45241

Amateur Radio

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

COMMUNICATIONS & TECHNOLOGY

MARCH 2006

CQ

NEW COLUMN!
The Weekender
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**********SCH 3-DIGIT 230
01 000658060 9912 2603
JACK SPEER
BUCKMASTER PUB
6196 JEFFERSON HWY
MINERAL VA 23117-3425

On the cover: One-of the antennas from the former D4B station is raised at D44AC in Mindelo, Cape Verde. Story on page 13.

KENWOOD

Listen to the Future

TS-480

The Perfect Remote Base Transceiver

Straight Out of the Box!

- The perfect internet base transceiver - straight out of the box!
- Easy to operate
- The size makes it great for base, mobile or portable operation.
- Free VoIP/Control software downloads at Kenwood.net.
- Incredible RX specifications.

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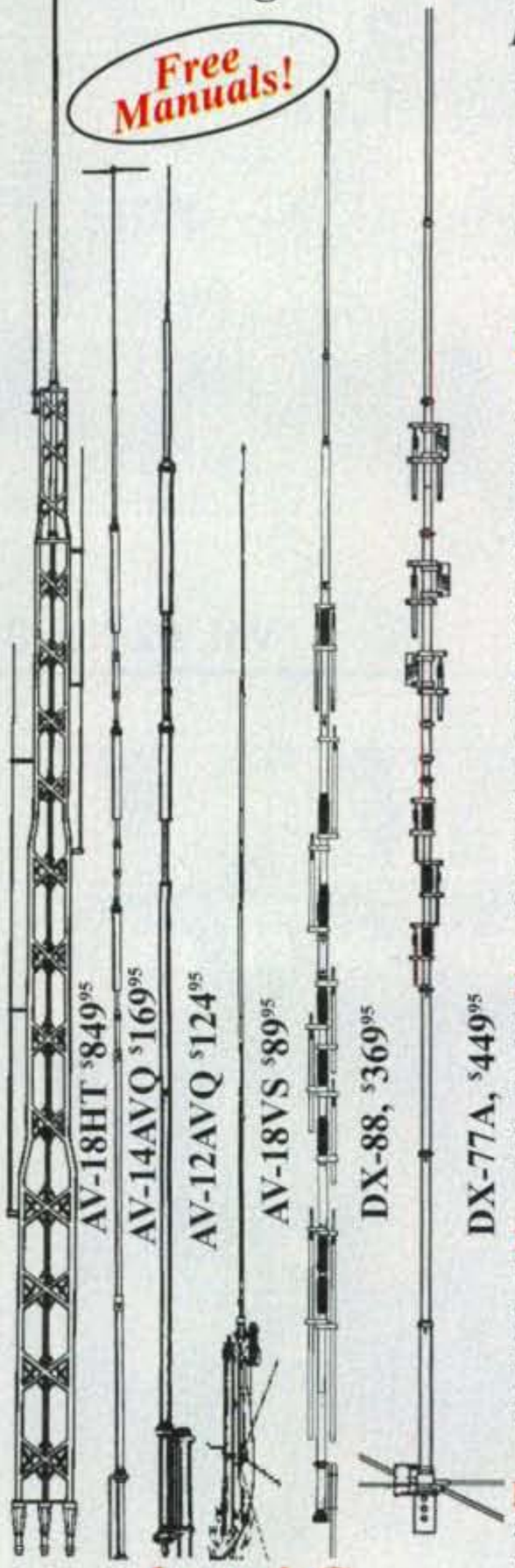
hy-gain® HF VERTICALS

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



hy-gain(R) Classics

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

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

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

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

AV-18HT, $849.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

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

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

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

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

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

All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $189.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

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

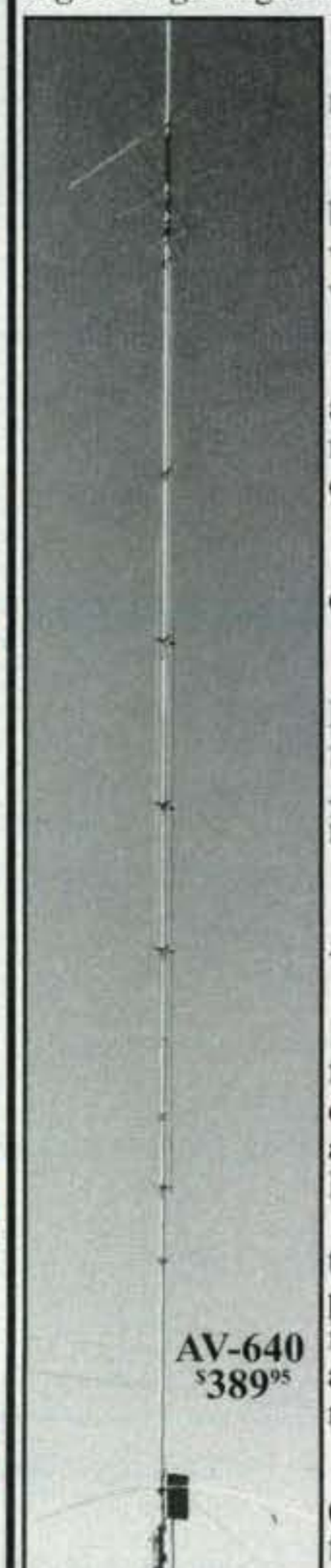
No ground radials required! Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$849.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 80 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 40 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

hy-gain(R)

PATRIOT

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



No ground or radials needed

Effective counterpoise replaces radials and ground.

Automatic bandswitching

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

Sleek and low-profile

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

Full legal limit

Handles 1500 Watts key down continuous for two minutes.

Built-to-last

High wind survival of 80 mph. Broadband matching unit made from all *Teflon*(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, $389.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

AV-620, $289.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

Free Hy-Gain Catalog
and Nearest Dealer . . . 800-973-6572
Call your dealer for your best price!

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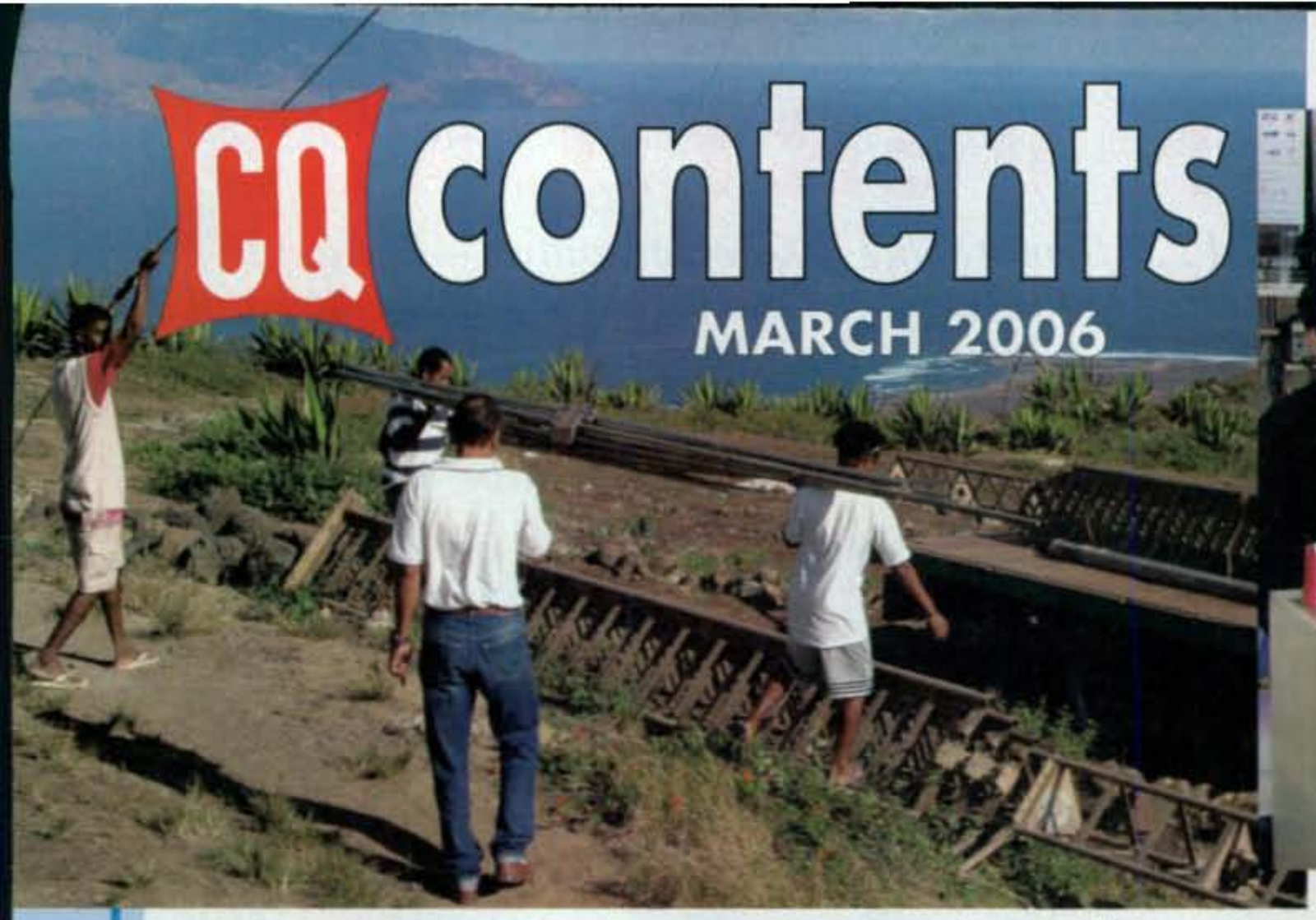

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Depend on Alinco for leading edge technology and compact design

Pocket one of these "Maxi-Micros"!

No one has more experience with "pocket radios" than Alinco. Sure, they're "micro sized" but very affordable, ultra light and ultra thin. Yet they pack a "punch" when it comes to performance!

Here are some good reasons why you should own a maxi-micro:

- You can always carry a radio; that's pocket sized and light weight.
- Easily fits in pocket, purse, backpack or briefcase.
- Perfect for repeater or simplex operations.
- An ideal "remote mic" for your cross-band transceiver.*
- A great "backup" HT with long battery life.
- Great for camping, ski trips, road trips or emergencies.

Alinco's Maxi-Micros are rugged, easy to program and have excellent audio.

DJ-C7T VHF+UHF HT with VHF and UHF Extended Receive

Ultra-thin and packed with features!

- 200 memory channels; any mix of VHF & UHF
- Accommodates non-standard repeater offsets
- CTCSS encode+ decode and Euro tone bursts
- Powerful and long-lasting 600mAh Lithium-ion battery
- Wide-band FM broadcast reception
- AM Aircraft band reception
- 300 mw output on battery; 500 mw with 6VDC external power
- Port for options like speaker mic or computer programming cable
- SMA antenna port
- Computer programmable with optional cable, free software at www.alinco.com

DJ-S45T UHF HT

- Tough polycarbonate shell resists impacts, dust & moisture
- New Quick Repeater Access Mode
- 100 memories; any mix of simplex or repeater channels
- CTCSS encode and decode (separately programmable)
- Computer programmable with optional cable, free software at www.alinco.com
- Flexible power choices; works on 2 AA batteries, optional Li-ion battery pack or 6 VDC external power sources
- Output: .5w on alkaline AA cells; 1w on Lithium-ion; 2w on 6VDC
- TX/RX on entire USA UHF Amateur band; 420~450 MHZ**
- Extended receive 420 ~ 474 MHz
- Large backlit display
- SMA Antenna port
- Speaker mic, computer programming and external power ports

DJ-X7T Wide Band Communications Receiver

Hear what the reviewers are raving about!

You can stay up with the action when you own this versatile receiver that covers from 100 KHz to 1300 MHz (cellular blocked). Monitor AM, FM and WFM signals with a receiver that fits in a shirt pocket!

- 1000 memory channels
- Ultra-Sensitive triple-conversion AM and NFM, double conversion WFM
- Five different scan modes
- AM, FM and TV bands are pre-loaded at the factory
- Long-lasting 600 mAh Lithium-ion battery
- SMA antenna port with whip antenna included
- CTCSS "search" mode
- Computer programmable with optional cable, free software at www.alinco.com

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ham radio news

W5ZN New ARRL President

Joel Harrison, W5ZN, has been elected president of the ARRL, succeeding Jim Haynie, W5JBP, who did not seek re-election after leading the organization for the past six years. Harrison, who has been First Vice President, says the League must do a better job of attracting the average person into amateur radio, noting in the *ARRL Letter* that "the magic is still there, but Main Street has changed." Harrison is active in all areas of amateur radio, with a particular interest in VHF and UHF weak-signal operating.

FCC Seeks Comments on Bandwidth Regulation

The FCC opened preliminary comment periods in early January on two petitions calling for changes in how the amateur bands are subdivided for different uses. One petition, RM-11305, calls for elimination of subbands and complete reliance on voluntary band plans to keep incompatible modes from interfering with one another. The second, RM-11306, is the ARRL's proposal to change from subbands based on permitted *modes* to divisions based on maximum permitted *bandwidth* (see this month's Reader Survey). Comments on both petitions were due February 6; the next step will be the issuance of a Notice of Proposed Rule Making based on both the petitions filed and the comments received.

Copps, Tate, Sworn in as FCC Commissioners

Michael Copps and Deborah Tate have been sworn in as members of the Federal Communications Commission after confirmation by the U.S. Senate. Tate, a Republican, is new to the Commission. She fills the vacancy created with the resignation last year of former FCC Chairman Michael Powell. Copps, a Democrat who has served on the Commission since 2001, was re-appointed to a new term ending in June 2010. The *ARRL Letter* notes that there is still a vacancy in the FCC, with no one yet appointed to complete the term of Republican Kathleen Abernathy, who resigned last December.

Vanity Call System Back Up and Running

The FCC's licensing staff in Gettysburg, Pennsylvania took less than a week to work through a backlog of nearly 1000 vanity callsign applications that had built up during a suspension of more than three months, according to the *ARRL Letter*. Issuance of vanity calls was suspended in late September in the aftermath of Hurricanes Katrina, Rita, and Wilma, as people in the affected areas were given extra time to file renewal applications. This kept certain callsigns scheduled to be made available tied up by an extended grace period, so the FCC decided to delay issuing any new vanity calls until the special time period was over. Processing resumed on January 4 and the backlog was cleared out by January 10.

Peter I DXpedition Still on Track

By the time you read this, we'll all know whether the group of nearly two dozen DXers hoping to operate 3YØX from remote Peter I Island off the coast of Antarctica were successful in their second attempt. The first try last year had to be cancelled because of transportation problems. The group, which was leaving from Chile, was issued the special Chilean Antarctic callsign XR9A for use while on board ship, and was helped financially by a $7500 ARRL Colvin Award, established to support ham radio projects that promote international goodwill in the field of DX. In addition, Iridium Satellite announced that it would be supplying the group with mobile satellite phone systems for its non-ham communication needs, including calls home to family and daily uploads of logs and photos during the trip. The phones will also reduce the group's dependence on good ionospheric conditions during this bottom-of-the-sunspot-cycle DXpedition in the event of an emergency.

WAC/WAS From Space

Astronaut Bill McArthur, KC5ACR, has been busy earning operating awards from orbit. Using the International Space Station callsign, NA1SS, the AMSAT News Service says McArthur has managed to make enough contacts for Worked All Continents (WAC) on 70 centimeters and Worked All States (WAS) on 2 meters, a first for both from space. He'd previously become the second astronaut, after colleague Mike Fincke, to work all seven continents from space on 2 meters.

Did You Hear SuitSat?

One of the strangest satellites ever "launched" was scheduled to be deployed on February 3 from the International Space Station. "SuitSat" was an outdated space suit outfitted with an amateur radio beacon transmitter. According to the AMSAT News Service, the "satellite" was set to be hand-launched by ISS crew members during a spacewalk scheduled for February 3. The report notes that the batteries running the beacon on 145.99 MHz were expected to last only a few days.

YI9DXX Remote Base on Air from Iraq

Hams around the world will be able to use the internet to remotely control and operate a remote base station in Iraq. The *ARRL Letter* reports that Keith Lamonica, W7DXX, who has made his home station available for remote control via the internet, has put YI9DXX on the air in Baghdad. The station is licensed to Lamonica by the Iraqi government. Only those hams who helped finance or construct the station may access it as control operators, but hams anywhere may work it over the air.

The ARRL says contacts with YI9DXX will count toward DXCC only if the control operator is also in Iraq. The CQ Awards Committee has determined that contacts with the station will count for all CQ awards, regardless of the location of the control operator, since the RF path originates in Iraq.

APRSLink Merges APRS and Winlink 2000

Users of the Automatic Position Reporting System (APRS) will now be able to remotely access Winlink 2000 e-mail accounts under emergency or unusual conditions. The *ARRL Letter* reports that in the wake of recent disasters, APRS developer Bob Bruninga, WB4APR, suggested linking the two systems. The Winlink development team came up with APRSLink, which monitors all APRS traffic sent to the internet and watches for special commands that permit users to send and receive short e-mail messages via Winlink 2000 and get other information. For more details, see <http://www.winlink.org/aprslink.htm>.

Welcome to the "Family"

CQ welcomes two new members to our staff, CQ DX Marathon Director John Sweeney, K9EL, and "Weekender" columnist Phil Salas, AD5X. John has some 30 years of experience both chasing and being DX, having operated from a variety of rare locations during a long career with Motorola. Information on the Marathon can be found on the CQ website at <www.cq-amateur-radio.com>. Phil is a longtime author for *CQ* and other ham radio magazines. With the "Weekender," he is reviving a *Ham Radio* magazine column featuring small, useful projects that can be built in a weekend by a typical ham. The first installment is on page 56.

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.

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

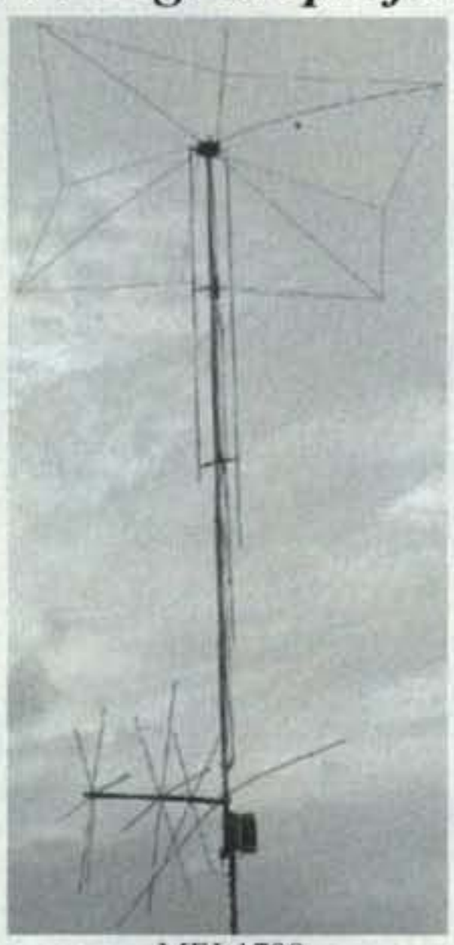
Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.



MFJ-1798
$289.95
Ship Code F

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

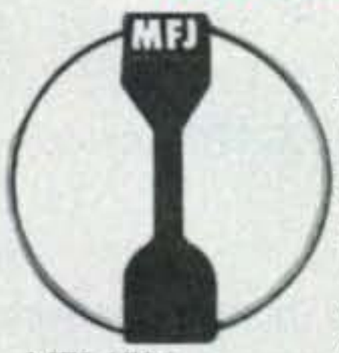
The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ's Super High-Q Loop™ Antennas



MFJ-1786
$379.95

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes.

Enjoy both DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- *gives you highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning.

Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

MFJ-1788, $429.95. Same as MFJ-1786 but covers 40 Meters-15 Meters continuous. Includes super remote control.

MFJ-1782, $339.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $249.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

MFJ Portable Antenna

MFJ-1621 **$89.95**

MFJ-1621 lets you operate in most any electrically free area -- apartment, campsite, hotel, the beach, etc. DXCC, WAZ, WAC, WAS have been won with MFJ-1621! Work 40, 30, 20, 17, 15, 12 and 10 Meters with a telescopic whip that extends to 54 inches. Mounted on a sturdy 6x3x6 inch cabinet. Built-in antenna tuner, field strength meter, and 50 feet of RG-58 coax cable. Handles 200 Watts.

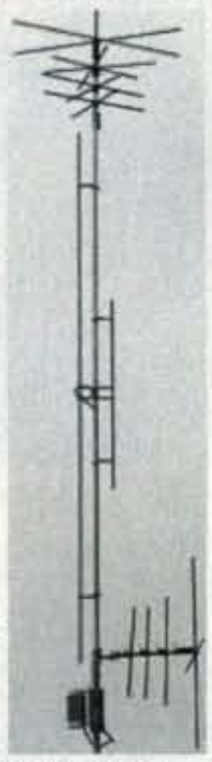
MFJ's G5RV Antenna

$39.95
MFJ-1778

Covers all bands, 160-10 Meters with antenna tuner. 102 feet long, shorter than 80 Meter dipole. Use as inverted vee or sloper to be more compact. Use on 160 Meters as Marconi with tuner and ground. Handles full legal limit power. Add coax feedline and some rope or other nonconductor and you're *on the air!*

MFJ halfwave vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed



MFJ-1796
$209.95

Only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments,small lots, trailers. Perfect for vacations, field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting 1 band has minimum effect on others.

MFJ-1792, $169.95. Full size 1/4 wave radiator for 40 Meters. 33 feet, handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $189.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

Free MFJ Catalog

and Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

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

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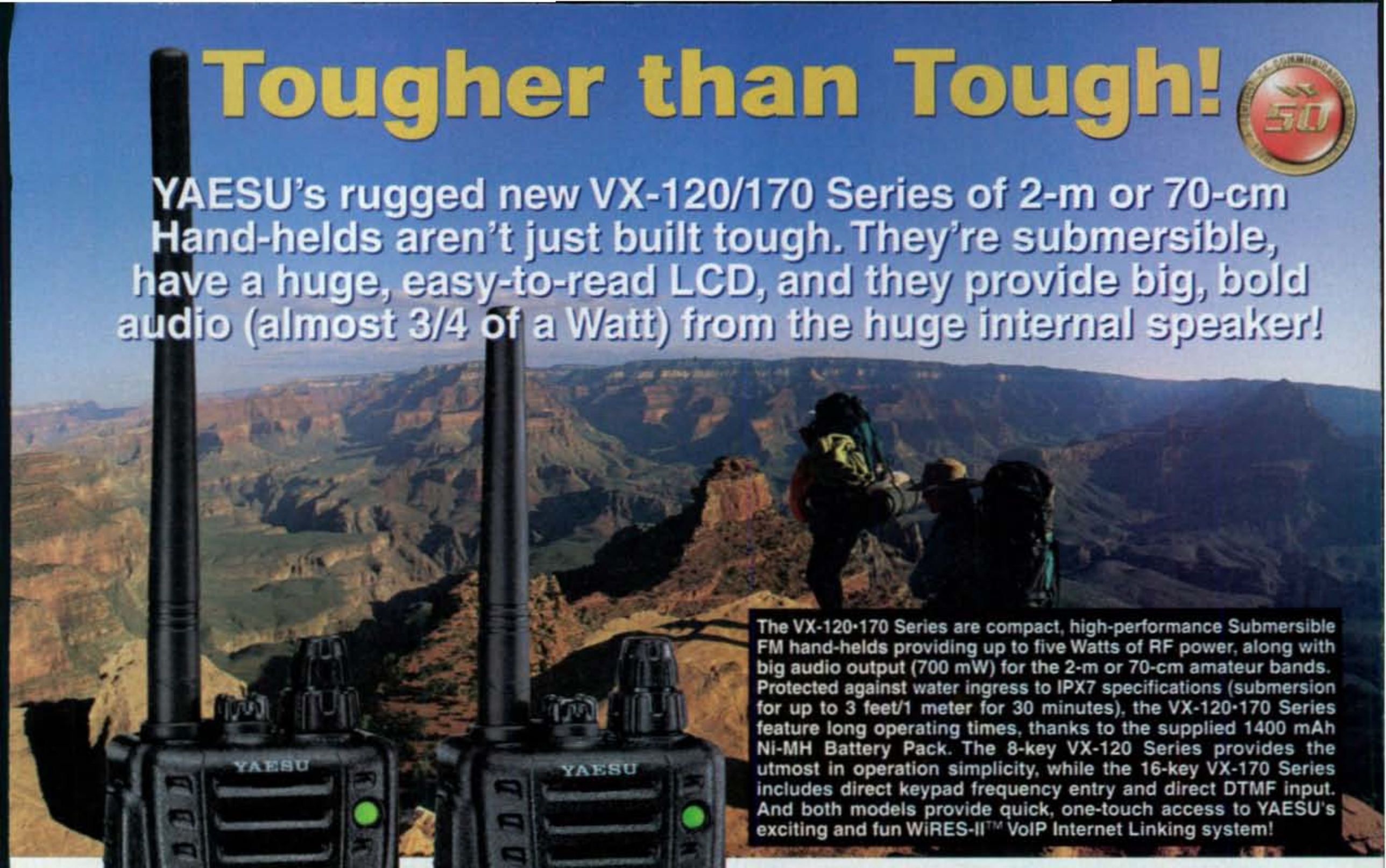
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

MFJ . . . the world leader in ham radio accessories!

Tougher than Tough!

YAESU's rugged new VX-120/170 Series of 2-m or 70-cm Hand-helds aren't just built tough. They're submersible, have a huge, easy-to-read LCD, and they provide big, bold audio (almost 3/4 of a Watt) from the huge internal speaker!



The VX-120•170 Series are compact, high-performance Submersible FM hand-helds providing up to five Watts of RF power, along with big audio output (700 mW) for the 2-m or 70-cm amateur bands. Protected against water ingress to IPX7 specifications (submersion for up to 3 feet/1 meter for 30 minutes), the VX-120•170 Series feature long operating times, thanks to the supplied 1400 mAh Ni-MH Battery Pack. The 8-key VX-120 Series provides the utmost in operation simplicity, while the 16-key VX-170 Series includes direct keypad frequency entry and direct DTMF input. And both models provide quick, one-touch access to YAESU's exciting and fun WiRES-II™ VoIP Internet Linking system!

- 5W FM Transceiver
- Wide Receiver Coverage
- IPX7 Submersible 3 feet (1m) for 30 minutes
- Loud Audio 700 mW via Internal Speaker
- Long Life Battery FNB-83 (7.2 V/1400 mAh) included
- Huge Display (LCD)
- Enhanced Paging and Code Squelch (EPCS)
- CTCSS/DCS included
- Security Password Feature
- Direct Keypad Frequency Entry (VX-170 Series)
- Transmit Time-Out Timer (TOT)
- Automatic Power-Off (APO)
- Automatic Repeater Shift (ARS)
- YAESU's exclusive ARTS™ (Auto-Range Transponder System)
- RF Squelch Circuit
- 200 Standard Memory Channels with 10 Memory Banks
- Alpha-Numeric Labeling of Memories
- Dual Watch (Priority Channel Scanning)
- Emergency Feature
- Smart Search Memories

IPX7 Submersible 3 feet (1m) for 30 min. | Huge LCD | Big 700 mW Audio! | 1400 mAh Long Life Battery

FM Mono Band Hand Held Transceiver

VX-120/VX-170 Series

(8 key Version / 16 key Version)

VX-120/170 (VHF) VX-127/177 (UHF)

HANDHELD TRANSCEIVERS

IPX7 Submersible 3 feet (1m) for 30 min.

5 W Ultra-Rugged, Submersible 6 m/2 m/70 cm Tri-Band FM Handhelds

VX-7R/VX-7RB

IPX7 Submersible 3 feet (1m) for 30 min.

5 W Heavy Duty Submersible 2 m/70 cm Dual Band FM Handheld

VX-6R

5 W Heavy Duty 2 m/70 cm Dual Band FM Handheld

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zero bias — a CQ editorial

BY RICH MOSESON,* W2VU

Dumbing Down or Wising Up?

The group that designs the amateur radio license exams has released a new pool of potential questions for the Technician exam, to be used as of this coming July 1, and as soon as it gets widely distributed, I'm sure the airwaves and the internet will fill up with complaints about "dumbing down" the exam. Before you join the chorus, though, I'd like to offer a different point of view. I think the Question Pool Committee (QPC) of the National Conference of Volunteer Examiner Coordinators is "wising up" to the realities of what should be on an entry-level exam and how those questions should be phrased. It is also adopting the philosophy that we have long held here at *CQ* that real learning doesn't truly begin until *after* you have your license and start getting on the air.

A Shift in Emphasis

From reading through the new question pool and comparing it to the old, it is clear that the emphasis has shifted from the theoretical to the practical, and from trying to cover every activity authorized by the Technician license to those activities most likely to be pursued by a newly-licensed ham. For example, there are no more questions on EME (Earth-Moon-Earth). Yes, a Technician license permits you to do moonbounce, but what newly-licensed ham who isn't already a radio astronomer would even consider starting out with EME? On the other hand, questions have been added about using IRLP and Echolink, two popular internet repeater-linking networks that a new ham is quite likely to encounter.

In addition, the *phrasing* of the questions (*not* the content) has been greatly simplified. For example, here's a question from the current exam: *"What is the minimum safe distance for a controlled RF radiation environment from a station using a 17-element Yagi on a five-wavelength boom on 144 MHz at 100 watts, as specified in Figure T0-2?"*

In fact, the answer to this question is quite simple, as it requires only looking at an accompanying table and picking the right value. But the wording of the question is so intimidating that many potential licensees would give up before even trying to find the answer. A typical question from the new pool on the same topic is: *"What factors affect the RF exposure of people near an amateur transmitter?"*

A much "friendlier" question and you have to do more than look at a chart to know the right answer. Overall, by the way, the biggest change in the number of questions has come in the area of RF exposure safety. The old pool has 59 questions on the topic, of which four will be on the exam. The new pool has only 11 possible questions, from which one will be selected for each test.

Finally, the whole structure of the pool has been reorganized, with the addition of new sections on "station setup and operation," "emergency and public service operations" and "radio waves, propagation and antennas," all while reducing the overall number of potential test questions from 511 to 396. These changes are most welcome.

CQ Contributing Editors Fred Maia, W5YI (a former QPC member), and Gordon West, WB6NOA, were involved in writing and proposing new questions (the process was open to all, but according to Gordon, very few people and organizations offered any input). West says the criteria for the new pool included goals of keeping questions on a high-school reading level, eliminating those dealing with obsolete technology, and adding questions relating to digital communications, APRS (Automatic Position Reporting System), internet repeater linking, and satellite communications.

The old test has satellite questions, of course, but they lean more toward the theoretical than the practical, such as knowing the definitions of the terms "apogee" and "perigee," or knowing *"What mathematical parameters describe a satellite's orbit?"* The new questions include the more practical, *"What should you use to determine when you can access an amateur satellite?"* with the answer being *"A satellite tracking program."* Once you start using such a program, you'll quickly learn about the need to download the latest list of Keplerian elements, the answer to the old question, but you'll now have a more practical frame of reference.

A couple of other notes: Questions on repeater operation have been moved from the "Special Operations" section to "Station Setup and Operation," while the "Special Operations" section now includes questions on operating away from home, hidden transmitter hunts, contesting, and special event stations. Again, these reflect activities more likely to be encountered by the new ham than working moonbounce or knowing about propagation on the low bands. Finally, all of the diagrams, tables, etc., have been eliminated in favor of direct questions with direct answers.

The changes reflect the philosophy of QPC Chairman Jim Wiley, KL7CC, who took the reins of the committee in 2004 and told *CQ* not long afterward that "(t)he purpose of the test is not to teach people electronic engineering ... We want to see if people know how to run their radio and not interfere with other people." Regarding the old exam questions, he said, "I think the language is too hard, not the questions. I think it's too high a reading level, too high a math level." We welcome the changes and congratulate the QPC and its contributors for a job well done. Our only question for the complainers: "Did you participate in the process when input was requested?" If not, you have no grounds to gripe.

On-Air Learning

I encountered two examples this past weekend of our philosophy of learning *after* getting your license. First, during the ARRL January VHF Contest, I came across two hams very obviously working on building up their CW skills in a real-life setting. I spent a few minutes with them completing the basic exchange (callsign and grid square), and later talked with them on phone. It turns out that they're new Generals and very anxious to get on-air code experience and build up their skills. They told me how much they appreciated the patience and helpfulness of their fellow hams. I, in turn, thanked them, because I ended up having about four or five CW QSOs (on 2 meters!) in a contest in which I generally operate only SSB.

The second example involved my own learning about the unique characteristics of propagation at 1.2 GHz. I've been using the ID-1 transceiver I discussed here last month whenever I've been driving any distance, and yesterday had to drive about 25 miles away from the D-Star repeater in New York City to pick up my daughter. I had trouble holding the repeater early in the trip, as I got into shadows of various hills, but as I got farther away, the signals got better. I don't think I had a direct line-of-sight path all the time, but apparently managed to get good bounces off of hills, etc., giving me better coverage farther away from the repeater than closer in. I've read a lot about propagation at these frequencies, but there's nothing like experiencing it first-hand to turn knowledge into understanding. Ham radio should be a lifelong learning experience, and the license should be the key that opens the door.

—73, W2VU

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

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WindLoad capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power (in lbs.)	800
Brake Power (in lbs.)	**5000**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
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Wind Load (w/ mast adapter)	**10 square feet**
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Brake Power (in lbs.)	**9000**
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight (lbs.)	31
Effective Moment (in tower)	**3400 ft/lbs.**

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

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

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

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

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announcements

The following special event stations are scheduled to be on the air in March:

W4BKM, from 24th annual Cherry Blossom Festival, Macon, Georgia; Macon ARC; 1500–2200Z March 18 on SSB 14.240, 145.370; CW 7.055, 10.110, 14.055. For certificate send QSL and 9×12 SASE to Macon ARC, P.O. Box 4862, Macon, GA 31208.

N9J, from celebration of 46th year of Hawaii's statehood, Kauai, Hawaii; March 5–17 on the 3905 CCN and OMISS 40- and 80-meter frequencies, including CW nets. Twenty-meter county hunters will also be activated. Send QSL and SASE to N9JZ, 39W345 Central Drive, Elgin, IL 60123.

WØW, from 60th anniversary of Churchill's Iron Curtain speech, Fulton, Missouri; Callaway Amateur Radio League; 8 AM to 10 PM CST March 3–7 on CW 14.040, 7.040; SSB 14.275, 7.725; PSK 14.695, 7.073; 2 meters 147.315 MHz. Send QSL and SASE to KSØM, 826 Evergreen Drive, Fulton, MO 65251.

The following hamfests are slated for late February and March:

Feb. 25, **Northern Vermont Winter Hamfest & ARRL Vermont State Convention**, Milton High School, Milton, Vermont. Radio Amateurs of Northern Vermont. Contact Mitch, W1SJ, e-mail <w1sj@arrl.net>, phone 802-879-6589; <http://www.ranv.org>. (Talk-in 145.15, bulletins 146.67; exams at noon)

Mar. 4, **VE2UMS Hamfest**, Centre Roussin, Montreal, QC, Canada. Reservations: Pierre, phone 514-521-7765, e-mail <hamfest@ve2ums.ca>; <http://www.ve2ums.ca>. (Talk-in VE2RXW, 146.700 [–])

Mar. 4–5, **St. Patrick's Day Hamfest & West Texas Section Convention**, Midlands Lions Club, Midland, Texas. Midland ARC. Contact Joe Coldewey, KK5ZG, phone 432-697-7846, e-mail <kk5zg@caprok.net>; <http://hamfest.w5qgg.org>. (Talk-in 147.30+; exams Saturday at 1 PM)

Mar. 11–12, **Charlotte Hamfest & Computer Fair**, Charlotte Merchandise Mart, Charlotte, North Carolina. Info telephone 704-948-7373; e-mail <hamfest@w4bfb.org>; <www.w4bfb.org/hamfest.html>. (Talk-in 145.29 [–600 kHz]; exams) ***See us at the CQ Booth.***

Mar. 18, **Charleston (WV) Hamfest & Computer Show**, Coonskin Armory, Charleston, West Virginia. Contact Jim Damron, N8TMW, e-mail <n8tmw@arrl.net>. (Talk-in 145.35; exams 12:30)

Mar. 19, **Coontoocook Valley RC (K1BKE) Hamfest**, Henniker Community School, Henniker, New Hampshire. Contact Jim McElroy, NS1E, 603-428-7436. (Talk-in 146.895 using call W1CPL; exams 9 AM, preregistration requested but not required, exam contact Al Bardwell, NS1O, 603-228-1407)

Mar. 18, **Kennehoochee ARC Hamfest**, Jim R. Miller Park, Marietta, Georgia. Contact Will Peters, WB4BRA, 770-642-7741, or e-mail <w4bti@arrl.net>; <www.w4bti.org>. (Talk-in 146.880 [–] PL 100; exams)

Mar. 25, **Columbus ARC Hamfest**, Bartholomew County 4H Fairgrounds, State Rd. 11 SW of Columbus, Indiana. Contact Marion Winterberg, WD9HTN, phone 812-342-4670, e-mail <carc_in@yahoo.com>. (Talk-in 146.790/146.190, PL 100; exams 11 AM, walk-ins okay, contact Dave Wendt, KA9OOH, phone 317-881-6531, e-mail <veteam@midstatehams.org>)

Mar. 25–26, **Greater Baltimore Hamboree & Computerfest**, Maryland State Fairgrounds, Timonium, Maryland. Info telephone 410-426-3378; <www.gbhc.org>. ***See us at the CQ Booth.***

our readers say

Re: ZAP! Electrical Safety Considerations

Editor, *CQ*:

I was reading the January issue of *CQ* and noted the letters *("Our Readers Say," p. 10—ed.)* about an October article on electrical safety *("Math's Notes," p. 28—ed.)*. I was quite taken back when I read the reply by Dr. Hilpert when he stated that "...it has been over 25 years that the code demands that the ground lug be on top!" The lame argument he cites about a knife falling across the blades is the *only* one that has ever surfaced to support that side. While it makes sense to the average person who has no experience, it is so far fetched that I can hardly believe that problem has ever existed.

I am an electrician and have been involved with the National Electrical Code for over 30 years both in installing and inspecting work, and I can tell all that the ground lug goes down because it *has* to be the last connection to be removed. The other side is that a grounded cord will exert pressure on the bottom of the cord cap, thus forcing the ground to be pushed in rather than pulled out.

The next point is count how many grounded (three-wire) cords in your house vs. the two-wire cords. You will find that the majority of the cords in the average house are the two-wire type, and having the ground on top or bottom makes no difference, since the knife will do its damage anyway.

This debate has raged over my entire career and I doubt that it will ever be laid to rest in my lifetime.

NEC Article 250 deals with grounding and will answer the response by Bill, W4BSG, and again, there is no reference in the NEC to Conrad's reply.

W. Clayton Brantley, W3ZD

Regulation by Bandwidth

Editor, *CQ*:

I read with interest N2IRZ's comments on "Regulation by Bandwidth" in the December 2005 *CQ*. The comment that "...with a bandwidth limitation like that higher data rates become impossible..." is generally incorrect. You can increase data rate while keeping the baud rate low—the baud rate being the controlling factor in spectral width. In order to do this, however, you must improve the spectral efficiency of your signal through more efficient modulation schemes. I'll give you an example: Simple FSK modulation has a spectral efficiency of 1 bit/second/Hz. By going to 16-QAM, your spectral efficiency increases to 4 bits/second/Hz, meaning that you can put four times the data rate in the original bandwidth occupied by the FSK signal. Now you do lose 7 dB of system gain due to the 7 dB higher S/N required by the 16-QAM signal, but you also get a 6 dB bandwidth improvement factor for any given data rate, meaning you are only 1 dB in the hole in this example. Further, improved error correction techniques can eliminate any difference between the two. Of course, these more spectrally efficient modulation schemes are more complex, though chip sets are available today that can make the modulation/demodulation process of some higher order modulation schemes relatively easy to implement.

In the early '90s I worked with numerous competitors in the fixed wireless industry (microwave point-to-point communications) to compel the FCC to implement "Regulation by Bandwidth" in that industry. All of us wanted to be given a bandwidth allocation, and then have the flexibility of putting whatever data rates we could into those fixed bandwidths. This generated significant improvements in modulation efficiency through competition, resulting in very efficient use of the spectrum. Modulation complexities up to 512-QAM (9 bits/second/Hz spectral efficiency) were implemented.

I am a supporter of the ARRL's "Regulation by Bandwidth" proposal. I believe that it will encourage new innovative communications schemes and error correction techniques, which will result in improved utilization of our limited spectrum.

Phil Salas, AD5X

Don't Touch That Diode!

Editor, *CQ*:

Altering the IC-7000 as described in detail in your February 2006 issue of *CQ ("VHF Plus" column, p. 95—ed.)* alters the FCC certification for this unit in the U.S. Is your legal team ready to be deemed defendants when some moron is cited for watching video on his screen in a state where it is illegal to do so, and claims, "*CQ* showed me how!!"?

Clint Bradford, K6LCS

Clint—Modifying radios is a long-standing amateur tradition. FCC certification for amateur equipment applies only to commercial sale of that equipment, not to post-purchase use. In fact, the FCC encourages us to build, repair, and modify our radios (we are the only service permitted to do so). However, it remains the responsibility of the individual amateur to assure that his/her use of modified equipment remains legal. We provide this information on the assumption that it will be used in a legal and responsible manner.

Keep Code for All Classes

Editor, *CQ*:

After finding the time to read December's issue of *CQ*, I found your Zero Bias, "Looking Back..." column very interesting. While I've not been a ham as long as you, my father has. I feel that code is still needed for entry into our hobby. While all of us may not use it, we all had to study about satellite communications or EME, just to name two. I feel the same way about CW. If you can learn everything it takes to pass the General ticket, you should be able to pass code. It's not given to anyone on a silver platter; you have to work for it. At 44 years old I spent at least 3 hours a day studying just the code element. I'm not writing this for the historical aspects. You had to pass it, I had to pass it, and even it's how amateur radio got started in the first place. I'm stating this because CW is a necessary part of amateur radio. If CW is made only a required Extra class element, I foresee a day when code will be eliminated from ham radio all together. Let's hope that never happens.

Michael "Doc" Cerkez, AI4JN

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If you've been active in any major DX contests over the past several years, there's a good chance you've worked D4B on Cape Verde at least once. Last fall, owner 4L5A decided to dismantle the station, making the 2005 CQ WPX CW contest (results in this issue) the final operation for the record-setting station. SMØJHF visited just after the station was taken down.

The Last Contest from D4B

BY HENRYK KOTOWSKI,* SMØJHF

Monte Verde (2500 ft. ASL) seen from Mindelo on a sunny afternoon. The visible antennas on top are commercial and military, not amateur. (All photos by the author)

The 2005 CQ WPX CW entry of D4B was the last contest in which Alexander Teimurazov participated from Cape Verde. His very intense relationship with this island country off the coast of West Africa lasted for three years.

It all started in March 2002 when Alexánder, then (and still) known as 4L5A and better known under his previous Georgian callsign RFØFWW, came here for a reconnaissance visit and to operate the 2002 CQ WPX SSB Contest. Carlos, D44AC, hosted him and even lent him his callsign for the contest. Alexander broke the world record for 28 MHz using a quite simple and temporary setup on top of Monte Verde. Monte Verde, The Green Mountain, is actually green at its top, about 750 meters (2500 feet) ASL, but dry brown on the slopes. It is the highest point of São Vincente island and relatively easy to reach.

The D4B story ended in early October 2005, when Alexander startled the contesting community by announcing that

The last antenna of D4B's Monte Verde station is taken to Mindelo to be installed at D44AC. In the background the neighboring island of Santo Antão is visible.

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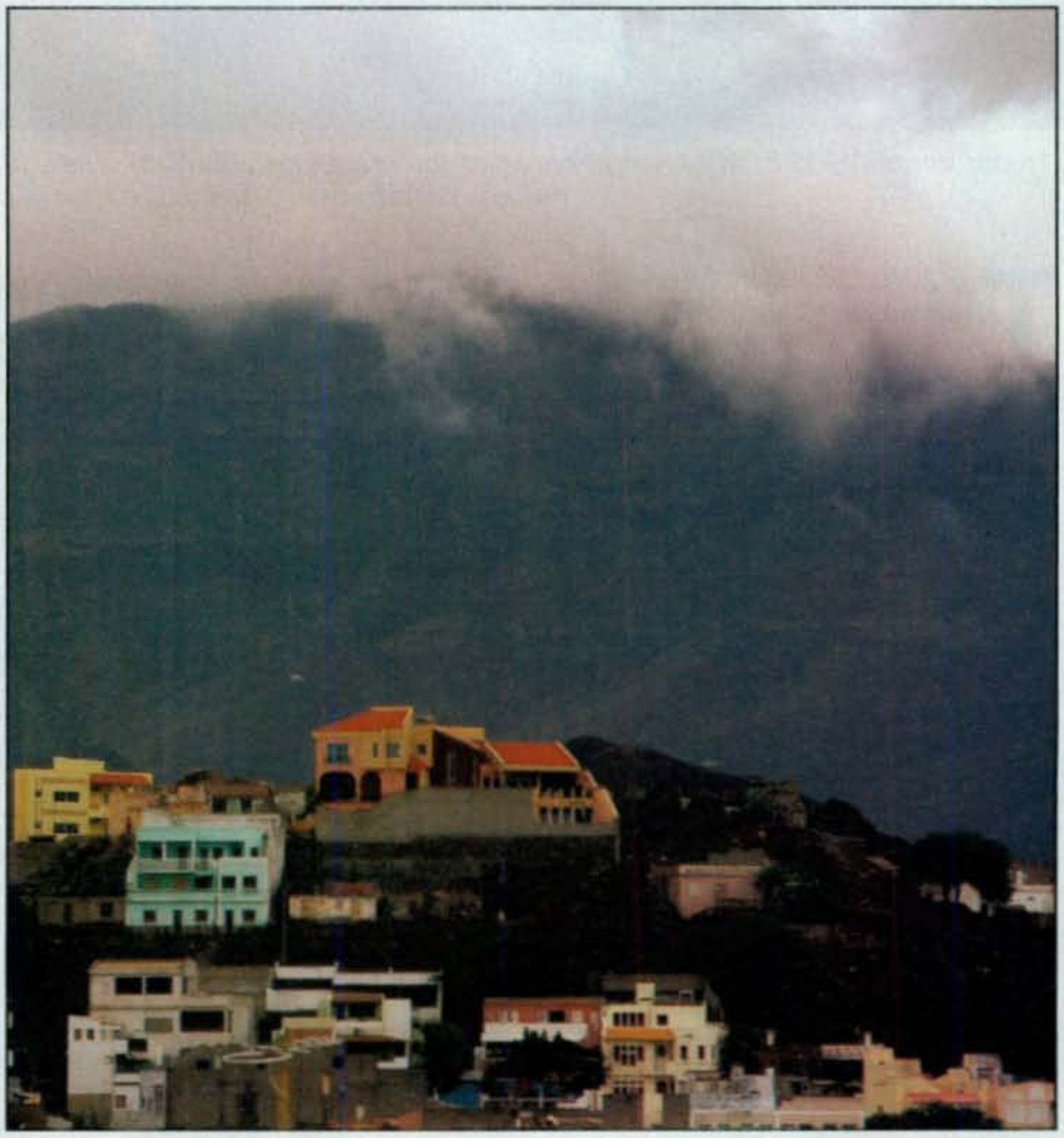
One of the crank-up towers from D4B being unloaded at the QTH of D44AC in Mindelo. Monte Verde is visible in the background.

he had achieved his goals and would be terminating operations immediately.

I reached the top of Monte Verde for the very first time on November 16, 2005. By that time the D4B station was already dismantled. During a few weeks of October and November 2005, nearly all of the hardware was removed from the site and shipped in a cargo container to another African country. Some of the hardware was left on Cape Verde, and D44AC's station in Mindelo has already been reinforced with a new tower and antenna.

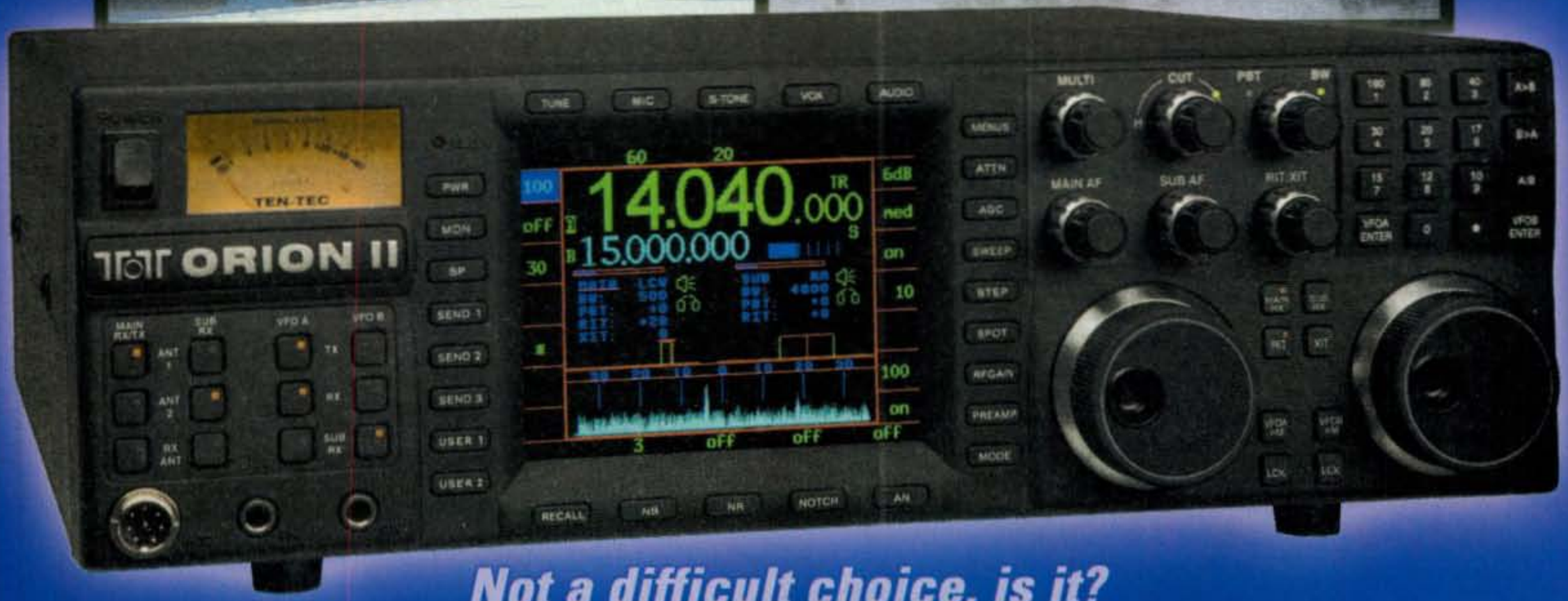
I have written about Cape Verde islands in *CQ* before ("Ham Radio on Cape Verde," May 2004). I have had an emotional relationship with this archipelago (it's hard to say why) since the late 1990s, when I discovered the islands' distinctive music. Alexander discovered Cape Verde and its advantages for ham radio contests only four years ago, but I am sure he knew what to expect: subtropical dry climate, good propagation, and suitable geographical location rather close to areas with a high density of ham population. However, he apparently did not take the *disadvantages* into consideration: very high humidity on top of Monte Verde; strong, perpetual winds at this altitude; and poor shipping and travel facilities to the chosen island.

Getting to Cape Verde from Moscow, Russia for each contest often took Alexander 48 hours or more. Most of the



Monte Verde in clouds. It rarely rains in Cape Verde, but any clouds that pass by will always scratch the top of Monte Verde.

WHICH ROOF WOULD YOU PREFER OVER YOUR HEAD?



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On the Cover

The decision by Al Teimurazov, 4L5A, to go QRT from Cape Verde and dismantle his record-breaking D4B contest station proved a windfall for local ham Carlos, D44AC, better known by his nickname, "Pulu." Pulu was Al's host on his first visit to the tropical island in 2002. In gratitude, when he dismantled D4B, Al gave Pulu a tower and one of the station's 16-element OptiBeam antennas. Our photo shows the antenna being raised at D44AC's QTH. *(Cover photo by Henryk Kotowski, SMØJHF)*

The house at D4B was built in 2002 and is still in good shape. Behind the house, the four 120-ft. towers that supported wire quad antennas are intact.

hardware failed too quickly. Antennas, rotators, cables, and accessories have been replaced, sometimes more than once. The D4B hitch was more a struggle than a play; this I can assure any dreamer who might think the opposite.

Passion and Determination

For the average ham radio operator, it is hard to comprehend the passion, determination, and purposefulness a person must possess to carry out a project of this magnitude. After all, ham radio is only a hobby. In every walk of life there are exceptional people who will go over the brink, beyond what is accepted as sensible and well-reasoned. That's how progress is achieved.

In the case of the D4B station on Monte Verde, a few factors and traits had to overlap and coincide for the project to be accomplished. First of all, a deep and burning interest in amateur radio was prerequisite. Alexander was a proficient ham radio operator before he became a teenager. Radiosport was popular and promoted in the Soviet Union, including Georgia, where Alexander grew up. (This reminds me of José, CT1BOH, from Lisbon. He is one of the top contest operators in the world, and he also became fascinated with radio at a very early age. José told me

The operating position of D4B, once filled with two sets of the best amateur radio equipment available. The chair, actually two of them stacked on one another, is far from being considered comfortable.

that by the time he was 8 [yes, eight]), he could easily use his parents' amateur radio station in Angola, where they all lived. He had to wait several years to get a license of his own, because of age limits in Portugal.)

The second factor is the personal energy, vigor, and mental strength. To set up a competitive contest station in a remote place is extremely time-consuming, wrapped with a lot of red tape and full of unexpected, unreasonable expenses and logistics problems. One has to be restless, a diplomat, sometimes a fighter, and always a supervisor.

The third, and probably most critical, attribute of having a total triumph is the execution of the contest operation itself. The man and the machine must be coherent, in harmony for 48 hours. Staying wide awake and having the senses in top shape is not easy; combined mental and physical fitness is rare.

The fourth, but not the least, factor is the financial means to carry out all of the above. Today, assembling an average station is pretty expensive; a winning single-operator station might cost five or ten times more. Shipping every item to a faraway mountain peak doubles the cost.

I have never met Alexander in person and can only appraise his capabilities by seeing the contest results. His series of World Records and top scores in the most popular and demanding contesting events in the 36 months of the D4B odyssey is outstanding and had never been seen before. The complete list of all his scores is in the "Results" folder on <www.qsl.net/d44tt>. (In his final contest from Monte Verde, Alexander took first place in the world in his class, but did not break any existing records, which are mostly his own.)

I did not ask Alexander why he so suddenly decided to shut down the D4B station. I accept and respect his announcement. Everything has a beginning and an end. The finale of D4B was impressive and generous: All of the equipment remains in Africa, the most under-represented continent on the amateur radio bands.

Hope for the Future?

The Monte Verde station might be reactivated in the future. The house is new and in good shape, and the four towers that supported wire quad arrays were left intact. Who will be willing to take over this place and continue with amateur radio activity ?

Rumors circulated for a while that Valery, RD3A (previously RD3AF), was going to take over the station. Valery visited Cape Verde together with Alexander last year and took part in the CQ WPX CW contest on 20 meters single band from the home of Carlos, D44AC *(see the results).* Valery's own very impressive station near Moscow was also on the air in this contest on 20 meters, manned by his friend RA3CW.

There are several accounts of particular contests on Alexander's website, but they are in Russian. I hope that one day he will publish his memoirs and photographs from the D4B period.

Note: Even though Alexander is known to most hams as "Al/D4B," I always call him Alexander. In this part of the world it is uncommon to shorten names; on the contrary, very often, even between friends, both the given name and the father's name are used when addressing a person.

On Cape Verde, on the other hand, everyone has a nickname and I never say "Carlos" when I address Carlos, D44AC. He is "Pulú" and the island he lives on is "Soncente" instead of the official "Ilha de São Vicente."

Results of the 2005 CQ WW WPX CW Contest

BY STEVE MERCHANT,* K6AW

The 2005 CQ WPX CW Contest was a big success. Conditions were quite good in many parts of the world. The number of logs received was up and just as in 2004, there were 12 new records set. Also as in 2004, D4B took the top SOAB (Single Op All Band) spot!

DX

From Cape Verde, Al, 4L5A, operated D4B to again take the top SOAB spot with over 16 million points, a lead of almost 5 million points ahead of the number two finisher P40W (John, W2GD op.). *(See the D4B story elsewhere in this issue.—ed.)* Third place went to Tom, W2SC, operating 8P7A, followed very closely by fourth place TS3B, operated by Hrane, YT1AD. This time Olli, EA4XX/OHØXX, traveled to Surinam and operated PZ5XX for a fifth place finish, narrowly beating the fine sixth place low power entry from Scott, KØDQ, operating P41P. Seventh place world and top U.S. honors went to Randy, K5ZD, as AK1W. Eighth place was won by PJ2W (Jim, WI9WI op.). The number nine and ten winners were both low power entries from Martin, OL5Y, at IH9U and J-P, OH6RX, at CT9A. Places seven through ten were hotly contested, with only a bit over 500,000 points separating numbers seven and ten with the others scrunched in between.

The 10-meter category was won by Ton, PY2YU, as PX2W. Second place went to Juan, LU1HF; with Meho, T94DU, operating T9ØO in third; Roman, S58P, fourth; and Jan, 4X1VF, in fifth place.

On 15 meters number one was ZX5J operated by Simone, IV3NVN, with a substantial margin and new world and continental records. Number two was AM6IB (Pere, EA3ELZ op.). Boris, T93Y, took third place. Marcelo, PY1KN, took fourth, and fifth place was won by Zdenko, 9A5RR.

Twenty meters was again won by Vaho, 4L8A, who also set a new continental record. Valery, RD3AF, was in second place operating D44AC from Cape Verde, followed once again by John, N2NC, at N2RM. Fourth place was won by Serge, RA3CW, and fifth place was taken by Milan, YU1ZZ, operating YZØZ.

On 40 meters Paolo, YV1DIG, took YW4D to a big lead and first place, handily beating Rafael, PY2NDX, who operated PS2T. Third place and a new continental record was taken by Emil, 9A9A. Fourth was Jiri, OK1RF, and IR4X (Matteo, IZ3EYZ op.) took fifth place.

The 80-meter winner was Chris, SP7GIQ, as SN7Q with a close first-place lead over second-place SO2R operated by Kaz, SP2FAX. HG8R (Pal, HA8JV op.) was third; Acim, YU1YV, was fourth as YTØT; and Zoran, YU1KR, was fifth as 4N2K.

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The P4 power grid (left to right): Jacobo, P43P; P40W (John, W2GD); P40A (John, KK9A); and P41P (Scott, KØDQ).

The Multi-Two ZX3S team.

2005 WPX SSB Results Errata

The following are corrections to the WPX SSB Contest results published in the Jan. 2006 issue:

Trophies: The winner of the Single Op World 7 MHz trophy is CN2R operated by James Sullivan, W7EJ. The winner of the Single Op USA 21 MHz trophy is Carol Richards, N2MM.

World Top Scores: IV3OWC, 1st place 1.8 MHz; I4AVG, 6th place 3.7 MHz; IR4X, 4th place 7 MHz; II3L, 5th place 7 MHz Low Power; J75RZ, 10th place Multi-Two.

ES5TV should have been listed as Single Op 14 MHz instead of Single Op All Band. He is #7 in the world and a certificate winner.

Check logs omitted: EA3BJM, EA5JC, EA5PS.

The following entries were left out of the scores listing (Call, Band, Final Score, QSOs, Prefixes; an * indicates low power; bold is certificate winner):

		SINGLE OPERATOR		
		CHILE		
3G4PHG	A	128,248	267	184 (Op. CE4ETZ)
		SPAIN		
*EA2AFE	A	26,975	125	115
EC2AWD	A	26,076	121	106 (BR & Rookie)
*EA3BIP	14	76,440	271	210
*AN7HE	3.7	7,656	64	58
		ITALY		
IK2SND	**A**	**933,075**	**941**	**495**
IO8SRM	**A**	**206,080**	**445**	**280**
IZ8FDG	*	200,504	480	284
IZ8DSX	*	113,643	265	183
IK2UCK	*	26,334	105	99
IZ8GBH	*	4,628	52	52
IU3A	**21**	**2,045,442**	**1290**	**651**
II8PHG	**21**	**1,346,436**	**1003**	**548**
IZ8EPX	**14**	**155,817**	**399**	**261**
IR4X	**7**	**4,451,850**	**1639**	**761 (Op: IZ3EYZ)**
IQ2CJ	**7**	**2,516,978**	**1146**	**613 (Op: IW2HAJ)**
I4AVG	**3.7**	**1,797,400**	**1126**	**550**
IK8UND	**3.8**	**740,040**	**744**	**420**
IV3OWC	**1.8**	**794,800**	**788**	**400**
*IK2DZN	A	1,130,850	1000	525
*IZ2FOS	A	420,002	547	374
*II2PHG	A	352,704	500	352
*IU1A	*	349,798	442	326 (Op: IK1SPR)
*IK4DCS	*	284,798	461	314
*IKØXBX	*	163,566	301	233
*IZ4EKI	*	136,904	312	218
*IV3ARJ	*	127,490	243	209
*IK2YSJ	*	125,970	292	221
*IV3MGN	*	117,397	275	217
*IZ4DIG	*	103,935	251	195
*IK7SBU	*	100,833	287	183
*IZ5DKF	*	88,736	268	188
*IK5TUZ	*	85,428	232	189
*IZ8APP	*	81,837	212	189
*I8TWB	*	77,958	246	183
*IK4QJF	*	58,201	180	143
*IKØVWH	*	39,312	146	112
*IZ0FKE	*	37,408	139	112
*IZ2ABN	*	34,020	120	108
*IZØBNR	*	29,403	129	121
*I2WIJ	*	17,812	90	73
*IZ8FOV	*	15,105	111	95
*IK8NBL	*	14,875	95	85
*IK5WQO	*	12,087	80	79
*IZ3GAK	*	8,721	59	57
*IK8YFU	*	5,980	58	52
*IZ1DLY	*	1,581	31	31
*IK2HLM	*	414	19	18
***IR2M**	**21**	**1,488,880**	**1057**	**592 (Op: IZ2FDU)**
*IZ5CML	*	302,512	418	292
*IO4I	*	53,430	155	130
***IK3OII**	**14**	**140,778**	**314**	**237**
*IK3SCB	*	74,958	261	186
*IN3BYZ	*	40,425	195	147
*IZ5AJP	*	3,526	43	43
***II3L**	**7**	**324,415**	**511**	**299**
*IZ3EOU	*	936	18	18
***IZ8EDL**	**3.7**	**18,000**	**102**	**90**
		SARDINIA		
IS8HQJ	**A**	**374,796**	**547**	**359**
ISØLLJ	*	14,504	80	74
		SICILY		
IR9Z	**A**	**130,314**	**300**	**222 (Op: IT9VCE)**
IU9A	**14**	**1,304,485**	**1521**	**611**
***IT9ESW**	**A**	**203,041**	**390**	**277**
*IT9ORA	*	124,564	280	209
***IT9WMD**	**14**	**412,155**	**831**	**387**
*IT9RJE	*	53,070	223	174
		GREECE		
J41V	**14**	**1,305,738**	**1611**	**602 (Op: SV1CIB)**
		QRP/p		
IZ1ANK	**A**	**338,530**	**518**	**349**
		SINGLE OP ASSISTED		
IK2TDM	**A**	**581,744**	**625**	**412**
IV3NVN	A	64,780	167	164
IZ5ASZ	**21**	**39,746**	**130**	**119**
IR4T	**14**	**1,004,416**	**932**	**532 (Op: IK2QEI)**
IN3NJB	**3.7**	**108,339**	**263**	**201**
		MULTI -OP SINGLE TRANSMITTER		
J42T		**4,502,750**	**2867**	**830**
J43P		2,440,704	2408	681
		MULTI-OP TWO TRANSMITTER		
J75RZ		**5,663,845**	**3054**	**737**

TROPHY WINNERS AND DONORS

CW

SINGLE OPERATOR, ALL BAND

WORLD: Steve Bolia, N8BJQ. Won by: **D4B operated by Alexander Teimurazov, 4L5A.**
USA: Dennis Motschenbacher, K7BV. Won by: **AK1W operated by Randall Thompson, K5ZD.**
EUROPE: Ivo Pezer, 5B4ADA/9A3A. Won by: **CS5A operated by Cornelius Paul, DF4SA.**
OCEANIA: Tom Morton, K6CT. Won by: **Joel Chalmers, KG6DX.**
CANADA: Radio Amateurs of Canada (RAC). Won by: **VY2TT operated by Kenneth Widelitz, K6LA.**
JAPAN: The DX Family Foundation. Won by: **Masaki Masa Okano, M.D., JH4UYB.**
WORLD LOW POWER: Caribbean Contesting Consortium. Won by: **P41P operated by Scott Redd, KØDQ.**
CANADA LOW POWER: Contest Club Ontario. Won by: **CG3DZ operated by Yuri Onipko, VE3DZ.**
USA LOW POWER: Terry Zivney, N4TZ. Won by: **Larry Schimelpfenig, K7SV.**
USA ZONE 3 HIGH POWER: Jim Pratt, N6IG. Won by: **NK7U operated by Christopher Hurlbut, KL9A.**
USA ZONE 4 HIGH POWER: Society of Midwest Contesters. Won by: **Steven London, N2IC.**
USA ZONE 4 LOW POWER: Society of Midwest Contesters. Won by: **Terry Zivney, N4TZ.**

SINGLE OPERATOR, SINGLE BAND

WORLD 7 MHz: William D. Johnson, KVØQ. Won by: **YW4D operated by Paolo Stradiotto, YV1DIG.**
WORLD 3.5 MHz: Lance Johnson Digital Graphics. Won by: **SN7Q operated by Krzysztof Sobon, SP7GIQ.**
USA: Kansas City DX Club. Won by: **John Golumb, N2NC @ N2RM (14 MHz)**
USA 28 MHz: Bernie Welch, W8IMZ Memorial. Won by: **NN5AA operated by Richard King, K5NA.**
USA 21 MHz: Wayne Carroll, W4MPY. Won by: **Bertram Aaron, K2BA.**

MULTI-OPERATOR, SINGLE TRANSMITTER

WORLD: Ron Blake, N4KE. Won by: **5B/AJ2O operated by RW3QC, RW4WR, UA9CDV, and RN3QY.**
ASIA: W2MIG Memorial (NT4TT Sponsor). Won by: **5B/KIØBP operated by KIØBP, 5B8AD, UA6LCW, and RA6CO.**
USA ZONE 4: Society of Midwest Contesters. Won by: **NO5W operated by NO5W, NT5TU, K5GA, and K5NZ.**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Steve Merchant, K6AW. Won by: **V25O operated by LY2CY and LY2TA.**

CONTEST EXPEDITION

WORLD: Steve Bolia, N8BJQ. Won by: **9G5FD operated by Don Field, G3XTT.**

COMBINED SSB/CW

Single Operator, All Band

WORLD: Al Slater, G3FXB Memorial. Won by: **D4B operated by Alexander Teimurazov, 4L5A.**

CLUB (SSB & CW)

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

On 160 meters, HG3M (Istvan, HA3MY op.) was first and Bela, HA8BE, took second place, followed closely by Girdas, LY2BW, operating as LY7M in third, and low power T99Z fourth. Leif, SMØAJU, was the fifth place finisher, operating SLØW.

The world low power SOAB winner was Scott, KØDQ, operating P41P. Second place went to Martin, OL5Y, operating IH9U and narrowly squeaking by J-P, OH6RX, who drove CT9A. In fourth place was Yuri, VE3DZ, as CG3DZ. Right behind him in fifth was Tadej, S51TA, as TK9A, and in sixth place was Petr, OK1FCJ, as EA9/OL8R. Seventh place went to Larry, K7SV, and eighth was C4M operated by Val, 5B4AGM. Ninth place was won by Nikolai, UN3M, and tenth place was Filipe, CT1ILT, as CT7B.

Matija, 9A3VM, again won the low power 10-meter category over Elvir, T97G, in second place and Jose, CT1AOZ, third. Aleks, S57S, was fourth and Georgi, LZ2GS, was fifth. On 15 meters low power Jovica, T94FC, took first place, followed by Mario, PY4FQ, in second, and Bill, BX3AC, third with a very nice score from Taiwan. Samir, 7S7V, was fourth, and fifth place went to Yuri, UA9AFS. The first-place 20-meter low power score was made by Winfried, EA8/DK9IP. Second was 9A3B (9A1AA op.). Third place again went to LY9A (Gedas, LY3BA op.), and fourth was Mamuka, 4L2M. HG8L (Janos, HA8MD op.) was in fifth place. The 40-meter low power winner was YT7A (Attila, YU7GMN op.) Second place went to Sasha, 4N1FG, and third was Danijel, S51W. Igor, S57Z, was fourth and Ricardo, CT3KN, fifth. First place on 80 meters was won by Goran, YT2A, with LY5A (Jonas, LY2PAJ op.) in second and Janko, S57L, third. Dan, S59N, took fourth place and Kes, LY1CT, was fifth. The 160-meter low power category was won by Zaim, T99Z, with Aadu, ES6PZ, in second. Damir, 9A3RE, was third; Sinisa, YT2W, was fourth; and fifth place was taken by Jiri, OK1JOK.

The Tribander-Single Element category was won by CS5A (Con, DF4SA op.), who also set a new continental record with a two-plus million point lead over the low power second-place entry from Tadej, TK9A. Close behind was Vlad, 9H1ZA, in third. Fernando, AM3KU, was fourth and Jorge, CX6VM, was fifth. Dani, EA5FV, as AN5FV was again sixth and Alex, RZ3AZ, took seventh place. Val, C4M, was in eighth place with a low power entry; Adam, WY4N, was ninth; and Heinrich, DL2OBF, tenth. The 20-meter winner in the TS category was Mircea, YO3GDA, as YP3A, followed by low power Milan, YT7KM, in second and Bob, K8IA, in third. The 40-meter winner was Al, EU1AZ, followed by low

WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

D4B (4L5A)	16,137,128
P4ØW (W2GD)	11,193,728
8P7A (W2SC)	10,855,692
TS3B (YT1AD)	10,205,100
PZ5XX (EA4XX/OHØXX)	9,836,424
*P41P (KØDQ)	9,384,444
AK1W (K5ZD)	8,650,704
PJ2W (WI9WI)	8,195,516
*IH9U (OL5Y)	8,116,416
*CT9A (OH6RX)	8,109,332
VY2TT (K6LA)	7,936,704
CS5A (DF4SA)	7,699,740
CT8T	7,632,890
KC3R (LZ4AX)	7,511,364
WC1M	6,904,788
NY4A	6,658,866
VE3JM	6,555,276
KT1V	6,541,560
UA9CLB	6,539,143
ZC4LI	6,499,094

28 MHz

PX2W (PY2YU)	2,940,864
LU1HF	1,549,400
T9ØO (T94DU)	624,262
S58P	394,440
4X1VF	363,640
9A7D	303,933
P43JB	299,619
*9A3VM	299,155
*T97G	275,391
*CT1AOZ	246,645

21 MHz

ZX5J (IV3NVN)	7,061,000
AM6IB (EA3ELZ)	3,063,543
T93Y	2,955,304
PY1KN	2,836,561
9A5RR	2,771,872
IY4W (IK4GZO)	2,509,523
T93C	2,249,692
YZ5B	2,189,838
YU1EL	1,890,000
YT1BB	1,723,186

14 MHz

4L8A	5,404,455
D44AC (RD3AF)	5,110,344
N2NC (@N2RM)	4,540,519
RA3CW	3,519,600
YZØZ (YU1ZZ)	3,439,059
UPØL (UN9LW)	3,380,512
VC6X (VE6BF)	3,275,108
OM7JG	3,218,334
YT5A (YU1EA)	3,118,832
IO3P (IV3SKB)	3,118,544

7 MHz

YW4D (YV1DIG)	6,472,554
PS2T (PY2NDX)	5,081,021
9A9A	4,120,956
OK1RF	3,944,040
IR4X (IZ3EYZ)	3,754,960
S5ØA	3,602,565
KG1D (K1KI)	3,594,822
V31JP	3,587,500
NN3L	3,504,786
YT3A	3,140,144

3.5 MHz

SN7Q (SP7GIQ)	1,224,350
SO2R (SP2FAX)	1,148,353
HG8R	917,428
YTØT (YU1YV)	782,070
4N2K (YU1KR)	671,400
9A6A	646,020
YZ1KA	624,206
EO6F (UXØFF)	607,568
T99W	603,100
*YT2A	570,019

1.8 MHz

HG3M (HA3MY)	284,479
HA8BE	211,435
LY7M (LY2BW)	204,240
*T99Z	120,315
SLØW (SMØAJU)	99,671
*ES6PZ	96,300
*9A3RE	95,934
*YT2W	83,772
*OK1JOK	73,224
*LY2OU	61,712

LOW POWER ALL BAND

P41P (KØDQ)	9,384,444
IH9U (OL5Y)	8,116,416
CT9A (OH6RX)	8,109,332
CG3DZ (VE3DZ)	5,813,395
TK9A (S51TA)	5,526,918
EA9/OL8R (OK1FCJ)	4,425,806
K7SV	3,806,946
C4M (5B4AGM)	3,757,184
UN3M	3,646,335
CT7B (CT1ILT)	3,393,885
UA4FER	3,229,568
NV1N (N1UR)	3,213,782
WP3C	3,211,372
PV8DX	3,187,912
YT2R	3,021,680
UR5HAC	2,885,511
V31RA (K9ZO)	2,593,668
KC2NTB	2,522,855
EA7RM	2,469,851
S52OP	2,451,645

28 MHz

9A3VM	299,155
T97G	275,391
CT1AOZ	246,645
S57S	229,191
LZ2GS	177,878
HA8TP	150,321
UA9QA	110,554
UA3QG	107,124
SQ6ELV	73,968
LZ1IS	69,972

21 MHz

T94FC	1,216,800
PY4FQ	772,030
BX3AC	580,887
7S7V	488,910
UA9AFS	439,488
SP2AVE	343,332
JF3BFS	317,376
EI4CF	282,424
JM1RPV/2	271,105
EU1SA	261,360

14 MHz

EA8/DK9IP	2,568,588
9A3B (9A1AA)	2,511,600
LY9A (LY3BA)	1,968,659
4L2M	1,879,278
HG8L	1,872,645
K9QVB	1,644,300
HG4F	1,327,270
VC6R	1,210,559
UU5WW	1,136,436
RX9TL	1,125,650

7 MHz

YT7A (YU7GMN)	2,176,994
4N1FG	1,910,328
S51W	1,725,008
S57Z	1,293,200
CT3KN	1,196,832
S54A	1,138,100
S53F	1,036,672
HA6NL	1,018,248
TA3DD	988,848
SP3FYX	963,792

3.5 MHz

YT2A	570,019
LY5A (LY2PAJ)	521,937
S57L	489,086
S59N	460,872
LY1CT	438,557
UY6IM	415,626
SP9XCN	395,280
HA8KW	390,616
YU7FU	369,292
YR5O	364,170

1.8 MHz

T99Z	120,315
ES6PZ	96,300
9A3RE	95,934
YT2W	83,772
OK1JOK	73,224
LY2OU	61,712
USØZZ	53,841
OK2PWJ	53,482
DJ6BQ	46,376
UT3N	38,437

TRIBANDER/SINGLE ELEMENT

CS5A	A	7,699,740
*TK9A	A	5,526,918
9H1ZA	A	5,105,152
AM3KU	A	4,789,088
CX6VM	A	4,255,020
AN5FV	A	4,216,008
RZ3AZ	A	4,174,755
*C4M	A	3,757,184
WY4N	A	3,698,920
DL2OBF	A	3,330,586
K2PLF	A	3,292,042
N2GC	A	3,259,776
UA9SP	A	2,993,760
9M2CNC	A	2,975,232
GØWKW	A	2,830,640
YP3A	14	2,745,975
*YT7KM	14	1,009,608
*K8IA	14	891,695
*JA1BPA	14	668,552
W1MO	14	661,279
EU1AZ	7	1,429,023
*S54A	7	1,138,100
*N3CZ	7	455,775
OE5ØZKC	3.5	426,098
*OK2PXD	3.5	73,440
*YT2W	1.8	83,772
SE4DHF	1.8	3,696

ROOKIE

*CT1IUA	A	425,528
*KI4EXW	A	333,450
*YY5YMA	A	163,038
*KI4EGT	A	110,968
*EA5GQM	A	81,404
*VE6CNU	A	73,556
*RK4CYW	A	58,058
*BD3AF	A	51,220
*K1USC	A	25,288
*DV3ZQR	A	12,610
AM6IB	21	3,063,543
*EA2BOV	21	158,484
*RX9TL	14	1,125,650
*K4OSO	14	21,996
*IZ8GCB	7	117,288

QRP/p

P4ØA (KK9A)	A	3,674,242
LY8O (LY4XX)	A	1,858,616
YT7TY	A	1,782,872
TE1W (W8QZA)	A	1,695,920
OM7DX	A	1,579,454
S57XX	A	1,254,498
OT5A (JK3GAD)	A	1,068,331
DF3AX	A	817,200
YZ2M (YU1LM)	A	723,600
VA3DF	A	708,124
YT1BX	28	40,092
NA4CW	28	30,624
LY3AA	28	21,658
LY2BBF	28	17,784
UR5ZQV	28	7,210
SP9H	21	251,576
OH6BG	21	217,554
HAØGK	21	140,896
SP4GFG	21	137,256
JA1NLX	21	92,916
S54AA	14	503,433
SM3C (SM5CCT)	14	451,278
UA6LCJ	14	263,765
ES1CW	14	254,800
JR3RWB	14	188,468
TI5A (NØKE)	7	867,840
OK2BYW	7	416,416
UU2CW	7	361,692
T93W	7	295,740
7S3J (SMØDZH)	7	203,522
LY5G (LY2FE)	3.5	170,178
S57MSU	3.5	80,920
KP3T	3.5	77,165
SP4TBM	3.5	68,098
Z31GX	3.5	66,044
OMØTT	1.8	77,228
LY4BF	1.8	17,496
K3BU	1.8	1,152

SINGLE OP ASSISTED

RG9A (UA9AM)	A	8,484,704
DQ8ØIARU (DL5AXX)	A	6,998,679
CG3EJ (VE3EJ)	A	6,933,654
DJ5MW	A	5,750,277
NI1N	A	5,216,020
OK1DX	A	4,966,992
DK3GI	A	4,917,628
YR9P (YO9HP)	A	4,863,107
K1LZ	A	4,650,447
S57DX	A	4,512,088
YLØA (YL2KA)	A	4,081,260
KU1CW	A	3,968,080
HZ1EX	A	3,557,073
OH6NIO	A	3,500,010
*TM6A (F6IRF)	A	3,028,081
DL9EE	A	3,017,124
UAØANW	A	2,951,344
WN9O (W9IU)	A	2,475,660
WO8CC (N8BJQ)	A	2,467,150
OK1FDY	A	2,403,444
EO1I (UT1IA)	28	524,145
*9A2U	28	250,368
9A1V (9A4M)	21	2,338,857
IK1QBT	21	587,845
*YU5W (YU1QW)	21	405,858
HA4A	14	3,670,660
EO3Q (UW5Q)	14	3,581,868
OH4R (OH4JFN)	14	3,049,305
S5ØR	14	2,470,860
S5ØY	14	2,387,085
LT2H (LU7HN)	7	2,951,570
S52ZW	7	2,321,650
W3UA	7	2,003,265
*YZ1V	7	1,624,916
*ON9CKW	7	900,042
SN8F	3.5	627,361
I1NVU	3.5	388,740
*YU1WC	3.5	143,480

MULTI-OP SINGLE TRANSMITTER

5B/AJ2O	15,255,954
ZF1A	14,937,125
9Y4W	13,733,418
5B/KIØBP	13,174,324
RZ9OZO	9,580,672
LR2F	9,199,125
G6PZ	9,117,530
HA8ØIARU	8,876,960
OLØW	8,291,787
OHØR	7,590,645
KT3Y	7,518,819
CF7OO	7,277,866
RY9C	7,161,480
YR7M	7,085,880
LI8W	7,052,486
IR2C	7,040,100
SJØX	6,517,203
NZ1U	6,299,580
SQ6Z	6,037,830
NO5W	5,767,552

MULTI-OP TWO TRANSMITTER

EG8FAS	27,959,740
RU1A	14,648,208
LT1F	14,473,290
ZL6QH	13,312,768
HG6N	10,671,784
DK4YJ	10,381,371
ES5Q	9,923,464
CG7SV	8,254,320
WR3Z	7,833,315
TM4C	7,544,536
ZM1A	6,955,456
OL7D	6,307,332
C6AKU	6,161,890
SJ3W	5,633,847
WX5S	4,843,552
VE3YAA	4,743,684
9A7T	3,965,790
ZX3S	3,598,465
VE7SQ	3,421,780
SI9AM	2,900,248

MULTI-OP MULTI-TRANSMITTER

V25O	25,123,968
LZ9W	19,736,872
DFØCG	19,218,330
LY7A	12,484,615
UU7J	11,053,744
NA6Q	2,167,924
OH2K	1,776,576
WX3B	1,722,120
SP6KFA	874,780
8J1VLP/1	18,174

*Low Power

power entries from Ivan, S54A, second and Vlad, N3CZ, in third place. Eighty meters was won by Jun, JH4RHF, operating OE5ØZKC, followed by the low power entry from Zdenek, OK2PXD. The 160-meter winner was low power Sinisa, YT2W.

The Rookie category winners were all low power entrants. Mike, CT1IUA, was first, followed by Carlton, KI4EXW, in second. Ymanol, YV5YMA, was third; Dan, KI4EGT, fourth; and Juan, EA5GQM, in fifth place.

Single Op Assisted was decisively won by last year's winner, Yuri, UA9AM, operating RG9A. He was followed by second-place winner Ulf, DL5AXX, operating DQ8ØIARU. John, VE3EJ, was third as CG3EJ; Manfred, DJ5MW, was fourth; and Tom, NI1N, was fifth. The 10-meter Assisted winner was Bob, UT1IA, operating as EO1I, followed by low power 9A2U (Davor, 9A3ZA op.). On 15 meters Mate, 9A4M, operated 9A1V for first place; Tony, IK1QBT, was second; and low power Cocic, YU1QW, as YU5W was third. On 20 meters Janos, HA4A, won, followed by EO3Q (Ruslan, UW5Q op.) and Marko, OH4JFN, as OH4R in third. The 40-meter top spot in Single Op Assisted went to Rene, LU7HN, operating LT2H, with Fredi, S52ZW, in second and Gene, W3UA, third. Jan, SN8F, won 80 meters, with Pietro, I1NVU, second and low power Vlad, YU1WC, third.

The top QRP spot this year was won by John, KK9A, as P40A with a big lead over second-place Remi, LY4XX, as LY8O. Milan, YT7TY, was third, with Bill, W8QZA, at TE1W fourth, and OM7DX fifth. Vlad, YT1BX, was the top 10-meter op; Edward, SP9H, won again on 15 meters; and S54AA won 20 meters. Phil, NØKE, was the 40-meter champion as TI5A, and Vitas, LY2FE, won on 80 meters as LY5G. OMØTT was the 160-meter winner.

USA

Randy, K5ZD, won the top SOAB USA spot and set a new USA record as AK1W. KC3R (Alex, LZ4AX op.) moved up a notch this year into second place, and Dick, WC1M, was third. Howie, N4AF, was fourth as NY4A and Ted, KT1V, again was fifth. Ken, K4ZW, operated KN1DX for a sixth place win. The western part of the U.S. grabbed seventh place with a win from Chris, KL9A, at NK7U, and John, K4BAI, was eighth operating from NQ4I. Scott, W4PA, was ninth as KM9P, and Bud, AA3B, took the tenth place finish.

Richard, K5NA, again drove NN5AA to the top 10-meter spot, followed by Larry, KØRI, second, and low power Carl, K9CS, third. On 15 meters Bert, K2BA, moved up from last year's number two spot and won handily. Second place went to Ken, K1UM, who also moved up a peg this time, followed by Jay, KT5E, in third. Gheorghe, N2GM, was fourth, and John, W9ILY, fifth, both low power. twenty meters was again convincingly won by John, N2NC, at N2RM, setting another USA record. Mark, KD4D, operated N3HBX to a second-place win. Mark, KØEJ, was third as WD4K; Mike, K9NW, took a nice fourth spot; and Scott, NE9U, was fifth. On 40 meters frequent winner Tom, K1KI, won again and set a new USA record as KG1D, just getting by second-place NN3L, operated by Sig, N3RS. Kamal, N3KS, was third; George, K2UR, was fourth, and low power Doug, N4IJ, was fifth. The 80-meter winner once again was Al, W1FJ, with Steve, W3BGN, in second and Mike, W7DRA, third.

Larry, K7SV, nicely won the U.S. SOAB low power title, followed by Ed, N1UR, who moved up to second place as NV1N. Yuriy, KC2NTB, was third; Kevin, N4KM, operating from K4OJ was fourth; and fifth place went to Merrill, WK2G. Carl, K9CS, was the 10-meter winner. Fifteen meters was won by Gheorghe, N2GM, with John, W9ILY, second and Carlos, NP4IW/KF6, third. The top three places on 20 meters were repeats from 2004: John, K9QVB, was the top 20-meter low power entry, followed by Carol, N2MM, and Bob, K8IA, in third place. Forty meters was won by Doug, N4IJ, with Mike, WØYR, second and Vlad, N3CZ, third.

Paul, N4PN, won the U.S. Tribander/Single Element category as WY4N, followed by Martin, K2PLF, in second; Mike, N2GC, third; Yuriy, KC2NTB, fourth; and Ben, N3UM, fifth.

Single Op Assisted top honors went to Tom, NI1N, with second place going to Krassy, K1LZ. Third place went to Alex, KU1CW, followed by Dan, W9IU, operating WN9O. Fifth place honors went to Steve, N8BJQ operating WO8CC. Colin, KU5B, operated NX5M for the top 20-meter score, and Gene, W3UA, won 40 meters.

The USA QRP winners were Dale, KG5U, in first place, with Gary, N7IR, second and Chas, K3WW, third. Dave, WA8WV, was fourth and once again Ken, WA8REI, was in fifth place. Single band winners were Francis, NA4CW, on 10 meters; Ron, WA6FGV, on 15; Larry, NU4B, on 20; Bruce, W1CVE, on 40; and Yuri, K3BU, on 160 meters.

Multi-Ops

The Multi-Single category was fiercely contested this time with the top four stations all finishing quite close. The category was won by 5B/AJ2O. ZF1A came in right behind them in second place. 9Y4W was third and 5B/KIØBP was fourth. RZ9OZO was fifth, with LR2F in sixth place, G6PZ seventh, HA8ØIARU eighth, OLØW ninth, and OHØR finishing up tenth.

Congratulations to the ops at KT3Y (Phil, KT3Y, and Bob, K3EST), who won the top USA Multi-Single award in both modes of WPX this time. Second place went to NZ1U, who moved up from fourth in 2004. Third place was claimed by NO5W. Fourth position went to KC7V and in fifth place was W2YC.

In the Multi-Two category almost everyone set a continental record. EG8FAS was the clear winner of the category and set a record for Africa. RU1A moved up to second place, also setting a new Europe record. LT1F was third, ZL6QH was fourth and set a new Oceania record, and HG6N took fifth place.

The big U.S. Multi-Two winner was WR3Z. Second place honors went to WX5S and NG3U was third.

The Multi-Multi category was won this time by the team at V25O. Second place went to LZ9W, who moved up from third in 2004. Third place went to DFØCG.

In the U.S. NA6Q took first place Multi-Multi, and second place went to WX3B.

The list of operators of the multi stations will appear on the CQ website (www.cq-amateur-radio.com), along with expanded QRM, and the CQ WPX Contest website (www.cqwpx. com).

Club Scores

The top combined SSB and CW club score was earned by the Bavarian Contest Club, and the number two club was the Potomac Valley Radio Club. Congratulations to both groups for all their hard work!

Log Info and Credits

Please do not rely on your logging program to get the Cabrillo header filled out correctly, especially if you are entering one of the categories that

requires a Category Overlay line in the header. If you make any changes to your Cabrillo file, please use a simple text editor such as Notepad or the DOS editor, not a word processor. See the 2006 rules for more information. There are important updates to the rules regarding submission of Cabrillo logs: only your callsign is required in the Subject: line of the e-mail with which you send the log. Also, USA stations are requested to include their ARRL Section in the header of their Cabrillo log file. Also, please send photos of your contest operations so we might share them with readers in our write-ups. You can submit photos as attachments to your Cabrilllo log.

Special thanks go to the many operators who travel to remote locations all over the world so the rest of us have interesting and exciting prefixes to work. Also, we thank the many operators who arrange for special prefixes solely for use in this contest.

Thanks to WT4I for his log-checking software, and to EA3DU and OH5DX for help handling logs from their respective countries. Many thanks also to members of the CQWW Contest Committee for helping with various log-handling issues in local languages. Thanks as well to N5KO and his robots; they are a huge help in the log-checking process.

We check callsigns, serial numbers, and times. If we receive a log without sent or received serial numbers it is reclassified a check log. If you encounter problems with serial numbers in your log, please first take up the matter with your logging program author. With close to 5000 logs to process each year it's impossible for us to fix everyone's log. Check the Logs Received web page to make sure you selected the proper category for your log. If it needs changing, you can do it yourself simply by resubmitting your log to the robot.

Big thanks go to Steve, N8BJQ, and Gail, K2RED, for all their help. Our biggest thanks go to Barry, W5GN, for his help with producing and mailing CQ WPX Contest certificates. This is a huge and thankless job, and we all owe Barry and his staff a large measure of appreciation for this major contribution.

2006 WPX Contest Dates

The 2006 WPX CW Contest will be held on May 27 and 28. Please plan to participate. Rules can be found in the January issue of *CQ*, and on both the CQ website (www.cq-amateur-radio.com) and the WPX Contest website (www.cqwpx.com). We request that logs be submitted via e-mail in Cabrillo format. Send CW logs to <cw@cqwpx.com>. 73, Steve, K6AW

DX QRM

Just in to give out 8S6 and to have some hours of fun. No time for a full effort . . . **8S6T**. I had very limited operating time while in Hawaii. However, under cover of darkness, I strung up a clandestine 20-meter dipole and drove it with

CW & SSB CLUB COMPETITION

BAVARIAN CONTEST CLUB	**221,468,371**
POTOMAC VALLEY RADIO CLUB	**142,743,102**
YANKEE CLIPPER CONTEST CLUB	111,465,447
CONTEST CLUB FINLAND	90,282,327
WORLD WIDE YOUNG CONTESTERS	85,608,541
RHEIN RUHR DX ASSOCIATION	79,698,630
ARAUCARIA DX GROUP	77,890,418
CONTEST CLUB ONTARIO	68,870,716
YU CONTEST CLUB	63,424,651
FRANKFORD RADIO CLUB	59,762,875
URAL CONTEST GROUP	56,842,492
ATCC	55,258,599
NORTHERN CALIFORNIA CONTEST CLUB	51,560,702
SOCIETY OF MIDWEST CONTESTERS	50,183,232
FLORIDA CONTEST GROUP	48,659,201
LATVIAN CONTEST CLUB	47,315,339
SLOVENIA CONTEST CLUB	44,820,074
RUSSIAN CONTEST CLUB	42,661,339
LZ CONTEST TEAM	41,638,490
LITHUANIAN CONTEST GROUP	37,614,077
KAUNAS UNIVERSITY OF TECHNOLOGY RADIO CLUB	37,199,141
SOUTHERN CALIFORNIA CONTEST CLUB	35,599,703
SOUTHEAST CONTEST CLUB	35,480,948
UKRAINIAN CONTEST CLUB	28,517,631
SKY CONTEST CLUB	28,380,250
CROATIAN CONTEST CLUB	27,192,842
BRITISH COLUMBIA DX CLUB	26,044,125
TENNESSEE CONTEST GROUP	23,994,719
CENTRAL SIBERIA DX-CLUB	23,924,631
HA DX CLUB	21,254,539
CHILTERN DX CLUB	20,870,430
AUSTRIAN CONTEST CLUB	20,552,706
SUCC	19,076,208
CRIMEAN CONTEST CLUB	18,417,395
EAST COAST CANADA CONTEST CLUB	17,363,751
TUPY DX GROUP	15,983,501
NORTH COAST CONTESTERS	15,670,660
SP DX CLUB	15,546,170
WESTERN WASHINGTON DX CLUB	15,276,250
MOSCOW CONTEST CLUB	14,784,146
CENTRAL TEXAS DX & CONTEST CLUB	14,543,265
GRAND MESA CONTESTERS OF COLORADO	14,062,690
MAD RIVER RADIO CLUB	13,879,933
BOSNIA AND HERZEGOVINA CONTEST CLUB (BHCC)	11,337,011
MARCONI CONTEST CLUB	11,288,461
WILLAMETTE VALLEY DX CLUB	11,063,097
VRHNIKA CONTESTERS	11,040,042
CT RI CONTEST GROUP	10,022,573
KANSAS CITY DX CLUB	9,425,893
GUARA DX GROUP	9,094,991
VK CONTEST CLUB	8,334,631
MINNESOTA WIRELESS ASSN	8,199,351
FOX CONTEST CLUB	8,152,655
BELARUS CONTEST CLUB	6,895,751
KIEV CONTEST GROUP	6,682,730
KYIV CONTEST GROUP	5,971,574
LU-CG	5,664,252
CAJUN CONTEST CLUB	5,465,879
SÃO PAULO CONTEST GROUP	5,436,916
A1 CONTEST CLUB	5,116,202
NORTH TEXAS CONTEST CLUB	4,891,007
CENTRAL ARIZONA DX ASSN	4,872,124
MARITIME CONTEST CLUB	4,849,674
TOP OF EUROPE CONTESTERS	4,006,240
SIAM DX GROUP	3,866,649
BELOKRANJEC CONTEST CLUB	3,862,973
OKLAHOMA DX ASSN	3,611,290
KEMEROVSKIJ OBLASTNOJ RADIOKLUB	3,454,188
YO DX CLUB	3,417,545
CONTEST CLUB KRASNODARSKOGO KRAYA	3,175,859
SRR	3,051,240
ARUK	2,973,892
CGCG	2,880,463
TEXAS DX SOCIETY	2,563,596
SRARS	2,094,652
BASHKORTOSTAN DX CLUB	2,024,318
BRIMHAM CONTEST GROUP	1,952,707
OMSK REGION RADIOCLUB	1,746,701
ORENBURG CONTEST CLUB	1,674,233
ORDER OF BOILED OWLS OF NEW YORK	1,538,101
NCC	1,486,287
Z30M CONTEST TEAM	1,284,870
DANISH DX GROUP	1,274,415
IRKUTSK RADIO CLUB	1,270,110
UDXC	1,268,290
GACW	1,211,998
ALRS SAINT-PETERSBURG	1,104,125
HUDSON VALLEY CONTESTERS AND DXERS	945,519
ALBERTA CLIPPERS	931,047
LYNX DX GROUP	910,748
EZHVA KOMI REPUBLIC	856,533
CAROLINA DX ASSN	777,429
SP CONTEST CLUB	725,102
VENEZUELA DX CLUB	677,173
NORTHERN ILLINOIS DX ASSN	641,875
BASHKORTOSTAN DX-CLUB	610,167
MOSCOW RADIO CLUB	606,246
ADXC	578,457
CENTRAL ARIZONA DX ASSN	549,640
WEST PARK RADIOPS	543,303
777 CLUB	508,626
SERPUKHOV RADIO CLUB	463,640
PANEVEZYS REGION RADIO CLUB	459,566
RADIO CLUB OF TACOMA	448,130
IVANOVO DX CLUB	420,117
BERGEN A.R.A.	388,931
SOUTH JERSEY RADIO ASSN	387,608
PODOLSK RADIO CLUB	344,506
POISK	341,897
NORTHERN ARIZONA DX ASSN	329,072
CLUB 22	325,521
PARNU RC	308,944
YAROSLAVSKIY RADIO CLUB	291,530
MOTHER LODE DX/CONTEST CLUB	278,122
NOGINSKIJ RADIOCLUB	244,102
ROCHESTER (NY) DX ASSN	226,870
RU QRP CLUB	140,184
VLADIMIR RADIO CLUB	51,976
PUSHKINO RADIOCLUB	47,388
METRO DX CLUB	38,762

my K1 QRP XCVR. Thanks go to the mainland working my pipsqueak signal . . . **AC7A/AH6**. First time SO2R in a CW contest. Once again tnx to CT1BOH for lending me his SO2R box and CT1EEB for lending me his TS2000 . . . **CT7B**. My Vy first WPX. Only short term operation, but in several stages over the period. Have met many friends and got less requests concerning my CW-unusual prefix but more acknowledgements for the new mult. Hi . . . **DD1IM**. Tnx to Peter, DF3KV, for another great contest weekend at his fine station . . . **DL2OBF**. I had a lot of fun. Two days later the 40 meter GP was broken by storm; sometimes I have luck. See you next year! . . . **DL7UMK**. Really surprised at the activity on 15 and the difference between the two days . . . **EI4CF**. Great contest with never ending supply of QSOs. 10 meters surprisingly good to EU on Sunday. 80 and 160 very noisy on Sunday evening. Nice to meet many old friends . . . **G3KKQ**. Great contest as usual, with plenty of activity. And a great opening on 10m on Sunday made lots of QSOs. Sometimes hard work on QRP, but it is always worth it to convince others to have a try. You don't need amplifiers to win in contests! . . . **G3YMC**.

Great band conditions this year. My first time using SD log. What a pleasure! Shame I could only work with wire antennas, no beams here . . . **G4GOY**. 15 opened earlier than expected on Saturday AM, but not Sunday. Missed the Saturday opening and twiddled thumbs on Sunday AM. Many

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	TA0/Z33F ('02)	1,452,522	348
7.0	LU1IV('97)	7,671,456	702
14	EA9LZ('98)	5,708,498	758
21	ZX5J('05)	7,061,000	920
28	ZX5J('02)	6,787,440	857
AB	D4B('04)	16,619,000	1000

Multi-Operator Single Transmitter

P49V('01)		19,760,774	1034

Multi-Operator Two Transmitters

HC8N('03)		54,697,072	1189

Multi-Operator Multi-Transmitter

HC8N('99)		54,697,072	1264

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95)	40,446	107
3.5	K1ZM('93)	406,080	288
7.0	KG1D('05)	3,594,822	651
14	N2NC('05)	4,540,510	853
21	NU5A('99)	4,411,299	789
28	WW4M('01)	2,547,046	674
AB	AK1W('05)	8,650,704	916

Multi-Operator Single Transmitter

KM9P('01)		10,691,724	964

Multi-Operator Two Transmitters

KM4M('04)		16,283,745	1095

Multi-Operator Multi-Transmitter

KM3T('01)		21,103,320	1110

CLUB RECORD		WPX (Prefix) RECORD		QRP/p RECORD	
Northern Calif. Contest Club('02)	253,543,497	HC8N('01)	1299	P40W('97)	4,018,208

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	IH9/OL5Y('98)	341,068	182
3.5	EA8/OH2KI('96)	1,358,852	347
7.0	IG9B('04)	5,187,819	613
14	EA9LZ('98)	5,708,498	758
21	5X1Z('01)	6,362,352	782
28	ZS4TX('01)	4,602,028	722
AB	D4B('04)	16,619,000	1000

ASIA

1.8	4X4NJ('96)	259,420	170
3.5	TA0/Z33F('02)	1,452,552	348
7.0	TA3/G3AB('03)	4,266,512	571
14	4L8A('05)	5,404,455	855
21	A45XR('99)	6,557,697	843
28	HZ1AB('02)	3,669,994	659
AB	P3A('01)	10,723,620	870

EUROPE

1.8	HA8BE('04)	293,388	276
3.5	S57AW('04)	1,333,014	489
7.0	9A9A('05)	4,120,956	711
14	9A5W('04)	4,443,300	900
21	9H0A('02)	5,389,008	933
28	9H0A('01)	3,965,315	841
AB	CS5A('05)	7,699,740	905

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	FM5BH('98)	4,642,866	762
21	ZF1A('99)	5,330,129	799
28	FM5GU('01)	2,849,769	621
AB	WP2Z('99)	12,506,280	890

OCEANIA

1.8	KX6DC('88)	12,240	45
3.5	KH6ND('05)	476,928	207
7.0	ZM1A('98)	5,144,480	592
14	KH6ND('03)	4,126,690	730
21	KH6ND('99)	6,107,256	813
28	KH6ND('00)	1,523,008	424
AB	KH6ND('02)	7,996,774	862

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	LU1IV('97)	7,671,456	702
14	YW1A('91)	4,617,456	732
21	ZX5J('05)	7,061,000	920
28	ZX5J('02)	6,787,440	857
AB	P40W('94)	14,168,115	845

MULTI-OPERATOR SINGLE TRANSMITTER

AF	3V8BB('02)	19,041,135	1065
AS	P3A('02)	18,176,342	1046
EU	9A7A('01)	10,915,020	1044
NA	8P4A('02)	18,516,960	1056
OC	AH2R('01)	11,541,420	957
SA	P49V('01)	19,760,744	1034

MULTI-OPERATOR TWO TRANSMITTERS

AF	EG8FAS('05)	27,959,740	1115
AS	RT9W ('03)	12,006,568	872
EU	RU1A('05)	14,648,208	1128
NA	KM4M('04)	16,283,745	1095
OC	ZL6QH('05)	13,312,768	952
SA	HC8N ('03)	30,928,268	1187

MULTI-OPERATOR MULTI-TRANSMITTER

AF	6V6U('97)	9,938,896	758
AS	A61AJ('02)	42,766,232	1244
EU	4O0A('00)	20,932,902	1143
NA	6Y2A('02)	38,821,328	1274
OC	ZL6QH('04)	16,143,840	1010
SA	HC8N('99)	54,697,072	1264

QRPp

AF	5Y4FO('92)	649,057	311
AS	ZC4BS('02)	2,515,388	521
EU	LY5A('01)	2,331,414	646
NA	TI5X('01)	2,568,470	615
OC	FO8JP('86)	572,131	259
SA	P40W('97)	4,018,208	632

USA TOP SCORES

SINGLE OPERATOR ALL BAND

AK1W (K5ZD)	8,650,704
KC3R (LZ4AX)	7,511,364
WC1M	6,904,788
NY4A	6,658,866
KT1V	6,541,560
KN1DX (K4ZW)	6,463,160
NK7U (KL9A)	6,075,919
NQ4I (K4BAI)	5,828,592
KM9P (W4PA)	5,549,038
AA3B	5,417,124
N2IC	5,204,000
KM7W (N6MJ@W6YI)	5,174,540
K3ZO	5,103,686
KR7X (KL2A)	4,675,220
WJ9B	4,015,042
*K7SV	3,806,946
WY4N (N4PN)	3,698,920
WK1Q (K1MK@K1TTT)	3,615,240
K2PLF	3,292,042
K9DX	3,286,005

28 MHz

NN5AA (K5NA)	182,406
KØRI	58,617
*K9CS	8,775

21 MHz

K2BA	1,492,470
K1UM	1,181,050
KT5E	577,545
*N2GM	45,261
*W9ILY	32,860

14 MHz

N2NC (@N2RM)	4,540,519
KD4D (@N3HBX)	3,079,100
WD4K (KØEJ)	2,896,246
K9NW	2,857,180
NE9U	2,427,956
*K9QVB	1,644,300
W4NZ	1,592,477
KN5G	1,210,689
*N2MM	998,704
AD5Q	991,236

7 MHz

KG1D (K1KI)	3,594,822
NN3L	3,504,786
N3KS	1,394,556
K2UR	907,800
*N4IJ	884,585

3.5 MHz

W1FJ	353,808
W3BGN	270,512
W7DRA	15,680

LOW POWER ALL BAND

K7SV	3,806,946
NV1N (N1UR)	3,213,782
KC2NTB	2,522,855
K4OJ (N4KM)	2,376,180
WK2G	2,227,780
N4ZZ	1,991,925
NB1B	1,955,655
NG4Z (K4OGG)	1,953,900
N3UA	1,917,169
WB2AA	1,332,000

28 MHz

K9CS	8,775

21 MHz

N2GM	45,261
W9ILY	32,860
NP4IW/KF6	16,833
N2XU (N2ZN)	2,706
NEØP	1,100

14 MHz

K9QVB	1,644,300
N2MM	998,704
K8IA	891,695
KG1V	131,544
KØCOP	59,792

7 MHz

N4IJ	884,585
WØYR	576,240
N3CZ	455,775
AD4LC	200,996
KU6T	9,943

TRIBANDER/SINGLE ELEMENT

WY4N (N4PN)	A	3,698,920
K2PLF	A	3,292,042
N2GC	A	3,259,776
KC2NTB	A	2,522,855
N3UM	A	2,354,415
KZ5D	A	1,994,846
NB1B	A	1,955,655
N3UA	A	1,917,169
K4PV	A	1,895,465
NO4S (K9OM)	A	1,867,234
N2XU (N2ZN)	21	2,706
K8IA	14	891,695
W1MO	14	661,279
NØVD	14	414,612
KGØUA	14	209,137
KØCAT (K9WIE)	14	84,480
N3CZ	7	455,775

ROOKIE

*K4OSO	14	21,996

QRP/p

KG5U	A	672,144
N7IR	A	549,640
K3WW	A	526,779
WA8WV	A	390,720
WA8REI	A	279,300
NA4CW	28	30,624
K9MU	28	247
WA6FGV	21	15,604
K6III	21	4,050
NU4B	14	104,940
NØLY	14	73,528
W6YJ	14	44,730
W1CVE	7	76,995
N2JNZ	7	40,932
K5LG	7	25,665
K3BU	1.8	1,152

SINGLE-OP ASSISTED

NI1N	A	5,216,020
K1LZ	A	4,650,447
KU1CW	A	3,968,080
WN9O (W9IU)	A	2,475,660
WO8CC (N8BJQ)	A	2,467,150
NF6A (K6XX)	A	2,247,168
AD4EB	A	2,032,708
K3MD	A	1,643,649
NO2R	A	1,551,517
K3KO	A	965,952
KU5B (@NX5M)	14	1,346,125
WA3AAN	14	633,828
W3UA	7	2,003,265
AA4VV	7	516,496

MULTI-OP, SINGLE TRANSMITTER

KT3Y	7,518,819
NZ1U	6,299,580
NO5W	5,767,552
KC7V	2,464,461
W2YC	2,124,762

MULTI-OP, TWO TRANSMITTER

WR3Z	7,833,315
WX5S	4,843,552
NG3U	2,486,454

MULTI-OP, MULTI-TRANSMITTER

NA6O	2,167,924
WX3B	1,722,120

**Low Power*

CONTINENTAL LEADERS

AFRICA

1.8	No Entry	
3.5	No Entry	
7	*CT3KN	1,196,832
14	D44AC	5,110,344
21	No Entry	
28	*CT3KU	10,904
AB	D4B	16,137,128

ASIA

1.8	*UA9AL	32,944
3.5	*UA9QFF	4,050
7	*TA3DD	988,848
14	4L8A	5,404,455
21	9V1YC	1,084,655
28	4X1VF	363,640
AB	UA9CLB	6,539,143

EUROPE

1.8	HG3M	284,479
3.5	SN7Q	1,224,350
7	9A9A	4,120,956
14	RA3CW	3,519,600
21	AM6IB	3,063,543
28	T9ØO	624,262
AB	CS5A	7,699,740

NORTH AMERICA

1.8	No Entry	
3.5	W1FJ	353,808
7	KG1D	3,594,822
14	N2NC	4,540,519
21	K2BA	1,492,470
28	NN5AA	182,406
AB	8P7A	10,855,692

OCEANIA

1.8	KH7U	7,416
3.5	KH6ND	476,928
7	ZL4BR	1,446,330
14	*VK4BUI	329,085
21	*YD3KWR	123,888
28	No Entry	
AB	KG6DX	2,685,251

SOUTH AMERICA

1.8	No Entry	
3.5	*PR7AR	25,806
7	YW4D	6,472,554
14	PY2NY	2,486,668
21	ZX5J	7,061,000
28	PX2W	2,940,864
AB	P4ØW	11,193,728

MULTI-OP SINGLE TRANSMITTER

AF	7Q7WW	352,240
AS	5B/KIØBP	13,174,324
EU	G6PZ	9,117,530
NA	ZF1A	14,937,125
OC	YE1ZAT	546,048
SA	9Y4W	13,733,418

MULTI-OP TWO TRANSMITTER

AF	EG8FAS	27,959,740
AS	RK9CWB	2,119,208
EU	RU1A	14,648,208
NA	WR3Z	7,833,315
OC	ZL6QH	13,312,768
SA	LT1F	14,473,290

MULTI-OP MULTI-TRANSMITTER

AF	No Entry	
AS	8J1VLP/1	18,184
EU	LZ9W	19,736,872
NA	V25O	25,123,968
OC	No Entry	
SA	No Entry	

**Low Power*

thanks to Neil, Sue, Gavin, and Amy for the hospitality and hot food! Great contest location! . . . **G6M**. Worked from club station of RAST . . . **HSØAC**. After three years of absence in WPX CW contest from Pantelleria I enjoyed it again. I used much better callsign (IH9U) than in the past (IH9/OL5Y). Thanks to Mauro, IN3QBR! I concentrated on low bands (especially on 40) and it paid off . . . **IH9U**. No computer, only phone directory and Casio SF7900. My age 81 years, my first WPX contest . . . **IT9GXE**. This year the propagation was much better than expected on 20. Both Europe and North America were open most of the time . . . **JA1BPA**. Operated from sailing vessel Belladonna in Toronto, Lake Ontario, and Niagara on the lake. Conditions on 40 were awesome. Ouch! OK1RF showed 60 over on the IC-706! Great fun! . . . **K2NV/VE3**.

We learned that a 40 meter dipole right next to a neon sign is a bad idea. When the sun sets, the band opens but the sign lights up and destroys the SNR . . . **LI1K**. After being QRT for 10 years, just got back one month b4. Bought new TX two weeks b4, paddle-keyer two days b4, and antenna. Put up 2m above roof of a three store block. Even if now 66 yrs, looks like I'm still able to take part, although limited time available . . . **LI6CF**. Another fun with QRP and two radios. Perfect DX conditions at the beginning on 20. And fine sporadic-E on higher bands both days except 10 meters, where signals were time to time here. Activity in the contest was high so there was a lot to work both days . . . **LY8O**. Great contest. Very happy with what 5 watts can do. Computer trouble from the start. Had to change logging in the first half an hour of contest! . . . **M3CVN**. Murphy sure was around! Because of a failure in the linear I had to enter low power once again. Bed broke down so I had to sleep on the naked ground. What a pain! Next time better planning will be necessary! . . . **OE6V**. I worked many special prefixes good for WPX award. See you next year again, friends. My age 67 . . . **OK2SWD**.

OL7R HF contest team. Special call for WPX, OLØW (thanks to OK1DSZ) . . . **OLØW**. Use 40 meter long wire for all bands. No other antennas. My age 78 years. On air since 1947. Amateur radio is great hobby in my life . . . **OL4M**. Very good time spent to make contacts with all hams! My vertical was wonderful but I hope to have my beam ready on the tower for next one! . . . **ON5SV**. The OO prefix was used to celebrate the 175th anniversary of the Belgian independence . . . **OO4CAS**. My first WPX CW from Aruba. This contest is fun from any location! . . . **P4ØA**. Conditions not great but good enough. Perfect for low power and SO2R. TRlog really sings in two-radio mode. Had almost 750 band changes. Thanks to Jacky, P43P, for magnificent hospitality, again! . . . **P41P**. Only limited time so glad I could at least make 100 QSOs. Now that I am retired from the job, less time remains for the hobby, hi . . . **PAØMIR**. Nice to have the young generation again operating my station. Raf (18 years old) is already a tremendous operator. Congratulations, Oms . . . **PS2T**. Very nice propagation to Europe on 15. Thanks to all hams. See you later and 73! . . . **RA3XEV**. Finished 30 minutes early. Another 30 minutes at 6 AM Sunday used to manually turn antennas from USA to JA on fourth floor building roof . . . **S56A**. Special prefix May 17 – June 6 for 100 years since the end of the LA/SM union . . . **SE5CCE**.

Sorry, guys, but I run just one hour as I prefered to go to Athens hamfest which is the biggest in Greece. Unfortunately the RAAG insists to make the hamfest the same weekend with WPX. Maybe they don't like CW . . . **SV1DPI**. Operated from /p position in Cape Kolimbari mountains. In addition to poor preparation, heavy storms with lightning and wild goats trying to eat my guying ropes. It was worth it! The second part of the contest operated from the beach having short swimming breaks . . . **SV9/LY1DF**. Many thanks to Keko, TI5KD, for getting all his antennas working before the start of the contest. QRP gets tough at this part of the cycle, and I had to use S&P for more than 80% of my Q's. My biggest thrills were working ET3TK on 20 meters and 7Z1SJ, who answered my CQ on 15 . . . **TE1W**. Tnx so much for such nice opportunity to test our exeperience during the contest. We would like to thank UY5HF for greatest support and UR7GW for teaching. Hope we didn't make a QRM to you guys, and we hope to beat our new record next year! . . . **UZØG**.

Several storms came in off the sea and forced me to shut down until they passed. Worst was during the Saturday morning JA run. QRN was above normal even on 40 meters. Having to ask for repeats. First WPX from our home here in Belize . . . **V31JP**. A wonderful DXpedition as a guest of V31LZ! . . . **V31RA**. Excellent conditions made QRP an enjoyable mode . . . **VE3XD**. Usual down-under difficulties of QRP being heard through strong signals, but a great

Tom, W2SC, at the helm of his Barbados station, 8P7A, third place Single Op All Band world.

challenge! Many thanks . . . **VK3JS**. Conditions not great from VK7, but I guess that is what we can expect at this point in the solar cycle! Had fun, and I really do think my Morse is getting better! . . . **VK7GN**. Enjoyed working one more WPX contest. There was no power most of the time and had to run for battery from the market . . . **VU2UR**. Better than expected conditions. Even managed to get some 10 meter QSOs! . . . **XE2AC**. K-index = 4 makes me dizzy during contest . . . **YB2MTA**. Good condx and participation. No stations from South America heard . . . **YO8RIX**. Achieved the goals and enjoyed the contest . . . **YP3A**.This turned out to be a fun contest with both stations being kept busy for most of the 48 hours. It looks like we may even beat our earlier M/2 Oceania record score of 12,029,472 in 2003 *(they did—ed.)* . . . **ZL6QH.**

USA QRM

This was one of the best contests I've ever participated in. Conditions on all the bands were great and even 15 was open . . . **AC4CS**. I was able to operate only limited hours, so I focused on adding to my QRP country count. After a while I forgot I was QRP and had amazing success getting through pile-ups. Thanks to everyone who listened for that weak stations through the QRM . . . **AF7Y**. My first WPX CW contest and the most contacts I've ever made in a contest. I had lots of fun and it was a great learning experience. I can't wait to do it again next year . . . **K1USC**. Many thanks to K5NA and K5DU for use of their station in thunderstorm land! . . . **K2UR**. Thanks to all the great ears out there. Great condx on low bands Friday night made going to bed difficult . . . **K3UW**. First CW contest in three years. What a blast! Can hardly wait for Field Day . . . **KA6R**. Friday night 20 meter band cdx were amazing. Having more than 50 Qs on 10 meters was a nice touch. Great contest. Great operators. Great fun . . . **KG5U**. Great contest with some nice runs (for me) on 10, 15, and 20 meters. Did not do anything on 80 meters. Too many 80 meter absorbing mosquitoes in these Wakulla woods . . . **KN4Y**.

Now that was a contest! . . . **KR7X**. My very first contact was a new prefix as I just got home from work after midnight. Turned the rig on and without having to move the dial there was DQ80IARU. One call and had a new one and that was all the new ones I worked! . . . **KS7T**. Erected a new tower Thursday, but no antennas on it yet. Worked WPX with a vertical. A few new countries and islands. Lots of fun. Only my second time in this contest. Used a dipole last year. The Yagi will be up soon. Bigger score next time and in WW . . . **N6KW**. Sincerest thanks to W6EMC for letting us use his fine station. It was a first time out for a M/M effort and the station performed superbly. You'll hear it again! Thanks for all the Q's (73 de Bill, W1HIJ, and the team) . . . **NA6Q**. Good contest. Surprised myself with what TB/wires can do . . . **NB1B**.Had a lot of fun with our new club call. You should hear more from NN3L in the future. Congrats to Tom, K1KI, for a super effort and good competition. Maybe next year I will get the hang of this . . . **NN3L**. It was great to have N1XS back to help out. Our best ever in this contest. Our first attempt using N1MM logger and we had cockpit problems for about 4–6 hours mid-Sunday. It's dangerous to give such nice software to some of us! The program is great, though . . . **NZ1U**. Bands were super! The QRP K2 performed fantastically! . . . **WØEB**.

Fantastic conditions on Friday evening, but went downhill as the contest continued. Lowest I ever saw the A and K levels . . . **W4NTI**. This was very laid back and a lot of fun. My operating time was limited. 80 and 40 not the best in the world. There were a lot of good and patient hams around the world! Thanks to everyone . . . **W4TDB**. Pretty good for a late start, due to broken G5RV, but with it given a "quick-fix" and my trusty old TH3JR up about 13 feet, I had fun. Propagation was not very good here; only heard one JA! . . . **W7LPF**. Beyond my wildest dreams running QRP! Tnx all stns who took the time to get an exchange, and tnx all the courteous stations who tried but couldn't complete the exchange. Many stns made a valiant effort . . . **WA8REI**. Tnx to Tom for letting me use the toys to make the noise and work the boys! . . . **WD4K**. I was very surprised with great condx, except for 40, which was very noisy here. Thanks for all the calls . . . **WK2G**. Part-time fun. Good to hear the K4OJ and KM9P callsigns . . . **WR3O**.

This was a great evening that lasted from 8:00 PM until about 1:30 AM. N3ST was running 20 meters and logged 300 QSOs in his 5 hours of operation. It was my first time meeting Nat, WZ3AR, who was sizing up WX3B for a Field Day (home) station. Was also the first CW contest at WX3B for Michael, K3LNT (new PVRC member). Michael is 16 years old and did GREAT copying CW. By the end of the evening he was running stations by himself on 80 meter CW. We all have high hopes that Michael will become a great CW enthusiast in the future. Saturday and Sunday were staffed on and off by WX3B for another few hundred QSOs. Thanks to everyone for a great time, and thanks Bob (Michael's Dad) for providing transportation . . . **WX3B**.

(Continued on page 107)

For decades hams from around the world have come to Europe or the U.S. for DX conventions. Now the Asia-Pacific region has its own DX convention, and as K6SV reports first-hand, it was a great success.

APDXC 2005

The First Asia-Pacific DX Convention

BY GEORGE VARVITSIOTES,* K6SV

The first-ever Asia-Pacific DX Convention was held in Osaka, Japan on November 18–20, 2005. This was the first DX convention to be held in the region, and it was patterned after the famous Visalia DX Convention in California that has been ongoing for 57 years now.

The idea for the Asia-Pacific DX Convention was developed by Mac, JA3USA, who was the prime motivator and organizer of the event. The convention was held at the I-House Hotel (International House Hotel of Osaka), which has a very active radio club and a permanent station. It was really a pleasure to visit the club station shack, which is complete with an ICOM IC-7800 and beam antennas located on the roof of the tall hotel building. If you hear JI3ZAG on the air, you are listening to the I-House Radio Club in action!

The I-House Radio Club members were instrumental in planning and hosting the convention. They also were extremely gracious hosts, keeping their club station open for attendees to tune the bands, offering assistance throughout, and providing fellowship during tours. They sure know how to make their guests feel welcome!

According to the I-House group, over 110 Japanese operators attended the

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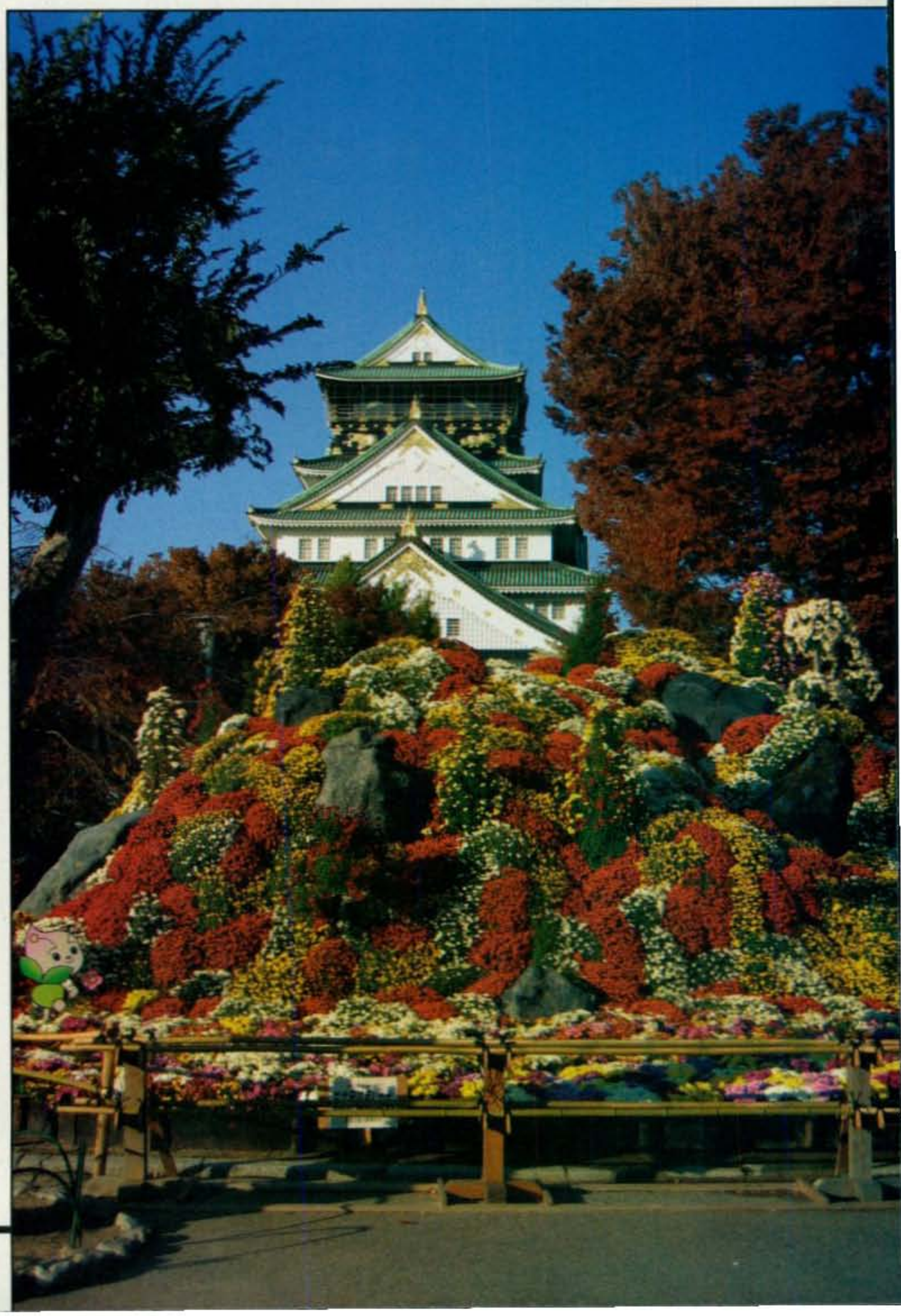
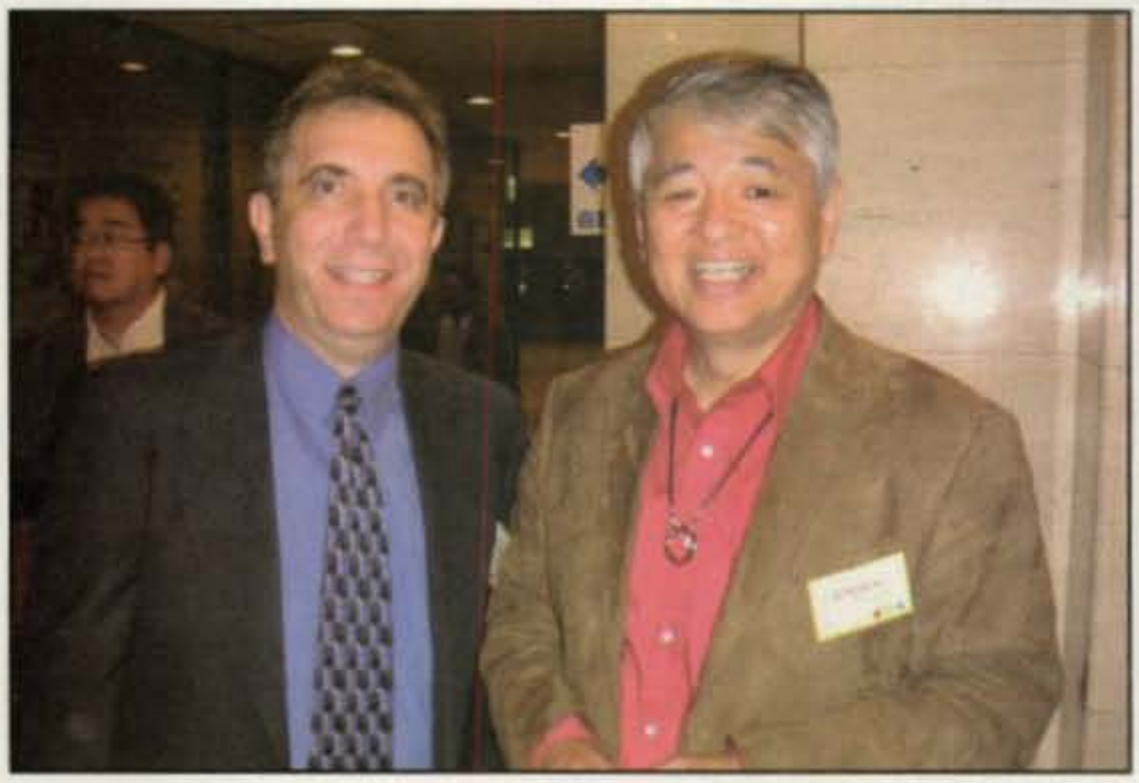
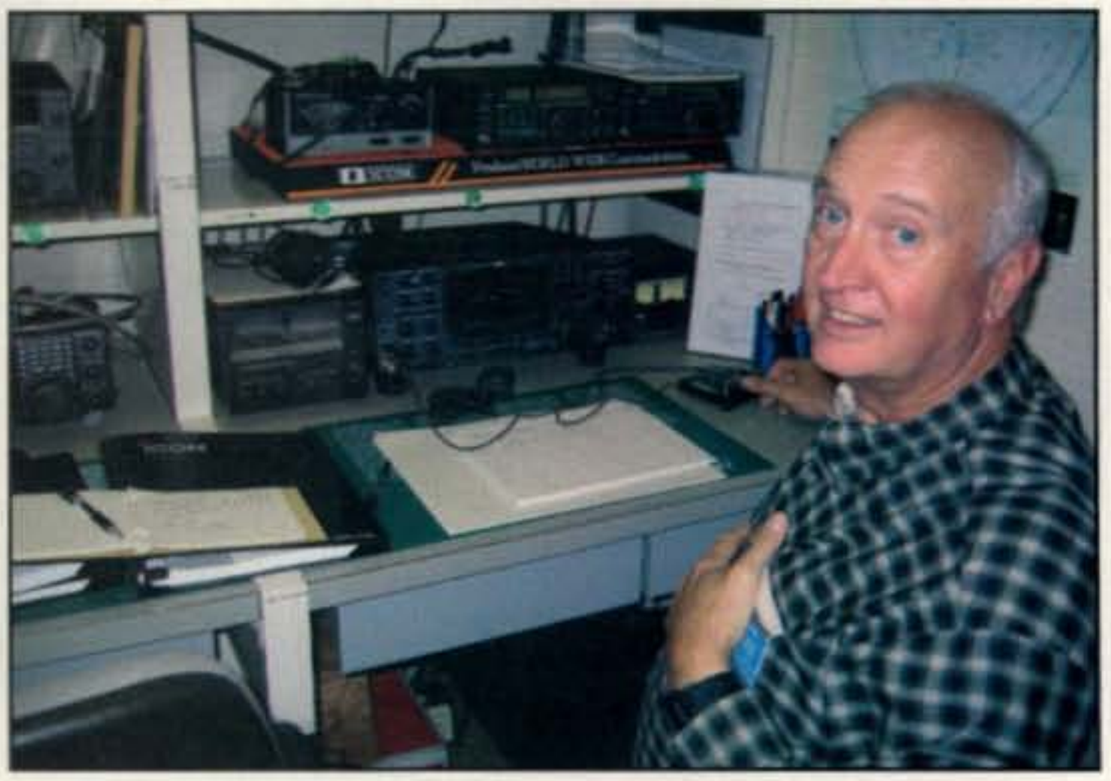


The eight-story tall Osaka Castle, with an observation deck at the 150-meter level, was one of the sightseeing highlights of the first Asian Pacific DX Convention. (Photos by the author unless otherwise indicated) →



Author K6SV and conference organizer Mac, JA3USA. (Photo by JA3AOP)



Noted DXer Bob Allphin, K4UEE, at the JI3ZAG club station at the I-House Hotel in Osaka, the host hotel for the convention.

DXers from 11 of the 13 different countries gathered outside ICOM headquarters. They were treated to a factory tour, discussions with engineers, and a welcome from ICOM's president, JA3FA.

convention, along with 23 DX operators representing 13 different countries. Not bad for the very first effort!

Tours as Well as Talks

The convention was spread over three days to allow DXers from other countries to attend and have a chance to tour the Osaka area as well. During the opening day, attendees were bused from Osaka to Wakayama, where we took a tour of ICOM's state-of-the-art factory. While we were there, we actually watched the assembly process—from the SMT (surface-mount) parts being stuffed onto circuit boards at blazing speeds, to completed IC-7000 transceivers moving down the assembly line and out to shipping for worldwide distribution. The factory was impeccable and extremely efficient.

Following a delicious Japanese lunch served on the bus, we traveled to Osaka to visit the headquarters office of ICOM. Following a tour of the company's products in the lobby, we met with Mr. Tokuzo Inoue, JA3FA, President of ICOM, who welcomed the group. We then had the opportunity to have some very productive meetings with the product engineers. We came away with great respect for their hard work and dedication to amateur radio and the marketplace.

Following the visit to ICOM headquarters, we returned to downtown Osaka for a quick visit to the city's Nipponbashi Electronics store district. This is a ham's dream, with store after store of electronics goodies and consumer-related electronics, including at least three ham radio shops! It's enough to make your head spin, for not only are these stores stacked up for what seems like endless

Author K6SV with ICOM President Tokuzo Inoue, JA3FA, at the convention's welcoming party. (Photo by JH3DMQ)

Jazz singer Naomi, JO3AUZ, and her group provided a warm welcome to attendees at the welcoming party. (Photo by JA3ART)

blocks and blocks, but most of the stores are multi-story! *Warning:* You cannot visit all the stores in one day!

That afternoon we met with most of the local JA operators who attended the convention, including many well-known calls, fellows you may have seen or met at Visalia or Dayton or perhaps worked in DX contests or on DXpeditions.

That night the welcome party was hosted by ICOM's President Inoue. The food and drinks were great and plentiful; we also were treated to a live performance by jazz singer Naomi Fujioka, JO3AUZ, who together with a jazz trio really got the party started! As with all good times, the party was a great way to meet old friends and make new ones.

On the Air or On the Bus?

The following day was split among those wanting to operate from the I-House Club station and those taking a short tour to Kyoto by deluxe bus. The bus tour was a wonderful experience, seeing the surrounding areas near Osaka and knowing that only three days earlier U.S. President Bush was there visiting exactly where we were touring. The temples and manicured grounds were quite beautiful and impressive. Speaking for the USA hams there, it was really interesting to see the centuries of history surrounding the temples and grounds we visited. After all, in contrast, our own country has only a few centuries of history to view.

Upon our return to the hotel, we made another quick trip to the Nipponbashi area for more electronic-store viewing. We got carried away and were almost late for the convention dinner! It was a very nice dinner buffet with quite a selection of Asian and Western foods. The food was outstanding and the drinks again plentiful, *compai!* That warm Sake sure is good!

Ham stores abound in Osaka's electronics district. Here is Shigeru, JO3BAV, owner of the UEDA Musen Ham Store.

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The convention was a real world gathering. Here, from left to right, are Andy, UA3AB; Roman, RZ3AA; Bob, K4UEE; and Katsu, JH7OHF.

Tokyo International Amateur Radio Association President Steve Herman, K7USJ/7J1AIL, presents the W7BX Lynch Memorial Humanitarian Award to Bharathi Prasad, VU2RBI, in recognition of her work following the Indian Ocean tsunami of 2004. (Photo by JF1SWH)

Following dinner there was a short list of speakers. JA1AN, President of JARL, welcomed the DXers and local Japanese hams and spoke of the trends in ham radio as seen from the JARL prospective. Your author, K6SV, spoke as well to answer some questions regarding trends in amateur radio from a USA prospective and the trends in amateur radio equipment over the decades.

Following these short talks, Steven Herman, K7USJ, presented Bharathi Prasad, VU2RBI, with the second annual Lynch (W7BX) Memorial Award, given by the Tokyo International Amateur Radio Association (TIARA). According to the association, Bharathi became famous in the ham world in 2004 for her DXpedition to the Andaman Islands after 14 years of wrangling with Indian bureaucrats. Shortly after that, she became widely known outside the amateur radio community for her heroic work on-the-air in the aftermath of the Indian Ocean tsunami, which struck while her DXpedition team was on the island. *(Bharathi's first-person account of both the DXpedition and her group's disaster response appeared in the April 2005 issue of* CQ.*—ed.)* After dinner many smaller groups retreated to the hotel bar for additional fellowship and in-person QSOs.

The last day of the convention provided us with a wealth of information, as we were treated to a day of outstanding presentations, including:

"Premier Showing of FT5XO DXpedition Video" by 9V1YC
"Big Guns of Russia" show by UA3AB
"Russia DX Contest" by RA3AUU
"Low-Band Antennas" by ON4UN
"Asia Pacific Sprint" by VR2BG
"VU4RBI and Tsunami" by VU2RBI
"3Y0X Peter I" by K4UEE, and
"Mt. Athos" by K6SV

Most of these presentations can be viewed in total by way of streaming video at: <http://www.apdxc.org>.

Looking Ahead to 2007

Mac, JA3USA, and his planning group are already working on the next Asia Pacific DX Convention, which is scheduled for 2007 and will be hosted somewhere within the Asia Pacific region. Watch for details soon. ■

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

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

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

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From QST Magazine, March, 2005

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

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

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

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

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

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

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

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ALS-500M, $849, 500 Watt mobile amp.

ALS-500MR, $879, ALS-500M/Remote Head

ALS-500RC, $49, Remote head for ALS-500M (for serial # above 13049).

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

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

RCS-4 Remote Coax Switch . . . $139

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

RCS-8V Remote Coax Switch. . . $149

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

RCS-10 Remote Coax Switch. . . $159

Replace **8** coax with 1! SWR<1.3 to 60 MHz.**RCS-10L, $199.95** with lightning arrestors.

New! RCS-12C Fully Automatic Remote Coax Switch Controller… $229

Band data from transceiver auto selects antennas. Antenna memories. No hotswitching. Rig-to-amp interface. For 3/4 BCD, 1 of 8 relay boxes. **RCS-12, $299**, auto controller with 8 coax relay box, to 60 MHz. **RCS-12L, $339**, with lightning arrestors.

AWM-30 Precision SWR Wattmeter..$149.95

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

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

ATP-100 Tuning Pulser . . . $49.95

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SDA-100 Mobile Screwdriver Antenna

$359.95 80-10M, fiberglass form, Pittman motor, CNC parts, magnetic sensors, #14 wire, 1.2 kW PEP. 6' whip, $24.95

800 Watts . . . $799
with four 811A tubes

AL-811H, $799. Plugs into 120 VAC outlet. All HF bands. Hi-silicon transformer, heavy duty tank coils, tuned input, operate/standby switch, Xmit LED, ALC, lighted meters, 32 lbs. 13¼Wx8Hx16D in.

AL-811, $649. Like AL-811H, but three 811A, 600 W.

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with Classic 3-500G tube

AL-80B, $1349. Whisper quiet 3-500G desktop amp gives *full* kilowatt SSB PEP output. Plugs into 120 VAC. Ameritron's exclusive *DynamicALC*™ doubles average SSB power out and *Instantaneous RF Bias*™ gives cooler operation. All HF bands. 48 lbs. 14Wx8½Hx15½D in.

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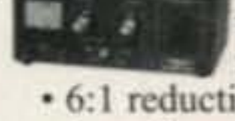

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"Slap, Click, Twang" ... the distinctive sound of a landline telegraph sounder. Many hams collect them, but what about actually using one? In February OH2BGX offered one approach to building an interface to modern radios. Now WA8SME uses 21st-century PIC technology to help bring these 19th-century wonders into the computer age!

Morse Code the (New) Old Way

BY MARK SPENCER,* WA8SME

I have always wanted to do it. When I was a lot younger, there was a group of hams who used old telegraph sounders and American Morse Code on the bands. Their fists were meticulous; I admired their skill, more so because I couldn't quite achieve 100-percent copy while reading the mail. Later, at a hamfest I purchased a late-1880s vintage telegraph sounder that I believe came from a New Hampshire railroad station. It has hung on my shack wall for years as a conversation piece, and I use it periodically as part of a history lesson for the ham licensing classes I teach. However, now the key and sounder have a new life, and they bring a little nostalgic operation to the shack. This article describes a simple interface that will allow you to use a telegraph sounder to copy code like they did in yesteryear.

e-mail: <wa8sme@arrl.org>

The Interface Circuit

The main job of the sounder interface is to convert the CW audio tones produced by the receiver into electrical pulses that can drive the electromagnet

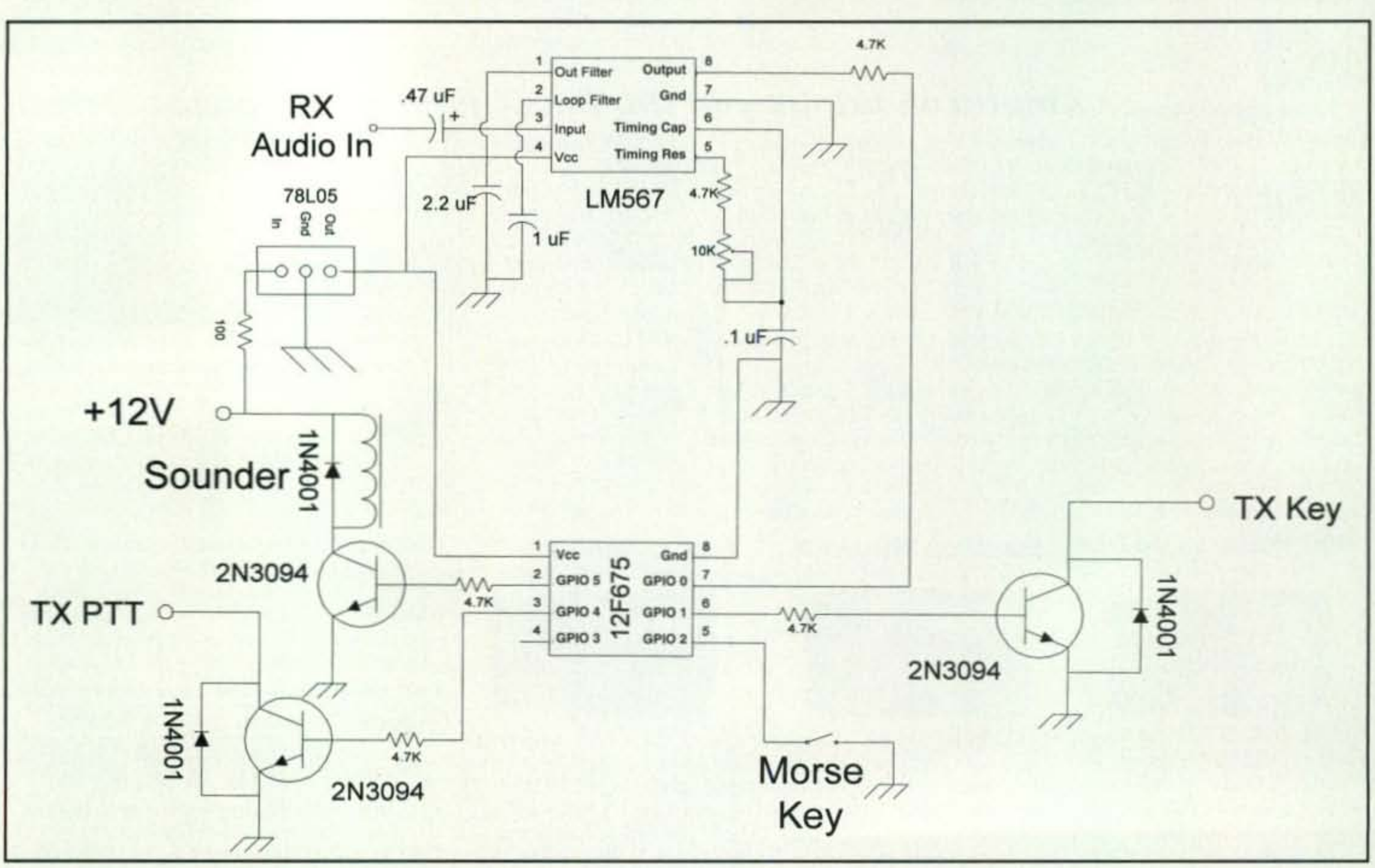


Fig. 1– Schematic of the PIC-microprocessor-based adapter for feeding a receiver output to an old-time telegraph sounder.

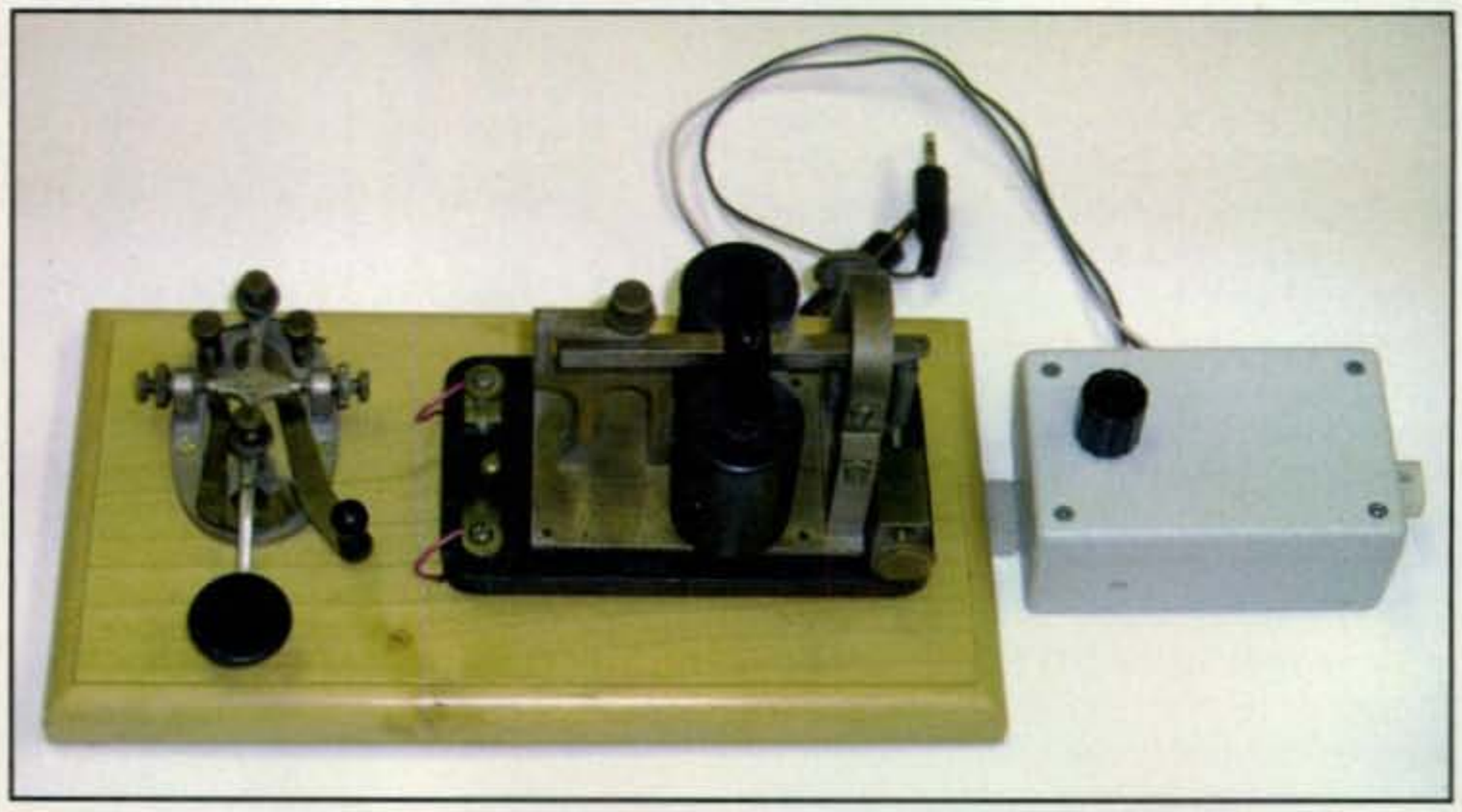
coils of the sounder. An inexpensive integrated circuit, the LM567 tone decoder, makes the conversion a snap. The supporting components surrounding the LM567 in the circuit diagram will allow the IC to decode tones within the usual frequency range for CW work. The bandwidth of the decoder is about 100 Hz, which helps reduce interference from adjacent QSOs. When a Morse dit or dah is received, the output of the LM567 goes to the low state (ground). It's that simple.

The second major component of the sounder interface is a 12F675 PIC microcontroller. Some may view the use of a PIC in the interface as overkill, but I prefer to view it as "old meets new." The PIC certainly simplifies the circuitry of the interface and reduces costs, plus the software makes the interface easily adaptable to your particular situation.

Sounder Interface Software

The PIC software contains a loop that monitors the tone decoder for a low state (received dit or dah). When the low is detected, the PIC turns on the switching transistor, which in turn energizes the sounder coils from a 12-volt DC power source. When the tone stops, the tone decoder goes to a high state and the PIC turns off the current to the sounder coils. A "slap, click, twang" sound is the result. The diode across the sounder coils (and across the other switching transistors) performs an important protection function. Very high, and potentially damaging, reverse voltages can be produced within the sounder coils when the induced magnetic field collapses as the current is turned off. The diode provides a short circuit path for these reverse high voltages.

The PIC software also performs other interface functions. Closing the hand-key triggers an interrupt program that captures the attention of the PIC. The PIC follows your hand-key movement and keys the sounder, the PTT line, and the key line of the transmitter to allow you to produce not only code on the sounder, but also over the air. The PIC is programmed to hold the PTT line closed for a period of approximately 750 ms after the final character is sent (similar to the way a VOX circuit keeps the transmitter keyed for a certain amount of time after you stop talking into the microphone). Then the PIC releases the PTT line and begins to monitor for the next incoming signal from the tone decoder. The software source code is



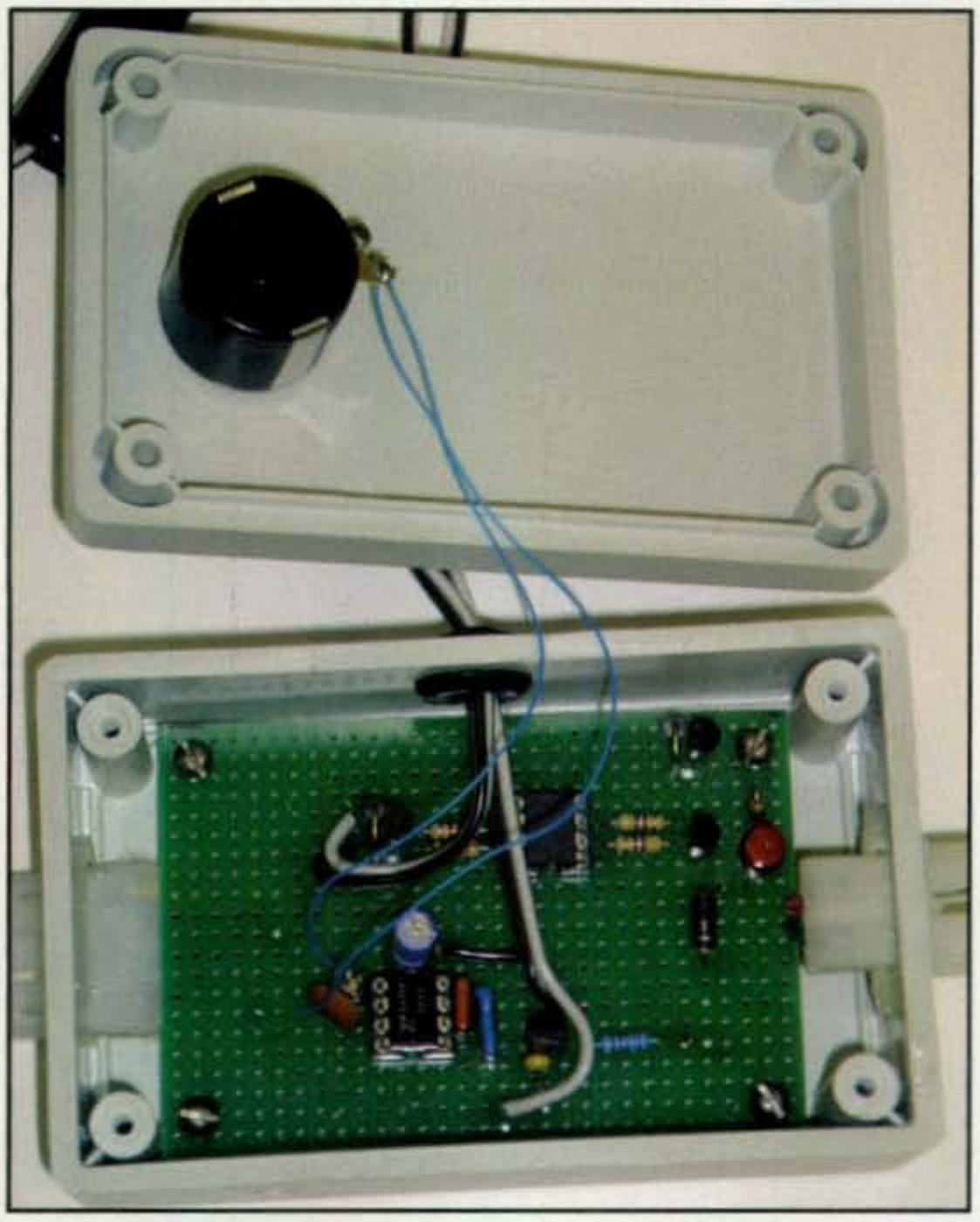
The author gave new life to an old telegraph sounder by building an adapter that converts Morse Code tones from his receiver into the voltages needed to operate the sounder.

well documented and easily modified by the user. Contact the author for the source code.

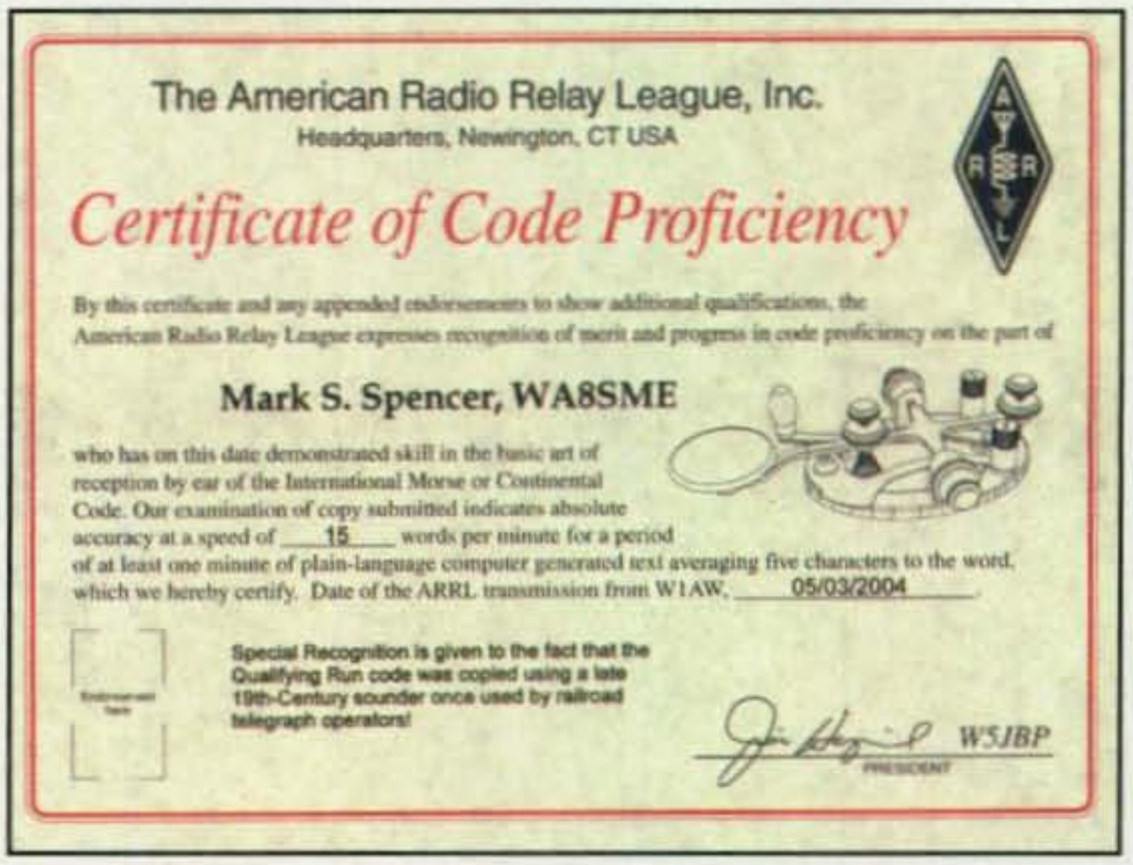
Operating the Sounder Interface

Adjusting the sounder interface is simple. Tune in a CW signal as you normally would. Feed the audio to the interface

Close-up view of the sounder adapter.
← Not much to it on the outside...



Interior view of the sounder adapter. The heart of the circuit ← *is an LM567 IC and a 12F675 PIC microcontroller.*



Just to prove to himself that he could use a sounder for actual receiving, the author tuned in a W1AW Code Proficiency Run and qualified at 15 words per minute—on the sounder! Note the special recognition on the certificate.

and adjust the variable resistor (potentiometer) until the sounder is activated in step with the incoming code. Continue to adjust the variable resistor until the sounder ceases to operate. Then back the variable resistor adjustment to the halfway point to center the tone-decoder pass band to the audio frequency you normally use to copy code.

Operations with the Sounder

Operating with a sounder is something you have to experience for yourself. It was exhilarating the first time I connected up the interface, turned in W1AW code practice, and the sounder began its "slap, click, twang." Even more surprising was that it didn't take long before the "snap, click, twang" began to make sense. The transition from tone Morse Code to sounder code was easier than I thought it would be.

I've used the words "slap, click, twang" to describe the sound made by the sounder. The "slap" sound comes from the downward movement of the sounder arm as the energized coils pull it down hard against the sounder anvil. The "click" sound comes from the upward movement of the arm after it is released and the return spring tension pulls the arm up against a mechanical stop. The "twang" sound comes from the flexing spring. The dits and dahs make a different and distinctive "slap, click, twang" sound.

My first sounder QSOs were with K4JIF, K1TG, and WBØNQM. The narrow bandwidth of the LM567 tone decoder requires careful receiver tuning. The signals have to be relatively strong to maintain the rhythm of the sounder . . . and speaking of rhythm (although it could also be due to my inexperience), the sounder is not as forgiving of sloppy fists as is normal tone CW. Finally, to prove to myself I could use a sounder, I did a W1AW CW proficiency run. With renewed pride (and probably not so humble), I copied 15 wpm.

Thus, as the din over the relevance and demise of Morse Code as a licensing requirement continues, why not step back and experience the code the way it was done in the beginning? A little "slap, click, twang" can perhaps put the din in a new perspective. ■

Note: This article originally appeared in *Homebrewer* magazine, Issue #4, January 2005, published by the American QRP Club, and is reprinted here by permission.

BY DAVE INGRAM,* K4TWJ

Specialty Clubs and Groups

If you have been in amateur radio for a number of years or if you have listened to "old pro" amateurs talking, you have probably heard mention of some rather unique organizations in or with close ties to amateur radio. These organizations differ from familiar-name groups such as the ARRL, RACES, SKYWARN, etc., and one or two have a history dating back to the very early days of wireless communications. Some of these groups you may know about, some you probably do not know about, and we are sure there are some you will appreciate knowing about. This month's column thus is dedicated to an overview of a few of the special groups that make amateur radio such an internationally respected hobby/service. Space is limited, so let's jump right into the discussion!

QCWA

One of the most widely known groups of special interest in amateur radio today is the Quarter Century Wireless Association. It is also one of the largest independent organizations in amateur radio, with membership in excess of 20,000. A creditable amount of QCWA's growth is attributed to its approximately 150 chapters located through the U.S. Each chapter is self-governing, operates in agreement with the QCWA constitution and by-laws, and makes an annual report to QCWA headquarters.

QCWA was formed in 1947 with the purpose of promoting friendship and cooperation among radio amateurs licensed at least 25 years, and its mission has progressed admirably since that time. Its weekly on-the-air nets and quarterly QSO party are well-endorsed and quite popular operating events. QCWA also publishes a newsletter or journal four times a year. A typical issue is approximately 60 pages in length and includes a variety of columns, feature articles, chapter newsletters, and want ads (free listing for members).

Membership in QCWA is open to radio amateurs who were first licensed at least 25 years ago, and no, you need not be continuously active on the air during that time to qualify for membership. You must, however, supply verifiable proof of holding an amateur radio license at least 25 years ago. If you are like many of us, you lost your first license years ago. You or a close friend may still have an old "callbook" listing your name and call, however, so a copy of the cover and the page (showing year and page number) can fill that requirement.

There is a special sense of pride and dedication to the hobby in being a licensed radio amateur for 25 years, and we know of no better way to celebrate that milestone than with a membership in QCWA. Go for it! You can join by downloading a membership application from <www.qcwa.org> and sending it along with $20 dues plus $3 initiation fee to QCWA, Inc., P.O. Box 3247, Framingham, MA 01705-3247.

SOWP

The Society of Wireless Pioneers is especially dedicated to "professional and amateur telegraphers who have mastered the art of communicating over long distances via Morse Code with a hand

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e-mail: <k4twj@cq-amateur-radio.com>

Every club, group, and/or organization in amateur radio has its own special logo (or logos) available to members on lapel pins, coffee cups, jacket patches, and knit shirts. Shown here are logos for FISTS, QCWA, SOWP, FOC, YLRL, and RCA. Items with logos on them are a great way to show your support of a group or club.

key or a bug." SOWP members are known for their unique ability to copy code through atmospheric noises, interpret strangely produced dots and dashes, and occasionally "make sense" out of unusual silence. The society also realizes that wireless communication is rapidly changing, but regardless of various satellites, burst transmissions, spread-spectrum techniques, etc., CW is an art that will transcend the annals of time.

The SOWP membership is mainly comprised of professional radio operators. However, Technical Associate membership is also available to engineers, technicians, instructors, authors, and writers interested in the collection and preservation of communications history and CW in particular. As you might expect, SOWP is also a strong voice in the preservation of CW as a viable mode of communication.

Membership in SOWP is by application and acceptance rather than a straight "pay dues and join" procedure. Your qualifications should be included with a request for membership. Acceptance into SOWP is for life, and it is kept active by annual dues of $15 (which includes quarterly issues of SOWP's newsletter, "World Wireless Beacon").

Apply by contacting the Society of Wireless Pioneers at P.O. Box 86, Geyserville, CA 95441, or on the web at <www.sowp.org>. You also may send an e-mail inquiry to <k6dzy@direcway.com>. A listing of SOWP on-the-air activities and nets is posted on the society's website.

FISTS

Another group with a strong appreciation for Morse Code and radiotelegraphy is the FISTS CW Club. This group was founded in England in 1987. It is part of the International Morse Preservation Society, and it is now active in the U.K., the U.S., and Asia. FISTS' purpose or mission is furthering the use of CW on our amateur radio bands, encouraging newcomers to the CW mode, and promoting friendships within its membership (which is open to all radio amateurs with an interest in Morse Code, regardless of their CW speed).

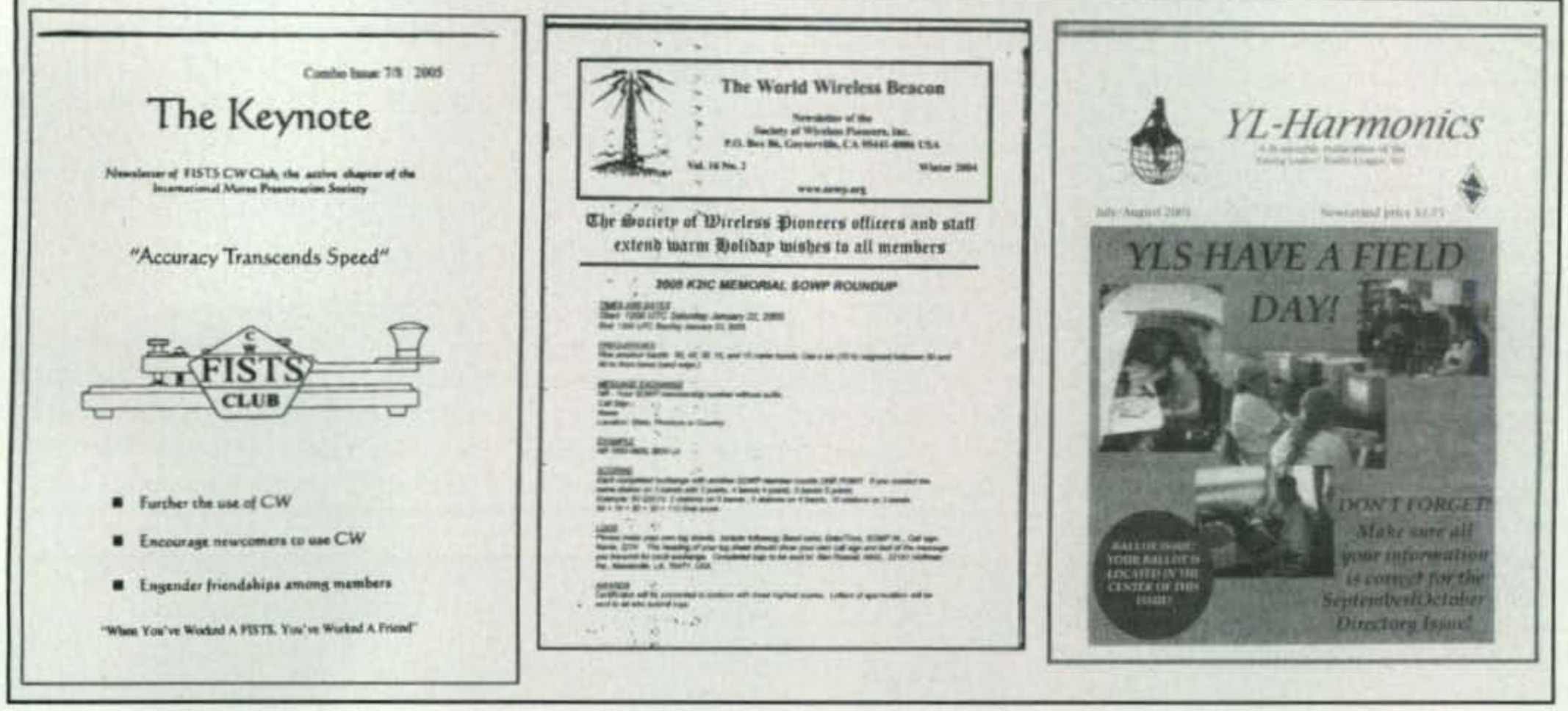
In pursuit of that goal, FISTS has put together enough on-the-air activities and operating awards to keep club members enthused for many years. The club also has a clever on-the-air Code Buddy program to help amateurs improve their CW skill and speed, plus a written guide for newcomers that walks you through making on-the-air QSOs, regardless of prior experience. Both the Code Buddy program and written CW guide are excellent aids for helping anyone with an interest in Morse and CW to become a proficient and confident CW operator.

If you would like an overview of FISTS' activities, listen on the club's popular "hangout" frequencies of 7.028, 10.118, or 14.058 MHz any time the bands are open. You will hear members exchanging friendly greetings, working toward awards, and enjoying CW to the max.

There are two routes to joining FISTS. You can download an application from the FISTS website, <www.fists.org>, or you can request an application by postal mail (send an SASE to Jim Ranieri, AA9LS, 33778 Rebecca Rd., Kingston, IL 60145). Membership fee, which includes ten issues of the club's newsletter, "Keynote," is $15 a year.

YLRL

YLs and XYLs of all license classes are invited to join the Young Ladies Radio League, an organization "dedicated to encouraging and assisting YLs throughout the world entering into amateur radio." YLRL offers a variety of activities,



Dedicated club newsletters or mini magazines are included with annual membership fees and are a very effective means of staying informed about club activities.

from friendly conversation both on the air and at hamfests to contesting, pursuing special YL-related awards, and meetings at national conventions.

Probably YLRL's best known activity is the YL-OM Contest held annually in February with, as the name implies, YLs pursuing a maximum number of contacts with OMs over a 24-hour period. There is also a DX-to-North American YL contest in April, an informal Howdy Days celebration in September, and a YL Anniversary Party in October. There are informal YL nets at 1800 and 1900 UTC on 14.298 and 14.288 MHz most Thursdays and Wednesdays. With respect to non-contest operating awards, YLRL offers certificates for YLCC (contacting 100 YLs), DX-YL (contacting 25 YLs outside of the U.S.), Working All States YL, Working All Continents YL, and DXCC-YL.

A small number of YLs, incidentally, have been noted pioneering IRLP, or Internet-Linked 2 meter operations, for globe-spanning communications. YLRL has significant potential for growth, such as special-event awards for working YLs on the air, producing and selling items such as rig covers, continuing IRLP work, and much more. YLs in amateur radio are special—very special—and it is delightful to see an organization such as YLRL bringing them together under one international umbrella. Hopefully their efforts will continue indefinitely.

If you would like to learn more or join YLRL, check on the web at <www.ylrl.org>, or acquire a membership application online at the website and send it to Carol Schmitkons, KI8IM, 43530 Middle Ridge Rd., Lorraine, OH 44053-3902. Membership fee is $15 per year, which includes six issues of the newsletter "YL Harmonics."

The Clubs in Brief

QCWA—Being a licensed radio amateur at least 25 years is a commendable achievement, and there is no better way to celebrate that fact than by joining The Quarter Century Wireless Association. It is a proud and highly influential organization of the best kind.

SOWP—The Society of Wireless Pioneers is comprised of highly astute CW enthusiasts and professional radio operators/telegraphers. Their ability to copy Morse Code under any and all circumstances is remarkable. Membership is also available to radio amateurs interested in the preservation of telegraphic history.

FISTS—Do you appreciate CW and would you like to become more proficient in its use or help aspiring newcomers enjoy CW? Would you like to meet other CW enthusiasts? Joining FISTS is a smart first step.

YLRL—YLs and XYLs in amateur radio are very special, and they are also a minority group deserving all the encouragement and friendship possible to continue active in amateur radio. The Young Ladies Relay League helps fill that need.

RCA—Are the technical aspects of electronic communications your specialty? Are you intensely interested in advancing the state of communications technology? If so, you may appreciate being a member of the highly esteemed Radio Club of America.

FOC—As related in the First Class CW Operator Club's mission statement, membership in FOC is not an award; it is a goal. Continuously strive for the highest possible standards in both your transmitted signals and operating techniques, make friends with some FOC members, and someday you may be invited to join this special group.

RCA

Amateurs with a formidable interest and background in the technical aspects of radio and electronics will surely find the Radio Club of America appealing. This highly esteemed organization has roots dating back to the very early days of wireless (1909), with membership composed of top names in electronics and communications such as Armstrong, Hazeltine, DuMont, Collins, etc. The club's traditions continue strong today, with many members standing as leaders in areas such as land mobile, cell phones, and audio enhancement.

Formally described, the club's purpose or mission is to "operate exclusively for charitable, educational, and scientific purposes and more specifically to design and contribute to the development of radio communications programs plus provide a scholarship fund for worthy students to study radio communications."

Membership in RCA is open to any interested party and subject to approval by the membership committee. It is an exclusive honor. You can apply by downloading a membership form from the club's website, <www.radio-club-of-america.org>, and listing your achievements and contribu-

tions to the art "resume style." Visiting the club's website has a second purpose: You learn of RCA on-the-air QSO parties, where you can meet members and discuss the club more specifically and possibly gain (optional) sponsorship to aid in joining the Radio Club of America. RCA welcomes and encourages new membership.

FOC

As you probably have noticed, some radio amateurs are technical wizards and some are super-skillful operators—especially on CW. The British-based First Class CW Operators Club recognizes the latter group in a very special way. You do not ask to join or apply for membership, but may be invited to join if your on-the-air caliber and conduct are recognized and reported to FOC by at least five members/sponsors in at least two continents and within the same six-month period. You then progress to a "starred list" for months. If there are no objections at the end of that time, you will be eligible for membership. The club's membership is limited to 500 worldwide, so there typically is a waiting list to "get in," and your name could stay on the list for a period of time before a final invitation to join FOC. As related in the club's mission statement, "FOC is more than a club; it is a way of life. Membership is not an award, it is a goal. FOC is more than a high speed CW signal. It also means a clean signal, a willingness to QRS to 3 w.p.m. for the struggling beginner, a helping hand for the aspirant down the street, and a feeling of oneness who would like to see the level of amateur radio rise."

How do you make your interest in FOC known? Check out the club's website: <www.firstclasscw.org.uk>. Note times and frequencies of various on-the-air FOC activities (typically 25 kHz from a band's lower end), and make friends with members. Then, if you are truly a first-class operator and maintain that high standard over time, someday you may be invited to join FOC.

Conclusion

As you probably surmised, there is a creditable number of special clubs and groups, both known and unknown, associated with amateur radio—and including information on all of them in a single column is also nigh impossible. To all those we missed, we offer our apologies and an invitation to share pertinent details of the group/association with us for inclusion in a future/follow-up column. 73, Dave, K4TWJ

What You've Told Us...

In the spirit of the season, we decided to have a little fun with our December survey...

Our first question asked if you've been a good boy or girl this past year, and 59% of you said yes, 41% said "depends on whom you ask," and 2% said no. There was less ambiguity about whether you were a good ham in '05 ... 79% of you said yes, 17% said depends on whom you ask, and 4% said no.

Next we asked if you anticipated receiving a ham radio related gift during the holiday season, and we hope more of you were surprised than disappointed ... 50% said no, 29% said yes, and 21% said "sure would be nice (hint, hint)." On the other hand, 47% of you said you were planning to *give* someone (yourself included) a ham-related holiday gift, 41% said no, and 14% said "can't reveal secret plans."

For our next question we asked if Riley deputized Santa, what you would be most likely to find in your stocking on Christmas morning ... 48% of you said candy, 29% said an A-1 Operators' Club certificate, and then it dropped to single digits—7% said they might find an invitation to call Riley after the holidays "to discuss some things," 5% expected a copy of The Amateur's Code, 4% said they might get a copy of their rig's operating manual, 3% each said coal and coal futures (which are quite valuable right now, by the way), and none of you—zero—said you'd likely get an Official Observer notice or an FCC citation.

Finally, we asked about your ham radio plans for the coming year ... 68% of you want to get on the air more (including 7% who want to get on for the first time); 53% want to clean up their shacks; 50% want to upgrade their skills; 47% want to work more DX; 40% each say they'd like to upgrade their stations, help someone get his/her ham license and be a mentor to another ham; 34% want to try a new mode or band; 21% want to upgrade their own licenses; and 8% want to *be* DX.

This month's free subscription winner is John Scott, K8YC, of Cornelius, North Carolina.

Reader Survey March 2006

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

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

This month, we have some questions about your views on the ARRL's proposal for the FCC to change subband regulation from a permitted *mode* basis to a permitted *bandwidth* basis.

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

1. Are you familiar with the discussions on replacing permitted-*mode* subbands on the amateur bands (e.g., CW and data only in this band segment; phone and image in this segment) with permitted-*bandwidth* subbands (e.g., 200 Hz, 500 Hz, 3.5 kHz)?
- Yes 1
- No 2

2. Are you familiar with the ARRL's proposal to the FCC for bandwidth regulation (RM-11306)?
- Yes 3
- No 4

3. Do you think the *concept* of bandwidth regulation is needed in order to accommodate future technical growth in amateur radio?
- Yes 5
- No 6
- Don't know 7
- Not interested 8

4. How do you feel about the ARRL's proposal to permit bandwidths of 3.5 kHz (the size of an SSB signal) on certain frequencies now reserved for CW and data, with only a voluntary bandplan to prevent use of SSB phone on these frequencies?
- Agree strongly 9
- Agree 10
- Neither agree nor disagree 11
- Disagree 12
- Disagree strongly 13

5. How do you feel about the ARRL's proposal to permit "semi-automatic" digital stations (that transmit only in response to inquiries) virtually anywhere in the HF amateur bands?
- Agree strongly 14
- Agree 15
- Neither agree nor disagree 16
- Disagree 17
- Disagree strongly 18

6. To what extent should amateurs be required to abide by band plans (e.g., not using a particular mode in a particular band segment even though its bandwidth fits within the maximum permitted by the rules)?
- Adherence to bandplans should remain totally voluntary 19
- Adherence to bandplans should be considered "good amateur practice" 20
- Bandplans should be like repeater coordination—voluntary, but in cases of interference when one station is observing the bandplan and the other is not, the station that is *not* following the bandplan has to resolve the interference 21
- Adherence to bandplans should be made mandatory 22
- There should be no bandplans beyond what is required by FCC rules 23

7. Another proposal before the FCC (RM-11305) proposes dropping all required subbands and relying exclusively on bandplans to separate different modes. How do feel about this idea?
- Agree strongly 24
- Agree 25
- Neither agree nor disagree 26
- Disagree 27
- Disagree strongly 28

8. Have you filed comments with the FCC on either RM-11305 or RM-11306, or do you plan to file comments on an eventual Notice of Proposed Rule Making based on either one or both of these petitions?
- Yes 29
- No 30
- Undecided 31

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

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The complete portable station set up and ready to get on the air on Mustang Island.

The ever-shrinking size of some HF radios makes the concept of operating on the road or on vacation ever more appealing. AD5X helps out with plans for a pack-and-go HF station that would be good for emergencies as well as vacation fun.

A Compact and Effective 40-10 Meter Portable Station

BY PHIL SALAS,* AD5X

I really enjoy this hobby of ours ... so much so that I don't like to let something like a vacation interfere with it. Thus, I always carry an HF station with me when on vacation. Over the past few years I've evolved my portable setup to make it more compact and transportable without sacrificing performance. This article describes my current, very compact portable station that is easily carried on "planes, trains, and automobiles" and will provide you with a tremendous amount of enjoyment when you reach your final destination.

The Basic Station

I prefer to use a full 100-watt rig for portable operation so as not to suffer any potential power disadvantage. While I use an ICOM IC-706MKIIG, you certainly have many different compact transceivers from which to choose. The basic accessories I've added to this transceiver are an MFJ-4125 switching power supply (possibly the smallest and lightest 25-amp peak switcher currently available) and the MFJ-902 travel tuner. For an antenna, I use a simple 40–10 meter portable dipole along with 15- and 25-foot sections of RG-

Photo A– The author has packed a complete HF station into a single carrying case for use in just about any portable location with access to AC power. (All photos courtesy AD5X)

**1517 Creekside Drive, Richardson, TX 75081*
e-mail: <ad5x@arrl.net>

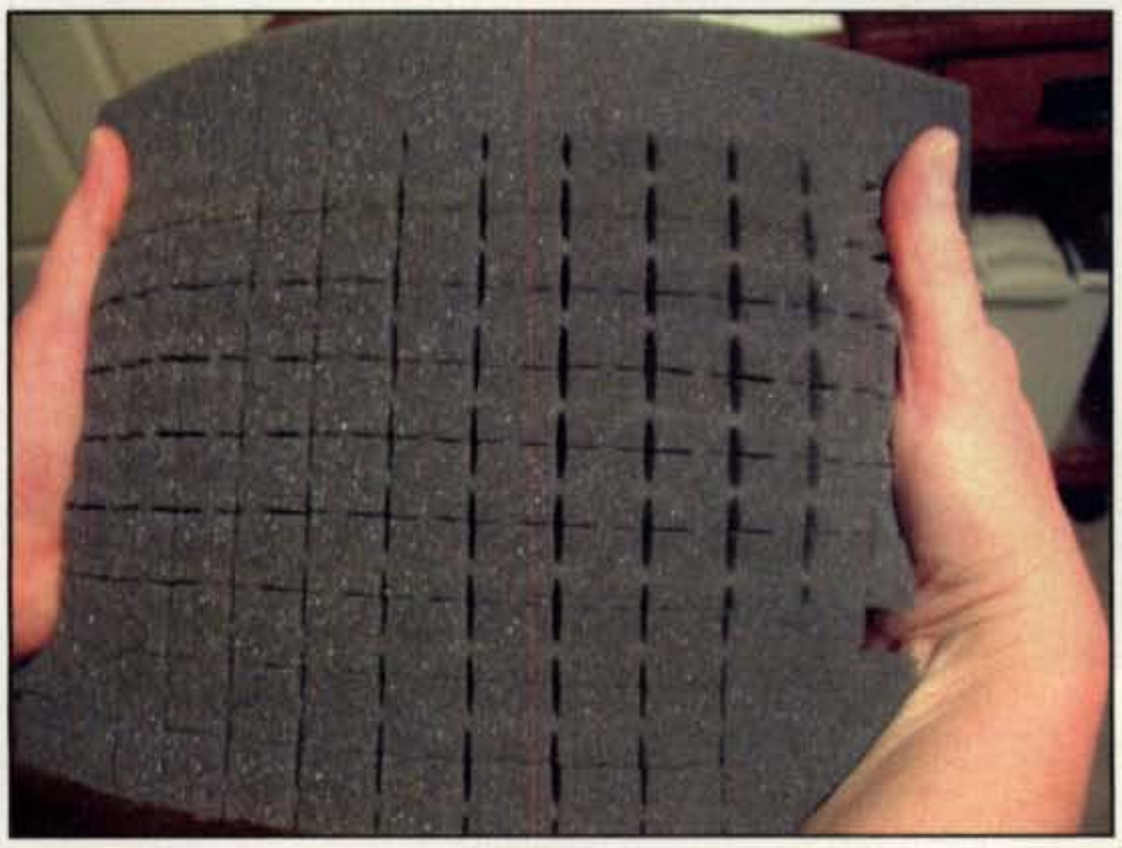

Photo B– The foam padding in the MFJ-6404 carrying case is 5/8 inch thick and easily customizable by hand to fit around your specific gear.

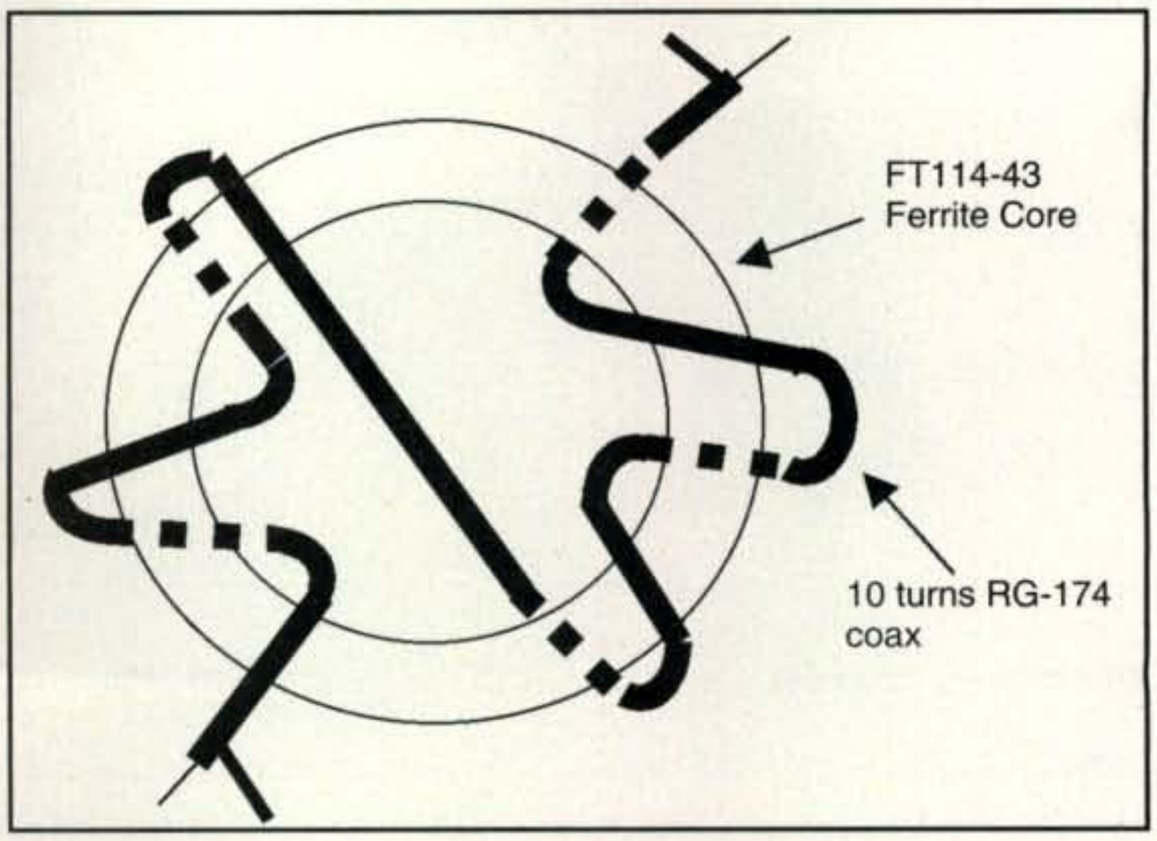

Fig. 1– Balun winding details. There are five turns per side (not all turns are shown here).

Photo C– It's easy to arrange the MFJ-6404's foam padding to accommodate whatever equipment you're planning to pack (as long as it fits in the box!).

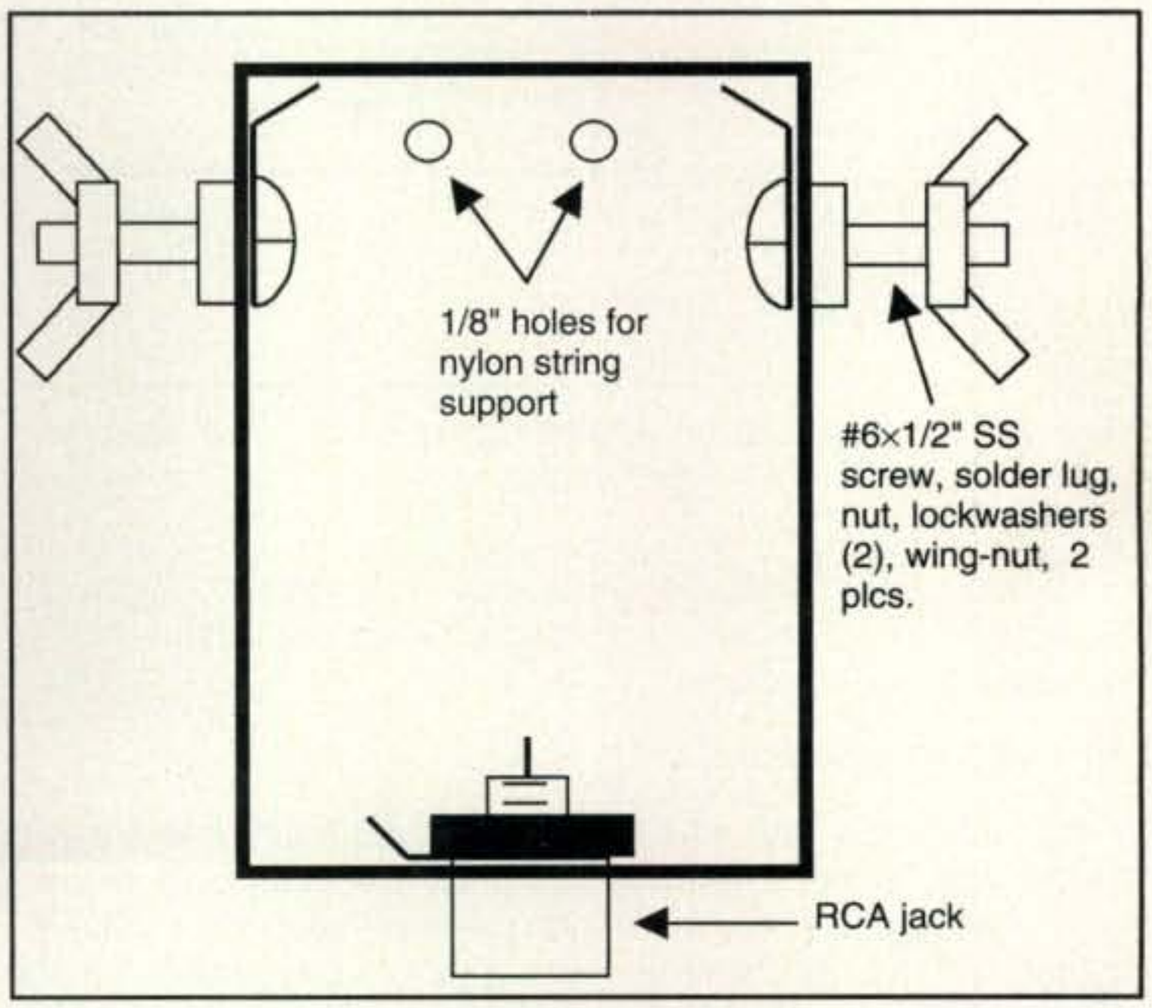

Fig. 2– Balun/center-support box details.

174 coax and a balun. The TE-NE-KEY <http://www.qsl.net/noarc/newneke.htm> is my portable key of choice, but again, there are many options out there. Finally, I fit the entire station into an MFJ-6404 carrying case (see photo A).

The MFJ-6404 carrying case is perfect for transporting your portable station. Besides being externally rugged, it has internal foam padding and a foam insert that is easily customized for your particular equipment. The foam insert is made up of 5/8-inch serrated pieces and is easily modified by hand (see photos B and C). The MFJ-6404 also comes with a carrying strap, and includes keyed latches to secure your equipment.

Improved Portable Multi-band Dipole

It's tough to beat the effectiveness of a dipole for portable operation. Dipoles are simple, compact, and good performers. I published an article in December 2000 *QST* for a 20–10 meter portable dipole that uses nylon insulators and clip-leads to "enable" or "disable" sections of the antenna to make it resonant on all the bands. However, I've found that a simpler antenna is easily built with small switches instead.

Also, the original antenna did not include a balun. Over the past few years I've found that my setup could become "RF hot" when operating from portable locations with poor (or no) ground systems, and an in-line balun always seemed to cure this problem. Since I needed a feed-point support anyway, I combined the feed support with a balun in a small enclosure. The balun consists of an FT114-43 ferrite core wrapped with ten turns of RG-174 coax as shown in fig. 1. Note the crossover winding necessary to get the input and output ends of the coax on opposite sides of the ferrite core so the balun will fit into the referenced plastic box. I mounted the balun along with an input RCA-style phono connector and #6 stainless-steel hardware into the plastic mini-box as shown in fig. 2 and photos D and E. Note the holes in the bottom of the box for putting in a nylon cord loop to support the assembly.

As before, the multi-band dipole is a full-size 20-meter dipole subdivided into switched sections to support the high-

Photo D– The balun (see text) performs double duty, helping minimize RF "bites" in areas with poor or no ground, and providing a center support and feedline connection point for the antenna.

Photo E– A loop of nylon cord through the back of the balun box makes it easy to hang up this antenna just about anywhere.

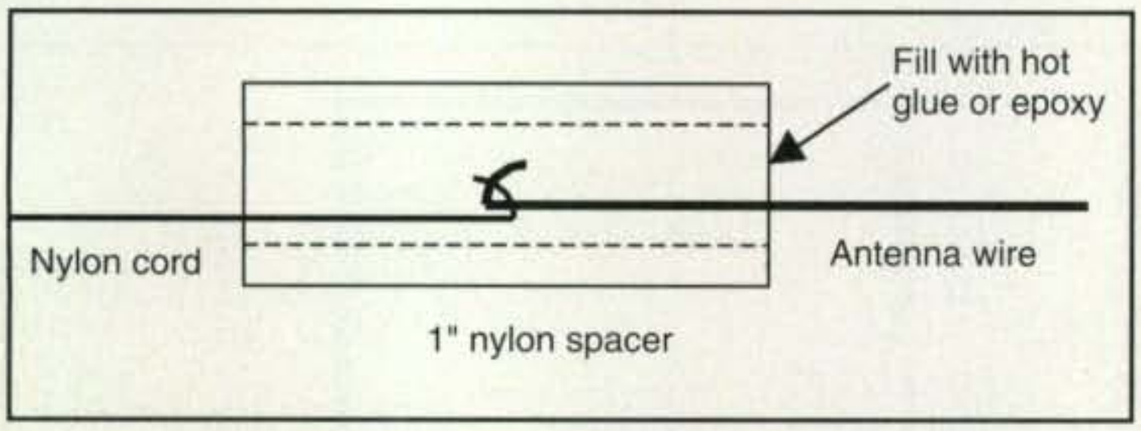

Fig. 3– End insulator assembly details. See text for explanation.

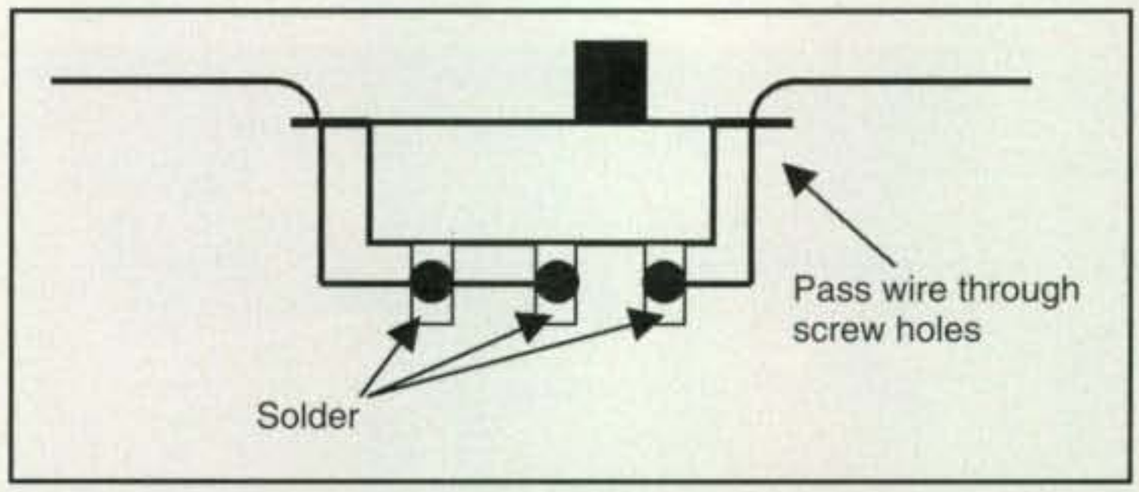

Fig. 4– Switch wiring. There is one switch on each side of the dipole between each set of wires. See fig. 5 and the text for details.

er bands. For the dipole wires, I used stranded 22-gauge insulated wire. My starting dipole lengths were based on the standard dipole formula:

L (feet) = 468/Freq (MHz)

With insulated wire, this formula ensures that the wires are a little long (velocity factor is less). For the outer end-insulators, overlap one end of a 12-inch piece of nylon cord with the outside end of the 20-meter wire section and slide a 1-inch nylon spacer over the joint. Then fill the nylon spacer with hot glue or epoxy (see fig. 3). The nylon cord can be used to tie off the ends of the dipole for supporting the antenna. (*Note:* Use a match to cut your nylon cord. As the flame burns through the nylon cord, it also fuses the ends of the cord so that there is no unraveling.). Solder #6 spade lugs onto the inner ends of the two 10-meter wires. These #6 spade lugs attach to the feedpoint/balun using the #6 wing-nuts on the balun. Tack-solder all the wire sections to the switches, and then hang the dipole where you can easily get to it for tuning (between sections of a fence is fine).

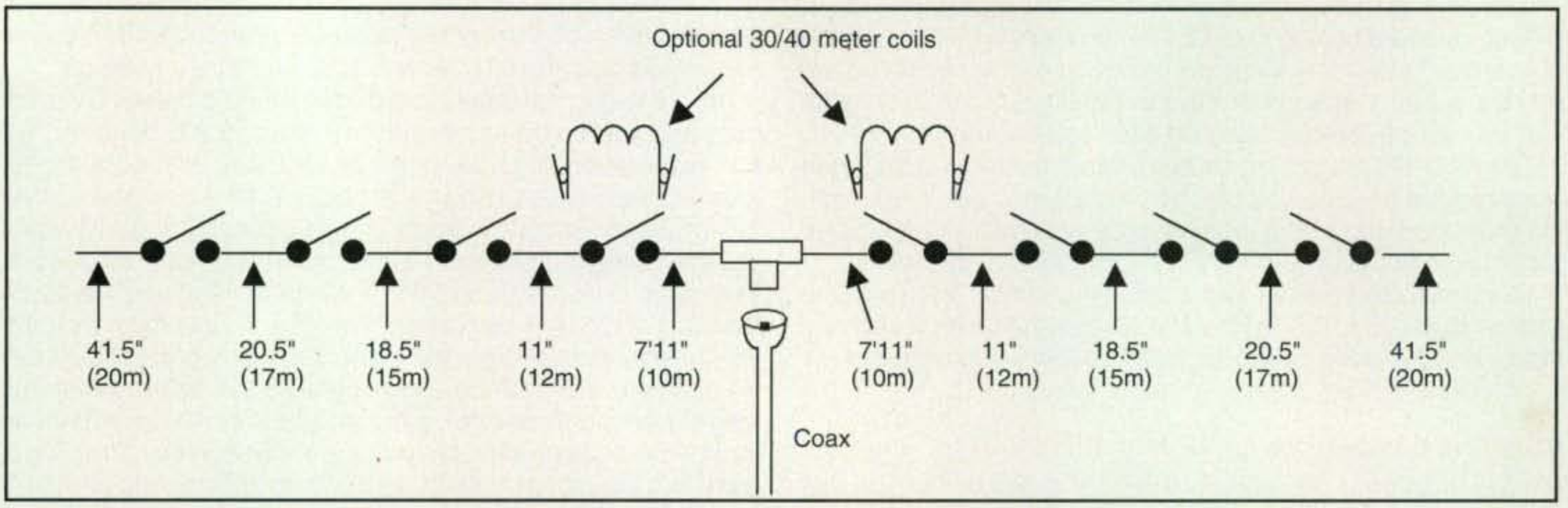

Fig. 5– Overall view of 40–10 meter switched dipole. The switches are opened or closed depending on which band between 10 and 20 meters you're using. Coils for 30 or 40 meters are clipped across the 10-meter switch (which remains open while all the others are closed).

Photo F– Putting a 20-meter antenna on 30 and 40 meters requires the addition of loading coils, clipped across the 10-meter switch. This photo shows the 30-meter coil.

To tune the antenna, open all switches and adjust the two inner wire sections for lowest SWR on 10 meters using an antenna analyzer. Unsolder the wires on the switch end and shorten them as necessary. Use the following equation to determine the correct length:

Correct Length = Current Length × (Frequency of Low SWR/Desired Frequency)

Now switch in the 12-meter sections and adjust these sections for resonance on 12 meters. Continue this procedure for the 15-, 17-, and 20-meter bands. Once the final lengths have been determined, thread the wires through the switch mounting holes as shown in fig. 4 so as to give strain relief to the switch terminals. The switch-hole to switch-hole lengths I wound up with are shown in fig. 5. A dab of epoxy on the holes will fix the wires in place and keep the insulation from wearing over time.

Photo G– With the 40-meter coil in place, the antenna is ready to "rock" on 7 MHz. Changing bands simply requires unclipping the coil.

While the SWR may move around some due to your changing portable locations, most of today's rigs can put out full power into a 2:1 SWR. Therefore, the important thing is that the antenna is close to resonance on your selected bands to ensure that you won't suffer noticeable inefficiencies due to coax losses. If needed, I use the MFJ-902 antenna tuner to make my IC-706MKIIG happy, although this is usually unnecessary on 20–10 meters.

Adding 30 and 40 meters

I also wanted to operate on 30 and 40 meters, yet keep the antenna length to that of a 20-meter dipole. This keeps the antenna compact and is also a good length for a condo balcony installation. I achieved the added bands by adding loading coils across the 10-meter switches. The 30-meter coils consist of 6.5-µHy inductors (22T #20 enamel wire on T106-2 toroid cores). For 40 meters you need 18.5-µHy inductors (36 turns of #20 enamel wire on T106-2 cores). I used alligator clips on the toroid wire leads so I could just clip these inductors across the 10-meter switch contacts (with the 10-meter switches "open" and all other switches "closed"). A small dab of epoxy or hot glue keeps the turns in place. I also

Dipole/Balun Parts List

QTY	Description	Source/Part Number	Price
8	DPDT slide switches	www.allelectronics.com SSW-37	4/$1.00
1	Phono jack	www.allelectronics.com RCMJ	$0.40
1	2.35"x1.38"x0.8" ABS case	www.allelectronics.com1551-HBK	$1.20
2 or 4	Shielded phono plug	www.allelectronics.com MPRP	$0.50 ea
1	phono plug coupler	www.allelectronics.com AD-3	$0.75
1	FT114-43 ferrite core	www.oselectronics.com FT114-43	$2.30
4	T106-2 powdered Iron core	www.oselectronics.com T106-2	$2.25 ea
35 ft	#22 insulated stranded wire	www.oselectronics.com HW22BK	$5.95/100 ft
2	1" nylon spacer	www.oselectronics.com 14-211D	$0.15 ea
	#20 enameled wire	www.oselectronics.com MW20	$4.50/100 ft
40 ft	RG-174 coax	www.oselectronics.com RG-174U	$0.15/ft
2	#6 lockwasher solder lugs	www.oselectronics.com 10-479	$4.20/100
8	7/8" alligator clips	www.oselectronics.com 267	$0.15 ea
2	#6 x _" screw	Local hardware store	
4	#6 split lockwasher	Local hardware store	
2	#6 nut	Local hardware store	
2	#6 wing-nut	Local hardware store	
	Nylon cord	Local hardware store	

Note: For long-lasting use, stainless steel hardware is best (#6 screws, nuts, lockwashers, wingnuts).

Photo H– Here's the antenna, hung from a 15th-floor balcony at a condo on Mustang Island, Texas.

Photo I– This is a close-up of the feedpoint, showing the balun string wrapped around a stray nail to provide center support, and the RG-174 coax feeding the rig.

looped a 12-inch strand of nylon cord through each toroid for supporting the toroid on the antenna should the clip leads come loose in the wind (refer to photo F). Unless you are lucky, the SWR won't be truly centered with these values, so adjust the turns spacing a little to center the SWR. The SWR on 30 and 40 meters will probably exceed 2:1 at resonance, since the antenna is physically short on these bands (much lower radiation resistance). Thus, again I use my MFJ-902 antenna tuner to keep the SWR at the transceiver low. Photo

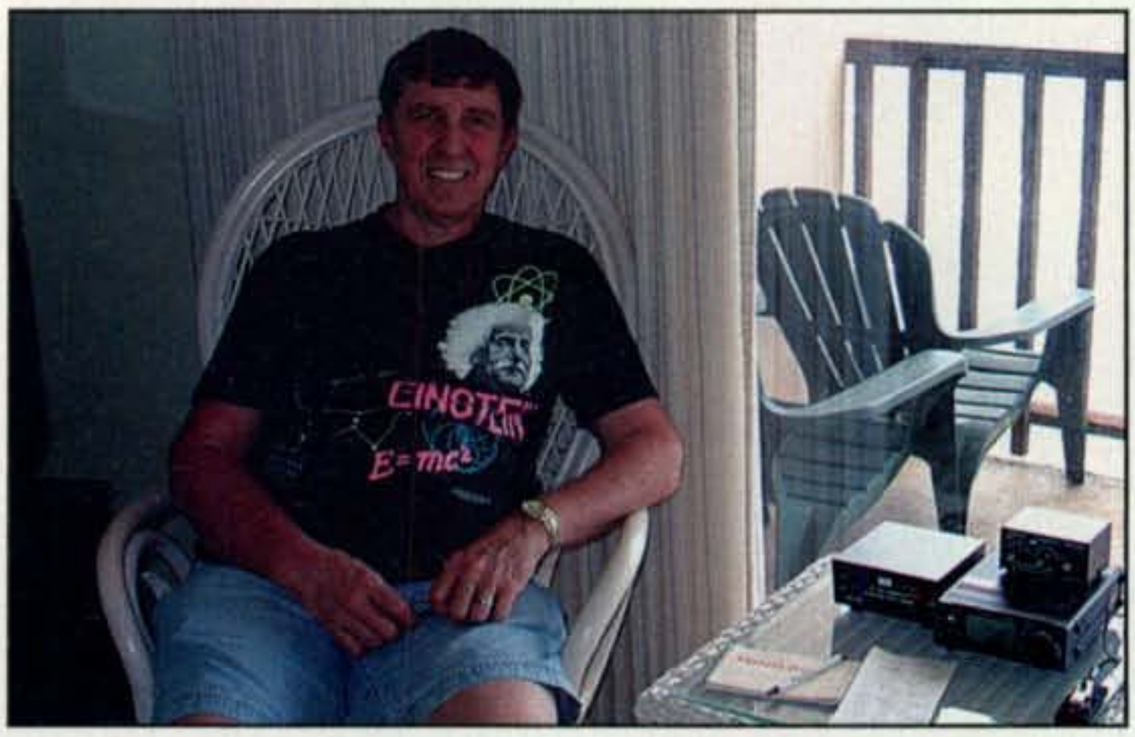

Photo J– The author relaxing next to his portable setup, combining ham radio with vacation fun.

G shows a close-up of the 40-meter loading coil clipped onto a 10-meter switch during portable operation.

Feedline

As mentioned earlier, I include 15- and 25-foot sections of RG-174 coax in my portable kit. These coax cables are terminated in male phono connectors, and I use a female-to-female phono coupler to tie them together for a longer feedline when necessary. RG-174 coax is fine for 100-watt rigs if the SWR isn't too high, which is the case, since this antenna is resonant on all bands. Also, phono connectors are fine at HF. Photos H and I show details of the antenna and feed mounted and in use on the 15th floor balcony of a condo during our vacation on Mustang Island, Texas (IOTA NA092). Man, what a great portable location that was! The lead photo and photo J show my portable station at that location.

Conclusion

Portable operation with minimal compromises is extremely easy with the compact equipment available today. I've described a very compact portable station that is hard to justify *not* taking with you on trips. Certainly you can substitute other equipment, but you get the general idea. So get out of the house and have fun operating HF portable! ■

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math's notes

BY IRWIN MATH,* WA2NDM

Potpourri

This month we would like to pass along a few interesting tidbits to hopefully spark the experimenter in you. Get out the soldering iron and continue reading!

Many of us are familiar with the common dummy load used to test transmitters. In the past in this column we have given examples of how to fabricate them with common non-inductive carbon resistors. Similar products are and have been on the market for years and have even included devices immersed in mineral oil (remember the Heath Cantenna?).

There is now another option in the form of a transistor-housing-encased (TO-220) non-inductive resistor that can easily handle reasonably high power levels. We are talking about the Caddock Corporation line of non-inductive resistors, particularly the MP9100 series. You can see what they look like on the Caddock Electronics website, <www.caddock.com>, or find out much they cost in the Mouser Electronics catalog (online at <www.mouser.com>). These resistors can be used individually for 25 to 100 watts dissipation, or connected in parallel for even higher wattages. For a single load use a 50-ohm device. For higher power use parallel devices. A 100-watt load, for example, could be made of two 100-ohm 50-watt resistors in parallel, but you get the idea.

Since the package is a common TO-220, mounting to a heat sink is very easy with a simple screw and nut. The resistor is also insulated from the housing (up to 1000 volts), so no mounting kits are needed. However, you do need to heat sink these, and the use of silicon grease or other heat-conducting paste between the resistor and the heat sink is also a good idea, especially for higher power levels. Remember, if you are dissipating any power at all, the heat has to go somewhere. You can use any conductive metal surface, heat-sink material, or even a chassis, but take care that whatever you do use can safely dissipate the power. Also, when you wire resistors in parallel, remember you are still dealing with RF, so use as short a connecting lead between the resistor and coaxial connector as practical.

*c/o CQ magazine

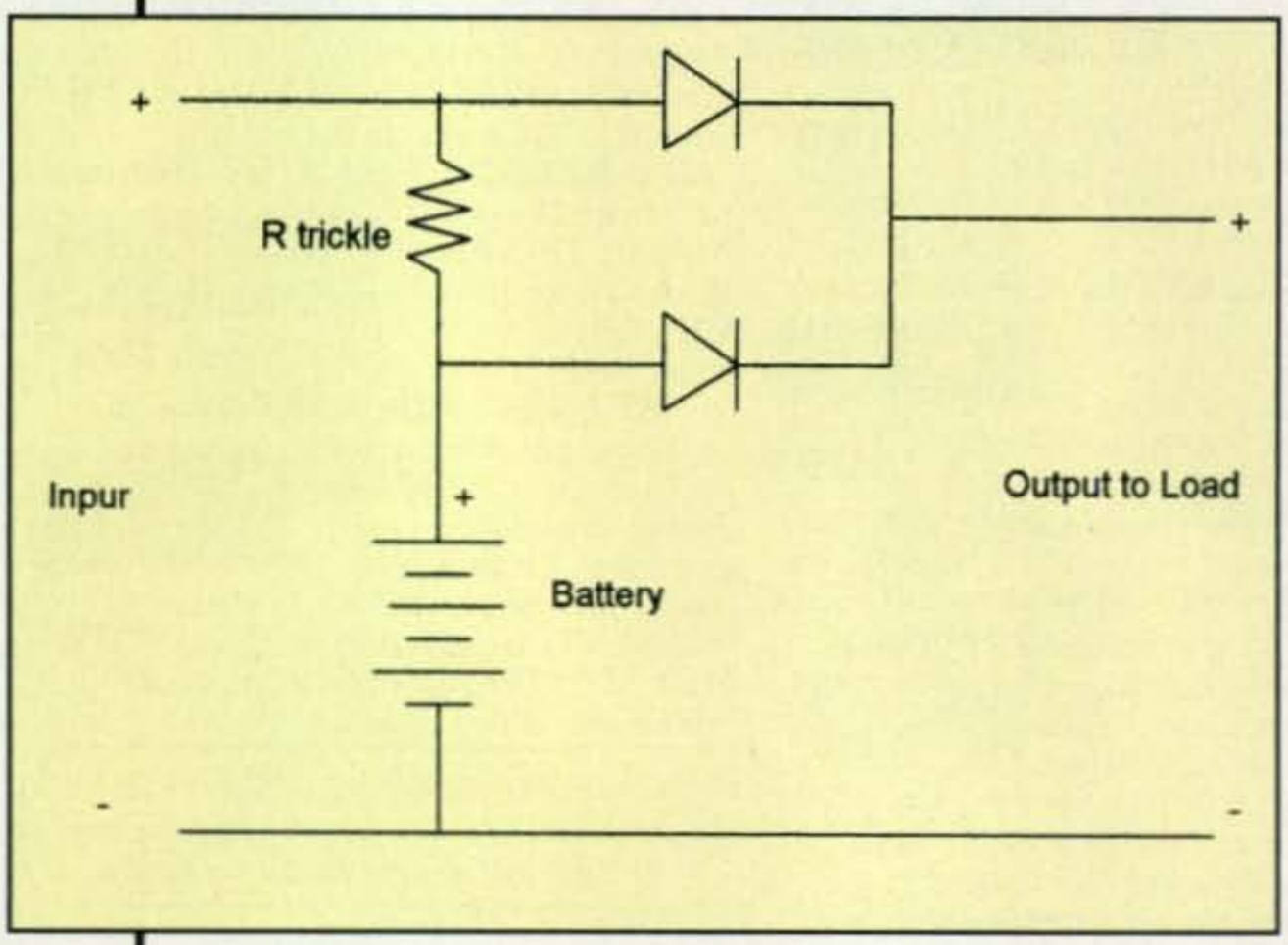

Fig. 1– The simple battery backup scheme discussed in the text.

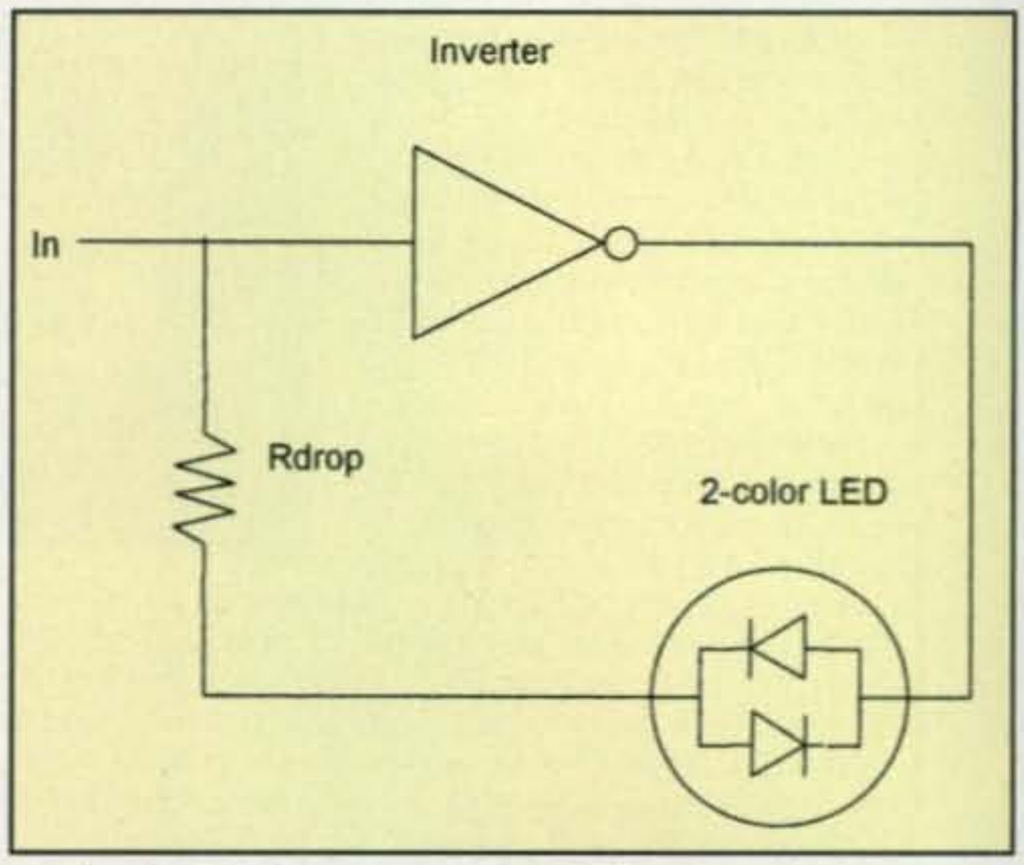

Fig. 2– Driving a two-color LED with one line.

Fig. 1 is a method to add either rechargeable battery backup to equipment lacking it, or an external power supply to battery-powered equipment that would benefit from this feature. In the circuit, two silicon diodes are arranged as an OR gate and allow whatever power-supply voltage is higher to pass on to the equipment. In configuring such a circuit, the battery voltage should be what is normally recommended for the equipment to be powered, and the external supply, which can be a wall-type plug-in, should have a slightly higher voltage rating (under full load). Be sure to choose diodes that can carry the full current that will flow, and be aware that the although the forward voltage drop of the diodes will only be 0.7 volts or so for common silicon devices, they may still dissipate significant power. If your load were to draw 5 amperes, for example, the diodes would dissipate 3.5 watts!

The added resistor (R trickle), by the way, is used to "trickle" charge the battery when the external power is connected. It should be chosen so that the current flowing into the battery is about 5% or so of the recommended charging current of the units used. Remember that we are not trying to charge the batteries as such; we are only attempting to keep them "topped off." Such a scheme switches almost instantly, and you can go between

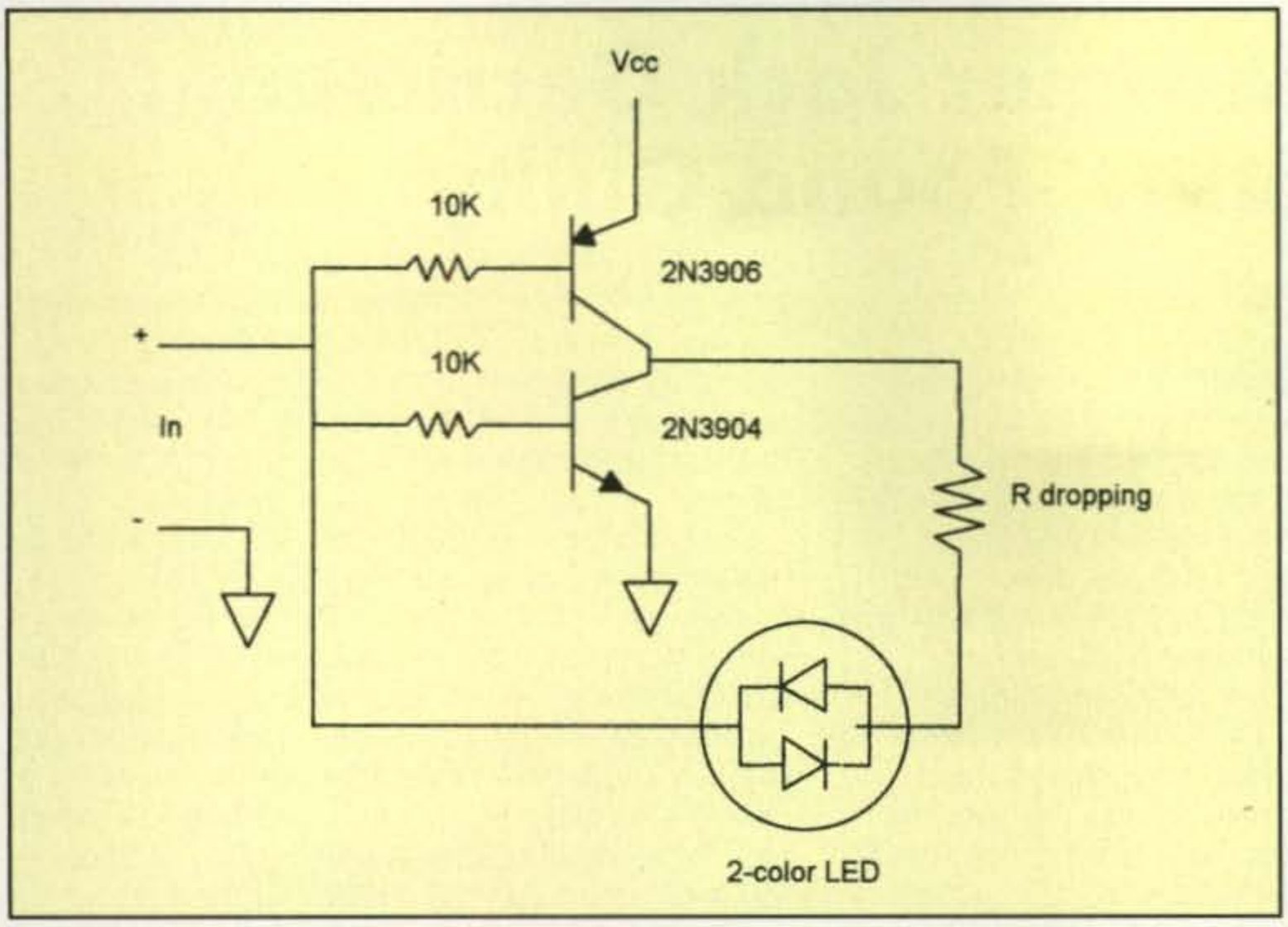

Fig. 3– Driving a two-color LED with transistors and one line.

external and internal power as quickly as you can change connectors.

Fig. 2 is a circuit we came across in the October issue of *Electronic Design Magazine*. It is quite clever, and is a method of driving a two-color LED with a single control line. Referring to the schematic, when the input (to the inverter) is low, the forward-biased LED lights, since the output of the inverter is high. When the input goes high, however, the inverter output goes low and "sinks" current from the other LED. For best results, the 74ACTxx series of logic is recommended, since it has enough capability to sink and source enough current (25 ma) to drive most common two-color LED devices. If an inverter is not available in your design, the circuit of fig. 3 may be used instead. Common 2N3904 and 2M3905 transistors can be used, but keep in mind that the input has to have enough "steam" to directly drive the LEDs as well.

Fig. 4 is a way to detect the output from an HT (or cellular telephone, if that is your preference). Since both devices produce RF, all that is needed is a simple untuned diode detector. The 1N5711 Shottkey diodes are arranged in a voltage-doubler circuit and applied to the input of a 74ACT04 hex inverter.

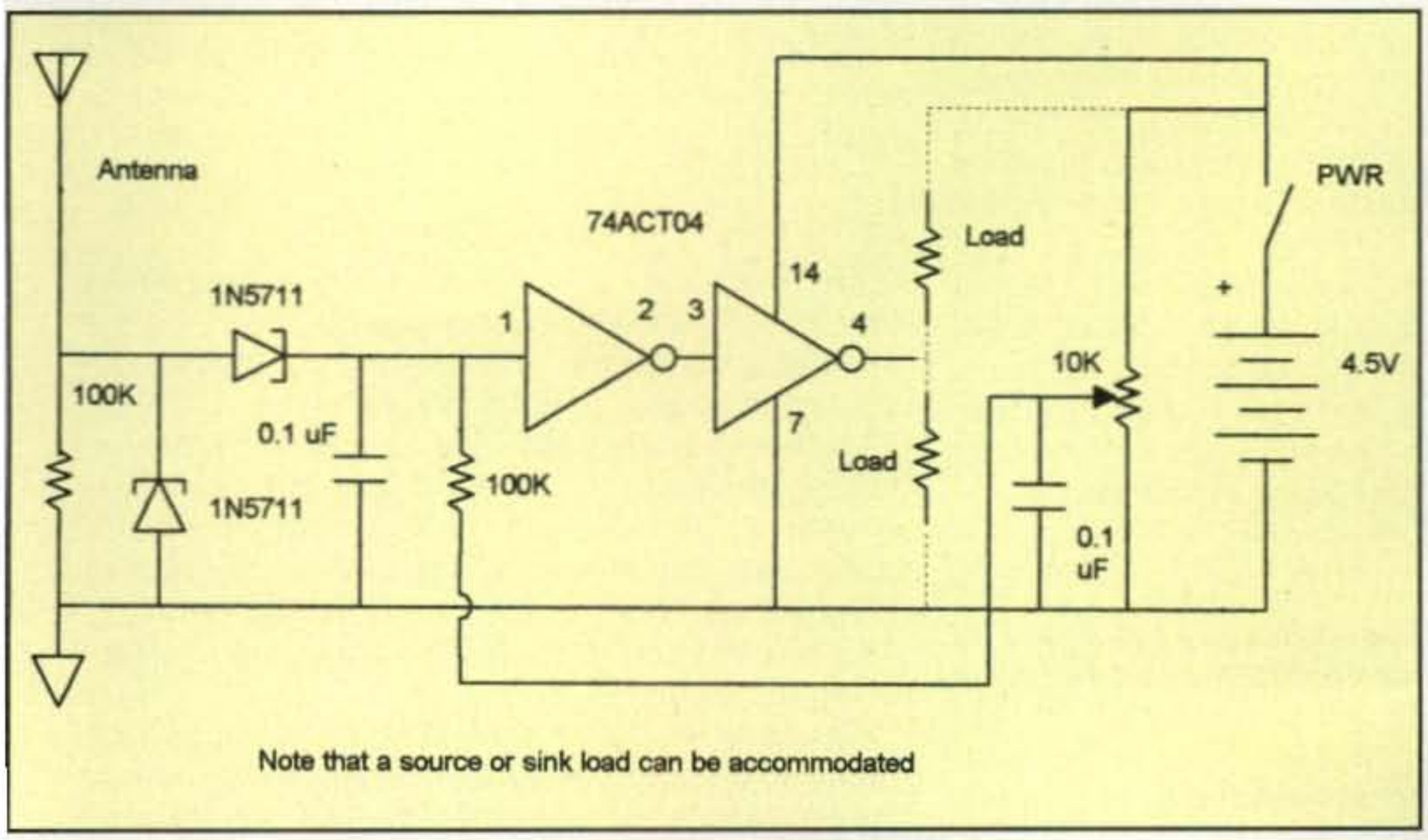

Fig. 4– A simple RF detector circuit.

The inverter then is used to trigger whatever load you choose. In operation, the 10K pot is adjusted just below the trigger point of the circuit. Any RF that is then "received" by the antenna is rectified, filtered by the 0.1-µF capacitor, and triggers the gate. Since the ACT family of hex inverters can source or sink up to 25 milliamperes per inverter, reasonable loads can be driven. Connections for either version are shown in the diagram as dotted lines. Keep in mind that you can even parallel several of the remaining gates (for the second stage) and drive a good-size relay, lamp, or other load. This circuit will work well into the VHF region, and its overall sensitivity will be determined by the length of the antenna as well as its distance from the RF source. For HT work, 6 to 12 inches should be adequate.

I sincerely hope the above "tips" serve to spark your interest to the extent that you are actually motivated to try something. They are simple enough and may be just what you need to update and complete that project of yours.

73, Irwin, WA2NDM

BY FREDERICK O. MAIA,* W5YI

Radio Jammer Jack Gerritsen, ex-KG6IRO, Found Guilty

Jack Gerritsen held an amateur license for about a week, according to the FCC. However, hams in southern California–as well as the California Highway Patrol, the U.S. Coast Guard, and others—will tell you that he's been a thorn in their side for more than five years. This month he'll find out the price he'll pay for ongoing illegal interference, as he faces sentencing on March 6 on a six-count federal conviction that could land him in prison for up to 15 years.

The public record on Jack Gerritsen of Bell, California, started in December 1999, when he was arrested by the California Highway Patrol and charged with intentionally interfering with police radio communications. He was convicted six months later and sentenced to 38 months in prison, but was placed on probation after serving one year. One condition of the parole was that he not possess any radio transmitting devices nor interfere with police or FCC activity.

Two years later, Gerritsen applied for and was granted a ham ticket with the callsign KG6IRO. Within a week the FCC realized it had licensed someone convicted of interfering with public-safety radio frequencies, and the agency "set aside" (rescinded) his amateur license, and later his GMRS license. "Set aside" actions are authorized by Part 1, Subpart "A" Section §1.113 of the Commission's Rules, which allows the FCC to return an application to "pending status" within 30 days of being approved.

Gerritsen was told that his license was being "set aside" because of complaints about the operation of his station and questions regarding his qualifications to be a licensee in light of his 1999 arrest and 2000 conviction for radio interference to police radio communications. "You have no authority to operate radio transmitting equipment, and such operation would . . . subject you to monetary penalties and imprisonment," the FCC said. Gerritsen's position was that his license was properly issued and could not be canceled without a hearing, and he ignored the FCC warning.

A month later, the Bell California Police Department notified the FCC that it had received complaints about Gerritsen's radio transmissions. Another FCC warning letter was issued for unlicensed operation. His response was that the cancellation of his amateur license was improper.

Gerritsen Imprisoned

On January 29, 2002, Gerritsen was arrested for violation of his probation. A subsequent search of his home uncovered 20 radios, eight of which were capable of operating on frequencies in the amateur, marine and land-mobile public-safety bands.

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

He was sentenced to three years imprisonment but was released 18 months later due to jail overcrowding. Gerritsen almost immediately returned to the radio airwaves—not only ham radio, but business and public-safety radio repeater systems as well.

On November 6, 2003, the FCC identified 2-meter transmissions coming from Gerritsen's residence, and he was seen sitting in his driveway with a small, portable two-way radio. He admitted to transmitting on various amateur radio frequencies as well as various business radio frequencies without a valid station license and was issued a Notice of Unlicensed Radio Operation. Gerritsen said he wanted a hearing and continued to operate, signing his canceled KG6IRO callsign.

Gerritsen Fined $10,000

On February 9, 2004, FCC agents again monitored 2-meter transmissions coming from the Gerritsen home, but he refused to have his station inspected. Operators of radio-frequency devices, including unlicensed devices and stations operating under a blanket licensing authority such as CB radio, must allow the FCC to inspect their equipment. Section 303(n) of the Communications Act gives the FCC this authority and a search warrant is not necessary. All FCC authorizations come with the obligation to allow inspection, and refusing station inspection is a serious violation that can lead to license revocation and a monetary fine.

The FCC issued Gerritsen an NAL (Notice of Apparent Liability for Forfeiture, an FCC fine) in the amount of $10,000 on June 15, 2004. Gerritsen's response was that he has a valid amateur license which cannot be suspended without a hearing before an Administrative Law Judge. The FCC saw otherwise and declined to either withdraw or reduce the penalty. The fine was to have been paid within 30 days, but it was not.

Refuses to Stop Transmitting

Gerritsen's abusive operations continued on the ham bands, and the FCC began documenting the violations. On June 15, 2004, FCC agents observed a signal interfering with the 147.435/146.405-MHz repeater. Using mobile direction-finding techniques, the FCC again located the source of the signal as coming from Gerritsen's home. For almost an hour Gerritsen maintained a steady transmission on the input frequency of 146.405 MHz, which kept all other operators from using the repeater.

On June 24, 2004, the FCC's Los Angeles Office received a complaint from an amateur operator on the repeater's output frequency, 147.435 MHz, by a man identifying himself as Jack Gerritsen, announcing a "hostile takeover" of the frequency.

On July 16, 2004, the Los Angeles Office received another complaint alleging that Gerritsen was interfering with fire-watch communications on the authorized 147.105/146.505-MHz repeater. Gerritsen was again warned by FCC agents that he did not have authority to transmit on any amateur band and that he should vacate all amateur frequencies. Again the warnings were ignored.

A week later, the FCC heard Gerritsen threatening to "jam" other operators with a recording of the tone used by the phone company to indicate a phone is off the hook.

On July 26, 2004, the FCC received a complaint stating that Gerritsen had played a recording for 48 minutes without interruption over the "Keller Peak" repeater on 146.985/146.385 MHz.

On September 13, 2004, the Los Angeles Office received a complaint from an ARRL Official Observer alleging that Gerritsen deliberately and maliciously interfered with the Young Hams Net using the Catalina Island Amateur Repeater Association ("CARA") repeater "... so intense and vile they were reported to have reduced one of the younger participants to tears."

On September 15, 2004, the FCC positively identified radio transmissions coming from Gerritsen's home residence as the source of interference to the CARA repeater.

On December 2, 2004, the FCC issued another fine to Gerritsen, this time for $21,000 for " . . . willfully, repeatedly, and maliciously causing interference to authorized users in the Amateur Radio Service" between June 15, 2004 and September 15, 2004. Gerritsen denied the charges and said his amateur license " . . . has not been suspended, terminated, revoked, modified, or set aside; that no record of his license set aside exists; that he did not engage in interference; that the actual motive behind the NAL is to silence his messages in violation of the U.S. Constitution; and that he does not have sufficient income to pay the forfeiture amount proposed in the NAL." Gerritsen ignored the fines (now totaling $32,000) and continued to operate.

Interfering with Distress Communications

Up until this point, Gerritsen's operation interfered only with ham operators, a misdemeanor. On October 29, 2004, he stepped over the line. The FCC's Los Angeles Office received a telephone call from the Elfriede Geiger, N6LNX, of Huntington Beach, California, the wife of a mariner, Alois Geiger, KG6FB. She told the FCC that she had not been able to contact her husband on the sailing vessel *Elke-Marie,* which was traveling from California to Guadalupe Island, Mexico.

According to Mrs. Geiger, the *Elke-Marie* had been traveling with a companion vessel, the *Drummoral,* and both had encountered a storm a few days earlier which damaged the ship's VHF marine radio. Amateur radio was the only operational transmitter aboard the vessel. The wife contacted the Coast Guard, which attempted to contact the husband via ham radio to determine his need for assistance.

Identifying himself as "W1HIJ" and "U.S. Coast Guard Auxiliary Upland Radio One," the Coast Guard Officer came up on the Catalina Island Amateur Repeater Association (CARA) repeater on Catalina Island, California and requested that all stations stand by while he attempted to contact the *Elke-Marie.*

According to the Coast Guard and the wife, Jack Gerritsen then began speaking and transmitting a prerecorded message over the CARA repeater. The Auxiliary Officer announced that the

channel was being used for emergency traffic, but each time he attempted to contact the *Elke-Marie,* Gerritsen played a recording or questioned the validity of the emergency, stating that he did not believe there was a real emergency.

Gerritsen continued transmitting for approximately 40 minutes, according to FCC documents, repeatedly playing the taped recording and ultimately ending his transmission by stating, "If you jam me, I'll jam you." The Communications Act requires that all radio stations give "absolute priority" to radio communications or signals relating to ships in distress. Failure to do so is a felony. FCC agents were able to pinpoint the source of the signal on the input frequency of the CARA repeater as coming from Gerritsen's home, but he would not answer the door.

On January 21, 2005, the FCC's Los Angeles Office issued still another $21,000 NAL to Gerritsen for " . . . willfully and maliciously causing interference to the radio communications of the Coast Guard Auxiliary Officer who was attempting to communicate with a ship in distress." On February 16, 2005, Gerritsen filed a response with the NAL denying the allegations. The FCC said it had evidence to the contrary, and he was ordered to pay the additional $21,000 within 30 days.

Radio amateurs on the West Coast had been complaining for months about the slow pace of enforcement action in the Gerritsen case. Los Angeles area repeater owners have been shutting down their machines to avoid the nearly constant barrage of malicious interference attributed to Gerritsen.

Gerritsen Arrested

You would think that after $52,000 in fines, Jack Gerritsen would have gotten the message. He didn't. On May 5, 2005, FBI special agents, accompanied by personnel from the FCC Los Angeles Field Office, arrested Gerritsen at his home in Bell, California. Federal agents also seized Gerritsen's radio equipment.

According to the criminal complaint, an FCC investigation revealed that Gerritsen " . . . often transmits his prerecorded political messages and real-time harassment and profanity for hours at a time, often making it impossible for licensed radio operators to use the public frequencies." He was charged with a felony charge of malicious interference and misdemeanor counts of intentional interference and transmitting radio signals without a license.

Gerritsen was released on a $250,000 bond (secured by his property) and remained in home detention, barred from possessing any radio equipment, while awaiting trial.

On December 2, 2005, the FCC affirmed the last two $21,000 fines. "His unlicensed operation on amateur frequencies is not protected by the U.S. Constitution, as it is well established that the right to free speech does not include the right to use radio facilities without a license," the FCC said. A federal grand jury indicted Gerritsen and a trial was set for December 5.

Gerritsen Goes on Trial

Earlier Gerritsen had turned down the offer of a public defender and served as his own attorney in the federal court trial in downtown Los Angeles. The FCC pointed out that it had been investigating illegal radio transmissions linked to Gerritsen for some four years and that he transmitted his prerecorded messages, as well as real-time harassment and profanity, for hours at a time, making it impossible for licensed radio operators to use the public frequencies.

In addition to amateur radio repeater and emergency communications, it was also brought out that Gerritsen interfered with American Red Cross radio transmissions on January 14, 2005, while the agency was preparing for disaster relief operations involving the Prado Dam. According to the testimony, he also caused the cancellation of an Army Reserve homeland security training exercise on March 10, 2005, when he interfered with the United States Army Military Affiliate Radio System (MARS). The FCC additionally reported that it had received complaints from other government agencies charging that Gerritsen interfered with local and state police and fire agencies and other radio services.

The government's case, presented by Assistant US Attorney Lamar Baker, went to the jury December 8, and the jury deliberated for less than an hour. Gerritsen was quickly convicted by the US District Court Jury on a felony charge of interfering with government radio frequencies being used by the United States military, the United States Coast Guard, and other public-safety organizations.

He was also found guilty of two misdemeanor counts of willful and malicious interference to ongoing radio communications and three misdemeanor counts of transmitting radio signals without a license, a total of six counts. Gerritsen's bail was immediately revoked, and he was taken into federal custody after the jury's verdict was delivered.

Gerritsen will be sentenced on March 6, 2006 by United States District Judge R. Gary Klausner. According to the office of Debra W. Yang, U.S. Attorney for the Central District of California, he could receive up to 15 years in federal prison.

73, Fred, W5YI

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SS-12	10	12	1⅝ x 6 x 9	3.4
SS-18	15	18	1⅝ x 6 x 9	3.6
SS-25	20	25	2⅛ x 7 x 9⅝	4.2
SS-30	25	30	3¼ x 7 x 9⅝	5.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
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SS-30M*	25	30	3¼ x 7 x 9⅝	5.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

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

WITH SEPARATE VOLT & AMP METERS

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

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

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

CIRCLE 134 ON READER SERVICE CARD

NEW SWITCHING MODELS

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

ICS – Intermittent Communication Service

the weekender

BY PHIL SALAS,* AD5X

A New Beginning . . . and Some Useful Tools and Supplies for the Ham

Beginning with this issue, *CQ* is resurrecting "The Weekender" column originally published in *Ham Radio* magazine. As you may remember, that column focused on relatively simple projects that the average ham could build in a weekend. We will continue the goal of dedicating "The Weekender" to simple but useful projects that require minimal skills and few tools. However, for this column to be successful, we need *your* ideas. We are particularly interested in featuring projects that take anywhere from a few minutes to a few hours to implement—with a limit on what could be built or implemented in a typical weekend of spare time. Thus, if you want to share a gadget, a circuit, or even an idea you've had that makes something easier or more useful for your fellow hams, please e-mail it to me.

As I will be editing this column, let's begin with just a little background on myself. I initially became licensed as WN3BCQ in 1964 at the age of 15, and I've been an active ham ever since. Because of this hobby I became an engineer, spending 33 years in new-product development in RF, Microwave, and Light-wave engineering. Since I recently retired, I'm now able to tinker even more. The accompanying photo shows my family-room work area (yes, the family room!), where I spend several hours each day working on various ham-related projects.

But enough about me. Let's start out this first column by looking at useful tools and supplies for your shack. Next month we'll tackle our first project.

First, in the photo you'll notice a white object in the center of my work bench. This is just an 8" × 12" ceramic tile available inexpensively from any home-improvement center. The ceramic material is an excellent insulator and protects your desk during all types of soldering, including the use of large soldering irons and even butane-powered torches.

Why would you use a butane torch? Well, these torches are great for outdoor use, and a variety of solder pastes permit you to solder to just about anything, such as aluminum and stainless steel. I use the SolderPro-120 from the Solder-It company. Check out its website at <http://www.solder-it.com>.

One hand tool that I find almost indispensable is the Harbor Freight 44060 Hand Punch <http://www.harborfreight.com>. This unit punches holes from 1/16- to 5/16- inch diameter in steel, aluminum, and brass. In many applications it is much easier, more convenient, and safer to use than a hand drill. Some other useful tools available from Harbor Freight are its 39103 18-nch Bending Brake, the 39391 Tap & Die Kit, the 91616 Step-Drill set, and the 36411 Crimper, which is excellent for crimping Anderson PowerPole terminals.

Speaking of PowerPole connectors, Amp/Tyco now makes equivalent connectors. You can buy these from Mouser Electronics (571-538942 black, 571-53894-4 red, 571-53892-4 contacts). If you just need a few connectors and are ordering other parts from Mouser Electronics <http://www.mouser.com>, this is an alternative to placing a separate order for connectors from another source. The nice thing about the Amp/Tyco contact specified is that it accommodates wire sizes from 12 to 18 gauge.

Astro Flight <http://www.astroflight.com> is a supplier of accessories and supplies for Radio Control hobbyists. Its Super Whattmeter (Model 101N) is an in-line digital voltmeter/ammeter/watt-

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Here's AD5X at his family-room (!) workbench. He didn't tell us whether his shack is in the living room or the dining room.

meter that measures up to 60 volts (10 mv resolution) and 70 amps (10 ma resolution). Assuming you start with a discharged battery, you can even measure the charged amp-hour capacity of the battery after charging through the digital meters. The Super Whattmeter is only $45 without connectors, so you need to attach your own connectors of choice (such as the PowerPoles discussed earlier).

If you build antennas, Texas Towers <http://www.texastowers.com> sells aluminum tubing at good prices. Also check out The Deer-Shock Depot <http://electric-deer-fence.com> and Max-Gain Systems <http://www.mgs4u.com> for fiberglass rods and tubes. You'll also need stainless-steel hardware, and JS Schmidt <http://www.jschmidtstainless.com> is a great source. While prices are generally quoted on quantities of 100, JS Schmidt will sell you smaller quantities at the same per-piece prices.

Another good hardware supplier is McMaster-Carr <http://www.mcmaster.com>. You can buy stainless and brass hardware, wire, tubing, and more things than I can list here. Check out its website, but be prepared to spend a lot of time there.

Well, I think I've provided you with enough web links for a weekend's worth of looking. Next month we'll have a simple project that I think will be of interest to many of you. Don't forget to send me your ideas, too! E-mail them to me at <ad5x@arrl.net>. I prefer Word® files, as these are the easiest for me to work with. Photos are always welcomed, as they generally make any text more understandable. I prefer jpeg photos with at least a 300k file size so they can be edited and well-reproduced for publication. Please send photo files separately and do not embed them in your Word® file, as they cannot be removed and used separately. See you next month . . .

73, Phil, AD5X

SAVE BIG ON ANTENNAS, TOWERS & CABLE

TELESCOPING ALUMINUM TUBING

DRAWN 6063-T832

.375"	$.80/ft	1.250"	$1.65/ft
.500"	$.90/ft	1.375"	$1.85/ft
.625"	$1.00/ft	1.500"	$2.05/ft
.750"	$1.10/ft	1.625"	$2.35/ft
.875"	$1.20/ft	1.750"	$2.60/ft
1.000	$1.30/ft	1.875"	$2.85/ft
1.125	$1.45/ft	2.000"	$3.10/ft
		2.125"	$3.60/ft

EXTRUDED 6061-T6

.250" rod	$.50/ft	.188" rod	$.35/ft
2"x.125"	$4.50/ft	4"x.375" bar	$6.50/ft
		2"x.250"	$8.00/ft

6' OR 12' LENGTHS. 6' LENGTHS SHIP UPS.

ANTENNA ROTATORS

M2 OR-2800PDX	$1279
Hygain HAM IV	$499
Hygain T2X Tailtwister	$569
Yaesu G-450A	$249
Yaesu G-800SA/G-800DXA	$329/409
G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550	$299
Yaesu G-5500	$599

ROTATOR CABLE

R62 (#18), HD 6 conductor	$.39/ft.
R81/82/84, 8 cond.	$.29/ft./.49/ft./.99/ft.

ROHN TOWER

25G/45G/55G	$99/209/259
25AG2/25AG3/25AG4	$119/149/129
45AG2/45AG4	$249/249
AS25G/AS455G	$49/109
BPC25G/BPC45G/BPC55G	$89/119/129
BPL25G/BPL45G/BPL55G	$99/189/219
GA25GD/GA45GD/GA55GD	$99/139/159
GAR30/GAS604	$39/49
SB25G/45/55	$59/109/149
SB25G5/SBH25G	$79/139
TB3/TB4	$139/159

PLEASE CALL FOR MORE ROHN ITEMS.

COMET ANTENNAS

GP3, 2m/70cm Vertical	$99
GP6, 2m/70cm Vertical	$149
GP9 2m/70cm Vertical	$189
GP15, 6m/2m/70cm Vertical	$159
GP98, 2m/70cm/23cm Vertical	$189

DIAMOND ANTENNAS

X50A, 2m/70cm Vertical	$109
X200A, 2m/70cm Vertical	$149
X510MA 2m/70cm Vertical	$195
X500HNA 2m/70cm Vertical	$259
X700HNA 2m/70cm Vertical	$399
V2000A 6m/2m/70cm Vertical	$172

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.45/ft
RG-8X, Mini RG-8 Foam	$.25/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

CALL FOR MORE COAX/CONNECTORS.

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400DB Direct Bury	$.74/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

CALL FOR MORE SIZES & CONNECTORS.

TRYLON "TITAN" TOWERS

SELF-SUPPORTING STEEL TOWERS

T200-64	64', 15 square feet	$1489
T200-72	72', 15 square feet	$1819
T200-80	80', 15 square feet	$2169
T200-88	88', 15 square feet	$2529
T200-96	96', 15 square feet	$2969
T300-88	88', 22 square feet	$2869
T400-80	80', 34 square feet	$2759
T500-72	72', 45 square feet	$2629
T600-64	64', 60 square feet	$2499
T700-56	56', 80 square feet	$2349

MORE TRYLON TOWERS AVAILABLE.

M2 VHF/UHF ANTENNAS

6M5X/6M7JHV	$219/289
6M2WLC/6M9KHW	$489/529
2M4/2M7/2M9SSBFM	$105/119/139
2M12/2M5WL	$179/219
2M5-440XP, 2m/70cm	$189
440-470-5W/420-450-11	$149/105
432-9WL/432-13WLA	$189/255
440-18/440-21ATV	$135/159

M2 SATELLITE ANTENNAS

2MCP14/2MCP22	$189/259
436CP30/436CP42UG	$255/299

CALL FOR MORE IN-STOCK M2 ITEMS.

TOWER HARDWARE

3/8"EE/EJ Turnbuckle	$15/16
1/2"x9"EE/EJ Turnbuckle	$21/23
1/2"x12"EE/EJ Turnbuckle	$24/26
3/16"/1/4" Big Grips	$5/6
3/16"EHS-500'/1/4"EHS-500'	$119/149

PLEASE CALL FOR MORE HARDWARE.

HIGH CARBON STEEL MASTS

5 FT x .12" / 5 FT x .18"	$45/59
11 FT x .12" / 11 FT x .25"	$80/199
12 FT x .18" / 17 FT x .12"	$159/149
20 FT x .18" / 22 FT x .12"	$249/199
23 FT x .25" / 24 FT x .18"	$369/299

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$569/809/1149
7-50'/60'/70'	$1039/1499/1969
9-40'/50'/60'	$809/1149/1619
12-30'/40'	$599/949
15-40'/50'	$1069/1529
16-60'/80'	$2219/3389
21-50'/60'/70'	$1759/2339/2929
23-30'/40'	$959/1419
35-40'	$1649

BOLD IN PART NUMBER SHOWS WIND LOAD *CAPACITY*. SHIPS DIRECT FROM THE FACTORY TO SAVE YOU MONEY!

HYGAIN ANTENNAS

AV18HT Hightower	$739
DIS71/72	$269/569
TH3JRS/TH3MK4	$319/399
TH5MK2/TH2MK3	$659/319
TH7DX/TH11DX	$749/995

MFJ

259B/269, Analyzers	$229/319
948/949E, Tuners	$129/149
969, HF–6m Tuner	$179
986, 3kW Tuner	$299
989D, Deluxe 3kW Tuner	$319
991/993 Autotuners	$199/229

PHILLYSTRAN GUY CABLE

HPTG1200I	$.45/ft
1200 END KIT	$3.60
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$7.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$9.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$13.50
HPTG11200	$1.89/ft
PLP2758 Big Grip (11200)	$16.00

PLEASE CALL FOR HELP SELECTING THE PHILLYSTRAN SIZE FOR YOUR PROJECT.

US TOWER CRANK-UPS

MA40/MA550	$1099/1699
MA770/MA850	$2799/4349
TMM433SS/HD	$1479/1789
TMM541SS	$1939
TX438, 38' Crankup Tower	$1379
TX455, 55' Crankup Tower	$1899
TX472, 72' Crankup Tower	$3139
TX489MDPL, 89' Motorized HD	$8239
HDX538, 38' Extra Heavy Duty	$1649
HDX555, 55' Extra Heavy Duty	$2889
HDX572MDPL 72' Motorized	$7549

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• Handles 35 square feet of antenna load at 50 MPH, 14.75 square feet at 70 MPH.

• All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.

• MDP & MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

Now shipping from CA for west coast customers, and KS for east coast and midwest customers, to reduce freight cost!

TX SERIES HEAVY DUTY CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TX-438	38'	21'6"	355	$1,523	$1,379
TX-455	55'	22'	670	$2,107	$1,899
TX-472	72'	22'8"	1040	$3,462	$3,139
TX-472MDP	72'	22'8"	1210	$5,571	$5,049
TX-489MDPL	89'	23'4"	1800	$9,034	$8,239

HDX SERIES CRANK-UP TOWERS

• Heavy duty, handles 44.7 square feet of antenna load at 50 MPH, 35 square feet at 70 MPH.

• All models supllied with hinged T-base, anchor bolts, hand winch (except motor drive models), top plate, and rotor plate.

• MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

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HDX SERIES HEAVY DUTY CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
HDX-538	38'	21'6"	600	$1,807	$1,649
HDX-555	55'	22'	870	$3,162	$2,889
HDX-572MDPL	72'	22'8"	1600	$8,281	$7,549
HDX-589MDPL	89'	23'8"	2440	$10,841	$9,899
HDX-689MDPL	89'	23'8"	3450	$20,943	$19,129
HDX-5106MDPL	106'	24'8"	3700	$22,791	$20,799

MA SERIES CRANK-UP MASTS

• Handles up to 22 square feet of antenna load. (See chart below)

• MDP models include motor drive.

• All models supllied with anchor bolts, load-actuated hand winch, and house bracket.

• Options include coax arms, raising fixtures, motor drives, self-supporting and rotator bases, remote control panel, and more!

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MA SERIES CRANK-UP MASTS							
MAST MODEL	MAX HT.	MIN HT.	WT (LBS.)	50 MPH (sq. ft.)	70 MPH (sq. ft.)	LIST PRICE	SALE PRICE
MA-40	40'	21'6"	242	16.5	6.8	$1,209	$1,099
MA-550	55'	22'1"	435	22	9	$1,875	$1,699
MA-550MDP	55'	22'1"	620	22	9	$3,584	$3,249
MA-770	71'	22'10"	645	15.5	5.5	$3,091	$2,799
MA-770MDP	71'	22'10"	830	15.5	5.5	$4,890	$4,449
MA-850MDP	85'	23'6"	1128	15.3	6.3	$6,591	$5,999

TMM SERIES COMPACT CRANK-UP TOWERS

• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

• Compact design is great for areas with tower restrictions, or where a less intrusive installation is desirable.

• All models supllied with hinged T-base, anchor bolts, load-actuated hand winch, 8' steel mast, top plate, and rotor plate.

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

Now shipping from CA for west coast customers, and KS for east coast and midwest customers, to reduce freight cost!

TMM SERIES COMPACT CRANK-UP TOWERS					
TOWER MODEL	MAX. HT.	MIN. HT.	WT. (LBS.)	LIST PRICE	SALE PRICE
TMM-433SS	33'	11'4"	315	$1,626	$1,479
TMM-433HD	33'	11'4"	400	$1,970	$1,789
TMM-541SS	41'	12'	430	$2,135	$1,939

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public service

BY BOB JOSUWEIT,* WA3PZO

Miscommunication—A Fatal Mistake

As trained amateur radio operators, we are aware of the responsibilities of providing a communication service. The recent tragedy at the Sago coal mines in West Virginia shows a clear example of the devastating effects of inaccurate communications when people slip on their communication responsibilities. Thankfully, ham radio was not involved in this situation, although the one surviving miner is a ham. This month we'll take a look at what happened in January, some history, and some things we can do as trained communicators to prevent miscommunication.

"One Item Found"

In early January many of us were tuned to our television sets . . . parades, football games, and a West Virginia coal mine emergency. Thirteen miners were trapped below the ground following an explosion in the mine. For 44 hours family members and the world waited to hear word about the miners. Then at 8 PM on the fourth day mine officials announced that one miner's body had been found near the area where the explosion occurred. The company said there was hope for the remaining 12 miners because their track-mounted car was found undamaged deeper in the mine. About three hours later rescue crews signaled to the surface that the 12 remaining miners had been found.

The command center was coordinating several operations at the same time as they tried to rescue the miners. The men in the mine were wearing masks, hindering communications. The search-and-rescue teams were instructed to use a code to avoid the dissemination of incorrect information.

Upon finding Randal McCloy, Jr., Gene Kitts, senior vice president of International Coal Group, said, rescuers relayed the news in code to the operations base: "One item was found at break 56." Mining Executive Ben Hatfield said earlier that the rescue team was speaking to the command center over the mine communication system on an open speaker audible to a number of people.

Thirty minutes later local residents began receiving word from a central command post that the remaining 12 trapped miners had been found alive, based on a cell-phone call made by an onlooker in the command center. The company did not confirm the information. In fact, officials learned that the initial report was wrong, but wanted to make absolutely sure that the information was correct. They didn't want to compound the problem, but in retrospect they did so by remaining silent. At 1:30 AM the following day an ambulance carrying a then-unidentified miner left the mine site and headed to Saint Joseph's Hospital in Upshur County.

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

Wildfire support:Colorado amateur radio operators provided communications for the Salvation Army, which was supporting nearby fire crews. (FEMA News Photo by Andrea Booher)

Forecasters at the National Hurricane Center in Miami finally were able to close the book on the 2005 Hurricane Season in January. (Photo courtesy of Julio Ripoll, WD4R)

After the rescue and recovery of the miners had been completed, Hatfield said a possible explanation of the communication breakdown was "The rescuers were working under full-face oxygen masks—through extreme stress and physical exhaustion—and communicating in code over a possibly spotty connection to the operations base on the surface." The actual communication breakdown was the person on the cell phone at the command post relaying incorrect information. That information raised false hopes for family members and the world waiting for a miracle.

The one surviving miner later was identified as 27-year-old Simpson, West Virginia native Randal McCloy, Jr., who happens to be a ham radio operator—KC8VKZ. According to published reports, McCloy was studying electronics and hoped to get out of the mines. As our deadline approached, McCloy was recovering in a West Virginia hospital. According to one newsgroup, McCloy's brother-in-law, Rick McGee, said Randal was doing "rather well." Doctors still had McCloy's condition listed as critical.

Hams on Duty

About 80 years ago amateur radio operators provided critical communications during a similar accident. In January 1925 a Kentucky disaster closely paralleled the events of early January 2006. Wayne Thalls, KB6KN, passed along information on a young cave explorer, Floyd Collins, who became trapped in a previously unexplored cave now known as Sand Cave. He was hoping to create a tourist attraction rivaling nearby Mammoth Cave. In recent years it has been determined that Sand Cave is actually a branch of Mammoth Cave.

According to Thalls, "The nearest radio broadcast station was a couple hundred miles away in Louisville. The cave was several miles from the nearest telegraph office in Cave City. Two amateur radio operators came to the rescue." They set up a low-power battery-operated radiotelegraph station at the cave entrance. Another station was established at the terminus of the telegraph line. For four days the two hams relayed the story of rescue efforts. It became a world event.

The scene of the tragedy was a circus. An estimated 20,000 onlookers arrived. There were jugglers, medicine men, preachers, and movie crews. Reporters were there from throughout the world. Jurisdictional disputes erupted between the local sheriff and the state guard. The incumbent governor and his rival in the upcoming election both arrived, seeking media exposure. For the first time, audiences in far away places were receiving eyewitness updates on the situation as events unfolded. Of course, this was before the era of broadcast networks. The information was delivered to local newsrooms via telegraph.

Thalls continued, "Through it all, the two amateur radio operators performed their emergency service without relief, until they were released after a temporary wire line was erected to Cave City. A rescue shaft was finally completed on Friday, February 13—seventeen days after the entrapment began. Alas, Collins had died of exposure and starvation three days earlier. The carnival packed up and returned home."

Black Eye . . .

Fortunately, the communication mistakes at the West Virginia coal mine were not made by amateur radio operators. However, the situation does point to the need for training, particularly in receiving information correctly and passing it on accurately. It also points to the need for training in knowing to whom you can pass the information you receive and sticking to what you know rather than passing on speculation. Here's an example:

You are standing on a corner helping with a local bicycle race. Your responsibility is to report any problems via radio

to the net control station. All of a sudden there is an accident involving a participant and a car at the other end of the course. People standing nearby hear the comments about the accident on the radio and want more information. As the events unfold you hear an ambulance coming toward the course. You assume it is heading to the crash site, but you never actually hear that an ambulance was requested at the crash site. Later you hear a report that the ambulance is leaving the course. You tell people standing at your corner that an injured participant was taken to the hospital. Word gets out that a ham radio operator reported a race participant was taken to the hospital.

Later you find out that the ambulance had responded to a nearby street and no one from the race was involved. Hopefully from this lesson you learned that all official information should come from a race official. If asked what you are doing, you can indicate that you, along with members of the local amateur radio club, are providing safety communications for the race. Let's make sure future miscommunications don't occur via amateur radio.

Wildfires

Meanwhile, out west, wildfires were causing havoc in areas of Texas, Oklahoma, New Mexico, and Colorado. Amateur radio operators from the Abilene, Texas area were called to assist with communications during the last week of December, when wildfires struck Cross Plains, Texas.

Taylor County ARRL Emergency Coordinator Bill Shaw, KJ5DX, told ARRL Headquarters, "There was no cell service because the connection to the cell tower was burned. There was one landline phone working at the church where the Cross Plains Red Cross shelter was set up." Fourteen amateur radio operators established communications between the Cross Plains Shelter, Brownwood Red Cross Shelter, and Abilene Red Cross headquarters.

"We kept up 24-hour communications for Wednesday, Thursday, and Friday until noon via ham radio," Shaw explained. "The fire started as a grass fire about noontime on December 27 and quickly escalated into a raging wildfire that was fed by 45-mph winds." According to the ARRL, the fire quickly spread toward town about 3 miles away, and it burned an area that is about 4 to 6 miles east-west and 2 to 3 miles north-south in size. "About 31 fire departments fought fires until about 5 o'clock the next morning," Shaw said. As a result of this fire, nearly 8000 acres burned and 152 homes were damaged, accounting for 25 to 30 percent of the homes in Cross Plains. Over a hundred of those homes were destroyed.

In Colorado the Salvation Army was assisted by ARES members. According to Rob Roller, N7LV, ARRL Colorado Section Emergency Coordinator, amateur radio operators supported the Mauricio Canyon Fire, which was 4 miles west of Aguilar. He said there were very few hams in the area and no ARES members within 50 miles of the fire.

Hurricane Season Finally Over

January 6 marked the last report on Tropical Depression Zeta. Forecaster Stewart of the National Hurricane Center said:

I suppose it is only fitting that the record-breaking 2005 Atlantic hurricane season ends with a record breaking storm. Today ... Zeta surpassed 1954 Alice #2 as the longest lived tropical cyclone to form in December and cross over into the next year. Zeta was also the longest lived January tropical cyclone. In addition...Zeta resulted in the 2005 season having the largest Accumulated Cyclone Energy, or ACE, surpassing the 1950 season. So ... until the 2006 season begins ... unless Zeta somehow makes an unlikely miracle comeback ... this is the national hurricane center signing off for 2005 ... Finally.

Expectations

Last year was filled with dramatic and tragic events. Amateur radio played an important role when other communication systems failed. The Amateur Radio Service got an unprecedented amount of news media coverage. The coverage has created high expectations of the public-service and emergency communications we provide. The expectations are not just in the United States, but around the globe.

This year important steps will be taken on an international level in amateur radio emergency communications. Last year the first Global Amateur Radio Emergency Communications Conference (GAREC-2005) was held in Finland. Delegates discussed experiences and new ideas for providing emergency communications.

GAREC-2005 proposed the establishment of "Center of Activity" Frequencies for emergency traffic on some of the HF bands. Region 1 (Europe and Africa) adopted these frequencies in its conference in September. Hans Zimmermann, F5VKP/HB9AQS, IARU International Emergency Communications Coordinator, expects the other two regions will do the same at their conferences in 2006 and 2007. Zimmerman said the "band plans are under the responsibility of each region, and the frequencies on the mostly regionally used 40- and 80-meter bands are specific for Region 1." He continued, "The other Regions have different allocations and already use frequencies in parts of the bands so far not accessible in Region 1. The frequencies on 15, 17, and 20 meters, mostly used for intercontinental traffic, have been discussed with Regions 2 and 3, and we hope that they will also be adopted by the competent conferences in these Regions." Details are available at <http://www.iaru.org/emergency/CoA2.html>.

Hans Zimmermann, F/HB9AQS, IARU International Coordinator for Emergency Communications, says amateur radio's "role has not diminished with the introduction of new technologies."
(Photo courtesy of Y. Karakawa)

Zimmerman said the IARU Advisory Committee decided to establish a working group for the development of an *IARU Emergency Communication Handbook*. At the same time it was also decided to publish a "flyer" or small brochure about the role of the Amateur Radio Service in Emergency Communications.

He said there had been several opportunities to discuss emergency telecommunications when he visited different countries. He has found much interest in amateur radio at international conferences on emergency and crisis management. Several documents of interest to amateur radio operators on an international level were published. These are the "Tampere Convention on Telecommunication Resources for Disaster Mitigation and Response Operations" (see <http://www.iaru.org/emergency/tc-hams.html>), and publication of the second edition of the ITU *Handbook on Emergency Telecommu-*

nications. This manual includes a large section about the Amateur Radio Service; parts of this book are now available for free download at <http://www.itu.int/ITU-D/emergencytelecoms/publications.html>.

This year international emergency communication discussions will take place at GAREC-2006 scheduled for June 19–20, in the participation of the IARU in the ITU World Telecommunication Development Conference (WTDC) this month, as well as in other work with the ITU. Much of this work concerns the preparation for the World Radiocommunication Conference (WRC) 2007, which is expected to make important decisions concerning the Amateur Radio Service. "At this conference," says Zimmerman, "emergency communications will be a key argument for defending the existing and obtaining additional privileges for our service."

Zimmerman indicates that more and more national IARU member societies are intensifying their work on emergency communications and are forming specialized groups.

Looking Forward...

Can you believe the 2006 hurricane season gets started on June 1? Now is the time to make sure your go-kit is in place and that you're up to speed with the latest training in disasters and emergency communications. Remember, we are no longer providing communications only for the traditional agencies, such as emergency management, Red Cross, Salvation Army, and the National Weather Service. Today we are also being asked to assist at hospitals, pet shelters, health departments, volunteer feeding centers, and many other locations.

Meeting all of these needs will require the amateur radio toolbox to grow to handle large lists of supplies, food, and other needs. The days of relatively short 25-word messages are fading. It is time for our message-handling system to grow with the needs of the agencies we are being asked to serve. Will you be ready the next time there is no electricity or telephone service? Will you be ready when the lines are down?

This month we want to thank Wayne Thalls, KB6KN, for supplying some coal-mine history and the ARRL for information on the wild fires. Do you have a story to tell of your group providing public service or emergency communications? Drop us a note. Until next time . . .

73, Bob, WA3PZO

antennas

BY KENT BRITAIN,* WA5VJB

Clean-up Time

This month is going to be a "clean-up" month, where we answer some of your questions and cover several other short topics.

High-Impedance Antennas

There is nothing magical about 50 or 72 ohms for an antenna. Available at many of the discount stores is a family of set-top, or rabbit-ear, antennas with my initials on the PC boards (photo A). Rabbit ears are a dipole antenna close to ground, and usually at a V angle. When resonant, this gives the antenna an impedance of 40 ohms or so. With the typical 1-meter long elements, these elements resonate at about TV Channel 4. When the antenna is not resonant, you still have two meters of capture area, but the impedance is much higher. The preamps for these antennas are designed for a 1000-ohm input impedance and 75 ohms at the output. Thus, where the antenna is resonant, the preamp is mismatched and has poor gain. Where the antenna is non-resonant, the preamp is well matched. Together this gives the antenna a much flatter response over the entire 54- to 806-MHz range for TV reception.

All of my TV antenna preamps also contained a simple 100-MHz notch filter to remove most of the FM broadcast band. About half of all the energy collected by a TV antenna in an urban area is in the FM broadcast band. The FM stations run just about as much power as the TV stations, and there are usually more FM stations than TV stations in most urban communities. Thus, if your receiver is getting blasted by strong local signals, they are probably coming from FM stations. Therefore, for an antenna with a broad frequency response, go up in impedance.

What is a Tracking Generator?

I received two e-mails regarding my last column, asking what a tracking generator is. A tracking generator (photo B) is an incredibly handy accessory for a

Photo A– TV antenna with a high-impedance input preamp.

spectrum analyzer. The tracking generator puts out a signal on exactly the same frequency the spectrum analyzer is looking at. Fig. 1 shows a few of the ways you can use one. Just connect the filters, amp, isolator, circulator, or coax between the tracking generator and the input of the spectrum analyzer. Set the spectrum analyzer to sweep the frequencies of choice, and the frequency response of the filter is plotted out on the screen. When you measure the gain and frequency response of low-power amplifiers, just make sure you have enough attenuation on the output of the amp to protect the input of the spectrum analyzer.

Photo B– Examples of tracking generators.

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Fig. 2 shows what you might see if you did a broad frequency sweep of a length of coax, or a passband filter. After testing all of my coax a few years ago, I threw out all pieces of RG-8. RG-8 ages poorly, while sections of RG-213 and RG-214 that were old when I got them 25 years ago still measure at factory specs.

Next you need a directional coupler or a resistive bridge (see fig. 3). The tracking generator goes up to the antenna, and the coupled return signal goes to the spectrum analyzer input. Now the return loss or SWR of the antenna is again plotted. This is also a great way to put that ultra tweak on a filter. Connect the directional coupler to the filter, and then put a good termination on the other side of the filter. If the filter is just tuned for lowest loss, it can be hard to see the difference between .5 and .6 dB. However, the sweep (fig. 4) will easily show the difference between –20 and –30 dB return loss in the filter response. Add a directional coupler to a spectrum analyzer with a tracking generator and you have the basic network analyzer. It's a very handy accessory.

You can also use the tracking generator as a signal generator (see fig. 5). Set the spectrum analyzer to your test frequency—say, 146.34 MHz. Next set the spectrum analyzer to "Zero Span" mode. This tells it to stop sweeping. You now have a CW signal on 146.34 MHz. It's going to be a strong signal for simply testing receivers. About –30 dBm is the lowest level output for most tracking generators, but a couple of attenuator pads can bring that level down for SINAD tuning..

Photo C– Gamma-matched dipole/Squalo antenna.

Letters, We Get Letters

From Rich we get a question: *"How do you shunt feed a tower and use it as an antenna? It's grounded!"*

There are many antenna designs in which all the elements are at DC ground. These antennas with all elements grounded are particularly popular in areas that experience a great deal of lightning. With proper design, a grounded antenna is not a problem.

Let's start with an antenna with which

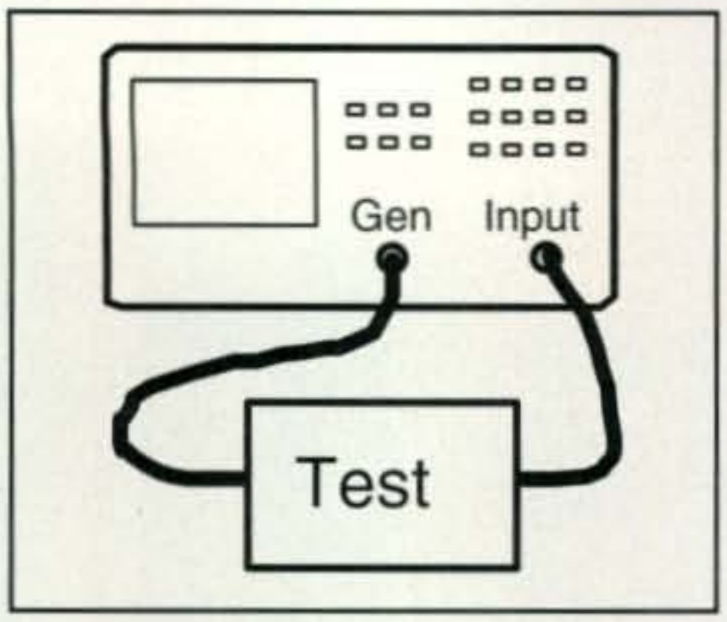


Fig. 1– Using a tracking generator.

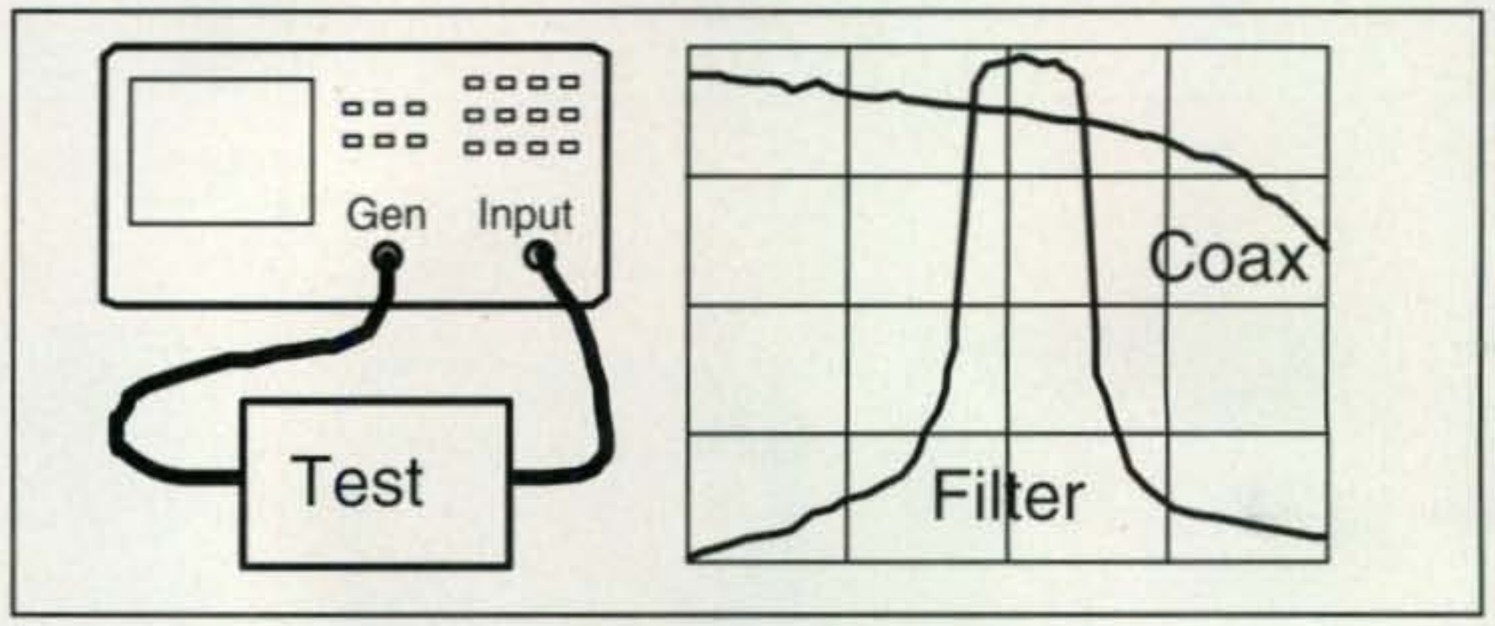


Fig. 2– Typical passband filter and coax sweeps.

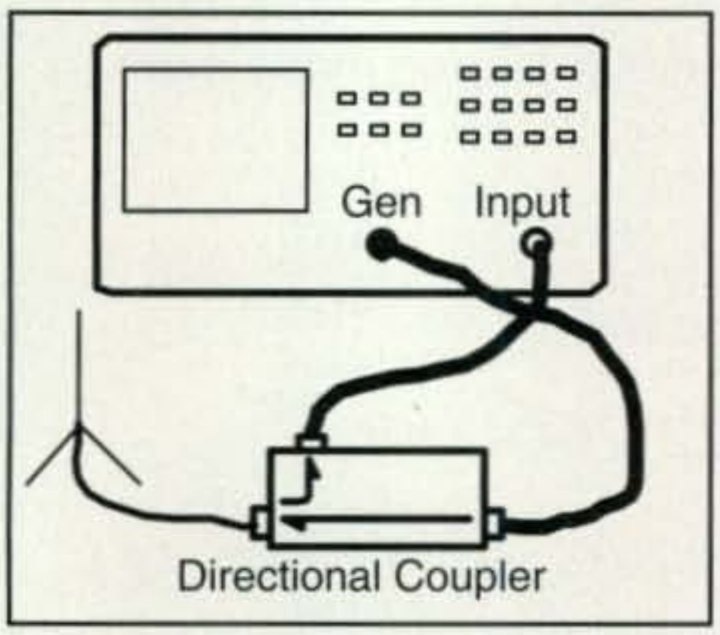


Fig. 3– Connecting a directional coupler.

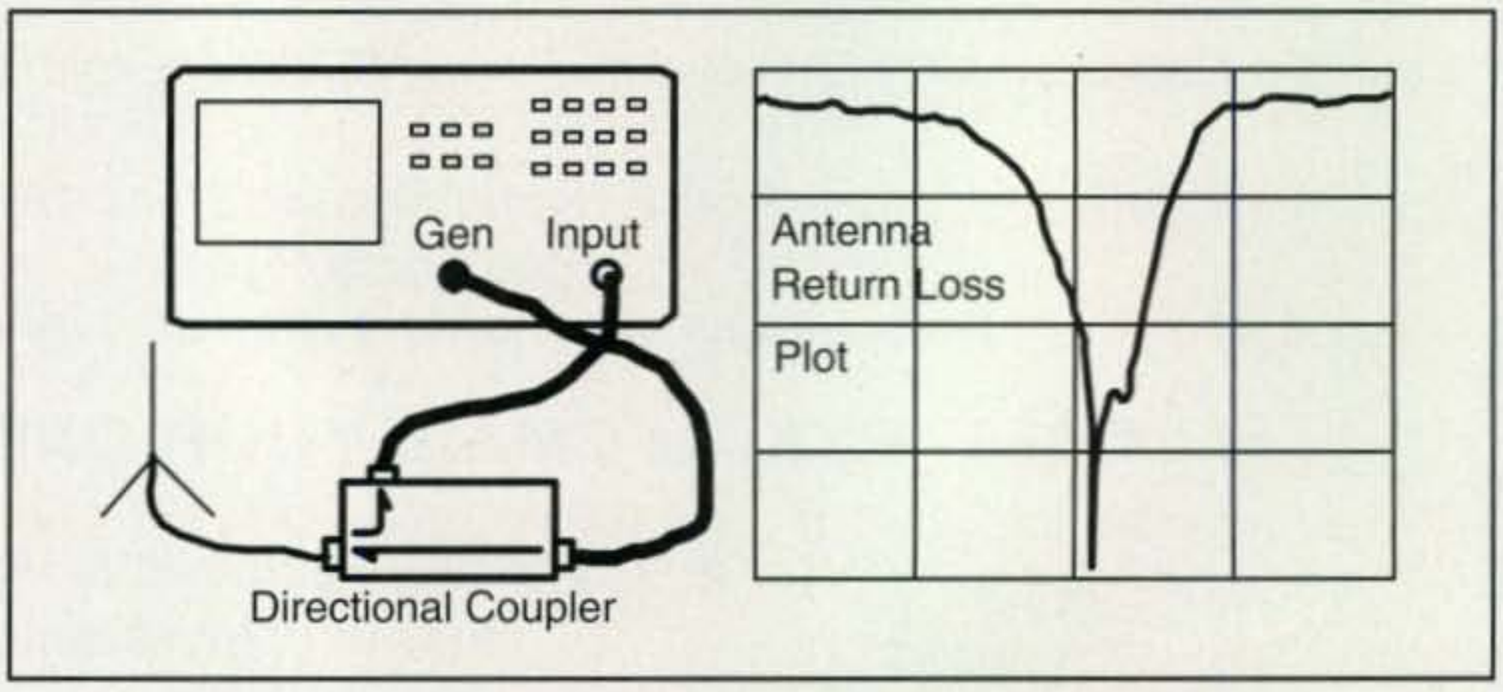
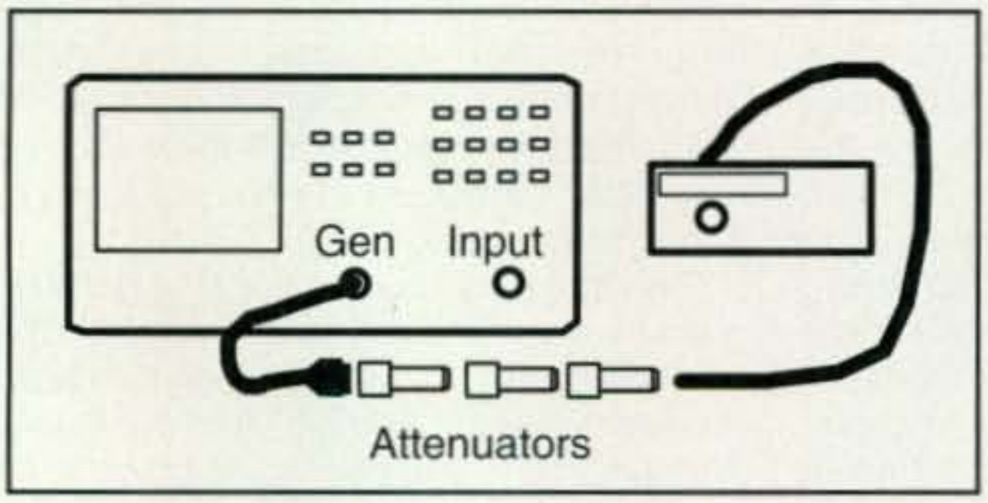
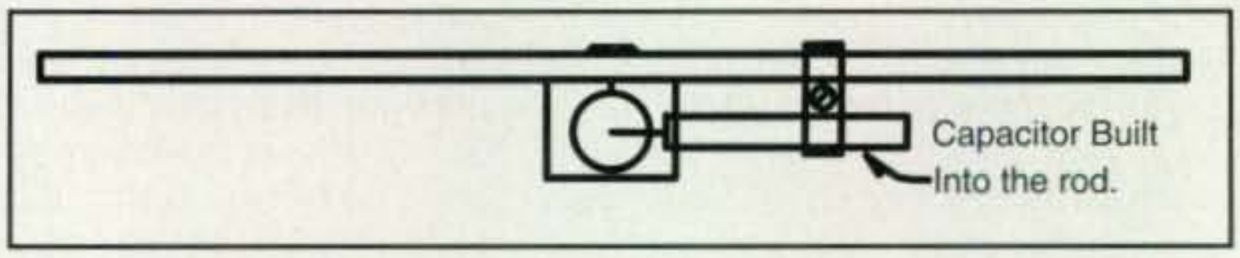


Fig. 4– Antenna or terminated filter sweep.



← *Fig. 5– Using a tracking generator as a signal generator.*

↓ *Fig. 6– Gamma-matched dipole.*



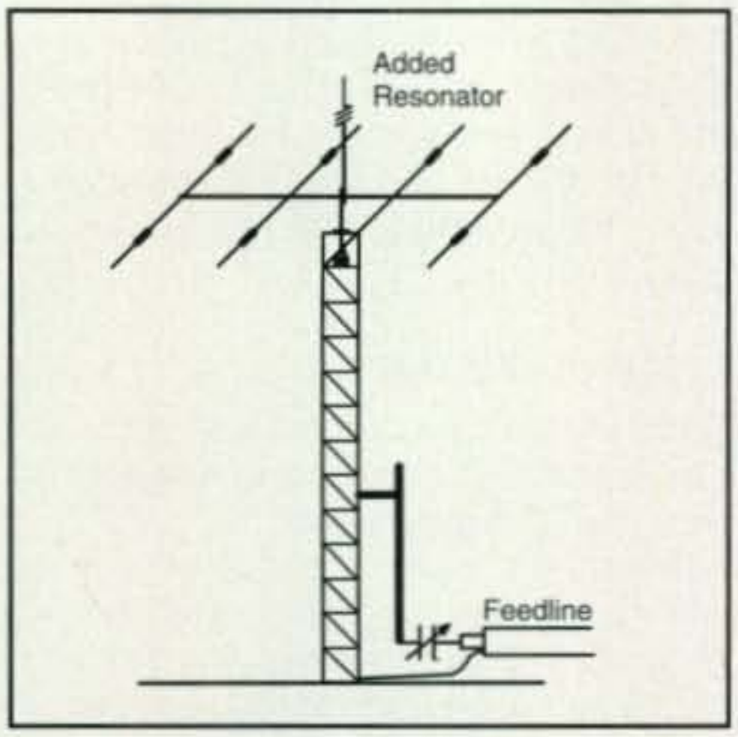


Fig. 7– Turning a tower into a gamma-matched vertical over a ground plane (see text).

most of you are familiar—the "Gamma Matched" driven element, as shown on a Squalo antenna in photo C. For a many technical reasons (I feel a column coming on here), I don't like gamma-matched driven elements on Yagis. However, for this example they work well. Essentially, we shunt-feed the tower by using a giant gamma match.

A dipole (fig. 6) needs to be 1/2 wavelength long. On the other hand, a vertical over a ground plane—which is really what a tower is, if you think about it—only needs to be 1/4 wavelength long, since the ground plane behaves as the other half of the dipole. The tower with its HF beam as a capacitance top hat (fig. 7) rarely resonates at the desired frequency, though. With careful tuning of the shunt feed, this gamma-match network can do the same thing as an antenna tuner and resonate the tower to a low SWR. However, for better performance and to get most ham towers to tune down to 160 meters, for example, a loading coil can be added at the top. It's a classic way of making do with what you have.

From Glenn we have: *"Why are the radials bent down on my ground-plane antenna? Does the signal reflect off them at the horizon?"*

No Glenn, in this case it's all a matter of impedance (see fig. 8). A straight dipole has an impedance of around 72 ohms. I can make the bottom section out of tubing and feed the antenna through that tubing. Shakespeare® (the

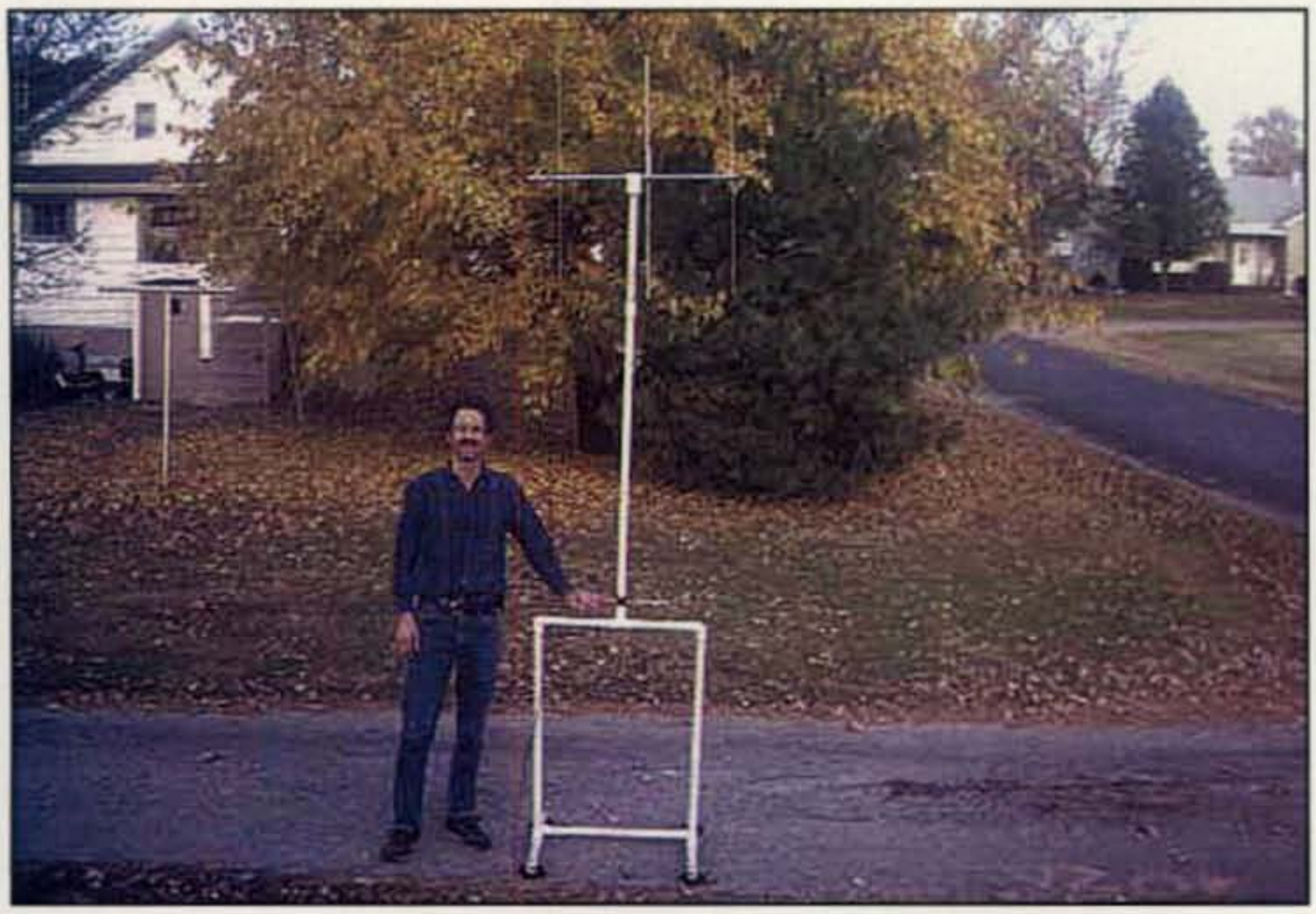


Photo D– Homebrew portable mast.

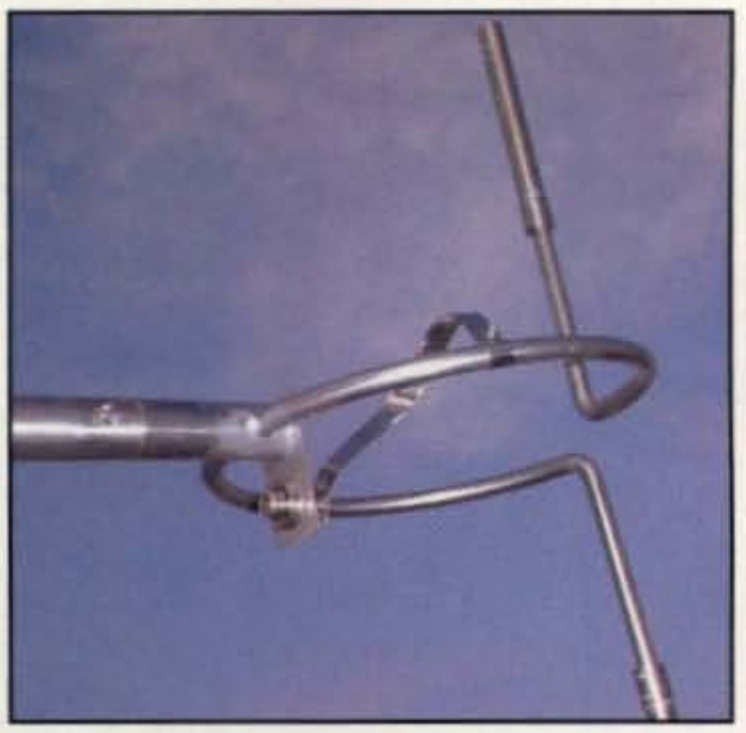


Photo E– Circularly polarized broadcast antenna. If anyone knows the proper name for this antenna, please let me know.

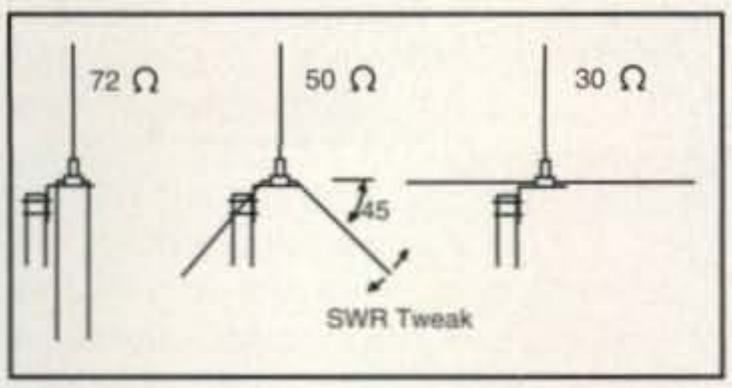


Fig. 8– The impedance of a ground-plane antenna depends on the angle of its radials.

antenna company, not the playwright) was especially noted for making vertical antennas this way. Again, though, as is, the impedance is going to be around 72 ohms. If I make a flat ground plane, the impedance is about 30 ohms. I once had a 6-meter ground plane built this way, and it used a matching stub to get the impedance back to 50 ohms—or we can just split the difference. Put the ground radials at about 45 degrees and the impedance is 50 ohms. If you're really into playing with the SWR of your homebrew ground-plane antenna, you can bend the radials up and down a bit for that super tweak on the SWR after you get the length optimized.

Creative Use of PVC

This month's award for the most creative use of PVC plumbing parts goes to Dean, KF9DL, Mark, KB9QLJ, and Bill, K4LRX. Their portable mast (see photo D) was made from PVC fittings with magnets on the four legs, so it will attach itself to the top of their car. That's one way to get that VHF/UHF antenna up there so you can hit those distant re-peaters.

Next Column . . .

I was contracted to do some testing on a circularly polarized antenna used in FM community broadcasting (see photo E). It sure looks as if it would be easy to build one out of commonly available parts, and it is a modest size for 146, 223, and 445 MHz. I hope to have a construction project for you by my May column. I have been not been able to find this antenna in any of my textbooks. If it has an official name, please let me know and I'll call it by name in the column. Meanwhile, keep those soldering irons hot and the questions coming.

73, Kent, WA5VJB

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Giving and Taking: Your First QSO and Opportunities to Teach Others

All active hams have one thing in common: Each has survived his/her first radio contact. Some of you have done it on your own; others have been helped by a club that does a good job of holding a new ham's hand while he/she turns on a ham rig for the first time. This is a great reason to join a radio club. If you haven't yet made your first contact, one thing that really helps is to listen to the band or bands on which you are interested in operating and learn what a two-way ham radio QSO sounds like. Another excellent resource, in addition to a local radio club, is the CQ "Getting Started" video series on ham radio. Check the CQ Bookstore for ordering information. However, getting on the air and making contacts is truly the best way to learn how to operate a ham station, and really is the most fun.

I remember my first QSO, and maybe it wasn't really so bad, since I'd watched others make contacts before. Still, though, saying the words "See cue" or "Seek you" (CQ, the general call on the ham bands for a station seeking contacts) into a microphone connected to some electronic box that is connected to nothing but air via a mass of wire and electronic parts is always very strange the first (or maybe second or third or fourth) time.

Who is this See Cue anyway? Beeping out "Dah-di-dah-dit, dah-dah-di-dah" with Morse Code on a machine is a little less strange than saying this weird phrase with your voice. (On most FM repeaters, a ham looking for a contact generally says, "[your callsign] listening," or something similar, rather than calling CQ. This is an example of why it's good to listen first where you plan to operate.)

In any case, my first QSO was on CW as a Novice licensee in the early 1980s. I was in the UCLA radio club station (W6YRA) with a bunch of other members present. Since it wasn't my rig, I was afraid I would "do something stupid" and break something. However, the other fellows showed me how to operate the rig properly and reminded me of the frequency allocations for 15-meter Novice CW.

Although I was familiar with operating procedures and the most popular "Q-signals" and abbreviations (such as "ES" for "and" on CW), all of this was only from book learning. I was sweating and felt embarrassed, because even in sending code, the other club members could hear all the mistakes I made (and heckled me for making them) and corrected my receiving, too. I struggled with getting through the basic small talk everyone exchanges in the beginning of a contact, such as signal report and name, the weather conditions, and station setup. I felt sorry for the ham on the other side (somewhere in Michigan) who had to struggle with listening to my rough characters sent with a straight key. I mentioned to the other station that he was my very first QSO and asked him to please forgive my rough sending.

Fortunately, and I think this is nearly always the case, the other operator understood what I was going through and encouraged me to "hang in there." He told me that things would get easier with practice. I tried to make the conversation as short as possible, since I was having a hard time understanding what he was saying. Even then, the simple QSO lasted for around 45 minutes.

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Field Day is a great time to teach ham radio newcomers how to operate equipment and the proper operating procedures. On the left, Huntington Beach RACES member Steve Graboff, W6GOS, shows City of Huntington Beach Emergency Services Battalion Chief Jacques Pelletier how to handle a pile-up on 20 meters.

Thus, with that first contact I qualified for my very first operating award—the Rag Chewer's Club (RCC), from the American Radio Relay League, or ARRL for short. I still have that certificate somewhere in a filing cabinet. It is sure to be a collector's item now, since recently that award was discontinued. (Another organization, the Society for the Preservation of Amateur Radio [SPAR] has picked up where the ARRL left off. See References for a link to more information.)

As the weeks went by, I continued to operate on 15 meters CW and sometimes ventured to other bands as well. I signed up for operating time when no one else was using the station. I was there all by myself, so if I goofed up, no one except me (and whomever else was listening to my frequency) could hear. Strangely, I still remember that I could feel my face and ears turn red as I used the radio during the first several dozen contacts. Equally strange, I do not remember when that feeling of embarrassment went away. It's sort of like having a headache; you take an aspirin, and a few minutes later it's just gone, and you didn't notice when the pain stopped.

Practice Becomes Recreation

As the weeks turned into months and I filled several pages in the club logbook, the contacts became easier to make. I began to feel comfortable on the radio, and the QSOs became more interesting. I had fun making new friends all over the world, and it did not seem to matter where the other fellow was or what language he spoke, since my earliest contacts were made on CW.

We exchanged signal reports and weather information, and it was interesting to me that hams in other locations were always envious of the usually sunny southern California weather. Sometimes we discovered that we had things besides ham radio in common, and our QSO would last until propagation conditions on the band "closed."

I remember exchanging ideas about effective and not so effective antennas for Field Day and other topics such as flying radio-control planes, photography, and building go-karts. It is amazing (well, maybe not really so amazing) that most hams have other interests besides ham radio and find the time to do it all.

Remember, once you have had your first contact, the others will be much easier. You will most likely remember that although it seemed difficult, making contacts on the radio is actually pretty simple, and after the first few contacts it will become just another ordinary "thing" you do.

Reversing the Role

When you are on the receiving end of a first-timer's contact, remember how you felt when it was your first time and help the other operator through the experience, just as someone else helped you. Exercise patience and encourage him or her to relax and work through the jitters. Find out something new about the person you just met on the radio. If we all just return this favor by helping others, think about how many great operators we can get on the air.

Also, like many first-time events in one's life, the newcomer will most likely remember you and how you helped him or her through a tough time. Let's all try to encourage newcomers into our radio service by helping them through their difficult first experiences.

By the way, the ARRL Field and Educational Services Department issues First Contact Certificates to hams who have successfully completed ARRL licensing courses. The student and his/her first contact are responsible for completing the required information for the certificate.

In addition, the ARRL Elmer Award is available to mentors who have helped get new people on the air. The mentor is nominated by the new ham as a way of saying thanks. More details about the First Contact Certificate and the Elmer Award program can be found at the ARRL website; see References section for a link.

73, Wayne, KH6WZ

References

Videos and books for newcomers can be found at the CQ Bookstore on the CQ website: <http://www.cq-amateur-radio.com>.

To find out more about the Society for the Preservation of Amateur Radio's Rag Chewer's Club (RCC) award, visit <http://www.spar-hams.org/index.php?pg=11>.

More information on First Contact Certificates and the Elmer Awards are posted on the ARRL website: <http://www.arrl.org>.

An interesting site with all sorts of ham radio trivia: <http://www.ac6v.com/73.htm#cq>.

know it works

BY DAVE INGRAM,* K4TWJ

Large vs. Small Rigs: Which is Best?

A number of readers have asked my opinion about which is the better choice for HF operating and why—a full-size transceiver or a compact transceiver. The question is quite understandable and holds merit. Every person's situation and lifestyle are unique, however, so going over the whys, hows, and differences in transceivers and then letting you make the call is the best overall answer. This month's column thus looks at the similarities and differences in those full-size and compact HF transceivers we all enjoy owning and operating. As a convenient starting point, let's define our area of discussion.

Generally speaking, transceivers such the ICOM IC-756PRO, Yaesu FT-1000, Kenwood TS-940, and Ten-Tec Omnis are considered full-size rigs, while transceivers such as the ICOM IC-706, Yaesu FT-857, Kenwood TS-50 and TS-480, and Alinco DX-70 are considered compact rigs. There are larger/more expensive and smaller/less expensive transceivers such as the ICOM's IC-7800 and Yaesu FT-817, but their market or appeal to the overall amateur radio population is specialized and limited.

Let's begin with the most obvious differences in presently popular transceivers and progress to the more technical-based differences.

Obvious Differences

If you place a full-size transceiver and a compact transceiver side by side, their physical differences will immediately be apparent. The full-size transceiver has larger knobs and switches, a more spacious front panel, and a larger frequency/display area. The full-size transceiver also has a larger heatsink and fan, so it runs cooler than a compact transceiver during periods of heavy use. Big transceivers also tend to inspire a more positive mindset (wow, I could work the world with a rig like that!).

Compact transceivers should not be underestimated, however, as they have their own special attractions and assets. Being smaller, they fit in more confined spaces, and they are more affordable than big rigs. You can use one fixed, mobile, and portable, and you usually need not be an electronics engineer to operate one (remember, they are designed for easy on-the-road operation).

Further cross-comparing transceivers, full-size rigs often have a built-in power supply and automatic antenna tuner, while those items are external options for compact rigs. Do you prefer handling one large (and heavy) box, or two or three smaller and lighter boxes? Larger transceivers often include a few more features than smaller transceivers, and their menu sets can be slightly easier to access, but consider how often you use those features or menu selections. A creditable number of amateurs purchase full-size transceivers and find at least half of their special features are unnecessary or too compact to call into use during a fast operating stint.

Recently, for example, XYL Sandy, WB4OEE, worked VQ9LA on Diego Garcia (Chagos) in the Indian Ocean using a little TS-50 and a Hy-Gain AV-640 vertical. The pile-up was fast moving and there was no time to even consider the lack of a full-size transceiver with all of its super-terrific features and functions. She just concentrated (fo-

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Photo A– Which is best, a full-size transceiver with super performance circuitry and features galore or a compact go-anywhere transceiver that is easier to use and lighter on the budget? The answer depends on your operating habits, personal preferences, and lifestyle, as discussed in the text. (Photos courtesy of ICOM America)

Photo B– Studying equipment brochures obtained from manufacturers at hamfests is a clever way to learn more about a considered-for-purchase transceiver. Brochures are also good for cross-comparing rigs and features if you cannot test-tune a transceiver before buying it. Keeping all brochures on considered rigs with your chosen transceiver for future reference is also a good idea.

cused!) on placing her call letters in between European callers and ignored on-frequency QRM. She exhibited the confidence of someone running a 10-grand rig with a 2-KW amplifier and 7-element beam and made contact on the fourth call—proving, as I always say, the operator rather than the rig makes the big difference in success!

The bottom line is simple: Both large and small transceivers cover the same bands, tune the same frequencies, run the same power, and are so similar in receive sensitivity that most folks do not notice the difference. Most of the time, or in 80 percent of the cases, you can work any station using a compact transceiver that you can work using a full-size transceiver. A positive mindset is the key.

Internal Differences

In many respects, the classic saying "pay more, get more" applies perfectly to full-size and compact transceivers. Indeed, there often is more high-tech engineering and more elaborate circuit designs in the larger transceivers than in (less expensive) small transceivers, but that is not surprising.

Full-size transceivers usually exhibit more "front end" or RF level filtering, more extensive IF filtering, and more effective noise blanking than compact transceivers. They also have double- and triple-stage AGC systems that are most beneficial in avoiding "blocking" by strong adjacent-frequency signals (often apparent by an S-meter reading upscale, receiver sensitivity being low with no noticeably signal on a tuned frequency). In comparing circuit diagrams, I noticed large transceivers often include more noise-reducing balanced RF and IF amplifying stages, whereas small transceivers favor conventional single-ended RF and IF stages. Several large transceivers also include separate low, mid, and upper HF-band RF preamps, while small transceivers utilize a single "all band" RF preamp.

How noticeable are the previously mentioned facts in actual on-the-air operation? Unofficially, I would say they are noticeable, but not earth shattering. They are good to have, but not absolutely necessary.

Looking further behind the front panel, I notice an increasing number of full-size transceivers include IF- rather than AF-level DSP (Digital Signal Processing) passband filtering and notching, plus adjustable transmit bandwidths and transmit audio equalization. IF-level DSP utilizes data clocking techniques to produce a (user selected) bandwidth that is very steep-skirted (it stops QRM flat!). It also stops strong signals from "blasting through" mildly filtered IF stages which cause "blocking" of AGC action. Conversely, audio-level DSP (which is often used in small transceivers) is limited in effectiveness because it cannot compensate for AGC action that has already "clamped" and reduced gain of IF stages.

Mid-Size Rigs

In looking at the full picture and considering the average amateur (a semi-serious DXer and occasional contester with a good appreciation for neat rigs), a mid-size transceiver could easily prove to be an overall best buy. How so? It has reasonably large knobs and frequency display area, a very good cooling system, an impressive amount of big-rig circuit-

Photo C– A mid-size transceiver may easily represent the best overall mix of special operating features, portability, and cost. This Kenwood TS-2000, for example, is factory supplied with a full IF-level DSP filter system, digital AGC, automatic antenna tuner, plus other "big rig" features. It is also satellite ready and equipped for deluxe remote-controlled "Sky Command" HF operation using a handheld talkie as discussed in the text. (Photo courtesy of Kenwood U.S.A.)

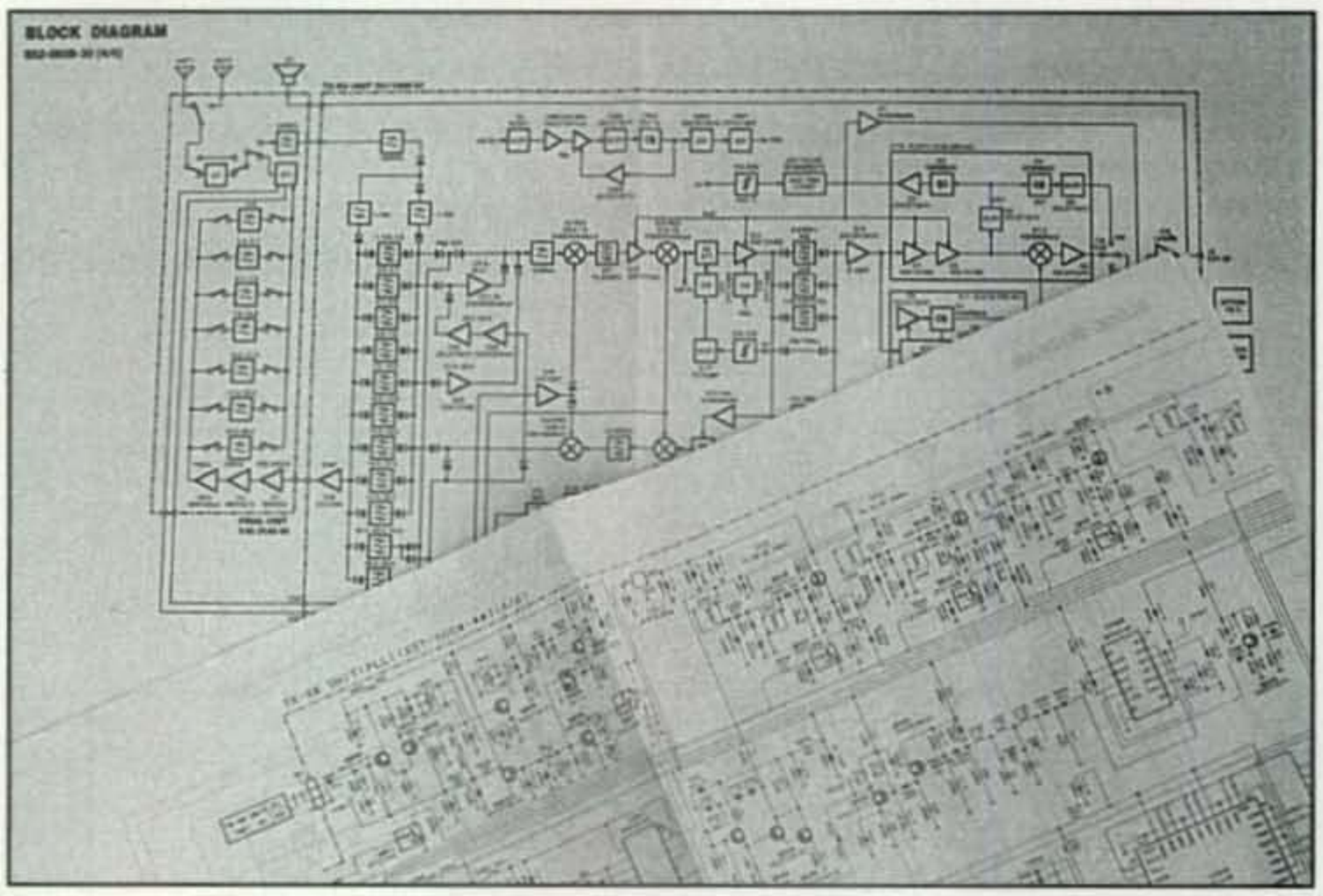


Photo D– If you are technical-minded, comparing block diagrams and circuit diagrams of rigs can be quite beneficial in choosing the "perfect for you" HF transceiver (if such actually exists!).

ry, and all the deluxe features one could ever want or master. It also is affordably priced. The initial purchase may tax some amateurs' budgets, but the strain is easily overshadowed by long-run enjoyment and good "down the line" trade/resale value.

A shining example of that fact is Kenwood's TS-2000. It has a real glitz and glamour appearance to support a positive "can do" mindset, sports Kenwood's famous rich and full-bodied audio which sounds like a million dollars, and has "big rig" circuitry and all of today's most wanted features. It also has IF-level DSP filtering (no optional filters to buy; they are built in!), digital AGC, selectable transmit bandwidths, audio equalization, and automatic antenna tuner plus 2m/70cm satellite capabilities and something new—Sky Command.

The Sky Command feature is fantastic. It lets you operate the TS-2000 remotely using a TH-D7 2m/70cm handheld talkie as a controller. It is akin to putting a full HF station right in your hand. You can switch the TS-2000 on and off, tune frequencies, switch bands, call up memories and VFOs, operate the RIT, change modes, and more. It is wild! As this column is being written, Kenwood is awaiting FCC approval of the Sky Command system. It probably will be approved and available by the time this issue of *CQ* is printed. Check <www.kenwoodusa.com> for late-breaking details.

Conclusion

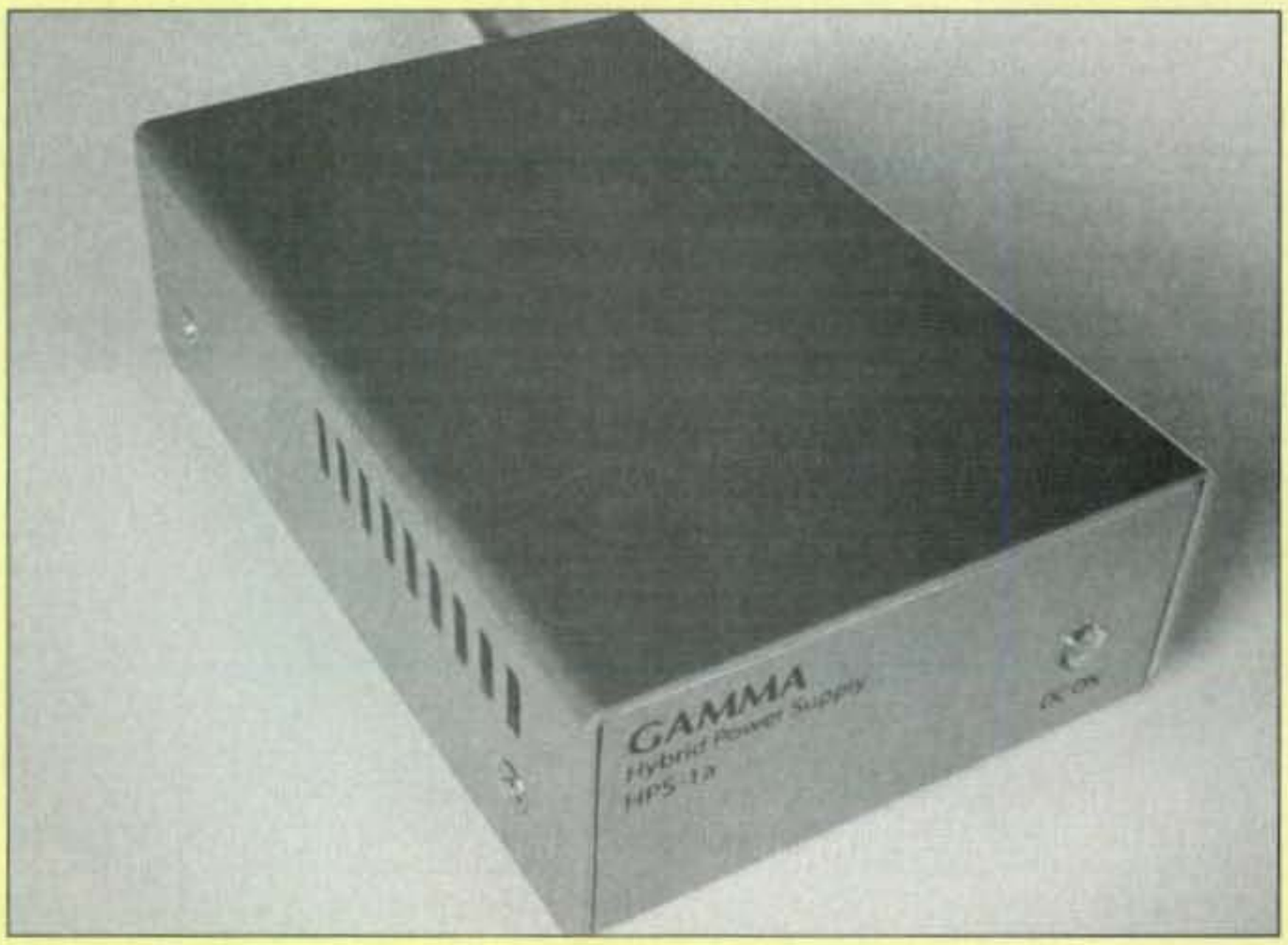
This month's column was slightly different from our usual, but I trust you found it helpful in understanding the "How It Works" aspect of HF operating with a full-size and a compact transceiver. As we close, one final point warrants mentioning. Regardless of whether you choose a large, small, or mid-size transceiver, always consider its record of performance, long-run reliability, and manufacturer's service/customer support reputation. Even the most elaborate and admired transceiver is of little use if it does not work properly, and that, dear friends, is the most important consideration of all. Good luck in all your HF pursuits!

73, Dave, K4TWJ

100 Watts in Your Hand!

Our large vs. small discussion also includes power supplies, and one of the most impressive new gems I have seen is the 13-volt/20-amp DC supply being made by Gamma Research, Inc. of Kentucky (see photo). Like many column readers, I had difficulty believing this 1.5" × 3.5" × 5.5" marvel could actually power a 100-watt transceiver—even when I saw it calmly running an IC-706 to full output at a recent hamfest. I am now using one in my own shack and while portable with a TS-570 and even a TS-2000 (it powers either one like a champ), and it runs cool and calm while doing so. How is that possible? Designer Fred Graham, K3GQ, explains that it is a new type of hybrid switching supply with "Double Layer Ultra Capacitors" producing five Farads (yes, you read right—5 Farads) of output capacitance. The supply continuously charges that capacitance, and a connected transceiver draws power from it like a giant storage tank. Personally, I have also found the Gamma Hybrid Power Supply exceptionally clean of RF "hash" found in several types of DC supplies.

You probably will hear more about this remarkable power supply during coming months. Meanwhile, you can get more details (or order a Gamma Supply) at/from <www.gammaresearch.net>, or Gamma Research, Inc., P.O. Box 500885, Nashville, TN 37205.



Like portable operation but dislike dragging along a larger (and heavier) than transceiver power supply? Check out this amazing new Gamma Hybrid Power Supply. It is super small and runs 100-watt output transceivers admirably, provided you do not transmit a solid key-down carrier long enough to discharge its capacitors.

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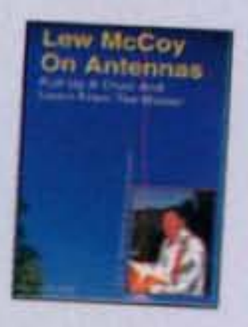

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radio classics

BY JOE VERAS,* K9OCO

A Visit with WA4KCY

Andy Howard, WA4KCY, shares a character trait with one of my early heroes. The late Green Bay Packers coach Vince Lombardi taught and practiced the pursuit of excellence. It doesn't take long to conclude that Andy is driven by the same ideal.

Ham Radio and Beyond

I visited Andy at his Clem, Georgia home to conduct an interview and do photography for a column on his magnificent homebrew AM rigs. During the course of the day, I found myself mentally rewriting the story, expanding it beyond the transmitters to include the man as well.

Ham antennas announced the presence of WA4KCY as soon as I turned into the driveway off the quiet country road in front of his home. Once inside the house, I was greeted by a large number of exquisitely restored old-time broadcast-band receivers. Andy poured each of us a cup of coffee and gave me a tour of the BC radios. He showed me small tabletop sets, elaborate floor console models, and everything in between. Those with wooden cabinets have the gleam of fine furniture. The restorations go beyond the veneer of appearance; the receivers work well, too. Their owner proudly demonstrated a few of his favorites. They easily pulled in AM broadcast stations from all over the Southeast and Midwest, even though it was approaching mid-day.

*208 Alpine Circle, Vestavia Hills, AL 35216
e-mail: <k9oco@jveras.com>
website: <www.k9oco.com>

Photo 1– The main AM operating position at WA4KCY. Equipment includes several very desirable classic receivers, a Gates broadcast audio mixer, and even a vintage Conelrad monitor. (Photos © Joe Veras, 2006, all rights reserved)

Andy's appreciation of things from days gone by is not limited to ham or broadcast radios. "I like antiques . . . just about anything antique," he told me. A trip downstairs illustrated this passion. Guys my age (I turn 61 this year) probably remember Cushman motor scooters. Andy has two of them, a 1959 Eagle and a '61 Highlander parked in his basement garage. He and his wife Sally, N4RFQ, both ride the scooters. When they wish to go two-wheeling together, the Howards climb aboard a big Yamaha Royal Star Venture. It is *full-dress*, equipped with every feature needed for comfort and convenience on long trips. Andy rides frequently, saying it is one of his great pleasures.

Continuing our walk back toward the ham shack, we entered the *Firearms Collection Area*. As with the two-wheeled vehicles, this collection is a juxtaposition of vintage and modern. Fine examples of WW II weapons share rack space with antique and current hunting rifles. Even fully automatic weapons are present (relax, folks; he has done the appropriate federal paperwork and is licensed). Andy was kind enough to offer me the opportunity to burn through a few rounds with one of his machine guns, an Ingram MAC 10 chambered for .45 ACP. When I touched the trigger, a glittering waterfall of spent brass arced into the Georgia sunlight and the sound effects were spectacular. Now *that* put a smile on my face!

Regular readers know of my involvement in music in my youth and my continued interest in the subject. Our downstairs tour was accompanied by a wonderful variety of recorded music coming from Andy's PC. I discovered that his office computer has more than 500 sound files on it. As he scrolled through the list on the monitor screen, I spotted a number of personal favorites and we compared notes on them. Andy displays the knowledge and appreciation of a trained musicologist, and his taste seems as eclectic as my own. Among the recordings on his PC are a number of radio broadcast transcriptions . . . not only the classic network shows, but also local and regional programs from days gone by, material not available commercially.

In the Shack of WA4KCY

We left the office, walked through a well-equipped workshop, and entered the hamshack. The shack is large by most standards and—as a shame on many of us in the hobby—tidy. Operating positions run along three of the walls and hulking homebrew transmitters take up most of the fourth. The commercial equipment is mostly vintage, with a small amount of modern gear also in evidence. Surplus radios from the World War II years are there as well.

The stars of the homebrew show are the big transmitters, but Andy proudly showed off a little 10-meter AM transmitter he built in 1960. The cir-

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cuit is similar to the Heathkit Lunch Box (HW-19) of that era. Andy's penchant for building is even longer lived than his amateur career. He became WA4KCY in 1962, first getting on the air in his native Augusta, Georgia.

In the decades since, Andy has sampled many of the things amateur radio has to offer. For a time he chased DX with a vengeance. Some of the cards displayed on the walls of his shack remain rare catches today. He operated RTTY extensively, too, but his interest developed a new focus in the mid-1980s with the discovery of hams working AM with vintage gear.

"They turned out to be a good group," Andy remembers. WA4KCY joined the AM gang with a surplus ART-13, a transmitter used primarily in large aircraft during the Second World War. Today, the shack is filled with classic gear from the AM era, all nicely refurbished and working as it did when new. Andy says there is a large difference between restoration and building equipment from scratch. Even the most elaborate restoration fails to provide the same challenges as designing and building. It is the challenge to stretch one's limits that gives homebrewing much of its appeal to him.

Meeting the challenge yields rewards beyond winding up with a well-made, good-sounding piece of gear. The challenge begins at the conception of a project, saying, "I can do that." When the finished product is installed in the shack, "can do it" changes to "I did it . . . I built that myself!" Creating something one-of-a-kind and having a hand in all, or even most, steps in its construction magnifies the reward.

The process of building a transmitter begins well before the first chassis hole is punched or a single wire soldered. Andy comes up with a concept for the circuit and then studies the electronic theory involved, endeavoring to understand how everything works. Next comes the physical layout and mechanical design. Electrical considerations often govern the mechanical work. Short connecting leads may be necessary, input and output circuits isolated, or transformers, coils, and chokes oriented in a particular fashion. The third step begins with the execution of the electrical and mechanical plans. The manual skills necessary for both the metal work and wiring come naturally to Andy. "I get great enjoyment out of working with my hands," he says. "Some parts of the construction process could be farmed out to others, but that would dilute the satisfaction derived from personal involvement in concept and design to final assembly."

One cannot fully appreciate the work that goes into such a project without seeing the steps along the way. The transmitters shown here were completed prior to my visit, and I regret I wasn't around to document their design and construction. More details on the WA4KCY rigs are available in several back issues of *Electric Radio*.[1]

Homebrew Gear

After several years of operating with the ART-13 transmitter, Andy decided he wanted to build a big AM rig. One of his frequent phone contacts in those days was Jim Taylor, W4PNM (now SK), in Augusta, Georgia. They met at the Augusta hamfest, and Jim invited Andy to his house to see his homebrew AM kilowatt transmitter.

The W4PNM rig used 4-400 tubes and was the piece of gear that inspired Andy to get started on his own transmitter. Shortly after their meeting, Jim put some of his transmitter ideas on paper and sent the notes and schematics to Andy. This started Andy searching for the parts still needed for the project. He became expert at finding the buried treasures often hidden under fleamarket tables and enlisted the help of fellow AMers in finding others. It took eight months to take

Photo 2– The first homebrew AM transmitter to come out of the WA4KCY workshop was this 813 kilowatt built in 1989.

the project from the drawing board to a handsome rig in a 5 1/2-foot rack.

Rather than the 4-400s used at W4PNM, Andy chose 813s for his rig, both finals and modulators; the latter are used as triodes. One of his design philosophies is using the same

Photo 3– This desktop AM transmitter runs 500 watts with a pair of 4-125As. The tubes on top are for decoration only!

tubes in the final RF and modulator stages. He also prefers tubes that are relatively inexpensive and in plentiful supply. The speech amp, a major factor in the rig's great sound, is a W4PNM design. Photo 2 is a detail shot of the 813 kilowatt's front panel. Five meters across the top monitor every function critical to tune up and proper operation. A Collins 32V-3 is used as an exciter.

A year or so later, plans for another transmitter began to take shape. Andy had a supply of 4-125As on hand and that influenced the choice of RF amplifier and modulator tubes. This rig would be a desktop 500 watter with the power supplies on a separate chassis that could be placed on the floor. It also would exhibit what has become a Howard trademark: Windows in the front panel put the glowing tubes on display. The 4-125As in the final are paralleled, running in Class C, while the pair used as modulators are Class AB_1.

The exciter also fits in the desktop rack cabinet and is a commercial unit, although properly vintage. The Millen 90801 transmitter has a 5763 crystal oscillator/buffer and a 6146 final. It produces ample drive to the 4-125s, loafing along at less than 25% of its rated output. Most routine AM operation takes place on certain frequencies, and Andy grinds his own crystals, so frequency flexibility is seldom an issue. However, the 90801 can be driven by a VFO if necessary.

The front panels are black-wrinkle finish and labeled with white dry-transfer letters. The cabinet is done in a General Motors' silver acrylic lacquer. Before painting, Andy took the cabinet to a tombstone maker to have it sandblasted. He says, "They use a very fine grade of sand, one which leaves a smooth finish on the metal." Two coats of primer, each sanded after application, go on the bare metal before the final coat of automotive lacquer. Photo 3 shows the finished transmitter, D-104 plugged in and ready to go.

The power supply is an extensively reworked T-368 surplus unit. It and the exciter supply connect to the transmitter rack through a 10-foot cable.

The most impressive piece of homebrew gear is the 4-1000A transmitter (photos 4, 5, and 6). This is true in terms of stature as well as the complexity and scope of the project. To Andy, it is the culmination, the ultimate realization, of four decades of homebrewing. This rig also has a W4PNM connection. Jim and Andy went to the Dayton Hamvention® together in 1990, and after-dinner conversation there often turned to transmitter design and building. They filled up paper napkins and the back of placemats with schematics, diagramming circuit ideas. The concepts that came out of those sessions inspired Jim to formalize the impromptu drawings into plans for a 4-1000 transmitter.

Jim contacted Ten-Tec and arranged to have the transmitter's metalwork fabricated in the firm's Sevierville, Tennessee shop. However, he never completed the transmitter. Jim passed away on March 8, 1996, with most of the work unfinished. Andy bought the work-in-progress from Jim's widow but didn't begin trying to complete the project until early 2001. Jim had not left behind much documentation, so Andy decided to start from scratch.

The transmitter runs a single 4-1000 in the final. It operates in Class C for AM, but can be biased to Class AB_2 linear service for use as an SSB amplifier. A small variac in the input of the 4-1000's screen supply controls screen voltage

so that the transmitter can be unloaded without the screen current rising into the danger zone. The amp will run 1500 watts PEP on SSB. For AM, it is unloaded down to 375 watts carrier power.

A pi-network couples the amplifier to its load. Surplus ceramic coil forms wound with #10 or #12 wire are used for 160, 80, and 40 meters. The inductor for 20 through 10 is made from 1/8-inch copper tubing. A pair of vacuum variable capacitors completes the network.

Building a power supply for a transmitter such as this is a serious endeavor. Tom Hand, W4WDS, custom wound the large iron. Smaller transformers—those used in supplies for the screens, bias, and speech amp—were already in the junkbox or acquired from friends. The plate transformer has a 240-volt primary and secondary taps from 3500 up to 5500 volts. The current capacity? Two amps!

The modulator is biased for Class AB_2. Two filament transformers are used so that each modulator tube's cathode current can be monitored separately on its front-panel meter. W4WDS wound the filament transformers as well as the modulation transformer. A W4PNM-design speech amplifier drives the 4-1000 modulators with a pair of 6B4Gs in push-pull. The speech amp also incorporates a 6AL5 series limiter and an audio bandpass filter that restricts the audio to the 100–3500 Hz range.

A significant problem with a transmitter this size is finding a rack cabinet to house it. Allen Cutts, N4OZI, supplied one which had been damaged in shipping and could not be used by his employer. Andy repaired the damage and switched a couple of parts around, and the result is the handsome enclosure shown in photo 4. The smoked-glass door normally on the front was removed for photography.

An E.F. Johnson Viking Navigator is used as an exciter on AM. Andy favors the Navigator because it offers both VFO control as well as the choice of two switch-selected crystals. The lack of phone capability is not a drawback, because exciter speech circuits are not needed for AM operation of the transmitter. The Navigator's modest power output is more than sufficient to drive the 4-1000. When used on AM, the 4-1000 rig is a transmitter.

Another Side of WA4KCY

Along with his talent for building transmitters, Andy seems to have a secret way of manufacturing the spare time most of us find in chronic short supply. What does he do with hours not spent on amateur radio or his other hobby interests? He dedicates his time, talents, and energy to helping others.

Andy spends every Wednesday preparing full meals for families involved in programs at his church. He says that food preparation is his ministry, and he credits the U.S. Army with having taught him how to cook for large groups. Speaking of feeding the multitudes, Andy is a dedicated follower of Christ and demonstrates his faith in the finest

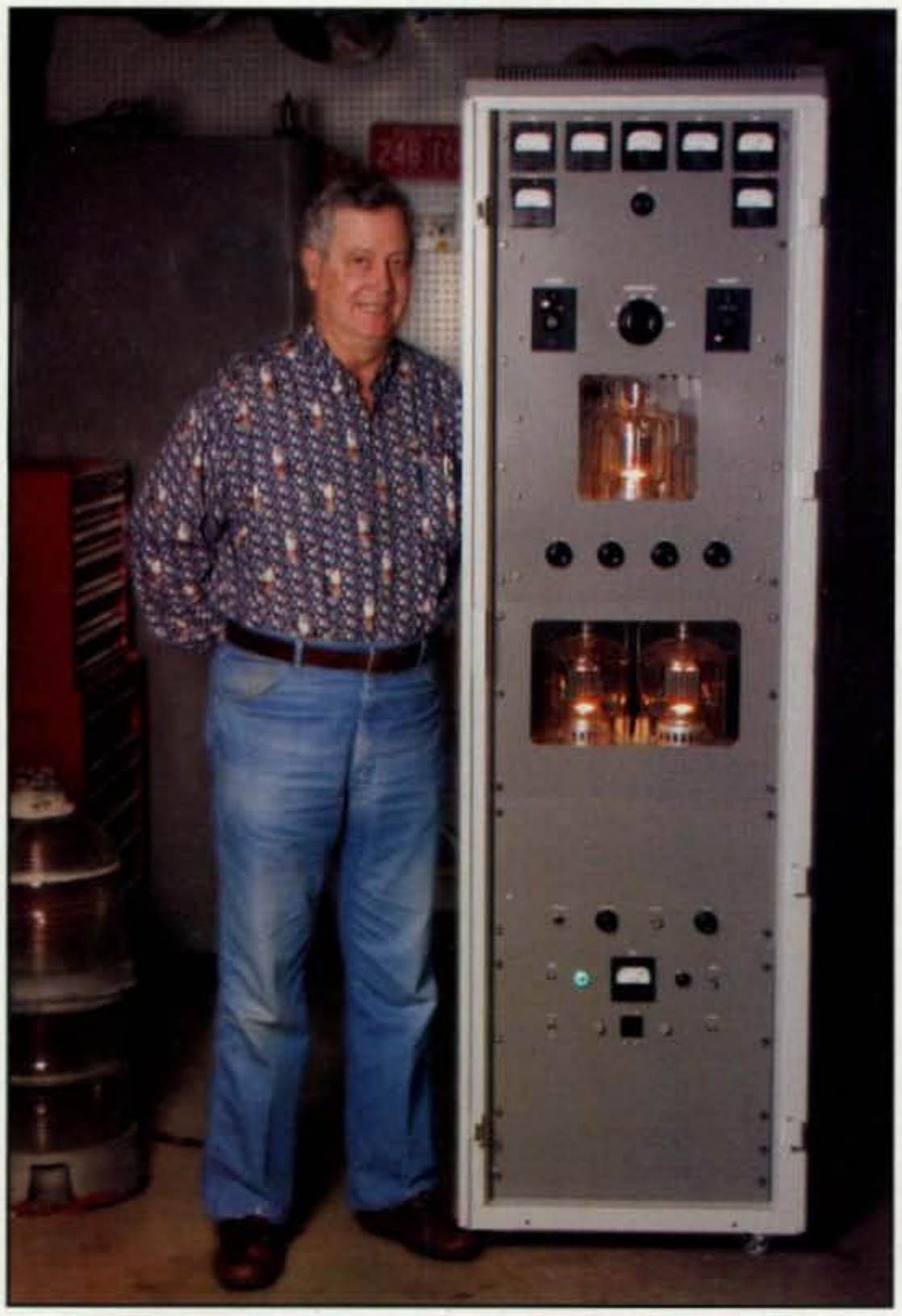


Photo 4– Six-foot, two-inch Andy stands alongside his 4-1000 transmitter to provide a sense of scale. It's a Big transmitter!

Photo 5– Front-panel detail of the 4-1000 transmitter's RF deck. The viewing window for the tube is a signature Howard design feature.

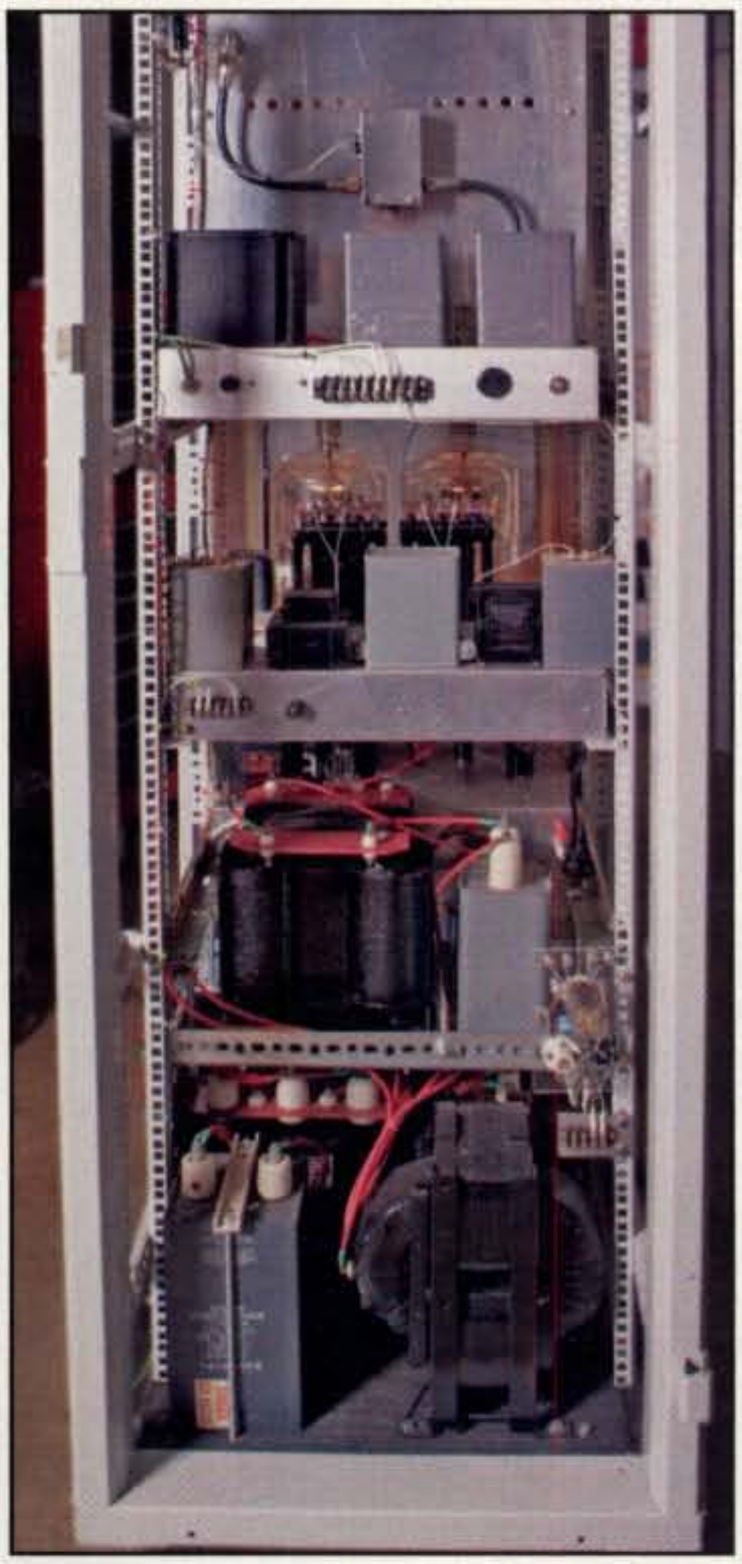


Photo 6– The business end of the 4-1000 rig. The RF deck is behind the cover at the top.

way possible, by example. His duties at the Midway-Macedonia Baptist Church are not limited to the kitchen, either. He chairs the church's board of directors and also teaches a Sunday school class.

I first met Andy about nine years ago when I stopped at his previous QTH in nearby Carrollton, Georgia for a Radio Classics calendar photo shoot. On that occasion, I worked at photographing vintage commercial ham gear and military surplus sets. My concentration was mostly on the task at hand.

The visit that resulted in this month's column took place in November 2005. It was more relaxed and reinforced the lesson that ham radio is as much about people as equipment. We are a wonderfully diverse group. I was reminded of this during a return visit to WA4KCY on the last day of the year. I went to the annual gathering at Andy and Sally's, along with a crowd of AMers, vintage radio enthusiasts, and just plain fans of the friendship and fellowship integral to our hobby. The guys and gals in attendance started the day with an Andy Howard prepared breakfast and we parted after a fine lunch in Carrollton. It was an enjoyable way to end one year and begin another.

Speaking of the new year, 2006 will be significant for your columnist. It will see the completion of a book project that has been a dozen years in the making.

Shortly after completing the first Radio Classics calendar in 1993, *CQ* publisher Dick Ross, K2MGA, and I started talking about doing a vintage-radio book. That project was launched in 1994, and in the years since more than 2100 pieces of American ham gear from the 1930–1980 period have passed in front of my camera. As 2006 begins, we are in the process of putting the book together, a task that likely will take the rest of the year. Watch these pages for more information, and if you are attending a hamfest where CQ is represented, be sure to talk to me or Gail, K2RED, about the book.

Notes

1. The following articles by Andy Howard, WA4KCY, were published in *Electric Radio*:

"An AM kilowatt using 813s 1989 style," *Electric Radio* #5, September 1989, pp. 20–23.

"A Desktop 500 Watter Using 4-125A Tetrodes," *Electric Radio* #29, September 1991, pp. 12–16.

"A 4-1000A Homebrew Transmitter," *Electric Radio* #152, January 2002, pp. 20–27, 41.

More Information on AM

Amplitude Modulation is not an anachronism. For many hams, including those with an interest in homebrewing, vintage restoration, and experimenting with audio, it remains a viable mode. Most current transceivers, even the most elaborate and expensive models offered by major manufacturers, retain AM capability. Whether one uses modern, vintage, or homebrew gear, AM operation has an old-time-radio feel to it. The QSOs most often resemble conversations.

In common with most amateur radio special-interest groups, AMers have nets and organizations. The following list in not comprehensive but provides a place to start:

• AM International was founded at the 1993 Dayton Hamvention® and today has about 1600 members. It is devoted to the enjoyment, promotion, and preservation of AM operation on the ham bands. To make the organization more effective, AMI is divided into eight national regions and one Canadian region, each with a director. The organization's president is Dale Gagnon, KW1I. You can join AMI and receive a membership number and handsome certificate by sending $2.00 to AM International, Box 1500, Merrimack, NH 03054-1500.

• The Southeastern AM Radio Club formed in June 2000. Its 183 members are spread over 15 states. SAMRC's on-the-air presence centers around 3885 kHz, with nets Tuesday at 1930 and Sundays at 0730 (both Eastern time). WA4KCY is club president; Andy also is the Southeast regional director for AMI.

• The Collins Collectors Association net has an AM night the first Wednesday of each month on 3800 kHz at 2000 Central time. The West Coast AMI net meets Wednesdays at 2000 Pacific time on 3870 kHz.

In addition to the 75-meter frequencies, other popular gathering spots for AMers are 1885, 7290, 14286, above 21400, and 29000–29100 kHz.

• If you would like to listen to AM operation, you can do so from anywhere in the world without turning on your radio! My friend Brian, N4DKD, streams live 3885 audio on the web at <http://personalpages.bellsouth.net/b/w/bwingard/audio1.html>, or you can find a link to Mister Brian's site on <http://wa4kcy.com>, along with a number of other AM-related links.

what's new

BY KARL T. THURBER, JR.,* W8FX

OHR Transceiver, GAP DSP Module, MFJ Wire Antennas, and more

This month we again shine *CQ*'s bright product spotlight on a wide variety of radio gear, radio shack accessories, antennas and antenna accessories, and books galore, and otherwise take a look at "what's new" in our great radio hobby. Are you ready to proceed? Well, then, let's dig right in.

Radio Gear

80-Meter CW Transceiver Kit from Oak Hills Research. Oak Hills Research has announced a new addition to its line of QRP products—an 80-meter version of the popular OHR 100A QRP CW transceiver (see photo A). Available for the 15-, 20-, 30-, 40-, and 80-meter bands, the OHR 100A has an enviable reputation for ease of building, performance features, and operator convenience at a very reasonable price. The complete OHR 100A kit is $139.95, and it can also be "built to order."

The new 80-meter version of the OHR 100A puts out a solid 5 to 8 watts of RF power, and it can easily be set for QRPp output. The default alignment is for 3.500–3.570 MHz, but the rig can be set for any 70-kHz segment of the band.

OHR proprietor Marshall Emm, N1FN, says that OHR has done everything possible to make this both an easy-to-build kit and an excellent radio to operate. He notes that the 80-meter band is often overlooked by QRP operators, and he hopes this new kit will stimulate further interest in this underutilized resource.

The completed transceiver measures 2 1/2" H × 6" W × 6" D and weighs in at just 24 oz. The kit comes complete with cabinet, controls, high-quality silk-screened and masked printed circuit board (PCB), all components, and detailed instructions.

For more information, contact Oak Hills Research, a division of Milestone Technologies, Inc., 10691 E. Bethany Dr., Suite 800, Aurora, CO 80014-2670; (1-866-OHR-KITS; e-mail: <qrp@ohr.com>; on the web: <http://www.ohr.com>). You'll find lots of QRP gear on the OHR website, and check out the related Morse Express website at <http://www.MorseX.com> for keys, bugs, paddles, and other interesting goodies, including products from Ameco and others.

Revisiting the Big Four Amateur Radio Manufacturer Websites. Have you recently checked out the websites of the "big four" amateur radio major equipment manufacturers—ICOM, Kenwood, Ten-Tec, and Yaesu? We believe it's important to remind our readers that these four firms have very comprehensive, feature-rich, and easy-to-navigate websites. It seems like it's time to revisit these sites, especially in view of their increasing usefulness.

The four manufacturers' websites (see fig. 1) make it easy for you to find out "what's new" in terms of amateur transceivers, receivers, transmitters, and other major equipment (photos B and C). Besides being among the first to announce new and upgraded products, the "big four" websites

Photo A– Oak Hills Research offers an 80-meter version of the popular OHR 100A QRP CW transceiver. The new radio puts out a solid 5 to 8 watts of RF power, and it can easily be set for QRPp output. The OHR 100A kit is $139.95, and it can also be "built to order." (Photo courtesy OHR)

Photo B– The four major amateur radio equipment manufacturers' websites make it easy for you to find out "what's new" in terms of major amateur equipment. Here's a photo of the stylish Kenwood TS-2000 HF/VHF/UHF Multi-Bander Transceiver snapped at the Huntsville Hamfest. Details? Check out the Kenwood website. (W8FX photo)

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

Photo C– Not to be outdone by its competitors in the amateur radio equipment market, here's the groundbreaking Yaesu FTDX-9000 HF/50-MHz Elite Class Transceiver, also on display at a recent hamfest manufacturer's booth. Check out the Yaesu website for details. (W8FX photo)

also have a variety of interactive features that greatly facilitate seamless, user-to-manufacturer communication and technical support.

While the specific features of the four manufacturers' sites vary considerably, they generally include "what's new" equipment announcements, accessory listings, equipment photos, customer and technical support pages, service bulletins, warranty and repair information, current and discontinued instruction manuals, battery information, pricing and promotions, and dealer listings—in addition to key radio trade show, hamfest, and other event locations and dates.

Also offered on the manufacturers' websites are information on DX activities, company news and contact information, product registration, downloadable software and frequency files, firmware updates, press releases, and much more. Often the manufacturers' sites announce new and planned technology implementations, along with detailed explanations of how these technologies work in practice.

Why not visit each of the "big four" websites soon, bookmarking them for convenient future reference? Most likely you'll be pleasantly surprised at the wide-ranging support and sense of community they offer you.

ICOM: ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98004 (425-454-8155; e-mail: <amateur@icomamerica.com>; on the web: <http://www.icomamerica.com>).

Kenwood: Kenwood USA Corporation, Amateur Radio Division, P.O. Box 22745, Long Beach, CA 90801-5745 (310-639-4200; e-mail: <kcc-amateur@kenwoodusa.com; on the web: <http://www.kenwood.net>).

Ten-Tec: Ten-Tec, Inc., 1185 Dolly Parton Parkway, Sevierville, TN 37862 (1-800-833-7373; e-mail: <sales@tentec.com> or <service@tentec.com>; on the web: <http://www.tentec.com>).

Yaesu: Vertex Standard USA, 10900 Walker Street, Cypress, CA 90630 (714-827-7600; e-mail: <amateursales@vxstdusa.com> or <customerservice@vxstdusa.com>; on the web: <http://www.vxstdusa.com> or <http://www.yaesu.com>).

Fig. 1–Updated contact information, especially website addresses, for the "big four" amateur radio equipment manufacturers. Why not visit (and bookmark) each of these websites soon?

Accessories for the Shack

New HEAR IT Amplified DSP Module. Give your speaker intelligence or modernize your old rig with this new DSP noise-canceling product. If you can hook up a speaker, you can install this new HEAR IT amplified noise-eliminating module and get rid of that annoying background noise. The module, offered by GAP Antenna Products, Inc., and no larger than the remote on your keychain, is pre-wired so that you can easily insert it into the audio path of your favorite speaker or communications equipment. The HEAR IT amplified module is suitable for a wide range of applications, but is particularly useful for improving voice quality in radio communications.

Operating on 12 volts, the HEAR IT amplified module will remove unwanted QRM and QRN to improve readability and speech intelligibility across all bands; it's an economical and efficient way to upgrade even the oldest equipment. The small package size yields unlimited installation opportunities; now you can keep that vintage rig in pristine condition while providing state-of-the-art audio clarity.

Two micro pushbuttons control the power on/off audio bypass and DSP on/off. During power-up, you can select from four or eight levels of noise cancellation, giving you the ability to tailor your listening pleasure. The HEAR IT amplified module is supplied with a fused power lead, mounting accessories, and a comprehensive manual. The module retails for $159.00 and is available direct from GAP and through their dealers.

For additional information, contact GAP Antenna Products, Inc., 99 North Willow Street, Fellsmere, FL 32948 (772-571-9922; e-mail: <cpmtact@gapantenna.com; on the web: <http://www.gapantenna.com>).

Ronson® TechTorch®. Are you "hot" for a very useful butane torch? Offering far more utility than the average torch, the butane-based Ronson TechTorch (see photo D) reportedly has revolutionized the tool boxes and workbenches of radio enthusiasts, and the torch can be used to repair, craft, build, and install connectors, circuits, and wires. Billed by the manufacturer as an ideal tool for any serious radio enthusiast, the TechTorch is reliable, easy to handle, and useful for a wide range of soldering and shrinking applications.

The TechTorch is said to easily solder PL-259s, the most commonly used radio connector for tabletop shortwave and amateur radio products. After soldering the connector, the torch's hot-air blower attachment enables convenient heat shrinking. Reaching a temperature of 2372° F, the torch is even able to solder items on a tower in a strong wind.

Photo D– Billed by the manufacturer as an ideal tool for any serious radio enthusiast, the Ronson® TechTorch® is reliable, easy-to-handle, and useful for a wide range of soldering and shrinking applications. Full details are in this month's column. (Photo courtesy Ronson)

Photo E– The new high-performance, two- and four-element MFJ Collinear array antennas need just two trees or other points to "hang and play"™. Check out the column for details on the new MFJ-62XX and MFJ-64XX series Collinears, as well as the new MFJ61XX End Fed Zepps (not pictured). (Photo courtesy MFJ)

The Ronson TechTorch is styled for hands-free use; its adjustable flame ranges from "hi-heat" blue to lower temperature yellow. It's available in a "Storage Kit," listing at $39, that is equipped with a Comet butane lighter, a butane refill, a safety lock, a chisel soldering tip and fine-point soldering tip, and a connector/hot-air blower attachment. The torch is refillable with any size Ronson Multi-Fill Butane fuel. The unit carries a one-year warranty and is sold at Wal-Mart stores.

For more information, contact Ronson Consumer Products Corporation, P.O. Box 6709, Somerset, NJ 08875-6709 (1-800-5264281; e-mail: <order@ronsonstore.com>; on the web: <http://www.ronsonstore.com>).

Antennas and Antenna Accessories

New MFJ Collinear Array Antennas. Recently, MFJ Enterprises reached back in time to when "radio was king" and brought back to life some of the most popular, classic antennas that produced some of the most powerful signals for radio amateurs. These high-performance antennas (depicted in the representative photo E) can give you a powerful, booming signal, and they need just two trees or other points for you to simply "hang and play"™—there's no cutting, soldering, tuning, or trimming required. MFJ has updated these two- and four-element arrays with stronger, more durable modern materials and adapted some to simple, direct coax feed.

MFJ offers two series. The MFJ-62XX series single-band, two half-wave element collinear array reportedly gives you nearly 2 dB gain and twice the receiving capture area of a half-wave dipole. The antennas in the series have direct coax feed and low SWR across the entire band. There are five models in the series to individually cover 15, 17, 20, 30, and 40 meters, ranging in price from $39.95 for the 15-meter model (MFJ-6215) to $59.95 for the 40-meter model (MFJ-6240); coax feedline is not included.

The MFJ-64XX series single-band, four half-wave element collinear arrays are designed to give you 4.5 dB gain. With these antennas you also reportedly get four times the receiving capture area of a half-wave dipole. These antennas require a balanced line tuner or a tuner with a balun for balanced lines. There are three models in this series to individually cover 15, 17, and 20 meters, ranging from $94.95 for the 15-meter model (MFJ-6415) to $109.95 for the 20-meter model (MFJ-6420).

The antennas are completely assembled. They include strong custom fiberglass center insulators; authentic glazed-ceramic end insulators; heavy-duty, 7-strand, 14-gauge hard copper element wire; and strong, solderlesscrimped construction.

While we're on the subject of MFJ wire antennas, we should note that MFJ also has introduced a line of hang-and-play end-fed Zepp antennas, the MFJ-61XX series (not pictured). Available in five different single-band versions— each covering 15, 17, 20, 30, and 40 meters—they are completely assembled, single-band, half-wave antennas with direct coax feed that handle a full 1500 watts RF. Prices range from $31.95 to $44.95, depending on band.

All of the antennas mentioned here are protected by MFJ's famous No Matter What™ one-year limited warranty. Under it, MFJ will repair or replace (at their option) your MFJ products, no matter what, for one complete year.

To place an order, find the name of your nearest MFJ dealer, or request a free catalog, contact MFJ Enterprises, Inc., 300 Industrial Park Rd., Starkville, MS 39759 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; web: <http://www.mfjenterprises.com>).

From the Bookshelf

New National Radio Club AM Radio Log. Your column editor frequently is surprised at the number of licensed radio

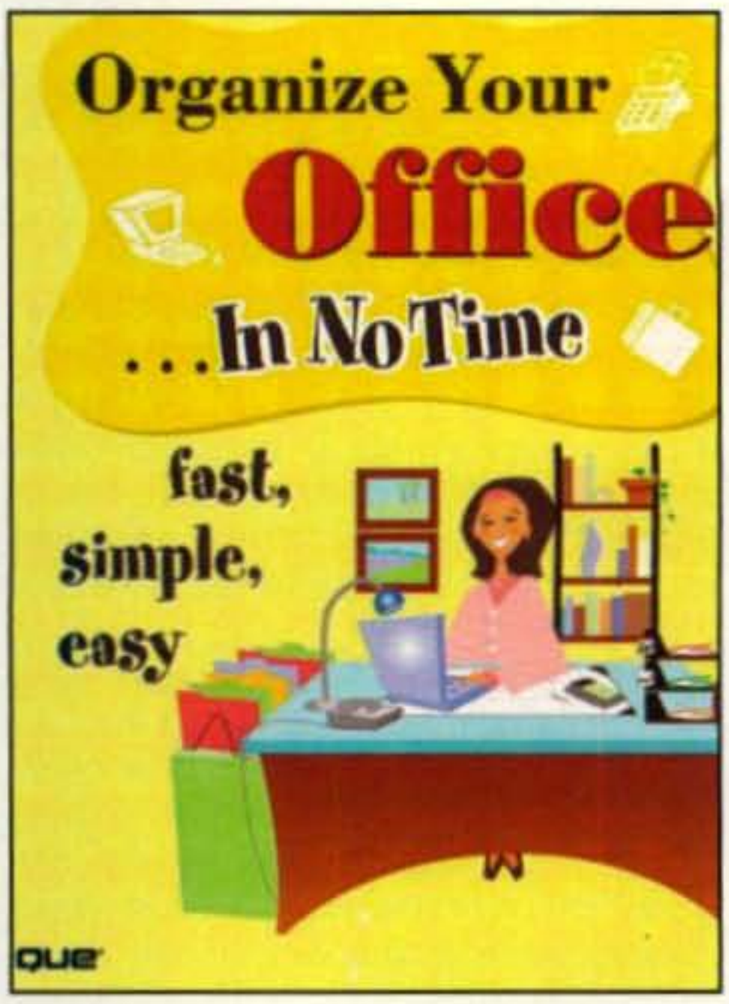


Fig. 3– The new Que book Organize Your Office in No Time *was written primarily for office workers in need of optimizing the organization of their workspace, but many of the techniques and suggestions contained in the book are equally useful in doing the same for your own workspace—your radio hamshack. Check it out. (Graphic courtesy Que Marketing)*

amateurs (including myself) who also are avid listeners to DX medium-wave (MW) broadcasts. Supporting these listeners is The National Radio Club (NRC). Since 1933 an association of MW listeners and radio hobbyists, the club offers an extensive online catalog of MW-related publications at <http://www.nrcdxas.org>.

NRC's Wayne Heinen, NØPOH, tells us that the *AM Radio Log,* 26th Edition, for the 2005–2006 DX season, is now available. It's considered by many to be the world's best and most accurate source of AM radio stations in the United States and Canada. The new edition, edited by Wayne and Joan Heinen, KBØYRX, contains 276 pages in an $8^1/2" \times 11"$, three-hole punched, loose-leaf format.

With nearly 3500 updates since last year's edition, recent additions to the log list call letters of FM simulcasts and listing of regional groups of stations in the groups section; talk radio hosts and their syndicator or network also are listed. The new book's cost is $25.95 postpaid in the U.S. to nonmembers, or $19.95 to NRC members. Orders are shipped postpaid by Media Rate; USA and Canada add $2.50 for Priority Mail shipping.

Send publication orders to the NRC Publications, Box 164, Mannsville, NY 13661-0164 (e-mail: <sales@nrcdxas.org> or <amradiolog@nrcdxas.org>; on the web: <http://www.nrcdxas.org>). Make checks payable to the National Radio Club, Inc.

***Amateur Radio on the Move* and More from the ARRL.** Appropriately subtitled "from Your Car or RV, Boat, Airplane, Motorcycle or Backpack!" the new *Amateur Radio on the Move* (see fig. 2) offers expert advice for operating on the go.

The new indexed book, by multiple contributors, covers all forms of amateur radio mobiling. It includes chapters describing mobiling in your car, your boat, your airplane, your motorcycle, your RV, or even from your backpack while hiking in the wilderness. Each chapter has been written by experts—people who have a great deal of hands-on, practical experience with the joys (as well as the pitfalls) of mobile operation.

All mobiling bases appear to be covered in the book. Chapters include "Mobile in Your Automobile," "On the Go with Maritime Mobile," "Aeronautical Mobile, "RV Mobile and Motorcycle Mobile," and "HF Unplugged," covering backpack mobile.

Indeed, you can use this ARRL book to find out what to do and what not to do. Among the many topics covered include radios you can use mobile, getting power to run a radio, installation tips, safety, antennas for mobiling, getting rid of noise, operating hints and tips, and even software.

According to the publisher, there's something in the book for everyone who has ever entertained an idea about getting on the air while in motion. The book is priced at $19.95 plus s/h.

While we're on the subject of ARRL books, we also should note that *The ARRL Handbook for Radio Communications—2006 Edition* also is available from the ARRL ($39.95 softcover; $54.95 hardcover). The new edition celebrates "80 years of excellence," going back to 1926 when the ARRL published the first edition of *The Radio Amateur's Handbook,* subtitled *"A Manual of Amateur Short-Wave Radiotelegraphic Communication."* The new 2006 book comes complete with *The ARRL Handbook* on CD-ROM, version 1.0.

Contact the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494 (1-888-277-5289; e-mail: <pubsales@arrl.org>; on the web: <http://www.arrl.org/shop>). Orders can be placed online, and the paper ARRL Publications Catalog is available upon request.

Organize Your Office in No Time (fig. 3) gives readers with no time to waste all the information they need to create an organized workspace simply and easily. Using step-by-step instructions and easy-to-follow to-do lists, author Monica Ricci, a professional organizer, shows the best ways to tame a messy desk and an impossible schedule, and also claim extra time each day by getting rid of the clutter. The author helps each reader find the type of organization that works best for his or her personality, work style, and needs.

The suggestions offered in the book primarily are for offices, but most are practical for home and hamshack, and they aren't one-size-fits-all solutions. In fact, the author helps you find the type of organization that works best for your personality, work style, and needs, and then recommends specific products to help you get on your way to "organizational bliss."

Check your local bookstore, or for more information contact Pearson Education, 200 Old Tappan Road, Tappan, NJ 07675 (1-800-922-0579; on the web: <http://www.quepublishing.com>).

Devastation on the Delaware. A new book by Mary A. Shafer includes stories of amateur radio prowess in the flood recovery effort of 1955. *Devastation on the Delaware: Stories and Images of the Deadly Flood of 1955* reportedly is the first comprehensive documentary of the destruction wrought by the remnants of Hurricane Diane in the Delaware Valley. The book contains several accounts of rescue and recovery efforts aided by amateur radio operators during the aftermath of the disastrous weather event.

Although the flood happened more than 50 years ago, the event was an eerie precursor of current disaster scenarios surrounding recent Hurricanes Katrina and Rita, where disaster mitigation and recovery are concerned. Taking place in the era whose emergency response was dictated by the realities of the Cold War and a quasi-military Civil Defense structure left over from World War II, the 1955 flood wreaked havoc over the entire eastern seaboard from the Carolinas north to the Mid-Atlantic and New England states. Yet, for all its under-funded lack of structure, the net of public and private first responders, including ARES/RACES groups, performed with nothing

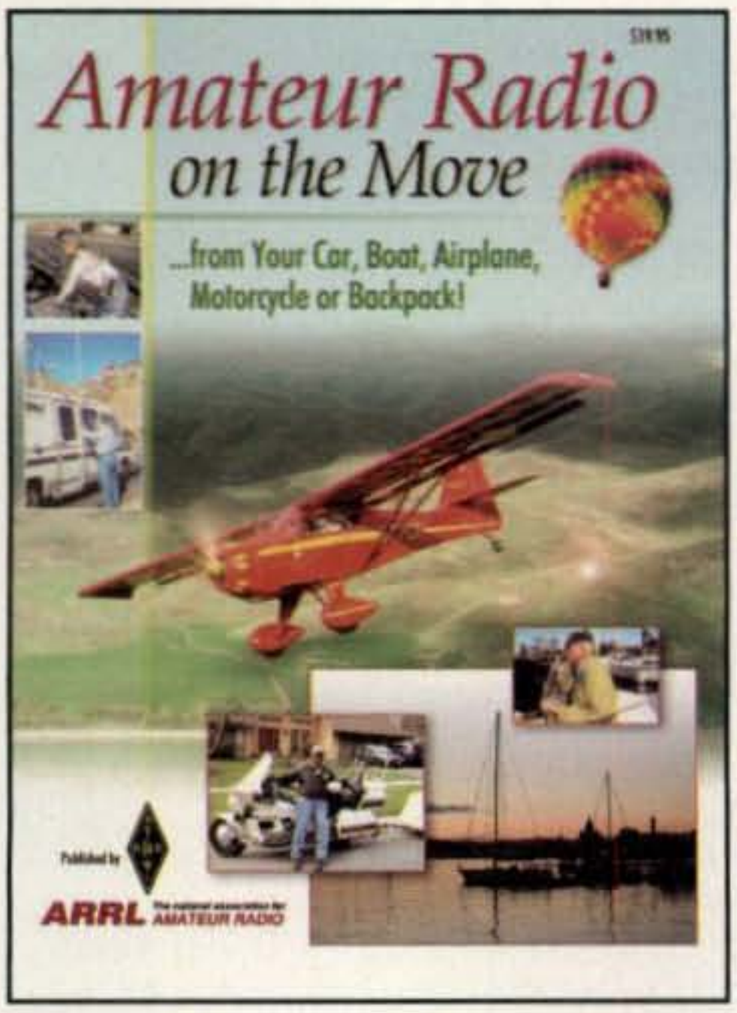


Fig. 2– The new ARRL publication Amateur Radio on the Move *offers expert advice for radio operating on the go. The book covers all forms of amateur radio mobiling: mobiling in your car, your boat, your airplane, your motorcycle, your RV, or even from your backpack. (Graphic courtesy ARRL)*

less than astounding effectiveness.

The book presents a particularly nostalgic look at how amateur operators responded in a time of rapid technological development in mobile communications technology. Everything from truckloads of bulky, tube-based home setups to the beloved VHF Gonset "Gooney Box" transceivers played a role in keeping the recovery effort moving. Hams should enjoy reading the diverse accounts of operators doing what it took to make a difference in the devastated area.

The book, published by Word Forge Books, is a 6" × 9" softcover of 456 pages, with more than 100 historical photos and a dozen maps and diagrams. Written in narrative nonfiction style, it's a historically factual account that reads like a novel. It retails for $19.95 and is available from major booksellers. The book also may conveniently be ordered online through the book's own online ordering portal at <http://www.55flood.com>, by calling toll-free at 1-888-320-9673, or via snail mail using a PDF order form which is available on the website.

In the Course of Duty. Best-selling author Don Keith, N4KC, has published his 13th book, *In the Course of Duty,* the true tale of an amazing World War II submarine. Here Don tells the story of the *USS Batfish*, which sank three enemy submarines in three days, an almost impossible feat. However, the details of the story make it an even more remarkable, death-defying accomplishment. Don also recounts how that submarine has come to rest today in a bean field in the middle of the Dust Bowl in Oklahoma, not far from the Cherokee Nation's capital.

In the Course of Duty is not just of interest to historians or military buffs. It delves into the very human story of the submarine's unbelievably young crew and the personalities of her strong-willed commanding officers, who voluntarily risked their lives to defend their country from a fanatical enemy, a theme that resonates with events of today. Don also describes the determined group of sub veterans in Oklahoma who decided they wanted a submarine—come hell or high water—to serve as a memorial to their fellow submariners who died in the course of duty. The author also notes that local hams in Muskogee, Oklahoma, occasionally operate from *Batfish*'s radio room as a special events station.

In the Course of Duty, at 336 pages, is published in paperback by NAL/Caliber, an imprint of Penguin Group USA, at $15. Details of all of Don Keith's works and an online ordering portal can be found on his website at <http://www.donkeith.com>. Don can also be contacted via e-mail at <n4kc@bellsouth.net>.

Wrap-Up

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

Overheard: Over the years, I have found that there certainly are many more important things in life than simply being right.

73, Karl, W8FX

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

BY JOE LYNCH,* N6CL

Ending 2005 and Starting 2006:

Tremendous 6- and 2-meter propagation between VK and ZL

Last month I highlighted an article written by Bob Gyde, ZL3NE, that is available for download from Volker Grassmann, DF5AI's website, <http://www.df5ai.net>. My curiosity about Bob's predictions led to my corresponding with him and eventually to accepting an article by him that was published in the Winter 2006 issue of *CQ VHF* magazine, available from CQ Communications.

Subsequent to accepting the article, I received the following letter from Bob as further enticement to check into his methodology for predicting VHF and above propagation. I invite you to read on with me and make your own assessment.

Joe, I thought you would be interested in how my program for predicting propagation is working out! This year it is particularly good, as with *El-Niño,* propagation has extended up to FK8 every day in December! Other years I seldom hear them. The places contacted are almost identical with those of 1983, another very prominent *El-Niño* year. So what have we worked?

In fig. 1, I have a picture taken on 24 December 2005 of a cold front that came off Tasmania and was moving into the Tasman Sea. It all started at 11 AM on 25 December, when VK3s came in, followed by VK2s from mid-day until 3:30 PM. ZL3s were in from 12:30 until 1:30 PM, across the southern end of the front. Around 4 PM VK4s arrived, this time from over the northern end of the front. Additionally, we had signals from FK8 beginning at 5 PM. This front was a fast mover—there and gone in a day! On 26 December a second front 24 hours behind it came over the south of the North Island of New Zealand, and we had a very extensive and long opening to the South Island on 6 meters.

Late on 27 December, a small anticyclone developed over the northwest sector of the Tasman Sea. This grew considerably overnight. From 2 PM on 28 December it became massive, covering all the Tasman Sea, over the eastern coast of Australia, as well as over New Zealand.

In fig. 2 is a picture of the developing anticyclone. Notice how low the pressure is. Yet it intensified quickly and produced fantastic propagation. This figure was not recorded at the peak of the pressure.

e-mail: <n6cl@sbcglobal.net>

Fig. 1– Weather map showing a cold front off Tasmania, moving toward the Tasman Sea. (All artwork courtesy of Bob, ZL3NE)

VHF Plus Calendar

Mar. 5	Moderate EME conditions
Mar. 6	First Quarter Moon
Mar. 11–12	Second weekend of the DUBUS EME contest; see text for details
Mar. 12	Moderate EME conditions
Mar. 13	Moon Apogee
Mar. 14	Full Moon and Penumbral Lunar Eclipse
Mar. 19	Poor EME conditions
Mar. 20	Vernal Equinox
Mar. 22	Last Quarter Moon
Mar. 26	Moderate EME conditions
Mar. 28	Moon Perigee
Mar. 29	New Moon and Total Solar Eclipse, central Africa, central Asia, and central Russia

—EME conditions courtesy W5LUU

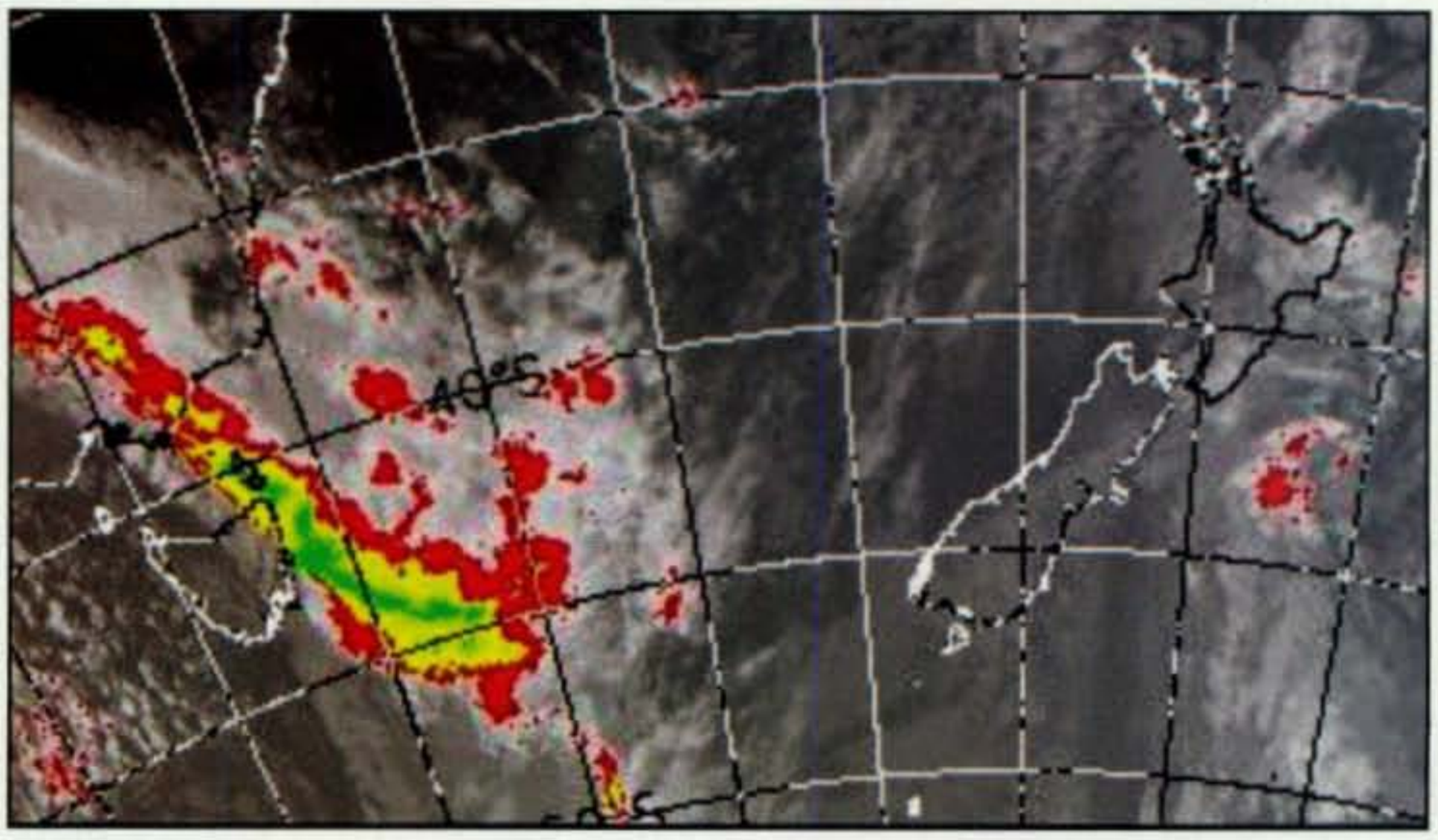
Anticyclone Recorded on 24 December 2005

You will notice that most anticyclones become more intense as you approach the center, so we go for anticyclones of say 1026 mb, which will give us 1022 mb at the sides, as this is the lowest usable part of the anticyclone.

What did this anticyclone produce? Very strong propagation was recorded, from the North Island on 6 meters to all of the east coast of Australia. With this came a 2–3 hour opening on 2 meters across the northern sector of the anticyclone to ZL1 stations, who worked into VK2, 3, and 4. I was fortunate to be one of the participants. The temperatures across the southern part of the anticyclone were too low to produce 2-meter propagation and not much on 6 meters.

Temperatures recorded at the likes of R. J. McQuarrie, ZL3TY's area were 18–20° C, while in Auckland we had 24° C. This is the difference between propagation on 2 meters and none! Even when Canterbury has 30° C, here the 20° C over the southern Tasman Sea off Greymouth is the governing temperature. This is typical of *El-Niño,* as temperatures are generally colder than normal. A typical example of how much colder than normal was that our marrows planted outside in late November died! Cucumbers under glass in early December died, while the Pohutukawa trees, our Christmas trees, took until 10 January to flower! They should have done it before Christmas!

The second opening Nick Wallace, ZL1IU, had on 2 meters came from a big thunderstorm out



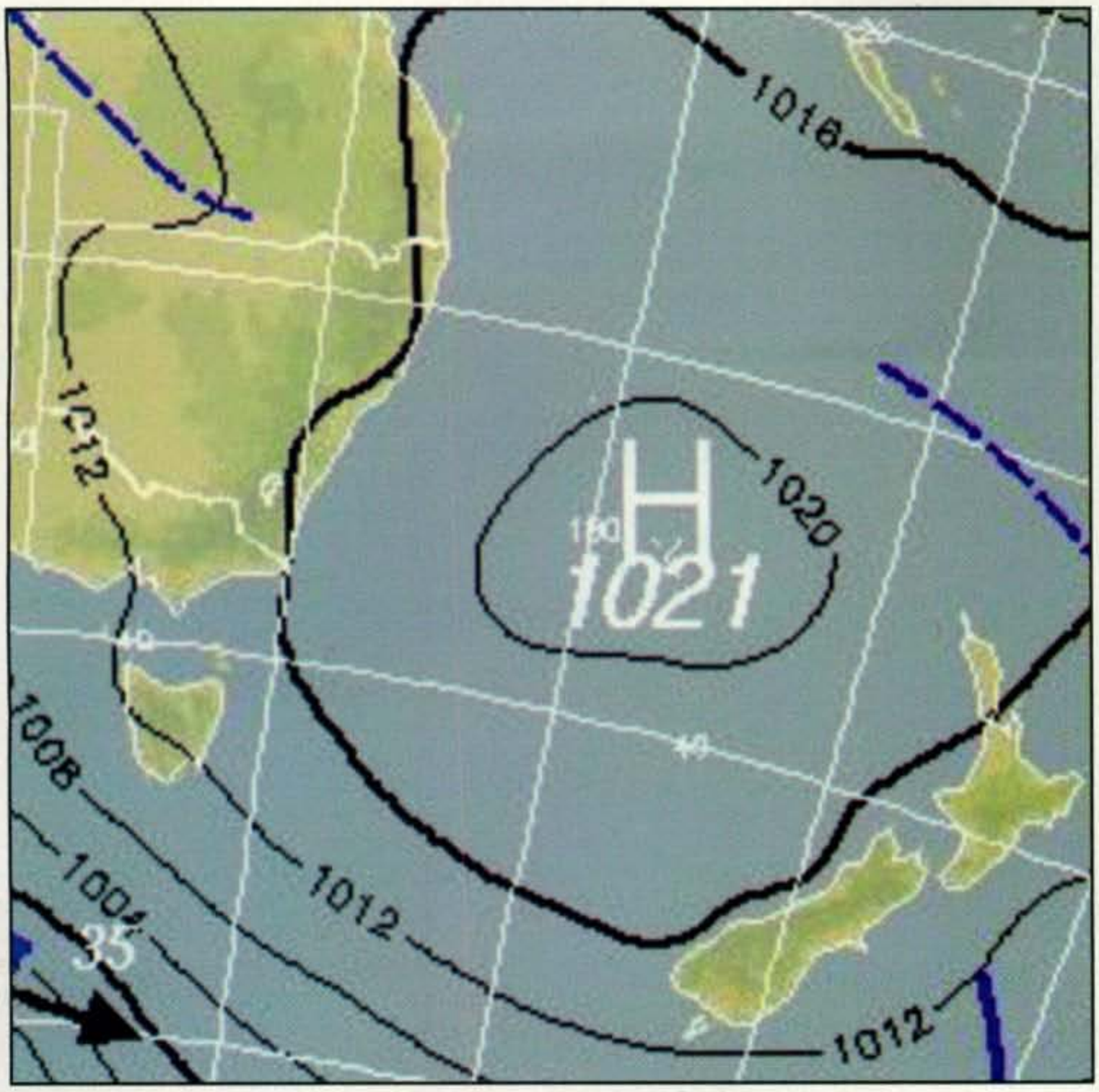


Fig. 2– Weather map showing the developing anticyclone.

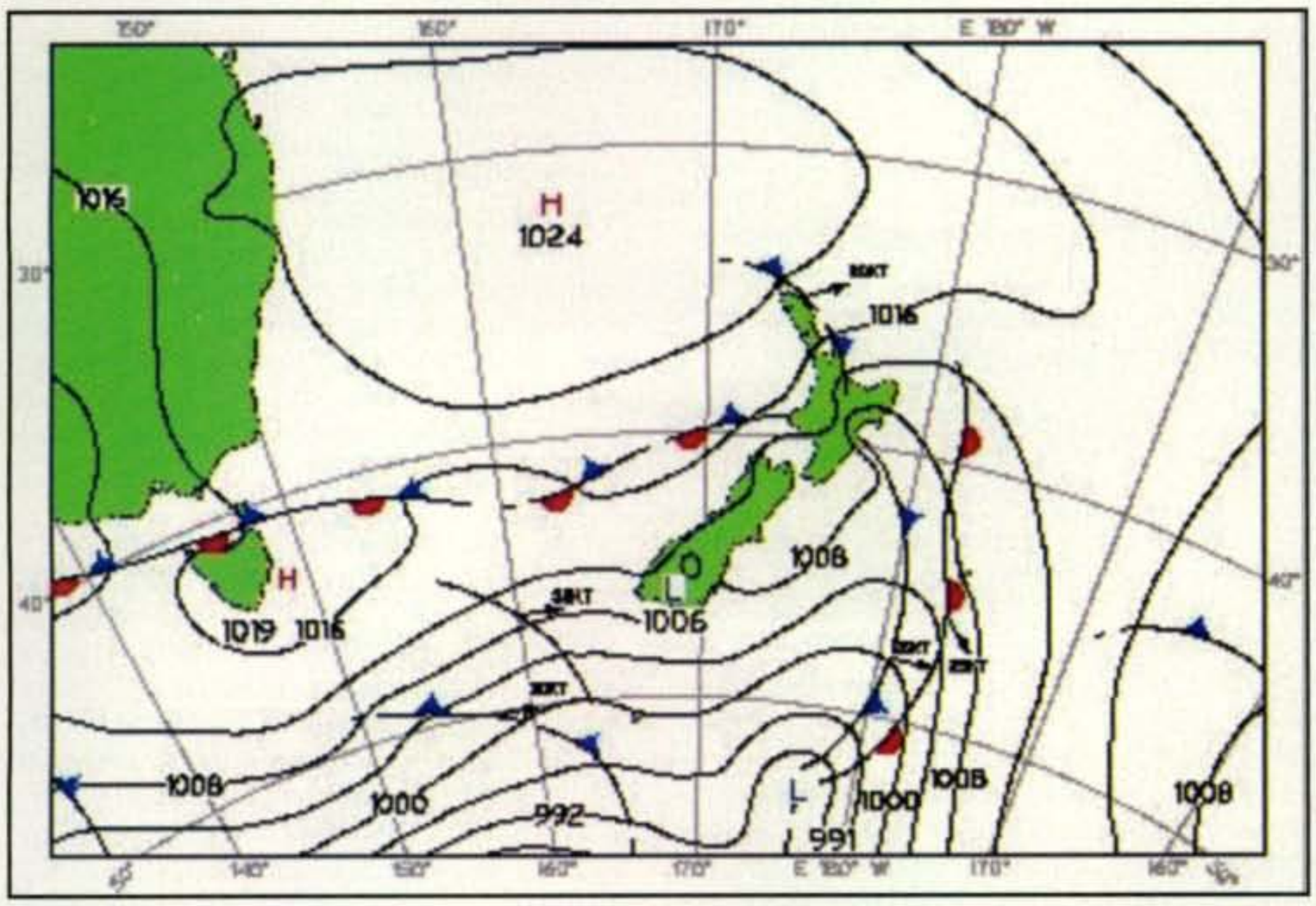


Fig. 3– Weather map showing a large anticyclone that was associated with 6- and 2-meter propagation between ZL1 and VK2, 3, and 4 on 31 December 2005 and 1 January 2006.

to sea, and when it hit in the center of the North Island, the National Institute of Water and Atmospheric Research (NIWA) recorded some 5000 lightning strikes in a very short time! Now without this information we could not account for the propagation, as the storm that arose from a very weak depression overnight became large! This is not always easy to find. Kerry Mundell, ZL2TPY, had a similar storm on 6 meters when he alone had a big opening on 6 meters to VK2, again the same type of storm plus lightning.

Fig. 3 was taken on 31 December 2005. Here we have a large anticyclone that brought both 6- and 2-meter propagation, mainly to ZL1 on 31 December 2005 and to VK2, 3, and 4 on 1 January 2006. It also produced a very good 2-meter opening. Like with the December opening, I could sit here and listen to Nick working stations on 2 meters as if he was on HF even though he was 180 km north of me, while our beams were 90 degrees off from each other. On 2 meters Ross Barlin, VK2DVZ, was from S6 to S9 for some three hours on 1 January.

It is important to note that when making use of anticyclones for propagation, it must be remembered that the best area of propagation is at the equator side of the anticyclone.

During the first week in January, I noticed a very long anticyclone coming over southern Australia from the Indian Ocean. At this time it was over 7000 km long, all with an air pressure usable for propagation. By the 4th or 5th of January it produced 2-meter propagation from VK2 to VK6, some 3000 km distance. On 7 January it came onto ZL and it was still very long. By early afternoon propagation took place from ZL1, 2, and 3 to VK6, some 5000 km distance. At the time of the opening, I could hear every station along the path—VK5s working VK6 with the VK5s' antennas back to me! The VK3s and 4s were also there at the same strength as the others. This was anticyclone sheet ducting 5000 km long at the height of 2 km! There were no gaps in the propagation path; every one could be heard at the same time!

As mentioned, Bob's propagation prediction article can be found in the Winter 2006 issue of *CQ VHF* magazine. Along with his article are two others related to VHF and above propagation, one by Rex Moncur, VK7MO, on calculating tropospheric-scatter propagation losses, and one by Gordon West, WB6NOA, on beacon monitoring with DSP (digital signal processing).

What a Way to End 2005: Working 2 New Grids on 24 GHz

The following is from **Mike King, KMØT**, dated December 31, 2005:

It's been a good year here at KMØT. First I need to say thanks to all the guys who have helped me out! Without the help, all this would not have happened.

I worked two more grids on 24 GHz today, to give a total of 15. Now it's time to send for the endorsement! First, Jon Platt, WØZQ, was good enough to go out and brave the 30° temperatures. I know that's not too cold, but still, after the recent storm up in Minnesota with snow all over the place, that was a big favor.

I noticed some precipitation showing on radar around noon today and watched it for a bit as it was moving in a slightly southeast path, moving into a potential center scattering point for EN25 and EN35. I got hold of Jon and we both watched it for a bit before he headed out.

Jon got to EN25 and fired up the 10-GHz liaison rig. Good signals were received both ways. I found Jon with very little effort, albeit weaker, but what I would call a 56 to 57 here. We did not mess around, and he headed out for EN35, hoping the precipitation would hold. No problem there either, but weaker signals. The storm was in the process of breaking up. Details on path distances and pictures of storms via the rain scatter program, as well as an SDR screen shot, is on the main page of my website: <http://www.km0t.com>.

The distance was about the same as what we did earlier in December. Thanks again to Andy Flowers, KØSM, for such a great software tool! "Rainscatter" rocks!

It appears that when dewpoints are in the 30s, this distance would be very repeatable—that is, if there is some precipitation near the scatter point. I'm pretty sure it was snow scatter, as the signal was slightly distorted, but not as bad as last time on December 11, 2005, when we worked EN34. (I believe that the storm was a slow mover. No Doppler was experienced.) However, on that day *Jon went* to the same spot he went to today, and no signals were heard on 24 GHz, as the storm had broken up by the time he got there back then. Furthermore, the dew points and temps were about the same back then (10 GHz was way down as well at that spot when the storm broke up).

We are pretty pumped up for going for more distance now, as the 20-grid mark will be a long time in coming I'm afraid. It's pretty hard to coordinate trips to the outlying grids with storms, sleet, and snow in the right spot, but we shall see. However, it sure doesn't mean I won't try.

The SDR-1000 bandscope was instrumental once again in quickly finding the signals, as Jon had done some modifications to the 24-GHz dish he was using, and the frequency I expected to find him on was not working out. Some quick tuning and I saw him 25 kHz or so up from where I expected, but the SDR made it easy! "Oh, I see you!" is getting to be a pretty standard statement when using the SDR-1000!

The following is the other side of the contacts, from **Jon Platt, WØZQ**:

Mike gave me a call this afternoon when he noted some radar precipitation between us in a favorable location. Throwing the 10- and 24-GHz dishes in the car, I drove out to the Winstead grid corner, arriving at around 3:00 PM or so. I first set up in EN25wb at the radio tower just south of Howard Lake, MN. Mike and I aligned on 10 GHz pretty quickly with S7 to S8 signals. After looking down the bore sight on the 10-GHz dish, I lined up the 24-GHz dish on the same heading and started to beacon. Mike found me pretty quickly. We peaked up on both ends, and exchanged calls and grids on CW. Signals were actually pretty good, S2 or S3, rough in tone, scatter-like, and on the direct heading to Mike. I had a little upward elevation,

perhaps a few degrees, but this may be within the tolerance of the bubble and dish/feed, etc. I was either on the horizon, or just up a degree or two. The distance between grid locators EN13vc and EN25wb is 170.4 miles, or 274.2 km. This was grid number 14 for Mr. King.

We didn't play too long, as I wanted to take advantage of whatever the propagation path was, so I threw the dishes in the car to head over to EN35. I found a spot to set up in EN35ab and proceeded to find Mike on 10 GHz with no problem; 10 GHz is such a great band!

We got lined up on 24 gig and found each other, albeit with weaker signals, no better than S1 signals on my end. After exchanging calls and grids on CW, Mike had grid number 15 in the bank at a distance of 175.5 miles, or 282.5 km.

The weather on my end was 28 degrees, gray with a heavy overcast, and light to no wind—nice conditions for the end of December. Mike collected and saved the radar plots that showed precipitation between us, but according to Mike none of the ground stations were reporting any virga (rain that doesn't make it to Earth). It was not snowing on my end or on Mike's end. I'm not sure that we made this path because of snow scatter or because of reduced water-vapor pressure (28 degrees versus summertime conditions). I'm leaning towards snow scatter, but I think we still have a lot to learn about this.

I do know that our previous attempts at 24-gig rain scatter during the summer over similar paths have not been successful; big signals on 10 GHz, but no signals on 24 GHz. More experimenting is needed, but it *seems* that snow is a better scattering material on 24 GHz than is rain—maybe coupled with lower water-vapor pressure when it's cold—maybe. In any case, two new grids for Mike, 15 grids worked on 24 GHz, and an afternoon of fun for me.

DXCC and WAS from Space

The following is from AMSAT News Service (ANS):

Kenneth Ransom, N5VHO, who is the ISS Ham Radio Project Engineer at the Johnson Space Center in Houston, provided these several updates to the recent ham band activity from the ISS:

Radio amateurs around the world have been enjoying how active Astronaut Bill McArthur has been during these recent weeks. The ISS has been in favorable pass times for the continental US right after the end of the crew work day. Bill has already been heard on a few of the passes around 1930–2200 UTC. He is often active on Saturday and Sunday at various times from 0800–2200 UTC.

Bill has worked 49 states from orbit. The sole state remaining is Alaska, which will be in more favorable orbits starting around January 20. Current orbits for them are during the normal crew sleep time.

Bill has also worked operators on all continents including Antarctica using VHF. As of January 9 Bill had 63 DXCC entities with the following breakdown by continent:

- 5 Total worked in S. America
- 4 Total worked in Oceania
- 9 Total worked in N. America
- 29 Total worked in Europe
- 11 Total worked in Asia
- 1 Total worked in Antarctica
- 4 Total worked in Africa

Henk, PA3GUO, has a web page with photographs and an audio recording of both ends of his contact with ISS; see: <http://www.qsl.net/pa3guo>.

Mak, SV1BSX, reports hearing Bill work the following prefixes: DL, EA, F, HA, I, ISØ, G, OE, OK, ON, PA, SM, SP, SV, TA, UA, YU, HZ, and 9K. Mak says that these Greek stations have had the opportunity to have a contact with Bill: SV1BSX, SV1LK, SV8CS.

Bill's contact log now exceeds 700, but that includes several repeat stations. Please give others a chance if you are in a highly populated footprint. As a reminder, these simple operating practices will increase everyone's chances:

1. Wait for ISS crew to call CQ or QRZ.
2. Send only your callsign phonetically and wait for crew to acknowledge your specific callsign.
3. Listen closely for the call of the station ISS is talking with.
4. If you do not hear your specific callsign, do not transmit again until you hear the ISS crew member say CQ or QRZ.
5. Please be courteous.

Current Contests

European Worldwide EME Contest: Sponsored by DUBUS and REF, the EU WW EME contest is intended to en-

courage worldwide activity on moonbounce. Multipliers are DXCC countries plus all W/VK/VE states. The contest dates and bands are as follows:

Second weekend—432 MHz and 5.7 GHz and up, CW/SSB, 11–12 March, 0000 to 2400 UTC.

Third weekend—144 MHz and 2.3 and 3.4 GHz, CW/SSB, 8–9 April, 0000 to 2400 UTC.

Fourth weekend—1296 MHz CW/SSB, 6–7 May, 0000 to 2400 UTC.

Complete rules for the contest can be found at: <http://www.marsport.demon.co.uk/EMEcont2006.pdf>.

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 have announced a call for papers for their forthcoming conferences:

Southeastern VHF Society Conference: This event will be hosted in Greenville, South Carolina, April 28–29, 2006. The deadline for the submission of papers and presentations is March 3, 2006. All submissions should be in Microsoft Word (.doc) or alternatively Adobe Acrobat (.pdf) files. Pages are 8 1/2 by 11 inches with a 1-inch margin on the bottom and 3/4-inch margin on the other three sides. All text, drawings, photos, etc., must be black and white only (no color). Please indicate when you submit your paper or presentation if you plan to attend the conference and present there or if you are submitting just for publication. Papers and presentations will be published in bound proceedings by the ARRL. Send all questions, comments, and submissions to technical program chair Jim Worsham, W4KXY, at <w4kxy@bellsouth.net>.

Central States VHF Society Conference: The Central States VHF Society is soliciting papers, presentations, and poster/tabletop displays for the 40th annual CSVHFS Conference to be held in Bloomington, Minnesota (across from the Mall of America) on 27–29 July, 2006. Papers, presentations, and posters on all aspects of weak-signal VHF and above amateur radio are requested.

Deadline for Submissions: For the *Proceedings,* 1 May 2006; for presentations at the conference and for notifying them you will have a poster to be displayed at the conference, 3 July 2006. (Bring your poster with you on the 27th of July.)

Further information is available at the CSVHFS website: <http://www.csvhfs.org>. Also available are the following: "The 2006 Conference," "Guidance for Proceedings Authors," "Guidance for Presenters," and "Guidance for Tabletop/Poster Displays." Contacts: Technical Program Chairman, Jon Platt, WØZQ, e-mail: <W0ZQ @aol.com>; Proceedings Chairman, Donn Baker, WA2VOI/Ø, e-mail: <Proceedings.WA2VOI@OurTownUSA.net>.

EME Conference 2006: The EME Conference 2006 will be held in Wuerzburg, Germany, August 25–27. Interested authors are invited to present a paper(s) for the conference. Electronic submissions in Word97, Word2000, Acrobat5 (pdf), or text format will be accepted by e-mail or CD. Please ask if you are using another format.

If you are interested in writing and/or presenting a paper for the conference, send an e-mail to Rainer Allraun, DF6NA, at: <df6na@df6na.de>. Please contact him as soon as possible with an abstract or even a general idea. This will help the conference team with its planning activities. For more information about the EME Conference 2006 see: <http://www.eme2006.com>.

Meteor Showers

The γ-*Normids* shower is expected to

peak on March 13 and again on March 17. For more information on the above meteor shower prediction, see Tomas Hood, NW7US's propagation column elsewhere in this issue. Also visit the International Meteor Organization's website: <http://www.imo.net>.

And Finally . . .

This past January Jim Haynie, W5JBP, retired as president of the ARRL, seeking to not run for a fourth two-year term. He was replaced by Joel Harrison, W5ZN, who is very well known in VHF circles.

Jim led the League through some tough times during his tenure. He was on watch during 9/11 and this past year during the devastating hurricanes, one of which caused considerable damage to his home state of Texas.

Jim was also on duty during the Michael Powell era at the FCC, the era that is known for bringing BPL into our laps. Jim's continuing strong leadership has kept the fight for protection of our frequency allocations in the forefront of amateur radio, as well as on the minds of important political leaders in Washington, DC.

Not too long ago I was at an ARRL forum where Jim gave a pep talk to the faithful. One point from his talk that sticks in my mind is his statement that we should no longer refer to amateur radio as a hobby. He stressed, "It's a service, and it needs to be referred to as a service!"

In spite of his lecture, I still occasionally use the "h" word in describing amateur radio. However, thanks to Jim my consciousness has been raised. I think, though, that the word "service" is too limiting. Granted, we provide various kinds of service, most notably emergency communications services, as was reported on so much last year. However, we are more than a service. We are a community—a worldwide community.

Again, it was Jim who reminded us hams in another ARRL forum of that fact. He told us at this particular forum that there is no other hobby (his word at that time) that affords us instant friendship wherever we go. He described how he could go to a home sporting a tri-band beam on a tower in the back yard, and not ever having met the occupant, he could instantly strike up a friendship with the ham living there.

Such has been the case for me in my travels. I made new friends with ham radio operators in various countries where I have traveled, and I cannot think of a time when I have been given the cold shoulder by a fellow ham radio operator.

Granted, we in our community don't agree on everything. Currently there is an ongoing battle between the pro and anti digital EME communications hams that every few weeks manifests itself on the moon-net reflector. Even so, we still remain a community.

In closing this column, I want to say thank you to Jim for his willingness to serve our community. His hundreds and hundreds of hours away from his family and his business were major sacrifices for us. Furthermore, his leadership at critical turning points in amateur radio was most important in bringing to the forefront our nation's need for our service as amateur radio operators. In summary, it was via Jim's leadership these past six years that we as a community are a bit better off.

Until next month . . .

73, Joe, N6CL

dx

BY CARL SMITH,* N4AA

Pile-ups and Thoughts from Uncle DX

How's your DXing these days? Pretty slow, huh? You're sure not alone, unless you have low-band capabilities. Early January turned out to be a real bonus time for 160 and 80 meters. Well over half of the cluster spots I observed were for those bands, and a lot of those were at some pretty strange times of the day, too. I remember one which came from the U.S. West Coast on a European station worked on 40 meters at "high noon" local time. I remember seeing a lot of 160 spots for mid-afternoon hours local time, which is not the time one would expect to see DX activity on 160. We can hope these conditions hold long enough for the CEØ, Juan Fernandez and the Peter I DXpeditions later on in January and early February. I can only imagine what the pile-ups will be like if that happens!

Pile-up on the Low Bands

In early January I received a note relative to low-band operation, from the operator at 9N7JO, Pop, YU7EF. He complained about stations calling him at inappropriate times (while he was in QSO with another station). He also complained that the stations calling him were not "spreading out," but were instead congregating on the frequency of the last station he worked. I personally observed some of this one night when he was on 40 meters. I can only imagine what it must have been like for him as he tried to pick a callsign out of the mess I was hearing on this side.

Put yourself in his shoes and think about what you are doing. If you can't hear him well enough to know whom he is coming back to, what are you doing calling him? If he comes back to W9ABC, why would you (W5XYZ) go back and give him a signal report? And why would you be giving him a 599 report under such conditions anyway? *Listen, listen, listen!* I know the owners of some of the calls I've heard in these pile-ups, and these hams should certainly know better than to operate this way.

This is not the image you want to display to others, especially the newcomers in our midst. It's early in the new year, and perhaps we all should step back and listen to ourselves and reflect on the

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e-mail: <n4aa@cq-amateur-radio.com>

At the HF Convention London-Gatwick, we find (left to right): Henry, GJ3LFJ; Jim Smith, VK9NS; Roger, G3LQP, and John, GW3JXN. (Photo courtesy of Roger, G3LQP)

This scene recently was observed in a friend's shack. You old timers will remember the RCA dog listening to the speaker. Here he appears to be trying to copy CW! (Photo by David, K4PZT; courtesy of Lynn, W4NL)

BG5SBP enjoys DXing around the Chinese calling frequency of 14.270 MHz from this setup in Xiamen. (Photo courtesy of Fred, K3ZO)

5 Band WAZ

As of January 1, 2006, 685 stations have attained the 200 zone level and 1476 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 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
SP5DVP, 199 (31 on 40)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
WAØQII, 199 (26)
N4PQX, 199 (26)
JA5IU, 199 (2)
N6HR/7, 199 (37)
CT3DL, 199 (26)
NØIJ, 199 (21)
RU3DX, 199 (6)
N4XR, 199 (22)
WØPGI, 199 (26)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
RX9TX, 198 (2, 6)
F5NBU, 198 (19, 31)
WA5VGI, 198 (34, 37)
K7BG, 198 (17,22)

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

None

****Please note: Cost of the 5 Band WAZ Plaque is $100 ($120 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WPX Program

CW

3164 .....SV1EOS 3165.....NEØP

CW: 500 SV1EOS. 2050 W9IL. 2400 S51NR. 2650 I7PXV. 5100 WA2HZR.
SSB: 400 KU4BP. 850 AA3TN. 2150 W9IL. 4350 I2PJA.
Mixed: 800 WB5JID. 900 KB8MCZ. 1350 W2FKF. 2000 WZ4P. 2150 UA1SKW. 2200 JA6GWU. 2850 OZ1ACB. 2900 W9IL. 4350 I2PJA.

North America: G3TSZ, YV5IAL
Europe: YV5IAL

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B.

160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

**Please Note: the price of the 160 meter bar for the Award of Excellence is $6.50.*

way we do things. It's not too late for a New Year's resolution to operate in a more positive and respectful manner in the future. How about it, folks?

Uncle DX on DXpeditions

My old buddy Uncle DX recently wrote about DXpeditions and DXpeditioners. Here is what he had to say:

DXpeditions and DXpeditioners do for DXers what a good sermon does for our spiritual journey. DXpeditions and DXpeditioners do for DXers what a doctor and medication do for the sick. DXpeditions and DXpeditioners create excitement in the lives of DXers and make all of us feel a little bit better.

So let's assume for a moment that the guys and gals who are executing the rare one for us are doctors and preachers. We could carry this thinking in life to sports figures, entertainers, the fish in the lake, etc., but I like the doctor and preacher analogy best.

First of all, those going to these far away places learn skills to allow them to give DXers what they need—a shot of DX. They work at becoming very, very good in areas such as:

1. Logistics, which is at the doctorate level, I'm sure.

2. Understanding the environment and actions required. Ask the Heard Island team about this one.

3. Being the best of the best in operating the radios. I have a list, but that little voice tells me not to go there!

4. Making rules and sticking to them—this at the doctorate-plus level.

5. Transportation—to the tune of Aristotle Onassis level.

CQ DX Awards Program

SSB

2480.....N7TY 2481.....W7BJN

SSB Endorsements

320 .....ZL1HY/335
320 .....K9OW/335
320 .....W7BJN/333
275 .....K7SAM/292
28 MHz.....W7BJN

CW Endorsements

320 .....W8XD/334 320 .....K9OW/331

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

The WAZ Program

20 Meter SSB

1141 .....W5GT 1142.....W8SAX

80 Meter CW

69 .....NW4N

20 Meter RTTY

57 .....JA1EUL

160 Meters

217.....RA9AB

All Band WAZ SSB

4983.....W7QDM

Mixed

8392.....IK2PZQ 8394 .....EA6AZ
8393.....GM4DLU

All CW

475 .....JA2FEA

RTTY

163 .....EA3AGZ

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>.

CQ DX Honor Roll

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

CW

K2TQC 334	W2FXA 334	I4LCK 334	KA7T 332	K3JGJ 331	N5HB 329	K1FK 324	OZ5UR 319	WA4DOU 289
K2FL 334	N4JF 334	PY2YP 334	K8LJG 332	WA8DXA 331	K1HDO 329	YV5ANT 324	G3KMQ 317	G3DPX 284
K9BWQ 334	K4MQG 334	W8XD 334	YU1AB 332	K7LAY 331	K7JS 329	N5ZM 323	YT1AT 317	EA3BHK 282
K9MM 334	EA2IA 334	WB5MTV 333	K5RT 332	K4JLD 331	K5UO 329	KE3A 323	K8JJC 315	YC2OK 282
W7OM 334	PA5PQ 334	W7CNL 333	YU1AB 332	K9OW 331	W6OUL 329	N7WO 323	W6YQ 314	DJ1YH 281
K2JLA 334	K3UA 334	YU1HA 333	NØFW 332	W2UE 330	W4QB 327	KE5PO 322	UA9SG 310	XE1MD 280
N7FU 334	DL3DXX 334	IT9QDS 333	N4AH 332	VE7CNE 330	SM5HV/HK7 327	IKØTUG 321	EA3ALV 306	WD9DZV 277
K2OWE 334	K2ENT 334	K4CEB 333	HB9DDZ 332	4N7ZZ 330	W7IIT 327	VE7DX 320	YU7FW 306	W2JLK 277
N4MM 334	OK1MP 334	K4IQJ 333	WB4UBD 332	W6DN 330	KA3S 327	IKØADY 320	LU3DSI 302	I3ZSX 276
F3TH 334	NC9T 334	WØHZ 333	K9IW 332	YU1TR 330	IT9TQH 326	WG5G/QRPp 320	N1KC 302	
F3AT 334	W2VJN 334	N5FG 333	K6LEB 331	W4UW 330	I2EOW 326	W3II 320	RA1AOB 300	
DJ2PJ 334	G4BWP 334	K4CN 333	VE3XN 331	N6AW 330	K6CU 326	F5OIU 320	VE7KDU 300	
WA4IUM 334	N7RO 334	W4MPY 333	W1WAI 331	G3KMQ 329	W4LI 325	PY4WS 320	KT2C 300	
W4OEL 334	W1JR 334	N4CH 333	K2JF 331	KZ4V 329	N4OT 325	F6HMJ 319	K4IE 291	

SSB

K6YRA 335	K5TVC 335	PY2YP 335	VE2PJ 334	W2FKF 332	VE7DX 329	PY2DBU 325	N8SHZ 316	K6GFJ 299
K2TQC 335	N5FG 335	ZL1HY 335	W3AZD 334	CT1EEN 332	W2FGY 329	IKØIOL 325	XE2NLD 315	WA1ECF 295
W6EUF 335	DJ9ZB 335	WDØBNC 334	YZ7AA 334	K9IW 332	CT1CFH 329	YT1AT 325	WZ3E 314	KW1DX 295
K2JLA 335	PY4OY 335	K2FL 334	CT3BM 334	DL9OH 331	EA1JG 329	K7HG 324	IZ6CST 314	W4EJG 295
K4MQG 335	VE3XN 335	WØYDB 334	N6AW 334	YV1JV 331	W9IL 329	ZL1HY 324	W7GAX 312	K7ZM 292
IK1GPG 335	4Z4DX 335	W4UW 334	WS9V 334	WA4WTG 331	KE4VU 328	K4JDJ 323	YV5NWG 311	K1RB 292
K5OVC 335	N7RO 335	K9BWQ 334	4N7ZZ 333	W8KS 331	KF8UN 328	W6WI 323	WA5MLT 310	K7SAM 292
NØFW 335	IØZV 335	W4NKI 334	KE5PO 333	YV5IVB 331	WØULU 328	EA3CYM 323	XE2NLD 310	KØOZ 291
K9MM 335	EA2IA 335	WB4UBD 334	VE1YX 333	KX5V 331	K1EY 328	KE4SCY 323	VE7SMP 310	W9ACE 291
W6BCQ 335	IN3DEI 335	W4UNP 334	W2JZK 333	K3JGJ 331	KZ4V 328	K6CF 322	RW9SG 310	I3ZSX 290
XE1AE 335	EA4DO 335	W8AXI 334	K8LJG 333	N5ORT 331	XE1D 328	LU7HJM 322	WØROB 307	XE1MW 287
W7OM 335	PA5PQ 335	VE2GHZ 334	VE4ACY 333	PT2TF 331	K3LC 328	WA4ZZ 322	KK4TR 306	N2LM 286
KZ2P 335	K9OW 335	OE2EGL 334	KØKG 333	CT1AHU 331	K4DXA 328	WN9NBT 322	XE1MDX 305	KU4BP 286
IK8CNT 335	W6DPD 335	WA4IUM 334	VE2WY 333	EA3JL 331	LU5DV 328	WW1N 322	WB2AQC 305	W5PVE 286
VK4LC 335	XE1VIC 335	K5RT 334	WB3DNA 333	K1HDO 331	I1EEW 327	W6OUL 322	XE1RBV 304	KKØDX 285
OE7SEL 335	K2ENT 335	W2FXA 334	K9PP 333	K5UO 331	SV1ADG 327	KD5ZD 322	K3BYV 303	VE7HAM 285
VE3MR 335	OK1MP 335	W6SHY 334	W2CC 333	W6DN 330	XE1MD 327	XE1CI 321	YC2OK 303	N8LIQ 284
VE3MRS 335	IK6GPZ 335	W5RUK 334	DL3DXX 333	YV1CLM 330	IØSGF 327	CT1ESO 321	JR4NUN 303	WØIKD 283
K4MZU 335	K1UO 335	K4CN 334	EA3BMT 333	AB4IQ 330	IT9TGO 327	KØFP 320	VE7KDU 302	KBØRNC 282
OZ5EV 335	I8KCI 335	EA3KB 334	EA3EQT 333	AE5DX 330	IT9TQH 327	EA7TV 320	W5GZI 302	IK8TMI 281
N7BK 335	I8LEL 335	K3UA 334	YV1KZ 333	KB2MY 330	DK5WQ 327	SV1RK 320	W4PGC 302	KA5OER 280
K7LAY 335	DU9RG 335	K4JLD 334	KE3A 333	K3PT 330	KE5K 327	N1KC 320	EA8AYV 302	F5INJ 279
ZL3NS 335	DU1KT 335	N5ZM 334	W7BJN 333	ZL1BOQ 330	CP2DL 327	W5GZI 320	YV2FEQ 301	WD9DZV 278
N4MM 335	N4JF 335	PY2YP 334	YV1AJ 332	N7WR 330	NI5D 327	SV3AQR 320	AC6WO 301	W5GT 276
OZ3SK 335	CT1EEB 335	AA4S 334	KSØZ 332	WS9V 329	K7TCL 326	KD2GC 320	4X6DK 301	4Z5FL/M 275
K7JS 335	W4WX 335	CT3DL 334	LU4DXU 332	K2JF 329	W9HRQ 326	W5OXA 317	SV2CWY 300	K9DXR 275
XE1L 335	W1JR 335	NC9T 334	VE4ROY 332	ZL1AGO 329	HB9DDZ 326	YV4VN 317	4X6DK 300	
YU1AB 335	N4CH 335	W9SS 334	W7FP 332	W9OKL 329	WR5Y 325	LU3HBO 317	N5WYR 300	
OE3WWB 335	I4LCK 335	VE7WJ 334	K9HQM 332	I2EOW 329	KC4MJ 325	K6RO 316	K4IE 300	

RTTY

K2ENT 333	K3UA 328	N5FG 325	EA5FKI 320	W2JGR 316	KE5PO 297	W4EEU 297	I2EOW 291	YC2OK 280
WB4UBD 332	NI4H 325	G4BWP 325	OK1MP 321	PA5PQ 311				

6. Fund raising (the more sophisticated will call this "development"!).

7. Propagation (knowing the gray line for the East Coast!).

8. Computers/logging programs. Some have recruited Bill Gates!

9. Speaking at conventions. Some were at the new SEDCO Convention recently.

10. Writing about their adventures—Pulitzer Prize level—and being photo experts as well.

11. Dancing to the point of being the kings/queens of soft shoe. This is required to convince the rest of their families that they are in fact doctors and preachers on a mission.

12. Setting up equipment/antennas. Antennas may need to go up quickly and sometimes crudely, but often it is *very* difficult.

13. Survival to the level the Delta Force or the Seals would respect.

14. "And other things," as a good government worker would say.

Isn't it nice to look forward to a DXpedition even if we don't need the entity for an all-time new one, but perhaps for a band or mode? Some of us find ourselves tweaking some antenna for a little edge and altering our work schedule or obligations to make sure we are there from the first moment. Remember BS7?

Hats off to all who aspire to become and do in fact give us what we as DXers need—some excitement and pleasure with a little effort on our part and tons on theirs. We all thank you . . . all of you . . . very much.

73/DX, Uncle DX

The storm surge from Hurricane Katrina as it hit DeLise, Mississippi, north of Bay St. Louis. An absolutely sobering sight to say the least. (Photo courtesy of Floyd, N5FG)

I like Uncle DX. He comes up with some pretty interesting and thought-provoking items.

So Close, Yet So Far

I received a humorous note from one of my readers, and I'd like to share that with you this month. I won't give the call-sign of the writer, just to protect him from any unnecessary commentary.

Just got back from Rome (I-land). Stayed less than 2 miles from the Vatican (HV-land), which I have not worked or confirmed. Saw the log periodic for the HV station. (They have no permanent ops there anymore, just visiting ops.) Went to SMO Malta (1A-land), but was not allowed in. I have not worked 1A-land either. 1A-land is about 300 acres in size and they do not allow visitors. We were allowed to look through the keyhole of the large wooden (locked) gates going into 1A-land. When I looked through the keyhole, I saw a garden path with large hedges on either side, like a gun barrel. Way down at the end framed like a picture was the dome of St. Peter's, another one I don't have. What a bite! Talk about the fickle finger of fate! God has a strange sense of humor.

The Complete DXer

With all of the above having been said, I would like to remind DXers that there is a pretty doggone good book available that goes into how to be a good DXer. It was written by Bob Locher, W9KNI, and the newest edition of his *The Complete DXer* is a very good read. It is an excellent tool for DXers at any level of accomplishment.

The book is available from Idiom Press. Check the website <http://www.idiompress.com>. It's worth every penny, but only if you read it and put into practice what you have read!

In Closing

By the time you read this, the Juan Fernandez and Peter I DXpeditions should be history. I can only guess what will happen, but I hope and pray for reasonable propagation to allow as many as possible to make the contacts they want. We'll be hearing about the Peter I operation from Bob Allphin, K4UEE, at the Charlotte (North Carolina) Hamfest in March, and I'm looking forward to that presentation.

We still have a few contests to go this season, and I hope you are getting your share of time to operate in as many as possible. Contests provide a great opportunity to add to your totals. I recommend spending as much time as possible on the air during any contest.

Until next month, enjoy the chase and Have Fun! 73, Carl, N4AA

QSL Information

7XØRY via OK1DYW
7X2DF via 7X2ARA
7X5RS via 7X5RS
8P1A via NN1N
8P5A via NN1N
8P9JK via W3ADX
8P9R via W3ADX
8Q7EA via EA4URE
8R1EA via AH8DX
9A1P via 9A1UN
9A2F via 9A2F
9G5A via DL4WK
9G5GJ via N6ZZ
9G5TF via DJ6TF
9H2NCC via 9H4DX
9H3MR via IK1PMR
9H3ZZ via VE3ZZ
9H4DX via 9H4DX
9K/PA5CW via PA5CW
9K2/PA5CW via PA5CW
9K2HN via 9K2HN
9M2/E21EIC via E21EIC
9M2/PAØRRS via PAØRRS
9M2CNC via 9M2CNC
9M6DXX via 9M6DXX
9M6NA via JE1JKL
9Q1TB via F5LTB
9Y4AA via VE3HO
A4/GØRTN via GØRTN
A52CDX via F9DK
A6/OD5TX via W4JS
A61/SP9MRO via SP9MRO
A61Q via EA7FTR
A92GR via 4Z4DX
AH2K via JE8KKX
AO7URE via EA4URE
ATØD via EA7FTR
ATØJCB via VU2DSI
AT3DJQ via AT3DJQ
BG1LQH via BG1LQH
BVØJ via BWØIR
C31VQ via C31VQ
C6A/N7MQ via N7MQ
C6AQQ via ND3F
C6AUR via UR5DEM
C6AWS via W6SJ
CE6TC via CE6TC
CN2DH via ON6ID
CN2PD via EA7FTR
CN2R via W7EJ
CO2AI via EA7FTR
CO6LPB via EA7FTR
CO8LY via EA7ADH
CP6XE via IK6SNR
CS5BWW via CT1BWW
CS7HGL via CT2HGL
CT/PA5TT via PA5TT
CT3/CT1BOH via CT1BOH
CT3/CT1DEZ via CT1DEZ
CT3/DJ8OG via DJ8OG
CT3/DK5LM via DK5LM
CT3/DL1YFF via DL1YFF
CT3/N6MJ via N6MJ
CT3/OH6RX via OH6RX
CT3EN via CT3EN
CT3MD via CT3MD
CT3YA via CQ9K
CT6A via CT1ILT
CT7F via CT1FFU
CT9A via OH6RX
CU/OH3SR via OH3SR
CU2/OH1VR via OH1VR
CU2/OH1VR/P via OH1VR
CU2/OH2PM via OH2PM
CU2A via OH2BH
CU2B via OH2BH
CU2JT via CU2JT
CU2T via CU2AF
CU3EE via CU3EE
CU3FT via CU3FT
CU7/G3TXF via G3TXF
D44TD via CT1EKF
DD4B via DL3PS
DF1PAW via DF1PAW
DR6ØHES via DL2ZAE
DU1/IV3IYH via IK2ILH
DU1/NZ7X via NZ7X
DXØST via JM1PXG
DXØTIC via JM1PXG
E2ØPFE via E2ØPFE
E2ØWXA via E2ØWXA
E21IZC via EA5KB
EA4TD via EA4TD
EA6/EA3KU via EA3KU
EA6IB via EA6IB
EA8/EA2CLU via EA2CLU
EA8/HB9AMA via HB9AMA
EA8/SM5AXG via SM5AXG
EA8EW via EA8EW
EA8PP via EA8AHB
EA8URL via bureau
EA9CP/HC8 via EA9CP
EA9LZ via EA7JB
ED5MSV via EA5URR
ED5TIF via EA5FHK
ED5TII via EA5FHK
ED8CSC via EC8AUA
EF7CIH via EA7FTR
EGØNR via EA4RCU
EI/AB2E via AB2E
EKØB via SP9ERV
EO3Q via UR3QCW
ER4/SP4FKS via SP4FKS
ER4/SP4R via SP4R
ER4DX via ER4DX
EX/ES1FB via ES1FB
EY7AB via EY7AB
EY8MM via K1BV
F/KA2JIZ via KA2JIZ
F/XE1YGN via XE1YGN
F5REF via F2WS
FG/K9NW via K9NW
FH/F6AUS via F6AUS
FK8HN via FK8HN
FM5AA via FM5AA
FM5FJ via KU9C
FO5RH via FO5RH
FR/F5SGI via F5SGI
FR1HZ via FR1HZ
FR5EC via FR5EC
FR5HA via FR5HA
FS/AA4V via AA4V
FS/F5AHO via F5AHO
FS/K7ZUM via K7ZUM
FS/W2GJ via W2GJ
FY/F1HAR via F1HAR
FY/F5HRY via F5HRY
FY/I4UFH via I4UFH
FY5KE via FY5KE
FY5PO via FY5PO
GBØLTM via G4LAD
GB2ØØHNT via GWØANA
GB2NNC via MØCNP
GB4RN via G3LIK
GB9ØSTD via G3STD
GD6IA via K1EU
GD6IA via GD6IA
GJ2A via K2WR

(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>.)

awards

BY TED MELINOSKY,* K1BV

Awards with an Emphasis on QRP

QRP operation (5 watts or less) is very popular, and there are many clubs and organizations that are devoted to this segment of amateur radio. The most popular of these is the QRP Amateur Radio Club International (QRP ARCI[sm]), which was formed in 1961 and currently has a membership of over 12,300. One of the reasons I think the club is so popular is that it sponsors no fewer than 11 contests spaced throughout the year, ranging from general QSO parties among QRPers to contests in which homebrew, PSK-31, and 160-meter operation are featured on a QRP level.

Schedules for the contests appear on the QRP ARCI website (http://www.qrparci.org/) and are published in magazines and on other sites the internet as well. Non-members are welcomed into the contests, too. It always gives me a thrill to turn down the output on my rig to 4–5 watts and realize how easy and exciting it is to work so many other QRP stations, some using as little power as 1 watt or less—all this in the middle of the ham bands vibrating from the kilowatts of power used by others.

The QRP ARCI's Worked All States QRP award is issued for confirmed contacts with stations in at least 20 of the 50 U.S. states while running QRP.

QRP ARCI Award Series

The QRP ARCI awards series parallels some of the popular awards of the IARU, ARRL, and CQ. The only requirement is that you must certify that the power used was no more than 5 watts (10 watts PEP on SSB).

General Requirements. QRP is defined by the club as 5 watts output CW and 10 watts PEP output SSB. The following awards are available to any amateur operator. Application forms are on the club's website at <http://www.qrparci.org/arciawds.html>. The fee for all awards or endorsements for W/K amateurs is $US4, or for non-W/K $US5 or 10 IRCs. Make checks or money orders (preferred) payable to Thom Durfee. Cash is accepted, but sent at your own risk. e-QSLs are now accepted. QRP ARCI member numbers are now published online. You must include the member number of each contact with your application. There are endorsements for band and mode, etc. QSOs for the awards involving multiple contacts (WAS, DXCC, WAC QRP25) must be made from within a 25-mile radius. Apply to: QRP ARCI Awards Chairman, Thom Durfee, WI8W, 3509 Collingwood Avenue SW, Wyoming, MI 49509 (e-mail: <wi8w@arrl.net>; web: <http://www.qrparci. org/>).

Worked ARCI Members. Work members of the QRP ARCI as follows:

Basic level = 50 members
Bronze Level = 100 members
Silver Level = 200 members
Gold Level = 400 members
Platinum Level = 800 members
Diamond Level = 1600 members

County Hunter. Stations must work a minimum of 500 U.S. counties. The current total is 3077. Endorsements for 1000, 1500, 2500, 3000, and All

USA-CA Special Honor Roll

William Kirks, W8TZA
USA-CA All Counties #1129
December 13, 2005

Harold Hall, KA5AGM
USA-CA All Counties #1130
December 24, 2005

USA-CA Honor Roll

500

W8TZA.....3365
WA4EEZ.....3566
AE9DX.....3367
KA5AGM.....3368

1000

K7ZYV.....1704
W8TZA.....1705
KA5AGM.....1706

1500

K8XP.....1427
W8TZA.....1428
KA5AGM.....1429

2000

W8TZA.....1321
KA5AGM.....1322

2500

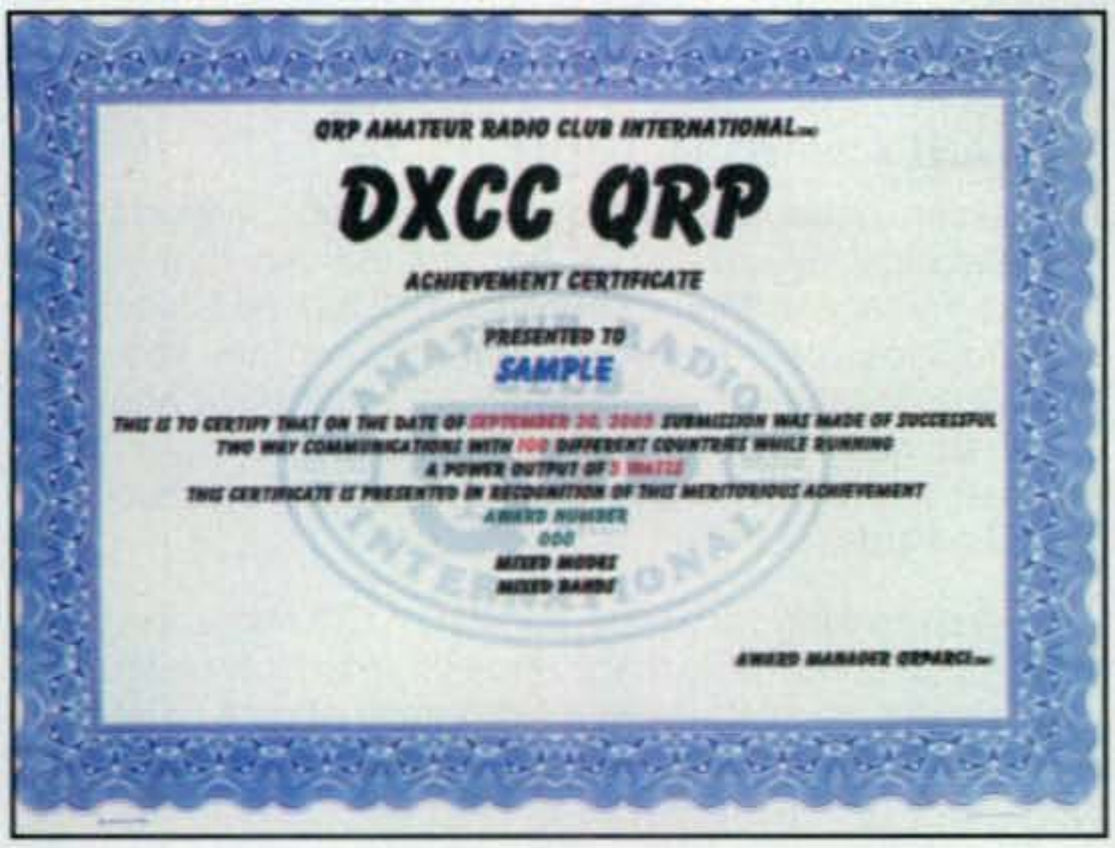
W8TZA.....1241
KA5AGM.....1242

3000

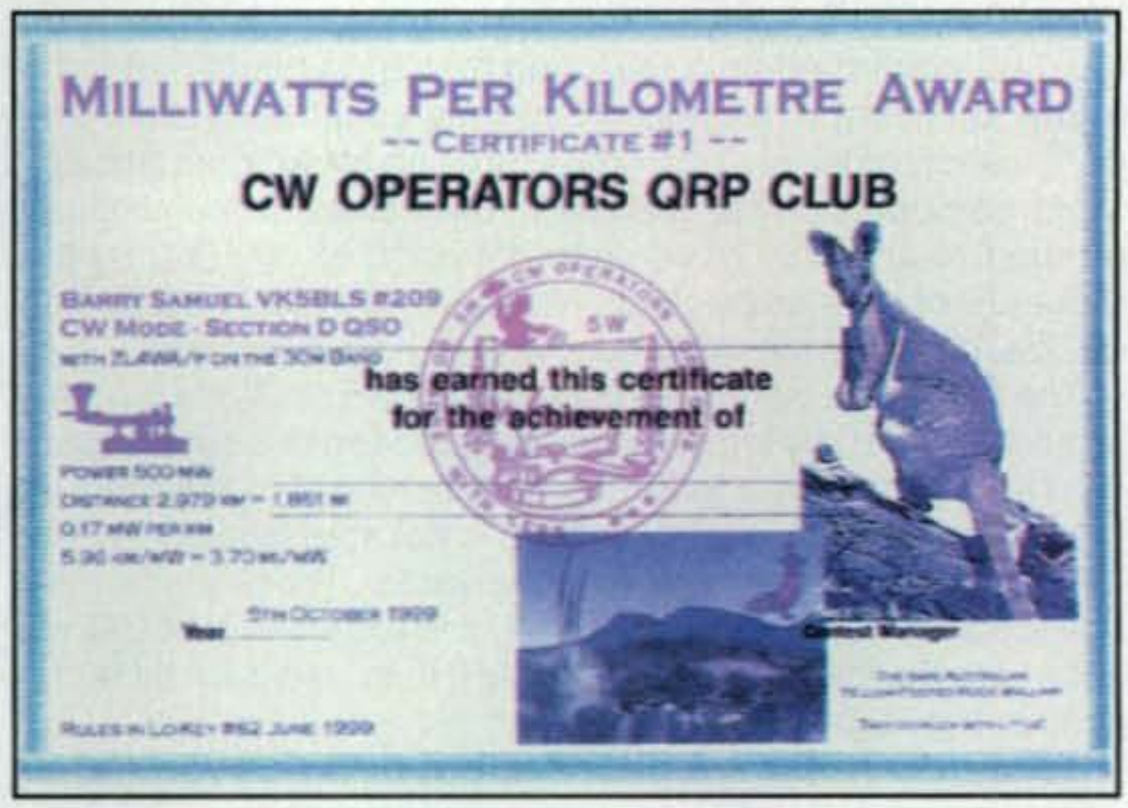
W8TZA.....1151
KA5AGM.....1152

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>



To earn the QRP ARCI's DXCC QRP award confirm contacts with 100 countries while running QRP.



The CW Operators QRP Club offers the Milliwatts per Kilometre Award. The goal of the award is to popularize working the farthest distance with the least amount of power.

Counties. The CQ USA-CA award rules apply *(see rules on the web at <www.cq-amateur-radio.com>)*. SSB and CW nets run on regular schedules and welcome QRP operators. The SSB net meets daily on 14.336 MHz; CW nets are on 14056.5 and 10114 MHz. County lists and maps are available at <countyhunter.com>.

Elmer Award. This award was created so that you can honor someone who has taken the time to help you achieve your goals in the hobby.

Standard = only one nominator
Bronze = up to 3 nominators
Silver = up to 10 nominators
Gold = up to 15 nominators.
Supergold = up to 25 nominators

WAC QRP. Confirm stations in all six continents while running QRP on the 30-, 17-, and 12-meter bands. Endorsements for All CW, SSB, AM, RTTY, PSK31, etc., are available.

WAS QRP. Confirm contacts with stations in at least 20 of the 50 states while running QRP. Endorsements at 30, 40, and 50 states confirmed. The 30-, 17-, and 12-meter bands apply for this award.

5-Band WAS QRP. Confirm contacts in each of the 50 states on each of any five HF amateur radio bands. The 30, 17-, and 12-meter bands are acceptable for this award. Endorsements for All CW, SSB, AM, RTTY, PSK31, etc., are available.

DXCC QRP. Confirm contacts with 100 countries defined by the ARRL DXCC List while running QRP.

5-Band DXCC QRP. Station must work and confirm 100 countries on each of any five HF amateur bands. The 30-, 17-, and 12-meter bands apply for this award. Endorsements for All CW, SSB, AM, RTTY, PSK31, etc., are available.

The Milliwatts per Kilometre Award

Do you feel the urge to try QRP yet? If so and you are really looking for a serious QRP challenge, you might want to consider this award from Australia. The distance from Hartford, Connecticut to Melbourne, Australia is 16,800 km, so if I can find a willing VK, Level F of this award is in the bag for me, even if I use the full 5 watts. Of course, conditions have to cooperate, which lately has been a bit of a problem. However, you get the idea!

Sponsored by the CW Operators QRP Club, the goal of the Milliwatts per Kilometre Award is to popularize working the farthest distance with the least amount of power. CW and SSB okay, and contacts must have been made on or after January 1, 1999 over distances equal to or greater than those listed in the accompanying table.

Applicants should specify full details of output power (key down for CW, and PEP for SSB), latitude and longitude, grid squares, and GPS location or map reference (preferably two or more), with photocopies of the cards sent and received.

Fee for Australians is $A5 or 5 IRCs (or five $1 Australian postage stamps). Fee for DX is $A10 or $US6 or 6 IRCs. Apply to: CW Operators QRP Club, Awards and Contests Manager, Ian Godsil, VK3JS, 363 Nepean Highway, Chelsea 3196, Australia (e-mail: <vk3js@vkham.com>; <http://www.users.on.net/~zietz/qrp/club.htm>).

Logbook of The World

The original rules of the CQ USA-CA Award were written in the days when the term *computer* referred to giant mainframe devices that were tended in air-conditioned, isolated, clean rooms by white-suited attendants who acted as priests or acolytes to the machine god which ate punch cards and magnetic tape (okay, the early 1960s, to be specific). USA-CA

Milliwatts per Kilometer Award Requirements

Award Level	Applicant Power no more than	Distance at least	km per mw at least	mw per km no more than
A	10 mw	100 km	10	0.1
B	100 mw	500 km	5	0.2
C	200 mw	600 km	3	0.33
D	500 mw	1,000 km	2	0.5
E	1 watt	2,000 km	2	0.5
F	5 watts	10,000 km	2	0.5

rules (B.2. and B.3.) specified that all contacts for the award must be confirmed by a QSL and that such cards had to be in the applicant's possession so they could be checked by certification officials. Yes, times have changed dramatically. More computer power resides in the hands of the ordinary amateur than could have been dreamed of in 1962 by the pioneers of data technology. However, physical possession of QSL cards is still required. Why?

The ARRL has pioneered the Logbook of The World (LoTW), a process whereby log data can be uploaded to a secure server. This tool appears to be the gold standard of log data. At the present time the LoTW system is not able to support non-ARRL awards (or even all ARRL awards). When support for outside awards becomes possible, it is expected that CQ will enter into an agreement with the ARRL to use it for all of the awards that CQ sponsors.

You can be sure that any such agreement will be widely publicized, and that the rules for all of the CQ awards will be modified to accommodate this new reality of the 21st century.

New ARI Awards Manager

The Italian national amateur radio society, Associazione Radiotecnica Italiana (ARI), has announced that its new awards manager is Mauro Pregliasco, I1JQJ. All applications and inquiries regarding ARI's awards program should be addressed to Mauro at: Via Scarlatti 31, I-20184, Milano, Italy.

Please note that former ARI Awards Manager Mario Ambrosi, I2MQP, continues to serve as the Italian checkpoint for CQ awards.

Are you looking for award publicity? *CQ* magazine is the only U.S. amateur radio magazine with a monthly awards column. Please contact me with full details of new or interesting awards you might have discovered. 73, Ted K1BV

Harold Hall, KA5AGM
USA-CA All Counties #1130, December 24, 2005

My adventure as a county hunter started when I stumbled upon the County Hunter Net on the 20-meter band. I was retired and spent considerable time with my hobby of amateur radio. Not sure of what was going on, I monitored for several days. Then I dropped in my call and the mobile exchanged signal reports with me. Over time I learned enough to play the game and accumulated contacts in my logbook. Never dreaming that I could even complete the "worked all counties" in the USA, I just enjoyed the contacts—all 3077 of them!

My first license was the Novice class in 1959. At that time the Novice ticket was for one year with a maximum power of 75 watts and crystal-control CW. My station was the AT-1 transmitter and S-38D receiver. Few contacts were made, but my interest was still in amateur radio. Resources were limited. My hobby was on hold until I was licensed again in 1978. During the next few years I was strictly a CW operator and had no interest in a microphone. My goal was to have a contact every day and to gather all the QSL cards I could. It was easy then because almost everyone exchanged cards. Many of those cards were used in my USA-CA all counties application.

During the years I also collected cards from my contacts by participation on the Century Club, HHH, OMISS, and other nets. When I looked at my QSL card collection, I realized that I had a nice start toward working all counties. County hunting became a habit. I did not realize just how much of a habit it had become until one day my two-year-old granddaughter was in my truck with me. She picked up the microphone and started saying,"three-three." The rig was not on and her mimic of me gave me a chuckle.

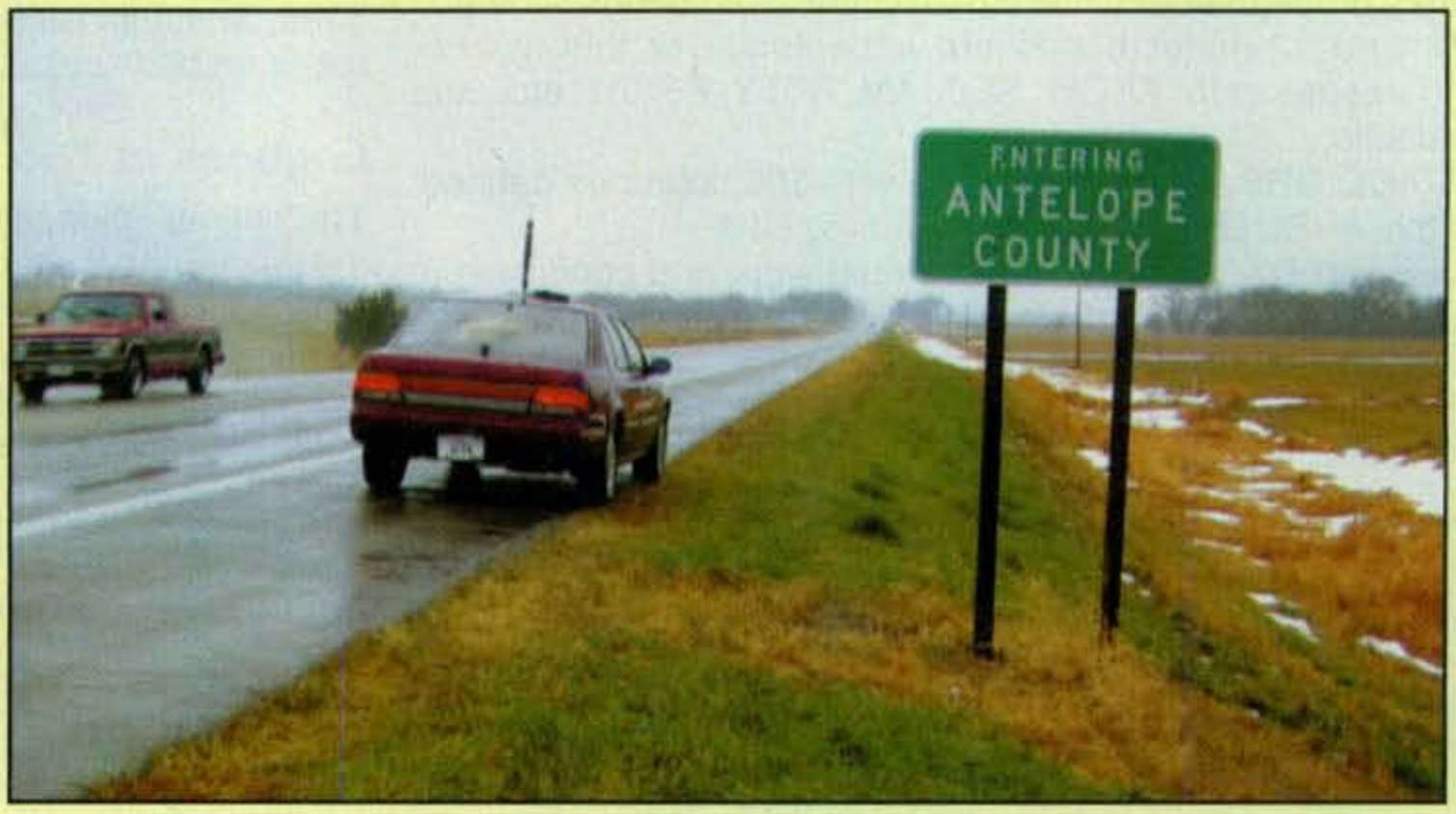
It took several years to complete the last dozen counties. Many of them were close, because I had spent most of my time on 20 meters. Finally my list was down to four counties, with two in Oklahoma and two in Nebraska. Forty meters did the job. My next to last in OK came from K5OH/M, Troy, and WØRRY/M, Charley, made my last county contact in OK. In less than a week, N4CD/M, Bob, ran Pawnee, NE for my next to last. My last county for the "whole ball of wax" came when NFØN/M, Mike, gave me Antelope, NE.

My station is modest. The antenna is a folded dipole at six feet hidden behind a fence. The stealth antenna is because of the neighborhood covenant that does not allow visible outside antennas.

Many people contributed to my completion of USA-CA. The final four mobile contacts listed above stand out, and N4CD even mailed me a confirmation while on the trip. CQ's official checkpoint, NE5S, Dave, deserves my gratitude for his effort in checking my 3077 cards, along with Ted, K1BV, the award manager. Just like in the EMMY Awards, I acknowledge my wife, who supports my radio hobby.

County hunting is not for everyone, but I recommend other hams give it a try if they enjoy a challenge. Shall I start over? You bet! Listen for me. *—73, Harold, KA5AG*

Harold Hall, KA5AGM, USA-CA All Counties #1130.



KA5AGM's last county for the "whole ball of wax" was Antelope, Nebraska, given to him by NFØN/M.

RSGB Books available from CQ

Antenna Topics

byPat Hawker, G3VA

RSGB. 2002 Ed. 384 pages.
This book is a chronological collection of selections of G3VA's words over the years. Hundreds of areas and subjects are covered and many a good idea is included.

Order No. RSAT **$29.00**

HF Antenna Collection

RSGB, 1st Ed., 1992. 233 pages.
A collection of outstanding articles and short pieces which were published in Radio Communication magazine during the period 1968-89. Includes ingenious designs for single element, beam and miniature antennas, as well providing comprehensive information about feeders, tuners, baluns, testing, modeling, and how to erect your antenna safely.

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IOTA Directory - 11th Edition

Edited by Roger Balister, G3KMA.
RSGB, 2002 Ed., 128 pages
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By Joe Carr, K4IPV
RSGB & Newnes, 2002 Ed.
256 pages.A definitive design guide for sending and receiving radio signals. Together with the powerful suite of CD software included with this book, the reader will have a complete solution for constructing or using an antenna; everything but the actual hardware!

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Practical Projects

Edited by Dr. George Brown, M5ACN
RSGB 2002 Ed, 224 pages
Packed with around 50 "weekend projects," Practical Projects is a book of simple construction projects for the radio amateur and others interested in electronics. Features a wide variety of radio ideas plus other simple electronic designs and a handy "now that I've built it, what do I do with it?" section. Excellent for newcomers or anyone just looking for interesting projects to build.

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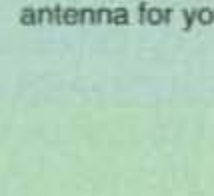

HF Amateur Radio

RSGB. 2002 Ed.
The HF or short wave bands are one of the most interesting areas of amateur radio. This book takes the reader through setting up an efficient amateur radio station, which equipment to choose, installation, and the best antenna for your location and MUCH more.

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RSGB. 2002 Ed., 128 pages.
The Amateur Radio Mobile Handbook covers all aspects of this popular part of the hobby. It includes operating techniques, installing equipment in a vehicle and antennas, as well as maritime and even bicycle mobile. This is essential reading if you want to get the most out of your mobile station.

Order: RSARMH **$21.00**

RSGB Prefix Guide

By Fred Handscombe, G4BWP.
RSGB. 6th Ed., 2003. 48 pages.
This book is an excellent tool for the beginner and the experienced hand alike. Designed with a "lay flat" wire binding for ease of use the new "Prefix Guide" is a must for every shack.

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VHF/UHF Antennas

By Ian Poole, G3YWX

RSGB, 2002 Ed, 128 pages
This great new book investigates the exciting area of VHF and UHF antennas. VHF and UHF bands provide an exciting opportunity for those wishing to experiment, while the antenna sizes at these frequencies do not occupy great amounts of space.

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contesting

BY JOHN DORR,* K1AR

Critical Times in the Life of a Contest

March Contest Tip

Do you have a plan in place before starting a contest? Do you know which band to use first? Will you be CQing or tuning around? A game plan is almost as important to maximizing contest scores as the event itself. If you simply stroll into your shack with five minutes to go before the start with no plan in mind, you'll probably do as well as the marathon runner who didn't prepare for the beginning of the race. Conscious consideration of band conditions, the strengths of your station, and other factors will only improve your start out of the gate. With a plan in place, you're already ahead of most folks, as should be your final score!

Over the years, one of the most important lessons I've learned about contesting is to consider the critical points in the event and focus on making the right strategic decisions when it really matters. Put another way, if you simply look at the rules and limit your planning to when a contest begins and ends, you're already behind.

Contests do indeed have critical moments. If you're interested in maximizing your total score, understanding when some of those critical points take place and developing a plan for them is a key component to achieving improved results.

This month I've chosen a few important contest milestones for you to consider. They generally apply to all contests, both domestic and international. I guarantee that if you apply some planning around these key time periods, your contest scores will go up. Read on!

Before the Contest Starts

One of the most important operating decisions one can make in a contest is how and where to start. There is a myriad of branches in this critical decision tree, ranging from choosing a starting band (or frequency within a band) to deciding whether to call CQ or search & pounce. A pre-contest investment I highly recommend is to make sure you are aware of band conditions—both in a general sense and on the specific band you would like to use first. Listening on the bands a week or so before the contest (at a minimum) will give you a good idea of how conditions are overall. In addition, you'll develop a sense of when the bands are opening to certain parts of the world and how your station is performing in light of those conditions. With that collection of contest intelligence, before the contest starts you'll be able to make smarter decisions on how to maximize those first few hours, when events are often won or lost.

*2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

Calendar of Events

All year	**CQ DX Marathon**
Feb. 25–26	**CQ 160-Meter SSB Contest**
Feb. 25–26	REF SSB Contest
Feb. 25–26	UBA CW DX Contest
Feb. 25–26	Mississippi QSO Party
Feb. 25–26	North American RTTY QSO Party
Feb. 26–27	North Carolina QSO Party
Mar. 4–5	ARRL SSB DX Contest
Mar. 11–12	Idaho QSO Party
Mar. 11–12	RSGB Commonwealth Contest
Mar. 11–12	Oklahoma QSO Party
Mar. 12	North American RTTY Sprint
Mar. 12–13	Wisconsin QSO Party
Mar. 18–19	Russian DX Contest
Mar. 18–20	Virginia QSO Party
Mar. 18–20	BARTG Spring RTTY Contest
Mar. 25–26	**CQ WW WPX SSB Contest**
Apr. 1	Poisson d'Avril Contest
Apr. 1–2	Kids' Roundup
Apr. 1–2	SP DX Contest
Apr. 1–2	EA RTTY Contest
Apr. 1–2	QCWA Spring QSO Party
Apr. 1–2	Missouri QSO Party

Don't Miss Those High Rate Times

Every station experiences periods of rates higher than others. The key to maximizing your contest score is to ensure that you're operating on the right bands and at the optimal times when the highest rates can be obtained, whether that's 20 QSOs or 200 QSOs per hour. For example, it may be fun to work cool DX on 80 meters in the morning during a DX contest, but if your mission is to maximize your score, you need to be on a higher band taking advantage of the best run times you'll experience over the entire weekend.

A good rule of thumb is to keep an eye on where the sun is rising and setting. Generally, these are enhanced propagation periods when small antennas can perform reasonably well. Examples include working European sunrise on 40 and 80 meters, or ensuring you work the early morning runs into Europe on the high bands. If you are into more exotic operating, gray-line openings on the low bands can produce an amazing list of multipliers that are only workable in 20- or 30-minute windows of time. Again, the operative concept is conscious planning.

Multipliers, Multipliers, Multipliers

There is a simple reason why multipliers are called just that; it's because they dramatically multiply your score in a contest. Working too few can produce disappointing results. However, if you try too hard to get mults, you'll sacrifice productive runs for the sake a few extra mults, ending up with a low

QSO total. The key is to constantly be aware of your multiplier situation, whether it's a CQ WW or a local domestic contest.

There is indeed a time and place to work multipliers as a conscious investment. It will be a rare circumstance that justifies one leaving a high-rate situation to look for multipliers. Usually multiplier chasing takes place when there is a lull in the "running" action, or if you simply want to sweep across a new band on your way to establishing a new run frequency.

In the multiplier game, it's important to be aware of your station's capability. For example, if your run rate isn't that great, it actually may pay to look for multipliers during non-traditional times (e.g., working southern DX stations from the U.S. on the high bands in the morning) when the pile-ups are not as large. You get the idea.

Maximize Your Station's Performance Capabilities

At the end of the day, a contest's notable critical moments align with the capability of your station. If you have poor antennas on 40 meters, for example, the need to maximize the potential big runs at the beginning of a contest is not as acute. However, even compromised antenna setups need to be leveraged at times when a band is best. For example, a 30-foot high dipole on 40 meters will work wonders at many times during a domestic contest, although it will admittedly perform poorly later at night compared to the world of Yagis and wire beams.

I remember a few years ago operating on 10 meters (remember that band?) with just 100 watts and a dipole during the ARRL 10 Meter contest and running guys in Europe at well over 100 QSOs/hour because I maximized my station's performance capabilities and took advantage of a window of propagation and scoring opportunity. The same can be true for you with a little planning and common sense.

Who Should Operate?

This one is easy if you're single operator. After all, you're the only game in town to man the bands. That being said, in a multi-op one of the critical decisions in a contest is determining whom to put on the bands at any point in time. It's a balancing act between keeping everyone happy and providing adequate "chair time" and the need to maximize your score. Many multi-operator stations prepare an operating schedule. As a rule, I've always found that approach to be too restrictive and not responsive to the ever-changing circumstances in a contest. If you're truly interested in the highest score possible, the approach should be just like any other sporting event: Put your best people on the field when it really counts. The first hour of a contest or an event's highest rate time is probably not the point where you want to experiment with inexperienced operators. Also, some ops are actually better at tuning and finding multipliers.

The point is that you should attempt to maximize everyone's skill and experience level to ensure you have taken advantage of every critical moment in the contest.

Final Comments

Hopefully you've noted that maximizing your contest scores has almost as much to do with good decision-making as it does with station hardware and antennas. In fact, clever planning can overcome some of the limitations of small antennas and low power. Give it some thought before the next contest comes around. You will be amazed at the improvement in your results!

That's it for this month. I hope to be able to report the results of the recently concluded CQ Contest Survey next time, work and life permitting. Until then, keep the faith. The warm weather is coming to many of us soon and that's a good thing!

73, John, K1AR

propagation

BY TOMAS HOOD,* NW7US

HF Propagation in March

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, December 2005: 41
Twelve-month smoothed, June 2005: 48

10.7 cm Flux
Observed Monthly, December 2005: 91
Twelve-month smoothed, June 2005: 92

***Ap* Index**
Observed Monthly, December 2005: 7
Twelve-month smoothed, June 2005: 14

In general, due to the decline of the solar cycle the ionosphere is not able to support propagation on the higher HF frequencies. Also, with the reduced energy level of the ionosphere, bands such as 20 meters suffer with early closures, becoming quiet quickly after dark. Signals are generally weaker over many paths.

Even so, 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, the HF bands are improving.

Ten meters will be spotty, with the most reliable propagation along north/south paths. I've been following the revealing reports from the PropNET propagation research group: <http://www.propnet.org/>. The group conducts daily propagation tests on 10 meters. The reports confirm that even during the lowest phase of the solar cycle, 10 meters does have life. This month we can even expect occasional strong but short openings between stations on east/west paths into Asia from the North American west coast and into Europe from the North American east coast. These paths will quickly disappear as we move into April, so don't miss out.

Fifteen meters will be much more usable than 10. We will find 15 opening up to more areas and for somewhat longer periods into the evenings. Those daytime paths which do open up (certainly much less often than during the peak solar cycle years) will not degrade much until mid-summer. 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. Prime-time 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.

Daytime maximum usable frequencies (MUF) continue to drop, and the geomagnetic activity as reported by the planetary *A*-index (*Ap*) is on its seasonal rise, so take advantage of the current excellent conditions and work the world!

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for March 2006

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-11, 14, 16-18, 24-31	A	A	B	C
High Normal:13, 15, 21-23	A	B	C	C-D
Low Normal: 12, 19-20	B	C-B	C-D	D-E
Below Normal: none	C	C-D	D-E	E
Disturbed: none	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be excellent (A) on March 1st through the 11th, fair to good (C-B) on the 12th, good (B) on the 13th, etc.

VHF Propagation

The possibilities for ionospheric openings on the VHF bands usually improve during March and the spring months. Many of the solar-ionospheric relationships that can produce ionospheric openings on the VHF bands tend to maximize during equinoctial periods.

A seasonal increase in short-skip openings due to sporadic-*E* propagation generally takes place

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. In the Short-Skip Chart appropriate *standard* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between New York and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones add 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone; and 5 hours in the EST zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 PM in Los Angeles; 17 or 5 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA subtract 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone; and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

during March, and an occasional 6-meter opening may be possible during this month. Sporadic-*E* openings most often occur during the daylight hours over distances between about 1000 and 1400 miles. There is also a fair chance for an in-crease in widespread auroral activity during March, since we continue to experience coronal-hole activity during the solar cycle minimum. These auroras could be accompanied by auroral-scatter-type openings on 6 and 2 meters. Check the Last-Minute Forecast at the beginning of this column for those days in March that are expected to be Below Normal or Disturbed. These are days on which auroral activity is most likely to occur.

Conditions should be optimal during March for trans-equatorial scatter propagation between the southern tier states and countries deep in South America. The best time for TE openings should be between 8 and 11 PM local time. Don't forget to check out my column in *CQ VHF* magazine for more details on VHF propagation and conditions.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for December 2005 is 41.2, a significant spike upward from November's 18.0 and October's 8.5. The lowest daily sunspot value during December, recorded on December 7 and 9, was 23. The highest daily sunspot count was 60 on December 3. These high and low marks are significantly lower than the spread in November. The 12-month running smoothed sunspot number centered on June 2005 is 47.9. A smoothed sunspot count of 12.1 is expected in March 2006, give or take about 12 points.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 90.8 for December 2005, a bit higher than November's 86.3 and October's 76.7 The 12-month smoothed 10.7-cm flux centered on June 2005 is 91.9. The predicted

smoothed 10.7-cm solar flux for March 2006 is 75, give or take about 16 points.

The observed monthly mean planetary *A*-index (*Ap*) for December 2005 is 7, about the same as for October and November. The 12-month smoothed *Ap*-index centered on June 2005 is 13.9, just lower than May. Expect the overall geomagnetic activity to be quiet to active during most days in March, with some isolated periods of storm-level activity, since we are in the equinoctial season. Refer to the Last-Minute Forecast for the outlook on which days this might occur.

Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. I have also enhanced my Space Weather and Radio Propagation center at <http://prop.hfradio.org>, so please take a look. These resources may also be viewed on a cellphone or other wireless device that has WAP/WML features by browsing to <http://wap.hfradio.org>.

Drop me an e-mail or send me a letter if you have questions or topics you would like to see me explore in this column. I would also love to hear any feedback you might have on what I have written. Until next month . . .

73, Tomas, NW7US

CQ Short-Skip Propagation Chart
March & April 2006
Band Openings Given In Local Standard Time At Path Mid-Point (24-Hour Time System)

Band (Meters)	*Distance From Transmitter (Miles)*			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	Nil	Nil	08-19 (0-1)	08-13 (1-0) 13-16 (1) 16-19 (1-0)
15	Nil	08-16 (0-1)	09-12 (1) 12-17 (1-2) 17-18 (0-1)	08-09 (0-1) 09-10 (1) 10-13 (1-2) 13-14 (2) 14-17 (2-3) 17-18 (1-2) 18-20 (0-1)
20	Nil	07-08 (0-1) 08-09 (0-2) 09-14 (0-3) 14-16 (0-2) 16-23 (0-1)	07-08 (1) 08-09 (2) 09-10 (3) 10-14 (3-4) 14-16 (2-4) 16-18 (1-4) 18-19 (1-3) 19-20 (1-2) 20-23 (1) 23-05 (0-1)	06-07 (0-1) 07-08 (1-2) 08-09 (2-3) 09-10 (3) 10-15 (4-3) 15-18 (4) 18-19 (3) 19-20 (2-3) 20-21 (1-2) 21-05 (1) 05-06 (0-2)
40	07-09 (0-1) 09-10 (0-2) 10-12 (2-3) 12-17 (3-4) 17-19 (2-3) 19-20 (1-2) 20-22 (0-1)	06-07 (0-2) 07-09 (1-4) 09-10 (2-4) 10-15 (4-3) 15-17 (4) 17-19 (3-4) 19-20 (2-4) 20-22 (1-2) 22-00 (0-2) 00-06 (0-1)	06-07 (1) 07-08 (4-2) 08-15 (3-1) 15-17 (4-2) 17-19 (4-3) 19-20 (4) 20-22 (2-4) 22-00 (2-3) 00-06 (1-2)	06-08 (2-1) 08-15 (1-0) 15-16 (2-0) 16-17 (2-1) 17-19 (3-2) 19-21 (4-3) 21-22 (4) 22-00 (3-4) 00-02 (2-3) 02-06 (2)
80	07-08 (2-3) 08-11 (3-4) 11-18 (4) 18-20 (3-4) 20-22 (2-3) 22-00 (1-2) 00-06 (1) 06-07 (1-2)	07-08 (3-2) 08-11 (4-1) 11-16 (4-0) 16-18 (4-2) 18-20 (4-3) 20-22 (3-4) 22-00 (2-4) 00-06 (1-2) 06-07 (2)	07-08 (2-1) 08-11 (1-0) 11-16 (0) 16-18 (2-1) 18-20 (3-2) 20-00 (4) 00-05 (2-3) 05-07 (2)	07-08 (1-0) 08-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-2) 22-00 (4-3) 00-05 (3) 05-07 (2-1)
160	05-07 (4-2) 07-09 (3-1) 09-17 (2-0) 17-19 (3-1) 19-20 (4-2) 20-05 (4)	05-06 (2-1) 06-07 (2-0) 07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-20 (2) 20-22 (4-3) 22-03 (4) 03-05 (4-3)	05-06 (1) 06-19 (0) 19-20 (2-1) 20-22 (3-2) 22-03 (4-3) 03-05 (3-2)	05-06 (0-1) 06-19 (0) 19-20 (1-0) 20-22 (2) 22-03 (3-2) 03-05 (2-1)

ALASKA
Openings Given in GMT

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	Nil	22-00 (1)	22-00 (1) 00-02 (2) 02-04 (1)	06-13 (1) 07-12 (1)*
Central USA	Nil	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1) 00-03 (2) 03-05 (1)	07-09 (1) 09-12 (2) 12-14 (1) 07-12 (1)*
Western USA	Nil	20-22 (1) 22-00 (2) 00-03 (1)	19-22 (1) 22-00 (2) 00-02 (3) 02-04 (2) 04-06 (1)	06-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-15 (1) 08-10 (1)* 10-12 (2)* 12-14 (1)*

HAWAII
Openings Given in Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	Nil	08-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	02-05 (1) 05-07 (2) 07-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-21 (1)	18-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 19-21 (1)* 21-00 (2)* 00-02 (1)*
Central USA	11-15 (1)	08-09 (1) 09-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	03-05 (1) 05-08 (2) 08-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	18-19 (1) 19-21 (2) 21-01 (3) 01-04 (2) 04-05 (1) 19-21 (1)* 21-01 (3)* 01-02 (2)* 02-03 (1)*
Western USA	11-15 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	02-04 (1) 04-06 (2) 06-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-21 (2) 21-23 (1)	17-19 (1) 19-20 (2) 20-23 (4) 23-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

**Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

Propagation charts prepared by George Jacobs, W3ASK.

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.)

CW RESULTS
QRP/p

P4BA	**A**	**3,674,242**	**1792**	**638**
			(Op: KK9A)	
LY8O	**A**	**1,858,616**	**1648**	**613**
			(Op: LY4XX)	
YT7TY	**A**	**1,782,872**	**1444**	**632**
TE1W	**A**	**1,695,920**	**1185**	**493**
			(Op: W8QZA)	
OM7DX	**A**	**1,579,454**	**1312**	**554**
S57XX	**A**	**1,254,498**	**1146**	**502**
OT5A	**A**	**1,068,331**	**1048**	**493**
			(Op: JK3GAD)	
DF3AX	**A**	**817,200**	**895**	**454**
YZ2M	*	723,600	930	432
			(Op: YU1LM)	
VA3DF	**A**	**708,124**	**662**	**358**
GW4ALG	**A**	**672,384**	**845**	**412**
KG5U	**A**	**672,144**	**798**	**418**
RW3AI	**A**	**671,840**	**879**	**416**
OK1VBA	**A**	**637,855**	**721**	**415**
US2IZ	**A**	**636,020**	**923**	**385**
SM6EQO	**A**	**635,040**	**827**	**405**
YZ8A	*	607,560	651	415
			(Op: YT1AA)	
LY3BY	*	586,800	921	400
G3YMC	**A**	**586,278**	**840**	**378**
HA1CW	**A**	**577,499**	**778**	**403**
N7IR	**A**	**549,640**	**666**	**364**
SV9/LY1DF	**A**	**542,241**	**825**	**399**
VE3XD	*	539,856	553	326
K3WW	**A**	**526,779**	**509**	**313**
JA1MCU	**A**	**511,560**	**527**	**348**
OL3M	*	502,656	740	374
			(Op: OK1TGI)	
GØDCK	*	492,317	718	371
WA8WV	**A**	**390,720**	**471**	**296**
M3CVN	*	343,200	666	330
LI2MOA	**A**	**338,178**	**622**	**314**
			(Op: LA2MOA)	
LA5EKA	*	322,790	487	338
EA1FAQ	**A**	**315,222**	**579**	**321**
I1BAY	**A**	**298,803**	**464**	**309**
WA8REI	*	279,300	468	300
W4QO	**A**	**276,466**	**409**	**274**
VE3RSA	*	272,304	359	248
UA1CUR	*	253,851	494	283
EW1NA	**A**	**248,223**	**487**	**291**
IT9LNH	**A**	**247,142**	**448**	**278**
L73E	**A**	**242,469**	**326**	**261**
RA6GW	*	233,788	474	277
G4OBW	*	220,590	451	285
WØEB	**A**	**220,023**	**390**	**281**
KO1H	**A**	**215,816**	**360**	**248**
K3NCO	*	208,726	347	238
MØO	*	191,574	403	261
			(Op: G4JZO)	
JG3QBJ	*	175,536	312	207
SP6GCU	**A**	**173,706**	**352**	**262**
OZ5XR	**A**	**172,414**	**249**	**187**
W8VE	*	147,175	291	203
KE4R	*	136,116	309	199
MM3AWD	**A**	**118,791**	**315**	**201**
EA2NA	*	116,550	324	222
N6WG	**A**	**116,314**	**376**	**187**
DL8MBS	**A**	**114,264**	**285**	**207**
K3WWP	*	100,746	267	193
W5KDJ	*	96,162	293	186
9A5AND	**A**	**89,404**	**258**	**217**
RV3DBK	*	76,328	322	188
NA4BW	*	71,604	251	162
OO7CC	*	63,366	234	177
HB9AYZ	**A**	**57,448**	**211**	**172**
I2AZ	*	55,848	195	156
DL1LAW	*	55,428	251	149
K4AQ	*	49,484	214	139
RU2FM	**A**	**47,360**	**179**	**148**
M5AEF	*	42,336	193	144
K9MMS	**A**	**41,140**	**150**	**121**
AF7Y	*	39,040	135	122
K9FOH	*	34,160	172	122
DL4YAO	*	30,740	120	106
K3TW	*	30,674	112	98
N8IY	*	30,300	129	100
MM0DWF	*	23,381	134	103
PA3AM	**A**	**21,186**	**109**	**99**
JA1GTF	*	20,769	100	69
NØTK	*	20,332	119	92
LZ1IQ	**A**	**19,152**	**143**	**112**
DL9NEI	*	18,908	125	116
YB5AQ8	**A**	**17,225**	**82**	**65**
WA4PGM	*	15,504	82	76
UT5UQV	*	14,832	77	72
DG8VE	*	14,136	106	93
LZ5PL	*	14,112	97	84
SP9RQH	*	13,280	108	83
DJ5QK	*	13,041	106	81
K9GY	*	11,475	89	75
Z33F	**A**	**11,376**	**74**	**72**
PAØATG	*	11,310	104	87
SV1JSB	**A**	**10,125**	**85**	**81**
W4DEC	*	8,723	65	61
PA1B	*	8,712	76	66
HB9QA	*	8,308	74	67
JGØMWU	*	7,987	56	49
7K1CPT/1	*	7,748	59	52
NO2D	**A**	**5,670**	**59**	**54**
KE2WB	*	5,203	44	43
DL2BQD	*	4,950	47	45
DL3BVA	*	3,984	55	48
CB3JFF	*	3,880	41	40
MØPCB	*	2,052	36	36
IK1RAC	*	1,705	31	31
KX7L	*	1,530	37	34
VU2UR	**A**	**1,288**	**26**	**23**
VK3JS	*	1,134	27	21
AD7BN	*	1,092	29	28
PAØRBO	*	936	26	26
VE9QRP	*	592	17	16
UT5MB	*	165	13	11
K6MI	*	3	1	1
YT1BX	**28**	**40,092**	**283**	**156**
NA4CW	**28**	**30,624**	**159**	**115**
LY3AA	**28**	**21,658**	**154**	**119**
LY2BBF	*	17,784	130	114
UR5ZQV	**28**	**7,210**	**81**	**78**
EA7GO	**28**	**5,824**	**60**	**56**
DH8BQA	**28**	**1,968**	**42**	**41**
DL1AQG/P	*	256	16	16
K9MU	**28**	**247**	**14**	**13**
DL6UAA	*	20	5	4
SP9H	**21**	**251,576**	**439**	**328**
OH6BG	**21**	**217,554**	**394**	**383**
HAØGK	**21**	**140,896**	**322**	**259**
SP4GFG	*	137,256	348	258
JA1NLX	**21**	**92,916**	**214**	**178**
ES1CR	**21**	**63,126**	**230**	**189**
TI5X	**21**	**21,472**	**95**	**88**
			(Op: NØKE)	
DL9FBF	**21**	**21,186**	**118**	**107**
WA6FGV	**21**	**15,604**	**118**	**94**
OK1ALJ	**21**	**9,085**	**91**	**79**
OH6NPV	*	5,668	57	52
DL2TM	*	70	8	7
I7/IK2AIT	*	64	8	8
IKØWEI	*	48	6	6
SM1TDE	*	3	1	1
TI5A	**7**	**867,840**	**519**	**339**
			(Op: NØKE)	
OK2BYW	**7**	**416,416**	**464**	**338**
UU2CW	**7**	**361,692**	**410**	**306**
TS3W	**7**	**295,740**	**393**	**279**
7S3J	**7**	**283,522**	**315**	**242**
			(Op: SMØDZH)	
DL1DQY	**7**	**192,691**	**275**	**233**
UN7CN	**7**	**135,660**	**190**	**140**
IZ1DFI	**7**	**133,008**	**278**	**204**
F5UL	**7**	**113,208**	**223**	**178**
W1CVE	**7**	**76,995**	**181**	**145**
SP5XSB	**7**	**44,000**	**160**	**125**
N2JNZ	**7**	**40,932**	**138**	**108**
DL5CL	*	39,432	160	124
UA9CDJ	**7**	**29,716**	**83**	**68**
K5LG	**7**	**25,665**	**92**	**87**
NE6M	**7**	**10,126**	**64**	**61**
JG2AIG	**7**	**4,060**	**29**	**29**
W7VMI	**7**	**3,608**	**43**	**41**
			(Op: AH6B)	
N4XR	*	818,132	629	427
KC1ME	*	786,558	711	389
			(Op: K1JB)	
K1BV	*	347,916	506	316
K5MA	*	242,053	319	229
KG1D	**7**	**3,594,822**	**1388**	**651**
			(Op: K1KI)	
W1FJ	**3.5**	**353,808**	**403**	**273**
***NV1N**	**A**	**3,213,782**	**1645**	**661**
			(Op: N1UR)	
***N8I8**	**A**	**1,955,655**	**1274**	**585**
***NY1S**	**A**	**1,275,580**	**912**	**460**
*W1JQ	*	612,896	634	358
*KS1J	*	563,004	575	351
*W2JU	*	335,400	421	258
*W1END	*	262,154	426	278
*W1TO	*	216,295	345	239
*WA1S	*	206,371	361	257
*K1SWG	*	157,406	295	211
*AE1D	*	155,618	314	199
*AE1T	*	113,490	232	195
*WB1EDI	*	73,062	197	162
*AA1TV	*	63,516	170	134
*K1EP	*	52,578	159	138
*KN6OT	*	51,212	150	118
*N2XU	*	2,706	34	33
			(Op: N2ZN)	
***N2MM**	**14**	**998,704**	**839**	**518**
***AD4LC**	**7**	**280,996**	**260**	**218**
KC3R	**A**	**7,511,364**	**2990**	**861**
			(Op: LZ4AX)	
AA3B	**A**	**5,417,124**	**2376**	**772**
K3ZO	**A**	**5,183,586**	**2208**	**749**
K2PLF	*	3,292,042	1723	689
N3UM	*	2,354,415	1364	595
AA1K	*	49,632	157	132
W6AAN	*	23,048	91	86
W3GG	*	14,994	68	63
KD4D	**14**	**3,079,100**	**1721**	**751**
			(@N3HBX)	
NN3L	**7**	**3,504,786**	**1336**	**654**
N3KS	**7**	**1,394,556**	**796**	**463**
W3BGN	**3.5**	**270,512**	**358**	**232**
***W7LPF**	**A**	**574,722**	**589**	**367**
***WA3KYY**	**A**	**282,750**	**394**	**250**
***N3XL**	**A**	**180,348**	**312**	**226**
*N3NZ	*	125,251	260	203
*AB3AI	*	112,880	231	170
*AA8CY	*	57,771	180	147
*KA3PVA	*	32,016	138	116
NY4A	**A**	**6,658,866**	**2662**	**846**
KN1DX	**A**	**6,463,160**	**2873**	**794**
			(Op: K4ZW)	
NQ4I	**A**	**5,828,592**	**2652**	**836**
			(Op: K4BAI)	
K3MSP	*	5,549,038	2557	814
			(Op: W4PA)	
WJ9B	*	4,015,042	2125	722
WY4N	*	3,698,920	2051	785
			(Op: N4PN)	
N3ØS	*	1,867,234	1272	566
			(Op: K9OM)	
W4YE	*	1,591,578	1016	522
N4CW	*	1,492,642	1048	523
W4BQF	*	1,204,288	966	496
K1GU	*	1,126,608	933	479
WR3O	*	916,320	999	460
			(Op: K4RO)	
KD4HEG	*	901,971	667	417
			(Op: N6ZO)	
K4LQ	*	694,702	574	419
WK4Y	*	612,864	687	399
W4QM	*	522,357	607	363
W2OO	*	473,526	485	333
KØUK	*	301,806	427	243
AF4OX	*	292,392	415	262
WC4E	*	270,300	342	255
W7QF	*	267,992	327	241
KI4JKY	*	217,932	428	254
			(Op: N4GG)	
K7CS	*	216,090	353	245
N4UH	*	132,728	238	188
NE4AA	*	127,573	301	193
			(Op: K1TO)	
WW4CW	*	125,928	261	198
			(Op: K4WJ)	
KE6QR	*	101,184	329	186
AH6HJ/W4	*	93,058	240	161
NE4M	*	56,648	200	146
AC4CS	*	41,344	179	128
KG4FFJ	*	16,434	73	66
			(Op: N4GI)	
AA3VA	*	15,180	78	69
AI4U	*	14,454	74	73
K1UM	**21**	**1,181,850**	**991**	**575**
WD4K	**14**	**2,896,246**	**1727**	**766**
			(Op: KBEJ)	
W4NZ	**14**	**1,592,477**	**1171**	**617**
W9WI	*	914,500	886	500
W1MO	*	661,279	697	457
W4NTI	*	272,303	412	317
K4AMC	*	234,630	363	270
WW4KY	*	179,400	337	260
			(Op: K4WW)	
***K7SV**	**A**	**3,806,946**	**1784**	**702**
***K4OJ**	**A**	**2,376,180**	**1614**	**645**
			(Op: N4KM)	
***WK2G**	**A**	**2,227,780**	**1528**	**580**
*N4ZZ	*	1,991,925	1405	681
*NG4Z	*	1,953,900	1376	585
			(Op: K4OGG)	
*N3UA	*	1,917,169	1224	593
*NR3X	*	1,329,048	1051	504
			(Op: N4YDU)	
*N4NX	*	845,240	745	452
*AA4FU	*	803,187	769	399
*KU8E	*	745,624	782	407
*K4IE	*	649,044	700	396
*KA8GGV/4	*	576,708	740	374
*NF4A	*	569,350	742	386
*NA4K	*	501,615	558	355
*KN4Y	*	388,854	575	342
*W4DAN	*	356,076	508	314
*K1SE	*	349,232	465	299
*KI4EXW	*	333,450	398	285
*N4N	*	330,992	544	302
			(Op: W4ARM)	
*W4RQ	*	329,515	398	295
*WA4JUK	*	270,710	374	253
*KI3O	*	222,952	389	232
*W4IHI	*	207,324	353	234
*N4GJ	*	196,581	325	259
*W4EIP	*	170,646	274	238
*N5VI	*	161,975	374	209
*W1MD	*	161,931	302	231
*N4MM	*	137,385	238	213
*WA4OSD	*	113,050	279	190
*WO4O	*	111,800	234	172
*KI4EGT	*	110,968	277	194
*AI4IE	*	106,067	236	199
*K4BX	*	99,560	269	190
*W4NBS	*	97,734	256	182
*AE4Y	*	84,728	234	178
*K4GKD	*	68,363	163	137
*WD4AHZ	*	59,047	166	137
*NW4V	*	57,040	143	124
*K4FTO	*	56,700	173	135
*K4GMH	*	44,912	130	112
*W4TDB	*	37,761	151	123
*W2EJG	*	36,771	121	103
*K3MZ	*	35,400	109	100
*K2EKM	*	30,798	99	87
*N4HXI	*	25,758	124	106
JR1NKN	*	4,092	47	44
K6III	*	4,050	45	45
JO6PAQ/1	*	2,277	39	33
I1/K2LEO	**21**	**63**	**7**	**7**
S54AA	**14**	**503,433**	**587**	**427**
SM3C	**14**	**451,278**	**598**	**411**
			(Op: SM5CCT)	
UA6LCJ	**14**	**263,765**	**513**	**355**
ES1CW	**14**	**254,800**	**460**	**350**
JR3RWB	**14**	**188,468**	**312**	**254**
G3LHJ	**14**	**188,210**	**369**	**290**
SMØGNS	*	162,144	395	288
SP6T	**14**	**116,644**	**272**	**241**
S56C	*	109,312	292	244
NU4B	**14**	**104,940**	**223**	**198**
SM6CRM	*	83,538	254	221
NØLY	**14**	**73,528**	**221**	**182**
OK2COR	**14**	**72,036**	**206**	**174**
OO7BS	**14**	**53,120**	**184**	**166**
			(Op: ON7BS)	
DF5SF	**14**	**45,326**	**192**	**173**
W6YJ	**14**	**44,730**	**162**	**142**
9A8MM	**14**	**26,568**	**138**	**123**
KP4FP	**14**	**19,836**	**92**	**87**
			(Op: KP4KE)	
N4HH	*	13,770	82	81
F8BDQ	**14**	**12,276**	**106**	**99**
VE3LMS	**14**	**9,052**	**64**	**62**
SP5DXJ	*	1,092	26	26
OH6DC	**14**	**1,044**	**30**	**29**
W8EH	**14**	**760**	**19**	**19**
AC7A/AH6	**14**	**468**	**13**	**12**
WV7G	**14**	**224**	**14**	**14**
JO3LDN	*	867	20	17
K2HT	*	210	7	7
LY5G	**3.5**	**170,178**	**354**	**225**
			(Op: LY2FE)	
S57MSU	**3.5**	**80,920**	**218**	**170**
KP3T	**3.5**	**77,165**	**142**	**115**
SP4TBM	**3.5**	**68,098**	**199**	**158**
Z31GX	**3.5**	**66,044**	**177**	**158**
OZ7BQ	**3.5**	**62,329**	**191**	**157**
RA3XAR	**3.5**	**47,328**	**176**	**136**
OL4W	**3.5**	**36,036**	**158**	**117**
			(Op: OK1IF)	
SP3MEP	*	27,510	135	105
OH7WV	**3.5**	**14,118**	**90**	**78**
SE3CCT	**3.5**	**7,874**	**66**	**62**
			(Op: SM5CCT)	
LZ2JR	*	32	4	4
OMØTT	**1.8**	**77,228**	**220**	**172**
LY4BF	**1.8**	**17,496**	**100**	**81**
K3BU	**1.8**	**1,152**	**33**	**24**
SP6IHE	**1.8**	**480**	**15**	**15**
*AJ1E	*	50,220	172	135
*AA1O	*	48,762	145	126
*W1EQ	*	40,136	133	116
*W1WEF	*	4,066	41	38
*K1VSJ	*	3,900	41	39
*K1RFD	*	850	19	17
***KG1V**	**14**	**131,544**	**266**	**232**
N2GC	**A**	**3,259,776**	**1632**	**653**
K2FU	**A**	**1,458,695**	**1053**	**497**
KA2MGE	**A**	**1,250,696**	**990**	**508**
K2SX	*	541,856	545	328
W2FUI	*	101,472	210	168
N2NC	**14**	**4,540,519**	**2135**	**853**
			(@N2RM)	
N2OO	*	35,160	142	120
K2YR	*	2,220	30	30
***KC2NTB**	**A**	**2,522,855**	**1411**	**635**
***WB2AA**	**A**	**1,332,000**	**983**	**480**
***K2UF**	**A**	**828,636**	**729**	**398**
*WW2P	*	244,035	410	255
*WA2BMH	*	117,401	230	167
*WA2MCR	*	100,450	238	175
*AI2I	*	89,748	230	162
*K2MK	*	65,560	172	149
*WA2VQV	*	62,034	185	147
*W2BEE	*	41,844	149	132
*K2CS	*	41,650	133	119
*W2NRA	*	40,414	147	121
*K2YEH	*	4,060	31	28
*K2TV	*	1,127	23	23
*KC2GOW	*	665	20	19
***N2GM**	**21**	**45,261**	**157**	**141**

NORTH AMERICA
UNITED STATES

AK1W	**A**	**8,650,704**	**3275**	**916**
			(Op: K5ZD)	
WC1M	**A**	**6,904,788**	**2548**	**867**
KT1V	**A**	**6,541,560**	**2505**	**810**
WK1Q	*	3,615,240	1817	705
			(Op: K1MK @K1TTT)	
KC1F	*	991,460	796	445

*W4KAZ	*	23,904	116	96
*K4BEV	*	18,048	96	96
*WDØQG	*	15,633	89	81
*WD4ELG	*	14,196	69	52
*W4CWA	*	8,525	57	55
*KA6R	*	7,865	81	65
*K6ETM	*	7,480	59	55
***KØCOP**	**14**	**59,792**	**167**	**148**
*K4OSO	*	21,996	104	94
*WADWHT	*	1,026	19	19
***N4IJ**	**7**	**884,585**	**623**	**403**
***WØYR**	**7**	**576,240**	**441**	**294**
*N3CZ	*	455,775	435	309
N2IC	**A**	**5,294,900**	**2578**	**800**
KZ5D	**A**	**1,994,845**	**1560**	**623**
N4OGW	**A**	**1,982,400**	**1370**	**600**
K4PV	*	1,895,465	1485	605
N5JR	*	620,044	588	409
K5YAA	*	224,812	395	259
NI5F	*	79,870	191	163
NN5AA	**28**	**182,406**	**515**	**258**
			(Op: K5NA)	
K2BA	**21**	**1,492,470**	**1206**	**618**
KE5AN	*	36	4	4
KN5G	**14**	**1,210,689**	**1004**	**579**
AD5Q	*	991,236	928	516
N5PU	*	20,640	106	96
K2UR	**7**	**907,800**	**710**	**408**
***K5WAF**	**A**	**302,527**	**384**	**283**
***K5WW**	**A**	**57,619**	**199**	**157**
***KE5CTY**	**A**	**40,386**	**169**	**127**
*K5GM	*	37,996	147	118
*KC5LK	*	17,340	103	85
*KB5NJD	*	11,011	97	77
*K5IB	*	2,747	43	41
***NEØP**	**21**	**1,100**	**20**	**20**
***KI5XP**	**14**	**22,077**	**107**	**99**
*KB5VTB	*	5,831	52	49
***K5JJ**	**7**	**1,092**	**14**	**14**
KM7W	**A**	**5,174,540**	**2525**	**805**
		(Op: N6MJ @ W6YI)		
KX7M	**A**	**3,125,776**	**1936**	**694**
WA6O	**A**	**2,741,232**	**1902**	**624**
N6AA	*	523,712	604	334
NF6V	*	431,964	574	338
W6TK	*	336,567	508	329
N6TV	*	297,255	460	285
KI6T	*	150,682	325	229
N5KO/6	*	80,000	217	160
NT6K	*	63,434	284	161
N6QQ	*	55,932	182	158
WA6BOB	*	33,488	165	112
N7LU	*	25,009	109	89
			(Op: N6NC)	
K6LRN	*	19,575	107	87
KO6LU	*	7,168	71	64
***WN6K**	**A**	**454,608**	**656**	**336**
***N6EM**	**A**	**236,344**	**441**	**248**
***KM6Z**	**A**	**166,551**	**401**	**231**
*WD6AVV	*	118,000	344	200
*AA6EE	*	101,493	283	179
*N6GL	*	100,859	323	173
*K6RAD	*	94,736	263	191
*NZ6K	*	81,483	268	173
			(Op: K6RB)	
*K6CSL	*	49,266	159	138
*W6NKR	*	45,510	142	123
*NK6A	*	44,196	163	127
*WW6D	*	39,125	151	125
*W6FRH	*	37,145	148	115
*K1USC	*	25,288	140	109
*K3KOA	*	21,854	132	98
*K6OWL	*	15,366	107	78
*W6RKC	*	13,774	73	71
*N6NIA	*	9,976	65	58
*N6PC	*	2,030	40	35
*KN6N	*	888	29	24
***KU6T**	**7**	**9,943**	**66**	**61**
***NP4IW/KF6**	**21**	**16,833**	**141**	**93**
***KG6HAF**	**14**	**2,275**	**38**	**35**
NK7U	**A**	**6,075,919**	**2648**	**853**
			(Op: KL9A)	
KR7X	**A**	**4,675,220**	**2231**	**790**
			(Op: KL2A)	
KN7NV	**A**	**3,108,072**	**1823**	**671**
			(Op: K7NV)	
K7QQ	*	2,260,050	1560	610
KO7X	*	828,064	1029	452
AI7B	*	712,300	664	419
			(Op: W7GG)	
N6HR	*	370,272	441	304
			(Op: N6HR)	
W7QN	*	340,827	568	309
NR7DX	*	265,188	439	287
			(Op: K7ABV)	
W7LKG	*	216,372	382	292
KS7T	*	112,112	276	196
W7BBC	*	91,314	233	178
N7RVD	*	23,793	117	103
W7YS	*	8,357	66	61
W7RG	**14**	**969,710**	**907**	**490**
K7GK	*	86,400	236	180
N7XY	*	46,690	161	145
WG7X	*	7,480	78	68
W7AYY	*	277	121	117
W7DRA	**3.5**	**15,680**	**94**	**70**
***N7ZG**	**A**	**585,288**	**714**	**396**
***K7ZZ**	**A**	**402,876**	**607**	**342**
***W7ZMD**	**A**	**340,080**	**505**	**312**
*W3CP	*	266,658	392	294
*AB7RW	*	261,876	455	314
*N6KW	*	175,208	341	242
*AE7DX	*	104,400	314	174
*W6RLL	*	102,176	286	206
*KC7NUP	*	98,820	344	183
*NG7Z	*	83,520	254	180
*K7TR	*	25,016	140	106
*NQ7R	*	22,100	144	100
*N7EIE	*	10,293	82	73
*K6UM	*	7,590	60	55
*K7UIR	*	3,250	29	26
***K8IA**	**14**	**891,695**	**892**	**511**
*W7AFA	*	2,800	37	35
W8MJ	**A**	**3,133,466**	**1951**	**721**
K8GL	**A**	**3,123,855**	**1639**	**705**
N8II	**A**	**2,849,688**	**1581**	**668**
N8PW	*	1,380,352	1028	512
K3WA	*	1,054,920	868	447
K2UOP	*	1,023,230	852	442
K8OQL	*	762,390	783	394
W8PN	*	350,428	508	293
KT8X	*	285,040	382	280
N8NQ	*	178,707	275	213
***K8IR**	**A**	**769,006**	**812**	**413**
***W8GOC**	**A**	**420,672**	**508**	**313**
***K9ALP**	**A**	**187,950**	**244**	**179**
*W8JGU	*	129,456	229	174
*AC8P	*	76,587	201	147
*K8AJS	*	42,828	149	129
*WB8JUI	*	40,710	133	118
*NF8M	*	31,096	114	104
*W8UE	*	30,856	144	116
*KN8J	*	9,664	70	64
*WØCG	*	1,495	24	23
***AF8C**	**14**	**19,760**	**99**	**95**
*KD8W	*	8,296	70	68
K9DX	**A**	**3,286,005**	**1841**	**705**
KK9K	**A**	**1,380,090**	**1308**	**537**
K2AAW	*	143,936	276	208
N9LYE	*	7,869	75	61
K9NW	**14**	**2,857,180**	**1618**	**766**
NE9U	**14**	**2,427,956**	**1552**	**716**
K9UQN	*	453,574	531	389
***K9BG**	**A**	**439,852**	**467**	**322**
***K1TN**	**A**	**357,903**	**504**	**299**
***K9WJU**	**A**	**113,971**	**201**	**143**
			(Op: W9CG)	
*W9OA/9	*	106,777	235	187
*K9OR	*	52,070	150	127
*K9XL	*	29,190	116	105
*KB9S	*	27,500	147	125
*N9SV	*	23,199	137	111
*W9AEM	*	13,578	73	73
*KG9LZ	*	13,013	96	77
*W9LYA	*	7,089	58	51
*K9PY	*	5,198	49	46
*NE9A	*	588	14	14
***K9CS**	**28**	**8,775**	**72**	**65**
***W9ILY**	**21**	**32,860**	**132**	**124**
***K9QVB**	**14**	**1,644,300**	**1151**	**630**
*K9OSH	14	3,939	39	39
KEØUI	**A**	**1,555,232**	**1312**	**524**
KØØU	**A**	**1,431,808**	**1266**	**544**
KØRAY	**A**	**895,818**	**1007**	**462**
KTØR	*	616,144	822	397
WØETT	*	340,054	510	319
KØJPL	*	258,912	441	279
NØAT	*	117,216	269	198
WS4Y	*	102,200	228	175
K4IU	*	25,608	102	97
KØFG	*	24,905	99	85
KØRI	**28**	**58,617**	**253**	**167**
KT5E	**21**	**577,545**	**689**	**417**
NØVD	**14**	**414,612**	**645**	**349**
KGØUA	*	209,137	311	283
KØCAT	*	84,480	212	176
			(Op: K9WIE)	
***NØBUI**	**A**	**461,970**	**680**	**354**
***KIØDY**	**A**	**386,722**	**684**	**322**
***KØCF**	**A**	**215,296**	**380**	**256**
*KØHW	*	143,880	397	218
*KØGSV	*	142,560	333	220
*KØPY	*	128,896	344	212
*KSØM	*	116,928	254	203
*KØAD	*	114,534	293	202
*WA2MNO	*	81,506	264	166
*KØRY	*	78,575	238	175
*WGØM	*	67,336	195	152
*WØQQS	*	41,138	162	134
*WAØIAF	*	28,072	147	116
*KØJV	*	2,380	28	28

BARBADOS

8P7A	**A**	**10,855,692**	**3651**	**906**
			(Op: W2SC)	

CUBA

***CO2JD**	**7**	**573,573**	**444**	**273**
*CO6LPB	*	240,126	281	186

ALASKA

NL7Z	**A**	**24,138**	**99**	**81**

US VIRGIN ISLANDS

WP2Z	**A**	**3,784,044**	**1635**	**654**
			(Op: WBØO)	

PUERTO RICO

***WP3C**	**A**	**3,211,372**	**1641**	**619**
***KP4JRS**	**14**	**4,144**	**38**	**37**

GREENLAND

***OX3KV**	**A**	**253,656**	**345**	**271**

COSTA RICA

***TI3M**	**A**	**1,942,600**	**1294**	**550**
			(Op: TI3TLS)	

BELIZE

V31JP	**7**	**3,587,580**	**1249**	**574**
***V31RA**	**A**	**2,593,668**	**1523**	**539**
			(Op: K9ZO)	

CANADA

VY2TT	**A**	**7,936,704**	**2989**	**864**
			(Op: K6LA)	
VE3JM	**A**	**6,555,276**	**2448**	**783**
VO1AU	**A**	**4,632,562**	**1882**	**649**
VE3VO	*	1,498,160	974	488
VE3CR	*	521,560	513	340
VC6X	**14**	**3,275,108**	**1801**	**734**
			(Op: VE6BF)	
***CG3DZ**	**A**	**5,813,395**	**2362**	**815**
			(Op: VE3DZ)	
*VE3KP	*	1,387,750	967	455
***VE1OP**	**A**	**1,358,181**	**916**	**459**
*VE3JAQ	*	1,347,042	966	461
***CG2AWR**	**A**	**1,269,360**	**976**	**430**
			(Op: VE2AWR)	
*VA3NR	*	1,088,349	844	409
*VA1MM	*	956,480	694	392
***VE6BMX**	**A**	**883,550**	**872**	**410**
***VE7XF**	**A**	**697,477**	**654**	**389**
*VA7ST	*	677,484	679	369
*VA1CHP	*	575,716	600	326
*VE3WG	*	509,184	502	306
*VA7LC	*	309,136	455	278
*VE2FK	*	303,396	393	262
***VE4YU**	**A**	**256,688**	**402**	**244**
*VE3OM	*	228,004	332	238
*VA3EC	*	204,204	289	204
*VE7WU	*	135,273	219	201
*VA3PL	*	109,446	217	174
*VE3MA	*	103,740	232	182
*K2NV/VE3	*	96,214	194	146
*VE6CNU	*	73,556	207	142
*VE3FH	*	67,456	164	124
*VA3HUN	*	63,928	158	122
*VA7CAB	*	46,683	171	117
*VE2FFE	*	16,388	71	68
*VE3RCN	*	13,440	79	70
*VE3XAT	*	6,812	54	52
***VO1MP**	**A**	**6,350**	**58**	**50**
*CF7JC	*	5,967	55	51
***VC6R**	**14**	**1,210,559**	**982**	**511**
			(Op: VE6RST)	
***VE3UKR**	**14**	**218,970**	**330**	**270**
***CG7NI**	**14**	**135,255**	**264**	**213**
***VE4MG**	**14**	**65,296**	**160**	**154**
***VE2HLS**	**14**	**30,076**	**113**	**103**
***VO1TA**	**14**	**8,910**	**64**	**55**
*CG2DWA	*	1,809	27	27
			(Op: LU7DW)	
***VE1NB**	**7**	**704,340**	**478**	**301**
***VE3TDG**	**7**	**287,651**	**334**	**203**
***VE3OSZ**	**3.5**	**130,615**	**206**	**151**

MEXICO

XE1MM	**A**	**708,975**	**714**	**345**
***XE1NW**	**A**	**94,950**	**196**	**150**
*XE2AUB	*	40,365	143	115
***XE1HSW**	**14**	**811,456**	**863**	**409**

AFRICA

AFRICAN ITALY

***IH9U**	**A**	**8,116,416**	**2726**	**756**
			(Op: OL5Y/OK1FUA)	
***IH9GPI**	**A**	**33,600**	**80**	**70**

TUNISIA

TS3B	**A**	**10,205,100**	**3261**	**828**
			(Op: YT1AD)	

GHANA

9GSFD	**A**	**6,251,204**	**2549**	**788**
			(Op: G3XTT)	

MADEIRA IS.

CT3BD	**A**	**453,169**	**452**	**323**
			(Op: CT3BD)	
***CT9A**	**A**	**8,109,332**	**2837**	**791**
			(Op: DH6RX)	
***CT3KU**	**28**	**10,904**	**64**	**58**
***CT3KN**	**7**	**1,196,832**	**551**	**364**

CAPE VERDE

D4B	**A**	**16,137,128**	**4678**	**1016**
			(Op: 4L5A)	
D44AC	**14**	**5,110,344**	**2134**	**802**
			(Op: RD3AF)	

CANARY IS.

***EA8ASJ**	**A**	**862,645**	**642**	**343**
***EA8/DK9IP**	**14**	**2,568,588**	**1358**	**638**
*EA8NQ	*	282,072	346	276

CEUTA AND MELILLA

***EA9/OL8R**	**A**	**4,425,806**	**1928**	**638**
			(Op: OK1FCJ)	

BURKINA FASO

***XT2JZ**	**A**	**625,222**	**551**	**346**
			(Op: SM5DJZ)	

REPUBLIC OF SOUTH AFRICA

ZS1EL	**A**	**31,776**	**113**	**96**
***ZS1AJS**	**A**	**43,092**	**132**	**114**
***ZS4JAN**	**28**	**225**	**9**	**9**

ASIA

AZERBAIJAN

***4K9W**	**A**	**745,602**	**614**	**363**
*4J6DWMF	*	511,159	545	341
			(Op: 4J7WMF)	

GEORGIA

4L8A	**14**	**5,404,455**	**2333**	**855**
***4L2M**	**14**	**1,879,278**	**1143**	**582**

SRI LANKA

4S7EXG	**A**	**265,406**	**395**	**262**

ISRAEL

4X1VF	**28**	**363,640**	**480**	**278**
***4Z5MU**	**A**	**579,768**	**584**	**357**
*4Z5LA	*	125,652	183	148
***4Z5FW**	**14**	**158,414**	**286**	**206**

CYPRUS

***C4M**	**A**	**3,757,184**	**1840**	**596**
			(Op: 5B4AGM)	

WEST MALAYSIA

9M2CNC	**A**	**2,975,232**	**1857**	**624**
***9M2FB**	**A**	**485,022**	**604**	**353**

SINGAPORE

9V1YC	**21**	**1,084,655**	**979**	**481**

UNITED ARAB EMIRATES

***A61M**	**21**	**253,614**	**351**	**258**

TAIWAN

***BU2AI**	**A**	**203,432**	**433**	**236**
***BX3AC**	**21**	**580,887**	**699**	**387**
***BV2WS**	**7**	**4,740**	**31**	**30**

CHINA

***BD1AAX**	**A**	**237,893**	**427**	**233**
***BG1DCG**	**A**	**104,668**	**240**	**191**
*BD3AF	*	51,220	181	130
*BG1AQH	*	47,215	139	133

KYRGYZSTAN

***EX2X**	**A**	**2,192,768**	**1408**	**592**
*EX2A	*	874,540	781	365

SOUTH KOREA

HL5UOG	**A**	**444,275**	**555**	**325**
HL3AHO	*	15,075	72	67
*HL9TY	*	141,934	316	206
*DS5DNO	*	96,138	286	147
*DS5KJR	*	14,673	130	67
***HL5BAP**	**21**	**30,723**	**209**	**147**
			(Op: HL5BAT)	
***DS2QJS**	**14**	**50,760**	**190**	**135**

THAILAND

***E21EIC**	**A**	**1,511,515**	**1140**	**583**
*HS8AC	*	569,485	733	371
			(Op: HSØ/OZ1HET)	
*E2ØYLM	*	9,912	62	59
***HS8KGG**	**21**	**41,268**	**130**	**114**
***HS8KAY**	**14**	**16,942**	**93**	**86**

SAUDI ARABIA

***7Z1SJ**	**21**	**68,376**	**188**	**148**

JAPAN

JH4UYB	**A**	**5,668,084**	**2309**	**788**
JA1JKG	**A**	**1,224,129**	**826**	**471**
JH6OPP	**A**	**532,677**	**568**	**353**
JA7DLE	*	483,276	550	309
JA1HP	*	349,621	465	313
JR3NZC	*	342,504	417	284
JA7IC	*	324,058	418	293
JA1QOW	*	267,028	370	241
JA2ZJW	*	242,307	376	247
			(Op: JH2SON)	
JA6BGA	*	238,791	310	249
JI1ALP	*	234,498	332	242
JF2BDK	*	217,828	299	236
JA1BNW	*	210,865	312	233
7J1ABD	*	66,693	168	129
JA2FSM	*	46,371	147	123
JA9NFO	*	40,737	123	111
JQ2EHD	*	13,192	72	68
JA1ISJ	*	495	17	15
JF2FIU	**21**	**1,652**	**29**	**28**
JA5APU	**14**	**733,905**	**677**	**423**
JA9CWJ	**14**	**449,108**	**476**	**346**
JS1PWV	*	325,022	423	326
JO7KMB	*	239,525	357	275
JM4WUZ	*	128,338	243	206
JA3DAY	*	96,120	198	180
JA1FWY	*	27,459	79	65
JL4LWL	*	4,104	40	36
JK1LUY	*	364	14	13
JA7MJ	**3.5**	**3,185**	**27**	**27**
JO1QZI	*	2,150	25	25
***JH2NWP**	**A**	**1,221,120**	**890**	**480**
***JA2KVB**	**A**	**483,990**	**544**	**365**
***JA2AXB**	**A**	**424,390**	**478**	**310**
*JA6CYL/6	*	399,244	465	302
*JA1CP	*	287,928	412	258
*JA7BME	*	276,480	347	256
*JA7LMZ	*	246,840	324	242
*JA4AQR	*	202,464	299	228
*JA1HTG	*	178,641	324	207
*JA1CPZ	*	172,480	278	224
*JA1BJI	*	170,247	268	201
*JH8BKP	*	158,461	276	211
*JH1FNU	*	152,325	285	225
*JA1PS	*	143,472	252	168
*JE1UKM	*	142,880	260	190
*JA1XRH	*	118,012	225	163
*JA4BAA	*	107,796	245	156
*JJ6TWQ	*	97,200	208	162
*JA4BDY	*	88,245	203	159
*JA1XPU	*	82,626	217	141
*JR7HOD/1	*	77,274	206	162
*JA1BUI	*	74,205	192	153
*JP1SRG	*	68,376	157	132
*JAØXZD	*	64,998	163	138
*JA1EMQ	*	53,868	152	134
*7N4CLJ	*	48,168	144	108
*JA3AVO	*	45,843	120	111
*7K2GMJ	*	44,982	134	102
*JK2VOC	*	40,456	144	104
*JA1IE	*	40,392	133	102
*JA1HG	*	32,760	113	90
*JA2KCY	*	26,013	107	87
*JA1HNW/1	*	24,119	102	89
*JA1IZ	*	20,945	94	71
*JAØBMS	*	17,304	94	84
*JJ4PPK	*	16,353	84	79
*JA7AEM	*	14,612	72	52
*JN7OJA	*	11,440	68	52
*JA2KKA	*	6,345	49	45
*JQ1AHZ/6	*	5,580	48	45
*7K1DPE	*	1,943	31	29
*JR1UMO	*	1,692	19	18
***JE2SOY**	**28**	**4,185**	**55**	**45**
*JE1ALA	*	792	24	22
*JA1AAT	*	242	12	11
***JF3BFS**	**21**	**317,376**	**412**	**304**
***JM1RPV/2**	**21**	**271,105**	**389**	**295**
*7K3OWM	*	230,285	351	265
*JJ1GOH	*	69,801	175	159
*7K1EQG	*	3,367	37	37
*JN1HYU	*	2,108	38	31
*JG1FGL/2	*	1,334	26	23
***JA1BPA**	**14**	**668,552**	**588**	**433**
			(Op: JA6-9330)	
***JR4GPA**	**14**	**286,377**	**423**	**273**
***JHØEPI**	**14**	**197,520**	**336**	**240**
*JE1REU	*	173,536	310	232
*JA1JQY	*	165,029	285	227
*JO3FUO	*	22,185	97	87
			(Op: JJ1BDX)	
*JA2KPV	*	20,812	98	86
*JH2OMM	*	6,860	54	49
*JHØNVX/1	*	2,656	33	32
*JE1CAC	*	1,080	20	20
*JA7AXP	*	377	13	13
*JA1LPV	*	341	11	11
*JG3EHD	*	108	6	6
*JL1LNC/Ø	*	84	6	6
***JE2UFF**	**7**	**304,200**	**304**	**225**
*JR5HXU	*	47,985	118	105
*JE1RRK	*	42,809	103	89
*JL2LFK	*	12,054	49	49
*JA1XEM	*	3,588	27	26
***JE1SPY**	**1.8**	**150**	**10**	**10**

TURKEY

***TA3DD**	**7**	**988,848**	**516**	**336**

ASIATIC RUSSIA

UA9CLB	**A**	**6,539,143**	**2477**	**743**
RX9AF	**A**	**3,593,700**	**1669**	**605**
UA9SP	**A**	**2,993,760**	**1532**	**560**
RZ9HG	*	2,197,939	1195	551
UA9CMQ	*	1,359,940	986	485
UA9FM	*	348,704	408	272
RA9ST	*	316,216	406	232
RX9TX	*	305,808	421	276
RW9TA	*	140,946	296	169
RW9WW	*	14,208	78	64
UA9KJ	**14**	**1,615,050**	**1064**	**555**
RV9JE	**14**	**1,453,424**	**1000**	**532**
RN9SXX	*	351,975	453	285
UA9HR	*	113,220	236	185
RV9SV	**1.8**	**10,530**	**49**	**39**
***RW9MD**	**A**	**1,242,112**	**890**	**512**
***UA9DD**	**A**	**1,165,350**	**834**	**457**
***UA9AOL**	**A**	**1,160,943**	**818**	**413**
*RA9XF	*	1,100,412	867	414
*UA9CBR	*	1,039,920	746	420
*RK9CR	*	1,008,522	755	387
*RX9FB	*	996,060	761	390
*UA9FGJ	*	794,005	656	379
*UA9XS	*	754,600	615	385
*UA9OA	*	604,062	529	333
*RX9AM	*	574,072	511	292
*UA9AX	*	530,660	497	338
*RW9OS	*	453,288	522	303
*UA9UCK	*	377,720	381	266
*RA9UN	*	355,114	432	277
*RU9CK	*	345,144	343	219
*RV9AZ	*	309,570	399	255
*UA9TW	*	291,096	410	234
*RA9AC	*	242,871	311	219
*UA9OV	*	216,733	341	209
*RX9WN	*	201,824	300	238
*RV9UF	*	186,874	335	223
*RU9UC	*	132,559	232	203
*RU9UG	*	100,128	226	168
*RV9UP	*	89,846	217	167
*RV9WZ	*	81,842	196	151
*UA9XMB	*	67,298	145	133
*RU9WB	*	35,442	134	99
*RM9AA	*	22,712	90	68
*RV9CQ	*	10,800	58	54
*UA9CHL	*	5,895	45	45
***UA9QA**	**28**	**110,554**	**235**	**167**
*RK9XXX	*	672	16	16
			(Op: UA9XC)	
***UA9AFS**	**21**	**439,488**	**490**	**327**
*RV9FT	*	156,005	271	205
*RA9XU	*	91,850	202	167
*RW9QA	*	8,904	60	53
***RX9TL**	**14**	**1,125,650**	**845**	**470**
***RA9KM**	**14**	**994,404**	**762**	**479**
***UA9CCL**	**14**	**752,675**	**643**	**425**
*RW9SZ	*	414,414	471	322
*RX9JW	*	274,219	369	257
*UA9APA	*	258,108	360	274
*UA9LAC	*	38,340	125	108
*RW9UU	*	21,141	95	87
*RV9WB	*	3,220	36	35
*RX9DJ	*	2,581	31	29
***UA9WQK**	**7**	**323,885**	**274**	**211**
***UA9QFF**	**3.5**	**4,050**	**29**	**27**
***UA9AL**	**1.8**	**32,944**	**92**	**71**
UABAZ	**A**	**1,920,240**	**1049**	**540**
RUØAW	**A**	**1,817,019**	**1087**	**519**
RAØZD	*	390,397	451	301
RAØFU	*	214,760	450	260
UAØLMO	*	49,005	247	135
UAØAGI	*	37,980	98	90
UAØBA	*	65	5	5
RKØUT	**14**	**505,920**	**596**	**372**
RAØAA	*	440,142	518	327
***RUØSN**	**A**	**1,021,682**	**819**	**409**
***UAØSR**	**A**	**714,058**	**693**	**361**
*UAØACG	*	284,532	396	262
*RWØUM	*	24,500	122	100
*RZØCQ	*	17,568	80	72
*RUØAE	*	10,659	65	57
***RAØCDF**	**21**	**58,135**	**197**	**151**
***RWØAJ**	**14**	**202,147**	**323**	**253**
*UAØSDX	*	34,155	135	115
***RAØAY**	**7**	**57,700**	**107**	**100**

UZBEKISTAN

***UK/JI2MED**	**A**	**798,708**	**773**	**484**

KAZAKHSTAN

UN6G	**A**	**2,294,080**	**1368**	**535**
UN2E	**A**	**1,300,152**	**883**	**436**
UP1G	*	1,249,150	957	430
UPØL	**14**	**3,380,512**	**1728**	**709**
			(Op: UN9LW)	
UN6LN	*	657,987	643	381
UN7GCE	*	172,312	282	238
***UN3M**	**A**	**3,646,335**	**1679**	**605**
***UN8GV**	**A**	**1,386,516**	**1079**	**454**
***UN7EX**	**28**	**16,940**	**88**	**77**
***UN4PO**	**21**	**26,125**	**101**	**95**
***UNØC**	**14**	**4,264**	**42**	**41**

HONG KONG

VR2BG	**A**	**2,596,050**	**1610**	**641**
***VR2XLN**	**14**	**24,158**	**103**	**94**

INDIA

***VU3RIC**	**A**	**36,520**	**152**	**110**
			(Op: DJ5IW)	

IRAQ

YI9LZ	**A**	**90,420**	**318**	**165**
***YI9VCQ**	**A**	**245,466**	**380**	**234**

UK BASES ON CYPRUS

ZC4LI	**A**	**6,499,094**	**2598**	**721**

EUROPE

CROATIA

9A8A	A	5,873,556	2822	897	
9A7D	28	303,933	679	353	
9A5RR	21	2,771,872	1918	752	
9A4W	14	2,191,652	1684	694	
9A9A	7	4,120,956	1682	711	
9A6A	3.5	646,020	690	370	
*9A3GI	A	645,975	797	405	
*9A5K	A	333,519	531	321	
*9A5CW	*	92,920	309	202	
*9A5YY	*	4,550	52	50	
*9A3VM	28	299,155	721	335	
*9A5ST	21	159,820	340	262	
*9A3B	14	2,511,600	1644	728	(Op: 9A1AA)
*9A4RV	3.5	69,003	193	153	
*9A3RE	1.8	95,934	271	177	

MALTA

9H1ZA	A	5,105,152	3140	832	
*9H6A	A	122,905	354	235	(Op: 9H1XT)

PORTUGAL

CS5A	A	7,699,740	3862	905	(Op: DF4SA)
CT8T	A	7,632,890	3607	886	
*CT7B	A	3,393,885	2207	737	(Op: CT1ILT)
*CT1IUA	*	425,528	546	344	
*CT1AOZ	28	246,645	469	315	
*CT4DX	14	101,218	254	229	
*CT/SM6PVB	*	4,263	51	49	

AZORES

*CU2JT	7	921,232	584	412	

GERMANY

DL3YM	A	5,270,664	2559	822	
DJ1YFK	A	4,619,746	2374	766	
DL4MCF	A	4,239,558	2265	743	
DK2OY	*	3,424,596	2045	708	
DL2OBF	*	3,330,586	2093	722	
DL5AWI	*	2,834,100	1814	705	
DL5YM	*	1,879,755	1442	565	
DL1RG	*	1,415,340	1149	540	
DL3EBX	*	625,646	694	406	
DJ9RR	*	455,250	614	375	
DF9DM	*	253,456	462	292	
DJ3IW	*	185,188	286	268	
DL5RBR	*	95,004	239	182	
DK4RL	*	87,264	268	202	
DF5ZV	*	80,136	187	159	
DL6RBH	*	62,453	207	173	
DL3JRA	*	10,400	93	80	
DL5KUT	14	944,052	948	521	
DL5JS	7	737,155	665	389	
*DF1IAQ	A	1,078,980	1087	490	
*DL9MRF	A	1,073,848	1095	499	
*DK5IM	A	925,430	1008	470	
*DL1NKS	*	861,645	905	465	
*DL1ARJ	*	693,264	850	429	
*DL1DTC	*	534,660	685	399	
*DL7UMK	*	480,424	676	373	
*DL1NEO	*	446,590	607	370	
*DL8UNF	*	443,110	660	365	
*DM5JBN	*	428,340	641	354	
*DL1ANT	*	421,060	645	370	
*DL8DWW	*	399,000	643	350	
*DL4HRM	*	372,504	565	332	
*DL1TH	*	372,372	571	341	
*DJ2IA	*	353,362	506	323	
*DJ8UV	*	346,800	538	340	
*DL5CD	*	326,400	546	320	
*DL1RTL	*	276,048	493	284	
*DL8UKE	*	267,750	449	306	
*DL1BBO	*	249,696	421	289	
*DJ1OJ	*	246,120	409	280	
*DJ8QP	*	195,640	377	268	
*DL7RV	*	178,618	356	253	
*DL8UFO	*	134,064	292	228	
*DL1DVN	*	131,433	315	227	
*DJ2MX	*	129,360	272	220	
*DJ2AX	*	106,872	313	219	
*DL3DRN	*	94,870	244	179	
*DL1DQW	*	89,043	253	201	
*DF6WE	*	84,920	284	193	
*DF1HF	*	83,559	210	173	
*DL3BBY	*	74,239	266	187	
*DL2GBB	*	71,022	223	178	
*DH3FAW	*	60,000	193	160	
*DL5AZZ	*	59,040	221	160	
*DL3KVR	*	41,720	174	140	
*DO4DA	*	36,378	146	129	
*DL6UAM	*	35,620	152	130	
*DL5KUD	*	32,604	149	132	
*DL7UXG	*	32,568	142	118	
*DL9AWI	*	27,183	144	123	
*DL9NDS	*	24,080	125	112	
*DL8HCO	*	23,632	138	112	
*DL4SUN	*	19,908	96	79	
*DL7BA	*	18,286	113	82	
*DL5ASK	*	17,760	117	96	
*DL5LYM	*	16,815	95	95	
*DL8DXL	*	16,182	118	93	
*DK8RE	*	15,106	98	91	
*DAØPSA	*	13,440	100	80	
*DL5CE	*	12,218	101	82	
*DL2AXM	*	7,420	77	70	
*DL7VRG	*	7,150	73	65	
*DB7MA	*	6,592	67	64	
*DJ4KW	28	8,050	77	70	
*DL2MIH	21	37,630	155	142	
*DL5FCO	*	1,728	39	36	
*DO1IM	14	149,328	339	272	
*DL8CA	*	24,642	116	111	
*DL4AAE	*	5,934	51	46	
*DL1APX	*	1,638	40	39	
*DL7BY	7	890,216	771	446	
*DK7YY	7	792,022	707	407	
*DL4JYT	*	326,960	465	305	
*DL5YL	*	206,573	344	251	
*DL1EMH	*	125,590	277	190	
*DK7GH	*	46,845	144	135	
*DL2ZA	*	3,948	46	42	
*DJ6BQ	1.8	46,376	177	136	
*DLØDBO	*	162	10	9	(Op: DL2ZA)

SPAIN

AM3KU	A	4,789,088	2749	824	(Op: EA3KU)
AN5FV	A	4,216,008	2821	776	(Op: EA5FV)
EA2LU	14	27,348	188	129	
*EA7RM	A	2,469,851	1829	617	
*EA7TN	A	1,076,928	996	474	
*AM4DRV	A	1,076,911	1243	517	
*EA5BM	*	659,691	901	461	
*EA3ALV	*	310,408	463	322	
*EA7GV	*	245,622	455	282	
*EA4NP	*	215,397	373	273	
*EA5GQM	*	81,404	250	188	
*EA3AXM	*	68,442	223	187	
*EA5UF	*	60,640	219	160	
*EA3AVV	*	48,240	168	134	
*EA1VM	*	47,955	192	139	
*EA7CWA	*	47,601	160	129	
*EA7TG	*	32,754	149	106	
*EA5VN	*	22,035	115	113	
*EA7CA	*	12,640	93	80	
*EA3CWT	*	7,788	63	59	
*AN1FBJ	*	5,858	60	58	
*AN7NW	*	1,254	26	22	
*AM7KJ	21	203,705	459	311	
*EA2BOV	*	158,484	394	282	
*EA2BNU	14	378,852	548	393	
*EA1ND	*	252,175	445	275	

BALEARIC IS.

AM6IB	21	3,063,543	2225	791	(Op: EA3ALZ)

IRELAND

EI4DW	A	362,894	477	343	
*EI7CC	*	41,789	173	131	
*EI4CF	21	282,424	529	344	
*EI9JN	*	63,920	270	188	

MOLDOVA

ER2CQ	A	351	13	13	
*ER100	A	37,947	99	91	
*ER3ZZ	*	21,168	126	108	

ESTONIA

ES2DJ	A	112,200	266	220	
ES2EZ	3.5	81,506	227	166	
*ES8DH	A	179,866	397	278	
*ES7FU	*	18,100	124	100	
*ES4MM	28	25,212	159	132	
*ES4RD	14	79,838	242	191	
*ES6PZ	1.8	96,300	248	180	

BELARUS

EU1PA	A	2,096,180	1779	643	
EW3LN	*	701,844	752	429	
EW2AA	14	1,067,066	1047	574	
EU1AZ	7	1,429,023	1027	503	
EW7LO	*	919,494	796	414	
EW8CY	*	701,952	671	384	
*EU4LY	A	477,303	750	389	
*EW6GL	*	188,496	346	264	
*EW6EW	*	76,426	271	206	
*EU1SA	21	261,360	512	330	
*EW1CQ	14	777,701	879	523	
*EU3AR	1.8	512	16	16	

FRANCE

TM9C	A	4,355,894	2459	746	(Op: F5IN)
F8BPN	*	897,744	933	472	
F6CXJ	*	111,360	250	192	
TM6X	7	2,290,400	1192	560	(Op: F5VHY)
TM9R	7	2,176,450	1189	551	(Op: F6IRA)
*F5RRS	A	650,944	826	448	
*F5OF	A	394,301	557	353	
*F5SGI	*	378,230	547	347	
*F5INJ	*	315,206	571	346	
*F5UKL	*	106,200	288	200	
*F8AAN	*	12,546	119	82	
*F8CRH	*	1,247	31	29	
*F6FTB	21	209,300	386	299	
*F5JY	*	122,876	274	221	
*F5NOD	14	886,440	962	534	
*F4DNW	*	149,248	309	256	
*F5PIQ	*	131,157	281	247	

ENGLAND

G5W	A	5,395,300	2836	815	(Op: G3BJ)
G3TXF	A	2,924,813	1951	713	
GØWKW	A	2,830,640	1938	656	
G4BJM	*	1,649,200	1342	560	
G5X	*	1,146,225	1131	493	(Op: G4RCG)
G4KFT	*	643,867	747	413	
G4SGI	*	305,082	491	306	
G6M	21	711,924	909	492	(Op: MØCCE)
M3C	14	290,700	553	340	(Op: GØVQR)
*GØMTN	A	1,378,045	1440	529	
*G3KKQ	A	753,858	840	434	
*G4GDY	A	577,896	775	398	
*G3RSD	*	456,246	674	357	
*G3JJZ	*	330,238	504	326	
*G4DDX	*	235,436	389	284	
*MØGMB	*	109,180	304	206	
*G3ZRJ	14	184,977	369	279	
*GØMRH	*	24,180	138	130	
*G4ZOB	7	460,290	442	335	

NORTHERN IRELAND

GI4KSH	A	177,360	313	240	

SCOTLAND

GM3WUX	A	760,487	943	427	
GM4SID	*	295,800	467	300	
*GM3CFS	21	174,498	361	287	

GUERNSEY

MUØFAL	7	33,456	134	102	

WALES

GW3NJW	21	1,109,544	1238	557	
*GW4MVA	A	247,422	358	301	
*MWØYDX	*	40,600	166	140	
*GC4TTA	14	245,862	429	314	(Op: GW8ETF)

HUNGARY

HA8FM	A	4,260,685	2299	767	
HA8VK	A	1,621,004	1517	554	
HA5KKC	21	1,026,504	1070	538	(Op: HA7SBQ)
HG4I	7	751,875	607	375	
HG8R	3.5	917,428	844	422	
HA3LI	3.5	542,544	650	356	
HG3M	1.8	284,479	456	277	(Op: HA3MY)
HA8BE	1.8	211,435	395	245	
*HA1SN	A	38,676	177	132	
*HA8TP	28	150,321	433	267	
*HG8L	14	1,872,645	1493	655	
*HG4F	14	1,327,270	1181	566	
*HA6IAM	*	523,026	682	441	
*HA3JB	*	392,265	657	379	
*HA3MU	*	349,148	522	382	
*HA9PP	*	203,534	373	298	
*HA8CQ	*	127,428	310	246	
*HA7AP	*	106,898	291	226	
*HA6NL	7	1,018,248	795	462	
*HA8KW	3.5	390,616	504	314	

SWITZERLAND

HB9APJ	A	257,100	453	300	
*HB9CZF	A	971,598	991	498	
*HB9ARF	A	969,610	1049	470	
*HB9HQX	*	159,278	362	217	
*HB9SVT	*	114,534	244	189	

ITALY

IN3QBR	A	2,029,201	1585	607	
IK2UCK	A	1,433,544	1316	552	
IK2AOO	*	427,556	565	356	
I7/9A3A	*	308,140	519	310	
IY4W	21	2,509,523	1749	731	(Op: IK4ZGO)
IO3P	14	3,118,544	1994	754	(Op: IV3SKB)
IR4X	7	3,754,960	1583	680	(Op: IZ3EYZ)
*IA5/OK2WH	A	1,040,116	1249	484	
*IZ3DBA	A	429,392	664	376	
*I6FDJ	*	209,137	466	283	
*IK2NUX	*	200,548	366	277	
*IK2ULV	*	95,342	288	193	
*IK3OII	*	73,470	201	186	
*IV3DYS	*	53,820	182	156	
*IK2CZQ	*	40,183	162	143	
*IV3ARJ	*	29,889	148	123	
*IV3KSE	*	21,978	124	99	
*IZ1DXS	*	20,274	103	93	
*IZ4DYX	*	17,112	108	92	
*IK2NCF	*	11,431	75	71	
*IZ7EUB	*	8,568	74	63	
*IV3HYD	*	7,497	63	63	
*IK4DCS	28	17,300	123	100	
*IZØBXZ	*	6,240	70	65	
*IR2M	21	110,032	269	208	(Op: IZ2FDU)
*IØQM	*	3,534	41	38	
*IU1R	14	752,496	930	514	(Op: IK1PMR)
*IK2WXQ	*	138,595	377	265	
*IN3OWY/2	*	46,816	174	154	
*I2JIN	*	25,312	124	112	
*IZ8GCB	7	117,288	232	181	
*I7PXV	3.5	221,440	369	256	
*I5NXH	3.5	33,516	135	114	

SARDINIA

*ISØOMH	A	218,890	424	265	

SICILY

IT9ESW	A	293,700	618	300	
IT9ZAU	*	34,056	180	129	
IT9GXE	21	11,616	94	88	
*IT9ORA	A	1,025,662	1118	506	
*IT9LWP	21	97,383	323	227	

NORWAY

LI6FJA	A	978,036	928	447	
LI9DFA	14	327,339	523	333	(Op: LA9DFA)
*LI3S	A	1,681,336	1532	584	(Op: LA3BO)
*LA8OM	A	928,725	1165	435	
*LG5LG	*	480,249	719	363	(Op: DL3KWR)
*LI6CF	*	295,918	415	322	(Op: LA6CF)
*LA1YE	*	119,214	325	222	
*LI1PHA	*	58,680	199	163	
*LI6PB	*	53,223	208	157	(Op: LA6PB)
*LA7SI	*	17,313	96	87	
*LA1QDA	14	180,600	434	301	
*LI9WDA	*	63,954	214	187	(Op: LA9WDA)
*LI8WG	7	128,640	257	201	

LUXEMBOURG

LX7I	A	4,898,400	2534	785	(Op: DL4SDW)
LX1NO	21	386,580	674	379	
LX6T	7	228,950	389	241	

LITHUANIA

LY2FN	A	1,785,020	1602	596	
LY2OX	A	1,542,516	1283	573	
LY4CW	A	1,419,600	1336	560	
LY2MM	*	677,250	753	430	
LY7M	1.8	204,240	380	240	(Op: LY2BW)
*LY2LF	A	804,600	990	447	
*LY2OM	A	415,233	577	351	
*LY3CY	A	207,966	457	274	
*LY1BX	*	202,958	433	266	
*LY2AT	*	201,196	423	281	
*LY2DX	*	104,220	255	193	
*LY4AF	*	14,964	96	86	
*LY9A	14	1,968,659	1559	691	(Op: LY3BA)
*LY3ID	*	109,044	300	234	
*LY2BNL	7	1,520	20	20	
*LY5A	3.5	521,937	647	351	(Op: LY2PAJ)
*LY1CT	3.5	438,557	591	329	
*LY3CW	3.5	242,262	433	258	
*LY2OU	1.8	61,712	204	152	

BULGARIA

LZ6A	A	2,152,120	1959	622	
LZ2PL	A	1,543,960	1563	580	
LZ1BJ	A	1,296,900	1294	550	
LZ1AQ	*	845,184	967	496	
LZ2BE	*	123,354	422	231	
*LZ8IARU	A	2,024,620	1762	599	(Op: LZ3YY)
*LZ5XQ	A	1,015,740	1253	486	
*LZ1QV	*	354,863	455	361	
*LZ7H	*	313,612	575	326	(Op: LZ2ITU)
*LZ2FV	*	36,039	157	123	
*LZ4BU	*	5,076	49	47	
*LZ2GS	28	177,878	417	302	
*LZ1IS	*	69,972	266	204	
*LZ1EP	14	4,902	43	43	
*LZ2ZG	7	41,769	133	117	
*LZ3NY	*	5,832	37	36	

AUSTRIA

OE4A	A	6,303,594	2938	894	(Op: OE1EMS)
OE5ØG	A	1,834,972	1453	566	(Op: DK5AD/OE2BZL)
OE5ØTKW	*	272,616	392	296	(Op: OE1TKW)
OE3I	14	1,654,434	1317	642	(Op: OE1JNB)
OE5ØZKC	3.5	426,098	602	314	(Op: JH4RHF)
*OE6V	A	1,421,680	1344	520	(Op: OE5CWL)

FINLAND

OH1F	A	4,504,027	2471	803	(Op: OH1MDR)
OH2VZ	*	271,128	428	286	
OH1BOI	*	7,350	73	70	
OH8L	14	2,366,208	1742	711	(Op: OH8LQ)
OH2BAH	*	79,712	206	188	
OH3MEP	3.5	193,600	367	242	
*OH1MA	A	4,830	50	42	
*OH2FS	21	13,585	95	95	
*OH2BPA	7	140,817	269	217	

CZECH REPUBLIC

OK2PDT	A	1,383,152	1276	548	
OL4M	A	1,339,260	1289	510	
OK1AYY	*	228,112	405	269	
OK1FRO	*	88,536	250	204	
OK5DX	14	1,684,660	1298	655	(Op: OK1TN)
OK1RF	7	3,944,040	1586	690	
OK1DG	7	1,727,208	985	552	
*OL6P	A	2,166,223	1669	631	(Op: OK2WTM)
*OL6Z	A	1,747,422	1513	579	(Op: OK2DU)
*OK2YT	A	1,527,318	1218	549	
*OK1HX	*	1,488,186	1298	558	
*OK1VD	*	1,421,460	1215	530	
*OK2PTZ	*	1,265,616	1233	528	
*OL6T	*	1,141,788	1095	493	(Op: OK1DCF)
*OK1ZP	*	931,823	933	457	
*OK1GS	*	773,388	815	434	
*OK1IBP	*	761,504	890	424	
*OK1DKO	*	733,590	733	418	
*OK1BA	*	612,479	731	413	
*OK2PHC	*	587,448	762	398	
*OK1AJR	*	579,439	644	413	
*OK1FCA	*	523,740	604	406	
*OK2KJ	*	495,516	621	357	
*OK1FMG	*	428,840	675	355	
*OK2BNC	*	333,540	558	340	
*OK1TFH	*	239,616	366	288	
*OK2PYA	*	210,250	445	290	
*OK2ZJ	*	175,644	397	246	
*OK2BJ	*	150,285	310	233	
*OK2VX	*	146,750	357	250	
*OL2PBG	*	139,120	244	188	
*OK2BND	*	128,310	304	210	
*OK2SWD	*	111,776	285	224	
*OL7G	*	26,015	133	121	(Op: OK1FPG)
*OK2PMS	*	21,518	124	106	
*OK1ANP	*	7,800	70	60	
*OK1DSU	*	1,924	28	26	
*OK2CLW	28	10,164	84	77	
*OK1XC	*	5,148	55	52	
*OK2EQ	14	421,776	572	404	
*OK1MMN	14	209,070	366	303	
*OK2TBC	*	122,187	285	241	
*OK2BRA	*	60,725	241	175	
*OK1BLU	*	51,035	197	173	
*OK5SWL	*	3,150	46	45	(Op: OK2SWD)
*OL7P	7	605,101	587	371	(Op: OK1CRM)
*OK1AY	*	520,256	554	352	
*OK2PXD	3.5	73,440	224	153	
*OK1JOK	1.8	73,224	230	162	
*OK2PWJ	1.8	53,482	182	143	
*OK1DXK	*	30,780	139	114	
*OK1KZ	*	1,325	25	25	

SLOVAKIA

OM3OM	A	2,063,264	1655	604	
OM7JG	14	3,218,334	1878	777	
OM7PY	7	481,636	487	347	
OM3ZWA	3.5	358,416	494	304	
*OM5CD	A	1,928,572	1441	604	
*OM8ON	A	1,216,014	1004	521	
*OM4DN	A	1,039,916	1082	499	
*OM4W	*	472,626	640	363	(Op: OM4KW)
*OM1AF	*	472,048	644	362	
*OM3CFR	*	273,296	462	304	
*OM4DA	*	201,938	440	274	
*OM7AG	*	184,440	397	265	
*OM3TLE	*	100,368	292	204	
*OM1AW	*	99,632	264	208	
*OM3BA	*	89,244	246	201	
*OM7AT	*	87,984	302	188	
*OM7YC	*	41,020	169	140	
*OM2EE	14	124,540	329	260	
*OM2AK	*	53,504	210	176	
*OM4WW	7	462,737	495	341	
*OM8AQ	*	128,641	247	197	
*OM3CDN	3.5	79,048	216	164	
*OM6TX	3.5	43,625	165	125	

BELGIUM

*OO6NR	A	1,927,708	1425	587	(Op: ON4RU)
*ON4XG	A	176,326	399	262	
*ON5SV	*	170,556	391	244	
*ON5WL	*	157,740	352	239	
*OR5G	*	154,037	301	221	(Op: ON4KJ)
*ON9CTZ	14	960,300	1036	550	
*ON4KVA	*	9,711	87	83	

FAROE IS.

OY1CT	A	1,920,548	1922	607	

DENMARK

OZ/RZ9OU	14	1,171,750	1172	545	
*OZ8AE	A	1,167,859	1096	523	
*OZ5DL	A	316,863	496	323	
*OZ1BMA	*	251,937	492	301	
*OZØF	*	174,195	402	245	
*OZ5DX	*	81,567	227	171	
*OZ4EL	*	76,140	272	188	
*OZ5WQ	*	74,643	231	179	
*OZ4FF	*	38,352	160	136	
*OZ4RT	*	275	11	11	

THE NETHERLANDS

PA4A	A	1,207,170	1106	526	
PAØJNH	*	683,218	764	422	
PAØLOU	*	180,245	347	235	
PAØBWL	7	120,576	240	192	
PA5A	1.8	1,711	30	29	
*PA3BFH	A	1,189,116	1157	493	
*PA3AAV	A	1,153,866	1075	498	
*PG7V	A	783,054	1003	459	
*PA3EMN	*	539,766	697	382	
*PA3DJY	*	330,480	498	324	
*PA3ARM	*	229,887	428	287	
*PAØLSK	*	67,710	237	183	
*PA2R	*	64,713	203	159	
*PG4I	*	63,612	208	171	
*PA3GBI	*	52,164	197	161	
*PA3EZC	*	36,790	166	130	
*PA7HPH	*	29,606	150	131	
*PAØLRK	*	24,198	116	109	
*PA2WJZ	*	1,372	29	28	
*PA2ALF	*	403	13	13	
*PA3ADJ	14	30,030	137	110	
*PAØMIR	7	22,161	95	89	
*PA3GVI	*	13,662	86	69	

SLOVENIA

S58A	A	6,133,219	2971	817	
S56A	A	2,899,827	1931	687	
S52A	*	1,297,855	1034	533	
S52X	*	52,272	173	132	
S58P	28	394,440	786	380	
S51FB	21	164,780	347	220	
S56M	14	2,862,217	1793	757	
S53O	14	2,608,939	1741	731	
S52EZ	*	1,842,732	1353	612	
S5ØA	7	3,602,565	1563	669	
*S52OP	A	2,451,645	1784	645	
*S54X	A	1,044,015	936	489	
*S57U	A	997,269	1059	507	
*S51MF	*	269,100	387	276	
*S58RU	*	144,474	370	242	
*S57S	28	229,191	549	317	
*S51J	21	231,900	419	300	
*S5ØDX	14	34,425	147	135	
*S58WW	*	24,653	117	89	
*S51W	7	1,725,008	1026	524	
*S57Z	7	1,293,200	879	488	
*S54A	*	1,138,100	827	475	
*S53F	*	1,036,672	794	448	
*S57L	3.5	489,086	623	338	
*S59N	3.5	460,872	598	333	

SWEDEN

8S5A	A	3,674,384	2416	742	(Op: SM5AJV)
SE5CCE	A	625,056	820	408	
SM6E	*	449,827	545	359	(Op: SM6FUD)
SM2CEW	14	1,762,881	1455	667	
SJØSAS	*	312,390	534	351	(Op: SM5QU)
SE2YIZ	7	220,116	338	249	(Op: SM2YIZ)
8S5X	3.5	241,152	419	256	(Op: SM5HJZ)
SLØW	1.8	99,671	252	187	(Op: SMØAJU)
SE4DHF	*	3,696	45	42	(Op: SM4DHF)
7S3C	*	2,975	39	35	(Op: SM3CCM)
*SJ9WL	A	814,350	978	445	
*SM7EH	A	326,268	607	318	
*SAØQ	A	236,082	551	294	(Op: SMØOGQ)
*SM7BJW	*	174,246	361	257	
*8SØW	*	166,560	324	240	(Op: SMØNJO)
*SM5AOG	*	127,206	281	222	
*SEØBDS	*	94,432	249	208	
*8S6T	*	55,484	176	143	(Op: SM6WET)
*SMØOGQ	*	35,258	158	122	
*SE6DER	*	23,976	139	111	(Op: SM6DER)
*SK5BN	*	15,366	86	78	(Op: SM5AQI)
*SJ6KY	*	15,308	90	86	(Op: SM6DER)
*SMØOY	*	5,450	59	50	
*SM3EAE	*	540	21	20	
*7S7V	21	488,910	733	430	
*SEØPSO	14	1,081,773	1061	539	(Op: SMØPSO)

*8SØF	"	178,180	434	302
			(Op: SMØOGQ)	
*SM7BQX	"	9,120	86	80

POLAND

SP2LNW	A	1,212,219	1184	513
SP2QG	A	1,011,082	836	446
SP6A	A	995,841	1038	479
SP9LJD	"	471,541	682	371
SP6LMQ/9	"	134,756	348	236
SP4AVG	"	122,382	330	234
SQ7B	"	64,500	222	172
SN2M	"	60,496	195	152
			(Op: SP2XF)	
SP3KPN	"	405	19	15
			(Op: SP3GXU)	
SP2MHC	21	17,271	117	101
SP2JGK	14	45,090	216	167
SN7Q	3.5	1,224,350	973	470
			(Op: SP7GIQ)	
SO2R	3.5	1,148,353	953	467
			(Op: SP2FAX)	
SP2HMT	1.8	60,648	196	152
*SP4JCQ	A	2,257,602	1679	641
*SP5KEH	A	1,855,179	1470	571
			(Op: SP5JTF)	
*SP6LV	A	1,404,988	1307	533
*SQ9UM	"	1,109,310	1061	515
*SP2DNI	"	673,220	918	410
*SQ9MZ	"	572,460	684	406
*SP5ATO	"	539,392	592	448
*SP6BEN	"	524,165	675	395
*SP9UMJ	"	510,840	652	430
*3Z8Z	"	473,301	615	387
*SP7IIT/6	"	374,760	663	360
*SP8JUS	"	323,050	508	325
*SP3OL	"	315,571	552	323
*SP9EMI	"	293,232	502	328
*SP3KCL	"	200,880	432	279
			(Op: SP3FLR)	
*SP9FT	"	181,041	401	259
*SQ9ZM	"	178,284	352	249
*SP5CGN	"	155,000	333	250
*SP8FHJ	"	149,314	390	242
*SP6IEQ	"	116,812	281	212
*SN6A	"	110,744	308	218
			(Op: SP6CES)	
*SP3HC	"	86,330	247	194
*SP9IHP	"	65,608	179	118
*SP3DOF	"	56,052	251	162
*SP4AAZ	"	54,060	198	170
*SP7FBQ	"	51,824	205	158
*SP2GCE	"	48,015	181	165
*SP2MKI	"	43,428	168	141
*SP9IBJ	"	33,785	171	145
*SP5XOV	"	22,260	121	106
*SP2SGN	"	20,570	123	110
*SP1DTG	"	14,560	84	70
*SP6DNZ	"	14,536	96	92
*SP1BLE	"	9,976	122	58
*SP6DHH	"	8,740	84	80
*SP5ULV	"	8,568	64	63
*SP2AYC	"	8,150	62	50
*SP1HJK	"	6,435	56	55
*SQ9IWT/8	"	3,978	58	51
*SP6CZ	"	646	17	17
*SQ6ELV	28	73,968	260	201
*SP2AVE	21	343,332	575	374
*SP2JLR	21	152,139	319	249
*SP9DLY	"	125,840	314	242
*3Z6V	"	20,020	124	110
			(Op: SP6DVP)	
*SP8BAB	14	541,120	648	445
*SQ9E	"	40,468	198	151
*SP6DMI	"	18,232	118	106
*SQ5EK	"	690	16	15
*SP3FYX	7	963,792	835	432
*SP5CNA	7	757,200	690	400
*SP3GTS	"	480,165	519	357
*SP2HPD	"	403,200	473	320
*SP3ASN	"	230,144	324	256
*SP9XCN	3.5	395,280	552	324
*SN5J	3.5	232,670	419	265
			(Op: SP5JXK)	
*SP8NR	3.5	207,713	378	253
*SP9DUX	3.5	4,186	48	46
*SP6M	1.8	4,275	47	45

GREECE

SV1DPI	A	1,496	42	34
SZ1A	14	1,026,630	1126	561
			(Op: SV1DPJ)	
*SV1ENG	A	297,778	543	338
*SVØXAI/9	"	37,908	199	156
*SV1BJW	21	248,085	625	333

DODECANESE

*J45KLN	A	447,122	702	377
			(Op: SMØCMH)	

BOSNIA-HERZEGOVINA

T93M	A	4,908,550	2676	773
T9ØO	28	624,262	1092	457
			(Op: T94DU)	
T93Y	21	2,955,304	1932	781
T93C	21	2,249,692	1731	692
T94GZ	14	197,325	355	225
T99W	3.5	603,100	659	370
*T97G	28	275,391	693	333
*T94FC	21	1,216,800	1190	585
*T92M	"	135,945	341	265
*T94OM	7	664,845	697	381
*T99Z	1.8	120,315	282	195

ICELAND

TF4M	A	992,124	1016	508

CORSICA

*TK9A	A	5,526,918	3072	834
			(Op: S51TA)	
*TK/HAØHW	"	534,650	744	370

EUROPEAN RUSSIA

RA3CO	A	5,644,940	3060	854
RZ3AZ	A	4,174,755	2639	813
RT3T	A	3,307,093	2299	743
			(Op: UA3TU)	
UA3QDX	"	3,009,573	2249	713
UA3TCJ	"	2,933,469	1818	693
RN4WA	"	2,407,353	2071	663
UA4SU	"	1,310,855	1297	559
UA4SAW	"	1,239,933	1315	537
RW1ZA	"	1,215,768	1098	537
RA3UT	"	1,153,600	1204	515
RA1OJ	"	1,023,534	984	563
RA3SL	"	961,136	1169	473
UA3LEO	"	889,168	1056	467
UA4PN	"	851,848	1035	457
RA6CZ	"	828,938	1038	451
RU6YY	"	544,065	810	415
RK3WP	"	537,600	827	400
RA3TT	"	438,981	623	393
RV1AT	"	364,896	531	336
UA3ICK	"	201,930	441	265
UA4LY	"	170,430	295	247
RA3RK	"	65,048	244	173
RV1CC	"	58,460	175	148
RW6FO	"	48	4	4
RA6DB	21	615,170	781	454
UA3DEE	"	163,392	398	276
RA3CW	14	3,519,600	1986	840
RU3AA	14	2,193,459	1617	697
RW6CF	7	714,808	626	398
UA6AKD	"	210,456	326	237
UA6JFG	1.8	8,970	71	65
*UA4FER	A	3,229,568	2199	736
*RW3GB	A	2,150,628	1718	647
*RU4SS	A	1,566,320	1415	560
*RN6AH	"	1,529,815	1578	545
*RU3FF	"	1,231,230	1385	546
*UA3ABJ	"	1,183,534	1209	506
*UA4LU	"	1,178,544	1321	516
*RV3QX	"	1,145,171	1205	527
*RA3NZ	"	1,123,866	1193	522
*RA3DHS	"	1,042,654	1104	502
*RN4SS	"	917,445	1119	465
*RW4FO	"	908,208	1018	476
*UA4SMM	"	860,660	1014	460
*UA4FEN	"	799,504	994	428
*RX3ZX	"	656,726	791	427
*UA1CEC	"	607,220	840	388
*RA3XO	"	603,694	831	434
*RV3FI	"	583,947	815	403
*RW6HJV/6	"	581,150	839	394
*RK4HD	"	559,728	512	507
*RV3LO	"	453,417	586	359
*RA1QX	"	407,362	541	353
*UA4ALI	"	386,780	683	332
*RV3LQ	"	370,440	634	360
*RN6FA	"	369,434	488	338
*UA6ECU	"	358,237	593	319
*RU3UN	"	356,320	495	340
*RX4HB	"	351,648	599	333
*RX3RZ	"	317,520	611	324
*RU4WE	"	312,555	499	311
*RU4LM	"	286,304	383	368
*RA1QN	"	254,592	448	288
*RW6AH	"	230,356	428	266
*RA3FH	"	200,880	395	270
*UA3ABW	"	196,080	353	240
*UA3AKI	"	194,256	433	304
*RV4AQ	"	147,168	391	219
*UA3DMO	"	145,730	307	247
*RU3XB	"	145,644	358	229
*RW3TA	"	142,568	390	251
*UA3DOM	"	119,925	295	225
*RX3MM	"	118,984	308	214
*RD3FT	"	118,876	364	226
*RX3DVF	"	117,030	297	249
*RV3DND	"	110,565	265	195
*RW4AD	"	71,478	258	171
*RA3UAG	"	59,360	214	160
*RK4CYW	"	58,058	164	143
			(Op: RA4CEO)	
*RV3DCL	"	33,024	170	129
*RA3FD	"	31,611	147	123
*RA6AAW	"	28,224	110	84
*UA4CC	"	25,086	146	113
*RW4HM	"	16,732	98	89
*RW4PY	"	14,661	93	81
*RU3DM	"	14,214	93	69
*RK3AY	"	12,730	80	67
*UA3VFI	"	11,408	102	92
*RZ3DA	"	11,323	78	67
*UA3PW	"	5,724	56	53
*RA6XB	"	3,440	44	40
*RW3SU	"	2,619	27	27
*UA4QK	"	363	11	11
*UA3QG	28	107,124	338	226
*UA6AK	"	54,723	352	111
*RW6ATJ	"	50,058	233	162
*RZ6HF	"	20,383	139	109
*UA6ADC	"	18,612	118	99
*RA3XEV	21	110,556	322	222
*RA6YDX	"	20,160	122	105
*RW4FX	"	8,777	73	67
*RW4LQ	"	6,681	51	51
*UA4LW	"	5,963	67	67
*UA1ZZ	14	294,555	535	365
*UA4AGO	14	283,560	526	340
*RZ6LG	"	193,732	383	308
*RA6MS	"	156,800	376	280
*UA4PAY	"	146,874	318	269
*RX3DBG	"	115,920	289	240
*RN6FZ	"	103,509	393	217
*RN6HI	"	63,000	208	175
*RK6HWM	"	50,204	230	154
*RA4LK	"	16,044	93	84
*RZ1CXS	"	3,726	53	46
*RW6FF	"	1,696	35	32
*UA3AGW	7	759,728	666	412
*UA4FCO	7	396,240	484	312
*RK6MY	"	208,362	330	246
*RU3MW	"	38,913	145	119
*UA6LCN	3.5	260,633	450	263
*UA3DTT	3.5	3,060	36	36
*RA6AFB	3.5	408	13	12

KALININGRADSK

*RA2FAC	A	1,435,293	1326	531
*RU2FL	"	8,850	78	75

UKRAINE

UW2M	A	4,134,780	2610	780
			(Op: URØMC)	
UT2UZ	A	4,030,809	2392	753
UX7IA	A	2,779,998	2195	754
UYØZG	"	1,482,190	1345	551
UR7EQ	"	1,393,206	1329	534
US5II	"	1,166,670	1202	522
UT5UIA	"	418,338	633	381
UY3QW	"	95,264	275	208
UY2RZ	"	41,280	161	129
UT3EK	"	6,336	68	66
UU4J	28	32,696	174	134
UT3FM	21	171,248	416	278
UU2JQ	"	39,064	213	152
UT2AU	14	300,927	503	363
UT4EK	7	651,483	584	383
UT5ECZ	"	229,810	352	245
EO6F	3.5	607,568	689	368
			(Op: UXØFF)	
UUØJL	3.5	547,026	654	346
UX5I	3.5	336,396	518	291
			(Op: UT5IZ)	
UR5IOK	3.5	144,200	281	206
UT4ZG	3.5	109,053	250	189
UT8IT	1.8	31,900	135	110
UT2UB	"	18,618	102	87
*UR5HAC	A	2,885,511	2180	713
*UR6QS	A	1,328,185	1365	515
*UX4UA	A	961,824	984	516
*UT8EU	"	581,808	828	408
*UY5ZI	"	393,300	572	345
*UR3IQO	"	288,920	463	310
*UY5TE	"	265,188	546	294
*UR5IPD	"	232,128	522	279
*UX8IR	"	211,967	445	283
*UT5JAB	"	178,880	416	260
*UX8ZA	"	147,323	379	227
*UY7C	"	108,200	310	200
			(Op: UR3CMA)	
*UTØRM	"	55,388	174	122
*US3QQ	"	42,672	162	127
*UYØM	"	36,259	118	101
			(Op: UYØMF)	
*US3IZ	"	10,434	64	47
*UY5YA	28	3,552	50	48
*UX5EF	21	144,480	361	280
*UR8QR	"	122,187	307	241
*UU5WW	14	1,136,436	1222	581
*US7IGF	14	1,069,686	1057	558
*UR6IJ	14	1,057,624	1041	584
*UT5KO	"	337,680	610	335
*UXØZX	"	311,460	500	358
*UY5OQ	"	205,504	430	304
*UY3AW	"	173,196	394	283
*UX7QD	"	168,000	460	280
*US7IID	"	142,032	300	264
*UR4QX	"	135,576	384	269
*USØHZ	7	315,648	402	288
*US9QA	"	232,800	331	240
*UT5ZA	"	1,449	21	21
*UY6IM	3.5	415,626	551	318
*UR5IHQ	3.5	64,070	195	149
*UR4III	3.5	7,068	60	57
*USØZZ	1.8	53,841	183	137
*UT3N	"	38,437	155	119
			(Op: UT3NK)	
*UX5NQ	"	12,960	84	72

LATVIA

YL2PQ	A	2,495,460	2013	627
YL2KO	A	694,640	811	457
YL2PA	"	459,409	598	389
YL7A	"	13,608	100	84
YL4U	"	2,072	42	37
			(Op: YL3GN)	
YL1S	"	1,316	33	28
			(Op: YL1ZS)	
YL8M	"	690	24	23
			(Op: YL2GM)	
YL6W	"	589	19	19
			(Op: YL2GD)	
*YL5W	A	2,132,422	1799	614
*YL9T	A	2,116,884	1791	638
			(Op: YL2TW)	
*YL2PJ	A	1,054,636	1090	484
*YL3GDQ	"	883,632	1033	449
*YL3GFT	"	711,030	866	411
*YL3GCU	"	250,551	437	287
*YL2BJ	"	31,248	131	112
*YL2EC	"	18,330	99	94
*YL2PP	21	29,210	132	127
*YL2KF	14	137,550	353	262
*YL2PW	"	696	25	24
*YL3DX	7	695,760	669	390
*YL2PN	3.5	28,527	124	111

ROMANIA

YO7BGA	A	388,716	578	348
YO5OEF	21	388,032	600	376
YO2RR	"	325,268	554	349
YP3A	14	2,745,975	2021	779
			(Op: YO3GDA)	
YO6BHN	14	1,578,565	1329	643
YO3BL	7	538,220	545	340
YO5PBW	3.5	319,238	512	271
YO5AJR	3.5	196,930	368	235
*YO4AAC	A	216,112	599	208
*YO3AAK	A	137,288	390	262
*YO3APJ	"	133,472	241	194
*YO7LGI	"	101,404	309	202
*YO9HG	"	6,138	72	66
*YO4CSL	"	5,202	80	51
*YO7HHI	28	33,785	171	145
*YO3JW/P	28	15	3	3
*YO4ATW	21	250,083	501	333
*YO8MI	"	54,126	240	194
*YO6EZ	"	22,015	135	119
*YO9AGI	14	408,870	649	385
*YO9FYP	"	93,304	322	214
*YO4FHU	"	86,832	268	216
*YO8RIX	"	63,744	238	192
*YO5CBX	7	869,440	756	418
*YO2/DL1CW	"	360,162	512	306
*YR5O	3.5	364,170	508	305

YUGOSLAVIA

YU2V	A	299,205	489	305
YZ5B	21	2,189,838	1663	714
YU1EL	21	1,890,000	1446	675
YT1BB	21	1,723,186	1441	662
YT7Z	"	1,334,557	1201	581
			(Op: YU7EE)	
YZØZ	14	3,439,059	2131	809
			(Op: YU1ZZ)	
YT5A	14	3,118,832	2096	794
			(Op: YU1EA)	
YT6A	14	2,807,040	1831	768
			(Op: YZ1EW)	
YT3A	7	3,140,144	1398	644
4N2Z	7	2,624,646	1280	618
YTØT	3.5	782,070	745	398
			(Op: YU1YV)	
4N2K	3.5	671,400	731	373
			(Op: YU1KR)	
YZ1KA	"	624,206	684	374
*YT2R	A	3,021,680	2082	706
*YU1BN	"	80,808	217	168
*YU7AM	"	4,845	67	57
*YU1XW	21	60,888	188	172
*YT7KM	14	1,009,608	1121	552
*YU7KM	"	368,000	534	368
*YT1V	"	37,444	173	148
*YT7A	7	2,176,994	1158	569
			(Op: YU7GMN)	
*4N1FG	7	1,910,328	1120	548
*YT2A	3.5	570,019	675	361
*YU7FU	"	369,292	510	308
*YT2W	1.8	83,772	235	179

ALBANIA

ZA/Z35M	A	884,160	989	480
*ZA/DL2RMC	A	2,227,712	2060	608
*ZA/DM5TI	"	684	19	18

OCEANIA

PHILIPPINES

DU3NXE	A	175,266	318	182
*DV3ZQR	A	12,610	72	65

SAIPAN

WHØV	21	59,850	167	126

GUAM

KG6DX	A	2,685,251	1411	589
KH2/WX8C	A	1,120,896	897	417

HAWAII

KH6ND	3.5	476,928	399	207
KH7U	1.8	7,416	40	36
*KN6Y/KH6	A	489,786	557	246
*KH6/WOCN	"	80,615	168	115

AUSTRALIA

VK7GN	A	653,260	563	367
*VK6AA	A	1,371,832	974	476
			(Op: VK2IA)	
*VK8AV	A	484,610	426	322
*VK4TT	A	270,068	367	214
*VK3KE	A	43,384	130	116
*VK2BAA	A	12,932	65	61
*VK4BUI	14	329,085	367	309
*VK6HZ	14	2,378	30	29

INDONESIA

YB2MTA	A	582,820	593	322
YB2ZDR	21	23,268	97	84
*YBØDPO	A	883,134	705	387
*YC3MM	"	207,900	268	198
*YBØWWW	"	120,530	230	170
*YD3KWR	21	123,888	248	174
*YBØECT	14	33,464	120	94

NEW ZEALAND

ZL1V	A	2,625,840	1288	560
			(Op: ZL1CT)	
ZL4BR	7	1,446,330	677	370
*ZL3TE	A	934,144	747	328
			(Op: W3SE)	
*ZL1BYZ	"	174,522	317	174

SOUTH AMERICA

CHILE

CE3BFZ	A	240,240	365	220
*XQ4ZW	A	12,644	69	58

ANTARTICA

*R1ANT	A	21,816	85	72
			(Op: RW1AI)	

URUGUAY

CX6VM	A	4,255,020	1823	693
CX7BY	21	569,380	566	343

ARGENTINA

LU1HF	28	1,549,400	1036	508
*LU1EWL	A	419,824	471	304
*LW5EE	"	141,000	253	188

ARUBA

P4ØW	A	11,193,728	3290	868
			(Op: W2GD)	
P43JB	28	299,619	425	243
*P41P	A	9,384,444	3073	837
			(Op: KØDQ)	
*P43E	A	1,178,496	918	396

NETHERLANDS ANTILLES

PJ2W	A	8,195,516	2811	812
			(Op: WI9WI)	

BRAZIL

ZX2B	A	318,017	372	251
			(Op: PY2MNL)	
PX2W	28	2,940,864	1560	636
			(Op: PY2YU)	
ZX5J	21	7,061,000	2585	920
			(Op: IV3NVN)	
PY1KN	21	2,836,561	1501	637
PY2NY	14	2,486,668	1383	604
PS2T	7	5,081,021	1337	649
			(Op: PY2NDX)	
PY7ZY	"	916,764	490	317
PY2BW	3.5	4,290	29	26
*PV8DX	A	3,187,912	1477	604
*PY2NA	A	2,224,416	1270	564
*PP7ZZ	"	213,925	253	199
*PY2IQ	"	22,792	91	77
*PR7FMT	"	260	11	10
*PY2ALR	"	112	7	7
*PY4CEL	28	61,410	159	138
*PY2XC	"	25,543	103	89
*PY1MK	"	4,719	41	39
*PY4FQ	21	772,030	641	410
*PY4PW	"	6,834	52	51
*PR7AR	3.5	25,806	69	66
*PP5BZ	"	1	1	1

SURINAM

PZ5XX	A	9,836,424	3088	837
			(Op: EA4BQ/OHØXX)	

VENEZUELA

YW4D	7	6,472,554	1566	698
			(Op: YV1DIG)	
*YY5YMA	A	163,038	302	174
*YV7QP	21	128,709	233	189
*YV5KG	14	676,995	625	363
*YV5NWG	7	162	6	6

TRIBANDER/SINGLE ELEMENT

UNITED STATES

WY4N	A	3,698,920	2051	785
			(Op: N4PN)	
K2PLF	A	3,292,042	1723	689
N2GC	A	3,259,776	1632	653
N3UM	"	2,354,415	1364	595
KZ5D	A	1,994,846	1560	623
K4PV	"	1,895,465	1485	605
NO4S	A	1,867,234	1272	566
			(Op: K9OM)	
N8PW	A	1,380,352	1028	512
KK9K	A	1,380,090	1308	537
KA2MGE	"	1,250,696	990	508
W4BQF	"	1,204,288	966	496
WK4Y	"	612,864	687	399
K2SX	"	541,856	545	328
W7QN	A	340,827	568	309
W6TK	A	336,567	508	329
WC4E	"	270,300	342	255
W7LKG	"	216,372	382	292
K7CS	"	216,090	353	245
KS7T	"	112,112	276	196
W7BBC	"	91,314	233	178
NT6K	"	63,434	284	161
N7RVD	"	23,793	117	103
W1MO	14	661,279	697	457
NØVD	14	414,612	645	349
KGØUA	"	209,137	311	283
KØCAT	"	84,480	212	176
			(Op: K9WIE)	
N7XY	14	46,690	161	145
N5PU	14	20,640	106	96
WG7X	"	7,480	78	68
*KC2NTB	A	2,522,855	1411	635
*NB1B	A	1,955,655	1274	585
*N3UA	A	1,917,169	1224	593
*NY1S	"	1,275,580	912	460
*KU8E	"	745,624	782	407
*K4IE	"	649,044	700	396
*N7ZG	A	585,288	714	396
*W7LPF	A	574,722	589	367
*NF4A	"	569,350	742	386
*NA4K	"	501,615	558	355
*NØBUI	A	461,970	680	354
*WN6K	A	454,608	656	336
*K1TN	A	357,903	504	299
*WA3KYY	"	282,750	394	250
*W3CP	"	266,658	392	294
*WA1S	"	206,371	361	257
*K9ALP	A	187,950	244	179
*KØHW	"	143,880	397	218
*KØPY	"	128,896	344	212
*AE1T	"	113,490	232	195
*AI4IE	"	106,067	236	199
*AA6EE	"	101,493	283	179
*N6GL	"	100,859	323	173
*WD4AHZ	"	59,047	166	137
*K1EP	"	52,578	159	138
*KN6OT	"	51,212	150	118
*AJ1E	"	50,220	172	135
*K6CSL	"	49,266	159	138
*W6NKR	"	45,510	142	123
*K8AJS	"	42,828	149	129
*W1EQ	"	40,136	133	116
*K5GM	"	37,996	147	118
*K2EKM	"	30,798	99	87
*KB9S	"	27,500	147	125
*K7TR	"	25,016	140	106
*WØQQG	"	15,633	89	81
*KB5NJD	"	11,011	97	77
*N6NIA	"	9,976	65	58
*K6UM	"	7,590	60	55
*W9LYA	"	7,089	58	51
*K1VSJ	"	3,900	41	39
*K1RFD	"	850	19	17
*N2XU	21	2,706	34	33
*K8IA	14	891,695	892	511
*N3CZ	7	455,775	435	309

DX

CS5A	A	7,699,740	3862	905
			(Op: DF4SA)	
9H1ZA	A	5,105,152	3140	832
AM3KU	A	4,789,088	2749	824
			(Op: EA3KU)	
CX6VM	A	4,255,020	1823	693
AN5FV	"	4,216,008	2821	776
			(Op: EA5FV)	
RZ3AZ	A	4,174,755	2639	813
DL2OBF	A	3,330,586	2093	722
UA9SP	A	2,993,760	1532	560
9M2CNC	A	2,975,232	1857	624
GØWKW	A	2,830,640	1938	656
UX7IA	A	2,779,998	2195	754
KG6DX	A	2,685,251	1411	589
IN3OBR	A	2,029,201	1585	607
OY1CT	A	1,920,548	1922	607
G4BJM	"	1,649,200	1342	560
LY2OX	A	1,542,516	1283	573
IK2UCK	"	1,433,544	1316	552
OK2PDT	A	1,383,152	1276	548
UA9CMQ	"	1,359,940	986	485
KH2/WX8C	"	1,120,896	897	417
SP2QG	A	1,011,082	836	446
RA6CZ	"	828,938	1038	451
PAØJNH	A	683,218	764	422
DL3EBX	"	625,646	694	406
JH6OPP	A	532,677	568	353
VE3CR	A	521,560	513	340
EI4DW	A	362,894	477	343

JA1HP	*	349,621	465	313
ZX2B	A	318,817	372	251
			(Op: PY2MNL)	
GM4SID	A	295,800	467	300
OH2VZ	A	271,128	428	286
JA1QDW	*	267,028	370	241
DF9DM	*	253,456	462	292
JA6BGA	*	238,791	310	249
JI1ALP	*	234,498	332	242
DJ3IW	*	185,188	286	268
GI4KSH	A	177,360	313	240
OH1BOI	*	7,350	73	70
JA1ISJ	*	495	17	15
YP3A	14	2,745,975	2021	779
			(Op: YO3GDA)	
JA9CWJ	14	449,108	476	346
LI9DFA	14	327,339	523	333
			(Op: LA9DFA)	
EU1AZ	7	1,429,023	1027	503
OE5BZKC	3.5	426,098	602	314
			(Op: JH4RHF)	
JA7MJ	3.5	3,105	27	27
SE4DHF	1.8	3,696	45	42
			(Op: SM4DHF)	
*TK9A	A	5,526,918	3072	834
			(Op: S51TA)	
*C4M	A	3,757,184	1848	596
			(Op: 5B4AGM)	
*V31RA	A	2,593,668	1523	539
			(Op: K9ZO)	
*EX2X	A	2,192,768	1408	592
*YL9T	A	2,116,884	1791	638
			(Op: YL2TW)	
*TI3M	A	1,942,600	1294	550
			(Op: TI3TLS)	
*LI3S	A	1,681,336	1532	584
			(Op: LA3BO)	
*OK2YT	A	1,527,318	1218	549
*OK1HX	*	1,488,186	1298	558
*OE6V	A	1,421,680	1344	520
			(Op: OE5CWL)	
*VE3KP	A	1,387,750	967	455
*GØMTN	A	1,378,045	1440	529
*VE1OP	A	1,358,181	916	459
*RU3FF	A	1,231,230	1385	546
*JH2NWP	A	1,221,120	890	480
*PA3BFH	A	1,189,116	1157	493
*UA3ABJ	A	1,183,534	1209	506
*OZ8AE	A	1,167,859	1096	523
*SQ9UM	A	1,109,310	1061	515
*EA7TN	A	1,075,928	996	474
*S57U	A	997,269	1059	507
*HB9CZF	A	971,598	991	498
*G3KKQ	*	753,858	840	434
*EA5BM	*	659,691	901	461
*UT8EU	A	581,808	828	408
*G4GOY	*	577,896	775	398
*SQ9MZ	*	572,460	684	406
*JA2KVB	*	483,990	544	365
*3Z8Z	*	473,301	615	387
*J45KLN	A	447,122	702	377
			(Op: SMØCMH)	
*DL1NEO	A	446,590	607	370
*SP7IIT/6	*	374,760	663	360
*RU3UN	*	356,320	495	340
*VA7LC	A	309,136	455	278
*SP9EMI	*	293,232	502	328
*VK4TT	A	270,068	367	214
*EA7GV	*	245,622	455	282
*UX8IR	*	211,967	445	283
*OZ8F	A	174,195	402	245
*JA1CPZ	*	172,480	278	224
*JA1PS	*	143,472	252	168
*YO3APJ	A	133,472	241	194
*JA1XRH	*	118,012	225	163
*UY7C	*	108,200	310	200
			(Op: UR3CMA)	
*JA4BAA	*	107,796	245	156
*VE3MA	*	103,740	232	182
*JJ6TWQ	*	97,200	208	162
*K2NV/VE3	*	96,214	194	146
*RV9UP	A	89,846	217	167
*JAØXZD	*	64,998	163	138
*DH3FAW	*	60,000	193	160
*8S6T	A	55,484	176	143
			(Op: SM6WET)	
*SP2MKI	A	43,428	168	141
*MWØYDX	A	40,600	166	140
*JA1IE	*	40,392	133	102
*IK2CZQ	A	40,183	162	143
*JA2KCY	*	26,013	107	87
*PAØLRK	*	24,198	116	109
*DL4SUN	*	19,908	96	79
*DL5LYM	*	16,815	95	95
*JN7OJA	*	11,440	68	52
*EA3CWT	*	7,788	63	59
*SMØOY	*	5,450	59	50
*PR7FMT	*	260	11	10
*YT7KM	14	1,009,608	1121	552
*JA1BPA	14	668,552	588	433
			(Op: JA6-9330)	
*G3ZRJ	14	184,977	369	279
*VO1TA	14	8,910	64	55
*RX9DJ	14	2,581	31	29
*JE1CAC	*	1,080	20	20
*S54A	7	1,138,100	827	475
*PAØMIR	7	22,161	95	89
*PA3GVI	*	13,662	86	69
*OK2PXD	3.5	73,440	224	153
*YT2W	1.8	83,772	235	179

ROOKIE

AM6IB	21	3,063,543	2225	791
			(Op: EA3ALZ)	
*CT1IUA	A	425,528	546	344
*KI4EXW	A	333,450	398	285
*YY5YMA	A	163,038	302	174
*KI4EGT	*	110,968	277	194
*EA5GQM	A	81,404	250	188
*VE6CNU	A	73,556	207	142
*RK4CYW	A	58,058	164	143
			(Op: RA4CEO)	
*BD3AF	A	51,220	181	130
*K1USC	A	25,288	140	109
*DV3ZQR	A	12,610	72	65
*N7EIE	A	10,293	82	73
*DB7MA	A	6,592	67	64
*RA6XB	*	3,440	44	40
*KC2GOW	A	665	20	19
*ZS4JAN	28	225	9	9
*EA2BOV	21	158,484	394	282
*RX9TL	14	1,125,650	845	470
*K4OSO	14	21,996	104	94
*IZ8GCB	7	117,288	232	181

SINGLE OPERATOR ASSISTED

UNITED STATES

NI1N	A	5,216,020	2361	820
K1LZ	A	4,650,447	1951	699
KU1CW	A	3,968,080	2083	772
WN9O	A	2,475,660	1508	660
			(Op: W9IU)	
WO8CC	A	2,467,150	1445	665
			(Op: N8BJQ)	
NF6A	A	2,247,168	1314	608
			(Op: K6XX)	
AD4EB	*	2,032,708	1500	613
K3MD	A	1,643,649	1082	581
NO2R	A	1,551,517	995	517
K3KO	*	965,952	647	468
W2LE	*	811,104	692	408
WZ7ZR	A	767,052	996	447
			(Op: W7ZR)	
W5GN	A	609,220	568	367
N2BJ	A	544,272	551	368
W4FDA	*	473,200	434	364
W1CSM	*	368,906	361	278
KM9M	*	346,680	588	321
W1EBI	*	332,840	467	314
NE3H	*	258,884	331	244
W3FV	*	240,204	307	222
W6UB	*	167,280	253	205
W3YY	*	159,984	231	198
N3HUV	*	109,953	189	171
K6DGW	*	79,220	252	170
KF2O	*	38,822	124	118
N6ED	*	36,005	119	95
WS1L	*	9,177	79	69
K8YC	*	7,104	50	48
KU5B	14	1,346,125	1229	605
WA3AAN	14	633,828	669	442
K5TA	14	311,656	419	326
W1CU	14	157,084	250	227
W3UA	7	2,003,265	925	513
AA4VV	7	516,496	369	304
*K3STX	A	455,000	440	325
*K3UW	*	269,916	367	249
*W6OAT	A	213,530	391	262
*NA2M	A	176,160	299	240
*KSØT	A	174,002	378	241
*NC7J	A	173,717	330	223
			(Op: W7CT)	
*N6MZ	*	126,800	237	200
*W7HS	*	125,558	249	186
*KØMPH	*	120,768	267	204
*W6RK	*	99,166	247	179
*AA4NO	A	73,200	184	150
*KB3MM	*	54,889	158	131
*KK8I	A	47,495	158	115
*W7SST	*	34,983	154	117
*AJ1M	*	26,790	107	95
*KCØRET	*	10,005	81	69

DX

RG9A	A	8,484,704	2785	892
			(Op: UA9AM)	
DQ8ØIARU	A	6,998,679	3234	921
			(Op: DL5AXX)	
CG3EJ	A	6,933,654	2638	819
			(Op: VE3EJ)	
DJ5MW	*	5,750,277	2717	849
OK1DX	A	4,966,992	2436	816
DK3GI	*	4,917,628	2426	829
YR9P	A	4,863,107	3003	823
			(Op: YO9HP)	
S57DX	A	4,512,088	2482	788
YLØA	A	4,081,260	2523	813
			(Op: YL2KA)	
HZ1EX	A	3,557,073	1818	669
OH6NIO	A	3,500,010	2110	783
DL9EE	*	3,017,124	1796	684
UAØANW	A	2,951,344	1463	656
OK1FDY	*	2,403,444	1690	636
DFØCK	*	2,100,230	1510	626
			(Op: DL2ZAE)	
HB9Z	A	2,092,213	1519	569
			(Op: HB9CVQ)	
EI/AB2E	A	2,068,860	1487	615
OE3ZK	A	1,876,952	1454	616
DL5NDX	*	1,806,587	1321	577
DF2UU	*	1,607,970	1183	589
JF1PJK	A	1,530,690	1042	518
W1AJT/VE3	A	1,436,932	912	518
DL6KVA	*	1,409,980	1198	580
IKØYVV	A	1,329,120	1105	520
YT5T	A	1,000,110	1085	510
PY8AZT	A	981,180	527	345
DK3QJ	*	967,216	799	488
DHØGHU	*	933,571	955	479
HA5X	A	843,386	933	446
DJ3WE	*	827,524	771	443
HA5PT	*	598,246	689	383
PA5TT	*	370,476	557	369
JR1BAS	A	329,749	428	289
EA5FID	A	311,374	481	322
G3AB	A	301,767	456	291
VG6XDX	A	233,836	380	212
			(Op: VE6LB)	
9A4KW	A	138,706	289	223
DK7ZT	*	114,062	272	214
RAØAM	*	101,672	214	179
PV2J	*	71,955	199	123
			(Op: PY2VM)	
G4OBK	*	38,985	158	115
LY3BH	A	18,048	96	94
JS1KQQ	*	16,117	82	71
EDII	28	524,145	1001	415
			(Op: UT1IA)	
EA1DX/5	28	89,666	345	214
			(Op: EA5FID)	
9A1V	21	2,338,857	1643	747
			(Op: 9A4M)	
IK1QBT	21	587,845	779	445
LY2IC	21	294,130	536	335
HA4A	14	3,670,660	2112	835
EDØQ	14	3,581,868	2118	842
			(Op: UW5Q)	
OH4R	14	3,049,385	2011	791
			(Op: OH4JFN)	

Roy, WK4Y, Single Op, All Band, High Power entrant.

SSBR	14	2,470,860	1607	740
SSØY	14	2,387,085	1665	699
IZ1GAR	14	1,640,745	1343	626
DF1LON	14	1,461,560	1198	618
OK1AOV	14	489,410	570	449
VE6TN	14	308,880	416	312
VE6AVR	14	242,480	360	280
LT2H	7	2,951,570	956	530
			(Op: LU7HN)	
S52ZW	7	2,321,650	1204	590
IK2AHB	7	392,904	411	306
SN8F	3.5	627,361	699	371
			(Op: SP8FHK)	
I1NVU	3.5	388,740	480	310
9A4VV	3.5	6,273	54	51
*TM6A	A	3,028,081	1815	707
			(Op: F6IRF)	
*OO5ZO	A	2,278,386	1699	622
			(Op: ON5ZO)	
*UA9CDC	A	2,018,085	1232	485
*MZW	A	1,471,704	1172	534
			(Op: GØRTN)	
*UT3UA	A	1,234,296	1177	558
*RZ4AG	A	1,141,140	1036	532
*JF1SQC	A	1,092,030	817	445
*JI1RXQ	*	1,045,524	821	453
*DJ9MH	A	1,036,819	1004	511
*DM3PKK	*	796,235	827	467
*OK2ZC	A	790,857	780	459
*SQ9FMU	A	743,724	825	438
*OO4CAS	*	644,787	790	429
*DL4RCK	*	609,513	710	411
*XE2AC	A	498,080	554	352
*AN3BHK	A	324,314	546	334
			(Op: EA3BHK)	
*JA3PYC	*	301,568	392	256
*CT3EE	A	232,064	297	224
*S51DX	A	194,525	470	251
*OK1UU	*	131,452	324	236
*JG3KIV/4	*	125,376	244	192
*PAØKHS	A	74,490	281	191
*DL1YFF	*	69,300	213	165
*OK1CJN	*	44,800	176	140
*YU1AAV	A	36,260	171	140
			(Op: YZ1ZV)	
*MMØBQI	A	33,920	137	128
*SA1A	A	32,508	152	129
			(Op: SM1TDE)	
*VE3MGY	A	29,835	101	85
*DL9NDV	*	28,749	125	111
*DL8UAT	*	25,942	117	109
*JH1RNI	*	22,860	95	90
*DJ9NMH	*	13,689	103	81
*G6OKU	*	13,689	89	81
*JEØIUR	*	8,525	59	55
*HS1OVH	A	3,458	39	38
*MØOKT	*	3,040	43	40
*9A2U	28	250,368	566	326
			(Op: 9A3ZA)	
*YU5W	21	405,858	616	391
			(Op: YU1QW)	
*RUØBB	21	236,520	342	270
*JM1NKT	14	18,088	96	76
*YZ1V	7	1,624,916	1043	542
			(Op: YT1HA)	
*ON9CKW	7	900,042	667	429
*YU1WC	3.5	143,480	302	211
*YU1UA	1.8	480	16	16

MULTI-OPERATOR SINGLE TRANSMITER

UNITED STATES

KT3Y	7,518,819	2897	847
NZ1U	6,299,580	2493	849
NO5W	5,767,552	2666	896
KC7V	2,464,461	1784	603
W2YC	2,124,762	1215	629
W1MX	1,779,330	1266	555
NW2D	1,412,704	1040	524
KQ7W	1,141,764	963	563
KU4BT	1,035,519	1010	491
WI3T	823,890	764	435
NE3MD	161,415	293	211
WC8VOA	139,728	271	213
WB9AYW/9	38,514	122	98

AFRICA

7Q7WW	352,240	417	280

ASIA

5B/KIØBP	13,174,324	4278	974
RZ9OZO	9,560,672	3168	928
RY9C	7,161,480	2667	760
RZ9UWZ	1,298,535	968	415
RZ9WXK	1,048,872	718	348
JF2SKV	577,485	585	369

EUROPE

G6PZ	9,117,530	3675	1021
HA8DIARU	8,876,960	3738	1018
OLØW	8,291,787	3436	987
OHØR	7,590,645	3792	953
YR7M	7,085,880	3411	972
LI8W	7,052,486	3434	959
IR2C	7,040,100	3177	930
SJØX	6,517,203	3242	951
SQ6Z	6,037,830	2744	919
DC8SG	5,507,320	2814	890
RF3A	5,470,386	3207	894
OL3Z	5,338,024	2776	866
TM4Q	5,260,717	2634	847
RX3RXX	5,250,070	3389	838
4N1N	4,240,335	2644	829
RI4C	3,967,353	2733	801
HG1R	3,898,603	2334	761
DBØYS	3,567,262	2164	766
EA2URD	3,484,621	2295	763
EA1WX	3,370,588	2194	689
UZØG	2,938,806	2607	661
OM4A	2,770,776	1790	696
OL1X	2,640,168	1780	719
ED2JJ	2,347,086	1934	609
IR1R	2,265,935	1822	641
DL4WA	2,162,256	1672	642
IZ3ALF	1,974,000	1529	600
SP9KDA	1,125,728	1027	508
UR4LWY	741,600	877	450
RK3SWB	731,146	883	461
SNØPJP	560,640	744	384
UT4IYZ	538,498	744	383
DF5RF	468,300	601	350
YO6KNY	425,568	528	312
LI1K	386,246	568	329
OM3ROM	258,495	430	285
EW8WW	256,960	561	320
UT5IZO	55,706	262	161
RK3AZZ	46,926	204	158
EW8ZZ	45,360	170	135
OM3KUN	15,484	124	98

NORTH AMERICA

ZF1A	14,937,125	4180	1075
CF7OO	7,277,856	2600	862
AL1G	274,743	399	267
VE7FO	182,637	279	223

OCEANIA

YE1ZAT	546,048	551	316
ZL4AA	348,102	381	249

SOUTH AMERICA

9Y4W	13,733,418	3878	942
LR2F	9,199,125	2693	925
ZY7C	4,907,579	1875	713
PR2O	2,510,782	1277	593

MULTI-OPERATOR TWO TRANSMITTER

UNITED STATES

WR3Z	7,833,315	3199	915
WX5S	4,843,552	2325	784
NG3U	2,486,454	1459	646

DX

EG8FAS	27,959,740	6642	1115
RU1A	14,648,208	5999	1128
LT1F	14,473,290	4130	1003
ZL6QH	13,312,768	3493	952
HG6N	10,671,784	4587	1048
DK4YJ	10,381,371	4306	1001
ES5Q	9,923,464	4814	1018
CG7SV	8,254,320	3051	844
TM4C	7,544,536	3751	892
ZM1A	6,955,456	2420	764
OL7D	6,307,332	3319	892
CSAKU	6,161,890	2601	791
SJ3W	5,633,847	2995	837
VE3YAA	4,743,684	2120	726
9A7T	3,965,790	2299	811
ZX3S	3,598,465	1604	667
VE7SQ	3,421,780	1709	620
SI9AM	2,900,248	2133	706
RK9CWB	2,119,208	1153	533
HBØ/HB9AON	1,689,632	1361	532

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

NA6Q	2,167,924	1841	638
WX3B	1,722,120	1049	565

DX

V25O	25,123,968	6749	1158
LZ9W	19,736,872	7759	1181
DFØCG	19,218,330	6996	1185
LY7A	12,484,615	5706	1045
UU7J	11,053,744	5405	988
OH2K	1,776,576	1735	608
SP6KFA	874,780	1059	458
8J1VLP/1	18,174	99	78

CHECKLOGS

The following logs were used as checklogs. Checklogs and SWL logs are always appreciated: 4X4REM, 8J4VLP/4, BA3CW, DF8AA, DK4WF, DL1ARD, DL1KUR, DL3LQM, DL5DWW, DL5JRA, DL6YRM, DL7UCX, DL8UVG, EA1AUS, EA3DU, EA5FV, EW2EG, F5RPB, G4EMT, G4ERW, GW4BLE, HA2MN/5, IV3RLB, IY0TC, K1KI, K4OH, KC7UP, KF3CV, KY2T, LY1FCI, LY2KM, LY3BS, LZ2PS, LZ9MAY, N1NN, OK2BDF, OK2HFC, OZ/W7LNG, PAØJED, PY2DBU, PY7OJ, RAØALM, RA9DZ, RKØLWW, RK9DR, RUØAT, RVØAL, RV3ML, RV4AB, RV6FG, RV9UD, RV9YW, RX3DTN, RZ3DJ, RZ3VA, SM5QU, SM6DUA, SPØDXC, SP1EGN/1, SP2DWA, SP4DZT, SP5BYC/9, SP6CIK, SP7BDS, SP7HDV, SP9ONO, SP9GFI, SP9RTI, SP9UOP, SQ4MP, SV18FW, SV1HEM, SV1JA, SV5DZX, UAØQPA, UA1AUW, UA3AVR, UA3DNR, UA3OIX, UA4ARL, UA4NAL, UA4NU, UA9MO, UA9MFB, UA9MQR, UN8FR, UT1IWA, UT3NF, UUØJC, UX1IL, VP9HW, YO2NAA, YO4CAH, YO6OAF.

Looking ahead in CQ

Here's a look at articles we are working on for upcoming issues of *CQ*:

- "Backscatter Over the Atlantic," by Emil Pocock, W3EP
- "Selective Fading," by Bob Shrader, W6BNB
- "A Limited Space Antenna Combining Commercial Components," by Hugh Paul, W6POK
- "Design Your Own Coaxial RF Choke and Balun," by Benson Smith, KA4LBE

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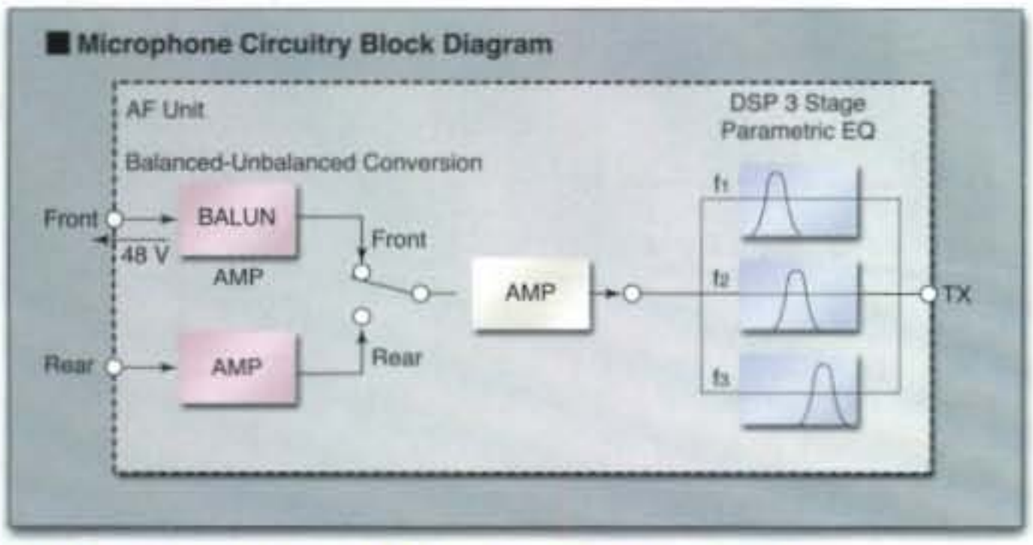

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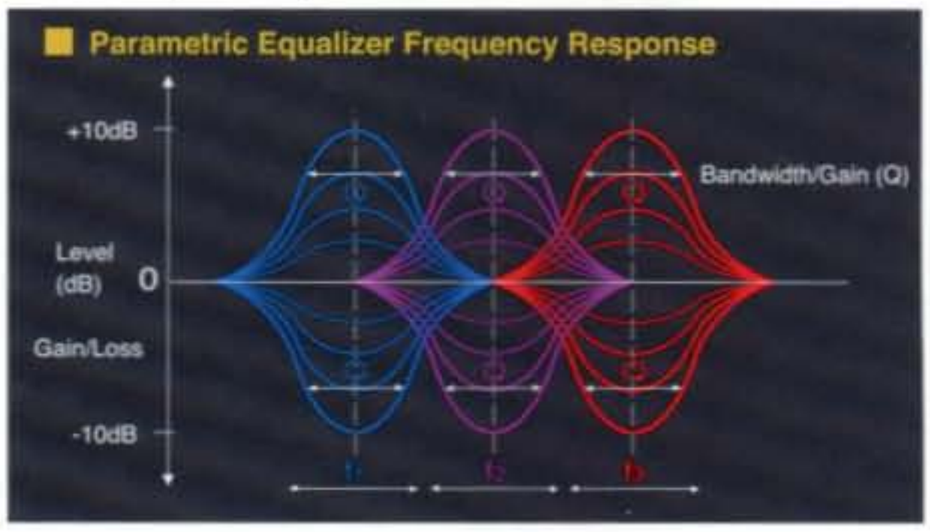

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