New Column! Ham Notebook

Amateur Radio

COMMUNICATIONS & TECHNOLOGY

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CQ

MARCH 2010

1945 Our 65th Anniversary 2010

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- CW Results, 2009 CQ WPX Contest, p. 20
- CQ Reviews: Jetstream JT-220M FM Mobile Transceiver, p. 34

On the Cover: Jon Hamlet, W4ZW, of Nokomis, Florida, works on his antenna overlooking the Gulf of Mexico. Details on page 48.

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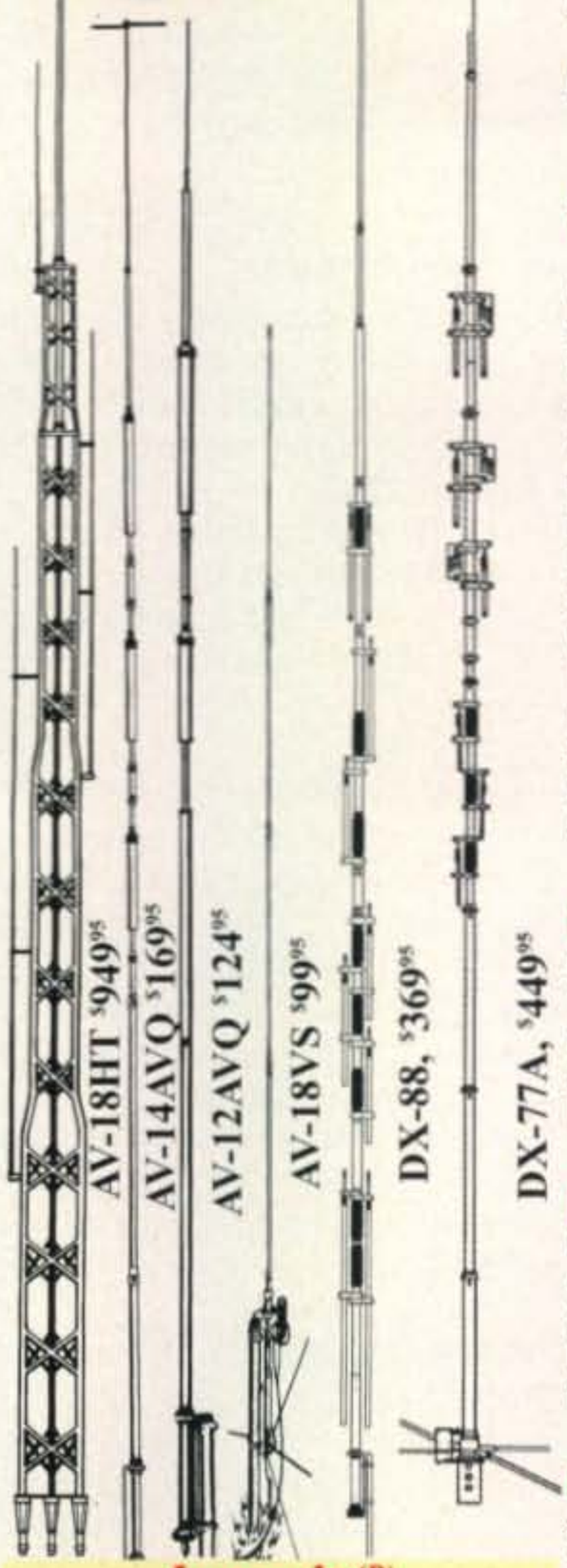

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AV-18HT, $949.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

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AV-14AVQ, $169.95. (10,15,20,40 Meters). 18 ft., 9 lbs. **The** Hy-Gain AV-14AVQ uses the same trap design as the famous Hy-Gain Thunderbird beams. Three separate air dielectric Hy-Q traps with oversize coils give superb stability and 1/4 wave resonance on all bands. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

AV-12AVQ, $124.95. (10, 15, 20 Meters). 13 ft., 9 lbs. **AV-12AVQ** also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $89.95.

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

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

All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $199.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

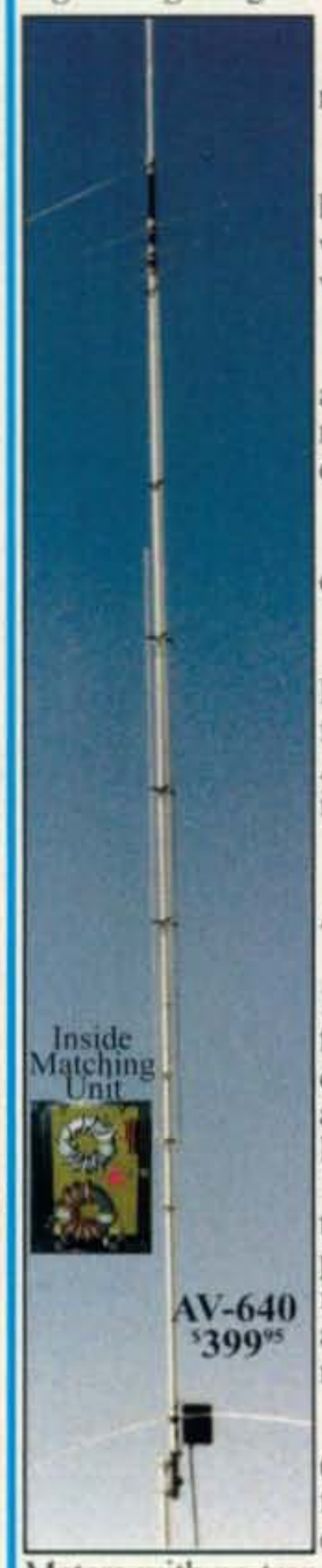
DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$124.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$99.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph w guys	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph w guys**	**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.

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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*(R) insulated wire. Aircraft quality aluminum tubing, stainless steel hardware.

hy-gain(R) 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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ham radio news

Earthquake in Haiti

Ham radio was able to play only a limited role in getting communications into and out of Haiti in the immediate aftermath of the massive earthquake there in January. This was due primarily to the small number of resident amateurs. Ham activity by relief organizations appeared to be picking up at press time. KI6SN has early information in his Public Service column this month (see page 50), and will follow up in future issues as developments warrant.

ARRL Elects First Female President

The ARRL Board of Directors in January elected First Vice President Kay Craigie, N3KN, as the organization's new President, succeeding Joel Harrison, W5ZN, who did not seek re-election. Craigie is the first woman to hold the League's top position. According to the *ARRL Letter*, Rick Roderick, K5UR, is the new First Vice President; Midwest Division Director Bruce Frahm, KØBJ, was elected an additional vice president and Dakota Division Director Jay Bellows, KØQB, is the new VP for International Affairs. Their respective vice directors moved up to the directors' seats, and Craigie will appoint new vice directors. In addition, Technical Relations Manager Brennan Price, N4QX, was named ARRL Chief Technology Officer.

W7HAS in Charge of Federal Computer Security

Howard Schmidt, W7HAS, has been named White House Cybersecurity Coordinator by President Obama. According to the White House, he is one of the world's leading authorities on computer security and will be a key member of the President's national security staff. Schmidt told the ARRL that amateur radio got him started in the world of computers. A former police officer and computer security advisor to the FBI and the Department of Defense, "Newsline" reports Schmidt has also worked in the private sector at eBay and as Microsoft's first Chief Security Officer.

CQ Columnist K4TWJ Silent Key

Dave Ingram, K4TWJ, a *CQ* columnist for nearly 30 years, passed away on January 20 as a result of complications from a massive heart attack that he suffered on New Year's Eve. Dave was best known for his monthly "World of Ideas" column. He also wrote *CQ*'s "How it Works" and "QRP" (low power) columns. His family asks that any contributions in his memory be made to the American Heart Association. See this month's "Zero Bias" editorial for more about Dave.

KI6SN Named Editor of *WorldRadio Online*

Richard Fisher, KI6SN, of Riverside, California, has been named Editor of *WorldRadio Online* magazine, succeeding Nancy Kott, WZ8C, who resigned. A veteran journalist and writer, Fisher is already familiar to many readers of CQ publications. He is *CQ*'s Public Service Editor and writes the "Trail Friendly Radio" column in *WRO* as well as the "Washington Beat" column in *Popular Communications*. He plans to continue writing those columns in addition to his editing duties. Fisher takes up the reins at *WRO* as of the magazine's April issue.

Genachowski Looking to "Reboot" the FCC

FCC Chairman Julius Genachowski is asking for input on ways to improve the functioning of the government's main communications regulatory agency. According to "Newsline," Genachowski has set up a website called "Reboot.fcc.gov" and is seeking suggestions from the public on how the FCC can better serve the American people.

CQ Expands Web Presence

CQ's presence on the World Wide Web is growing. In addition to the long-standing websites for each of our magazines, we now have Facebook pages for *CQ*, *CQ VHF*, and *Popular Communications* (tnx to NW7US, who is posting regular propagation updates), to be followed soon by one for *WorldRadio Online* as well. In addition, the CQ WPX Contest website at <www.cqwpx.com> now has all line scores going back to 1991 (for CW) and 1985 (for SSB), with additional years to follow, as well as contest rules in 14 languages. Finally, *CQ* Public Service Editor Richard Fisher, KI6SN, has set up a website for material that would not fit in his monthly print column. "CQ Public Service on the Web" may be found at <www.CQPublicService.blogspot.com>.

Hamvention® Sticking With Hara

The Dayton Amateur Radio Association says the annual Dayton Hamvention® will remain at Hara Arena for at least the next three years. Organizers of the world's largest hamfest have reached an agreement to keep the event in place at least through 2013.

Nominations are open for Dayton's annual awards—the Amateur of the Year, Special Achievement, and Technical Excellence awards—and are due in by March 15th. For information, see the DARA website at <www.hamvention.org>.

N. Korea Remains at Top of Most-Wanted List

The DX Magazine's annual Most Wanted countries list is out, with North Korea (P5) remaining at the top for yet another year. Major DXpeditions to Desecheo Island (K5D) and Willis Island (VK9/W) knocked both of those entities from near the top of the list clear out of the top 100 DXCC entities needed by the world's DXers. Rounding out the top five worldwide for 2009 are Navassa Island (KP1), Marion Island (ZS8), Bouvet (3Y/B), and Yemen (YO). For additional listings and regional breakdowns, see the January/February 2010 issue of *The DX Magazine*.

MARS Gets a New Name and a New Mission

The Military Affiliate Radio System has been renamed the Military *Auxiliary* Radio System by the Department of Defense and given a new primary role in providing backup communications to the military and to civil authorities at all levels of government. The new "instruction," the first major revision of the MARS mission in over 20 years, also lays to rest fears that Navy-Marine Corps MARS might be eliminated. See this month's "Public Service" column for additional details.

Ham Ranks Keep Growing

The ARRL/VEC reports that more than 30,000 new people entered the Amateur Radio Service in 2009, nearly double the number of new hams who joined the fraternity five years earlier. The numbers have been climbing steadily since 2005, when only 16,000 newcomers joined our ranks, hitting 21,000 in 2006, nearly 27,000 in 2007, and 28,000 in 2008. Overall, more than 122,000 new people have become hams in the past five years ... not bad for a hobby that some of us continue to insist is dying!

(Continued on p. 10)

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.

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HC-1.5KAT

HF 1.5kW Auto Tuner

HL-2.5KFX *Auto Band Set and QSK*

Solid-state HF 1.5kW Linear Amplifier

Photo : From 1eft HC-1.5KAT (HF 1.5kW Tuner with Auto Band Set Feature), HL-2.5KFX (HF 1.5kW MOSFET Linear) and IC-7700 Transceiver

For DXpeditioners

HL-1.1KFX

HF 600W Linear

HL-1.2KFX

HF 750W Linear

HL-1.5KFX

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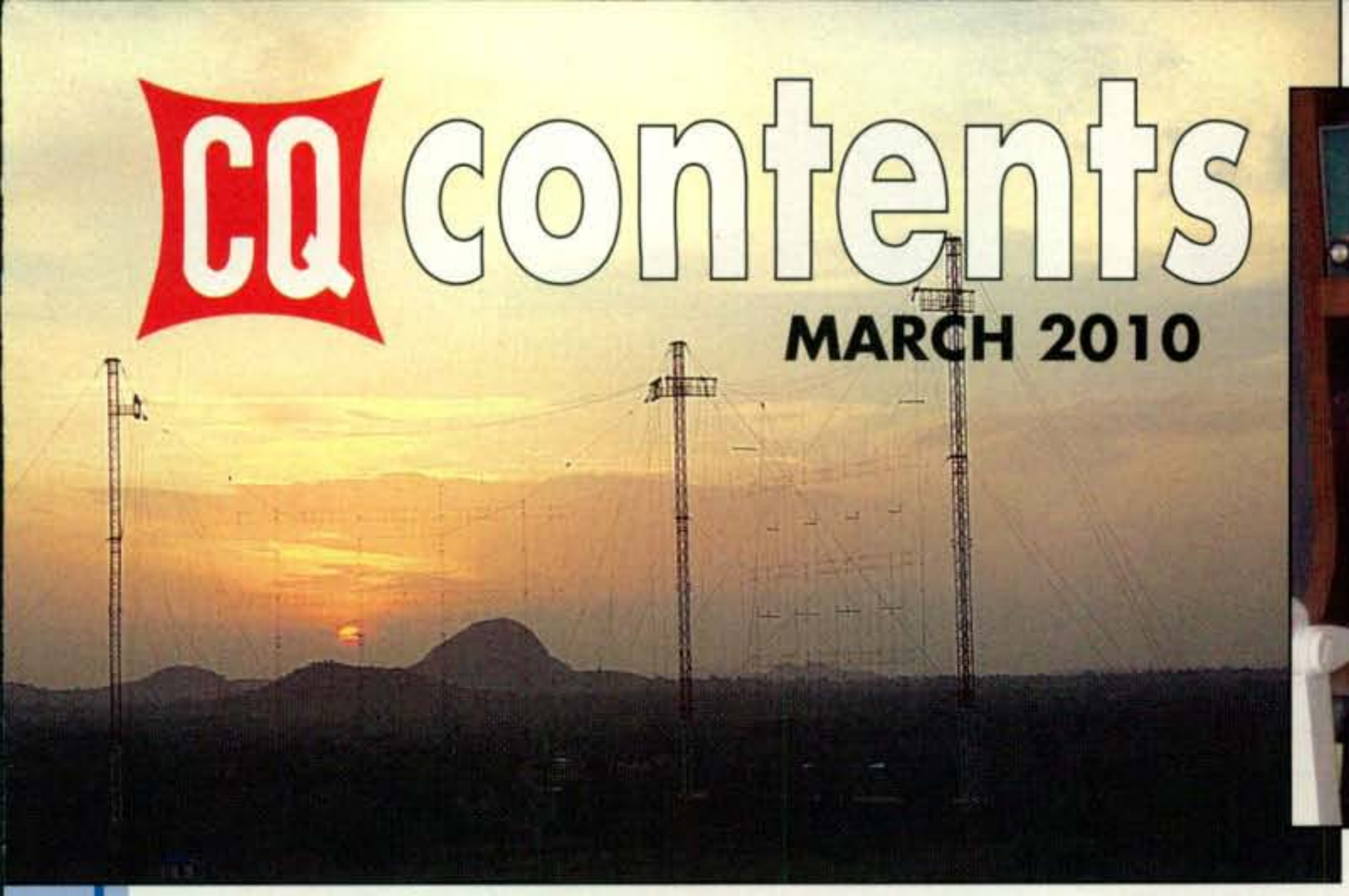

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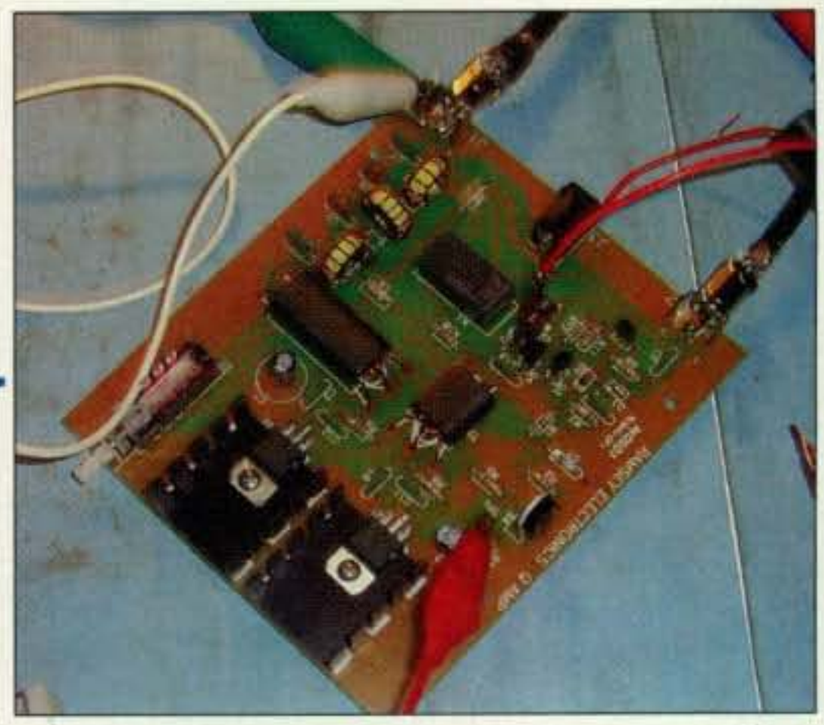

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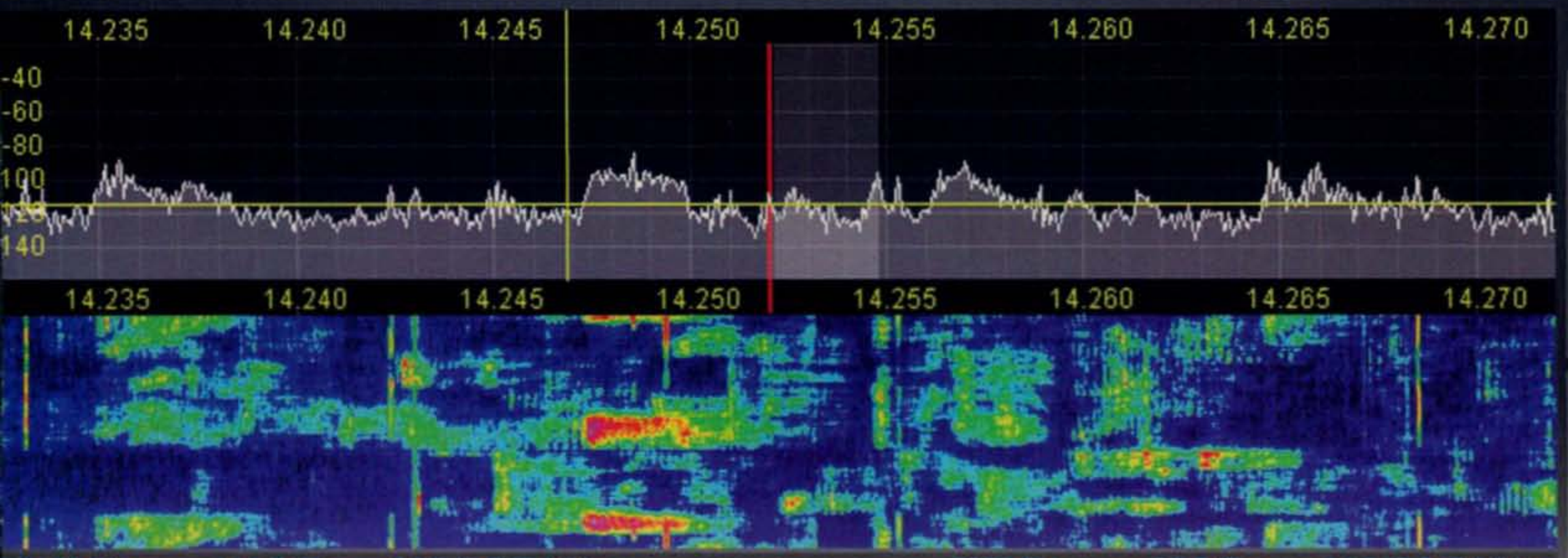

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• Shown with the optional FGPS-2 GPS Antenna and the optional CT-136 Adapter.

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- Full 5 watts FM 50/144/430 MHz – plus 1.5 watts on 222 MHz. 50 MHz AM included.
- Bluetooth® hands-free operation with the optional BU-1 and BH-1A or BH-2A.
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- Barometric sensor included.
- Operate Amateur radio while receiving AM/FM broadcasting.
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NEW — Huge memory channel management capability! 500 Independent Memory channels + 9 Programmable Band Limit Memory Scan channels + 1 Rewritable Preferred channel for each L and R Band

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Exclusive — Dual Band AF Monitor for listening to FM/AM broadcast and monitoring ham bands as well

Exclusive — Built-in Barometric Pressure Sensor

Screen Example

Dual Band (Spectrum Scope function)

Navigation (with GPS antenna unit attached)

Mono Band (Spectrum Scope function)

APRS®

Barometer

Timer

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* SmartBeaconing™ from HamHUD Nichetronix

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zero bias — a CQ editorial

BY RICH MOSESON,* W2VU

K4TWJ, W2FMI . . . and a Message for the Rest of Us

I am writing this on January 20th, a little more than a week after the earthquake in Haiti and the day that our good friend and longtime colleague, Dave Ingram, K4TWJ, became a Silent Key. Dave has been a fixture on the pages of *CQ* for nearly 30 years. His byline first appeared on an antenna review back in 1981. The following year, he began writing an amateur television column called "The World of Video." Over the years, Dave broadened the column's focus and it transformed into "The World of Ideas," his signature monthly column. For the past decade, Dave has also been our QRP Editor and anchored the bi-monthly "How it Works" column. (This month's columns were off to the printer before Dave's passing.)

Dave suffered a massive heart attack on New Year's Eve, but appeared to be recovering steadily if slowly. At one point, he was even able to enjoy some of the many cards that well-wishers had sent him at the hospital. But it seems that the damage to his heart was just too great, and Dave slipped away in the early morning hours today, with Sandy, WB4OEE, his wife of 47 years, by his side.

Anyone who ever met Dave came away amazed at the amount of energy and enthusiasm that he seemed to just radiate, especially for anything that had to do with ham radio. The law of conservation of energy says that energy may neither be created nor destroyed, so that means that in Dave's absence, there is now a tremendous amount of ham-radio-focused energy floating around, waiting for others of us to harness it and put it to use to promote all of the wonderful things about our hobby. Dave's favorites, of course, were QRP, CW, code keys, and projects—especially tube-based projects. And he had enough energy and enthusiasm for 100 "normal" hams, so feel free to make some of that energy your own, and use it to show your fellow hams and others just what it is that makes your favorite part of ham radio so special. No need to worry about that energy supply running out … and it will be a fitting tribute to Dave as well.

"From Phys. Ed. to Physics"

Dave is the fourth ham radio friend I've lost in the last few months. Two were personal (non-*CQ*) friends, but the other is someone whose name and callsign graced these pages many times: Jerry Sevick, W2FMI. Jerry was "the man" when it came to transmission line transformers, also known as baluns and ununs, and he wrote several books on the topic for us and other publishers. His *Understanding, Building and Using Baluns and Ununs* and *The Short Vertical Antenna* continue to be among our most popular titles. Those books got their start as a series of articles on the topic that ran here in *CQ* in the 1980s. Jerry was 90 when he became a Silent Key last fall, but had remained active on the air nearly to the end. He was a regular check-in on his local club's weekly 2-meter net until about two weeks before his passing.

Jerry's story illustrates the power of ham radio to change lives. He grew up in a working-class family in Detroit, where he excelled in athletics (he turned down an offer to play for the Detroit Lions football team) and planned to become a Phys. Ed. teacher and high school coach. But after joining the Army Air Corps during World War II, the fact that he had a ham license got him sent off to study a newfangled device called radar at a little college in Massachusetts called Harvard. After the war, Jerry realized it was possible for a working-class kid from Detroit to have a career in science and technology. He returned to his alma mater, Wayne State University in Michigan, to get a Master's degree in physics, followed by a Ph.D. from Harvard, all paid for by the G. I. Bill.

He taught briefly at Wayne State, did a stint as a TV weatherman in the mid-1950s, and then was hired by Bell Laboratories to work on transistors and semiconductor reliability. In his spare time, he worked on antennas, transmission lines, and transmission-line transformers, taking advantage of the test equipment available at work to make measurements.

"Although this work was outside of my responsibility," he wrote in a memoir titled *From Phys. Ed. to Physics*, "Bell Labs was glad to measure my transformers because they thought of it as good science." Jerry retired from Bell Labs in 1984 as Director of Technical Relations, after which he began writing and publishing his books for hams. Jerry's depth of knowledge in his very specialized area of expertise will be missed as much as Dave's broader enthusiasm for all things relating to ham radio.

Devastation in Haiti

Just over a week ago, a massive earthquake shook Haiti and its capital city, Port-au-Prince. Early indications are that over 100,000 lives may have been lost. As soon as the news of the quake became known, hams all over the U.S. and around the Caribbean went into "disaster mode," monitoring the bands for any possible word from the affected area. Some ham radio activity was reported (see box in this month's Public Service column), but Haiti has very few hams to begin with, so there has not been much. We will be following the story and if there is more to report in the coming weeks, KI6SN will cover it in his April column.

A Matter of Perspective

Reflecting on these losses, both personal and communal (be it the ham radio community or the world community), and on the fragility of life, should make us pause to take a look at our own priorities and try to put things in their proper perspective.

The bottom line is that life is short and unpredictable. It can change dramatically in a matter of seconds. Are we making the best use of whatever time we are given? Since this is a hobby magazine, it is appropriate to ponder whether we are using our leisure time to fully enjoy our hobbies or wasting much of that time quibbling with each other over matters that, in the long run, are of little importance? Are we trying to make sure that we *have* some leisure time and family time blocked into our always-busy schedules? An unknown writer once remarked that "No man on his deathbed ever looked up into the eyes of his family and friends and said, 'I wish I'd spent more time at the office.'"

Let us honor the memories of people like Dave and Jerry* by enjoying our hobby to the maximum, and by making it a source of lifetime learning and accomplishment, and most of all, fun. Dave and Jerry, may peace be with you and may your memories be a blessing to all who knew you. We will greatly miss you both. *73, W2VU*

**Dave's family requests that donations in his memory be made to the American Heart Association. Jerry's family has asked that those wishing to make contributions in his memory direct them to their local YMCA, another of Jerry's longtime loves.*

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

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HAM-IV
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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
$799.95

T-2XD
$1229.95
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
$449.95

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
$1099.95
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, $109.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $49.95. 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
$349.95

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
$1499.95

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

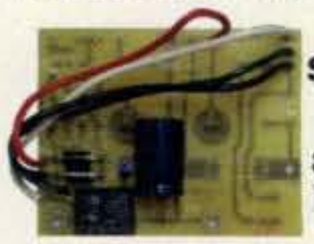
DCU-1
$749.95

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

AR-35 Rotator/Controller

AR-35
$89.95

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



RBD-5
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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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announcements

• The following special event station is scheduled for early April:

N4C, from the 38th Annual Raleich (NC) Hamfest & ARRL State Convention, Raleigh ARS; 8 AM to 3:30 PM EST April 3 on SSB approximately 7.235 or 14.235 MHz. QSL information at <www.rars.org/hamfest>.

• The following hamfests, etc., are slated for March and early April:

March 13–14, **2010 Charlotte Hamfest**, Cabarrus Arena & Events Center, Concord, North Carolina. For details go to: <http://www.W4BFB.org/hamfest>. (Talk-in 146.665 [–600 kHz], 146.94 [–600]; exams 12:30 Saturday)

March 20, **Charleston, WV Hamfest**, Coonskin Armory, Charleston, West Virginia. Contact Jim Damron, N8TMW, e-mail: <n8tmw@arrl.net>; phone 304-965-5349; <www.w8gk.org>. (Exams 12:30)

March 20, **Middle Tennessee ARS Hamfest**, First Methodist Church Center, Tullahoma, Tennessee. For general information contact via e-mail: <KR4OJ@bellsouth.net> or <KE4KMG @edge.net>. Tables contact KB4JD at <hlpratt@bellsouth. net>. <http://www.qsl.net/mtars>. (Talk-in 146.10 / 70 repeater)

March 21, **Contoocook Valley Radio Club Hamfest**, Henniker Community School, Henniker, New Hampshire. Contact Donn, N1ZIH, phone 603-717-2086, or go to: <www.k1bke>. (Talk-in 146.895 [–600 Hz offset 100.0 Hz PL]; exams)

March 27, **Columbus (IN) ARC Hamfest**, Bartholomew County 4H Fairgrounds, SW of Columbus, Indiana. Contact Marion Winterberg, WD9HTN, phone 812-342-4670, e-mail: <Carc_in@bcremc.net>. (Talk-in 146.790/146.190 PL 100.0; exams 11 AM contact Dave Wendt, KA9OOH, phone 317-881-6531, e-mail: <veteam@midstatehams.org>)

April 3, **Raleigh ARS 38th Hamfest, ARRL NC State Convention, & Electronic Fleamarket**, Expo Center Building, North Carolina State Fairgrounds, Raleigh, North Carolina. Contact Steve Farrarini, KJ4BX, e-mail: <steve.kj4bx@gmail.com>, phone 919-247-8690; <wwww.rars.org/hamfest>. (Talk-in 146.64; exams WA4GIR phone 919-387-9152)

April 3–5, **China International Ham Radio 2010 Expo & Festival**, INTEX, Shanghai. For details go to: <http://www.chinahamexpo.com/>.

April 16–18, **61st Annual International DX Convention**, Holiday Inn Hotel & Conference Center, Visalia, California. Early registration suggested. For details go to: <http://www.dxconvention.org/>.

ham radio news

Ham Radio News *(from page 2)*

New Tech Class Question Pool Released

The National Conference of Volunteer Examiner Coordinators (NCVEC) has released the new pool of questions from which Technician Class license exams will be assembled for the next four years. The new pool contains roughly 400 questions, of which 35 will be selected for each Tech exam. For the first time since volunteer examining began in the 1980s, the Element 2 exam will contain questions based on graphics and diagrams. These questions will be used between July 1, 2010 and June 30, 2014.

Handiham System Moves to New Home

The headquarters of the Courage Handiham System has moved from the main Courage Center complex in Golden Valley, Minnesota, a Minneaplois suburb, to Camp Courage in rural Maple Lake, about 45 miles away. The move appears to be part of an overall move by Courage Center, in the wake of the nationwide downturn in philanthropic giving, to concentrate more of its resources on its core rehabilitation services. For more information, go to <www.handiham.org>.

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6 antennas to one feedline. Need a simple remote antenna switch to go out on the tower or be placed into a matrix of your antenna system? This may be the answer you're looking for. High power, using the proven, reliable relays that we have been using for years. Very ruggedly built.

SixPak 6X2 RF Matrix Antenna Switch

The SixPak is designed to switch 6 antennas to radios. It can be mounted inside the shack or outside up on the tower. Electro-mechanical fail-safe interlocking ensures that neither radio can feed power into the other.

TenPak Shack-LAN 2x10 Matrix Antenna Switch

The Shack-LAN 2-10 Antenna Switch is a self-contained unit capable of handling 1500W and routing up to 10 antennas to 2 radios. Arrangement of the switching system mechanically prohibits both radios from accessing the same antenna.

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IC-718 HF Transceiver

• 160-10M* @ 100W • 12V operation • Simple to use • CW Keyer Built-in • One touch band switching • Direct frequency input • VOX Built-in • Band stacking register • IF shift • 101 memories

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IC-2820H Dual Band FM Transceiver

• D-STAR & GPS upgradeable 2M/70CM • 50/15/5W RF output levels • RX: 118-173.995, 375-549.995, 810-999.99 MHz** • Analog/digital voice with GPS (optional UT-123) • 500 alphanumeric memories

IC-7800 All Mode Transceiver

• 160-6M @ 200W • Four 32 bit IF-DSPs+ 24 bit AD/DA converters • Two completely independent receivers • +40dBm 3rd order intercept point

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• 100W HF/6m Transceiver, gen cov. receiver • Dual DSP 32 bit • Three roofing filters- 3, 6, 15khz • 5.8 in WQVGA TFT display • Hi-res real time spectrum scope

IC-7700 Transceiver. The Contester's Rig

• HF + 6m operation • +40dBm ultra high intercept point • IF DSP, user defined filters • 200W output power full duty cycle • Digital voice recorder

IC-2200H 2M Mobile Transceiver

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When opportunity knocked, N3AIU answered, even though it meant moving across the ocean. After he returned home, Nick looked back at the ham radio side of his transatlantic adventure.

Ein Funkamateur in Deutschland (A Radio Amateur in Germany)

BY NICHOLAS M. ELIAS II,* N3AIU

I've spent all of my professional life as an astronomer or a systems engineer working in astronomy. Shortly after I landed my first job, a scientist from Germany joined our group. As colleagues, we did research and published papers together. After three years, he left for other employment in the U.S. and Europe. Nine years after that, I changed jobs as well.

Two years ago, I bumped into my friend at a conference. He had just become the director of an observatory in Heidelberg, Germany. We exchanged the usual pleasantries and talked for a while. I mentioned that I was very happy with my present position, but I was looking for a change. He answered that he was looking for someone to lead the data-reduction software[1] team for an interferometric instrument[2] designed to search for planets orbiting other stars. Such a nice coincidence! A few days after a telephone interview with the management, I was offered the job.

**c/o National Radio Astronomy Observatory, Array Operations Center, P.O. Box O (that's the letter O, not a zero), 1003 Lopezville Road, Socorro, NM 87801-0387*
e-mail: <n3aiu@arrl.net>

I had experience writing data-reduction software, and I had been involved with other interferometer and planet-detection projects. The prospect of using this instrument for my own research appealed to me as well. Taking the job, however, meant putting my life in the U.S. on hold for a few years. Plus, the only words of German that I knew were *ja*, *nein*, and *Gesundheit*. Also, what about my passion, amateur radio?

I was very excited, but at the same time I agonized over whether to accept. Should I take advantage of an excellent opportunity overseas, or should I wait several years for a similar opportunity to appear in the U.S.? Sometimes posing the correct question leads to the obvious answer: Go to Germany.

Getting Organized

Travel is the norm for many astronomers, but this time was different. I was actually going to live in a foreign country for two or three years. Granted, Germany is not the most exotic of locales, but a lot of questions needed to be answered quickly. Should I ship my furniture or get new furniture after I arrive? Should I ship my car, purchase a pre-owned one when I'm settled, or just use public transportation? What ham

Photo A– The view toward the west of Gauangelloch from my balcony. Note the tile roofs, the green fields, the power lines, and one of the footpaths leading to the village of Ochsenbach.

Photo B– My Amateurfunkstelle, or "amateur radio station," in Gauangelloch. The transceiver and impedance matcher are on the left, station accessories are on the right, and the power supply is on the lower shelf.

equipment should I bring or buy? How do I obtain permission to operate an amateur radio station in Germany?

I handled the non-ham questions quickly. I shipped the furniture from the condo, not the vacation house. Public transportation is quite good in Germany. Unfortunately, the observatory is located on top of the *Königstuhl*, which is a hill outside of Heidelberg with no nighttime bus service (remember, I'm an astronomer). I was tempted to buy a used Mercedes for my daily commute (also for warp-speed travel on the Autobahn), but I had already bought a hybrid car the previous year. Shipping cost less than the loss incurred by selling a low-mileage car, so I did the former. The flexibility of having my own car in Germany would definitely come in handy. Besides, a hybrid car matched well with the high gasoline prices in Europe.

I could have bought a new transceiver, but I wasn't going on a DXpedition, so I decided to economize. I'd been using an ICOM IC-706MkIIG in my condo because it was a lot of radio in a compact package. I originally intended to install it in my car and eventually buy a larger radio that was more ergonomic for CW, but I never got around to it. I expected that my apartment in Germany would also be small, so the '706 was a good choice.

I toyed with the idea of building or buying a multiband vertical antenna for HF operation, but I wanted a stealth antenna that I wouldn't have to explain to the neighbors (or a policeman!) with my broken German. I'd been using hidden and not-so-hidden wire antennas throughout my ham career, so I packed several spools of wire.

It was likely that my antenna would be non-resonant, so an impedance matcher would definitely be required. I've had an MFJ-969 for many years, and that would work just fine. I have a personal laptop that I use for work, but it does double duty as a logger and digital-mode generator. I typically operate 80–90% CW, so I needed keyer paddles. My Bencher would be perfectly adequate. Fortunately, the '706 has a built-in electronic keyer. The SM-20 desk-top microphone, lightweight headphones, low-pass filter, RIGblaster-plus digital interface, and a small toolbox rounded out the equipment list. Since commercial power is 240 volts in Germany, I would have to buy a new 12-volt power supply there.

I allowed the moving company to pack my gear. After all, they're experts. I must say that they did a very good job. The individual components were padded and packed into small boxes, and then all of the small boxes were padded and packed into a single large box. I was concerned about the keyer paddles, since they are delicate. I packed them in bubble wrap inside of a Tupperware® plastic container before giving them to the movers. *Note:* Make sure to accurately describe the equipment and its monetary value on customs and insurance forms, just in case your equipment is lost or damaged in transit.

Obtaining permission to operate an amateur radio station Germany is relatively straightforward. I found most of the information I needed on the internet. For a limited time after I arrived, I could operate as DL/N3AIU/P. That's a long call to send on CW, especially in a pile-up. Since my stay would be an extended one, I would have to apply for a German license after I established my place of residence. Germany is a CEPT signatory, which means that my U.S. Extra Class license made me eligible for a German Class A license. I was ready to go.

Finding a Place

When I arrived in Germany, I was very fortunate that a colleague volunteered to drive me to the various government offices (my car did not arrive for six weeks) plus interpret for me. I can definitely appreciate the difficulties faced by foreigners who move to a new country.

She also helped me find an apartment. We checked out three places, but I was not satisfied. I wanted something small and inexpensive, but I also wanted a place where I could set up my station. Finally, we located a small flat in the village of Gauangelloch, the name of which is reminiscent more of Scotland than southwest Germany. Roughly translated, the name means "remote fishing hole." It has 2000 inhabitants, a town hall, a small bakery, two churches, two branch banks, three restaurants, and no gas station. It is located on the side of the Königstuhl opposite from Heidelberg, only nine kilometers (five miles) from the observatory. The little road to work, which carries almost no traffic, runs through a dense and picturesque forest.

The apartment was the perfect size, perched on the third and top floor of a six-unit building. It was located on a street called *Schöne Aussicht*, which means "beautiful view." As you can see in photo A, the name is very appropriate. I thought it was perfect, and said that I'd take it. As I walked out the door to leave, I looked to my left at a horrifying spectacle—high-voltage lines about 100 meters (328 feet) from the apartment, hidden in plain sight. I had visions of continuous S9 + 20 dB noise on all bands. I was about to change my mind about the apartment, but other than the towers it was the perfect place and I didn't want to impose on my colleague for any more driving. I would just have to do the best I could with station design and hope for the best.

Setting Up My Station

A few days later, I began searching for a 40A switching power supply. Some friends recommended a German company

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called *wimo* (www.wimo.de). It sells ham gear and accessories and is located about 60 km (36 miles) southwest of Heidelberg. I called and tried to speak some German, but mercifully I found that they spoke English very well. Within a few days, the company shipped a Diamond Antenna GZV4000 switcher to me.My furniture and station arrived on the day I moved into my flat. After unpacking the sundries, I began thinking about where to set up the station. I had a choice of several locations. I chose the nook between the living room and the dining area. As you can see in photo B, the console table fit perfectly. My office recliner provided real armchair copy. I even had some room on the wall to hang my licenses and reminders of home.

Before I could get on the air, I had to install an antenna. I thought about hanging a thin wire from my balcony to one of the trees in the backyard, but I decided against it. The distance was relatively short, plus I was sure that it would eventually be discovered. I pondered slinging a thin wire up and over the roof. Without thinking, I climbed up the clay tiles to the peak of the building to check the feasibility. I'm not the biggest fan of high places, but I've climbed many roofs and trees before. Then I looked down and experienced a "weak in the knees" feeling. The roof was a bit steeper than those I had climbed back in the U.S. One slip and I would have fallen 14 meters (43 feet) to my doom. Please! Make sure that you never do anything this stupid!

Not wanting to spend time devising a safe roof-climbing protocol, I settled for an indoor antenna. My apartment was small, but I could certainly string up a significant length of wire. Plus, the high-peaked roof had provided me with a sizable attic. I considered a G5RV antenna, which is center fed with a length of about 31 meters (102 feet). If I fed the antenna directly to the impedance matcher without standard the open-wire transmission line, it just might make a workable indoor antenna. I decided to give it a try. I cut the wire to the required lengths. Before tacking the antenna around the apartment and the attic, I decided to load it up on 40 meters with the wire partially coiled up on the floor. I made contacts with DJ2CV, LY4BR, and EU3DN using the temporary call DL/N3AIU/P. I then performed the final installation and made a few more European QSOs on 80, 30, 20, and 17 meters. It even loaded on 15, 12, 10, and 6 meters. I'd be the first to admit that these were not the most earth-shattering QSOs in amateur radio history, but I was cautiously optimistic for the future.

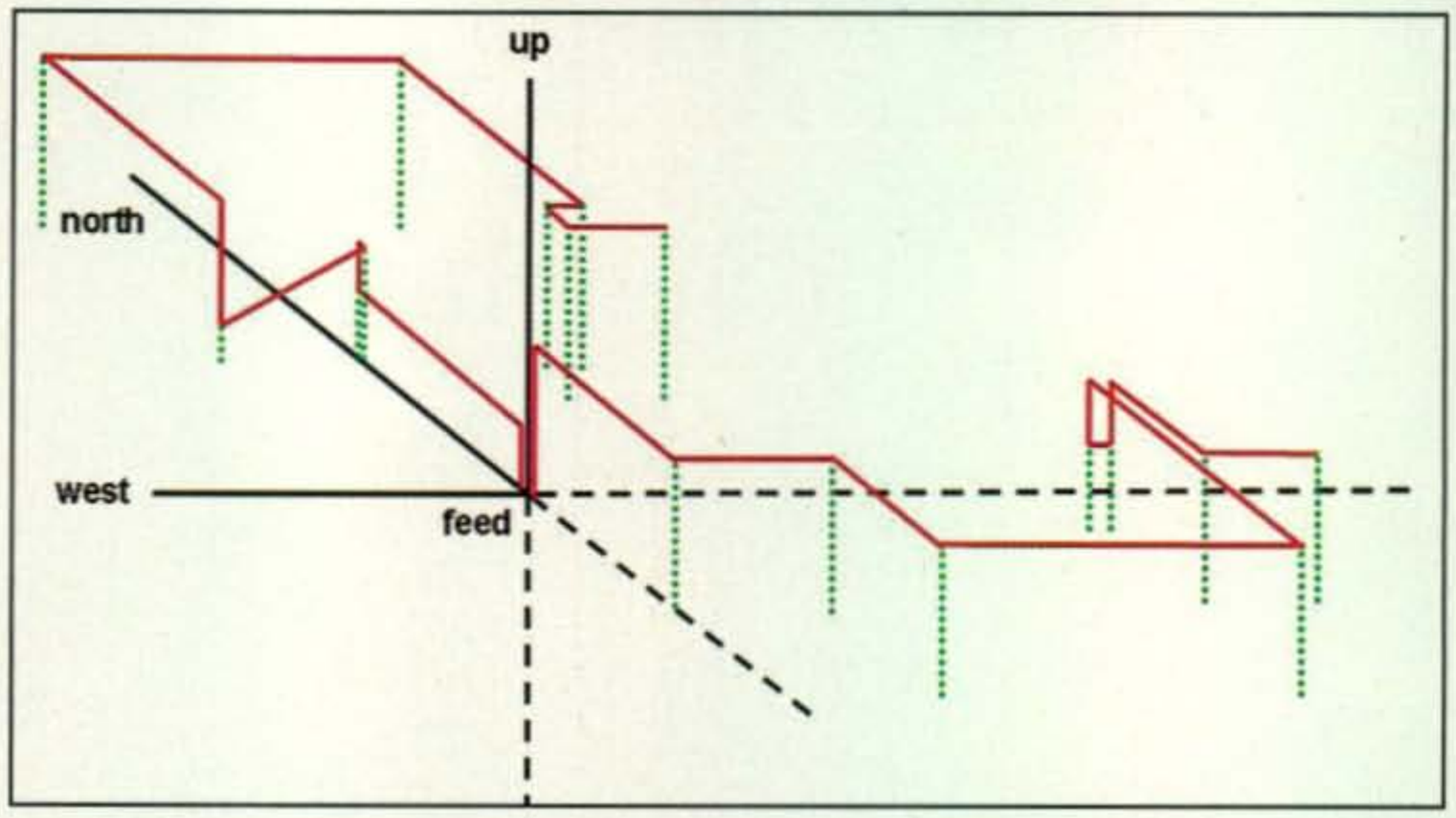

Fig. 1– The DL1NE compromise indoor antenna—a G5RV without the feed line. Each arm is 15.5 meters (51 feet) long. The red lines are the antenna wires, the black lines are the isometric coordinate system, and the dotted green lines aid the viewer to understand the 3D shape.

I'd like to show the antenna to you in its full glory, but there is no way convenient way to fit all of it in a single picture. The solution? A drawing, of course. In fig. 1 you can clearly see how irregular it is. How well would such an antenna work, especially during the low part of the sunspot cycle? I must say that I have been pleased and even surprised with the results.

On the Air

I was relieved to find that my location was relatively quiet, in spite of the nearby high-voltage lines. Occasionally, very high noise levels would suddenly appear on 80 and 40 meters late at night, but then just as suddenly they would disappear. I have never been able to locate the source of this QRN, but I suspect it comes from an appliance used sporadically by one of my neighbors. During the day, I would sometimes find high noise on 20 and 17 meters. I did manage to find the cause of that noise ... my laptop's power supply.

The bands acted just as one would expect near the sunspot minimum. There were occasional openings on 15, 12, and 10 meters. Short skip within Europe was much more frequent compared with long skip to other continents. *Es* openings on 6 meters were infrequent. I spent most of my time on 20 and 17 meters in the early mornings and on weekends. As on the higher bands, the skip could be short or long, but long was somewhat more frequent. If I stayed up late at night, I would definitely try 80 and 40 meters.

While in Germany, I didn't actively participate in contests, but did use them to hunt for new DXCC entities and U.S. states. I really enjoyed the Worked All Germany (WAG) contest every October, which is similar to the ARRL International DX Contest. It is sponsored by the Deutscher Amateur Radio Club (DARC), the national amateur radio society of Germany. In this contest everyone must contact German stations, which made even modest stations like mine very popular.

By June 2009 I had made nearly 3,200 QSOs using DL/N3AIU/P and DL1NE, not including 653 QSOs with the DARC/Heidelberg callsign DA2U during the CQ WW DX CW Contest in November 2008. Most of them were on CW, but I occasionally made some on SSB, PSK31, PSK63, and RTTY. I have confirmed 165 DXCC entities and 505 band-entities. I have confirmed QSOs on all continents except Antarctica. I have also confirmed 24 U.S. states, all on CW and mostly on 20 and 15 meters. Most of these QSOs were with stations on the East Coast, but I've worked stations out west as well. Not too bad for an indoor antenna, eh?

I wish that I could share all of my QSOs with you here, but that's not possible. When I return to the U.S., I plan to put my logs on the web for my friends to view. Some QSOs, however, were especially memorable and worth mentioning here. For example, Montenegro became a DXCC entity immediately after I arrived in Germany, and I've worked it a number of times. I've also made contact with Rodriguez Island, Iraq, São Tome and Principe, Mozam-

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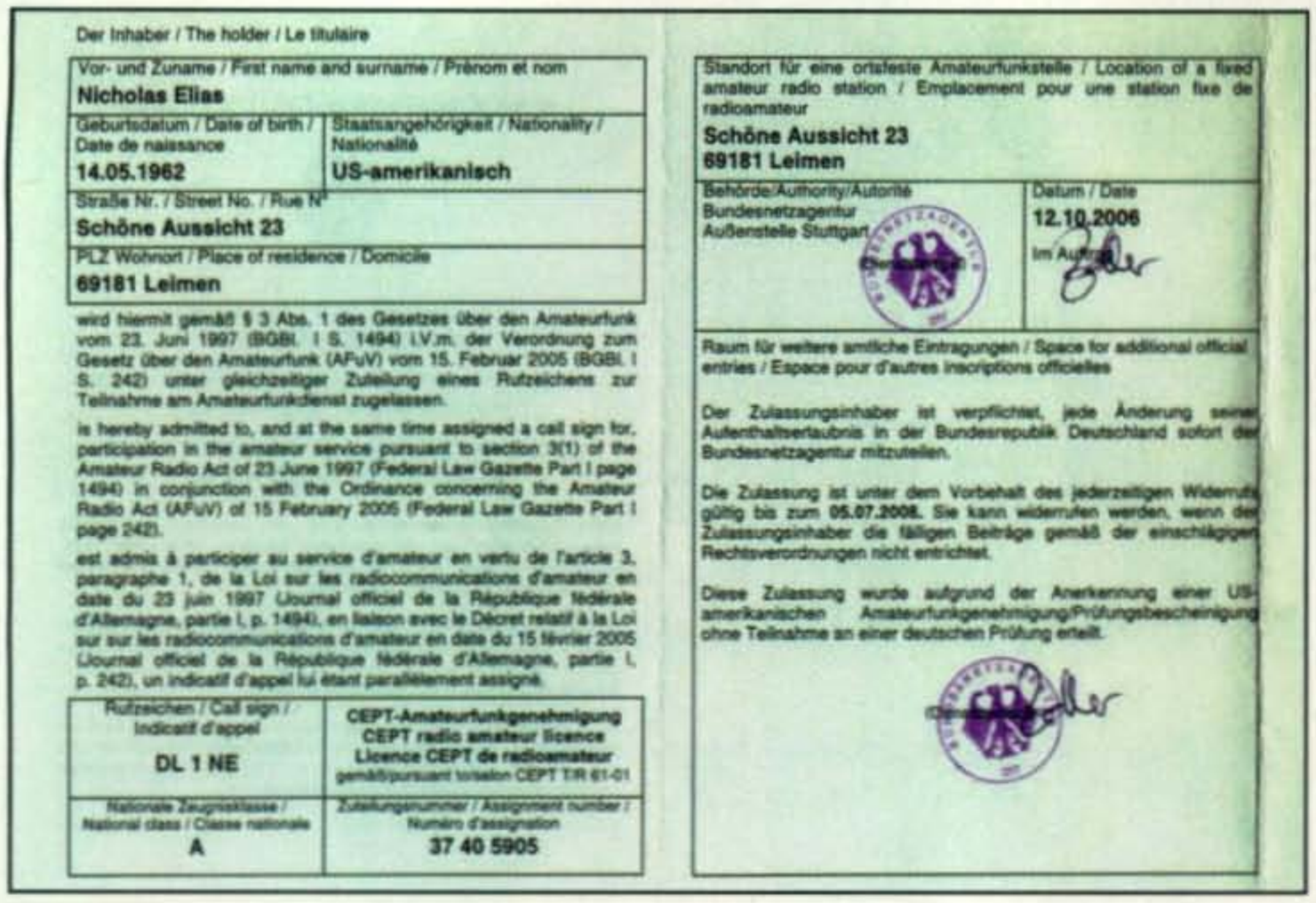

Der Inhaber / The holder / Le titulaire

Vor- und Zuname / First name and surname / Prénom et nom
Nicholas Elias

Geburtsdatum / Date of birth / Date de naissance
14.05.1962

Staatsangehörigkeit / Nationality / Nationalité
US-amerikanisch

Straße Nr. / Street No. / Rue N°
Schöne Aussicht 23

PLZ Wohnort / Place of residence / Domicile
69181 Leimen

wird hiermit gemäß § 3 Abs. 1 des Gesetzes über den Amateurfunk vom 23. Juni 1997 (BGBl. I S. 1494) i.V.m. der Verordnung zum Gesetz über den Amateurfunk (AFuV) vom 15. Februar 2005 (BGBl. I S. 242) unter gleichzeitiger Zuteilung eines Rufzeichens zur Teilnahme am Amateurfunkdienst zugelassen.

is hereby admitted to, and at the same time assigned a call sign for, participation in the amateur service pursuant to section 3(1) of the Amateur Radio Act of 23 June 1997 (Federal Law Gazette Part I page 1494) in conjunction with the Ordinance concerning the Amateur Radio Act (AFuV) of 15 February 2005 (Federal Law Gazette Part I page 242).

est admis à participer au service d'amateur en vertu de l'article 3, paragraphe 1, de la Loi sur les radiocommunications d'amateur en date du 23 juin 1997 (Journal officiel de la République fédérale d'Allemagne, partie I, p. 1494), en liaison avec le Décret relatif à la Loi sur sur les radiocommunications d'amateur en date du 15 février 2005 (Journal officiel de la République fédérale d'Allemagne, partie I, p. 242), un indicatif d'appel lui étant parallèlement assigné.

Rufzeichen / Call sign / Indicatif d'appel
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CEPT radio amateur licence
Licence CEPT de radioamateur
gemäß/pursuant to/selon CEPT T/R 61-01

Nationale Zeugnisklasse / National class / Classe nationale
A

Zuteilungsnummer / Assignment number / Numéro d'assignation
37 40 5905

Standort für eine ortsfeste Amateurfunkstelle / Location of a fixed amateur radio station / Emplacement pour une station fixe de radioamateur
Schöne Aussicht 23
69181 Leimen

Behörde/Authority/Autorité
Bundesnetzagentur
Außenstelle Stuttgart

Datum / Date
12.10.2006

Im Auftrag

Raum für weitere amtliche Eintragungen / Space for additional official entries / Espace pour d'autres inscriptions officielles

Der Zulassungsinhaber ist verpflichtet, jede Änderung seines Aufenthaltsertaubnis in der Bundesrepublik Deutschland sofort der Bundesnetzagentur mitzuteilen.

Die Zulassung ist unter dem Vorbehalt des jederzeitigen Widerrufs gültig bis zum **05.07.2008.** Sie kann widerrufen werden, wenn der Zulassungsinhaber die fälligen Beiträge gemäß der einschlägigen Rechtsverordnungen nicht entrichtet.

Diese Zulassung wurde aufgrund der Anerkennung einer US-amerikanischen Amateurfunkgenehmigung/Prüfungsbescheinigung ohne Teilnahme an einer deutschen Prüfung erteilt.

Fig. 2– My first formal permission to operate an amateur radio station in Germany. My callsign appears in the lower left. I renewed this CEPT license when my job contract was extended.

bique, Ethiopia, St. Kitts, Sri Lanka, Swaziland, Cambodia, Rwanda, Uzbekistan, Galapagos Islands, Chagos Island, Libya, Martinique, Guinea, Surinam, The Sovereign Military Order of Malta, Mali, Gibraltar, Nigeria, Indonesia, Monaco, Burkina Faso, Jordan, Djibouti, Malawi, Willis Island, Botswana, Vatican City, Uganda, Grenada, Sierra Leone, and Bhutan. The pile-ups for Rodriguez, Libya, SMOM, and the Vatican were especially exciting.

My operations have yielded other surprises. For example, I worked several stations on the U.S. east coast on 80 meters CW, including the big-gun station K3LR. Even with their superior stations, I never would have expected to work them on this band with my contorted little antenna. I worked a number of stations in the Caribbean and South America on 40 metes CW, VY2ZM on 40 meters SSB, and P49X on 40 meters RTTY. Again, these QSOs were completely unexpected. The 6-meter *Es* season in 2007 was somewhat disappointing throughout Europe, but one summer day I noticed that HB9SIX (a beacon two grid squares to the south) was much stronger than normal. I tuned around a little, found EA9IB, and worked him on SSB. That was fun!

Off the Air

Since DL/N3AIU/P was only a temporary callsign, I applied for a CEPT license. Actually, in Germany there is no such thing as an amateur radio license; it is formally called an *Amateurfunkgenehmigung*, or "amateur radio permission." I found the form online and submitted it along with a copy of my U.S. amateur license and *Aufenthaltserlaubnis*, or "work/residence permit," that was affixed within my passport. I was later billed for 100 Euros. A few days later (that's right, days!) my callsign arrived, DL1NE, valid through 31 December 2009. The document appears in fig. 2. I was amazed, because the callsign contained my initials. I certainly did not apply for it. Did a kind *Beamter*, or "civil servant," specifically assign it, or was it assigned randomly? I'll never know.

Now that I had a callsign, I needed QSL cards. I shopped around using the internet. Many companies offered beautiful cards, but I've always preferred the minimalist QSL containing the required information for awards. I finally decided on HappyQSL.com, a printer in the Czech Republic. The cards were relatively inexpensive and were of reasonable quality (fig. 3). I've already placed two additional orders.

Autoschilder, or "license plates," are a big deal in Germany. Depending on how much space is available on the car, they can have different numbers of characters or even different fonts! My Honda has only a small recess for the license plate, so I was given a very short one, "HD-F2," shown in photo C. The HD stands for Heidelberg, and the F2 is very symbolic for a DXer who is waiting for the next sunspot maximum. That was quite a coincidence.

I wanted to meet other hams while I lived in Germany, so I joined the Heidelberg chapter of the DARC, which is equivalent to the ARRL. In the *Clubheim*, or "club room," there is an entire wall of pigeon holes, one for each member, representing the incoming QSL service. There is another wall of pigeon holes, one for each DXCC entity that has a QSL bureau. Each member has to fill those with his/her outgoing cards.

There are informal meetings every week. Afterwards we go to a local restaurant for dinner. This wonderful custom, which is common among many German social clubs, is called a *Stammtisch*, or "regular table." We talk a little about amateur radio, but we also talk about more mundane things such as the weather, travel, and politics. And of course, the beer is always excellent.

No article about amateur radio in Germany can be written without a brief mention of the Friedrichshafen hamfest called, coincidentally, "Ham Radio." It is the European equivalent of the Dayton Hamvention®, and is held every year at the end of June. Friedrichshafen is a picturesque little town on Lake Constance (called *der Bodensee* in German), with many orchards and vineyards in the outskirts. I went there in 2007 and met hams from all over the world. I tried the latest Hilberling trans-

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☐ CONFIRMING 2-WAY QSO ☐ SWL REPORT

TO RADIO	DATE DAY	MONTH	YEAR	UTC	MHz	MODE	RST

LOC: JN49

REMARK: ALSO N3AIU (ex WN3YJZ, WA3YJZ)

PSE QSL TNX
VIA DARC QSL BUREAU

73, Nick DL1NE/N3AIU HAPPYQSL.COM

Fig. 3– My functional QSL card.

ceiver and the Begali Sculpture keyer paddles. I even saw many of the "ARRL gang." I had a lot of fun.

Epilogue

For those of you who live in locations where HF antennas are difficult to install, don't lose hope! No, I didn't have a huge signal from my station in Germany, but with a little patience and skill, I worked some good DX. I know that you can, too. It can be frustrating sometimes, but keep at it! I'm sure that many of you would even enjoy the challenge, and don't forget that the sunspot maximum will be back soon. When 15 and 10 meters regularly open for *F*-layer propagation, you can work the world using almost any piece of wire.

Photo C– The ionospheric license plate on the back of my hybrid car.

My entire experience in Germany was wonderful. It was a little hectic in the beginning, but I believe that I made the right choice when I decided to go. I hope that I have been a good ambassador for both amateur radio and the United States. I have come to appreciate Germany and Germans. Not surprisingly, I have also come to "re-appreciate" America and Americans, and through amateur radio, I have made friends for life.

Toward the end of my sojourn in Germany, I was becoming very homesick for the United States. However, now that I've returned to new professional challenges[3], I find myself missing Germany. I'm torn, but in a good way. Would I live in another country for an extended period? Maybe, but probably not right away. And I'd want to set up a small station …

Notes

1. "Data reduction" means processing raw data from an instrument so that the results can be used by scientists.

2. Optical/Near-infrared interferometry is combining the light from two separated telescopes. It is analogous to radio interferometry (e.g., performed with the Very Large Array near Socorro, NM). Interferometry is used for high-resolution imaging and measuring precise stellar positions. The planets are too faint to image directly, but we see them tug on their parent stars as they orbit (Newton's Third Law). When we measure the positions of the stars as a function of time, we can solve for the orbit of the planet.

3. After three years in Heidelberg, I accepted an associate scientist position at the National Radio Astronomy Observatory in Socorro, NM. I am the new supervisor for the data-reduction software of the EVLA (Socorro, NM) and ALMA (Atacama, Chile) radio interferometers. See <www.nrao.edu> for details.

Results of the 2009 CQ WW WPX CW Contest

BY RANDY THOMPSON,* K5ZD

Bodo, DL3OCH, used this impressive curtain array of 16 dipoles as 5NØOCH during the contest. This antenna will be used for commercial broadcasting once it is put into service.

The 51st running of the WPX CW Contest on May 30–31, 2009 fell on a rare fifth weekend in the month of May. This moved the contest away from its usual conflict with bank holidays in Europe and the Memorial Day holiday in the United States, enabling many contesters to participate without having to share their time with holiday or family activities. The result was a record number 3,649 log submissions and 44 new World or Continent records!

Big scores result from big multipliers. The multi-operator team at UU7J surpassed all others with 1311 prefixes (just two short of the all-time record set by DR1A last year). They were followed by WE3C (1274) and NR4M (1267). Among the single operators, the top prefix hunters were CU2X with 1066 and VY2TT with 1054. There were 60 entries with 1000 or more prefix multipliers—almost double last year!

Conditions were much better than for the WPX SSB contest. Some participants reported conditions as only being fair, while others raved about excellent over-the-pole openings. UP2L worked 940 North America stations on 20 meters, a direct polar path from Kazakhstan. Sporadic-*E* provided excitement on both 10 and 15 meters, with double- and triple-hop contacts providing score-boosting DX contacts. KD4D reported 21 contacts with Europe on 10 meters. The low bands experienced QRN in both Europe and North America. Top band winner LY2IJ was only able to work 15 stations outside Europe.

Many competitors find it helpful to set a goal for their operation. KH7XS had high expectations with his goal to "break the old Oceanic record set near the top of the last solar cycle." He did it by a comfortable margin. N1LN defined his effort from NC4KW very clearly: "Goal 1 was to make 1M points. Goal 2 was to log 1000 Qs." Mission accomplished. NG7Z's goals were more modest: "Break 200 Q's and get at least one contact on every band." He did it in less than five hours of operating time. Regardless of goals or expectations, WO1N is probably not the only one to feel "...a bit of contester's remorse. When it was over I was bummed I didn't spend more time..."

Not everyone in the contest was measuring their success by the numbers. For KE1HA, "This was my first CW contest ever." The multi-op team at NM7D reported: "We all had fun and learned a lot in our first try at this operation." KL8DX summed it up this way: "Limited time but unlimited fun."

Single Operator, All Bands

The Single Operator High Power category pitted two experienced contesters in locations with access to Europe on all bands. Valery, RD3AF, operated EF8M to a new World record score, narrowly taking the victory over Hrane, YT1AD, operating as 3V9A. Slightly more contacts on 40 meters made the difference. Hrane did earn the trophy for top combined score from both modes.

The surprise performance of the weekend was the third-place finish of Ken, K6LA, operating from VY2TT. Making the world top three from Canada is a rare accomplishment. Ken also broke the North American record set way back in 1999! In fourth place, with a new Asia record, was Andy, UUØJM, operating from 4LØA. Toni, OH2UA, made another trip to the Azores to set a new European record and sixth place overall.

In the USA, Alex, LZ4AX, piloted the KC3R station to ninth place in the world and a new USA record. Randy, K5ZD, at AK1W and Dick, WC1M, were close behind, with logging accuracy determining the order of finish between them. Bud, AA3B, and Kamal, N3KS (operating WM3T), rounded out the USA top five. Kamal's score, plus his victory on SSB, earned him the trophy for top USA combined score.

On the European continent, Serge, RA3CW, operated RS3A to a nice finish, while Tine, S5ØA, finished a comfortable third. The next seven places in the European Top Ten were all grouped within 10 percent of each other. Andy, DL3YM, moved to the top of the group by having a very accurate log. RM3F (Andy, UA3DPX) ended up just a few points ahead of another Russian special call RG6G (Alexey, RW6HX).

Single-Operator All-Band Low Power

The Single Operator Low Power category offered an interesting mix of expeditions and home stations. Yuri, VE3DZ, visited Bermuda to take the top spot after finishing second in 2008. Yasar, TA3D, used the special call YM3D to take second. Eric, K9GY, went back to Nicaragua, this time with the call YN2GY, and worked around thunderstorms that impacted his operating plans.

Ed, N1UR, operated as NV1N to take fourth in the world and his third USA victory in four years. Maury, W3EF, took his first try at the WPX contest. Family obligations prevented Maury from operating the full 36 hours, but he still finished second in the USA. Will, WJ9B/4, moved down a spot from last year to take third. John, K9QVB, did a great job from Illinois to finish fifth. Peter, K2PS, finished sixth in his last contest before moving to a new location.

The race for top low power score in Europe was among three stations. Gedas, LY9A, had

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TROPHY WINNERS AND DONORS

SINGLE OPERATOR ALL BAND

WORLD: Steve Bolia, N8BJQ Trophy. Won by: **EF8M operated by Valery Komarov, RD3AF**
WORLD Low Power: Caribbean Contesting Consortium Trophy. Won by: **VE3DZ/VP9 operated by Yuri Onipko, VE3DZ**
WORLD QRP: Bill Parker, W8QZA Trophy. Won by: **Dragan Djordjevic, 4O4A**
USA: Dennis Motschenbacher, K7BV Trophy. Won by: **KC3R operated by Alexander Avramov, LZ4AX**
USA Low Power: Ken Boasi, N2ZN Trophy. Won by: **NV1N operated by Edward Sawyer, N1UR**
USA QRP: John T. Laney, K4BAI Trophy. Won by: **Gary Hembree, N7IR**
USA Zone 4 High Power: Society of Midwest Contesters Trophy. Won by: **KT5J operated by Steve London, N2IC**
USA Zone 4 Low Power: Society of Midwest Contesters Trophy. Won by: **John F. Meyer, K9QVB**
USA Zone 3 High Power: Northern California Contest Club Trophy. Won by: **NY6N operated by** Daniel M. Craig, **N6MJ**
USA Zone 3 Low Power: Arizona Outlaws Contest Club Trophy. Won by: **WV7Q operated by Michael Dinkelman, N7WA**
EUROPE High Power: Ivo Pezer, 5B4ADA/9A3A Trophy. Won by: **CU2X operated by Toni Lindén, OH2UA**
EUROPE Low Power: Vitor Santos, PY2NY Trophy. Won by: **Gediminas Lucinskas, LY9A**
EUROPE QRP: Julius Fazekas, N2WN Trophy. Awarded to: **Antonin Bechyna, OK7CM**

AFRICA: Chris Terkla, N1XS Trophy. Won by: **3V9A operated by Hranislav Milosevic, YT1AD**
ASIA: Rick Tavan, N6XI Trophy. Won by: **4LØA operated by Andy Kazantsev, UUØJM**
NORTH AMERICA: Louisiana Contest Club Trophy. Won by: **8P5A operated by Tom Georgens, W2SC**
NORTH AMERICA QRP: Dale Martin, KG5U Trophy. Won by: **Doug Ferris, VA3DF**
OCEANIA: Lloyd Cabral, KH6LC Trophy. Won by: **Bill Kollenbaum, KH7XS**
SOUTH AMERICA: David Kopacz, KY1V Trophy. Won by: **PJ2T operated by Jim Fitzpatrick, WI9WI**
SOUTHERN CONE (CE,CX,LU): Tom Morton, K6CT Trophy. Won by: **Daniel Neves, CX9AU**

CANADA High Power: Radio Amateurs of Canada (RAC) Trophy. Won by: **VY2TT operated by Ken Widelitz, K6LA**
CANADA Low Power: Contest Club Ontario Trophy. Won by: **Alexey Yushin, VE2XAA**
JAPAN: Simone Candotto, IV3NVN Trophy. Won by: **Masaki Okano, JH4UYB**

SINGLE OPERATOR, SINGLE BAND

WORLD 28 MHz: Steve Hodgson, ZC4LI Trophy. Won by: **UP6P operated by Yuri Loparev, UN6P**
WORLD 21 MHz: Andrei Stchislenok, NP3D Memorial (W3UA/RA3AA sponsor) Trophy. Won by: **ZX5J operated by Carl Cook, AI6V**
WORLD 14 MHz: Gene Walsh, N2AA Trophy. Won by: **UP2L operated by Vladimir Umanets, UA9BA**
WORLD 7 MHz: 6Y1V Contest Station Trophy. Won by: **YW4D operated by Paolo Stradiotto, YV1DIG**
WORLD 7 MHz Low Power: Neal Campbell, K3NC Trophy. Won by: **9A7T operated by Zlatko Maticic, 9A2EU**
WORLD 3.5 MHz: Ranko Boca, 4O3A Trophy. Won by: **9A1CCY operated by Sasa Pokorni, 9A3NM**
WORLD 1.8 MHz: Dusko Dumanovic, ZL3WW Trophy. Won by: **Arunas Vaglys, LY2IJ**
USA 28 MHz: Paul Beringer, NG7Z Trophy. Won by: **WN1GIV/4 operated by Bob Patten, N4BP**
USA 21 MHz: Charlie Wooten, NF4A Trophy. Won by: **Eric Silverthorn, NM5M**
USA 14 MHz: Kansas City DX Club Trophy. Won by: **Robert L. Shohet, KQ2M/1**
USA 7 MHz: Darin Divinia, WG5J Trophy. Won by: **Mike Tessmer, K9NW**
USA 3.5 MHz: Wes Printz, W3SE/ZL3TE Trophy. Won by: **Steven Sussman, W3BGN**
EUROPE 28 MHz High Power: SKY Contest Club Trophy. Won by: **UW1M operated by Victor Yarovoj, UR5MW**
EUROPE 21 MHz High Power: SKY Contest Club Trophy. Won by: **Milan Milovanovic, YTØZ**
EUROPE 14 MHz High Power: SKY Contest Club Trophy. Won by: **IU9T operated by Fabio Grisafi, IT9GSF**
EUROPE 7 MHz High Power: SKY Contest Club Trophy. Won by: **CT1JLZ operated by Jiri Pesta, OK1RF**
EUROPE 3.5 MHz High Power: SKY Contest Club Trophy. Awarded to: **RW2F operated by Dmitri Gorshkov, UA2FB**
EUROPE 1.8 MHz High Power: SKY Contest Club Trophy. Awarded to: **OL1A operated by Vladimir SladeK, OK1CW**

SINGLE OPERATOR ASSISTED

WORLD: D4C Station Trophy. Won by: **CN3A operated by Stefano Brioschi, IK2QEI**
USA: Ron Sigismonti, N3RS Trophy. Won by: **WK1Q operated by Michael Keane, K1MK**
EUROPE: Martin Huml, OL5Y Trophy. Won by: **IR4X operated by Matteo Marzilli, IZ3EYZ**

OVERLAY CATEGORIES

WORLD Tribander/Single Element: Helmut Mueller, DF7ZS Trophy. Won by: **VC2A operated** by Lali Laki, VE3NE
USA Tribander/ Single Element: Paul Newberry, N4PN Trophy. Won by: **KR4Z operated by Paul Newberry, N4PN**
EUROPE Tribander/ Single Element: WPX Contest Committee Trophy. Won by: **Matija Brodnik, S53MM**
WORLD Rookie: Val Edwards W8KIC Memorial (K3LR sponsor) Trophy. Won by: **Sergej Volkov, RN3DBA**
NORTH AMERICA Rookie: Val Edwards W8KIC Memorial (K3LR sponsor) Trophy. Won by: **David Davison, AF6EV**

MULTI-OPERATOR, SINGLE-TRANSMITTER

WORLD: Steve Miller, NØSM Trophy. Won by: **CS9L operated by DL5AXX, DL8WAA, SV1RP**
USA: Phil Allardice, KT3Y Trophy. Won by: **K1LZ operated by K1LZ, K1VR, K1ZM, W1UE, K3JO**
ASIA: W2MIG Memorial (NX7TT Sponsor) Trophy. Won by: **C4N operated by 5B4AGM, 5B8AD, UA9CDV**
EUROPE: Andy Ruse, YO3JR/YR1A Trophy. Won by: **RU1A operated by RW1AC, RA1AIP, RA1AR, UA1CUR, UA9MQR, RU4HP, UA1AKC**
NORTH AMERICA: Jim George, N3BB Trophy. Won by: **HQ2R operated by UA3AGW, HR2J**

MULTI-OPERATOR, TWO-TRANSMITTER

WORLD: UA1DZ Memorial (W3UA Sponsor) Trophy. Won by: **OLØW operated by OK1WMV, OK1VWK, OK1DSZ, OK1HRA**
USA: Florida Contest Group Trophy. Won by: **KD4D/3 operated by N6CY, N8II, K3MM, K3RA, K3WI, NA3D, KD4D**
EUROPE: Tom Georgens, W2SC Trophy. Awarded to: **9A8ØØVZ operated by 9A3TR, 9A3OS, 9A5X, 9A7V**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Steve Merchant, K6AW Trophy. Won by: **WE3C operated by K3CT, K3TEJ, K3TUF, N3RD, NN3Q, W3FV, W8FJ, WE3C**
USA: Jim Reisert, AD1C Trophy. Awarded to: **NR4M operated by K1SE, K4EC, K4EU, K4GM, K4GMH, K4IA, K4ZW, K7SV, KC4D, N2YO, N4NW, NR4M, W3YY, WA4JUK**
EUROPE: David Robbins, K1TTT Trophy. Won by: **UU7J operated by UU6JJ, UT3UA, UT5UGR, UU4JMG, UUØJX, UU1AZ**

CONTEST EXPEDITION

WORLD: Phil Goetz N6ZZ Memorial Trophy. Won by: **YN2GY operated by Eric Hall, K9GY**

COMBINED SSB/CW

WORLD Single Operator: Yuri Blanarovich, K3BU Trophy. Won by: **Hranislav Milosevic, YT1AD**
USA Single Operator: Bill Fisher W4AN Memorial (KM3T Sponsor). Won by: **Kamal Sirageldin, N3KS**
WORLD Club Score: CQ Magazine trophy. Won by: **Bavarian Contest Club**

Please contact awards manager Doug Grant, K1DG, at <plaques@cqwpx.com> if you are interested in sponsoring a trophy.

Dave, K5GN, hands out multipliers from the A73A multi-single in Qatar.

Bob, KQ2M, is USA winner and new record holder for single band 20 meters.

a very accurate log to finish first in Europe and fifth overall. Pert, OK2WTM, operated as OL6P to finish eight overall and second in Europe. GJ3WW was the third European in the world Top Ten. Long-time WPX contester Franci, S51F, easily took fourth. EU2MM and UT7NW finished just 10k apart for the next two spots.

Single Operator, Single Band

UP2L, operated by Willy, UA9BA, had the top single band score in the world. Willy set a new world record not only for 20 meters, but for all single band entries. Vaho, 4L8A, finished a strong second, but was unable to defend his 20-meter record. Jovica, 6W1SJ, survived some equipment damage the day before the contest to finish third and set a new African record. Bob, KQ2M/1, matched his USA victory and record-setting effort on SSB with one on CW. Fabio, IT9GSF, used the special call IU9T to take the top 20 meter score for Europe.

Competition was fierce on 40 meters with both of the top finishers having a world record as their goal. When it was all done, the winner was Paul, YV1DIG, operating as YW4D from the station of YV5AMH. Paul overcame amplifier problems the first night. Perennial 40-meter champion ZM3A (Dule, ZL3WW) broke his own Oceania record on the way to second place. Dule had to operate the first 6 hours using low power until he was able to get a power generator, but it was low activity on the second day that hurt his score the most. Jiri, OK1RF, operated from CT1JLZ to finish a close third. Bernd, VK2IA, visited the Northern Corridor Radio Group in Perth (VK6AA) and enjoyed their new three-element Yagi on his way to a sixth place finish.

Eighty meters was dominated by Europeans. Sasa, 9A3NM, celebrated the 35th year

of club station 9A1CCY with the top 80-meter score. RW2F, operated by Dmitri, UA2FB, was unable to match his victory on SSB but finished second. Milan, OK2BYW, finished a close third. The only non-European score in the Top Ten was by Mike, KH6ND, who finished ninth while setting a new Oceania record. This is an impressive score from such an isolated location. In the USA competition, Steve, W3BGN, won for the forth year in a row. Chuck, KØRF, put up a nice score from out west in Colorado to finish second.

The 160-meter competition was among Arunas, LY2IJ, Vladimir OK1CW at OL1A, and Bela, HA8BE. Paul, K8PO/1, was the only score outside of Europe in the Top Ten.

With sporadic-*E* providing propagation, we don't need sunspots to have fun on 10 meters. Yuri, UN6P, took advantage of band openings to Europe to put UP6P in the top spot. Second place UW1M (op Victor, UR5MW) made 170 more contacts than Yuri, but most were with 1-point Europeans. Third and fourth place was a close race between Meho, E73O, and Mersudin, E73C, who finished only 50k points apart. Bob, N4BP, used the call WN1GIV/4 to finish sixth overall and first in the USA.

Carl, AI6V, returned to Brazil to pilot ZX5J to his second victory in a row on 15 meters. The next three places were incredibly close with only 70k points between them. Raimundo, PT7CG, grabbed second place over Joe, W5ASP, who operated from ZF1A. Jesus, LU5FC, used the special call AY5F to finish fourth. The top European score was Milan, YTØZ, who finished fifth, just ahead of Laszlo, HA3NU at HG3R. Seventh went to the top USA score of Eric, NM5M, operating from the NR5M superstation.

The top low power single band score was also on 20 meters. Miro, YU2A, took the victory over Aleksey, RV9JR, and Brian, 5B4AIZ at C4Z. Top USA score on 20 meters was by Carol, N2MM. The second highest Low Power single band score was on 40 meters by Zlatko, 9A2EU, operating as 9A7T. His competition was from Anatoly, ER3DX. The top USA 40-meter score was by Richard, W2EG.

The lower bands had some exciting races. On 80 meters Zeljko, E77C, finished only 4k points ahead of OL4W (operator Milan, OK1IF). On 160 meters it was Szabo, HA8IB, finishing ahead of Ozer, TA2RC. YT4A and E79Z were less than 2k points behind in third and fourth!

The higher bands are always a bit easier and more popular for the low power ops. On 10 meters, Matija, 9A3VM, had the high score over Victor, US5XD, and Neacsu, YO8AXP (operating YR8A). In the USA, only 800 points separated winner NA4W (Courtney, K4WI) from Julius, N2WN! Scores were higher on 15 meters, with Franceso, YV1FM, getting the category win over Valery, UA9FGJ. YR8B (Mancas, YO8DOH), had the top European score. Andy, WB4TDH, was the high USA scorer on 15 meters.

QRP

The single operator all band QRP competition was extremely close. The winner, Dragan, 4O4A, made this comment: "This was my first WW QRP contest. I accidentally discovered QRP two weeks ago… I felt like a kid, and every QSO was like a gift." Just 11k points behind in second was experienced QRP op Antonin, OK7CM. Ludek, OK2ZC, operating as OK3C, finished third.

In the USA, it was a race between two veteran QRP contesters. Gary, N7IR, was happy with his victory: "A combination of good propagation on 20 and 40 plus a new off-time strategy made this the highest score for me since 2002 and a fourth place personal best all-time in this contest." Phil, NØKE, used the call NAØCW for his second-place finish. He lost time to thunderstorms and only operated 29 hours. Dave, WA8WV, beat Tim, KT8K, for third place.

Single-Operator Assisted

The top Assisted all band score was from Stefano, IK2QEI, operating as CN3A. This was a new all-time record for the category. Matteo, IZ3EYZ, operated from IR4X to take second and set a new European record. Yuri, UA9AM, activated the call RG9A to finish third.

The Assisted single band record book was almost completely rewritten this year. Luciano, PY8AZT, won 20 meters from ZY7C and set a new world record. Second-place RZ9HT set a new record for Asia. Ivan, YU1LA, set a new record on 40 meters. S56X did the same on 80 meters. S57M set a new record on 160 meters.

In other parts of the world, John, ZL1BYZ, set a new all band record for Oceania. Gary, ZL2IFB, established the Oceania record for 10 meters. Ramon, LU5HM, operated as LP1H to set a new South American record for all bands.

There were 645 entries in the Single-Operator Assisted categories, an increase of 50% over last year. It is interesting to note that none of the Assisted category winners had a higher score than the single operator for the same category. The large number of multipliers and emphasis on QSO points seems to limit the advantage of using the DX spotting networks. A survey of over 4000 WPX Contest participants conducted in August 2009 revealed that 40% feel the categories should be combined, while 46% are against this. No rule changes are currently planned.

Overlay Categories

The Tribander/Single-Element (TB/SE) category provides a separate competition for stations using only a tribander for 10-15-20 meters and single elements for the other bands. Lali, VE3NE, drove 17 hours north to Zone 2 and operated as VC2A using a tribander and vertical antennas to win the TB/SE category and place seventh in the world overall. Pertti, OH2PM, operated TC4X from Turkey using a two-element tribander and wire antennas from the roof of a building to finish a close second (and tenth overall). Both of these scores prove that you don't need giant antennas to do well—if you can put them in the right place. UP4L and S53MM were only 10k points apart for third and fourth place.

On low power, VE3DZ/VP9 dominated the TB/SE competition by a wide margin. Second pace went to Dez, G3WW, who took advantage of a family vacation to operate from Jersey as GJ3WW. Yuri, UA9SP, activated the special call RT9S to take third.

The Rookie category is for operators who have been licensed less than three years at the time of the contest. There were 40 entrants, up slightly from last year. The Rookie category winner was 13-year old Sergej, RN3DBA, who moved up from his third-place finish last year. Second place with a very nice score was Igor, EW1IP. Third place finisher David, AF6EV, shows the right spirit with his comments: "I set

WORLD TOP SCORES

SINGLE OPERATOR – HIGH POWER ALL BAND

EF8M (RD3AF) 17,288,864
3V9A (YT1AD) 17,115,840
VY2TT (K6LA) 12,878,826
4LØA (UUØJM) 12,560,363
8P5A (W2SC) 10,809,400
CU2X (OH2UA) 10,208,016
VC2A (VE3NE) 9,801,372
UA9CLB 9,654,254
KC3R (LZ4AX) 9,597,400
TC4X (OH2PM) 9,500,632

28 MHz

UP6P (UN6P) 569,430
UW1M (UR5MW) 481,100
E73O 446,220
E73C 395,200
AO3T (EA3AKY) 388,476
WN1GIV/4 (N4BP) 296,485
OH1RX 245,344
OQ5M (ON5ZO) 143,374
UP1G (UN7QX) 134,495
4XØA (4X1VF) 115,928

21 MHz

ZX5J (AI6V) 2,500,374
PT7CG 1,998,216
ZF1A (W5ASP) 1,934,424
AY5F (LU5FC) 1,927,920
YTØZ 1,392,252
HG3R (HA3NU) 1,325,088
NM5M 969,285
YL2SM 952,536
YU1KX 944,877
PY2MTV 933,945

14 MHz

UP2L (UA9BA) 7,928,886
4L8A 6,908,715
6W1SJ (E78A) 6,755,364
KQ2M/1 5,348,477
ZC4LI 4,907,424
IU9T (IT9GSF) 4,405,444
9A9A 3,950,100
S5ØK 3,407,768
YT9A 3,313,242
WØUA 3,139,745

7 MHz

YW4D (YV1DIG) 6,516,515
ZM3A (ZL3WW) 6,437,695
CT1JLZ (OK1RF) 6,075,936
YT5A (YU1EA) 5,541,777
9A5W 5,166,990
VK6AA (VK2IA) 5,001,626
ZF2DO (N5DO) 4,712,800
9A8A 4,505,454
9A3Y 3,185,868
OK1Z (OK1DKZ) 3,051,552

3.5 MHz

9A1CCY (9A3NM) 1,808,466
RW2F (UA2FB) 1,612,764
OK2BYW 1,396,629
YT4T 1,202,604
SMØW 959,454
OL2N (OK1FDR) 844,358
SP5KCR (SP5JTF) 752,524
9A8M (9A7DM) 638,748
KH6ND 596,673
OK1NI 524,900

1.8 MHz

LY2IJ 299,673
OL1A 288,358
HA8BE 285,762
S53O 242,490
9A3B (9A2VR) 236,989
LZ4TX 167,560
YO5AJR 129,717
SP6AEG 113,883
LY1CM 88,998
K8PO/1 12,449

SINGLE OPERATOR – LOW POWER ALL BAND

*VE3DZ/VP9 7,152,900
*YM3D (TA3D) 5,092,632
*YN2GY (K9GY) 4,744,256
*NV1N (N1UR) 3,592,587
*LY9A 3,413,552
*RV9CX 3,330,432
*W3EF 2,950,275
*OL6P (OK2WTM) 2,859,392
*TA3AX 2,846,448
*GJ3WW 2,837,742

28 MHz

*9A3VM 276,963
*US5XD 192,945
*YR8A (YO8AXP) 183,680
*UA9QM 166,075
*UA3QG 165,000
*UN9GD 161,796
*RX6AH 101,783
*RX3BP 100,083
*RV3LO 89,244
*UA9AB 81,056

21 MHz

*YV1FM 709,168
*UA9FGJ 643,167
*YR8B (YO8DOH) 517,409
*EW6AF 278,641
*PW2B (PY2HL) 258,741
*UA2FL 253,618
*WB4TDH 252,800
*Z31MM 248,159
*EI4CF 237,978
*LZ2JA 225,592

14 MHz

*YU2A 1,959,204
*RV9JR 1,847,004
*C4Z (5B4AIZ) 1,734,560
*HG4F 1,661,497
*S53F 1,484,440
*J41E (SV1BJW) 1,320,960
*EU1CL 1,319,937
*N2MM 1,098,045
*S57U 1,060,565
*JG2KKG 1,018,584

7 MHz

*9A7T (9A2EU) 1,944,940
*ER3DX 1,722,816
*VE1NB 1,367,681
*S54A 1,353,690
*UU2CW 1,208,232
*LZ1GL 1,196,184
*PY2SEX 1,136,637
*SP5CNA 1,121,320
*RA9AP 1,094,764
*SP6OJE 1,034,870

3.5 MHz

*E77C 634,695
*OL4W (OK1IF) 630,585
*UT7XX 598,858
*LY1ØØØCW (LY3CW) 514,167
*LY2GW 453,690
*YL5W 444,644
*YL3GFX 409,705
*SQ5M 363,025
*UR3LPM 350,124
*EU1AI 318,600

1.8 MHz

*HA8IB 132,508
*TA2RC 120,269
*YT4A 119,892
*E79Z 118,146
*OK6Y (OK2PTZ) 105,185
*UX5NQ 99,009
*YT1T 76,121
*OM5FA 58,293
*UA6AX 58,058
*ER2RM 31,824

SINGLE OPERATOR – QRP ALL BAND

4O4A 1,238,895
OK7CM 1,227,440
OK3C (OK2ZC) 1,123,344
RW4AA/9 1,084,907
US2IZ 1,066,725
RA3AN 906,326
HA6IAM 843,622
YP8A (YO8WW) 824,000
JA1MCU 822,829
RW3AI 735,042

28 MHz

.VR2ZQZ 88,323
ER1RR 25,092
F8AKC 10,773
SP5DDJ 3,792
GM4UBJ 2,009

21 MHz

SP4GFG 58,608
HK1AA 44,802
JH7RTQ 32,696
SP4JFR 24,200
JR1NKN 17,480

14 MHz

IØUZF 298,027
LZ1VB 279,654
RW9SZ 232,440
LZ1MG 208,861
AO7AAW 201,663

7 MHz

YP6C 903,495
DL1DQY 519,365
F5UL 292,006
RAØAY 264,918
HAØGK 181,401

3.5 MHz

OK1FKD 199,870
9A9L 45,024
OK1WF 44,016
SM5OUU 31,088
VE3SQZ 11,904

1.8 MHz

ES1CW 34,485
SP4GL 16,575
VE3MGY 3,198

SINGLE OPERATOR ASSISTED HIGH POWER ALL BAND

CN3A (IK2QEI) 12,900,240
IR4X (IZ3EYZ) 9,160,470
RG9A (UA9AM) 8,727,154
UPØL (UN9LW) 8,537,042
LZ8E (LZ28E) 7,286,538
E73M 7,020,878
DL3TD 6,804,672
LP1H (LU5HM) 6,699,400
LY8O 6,582,390
G1A (MØDXR) 6,320,160

28 MHz

S57AW 403,524
9A2U (9A3ZA) 302,168
YT2T 255,640
BA7IO 152,862
OH4MDY 140,541

21 MHz

EA5FID 384,580
PA3EWP 307,192
UA9HR 245,700
YO5BBO 189,042
SP2JMB 182,920

14 MHz

ZY7C (PY8AZT) 4,431,078
RZ9HT 4,074,640
HA9PP 3,000,404
RX6AM 2,987,206
RO9O (RZ9OO) 2,811,702

7 MHz

YU1LA 5,555,958
OE3I (OE3DSA) 3,384,564
HG3A (HA3MQ) 3,088,944
M7A (LY4Y) 3,026,082
LZ7J (LZ1CL) 3,002,880

3.5 MHz

S56X 1,315,146
HA3LI 867,141
LY7M 841,940
YT6T (YU7CM) 573,806
DR7T (DL1HCM) 498,006

1.8 MHz

S57M 209,040
DLØMB (DF2UU) 78,400
RA6CZ 19,716

SINGLE OPERATOR ASSISTED LOW POWER ALL BAND

*9A3XV 2,389,200
*CE4CT (XQ4CW) 2,134,938
*N2BA 1,666,170
*OK1TA 1,550,374
*UY7C 1,460,525
*S54X 1,422,869
*OK1TC 1,214,952
*W3FW 1,160,082
*ON4CAS 1,106,315
*LZ9R (LZ3YY) 1,094,501

28 MHz

*UR5LO 138,381
*DH8BQA 109,680
*RZ9CJ 69,068
*SP5XO 42,632
*RA6YDX 32,640

21 MHz

*UA9CAX 136,704
*SP3GXH 91,590
*UR2VA 54,615
*BY2UDL (BG2RJE) 17,340
*PU9OSB 7,738

14 MHz

*YQ5Q (YO5OHO) 1,479,492
*UA9TT 1,094,016
*LU7KAT 671,044
*US4LGW 662,656
*YT5CWW 385,742

7 MHz

*4L6QC 2,910,696
*YU6DX 2,466,420
*HG8K 1,504,752
*PA4AO 1,222,292
*LY2KZ 941,787

3.5 MHz

*SQ1DWR 290,169
*UX6VA 67,396
*UR5IHQ 66,411
*UR8IDX 44,298
*RA4HO 27,606

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

VC2A (VE3NE) 9,801,372
TC4X (OH2PM) 9,500,632
UP4L (UN7LZ) 6,180,760
S53MM 6,170,859
HG8R (HA8JV) 5,798,912
9A5K 4,823,122
HQ2R 4,822,632
KR4Z (N4PN) 3,908,800
VA2WDQ 3,610,516
UO1P (UN7PL) 3,568,848

28 MHz

BA7IO 152,862
OQ5M (ON5ZO) 143,374
G4IUF 37,500

21 MHz

EA5FID 384,580
RA9AC 114,558
ON6NL 112,776

14 MHz

ZC4LI 4,907,424
IU9T (IT9GSF) 4,405,444
EF7R (EA7AJR) 1,883,052
OI6X (OH6NJ) 1,587,624
AB7E 1,558,050

7 MHz

N2WQ/VE3 1,907,698
W9/UY5LW 1,169,649
G4IIY 1,114,861

3.5 MHz

HA3LI 867,141
OL2N (OK1FDR) 844,358
SP5KCR (SP5JTF) 752,524
IK2SND 223,170

TRIBANDER/SINGLE ELEMENT LOW POWER ALL BAND

*VE3DZ/VP9 7,152,900
*GJ3WW (G3WW) 2,837,742
*RT9S (UA9SP) 2,723,300
*UT7NW 2,104,752
*VE2XAA 1,986,262
*UN7IT 1,974,009
*RX9AM 1,906,632
*DK5DQ 1,762,748
*NR3X/4 (N4YDU) 1,752,894
*WD4AHZ 1,689,540

28 MHz

*UR5LO 138,381
*RZ9CJ 69,068
*EA5GS 28,560

21 MHz

*Z31MM 248,159
*HK1N 146,382
*AHØAA (JR2SCJ) 141,484

14 MHz

*C4Z (5B4AIZ) 1,734,560
*S57U 1,060,565
*WA1FCN/4 982,311

7 MHz

*S54A 1,353,690
*DK8NT 578,124
*UW2F (UTØFT) 554,496

3.5 MHz

*RK1AX 266,630
*IV3NVN 259,974
*PAØMIR 49,345

1.8 MHz

*YT4A 119,892

ROOKIE ALL BAND

*RN3DBA 1,415,116
*EW1IP 889,024
*AF6EV 294,126
*PD7BZ 262,725
*OH8FKU 194,184
IR1G (IZ1LBG) 116,164
*UR5XMM 102,124
DS4GGM 74,782
*NG5NG 62,726

28 MHz

UU4JC 19,982

21 MHz

*YD1BJX 9,882

14 MHz

*YT2AAA 501,786
*RK9UAC 64,070

7 MHz

*HA8AAA 886,886
PY2LSM 25,060

3.5 MHz

*BA3AX 3,910

MULTI-OPERATOR SINGLE-TRANSMITTER

CS9L 20,691,183
C4N 18,470,529
RU1A 13,838,256
K1LZ 12,754,560
A73A 12,618,825
ES9C 12,562,719
E7DX 11,861,398
OM7M 11,688,672
OL3Z 11,666,757
OG6A 11,430,899

MULTI-OPERATOR TWO-TRANSMITTER

OLØW 15,156,414
9A8ØØVZ 15,041,455
C4I 14,632,800
KD4D/3 13,809,375
DQ4W 13,533,914
HG1S 13,083,928
NH7O 13,050,660
KL7RA 12,655,072
TA3KZ 12,619,640
XM7SV 11,225,610

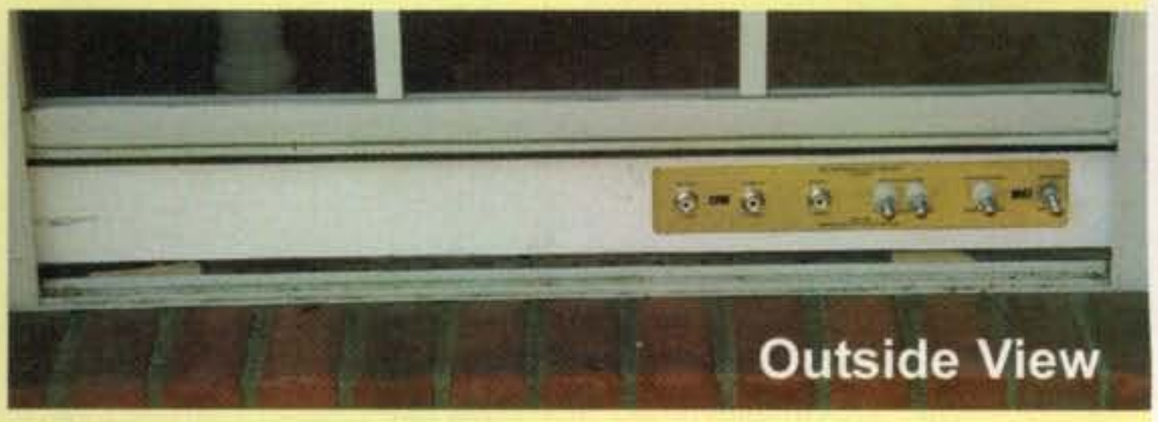
MULTI-OPERATOR MULTI-TRANSMITTER

WE3C 21,910,252
ZW5B 20,249,325
UU7J 19,992,750
NR4M 18,863,096
LZ9W 17,398,059
LY7A 12,593,398
DFØSAX 11,705,496
EA8URL 10,543,122
NØNI 8,390,088
VE7UF 7,291,488

*Low Power

MFJ Weather-Proof *Window Feedthrough Panels*

Weather-proof window feedthrough panels bring coax, balanced lines, HF/VHF/UHF antennas, random wire antennas, ground, rotator/antenna switch cables and DC/AC power into your hamshack without drilling through walls!



MFJ Weather-Proof *Window Feedthrough Panels* mount in your window sill. Lets you bring all your antenna connections into your hamshack *without* drilling holes through walls.

Simply place in window sill and close window. One cut customizes it for any window up to 48 inches. Use horizontally or vertically. Connectors are mounted on inside/outside stainless steel plates and attached to a 4 foot long, 3½ inch high, ¾ inch thick *pressure-treated* wood panel. Has excellent insulating properties. Weather-sealed with a heavy coat of long-lasting white outdoor enamel paint. Edges sealed by weather-stripping. Seals and insulates against all weather conditions. Includes window locking rod.

Inside/outside stainless steel plates ground all coax shields. Stainless steel ground post brings ground in.

MFJ-4603 Universal Window Feedthru Panel

MFJ-4603
$89.95

Four 50 Ohm *Teflon*(R) SO-239 coax connectors lets you feed HF/VHF/UHF antennas at full legal power limit.

A 50 Ohm *Teflon*(R) coax *N-connector* lets you use any antenna up to 11 GHz, including 450 MHz, UHF, satellite, moon bounce and 2.4/5.8 GHz Wi-Fi antennas.

A 75 Ohm, 1 GHz *F-connector* makes it easy to bring in television, Satellite, HD, cable TV and FM radio signals.

A pair of high-voltage *ceramic feedthru insulators* lets you bring in 450/300 Ohm balanced lines directly to your antenna tuner.

Has random/longwire antenna *ceramic feedthru insulator*.

***5-way** binding posts* lets you supply 50 Volts/15 Amps DC/AC power to your outside antenna tuners/relays/switches.

Stainless ground post brings in ground connection, bonds inside/outside stainless steel panels together and drains away static charges.

MFJ's exclusive *Adaptive Cable Feedthru*™ lets you bring in rotator/antenna switch cable, etc. without removing connectors (up to 1¼X1⅝ in). Adapts to virtually *any* cable size. Seals out rain, snow, adverse weather.

3 Coax, Balanced Line, Random Wire

MFJ-4602
$69.95

Best Seller! 3 *Teflon*(R) coax connectors for HF/VHF/UHF antennas. Separate high voltage *ceramic* feed-thru insulators for balanced lines and longwire/random wire, Stainless steel ground post.

6 Coax

MFJ-4601
$59.95

6 high quality *Teflon*(R) coax connectors for HF/VHF/UHF antennas. Stainless steel ground post. Full 1500 Watt legal limit.

4 Balanced Line, 2 Coax

MFJ-4600
$79.95
New!

4 pairs of high-voltage *ceramic* feed-thru insulators for balanced lines and 2 coax connectors.

5 Cables, any-size

MFJ-4604
$99.95

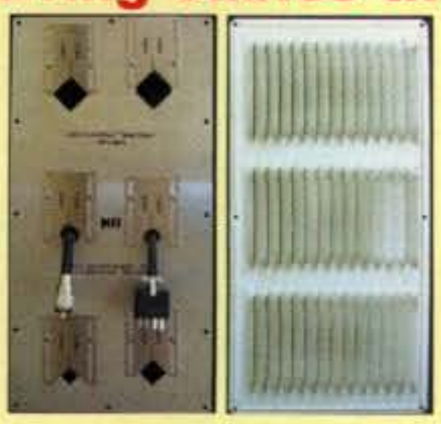
5 *Adaptive Cable Feedthrus*™. Pass any cable with connector: 2 cables with large connectors up to 1¼x1⅝ inches and 3 cables with UHF/N size coax connectors. Seals out weather.

All-Purpose FeedThru/CableThru™

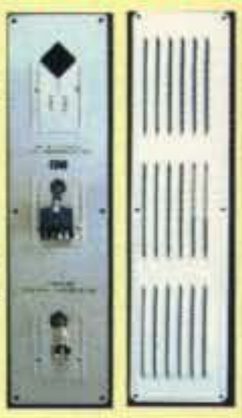
MFJ-4605
$159.95
New!

***Stacks** MFJ-4603 **and** MFJ-4604!* Gives you every possible cable connection you'll ever need through your window without drilling holes in wall -- including UHF, N and F coax connectors, balanced lines, random wire, ground, DC/AC power and cables of any size for rotators, antenna switches, etc.

Bring cables thru eave of your house



MFJ-4616
shown with standard full-size vent (not included) it replaces. For *6 Cables*
$26.95



MFJ-4613
shown with standard half-size vent (not included) it replaces. For *3 Cables*
$14.95

Replace your standard air vents on the eave/sofitt of your house with these *MFJ AdaptiveCable*™ *Air Vent Plates* and…

Bring in coax, rotator, antenna switch, power cables, etc. *with connectors* up to 1¼x1⅝ inches!

Sliding plates and rubber grommets adjust for virtually any cable size to seal out adverse weather, insects and varmints. Use existing vent hole, mounting screws and screw holes.

AdaptiveCable™ Wall Plates

MFJ-4614
For 4 Cables
$34.95

Bring nearly any cable -- rotator, antenna switch, coax, DC/ AC power, etc. -- through walls *without removing connectors* (up to 1¼x1⅝ inches). Sliding plates and rubber grommets adjust hole size to weather-seal virtually any size cable.

Includes *stainless steel* plates for each side of wall, sliding plates, rubber grommets, weather stripping and screws.

MFJ-4612
For 2 Cables
$24.95

MFJ-4611
For 1 Cable
$14.95

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

USA TOP SCORES

SINGLE OPERATOR – HIGH POWER
ALL BAND

KC3R (LZ4AX)	9,597,400
AK1W (K5ZD)	9,260,843
WC1M	9,103,680
AA3B	7,373,940
WM3T (N3KS)	7,151,560
AD4J (K3ZM)	6,384,784
KT5J (N2IC)	6,352,988
NY6N (N6MJ)	6,104,797
NY4A (N4AF)	6,011,330
KM7W (N6TR)	5,421,090

28 MHz

WN1GIV/4 (N4BP)	296,485
W5VX	28,290

21 MHz

NM5M	969,285
NJ4U	594,450
KZ5J	170,100
N6ND	27,750

14 MHz

KQ2M/1	5,348,477
WØUA	3,139,745
NR5M (K5GA)	3,060,828
K9OM	2,119,019
N8BJQ	2,050,428
AB7E	1,558,050
K4FJ	1,207,568
NØAT	971,432
KR2AA	951,096
N2NC	860,700

7 MHz

K9NW	2,331,744
WA1Z	1,344,234
W9/UY5LW	1,169,649
WX9U	968,072
W7IJ	757,358
AB9H	535,074
K9MUG/4	416,353

3.5 MHz

W3BGN	419,869
KØRF	330,624
W3NO	154,400

1.8 MHz

K8PO/1	12,449
NR6O (N6RO)	9,240
W9IND	1,860

SINGLE OPERATOR – LOW POWER
ALL BAND

*NV1N (N1UR)	3,592,587
*W3EF	2,950,275
*WJ9B/4	2,738,694
*K9QVB	2,494,410
*K2PS	2,306,963
*WK2G/4	2,047,104
*NR3X/4 (N4YDU)	1,752,894
*WD4AHZ	1,689,540
*WD5K	1,582,105
*WV7Q (N7WA)	1,340,583

28 MHz

*NA4W (K4WI)	8,908
*N2WN/4	8,120
*N3UA/4	2,184

21 MHz

*WB4TDH	252,800
*KU5B	119,475
*KE7DX	12,905
*K7MH	7,704

14 MHz

*N2MM	1,098,045
*WA1FCN/4	982,311
*NG9T/8 (K8IR)	382,660
*K7HBN	315,076
*KM6Z	252,492
*K3GW	178,461
*NWØDX (KØIO)	120,085
*WA2VQV/3	105,222

7 MHz

*W2EG	1,008,830
*WB8JUI	435,015
*AB1J	241,542
*AA5B	105,608
*KA9O	84,900
*KE1F/4	36,340

3.5 MHz

*KI3O/4	4,606
*N9TF	2,484

1.8 MHz

*WI4R	962
*K4WI	725

SINGLE OPERATOR – QRP
ALL BAND

N7IR	597,893
NAØCW (NØKE)	474,456
WA8WV	408,640
KT8K	357,557
AA1CA	291,760
W4OO	264,470
NN7SS (K6UFO)	221,496
K1SM	216,591
WI1G	109,025
W5JBV/4	93,939

28 MHz

N6WG	1,508

21 MHz

WA6FGV	10,218

14 MHz

K3TW	82,782
NU4B	81,030
NT1A	38,088
N5WLA	37,204
W8EH	36,400

7 MHz

NE6M	30,076

3.5 MHz

W8QZA/Ø	2,880

SINGLE OPERATOR ASSISTED
HIGH POWER
ALL BAND

WK1Q (K1MK)	5,796,895
K3WW	5,484,950
WW2DX	5,397,492
W8MJ	4,465,120
NN3L (N3RS)	3,768,720
NS1S/4 (K1ZZI)	3,220,480
W5WMU	2,798,643
W2YC	2,732,240
NO2R	2,700,130
ND9E	2,552,000

28 MHz

W9SE	8,614

21 MHz

KC4HW	19,278

14 MHz

W4CU	672,819
N6JV	293,094
KØBX	15,540
K4EDI	7,224

7 MHz

NN4N (W4ARM)	341,784
AA4VV	215,922
K3MQ	181,196
W2IRT	85,644

SINGLE OPERATOR ASSISTED
LOW POWER
ALL BAND

*N2BA	1,666,170
*W3FW	1,160,082
*NS4SN (W4IX)	960,890
*AA4FU	719,831
*K4FPF	692,265
*WK5X/4	621,338
*K3WJV	447,913
*WA3KYY	405,854
*N4KG	332,123
*KZ3M	280,194

28 MHz

*N4NM	7,504

14 MHz

*KJ9A	349,125
*WM6A (K6TA)	114,898

TRIBANDER/SINGLE ELEMENT
HIGH POWER
ALL BAND

KR4Z (N4PN)	3,908,800
K4BAI	3,277,260
WN2O (N2GC)	3,248,232
W1CU	2,593,020
KN6DV/2	2,517,798
AB3CX/2	2,442,242
NM5O (N5NU)	2,128,780
N1WR/3	2,081,340
NF4A	2,050,272
N3UM	2,004,080

TRIBANDER/SINGLE ELEMENT
LOW POWER
ALL BAND

*NR3X/4 (N4YDU)	1,752,894
*WD4AHZ	1,689,540
*N2BA	1,666,170
*WD5K	1,582,105
*KZ9O	1,287,018
*NA4K	1,218,474
*K4IE	1,097,577
*KV8Q	1,084,824
*NO3M	1,074,479
*WN6K	840,042

MULTI-OPERATOR
SINGLE-TRANSMITTER
ALL BAND

K1LZ	12,754,560
NG3R	9,072,530
KT3Y/4	9,010,276
KY4F	6,632,010
NQ2F	6,543,449
KX7M/6	6,488,498
WR3Z	6,044,074
W7VJ	5,165,370
NM7D	4,329,133
AJ9C	3,846,964

MULTI-OPERATOR
TWO-TRANSMITTER
All BAND

KD4D/3	13,809,375
NN5J	11,152,400
WW4E	10,047,840
NZ1U	7,451,520
WX5S/6	5,777,880
NK7U	4,852,802

MULTI-OPERATOR
MULTI-TRANSMITTER
ALL BAND

WE3C	21,910,252
NR4M	18,863,096
NØNI	8,390,088
WX3B	3,814,290
WQ2N	3,054,854

**Low Power*

a pre-contest goal of 500 Qs and I'm really happy I made it. This is my second WPX CW and I feel I improved a lot since last year." The trophy for top USA Rookie is sure to look good on his shack wall.

The overlay categories were open only to single operators this year. For 2010 they will return to allowing both single operator and single operator assisted entries.

Multi-Operator

As always, the Multi-Operator Single-Transmitter category produced some impressive scores. The three-operator team of DL5AXX, DL8WAA, and SV1RP operated CS9L to first place with over 20-million points. Another three-op team (5B4AGM, 5B8AD, UA9CDV) operated from C4N on Cyprus to finish second. The group at RU1A had over 2300 QSOs on 20 meters on their way to breaking the European record set back in 2001 by over 20%. Fourth place went to the team at K1LZ, who replaced the USA record also set back in 2001. The battle for second place in Europe was very close with ES9C, E7DX, OM7M, and OL3Z all within ten percent of one another.

The Multi-Operator Two-Transmitter category pitted two very strong teams against each other. The claimed scores between OLØW and 9A8ØØVZ were less than 0.1% apart! When the log checking was done, the OLØW group came out on top by just 100k points. Both groups did a fantastic job with just four operators each. Third place went to C4I, who set a new Asia record. KD4D/3 in fourth was the top USA score. NH7O, KL7RA, and XM7SV all had great efforts to make the Top Ten box.

WE3C set a new USA record on the way to the world high score for the Multi-Operator Multi-Transmitter category. The only other time this has happened from the USA was in 2003 by NY4A. The team at ZW5B struggled with poor conditions to finish a close second. UU7J had the highest number of contacts and prefixes in finishing third. EA8URL replaced the record score for Africa established back in 1997.

Club Competition

There were 124 clubs from around the world that met the requirement of three or more logs to be listed in the results. The highest club score came from the Bavarian Contest Club (BCC) in southern Germany. Its 204 entries help generate lots of activity on the bands for all of us. The Rhein Ruhr DX Association (RRDXA) passed the Araucaria DX Group from Brazil for second place by only 300k points!

The Potomac Valley Radio Club (PVRC) scored an impressive win over the 56 USA clubs that submitted three or more member logs. The Yankee Clipper Contest Club (YCCC) took second over a strong points-per-log effort by arch rival Frankford Radio Club (FRC).

There were more than 190 other clubs that did not meet the three-log minimum to be included in the listing. Some club scores were lowered this year as the new distance rule was enforced. A full breakdown of all club scores can be found on the <cqwpx.com> website.

Final Thoughts

We are pleased to announce that the results now include separate listings and awards for each Russian call area. This is in recognition of the increase in participation and log submissions from Russia.

There are a lot of people working to help make the CQ WPX Contest such a success. Thanks to K2DSL, N8RA, NJ1F, W1KM, W1KQ, W1TO, W1UE, W1ZT, W2JU, WA1Z, and WO1N for their help in typing all of the paper logs. F6BEE maintains the score records. W5GN does a great job handling the certificates and K1DG does the same for the plaques. The quality of the results wouldn't be possible without the software talents of K1EA.

For expanded results, including operators of multi stations and expanded QRM, visit the *CQ* website at :<www.cq-amateur-radio.com>.

The 2010 WPX CW Contest will be held on May 29 and 30. There are a number of rule changes for the 2010 contest, so please read the rules very carefully. Visit the frequently-asked questions page on the CQ WPX Contest website (**www.cqwpx.com**). Please submit your WPX CW logs by e-mail to <**cw@cqwpx.com**> before June 27, 2010.

73, Randy, K5ZD

QRM

I was using for this contest a 4-el OWA Yagi but condx were very very poor. Most of the time I was listening to 20 meters waiting for band opening on 15. ... **3G1X**. Radio finals got busted due to old age. Although SWR is 1.2 to 10–40 meters. ... **4D1N**. Working Australia 10,000 miles with only 2 watts. That's wow! TNX, mate. ... **5Q8A**. FT-840 (50W), whip at 11-floor balcony of apartment. Cycle 24 may be started slowly! ... **7K1EQG**. Excellent propagation on 40 meters, but with lot of statics. ZL stations were workable at least 3 hours after sunrise and 3 hours before sunset. ...

9A7T. The bands were much better than they have been recently. 20m was open almost round the clock and there was even a good opening on 10m. Many thanks to the organisers. 73 from Borneo to all participants! ... **9M6XRO**. Great contest. Was able to participate more than I thought I would and less than I would have liked. ... **AE5X**. Had a fun time. I wish I'd had more time to participate. ... **AF9J**. Condx were not so good, but enjoyed doing contest from tropical island. ... **AHØAA**. This contest got me back on CW for the first time in 21 years. ... **AI5G**. Started out with no plan. Just wanted to operate. Got hooked and then couldn't stop. ... **AK1W**. I had to work Saturday morning so I missed a lot of time. However, I gave the prefix and enjoyed a good weekend. See u all next WPX! ... **CO8ZZ**. My second CQ WPX CW. Glad to see all the bands open. My goal was to increase last year's score. Goal achieved! Thanks to CQ for organizing amazing contests. ... **CT1ENQ**. Another excellent contest. I had great fun doing contest despite my modest setup. Next year I will be again and with better setup, I hope, hi. ... **CU3HQ**. First time ever more than 1.5K QSOs in a contest with just one single wire dipole antenna. Almost 70 years of age: Who says you are beyond the prime of your life, hi. Thanks for a great contest, enjoyed it a lot! ... **DJ3WE**. 60th Anniversary of SOS Childrens Villages. ... **DL60CHILD**. First participation. Very good operators and very fun contest. ... **EA2BVV**. This was my first WPX CW and I worked many new DXCC on all bands. See you the next year I hope to learn and study more CW because now I'm a poor CW operator. See you in other contests. ... **EC1KR**. QRP entry (5W), mono-band (20m) dipole located under the roof, and a lot of QRN. Anyway, great time during this contest even if 99% of my Qs are European ones, which turned my WPX CW into kind of WAE! ... **F5PBL**. Someone turned on a switch somewhere. Are the good times back? ... **GØMTN**. Watching the score accelerate every time you work a new prefix multiplier is part of the fun of the WPX CW Contest! ... **G3TXF**.Using straight key, no computers! ... **GI4BQI**. Improved my score from last year despite pathetic conditions on Saturday. Impressed by the performance of my Bi-Square allowing me contacts into PY and LU using just 5 watts.10m was dead most of Saturday and Sunday evening only coming to life again at 11:50 PM. Typical! ... **GM4UBJ**. First airing of the new contest call for the Dragon ARC here in North Wales. Decent conditions on Saturday but very quiet during daylight hours on Sunday; things really opened up after sunset however and the final 2 hours of the contest were buzzing! ... **GW6W**. Enjoyed the contest very much though the claimed score is much less than it was last year. Maybe the propagation can be blamed and me, having not been on the top, too. Many thanks for Qs, see you next time! ... **HA2MN**. I could listen and work stations from East Coast by 5 watts QRP + short mobile whip (Lakeview 20m Hamstick on mag mount)! Propagation was amazing! This was a contest expedition to Honduras by UA3AGW. ... **HQ2R**. The usual tropical thunderstorms caused QRT numerous times. 10m openings to EU were surprising. Maybe there is hope for this cycle after all. 80 was disappointing with very high noise levels. ... **HSØZDY**. Very nice contest. First time SOAB full time, great fun! ... **IO4T**. The condition was open for Europe from evening in Japan. I'm very pleased to be able to contact with European hams! ... **JA7YCQ**. Great opening 0200Z Sunday over the pole to many UA and UA9 stations. Just like fishing in a barrel! ... **KØBX**. My last hurrah from this QTH. Moving to DC but without the tower and antennas, so you'll have to dig me out of the mud for that DC mult. Thanks to all for a great run. ... **K2PS**. Six-foot black snake crawled in radio room at 11PM Sat. nite. Very exciting! ...

EUROPE TOP SCORES

SINGLE OPERATOR – HIGH POWER ALL BAND

CU2X (OH2UA)	10,208,016
RS3A (RA3CW)	7,834,540
S5ØA	6,988,086
DL3YM	6,511,428
RM3F (UA3DPX)	6,488,673
RG6G (RW6HX)	6,371,000
LY9Y	6,358,450
OG8X (OH6UM)	6,232,000
YT5W (YU8A)	6,226,896
S53MM	6,170,859

28 MHz

UW1M (UR5MW)	481,100
E73O	446,220
E73C	395,200
AO3T (EA3AKY)	388,476
OH1RX	245,344
OQ5M (ON5ZO)	143,374

21 MHz

YTØZ	1,392,252
HG3R (HA3NU)	1,325,088
YL2SM	952,536
YU1KX	944,877
RZ3TZZ (UA3TW)	509,240
UR6IJ	331,875

14 MHz

IU9T (IT9GSF)	4,405,444
9A9A	3,950,100
S5ØK	3,407,768
YT9A	3,313,242
YU1EL	2,837,604
UY5ZZ (UY5ZZ/A)	2,624,128
OL8M	2,500,302
OF2ØØAD (OH5TS)	2,193,731
YT7DQ	2,055,872
EF7R (EA7AJR)	1,883,052

7 MHz

CT1JLZ (OK1RF)	6,075,936
YT5A (YU1EA)	5,541,777
9A5W	5,166,990
9A8A	4,505,454
9A3Y	3,185,868
OK1Z (OK1DKZ)	3,051,552
YL3FT	3,028,480
SK3W (SM5IMO)	3,006,250

3.5 MHz

9A1CCY (9A3NM)	1,808,466
RW2F (UA2FB)	1,612,764
OK2BYW	1,396,629
YT4T	1,202,604
SMØW	959,454
OL2N (OK1FDR)	844,358
SP5KCR (SP5JTF)	752,524
9A8M (9A7DM)	638,748

1.8 MHz

LY2IJ	299,673
OL1A (OK1CW)	288,358
HA8BE	285,762
S53O	242,490
9A3B (9A2VR)	236,989
LZ4TX	167,560
YO5AJR	129,717
SP6AEG	113,883

SINGLE OPERATOR – LOW POWER ALL BAND

*LY9A	3,413,552
*OL6P (OK2WTM)	2,859,392
*GJ3WW	2,837,742
*S51F	2,415,235
*EU2MM	2,115,390
*UT7NW	2,104,752
*S52OP	2,025,186
*LY4T	1,927,485
*RN4WA	1,859,286
*DD5M (DJØZY)	1,823,955

28 MHz

*9A3VM	276,963
*US5XD	192,945
*YR8A (YO8AXP)	183,680
*UA3QG	165,000
*RX6AH	101,783
*RX3BP	100,083

21 MHz

*YR8B (YO8DOH)	517,409
*EW6AF	278,641
*UA2FL	253,618
*Z31MM	248,159
*EI4CF	237,978
*LZ2JA	225,592

14 MHz

*YU2A	1,959,204
*HG4F	1,661,497
*S53F	1,484,440
*J41E (SV1BJW)	1,320,960
*EU1CL	1,319,937
*S57U	1,060,565

7 MHz

*9A7T (9A2EU)	1,944,940
*ER3DX	1,722,816
*S54A	1,353,690
*UU2CW	1,208,232
*LZ1GL	1,196,184
*SP5CNA	1,121,320
*SP6OJE	1,034,870

3.5 MHz

*E77C	634,695
*OL4W (OK1IF)	630,585
*UT7XX	598,858
*LY1ØØØCW (LY3CW)	514,167
*LY2GW	453,690
*YL5W	444,644

1.8 MHz

*HA8IB	132,508
*YT4A	119,892
*E79Z	118,146
*OK6Y (OK2PTZ)	105,185
*UX5NQ	99,009
*YT1T	76,121

SINGLE OPERATOR – QRP ALL BAND

4O4A	1,238,895
OK7CM	1,227,440
OK3C (OK2ZC)	1,123,344
US2IZ	1,066,725
RA3AN	906,326
HA6IAM	843,622
YP8A (YO8WW)	824,000
RW3AI	735,042
SP2DNI	684,560
F5VBT	607,223

28 MHz

ER1RR	25,092
F8AKC	10,773
SP5DDJ	3,792

21 MHz

SP4GFG	58,608
SP4JFR	24,200
OK1AIJ	5,880

14 MHz

IØUZF	298,027
LZ1VB	279,654
LZ1MG	208,861
AO7AAW	201,663
RW6FZ	157,096

7 MHz

YP6C	903,495
DL1DQY	519,365
F5UL	292,006
HAØGK	181,401
G4DBW	109,746

3.5 MHz

OK1FKD	199,870
9A9L	45,024
OK1WF	44,016
SM5OUU	31,088

1.8 MHz

ES1CW	34,485
SP4GL	16,575

SINGLE OPERATOR ASSISTED HIGH POWER ALL BAND

IR4X (IZ3EYZ)	9,160,470
LZ8E (LZ2BE)	7,286,538
E73M	7,020,878
DL3TD	6,804,672
LY8O	6,582,390
G1A (MØDXR)	6,320,160
S59ABC (S51DS)	5,704,920
OK7M (OK1DIG)	5,637,618
UA6LV	5,444,692
YR9P (YO9HP)	4,918,251

28 MHz

S57AW	403,524
9A2U (9A3ZA)	302,168
YT2T	255,640
OH4MDY	140,541
HA8TP	135,150

21 MHz

EA5FID	384,580
PA3EWP	307,192
YO5BBO	189,042
SP2JMB	182,920
ON6NL	112,776

14 MHz

HA9PP	3,000,404
RX6AM	2,987,206
UT4ZG	2,416,398
HB9DDO	1,520,480
F5IN	1,446,400

7 MHz

YU1LA	5,555,958
OE3I (OE3DSA)	3,384,564
HG3A (HA3MQ)	3,088,944
M7A (LY4Y)	3,026,082
LZ7J (LZ1CL)	3,002,880

3.5 MHz

S56X	1,315,146
HA3LI	867,141
LY7M	841,940
YT6T (YU7CM)	573,806
DR7T (DL1HCM)	498,006

1.8 MHz

S57M	209,040
DLØMB (DF2UU)	78,400
RA6CZ	19,716

SINGLE OPERATOR ASSISTED LOW POWER ALL BAND

*9A3XV	2,389,200
*OK1TA	1,550,374
*UY7C	1,460,525
*S54X	1,422,869
*OK1TC	1,214,952
*ON4CAS	1,106,315
*LZ9R (LZ3YY)	1,094,501
*SQ3RX	1,075,320
*HG8C (HA8EK)	1,063,628
*DJ1OJ	961,193

28 MHz

*UR5LO	138,381
*DH8BQA	109,680
*SP5XO	42,632
*RA6YDX	32,640
*EA5GS	28,560

21 MHz

*SP3GXH	91,590
*UR2VA	54,615
*SP8TJU	3,213

14 MHz

*YQ5Q (YO5OHO)	1,479,492
*US4LGW	662,656
*YT5CWW	385,742
*SQ5FWR	298,738
*UA6GM	231,820

7 MHz

*YU6DX	2,466,420
*HG8K	1,504,752
*PA4AO	1,222,292
*LY2KZ	941,787
*UT3L (US5LAC)	352,878

3.5 MHz

*SQ1DWR	290,169
*UX6VA	67,396
*UR5IHQ	66,411
*UR8IDX	44,298
*RA4HO	27,606

TRIBANDER/SINGLE ELEMENT HIGH POWER ALL BAND

S53MM	6,170,859
HG8R (HA8JV)	5,798,912
9A5K	4,823,122
LY5W	3,305,148
IN3QBR	3,298,816
EV2A (EW2AA)	3,209,080
EF3A (EA3KU)	3,172,609
YL9T (YL2TW)	2,622,144
YL8M (YL2KL)	2,522,160
UW8SM	2,516,736

TRIBANDER/SINGLE ELEMENT LOW POWER ALL BAND

*GJ3WW	2,837,742
*UT7NW	2,104,752
*DK5DQ	1,762,748
*OK1TA	1,550,374
*OV3X (OZ8AE)	1,463,616
*UY7C	1,460,525
*OK2QX	1,443,488
*S54X	1,422,869
*GØMTN	1,242,412
*UU1CC	1,222,320

MULTI-OPERATOR SINGLE-TRANSMITTER ALL BAND

RU1A	13,838,256
ES9C	12,562,719
E7DX	11,861,398
OM7M	11,688,672
OL3Z	11,666,757
OG6A	11,430,899
UZ2M	11,318,868
IR2C	10,234,884
TMØR	9,906,465
M6T	9,608,598

MULTI-OPERATOR TWO-TRANSMITTER ALL BAND

OLØW	15,156,414
9AØØVZ	15,041,455
DQ4W	13,533,914
HG1S	13,083,928
DL1A	10,956,855
S52ZW	10,676,765
G6PZ	10,580,064
DLØCS	9,945,265
OHØEC	5,795,865
LY3V	5,765,608

MULTI-OPERATOR MULTI-TRANSMITTER ALL BAND

UU7J	19,992,750
LZ9W	17,398,059
LY7A	12,593,398
DFØSAX	11,705,496
HF94KE	5,128,144
PA6Z	3,955,686
E71A	1,640,650
SP5ØDXC	1,501,830

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The easiest and safest way to connect power to all your 13.8 volt DC equipment. Standardize all your connections with Anderson Powerpoles®. All RIGrunners handle at least 40 Amperes, are fused at the input and each output, have blown fuse LED indicators, RF filter capacitors, and are sturdily built in aluminum enclosures.

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RIGrunner 8012 This powerhouse handles 80 amperes on two 40 Amp buses, each with six outputs. Comes with a permanently attached 6 foot #8 power cord with ¼ inch ring terminals for your power supply. It has our unambiguous LED voltage indicators and settable buzzer for over and under voltage alerts.

RIGrunner 4010S Automaticallypower on your station by switching your main rig on. This model has a circuit that it senses current drawn from the always ON master output and automatically powers on all nine switched outputs through a 90 amp FET. It also has manual ON-OFF and our unambiguous LED voltage indicators and settable buzzer for over and under voltage alerts.

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RIGrunner 4008H Eight always ON Powerpole® outputs and one input, with connections on the side to facilitate horizontal mounting.

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Anderson Powerpoles®

RIGrunner 4005H Five always ON Powerpole® outputs and one input, with connections on the side to facilitate horizontal mounting.

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SSB & CW COMBINED CLUB SCORES

UNITED STATES

Club Name	Entries	Total Score
POTOMAC VALLEY RADIO CLUB	122	167,011,655
YANKEE CLIPPER CONTEST CLUB	87	116,545,547
FRANKFORD RADIO CLUB	44	106,819,493
NORTHERN CALIFORNIA CONTEST CLUB	106	85,833,623
FLORIDA CONTEST GROUP	55	67,654,685
SOCIETY OF MIDWEST CONTESTERS	78	48,517,984
CENTRAL TEXAS DX AND CONTEST CLUB	26	35,378,854
SOUTH EAST CONTEST CLUB	32	31,264,576
ALABAMA CONTEST GROUP	30	30,443,131
TENNESSEE CONTEST GROUP	55	26,392,619
SOUTHERN CALIFORNIA CONTEST CLUB	37	24,363,959
WESTERN WASHINGTON DX CLUB	28	22,933,111
MAD RIVER RADIO CLUB	31	20,087,650
WILLAMETTE VALLEY DX CLUB	26	18,242,752
MINNESOTA WIRELESS ASSN	32	16,175,532
CENTRAL ARIZONA DX ASSOCIATION	28	15,627,209
CTRI CONTEST GROUP	8	15,477,308
HUDSON VALLEY CONTESTERS AND DXERS	21	12,836,478
NORTH COAST CONTESTERS	6	12,344,039
GRAND MESA CONTESTERS OF COLORADO	16	8,994,031
IOWA DX AND CONTEST CLUB	3	8,476,674
OKLAHOMA DX ASSOCIATION	4	7,570,026
LOUISIANA CONTEST CLUB	7	7,480,302
NORTH TEXAS CONTEST CLUB	11	6,700,995
BORING AMATEUR RADIO CLUB	4	6,533,055
MOTHER LODE DX/CONTEST CLUB	12	4,372,821
THUMB AREA CONTESTERS	4	4,081,803
SOUTHWEST OHIO DX ASSOCIATION	4	4,018,411
KANSAS CITY DX CLUB	8	3,517,979
TEXAS DX SOCIETY	6	3,401,727
NORTHERN ARIZONA DX ASSN	5	2,669,769
SOUTHERN CALIFORNIA DX CLUB	4	2,291,677
MISSOURI DX/CONTEST CLUB	7	2,257,284
UTAH DX ASSOCIATION	11	2,070,233
KENTUCKY CONTEST GROUP	7	1,934,515
SPOKANE DX ASSOCIATION	7	1,865,285
ORDER OF BOILED OWLS OF NEW YORK	8	1,690,487
SKYVIEW RADIO SOCIETY	6	1,506,766
NORTHERN ROCKIES DX ASSOCIATION	3	1,468,381
STERLING PARK AMATEUR RADIO CLUB	6	1,339,808
BERGEN ARA	9	956,315
FALMOUTH ARA	3	737,866
MAGNOLIA DX ASSOCIATION	4	576,448
WESTERN NEW YORK DX ASSOCIATION	3	500,383
ALLEGHENY VALLEY RADIO ASSOCIATION	4	490,305
WEST PARK RADIOPS	9	459,290
REDMOND TOP KEY CONTEST CLUB	6	457,001
ROCHESTER (NY) DX ASSN	8	400,039
CAROLINA DX ASSOCIATION	7	394,671
LOW COUNTRY CONTEST CLUB	6	350,721
SOUTHEASTERN DX CLUB	4	314,230
CAROLINA SHINE	5	296,779
METRO DX CLUB	3	168,958
GREAT SOUTH BAY AMATEUR RADIO CLUB	3	142,238
PORTAGE COUNTY AMATEUR RADIO SERVICE	4	137,237
HAZEL PARK AMATEUR RADIO CLUB	3	127,867

DX

Club Name	Entries	Total Score
BAVARIAN CONTEST CLUB	204	194,450,401
RHEIN RUHR DX ASSOCIATION	137	145,429,515
ARAUCARIA DX GROUP	49	145,147,549
CONTEST CLUB ONTARIO	66	110,133,167
CONTEST CLUB FINLAND	30	103,654,341
UKRAINIAN CONTEST CLUB	84	89,902,276
URAL CONTEST GROUP	34	89,027,286
BLACK SEA CONTEST CLUB	67	87,267,345
CROATIAN CONTEST CLUB	32	85,611,579
LU CONTEST GROUP	40	70,720,515
SLOVENIA CONTEST CLUB	36	69,256,103
YU CONTEST CLUB	26	61,764,741
BOSNIA AND HERZEGOVINA CONTEST CLUB	18	61,102,475
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	36	54,818,685
LZ CONTEST TEAM	4	48,939,072
RUSSIAN CONTEST CLUB*	29	47,940,030
SP DX CLUB	70	42,414,003
LATVIAN CONTEST CLUB	36	40,658,367
SKY CONTEST CLUB	8	36,592,649
LITHUANIAN CONTEST GROUP	19	36,401,292
BRITISH COLUMBIA DX CLUB	14	35,291,788
HUNGARIAN DX CLUB	11	33,829,896
TARTU CONTEST TEAM	4	30,297,528
CARIBBEAN CONTESTING CONSORTIUM	3	26,477,143
WORLD WIDE YOUNG CONTESTERS*	28	23,478,055
RIO DX GROUP	24	21,669,287
BELARUS CONTEST CLUB	14	20,041,105
SOUTH URAL CONTEST CLUB	11	19,672,456
CHILTERN DX CLUB	21	17,470,711
MARITIME CONTEST CLUB	16	16,902,647
ARIPA DX TEAM	3	16,485,898
CONTEST GROUP DU QUEBEC	11	13,998,961
BELOKRANJEC CONTEST CLUB	8	13,770,670
VRHNIKA CONTESTERS	14	12,139,217
CENTRAL SIBERIA DX CLUB	7	9,442,123
VYTAUTAS MAGNUS UNIVERSITY RADIO CLUB	11	9,193,849
UA2 CONTEST CLUB	12	8,114,434
CANTAREIRA DX GROUP	25	8,097,908
DANISH DX GROUP	9	7,562,028
FOX CONTEST CLUB	5	7,432,173
VK CONTEST CLUB*	13	7,281,367
STAVROPOL REGION RADIO CLUB	6	7,175,253
MICHURINSK CONTEST GROUP	3	6,939,863
LYNX DX GROUP	3	6,428,296
TEMIRTAU CONTEST CLUB	7	6,394,915
GIPANIS CONTEST GROUP	5	6,314,780
LES NOUVELLES DX	4	6,041,517
IZMAIL RADIO CLUB	8	6,005,654
NOVOSIBIRSK CONTEST CLUB	5	5,579,830
GRUPO DXXE	10	5,523,460
TOP OF EUROPE CONTESTERS	5	5,173,683
MOSCOW RADIO CLUB	7	4,846,983
LOW LAND CRAZY CONTESTERS	4	4,343,444
HAROS RADIO CLUB	5	4,330,270
KEMEROVO RADIO CLUB	4	4,272,671
ALRS ST PETERSBURG	12	3,871,703
CE CONTEST GROUP	5	3,684,602
DNEPR CONTEST GROUP	3	3,666,615
ARCK	9	3,477,212
SASKATCHEWAN CONTEST CLUB	3	3,418,206
PERM RADIO CLUB	3	3,392,760
WEST SERBIA CONTEST CLUB	4	3,014,280
YAROSLAVL CONTEST CLUB	10	2,996,452
STRUMBLE HEAD DX AND CONTEST GROUP	3	2,989,700
AUSTRIAN CONTEST CLUB	5	2,880,475
RU-QRP CLUB*	13	2,798,749
CSM BAIA MARE	4	2,792,667
GRUPO PORTUGUESE DX	3	2,740,130
SP CONTEST CLUB	12	2,544,689
SPORT CLUB MIERCUREA-CIUC	4	2,522,190
SHAKHAN CONTEST CLUB	5	2,374,610
YO DX CLUB	17	2,249,276
SIAM DX GROUP	7	2,115,832
RADIOCLUBUL RADU BRATU	3	2,050,873
TORRENT CONTEST CLUB	4	1,956,453
KIEV CONTEST GROUP	4	1,919,815
NOVOKUZNETSK RADIO CLUB	8	1,910,114
AMSTERDAM DX CLUB	4	1,834,923
BASHKORTOSTAN DX CLUB	6	1,757,861
ATCC	5	1,709,584
POISK	4	1,527,254
MARCONI CONTEST CLUB	5	1,473,743
GUARA DX GROUP	8	1,391,923
CSTA SUCEAVA	4	1,301,327
ARGO	3	1,081,317
SAMOTLOR	3	936,360
MAYCOPSKIJ RADIO CLUB	5	933,093
UNION FRANCAISE DES TELEGRAPHISTES	6	913,727
JABLANIK BEARS CONTEST CLUB	3	874,211
PODOLSK	8	859,205
599 CONTEST CLUB	4	801,275
SPEKTR	3	769,016
IRKUTSK RADIO CLUB	7	709,537
BALKAN CONTEST CLUB	3	628,624
BEEMSTER CONTEST CLUB	3	603,571
KKKK CONTEST CLUB KRASNODARSKOGO KRAYA	8	598,826
MEDITERRANEO DX CLUB	3	595,326
IVANOVO DX CLUB	3	582,656
OBNINSK QRU CLUB	5	571,879
RADIOCLUBUL NOSTRU DIN CONSTANTA	3	565,171
ACTIVITY GROUP BELARUS	3	545,773
DONBASS	5	520,980
SVARK	3	516,039
R4F-DX-G	4	499,958
SMOLENSK CONTEST CLUB	3	464,121
VLADIMIR RADIO CLUB	8	454,486
VORONEZH RADIO CLUB	3	406,826
VU CONTEST GROUP	3	364,652
VOLYN CONTEST GROUP	6	354,239
CS PETROLUL PLOIESTI	3	331,833
LKK LVIV SHORTWAVE CLUB	3	328,952
KRIVBASS	5	308,713
DUBNA DX CLUB	7	282,795
CSM CLUJ-NAPOCA	6	248,701
NANAIMO AMATEUR RADIO ASSOCIATION	3	206,779
SERPUKHOV RADIO CLUB	4	170,179
VERENIGING VAN RADIO ZEND AMATEURS	5	170,080
GRUPO ARGENTINO DE CW	4	153,150
TUPY DX GROUP	4	141,430
SOUTH GERMAN DX GROUP	4	138,551
R3L-CC	3	128,797
SP-CW-C	3	106,947
WAIKIKI AMATEUR RADIO CLUB	3	91,618
RADIO KLUB BAGDALA	4	62,228

** Club does not meet distance rule for all scores.*

K3MJW. The Russian UA/RV/RW stations really saved the day. ... **KCØMO**. I'd like to thank all the ops who took the time to get a QRP station, especially ZW5B and AY5F, who patiently pulled my numbers out of the ether. ... **KI6OFN**. Great contest. Had a bunch of fun and learned a lot. Also greatly improved my skills. ... **KJ4HYG**. Thanks to *CQ*. This was truly as good as it gets. Forget worrying about sunspots. Worry about something else. Condx were outstanding and how long has it been since 20m stayed open 24-hours a day? ... **KR4Z**. Who needs sunspots anyway? Maybe it's just a new antenna, but this is my best score ever with QRP. 20m just wouldn't quit in the evenings. It seemed easier to work the Europeans than to get a response from domestic CQers. ... **KX7L**. Summer opening for 10 and 15m bands made contest more enjoyable. 80 and 160m bands were a disappointment All in all: Very enjoyable! ... **LA2AB**. Wow! Europe QRP at the bottom of the sunspot cycle! Cool! ... **N6RV**. This was my seventh try at this great contest, and I always have a great time. 20 meters even opened to western Asia for a couple hours. CU next year! ... **N7EIE**. Good conditions for QRP operating. My best ever for QRP in a contest. ... **NFØN**. A great BBQ, plenty of Bud Lights, and oh yeah, a good 10 and 15 meter opening! What could be better? Thanks to "Webmaster Mike" (N2MG) and Scott "The Machine" (NQ2F) for getting us on the board. See you next year! (NQ2F@KD2RD) ... **NQ2F**. Most things that are as much fun as this contest was are illegal! The

OLD CQ WW WPX CW CONTEST ALL-TIME RECORDS

The contest is held each year on the last full weekend of May. The All-Time Records are updated and published annually. Data shown below is: callsign, year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	IH9/OL5Y('98)	341,068	182
3.5	TM5Y ('08)	1,983,366	567
7.0	LU1IV('97)	7,671,456	702
14	UP2L('09)	7,928,886	1043
21	ZX5J('05)	7,061,000	920
28	ZX5J('02)	6,787,440	857
AB	D4B('04)	16,619,000	1000

Multi-Operator Single Transmitter

	CT9M('08)	24,125,802	1182

Multi-Operator Two Transmitters

	EF8M('07)	33,324,192	1256

Multi-Operator Multi-Transmitter

	HC8N('99)	54,697,072	1264

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95)	40,446	107
3.5	W3BGN('08)	641,092	332
7.0	KG1D('05)	3,594,822	651
14	N2NC('06)	5,418,630	915
21	NU5A('99)	4,411,299	789
28	WW4M('01)	2,547,046	674
AB	KC3R('09)	9,597,400	806

Multi-Operator Single Transmitter

	K1LZ('09)	12,754,560	1120

Multi-Operator Two Transmitters

	KM4M('04)	16,283,745	1095

Multi-Operator Multi-Transmitter

	WE3C('09)	21,910,252	1274

CLUB RECORD

Northern Calif. Contest Club('02) 253,543,497

WPX (Prefix) RECORD

DR1A('08) 1313

QRP/p RECORD

P4ØW('97) 4,018,208

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	IH9/OL5Y('98)	341,068	182
3.5	7XØRY ('08)	1,701,260	407
7.0	IG9B('04)	5,187,819	613
14	6W1SJ('09)	6,755,364	924
21	5X1Z('01)	6,362,352	782
28	ZS4TX('01)	4,602,028	722
AB	EF8M('09)	17,288,864	1037

ASIA

1.8	4X4NJ('96)	259,420	170
3.5	TAØ/Z33F('02)	1,452,552	348
7.0	9K2HN('06)	4,541,970	606
14	UP2L('09)	7,928,886	1043
21	A45XR('99)	6,557,697	843
28	HZ1AB('02)	3,669,994	659
AB	4LØA('08)	11,213,664	888

EUROPE

1.8	SN7Q('08)	339,542	307
3.5	TM5Y('08)	1,983,366	567
7.0	CT1JLZ('09)	6,075,936	816
14	4O3T('06)	5,313,554	986
21	9HØA('02)	5,389,008	933
28	9HØA('01)	3,965,315	841
AB	CU2X('09)	10,208,016	1066

NORTH AMERICA

1.8	VA1A('99)	103,680	120
3.5	FM5BH('97)	833,490	315
7.0	V26BA('97)	6,227,550	659
14	N2NC('06)	5,418,630	915
21	ZF1A('99)	5,330,129	799
28	FM5GU('01)	2,849,769	621
AB	VY2TT('09)	12,878,826	1054

OCEANIA

1.8	KH6ND('07)	22,100	50
3.5	KH6ND('09)	596,673	231
7.0	ZM3A('09)	6,437,695	737
14	KH6ND('03)	4,126,690	730
21	KH6ND('99)	6,107,256	813
28	KH6ND('00)	1,523,008	424
AB	KH7XS('09)	9,124,899	879

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	LU1IV('97)	7,671,456	702
14	YW1A('91)	4,617,456	732
21	ZX5J('05)	7,061,000	920
28	ZX5J('02)	6,787,440	857
AB	P4ØW('94)	14,168,115	845

MULTI-OPERATOR SINGLE TRANSMITTER

AF	CT9M('08)	24,125,802	1182
AS	P33W('08)	21,314,175	1145
EU	RU1A('09)	13,838,256	1236
NA	8P4A('02)	18,516,960	1056
OC	AH2R('01)	11,541,420	957
SA	P49V('01)	19,760,744	1034

MULTI-OPERATOR TWO TRANSMITTER

AF	EF8M('07)	33,324,192	1256
AS	C4I ('09)	14,632,800	1005
EU	ES9C('08)	18,557,028	1266
NA	6Y1V('08)	20,507,972	1108
OC	ZL6QH('05)	13,312,768	952
SA	HC8N ('03)	30,928,268	1187

MULTI-OPERATOR MULTI-TRANSMITTER

AF	EA8URL('09)	10,543,122	906
AS	A61AJ('02)	42,766,232	1244
EU	DR1A('08)	24,285,248	1313
NA	6Y2A('02)	38,821,328	1274
OC	ZL6QH('04)	16,143,840	1010
SA	HC8N('99)	54,697,072	1264

QRPp

AF	5Y4FO('92)	649,057	311
AS	ZC4BS('02)	2,515,388	521
EU	LY5A('01)	2,331,414	646
NA	TI5X('01)	2,568,470	615
OC	FO8JP('86)	572,131	259
SA	P4ØW('97)	4,018,208	632

crew had a great time with one equipment failure. It seems like having the contest on a non-holiday weekend drew out more US and prefixes. Kudos to K5ZD and the cast that supports the WPX CW! ... **NR4M**. Good contest. 20 the main band and Europe signals most of the day. Thanks to all for a good time. CW rocks! ... **NR7DX**. Worked a few North American stations on 10m. Wondering if the frequency readout of my rig was erroneous, hi. It's been a long time, guys! Had some family obligations so had to go QRT the entire (local) Sunday afternoon; attended a horse-training show while browsing the DX Cluster on my mobile phone on the sly. Darn ... another multi missed, hi. Is ham radio just a hobby? I ain't to me; it's an addiction. CUAGN 2010! ... **ON4CAS**. Fine to hear so many FB CW operators ... **PAØWKI**. I like contest. Many USA stations and Russian stations. Tnx all QSOs. See you in the next contest. ... **PD5CW**. Thank you for the nice contest! I used portable field transceiver PFR-3, only 5 watts, and portable antenna G5IJ. Thanks to all hams who heard and worked me. All the best from Russia and 73! ... **RA3XEV**. 20m open 24 hours, 1350 NA stations (300 on 40m) from 5200 QSO, 250 JA, 1270 mults. Thanks RU4HP and UA1CUR; they have considerably strengthened our team. ... **RU1A**. 20m was great here. 866 Q's include 22 Q's by CQ mode is new record for my QRP. 10m was open here first time this year. QSOed 40 southern neighbours mostly. Enjoyed contest. Thanks for all. ... **RW4AA**. First time on the contest. Worked few hours, enjoyed my few contacts very much. Also enjoyed SD logger. Thank you ... **SV1AAK**. Hello Contesters! First participating to CQ Contest from Erzincan city. ... **TA7KI**. First QSOs on 10 meter in new solar cycle 24. New step in our growth score when break 10M points ... **TMØR**. It was a really great weekend! 20m band conditions on Sunday were amazing. I improved my last year result from 1.2 to 1.7 million points. ... **UR3IQO**. My first CW contest. The speed, I can't believe it. ... **VE5AE**. A difficult operation with excessive noise levels of S8+ on the low bands, with low power and a low antenna. A bit of fun and it was great to put another VK8 signal onto HF! ... **VK2GR**. Who needs sunspots? Very hard for VK to break into EU on 40 through QRM. ... **VK3TDX**. Enjoyed another WPX Contest. Conditions were quite erratic. ... **VU2UR**. Now we know what it must be like to run EU from the East Coast. Incredible conditions on 20. ... **W7VJ**. Wow, so many UA9/UAØ. Nice propagation over the poles. Still I long for these conditions on 10/15. Glad I'm young enough (61) to see this cycle peak. ... **WA1FCN**. Always a pleasure to work the WPX Contest *in any* mode. Been doing it for more than 30 years. 10 and 15m wide open for hours, but very little activity. Give it a try guys! ... **WE6EZ**. Good fun with the CW contest. Most of the time I use more S&P, because with 100W not always hear you and the big guns are powerful. ... **XE1AY**. Great conditions to EU for a change. ... **XM7GL**. Great contest from ZL2JU's QTH in outside garage. Freezing weather around 0°C, but plenty of signals on the bands to keep us busy. Difficult to break the EU wall from way down under here, but we had lots of fun. ... **ZL2AGY**. The worst 40m propagation ever for WPX. I was beaming to the sun, but no improvement in sunspot numbers. See you all next time in the log. ... **ZS4JAN**.

Where Do Errors Come From?

We began the WPX CW Contest log checking with 3,649 received logs containing 2,224,164 total QSOs. The computer was able to cross check 82.8% of these QSOs against another log. Of those, 94.9% checked good for both callsign and serial number. Rather amazing accuracy when you consider the challenge of weak signals, QSB, QRM, QRN, and other vagaries of real world radio communication. Contesting really is a training ground for improving communication skills.

Of the 35,451 different calls found in the logs, there were 20,273 (57.1%) of them that were only logged one time (so-called "unique" QSOs). Approximately 14,000 of these unique calls were computer cross-checked against other logs and found to be errors. A second manual cross-check process was applied to the remaining calls, which identified an additional 3,500 calls as being incorrect. The end result was that 84.6% of the unique calls were found to be errors. Yes, there are people who get on the air and make only one QSO, but this really doesn't happen very often.

The most common source of errors was from incorrect copy of calls containing lots of dots, such as the letters S and H, or number 5. One great example is the call KH7XS, which was logged incorrectly 93 times in 17 different variations. Another problematic combination was calls containing V and 4 or B and 6. Rare or unusual calls that have extra numbers in the prefix are also sources of errors. Some of the callsigns generating the most errors (with number of times incorrectly logged) included HF94KE (405), OL25LP (205), ES9C (201), HG1S (136), VC2A (117), NH7O (113), EE2W (111), AB1HZ (103), NV1N (102), RZ9HT (96), HG6N (97), S52ZW (83), and 9A8ØØVZ (70). In many cases the errors matched bad callsigns spotted on the DX Cluster. Caveat emptor! It is your responsibility to confirm the call of each station in your log.

Even with the deep log checking, there were still 131 stations that produced logs with no score reductions. The top golden logs (with number of QSOs) were: LY1CX (523), N9CK (300), KØCF (250), RAØAY (201), SP4GFG (241), N9LYE (236), E21YDP (234), KA6NGR (214), AD5Q (210), and PA5TT (201).

The average score reduction for all single operator entrants was 13.9%. For the top 20 single op scores, the average reduction was only 5.5%. Detailed log-checking reports are available for every submitted log and may be requested by sending an e-mail to <k5zd@cqwpx.com>.

(Continued on page 105)

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A new entry in the ham transceiver market with a unique receive circuit gets the once-over—and a thumbs-up—from Gordo.

CQ Reviews:

The Jetstream JT-220M 222-MHz, 50-Watt Mobile

BY GORDON WEST,* WB6NOA

It is good to see new manufacturers entering the ham radio transceiver market. The new entry product may be something entirely new, a product that takes up where another manufacturer stopped, or a product priced substantially lower than the competition, hoping to get into the ham transceiver marketplace.

A new entry is best launched by a marketing expert well-established within the ham radio industry. This is *exactly* how Jetstream enters the ham transceiver market with its 50-watt 222-MHz mobile radio, with marketing direction from Evelyn Garrison, WS7A. Evelyn is one of the ham industry's pioneers in innovative marketing strategies, having directed amateur radio sales at ICOM America, Alinco, and now Jetstream.

Evelyn points out that even though Jetstream is not yet a household name among hams (something she aims to change), the Ohio-based company has actually been in business for 15 years, focusing until now on antennas and accessories, as well as "private label" products that bear a retailer's brand name.

It wasn't until last year's Dayton Hamvention® that I realized how many products Jetstream was offering:

- Dual-band and tri-band VHF/UHF fiberglass base antennas
- Scanner discones
- Coax cable and coax switches
- Fan dipoles
- A full line of power supplies, including repeater battery-backup supplies
- Cross-needle SWR bridges and speakers—and now…
- A new 50-watt, 99-channel, 222-MHz FM mobile radio, the JT-220M.

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e-mail: <wb6noa@cq-amateur-radio.com>

Jetstream's JT-220M 50-watt mobile rig for 222 MHz. The display is very bright, and this is at the low brilliance level!

Actually, the JT-220M is a mobile or base station, using one of Jetstream's power supplies and its JTB 5 tri-band base antenna 144/222/446 (or the power supply and antenna of your choice). The radio is manufactured in China, and while we've all heard stories about quality issues with Chinese radios, Evelyn says the person in charge of manufacturing the JT-220M is someone with whom she has worked for more than 30 years, while at both ICOM and Alinco, and that she has full confidence in the quality and workmanship behind this transceiver.

A Heavyweight Mobile

This mobile is no lightweight; it weighs over two and a half pounds, with most of the weight in the heavy upper and rear heat sink. The 10-foot power cord will get you into the engine compartment for a direct battery or near-battery hookup. We measured nearly 10 amps on transmit, and you don't want to continuously pull this much current through an accessory socket in the mobile. If you are paying the money for a high-power 222-MHz mobile, go direct to the battery for a full 50 watts out!

Our testing was first conducted on the bench, and there are enough repeaters on 222 MHz here in southern California to judge voice quality on transmit, as well as distant repeater and simplex receiver capabilities. We had no problem with 50 watts output, and our IFR gave us 0.25 µV, 12 dB SINAD, nice and hot sensitivity, dual conversion, although we

Gordo takes the Jetstream for a spin in his dune buggy,and can easily hear the volume over the loud engine!

seldom had much interference on this band, even in southern California.

Front-Panel Controls and Readout

On turn-on, the bright-blue display was so bright that we immediately went to the instruction manual to find the display dimmer. There are only two levels, too bright at night, or just right. I would have liked one more level down, but only two levels are offered at the moment.

The JT-220M's mobile display characters are black on a blue background. During the day, in the bright sunlight, they showed up just fine. These aren't the skinny little characters, nor are they big and bold either. They are right about in the middle.

The large channel-changing knob has a nice feel, and the same with the upper-right *large* volume control. However, there is no squelch knob. Squelch set is a menu item, and on the 222-MHz band this is no big deal because the background noise level doesn't change all that much, as it might on 2 meters or low band. But many of us like to reach over and "crack the squelch," giving us an audible check of where we have set the volume. You can still do this by

The front panel is connected to the rest of the radio by just one ribbon cable, suggesting possible remote applications in the future.

Here the JT-220M undergoes a "cat scan" on WB6NOA's specially-equipped test bench!

pushing the squelch *button* for one second, disabling squelch completely.

Next to the volume is the data input jack for cloning and connecting the security alarm cable (more on this later). I'm not sure why this seldom-used jack would be on the front; if a jack on the front, I would have preferred an audio-out jack for an earphone for when I'm rolling down the beach in the WB6NOA dune buggy. Yes, there is a speaker jack on the rear, and on my test radio it was the lower jack, which in the instruction manual is marked "external power jack," to be used with your vehicle's ignition circuit. Just eyeball the two rear jacks, and later on the instruction book will show the jacks properly marked.

The instruction book is humorous to read, in their best attempt at translation. However, this unit is so simple to operate and program that you really don't need the book, and any goofs lost in translation can easily be overlooked.

Frequency Selection

You can dial in specific frequency information or you can program the 50-watt mobile with Jetstream's software and optional programming cable. Memory channel readout is either alphanumeric or by frequency (your choice for each memory channel). However, if you're a new ham or other hams are likely to use your rig, don't become too dependent on the alphanumerics. During the recent California wildfires, many new hams with alphanumerics on their displays were stymied when told to go to a specific frequency such as 446 MHz simplex, as they had no idea where to find it in alphanumeric memory.

Each memory channel holds a frequency, selectable offset, offset direction, CTCSS and DCS tones, and narrow or wide FM. While we don't have any 2.5-kHz narrow-band FM activity on 222 MHz here in southern California, it's good to know that we can switch from 5-kHz deviation down to 2.5-kHz deviation.

The offset is not automatic. If you go to 223.500 MHz simplex,and forget and leave the minus offset showing, indeed you won't be transmitting where you are listening! Also, if that negative offset would take you out of band, "ERROR" will show up on the display, with an accompanying "raspberry" sound on transmit.

On the Air

Transmit is unique. The microphone "push to talk" goes click, letting know you are transmitting, and when released, the transmitter drops audio but remains keyed up for about 500 ms. The sound on the air would be a "kerchunk," similar to some RadioShack sets you might hear on the 2-meter band. This could slow things down a bit in a fast-paced net operation, but should not pose a problem in any other setting.

Everyone gave us excellent signal reports. The microphone cord was ultra heavy. The backlit keypad on the mic itself was easy to see at night. There are up/down buttons for changing channels or frequencies, a switch to lock out DTMF, and a lock button that locks the keypad, but does *not* lock the up/down buttons. I'll modify this soon, to keep new students from accidentally popping off channel when they tap the up or down buttons on the top of the mic.

During prolonged base-station transmit this 50-watter didn't even work up a sweat! It got a little warm after 10 minutes of continuous transmit on a net at 50 watts, but not hot.

Favorite repeater and simplex channels are easily memorized, but power levels remain global for all channels. If you leave it at 50 watts and you take your 222 HT just down the street, your licensed better half will still be pumping out 50 watts on simplex *(unless, of course, s/he turns down the power level!—ed.)*.

It's quick to drop in memory channels, and the friendly display lets you know which channels are already occupied with saved information and which ones are free. If you *do* decide to go with alphanumerics, best do it on the computer, as it's tedious with any radio loading it from the front panel letter by letter!

Additional features! Yes, tone decode is included as well as encode. A vertical bar graph shows relative signal strength on receive, as well as relative transmitter power out. However, there is no indication of high VSWR, so every now and then do an antenna check.

There are also lots of scanning types, beeps, adjustable timeout timer, automatic power off, busy channel lockout, and check this—a burglar alarm! "This alert uses a beep sound when the unit is about to be removed in an unwarrantable way," says the instruction book. The book then spends an entire page on how the alarm sounds off, how to shut it down, and if you read the fine print, you see the alarm plugs into the front-panel data jack, even though the book shows it going somewhere else. I would think your car alarm would be a great warning before they get their hands on the equipment! Nonetheless, I suppose it would cause a burglar to think twice.

A Unique Receive Circuit

We ran the JT-220M 50-watt mobile for a solid week, in mobile as well as base-station use, and it gave us great performance, nice signal reports, and an interesting receive mode called "compander." This circuit may be switched

on, and magically a mobile station coming in 50% quieting will now come in 100% quieting. All the background mobile noise seems to disappear when the compander function is turned on. You will need to crank up the volume all the way, because the circuit cuts the speech audio level by about 3 dB. Nonetheless, it's an interesting circuit that I have not found in other mobile transceivers—and it's not DSP, but rather voice compandering, a noise-reduction system similar that used in Dolby® noise reduction for music recordings.

The overall operation of the Jetstream 222-MHz transceiver was great, with extra loud audio in the noisiest of vehicles, good transmit audio, and the backlit microphone keypad doubles for frequency input as well as DTMF dialing.

The removal of four screws opens up the Jetstream, and the circuit boards look professional and tidy. A single plastic ribbon cable electronically connects the head to the body, and who knows if Jetstream may soon offer a separation kit. Also, I spotted an accessory plug on the circuit board. Might this be a hint it will accept digital options in the future?

The equipment is warranted for one year, and in speaking with a few of Jetstream's 37 US dealers, all reported great success with the product.

Since the 222-MHz band is usually a "next band to do" for operators already on 2 meters and 440, those operators have a good idea regarding mobile-radio programming, features, and splits, and will quickly understand the operation of the Jetstream 222-MHz gear.

It was seen selling for an average price of $245, on a par with the only other single-band 222-MHz transceiver currently on the market, the 25-watt DR-235 MK II from Alinco. You'll find additional company on the band from folks who have 222-MHz handhelds from Alinco, Kenwood, and Yaesu.

It is quite a radio, and with Evelyn Garrison's backing, the future for Jetstream looks good! "Jetstream is working hard to have quality products at great prices. We feel we are never done and are always striving to improve on existing products and continue to introduce more items, including additional transceivers. We have over 100 years of combined experience in the amateur radio industry," states Evelyn.

For more information on the complete line of Jetstream products and a dealer listing, go to <www.Jetstream-USA.com> (remember the dash), or e-mail <sales@Jetstream-USA.com>.

BY IRWIN MATH,* WA2NDM

Experimental Transmission Project (continued)

Last month we built the transmitter portion of the FM-modulated communications system. This month we will concentrate on the receiver. For reference, fig. 1 is the block diagram of the complete system. The transmitter accepts audio from a microphone, amplifies it, and then drives a 75-kHz (nominal) voltage-controlled oscillator. This produces an output pulse stream that is FM modulated by the incoming audio. The pulse stream is then used to drive a transmitting source (in the original system this was a light-emitting diode). At the receiver, a photodiode (in the original system) converts the modulated light pulses into tiny current pulses (if light is used), amplifies them, and then limits them to eliminate any residual AM. The amplitude-limited pulses are then demodulated by an FM detector and converted back into audio. The resulting audio is then amplified and applied to a small speaker or pair of headphones.

Fig. 2 is a schematic of the receiver's front end. The first stage is a current-to-voltage converter using a high-speed op-amp. This device can be almost any voltage-mode op-amp with an open loop bandwidth of at least 10 MHz or higher, such as (but not limited to) the type indicated on the schematic. Since the received carrier is at 75 kHz, the wide bandwidth of this stage will assure that a clean square-wave signal with good rise and fall times is reproduced. Tiny current from the photodiode is converted to a voltage by this stage in accordance with a transfer function of anywhere from 10,000 to 110,000 times depending on the setting of the 100K potentiometer. This means that an input current of 10 microamperes (corresponding to 20 microwatts of light at 850 nm, for example) will produce an output in the range of 10 to 100 millivolts (again determine by the setting of the pot). This signal is then applied to an LM311 comparator. The signal itself is applied to pin 2, while a differentiated version of the signal is used as a reference and connected to pin 3. Since the input is roughly a square wave (at 75 kHz), regardless of the degree of modulation the capacitor across pin 3 will always charge to approximately 50% of the peak-to-peak amplitude of the input. This forces the comparator to switch at or close to the center of the square wave, with the result that a minimally distorted 5-volt pp signal will appear at the output (pin 7) of the LM311. In addition, since any variation in the amplitude of input signal will also result in a similar variation in amplitude of the reference voltage (at pin 3), the comparator will always readjust itself to switch at (or close to) the 50% point. This feature neatly eliminates any AM component that might be present, which is, of course, what the limiting function in an FM receiver is supposed to do. If you have a scope, you can see how this works by comparing the signals on pins 2, 3, and 7 of the LM311 while you vary the input signal level.

Now that we have produced a constant-amplitude signal, it is time to convert it back into audio. Fig. 3 is the schematic of the FM detector and the audio output stage. An LM568 phase-locked loop

*c/o CQ magazine

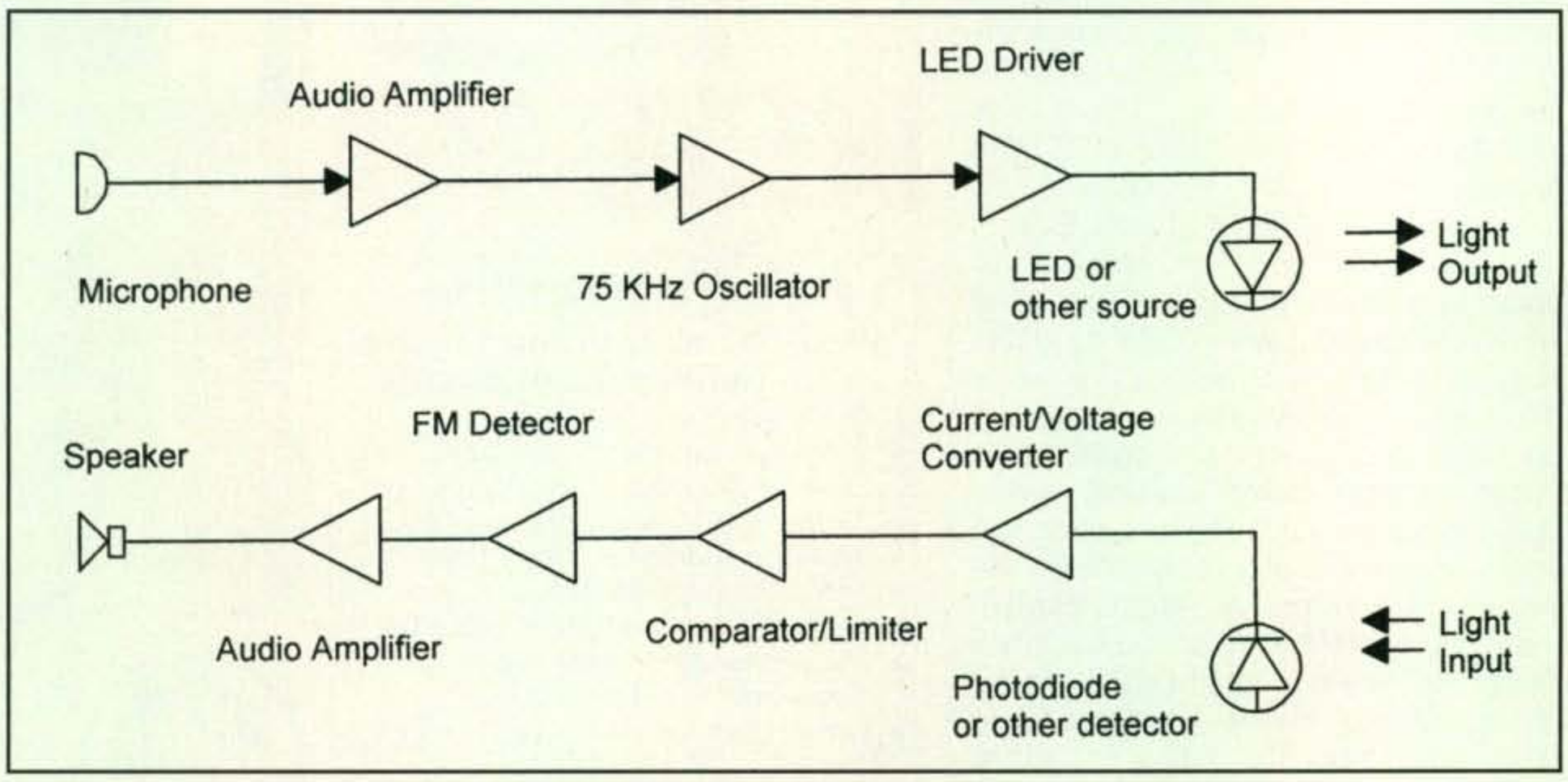

Fig. 1– Block diagram of FM transmitter/receiver.

is used here as the FM detector. The 10K pot is used to tune the detector to the frequency of the incoming signal, and when properly adjusted, the resulting output will be low-level audio. A simple 1K resistor and 0.01-μF capacitor form a low-pass filter in series with the output to remove any residual 75-kHz carrier but still allow the recovered audio to pass. The final stage is our favorite, the LM386 audio amplifier. It provides enough gain to drive a small loudspeaker or pair of headphones.

Adjusting the detector involves setting the 10K pot to twice the expected received signal frequency (in this case 150 kHz) as measured at pin 5 of the LM568. The best way to do this is with a frequency counter connected to pin 5 through a common low-capacitance (10 pF or less) 10X oscilloscope probe. The capture range of the LM568 is pretty wide, however, so this setting is not especially critical. If you do not have a scope, you can simply adjust the 10K pot for the best overall recovered audio. Power for the entire optical receiver is provided by the same simple regulated power supply described last month.

After all is built and the various stages "smoke" tested, it is a good idea to do a preliminary overall system check. This will give you the assurance that everything is working properly before you start on the "antenna" portion of the project. For preliminary testing purposes any high-output, visible red LED and silicon photodiode will do. When connecting the photodiode, however, be sure to keep the lead going to pin 2 of the op-amp as short as possible. Because of the high gain and wide bandwidth of this stage, the input lead can easily act as an "antenna," and if it is too long, noise and other extraneous signals will be picked up, interfering with normal operation. A lead length of 1/4 inch or less is ideal.

To begin, first place the transmitter's microphone next to a continuous source of audio such as the output of a radio or stereo. Next temporarily connect the transmitting LED to a couple of wires and arrange it so that it is pointed directly toward the receiving photodiode and about 6 inches away. Now adjust the various pots until a clear, undistorted signal is received. Slowly move the transmitting LED out of the direct path of the photodiode (to reduce the received signal level) and readjust all of the potentiometers again until maximum sensitivity is achieved. If you are careful, you may actually be able to receive signals reflected off a wall at the far end of the room in which you are

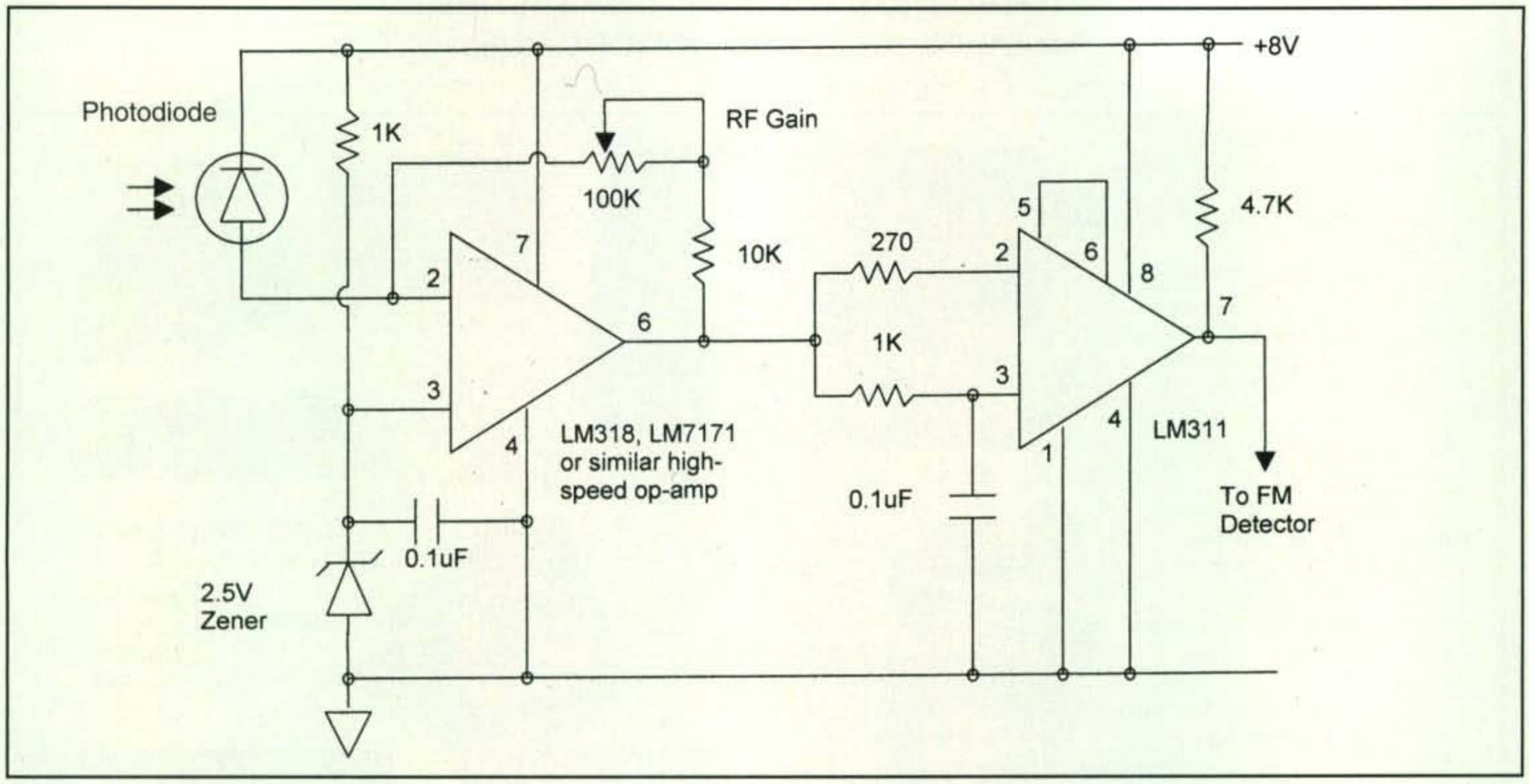

Fig. 2– Optical "front end."

working. If you have any problems along the way, use a scope and probe all stages, one at a time, starting with the transmitter, until you find the stage with the problem.

When all is operating properly, you can replace the test LED and photodiode with the final source and detector devices with which you want to experiment. You will have to modify the transmitter driver to match your source, as well as probably change the front-end sensitivity to match your detector.

Some possibilities are to use ultraviolet LEDs and detectors to experiment with non-line-of sight systems as discussed a couple of months ago. Another possibility is to configure an array of LEDs with a suitable high-current driver for increased range. You could even drive a laser salvaged from a laser pointer or an RGB combination LED for a pseudo tunable system as also previously discussed. For a real change, you could try to build an ultrasonic transmission system using common 40-kHz transducers or even stereo tweeters. If you do, you may have to change the operating frequency from 75 kHz to 40 kHz. The field is only limited by your imagination. Who knows what you might come up with!

73, Irwin, WA2NDM

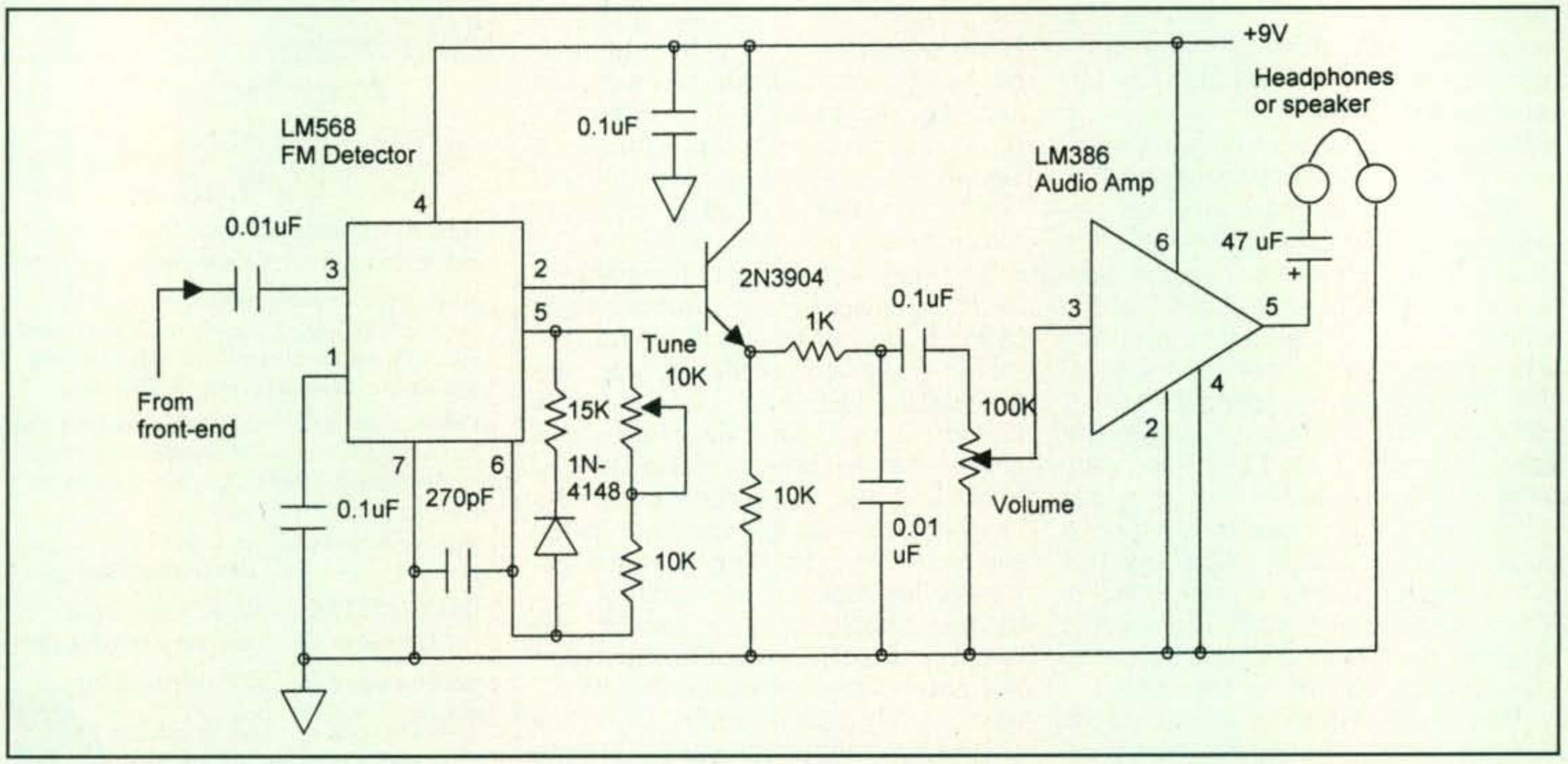

Fig. 3– FM detector and audio output.

What You've Told Us...

Our October survey asked for your views regarding online publications. To start with, 92% of the readers who responded have internet access at home, and 91% of them have broadband. Most of the respondents (57%) do not currently read any online magazines, but a healthy 42% do. On the other hand, two-thirds of you read magazines that offer both print and online versions. Of that group, a large majority (71%) reads only the print version, while 22% read both versions and 7% read the online version only.

Asked how you approach reading online magazines, after factoring out the 48% who say they don't, 46% download and save the issue, either to read later onscreen (23%) or to print out (23%). Another 40% read directly from the website while 14% print selected pages directly from the magazine's website. On the question of your comfort level with reading online magazines, 54% of those offering an opinion are either somewhat or very uncomfortable while 46% are either somewhat or very comfortable.

Three-quarters of the respondents do not currently pay for reading online magazines, and two-thirds say they would not do so, while 30% say they would pay for an online subscription but would expect a reduced rate over the cost of a printed and mailed magazine and 3% said they would pay the same regardless of format. Finally, we asked what you thought would be a reasonable subscription rate for an online magazine, and 59% of you said (again) that you would not pay for online content. Of the rest, 29% said $10–$15 per year, 26% said $5–$10/year; 19% said $15–$20, and 8% each said less than $5, $20–$25 or $25–$30.

This month's free subscription winner is R. Reams of Wendell, North Carolina.

Reader Survey
March 2010

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

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

This month, we'd like to find out more about your personal copy of *CQ* magazine.

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

1. How did you get this copy of *CQ*?

Subscription copy delivered to me by mail 1
Purchased at ham radio store or hamfest 2
Purchased at newsstand or bookstore 3
Passed along to me by a fellow ham 4
Reading a library copy 5

2. What is your usual reading pattern for *CQ*?

Read entire issue, front to back 6
Read entire issue, starting with favorite column 7
Read articles/columns of interest first, then read the rest later 8
Read articles/columns of interest only 9
No particular pattern; varies with each issue 10

3. What will you do with this copy of *CQ* when you're finished with it?

Save it for future reference 11
Save it for collection purposes 12
Pass it along to another ham 13
Pass it along to a club library 14
Recycle it 15
Throw it in the trash 16
Return it to the newsstand 17

4. Which ham radio-related magazines do you read regularly?

Amateur Television Quarterly 18
AMSAT Journal 19
CQ 20
CQ VHF 21
CQ Radio Amateur (Spanish CQ) 22
DX Magazine 23
Monitoring Times 24
National Contest Journal (NCJ) 25
Popular Communications 26
QCWA Journal 27
QEX 28
QST 29
WorldRadio Online 30
Other 31

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

washington readout

BY FREDERICK O. MAIA,* W5YI

Top Ham Radio Stories of the Past Decade

I am writing this on the final day of 2009. Another decade has passed and 2010 is upon us. From 1999 to 2009, the amateur radio world changed dramatically. The Amateur Radio Service of today is quite different from that of the 1990s. The following is what I believe are the most important amateur radio events of the 2000s. They impacted just about every current and future ham radio operator.

Amateur Radio Restructuring

Before the new decade, the last major restructuring of the Amateur Radio Service rules had taken place in 1989 (PR Docket No. 88-139) when the Commission eliminated unnecessary rules and simplified complex terminology. The classes of operator licenses and examination requirements to obtain these licenses, however, remained the same. That changed in 2000.

The new decade started out with the FCC releasing a 70-page Report and Order (WT-Docket 98-143) restructuring the Amateur Service into three license classes. At the time there were six: Novice, Technician, Tech Plus, General, Advanced, and Amateur Extra Class. This was accomplished by "grandfathering" the Novice and Advanced Class operator licenses and combining the Technician and Technician Plus into a single class. This in effect phased out the Tech Plus Class.

The only difference between the Technician and Tech Plus Class was that a Tech Plus operator had passed a five words-per-minute (wpm) telegraphy examination. Tech Plus operators still retained credit for the 5-wpm code exam indefinitely. Their authority to operate HF was conveyed by the Certificate of Successful Completion of Examination (CSCE) received from the VE team when they passed the 5-wpm code exam.

All six classes remained in the FCC's Amateur Service database, however, to this day. Novice and Advanced Class amateurs would be able to modify their licenses (that is, change their name, address, and callsign) and renew their tickets indefinitely.

Effective April 15, 2000, applicants would only be able to be examined for three classes: Technician (the VHF/UHF entry level); General (the HF entry); and Extra, a technically oriented senior license. The Technician Class continued as a "no code" ticket. No new Novice, Tech Plus, or Advanced Class licenses have been issued since April 15, 2000, and only one Morse code examination at 5 words-per-minute (wpm) remained at the time. The number of license exams was reduced to four. There had been eight, the most of any country in the world.

The FCC said the Amateur Radio Service fundamentally is a technical service and it "... believed that an individual's ability to demonstrate increased Morse code proficiency is not necessarily indicative of that individual's ability to contribute to the advancement of the radio art." As a result, the 13-wpm (Element 1B) and 20-wpm (Element 1C) were discontinued. The FCC declined, however, to abolish all CW exam speeds until the international radio regulations were changed to eliminate the mandatory telegraphy proficiency requirement in the Amateur Service worldwide.

The FCC-mandated ten written exam topics were also eliminated effective April 15, 2000. The VECs' Question Pool Committee (QPC) would now have free rein to decide on the content of each of the three written examinations. Both the Technician Class multiple-choice written exam (now called Element 2) and General Class written exam (now Element 3) would contain 35 multiple-choice questions. The Extra Class written Element 4 test, would have 50 questions. The question-pool system remained intact, and each of the three remaining question pools were still required to contain at least ten times as many questions as would appear on an examination.

Technicians licensed before March 21, 1987 retained exam credit for both the 5-wpm code and the new General Class Element 3. They were eligible to upgrade without further examination and were the only group of radio amateurs to achieve additional frequency privileges as a result of the Report and Order. Thousands of Technicians ap-

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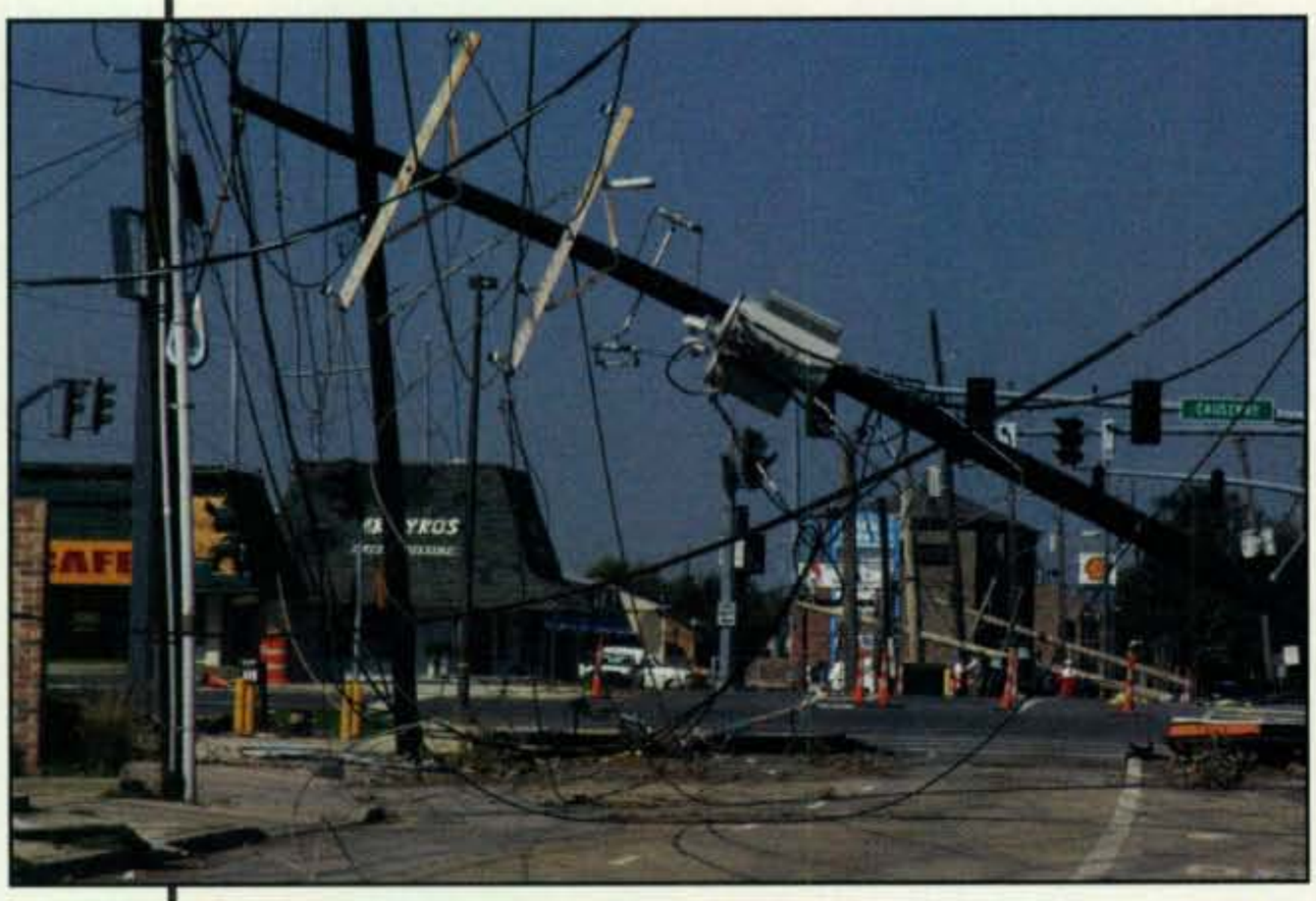

With telephone and power lines down throughout the Gulf Coast area after Hurricane Katrina in 2005, amateur radio was there to provide communications. (Photo by Liz Roll/FEMA)

plied for a "paper upgrade." General and Advanced Class radio amateurs could upgrade simply by passing Element 4 without passing an additional code exam. There was an unprecedented mad rush to upgrade.

In addition, station licenses in the Radio Amateur Civil Emergency Service (RACES) were eliminated as being unnecessary for amateurs to provide emergency service. However, the RACES service remained. The new Part 97 rules also required that club and military recreation station licenses be modified or renewed through a Club Call Sign Administrator (CCSA) who would electronically submit the information to the FCC.

It was particularly difficult for the Volunteer Examiner Coordinators' Question Pool Committee, which had to revise all three written examination pools at once ... and in only 30 days. The number of questions in the five Novice (Element 2), Technician (Element 3A), General (Element 3B), Advanced (Element 4A), and Extra Class (Element 4B) question pools were reduced and folded into three pools: Elements 2, 3, and 4. Element 1 was the 5-wpm code exam.

The new (Element 2) Technician pool consisted of questions from the Novice and Element 3A pool. The new (Element 3) General pool primarily came from the old Element 3B pool. Also, the new Element 4 (Extra Class) pool consisted of questions from the old Element 4A (Advanced) and 4B (Extra Class) pools. Several questions were revised or added to the pools to reflect the new restructuring rules. All three question pools were released to the public on February 1, 2000 by the Question Pool Committee.On April 15, 2000, the VEs began using the new question pools.

Morse Testing Made Optional at WRC-2003

World Radio Conferences used to be held every 20 years by the International Telecommunication Union (ITU), the worldwide body governing telecommunications. However, with the rapid development of technology and its associated demands on spectrum, WRCs are now convened much more frequently ... about every two or three years.

Each International Amateur Radio Union (IARU) region also conducts a triennial conference of national amateur radio societies that lie within their borders. The IARU is a federation of national amateur radio societies from around

the world. Region 1 consists of Europe (including China and Russia) and Africa; Region 2, North, Central, and South America; and Region 3, the Middle East, Asia, Australia, and the South Pacific.

During the early 2000s, the IARU developed a position regarding future amateur radio qualifications that are embodied in the international Radio Regulations: ITU Article S.25. At the time, the international amateur service rules required demonstrated Morse code proficiency in order to operate on the HF frequencies.

Article S25 of the Radio Regulations stated in part: "2735/S25.5—Any person seeking a license to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz."

Updating the Amateur Radio Service regulations was on the agenda to be considered at WRC-2003. The various IARU regional meetings agreed to support lowering the amateur license Morse code test speed as a temporary measure, with the ultimate removal of Morse code requirement being an ITU license requirement.

The IARU's Administrative Council met in October 2001 in Guatemala City, Guatemala. The Administrative Council is responsible for the policy and management of the IARU. Representatives of all three IARU Regions were in attendance.

At that meeting, the IARU Council adopted a landmark resolution: " ... recognizing that the Morse code continues to be an effective and efficient mode of communication used by many thousands of radio amateurs, but that the position of Morse as a qualifying criterion for an HF amateur license is no longer relevant to the healthy future of amateur radio." Member societies were "... urged to seek, as an interim measure, Morse code testing speeds not exceeding five words per minute."

The resolution further said, "IARU policy is to support the removal of Morse code testing as an ITU requirement for an amateur license to operate on frequencies below 30 MHz." That resolution was not publicized very well in the U.S. because the ARRL and a good many of its members still felt that demonstrated manual telegraphy proficiency should be mandated in the international Radio Regulations.

The World Radiocommunications Conference (WRC-03) was held beginning June 9, 2003 at the ITU in Geneva, Switzerland. It ended on July 4. The 189 countries affiliated with the ITU sent delegations to the conference totaling more than 2600 participants. Each country had one vote.

Although amateur radio matters were but a small part of the conference, several items on the conference agenda were of importance to radio amateurs. The most important was Agenda Item 1.7, the revision of Article 25, the international regulations governing the amateur and amateur-satellite services.

In the last 50 years, the ITU has reviewed and relaxed the amateur Morse requirement at every international conference capable of doing so. WRC-03 was no exception. In 1947 (Atlantic City), the ITU member states agreed that Morse proficiency should only be required when the operation took place on frequencies below 1000 MHz (1 GHz). At WARC-59, the 1959 World Administrative Radio Conference, this level was dropped to 144 MHz. A further reduction was made at WARC-79 to 30 MHz.

At WRC-2003, the USA proposed to simplify Article 25 and to totally "... eliminate the requirement to prove Morse code ability and to leave this matter to administrations." The nations of the world agreed that Article 25 of the Radio Regulations should be amended to allow a country to determine for itself whether the manual Morse code requirement should be continued.

Article S25.5 now reads: "Administrations shall determine whether or not a person seeking a license to operate an amateur station shall demonstrate the ability to send and receive texts in Morse code signals." The effect of this revision was to eliminate the mandatory requirement that a person seeking an amateur radio operator license had to demonstrate manual code proficiency. Dozens of countries immediately responded by dropping their Morse code examinations.

End of an Era: FCC Drops All Morse Testing

In the summer of 2003, right after WRC-03 ended, Petitions for Rulemaking started rolling in to the FCC. Most of the petitioners wanted the FCC to entirely or partially eliminate the international Morse code requirement.

Some two years later, on July 19, 2005, the Commission finally addressed the 18 petitions it had received by releasing a Notice of Proposed Rulemaking (WT Docket No. 05-235.) In it the FCC said that it had previously considered the need for Morse proficiency and concluded that code testing should be reduced to the minimum required to satisfy the international Radio Regulations.

It pointed out that as of July 4, 2003 the Radio Regulations now only requires that countries "... verify the operational and technical qualifications of any person wishing to operate an amateur station." The Commission said this requirement can be satisfied by requiring applicants to pass written examinations covering relevant subject matter.

The FCC also said in the NPRM that it believed "... the public interest will be served by revising the Amateur Service rules to eliminate the telegraphy testing requirement" for all classes and asked for comment on this premise. Thousands of pages of comments were submitted by the amateur community.

On December 19, 2006, nearly two-and-a-half years after the NPRM was issued, the FCC released a historic Report and Order eliminating the remaining 5 words-per-minute Morse code examination requirement for General and Amateur Extra licensees.

The FCC said the R&O "... comports with revisions to the international Radio Regulations resulting from World Radiocommunication Conference 2003 (WRC-03). At that gathering, delegates agreed to authorize each country to determine whether or not to require that applicants demonstrate Morse code proficiency in order to qualify for an amateur radio license with privileges on frequencies below 30 MHz." The Commission called telegraphy testing "... an unnecessary regulatory burden."

The R&O was 41 pages long—with more than half being devoted to a listing of everyone who submitted comments on the proceeding ...nearly 4,000 names! The Commission wanted the amateur radio community to know that their comments on the volatile Morse testing issue were indeed received and considered. The new rules took effect on February 23, 2007. It took nearly seven years to end telegraphy testing in the U.S. Amateur Radio Service.

WT Docket 04-140

The Omnibus Report and Order became effective on December 15, 2006. It was called "Omnibus" because it was a "catch-all" rulemaking impacting several amateur radio rule sections.

Its most significant feature is that it expanded the HF phone segments for

General, Advanced, and Extra Class amateurs, and allowed Novice and Technician Class licensees (with Element 1 code credit) to operate in the General Class CW sub-bands on 80, 40, 15, and 10 meters. There were no changes on 20 meters.

Among other things, it also permitted radio amateurs to designate (or "will") their callsign to a specific amateur radio club upon their death; relaxed certain restrictions on the sale of external amateur radio power amplifiers; deleted the Radio Amateur Civil Emergency Service (RACES) frequencies; prohibited the filing of multiple "vanity" callsign applications for the same callsign, and eliminated the requirement to publicly announce amateur radio examination locations and times.

Hurricane Katrina, August '05

Federal regulations governing our hobby specifically state that one of the reasons that amateur radio exists is to provide the public with "... a voluntary noncommercial communication service, particularly with respect to providing emergency communications."

It had long been known what would happen if a large hurricane hit Louisiana and the levees failed in New Orleans, a city that lies below sea level. On August 29, 2005, Hurricane Katrina smashed into the Gulf Coast and the sea walls crumbled, submerging the city. Tens of thousands of people were stranded and waited for help, some for days.

Louisiana was ill-prepared to deal with Katrina. Supposedly, preparations for Hurricane Katrina were to have begun by the city and state at least three days before it made landfall, but it didn't happen. Mandatory evacuation was not ordered until less than a day before Katrina hit, and FEMA officials were supposed to have had critical resources in place before landfall. They didn't. The storm hit Monday at 8:00 AM.

Although for the most part preventable, what happened was a disaster of unprecedented proportions. There can be no doubt that it is the worst catastrophe in U.S. history. The chaos that followed was almost unimaginable. Looters, unhampered by police, stripped the city's retail businesses dry. FEMA Director Michael Brown was relieved of his duties by President Bush. He subsequently resigned, as did the New Orleans police chief.

Hurricane Katrina was the costliest hurricane and one of the deadliest in the history of the United States. Damage

On the Cover

Cover photographer Larry Mulvehill, WB2ZPI, found Jon Hamlet, W4ZW, of Nokomis, Florida, overlooking the Gulf of Mexico, out on his roof adjusting his SteppIR antenna when he came to shoot pictures, but nowadays you're most likely to find Jon at one of the three schools where he helps run amateur radio clubs and licensing courses. Since late 2008, he and Dave Brandenburg, K5RQ, with the help of several local radio clubs, have licensed more than two dozen young people and have two more groups signed up for Technician classes as well as a General Class course that was scheduled for February.

Jon and Dave have outfitted each of the schools at which they volunteer with a complete club station. In addition, they donate a handheld for each student who earns his or her license. (Jon notes that the HTs are actually donated to the school club, which then lends them to the students, who have the option of purchasing them for whatever they can afford to pay.) Local clubs have stepped in with additional donations as well as volunteers and the use of club repeaters for training and youth nets.

Jon has been licensed since 1955 and says he's tried just about everything ham radio has to offer over the years. Currently, his main interests are contesting and CW, and he tries to involve his students in contesting efforts as well. Jon is a retired businessman who has owned a computer company and a telephone company, built cars and owned the RadioShack franchise in Russia for six years. He credits ham radio with leading him into the telecommunications business and helping him meet a lot of very interesting people, noting that "hams tend to be a cut above average to begin with." We couldn't agree more! *(Cover photo by Larry Mulvehill, WB2ZPI)*

estimates were well in excess of $100 billion. Nearly 2,000 people lost their lives in the actual hurricane and in the subsequent floods, and 270,000 were homeless. An estimated 3-million people were without electricity. Years later, thousands of displaced residents in Mississippi and Louisiana were still living in government-supplied trailers. Katrina redistributed over 1million people from the central Gulf Coast elsewhere across the United States.

Hurricane Katrina caused a virtual communications blackout in the region, knocking out some 2.5-million BellSouth Corp. telephone lines and disabling more than 1,000 cell-tower sites operated by Nextel and Cingular Wireless. People calling into southern Louisiana, Mississippi, and Alabama got constant busy signals or announcements that "... all circuits are busy." The outage completely disrupted the public's ability to communicate with police, fire, hospitals, relief agencies, and other emergency-care providers. Louisiana Governor Kathleen Blanco blasted telecommunications providers for the collapse of the state's wireless and telephone networks. For more than two weeks after the storm amateur radio was the only reliable means of communications in and out of the three states hardest hit by Hurricane Katrina. Even one of President Bush's messages to the New Orleans Mayor had to be relayed by ham radio.

The American Red Cross's frantic call for emergency communications help

"The American Red Cross's frantic call for emergency communications help was answered by hundreds of amateur radio operators from all over the nation. "

was answered by hundreds of amateur radio operators from all over the nation. The plea for assistance, transmitted through the ARRL, met with a huge response. A volunteer army of ham operators descended on the Gulf Coast.

Operators were asked to work in severe conditions throughout the devastated region. They found victims trapped in attics and on roofs who needed to be rescued, many desperate for food, water, and medicine. Many rescues were coordinated using ham radio systems that worked during the widespread power and communications outage.

Radio amateurs deployed several hundred thousand dollars worth of equipment and resources to the area. Several amateur-owned self-contained communications vans and trailers were effectively utilized in the disaster area. During the storm amateur operators gave weather reports to the National Hurricane Center in Florida using HF radio.

Amateur radio communications were established among hospitals, evacuation centers, and emergency operations centers. Ham radio volunteers all over the country manned health and welfare message networks to advise loved ones of the fate of evacuees.

The government made some funding available to reimburse radio amateurs for some of their expenses, up to $25 a day. The grant, administered by the ARRL, was made through the Corporation for National and Community Service (CNCS), an independent U.S. agency created in 1993 to support volunteer services.

In many cases, ham radio operators provided the only communications into or out of the area, and even served as 911 dispatchers. The old-fashioned ham radio proved its usefulness in the high-tech world of computers, the internet, and cell phones. "When all else fails, Amateur Radio..." is a lot more than a slogan,

The recovery effort lasted for months. It has taken years to rebuild the New Orleans infrastructure destroyed by the storm, and they are not done yet.

73, Fred, W5YI

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public service

BY RICHARD FISHER,* KI6SN

Big Changes at MARS, plus Early Reports from Haiti

The acronym is conveniently staying the same, but much is different at MARS. With a distinguished history dating decades before its being named the Military Affiliate Radio System in 1952, the program has undergone its first major charter revision in more than ten years with a change to its name, mission, and top-tier management structure.

Two days before Christmas 2009, the Department of Defense issued an Instruction establishing the Military *Auxiliary* Radio System with added focus on United States homeland security and a directive calling for MARS managers to report to a trio of DoD officials. Consisting primarily of licensed radio amateurs, MARS is a civilian auxiliary that assists the military and other government agencies with communications on a range of designated frequencies.

December's Instruction now assigns the program responsibility of providing "contingency radio communications" to support U.S. government operations, "DoD Components," and "civil authorities at all levels," including those related to national security and emergency preparedness. To view the Instruction's full text on the Internet, visit: <http://www.dtic.mil/whs/directives/corres/pdf/465002p.pdf>.

MARS leadership previously answered to the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, as defined in the 1998 charter. With the 2009 charter changes, leaders will now report to three DoD officials: The Assistant Secretary of Defense for Homeland Defense and Americas' Security Affairs has chief responsibility for the MARS Defense Support of Civil Authorities (DSCA) mission. Additionally, MARS leaders will report to the Assistant Secretary of Defense for Networks and Information Integration/DoD Chief Information Officer and the Assistant Secretary of Defense for Logistics and Material Readiness.

The announcement puts to rest recent concern that Navy/Marine Corps MARS was being targeted for abandonment. Along with Army and Air Force MARS, the Navy/Marine Corps component is well-established in the document's vision for the future. Left unclear in the December directive is which MARS element will take the lead during a domestic emergency. Proposed language designating Army MARS reportedly did not survive the Pentagon drafting process. Health and welfare communications will continue to be provided by MARS units "to military members, civilian employees and contractors of DoD components, and civil agency employees and contractors, when in remote or isolated areas, in contingencies or whenever appropriate," the Instruction said.

The new MARS mission calls for its components to establish means for reliable radio-only communications, without reliance on landline services or the internet. It must also have a dependable emergency power contingency and have mobile communications components for on-the-spot deployment. In the eyes of DoD, a military auxiliary is "an organized body of volunteers prepared to supplement the uniformed services or any designated civilian authorities by provision of specialized autonomous services when called upon or when situations warrant (e.g., Civil Air Patrol, U.S. Coast Guard Auxiliary)."

Involvement in MARS, the Instruction says, is to be encouraged "by establishing and funding an active MARS program within each military department, which shall then assign a MARS-licensed staff representative to manage operations, readiness, planning, procedural and technical development, documentation, standards, training, equipment, program and membership administration, and other matters necessary for mission accomplishment." The DoD has called upon the secretaries of the Army, Air Force, and Navy to support this initiative. Further, the secretaries are expected to develop plans to "promote civilian interest, recruit

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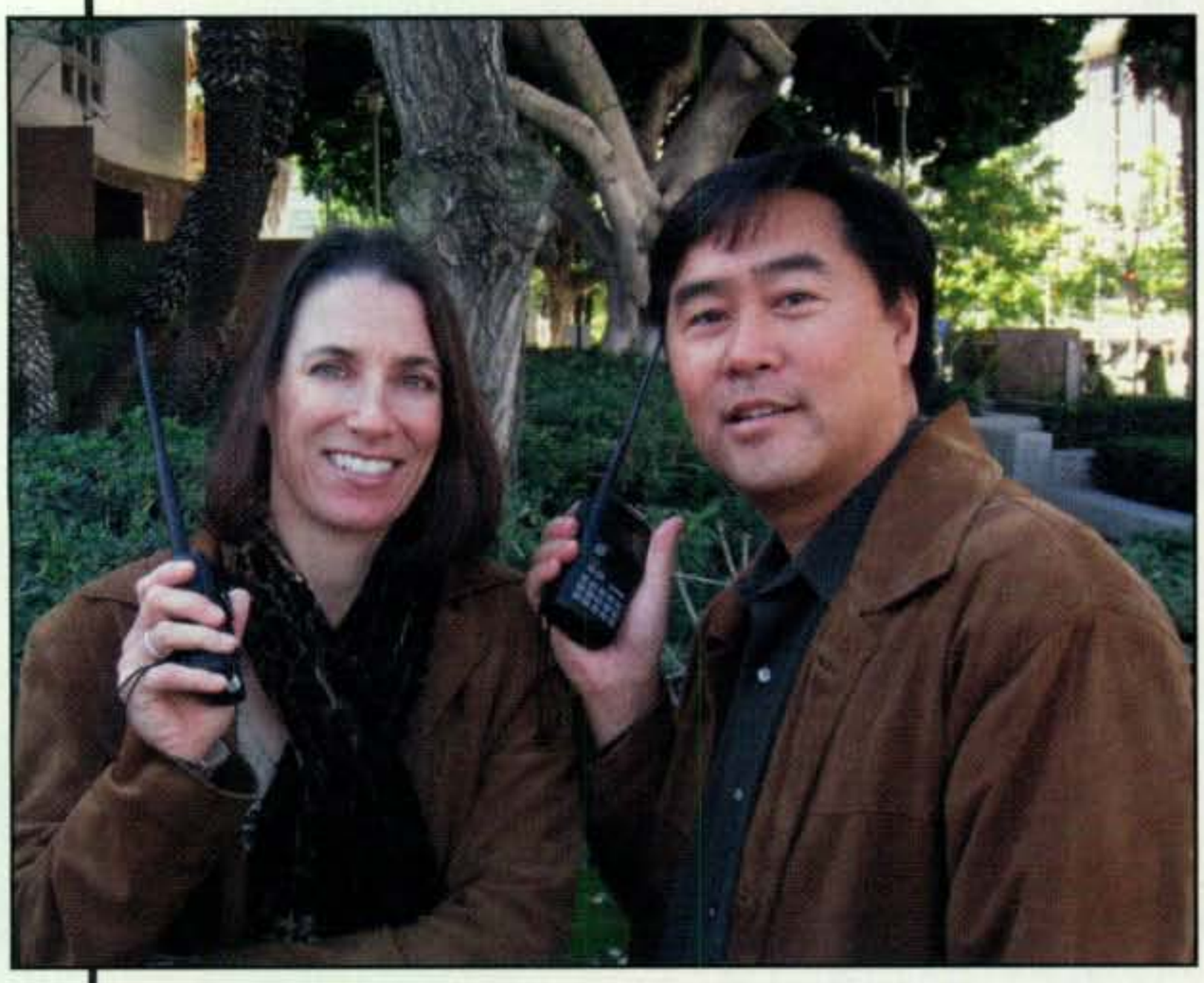

Deborah Ava, KJ6CRZ, and Karl Tso, KI6PCW, were honored by the Los Angeles County Board of Supervisors for their life-saving efforts in the rescue of a severely injured man on Catalina Island off the coast of southern California. The duo used 2-meter FM repeater communications to summon help. (Courtesy of KI6PCW)

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KJ6CRZ and KI6PCW Honored for Rescue Assistance

On the 30-mile catamaran trip from Marina Del Rey on the coast of southern California to Catalina, Deborah Ava, KJ6CRZ, and Karl Tso, KI6PCW, made it a point to scope out the 2-meter repeaters accessible from the island. After all, they said, you never know when you might need to rely on amateur radio to get you out of a jam.

The Topanga couple was accompanying their sons Stephan, 8, and Julian, 6, on a weekend Cub Scout campout in late October. Having completed an EmComm training class just two days earlier, 'CRZ and 'PCW knew the importance of communications preparation, even though they had no hint of what a huge role it would play in the coming hours.

After arriving at Catalina's Emerald Bay at about 8 PM, the family got their cabin assignment and joined other Scouts for a campfire session—complete with Smores—at 8:30. At about 9:30 PM, as others were heading back to their cabins, the couple "wanted to check out the Catalina repeater," Tso said. They hiked up a trail overlooking a cove "to check out the view," Ava said. "It was indeed beautiful," but there was a "really gnarly drop-off."

Then, "we hear this moaning sound," Ava said. "What is this sound?" At first they thought it might be a bison or some other animal in this dark, remote area of the island. Shining a powerful flashlight down the cliffside, though, they saw a man sprawled at the base of jagged rocks some 40-feet below. "He was in a pretty strange position, clearly bleeding from the side of his face, lying flat and moaning," she said.

"We were completely stunned for the moment," Ava said, but it was immediately clear this was a serious emergency situation. "We yelled, 'We know you're down there. We're going to get help,'" she said. They would learn later that 59-year-old southern California resident Peter Conn, who was also part of the Cub Scout excursion, had fallen from the trail down the rocks, sustaining potentially life-threatening injuries.

"We screamed for (Cub Scout) counselors to come," Tso said, unsure if anyone hearing their shouts made a call to 911. "They never confirmed communication." Pulling out his ICOM IC-92AD VHF/UHF handie-talkie, Karl made a distress call on 2-meter FM answered by Scott Bastian, KD6QZX, of Fullerton and Joyce Wood, KD6HYO, of Costa Mesa, both on the mainland. Bastian, an off-duty LA Sheriff's deputy, put the process of contacting emergency personnel into motion, while Wood stood by as needed.

Amateur Radio's Life Link Amid Death and Destruction in Haiti

Radio amateurs around the world stood poised to provide emergency communications to the people of Haiti, devastated by a 7.0-magnitude earthquake on the afternoon of Tuesday, January 12.

At press time, precious few signals were being copied from the crippled nation, where many thousands of deaths were reported; residences, businesses, and infrastructure destroyed; and communications at all levels crippled.

HH2JR: "I'm probably one of the very last communications out of Haiti."

With one of the earliest descriptions of the magnitude of devastation in Haiti, Jean-Robert Gaillard, HH2JR, of Port-au-Prince, put out a call on 14.300 MHz for a phone patch into the U.S. Wednesday morning, less than 24 hours after the initial 7.0 shock.

Fred Moore, W3ZU, in Inverness, Florida, stepped forward, moving HH2JR to 14.313, and telling him: "We can run you any traffic you need, anywhere worldwide, toll free."

"Fred, I appreciate that," Gaillard replied. "I'm a bit nervous . . . we've had 30 aftershocks since 5 o'clock yesterday afternoon."

In the next 20+ minutes, Gaillard, operating using a borrowed generator, would emotionally describe a scene of destruction and death, having himself seen at least 200 fatalities.

"No internet, no cell phone communication, no regular telephone," he said. With communications crippled throughout the country, Gaillard said, "I'm probably one of the very last communications out of Haiti. There's nothing coming out."

"It's chaos, I'm telling you," he said. "Real chaos."

In subsequent days, two VHF repeaters were reported operational, one in Port-au-Prince and another on a mountain near the Dominican Republic border. Both were being used by Salvation Army Team Emergency Radio Network (SATERN) and IARU operators.

HH6JH: "On battery power, hoping to get a generator."

Fr. John Henault, HH6JH, in Port-au-Prince, was one of the first stations heard, making contact Wednesday on 14.300 MHz, the IARU Global Centre of Activity frequency for emergency communications.

Based on relays monitored by *CQ* magazine editor Rich Moseson, W2VU, Fr. Henault reported he was safe, but had no power and no phone service.

HH6JH was operating on battery power and hoping to get a generator running later in the day. He asked Bill Sturridge, KI4MMZ, in Flagler Beach, Florida, to telephone relatives with information he was OK.

Nets And Operators: Quick Action Sets the Stage for Haiti EmComm

Within moments of the Haitian earthquake, radio amateurs in the region were on the move, activating emergency communications plans and stations to render aid.

Arnie Coro, CO2KK, IARU Region II Area C Emergency Coordinator and member of the Federacion de Radioaficionados de Cuba, quickly filed a report documenting the quick action and early efforts of operators in Cuba, the Dominican Republic, Puerto Rico, Mexico, Venezuela, and the United States.

"A few minutes after the earthquake was felt in eastern Cuba's cities, the Cuban Federation of Radio Amateurs Emergency Net was activated," he said, "with net control stations CO8WM and CO8RP located in Santiago de Cuba, and in permanent contact with the National Seismology Center of Cuba.

"Stations in Baracoa, in Guantanamo province, were also activated immediately as the earth movements were felt even stronger there due to its proximity to Haiti. CO8AZ and CO8AW went on the air immediately, with CM8WAL following.

"Baracoa could not contact Santiago de Cuba stations on 40 meters due to long skip after 5 PM local time, so several stations in western Cuba and one in Florida provided relays."

Frequencies requested to be kept clear for earthquake-related traffic included: 14.300 MHz (IATN), 14.265 (SATERN); 7.045 (IARU Region II), and 3.720 (IARU Region II).

We will have updates next month when and if there is additional amateur radio communication related to the disaster in Haiti.

—KI6SN

Bastian had been "driving home on the eastbound 60 Freeway through the City of Industry monitoring the Catalina Island Repeater (CARA), as I do while traveling in the LA basin . . . when I heard the call from Karl" at about 9:45 PM. "He explained he had discovered an injured male adult hiker . . . this person was badly injured and he had no cell phone service and was requesting rescue personnel. Both Joyce and I answered his call."

Bastian said he advised both of them of his LA Sheriff's deputy experience and would check on the rescue status. He contacted the Los Angeles County Communications Center in East LA. Even though off duty, he has "a direct number to them being a deputy," he said.

"The Radio Transmission Operator (RTO) had me stand by and he made contact with the Avalon Sheriff's Station Desk (on Catalina Island). I could hear them relay information that both Sheriff's Rescue as well as Bay Watch had just been dispatched to the downed hiker at Emerald Cove.

"The RTO relayed this to me and I in turn advised Karl via amateur radio of the responding rescue efforts," Bastian said. "I dropped the connection to the Sheriffs Communications Center and advised Karl that I would stand by on his frequency pending the rescue response arrival.

". . . It took approximately one hour for them to extract the injured man and get him en route to a hospital. After Karl's last update of the outbound injured male, I thanked him for his efforts and he did the same. He told me he was very moved by being able to have communications in an emergency with a remote location."

Bastian's mobile station is in a 2009 Jeep JK Unlimited 4x4. "I am using a Yaesu FT100D radio and have a matching Yaesu ATAS100 antenna with a duplexer for HF/VHF/UHF frequencies."

Back at the rescue scene, Tso and Ava assisted emergency personnel as they maneuvered to reach the injured hiker. "We were the only ones with a functioning flashlight," Ava said, giving them her headlamp. Conn was airlifted to a mainland hospital where he was treated for injuries to his hand, pelvis, legs, foot, and ankle, the couple said. "He had broken his jaw in four places." Tso said the experience reminded him of how vital it is to have "multiple layers of ways to communicate" and how important training and preparedness are for radio amateurs to efficiently step in during EmComm situations.

For their remarkable rescue efforts, Tso and Ava were honored by the Los Angeles County Board of Supervisors in a December ceremony. "Karl Tso and Deborah Ava exemplify how dedicated volunteers can empower themselves to help others in times of emergency, and even save lives," Third District Supervisor Zev Yaroslavsky said in his citation.

According to the county supervisor, "The (Conn) family is grateful for Tso's and Ava's quick thinking. 'We owe them everything,' says Gail Conn, who says her husband could well have bled to death had he not been rescued quickly. 'He was very lucky to be found when he was.'"

Ava and Tso are Technician class licensees and members of the Topanga Disaster Radio Team (DRT), which is part of the Topanga Coalition for Emergency Preparedness (T-CEP). Amateur radio is an avid hobby for Tso, who is an architect in home construction and Ava, who is a creative packaging designer for Mattel Toy Corp. Tso said amateur radio provides a necessary "comfort zone" in times of emergency, "one of the many layers of defense."

FM Simplex Key In Idaho Op's Aid To Stranded Men

A routine maintenance excursion to a repeater site at the 9,000-foot level of southern Idaho's Mount Harrison was spiced with a generous helping of drama when two radio amateurs found themselves stranded by a fierce storm around New Year's.

Terry Fletcher, K7THF, of Twin Falls, was monitoring the 146.52-MHz 2-meter FM simplex national calling frequency when he heard a call from Bliss Wheeler, W7RUG, and Vance Hawley, WA7FDR, that whiteout conditions were preventing them from coming down the mountain. The men were warm and dry in a communications building, Fletcher said, but cell phone communication had failed and amateur radio would be their only connection to the world below. A combination of

Terry Fletcher, K7THF (right), looks over EmComm equipment with Lee Kelly, K6ZVA, during ARRL Field Day 2009. Fletcher recently acted as the communications link between rescue authorities and two men stranded on southern Idaho's Mount Harrison. (Courtesy of K7MVA, Magic Valley Amateurs and KC7QR)

lousy weather and increasing medical concerns for one of the men created a situation that called for the help of volunteers and professionals in assuring the men would be safely returned home.

This mountain repeater building is "about 40 to 45 miles from me—line of sight," Fletcher said. But from that height, 144-MHz communication was not a problem, even on simplex using a handie-talkie with a rubber duck antenna.

"The big trick is that people need assurance that (other) people know where they are," Fletcher said. After hearing the distress call, he notified the Cassia County (ID) Sheriff's Department, who assessed the situation and put together a rescue plan.

"I told them I am in contact with (the two men)," Fletcher said, and offered "to be their link" to rescue authorities. They took Fletcher up on his offer. For the next 12 hours, K7THF kept both the stranded men and officials apprised of each one's status. "There was enough conversation," Fletcher said," that we were talking at least every 20 to 30 minutes."

Wheeler is from Idaho Falls and Hawley lives in Howe. Fletcher, who spent 35 years with the U.S. Forest Service principally as a landscape architect, had some USFS communications background as a dispatcher in incident management during wildfires. "That mountain top was part of the realm in which I worked," he said. So "incident management" in this case came somewhat naturally to Fletcher, who after retirement got his Technician license in March 2009. Using his Yaesu FT857D transceiver and 5/8-wave J-pole, Fletcher said the trick in emergency communications is not to get "emotionally involved. Just work the conversations."

According to a report published by the Times-News on MagicValley.com, "Mini-Cassia Search and Rescue was called out shortly after 4 PM . . . when Wheeler's medical condition deteriorated and required attention.

"Because of the white-out on the mountain, search crews were unable to reach the pair until midnight . . . Pomerelle Mountain Ski Resort Manager John Burrows used the ski resorts' Sno-Cat to tamp down the snow in front of the rescuers as they went in, Hawley said.

"Hawley was able to ride his snowmobile back out, while a search and rescue member brought out Wheeler's machine. Wheeler was transferred to Life Run Ambulance, then transported to Cassia Regional Medical Center. 'They took him to the hospital to be checked out,' Hawley said. 'I talked to him this morning and he's home, warmed up and feeling better,'" the Times-News story reported.

Fletcher said routinely monitoring the 2-meter FM simplex national calling frequency, 146.52 MHz, was key to hearing the radio amateurs' call for help. "It should be on everyone's scan list," he said, adding that reliable VHF simplex communication was crucial to the story's happy ending.

We'd Like to Hear Your Stories

The actions of Deborah Ava, KJ6CRZ, Karl Tso, KI6PCW, and Terry Fletcher, K7THF, are great examples of how radio amateurs take decisive action to fulfill our fraternity's obligation as public servants.

Do you know of other operators who chose to get involved during times of need? Please let us know, and we'll feature their stories in an upcoming column. Just drop an e-mail to: <ki6sn@cq-amateur-radio.com>. 73, Richard, KI6SN

CQ Public Service On The Web

For amateur radio public service updates, more photographs from this month's column, and other information, please visit *CQ* Public Service On The Web at: <http://www.cqpublicservice.blogspot.com/>.

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BY DAVE INGRAM,* K4TWJ

Hamming from the Shadows – Part 8

Your interest in our previous "Hamming from the Shadows" series in *CQ* continues to grow, indicating we are filling a definite need and addressing an area of widespread concern. That makes sense, as more and more people are living in confined spaces, and modern consumer-installed TVs, surround-sound systems, stereos, etc., are noticeably more susceptible to RFI than those simple-to-connect electronic setups of past times. Discouraged by the combined results, a number of radio amateurs have downsized to using only a 2-meter or dual-band FM handie-talkie for hamming. Once again I say, "Don't give up!" Amateur radio is one of the world's greatest hobbies/pursuits, and our globe-spanning HF bands are the glitz and glamour area we need to experience first hand to fully appreciate it.

Looking at station photos in radio magazines may give you the impression that everyone on HF has a super-tall tower and monster antenna system, but such is not the case. Many amateurs, and I emphasize *many* amateurs, are having a ball QSOing friends and working the world using only a 100-watt HF transceiver and a vertical or horizontal wire antenna. You can do it, too. Remember, where there is a will, there is a way. Need more thought-whetting ideas and encouragement? Read on!

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

Radiating Gutters

After highlighting the house-gutter antenna used by Jeff, K8CQ, in last year's "Shadows" column, Dave Winkle (Wink), WA8KOQ, stepped up and reported using a similar setup with good results (Winky Dink 'Tenna?). Thinking back a few years, I recall several other friends using gutter antennas. Apparently, loading up the old metal gutter is a popular "secret solution" for amateurs living in ridiculously restricted areas. Don't sneer: When we briefly lived in a townhouse several years ago, I gamma-matched and loaded up our (second story) metal bed frame on 17 meters and worked stations coast to coast (and some DX) with it.

Details of Wink's invisible antenna and rigs are shown in photos A and B and fig. 1. An SGC-239

Photo A– Can you spot the multiband antenna at this QTH of Dave Winkle, WA8KOQ? Neither can suspicious eyes. It is comprised of dual rain gutters on each side of the house front, with a white-insulated wire attached to theeaves of the peaked section, connecting the sides. An auto tuner is located out of view at the feedpoint, which is at base of the downspout. Photo courtesy of WA8KOQ)

auto tuner is installed at the feed point, and the pair of radials alongside the house serves as a ground system. Initially, Wink used the left-side downspout and gutter to the base of the roof peak (11 feet plus 26 feet, or 37 feet total) and found it worked quite well. A couple of years later, he added a 16-foot strip of wire along the roof peak and connected it to the 16-foot gutter plus 11-foot downspout on the right side of the house. Wink reports the resultant 80-foot antenna (with SGC-239 tuner at base) works 160 through 10 meters and outperforms all the indoor antennas he has tried. There are some good lessons here: Outdoor antennas, even those comprised of thin wire with buttons for insulators and clear nylon fishing line beat dipoles strung indoors around a room. The radiation pattern resulting from "bent to fit available space or supports" antennas may be distorted, but it works—and a distorted-pattern antenna beats no antenna. A low gutter antenna may have a high angle of radiation (translation, better for close-in rather than farther-out QSOs), but low-angle radiation from the vertical downspouts can "take up the slack." Limited room for a large 130-foot doublet or horizontal loop antenna? Use insulated wire placed around roof edges and zigzagged toward the roof middle as necessary. Our thanks to Wink, WA8KOQ, for sharing his views of his hidden antenna.

Hamming from Fantasyland

Now looking in the opposite direction, Howard Hawkins, K6BYU, enjoys hamming from the shadows with one of the most elaborate undercover antenna farms we have seen (photos C through F). Living amidst strictly enforced CC&Rs, Howard has a 28-foot tall "flagpole" vertical with 80 radials, a G5RV on a 32-foot fiberglass mast, a 43-foot "Zero-Five" vertical, and a 2-element SteppIR beam on a motor-raised 50-foot tower. Howard's indoor setup (photo G) is capable of running full legal power and he says RFI is not a problem. His elaborate 80-radial ground system and buried-in-conduit coax cables obviously helped to ensure radiation is confined to the antenna proper. We also note neighboring houses are a fair distance from Howard's antennas and his house is situated above street level and peppered with foliage, so spotting anything inside the fenced back area (without being considered a prowler) is difficult.

The 28-foot flagpole was considered patriotic and approved by the neighborhood Home Owners Association. Howard installed its base radial plate, radials, coax, and feed line below ground level and even added a drainage system with a base of rocks, so no one realized it was a vertical. Howard says the vertical is his main antenna, because it blends with the landscape and is always up and ready for use.

The G5RV is supported by a 32-foot fiberglass mast that Howard lies flat on

Photo B– A heartwarming pair of classic R. L. Drake twins from the good old days plus a Yaesu FT-857D for "modern day flavor" grace the shack of WA8KOQ. A hidden antenna is definitely easier to accept with a setup like this!

LDG ELECTRONICS

KT-100

LDG's first dedicated autotuner for Kenwood Amateur transceivers. Easy to use - just right for an AT-300 compatible Kenwood transceiver. The KT-100 actually allows you to use the Tune button on the radio. The LEDs on the front panel indicate tuning status, and will show a match in seconds, or even less of you've tuned on or near that frequency before. Has 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. If you have an AT-300 compatible Kenwood radio, you can simply plug the KT-100 into your transceiver with the provided cable; the interface powers the tuner, and the Tune button on the radio begins a tuning cycle. The supplied interface cable makes the KT-100 a dedicated tuner for most modern Kenwood transceivers. ***Suggested Price $199.99***

NEW! IT-100

Matched in size to the IC-7000 and IC-706, the new IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. It's the perfect complement to your Icom radio that is AH3 or AH-4 compatible.

Suggested Price $179.99

AT-200Pro

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

Suggested Price $249

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). Tuning is simple; one button push on the tuner is all that is needed - the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the tune button on the tuner. Powered by four AA internal Alkaline batteries (not included), so there are no additional cables required. A coax jumper cable is also induced for fast hook up. ***Suggested Price $129.99.***

NEW! Z-11Proll

Meet the Z-11Proll, everything you always wanted in a small, portable tuner. Designed from the ground up for battery operation. Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 - 6 meters. The Z-11Proll uses LDG's state-of-the-art processor-controlled Switched-L tuning network. It will match dipoles, verticals, inverted-Vs or virtually any coax-fed antenna. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line. All cables included. ***Suggested Price $179***

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Suggested Price $229

radio not included

NEW! AT-897Plus for the Yaesu FT-897

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

Suggested Price$199

radio not included

FTL Meter 2.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu.

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Suggested Price $79.99

M-7700 For IC-7700. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together.

Suggested Price $79.99

See AT-1000Pro Review in Nov. '08 CQ

AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. All cables included.

Suggested Price $599

NEW! YT-100

An autotuner for several popular Yaesu Radios. An included cable interfaces with your FT-857, FT-897 and FT-100 (and all D models) making it an integrated tuner, powered by the interface. Just press the tune button on the tuner, and everything else happens automatically: mode and power are set, a tune cycle runs, and the radio is returned to its original settings. It's the perfect complement to your Yaesu radio.

Suggested Price $199.99

NEW! Z-100Plus

Small and simple to use, the Z-100Plus sports 2000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. ***Suggested Price $159.99***

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Photo C– A first view of the hidden antenna farm at QTH of Howard Hawkins, K6BYU. The 2-element SteppIR beam with olive-green elements and boom plus motorized tower, also painted green, is lowered and nesting in foliage while 32-foot pole supporting a G5RV is raised. All antennas are behind the house and inside gated yard. (Photo courtesy of K6BYU)

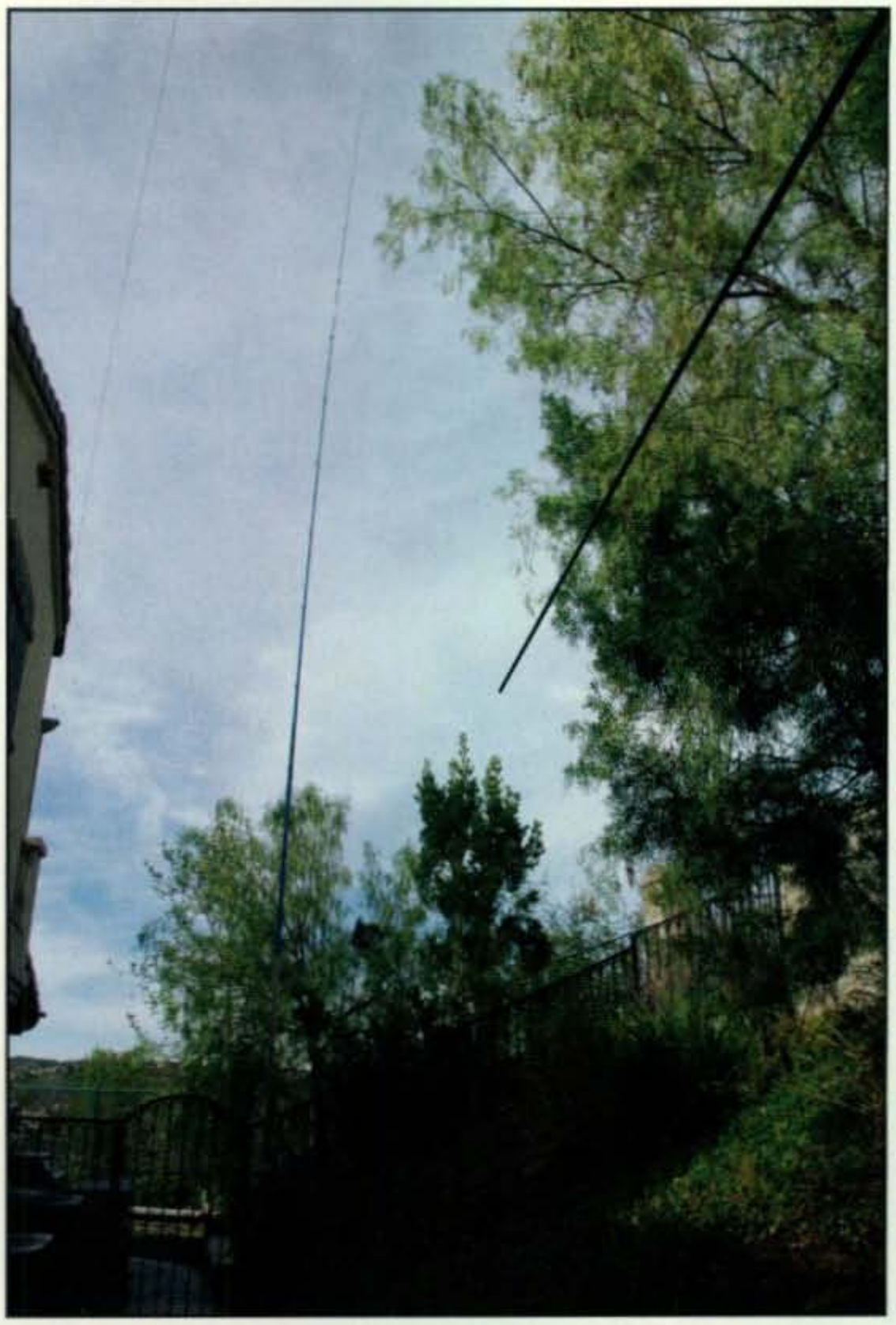

Photo D– Looking in the opposite direction and past the nested SteppIR beam of photo C, we see the other end of the G5RV antenna at or slightly above roof level and a 43-foot vertical quickly raised into the operating position. A view of the city below is in the distance.

the ground and/or raises/lowers as required. Several companies (MFJ, DX Engineering, Zero-Five, and possibly others) are producing 43-foot verticals, and all the reports on them I have heard have been very good. Howard says his vertical is made by <www.zerofive-antennas.com>, is connected to the flag pole's 80 radials system, and it is light enough so he can quickly raise and lower it as needed. He often serves as NCS for a 40-meter net, and net members consistently rate the Zero-Five several dBs above his flagpole or G5RV. The antenna is painted a sky-blue color so it blends with its background, and it lies flat on the ground—undetected inside his gated back area—when the rig is not in use.

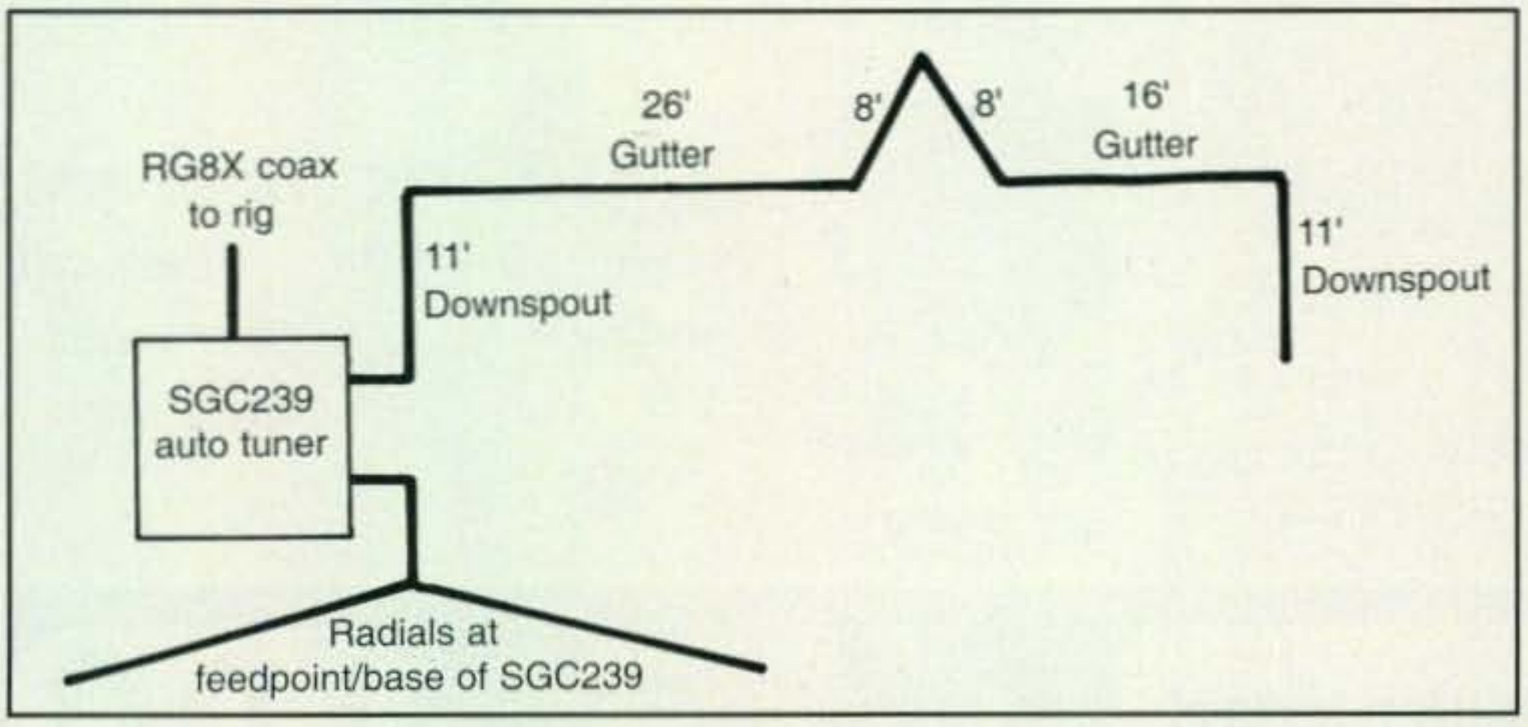

Fig. 1– Outline of the dual rain-gutter antenna system at WA8KOQ. The combination of vertical and horizontal radiating sections proves beneficial for working both near and distant stations.

The biggest surprise at the CC&R restricted QTH of K6BYU is the 2-element SteppIR Yagi on a power-raised Force 12 tower. The beam and tower nest amidst foliage at 12 feet and pass unnoticed to untrained eyes, and then quickly rise to 50 feet at the push of a button. The antenna also spends much of its life nested, which blends with the most non-retired amateurs' career-oriented lifestyle—that is, most daytime hours are devoted to business/career pursuits and only night hours are free

Photo E– A couple of minutes later, the SteppIR beam has been raised to nearly 50 feet (magnificent little gem, isn't it?) and the 32-foot vertical has been tilted down out of sight.

Photo F– Proceeding through a second gate and around a corner, we find Howard's main antenna, a 28-foot tall flagpole vertical with 80 radials ready for action.

for hamming. Our special thanks to Howard, K6BYU, for sharing details of his low-profile setup.

Shadow Talk

A number of friends say they follow my "Hamming from the Shadows" series here in *CQ* in hopes of acquiring one or two ideas they, too, can use for undercover hamming. Jolly good! Once again, however, I must emphasize that one idea or solution does not necessarily fit all circumstances, but seeing how others have overcome the handicaps gives all of us hope and inspiration. Combine that with some helpful notes to kindle your own thoughts and creative thinking plus some tips for minimizing RFI and presenting a good-neighbor attitude, and your odds for success increase tenfold. Let's cite some examples.

Your available area for installing a dipole may be limited, but folding each side or element as illustrated in fig. 2A or 2B may be a previously unrealized solution. The resultant radiation pattern may not be ideal, but it works and it definitely beats no radiation pattern and no on-the-air operations.

Going mobile or routing a rollup coax cable (or AC extension cord) to your vehicle's mobile setup is another alternative worth pursuing. Look back in November 2009 *CQ* (pages 13, 14, and 16) and read how K7FF had a ball in the 2008 CQ World-Wide DX Contest using an FT-450AT and tall whip from his truck that he parked in an open field adjacent to his apartment complex. He used a couple of externally charged batteries for full weekend hamming and hopped back home for bed and breakfast breaks. Expanding on that idea, I visualize installing a really tall and snap-together vertical or a Super Antennas snap-together minibeam on a tilt mount in the truck bed. That would give it almost "home rig clout" and, being independent of home or apartment fixtures,

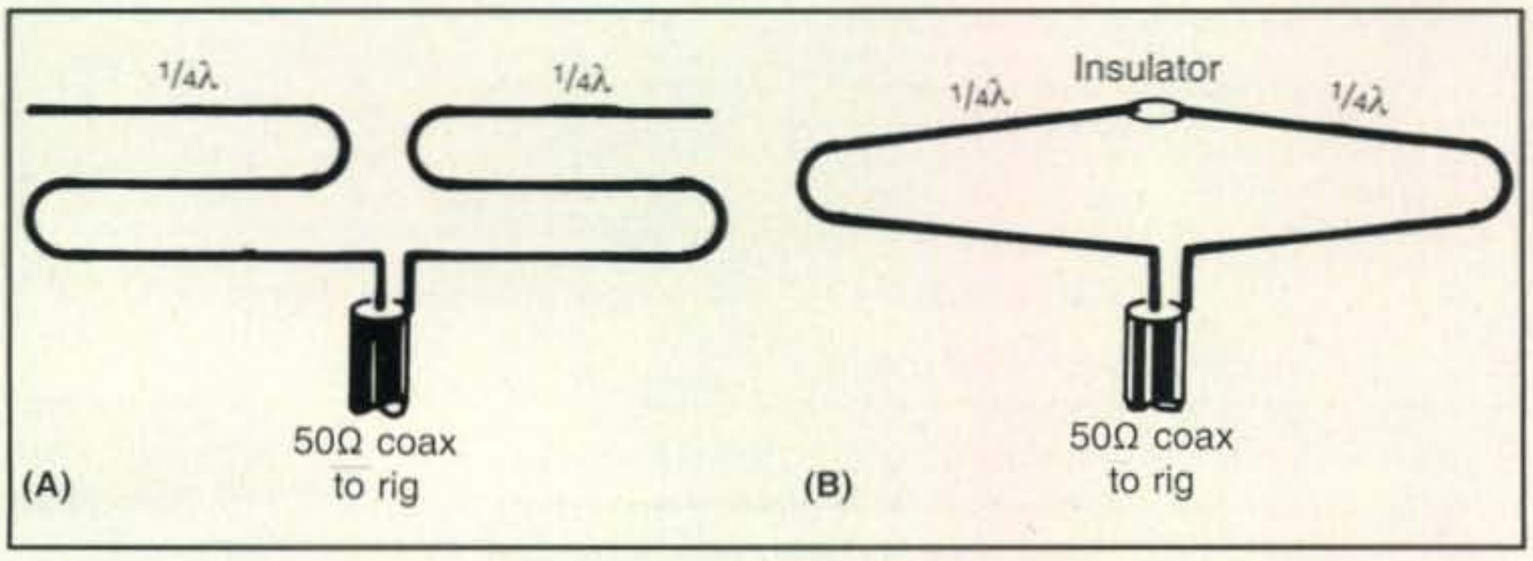

Fig. 2– Outline of how a dipole may be bent to fit within a confined space.

Photo G– Indoor station at K6BYU has it all: deluxe transceiver, high-power amplifier, tuner, remote controls, and junior ops.

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- Maintenance

EMERGENCY PAGER

The Peachtree Perks

Gardendale, AL — TAKING PRIDE IN OUR COMMUNITY — *Volume VI Issue X*

Ham Radio Saves local Resident

In a less than neighborly society, one man goes above and beyond.

- Johnny Rye

The following is a true story and I hope you find it as fulfilling as I did.

2009... a far cry from 1959, when being a neighbor was like being a part of the family. When you were doing something you knew mama wouldn't want you to do, you had better make sure that Neighbor Nancy was watching through her kitchen window, not because she would tell mama, but because she would take you out behind the woodshed herself. If someone in the family was hurting, well, neighbors were the first ones to show up with a warm dinner to keep mama from having to cook. Many recall that was a smaller world then.

But in 2009, most folks don't even know their neighbor's names. But one man, that finds pleasure and excitement in what most don't understand, was about his normal routine of monitoring his ham radio. Now I can't tell you the details about radio frequencies or bandwidth or any other technical terms involved, but the next part of this story tells, in plain English, how Dave used his unique ability to "hear" a problem and solve it.

Dave said he could hear what seemed to be interference from a possible exposed power line. He checked a vacant lot nearby, where he was certain the "noise" was coming from, but quickly discovered it was not the source of the problem.

Now any average neighbor would have stopped there, but not Dave. He searched around until he confirmed the source of the interference, which was coming from a nearby neighbor's home. He approached the neighbor's door, knocked, introduced himself, and continued to explained the situation and the potential danger. She allowed him in and within a few moments and series of "breaker flipping", he discovered the problem was in her furnace.

The lady quickly called a her son that discovered an exposed wire that was arcing. Had the problem not been discovered, the electrical problem could have easily resulted in a house fire.

The woman was very appreciative and Dave... well he is probably sitting at his ham radio right now, communicating with people overseas or astronauts in space. It may seem hum drum, to you, to sit for hours on end in from of a radio, instead of a television, but for one resident, she is thankful Dave does.

Photo H– Accepting a ham with a tall vertical antenna in my CC&R community became easy after I tracked down a case of severe power-line noise (details in text). I also tracked down a case of power-line noise at my earlier QTH and found the problem was a red-hot doorbell transformer in a neighbor's attic.

should skirt CC&R entanglements. My apologies for suggesting such naughty but clever ideas.

Finally, remember diplomacy and standing ready to assist your community when needed are invaluable assets. When I moved to a near coastal area five years ago, I ended up teaching the local power company why and how to find and fix power-line noise (photo H). When I moved back to central Alabama a year later, my budget necessitated moving into a gated community with a 200-page book of CC&Rs. I explained the benefits of having a ham with emergency and global communications capabilities in the community, shared pictures of my neatly installed vertical, and described by plan for making it transparent to untrained eyes (and I also hid my prized crank-up tower under the house).

After moving in, I held output power to 100 watts, met neighbors, and (unbeknownst to them) evaluated their electronic appliances from the "susceptible to RFI" standpoints. I even sneakily added clamp-on toroids to cable TV distribution lines as a safekeeping measure to avoid TVI. A little later I began using my "occasional" maximum power of 500 watts and continue holding at that maximum level today. I am also literally working the world with 100 to 500 watts: XU, 3B8, 9K2, VK, ZL, and more.

A couple of months ago, vicious QRN almost annihilated my DXcapades. I drove around the community checking with my mobile rig and narrowed the source to a neighbor's house. I then introduced myself and explained the arcing from within could be a fire hazard. The neighbor asked what to do, so I sequentially switched off each of the house circuit breakers and found the culprit was a 220-volt arcing heater contactor lying on a piece of dry carpet—a fire waiting to happen. The lady had the contactor replaced and I was hailed as a hero in the community's next month's bulletin. Hopefully that will help justify my vertical antenna's existence, but I continue to look for an alternate QTH just in case the old knife-in-back syndrome surfaces.

Conclusion

That overflows column space for this month, friends, but more views and tales of amateur successfully hamming from the shadows, plus more tips on staying low profile (avoiding discovery) are coming soon. Watch for them and do whatever you need to do to keep on hamming. 73, Dave, K4TWJ

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kit-building

BY JOE EISENBERG,* KØNEB

Scratching the Surface of Surface-Mount

We hams have seen tremendous changes in the way we build electronics. We have gone from wiring point-to-point from tube socket pins to terminal strips, to printed circuit boards. Now we are faced with something that has been creeping into the world of kit-building—surface-mount parts. With the trend in the electronics industry away from conventional through-hole parts, we hams are faced with building with these new tiny components.

There are many kits on the market today that have a handful, or even just one or two, of these parts. Some kits have the surface-mount parts already mounted, as in the MFJ Cub-series of CW transceivers. The MFJ Cub-series has all the surface-mount parts already mounted, and the builder completes the kit by installing all of the through-hole components. The Elecraft KX-1 CW transceiver kit as well as the Hendricks PFR-3 CW transceiver are also examples of kits with a few of these parts already mounted on the board. The very popular Rock-Mite by Small Wonder Labs has a single surface-mount 8-pin IC that is not pre-mounted, but is very easy to solder in place by any of a number of methods. More kits are coming that will make use of these inexpensive but tiny components, so I decided to cover the best ways to deal with them.

*7133 Yosemite Drive, Lincoln, NE 68507
e-mail: <k0neb@cq-amateur-radio.com>

Arnie Grubbs, KAØNCR, using a solder-paste syringe on a PC board. Solder paste and a low-airflow heating tool from a craft store can make mounting surface-mount parts easier.

It is time again to remember to use a very brightly lit magnifier when working with surface-mount parts to be sure to identify and orient the part correctly. Working on a cookie sheet will save you a lot of grief if a part should come loose while handling it. Often there are tiny numbers or other marks printed on them, so it is always a good idea to mount them with the numbers facing up to be able to check your work later. By far, the simplest way to solder a surface-mount part such as a capacitor or resistor is to put a tiny dab of solder on one of the two pads. Then use tweezers to bring the part to that pad and heat it with your soldering iron. Be sure to use the smallest tip possible for best results as well as the thinnest solder available to prevent placing too much solder on the connection or causing solder bridges.

Now with one side soldered, you can easily solder the other side and return to the first connection if needed. The 8-pin IC in the Rock-Mite can be soldered by holding it in place with tweezers and soldering one pin, being careful to hold the IC in alignment with all of the eight pads. Then once that pin is soldered and it looks straight, solder the rest of the pins. You will see that the board has a solder resist on it that helps prevent solder bridges, but do not use excessive solder. Most kits will call for the surface-mount parts to be placed before any other components are installed. That is to allow you the easiest access to the pads where they are mounted. It also allows for more than one method of installing the parts.

The Heat Tool Approach

My favorite way to solder surface-mount parts is to use solder paste and a low-airflow embossing heat tool. Don't use a hair dryer or painter's heat gun as the airflow is way too strong and will blow the parts right off your board! The low-airflow embossing heat tool is available for about $20 or less at many craft stores that specialize in scrapbooking items, such as Hobby Lobby or Michael's. Watch for sales or discount coupons to make these tools even more affordable. This method is very similar to how surface-mount components are soldered in mass production, but on a much smaller scale.

The solder paste used looks like a gray paste and is actually a mixture of solder and flux. It is often dispensed in a modified medical syringe. Simply take the syringe and place a dab on each of the pads for each component you are mounting. I most often make a line of paste about the length of the pad without going over it. Then, using tweezers, place the parts onto the pads. The solder paste will hold the parts loosely in place, but do not tilt or jostle the board very much, as the parts may come loose. Turn on the heat tool and hold it a few inches above the board so as not to blow an excessive amount of air on the board. That may result in parts coming off their pads. Moving the heat around will

Completed Norcal surface-mount dummy-load kit on a warming plate. The warming plate can pre-soften solder paste before heating with a heat tool.

gradually melt the solder paste and release the mixture of solder and flux. When that happens, the gray paste will suddenly turn silvery and the parts may move slightly as the surface tension almost magically aligns the parts on their pads as the solder flows.

Once all of the paste on all of the pads has liquefied, you may remove the heat and allow the board to cool, once again being careful not to move the board. Once cooled, it is a good idea to view your connections through a magnifying glass and see if they all are smooth and appear to make good contact between the part and the board with no bridges. If there are a large number of surface-mount parts, try doing them in sections, but remember that adjacent parts may be reheated as well during the melting process.

A technique to try that makes this process go a little faster is to use an inexpensive warming plate to preheat the board before placing the paste on the pads and using the heat tool to melt it. You can buy potpourri warmers or coffee-cup warmers at many discount stores for about $5 to $10. These often have a soft rubber pad onto which you place the cup. Preheating the board allows the paste to stick a little better to the pads before parts placement and speeds up the process of melting the solder paste with the heat tool. It is not advised to use this if there are surface-mount parts on both sides of the board, as you run the risk of losing parts mounted on the bottom. These plates also are helpful only if the board is small enough to fit in the round rubber-surface pad. Do not use metal heating plates, as they might damage the underside of the board or overheat it.

Baking Your Board

An alternative method is to carefully place the board with the pasted components in place on a metal tray with metal screws with nuts or standoffs to keep the board off the surface of the tray. Place the tray with the board in a conventional oven or a small toaster oven that has been preheated to about 350 degrees. Use a good, oven thermometer to be sure you are at the proper temperature. You can watch the process through the window to see when the solder has melted. Be very careful to allow the board to cool before moving it. The great thing about this method is that it is extremely low-cost. It also allows you to desolder and resolder surface-mount components.

Solder paste is available pre-loaded in a 0.5-cc syringe from Cash Olson, KD5SSJ, for $5.00 plus $1.95 for shipping/handling in the USA. His website is: <http://kd5ssj.com> and he offers a discount in quantity, so buying as a group saves you even more. It may not look like a lot of solder paste, but it will last for many connections.

As with conventional soldering methods, a great way to practice surface-mount techniques is by using surplus circuit boards. Old computer boards and cards are a goldmine of surface-mount parts for practice desoldering and resoldering. Keep in mind that many types of surface-mount parts you see on computer boards may not show up in kits, such as large, flat-pack ICs or exceptionally small resistors/capacitors/diodes. However, practicing with them will make soldering the more common larger surface-mount parts a lot easier. Try using the heat tool to remove a part from the board and using the paste to solder it. After a while,you will discover the right distance to hold the tool from your board and how long it takes for it to melt the solder or paste. Keep in mind that boards made with the newer lead-free solder will take longer to heat than those made with traditional lead-based solder.

I have just "scratched the surface" of surface-mount soldering. There are many more things that are helpful that will be discussed in future columns.

73, Joe, KØNEB

BY BRITTANY DECKER,* KB1OGL

Kits for Kids

As a young ham, I always get the question "What do you think would get young people interested in radio?" Well, quite frankly, there is no one answer to that, but many. All people are different. They all have different interests. We can tell this even by looking at just the adult ham operators. This is why radio has factions such as ragchewing, contesting, DXing, and people who are interested in building.

Let's take the people who are interested in the technical aspect of radio, for example. These people also differ from each other in their likes and dislikes. They could be very artistically inclined people who enjoy putting things together with their hands. They could be people who love to tackle a challenge, they could be puzzle lovers, they could be scientists, or even people who want to get some relaxation time. Either way, in order to get *kids* interested in radio, you have to focus on their interests. If they love to talk, the answer is ragchewing; if they enjoy the fast-paced communication, then contesting. However, I would like to focus on the lovers of art, challenge, puzzles, science, or a nice relaxing hobby. I would like to focus on the art of building.

To see if kit-building is a good activity for kids, I decided to be the guinea pig. I decided to build a kit of my own and write step-by-step my challenges and tips. My dad had bought me a QRP amplifier kit recently, to go with my radio, a Yaesu FT-817, for a little power boost. He also had a kit he was building, so we worked side-by-side, each on our own project. Here is my kit-building expe-rience, and everything I learned along the way!

*c/o CQ magazine

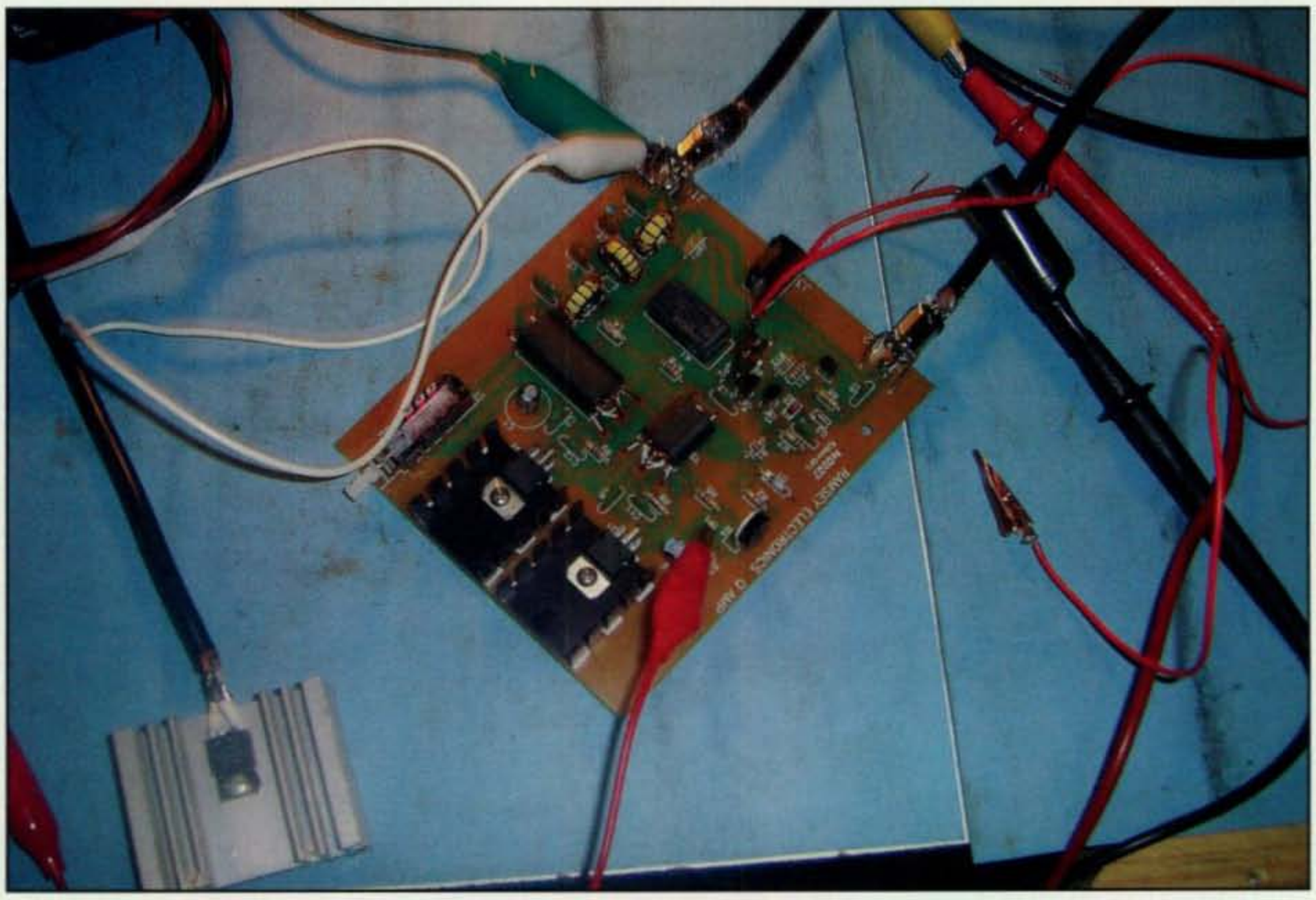
Ramsey 20-Meter 20-Watt QRP Linear Amplifier Kit

1. Sit down with the manual and read through it. It may not be the most exciting thing to read out there, but going through the steps in your mind before you begin will help you know what you're doing and will get you off to a better start. In fact, I learned this trick in my chemistry class, where before every lab we are required to do a write-up showing that we understand the instructions of the lab. This is so that we do not make mistakes, because especially in chemistry class, if you make a mistake, it could cost you your experiment.

2. Now it's time to take inventory. Go through every single part and make sure it is accounted for. I took a piece of foam, and as I went through my parts I stuck them in the foam so they wouldn't fall off the desk.

3. It's time to start building your kit! With your work space clear and clean, your parts accounted for and organized, you know exactly where to start, because you already reviewed the instructions.

I first had to install the PC-mounted pushbutton switch, PC-mounted RCA phono jacks, PC-mounted DC power jack, a relay, and a poten-



My finished kit, and it's hooked up to be tested!

tiometer. These installations went smoothly and were straightforward.

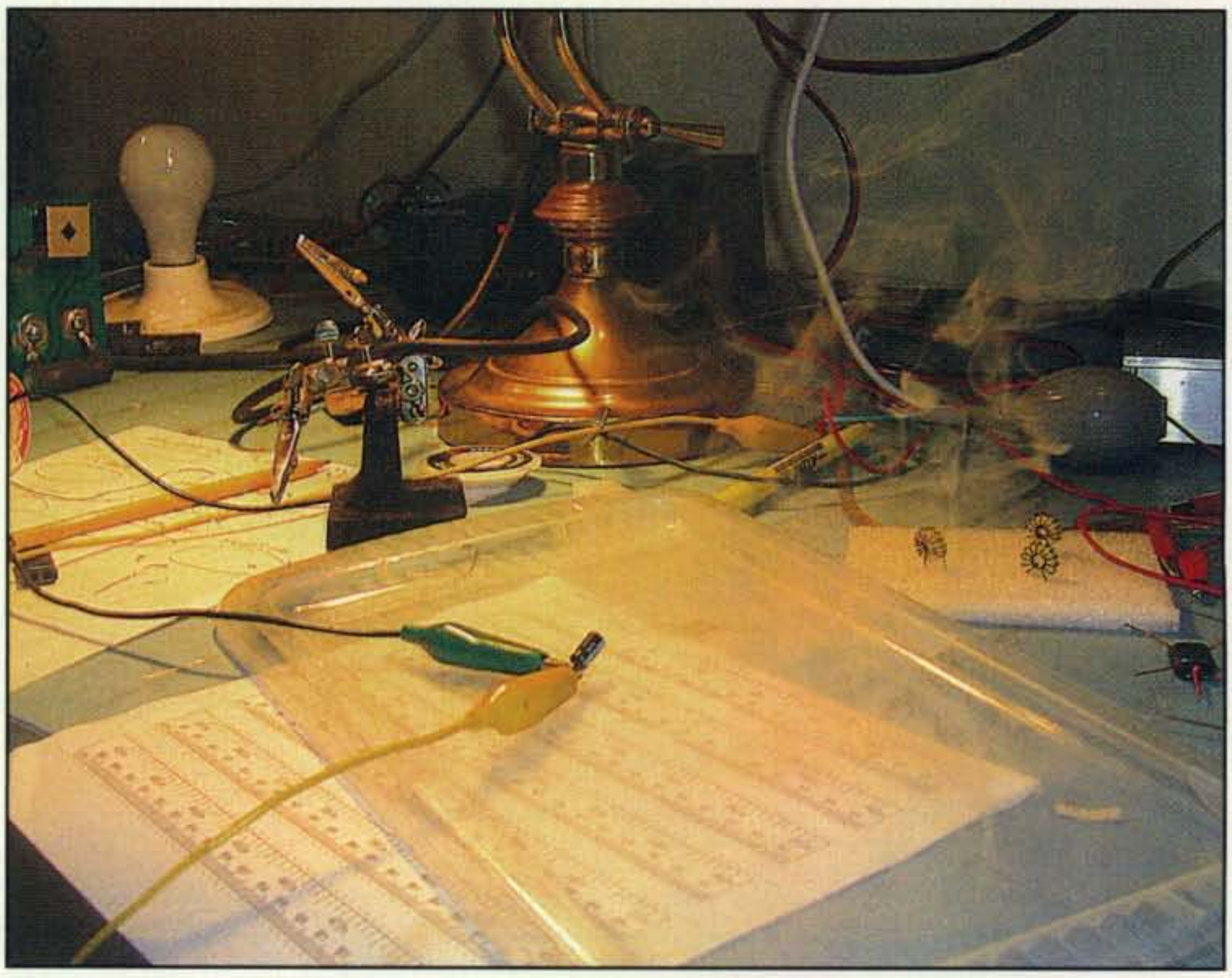
4. The next step was where I came to a problem. I had gained momentum and was going through the motions, when I apparently installed a capacitor *and* a transistor in the wrong spots. I did not notice this until many steps later when I went to install a part and found there was already one in its place! So this is where my first tip comes in handy: Check everything twice—even three times. You may not know it, but you could be reading a line below where you are supposed to be. And trust me, it is a pain to use the solder wick to uninstall, then reinstall, your parts. In fact, when I made a mistake with the transistor, I uninstalled it, put it in the correct place, and then took the other transistor that was supposed to be in its placeand installed it backwards! Therefore, despite mistakes, go slowly. It's worth it.

5. Next I put in various resistors, and then diodes, which had to be installed with the band on the correct side in order for the circuit to work. After that, capacitors and more diodes. Next I had to put in a piece of lead wire as a jumper. I recommend you save the scrap lead wire from when you cut the ends off your resistors so that you can use them for the jumpers in this project.

6. Then came more capacitors, including an electrolytic capacitor, which is polarized and must be installed with the polarities facing the correct directions. If you fail to do this, your experiment literally will blow up—not like an atomic-size explosion, but...

We did a test of this scenario to show you exactly what it would look like!

Now imagine a large electrolytic



Our smoking capacitor experiment, and my dad's project visible in the left corner.

capacitor (about 100 times the size of the small one in the kit) being installed wrong. That would not be good.

7. Next I installed a whole bunch of resistors, which, in my opinion, are the easiest to install. A tip: If you are having trouble keeping your resistors from falling through the board, just bend the wires a bit on the other side and they won't fall out while you solder. One of the resistors required me to cut 3/4 of an inch off the wire and bend it into a hook, which is quite difficult if using your hands. I used a wire stripper to grip the wire and bend it into a perfect hook shape for testing later. *(Needle-nose pliers work pretty well, too.—ed.)*

8. After that was mostly capacitors that had to be put in, including another electrolytic capacitor (remember the polarity!).

9. Next I started to get to the more complicated stuff. The MOSFET power transistors were to be installed. The three prongs had to be bent at different lengths, which is best done with a tool, not with hands. Then it was put on a heatsink and screwed onto the board and soldered. I liked this part because it was not as monotonous as installing resistors and capacitors which involve the same basic concept to put in.

10. The next part I found the hardest and most frustrating. I had to wrap 8 inches of enameled wire around a 1/2-inch toroid RF coil *exactly* 14 times—not 15 or 13, but 14. This is difficult because it's thin wire and bends in all directions so it doesn't always cooperate when you want it to. As if this wasn't a hard enough task to complete, I also had to heat the wire so that the enamel would melt off or else the solder wouldn't hold onto the wire. This particular wire supplied in the kit gave us quite a lot of difficulty, so we decided to use our own wire instead, and that was much easier. Although this was a tough step, I loved the challenge of completing it.

11. The last step was the ferrite transformers. The interesting piece about this step was how they had a different approach to the center tap. In the kit, you wound the wire through the transformers, and since a center tap was needed, they had me twist the wire from the center into one wire. Usually you would scrape the center wire and just solder another wire to it. This twist was much less time-consuming.

12. Your kit is finished! Now just give it a good looking over to look for the following:

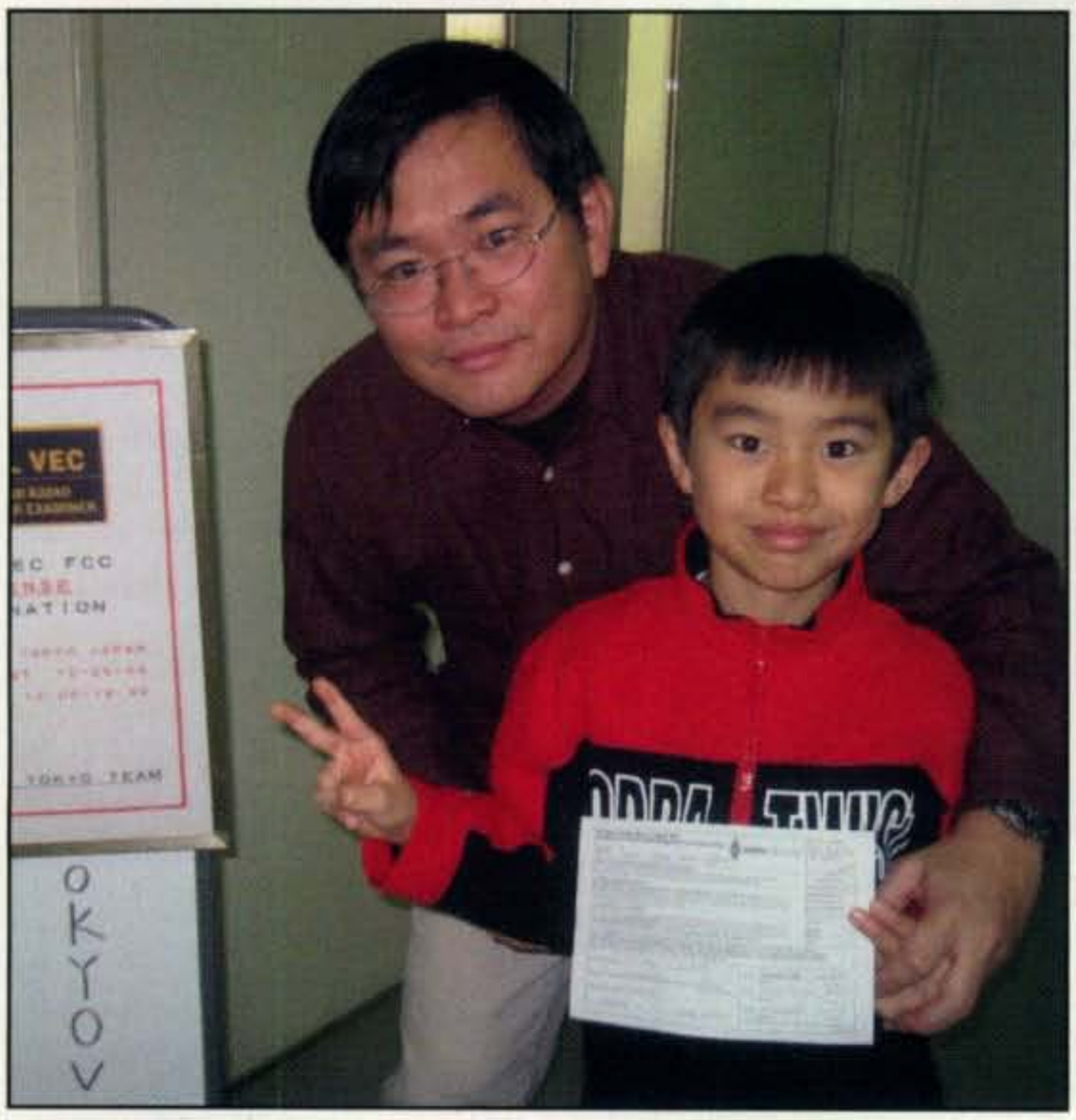
- No bridged over solder joints
- No misplaced components
- No incorrectly installed transistors or diodes
- No incorrectly installed capacitors!!

Now, with my project finished, it was time for the moment of truth. Time for the test that would prove whether my efforts had been fruitful.

First we used an ammeter to adjust the bias. We hooked up a QRP transmitter to our amp then to a dummy load, and when we looked at the wattmeter, sure enough, we saw about 20 watts. Our project was successful!

Yes, Yes, and Yes!

My review of the benefit of kits for kids is simply—yes, yes, and yes! I had such a great time doing this kit. Especially as the type of person who is independent and enjoys problem solving on my own, I really liked the challenge of doing this. It's great for younger kids to have a sense of independence while doing this kit, but always have their Elmer right there for them to watch for any mistakes. I also liked how I got to spend more quality time with my dad in his ham radio room, which with both of our busy lives going at full throttle can be hard to come by. I am sure this is the situation for many other



Nine-year-old Yoshiki Nakada, KHØUA, seen here with his father, Kuny, W1FPU/7L1FPU, just upgraded to Extra Class. (Photo courtesy Kuny Nakada)

parents and kids, too! We both were doing our own projects, but side by side, and if I had a question he could help me out.

Kits are extremely beneficial for less experienced hams who are struggling to learn about electronics. Instead of answering questions out of a Q&A book, it is much more effective to have a hands-on visual project. This way, the mechanics of the project can be explained on a build-as-you-go basis, seeing which parts work in which ways. Math can also be incorporated into this lesson. For example, when setting the bias control we set the transistors to pull about 1/2 amp and the voltage to 12 volts. Using the power equation, we can figure out how much power the amplifier takes when not being keyed. $P = I \times E$ is the equation with I = current (1/2 amp), E = voltage (12 volts), and P = power in watts. Therefore, $P = 1/2 \times 12$, P = 6 watts. This is a concrete example that gives substance to the power formula.

Another benefit of building kits is that a lot of times you can buy a kit cheaply and build it into something that would normally cost a lot of money to buy already made. This QRP amp is not something you could normally buy. Therefore it is definitely a must-have to build. CW keyers can also be cheaper if you build them.

Because these kits are cheaper than buying the already-made product, or the product isn't sold as anything but a kit, they can make great gifts. They are mind stimulating, and perfect for a family who is or would like to be involved in ham radio as a family hobby. It is a timeless gift that Elmers have always given kids, and those kids usually have kept the QRP amps, keyers, or like my dad, a Heathkit HW-8 transceiver, for years afterwards.

As an artistic person myself—very interested in music, literature, and other forms of art—I thought this project was actually very artsy. It definitely takes craftsmanship, a keen eye, and some patience to complete these projects. A steady hand is also a plus, which unfortunately I do not have.

Lastly, kit-building is great for kids simply because it's an activity that beats out many of the other activities that kids are so obsessed with these days. With much of today's technology being more on the pointless side, it is sometimes hard for kids to break away from the computer screen or from X-Box® to do something mind-stimulating. It is like pulling teeth to get some kids to even pick up a book for pleasure. However, many of the kids who enjoy video games enjoy them because they are a challenge or a puzzle. Well, so are these kits, except if you have not been introduced to electronics or do not know any of the parts, it is especially challenging. This hobby has led countless kids to careers in engineering or communications just because activities like this pique their interest at a young age. Then their hobby evolves into a college major they enjoy studying and a career for which they have a passion.

Sound Bytes

Congratulations to Yoshiki Nakada, KHØUA, for passing his FCC Amateur Extra Exam at only 9 years old! This is quite an achievement, especially because English is not his first language.

Know a young ham who recently achieved something worth congratulating? Send your sound byte to me at <KB1OGL@cq-amateur-radio.com>.

73, Brittany, KB1OGL

the ham notebook

BY WAYNE YOSHIDA,* KH6WZ

New Column, New Topics, Same Mission

After doing the "Beginner's Corner" for several years, the editors and I decided to try something different to add new life to my column. Although my column has changed, the mission statement is still the same. "The Ham Notebook" is a source of useful and practical information for the ham radio operator—sort of like a "what every ham should know" knowledge bank that includes book learning as well as hands-on, common-sense practices garnered through experience.

Records + Notes + Doodles = Inspiration

The new name is inspired by something I have been doing since my start in amateur radio in 1976—keeping a record of all radio activities in my shack and shop (see photo A). At first glance, it may look like an ordinary notebook. However, inside it is a journal of all of my ham radio activities, including notes on how to properly tune my first transmitter (an Eico 723, a crystal-controlled, 60-watt transmitter from the 1960s with three vacuum tubes inside) and what wrench sizes are needed to tighten down the U-bolts and other fasteners on my antennas.

I should mention that the FCC removed the logging requirements many years ago. Even so, many hams continue to keep a log of activities, and I agree this is a good practice to follow, for several reasons. For example, keeping a record of your contacts may become important if a neighbor blames you for causing interference to his home theater system, and you can show evidence that your station was not on the air at the time.

Second, a station log is an easy way to record your two-way contacts for the various operating awards such as the DX Century Club (DXCC), Worked All States (WAS), and the CQ DX and DX Field Awards.

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Third, a logbook is a great place to record general information on your radio activities. Think of the logbook as a journal, where you record important facts and notes that may come in handy later. For example, if you work on your antenna system by moving the direction a few degrees to the north, make a note of this in the logbook. You should include any notes on the antenna system before the changes as well. After a few months, compare signal reports of the contacts before and after the antenna work to see if there have been any improvements. Of course, propagation might be a factor, but over time some pattern of change or improvement may be noticed. On the other hand, if the signal reports are consistently lower or worse than before the antenna work, that is an indication of something, too.

Other things you may want to make note of include special ham visitors, new rig purchases and installations, serial numbers of your equipment, adjustments or switch settings on an antenna tuner, and so on. Lately, my log reflects my main radio interest these days: Microwave- and millimeter-wave station equipment building and contesting. The notebook includes much practical information on microwave equipment construction and component notes.

Of course, in the 21st century the notebook does not necessarily have to be on paper. It certainly can be an electronic, paperless document. Electronic documents have the additional advantage of being "searchable" using key words.

And Now for Something Completely Different

One item that is documented in my notebook is a portable power supply I take to various operating events. The "Orange Box" has made small appearances in previous articles, but has never been fully described. I have received several requests for more information on the portable power source, so this is a good time to show this project in more detail.

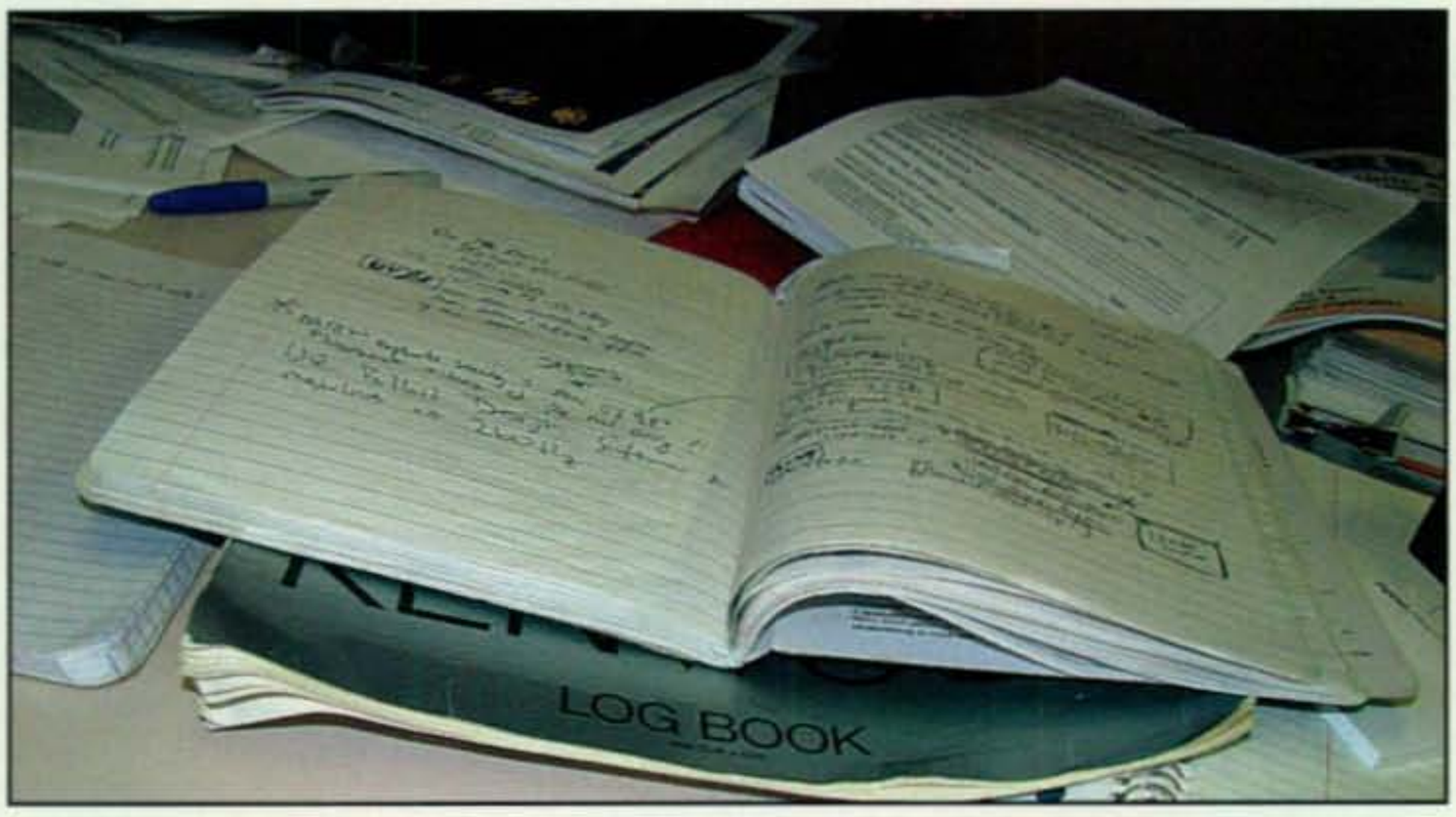

Photo A– A ham's log can and should contain much more than a record of radio contacts. The notebook is a handy, single location to keep important information about your station.

Refer to photo B. The portable power supply is really a weatherproof box with a big gel-cell inside. One version is an off-the-shelf item from an automotive supply store. It is intended to be an emergency jump-start battery for your vehicle. Every ham with a mobile rig installed in a vehicle should have one of these, just in case you forget to turn off the radio and the starting battery fails to crank the engine. Although these booster batteries can be used as-is, some adapters are needed in order to enhance safety and convenience when using them as a power source for your radio gear.

Photo C, shows you one of these modifications—an adapter to connect the big clips to smaller wires that are more convenient to connect to your rig or rigs. The picture does the best job of describing how this cable is made. A scrap piece of wood and a pair of 1/4-inch screws and nuts create terminals for the big clips to grab onto. Then a pair of wires goes to the radio gear. All of my 12-volt units use power cables terminated in Anderson PowerPoles®. This includes non-ham radio items such as rechargeable flashlights, radar detectors, GPS units, and digital camera chargers.

Photo B– An automotive emergency starter battery can be used as a portable power source, but some minor modifications will increase safety and convenience.

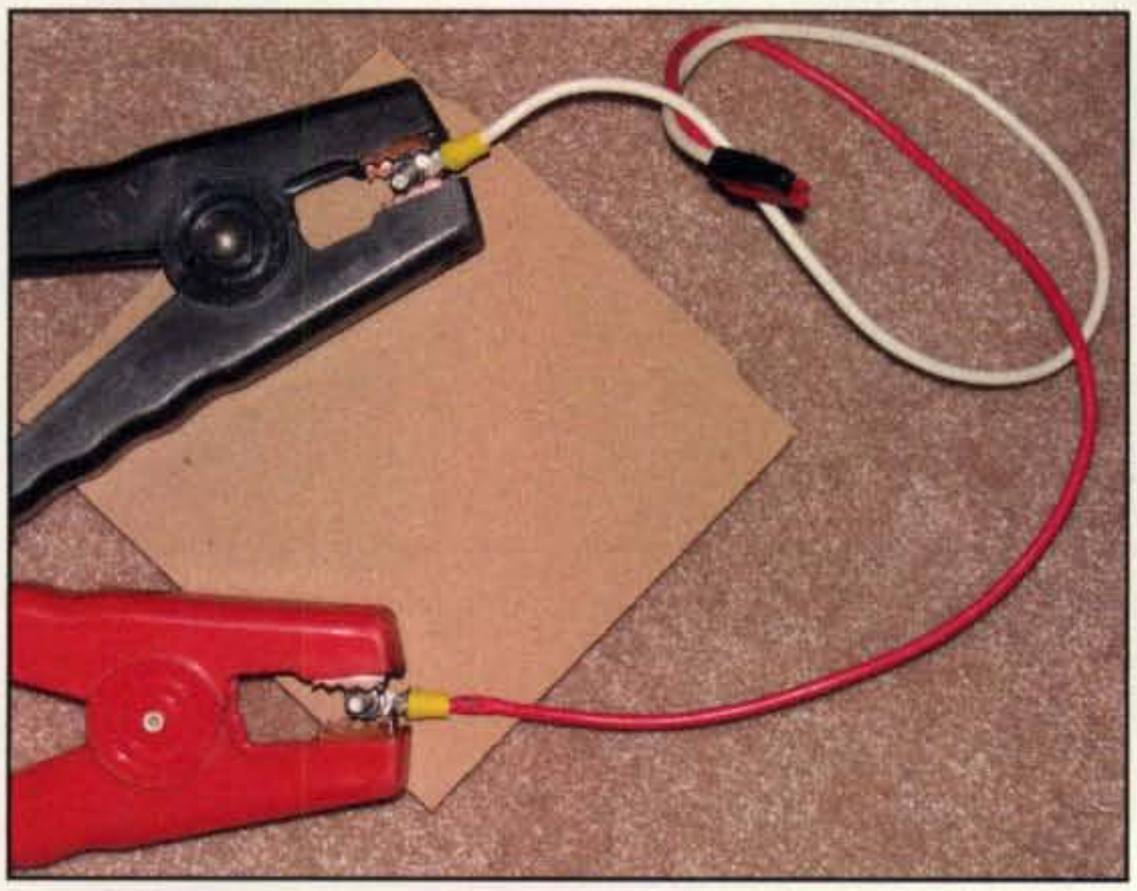

Photo C– The booster battery should have some modifications to increase safety and convenience. (See the text for more details.)

Photo D– My dedicated portable power box is a sportsman's dry box that I have modified for ham use, including a light for nighttime operating.

Photo E– The homemade power box includes enhancements such as meters to monitor battery condition and multiple DC outlets. The wire handles help protect the meters from damage.

Remember to include a fuse somewhere in the positive line for safety, since a big battery like this can deliver quite a spark if the plus and minus leads get shorted. If something goes wrong with the radio, there is enough juice to cause a fire, since the battery will be able to force a lot of current through the interconnecting wires. *(Some folks will fuse the negative line as well, as an added precaution.—ed.)*

The Orange Box portable power unit (see photo D) is essentially the same. The plastic sportman's dry box is available from fishing tackle or marine stores. Other sturdy containers or boxes with handles can also be used, or made, but make sure the box is sturdy enough to accommodate the battery, since lead-acid gel-cells are very heavy.

I added meters, a small West Mountain Radio RigRunner™ DC power strip, and a cigarette lighter socket to the front panel, as shown in photo E. The small automotive map light with its flexible lamp comes in handy when operating in the dark, although it is switched off as much as possible to conserve battery power.

In addition, there is a battery charger inside the box. The charger is a surplus unit intended to be the power supply for a burglar or fire alarm. I removed the circuit board from its plastic case so it fits into the dry box. The price is in the $5.00 range.

Being a surplus item, I hesitate to reveal the source, since many times such surplus items run out, never to be seen again. However, I checked with the store, and they have plenty of these units. The source is JK Electronics, 6395 Westminster Boulevard, Westminster, CA 92683 (714-890-4001).

If you are not able to find this exact "12V alarm power supply/battery charger" you can use any other charger that is compatible with the battery you purchased. Ask the sales staff where you bought the battery. Also check the advertisers in *CQ* for other possibilities.

Regarding the battery, I recommend that you purchase the biggest, beefiest battery you can afford and can fit into the case you use. In my experience, a 20-Ah or 30-Ah gel-cell would be strong enough to power a mobile transceiver in low power (5 watts or 1 watt) for several weeks—depending, of course, on how much you transmit. To extend battery life even more, I would use a 1-watt/5-watt handie-talkie radio rather than a mobile rig. As with all emergency or backup supplies, one must conserve as much as possible and transmit only when necessary.

Photo F– Big gel-cells are strapped inside the box. A piece of nylon webbing wrapped around and under the batteries helps to make battery removal easier. A battery charger is included inside the power box.

In photo F I have multiple 12-volt gel-cells connected in parallel. However, I recommend that you get a single, large 12-volt gel-cell, since it will simplify wiring and may last longer than connecting multiple batteries in parallel.

I got the batteries free from our building telecommunications man, who performed some preventative maintenance work on a bank of uninterruptible power supplies in the telephone switch room. These were considered hazardous waste, but after I explained what I wanted them for he gladly gave them to me. Although the batteries were several years old, they were able to supply emergency power for my 2-meter mobile radio for several hours. Recently, these batteries became depleted, and I will be replacing them with one large 12-volt gel-cell. When shopping for the battery, take the case with you and "try on" several batteries to make sure of a comfortable fit inside your box.

That's it for this column. If you have any ideas you'd like to share with other *CQ* readers, or if you want to see something covered in this column, send me an e-mail message and let me know.

By the way, I plugged "what every man should know" into the Barnes and Noble search engine. The B and N search reports 139 books related to this topic, so I hope my ham radio version of this concept catches on.

73, Wayne, KH6WZ

how it works

BY DAVE INGRAM,* K4TWJ

Low-Cost HF'n: Tips for Success

Our previous "How It Works" column introduced the concept of seeking out and lightly refurbishing an older and basic-style transmitter and receiver for getting started in HF band activities at low cost. That description contained an extensive amount of always-beneficial information, and it also overflowed available column space before we could bring in full details on interconnecting and operating the setup. This time we continue from that point with a number of time-proven notes and tips on rig connections, antenna and T/R switching, semi- versus full-break-in operation, frequency-warping crystals, and more. Let's start with some notes on hookups.

Hookups and Options

When you start setting up a separate transmitter and receiver for HF, you realize there are two AC power cables to connect and no T/R switch or antenna changeover relay like included in modern transceivers. What to do? Several options are possible. You might implement the separate receive and transmit antennas arrangement as we quickly discussed in our January column and reiterated/clarified in fig. 1. A random-length wire preferably 1/4 or 1/2 wavelength long for your favorite band works well for receiving. However, a dipole, vertical, or other 50-ohm antenna cut for your favorite band and tweaked for lowest SWR should be used for transmitting.

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Position the antennas away from each other and (hopefully) at right angles to minimize receiver pickup of your transmitted RF energy. The back-to-back 1N34 or equivalent glass/germanium diodes connected between the receiver's rear-panel antenna and ground screws do not degrade reception; they just prevent signals greater than .3 volts from overloading the receiver. Are they actually necessary? I cannot physically visit each reader to evaluate all the fine details of your particular installation, so I say it is better to have them and not need them than vice versa. Using this arrangement, you may also find it necessary to quickly reduce the receiver's RF gain control to minimize loud bleeps when transmitting. You could use the receiver's "receive/standby" switch, but that would eliminate a convenient means of monitoring your transmitted CW—although an alternate idea will be discussed later.

The next step is to use a large knife switch for antenna changeovers (fig. 2). Too "fumblesome"? No, it brings out the "real operator" in you! With a little practice, you can become fast and accurate at T/R switching ye olde knife switch and cranking down receiver RF gain. I know . . . like many old pros, I used that "two-handed T/R switching" when starting out in amateur radio and actually found it fun. I even left the knife/antenna switch "straight up" (disconnected from both transmitter and receiver) for safety and lightning protection when away from the rig.

Moving up one more step, you can substitute a relay with double contacts for the knife switch and acquire voltage to operate the relay from the trans-

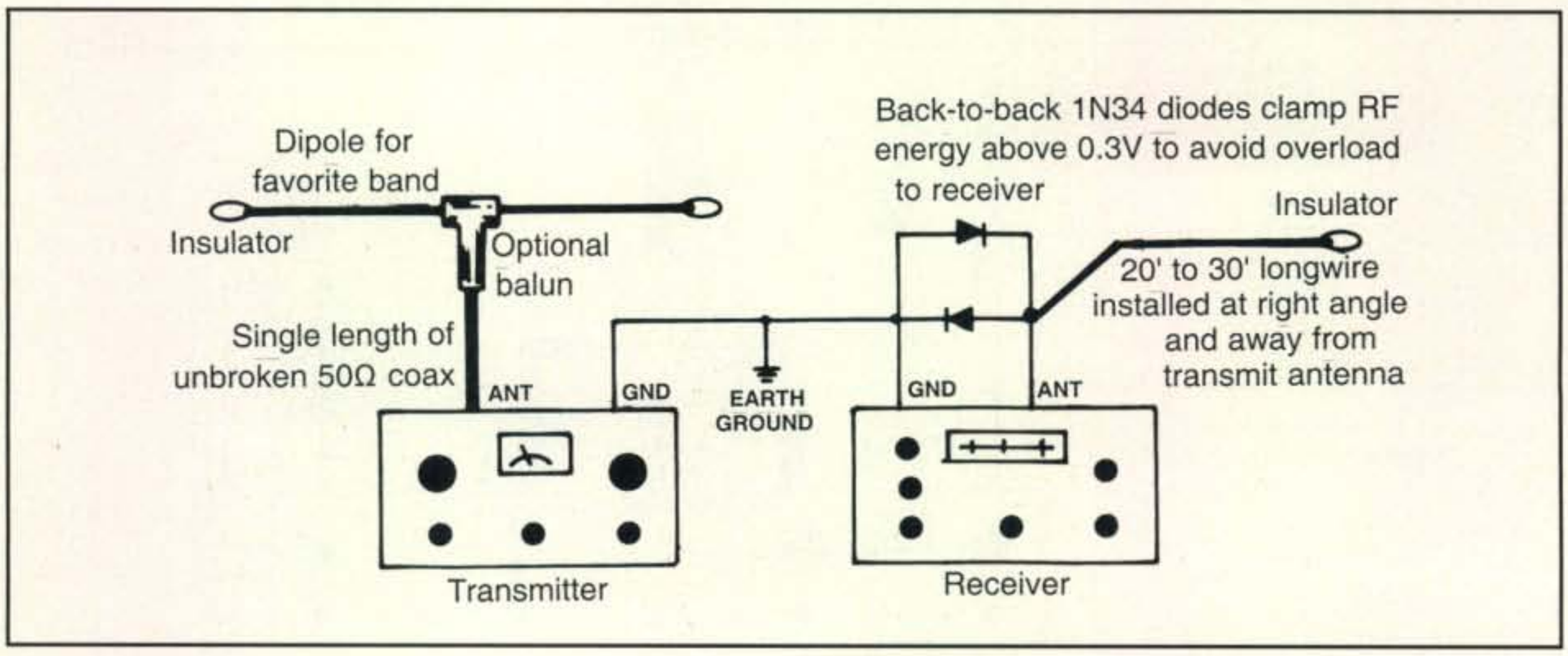

Fig. 1– The super-simple way to combine a vintage receiver and transmitter in an HF setup: The transmitter connects to dipole via a length of good-quality 50-ohm cable, while a random wire connects to the receiver. "Back-to-back" 1N34 or similar "glass"/germanium diodes clamp the transmitter RF at .3 volts to protect the receiver. You manually turn down the receiver's RF gain when transmitting. Most "low end" transmitters are keyed in both oscillator and amplifier stages and need not be T/R-switched.

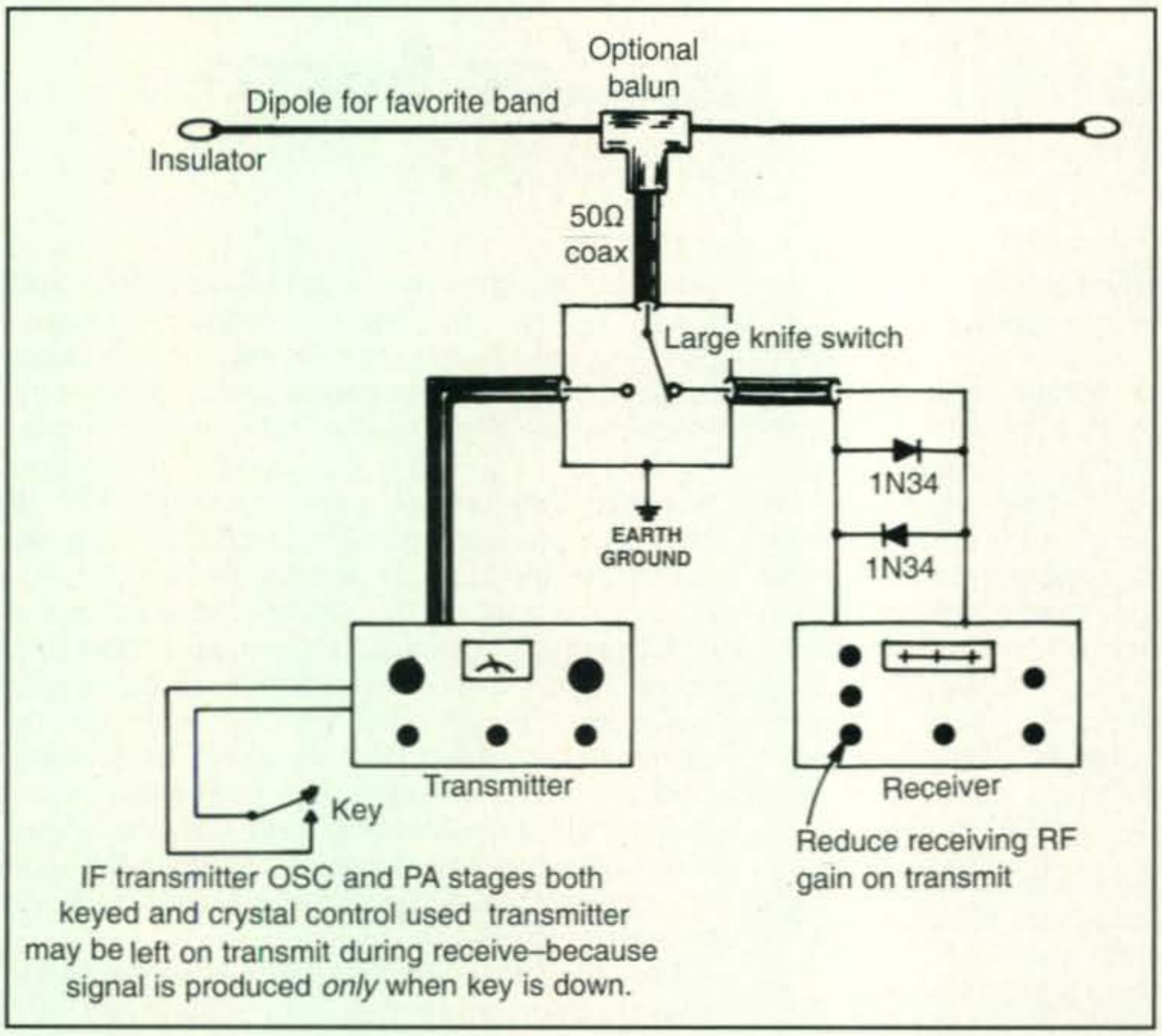

Fig. 2– A more proficient setup utilizes the same antenna for transmitting and receiving, with a simple open-air knife switch used for antenna changeovers. Simultaneously, you turn down the receiver's RF gain with your free hand—two-handed T/R switching.

mitter's "send/standby" or receiver's "receive/ standby" switch. This will require some technical savvy, but it produces a cool-going setup. One of the old Dow Key coaxial relays with fully enclosed mechanism, extra receiver standby/muting contacts, and three SO-239 sockets (for antenna, transmitter, and receiver) is ideal here. Finding one today is a major challenge, however, so you will probably substitute a large Potter and Brumfield relay (or flea-market-obtained equivalent).

Wire one set of contacts for antenna switching, one set for receiver muting, and enclose the relay in a metal box with all its screws intact. Check your transmitter's circuit diagram carefully, looking for extra switch contacts. Then consider rectifying 6 or 12 volts from the transmitter's filament supply to operate the relay (be sure it, too, has a 6- or 12-volt DC coil!). Depending on your technical expertise, other relays and activating schemes may be utilized.

Like to add a neat finishing touch? Use the relay's "second set" of contacts to switch between the receiver's internal RF gain control (on receive) and an external and equal ohmic value RF gain control (on transmit). (See fig. 3.) Then adjust the external control to a reduced/non-overload level for easy monitoring of your transmitted signal.

One other note warrants mention while planning station "frills" and relay voltages. Many simple low-power transmitters from past times relied mainly on frequency-controlling crystals and lacked mating VFOs. In such cases, you can add a 10- or 15-µHy inductor and 150- or 250-pFd variable capacitor in series with the crystal to produce a variable frequency crystal oscillator, or VXO, with a tuning range of 5 to 15 or 20 kHz (fig. 4). It is akin to a limited-range VFO, but more stable.

Additionally, most simple low-power transmitters do not draw plate current or produce an output signal until their connected key is closed. In that case, you may leave the transmitter set

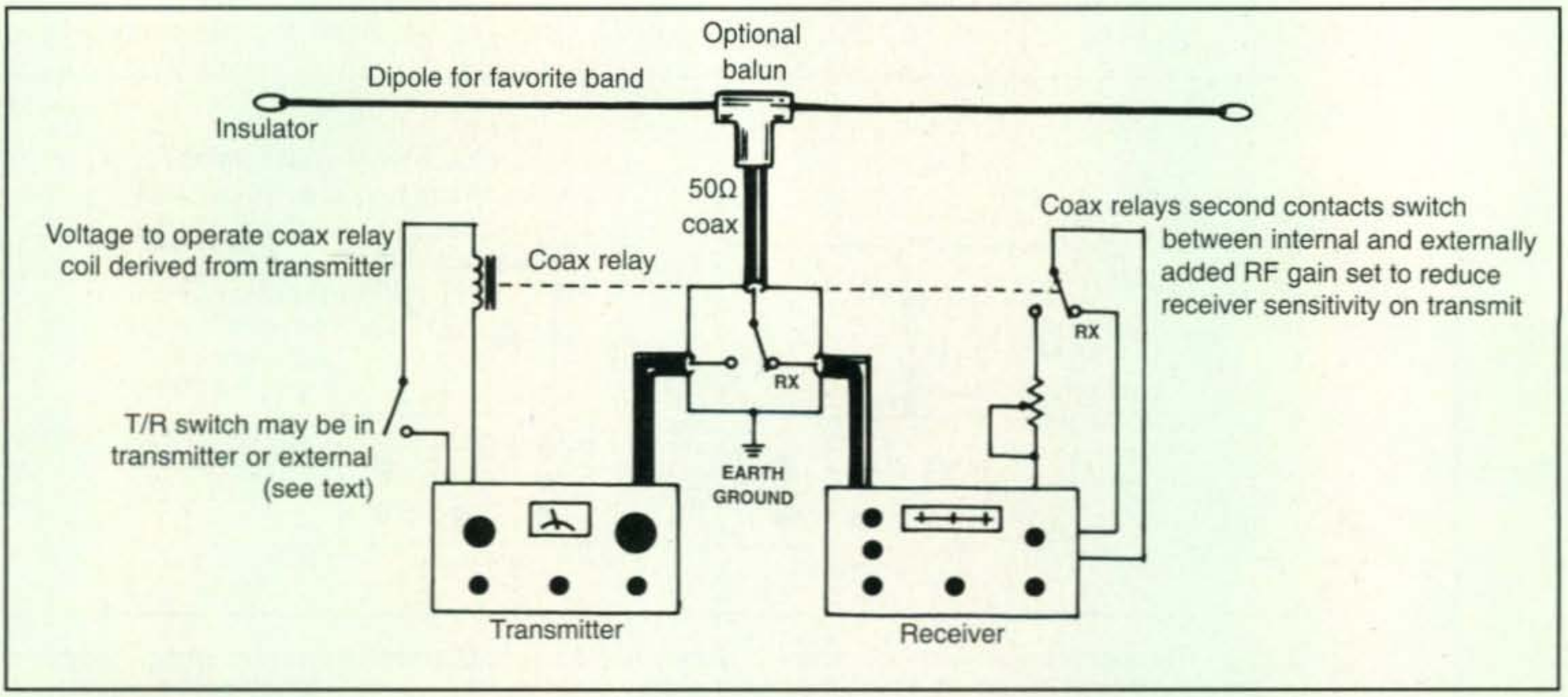

Fig. 3– A "big time" T/R switching arrangement utilizing a (homebrewed or commercial) coaxial relay with its coil activated from voltage acquired and switched by your transmitter. As discussed in the text, a second pair of relay contacts can switch between the internal and an (added) external RF gain control for conveniently monitoring your transmitted signal.

to "send" when operating and activate the T/R relay by another voltage source. You might also consider replacing the receiver's "receive/standby" switch with a Double Pole equivalent and using the extra set of contacts to operate the T/R relay.

Now do not become perplexed over the previously discussed options. Just pick the one you like and understand and implement it. Remember the name of the game is enjoyment and having fun.

Antennas and Keys

A good antenna is your key to successful HF'n, and several types are easy to home-assemble. A dipole

Photo A– Concerned about getting zapped by high voltage when operating CW with a tube rig? Use a plastic-cased key such as this Hi-Mound HK-706 available from <www.morseX.com>. It's a gem.

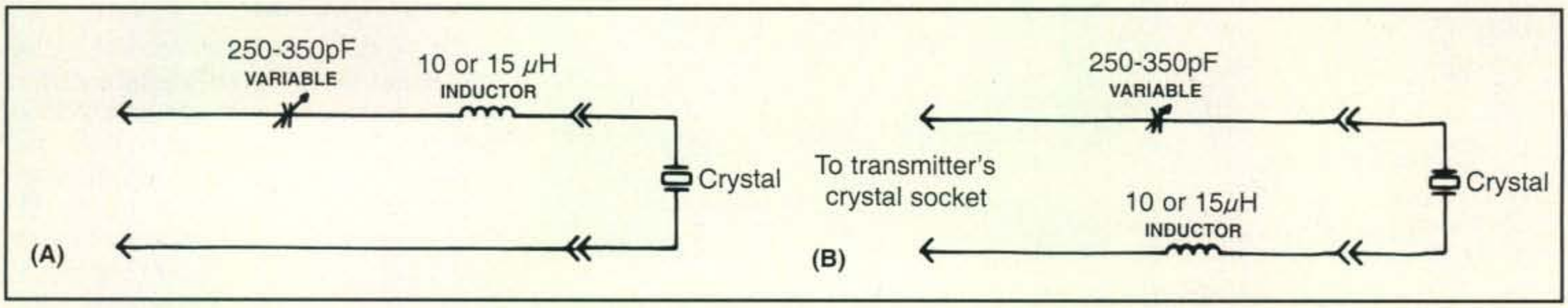

Fig. 4– Outline of a simple VXO circuit capable of shifting the frequency of your transmitter's quartz crystal between 5 and 20 kHz (depending on band and value of inductor). Suitable inductors may be home-wound on toroid forms (T-50-2 with 20 or 30 turns works well), or ready-to-use molded inductors may be purchased from Mouser Electronics (1-800-346-6873).

Photo B– As shown by this neat Eico 720 transmitter (right) and Hallicrafters SX-25 receiver (left) setup put together by Bill Albrant, K6CU, old-time gear has a special warmth and beauty unequaled by modern gear. Look at those soft amber dials, those analog meters, those classy knobs!

installed in an open area 30 to 60 feet above ground so it has plenty of clear room to radiate and receive signals is a popular choice. Be sure to use or "feed" it with a single and unbroken/unspliced length of high-grade 50-ohm coax, include a balun, and seal feedpoint connections with silicone or Coax Seal® (and no, electrical tape is not an adequate sealer). Tweak overall length to yield an SWR close to 1:1 and enjoy.

A better wire antenna with a tad of signal gain is a full-wave delta loop, and it usually can be installed in the same space required for a dipole. You can also make it a real romper by installing it in what most folks might call an upside-down configuration so most of its wire is highest in the air for maximum radiation/reception and its feed point is closest to ground for minimizing coax-cable length.

If supports (such as trees) are not available for installing wire antennas up high, consider using a homebrewed vertical installed at ground level. Some folks say verticals do not "work out" as well as dipoles or delta loops, but that is usually because they mount them in a closed/confined area where signal radiation is blocked and/or they fail to include a ground radial system. Install at least four quarter-wave-long radials, with the vertical positioned for a good horizon-to-horizon view, and maintain a positive "can do" attitude. Confidence is paramount! Another tip: Aluminum tubing (or less-expensive electrical conduit) is not mandatory for making a vertical. Anything that will support a thick wire or unrolled strip of half-inch-wide copper works equally well, and that radiator can also be hidden in a fiberglass pipe or pole adorned with a flag and plastic ball or eagle.

With respect to keys, I should remind you that tube gear places high voltage on its key's contacts. You must exercise care—just like we did in the good old days—to avoid getting shocked. If you can't be careful, use a plastic-cased key or bug. Hi-Mound's HK-706 hand key (photo A), available from <www.MorseX.com>, is a nice choice. Alternately, browsing hamfest flea markets might reward you with a plastic-cased E.F. Johnson, Skilman or Hi-Mound bug like Bill Albrant, K6CU, uses with his golden oldie setup shown in photo B. Also note that hamfest flea markets can be a great source of old-time rigs (photo C); you just have to look for them!

Photo C– A quick tour of the 2009 Huntsville (Alabama) hamfest flea market uncovered these smooth-working Conar transmitter-receiver twins complete with original manuals and at a most affordable price to boot. The good deals are out there, friends. Just look carefully to find them.

Operating Tips and Techniques

Using a delightful old receiver and transmitter setup is a mite different from using a modern transceiver. The receiver's AGC system is less active, for example, so you avoid overload from strong signals by cranking up the AF Gain to around three-quarters of maximum and using the RF gain (sensitivity) to control overall volume. This is the "reverse" of transceiver operation. Once acclimated to the technique, you might also "tweak" RF and AF levels for

your particular rig, antenna, and usual times of operation.

Assuming you add VFO or VXO control to your transmitter, setting it to the precise same frequency as received stations' (called) "zero beating" can prove tricky, especially if your transmit signal overloads your receiver. A "spot" switch is ideal here, but if it is not included in your transmitter, reducing your receiver's RF gain usually helps. You "zero beat" a station by tuning your receiver from a high-pitch/treble CW tone on one sideband down to the lowest pitch/bass tone you can hear, and then double-check that setting by tuning through the other sideband in a similar manner. Then leave your receiver set at zero (midway between the two sidebands lowest pitch tones) and set your transmit frequency to that same zero-beat tone point for transmitting. Once zeroed, you can retune the receiver (but not the transmitter!) for a comfortable-to-copy tone from the other station.

You may also find it helpful to ask an old-pro amateur to double-check your zero-beating accuracy with an on-the-air QSO. With some practice, you may also become proficient in matching sideband tones rather than zero beating stations. Just be sure you tune in the proper sideband or the "other station" may not hear your (2 or 3 kHz) off-frequency signal. You can quickly check that, incidentally, by placing a borrowed "big time" transceiver by your receiver and tuning in the same station on both rigs.

Unlike instant-on solid-state gear, tube gear appreciates a few minutes warm-up time before transmitting. Remember that fact, and it will reward you with long tube life. Checking your antenna's SWR each time you get on the air is also encouraged, as it alerts you to an unrealized antenna or transmitter problem and/or gives you a positive "can work them" mindset when the power is up and the SWR is down.

If you are new to HF'n, 80 meters is usually considered a nighttime band because it is typically "open" during the hours of darkness (similar to the AM broadcast band on 550 kHz to 1650 kHz). Forty meters is a night plus some-of-the-day band, with a "slump" in signal propagation between 10 AM and 2 or 3 PM your local time, and 30 meters is a day and nighttime band with a mild slump between 12 noon and 2 PM and 2 AM and 5 AM. The higher you go in bands, the more they are open during daytime hours, and the lower you go in bands, the more they are open during nighttime hours—plain and simple.

In closing, I remind you that some folks battle high power-line noise, and sometimes that noise is intermittent. It drowns out your signal and drops off the minute after you call so another station "gets through" with no problem. Some operators also use narrow CW filters (even when calling CQ! Gad!) and do not hear you unless your signal falls right into their passband (like Luke Skywalker dropping a bomb into a small opening on the Death Star ship in *Star Wars*). Don't fret: Just learn as you go and move on. Developing good operating skills can give you a 10- to 20-dB advantage over other less-proficient operators—and that's a fact!

Conclusion

Goodness gracious, we totally overflowed available column space and must bow out quickly. Here's hoping our mini series inspires you to give HF'n a good old college try, and if you need more guidance, tell us (specifically) and we will address those needs in future columns. Good luck on HF and here's hoping we meet one night soon on 30 meters. 73, Dave, K4TWJ

what's new

BY JOHN WOOD,* WV5J

Radios, Improvements, and More

New and improved amateur radios and other gear are in the spotlight this month as far as "What's New" is concerned with the introduction of Yaesu's new FTM-350R mobile rig, Yaesu's APRS-improved VX-8DR, a new USB-controlled RF switch from RFMD, some definite improvements to the popular Weather Defender computer application from Swift Weather, some new items from MFJ, PSK31 help from Nifty! and a new version of the HamLog software application for the iPhone.

Yaesu's Newest: the FTM-350R

Leave it to Yaesu to produce one of the most technologically advanced VHF/UHF ham rigs to come down the pike in awhile—the new Yaesu FTM-350R (photo A) with GPS, APRS, and Bluetooth® capabilities.

Advertised by Yaesu as a 50-watt, dual-band, 2-eter and 70-cm radio that at press time is waiting for FCC approval, this one is actually a tri-bander with its 1-watt output capability on the 222-MHz ham band. In many areas of the country that means this rig can go a long way in helping its monitoring owners keep up with what the nearby hams are talking about on the crowd's favorite local FM repeater, since it covers the most popular bands for ham repeaters.

However, the GPS, APRS, and Bluetooth features are the big draw for this rig. You'll need the optional FGPS-1 or FGPS-2 receiver and antenna, but with the combo, the screen of the FTM-350R can supply you with all of the information available from a traditional GPS unit, and it's compatible with various APRS functions, including traditional APRS receive capabilities and what Yaesu describes as SmartBeaconing from HamHUD Nichetronix.

In addition, the FTM-350R comes with dual speakers to listen to FM commercial stereo broadcasts, wide-band receive, a high-speed band scope to check local FM activity, a 1200/9600-bps packet port, more than 1000 memory channels, a built-in front-panel microphone and an MH-48A6JA hand microphone, a detachable control head, and support for the optional FPR-1, a portable monitor unit that enables you to let others within 1000 feet of your FTM-350R receive your transmissions.

Yes, it's quite a package, and I have no doubt you'll discover many other impressive features once you get your hands on your own FTM-350R. With this radio it's pretty obvious that Yaesu is continuing its role as a leader in amateur radio technology.

Yaesu VX-8DR, Adding Enhanced APRS

Are you already enjoying your technologically advanced Yaesu VX-8R (photo B) portable radio? Well, now you have an option to upgrade to an even more advanced unit that Yaesu has christened the VX-8DR, which comes with enhanced APRS capabilities. Yes, upgrading your present

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e-mail: <wv5j@cq-amateur-radio.com>

Photo A– Yaesu's newest ham rig is the FTM-350R, which features three-band operation on the 2-meter, 222-MHz, and 70-cm bands along with GPS, APRS, and Bluetooth® capabilities. The new mobile/base transmits up to 50 watts on 2 meters and 440 MHz and can also receive commercial broadcasts and play FM stereo broadcasts through twin speakers located in the back of its removable control head.

Photo B– Yaesu is now marketing its new and improved VX-8R under the new model name VX-8DR. The new model has been equipped with enhanced APRS capabilities and has a slightly higher price. Present VX-8R owners have the option to upgrade their radios with the enhanced APRS capabilities for a few dollars if they choose, but they must send the HT toYaesu to have the work done.

VX-8R is an option that will cost you a few dollars, but if you haven't made the purchase yet, you now have the choice of either buying the VX-8R or the VX-8DR with new expanded APRS capabilities that Yaesu says can meet the needs of even the most active APRS user. The VX-8DR has the same appearance as the VX-8R and uses the very same accessories, but it costs a little more.

Why consider getting the VX-8R now that the VX-8DR is here? For all the great reasons you were first attracted to the VX-8R, including a full 5 watts of FM transmit power on 50/144/430 MHz, plus 1.5 watts on 222 MHz and AM capability on 6 meters; Bluetooth hands-free operation with the optional BU-1 and BH-1 or BH-2; APRS 1200/9600-bps data communication (B band only); submersible capabilities (can go 3 feet under for a minimum of 30 minutes); 7.4V 1100-mAh lithium ion battery (included); its compact size 2.36" × 3.74" × 0.92"; simultaneous independent two-signal dual receive function (both V + V or U + U); weather receiving with Weather Alert; built-in barometric sensor; the ability to monitor amateur radio frequencies while receiving AM/FM broadcasting; a dot matrix LCD display that provides up to 16 character memory tags; a high-resolution Spectrum Analyzer with ±50 channels indication; DCS and CTCSS ENC/DEC tone features and wave monitoring of received/modulated signal; and a laundry list of additional options such as a 1800-mAh LI battery, GPS unit and antenna, and a 3× AA battery-cell case.

But if that's not enough for you as an APRS enthusiast, opt for the VX-8DR and get all that plus advanced APRS functions such as Smart Beaconing™, a standout feature that automatically adjusts the beacon timing to your traveling speed and location to plot a smoother trace to match your position and movement on a map. Other Yaesu improvements to the VX-8DR include an increase in the number of stations listed from 40 to 50; a larger APRS message memory growing from 20 to 30 while also adding a selectable message-received LED flashing rate; a DIGI-PATH route indication function (the APRS® packet data includes Digipeater routing information); and a change to the heads-up compass display on the GPS screen that positions your traveling direction always toward the top of the display.

So now is the time to do some digging—or just call it personal research if you like—and find out all about the

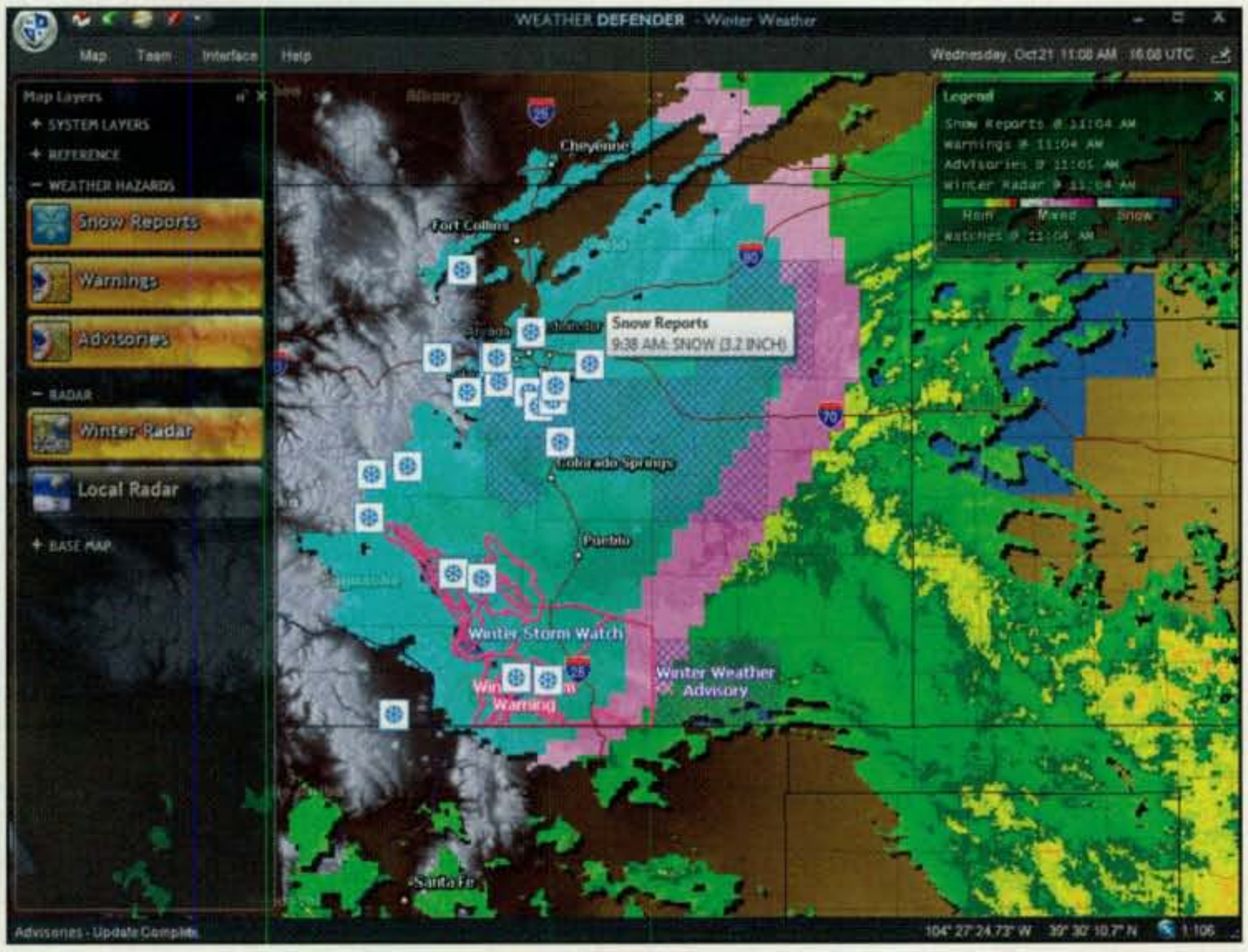


Photo C– Swift Weather has improved its Weather Defender software, giving it increased warning times to a user-designated location, additional maps, and greater alert capabilities, while also enhancing its programmable alert dissemination features to include sending notices about threatening lightning storms, tornadoes, hail, high winds, heavy precipitation, and more via e-mail or to a handheld device.

Yaesu VX-8R and VX-8DR, then determine which one of these feature-packed HTs you want and fills your needs. By the time you read this, the VX-8DR should be available through most ham radio dealers.

Swift Weather Releases Improved Weather Defender 1.1

Swift Weather tells us that its new easy-to-use weather software, Weather Defender 1.1 (photo C), allows users to track winter weather threats in real-time so they can better prepare for blizzards, snowstorms, and extreme temperatures. Weather Defender 1.1 also provides immediate customized severe winter weather alerts for users' specified geographic areas through an on-screen computer monitor display, an audible alarm, e-mail message, or by SMS text to any mobile handheld device.

Weather Defender 1.1 should be an attractive product for both consumers and businesses alike, since it allows users to monitor weather changes in a timely, accurate manner and send weather updates to their e-mail or handheld device.

Other features of Weather Defender 1.1 include the ability to track blizzard and winter storm watches, warnings, and advisories as they are issued in real-time; view live weather radar with precise rain, sleet, and snow color-coding; see up-to-the-minute snow depth reports and road conditions; study extreme temperature maps; and issue automated alerts based on any weather threat to the nearest 1/10 mile that can be sent directly to a user's preferred e-mail or mobile handheld device.

Weather Defender 1.1 is compatible with Windows® 2000/XP/Vista/7 operating systems. The Residential Edition is $29.95 per month plus activation, while the Commercial Edition is $49.95 per month plus activation. For more information and a free seven-day trial version of Weather Defender 1.1, visit <weatherdefender.com>.

TES6000-30 USB-Controlled RF Switch

Telemakus, LLC tells us it is now marketing the TES6000-30 (photo D), a laboratory-quality RF SPDT switch that provides 30 dB isolation, less than 2 dB insertion loss, and is described as the smallest USB microwave switch available today.

The switch is fully terminated at all ports with a return loss better than 20 dB at 4 GHz. The RF connectors are SMA, with the common port male and ports 1 and 2 female, allowing for easy interconnection. Put simply, by plugging this unit into a USB port on your

Photo D– Want to control your RF outputs via your computer or laptop? This USB-controlled RF switch model TES6000-30 from Telemakus, LLC is just the thing to make it happen. Plug it into a USB port or extender cable attached it to your computer, connect your SMA-equipped cables from antennas and transmitters, and you are ready to go. The TES6000-30 may also be used as a basic building block for complex switch matrices.

computer, you can control RF connections through a Windows®-based user interface. The device comes with a half-GB of flash memory containing all the installation files, data sheet, and test results. It can also be used with common ATE software. Multiple switches can be used, allowing complex switch matrices to be built.

Potential applications for this compact switch include RF routing for various test or communication configurations, switching between two RF sources or loads, pulse modulation for amplifier testing, redundancy switching, and filter banks.

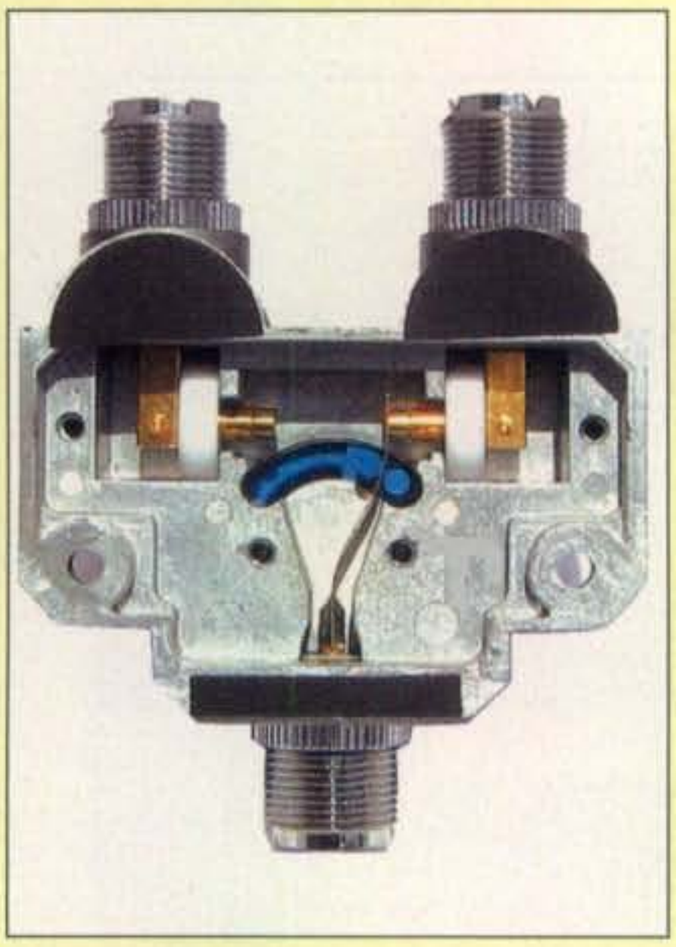
For more information visit <rfmw.com/Telemakus>, or contact RFMW, Ltd. at telephone 1 (877) 367-7369, e-mail <sales@rfmw.com>, or by mail at RFMW Ltd., 90 Great Oaks Blvd. #107, San Jose, CA, 95119.

MFJ New Products

Triple-Band 2m/220/440 FlexiDuck™. MFJ is doing it again—answering the needs of amateurs everywhere, this time by providing compatible antennas that work with today's multi-band HTs such as the Kenwood F6 and the Yaesu VX-8R and VX-8DR.

MFJ is now making available its triple-band MFJ-1718S 2M/220/440 HT FlexiDuck™ antenna which measures in at 17 inches tall, comes with an SMA connector, and gives the user a 1/4-wave antenna on 2 meters and 222 MHz, and a 5/8-wave on 440 MHz.

MFJ also claims that the MFJ-1718S is precision-tuned at the factory for lowest SWR, features High-Q and low-loss construction, and handles up to 10 watts of output power. The MFJ-1718S is priced at $29.95.



Photos E & F– Recently, MFJ announced a number of new products, including a tri-band rubber-duck antenna for 2m, 222, and 440; an NMO truck-lip mount; 1- and 3-GHz antenna switches (left), and dummy loads (top). Get more information about each item or place an order by visiting the <mfjenterprises.com> website.

Mini NMO Trunk-Lip Mount. MFJ is aso making available its new Mini NMO Trunk Lip Mount, the MFJ-346M, priced at $24.95. Made with stainless steel, it comes with 17 feet of coaxial cable terminated with a PL-259 connector and includes a rubber cushion that protects your vehicle surface from scratches.

Antenna Switches, Dummy Loads. MFJ is also now marketing its new wideband 1- and 3-GHz two-position antenna switches (photo E) and 1- and 3-GHz dry dummy loads (photo F), both available with SO-239- and N-male connectors.

The antenna switches feature gold-plated flange and connector contacts and are priced at $49.95 each with the SO-239 connectors (MFJ-2702) and $59.95 for N connectors (MFJ-2702N).

The dummy loads are rated to handle up to 200 watts for 5 seconds and 35 watts continuous for frequencies from DC up to 1 or 3 GHz depending on the model selected. Both versions are available with your choice of SO-239 (MFJ-262B) or N connector (MFJ-262BN) option and are priced at $59.95 each.

MFJ's products are covered under its famous No Matter What™ one-year, limited warranty that promises that MFJ will repair or replace (at its option) your MFJ products no matter what the reason for one complete year.

To order any of these MFJ items, get a free catalog, or to locate your nearest MFJ dealer, call 1-800-647-1800; send a fax to 1-662-323-6551; write to MFJ at 300 Industrial Park Road, Starkville, MS 39759; or visit <mfjenterprises.com>.

Photo G– Is it worth 99 cents to get some help with your logging duties? Nick Garner, N3WG, hopes so now that he has developed and gained Apple approval for HamLog, an app for the iPhone that is designed to help radio amateurs handle their logging of contacts.

HAMLOG App for the iPhone

Are you ready for a ham radio application for your iPhone that can make your logging chores a little more fun? It's called HamLog (photo G), and it logs contacts; exports via e-mail as CSV (comma separated values), ADIF (Amateur Data Interchange Format), or eQSL.cc formats; conducts automatic name/QTH resolution based on U.S. callsign; handles grid square calculation using the phone's built-in GPS; gives you azimuth calculations; and performs callsign lookup via QRZ.com or a dedicated database imported directly from the FCC (U.S. only). Logging fields include time

SUCH A HAM

I have enough radios. I can't afford it.
My wife wouldn't speak to me for months.
I'll take it.

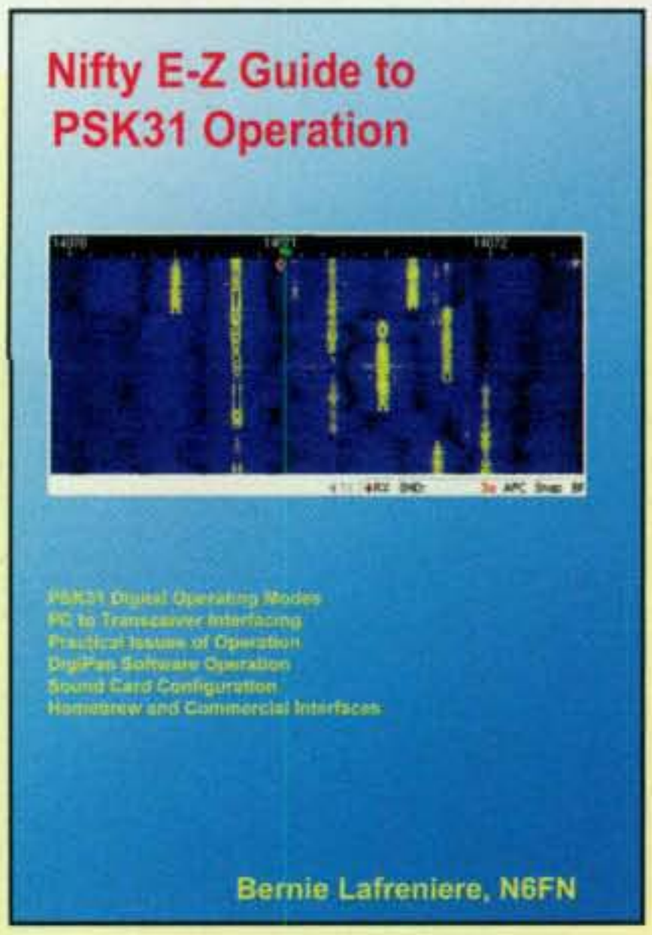


Photo H– Nifty! Radio Accessories can bring you up to speed on how to get up and running on PSK31 with its newest book, a 70-page compilation of facts about one of the modes of amateur digital communications. Priced at $12.95, the book goes light on theory, emphasizes how to get things connected, and shows you the best way to start making PSK31 QSOs.

on, time off, frequency, mode, RRST, SRST, name, QTH, grid, power, and a space for user notations. HamLog also provides you with an IARU prefixes list, the U.S. band plan, the latest DX spots from DX Summit, WWV propagation reports, and a Q signal list.

Additional screenshots of the software can be seen at <n3wg.com/hamlog>. HamLog (current version is 2.4) costs 99 cents and is downloadable from the iTunes App Store.

HamLog author Nick Garner, N3WG, also tells me he has a free iPhone app coming, somewhat of a HamLog Lite, that is awaiting Apple approval. It is called iRover and can be of assistance to VHF/UHF contesters. For more information, visit <n3wg.com/iRover>.

Nifty E-Z Guide to PSK31

Nifty! Ham Accessories, well known for its series of amateur radio quick-reference guides, has now released a book designed to quickly get amateur radio operators up and running with PSK31 mode operation (photo H). Light on theory, the book concentrates on getting things connected and making PSK31 QSOs. The book explains the details of transceiver-to-PC sound-card interfacing, software configuration, and operation. The pros and cons of building a homebrew interface or purchasing several types of commercial interfaces are also explored. Nifty! says its detailed instructions and screen shots take the mystery out of operating PSK31 software and interpreting the quality of received signals.

Priced at $12.95, this 70-page book can be ordered from the company's web page: <niftyaccessories.com>. For further information about this book, you may visit the company website, call 1-760-781-5522, or write to Nifty! Ham Accessories, 1601 Donalor Drive, Escondido, CA 92027.

That's it for this month. We'll be back next time with more new products of interest to the amateur radio operator.

73, John, WV5J

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

Apollo 11: The Australian Story

BY JOE LYNCH,* N6CL

This past June amateur radio operators around the world operated Earth-Moon-Earth (EME) in celebration of the 40th anniversary of the successful Moon landing of Astronauts Neil Armstrong and Edwin (Buzz) Aldrin, who were onboard the Lunar Module (LM) of Apollo 11. Under the project Echoes of Apollo (EOA), which was organized by Pat Barthelow, AA6EG, several major dishes were in operation. Among them was the Mt. Pleasant dish located in Tasmania, Australia.

Along with the operation of the Mt. Pleasant dish came a spotlight on Australia and the tremendous contribution citizens of that country made in the successful transmission of the live pictures from the Moon on July 21, 1969.

The Winter 2010 issue of *CQ VHF* magazine contains Barthelow's article summarizing the EOA success of last June. Along with mentioning the Mt. Pleasant record-setting 3-mW QSO that took place during the EOA project date, he also discusses the two other dishes of importance to the success of the Apollo 11 operation 40 years ago. These dishes are Parkes and Honeysuckle Creek. For more information on their success, he includes this URL: <http://www.publish.csiro.au/?act=view_file&file_id=AS01038.pdf>, which is a pdf of John Sarkissian's paper "On Eagle's Wings: The Parkes Observatory's Support of the Apollo 11 Mission."

While Sarkissian's paper is quite lengthy (25 pages), the story he tells about the Parkes dish and the other Australian giant dishes used in the live Moon broadcast is absolutely fascinating. Ten years ago the movie *The Dish* was released. It takes a humorous and creative license approach to the story of the Parkes dish. As is so often the case, when creative license is taken some of the more intriguing facts in the real story are lost in the artistic rendition. For example, in watching the movie the viewer is led to believe that the Parkes dish was the only dish involved in the television transmissions from the Moon. In actuality, when the TV camera on the LM was switched on (by activating its circuit breaker), three dishes received the signals simultaneously. They were Goldstone, Honeysuckle Creek, and Parkes. NASA began the broadcast by choosing the Goldstone received TV signals first. A fourth Australian dish, the Tidbinbilla, also received the signal but it was not used in the broadcasts. More about its role is covered later in this piece.

It is popularly understood that for the first few minutes of the broadcast NASA alternated the signals between those received by Goldstone and Honeysuckle Creek. After 8 minutes and 51 seconds, the Parkes signal was used and they stayed with it for the remainder of the 2 1/2-hour transmission. In truth, there is some doubt about this understanding. The conclusion of this piece addresses this confusion.

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

March 7	Last quarter Moon. Very poor EME conditions.
March 12	Moon apogee.
March 14	Moderate EME conditions.
March 15	New Moon.
March 21	Moderate EME conditions.
March 23	First quarter Moon.
March 28	Moon perigee. Excellent EME conditions.
March 30	Full Moon.

—EME conditions courtesy W5LUU

As I read Sarkissian's article, I was inspired by what I read. Furthermore, I felt that this story needed to be shared with us amateur radio operators. Therefore, in order to give the Australian story an amateur radio venue, I created the following, a very limited and somewhat focused digest of Sarkissian's paper:

It was in 1968 when NASA asked for the Parkes dish to be used in the Apollo 11 mission. It was the superior gain of the 64-meter dish that originally caught the attention of NASA in 1966, when it had to cut back on its project to build three 64-meter dishes, one in Goldstone, California, and the other two in Australia and Spain. Suddenly, the already existing Parkes dish became very attractive—especially for the Apollo 11 mission.

The agreement between NASA and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia consisted of a two-sentence contract that essentially stated that the Radiophysics Division of CSIRO would agree to support the Apollo 11 mission for $3,500 per day plus $15,000 to cover the additional work on the dish.

NASA supplied the S-band front-end receiving equipment, tape recorders, and translating equipment for converting the incoming signals into a TV signal. The observatory provided everything else. Personnel at the dish included both NASA and CSIRO employees.

The original plan was for Parkes to be a backup to Goldstone and the 26-meter dish at Tidbinbilla near Canberra, Australia. Additionally, the 26-meter Honeysuckle Creek dish, also near Canberra would track the command module *Columbia*. One problem was that the original timeframe for the first extra vehicular activity (EVA), or Moonwalk, was to take place immediately upon landing. However, Moonrise at Parkes would not take place for more than six hours after lunar landing. Additionally, because of the dish's 30-degree horizon (meaning that the dish could not be lowered beyond 30 degrees), Moonrise for the dish would

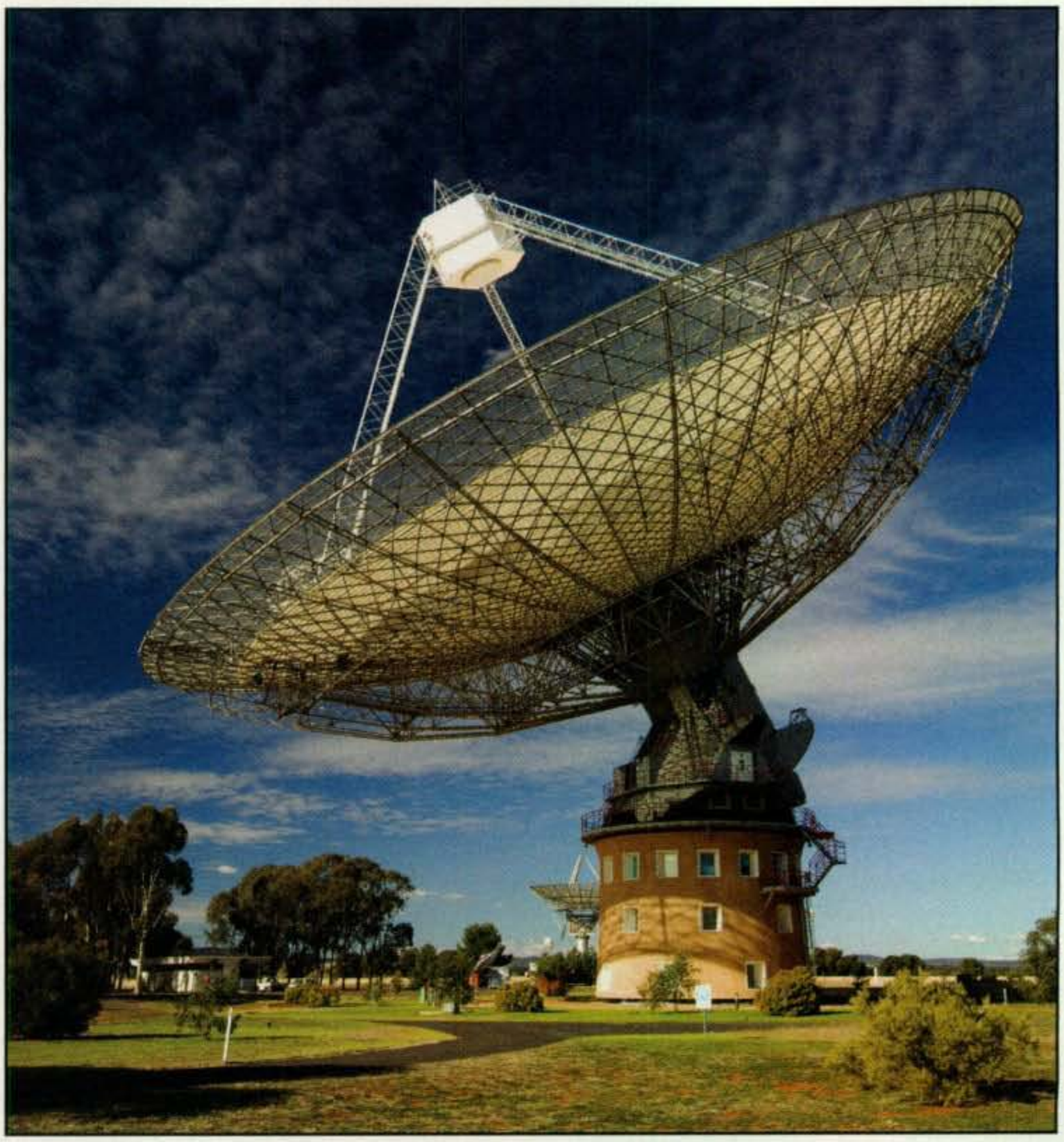
be another 30–40 minutes after the Moon had risen. This lack of availability of Parkes meant that the plan for an immediate EVA upon landing was scrubbed for a later time of ten hours after landing. Ironically, the problem with this new time was that the Moon would have already set at Goldstone.

In the end, Armstrong would exercise his option to go ahead with the EVA as soon as they had landed and were secured. Unfortunately (or fortunately, as it turned out), it took the astronauts several hours to suit up and depressurize the LM's cabin. By the time Armstrong was ready to alight, it was just about time for Parkes to acquire the signal with its offset feed.

Another unfortunate event almost scuttled Parkes availability. Just before the acquisition of the signal, a huge squall hit Parkes. Winds in excess of 70 mph subjected the dish to forces ten times more than it was designed to take. As fortune would have it, at about the same time that Aldrin was to push in the circuit-breaker button and thus activate the television camera, the winds died down. Additionally, the Moon rose sufficiently for the Apollo 11 signal to be picked up when Aldrin activated the camera. As the 1980s television series *The A-Team* character Col. John "Hannibal" Smith (played by George Peppard) would often say, "I love it when a plan comes together."

Even though there was a calm in the squall at the moment of the acquisition of the television signal, the weather never did fully cooperate. The winds pushed the dish outside its safety limits for the duration of the 2 1/2-hour EVA. Furthermore, regarding that plan coming together, before it finally came together there was one more change in the order of the giant Australian dishes. Unfortunately for the personnel at the Tidbinbilla dish, a fire in the transmitter on July 18 made it inoperable. Heroically, the engineers made the necessary repairs in 12 hours. Even so, insofar as NASA was concerned the damage was done. Tidbinbilla's role was given to Honeysuckle Creek. Tidbinbilla would become the tracking dish for *Columbia*. Yet insofar as the television broadcast was concerned, that relegated role would not take it entirely out of the picture. I will have more on this tidbit later in this piece. For now, however, we continue to focus on Parkes's role.

NASA had the signals from all three of the dishes—Goldstone, Honeysuckle Creek, and Parkes. Initially, NASA rotated around the three signals. However, after the main receiver on the Parkes



CSIRO's Parkes Dish was the focal point of the 2000 movie The Dish, which was about its involvement in the reception of Apollo 11's transmissions. (Photo credit: David McClenaghan, CSIRO)

dish acquired the signal it turned out to be of such superior quality that NASA switched to that signal and stayed with it for the remainder of the EVA.

Tidbinbilla would not be the only site to experience a disaster. One important element of Australia's communications network was the Overseas Telecommunications Commission (OTC), which was located in Paddington. At OTC the television and telemetry signals were separated and routed to their respective termination points. The television pictures were slow scan television (SSTV) with as scan rate of ten frames per second (non-interlaced) at 320 lines per frame. These pictures were hardly ready for prime-time TV. They would have to be converted to both NTSC (the North American format of 30 frames per second, 60 interlaced fields per second) at 525 lines per frame and the Australian CCIR standard of 25 frames per second (50 interlaced fields per second) at 625 lines per frame.

For the North American conversion the pictures were displayed on a 10-inch black-and-white monitor with a Vidicom TK22 camera pointed at the screen. The camera was gated so that it did not take a picture until the 10-inch monitor had completed displaying the full SSTV frame. This output was then recorded and played back five times. During the playback the monitor screen was blacked out and the next SSTV frame would begin displaying.

Because the monitor had enough persistence, it retained the picture. Also, because RCA had built special circuits in the monitor, any loss of brightness between the top and bottom of the picture was alleviated. It was by way of this setup the NTSC signal was produced, with only one of the six fields being live.

In actuality not even the single live field was live because NASA, fearing that something might go tragically wrong, introduced a 6-second delay. This delay, coupled with the 300-ms delay caused by the relay from Australia to Houston via satellite, meant that what the world

saw was 6.3 seconds behind live. Australia, on the other hand, picked off its part of the television signal, electronically converted to the CCIR standards, and broadcast it live. Thus, Australian audiences saw the picture about 6.3 seconds ahead of everyone else.

Even so, all of this conversion almost didn't take place. A few weeks before the launch the scan-converter exploded when it was switched on following a test. The difference in wire color coding is what almost ruined everything. In the U.S. black is the hot wire for electrical circuits. White is neutral and green is ground. However, in Australia black is neutral. In addition, while all of the other equipment in the room was single phase, the scan-converter was wired for three-phase power.

It appears that an Australian technician saw the black wire connected to the hot terminal, assumed that it was incorrectly hooked up, and changed it. When the scan-converter was turned on the next day it exploded, with the camera taking the biggest hit. It took weeks of work, ordering special parts, replacing over 100 transistors, and adapting components to complete the repairs while the astronauts were on their way to the Moon. Fortunately, the repairs were made in time before the EVA took place.

I mentioned above that because of the problems at Tidbinbilla, it was relegated to tracking *Columbia*, the command module. The controllers discovered that the beamwidth of the 26-meter dish was so wide that it could also pick up the LM signal. Using a little creativity, the controllers were able to extract the television signals from the LM signal and display them on television sets at the station. Thus, the only truly "live" pictures of the EVA were seen by the Tidbinbilla controllers. It seems that the ancient saying of the last shall be first had a ring of authenticity at the Tidbinbilla dish.

Even though there was much work done in order to make the television broadcast happen, it almost didn't get off the ground. It was at a meeting at NASA's Manned Spacecraft Center in Houston that took place about five months before launch when a number of NASA managers and others who were interested in televising the lunar walk met to discuss the pros and cons of making it happen.

One of the biggest cons was the camera. It weighed more than seven pounds, was big and bulky. The LM's weight limitations had already caused design changes to accommodate all of the gear that would be stowed in it. For some, adding the additional weight of the camera was an unnecessary luxury that the LM could do without.

During this meeting Ed Fendell, the man responsible for scheduling the television broadcasts during the flight to the Moon, made an impassioned plea for not having television broadcasts from the Moon. To his surprise, when he concluded his remarks the audience loudly objected to his conclusions.

Some of the senior NASA executives then spoke equally impassioned on behalf of having television broadcasts from the Moon. In particular, they were concerned with how NASA owed the people of the world this possibility of witnessing the historical event of man walking on the Moon. In the end, the group gathered voted unanimously to have television broadcasts from the Moon.

While the opening account of this piece indicates that it was popularly understood that the Parkes signal was used almost throughout the lunar television broadcast, in truth, the knowledge of which signal of the three dishes NASA used has been lost. Even so, what was important to John Bolton, Parkes's director at the time of the project, was that the entire group on all sides of the project "collectively succeeded." In a letter he wrote to Mike Dinn, the Deputy Director of Operations at Honeysuckle Creek in July 1969, just before his death, Bolton commented: "Unfortunately, this [collective success] is something that historians never seem to understand; for them A has to have beaten B."

In fact, it was the work of thousands of people around the globe that made it possible for one-fifth of those of us who were alive on July 21, 1969 to watch one

of the most significant events in the history of Earth—a man walking on the surface of another heavenly body.

Balloon Sat Project

The following by Michael Weigand, KB3PDB, is reprinted from the Fall 2009 issue of "Checking In," the newsletter of the USMA Amateur Radio Club:

Partnering with the Astronomy Club and the Electronics Experimenters' Club, the Ham Club is developing its first Balloon Sat payloads, scheduled for launch in the mid-spring semester of 2010. The Balloon Sat project is an opportunity for cadets in the three clubs to develop their own satellites, which will rise to an altitude to exceed 100,000 feet on a tether below a large helium- or hydrogen-filled weather balloon. At that height the sky is literally black.

Each satellite team consists of cadets across the three clubs and cadet classes in order to share ideas and experience. CDT Tom Dean, KB1JIJ, is developing a radio package based around APRS that will allow the ground crew to monitor the balloon's progress and locate its position once the balloon bursts at apogee and begins its descent back to Earth under a large parachute. He is also developing an amateur television payload that will beam live video from the balloon to the ground station throughout the entire journey.

CDT Michael Weigand, KB3PDB, the Ham Club A/CIC, leads up a different team and plans to conduct experiments with the IEEE 802.15.4 standard radio devices commonly known as Zigbee radios. *[Ed note: Zigbee radios are low-cost, low-power digital radios that are based on the IEEE 802.15.4-2003 standard for wireless personal area networks (WPANs). For more information on them see the Zigbee Alliance website: <http://www.zigbee.org>.]*

He is utilizing a custom-made microcontroller solution to log and transmit GPS, air pressure, and ambient-light readings to the ground station through the Zigbee transceiver using high-gain antennas. The three clubs hope to launch their balloon with attached payloads sometime in mid-spring semester out west in Colorado or in the Northeast. Stay tuned for pictures and details of the launch!

Current Contests

European Worldwide EME Contest 2010: Sponsored by DUBUS and REF, the EU WW EME contest is intended to encourage worldwide activity on moonbounce. Information for this contest is available at the following website: <http://www.marsport.org.uk/dubus/EMEContest2010.pdf>.

Echoes of Apollo 2010: In his Winter 2010 *CQ VHF* magazine article Pat Barthelow also announces this year's Echoes of Apollo event. Taking place over the weekend of April 16–18, it will be in honor of Apollo 8. Again, it will be an EME event with participation encouraged by the big dishes. This year's event will include Arecibo, which is expected to be on the air on its favorite band, 70 cms.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. The following organizations and/or conference organizers have announced calls for papers for their forthcoming conferences:

Southeastern VHF Society Conference: Technical papers are solicited for the 14th annual Southeastern VHF Society Conference to be held in Morehead, Kentucky on April 23–24. Papers and presentations are solicited on both the technical and operational aspects of VHF, UHF, and Microwave weak-signal amateur radio. The deadline for the submission of papers and presentations is February 5. All submissions should be in Microsoft Word (.doc) or alternatively Adobe Acrobat (.pdf) files. All text, drawings, photos, etc. should be black and white only (no color). Submissions for presentation at the conference should be in PowerPoint (.ppt) format, and delivered on either a USB memory stick or CDROM or posted for download on a website.

Please indicate when you submit your paper or presentation if you plan to attend the conference and present there or if you are submitting just for publication. Papers and presentations will be published in the conference *Proceedings*. Send all questions, comments and submissions to the program chair, Robin Midgett, K4IDC, via <K4IDC@comcast.net>. For further information about the conference go to: <http://www.svhfs.org>.

Central States VHF Society Conference: Technical papers are solicited for the 44th annual Central States VHF Society Conference to be held in St. Louis, Missouri on July 22–24. Papers, presentations, and posters on all aspects of weak-signal VHF and above amateur radio are requested. You do not need to attend the conference, nor present your paper, to have it published in the *Proceedings*. Posters will be displayed during the two days of the conference. Please contact the folks below if you have any questions about the suitability of a topic. Strong editorial preference will be given to those papers that are written and formatted specifically for publication, rather than as visual presentation aids. Submissions may be made via the following: electronic formats (preferred)—via e-mail; uploaded to a website for subsequent downloading; on media (3.5" floppy, CD, USB stick/thumb drive). Deadline for submissions: May 1. For more information, please contact CSVHFS President Ron Ocho, KØZ, at ko0z@arrl.net.

Meteor Showers

The γ-*Normids* shower is expected to peak on March 14. For more information on this meteor shower's predictions please see Tomas Hood, NW7US's Propagation column, as well as visit the International Meteor Organization's website: <http://www.imo.net>.

And Finally . . .

The saying that truth is stranger than fiction is certainly applicable to the first televised broadcast of man's walk on the Moon. The movie *The Dish* took some creative license with the facts. For example, in the movie the Parkes dish director is seen playing cricket on the dish's surface. It did not happen. Also in the movie, the whole area surrounding the dish suddenly loses power. It did not happen. Additionally, in the movie Australia's prime minister visits Parkes. It did not happen. Finally, the relationship between the Australians and the NASA personnel seems curious and at times strained. Again, it did not happen.

What happened was what inspires us amateurs. When problems arose, ingenuity solved them. Some of the problems seemed strange. However, they were not insurmountable. The best of these traits is what we amateur radio operators are also capable of displaying. Therefore, I challenge us to be inspired and to stand on the shoulders of the giants of our past so that we can see into the future and thus be able to also solve our sets of unique and challenging problems.

If you have solved your own unique and challenging project, I invite you to tell your story here in this column or in *CQ VHF* magazine. You can contact me with your story via my e-mail address: <n6cl@sbcglobal.net>. I am looking forward to reading your story.

Until next month... 73 de Joe, N6CL

BY TED MELINOSKY,* K1BV

Castles, Flora & Fauna, and Islands

USA-CA Special Honor Roll

Howard Terry Harrison, AA1VA
USA-CA All Counties #1192
November 25, 2009

Richard McKinney, WB4VFN
USA-CA All Counties #1193
November 27, 2009

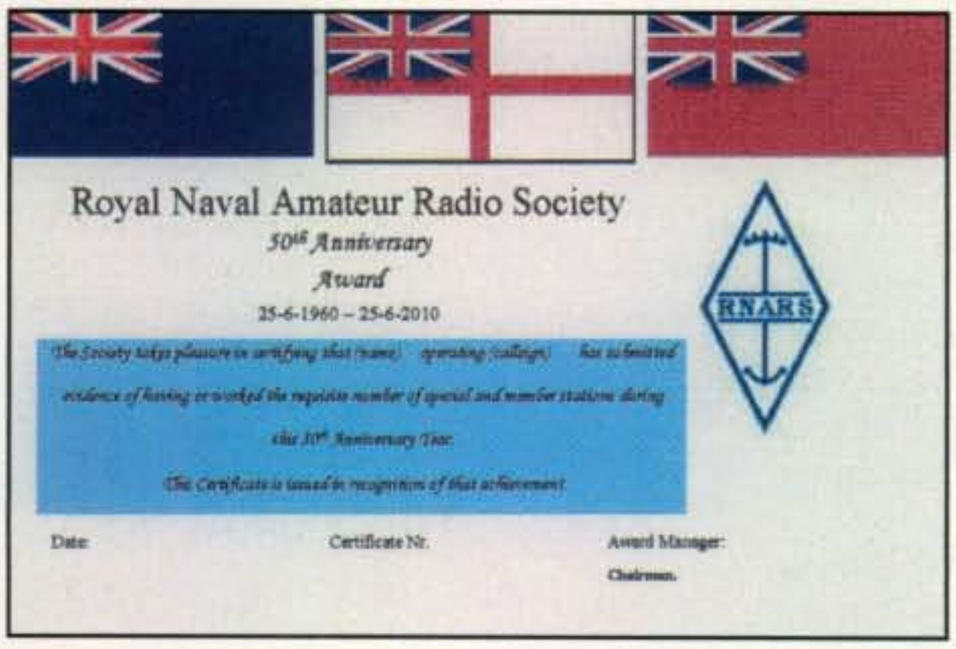
Jim Lineberger, K4DI
USA-CA All Counties #1194
December 7, 2009

We begin this month's column with a short-term award celebrating the 50th annniversary of The Royal Navy Amateur Radio Society. We then move on to the popular award themes of castles, flora and fauna, and islands.

Royal Navy ARS 50th Anniversary Award

The Royal Navy Amateur Radio Society (RNARS) was formed in June 1960. This year, therefore, is the 50th anniversary of the society and a number of events are being planned throughout the year to celebrate this occasion. The RNARS has been authorized to use the special callsign GB50RNARS. This or any other special event callsign may be used by only by members of the society from their own stations for a period not exceeding 28 days in order for contacts to be available to the maximum number of amateur radio operators throughout the UK and beyond.

To earn this award, work 50 RNARS members between January 1 and December 31, 2010. Mixed modes are acceptable. A station can only be counted once no matter on how many bands/modes you have worked/heard it. Each station worked/heard counts one point, but special stations run by the RNARS during the qualifying period count for two points. Applications for this award must be on the official RNARS awards form, which can be downloaded from the RNARS website, or by sending a suitable SAE to the Awards Manager. QSL cards are not required. Send to RNARS HQ, HMS Collingwood, Portsmouth, UK. Internet: <http://www.rnars.org.uk/50TH_ANNIVERSARY.htm>; e-mail: M. Puttick, G3LIK, Chairman RNARS at <mick_g3lik@ntlworld.com>.



To earn The Royal Navy Amateur Radio Society 50th Anniversary Award work 50 RNARS members between January 1 and December 31, 2010.

The group offers an interesting series of awards which can be found on its internet site: <http://www.rnars.ork.uk>.

Castles

Operating on the premises of or within specified distances from castles is a popular summertime activity in Europe. Literally thousands of castles, old forts, and grand homes have been cataloged by numerous sponsors for their particular award. The rules usually require a minimum number of contacts to earn the basic level of award. If the rules are well-designed, the number of contacts is modest for those of us living on another continent. The award described below meets that rule perfectly, calling for only three such "entities." Swabia is a region located in the southernmost part of Germany, rather than a political entity, so well-defined borders do not exist. The sponsor has provided a list of valid castles for the award.

Germany's Schwäbisches Burgen Diplom. This award is sponsored by the DARC e.V., Ortsverband Illertissen, T15 for contacts after January 1, 2009 with stations operating no farther than 500 meters from castles or fortresses in Schwaben. SWL OK. Each castle or fortress must give you a Schwäbische Burgen-Number (SWB), and this number must be shown on the operator's QSL card. Each SWB number counts only once.

USA-CA Honor Roll

500

AA1CA	3489
WB4VFN	3490
KB7QLH	3491
K4DI	3492
S51ZZ	3493
KG4JSZ	3494

1000

AA1CA	1789
WB4VFN	1790
K4DI	1791

1500

AA1CA	1503
WB4VFN	1504
K4DI	1505

2000

AA1CA	1389
WB4VFN	1390
K4DI	1391

2500

AA1CA	1307
WB4VFN	1308
K4DI	1309

3000

AA1CA	1218
WB4VFN	1219
K4DI	1220

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.

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

Germany's Schwäbisches Burgen Diplom. is sponsored by the DARC e.V., Ortsverband Illertissen, T15 for contacts after January 1, 2009 with stations operating no farther than 500 meters from castles or fortresses in Schwäben.

DL stations need 7 different SWB numbers from 5 different areas.

EU stations need 5 different SWB numbers from 3 different areas.

DX stations need 3 different SWB numbers from 2 different areas

All bands and modes except Echo-Link allowed. Send a GCR list and fee for DL 5 Euros, EU 7.50 Euros, or DX US$12 to Manfred Siebenhaller, DB6SQ, Römerhalde 31, D-89287 Bellenberg, Germany. Internet: <www.mydarc.de/db6sq/swb.htm>.The list of SWB numbers can be found at: <http://www.mydarc.de/db6sq/swbliste_konplett.htm>.

Flora and Fauna

This is a rapidly growing series of awards given for contacting stations that operate within the borders of nature parks or nature reserves. The idea was conceived by a group of Russian amateurs who continue to provide artistic assistance to other sponsors and maintain continent-wide lists of parks and reserves that are valid for the awards.

Italian Flora Fauna Award is sponsored by the ARI Mondovi (Cuneo) to publicize the national parks, reserves, oases, and natural or proteced areas of Italy.

Their website is <http://wff44.com> and contains pages in Russian and English. It is the authoritative website for this segment of the hobby. It shows that at the end of 2009 there were some 20 countries that sponsor "WFF" awards.

Italian Flora Fauna Award (IFFA). The IFFA is sponsored by the ARI Mondovi (Cuneo) for all amateurs and SWLs to publicize the national parks, reserves, oases, and natural or protected areas as recognized by the Italian Government of the environment and Guardianship of Italy. The award is available for contacting 10 different IFFA locations on HF or 5 references on VHF (50 MHz or higher). All modes may be used. Contacts must be made on or after August 1, 2009.

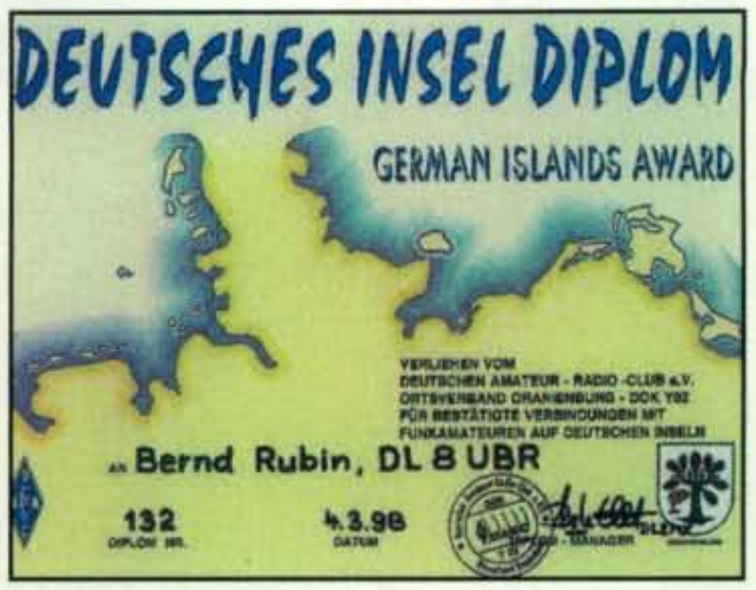
The application form is provided on the website noted below. A list of valid Flora/Fauna references is also shown on the website. The award is *free* if you agree to receive it via e-mail in a PDF format and print it yourself. If you choose the free award, apply via e-mail to the address shown below. If you wish a traditional printed copy, the cost is 10 Euros or $US13 and the application should be sent to: Massimo Balsamo, IK1GPG (or Betty Sciolla, IK1QFM), ARI Mondovi, Casella Postale 4, I-12084 Mondovi (Cuneo), Italy.

QSLs are not needed as the sponsor will verify using the IØSSH-Log-IFFA-database.Endorsements are available for each additional 25 IFF QSOs. Fee is SAE and 2 Euros. An Honor Roll Plaque is available at the 100 different IFFA references level. The fee for this plaque is 25 Euros or $US35. A Top Honor Plaque is available for QSOing 200 different references. Fee for this level is the same. Internet: <http://wwww.dcia.it/IFFA/>; e-mail: <iffainfo@alice.it>.

Islands

One of the original specialty "location"based awards is the famous Islands On The Air Award (IOTA); see <www.rsgbiota. org>. Supplementing this are literally dozens of awards from individual countries for contacting their own islands. During the summer, many of the German Islands valid for the following award will be activated.

German Islands Award. The Oranienburg branch (DOK Y 02) of the DARC issues this award to licensed radio amateurs and SWLs for contacting stations active on German islands, both in the sea and in bays near the coast on or after January 1, 1994. Work a specific number of islands and earn points per the list below. Use the official list of



The German Islands Award joins the many awards that promote contacting islands of the world.

islands. Each callsign on an island may be used once. The number of islands and minimum point score required for the basic award are:

DL stations—at least 6 islands, and a minimum of 8 points (callsigns)

EU stations—at least 4 islands, and a minimum of 6 points

DX stations—at least 2 islands, and minimum of 4 points

Islands/points that are required for higher classes:

Sticker	*3rd class*	*2nd class*	*1st class*
DL	12/16	18/24	24/32
EU	8/12	12 / 18	16/24
DX	4/8	6/12	8/16

At least one island must be in the North Sea and one in the Baltic Sea for the basic award. For higher classes you may not exceed a ratio of one to three (three to one) of the number of the islands in either of both seas. The name of the island must be clearly identifiable on each QSL card. All bands and modes OK. The application for the award must be accompanied by the certified GCR list of QSL cards and the fee (for DL stations 5 Euros, for all others 7.50 Euros or $US7.50) must be sent to the award manager: Dietmar Piepenhagen, DL2YY, An der Nordbahn 23, D-16556 Borgsdorf, Germany. The application for higher classes of the award also must be accompanied with the complete GCR list. The fee for one sticker (including postage) is: for DL stations 1.50 Euros, for all others 2 Euros or $US2. IRCs and checks are not accepted. The German Islands list is available at <http://www.islandchaser.de/>.

We'd like to hear from any groups or individuals who sponsor awards. Please contact me at the e-mail address shown on the first page of this column.

73, Ted, K1BV

5 Band WAZ and N5PHT

BY CARL SMITH,* N4AA

Well, now, 2009 sure gave the eastern USA a cool goodbye! Sub-freezing temperatures and heavy snow kept a lot of folks at home for Christmas and extended through New Year's. Even in mid January as I write this it is very cold well into the sunshine state of Florida. It's hard to comprehend freezing temperatures at Disney World in Orlando! I sure hope they are able to save the citrus crops.

If you couldn't get out to see friends and relatives over the holidays, you probably spent time on the air ... if you had power, that is. I lost mine for three full days. Propagation on the low bands was far more favorable than the weather, so your on-the-air time would have been well spent.

N5PHT and 5 Band WAZ

A good story came along concerning the low bands, and I'd like to share it with you. You might get some ideas of your own. Here is what Gary, N5PHT, in Texas had to say following his completion of the requirements for *CQ*'s 5 Band Worked All Zones Award.

In pursuit of the 5B WAZ! A few details of the N5PHT quest for 5B WAZ:

My first WAZ award was for 20 Meter SSB, awarded in 1993. I've been active on and off since then, but my active DX chasing started about 10 years ago. I got it down to needing only four zones (all on 80 meters), but I had no success working them after many tries. I finally decided the simplest antenna I could put together with a little bit of gain on 80 meters would be a 1/4-wave sloper hanging off my 80 foot tower.

I thought about the direction of the last four zones needed. Well, it turned out they all are fairly close together from north Texas. I realized that my "hit list" spread was only from about 355 degrees (zone 18) to about 20 degrees (zone 21), with zones 22 and 17 tucked in between. I reasoned that a simple wire 1/4-wave sloper would be a good bet aimed at about 5 degrees and it would easily cover the target zones. Simple it was, too, just a 1/4 wavelength of wire sloping at about a 45-degree angle from the tower, with the lower end about ten feet above ground (to prevent accidental contact). I fed the top end with coax, bonding the outer shield to the tower leg. The rig isn't anything out of this world either. I had an ICOM 746, but had upgraded to a 746PRO a few years ago. It feeds an Ameritron ALS-600 with about 500 watts output.

On November 27, 2009, Nodir, EY8MM, gave me zone 17 (with a USA QSL Manager). Zone 18 was provided by Alex, UA9YAB, on December 16, 2009. Then only five days later came zone 22 via Nelson, 4S7NE. I had to use registered mail, but what is ten bucks postage for #199!

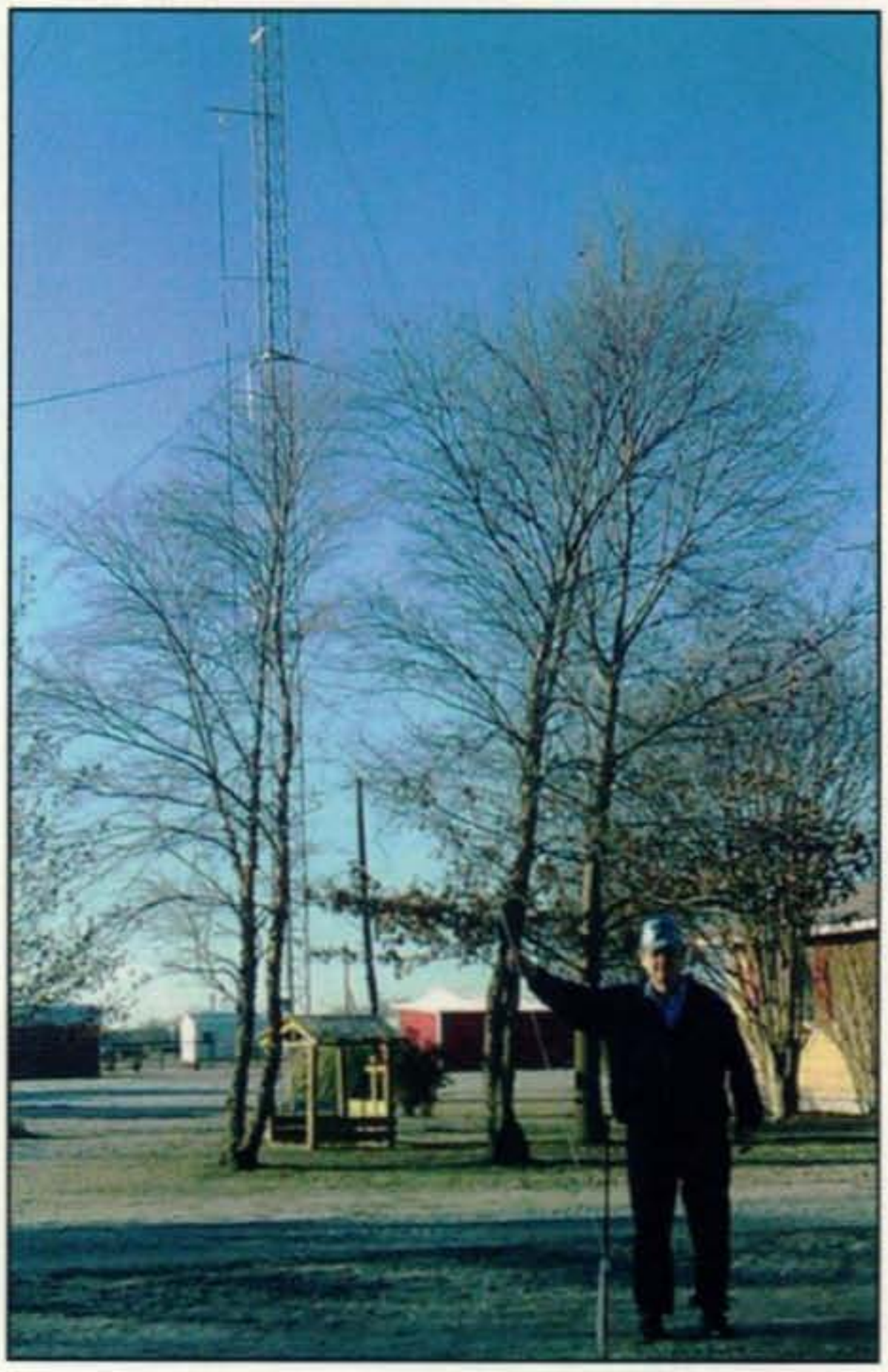
And the best was left for last. I had been e-mailing and trying some skeds with a few stations for my last zone (21), including with Hamad, 9K2HN, with no luck. Hamad has a 2-element Optibeam on 80 meters so that gave me some hope. We tried . . . and zip. Then during the last few hours of 2009 I received a call on my cell phone with "Good morning from Kuwait City," and it was none other than Hamad. He said, "Hope you are near your radio." I said something like, "I will be in a few seconds." Well, we were almost perfect greyline in both locations and traded a nice 559 each way and #200 was in the bag!

Thus, 5B WAZ started with my initial award of 180 zones (certificate #1514) issued on September 6, 2006 and ended a little over three years later, completing those last 20 zones.

73 de Gary, N5PHT

(A photo of Gary's tower and the bottom end of that quarter-wave sloper is shown this month. It's nothing exotic or outlandishly expensive, but it worked!—ed.)

I enjoy telling these stories about DXers who have made a significant effort to accomplishing their goals. You don't have to spend a fortune on



Here's that sloper for 80 that Gary, N5PHT, used to finally wrap up his 5 Band WAZ. (Photo courtesy of Gary, N5PHT)

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

The WPX Program

CW

3239 .....W6IYS

MIXED

2084 .....K8ZEE
2085.....LU1WI
2086.....N5PHT

CW: 400 EA1DR. 600 IT9ELD. 1000 HA2ESM.
SSB: 450 EA1DR.
Mixed: 850 NN5PHT. 1200 DH5MM. 1500 EA1DR. 2500 KC9ARR.
Digital: 750 EA1DR.

30 Meters: HA2ESM

Africa: HA2ESM
Oceania: HA2ESM
North America: HA2ESM

Award of Excellence: S55SL

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, N3XX, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UT9FJ, UT4EK, K9UQN, UR5FEO, LY2MM, N3RC, OH3MKH, RA3CQ, UT3IZ.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, NN3XX, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ, 7K3QPL, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR, UT3UY, WA5VGI, UR5FEO, N3RC, UT3IZ.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage for airmail) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will now accept prefixes/calls which have been confirmed by eQSL.cc. Other electronic QSL confirmation means are not accepted.

*Please Note: The price of the 160, 30, 17, 12, 6, and Digital bars for the Award of Excellence are $6.50 each.

The WAZ Program

6 Meters

91.....K6QXY (31 zones)

40 Meter CW

275 .....N6KZ

20 Meter RTTY

63.....N5ZM

160 Meters

329 ....RA1AOB (40 zones)

All Band WAZ

Diamond Jubilee

005 .....WD5DBV
006 .....WT8C
007.....VE3XN
008 .....W9RPM
009.....WA5VGI
010.....4X4JU
011 .....N3SL
012 .....SM3NRY
013 .....WB6RSE
014.....N4ZM
015 .....K7MTR

Mixed

8639 .....EA1AHP
8640 .....NA5Z
8641 .....VA1CHP
8642.....K5OAZ
8643 .....LU5OM
8644.....JR9CPT
8645 .....K8ZEE

SSB

5124 .....IV3NDI
5125 .....K6FW

CW

583.....K5OAZ

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>.

The CQ DX Field Award Program

Mixed

103 .....HA1ZH

SSB

64 .....WB6TFD
65.....VK2RO
66 .....N4GOA

Digital

16.....GØDEZ

Mixed Endorsements

220 .....N8PR/220
200 .....VE3ZZ/207
200.....JN3SAC/206
200 .....N4MM/202
150.....HA1ZH/152
100 .....GØDEZ/100
3.5/7 MHz .....GØDEZ
SSTV HA1ZH

SSB Endorsements

175 .....N4MM/186
100 .....VK2RO/123

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

equipment or antennas; just set a goal and be determined to achieve it. Like Gary, it probably won't be accomplished in a short time. It will take dedication, and perhaps the loss of some sleep for those low bands, but it can be done.

The Solar Flux

I just have to mention the solar flux. Here it is mid January and the flux number has risen to the low 90s. I can't remember that last time I saw the flux at 90. It's been a *long* time. Therefore, the upcoming contests should be interesting. Could we see some propagation on 10 meters? That would be signifi-

5 Band WAZ

As of January 1, 2010, 796 stations have attained the 200 zone level and 1664 stations have attained the 150 zone level.

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

None

The top contenders for 5 Band WAZ (zones needed, 80 or 40 meters):

S51U, 199 (27)
N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
RU3FM, 199 (1)
N3UN, 199 (18)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N6HR/7, 199 (37)
JA5IU, 199 (2)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
VE3XN, 199 (26)
YU7GMN, 199 (10)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10m)
RX4HZ, 199 (13)
KØGM, 199 (17)
S58Q, 199 (31)
KQØB, 199 (2 on 10)
K9OW, 199 (34 on 10)
N5AW, 199 (17)
JH7CFX, 199 (2)
IN3ZNR, 199 (1)
G3VKW, 199 (31)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
F5NBU, 198 (19, 31)
OE2LCM, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W7VJ, 198 (34, 37)
K9MIE, 198 (18, 21)
W9RN, 198 (26, 19 on 40)
W5CWQ,198 (17, 18)
I5KKW, 198 (31&23 on 20)
IV3MUC, 198 (1&31 on 40)
UA4LY, 198 (6&2 on 10)
JA7XBG, 198 (2 on 80&10)

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

IWØHOU (168 zones)

5 Band WAZ updates:

W7/DL1UF (195 zones)

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

Lee, HL1IWD, likes to visit and operate in contests from Saipan. Here (left to right) we find Lee, KH0/AH2Y; Jun, WH0V; Len, KH0AC; and Harry, KH0/WX8C. (Photo courtesy of Lee, HL1IWD)

David Bower, K4PZT (in the Hawaiian shirt on the left in the front row), visiting in Hawaii happened to be on hand for the Koolau ARC holiday picnic. The club has more than 60 members and meets monthly at the Ho'omaluhia Botanical Gardens. Sorry I didn't get a "roster" of all these folks. The club URL is <http://www.karc.net>. (Photo courtesy of David, K4PZT)

cant, and we need to be listening … maybe talking would be better … to see if there is anyone else doing the same.

Contests seem to be the place to look for DX in late February and on through March. There are a few operations scheduled, but most of those are related to contesting.

Postal Rates and QSLing

An increase in Canadian postal rates, increased post office box rental rates in Italy, and talk of another rate increase from the U.S. Postal Service … it just continues to cost more to use the postal services, no matter where you are. Two years ago, my PO box rental went from under $100 to $180 per year. Yes, I do have a large box because we need a large box, but the rate increasing nearly 50% over two years was almost enough for me to drop mine. I have not done so, because it is convenient and we live in an area where a box on the roadside is required, and that service has proven to be unreliable for several reasons. "So what," you say. I'm getting there—QSLing, and I talked about it last month. With the latest rate increases I thought I'd touch on it again. If you are not using the ARRL's LoTW, or eQSL, you really need to take a long. hard look at getting there. If you are collecting paper, it probably isn't for you, but if you want confirmations you need to be using LoTW.

From a Reader

Recently, I had an interesting telephone conversation. A reader commented that he had about given up on DXing, with all

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

6139 9A2AA	4150 I2PJA	3684 IK2ILH	2998 K9UQN	2440 K5UR	1930 W2FKF	1593 S55SL	964 K8ZEE	636 ZS2DL
5758 K2VV	4146 N6JV	3616 W9OP	2965 OZ1ACB	2397 VE6BF	1905 W7CB	1512 WD9DZV	815 KL7FAP	
5426 W1CU	4082 I2MQP	3609 YU7BCD	2905 N8BJQ	2378 W3LL	1891 VE9FX	1446 DF3JO	726 K5IC	
5031 W2FXA	3980 N9AF	3522 ON4CAS	2873 W2ME	2358 I2EAY	1820 KX1A	1359 N3RC	723 KØDAN	
4669 EA2IA	3937 S53EO	3325 SM6DHU	2845 JN3SAC	2353 W2OO	1741 AB5C	1337 K6UXO	682 AI8P	
4618 N4NO	3930 KØDEQ	3227 K9BG	2752 K1BV	2116 AE5B	1705 W2EZ	1322 AA4FU	680 IWØHOU	
4592 9A2NA	3821 KF2O	3150 W9IL	2704 K2XF	2192 N2SS	1662 SV1DPI	1269 K5WAF	662 JA7OXR	
4430 YU1AB	3814 WA5VGI	3091 9A4W	2499 KC9ARR	2001 AB1J	1643 N1KC	1016 RA1AOB	650 N3YZ	
4232 VE3XN	3735 WB2YQH	3007 W2WC	2475 W6OUL	1951 KØKG	1634 AG4W	976 KM6HB	644 KWØH	

SSB

5065 IØZV	3505 N4NO	2711 LU8ESU	2300 SM6DHU	2072 K5UR	1795 KQ8D	1464 VE7SMP	1083 KX1A	637 K5WAF
4505 VE1YX	3323 OE2EGL	2709 KF7RU	2297 W9IL	2071 N6FX	1751 N8BJQ	1463 I2EAY	1042 IZØBNR	600 WA2BEV
4377 K2VV	3213 CT1AHU	2642 YU7BCD	2209 IK2QPR	1986 DL8AAV	1729 W6OUL	1410 S55SL	1031 IK8OZP	
4371 F6DZU	3133 KF2O	2595 EA1JG	2201 NQ3A	1945 KI7AO	1714 IK2DZN	1404 AG4W	978 EA7HY	
4184 OZ5EV	3108 I4CSP	2550 WA5VGI	2142 W3LL	1935 SV1EOS	1678 K9UQN	1386 IK4HPU	951 KU4BP	
4116 I2PJA	2914 KØDEQ	2471 I3ZSX	2140 SV3AQR	1927 AE5B	1643 JN3SAC	1385 AE9DX	924 VE6BF	
3843 I2MQP	2860 I8KCI	2451 EA3GHZ	2094 I8LEL	1915 W2OO	1623 VE9FX	1377 EA3NP	875 K7SAM	
3669 9A2NA	2857 4X6DK	2431 G4UOL	2093 W2WC	1879 K3IXD	1611 W2ME	1258 N1KC	741 WD9DZV	
3616 EA2IA	2817 IN3QCI	2326 CX6BZ	2076 K2XF	1891 W2FKF	1480 AB5C	1145 EA3EQT	717 KØDAN	

CW

5353 K9QVB	3607 EA2IA	2723 EA7AZA	2502 JA9CWJ	2308 N6FX	1927 W6OUL	1403 AG4W	1053 K5WAF	749 AE5B
5254 WA2HZR	3295 WA5VGI	2632 W2ME	2483 JN3SAC	2305 N8BJQ	1848 I2EAY	1334 RUØLL	1030 AA5JG	695 S55SL
5107 K2VV	3223 9A2NA	2623 SM6DHU	2419 IK3GER	2223 VE6BF	1804 EA7AAW	1327 WA2VQV	987 WD9DZV	608 IK2SGV
4146 N6JV	3241 KØDEQ	2618 K9UQN	2415 W2WC	2101 I2MQP	1665 AC5K	1317 K6UXO	915 N1KC	600 IT9ELD
4128 N4NO	2838 I7PXV	2727 YU7BCD	2373 W9IL	2089 K2XF	1643 W2OO	1223 KX1A	824 VE9FX	
3827 VE7DP	2837 KF2O	2707 W8IQ	2324 OZ5UR	1979 K5UR	1445 EA2CIN	1220 AA4FU	821 HB9DAX	
3760 LZ1XL	2727 YU7BCD	2647 KA7T	2323 IØNNY	1966 W9HR	1407 WO3Z	1109 VE1YX	753 F5PBL	

DIGITAL

1284 W3LL	1010 N8BJQ	1009 GUØSUP	721 KØDEQ	692 WD9DZV	653 AG4W

of the intentional interference and general discourteous operation by so many. However, after taking a look at the whole subject, he has taken the attitude "I don't care if I get a card;. I don't plan to apply for any awards. If I don't like what a DX station is doing, I just turn the knob. It doesn't matter anymore if I have worked 'his' country or not. I just like the competition of the pile-up and making the contact. I worked a station recently and he had my call wrong. I don't even care. I worked him, I put him in my log, and to me that's all that counts."

Hmmm. Sometimes I feel like doing that myself.

Perhaps I'll have more DX to talk about next time, but for now all I can offer is to enjoy the chase and remember to Have Fun doing it!

73, Carl, N4AA

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Billy F. Williams. Mail all updates to P.O. Box 9673, Jacksonville, FL 32208.

Mixed

K2TQC....265	F6HMJ....206	K8OOK....189
HAØDU....240	JN3SAC....206	BA4DW....188
W1CU....228	KF8UN....205	9A5CY....187
VE7IG....227	W6OAT....205	RW4NH....187
HA1RW....220	OK1AOV....205	K2SHZ....182
N8PR....220	N4MM....202	K1NU....180
VE3XN....217	W4UM....198	W5ODD....177
KØDEQ....216	N4NX....192	NØFW....176
VE3ZZ....207	ON4CAS....191	
HA5WA....206	HA9PP....190	

SSB

W1CU....209	VE7SMP....190	NØFW....176
W4ABW....202	N4MM....186	DL3DXX....175
KØDEQ....192	W4UM....182	JN3SAC....175

CW

DL6KVA....225	DL3DXX....203	OK2PO....184
W1CU....220	JN3SAC....200	N4MM....179
DL2DXA....209	OK1AOV....196	N4NX....177
KØDEQ....207	W4UM....191	

QSL Information

D2EB via IZ3ETU
DRØ9ANT via DL5MHQ
DV9XO via DU9AXJ
EA6/AA5UK via AA5UK
EA6/LX1DH via LX1DH
EA8/OH6CS via OH6CS
EF8M via UA3DX
EG5WSP via EA5RKB
EG6CIB via EA6JN
EG7SDC via EA1AUM
EH1DAA via EA1WS
EH1PAZ via EA1RCM
EH5VE via EA7URD
EH7VE via EA7URD
EK6LP via DL8KAC
EO16IKF via US6IKN
EO16IKN via US6IKN
EO16IT via UX3IT
EO16IZ via UX5IZ
ET3JD via WUØI
EU1EU via OK8EU
EX9FF via EX8AB
EY7/DJ8QP via DJ8QP
EY8/DJ8QP via DJ8QP
EY8/K4ZW via K4ZW
FG/F4EUG via F4EUG
FO/G3BJ via G3BJ
FS/W6IZT via N7XG
FT5WO via F4DYW
GAØNBM via GMØNBM
GA2MP via N3SL

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>; <http://golist.net/>.)

contesting

BY JOHN DORR,* K1AR

CQ Contest, CQ Contest, CQ Contest

March's Contest Tip

Passing needed multipliers from one band to another is both an art form and an aggressive sport. The fundamental secret to success, however, is to ask another station in a way that makes it sound like you really mean it. For example, instead of saying "Can you go to 40 meters?" frame the question to be "Thanks. Let's now QSY to 7145, OK?" Being more specific and convincing is an important element to the successful pass. Also, don't be limited by the fear of rejection. Not everyone can or will move for you. You can be guaranteed, however, that the other station won't QSY if you don't ask, and especially if you take a lax approach. Give it a try!

Calendar of Events

All year	**CQ DX Marathon**
Feb. 26–28	**CQ 160M SSB Contest**
Feb. 27–28	REF SSB Contest
Feb. 27–28	UBA CW DX Contest
Feb. 27–28	North American RTTY QSO Party
Mar. 2	AGCW YL-CW QSO Party
Mar. 6–7	ARRL SSB Contest
Mar. 13	AGCW QRP Contest
Mar. 13–14	EA PSK31 Contest
Mar. 14	North American RTTY Sprint
Mar. 14–15	Wisconsin QSO Party
Mar. 20–21	BARTG HF RTTY Contest
Mar. 20–21	Russian DX Contest
Mar. 27–28	**CQ WW WPX SSB Contest**
Apr. 3–4	SP DX Contest
Apr. 3–4	Missouri QSO Party
May 29–30	**CQ WW WPX CW Contest**

It's 2359Z and the anticipation of yet another exciting XYZ contest has reached its peak. You may not have the biggest station in the world, but you've at least completed as much preparation as possible. For once, you've actually tested your computer software ahead of time. Even your voice-recording hardware is working and pre-programmed! The coffee is brewing along with a steaming crock pot full of beef stew. This is contesting as we know it.

Suddenly the clock turns over to 0000Z; the contest has begun. As a smaller station, you choose a strategy that begins by searching and pouncing up and down the bands. This is probably the approach taken by most participants in a major contest, and it can be quite effective. Careful tuning combined with judicious use of a second radio can really maximize your start in any contest—especially as a smaller station.

What I have been characterizing so far is missing one key element. In many contests, one can start at 14150.2 and move up to the other end of the band and find station after station calling CQ, especially when the band is wide open. Some of them are DX stations in South America or the Caribbean working guys at incredible rates. Others are North American operators endlessly calling CQ with only an occasional answer. And this phenomenon is not limited to only DX contests. The ARRL Sweepstakes, for example, can often demonstrate similar characteristics.

Unless I've missed something, there are no contest rules that disallow discretionary CQing. If you want to park your VFO on 28995 kHz for the entire 48 hours of a DX contest, calling CQ the entire time, that's your prerogative. Lately, however, there seems to be more debate about excessive CQing in contests, so let's unpack the topic a little more.

Who are the predominant CQers these days? Well, it used to be an exclusive club that included mostly the large multi-multi and multi-single stations from around the world. However, in recent years it seems that something has changed dramatically. More and more operators have become increasingly aggressive with their use of the CQing operating tool. Why is that? Well, for starters there are simply more stations to work. From a U.S. perspective (especially the East Coast), the number of European participants in a DX contest such as the CQ WW is at an all-time high. I'd be a rich man if I had 25 cents for every time I've commented about the "bottomless pit" of G, DL, I, EA, and other countries that call me during a European opening. Thus, from this perspective aggressively calling CQ is usually a sensible operating strategy.

Secondly, while the top tier of stations has maintained its leadership in antenna hardware, the second tier has been hard at work, too. It used to be that only the very elite had use of stacked high-band beams and other large antennas. Now, while it's hardly a majority, it's no longer that uncommon to run into station after station—especially in the U.S.—using antenna hardware that's larger than a tribander on a rooftop. The point is that while station "X" may still be 15 dB weaker than W3LPL or K3LR, it is still transmitting a dominant signal that can take good advantage of a CQing operating strategy.

The third contributor to this proliferation of CQers in contests is the use of the second radio by single operators. In the "old days," you had to make some tough decisions about band choices as a single operator with only one radio. For example, "Should I call CQ on 20 meters with the intent of establishing a good clear frequency at the beginning of an opening to Europe/Japan?" Or, "Should I stay on the low bands for another 20 minutes and pick up some of those juicy 5W, VK6, FK8, CE, UAØ multipliers on 40 and 80 meters?" With the use of a second radio, as I've described in the past, you can have the best of both worlds. After all, as a single operator you don't have the limitation of the 10-minute rule or band-change restrictions that multi-single operations have to contend with. You can CQ to your heart's content on 20 meters working stations at 20–30 QSOs per hour, for example, while mounting a determined multiplier search on the second radio. The result is maximized score and the creation of yet another tier of CQers on the band.

Lastly (and I'm sure there are even more examples), competitors outside of North America have

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jumped on the CQing bandwagon as well. For at least the past 25 years, the bands have always been filled with the louder overseas stations running Ws at a feverish clip. In recent years, they have been joined by a new second level of stations that have found CQing to be an effective operating strategy by virtue of: (1) improved station hardware, (2) increased contesting experience, and (3) rising participation by North Americans. This is especially noticeable with the JAs and some European areas.

So what is the point of all of this rhetoric? I think a fair question to consider is: Is there too much CQing in today's world of contesting and is there anything we should do about it? While thinking about this topic, my first reaction was to put much of the blame on the level of sunspot activity. It's only natural that this topic becomes an issue of contention when everyone is forced into a 300+ kHz band on the only useful daytime band —20 meters. However, if you think about it, we have been dealing with this issue even during the last sunspot cycle peak. I can still vividly recall operating on 10 meters above 28850 kHz—not because I wanted to be there, but because the band was so crowded that it was simply the first usable spot I could find. Also, the issue of CQing is not simply limited to SSB. A little introspective thought can yield similar comparisons on CW, too.

Well, just to set your mind at ease (if it even needs to be), I'm hardly suggesting that we need to change contest rules to put a governor on the use of CQing in contests. What I am asking this month is for contesters to continue to keep this topic at the forefront of their minds and think about it in a little more depth as we operate. Remember, excessive CQing has implications beyond the contest community. A non-contester listening to a station calling CQ ineffectively can build a pretty strong case for spectrum misuse if you look at it from his/her perspective. As contesters, we need to continually be sensitive to that point.

Let me list some scenarios that may fit into the excessive CQing category:

• Situating yourself on the lower end of a band two to three hours before the band opens to Europe/USA/Japan in an attempt to establish a clear running frequency. A questionable moral violation (if not outright breaking of the rules) is to do this with a different callsign so as to not use valuable on-time during non-48 hour events.

• Allowing yourself to go beyond what is reasonable and sensible and continue to call CQ, even when rates fall to five to10 QSOs/hour.

• Being overly inflexible and continuing to call CQ when the frequency you are using is clearly not yours (e.g., is being used by nets, ragchewers, other modes, etc.). Another variation on this is the typical "frequency battles" where two stations may choose to "duke-it-out" for upwards of 15 to 30 minutes, both calling endless CQs and neither operator working anyone.

• Transmitting with an endless CQ loop while you leave the station temporarily, e.g., "potty break") in order to hold a run frequency.

I'm sure you can think of a myriad of other examples along these lines. Let's face it: CQing as an operating strategy has been with us for decades and will be an element of contesting for a very long time into the future. I'm personally opposed to putting artificial limits on the practice through rule changes. One interesting idea I've recently heard is to determine, by looking at the reported frequencies in a log, whether someone is CQing vs. searching. By giving increased point credit to the "searched QSOs," you may encourage less CQing and more searching on the bands. This is probably not a practical alternative, but it is an intriguing concept. And, of course, there is the challenge of accommodating the "non-computerized" entry. There is plenty of opportunity to develop other ideas. What do you think?

Final Comments

I hope you've been surviving the winter season and are making plans for fun antenna projects in the spring and summer (at least those of you in the north). This year will be the year we start our outside activities in April and not October, right? Well, we can dream.

See you in the next contest!

73, John, K1AR

BY TOMAS HOOD,* NW7US

There Really Is A Sunspot Cycle 24!

A Quick Look at Current Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, December 2009: 11
Twelve-month smoothed, June 2009: 3

10.7 cm Flux
Observed Monthly, December 2009: 77
Twelve-month smoothed, June 2009: 70

***Ap* Index**
Observed Monthly, December 2009: 1
Twelve-month smoothed, June 2009: 4

One Year Ago: A Quick Look at Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, December 2008: 1
Twelve-month smoothed, June 2008: 3

10.7 cm Flux
Observed Monthly, December 2008: 69
Twelve-month smoothed, June 2008: 69

***Ap* Index**
Observed Monthly, December 2008: 2
Twelve-month smoothed, June 2008: 7

Sunspot activity over the last few years has been nearly nonexistent. Certainly, the solar cycle minimum between sunspot Cycle 23 and the new Cycle 24 is one of the longest since the early 1900s. A great deal of speculation developed about the prolonged absence of solar activity. In 2008, there were 266 spotless days (73% of the year), and 2009 looked to follow suit. However, the last decade closed out with a welcomed sign that our nearest star was no longer inactive.

From November 2009 until press time (early January 2010), sunspot activity ruled the solar disc. December was a very active month, with only ten days without official sunspots. This resulted in 2009 seeing a total of 260 spotless days (71% of the year). That does not seem encouraging, unless you look at the monthly activity from November onward (fig. 1).

While the latter part of November was void of official sunspot regions, by December 9th, ending 16 days of zero spots, the Sun began to show signs of activity. Sunspot region 1034 (as numbered by The National Oceanic and Atmospheric Administration (NOAA), small but belonging to the new Cycle 24, emerged near the eastern limb of the Sun. This small region resulted in an initial sunspot count on December 9 of 13. By December 12, it appeared to be fading, yet on December 13 it increased in spots with a count of 14.

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for March 2010

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-6, 10-17, 19-25, 27-31	A	A	B	C
High Normal: 8, 18, 26	A	B	C	C-D
Low Normal: 7, 9	B	C-B	C-D	D-E
Below Normal: N/A	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 2 will be good (B) on March 1st through the 6th, poor (C) to fair (C) on the 7th, fair (C) on the 8th, etc.

3. As an alternative, the Last-Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet and space weather should be mild. On the other hand, days marked as Disturbed will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the path is ionospherically supported.

Then, on December 14, another new sunspot region numbered 1035 emerged, kicking the sunspot count up to 28. By December 15, its size was seven times wider than Earth (fig. 2)! Over the next several days through December 18, this new Cycle 24 sunspot group rapidly increased in size. On December 16, the complex magnetic structures within this sunspot region triggered a coronal mass ejection (CME) toward Earth. This massively huge cloud of solar plasma (billions of tons!) arrived about three days later, but did not cause any geomagnetic disturbance. This is one of the downsides of an increase in solar activity: When active sunspot regions breed CMEs, the possible result is geomagnetic storms that counter any positive effect that the increased solar activity may have on radio signal propagation.

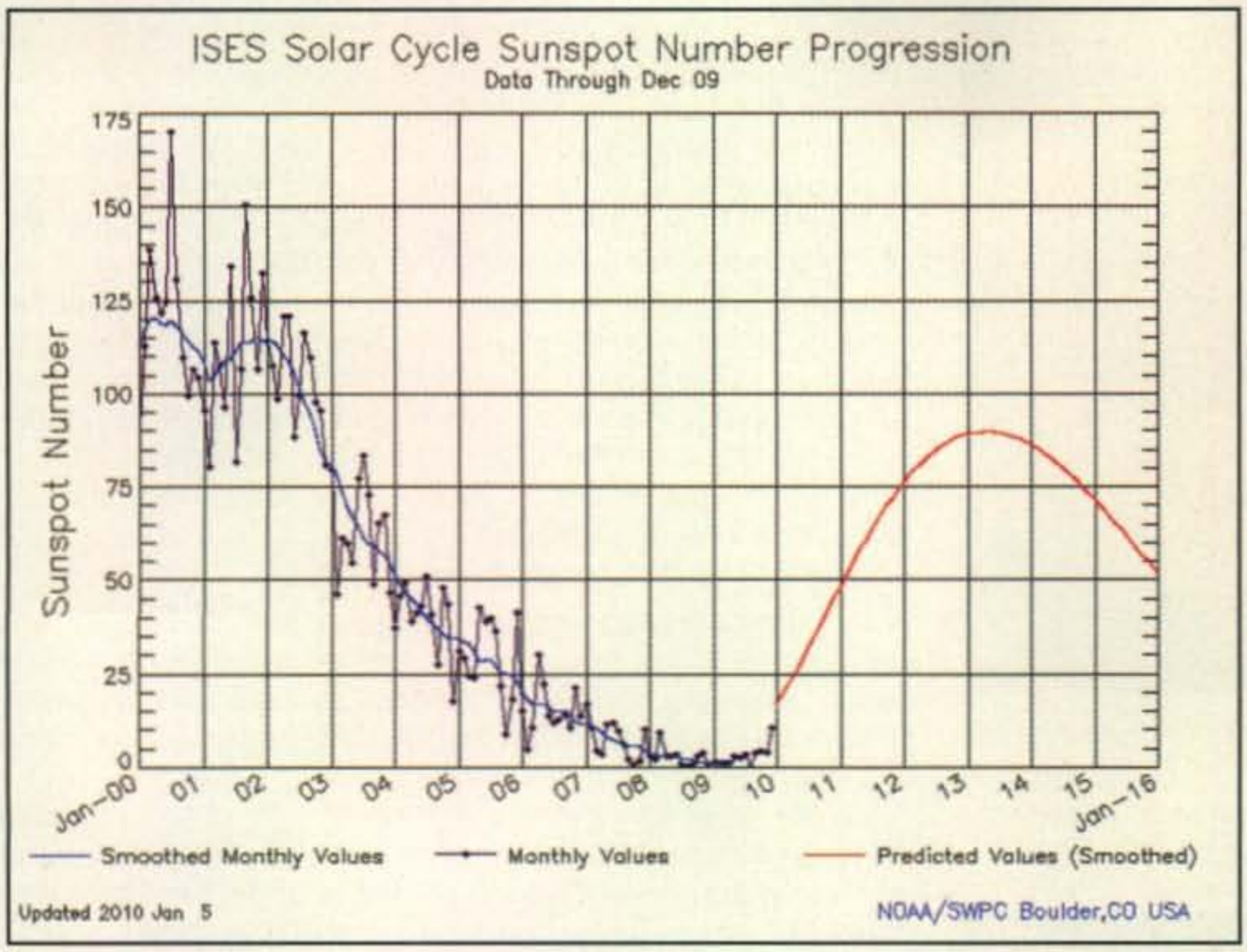
CMEs are the fuel for auroral activity, and that is welcomed activity to the VHF weak-signal DX hound. When active sunspot regions breed CMEs, the possible result is geomagnetic storms that counter any positive effect that the increased solar activity may have on radio signal propagation on the frequencies below 6 meters. At the same time, the CME unleashes a plasma cloud that rides the solar wind, and then, if the unleashed ejection is directed into the orbital path of Earth, causes aurora. Auroral activity occurs at the *E*-region of the

ionosphere, and "clouds" of highly-ionized clouds form that in turn may reflect radio signals in VHF and sometimes even UHF spectrum.

Another downside to increased sunspot activity is the direct impact of solar flares. On December 16, region 1035 produced three C-class flares. (For a scale showing the size of C-class flares, refer to <http://www.swpc.noaa.gov/NOAAscales/>). During the rest of the period until press time, a number of new C-class flares were produced. These flares result in degradation on the high-frequency propagation of radio waves, starting at the lower frequencies if the flare is weak. The stronger the flare, the higher the frequencies affected.

By December 19, the Sun kicked into high gear with the total sunspot count climbing to 43. This pushed the 10.7-cm flux up to 87 on December 17, becoming the highest flux reading of 2009!

Speaking of size, the size of active



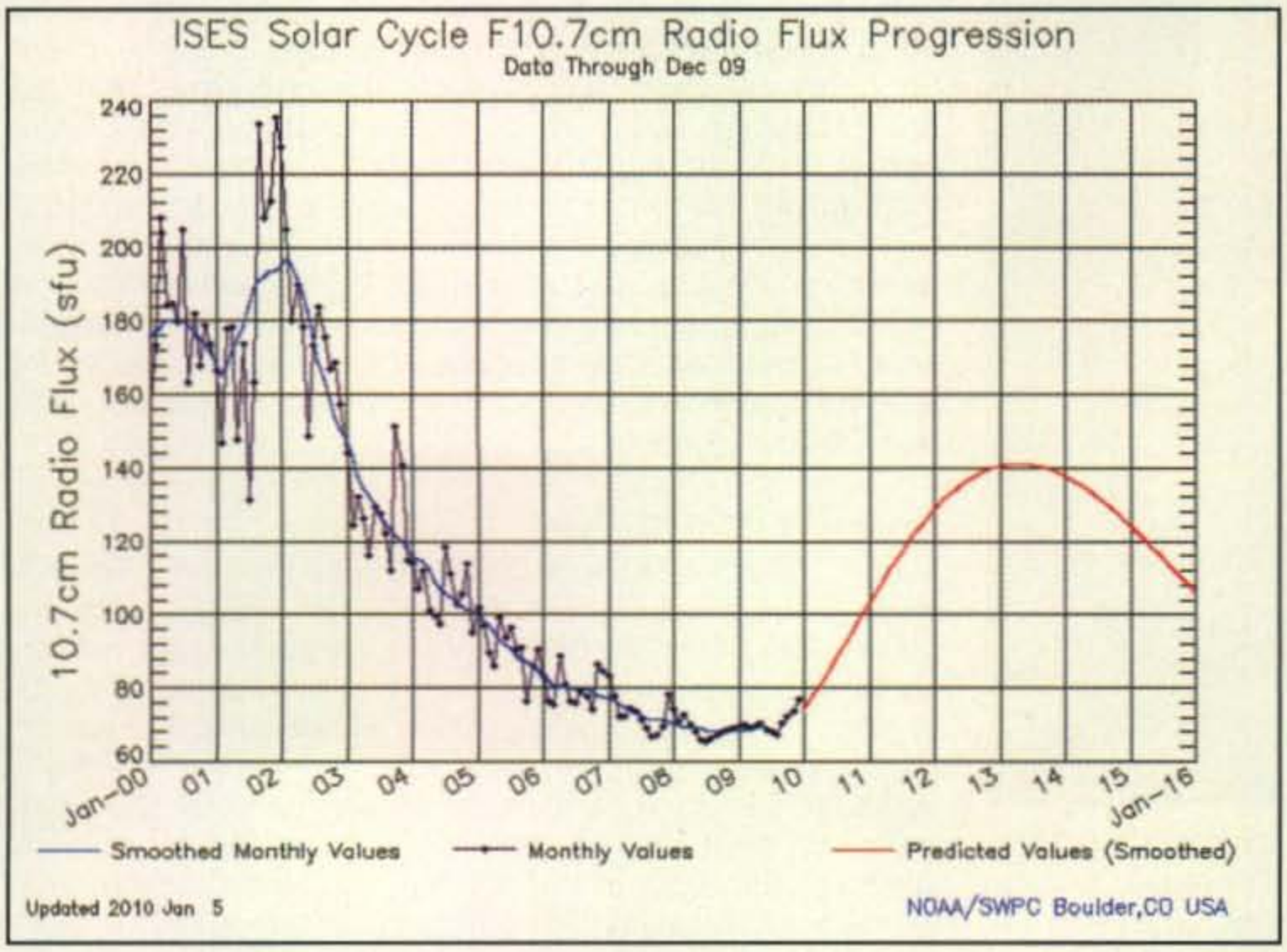


Fig. 1– Sunspot Cycle 24 progression charts showing the definite rise in both the monthly observed sunspot counts in the last months of 2009, as well as the rise in the 10.7-cm flux monthly figures. (Source: Space Weather Prediction Center [SWPC] / The National Oceanic and Atmospheric Administration [NOAA])

sunspot regions is given as units, each unit being one millionth of the Sun's visible hemisphere (this unit does not have a specific name). The active region 1034 that emerged on December 9 measured ten of these units, or 10 millionths of the visible solar disc. By December 11, it grew to 20 millionths. With the new sunspot region, 1035, emerging on December 14, the total area of all active regions only totaled 30 millionths. However, 1035 quickly grew in size. By December 20, the total area of all sunspot regions equaled a huge 330 millionths of the visible solar hemisphere, the largest sunspot region of 2009 and the second largest so far in the new Cycle 24 (the largest came in January 2010).

Fig. 2– The Michelson Doppler Imager (MDI) intensitygram (IGR) of the active sunspot region 1035 on December 15, 2009. The size of this active region is seven times that of Earth. (Source: Solar and Heliospheric Observatory [SOHO])

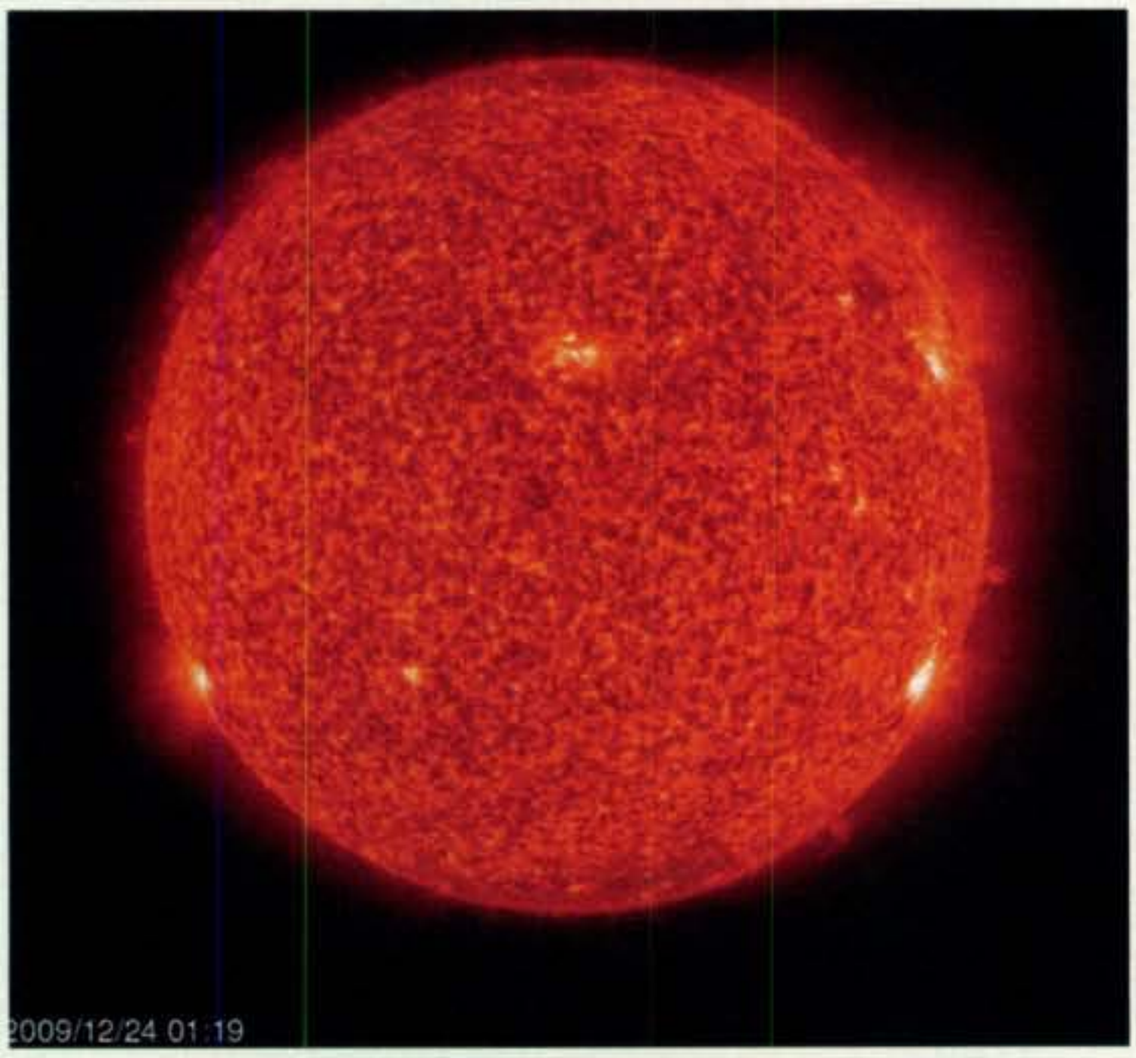


Fig. 3– The Solar and Heliospheric Observatory (SOHO) Extreme ultraviolet Imaging Telescope (EIT) image (EIT 304) on Christmas 2009 at eleven times ionized iron at a temperature of approximately 1.5-million degrees Kelvin, showing activity in many areas of the visible solar disc. This much activity has not been seen since the last sunspot cycle, a number of years ago. (Source: SOHO)

Between Christmas and New Year's Eve, three additional sunspot regions emerged—1036, 1037, and 1038 (fig. 3). Region 1037 quickly ended, but the others continued to help keep things exciting. Additionally, active region 1039 emerged on December 26, 2009 and continued to rotate across the solar disc until it rotated around out of view on January 6, 2010. On January 7, region 1036 rotated back into view, re-numbered 1040. As this region quickly grew, it became larger than ten times the size of Earth, peaking at 380 millionths of the visible Sun hemispheres, the largest yet in the new cycle. This region was peppered with spots (fig. 4). As a result, the 10.7-cm flux peaked at 93 on January 12, and the sunspot count peaked at 41 on January 13 (figs. 5 and 6). At press time, the rest of January has not yet played out, but perhaps now we can start to accept the idea that the new cycle is well under way. With that comes overall improvement on higher frequencies in the high-frequency shortwave spectrum. Soon, with this up-tick in sunspot activity, the *F*-region of the ionosphere will begin to offer VHF propagation, as well.

Why Aren't HF Conditions Showing Significant Improvement?

With this increased activity, hopes are high that drastic improvements will occur in ionospheric radio signal propagation. However, many are observing the conditions on the HF amateur radio bands are not that different from conditions of a year ago.

In truth, we really haven't seen enough solar energy to raise the maximum usable frequency (MUF) higher than that of the last few years. Data from ionosonde sounders indicate that these MUFs are not yet changing enough to cause noticeable improvements. You can view these readings at <http://www.swpc.noaa.gov/ftpdir/lists/iono_month> and <http://www.swpc.noaa.gov/ftpdir/lists/iono_day> (the day data shows the variations during the course of one 24-hour period, while the month data shows the same hourly variations, but for the entire month in question). Any variations that we see during such low solar activity are due to other influences on the ionosphere, and not from solar energy from sunspot regions. Only when sunspot activity rises significantly, and for extended periods of time, will we see lasting and noticeable improvements in radio propagation in the high-frequency spectrum.

Gray-line Propagation

March is one of the optimal DX months. As the Spring Equinox approaches, the gray- line begins to run straight north and south. With the return of sunlight to the polar north, north to south openings on the higher shortwave frequencies (20 through 10 meters) are improving. However, since we are still at the bottom of the solar cycle, openings on east/west paths on higher frequencies continue to be short and weak, if they occur at all. The good news is that this year we are seeing an increase in the 10.7-cm flux levels, which could strengthen these openings, affording an opportunity to catch some longer-range DX.

During the daylight hours, the energy from the Sun ionizes our upper atmosphere, causing distinct layers of ionized gas to form. These layers form what we call "ionosphere." The

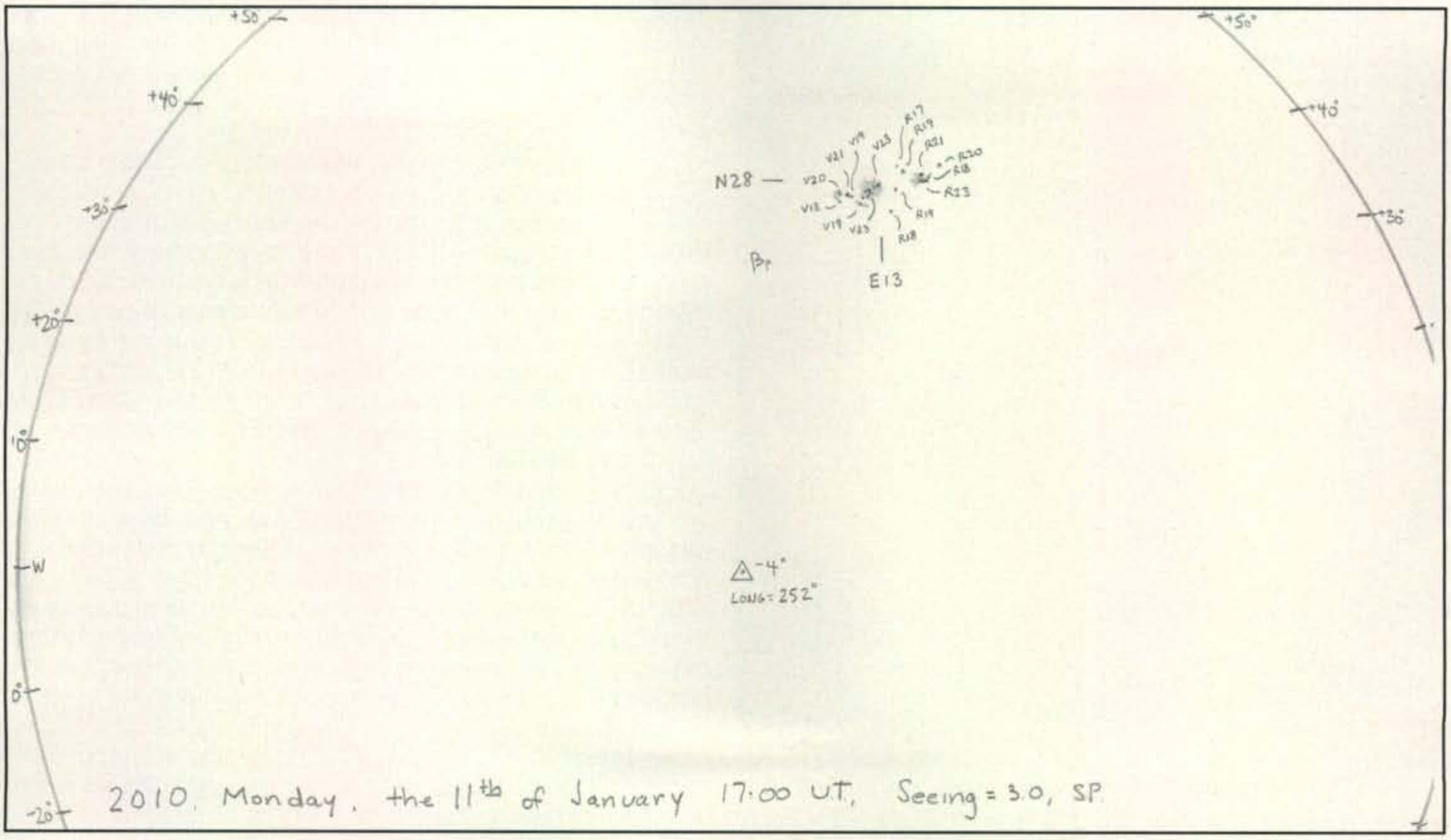


Fig. 4– The hand drawing at a solar observatory of the sunspots observed on January 11, 2010. Notice the numerous spots counted. This is not typical yet in the new Cycle 24, and is a hopeful sign that the new cycle is coming awake. (Source: The Division of Astronomy & Astrophysics, University of California, Los Angeles [UCLA])

layer closest to the Earth is called the "*D*-layer" or "*D*-region." This layer of ionized gases generally absorbs some of the energy of an HF (high frequency; those frequencies below 30 MHz) radio wave, and hence the *D*-layer is often called the "absorption layer."

As a radio signal travels through the *D*-layer, it gets attenuated. How much a radio wave is attenuated depends on how energized the *D*-layer has become, the frequency of the radio wave, and the angle at which the radio wave enters the *D*-layer.

When the end of daylight occurs at our radio shacks, and sunset ends the direct exposure of the ionosphere above us to sunlight, solar radiation no longer strikes the ionosphere and ionization stops. Without this solar radiation, the layers of ionization decrease in density by a process called "recombination." This causes the MUF to become lower as well, which is why by total darkness the highest HF bands close down. Those frequencies do not get refracted, but continue on out into space.

The *D*-layer is the first layer where ionization stops. Since it is closest to the ground, sunlight no longer reaches it, while higher levels of the atmosphere remain in sunlight. Think about how you can see a passing satellite by the sunlight reflected on its surface, while you are standing in darkness; it's dark on the ground, but the satellite is still being illuminated. As the *D*-layer goes into recombination, the electron density goes down and the absorption does down.

During the twilight hours the *D*-layer rapidly loses its ionization and does not absorb radio signals passing through it, while the *E*- and *F*-layers are still being ionized by sunlight. This makes for about 45 to 60 minutes of stronger signal propagation on a wide range of HF frequencies. As the ionization decreases, lower and lower frequencies start to punch through the *D*-layer with almost no signal attenuation. Yet the MUF is still high, allowing long-distance skip propagation. Then, when the Sun is blocked from illuminating the *E*- and *F*-layers, the MUF can drop dramatically and very quickly (within minutes). This twilight zone, where the Sun is exactly 12 degrees below the horizon, is called the "gray-line," or

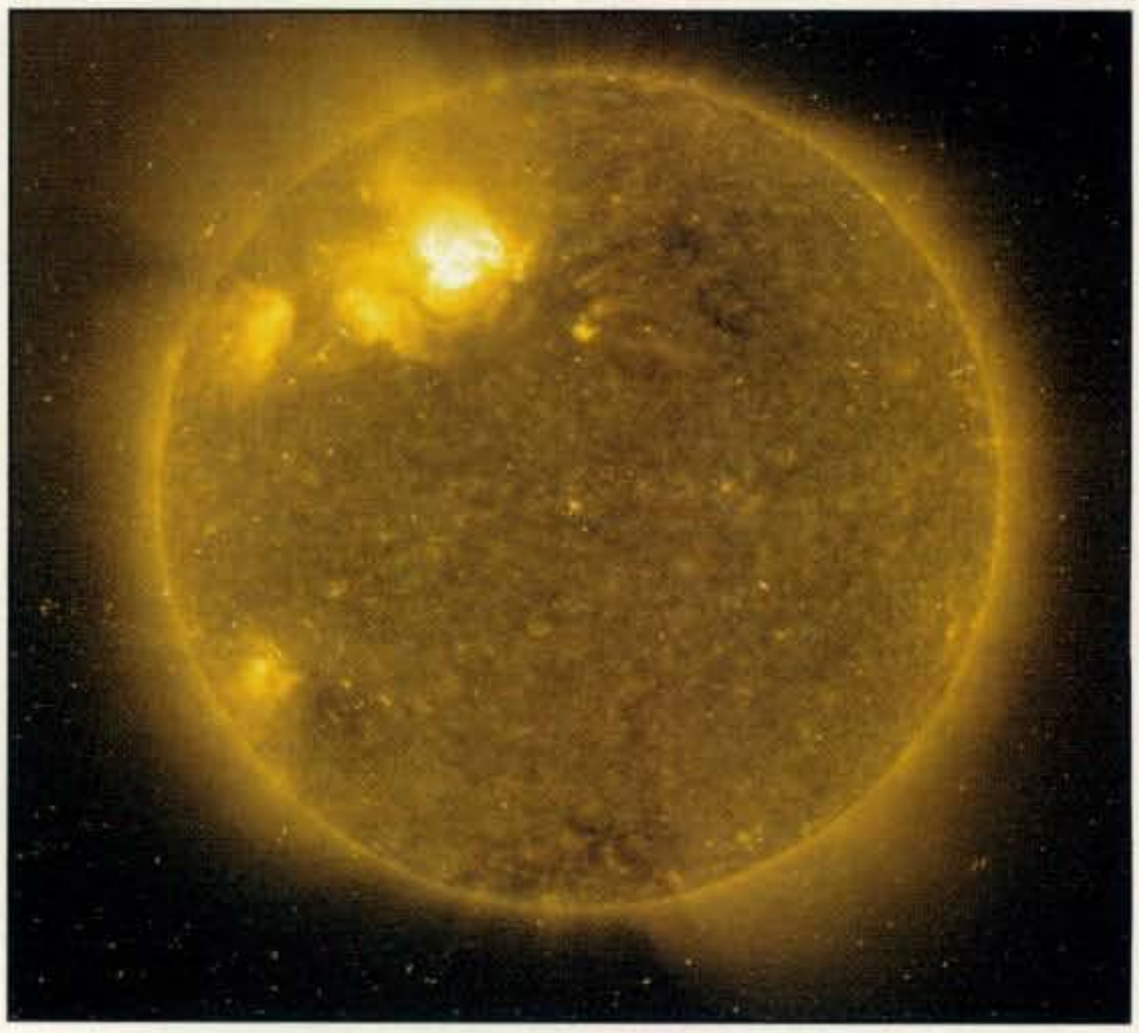


Fig. 5– The EIT image of the active sunspot region on January 11, 2010. This active region 1040 pushed the 10.7-cm flux to 93, the highest yet (as of press time) of the new sunspot Cycle 24. (Source: SOHO)

Fig. 6– The Michelson Doppler Imager (MDI) intensitygram (IGR) of the active sunspot region 1035 on January 15, 2010. The size of this active region is over ten times that of Earth (the largest sunspot region yet in Cycle 24 as of press time), and is responsible for a number of C-class X-ray flares, and for pushing the 10.7-cm flux to above 90. (Source: SOHO)

in astronomical terms, the "terminator." The same principles apply at sunrise; the upper ionosphere begins to become ionized, while the *D*-layer is still dark and low in density, offering free passage of very low HF signals, even MW signals.

Signals that are aimed along a path that stays within the gray-line often experience significant improvements in propagation. This is what we refer to as "gray-line propagation," and is a very exciting way to hear exotic DX signals. These signals may be coming in from the long path as well as the short path, but always along this gray line.

There is an excellent article regarding gray-line propagation at Steve Nichols, GØKYA's internet web page, <http://www.qsl.net/g0kya/radcom.html>. Steve, a member of the Radio Society of Great Britain's Propagation Studies Committee, believes that propagation around sunrise and sunset is not fully understood. His article outlines the mechanisms behind gray-line and other twilight propagation modes, and also explains a research project designed to better understand these modes.

As we are right at the start solar Cycle 24, gray-line propagation will bring exciting DX. Tune around the lower amateur radio HF bands about an hour before sunrise, and again right before sunset, and look for these long-distance signals. Of course, gray-line DX will occur on most of the HF spectrum, but is quite noticeable on these lower shortwave bands, since DX signals on these bands are rare.

March Propagation

At this time, the ionosphere is not being energized enough to support much propagation on the highest HF bands. This is because the solar energy is not yet at a consistently high enough level to ionize the *F*-layers sufficiently for refracting these higher frequencies. With the reduced energy level of the ionosphere, even 20-meter propagation suffers with short openings and limited distances. Overall, signals are generally weaker over many radio circuits during this part of the solar cycle.

Ten meters will be spotty, with the most reliable propagation along north/south paths, and mostly over shorter distances. I've been following the revealing reports from the PropNET propagation research group <http://www.propnet.org/>. It conducts daily propagation tests on 10 meters. The reports confirm that even during the lowest phase of the solar cycle,10 meters does have life. You won't know it, though, if you are not on the band trying. When the 10.7-cm flux rose above 90 in January, there were reports of CW Morse Code two-way (non-sporadic-*E*) contacts successfully made on 10 meters.

Fifteen meters will be somewhat more usable than 10. We will find 15 opening up to more areas, and for somewhat longer periods, into the evenings. Those daytime paths that do open up (certainly much less often than during the peak solar cycle years) will not degrade much until midsummer. You will see these openings mostly from regions close to the equator, as the current solar activity is not supporting the propagation of these higher frequencies via the *F*-layer of the ionosphere.

Seventeen and 20 meters will remain in good shape. Both short- and long-path circuits are reliable and solid. All nighttime paths are wide open during March. Primetime evening hours in the United States are sunrise hours across Russia, Africa, and both the Near and Far East. Expect a lot of short- and long-path DX into these areas of the world. The daytime band of choice will be 20 meters, as has been proven in contests during past solar cycle minimums.

Between sunset and midnight, expect DX openings on all bands between 20 and 160 meters, with occasional openings on 15 and 17 when conditions are High or Above Normal. Conditions on 30, 40, 60, 80, and 160 meters should favor openings to the east and south. These bands should peak for openings to Europe and Africa near midnight.

From midnight to sunrise, expect optimum DX conditions on 30, 40, 60, 80, and occasionally 160 meters. Conditions should favor openings toward the west and south. Some rather good 20-meter openings should also be possible toward the south and west during this time.

The seasonal drop of daytime maximum usable frequencies continues and the geomagnetic activity as reported by the planetary *A*- index (*Ap*) is on its seasonal rise. Take advantage of the current excellent conditions and work the world before the summer conditions create greater challenges.

VHF Conditions

The possibilities for ionospheric openings on the VHF bands usually improve during March and the spring months as more auroras occur close to the equinoctial period. There is a slight but fair chance for an increase in widespread auroral activity during March, but definitely by April, since we will continue to experience coronal-hole activity and possiblely solar flares during this new solar cycle. These auroras could be accompanied by auroral-scatter-type openings on 6 and 2 meters. Check the Last-Minute Forecast at the beginning of this column for those days in March expected to be Below Normal or Disturbed. These are days on which auroral activity is most likely to occur..

Conditions should be optimal during March for trans-equatorial scatter propagation between the southern tier states

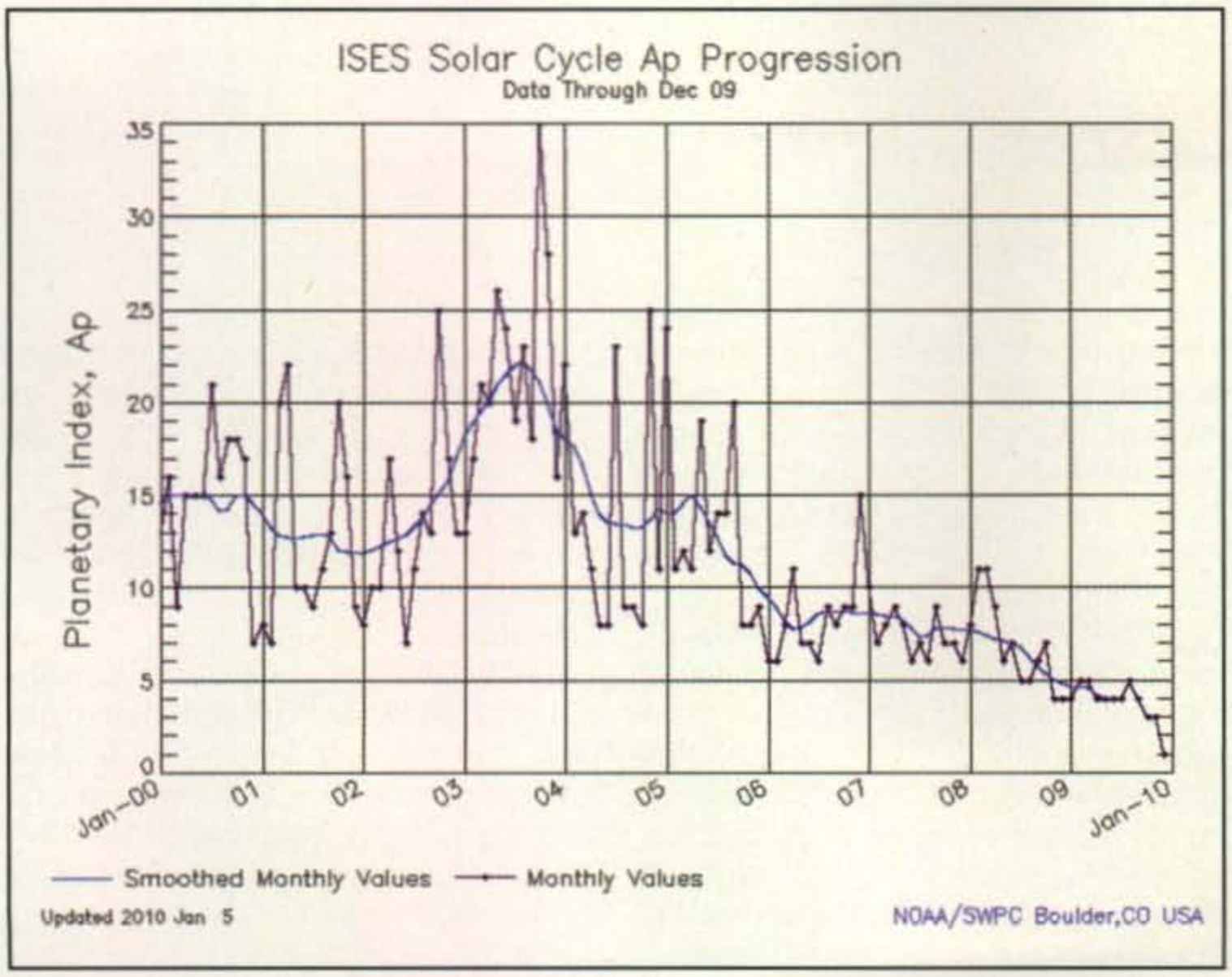


Fig. 7– This graph of the monthly and smoothed planetary A-index (Ap) reveals that we've reached the most geomagnetically quiet period yet recorded in the sunspot cycle minimum between Cycle 23 and 24. This is a record low, at least within the last few solar cycles observed. (Source: SWPC/NOAA)

and countries deep in South America. The best time for TE openings should be between 8 and 11 PM local time. Don't forget to check out *CQ VHF* magazine for more details on VHF propagation and conditions.

Current Solar Cycle Progress

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 76.8 for December 2009, up from November's 73.6, continuing a slow but steady monthly rise. The 12-month smoothed 10.7-cm flux centered on June 2009 is 70.2, also indicating a steady rise. The predicted smoothed 10.7-cm solar flux for March 2010 is about 80, give or take about 7 points.

The Royal Observatory of Belgium reports that the mean monthly observed sunspot number for December 2009 is 10.6, a very sharp rise over the previous three months of 4.2, 4.6, and 4.2. The lowest daily sunspot value during December 2009 was zero, occurring on December 1–9 and December 25. That's only ten days without sunspots! The highest daily sunspot count for December was 30 on December 20. The 12-month running smoothed sunspot number centered on June 2009 is 2.7. A smoothed sunspot count of 20 is expected for March 2010, give or take about 8 points.

The observed monthly mean planetary *A*-index (*Ap*) for December 2009 is one (1)! That's the lowest of the solar cycle minimum between Cycles 23 and 24 (fig. 7). The 12-month smoothed *Ap* index centered on June 2009 is 4.0. Expect the overall geomagnetic activity to be unsettled to stormy during March. At the time of this writing, the forecast holds that March will be a reasonably quiet month, but with occasional geomagnetic storminess due to recurring coronal holes, flares, and possible coronal mass ejections (if flaring occurs from possible sunspot activity). Refer to the Last Minute Forecast for the outlook on which days this might occur.

I welcome your thoughts, questions, and experiences regarding this fascinating science of propagation. You may e-mail me, write me a letter, or catch me on the HF amateur bands. Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. If you are on Facebook, check out <http://tinyurl.com/fb-spacewx> and <http://tinyurl.com/fb-nw7us>. See you on the air!

73, Tomas, NW7US

1945 — Our 65th Anniversary — 2010

Timeline of Ham Radio History 1945–2010

To help celebrate CQ*'s 65th anniversary, we've put together a timeline of significant events in ham radio history from 1945 to the present. Each month this year, we'll present five or six years' worth, and then put the whole list on our website when we're done. (Since this is a timeline and not a textbook, we had to be selective. We apologize in advance if we leave out something of importance to you.)*

This month, we'll cover the years 1957–1961:

1957–1961: Dawn of the Space Age & Record Sunspot Numbers

1957: Sputnik launched by USSR, ushering in the Space Age; hams among first to receive transmissions from the satellite. Solar Cycle 19 reaches peak, highest on record, resulting in unparalleled DXing opportunities; Collins introduces its first transceiver, the KWM-1; Slow-Scan Television (SSTV) invented.

1958: Continued peak of Cycle 19; integrated circuit invented; 11-meter ham band reallocated to newly-created Citizen's Band.

1959: RCA promotes nuvistors to hams in effort to hold off onslaught of transistors; Don Stoner, W6TNS, famously poses the question in his *CQ* "Semiconductors" column, "Does anyone have a spare rocket for orbiting purposes?" leading directly to birth of Project OSCAR and the launch of the first amateur satellite two years later.

1960: First amateur radio EME (Earth-Moon-Earth) contact, between W6HB and W1BU; *73* magazine begins publication; General Conference on Weights and Measures adopts the Hertz (Hz) as the standard unit of frequency (1 Hz = 1 cycle per second), turning kilocycles (kc) and megacycles (Mc) into kilohertz (kHz) and megahertz (MHz).

1961: OSCAR-1 (Orbiting Satellite Carrying Amateur Radio) launched, the first non-governmental satellite ever placed in orbit. It was a transmit-only satellite, sending primitive telemetry—"HI" in Morse code on 2 meters—with speed varying with the satellite's temperature.

Next month, we'll look at 1962 through 1967, an era marked by the first appearance of Japanese gear on the U.S. ham market and the debate over "incentive licensing."

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (Note that the country names and groupings reflect the DXCC list at the time of the contest.)

2009 WPX CW RESULTS
SINGLE OPERATOR
NORTH AMERICA

United States

AK1W	**A**	**9,260,843**	**3203**	**983**
			(OP: K5ZD)	
WC1M	*	**9,103,680**	**2945**	**981**
W1CU	*	2,593,020	1197	690
K1AR	*	1,542,912	1114	574
NN1N	*	1,232,041	886	529
W1BYH	*	907,709	727	481
K1IB	*	882,880	639	445
W1FJ	*	811,960	676	424
K1AIR	*	490,176	479	296
			(OP: K5MA)	
W1ZS	*	238,238	306	238
N4XR/1	*	222,952	285	248
N5VU/1	*	208,864	377	244
N8WXQ/1	*	151,235	288	203
W1HBR	*	145,197	290	219
K1SEZ	*	123,000	264	205
K1ZE	*	118,737	195	167
N1KWF	*	33,990	128	103
KB1ODO	*	19,270	143	94
KQ2M/1	**14**	**5,348,477**	**2318**	**967**
AE1T	*	478,859	546	389
W1UJ	*	24,024	133	104
WA1Z	**7**	**1,344,234**	**828**	**471**
K5MA/1	*	87,230	144	130
K1KI	*	83,732	139	121
KBPO/1	**1.8**	**12,449**	**74**	**59**
***NV1N**	**A**	**3,592,587**	**1700**	**723**
			(OP: N1UR)	
*W2JU/1	*	741,888	727	384
*NJ1T	*	641,826	633	394
*W1TO	*	519,216	513	348
*KA1API	*	421,740	408	284
*K1BV	*	317,900	592	289
*W1JQ	*	281,105	376	269
*K1TR	*	229,392	352	243
*N3XL/1	*	201,450	363	237
*K1HI	*	177,816	329	239
*W1FA	*	155,775	262	201
*WD1N	*	147,489	296	211
*NA1R	*	134,664	249	186
*WA1ESO	*	65,648	220	176
*N1IX	*	53,428	180	148
*AA1O	*	49,270	173	130
*WB1FJH	*	44,520	181	140
*N1IMW	*	17,290	101	91
*W1MJ	*	2,542	35	31
*KB1NRB	*	1,188	27	27
***W3IZ/1**	**14**	**1,050**	**21**	**21**
***AB1J**	**7**	**241,542**	**309**	**243**
*K1PU	*	17,980	65	62
WN2O	**A**	**3,248,232**	**1673**	**718**
			(OP: N2GC)	
K2FU	*	1,546,704	1072	552
NX2X	*	1,153,440	904	480
K2MK	*	753,920	687	380
WS9M/2	*	615,118	548	371
W2LE	*	580,957	595	377
KD2HE	*	253,764	405	266
WA2ETU	*	143,312	271	208
W3JK/2	*	81,770	223	170
N2CG	*	50,096	118	101
W2FUI	*	26,300	120	100
W2UDT	*	11,250	87	75
KR2AA	**14**	**951,096**	**916**	**552**
N2NC	*	860,700	828	475
NA2U	*	830,248	853	472
			(OP: K2TTT)	
AI2N	*	39,780	140	130
K2XA	**3.5**	**15,433**	**65**	**61**
***K2PS**	**A**	**2,306,963**	**1309**	**617**
*K2UF	*	767,533	687	391
*NP3D/NY2	*	534,204	595	396
*KM2L	*	493,324	482	358
*K1TN/2	*	384,709	496	293
*KC2IGE	*	282,443	379	257
*K2ZC	*	278,382	371	249
*WA2MCR	*	260,425	442	275
*N2FF	*	177,708	333	236
*AK2B	*	147,777	344	227
*K2TV	*	131,052	278	201
*WA2LXE	*	118,950	300	183
*W2NRA	*	91,584	246	192
*N4BG/2	*	70,811	204	169
*WC2C	*	68,838	202	149
*KD2MX	*	54,288	186	144
*NV2G	*	45,880	143	124
			(OP: N2ZN)	
*W3TUA/2	*	25,194	135	102
*KB2AMY	*	21,888	140	96
*WB2RIS	*	15,930	120	90
*K3UK/2	*	4,320	65	54
*K2IZ	*	2,730	38	35
*KV2X	*	2,240	44	40
*K2RNY	*	1,792	32	32
***N2MM**	**14**	**1,098,045**	**939**	**585**
***W2EG**	**7**	**1,008,830**	**583**	**395**
*W2LHL	*	7,067	37	37
KC3R	**A**	**9,597,400**	**3271**	**1021**
			(OP: LZ4AX)	
AA3B	*	**7,373,940**	**2765**	**905**
WM3T	*	7,151,560	2642	884
			(OP: N3KS)	
K3ZO	*	5,240,699	1971	827
N1WR/3	*	2,081,340	1248	620
N3UM	*	2,004,080	1203	611
N3AM	*	797,357	682	419
WI2E/3	*	330,885	462	285
N4OQ/3	*	318,045	431	273
NA3F	*	267,582	423	277
KJ3X	*	92,092	220	161
			(OP: K1DQV)	
K3RMB	*	44,660	177	140
WA3AAN	*	30,504	105	93
K3YG	*	85	6	5
W3BGN	**3.5**	**419,869**	**451**	**293**
W3NO	*	154,400	243	200
***W3EF**	**A**	**2,950,275**	**1402**	**695**
*NO3M	*	1,074,479	1076	469
*WO3Z	*	692,000	683	400
*W6AAN/3	*	497,340	518	405
*ND3R	*	486,450	534	345
*W3DQN	*	421,155	520	315
*KB3LIX	*	305,525	437	275
*K3TN	*	186,735	275	211
*N3QE	*	127,835	242	185
*NJ3K	*	127,125	338	225
*W3WC	*	121,260	257	188
*WC3O	*	92,070	225	186
*NY3B	*	86,686	266	178
AD4EB	*	804,300	978	420
N4CW	*	644,080	615	415
W9WI/4	*	632,690	852	419
W1MD/4	*	606,840	741	389
K4DJ	*	559,700	666	386
K4LQ	*	507,780	535	364
N4QS	*	499,484	588	386
AK4K	*	471,224	714	394
			(OP: W4LT)	
NE4M	*	458,076	631	354
W6UB/4	*	429,668	483	326
K4HAL	*	398,112	611	348
W4PM	*	383,394	543	314
AI4WW	*	294,265	383	257
KØZR/4	*	252,252	472	252
WB4ROA	*	155,092	238	191
W4XO	*	109,335	267	185
NA4C	*	100,793	286	187
AB4IQ	*	88,408	216	172
W4NZ	*	77,349	242	177
*W4RYW	*	185,879	349	269
*NB4M	*	178,542	334	234
*AB4GG	*	174,648	335	228
*W4RQ	*	146,985	267	239
*ND4X	*	121,272	278	186
*KS4L	*	113,634	246	177
*N4WO	*	104,650	255	182
*WC4E	*	103,986	194	159
*N4HXI	*	101,092	266	199
*W4BK	*	97,495	285	185
*NN4DF	*	92,635	215	191
*NS2X/4	*	74,550	174	150
*N3TG/4	*	70,892	175	148
*KN4QD	*	68,838	191	154
*N4ZI	*	56,794	229	146
*N4LV	*	55,264	210	157
*WX4TM	*	54,696	173	159
*AE4O	*	47,762	183	143
*KN4Y	*	47,430	204	155
*K4FTO	*	40,172	144	121
KK5I	*	2,382,756	1896	668
			(OP: W5CW)	
NM5O	*	2,128,780	1605	652
			(OP: N5NU)	
K7IA/5	*	491,490	663	387
KE3D/5	*	465,864	558	354
NU5A	*	414,414	450	299
			(OP: W5KU)	
NE5D	*	381,924	440	309
			(OP: K5RX)	
K5KA	*	299,667	598	303
W5VQ	*	240,084	301	234
WA5ZUP	*	153,600	329	240
K5ER	*	62,088	196	156
AD5Q	*	42,441	210	141
KZ5D	*	28,496	177	104
WØZW/5	*	16,195	96	79
W5VX	**28**	**28,290**	**198**	**123**
NM5M	**21**	**969,285**	**1163**	**537**
KZ5J	*	170,100	491	270
NR5M	**14**	**3,060,828**	**1894**	**846**
			(OP: K5GA)	
WA5SOG	*	501,060	585	420
N4OGW/5	*	140,082	365	222
NF5T	*	48,184	189	152
			(OP: K5BG)	
WD5R	**7**	**43,248**	**112**	**106**
			(OP: N5ECT)	
***WD5K**	**A**	**1,582,185**	**1223**	**595**
*N5PO	*	568,510	648	409
*N5AW	*	489,972	605	399
*W5RYA	*	482,328	737	348
*K5EWJ	*	388,925	549	331
*WQ5L	*	367,479	468	307
*AC5K	*	340,392	567	312
*KØGEO/5	*	324,775	545	275
*AE5X	*	144,256	347	224
*WB5TEQ	*	125,008	271	208
*AD5MN	*	84,107	201	151
*W5EK	*	78,416	206	169
*N7FF/5	*	72,300	227	150
*NK5Q	*	71,808	229	176
			(OP: K5WA)	
*WA5BDU	*	71,676	154	132
*NK5G	*	68,949	254	163
*K5QEA	*	63,910	236	166
*NG5NG	*	62,726	199	158
*AA5TB	*	36,800	108	100
*WØVX/5	*	33,012	145	126
*AD5VC	*	24,644	116	101
*NO5W	*	20,100	127	100
*KD5J	*	18,810	114	95
*W5PQ	*	17,512	107	88
*K5ICW	*	12,691	51	49
*KD5JHE	*	10,206	105	81
*W5AG	*	6,003	94	69
*W5WZ	*	5,952	66	62
*W5QLF	*	4,830	81	69
*KE5PWL	*	4,560	59	48
*AE5KM	*	594	20	18
*AI5G	*	312	13	13
***KU5B**	**21**	**119,475**	**353**	**225**
*NA4M/5	*	952	28	28
***AA5JG**	**14**	**26,432**	**123**	**112**
***AA5B**	**7**	**105,608**	**245**	**172**
*N5ER	*	20,886	64	59
*AF5Z	*	3,052	28	28
***WD5BJT**	**1.8**	**49**	**7**	**7**
NY6N	**A**	**5,104,797**	**2826**	**877**
			(OP: N6MJ)	
NF6A	*	4,153,842	1989	777
WC6H	*	4,144,518	2115	762
			(OP: NU6S)	
WA6O	*	3,794,058	2108	738
WX6V	*	2,261,616	1467	636
KYØW/6	*	1,949,970	1496	627
			(OP: K6SRZ)	
KF6T	*	1,875,357	1393	627
KC6X	*	1,133,220	984	510
W6TK	*	716,909	723	419
N6NF	*	701,520	932	444
WA6KHK	*	675,955	832	445
KE1B/6	*	543,720	661	394
K6LRN	*	495,110	569	385
NW6H	*	494,680	603	332
			(OP: K6RB)	
K6YK	*	252,747	419	297
WT6K	*	245,875	589	281
K6RR	*	185,370	372	222
W6FA	*	165,483	300	243
KI6T	*	143,752	321	238
W6SX	*	132,858	342	198
NV6C	*	103,836	294	204
			(OP: N6AN)	
WB6JJJ	*	97,188	246	182
N6AA	*	73,948	177	139
W6FG	*	47,125	215	125
K6III	*	45,543	165	141
K6NA	*	28,400	125	100
K6HRT	*	27,144	158	116
K6IP	*	19,401	101	87
KG6ZHC	*	3,920	46	40
W6VNR	*	2,460	44	41
N6ND	**21**	**27,750**	**147**	**125**
NG6S	**14**	**415,290**	**530**	**381**
			(OP: W4UAT)	
W6RKC	*	96,768	225	189
WW6D	*	29,267	130	113
KQ6LQ	*	3,268	47	43
KZ5OM/6	*	1,242	23	23
N2NS/6	*	950	28	25
NR6O	**1.8**	**9,248**	**78**	**66**
			(OP: N6RO)	
***WN5K**	**A**	**840,042**	**998**	**413**
*AF6EV	*	294,126	517	282
*KQ6X	*	117,151	273	193
*K6AAB	*	111,132	318	196
*W6RFF	*	102,144	249	192
*NK6A	*	95,380	293	190
*KD4HXT/6	*	87,376	320	172
*N6GL	*	86,022	304	162
*AA6EE	*	72,652	250	164
*NC6V	*	72,332	255	169
*K6RM	*	67,704	255	156
*K6WSC	*	45,560	190	134
*AE6RG	*	30,090	152	102
*K6CSL	*	26,000	152	100
*W6IYS	*	23,436	106	93
*AA6YX	*	17,760	128	96
*N6EF	*	17,688	123	88
*WW3DE	*	67,350	197	150
*N3NZ	*	56,628	238	143
*K3RWN	*	52,500	177	140
*AD8J/3	*	50,249	139	109
*K3MRG	*	22,995	82	73
*NE3R	*	18,492	103	92
*N3JNX	*	9,636	83	66
*K3KU	*	2,816	34	32
***K3GW**	**14**	**178,461**	**286**	**251**
*WA2VQV/3	*	105,222	248	213
AD4J	**A**	**6,384,784**	**2546**	**872**
			(OP: K3ZM)	
NY4A	*	**6,011,330**	**2480**	**845**
			(OP: N4AF)	
KM9P/4	*	4,571,598	2403	859
			(OP: KØEJ)	
AB1HZ/4	*	4,035,749	2371	799
			(OP: K5KG)	
KR4Z	*	3,908,800	2198	800
			(OP: N4PN)	
K4RO	*	3,681,516	2143	804
K4BAI	*	3,277,260	2005	756
K4PV	*	2,316,782	1837	681
WW4R	*	1,920,568	1493	626
			(OP: N4ZZ)	
N3CZ/4	*	1,878,600	1297	606
WZ4F	*	1,622,080	1213	592
			(OP: K4AB)	
KM4M	*	1,582,565	1046	565
			(OP: W3BP)	
NJ4I	*	1,435,588	1282	553
			(OP: K4LTA)	
K4SV	*	1,426,760	1069	530
KM4MK	*	1,361,085	1330	565
			(OP: N4UU)	
K1GU/4	*	1,237,545	1014	515
K7CS/4	*	1,190,448	1022	504
W4SAA	*	1,128,006	836	486
NN4GG	*	986,952	1038	472
			(OP: N4GG)	
N6AR/4	*	982,550	685	430
W4CWA	*	77,331	213	173
N3KN/4	*	75,950	216	175
NE8J/4	*	72,141	307	173
K3CQ/4	*	23,408	98	88
K4DZR	*	19,504	150	106
AE4EC	*	18,666	149	102
W4OJC	*	15,500	117	100
W2OO/4	*	15,066	81	81
WA4ZXV	*	12,069	92	81
W4ATL	*	3,936	46	41
WN1GIV/4	**28**	**296,485**	**657**	**301**
			(OP: N4BP)	
NJ4U	**21**	**594,450**	**780**	**450**
K4FJ	**14**	**1,207,568**	**951**	**568**
K2SX/4	*	114,080	344	230
KU8E/4	*	98,810	247	205
AF4RK	*	31,125	139	125
K4RDU	*	22,278	104	94
K9MUG/4	**7**	**416,353**	**374**	**293**
KGØZ/4	*	83,125	145	133
***WJ9B/4**	**A**	**2,738,694**	**1657**	**662**
***WK2G/4**	*	**2,047,104**	**1389**	**576**
*NR3X/4	*	1,752,894	1438	594
			(OP: N4YDU)	
*WD4AHZ	*	1,689,540	1317	580
*NA4K	*	1,218,474	1037	487
*W4YE	*	1,184,535	933	495
*K4IE	*	1,097,577	944	477
*N4IG	*	938,410	784	449
*N4PSE	*	576,878	604	361
*WF7T/4	*	496,856	657	346
*N4AAI	*	444,860	669	377
*N4EMG	*	406,640	474	299
*K4MF	*	358,710	500	330
*N4ARO	*	320,073	434	283
*KE4KY	*	315,877	489	289
*WØUCE/4	*	296,808	482	298
*KG4W	*	235,572	405	268
*W4KAZ	*	204,424	403	253
*KG4CUY	*	200,244	413	246
*NV4B	*	197,784	409	268
*N4HA	*	188,604	297	234
*KE4UNA	*	28,448	118	112
*KQ4Y	*	26,936	129	104
*W4PVC	*	26,160	132	109
*WI8B/4	*	23,653	130	109
			(OP: W4EBA)	
*KJ4AOM	*	23,210	159	110
*KI4EZC	*	18,988	128	101
*WD4PDZ	*	15,038	82	73
*KJ4HYG	*	12,998	129	97
*N5VI/4	*	11,858	52	49
*W87ECS/4	*	4,750	39	38
*AC4PQ	*	4,433	33	31
*KJ4WD	*	2,600	45	40
*WB5NMZ/4	*	902	22	22
*W4WNT	*	620	20	20
*KJ4IT	*	156	12	12
***NA4W**	**28**	**8,908**	**101**	**68**
			(OP: K4WI)	
*N2WN/4	*	8,120	83	70
*N3UA/4	*	2,184	49	39
***WB4TDH**	**21**	**252,800**	**507**	**320**
***WA1FCN/4**	**14**	**982,311**	**1014**	**561**
*K4EU	*	80,808	196	182
*N4MM	*	55,614	155	138
*WA2ASQ/4	*	14,268	102	87
*KX4O	*	13,776	92	82
*K4NVJ	*	3,626	38	37
*AC6NN/4	*	3,360	49	48
*KI4MFX	*	200	10	10
***KE1F/4**	**7**	**36,340**	**97**	**92**
*K4PG	*	33,936	87	84
*N9MTT/4	*	31,031	94	91
*K4CQW	*	400	17	16
***KI3O/4**	**3.5**	**4,606**	**58**	**47**
***WI4R**	**1.8**	**962**	**34**	**26**
*K4WI	*	725	27	25
KT5J	**A**	**6,352,988**	**2747**	**877**
			(OP: N2IC)	
WC5T	*	4,188,267	2343	783
			(OP: K5PI)	
N8OO/5	*	3,486,893	2201	751

*WA6BOB	*	12,775	99	73
*KA3DRR/6	*	12,480	110	65
*N6AJR	*	5,029	56	47
*KI6FEN	*	608	16	16
***KM6Z**	**14**	**252,492**	**470**	**318**
*NP4IW/NK6	*	85,244	369	202
*K6EEP	*	12,502	117	94
*WA6L	*	8,733	73	71
*KI6OY	*	4	2	2
KM7W	**A**	**5,421,090**	**2364**	**822**
			(OP: N6TR)	
KR7X	*	**4,300,900**	**2217**	**820**
			(OP: K7GK)	
WR7HE	*	2,591,560	1559	670
			(OP: K7QQ)	
N7TT	*	2,320,815	1623	651
NE6LE/7	*	2,021,677	1512	667
			(OP: K4XU)	
K7ZZ	*	1,911,000	1536	600
K7HP	*	986,518	990	494
K7BG	*	581,822	770	421
N7RO	*	562,533	739	417
NW7ZZ	*	445,201	673	347
			(OP: N5LZ)	
W7SW	*	396,644	587	307
KI7Y	*	392,445	618	323
N6KW/7	*	391,152	550	348
NR7DX	*	373,635	554	361
			(OP: K7ABV)	
KS7T	*	272,400	433	300
K7UA	*	147,200	286	230
W7GKF	*	135,673	320	211
W9PL/7	*	135,360	236	160
N6TW/7	*	129,429	279	197
N7WO	*	119,853	238	207
NI7R	*	112,800	234	200
K7GLM	*	46,860	193	142
W7YS	*	36,036	148	126
WZ7ZR	*	32,595	237	123
			(OP: W7ZR)	
KB7N	*	25,168	136	104
NE9Z/7	*	6,656	57	52
AB7E	**14**	**1,558,050**	**1283**	**663**
KQ7W	*	609,738	770	453
			(OP: N7BV)	
KV7DX	*	150,600	328	251
			(OP: KN5H)	
K7RF	*	118,767	241	183
W7UG	*	75,620	266	190
AD7AV	*	22,351	110	103
KC7UP	*	21,824	92	88
W7IJ	**7**	**757,358**	**648**	**329**
W6XI/7	*	209,304	295	216
K8IA/7	*	19,588	96	83
W7TSQ	*	8,614	78	73
W7DRA	**1.8**	**6**	**3**	**2**
***WV7Q**	**A**	**1,340,583**	**1259**	**551**
			(OP: N7WA)	
***K7WP**	*	**1,066,858**	**1044**	**481**
*KN7T	*	721,476	975	441
*NE7D	*	250,120	496	260
*KN7K	*	241,024	504	269
*W7QN	*	239,382	451	286
*W7YAQ	*	231,424	322	256
*AB7RW	*	187,690	415	274
*KB7Q	*	135,486	413	234
*WA0WWW/7	*	120,345	305	213
*NV7E	*	100,939	271	193
*W7VXS	*	92,512	319	196
*KD7MSC	*	86,000	243	172
*K7TR	*	82,128	246	177
*N7BAN	*	67,452	267	154
*WE6EZ/7	*	66,297	259	147
*KC7KZ	*	49,880	243	145
*N7QS	*	49,800	236	150
*W7GT	*	48,895	218	127
*KE7YF	*	41,472	187	128
*NG7Z	*	39,688	217	121
*W3CP/7	*	33,887	117	103
*N7VS	*	31,842	181	122
*N7EIE	*	31,248	167	112
*NU7J	*	28,531	130	103
*WA1PMA/7	*	22,077	122	99
*KA7T	*	20,398	133	94
*K7RR	*	16,102	116	83
*N7RN	*	10,956	98	83
*NC7M	*	8,772	75	68
*W4LSC/7	*	3,280	41	41
*WA7SHP	*	3,002	52	38
*N7BT	*	1,410	31	30
*K7EIQ	*	882	22	21
*K7GIM	*	330	23	22
***KE7DX**	**21**	**12,905**	**100**	**89**
*K7MH	*	7,704	82	72
***K7HBN**	**14**	**315,076**	**408**	**347**
*N7FG	*	476	17	17
*N6MZ/7	*	230	10	10
*WR7Q	*	196	14	14
***WA7BME**	**7**	**204**	**12**	**12**
K8GL	**A**	**3,946,745**	**1787**	**803**
NO8DX	*	1,097,600	872	490
			(OP: K8MR)	
K8JQ	*	814,956	1006	452
K8MP	*	715,737	807	451
NE8P	*	646,646	716	418
K8FL	*	392,464	399	304
NS8O	*	375,410	520	346
W8OHT	*	362,894	552	322
W8GXT	*	358,155	539	315
W8PN	*	171,558	364	243
N8OC	*	155,916	260	213
N8LJ	*	120,059	316	211
WA8RCN	*	45,360	164	140
W8MET	*	22,989	86	79
KG9Z/8	*	196	8	7
N8BJQ	**14**	**2,050,428**	**1315**	**709**
K8ODL	**3.5**	**21,902**	**151**	**94**
***KV8Q**	**A**	**1,084,824**	**966**	**488**
*W1NN/8	*	557,004	540	349
*WB8TLI	*	443,856	448	336
*K8MEG	*	420,660	478	342
*W8IQ	*	402,203	401	401
*N8VV	*	398,250	524	354
*W8GOC	*	295,800	425	290
*KK8U	*	289,870	472	287
			(OP: K8MM)	
*W8PI	*	259,930	365	278
*K8AJS	*	197,656	326	248
*KS8O	*	168,948	362	247
*W8IDM	*	139,650	341	245
*N9AUG/8	*	125,600	278	200
*W8TM	*	120,132	183	142
*NN8UU	*	92,340	276	190
			(OP: N8VW)	
*N8EA	*	87,318	227	162
*KB8OCP	*	63,024	202	156
*WB8TSD	*	32,670	168	121
*NA8W	*	27,840	146	120
*N2OPW/8	*	17,472	106	91
*K8AO	*	10,033	93	79
*KB8X	*	9,758	98	82
*NF8M	*	5,390	59	55
*KD8GOX	*	3,995	56	47
*N8NOE	*	2,679	51	47
*N8NX	*	825	26	25
***W8KNO**	**28**	**54**	**6**	**6**
***NG9T/8**	**14**	**382,660**	**511**	**380**
			(OP: K8IR)	
***WB8JUI**	**7**	**435,015**	**472**	**315**
*K8ME	*	15,066	65	62
W9OP	**A**	**1,134,406**	**933**	**542**
K9CC	*	1,015,580	1179	493
NS9I	*	995,976	1061	522
K9UQN	*	459,672	553	358
AC9BP	*	367,224	423	321
			(OP: N9FC)	
KY9KYO	*	335,104	445	308
N9WKW	*	275,220	411	278
K9DJ	*	272,289	376	323
W9RE	*	267,960	428	280
W3HDH/9	*	214,797	348	253
WW9R	*	131,365	400	215
AA9D	*	63,126	139	126
K9WWT	*	55,695	210	141
N9NA	*	48,768	151	127
K9OM	**14**	**2,119,019**	**1378**	**721**
K9NW	**7**	**2,331,744**	**1225**	**642**
W9UYSLW	*	1,169,649	934	507
WX9U	*	968,072	815	472
AB9H	*	535,074	592	347
K9CJ	*	139,896	259	201
KX9DX	*	89,858	262	179
W9IND	**1.8**	**1,860**	**47**	**30**
***K9QVB**	**A**	**2,494,410**	**1488**	**739**
*KZ9O	*	1,287,018	1180	563
*W9LHG	*	461,462	629	358
*W9SN	*	435,116	477	319
*W9CPI	*	225,502	408	274
*NJ9Z	*	191,354	345	241
*N9CK	*	180,540	300	236
*K9XE	*	146,163	299	249
*K9WX	*	129,998	369	209
*K9IL	*	110,376	210	189
*WR9Y	*	93,100	254	190
*AI4AW/9	*	65,440	252	160
*K9PMV	*	58,548	197	164
*N9LYE	*	48,706	236	142
*N9DO	*	47,908	136	116
*WD9CIR	*	40,635	158	135
*N9BT	*	23,670	115	90
*K9QH	*	18,630	105	90
*KB9YGD	*	12,835	102	85
*WA9VEE	*	9,020	57	55
*NV9X	*	6,240	106	96
*AI9I	*	3,174	51	46
*WB9CHY	*	2,814	43	42
***N9GBB**	**14**	**15,390**	**103**	**90**
*WQ9T	*	3,069	34	33
*W9WE	*	380	20	20
***KA9O**	**7**	**84,900**	**162**	**150**
***N9TF**	**3.5**	**2,484**	**43**	**36**
WØEWD	**A**	**2,348,770**	**1741**	**698**
KCØMO	*	2,062,928	1510	652
			(OP: KØOU)	
KØDEQ	*	1,410,444	1120	579
WØBH	*	1,096,731	1326	523
KGØUA	*	176,400	279	240
NØRN	*	134,907	216	193
KØXTR	*	84,280	283	172
WDØT	*	75,992	339	184
NSØM	*	60,450	167	155
KØFG	*	18,952	98	92
KBØL	*	16,287	117	89
WØUA	**14**	**3,139,745**	**1815**	**823**
NØAT	*	971,432	1045	532
KØRF	**3.5**	**330,624**	**480**	**287**
***KØPK**	**A**	**982,566**	**924**	**494**
*KØRC	*	346,608	471	348
*KTØR	*	285,855	649	285
			(OP: NØKK)	
*WYØB	*	272,340	503	306
*NØBUI	*	222,780	406	282
*N1WQ/Ø	*	173,484	356	237
*AD1C/Ø	*	167,328	396	249
*WØRAA	*	110,740	329	226
*KØCF	*	105,742	250	182
*W9TTT/Ø	*	58,580	226	145
*KØLDS	*	56,550	232	145
*WØHBH	*	55,074	166	134
*KNØV	*	35,380	147	122
*AGØJ	*	34,870	119	110
*NØKMA	*	34,086	146	114
*KØHW	*	17,199	116	91
*ADØH	*	16,356	124	87
*WØTY	*	16,284	105	92
*KØHNC	*	15,604	115	83
*NGØK	*	8,208	97	72
*WAØRSX	*	5,727	76	69
*NØBK	*	5,247	60	53
			(OP: WØQQS)	
*KEØL	*	2,808	47	39
*NRØL	*	2,345	37	35
*ABØWR	*	2,160	30	27
*ACØOJ	*	72	9	8
***NWØDX**	**14**	**120,085**	**297**	**235**
			(OP: KØIO)	
*NØGOS	*	84,448	287	203
*NGØT	*	84,170	215	190
*KFØIQ	*	168	12	12
***N9HDE/Ø**	**7**	**21,600**	**112**	**95**
*KBØJSH	*	14,964	116	87

Alaska

KL8OX	**14**	**510,884**	**588**	**374**
AL1G	*	55,062	208	133
***KL2R**	**A**	**96,624**	**245**	**176**
			(OP: N1TX)	
*KL1JP	*	53,502	184	111
*KL7R	*	14,818	80	62

Barbados

8P5A	**A**	**10,809,400**	**3310**	**980**
			(OP: W2SC)	

Bermuda

***VE3DZ/VP9**	**A**	**7,152,900**	**2573**	**844**

Canada

VY2TT	**A**	**12,878,826**	**3550**	**1054**
			(OP: K6LA)	
VE1DT	*	3,482,048	1495	656
VA1MM	*	2,371,392	1299	576
VY2SS	*	116,336	248	176
VA1CHP	**14**	**1,028,970**	**842**	**515**
VE1MC	*	452,822	484	373
VO1HE	**7**	**58,344**	**104**	**104**
***VE1RGB**	**A**	**1,820,816**	**1070**	**496**
*VO1TA	*	211,037	336	239
*VE1TT	*	18,564	107	91
*VY2LI	*	2,187	33	27
***VE1AYY**	**14**	**84,780**	**202**	**180**
***VE1NB**	**7**	**1,367,681**	**648**	**427**
VC2A	**A**	**9,801,372**	**3060**	**948**
			(OP: VE3NE)	
VE2TZT	*	5,771,136	2074	798
VA2WDQ	*	3,610,516	1680	676
***VE2XAA**	**A**	**1,986,262**	**1109**	**557**
*VA2SG	*	998,030	764	430
*VE2GHI	*	226,814	329	238
*VE2EZD	*	151,971	279	179
*VE2FK	*	133,385	254	185
*VE2FFE	*	34,689	124	93
***VE2HLS**	**14**	**103,950**	**220**	**198**
*XM2DWA	*	78	6	6
			(OP: DL7FER)	
***VE2DWA**	**1.8**	**248**	**9**	**8**
			(OP: LU7DW)	
VE3JM	**A**	**8,894,093**	**2788**	**911**
VE3EJ	*	8,458,135	2829	931
VE3OI	*	2,369,897	1260	617
VE3TA	*	1,714,140	1023	534
VE3FU	*	37,067	124	101
N2WQ/VE3	**7**	**1,907,698**	**931**	**478**
XM3CX	*	660,804	479	318
			(OP: VE3CX)	
VE3MM	*	300,128	328	226
***VE3EK**	**A**	**656,128**	**552**	**352**
*VE3GSI	*	531,664	508	329
*XM3FH	*	514,600	505	310
			(OP: VE3FH)	
*VE3KAQ	*	274,176	354	238
*VE3OM	*	262,902	340	258
*VE3UZ	*	203,280	307	231
*VE3RCN	*	180,184	297	202
*VE3XB	*	162,378	254	194
*VA3HUN	*	65,436	179	133
*VE3OX	*	48,133	154	127
*XM3CH	*	32,490	111	95
			(OP: VE3CH)	
*VE3EY	*	26,364	85	78
***XL3RA**	**28**	**1,104**	**25**	**24**
***VE3XD**	**21**	**51,649**	**174**	**137**
*VA3RJ	*	13,500	80	75
***VE3FJ**	**14**	**97,760**	**234**	**188**
*VA3GML	*	15,708	97	84
*VE3OBU	*	11,776	69	64
*VA3RNJ	*	253	11	11
***VE3OSZ**	**3.5**	**151,724**	**217**	**166**
***VE4YU**	**A**	**351,994**	**440**	**314**
*VE4EAR	*	328,467	387	309
VE5ZX	**14**	**1,036,726**	**845**	**538**
***VC6X**	**A**	**169,344**	**274**	**216**
			(OP: VE6BF)	
VA7RN	**A**	**316,407**	**398**	**273**
VE7JKZ	*	135,470	236	190
VE7XF	**14**	**950,130**	**778**	**510**
***VA7ND**	**A**	**455,952**	**515**	**322**
			(OP: VE7ALN)	
*VE7BGP	*	13,124	87	68
*VA7MM	*	4,130	38	35
***VA7KO**	**14**	**266,847**	**405**	**291**
*VE7WEB	*	18,879	98	87

Cayman Islands

ZF1A	**21**	**1,934,424**	**1431**	**603**
			(OP: W5ASP)	
ZF2DO	**7**	**4,712,800**	**1437**	**688**
			(OP: N5DO)	

Costa Rica

***TI8II**	**A**	**203,256**	**321**	**216**

Cuba

CO8ZZ	**A**	**1,150,626**	**823**	**426**
***CO2WF**	**A**	**166,833**	**232**	**167**
***CO2JD**	**7**	**390,156**	**384**	**244**
*CO6CAC	*	229,200	301	191

Grenada

***J39BS**	**A**	**2,122,727**	**1167**	**557**

Honduras

HR2J	**7**	**6**	**1**	**1**

Martinique

***FM5AN**	**A**	**9,804**	**61**	**57**

Mexico

XE2S	**A**	**1,341,230**	**892**	**445**
XE2WWW	**14**	**58,938**	**205**	**141**
***XE1MM**	**A**	**786,840**	**728**	**395**
*XE1AY	*	133,172	282	169
*XE2AU	*	86,821	203	157
*XE2HUM	*	27,993	104	93
***XE1CT**	**14**	**55,348**	**185**	**137**
***XE2YWH**	**7**	**41,132**	**106**	**91**

Nicaragua

***YN2GY**	**A**	**4,744,256**	**1814**	**736**
			(OP: K9GY)	

Panama

***HP1RIS**	**28**	**966**	**21**	**21**

Puerto Rico

KP4GC	**A**	**133,920**	**189**	**186**
***NP3CW**	**A**	**3,300**	**34**	**33**

U.S. Virgin Islands

***NP2L**	**A**	**302,974**	**327**	**238**

AFRICA

Canary Islands

EF8M	**A**	**17,288,864**	**4032**	**1037**
			(OP: RD3AF)	
EA8MQ	*	1,376,439	776	411
***EA8DA**	**14**	**628,056**	**547**	**396**
*EA8NQ	*	253,504	326	272
*EA8BVP	*	10,858	64	61

Djibouti

***J28OO**	**A**	**62,330**	**131**	**115**
			(OP: E7BA)	

Kenya

***5Z4/RW1AU**	**A**	**320,934**	**410**	**257**

Lesotho

***7P8A**	**A**	**23,940**	**80**	**76**
			(OP: UX4UL)	

Madeira Islands

CT3BO	**A**	**77,256**	**175**	**148**

Morocco

***CN8KD**	**A**	**1,498,992**	**833**	**501**

Namibia

***V55X**	**A**	**103,870**	**204**	**170**
			(OP: V51YJ)	

Nigeria

***5NØOCH**	**A**	**2,792,790**	**1588**	**546**
			(OP: DL3OCH)	

Senegal

6W1SE	**21**	**56,375**	**154**	**125**
6W1SJ	**14**	**6,755,364**	**2474**	**924**
			(OP: E78A)	

South Africa

ZS1ANF	**A**	**12,546**	**54**	**51**
***ZS6WR**	**A**	**52,662**	**158**	**131**
			(OP: ZS6C)	
*ZS1JY	*	8,016	52	48
***ZS4JAN**	**7**	**6,868**	**36**	**34**

Tanzania

***5H2WK**	**14**	**584,060**	**532**	**380**
			(OP: DK9IP)	

Tunisia

3V9A	**A**	**17,115,840**	**4385**	**1008**
			(OP: YT1AD)	
***3V8SS**	**A**	**583,902**	**540**	**297**

ASIA

Armenia

***EK3SA**	**A**	**1,409,845**	**917**	**457**

Asiatic Russia

UA9CLB	**A**	**9,654,254**	**3307**	**853**
RC9O	*	8,621,960	2738	878
			(OP: UA9PC)	
RW9JZ	*	5,639,942	2406	742
RX9AF	*	3,699,892	1773	602
RV9SV	*	3,553,914	1872	598
UA9TF	*	1,884,960	1261	504
UE8ØMC	*	1,196,754	971	458
			(OP: UA9MC)	
UA9UCK	*	938,313	590	411
RV9FT	*	821,008	699	368
RU9WZ	*	537,966	513	286
UA9BS	*	369,520	424	298
RK9KWI	*	283,800	414	264
UA9UPG	*	122,668	269	182
RU9UC	*	105,408	193	183
RA9FEU	*	33,120	138	92
RA9UN	*	20,251	120	77
RX9TX	*	3,564	41	36
RX9LW	**14**	**519,921**	**527**	**369**
RV9JE	*	475,491	488	353
RX9TL	*	48,789	146	117
RZ9OJ	*	33,063	129	103
UA9QQ	**7**	**108,636**	**157**	**132**
***RV9CX**	**A**	**3,330,432**	**1602**	**588**
*RT9S	*	2,723,300	1488	565
			(OP: UA9SP)	
*RX9AM	*	1,906,632	1073	504
*UA9BX	*	1,647,030	1093	483
*RX9FB	*	1,204,074	958	453
*RA9SN	*	969,822	744	387
*UA9DD	*	670,892	591	358
*UA9AOL	*	516,987	523	327
*RX9DJ	*	512,919	587	297
*RV9AZ	*	343,998	431	261
*UA9XF	*	297,084	445	228
*RA9SC	*	255,915	386	235
*RU9AZ/9	*	174,410	291	214
*RA9AAA	*	170,345	297	217
*UA9OV	*	120,839	240	149
*UA9XBJ	*	103,320	204	140
*UA9CHL	*	96,050	221	170
*RZ9HA	*	87,548	204	172
*RU9UG	*	80,940	207	142
*RV9CQ	*	21,450	105	75
*RA9OFA	*	17,976	94	84
*RA9SAS	*	768	20	16
***UA9QM**	**28**	**166,075**	**343**	**175**
*UA9AB	*	81,056	221	149
*UA9UX	*	62,049	197	129
*UA9OA	*	17,812	102	73
*UA9SAW	*	1,586	27	26
***UA9FGJ**	**21**	**543,157**	**638**	**369**
*UA9AFS	*	160,680	300	206
***RV9JR**	**14**	**1,847,004**	**1178**	**596**
*RA9XF	*	881,166	761	429
*RW9RW	*	746,364	649	444
*UA9WOB	*	317,100	429	300
*RA9XU	*	217,580	329	253
*RA9SUF	*	148,730	257	214
*RX9SK	*	115,245	222	195
*RK9UAC	*	64,070	173	149
*RW9QA	*	7,344	54	51
***RA9AP**	**7**	**1,094,764**	**554**	**358**
*UA9TZ	*	515,160	376	265
*UA9OLO	*	257,355	258	215
*UA9QF	*	77,970	138	115
***RU9CD**	**3.5**	**122,181**	**163**	**139**
UAØIDZ	**A**	**1,601,757**	**1209**	**551**
RWØCR	*	1,377,576	1166	477
UAØFAI	*	1,062,925	1126	425
RAØFU	*	828,082	951	466
UAØDC	*	565,250	758	323
RWØCN	*	101,898	213	162
UAØZAM	*	29,784	106	102
UAØCW	*	9,394	64	61
RAØQD	**21**	**8,514**	**97**	**66**
RKØUT	**14**	**988,428**	**850**	**492**
RAØUF	*	534,435	597	395
RAØAA	*	451,815	533	331
UAØAZ	*	374,128	409	349
RWØUM	*	111,520	272	205
UAØYAY	*	48,013	155	133
UAØBA	*	36,284	136	94
UAØAGI	*	31,400	130	100
UAØSR	**7**	**268,494**	**281**	**219**
***UAØOD**	**A**	**794,004**	**701**	**381**
*UAØCNX	*	286,273	735	247
*UAØSBQ	*	28,611	118	99
*UAØZV	*	11,655	54	45
*RVØAL	*	420	13	12
***RNØCW**	**28**	**13,425**	**165**	**75**
*RUØAE	*	6,604	66	52
*UAØCMS	*	1,131	37	29
***RUØSU**	**21**	**39,675**	**165**	**115**
***RWØAJ**	**14**	**272,448**	**374**	**288**
*RN4CU/Ø	*	64,629	202	167
*UAØLS	*	51,680	227	152
*UAØACG	*	50,424	158	132
*UAØUV	*	28,224	129	112
*RWØAA	*	680	17	17

Azerbaijan

***4K9W**	**A**	**1,331,215**	**771**	**443**
*4J9M	*	184,052	322	188
***4K8M**	**28**	**26,315**	**127**	**95**

China

B3C	**A**	**527,405**	**730**	**337**
			(OP: BD3AVB)	
***BA1AN**	**A**	**1,496,020**	**1193**	**524**
*BA4SI	*	50,022	162	126
*BY1QH	*	44,042	184	122
			(OP: BA1SN)	
*BD1AQH	*	30,084	107	92
*BD2BT	*	28,128	134	96
*BD5CFB	*	26,344	98	89
*BA4SD	*	5,400	65	50
***BA8AG**	**28**	**72,345**	**269**	**159**
*BD7NWF	*	15,170	154	82
***BD1TCC**	**14**	**114,532**	**304**	**209**
***BD1ISI**	**7**	**270,020**	**358**	**230**
*BD4SX	*	7,830	50	45
*BD4QO	*	3,360	32	30
***BA3AX**	**3.5**	**3,910**	**48**	**34**

Cyprus

C4SV	**14**	**415,582**	**507**	**289**
			(OP: SV2FWV)	
***C4Z**	**14**	**1,734,560**	**1089**	**586**
			(OP: 5B4AIZ)	

Georgia

4LØA	**A**	**12,560,363**	**3747**	**967**
			(OP: UUØJM)	
4L8A	**14**	**6,908,715**	**2672**	**935**

Hong Kong

***VR2EH**	**3.5**	**1,944**	**34**	**27**
			(OP: UA3QJC)	

India

***VU2PTT**	**A**	**162,180**	**270**	**204**
*VU2NKS	*	108,550	207	167
*VU3USJ	*	26,688	110	96

Israel

4XØA	**28**	**115,928**	**234**	**172**
			(OP: 4X1VF)	
***4Z5TK**	**A**	**667,080**	**559**	**327**
***4Z5QQ**	**14**	**444,624**	**462**	**354**

Japan

JF1SOC	**A**	**5,131,608**	**2064**	**808**
JA1JKG	*	1,629,753	1045	501
JE1LFX	*	411,174	517	318
JA1HP	*	229,104	447	256
JF1SEK	*	176,440	291	220
JI1ALP	*	172,769	338	197
JO1SIM	*	102,480	289	168
8N1Y	*	64,990	182	134
			(OP: JJ1BMB)	
JA1MJN	*	50,500	152	125
7K1PTT	*	48,025	126	113
JA1LZR	*	36,782	125	106
JH1BED	*	36,654	155	123
JA1FWY	*	23,352	144	84
7J1ABD	*	16,318	103	82
JH1NXU	*	7,102	64	53
JI1DSU	*	5,720	59	52
JA1HGY	*	520	10	10
JK1LUY	**14**	**17,302**	**91**	**82**
JN1ROV	*	12	2	2
JH1APK	**7**	**80,827**	**145**	**131**
***JI1RXQ**	**A**	**1,536,210**	**972**	**507**
*JA1HNW	*	203,174	344	226
*JE1REU	*	159,537	345	213
*JE1SGH	*	131,211	280	183
*JH1SWD	*	125,751	258	167
*7K1MAG	*	120,225	239	175
*JE1NVD	*	97,020	246	165
*JA1AZR	*	83,376	243	144
*JP1EWY	*	68,644	178	131
*JH1DJD	*	63,855	186	135
*JA1ANG	*	57,218	175	122
*JN1GLB	*	47,280	174	120
*7K1EQG	*	47,008	189	113
*JJ1MZH	*	46,965	152	93
*JA1IE	*	34,080	153	96
*JO1VRV	*	32,190	128	87
*JL1CNY	*	32,040	107	90
*JA1IZ	*	29,505	125	105

*JA1CPZ	"	22,540	99	92
*JA1HFY	"	19,296	104	67
*JK1NSR	"	18,615	122	85
*JI1UDD	"	12,505	89	61
*JP1IXV	"	9,000	68	60
*JF1HJX	"	7,038	55	51
*JM1KNI	"	6,149	68	43
*JM1KLO	"	5,922	72	42
*JA1BFN	"	4,495	35	29
*JI1AQY	"	3,468	44	34
*JA1EMQ	"	2,747	50	41
*JI1BDQ	"	2,418	29	26
*JO1WIZ	"	336	20	14
*JR7HOD/1	"	168	7	6
*JL7FBV/1	28	143	13	11
*JM1NKT	21	150,960	326	240
*JI1BBN	"	4,224	50	48
*JN1BBO	"	703	19	19
*JI1LAI	"	280	10	10
*JR1FVW	"	60	6	6
*JA1KEV	14	29,380	128	113
*7K4QOK	"	26,300	103	100
*JA1PJS	"	19,680	93	82
*JJ1IVX	"	8,178	60	58
*JE1RRK	"	4,494	43	42
*7N2JNN	"	1,680	31	28
*JE4ICX/1	"	27	3	3
*JP1JFG	7	334,466	313	253
*JJ2JQF/1	"	55,796	154	116
*JN1IZK	"	9,706	57	46
*JE1SHW	"	3,240	28	27
*JE1SPY	1.8	638	27	22
JH2AMH	A	499,485	534	355
JA2FSM	"	75,477	247	139
JH2FXK	1.8	1,188	23	22
*JA2KVB	A	527,662	557	386
*JA2AXB	"	208,740	309	213
*JA2VZL	"	93,480	219	152
*JA2QVP	"	77,463	198	151
*JA2MOG	"	77,418	221	153
*JA2KPW	"	14,750	92	59
*JA2KCY	"	10,620	74	59
*JQ2OUL	"	1,975	30	25
*JF2FIU	"	1,400	30	25
*JE2XBS	"	195	15	13
*JA2KKA	21	6,400	58	50
*JG2KKG	14	1,018,584	813	504
*JA2PFO	7	99,216	195	144
JI3BFC	A	729,018	810	401
JR3NZC	"	178,068	268	209
JA3AVO	"	45,684	130	94
JH3AIU	14	3,047,020	1593	730
JA3DAY	"	133,760	256	220
JH3GCN	7	217,008	253	198
JF3LOP	3.5	4,284	41	34
*JA3JM	A	317,996	476	287
*JH3CUL	"	313,116	522	269
*JF3KQA	"	247,940	422	230
*JH3PTC	"	156,640	384	176
*JA3IKG	"	84,409	189	151
*JG3CQJ	"	66,600	193	150
*JR3NDM	"	26,400	132	88
*JA3HBF	"	13,608	66	63
*JA3EOE	"	9,196	57	44
*JH3JYS	"	2,100	33	30
*JL3MCM	28	7,705	106	67
*JF3BFS	21	95,348	295	197
*JF3IYW	14	179,000	360	250
*JA3UWB	"	166,370	338	254
*JA5UBW/3	"	71,795	203	173
*JR3XEX	"	969	19	19
*JO3EVM	"	836	19	19
JH4UYB	A	6,853,034	2477	874
JM4WUZ	3.5	15,813	87	63
*JE4MHL	A	518,500	645	340
*JH4RUF	"	37,752	133	88
*JA4BDY	"	27,642	124	102
*JI4WHS	"	3,710	40	35
*JI4JGD	"	400	22	16
*JH1MTR/4	28	720	30	24
*JR4GPA	14	565,877	579	377
*JA4AQR	"	24,252	99	94
*JR4URW	7	53,901	153	113
JA5FBZ	14	1,638,000	1129	600
JA5APU	"	251,020	394	308
JR5VHU	"	90,753	210	179
JJ5GMJ	3.5	67,773	165	123
*JG5DHX	A	225,968	414	232
JA6BZI	A	1,020,384	664	432
JH6QFJ	"	432,900	484	325
JA6BWH	"	185,800	276	200
JA6WIF	28	88,688	315	184
*JJ6TWQ	A	160,930	286	209
*JA6FFK	"	15,004	78	62
*JH6WHN	28	9,656	102	71
*JQ1AHZ/6	21	286	16	13
*JA6DIJ	14	570,876	587	421
*JA6WFM	"	500,080	616	376
*JR6GHN	"	145,130	309	230
JA7DLE	A	1,834,490	1170	511
JA7COI	"	1,106,892	968	444
JA7BME	"	1,097,833	841	473
JA7WQJ	"	24,290	100	70
JH7XMO	14	1,499,025	1079	575
JH7XGN	"	1,492,932	989	588
*JH7QXJ	A	119,448	286	189
*JH7IXX	"	54,634	161	118
*JA7ARW	"	21,995	125	83
*JH7YHD	28	1,376	33	32
			(OP: JA7WSZ)	
*JA7LLL	14	11,544	78	74
*JF7GDF	"	5,016	49	44
JH8SLS	A	497,768	603	344
JA8RWU	14	572,824	607	371
JA8MXC	7	48,510	120	99
*JA8AJE	A	11,718	79	63
*JL8MBF	"	2,244	48	34
*JE8CLT	28	672	26	24
*JH8SIT	14	64,800	167	150
*JE8KKX	"	8,896	71	64
JA9CWJ	14	334,536	397	318
JHØINP	A	691,182	669	387
*JHØNEC	A	1,035,452	850	466
*JAØIOF	"	36,112	183	122
*JGØGGI	"	5,145	49	35
*JRØBUL	28	208	14	13
*JHØEPI	14	86,768	240	176
Kazakhstan				
UO1P	A	3,568,848	1890	596
			(OP: UN7PL)	
UN2E	"	954,664	755	376
UN7QF	"	411,191	509	319
UN5J	"	276,750	358	250
UP6P	28	569,430	650	333
			(OP: UN6P)	
UP1G	"	134,495	296	185
			(OP: UN7QX)	
UP2L	14	7,928,886	2849	1043
			(OP: UA9BA)	
UN9L	7	735,984	467	304
UP7A	"	613,486	427	274
			(OP: UN7AL)	
*UN7IT	A	1,974,009	1083	467
*UN7EW	"	573,325	633	323
*UN8FM	"	133,991	213	143
*UN6G	"	60,006	159	137
*UN6GK	"	23,035	93	85
*UN7FW	"	20,485	109	85
*UN9GD	28	161,796	342	194
*UN5C	"	14,832	95	72
*UNØC	14	416	14	13
*UN7EX	7	145,080	184	156
*UN4PG	"	41,124	99	92
*UN7CN	3.5	153,102	188	158
*UN7CH	1.8	1,672	19	19
Kuwait				
9K2HN	28	4,180	38	38
Kyrgyzstan				
EX2X	A	1,708,670	1260	529
Mongolia				
JT1CO	A	1,577,439	977	477
*JT1BL	A	429,210	590	342
*JT1BV	3.5	5,476	40	37
Saudi Arabia				
*7Z1HL	14	92,394	197	174
South Korea				
HL2FDW	A	232,388	672	218
HL5UOG	"	214,896	472	242
DS4GGM	"	74,782	355	139
*HL5JCB	A	116,280	366	152
*DS5DNO	"	94,384	404	136
*DS5KJR	"	31,872	288	96
*HL5YI	"	18,564	93	78
*DS1RJI	"	6,050	59	50
Sri Lanka				
*4S7NI	14	40	4	4
Taiwan				
BV1EK	A	229,021	411	223
BV4VR	"	45,672	159	132
*BX5AA	A	37,908	153	108
Thailand				
HSØZDY	A	418,089	483	301
*HSØZEE	A	142,136	302	218
*E21EIC	28	14,204	80	67
*E2ØYLM	"	6,216	65	56
*E21YDP	21	88,920	234	180
*HSØZDR	"	3,045	35	35
Turkey				
TC4X	A	9,500,632	2907	899
			(OP: OH2PM)	
*YM3D	A	5,092,632	2157	696
			(OP: TA3D)	
*TA3AX	"	2,846,448	1427	528
*TA7KI	14	2,324	30	28
			(OP: TA3J)	
*TA2RC	1.8	120,269	161	127
UK Bases on Cyprus				
ZC4LI	14	4,907,424	2185	816
Vietnam				
3W3W	A	454,675	617	325
			(OP: XV1X)	
West Malaysia				
*9M1CSP	A	84,854	201	154
			(OP: 9M2TO)	

EUROPE

Aland Islands				
OGØR	A	5,492,520	3011	876
			(OP: OH2TA)	
Austria				
OE8SKQ	A	1,672,209	1598	627
*OE1H	A	46,916	167	148
			(OP: OE1TKW)	
Azores				
CU2X	A	10,208,016	3924	1066
			(OP: OH2UA)	
CT8K	"	192,150	372	210
*CU3HQ	A	862,272	1085	499
*CU2AF	28	7,370	74	67
Balearic Islands				
*EA6ZS	A	34,440	170	140
Belarus				
EV2A	A	3,209,080	2071	785
			(OP: EW2AA)	
EU1AZ	"	2,439,885	1949	665
EW8DX	"	1,907,997	1670	609
EV8D	"	1,127,280	1055	528
EW8KY	"	779,304	810	456
EW7BR	"	636,768	708	432
EW6GF	14	340,744	650	382
EW7LO	7	1,946,295	1165	585
EW2DN	3.5	97,028	247	191
EW8RR	"	55,870	184	151
*EU2MM	A	2,115,390	1592	642
*EW1IP	"	889,024	994	464
*EU6AA	"	674,730	876	405
*EV6Z	"	344,925	644	315
*EW1EA	"	306,528	496	309
*EW2ES	"	146,816	366	248
*EU5ROPE	"	113,764	399	239
*EW6GL	"	56,985	178	145
*EW8DJ	"	39,936	142	128
*EW6DX	28	15,225	119	87
*EW3LN	"	6,968	80	67
*EW6AF	21	278,641	649	347
*EU1CL	14	1,319,937	1244	669
*EV6M	"	536,975	660	457
*EW1YL	"	353,920	606	395
*EW8OM	"	316,906	554	386
*EW6EW	"	308,072	549	388
*EU6AF	7	97,856	194	176
*EU1AI	3.5	318,600	473	300
Belgium				
OP4A	A	1,120,924	1056	532
ON7ON	"	101,304	295	216
OQ5M	28	143,374	419	266
			(OP: ON5ZO)	
OT5W	7	2,110,976	1158	608
			(OP: ON4RU)	
OO4T	"	75,469	193	163
*ON3ND	A	545,535	750	405
*OR6C	"	239,425	438	305
*ON4KEP	"	129,015	305	235
*ON6FC	"	126,880	316	244
*OP5T	"	102,720	220	192
			(OP: ON5UM)	
*ON4VMA	"	71,360	200	160
*ON4CT	"	59,730	205	165
*ON5HY	"	22,624	118	101
*ON5JD	"	414	18	18
*ON5WL	28	3,162	56	51
*ON4ALY	7	325,500	405	300
Bosnia-Herzegovina				
E73O	28	446,220	934	402
E73C	"	395,200	903	380
E77XZ	14	203,344	449	284
			(OP: DK6XZ)	
E77EZ	3.5	227,420	381	274
*E72U	A	304,764	530	327
*E78CB	"	184,783	358	257
*E77AR	28	460	23	20
*E77G	7	895,804	760	428
*E79D	"	55,461	183	139
*E77C	3.5	634,695	732	393
*E79Z	1.8	118,146	297	203
Bulgaria				
LZ3FN	A	4,938,330	2646	842
LZ1BJ	"	1,117,284	1199	566
LZ1AQ	"	560,406	739	462
LZ2NG	"	214,434	435	297
LZ1QZ	"	21,867	132	111
LZ2JR	"	4,600	47	46
LZØ6ANT	21	1,620	36	36
LZ4TX	1.8	167,560	351	236
*LZ5XQ	A	1,152,144	1277	504
*LZ1BP	"	705,936	710	462
*LZ5VK	"	613,600	720	416
*LZ1ND	"	284,240	587	340
*LZ1IKY	"	267,138	483	306
*LZ1ONK	"	216,664	470	292
*LZ2DF	"	57,912	212	152
*LZ3TL	"	40,700	184	148
*LZ1WJ	"	22,320	111	93
*LZØ9IPY	"	5,184	60	54
*LZ2FM	28	31,443	174	141
*LZ2JA	21	225,592	519	326
*LZ1GL	7	1,196,184	885	506
*LZ1DNY	"	220,740	319	260
*LZ1HW	"	37,630	113	106
Crete				
*SX9JZ	A	324,049	654	331
			(OP: LZ1JZ)	
*SV9COL	"	146,931	266	201
Croatia				
9A5K	A	4,823,122	2462	829
9A9A	14	3,950,100	2238	924
9A5W	7	5,166,990	1897	810
9A8A	"	4,505,454	1762	774
9A3Y	"	3,185,868	1552	679
9A4D	"	2,974,738	1445	677
			(OP: 9A1AA)	
9A1CCY	3.5	1,808,466	1194	583
			(OP: 9A3NM)	
9A8M	"	638,748	674	396
			(OP: 9A7DM)	
9A3B	1.8	236,989	424	269
			(OP: 9A2VR)	
*9A4KW	A	393,684	495	318
*9A4BA	"	137,703	303	233
*9A3VM	28	276,963	766	339
*9A2NO	21	171,715	364	305
*9A6C	"	32,996	194	146
*9A5V	14	57,456	207	171
*9A7T	7	1,944,940	1071	620
			(OP: 9A2EU)	
Czech Republic				
OK1VD	A	2,428,184	1531	673
OL1M	"	2,246,601	1717	651
			(OP: OK1EW)	
OL4M	"	1,080,576	1156	504
OK1HEH	"	611,046	791	409
OK1AYY	"	462,258	607	366
OK1FRO	"	342,127	599	359
OK1TFH	"	62,832	232	176
OK1DC	"	1,872	38	36
OK2PDT	28	80,134	315	206
OK2ABU	"	22,581	152	117
OK1MBZ	21	75,576	279	201
OL8M	14	2,500,302	1557	826
OK5MM	"	43,212	180	156
OK1Z	7	3,051,552	1397	672
			(OP: OK1DKZ)	
OK2SAR	"	361,114	408	323
OK2BYW	3.5	1,396,629	1032	519
OL2N	"	844,358	819	443
			(OP: OK1FDR)	
OK1NI	"	524,900	668	382
OL1A	1.8	288,358	465	301
			(OP: OK1CW)	
*OL6P	A	2,859,392	1773	712
			(OP: OK2WTM)	
*OK1JOC	"	1,638,230	1372	583
*OK2QX	"	1,443,488	1243	571
*OK2MBP	"	1,242,384	1170	543
*OK1FHI	"	1,052,612	1092	509
*OK4N	"	1,004,880	1065	474
*OK1GS	"	713,859	768	447
*OK1AOV	"	501,296	494	388
*OK2KFK	"	460,020	648	374
			(OP: OK2ABU)	
*OK1LO	"	379,620	544	333
*OK1FCA	"	350,982	587	333
*OK2HBR	"	332,664	510	332
*OK2PQS	"	324,423	528	319
*OK5OK	"	321,244	490	298
*OK2VX	"	307,830	514	310
*OL2ØFOC	"	300,898	496	326
			(OP: OK1CZ)	
*OK2SGW	"	272,937	470	317
*OK1MKU	"	248,310	358	279
*OK2BND	"	228,222	446	279
*OK1FMG	"	225,212	404	284
*OK2PBG	"	154,872	355	239
*OK1BLU	"	102,830	283	226
*OK1EV	"	84,294	268	223
*OK2KG	"	44,688	173	133
*OK8DF	"	23,544	126	109
			(OP: DL2HWI)	
*OK2QA	"	23,408	132	112
*OK2HZ	28	47,430	227	155
*OK1DRX	"	1,024	33	32
*OK1KZ	"	896	29	28
*OK7MT	21	23,370	123	114
*OK2AJ	"	11,904	115	96
*OL9M	14	105,679	245	217
			(OP: OK1MMN)	
*OK1FGD	"	72,118	261	214
*OK2BME	"	33,220	176	151
*OK2SWD	"	8,820	77	70
*OK2RU	7	916,624	721	472
*OK2BZ	"	282,382	300	271
*OK1ARO	"	29,184	102	96
*OL4W	3.5	630,585	751	405
			(OP: OK1IF)	
*OK2BIU	"	171,841	393	239
*OK5AD	"	4,116	50	42
*OK6Y	1.8	105,185	287	193
			(OP: OK2PTZ)	
*OK1JOK	"	27,904	136	109
Denmark				
OZ7AM	A	3,726,352	1996	776
OZ7EA	"	265,188	452	294
OZ2TF	"	110,352	315	209
OZ8SW	"	63,366	228	179
OZ6EI	14	24,752	128	119
OZ7RQ	7	1,084,752	806	496
*OV3X	A	1,463,616	1211	594
			(OP: OZ8AE)	
*OV5A	"	559,104	783	416
*OZ5UR	"	35,685	135	117
*OZ4RT	"	21,384	116	108
*OZ/G4DDL	"	18,666	116	102
*OZ1DGQ	"	4,032	52	48
*OZ6TL	7	121,952	264	206
*OZ1CCM	3.5	15,662	91	82
England				
G4MKP	A	1,141,920	1105	488
GØORH	"	1,102,587	1087	467
G3TXF	"	966,724	1032	508
G3MIR	"	425,256	585	377
G4KFT	"	377,486	512	346
G4SGI	"	363,816	548	326
G4HZV	"	314,314	507	314
G4BUO	"	176,472	332	228
G4FAL	"	65,740	218	173
GØOKF	"	23,056	162	131
G4IUF	28	37,500	196	150
*GØMTN	A	1,242,412	1223	526
*G4ZOB	"	532,884	615	367
*G3RSD	"	391,300	538	325
*G3PSM	"	317,120	481	320
*G4FOC	"	304,983	486	329
			(OP: G3LIK)	
*GØHVQ	"	285,664	514	316
*G3VQO	"	218,890	500	265
*MØRYB	"	188,964	403	261
*G4DDX	"	180,005	353	259
*MØRTI	"	170,942	427	254
*G3RWF	"	133,049	309	229
*G6NUM	"	115,233	294	213
*G4MUL	"	58,280	203	155
*GØRPM	"	34,080	137	120
*GØOTT	"	32,249	149	119
*G3KMQ	"	30,720	131	120
*G2HDR	"	14,250	108	95
*M4T	28	4,160	71	52
			(OP: GØVQR)	
*G3ZRJ	14	62,868	212	186
*M/SP3CW	7	548,298	567	367
*G3MZV	"	538,284	520	372
*M/YO4RDW	"	337,025	363	305
*G4BXT	"	65,036	161	142
*GØMLY	3.5	392	14	14
Estonia				
*ES2BH	A	14,868	89	84
*ES5DB	14	151,886	329	266
*ES8/OH6CS	"	1,488	31	31
*ES4MM	7	155,350	266	239
European Russia				
RA1AGL	A	1,867,440	1627	620
RA1AL	"	415,638	687	358
RA1TU	14	756,840	905	530
*RN1NW	A	1,098,552	1217	503
*UA1CEC	"	693,854	1005	406
*UA1TGO	"	305,694	440	306
*RZ1OK	"	298,297	502	317
*RW1AI	"	126,540	307	222
*RK1NA	"	121,476	350	212
*RA1TV	"	114,870	313	210
*RK1AM	"	82,812	297	206
*RV1AT	"	12,792	98	82
*UA1OMS	28	12,699	117	83
*RN1AO	21	50,367	222	163
*RA1OGP	14	426,949	629	437
*UA1AFT	"	392,780	522	410
*RV1CC	"	101,160	216	180
*RK1AX	3.5	266,630	451	293
RS3A	A	7,834,540	3402	1046
			(OP: RA3CW)	
RM3F	"	6,488,673	3354	951
			(OP: UA3DPX)	
RZ3TZL	"	2,785,330	2204	710
RD3BW	"	2,194,320	1872	656
RU3UR	"	1,944,783	1497	669
RV3FI	"	1,775,088	1619	587
RA3AUM	"	1,755,936	1695	624
UA3RC	"	1,214,928	1385	528
RU3FF	"	1,184,240	1226	524
UA3DGG	"	820,148	844	476
RL3AF	"	772,464	812	418
RW3DA	"	536,355	782	411
RN3BO	"	531,860	657	406
UA3DAM	"	372,415	664	353
RX3AJ	"	287,419	487	319
R85NN	"	247,905	486	315
			(OP: RA3TT)	
UA3ICK	"	211,703	423	269
UA3QIX	"	93,628	273	178
RX9UL/3	"	81,144	302	196
RD3DS	"	14,025	93	85
RW3DD	"	3,441	32	31
RK3ER	28	109,604	387	212
UA3MSS	"	595	20	17
RZ3TZZ	21	509,240	767	439
			(OP: UA3TW)	
RA3ZZ	14	1,567,918	1285	682
RA3BT	7	44,280	96	90
RX3OM	3.5	123,480	284	210
UA3MIF	"	34,542	143	114
*RN3DBA	A	1,415,116	1408	562
*RL3ZI	"	1,252,406	1221	526
*UA3ABJ	"	1,194,090	1085	530
*RN3QP	"	1,169,792	1435	494
*RV3ZN	"	1,031,168	1043	512
*RA3NC	"	938,703	1104	471
*RU3SE	"	880,049	1092	461
*RK3AQW	"	876,880	978	452
*RA3ZC	"	706,685	951	427
*RU3ZV	"	675,178	820	406
*RZ3DXR	"	663,384	765	422
*UA3DCW	"	594,500	852	410
*RA3UT	"	543,118	780	443
*RW3TA	"	498,843	767	387
*RU3XY	"	374,187	607	319
*UA3LIZ	"	372,744	554	334
*RV3MR	"	359,970	628	338
*UA3QAM	"	326,960	536	335
*RX3VF	"	324,450	582	309
*UA3PW	"	322,164	513	342
*UA3AMZ	"	302,022	561	306
*RL3BK/3	"	286,688	466	289
*RU3MW	"	268,690	557	277
*UA3UDE	"	243,708	488	276
*RA3XCZ	"	170,147	405	229
*RU3DM	"	164,720	332	232
*RK3IM	"	159,384	335	232
*RV3AQN	"	145,770	400	258
*UA3DSS	"	144,270	295	229
*RX3MM	"	143,856	333	222
*UA3DUJ	"	124,950	357	245
*R3/SM6LRR	"	121,604	274	202
*UA3RN	"	102,000	253	200
*RU3BU	"	89,121	217	183
*RU3XB	"	78,568	248	184
*RK3FM	"	77,832	219	184
*RV3DHC	"	77,805	294	171
*RA3MB	"	73,944	202	158
*RX3AGQ	"	68,442	207	183
*RA3VE	"	55,480	204	146
*RA3BQ/3	"	49,660	153	130
*UA3DFM	"	33,158	150	118
*RN3ZC	"	25,092	118	102
*UA3DPM	"	21,218	115	103
*RU3WR	"	8,636	90	68
*UA3QG	28	165,000	457	264
*RX3BP	"	100,083	348	219
*RV3LO	"	89,244	314	201
*UA3AKI	"	9,454	94	58
*RZ3VA	"	4,590	57	51
*RW3VZ	"	480	20	20
*RA3SS	"	276	13	12
*UA3YCX	"	198	11	11
*UA3AO	14	522,100	782	454
*RA3UAG	"	473,744	672	464
*RX3ZX	"	441,344	598	431
*UA3XAG	"	164,423	334	283
*UA3VVB	"	73,440	178	170
*RX3DBG	"	37,929	166	141
*RV3TG	"	15,939	103	99
*RD3ZW	"	6,930	69	63
*UA3QR	"	6,720	70	70
*UA3LQQ	"	420	21	20
*UA3VQL	"	144	12	12
*RU3PU	7	421,080	473	348
*RA3QH	3.5	115,872	275	213
*RU3UW	"	19,068	114	84
*RA3AV	"	24	2	2
RO4W	A	3,795,996	2520	822
			(OP: RD4WA)	
UA4WI	"	1,757,288	1826	554
RW4HP	"	1,003,328	1064	488
RZ4FA	"	301,324	496	284
RW4PY	"	250,200	523	278
RU4WD	"	243,312	679	296
UA4RZ	"	230,622	401	266
UA4CCG	"	208,161	486	303
RX4HX	"	15,582	117	106
UA4NC	"	1,036	28	28
UA4SAW	14	469,654	739	449
*RN4WA	A	1,859,286	1995	591
*UA4ALI	"	1,274,593	1353	577
*UA4WCM	"	889,372	1121	493
*UA4AGO	"	767,652	1009	426
*RK4YJ	"	634,280	773	404
*RA4ACX	"	440,856	692	351
*UA4PAQ	"	432,333	683	363
*UA4FUW	"	374,080	578	334
*RK4PB	"	211,072	498	272
*RA4SE	"	183,465	455	243
*RW4NQ	"	183,311	318	263
*UA4WAV	"	168,805	350	245
*RK4PA	"	126,165	274	195
*UA4HIP	"	72,812	241	167
*UA4ANZ	"	54,720	207	152
*UA4PCM	"	39,990	142	129
*UA4AAC	"	15,640	102	85

*RA4NCC	"	15,624	118	84
*UA4PAY	"	11,286	69	66
*UA4CNJ	"	3,232	35	32
*UA4NX	"	2,849	40	37
*RN4AO	28	77,644	293	188
*UA4LW	21	113,250	322	250
*RZ4AG	14	774,520	879	536
*UA4YA	"	309,792	412	336
*UA4WAG	"	7,128	71	66
*RW4LQ	"	6,762	50	49
*RN4HA	"	3,920	58	56
*RA4LK	"	1,102	20	19
*UA4FHW	7	120,582	212	189
*RX4AW	"	1,540	22	22
RG6G	A	6,371,000	2944	1000
			(OP: RW6HX)	
RA6AX	"	194,432	394	248
RV6YB	"	137,126	332	253
UA6AF	"	129,291	298	213
RZ6AK	"	57,629	214	169
RV6ALI	"	19,565	74	65
UA6JFG	"	276	12	12
RU6YJ	28	13,485	120	87
RZ6HF	14	1,130,234	1208	607
RW6BN	"	203,940	397	309
RW6CF	7	1,239,249	840	517
RA6EE	"	378,994	419	322
UA6AKD	"	285,382	416	293
*RZ6BU	A	1,120,212	1113	522
*RX6DQ	"	930,624	1033	444
*RW6AHO	"	904,550	1032	458
*RA6AR	"	582,521	728	437
*UA6NZ	"	479,115	682	405
*RW6MBC	"	414,162	571	342
*RN6FZ	"	338,057	553	311
*RU6HJ	"	294,176	514	317
*RV6LCI	"	182,820	391	277
*RU6BR	"	112,251	240	213
*UA6HFI	"	76,260	253	186
*RA6UAR	"	27,233	140	113
*UA6AES	"	19,800	95	90
*UA6LPY	"	7,714	64	58
*RA6AAW	"	1,750	28	25
*RX6AH	28	101,783	334	209
*UA6AK	"	49,138	238	158
*RU6MD	"	21,306	128	106
*UA6LCN	21	102,485	304	199
*RV6LX	"	98,560	299	220
*RK6CM	"	95,372	296	226
*RA6MS	14	117,432	310	252
*UA6BFE	7	293,601	360	287
*RW6AH	3.5	53,392	190	142
*UA6AX	1.8	58,058	196	154
Faroe Islands				
OY1CT	A	2,492,924	2180	686
Finland				
OG8X	A	6,232,000	3191	950
			(OP: OH6UM)	
OH8L	"	5,280,978	2626	926
			(OP: OH8LQ)	
OG5ØF	"	4,464,598	2736	821
			(OP: OH1NOA)	
OH2VZ	"	324,362	545	314
OH1BOI	"	318,688	583	368
OH8KA	"	229,026	523	287
OH2KW	"	38,324	157	134
OH1RX	28	245,344	588	328
OF2ØØAD	14	2,193,731	1716	731
			(OP: OH5TS)	
OI6X	"	1,587,624	1434	664
			(OP: OH6NJ)	
OG1M	"	1,130,332	1071	553
			(OP: OH1VR)	
OH2BAH	"	220,690	496	290
OG5M	7	2,649,240	1325	669
			(OP: OH5WH)	
OH8MJ	3.5	760	20	20
*OH8FKU	A	194,184	361	279
*OH2BBT	"	94,915	268	205
*OH8KVY	"	25,536	122	114
*OH8DR	"	9,853	60	59
*OH6RC	28	8,778	89	77
France				
F/G4BJM	A	791,265	887	435
F5VHY	"	691,812	717	396
F5BBD	"	439,176	641	348
F8CIL	"	361,530	663	390
F5JGA	"	136,065	313	235
F5RDS	"	105,024	298	192
F8DFP	"	63,700	260	182
*F3CW	A	776,662	944	431
*F5NQL	"	524,443	656	367
*F6AUS	"	294,465	458	335
*F5LCU	"	294,125	500	325
*F5NCU	"	140,082	299	222
*F5PAL	"	135,454	378	262
*F5INJ	"	134,685	279	219
*F5QF	"	86,304	226	174
*F5AQB	"	76,140	288	180
*F5LLE	"	48,069	178	147
*F6ABI	"	45,156	184	142
*F5GGL	"	41,832	144	126
*F6BUL	"	19,305	115	99
*F6CZV	"	17,876	96	82
*F4FEP	"	13,680	93	76
*F6JOE	"	13,575	86	75
*F5FRM	28	3,996	58	54
*F6IRG	"	1,462	45	34
*F6FTB	"	1,160	32	29
Germany				
DL3YM	A	6,511,428	2700	891
DL1MGB	"	4,889,928	2284	804
DK3WW	"	3,294,368	1750	764
DL5YM	"	1,818,771	1463	613
DL8WEM	"	1,756,875	1496	625
DL4WA	"	1,662,967	1339	601
DL8SCG	"	1,384,154	1180	613
DK1KC	"	1,314,334	1182	538
DF1DX	"	1,254,400	1183	560
DJ6OZ	"	1,105,610	1085	529
DJ6QT	"	1,007,266	1016	494
DL4ME	"	883,484	1032	454
DK8EY	"	860,232	922	491
DM5ØPSF	"	691,010	781	430
			(OP: DL5JAN)	
DJ5MY	"	419,843	628	361
DK5AD	"	361,121	477	331
DK7VW	"	330,525	507	325
DL6ZXG	"	280,150	461	325
DL6AG	"	275,400	500	324
DL5ST	"	270,402	396	374
DL5MK	"	212,126	407	289
DF6QV	"	151,650	298	225
DL7JOM	"	107,952	266	208
DF3EH	"	101,469	276	227
DJ6TB	"	44,460	158	130
DJ6TK	"	39,530	164	134
DL8WX	"	36,400	131	91
DL8EAQ	"	32,379	156	129
DJ2SL	"	31,680	99	96
DF8QB	"	26,104	115	104
DF6RI	"	25,740	130	110
DL9GWD	"	23,544	122	109
DK3AX	"	22,440	135	110
DL5JAN	"	3,535	40	35
DL1DTF	"	2,214	41	41
DL2OM	28	17,278	128	106
DP3D	21	144,780	381	285
			(OP: DK3KD)	
DL5AN	"	23,985	124	117
DR1A	14	509,106	577	366
			(OP: DL6FBL)	
DG4R	7	1,325,571	838	533
			(OP: DL1RG)	
DF1LON	"	434,880	457	302
DK5JM	3.5	505,352	733	362
*DD5M	A	1,823,955	1531	609
			(OP: DJØZY)	
*DK5DQ	"	1,762,748	1437	622
*DL5KUD	"	1,393,911	1159	549
*DJ8EW	"	1,178,793	1107	539
*DL7UMK	"	1,021,972	1101	476
*DP5X	"	824,428	882	457
			(OP: DL3EBX)	
*DL4ZA	"	710,478	828	446
*DL3KWF	"	647,904	831	408
*DL1SCH	"	608,994	730	414
*DL5YL	"	601,470	797	410
*DL5AWI	"	537,920	591	410
*DJ7EC	"	496,584	779	396
*DK3W	"	461,074	579	382
			(OP: DL6MHW)	
*DJ3XA	"	413,910	600	365
*DD3D	"	378,780	491	321
*DL1EAL	"	368,962	531	341
*DL4HRM	"	361,374	572	339
*DL9NEI	"	329,249	569	337
*DL9CW	"	293,910	416	291
*DF4ZY	"	255,765	438	295
*DKØIU	"	251,136	468	288
			(OP: DK9HE)	
*DM3FZN	"	248,368	468	304
*DJ5TT	"	248,200	479	292
*DL3KWR	"	246,806	450	289
*DK7GH	"	241,237	445	317
*DL5CD	"	236,800	480	296
*DH2URF	"	208,010	316	305
*DL1RTS	"	180,048	390	264
*DL8YR	"	158,569	382	257
*DK4RM	"	155,445	377	241
*DL1VJL	"	146,272	312	224
*DL2ZA	"	141,570	344	234
*DL6DCD	"	129,472	337	238
*DM2RN	"	124,785	303	235
*DL5ARM	"	117,390	307	215
*DK3YD	"	111,252	283	219
*DL1KUR	"	110,440	293	220
*DL5AOJ	"	107,124	341	226
*DL1TPY	"	104,372	265	194
*DF8XC	"	96,520	241	190
*DL2ANM	"	90,480	267	195
*DK2BJ	"	87,500	248	175
*DJØYI	"	70,168	243	179
*DH3FAW	"	66,740	239	188
*DL7VMM	"	64,277	241	199
*DL3KVR	"	60,060	196	182
*DO6SR	"	58,740	238	178
*DL7VRG	"	57,627	219	171
*DL6UNF	"	57,594	245	174
*DL6RBH	"	55,800	205	155
*DJ1HF	"	54,880	203	160
*DM5JL	"	51,993	207	159
*DL2FK	"	49,769	200	157
*DK9MH	"	47,895	185	155
*DL3SEM	"	47,270	179	145
*DF2QZ	"	43,368	161	139
*DL2AXM	"	42,771	190	159
*DL1NFG	"	42,032	158	142
*DF3OL	"	41,138	150	134
*DF6WE	"	40,320	207	160
*DO1MGN	"	39,187	196	149
*DG4YGW	"	38,340	172	142
*DJ6UP	"	33,274	156	127
*DL9SEV	"	32,830	151	134
*DF4TD	"	28,462	131	107
*DL6ØCHILD	"	25,179	124	109
			(OP: DF7DF)	
*DL1SAN	"	24,530	130	110
*DLØEKO	"	22,351	118	103
			(OP: DL8UKE)	
*DL4VQ	"	22,338	115	102
*DK5IR	"	21,715	119	101
*DL1CJ	"	21,525	129	105
*DF3IS	"	20,790	103	90
*DGØKS	"	19,402	120	109
*DL5KUR	"	18,900	101	100
*DF9DD	"	18,032	114	98
*DK3PM	"	17,430	113	105
*DJ2IA	"	17,391	107	93
*DF1MA	"	17,298	106	93
*DL1DQW	"	17,088	102	89
*DL4JWU	"	16,274	95	79
*DL2WJT	"	14,960	95	85
*DL6UAM	"	14,812	111	92
*DO9ST	"	12,580	98	85
*DL3VZL	"	10,112	92	79
*DF7JC	"	7,686	78	61
*DL9YAJ	"	5,850	69	65
*DK4VY	"	5,520	51	48
*DL5KMS	"	5,394	64	58
*DK2LO	"	5,000	52	50
*DJ3HW	"	4,324	50	46
*DL5CX	"	2,673	36	33
*DL4SUN	"	1,664	28	26
*DD5FZ	"	580	20	20
*DL9ZP	28	78,337	302	217
*DL7BY	"	63,798	280	186
*DL8DWW	"	16,120	127	104
*DO2ML	"	7,200	93	72
*DF5BM	"	575	24	23
*DL3ZAI	21	41,728	187	163
*DO3ME	"	638	23	22
*DL4FN	14	902,664	861	567
*DL9LM	"	533,314	646	467
*DD1IM	"	241,230	411	330
*DL3BRA	"	51,947	218	181
*DL1DXA	"	45,880	157	148
*DK5ZX	"	42,780	184	155
*DM3GH	"	11,152	84	82
*DL2FAG	"	4,158	43	42
*DJ1HA	"	3,864	49	46
*DL1AZK	"	243	9	9
*DF7GG	7	947,205	735	485
*DF3AX	"	580,548	622	404
*DK8NT	"	578,124	562	404
*DL1THB	"	162,193	297	241
*DL1TS	"	94,535	211	185
*DL2DCX	"	51,504	172	148
*DL1HSI	"	48,125	135	125
*DL9ZWG	"	3,784	43	43
*DL2MIH	3.5	858	22	22
Greece				
J48HW	A	2,506,761	2056	681
			(OP: HAØHW)	
SV2CUI	"	243,366	607	282
SV2BFN	21	117,126	451	243
SV2BOH	7	244,064	352	263
*SV3AWG	A	278,142	476	302
*J41E	14	1,320,960	1387	640
			(OP: SV1BJW)	
*SV1JFT	7	168,000	274	224
*SV1JG	3.5	69,465	210	165
Hungary				
HG8R	A	5,798,912	2627	896
			(OP: HA8JV)	
HA1AG	"	4,703,694	2291	838
HA1TNX	"	1,878,600	1359	600
HA7LW	"	1,128,087	1125	513
HA8VV	"	15,106	100	83
HG3R	21	1,325,088	1295	642
			(OP: HA3NU)	
HA8VK	14	851,360	925	544
HA8BE	1.8	285,762	479	291
*HA2MN	A	755,958	751	439
*HA1BC	"	684,320	723	416
*HA1AR	"	546,156	624	389
*HAØML	"	425,940	642	372
*HA5TI	"	72,168	239	186
*HA8TI	"	45,696	169	128
*HA5LZ	28	38,570	199	145
*HA7SBQ	"	33,740	217	140
*HA6D	21	2,880	48	48
*HG4F	14	1,661,497	1368	667
*HA8AAA	7	886,886	787	443
*HA3MU	"	837,900	674	450
*HA6ZQ	"	22,407	97	97
*HA1FF	3.5	207,966	396	253
*HA4FV	"	8,777	72	67
*HA8IB	1.8	132,508	314	211
Iceland				
TF3CW	14	92,040	250	156
*TF3GB	A	272,866	479	314
*TF8GX	"	15,840	97	90
Ireland				
EI2CN	14	1,664,963	1395	629
*EI7CC	28	10,530	93	78
*EI4CF	21	237,978	536	339
Italy				
IO3J	A	2,611,974	1597	687
			(OP: IV3ZXQ)	
IØZUT	"	351,648	508	333
IU1A	"	346,437	489	329
			(OP: IK1SPR)	
II1H	"	229,796	490	283
			(OP: I1HJT)	
IK3OII	"	117,600	279	245
IR1G	"	116,164	312	226
			(OP: IZ1LBG)	
IV3DYS	"	62,699	221	169
IN3YKS	"	30,305	167	145
IZØFZM	"	25,650	192	150
IK2YXB	"	22,148	117	98
IK8EJN	"	12,375	74	55
IZ8EDL	28	3,796	57	52
IK4ZGO	7	865,810	602	374
IZ4GOL	"	13,182	90	78
IK2SND	3.5	223,170	420	258
*IK2AHB	A	806,083	898	463
*IN3FHE	"	648,550	710	425
*I6FDJ	"	298,816	587	322
*IY3MG	"	116,550	348	225
			(OP: IZ3DBA)	
*IK2WYI	"	111,909	351	219
*IK2NUX	"	109,482	255	213
*I2TFJ	"	57,800	215	170
*IK5FKF	"	55,440	210	165
*IK4UNH	"	54,549	217	171
*IW2MYH	"	53,766	221	174
*IV3ARJ	"	50,530	209	155
*IV3KSE	"	41,464	170	142
*IY8GM	"	21,939	113	103
*IK5PVX	"	21,528	129	104
*IK2NCF	"	19,392	119	101
*IK8SCR	"	18,400	98	92
*IW1RAX	"	17,304	93	84
*IK2CZQ	"	15,811	105	97
*IK7NXU	"	11,840	90	80
*IZ4GSE	"	9,275	57	53
*IK1CCS	"	7,626	64	62
*IK2HDF	"	5,184	55	48
*IK3ORD	"	3,948	50	47
*IW1QLH	"	3,916	44	44
*IK2IKW	"	2,295	47	45
*IK4AUY	"	1,035	23	23
*IZ2CSX	"	475	20	19
*IZ4DYX	28	1,560	45	39
*IZ3NVR	"	35	5	5
*IZ8CCW	21	32,400	205	144
*IWØGXY	"	15,675	129	95
*IK6MNB	14	761,985	1026	531
*IZ3DBA	"	477,456	758	406
*IQ2CU	"	66,300	228	195
			(OP: IN3OWY)	
*IK2WYW	"	36,830	163	145
*IV3AZV	7	234,696	384	254
*IZ5GRS	"	4,888	49	47
*IZ8BFV	"	144	9	9
*IV3NVN	3.5	259,974	421	286
*IKØEIE	"	3,120	40	40
Jersey				
*GJ3WW	A	2,837,742	1916	731
Kaliningrad				
UA2FZ	A	21,280	109	95
RN2FQ	14	2,686	35	34
RW2F	3.5	1,612,764	1148	548
			(OP: UA2FB)	
*RA2FB	A	109,604	329	212
*UA2FFW	"	49,392	171	147
*UA2FL	21	253,618	598	346
*UA2FGY	14	17,290	98	91
Latvia				
YL2KO	A	4,776,061	2458	857
YL9T	"	2,622,144	2107	672
			(OP: YL2TW)	
YL2PA	"	400,764	500	364
YL2IP	"	28,625	138	125
YL4U	"	4,864	70	64
YL2PP	28	27,258	160	118
YL2SM	21	952,536	1154	559
YL3FT	7	3,028,480	1483	676
YL2BJ	"	1,117,699	830	473
YL2NK	"	20,976	97	92
*YL5M	A	1,471,199	1430	523
			(OP: YL2UZ)	
*YL3DX	"	1,153,696	1271	496
*YL2TB	"	655,989	729	449
*YL2IU	"	74,448	294	188
*YL2CV	28	66,624	268	192
*YL5W	3.5	444,644	579	356
*YL3GFX	"	409,705	575	335
Lithuania				
LY9Y	A	6,358,450	2852	925
LY6A	"	4,912,830	2684	855
LY4CW	"	1,739,520	1501	604
LY2MM	"	1,553,317	1327	563
LY2TS	"	1,301,408	1190	536
LY2BKT	"	1,262,027	1293	503
LY3ID	"	1,097,226	990	521
LY2VA	"	987,540	1203	436
LY2J	"	973,557	1158	477
LY2X	"	508,662	648	367
LY3CY	"	348,008	613	328
LY2F	"	243,390	407	285
LY2NI	21	10,044	98	81
LY1CX	14	259,854	523	322
LY2FN	"	34,989	142	107
LY2IJ	1.8	299,673	488	297
LY1CM	"	88,998	257	182
*LY9A	A	3,413,552	2154	764
*LY4T	"	1,927,485	1520	609
*LY2DV	"	342,705	559	335
*LY4G	28	16,975	127	97
*LY2BBF	14	130,000	341	250
*LY2OM	7	88,690	218	181
*LY1ØØØCW	3.5	514,167	668	367
			(OP: LY3CW)	
*LY2GW	"	453,690	602	355
*LY7Z	"	305,748	489	298
*LY2OU	1.8	28,160	135	110
Luxembourg				
LX1NO	7	7,840	52	49
*LX1ER	A	36,855	141	117
Macedonia				
Z33A	14	487,692	815	437
*Z35G	A	531,250	765	425
*Z31MM	21	248,159	645	353
*Z35F	14	429,732	713	414
*Z37M	7	348,986	416	319
Moldova				
ER5AA	7	142,416	240	207
*ER1DA	A	648,678	838	438
*ER3AU	"	609,434	797	431
*ER5DX	"	442,726	646	362
*ER3ZZ	"	18,368	88	82
*ER1WK	14	183,012	425	303
*ER3DX	7	1,722,816	1090	576
*ER2RM	1.8	31,824	141	117
Monaco				
*3A2MW	A	28,188	173	116
Montenegro				
*4O3Z	A	81,997	233	167
Netherlands				
PF7M	A	1,862,280	1563	630
PA5KT	"	1,208,190	1132	515
PA3AAV	"	512,676	786	404
PAØLOU	"	420,917	633	383
PA5TT	"	72,268	201	178
PA3GWN	"	71,040	257	185
PAØLSK	"	65,567	221	173
PA2ALF	"	12,615	98	87
PA5WT	28	54,498	231	186
PA1AW	14	513,199	669	421
*PA3ARM	A	749,380	822	445
*PA3CVI	"	342,260	521	314
*PA3DBS	"	284,867	573	319
*PD7BZ	"	262,725	475	339
*PAØCYW	"	261,136	454	304
*PA2PCH	"	240,996	446	302
*PA3AIN	"	221,904	430	276
*PG7V	"	189,864	343	293
*PA/IK1PMR	"	173,168	357	274
*PA3FKN	"	112,024	268	209
*PD5CW	"	58,812	194	174
*PA2CHM	"	56,110	199	155
*PA3HGF	"	53,300	189	164
*PAØWLB	"	48,150	202	150
*PA3EEG	"	46,508	196	151
*PA3HCC	"	38,591	176	149
*PA3AFF	"	38,038	182	133
*PAØWKI	"	33,976	164	137
*PA1TT	"	29,151	137	123
*PA5GU	"	27,816	149	114
*PA3AQL	"	24,780	137	118
*PA1BX	"	16,468	102	92
*PAØATG	"	15,141	110	103
*PE2T	"	13,430	94	85
			(OP: PA1TT)	
*PA3EWG	"	13,041	91	81
*PA8TWN	"	9,520	73	70
*PA3GEO	"	6,039	70	61
*PA3CLQ	"	4,720	61	59
*PA9CC	"	792	22	22
*PAØFEI	"	416	15	13
*PA7F	28	5,280	60	55
*PH6ØPH	14	11,520	92	90
			(OP: PA7HPH)	
*PAØMIR	3.5	49,345	171	139
Northern Ireland				
GI4VIV	A	163,170	276	210
*GI4BQI	A	26,508	111	94
Norway				
LA8OM	A	2,468,572	1804	619
LA9TJA	"	774,136	948	463
*LA8D	A	270,040	451	314
			(OP: LA8AW)	
*LA6CF	"	177,219	283	203
*LA1YE	"	59,926	206	166
*LA7SI	"	55,115	185	151
*LA6ZFA	"	24,824	128	116
*LA1EK	"	19,008	93	88
*LA7CL	"	7,920	76	72
*LA8TIA	7	176	8	8
Poland				
SN6Z	A	4,127,464	2142	748
			(OP: SQ9C)	
SP3LPG	"	963,765	912	495
SP9RQJ	"	548,800	767	392
SN2K	"	459,910	553	370
			(OP: SP2FWC)	
SP2GWH	"	422,184	490	359
SP9JZT	"	318,710	509	314
SQ7B	"	265,804	511	308
SP2MHC	"	114,845	304	223
SP2FGO	"	93,436	237	188
SQ2AJI	"	15,664	106	88
SP5DRH	"	12,236	85	76
SP5GH	28	29,532	147	138
SP1GZF	"	480	19	16
SP2QG	14	442,540	624	436
SP8RX/1	"	82,248	223	184
			(OP: DJØIF)	
SP2BKX	"	3,710	53	53
SP4TKR	7	1,716,816	1067	564
SN8R	"	1,359,116	989	506
			(OP: SP8ONZ)	
SP2FAP	"	1,180,498	909	506
SP3GTS	"	757,490	713	422
SP5KCR	3.5	752,524	808	419
			(OP: SP5JTF)	
SP6AEG	1.8	113,883	288	203
*SP1AEN	A	1,530,079	1236	557
*SP8AJK	"	685,903	692	419
*SP6LV	"	649,296	843	432
*SP6EIY	"	586,500	690	425
*SP5EOT	"	569,936	801	398
*SP1KRF	"	405,275	518	325
			(OP: SP3FLR)	
*SP9FT	"	281,750	535	322
*SP9CV	"	279,522	522	318
*SQ9E	"	268,785	424	297
*SP3HC	"	203,931	441	273
*SP3DOF	"	195,579	385	279
*SP6QKP	"	172,996	379	244
*SP7OGP	"	151,470	325	255
*SP7JLH	"	140,990	339	230
*SP2YUV	"	133,836	321	228
			(OP: SP2UV)	
*SN9N	"	121,334	266	206
*SP8YB	"	116,100	279	215
*SP2IKP	"	108,153	252	197
*SP7TES	"	92,130	233	185
*SP2DKI	"	72,930	220	170
*SP6BEN	"	69,776	203	178
*SP8YZZ	"	64,780	166	158
*SP2UV	"	39,186	149	126
*SP2HMN	"	37,389	148	121
*SP9MZH	"	25,480	109	98
*SP5NVX	"	18,620	101	95
*SP9CXN	"	10,286	80	74
*SP3LWP	28	30,702	177	129
*SP2FAV	"	17,484	129	93
*SP3MGM	"	16,014	131	102
*SP3AZO	"	6,840	72	72
*SP3ZIR	"	6,204	72	66
			(OP: SQ3JPV)	
*SP9W	21	93,528	330	216
*SN2I	14	366,282	522	399
*SP2JLR	"	256,457	433	337
*SN3C	"	246,888	416	324
			(OP: SP3ASN)	
*SP8BAB	"	241,604	375	374
*SQ9BDN	"	239,183	418	329
*SP9BNM	"	217,408	445	316
*SP8EEX	"	71,440	219	190
*SN9R	"	32,096	149	136
			(OP: SP9BRP)	
*SQ3WW	"	12,180	91	87
*SP5CNA	7	1,121,320	851	485
*SP6DJE	"	1,034,870	897	478
*SP9DLY	"	465,758	465	358
*SP9RI	"	145,548	273	234
*SN7O	"	129,350	220	199
*SP5NZN	"	95,387	210	181
*SP9EML	"	66,672	167	144
*SPØPGC	"	731	18	17
			(OP: SP2JFB)	
*SQ5M	3.5	363,025	545	325
*SP5ELA/8	"	116,781	289	201
*SP3FYX	"	102,949	298	191
*SN3B	"	31,165	136	115
			(OP: SQ3JPV)	
*SQ1EUG	"	21,476	120	91
*SN5Q	"	15,390	98	81
			(OP: SQ5RDX)	
*SP3CYY	"	4,400	51	44
*SP6TRH	"	3,608	50	44
*SP7LI	1.8	22,473	113	99
Portugal				
CT1JLZ	7	6,075,936	1941	816
			(OP: OK1RF)	

***CT1ENQ**	**A**	**202,788**	**394**	**258**
***CT1BWW**	**28**	**17,604**	**139**	**108**
Romania				
YO4KCC	**A**	**781,927**	**984**	**457**
YO7LGI	"	472,440	599	372
YO7ARY	"	164,604	269	172
YO7VT	"	122,112	249	212
YO2R	**21**	**142,845**	**400**	**267**
			(OP: YO2RR)	
YO3AK	"	31,465	166	145
YO5AJR	**1.8**	**129,717**	**312**	**213**
***YO3APJ**	**A**	**1,016,189**	**899**	**523**
*YO5AIR	"	743,008	955	434
*YR8V	"	729,450	932	450
*YR8DHCS	"	499,820	718	373
			(OP: YO6CFB)	
*YO5OHY	"	475,575	572	373
*YO9CWY	"	370,832	623	308
*YO6ADW	"	366,036	585	354
*YO4CAH	"	340,659	544	333
*YO4SI	"	315,252	496	324
*YO7NW	"	290,680	520	338
*YO5ØIF	"	284,240	477	304
*YO6UO	"	278,712	462	294
*YO2QY	"	193,192	355	248
*YO3CVG	"	146,298	317	222
*YO5DAS	"	111,930	292	210
*YR5S	"	77,608	212	178
			(OP: YO5QBP)	
*YO5NY	"	57,280	218	160
*YO4BTB	"	4,730	60	55
*YO6HSU	"	3,588	55	52
***YR8A**	**28**	**183,680**	**547**	**287**
			(OP: YO8AXP)	
*YO5ALI	"	53,523	251	171
*YO8DDP	"	51,471	229	171
*YO9RXC	"	13,485	103	93
*YO2AQB	"	2,193	47	43
***YR8B**	**21**	**517,409**	**800**	**421**
			(OP: YO8DOH)	
***YO9CB**	**14**	**147,696**	**323**	**272**
*YR6M	"	90,132	258	222
			(OP: YO6MT)	
*YO3FF	"	55,146	206	182
*YO4ASG	"	13,013	97	91
*YO3BL	"	12,963	89	87
*YO8BFC	"	3,570	52	51
***YO8RIJ**	**7**	**176,640**	**291**	**230**
*YO5CCX	"	63,840	168	152
***YR8D**	**3.5**	**196,587**	**368**	**243**
Sardinia				
ISØAFM	**A**	**1,352,699**	**1593**	**571**
ISØHQJ	"	389,874	592	362
Scotland				
GMØF	**A**	**3,840,000**	**2483**	**800**
			(OP: GM4AFF)	
GM4SID	"	1,256,040	1240	540
GM3JKS	"	34,220	131	116
MMØGPZ	"	16,112	124	106
MM2R	**14**	**177,851**	**373**	**293**
			(OP: GM3YOR)	
***GMØNBM**	**A**	**385,917**	**665**	**357**
*MMØYEC	"	273,585	484	305
*GM4OSS	"	21,735	143	115
***MM3T**	**7**	**48,762**	**179**	**126**
			(OP: GMØELP)	
Serbia				
YT5W	**A**	**6,226,896**	**2950**	**884**
			(OP: YU8A)	
YU1KT	"	599,460	769	412
YT2AA	"	142,044	327	266
YTØZ	**21**	**1,392,252**	**1440**	**641**
YU1KX	"	944,877	1148	573
YT9A	**14**	**3,313,242**	**2051**	**906**
YU1EL	"	2,837,604	1877	814
YT7DQ	"	2,055,872	1565	728
YT2CW	"	2,752	47	43
YT5A	**7**	**5,541,777**	**1912**	**837**
			(OP: YU1EA)	
YU1DW	"	2,742,565	1407	635
YT4T	**3.5**	**1,202,604**	**979**	**507**
***YU1FG**	**A**	**677,295**	**806**	**435**
*YT2U	"	165,968	362	253
*YT2RX	"	114,180	283	220
*YU1CC	"	109,917	300	207
*YU7FN	"	25,398	129	102
*YU1AT	"	4,150	56	50
*YT3R	"	2,852	49	46
***YU/N88O**	**28**	**19,950**	**159**	**114**
***YT7T**	**21**	**58,645**	**261**	**185**
***YU2A**	**14**	**1,959,204**	**1388**	**741**
*YT5C	"	838,116	1020	558
			(OP: YU7WW)	
*YU5M	"	546,840	755	465
*YT2AAA	"	501,786	653	457
*YU1ED	"	233,919	438	329
*YU7KM	"	175,608	375	271
*YT7IM	"	59,940	186	162
*YU1JF	"	35,670	164	145
*YU1ADO	"	33,784	184	164
*YU1SZ	"	1,350	33	30
***YU7D**	**7**	**200,976**	**297**	**237**
			(OP: YU7DP)	
*YT7WM	"	31,184	116	106
***YU5T**	**3.5**	**297,395**	**448**	**293**
			(OP: YU1JU)	
***YT4A**	**1.8**	**119,892**	**292**	**206**
*YT1T	"	76,121	242	163
Sicily				
IT9IMJ	**28**	**624**	**26**	**24**
IU9T	**14**	**4,405,444**	**2359**	**947**
			(OP: IT9GSF)	
***IT9ZTX**	**28**	**2,544**	**51**	**48**
Slovakia				
***OM4KW**	**A**	**1,666,980**	**1325**	**567**
*OM7DX	"	1,099,128	1029	492
*OM7AG	"	928,928	1031	464
*OM/SQ9UM	"	889,240	988	470
*OM8ON	"	736,360	733	449
*OM3R	"	628,575	764	425
			(OP: OM3CFR)	
*OM6AL	"	426,020	658	358
*OM7YC	"	413,930	621	355
*OM7PY	"	294,130	506	335
*OM3TPN	"	188,415	394	265
*OM4DA	"	158,916	337	246
*OM7AT	"	68,340	241	170
*OM8AQ	"	20,808	117	102
***OM3TB**	**14**	**244,120**	**458**	**340**
***OM3CDN**	**7**	**210,140**	**347**	**266**
*OM6TX	"	52,515	159	135
***OM5FA**	**1.8**	**58,293**	**205**	**153**
Slovenia				
S5ØA	**A**	**6,988,086**	**2887**	**931**
S53MM	*****	**6,170,859**	**2671**	**887**
S57DX	"	4,946,592	2647	816
S56A	"	3,571,975	1974	775
S59AA	"	554,400	634	400
S51J	"	324,000	493	324
S58P	"	243,946	504	283
S51Z	"	152,721	290	213
S59T	"	260	15	10
S5ØK	**14**	**3,407,768**	**2104**	**868**
S57Z	**7**	**2,557,800**	**1261**	**630**
S53M	"	1,928,472	1000	546
			(OP: S51FB)	
S58Q	"	868,464	711	444
S53O	**1.8**	**242,490**	**447**	**274**
***S51F**	**A**	**2,415,235**	**1594**	**659**
***S52OP**	*****	**2,025,186**	**1661**	**618**
*S53AU	"	416,223	533	309
*S51MF	"	242,970	391	273
*S53QD	"	159,544	378	259
*S57AD	"	127,224	331	228
*S58RU	"	109,939	345	223
*S56C	"	63,984	199	172
*S51AE	"	10,374	67	57
*S59EIJ	"	270	14	10
*S56DX	"	200	13	10
*S53DIJ	"	198	12	9
***S51VC**	**21**	**8,349**	**79**	**69**
***S53F**	**14**	**1,484,440**	**1231**	**680**
*S57U	"	1,060,565	1037	605
*S58MU	"	399,634	620	422
***S54A**	**7**	**1,353,690**	**911**	**534**
*S58WW	"	860,860	736	430
Spain				
EA1EVR	**A**	**484,715**	**846**	**385**
***EA1JO**	**A**	**502,228**	**686**	**412**
*EA1AST	"	259,156	389	268
*EA1VT	"	115,544	298	202
*EA1ND	"	37,696	149	124
*AN1CBX	"	1,952	32	32
***EA1CS**	**14**	**2,184**	**42**	**42**
***AN2K**	**A**	**48,191**	**191**	**143**
			(OP: EB2CYQ)	
***EA2BVV**	**14**	**6,090**	**74**	**70**
EF3A	**A**	**3,172,609**	**2171**	**761**
			(OP: EA3KU)	
EA3CEC	"	182,790	343	270
AD3T	**28**	**388,476**	**806**	**396**
			(OP: EA3AKY)	
***EA3AVV**	**A**	**27,776**	**147**	**128**
*EA3GHZ	"	24,289	119	107
*EA3AXM	"	18,430	105	97
***EA3FHP**	**14**	**775**	**25**	**25**
***EA4/UY7CW**	**A**	**354,159**	**622**	**351**
*EA4KG	"	41,041	230	143
*EA4DA	"	28,702	143	113
***EA4CWN**	**14**	**165,968**	**315**	**253**
*EA4BF	"	66,332	246	206
EA5YU	**A**	**1,083,096**	**1085**	**504**
EA5KV	"	33,024	185	128
EA5KA	"	18,117	125	99
EA5IY	"	8,058	89	79
EA5/UT2XD	**14**	**1,711,316**	**1420**	**692**
***EA5GTQ**	**A**	**919,565**	**1001**	**521**
*EB5CNK	"	204,554	393	266
*EA/DJ5IR	"	166,145	346	235
*EA5DCL	"	157,685	337	235
*EA5CP	"	132,102	349	246
*AM5Q	"	116,958	269	193
			(OP: EA5QB)	
*EA5AWJ	"	51,456	165	134
*EA5VN	"	28,224	146	144
*EG5M	"	14,601	109	93
			(OP: EA5GX)	
EA7MT	**A**	**180,180**	**382**	**252**
EA7OR	"	172,544	382	256
EA7TG	"	138,169	298	233
EF7R	**14**	**1,883,052**	**1488**	**684**
			(OP: EA7AJR)	
***EA7CWA**	**A**	**137,696**	**283**	**208**
*EA7CIX	"	46,580	163	137
*EA7VJ	"	4,738	50	46
***EA7GV**	**28**	**726**	**32**	**22**
***AO7T**	**14**	**572,852**	**771**	**499**
			(OP: EA7KJ)	
Sweden				
SE6Y	**A**	**1,024,128**	**1094**	**506**
			(OP: SM6DED)	
SM7YEA	"	1,008,640	1067	512
SMØBSO	"	426,010	589	377
8SØA	"	236,462	380	274
			(OP: SMØAIG)	
SM5AOG	"	179,768	271	184
SM6X	**28**	**18,810**	**139**	**95**
			(OP: SM6CLU)	
SM3C	**14**	**1,547,312**	**1274**	**688**
			(OP: SM5CCT)	
SK3W	**7**	**3,006,250**	**1378**	**650**
			(OP: SM5IMO)	
SM5QU	"	123,156	231	198
SMØW	**3.5**	**959,454**	**938**	**453**
***SC3N**	**A**	**670,558**	**705**	**422**
			(OP: EA8CN)	
*SMØQ	"	504,912	792	402
			(OP: SMØOGQ)	
*SF3E	"	133,614	295	234
			(OP: SM3EAE)	
*SE6C	"	116,696	300	232
			(OP: SM6CDN)	
*SI0E	"	104,880	293	184
			(OP: SMØEPO)	
*7S5Q	"	79,834	248	179
			(OP: SM5COP)	
*SM7TZK	"	45,120	196	141
*SMØBOS	"	36,162	147	123
*SM6DER/7	"	34,925	164	127
*SM7EH	"	33,660	147	132
*SM6IQD	"	3,828	47	44
*SM6Z	"	3,525	47	47
*SM5CNQ	"	2,142	38	34
*SM6LTO	"	8	2	2
***SM6NET**	**14**	**153,630**	**286**	**270**
*SM6C	"	31,445	116	95
*SF6DX	"	14,168	101	92
			(OP: SM6FUD)	
***SMØS**	**7**	**317,015**	**394**	**306**
			(OP: SM5BAX)	
*SM6Q	"	96,968	226	184
			(OP: SM6UQJ)	
Switzerland				
HB9AZZ	**A**	**131,412**	**291**	**233**
HB9CPS	"	29,500	109	100
HE8ZZ	"	27,477	153	129
			(OP: HB9EFC)	
***HB9ARF**	**A**	**1,022,580**	**1199**	**468**
*HE8CSM	"	60,550	268	173
*HB9BGF	"	736	24	23
***HB9WDY**	**7**	**16,150**	**93**	**85**
Ukraine				
UU5WW	**A**	**5,285,468**	**2337**	**908**
UX2X	"	3,123,000	2086	750
			(OP: UT2XQ)	
UYØZG	"	3,003,968	2083	748
UW5U	"	2,897,440	2162	728
			(OP: UY2UA)	
UV5U	"	2,675,400	1769	735
			(OP: UX1UA)	
UW8SM	"	2,516,736	1877	696
USØKW	"	2,465,421	1599	703
UW1G	"	2,426,918	1959	694
EO1i	"	1,751,340	1819	606
			(OP: UT1IA)	
UR3IQO	"	1,645,392	1367	581
UW2Q	"	1,332,008	1367	524
UT4EK	"	1,284,324	1249	524
USØSY	"	1,064,742	1056	502
UT5ECZ	"	1,022,380	1095	485
UT2PX	"	1,007,816	1078	479
US7IVW	"	956,084	984	499
UT3N	"	755,724	991	426
			(OP: UT3NK)	
URØIQ	"	583,430	781	410
UR5WCQ	"	509,340	610	390
UR7VA	"	247,032	413	292
UR5E	"	149,548	300	218
			(OP: UR5EDX)	
UR5AKU	"	40,920	139	120
UT3UV	"	31,560	148	120
UU2JG	"	31,428	124	108
US7MM	"	23,976	145	111
UT4PZ	"	20,367	99	93
UZ4L	"	608	19	16
UW1M	**28**	**481,100**	**820**	**425**
			(OP: UR5MW)	
UU4JC	"	19,982	145	103
UR5MBA	"	10,626	87	66
UR6IJ	**21**	**331,875**	**589**	**375**
UY5ZZ/A	**14**	**2,624,128**	**1700**	**832**
UY5QO	"	377,055	514	399
US7IID	"	297,388	495	364
UU4JWA	"	34,447	169	133
			(OP: UU5DX)	
UR5MW	"	13,872	84	66
UX5D	**7**	**2,566,242**	**1339**	**657**
			(OP: UT7DK)	
UR5IFX	"	2,337,484	1252	626
UR7QC	"	1,145,400	808	498
UZ1H	"	1,028,160	784	448
			(OP: UZ1HZ)	
US8IBS	"	666,365	694	395
URØQX	"	329,589	396	313
UY2ZZ	"	243,806	346	278
UY3MW	"	45,312	160	128
UX1UX	**3.5**	**490,510**	**671**	**362**
UY3AW	"	228,995	412	271
***UT7NW**	**A**	**2,104,752**	**1720**	**624**
***UU1CC**	**"**	**1,222,320**	**1207**	**528**
***USØHZ**	**"**	**1,118,600**	**1338**	**476**
*UX7U	"	1,092,406	1198	497
*UT5UIA	"	1,081,066	1002	518
*UX6F	"	1,065,024	1170	516
			(OP: ERØFEL)	
*UW7M	"	981,615	1204	465
			(OP: UR3MP)	
*UT8IM	"	931,665	1118	467
*UT3UZ	"	918,918	1054	459
*UR7EQ	"	910,118	1026	451
*US7IB	"	775,423	958	449
*UT2IO	"	714,446	910	422
*UT4XU	"	675,552	804	454
*UR7R	"	574,167	831	411
			(OP: UX1RX)	
*UT5UN	"	571,029	807	393
*UR5LJD	"	542,300	792	374
*UX5TQ	"	483,085	646	395
*UT4EN	"	470,057	693	371
*UR4U	"	423,984	574	363
			(OP: UR4UDI)	
*UY5TE	"	396,458	617	334
*US3WD	"	364,971	570	337
*UY2UQ	"	364,394	599	334
*UX2KA	"	351,918	509	343
*US8ICM	"	349,776	591	347
*US6CQ	"	342,392	593	337
*UR5KED	"	322,926	474	321
*UX7UN	"	311,049	517	323
*UX7MA	"	294,446	464	346
*US1IV	"	286,143	458	319
*UT2LF	"	247,752	440	296
*UR5WDQ	"	232,290	468	290
*US3QW	"	225,910	429	290
*UU2JA	"	213,030	340	270
*UX6IB	"	202,320	345	281
*UT4NY	"	202,160	446	280
*UX8IW	"	198,550	422	275
*UY5AA	"	187,920	407	270
*US8MX	"	115,995	337	209
*UR5XMM	"	102,124	296	211
*UT7MR	"	84,640	242	184
*UT8IT	"	68,400	221	190
*UR3LTD	"	67,548	199	156
*UY2RZ	"	58,443	210	161
*UT2LU	"	56,320	235	160
*UT8EL	"	50,796	216	153
*US9PA	"	46,784	155	136
*UY3QW	"	45,760	161	143
*UR5EPG	"	33,794	136	122
*UR5WX	"	31,581	148	121
*UT7HM	"	29,792	163	133
*UU1JE	"	28,542	156	142
*UU7JN	"	15,753	96	89
*US4IXT	"	8,100	56	54
			(OP: USØITU)	
*UU9JQ	"	6,372	57	54
*UT5EPP	"	6,300	54	50
*UR5EIT	"	6,096	50	48
*UT4ZX	"	5,289	54	41
*US6IPD	"	5,022	59	54
*UTØCK	"	4,550	57	50
*UWØU	"	3,160	42	40
*UX3IO	"	2,376	38	36
*UR6AJ	"	330	11	11
***US5XD**	**28**	**192,945**	**514**	**285**
*UX8IR	"	73,726	266	191
*UXØUW	"	50,830	224	170
*US7IA	"	36,894	182	129
*UYØCA	"	35,632	184	136
*UR5AW	"	6,726	70	57
*UU5JQV	"	1,824	37	32
*UR5FAV	"	64	8	8
***UT3EX**	**21**	**185,328**	**410**	**297**
***UZ5I**	**14**	**903,474**	**991**	**594**
			(OP: UY5IM)	
*US8IM	"	658,350	848	475
*US1PM	"	428,910	604	435
*UX7QD	"	350,100	627	389
*US7IGF	"	199,881	499	297
*UR5EFL	"	100,205	293	245
*UT3I	"	91,884	265	228
*UT5UNZ	"	80,886	270	221
*URSPG	"	56,440	190	166
*UY8LM	"	44,436	191	161
*US5EEK	"	12,166	81	79
***UU2CW**	**7**	**1,288,232**	**851**	**519**
*UZ5UA	"	922,350	770	473
*UW2F	"	554,496	574	384
			(OP: UTØFT)	
*UY5AR	"	471,367	508	359
*US2MW	"	242,970	364	267
*UY7LM	"	181,656	332	261
*UT2UZ	"	171,534	286	226
*UT5UQN	"	120,330	226	191
*UR4CU	"	111,555	241	201
*UT2VU	"	5,728	38	32
*UR5FBK	"	192	12	12
***UT7XX**	**3.5**	**598,858**	**718**	**403**
*UR3LPM	"	350,124	527	326
*UY1HY	"	236,600	394	280
*UR2P	"	206,194	412	262
*UT1PO	"	171,935	368	251
*UT8AS	"	108,853	277	199
*UX6IR	"	100,450	241	205
*UR8QR	"	92,787	234	197
*UT5KO	"	82,694	244	173
*UT7DU	"	6,540	74	60
***UX5NQ**	**1.8**	**99,009**	**279**	**193**
Wales				
GWØRYT	**A**	**46,500**	**178**	**150**
GW6W	**14**	**865,095**	**923**	**539**
			(OP: GWØETF)	
OCEANIA				
Australia				
VK2IM	**A**	**870,504**	**710**	**332**
VK3IO	**A**	**775,124**	**512**	**329**
VK3TDX	"	509,454	449	279
***VK3VT**	**7**	**2,640**	**23**	**22**
VK4BUI	**A**	**491,057**	**479**	**287**
***VK4TT**	**A**	**37,926**	**115**	**86**
*VK4SN	"	9,720	45	45
***VK4EJ**	**14**	**7,097**	**57**	**47**
VK6HZ	**14**	**1,512**	**24**	**24**
VK6AA	**7**	**5,001,626**	**1261**	**686**
			(OP: VK2IA)	
VK7GN	**A**	**151,255**	**224**	**179**
***VK2GR/6**	**A**	**8,624**	**61**	**49**
East Malaysia				
9M6XRO	**A**	**2,726,068**	**1415**	**556**
***9M6YBG**	**21**	**37,350**	**143**	**90**
Guam				
WH2D	**A**	**86,730**	**224**	**118**
			(OP: K3UOC)	
KG6DX	**28**	**10,368**	**66**	**54**
Hawaii				
KH7XS	**A**	**9,124,899**	**2741**	**879**
			(OP: K4XS)	
KH6MB	**14**	**1,920,549**	**1097**	**597**
KH6CW	"	228,000	315	250
			(OP: K7GQ)	
KH6ND	**3.5**	**596,673**	**457**	**231**
***KH6CO**	**A**	**39,758**	**128**	**103**
			(OP: KH6OO)	
*KH7T	"	34,216	120	91
***AH7C**	**14**	**12,852**	**70**	**63**
Indonesia				
***YB3XM**	**A**	**138,834**	**237**	**162**
*YB2UTX	"	86,450	152	130
*YB3BOA	"	24,882	104	87
*YC2EUZ	"	459	10	9
***YD1BJX**	**21**	**9,882**	**68**	**54**
***YB1ALL**	**14**	**295,093**	**403**	**269**
***YC1COZ**	**1.8**	**4**	**2**	**2**
Mariana Islands				
***AHBAA**	**21**	**141,484**	**309**	**163**
			(OP: JR2SCJ)	
***WHØS**	**14**	**15,602**	**91**	**58**
New Zealand				
ZM3A	**7**	**6,437,695**	**1517**	**737**
			(OP: ZL3WW)	
***ZL4CR**	**A**	**975**	**14**	**13**
***ZL3TE**	**21**	**36,180**	**138**	**90**
			(OP: W3SE)	
Niue				
ZK2V	**A**	**635,904**	**638**	**288**
			(OP: ZL1CT)	
Tonga				
***A35RK**	**A**	**29,722**	**106**	**77**
SOUTH AMERICA				
Antarctica				
***R1ANB**	**A**	**172,377**	**203**	**179**
			(OP: RW6ACM)	
Argentina				
LU9MDH	**A**	**8,845**	**66**	**61**
AY5F	**21**	**1,927,920**	**1156**	**580**
			(OP: LU5FC)	
LU1DP	**14**	**113,231**	**240**	**199**
***LU3FID**	**A**	**138,075**	**222**	**175**
*LU5YF	"	102,753	183	147
*LU3DAT	"	27,232	106	92
*LW1E	"	20,720	77	74
***LW3DG**	**21**	**78,848**	**185**	**154**
*LW6DW	"	67,734	180	142
***L33M**	**14**	**63,648**	**164**	**136**
			(OP: LU3MAM)	
***LU4MHQ**	**7**	**115,780**	**152**	**140**
*LU5OM	"	19,947	69	61
Aruba				
P43JB	**A**	**1,728,720**	**994**	**504**
***P4/W1XP**	**A**	**74,520**	**175**	**138**
Brazil				
PT2ZHA	**A**	**1,936,784**	**1114**	**554**
PY2NY	"	1,264,244	805	452
PP1CZ	"	482,598	484	331
PP5JN	"	67,488	132	111
PY2KP	"	19,272	76	66
PP5KR	"	13,583	56	47
PP5JY	"	9,954	86	79
PY3CAL	"	5,593	51	47
ZX5J	**21**	**2,500,374**	**1324**	**662**
			(OP: AI6V)	
PT7CG	"	1,998,216	1179	594
PY2MTV	"	933,945	795	435
PY1KN	"	649,884	605	372
PY3AU	**14**	**27,538**	**101**	**98**
PY7XC	**7**	**929,810**	**468**	**359**
PY2LSM	"	25,060	75	70
PY2KJ	"	1,590	20	15
ZW3F	**3.5**	**211,416**	**222**	**184**
			(OP: PY3VK)	
PY2BK	"	37,926	91	86
***PV8AA**	**A**	**146,835**	**249**	**195**
			(OP: PV8DX)	
*PR7HR	"	37,224	111	99
*PY7GK	"	16,985	86	79
*PQ4F	"	9,106	62	58
			(OP: PY4FQ)	
*PS7DX	"	6,956	52	47
*PY7OJ	"	4,730	43	43
*PU8TEP	"	1,767	33	31
*PY1ZV	"	1,728	31	27
*PY7AEF	"	198	9	9
***PU2MTS**	**28**	**11,780**	**70**	**62**
***PW2B**	**21**	**258,741**	**361**	**259**
			(OP: PY2HL)	
*PT4C	"	1,809	27	27
*PU3LYB	"	260	11	10
***PY4LH**	**14**	**3,960**	**41**	**40**
*PW1W	"	476	14	14
			(OP: PY1WW)	
***PY2SEX**	**7**	**1,136,637**	**518**	**391**
*PX5B	"	75,446	129	119
			(OP: PP5BZ)	
Chile				
CE3FZ	**A**	**73,698**	**179**	**142**
3G1X	**21**	**169,260**	**319**	**186**
			(OP: XQ1IDM)	
***XR3A**	**14**	**96,526**	**217**	**167**
			(OP: CE3DNP)	
Colombia				
***HK1N**	**21**	**146,382**	**287**	**186**
Ecuador				
HC2A	**7**	**1,080**	**18**	**18**
HC2SL	**3.5**	**318,798**	**307**	**199**
Netherlands Antilles				
PJ2T	**A**	**8,794,791**	**2495**	**849**
			(OP: WI9WI)	
Peru				
OA4SS	**A**	**1,826,166**	**1132**	**498**
Suriname				
PZ5RA	**A**	**1,857,556**	**942**	**463**
Uruguay				
CX9AU	**A**	**870,156**	**592**	**378**
CX5BW	**21**	**623,455**	**590**	**379**
***CX2AQ**	**A**	**12,415**	**71**	**65**
Venezuela				
YW5DX	**14**	**1,764,288**	**1079**	**576**
			(OP: YV5OHW)	
YW4D	**7**	**6,516,515**	**1518**	**745**
			(OP: YV1DIG)	
4M5IR	**3.5**	**6,956**	**40**	**37**
***YV5JBI**	**A**	**57,816**	**155**	**132**
*YV7QP	"	8,624	48	44
***YV1FM**	**21**	**709,168**	**699**	**349**
***YY5EBV**	**7**	**550**	**11**	**11**
QRP				
4O4A	**A**	**1,238,895**	**1196**	**567**
OK7CM	*****	**1,227,440**	**1209**	**536**
OK3C	"	1,123,344	1107	538
			(OP: OK2ZC)	
RW4AA/9	*****	**1,084,907**	**806**	**443**
US2IZ	*****	**1,066,725**	**1162**	**495**
RA3AN	*****	**906,326**	**1148**	**461**
HA5IAM	*****	**843,622**	**969**	**457**
YP8A	*****	**824,000**	**917**	**515**
			(OP: YO8WW)	
JA1MCU	*****	**822,829**	**782**	**427**
RW3AI	"	735,042	1040	407
SP2DNI	*****	**684,560**	**868**	**430**

F5VBT	*	**607,223**	**909**	**391**
N7IR	*	**597,893**	**702**	**389**
VA3DF	*	**581,061**	**529**	**317**
UR5LAM	*	520,284	702	382
RW6FO	*	**514,745**	**742**	**385**
HA5BA	*	483,600	712	372
NA8CW	*	**474,456**	**652**	**373**
			(OP: NØKE)	
DF5RF	*	**465,864**	**704**	**376**
RN3QQ	*	431,648	646	376
OK1DVM	*	422,250	571	375
WA8WV	*	**408,640**	**543**	**320**
KT8K	*	357,557	511	337
G3YMC	*	**349,335**	**641**	**315**
RA9CEX	*	347,874	387	222
YT1TA	*	**311,000**	**508**	**311**
RK4FB	*	**295,960**	**571**	**280**
AA1CA	*	**291,760**	**474**	**280**
UT5UUV	*	281,200	545	296
LZ5T	*	**279,477**	**440**	**297**
			(OP: LZ3RR)	
W4QO	*	**264,470**	**422**	**265**
UX8ZA	*	254,150	510	299
OL25LP	*	252,450	488	306
			(OP: OK2FB)	
MU/OZ7BQ	*	**250,790**	**460**	**310**
YO4AAC	*	250,515	498	285
NN7SS	*	221,496	478	264
			(OP: K6UFO)	
K1SM	*	216,591	304	219
UN8PT	*	**195,734**	**349**	**217**
US8UA	*	190,920	379	258
LZ7H	*	180,048	382	242
UT5DJ	*	171,250	382	250
M5AEF	*	167,552	387	272
G3LHJ	*	155,232	358	252
HA5OB	*	145,376	375	236
ON7CC	*	**130,071**	**350**	**227**
PA1B	*	**125,100**	**328**	**225**
DL5CL	*	117,450	297	225
WI1G	*	109,025	279	175
W5JBV/4	*	93,939	232	173
RV3DBK	*	92,378	347	209
8J4P	*	**84,495**	**457**	**129**
			(OP: JA4MRL)	
G6CSY	*	80,017	197	161
LZ1FJ	*	75,888	254	186
VE3SMA	*	74,244	182	138
RX1CQ	*	**71,449**	**242**	**173**
WT5R	*	**70,028**	**203**	**164**
			(OP: W5ZL)	
YL2MR	*	**68,816**	**241**	**176**
W3PO	*	**68,688**	**194**	**144**
MMØDWF	*	**67,710**	**220**	**183**
PE2KP	*	60,939	246	183
HE8DAX	*	**60,750**	**198**	**162**
KX7L	*	58,824	221	152
I2AZ	*	**58,384**	**213**	**164**
NFØN	*	58,320	217	162
DG8VE	*	52,124	164	157
N6RV	*	**50,954**	**176**	**146**
KA6SGT/9	*	**47,744**	**164**	**128**
BA4II	*	**47,104**	**195**	**128**
AA4SD	*	43,080	174	120
KEØG	*	41,464	221	142
KL7CW	*	**39,652**	**143**	**92**
SP9LDU	*	39,005	173	145
DL4EAX	*	38,896	183	143
RU9CX	*	36,200	114	100
F5UKL	*	35,772	214	132
DLØVLP	*	31,590	129	117
			(OP: DL2BQD)	
WY7N	*	29,975	201	109
WC7S	*	29,601	183	117
JH1HGI	*	25,758	123	81
NVØU	*	24,860	148	113
OM3TLE	*	**24,530**	**136**	**110**
VE3VO	*	23,800	119	85
WQ8RP	*	23,219	149	107
JH8FIH	*	**22,540**	**141**	**98**
IW3ILM	*	22,470	124	107
KI4FW	*	20,094	127	102
KO1H	*	17,816	74	68
SM6AHU	*	**16,587**	**110**	**97**
USØYA	*	16,008	90	87
NA4BW	*	15,840	114	96
PAØRBO	*	15,810	124	102
W6GMT/Ø	*	14,535	113	85
OK2NA	*	13,694	91	82
K9JWV/7	*	12,150	118	75
WØRU	*	10,764	90	78
EU1UA	*	**10,480**	**99**	**80**
AF9J	*	10,400	90	80
DJ5QK	*	9,590	74	70
WA5RML	*	8,432	88	68
LY2BNL	*	**8,112**	**83**	**78**
JA9BGL	*	**7,714**	**66**	**58**
K6MI	*	7,236	62	54
YO4RST	*	6,710	68	61
F8FKD	*	6,674	74	71
DL3BVA	*	6,392	75	68
K6DBG	*	4,950	64	45
SQ2DYL	*	4,704	57	56
IZ2FME	*	4,482	62	54
SF5X	*	3,610	43	38
			(OP: SM5EFX)	
KI6OFN	*	3,168	42	36
DM1LM	*	3,096	46	43
PY2IAX	*	**2,952**	**41**	**36**
K5ND	*	2,948	50	44
W2JEK	*	**2,640**	**46**	**40**
JAØIND/1	*	2,618	30	22
MØCEF	*	2,412	38	36
KK6TV	*	1,820	51	35
PU5ATX	*	1,537	30	29
KQ6HE	*	1,320	25	22
LU5EM	*	**1,292**	**23**	**19**
			(OP: LU5FZ)	
JA1POS	*	1,020	22	20
ON3AD	*	975	27	25
UT1AB	*	960	25	24
NO2D/Ø	*	500	22	20
4D1N	*	**220**	**13**	**11**
VA3RKM	*	30	3	3
VR2ZQZ	28	**88,323**	**295**	**177**
ER1RR	*	**25,092**	**155**	**123**
FBAKC	*	**10,773**	**131**	**81**
SP5DDJ	*	**3,792**	**56**	**48**
GM4UBJ	*	**2,009**	**44**	**41**
N6WG	*	**1,508**	**44**	**29**
DL8TG	*	**1,224**	**35**	**34**
YR9F	*	**1,176**	**30**	**28**
			(OP: YO9FNP)	
HA3RJ	*	**1,020**	**36**	**30**
UR4MCK	*	**720**	**25**	**24**
DF5SF	*	462	22	21
SP4GFG	21	**58,608**	**241**	**176**
HK1AA	*	**44,802**	**145**	**114**
JH7RTQ	*	**32,696**	**140**	**122**
SP4JFR	*	24,200	147	121
JR1NKN	*	**17,480**	**126**	**95**
WA6FGV	*	**10,218**	**94**	**78**
OK1AIJ	*	**5,880**	**73**	**70**
VU2UR	*	**4,692**	**49**	**46**
JA1KPF	*	2,405	47	37
ES1CR	*	**1,344**	**32**	**28**
LW4DYI	*	**672**	**16**	**16**
JQ6PAQ/1	*	180	13	12
IBUZF	14	**298,027**	**485**	**373**
LZ1VB	*	**279,654**	**499**	**367**
RW9SZ	*	**232,440**	**343**	**260**
LZ1MG	*	208,861	416	331
AO7AAW	*	**201,663**	**351**	**291**
RW6FZ	*	**157,096**	**390**	**292**
HA7MW	*	**145,917**	**339**	**279**
JR3RWB	*	**142,425**	**285**	**225**
SM6CRM	*	**127,050**	**300**	**275**
EW7DK	*	**109,312**	**295**	**244**
CT/LZ3ND	*	**100,738**	**254**	**209**
K3TW	*	**82,782**	**208**	**189**
NU4B	*	**81,030**	**204**	**185**
UU7JF	*	**72,270**	**227**	**198**
LZ1CY	*	69,905	189	155
LZ2VP	*	59,535	218	189
NT1A	*	**38,088**	**206**	**138**
N5WLA	*	**37,204**	**157**	**131**
W8EH	*	**36,400**	**148**	**140**
GWØVSW	*	**35,448**	**193**	**168**
US5VX	*	34,238	117	106
RU2FM	*	**33,210**	**157**	**135**
RA3XEV	*	**30,576**	**161**	**147**
JM2RUV	*	**24,768**	**100**	**96**
5Q8A	*	**24,738**	**144**	**133**
			(OP: OZ8A)	
JF1WQC	*	**15,876**	**93**	**81**
KZ2V/6	*	**13,224**	**106**	**87**
PA5PR	*	**13,056**	**112**	**102**
HL1VAU	*	**9,240**	**76**	**66**
W6/VK2IMM	*	7,259	70	61
RZØSO	*	**6,156**	**57**	**54**
F5PBL	*	**6,075**	**78**	**75**
9A8MM	*	**1,376**	**33**	**32**
F2AI	*	1,260	36	36
SP6BXM	*	**696**	**25**	**24**
VE5AE	*	**667**	**25**	**23**
JK3AHS	*	608	24	19
SM7RPU	*	529	23	23
JK1TCV	*	75	5	5
M3YOM	*	**1**	**1**	**1**
YP6C	7	**903,495**	**767**	**465**
DL1DQY	*	**519,365**	**473**	**385**
F5UL	*	**292,006**	**414**	**286**
RAØAY	*	**264,918**	**246**	**201**
HAØGK	*	**181,401**	**312**	**239**
G4DBW	*	**109,746**	**244**	**201**
YU1LM	*	**107,508**	**234**	**204**
IV3AOL	*	**31,240**	**126**	**110**
NE6M	*	**30,076**	**127**	**103**
VK2CCC	*	**16,610**	**59**	**55**
OK1IF	*	**6,254**	**59**	**53**
JP1GVC	*	**864**	**13**	**12**
JG2CNS/3	*	**372**	**12**	**12**
7K1CPT	*	24	2	2
JK1VOZ	*	15	5	3
DV1UBY	*	**2**	**1**	**1**
OK1FKD	3.5	**199,870**	**407**	**253**
9A9L	*	**45,024**	**161**	**134**
OK1WF	*	44,016	173	131
SM5OUU	*	**31,088**	**141**	**116**
VE3SQZ	*	**11,904**	**70**	**48**
DL7GEM	*	**4,042**	**53**	**47**
W8QZA/Ø	*	**2,880**	**50**	**40**
ES1CW	1.8	**34,485**	**148**	**121**
SP4GL	*	**16,575**	**105**	**85**
VE3MGY	*	**3,198**	**38**	**26**
DJ3GE	*	**1,274**	**27**	**26**

ASSISTED

NORTH AMERICA

United States

WK1Q	A	**5,796,895**	**2114**	**883**
			(OP: K1MK)	
K3WW	*	**5,484,950**	**2119**	**815**
WW2DX	*	**5,397,492**	**2208**	**892**
W8MJ	*	**4,465,120**	**2164**	**860**
NN3L	*	3,768,720	1664	766
			(OP: N3RS)	
NS1S/4	*	**3,220,480**	**1857**	**740**
			(OP: K1ZZI)	
W5WMU	*	**2,798,643**	**1760**	**703**
W2YC	*	2,732,240	1306	697
ND9E	*	**2,552,000**	**1534**	**704**
KN6DV/2	*	2,517,798	1384	699
AB3CX/2	*	2,442,242	1399	682
N6MA/7	*	**2,221,200**	**1374**	**617**
NF4A	*	2,050,272	1433	648
AA7A	*	1,911,305	1300	649
K9YC/5	*	**1,758,750**	**1257**	**525**
K1FWE	*	1,510,768	937	574
KBRU	*	**1,444,404**	**1128**	**611**
K1LT/B	*	1,390,068	1030	549
NC4KW	*	1,265,854	971	527
			(OP: N1LN)	
KR4F	*	1,257,962	969	529
N4DW	*	1,236,576	952	528
KØKX	*	1,059,456	680	496
W3KL	*	1,025,406	779	459
K3MJW	*	995,904	846	504
			(OP: K3MD)	
NØSXX	*	971,115	969	505
W1EBI	*	957,392	682	424
KQ8M	*	942,984	760	504
KEØUI	*	925,344	894	476
AA8LL	*	889,239	620	453
AK6M	*	860,509	900	481
			(OP: K6MM)	
NQ7R	*	854,906	905	502
K7RL	*	831,905	847	439
K3IE/4	*	826,272	693	453
NQ1W/4	*	795,758	724	487
			(OP: K1KO)	
K3EL/2	*	785,400	645	420
N6QQ	*	744,458	673	494
N6IE	*	721,345	887	445
NG3U	*	657,040	534	344
			(OP: K3DI)	
N3GJ	*	640,710	537	378
NX6T	*	574,161	630	399
			(OP: N6KJ)	
N2BJ/9	*	548,600	571	422
KC5FU	*	546,804	729	366
			(OP: N5QQ)	
WS2E/3	*	546,000	515	336
NQ5D	*	503,550	581	373
			(OP: K5NZ)	
NA3M	*	496,340	446	332
K6RIM	*	469,160	575	370
W4BQF	*	397,793	596	319
W7OM	*	380,946	567	346
K2WK/4	*	378,114	480	337
K2QMF	*	340,669	369	287
K8AC/4	*	340,480	408	280
WØTT	*	310,590	513	315
W2LK	*	304,359	302	253
KE1FO	*	297,640	374	280
KF6I	*	268,416	487	286
WBØN	*	268,203	415	299
W9KB/8	*	257,771	375	257
KI2P	*	231,360	355	241
K5GM	*	217,512	346	228
KE5K	*	207,770	358	263
K4FX	*	141,024	300	208
N4ZR/8	*	127,835	227	185
NQ4U	*	125,077	494	227
W2YR	*	125,000	258	200
K9DUR	*	123,000	280	200
W4DFW	*	108,188	216	172
NW6P	*	104,904	235	188
W8TE	*	99,495	188	165
N6ML	*	98,124	199	156
K3KO/4	*	97,940	170	166
N6WK	*	90,534	215	191
W2RZS	*	86,664	184	157
			(OP: WB2NVR)	
W7RN	*	84,170	263	190
			(OP: K5RC)	
KO7X	*	82,904	284	172
NI6T	*	77,914	206	163
ND2T/6	*	75,600	255	180
KØMD	*	71,749	183	157
K1TH	*	69,696	145	132
K4CZ	*	67,164	247	174
K6DGW	*	65,184	235	168
AB2DE	*	64,272	156	156
NE4S/Ø	*	62,592	241	163
AC7JW	*	55,848	198	156
K8QKY	*	53,932	200	139
K9EN	*	45,828	186	171
W4VIC	*	41,302	117	107
W3MF	*	37,584	124	108
WT5U	*	36,542	138	121
W6SA/7	*	31,100	135	100
W1KQ	*	30,576	107	104
K7RSM	*	29,835	158	117
WX7P	*	28,689	166	131
N4TL	*	27,552	115	96
N3BM/4	*	25,800	117	100
K7EG	*	24,530	126	110
AE6RF	*	22,800	150	95
W4NX	*	19,596	103	92
			(OP: W4BCG)	
NW3DC	*	18,705	97	87
			(OP: W3DQ)	
WF4W	*	11,360	109	80
W4GHD	*	10,150	95	70
NT5C	*	9,471	98	77
			(OP: N3BB)	
W9SE	28	**8,614**	**103**	**73**
KC4HW	21	**19,278**	**135**	**102**
W4CU	14	**672,819**	**706**	**483**
N6JV	*	**293,094**	**428**	**342**
KØBX	*	**15,540**	**75**	**70**
K4EDI	*	7,224	56	56
NN4N	7	**341,784**	**370**	**282**
			(OP: W4ARM)	
AA4VV	*	215,922	215	194
K3MQ	*	**181,196**	**229**	**194**
W2IRT	*	**85,644**	**123**	**122**
***N2BA**	A	**1,666,170**	**992**	**605**
***W3FW**	*	**1,160,082**	**864**	**486**
***NS4SN**	*	**960,890**	**952**	**518**
			(OP: W4IX)	
*AA4FU	*	719,831	732	391
*K4FPF	*	692,265	588	399
*WK5X/4	*	621,338	687	394
*K3WJV	*	447,913	536	307
*WA3KYY	*	405,854	509	307
*N4KG	*	332,123	388	277
*KZ3M	*	280,194	334	246
***KSØT**	*	**273,564**	**380**	**306**
***AG3R/9**	*	**265,375**	**482**	**275**
***KE1V**	*	**254,475**	**397**	**261**
***K2PO/7**	*	**241,390**	**511**	**239**
*AB2E	*	238,290	338	235
*K2DSL	*	222,985	392	277
*WGØM	*	155,817	355	261
***WB6BFG**	*	**148,208**	**321**	**236**
*N4VA	*	121,272	261	186
*NG7M	*	115,566	395	187
*WW2P	*	115,060	295	220
*W3KB	*	113,322	255	187
***K5HDU**	*	**110,142**	**304**	**211**
*KE6QR	*	109,746	321	201
*WA5VSK	*	107,163	217	189
*W1RM	*	103,259	209	169
*KL2A/ND1	*	87,848	183	158
*N2CQ	*	82,368	251	192
*NZ6L	*	72,890	314	185
*N6YEU	*	68,838	174	154
*KA6NGR	*	64,477	214	151
*KW9A	*	63,504	215	144
			(OP: KØDXC)	
*W3AG	*	55,272	161	141
*N4DXI	*	49,794	157	129
*K6GEP	*	41,182	154	118
*AADAW	*	41,097	162	133
*WA5Y	*	40,567	130	113
*K6LE	*	39,864	193	132
*K7VIT	*	33,439	132	119
*NA6Q	*	30,970	116	95
*WJ7R	*	30,048	112	96
*AK6R	*	28,194	210	111
*K9CT	*	23,474	103	97
*AD5VJ	*	18,177	88	83
*W6OAT	*	11,505	79	65
***W8TK**	*	**9,129**	**56**	**51**
*N4TOL	*	9,072	92	72
*WA2BCK/4	*	7,370	61	55
*WY8DX	*	5,808	44	44
			(OP: K8GT)	
*KH2AR/NI4	*	4,600	48	46
*W4HJ	*	4,402	31	31
*N2MUN	*	3,608	64	44
*N5KO/6	*	3,300	48	44
*NA6G	*	1,560	36	30
***N4NM**	28	**7,504**	**94**	**67**
***KJ9A**	14	**349,125**	**503**	**375**
***WM6A**	*	**114,898**	**255**	**203**
			(OP: K6TA)	

Alaska

AL9A	A	**277,722**	**373**	**278**
***AL2F**	14	**18**	**3**	**3**

Canada

VE3UTT	A	**5,536,092**	**1824**	**834**
VE1OP	*	**2,549,484**	**1224**	**603**
XM6LB	*	**495,216**	**490**	**342**
			(OP: VE6LB)	
VE7KS	*	**390,726**	**415**	**294**
XM5MX	*	**39,330**	**160**	**115**
			(OP: VE5MX)	
VY1EI	14	**180,923**	**335**	**239**
***K2NV/VE3**	A	**436,536**	**451**	**282**
*VA3PL	*	319,462	389	286
*VA3WR	*	3,000	33	30
*VE3XAT	*	225	9	9

Mexico

XE2K	A	**21,068**	**104**	**92**
***XE1EE**	A	**741**	**19**	**19**

U.S. Virgin Islands

***KP2B**	A	**339,915**	**337**	**255**
			(OP: WP3A)	

AFRICA

Lesotho

7P8R	A	**107,070**	**211**	**166**

Madeira Islands

CT3KN	A	**6,145,750**	**2092**	**775**
CT3EE	*	59,944	135	127

Morocco

CN3A	A	**12,900,240**	**3446**	**943**
			(OP: IK2QEI)	

ASIA

Asiatic Russia

RG9A	A	**8,727,154**	**2934**	**907**
			(OP: UA9AM)	
RX9SA	*	3,141,795	1622	645
RU9CK	*	3,065,000	1586	613
UA9CDC	*	2,217,644	1190	572
UE8ØMD	*	**704,480**	**709**	**340**
RK9CWW	*	682,998	590	402
			(OP: UA9CIR)	
RUØLL	*	**561,522**	**672**	**313**
UA9OC	*	249,080	314	260
RW9TA	*	211,627	362	223
UA9HR	21	**245,700**	**375**	**260**
RA9AC	*	114,558	251	183
RZ9HT	14	**4,074,640**	**1794**	**848**
RO9O	*	2,811,702	1397	753
			(OP: RZ9OO)	
RK9UE	*	2,743,624	1434	713
RA9JP	*	1,620,261	1016	603
RM9RZ	*	1,593,118	1022	587
RXØAW	*	**1,563,120**	**1027**	**585**
RV9CP	*	1,409,508	930	558
***RW9UU**	A	**870,216**	**780**	**404**
*RK9AD	*	651,805	666	385
*RA9MX	*	568,182	619	337
*RA9DZ	*	534,570	570	309
*RA9MC	*	271,975	400	275
*RV9MZ	*	241,155	396	233
*RW9WA	*	84,711	209	151
*RV9UB	*	35,504	136	112
*RW9WW	*	12,642	59	49
***RAØANO**	*	**128**	**8**	**8**
***RZ9CJ**	28	**69,068**	**213**	**124**
***UA9CAX**	21	**136,704**	**269**	**192**
***UA9TT**	14	**1,094,016**	**778**	**518**
*RV9UP	*	105,640	222	190
***RAØAM**	*	**35,938**	**123**	**119**

China

BA7IO	28	**152,862**	**395**	**219**
BA4ALC	3.5	**23,287**	**135**	**73**
***BA6QD**	A	**173,958**	**320**	**237**
*BD1DCG	*	10,286	94	74
***BY2UOL**	21	**17,340**	**205**	**85**
			(OP: BG2RJE)	
***BA5DX**	7	**166,704**	**283**	**184**

Georgia

***4L6QC**	7	**2,910,696**	**956**	**552**

Hong Kong

VR2XLN	A	**314,278**	**457**	**274**

India

***VU2HFR**	A	**197,780**	**307**	**220**

Japan

JAØFVU	A	**1,497,618**	**1047**	**551**
JH3PRR	*	**1,265,759**	**702**	**469**
JA2CUS	*	**1,160,073**	**893**	**471**
JN3SAC	*	465,321	531	327
JR2PMT	*	236,192	326	244
JF9JTS	*	**124,729**	**280**	**187**
JS1KQQ	*	**75,600**	**174**	**144**
JH1OVY	*	25,705	115	97
JA7ZP	*	**1,539**	**29**	**27**
JA7OWD	28	**16,020**	**105**	**89**
JE7SOG	14	**1,020**	**21**	**20**
JO1WKO	7	**442,816**	**329**	**272**
***JA1MZM**	A	**419,888**	**505**	**326**
***JA3PYC**	*	**215,270**	**341**	**209**
***JK2VOC**	*	**186,140**	**410**	**205**
***JR5XPG**	*	**89,856**	**202**	**156**
*JH1DYV	*	57,132	149	108
*JA1XRH	*	54,858	159	123
*JA1XPU	*	53,570	189	110
*JQ3UDL	*	46,440	139	129
*JRØKVU/1	*	46,400	157	100
***JH1GUO/4**	*	**42,876**	**162**	**108**
*JN1KWR	*	27,075	160	95
*JA1HG	*	24,225	116	75
*JA1KEB	*	9,389	60	41
*JI3KXB	*	4,452	47	42
*JI3OGI	*	3,977	45	41
***JA2KPV**	14	**24,864**	**112**	**96**
***JK6JAB**	7	**10,058**	**51**	**47**

Kazakhstan

UPØL	A	**8,537,042**	**3124**	**829**
			(OP: UN9LW)	
UP4L	*	6,180,760	2444	764
			(OP: UN7LZ)	
UN3GX	*	44,226	151	117

Oman

***A45WG**	A	**2,952**	**49**	**41**

Saudi Arabia

***7Z1SJ**	14	**124,630**	**221**	**206**

South Korea

***DS5UST**	A	**2,240**	**63**	**40**

EUROPE

Austria

OE3KAB	A	**890,569**	**826**	**467**
OE2VEL	*	785,192	740	488
OE3GCU	*	431,730	578	369
OE5OHO	14	**1,007,566**	**1013**	**553**
OE3I	7	**3,384,564**	**1426**	**706**
			(OP: OE3DSA)	
***OE1PPA**	A	**20,855**	**118**	**97**

Balearic Islands

EA6IB	A	**4,674,784**	**2533**	**842**
			(OP: EA3AIR)	

Belarus

EV1R	A	**2,718,848**	**1965**	**704**
EW2EG	*	75,425	248	175
EV1Z	3.5	**76,858**	**221**	**166**
			(OP: EU1UN)	
***EW1NA**	A	**594,392**	**634**	**382**

Belgium

ON6NL	21	**112,776**	**311**	**254**
OR2A	14	**396,036**	**594**	**386**
			(OP: ON7YX)	
OQ4B	*	146,747	301	257
			(OP: ON4BHQ)	
OP4K	7	**2,608,450**	**1370**	**650**
ON5KQ	*	226,950	395	255
***ON4CAS**	A	**1,106,315**	**932**	**511**
*OO9O	*	454,168	679	397
			(OP: ON7SS)	

Bosnia-Herzegovina

E73M	A	**7,020,878**	**2925**	**934**

Bulgaria

LZ8E	A	**7,286,538**	**3818**	**966**
			(OP: LZ2BE)	
LZ2ZG	28	**5,760**	**63**	**60**
LZ7J	7	**3,002,880**	**1524**	**690**
			(OP: LZ1CL)	
***LZ9R**	A	**1,094,501**	**1121**	**529**
			(OP: LZ3YY)	
*LZ2UZ	*	9,555	75	65
***LZ1QV**	7	**83,420**	**188**	**172**

Croatia

9A1CMA	A	**294,920**	**421**	**292**
			(OP: 9A5TO)	
9A2U	28	**302,168**	**718**	**353**
			(OP: 9A3ZA)	
***9A3XV**	A	**2,389,200**	**1475**	**724**

Czech Republic

OK7M	A	**5,637,618**	**2482**	**886**
			(OP: OK1DIG)	
OK7Y	*	3,106,558	1814	707
			(OP: OK1FDY)	
OK2YZ	*	826,560	873	492
OK1DTC	*	103,936	255	203
***OK1TA**	A	**1,550,374**	**1197**	**574**
*OK1TC	*	1,214,952	1063	568
*OK2BXE	*	921,456	983	486

Dodecanese

***SV5/DL3DRN**	A	**324,276**	**674**	**366**

England

G1A	A	**5,320,160**	**2908**	**912**
			(OP: MØDXR)	
G3NKC	*	209,348	348	263
G4AIU	28	**483**	**21**	**21**
M7A	7	**3,026,082**	**1346**	**634**
			(OP: LY4Y)	
G4IIY	*	1,114,861	789	473
***G4WGE**	A	**511,216**	**667**	**359**
*G8MIA	*	277,420	510	286
*2E1OKT	*	48,790	197	170
			(OP: MØOKT)	
*G6OKU	*	31,440	159	131
*G4PIQ	*	4,653	51	47
***G4ROI**	14	**59,400**	**193**	**180**

European Russia

UA6LV	A	**5,444,692**	**2552**	**1004**
RT3T	*	**4,086,192**	**2436**	**852**
			(OP: UA3TU)	
RW3GU	*	3,635,044	2345	788
RX4HZ	*	**3,379,014**	**2088**	**786**
RV2FW/1	*	**2,638,902**	**1968**	**757**
RX3AT	*	1,894,676	1411	628
UA1ANA	*	1,582,030	1583	562
RV3MI	*	987,224	997	488
RN1ON	*	713,296	738	409
RA1QD	*	704,435	788	445
RK3DH	*	700,308	730	441
RX3AEX	*	548,800	742	400

RX3AGD	"	474,300	521	425
RA3FD	"	229,215	391	259
UA3PPP	"	223,001	476	269
RW4WZ	"	218,064	390	308
UA6AA	"	142,200	334	225
RW3ZA	"	117,392	284	232
RA3XE	"	60,249	180	151
RW3DOX	"	41,756	203	143
RZ3DA	"	37,674	128	117
RU3OO	"	80	8	8
RK6ASY	21	35,742	172	138
RX6AM	14	2,987,206	1869	853
UA6LUQ	"	548,129	744	461
RL4R	7	2,647,350	1377	675
(OP: RW4PL)				
UA6GP	"	2,138,697	1210	627
RU6FA	"	1,542,932	1014	541
RA4ST	"	582,540	621	380
UA4FCO	3.5	32,944	144	116
RA6CZ	1.8	19,716	106	93
*RD1AW	A	901,697	997	493
*RK3FJ	"	607,425	672	445
*RL3FO	"	546,630	816	411
*UA6YH	"	296,475	500	335
*RV3QO	"	167,825	420	245
*UA3RW	"	147,840	351	231
*RA3BB	"	132,326	305	218
*RU3UM	"	105,910	314	238
*RA3YC	"	36	3	3
*RA6YDX	28	32,640	187	128
*UA6GM	14	231,820	406	335
*RN4HAB	"	112,320	298	234
*RK3DXB	7	180	9	9
*RA4HO	3.5	27,606	132	107

Finland

OG6N	A	3,080,096	2129	808
OH6MW	"	1,663,038	1630	598
OG4X	"	424,864	714	374
OH2XX	"	212,976	377	261
OH3FM	"	137,470	390	233
OH4MDY	28	140,541	476	237
OH6M	7	2,387,858	1288	622
(OP: OH6LBW)				
*OH2LNH	A	527,013	732	393
*OH2BN	14	1,173	23	23

France

F5CQ	A	1,404,861	1104	569
F5VKT	"	692,094	747	467
F5IN	14	1,446,400	1188	640
*F8CRS	A	839,928	848	474
*F4FDA	"	60,435	198	153

Germany

DL3TD	A	6,804,672	2622	976
DK3GI	"	4,632,516	2237	868
DL5YYM	"	3,663,516	2103	769
DL7ON	"	3,152,160	1822	792
DL6KVA	"	3,115,221	1790	817
DJ3WE	"	1,878,759	1474	597
DL8QS	"	1,764,532	1282	674
DR8ØØGRZ	"	1,743,420	1287	593
(OP: DG1CMZ)				
DHØGHU	"	1,612,260	1301	585
DL4SDW	"	1,481,174	1163	571
DL7JAN	"	1,402,343	1267	587
DJ9AO	"	1,091,800	1170	530
DL8UAT	"	1,082,088	976	504
DL1NEO	"	1,021,140	916	558
DL5JS	"	1,001,889	931	513
DL5MX	"	889,002	966	489
DJ5MW	"	645,920	805	440
DK6CQ	"	542,136	698	392
DJ9RR	"	508,644	721	398
DF8AA	"	399,160	515	340
DF5ZV	"	293,475	467	301
DL9GS	"	269,925	460	295
DL7DZ	"	204,215	328	235
DM5TI	"	195,270	364	283
DL1BUG	"	131,175	294	225
DR5X	"	125,664	338	238
(OP: DL8LAS)				
DAØI	"	113,661	266	219
DL4YAO	"	81,266	206	179
DL1YFF	"	76,744	224	181
DL2RTL	"	47,728	199	152
DL5MEV	"	3,306	38	38
DO4DXA	28	17,013	124	107
DJ1AA	"	3,484	53	52
DK5OS	14	415,512	514	398
DK1QH	"	62,320	215	190
DL6EZ	"	16,016	93	88
DL4CF	7	1,830,390	1004	555
DL3QQ	"	1,709,208	951	579
DR7T	3.5	498,006	637	379
(OP: DL1HCM)				
DF9LJ	"	214,578	358	273
DLØMB	1.8	78,400	251	175
(OP: DF2UU)				
*DJ1OJ	A	961,193	978	529
*DM5JBN	"	865,809	954	509
*DJ5QV	"	851,341	928	467
*DL3ZM	"	795,905	825	499
*DG7RO	"	571,024	656	401
*DL7UIO	"	441,232	606	368
*DM3PKK	"	415,149	549	371
*DJØSP	"	156,624	383	251
*DK4WF	"	137,591	319	223
*DF2LH	"	111,904	265	208
*DF9ZP	"	106,855	270	215
*DK3DUA	"	91,960	268	190
*DL6DH	"	86,994	225	179
*DL8CA	"	78,320	203	178
*DF1HF	"	66,259	201	173
*DH5JG	"	58,646	167	142
*DK7ZH	"	57,933	194	157
*DL1EHR	"	43,095	221	169
*DL8ZAJ	"	36,608	153	128
*DL2SWN	"	31,395	147	115
*DF2HL	"	22,448	101	92
*DO1AYJ	"	17,066	138	106
*DL6UM	"	7,198	60	59
*DF2AP	"	3,680	47	46
*DL3YDY	"	1,400	36	35
*DL2MLU	"	1,224	27	24
*DH8BQA	28	109,680	370	240
*DL5MO	14	157,794	337	273
*DL2SAX	7	339,416	475	319
*DAØCA	"	288,708	410	294
(OP: DL1REM)				
*DJ8ES	"	50,556	141	132
*DN7DX	3.5	2,048	34	32

Greece

SV1ENG	A	1,430,823	1554	617
SV1DPI	"	5,760	79	60
*J43J	A	36,312	161	136
(OP: DJ5JH)				
*SV1AAK	"	3,200	40	40

Guernsey

*MUØFAL	A	79,061	238	173

Hungary

HG7T	A	4,286,414	2330	803
(OP: HA7TM)				
HA3OU	"	925,002	911	531
HA7PF	"	299,224	507	331
HA3PT	"	88,830	257	189
HA8TP	28	135,150	417	255
HA9PP	14	3,000,404	1865	836
HG3A	7	3,088,944	1426	684
(OP: HA3MQ)				
HA3LI	3.5	867,141	850	461
*HG8C	A	1,063,628	1077	556
(OP: HA8EK)				
*HA2VR	"	316,092	439	318
*HA7VK	"	227,920	394	296
*HA3OV	14	61,854	207	183
*HG8K	7	1,504,752	947	552

Isle of Man

MDØCCE	A	1,209,465	1029	527

Italy

IR4X	A	9,160,470	3272	1045
(OP: IZ3EYZ)				
IO4T	"	4,285,532	2334	838
(OP: IK4VET)				
IN3QBR	"	3,298,816	1987	758
I1XSG	"	891,344	986	452
I1EIS	"	662,121	715	411
IKØXBX	"	117,216	285	222
IZ6BTN	"	2,808	44	39
IK2AOO	14	324,894	491	346
IQ8LR	7	35,754	129	118
(OP: IZ8DVD)				
*I2WIJ	A	349,307	486	359
*IK3QAR	"	338,238	635	342
*IZ3DVU	"	129,816	290	216
*IZ1GIP	"	17,112	98	93
*IK2XRW	14	5,076	57	54
*IZ3KKE	7	237,096	319	267
*IZ8GCB	"	97,200	223	180

Latvia

YL5T	A	3,181,003	2063	749
(OP: YL3DQ)				
YL8M	"	2,522,160	1707	720
(OP: YL2KL)				

Lithuania

LY8O	A	6,582,390	2885	939
LY5W	"	3,305,148	2054	803
LY2XW	"	1,099,761	1131	519
LY7M	3.5	841,940	826	445
*LY3BY	A	878,007	945	479
*LY2LF	14	34,827	177	141
*LY2KZ	7	941,787	826	453

Macedonia

*Z35X	A	661,540	904	485

Netherlands

PA3EWP	21	307,192	535	376
*PA1TX	A	542,464	724	416
*PA7RA	"	143,321	359	251
*PA5F	"	57,834	208	189
*PA4AO	7	1,222,292	857	514

Norway

*LA4RT	A	227,098	402	271
*LA3ZA	"	20,114	99	89

Poland

SP4Z	A	4,305,942	2135	834
SO6I	"	1,167,194	1074	526
(OP: SP6JIU)				
SN9Z	"	472,386	664	393
(OP: SP6EQZ)				
SP8HXN	"	193,214	398	259
SP5BMU	"	24,898	133	118
SP3JUN	"	6,240	72	65
SP2JMB	21	182,920	407	269
SP1RKT	"	486	19	18
SP9CVY	14	15,030	98	90
*SQ3RX	A	1,075,320	1111	522
*SP7FRO	"	17,480	103	92
*SN9K	"	11,424	95	84
(OP: SP9MDY)				
*SQ9IWT	"	10,833	78	69
*SP6IHE	"	9,546	45	43
*SP5ADX	"	3,567	43	41
*SP5XO	28	42,632	215	146
*SQ9FMU	"	17,385	129	95
*SP3GXH	21	91,590	266	213
*SP8TJU	"	3,213	54	51
*SQ5FWR	14	298,738	464	367
*SP2UKB	"	91,400	245	200
*SP4JTJ	7	251,370	316	270
*SQ1DWR	3.5	290,169	474	297

Romania

YR9P	A	4,918,251	2449	897
(OP: YO9HP)				
YO6A	"	2,817,840	1941	708
(OP: YO6BHN)				
YO7FB	"	1,452,540	1484	563
YO5CUQ	"	33,929	157	131
YO5BBO	21	189,042	518	294
YO5CBX	14	1,285,232	1124	668
YO3JW	7	368,508	432	321
YO8TOH	"	35,328	105	96
YO8MI	3.5	7,493	63	59
*YR8I	A	543,360	789	384
(OP: YO8TBA)				
*YP2U	"	324,800	493	320
(OP: YO2NAA)				
*YO2GL	"	253,376	438	296
*YO3FRI	"	72,822	188	159
*YO5Q	14	1,479,492	1409	684
(OP: YO5OHO)				
*YO9HG	"	20,790	139	126

Sardinia

*ISØ/IT9VDQ	A	9,717	95	79

Scotland

*GM4UYZ	A	8,881	88	83

Serbia

YT2T	28	255,640	661	332
YU1LA	7	5,555,958	1919	829
YT6T	3.5	573,806	661	379
(OP: YU7CM)				
*YU9DX	A	4,779	67	59
*YT5CWW	14	385,742	639	413
*YU2EZ	"	165,564	381	292
*YU6DX	7	2,466,420	1302	660

Sicily

*IT9LNH	A	874	23	19

Slovakia

OM6A	A	2,195,192	1595	662
(OP: OM6NM)				
OM3AG	28	86,904	340	204
*OM5UM	A	162,081	358	243
*OM4DU	"	48,384	181	144
*OM3NI	14	103,292	272	238

Slovenia

S59ABC	A	5,704,920	2339	954
(OP: S51DS)				
S52AU	"	364,170	560	366
S55O	"	66,348	238	171
S57AW	28	403,524	836	396
S5ØR	7	1,796,300	1085	550
S51DX	"	156,240	346	217
S56X	3.5	1,315,146	1008	519
S59A	"	481,822	582	362
S57M	1.8	209,040	406	260
*S54X	A	1,422,869	1144	553
*S59MA	"	560,268	721	394
*S52W	"	102,676	252	193

Spain

EA4KA	A	2,324,511	1631	753
EA1WX	"	771,420	854	516
EC1KR	"	84,915	258	185
EA7ZY	"	31,185	156	135
EA5FID	21	384,580	705	410
EA4TX	14	382,481	553	319
EA2AZ	"	3,408	50	48
EF1A	7	847,314	616	442
(OP: EA1XT)				
EA2KY	"	5,145	51	49
*EA5DKU	A	112,750	246	205
*EA4XT	"	106,930	273	185
*EA5GS	28	28,560	176	140
*EA4/DH1TW	14	2,088	32	29

Sweden

SM6CNN	A	3,153,969	1807	819
SD4ØJZ	"	1,252,220	1134	580
(OP: SM5DJZ)				
SA1A	"	406,812	739	348
(OP: SM1TDE)				
SM2M	"	406,029	504	359
(OP: SM2LIY)				
8SØW	"	192,740	330	230
SE2T	21	76,167	311	189
*SE5E	A	137,925	301	225
(OP: SM5AJV)				
*SM6WET	"	20,097	99	87
*SM6TOL	"	11,135	88	85
*SC3A	3.5	1,431	28	27
(OP: SM3WMU)				

Switzerland

HB9TMW	A	93,177	264	189
HE8CZF	28	5,490	74	61
(OP: HB9CZF)				
HB9DDO	14	1,520,480	1235	680
HB9CVQ	7	2,192,610	1266	591

Ukraine

UT7UJ	A	1,851,082	1229	626
UT2UB	"	1,501,591	1381	569
UT5EO	"	922,214	913	466
US3IZ	"	873,438	1079	447
UU2J	"	803,523	820	461
UR5QA	"	323,610	605	345
UX2IJ	"	154,395	320	219
UU2JQ	"	1,881	35	33
UZ5Q	28	19,190	129	101
UT4ZG	14	2,416,398	1763	773
UTØRM	"	383,376	650	392
UR5VR	"	86,000	237	215
UT8EU	7	937,860	698	462
*UY7C	A	1,460,525	1279	565
*UY5ZI	"	535,768	728	386
*UT3FM	"	290,400	540	300
*UX5I	"	247,296	499	256
*UR6IS	"	233,130	457	285
*UR7EW	"	160,062	318	259
*UU1CW	"	146,557	294	233
*UR5IFB	"	96,577	269	221
*UT2UU	"	48,860	154	140
*US2YW	"	8,820	69	60
*US3IP	"	189	10	9
*UR5LO	28	138,381	395	239
*UT2IV	"	4,524	62	52
*UR2VA	21	54,615	209	165
*US4LGW	14	662,656	745	496
*UR7QM	"	47,261	196	167
*UT3L	7	352,878	449	309
(OP: US5LAC)				
*UV1G	"	690	15	15
*UT1YV	"	18	3	3
*UX6VA	3.5	67,396	208	166
*UR5IHQ	"	66,411	214	157
*UR8IDX	"	44,298	163	138
*UR6QR	"	10,080	82	70
*US7IY	"	136	8	8

OCEANIA

Australia

*VK3KE	A	49,184	125	106
*VK3FM	"	43,800	124	100

Hawaii

*AH6NF	7	1,674	18	18

Indonesia

YB4IR	A	295,542	348	234

New Zealand

ZL1BYZ	A	2,086,391	1068	509
ZL2IFB	28	9,932	67	52

SOUTH AMERICA

Argentina

LP1H	A	6,699,400	2155	817
(OP: LU5HM)				
*LU3JVO	21	7,350	53	50
*LU7KAT	14	671,044	599	404

Brazil

PR5W	A	751,100	534	370
ZY7C	14	4,431,078	1838	837
(OP: PY8AZT)				
PY5AKW	7	101,432	144	124
*PY2IQ	A	93,318	183	151
*PY2XC	28	2,128	31	28
*PU9OSB	21	7,738	56	53
*PY2BRZ	14	40	5	5

Chile

*CE4CT	A	2,134,938	1051	542
(OP: XQ4CW)				

Colombia

HK1X	A	288,648	414	228
HK3Q	"	113,562	204	162

Uruguay

CW7T	A	193,505	262	229
(OP: CX7TT)				

TRIBANDER/SINGLE ELEMENT

United States

KR4Z	A	3,908,800	2198	800
(OP: N4PN)				
K4BAI	"	3,277,260	2005	756
WN2O	"	3,248,232	1673	718
(OP: N2GC)				
W1CU	"	2,593,020	1197	690
NM5O	"	2,128,780	1605	652
(OP: N5NU)				
N1WR/3	"	2,081,340	1248	620
N3UM	"	2,004,080	1203	611
KYØW/6	"	1,949,970	1496	627
(OP: K6SRZ)				
N3CZ/4	"	1,878,600	1297	606
KF6T	"	1,875,357	1393	627
WZ4F	"	1,622,080	1213	592
(OP: K4AB)				
NX2X	"	1,153,440	904	480
NO8DX	"	1,097,600	872	490
(OP: K8MR)				
K9CC	"	1,015,580	1179	493
NS9I	"	995,976	1061	522
K7HP	"	986,518	990	494
W1BYH	"	907,709	727	461
W1FJ	"	811,960	676	424
AD4EB	"	804,300	978	420
W6TK	"	716,909	723	419
NE8P	"	646,646	716	418
W2LE	"	580,957	595	377
K4DJ	"	559,700	666	386
KE3D/5	"	465,864	558	354
K4HAL	"	398,112	611	348
W7SW	"	396,644	587	307
KI7Y	"	392,445	618	323
N6KW/7	"	391,152	550	348
W4PM	"	383,394	543	314
NS8O	"	375,410	520	346
WI2E/3	"	330,885	462	285
N4QQ/3	"	318,045	431	273
KGØUA	"	176,400	279	240
W8PN	"	171,558	364	243
WB4ROA	"	155,092	238	191
W6SX	"	132,858	342	198
K1ZE	"	118,737	195	167
W4XO	"	109,335	267	185
KJ3X	"	92,092	220	161
(OP: K1DQV)				
W4CWA	"	77,331	213	173
W6FG	"	47,125	215	125
K6IP	"	19,401	101	87
AE4EC	"	18,666	149	102
W2UDT	"	11,250	87	75
AB7E	14	1,558,050	1283	663
AE1T	"	478,859	546	389
KV7DX	"	150,600	328	251
(OP: KN5H)				
K7RF	"	118,767	241	183
K2SX/4	"	114,080	344	230
KU8E/4	"	98,810	247	205
W6RKC	"	96,768	225	189
W9/UY5LW	7	1,169,649	934	507
*NR3X/4	A	1,752,894	1438	594
(OP: N4YDU)				
*WD4AHZ	"	1,689,540	1317	580
*WD5K	"	1,582,105	1223	595
*KZ9O	"	1,287,018	1180	563
*NA4K	"	1,218,474	1037	487
*K4IE	"	1,097,577	944	477
*KV8Q	"	1,084,824	966	488
*NO3M	"	1,074,479	1076	469
*WN6K	"	840,042	998	413
*KN7T	"	721,476	975	441
*N4PSE	"	576,878	604	361
*W1NN/8	"	557,004	540	349
*NP3D/NY2	"	534,204	595	396
*W1TO	"	519,216	513	348
*KM2L	"	493,324	482	358
*W9LHG	"	461,462	629	358
*WB8TLI	"	443,856	448	336
*W8IQ	"	402,203	401	401
*K5EWJ	"	388,925	549	331
*K1TN/2	"	384,709	496	293
*WQ5L	"	367,479	468	307
*K4MF	"	358,710	500	330
*KØGEO/5	"	324,775	545	275
*N4ARO	"	320,073	434	283
*KB3LIX	"	305,525	437	275
*W8GOC	"	295,800	425	290
*KK8U	"	289,870	472	287
(OP: K8MM)				
*NE7D	"	250,120	496	260
*KG4W	"	235,572	405	268
*W9CPI	"	225,502	408	274
*NØBUI	"	222,780	406	282
*N4HA	"	188,604	297	234
*K3TN	"	186,735	275	211
*W4RYW	"	185,879	349	269
*K1HI	"	177,816	329	239
*N2FF	"	177,708	333	236
*KS8O	"	168,948	362	247
*AD1C/Ø	"	167,328	396	249
*WO1N	"	147,489	296	211
*N3QE	"	127,835	242	185
*W3WC	"	121,260	257	188
*WC4E	"	103,986	194	159
*NN8UU	"	92,340	276	190
(OP: N8VW)				
*WC3O	"	92,070	225	186
*N6GL	"	86,022	304	162
*K7TR	"	82,128	246	177
*W5EK	"	78,416	206	169
*AA6EE	"	72,652	250	164
*NC6V	"	72,332	255	169
*WE6EZ/7	"	66,297	259	147
*WA1ESO	"	65,648	220	176
*KB8OCP	"	63,024	202	156
*K3RWN	"	52,500	177	140
*K6WSC	"	45,560	190	134
*K4FTO	"	40,172	144	121
*AA5TB	"	36,800	108	100
*WB8TSD	"	32,670	168	121
*N7EIE	"	31,248	167	112
*AE6RG	"	30,090	152	102
*K6CSL	"	26,000	152	100
*WI8B/4	"	23,653	130	109
(OP: W4EBA)				
*NO5W	"	20,100	127	100
*AA6YX	"	17,760	128	96
*K5ICW	"	12,691	51	49
*N7RN	"	10,956	98	83
*N6AJR	"	5,029	56	47
*K2IZ	"	2,730	38	35
*K7EIQ	"	882	22	21
*K7GIM	"	330	23	22
*KE7DX	21	12,905	100	89
*K7MH	"	7,704	82	72
*NA4M/5	"	952	28	28
*WA1FCN/4	14	982,311	1014	561
*K3GW	"	178,461	286	251
*NWØDX	"	120,085	297	235
(OP: KØIO)				
*K4EU	"	80,808	196	182
*WA6L	"	8,733	73	71
*N7FG	"	476	17	17
*KI6OY	"	4	2	2
*AB1J	7	241,542	309	243
*AF5Z	"	3,052	28	28
*N9TF	3.5	2,484	43	36
*WD5BJT	1.8	49	7	7

DX

VC2A	A	9,801,372	3060	948
(OP: VE3NE)				
TC4X	"	9,500,632	2907	899
(OP: OH2PM)				
S53MM	"	6,170,859	2671	887
HG8R	"	5,798,912	2627	896
(OP: HA8JV)				
9A5K	"	4,823,122	2462	829
VA2WDQ	"	3,610,516	1680	676
UO1P	"	3,568,848	1890	596
(OP: UN7PL)				
EV2A	"	3,209,080	2071	785
(OP: EW2AA)				
EF3A	"	3,172,609	2171	761
(OP: EA3KU)				
YL9T	"	2,622,144	2107	672
(OP: YL2TW)				
UW8SM	"	2,516,736	1877	696
J48HW	"	2,506,761	2056	681
(OP: HAØHW)				
OY1CT	"	2,492,924	2180	686
LA8OM	"	2,468,572	1804	619
EU1AZ	"	2,439,885	1949	665
OK1VD	"	2,428,184	1531	673
RU3UR	"	1,944,783	1497	669
HA1TNX	"	1,878,600	1359	600
PF7M	"	1,862,280	1563	630
OA4SS	"	1,826,166	1132	498
DL5YM	"	1,818,771	1463	613
UA4WI	"	1,757,288	1826	554
RA3AUM	"	1,755,936	1695	624
EO1I	"	1,751,340	1819	606
(OP: UT1IA)				
EX2X	"	1,708,670	1260	529
DL4WA	"	1,662,967	1339	601
DK1KC	"	1,314,334	1182	538
LY2TS	"	1,301,408	1190	536
GM4SID	"	1,256,040	1240	540
DF1DX	"	1,254,400	1183	560
RU3FF	"	1,184,240	1226	524
G4MKP	"	1,141,920	1105	488
OP4A	"	1,120,924	1056	532
JA7COI	"	1,106,892	968	444
GØORH	"	1,102,587	1087	467
UA9UCK	"	938,313	590	411
VK2IM	"	870,504	710	332
DK8EY	"	860,232	922	491
JI3BFC	"	729,018	810	401
EW7BR	"	636,768	708	432
B3C	"	527,405	730	337
(OP: BD3AVB)				
UR5WCQ	"	509,340	610	390
VK4BUI	"	491,057	479	287
DJ5MY	"	419,843	628	361
JE1LFX	"	411,174	517	318
IØZUT	"	351,648	508	333
IU1A	"	346,437	489	329
(OP: IK1SPR)				
OH2VZ	"	324,362	545	314
S51J	"	324,000	493	324
OH1BOI	"	318,688	583	368
G4HZV	"	314,314	507	314
RK9KWI	"	283,800	414	264
S58P	"	243,946	504	283
JA1HP	"	229,104	447	258
OH8KA	"	229,026	523	287
UA4CCG	"	208,161	486	303

EA7MT	"	**180,180**	**382**	**252**
EA7OR	"	172,544	382	256
YT2AA	"	**142,044**	**327**	**266**
VE7JKZ	"	**135,470**	**236**	**190**
KP4GC	"	**133,920**	**189**	**186**
DF3EH	"	101,469	276	227
ON7ON	"	101,304	295	216
SP2FGO	"	**93,436**	**237**	**188**
DJ6TB	"	44,460	158	130
GM3JKS	"	34,220	131	116
EA5KV	"	**33,024**	**185**	**128**
DF6RI	"	25,740	130	110
DL9GWD	"	23,544	122	109
GØOKF	"	23,056	162	131
RA9UN	"	20,251	120	77
IK8EJN	"	12,375	74	55
LU9MDH	"	**8,845**	**66**	**61**
OQ5M	28	**143,374**	**419**	**266**
			(OP: ON5ZO)	
G4IUF	"	**37,500**	**196**	**150**
SM6X	"	**18,810**	**139**	**95**
			(OP: SM6CLU)	
UR5MBA	"	**10,626**	**87**	**66**
KG6DX	"	**10,368**	**66**	**54**
IT9IMJ	"	**624**	**26**	**24**
LY2NI	21	**10,044**	**98**	**81**
ZC4LI	14	**4,907,424**	**2185**	**816**
IU9T	"	**4,405,444**	**2359**	**947**
			(OP: IT9GSF)	
EF7R	"	**1,883,052**	**1488**	**684**
			(OP: EA7AJR)	
OI6X	"	**1,587,624**	**1434**	**664**
			(OP: OH6NJ)	
JH7XMO	"	**1,499,025**	**1079**	**575**
VE1MC	"	**452,822**	**484**	**373**
JA9CWJ	"	**334,536**	**397**	**318**
KH6CW	"	**228,000**	**315**	**250**
			(OP: K7GQ)	
JA3DAY	"	**133,760**	**256**	**220**
N2WQ/VE3	7	**1,907,698**	**931**	**478**
UY2ZZ	"	**243,806**	**346**	**278**
JH1APK	"	**80,827**	**145**	**131**
HR2J	"	**6**	**1**	**1**
OL2N	3.5	**844,358**	**819**	**443**
			(OP: OK1FDR)	
SP5KCR	"	**752,524**	**808**	**419**
			(OP: SP5JTF)	
IK2SND	"	**223,170**	**420**	**258**
***VE3DZ/VP9**	**A**	**7,152,900**	**2573**	**844**
***GJ3WW**	"	**2,837,742**	**1916**	**731**
***RT9S**	"	**2,723,300**	**1488**	**565**
			(OP: UA9SP)	
***UT7NW**	"	**2,104,752**	**1720**	**624**
***VE2XAA**	"	**1,986,262**	**1109**	**557**
***UN7IT**	"	**1,974,009**	**1083**	**467**
*RX9AM	"	1,906,632	1073	504
***OK5DQ**	"	**1,762,748**	**1437**	**622**
***JI1RXQ**	"	**1,536,210**	**972**	**507**
***OV3X**	"	**1,463,616**	**1211**	**594**
			(OP: OZ8AE)	
***OK2QX**	"	**1,443,488**	**1243**	**571**
***GØMTN**	"	**1,242,412**	**1223**	**526**
*UU1CC	"	1,222,320	1207	528
***UA3ABJ**	"	**1,194,090**	**1085**	**530**
***YL3DX**	"	**1,153,696**	**1271**	**496**
*OK1FHI	"	1,052,612	1092	509
***JHØNEC**	"	**1,035,452**	**850**	**466**
***YO3APJ**	"	**1,016,189**	**899**	**523**
*OK4N	"	1,004,880	1065	474
*VA2SG	"	998,030	764	430
*RA9SN	"	969,822	744	387
*UR7EQ	"	910,118	1026	451
***UA4WCM**	"	**889,372**	**1121**	**493**
***OM/SQ9UM**	"	**889,240**	**988**	**470**
*RU3SE	"	880,049	1092	461
***CU3HQ**	"	**862,272**	**1085**	**499**
***IK2AHB**	"	**806,083**	**898**	**463**
*OK1GS	"	713,859	768	447
***HA1BC**	"	**684,320**	**723**	**416**
***YU1FG**	"	**677,295**	**806**	**435**
*UA9DD	"	670,892	591	358
***LZ5VK**	"	**613,600**	**720**	**416**
***RA6AR**	"	**582,521**	**728**	**437**
***SP5EOT**	"	**569,936**	**801**	**398**
*HA1AR	"	546,156	624	389
*RA3UT	"	543,118	780	443
***JA2KVB**	"	**527,662**	**557**	**386**
***F5NQL**	"	**524,443**	**656**	**367**
***JE4MHL**	"	**518,500**	**645**	**340**
*RX9DJ	"	512,919	587	297
*DJ7EC	"	496,584	779	396
*UR4U	"	423,984	574	363
			(OP: UR4UDI)	
*DD3D	"	378,780	491	321
*DL4HRM	"	361,374	572	339
***LY2DV**	"	**342,705**	**559**	**335**
*OK2HBR	"	332,664	510	332
***JH3CUL**	"	**313,116**	**522**	**269**
***UA1TGQ**	"	**305,694**	**440**	**306**
***E72U**	"	**304,764**	**530**	**327**
***NP2L**	"	**302,974**	**327**	**238**
*OL2ØFOC	"	300,898	496	326
			(OP: OK1CZ)	
*UA9XF	"	297,084	445	228
*DL9CW	"	293,910	416	291
***PA3DBS**	"	**284,867**	**573**	**319**
*SQ9E	"	268,785	424	297
*JF3KQA	"	247,940	422	230
*UT2LF	"	247,752	440	296
***S51MF**	"	**242,970**	**391**	**273**
***OR6C**	"	**239,425**	**438**	**305**
***JG5DHX**	"	**225,968**	**414**	**232**
*PA3AIN	"	221,904	430	276
*G3VQO	"	218,890	500	265
***VO1TA**	"	**211,037**	**336**	**239**
***VE3UZ**	"	**203,280**	**307**	**231**
*PG7V	"	189,864	343	293
*VE3RCN	"	180,184	297	202
*G4DDX	"	180,005	353	259
*SP6QKP	"	172,996	379	244
*RA9AAA	"	170,345	297	217
***CO2WF**	"	**166,833**	**232**	**167**
***JJ6TWQ**	"	**160,930**	**286**	**209**
*JE1REU	"	159,537	345	213
*JH3PTC	"	156,640	384	176
***SV9COL**	"	**146,931**	**266**	**201**
*UN8FM	"	133,991	213	143
*SP2YUV	"	133,836	321	228
			(OP: SP2UV)	
*VE2FK	"	133,385	254	185
*G3RWF	"	133,049	309	229
*JE1SGH	"	131,211	280	183
*S57AD	"	127,224	331	228
*JH1SWD	"	125,751	258	167
*7K1MAG	"	120,225	239	175
***SE6C**	"	**116,696**	**300**	**232**
			(OP: SM6CDN)	
*G6NUM	"	115,233	294	213
***RA2FB**	"	**109,604**	**329**	**212**
***V55X**	"	**103,870**	**204**	**170**
			(OP: V51YJ)	
*JA2VZL	"	93,480	219	152
*SP7TES	"	92,130	233	185
*RZ9HA	"	87,548	204	172
*RK1AM	"	82,812	297	206
*RU9UG	"	80,940	207	142
*YR5S	"	77,608	212	178
			(OP: YO5OBP)	
*JA2QVP	"	77,463	198	151
*YL2IU	"	74,448	294	188
*DH3FAW	"	66,740	239	188
*S56C	"	63,984	199	172
*DL3KVR	"	60,060	196	182
*ON4CT	"	59,730	205	165
*RA3VE	"	55,480	204	146
*IK4UNH	"	54,549	217	171
*IV3ARJ	"	50,530	209	155
*VE3OX	"	48,133	154	127
*DL1NFG	"	42,032	158	142
*SP2UV	"	39,186	149	126
*PA3AFF	"	38,038	182	133
***VK4TT**	"	**37,926**	**115**	**86**
***LX1ER**	"	**36,855**	**141**	**117**
***A35RK**	"	**29,722**	**106**	**77**
*UU1JE	"	28,542	156	142
*JA4BDY	"	27,642	124	102
*YU7FN	"	25,398	129	102
***LA6ZFA**	"	**24,824**	**128**	**116**
*OK2QA	"	23,408	132	112
*OZ4RT	"	21,384	116	108
*OZ/G4DDL	"	18,666	116	102
***HL5YI**	"	**18,564**	**93**	**78**
*IK8SCR	"	18,400	98	92
*DF1MA	"	17,298	106	93
***TF8GX**	"	**15,840**	**97**	**90**
*IK2CZQ	"	15,811	105	97
*DL2WJT	"	14,960	95	85
***VE7BGP**	"	**13,124**	**87**	**68**
*JI1UDD	"	12,505	89	61
*IK7NXU	"	11,840	90	80
*S51AE	"	10,374	67	57
*VK4SN	"	9,720	45	45
*US4IXT	"	8,100	56	54
			(OP: US0ITU)	
*DK2LO	"	5,000	52	50
*DJ3HW	"	4,324	50	46
*VA7MM	"	4,130	38	35
*JI4WHS	"	3,710	40	35
*SM6Z	"	3,525	47	47
*UA4CNJ	"	3,232	35	32
*JI1BDQ	"	2,418	29	26
***JL8MBF**	"	**2,244**	**48**	**34**
*VY2LI	"	2,187	33	27
*DL4SUN	"	1,664	28	26
*JO1WIZ	"	336	20	14
*JE2XBS	"	195	15	13
***RU6MD**	**28**	**21,306**	**128**	**106**
***JL3MCM**	"	**7,705**	**106**	**67**
***RW3VZ**	"	**480**	**20**	**20**
***Z31MM**	**21**	**248,159**	**645**	**353**
***HK1N**	"	**146,382**	**287**	**186**
***AHØAA**	"	**141,484**	**309**	**163**
			(OP: JR2SCJ)	
*YT7T	"	58,645	261	185
*ZL3TE	"	36,180	138	90
			(OP: W3SE)	
*HSØZDR	"	3,045	35	35
*C4Z	**14**	**1,734,560**	**1089**	**586**
			(OP: 5B4AIZ)	
*S57U	"	1,060,565	1037	605
*DD1IM	"	241,230	411	330
*EA4CWN	"	165,968	315	253
*UA3VVB	"	73,440	178	170
*SP8EEX	"	71,440	219	190
*G3ZRJ	"	62,868	212	186
*JA4AQR	"	24,252	99	94
*US5EEK	"	12,166	81	79
*RW4LQ	"	6,762	50	49
*ES8/OH6CS	"	1,488	31	31
*S54A	**7**	**1,353,690**	**911**	**534**
*DK8NT	"	578,124	562	404
*UW2F	"	554,496	574	384
			(OP: UTØFT)	
*G3MZV	"	538,284	520	372
*RU3PU	"	421,080	473	348
*UA6BFE	"	293,601	360	287
*US2MW	"	242,970	364	267
*JA2PFO	"	99,216	195	144
*SP5NZN	"	95,387	210	181
*G4BXT	"	65,036	161	142
*JJ2JQF/1	"	55,796	154	116
*JR4URW	"	53,901	153	113
*ZS4JAN	"	6,868	36	34
*VK3VT	"	2,640	23	22
***RK1AX**	**3.5**	**266,630**	**451**	**293**
***IV3NVN**	"	**259,974**	**421**	**286**
***PAØMIR**	"	**49,345**	**171**	**139**
***SN5Q**	"	**15,390**	**98**	**81**
			(OP: SQ5RDX)	
*IKØEIE	"	3,120	40	40
***GØMLY**	"	**392**	**14**	**14**
***YT4A**	**1.8**	**119,892**	**292**	**206**

ROOKIE

United States

***AF6EV**	**A**	**294,126**	**517**	**282**
***NG5NG**	"	**62,726**	**199**	**158**
***W4PVC**	"	**26,160**	**132**	**109**
*AD5VC	"	24,644	116	101
KB1ODO	"	**19,270**	**143**	**94**
*KJ4HYG	"	12,998	129	97
*W5AG	"	6,003	94	69
*KE5PWL	"	4,560	59	48
*KI6OFN	"	3,168	42	36
***KB1NRB**	"	**1,188**	**27**	**27**
*KI6FEN	"	608	16	16
*AE5KM	"	594	20	18

DX

***RN3DBA**	**A**	**1,415,116**	**1408**	**562**
***EW1IP**	"	**889,024**	**994**	**464**
***PD7BZ**	"	**262,725**	**475**	**339**
***OH8FKU**	"	**194,184**	**361**	**279**
IR1G	"	**116,164**	**312**	**226**
			(OP: IZ1LBG)	
***UR5XMM**	"	**102,124**	**296**	**211**
DS4GGM	"	**74,782**	**355**	**139**
*PD5CW	"	58,812	194	174
***YO5NY**	"	**57,280**	**218**	**160**
***F5LLE**	"	**48,069**	**178**	**147**
BV4VR	"	**45,672**	**159**	**132**
***GØOTT**	"	**32,249**	**149**	**119**
***XE2HUM**	"	**27,993**	**104**	**93**
***LU3DAT**	"	**27,232**	**106**	**92**
*F4FEP	"	13,680	93	76
*UU9JQ	"	6,372	57	54
***DS1RJI**	"	**6,050**	**59**	**50**
UU4JC	**28**	**19,982**	**145**	**103**
***SP3ZIR**	**28**	**6,204**	**72**	**66**
			(OP: SQ3JPV)	
***YD1BJX**	**21**	**9,882**	**68**	**54**
***YT2AAA**	**14**	**501,786**	**653**	**457**
***RK9UAC**	"	**64,070**	**173**	**149**
***UY8LM**	"	**44,436**	**191**	**161**
***HA8AAA**	**7**	**886,886**	**787**	**443**
PY2LSM	"	**25,060**	**75**	**70**
***JE1SHW**	"	**3,240**	**28**	**27**
***YY5EBV**	"	**550**	**11**	**11**
***BA3AX**	**3.5**	**3,910**	**48**	**34**

MULTI-OPERATOR SINGLE-TRANSMITTER

NORTH AMERICA

United States

K1LZ	**12,754,560**	**3570**	**1120**
NG3R	**9,072,530**	**3112**	**1070**
KT3Y/4	**9,010,276**	**2921**	**1034**
KY4F	6,632,010	2803	990
NQ2F	**6,543,449**	**2538**	**961**
KX7M/6	**6,488,498**	**2924**	**934**
WR3Z	6,044,074	2472	929
W7VJ	**5,165,370**	**2275**	**945**
NM7D	4,329,133	2155	821
AJ9C	**3,846,964**	**2055**	**814**
AC8W	**3,227,780**	**1786**	**796**
WAØMHJ	**1,192,064**	**1006**	**556**
AF6T	1,158,564	1159	524
W2TX/4	566,888	634	371
W3LJ	431,365	519	341
AK1Q	415,351	479	313
AD4ES	191,136	493	264
K4VV	129,307	249	191
WC8VOA	109,931	294	211
W1AW/Ø	91,489	322	191
W6YRA	55,918	216	146
K2DB	53,795	161	145
N6EM	28,350	139	105
K4NVA	272	17	16

Alaska

KL7Z	**2,359,158**	**1417**	**687**

Canada

XM7GL	**8,946,288**	**2704**	**972**
VE3YAA	**4,932,087**	**1928**	**771**

Honduras

HQ2R	**4,822,632**	**1973**	**747**

U.S. Virgin Islands

NP2SH	**696,692**	**615**	**356**

AFRICA

Madeira Islands

CS9L	**20,691,183**	**4682**	**1129**

ASIA

Asiatic Russia

RK9QWM	**5,446,728**	**2344**	**749**
UAØSWA	**4,035,597**	**1849**	**677**
RWØLT	3,893,120	2103	704
RF9W	855,729	752	357
UE9CAP	447,720	505	287
RKØSXR	97,740	266	180
RZØSZZ	80,172	237	153

China

B7M	**774,150**	**925**	**397**
B4B	659,682	989	402
B1Z	451,153	815	331
BY1CW	141,887	433	199

Cyprus

C4N	**18,470,529**	**4692**	**1089**

Japan

JA3YKC	**1,713,803**	**1031**	**509**
JA2XYO	**1,362,428**	**939**	**502**
JJ1ZEJ	**201,630**	**308**	**235**

Qatar

A73A	**12,618,825**	**3617**	**933**

EUROPE

Aland Islands

OHØZ	**7,926,776**	**3606**	**1066**

Bosnia-Herzegovina

E7DX	**11,861,398**	**4219**	**1198**

Czech Republic

OL3Z	**11,666,757**	**3926**	**1137**
OL7C	5,405,600	2832	928
OK2KPS	964,447	984	473
OK5SWL	392	14	14

England

M6T	**9,608,598**	**3584**	**1098**
G3YNN	165,000	444	264

Estonia

ES9C	**12,562,719**	**4845**	**1209**

European Russia

RU1A	**13,838,256**	**4954**	**1236**
UA3R	**6,882,624**	**3744**	**1008**
RK3K	6,635,070	3412	963
RT4D	**4,941,738**	**2915**	**937**
RT4M	4,859,440	2735	874
RK3DZB	3,203,970	2216	798
RZ6HWA	**2,223,936**	**1841**	**648**
RZ4HZW	1,521,415	1550	595
RK3YZA	927,696	921	502
RK4FWX	253,330	453	329
RK3AWA	215,246	414	281
RF4S	172,446	381	246
RK3RWA	132,075	381	225
RK1QWX	29,746	162	107
RK4WWQ	16,992	111	96

Finland

OG6A	**11,430,899**	**4244**	**1181**

France

TMØR	**9,906,465**	**3836**	**1095**
F6KPQ	62,900	224	170

Germany

DR4A	**7,210,530**	**3168**	**1017**
DF7ZS	4,867,979	2173	883
DK1AX	3,252,078	1973	771
DLØFTL	103,020	279	202
DFØUK	1,947	33	33

Hungary

HG6N	**9,484,370**	**3548**	**1099**
HA/YO5KAD	1,462,134	1318	591

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4U1ITU	**7,909,083**	**3895**	**999**

Ireland

EI2JD	**1,918,620**	**1344**	**594**

Italy

IR2C	**10,234,884**	**3741**	**1122**
IR1Y	9,211,696	3567	1072

Kaliningrad

RK2FWN	**44,422**	**140**	**133**

Latvia

YL7X	**7,893,459**	**3467**	**1029**
YL1ZS	66,990	198	165

Luxembourg

LX7I	**9,423,744**	**3516**	**1067**

Netherlands

PA6OI	**1,024,454**	**1047**	**493**

Norway

LN3Z	**7,887,896**	**3347**	**1052**
LA2AB	2,188,920	1612	629

Poland

SO9S	**8,637,650**	**3242**	**1073**
SO8A	8,299,532	3315	1039
SN9D	5,732,256	2429	928
SN5ØRS	195,714	347	249

Romania

YO2KJI	**1,958,544**	**1817**	**609**

Serbia

YTØA	**8,631,175**	**3325**	**1075**

Sicily

IR9Y	**7,343,525**	**3451**	**1015**

Slovakia

OM7M	**11,688,672**	**3988**	**1167**
OM3KWZ	2,262,730	1681	641
OM3RRC	1,502,872	1275	571

Spain

EE2W	**7,813,938**	**3196**	**1034**
EA5CW	**5,840,926**	**2871**	**938**
EF5BM	5,715,492	3054	948
ED2R	2,000,271	1642	663

Switzerland

HB9ON	**1,945,860**	**1556**	**615**

Ukraine

UZ2M	**11,318,868**	**4604**	**1132**
UT7L	5,993,352	3080	972
UW4E	3,208,161	2104	737
UY4WWA	1,977,948	1412	668
UWØL	1,106,886	1097	541
UX4E	912,024	975	477
UU5JZA	906,110	1140	502

OCEANIA

Guam

AH2Y	**3,810,768**	**1687**	**591**

Hawaii

KH6YR	**5,870,582**	**2169**	**722**

Indonesia

YE1ZAT	**3,747,104**	**1606**	**608**

New Zealand

ZM1A	**5,348,288**	**1743**	**704**
ZL2AGY	1,022,112	608	351
ZM4A	5,658	53	41

Berkin, TA3J, travelled to Erzincan city to give out the TA7 multiplier as TA7KI.

SOUTH AMERICA

Argentina

LR2F	**8,560,354**	**2468**	**946**
LS1D	3,217,329	1337	657
LT5X	43,815	132	115

Brazil

PR1T	**7,223,796**	**1979**	**844**

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NN5J	**11,152,400**	**4114**	**1138**
TI5N	**10,726,992**	**3285**	**972**
WW4E	**10,047,840**	**4087**	**1056**
NZ1U	**7,451,520**	**2910**	**960**
WX5S/6	**5,777,880**	**2624**	**890**
NK7U	**4,852,802**	**2698**	**899**
VE9ML	**1,257,411**	**850**	**447**

AFRICA

AN8R	**3,567,518**	**1732**	**662**

ASIA

C4I	**14,632,800**	**3970**	**1005**
TA3KZ	**12,619,640**	**3506**	**946**
RA9A	**10,396,835**	**3406**	**877**
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EUROPE

OLØW	**15,156,414**	**5217**	**1197**
9A8ØØVZ	**15,041,455**	**5413**	**1199**
DQ4W	**13,533,914**	**5009**	**1153**
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G6PZ	**10,580,064**	**4285**	**1056**
DLØCS	9,945,265	4018	1045
OHØEC	**5,795,865**	**3548**	**885**
LY3V	**5,765,608**	**3037**	**859**
LG5LG	**4,601,892**	**3240**	**772**
G5O	4,401,460	2547	844
OZ5E	**3,216,564**	**1812**	**783**
RK3DXZ	**2,561,780**	**2218**	**668**
RM3Q	2,430,304	2045	664
DFØII	362,776	575	331

OCEANIA

NH7O	**13,050,660**	**3567**	**965**

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WE3C	**21,910,252**	**6281**	**1274**
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LZ9W	**17,398,059**	**6774**	**1213**
LY7A	**12,593,398**	**5620**	**1082**
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SP5ØDXC	1,501,830	1325	555
RL6YXX	**881,328**	**1191**	**516**

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