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Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

SEPTEMBER 2006

CQ

- **A Year After Katrina:**
  - **Still Struggling in Mississippi, p. 13**
  - **FCC Panel Recommendations, p. 20**
- **CW Results: 2005 CQ World Wide DX Contest, p. 30**

On the Cover: Charlie Otnott, WD5BJT, in front of the now-condemned Hancock County, Mississippi sheriff's office, where he rode out Hurricane Katrina. He fared better than his vintage Collins receiver (right). Details on page 84, story on page 13.

KENWOOD

Listen to the Future

60th Anniversary: Introducing the TS-2000 Limited Edition — Special Black Version

Black Version

TS-2000 All-mode Multibander HF/50/144/440MHz

Kenwood is celebrating its 60th anniversary with a Limited Edition model (black version) of the renowned TS-2000. Functionally identical but visibly different, this Limited Edition offers the same advanced features as the original model, but with a front panel, main tuning knob and carrying handle all finished in exclusive black — a feast for the eyes.

Engineered for long years of enjoyment, this special TS-2000 is further distinguished by a unique serial number on the back, starting with No.1. Only 570 are to be produced, and of those just 300 will be sold in the US.

Each Limited Edition model will be factory-fitted with the popular DRU-3A digital recording unit and VS-3 voice synthesizer, and supplied with ARCP-2000 radio control software. Straight from the box, it's fully equipped for action.

Additionally, a special present will be sent to every new owner of this 60th anniversary model — just fill in and return the postcard included in the package to claim your cool Kenwood jacket.

Unique serial number

Carrying handle

Kenwood U.S.A. Corporation
Communications Sector Headquarters
3975 Johns Creek Court, Suite 300, Suwanee, GA 30024-1265

Customer Support/Distribution
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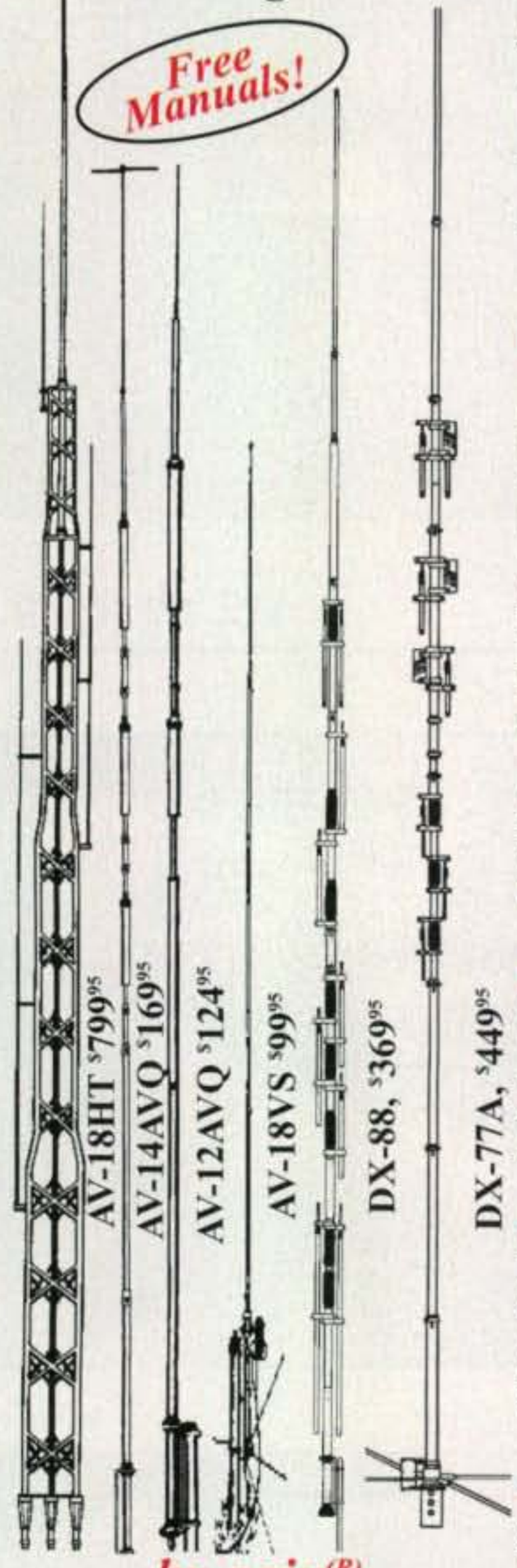
ADS#23306

hy-gain® HF VERTICALS

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



hy-gain(R) Classics

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

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

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

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

AV-18HT, $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, $99.95. (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. **High** quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

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

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

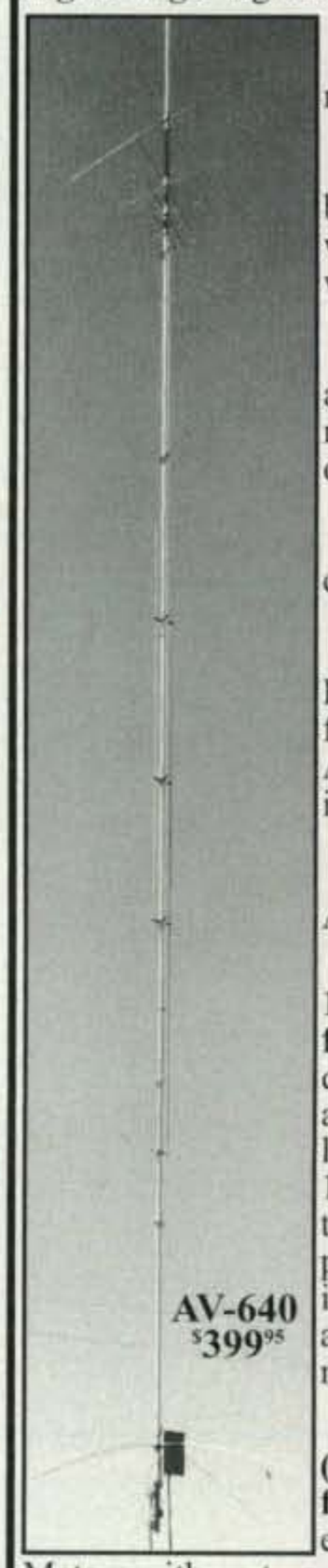
No ground radials required! Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

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	**$99.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

hy-gain(R)

PATRIOT

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



No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

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

Sleek and low-profile

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

Full legal limit

Handles 1500 Watts key down continuous for two minutes.

Built-to-last

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

hy-gain® warranty

Two year limited warranty. All replacement parts in stock.

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

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

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departments

MFJ *IntelliTuner*™ Automatic Tuner

Automatically tunes unbalanced/balanced antennas . . .Ultra fast . . . New 20,000 memories . . . Antenna Switch . . . Efficient L-network . . . Select 300 Watts (6-1600 Ohms) or 150 Watts (6-3200 Ohms) . . . 1.8-30 MHz . . . 4:1 current balun . . . Cross-Needle and Digital SWR/ Wattmeter . . . Audio SWR meter . . . Backlit LCD . . . Remote control port . . . Radio interface . . .

MFJ-993B
$259.95

New!

World's First dual power level 300/150 Watts SSB/CW Tuner --

Select 300 Watt SSB/CW power level and match 6-1600 Ohm antennas ***Or . . .*** select **150 Watt** SSB/CW power level and match *extra wide-range* 6-3200 Ohms!

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

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

MFJ's exclusive *IntelliTuner*™, *Adaptive Search*™ and *InstantRecall*™ algorithms give you *ultra fast* automatic tuning with over 20,000 *VirtualAntenna*™ Memories.

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

It learns while you're having fun

As you're ragchewing, contesting or DXing, *your MFJ-993B is learning!*

When you transmit, the MFJ-993B automatically tunes for minimum SWR and remembers your frequency and tuner settings. The next time you operate on that frequency and antenna, these tuner settings are instantly restored and *you're ready to operate in milliseconds!*

MFJ's new *VirtualAntenna*™ Memory system gives you 4 antenna memory banks for *each* of 2 antenna connectors. Select up to 4 antennas on each antenna connector. Each antenna has 2500 memories, 20,000 total.

Intelligent ultra fast tuning

MFJ's *InstantRecall*™ first checks its memory to see if you have operated this frequency before. If so, tuning is instantaneous and you're ready to operate.

If not, MFJ's *IntelliTuner*™ algorithm -- based on MFJ's famous SWR Analyzer technology - - kicks in. It *measures* the complex impedance of your antenna. Next, it *calculates* the components it needs and instantly *snaps* them in. Then, it fine tunes to minimize SWR -- you're ready to operate. It's all done in a *fraction* of a second.

When the impedance is within its measurement range, the MFJ-993B is the *fastest automatic antenna tuner in the world.*

If it can't accurately determine impedance, MFJ's *AdaptiveSearch*™ algorithm goes into action. Frequency is measured and relevant components values are determined. Only those values are searched for ultra-fast tuning.

For even faster searches, you can set the target SWR to 2 (settable 1.0-2.0).

You can manually tune when you can't transmit (for listening out of ham bands).

Cross Needle and Digital SWR/Watt Meters

Lighted Cross-Needle and *digital* meters lets you accurately read SWR, forward and reflected power at a glance.

An *audio* SWR meter lets you *hear* the tuned SWR when you can't see/read meters.

Turn on a highly visible, instant response SWR LCD bargraph when you need it.

Backlit LCD Display

An easy-to-read *backlit* LCD displays SWR, forward/reflected power, frequency, antenna 1 or 2, L/C tuner values, on/off indicators and other information.

The MFJ-993B is a compact 10Wx2¾ Hx9D inches. Use 12 to 15 VDC at 1 amp or 110 VAC with **MFJ-1316, $21.95**.

Tune any Antenna

You can tune any antenna -- dipoles, verticals, beams, phased arrays, inverted vees, quads, random wires, mobile antennas, compact limited space antennas.

A 4:1 *true* current balun lets you tune any balanced antenna - - horizontal loops, vertical loops, multi-band doublets, quads, folded dipoles, Zepps.

Remote Control

Plug in the **MFJ-993RC, $39.95**, remote control and use your tuner elsewhere remotely.

MFJ-993B Interface Pre-wired Cables

Allows automatic tuning of your MFJ-991B/993B/994B *IntelliTuner*™ through radio.

MFJ-5124I, $19.95, *ICOM*. Supports IC-706, 707, 718, 725, 728, 736, 746, 756, 765, 775, others that support AH-3 or AH-4.

MFJ-5124A, $19.95, *ALINCO*. Supports DX-70, DX-77 and others.

MFJ-5124K, $59.95, *KENWOOD*. Supports TS-50S, 450S, 570S, 690S, 850S, 870S, 2000 and others that support AT-300.

MFJ-5124Y, $59.95, *YAESU*. Supports FT-100D, FT-857, FT-897, others.

MFJ-5124Y2, $59.95, *YAESU* FT-847.

No Matter What™ *Warranty*

Every MFJ tuner is protected by MFJ's famous one year *No Matter What*™ limited warranty. We will repair or replace your MFJ tuner *no matter what* (at our option) for one full year.

Dual 300/150 Watt Auto Tuner

World's First dual power level Tuner

New!

MFJ-991B
$219.95

— Select **300 Watt** SSB/CW and match 6-1600 Ohm antennas ***Or*** select **150 Watt** SSB/CW and match *extra wide-range* 6-3200 Ohms. New 10,000 *VirtualAntenna*™ Memories. Like MFJ-993B, less digital SWR/Wattmeter/ LCD display, audio SWR meter/audio feedback, antenna switch or 4:1 current balun.

600 Watt MFJ Automatic Tuner

MFJ-994B
$359.95
New!

MFJ-994B, *600 Watt Intelli-Tuner*™! automatic antenna tuner with new 10,000 *VirtualAntenna*™ Memories. Like MFJ-993B but handles 600 Watts SSB/300 Watts CW, matches 12-800 Ohms. Does not have digital SWR/Wattmeter/LCD display, audio SWR meter/audio feedback, antenna switch or 4:1 current balun.

Dealer/Catalog/Manuals

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

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FAX:(662)323-6551 8-4:30 CST, Mon.-Fri. ***Add shipping.***

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

ham radio news

Intrigue at WRTC

For the first time, there have been suggestions of improprieties relating to the World Radio Teamsport Championship (WRTC), kind of a World Series of contesting held every four years since 1990. This year, 46 teams from around the world competed from Brazil. The event was won by Canadians John Slumyer, VE3EJ, and Jim Roberts, VE7ZO, operating as PT5M. Second place went to the U.S. team operating PW5C, Dan Craig, N6MJ, and Dave Mueller, N2NL. Initially, the third-place team was PT5L, operated by Ranko Boca, YT6A, and Djurica Maletin, YT6T, of Serbia-Montenegro. But after a review by the judges, PT5L ended up in 11th place and another U.S. team—PT5Y, operated by Doug Grant, K1DG, and Andy Blank, N2NT, took home the bronze medal.

There are conflicting reports of what happened. "Newsline" reported that the PT5L team mistakenly set up their logging software for a location in Europe rather than South America, which changed the point-scoring for the IARU HF World Championships, the contest in which all teams competed. The *ARRL Letter* reported, however, that PT5L's log showed an unusually high number of "unique" contacts—that is, stations contacted by them and no one else—and that on review, it was concluded by the judges that "there was a small number of stations ... feeding 'phantom QSOs' to PT5L." As a result, the judges eliminated all "uniques" from all logs and the PT5L score dropped from third place to 11th. There was no suggestion of wrongdoing by either YT6A or YT6T, but rather that they were victims of an effort "intended to sabotage either one or both of the PT5L operators or a randomly selected WRTC station." Officials said a thorough investigation was impossible to conduct within the timeframe of the competition.

Hams Help After India Bombing

It was ham radio to the rescue again after the terrorist train bombing in Mumbai, India on July 11. Cell phone networks quickly crashed under the load of people trying to call loved ones. According to a report by CNN, hams with handhelds provided alternate means of making contact near and far for people who could not get through to family members by cell phone. In addition, the report said hams helped gather information for the city government. *(Tnx KZ1Z)*

Conference Selects Worldwide Disaster Frequencies

GAREC-2006, the second Global Amateur Radio Emergency Communications Conference, has recommended worldwide adoption of certain HF frequencies as "centers of activity" for emergency communications. The conference, held in June in Tampere, Finland, adopted those frequencies approved last year by Region 1 of the International Amateur Radio Union (IARU), specifically 21.360, 18.160, 14.300, 7.060 and 3.760 MHz, and recommended their approval by IARU regions 2 and 3 at their next conferences. Only one frequency is likely to cause a problem in Region 2—7.060 MHz is not within the U.S. voice subband on 40 meters, although it is in much of the rest of the world.

Emergency Net Activated in Lebanon

As fighting flared in mid-July between Israel and the Lebanese-based Hezbollah guerrilla group, many uninvolved Lebanese citizens and visitors were caught in the crossfire. The Arab Amateur Radio Emergency Service started a net on 14.305 MHz to handle emergency and welfare traffic, according to OD5TE. In addition, Lebanese repeaters were made available for emergency communications and were linked together via Echolink.

FCC: Keep Addresses Current

The FCC has suspended the licenses of several hams who moved without notifying the Commission of their new addresses. Letters from the FCC to at least three hams regarding other complaints were returned by the post office as "unclaimed" and/or "unable to forward," according to the FCC, putting them in violation of Section 97.23 of the Amateur Service rules. Two hams had their licenses suspended "for the remainder of the license term, or until a valid mailing address is provided." A third, already threatened with fines for refusing a trustee's request not to operate a particular repeater, was warned to "take immediate steps to correct your address," and a fourth had already submitted his license for cancellation in regard to other complaints. Bottom line: If you move, update your licensing records with the FCC.

Don't Ignore FCC Notices

Ignoring an FCC Enforcement Bureau letter apparently can get you into even more trouble than whatever prompted the letter to begin with. A Maryland ham was contacted nearly three years ago by the FCC regarding a complaint about interference to emergency communications. The letter was returned as undeliverable. A new letter was sent and never answered. Apparently, the ham in question recently updated his address in the FCC database. The FCC then sent a third letter, threatening a $4000 fine if a reply was not received within 20 days from receipt of the letter.

Catherine Ferry, NC8F, Named 2006 Young Ham of the Year

Catherine Ferry, NC8F, of Silver Lake, Ohio, has been chosen as the Newsline Young Ham of the Year for 2006. Cathy is 18 and graduated from high school this past June. She is the daughter of Bruce Ferry, AK8B, and the late Joan Ferry. A ham since age 10, Cathy has been active in the Cuyahoga Falls Amateur Radio Club, where she is newsletter editor and a regular volunteer for the club's hamfests and licensing courses. She also provides communications for a wide range of public service events.

Cathy's primary interest is music. She plays the bassoon and was performing in Australia with the Cleveland Youth Symphony when Newsline's Bill Pasternak, WA6ITF, first tried to notify her that she'd won this year's YHOTY award. Cathy will be attending Baldwin Wallace College in Berea, Ohio, this fall, majoring in music.

As Young Ham of the Year, Cathy was to receive a plaque from Amateur Radio Newsline at the Huntsville (AL) Hamfest in August, along with Yaesu radio equipment from corporate underwriter Vertex-Standard, and a week at SpaceCamp from *CQ* magazine, also a corporate underwriter. Cathy is the 21st young amateur to be honored under the Young Ham of the Year program.

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.

hy-gain® ROTATORS

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

HAM-IV

HAM-IV
$559.95

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

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

TAILTWISTER SERIES II

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.

T-2X
$649.95

T-2XD
$1029.95
with DCU-1

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

CD-45II

CD-45II
$389.95

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

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

HAM-V

HAM-V
$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	350 in.-lbs.
Brake Power	**450 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight	14 lbs.
Effective Moment (in tower)	**300 ft.-lbs.**

HDR-300A

HDR-300A
$1379.95

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

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

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
$34.95

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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The ruggedly-built new FT-1802M brings you Yaesu's legendary mechanical toughness, along with outstanding receiver performance and crisp, clean audio that will get your message through!

- 50 Watts of RF Power Output.
- Extended Receive: 136 – 174 MHz.
- Keyboard entry of frequencies directly from microphone.
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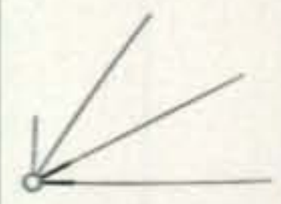

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a CQ editorial

zero bias — BY RICH MOSESON,* W2VU

Turn on That Radio – Part II

I hate to sound like a broken record, but if you're sitting around waiting for the sunspots to return so you can work some good DX again, you're missing out on a lot of good DX. And the best of it this summer has been on 6 meters! The great conditions I wrote about here last month continued at least halfway through July, with the 12th and 13th featuring Asia-to-North America and North America-to-Europe openings (see VHF+ on page 86 for more). I missed out on the latest European openings (had to work, darn it!), but I did get on for a good portion of the CQ World-Wide VHF Contest and it was truly amazing! Six meters was wide open when the contest began midday on Saturday and seemed to just stay that way. It was still open when I pulled the plug for the night just after 11 PM. (It's going to be very interesting to see if there was any significant activity on two meters, since most VHF contesters move up to two when six meters has nothing to offer, and it seemed that six was open all the time.)

At times, the calls of "CQ contest" and "QRZ contest" across a 200-kHz-wide swath of 6 meters sounded more like the CQ World-Wide DX Contest (CW results this issue) than the CQ World-Wide VHF Contest! In fact, there were even enough stations to work on CW on this "CW-optional" band for several 30-wpm-plus CW contesters to be able to display a behavior I find at least as annoying on VHF as on HF—not slowing down when called by a slower station, and/or responding to a request to repeat or slow down with "CQ test..." The phone ops seem able to spend a fair amount of time trying to pull marginal signals out of the noise without hurting their scores; I don't see why it should be any different on CW, where supposedly everyone is a lot friendlier than on phone.

That frustration aside, this was probably an all-time best for me in a VHF contest—I worked 65 grids, 24 of them for the first time, including Bermuda, Labrador and double-hops to Puerto Rico, Martinique, and the western U.S. (remember, this is VHF!). My last contact before shutting down on Saturday night was with VHF Contest Director John Lindholm, W1XX. As of late Saturday night, he had already made more than 600 contacts on six! Last year, by contrast, John won his call area and placed 4th overall in the U.S. with only 356 total contacts.

With the prolonged openings on six and the resultant high levels of activity, this contest has finally come into its own, a long process that began with former Contest Director Gene Zimmerman, W3ZZ, restructuring the contest several years ago into a 6- and 2-meter only event, and excellent promotion and publicity by our current director, W1XX. Hats off to both Gene and John, and of course, to all of you who got on the air, for making the contest a success. The activity level was truly astounding. If you're not on 6 meters, you're missing out on a lot of fun—perhaps the most fun to be had on the air right now. (For you HF-only folks, Propagation Editor NW7US assures us in his column this month that conditions should be looking up as we get into autumn.)

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

Katrina Plus One Year

You should be receiving this issue within a week or so of the one-year anniversary of the landfall of Hurricane Katrina, the worst natural disaster ever to hit the United States. In most parts of the U.S., after most big storms, a visit a year later may reveal some residual damage, but most everything will have been repaired or rebuilt. Not so a year after Katrina. The destruction was so massive, and the affected area so large, that in many of the hardest-hit communities, reconstruction has barely begun, and thousands of people are still living in (non-hurricane-resistant) FEMA-provided mobile homes. One of those people is Charlie Otnott, WD5BJT, of Bay St. Louis, Mississippi, where the eye of the storm came ashore. We have Charlie's story in this issue (see "Misssissippi Mud," page 13), and his picture on the cover (see "On the Cover," page 84), as a reminder that the aftermath of Hurricane Katrina is not yet over, even as we approach the midway point of the 2006 hurricane season.

Another part of the aftermath of Katrina has been the examination of what went wrong in the nation's emergency response, which may be the storm's longest-lasting legacy. One of the major problems was communications, a weak point in any disaster, but magnified by the massiveness of this catastrophe. The FCC chartered an independent panel to study the failures and make recommendations for changes in FCC rules to help bring vital communication services back online as quickly and efficiently as possible after future disasters. The panel's report and recommendations were released in mid-June as part of a Notice of Proposed Rule Making on implementing those recommendations. "Washington Readout" Editor Fred Maia, W5YI, examines the highlights of the report—in which ham radio was recognized as one of the few systems that worked—and the major recommendations. At press time, no comment deadline had been set, so if you have input regarding the recommendations, there is probably still time to file them. As always, we recommend that you read the entire NPRM (80+ pages in this case) before filing your comments.

Of course, you don't need a named storm to cause major damage. Several days of heavy rains in the northeast at the end of June caused significant flooding in eastern Pennsylvania, western New Jersey and upstate New York, as the Delaware and Susquehanna Rivers overflowed their banks. Public Service Editor Bob Josuweit, WA3PZO, who wrote just a couple of months ago that conditions seemed ripe for such flooding, covers the ham radio response in his column (page 35).

Welcome Back, N8BJQ

Norm Koch, WN5N, has decided that 25 years as CQ WPX Awards Manager is enough, and he has decided to step down. Steve Bolia, N8BJQ, who "retired" a few years back as director of the CQ WPX contests, has agreed to take over as award administrator. We welcome Steve back into the official CQ "family," and thank Norm for his quarter-century of dedicated service to CQ, the WPX Award and amateur radio. An announcement with details on where to send WPX award applications is in this month's DX column.

73, W2VU

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

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

ALS-600 Amp with Switching Power Supply
***New!* ALS-600S, $1428.** ALS-600 amplifier with 10 lb. ALS-600SPS switching power supply combo.

Switching Power Supply

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

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

From QST Magazine, March, 2005

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

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

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

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

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

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

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

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

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

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Covers 1.5-22 MHz, (10/12 Meters with $29.95 kit, requires FCC license).

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

Typically 60-70 watts in gives full output. ON/OFF switch bypasses amplifier for "barefoot" operation. Extremely quiet fan comes on as needed. Excellent harmonic suppression, push-pull output, DC current meter. 13.8 VDC/80 Amps. 3½x9x15 in. 7 lbs.

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

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

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

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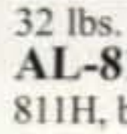
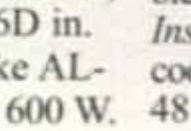
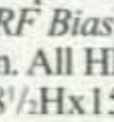
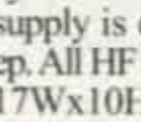
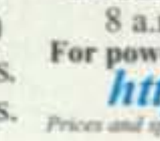
Band data from transceiver auto selects antennas. Antenna memories. No hotswitching. Rig-to-amp interface. For 3/4 BCD, 1 of 8 relay boxes. **RCS-12, $299.95**, auto controller with 8 coax relay box, to 60 MHz. **RCS-12L, $339.95**, with lightning arrestors.

AWM-30 Precision SWR Wattmeter..$149.95

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

AWM-35 Flat Mobile SWR Wattmeter . . $159.95

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

ATP-100 Tuning Pulser . . . $59.95

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

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

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

ADL-2500 fan-cooled Dry Dummy Load, $199.95

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

SDA-100 Mobile Screwdriver Antenna

$379.95 80-10M, fiberglass form, Pittman motor, CNC parts, magnetic sensors, #14 wire, 1.2 kW PEP. 6' whip, $24.95

800 Watts . . . $849 with four 811A tubes

AL-811H, $849. Plugs into 120 VAC outlet. All HF bands. Hi-silicon transformer, heavy duty tank coils, tuned input, operate/standby switch, Xmit LED, ALC, lighted meters, 32 lbs. 13¾Wx8Hx16D in.
AL-811, $699. Like AL-811H, but three 811A, 600 W.

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

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announcements

The following Special Event stations are scheduled for September:

N2UL, from "CQ Labor Day," Nutley, NJ; Robert D. Grant United labor ARA; 1200–2400Z Sept. 4 on 14.260 and 28.420 MHz. For certificate send QSL and SASE to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

W4PL, from Emerald Isle, NC, NA-112; Tennessee Valley DX Association; Sept. 27 to Oct. 7 on 10–80 meters, including WARC bands, CW, SSB, RTTY. QSL to K4KWK direct with SASE or through the bureau.

K5R, from first anniversaries of Hurricanes Katrina and Rita, New Orleans, LA; 1400–2000Z Sept. 16 on 14.250 and 7.250 ±QRM. For certificate send QSL and SASE to SELARC, K5R, P.O. Box 1324, Hammond, LA 70404 (http://groups.yahoo.com/K5R).

KB8UUZ, from National POW/MIA Recognition Day, Freedom Township, OH; 1400–2300Z Sept. 6 on 7.237, 14.237, 21.337, 28.337 MHz. For $8^1/2 \times 11$ certificate send QSL and SASE to Tom Parkinson, KB8UUZ, 9992 State Route 700, Mantua, OH 44255.

KD8CKP, from Kent State University Black Squirrel Festival, Kent, OH; Portage County ARS; 1400–2300Z Sept. 8 on 7.237, 14.237, 21.337, 28.337 MHz. For $8^1/2 \times 11$ certificate send QSL and SASE to Al Atkins, KB8VJL, 12433 Chamberlain Rd., Aurora, OH 44202.

W8VP, from celebration of unique "S" bridges of Historic National Road, New Concord, OH; Cambridge ARA; 1300–2100Z Sept. 23 on 7.230–7.250 and 14.250–14.260 MHz. For QSL send QSL and SASE to Cambridge ARA, W8VP, P.O. Box 1804, Cambridge, OH 43725.

WØS, from Wellsville, MO Sequiscentennial; Sept. 8–10 on 3.963, 7.235, 14.040, 21.040 MHz. For certificate and QSL send QSL with SASE to H. R. Thompson, K2HT, P.O. Box 95, Wellsville, MO 63384.

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

Sept. 9, **Grand Rapids Area Hamfest**, Kent County Fairgrounds, Lowell, MI. Contact Jack Amelar, NY8D, e-mail: <grahamfest06@w8dc.org>; or 616-897-6885; <http://www.grahamfest.org>. (Talk-in 147.26+ (94.8 Hz), 146.52 simplex; exams 10 AM)

Sept. 9, **Kingman Hamfest**, Mohave Community College parking lot, Kingman, AZ. Contact Bill Beaman, KAØIYS, phone 928-758-6780, or cell 602-999-6004. (Talk-in 146.76, PL 131.8; exams)

Sept. 16, **W9DXCC Midwest DX Convention,** Holiday Inn, Elk Grove, IL. Contact Bill Smith, W9VA, e-mail: <w9va@aol.com>; phone 847-945-1564; <www.w9dxcc.com>.

Sept. 16, **Rhode Island Amateur FNM Repeater Service Fall Fleamarket & Auction**, VFW Post 6342, Forestdale, RI. Contact Rick Fairweather, K1KYI, e-mail: <k1kyi@arrl.net>; 401-864-9611 (7–8 PM only). (Talk-in 146.76)

Sept. 16, **RAGS Hamfest**, Pompey Hill Fire Dept., Liverpool, NY. For info call 315-698-4558; e-mail: <www.ragsonline@hotmail.com>; <www.ragsinreview.com>. (Talk-in 147.90/30; exams 11 AM)

Sept. 16–17, **Virginia Beach Hamfest & Roanoke Div. Convention**, Virginia Wesleyan College, Virginia Beach, VA. Info e-mail: <hamfest@exis.net>; <http://www.vahamfest.com>. *See us at the CQ Booth.*

Sept. 17, **Western CT Hamfest**, Edmond Town Hall, Newton, CT. Contact Joe de Groot, AB1DO, 203-938-4880.

Sept. 30, **Elmira International Hamfest**, Chemung County Fairgrounds, Horseheads, NY. Contact Ken, KA2LIM, 607-739-7305; <www.arast.org>. (Talk-in 147.360+, 146.700–; exams 0900)

Sept. 30, **SEDCO DXers & Contesters Gathering**, MainStay Suites, Gatlinburg, TN. For details go to: <www.SEDCO.Homestead.com>, or see this month's DX column on p. 90.

our readers say

Incredible AM Equipment

The following letter was written to Joe Veras, K9OCO, author of CQ's "Radio Classics" column.

Dear Joe,

Very good morning to Andy, WA4KCY, and K9OCO, the author of a most uplifting article on incredible AM equipment *("A Visit with WA4KCY," March 2006 CQ, page 74—ed.).* I've read this article three times and very much enjoyed looking at the pictures of the homebrew AM transmitters.

My best friend, who is also an amateur, Arno, ZS6BDD, gets *CQ* magazine every month, and then when he is finished reading it, he passes it on to me. The pictures of the AM 813 kilowatt and 4/125 500-watter are really outstanding. I love old people and old amateurs with antique equipment—hi! My wife Susan

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also has an amateur radio license, but she is not active.

We have a regular net on 3700 kHz every night at 1900 hrs. I run two homebrew TXs, one at 100 watts, with a modulator using a phase splitter driving a 12au7, and then a pair of old soldiers called 807's into a UM2 modulation transformer, and a pair of 6146's with a pi network in the final stage. The oscillator is an Italian two-tube Geloso.The other TX has a single 813 in the final with a Barker & Williamson pi network and a pair of TT21's into a UM 3 modulation transformer, also with a Geloso VFO with three tubes for the 813. A few restored commercial rigs are also on display: National receivers NC-109 and NC-173, Hallicrafters SX100 and SX42, Viking Ranger I TX, and also a Hallicrafters HT-32. I have on the bench a National NC-125 to be restored, which is planned for the near future. We have a quarterly flea market, and sometimes I pick up some goodies. As they say, one man's junk is a another's treasure.

It was very inspiring, too, to see that you and Andy are dedicated followers of Christ. I share this with you, and may you both receive lots of blessings. On December 9, 2005, I attended a gospel homecoming music show by the Bill Gaither singers, and it was a highlight of my career in music .

Best 73's and God Bless!

Sakkie Coetzee, ZS6BPA

Dumbing Down or Wising Up?

Editor, *CQ*:

I read your article ("Zero Bias," April 2006 *CQ*), my very first ham-related reading besides the study book I used to pass my ham exam a few months ago. I have to agree with you about changing the type of questions on the ham exam, because although I passed with 100%, I still know absolutely nothing (well almost) about ham radio. My husband and two oldest sons, ages 14 and 13, all passed with between 85–100% as well and are excited to make use of their new licenses, but could use more teaching on proper "on-air" conduct and other practical, "hands-on" instruction.

I agree that it doesn't help me a lot to know what apogee, perigee, and moon bounce mean, while just last night my husband discovered Echolink, IRLP, and how to go from his laptop to around the world without using his radio. (He was very excited about this!) And, as you mentioned, all of us are learning a lot just by getting "on-air" experience, tuning in to other conversations and practicing our own CQs etc. My 13 year-old is programming his radio right now!

Another article in the magazine talked about CW being removed from the requirements for some of the license classes. We are studying for the Morse code exam and even if it is not required by the time we go for our General licenses, my husband, KE7HBG, feels it's good just to have this knowledge under our belt (and maybe have one step out of the way to our Extra, which we hope to get to, if the enthusiasm holds up).

Also, with having all the questions and answers to the question pool in the back of the book, I feel like I was able to slide right into a license without really having to study or know anything except how to memorize answers. (That's good and bad.) I am grateful for being able to get my license, so I can get real-life practice before we move on to our General Class licenses.

Letricia Hatch, KE7HBH

Letricia—Congratulations to you and your family and welcome to ham radio. Have fun and keep reading CQ*!*

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Special one day only pricing at
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– See the latest gear –
– Refreshments –
10:00 - 5:30 pm
(no purchase necessary)

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Most of you will receive this issue almost exactly one year after Hurricane Katrina struck the Gulf Coast of the United States, touching off the worst natural disaster in this nation's history. The eye of the storm came ashore in Mississippi and caused the greatest direct damage there. What was it like to be there? What is it like today, a year later? What follows is a look at one person's—one ham's—experiences during and after Katrina.

Mississippi Mud[1]

BY DAN BROWN,* W1DAN, AND CHARLIE OTNOTT,† WD5BJT

This is a survival story about Charlie Otnott, WD5BJT, who made it through Hurricane Katrina at great personal and material loss. At around 8 AM on August 29, 2005, Hurricane Katrina landed on the Mississippi Gulf Coast. The hurricane created a 37-foot storm surge with wind gusts over 140 mph. "Ground Zero" were the communities of Hancock County, Mississippi, including Bay St. Louis, Clermont Harbor, Diamondhead, Kiln, Lakeshore-Ansley, Pearlington, and Waveland. In the direct path of Katrina was Charlie Otnott's home (and amateur radio shack) in Clermont Harbor. It did not survive. He did.

I met Charlie in the late 1970s when I became a member of the Greater New Orleans Amateur Radio Club, W5UK. Charlie was living in New Orleans at the time, and our shared interest in vintage radio helped us to become longtime friends. Retired from the Coast Guard, Charlie now works as an Intelligence Coordination Specialist at the Gulf Coast High Intensity Drug Trafficking Area in Gulfport, Mississippi. He lives with his wife Linda and step-daughter Julie.

Their story came out as I visited the region after the storm to check on friends and family in my hometown of New Orleans and viewed for the first time the vast devastation in Crescent City. On December 31, I traveled about an hour east from New Orleans to Hancock County, Mississippi to visit Charlie, who was—and still is—living in his government-supplied FEMA trailer. We talked about his Katrina experience and his plans for the future. After sitting and chatting for a while outside his "FEMA Condo," as the locals call it, in the local campground turned FEMA trailer community, we traveled to his old QTH in Clermont Harbor, which is now just rubble. During that time and afterwards, I asked him many questions . . .

Hurricane Katrina destroyed Charlie's house, but deposited two boats on his property, three blocks inland from the coast. One of the boats had been carried by the storm all the way from Pensacola, Florida.

W1DAN: What were your thoughts before the hurricane hit?

WD5BJT: This was gonna be a big one. I compared Katrina against the then de-facto yard stick of Hurricane Camille in August of 1969, when there was 5 1/2 feet of water in our house. So for Katrina, I knew I needed to board up the windows and move important stuff to the second floor, because it would not flood up there. I also needed to ensure the safety of our dog, Sybil. While I was

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doing this, I was recovering from a bad stomach virus. My intention was to ride the storm out in the house with our dog.

W1DAN: What were your experiences before the storm?

WD5BJT: My wife Linda received permission for me (but not our dog) to evacuate to the Sheriff's Office Building in downtown Bay St. Louis. After boarding up the house, I evacuated around 7 PM. In recorded history, flood water had never reached the downtown area. Downtown Bay Saint Louis is on a bluff and is the highest point in southern Hancock County, with an elevation of 25 feet above sea level. The Sheriff's Office building is located approximately one-half block from the beach.

W1DAN: What were your thoughts during the storm?

WD5BJT: As the storm came I was in disbelief, but not denial. This storm was extremely dangerous and worse than Camille. The training and leadership that I received as a Chief Petty Officer in the US Coast Guard kicked in. I kept thinking about my step-daughter Julie, who was on a camping trip in the middle of Mississippi. I also worried about our dog.

W1DAN: What did you do after the storm?

WD5BJT: We were able to get back to our property about a week after the storm. The police officer who brought us to Clermont Harbor could not begin to prepare us for what lay ahead—total and utter destruction. My small town was gone. There were no structures standing. A town of about 300 people had literally been swept off the face of the Earth. My house floated 30 feet into the neighbor's yard and broke apart during the 37-foot-high tidal surge that hit our home. I was numb with shock. I wondered and feared for our dog Sybil, because there was so very little left to our home that was recognizable. We cried for a few moments over our loss. We then began to see what could be salvaged.

There was almost nothing left of our possessions, and the remains of four other homes were intermixed with our house. There were two boats on our property after the storm. One was so badly mangled that identification could not be obtained. The second boat had identification on it. It turned out that the boat had floated from near Pensacola, Florida and landed on my property three blocks in from the Mississippi Sound. The owner said that we could keep the boat (it was totaled anyway). Our dog Sybil could not be located. I left some dog food for her should she make her way back home, but the food was not eaten. She was later found deceased in the shattered remains of our home.

Charlie's antennas stayed in the trees, even though many of the trees came down in the storm.

(Sybil was a member of the family, adding to the material loss, which was made even worse by the fact that Charlie had no insurance. We also talked about how the community fared, and whether amateur radio was able to maintain emergency service to the area.)

W1DAN: What was the status of the local repeaters?

WD5BJT: There were two repeaters on the air before the hurricane. My UHF repeater (WD5BJT/R) on 444.150 MHz and Mississippi ARES Emergency Coordinator Jerry Leake's 2-meter repeater (K5DMC/R) on 145.330 MHz. My repeater was located at our home, which was destroyed. The K5DMC/R repeater is located in Fenton, in the northern part of Hancock County, and it was knocked off the air when commercial power was lost. A portable generator was then used to keep the repeater on the air. Hams who later came into the area for disaster relief set up a temporary 2-meter repeater on

Even a Collins 75A1 was no match for the fury of Katrina…

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Update: What Has (But Mostly Hasn't) Changed...

W1DAN's initial interview with Charlie took place at the end of December 2005, and has been updated in the intervening months, such as with Charlie's trip, with Dan, to the 2006 Dayton Hamvention®. Since we've heard reports of significant progress in recovery in some parts of Mississippi, we wanted to get some further updates, as of the time this issue was being prepared at the beginning of July.

CQ: What has and hasn't changed since the beginning of the year, especially things such as whether you have been able to find suitable property on which to rebuild?

WD5BJT: We have been working with realtors to assist us to find a home to buy for a good six months now. Property prices remain at high levels. I found an advertisement for a 100 × 150 foot lot just down the street from where we used to live in Clermont Harbor. The selling price for the vacant lot was $75,000. Another lot was being advertised for over $100,000. Very high prices for this area.

Two realtors have stopped working with us because we did not put a bid in on the first couple of properties they told us about. One realtor scheduled house showings at two properties, only to not show up for the appointments. Linda and I have now been working with a realtor who is very sympathetic to our plight. He has gone over and above to research potential properties that we may be interested in seeing. We have since used his services to place bids on three properties.

Unfortunately, the owners of the first property would not acknowledge our contract for sale of the property. We later found out that the owners were very behind on their house payments and were hiding from the realtor whom they had contracted to sell the land and trailer.

Two other property owners would not negotiate their prices. One stated quite bluntly that there were other people desperate enough to pay the asking price without any negotiation. Unfortunately, for these desperate people, he is correct.

You may be aware of the federal government's homeowners assistance grant of $150,000 for those who lived outside of the 100-year FEMA flood zone and did not have flood insurance. In June of 2006, Mississippi Governor Haley Barbour announced that he was forming a new grant for those like my family who lived inside the flood zone and did not have insurance (see <http://www.mshomehelp.gov/>). This grant program, if approved by HUD, will provide $150,000 for families like ours. I immediately called the number on the website and was given an appointment. It appears that we meet the qualifications for the grant if the program is approved by the federal government.

CQ: What's different, in light of last year's rewriting of the "de facto yardstick"?

WD5BJT: Some insurance companies are raising rates by 450%. Gil's insurance premium went from $7,000 a year to over $24,000. The flood insurance is supposed to increase drastically as well. Several insurance companies are not writing policies altogether, and not renewing expiring policies. One insurance company is now requiring that you carry earthquake insurance. The Mississippi coast sits on an "extinct" fault line. These companies are charging $50 per policy for earthquake coverage, knowing that the likelihood of a claim is virtually non-existent.

Building codes are constantly being changed now that FEMA has redrawn the 100-year flood-plain map. Building codes have increased the minimum elevation of a home three times in the past few months. In Clermont Harbor, a home that sat on a concrete foundation at ground level must be built up at least 18 feet above sea level. In other parts of the county, the minimum elevation to build a home is 24 feet above sea level. The cost to put down 10-foot pilings is now at $20,000. The county building inspector has been sitting on home plans for months because the codes are constantly changing.

More and more people are telling their employers, friends, and relatives that they will be evacuating if a Category 1 storm even thinks about showing up anywhere near here. People are stocking up on food, water, and other emergency supplies.

CQ: With the 2006 hurricane season now officially under way, what plans are you, your neighbors, and community making for dealing with the possibility of another big storm? What preparations are being made?

WD5BJT: Now that the '06 hurricane season is upon us, many here have expressed anxiety and fear. Some who are rebuilding have delayed major repairs because of this fear. Linda and I have notified our employers that if a hurricane comes this way, we are evacuating out of the area.

Most of our possessions can fit inside of our vehicles, as the FEMA trailers will not withstand hurricane-force winds. The FEMA condo we occupy is set up in a state park and is within the flood zone. We are prepared to evacuate with good notice. The only items that we and others lack are food stocks and drinking water. ***I will not be caught without my amateur radio equipment this time.***

146.700 MHz for their use at the relocated Emergency Operations Center at Stennis Airport. The temporary 2-meter repeater has since been taken down, and the K5DMC/R repeater is the only one that now remains on the air.

W1DAN: How did other hams assist in your area?

WD5BJT: There were no local ham radio operators from the affected area of Hancock County who could help. They were too busy surviving. I was in a unique position to help, because I had access to law-enforcement radio equipment. Several volunteer groups of amateur radio operators were in the county to set up emergency communications systems. It was weeks before I could make my way to the temporary Emergency Operations Center at Stennis Airport to make contact with these hams. The volunteer group issued a Yaesu 2-meter radio and magnetic-mount antenna for me to check into their emergency net. With permission, I used the callsign of a group I am a board member of, the Greater New Orleans Amateur Radio Club (W5UK), to check into the nets. As a point of interest, members of GNOARC assisted many victims of Hurricane Camille after it devastated the Mississippi Gulf Coast back in 1969.

W1DAN: How did the other hams in the area survive the storm?

WD5BJT: Other hams I know who were affected are:

• N5ATF, Milton Paske. He lived about 2 1/2 miles to the north of me in Lakeshore. His home went under water and was condemned. He resides in a FEMA "condo" on his property. He lost everything.

• W5UE, Randy Becnel. He and his family live in the town of Kiln. His home was flooded with 4 to 5 feet of water. He lost most everything that was below the flood water. His family lives in a FEMA "condo" on the Stennis Space Center property.

• N5UK, Gil Stock. He also lives in Kiln. His home was 3 1/2 feet above the ground. Flood water just touched the bottom of his home, but did not enter the structure. He lost vehicles, tractors, and the contents of his garage.

• KA5ALI, Elsie Otnott (my mother), lived in Clermont Harbor. She lost everything. She resides about a mile away in a FEMA "condo."

• KA5ALJ, Cindy O. Bordes. She lives

This former campground now serves as a FEMA trailer park, providing temporary housing for many people who have lost their homes.

about a mile away from me. Her family's home had 7 1/2 feet of water in it. Her home has since been gutted and she is rebuilding the inside of her home. She lost all of the contents of the home. She and her family reside in a FEMA "condo" that was put on her property next to their home.

• K5DMC, Jerry Leake. Had some minor wind damage to the roof and siding of his house. He lives in Fenton.

• K5DNB, David Wilson. His home was destroyed. He lived in Shoreline Park, Mississippi. He is renting an apartment in Fenton. There are others, but I am not aware of their status.

W1DAN: What happened to your ham gear?

WD5BJT: I lost my complete ham station, including items such as a Kenwood TS-430S, Henry 2K amp, and Collins 75A1 receiver. I also lost all of my logs, QSL cards, awards, and a large radio magazine collection. In all, I lost more than 31 radios and all accessories.

W1DAN: What ham radio assistance did you receive after the hurricane?

WD5BJT: Members of the Greater New Orleans Amateur Radio Club, The Magnolia DX Association, Wayne Carroll, W4MPY, and anonymous benefactors donated equipment, money to purchase gear, antennas or excess radios, a power supply, and QSL cards. Bob Dunn, K5IQ, from New Orleans visited and bought clothing. Gil Stock, N5UK, donated a Drake TR-4C and an MFJ Super Tuner. Members of the Wellesley Amateur Radio Society near Boston purchased a Yaesu FT-857D, mobile antennas, and other accessories.

I was able to put a station on the air from my FEMA condo. As I made contacts, I would call friends and tell them that I felt like a "real ham" again. Each QSO was cherished, each QSL card that was received, a treasure.

W1DAN: What do you do to get away from the situation?

WD5BJT: I look forward to the time that I can spend with my friends. Doing things that were fun before the storm are now treasured occasions. Friday night pizza with members of the Greater New Orleans Amateur Radio Club now only happens four to five times a year. Visiting with the Magnolia DX Association helps. Going to a hamfest now becomes more of an important bonding event. I was able to attend the 2006 Dayton Hamvention® to replace lost equipment and tools. Storage is still a major issue due to the small living and storage area of a FEMA trailer. Many bargain equipment and antenna purchases had to be passed over because of the storage issue. I did manage to purchase much-needed ham radio software for the donated computer, a dual-band mobile radio, and a straight key.

Just being able to touch and see the vintage as well as the new radios brings tears to my eyes. My family has taken only one car trip until now. My wife

A donated FT-857D has gotten Charlie back on the air. He says he'll never again be caught in a storm without his ham gear!

works full time, my step-daughter goes to school and works part time, and therefore spending time as a family is extremely difficult.

W1DAN: What are your future plans?

WD5BJT: We need to build a new home. There is a strong "hurry up and wait" mentality here. Hopes and dreams about finding property to buy are dashed with each failed attempt. The price of land has become unattainable for most people. Property owners have become extremely greedy and are taking advantage of those who have lost everything. Land that was priced at $1,500 an acre before the hurricane is now selling for over $35,000 an acre. The price for building materials has doubled or tripled. Over 26,000 homes were damaged or destroyed. The building industry in this area can support the construction of about a thousand homes per month. Nothing can be done in our present legal system. The radio equipment that was donated to me will form the nucleus of a modern ham shack. Members of the radio clubs that I am associated with and friends have promised to assist in the replacement of my permanent antennas once a home can be built.

W1DAN: What do you still need?

WD5BJT: With the destruction of our home, and total loss of our personal possessions (we are fortunate to be alive), we need everything that is required to establish a home. We have received donations of kitchen ware, clothing, and food. Once construction can begin on a home, we will need donations of time and talent from the various home building trades, furniture, appliances, and building materials. I have set up a separate bank account strictly for badly needed money donations to help rebuild our home and our lives.

Charlie and his family recently were given a new "FEMA Condo," as these trailers are called, while they continue their search for a new place to rebuild. None of the trailers, by the way, are rated to withstand hurricane-force winds.

In Summary...

Fellow amateurs' assistance has helped Charlie get through some very tough times. Post-Traumatic Stress Disorder and mental depression are rampant in the affected areas. People who can use amateur radio as a connection to the "normal world" have the ability, if only for a short time, to escape from the daily reminders of Katrina. Amateur radio has created an extended family and support network for those hams affected by the hurricanes.

If you can, please pay attention to news from the area. Donate time and money to people who are affected or groups in your neighborhood that are providing relief. Get on your radio and just rag-chew with someone from the affected area.

Maybe an independent radio clearing house could be established to help provide replacement ham gear to those affected by Katrina. Your old radio, antenna, tuner, or accessory will be of valuable use for future emergency communications and the occasional QSO that allows hams to continue to enjoy the amateur service.

Thanks to Larry Coyle, K1QW, and Paul Courson, WA3VJB, for assistance with this article. ■

Note

1. The title of this article is borrowed from a song written in the 1920s by James Cavanaugh and Harry Barris, and performed by Bing Crosby and countless others between 1928 and 1998. See <http://lyricsplayground.com/alpha/songs/m/mississippimud.shtml> for lyrics and more information on the many artists who have recorded "Mississippi Mud."

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BY FREDERICK O. MAIA,* W5YI

Katrina Panel Recommends Changes to Cope with Future Disasters

Hurricane Katrina was the most destructive natural catastrophe to ever strike the United States. For weeks the nation watched in horror as survivors in Louisiana and Mississippi struggled to save themselves, their families, and their property ravaged by Katrina and FEMA's inadequate response.

Perhaps the biggest single failing was the almost complete destruction of telecommunications in and out of the affected area. Residents were not able to use the services upon which they normally rely nor could they communicate with emergency assistance.

Hurricane Katrina knocked out more than 3-million customer phone lines. The wireline telecommunications network sustained enormous damage; dozens of central offices and countless miles of outside infrastructure were damaged or destroyed as a result of the hurricane and the subsequent flooding. Radio and television broadcast stations were knocked off the air. Electricity was non-existent. Stranded citizens in the affected areas were completely cut off from the outside world.

Local wireless networks also sustained major damage; more than a thousand cell sites were knocked out of service by the hurricane. Many areas of Louisiana were without 911 service. Once the enormity of the disaster was known, ham operators by the hundreds rushed to the scene to establish links with the outside world, and there were many dramatic rescue stories.

Fear and loss soon turned to anger and rage, blame and denial, as citizens demanded accountability and responsibility for the disaster. Everyone struggled to make sense out of what happened on the Gulf Coast on Monday, August 29, 2005.

"The devastation of Hurricane Katrina highlighted the importance of telecommunications and media to our daily lives, and our dependency on our national communications infrastructure."

FCC Chairman Kevin J. Martin

"It is now clear that the causes of our national failure were multiple, including serious breakdowns in leadership, planning, engineering, policing, and emergency management and ... the failure of our national communications system played a terrible role in exacerbating all of these problems."

FCC Commissioner Michael J. Copps

"Our experience with Hurricane Katrina demonstrates that the role of communications is essential during emergencies, whether citizens are trying to find out what is happening with their families, or emergency personnel are responding to an urgent situation. This Report confirms that our nation's communications systems were put to the test, with unfortunately mixed results."

FCC Commissioner Jonathan S. Adelstein

"When disaster strikes, our first reaction is to reach out to those we love. We call for help, we call loved ones to tell them we are okay, and we call to offer assistance to those in need. The Commission plays a critical role in ensuring the continuity of essential communications systems that are relied on for public safety, for public officials, for relief efforts, and for every single citizen touched by a disaster."

FCC Commissioner Deborah Taylor Tate

"The lessons learned from the Katrina experience will allow us to be better prepared, not just in the Gulf Coast region or in the event of a hurricane, but in the face of any impending disaster to provide the critical infrastructure and interoperability of communications systems so vital to protecting lives and property."

FCC Commissioner Robert M. McDowell

Katrina Panel Formed

Congress has charged the Federal Communications Commission with promoting the safety of life and property through the use of wire and radio communications. Pursuant to the Federal Advisory Committee Act (FACA), in January 2006 FCC Chairman Kevin J. Martin established the "Independent Panel Reviewing the Impact of Hurricane Katrina on Communications Networks" (see: <http://www.fcc.gov/eb/hkip/>). The FACA requires open meetings and a wide diversity in its membership, and governs the behavior of advisory committees to government agencies.

The FCC's 27-member blue-ribbon panel was composed of experts from all sectors of the telecommunications industry, including city, county, state police, and fire officials; wired, wireless, and satellite network companies; radio and television broadcasters; cable providers; equipment manufacturers; telemedicine professionals; as well as minority groups. Its chairman was Nancy Victory from the prestigious communications law firm of Wiley Rein & Fielding. Richard Wiley is a previous FCC Chairman.

Their mission was to study the impact of Hurricane Katrina on telecommunications, media and public safety communications and critique the effectiveness of the recovery effort with respect to the communications infrastructure.

In addition, the Independent Panel was to develop recommendations by June 15, 2006 regarding ways to improve the FCC's response, disaster preparedness, network reliability, and communications among first responders such as police, fire fighters, and emergency medical personnel.

The Independent Panel met directly on five occasions. Four of these meetings were used to examine the facts surrounding the impact of

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Hurricane Katrina and to obtain evidence concerning the extent of the damage and the adequacy of the recovery effort.

On one occasion, the Independent Panel met in the area struck by Hurricane Katrina to hear first-hand from victims of the disaster. The panel also received written comments from interested members of the public. Finally, the panel's informal working groups met on numerous occasions via conference call and in person to discuss their progress.

On June 9, 2006, the Independent Panel held its final meeting in Washington, DC to conclude its analysis and deliberations. The panel finalized its findings and recommendations and submitted its report on June 12, 2006. It described Hurricane Katrina as the worst natural disaster in the nation's history.

A week later (June 19), the FCC released a Notice of Proposed Rule Making (EB Docket No. 06-119) seeking public comment on the panel's recommendations, some of which involve amateur radio. The entire NPRM can be found on the web at: <http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-06-83A1.pdf>.

Katrina Panel Recommends FCC Strategy

The panel's report made a series of sweeping recommendations on how public and private telecom networks should cope with serious disruptions.

In some cases, the Independent Panel recommended action that requires FCC notice-and-comment rulemaking. In other cases, Commission action is not dependent upon new regulations, such as increased outreach and education campaigns. Here is a capsule version of the panel's proposals:

1. To speed response efforts, the Independent Panel recommended the adoption of a proactive (rather than reactive) program for telecommunications reliability and resiliency.

2. They suggested working with industry sectors, associations, and other organizations to establish a "Readiness Checklist" for the communications industry that would include developing formal business continuity plans, conducting training exercises, developing suitable plans and procedures, and stockpiling supplies and equipment to help in disaster response.

3. The Independent Panel recommended enhancing the public safety community's awareness of "non-traditional emergency alternatives" through community education campaigns.

4. The Emergency Alert System (EAS) should be used more efficiently. The EAS uses broadcast radio, TV, and cable systems to warn the public about emergency situations. It replaced the Emergency Broadcast System (EBS) in 1994.

5. It was recommended that the FCC become the focal point for the coordination of all federal outage and infrastructure reporting requirements in times of crisis.

6. Communications infrastructure providers should have national credentials. The panel generally supported the certification of all telecommunications repair workers and guidelines to enable communications providers and their workers to gain access to the affected areas after a disaster.

7. The FCC should work with Congress and appropriate federal agencies to ensure that telecommunications providers are afforded "emergency responder" status under the Stafford Act (see: <http://www.fema. gov/library/stafact.shtm>) and that this designation be incorporated into national, state, and local emergency response plans. (The Robert T. Stafford Disaster Relief and Emergency Assistance Act authorizes the President to issue a major disaster declaration to speed a wide range of federal aid to states determined to be overwhelmed by hurricanes or other catastrophes.)

8. The FCC should work with state and local emergency officials and the communications industry to encourage the formation of coordinating and planning bodies at the state or regional level. The panel also listed activities that the Commission should encourage each state or regional coordinating body to engage in.

9. The FCC should work with the National Communications System (NCS), a unit of the Department of Homeland Security (DHS), to broaden its membership to include representation from all types of communications systems, including broadcast, cable, satellite, and other new technologies. The NCS is an interagency group of 23 federal departments and agencies that coordinates and plans telecommunications to support crises and disasters.

10. The use of existing priority communications services—such as the Government Emergency Telecommunications Service (GETS), Wireless Priority Service (WPS), and Telecommunications Service Priority (TSP)—should be maximized.

GETS is a White House-directed emergency phone service used in an emergency or crisis situations when the public telephone network is congested or disrupted. WPS allows cellular providers to offer wireless service to specific federal, state, and local level personnel during emergences. The TSP Program provides national security and emergency preparedness users priority access to telecommunications services.

11. The FCC should create two websites identifying: (1) the key state emergency management contacts and post-disaster staging areas for communications providers; and (2) contact information for the Commission's Task Force that coordinates disaster response efforts and outage recovery.

12. The Katrina Panel recommended that the FCC encourage state and local jurisdictions to maintain a pre-positioned cache of emergency response components—including radio-frequency communications equipment, tower system parts, power-system components, and fuel— that would be needed to immediately restore existing public safety communications within hours of a disaster.

13. The panel also made a number of recommendations intended to facilitate interoperability among first-responder communications. At present, many police, fire fighters, medical personnel, and other emergency services cannot communicate with one another during disasters. Common channels should be created for government, military, and civilian public safety agencies.

The panel said the FCC should "expeditiously approve any requests by broadcasters to terminate analog service in the 700-MHz band before the end of the digital TV transition in 2009 in order to allow public safety users immediate access to this spectrum."

14. The FCC should support pre-configured alternate 911 backup sites located away from the disaster area. The panel also recommended that: (1) service providers maintain 911 circuits using emergency back-up power located on-site when necessary; (2) dual-service 911 services be deployed as a way to eliminate single points of failure; and (3) network operators, service providers, equipment suppliers, and public safety authorities should establish alternative methods of communication for critical personnel.

15. The FCC should educate the emergency medical community about emergency communications and the various priority communications services available. State and community Emergency Medical Services (EMS) should be recognized as an equal part-

ner in public safety communications. EMS is a branch of medicine that is performed in the field, pre-hospital (i.e., the streets, peoples' homes, etc.) by paramedics, emergency medical technicians, and certified first responders.

16. The Commission should work with various industry trade associations and state and local government agencies to provide emergency information to persons with disabilities and those who do not speak English.

Amateur Radio Operation During Disasters

On September 1, 2005, two days after Katrina hit, the FCC informed amateur radio operators that they have the authority to make transmissions necessary to meet essential communication needs and facilitate relief actions and that prior FCC approval is not required. On September 11, the FCC granted an STA (Special Temporary Authority) to an amateur radio operator in Ocean Springs, Mississippi to provide communications to the American Red Cross on high frequency bands that he could not otherwise use.

The Katrina panel believes the FCC should establish a prioritized system of automatically waiving restrictive regulatory requirements or of granting automatic STAs to permit any transmissions necessary to meet essential communications needs.

The final report also recognized the value of ham radio during natural disasters. It said, "...once called into help, amateur radio operators volunteered to support many agencies, such as FEMA, the National Weather Service, Hurricane Watch, and the American Red Cross." The panel also noted, "Amateurs provided wireless communications in many locations where there was no other means of communicating and also provided other technical aid to the communities affected by Katrina."

NPRM Issued June 19

"With this Notice of Proposed Rulemaking, we are asking for comments and suggestions from the public on how to best address and implement the Independent Panel's recommendations," FCC Chairman Kevin J. Martin said. The goal "...is to take the lessons learned from this disaster and build upon them to promote more effective, efficient response and recovery efforts, as well as heightened readiness and preparedness, in the future."

The Commission also asked for comment on other steps the FCC can take within its jurisdiction and statutory authority to assist the public safety community in responding to disasters and other emergencies, and to strengthen telecom network resiliency and reliability.

The NPRM is huge (some 82 pages long) and includes the entire report of the Independent Panel. Comments will be due 60 days after publication in the Federal Register, which at press time had not yet happened. You may file online using the FCC's Electronic Comment Filing System (ECFS), located on the web at: <http://www.fcc.gov/cgb/ecfs/> (be sure to enter "06-119" under "Proceeding"). Comments and reply comments must include a short and concise summary of the substantive discussion and questions raised in the NPRM.

73, Fred, W5YI

When there's only one continent (other than Antarctica) from which you've never operated the CQ World-Wide DX Contest, and your travel genes are itching, well, there's really not much choice in the matter...

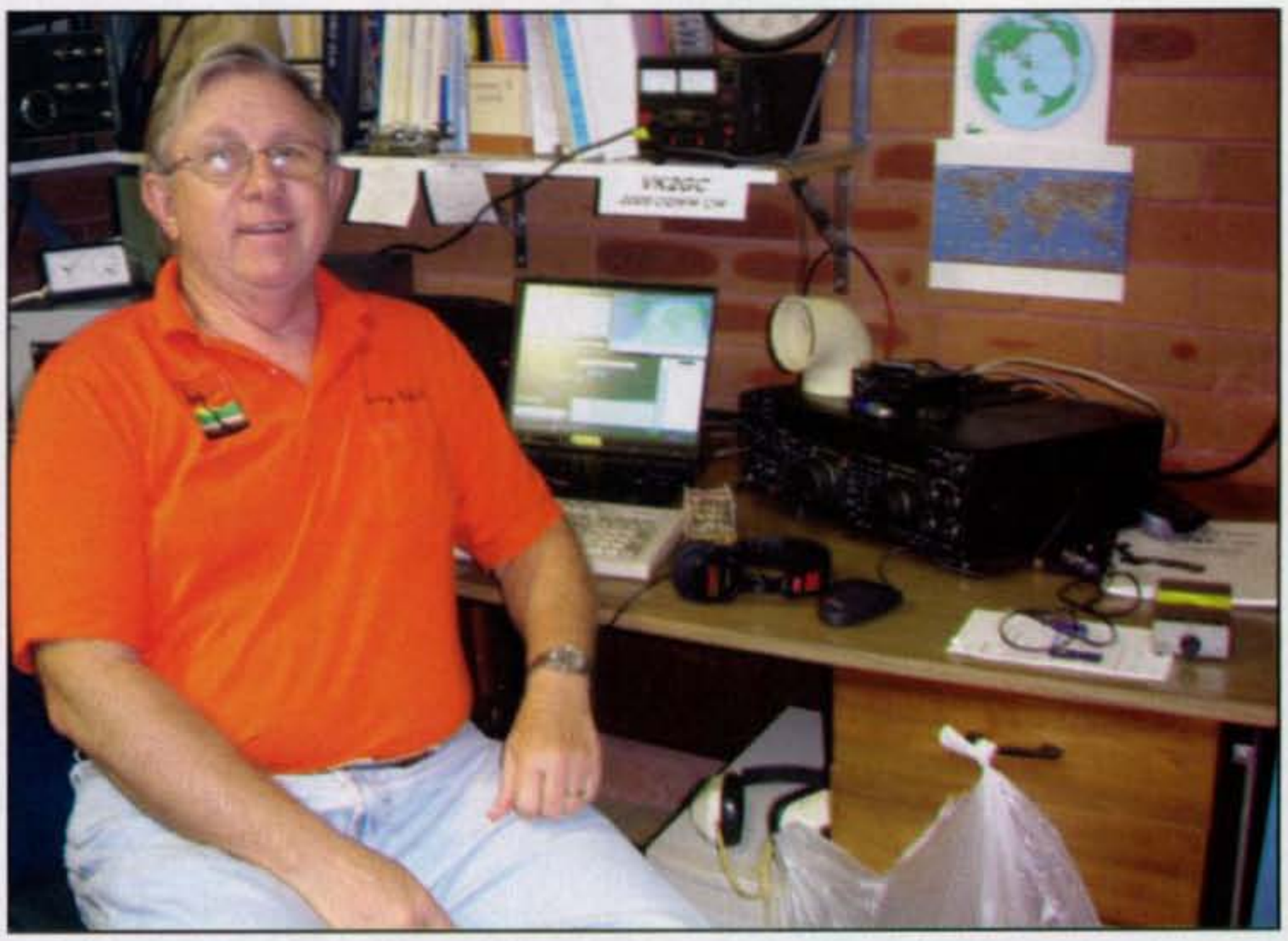
CQWW CW From Down Under
The VK2GC Story

BY GEORGE WAGNER,* K5KG

My XYL, Kay, and I jokingly said that there were only two places in the world we had never been —Australia and North Dakota. With that in mind, and not being able to find much of a reason to go to North Dakota (although I am considering it for Sweepstakes), we decided that the time was right for a trip "down under." After months of planning, we took off on a five-week venture in early November 2005 with both VK (Australia) and ZL (New Zealand) in our sights. Doing the CQWW DX CW Contest from the continent of Australia was imperative, since over the years we had operated this contest, and many others, from five other continents.

There were so many highlights to the trip. We met many fantastic contesters along the way: David, VK2CZ; Bernd, VK2IA; Serge, VK2IMM; Richard, 9M2CNC; all members of the VK Contest Club; Dom, VK2JNA, and other members of the VK2MB club; and Martin, VK7GN, and his XYL, Linda, VK7QP, in Richmond, Tasmania, with whom we spent three glorious days seeing the spectacular sights of southern Tasmania. Martin patiently taught me to drive on the "wrong side of the road." His thoughtful coaching paid off, as I would later drive the Great Ocean Road, a beautiful but treacherously winding drive of 1000 km from Melbourne to Adelaide. Later in Rotorua, New Zealand, we had a magnificent visit with Graeme, ZL1ANH, his XYL, Roz, and their family.

Knowing that we would meet a number of hams along the way, I took a supply of Florida Contest Group (FCG) Orange hats and shirts! Spreading FCG Orange proved to be a hit with the contesters, as the photos tell.



George, K5KG, at the VK2GC contest station. (Photos courtesy of the author)

On a cold, rainy Friday before the contest, Kay and I climbed the Sydney Harbour Bridge for her birthday. This climb to a height of 450 feet above the water is an undertaking not to be missed when visiting Sydney. Another thing not to be missed in VK-land is hand feeding kangaroos and wallabies; they are beautiful and gentle creatures. One evening in Tasmania, Martin and Linda took us to a night feeding of "tassie devils." When the devils feed, they put on a screaming fit, which is said to be why the early explorers named them "devils."

In Alice Springs we had a memorable visit to the School of the Air, where children living on sheep and cattle stations in the outback—some 130 of them in an area larger than Texas—attend school via HF radio and modern video conferencing that is transmitted over satellite links. Early radio gear all was built by Australian radio pioneer Alf Traeger, VK5AX, who built the first pedal wireless for the Royal Flying Doctor Service. (The story of Alf Traeger and his early radio inventions can be found in the January 2003 issue of *CQ*[1], or online at <http://www.antiqueradio.com/traeger_pedal_07-99.html>. Particularly interesting to read about is a typewriter-like machine that he developed to send Morse characters.)

Radio Time!

Enough of the travelogue, and on to ham radio. In advance of the trip, I spoke

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e-mail: <Georgek5kg@aol.com>

with Kenny, K2KW, and Tom, K1KI, about possible stations from which to operate, and put out a "CQ Australia" message on the CQ-Contest reflector asking for a CQWW CW invitation. Aussies active in the VKCC in VK2, VK3, VK4, VK6, and VK7 all responded with juicy invitations.

After sorting out the choices, locations, and constraints in our itinerary, I decided to accept the offer from David, VK2CZ/VK9XD, to operate the contest from his local club's station north of Sydney. (Incidentally, VK2CZ holds the VK record in the Florida QSO Party!) Bernd, VK2IA/VK9AA, who is also a member of the same club—the Manly Warringa Radio Society, VK2MB—assisted in planning my visit. Bernd got the doors open in Canberra with the VK licensing folks, and I managed to get one of the last two-letter calls, VK2GC, before they stopped issuing them (for reasons I never understood). Incidentally, I tried to get VK2OJ (in memory of Jim White, K4OJ, SK, founder of the FCG), but that call was unavailable, as was VK2KG and any other code-friendly two-letter combinations I could think of. VK2GC was meant to be.

David and Bernd mobilized the VK2MB club members to ready the station, which included replacing a defective rotor on their TH6 and adding 40- and 80-meter antennas. My contribution to the effort was a set of INRAD filters for their new FT1000MP MkV, which they installed upon my arrival in Sydney. The station is co-located in a facility with a coastal marine monitoring station and a fire brigade. The club had previously had some RFI problems with these other services, but fortunately got them resolved in advance of the contest, so I was able to operate without getting any knocks on the door in the middle of the night!

Station Setup

I used a pre-production microHam CW Keyer loaned by Joe, W4TV. It worked flawlessly, and offered the advantage of CW keying and speed control that was fully integrated with the logging program, N1MM Logger. Code generation was handled external to the computer, which resulted in perfect CW—no more stuttering CW when the CPU got overloaded!

Antennas used were a TH6 at 60 ft., a full-size half-wave 40-meter vertical (designed and built by David), and an 80-meter inverted-Vee hung from a tower at 100 ft. The terrain at the station is high, and David says you can see

Dom, VK2JNA, earned an FCG (Florida Contest Group) hat for hanging the 80-meter antenna at 100 ft. in the cold rain!

the Pacific Ocean from up on the tower. Space limitations and power lines at the property prevented a 160-meter antenna from being strung up. Not being able to get on 160 meters probably was not a big loss, however, as QRN (static and other natural noise) on 80 meters was horrific due to thunderstorms, and there was no receiving antenna, anyway.

Contesting from VK

Contesting from VK was out of the ordinary, at least for someone used to operating from the Northern Hemisphere.

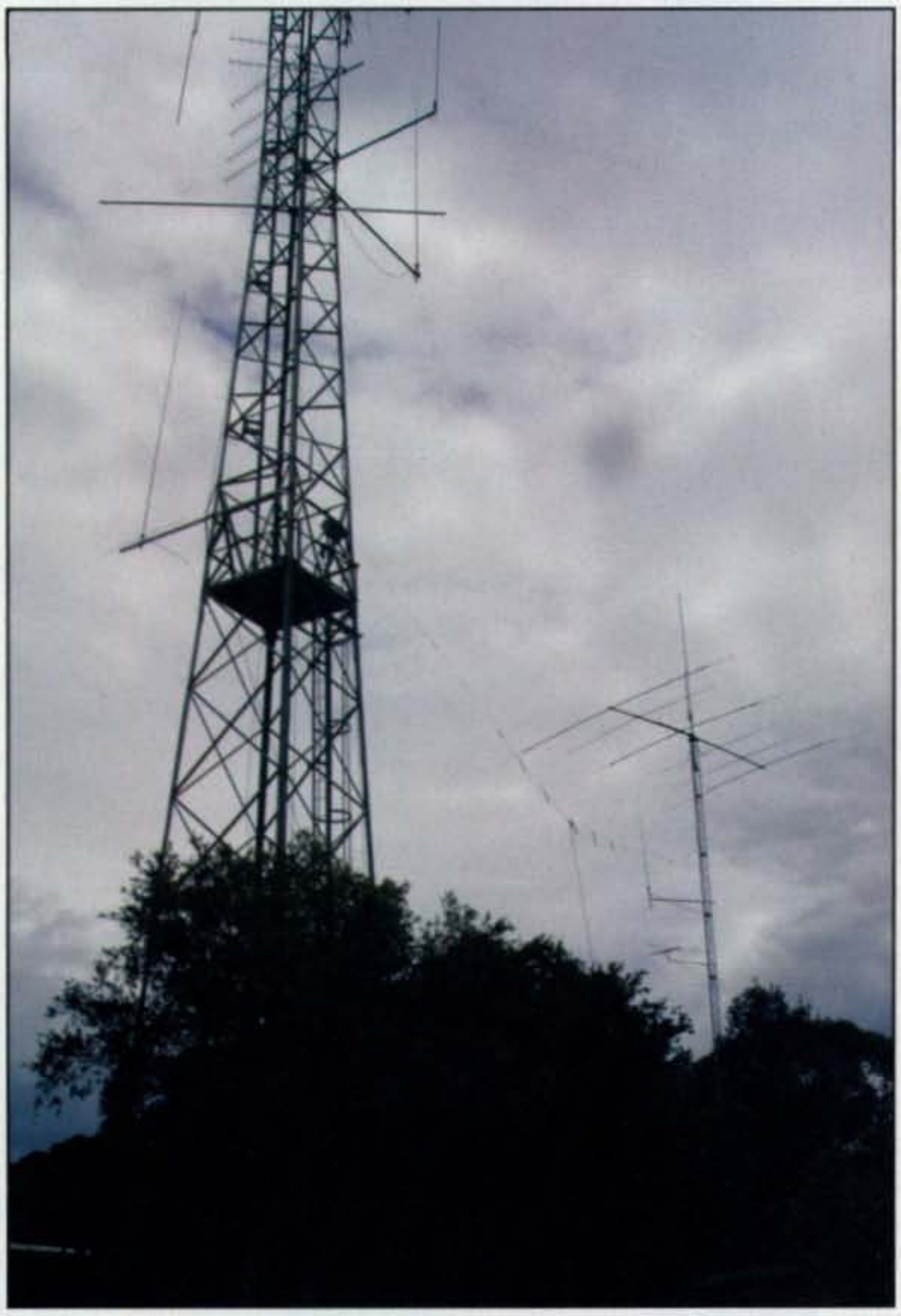
VKCC meeting in Sydney. From left to right, Richard, George, Bernd, and Sergey all earning their FCG Orange.

Doing it from down under was reminiscent of contesting I did from LU (Argentina) back in the '80s, and made me appreciate once again that the world's population is largely north of the equator, making it essential to get into distant population centers to garner any kind of score. Furthermore, being south of the equator offers interesting long-path openings over the course of a day. I spent a lot of time staring at the great-circle map while CQing, and wondering where to point the beam!

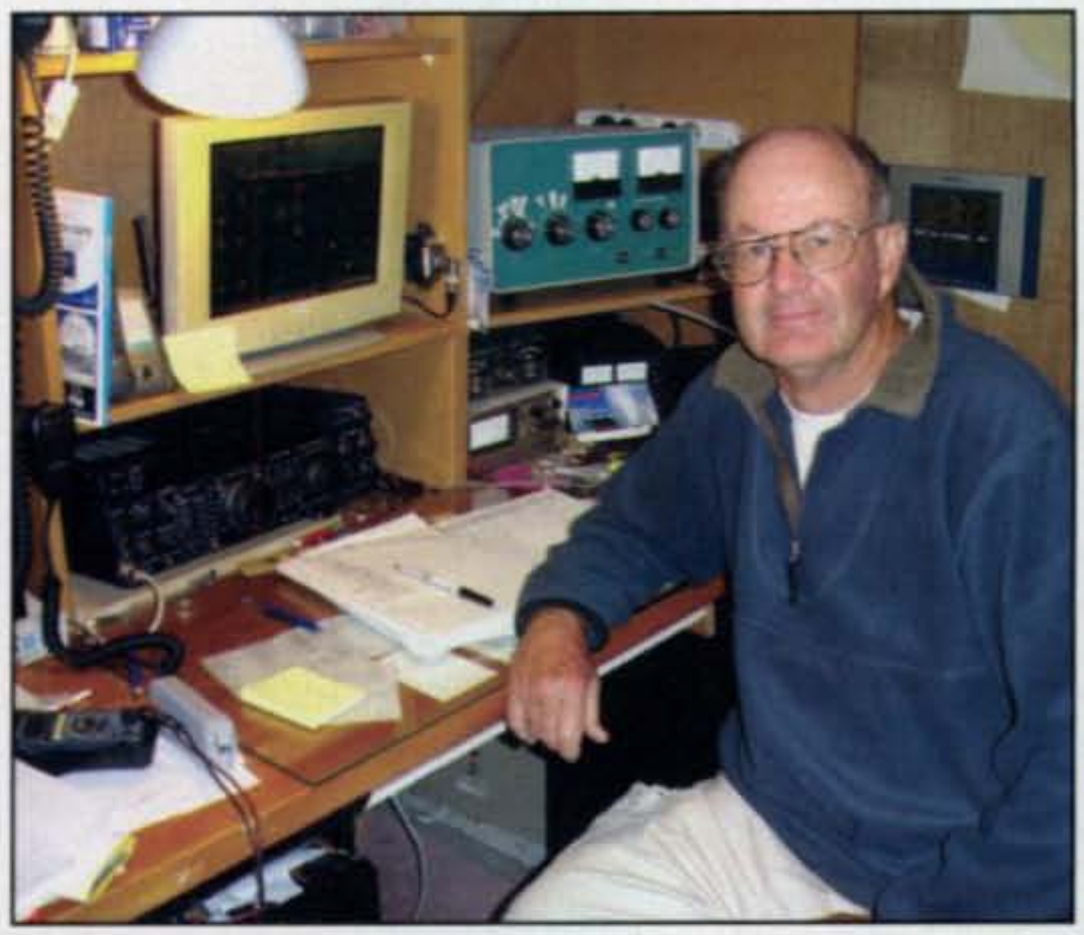
I went into the contest with setup still happening. David, VK2CZ, and Dom, VK2JNA, completed the final antenna work after the contest began at 11 AM (local time) Saturday. I slept in the shack on Friday night, which gave me time to arrange the operating position and get a feel for the station by running some pile-ups. Being somewhat unfamiliar with the FT1000MP, I took the time to go through the manual and set the menu settings to my liking. Final equipment setup, however, did not happen until moments before the start of the contest.

I was plagued with computer problems. A week before the contest my laptop developed the cantankerous problem of refusing to turn on and randomly locking up due to some kind of a video driver problem. Fortunately, David, VK2CZ, was able to lend me his laptop for the contest. I tried—with help from David; Bernd, VK2IA (before he left for Cocos Keeling, where he would make a tremendous score as VK9AA); Serge, VK2IMM; and Joe, W4TV—to establish communications between the logging software and the MP, but the efforts were in vain, and I was forced to work the contest without radio control. A few times during the contest I realized that I was logging on the wrong band and, of course, had to stop and figure out exactly which station was worked at the time of the band change—something you don't want to be doing in the heat of a pile-up!

Looking back at the end of the contest, I was pleased with my results: 2347 Qs and 369 mults in 42 hours of operating, bagging a score of 2.52 meg. Now this is not an earth-shattering score by any means, but considering the circumstances, I didn't think it was too bad *(George ended up placing first in his category. See complete CQWW CW results on page 30.—ed.)*. Runs were excellent on 10 meters through 40 meters. On 80 I was an "alligator" (all mouth, no ears) due to QRN and having no pennant or Beverage antenna for receiving. Additionally, I had no 160-meter antenna and therefore missed the



The antenna setup at VK2MB, where the author operated as VK2GC. The TH6 is in the background. The 80-meter inverted-Vee was strung from the commercial tower in the foreground. Note the preponderance of antennas; they mostly belong to the coastal marine monitoring station and the fire brigade with which the contest club shares the facility.



Graeme Hunt, ZL1ANH, at his shack in Rotorua on New Zealand's North Island. Following a personal tour of Rotorua's geothermal pools and a Maori village, sharing a bottle of local red, and enjoying a "barbie" (barbeque) with Graeme and his family, it was off to the ham shack in the basement for an enjoyable run of JAs, UA9/Øs, and Europeans while signing ZL/K5KG.

few multipliers that would have been picked up on that band. Difficulties encountered included the computer problems described above; RFI in the computer on 15 meters, forcing me to run barefoot on that band; and having to QRT for two hours on Saturday night due to lightning.

Here are my band by band comments (see Table I for band-by-band and zone breakdowns of stations worked in North America):

80 meters: 55 QSQs in 11 zones—3, 15, 16, 17, 19, 21, 25, 28, 29, 32, and 33. NA stations making the log were all in Zone 3. In order of being worked, they were W8AEF, W2VJN, K6OY, N2IC, and K7UA. Many times stations were calling, but it was difficult, if not impossible, to pull them out of the QRN.

40 meters: 537 QSOs, 111 mults. VK2CZ's half-wave vertical played very well. It was interesting using the vertical and not having to think about an azimuth. Given the space limitations at the station, I am convinced that this was the right antenna for the job. VK2CZ is building a 4-square using this full-size vertical design and it should be dynamite!

20 meters: 939 QSOs, 127 mults. Twenty was a *long-path* wonder. Many times I found long path preferable, and I was able to pull off two brilliant—to coin a frequently used Aussie term—openings to NA zones, 2000Z to 2145Z on the first day, and a four-hour run that began at 1900Z on the second day. Also on the second day I encountered a nice opening into SA over the South Pole at around 0530Z.

15 meters: 677 QSOs, 92 mults. This was the workhorse band for JA, AS, and EU. NA was sparse, with only 16 stations being worked in zones 1, 3, 4, and 5. SA was even thinner, with only HC8N, PJ2T, and CX5AO making the log. Bill, K5GA, was the first NA station

Martin Luther, VK7GN, at his shack near Richmond, Tasmania. Martin was previously VK5GN when he lived in Adelaide and VK4GN when in Brisbane. Although an avid contester for many years, Martin expressed serious dissatisfaction about the negative impact packet has had on contesting.

to be worked at 19 minutes into the contest on 15 meters.

10 meters: 139 QSOs, 18 mults. Ten was basically an AS-only band, with the only exceptions being HC8N, ZL6QH, KG6DX, T88AA, and six VKs.

At least one QSO was made in every zone except for 2, 35, and 36. Three stations were worked on all five bands. They were ZL6QH, ZM1A, and the ever-present UU7J. RL3A took the honor of being the most duped station in the log!

Sunrise was about six hours before the end of the contest on Monday morning, and it was during this time that I was

	Zone						
	1	3	4	5	6	7	8
Band							
80	—	5	—	—	—	—	—
40	—	44	60	55	—	—	—
20	—	38	137	207	1	2	10
15	1	7	4	4	—	—	—

Table I– Here is a breakdown by band and zone of the 575 North American stations worked from VK2GC during the 2005 CQWW CW Contest. Note that there were no contacts made with Zone 2, and no NA contacts on 10 meters.

blessed with the strong four-hour long-path opening on 20 meters to NA. After that the bands essentially died, probably due to a flare, to the point where there were no JAs to speak of even on 15 meters. During the last hour, I eked out a few AS stations on 15 and 20, and even K9NS at 2307Z on 15, the last NA station to be worked in the contest.

I must offer special thanks to the members of Manly Warringa Radio Society, VK2MB, for the use of their facilities. A special thanks to David, VK2CZ; Bernd, VK2IA; and Dom, VK2JNA, for their personal efforts in welcoming me into their inner circle and making this operation a success. Also kudos to Steve, N2IC, and Joe, W4TV, who helped me by recovering a damaged log database after we returned to the U.S. ■

Note

1. "Pedal Power: The Story of Alf Traeger, VK5AX, and the Royal Flying Doctor Service," by Steve Ireland, VK6VZ, *CQ*, January 2003, p. 26.

Results of the 2005 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, 2005 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, 2005 CQ WW CW."

The 2005 CQ WW DX CW Contest was looked forwarded to by contesters from around the world. Sure the sunspots were had all but disappeared, but undeterred by this information, a record number of CW logs were submitted from over 172 countries. The CQ WW CW test had a lot of surprises. The low bands were outstanding. Only 10 meters showed the sun's effects. The 2005 contest marks the highest number of submitted CW logs in radio history. Over 4100 logs were received. Contesters got on the air in droves from everywhere in the world.

Hundreds of contesters left home to try an adventure from a DX location. The CQ WW is a fantastic competition. It brings out the best in ham radio. Months of preparation honing skills, learning antenna theory and design, trying out the new antennas and equipment, and learning propagation leads to finally bringing it all together in a celebration of ham radio skill and effort over a fun-filled 48 hours. If you enter the CQ WW, you can't help but get caught up in the party.

Single Op, All Band, High Power

Winning the Single Op All Band category places you on the world stage in excellent historical company.

Jose, CT1BOH, has found a location in CT3 which provides him with an opportunity to maximize his already excellent skills. Standing at the #1 position in the world was CT3EN operated by CT1BOH. Taking advantage of being in Africa maximizes point total (http://www.qsl.net/ct1boh). Second place went to longtime top ten entrant W2GD operating P40W. John has been to Aruba so many times that the airline must have a special seat assigned to him. Third place went to Tom, W2SC, operating from 8P5A.

In Europe the top step was occupied by CU2A, with Toni, OH2UA, at the key. What a great job he did (http://www.cu2a.com/). If you cannot be in CU-land, the next best place is Portugal. Timo, OH1NOA, using CT8T took second place Europe. This was Timo's 5th CQWW from CT-land. Third place went to World Cup Soccer player Sergiy, UT5UDX, operating from ER4DX.

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

Reprising his station's position on SSB, Randy, K5ZD/1, took USA first place (http://www.k5zd.com/). Second place went to Alexander, LZ4AX, putting K3CR, the Penn State ARC, to good use (http://k3lr.com/W1AW/w1aw18.htm). Andy, N2NT, took the bronze for the USA (http://wrtc2000.bit.si/n2nt.htm).

The continental winners were: North America 8P5A (W2SC), USA K5ZD/1, Africa CT3EN (CT1BOH), Asia A45XR, Japan JH4UYB, Europe CU2A, Oceania VK2GC (K5KG), South America P40W (W2GD).

Single Op, All Band, Low Power

The category with the most entrants by far is low power. Running only a transmitter without an amplifier is how most of the world operates a contest. To rise to the top in this category requires hard work and skill. Winning for the world is very difficult.

Taking the first position in 2005 was longtime low-power advocate Joe, AA3B, who pushed V26K to the top. Second place went to CT9A operated by Jusi-Pettra, OH6RX (http://lipas.uwasa.fi/~h78848/). Third place went to traveler Carsten, DL1EFD, operating at FG5BG.

The number one score in Europe and #4 in the world was CT6A operated by 19-year-old Felipe, CT1ILT (http://ct1ilt.cybton.com/). Felipe also won the World Under 21 trophy! Second place in Europe went to Kreso, 9A5K. Manuel, EA7RM, who consistently finishes near the top, took third place Europe.

Moving up from last year's second place USA was Ed, N1UR, who took top honors. Second place went to WRTC veteran Ann, WA1S (http://home.tiac.net/~wa1s/), and third was Marvin, N5AW (http://www.ctdxcc.org/n5aw/).

The continental winners were: North America V26K(AA3B), USA N1UR, Africa CT9A, Asia HSØZAR, Japan JA8SLS, Europe CT6A (CT1ILT), Oceania YBØDPO, South America L73E.

QRP

Capturing first place in the QRP category close to the bottom of the sunspot cycle means that you have done a lot of search and pounce. You must have sharpened contesting skills to find stations, and to know where and when to call

Manfred, HZ1IK, put Saudia Arabia on the map on 7 MHz.

to make a good contact. It is surprising what you can work with just 5 watts. Renewing the thrill of working DX is a sure thing in the QRP category.

The number one score again in 2005 came from John, P40A (KK9A). Travelling to Aruba combines fun and a great vacation (http://www.qrz.com/p40a). Second place went to Dan, K1TO/4, located in Florida. Dan also took top honors in the USA. Traveling a great distance to join in the Caribbean fun was Yuriy, UR5DEM, who operated C6AUR and placed third worldwide.

Placing second in the USA was Bill, N8ET. He always places near the top in the QRP category. Almost breaking a thousand QSOs in the small-signal category means you are doing something right. Taking third was Tom, N1TM.

Over in Europe, Joe, DK5WL, took top honors (http://www.160m.de/). Second place went to Antonin, OK1VBA, and third to David, EA1FAQ. A special mention must be made of JR4DAH, W6JTI, RV9COI, and VK2BAA, who maxed out their scores operating far from population centers.

The continental winners were: North America K1TO/4, USA K1TO/4, Africa (No Entry), Asia JR4DAH, Japan JR4DAH, Europe DK5WL, Oceania VK2BAA, South America P40A (KK9A).

Assisted

Using any type of DX spotting help places the entrant in the Assisted category. There are lots of reasons to try this category: helping your club when you have limited time or just for fun are just a couple.

This year's world top scorer was Jack, RW3QC. He put the distinctive callsign 5B/AJ2O to good use by keying the Cyprus station to first place in the world. He was followed closely by a station operating half a world away on Christmas island, VK9AA operated by

The OM7M team, #1 world Multi-Single.

occurred in the Multi-Single category. Three FB stations with top operators went head to head.

The four-man team from the USA West Coast travelled to where QSOs are made, P40L, and keyed their way to world number one. They convincingly took the gold. Second place went to the Serbian team who put 3V5A on the map. Third place went to the all-Spanish team at EA8ZS (http://www.grupodxgc.com/).

Over in Europe the Low Bands Contest Club, OM7M, took first place (http://www.qsl.net/om7m/), second place went to the Irish/Latvian team at EI7M (http://www.lral.lv/exped/ei7m/index.html), and third went to another fine Slovakian team, OM8A (http://www.om8a.org/).

In the USA first place went to Ted's team from New Hampshire, KT1V. Second place was taken by K1IR (http://www.designet.com/k1ir/), and third by Tom's station, K1KI.

Special mention must be made of the continued outstanding efforts of the Japanese team at AH2R. Also, a surprise this year was the Russian team who put T88AA in a lot of logs (http://www.sakurai.or.jp/HAM/T88/photos.html).

The continental winners were: North America KT1V, USA KT1V, Africa 3V5A, Asia 4XØG, Japan JA8RWU, Europe OM7M, Oceania AH2R, South America P40L.

Bernd, VK2IA (http://www.contesting.com/articles/611). Breaking into the world top three from the USA was Barry, W2UP/3. Located near beautiful Lake Constance, Manfred, DJ5MW, had the right combination of QSOs and mults to take first place Europe (http://www.dj5mw.de/). Second place went to Braco, OE4A (OE1EMS), operating from eastern Austria (http://www.oe8ydq.com/ cpg132/thumbnails.php?album=15). Third place in Europe went to Vlad, RX4HZ. Long time Assisted aficionado, Charles, K3WW, was second in the USA followed by Ray, W2RE.

The continental winners were: North America W2UP/3, USA W2UP/3, Africa D44TD, Asia 5B/AJ2O, Japan JF2SKV, Europe DJ5MW, Oceania VK9AA (VK2IA), South America PJ4M (K2QM).

Multi-Single

The Multi-Single category is the most popular Multi category. If you look at all the stations listed, you will see almost a thousand. A real battle

Multi-Two

The M2 category continues to increase in popularity. Several good antennas, operators, and lots of coffee and you can vie for a high place in the M2 category.

In 2005 rare DX decided to hand out M2 QSOs. The M2 category is always a real challenge. Taking the gold was IH9P of the Tikirriki Contest Club (http://www.ih9p.com/). They handed out a lot QSOs. Second place in the world went to the Russian team of 8Q7DV (http://public.fotki.com/8q7dv/). They showed what can happen when good operators go someplace rare. Third place was VP5W operating from the beautiful Turks and Caicos islands.

In Europe top honors went to RU1A. They get out *and* hear well (http://ru1a.ru/eng/). Silver went to the Spanish team at EA6IB (http://www.qsl.net/ea6ib/home.htm). Radio Club Varazdin, 9A7A, took the bronze (http:// www.qsl.net/9a7a). The club's website sums up the

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
ALL BAND
World
CT3EN (Opr: Jose Carlos Cardoso Nunes, CT1BOH)
Donor: K4FW Memorial (Scott Robbins, W4PA)

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

World QRPp
P40A (Opr: John Bayne, KK9A)
Donor: Gene Walsh, N2AA

World Assisted
5B/AJ2O (Opr: Jack Danielyan, RW3QC)
Donor: Robert McGwier, N4HY

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

USA Low Power
Edward Sawyer, N1UR
Donor: North Coast Contesters

USA - Zone 3
Terry Baxter, N6CW/7
Donor: Central Arizona DX Association

USA - Zone 4
Michael Wetzel, W9RE
Donor: The Society of Midwest Contesters

Canada
VY2TT (Opr: Kenneth Widelitz, K6LA)
Donor: John Sluymer, VE3EJ & Jim Roberts, VE7ZO

Carib./C.A.
8P5A (Opr: Tom Georgens, W2SC)
Donor: Chuck Shinn, W7MAP

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

Europe - Low Power
CT6A (Opr: Filipe Monteiro Lopes, CT1ILT)
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

Scandinavia
OHØE (Opr: Ville Hiilesmaa, OH2MM)
Donor: W3FYS Memorial (Chas Weir, Jr., W6UM)

Russia
Alexander V. Shuklin, RA9SG
Donor: Roman Thomas, RZ3AA

Africa
ZD8A (Opr: Glenn Rattmann, K6NA)*
Donor: Gordon Marshall, W6RR

Asia
Chris Dabrowski, A45XR
Donor: Chuck Shinn, W7MAP

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

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

Oceania
VK2GC (Opr: George Wagner, K5KG)
Donor: Chris Tran, ZL1CT

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

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

World - 21 MHz
PT5A (Opr: Eric Castro, PY2EMC)
Donor: Lew Sayre, W7EW

World - 14 MHz
5Z1A (Opr: Alex C.J. Van Eijk, PA3DZN)
Donor: W2JT Memorial (North Jersey DX Assn.)

World - 7 MHz
Vakhtang Mumladze, 4L8A
Donor: Alex M. Kasevich, VP2MM

World - 3.5 MHz
CN2R (Opr: James Sullivan, W7EJ)
Donor: Fred Capossela, K6SSS

World - 1.8 MHz
Jeffrey Briggs, VY2ZM
Donor: Kenneth Byers, Jr., K4TEA

USA - 28 MHz
Bob Patten, N4BP
Donor: Wireless Institute of the Northeast

USA - 21 MHz
James McCook, W6YA
Donor: Wayne Carroll, W4MPY

USA - 14 MHz
Donald Binkley, N4ZZ
Donor: Northern Illinois DX Association

USA - 7 MHz
Bill Kollenbaum, K4XS
Donor: W6AM Memorial (Jan Perkins, N6AW)

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

USA - 1.8 MHz
Paul Newberry, Jr, N4PN
Donor: Kat Obermann Memorial
CQ magazine

Canada (14 MHz)
VE6JY (Opr: Einar Todd Bendtsen, VE5MX)
Donor: Radio Amateurs of Canada

Carib./C.A.(14 MHz)
HI9L (Opr: Stefan Radtke, DL5XX)
Donor: Bill Hein, NT1Y

Europe - 28 MHz
Alexsander Zagar, S57S
Donor: Jay Pryor, K4OGG

Europe - 21 MHz
Ivica Matkic, T96Q
Donor: Robert Naumann, N5NJ

Europe - 14 MHz
OH6KN (Opr: Pasi Luoma-aho, OH6UM)
Donor: G3FXB Memorial (Maud Slater)

Europe - 7 MHz
Olivier Cado F6ARC
Donor: Ivo Pezer, 9A3A

Europe - 3.5 MHz
OJØB (Opr: Pertti Simovaara , OH2PM)
Donor: K3VW Memorial (Frankford Radio Club)

Europe - 1.8 MHz
SO2R (Opr: Kazimierz Drzewiecki, SP2FAX)
Donor: Pat Barkey, N9RV & Terry Zivney, N4TZ

Japan - 21 MHz
Akito Nagi, JA5DQH
Donor: DX Family Foundation

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

Asia – 14 MHz
H2G (Opr: George Beasley, 5B4AGC)
Donor: JA4WFM Memorial
(Alexander Teimurazov, 4L5A)

MULTI-OPERATOR, SINGLE TRANSMITTER
World
P40L (Oprs: W6LD, N7MH, KX7M, N6XI)
Donor: Anthony Susen, W3AOH

U.S.A.
KT1V (Oprs: KC1F, KT1V, KM3T)
Donor: Douglas Zwiebel, KR2Q

Canada
VE3NE (Oprs: HAØHW, VE3NZ, VE3NE)
Donor: Eastern Canadian DX Assn.

Carib./C.A.
VP2E (Oprs: KC5EA, N5AU)
Donor: Lone Star DX Association

Africa
3V5A (Oprs: YT1AD, YU1RL, YZ1BX, YU7NU)
Donor: Harry Booklan, RA3AUU

Asia
4XØG (Oprs: W3GG, WD3I, 4Z4KX, 4X6ZK)
Donor: Steve Merchant, K6AW

Europe
OM7M (Oprs: OK2BFN, OM1KW, OM2XW, OM3TZQ, OM3PA, OM5RM, OM5ZW)
Donor: Bob Cox, K3EST

Japan
JA8RWU (Oprs: JF1NHD, JO1DFG, JA8RWU, JH8PNE)
Donor: CQ magazine

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

South America
5J1W (Oprs: AG9A, NN1N, K9ZO)
Donor: Araucaria DX Group

MULTI-OPERATOR, TWO-TRANSMITTER
World
IH9P (Oprs: IT9BLB, IT9VDQ, IT9ZGY, IV3SKB, I2IFT, IK2AHB)
Donor: CQ magazine

USA
K1AR (Oprs: K1AR, K1EA)
Donor: Northern Neck Contest Club

Europe
RU1A (Oprs: RU1AA, RW1AC, RK1AM, RX1AA, RA1AIP, UA1ARX, UA1ACC, UA1AKC)
Donor: Aki Nagi, JA5DQH

MULTI-OPERATOR, MULTI-TRANSMITTER
World
HC8N (Oprs: N6AN, K6AW, N7BG, K2UA, N2MG, W6NL, K6BL, N5KO)
Donor: K2GL Memorial (Doug Zwiebel, KR2Q)

USA
KC1XX (Oprs: WA1Z, K1QX, W1FV, K1GQ, N2AA, W2RQ, N3RD, KC1XX)
Donor: N6RJ Memorial (Bob Ferrero, W6RJ)

Europe
LZ9W (Oprs: LZ1UQ, LZ1ZD, LZ1PJ, LZ1ANA, LZ1PM, LZ2UZ, LZ2CJ, LZ2HM, LZ2PO, LZ2FV, LZ3UM, LZ3FN, LZ3FM, LZ5VK, LZ4UU)
Donor: Finnish Amateur Radio League

Japan
JA3YBK (Oprs: JG3KIV, JI3OPA, JP3PZD, JH3PRR, JH4NMT, JR4ISF, JF4FUF)
Donor: Ryozo Goto, JH3JYS

Oceania
ZL6QH (Opr: ZL2BSJ, ZL2IFB/G4IFB, ZL1TM, ZL1BYZ, ZL2AGY, ZL1AZE)
Donor: CQ magazine

WORLD - SSB/CW COMBINED
KC1XX (30,307,458)
Donor: WØID Alpha Award

USA - MULTI-MULTI SSB/CW COMBINED
K3LR (30,126,098)*
Donor: N8SM Memorial (Operators of K3LR)

CONTEST EXPEDITIONS
World Single Operator
3DAØNW (Opr: Michael Tessmer, K9NW)
Donor: Yankee Clipper Contest Club

WORLD MULTI-SINGLE
T88AA (Oprs: RZ3AA, UA3AB, RA3AUU)
Donor: Carl Cook, AI6V

WORLD MULTI-MULTI – Jim Neiger, N6TJ Award
R1MVC (Oprs: DL3DXX, DL5LYM, OH5NE, RA1AR, RA2FW, RA6LBS, RK3FA, RU1AS, RV1AC, RV2FW/1, RX1AX, UA1CDA, UA2FF, UA2FM, UA9XC)
Donor: Alexander Teimurazov, 4L5A

SPECIAL - SINGLE OPERATOR AWARD
World SSB/CW Combined
P40W (Opr: John Crovelli, W2GD)
34,038,802 points
Donor: Hrane Milosevic, YT1AD

WORLD ALL BAND: Under 21 years old
CT6A (Opr: Filipe Monteiro Lopes, CT1ILT)
Donor: Chuck Shinn, W7MAP

CLUB
World SSB/CW
Yankee Clipper Contest Club 291,818,776
Donor: W1WY Memorial (CQ magazine)

Non-USA SSB/CW
Bavarian Contest Club: 232,211,460
Donor: N6AUV Memorial
(Northern California Contest Club)

** Second Place*

Vlad, UN5J, placed in the top scores on 21 MHz, low power.

Dave, K1ZZ, placed in the top scores, U.S., all band, high power

ham spirit: "Everything we have achieved in the contests is the result of our friendship, as well as love for our hobby."

In the USA, the two-man team of K1AR and K1EA walked away with the trophy. Second place went to Howie's team at NY4A, and third went to Jerry's team at KØTV/1 (http://www.k0tv.com/).

Special mention is made of the fanatastic efforts of 3B8/OM3PC (http://www.vhf.sk/3b8/) and 9M2CNC (http://www.9m2cnc.com/).

The continental winners were: North America VP5W, USA K1AR, Africa IH9P, Asia 8Q7DV, Japan JF3GKE, Europe RU1A, Oceania (No Entry), South America PZ5C.

Multi-Multi

The Multi-Multi category requires a lot of pre-contest planning and work. Building a super station, recruiting good operators, and often maintaining the station from a distance are just the beginning of the preparation done by multi-multis. The top three World, Europe, and USA winners all have made a big time investment.

This 2005 winner is a familiar one. HC8N is located on the slopes of a volcanic mountain on San Cristobal island. Almost on the equator, the fine operators of HC8N always wring the most from the bands (http://www.hc8n.info/). For second place, travel over to Mali and you will find the VooDoo's operating as TZ5A. This group of friends has been active from Africa for many years (http://www.idiompress.com/books-contesting-africa.html). Third place was taken by the Caribbean Contesting Consortium: PJ2T (http://www.pj2t.org/).

The LZ9W contest station is in a small hotel called "Bardoto," located at 900 meters elevation about 60 km southwest of Sofia. The team's fine effort resulted in the #1 score in Europe (http://www.qsl.net/lz9w/). Second place went to the perennial high-scoring team of the Ilmenau Contest Club, DQØQ (http://www.stud.tu-ilmenau.de/~df0hq/). Third place went to the RW2F team from Kaliningrad.

After the dust settled on the very competitive USA MM scene, Matt's team at KC1XX took the top prize (http://www.kc1xx.com/). Second place went to Tim's team, K3LR, in western PA (http://www.k3lr.com/), just edging out Frank's team at W3LPL (http://homepage.mac.com/rrucker/PhotoAlbum46.html).

The continental winners were: North America KC1XX, USA KC1XX, Africa TZ5A, Asia UP5G, Japan JA3YBK, Europe LZ9W, Oceania ZL6QH, South America HC8M.

Nodir, EY8MM, finished in the top scores on 7 MHz, high power.

Team Contesting

The number of teams this year exceeded all expectations. Take any five contesters from anywhere in the world and form a team. Why not try an intra-club competition to boost your local club score? Or take members from anywhere, as the World Wide Young Contesters have done. All you have to do is register your team before the contest and you are all set to enter the Team Contesting category. This year's CW top team is far from a group of lids!

1. **League of Distinguished Lids:** K5ZD/1, N2NT, K1DG, VE3EJ, N2IC/5 – 23,578,243.
2. **Contest Club Finland Team Mannerheim:** CT8T (OH1NOA), CU2A (OH2UA), ES5TV, OH1F (OH1MDR), OH6NIO – 22,430,326.
3. **Rhein-Ruhr Steamboats:** DJ2YA, DL3YM, GD6IA (DL2OBF), V31TM (DL1HCM), FG5BG (DL1EFD) – 19,193,264.
4. **VK-Contest Club Team Australis:** VK9AA (VK2IA), VK2IMM, VK2BAA, VK2NU, VK2GC (K5KG) – 10,320,345.
5. **PVRC Strike Team Alpha:** W4RX, N2YO/4, N4TX, K4ZW, W4EE – 9,730,412.
6. **Have CW – Will Contest:** ZS1EL, ZS4TX, VE1OP, VO1AU, K5UN – 9,108,334.
7. **SP HQ Contest Team:** HI3/SP9XCN, SP4Z, SN5M (SP5UAF), SN8F (SP8FHK) – 8,888,505.
8. **Contest Club Ontario #2:** W1AJT/VE3, VE3EY, VE3JM, VE3KZ, VE3DZ – 8,282,071.
9. **Contest Club Finland Team Finlandia:** 6Y5/OH3RB, OH5B (OH5BM), OH6AC (OH6CS), OH6KN (OH6UM), EA8/OH4NL (OH2BYS) – 6,923,754.
10. **Kaunu Technologijos Universiteto Radijo Klubas:** LY2OO, LY6ØBY (LY3BY), LY5R (LY3BP), LY6A (LY3BA), LY9A (LY2BM) – 5,451,859.
11. **World Wide Young Contesters Team #1:** 9A5K, N4YDU, GØRTN, SQ9C – 5,388,333.
12. **Florida Contest Group Team #1:** AD4Z, CW5T (K9VV), K4XS, WJ9B, WK2G – 4,124,658.

13. **Contest Club Finland Team Nurmi:** OH2LU, OH6GAW, OH6OS, OHØE (OH2MM) – 3,943,227.
14. **Florida Contest Group Team #2:** CX7TT, K1TO, K9OM, K4PV – 3,187,988.
15. **Contest Club Ontario #1:** VA3NR, VA3DX, VE3CR, VE3XD – 3,104,006.
16. **Florida Contest Group Team #4:** W4ZW, K1PT, N4EK, WD4AHZ – 3,048,446.
17. **Contest Club Finland Team Sibelius:** OHØM (OH5DX), OH2BH (OH1WZ), OH2U (ES5RR), OH5Z (OH5CW), OH6BG – 2,631,535.
18. **DXXE-1:** XE1MM, XE2AC – 2,502,982.
19. **PVRC Strike Team Omega:** NN3W, WX3B, K3WA – 1,657,856.
20. **VK Contest Club Team Southern Lights:** VK6HZ, PAØMIR, VK7GN, VK4AN – 1,538,928.
21. **World Wide Young Contesters Team #2:** MØTDG, OZ5BD, OO5ZO, CX9AU – 885,210.
22. **Contest Club Ontario #4:** VE3ZI, VE3KP, VE3HLS, VE3FH – 847,716.
23. **Florida Contest Group Team #3:** KN4Y, NA4CW, K1UM/4 – 835,750.
24. **Contest Club Ontario #3:** VE3MGY, VE3JAQ, VE3HG, VE3PL, VE3RZ – 812,585.
25. **Multi-Multi QRM:** YU1LA, YT5A (YU1EA) – 628,140.
26. **Contest Club Finland Team Sauna:** OH1ØA (OH3WW), OH1MM, OH4MFA, OH6TN – 508,598.
27. **DXXE-2:** XE1KK, XE1CT, XE1NW, XE3WAO – 278,124.
28. **Lids of the Wild Wild West:** W7AT (W7EW), K7RAT (N6TR), NØAX/7 – 257,873.
29. **Florida Contest Group Team #5:** K4CC, W4EBA, N4BP – 52,513.

(Continued on page 100)

TOP SCORES

WORLD
All Band
CT3EN 12,489,525
P40W 11,100,243
8P5A 9,902,340
A45XR 9,626,226
ZD8A 8,834,449
EA8EW 8,300,250
CU2A 7,915,656
YW4D 7,717,876
ZF1A 7,335,327
6W1RW 6,942,460

28 MHz
LU1HF 363,610
CX7TT 285,798
LU6ETB 282,672
LT2H 273,258
S57S 15,808
JA6WIF 14,022

21 MHz
PT5A 1,021,776
AY8A 855,760
ZC4LI 849,400
PY2NA 789,239
4X4DZ 773,761
LT1F 710,016

14 MHz
5Z1A 1,767,150
HI9L 1,454,436
HP1/OA4WW 1,302,775
ZX5J 1,230,120
CW5T 1,173,008
OH6KN 1,119,048

7 MHz
4L8A 1,387,650
EA8/OH4NL 1,298,385
A61AR 1,197,180
KH7X 1,152,704
EY8MM 1,085,276
UA9AYA 1,002,244

3.5 MHz
CN2R 1,206,128
OJØB 608,896
OH2BH 593,922
9A9A 583,360
SN3A 581,532
S50C 467,166

1.8 MHz
VY2ZM 497,152
SO2R 234,720
OK1RF 232,185
SP3BQ 228,327
SN7Q 202,242
OHØZ 188,552

LOW POWER
All Band
V26K 6,960,084
CT9A 5,544,350
FG5BG 4,908,384
CT6A 4,730,157
HI3/SP9XCN 3,681,202
WP3C 2,938,800
C6AQQ 2,935,464
J79CW 2,553,160
EA8CN 2,548,680
9A5K 2,534,280

28 MHz
LU1FAM 155,156
LW5EE 15,840
PY1MK 13,455
LW2DX 9,361
LZ9X 8,883
K4WI 5,360

21 MHz
5H3EE 597,432
TI5X 413,056
9A7D 290,680
PJ7/K7ZUM 277,447
UN5J 228,361
IR2M 196,420

14 MHz
CN2WW 1,150,556
TI5A 639,360
9A3B 506,198
OK1FDR 440,398
G6M 430,110
DL1LH 398,848

7 MHz
TA3DD 675,176
HZ1IK 667,821
IY4W 626,202
S54A 333,540
SN3X 233,064
YU1LA 217,664

3.5 MHz
YO6EX/P 53,437
YO6ADW 43,891
W3NO 30,841
JA9XBW 10,395
CT1FNT 6,345
DC1LC 1,320

1.8 MHz
TE1W 43,524
9A3RE 36,894
RW3GB 32,504
9H3MR 32,093
OMØTT 31,727
UT1FA 27,744

QRP
All Band
P40A 4,014,648
K1TO/4 1,529,442
C6AUR 1,336,677
DK5WL 605,862
UA9SG 562,565
N8ET 553,443
OK1VBA 549,664
EA1FAQ 533,455
SM3C 402,537
RA9SO 401,024

ASSISTED
All Band
5B/AJ2O 9,445,098
VK9AA 6,878,488
W2UP/3 6,181,648
VP9I 5,528,907
DJ5MW 5,450,967
RG9A 4,983,841
OE4A 4,923,750
RX4HZ 4,923,400
K3WW 4,835,880
UW8M 4,331,040

MULTI-SINGLE
P40L 16,270,104
3V5A 14,026,738
EA8ZS 11,950,225
5J1W 11,675,367
KT1V 9,067,590
LR2F 8,377,160

MULTI-TWO
IH9P 23,649,712
8Q7DV 14,520,720
VP5W 13,454,000
WP2Z 12,969,736
RU1A 12,240,060
EA6IB 11,061,600

MULTI-MULTI
HC8N 38,368,108
TZ5A 28,747,008
PJ2T 27,392,376
KC1XX 15,825,048
LZ9W 14,318,682
K3LR 13,842,250

UNITED STATES
All Band
K5ZD/1 6,900,552
K3CR 5,287,744
N2NT 5,143,683
W1KM 4,548,425
K4ZW 4,445,562
K1ZZ 4,169,056
W9RE 3,907,904
AA1K/3 3,844,272
N2LT 3,614,850
WC1M 3,514,037

28 MHz
N4BP 6,498

21 MHz
W6YA 186,975
K4OAQ 159,372
K2BA 128,742
W7UT 99,792
K1UM/4 77,470
K4RV 45,408

14 MHz
N4ZZ 512,968
W7WA 506,550
K9OM/4 488,228
W6NV 336,447
K2AAW/9 271,123
N7CW/6 221,444

7 MHz
K4XS 600,066
N2MF 386,078
KØEJ/4 347,602
WF3J/4 101,184
K5NZ 99,946
K9CJ 98,814

3.5 MHz
W1MK 380,365
KU1CW/Ø 227,283
W5UN 201,684
K5RX 163,047
N9AG/8 160,082
N2GC 112,100

1.8 MHz
N4PN 136,653
W3GH 25,120
WF2W 18,207
KK4SI 6,720
W4EF/6 6,601
N2OO 4,477

LOW POWER
All Band
N1UR 2,129,919
WA1S 1,683,068
N5AW 1,644,186
K2PS 1,465,380
N4KG 1,153,668
W1JQ 1,073,852
K3AU 1,005,488
K4GKD 991,701
N4YDU 863,471
K1HT 834,771

28 MHz
K4WI 5,360
W9JUV 3,598
AA1ZT 2,277

21 MHz
WB4TDH 132,618
N6RV 25,550
KR2AA 21,534
K7SP 11,349

14 MHz
K2MFY 187,293
N7WA 130,196
N9XX 119,460
N4IJ 103,752
KA7T 74,008
K1EFI/3 55,762

7 MHz
KN5G 163,152
N4PSE 56,448
WA1FCN/4 49,839
W9ILY 35,409
K5MQ 31,556
K9UIY 20,448

3.5 MHz
W3NO 30,841

1.8 MHz
K1PX 5,130
K3MQ 780
KR4OW 442
W7DRA/7 407

QRP
All Band
K1TO/4 1,529,442
N8ET 553,443
N1TM 350,842
W6JTI 332,847
WA8WV 207,691
K8ZT 197,099
N8IE 147,168
NU4B 127,305
W5KDJ 88,816
NDØC 85,086

ASSISTED
All Band
W2UP/3 6,181,648
K3WW 4,835,880
W2RE 3,252,060
K5YA 3,142,958
WE3C 3,084,378
K3PH 2,834,512
KQ3F 2,400,444
K1PT/4 2,350,240
K3SV 2,211,900
W3FV 2,147,560

MULTI-SINGLE
KT1V 9,067,590
K1IR 6,441,380
K1KI 6,326,124
W2FU 5,969,292
K8AZ 5,458,329
K3OO 5,046,977

MULTI-TWO
K1AR 8,164,728
NY4A 8,012,145
KØTV/1 5,469,075
N4WW 5,248,440
NØNI 3,990,462
W8ZA 2,594,480

MULTI-MULTI
KC1XX 15,825,048
K3LR 13,842,250
W3LPL 13,790,784
N3RS 10,312,234
NQ4I 9,285,396
K1TTT 8,232,648

EUROPE
All Band
CU2A 7,915,656
CT8T 6,374,362
ER4DX 5,806,866
S50A 4,752,033
TM6X 4,290,840
GD6IA 4,158,378
MW5A 4,063,103
DL3YM 3,917,702
G3TXF 3,682,949
ES5TV 3,581,200

28 MHz
S57S 15,808
YU2A 3,895
EU3AR 3,807
RA6AFB 10

21 MHz
T96Q 570,473
9A5Y 523,260
OHØM 442,750
S50K 365,672
RZ6FA 250,305
OK1FFU 233,597

14 MHz
OH6KN 1,119,048
YZ9A 670,419
OH6AC 611,776
S57AL 580,470
SM5INC 572,976
S59ABC 572,241

7 MHz
F6ARC 959,139
OH5Z 724,592
HA8DU 711,666
OH2U 694,620
YT7A 682,136
YU7KW 672,864

3.5 MHz
OJØB 608,896
OH2BH 593,922
9A9A 583,360
SN3A 581,532
S50C 467,166
ISØN 442,986

1.8 MHz
SO2R 234,720
OK1RF 232,185
SP3BQ 228,327
SN7Q 202,242
OHØZ 188,552
GMØGAV 185,136

LOW POWER
All Band
CT6A 4,730,157
9A5K 2,534,280
EA7RM 2,039,040
LY9A 1,859,449
UA4FER 1,755,890
EA2AZ 1,754,739
UR5HAC 1,671,824
F6HKA 1,654,797
YO3APJ 1,533,672
OK2ZC 1,409,980

28 MHz
LZ9X 8,883
F8AKC 5,085
9A3VM 4,988
DL9URZ 3,360
UA6ADC 3,003
EA7GV 2,046

21 MHz
9A7D 290,680
IR2M 196,420
9A5D 186,914
OK2N 170,040
4N1N 169,717
RN6HZ 132,820

14 MHz
9A3B 506,198
OK1FDR 440,398
G6M 430,110
DL1LH 398,848
YL5W 285,246
YZ1AU 260,316

7 MHz
IY4W 626,202
S54A 333,540
SN3X 233,064
YU1LA 217,664
T94OM 210,080
ON9CTZ 208,656

3.5 MHz
YO6EX/P 53,437
YO6ADW 43,891
CT1FNT 6,345
DC1LC 1,320

1.8 MHz
9A3RE 36,894
RW3GB 32,504
9H3MR 32,093
OMØTT 31,727
UT1FA 27,744
YO2IS 26,820

QRP
All Band
DK5WL 605,862
OK1VBA 549,664
EA1FAQ 533,455
SM3C 402,537
US2IZ 381,350
OK1JOC 346,896
DF1DX 336,441
UA6LCJ 302,742
G3YMC 301,860
GW4ALG 298,196

ASSISTED
All Band
DJ5MW 5,450,967
OE4A 4,923,750
RX4HZ 4,923,400
UW8M 4,331,040
S52ZW 2,968,992
S57DX 2,940,288
OK2FD 2,841,344
YZØZ 2,771,194
DJ2YA 2,578,050
SN8F 2,444,904

MULTI-SINGLE
OM7M 8,176,644
EI7M 7,874,332
OM8A 7,850,888
G6PZ 7,406,250
OK5W 7,278,271
TM2Y 6,978,108

MULTI-TWO
RU1A 12,240,060
EA6IB 11,061,600
9A7A 10,981,728
IR4X 10,619,504
UU7J 9,047,168
HG6N 8,015,190

MULTI-MULTI
LZ9W 14,318,682
DQØQ 13,181,952
RW2F 11,960,032
DFØCG 11,592,276
YT6A 9,161,880
R1MVC 7,720,906

public service

BY BOB JOSUWEIT,* WA3PZO

Field Day – It's Only the Beginning

Emergency Exercise Real as Flooding Hits Three States

This year I have been traveling the Mid-Atlantic States with a program emphasizing that Field Day is not enough. Going out and operating one weekend a year is not enough in terms of emergency training, and getting a story about Field Day in the newspaper once a year is not enough in terms of letting the public know who we are and what we do. This year, as many were to learn in New York, New Jersey, Pennsylvania, Maryland, and Delaware, Field Day was only the beginning. This month we'll take a look at torrential rains which led to severe flooding in the Mid-Atlantic States.

The forecast for a decent Field Day weekend began to change early the previous week. Just days before Field Day was to begin, the Pennsylvania Emergency Management Agency issued a warning: "With heavy rain projected for parts of the commonwealth this weekend, residents are urged to take steps to protect lives and property from possible flooding. Some of the latest forecasts indicate that a weekend storm system could affect the commonwealth over the next few days, bringing rain, major lightning, and, perhaps, high winds," said Richard D. Flinn, Jr., PEMA's deputy director for operations. "This storm has the potential to trigger power outages and flooding, especially flash flooding, which could threaten communities with little warning."

Andrew Furlong, KC2PMW (age 13), participates in Field Day from the Philmont Mobile Radio Club site in Ft. Washington, PA. (Photo courtesy of Larry Stevenson, K3HWE)

Threat Gets Worse

As the weekend drew closer, National Weather Service estimates pointed to the potential for major flooding in portions of Pennsylvania. "The most recent NWS forecast models indicate that we may experience serious flooding along the Susquehanna River and other waterways in the commonwealth," said Governor Edward Rendell. "We are preparing for the worst case scenario, but praying for the best. I strongly recommend that all residents in flood-prone regions keep informed by listening to local Emergency Alert System (EAS) stations for updates."

The Governor said the National Weather Service estimated that the Susquehanna River would crest above flood stage at nearly all points along its course in Pennsylvania beginning on Wednesday in the northern part of the state. The crest generally was expected to move south during Wednesday into Thursday. The National Weather Service predicted the Susquehanna River would crest at a record 28 feet (17 feet above flood stage) at Sayre, Bradford County, and Waverly, NY, on Wednesday; at 36 feet (17 feet above flood stage) at Bloomsburg, Columbia County, on Thursday; and at 25 feet (eight feet above flood stage) at Harrisburg, Dauphin County, on Thursday evening.

Many ham radio operators who operated Field Day in 1972 remembered the remains of Hurricane Agnes coming through Pennsylvania and heavy rains flooding the Wilkes-Barre area and other river towns in the state. Would this be a repeat?

This is Not a Drill

Field Day groups across the region were geared up to get on the air to make that first contact. However, many groups in the Philadelphia area found themselves off the air within the first hour as severe thunderstorms moved across the region. In some cases, the "CQ Field Day" call was changed to calls for umbrellas, buckets, plastic coverings, and tape as severe thunderstorms rolled through the area.

While some Field Day sites packed it in early because of the rain, others hung in there until the very end and then had to wait hours to safely take down antennas and towers.

In Sussex County, Delaware, some areas received 15 inches of rain from the stalled weather system. It became difficult for emergency management to get road and medical crews to areas in need because of the high water. Communications also became disrupted by the volume of water falling, which affected both microwave relay and buried phone lines that were severed by rushing water.

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

Members of the Mid-Atlantic Amateur Radio Club raised their triband beam as stormy weather approached. (Photo courtesy of Lou Ruh, WX3I) ⟶

According to ARRL reports, there was no need to "call up" hams to stand by for possible duty. They were "already there, on frequency, and ready to go." The National Weather Service requested activation of Delaware Skywarn. Amateurs relayed reports on rainfall as well as roads impassable from high water and washed-out bridges. Some operators were mobile in the affected areas, giving the NWS important reports. Virginia Section Emergency Coordinator Brad Taylor, KW4USA, said that ARES volunteers were on duty for seven hours in Fairfax County because of the heavy rain. Flooding was also bad in Montgomery County, MD and Washington, DC.

Flood Warnings Continue

Amateur radio operators in ten eastern Pennsylvania counties were on flood duty as a heavy rainfall continue to pound the state and force rivers, both big and small, out of their banks. ARRL Eastern Pennsylvania Section Manager Eric Olena, WB3FPL, told *CQ* that evacuation orders had been issued for some 100,000 residents of Pennsylvania's Wyoming Valley. The fear was that the Susquehanna River would rise above the flood gates installed following the flooding in 1972. The state declared disaster areas in 46 counties, which included all of eastern Pennsylvania and the City of Philadelphia. "The city of Reading in Berks County has evacuated many residents," he said. The Schuylkill River, which flows through Philadelphia, was expected to crest at

Bob Nice, N3TZW, Upper Bucks County Assistant Emergency Coordinator, checks on supplies with Red Cross volunteers at the Yardley, PA Borough Hall Distribution Center. (Photo courtesy of Al Konschak, WI3Z)

Rivers throughout eastern Pennsylvania spilled out of their banks during severe flooding in late June. Here the Susquehanna River is out of its banks, threatening the Wilkes Barre area. During Hurricane Agnes in 1972, the river was over the top of bridge. (Photo courtesy of Sam Josuweit, KB3MLD)

Flood gates across bridges and other protective measures along the Susquehanna River minimized serious damage in the Wilkes Barre area, where more than 100,000 people were evacuated. (Photo courtesy of KB3MLD)

almost 23 feet—some 10 feet above flood stage—while the Susquehanna River was predicted to crest at 17 feet above flood level.

Rivers in southern New York and northern Pennsylvania went out of their banks quickly. Numerous water and helicopter rescues were reported. Calls quickly went out for amateur radio support in Orange County, NY and Pike County, PA. The call went out with the river heights just 4 inches above flood stage, because they were expected to rise to between 6 and 9 feet above flood stage.

Frank Stone, KB2YUR, Eastern New York Section Emergency Coordinator, said initial requests were for hams to provide communications for at least a 36-hour period at the Goshen and Matamoras Emergency Operations Centers and several shelters.

Additional Pennsylvania Counties Report

John Ciccolella, WS3S, reported that ARES/RACES in Monroe County provided communications between Red Cross evacuation shelters, the Stroud Area Regional Police, and Office of Emergency Management officials. In nearby Carbon County, East Penn Township Emergency Management Coordinator Todd Deem, KB3IKX, expressed his thanks to local hams for the "Great Job. Since East Penn Township is 'Cell Phone Hades,' it was so nice to be able to tune into the ARES/RACES gang at the EOC to pass information to the EOC and get the information I needed and not hear 'call the center by phone,' when they don't work around here (in) most places, especially in the valleys (where it floods). Again *thank you* for your professional *'amateur'* service to the community."

In Columbia County, the Susquehanna River crested in Bloomsburg at 28.6 feet. Flood stage is 19 feet. Fifteen ARES/RACES members maintained contact with the County Emergency Operations Center and assisted with stream gauge readings at each of their locations. Columbia County Radio Officer Randy Kishbaugh, N3JPV, was Net Control, with Belinda Daring, KB3ERH, as backup. During the net, ARES/RACES members assisted with many bridge and road closure announcements. In addition, they provided communications between two Red Cross shelters. Members also assisted with the bulk distribution of bottled drinking water, as many local water companies had to shut down due to the flooding.

Just north of Philadelphia along the Delaware River, 43 amateur radio operators provided emergency communications for seven days. Harris Stein, NY3H, Bucks County Emergency Coordinator, provided the following totals, which represent the dedication and sacrifice of the Bucks County Amateur Radio Emergency Service. He summed it up:

- 7 days of continuous operation
- 43 amateur radio operators participated
- 3 shelter operations staffed
- 6 EOC operations staffed
- 3 additional sites staffed
- 3 rover units utilized
- 5 BCARES members assisted with damage assessment
- 864 total BCARES man-hours expended
- 2,114 miles driven by BCARES operators
- $71,609 of personally owned amateur equipment used (not including repeaters)
- $ 866 of non-reimbursed personal cost spent by operators

Keller Taylor, WA3YSU, Disaster Services Chairman of the Lower Bucks Chapter of the American Red Cross, discusses staffing issues and upcoming operational requirements with Bucks County ARRL Emergency Coordinator Harris Stein, NY3H. (Photo courtesy of WI3Z)

Jacob Kinser, KB3LCB, of Philadelphia, supplied communications from the William Penn Shelter in Yardley, PA to the Borough Hall Distribution Center. (Photo courtesy of WI3Z)

Stein said that several amateur radio operators traveled area streets and highways passing along road condition and traffic reports. These reports were radioed in to the Net Control Station, who passed reports to Bucks County EOC. Stein said, "This information was invaluable as police and public works personnel had their hands full while extremely heavy rains continued to fall, hampering their ability to relay information on travel conditions and road closures to Bucks County Emergency Management.

Automatic Position Reporting System (APRS) digital operations were used to track deploying operators with APRS capability without adding additional voice communications to the increasing volume of net traffic handling generated by the evolving event. Al Konschak, WI3Z, set up the APRS digital operation at Bucks EOC using a hard-wired internet connection. In Yardley, PA, cell phone, county, and Red Cross communications were less than optimal, according to Stein. He said, "Amateur radio played a critical role in establishing reliable communication between Yardley area units, BCEMA, and Red Cross operations."

Stein also pointed out that BCARES provided communications for a July 4th parade in the county at the same time they were staffing shelters and EOCs along the Delaware River.

New Jersey Hams On Duty

On the other side of the Delaware River, New Jersey hams were alert and ready to assist. New Jersey Office of Emergency Management Communications and Warning Officer H. Robert Schroeder, N2HX, held a RACES coordinators' conference call with eight western New Jersey counties. ARRL Northern New Jersey Section Manager Bill Hudzik, W2UDT, told ARRL that flooding was expected in towns along the river in Warren, Sussex, Hunterdon, and Mercer Counties, most of which had flooded in 2005. "Low areas of Hunterdon and Warren counties along the Delaware River had voluntary evacuations. The state government complex in Trenton had also flooded," said Hudzik.

With most of the rain to the west in Pennsylvania, ARRL Hunterdon County District Emergency Coordinator David Kanitra, WB2AZE, took no chances and placed Hunterdon ARES on a Level 1 alert for possible deployment to assist RACES in Hunterdon County. Most rivers crested just below flood stage.

Bucks County ARES members provided disaster communications for seven days following the third major Delaware River flood since September 2004. (Photo courtesy Bucks County, PA)

Mercer County Emergency Coordinator Kip Burnett, KB2EGI, reported on June 28 that Mercer County ARES was on standby due to the Delaware River flooding. "The EOC is active, and we have a couple of people at W2MER monitoring 146.67," he said. W2MER is the callsign of the ARES/RACES station at the Mercer County Office of Emergency Management's emergency operations center.

Southern New Jersey Section Emergency Coordinator Gary Wilson, K2GW, said hams just manned the radio room and didn't have to deploy to the field in Mercer County. He explained that there never was a communications emergency in his area. Cell phones worked fine (as they usually do in a river flooding event) and public-safety frequencies didn't get overloaded. Wilson, a former Mercer County Emergency Coordinator, said hams planned communications at the Emergency Operations Center (EOC) to be flexible a long time ago. The EOC radio room, which was installed and staffed by hams, has radios for every public-safety frequency used in Mercer County. "If we need to talk to the incident commander by the river, we do so on his sheriff's radio," said Wilson. "If we need to talk to an ambu-

lance, we do so on its EMS frequencies, etc. If we need to talk to the Red Cross, we do so on 47.42 MHz. All of this is done by the hams in the EOC radio room, which also serves as an interoperability point for incident communications." He continued, "This dramatically reduces the need for hams to deploy to remote locations. We essentially use amateur frequencies for resource nets to ensure manning of the radio room and as a backup."

Moving Forward

In June, the Federal Communications Commission published the recommendations of the Independent Panel reviewing the impact of Hurricane Katrina on Communications Networks. The panel made recommendations in four areas including the (1) pre-positioning the communications industry and the government for disasters in order to achieve greater network reliability and resiliency, (2) improving recovery coordination to address existing shortcomings and to maximize the use of existing resources, (3) improving the operability and interoperability of public safety and 911 communications in times of crisis; and (4) improving communication of emergency information to the public.

Regarding amateur radio, the report said, "as with other communications services, amateur radio stations were also adversely affected by Katrina. Equipment was damaged or lost due to the storm and trained amateurs were difficult to find in the immediate aftermath. However, once called into help, amateur radio operators volunteered to support many agencies, such as FEMA (Federal Emergency Management Agency), the National Weather Service, Hurricane Watch, and the American Red Cross. Amateurs provided wireless communications in many locations where there was no other means of communicating and also provided other technical aid to the communities affected by Katrina." See this month's Washington Readout column for more on the panel's report and recommendations.

Training Due

By next month the National Incident Management System Integration Center strongly recommends that volunteers with a direct role in emergency and incident management and response take NIMS and ICS training. For most amateur radio operators it is suggested that the following courses be taken:

FEMA IS-700: NIMS, An Introduction,

ICS-100: Introduction to ICS or equivalent, and

ICS-200: Basic ICS or its equivalent.

Another Month...

In our June column we highlighted two key weather events. The first was Tropical Storm Alberto, making an appearance at the beginning of the month, and we compared this year's weather with the weather of 1955. The similarities were there—warm temperatures and tropical moisture. The only item we had wrong was predicting that the flooding in Pennsylvania would occur in August. The flooding was in June. Will a hurricane strike the Mid-Atlantic States?

"The support by BCARES of the Bucks County Emergency Management Agency and Lower Bucks Chapter of the American Red Cross operations proved once again that amateur radio is a reliable, viable and needed resource in time of disaster," said Stein. For further information on BCARES, checkout its website at <www.bucksares.org>.

For many of you, Field Day was just the beginning of your training in emergency communications. For others it was the realization that there's a lot more to learn than just calling "CQ Field Day."

In our July column, we discussed education at Moorpark High School in Ventura County, CA. This month, sixty 9th through 12th grade students will be part of the nation's first disaster-preparedness class with training in radio communications under the leadership of teacher Tom Baker, NC6B. We made a mistake on Tom's name and want to wish him and his students well in their **RADIO** (**R**adio **A**mateurs and **DI**saster **O**perations) class. For more information, see: <www.mhsweather.org>.

We're in the middle of hurricane season. Have you made all of your preparations so when you get that call at a moment's notice you are ready to respond? Drop us a note about your emergency or public-service communications and your preparations. Until next time . . . 73, Bob, WA3PZO

What You've Told Us...

Our June column asked about ham radio's role in your summer vacation plans, and two-thirds of you (67%) said ham radio generally *is* a consideration in your vacation planning. More than half of you (54%) always take a ham rig along on vacation, while 34% said sometimes, and only 9% never take a ham rig on vacation. Nearly as many of you actually *use* the rig on vacation, with 47% saying always, 38% saying sometimes, and 5% saying never.

It was no surprise that the most popular type of rig to bring on vacation is a VHF/UHF handheld (57%), followed by a VHF/UHF mobile rig (46%), but we were surprised to learn that 36% of you bring a mobile HF rig, and 24% bring along a portable HF rig for fixed operation. In addition, 13% each bring an HF QRP (low power) rig for use while hiking, a shortwave receiver or a VHF/UHF scanner.

Your vacation operating is about evenly split between the car (44%) and your hotel or vacation house (43%), with 8% operating while hiking or boating, and 9% "other." Also not too surprising were your family's attitude about your hamming on vacation—57% said family members tolerate it, 26% said they enjoy it, while 5% said they don't like it and 3% said "they don't let me operate." Just over 40% of you said your main goal in operating on vacation is rag-chewing, while 33% use your rigs mostly for meeting local hams, getting directions, etc. Another 16% enjoy DXing while on vacation, 5% operate mostly in contests and 15% answered "other."

Finally, 36% of you have - at least once - gone on a "ham radio vacation," in which the destination and/or timing was dictated by a ham radio event or activity.

Our free subscription winner for this month is Brian Bird, NXØX, of Duluth, Minnesota.

Reader Survey September 2006

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*.

This month, we'd like to find out more about your activity level on 6 meters.

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

1. Are you currently active on 6 meters?
Yes 1
No 2

2. When were you most recently on 6 meters?
Within the past week 3
Within the past month 4
Within the past year 5
1–5 years ago 6
5–10 years ago 7
Not within the past 10 years 8
Never 9

3. What is your perception of the distances you can work on 6 meters?
Local/regional only 10
About 1300 miles, when conditions are right 11
About 2500 miles, when conditions are right 12
Intercontinental, but only at sunspot peaks 13
Intercontinental, *not* only at sunspot peaks 14
Don't know 15

4. Are you aware of the 6-meter openings this summer between Asia, North America and Europe?
Yes 16
No 17

5. Have you personally taken advantage of any of these openings to work new countries / states / grids on 6 meters?
Yes 18
No 19

6. Will this summer's openings on 6 meters encourage you to become active or more active on the band?
Already very active 20
Yes 21
No 22
Don't know 23

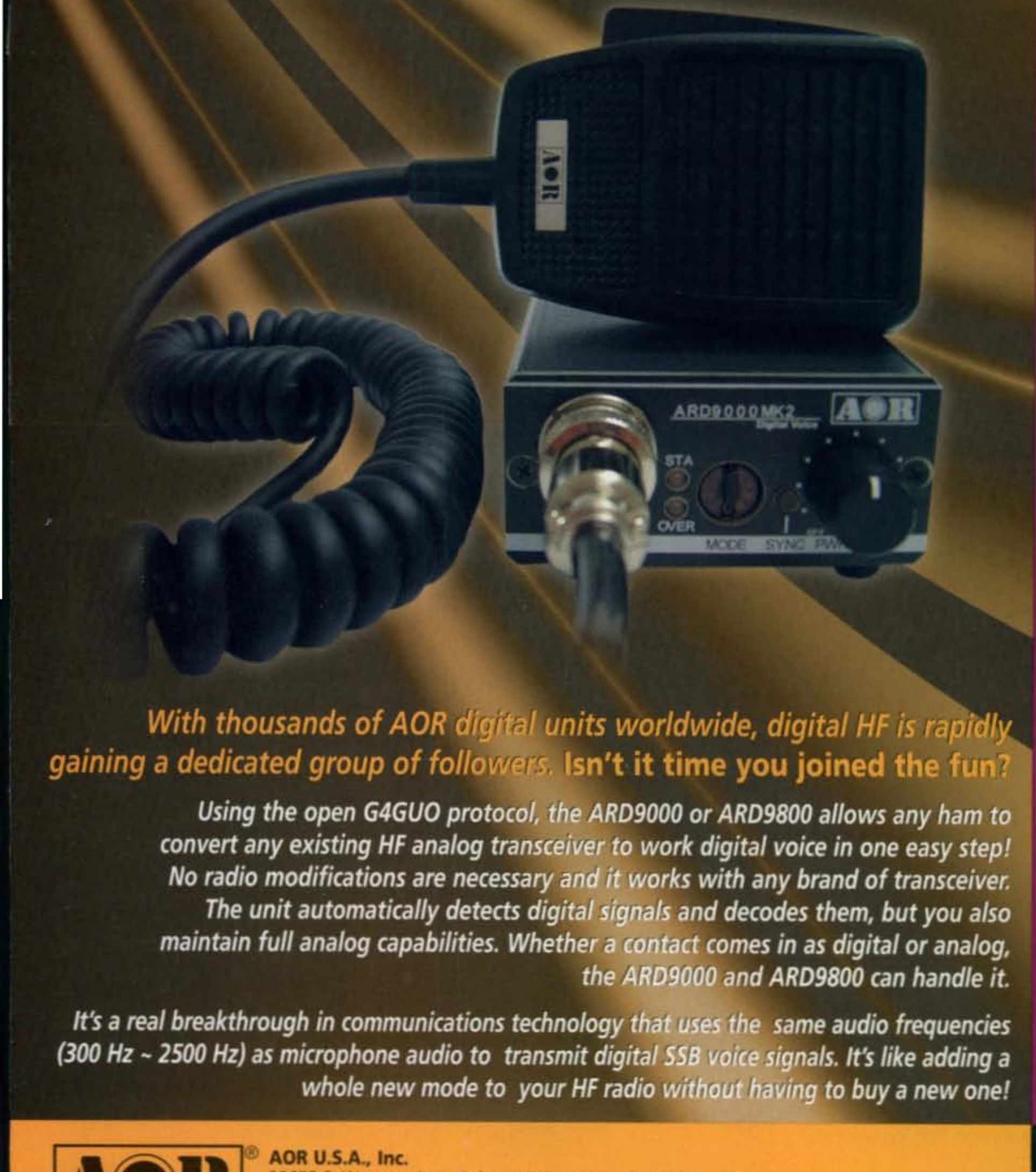
7. Do you participate in any of the following contests that include 6 meters? (Circle all that apply)
ARRL January VHF Contest 24
ARRL June VHF Contest 25
ARRL September VHF Contest 26
CQ World Wide VHF Contest 27
SMIRK contests 28
Other 6-meter contests 29
None 30

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

New ARD9000 MK2 steps up to the mike!

When you add digital capabilities to your existing HF rig with a new ARD9000 MK2, the advantages will come through LOUD and CLEAR.

AOR digital voice operators around the world are amazed at the audio quality delivered by the ARD9000 and ARD9800. Now AOR has improved the ARD9000 by adding a high quality speaker microphone with a traditional 8-pin round connector that lets you "go digital" with just a mike click. Its compact size makes the ARD9000 a favorite for backpackers who want to go HF digital while hiking or climbing. Of course, you don't have to leave home to enjoy the fun of clear DIGITAL contacts.



With thousands of AOR digital units worldwide, digital HF is rapidly gaining a dedicated group of followers. **Isn't it time you joined the fun?**

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- Utilizes a uniquely designed high performance DSP engine
- Uses the established G4GUO open protocol

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BY DAVE INGRAM,* K4TWJ

Hamming from the Shadows

As the general population continues to grow and age, an ever-increasing number of people (each with his or her own special interests and lifestyle) are being required to live in rather close quarters. As a spin-off or consequence, Covenants, Conditions and Restrictions (CC&Rs) are imposing some fairly strict regulations on homeowners. Residents of apartments, condos, and retirement facilities are also being subjected to an endless number of new-era regulations and stipulations. Yes, and close study indicates that sooner or later (and odds lean more toward sooner than later) over half of us will come face-to-face with such restrictions in our own use of outdoor antennas and enjoyment of amateur radio. That's frightful, especially considering the noteworthy role our person-to-person communications play in promoting international friendships and how much we have helped with communications during emergencies and disasters such as Hurricane Katrina. Will our imposed limitations be offset or overshadowed by state adoptions of PRB-1, the FCC rule requiring "reasonable accommodation" of amateur radio antennas and communications by municipal governments? We certainly hope so, but we should also realize the importance of knowing our options and/or alternatives for continued existence if "plan A" falls through, so-to-speak.

That is the focus of both this and next month's columns–covering hidden and disguised antennas, reduction of telltale RFI, and having a ball on the air while maintaining a low profile. This will probably evolve into an occasional or twice-a-year series of articles covering everything from semi-invisible antennas to "personal portable" setups for impromptu operations and more. You would thus be wise to earmark this first installment (and related later columns) for quick reference if/when needed.

Let's begin this month with a look at three unique vertical antennas with high appeal for all amateurs bound by some type of antenna limitations.

Photo 1– What's tall, delightful to see, and heard around the world? A Force 12 flagpole antenna, of course. It is an authentic metal flagpole that works 20 meters without a tuner and other bands with a tuner. Antenna is 16 feet tall and additional 4-foot sections to make custom flagpoles are available as options. Install the antenna so it has a good view of distant horizons in desired directions, and it will work out like a champ. More details at <www.force12inc.com>.

Force 12 Flag Pole Vertical

Have you noticed how areas with antenna restrictions always seem devoid of trees, especially in the Deep South, where it is 20 degrees hotter in the sun than in the shade? Maybe that is why verticals are so popular among many amateurs. They are reasonably affordable, easy to install, self-supporting, and work well to boot. Most of them have one trait in common, however: They look like a vertical antenna, and getting them accepted by landowners and neighbors can prove challenging. When some folks see an antenna, they say: "That is why my cell phone has drop-outs!" "My computer keeps losing its internet connection!" "Mabel's air conditioner doesn't cool properly." "Widow Jones says her hens stopped laying eggs." . . . "It's that antenna! We know it is!"

Patriotism is held in high esteem today, so antennas disguised as flagpoles are usually accepted or overlooked. Enter the Force 12 sixteen-foot flagpole for 40- through 10-meter operation (photos 1, 2, and 3). The antenna is all-aluminum and looks identical to a flagpole, right down to the rotating top cap and side cleat to hold a rope. It is strong, self-supporting, and holds a flag with no problem. Installation of a Force 12 flagpole antenna typically takes around an hour and involves digging an 18- to 20-inch hole for the base, filling it with quick-setting concrete, laying a few radials, and placing the antenna on its base. The flagpole is resonant on 20 meters and typically exhibits an SWR of 1.2:1 across

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CC&Rs

Covenants, Conditions, and Restrictions are covering our nation and directly affecting nearly everyone's lifestyle. Recently, for example, our daily newspaper (*The Birmingham News,* April 29, pages 1 and 2) reported how local CC&Rs were banning everything from outdoor flower gardens and barbecue grills to swing sets, basketball goals, and antennas. Even garage doors that are open when not in use came under fire. Every two weeks, CC&R enforcers canvassed neighborhoods looking for covenant violations. When found, the homeowner received two letters. If not corrected, an attorney was called in and a lawsuit was filed. In one highlighted case a lady was sued for planting flowers too close to the street. In another case, a person was cited for having a garbage can visible from the street. Gee, I remember when N4JF worked VU2DIA on Andaman Island with a beam balanced on a garbage can in his yard—and in full view of neighbors and street. Ah, those old days of yesteryear were terrific!

the band. A 10-turn coil of coax is positioned away from the antenna's base, allowing the coax feedline between the coil and antenna to serve as part of the antenna system, so with the aid of a tuner it can also work on 17, 15, 12, and 10 meters. When complemented with an optional base-loading coil, the antenna works on 40 meters, as well. Performance on non-resonant bands is not earth shattering, but it is not bad either. A good ground system is vitally important to the operation of any quarter-wave vertical, and Force 12 suggests using two resonant/quarter-wave radials for each band of operation. The radials may be bare or insulated wire stretched out on the ground or buried one or two inches below the surface.

This Force 12 flagpole is the least expensive antenna featured this month. It is so affordable, in fact, that an amateur residing in a retirement community could purchase one, have

Photo 2– This view shows how the Force 12 antenna fits onto its short base, which you fit into quick-setting cement. Look carefully and you can see one radial wire disappearing into the grass.

Photo 3– Here an optional 40-meter base coil has been added to the Force 12 antenna. Installation was halted at this particular point, so you can see the radial wires and transmission line connecting to the base plate.

it installed, and donate it to the facility, provided the amateur was allowed to use the flagpole antenna while residing in the community. Just remember to protect the antenna's base connections and coax from groundkeepers with wild weed eaters. A couple of short PVC pipes usually work fine here.

Additional information on Force 12 antennas is available at <www. force12inc.com> or 1-800-248-1985. Questions can be e-mailed to <force12manager@sbcglobal.net. Check it out!

The IAC Stealth Bazooka

Another neat flagpole-disguised vertical antenna is the IAC model SB-40 shown in photos 4 and 5. The metallic radiating elements of this antenna are enclosed in a 2.3-inch diameter, 17.5-foot tall pole made of furniture-grade PVC reinforced with UV stabilizers for long life. The antenna covers 40 and 20 meters without a tuner and can be used on other bands with the aid of a tuner. If you are thinking you have seen this antenna somewhere before, you are right. Its forerunner, the SB-10 that worked 10, 17, and 20 meters, was on the cover of *CQ* for January 2006. The new SB-40 looks identical to the SB-10. It has simply being modified to accommodate requests to operate two of the most popular HF bands without requiring a tuner.

Photo 4– Even overly strict home-owner committees should find this flagpole attractive. It is made of high-strength furniture-grade PVC with a white finish and gold ball on top for a clean, patriotic look. Inside the tubing and fully protected from the weather are separate vertical radiators for 40 and 20 meters. More details at <www.iacantennas.com>.

Photo 5– Base/feed-point view of IAC's SB-40 flagpole vertical showing the recessed socket accepting PL-259. The antenna fits onto a support mast you preinstall in the ground. Associated radials are buried just deep enough to avoid damage by wild weed eaters. (Photo courtesy of IAC Antenna Corporation)

Special features of the SB-40 antenna are a clean look with internal radiators that are fully protected from the weather. It has a high-gloss white finish to go with any environment. The antenna is also a quarter-wave radiator, so it requires ground radials, which are supplied with the antenna. Additional details are at <www.iacantennas.com> or from IAC, P.O. Box 1715, Escondido, CA 92033 (phone 1-888-268-4214).

SteppIR Verticals

Our third flagpole "look alike" antenna is made by SteppIR, the same folks producing those motor-tuned Yagi antennas that are so incredibly popular today (photos 6 and 7). There are two versions or models of SteppIR verticals—an 18 footer that remotely tunes/resonates on any frequency between 20 and 6 meters, and a 32 footer that remotely tunes/resonates on any frequency between 40 and 6 meters.

SteppIRs are not advertised as flagpole antennas, but in my opinion they fill the bill admirably! The antennas consist of a spool of flat and perforated copper strip that extends from a base housing unit. A precision Stepper motor then drives the copper strip up/down within the antenna's hollow fiberglass tube. A microprocessor-based controller operates the Stepper motor, thus setting the copper strip to the exact length required to produce a 1:1 SWR on a selected band/frequency. The antenna is easy to assemble and install, pruning for lowest SWR is a pushbutton cinch, and stepping rate is 1.17 MHz per second (4.4 seconds to go between 20 and 17 meters, for example). The antenna element is fully weather protected, and it can also be retracted into its base housing during electrical storms, leaving only the hollow fiberglass pole exposed to lightning.

SteppIRs are normally advertised as regular quarter-wave verticals, but they are capable of much more. Indeed, a creative-minded amateur can easily find a SteppIR comparable to an antenna farm in a 1-foot-square area. How so? First, a big (that's the 32 ft.) SteppIR can be set/adjusted to serve as a 3/4-wave vertical with mild gain on 15 through 6 meters. Likewise, a small (the 18 ft.) SteppIR can be set for 3/4-wave operation on 6 meters. Now think further and reflect back on your studies of antenna theory. If a SteppIR's length is set to 3/8 or 1/2 wave for a selected band, mild gain results and a few 4- or 5-ft. spokes rather than a full radial system can serve as a ground plane. The down

PRB-1: What It Is and What It Means

As you probably know, many owners of various types of property/land tend to be narrow-minded regarding amateur radio antennas. PRB-1 offers a viable solution to the dilemma by prohibiting outright bans on amateur radio antennas by state and local governments. But the FCC so far has declined repeated requests to expand the scope of PRB-1 to include private landowners and CC&Rs. Simply explained, this docket calls for limited preemption of local area antenna ordinances and requires all such rules "reasonably accommodate amateur radio antennas and communications." That's the general thrust of PRB-1. A more precise and formal description was included on page 4, July 2004 *CQ*, and on page 4 of May 2006 *CQ*. The latter also reports Mississippi as the 22nd state to adopt a statewide version of PRB-1. The other states are AK, CA, FL, ID, IN, LA, ME, MA, MO, NV, NH, NM, OR, TN, TX, UT, VA, WA, WV, WI, and WY.

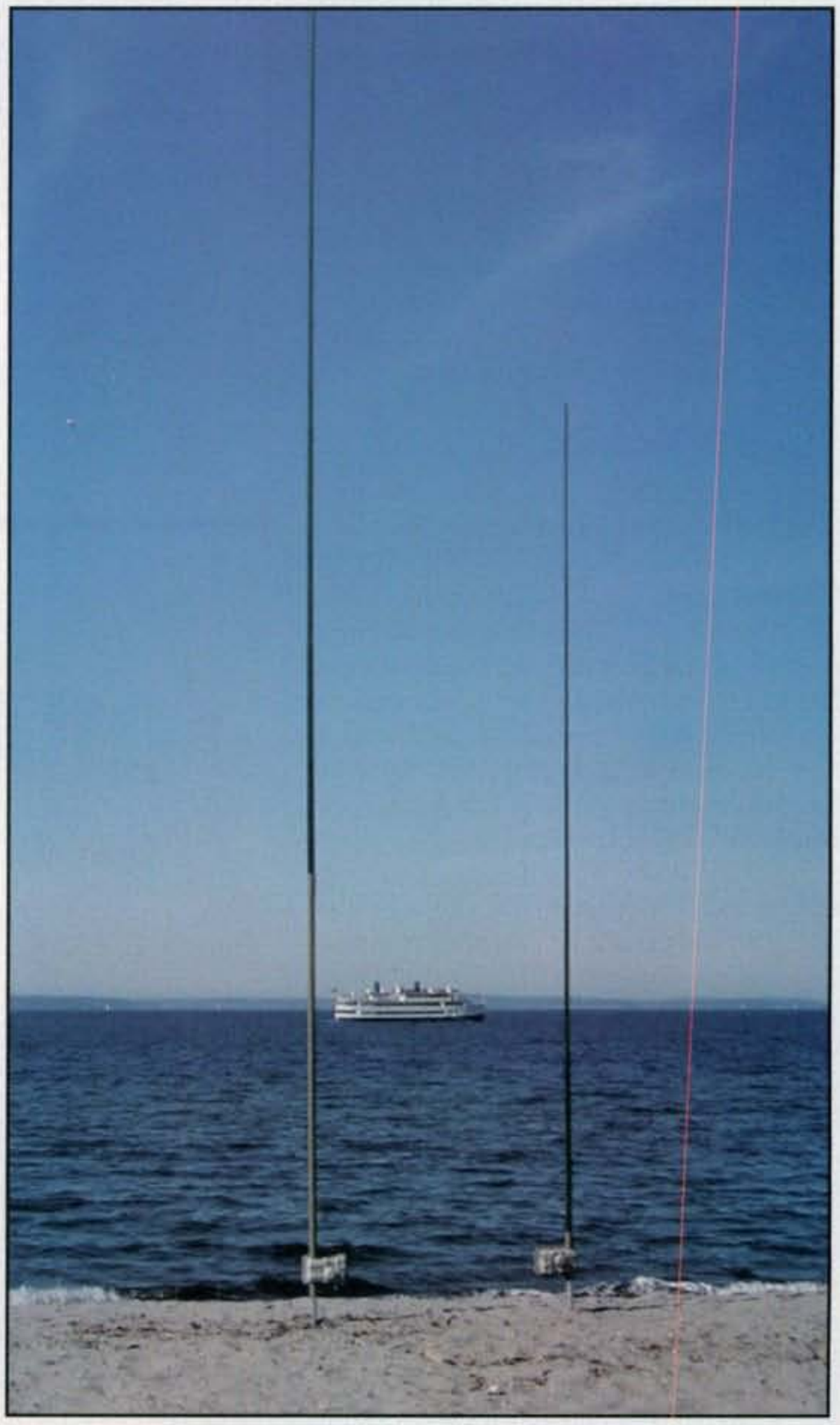

Photo 6– SteppIR produces two multiband verticals that can easily double as flagpoles—one 18 feet tall and one 32 feet tall. Antennas feature a microprocessor-controlled Stepper motor that drives a copper radiating element up/down inside a hollow fiberglass tube. The vertical element can thus be remotely set to any desired length/height/frequency. More details at <www.Steppir.com>.

side is feed point impedance goes from 50 ohms to between 1200 and 2000 ohms. Ah, but add a broadband matching transformer such as Hy-Gain does with its AV-640 or Cushcraft does with its R-7000 (not an antenna tuner, but a matching transformer), and a 50-ohm feed point plus big-time performance results. This "extended element idea" works for all bands through 20 meters. A base-located 2-ft. linear loading section could be added for 3/8-wave operation on 30 meters, and a bypass switch could be added for regular quarter-wave operation on 40 meters.

I have cross-compared 3/8- and 1/2-wave verticals with a three-element triband beam over a period of four years and consistently found performance of the vertical within three or four dB of the beam. I also noted I could contact any station with either the 3/8- or 1/2-wave vertical that I could contact with

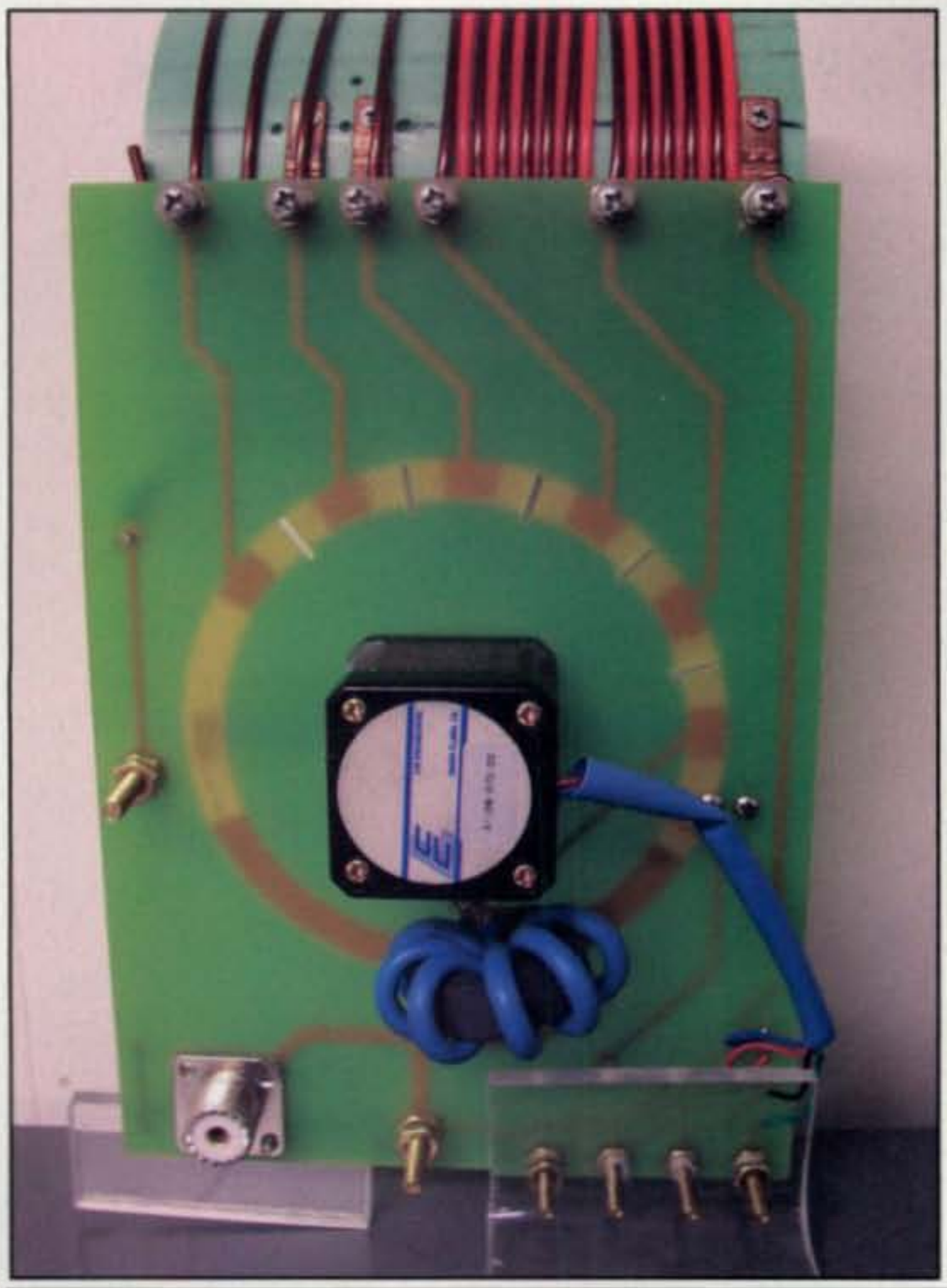

Photo 7– Removed-from-case view of the optional base-loading coil for using the short SteppIR on 40 meters.

the beam. That fact did not hold true for a quarter-wave vertical, however. It was typically 6 to 12 dB below the beam in performance. You have probably noticed similar measurements in performance.

Here is another "dink idea" worth considering: Add a small plastic pulley at the top of a small/short SteppIR, and then thread a thin nylon rope or fishing line through the pulley. Home-assemble an inverted-Vee for 40 meters, an inverted-L for 160 meters, or a two-element wire "X" beam (made from two inverted-Vees with a common center support) for 40 or 20 meters. Then retract the SteppIR's element and hoist up a really high-performance wire antenna for special operations. If you prefer more conventional types of experimenting and must stick with the short antenna, incidentally, SteppIR recently introduced a cool loading coil for 40- or 30-meter operation with a small SteppIR. Oh, such dinking delights!

Conclusion

We have run past the closing wire and we have only scratched the surface of this most interesting subject. Still to consider are numerous measures for minimizing RFI and ensuring neighbors never discover your secret, hiding wire antennas, and, of course, more vertical antennas for areas without trees. We will squeeze in as many of those topics as possible next month. Meanwhile, stay enthusiastic and active on HF, even if you must use an extension cable routed to your mobile antenna!

73, Dave, K4TWJ

the weekender

BY PHIL SALAS,* AD5X

SWR "Tamers" for HF Transceivers

Manual and automatic antenna tuners can present a high SWR to your transceiver during tuning. Many HF transceivers have a low- power "tune" mode and output fold-back circuitry to provide output circuitry protection under high SWR conditions. Popular QRP radios also turn down power in the presence of high SWR. However, unlike higher power radios, the low turned-down output of QRP transceivers is often insufficient to permit proper operation of auto-tuners or auto-screwdriver tuners. As an example, my IC-703 puts out full power into a 2:1 SWR. However, at a 3:1 SWR the output power is about 2 watts, and just about 1 watt at a 5:1 SWR. This makes the IC-703 incompatible with at least one available auto-screwdriver tuner.

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Therefore, this month we'll look at a few different circuits that will provide output SWR protection for HF transceivers, and also help keep QRP output levels high enough for automatic tuners.

My first SWR Tamer was simply a 3-dB pad that could be switched in-line during tuning. The worst-case SWR with this unit is about 3:1. Fig. 1 is the schematic, and photos A and B show internal and external views of the unit. The resistors are Caddock 15-watt thick-film resistors, good well up into

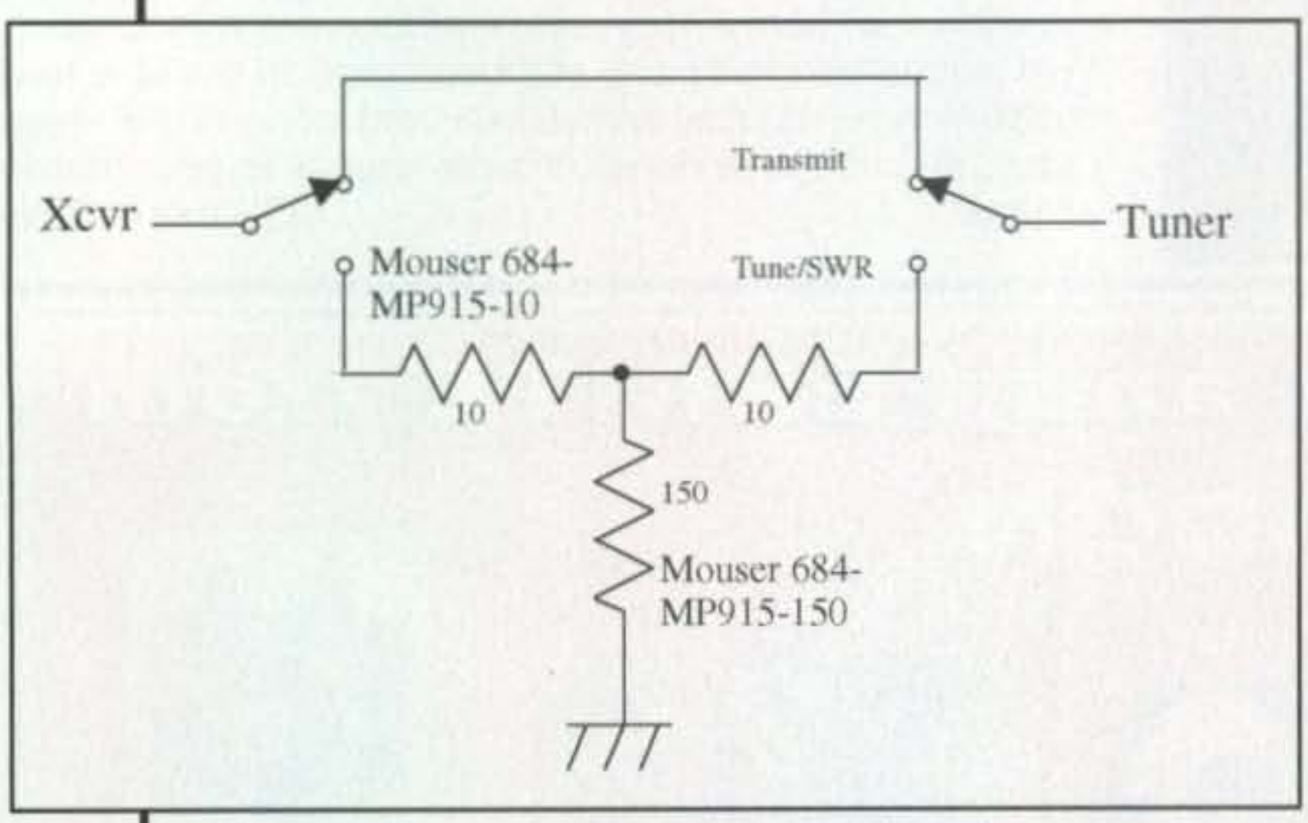

Fig. 1– In-line 3-dB attenuator.

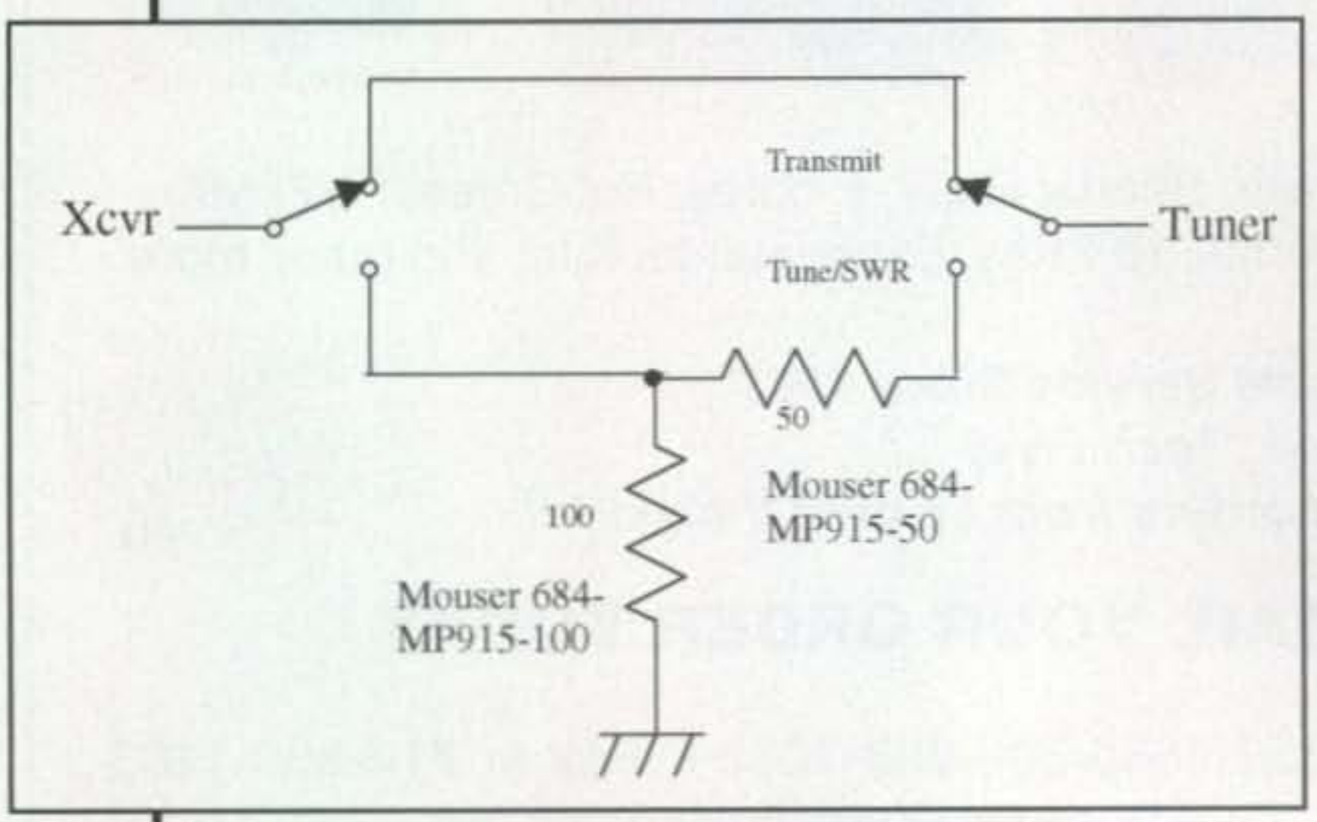

Fig. 2– In-line 6-dB attenuator.

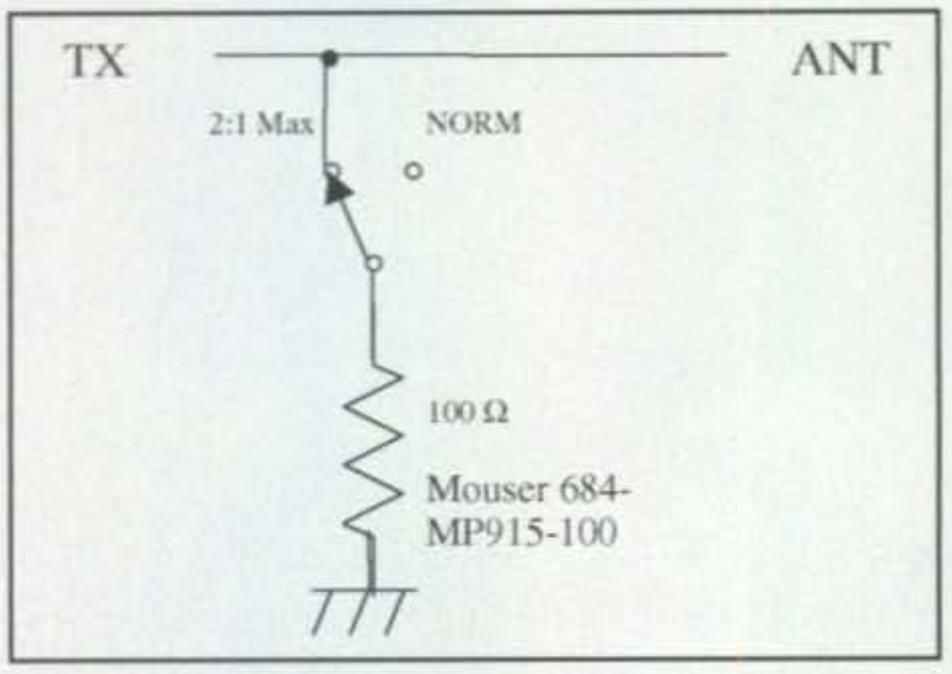

Fig. 3– Simplest SWR Tamer schematic.

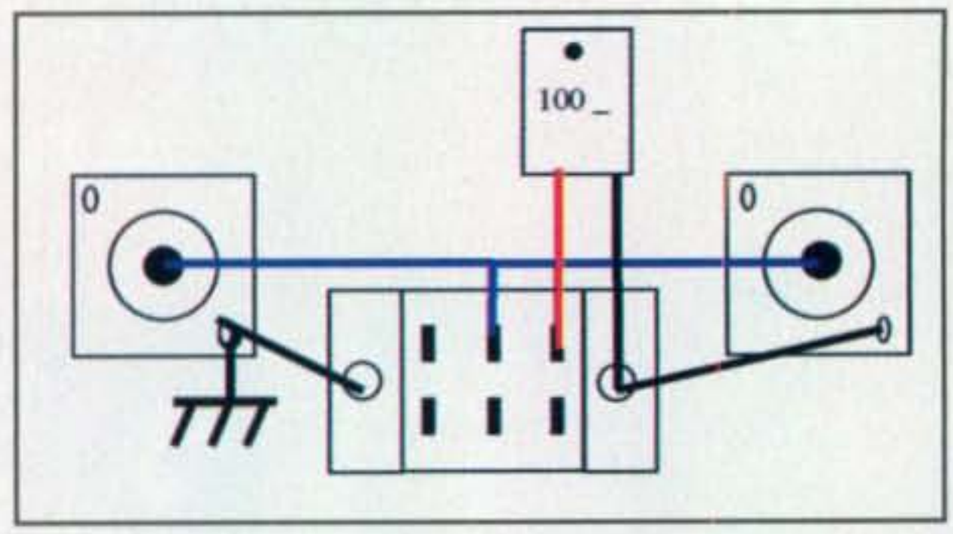

Fig. 4– Physical wiring diagram.

Photo A– Inside view of the 3-dB attenuator.

the VHF range. The aluminum box is a Mouser 537-M00-P.

A simpler circuit is the L-network shown in fig. 2. This circuit reduces the power resistors to only two, and limits your worst-case SWR to 2:1. However, under matched conditions you lose 6 dB of transmit power.

It finally occurred to me, though, that just placing a 100-ohm resistor across the RF line while tuning could keep the SWR at 2:1 or less with the least attenuation. The exception to this is if you are trying to match a very low impedance. However, short antennas have high capacitive reactance, and screwdriver antennas either have high capacitive reactance or high inductive reactance when off resonance. I've also found that when using a manual tuner, your impedance won't be too low if you set both the matching and tuning capacitors to maximum and then peak the receive signal with the tuner inductor prior to tuning with transmit power applied.

Fig. 3 is the schematic of this very simple circuit. The Mouser 537-M00-P aluminum box is painted, so scrape off paint around the SO-239 mounting screws for good RF grounding, and around the base of the 100-ohm power resistor for good heat transfer (use RadioShack 276-1372 heat-sink grease under the power resistor). You will need one solder lug to attach one end of the 100-ohm resistor to ground. The 100-ohm power resistor is mounted with a #2 screw, lockwasher, and nut. The switch and SO-239 connectors are mounted with #4 hardware.

The wiring diagram is shown in fig. 4. Point-to-point wiring is used, and is just fine for HF through 6-meter operation. Photos C and D show my final wired unit. For all labeling I used a Casio labeler with "black on clear" tape. I also added stick-on rubber feet on the bottom of the unit.

That's it for this month. Remember, send your Weekender ideas, questions, and projects to me at <ad5x@arrl.net>.

Photo C– Internal wiring of the simple SWR Tamer.

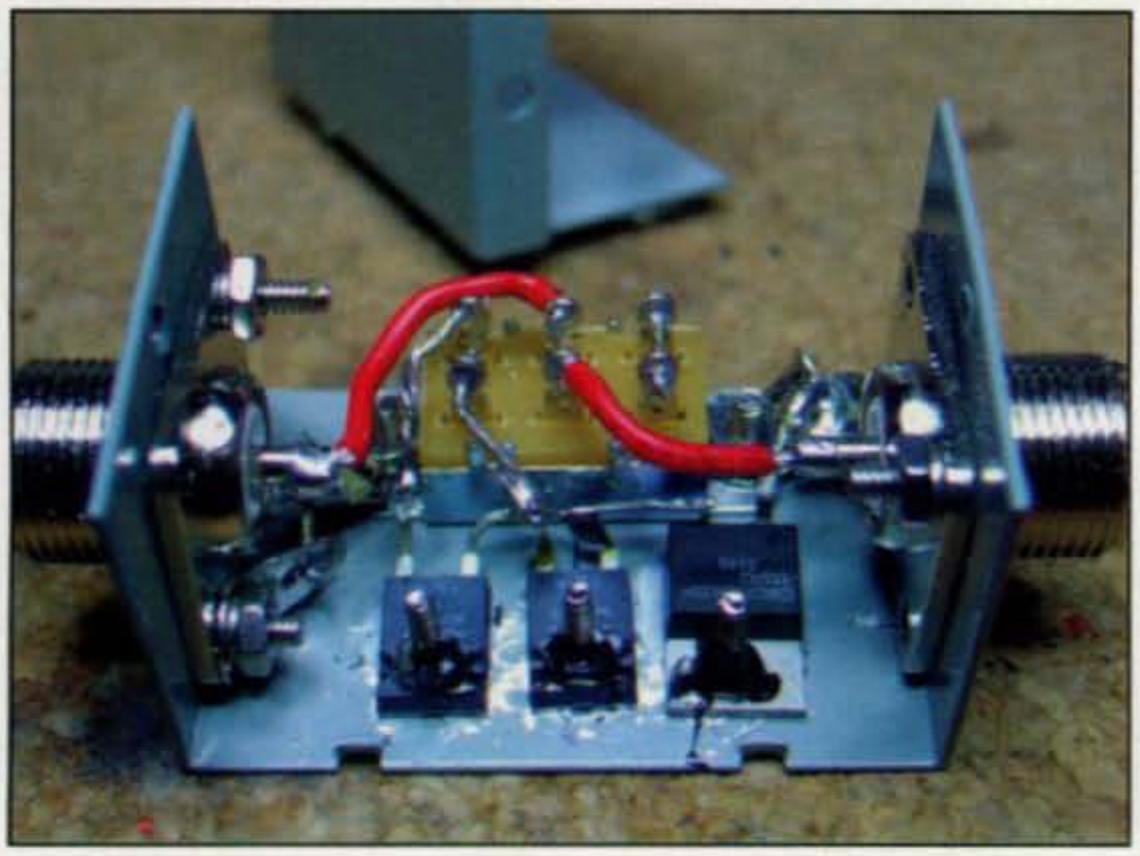

Photo B– The 3-dB attenuator, outside view.

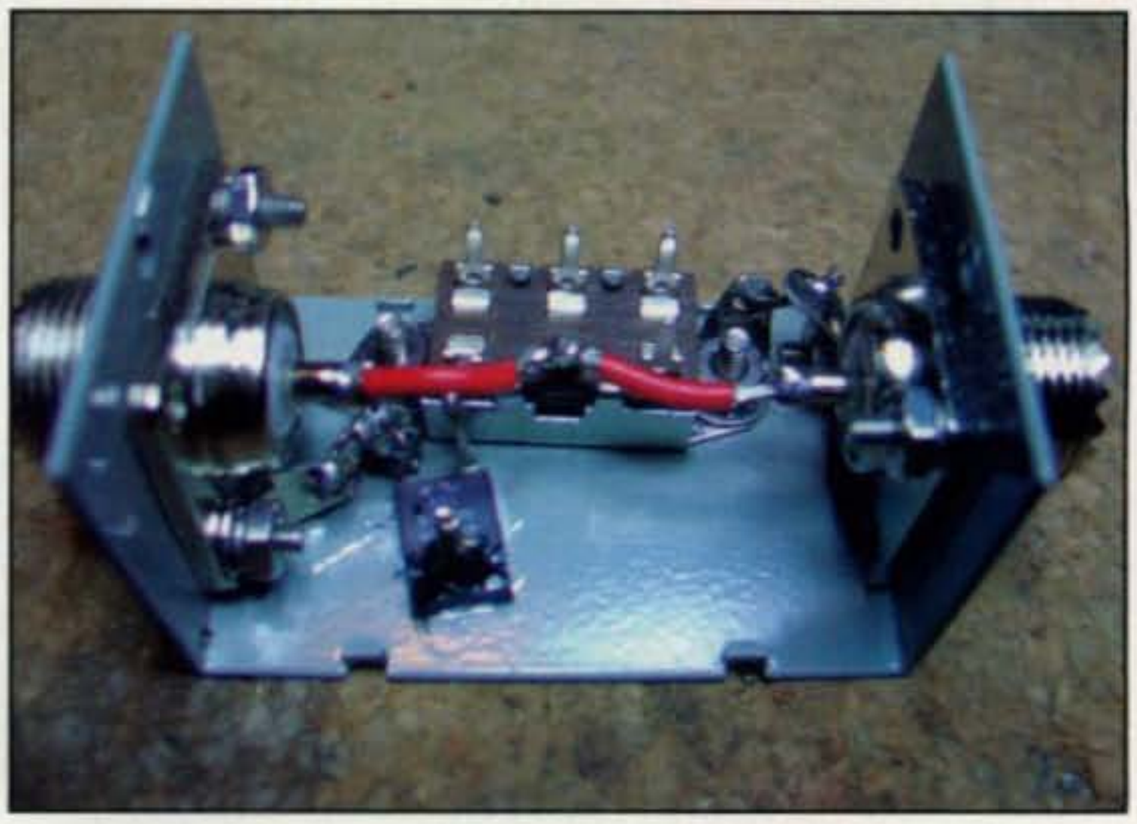

Photo D– Outside view of the simple SWR Tamer.

math's notes

BY IRWIN MATH,* WA2NDM

A Simple Antenna for the 2.39–2.45 GHz Amateur Band

Recently, we had a need to convert one of our products (a fiber-optic link) so that it could bridge a gap where a fiber could not be run. A free-space optical link could not be employed, since the stability of the physical mounts available for the optical elements (over the distances involved) would not be adequate. It seemed that the only practical choice would be a true RF wireless link with a beam width greater than that available from an optical link.

After a bit of research, we decided to use the ISM license-free band at 2.4 GHz (for this portion of the link) for the benefit of our customer. Since the amateur 2.39- to 2.45-GHz band also shares some of these frequencies, we thought it would be a good idea to relate some of our findings here for those of you who might be interested in further exploring this band. Some of this information, by the way, could also be used to extend the range of a 2.4-GHz wireless internet (WiFi) connection, but that is another matter.

Converting the fiber-optic units from optical devices to electrical inputs and outputs was straightforward and readily accomplished. The initial choice of the RF transmitter and receiver was also fairly easy, since FCC-certified units are available from numerous sources. The legal ones have relatively low output power levels, however, and normally are only usable for a few hundred meters with the types of omni-directional antennas usually provided.

Since our path was specifically point-to-point and almost a half mile between transmitter and receiver, it was obvious that a directional antenna of some sort would be needed. A search on the internet turned up many pre-packaged units (that could also be used on the amateur band, by the way), as well as numerous articles concerning homebrew antennas, one of which used (of all things) a Pringles™ potato-chip-can housing.[1] Being true homebrewers at heart, we decided that we would "take a chance," digest some of the basics of what had been done previously, and attempt to build our own antennas along these lines.

The potato-chip-can antenna is really a resonant waveguide type antenna as shown in fig. 1. RF is fed to a "probe" in the cavity, and since only one side is open, the RF exits through this opening. The front-to-back ratio is very good for obvious reasons, and forward power can reach into the 10 dBi+ region with relatively simple construction. The original potato-chip-can waveguide was an aluminum-foil-covered cardboard tube (with a built-in Yagi director assembly) that seemed a bit complex and would not last very long outdoors, so we had to find something more substantial.

What we finally decided to use (as did many others) was the familiar coffee can. Here was an all-metal housing of about the right size that even came with a plastic cover that could be used as a radom to keep out weather. Cost was free, since almost everyone drinks coffee, and even if one doesn't, a neighbor almost certainly does and used cans should be readily available. The coffee can we used was 4 inches in diameter and $5\frac{3}{8}$ inches long, the size used for most standard eleven-ounce brands. A somewhat better can would be the one used to package Pepperidge Farms Pirouette™ cookies, since it is the same diameter but has smooth sides (compared to the ridges on the coffee can) and is longer, resulting in higher gain.

We began by drilling a pilot hole $1\frac{3}{4}$ inches up from the bottom of the can and then carefully reaming this out to accept a type N coaxial receptacle (which happened to match the connector on our

*c/o CQ magazine

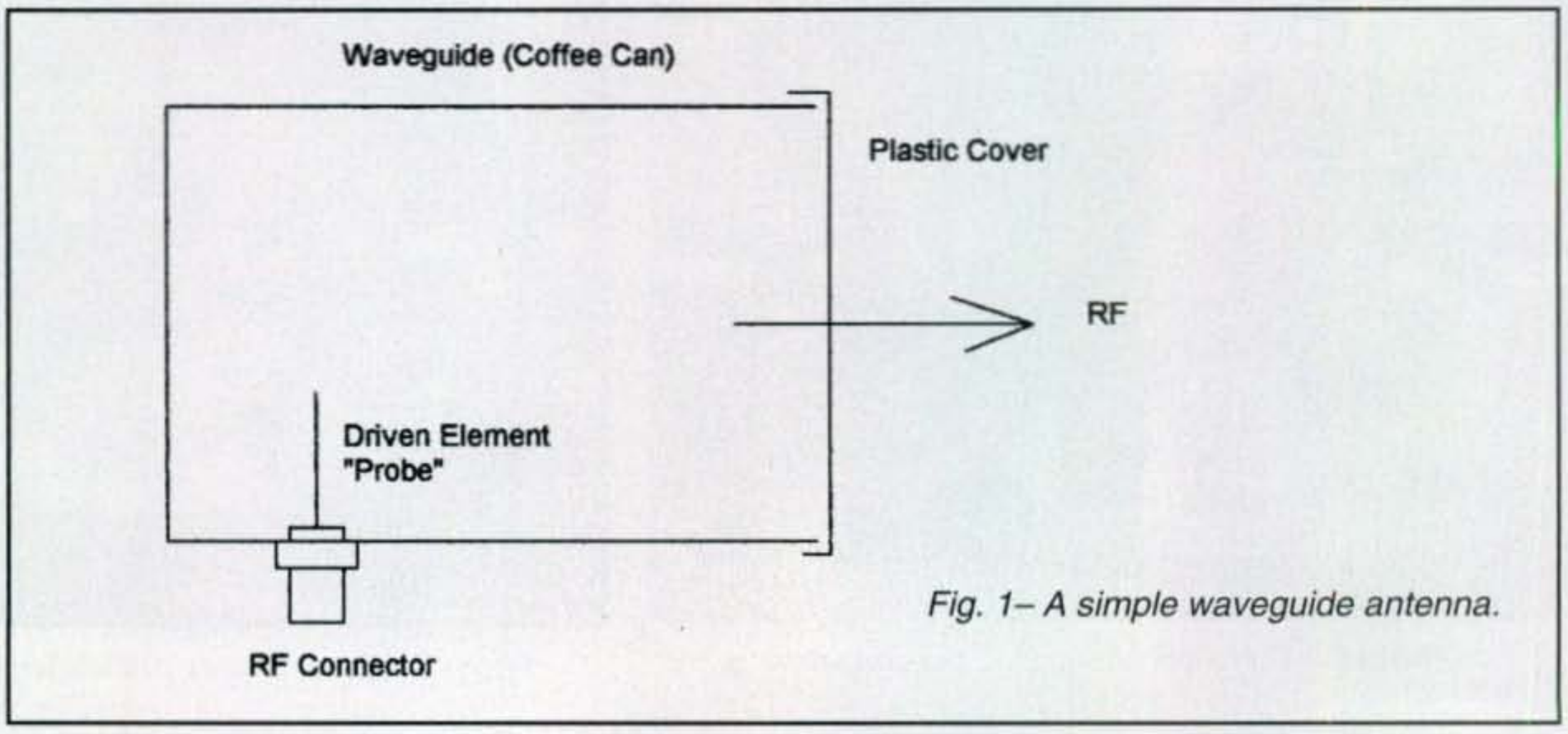

Fig. 1– A simple waveguide antenna.

transmitter). We were lucky enough to get a connector that mounted with a couple of large nuts; however, the standard N connector could also be used. In fact, you can even experiment with other connectors, but type N is rated for operation at this frequency (actually up to 11 GHz) and is not overly expensive.

We then prepared the probe from some #12 copper wire of the type used for house wiring. Since we only needed a couple of inches, the salesman at the local Home Depot simply cut a 3-inch "sample" for us from a huge reel at no charge. We made sure this wire was perfectly straight, soldered it into the connector, and then cut the final length to exactly 1.2 inches (which included the brass solder cup ferrule of the connector). Then we inserted the connector/probe assembly into the hole we had previously drilled, tightened the nuts, scraped off the paint around the connector, and carefully tack-soldered it in place to make sure of good electrical contact. An old 250-watt Weller™ soldering gun and plenty of rosin flux made this part of the job fairly easy, although the can did get quite hot, so be sure to exercise caution! Wearing gloves would be a good idea and would probably save some painful burns. Finally, we drilled a small 1/8-inch diameter hole at the rear of the can to allow any moisture that might condense to drip out. Fig. 2 shows the details of the mechanical construction. A coat of outdoor enamel paint (on the outside of the can only) then completed the job.

Once the two antennas were finished, we had to test the system. We set up the transmitter at one end of a large open field using the automotive lighter socket as our power source. The antenna was mounted to an inexpensive photographer's tripod with a couple of plastic tie-wraps to hold it steady. A 10-kHz square-wave oscillator was then connected to the transmitter as a temporary signal source. The receiving antenna was mounted to another tripod with the same probe orientation (up and down), and a 12-volt motorcycle battery was employed as a power source for some portability. A 1N4148 diode, a 0.1-µF capacitor and a DVM were then connected to the output of the receiver as a simple signal-strength detector. All transmitter-to-receiver communications during setup were by means of 2-meter HTs.

The first test was at 100 feet and signals were very strong. Mechanical alignment was not too critical, although the directivity of the antennas was clearly obvious. The next test was at 1000 feet (yes, we paced the distance by foot

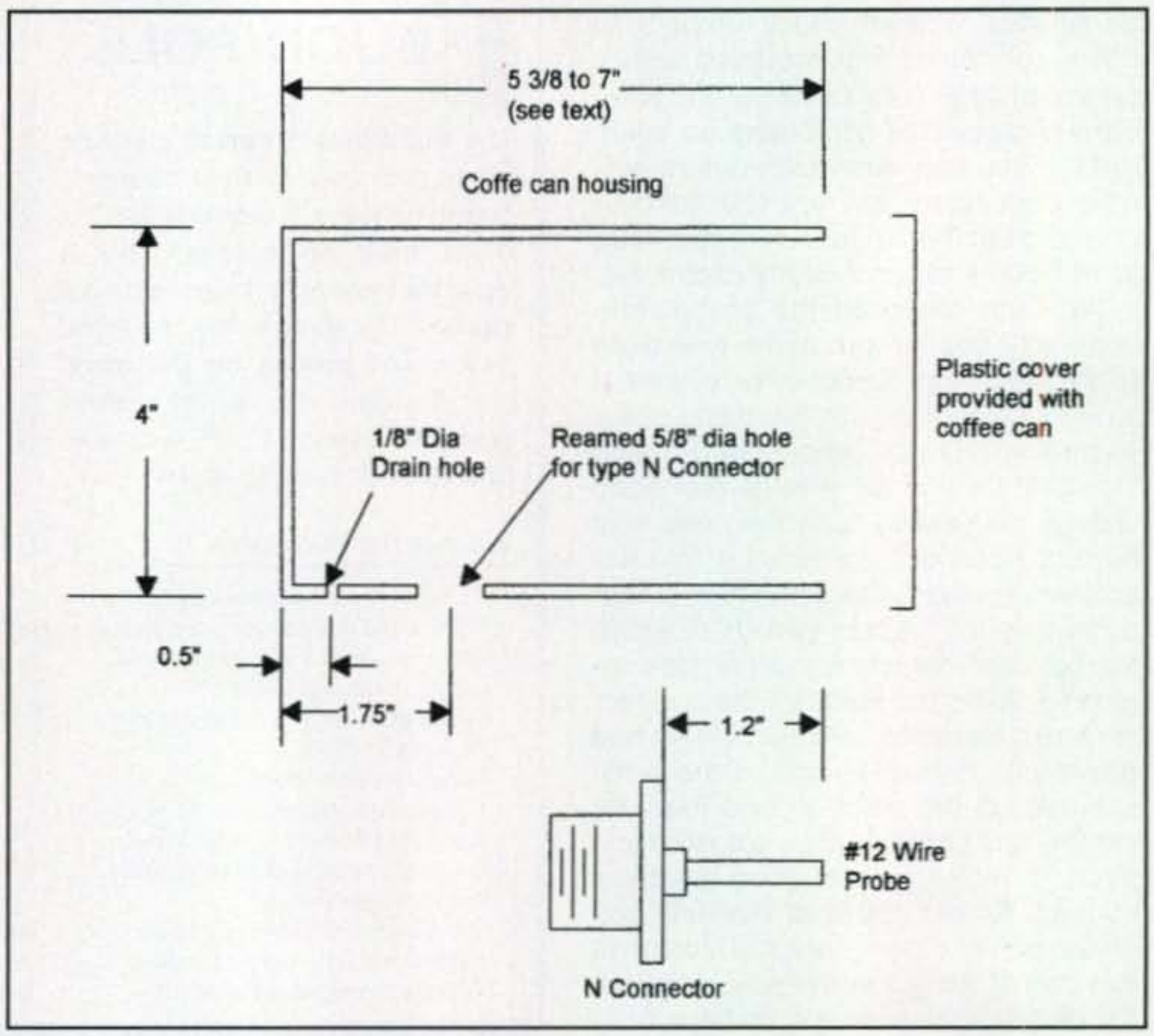

Fig. 2– Waveguide antenna details.

the hard way) and signals were still very strong. Alignment was now a bit more critical. At this point it became apparent that the polarization of both the transmitting and receiving antennas was important, since tilting or rotating one tripod "off vertical" (relative to the other one) could cause significant variations in signal strength. Polarization, by the way, is the direction of the probe with respect to the ground. If the probe is perpendicular to the ground (up and down), the output is vertically polarized. If the probe is horizontal (left to right), the output is horizontally polarized. As mentioned, our antennas were vertically polarized (for no particular reason).

Next we took the entire setup to a vacant beach on the Atlantic Ocean here on Long Island, about 15 miles from home and early in the morning to avoid crowds. At one-half mile the signals were still okay, but at a mile they became a little too noisy for reliable communications, although we could still detect signals—truly amazing for something homebrew at microwave frequencies. No doubt optimizing the various dimensions specifically for the exact operating frequency would result in even greater gain.

Incidentally, the final setup that we delivered to our customer used commercial antennas, since it not only "had to work reliably," but also had to look really "professional." The homebrew units would have worked just as well, but might not have been as readily accepted, and we certainly were not ready to explain the use of coffee cans on a commercial project.

If you research the various versions that others have built (look on the internet) with juice cans, cookie cans, and the like, you will quickly realize that high-gain antennas for this microwave band (and higher) are really not very difficult to build and are a lot of fun to boot.

With the wide range of microwave equipment available for the amateur, it is a lot of fun experimenting in the SHF (super high frequency) region. We were limited to low power in this particular project, but one can easily use higher power for strictly amateur-related communications. Just be sure not to attempt to look into a transmitting antenna when it is live, particularly when driving it with more than a few milliwatts. I do not know if this type of antenna can really cause RF exposure problems, but it is always better to be safe than sorry.

73, Irwin, WA2NDM

Note

1. For a previous discussion of this technique, see "The Use of Pringles™ Containers to Enhance Network Security," by Prof. Emil Heisseluft, April 2003 *CQ*.

antennas

Discover Ham Satellites with a Cheap Yagi

BY KENT BRITAIN,* WA5VJB

If ham radio satellites have always seemed out of reach for you because of cost or complexity, there's something you should know: If you own a dual-band handheld, you already have the most expensive and complicated part of an introductory satellite station. If you can hold a lightweight antenna, lift it over your head, and move it every couple of minutes, then you also have the getting-started rotator (you!). All that's left is the antenna, and this month's "Cheap Yagi" (photo A) will fill the bill—at a cost of about one $10 bill.

There are several low Earth orbit (LEO) FM satellites you can access with nothing more than a dual-band handheld (more about them later), and handheld dual-band antennas have become quite popular for making QSOs through them. Our version is a combined145-MHz/435-MHz antenna that's only 32 inches long, with two elements on 145 MHz and five elements on 435 MHz. At less than a pound, it's easy to hold up.

One popular commercial handheld satellite antenna mounts the elements for the different bands 90 degrees apart from each other. This is a mechanical, not really an electrical, decision. Crossed elements make the boom shorter, but mounting them flat (photo B) makes the antenna much easier to lay down in the back of a truck or store in the garage. If you mount all the elements in the same plane (which I find easiest), be aware that the last 145-MHz director and the 435-MHz reflector will interact if they're too close together. Space them three inches apart and everything should be fine.

Construction

For the boom, 5/8" × 5/8" or 3/4" × 3/4" wood works well. If you plan to mount the antenna outside for a long time, a coat of spar varnish, spray enamel, or some of that waterproofing stuff you use on wood decks will add years to its life.

For the elements, I used 1/8-inch material. The 435-MHz reflector and directors were from a roll of RadioShack aluminum ground-rod wire. Forty feet will run you about 5 bucks and make a lot of anten-

Photo A– "Cheap Yagi" for working FM "Easysat" satellites.

*1626 Vineyard, Grand Prairie, TX 75052
e-mail: <wa5vjb@cq-amateur-radio.com>

Photo B– Drew, KO4MA, using the Cheap LEO Yagi during a Dayton demonstration. In the background you can see CQ VHF *Satellite Editor Keith Pugh, W5IU, using his Arrow commercial antenna. The Cheap LEO Yagi was at least as effective.*

Photo C– Element splice using hobby tubing … in case you trim off too much and need to lengthen an element.

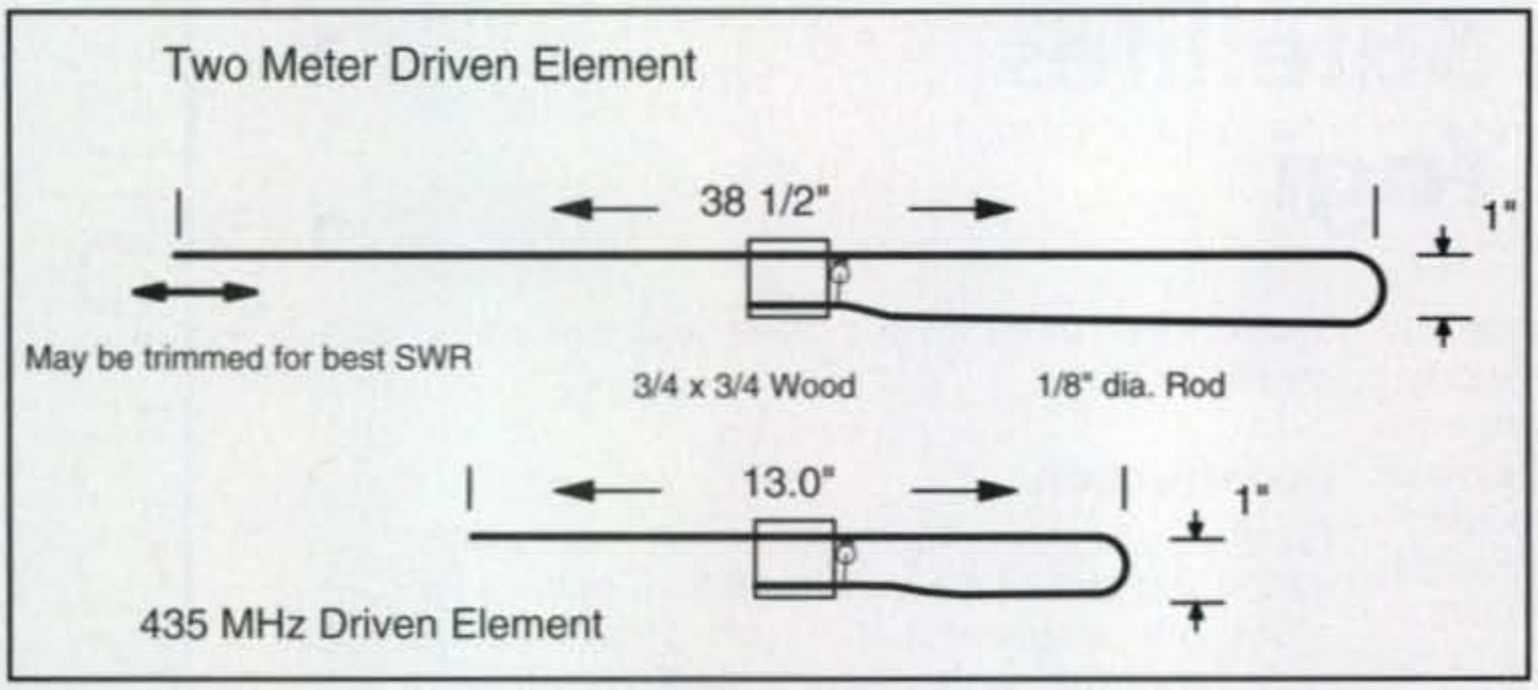

Fig. 1– Dimensions of the driven elements. Note that these dimensions do not include the additional wire needed for the lower portion of the "J."

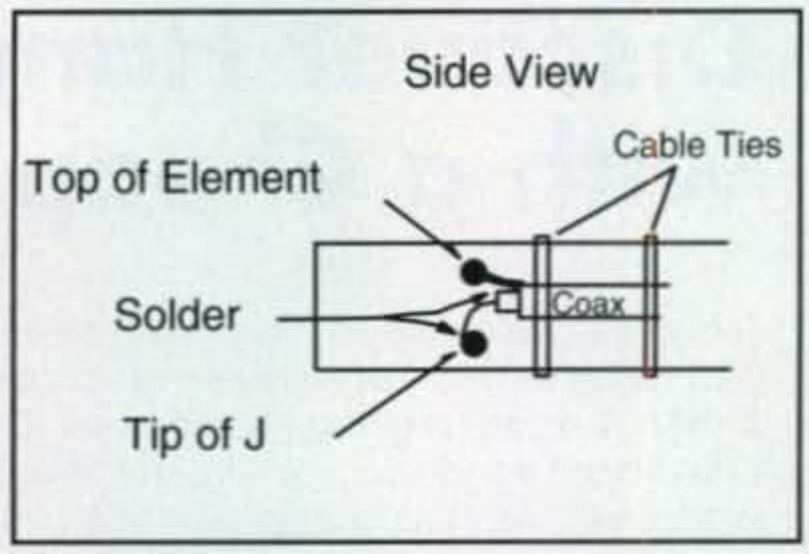

Fig. 2– Attaching the coax to the driven elements.

145 MHz Elements (2)

	Ref	DE*
Length	40.5	38.5
Spacing	0	7.0

435 MHz Elements (5)

	Ref	DE*	D1	D2	D3
Length	13.5	13.0	12.5	12.25	11.75
Spacing	0	2.5	5.25	12.0	18.5

Ref is the reflector, DE is the driven element, and D1, D2, etc., are the directors. All spacings are measured from the reflector element.
**The "J" driven elements extend the length of wire needed for each by approximately 50%. See fig. 1.*

Table I– Antenna dimensions (in inches).

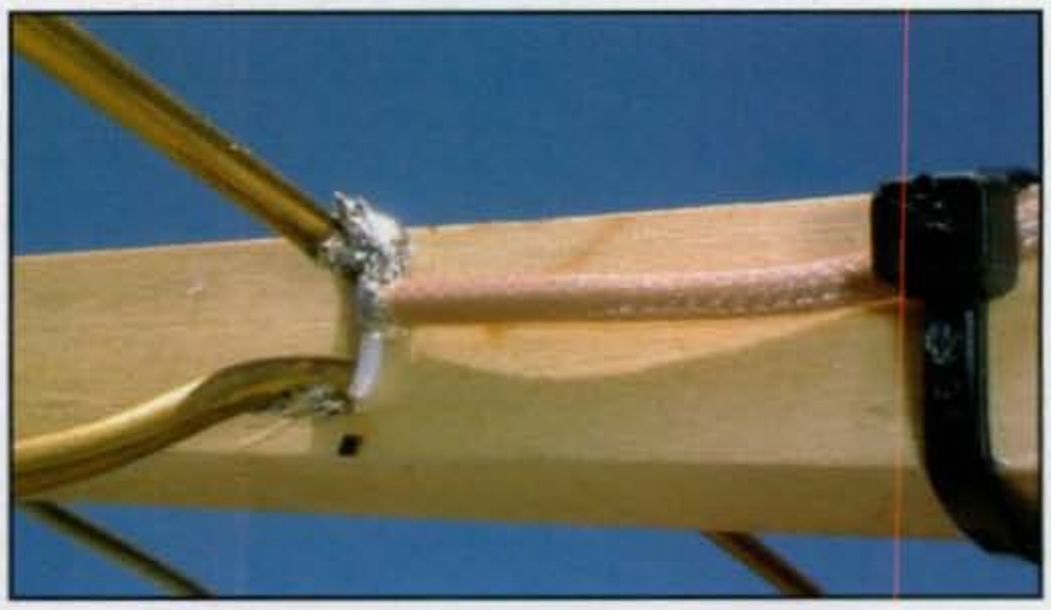

Photo D– Close-up of the coax connections to the driven element.

na elements. However, #10 bare copper wire, bronze welding rods, and hobby tubing all have been used to make elements. If you want to use 3/16-inch diameter elements, cut them .2 inches shorter than the dimensions in the tables to compensate for the thicker material. The 2-meter elements were all made from bronze welding rod. For the driven elements, I like to use something to which I can solder the coax directly, and the coppe- wire or welding rod solders well. See fig. 1 for driven0element dimensions; all other dimensions are in the table.

The welding rod is only 36 inches long. A section of 1/8-inch ID copper or brass hobby tubing makes a good splice. Just slip it on and solder them together. Save some of that hobby tubing. If the antenna ends up too short after trimming, you can solder a piece of tubing onto the end of the driven element and start over (photo C).

I usually hold the elements in place on the boom with a drop of super glue, but silicon glue and even paint have been used to hold the elements in place.

The driven elements are "J"s and they usually bring several comments from people new to "Cheap Yagis." The shield of the coax goes near the center of the *top* of the element (see fig. 2 and photo D). This is a voltage null and directly soldering the coax to the driven element has a lot of advantages. The center conductor of the coax goes to the tip of the J, so you can think of this driven element as three fourths of a folded dipole or a gamma match with no capacitor.

In free space, the J driven element has about a 150-ohm impedance. As other elements are added, they load down the impedance of the driven element. If the antenna has relatively wide element spacing, then a direct match to 75 ohms is possible. Bring in the reflector and directors a little closer, then you have a direct match to 50 ohms. Therefore, the impedance matching is the length and spacing of the other elements. Just build the antenna to the dimensions, solder on the coax, and start talking. No tuning required.

Band Splitter

The band splitter consists of a 250-MHz high-pass filter and a 250-MHz low-

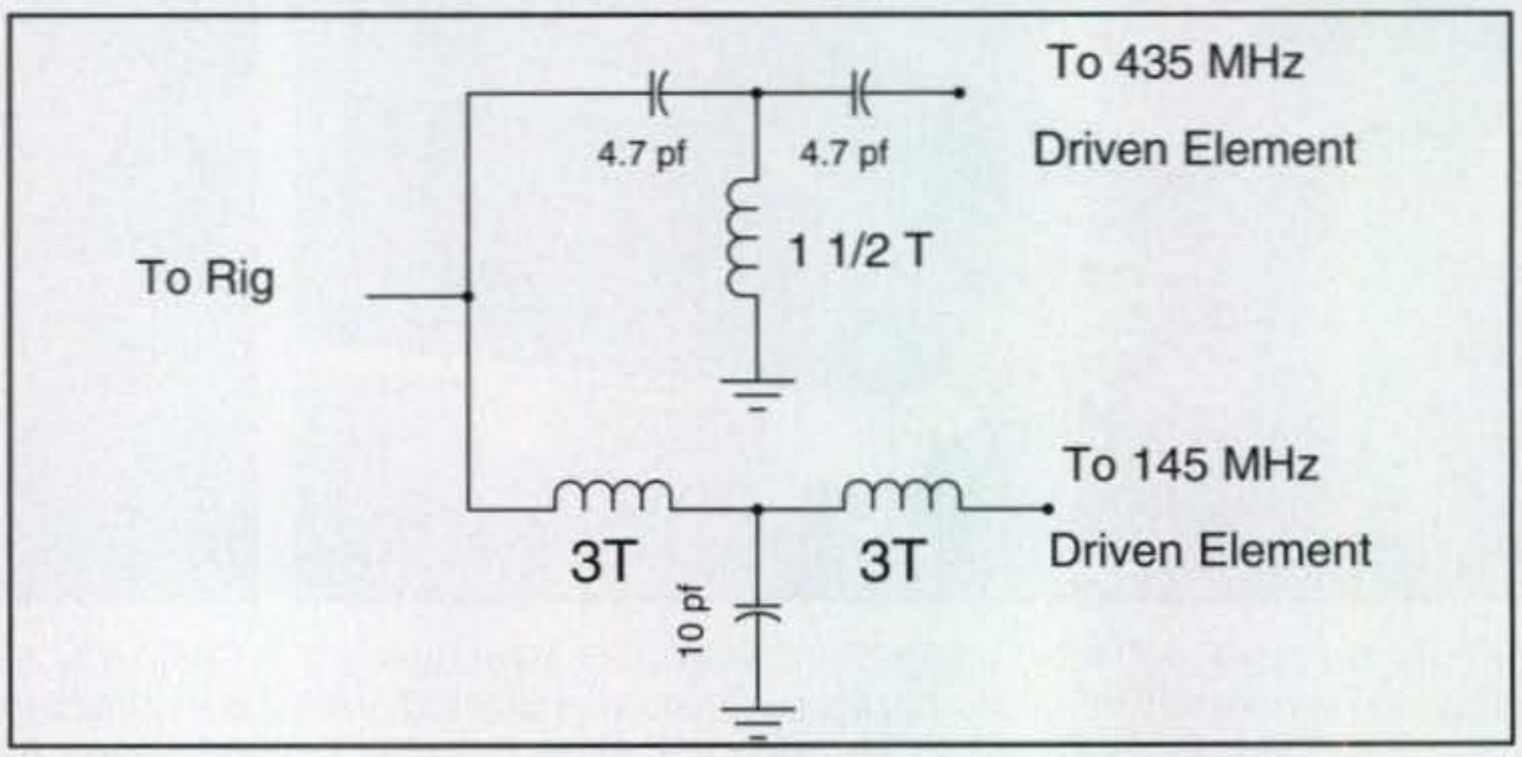

Fig. 3– Schematic of the band splitter.

Photo E– 145/435 MHz band splitter.

Photo F– Winding the band splitter coils.

pass filter connected together (see fig. 3 and photo E). This doesn't have to be very complex, or even very accurate. As long as the filters cut off somewhere between 200 and 400 MHz, they will work fine. If the coils get squished, just bend them kind of back in shape, and go for it. This one is built cheap, just out in the air on a piece of PC board. You can build the splitter into a box if you like, with connectors and all, but it's not going to change its performance. Remember, we are not trying to filter off harmonics, just make the 2-meter energy go to the 2-meter antenna, and the 435-MHz signals go to the 435-MHz antenna. This band splitter even makes a good project if you want to use two other 145/435-MHz antennas.

The parts list for the splitter is short and, of course, cheap:

435 high pass: Two 4.7-pF capacitors, one coil of 1 1/2 turns #18 or #20 wire wound on a pencil (see photo F).

145-MHz low pass: One 10-pF capacitor, two (2) coils, each 3 turns #18 or #20 wire on a pencil.

(You're too late. I have already been asked if it needs to be a #2 or a #3 pencil. For the record, I wound my coils on a red grading pencil. For those of you with a more mature sense of humor, just about all wood pencils make a .3-inch coil form.)

The length of the coax between the splitter and the antenna is not critical. You want to keep the coax as short as practical, but its exact length is not important, nor are exact capacitor values. Got a box of 4.7-pF caps? You can use two of them (in parallel) instead of the 10 pF. Regardless, be sure to keep those leads very short. I used Teflon® coax on my splitter, by the way, because

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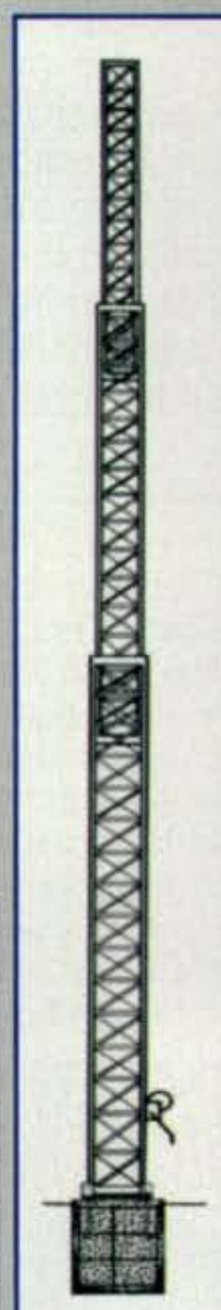

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TX-472	72'	22'8"	1040	$4,481	$3,689
TX-472MDP	72'	22'8"	1210	$7,211	$5,929
TX-489MDPL	89'	23'4"	1800	$11,692	$9,599

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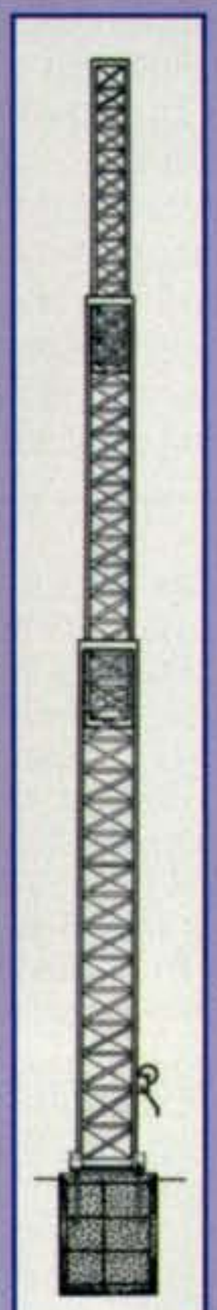

- Heavy duty, handles 44.7 square feet of antenna load at 50 MPH, 35 square feet at 70 MPH.
- All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.
- MDPL models include motor drive
- Options include coax arms, raising fixtures, masts, motor drives, and more!

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HDX-555	55'	22'	870	$4,093	$3,379
HDX-572MDPL	72'	22'8"	1600	$10,719	$8,769
HDX-589MDPL	89'	23'8"	2440	$14,031	$11,499
HDX-689MDPL	89'	23'8"	3450	$27,104	$22,199
HDX-5106MDPL	106'	24'8"	3700	$29,495	$23,799

MA SERIES CRANK-UP MASTS

- Handles up to 22 square feet of antenna load. (See chart below)
- MDP models include motor drive.
- All models supllied with anchor bolts, load-actuated hand winch, and house bracket.
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MAST MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	50 MPH (sq. ft.)	70 MPH (sq. ft.)	LIST PRICE	SALE PRICE
MA-40	40'	21'6"	242	16.5	6.8	$1,569	$1,289
MA-550	55'	22'1"	435	22	9	$2,427	$1,999
MA-550MDP	55'	22'1"	620	22	9	$4,639	$3,799
MA-770	71'	22'10"	645	15.5	5.5	$4,001	$3,279
MA-770MDP	71'	22'10"	830	15.5	5.5	$6,329	$5,149
MA-850MDP	85'	23'6"	1128	15.3	6.3	$8,531	$5,949

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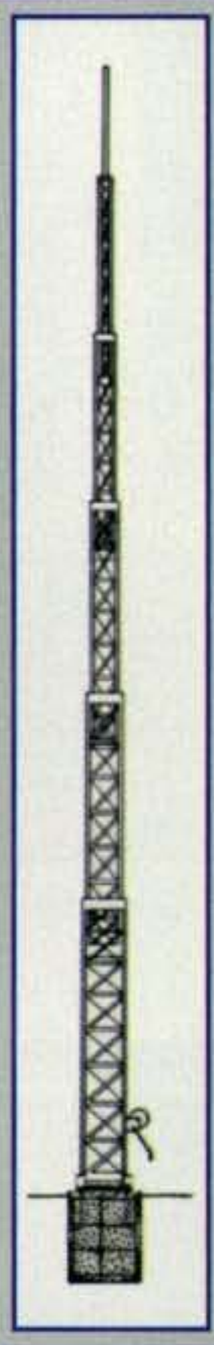

- Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.
- Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.
- All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8' steel mast, top plate, and rotor plate.
- Options include coax arms, raising fixtures, motor drives, thrust bearing, remote control panel, and more!

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TMM SERIES COMPACT CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
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TMM-433HD	33'	11'4"	400	$2,550	$2,089
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it solders so much more easily than foam RG-58.

Power Handling

Power handling of this band splitter depends almost entirely on your caps. With 50-volt caps, 20 watts is about your limit. Dig up some 1-kV caps, and the coax will probably melt first as you warm up that 4CX250 amplifier. (Just kidding—*do not* use high power to operate these satellites!)

Tuning It Up

For the ultimate in performance connect your coax to just the 2-meter portion and trim the free end of the J for best SWR for your favorite LEO uplink frequency. Then connect the coax to just the 435-MHz portion and again trim the free end of the element for best SWR. Now install the band splitter and this time tweak the coil spacing for best SWR at your spot frequencies. You have now gotten the last .1 dB out of the antenna.

For everyone else, just build the antenna to the dimensions and the SWR will be under 2:1 on both frequencies. Just build it and talk. The design is pretty foolproof.

Taking Your New Antenna Outside

There are three ways the antenna can be used. If you have a rig that will operate crossband duplex, then you can transmit and listen to your return signal at the same time. (There's a little delay that can be a little disconcerting until you get used to it.) Rigs such as the ICOM W32A, the Yaesu FT-530, or the Kenwood D7 are great for working satellites this way. You can actually hear how well you're getting into the bird.

With rigs such as the Yaesu FT-817 or the ICOM 706 Mk II, you can work the birds in simplex mode. That is, you talk, then listen, as on most repeaters. Also, just about any dual-band talkie can be used. If you want to use two different rigs for 145 and 435 MHz, then eliminate the band splitter and solder on a separate piece of coax for each band. Now your transmitter can be most any 2-meter rig and the receiver can be most any 440-MHz rig or even a scanner.

The Birds

There are two satellites most commonly used with FM. AO-51 uses 145.92 MHz up with a 67-Hz tone, and 435.300 MHz back down (receive frequencies vary with Doppler shift; see resources below). SO-50 is a bit more complex with the control tones, but uses 145.85 MHz up and 436.795 MHz back down. Plus, even after all these years, AO-27 (launched in 1993) is often on as well. For more information on frequencies and times be sure to visit <www. amsat.org>. The Frequently Asked Questions at <http://www.amsat.org/amsat-new/information/faqs/ao27so50faq.php> are very good for newcomers to satellite operations. I know it's against ham tradition, but read them before trying to use one of the satellites.

Now you can have fun with these LEO satellites for less than $10. My column in the summer issue of *CQ VHF* is an expanded version of this one, and offers a variety of other options for different antenna configurations. You can also find more information and variations on my website at <www.wa5vjb.com/Reference>. Please keep those e-mails coming. I'm always looking for antenna topics.

73, Kent, WA5VJB

Neat Antennas

I am always a sucker for neat antennas at fleamarkets and surplus stores. The ones in photos G and H are external antennas for a cell phone. I don't know how old they are, but it has been a long time since I have seen a cell phone with a TNC connector!

Opening up the antenna was even more interesting. It's a J-pole etched on a PC board. First time I've seen that. I am sure there was a good reason for twisting the stub over to the side like that, but I haven't figured it out as yet. If you want to make your own PCB J-pole, start with the usual free-space calculations for the length of the element and the stub. Now multiply those dimensions by 60%. This allows for the effects of the fiberglas PCB and should get you pretty close to your design frequency. I think you'll find 800 MHz or so is the lowest practical frequency unless you have some very large pieces of PC board. It might work well on that 2.4-GHz project.

Photo G– A couple of really neat cell phone antennas. I have no idea how old they are...

Photo H– Close-up of the PCB J-pole antenna, the first time I've ever seen a J-pole etched onto a PC board.

how it works

Support Items for Wire Antennas

BY DAVE INGRAM,* K4TWJ

As you may recall, our previous "How It Works" column discussed a subject of continued interest to radio amateurs of all license classes—dipoles and doublets. There is a high probability it also spun off some additional questions on wire antennas in general. We thus continue this time with a closer look at popular varieties of wires, support ropes, and transmission lines. The following information is typical of the "fine details" and personal opinions a helping Elmer would share with a new amateur getting started in HF action. Some (many?) newer amateurs do not have an Elmer, however. Hopefully I can help fill that void. Let's begin with a look at the main item utilized in all wire antennas—the wire.

Types of Wire

One of the most common questions asked by newer and seasoned amateurs alike is what wire to use for an antenna. Should it be copper or aluminum, solid or stranded, thick or thin, bare or insulated? I often say "all of the above," as they all work fine. However, each type has its own special characteristics and benefits.

Aluminum is used in the tubing for beams and verticals, while copper exhibits good conductivity at a reasonable price and is thus favored for wire antennas (it is "classic radio wire!"). Likewise, stranded wire is more flexible and adapts better to movement or swinging in the wind than solid wire and is thus preferred for antennas. You can observe this fact first hand by comparing how much "back and forth movement" causes solid wire to break, compared to stranded wire.

We should also note the more strands for a particular size or gauge of wire, the greater its flexibility (plus the smaller the wire size, the higher its gauge number). As an example, a length of 7-strand 13-gauge copper wire is almost the same diameter or thickness as, but not as flexible as, 168 strand number 12 or 14 copper wire. How can the approximately same size wire be comprised of seven strands in one case and 168 strands in another case? Each of the seven strands is larger in size (a lower gauge number), whereas each of the 168 strands is much smaller in size (a higher gauge number).

The choice of thick or thin wire is, to a large extent, influenced by your particular needs and preference. If you are installing a dipole up to around 70 feet long without a center/feedpoint support—so the full weight of the coax stresses the antenna—number 14 or 12 wire is a good minimum size or gauge to consider. If you need more strength for a particular wire size, consider using copper-clad or copperweld wire rather than hard-drawn or straight copper wire. That's because copperweld wire is comprised of a steel core with a copper coating. It works fine because RF energy travels mainly along the outer section of a wire (this is the "skin effect" you studied when preparing for your license exam). The drawback is a steel core makes the wire stiff, springy, and tough as nails. If you uncoil number 12 or 14 solid copperweld wire from a roll or let one end loose while making an antenna, look out, as it can fly back towards its original form with incredible ferocity and inflict some vicious cuts—nice wire, but hard to handle. Hard copper is more manageable. Just do not try to pull support trees together with it. Give it some slack.

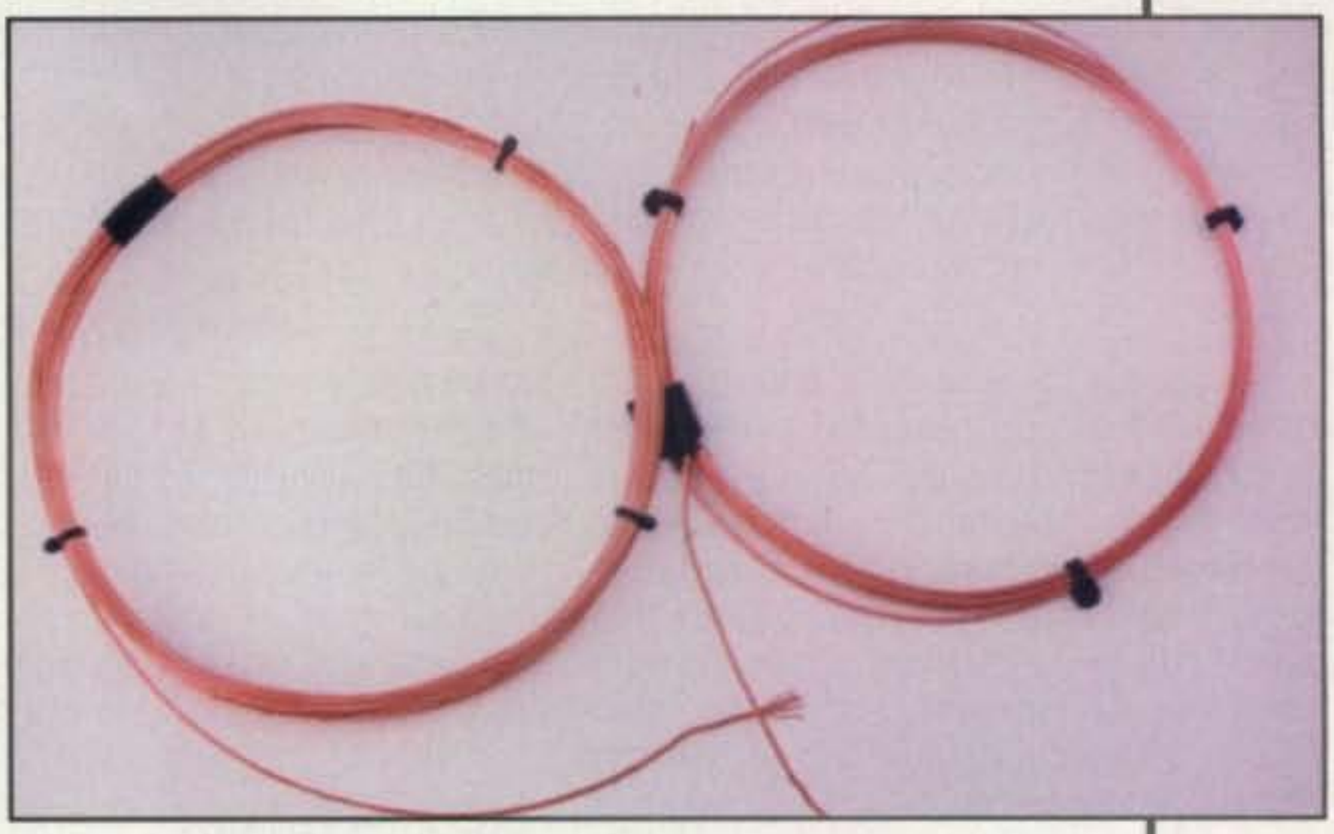

Photo 1– Stranded copper wire is an all-time favorite for making antennas. It is affordable, works well, turns black after a few months of outdoor use, and then continues to work well. It is available in two popular styles: hard copper that is easy to handle (left), and copper-clad steel or copperweld that is stiff and quite strong for its size (right).

Photo 2– Notice the difference between 7-strand hard copper wire on the left and Flexweave 168-strand hard copper wire on the right. Numerous strands of finer wire make Flexweave as strong as copper wire, but as flexible as string. It is available from <www.radioworks.com>.

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

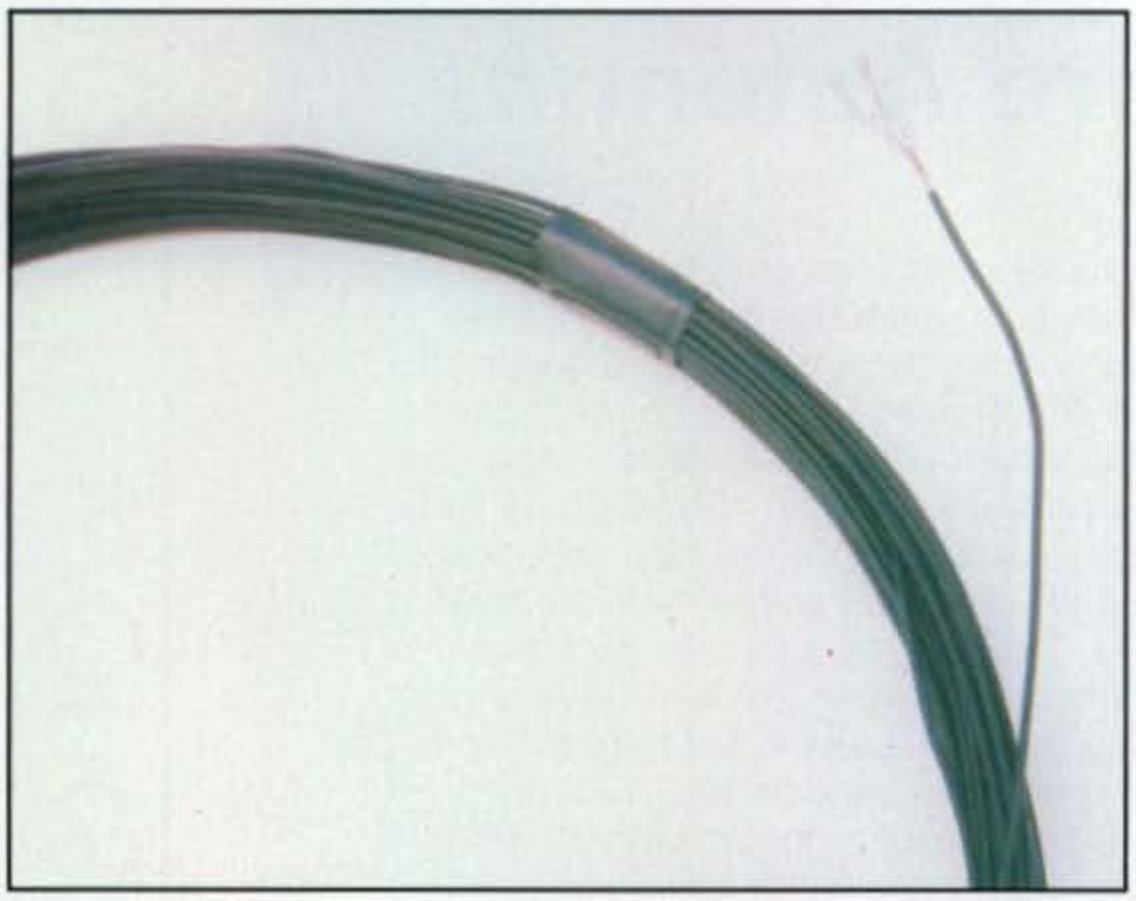

Photo 3– Here is the ideal wire for making a hidden antenna. It is very thin (number 26) and is comprised of 19 tiny strands of copperweld with a smooth black jacket or insulation. The result is a quite flexible and remarkably strong wire. It is called Variflex, and it is available from The Radio Works. (See text for details)

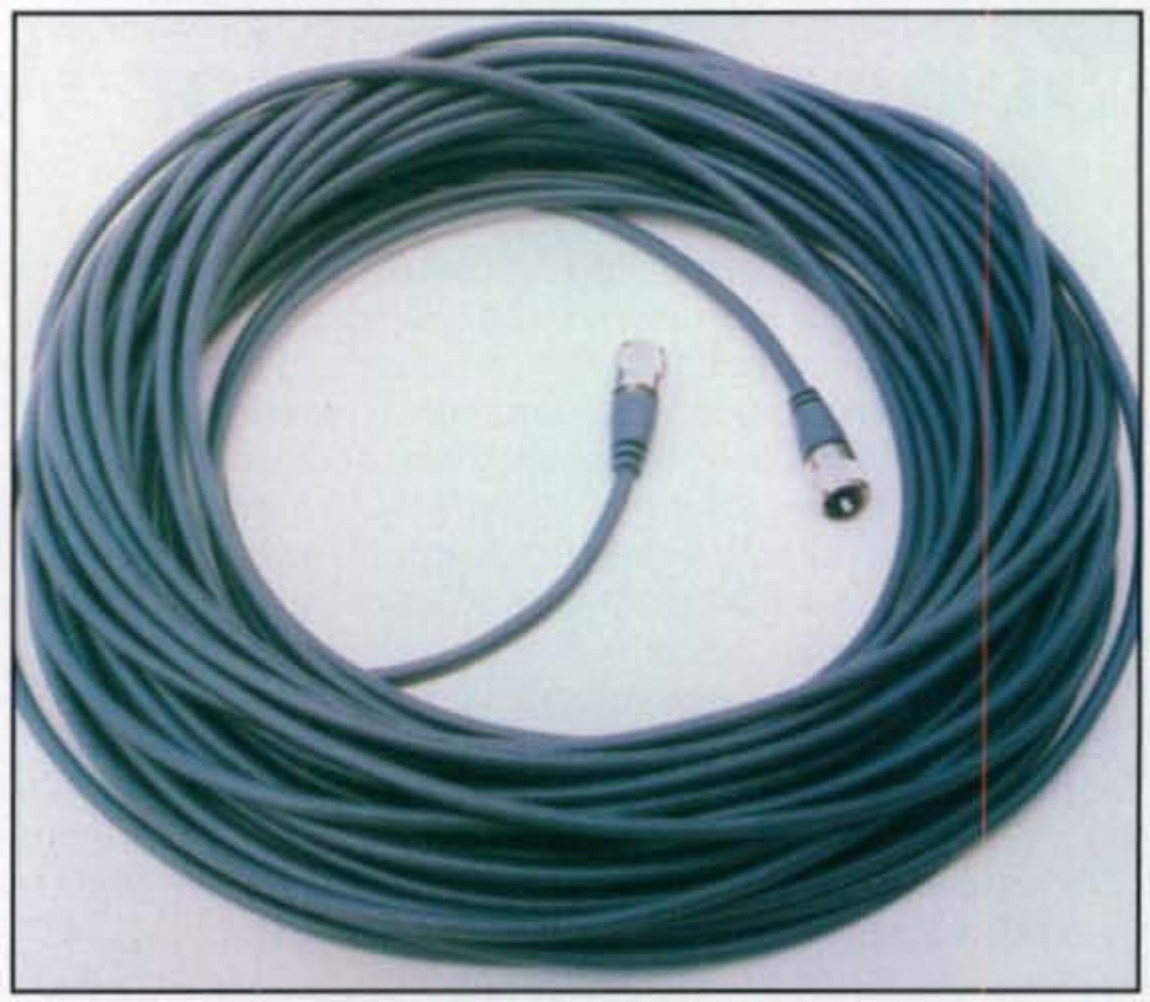

Photo 5– Concerned about soldering coax to connectors so they can survive several years of use and abuse? No problem. Several companies sell cables in various lengths with solid fitting PL-259s pre-installed.

Selection of bare or insulated wire also depends on personal preference and needs (and yes, RF energy will pass right through a wire's insulation with no problem). Insulation on wire may cause a very slight change in velocity factor that can alter an antenna's overall length roughly one percent, but again think back to your days of theory study. Proximity to nearby objects and angle of wires (like an inverted-Vee as compared to a flat-top dipole, for example) also affect an antenna's length, often more than one percent. That's why we cut antennas slightly longer than formulas calculate—so there is some slack/extra for wrapping around end insulators and pruning for lowest SWR. If insulated wire is blue-gray in color, it has another advantage: It disappears against the sky so curious neighbors do not notice it.

Support Ropes

If you have ever had a favorite antenna unexpectedly fall from a high tree limb, you know the benefits of using high-quality support rope—and replacing it before it deteriorates from snow, ice, sun, and snags on tree limbs. You should also consider that plain rope, even the good-looking white variety or (heaven forbid!) plastic clothesline, in no way compares to authentic "antenna rope." It may be slightly more expensive, but it is worth the cost.

One of the top all-around types of rope for antennas is Dacron®. It is strong, has good resistance to ultraviolet rays from the sun, and exhibits mild elasticity to absorb sudden yanks rather than breaking due to high winds.

Next in line is Nylon. It is slightly stronger and exhibits more elasticity than Dacron, but it is less resistant to ultraviolet energy and thus has a slightly shorter lifespan.

Another popular antenna rope is Kevlar®. It is stronger and more ultraviolet resistant than Dacron or Nylon, but it does not exhibit any elasticity and will break before stretching, so it should be allowed some slack when supporting wire antennas. Various ropes are also available in regular and heavy-duty or mil-spec versions, and the latter is always preferable. No red-blooded radio amateur wants to be caught with wire antennas down due to low-grade rope, especially during an emergency.

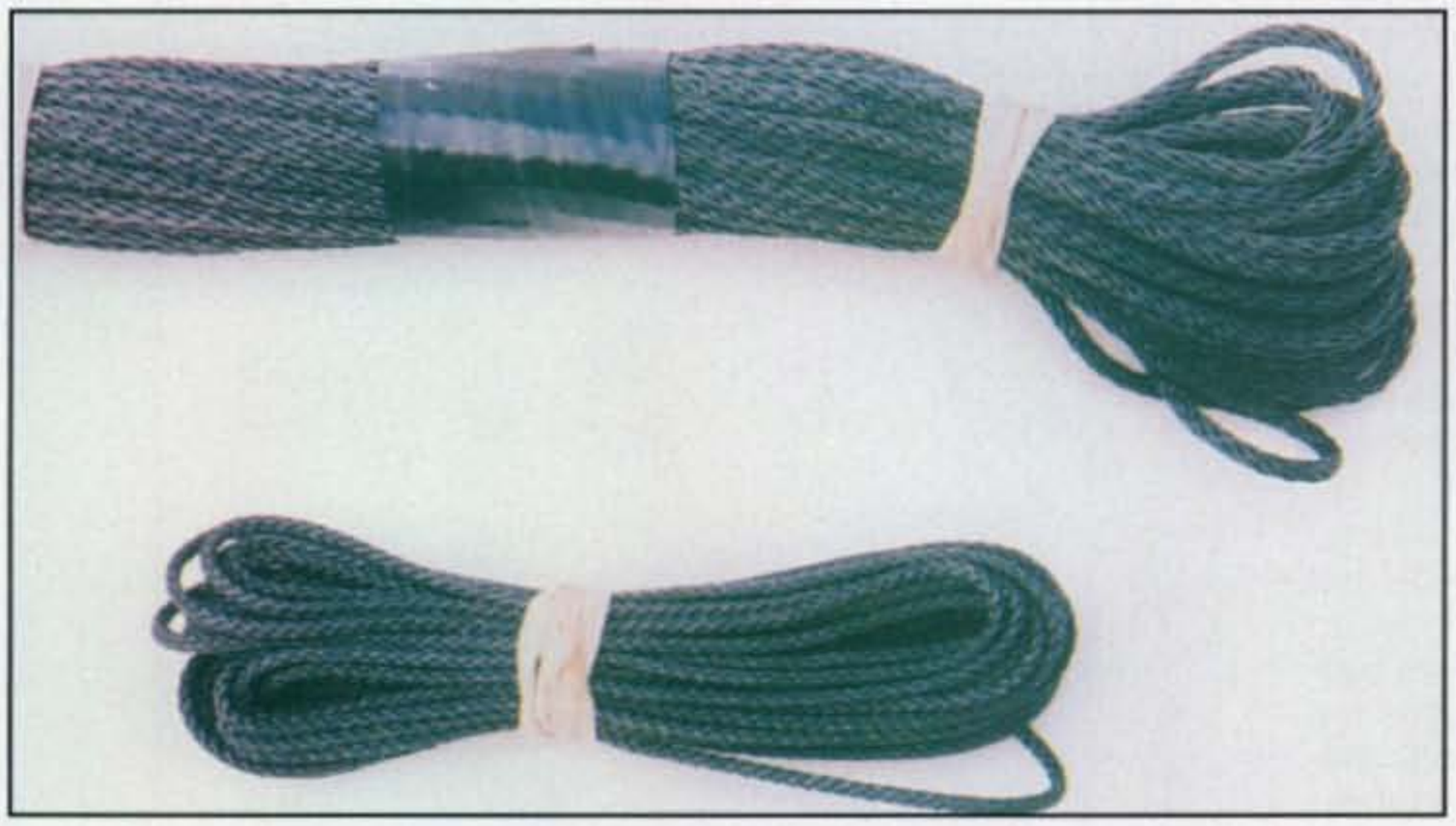

Photo 4– The rope used to support an antenna is just as important as the type of wire selected. Samples shown here are Dacron® (top), which exhibits good UV immunity and also tends to stretch rather than break when snapped by wind, and Kevlar® (bottom), which is stronger, tougher, and does not stretch. Both types are significantly better than any generic-type rope. Samples shown courtesy of The Radio Works.

Transmission Lines

As discussed in our previous "How It Works" column, the usual transmission

Photo 6– Sealing antenna connections from the weather is vitally important for long life, and nothing does it better than hand-moldable Coax Seal©. It is available in small thin rolls or large wide rolls from amateur radio dealers nationwide. Don't install an antenna without it!

line for dipoles (and other 50-ohm antennas) is coax cable, and the usual transmission line for doublets is 450-ohm ladder line. The coax cable market has grown so large that any amateur—new or old—can easily be confused by the varieties. We can simplify it to the basic facts, however, and then you can expand from that point as desired.

The classic 50-ohm cables of RG-58 (small size) and RG-8 (large size) are presently giving way to RG-8X (small size) and RG-213 (large size), which are low-loss equivalents. Both RG-8X and RG-213 are quite suitable for most HF applications (in other words, cable runs up to 100 or 150 feet without noticeable signal loss). If longer cable runs are necessary, consider using ultra-low-loss cables such as 9913 (or similar special nomenclatures). Confusing? Just be sure you select a top-grade inner dielectric, dense shield, and highly weather-resistant outer-jacket type cable (often described as "marine grade" or "mil-spec" quality). I hesitate to recommend double-shield cable and/or "hard line" cables here, as they can be difficult to work with and can also require special connectors that are challenging to install. Remember, too, the weight of coax pulling down against its connector adds extra stress to solder joints and can cause them to fail over time. If you feel uncomfortable trying to overcome that handicap, remember antenna companies such as The Radio Works (<www.radioworks.com>; 1-800-280-8327) can supply cables of various lengths with PL-259 connectors preinstalled.

Some amateurs may scoff at using ladder-line feed rather than coax, as it requires using a tuner with balanced output, it can also pick up and or radiate signals, and it should be spaced away from metal objects or supports. Factually speaking, however, it is the lowest loss type of transmission line and is ideal for multi-band doublets. The insulated type with little "window cutouts" is an all-time favorite. If you have a choice of solid or stranded wire in the ladder line, remember stranded wire adapts better to movement without breaking.

Wrap Up

Probably the most weather-sensitive point in an antenna is its feed point—right where coax typically meets wires or conductors (unless it's a beam on a tall tower, and then those totally out-of-reach traps always go kaput!). Wrapping up . . . err, sealing . . . that connection is vitally important for long antenna life, and many folks even consider weatherproofing connections an art. I agree, as tightly wrapping a connection with even top-grade "weatherproof" electrical tape is inadequate. Capillary action will draw any dew or moisture seeping into a cable end along the cable's length and ruin it in short order.

What to do? As a minimum acceptable measure, I suggest first tightly wrapping the connection with electrical tape, and then applying a full and continuous wrap of Coax Seal© over the electrical tape. I leave a corner of the electrical tape accessible to provide later access to the connection, and then hand-mold the Coax Seal to form a watertight seal. Jim Thompson of The Radio Works goes one step further by wrapping the overall Coax Sealed area in cold-shrink tape. It forms a totally weatherproof seal that lasts for years.

That concludes this month's discussion, friends, and we sincerely hope you will find our helping Elmer notes useful for many years to come. We also hope that someday in the future you will pass along these tips with your own "acquired through hands-on experience" notes to future generation amateurs. I always say it is better to expand on proven-useful facts rather than continuously starting from ground zero or "reinventing the wheel." Hopefully, you agree.

73, Dave, K4TWJ

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Too Much Technology?

I was doing my laundry one Sunday morning in May. The laundromat's wide-screen television set was playing an automobile race in the background. It was Memorial Day weekend, and the 90th running of the Indianapolis ("Indy") 500. I was working on some office paperwork, so I was only half-listening to the goings-on of the race, and would look up at the screen mostly to watch anything related to one of my favorite race car drivers, Danica Patrick.

While I was plowing through my paperwork, though, something from the two-way radio "cockpit audio" feed between one of the drivers and his pit crew caught my attention. The driver said something like, "the dashboard is not 'lighting up.'"

The announcer explained that modern-day race cars are equipped with computer-controlling and computer-reporting telemetry on all aspects of the racecar, from the engine to chassis and everything in-between. A radio unit transmits the data to the engineers in the pits, and dashboard indicators for the driver include information on engine condition, fuel levels, and more. The computer also tells the driver when to shift the transmission to maximize speed and performance.

For a while, the driver seemed to be distracted or confused as he struggled to figure out what was wrong with the instruments on the dashboard. Then everything seemed to be okay, and the driver regained his focus and concentration on his job: Driving the car to finish the race.

The announcer noticed this and reported that he had to ignore the non-functioning dashboard indicators and drive the old-fashioned way—using the seat of his pants.

Turning back to our ham shack now, a radio's front panel is like a racing car's dashboard. You have meters that tell you about the status of your radio, and switches and knobs to control what the radio does. In many radios these days, a microprocessor does some of the thinking for you, and you are "not allowed" to adjust something, which is sometimes a good thing and sometimes a bad thing. This is sort of like the HAL9000 computer in the 1968 movie, "2001: A Space Odyssey."

These days, when just about everything is microprocessor-controlled, including your modern-day ham radio set, it is easy to get confused or frustrated with the operation of the unit. Some

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Photo A– The 220-MHz FM rig on the left has microprocessor-control, lots of memory channels, and multiple-function keys and knobs—sometimes good, sometimes bad. On the right, the 220-MHz FM rig from the 1970s is an example of a perhaps long-forgotten concept: A radio that "just works"—not much more than a power switch, a volume control, a squelch control, and a tuning knob. Would you really want one of those today?

engineers design something they think will be useful to everyone, and yet it really isn't possible to create something for everybody. "One size does not fit all."

Today's radios have multiple-function controls, in which a single knob or button actually adjusts more than one function. Older radios were much simpler, with a single knob actuating a single function (photo A).

It's a Matter of Control

A co-worker at the office says that as you go through life, you are "either in control or you are being controlled." He likes to use this phrase when he describes the problems he encounters with the machines or people he works with. However, this statement also makes a lot of sense when dealing with a computer-controlled ham radio set.

One way to cope with these difficult features is to set everything to the factory "default" and then ignore a particular feature until you have a need for it. Years ago, I had one of those small and fancy dual-band (144 MHz/450 MHz) handie-talkies from a major manufacturer. I chose that particular model because the slick brochure and advertisements told everyone how many features this little device was capable of performing, and how compact the unit was—but the real decision-maker was the discount coupon.

Unfortunately, this turned into a big mistake for me, since I really was not ready at the time for a complicated, feature-laden unit. The programming instructions were so complicated, with multiple button-press combinations, that I just gave up after a few hours. I reset the radio (the equivalent of slapping it on the head) and started over several times. I decided that all I wanted was a "radio that just works" and traded in that radio for a simpler ("cheaper") unit that satisfied my radio needs back then.

In another instance, a friend loaned his radio to another ham for use during a contest. When the radio was returned, my friend re-installed the unit in his truck and turned it on. Immediately, he was concerned that "something broke" and wondered how his radio got broken by someone else using it. After fiddling with a number of knobs, we discovered that a function switch (which the radio's owner never used) was put into a different position. This was a case in which a complex radio "changed personality" when it was used by another operator and became "un-friendly" to the normal user.

Sometimes a radio is equipped with so many features that you can get into trouble. Now this does not mean that you will break anything; it just means that you can configure or program your radio so much that it becomes nearly non-operational. For example, one modern radio requires you to select the microphone gain from a computer-controlled "menu function." If you adjust it carefully, it can make a big difference in how your transmitted signal and your voice sound at the receiving station. Again, this could be a good thing or it could be a bad thing, since the radio has enough adjustment range for the transmitted audio to go from very weak and soft to harsh and distorted—both very bad things. Adjustments must be made in a certain way to get your transmitted audio to sound somewhere in the middle for the most effectiveness. However, the "real" setting must be found by actually putting a signal on the air and getting reports from other stations you talk to. No computer is going

to be able to tell you what you sound like to the station on the other side of the world, or right next door.

On the receiver side of things, the interference-fighting controls are nothing short of phenomenal. Features such as digital signal processing (DSP) are fairly new, and probably were not even imagined to be available in a ham radio set a few years ago. Now DSP is available as standard equipment on many models. Other features, such as crystal filters, may have been available decades ago, but are improved with microprocessor enhancements.

Help is Available

While it is true that after a while operating a particular radio becomes second nature, and your fingers can really "fly" as you manipulate the controls to achieve a desired result, sometimes this can also change. A good example of this is when there is some "pressure to perform," like when operating a radio at a public demonstration or during a communications drill, or fighting to work a rare station in a contest. In this case, you should just take a deep breath and reset your mind, rather than reset the computer in your radio.

One of the great things about ham radio is its built-in networking feature. No, not the CAT5 computer-cable kind of networking. I am talking about making friends using ham radio as the common bond. When you are stuck and are not sure how to beat the computer, talk to someone else who has gone through the same experience of learning that same model. If you do want to turn to your computer to help you learn how to use your radio, find a suitable website using your favorite search engine. Plug in some key words such as "how to program frequency into XX brand and YYY model." Also available are simplified "user guides" that I hear are pretty good. Check the ads in *CQ* magazine for these useful guides.

What Do You Want?

All of these microprocessor-controlled radio trends are a good thing, if you are interested in maximum performance with the maximum radio technology being offered today. However, when deciding to purchase a unit like this, you must think about what you really want. As beginners, do you want to get the best unit on the market today and "grow into" the unit as your interests and skills using a radio improve? How soon will this latest unit be discontinued with another, better one taking its place? Will you still be happy with your purchase then? Or do you want to start with a simpler unit that "just works"?

The best way to think about this is to examine yourself to see what you really want to do in the most general terms. How do you spend your money on other interests? Think about the car you drive right now. How did you decide which make and model to buy? How did you choose the available options? What color did you order? Did your spouse or significant other help you with your decision? Most often, such choices are based on a combination of desired features, available budget, and other individual factors. The same applies to ham radio purchases.

Today's micro-processor-controlled radios are amazing examples of communications technology. In terms of dollars-per-feature, we have an incredible value over radios that were available only a few years ago. With all this technology, though, it is easy to get overwhelmed in how to "work the knobs." Always remember, however, we are either "in control" or we are "being controlled." We are smarter than these machines; let's remember that as we take control. 73, Wayne KH6WZ

what's new

BY KARL T. THURBER, JR.,* W8FX

Connector System, Noise Reduction Headphone, Power Inverter, and more

This month, we again shine *CQ*'s bright product spotlight on a wide variety of accessories for the radio shack; antennas and antenna accessories; software; and radio books for your bookshelf, taking a close look at "what's new" in our hobby.

Accessories for the Shack

Anderson Power Products® Powerpole® 15/45 in Standard and Fingerproof Versions. Anderson Power Products (APP), a leader in interconnect solutions, offers its versatile Powerpole 15/45 Connector. The Powerpole is a genderless connector system that provides a simple, low-cost solution for power interconnection.

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e-mail: <w8fx@cq-amateur-radio.com>

The APP Powerpole 15/45's interchangeable genderless design allows for quick and easy assembly while minimizing the number of parts stocked. Molded dovetails secure connectors into keyed assemblies, thereby preventing misconnection with a similar configuration. Color modular housings provide useful visual identification for the proper mating connector.

APP's Powerpole 15/45 Finger Proof Connector (see photo A) minimizes potential finger access when the connector is unmated and energized.

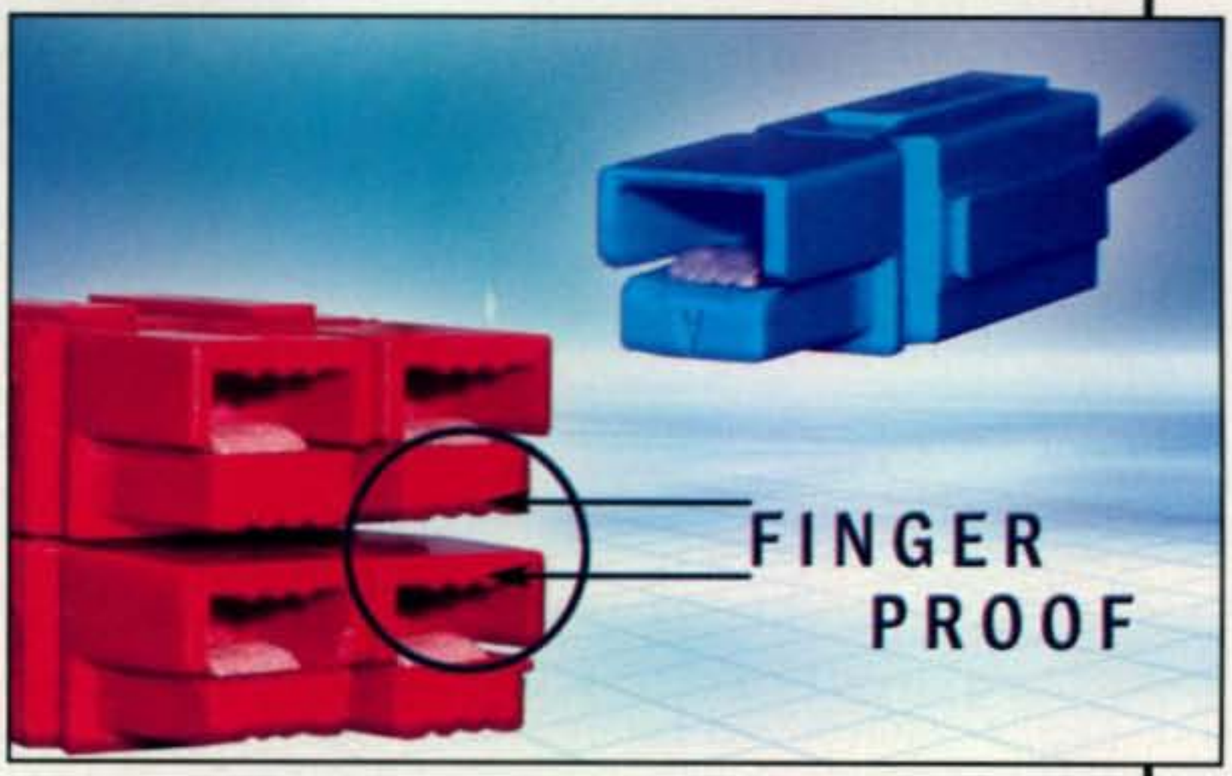


Photo A– APP's Powerpole® 15/45 Finger Proof Connector minimizes potential finger access when the connector is unmated and energized. This feature was designed for user safety in applications in which access to the energized connector is not otherwise protected. (Photo courtesy of APP) →

Fig. 1– The weary traveler can enjoy a comfortable trip with NoiseBuster® noise-canceling headphone from Pro Tech Communications. Check out the specs on its website for full details: visit <http://www.protechcommunications.com> or <http://www.noisebuster.net>. (Image from the Pro Tech Communications website)

This innovative fingerproof feature was designed specifically for user safety in applications in which access to the energized connector is not otherwise protected. Also, the Powerpole's flat-wiping contact system reduces contact resistance at high currents, while the wiping action cleans the contact surface during connection and disconnection.

Both the standard Powerpole 15/45 connector and the fingerproof version meet industry accessibility protection requirements, and they are rated at 15, 30, and 45 amps for 600 volts continuous AC or DC operation. Wire sizes range from #10 to #20 AWG. Low-detent contacts also are available for applications requiring low insertion/withdrawal force.

For further information, contact Anderson Power Products, 13 Pratts Junction Road, P.O. Box 579, Sterling, MA 01564-0579 (telephone 978-422-3600; e-mail: <customerservice @andersonpower.com>; or on the web: <http://www.andersonpower.com>).

NoiseBuster NB-FX Active Noise Reduction Headphone. Now, the weary traveler can enjoy a comfortable trip with the NoiseBuster® noise-canceling headphone from Pro Tech Communications (see fig. 1). NoiseBuster reportedly has received excellent product reviews of its $69 list-price Model NB-FX headphone, versus much higher priced competition.

The firm introduced one of the first noise-canceling headphones to the consumer audio market in 1994, the NoiseBuster technology having been developed by leading "anti-noise" engineers. The latest version, said to be the best one yet, includes the most recent technological innovations packaged in a headphone design that is both comfortable and versatile.

According to the firm, no other noise reduction headphone it has tested can match the level of active noise-reduction performance delivered by NoiseBuster. The product reportedly cancels an unheard-of 18 dB of noise across an extended frequency range, and the NoiseBuster phone is said to perform more consistently than any other from wearer to wearer.

The noise-canceling headphone delivers high-impact stereo sound. The headphone is comfortable, lightweight, and easy to adjust; foldable for portability and easy storage (travel pouch included); and includes an airplane-seat dual-prong adapter and AAA battery. The headphone features audio play-through with or without noise reduction.

As far as headphone operation is concerned, the NoiseBuster unit uses a microphone in the earcup to listen

Photo B– Cobra's CPI 2550 12-volt DC to 115-VAC Power Inverter offers 2500 watts continuous power handling, and 5000 watts peak power, with three AC receptacles, an LED volt/amp meter, and remote on/off capability. The unit features include heavy-duty construction and the ability to handle multiple loads. (Photo from the Cobra website)

to the offending noise coming into the ear. Using electronics, the system takes the information from the microphone and uses it to create a noise wave that is identical to, but directly opposite of, the one coming into the ear. The "anti-noise" wave is output through a speaker, also located in the earcup. When the two waves (the offending noise wave and the anti-noise wave) meet, the noise is significantly reduced.

For more information, including detailed specifications, contact Pro Tech Communications, Inc., 4492 Okeechobee Rd., Fort Pierce, FL 34947 (1-800-468-8371; e-mail: <info@protechcom.com>; <http://www.protechcommunications.com> or at <http://www.noisebuster.net>).

Cobra CPI 2550 Power Inverter. Cobra's power inverter product line is said to revolutionize the power inverter marketplace with an unsurpassed combination of power, reliability, and value added features—hence the firm's catchy slogan, "Nothing Comes Close to a Cobra®."

Cobra's new CPI 2550 12-volt DC to 115-VAC Power Inverter (see photo B) offers 2500 watts continuous power handling, and 5000 watts peak power, with three AC receptacles, an LED volt/amp meter, and remote on/off capability. The unit features include heavy-duty construction and the ability to handle multiple loads. Using the CPI 2550, with an

Photo C– Unlike other tuners, the LDG Electronics AT-200PC Automatic Antenna Tuner itself has no buttons or readouts, as can readily be seen in this front view. Its many functions are controlled entirely by a program running on your PC. (Photo courtesy of LDG Electronics)

Photo D– You can install the AT-200PC Automatic Antenna Tuner out of the way, on the floor, or even in another room, interfacing to your PC via a serial or USB cable. The rear view is shown here. (Photo courtesy of LDG Electronics)

input voltage from 10.0 to 14.9 VDC, you can power a wide range of AC appliances, including pumps, can openers, fans, TV sets, recorders, VCRs, heavy-duty tools, and more. The Cobra CPI Power Inverter sells for $329.95.

For more information, contact Cobra Electronics Corporation, 6500 West Cortland St., Chicago, IL 60707 (773-889-8870; e-mail: <productinfo@cobra.com>; on the web: <http://www.cobra.com>).

Antennas and Accessories

AT-200PC Automatic Antenna Tuner from LDG Electronics. LDG Electronics is a St. Leonard, Maryland based amateur radio equipment manufacturer. Its many products are well-known for their high quality, and they are available from distributors in 13 countries throughout the world.

Now you can have a state-of-the-art, high-performance automatic tuner and still run your whole station right from your keyboard and mouse. LDG's new AT-200PC Automatic Antenna Tuner—reportedly the first tuner engineered for USB computer control—is a special version of the popular AT-200Pro, but is designed for PC control. The tuner itself has no buttons or readouts; its many functions are controlled entirely by a program running on your PC. You can install the tuner out of the way, on the floor, or even in another room, interfacing to your PC via a serial or USB cable (photos C and D).

Photo E– Barker & Williamson's new Manpack Broadband Folded Dipole Antenna, together with its Manpack Mast System, provides full HF communications capability in one small, light, rapidly deployable kit. The antenna components ← are shown in this photo. (Photo courtesy B & W)

Photo F– The three-pole B & W Manpack Mast System will hold the antenna at a height of 6 ft. in a flattop configuration. Mast pole sections are a very short 18 inches and are rapidly field assembled with an inner joiner piece by pushing them together. (Photo courtesy B & W)

The tuner allows you to tune without transmitting and automatically tracks your frequency, assuring fast automatic tuning with your computer controlled-rig. The AT-200PC includes flash upgradeable firmware, and it can be connected to your PC with either serial or USB interfaces.

The AT-200PC handles up to 250 watts SSB or CW over the range 1.8 to 30 MHz, and 100 watts on 6 meters; it also features LDG's state-of-the-art, processor-controlled Switched-L tuner. The unit is said to match virtually and rapidly any kind of coax-fed antenna, including Yagis, dipoles, inverted Vees, slopers, and loops.

You also can use the AT-200PC with longwires, random wires, and antennas fed with ladderline with the optional LDG balun. The AT-200PC includes an internal antenna switch, controlled from the PC, so you can select between two antennas. The tuner includes a 10-foot serial cable, USB interface, and power cord. It lists for $259 and is available at ham radio equipment retailers. All LDG products include the new two-year warranty on parts and labor.

Contact LDG Electronics, 1445 Parran Road, St. Leonard, MD 20685 (410-586-2177; e-mail: <ldg@ldgelectronics.com>; or on the web: <http://www.ldgelectronics.com>).

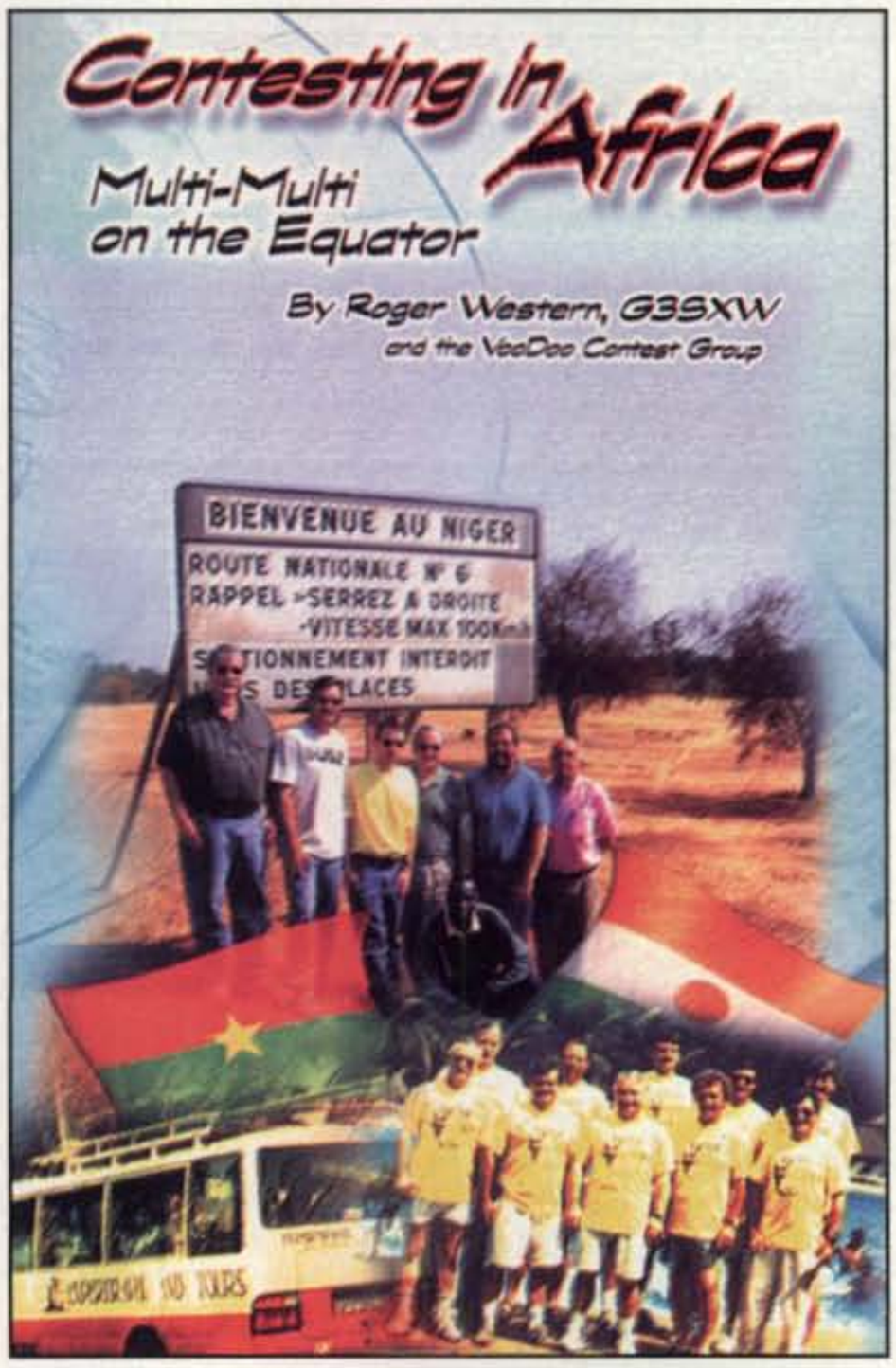
Manpack Broadband Antenna and Manpack Mast System from Barker & Williamson. Your column editor fondly remembers "the good old days" when Barker & Williamson (B & W) was heavily into amateur equipment production alongside now-departed ham gear names such as Johnson, Collins, Hallicrafters, Hammarlund, Globe, and others. Recently, the company has focused largely on supplying a variety of sophisticated amateur, commercial, military, government, emergency operations, and SWL antennas, coils, and accessories. And the firm's current lines of HF broadband antennas are quite innovative.

B & W's Manpack Broadband Folded Dipole Antenna (photo E), together with its Manpack Mast System (photo F), provides full HF communications capability in one small, light, rapidly deployable kit. Focused on operating NVIS (Near Vertical Incidence Skywave) propagation from a 20-watt field radio such as the military AN/PRC-150, the antenna is capable of fully automatic, low-SWR operation from 1.6 to 60 MHz without need for an antenna tuner/coupler. The frequency-agile antenna weighs only 5 lbs., fitting in the same bag with the manpack mast. (NVIS can allow a very dense coverage area of up to several hundred miles with no skip zone, and often is used to fill in HF radio "dead zones" between groundwave's maximum range and skywave's minimum range.)

The new antenna is amazingly compact and simple, comprised of only the center assembly, two spreaders, and the wire assemblies. It is furnished complete with thermoplastic housing, camouflage, super flexible insulated wires, 1/4-turn connections, and wire winders. To deploy, you simply erect support poles, hang the center assembly from a snap hook, clip the wires to the center assembly, unroll the wires to the end supports, clip onto the end rings, apply tension, and snap in the spreaders.

The three-pole mast set will hold the antenna at a height of 6 ft. in a flattop

Fig. 2– With the Topo USA 6.0 Topographic Mapping Software, you can scout the terrain as if you were there with highly defined shaded relief, realistic 3-D views (with "fly overs"), and downloadable aerial images. A 3-D full screen sample is depicted here. (Image courtesy of DeLorme Mapping)



configuration. Mast pole sections are a very short 18 inches, and they are rapidly field-assembled with an inner joiner piece by just pushing them together. A locator pin is hammered into the ground to stabilize the bottom of the assembly. A guy ring is placed on top, and lines run down to ground stakes. The preassembled guy lines have easy-to-use tensioners and snap hooks. Put the antenna together with the manpack mast kit, and you have a total HF communications system in a 22" × 10" × 10" bag weighing less than 25 lbs.

The material used for the pole sections is a composite known as FRP, or fiberglass reinforced plastic. Unlike cheap "fishing pole" material, it is extremely lightweight, strong, and rigid. The color is throughout the material, so there is no chipping paint. Also, shock hazards are eliminated. All guys and lines utilize polyester, which won't stretch, rot, or degrade in UV. The bottom line is that it's claimed to be the smallest and lightest broadband antenna system for NVIS HF use.

Contact Barker & Williamson, 603 Cidco Road, Cocoa, FL 32926 (321-639-1510; e-mail: <custsrvc@bwantennas.com>; on the web: <http://www.bwantennas.com>).

Software and Computers

Topo USA 6.0 Mapping and Navigation Software from Delorme. The new Topo USA 6.0 joins Delorme's array of

Fig. 3– Contesting in Africa: Multi-Multi On the Equator *represents a compelling array of contesting and DXing experience from one of the most unique operating venues on Earth, the African continent. The personal stories told by Roger Western, G3SXW, are said to make this book a "must have" for your library. (Published by Idiom Press)*

high-quality software packages in its quest to "bring technology down to earth"™. The new Topo USA 6.0 Topographic Mapping Software from Delorme (fig. 2) lets you explore anywhere in the U.S. on a detailed, seamless topographic map—all on a single DVD, providing large-scale U.S. topographic coverage in one package.

With the new software, you can scout the terrain as if you were there with highly defined shaded relief, realistic 3-D (with "fly overs"), and downloadable aerial images. You can see the land cover for any location, as well as find public lands for recreation, including Bureau of Land Management (BLM) lands, state and national parks and forests, and campgrounds. You can automatically create routes over roads and trails, based on the most up-to-date data available. The software also lets you print detailed, customized maps and effortlessly upload GPS waypoints, tracks, and routes to your receiver. You can then hit the back roads and trails and navigate with complete confidence, wherever your adventures take you.

You also can use the software on-the-go with a GPS receiver, as the Topo USA 6.0 software is compatible with DeLorme Earthmate GPS. You can load it on a laptop or PDA and see your position updated on detailed 2-D and 3-D maps and aerial imagery. On a laptop you can play back where you've been using the GPS log feature. You also can easily exchange waypoints and track logs between Topo 6.0 and third-party GPS receivers.

The new product is conveniently available on a single national DVD or on two regional edition CDs. For more information, including disc media options and product pricing, contact DeLorme, Two DeLorme Drive, P.O. Box 298, Yarmouth, ME 04096 (1-800-561-5105; on the web: <http://www.delorme.com>).

From the Bookshelf

Contesting in Africa: Multi-Multi On the Equator. Idiom Press has been operated by Bob Locher, Jr., W9KNI, since the early 1980s. The firm, whose name is derived from the words "I Did It On My Own," supplies some of the world's finest Morse Code keyers, computerized antenna rotator controls, audio filters, books of particular interest to DXers, and more. Recently, Idiom Press announced the new book *Contesting in Africa: Multi-Multi On the Equator.*

For homebound contesters and DXers alike, there is no thrill in amateur radio to match that of hearing your call come back from a new multiplier or a new country. However, imagine the thrill of being the new multiplier or country for literally thousands of stations! For the great majority of us, this means participating in a DXpedition.

DXpeditions typically are complex operations, especially where the goal is to win a major contest. Long lists of details must be attended to, including licensing, visas, vaccinations, transportation, clothing, tools, accommodations, and siting—not to mention organizing tons of radio equipment and antennas at the right place and at the right time.

The British/American VooDoo Contest Group has been particularly successful in this endeavor, year after year mounting highly complex operations from various West African countries to the delight of DXers and contesters worldwide. Their operations have been keyed to the CQ World-Wide DX Contest, considered by many as the crown jewel of contesting.

Contesting in Africa (fig. 3) is a fascinating new book detailing the VooDoo group's experiences, edited and much of it written by renowned contester and DXpeditioner Roger Western, G3SXW, and also containing additional chapters contributed by other VooDoo team members. The book provides an unusual and most fulfilling treat in simultaneously entertaining the armchair traveler with accounts of the challenges and adventures in getting to and operating from exotic countries, and at the same time providing inspiration and an informal planning guide for your own adventure and DXpedition.

CQ's own Contesting Editor John Dorr, K1AR, had this to say about the 190-page book: "Contesting in Africa, by the VooDoo Contest Group, offers a compelling array of contesting and DXing experiences from one of the most unique operating venues on Earth—the African continent. The opportunity for the reader to benefit from personal stories told by the worldrenowned and witty personality Roger Western, G3SXW, makes the book a 'must have' in any ham radio library."

Contact Idiom Press, P.O. Box 1985, Grants Pass, OR 97528 (541-474-0293; e-mail: <Sales@IdiomPress.com>; on the web: <http://www.idiompress.com>).

Special Note: Contesting in Africa is available from CQ's own bookstore (check the advertiser's index near the back of the magazine for the page numbers in this issue). The CQ Bookstore also conveniently stocks several of the most popular Radio Society of Great Britain (RSGB) Books. You can order any of these books from the CQ Bookstore by calling toll-free 1-800-853-9797.

Wrap-Up

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

Overheard: I have finally realized that when someone asks your advice on something, they probably want to tell you what they think.

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.*

RAL Series Receivers and Boatanchor Car Guys

BY JOE VERAS,* K9OCO

"While it is *possible* to use the RAL for amateur communications, it is an almost hopeless antique and certainly not worthy of any conversion efforts." With that sentence, the *Surplus Schematics Handbook*[1] dismisses the U.S. Navy's RAL series of receivers.

Navy radiomen who used the receiver from the mid-1930s through the Second World War might offer a different opinion, as would amateur and MARS (Military Affiliate Radio System) operators who gained experience with them in the post-war years.

The ex-Navy receiver first came to my attention in this year's Dayton Hamvention® flea market. My friend Alan Fryer, N3BJ, had an RAL-7 sitting in the trunk of his car with a For Sale sign on it. When I stopped to talk with him, he maneuvered the receiver into a better position so I could make a photograph of it. Alan is a longtime, knowledgeable receiver buff and he gave me a rundown on the RAL-7's features and performance. I began to think, "This is really a neat old radio."

He was particularly impressed with the smoothness with which the set enters regeneration. That's right: The RALs are regenerative receivers! He pointed out that it is worlds away in performance from the Ocean Hoppers, Space Spanners, and other simple regen sets familiar to many of us vintage-radio enthusiasts. The RAL's detector enters oscillation so gradually that the receiver has an *Oscillator Test* button to confirm regeneration. Pressing the button produces a double click in the headphones if the detector is oscillating. Alan was also impressed with the selectivity provided by the audio filters. The set's two RF stages contribute to stability and smooth regeneration. They control the signal level to the detector so there is little pulling or overloading of this stage. He also pointed out the lack of a conventional volume control.

The sensitivity knob controls the gain of the RF stages. The knob and switch marked AVC (Automatic Volume Control) on the front panel, and referred to as such in the RAL-7 manual, do not control a conventional AVC circuit. The type '41 AVC tube works instead as a limiter in the audio output. The manual recommends advancing the sensitivity control only enough to produce perceptible noise in the headphones and then switching on the AVC and adjusting the AVC Level control to produce comfortable copy.

An innovative-for-its-time feature is the audio filtering. When the audio switch is in the Sharp position, a low-pass filter is inserted after the detector. Its response begins rolling off between 1200 and 1600 Hz. In addition, the audio tuning control enables the operator to select 20 peak response frequencies ranging from 450 Hz to 1300 Hz in two banks of 10 frequencies each.

Although they are TRF (Tuned Radio Frequency) sets, the RAL receivers feature "uni-knob" tuning. The two RF stages and detector are gang-tuned with a three-section variable capacitor. The Antenna and RF trimmers on the panel are used to touch up the tracking, peaking the desired frequency. The Frequency Vernier knob controls a small-value trimmer capacitor in the detector circuit. It allows for fine adjustments in frequency, particularly useful for CW beat notes. The main tuning knob and dial scales are located in the center of the panel, just above the frequency card and below the nomenclature plate in the photograph. The RAL receivers do not have direct-reading calibration. The frequency is set using a calibration chart and the logging scales on the main tuning dial. Frequency coverage is .3 to 23 MHz in nine bands. The sister RAK series covers 15 kHz to 600 kHz. Both series use six tubes (exclusive of the external power supply). The RF stages, detector, and first audio use 6D6s; the audio output and AVC tubes are both type '41s.

The RAL series of receivers dates from 1935. They were used by the U.S. Navy through WW II. This RAL-7 belongs to Alan Fryer, N3BJ. (Photos © Joe Veras, 2006, all rights reserved)

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website: <www.k9oco.com>

Appropriately, considering its Navy service, the RAL-7 is truly a boatanchor. It weighs in at 74 lbs. The separate Type-50036A power supply tips the scales at 41 lbs. Dimensions are 15" W × 13.3" H × 16.1" D. The meter on the left side is a dB meter indicating the audio output power. Its four ranges cover 0 to +15 dB in *add dB* fashion. 0 dB is referenced at 6 mw. One detail about the radio in the photograph that is not original equipment: The little silver and gold device mounted on the lower left-hand corner of the nameplate has a small lamp in it and serves to illuminate the tuning dial.

Under the Navy nomenclature system in use when the initial design was done in 1935, the receiver was designated RAL. Subsequent contracts suffixed a dash followed by a number, so the next in line was the RAL-1, also 1935. The RAL-2, -3, -4, and -5 followed, with original contract dates of 1936, 1937, 1938, and 1939, respectively. The RAL-6 (1941) was modified to reduce radar interference. The RAL-7 and -8 iterations introduced additional shielding and were the models in production during the war years. Radiation from the receiver itself was a serious concern, and the RALs were designed to eliminate this. A signal radiated from a vessel's radio-room receiver could allow the enemy to locate and track a ship or submarine.

The receivers also have a type number. Early RALs were designated 46045; the RAL-6 and later versions were 46156. The first two digits of the type number indicate the component type (46 = Receiver). A three-letter code indicating manufacturer precedes the numbers. A CRV-46045 would have been manufactured by RCA. The RAL-7 pictured carries Type Number CND-46156, so it was manufactured by Andrea Radio Corporation on New York's Long Island. Andrea Radio was established in 1934 and survives today in the form of a successor company, Andrea Systems, LLC. The firm is still in the military and commercial communications equipment business in Farmingdale, NY.

De W7EKB, KN2X, and Others

Ken Gordon, W7EKB, does not agree with the assessment in the quote that begins this column. He acquired an RAL-7 in 1958 and it was his main station receiver for nearly 20 years. He used it for everything a ham does with a receiver, including traffic handling on both CW and SSB nets. The set's audio filters were switched out for phone work. Ken says, "It is very stable, selective enough for me (especially with its superb audio filtering system), and very sensitive." The RAL "heard everything I could hear on my SB-101," he goes on to say. The receiver must also have been durable and reliable, holding up through constant use. "During one period, I never turned it off for over six years," Ken states. He finally shut it down to check the tubes, and then, finding nothing wrong, turned it back on and left it running for another three years.

Ken uses his current RAL-7 on 160, 80, 40, and 20 meter CW and reports that the receiver has almost no internally generated noise. The signals have a "transparent sound" with greater depth. Anything you would change about the RAL, Ken? Yes: The lack of a directly calibrated frequency readout is his only complaint. After 48 years of experience with the breed, that's not a lengthy gripe list.

Bill Henneberry, KN2X, of Yonkers, New York has a lengthy familiarity with the RAL and its low-frequency sibling, the RAK. In July 1940, after graduating high school, Bill enlisted in the Navy as an Apprentice Seaman. After boot camp at Newport, Rhode Island, he was assigned to the cruiser *USS Trenton* as a *Striker* (an enlisted man working toward a Petty Officer's rate) in the ship's Communications Department. He was promoted to Chief Petty Officer in February 1945 and remained aboard the *Trenton* until war's end. After completing a pair of courses at the Navy's Treasure Island, California school his rating was changed to Chief Electronics Technician.

In his more than 20 years of service, Bill says, "The RAL/RAK receivers were ubiquitous. There was at least one pair on every vessel in which I served." The sets were popular with both radio operators and technicians. The radios were almost indestructible; techs rarely had to open them. Bill believes they also "were superior to supposedly better sets for copying Fox *(successively numbered messages in 5-letter code groups)*." Bill observes that, even with their audio filtering, "Selectivity was not what we take for granted today."

Longtime *CQ* readers with good memories may recall hearing of Bill before. After retiring from the Navy as a Chief Warrant Officer-2 in 1961, he went to work as an engineer for the Technical Material Corporation. TMC manufactured communication equipment systems for government, commercial, and military clients around the globe and is famous in amateur circles for its GPR-90 receivers. While at the Mamaroneck, NY company, Bill authored a 40-page booklet entitled "A Qualitative and Quantitative Analysis of the AM, SSB and AME[2] Modes of Operation of Radio Equipment." The work is referenced in March 1966 *CQ*.[3]

Along with the terrific input from Ken and Bill, I also received a wealth of information from other collectors/users. Thanks to: Chuck McGregor, N7RHU; Robert Flory, K2WI; Sandy Blaize, W5TVW; Meir Ben-Dror, WF2U; Marty Reynolds, AA4RM; and Art Leberman, W6REQ. I appreciate the time and effort you put into corresponding, as well as making inquiries on my behalf. Thanks to Alan Fryer, N3BJ, not only for his impressions of the RAL-7, but also for making his receiver available for photography. Despite all the expert assistance, this column is not intended to be an authoritative or comprehensive treatise on the RAL, but rather a shared experience of the item I found most fascinating in the 2006 Hamvention® flea market.

Car Guys

Dayton is not all about the flea market, though. A guy has to eat, too. For more years than I can recall, we have had a completely unofficial, impromptu boatanchor dinner at the Barnsider restaurant. It's not precisely the same people each year, but there are regulars and semi-regulars on the roster. Being completely unofficial, there is no official organizer, but if there were . . . it would be Herman Cone, N4CH. Herman needs no introduction to this column's readers or anyone who has bought a Radio Classics calendar in the past dozen years. Radios from Herman's magnificent collection frequently grace both the magazine and calendar pages.

Among the others around the Barnsider table this year were Gary Wagner, K3OMI; Alan Fryer, N3BJ; John Poulton, K4OZY; and Steve Tell, KF4ZPF. We all have vintage radio as a primary interest, but I was struck by the number of certifiable Car Guys . . . certifiable *Saab* Car Guys in attendance. Gary owned a Saab dealership for 20 years and has also raced sports cars. A visit to his QTH is a satisfying experience, whether one is a Car Guy, boatanchor fan, or both. He built an eight-car garage to house several hundred vintage radios and a variety of automobiles. A Saab Viggen, a pair of Lotuses, one each old (Austin Cooper S) and new Mini, and a Fiat Abarth are among the rolling stock.

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The K9OCO (N4QB) mobile hamshack circa 1978. More than 1800 CW QSOs were logged from the driver's seat of the Saab 99 Turbo.

John, K4OZY, was in the repair end of the Saab business at one time. In 1971, while in grad school, he did some mechanical work on a Saab belonging to a friend of his wife. As John says, "One thing led to another," and he soon found himself in the repair business. He is no longer personally turning wrenches at the garage, but the business is still going strong.

Alan, N3BJ, discovered a way to indulge his competitive streak without getting speeding tickets. He is a superb radio contester, honing his skills in the QRP ranks. He finished #1 U.S. in CQ's own 2001 World Wide DX contest and placed third in the world in the Y2K World Wide contest, both on CW.

A natural multi-tasker, I found a way to combine Saabs, CW, and mobile operation all at the same time. My claim to fame is more than 1800 CW QSOs from the driver's seat of a 99 (the model number, not the year) Saab Turbo . . . all while covering 115,000 accident-free miles. The accompanying photo shows the car. It was a great vehicle for blowing the doors off other mobile ham shacks in lesser conveyances such as Chevy Camaros. On page 80 of April 1984 issue of *CQ* is a photograph of my mobile operation in the 99's successor, a Saab 900 Turbo. Apparently not all Swedish cars are created equal. I once owned a Volvo that stopped dead any time I keyed down on 20 meters.

There was one more car connection with this year's Hamvention®. One of my prized Dayton traditions is an annual meeting with W8CAR and WØCAR. Dan, '8CAR, is the strength and conditioning coach for our Dayton ordeal. Early in the year–safely after the holidays—he begins putting John, 'ØCAR, and me through a regimen designed to have us in peak form by mid-May. Dan's routine is tough, but it has never failed.

73, Joe, K9OCO

Notes

1. Grayson, Kenneth B., W2HDM, *Surplus Schematics Handbook*, Cowan Publishing Corp., 1960, p. 71.
2. AM Equivalent
3. Schauers, Charles J., W6QLV, "Ham Clinic," *CQ* magazine, March 1966, p. 75.

BY JOHN DORR,* K1AR

Making the Top Ten

September's Contest Tip

Most contest operators track what they've worked in a contest. Many do not keep track of what they need, however. Obviously, this concept most applies to working multipliers. Whether you use your logging software to help or simply keep a written list, it's important not to miss the "easy ones" in contests so you can maximize your future scores!

Looking at the title, this month's column is probably not what you think it's going to be. For most contesters, making the top ten in a contest means you have achieved one of the top ten scores in your category. It's a goal that few obtain, but many strive for in each event.

This month, however, I'm going to be discussing a different kind of top ten-my own personal top ten experiences in contesting. The idea was spawned by the events of the recently concluded World Radio Team Championship (WRTC-2006) in Brazil. Due to personal commitments, I was not able to participate this time around. However, as I sit in New Hampshire writing this column, I can't help but reminisce about past WRTC events and the impact they had on my contest experience.

Indeed, like many of you, I have been blessed with incredible contest experiences over the years. In fact, it's nearly impossible to net them out into a list of ten, but that's the goal this month. With that in mind, what follows is my top ten, experiences for which I'm eternally grateful and ones that I will never forget.

Calendar of Events

All year	**CQ DX Marathon**
Aug. 26–27	ALARA Contest
Aug. 26–27	Hawaii QSO Party
Aug. 26–27	YO DX HF Contest
Aug. 26–27	SCC RTTY Contest
Aug. 26–27	Ohio QSO Party
Aug. 27	SARL HF CW Contest
Aug. 27–28	Kentucky QSO Party
Sept. 2	Russian RTTY Contest
Sept. 2–3	All Asian SSB Contest
Sept. 2–3	RSGB SSB Field Day
Sept. 9–10	Worked All Europe SSB Contest
Sept. 10	North American CW Sprint
Sept. 9–11	ARRL Sept. VHF QSO Party
Sept. 10–11	Tennessee QSO Party
Sept. 12–14	YLRL Howdy Days
Sept. 16–17	Scandinavian CW Activity Contest
Sept. 16–17	South Carolina QSO Party
Sept. 16–17	Wash. State Salmon Run Contest
Sept. 16–17	QCWA 50th Fall QSO Party
Sept. 17	North American SSB Sprint
Sept. 23–24	**CQ WW RTTY Contest**
Sept. 23–24	Scandinavian SSB Activity Contest
Sept. 23–24	Texas QSO Party
Sept. 30–Oct. 1	Arkansas QSO Party
Oct. 28–29	**CQ WW DX SSB Contest**
Nov. 25–26	**CQ WW DX CW Contest**

WRTC-1990

No other contest experience can hold a candle to WRTC-1990 for me. This was an event of firsts: the first to create a level-playing field of world-class competition, the first to host Russian and U.S. hams (and other Eastern Bloc countries) in the United States, and the first to align itself with a high-profile competition, Ted Turner's Goodwill Games™, as an official cross-cultural event.

There are a million stories to tell, but WRTC-1990 set the stage for all future WRTC events. I'll never forget the thrill of staying up until the wee hours of the night with Willy, UA9BA, finally talking face to face after all our years of on-the-air QSOs. Then there was the small matter of a WRTC contest, and the closing ceremonies where scores of fellow contesters said good-bye to one anther with tears in their eyes. It was the stuff you never forget. My thanks to Danny, K7SS, and so many others who made it all happen!

WRTC 2000 in Slovenia

With two incredible WRTC events in the bank, skepticism was growing as to whether or not another successful WRTC could be delivered. Tine, S50A, and his team made it happen in a big way.

Slovenia was another week of contest fantasy. Old friendships were rekindled and new ones made. Whether it was traipsing through the caves of Slovenia with 9A3A or riding in a bus with G3SXW, the fraternity of contesting was alive as I'd never seen before during that week in Bled. The thrill of watching an opening ceremony with national flags from each team being proudly displayed cannot adequately be described. Yes, contesting is much more than just sending numbers and callsigns.

CQ Contest Hall of Fame

It's a rare day when K1AR is surprised in public, but a bunch of folks led by K1DG and the Yankee Clipper Contest Club managed to pull it off at the 1999 Dayton Hamvention® Contest Dinner by inducting me into the CQ Contest Hall of Fame. Obviously, being the recipient of such an honor speaks for itself, but it was an event I'll never forget. More often than not, I look at the list of other Contest Hall of Fame members and say to myself, "I just don't belong here."

20 Meters at W2PV

Operating from W2PV is absolutely one of the highlights of my contesting experience, especially in the late 1970s and early 1980s. Aside from being one of contesting's class acts, Jim Lawson offered an amazing station that fueled the old-time multi-multi competitive battles between W2PV and N2AA (K2GL) that many of you have read about and a few of us actually experienced. I'll probably sound like my parents by saying, "Contesting just isn't the same as it was in those days." There were no computers, no packet, no battle over making sure the network was up and running. We just had good, old-fashioned fun. You know, after thinking about it, the more things have changed with technology,

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e-mail: <K1AR@contesting.com>

the more they have indeed stayed the same. I still get the same thrill from passing a 9J2 to 40 meters today as I did in the days of operating at W2PV. That's a good thing, indeed!

First Single Op in CQ WW

We remember those firsts in our lives: first child, first job interview, first date, etc. While I had operated in many contests as a casual entrant or as part of a serious multi-op team, I had never competed seriously as a single operator in the CQ WW—until the 1979 CW contest from K1GQ's place. As events sometimes go, Bill and I actually planned on operating multi-single. However, with 45 minutes to go before the contest, he looked and me and asked, "Do you want to do this by yourself?" It was an offer I couldn't pass up and one for which I'll always be thankful, as the 1979 CQ WW DX CW Contest was the beginning of a long string of single-op efforts for years to come. If I haven't said it lately, thanks again, Bill.

ARRL Field Day, 15A NNJ

One of the aspects of contesting I like the most is the way we try to push our operating and station-building capabilities to new heights. Even though ARRL Field Day is not an officially sanctioned contest, for all intents and purposes it might as well be one. Also, it does offer something very similar to mainstream contests: the occasion to do the extreme!

Andy Blank, N2NT, led an incredible logistical challenge that resulted in two back-to-back 15A (one of the categories) Field Day operations. These were not just your average operation. On 20 meters, for example, we had a 4-over-4 stacked array. All stations were using KW's with generator power provided by the U.S. National Guard. At the end of it all, we managed the following scores:

1980: W2RQ, 15A (KA2HVM was the Novice station), 10,673 QSOs, 34 ops, 15,673 points.

1981: W2RQ, 15A, 11,201 QSOs, 30 ops, 16,437 points.

It just doesn't get much better than that and we're still talking about it 25 years later.

Winning from Billerica

With the cost of equipment, lack of time, and required commitment levels higher than ever, it seems that more and more of us are not operating competitively from our own stations. Of course, there are many notable exceptions, such as N9RV, K5ZD, K4ZW, N2NT, and others. In the early 1980s I actually had a reasonable station of my own (single tower with mono-banders), albeit small potatoes by today's standards. However, it was mine and built with my own two hands, and I managed to win a few DX contests with it. Trust me when I say that's a great feeling!

First DX Operation from HI8XWP

If you've never been on a contest DXpedition, my advice is simple: Book a flight and go somewhere; almost anywhere will do. My first experience operating from outside the U.S. was in 1979. Together with K1DG, we put the "fabulous" callsign of HI8XWP on the air as the world high multi-single in the CQ WW contest. I had always dreamed about operating off-shore with those high QSO rates and incredible scores, but nothing compared to actually doing it.

We had the luxury of operating from Tony and Suzanne's QTH in downtown Santo Domingo, as well as benefiting from their diplomatic status when passing through customs. It was a turn-key station with enough gear to be loud in most parts of the world. At least that's what 8000 QSOs felt like after the contest. Oh, and can you remember what it was like to dupe a log by hand? I still can; it's one of many memories that make HI8XWP a key part of my top-ten.

Operating at W3AU

Imagine an 18-year-old kid being asked to operate from one of the giant stations of contesting, W3AU. That was my opportunity and experience. My folks lived in Maryland, so during college breaks I had the opportunity to stay with them and connect with the guys from the Potomac Valley Radio Club. On

The winning teams at WRTC-2006 (left to right): K1DG/N2NT (#3), VE3EJ/VE7ZO (#1), and N2NL/N6MJ (#2). (Photo courtesy of Jim Idelson, K1IR)

Place	WRTC Call	Operators	Total QSOs	Total Mults	Final Score	Error Rate%
1	PT5M	VE3EJ/VE7ZO	2369	230	2,439,380	2.2
2	PW5C	N6MJ/N2NL	2200	241	2,317,456	2.1
3	PT5Y	K1DG/N2NT	2124	230	2,098,060	3.1
4	PW5X	UT4UZ/UT5UGR	2304	204	2,024,496	2.9
5	PT5D	IK2QEI/IK2JUB	2024	232	1,987,080	2.4
6	PT5P	DL6FBL/DL2CC	1875	240	1,978,320	1.8
7	PT5N	9A8A/9A5K	2017	223	1,962,177	3.4
8	PW5Q	NØAX/KL9A	2020	222	1,958,928	2.0
9	PT5R	RW3QC/RW3GU	1840	238	1,945,174	3.1
10	PT5Q	W2SC/K5ZD	1822	248	1,944,320	1.6

Table I– WRTC-2006 top ten results.

one such occasion, Bob Cox, K3EST, asked me if I'd be interested in operating from the mighty W3AU. After thinking about it for maybe one nanosecond, I accepted, finding myself at the operating position with Bob on 40 meters. Bob and I have been friends for over 30 years, but I remember the experience as if it were yesterday, when he was "encouraging" me (some would use stronger words) to send faster and get the rate up. Little did Bob know that he was influencing my approach to contesting in a way that I'm still using today. Rate does indeed matter, and, doing it from W3AU in the mid-1970s was rate in style!

Operations at K1EA

What can one say about operating from a station such as K1EA for over 20 years? At Kenny's place we've done it all—single op, multi-single, multi-two, and even a few multi-multi operations. For the most part, operating at K1EA has been my contest experience, as I've operated more major contests from Ken's QTH than from all other locations combined. I could tell you stories until the end of the next sunspot cycle, but that is the essence of why this one makes my list. Of course, there was the time we worked 40 zones on 40 meters, or the QSO with HSØAC on 40 meters at 2 PM local time. Then there was the QSO with BV/K1RX on 80 meters and the thousands of passed multipliers. However, the real stories are the people. Over the years, we've had the pleasure of operating with an all-star cast of characters, and those relationships and good times are what I really remember about being at K1EA. It is, indeed, what contesting is really all about.

A Few Other Notables

The biggest challenge this month was to net out over 35 years of contest experience into ten significant events, and with that being said, I do have a few others that need to be acknowledged:

- Surprise 50th birthday dinner with many K1AR ham friends in attendance
- My first 400-hour rate, from PJ2T
- My first contest—the 1970 ARRL Novice Round-up
- Climbing my first 200-foot tower (and living to talk about it)
- All of the other WRTC events
- Our wins at the amazing K3LR multi-multi station
- Operating at TI1J and making so many good TI friends
- Thousands of hours of great conversation at the Dayton Hamvention®
- The honor of having so many good friends like you!

To be honest, some months are just another column to me. What strikes me this month is that I've realized again just how much contesting has been a huge part of my life. My friends are largely from this group, and many of the joys I've had in life have been in this sport we call contesting. Thanks for giving me the opportunity to share mine.

Late-Breaking News

This actually will be old news by the time you read these words, but in case you've been on a deserted Pacific island for the past two months, the WRTC-2006 results are in. In keeping with this month's theme, Table I is a snapshot of the top ten scores. Congratulations to everyone, especially the medal winners (see photo): VE3EJ/ VE7ZO (winners), N6MJ/N2NL (2nd place), K1DG/N2NT (3rd place). It's an honor to even be invited to the party, and for that, I tip my hat to you all!

Final Comments

Writing this column was a fun trip down memory lane. I'm sure many of you can recall your own set of contest memories that make up your personal top ten. It's important to keep in mind that aside from striving to do our best in contesting, the real value comes from building those memories and sharing them with others. Until next time, see you in the contest! 73, John, K1AR

awards

BY TED MELINOSKY,* K1BV

Hellschreiber Awards

An old method of data transmission has been rejuvenated by the digital revolution and has regained popularity. Nicknamed the "HELL" mode, it provides an air of mystery as well. Hellschreiber was patented in 1929, and is still in use today with pretty much the original format. Hellschreiber was the first successful direct printing text transmission system, and was very popular at a time when teleprinters were complex and expensive (the Hell receiving mechanism had only two moving parts). The first use was in land-line press services, which continued well into the 1980s. During WW II, Hellschreiber was widely used for field portable military communications. Today it is often referred to as "Feld Hell," or "Field Hell."

Each character of a Feld-Hell transmission is portrayed as a series of dots, in a matrix, just like the printing of a dot-matrix printer. The dots are sent one at a time, rather like Morse Code. Feld-Hell transmits in the following order: up each column from bottom to top, then up each successive column from left to right. Modern-day software "prints" the received data on the user's computer screen; hence the emphasis on the phrase "friends printing friends" in the Feld Hell Club awards presented below. Speeds of up to 200 baud (about 25 WPM) are supported, and several free programs are available to allow you to get into this old and new mode. An interesting website is maintained by the Feld Hell Club (www.feldhellclub.co.uk), and to encourage participation, they offer some very well-designed and colorful certificates.

England's Feld Hell Club Friends Printing Friends Awards

These awards are for contacting a required number of Feld Hell Club members or for contacting club members in a certain geographic area using this special digital mode. All contacts must be made on or after March 6, 2006, the date of the formation of the Feld Hell Club (exception: the DXCC Award). The log that you turn in should include Date and Time in GMT, Station's Call, Name, Frequency, FH Mode, and station's Feld Hell Number.

Submit the application in e-mail form, in increments of 25 members contacted (otherwise the first

USA-CA Honor Roll

500

JA1QVR 3376
DK9IP 3377

2500

K8XF 1249

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

The Feld Hell Club's award for contacting 25 Feld Hell Club members.

The Feld Hell Club's First Contact Award for completing a contact with an amateur radio operator who was using the mode of Feld Hell for the first time.

Feld Hell Club's DXCC Award.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

Larry (Frosty) Phillips, WØFP
USA-CA All Counties #1135, May 16, 2006

A cousin I was visiting in the State of Washington introduced me to amateur radio in 1954. When I returned home, it took me five years to get a license. There was no one around to help with my amateur radio studies in my location in southwestern Missouri.

In 1959, I passed the Novice test and received the call KNØVVH. Six months later, I upgraded and my call changed to KØVVH. In 1965, I read about county hunting in *CQ* magazine and I bought the *USA-CA Record Book* to keep track of counties. At that time there were 3079 counties and the book was 8½" x 11" and had a map of each state showing the counties in each. I got busy with work and raising a family and put the book away and forgot about county hunting.

In 1997, I changed my call to WØFP and started using my nickname, Frosty. Also in 1997, I found the original book that I had put away in 1972. I hadn't been very serious or committed, because i had recorded about 100 counties in the book and I don't remember collecting QSL cards for those contacts.

Finding the old record book piqued my interest again, and I found the County Hunters Net on 14.336. I worked a few counties and send some QSL cards without an SASE, and some kind soul responded with a QSL card and informed me that if I was truly interested, I should provide an SASE to those from whom I wanted a card. I went through all of my QSL cards from the Geratol Net, the 3905 nets, and the OMISS nets, and found that I had over 700 counties confirmed. having that many confirmed helped boost my interest, and i started to check into the county hunter nets on a random basis. I still was not as committed as I thought I was. Like a lot of people, I was told several times not to use phonetics on the nets, and it finally made it through my thick skull.

Somewhere about this time, I discovered the use of MRCs (Mobile Reply Coupons), where I could record more than one county. Toward the end as I was going through checking my cards, I found that I had some MRCs that spanned several years all on the same card.

In 2001, I installed an ICOM 706MkIIG in my car and went mobile. I quickly discovered that having to work got in the way of hunting counties. Despite the hurdle of working, I continued to work and record counties on the way home from work and on weekends. Somewhere about this time, I created my own MRC card with Frosty Press on the bottom of the card. I also found the county book from N4UJK, which has been a blessing for looking up the location of counties and trying to determine where to go mobile next.

In 2005, I discovered the use of the chat room, and toward the end of 2005 I discovered, with the help of WQ7A, the use of a script file for "Special Needs." This tool is what helped me get over the top while I was working. I am fortunate in that I work for a company that will allow me to have county hunting breaks, with a run to my car. I work with the chat room running in the background. With special needs script set, I can work and wait for the bells of "Big Ben" to go off to alert me that there is a county I need running somewhere.

I want to thank all of the net controls on the county hunting nets for their time and devotion to helping people like me work counties. I want to thank all the friends who called me on my cell phone when I didn't respond to a county they knew I needed and that had been spotted in the chat room (when I was working or in a meeting). I also want to thank K1SO, AE3Z, KB9MGI, KM9X, KQØB, and NØNH for going to some of the last counties I needed. I especially want to thank KCØQER and WØNAC for getting me the last county I needed for the "whole ball of wax." The people who participate in county hunting are some of the best and friendliest people I have ever met, and I want to thank each one for their help.

—73, Frosty, WØFP

bar is for 25, second for 50, etc.) No QSL cards are required, just a listing of the information from your log and your signature on the application. All FH numbers must be different. Submit this list in order of FH numbers to make it for easy recording and sorting. A certificate will be sent via e-mail with attached file for each bar award and is suitable for framing.

To become a member, and receive a number, send an e-mail to <join@feldhellclub.co.uk> and include your call, name, and QTH. There is no membership fee (www.feldhellclub.co.uk).

25 Bar Award: for contacting 25 Feld Hell Club members.

50 Bar Award: for contacting 50 Feld Hell Club members.

75 Bar Award: for contacting 75 Feld Hell Club members.

100, 125, 150 Bar Awards: for contacting 100, 125, 150, etc., Feld Hell Club members.

Friend in All States: for contacting a Feld Hell Club member in all 50 states of the U.S.

Friend in all Canadian Provinces: for contacting a Feld Hell Club member in every province of Canada.

Friend in all Europe: for contacting a Feld Hell Club member in every European country.

A Friend In All DXCC Countries: for contacting Feld Hell Club members or non-members in every DXCC country of the world. This award is issued in increments of 25 and a separate bar award will be given for each increment. Follow the rules of the DXCC Award. Use the same date for beginning the award as the DXCC allows. This is the only award of the series that deviates from beginning date and and includes non-members. This is to help members who were using Feld Hell long before the Feld Hell Club was start-

On the Cover

Charlie Otnott, WD5BJT, featured in the article, "Mississippi Mud," elsewhere in this issue, rode out Hurricane Katrina in the Hancock County, Mississippi, sheriff's office. The 40-foot tower visible in the background, with an antenna hanging limply off a side-mount, started out as an 80-foot tower, used for the county's public service communications. Katrina's winds snapped it off at the guys (which held). The building in the photo has been condemned—Charlie reports it had 4 1/2 feet of water on the first floor, and the roof above the second floor, which housed the county jail, was "just about gone."

"We stayed on the air til the generator went under water," Charlie recalls. "That's when we all evacuated to the second floor with the prisoners." As the winds began peeling off the roof, Charlie says, officials kept squeezing the prisoners into intact cellblocks, until all 120 prisoners were stuffed into two cellblocks, each meant to hold about 20 people. "There were some tense moments there," he noted. "We thought we were going to have a riot."

The inset photo shows what was left of Charlie's Collins 75A-2 after the storm. His family's home was destroyed and they are still living in a FEMA trailer a year later. Charlie's story, related by him and his longtime friend, Dan Brown, W1DAN, begins on page 13.

In Washington meanwhile, the FCC's independent panel on Hurricane Katrina issued its report and recommendations in mid-June. "Washington Readout" Editor Fred Maia, W5YI, takes a close-up look in his column on page 20. (Cover photos by Dan Brown, W1DAN)

The German Fortresses and castles Award sponsored by DARC Cochem.

ed and give them a chance to use prior QSOs to obtain an award.

German Fortresses and Castles Award

The long and oftentimes turbulent history of Germany resulted in the construction of many castles and fortresses. Today many of them are preserved as museums, historical landmarks, and residences. The DARC District of Rheinland-Pfalz provides an official listing of names and locations of 969 castles that are currently valid for award credit. This list is in the form of an XLS spreadsheet which can be downloaded for your personal use. Check the various DX bulletins, especially during summer months, for current and planned operations from castles in Germany.

Sponsored by DARC Cochem, DOK K45 (DOKs are designations of German clubs), this award is made available to all licensed amateurs and SWLs for confirmed contacts after January 1, 2005. Work stations in Germany that are operated from castles, castle ruins, fortresses, or mansions that are currently preserved as historic monuments. Contacts with these stations count only once for each application for the award. All modes except packet radio are OK. Endorsements are available for a single band or mode upon request.

Earn the following number of points from the required number of different club member stations:

DX stations (including those in the U.S.) need 20 points from 5 different German DOKs, minimum.

EU stations need 40 points from 20 different German DOKs, minimum.

DL stations need 60 points from 40 different German DOKs, minimum.

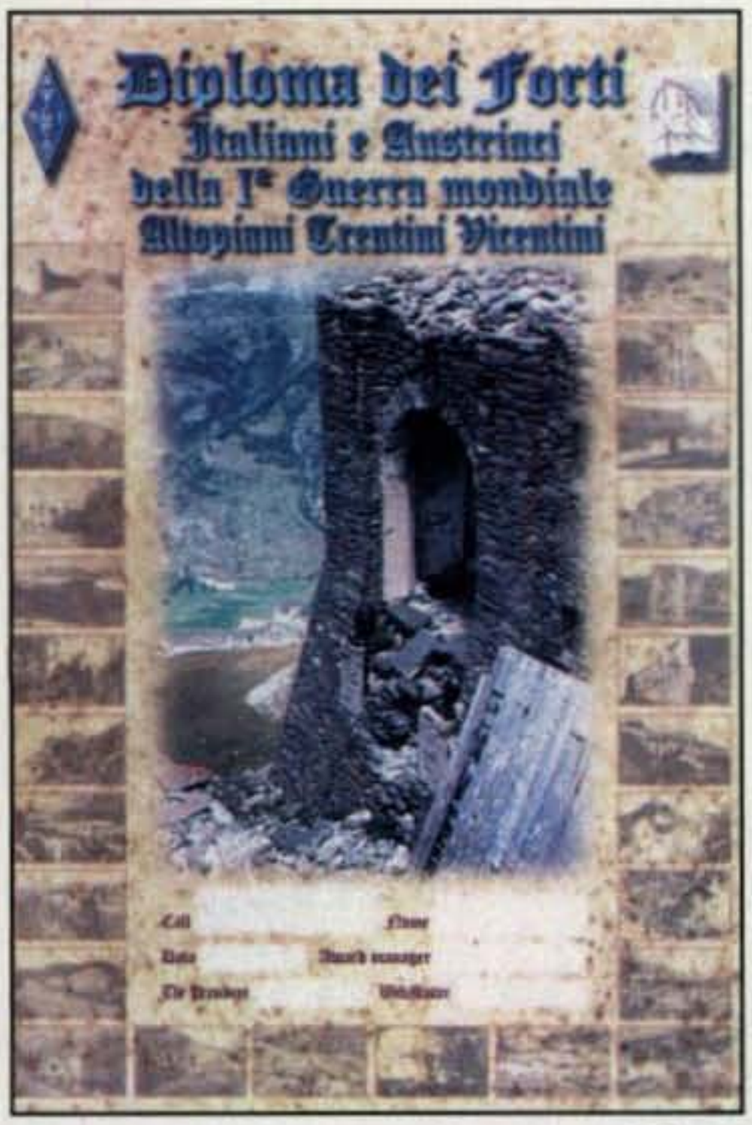
Each type of castle or fortress counts as follows: fortresses 10 points, mansions 8 points, castles 5 points, castle ruins 2 points.

Applicants for the award should record the postal code, location details, and the name of the monument in separate columns. For a given location only one monument can be used per application (for cases where a particular city or town has more than one monument).

Send GCR list and fee of 5 Euros for German stations or 7 Euros (or $US7) for European and DX stations to: Rita Gietzen, DL3PF (DIG 3888), Dohrer Weg 1, D-56814 Faid, Germany (http:// www.darc.de/k45/).

Diploma Forti Italiani e Austriaci DFIA

Italy and Austria also have a large number of castles, fortress-



An award sponsored by the ARI di Thiene for working fortresses in Italy and Austria

es, and other reminders of a turbulent history. This award is offered for those who contact stations in or in the immediate vicinity of a smaller number of forts. Again, the best source of information on special operations from these exotic QTHs is DX bulletins.

The award is sponsored by the ARI di Thiene for working Italian and Austrian forts. SWL okay. Contacts after January 1, 2001 count for the award. Repeater, satellite, and FM contacts may not be used doe this award.

Italy's fortresses: VI029 Forte Interrotto, VI030 Forte Tagliata d' Assa, VI031 Forte Lisser, VI032 Forte Campolongo, VI033 Forte Verena, VI034 Forte Cornolo, VI035 Forte Campomolon, VI036 Forte Casa Ratti, VI037 Forte Corbin, VI038 Forte Maso, VI039 Tagliata Bariola, VI040 Forte Enna, VI041 Batteria Monte Rione, VI047 Forte di Coldarco a Enego, VI048 Tagliata Tombion, VI049 Tagliata Scala di Cismon del Grappa, VI050 Tagliata Fontanelle di Cismon del Grappa.

Austria's fortresses: TN111 Forte Doss delle Somme, TN112 Forte Sommo Alto, TN113 Forte Cherle, TN114 Forte Belvedere, TN115 Forte Campo Luserna, TN116 Forte Verle, TN117 Forte Spitz Vezzena, TN118 Forte Matassone, TN119 Forte Pozzacchio.

Italian stations need on 10 different forts on HF and on 5 on VHF/UHF. EU stations need 7. All others 3. Send GCR list and fees (basic award 10 Euros, honor roll 20 Euros) to DX Team Thiene, P.O. Box 52, I-36016 Thiene VI, Italy (http://www.qsl.net/ari-thiene/).

Looking for some help in publicizing your group or club's award? *CQ* magazine can help. Please send all details and samples to me at the address listed at the beginning of this column.

73, Ted, K1BV

BY JOE LYNCH,* N6CL

The Best Bunkhouse Ham Shack in the Country

VHF Plus Calendar

Sept. 3	Very poor EME conditions
Sept. 7	Full Moon and Partial Lunar Eclipse, Europe, Africa, Asia, and Australia
Sept. 8	Moon Perigee
Sept. 10	Good EME conditions
Sept. 9-11	ARRL Sept. VHF QSO Party
Sept. 14	Last Quarter Moon
Sept. 16-17	ARRL 10 GHz and Above Cumulative Contest and ARRL 2304 MHz and Above EME Contest
Sept. 17	Moderate EME conditions
Sept. 18	144 MHz Fall Sprint
Sept. 22	New Moon and Moon Apogee and Annular Solar Eclipse, mostly over the Atlantic Ocean
Sept. 23	Fall Equinox
Sept. 24	Poor EME conditions
Sept. 26	222 MHz Fall Sprint
Sept. 30	First Quarter Moon

It all began with an almost chance encounter with Gary Gerber, KBØHH, at the VHF weak-signal banquet at the Holiday Inn North during the weekend of this year's Dayton Hamvention®. Almost immediately after greeting me, Gary handed me a sheet of paper and extended an invitation: "I would like to invite you and Carol [my wife, W6CL} out to the bunkhouse for some pickin' and singin' and some pit roast pig." Gary promised that there would be enough roast pig for everyone. All we had to do was bring some chips or a covered dish. Even though I don't necessarily like to travel on Saturday —especially when my traveling gets me back late in the evening—Carol and I decided to go, and we were glad that we did.

While Gary states that his bunkhouse QTH is in Byron, Oklahoma, that is actually where the nearest post office is located. Somewhere north and west of Enid, Oklahoma there is a little dot on the map called Vining. It is east of the Great Salt Plains Lake and north of the Great Salt Plains State Park on State Highway 38. If you get this far, you had better have your HT with you so that you can be talked in the rest of the way to Gary's QTH, which is precisely what we did. There's a lot of ancient history in this part of the country pertaining to the salt plains, geology, and archeology. However, those stories are constrained to be told in other, more appropriate venues.

Following the dirt road off the main road, we came to the end of that road, which put us in front of the bunkhouse. On the way to the bunkhouse our sky view continued to fill up with tower after tower. Finally arriving at the bunkhouse, we found what is perhaps the most nondescript contest station in the country.

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

Front view of the building that houses the bunkhouse, along with the woodworking and metalworking shops.

The sky is filled with the many towers at the QTH of Gary, KBØHH. (Photos by N6CL)

A view of the hamshack.

Gary, KBØHH, posing at the 6-meter station.

Before we actually got to the bunkhouse, however, we had to take a left turn to where the dirt parking lot was filled with cars and trucks from about everywhere around the area. After parking the car, we walked over to where we heard the pickin' and singin', only to arrive at a building surrounded by people standing in line. Taking our place in the queue, we could smell the food, which was dominated by the smell of the roast pig that had been roasting since early morning, thereby making it *very* tender meat.

We got to Gary's QTH just when the food was first being served and the last of the bands were playing. Gary had invited friends to come out for an all-day sing that included whatever you wanted to play on your choice of instrument. It was Gospel, folk, country, or whatever the particular group knew how to play and sing. The backdrop was a retention pond, and the amphitheatre was the lawn in front of the stage, which is a truck trailer. If you wanted to sit, you either brought a blanket or a lawn chair. Otherwise you sat on benches or one of a couple of picnic tables.

Finally arriving at the head of the food line, I got a paper plate and start filling it with a helping of the most tender pit-roast pig I had ever tasted. Adding some potato salad and a

Massive July VHF Openings

Mid-July witnessed massive openings on 6 and 2 meters. Of particular note was the huge NA-EU opening that took place between July 12–13 UTC. Hundreds of spots were recorded on the DX Sherlock VHF spotting website (http://www.vhfdx.net/index.html). The posts are so numerous that it will take time to digest them all. Unfortunately, the deadline of this column precluded such an analysis for this issue. Below are a few reports that your editor received via the noted routes:

Paul Kelley, N1BUG, writing for the VHF reflector, reported the following:

Wow, what a day! It started out with a great 6-meter opening to Europe in the morning, the best of the season to date from this location. That lasted for over three hours. Most of the good openings have been farther south, and I just caught the edge of them if anything at all. Not so this time. After that things were relatively quiet for a while, and then some strong signals from the west popped up. I was still resting and letting the shack cool down when I heard W5WVO. Remembering Bill needed my grid, I gave him one call with 5 watts (amp was off) and got him even though he had a pile-up calling. Some of the 8's calling Bill were pegging the meter at +60 and I realized I should at least *try* 2 meters . . .

After running down to the basement to hook up cables, I found 2 meters wide open to parts of W8/9/Ø. Worked about 30 stations there, many with signals pinning the meter. For me this was the best 144 *Es* since 1989 (but, yeah, I missed the big one a couple of years ago, as I was not home).

From the **UK Six Metre Group** (http:// www.uksmg.org/) were the following posts:

Freddy, IZ1EPM, wrote: "Another great *Es* multi-hop today morning, 6 Japanese guys in my log for a total of 32 Japanese stations from June."

Tony, IØJX, wrote: "Good and very long opening into the Midwest (5s and Øs), not so common for us in the south. Three new states worked (still eight to go for WAS). Several QSOs in the 8000–9000 km range. K7JE in DM33 heard IKØFTA, nearly 10,000 km."

Johan, ON4IQ, wrote: "Fantastic night opening to the States and Canada with FP, CO, HI, KP4, FM, 9Y. Over 150 stations logged. Stopped at 2300 UTC with over 150 QSOs into W1, 2, 3, 4, 5, 8, 9; VE1, 2, 3, 9, and VO1 area. Band was still humming at 2300 with good signs from TX."

Jon, NØJK, wrote: "The gates opened to Europe and Africa today (July 12). EH5HT, IM98 in with a good CW signal and worked at 2148 UTC, followed by EH8BPX, IL18 on SSB at 2208 UTC. EH8 7,400 km, EH5 almost 8,000 km! These are four *Es* hops to EM17, worked with 100 watts and a 2-element Yagi. KØHA was reportedly running European stations at times from EN10, NE. Conditions better for stations east of Kansas, as Pete's post indicates."

Pete, VE3IKV, wrote: "I don't think we will see another sporadic-*E* opening like today's for a long, long time. Wide open to EU, Caribbean, Africa, and North America all at same time. Worked Mike, G3SED 599/579, and almost made it with IØJX, all from the mobile in FN14!"

The ARRL posted a lengthy article concerning the July 12–13 six-meter opening on its website. You can read it at: <http://www.arrl.org/news/stories/2006/07/13/ 100/?nc=1>.

Incidentally, extensive coverage of the June openings can be found in the Summer 2006 issue of *CQ VHF* magazine. We will look into the possibility of a wrap-up article on this summer's unusually good propagation for the Fall 2006 issue, and an announcement about that will be forthcoming.

helping of June's brown beans (Gary's wife, June, KCØCEX, was responsible for this delicacy), along with tiny helpings of a few other items from the pots and bowls around the table, I found that I had a plateful. Being the gentleman that I am, I handed over that plate to my wife, Carol, W6CL, and proceeded back to the line for my food. Remembering my diet, I measure out my servings and passed up the desserts.

After we finished our dinner, I left Carol, who was visiting with some of the other guests, so that I could take a tour of the bunkhouse conducted by Gary's business partner, Steve Walz, KØUO. We walked over to the bunkhouse that Steve describes as a combination bunkhouse/hamshack, woodworking shop, and metalworking shop. The bunkhouse is situated in the middle of the long building with the shops located on opposite ends. On the way into the building, Steve pointed out the unique rotor that turns the whole tower. This rotor is nothing more than a truck winch motor. He told me that there are another couple of homebrew rotors on the other side of the building.

Walking through an open area, we arrived inside a room that is totally filled with radio stations—one for each band up to 1296 MHz. It is a jaw-dropping sight. While I was trying to process what I was seeing, Steve was rattling off statistics of recent contest and band-opening results.

After completing the tour of the shack, Steve took me outside for a tour of the QTH's skyline. As we walked around the building, he showed me the antennas for the various bands. Along the way he pointed out the dish for the WiFi and the collinear antenna for the cell phone, adding, "We cannot be an effective contest station without access to these services." I guess not! The WiFi service is about 30 miles to the west and the nearest cell phone tower is about 18 or so miles to the east. In spite of their distances, Gary enjoys excellent service thanks to these two antennas. Originally begun as a VHF-and-above contest station, Gary has gradually added HF capability via verticals that cover 160–40 meters, with beams covering the rest of the HF bands. He has 2-meter and 70-cm EME (Earth-Moon-Earth) coverage with four Yagis on each of these two bands, and on 1296 MHz via a 18-foot wire-mesh dish. (He has subsequently added 902-MHz horizon coverage via a 6-foot dish. He plans for higher band EME coverage via a 28-foot dish that is presently in four sections on the ground behind the bunkhouse.)

The 2-meter EME array atop the rotating tower. To the left side is a partial view of one of the two 8-element, 42-foot boom, 6-meter stacked Yagis mounted on a separate rotating tower.

The bunkhouse is heated in the winter via solar-heated water that is then pumped through pipes in the concrete floor. Gary is trying to figure out how to economically cool the shack in the summer. Knowing his genius and creativity, he will soon come up with the most efficient and economic plan feasible for cooling the building.

If you want to operate from the semi-rare EM06 grid locator during one of the contests this month, send Gary an e-mail via his QRZ.com e-mail address. If you plan to fly in, he will give you directions to the shack from either the Oklahoma City, Oklahoma or Wichita, Kansas airports. He claims that the latter is only a little over an hour away, and that is via the back roads! If you do operate from his bunkhouse at some point in the future, you will find that you are operating from one of the most quiet QTHs in the world.

We thoroughly enjoyed ourselves and the 350-mile roundtrip from Tulsa was well worth it. We really appreciate Gary and June's hospitality and are looking forward to next year's invitation.

Current Contests

The **ARRL September VHF QSO Party** is September 9–11. The second weekend of the **ARRL 10 GHz and Above Cumulative Contest** is September 16–17. The **ARRL 2304 MHz and Above EME Contest** is September 16–17. The **144 MHz Fall Sprint** is September 18, 7 PM to 11 PM local time. The **222 MHz Fall Sprint** is September 26, 7 PM to 11 PM local time.

The 222-MHz quagi antenna on a 30-foot boom.

The unique tower rotator, which is a truck winch linked to the tower by a chain. The cable entering and exiting the short piece of PVC pipe is tied to the direction indicator that is part of the maps on the wall inside the shack.

Dish antenna used for WiFi.

The collinear antenna used for cell-phone communications.

This building came from the Santa Fe Railroad. It houses a 70-cm repeater and will house the tuning units for the HF vertical.

For ARRL contest rules, see the issue of *QST* prior to the month of the contest or the League's URL: <http://www.arrl.org>. For Fall Sprint contest rules, see the Southeast VHF Society URL: <http://www.svhfs.org>.

Current Conferences and Conventions

September: The 2006 **TAPR/ARRL Digital Communications Conference** will be held September 15–17 in Tucson, Arizona, at the Clarion Hotel, Tucson Airport. For more information, see: <http://www.tapr.org/>. The unofficial information on the **Mid-Atlantic States VHF Conference** is that, if there is to be a conference, it will be held Saturday, September 30. For further information, please check the Packrats website at: <http://members.ij.net/packrats/latest.htm>.

October: The 2006 **AMSAT-NA Space Symposium and Annual Meeting** will be held October 5–10 in San Francisco, California at the Crowne Plaza Hotel San Francisco Mid-Peninsula Hotel. For more information, please see the AMSAT URL pertaining to the symposium at: <http://www.amsat.org/amsat-new/symposium/>. The annual **Microwave Update** conference dates are October 19–22, and it is to be held at the Dayton, Ohio Holiday Inn North Hotel, Wagner Ford Rd. For more information, go to: <http://www.microwaveupdate.org/>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. The following conference organizer has announced a call for papers for its forthcoming conference:

Microwave Update: A call for papers has been issue for the 2006 Microwave Update. If you are interested in submitting a paper for publication in the *Proceedings*, contact Gerd Schrick, WB8IFM, at 937-253-3993 or e-mail: <wb8ifm@amsat.org>. The submission deadline is September 1, 2006. For more information on the conference, go to: <http://microwaveupdate.org/>.

And Finally . . .

This column is skimpy on coverage because your editor underwent eyelid surgery the Friday the column was due. Thanks to Gail, K2RED, my managing editor, I was able to turn in this column at the very last minute on the following Monday. For you VHF-plus news junkies, I recommend reading the Summer 2006 issue of *CQ VHF* magazine, which was mailed out early last month to its subscribers. As usual, there are great articles on a variety of subjects. If you are not a subscriber, I strongly recommend that you become one, so as not to miss expanded coverage of all of the great activities on the VHF-plus ham bands.

This is a wrap for another column. As always, I look forward to hearing from you concerning your activities on the wonderful VHF-plus ham bands. Until next month . . .

73 de Joe, N6CL

BY CARL SMITH,* N4AA

DXpeditions and "New One"

As I write this, the 4th of July has passed and the IARU HF Championship and WRTC (World Radio Team Championship) 2006 gave us stations to work during the summer "drought." Most antennas were pointed south toward Brazil as the teams of the WRTC 2006 competed for the "gold." Lots of other DX was active for the IARU event as well, so it was a fun weekend of DXing.

Congratulations to the 46 teams who were active from Brazil. The top ten were: VE3EJ & VE7ZO, N6MJ & N2NL, K1DG & N2NT, UT4UJ & UT5UGR, IK2QEI & IK2JUB, DL6FBL & DL2CC, 9A8A & 9A5K; NØAX & KL9A; RW3QC & RW3GU, and W2SC & K5ZD.

Views on DXpeditioning

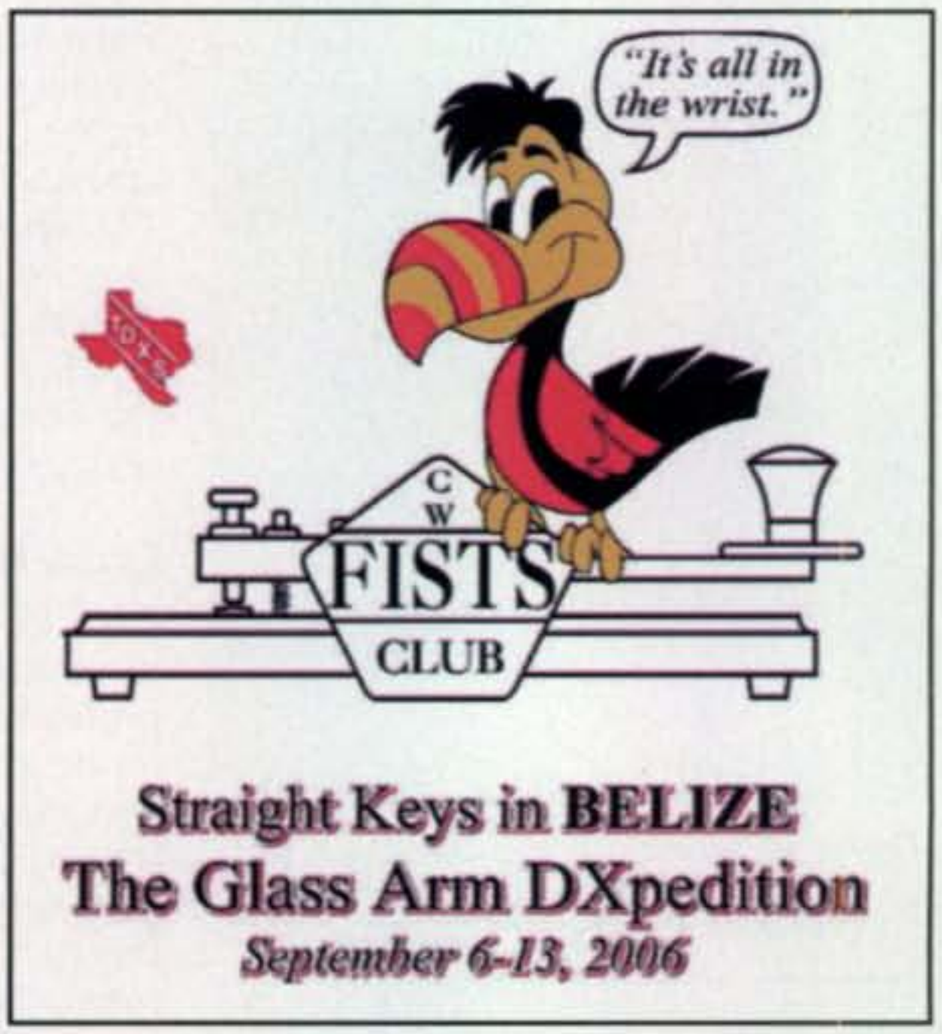
By now many of you will have received the ARRL's *DXCC Yearbook* for 2005. As I read through the articles, I detected two opposing views on DXpeditioning. I found this interesting and have given much thought to both views. I can't say that I am in favor of one or the other option, but it does provoke the thought process.

On the one hand, there are those who think you have to be a "big gun" on the DXpedition end, providing a big signal and thus being able to better control the pile-ups. On the other hand, there are those who believe you should still have to "earn" the contact by listening and using your operating skills. The second group chooses to use minimal power (100 watts) and simple antennas, such as verticals instead of Yagis. The first group takes tons of equipment and antennas, while the other group puts everything in a few suitcases with room to spare. The first group no doubt spends a lot more money than the second group by taking all the heavy stuff with them (amplifiers are heavy and antennas tend to be bulky).

I suppose there is justification for both points of view, and it's up to the individual or groups as to which approach they take. Indeed, both types of operations have taken place and both have provided thousands of DXers with the desired contacts, so overall it probably isn't a matter of great significance to anyone other than the DXpeditioners themselves. We thank both for their efforts and wish them well whichever route they choose to take in the future. Some will work all the DXpeditions and others won't, but that's the way it is in DXing.

Straight Key DXpedition

Another type of DXpedition is coming up that I'd like to share with you this month. The group is calling it the first ever "Straight Key DXpedition," and this one sounds like fun. Bill, K5WAF/V31WF; Cal, W5FW/V31EA; and Eddy, V31MR along with Nancy, WZ8C/V31?? (call not yet issued) will be operating from Belize September 6–13. Nancy tells me they will operate on the lower part of the General CW bands on all bands. She added:



Logo of the Straight Key DXpedition. (Photo courtesy of Nancy, WZ8C)

Well-known names in DXing circles meet at Friedrichshafen (left to right): Mike, N6MZ; Tom, N4XP; Bob, KK6EK; and Franz, DL9ZB. (Photo courtesy of DJ9ZB and N4XP)

> We decided to go to Belize, but since Belize isn't "rare" DX, we wanted to do something that would set us apart and generate some buzz about contacting us while we're there. All four of us are FISTS members and CW buffs

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e-mail: <n4aa@cq-amateur-radio.com>

and the trip coincides with FISTS Straight Key contest, so we decided to only use straight keys while we're there. Cal White did some research and couldn't find any mention of a straight key DXpedition within the last 50 years, so as far as we know we're the first! We'll be using computers to log, but our code will be hand-generated.

We will be using keys donated by Marshall Emm, N1FN, owner of Morse Express, and Toshihiko Ujiie, JA7GHD, at GHD Keys—a GT502 and a GT502MIL.

We will be operating from the Placencia Peninsula in southern Belize, running two stations. We plan on taking two-hour shifts and hope to keep at least one station going around the clock, especially during the FISTS Straight Key contest. We'll be on all bands. Last I heard, our antenna setup is a tribander for 10 meters, a vertical buried into the salt water 70 feet from the shore for 80 through 6 meters, and a separate 6-meter beam with rotator. We'll be hanging around the lower part of the General portions of the CW bands.

QSL via the FISTS QSL Bureau, 1020 Long Island Drive, Moneta, Va 24121.

To help defray the expenses, we're selling sand-colored "It's all in the wrist" Glass Arm DXpedition logo T-shirts for $16 postpaid, sizes M–3X. The address to order the shirts is The Glass Arm DXpedition, P.O. Box 807, Hadley, MI 48440, or use PAYPAL to: <nancy@tir.com>.

All of you CW guy/gals should mark your calendars for this one and be sure to work *them*.

Oh, O, I forgot . . . CW is dead! Wrong! Not by a long shot, for myself, and a lot of others, too.

Thanks for helping keep it alive, Nancy and friends.

Montenegro

Well, we got a New One the end of June—Montenegro. As of June 28 it became number 336 on the DXCC list. As of this writing a prefix block had not yet been assigned, but a number of YU6 stations have been active on the bands. Please note the separate item in the column on Montenegro as it relates to CQ's awards. The effective date is *not* the same as the one for the ARRL DXCC program.

A major DXpedition-type operation is scheduled to take place from Montenegro beginning July 20 and running for three weeks. Many operators from a number of countries will participate, so it should be fairly easy to get *this* one in your log.

Libya

5A7A will be active from Libya November 15–29. This should generate

Montenegro Added To CQ DX Countries List

CQ DX Awards Manager Billy Williams, N4UF, reports that Montenegro has been added to the CQ DX Countries List. Contacts made after June 3, 2006 (independence date) are valid. Updates of country totals, especially for those on the CQ DX Honor Roll, may be submitted at any time.

Updates submitted (by postal mail only) by July 31 were included in an updated CQ DX Honor Roll that was posted in early August on the CQ DX Awards page at <http://www.home.earthlink.net/~bfwillia/page3.html>, and will appear here in *CQ* in an upcoming issue. (Announcements were made online in late June.)

In order to equalize postal delivery times, updates received through July 31st received equal consideration. See CQ DX Country Award Tips on the CQ DX Awards web page for details on submitting updates.

CQ DX Field Award Update

Montenegro will be a dual field country (JN & KN). Serbia also remains a dual field country (JN/KN). Information on the CQ DX Field Award is also available from the CQ DX Awards home page and on the CQ magazine website awards page.

5 Band WAZ

As of JUNE 1, 2006, 700 stations have attained the 200 zone level and 1502 stations have attained the 150 zone level.

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

S52QM LY1FW

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
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)
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)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N6HR/7, 199 (37)
JA5IU, 199 (2)
CT3DL, 199 (26)
NØIJ, 199 (21)
RU3DX, 199 (6)
N4XR, 199 (27)
WØPGI, 199 (26)
HA5AGS, 199 (1)
EA8AYV, 199 (27)
VE3XN, 199 (26)
W6XK, 198 (17, 34)
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)
F5NBU, 198 (19, 31)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
WA5VGI, 198 (34)
K7BG, 198 (17, 22)
W7VJ, 198 (34, 37)
WØCP, 198 (18, 40)
K9MIE (18, 21)

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

S57XX (170 zones)
UA3BS (169 zones)
UT7EC (194 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $100 ($120 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>.

CQ DX Awards Program

SSB

2484 ..... W7GTO

CW

1078 ..... W7GTO

SSB Endorsements

320 ..... K6GJF/324
275 ..... XE1MEX/275
200 ..... IK8OZP/244
200 ..... AE9DX/217
150 ..... W7GTO/154
Mobile W7GTO

CW Endorsements

275 ..... WA4DOU

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.

The WAZ Program

20 Meter CW

563 ..... WA4DOU
564 ..... KA4RRU

6 Meters

79 ..... W3BTX

160 Meters

233 ..... UT7EC
234 ..... SM5CEU

All Band WAZ SSB

5000 ..... AF3X

Mixed

8410 ..... HL2ADO
8411 ..... NO9U
8412 ..... WS1L
8413 ..... UA3BS
8414 ..... UT7EC
8415 ..... UT4EK
8416 ..... UA3QUO
8417 ..... AF3X

CW

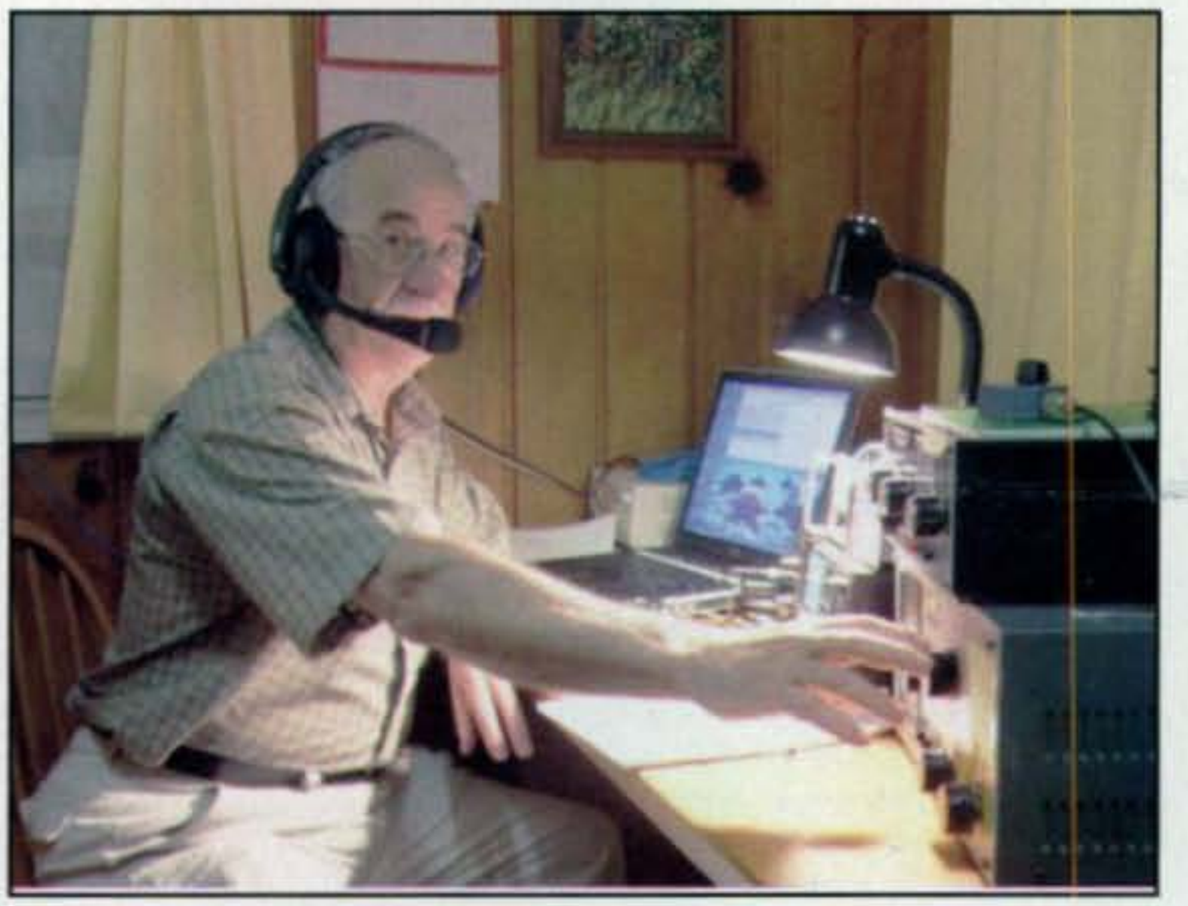
486 ..... DK8MCT
487 ..... AF3X

RTTY

167 ..... W9RPM

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>.

HR2DMR and Javier, HR2H, operating from Hog Keys as HQ3C. (Photo courtesy of Lane, HR2/KC4CD)



Ron, VE7NS, operating at VI9NI on Norfolk Island. (Photo courtesy of Bill, VK4FW)

some huge pile-ups, as Libya has not been active for quite some time. Operators for this one include: DJ7IK, DL1DBF, DL5EBE, DJ9CB, IT9ESZ (YL), K3LP, DK1BT, DF2SS, DL5CW, DL9USA, DJ7EO, DJ8NK, DF6ZV, PA0R, HB9AHL, DK1II, HB9TDE, DJ2VO, DL3KDV, DL8YHR, DK7PE, VE6OH, ON5GA, DL7RBI, K1LZ, and 5A1HA. That's an impressive lineup, so you won't want to miss this one.

ARRL "DXCC Dialog" Blog

The ARRL DXCC Desk has inaugurated the "DXCC Dialog Weblog," which contains news and notes about the ARRL DXCC program. "This page will have up-to-date information about the DXCC program," said ARRL Membership Services Manager Wayne Mills, N7NG, on June 26. "It does not provide for users to post responses, but authors and e-mail addresses are listed." The blog will be updated as needed to inform and update the DXing community regarding news of interest."

DX Gatherings

A couple of DX gatherings are scheduled for September. First the annual W9-DXCC Convention in Chicago will be held September 16 at the Elk Grove Village Holiday Inn, Chicago, Illinois. Details and registration form are on the web at: <www.w9dxcc.com>. I'll be there, again hosting the Friday evening Welcome Reception. Following the reception there is the late Friday Hospitality Suite hosted by Northern Illinois DX Association. It's always a good program and great fellowship.

Two weeks after Chicago, we'll be gathering in eastern Tennessee for the second annual SEDCO meeting. The first

N8BJQ Named New WPX Award Manager

Steve Bolia, N8BJQ, will be taking over administration of the CQ WPX Award program, following the retirement of longtime WPX Award Manager Norm Koch, WN5N (ex-K6ZDL). The WPX Awards are issued for confirmed contacts with stations having different call-sign prefixes.

Norm has held the reins of the WPX Award program for 25 years, taking over the job late in 1981, after Robert Huntington, K6XP, retired from the volunteer post. Norm has done a tremendous job of keeping the program active and up-to-date, as new and special prefixes arrived and older ones disappeared. We thank Norm for his many years of devoted service to amateur radio.

WPX enthusiasts will recognize Steve Bolia, N8BJQ, as former CQ WPX Contest Director, a post he held for 20 years before stepping down in 2003. Steve recently retired from his full-time job, so when we called asking for suggestions after Norm told us he wanted to step down, Steve replied, "Funny you should ask..." We welcome Steve back into the "CQ family" (not that he ever left!).

Award applications should now be sent to Steve Bolia, N8BJQ, P.O. Box 355, New carlisle, OH 45344. Applications and updates previously filed with WN5N have been transferred to N8BJQ and will be processed. WPX Award listings will resume as soon as the transition is complete.—*W2VU*

Steve Bolia, N8BJQ, CQ's new WPX Award Manager.

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	WA4IUM 334	W2VJN 334	K4CN 333	K9IW 332	N5HB 329	K1FK 324	F6HMJ 319	KT2C 300
K2FL 334	W4OEL 334	G4BWP 334	W4MPY 333	VE3XN 331	K1HDO 329	YV5ANT 324	OZ5UR 319	WA4DOU 297
K9BWQ 334	W2FXA 334	N7RO 334	N4CH 333	K2JF 331	K7JS 329	N5ZM 323	YT1AT 317	K4IE 291
K9MM 334	N4JF 334	W1JR 334	KA7T 332	K3JGJ 331	K5UO 329	KE3A 323	W6YQ 314	G3DPX 284
W7OM 334	K4MQG 334	I4LCK 334	K8LJG 332	WA8DXA 331	W6OUL 329	N7WO 323	UA9SG 310	DJ1YH 281
K2JLA 334	EA2IA 334	PY2YP 334	YU1AB 332	K7LAY 331	W4QB 327	KF8UN 323	W9IL 309	XE1MD 280
N7FU 334	PA5PQ 334	W8XD 334	K5RT 332	K4JLD 331	SM5HV/HK7 327	IKØTUG 321	EA3ALV 309	WD9DZV 277
K2OWE 334	K3UA 334	W7CNL 333	YU1AB 332	K9OW 331	W7IIT 327	IKØADY 320	YU7FW 306	W2JLK 277
N4MM 334	DL3DXX 334	K4CEB 333	NØFW 332	N6AW 331	KA3S 327	WG5G/QRPp 320	LU3DSI 302	
F3TH 334	K2ENT 334	K4IQJ 333	N4AH 332	W2UE 330	K6CU 326	W3II 320	N1KC 302	
F3AT 334	OK1MP 334	WØHZ 333	HB9DDZ 332	W4UW 330	W4LI 325	F5OIU 320	RA1AOB 300	
DJ2PJ 334	NC9T 334	N5FG 333	WB4UBD 332	G3KMQ 329	N4OT 325	PY4WS 320	VE7KDU 300	

SSB

K6YRA 335	K7JS 335	DU9RG 335	W5RUK 334	WB3DNA 333	CT1AHU 331	CP2DL 327	XE2NLD 315	KW1DX 295
K2TQC 335	XE1L 335	DU1KT 335	K4CN 334	K9PP 333	EA3JL 331	NI5D 327	IZ6CST 314	W4EJG 295
W6EUF 335	YU1AB 335	N4JF 335	EA3KB 334	W2CC 333	K1HDO 331	K7TCL 326	W7GAX 312	K7ZM 292
K2JLA 335	OE3WWB 335	CT1EEB 335	K3UA 334	DL3DXX 333	K5UO 331	HB9DDZ 326	WA5MLT 310	K1RB 292
K4MQG 335	K5TVC 335	W4WX 335	K4JLD 334	EA3BMT 333	AB4IQ 330	F6HMJ 326	XE2NLD 310	K7SAM 292
IK1GPG 335	N5FG 335	W1JR 335	N5ZM 334	EA3EQT 333	AE5DX 330	YV4VN 326	VE7SMP 310	KØOZ 291
K5OVC 335	DJ9ZB 335	N4CH 335	PY2YP 334	YV1KZ 333	KB2MY 330	WR5Y 325	RW9SG 310	W9ACE 291
NØFW 335	PY4OY 335	I4LCK 335	AA4S 334	KE3A 333	K3PT 330	KC4MJ 325	WØROB 307	N2LM 291
K9MM 335	VE3XN 335	PY2YP 335	CT3DL 334	W7BJN 333	ZL1BOQ 330	PY2DBU 325	KK4TR 306	KU4BP 291
W6BCQ 335	4Z4DX 335	ZL1HY 335	NC9T 334	K3JGJ 333	N7WR 330	YT1AT 325	WB2AQC 305	XE1MW 287
XE1AE 335	N7RO 335	WDØBNC 334	W9SS 334	N2VW 332	WS9V 329	K6GFJ 324	XE1RBV 304	W5PVE 286
W7OM 335	IØZV 335	K2FL 334	VE7WJ 334	YV1AJ 332	W9OKL 329	W6WI 323	K3BYV 303	KKØDX 285
KZ2P 335	EA2IA 335	WØYDB 334	VE2PJ 334	KSØZ 332	W2FGY 329	EA3CYM 323	JR4NUN 303	VE7HAM 285
IK8CNT 335	IN3DEI 335	W4UW 334	W3AZD 334	LU4DXU 332	CT1CFH 329	KE4SCY 323	VE7KDU 302	N8LIQ 284
VK4LC 335	EA4DO 335	K9BWQ 334	YZ7AA 334	VE4ROY 332	EA1JG 329	WA4ZZ 322	W5GZI 302	WØIKD 283
OE7SEL 335	PA5PQ 335	W4NKI 334	CT3BM 334	W7FP 332	W9IL 329	WN9NBT 322	W4PGC 302	KBØRNC 282
VE3MR 335	K9OW 335	WB4UBD 334	N6AW 334	K9HQM 332	KF8UN 328	W6OUL 322	EA8AYV 302	IK8TMI 281
VE3MRS 335	W6DPD 335	W4UNP 334	WS9V 334	W2FKF 332	WØULU 328	KD5ZD 322	YV2FEQ 301	F5INJ 279
K4MZU 335	XE1VIC 335	W8AXI 334	4N7ZZ 333	CT1EEN 332	K1EY 328	CT1ESO 321	AC6WO 301	WD9DZV 278
OZ5EV 335	K2ENT 335	VE2GHZ 334	VE1YX 333	K9IW 332	K3LC 328	N1KC 320	4X6DK 301	W5GT 276
N7BK 335	OK1MP 335	OE2EGL 334	W2JZK 333	DL9OH 331	K4DXA 328	W5GZI 320	4X6DK 300	K9DXR 275
K7LAY 335	IK6GPZ 335	WA4IUM 334	K8LJG 333	YV1JV 331	LU5DV 328	SV3AQR 320	N5WYR 300	XE1MEX 275
ZL3NS 335	K1UO 335	K5RT 334	VE4ACY 333	WA4WTG 331	XE1MD 327	KD2GC 320	K4IE 300	
N4MM 335	I8KCI 335	W2FXA 334	KØKG 333	K3JGJ 331	DK5WQ 327	LU3HBO 317	RA1AOB 300	
OZ3SK 335	I8LEL 335	W6SHY 334	VE2WY 333	N5ORT 331	KE5K 327	N8SHZ 316	WA1ECF 295	

RTTY

K2ENT 333	K3UA 328	N5FG 325	G4BWP 325	OK1MP 321	EA5FKI 320	PA5PQ 311	N5ZM 310	W4EEU 297
WB4UBD 332	NI4H 325							

year was so good that the organizers just had to plan it again. SEDCO is held the same weekend as the Ten-Tec Factory Hamfest, September 30th, in Sevierville, Tennessee. Beginning after lunch on Saturday, DXers and contesters will gather at the MainStay Suites in nearby Gatlinburg for the program. Check out the SEDCO website, <www. SEDCO. Homestead.com>, for more details. Ten-Tec is supporting SEDCO by selling tickets. This year an on-site dinner buffet, by Damon's restaurant, will be offered if desired. There will be a separate charge for the buffet, and Ten-Tec will be handling those tickets.

The MainStay Suites had "blocked" a substantial number of rooms for SEDCO, but those may be gone by the time you read this. You can check by calling 1-888-428-8350, and mention SEDCO. This is a great facility, and the feedback received last year has allowed the organizers to make the event even better for this year. Ted, W4NZ, will MC the Contest Program, while I will he handling the DX part of the program. This is a great time of the year to visit the Smokey Mountains, and there are also great shops in the Gatlinburg, Pigeon Forge area. Come and join us for an unforgettable weekend.

QSL Information

1AØKM via IKØFTA
2U1DQZ/P via G5XW
3A/K4ZLE via W8QID
3A/NØFW via W8QID
3A/N9NS via W8QID
3AØCE via F5LGF
3A3WPX via DJ9ZB
3B9/F8CHM via F8CHM
3B9/FR5EZ via F8CHM
3B9/ON4LAC via ON4LAC
3D2AM via K1ER
3D2BD via F4ELJ
3D2NB via W7YAQ
3D2OU via N7OU
3D2RO via N7OU
3D2RX via W7YAQ
3DAØVB via UA4WHX
3V8SM via HA5FA
3V8SS via ON4IQ
3YØX via N2OO
3ZØEE via SP1EG
3ZØOG via SP5YWA
3Z1EE via SP1EG
3Z1Z via SN1SM
3Z8IARU via SP8AQA
3Z8VD via SP8MI
4A7L via WA3HUP
4D2X via 4F2KWT
4JØAUM via UA3FDX
4JØDX via UA3FDX
4J8DX via DJ1CW
4K7FA via 4Z5LA
4LØB via UA4WHX
4L1DA via W7LPF
4L1DX via DJ1CW
4L1FX via DJ1CW
4MØI via IK6SNR
4O3AA via K2PF
4O3ANT via YZ1SG
4O3NT via YZ1AA
4S7JOG via LA7JO
4W1AF via DJ9ZB
4W1ZB via DJ9ZB
4W3ZZ via W4DR
4XØG via W3GG
4XØL via 4Z4TL
4X17A via 4Z4TL
4X17B via 4Z4TL
4X17C via 4Z4TL
4X17H via 4Z4TL

(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>.)

That wraps up this month. Are you ready for the upcoming "season"? Did you get your antenna projects finished? Better hurry! Until next time, enjoy the chase and please Have Fun!

73, Carl, N4AA

propagation

BY TOMAS HOOD,* NW7US

Fall Promises Much Better Propagation

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, June 2006: 14
Twelve-month smoothed, December 2005: 23

10.7 cm Flux
Observed Monthly, June 2006: 80
Twelve-month smoothed, December 2005: 85

***Ap* Index**
Observed Monthly, June 2006: 8
Twelve-month smoothed, December 2005: 10

September is a month of radical improvement in radio propagation conditions. On September 23, 2006 the sun will be directly over the equator. This happens twice a year, in the spring and fall, and is called an *equinox*. The fall, or "autumnal," equinox is the day on which the sun will cross the equator as it appears to travel from northern to southern skies. On this day, over much of the Earth the hours of daylight are equal to the hours of darkness. Sunrise should take place at approximately 6 AM local time and the sun should set at around 6 PM local time, except at the high latitudes.

This results in an ionosphere of almost similar characteristics over large areas of the world and is usually the best time of the year for long DX openings between the temperate regions of the Northern and Southern Hemispheres on all HF bands. Expect 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 are opening up on 20 meters. Expect a path to southern Asia around sunset, and daily morning openings to southern Asia and the Middle East, expanding to Africa. Also look for Antarctic short path, and signals from the Indian Ocean region long-path over the North Pole. Afternoons will fill with South Pacific long-path, and then extend to Russia and Europe. Look for possible long-path openings on 30, 40, and 80 meters for an hour or so before sunrise and just before sunset.

The winter DX season is about to open up, making for exciting DX conditions. While the weather is still warm and fair, tighten hardware on your antenna system, check coax cables, and fine tune your radio station. Get ready to reap the DX.

The 15-meter band will usually supply day-path propagation even over the polar paths, although these will become rare as compared with the peak solar cycle years. Watch 15 for many long-path opportunities. A considerable improvement is expected for DX propagation on both 15 and 17 meters, both opening shortly after sunrise and remaining open until after sundown. However, 15 will not stay open late into the night like it does during the spring season. 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

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 2006

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-2, 4, 6, 8-17 21-23, 27-29	A	A	B	C
High Normal: 3, 5, 7, 19-20, 24, 26, 30	A	B	C	C-D
Low Normal: 18, 25	B	C-B	C-D	D-E
Below Normal: N/A	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing 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 2 will be good (B) on Sept 1st; fair (C) on the 3rd 4th, and 5th; etc.

should become more reliable for those farther contacts. Working all states on 60 is very possible during this season. Eighty and 160 meters will become hot bands during the hours of darkness, especially for an hour or so before local sunrise.

For short-skip propagation during September and early October, use 60 and 80 meters during the day for openings shorter than 250 miles, and either 80 or 160 at night. For distances between 250 and 750 miles try 30, 40, and possibly 60 meters during the day and 80 meters at night. For openings between 750 and 1300 miles, 20 meters should work during the day; 30, 40, and 60 from sundown to midnight; and 60 and 80 from midnight to sunrise. For openings greater than 1300 miles try 15, 17, or 20 meters during the day, and 30, 40, and even 60 meters during the hours of darkness. Check 10 and 12 meters for some fairly good openings beyond 1300 miles in the afternoon hours, especially when conditions are High Normal or better, and for paths into South America and the south Pacific.

VHF Conditions

The month of September statistically has the lowest amount of sporadic-*E* propagation activity. Toward the end of September, trans-equatorial (TE) propagation will begin to occur between southern North America and northern South America. Openings will generally occur in the late afternoon to early evening hours.

Troposcatter conditions are generally very good for many of the VHF bands up to 440 MHz during September with the appearance of different weather fronts. This will be the primary mode for working up to 300 miles. A very useful internet resource for viewing tropospheric conditions is available at William Hepburn's "VHF /UHF Tropospheric Ducting Forecast" site <http://www.dxinfocentre.com/tropo.html>.

Don't forget to check out *CQ VHF* magazine as well as the VHF column by N6CL in this issue for a more in-depth look at VHF propagation. However, no matter what, get on the radio and try working the many modes. The more people active on these bands, the more we can unlock the mysteries of VHF propagation.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for June 2006 is 37.6. The lowest daily sunspot value recorded was zero (0) on June 2 and June 3 and from June 22 through June 24. The highest daily sunspot count was 33 on June 7 and June 8. The 12-month running smoothed sunspot number centered on December 2005 is 23.0. A smoothed sunspot count of 10, give or take about 12 points, is expected for September 2006.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 80.1 for June 2006. The 12-month smoothed 10.7-cm flux centered on December 2006 is 85.4. The predicted smoothed 10.7-cm solar flux for September 2006 is 73, give or take about 14 points.

The observed monthly mean planetary *A*-index (*Ap*) for June 2006 is 8. The 12-month smoothed *Ap*-index centered on December 2005 is 10.4. Expect the overall geomagnetic activity to be varying 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 for isolated periods of stormy activity. Refer to the Last-Minute Forecast at the beginning of this column for the days on which 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, de Tomas, NW7US

August Column Correction

I inadvertently listed the Space Environment Center's Space Weather Operations (SWO) numbers instead of the S.I.D.C. Brussels International Sunspot Number (RI) for May 2005 through October 2005 in the August column. The numbers that I typically report in this column are the RI number from the official keepers of the sunspot numbers, the S.I.D.C. The correct smoothed sunspot numbers are as follows:

May 2005	29
June 2005	29
July 2005	29
August 2005	28
September 2005	26
October 2005	26

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.

September 15–October 15, 2006
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 Mediterranean & 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)	08-10 (1) 13-15 (1) 15-18 (2)	19-22 (1) 22-00 (2) 00-02 (1)

Southern Africa		15-16 (2) 16-17 (1)	18-19 (3) 19-20 (2) 20-21 (1) 23-01 (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)*

* 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 2006
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)
40	08-10 (0-2) 10-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-22 (0-1)	08-10 (2-3) 10-12 (4-3) 12-16 (4-2) 16-18 (3) 18-20 (2-4) 20-22 (1-4) 22-00 (0-3) 00-03 (0-2) 03-06 (0-1) 06-08 (0-2)	08-10 (3-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-20 (4-3) 20-22 (4) 22-00 (3-4) 00-03 (2-3) 03-06 (1-2) 06-08 (2-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-21 (4-3) 21-00 (4) 00-03 (3-4) 03-06 (2-3) 06-08 (4-2)
80	07-09 (3-4) 09-12 (4) 12-19 (4-3) 19-22 (4) 22-04 (3-4) 04-07 (2-3)	07-09 (4-2) 09-12 (4) 12-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-04 (4) 04-06 (4-2) 06-07 (3)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-04 (4) 04-06 (4-2) 06-07 (3-2)	07-09 (1) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (3-2) 22-04 (4-3) 04-06 (2) 06-07 (2-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (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) 18-21 (1) 21-00 (2) 00-02 (1)	08-12 (1)
Central States	*Nil*	21-01 (1)	13-15 (1) 19-22 (1) 22-01 (2) 01-03 (1)	08-13 (1)
Western States	*Nil*	20-21 (1) 21-23 (2) 23-01 (1)	17-18 (1) 18-22 (2) 22-01 (3) 01-03 (2) 03-05 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (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) 12-15 (2) 15-16 (1)	11-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-19 (1) 03-05 (1) 05-07 (2) 07-08 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 19-20 (1)* 20-23 (2)* 23-01 (1)*
Central States	09-13 (1)	07-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	05-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-17 (4) 17-18 (2) 18-20 (1)	17-19 (1) 19-21 (2) 21-02 (3) 02-04 (2) 04-05 (1) 19-20 (1)* 20-00 (2)* 00-02 (1)*
Western States	10-15 (1)	07-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-21 (1)	17-18 (1) 18-19 (2) 19-01 (4) 01-03 (3) 03-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-03 (3)* 03-04 (2)* 04-06 (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.

Announcing:

The 2006 CQ WW DX Contest

Phone: October 28–29 CW: November 25–26
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:

<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. By submitting a potential high-scoring log to the CQ WW Contest, the entrant agrees to have the log open to the public.*

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. 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 $8\frac{1}{2}" \times 11"$ 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, 2006 for the SSB section and January 15, 2007 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.

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
CT3EN	375/18/61	868/21/83	1707/29/103	1145/32/106	2142/34/121	183/17/50
P4ØW	350/18/57	808/22/80	1255/30/89	1854/35/110	1744/29/100	427/15/24
8P5A	449/17/58	941/23/86	1121/29/102	1566/30/99	1959/29/103	525/17/37
A45XR	227/13/53	392/23/73	1777/37/123	1597/34/120	1476/32/106	50/15/25
ZD8A	122/13/38	256/17/63	885/26/86	1070/30/104	2197/31/120	498/23/60
EA8EW	157/11/47	661/17/58	1543/25/84	1454/28/84	1636/22/76	198/18/57
CU2A	255/15/60	970/22/83	1754/27/97	1455/29/107	1782/30/108	103/14/44
YW4D	254/13/57	682/22/84	1054/27/92	1106/31/74	1267/30/106	373/17/34
ZF1A	263/15/43	543/18/72	1680/29/99	1691/33/111	1442/24/89	38/13/17
6W1RW	38/11/24	307/16/65	724/24/90	1034/31/107	1690/30/112	297/18/67

USA TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
K5ZD/1	112/17/56	789/22/92	815/29/107	1447/36/125	546/25/104	40/12/23
K3CR	103/13/50	523/22/92	502/33/104	1472/34/114	466/24/94	45/12/24
N2NT	132/15/57	668/21/91	619/28/104	1300/32/114	303/24/90	44/12/25
W1KM	138/14/52	668/19/73	544/30/103	1266/29/100	336/22/79	35/11/21
K4ZW	71/14/49	438/23/83	620/29/106	1189/32/111	453/19/85	26/10/18
K1ZZ	90/13/46	313/24/90	610/28/99	1065/31/111	333/25/100	48/13/28
W9RE	89/16/46	476/18/82	444/28/91	1141/34/113	398/25/88	38/9/22
AA1K/3	147/15/54	471/23/82	493/30/94	1193/30/105	246/22/79	35/11/21
N2LT	81/11/40	234/16/72	535/32/104	1086/34/114	393/24/88	16/6/13
WC1M	50/12/41	404/17/70	460/26/90	1334/36/114	143/20/68	23/9/20

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

P4ØL	346/17/66	667/25/104	2350/36/131	1796/35/138	1672/33/121	636/19/48
3V5A	270/17/72	1606/26/94	1584/34/123	2550/36/123	1095/34/120	32/16/32
EA8ZS	192/17/66	554/23/100	1672/35/130	1145/35/140	1856/35/141	65/22/61
5J1W	83/8/19	760/23/85	2003/32/110	1554/37/121	1777/28/103	396/19/42
KT1V	111/16/76	867/29/111	1368/38/135	1492/36/142	326/29/116	35/14/35
LR2F	13/8/10	144/19/43	907/34/115	1290/36/123	2115/36/133	507/22/53

USA MULTI-OPERATOR SINGLE TRANSMITTER

KT1V	111/16/76	867/29/111	1368/38/135	1492/36/142	326/29/116	35/14/35
K1IR	86/14/66	703/25/107	652/34/131	1456/37/139	324/25/112	35/13/34
K1KI	121/16/75	667/27/108	720/35/130	1146/38/140	406/27/116	48/13/37
W2FU	80/16/63	674/27/105	519/34/126	1735/38/132	128/25/101	36/14/35
K8AZ	58/15/57	340/28/103	667/38/139	1562/38/146	184/27/108	44/14/34
K3OO	58/14/54	440/25/101	603/35/128	1333/35/133	293/25/109	27/13/25

WORLD MULTI-OPERATOR TWO TRANSMITTER

IH9P	658/19/79	1695/27/109	2930/35/138	2638/37/133	1836/37/142	239/20/53
8Q7DV	266/19/58	744/33/100	2480/38/140	1468/36/133	2037/35/133	325/23/68
VP5W	438/13/59	827/24/97	2425/34/121	2453/34/121	1987/33/122	46/15/27
WP2Z	254/11/33	796/18/81	2163/35/123	2191/36/122	2150/32/120	545/20/58
RU1A	844/28/95	1879/35/131	1924/38/151	2104/39/144	583/37/142	174/17/49
EA6IB	646/19/76	1662/28/111	1919/36/137	2096/38/135	1233/36/136	131/18/55

USA MULTI-OPERATOR TWO TRANSMITTER

K1AR	102/17/56	464/24/101	963/35/134	1910/38/143	712/27/124	33/10/23
NY4A	125/16/61	831/28/105	1192/31/117	1542/35/131	787/25/110	30/13/19
KØTV/1	107/14/56	556/26/101	759/31/127	1145/33/125	423/24/104	32/9/19
N4WW	89/14/63	279/26/101	807/35/128	1123/37/136	625/28/119	53/15/30
NØNI	92/15/44	300/27/98	520/37/127	1112/36/129	320/28/102	50/13/30
W8ZA	62/10/31	171/19/85	261/29/101	1085/36/125	203/23/83	27/7/16

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

HC8N	1069/21/78	1638/31/111	3640/37/139	3525/40/157	3570/38/148	1505/29/93
TZ5A	329/16/64	638/22/87	2545/35/139	4149/39/153	3657/39/152	570/25/93
PJ2T	1000/22/89	1220/28/106	2878/37/135	3275/37/137	2522/33/133	959/21/58
KC1XX	385/21/83	1618/33/120	1418/36/142	2356/38/150	1011/32/136	141/16/45
LZ9W	883/15/71	2046/32/120	2713/37/149	2591/38/147	1255/37/146	111/19/51
K3LR	292/20/79	1100/32/121	1479/38/154	2439/38/155	677/30/123	144/16/44

USA MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	385/21/83	1618/33/120	1418/36/142	2356/38/150	1011/32/136	141/16/45
K3LR	292/20/79	1100/32/121	1479/38/154	2439/38/155	677/30/123	144/16/44
W3LPL	366/20/91	1129/31/119	1370/39/149	2135/38/157	943/31/132	194/16/45
N3RS	113/16/63	649/29/107	1368/37/144	1950/38/144	701/28/122	81/15/39
NQ4I	248/19/73	503/27/106	1191/38/147	1771/38/146	1044/30/129	165/15/36
K1TTT	190/15/66	822/26/102	872/37/134	1591/38/141	676/26/118	154/17/42

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. The fantastic low-band conditions produced several records.

World: 3.5 CN2R (W7EJ), 1.8 VY2ZM (K1ZM), Q14 SU8BHI; **Africa:** 3.5 CN2R (W7EJ), Q14 SU8BHI, MS 3V5A; **Asia:** 7 TA3DD; **Europe:** ALL CU2A (OH2UA), L7 IY4W (IK4ZGO), Q14 S56A, Q7 S54AA; **Japan:** (None); **North America:** 1.8 VY2ZM (K1ZM), L14 TI5A (K2PLF), L1.8 TE1W (NØKE), A14 KP4KE; **USA:** 1.8 VY2ZM (K1ZM), Q1.8 K3BU, A14 W5MX/4; **Oceania:** 7 KH7X (KH6ND); **South America:** L1.8 PV8DX, A21 LU4DX (LU5DX), MS P40L.

Special Mention

The CQ WW is a great place to pick up new countries. Hundreds of contesters leave their QTHs and spread out across the world, heading for exotic locations. In the 2005 CW contest, 172 countries submitted logs! The total number of countries available in all the logs was 221. DXCC and WAZ are obtainable in one weekend. Thanks to the many DXpeditions and the efforts of hundreds of contesters who made the contest experience more interesting for all of us. Here are a few of the calls you probably worked:

CU2A, CU2/OH3BHL, TK/DJ9RR, J45A, J45KLN, ZB2X, J43J, J43F, GD6IA, GJ2A, LX/DL5SE, LX/DK4ARL, 9H3LEO, OJØB, OJØJ, ISØN, 9M8YY, 4W3ZZ, KH6RZ, A35TT, P40W, P40A, PS2T, ZPØR, 9Y4AA, CW5T, C6AUR, SU8BHI, KH6WW, VP9I, V31TM, FM5JC, KP4KE, D44TD, 5B/AJ2O, VK9AA, VK3KE, VK2GC, KH6/VE7AHA, ZL3TE, FY/F5IRO, PJ4M, 6Y7A, VP2E, 7XØRY, 3V5A, A52CDX, 4XØG, LX7I, T88A, AH2R, P40L, 5J1W, VP5W, IH9P, 3B8/OM3PC, 8Q7DV, BVØJ, 9M2CNC, TF4M, PZ5C, FP/K8DD, TZ5A, R1MVC, HC8N, PJ2T, 4U6ØUN, V26K, C6AQQ, C6AGY, C6AWS, 8P5A, VY2TT, ZF1A, VY2ZM, TI3M, TI5N, TI5X, TI5A, TE1W, J79CW, HI9L, HI3/SP9XCN, FG5BG, 6Y3R, HP1/OA4WW, V47/AB2RF, PJ7/K7ZUM, J88DR, HKØFD, KP2TM, KP2/K3MD, ZD8A, ZD8R, EA8EW, EA8/OH4NL, 9G5GJ, 5Z1A, CT3EN, CT9A, CN2R, CN2WW, 6W1RW, STØRM, 3DAØNW, YI9LZ, T6X, HSØZAR, OHØE, OHØM, OHØZ.

Comments

To anyone who participated in the 2005 CW contest, it was clear that conditions on the low bands were really good. The number of countries on 160 and 80 meters hit all-time highs. N4PN had 96 countries on 160! It wasn't so long ago that 96 countries on 80 was an outstanding effort.

In October of 2005, just before the SSB contest, CQ WW certificates which had been in arrears were brought up to date. Thanks to Barry, W5GN, for his support and hard work to help clear the decks.

The percentage of electronically submitted logs was again about 95%! The CQ WW Contest Committee thanks all the entrants who took the time to submit their log electronically via the CQWW robot. Your effort to submit an electronic log allows for a fairer adjudication process. No matter how small your log, please send it to the CQ WW robot. It is easy. Send your CW log to <cw@cqww.com> (SSB to <ssb@cqww.com>). Send your log in Cabrillo format, which all the logging programs will create as an output. If you did everything okay, you will get back an acknowledgment and a tracking number. This tracking number is *not* the same as the password needed to access your UBN report. We will send your password sometime in the spring. If there was something wrong with your log submission, you will get a message telling you what to do to correct the error. You can then resubmit your log to the same above addresses. If you still are having trouble, contact <questions@cqww.com> for help. We will be happy to assist you.

The CQWWCC provides many ways for an entrant to check his/her log for category, club, operator, and score accuracy long before the final results are published. The logs-received list showing your category and the UBN list listing your final score are two ways you can interact with the CQWWCC before final printing (cqww.com). Thanks to the input from several entrants, corrections were made to their final scores. All these efforts help to make the results as accurate as possible.

Please remember that receiving help to find multipliers (using the DX Summit, for example) or QSOs places you in the Assisted category. Having a person help you at your operating location places you in a Multi

EUROPE TOP SINGLE OPERATOR ALL BAND

Station	160	80	40	20	15	10
CU2A	255/15/60	970/22/83	1754/27/97	1455/29/107	1782/30/108	103/14/44
CT8T	181/11/51	710/21/81	1753/32/113	1453/33/109	1205/32/100	52/14/34
ER4DX	377/8/52	840/26/96	1586/36/132	1876/37/127	313/33/104	54/8/24
S5ØA	152/16/56	766/25/73	1063/31/100	1076/32/109	658/34/93	48/18/40
TM6X	126/13/53	752/18/85	984/27/99	986/28/79	722/33/109	36/12/24
GD6IA	559/12/57	1035/21/86	1149/27/98	1286/27/90	477/28/88	79/8/25
MW5A	189/9/46	648/17/77	1029/26/96	1583/31/95	512/29/76	25/5/10
DL3YM	240/12/56	708/18/78	1129/30/109	1053/29/83	418/31/95	23/7/14
G3TXF	296/14/54	621/19/75	729/21/84	1558/31/92	358/24/70	67/11/26
ES5TV	440/19/62	764/23/81	772/27/82	1339/31/91	458/28/84	57/8/24

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

OM7M	178/21/76	882/29/114	1523/37/146	1451/35/140	610/37/139	61/18/60
EI7M	442/17/74	1448/28/107	1311/29/121	2077/36/132	914/34/121	38/8/24
OM8A	241/18/79	554/26/108	1560/38/143	1458/39/142	731/37/135	100/19/60
G6PZ	288/18/72	865/26/108	1380/33/120	1980/37/127	555/35/133	30/11/30
OK5W	176/19/73	1023/31/118	1272/38/146	1297/38/140	493/36/125	65/18/65
TM2Y	234/18/79	773/26/105	1380/36/136	1472/39/135	634/35/127	66/13/37

EUROPE MULTI-OPERATOR TWO TRANSMITTER

RU1A	844/28/95	1879/35/131	1924/38/151	2104/39/144	583/37/142	174/17/49
EA6IB	646/19/76	1662/28/111	1919/36/137	2096/38/135	1233/36/136	131/18/55
9A7A	749/17/72	1535/29/112	2357/36/141	1799/36/134	899/36/140	101/19/44
IR4X	330/16/77	1438/29/113	1854/39/137	1762/38/146	1006/36/135	83/20/62
UU7J	504/18/78	1265/29/110	2202/39/152	2000/38/145	1000/36/131	85/17/39
HG6N	494/14/69	1021/26/105	1518/36/141	1745/37/136	870/37/137	100/14/43

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

LZ9W	883/15/71	2046/32/120	2713/37/149	2591/38/147	1255/37/146	111/19/51
DQØQ	1124/20/88	2071/32/119	2676/38/154	1993/38/145	606/37/136	310/20/69
RW2F	1378/24/90	1780/28/113	2209/38/147	1953/37/136	611/36/142	161/13/52
DFØCG	827/14/72	1876/32/121	2186/38/150	1926/39/143	763/36/142	142/18/61
YT6A	586/17/74	1167/27/98	2192/38/140	2392/37/138	927/36/115	92/18/42
R1MVC	1629/21/82	2558/29/114	2235/35/113	1732/31/116	345/25/85	9/4/7

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

N6CW/7	2,509,784
W7RN	2,265,417
K7GK	1,902,865
K6XX	1,406,898
W6PH	1,288,560
W2VJN/7	1,023,960
VE7UF	974,700
WA7LT	774,630
N7TT	767,988
K7ZZ	758,016

Zone 4

VE3EJ	4,721,808
VC3O	4,280,916
W9RE	3,907,904
N2IC/5	3,348,750
VE3EY	3,323,781
*VE3DZ	2,313,036
WXØB/5	1,730,099
*N5AW	1,644,186
KØEU	1,596,062
*VE3JM	1,474,083
W5VX	1,395,456
KØSR	1,359,694

Zone 5

K5ZD/1	6,900,552
K3CR	5,287,744
N2NT	5,143,683
VY2TT	4,966,176
W1KM	4,548,425
K1ZZ	4,169,056
AA1K/3	3,844,272
VO1AU	3,744,921
N2LT	3,614,850
WC1M	3,514,037

Zone 14

CU2A	7,915,656
CT8T	6,374,362
*CT6A	4,730,157
TM6X	4,290,840
GD6IA	4,158,378
MW5A	4,063,103
DL3YM	3,917,702
G3TXF	3,682,949
EA5FV	3,116,265
GMØF	2,491,314

Zone 15

S5ØA	4,752,033
ES5TV	3,581,200
OHØE	3,534,100
OL8R	3,137,913
OH1F	2,822,175
9H1ZA	2,807,872
SP4Z	2,743,227
*9A5K	2,534,280
YL2KO	2,375,520
HA8A	2,104,832

Zone 16

ER4DX	5,806,866
RW1ZA	2,241,296
RW3GU/3	2,229,400
UA3QDX	2,027,400
*UA4FER	1,755,890
*UR5HAC	1,671,824
RT3T	1,443,420
UW5U	1,399,648
UA4CCG	1,198,880
*RN6FA	1,175,094

Zone 25

JH4UYB	4,160,646
JF1SQC	2,176,850
JE1CKA	1,880,016
JH7XGN	1,299,293
*JH8SLS	749,436
*JI1RXQ	736,452
JA7DLE	663,336
*JH2NWP	597,402
JA1JKG	530,140
JF3CCN	505,042

** Low Power*

DX QRM

Most interesting adventure! Thanks for the QSOs! . . . **3DAØNW.** This is a great contest that everybody can enjoy . . . **4S7RS.** Great. First use of 5Z4LS since left Kenya in 1970. Higher bands hard work, especially with 19 hr power cut. Worked from hired car when no AC power, hand logging . . . **5Z4LS.** First time out in the low power section. The great advantage was that it kept the temperature down to a reasonable level. Good condx helped a lot here at 64 degrees north . . . **7S2E.** I'm slow on CW, tnx for QRS. I operated few hours in the afternoon on 20m with 100w and a wire vertical from Gozo Island EU-023. . . . **9H3LEO.** Nice contest from Bhutan . . . **A52CDX.** It was fun. Limited working conditions. Only a homebrew fishing rod was used during the contest, and propagation on high bands was fair. See you next year . . . **B4TB.** Contesting, beach walks, and cinnamon rolls in paradise. What a life! . . . **C6AGY.** SO2R rocked!! Tks to my father for helping with the antennas and CT1BOH for WXØB box . . . **CT6A.** Again a lot of fun! Despite the bad conditions on 10m and 15m I worked QRP-DXCC (in total 105 entities). Surprising the many U.S. and Caribbean stations who copied my QRP signal on 40m, some even on 80m! VY2ZM copied my 5 watts on 160m on first call . . . **DK5WL.** Conditions pretty good this year except 10m which was nearly dead; only some very short openings or perhaps everybody thought that the band was dead and didn't try to activate it! . . . **F6FTB.**

As disappointing as 15 was, and truly pathetic as 10 was, they were made up for by the stunning low band conditions. I have never before worked ZL or the U.S. West Coast on 80! 20 was great too, though it closed early. This contest is the high point of the operating year for many, and more fun than I have doing anything else in radio. Thank you to the committee for organising it. Thanks also to G3LET for letting me use his station for the weekend, and to everyone for the QSOs . . . **GØRTN.** Best ever CW entry for own category. If you are single operator in *any* category, you cannot receive help in *any* way from another person. The use of packet to self-spot is also against the rules. There is nothing wrong with coming across a station and spotting it, but self-spotting is against the rules. The CQ WW provides a great opportunity to work new countries and prefixes. Everyone is counting on the other person to act in an honest manner, yielding true winners in all the categories.

Thanks

Thanks to the members of the CQ WW Contest Committee. Their hard work helped to resolve submission problems, validate the winners and provided insight into many contesting topics: K1DG, K3WW, K3ZO, KR2Q, N2AA, N2NC, N3ED, N6ZZ, N9RV, W3ZZ, K1AR, KM3T, KT3Y, N5TJ, W5OV, K6AW, W5GN, and N8BJQ. The DX advisors offered advice and help to sort out problem logs: CT1BOH, EA3DU, F6BEE, G3SXW, I2UIY, JE1CKA, OH2KI, OH2MM, PY5EG, S50A, UA9BA, VA7RR, VE3EJ, RA3AUU, E21EIC. A special thanks to Dick, N6AA; Larry, N6TW; and Phil, N6ZZ, who spent countless hours to make the CQWW as accurate as possible. The CQWW 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. Barry, W5GN, helped provide software which produced the details of the final results and certificates.

Congratulations to all the winners and entrants! CU in the 2006 WW DX contests! 73, Bob, K3EST

personal record! Conditions on LF bands good, nil on 10m this time (well only few!). Need more energy, but not too bad for a 76 year old! . . . **GW3JXN.** First time with 5 watts and 3-element Yagi on 10-15-20 meters and FD-4 Windom on 40/80 meters. Amazing what can be achieved with 5 watts and a Yagi! Wonderful contest, good conditions . . . **HB9CBR.** Surprising opening on 160 near my dawn. I heard and worked many NW EU stations . . . **HSØZDJ.** Military exercises started the night before the contest and I was not permitted to use the telescopic aluminium tower, hidden in the mountains, in the area of maneuvres. Forget the Mediterranean sunshine. The rain had washed away access to the mountaintop /p operating position so I had to operate from a beach. Then a brand new IC706MkIIG (purposefully purchased for the contest) died a couple of hours after the beginning of the contest. What can i say? Cu next year! . . . **J45A.**

The openings on 10m were very limited from JA8, but we did our best especially for 80 and 20m mults as we spent more time on the bands and chased new ones. It certainly was a lot of fun. Thanks to our all operators, but me, who came all the way from JA1! . . . **JA8RWU.** Superb conditions, and a new Oceania 40m record. Aloha . . . **KH7X (KH6ND)** With only 100 watts I must say the guys had really good ears this time. USA on 80m? Wow! . . . **LA1PHA.** Great contest again. Condx were weird though. 40m never really opened towards NA and the important Caribbean mults were very hard to get. 15m produced some good mults but no run whatsoever. 10m was almost dead. Some of the mults we made on 10m were pure luck, as the signals were really weak with peaks lasting a few seconds or less. Low bands were great, with one juicy mult after the other! Happy to work you all in the contest! . . . **LN8W.** Conditions were much better than expected and working alone, set myself a slow target of 200 QSOs and was happy to achieve that comfortably and get a few new DXCC and IOTA callsigns. Looking forward to the next one already . . . **MØOIC.** My first opportunity to operate a contest from DX location. A different perspective from stateside operation, in that you are always in-demand and create a pile-up each time you call CQ. Many thanks to the members of Radio Club Peruano for their support and the use of the station . . . **OC4O (WØTT).** Super! About 3 ft fresh snow outside, a warm contest room. Best to do a relaxed contest . . . **OE8CCQ.** I am not favouring single band operations but this time even getting an 80m quarter-wave vertical up was a challenging job. Sometimes the autumn stormy waves swept over the rocks. Glad to be able to give a multiplier and sometimes a new country to so many. However on single band I was badly missing the challenge and excitement of moving mults and timing the band changes. Missing those two elements one feels more like a spectator in a contest than a contester . . . **OJØB (OH2PM).** This is a special call of PI4NWG, Veron Afd. Nieuwegein. Had great fun with QRP. Thank you for a nice contest . . . **PI6ØNWG.** First CQWW CW out of W7 land, what a great time ! took my youngest son and his girlfriend with me, decided on doing a 15m, low power entry, so when the band folded, we all could go out in the evenings and check out the island nightlife! All in all, we had a great time, and will probally be back next year, but maybe a 20m effort. Need more action! . . . **PK7/K7ZUM.** Congratulations to all of the Multi-2 stations, especially EA6IB and IR4X. It's the competition from fine teams that get us fired up year after year . . . **RU1A.** Now I have reached 60 years of age but will work this contest as long as I can see, hear, or even stand up. It is great to participate in the world's largest concert! . . . **SM3C.** The team was composed of CW operators and some others who are learning the code. Once more it was a pleasure to enter in this contest even if the propagation on 10m is so poor. We missed some openings time to time but for sure we will improve the station and the operators for the next one . . . **TM4Q.**

Every time when I take part in CQWW DX I'm astonished how my weak signal (5w) is received, rather good so far. What good antennas, apparatus, and operators are there! . . . **UT5UQV.** Ah, if only it could be like this all year round! . . . **VK6HG.** 10 watts working from car! Finally battery is out and car cannot move . . . **YC3MM.** Good conditions from near Egypt. Surprised to hear two other /MMs in zone 34. Whole station (including antenna) only 8 kg! . . . **ZC4LI.**

CLUB SCORES

DX

Bavarian Contest Club	232,211,460
Rhein-Ruhr DX Association	137,816,881
Contest Club Ontario	89,723,652
Contest Club Finland	60,994,332
World Wide Young Contesters	55,965,351*
Russian Contest Club	53,255,010
Ural Contest Group (UA9)	49,328,221
Araucaria DX Group (PY5)	38,459,354
YU Contest Club	34,037,785
Chiltern DX Club (G)	31,483,424
Croatian Contest Club	30,430,809
Slovenian Contest Club	30,219,594
Tikirriki Contest Club (I)	28,600,499
Kaunas Technology Univ RC	26,003,075
Madeira Contest Team (CT3)	28,373,115
UA2 Contest Club	24,839,926
Ukrainian Contest Club	24,561,865
LBCC (OM)	22,346,871
VK Contest Club	21,546,933
SP DX Club	21,423,284
Lithuanian Contest Group	18,681,164
Crimean Contest Club	16,660,387
Maritime Contest Club (VE)	16,418,375
East Coast Canada Contest Club	14,948,556
Tartu Contest Team (ES)	14,828,198
South Ural Contest Club	13,832,681
Latvian Contest Club	13,129,172
Moscow Contest Club	12,974,496
HA DX Club	12,858,047
Low Land Crazy Contesters (PA)	12,713,087
Austrian Contest Club	12,186,398
Sky Contest Club (YU)	11,662,641
Lima Alpha Contest Club (LA)	10,361,243
KKKK (UA6A)	10,286,006
British Columbia DX Club	9,629,102
Bashkortostan DX Club (RA9W)	9,288,203
LDXG (F)	7,759,794
Tupy DX Group (PY)	7,479,378
Marconi Contest Club (I)	6,964,766
Orenburg RC (UA9S)	6,879,534
Israel ARC	6,778,396
Central Siberia DX Club (UAØA)	6,775,230
Z30M Contest Team	6,715,668
LU Contest Group	5,423,932
Kiev Contest Group	5,401,827
Lynx DX Group (EA)	5,189,908
Vrhnika Contesters (S5)	5,113,477
ATCC (EY)	5,014,930
ARUK (EX)	4,998,320
DXXE (XE)	3,671,918
GACW (LU)	3,316,046
Brimham Contest Group (G)	3,248,419
Bosnia-Herzegovinia Contest Club	3,027,197
Guara DX Group (PY7)	2,651,989
Kherson RS (UR-H)	2,536,227
Ivanovo DX Club (UA3U)	2,507,829
Top of Europe Contesters (SM)	2,475,736
Belarus Contest Club	2,467,700
Alberta Clippers (VE6)	2,404,949
Yamal Radio Club (UA9K)	2,387,128
Kemerovo Radio Club (UA9U)	2,005,562
Danish DX Group	1,957,391
Moscow City Radio Club	1,948,382
Fox Contest Club (YU)	1,828,564
Radio Club Costa Rico	1,822,807
Akmolinskiy Radio Club (UN)	1,793,681
Perm Club (UA9F)	1,492,910
Temirtau Contest Club (UN)	1,253,574
MRC (UA6Y)	1,237,266
Bristol Contest Group (G)	1,214,087
Omsk Region RC (UA9M)	1,205,573
Amsterdam DX Contest Club	1,133,980
Uirapuru DX Club (PY8)	1,126,156
South German DX Group	1,124,536
YO DX Club	1,079,302
ALRS (UA1)	1,073,170
Banat DX Group (YU7)	1,064,712
YO5KAD Club	1,002,170
Koryazhma DX Company (UA1O)	995,542
SP Contest Club	888,907
Siam DX Group	850,170
Belokranjec Club (S5)	801,063
Argo (US-I)	810,697
Parma Club (UA9X)	721,982
Serpuhov Radio Club (UA3D)	666,563
Bracknell ARC (G)	643,366
Czech Contest Club	592,059
Dozen Dashes Contest Club (OM)	579,457
RAST (HS)	576,036
ARM (ER)	553,178
RZ4AWA Club	448,825
Novio Magum DX Group (PA)	395,265
Radiosporting Team Vaaj (OH6)	361,076
Radio Club Vologna (UA1Q)	361,054
LKK (UR-W)	331,711
Podolsk Radio Club (UA3D)	326,479
Kirov RC (UA4N)	280,245
Kamchatka RC (UAØZ)	279,611
YO2KAR Club	276,846
Orel (UA3E)	240,805
Tokyo International ARA	235,174
Vladimir Radio Club (UA3V)	228,262
GM DX Group	200,778
Shakhan Contest Club (UA6A)	124,235
Amur (UAØC)	121,626
Paper DXers (JA)	109,657
University of Tokyo Contest Club	106,152
Parnu RC (ES8)	51,851
YU DX Club	47,493
SP5PSL Club	44,478
Nikolaev (UR-Z)	30,164

**Listed for completeness, however, not within Club rules.*

USA

Yankee Clipper Contest Club	291,818,776
Frankford Radio Club	270,969,017
Potomac Valley Radio Club	145,414,737
Southern California Contest Club	65,457,881
Northern California Contest Club	53,588,712
North Coast Contesters (W3)	53,368,416
Central Arizona DX Association	53,027,550
Florida Contest Group	42,559,145
Mad River Radio Club (W8)	33,779,344
Southeast Contest Club (W4)	28,873,413
Society Midwest Contesters	27,551,622
Tennessee Contest Group	24,921,750
Minnesota Wireless Association	24,589,534
Western Washington DX Association	24,147,713
Central Texas DXCC	20,800,555
Hudson Valley DXCC	19,422,409
North Texas Contest Club	18,999,112
Willamette Valley DX Club (W7)	12,308,355
Rochester DX Association (W2)	9,419,809
Grand Mesa Contest Club (WØ)	5,664,364
Mother Lode DXCC (W6)	4,097,659
Kentucky Contest Group	3,431,264
CT RI Contest Group	3,080,490
Low Country Contest Club (W4)	2,971,014
Spokane DX Association	2,847,214
Utah DX Association	2,082,821
Albuquerque DX Association.	1,476,745
North Carolina DXCC	1,357,059
Salt City DX Association (W2)	1,342,144
Texas DX Society	1,074,626
Order of Boiled Owls of NY	940,321
Northern Illinois DX Association.	906,393
Carolina DX Association.	862,007
Central Oregon DX Club	826,934
Bay Area Wireless (W9)	824,333
Northern Arizona DX Association	795,538
Utah's Dixie DX & Contest Club	649,752
Kansas City DX Club	599,357
Northeast Wisconsin DX Club	586,723
South Jersey DX Association	576,514
West Park RadioOps (W8)	534,441
Bergen ARA (W2)	524,114
Southeastern DX Club	343,924
South Texas DXCC	302,255
Western NY DX Association	216,397
Metro DX Club (W9)	150,374
Florida DXpedition Group	73,962
Redmond Top Key Contest Club (W7)	19,059
Caribbean Contesting Club (W7)	8,283

USA QRM

Lost AC power 2 hours before the end of the contest, so I missed the part I like the most. Other than that the bands were great and had a great time making a lot of contacts. Thanks to everyone who gave me a call . . . **AD5VJ.** Thanks to Jeff, K4JNY, and Scott, W4PA, for letting me play with the toys. Always a great contest! . . . **KØEJ.** Had a great time on the low bands . . . **KØRF.** Only operated a few hours because I had family visiting from out of town. Worked some rare DX from SE Asia late on Sunday, but never heard the 4W3ZZ, which would have made DXCC 330 for me . . . **K1KD.** Special thanks to PZ5C, YLØA, and others who would not give up pulling my callsign out of the noise. Stations should get bonus points for taking the extra time to work the low power stations . . . **K2TA.** Amazing low bands. Never would have expected to make so many QSOs on 80m! . . . **K5ZD.** Climbing the tower in a snow storm to fix a cable was a welcome break . . . **KE2WY.** Like pulling teeth to get some QSOs, but then got 5Z1A on one call. Go figure these weird cndx these days! . . . **KS7T.** Great low band conditions! JA's S9 on 80, wow! . . . **KTØR.** My best time was when I was close to dozing off Saturday night, the dial slowly turning in sleepy fingers, then OJØB! No pileup! Two calls and they were mine, then just down the dial a short piece R1MVC, the same, no pileup! Okay, so not everything was perfect, as couldn't land 8Q7DV (sigh) . . . **N2WN.** Amazing what you can score when you actually have time to operate! My highlights were contacting 5Z1A on the first try and working HC8N on four bands (including 40, which is surprising given my low power rig and dipole up around 30 feet!) Hopefully I'll be able to improve on my score in the years to come! . . . **N4HXI.** Great time, proving that 100w + homebrew ground mounted 20m vertical and limited operating time can bust into pileups (Mali and Kenya) . . . **W2BEE.** Got amp working 1 hour before contest. Whew! That was close . . . **W3HVQ.** Only QRM was the RFI from my son's plasma TV. It's gotta go! . .. **W5LEW.** Somehow I got it in my head to operate in major contests using only homebrew valve equipment. I had three breadboards connected together for the transmitter and another three for the receiver. The equipment worked well; it was the antennas that were poor. 30 to 50 mile na hour winds and driving rain. So much for antennas . . . **W7DRA.** Just a few hours to play on low bands. Nice to hear the Caribbean coming in so well . . . **WO9S.** Casual holiday weekend event, good fun, and good to see 20m and low bands so good! . . . **WX3B.**

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.)

2005 CW RESULTS
SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

K5ZD/1	**A**	**6,900,552**	**3749**	**141**	**507**
W1KM	**"**	**4,548,425**	**2987**	**125**	**428**
K1ZZ	**"**	**4,169,056**	**2459**	**134**	**474**
WC1M	*	3,514,037	2414	120	403
K1DG	*	3,463,450	2326	125	440
W1WEF	*	3,428,532	2402	115	409
K5MA/1	*	1,941,708	1643	99	327
AA1ON	*	1,915,208	1709	104	320
K1NQ	*	1,187,122	1132	94	300
W1AA	*	823,109	751	97	316
W1ECT	*	692,736	740	85	267
K1RU	*	681,462	905	79	210
KQ2M/1	*	640,485	1105	55	160
W1RZF	*	412,830	589	71	226
W1ZT	*	303,044	432	68	206
W1FM	*	279,524	425	68	200
N3KCJ/1	*	263,529	435	66	201
WA1T	*	237,244	349	64	195
W3IZ/1	*	212,364	410	70	236
W1ZK	*	202,686	314	72	177
W1TO	*	103,930	217	54	136
W6KOK/1	*	84,816	206	51	135
W1ZS	*	70,176	198	35	101
W1WFZ	*	57,824	177	42	97
N1KWF	*	1,120	15	13	15
W1OHM	14	8,802	79	15	39
K3FN/1	**7**	**83,479**	**266**	**30**	**106**
W1MK	**3.5**	**380,365**	**1138**	**28**	**99**
W1HI	*	42,686	189	18	78
W7OT/1	*	27,571	147	14	65
***N1UR**	**A**	**2,129,919**	**1746**	**102**	**371**
***WA1S**	**"**	**1,683,068**	**1310**	**105**	**362**
*W1JQ	*	1,073,852	927	94	334
*K1HT	*	834,771	789	92	289
*W2JU/1	*	727,112	706	87	301
*W1EQ	*	613,664	735	71	231
*WA1LNP	*	588,665	633	87	298
*N1DC	*	395,063	542	69	220
*K1EP	*	386,130	511	75	230
*K1IB	*	346,086	483	74	232
*W1KT	*	301,928	402	72	220
*K1SE	*	271,679	398	64	199
*N1PGA	*	224,775	407	59	166
*K1VSJ	*	221,792	355	61	171
*K1ZE	*	165,375	284	59	166
*AK1Q	*	133,352	303	56	155
*AE1T	*	115,379	239	53	134
*KB1T	*	115,374	241	57	144
*K2KQ/1	*	112,435	216	55	144
*W1END	*	101,728	214	49	138
*N1DS	*	82,984	225	53	131
*W1BYH	*	74,620	198	63	142
*K1BD	*	51,612	169	43	95
*K1KAV	*	45,724	120	46	96
*AE1D	*	38,194	138	34	79
*KD6NA/1	*	28,500	86	41	84
*AA1TV	*	19,116	94	21	60
*KA1VMG	*	580	22	12	17
***AA1ZT**	**28**	**2,277**	**44**	**10**	**23**
***K1PX**	**1.8**	**5,130**	**62**	**11**	**27**
N2NT	**A**	**5,143,683**	**3066**	**132**	**481**
N2LT	**"**	**3,614,850**	**2345**	**123**	**431**
W2RU	*	2,401,152	1847	107	374
K2TW	*	2,114,439	1736	101	342
N2MM	*	1,821,625	1589	114	361
W2LC	*	1,817,436	1532	105	348
K2NV	*	1,701,776	1236	113	383
WE2F	*	1,292,238	1593	74	232
N2RM	*	1,191,630	1300	82	248
K2FU	*	986,309	865	91	346
W2YK	*	736,950	648	91	334
K2XF	*	590,769	612	83	286
AJ3K/2	*	521,248	543	96	268
K2UOP	*	477,819	561	88	259
WA2VYA	*	447,535	563	92	268
N2ED	*	370,856	539	85	222
KA2MGE	*	322,620	434	79	204
N2MR	*	289,157	401	70	201
KE2WY	*	272,052	394	83	214
K2UG	*	139,494	352	78	269
			(OP:	WA2JQK)	
WB2HJV	*	139,490	296	57	128
KW2J	*	132,486	285	55	155
W2TN	*	131,157	327	71	176
WB2TPS	*	64,962	152	46	116
W2FUI	*	59,845	165	44	116
N2VM	*	20,298	117	32	70
K2SQS	*	17,745	77	35	70
WB2JEP	*	12,727	93	31	58
K2BA	**21**	**128,742**	**380**	**25**	**104**
N2MF	**7**	**386,078**	**1002**	**34**	**127**
N2GC	**3.5**	**112,100**	**356**	**23**	**95**
K2TA	*	33,180	158	12	67
WF2W	**1.8**	**18,207**	**196**	**12**	**51**
N2OO	*	4,477	50	8	29
K2YR	*	1,232	20	7	15
***K2PS**	**A**	**1,465,380**	**1258**	**99**	**321**
*NT2A	*	498,385	577	83	296
*NC2N	*	430,122	503	79	264
			(OP:	EW1AR)	
*WB2AA	*	381,193	488	71	222
*K2EK	*	360,678	507	65	217
*AI2N	*	295,475	432	65	200
*K2UF	*	258,263	383	63	208
*KU2N	*	230,160	371	60	180
*W2GDJ	*	200,704	337	62	162
*WB2WPM	*	184,005	329	64	171
*WA2YSJ	*	179,169	334	64	184
*W2CVW	*	168,586	285	69	206
*KM2L	*	119,751	260	48	131
*AK2P	*	113,953	234	62	161
*K2CS	*	93,034	211	54	127
*W2TZ	*	90,900	236	37	113
*W2BEE	*	66,176	214	35	93
*W2NRA	*	46,357	122	49	102
*WW2P	*	32,860	110	43	81
*N2ZN	*	32,010	117	37	73
*K2YLH	*	29,520	112	41	79
*AI2I	*	20,748	98	38	76
*K2TV	*	19,548	110	34	74
*WA2MCR	*	7,622	75	25	49
*K2MK	*	4,428	49	15	26
*N2EK	*	3,174	29	18	28
*NA2NA	*	750	18	10	15
*WA2BMH	*	0	0	0	0
*KR2AA	21	21,534	134	17	57
***K2MFY**	**14**	**187,293**	**489**	**29**	**120**
*KC2KME	*	437	17	8	15
K3CR	**A**	**5,287,744**	**3111**	**138**	**478**
			(OP:	LZ4AX)	
AA1K/3	**"**	**3,844,272**	**2585**	**131**	**435**
W3BGN	**"**	**3,431,878**	**2293**	**124**	**423**
N3AD	*	3,183,210	1920	134	492
N3AM	*	1,647,756	1438	94	324
KF3B	*	1,501,360	1464	90	302
K3ZZ	*	1,484,795	1428	103	328
N3UM	*	1,176,672	1235	81	276
K3TC	*	1,018,584	946	99	324
W9GE/3	*	645,660	604	91	331
K3WI	*	614,790	684	75	270
W3PT	*	501,847	485	92	341
W3IQ	*	386,687	582	61	198
N3KR	*	359,856	461	66	228
N3RJ	*	337,243	579	76	217
N3ST	*	320,334	504	67	196
K3TM	*	215,866	350	60	178
W3RJ	*	209,721	489	42	117
W3KV	*	190,694	380	54	166
W3DF	*	184,992	287	68	178
W4ZE/3	*	184,728	301	61	197
W3HVQ	*	120,120	306	57	153
K2LNS/3	*	85,305	224	41	100
WM3O	*	3,450	35	21	29
WA3AAN	**14**	**89,609**	**305**	**23**	**90**
NJ3C	*	17,686	112	18	56
W3FQE	*	2,112	57	12	32
K3GW	**7**	**39,372**	**152**	**24**	**78**
N3RW	*	30,783	161	21	72
K3JGJ	**3.5**	**66,229**	**258**	**18**	**85**
NA3M	*	53,500	203	22	85
NS3T	*	15,075	116	12	55
K3WGR	*	1,050	54	8	34
W3GH	**1.8**	**25,120**	**154**	**17**	**63**
***K3AU**	**A**	**1,005,488**	**984**	**90**	**304**
			(OP:	K2YWE)	
*WW3S	*	432,866	476	93	250
*K3MSB	*	320,665	426	73	222
*W3IUU	*	193,856	313	66	167
*K3ASK	*	172,317	440	54	159
*N3HCN	*	154,125	295	63	162
*N3WT	*	130,269	274	46	127
*W3AP	*	89,544	232	56	126
*K3STX	*	66,993	161	46	117
*AB3AI	*	56,518	153	50	104
*WR3H	*	52,734	168	43	96
*K3C8	*	17,632	178	42	110
*N3NZ	*	14,630	97	26	51
*AE3J	*	5,467	61	33	44
*K3QC	*	5,160	38	24	37
***K1EFL/3**	**14**	**55,762**	**204**	**20**	**78**
*K3VA	*	50,160	212	18	70
*N3GE	7	120	10	4	6
***W3NO**	**3.5**	**30,841**	**144**	**16**	**76**
***K3MQ**	**1.8**	**780**	**95**	**8**	**22**
K4ZW	**A**	**4,445,562**	**2797**	**127**	**452**
N2YO/4	**"**	**3,298,482**	**2581**	**118**	**368**
N4GN	*	2,089,464	1423	131	412
W4RX	*	1,917,770	1513	119	374
K3ZM/4	*	1,795,380	1520	106	354
K4RO	*	1,730,898	1353	116	391
WJ9B/4	*	1,481,827	1639	99	284
K4SV	*	1,131,944	1025	100	318
K1GU/4	*	1,068,960	975	101	307
W4QM	*	1,059,312	870	106	358
N4TB	*	1,019,676	916	103	324
W9WI/4	*	979,116	878	101	316
W6NWS/4	*	924,148	772	105	358
KU8E/4	*	923,680	826	110	350
AA4NN	*	913,800	1400	72	228
K4PV	*	884,520	1156	95	269
K4LTA	*	812,890	955	83	287
W4RQ	*	804,807	753	96	305
AF4OX	*	710,102	848	88	271
N4XM	*	691,076	738	96	298
N4MM	*	675,157	695	102	322
NA4K	*	670,194	674	96	298
N4AA	*	657,248	626	83	293
K4DJ	*	648,976	644	93	283
W4FDA	*	570,078	517	104	310
WØUCE/4	*	490,912	568	81	287
WA4JUK	*	387,600	577	71	214
KR4M	*	338,542	430	86	216
W2OO/4	*	325,725	448	83	220
NW6S/4	*	274,822	426	61	213
W4RK	*	189,484	392	67	187
AA4CF	*	183,983	298	73	178
N4PD	*	170,391	329	53	168
KE4COH	*	163,779	299	70	161
K4ZGB	*	155,606	298	72	170
W2YE/4	*	155,271	276	62	157
W4ARM	*	144,305	261	58	159
K7CS/4	*	136,927	265	62	155
N4IR	*	130,400	250	53	147
W7QF/4	*	99,064	200	61	142
KØCOP/4	*	86,346	340	50	112
K4CEB	*	83,277	189	53	118
K6ETM/4	*	65,828	211	54	116
W4EI	*	56,448	184	43	101
N2AN/4	*	49,368	147	39	93
			(OP:	WC4E)	
W4PRO	*	46,053	135	46	107
K4APG	*	41,700	119	42	97
NE4M	*	33,966	120	35	76
W4EEH	*	25,602	94	32	70
W4/AH6HJ	*	19,140	109	43	73
N4TX	*	18,836	110	25	62
WA4GLH	*	8,732	99	33	41
K4CC	*	5,715	50	11	34
N4BP	**28**	**6,498**	**121**	**13**	**25**
K4OAQ	**21**	**159,372**	**517**	**25**	**89**
K1UM/4	*	77,470	284	25	101
K4RV	*	45,408	141	28	104
N4ZZ	**14**	**512,968**	**1292**	**33**	**115**
K9OM/4	**"**	**488,228**	**1179**	**36**	**128**
K4RDU	*	103,334	301	27	95
N2TU/4	*	91,008	272	27	101
W4ZYT	*	72,048	254	25	89
K4XS	**7**	**600,066**	**1489**	**36**	**117**
KBEJ/4	**"**	**347,602**	**1054**	**33**	**118**
WF3J/4	*	101,184	306	27	97
N4NW	*	83,212	278	32	110
AA4VV	*	78,804	256	27	105
K4SB	*	28,614	160	29	85
AD4Z	**3.5**	**79,492**	**283**	**25**	**94**
N2WN/4	**"**	**74,368**	**263**	**22**	**90**
N3UA/4	*	58,266	211	23	94
K4DLJ	*	12,596	83	12	55
N4GU	*	1,209	26	9	22
N4PN	**1.8**	**136,653**	**581**	**27**	**96**
KK4SI	*	6,720	75	13	43
***N4KG**	**A**	**1,153,668**	**853**	**121**	**387**
***K4GKD**	**"**	**991,701**	**833**	**103**	**336**
*N4YDU	*	863,471	957	96	325
*WK2G/4	*	790,265	1134	87	250
*WA4DOU	*	567,756	602	91	287
*NA4CW	*	566,352	588	93	275
*K4OGG	*	565,796	675	81	253
*W4YE	*	539,231	620	82	247
*AA4FU	*	461,942	538	77	249
*K7CMZ/4	*	427,752	542	79	233
*K4IE	*	417,360	598	80	202
*WØAH/4	*	405,600	567	86	252
*K4MF	*	328,770	452	72	209
*K4FPF	*	313,233	458	65	198
*W4TAA	*	310,440	597	83	229
*WD4AHZ	*	251,850	401	60	170
*KN4Y	*	191,928	364	72	192
*N3JT/4	*	182,204	338	56	146
*N4EK	*	172,056	313	58	156
*KI3O/4	*	169,592	301	62	170
*AE4Y	*	120,204	235	57	155
*AA4LR	*	109,564	250	55	141
*KS4S	*	108,790	238	61	154
*K4KO	*	98,050	210	60	125
*W4UR	*	79,937	213	57	125
*K4DGJ	*	77,149	191	51	128
*N4WO	*	66,924	192	50	119
*N4HXI	*	55,233	165	45	108
*K1AA/4	*	55,152	156	47	97
*K4GMH	*	52,920	176	37	98
*KT4PD	*	45,584	150	46	102
*AI4CB	*	45,474	120	42	101
*WA4RTE	*	45,276	162	36	96
*N4WD	*	42,028	140	56	102
*W4EBA	*	40,300	142	40	90
*KU5D/4	*	36,630	255	49	116
*N4DXI	*	35,960	127	37	87
*KI4VB	*	32,604	119	45	87
*K4JAF	*	32,430	113	46	92
*W3TB/4	*	32,256	116	38	74
*AI4U	*	29,283	172	43	86
*WA4OSD	*	28,272	111	37	77
*AA4KD	*	25,389	126	39	78
*W4PFM	*	24,698	105	40	66
*K3MZ/4	*	23,220	100	35	73
*W4TDB	*	21,168	91	37	71
*N4UH	*	20,544	86	36	60
*K4BX	*	19,800	97	31	57
*K4LW	*	15,756	78	26	52
*N4JED	*	15,725	83	30	55
*N4NTO	*	13,608	71	28	53
*NN4DF	*	10,875	73	28	47
*WA4JQS	*	10,395	61	30	47
*KE4S	*	8,284	55	31	45
*WB4DNL	*	7,194	51	29	44
*W4OGG	*	5,448	47	21	33
*K8AJS/4	*	4,263	34	17	32
*AI4JW	*	4,116	44	21	28
*WA4FXX	*	2,460	28	16	25
*KA4AXS	*	1,260	29	9	21
*AJ2U/4	*	950	22	10	15
*W4BCG	*	888	17	8	16
*K4FTO	*	450	71	30	45
*K4OH	*	100	90	34	61
*AE4EC	*	100	42	21	33
***K4WI**	**28**	**5,360**	**56**	**12**	**28**
***WB4TDH**	**21**	**132,618**	**350**	**28**	**110**
***N4IJ**	**14**	**103,752**	**331**	**29**	**102**
***N4PSE**	**7**	**56,448**	**219**	**24**	**74**
*WA1FCN/4	*	49,839	205	27	84
*W9IXX/4	*	7,865	87	16	49
*KC4WQ	*	7,112	54	16	40
*WA2ASQ/4	*	5,624	57	13	35
*K4GM	*	2,280	28	8	22
***KR4OW**	**1.8**	**442**	**41**	**11**	**23**
N2IC/5	**A**	**3,348,750**	**2219**	**149**	**421**
WXØB/5	*	1,730,099	1677	117	322
			(OP:	AD5Q)	
W5VX	*	1,395,456	1091	136	416
N5DO	*	1,180,472	981	123	349
N9MM/5	*	1,065,672	830	118	374
W5ZO	*	567,600	598	105	295
WD7Z/5	*	379,522	604	80	206
N5PA	*	307,260	430	67	203
W6TER/5	*	304,515	429	80	223
W6PU/5	*	301,688	450	93	204
N5ZK	*	259,752	415	75	199
			(OP:	W5ASP)	
W5KI	*	179,336	299	62	170
W5WRL	*	100,854	296	71	163
NI5F	*	67,134	159	62	105
KD5JAA	*	48,824	151	48	88
K7IA/5	*	36,031	132	53	84
N5DEE	*	31,116	110	43	80
WA5Y	*	22,116	86	36	61
WT5U	*	17,415	93	24	57
N5PU	*	3,658	45	25	37
AD5Q	*	6	1	1	1
K5NZ	**7**	**99,946**	**316**	**29**	**92**
N5ZM	*	18,336	73	28	68
W5UN	**3.5**	**201,684**	**548**	**32**	**115**
K5RX	*	163,047	466	30	109
WS1L/5	*	5,141	55	15	38
W5GZ	*	1,560	29	11	15
***N5AW**	**A**	**1,644,186**	**1184**	**134**	**400**
*WD5K	*	709,365	693	97	296
*K5KLA	*	685,884	693	92	274
*N5PO	*	462,072	563	85	227
*N5CHA	*	218,828	384	63	164
*WA5SOG	*	147,630	290	63	147
*K5GM	*	132,458	268	69	137
*W5TM	*	56,826	172	53	101
*AD5MN	*	46,704	153	47	92
*K5WX	*	43,605	139	59	94
*K5SF	*	32,226	110	46	77
*K5WW	*	22,984	100	41	63
*W5PQ	*	17,922	100	33	54
*KE3D/5	*	17,710	79	42	68
*NA4M/5	*	11,830	68	22	48
*K5JJ	*	6,468	74	33	51
*KE5AQD	*	6,039	52	22	39
*WØZW/5	*	5,546	36	25	34
*W5GAI	*	5,408	41	21	31
*W4DLZ/5	*	1,862	32	17	21
*N5KEV	*	100	22	16	16
***KN5G**	**7**	**163,152**	**452**	**33**	**111**
*K5MQ	*	31,556	149	21	71
K6XX	**A**	**1,406,898**	**1258**	**131**	**292**
W6PH	*	1,288,560	1090	127	328
K6KM	*	616,986	895	102	200
			(OP:	AD6TF)	
W6UM	*	591,376	593	105	263
K6LRN	*	368,637	476	104	205
N6MA	*	356,934	560	94	209
N6EM	*	137,196	330	78	128
N6TV	*	122,958	229	72	135
K6RB	*	116,613	248	72	117
K6III	*	103,000	199	73	133
WO6M	*	101,480	240	65	107
NF6V	*	95,700	246	54	111
K6NR	*	76,382	170	74	107
AJ6V	*	49,210	163	50	83
N6NIA	*	31,392	118	43	66
W6KC	*	18,700	88	37	63
W6OUL	*	10,872	63	26	46
WA6BOB	*	9,088	55	28	36
KI6CK	*	3,483	44	19	24
K6OGO	*	2,010	25	14	16
W6QE	*	1,615	65	37	48
W6YA	**21**	**186,975**	**542**	**30**	**105**
K6KO	*	512	12	6	10
W6NV	**14**	**336,447**	**942**	**36**	**117**
N7CW/6	*	221,444	514	41	125
W6DCC	*	55,404	237	28	80
W6NKR	*	49,152	195	26	70
N6AW	**7**	**91,500**	**252**	**35**	**115**
AE6PP	*	79,894	526	29	57
			(OP:	OH1VR)	
K6OY	**3.5**	**94,116**	**398**	**35**	**89**
W4EF/6	**1.8**	**6,601**	**81**	**14**	**27**
K6SE	*	2,015	30	12	19
***KM6Z**	**A**	**200,925**	**382**	**80**	**145**
*N6TW	*	182,628	330	74	154
*W6RCL	*	168,720	349	69	121

*AA6EE	*	101,550	262	65	116
*AC6WY	*	81,686	239	63	95
*W6RFF	*	70,446	185	71	106
*N6YEU	*	61,306	159	53	98
*N6NG	*	51,766	162	49	94
*N3LQ/6	*	21,712	94	39	53
*NK6A	*	20,655	105	33	52
*KQ6ES	*	14,904	84	32	40
*N6RV	21	25,550	146	20	53
*K6CU	14	13,248	69	22	50
*KU6T	*	3,731	55	15	26
*W6PAP	7	19	4	1	1
N6CW/7	A	2,509,784	1715	144	412
W7RN	*	2,265,417	1685	145	394
(OP: KL2A)					
K7GK	*	1,902,865	1686	129	302
W2VJN/7	*	1,023,960	932	132	292
WA7LT	*	774,630	993	106	236
N7TT	*	767,988	910	106	245
K7ZZ	*	758,016	1133	93	195
K7ZA	*	626,202	685	108	234
K7BG	*	479,544	587	95	223
W7YS	*	267,786	404	84	177
N7RO	*	241,722	412	79	155
W7VJ	*	181,560	417	59	111
N7BF	*	137,416	290	64	129
K7LAZ	*	124,914	249	75	143
W7QN	*	95,880	242	62	108
W7IIT	*	86,361	247	50	105
N8GZ/7	*	79,335	221	84	131
K7RX	*	64,527	201	45	92
WO7T	*	48,015	147	55	110
KS7T	*	40,950	138	46	80
NW7DX	*	12,265	112	26	29
N6SS/7	*	6,909	62	19	28
W8TK/7	*	5,040	36	21	27
K8LJK/7	*	864	13	11	13
(OP: W8TK)					
N7CIX	*	10	3	3	3
W7UT	21	99,792	327	27	85
W7WA	14	506,550	1120	38	127
W7AYY	*	16	8	20	0
W6XI/7	7	51,156	191	32	94
K7RAT	3.5	75,915	350	27	78
(OP: N6TR)					
W8AEF/7	*	46,640	225	25	81
W7AT	1.8	2,544	71	11	13
(OP: W7EW)					
*N7ZG	A	258,630	458	72	150
*W7QDM	*	179,850	355	71	147
*N0AX/7	*	179,444	312	76	150
*W3CP/7	*	134,550	268	68	127
*NQ7R	*	123,024	268	83	150
*W6AEA/7	*	111,758	254	60	113
*NC7M	*	105,468	247	61	126
*N7DR	*	104,935	255	49	106
*AB7RW	*	89,700	242	48	102
*W7TMT	*	63,468	203	48	81
*W7YAQ	*	38,528	134	44	68
*W7HS	*	31,633	125	53	76
*N7YY	*	28,270	172	34	76
*KC7UP	*	27,170	106	37	73
*W7ZMD	*	25,110	122	32	58
*K6CSL/7	*	23,996	119	41	66
*N6KW/7	*	23,300	97	41	59
*K2DI/7	*	22,278	107	39	55
*W7SYJ	*	22,248	117	41	67
*NB7F	*	17,100	85	31	45
*K7AWB	*	17,028	89	39	47
*K7ARJ	*	16,974	104	33	49
*NI7R	*	15,288	77	32	46
*WA2OCG/7	*	12,671	76	32	47
*NE7L	*	11,792	82	32	56
*KT7G	*	9,398	75	30	44
*W7GTO	*	8,052	64	28	38
*K7TR	*	5,852	105	31	46
*KN7T	*	3,306	37	17	21
*K7FU	*	3,128	34	16	18
*N7EIE	*	2,720	34	16	16
*W7TSQ	*	1,131	31	18	21
*N7WI	*	276	17	12	11
*AA7PM	*	100	78	25	36
*K7SP	21	11,349	79	20	45
*N7WA	14	130,196	418	31	90
*KA7T	*	74,008	268	27	89
*KA7FEF	*	2,318	97	12	17
*W7DRA/7	1.8	407	21	6	5
K8IR	A	543,655	616	88	255
W8TWA	*	422,237	498	81	232
N8EA	*	343,140	462	78	223
N8MZ	*	340,544	427	82	231
N8NB	*	155,857	316	57	190
W8PN	*	128,924	278	53	140
N8II	*	37,830	154	20	77
N8OL	21	14,912	87	17	47
N9AG/8	3.5	160,082	492	27	104
K8MD	*	41,184	215	20	79
K8DO	*	20,303	134	17	62
K3XD/8	*	19,866	116	10	56
K8KFJ	*	6,860	53	12	37
N8XP	1.8	140	57	7	13
*KV8Q	A	484,946	646	80	249
*WB8YJF	*	398,160	587	77	203
*WB8JUI	*	261,885	399	67	188
*W8GOC	*	239,343	384	69	178
*K8GT	*	196,533	312	72	179
*K9ALP/8	*	190,242	321	61	173
*WB8TLI	*	137,196	257	55	151
*W8IDM	*	120,474	237	63	144
*W8MV	*	117,670	251	58	147
*W8OP	*	112,608	266	58	146
*K8LY	*	83,200	206	61	147
*WD8S	*	81,532	203	46	141
*KD8RB	*	54,978	178	31	88
*K8AB	*	50,832	157	49	95
*W8WT	*	45,962	135	35	99
*N8UZE	*	32,718	108	41	82
*N8OH	*	32,526	108	40	77
*K8VUS	*	22,356	128	20	61
*KF8HR	*	13,104	62	28	56
*K8MJZ	*	9,880	63	27	49
*K8IW	*	9,310	56	26	44
*AF8C	14	100	13	5	10
W9RE	A	3,907,904	2586	130	442
NØIJ/9	*	1,249,738	1180	105	308
W9MU	*	1,051,884	912	110	369
WI9WI	*	601,263	696	86	265
W9SE	*	445,374	538	82	245
KJ9C	*	444,624	539	81	233
K9MA	*	294,492	425	71	182
W3HDH/9	*	244,528	352	70	202
KA9F	*	125,643	289	56	137
K9BZ	*	71,166	161	57	117
W9VA	*	44,544	151	35	81
W9GXR	*	25,927	104	37	74
W9SWS	*	21,375	97	41	84
WO9S	*	13,416	81	25	53
WB9AYW	*	5,820	40	22	38
K2AAW/9	14	271,123	842	31	106
K9CAN	*	93,219	302	30	101
KØSN/9	*	83,013	457	14	53
K9CJ	7	98,814	305	30	99
W9OP	3.5	57,443	229	22	87
KG9N	*	3,686	40	11	27
*K1TN/9	A	233,426	365	62	192
*K9JE	*	159,732	301	56	148
*AC9X	*	143,228	290	76	168
*W9IL	*	130,508	303	41	117
*W9UM	*	64,261	192	53	126
*AJ9C	*	58,590	147	45	110
*W9YO	*	53,878	166	53	105
*W9VQ	*	32,096	114	36	82
*N9TTX	*	23,278	99	38	65
*KA9JAC	*	19,680	98	22	60
*WB8RFB/9	*	17,808	106	28	56
*KB9OWD	*	11,440	74	28	52
*W9ISC	*	5,824	58	18	38
*KD9FM	*	5,444	46	27	34
*N9LYE	*	4,539	52	23	28
*AD9T	*	2,336	31	12	20
*N9MTT	*	1,802	36	22	31
*W9JUV	28	3,598	47	10	28
*N9XX	14	119,460	328	27	105
*W9AEM	*	37,246	161	23	80
*N9GBB	*	1,236	22	10	17
*W9ILY	7	35,409	169	20	67
*K9UIY	*	20,448	112	23	62
KØEU	A	1,596,062	1459	119	323
KØSR	*	1,359,694	1108	114	379
KØCAT	*	898,398	872	101	292
(OP: K9WIE)					
K7RE/Ø	*	338,212	562	83	174
WØZA	*	264,114	545	69	150
NØSTL	*	257,224	322	84	232
KØUE	*	228,095	440	76	169
KØRI	*	215,364	383	83	191
KØDEQ	*	156,208	282	64	144
KØHW	*	139,462	295	68	138
WBØHCH	*	122,536	248	58	154
WØML	*	95,370	242	50	120
WNØL	*	92,322	227	69	138
KMØO	*	89,562	254	37	101
KJØG	*	57,255	193	58	107
K4IU/Ø	*	36,162	130	41	85
WØTY	*	24,852	143	34	75
K3WT/Ø	*	23,028	98	34	80
WA2MNO/Ø	*	20,532	102	40	76
NØXM	*	15,640	94	32	60
KØHB	*	7,467	52	19	38
KØVG	*	1,120	25	14	18
KKØHF	7	72,376	480	26	57
KØYW	*	29,274	191	31	92
KU1CW/Ø	3.5	227,283	623	30	107
*KØRC	A	514,402	564	91	271
*WØETT	*	394,638	516	94	224
*KØKP	*	320,973	459	76	215
*ACØW	*	165,765	308	75	182
*KØCIE	*	153,700	301	63	149
*KEØUI	*	130,200	282	68	142
*KØSQ	*	123,606	260	61	128
*KNØV	*	121,980	225	66	148
*KSØM	*	83,265	229	59	124
*KØCF	*	80,535	194	54	123
*KØPC	*	74,865	182	41	114
*K6MJ/Ø	*	56,571	191	55	118
*NAØN	*	38,664	129	34	74
*K5QQ/Ø	*	30,250	139	44	81
*NØEO	*	18,800	107	34	60
(OP: AAØAW)					
*NØFP	*	16,781	77	38	59
*KØRY	*	16,498	113	39	74
*NEØP	*	13,528	71	31	45
*NO2D/Ø	*	13,104	80	33	51
*KØMPH	*	7,308	55	22	41
*K2HT/Ø	*	7,194	49	28	45
*KØKGS	*	6,552	79	27	45
*NØIBT	*	6,534	49	23	31
*WØPC	*	5,510	51	19	39
*KØJV	*	4,636	45	29	32
*KCØSOG	*	3,010	33	17	26
*NØKQ	*	2,967	57	29	40
*KCØLUX	*	2,640	41	22	33
*WØPSS	*	1,674	26	14	17
*KIØJ	14	38,340	183	23	67
*NØGOS	*	26,149	138	21	58

4U-UNITED NATIONS

4U6ØUN	A	270,200	953	51	89
(OP: OH1VR)					

ALASKA

KL7WV	A	267,408	1221	51	57
(OP: W3YQ)					

ANTIGUA

*V26K	A	6,960,084	5430	115	408
(OP: AA3B)					

BAHAMAS

*C6AQQ	A	2,935,464	3422	100	304
(OP: ND3F)					
*C6AGY	*	93,789	456	56	97
(OP: ND6S)					
*C6AWS	14	362,112	1438	29	99
(OP: W6SJ)					

BARBADOS

8P5A	A	9,902,340	6561	145	485
(OP: W2SC)					

CANADA

VO1AU	A	3,744,921	3144	102	369
VO1MP	*	1,801,012	1294	111	455
VO1TA	*	468,468	766	48	186
VE1MC	*	189,543	402	49	152
VO1HP	*	47,655	136	36	99
*VE9DX	A	534,006	854	69	210
VY2TT	A	4,966,176	3783	115	429
(OP: K6LA)					
VA2AM	*	28,676	128	45	89
VY2ZM	1.8	497,152	1664	28	100
*VE2XAA	A	581,952	749	74	262
*VE2AWR	*	459,984	748	64	195
*VE2FK	*	251,944	775	39	115
*VE2FU	*	195,822	383	53	154
*VE2FFE	*	29,946	152	31	62
*VE2GHI	*	16,720	171	31	64
VE3EJ	A	4,721,808	3491	135	429
VC3O	*	4,280,916	3523	119	389
(OP: VE3AT)					
VE3EY	*	3,323,781	2968	117	362
VE3TA	*	1,137,402	1452	85	272
VE3XN	*	778,536	807	95	301
VE3CR	*	756,136	806	92	284
VE3KZ	14	397,761	1135	31	110
VE3RER	7	21,533	161	15	46
VE3NZ	3.5	33,000	357	11	39
VE3ZI	1.8	91,968	454	20	76
VE3PN	*	42,098	346	13	49
*VE3DZ	A	2,313,036	2048	111	373
*VE3JM	*	1,474,083	1602	94	293
*VA3NR	*	792,674	1230	77	230
*VE3KP	*	538,188	958	72	186
*VA3PL	*	420,786	584	70	221
*VE3NWA	*	326,608	514	68	206
*VE3GSI	*	233,988	462	63	159
*VE3OM	*	190,848	346	62	162
*VE3HLS	*	180,245	334	68	167
*VE3XAT	*	145,824	272	47	149
*VE3TW	*	138,242	377	51	118
*VE3RSA	*	110,700	297	48	116
*VE3FDT	*	63,420	217	48	92
*VE3WG	*	41,004	167	46	88
*VE3FH	*	37,315	209	24	61
*VE3HG	*	15,614	77	23	51
*VA3OBR	*	13,494	97	24	54
*VA3AVP	*	8,690	121	37	42
*VA3HUN	*	5,282	85	13	25
*VA3SWG	*	100	71	24	30
*VA3RJ	21	6,075	60	15	30
*VE3UKR	14	52,731	245	18	75
*VE3RCN	*	2,739	38	12	21
*VA3QP	7	156,978	710	27	87
*VE3OSZ	1.8	24,228	353	12	24
*VE3MGY	*	19,482	312	10	24
*VE3JAQ	*	8,544	318	6	10
VE5UA	A	412,293	1021	69	134
VA5SAM	*	476	10	8	9
*VE5ZX	A	391,515	991	67	148
*VE5UF	*	329,989	690	69	160
*VE5SF	*	112,560	370	38	96
VE6JY	14	635,664	1674	37	127
(OP: VE5MX)					
VE6WQ	7	287,976	874	35	121
VC6R	3.5	91,512	547	27	55
(OP: VE6RST)					
VE6WZ	*	22,563	148	22	47
VE6SF	1.8	1,271	52	9	9
*VE6TN	A	646,464	1056	82	191
*VE6CNU	14	106,401	607	24	63
VE7UF	A	974,700	1504	104	196
VE7JKZ	*	152,400	494	59	91
VE7VR	*	40,170	175	47	56
*VA7ST	A	395,345	1006	60	125
*VA7LC	*	160,104	433	60	108
*VE7ALN	*	80,693	292	49	88
*VE7IN	*	37,009	166	49	70
*VE7WU	*	25,752	101	48	63
*VE7BGP	*	7,788	64	26	33

CAYMAN ISLANDS

ZF1A	A	7,335,327	5657	132	431
(OP: K6AM)					

COSTA RICA

TI3M	A	1,296,819	2718	72	195
(OP: TI3TLS)					
TI5N	7	847,384	2407	32	114
(OP: KØAV)					
*TI2KAC	A	36	14	8	10
*TI5X	21	413,056	1489	28	100
(OP: NØKE)					
*TI5A	14	639,360	2231	31	97
(OP: K2PLF)					
*TE1W	1.8	43,524	350	13	49
(OP: NØKE)					

CUBA

*CO8LY	A	1,843,956	2350	102	289
*CO8TW	14	27,976	131	26	78

DOMINICA

*J79CW	A	2,553,160	3171	86	269
(OP: DL5CW)					

DOMINICAN REPUBLIC

HI9L	14	1,454,436	3701	35	127
*HI3/SP9XCN	A	3,681,202	4037	105	301

GUADELOUPE

*FG58G	A	4,908,384	4234	111	383
(OP: DL1EFD)					

GUATEMALA

*TG9ADM	A	10,780	142	19	25

HONDURAS

*HR1RTF	A	28,710	258	36	30

JAMAICA

6Y3R	A	3,366,825	4146	90	281
(OP: OH3RB)					

MARTINIQUE

*FM5FJ	14	3,220	97	11	17

MEXICO

XE1MM	A	1,310,542	2446	85	189
XE1V	*	195,600	435	79	161
XE1NW	3.5	32,725	288	14	41
*XE2MX	A	199,392	542	72	129
*XE1L	*	18,744	184	51	91
*XE1ZVO	*	750	31	14	16
*XE3WAO	21	158,390	821	22	72
*XE1CT	*	81,696	608	24	50
*XE2TG	1.8	14,322	337	10	12

PANAMA

HP1/OA4WW	14	1,302,775	3503	35	120
*HP1AC	A	70,760	301	45	82

PUERTO RICO

*WP3C	A	2,938,800	3383	98	297
*NP3CW	*	161,040	911	39	81

ST. KITTS & NEVIS

V47/AB2RF	A	122,268	640	26	66

ST. MAARTEN

*PJ7/K7ZUM	21	277,447	1180	20	81

ST. VINCENT

*J88DR	A	1,983,024	2464	90	286
(OP: G3TBK)					

SAN ANDRES/PROVIDENCIA

*HKØFD	7	142,560	706	22	77
(OP: DK8FD)					

U.S. VIRGIN ISLANDS

KP2TM	A	3,186,178	4232	97	256
(OP: K9TM)					
KP2/K3MD	*	1,501,620	2595	79	211
KV4FZ	1.8	98,888	644	22	72

AFRICA

AFRICAN ITALY

*IH9GPI	A	3,780	45	10	25
*IH9YMC	28	198	13	3	8

ASCENSION ISLAND

ZD8A	A	8,834,449	5028	140	471
(OP: K6NA)					
*ZD8R	A	173,250	304	71	139
(OP: N6ND)					

CANARY ISLANDS

EA8EW	A	8,300,250	5649	121	406
(OP: RD3AF)					
EA8/OH4NL	7	1,298,385	2845	34	131
(OP: OH2BYS)					
EA8PP	*	989,520	2395	34	121
(OP: EA8AHB)					
*EA8CN	A	2,548,680	2264	88	314
*EA8/DJ1OJ	*	1,515,162	1461	84	279
*EA8ASJ	*	136,178	501	43	94
*EA8BBJ	*	39,370	124	42	85
*EA8BQM	*	14,274	94	29	49
*EA8AY	28	1,392	26	13	16
*EA8IN	21	26,334	145	19	58
*EA8NQ	14	99,110	335	25	81

CHAGOS ISLANDS

VQ9JC	A	933,992	1046	81	232

GHANA

9G5GJ	A	6,039,720	3755	137	433
(OP: N6ZZ)					
*9G5ZS	21	9,135	95	19	44
*9G5OO	7	6	1	1	1

KENYA

5Z1A	14	1,767,150	3456	38	149
(OP: PA3DZN)					
*5Z4LS	A	418,154	812	67	162

MADAGASCAR

5R8FU	A	6	1	1	1

MADEIRA ISLANDS

CT3EN	A	12,489,525	6420	151	524
(OP: CT1BOH)					
CT3KN	3.5	385,756	867	36	125
CT3KY	*	4,900	40	9	40
*CT9A	A	5,544,350	3966	111	379
(OP: OH6RX)					

MOROCCO

CN2R	3.5	1,206,128	2743	33	121
(OP: W7EJ)					
*CN2WW	14	1,150,556	2479	36	122
(OP: F6IRF)					

SAO TOME & PRINCIPE

S9SS	A	522,806	1078	47	126

SENEGAL

6W1RW	A	6,942,460	4090	130	465
(OP: F6BEE)					

SOUTH AFRICA

ZS1EL	A	1,805,100	1940	89	241
ZS4TX	*	832,785	1009	94	201
ZS6KR	*	177,684	421	69	132
*ZS1AN	A	212,300	410	69	124
*ZS1AJS	*	29,880	142	36	54
*ZS5NK	*	15,642	100	37	42
*ZS4JAN	28	5,103	96	19	44

SUDAN

*STØRM	A	723,580	1009	61	192
(OP: T98A)					

SWAZILAND

3DAØNW	A	6,791,976	4451	135	402
(OP: K9NW)					

TANZANIA

*5H3EE	21	597,432	1454	33	113
(OP: DL4SM)					

UGANDA

*5X1RI	14	1,729	51	7	6

Maritime Mobile Zone 34

*ZL1CT/mm	A	1,268,502	1492	82	236

ASIA

AFGHANISTAN

*T6X	21	110,880	634	23	65

ARMENIA

EK3SA	3.5	10,800	108	6	30

ASIATIC RUSSIA

RA9SG	A	2,252,052	2148	104	319
UA9SP	*	1,900,743	1470	112	377
UA9KJ	*	1,108,424	1362	82	267
UA9QM	*	794,124	1086	79	245
RA9DZ	*	793,359	896	88	255
RA9AC	*	700,936	836	68	260
UA9KM	*	539,706	863	84	209
RK9KWI	*	298,095	539	64	191
UA9MC	*	258,016	312	91	261
UA9FM	*	244,825	520	41	134
RX9TX	*	242,200	531	45	128
RU9UC	*	200,508	370	66	165
RA9UT	*	106,335	459	42	111
RV9XJ	*	68,440	207	38	107
UA9XK	*	39,650	120	30	92
RV9XM	*	13,455	71	23	46
RV9AZ	28	24	2	2	2
RU9CK	21	259,560	966	26	79
RK9UE	14	181,440	725	25	80
UA9CMQ	*	96,187	417	22	69
UA9AYA	7	1,002,244	2213	36	136
(OP: UA9BA)					
UA9TZ	*	14,763	130	12	45
UA9MA	3.5	311,220	1007	27	99
RV9SV	*	203,280	1036	20	68
RN9AA	*	109,446	485	15	72
RW9QA	*	15,054	139	8	31
RU9TO	1.8	22,472	174	10	43
RA9ST	*	7,992	94	7	30
UA9OS	*	819	26	5	16
*RX9AF	A	1,474,956	1492	86	292
*UA9JLL	*	1,137,195	1259	76	257
*UA9AFS	*	830,340	1018	67	248
*UA9FGJ	*	797,160	944	61	251
*UA9AOL	*	701,739	690	68	241
*RA9XF	*	651,000	1013	56	194
*UA9MQR	*	640,855	763	78	257
*UA9BX	*	628,430	789	73	246
*UA9CBR	*	609,700	719	81	254
*UA9XS	*	592,161	785	62	227
*RW9RA	*	554,037	771	75	234
*RU9WZ	*	546,960	981	74	184
*RK9CR	*	545,490	777	68	222
*RV9UP	*	460,719	642	80	229
*UA9TF	*	409,959	530	71	232
*UA9OA	*	408,280	687	53	183
*RK9AX	*	406,404	571	91	227
*RA9UN	*	398,389	681	66	203
*UA9APA	*	382,755	604	48	189
*UA9XF	*	373,704	536	58	218
*RX9FB	*	346,330	473	82	213
*UA9UCK	*	320,597	529	73	217
*RA9CB	*	275,638	455	56	186
*RV9CLF	*	209,032	409	51	161
*RW9MD	*	206,402	236	82	240
*UA9ADW	*	165,354	455	42	144
*RU9UG	*	150,265	339	58	147
*UA9OV	*	150,258	380	41	117
*RU9AZ/9	*	148,480	397	44	116
*UA9XW	*	139,684	327	36	152
*RX9OJ	*	138,080	387	40	120
*UA9XBR	*	103,632	391	38	98
*UA9SAW	*	92,224	294	32	99
*RA9FLW	*	87,122	295	30	97
*RX9FW	*	69,600	240	42	118
*RZ9OJ	*	65,520	266	36	81
*RK9UC	*	62,634	224	48	98
*RA9WV	*	52,055	255	33	112
*RX9WN	*	41,291	115	61	96
*UA9MP	*	22,791	98	42	65
*RX9KA	*	19,904	114	35	40
*UA9UX	*	19,764	79	52	70
*UA9DD	*	11,160	70	23	37
*UA9XMB	*	7,611	59	17	42
*UA9QA	21	81,810	418	25	76
*UA9LAO	*	667	13	10	13
*RA9KM	14	278,521	820	32	105
*UA9AFZ	*	226,688	729	30	98
*RW9CW	*	201,626	548	34	112
*UA9CCL	*	133,284	451	30	86
*UA9OG	*	114,546	493	25	77
*RA9XU	*	104,622	543	23	71
*RX9JW	*	60,947	392	12	47
*RW9UU	*	27,643	227	20	57
*RV9UF	*	24,592	286	12	41
*UA9CBM	7	170,693	527	31	100
*RW9DX	*	158,796	567	34	98
*RX9LW	1.8	12,300	121	7	34
*RA9OM	*	3,783	69	7	18
*UA4LCQ/9	*	1,428	41	7	27
RKØUT	A	896,000	1516	89	231
UAØAZ	*	809,783	980	95	278
RAØAA	*	805,896	1101	83	229
UAØFAI	*	573,881	1155	92	165
UAØACG	*	472,245	795	76	209
UAØDC	*	259,454	699	82	139
RAØZD	*	213,248	376	81	143
UAØABB	*	177,906	385	52	147
UAØBA	*	101,994	252	54	124
RWØCF	*	69,020	177	62	108
UAØCW	*	24,924	101	50	84
UAØCNX	*	14,364	275	27	30
RUØSN	*	9,792	62	21	47
RAØAY	*	1,040	14	12	14
RUØAW	*	693	11	10	11
RZØAT	21	250,674	897	29	94
UAØSR	*	39,442	334	24	58
UAØWL	*	12,688	110	17	44
RWØLIA	*	12,180	110	22	36
UAØCA	14	323,820	1194	33	93
UAØAGI	*	323,136	1151	34	102
RWØBG	*	263,125	925	34	91
RAØBA	7	154,250	474	31	94
RWØAR	3.5	336,532	1204	29	90
UAØFDX	*	14,993	198	20	27
RWØAJ	*	4,719	69	10	29
RUØAT	1.8	34,255	252	16	49
RZØZWA	*	1,155	85	7	4
(OP: RUØZM)					
*RXØQA	A	249,750	591	65	160
*UAØSDX	*	154,560	422	63	147
*RV1AW/Ø	*	152,278	387	61	85
*UAØUV	*	136,530	370	55	130
*RKØSA	*	111,663	335	53	118
*RUØAE	*	110,564	237	68	143
*RZØCQ	*	106,872	301	73	110
*UAØSC	*	89,679	271	50	129
*UAØZAM	*	53,848	315	50	56
*UAØYAY	*	29,952	97	38	79

ASTRON CORPORATION
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...POWER ON WITH ASTRON

SWITCHING POWER SUPPLIES...

E151765 E151765

MODEL SS-10TK

MODEL SS-12IF

SPECIAL FEATURES:

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

PROTECTION FEATURES:

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

SPECIFICATIONS:

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

OUTPUT VOLTAGE: 13.8VDC

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

MODEL SS-18

DESKTOP SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1¼ x 6 x 9	3.2
SS-12	10	12	1¾ x 6 x 9	3.4
SS-18	15	18	1¾ x 6 x 9	3.6
SS-25	20	25	2¾ x 7 x 9¾	4.2
SS-30	25	30	3¾ x 7 x 9¾	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

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

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

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

CIRCLE 134 ON READER SERVICE CARD

NEW SWITCHING MODELS

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

*ICS – Intermittent Communication Service

*RVØAL	*	16,500	108	39	71
*UAØFGZ	*	12,816	96	38	51
*UAØFGN	*	7,372	53	35	41
*RNØSA	*	5,913	54	35	38
*RWØUM	*	1,960	43	16	19
*RVØST	*	1,736	25	11	20
*UAØFBS	*	1,548	29	14	22
*RAØUBN	*	10	3	3	3
*RAØCDF	21	11,088	98	23	33
*UAØSAD	14	147,804	584	25	84
*UAØQO	*	29,559	216	27	62
*RAØFLP	*	23,625	190	20	43
*RWØLZ	7	27,838	296	23	39

ASIATIC TURKEY

*TA2DA	21	114,904	425	28	78
*TA3DD	7	675,176	1670	31	117

AZERBAIJAN

*4K9W	A	345,268	523	68	198
*4J4K	*	1,353	25	13	20
			(OP: 4J8VHF)		

CAMBODIA

*XU7AFB	A	22,892	262	43	54

CHINA

*BG8AAI	A	23,664	236	44	92
*BG1DQU	*	12,075	179	33	42
*BG4IZL	*	504	45	17	19
*BD1FBV	*	100	16	8	11
*BD4ALC	21	40,677	241	28	63
*BA6QD	*	24,696	236	22	50
*B4TB	14	46,788	383	28	56
			(OP: BA4TB)		
*BA4DW	1.8	2,080	112	9	11

CYPRUS

H2G	14	1,106,876	2449	36	131
			(OP: 5B4AGC)		
C4M	1.8	141,201	678	17	70
			(OP: 5B4AGM)		

GEORGIA

4L1DX	A	12	2	2	2
4L8A	7	1,387,650	3159	35	139

HONG KONG

VR2BG	A	2,237,754	2376	138	336
VR2PX	*	256,122	972	62	124
VR2MY	21	182,700	849	28	88
VR2KW	3.5	102,918	608	24	78
*VR2JN	A	368,880	953	79	153
*VR2XLN	*	34,969	138	45	76

INDIA

*VU2BGS	A	200,207	350	85	174
*VU2NXM	*	57,900	171	51	99

IRAQ

YI9LZ	A	56,160	212	30	74

ISRAEL

4X4DZ	21	773,761	1903	36	127
4X6FR	7	899,968	2225	33	125
4Z5LA	3.5	158,928	748	16	68
*4Z4TL	A	263,032	431	58	186
*4Z5MU	*	53,599	191	50	83
*4X1VF	28	1,890	27	11	17

JAPAN

JF1SQC	A	2,176,850	1980	136	289
JE1CKA	*	1,880,016	1798	134	290
JA1JKG	*	530,140	917	86	174
JA1TMG	*	425,365	748	86	155
JA1QOW	*	312,666	506	88	158
JO1WKO	*	246,030	379	93	202
JA1HP	*	224,620	466	79	141
7J1ABD	*	98,808	246	74	110
JH1EVD	*	57,218	177	55	79
JR1VAY	*	27,246	103	47	67
JL1LNC	*	26,992	129	48	64
JO1QZI	*	11,957	83	30	42
JA1MRE	*	2,961	44	23	24
JA1CSB	*	1,116	24	9	9
JA1XZF	28	4,107	46	17	25
JS1IFK	21	78,234	338	33	69
JS1OYN	14	191,064	667	35	79
JA1GS	*	14,160	104	23	36
7N4KDU	*	3,704	40	16	27
JK1LUY	*	132	9	6	5
JH1AEP	7	411,685	1182	34	103
7M4AOE	*	1,353	31	15	18
JH1OGC	3.5	137,088	590	29	83
JH1APZ	*	11,220	94	21	39
JR4PMX/1	*	10,150	70	21	37
7K1CPT	*	612	21	8	9
JA1XEM	*	592	17	7	9
JE1SCJ	*	224	8	6	8
JA1VVH	*	220	17	10	10
JA1KVT	1.8	1,488	30	12	12
*JI1RXQ	A	736,452	919	113	211
*JH1RNI	*	331,170	530	90	176
*JA1PS	*	183,633	367	86	154
*JG1TVK	*	173,776	355	76	158
*JA1BUI	*	169,122	356	80	133
*JH1SWD	*	138,491	311	78	119
*JP1QDH	*	129,978	309	63	111
*JA1HNW	*	105,450	306	69	121
*JG1OWV	*	101,352	215	88	118
*JA1IZ	*	85,462	230	68	105
*JA1XPU	*	82,820	222	66	98
*JA1CP	*	82,620	241	69	101
*7N4CLI	*	64,207	210	60	83
*JE1COB	*	63,066	198	57	81
*JA1MVK	*	53,196	196	47	85
*JP1SRG	*	51,338	168	55	78
*JA1IE	*	48,750	175	55	75
*JA1HG	*	46,500	159	54	71
*JJ1JGI	*	42,812	150	53	86
*JA1HFY	*	41,674	185	54	80
*JH1WFK	*	39,088	151	44	68
*JA1HTG	*	34,544	132	53	74
*JA1CPZ	*	33,813	136	45	72
*7K1PYG	*	27,945	122	51	64
*JA1BFN	*	18,252	113	34	44
*JA1WHG	*	13,708	106	42	50
*JA1WQX	*	12,936	79	33	44
*JR1UMO	*	10,880	55	41	44
*JA1FWY	*	9,282	100	23	19
*7N4QCQ	*	8,631	72	27	36
*JA1GYO	*	7,918	56	33	41
*JH1FNU	*	7,560	64	21	33
*JE1UKM	*	7,452	49	32	37
*JN1HYU	*	6,600	52	24	36
*JE1JAC	*	5,096	47	22	27
*JG1FGL	*	4,563	49	22	27
*JK1NSR	*	3,552	41	17	20
*JA1IWP	*	2,108	33	16	18
*JP1IOI	*	1,296	44	26	28
*JA1GSQ	*	680	22	16	18
*JH1MHA	*	360	28	17	23
*JA1MNJ	*	100	22	14	13
*JI1AVY	*	10	8	7	8
*JI1HFJ	28	3,240	41	12	18
*JA1AAT	*	333	10	7	6
*JE1ALA	*	322	12	5	9
*7K4XNN	21	80,784	332	35	67
*JG1UKW	*	20,370	140	24	46
*JA1RQT	*	20,002	130	26	47
*JH1TXG	*	15,378	110	23	43
*JA1EM	*	13,633	110	24	37
*JA1PUK	*	4,929	44	20	33
*JO1WIZ	*	2,906	48	13	22
*JH1DJD	*	2,706	56	17	24
*JA1DBG	*	950	22	10	14
*JH1XOQ	*	252	10	6	6
*JE1RRK	14	14,355	110	22	33
*JI1FDF	*	100	19	16	19
*JA1BJI	7	59,388	238	29	72
*JN1MSO/1	*	23,856	147	23	48
*JG4KEZ/1	*	16,184	106	23	45
*JJ1RJR/1	*	2,829	49	13	28
*JE1SPY	1.8	2,457	53	14	13
*JE1TSD	*	520	15	11	9
*JH1GVY	*	494	18	10	9
JF2QNM	A	491,742	715	116	190
JA2FSM	*	179,124	379	91	145
JA2HO	*	87,350	209	82	132
JF2FIU	*	46,843	158	61	78
JH2OMM	*	10,659	74	27	41
JE2HVC	7	51,633	236	31	72
JA2KVD	*	35,451	157	30	71
JF2WXS	3.5	5,876	63	17	35
JH2FXK	1.8	5,310	52	16	29
*JH2NWP	A	597,402	754	107	226
*JA2AXB	*	465,192	634	110	202
*JA2KVB	*	289,248	454	92	184
*JA2IU	*	260,517	555	90	163
*JK2VOC	*	104,030	259	74	128
*JA2VZL	*	86,618	234	61	100
*JR2SQU	*	65,208	196	60	96
*JA2KKA	*	56,012	188	51	83
*JA2KPW	*	46,609	150	52	75
*JA2QVP	*	43,296	146	56	76
*JQ2EHD	*	35,765	137	49	66
*JA2KCY	*	4,464	46	22	26
*JA2AJA	*	1,364	35	11	11
*JA2XCR	14	77,214	320	31	71
*JE2HCJ	*	64,064	233	35	77
*JL2LPX	*	32,233	181	30	56
*JR2TMB	*	10,614	85	23	35
*JE2OTM	7	45,472	197	29	69
*JH1HTQ/2	*	32,640	180	28	57
*JA2GTW	*	20,002	122	23	50
*JA2PFO	*	2,970	40	12	15
JF3CCN	A	505,042	641	119	254
JF3KNW	*	155,996	292	89	147
JA3IKG	*	97,054	266	58	107
JR3XEX	*	79,119	232	76	101
JG3WCZ	*	1	2	2	2
JA3ETD	21	420	42	15	27
JH3AIU	14	461,520	1263	36	108
JA3DAY	*	35,010	166	29	61
JA3AYX	*	8,536	78	23	32
JA3XOG	7	43,022	181	27	71
JS3CTQ	3.5	33,620	169	25	57
JA3GN	*	16,817	122	23	44
*JG3LGD	A	196,560	326	100	152
*JA3AVO	*	77,700	212	60	90
*JH3CUL	*	66,456	203	65	91
*JA2CX/3	*	63,282	209	62	97
*JI3DNN	*	23,668	148	46	76
*JG3FWI	*	2,622	37	24	33
*JR3EOI	21	195,600	668	35	85
*JF3BFS	*	104,186	386	36	77
*JL3TEM	*	37,636	180	34	63
*JO3FUO	14	66,825	291	31	68
			(OP: JJ1BDX)		
*JK3GWT	*	52,348	266	29	63
*JN3DSH	*	30,738	152	31	63
*JH3MSA	*	3,060	37	16	20
*JI3JMG	*	1,612	22	12	14
*JN3QVC	7	38,024	152	28	69
*JG3EHD	*	240	10	4	4
*JI3KDH	1.8	1,710	38	13	17
JH4UYB	A	4,160,646	2879	168	399
JA4YHX	*	146,590	302	82	132
			(OP: JA4CZM)		
JA4ESR	*	56,384	193	51	89
JM4WUZ	21	60,164	291	28	61
JE4VVM	14	335,098	1046	37	94
JA4AQZ	*	14,992	109	23	33
JA4DHN	7	7,623	73	15	32
*JA4AQR	A	108,232	284	60	106
*JE4MHL	*	98,460	245	73	107
*JA4BAA	*	81,210	244	69	103
*JH4OYA	*	71	5	4	3
*JR4GPA	21	35,796	209	21	55
JE5JHZ	A	67,536	184	64	104
JA5DQH	21	398,811	1043	38	109
JA5APU	14	110,776	483	36	86
*JG5DHX/5	A	25,200	109	42	58
*JR5HXU	*	24,640	96	42	68
*JA5RB	*	21,879	110	43	56
*JA5IDV	21	10	4	3	3
*JA5JGV	1.8	447	14	9	9
JA6BGA	A	136,619	273	79	157
JA6WIF	28	14,022	116	21	36
JA6BZI	7	116,466	344	33	108
JA6GCE	3.5	45,591	247	26	65
JH6WHN	*	16,491	117	22	47
*JH6QFJ	A	229,116	574	70	113
*JA6CYL/6	*	221,175	407	81	144
*JQ1AHZ/6	*	28,222	133	46	57
*JA6BWB	*	7,915	90	10	40
*JA6BIF	21	4,512	62	18	29
*JO6EDD	*	1,232	22	13	15
*JA6WFM	7	100,128	483	30	82
JH7XGN	A	1,299,293	1294	138	253
JA7DLE	*	663,336	837	111	221
JA7COI	*	315,436	542	90	178
JA7ZP	*	46,170	179	68	94
JA7OWD	28	3,910	46	13	21
JH7XMO	21	87,847	380	35	72
JA7NVF	14	91,637	461	30	61
JA7DOT	*	23,764	113	25	71
JA7MJ	3.5	14,520	118	22	38
JM7TKK	*	4,400	69	16	24
JF7VVL/7	*	180	8	6	6
*JE7YSS	A	26,664	111	37	64
			(OP: 7N4TEN)		
*JN7OJA	*	16,867	93	39	49
*JA7AEM	*	14,896	99	33	43
*JF7GDF/7	*	13,260	90	32	36
*JA7AXP	*	2,832	31	20	21
*JH8SLS	A	749,436	830	120	241
*JA8CJY	*	105,794	249	61	108
*JK8JIC	*	4,320	41	18	27
JA9CWJ	14	39,852	178	24	58
JA9DOF	3.5	361	15	8	11
*JA9JFO	A	155,178	294	84	138
*JF9JTS	*	988	27	18	20
*JH9BWC	21	4,896	52	18	30
*JR9NVB	7	34,743	187	25	59
*JA9XBW	3.5	10,395	100	19	38
JJØJML	A	208,452	504	64	110
JAØUMV	*	169,560	335	77	139
JHØFUW	7	197,632	614	32	96
JAØFVU	3.5	2,916	53	14	22
JAØDAI	1.8	5,192	58	15	29
*JHØNEC	A	436,791	629	103	188
*JAØBMS	*	74,800	257	58	78
*JGØMWU	*	65,600	185	66	94
*JIØNXA	*	32,130	185	51	75
*JAØBJY	*	19,584	113	29	39
*JJØAEB	*	13,244	95	32	45
*JAØRCK	*	11,310	56	29	49
*JGØSXC	*	4,720	45	19	21
*JJØKWN	*	3,995	44	23	24
*JAØGZ	*	2,005	32	19	19
*JGØIPW	*	176	9	5	6
*JHØBLI	21	1,952	33	12	20
*JHØEPI	14	78,390	337	32	74

KAZAKHSTAN

UPØL	A	3,674,646	2908	111	375
			(OP: UN9LW)		
UN2E	*	1,129,842	1296	82	261
UN6T	*	539,316	811	74	210
UN8GA	7	40,807	234	16	57
UN2C	3.5	447,024	1395	29	105
*UN3M	A	2,005,515	2036	91	278
*UN7QF	*	15,900	159	25	50
*UNØC	*	10,062	58	35	51
*UN7EX	28	224	7	7	7
*UN5J	21	228,361	943	27	92
*UN7BN	*	12,508	84	15	44
*UN4PD	14	87,813	345	24	75
*UN7JX	*	69,012	364	20	61
*UN4PG	7	64,365	239	26	79
*UN7JID	*	25,122	177	18	61
*UN7IT	1.8	26,680	203	10	48
*UN6P	*	19,329	220	11	40

KOREA

HL5UOG	A	3,981	53	22	23
*6K2DIO	A	46,172	407	45	52
*6K2ABX	*	9,030	57	30	40
*HL2FDW	14	116,523	604	33	74
*DS4NMJ	7	6,960	146	20	38

KYRGYZSTAN

EX2A	A	1,230,272	1425	90	286
EX2X	*	1,045,482	1330	80	246

MONGOLIA

JT1CO	A	1,516,653	2286	120	267
JT1BH	21	88,650	737	24	66
JT1DA	7	156,113	927	27	80

OGASAWARA ISLANDS

JD1AMA	7	414,060	1673	35	99

OMAN

A45XR	A	9,626,226	5519	154	500
*A45WG	21	2,014	36	16	22

SAUDI ARABIA

*7Z1SJ	A	83,475	200	55	104
*HZ1IK	7	667,821	1749	34	113

SINGAPORE

9V1CW	A	86,728	268	52	96
9V1YC	3.5	96,594	485	27	75

SRI LANKA

4S7EXG	A	436,224	727	86	198
*4S7NI	14	42	3	3	3

TAIWAN

*BU2AI	A	299,288	926	79	130

TAJIKISTAN

EY7AF	A	2,523,430	2678	103	310
EY8MM	7	1,085,276	2347	39	142
EY8CQ	1.8	36,540	266	11	49

THAILAND

HSØAC	A	366,704	931	57	151
			(OP: OZ1HET)		
*HSØZAR	A	2,085,369	2269	116	313
			(OP: K3ZO)		
*HSØZGL	*	168,682	489	56	137
*E2ØYLM	14	23,068	146	25	54

UK BASES ON CYPRUS

ZC4LI	21	849,400	2202	33	122

UNITED ARAB EMIRATES

A61Q	A	1,865,490	2403	81	249
A61AR	7	1,197,180	2670	37	143
			(OP: RV6LNA)		

UZBEKISTAN

UK9AA	7	869,528	2103	36	128
*UK/JI2MED	A	509,950	1025	61	174

WEST MALAYSIA

*9M2TO	A	385,605	1429	85	200

EUROPE

ALAND ISLANDS

OHØE	A	3,534,100	3745	138	452
			(OP: OH2MM)		
OHØM	21	442,750	1418	36	139
			(OP: OH5DX)		
OHØZ	1.8	188,552	1484	23	81
			(OP: OH1JT)		

ALBANIA

ZA/Z35M	A	495,420	1335	53	177
*ZA/LZ5PL	A	2,050	45	13	28

AUSTRIA

OE2G	A	1,346,356	1901	95	312
			(OP: OE2BZL)		
OE1TKW	*	27,090	150	34	92
OE3GSA	14	373,616	1125	35	117
*OE5CYL	A	57,252	282	36	120
*OE8CCQ	*	38,675	213	30	89
*OE1BKA	*	17,901	124	23	50
*OE5ØWIG	21	40,128	225	30	66
			(OP: OE6WIG)		

AZORES

CU2A	A	7,915,656	6319	137	499
			(OP: OH2UA)		
CU3AA	3.5	156,017	1015	16	73
*CU2/OH3BHL	21	10	8	4	7
*CU2JT	7	191,760	732	24	96

BALEARIC ISLANDS

EA6AZ	7	34,874	207	21	85
*EA6AFF	A	431,864	1262	73	223
*EA6NB	*	334,800	860	65	175
*EA6DD	14	119,944	639	27	89

BELARUS

EU1PA	A	1,057,959	1715	102	339
EW1CQ	*	735,585	896	99	336
EU4LY	*	645,290	1289	79	267
EW8CY	*	548,430	1241	66	237
EW3LN	*	456,181	785	98	269
EW8OF	*	118,852	656	34	138
EW2EO	*	42,485	190	40	105
EU7SA	*	7,050	46	31	44
EU3AR	28	3,807	63	13	34
EW7KR	14	92,872	563	25	79
EW8EW	7	476,319	1985	37	142
EW7LO	*	176,800	857	29	107
EW2DN	*	16,640	152	16	64
EU1AZ	3.5	251,844	1531	25	99
EW8DX	*	170,748	1346	20	88
*EU1DX	A	890,015	1146	103	328
*EW1KT	*	224,952	609	69	204
*EU1CB	*	154,660	621	43	147
*EU4CQ	*	130,248	467	56	187
*EW2EG	*	2,411	72	15	30
*EW6DX	14	41,904	216	22	75
*EV6Z	7	105,900	888	23	77
*EU2MM	*	88,084	536	24	98
*EW6AL	*	65,637	390	26	91
*EV6M	1.8	8,976	213	7	37

BELGIUM

OO5ZO	14	469,376	1433	36	116
			(OP: ON5ZO)		
ON4AEK	7	380,568	1600	35	122
ON4CCP	3.5	65,268	870	11	52
OR5N	*	18,688	290	9	55
			(OP: ON4NOK)		
*OT5B	A	681,992	1308	73	253
			(OP: ON4AEB)		
*ON6NR	*	600,972	1002	84	282
			(OP: ON4RU)		
*ON5SV	*	214,875	595	53	172
*OO6ML	*	139,840	493	47	137
			(OP: ON6ML)		
*ON6LY	*	95,616	424	37	129
*OO5JD	*	20,825	169	29	90
			(OP: ON5JD)		
*ON7BS	*	3,355	57	17	38
*ON5WL	*	2,613	46	13	26
*OO6FC	*	2,310	97	24	53
			(OP: ON6FC)		
*ON9CTZ	7	208,656	1051	26	112
*ON4KVA	*	2,695	65	8	27

BOSNIA-HERZEGOVINA

T96Q	21	570,473	1613	37	142
*T93Y	A	245,358	414	70	188
*T92M	21	31,680	178	27	72
*T94DM	7	210,080	1258	28	102
*T9/VE3ZIK	*	153,036	1092	21	96

BULGARIA

LZ2DF	A	699,614	804	123	331
LZ1BJ	*	595,276	1038	78	254
LZ2PL	*	118,137	474	51	108
LZ5T	3.5	68,464	680	15	73
			(OP: LZ3RR)		
*LZ9R	A	1,036,741	1430	96	353
			(OP: LZ3YY)		
*LZ1QV	*	274,166	515	88	238
*LZ5XQ	*	255,373	707	65	198
*LZ3SM	*	242,858	544	66	200
*LZ2ITU	*	114,369	439	48	153
*LZ1GU	*	50,232	123	58	110
*LZ1ONK	*	9,576	164	11	52
*LZ1MC	*	7,632	67	25	47
*LZ2JR	*	4,420	88	16	49
*LZ9X	28	8,883	87	17	46
			(OP: LZ1RB)		
*LZ4AE	21	47,432	210	28	70
*LZ2ZG	*	17,168	120	26	48
*LZ4JO	14	60,135	333	25	70
*LZ5AZ	*	50,687	320	20	71
*LZ2CE	*	35,680	249	21	59
*LZ2VP	*	14,740	125	16	51
*LZ1AG	1.8	3,526	85	8	35

CRETE

*SVØXAI/9	A	134,714	635	42	151

CORSICA

*TK/DJ9RR	A	163,664	644	42	170

CROATIA

9A3ST	A	280,000	475	89	231
9A2VN	*	6,902	82	16	42
9A5Y	21	523,260	1330	37	153
			(OP: 9A3NM)		
9A8M	7	163,404	1240	23	85
9A9A	3.5	583,360	2328	34	126
9A4W	*	166,314	1380	21	85
9A2AJ	1.8	89,300	994	19	81
*9A5K	A	2,534,280	2313	130	458
*9A3TU	*	177,100	394	69	184
*9A5AQA	*	64,206	261	51	123
*9A5YY	*	21,978	154	32	67
*9A4MN	*	16,800	126	21	54
*9A3QB	*	7,130	84	19	43
*9A3VM	28	4,988	101	10	33
*9A7D	21	290,680	808	37	132
			(OP: 9A2SD)		
*9A5D	*	186,914	699	36	122
*9A4RV	*	4,824	52	16	20
*9A3B	14	506,198	1637	34	120
			(OP: 9A1AA)		
*9A6NCM	*	17,141	154	15	46
*9A3RE	1.8	36,894	585	10	56

CZECH REPUBLIC

OL8R	A	3,137,913	2871	139	482
			(OP: OK1FCJ)		
OK1EP	*	1,421,724	1621	118	396
OK2PDT	*	1,192,800	1692	95	325
OK2ABU	*	710,684	1392	83	263
OL6W	*	489,168	859	84	260
			(OP: OK2FB)		
OK1DWF	*	295,906	747	64	183
OK1MKU	*	276,828	441	95	259
OK1AXB	*	225,243	561	65	196
OK2PCL	*	187,425	326	71	154
OK2PZ	*	104,475	390	52	147
OK5MM	*	100,170	785	20	85
OK1AYY	*	94,760	415	37	147
OK1NE	*	56,800	265	36	124
OK1FRO	*	34,456	276	26	92
OK1FFU	21	233,597	672	37	114
OK5E	*	53,460	247	31	77
			(OP: OK1NE)		
OK1DRQ	*	42,479	191	27	80
OL9Z	14	287,700	1127	34	116
			(OP: OK2PVF)		
OK7XC	*	245,705	803	35	122
OK4RQ	3.5	440,482	1979	29	117
OK1FZM	*	139,625	793	25	100
OL6T	*	111,072	901	17	79
			(OP: OK1DCF)		
OK1FHI	*	92,778	827	17	77
OK1QM	*	91,759	828	15	74
OK2YT	*	70,043	609	15	74
OL7P	*	63,750	774	14	71
			(OP: OK1CRM)		
OK2BZ	*	55,890	453	16	74
OK2TRN	*	52,851	557	14	65
OK1IBP	*	45,846	483	13	68
OK1FAV	*	37,807	425	12	65
OK2VWB	*	30,464	368	10	58
OK1FOG	*	29,380	424	12	53
OK1AVY	*	22,325	124	17	78
OK1FC	*	17,550	231	11	54
OK1ICJ	*	10,500	123	12	58
OK5AA	*	8,400	169	7	41
OK1RF	1.8	232,185	1391	23	92
OK1IW	*	45,156	673	11	60
OK1DWJ	*	7,696	55	13	61
*OK2ZC	A	1,409,980	1786	108	385
*OL6P	*	1,266,694	1630	106	367
			(OP: OK2WTM)		
*OK1DOL	*	1,078,020	1392	101	351
*OK2DU	*	937,097	1488	98	315
*OL6BA	*	925,880	1462	91	304
*OK1HX	*	845,610	1141	98	328
*OLØA	*	836,271	1192	101	322
			(OP: OK1CZ)		
*OK2QX	*	820,836	1096	106	347
*OK2TCW	*	753,424	1110	90	302
*OK1VD	*	646,092	1018	92	301
*OK1KQH	*	536,956	1047	71	231
			(OP: OK1BA)		
*OK2EC	*	534,800	1060	76	274
*OK8HA	*	507,850	952	85	265
*OK1AY	*	500,625	791	89	286
*OK1DKR	*	489,552	693	89	287
*OK1ZP	*	431,940	883	79	234
*OK1AJR	*	424,560	663	82	266
*OK1FCA	*	383,040	949	54	198
*OK7MT	*	350,721	637	77	216
*OK1GS	*	324,250	857	43	207
*OK1DKO	*	289,050	643	70	212
*OK2BQL	*	263,857	673	71	218
*OK2VX	*	237,168	650	52	191
*OK1CO	*	231,840	575	67	221
*OK2KJ	*	225,348	641	48	163
*OK1DVK	*	208,554	373	83	262
*OK1TD	*	205,785	435	66	203
*OK1MLP	*	194,880	491	57	167
*OK1HCG	*	168,912	564	46	170
*OK2VP	*	151,616	458	52	154
*OK2PBG	*	148,125	362	60	199
*OK2BND	*	135,680	456	47	165
*OK1HGM	*	130,901	395	54	169
*OK1AUP	*	129,950	350	57	169
*OK1MZO	*	129,750	365	60	190
*OK1FWW	*	125,780	463	45	145
*OK5TM	*	119,889	393	46	127
			(OP: OK2BPL)		
*OK2BNC	*	116,859	369	59	149
*OK1TFH	*	95,592	423	37	131
*OK2BJ	*	90,095	277	59	126
*OK2BDF	*	82,812	309	50	151
*OK1LO	*	66,144	278	42	114
*OK2SWD	*	57,722	337	25	108
*OK1AKB	*	37,310	233	29	101
*OK1DSX	*	20,790	85	39	60
*OK1ARO	*	10,220	76	21	49
*OK2PAD	*	1,998	30	15	22
*OK1KMG	*	528	20	6	16
			(OP: OK1FUW)		
*OK1DJS	28	1,255	33	10	23
*OK2ZJ	*	782	16	8	15
*OK2N	21	170,040	473	36	120
			(OP: OK2NN)		

*OK2TBC	*	73,810	266	33	88
*OK1MMN	*	32,660	183	20	51
*OK1DRX	*	4,515	61	15	20
*OK1KZ	*	3,457	66	12	15
*OK1FDR	14	440,398	1209	36	130
*OK1GI	*	105,256	547	29	89
*OK2BRA	*	85,578	430	22	80
*OK2PYA	*	47,730	218	22	64
*OK1BLU	*	20,325	216	17	58
*OL5DX	*	1,838	29	11	21
*OK1FHL	7	186,728	917	29	107
*OL4W	*	129,572	871	25	91
			(OP: OK1IF)		
*OK2HI	*	97,343	446	30	108
*OK2DW	*	49,337	288	25	78
*OK2UQ	*	11,163	150	11	50
*OK1JOK	1.8	22,140	401	9	51
*OK1MNW	*	20,544	300	10	54
*OK1FM	*	3,948	89	10	37

DENMARK

OZ4RT	A	287,722	651	59	204
OZ1JTE	*	270,084	525	77	240
OZ8SW	*	116,816	275	51	145
OZØJ	*	24,112	176	37	100
OZ7BQ	3.5	48,208	377	17	75
OZ7AEI	*	12,060	170	11	56
*OZ8AE	A	724,593	1008	99	312
*OZ5DL	*	206,492	543	56	191
*OZ5UR	*	194,680	516	63	185
*OZ6PI	*	173,430	390	65	217
*OZ1DGQ	*	7,524	95	15	29
*OZ4FF	*	5,330	58	23	45
*OZ5BD	*	2,745	56	17	28
*OZ5RM	*	399	25	4	17
*OZ7YL	14	10,704	122	12	26

DODECANESE

J45A	3.5	8,507	189	8	39
			(OP: LY1DF)		
*J45KLN	A	241,713	716	59	192
			(OP: SMØCMH)		

ENGLAND

G3TXF	A	3,682,949	3629	120	401
GØWKW	*	1,197,346	2580	66	212
GØOPB	*	776,503	1547	70	229
G4KFT	*	404,212	744	66	212
GØORH	*	312,134	949	57	182
G3ZGC	*	249,682	590	56	198
G4SGI	*	218,008	527	58	180
G4HZV	*	169,830	396	59	163
G3UFY	*	108,150	351	46	160
GØDAY	*	71,825	340	42	127
MØTDG	*	33,700	230	31	69
G3KMQ	*	32,595	121	36	87
G3WVG	*	1	1	1	1
MØC	21	140,306	511	30	116
			(OP: G3RTE)		
G3RAU	14	417,300	1297	37	113
M8C	*	336,774	1509	31	80
			(OP: G4DBL)		
M4T	*	6,960	166	14	46
			(OP: GØLHZ)		
MØIPX	3.5	59,829	649	16	61
			(OP: G3UNA)		
G5YC	*	7,182	95	11	52
G3GLL	1.8	13,572	223	9	49
*GØRTN	A	1,275,904	1596	97	351
*GØMTN	*	938,088	1721	81	306
*MØCCE	*	485,933	941	69	260
*G3KKP	*	432,798	845	65	253
*G4FKA	*	284,348	696	54	214
*G3YEC	*	162,110	412	54	161
*M5FUN	*	161,280	546	52	158
*M1SMH	*	150,308	421	48	164
*G3MPB	*	124,773	309	59	150
*G4DDL	*	109,532	376	46	151
*GØHDB	*	94,300	316	46	159
*G3MIR	*	90,090	226	60	150
*GØUKX	*	76,960	302	38	110
*MØGMB	*	73,095	316	38	127
*G3BFP	*	68,783	279	38	105
*G3RSD	*	46,332	217	39	104
*MØOIC	*	44,044	193	36	107
*GØUVX	*	40,080	185	29	91
*GØMRH	*	34,220	230	26	92
*G4SLE	*	25,585	210	30	89
*MØRUS	*	20,444	141	20	56
*G4ZME	*	14,651	100	20	60
*G4WGE	*	8,760	102	21	52
*GØLZL	21	65,184	280	25	87
*MØBJL	*	51,831	311	28	89
*GØRDO	*	5,828	58	14	33
*G6M	14	430,110	1323	36	126
			(OP: G4KIV)		
*M3C	*	87,548	700	21	65
			(OP: GØVQR)		
*G6EFX	*	20,274	241	14	48
*M/SQ9I	*	8,118	112	9	32
*G3ZRJ	7	23,584	252	13	54
*G3VYI	1.8	2,698	73	5	33

ESTONIA

ES5TV	A	3,581,200	3830	136	424
ES5JR	14	417,196	1610	34	108
ES5MC	7	531,696	1945	36	140
ES6DO	*	286,380	1469	35	113
ES2DJ	*	242,808	1160	36	115
ES6CO	3.5	3,510	78	9	30
*ES4MM	A	124,450	292	72	190
*ES7FU	*	31,185	173	29	106
*ES4RC	21	16,116	113	24	55
*ES4RD	14	78,260	315	31	109
*ES8DH	7	36,975	354	19	66

EUROPEAN RUSSIA

RW1ZA	A	2,241,296	2407	120	388
RW3GU/3	*	2,229,400	2409	125	443
UA3QDX	*	2,027,400	2146	131	469
RT3T	*	1,443,420	2128	108	378
			(OP: UA3TU)		
UA4CCG	*	1,198,880	1670	111	361
UA4SU	*	1,058,608	1624	101	335
RA3UT	*	1,052,062	1378	114	379
RA3NZ	*	769,120	1218	93	325
RU3GN	*	699,309	916	97	320
RD4WA	*	691,335	1347	96	309
UA4PN	*	629,724	1166	93	295
RA4YW	*	608,853	1209	87	280
RK3DK	*	586,470	1269	80	266
RZ3AV	*	441,324	847	82	287
UA3UJE	*	396,490	899	67	243
RV1CC	*	363,216	702	85	244
RA4PO	*	315,150	679	85	245
RX1CD	*	289,849	540	73	256
RK1NA	*	184,016	533	58	190
RK3BA	*	176,847	417	62	191
RA3TT	*	149,328	373	61	143
RU3AV	*	135,788	498	40	126
RN4AK	*	71,940	325	37	128
RU6MD	*	62,988	297	39	135
UA3DSS	*	39,751	221	32	95
UA6LLE	*	24,024	126	38	66
RK3QS	*	22,523	139	28	73
UA1AKE	*	19,380	72	50	64
RW4NH	*	18,281	70	41	60
RX6LDB	*	8,384	126	17	47
RD3AT	*	6,572	108	15	47
RZ3DX	*	4,760	38	24	32
RA6AFB	28	10	5	2	2
RZ6FA	21	250,305	785	33	132
RW6HX	*	177,727	754	33	118
UA4LU	*	160,284	710	30	118
RA6DB	*	101,556	428	28	98
RA3AN	*	45,240	253	25	79
UA3AO	*	44,414	247	26	80
RK3ER	*	10,287	147	23	58
UA3DEE	*	9,086	73	20	39
RA3CW	14	530,115	1672	37	140
RU3AA	7	247,860	1139	36	126
UA6LTI	*	238,545	842	33	122
RW6FO	*	226,512	956	35	121
RW6CF	*	180,450	828	34	116
UA6AA	*	86,250	371	33	105
RA6CZ	*	49,184	356	27	89
UA6AKD	*	47,151	397	20	73
UA1ORT	*	24,381	195	21	60
RX3AP	*	13,564	141	15	61
RW4PL	3.5	245,544	1054	33	123
UA1DMS	*	216,104	1171	29	107
UA3TCJ	*	200,390	742	32	113
RA3XA	*	112,860	765	22	86
UA6AAY	*	108,748	717	25	99
RU3FM	*	84,112	550	21	91
UA3WU	*	73,914	635	19	78
RW4WM	*	73,600	670	15	77
RW1ZZ/3	*	68,495	545	17	78
RZ3DJ	*	35,640	323	17	73
RV6LA	*	11,327	247	8	39
UA3DTT	*	8,200	139	8	42
RU4CO	*	6,864	96	10	42
RW4HM	*	6,200	99	9	41
RX4HB	*	2,886	72	10	29
RA1QX	*	1,305	43	7	22
UA6ATG	*	143	8	5	8
RA3AH	1.8	16,688	280	9	47
UA3AP	*	12,095	212	9	50
UA4SAW	*	6,150	124	7	34
*UA4FER	A	1,755,890	2005	119	411
*RN6FA	*	1,175,094	1697	107	356
*RV6LFE	*	958,826	1342	104	347
*RZ4AG	*	885,877	1164	106	343
*UA1ANA	*	744,184	1314	82	306
*RW6FZ	*	696,449	1666	73	244
*RK3ZZ	*	670,089	1152	83	274
*RV3FI	*	615,111	1214	80	277
*UA3DMO	*	539,932	938	88	301
*UA4YA	*	453,080	913	88	310
*UA4ALI	*	402,831	874	73	240
*RV3LO	*	375,284	761	85	279
*RK4FM	*	373,329	881	67	230
*RX3ZX	*	373,196	715	73	243
*UA1CEC	*	367,900	1093	55	228
*RU4WE	*	358,224	998	61	211
*RA3FD	*	349,416	960	59	217
*RX3AEX	*	349,200	992	69	231
*UA1OMX	*	346,830	644	82	248
*UA4LA	*	343,540	815	84	272
*RU6AT	*	335,040	1193	55	185
*RU3UN	*	333,408	490	85	283
*RN4SS	*	329,120	1159	52	220
*RX3RZ	*	308,363	776	69	220
*RA1QN	*	275,990	738	63	223
*UA3DPM	*	273,573	585	80	259
*RX3DBG	*	253,708	618	62	225
*RK3AQW	*	247,689	656	63	198
*RN3FA	*	231,264	568	65	199
*RW6BN	*	220,580	594	68	201
*RV4LC	*	219,294	585	58	221
*RK6MY	*	218,136	596	55	189
*RZ6HN	*	216,418	697	55	186
*RW1QD	*	197,750	604	53	197
*RD3FT	*	194,340	476	63	183
*RD3AP	*	193,905	526	64	215
*UA4FCO	*	190,638	582	64	203
*RN3QP	*	182,515	575	52	159
*UA4AGO	*	171,756	567	51	183
*UA1CUR	*	170,372	503	49	174
*RK4HD	*	169,265	288	78	271
*UA1ZZ	*	165,095	583	46	185
*RD3AD	*	159,938	610	42	169
*RW3TA	*	157,780	431	57	173
*RU6AI	*	156,128	395	77	195
*RZ3DA	*	151,116	347	79	215
*RA1OD	*	148,056	308	70	178
*RU4SM	*	141,980	530	49	180
*UA3EAY	*	133,363	470	46	147
*RU3FT	*	122,232	251	76	188
*RX3DVF	*	118,384	395	46	150
*RD3QJ	*	114,490	407	49	165
*UA4QK	*	111,143	366	56	162
*RU3WR	*	110,644	470	43	156
*RX3MM	*	107,625	364	50	155
*RA3BB	*	103,212	276	55	128
*RA4NCC	*	101,400	422	37	132
*UA3VLO	*	92,876	266	48	169
*RU3DM	*	92,736	195	71	153
*RA6YJ	*	92,092	258	50	132
*RA6FV	*	90,666	209	66	153
*RU3MW	*	84,952	397	34	130
*RU6CO	*	82,015	225	52	183
*UA4NCI	*	76,857	211	58	129
*UA3RLT	*	76,025	379	42	152
*RZ6AK	*	75,600	423	42	147
*RA1AGL	*	74,620	303	56	149
*RZ1CXS	*	74,556	307	38	133
*UA3QIX	*	71,166	324	46	128
*UA3QU	*	69,751	289	43	144
*UA3EDQ	*	68,497	169	52	91
*RA6DE	*	64,135	256	35	92
*RN4CA	*	59,280	291	32	98
*RZ3AMW	*	58,752	367	28	125
*RW4AD	*	54,786	315	29	109
*RZ3OV	*	53,946	216	42	120
*RV3LQ	*	52,864	243	33	95
*UA3RW	*	51,975	270	49	116
*RA3DH	*	45,885	180	37	96
*UA4PAY	*	44,588	200	37	105
*RV3BQ	*	42,706	203	31	100
*UA1TAN	*	42,085	183	29	66
*RX3BP	*	34,425	100	57	96
*RX4HX	*	31,995	153	39	96
*RV3MI	*	30,174	201	22	65
*RX3AW	*	28,792	127	38	84
*RA3GFG	*	28,689	181	33	98
*RA3FH	*	28,000	97	58	82
*RZ6LB	*	25,986	89	59	83
*RW6CW	*	25,276	117	48	94
*UA4HQS	*	24,672	119	34	62
*UA6FQ	*	23,391	98	45	68
*UA3AKI	*	21,681	141	25	74
*RW3LL	*	19,392	142	27	74
*RU3AT	*	15,752	74	39	49
*UA4WAG	*	11,970	99	29	66
*RZ6AE	*	10,181	94	23	57
*RA6AAW	*	9,632	50	38	48
*RA3MB	*	9,345	76	28	61
*UA3VFI	*	9,072	108	17	55
*UA4ACP	*	8,650	83	17	33
*UA3OQ	*	7,524	83	21	55
*UA3MJX	*	6,540	76	15	45
*RU4LM	*	6,216	52	26	48
*UA4LF	*	5,684	70	14	44
*RW3SU	*	5,372	43	27	41
*UA3ABW	*	4,920	61	17	43
*UA4AMM	*	4,590	76	27	58
*UA3DUJ	*	4,399	44	22	31
*RA6FOT	*	3,600	51	15	33
*RL3DD	*	3,354	51	11	32
*RW1AJ/3	*	1,558	41	10	28
*UA6ADC	28	3,003	31	15	24
*UA6AK	*	670	18	11	13
*RN6HZ	21	132,820	636	30	115
*UA6LCN	*	50,430	235	33	90
*RZ3VA	*	44,748	227	25	74
*UA1NFA	*	41,704	201	27	77
*RA3XO	*	40,950	159	29	88
*RW4FX	*	40,800	220	28	68
*RU3DKW	*	18,450	110	24	58
*RA3QN	*	11,388	120	23	55
*RA4LBS	*	9,486	115	14	37
*RA4LK	*	8,432	72	18	44
*RK6CM	*	8,374	120	13	40
*RW4LQ	*	6,840	43	21	36
*UA4AGJ	*	4,760	147	15	41
*UA3ABJ	14	224,543	1022	31	106
*RW3AFY	*	151,116	541	35	112
*UA4AN	*	106,672	585	26	87
*UA4HAM	*	53,676	287	28	80
*RW6AH	*	43,788	345	20	62
*RU3UW	*	30,730	270	22	68
*RV3DSF	*	14,490	145	17	46
*RX3AA	*	10,017	111	13	40
*RN6HI	*	8,268	132	15	37
*RN3AQ	*	7,776	109	15	39
*UA1ODM	*	420	28	3	2
*RV3FM	*	10	6	5	6
*RU6FA	7	180,708	823	34	114
*UA3SAQ	*	108,940	695	29	101
*RV6LO	*	85,960	435	33	107
*RA6CT	*	55,328	314	27	85
*RV3ML	*	22,356	267	14	55
*RV3PN	*	9,569	144	9	50
*UA3RF	*	9,280	94	12	46
*RW3GB	1.8	32,504	401	12	56
*RA3UAG	*	25,935	342	10	55
*UA4FRL	*	24,450	248	13	62
*RN6DV	*	13,662	205	12	54

FAROE ISLANDS

OY1CT	A	529,152	1334	61	251
OY9JD	1.8	141,610	1215	18	80

FINLAND

OH1F	A	2,822,175	3035	131	424
			(OP: OH1MDR)		
OH2RA	*	1,023,408	1725	92	276
OH1EB	*	317,196	660	75	222
OH2VZ	*	250,439	576	67	202
OH6DH	*	81,770	300	45	125
OH1MA	*	67,878	164	63	99
OH3JR	*	28,080	108	44	100
OH1BOI	*	26,883	129	24	63
OH1ØA	21	166,440	595	33	119
			(OP: OH3WW)		
OH6TN	*	122,546	500	30	112
OH2CK	*	38,907	145	28	103
OH2XF	*	10,140	78	22	56
OH6KN	14	1,119,048	3029	37	131
			(OP: OH6UM)		
OH6AC	*	611,776	1825	37	121
			(OP: OH6CS)		
OH4TY	*	93,049	412	28	93
OH5Z	7	724,592	2419	37	139
			(OP: OH5CW)		
OH2U	*	694,620	2301	38	142
			(OP: ES2RR)		
OH2BH	3.5	593,922	2283	35	123
			(OP: OH1WZ)		
OH3WD	*	31,186	160	24	78
OH3WS	*	7,168	106	10	46
OH5UX	*	81	5	4	5
OH1MM	1.8	157,788	1210	22	86
OH4MFA	*	61,824	534	18	74
OH5PT	*	625	18	8	18
*OH2BPA	A	135,654	359	65	209
*OH1ZE	*	128,475	401	49	176
*OH3NDH	*	124,068	393	49	147
*OH2LO	*	84,040	278	48	143
*OH2LU	*	81,900	403	33	117
*OH2LP	*	63,900	303	54	159
*OH6LHB	*	53,664	257	32	97
*OH2FS	*	45,396	159	48	146
*OH6MBQ	*	37,488	257	27	105
*OH3HS	*	16,302	101	24	54
*OH7PF	*	14,006	59	41	53
*OH6GFI	*	392	20	10	18
*OH3VX	*	10	6	6	6
*OH3MC	21	12,191	102	18	55
*OH6OS	14	206,346	902	27	92
*OH6RC	*	16,920	104	24	68

FRANCE

TM6X	A	4,290,840	3606	131	449
			(OP: F5VHY)		
F5RAB	*	473,882	982	69	244
F6CXJ	*	315,675	673	72	233
F6GQO	*	89,011	340	43	124
F6ARC	7	959,139	2935	38	133
F6FJE	3.5	67,405	562	14	71
F5PHW	*	23,760	348	10	56
F8BPN	1.8	53,088	540	14	70
F6CWA	*	38,151	410	15	66
*F6HKA	A	1,654,797	1940	95	362
*F6FTB	*	822,187	1214	92	305
*F5QF	*	691,793	1041	80	279
*F5UKL	*	466,468	900	68	209
*F8AAN	*	458,988	987	74	202
*F6DYX	*	303,045	692	58	209
*F5NQL	*	244,736	687	56	183
*F8EEQ	*	193,500	507	68	182
*F5AIB	*	128,312	467	38	134
*F8CIL	*	97,722	263	48	130
*F5JY	*	95,172	358	31	101
*F5INJ	*	67,452	317	38	116
*F5AKL	*	63,712	208	50	126
*F6ABI	*	47,040	296	36	111
*F6DZD	*	44,064	223	35	101
*F5NKX	*	39,501	520	12	65
*F5TSB	*	22,487	169	31	82
*F5SDD	*	21,800	174	27	73
*F6CZV	*	19,280	146	22	58
*F8DFP	*	17,480	184	27	88
*F8BTR	*	8,910	79	19	35
*F8DYD	*	10	10	5	8
*F8AKC	28	5,085	103	12	33
*TM6Q	14	158,346	797	25	88
			(OP: FY5FY)		
*F8PDR	*	134,865	513	33	102
*F5NGA	7	43,164	325	19	80
*F8DNX	1.8	506	27	5	18

GERMANY

DL3YM	A	3,917,702	3571	127	435
DL5YM	*	1,135,739	1444	111	352
DL2DX	*	958,152	994	120	324
DL2F	*	829,374	1957	80	263
			(OP: DL2FDL)		
DL5JS	*	755,244	1248	69	255
DL5DXS	*	502,789	1062	78	253
DL7DZ	*	354,114	738	81	228
DL1DTC	*	264,880	446	75	233
DL1VDL	*	252,406	505	79	219
DL3YA	*	194,292	421	66	186
DL1ECG	*	173,848	435	58	190
DL6AG	*	169,824	398	59	173
DL7VAF	*	167,466	403	56	191
DJ9HX	*	137,562	255	75	152
DL5MEV	*	98,745	236	60	167
DD4DA	*	77,522	285	44	122
DM3M	*	70,452	283	40	131
			(OP: DM3XRF)		
DH8VV	*	66,975	196	55	86
DL9AWI	*	55,238	157	55	87
DL6RBH	*	50,397	259	41	116
DLØLA	*	44,380	169	43	97
			(OP: DL5RBR)		
DJ4KW	*	39,300	260	33	98
DF6WE	*	31,892	207	35	84
DJ2SL	*	15,369	70	42	67
DL6DVU	*	14,884	133	24	37
DL5RBR	*	14,430	82	31	47
DK5EZ	*	8,325	79	19	56
DJ2RB	*	4,437	55	21	30
DF5AU	*	4,104	35	23	34
DP3A	21	220,568	650	36	122
			(OP: DK2GZ)		
DP3D	*	77,616	334	30	82
			(OP: DL3ABL)		
DJØIF	14	283,050	866	33	117
DL5CF	*	275,553	860	34	119
DL7BY	*	189,656	643	34	117
DJ1AA	*	50,568	258	26	72
DL5RMH	7	140,448	609	30	103
DLØWW	*	11,488	150	13	19
			(OP: DK3GI)		
DL8EAQ	*	9,238	144	11	51
DL7ON	3.5	346,500	1410	31	123
DJ6BQ	*	129,030	1024	18	84
DL1RG	*	52,170	362	17	77
DL6KWN	*	43,168	496	12	64
DL1ET	*	24,600	269	11	64
DF3KV	*	23,532	316	15	59
DL5CL	*	16,017	260	9	48
DK7AN	*	7,810	116	9	46
DJØMDR	1.8	81,524	844	18	71
DJ3RA	*	9,280	155	12	46
*DF1IAQ	A	1,015,385	1488	100	333
*DJ9MH	*	917,359	1265	93	328
*DJ6QT	*	660,344	977	86	308
*DL6UNF	*	598,535	1010	82	267
*DK5DQ	*	501,423	834	70	229
*DL5KUD	*	487,009	793	82	285
*DD5M	*	470,346	1063	66	211
			(OP: DJØZY)		
*DF3AX	*	467,364	945	73	243
*DM5JBN	*	438,650	785	69	241
*DM5TI	*	423,738	492	94	305
*DL2NBY	*	384,608	976	62	210
*DL2KCK	*	380,064	711	70	226
*DL9CW	*	370,392	863	60	204
*DL7UMK	*	368,280	820	68	242
*DL4FN	*	320,229	715	61	212
*DL1NUX	*	287,260	646	62	203
*DL1RTL	*	249,776	646	66	202
*DJ1WQ	*	242,604	615	63	213
*DL4JYT	*	237,690	692	59	219
*DF6QC	*	234,740	722	50	192
*DL1ARJ	*	229,250	666	59	191
*DL8UKE	*	214,965	438	84	197
*DF2CH	*	213,520	536	62	210
*DL3BRA	*	211,680	591	54	191
*DL8UNF	*	203,000	661	55	195
*DJ8UV	*	201,250	679	56	194
*DL8MBS	*	199,675	563	52	193
*DL3ZAI	*	197,100	556	52	173
*DK8AX	*	193,800	429	65	190
*DL8YR	*	184,658	513	55	199
*DL1SAN	*	183,855	500	64	191
*DL1KUR	*	178,711	415	57	176
*DK3WJ	*	151,296	403	50	147
*DK8EY	*	146,060	423	51	167
*DL3KUM	*	142,600	433	53	177
*DL2ANM	*	142,344	440	51	165
*DF6MU	*	140,657	346	59	150
*DL8ZAJ	*	139,308	368	62	166
*DL8DWW	*	137,837	460	50	153
*DL5ARM	*	137,640	556	36	149
*DF7ZS	*	137,592	261	64	170
*DK3WN	*	134,640	477	54	166
*DLØK	*	122,901	406	50	163
			(OP: DJ2ZS)		
*DJ2RG	*	122,760	522	41	157
*DL7UIO	*	118,590	460	38	139
*DR5T	*	116,600	273	51	161
			(OP: DJ3IW)		
*DL2GBB	*	110,894	339	45	133
*DL5CD	*	101,370	419	50	168
*DL8ULO	*	98,325	405	53	154
*DL1RTS	*	96,278	344	41	120
*DL2HYH	*	94,965	314	48	147
*DL1SBF	*	90,440	259	54	136
*DL8UVG	*	87,584	314	47	137
*DL9LM	*	86,532	437	26	92
*DL8UFO	*	83,834	322	42	125
*DL8NBJ	*	83,700	291	45	135
*DM3PKK	*	80,000	254	46	114
*DL3DRN	*	77,916	274	46	126
*DL1BUG	*	70,855	232	52	133
*DL7BA	*	68,101	185	57	94
*DL5AZZ	*	67,758	325	34	104
*DL1TPY	*	65,313	363	37	140
*DF6LQ	*	64,384	271	36	92
*DL4KUG	*	63,342	294	33	120
*DL5A	*	61,440	246	42	118
			(OP: DL5KUA)		
*DF8QB	*	61,374	273	42	117
*DF5AN	*	59,454	284	34	128
*DL1IA	*	58,990	182	54	116
*DM2RN	*	57,036	228	40	107
*DL3ZM	*	56,980	306	43	111
*DL4ME	*	55,490	290	35	120
*DK5ZX	*	55,204	231	41	107
*DK7GH	*	55,047	208	46	131
*DL7APK	*	54,950	231	46	129
*DL2HWI	*	54,128	167	49	87
*DL5AWI	*	52,734	176	47	94
*DL3HSC	*	51,323	236	41	110
*DK4WF	*	50,837	301	30	100
*DL9JON	*	49,500	223	45	120
*DL3DBY	*	48,860	283	37	103
*DF1QQ	*	48,618	211	33	113
*DL1HTX	*	44,861	283	53	70
*DL6DSA	*	37,630	145	42	100
*DJ2GM	*	37,324	189	36	88
*DK2BJ	*	37,128	244	28	91
*DJ6NH	*	33,812	158	43	115
*DL9SEV	*	33,534	173	37	101
*DL7VRG	*	33,000	183	33	87
*DJ3GE	*	32,522	213	23	78
*DJ2MX	*	31,886	160	31	76
*DL5KUR	*	31,654	121	38	60
*DL7BD	*	28,438	164	35	83
*DL1AWM	*	28,067	166	36	91
*DL3KWR	*	27,572	169	30	83
*DL5DD	*	27,251	190	28	91
*DL5ANS	*	27,025	174	33	82
*DK7VW	*	24,871	151	34	85
*DL9ABM	*	24,552	146	27	72
*DL1DQW	*	24,308	148	34	69
*DL1YFF	*	24,010	126	32	66
*DF1HF	*	23,595	124	34	87
*DL3KWF	*	22,960	155	20	62
*DF1MM	*	22,713	88	39	74
*DF3QG	*	22,248	121	37	71
*DL3HAA	*	21,912	118	26	62
*DL5ASK	*	19,775	83	41	72
*DL4JNB	*	19,456	100	43	85
*DL1KSE	*	19,110	298	20	85
*DL1DBR	*	18,630	122	28	62
*DL1NRC	*	17,978	124	33	68
*DK7KR	*	17,928	174	23	60
*DH3FAW	*	16,576	118	21	35
*DL8JDX	*	16,416	76	36	60
*DJ7LH	*	16,380	78	35	55
*DL5MO	*	16,376	129	25	64
*DL2BQD	*	15,652	91	36	50
*DP4X	*	14,260	122	14	48
			(OP: DJ2MX)		
*DJ6OL	*	13,260	122	22	46
*DL7JOM	*	12,954	123	27	75
*DK1KC	*	12,738	138	17	49
*DL7BW	*	9,694	73	26	48
*DL2RTJ	*	9,656	160	10	58
*DL2VLA	*	8,550	86	19	38
*DL1BUT	*	7,047	91	24	57
*DGØDG	*	6,976	49	25	39
*DL2AXM	*	6,566	119	14	53
*DH6DAO	*	5,916	58	25	33
*DL6UAM	*	5,655	106	9	56
*DL2YET	*	5,533	60	24	38
*DJ2FR	*	5,312	94	17	47
*DJ5GG	*	4,399	54	22	31
*DL1AZA	*	4,256	74	19	57
*DJ3EF	*	3,672	54	23	31
*DL1SWB	*	2,907	46	21	30
*DL2KWW	*	1,900	21	18	20
*DH9SB	*	1,887	39	16	21
*DL6EZ	*	1,679	39	10	13
*DL6GV	*	1,504	22	15	17
*DG7RO	*	1,260	36	16	26
*DL2QT	*	1,104	35	6	6
*DC9AM	*	1,056	30	10	22
*DL1ARD	*	891	20	11	16
*DH5WB	*	204	15	7	10
*DL2DYL	*	100	40	21	30
*DL9URZ	28	3,360	52	11	31
*DL2MIH	21	7,084	66	17	29
*DJ6XB	*	1,568	27	10	18
*DL5FCO	*	1,322	25	11	11
*DL2ASK	*	640	17	7	9
*DL1LH	14	398,848	1196	35	117
*DL4AAE	*	152,817	567	30	103
*DK7EO	*	122,732	471	26	96
*DL3DTH	*	113,446	419	31	100
*DL4YR	*	49,125	300	22	53
*DL5MBY	*	21,096	135	19	53
*DL1FMG	*	17,106	185	17	49
*DD1IM	*	11,088	128	11	25
*DL5YL	*	3,640	56	11	17
*DL2HQ	7	95,728	510	24	100
*DL6UAA	*	79,800	455	25	95
*DJ2XC	*	73,712	411	28	108
*DJ8OG	*	31,668	249	18	73

*DL1DWR	"	24,964	216	18	61
*DJ6TK	"	22,230	149	19	76
*DL3EBX	"	13,608	184	10	53
*DL1EAL	"	3,654	67	8	34
*DK7FP	"	2,604	57	8	20
*DB7MA	"	510	66	6	28
*DK0IU	"	195	7	6	7
			(OP: DJ6TK)		
*DC1LC	3.5	1,320	48	6	21
*DL2YED	1.8	2,886	101	5	32

GIBRALTAR

ZB2X	3.5	423,291	2152	24	103
			(OP: OH2KI)		

GREECE

SV1ENG	A	727,664	2006	65	227
SV8CRI	"	116,246	354	59	162
J43J	14	373,176	1843	32	110
			(OP: DJ5JH)		
*SV1HEM	A	11,745	106	26	61
*SV2BOH	21	67,260	305	29	85
*J43F	14	166,532	943	30	94
			(OP: SM4DHF)		
*SV1RP	7	171,217	1227	27	104

GUERNSEY

GU4YOX	3.5	182,600	1261	18	82
*2U0GSY	A	245	32	10	25
*MU0FAL	7	68,130	557	16	74

HUNGARY

HA8A	A	2,104,832	2256	119	393
HA3LI	"	669,305	895	103	352
HA9PP	"	224,750	472	84	206
HG1R	14	540,423	2106	34	115
			(OP: HA1DRR)		
HA8DU	7	711,666	2524	39	152
HA8KW	3.5	124,072	944	21	83
HG6EU	"	6,498	207	8	49
			(OP: HA6VA)		
HA8BE	1.8	134,832	1094	22	84
*HA1ZH	A	507,967	879	98	255
*HA6IAM	"	330,695	815	69	226
*HA3OD	"	253,176	490	67	207
*HA2MN/5	"	130,320	445	49	131
*HA8CQ	"	119,200	368	57	143
*HA0LC	"	61,491	155	75	124
*HA7JJS	21	13,651	121	25	48
*HA8UH	"	5,100	87	18	33
*HG8C	14	149,860	609	28	99
			(OP: HA8EK)		
*HA3MU	7	67,822	446	25	92
*HA1YI	1.8	10,149	196	7	44

ICELAND

TF3CW	14	379,538	1700	22	87
*TF3GB	A	182,160	498	42	142

IRELAND

EI2JD	A	78,991	280	39	128
EI4DW	"	45,024	157	43	125
*EI7CC	A	148,163	403	53	176
*EI7JK	"	27,132	195	29	85
*EI5JP	"	19,467	160	28	75
*EI9ES	"	7,178	94	16	58
*EI4CF	21	63,612	293	25	89
*EI9JN	"	18,103	306	18	54
*EI6DX	7	111,100	967	20	81

ISLE OF MAN

GD6IA	A	4,158,378	4585	123	444
			(OP: DL2OBF)		

ITALY

I2SVA	A	795,626	919	100	331
IK2AIT	"	141,075	485	42	123
IK3OII	"	92,185	321	50	129
IK3SCB	"	71,040	326	32	79
IK3SWB	"	64,030	204	55	135
IK4ZHH	21	139,576	425	36	110
IK2SND	14	90,946	770	21	53
IU1A	3.5	206,618	1229	23	95
			(OP: IK1SPR)		
IZ8GCB	"	116,424	1002	20	78
IK3SSO	"	93,900	796	23	77
IK2AOO	"	91,630	872	15	62
I1BAY	"	23,146	365	11	60
I0YQV	"	5,974	104	10	48
*IK4EWX	A	479,792	868	75	239
*IZ3DBA	"	297,560	849	53	162
*IZ8DVD	"	246,636	576	78	228
*II2B	"	198,720	516	67	203
			(OP: IZ2BKC)		
*IZ2GMT	"	159,048	522	39	149
*IZ2EJU	"	104,477	283	56	135
*I2AZ	"	89,880	368	43	125
*IN3FHE	"	78,923	246	47	122
*IZ5AHB	"	71,022	341	44	134
*IZ1DXS	"	69,628	292	50	119
*IV3ARJ	"	65,312	240	45	112
*IR7A	"	63,984	177	54	132
			(OP: I7ALE)		
*IK8MIG	"	44,756	208	35	99
*IV3IFN	"	36,186	145	44	119
*IK2NCF	"	35,880	195	31	84
*IV3KSE	"	32,600	160	33	67
*IK0MIB	"	30,128	178	37	75
*IZ4DZD	"	24,750	156	28	71
*IV3DYS	"	22,264	133	38	83
*IK7FMQ	"	21,912	166	43	89
*IK0NSF	"	19,698	160	33	65
*IZ1DBY	"	16,380	127	28	77
*IZ3GAK	"	15,219	129	27	62
*IZ4DYX	"	15,132	130	25	72
*IV3AZV	"	7,493	132	15	44
*IK2NUX	"	6,566	50	18	31
*IK4DCS	"	4,389	44	19	38
*IZ1GSO	"	3,053	52	14	29
*IK2RLS	"	2,820	70	18	42
*IZ0BPI	"	2,074	42	14	20
*IK1WEG	"	336	74	19	37
*IR2M	21	196,420	770	34	106
*IK8TEO	14	57,526	405	24	74
*IV3TQE	"	31,061	207	23	66
*IZ8DBJ	"	22,599	160	23	70
*IZ8DWH	"	13,346	157	17	46
*IY4W	7	626,202	2128	37	134
			(OP: IK4ZGO)		
*IN3ZWF	"	6,110	105	8	39
*I0KHP	1.8	348	23	3	13

JERSEY

GJ2A	A	1,330,592	2091	80	264
			(OP: K2WR)		

KALININGRAD

RK2FXG	3.5	5,100	140	5	29
*RA2FAC	A	483,210	1185	65	230

LATVIA

YL2KO	A	2,375,520	2546	135	453
YL6W	"	1,862,580	1970	128	427
			(OP: YL2GD)		
YL2PQ	"	1,332,834	2312	96	342
YL7A	7	160,000	659	36	124
			(OP: YL2GM)		
YL2PA	"	61,776	365	30	102
YL0A	3.5	364,119	1813	31	116
			(OP: YL2KA)		
YL3GDQ	"	66,483	694	16	67
YL1S	1.8	57,624	583	15	69
			(OP: YL2PP)		
*YL2CV	A	640,770	1052	86	304
*YL3AD	"	191,345	606	54	191
*YL2CR	"	111,397	512	42	167
*YL2IP	"	97,580	304	59	179
*YL2PN	"	34,572	243	30	99
*YL2KF	"	14,110	121	19	64
*YL2PP	"	6,716	49	30	43
*YL3GFT	21	91,296	291	32	112
*YL5W	14	285,246	1078	35	124
*YL3DX	7	84,000	726	21	79
*YL3GCU	"	34,030	364	16	67
*YL3RW	"	13,130	170	13	52
*YL2RM	"	1,160	52	7	22

LITHUANIA

LY5R	A	1,946,880	2384	123	384
			(OP: LY3BP)		
LY2MM	"	1,043,525	1460	102	343
LY4CW	"	693,440	1253	84	310
LY1CX	"	419,870	592	84	263
LY2XW	"	373,014	835	72	234
LY3BU	"	336,978	900	63	228
LY2BOS	"	184,788	575	54	182
LY2CO	"	65,469	380	35	104
LY2NK	"	62,060	327	32	113
LY2BW	7	35,025	464	17	58
LY7M	3.5	347,652	1590	31	117
			(OP: LY2BIL)		
LY2KN	"	191,770	1011	26	101
LY5A	"	138,575	901	20	95
			(OP: LY2ZZ)		
LY1DT	"	63,800	669	15	73
LY5G	"	52,338	598	12	66
			(OP: LY2FE)		
LY2GW	"	51,528	606	11	65
LY4AX	"	21,708	296	10	57
LY2BNL	"	2,665	62	7	34
LY2IJ	1.8	167,127	1185	24	89
LY2OU	"	33,970	471	12	64
LY2LE	"	10,001	87	12	61
*LY9A	A	1,859,449	2063	111	410
			(OP: LY3BA)		
*LY6A	"	1,092,183	1598	103	350
			(OP: LY2BM)		
*LY2OO	"	409,734	1030	71	238
*LY2DV	"	181,188	555	57	195
*LY2LF	"	154,171	754	33	118
*LY3QA	"	126,525	596	37	138
*LY1BX	"	102,816	462	38	130
*LY2HK	"	102,036	679	33	99
*LY3CY	"	71,686	335	29	117
*LY2OM	"	64,000	337	33	127
*LY3BW	"	41,830	215	27	67
*LY2BJ	"	26,845	277	23	68
*LY1DM	"	5,760	62	24	48
*LY3JY	21	82,460	282	32	108
*LY2TE	14	220,968	951	30	102
*LY2AT	7	32,585	271	20	75

LUXEMBOURG

LX/DL5SE	A	464,576	1529	56	182
LX1NO	"	439,476	797	79	239
LX/DK4ARL	"	297,824	1384	48	179
LX6T	7	295,757	1434	35	126
			(OP: LX1KC)		
*LX1JH	A	46,136	257	37	121

MACEDONIA

*Z32ZM	A	16,928	91	29	63

MALTA

9H1ZA	A	2,807,872	3014	133	468
*9H3LEO	14	2,222	53	5	17
			(OP: K2LEO)		
*9H3MR	1.8	32,093	469	9	58
			(OP: IK1PMR)		

MARKET REEF

OJ0B	3.5	608,896	2867	31	111
			(OP: OH2PM)		
OJ0J	1.8	127,688	1327	16	72
			(OP: OH2BO)		

MOLDOVA

ER4DX	A	5,806,866	5046	148	535
			(OP: UT5UDX)		
*ER5AG	A	249,400	993	50	165
*ER100	"	96,976	221	71	161
*ER3MM	21	7,722	79	25	41

NETHERLANDS

PA3AAV	A	1,841,424	2540	107	347
PA4A	"	1,218,591	2100	88	285
PA1T	"	582,108	874	96	262
PA0JNH	"	468,784	855	70	262
PA0LSK	"	31,396	155	32	62
PA9CW	"	14,964	100	26	61
PA0WRS	"	2,100	51	9	33
PA5WT	7	79,180	532	22	85
PA0BWL	"	68,487	419	23	88
PA3GVI	"	62,100	496	21	87
PA3ADJ	3.5	7,240	200	8	32
PA3GCV	1.8	38,512	431	18	65
*PA3BFH	A	551,897	1085	65	252
*PG7V	"	453,749	874	65	246
*PA0MIR	"	364,496	863	69	235
*PC4M	"	355,887	822	61	208
*PA2W	"	233,580	652	56	199
*PA3ARM	"	186,637	525	50	159
*PA7LV	"	101,314	295	48	131
*PA0LOU	"	97,868	263	50	122
*PA1BX	"	57,304	283	39	113
*PA3AQL	"	55,566	311	37	125
*PA3CQE	"	48,792	245	36	116
*PA0FAW	"	44,187	290	29	114
*PA2ALF	"	40,484	265	23	93
*PA3HGF	"	40,064	210	28	100
*PE2AE	"	29,083	204	35	92
*PA3AFF	"	27,501	186	28	75
*PA0LRK	"	20,418	114	35	69
*PE2JMR	"	19,894	178	23	75
*PA5P	"	13,398	98	23	64
*PA3GBI	"	12,350	115	21	44
*PA3DRZ	"	11,545	76	29	57
*PA3CLQ	"	10,878	144	19	79
*PA0B	"	9,246	97	19	50
*PA3CDN	"	8,946	136	19	52
*PA0W	"	4,774	135	21	56
*PA0ATG	"	4,350	115	15	43
*PA0JED	14	110,548	465	27	89
*PG4I	"	21,386	164	19	55
*PA7HPH	"	10,810	146	12	34
*PA5GU	"	3,905	140	10	24
*PA1KW	"	100	19	7	12
*PA0KHS	7	4,095	83	9	30
*PA2CHM	"	3,327	104	9	34

NORWAY

LA7SI	A	79,234	287	49	124
LA2IJ	"	24,128	153	36	80
LA5HE	7	124,533	601	31	106
LA8XM	"	49,731	189	33	104
LA7THA	1.8	5,734	146	8	39
*LA3S	A	785,312	1335	75	293
			(OP: LA3BO)		
*LA1YE	"	246,204	615	52	200
*LA8OM	"	102,222	454	40	122
*LA6CF	"	95,060	297	49	147
*LA9DK	"	82,110	311	41	129
*LA1PHA	"	54,600	254	32	98
*LA3ZA	"	48,438	184	34	128
*LB8AE	"	34,200	237	27	93
*LA7JKA	"	2,232	40	12	19
*LA1QDA	14	63,396	347	25	83
*LA8WG	1.8	12,863	218	11	53
*LA6PB	"	1,798	65	4	27

POLAND

SP4Z	A	2,743,227	2358	144	495
SP2QG	"	664,866	1230	92	295
SQ3A	"	123,216	325	55	149
SP5GH	"	86,923	216	70	224
SP1DPA	"	86,784	249	51	141
SP2BBD	"	81,106	223	63	151
SN7F	"	72,063	266	50	107
			(OP: SP7LFT)		
SP4AVG	"	71,145	278	38	115
SP1S	"	63,246	192	49	117
SP1BBT	"	27,144	171	24	63
SP7BDS	"	5,525	84	22	58
SQ4MP	14	52,880	359	23	57
SN3A	3.5	581,532	2138	35	126
			(OP: SP3RBR)		
SP8BRQ	"	361,934	1479	30	116
SP4MPB	"	263,994	1417	29	109
SP4JCQ	"	75,225	965	14	71
SN2M	"	59,976	545	17	81
			(OP: SP2XF)		
SN5J	"	58,847	609	14	69
			(OP: SP5JXK)		
SP9DWT	"	49,608	296	21	83
SP8BVN	"	43,512	540	12	62
SP3DIK	"	17,446	247	10	51
SO9O	"	12,900	145	17	83
			(OP: SP9P)		
SP9DUX	"	10,528	219	7	40
SO2R	1.8	234,720	1483	25	95
			(OP: SP2FAX)		
SP3BQ	"	228,327	1341	26	95
			(OP: SP8NR)		
SN7Q	"	202,242	1324	24	87
			(OP: SP7GIQ)		
SP2GJV	"	39,150	458	13	62
SP2HMT	"	26,102	399	10	52
*SQ9E	A	830,086	1468	86	296
*SQ9C	"	714,678	1245	85	298
*SP2HPD	"	560,880	1086	72	270
*SQ9FMU	"	404,040	795	74	238
*SP6LV	"	388,355	985	66	241
*SQ9MZ	"	378,994	791	80	242
*3Z8Z	"	288,410	568	82	220
*SP6IEQ	"	268,584	616	59	189
*SQ3RX	"	243,320	723	54	166
*SQ9HZM	"	201,135	557	73	192
*SQ9ZM	"	192,228	556	56	193
*SP6BEN	"	183,600	400	60	195
*SP6NIF	"	183,084	288	81	211
*SP9FT	"	175,474	502	55	166
*SP5MBA	"	169,218	442	57	180
*SP9GKM	"	168,756	586	44	152
*SP3DOF	"	154,128	425	56	152
*SP6TRX	"	150,696	388	64	188
*SP9GFI	"	131,208	439	55	158
*SP6AUI	"	131,080	304	57	175
*SP6KFA	"	131,040	539	42	140
			(OP: SP6JQC)		
*SP9LAS	"	127,379	412	50	167
*SQ7B	"	126,940	441	44	176
*SQ9DXN	"	122,265	399	50	159
*SP8JUS	"	119,393	499	44	135
*SP5CGN	"	102,676	350	50	143
*SP2IW	"	92,685	310	49	136
*SP9BGS	"	91,140	331	52	144
*SP3DSC	"	89,280	378	51	129
*SP4DZT	"	77,710	252	47	143
*SP4AAZ	"	65,205	307	46	143
*SP9CV	"	52,164	265	43	118
*SP3OL	"	45,537	197	38	91
*SP7CXV	"	40,166	109	49	102
*SP3HC	"	36,047	239	28	85
*SP7FBQ	"	34,782	242	24	69
*SQ2AF	"	33,288	125	40	112
*SP3CDQ	"	32,596	191	33	83
*SP7FAH	"	28,438	131	39	79
*SP1RKT	"	25,016	222	58	154
*SP9KJU	"	19,173	123	29	48
*SQ9IWT	"	19,153	160	30	77
*SP6IHE	"	18,648	90	47	79
*SP1DTG	"	16,376	82	33	59
*SP7AWG	"	14,768	77	43	61
*SP5ATO	"	13,855	66	35	50
*SN6A	"	10,368	88	24	40
			(OP: SP6CES)		
*SP1MWK	"	7,050	47	28	47
*SP5EPP	"	7,020	113	48	87
*SP5BYC	"	6,615	91	17	32
*SP9OHL	"	6,270	99	13	53
*SP3BGD	"	5,626	34	26	32
*SP8UFB	"	5,304	59	27	51
*SP7ENU	"	4,933	143	28	56
*SQ3DD	"	4,930	52	22	36
*SP9IHP	"	4,674	44	19	22
*SP9MAN	"	3,300	79	22	44
*SP2DKI	"	3,216	30	20	28
*SP8HPW	"	2,109	54	11	26
*SP8DHJ	"	936	17	12	12
*SQ6ELV	28	484	22	7	15
*SP3FYX	"	252	22	6	12
*SP2GCE	21	22,690	138	26	59
*SP9DLY	"	22,184	146	27	67
*SP2EXN	"	17,992	130	30	74
*SP3FPF	"	6,000	56	20	30
*SP2MHC	"	3,450	74	17	33
*SP3AZO	"	2,998	65	21	35
*SP9ADV	"	2,108	30	14	17
*SP3ASN	14	219,106	694	32	110
*SP2AVE	"	158,653	638	32	113
*SP8BAB	"	125,936	428	30	106
*SP9UMJ	"	119,316	439	28	94
*SP2JLR	"	48,925	262	24	71
*SO5O	"	38,556	382	30	89
			(OP: SP5ANJ)		
*SP2JGK	"	15,120	134	16	47
*SP9QJ	"	14,403	236	11	53
*SP8CUR	"	13,000	122	16	36
*SQ8JLU	"	10,258	126	12	34
*SP6XP	"	7,552	83	16	43
*SQ5EK	"	4,100	34	19	31
*SP1BLE	"	2,406	94	8	23
*SP6DHH	"	1,839	59	8	22
*SN3X	7	233,064	1096	33	123
			(OP: SP3BHG)		
*SP4TKR	"	142,516	688	33	125
*SP5CNA	"	55,680	353	25	91
*SP5OXJ	"	45,288	314	19	83
*SP6YF	"	22,651	148	21	80
*SP6RGB	"	15,760	192	16	64
*SP9DNO	"	13,944	170	17	67
*SP2IU	"	11,346	164	8	54
*SP7FGA	"	11,330	189	16	57
*SP5BB	"	5,847	97	12	43
*SQ3BDQ	"	5,712	60	17	39
*SP9CQ	"	4,960	61	13	49
*SP8CUW	"	4,750	69	10	28
*SP4FKS	"	4,503	169	11	46
*SP6FJ	"	144	7	5	7
*SP6M	1.8	9,860	164	10	48
*SP7EXJ	"	5,940	169	9	45
*SP3XR	"	5,354	65	4	25
*SQ7FPD	"	4,600	119	5	35
*SQ3GNA	"	1,190	93	5	30
*SQ1EUG	"	600	33	3	21
*SP8BWR	"	255	19	5	12

PORTUGAL

CT8T	A	6,374,362	5354	143	488
			(OP: OH1NOA)		
*CT6A	A	4,730,157	3960	131	490
			(OP: CT1ILT)		
*CS1GDX	"	324,480	768	61	179
			(OP: CT1DRB)		
*CT1BQH	21	67,008	414	26	70
*CT1DJE	14	26,240	232	21	59
*CT4DX	7	12,528	167	10	48
*CT1FNT	3.5	6,345	106	9	47

ROMANIA

YO7BGA	A	506,160	1062	79	254
YO4CAH	"	207,397	585	55	206
YO3BL	"	138,690	322	64	166
YO3CDN	"	55	6	5	6
YO2RR	21	91,866	341	31	91
YO5OEF	"	47,320	158	33	97
YO6BHN	14	293,120	989	36	124
YQ9W	"	12,870	161	13	42
			(OP: YO9WF)		
YR2I	3.5	332,166	1706	27	111
			(OP: YO2DFA)		
YO5PBF	"	114,204	1178	18	75
YO2AQB	"	18,414	515	11	51
*YO3APJ	A	1,533,672	1618	120	417
*YR8B	"	457,177	1374	67	204
			(OP: YO8SS)		
*YO5DAS	"	342,348	803	70	212
*YO8BPK	"	284,408	621	69	223
*YO3FRI	"	239,440	637	80	248
*YO8BPY	"	177,856	499	54	170
*YO9FYP	"	139,101	492	46	153
*YO7ARY	"	115,028	555	41	152
*YO4AAC	"	106,093	477	36	163
*YO7AWZ	"	83,955	417	39	154
*YO2MAX	"	81,158	296	51	136
*YO9CWY	"	73,140	391	37	122
*YO2QY	"	72,761	195	61	132
*YO8MI	"	70,583	317	78	100
*YO3BBW	"	65,824	287	49	127
*YO6GCW	"	47,360	206	43	105
*YO7LGI	"	37,500	193	36	89
*YO6AEI	"	22,163	176	31	81
*YO2GL	"	18,018	167	24	53
*YO4CSL	"	16,710	126	25	72
*YO7HHI	"	12,936	257	21	77
*YO9HG	"	12,580	165	18	67
*YO8DHD	"	5,307	90	16	45
*YO8AXP	"	3,848	72	17	35
*YO7BGB	"	1,989	60	17	34
*YO7LFV	"	288	9	9	9
*YO5CRQ	28	64	6	3	5
*YO4ATW	21	43,862	198	26	65
*YO8KOS	"	31,360	167	29	69
*YO9AGI	"	12,711	100	22	43
*YO9CXE	"	100	68	15	26
*YO4MM	14	27,878	236	20	55
*YO5TP	"	25,428	190	23	55
*YO4AH	"	8,820	97	17	32
*YO5CBX	7	131,040	847	24	93
*YO2AOB	"	60,895	532	19	76
*YO6EX/P	3.5	53,437	815	11	58
*YO6ADW	"	43,891	556	15	65
*YO2IS	1.8	26,820	528	8	52

SARDINIA

IS0HQJ	A	129,030	567	50	115
IS0N	3.5	442,986	2182	26	103
			(OP: DL5Y)		
IS0U	1.8	125,019	1155	16	71
			(OP: IN3QBR)		
*IS0IGV	A	181,922	695	44	144
*IS0OMH	"	111,361	416	49	144
*IS0VSG	"	53,576	203	50	98
*IS0MYN	14	24,075	197	19	56
*IS0XDA	7	24,900	201	16	67

SCOTLAND

GM0F	A	2,491,314	3143	114	369
			(OP: GM4AFF)		
GM4SID	"	368,530	906	59	215
GM3W	"	289,152	873	56	136
			(OP: GM3JKS)		
GM4YXI	3.5	325,130	1755	29	101
GM5A	"	100,687	650	23	84
			(OP: MM0CCC)		
GM0GAV	1.8	185,136	1109	23	91
*GM7TUD	A	55,419	196	41	106
*GM0IIO	21	32,476	285	19	73
*MM0BSM	"	12,000	110	12	48
*GM3CFS	14	70,236	407	21	84
*GM3YEH	1.8	5,733	163	6	43

SICILY

IT9ZAU	A	91,010	902	25	70
IT9LWP	21	27,520	259	22	58
*IT9ORA	A	561,384	1094	82	257
*IT9ESW	7	18,825	263	17	58

SLOVAK REPUBLIC

OM6KW	A	791,538	1200	90	312
OM8AA	"	334,044	661	85	239
OM0M	3.5	413,472	1856	30	116
			(OP: OM0WR)		
OM7RU	"	76,360	785	15	68
OM4APD	"	8,415	202	7	38
*OM8AQ	A	778,544	1174	97	297
*OM8ON	"	687,628	798	105	307
*OM7CA	"	650,830	1157	89	281
*OM5NL	"	550,544	1120	70	234
*OM1II	"	530,058	1008	81	253
*OM2AK	"	472,164	999	73	235
*OM7AG	"	451,440	1067	61	224
*OM3PQ	"	243,780	672	50	189
*OM3BA	"	242,580	673	56	204
*OM3CFR	"	207,450	629	52	173
*OM7YC	"	200,031	552	56	167
*OM4W	"	171,360	743	44	160
			(OP: OM4KW)		
*OM1AF	"	152,352	498	47	160
*OM5UM	"	139,605	545	45	160
*OM4DA	"	70,716	345	37	105
*OM3GB	"	66,066	194	47	96
*OM6AL	"	55,845	473	29	124
*OM7AT	"	34,627	403	37	81
*OM1TD	"	7,392	94	21	56
*OM3CHL	"	5,986	161	15	58
*OM5MX	"	2,448	33	22	26
*OM4AMA	"	1,872	120	20	58
*OM8FF	21	37,149	179	29	58
*OM8HG	14	40,803	261	23	64
*OM2AW	"	33,624	301	18	54
*OM5LR	"	27,087	211	18	44
*OM4WW	7	79,583	450	29	100
*OM6TX	"	58,311	447	18	81
*OM3CDN	"	10,616	158	12	48
*OM0TT	1.8	31,727	548	8	57
*OM3TLE	"	4,329	116	6	33

SLOVENIA

S50A	A	4,752,033	3763	156	471
S53XX	"	1,692,480	1987	119	361
S54X	"	601,649	905	93	280
S57S	28	15,808	147	20	56
S50K	21	365,672	974	37	135
S51FB	"	198,594	806	32	86
S57AL	14	580,470	1739	37	128
S59ABC	"	572,241	1674	37	122
			(OP: S51DS)		
S53M	"	427,576	1337	35	117
			(OP: S51RJ)		
S50C	3.5	467,166	2005	30	117
			(OP: S53MM)		
S53F	"	244,644	1487	22	94
S52W	"	119,392	981	16	75
S52X	"	29,524	503	11	50
S57M	1.8	131,373	1106	20	79
*S51F	A	1,227,570	1311	119	391
*S59N	"	893,631	1725	100	317
*S57U	"	700,158	1212	77	289
*S520T	"	547,596	848	94	277
*S51AY	"	213,528	593	54	192
*S53AU	"	137,532	258	67	152
*S58RU	"	58,904	393	54	145
*S53AK	21	70,523	333	32	77
*S52GO	14	74,152	394	24	80
*S54A	7	333,540	1336	35	135
*S51MF	"	69,960	345	27	93

SPAIN

EA5FV	A	3,116,265	3466	111	404
EA4KA	"	1,022,400	1640	78	242
EA7CA	"	113,176	342	48	140
EA1DJ	"	42,742	170	44	98
EA3FM	"	100	58	11	23
EA2LU	14	81,510	588	21	45
EA5RS	7	659,664	2113	35	127
EA3AKY	"	593,864	2279	32	120
EA1FBU	"	44,196	382	19	68
EA1WX	3.5	64,214	509	16	81
EA1EB	"	7,198	102	8	51
EA5HT	1.8	8,195	147	8	47
*EA7RM	A	2,036,040	2240	105	367
*EA2AZ	"	1,754,739	1987	114	405
*EA4DRV	"	1,241,838	1839	83	283
*EA7AJR	"	709,308	1247	70	236
*EA2BNU	"	622,454	965	79	267
*EA1JO	"	528,162	858	73	266
*EA4NP	"	496,592	844	77	251
*EA5GX	"	439,040	807	81	239
*EA7WA	"	257,200	617	55	145
*EA2BOV	"	165,466	433	60	163
*EA3BHK	"	147,681	272	81	188
*EA3BOW	"	129,696	492	47	146
*EA1BRB	"	123,039	377	47	142
*EA5EOH	"	109,220	326	46	126

*EA7CWA	"	103,448	286	53	140
*EC7ABV	"	99,412	626	31	85
*EA5GQM	"	96,250	300	51	124
*EA5LA	"	94,872	349	48	129
*EA1MR	"	86,151	297	40	101
*EA1DGG	"	72,086	338	33	100
*EA5KV	"	65,283	221	41	100
*EA3AVV	"	62,400	205	46	104
*EA4CRP	"	59,192	236	48	103
*EA3ALZ	"	48,880	199	41	89
*EA3AXM	"	34,798	160	39	88
*EA3CEC	"	25,380	122	36	72
*EA3GHZ	"	24,360	143	32	73
*EA4CJI	"	18,876	172	42	90
*EA4OA	"	17,848	111	32	60
*EA5ARC	"	15,390	117	24	30
*EA5ABH	"	15,012	174	34	74
*EA2AHZ	"	14,355	76	40	59
*EA1AUS	"	13,286	73	31	60
*EA7EYQ	"	10,044	93	28	53
*EC1DMY	"	9,180	116	17	28
*EA3EU	"	8,890	60	24	46
*EA5GIE	"	8,690	93	20	35
*EA1RCO	"	7,822	89	20	60
*EA4CWN	"	6,510	62	22	40
*EA4BGM	"	5,880	96	12	12
*EA2GC	"	4,433	47	10	41
*EA5TD	"	3,792	56	28	51
*EA1CGK	"	2,379	32	14	25
*EA3OH	"	2,009	24	17	24
*EA4WD	"	1,558	47	10	28
*EA1FCH	"	1,452	19	14	19
*EA1FBJ	"	46	31	9	14
*EA7GV	28	2,046	32	8	14
*EA7KJ	21	33,078	280	19	55
*EA4AYD	"	6,639	76	15	31
*EA1CS	14	93,590	562	24	74
*EA4BF	"	41,902	355	18	64
*EA1ND	"	24,674	209	20	53
*EA7MT	7	30,102	238	18	69
*EA3DVJ	"	1,768	57	7	27
*EA2SW	1.8	100	25	4	14

SVALBARD

JW1CCA	A	138,385	445	45	106

SWEDEN

SM7YEA	A	1,061,095	1955	82	273
SM5Q	"	585,336	1029	91	260
SA6A	"	196,800	484	57	183
					(OP: SM6JSM)
SM6WET	"	145,612	466	55	181
SM5QU	"	131,675	438	50	179
SMØEPO	"	89,178	398	43	135
SM3B	"	72,640	294	48	112
SM3Q	"	58,240	207	46	114
					(OP: SM3BFH)
SM4TU	"	9,462	64	30	59
SM5GMZ	"	162	14	6	12
SM5INC	14	572,976	1955	36	108
SM7CQY	"	53,440	317	22	58
SM6NM	"	45,050	305	21	64
SA25RO	"	30,150	191	26	64
					(OP: SM5CBM)
SM2CVH	"	24,108	158	22	60
SMØP	7	536,877	2191	36	117
					(OP: SMØPSO)
SM6DHU	"	140,306	679	34	112
SK3W	3.5	387,186	1703	31	110
					(OP: SM5IMO)
SM6CNN	"	278,320	1361	30	112
7S7V	"	154,809	1254	18	85
					(OP: SM7VZX)
SM6IQD	"	14,278	168	11	48
SM5MX	"	13,585	253	7	48
8S6A	"	11,475	259	6	39
					(OP: SM6DPF)
SLØW	1.8	115,185	898	21	84
					(OP: SMØAJU)
SM5CEU	"	108,819	830	23	84
SK3GW	"	93,279	793	19	74
					(OP: SM3SGP)
SM5CLE	"	39,220	490	13	61
SM3CCM	"	4,400	59	11	39
					(OP: SMØCCM)
*SM6D	A	502,495	974	75	268
					(OP: SM6DER)
*SM6NET	"	337,386	852	54	223
*SM7X	"	321,300	734	68	238
					(OP: SM7DIE)
*SM5G	"	237,900	627	51	193
					(OP: SM5JBM)
*SM6CRM	"	214,830	579	46	185
*SM5AOG	"	197,676	472	53	175
*SM7EH	"	184,080	582	48	188
*SM7BJW	"	145,044	405	56	148
*SMØWRA	"	110,152	369	47	149
*SM3JUR	"	91,857	390	46	155
*SM5BAX	"	70,493	288	39	118
*SM7CWI	"	51,840	202	38	90
*SM3EAE	"	44,660	278	26	84
*SM6AOU	"	30,600	114	52	98
*SM3R	"	16,562	162	22	76
					(OP: SM3CBR)
*SM5DXR	"	6,216	58	24	50
*SM6Z	"	3,608	41	17	27
					(OP: SM6BZE)
*SM2IEO	"	1,763	29	15	26
*SM7BQX	14	11,776	136	15	49
*7S2E	1.8	18,678	311	11	55
					(OP: SM2DMU)

SWITZERLAND

HB9MM	A	1,938,966	2502	111	350
					(OP: W3EF)
HB9AZZ	"	272,718	584	68	210
HB9CPS	"	87,542	391	38	131
HB9EP	14	259,692	1173	29	85
					(OP: HB9DQP)
HB9CZF	7	87,579	414	27	84
HB9FBM	"	31,892	267	14	54
HB9CRV	3.5	185,670	1533	18	72
HB9DOO	"	48,640	407	16	60
*HB9ARF	A	738,783	1049	90	297
*HB9DCM	"	556,285	877	89	266
*HB9BXE	"	214,144	568	62	162
*HB9DOZ	"	2,346	34	14	20
*HB9DHG	14	73,793	376	27	82
*HB9/IV3LZQ	7	31,160	243	19	76

UKRAINE

UW5U	A	1,399,648	1932	105	353
					(OP: UY2UA)
UR7EQ	"	546,090	1185	71	256
UT8EU	"	403,650	908	79	220
UR8MA	"	370,944	699	94	242
UR8RF	"	361,456	712	73	255
US3IZ	"	344,080	902	60	193
UT5ECZ	"	167,856	598	43	165
UR5WCQ	"	161,655	563	44	151
US7IA	"	121,487	396	56	189
US3WD	"	46,400	182	50	110
UX3ZW	"	1,950	28	15	24
UX7IA	21	188,480	663	34	126
UX4UA	14	393,700	1291	36	119
UT4EK	"	202,710	789	32	113
UT4ZG	7	236,538	1045	33	120
U5WF	"	173,650	786	32	119
UU4J	"	13,760	156	14	50
					(OP: UU4JO)
UR4ZWL	"	7,080	80	15	45
					(OP: USØZZ)
UT3UA	3.5	321,860	1527	28	112
US4EX	"	107,952	823	19	85
UT2UB	"	91,080	822	19	80
UR5IOK	"	81,699	611	24	89
US9PA	"	71,101	571	17	80
US2WU	"	43,164	467	18	81
UW8SM	"	27,729	321	13	66
UT4PZ	"	17,346	273	8	51
UR5IHQ	"	11,648	221	10	46
UX4E	"	9,744	201	10	38
UR6IJ	"	780	17	10	16
UT3EK	"	660	43	6	24
EO6F	1.8	39,225	458	13	62
					(OP: UXØFF)
UYØZG	"	36,498	423	14	65
*UR5HAC	A	1,671,824	2089	116	390
*USØKW	"	1,082,135	1316	119	374
*UT2UZ	"	1,074,840	1157	119	388
*UT5UIA	"	608,608	1056	81	283
*UY5HF	"	565,323	1042	101	306
*UY1HY	"	477,280	814	90	290
*UT3UZ	"	384,028	736	81	245
*UY5TE	"	299,820	821	60	203
*UR3IQO	"	256,736	538	66	218
*US8IM	"	178,422	658	51	176
*UX8IR	"	167,085	442	60	175
*UR5FS	"	165,984	447	58	166
*UU2JA	"	163,540	342	65	195
*US7IID	"	145,801	446	50	161
*UU2JG	"	134,829	394	49	162
*UT7WR	"	132,600	484	44	160
*UR5IPD	"	128,898	445	44	154
*UT5JAB	"	82,026	338	46	143
*UR5WX	"	74,298	318	44	130
*US5EEK	"	71,441	263	52	147
*US6EX	"	39,114	134	53	106
*UX5UU	"	35,140	167	39	101
*UR7HEC	"	24,603	220	37	102
*UU7JN	"	24,510	97	39	75
*UR5WDQ	"	24,310	228	25	85
*UT5ZY	"	16,700	81	41	59
*US8MX	"	12,768	91	28	56
*US3IUK	"	9,996	61	30	54
*UW2ZM	"	7,326	91	23	51
*UR5ZQV	"	2,773	82	12	35
*UTØRM	"	1,665	28	15	22
*UT5UGQ	"	1,628	42	9	28
*UT1IA	28	10	3	2	3
*UR8IDX	21	45,360	213	29	79
*UT3FM	"	43,884	193	31	75
*UX7UN	"	32,548	174	28	75
*UX5EF	"	27,851	143	29	68
*UT2QQ	"	8,120	105	21	49
*UXØZX	14	228,300	837	34	116
*UT5KO	"	112,221	558	29	82
*UR7QM	"	103,212	585	29	93
*UX7QD	"	58,652	493	21	65
*UT4NY	"	57,500	278	26	74
*UT1PO	"	46,075	260	21	74
*UY5YA	"	19,976	175	24	64
*UY3AW	"	15,318	129	21	48
*UR3LPM	7	104,958	606	25	94
*UW2F	"	86,784	545	23	90
					(OP: UTØFT)
*UT7MA	"	76,782	455	29	105
*UR8QR	"	58,984	420	20	81
*UT4NW	"	42,826	289	22	76
*UT1FA	1.8	27,744	425	10	58
*UX5NQ	"	25,075	495	9	50
*UT3N	"	11,546	250	7	39
					(OP: UT3NK)
*USØQG	"	1,973	69	6	25

WALES

MW5A	A	4,063,103	3986	117	400
					(OP: G3WVG)
GW3JXN	"	818,910	1592	81	256
GW3NJW	"	498,602	1095	64	190
GW3NAS	"	123,582	338	69	189
*MWØYDX	A	92,960	347	42	118
*GW4HBK	"	45,844	213	44	102
*GW4MVA	7	49,006	258	24	83

YUGOSLAVIA

YU2A	28	3,895	93	9	32
					(OP: YU1BX)
YZ9A	14	670,419	2073	36	127
					(OP: YU1AU)
YT1W	"	523,378	2109	37	130
YT7A	7	682,136	2274	37	145
YU7KW	"	672,864	2360	36	136
4N1A	"	594,948	2506	35	137
					(OP: YZ1ZV)
YT7AA	"	61,087	244	30	97
YT2T	3.5	262,000	1601	28	97
					(OP: 4N1JA)
YU1KR	"	244,419	1599	22	91
YT2A	"	145,410	1102	21	90
					(OP: YZ1SG)
YU1EQ	"	47,600	494	16	69
YT1VP	"	44,109	472	16	71
YU7AV	1.8	150,360	1210	22	83
*YZ5C	A	1,393,560	1756	115	375
*4N7N	"	1,389,440	2038	103	313
					(OP: YU7WW)
*YU7AM	"	345,712	756	69	203
*YU7LS	"	296,593	852	48	208
*YU8/S56M	"	175,319	750	47	152
*YU1JF	"	103,455	241	71	138
*YT1AT	"	16,892	154	30	73
*4N1N	21	169,717	532	35	122
					(OP: 4N1LB)
*YU5W	"	104,466	343	33	105
*YT7N	"	40,582	193	30	73
					(OP: YU7QL)
*YZ1AU	14	260,316	1098	34	92
*YU7KM	"	77,965	404	26	87
*YT1BX	"	59,558	415	24	73
*YU1LA	7	217,664	966	32	120
*YU1AFP	"	150,420	1312	29	80
*YU1BN	"	33,418	336	13	64
*YT2B	"	15,470	195	16	54
*YT2W	1.8	16,409	263	6	55
					(OP: YU1RA)
*YU1AST	"	2,700	74	6	30
					(OP: YZ1EA)

OCEANIA

AUSTRALIA

VK2GC	A	2,267,745	2293	108	257
					(OP: K5KG)
VK7GN	"	879,612	1397	87	189
VK2NU	"	464,512	587	98	206
VK2GWK	"	10,374	64	35	43
VK4AN	7	271,570	810	31	99
*VK2IMM	A	652,790	803	95	195
*VK2GR	"	210,888	393	79	153
*VK4TT	"	170,754	431	59	90
*VK6HG	"	112,665	267	66	119
*VK4BUI	"	111,826	194	70	151
*VK2AR	"	77,736	215	49	109
*VK4VFX	"	54,096	217	49	89
*VK6HZ	"	23,250	114	52	73
*VK4EJ	"	22,008	117	35	49
*VK2PN	"	4,745	115	31	42
*VK2WL	"	2,812	34	18	20

EAST MALAYSIA

9M6/G3OOK	A	762,437	1031	88	175
9M8YY	7	408,384	993	36	108
					(OP: JR3WXA)

EAST TIMOR

*4W3ZZ	A	581,427	980	93	138
					(OP: DU9/NØNM)

HAWAII

AH7C	A	115,416	263	70	98
KH6ZM	"	99,603	266	66	87
KH6FI	"	51,342	152	62	67
KH6/K1ER	"	30,888	125	52	56
KH7X	7	1,152,704	2468	39	127
					(OP: KH6ND)
*KH6RZ	A	163,725	445	82	95
					(OP: W6YM)
*KH6/NØCO	"	57,743	200	50	63
*KH6/K7AO	7	279	15	4	4

INDONESIA

YB5AQB	21	62,400	322	27	53
YC2MXV	3.5	3,672	50	19	32
*YBØDPO	A	840,699	987	104	217
*YC3MM	"	76,884	227	42	87
*YBØUNC	"	69,615	295	38	53
*YD3KWR	21	14,672	119	18	38
*YB5QZ	7	34,374	170	27	75

NEW ZEALAND

*ZL/KM9D	A	363,182	595	80	146
*ZL2AL	"	242,970	469	77	133
*ZL/DL2GK	14	4,452	50	15	27
*ZL1KMN	7	4,329	45	13	24
*ZL4JB	"	616	20	9	13

NORTHERN MARIANAS

WHØV	A	693,129	1043	101	156

PHILIPPINES

DU3NXE	A	352,914	971	59	72
*DX1DBT	A	363,138	852	68	106
*DV3ZQR	"	24,108	109	35	49

TONGA

*A35TT	A	86,144	275	53	75
					(OP: DL4RDJ)

SOUTH AMERICA

ANTARCTICA

R1ANT	A	474,600	763	72	154
R1ANN	7	287,900	1032	22	78
*R1ANC	14	7,144	59	17	30

ARGENTINA

LU7DIR	A	279,444	592	56	118
LU1DZ	"	80,000	295	31	69
LU1HF	28	363,610	1168	32	98
LU6ETB	"	282,672	972	26	78
					(OP: LW9DA)
LT2H	"	273,258	1030	28	74
					(OP: LU7HN)
AY8A	21	855,760	2359	37	115
					(OP: LW9EOC)
LT1F	"	710,016	1947	29	100
					(OP: LU1AEE)
LU7YS	14	187,074	656	33	81
LU8YE	1.8	253	10	6	5
					(OP: LU7YS)
*L73E	A	1,247,824	1426	95	239
*LU1EWL	"	403,904	841	71	134
*LU7DNN	"	238,464	401	69	147
*LU2AS	"	154,017	386	57	100
*LR1F	"	78,400	195	55	105
					(OP: LU5FD)
*LU2EE	"	47,944	182	44	60
					(OP: LW5EE)
*LU9FFZ	"	575	33	11	12
*LU8EOT	"	125	19	13	12
*LU1FAM	28	155,156	727	21	58
*LW5EE	"	15,840	186	11	21
*LW2DX	"	9,361	102	16	21
*LU2FLN	21	167,900	991	20	72
*LW5DD	"	12,390	110	19	51
*LW2EU	14	12,455	87	26	49
*LU5BE	7	5,324	72	16	28

ARUBA

P4ØW	A	11,100,243	6438	149	460
					(OP: W2GD)
P43JB	14	280,800	1044	25	83
*P43E	A	288,864	787	48	88

BRAZIL

PS2T	A	6,411,664	4242	141	391
					(OP: N6AA)
PY3AU	"	261,459	496	64	145
ZX2B	"	147,606	259	66	153
					(OP: PY2MNL)
PT5A	21	1,021,776	2465	37	131
					(OP: PY2EMC)
PY2NA	"	789,239	1787	35	122
ZX5J	14	1,230,120	2424	39	141
					(OP: IV3NVN)
PY2NY	"	819,007	1836	38	123
PX8C	7	648,243	1543	32	127
					(OP: PY8AZT)
PY7ZY	"	494,904	1334	32	104
PY2YU	3.5	31,624	170	18	49
PR7AR	"	22,572	198	13	53
PV8AZ	"	1,020	83	9	21
PY2FUS	1.8	2,760	46	9	15
*PY2IQ	A	400,294	636	71	162
*PY5BLG	"	394,858	828	67	135
*PY5EG	"	11,448	100	41	65
*PY7OJ	"	9,933	62	33	44
*PY3SB	"	3,363	38	26	33
*PY2BRZ	"	1,036	57	14	14
*PY7EG	"	261	11	5	4
*PY3YD	"	54	3	3	3
*PY1MK	28	13,455	127	18	27
*PY4CEL	21	173,072	584	28	88
*PY8MGB	"	133,023	595	20	67
*PY2HL	"	42,381	352	15	36
*PY1CMT	"	270	20	9	9
*PY4FQ	14	17,990	117	21	49
*PT8CWA	"	10	5	3	4
*PP7ZZ	7	41,440	198	21	59
*PY7GK	"	6,244	110	9	19
*PV8DX	1.8	10,879	97	12	31

CHILE

CE3BFZ	A	283,421	758	58	81
XQ1VLY	14	4,664	46	19	34
*XQ4ZW	A	931,368	1229	93	209
*CE1URJ	14	7,728	100	18	24

COLOMBIA

HK3CQ	A	554,323	902	77	176
HK3AXY	21	35,595	295	12	33

PARAGUAY

ZPØR	A	1,804,752	2062	101	231
					(OP: N5ZO)

TRINIDAD & TOBAGO

9Y4AA	A	6,921,538	4515	135	424
					(OP: N6TJ)

URUGUAY

CX7TT	28	285,798	903	26	88
CW5T	14	1,173,008	2607	39	128
					(OP: K9VV)
CX7BY	"	413,326	1004	36	110
*CX9AU	14	379,389	1070	33	96
*CX4SS	"	303,441	1007	35	88

VENEZUELA

YW4D	A	7,717,876	4736	140	447
					(OP: YV1DIG)
YV5LIX	14	28,728	374	14	22
4M5Y	3.5	270,066	1023	23	80
					(OP: YV5LIX)
*YV5KG	14	185,250	1101	32	82
*YV7QP	"	83,880	507	21	69

QRP

P40A	A	4,014,648	3496	99	297
					(OP: KK9A)
K1TO/4	"	1,529,442	1162	107	379
C6AUR	"	1,336,677	2077	85	254
DK5WL	"	605,862	972	79	268
UA9SG	"	562,565	790	66	229
N8ET	"	553,443	629	84	257
OK1VBA	"	549,664	903	83	273
EA1FAQ	"	533,455	1175	68	215
SM3C	"	402,537	851	67	260
					(OP: SM5CCT)
RA9SO	"	401,024	622	54	187
JR4DAH	"	396,090	611	92	178
US2IZ	"	381,350	941	60	230
N1TM	"	350,842	503	61	202
OK1JOC	"	346,896	811	49	215
DF1OX	"	336,441	737	58	201
VA3DF	"	333,450	651	53	172
W6JTI	"	332,847	459	97	182
UA6LCJ	"	302,742	750	63	215
G3YMC	"	301,860	833	48	212
GW4ALG	"	298,196	811	52	202
RV3QX	"	267,138	686	63	228
SM6EQO	"	259,548	734	50	208
G4DBW	"	239,280	653	47	193
YU1LM	"	227,136	660	53	171
WA8WV	"	207,691	349	61	178
EA3IW	"	202,840	542	59	161
HB9CBR	"	197,448	462	61	167
K8ZT	"	197,099	356	68	191
S59D	"	179,400	552	71	205
LY2TS	"	177,216	633	40	152
EW1NA	"	175,225	507	48	167
OL3M	"	172,800	658	46	179
					(OP: OK1TGI)
SP9NSV/7	"	168,454	575	44	165
MM3AWD	"	147,183	527	39	174
N8IE	"	147,168	280	58	166
LY6ØBY	"	143,613	586	40	157
					(OP: LY3BY)
NU4B	"	127,305	241	54	153
VE3XL	"	125,550	361	44	111
GØDCK	"	106,029	473	39	150
RV9COI	"	98,420	262	32	108
DL2YMR	"	97,336	388	38	146
JA1NLX	"	90,792	252	62	94
W5KDJ	"	88,816	233	56	126
NDØC	"	85,086	218	53	110
KØGT	"	81,243	177	55	122
K4ORD	"	77,572	190	52	112
UA9BS	"	72,588	236	36	102
KT8K	"	67,166	187	42	100
EA7AAW	"	66,356	309	29	77
PA3AM	"	65,912	342	35	119
AA1CA	"	58,646	196	41	101
UY7C	"	57,812	249	32	117
					(OP: UR3CMA)
VK2BAA	"	56,810	210	50	65
VE3QDR	"	52,864	297	33	79
UX8ZA	"	49,824	237	33	111
NØUR	"	48,906	158	36	81
K4AQ	"	43,542	151	37	86
VA3SB	"	42,681	169	36	87
GM4HQF	"	40,677	235	22	69
K7MM	"	40,222	164	24	67
DL1LAW	"	38,908	277	25	112
OO6QS	"	38,875	291	31	94
					(OP: ON6QS)
WZ2T	"	38,168	143	32	72
WA8REI	"	37,674	142	34	83
HA1CW	"	36,162	220	26	97
HB9AYZ	"	35,264	221	26	90
WØUY	"	35,086	135	35	71
VE7NI	"	34,916	202	30	56
ISØLDT	"	31,038	190	33	91
K7TQ	"	30,576	162	44	68
W1VET	"	29,988	117	25	73
K4GT	"	29,125	121	36	89
SP3BLT	"	28,350	170	28	98
KC9HAV	"	28,222	144	44	93
LZ1IQ	"	27,328	166	31	81
W4QO	"	23,560	98	28	67
RU3RM	"	19,982	134	24	79
RV3DBK	"	19,847	182	18	71
PY1KO	"	18,236	146	38	56
K4KSR	"	18,056	130	36	86
USØYA	"	17,608	93	26	45
W1XT/7	"	16,168	79	36	50
RX6CW	"	15,910	151	18	68
KØCD/9	"	15,397	75	33	56
PI6ØNWG	"	15,224	185	20	68
					(OP: PA1B)
HB9QA	"	14,317	102	32	71
DHØJAE	"	14,111	148	23	80
OK2NA	"	12,920	111	31	64
KIØG/5	"	12,896	109	50	74
SA2E	"	12,649	143	22	69
					(OP: SM2EKA)
LA8PV	"	9,975	101	24	71
K2EKM/4	"	9,825	61	24	51
DL2WRJ	"	9,682	113	30	64
PAØRBO	"	9,344	117	21	52
DJ5QK	"	8,505	129	20	60
G4ILO	"	8,154	115	15	39
RX3DOR	"	7,524	81	20	56
DL2EF	"	7,140	129	18	52
DL1RNN	"	5,676	88	14	52
K2JT	"	5,396	41	24	37
PA1W	"	5,396	90	23	53
JE1CAC	"	5,152	51	25	31
SV1JSB	"	4,345	60	17	38
N4HH	"	4,136	37	16	31
PA1B	"	4,032	59	12	30
YO4RLP	"	3,864	111	17	52
W2JEK	"	2,749	36	19	27
JH1NXU	"	2,575	35	19	23
JK1TCV	"	2,542	27	21	20
KC9ECI	"	2,296	42	20	25
RN6AH	"	2,236	25	18	25
SP9IKN	"	1,707	89	25	66
DL8MTG	"	1,632	26	11	23
DL3BVA	"	1,440	46	9	21
SP9AJM	"	1,305	19	13	16
F5MPS	"	1,096	106	29	84
SM6PPS	"	912	33	11	27
K4UK	"	864	17	13	14
WD5BJT	"	832	25	13	19
JHØQYS	"	810	19	13	16
DH5ST	"	720	30	10	20
EA5EXK	"	720	17	7	9
K3QQ	"	608	27	14	24
SM5EFX	"	112	8	6	8
KW4JS	"	100	77	33	54
AB8DF	"	100	12	7	10
AK7V	"	77	13	6	5
LZ2LE	"	61	480	28	83
VA3RKM	"	60	7	5	5
JG2MLI	28	4,836	56	16	23
W6QU	"	2,204	31	10	19
					(OP: W8QZA)
JK3ZQJ	"	143	8	5	6
					(OP: JG1EIQ)
DL9ZP	21	85,914	295	31	98
KR2Q	"	64,152	236	21	78
HA7MW	"	61,504	208	34	90
LU5FZ	"	41,230	247	17	45
JI1AQY	"	38,800	222	28	52
JQ1NGT	"	34,573	226	27	50
UA9FQY	"	34,112	183	19	63
SP2PI	"	32,760	167	27	63
JR1NKN	"	29,304	180	27	45
HAØGK	"	28,336	171	24	53
RUØUQ	"	20,150	298	14	36
BA6QH	"	11,016	109	18	36
ES1CR	"	10,655	91	20	49
WA6FGV	"	7,661	62	17	30
F5VBT	"	7,065	113	14	31
MØD	"	6,160	79	16	39
					(OP: G4JZO)
JA1KPF	"	3,815	49	15	20
NØUNL	"	3,744	38	13	26
					(OP: NØKIS)
RA3XEV	"	2,772	48	9	27
OK1AIJ	"	2,106	39	10	16
SP9RQH/9	"	342	15	7	11
SU8BHI	14	468,875	1509	29	92
					(OP: HA3JB)
S56A	"	237,546	720	34	125
EU8RZ	"	191,835	724	33	112
YU1AFT	"	162,435	1049	29	76
OM7DX	"	148,875	690	28	97
K3TW	"	130,688	376	28	100
SP6T	"	127,428	429	34	114
VE6EX	"	121,900	634	21	71
SP5DDJ	"	114,708	412	34	98
S52P	"	108,171	442	30	89
G3LHJ	"	78,578	385	23	78
LY4BF	"	76,272	397	26	86
RW3AI	"	70,498	433	25	76
SMØGNS	"	56,950	407	18	67
RK9QWZ	"	55,261	279	18	55
					(OP: RW9QA)
SP4GFG	"	47,470	281	23	71
RZ9IB	"	29,214	250	12	42
KH6WW	"	24,048	216	21	27
					(OP: N6XG)
RK3RX	"	23,328	262	17	55

SN8A	*	21,508	202	20	56
					(OP: SP8AQA)
W6YJ	*	16,864	116	23	45
PE2T	*	15,235	146	16	39
					(OP: PC2T)
RX6LDK	*	11,956	139	13	48
GIØKVQ	*	10,935	174	9	18
JA4DQX	*	7,560	79	18	27
UA3AAP	*	6,600	106	11	39
9A8MM	*	4,522	79	8	26
DG3MKO	*	3,604	60	10	24
BA6QA	*	3,311	99	15	28
JH8FAJ/7	*	3,147	46	15	24
DF3SM	*	1,844	51	6	16
S54AA	7	152,950	565	34	127
G4EDG	*	93,692	503	22	96
OK2BYW	*	88,191	485	24	99
UU2CW	*	69,734	478	24	95
YZ8A	*	65,375	338	29	96
					(OP: YT1AA)
RN6AL	*	64,496	360	25	91
DL1DQY	*	46,091	259	26	98
DK3W	*	45,045	353	16	75
					(OP: DL6MHW)
F5UL	*	40,866	323	18	80
HB9CEY	*	37,710	279	17	73
SP4TBM	*	36,105	314	16	71
G4CWH	*	31,896	390	11	61
PG2AA	*	26,288	393	10	52
UN7CN	*	26,047	181	13	48
RV3FW	*	24,621	213	22	65
IØZUT	*	24,336	173	15	63
SP3PSM	*	14,062	127	16	63
UT5UQV	*	11,288	107	12	56
DL4TJ	*	10,877	163	16	57
DK4CU	*	10,542	170	10	55
SP5XSB	*	9,918	162	9	48
NE6M	*	4,400	51	17	23
WD2E/4	*	4,224	68	16	32
OH2BEC	*	682	31	5	17
PV8IG	*	100	73	12	24
EW2AA	1.8	12,600	232	9	47
S57MSU	*	12,095	240	9	50
OH7FF	*	8,526	204	5	37
VE3DO	*	7,391	207	8	11
K3BU	*	4,865	74	10	25
RU2FM	*	3,325	105	4	31
SP9W	*	2,448	74	5	31
SP9DTH	*	1,320	39	5	28
N7IR	*	1,071	25	10	11
N8XA	*	456	21	7	7
SP9KJ	*	108	37	5	22
YU15ARDF	*	99	7	4	7
					(OP: YU1UA)

ASSISTED

NORTH AMERICA

UNITED STATES

K1JB	A	1,957,130	1379	105	406
N1DG	*	1,715,098	1054	124	478
K1BX	*	1,667,452	1346	94	349
N8RA/1	*	1,421,091	1001	111	400
W1NT	*	1,329,795	1177	94	341
W1EBI	*	1,276,325	997	104	371
W1UK	*	1,070,399	896	98	375
K2TE/1	*	1,033,410	934	87	312
K1TR	*	1,015,600	949	86	314
W1QK	*	1,006,911	963	85	316
W1CSM	*	870,146	731	98	348
W1HR	*	628,300	592	93	319
W1NR	*	613,112	508	96	347
N4XR/1	*	406,813	514	89	252
AA1V	*	314,721	338	85	278
K1RV	*	286,445	367	64	231
K1AE	*	272,376	295	80	271
WB1EDI	*	182,016	277	60	196
N1MD	*	139,284	259	53	159
KV1J	*	133,515	259	61	154
K1TW	*	110,286	206	49	149
N1RK	*	108,216	246	44	123
KK1W	*	68,052	171	48	111
WY1U	*	61,006	196	26	92
W6ZF/1	*	43,419	137	34	89
W1DAD	*	25,016	104	41	77
K1KD	*	18,200	85	39	65
K1OZ	*	10,836	66	19	44
NF1A	*	6,696	54	16	38
W1DY	*	4,841	42	19	28
W1MAT	*	4,794	40	19	32
N1SV	*	750	16	10	15
W1BIH	*	100	72	22	47
W2RE	A	3,252,060	2267	123	457
NA2U	*	1,711,620	1177	120	435
W1GD/2	*	1,556,964	1032	118	431
N1EU/2	*	1,541,680	1025	121	439
KF2O	*	1,442,925	900	130	475
NO2R	*	1,433,632	944	112	456
K2ONP	*	1,206,275	1070	93	334
W2WB	*	1,183,680	842	122	418
W2LE	*	963,776	861	90	317
K2SG	*	875,448	919	80	298
KA2D	*	784,323	676	95	326
K2EP	*	684,546	624	92	329
AB2E	*	594,360	613	88	293
K2GN	*	529,308	578	85	292
N1JP/2	*	523,768	548	91	307
K2SB	*	493,668	556	85	293
W2REH	*	482,405	480	92	293
W2RD	*	425,012	469	87	266
K2BX	*	353,124	465	73	233
WK2H	*	341,715	482	64	221
N2NI	*	330,165	412	83	236
K2QPN	*	255,148	385	73	208
NA2M	*	232,116	331	76	200
N2WKS	*	210,098	282	68	233
NJ1F/2	*	168,976	291	58	178
W2RZS	*	161,172	303	63	159
					(OP: WB2NVR)
N2KPB	*	160,512	515	55	201
W2CG	*	142,033	311	37	136
K2OWE	*	135,837	285	58	185
N2CQ	*	127,872	255	44	148
N2FF	*	40,064	122	36	92
K2BM	*	26,784	94	31	77
NJ2OM	*	19,080	76	46	60
W2UP/3	A	6,181,648	3264	145	537
K3WW	*	4,835,880	2713	137	528
WE3C	*	3,084,378	2098	128	433
K3PH	*	2,834,512	1762	122	456
KQ3F	*	2,400,444	1647	111	413
K3SV	*	2,211,900	1590	106	399
W3FV	*	2,147,560	1511	119	411
NN3Q	*	2,001,976	1483	106	396
W3GM	*	1,167,950	873	115	382
					(OP: K3ND)
WA3C	*	1,117,935	910	113	394
W3BG	*	1,095,750	894	99	351
K3NM	*	973,228	764	107	414
N3ZA	*	837,678	711	101	346
W3GK	*	736,005	705	98	319
K3ZV	*	701,986	778	86	287
N3KN	*	587,478	616	81	277
W3CC	*	293,696	333	87	266
KB3MP	*	192,654	308	60	218
K3DUG	*	186,960	326	53	175
NE3H	*	174,064	313	61	192
N3GNW	*	166,941	270	64	179
N3CW	*	142,786	257	54	163
N3NR	*	130,416	246	58	150
W4EE/3	*	49,762	154	44	95
KQ3V	*	21,965	76	39	76
W3MF	*	6,615	43	25	38
KD3TB	*	5,520	53	23	46
WA3RHW	*	5,445	47	19	36
N3CA	*	1,344	22	12	16
K3WC	14	140,650	366	32	113
WØBR/3	7	18,389	102	19	52
K1PT/4	A	2,350,240	1498	129	463
K4TD	*	1,404,420	1016	124	410
N4RV	*	1,391,250	1048	117	408
W4MYA	*	1,364,016	987	113	430
K4SAV	*	1,048,570	831	111	374
K4MA	*	957,734	773	114	368
W3GQ/4	*	815,080	773	97	313
AA4V	*	708,750	750	97	278
W3OA/4	*	660,366	651	93	285
K3KO/4	*	653,128	586	92	336
AD4EB	*	487,014	590	80	234
N4VV	*	483,155	510	81	274
KZ2I/4	*	455,376	514	92	266
N4VA	*	445,107	578	85	262
N8PR/4	*	429,942	434	102	291
K1KO/4	*	397,394	517	77	249
KE1F/4	*	350,571	489	75	228
W4NTI	*	304,800	430	77	223
W4ZW	*	274,300	358	91	234
AI4IE	*	240,096	422	62	182
W4NZ	*	227,120	316	77	195
K4WW	*	226,252	356	58	171
W4ATL	*	211,120	313	73	187
W3YY/4	*	194,112	250	77	211
N4GG	*	142,552	269	54	152
N4TL	*	139,200	270	53	147
N2UM/4	*	136,728	260	54	162
					(OP: N2UM/4)
W4BQF	*	132,676	374	45	119
K8YC/4	*	100,920	203	58	174
N4TN	*	70,896	177	54	114
KB4ET	*	67,942	197	46	115
AD4IE	*	57,183	160	44	103
K4CZ	*	56,856	177	39	99
NN3W/4	*	53,044	149	46	103
W4/NL7AU	*	49,113	124	48	105
NX9T/4	*	32,004	109	41	85
N4QV	*	25,573	100	34	73
W4WNT	*	19,376	96	40	72
W4BW	*	7,808	52	26	38
N4HN	*	7,392	55	18	38
W4DR	*	2,542	26	16	26
N4XMX	*	10	6	3	6
W5MX/4	14	698,250	1408	37	138
WK4Y	*	309,284	724	36	131
N3CZ/4	7	217,250	649	33	125
W4NL	*	105,032	290	36	116
AA4GA	*	101,053	269	29	110
W6IZT/4	*	54,683	243	32	117
N4LU	*	4,329	49	11	28
W4ZV	1.8	57,000	253	21	79
K4PIC	*	1,944	43	10	17
K5YA	A	3,142,958	1919	142	495
K5NA	*	2,052,646	1087	164	558
W5GN	*	1,154,412	962	121	388
K5UN	*	1,070,868	971	100	366
N5JR	*	608,317	562	99	302
K5BG	*	314,252	405	98	215
WØVX/5	*	298,193	401	82	205
KU5S	*	244,404	358	80	199
N5MT	*	78,528	178	68	124
N3BB/5	*	43,560	137	37	83
AD5VJ	*	43,000	206	52	120
KE5OG	*	42,000	113	51	99
K5HDU	*	31,024	113	34	78
W5LEW	*	12,584	91	37	67
W5GA	*	11,446	79	34	63
N5JB	14	233,742	565	37	126
N5ER	7	38,416	160	24	74
NX5M	1.8	8,176	78	15	41
K6RIM	A	662,858	614	118	301
K6TA	*	647,537	613	121	286
W6TK	*	559,650	657	102	248
WS6X	*	478,362	554	108	258
K6OQ	*	237,923	376	77	210
N6VH	*	217,968	344	76	163
N6QQ	*	214,632	365	82	189
WØYK/6	*	208,670	304	83	188
W6FRH	*	194,776	302	88	163
N6FM	*	108,419	247	58	123
W6DR	*	37,973	132	46	81
N6RK	*	37,084	98	58	88
K6OWL	*	35,796	129	47	67
NI6T	*	34,416	102	49	95
W6SC	*	28,080	95	36	72
K1USC/6	*	25,530	106	45	66
KI6IV	*	20,370	117	41	64
W6KNB	*	11,552	61	33	43
NZ6L	*	4,810	96	32	42
K6EU	*	4,032	35	18	24
K6ST	*	1,632	21	14	18
AD6ZJ	*	100	19	16	15
WX5S/6	14	290,764	697	36	121
N6RO	7	377,226	980	37	134
W7ZR	A	674,866	717	124	267
KO7X	*	453,602	541	100	237
AB7E	*	390,100	514	93	239
KF7E	*	283,140	363	113	217
WA7LNW	*	261,274	347	98	240
K7ABV	*	185,592	349	66	143
K7ZD	*	170,500	310	72	148
W7SW	*	146,200	284	71	129
K7EG	*	135,474	329	63	138
K8BN/7	*	119,232	230	55	137
NJ7I	*	64,719	184	54	99
K7KR	*	62,016	151	55	97
W7WHY	*	52,948	181	50	74
W6SA/7	*	34,510	112	48	71
K6UM/7	*	28,220	123	34	49
N7XY	*	26,765	113	42	59
WAØKDS/7	*	1,044	19	12	17
K7DX	14	247,260	667	36	120
W7CT	*	150,234	400	32	114
W7GG	7	314,578	761	37	121
K8IA/7	*	298,172	750	36	125
N7ON	*	10,816	76	25	39
K7RL	1.8	1,452	33	9	13
W8MJ	A	994,560	1006	112	336
K3WA/8	*	799,488	783	87	297
W8HC	*	750,780	731	89	299
N8TR	*	435,840	374	103	351
NU8Z	*	218,064	308	66	198
W8TN	*	148,230	217	65	205
W7JW/8	*	68,510	198	53	117
AJ1M/8	*	28,798	100	43	76
N9CK	A	1,161,538	847	120	389
W9XT	*	1,113,442	891	113	360
N2BJ/9	*	389,928	504	79	229
K9UQN	*	337,955	489	68	189
WE9V	*	322,326	315	96	285
K9OR	*	235,600	289	78	232
KM9M	*	57,270	139	53	113
K9OSH	*	46,690	138	50	95
N9BT	*	10,320	66	30	50
WB9Z	1.8	42,874	221	21	76
NØAT	A	1,471,536	1064	123	405
WAØMHJ	*	313,038	391	84	222
KØKT	*	308,560	422	89	215
N5IN/Ø	*	197,253	278	88	215
KØBJ	*	170,352	284	80	172
K6XT/Ø	*	151,734	253	79	163
WØEB	*	111,321	230	57	132
KØBX	*	77,816	212	37	105
KØCS	*	63,393	186	55	132
KØUK	*	46,136	158	57	89
KEØL	*	36,790	119	42	88
KØAD	*	18,392	83	28	60
KCØRET	*	11,914	61	25	49
WØQQS	*	3,969	38	20	29
NØVD	7	75,396	267	31	91
KVØQ	1.8	31,652	222	24	58

ALASKA

KL1V	A	78,800	386	47	53
KL7P	*	32,967	178	35	46

BELIZE

V31TM	A	3,630,750	3534	121	394
					(OP: DL1HCM)

BERMUDA

VP9I	A	5,528,907	4496	112	407
					(OP: K1XM)

CANADA

VE1OP	A	1,654,660	1578	89	357
VE3XB	*	1,413,312	1483	98	335
VE2TZT	*	1,035,907	1133	89	300
VA3DX	*	825,396	811	105	324
VE3/W1AJT	*	773,410	829	90	305
VE3XD	*	729,800	872	90	266
VA1CHP	*	674,472	825	71	287
VA3EC	*	553,920	704	74	246
VE3WO	*	456,177	889	61	158
VE3RZ	*	348,159	539	69	212
VO1HE	*	312,312	433	70	216
VE6LB	*	167,200	445	66	124
VE6AVR	*	144,690	413	52	107
VA7PAC	*	12,282	130	32	37
VA7PAX	*	0	0	0	0
VE2DWA	28	56	4	3	4

MARTINIQUE

FM5JC	A	969,524	1350	84	242
					(OP: F5JKK)

MEXICO

XE2AC	A	1,192,440	1616	104	276
XE1KK	1.8	5,313	117	10	23

PUERTO RICO

KP4KE	14	945,128	2845	33	115
					(OP: DK8ZB)

U.S. VIRGIN ISLANDS

NP2L	A	331,600	754	57	143

AFRICA

CAPE VERDE

D44TD	A	1,822,184	3462	38	144
					(OP: IK2JUB)

MADEIRA ISLANDS

CT3BD	A	106,890	255	62	148

ASIA

ASIATIC RUSSIA

RG9A	A	4,983,841	2964	146	501
					(OP: UA9AM)
UA9AX	*	966,302	900	103	328
RV9XO	*	32,518	105	55	87
RA9JR	21	192,348	716	30	107
UA9UR	*	18,802	109	22	57
RV9JE	14	411,150	1071	36	114
RW9HZZ	7	323,400	998	33	107
					(OP: RZ9HG)
UA9YAB	1.8	67,368	359	19	65
UAØQBR	A	226,912	517	74	150
UAØSE	*	9,313	72	21	46

CHINA

BA4RF	A	939,796	1219	126	277

CYPRUS

5B/AJ2O	A	9,445,098	5332	140	523
					(OP: RW3QC)
H2E	*	1,016,720	1120	80	275
					(OP: 5B4AGE)

JAPAN

JF2SKV	A	802,530	1106	120	213
JM1NKT	*	572,082	629	126	245
JA3PYC	*	231,422	366	91	160
JO7KMB	*	199,789	355	92	149
JN1BMX	*	186,730	301	100	163
JA3VUI	*	72,468	199	77	106
JA1XRH	*	60,710	190	54	76
JEØIUR	*	41,652	138	47	70
JS1KQQ	*	26,499	93	50	71
JG1VGX	*	4,400	43	23	27
JE1FWI	*	238	7	7	7
JHØEQN	28	2,688	40	12	20
JH9KVF	21	101,008	385	34	73
JA1PCY	*	90,100	380	34	72
7M4CDX	14	104,194	409	33	85
JG2KKG	*	104,020	334	37	103
JN4MMO	*	89,376	393	31	67
JR1BAS	*	35,511	162	29	60
JI1ALP	7	57,783	233	28	75

KYRGYZSTAN

EXØM	21	348,984	1308	27	104

THAILAND

HSØZDJ	A	675,855	983	101	244
HS1OVH	*	3,422	44	23	35

EUROPE

AUSTRIA

OE4A	A	4,923,750	3534	167	583
					(OP: OE1EMS)
OE3ZK	14	200,332	657	35	122
OE3I	7	353,440	1586	33	127
					(OP: OE1JNB)
OE9SBD	1.8	5,494	170	5	36

BELGIUM

OO4CAS	A	782,379	1268	71	280
					(OP: ON4CAS)
OO7SS	*	70,290	353	35	130
					(OP: ON7SS)
ON4WW	1.8	220,000	1363	28	97
ON4ATW	*	56,990	618	15	67

BULGARIA

LZ2BE	A	345,022	683	86	248
LZ5A	7	429,352	1964	35	129
LZ5ZI	*	59,514	364	29	80

CROATIA

9A2U	28	17,025	150	20	55
					(OP: 9A3ZA)

CZECH REPUBLIC

OK2FD	A	2,841,344	2152	152	552
OK1FDY	*	1,641,211	1918	114	385
OK1ES	*	262,710	531	71	244
OK1DOZ	*	159,651	419	52	167
OK1UU	*	46,648	243	39	97
OK2RN	*	9,300	84	17	43
OK7M	28	16,837	196	16	63
					(OP: OK1DIG)
OK3Z	21	222,870	664	37	133
					(OP: OK1DVM)
OK2HZ	14	112,772	470	31	90
OK1DG	7	460,645	1502	37	144
OK1TP	1.8	48,148	614	14	67
OK1FPG	*	12,744	229	7	47

DENMARK

OZ4O	A	266,855	698	58	207

ENGLAND

G4BUE	A	1,695,948	1658	131	451
G3AB	*	651,100	1028	87	338
G4BJM	*	548,000	1156	66	184
G3VQO	*	270,072	757	47	201
G3UHU	*	154,170	358	64	206
MØBLF	*	90,125	369	36	139
G4OBK	*	17,024	68	44	68
GØDEZ	*	1,443	29	12	27

ESTONIA

ES5RY	A	1,044,000	1211	117	405
ES5QX	1.8	167,724	1179	23	85

EUROPEAN RUSSIA

RX4HZ	A	4,923,400	3777	178	646
RZ3AZ	*	1,805,650	2198	121	418
RN4WA	*	1,009,522	1705	117	385
RU6YY	*	704,000	691	115	397
UA3AGW	*	500,346	709	113	286
RA3DNC	*	84,032	194	67	135
UA3BS	21	122,304	480	33	123
RV6YZ/6	14	485,584	1587	39	137
RZ1OM	*	61,824	251	27	85
UA6LV	7	634,586	2034	38	143
RK6BZ	*	67,034	379	28	93
RA6AX	1.8	111,996	761	23	85
RU3DX	*	78,728	628	22	82

FINLAND

OH6NIO	A	1,736,933	1622	131	456
OH6DX	*	564,696	548	121	431
OH2XX	*	78,411	205	49	128
OH6BG	21	175,651	655	33	128
OH6NJ	*	97,976	395	31	117
OH5B	14	527,720	1665	38	129
					(OP: OH5BM)
OH6GAW	*	120,881	699	26	83
OH2BCI	1.8	110,595	917	22	79
OH3BU	*	51,708	452	17	76
OH6KTD	*	504	22	5	16

FRANCE

F5RRS	A	541,206	974	73	248
F6BNH	*	173,455	302	89	218
F5SGI	*	4,592	55	16	40
F5IN	1.8	117,900	1090	16	74

GERMANY

DJ5MW	A	5,450,967	3636	161	592
DJ2YA	*	2,578,050	1722	143	531
DJ9DZ	*	1,968,960	2046	126	460
DM1TT	*	1,342,701	1284	131	448
DL2ZAE	*	1,272,024	1818	106	362
DKØOG	*	1,018,266	1415	106	341
					(OP: DM5TI)
DL1YD	*	957,249	1043	111	312
DL2MDZ	*	930,680	1145	109	330
DL6KVA	*	852,255	803	119	416
DF5ZV	*	699,504	902	102	354
DR5L	*	659,610	1330	69	246
					(OP: DK3QZ)
DHØGHU	*	617,826	855	90	317
DJ3WE	*	576,030	976	100	322
DL8KJ	*	569,268	872	77	301
DJ2T	*	425,736	808	73	251
					(OP: NJØIP)
DK3QJ	*	382,299	651	81	272
DL1EJA	*	382,044	525	80	236
DL4RCK	*	378,508	500	97	280
DL2RMC	*	332,878	406	95	308
DF6QV	*	217,678	578	54	200
DF5UL	*	202,536	348	68	164
DJ4PI	*	193,304	299	105	226
DL2VL	*	191,268	348	71	226
DL9NDV	*	185,796	374	64	170
DL5XAT	*	172,319	310	78	161
DJ3DQ	*	154,560	361	62	218
DL8AAM	*	152,390	378	54	191
DL1CWI	*	137,046	348	54	197
DJ9CW	*	130,900	447	73	202
DK3DUA	*	101,144	278	44	144
DF8AA	*	91,124	313	53	156
DL8WX	*	73,059	176	59	88
DK6CQ	*	63,393	232	52	135
DL9NCR	*	26,299	141	38	81
DL4FDI	*	25,636	173	28	88
DF2AP	*	23,517	194	25	92
DF2LH	*	19,065	111	28	65
DK1TF	*	3,174	59	14	32
DL1DVN	*	2,408	34	15	28
DP9Z	21	217,672	619	36	133
					(OP: DF9ZP)
DF1LON	*	116,688	394	33	99
DK3GI	14	666,788	1694	37	141
DK1MAX	*	422,853	1012	37	140
DFØCI	7	378,314	1583	35	131
					(OP: DL8AKI)
DJ8QP	*	67,080	327	28	102
DL6NCY	*	55,282	216	28	103
DL1GGT	*	49,567	310	26	71
DL7CX	1.8	84,600	945	19	81
DF2UU	*	21,128	259	12	64
DL2OBO	*	18,837	263	9	54

HUNGARY

HA5AO	21	42,152	197	28	60
HA3MQ	14	624,456	2179	38	151
HG4I	*	233,544	800	36	112
					(OP: HA5LN)
HA5A	7	704,524	2505	36	142
					(OP: HA7AP)
HA2VR/5	*	4,687	69	10	33
HA5BSW	1.8	19,728	410	11	61

ICELAND

TF3MA	A	57,680	247	33	107
TF3AO	*	4,410	62	11	34

ITALY

II1H	A	1,064,268	1826	83	223
					(OP: I1HJT)
IC8POF	*	19,594	109	27	70
IK2EGL	21	55,990	248	33	77
IKØYUT	14	148,610	473	36	118
IZ8CCW	*	17,733	189	19	50
IR2C	7	600,054	1805	38	144
					(OP: IK2PFL)
II1M	*	63,344	481	21	86
					(OP: IK1SOW)

LATVIA

YL7X	A	1,672,650	1864	115	416
					(OP: YL2LY)
YL9T	*	627,417	1004	96	337
					(OP: YL2TW)
YL2VW	1.8	94,569	891	17	70

LITHUANIA

LY2IC	A	457,114	779	81	236
LY3BH	*	83,411	247	60	179
LY8O	7	571,900	2234	36	136
LY3UM	1.8	154,860	1053	25	91

NETHERLANDS

PFØX	A	717,340	1277	78	232
PAØABM	*	669,678	777	102	376
PA3EMN	*	554,931	989	73	278
PA3C	*	58,724	181	54	158
PA5O	*	55,594	203	41	92
PAØR	21	205,360	695	35	101

POLAND

SN8F	A	2,444,904	2482	131	463
					(OP: SP8FHK)
SN5M	*	2,245,938	2146	134	448
					(OP: SP5UAF)
SP3LWP	*	644,776	1101	88	286
SP3JUN	*	96,660	333	36	99
SP6EIY	*	84,672	274	48	120
SQ1K	*	70,372	261	41	105
SP2EWQ/2	*	58,531	162	59	128
SP2JMB	21	98,252	326	35	119
SP3GXH	*	61,924	252	32	81
SP3HRN	1.8	94,864	864	20	78
SP3HUU	*	15,562	312	9	53

PORTUGAL

CT1IUA	A	288,860	546	68	192

ROMANIA

YO8WW	A	234,144	514	74	214
YO3III	*	4,914	60	15	39
YO3JW	28	754	25	7	19
YP3A	14	642,156	2061	38	139
					(OP: YO3GDA)
YO4RST	7	594	12	6	12

SCOTLAND

GM4FDM	A	88,091	469	29	108
GMØNAI	14	36,963	162	24	87

SLOVAK REPUBLIC

OM3DX	A	86,100	266	51	124
OM8AG	21	89,872	321	36	101
OM7PY	7	59,670	401	19	83

SLOVENIA

S52ZW	A	2,968,992	2727	139	485

S57DX	*	**2,940,288**	**2711**	**140**	**484**
S59AA	*	1,222,716	1378	116	355
S58P	*	298,848	778	67	197
S51DX	*	16,089	186	25	68
S50R	**14**	**613,818**	**1902**	**35**	**127**
S56X	**7**	**533,310**	**1928**	**38**	**136**
S53O	*	**394,748**	**1619**	**35**	**129**
S58M	*	321,408	1444	36	126
S57Z	*	230,096	1093	34	112
S50DX	*	20,251	236	14	63

SPAIN

EA2AYD	**A**	**930,066**	**1054**	**90**	**319**
EA3NM	*	**918,945**	**1492**	**89**	**316**
EA4KD	*	633,184	933	85	291
EA5DWS	*	112,326	434	55	138
EA5FID	**21**	**277,295**	**885**	**35**	**120**
EA1DX/5	7	27,264	196	17	47
			(OP: EA5FID)		

SWEDEN

8SØF	**A**	**277,672**	**840**	**47**	**197**
			(OP: SMØOGQ)		
SM6BSK	*	100,188	224	57	219
8SØW	*	92,322	309	65	142
			(OP: SMØNJO)		
SA1A	*	13,534	98	30	71
			(OP: SM1TDE)		

SWITZERLAND

HB9IQB	**A**	**716,584**	**1118**	**83**	**291**
HB9CIP	*	206,010	525	58	152

UKRAINE

UW8M	**A**	**4,331,040**	**4236**	**145**	**527**
			(OP: UR5MID)		
UV5U	*	1,722,240	1793	129	447
			(OP: UX1UA)		
UY5ZZ	*	1,629,739	1520	141	488
UT7I	**14**	**754,866**	**2294**	**39**	**150**
			(OP: UT2IO)		
UT8LO	*	215,905	1014	34	111
US2IR	**7**	**717,416**	**2510**	**37**	**147**
UX3MZ	*	293,217	1592	28	101
UW2M	**1.8**	**135,420**	**769**	**26**	**96**
			(OP: UR8MC)		

YUGOSLAVIA

YZ8Z	**A**	**2,771,194**	**3147**	**142**	**444**
			(OP: YU1ZZ)		
YT7TY	*	1,132,525	1282	114	396
4N1FG	*	622,748	1195	71	251
YT5A	**14**	**628,140**	**1942**	**36**	**138**
			(OP: YU1EA)		
YZ7A	**1.8**	**87,808**	**978**	**20**	**78**
			(OP: YU7CM)		

OCEANIA

AUSTRALIA

VK4XY	**A**	**58,293**	**205**	**63**	**90**
VK3KE	*	40,392	181	45	87
			(OP: N1MM)		
VK6DU	*	21,730	134	45	61

CHRISTMAS ISLAND

VK9AA	**A**	**6,878,488**	**3900**	**165**	**461**
			(OP: VK2IA)		

GUAM

KG6DX	**A**	**2,031,594**	**1737**	**139**	**287**

HAWAII

KH6/VE7AHA	**A**	**1,448,655**	**1969**	**118**	**167**

NEW ZEALAND

ZL3TE	**21**	**330,156**	**1134**	**31**	**77**
			(OP: W3SE)		
ZL4BR	**7**	**390,540**	**1037**	**32**	**106**

SOUTH AMERICA

ARGENTINA

LU4DX	**21**	**1,181,579**	**2323**	**38**	**141**
			(OP: LU5DX)		

BRAZIL

PR2J	**A**	**927,840**	**1388**	**71**	**169**
			(OP: PY2EX)		
PY1NB	*	40,590	154	46	77
PY2XC	**28**	**1,440**	**42**	**14**	**18**

FERNANDO DE NORONHA

PY0FF	**A**	**68,228**	**203**	**58**	**90**

FRENCH GUIANA

FY/F5IRO	**A**	**607,170**	**1141**	**67**	**155**

NETHERLANDS ANTILLES

PJ4M	**A**	**3,528,330**	**2521**	**123**	**375**
			(OP: K2QM)		

VENEZUELA

YV5NWG	A	864	16	12	15

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

KT1V	**9,067,590**	**4199**	**162**	**615**
K1IR	**6,441,380**	**3256**	**148**	**589**
K1KI	6,326,124	3108	156	606
W1MX	377,640	430	82	278
W2FU	**5,969,292**	**3172**	**154**	**562**
K2QMF	**3,672,942**	**2177**	**129**	**508**
N2LBR	966,616	847	96	325
N2BZP	17,360	153	48	107
K3OO	**5,046,977**	**2754**	**147**	**550**
N3MX	1,034,103	875	101	382
K4JLD/3	805,504	729	106	342
W3LJ	46,332	138	42	90
K8AC/4	**1,038,060**	**854**	**111**	**363**
N4ES	456,972	601	82	255
W6OAT	4,403	48	15	22
N7BV	**765,702**	**924**	**109**	**245**
K7UM	675,995	827	108	275
K8AZ	**5,458,329**	**2855**	**160**	**587**
W8AV	**3,778,635**	**2167**	**148**	**531**
NE8P	1,076,076	941	96	330
WN9O	**2,224,556**	**1539**	**124**	**432**
KØRF	**4,045,342**	**2427**	**156**	**530**

ANGUILLA

VP2E	**5,975,856**	**3624**	**150**	**546**

CANADA

VE3NE	**2,758,340**	**2515**	**117**	**398**
VE7SV	**2,754,752**	**2601**	**133**	**340**
VE6AO	576,576	1180	72	180

JAMAICA

6Y7A	**4,900,392**	**5212**	**103**	**338**

AFRICA

ALGERIA

7XØRY	**7,896,700**	**5084**	**128**	**452**

CANARY ISLANDS

EA8ZS	**11,950,225**	**5484**	**167**	**638**

TUNISIA

3V5A	**14,026,738**	**7137**	**163**	**564**

ASIA

ASIATIC RUSSIA

RZ9SWR	**3,070,010**	**2289**	**118**	**405**
RK9CZO	**2,590,080**	**2151**	**109**	**347**
RK9AWN	2,465,060	2002	107	392
RK9CXM	617,506	824	60	223
RZ9UWZ	432,051	811	52	185
RK9CWW	419,504	506	79	235
RY9C	299,484	558	51	185
RK9XXX	279,838	529	52	177
RK9AXX	114,696	432	23	85
UA9AWW	**1,945,441**	**1964**	**99**	**322**

AZERBAIJAN

4K7Z	**3,204,757**	**2483**	**109**	**382**

BHUTAN

A52CDX	**506,961**	**972**	**72**	**281**

CHINA

B7P	**994,700**	**1837**	**107**	**236**
BY4VAM	220,748	1015	65	108

INDIA

VU2UR	63,984	161	67	119

ISRAEL

4XØG	**3,672,585**	**3429**	**102**	**343**

JAPAN

JA8RWU	**3,545,612**	**2479**	**159**	**397**
JA7YAA	**2,619,750**	**1970**	**158**	**367**
JM1LPN	**1,805,694**	**1610**	**155**	**347**
JA2ZJW	**1,350,216**	**1456**	**126**	**252**
JA1ZLO	30,987	156	39	60

KAZAKHSTAN

UP1G	**2,801,250**	**2506**	**102**	**348**

MONGOLIA

JU1DX	**393,000**	**1182**	**81**	**169**

NEPAL

9N7JO	**1,782,810**	**2479**	**107**	**298**

SRI LANKA

4S7RS	2,915	41	20	33

EUROPE

AUSTRIA

OE5ØCWL	**345,720**	**1010**	**49**	**152**

BELGIUM

OT5L	**5,146,416**	**3874**	**157**	**565**
OT5G	**2,780,064**	**2506**	**129**	**462**
OT5P	1,168,425	2097	95	310

BULGARIA

LZ1ABC	**1,620,490**	**2251**	**106**	**361**

CZECH REPUBLIC

OK5W	**7,278,271**	**4326**	**180**	**667**
OL7R	**5,313,462**	**3914**	**163**	**579**
OL3Z	2,478,894	2648	120	409
OL2A	932,057	1485	89	240
OL2U	726,616	1620	75	284
OK1KDO	124,456	498	40	148

ENGLAND

G6PZ	**7,406,250**	**5098**	**160**	**590**
G5W	**6,629,755**	**4848**	**160**	**585**
G8D	2,093,592	2442	105	393
MØOKT	19,332	194	24	84

EUROPEAN RUSSIA

RL3A	**5,918,416**	**4375**	**167**	**617**
RZ6AZZ	**4,865,763**	**3690**	**172**	**617**
RO4M	**3,814,404**	**3291**	**161**	**565**
R3R	3,782,450	3637	150	557
RF3A	3,308,578	3485	147	542
UA3R	2,883,586	3592	132	467
RZ4CWW	1,945,908	2436	119	447
RW3WWW	1,483,086	2290	118	388
RK4WWA	1,299,804	2328	99	359
RK3QWW	896,815	1550	95	320
RK3UWA	845,397	1387	102	339
RK3RWA	432,948	1010	74	257
RK3DXZ	263,088	969	60	172
RK3SWB	27,328	157	34	88

FINLAND

OH6AH	**916,938**	**1396**	**88**	**333**
OH1TV	349,888	540	80	272

FRANCE

TM2Y	**6,978,108**	**4559**	**167**	**619**
F6KHM	**4,570,624**	**3532**	**126**	**506**
TM4Q	**3,342,176**	**3372**	**134**	**474**
TM2T	3,131,762	3403	133	421
TM5VT	368,668	1302	56	156
F8KGH	285,782	915	61	213
F6KNB	276,395	1064	36	113

GERMANY

DP4T	**6,327,080**	**4266**	**155**	**579**
DF3CB	**4,978,110**	**3288**	**152**	**579**
DR4A	**3,061,696**	**2483**	**152**	**552**
DK5QN	2,999,355	2652	134	481
DAØI	2,207,290	2458	113	402
DD4B	1,287,264	1838	92	332
DL4WA	1,049,898	1383	105	361
DKØMN	1,004,807	1506	85	312
DLØDYW	715,552	1184	89	290
DRØR	27,600	154	45	93
DQ7Q	19,716	134	30	76

GREECE

SZ1A	**2,516,240**	**3148**	**119**	**449**

HUNGARY

HA8ØIARU	**5,820,152**	**4335**	**161**	**603**
HG8N	965,376	2043	85	299
HA6KZS	164,633	575	52	151

IRELAND

EI7M	**7,874,332**	**6230**	**152**	**579**

ITALY

IR4M	**5,850,064**	**4003**	**169**	**604**
IU2R	**4,233,081**	**3314**	**154**	**559**
IK3OBX	825,737	1994	73	198
IO4T	354,816	1046	47	145
IZØGKB	271,950	660	74	220

LITHUANIA

LY3VM	**610,092**	**1508**	**72**	**252**

LUXEMBOURG

LX7I	**6,481,170**	**4733**	**153**	**560**

NETHERLANDS

PI4ZOD	15,540	203	29	82

NORWAY

LN8W	**5,576,494**	**4508**	**158**	**581**

POLAND

SN2K	**3,057,300**	**2747**	**142**	**583**
SP4YFJ	1,057,356	1530	93	321
SP5KEH	950,992	1713	94	298
SP9ZHR	383,382	727	83	259
SP9KRT	355,950	819	67	248
SP3KCL	282,282	576	75	211
SP9KJT	145,992	506	54	183
SP1YGL	15,582	107	29	77

ROMANIA

YR7M	**5,246,190**	**4293**	**150**	**560**

SCOTLAND

GMØB	**1,023,834**	**1842**	**83**	**316**

SLOVAK REPUBLIC

OM7M	**8,176,644**	**4705**	**177**	**675**
OM8A	**7,850,888**	**4644**	**177**	**667**
OM5M	**6,246,782**	**3851**	**165**	**652**
OM4A	1,689,030	2215	117	373
OM3KWZ	870,750	1439	89	298
OM3RRC	661,010	1258	82	273

SPAIN

ED2JJ	**1,103,424**	**2530**	**75**	**261**
EA7RCT	538,230	978	82	248

SWEDEN

SK2T	**1,249,955**	**1772**	**102**	**395**
SK6QW	**822,244**	**1470**	**72**	**277**

UKRAINE

UT7L	**2,627,205**	**2536**	**145**	**510**
UTØAZA	**1,268,764**	**2297**	**105**	**347**
US7HZZ	603,018	1377	79	272
UT4IYZ	595,650	1238	85	276
UZ4E	292,365	746	71	196
UY4WWA	168,554	631	34	108
UT5IZD	13,345	140	23	62
UR4PWC	400	17	4	12

YUGOSLAVIA

YU1ANT	100,128	558	47	121

OCEANIA

BELAU

T88AA	**4,200,408**	**3485**	**143**	**311**

GUAM

AH2R	**5,401,636**	**3658**	**151**	**397**

INDONESIA

YE1ZAT	**617,400**	**1028**	**91**	**189**
YEØX	41,301	150	42	75

NEW ZEALAND

ZM1A	**3,608,488**	**3047**	**128**	**314**

SOUTH AMERICA

ARGENTINA

LR2F	**8,377,160**	**4976**	**155**	**477**
LVØN	1,515,503	1994	91	220
LUØXW	432,400	991	55	145

ARUBA

P4ØL	**16,270,104**	**7467**	**165**	**608**

BRAZIL

ZY7C	**5,149,950**	**3524**	**134**	**436**

COLOMBIA

5J1W	**11,675,367**	**6573**	**147**	**480**

PERU

OC4O	**857,147**	**1643**	**67**	**130**

SOUTH SHETLAND ISLANDS

R1ANF	**2,613,424**	**2792**	**96**	**245**

MULTI-OPERATOR TWO TRANSMITTER NORTH AMERICA

UNITED STATES

K1AR	**8,164,728**	**4184**	**151**	**581**
KØTV/1	**5,469,075**	**3022**	**137**	**532**
W1SRG	365,792	492	67	217
NE3F	**2,141,394**	**1961**	**111**	**408**
K3DI	1,652,313	1217	112	395
WT3Q	1,155,924	931	129	465
WX3B	805,324	700	105	337
NY4A	**8,012,145**	**4507**	**148**	**543**
N4WW	**5,248,440**	**2976**	**155**	**577**
W5KFT	**2,175,690**	**1612**	**131**	**439**
W6YX	**1,146,080**	**1138**	**117**	**299**
W8ZA	**2,594,480**	**1809**	**124**	**441**
W9SN	**1,322,500**	**1440**	**107**	**353**
NØNI	**3,990,462**	**2394**	**156**	**530**
KTØR	1,464,703	1172	117	376

ALASKA

KL7DX	**469,368**	**1408**	**63**	**96**

CANADA

VE1JF	**6,228,117**	**4107**	**138**	**513**
VE3RM	**5,798,835**	**3903**	**129**	**486**
VE7GL	**2,781,252**	**3168**	**121**	**293**

TURKS & CAICOS ISLANDS

VP5W	**13,454,000**	**8176**	**153**	**547**

U.S. VIRGIN ISLANDS

WP2Z	**12,969,736**	**8099**	**152**	**537**

AFRICA

AFRICAN ITALY

IH9P	**23,649,712**	**9996**	**175**	**654**

MAURITIUS

3B8/DM3PC	**6,461,037**	**4560**	**138**	**423**

ASIA

ASIATIC RUSSIA

RT9W	**8,683,094**	**4991**	**151**	**555**

CHINA

B1Z	**1,697,646**	**3417**	**118**	**284**

JAPAN

JF3GKE	**1,054,044**	**1019**	**134**	**303**

MALDIVE ISLANDS

8Q7DV	**14,520,720**	**7320**	**184**	**632**

TAIWAN

BVØJ	**866,082**	**1631**	**107**	**250**

WEST MALAYSIA

9M2CNC	**3,720,982**	**3242**	**138**	**383**

EUROPE

AUSTRIA

OE2S	**6,888,885**	**5267**	**165**	**606**

BALEARIC ISLANDS

EA6IB	**11,061,600**	**7687**	**175**	**650**

CROATIA

9A7A	**10,981,728**	**7440**	**173**	**643**

DENMARK

OZ5E	**3,585,983**	**3682**	**128**	**459**
OZØXX	1,132,394	1832	94	352
OZØKR	245,016	882	56	193

ENGLAND

G4IIY	**2,245,080**	**2687**	**110**	**420**

EUROPEAN RUSSIA

RU1A	**12,240,060**	**7508**	**194**	**712**

FINLAND

OH4A	**3,193,480**	**3494**	**128**	**452**
OH6XX	**3,032,145**	**3198**	**133**	**512**
OH2BAH	533,010	971	88	239

FRANCE

F4DRT	10	7	7	5

GERMANY

DQ4W	**7,453,266**	**5250**	**166**	**607**
DLØCS	**5,522,484**	**4199**	**164**	**618**
DR5Z	4,418,424	3736	142	512
DLØKF	1,743,056	2055	118	435
DA3A	434,700	1116	66	234

HUNGARY

HG6N	**8,015,190**	**5748**	**164**	**631**
HG7H	2,527,810	2693	122	443

ICELAND

TF4M	**2,785,000**	**3986**	**103**	**397**

ITALY

IR4X	**10,619,504**	**6473**	**178**	**670**
IQ1SM	2,879,692	3393	128	426

LITHUANIA

LY7Z	**7,545,866**	**5533**	**164**	**602**

NETHERLANDS

PI4D	**1,613,392**	**2207**	**91**	**321**

POLAND

SQ6Z	**5,372,848**	**4690**	**140**	**536**

SWEDEN

SK6M	**4,781,651**	**4741**	**157**	**520**

UKRAINE

UU7J	**9,047,168**	**7056**	**177**	**655**

WALES

GWØGEI	**1,223,355**	**1902**	**85**	**342**

SOUTH AMERICA

SURINAME

PZ5C	**9,354,924**	**5837**	**143**	**493**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

KC1XX	**15,825,048**	**6929**	**176**	**676**
K3LR	**13,842,250**	**6131**	**174**	**676**
W3LPL	**13,790,784**	**6137**	**175**	**693**
N3RS	**10,312,234**	**4862**	**163**	**619**
NO4I	**9,285,396**	**4922**	**167**	**637**
K1TTT	**8,232,648**	**4305**	**159**	**603**
K1RX	8,130,024	4261	154	602
K9NS	**7,884,810**	**4136**	**177**	**618**
K2LE	**7,033,190**	**3862**	**142**	**532**
K5GO	**6,457,710**	**3714**	**165**	**570**
KB1H	6,364,400	3503	145	555
W3PP	5,067,226	3096	146	515
WBAØH/9	**4,002,380**	**2599**	**156**	**527**
W1CU/6	**2,588,884**	**1741**	**146**	**420**
W2YC	2,042,580	1451	120	457

ST. PIERRE & MIQUELON

FP/K8DD	**10,272,794**	**7741**	**118**	**460**

AFRICA

MALI

TZ5A	**28,747,008**	**11888**	**176**	**688**

ASIA

JAPAN

JA3YBK	**9,423,715**	**5153**	**186**	**517**
JA5BJC	**7,354,032**	**4399**	**183**	**505**

KAZAKHSTAN

UP5G	**9,475,770**	**6294**	**158**	**532**

EUROPE

BULGARIA

LZ9W	**14,318,682**	**9599**	**178**	**684**

CROATIA

9A7T	**1,938,364**	**2097**	**137**	**462**

ESTONIA

ES1A	**2,305,328**	**2914**	**121**	**475**

EUROPEAN RUSSIA

RK6YZZ	**772,175**	**1452**	**105**	**356**

FINLAND

OH2K	**951,522**	**1499**	**100**	**329**

GERMANY

DQ8Q	**13,181,952**	**8780**	**185**	**711**
DFØCG	**11,592,276**	**7720**	**177**	**689**
DP9A	6,136,656	5823	158	581

KALININGRAD

RW2F	**11,968,032**	**8092**	**176**	**680**

LITHUANIA

LY7A	**6,875,818**	**6012**	**155**	**603**

MACEDONIA

Z37M	**5,385,100**	**5706**	**148**	**480**

MALYJ VYSOTSKIJ ISLAND

R1MVC	**7,720,906**	**8508**	**145**	**517**

POLAND

SN6F	**1,890,979**	**2565**	**128**	**419**

YUGOSLAVIA

YT6A	**9,161,880**	**7356**	**173**	**607**

OCEANIA

NEW ZEALAND

ZL6QH	**10,414,813**	**6336**	**154**	**445**

SOUTH AMERICA

GALAPAGOS ISLANDS

HC8N	**38,368,108**	**14947**	**196**	**726**

NETHERLANDS ANTILLES

PJ2T	**27,392,376**	**11854**	**178**	**658**

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- "All-Time Records, CQ World-Wide DX Contest"
- "Rock Star Price Guide," by Joel Thurtell, K8PSV
- "The BasicX-24—An Easy-to-Use Microprocessor," by Dennis Nendza, W7KMV
- "Rack-Mount Your Station," by John Ellis, NP2B

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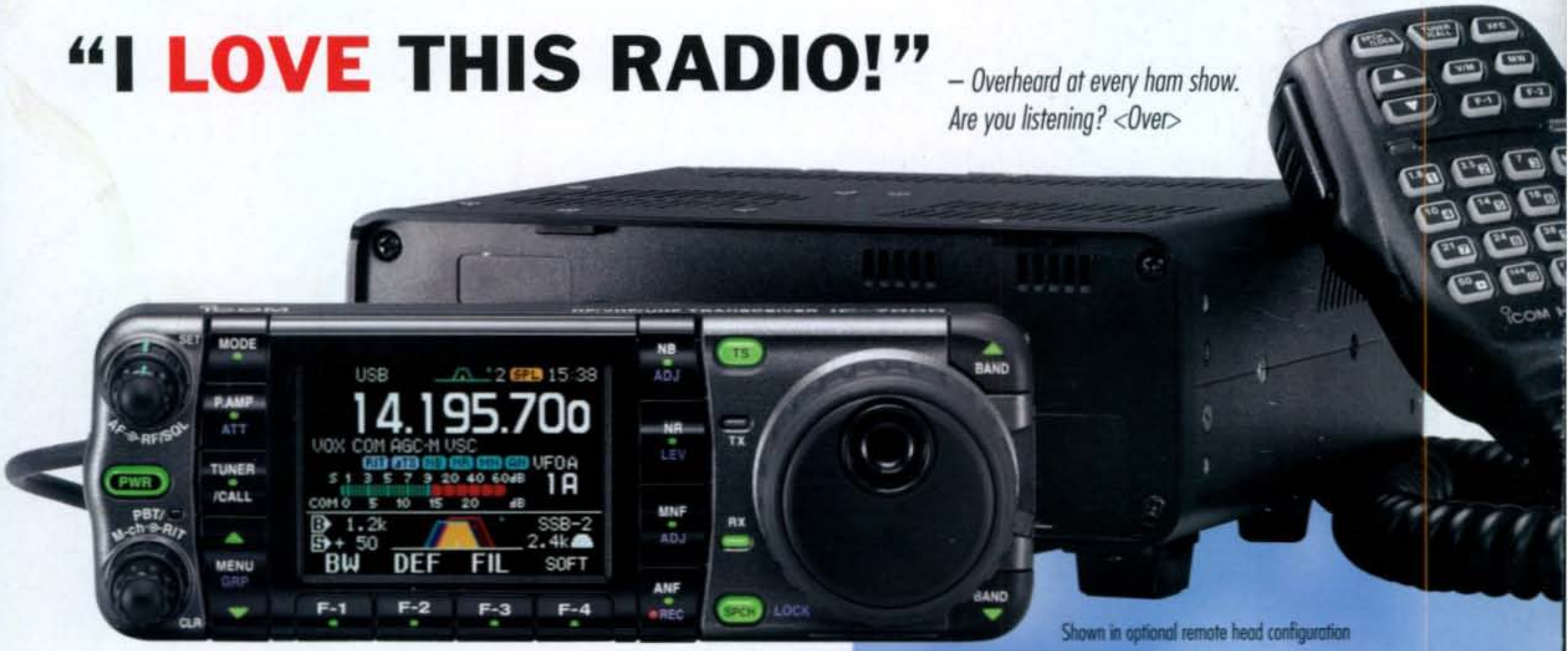

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- Water resistant
- Easy connection

AT-180

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- Mount the head where you want it!
- OPC-1443 = 11 ft; OPC-1444 = 16 ft

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