,342	551	98	269
W2YE/4	*	507,936	555	90	262
W4DO	*	484,731	509	85	266
N4LR	*	430,659	498	88	239
W3OA/4	*	423,094	497	83	246
W0PV/4	*	403,157	449	95	264
AD4EB	*	292,608	487	69	187
N4KZ	*	266,630	388	78	215
N4GG	*	244,816	330	82	204
K2SD/4	*	165,300	315	72	156
WO6M/4	*	138,908	244	84	158
W6UB/4	*	107,852	201	72	164
K4WW	*	95,355	221	46	117
K4GMH	*	48,618	159	36	110
WT4Q	*	47,277	130	50	103
KS4S	*	36,580	120	39	85
AF3X/4	*	23,278	86	42	71
W4WNT	*	17,710	99	38	77
N4XMX	*	16,463	69	42	59
K4EVH	*	16,380	97	40	77
KD4SN	*	14,195	64	30	55
K4EA	**21**	**422,450**	**932**	**35**	**140**
N4PN	**7**	**371,604**	**911**	**38**	**141**
W3YY/4	*	291,816	684	39	129
W4NTI	*	41,650	183	24	74
W6DSQ/4	*	19,734	121	18	60
WW4LL	*	18,601	109	21	68
K5NA	**A**	**2,480,540**	**1323**	**173**	**557**
N9MM/5	*	**1,543,399**	**1113**	**147**	**412**
W5GN	*	1,366,992	1100	130	398
AB5K	*	982,890	803	131	358
N5JR	*	936,243	803	111	330
K5UN	*	833,310	846	123	347
K5AF	*	559,404	626	101	278
N5BO	*	471,549	639	91	248
KU5S	*	206,700	266	99	201
N1CC/5	*	176,252	291	79	199
K5LP	*	148,740	200	95	173
K5HDU	*	54,600	145	53	103
NEØP/5	*	47,655	141	52	83
N5TJ	*	24,522	78	48	74
AC5AA	*	7,280	47	25	40
NØRQ/5	*	5,145	40	13	36
N5ER	**7**	**30,870**	**157**	**22**	**68**
NA4M/5	3.5	4,704	40	15	33
N6CW	**A**	**1,334,647**	**948**	**156**	**385**
N6WS	*	**1,227,172**	**999**	**143**	**339**
W6TK	*	883,535	842	128	287
KI6T	*	697,694	683	126	272
WT6G	*	542,916	628	130	266
K6RIM	*	469,216	511	101	240
N6DA	*	460,010	565	105	209
WK6I	*	306,464	380	105	209
N6VH	*	304,977	409	94	183
NI6T	*	290,019	343	119	230
N6IC	*	274,131	386	97	200
K6GT	*	213,980	323	93	167
N6QQ	*	175,392	344	80	172
K6EP	*	161,188	257	85	151
K6OWL	*	150,288	331	73	113
W6RKC	*	136,827	243	74	133
WØYK/6	*	78,772	172	67	121
W6FRH	*	36,064	124	47	65
KD6WW	*	34,200	111	43	71
W6ISO	*	20,274	76	42	67
K6DGW	*	7,378	52	24	38
W7GG	**A**	**1,438,421**	**1397**	**144**	**299**
KY7M	*	**911,078**	**880**	**120**	**293**
K7GQ	*	549,120	589	116	236
W7CT	*	455,406	585	93	201
K7ABV	*	357,348	471	91	200
N7OR	*	271,946	430	70	157
W6SA/7	*	255,636	416	91	152
W7SW	*	208,116	350	91	155
WA1PMA/7	*	181,222	298	78	173
W7VP	*	178,620	359	73	156
KU7T	*	18,936	102	25	47
N7JB	*	14,625	73	33	42
WU9B/7	*	10,250	66	31	51
AB7CF	*	1,107	17	11	16
W7ZR	**21**	**124,371**	**431**	**31**	**85**
K8IA/7	**7**	**346,164**	**874**	**36**	**128**
N8BJQ	**A**	**1,727,372**	**1144**	**136**	**418**
N8RA	*	**1,075,804**	**862**	**106**	**343**
K5ZG/8	*	58,432	153	58	108
WC8V0A	*	48,216	192	49	115
AB8SC	*	9,520	66	24	44
K8CC	*	4,559	39	19	28
KM4YY/8	*	3,360	76	20	50
N9CK	**A**	**1,641,325**	**1091**	**137**	**428**
W9MU	*	**1,259,280**	**938**	**128**	**402**
K9IG	*	518,287	521	97	274
K9UQN	*	455,706	588	78	213
N2BJ/9	*	340,100	405	96	262
KF9YR	*	298,214	353	99	259
K9CS	*	150,224	247	67	162
K9OSH	*	117,397	230	73	144
W9YO	*	89,024	212	66	142
NE9U	*	87,210	178	69	121
K9OR	*	81,928	152	73	136
N9IO	*	35,612	126	39	77
K9PG	*	9,880	52	29	47
W9VA	**14**	**123,824**	**317**	**34**	**108**
N9AU	**7**	**122,400**	**304**	**35**	**115**
KJ9C	*	107,640	324	31	99
KU1CW/Ø	**A**	**3,024,558**	**1783**	**154**	**514**
KØKX	*	**2,502,027**	**1542**	**152**	**445**
N5IN/Ø	*	767,944	725	131	341
KØOB	*	510,354	585	100	251
KØUK	*	418,652	537	111	221
KØCS	*	330,956	472	94	220
WØGJ	*	281,058	408	109	228
WØTT	*	277,552	358	91	241
WAØMHJ	*	275,753	351	93	220
NØHJZ	*	244,584	314	86	230
KØPC	*	214,345	335	76	187
ACØW	*	158,592	299	71	153
KØBX	*	120,120	257	56	126
NGØR	*	72,009	165	66	123
N1SZ/Ø	*	61,950	166	60	90
NØIM	*	58,712	150	64	115
KEØL	*	50,400	153	62	113
KØFG	*	40,810	131	49	105
NØEO	*	26,378	107	39	70
				(OP: AAØAW)	
WØAMT	*	10,880	78	39	46
NØKIS	*	3,240	47	20	25
KSØT	*	2,100	28	13	22
NØFP	21	3,157	31	14	27
KVØQ	**7**	**378,672**	**907**	**39**	**129**
NØYY	3.5	15,910	90	19	55
KL1V	**A**	**136,512**	**638**	**35**	**60**
AL1G	*	64,220	417	37	39
VE1OP	**A**	**2,090,620**	**2104**	**97**	**339**
W1AJT/VE3	*	**638,280**	**644**	**92**	**313**
VE7FO	*	**481,204**	**985**	**90**	**146**
VE3HG	*	226,512	318	79	207
VE2TZT	*	122,604	275	70	134
VE5MX	*	105,875	274	67	108
VE3NEA	*	88,842	214	68	133
VA6XDX	**7**	**41,514**	**313**	**23**	**51**
				(OP: VE6LB)	
VE6RST	**3.5**	**54,369**	**425**	**20**	**43**
VE6WZ	*	13,446	69	27	54

AFRICA

AFRICAN ITALY

IH9GPI	**A**	**594,181**	**1270**	**47**	**156**

TANZANIA

5H3KK	**A**	**5,470,958**	**3911**	**128**	**359**
				(OP: JE3MAS)	

ASIA

ASIATIC RUSSIA

RG9A	**A**	**3,455,097**	**2110**	**144**	**485**
				(OP: UA9AM)	
RN9XA	*	348,726	349	113	324
UA9XC	*	37,366	156	37	82
RA9FTM	*	4,905	43	12	33
RK9CWW	**21**	**520,133**	**1315**	**34**	**129**
				(OP: RA9CMO)	
RA9AC	*	195,851	583	32	107
RU9MY	**3.5**	**65,280**	**338**	**16**	**64**
UA9AT	**1.8**	**147,117**	**664**	**21**	**68**
UAØQBR	**A**	**125,290**	**366**	**64**	**123**
RUØBB	**28**	**16,440**	**131**	**18**	**42**
RZ8AF	**7**	**90,625**	**298**	**30**	**95**

CHINA

BA4RF	**A**	**1,756,170**	**1777**	**142**	**352**
B4TB	**14**	**64,672**	**476**	**29**	**65**
				(OP: BA4TB)	

CYPRUS

5B/AA1TN	**A**	**13,715,573**	**6381**	**170**	**627**
				(OP: RW3QC)	

ISRAEL

4Z5MU	**A**	**1,523,340**	**1475**	**104**	**299**

JAPAN

JF1PJK	**A**	**2,268,802**	**2032**	**134**	**312**
JO7KMB	*	**660,672**	**780**	**128**	**205**
JA3PYC	*	**503,998**	**595**	**123**	**218**
JF2SKV	*	314,280	466	112	179
JA1IST	*	311,264	448	95	189
JA1XRH	*	270,072	386	101	178
JA1HTG	*	89,060	211	76	94
JEØIUR	*	43,080	133	51	69
JA7OWD	**28**	**20,672**	**121**	**27**	**49**
JH4UTP	*	14,701	117	21	40
JH9KVF	**21**	**278,932**	**831**	**36**	**101**
JA1PCY	*	**247,722**	**806**	**34**	**89**
JK3GWT	*	**123,264**	**407**	**32**	**87**
JM1NKT	**14**	**171,936**	**453**	**38**	**106**
JL8AQH	*	**105,169**	**357**	**36**	**97**
JA9XBW	*	**96,820**	**370**	**30**	**73**
JM1LPN	**7**	**285,968**	**484**	**98**	**146**
JG3WCZ	3.5	9,576	76	23	34
JM7TKK	*	1,512	24	14	14

KOREA

DS4NMJ	**A**	**474,438**	**876**	**114**	**287**
HL1VAU	*	183,416	435	72	130

THAILAND

HS8ZDJ	**A**	**627,840**	**868**	**114**	**246**
				(OP: W2YR)	

EUROPE

4U-GENEVA

4U1ITU	**7**	**837,558**	**3045**	**38**	**133**
				(OP: DM3CGN)	

AUSTRIA

OE8CIQ	**A**	**1,285,920**	**1866**	**119**	**361**
OE3ZK	*	185,280	472	61	179
OE5OHO	*	60,720	256	38	77

BELARUS

EU1SA	**7**	**158,480**	**811**	**30**	**110**
EU1AZ	**1.8**	**50,967**	**730**	**10**	**53**

BELGIUM

ON4CCP	**A**	**982,290**	**1293**	**99**	**312**
ON4IG	*	202,070	426	67	175
ON4ATW	**3.5**	**242,316**	**1346**	**28**	**99**

BOSNIA-HERZEGOVINA

T94NO	**3.5**	**296,970**	**2001**	**26**	**88**

CROATIA

9A2U	**3.5**	**127,710**	**1075**	**19**	**80**

CZECH REPUBLIC

OK2FD	**A**	**1,831,263**	**1460**	**152**	**527**
OK1FDY	*	**1,711,078**	**2138**	**114**	**412**
OK1DXD	*	1,042,230	1331	114	376
OK1UU	*	86,478	357	47	127
OL1CW	*	19,502	133	34	64
OK2ZJ	**28**	**16,428**	**95**	**24**	**50**
OK1AOV	**14**	**97,818**	**396**	**33**	**104**
OK1TP	**1.8**	**45,119**	**566**	**10**	**82**

DENMARK

OZ1KWG	**14**	**39,284**	**268**	**23**	**69**

ENGLAND

G3XTT	**A**	**1,735,140**	**1646**	**128**	**477**
MØTAO	*	472,002	976	88	203
MØBPQ	*	143,451	484	54	177
G3WKL	*	106,144	412	61	187
G4TSH	**28**	**56,135**	**289**	**22**	**87**
G3UHU	**21**	**29,820**	**201**	**22**	**62**
G3WPH	**1.8**	**37,575**	**475**	**13**	**62**

EUROPEAN RUSSIA

RX4HZ	**A**	**3,622,592**	**3835**	**165**	**571**
RA6CM	*	**3,178,300**	**2546**	**172**	**568**
UA6LV	*	**2,880,889**	**2036**	**192**	**629**
RZ3AZ	*	2,659,377	2528	154	533
RN4WA	*	934,325	1537	111	364
UA3AB	*	513,295	648	125	284
RN1AO	*	106,190	273	73	186
RN3CT	*	6,565	57	19	46
RT4I	**7**	**433,650**	**1518**	**38**	**139**
				(OP: RA3CW)	
UA1ANA	*	105,300	594	28	102
RA6AU	**3.5**	**143,418**	**768**	**30**	**93**
RZ3DJ	*	35,867	305	17	72
RW4PL	**1.8**	**108,019**	**709**	**25**	**84**
RA6AX	*	97,900	697	25	85

FINLAND

OH6NIO	**A**	**2,337,456**	**1632**	**148**	**479**
OH6BG	**21**	**680,056**	**1689**	**38**	**131**
OH6AC	*	623,912	1566	35	132
OH2BO	**1.8**	**28,804**	**345**	**15**	**61**

FRANCE

F5VHJ	**A**	**349,899**	**512**	**117**	**344**
F5TSB	*	86,518	360	45	136
F6FJE	**14**	**41,847**	**261**	**23**	**64**
F6IRF	**7**	**644,112**	**2106**	**36**	**132**
TM2S	*	96,466	512	31	108
				(OP: F5PED)	

GERMANY

DJ5MW	**A**	**5,004,964**	**3513**	**165**	**599**
DK3GI	*	**3,249,372**	**2367**	**165**	**542**
DJ2YA	*	2,125,088	1500	161	555
DJ9OZ	*	1,723,898	1736	139	478
DL1MGB	*	1,055,232	1038	126	386
DL5XAT	*	707,980	785	121	334
DL6KVA	*	638,300	649	125	366
DL2RMC	*	625,456	1001	93	295
DHØGHU	*	526,513	722	92	309
DK8FS	*	497,352	693	103	305
DF5ZV	*	423,330	659	95	316
DF2UU	*	415,472	833	96	272
DF6QV	*	414,180	628	91	263
DL4FAY	*	411,930	560	102	296
DL8NFU	*	380,640	701	88	278
DK3QJ	*	281,784	458	89	265
DL8YR	*	281,614	644	66	212
DK3WN	*	280,418	721	67	231
DJ4SN	*	210,469	527	70	211
DL8QS	*	198,386	346	104	249
DK2JP	*	178,308	410	65	189
DJ8OG	*	155,295	416	73	188
DF2RG	*	152,568	337	64	170
DL9NDV	*	126,730	294	60	170
DF2LH	*	116,464	331	62	170
DM3PKK	*	116,424	227	73	143
DL4RCK	*	94,132	253	65	168
DF8AA	*	83,467	312	44	147
DL9NCR	*	81,175	302	55	136
DL5MBY	*	71,448	182	50	106
DL3APO	*	60,775	132	68	119
DL8ZAJ	*	58,368	212	46	106
DF5RF	*	38,115	150	40	81
DL5MEV	*	30,120	125	41	79
DG1CMZ	*	29,008	109	46	102
DF2AP	*	22,032	196	24	84
DL6FCB	*	7,373	52	28	45
DL8AAM	*	4,698	50	14	44
DF9ZP	**21**	**214,170**	**636**	**34**	**131**
DF6JC	**7**	**96,876**	**434**	**32**	**106**
DL7UIO	*	33,504	257	22	74
DL7ON	**3.5**	**268,494**	**1271**	**32**	**114**
DL7CX	**1.8**	**96,900**	**987**	**20**	**75**
DK7ZT	*	4,059	98	6	35

HUNGARY

HA5PT	**A**	**71,136**	**322**	**40**	**116**
HG3M	**14**	**502,503**	**1932**	**39**	**138**
				(OP: HA3MY)	
HA5PP	**7**	**517,789**	**1839**	**38**	**135**
HA5A	**3.5**	**406,848**	**1960**	**34**	**122**
				(OP: HA7ANT)	

IRELAND

EI/AB2E	**A**	**1,070,529**	**1453**	**94**	**346**

ITALY

IR2A	**A**	**1,534,160**	**2710**	**77**	**225**
				(OP: I2UIY)	
IKØYVV	*	**1,187,340**	**1177**	**131**	**383**
IK2EGL	*	198,453	588	71	178
IZ8GCB	*	59,892	346	45	116
IC8POF	*	52,480	165	47	117
IKØBAL	*	49,296	188	46	110
I1NVU	**21**	**102,231**	**494**	**30**	**81**
IK4ZGO	**14**	**85,833**	**640**	**25**	**74**

LATVIA

YL7X	**A**	**2,490,625**	**2881**	**140**	**485**
				(OP: YL1ZF)	
YL2KO	*	**2,362,989**	**2261**	**150**	**483**
YLØA	*	1,093,332	1218	120	417
				(OP: YL2KA)	
YL2KF	*	11,040	72	31	49

LITHUANIA

LY9Y	**A**	**3,023,943**	**2495**	**155**	**508**
				(OP: LY2CY)	
LY2CG	21	3,534	52	11	27
LY2IJ	**14**	**634,734**	**1662**	**38**	**141**
LY2IC	*	239,732	924	36	110

NETHERLANDS

PA1CC	**A**	**432,509**	**796**	**77**	**210**
PAØKHS	*	187,704	553	54	162
PI4COM	**21**	**273,136**	**863**	**35**	**137**
				(OP: PA3EWP)	
PI4TUE	*	261,908	748	36	128
				(OP: PC5A)	
PA5A	**3.5**	**25,620**	**327**	**12**	**58**

NORWAY

LA3R	**A**	**481,068**	**1036**	**77**	**255**
				(OP: LA5LJA)	
LA5LJA	*	168	5	6	6

POLAND

SN8F	**A**	**2,754,000**	**2563**	**145**	**583**
				(OP: SP8FHK)	
SPØDXC	*	**2,421,682**	**2819**	**155**	**519**
				(OP: SP5UAF)	
SQ3RX	*	333,126	738	71	208
SP1S	*	135,952	327	67	165
SP3MGM	*	85,613	350	49	132
SP3FAR	*	75,000	162	79	121
SP6NIF	*	5,665	74	36	67
SQ9IDE	*	1,353	41	9	24
SP3HUU	**28**	**26,362**	**122**	**27**	**71**
SN8V	**21**	**278,850**	**834**	**36**	**133**
				(OP: SP8GQU)	
SP3GXH	*	58,644	354	31	77
SP6EIY	*	47,520	210	32	88
SP5ES	*	8,694	74	20	34
SN7Q	**7**	**772,272**	**2557**	**38**	**135**
				(OP: SP7GIQ)	
SP8BRQ	**3.5**	**343,500**	**1489**	**34**	**116**
SP6CZ	**1.8**	**9,960**	**249**	**10**	**50**

SCOTLAND

GM3POI	**A**	**679,637**	**653**	**125**	**428**
MMØBSM	*	10,500	76	33	72
GMØGAV	**7**	**469,695**	**1784**	**38**	**135**
MMØBQI	*	11,122	117	16	67

SLOVENIA

S58WW	**A**	**647,280**	**871**	**99**	**273**
S53AU	*	33,536	108	46	85
S51FB	**21**	**402,480**	**1192**	**37**	**119**
S5ØR	*	337,976	977	37	129
S53M	**7**	**581,525**	**2011**	**37**	**138**
				(OP: S53ZO)	

SPAIN

EA7TN	**A**	**1,460,700**	**1577**	**114**	**426**
				(OP: EA1AK)	
EA3GM	*	632,271	1200	93	326
EA4KD	*	541,683	709	103	330
EA5VN	*	64,368	215	46	98
EA1FBJ	*	49,680	315	36	108
EA5RS	**14**	**613,645**	**1853**	**38**	**147**
EA2AYD	**7**	**1,924**	**55**	**11**	**26**
EA5BY	**3.5**	**170,520**	**897**	**31**	**109**
EA5FID	*	67,770	602	16	74

SWEDEN

SM6CNN	**A**	**2,063,452**	**1855**	**148**	**520**
SM5D	*	630,482	814	111	367
				(OP: SM5DJZ)	
SM6BSK	*	235,200	512	70	210
SM2M	*	234,479	501	73	228
				(OP: SM2LIY)	
SM7E	*	202,692	495	62	192
				(OP: SM7BHM)	
BSØW	*	198,170	428	86	212
				(OP: SMØNJO)	
SM6WQB	*	121,800	412	47	156
SM6EQO	*	95,200	494	30	140
SM4XIH	*	9,000	55	33	42
SF3DA	**7**	**124,020**	**915**	**37**	**122**
				(OP: SM5AQO)	
SM2ODB	*	44,838	380	25	81
SM7EHU	3.5	714	17	9	8

SWITZERLAND

HB9CIP	**A**	**205,030**	**678**	**57**	**146**

UKRAINE

UW8M	**A**	**3,288,976**	**3079**	**166**	**532**
				(OP: UR5MID)	
UW5Q	*	**2,982,554**	**2479**	**155**	**543**
				(OP: UR3QCW)	
UW2M	*	2,300,000	1664	166	570
				(OP: URØMC)	
UU2JQ	*	41,561	202	38	101
UZ8M	**21**	**251,823**	**1181**	**32**	**111**
				(OP: USØMR)	

YUGOSLAVIA

YU9VK	**A**	**122,540**	**372**	**59**	**161**
YU5A	**28**	**282,419**	**662**	**34**	**119**
				(OP: YU1EW)	
YZ5B	**21**	**267,456**	**901**	**35**	**115**
YT5T	**14**	**425,882**	**1539**	**38**	**121**
				(OP: YT1XX)	
YT9X	**3.5**	**245,322**	**1619**	**28**	**90**
				(OP: YU1ZZ)	

OCEANIA

AUSTRALIA

VK1AA	**14**	**921,852**	**1905**	**39**	**134**
VK6VZ	**1.8**	**7,955**	**79**	**12**	**31**

HAWAII

AH6NF	A	17,430	100	31	39

INDONESIA

YC3MM	**A**	**134,900**	**269**	**62**	**128**

NEW ZEALAND

ZL3GA	A	3,825	35	18	27
ZL2DX	**14**	**258,556**	**677**	**34**	**114**

SOUTH AMERICA

ARGENTINA

LU1NDC	A	24,705	182	36	45

ARUBA

P4ØW	**A**	**9,488,012**	**5009**	**166**	**526**
				(OP: W2GD)	
P43E	**14**	**283,443**

N4RV	**4,143,328**	**2237**	**155**	**543**
K4JLD	1,633,023	1195	133	396
W5VX	**2,362,912**	**1469**	**159**	**497**
W5AQ	**511,920**	**634**	**115**	**245**
W6YRA	14,300	80	42	58
W7VJ	**2,423,673**	**1781**	**150**	**377**
K8AZ	**5,732,240**	**2864**	**175**	**615**
N8PR	**1,916,145**	**1390**	**137**	**416**
N9AG/8	1,667,012	1087	146	450
WN9O	**2,307,285**	**1508**	**154**	**479**
NØNI	**3,516,498**	**2017**	**169**	**525**
KT5E/Ø	1,304,317	1548	121	268
4U-UNITED NATIONS				
4U1UN	**863,902**	**1886**	**72**	**151**
BRITISH VIRGIN ISLANDS				
VP2VVV	**637,296**	**1173**	**73**	**191**
CANADA				
VE7GL	**3,738,515**	**3565**	**150**	**355**
VE7UF	2,786,952	3110	133	291
VO2AAA	**2,598,638**	**3168**	**104**	**315**
VE6AO	**1,944,052**	**2479**	**109**	**265**
VE2OJ	2,560	136	4	6
MONTSERRAT				
VP2MZM	**6,772,428**	**5972**	**134**	**388**
PUERTO RICO				
KP4US	**3,766,020**	**3991**	**125**	**335**

AFRICA

MOZAMBIQUE				
C91F	**1,299,800**	**1551**	**93**	**242**

ASIA

ASIATIC RUSSIA				
UA9AYA	**10,647,435**	**5048**	**182**	**613**
RY9C	**8,225,880**	**4433**	**172**	**608**
RZ9OZO	5,879,700	3399	162	543
RK9JWV	2,143,632	2179	111	315
RK9AWN	1,796,000	1605	108	341
RZ9WXK	1,041,656	1163	77	279
RZ9UWZ	635,700	877	79	246
AZERBAIJAN				
4K7Z	**2,333,019**	**2176**	**113**	**376**
JAPAN				
JA7YAA	**4,145,097**	**2593**	**184**	**443**
JE1ZWT	**3,612,245**	**2534**	**175**	**420**
JA2ZJW	**2,256,815**	**2208**	**135**	**272**
JA1YPA	1,120,240	1431	105	230
JO1ZIW	87,010	250	53	101
JA1ZGP	4,578	41	20	22
			(OP: JF3EBO)	
KAZAKHSTAN				
UO1P	**1,946,490**	**1575**	**121**	**362**
KOREA				
6LØNJ	**31,373**	**501**	**64**	**73**
MALDIVE ISLANDS				
8Q7DV	**9,244,364**	**5255**	**165**	**541**
MONGOLIA				
JT1JA	**3,885,056**	**3809**	**138**	**374**

EUROPE

4U-VIENNA				
4U1VIC	**4,280,214**	**4157**	**146**	**496**
AUSTRIA				
OE2S	**6,453,202**	**4691**	**177**	**641**
OE4A	**5,187,704**	**3884**	**173**	**605**
BALEARIC ISLANDS				
EA6IB	**11,026,533**	**6705**	**194**	**709**
BELGIUM				
OT4L	**4,529,910**	**3452**	**160**	**582**
OT4P	1,178,360	2285	109	336
ON4BBD	738,540	1488	84	289
CROATIA				
9A1P	**5,342,870**	**4041**	**170**	**560**
9A6C	48,825	695	15	60
CZECH REPUBLIC				
OK5W	**6,681,264**	**4057**	**192**	**680**
OL3A	**5,554,172**	**3910**	**173**	**620**
OL7R	**4,960,460**	**3519**	**177**	**611**
OL3Z	1,743,665	2389	129	410
OL1C	1,678,066	2183	120	346
OK1KDO	1,023,780	1456	108	345
OL2U	965,440	1687	97	334
OL1P	689,850	1372	82	268
OL2A	446,400	756	88	222
OL9S	224,238	594	67	199
OK5SWL	6,069	74	15	36
ENGLAND				
G6PZ	**5,763,352**	**4331**	**161**	**615**
M2A	2,735,775	3214	135	444
EUROPEAN RUSSIA				
RL3A	**6,308,208**	**4499**	**185**	**667**
RO4M	**4,773,612**	**3670**	**173**	**623**
RX3RXX	**3,275,640**	**3735**	**158**	**516**
RF3A	3,163,027	3273	157	564
RK3FWA	3,094,245	2644	160	505
RZ1QZZ	2,597,770	2453	143	486
RZ4CWW	1,649,050	2495	125	434
RL4W	1,520,530	2432	118	388
RK4UWA	879,222	1325	115	374
RK3RWA	655,326	1128	107	334
RK3AWK	488,576	1084	77	275
RW3WWW	458,304	924	99	273
			(OP: RA3WJ)	
RK3QWM	296,964	749	63	229
RZ4AWR	284,647	933	57	172
RZ3AWM/3	93,060	416	39	141
RK3DZV	11,151	124	13	50
FINLAND				
OH7M	**6,284,820**	**3945**	**173**	**572**
OH5Z	**4,808,790**	**3318**	**174**	**591**
FRANCE				
F6KHM	**2,310,741**	**2312**	**119**	**430**
F6KAR	**2,236,928**	**2510**	**121**	**393**
F8KGH	370,527	903	86	253
F6KJX	326,349	1109	61	182
F5NCU	213,690	605	59	196
GERMANY				
DF3CB	**5,739,976**	**3530**	**178**	**658**
DK3DM	**4,075,088**	**3085**	**160**	**592**
DKØBN	2,800,182	2594	144	483
DKØMN	1,299,408	1915	104	324
DL4WA	1,029,680	1277	120	368
DFØCI	875,145	1298	141	474
DLØIT	334,521	900	65	214
HUNGARY				
HG1S	**7,440,275**	**4875**	**180**	**649**
HG1R	1,612,254	2873	112	371
HA8KVK	1,428,269	2196	104	345
IRELAND				
EI7M	**5,090,005**	**4510**	**139**	**516**
ITALY				
IU2R	**5,691,996**	**3873**	**170**	**604**
IR2C	**5,342,382**	**3681**	**174**	**605**
IQ3GA	279,360	895	79	212
IR3J	206,180	821	41	128
KALININGRAD				
RW2F	**7,225,119**	**4583**	**196**	**705**
LUXEMBOURG				
LX7I	**6,214,453**	**4849**	**162**	**587**
MACEDONIA				
Z37CXY	1,015	17	13	16
NETHERLANDS				
PI4D	**2,490,384**	**2689**	**130**	**484**
PI4CC	**2,442,168**	**2640**	**138**	**496**
NORWAY				
LN8W	**4,383,083**	**4060**	**160**	**567**
LA2AB	159,464	474	59	189
POLAND				
SP6KFA	**274,364**	**962**	**49**	**177**
SP9KJT	109,728	420	60	156
			(OP: SP9IKF)	
SP1YGL	10,950	59	33	42
SP3KPN	1,639	30	17	27
ROMANIA				
YO6KNY	**175,801**	**509**	**58**	**203**
SLOVAK REPUBLIC				
OM7M	**9,028,838**	**4924**	**202**	**729**
OM8A	**8,877,313**	**5035**	**194**	**699**
OM4A	1,939,920	2598	111	361
SLOVENIA				
S58A	**8,046,400**	**4440**	**188**	**668**
S58C	**6,782,344**	**4297**	**181**	**643**
S58G	4,870,400	3436	181	619
S57AD	5,655	146	6	33
SPAIN				
EA1CS	**2,075,766**	**2547**	**110**	**352**
SWEDEN				
SK6AW	**165,189**	**550**	**56**	**181**
SWITZERLAND				
HE3RSI	**1,835,780**	**2981**	**103**	**277**
HB9OK	**1,035,134**	**2120**	**81**	**268**
UKRAINE				
UT7L	**2,795,760**	**2433**	**160**	**560**
UV7M	674,928	1741	81	263
UT4IYZ	316,404	789	68	238
UR4LWY	308,484	618	83	259
US8Q	97,149	290	45	114
UT4UXW	475	27	7	18

OCEANIA

GUAM				
AH2R	**10,283,700**	**5279**	**188**	**512**
INDONESIA				
YB8ZZ	**2,235,522**	**2099**	**112**	**290**
NEW ZEALAND				
ZM1A	**5,590,774**	**4181**	**141**	**377**
PHILIPPINES				
DX1DBT	**669,515**	**1218**	**88**	**147**

SOUTH AMERICA

ARGENTINA				
LT1F	**7,962,240**	**4646**	**159**	**479**
LU8XW	776,820	1493	62	152
ARUBA				
P40L	**13,592,412**	**6690**	**169**	**578**
BOLIVIA				
CP6CW	**7,636,455**	**4606**	**145**	**470**
BRAZIL				
ZY7C	**4,596,160**	**3496**	**138**	**404**
FALKLAND ISLANDS				
VP8WWW	**1,233,765**	**2252**	**77**	**170**

MULTI-OPERATOR TWO TRANSMITTER NORTH AMERICA

UNITED STATES				
K1AR	**6,575,226**	**3439**	**169**	**588**
KØTV/1	3,435,012	2102	142	492
N2RM	**4,424,728**	**2798**	**138**	**478**
N3RS	**9,921,186**	**4878**	**175**	**626**
W3PP	4,187,709	2458	155	544
K3DI	2,020,876	1395	143	429
K4JA	**12,901,632**	**5737**	**182**	**674**
N4WW	5,658,241	3177	166	561
W5KFT	**4,260,454**	**2589**	**167**	**515**
W6YI	**5,561,792**	**3084**	**181**	**587**
W6YX	3,104,244	2005	160	434
W6OAT	2,772,972	1723	171	441
W6FA	736,560	786	129	243
W6TE	580,328	710	108	236
W8AV	**4,636,816**	**2622**	**161**	**555**
W8ZA	1,581,440	1115	136	424
KØRF	**2,986,901**	**2363**	**153**	**418**
KTØR	1,524,762	1209	136	386
BELIZE				
V31RM	**7,452,504**	**6664**	**142**	**392**
BERMUDA				
VP9I	**7,398,003**	**5790**	**123**	**450**
CANADA				
VE1JF	**7,412,000**	**4915**	**155**	**525**
VE7SCC	487,278	1218	84	123
DOMINICA				
J70J	**8,873,865**	**7597**	**148**	**443**
TURKS & CAICOS ISLANDS				
VP5W	**8,828,424**	**7292**	**142**	**426**
U.S. VIRGIN ISLANDS				
WP2Z	**12,582,528**	**8625**	**161**	**511**

AFRICA

MADEIRA ISLANDS				
CT9L	**22,157,172**	**10275**	**165**	**607**

ASIA

ASIATIC RUSSIA				
RT9W	**13,556,710**	**6403**	**178**	**637**
UAØAZA	8,763,748	5291	176	557
CHINA				
B1Z	**439,990**	**1227**	**82**	**148**
IRAQ				
YI9KT	**2,313,383**	**2276**	**90**	**299**
JAPAN				
JA8RWU	**5,536,020**	**3638**	**176**	**412**
JA1ZLO	**3,643,656**	**3187**	**145**	**326**
JF3GKE	**1,975,652**	**1557**	**155**	**363**
LEBANON				
OD5/DJ5CL	**6,100,523**	**4946**	**110**	**371**
NEPAL				
9N7BCC	**6,221,872**	**5190**	**150**	**422**
TAIWAN				
BVBJ	**1,458,735**	**2178**	**118**	**277**

EUROPE

CROATIA				
9A7T	**2,830,100**	**2224**	**159**	**541**
ESTONIA				
ES6Q	**8,842,550**	**6368**	**184**	**666**
ES1A	2,624,407	3000	145	508
EUROPEAN RUSSIA				
RU1A	**13,021,632**	**7154**	**208**	**728**
GERMANY				
DK6WL	**5,376,585**	**4077**	**173**	**622**
DL7IO	**4,505,952**	**4002**	**161**	**587**
DLØAO	3,589,040	3483	155	525
DK1II	1,516,250	1472	140	485
DLØKF	728,128	1075	118	378
HUNGARY				
HG6N	**7,884,742**	**5327**	**186**	**652**
ITALY				
IR4X	**12,791,640**	**7226**	**193**	**695**
IO4T	1,916,660	2782	115	355
JERSEY				
GJ2A	**7,638,274**	**6811**	**150**	**571**
LITHUANIA				
LY4A	**4,234,005**	**3912**	**162**	**549**
MACEDONIA				
Z37M	**7,345,252**	**6941**	**159**	**515**
NETHERLANDS				
PA6Z	**91,770**	**943**	**19**	**96**
NORWAY				
LA1K	135,519	549	43	156
POLAND				
SN1D	**1,687,785**	**2053**	**138**	**445**
SLOVENIA				
S52ZW	**5,949,216**	**5064**	**166**	**562**
SWEDEN				
SK6M	**4,502,304**	**4320**	**172**	**557**
UKRAINE				
UU7J	**12,876,290**	**8576**	**196**	**722**

SOUTH AMERICA

GALAPAGOS ISLANDS				
HC8N	**30,971,500**	**12429**	**196**	**679**
NETHERLANDS ANTILLES				
PJ2T	**22,440,300**	**10188**	**177**	**609**

EM1HO put Antarctica on the map for the contest.

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES				
K3LR	**15,170,944**	**6222**	**198**	**730**
W3LPL	**15,067,008**	**6687**	**190**	**712**
KC1XX	**13,408,500**	**6069**	**185**	**690**
K9NS	**10,441,362**	**5047**	**195**	**671**
K1TTT	**9,651,102**	**4626**	**174**	**648**
K1RX	**9,397,960**	**4623**	**176**	**630**
NQ4I	**8,858,460**	**4712**	**181**	**639**
KB1H	7,893,699	4120	166	587
K2LE/1	7,697,228	4156	169	577
W4MYA	6,377,760	3478	169	605
K5GO	**6,159,016**	**3651**	**179**	**593**
WØAIH	**3,175,451**	**2074**	**169**	**534**
K3II	2,811,250	1759	146	479
W2YC	1,289,914	1019	127	439
N7CW/6	1,118,410	881	142	343
N2VW	234,090	421	83	206
CANADA				
VE3YAA	**6,088,138**	**5187**	**141**	**460**

AFRICA

NIGER				
5U5Z	**36,651,908**	**14247**	**196**	**729**

ASIA

JAPAN				
JA3YBK	**12,796,800**	**6220**	**204**	**596**
JA5BJC	**12,346,300**	**6334**	**197**	**549**
KAZAKHSTAN				
UP5G	**13,266,369**	**7448**	**177**	**606**
THAILAND				
HS72B	**7,391,268**	**5207**	**165**	**501**

EUROPE

BULGARIA				
LZ9W	**13,875,100**	**9652**	**189**	**701**
DENMARK				
OZ5E	**3,842,067**	**3855**	**148**	**521**
FINLAND				
OH2K	**700,771**	**1212**	**95**	**284**
GERMANY				
DFØHQ	**14,652,565**	**9027**	**203**	**752**
DF1LX	2,252,250	2100	148	502
HUNGARY				
HA6KZS	**86,879**	**482**	**43**	**120**
LITHUANIA				
LY7A	**6,915,660**	**5914**	**173**	**617**
SCOTLAND				
GM5A	**10,975,578**	**8518**	**172**	**645**
UKRAINE				
UV2L	**2,979,880**	**3251**	**144**	**488**

OCEANIA

FIJI				
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- All-Time Records, CQ World-Wide DX Contest
- The GRX-1 Receiver, by James Graves
- Two articles on Telegraph Sounders

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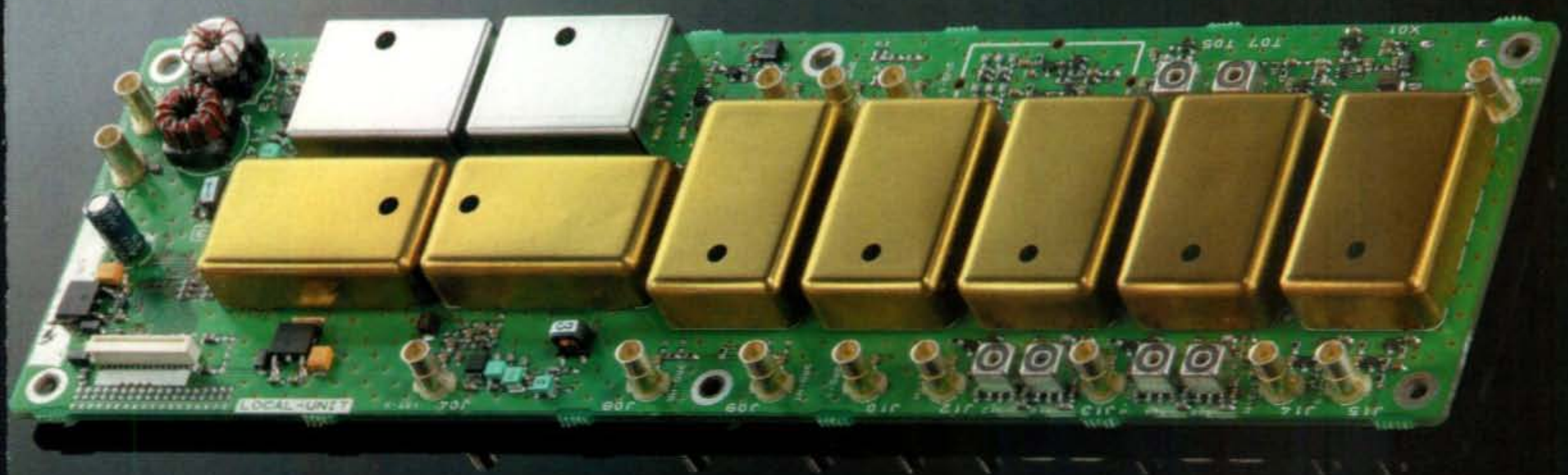

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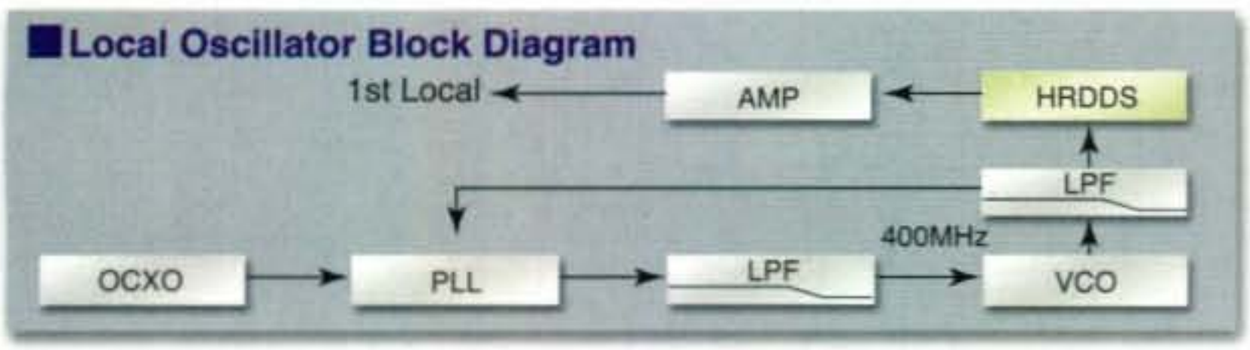

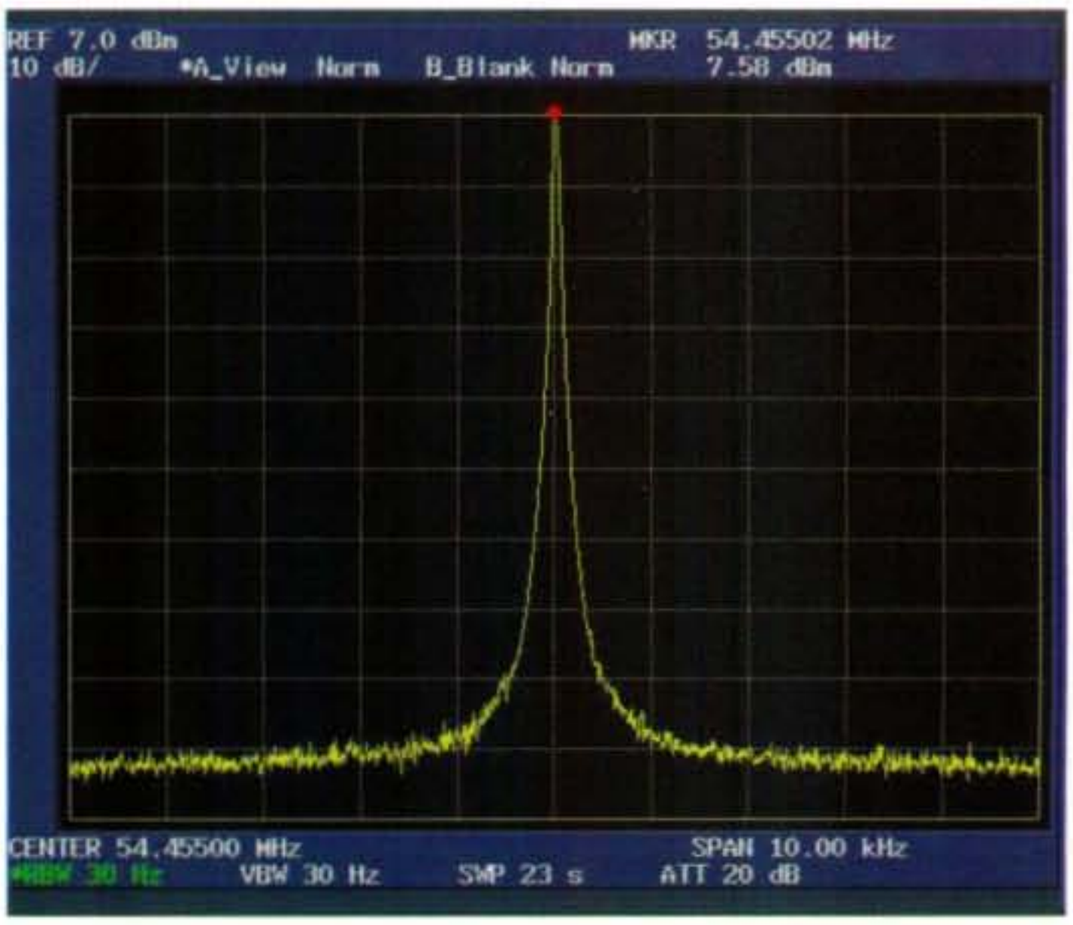

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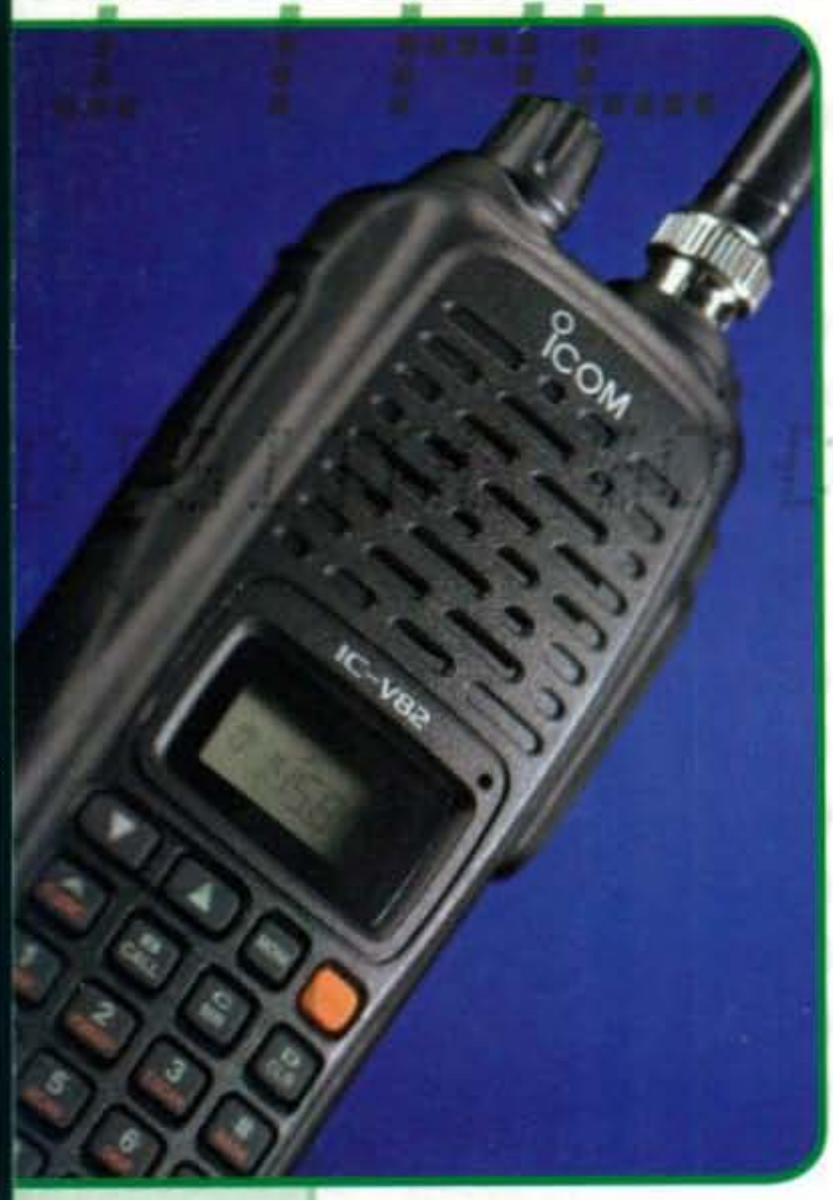

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