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COMMUNICATIONS & TECHNOLOGY

JANUARY 2005

CQ

60th Anniversary Issue

- A Visit to "Quartzfest," p. 11
- Details of FCC's Ruling on BPL, p. 16
- 2004 CQ WPX SSB Results, p. 22
- *CQ* Reviews: GAP "Hear It" Speaker and Inline Module, p. 26

On the Cover: Bob Allphin, K4UEE, of Marietta, Georgia, points out the location of Peter I Island – site of this month's 3Y0X DXpedition – on a map of Antarctica. Details on page 104.

THE RADIO AMATEUR'S JOURNAL

Groundbreaking News

Kenwood introduces the *new* TM-V708A mobile radio

144 / 440MHz FM DUAL BANDER

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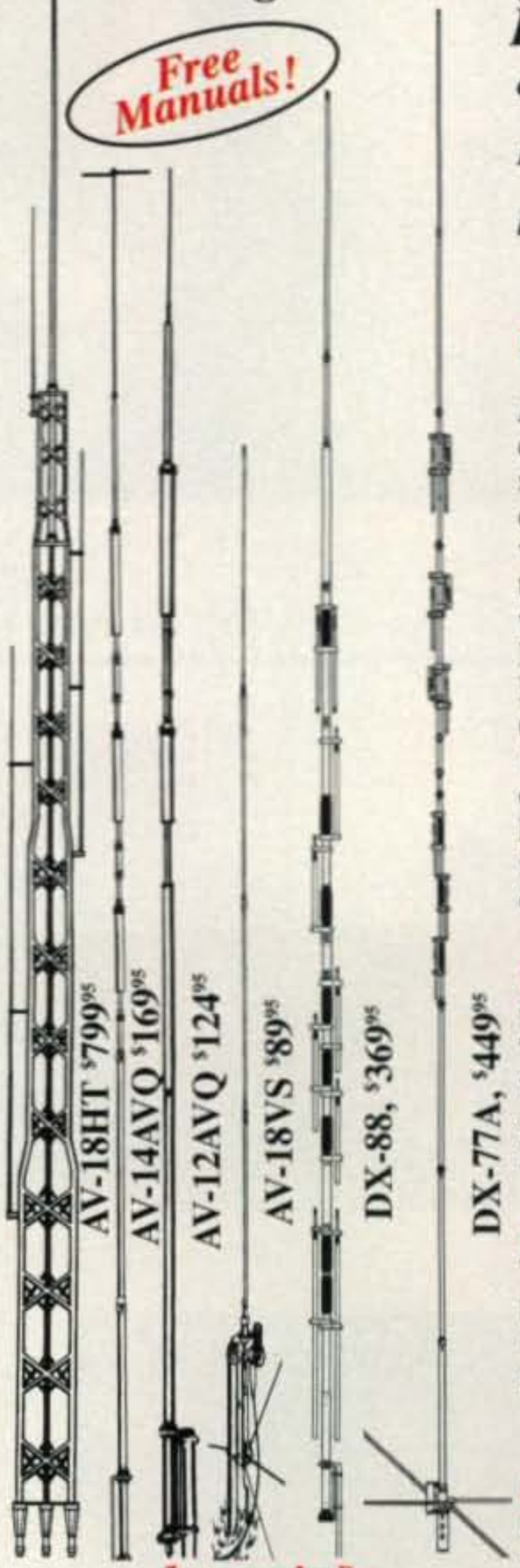

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AV-18HT, $799.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

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. The 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	$799.95	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 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph — guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph — guy**	**1.5-1.625"**

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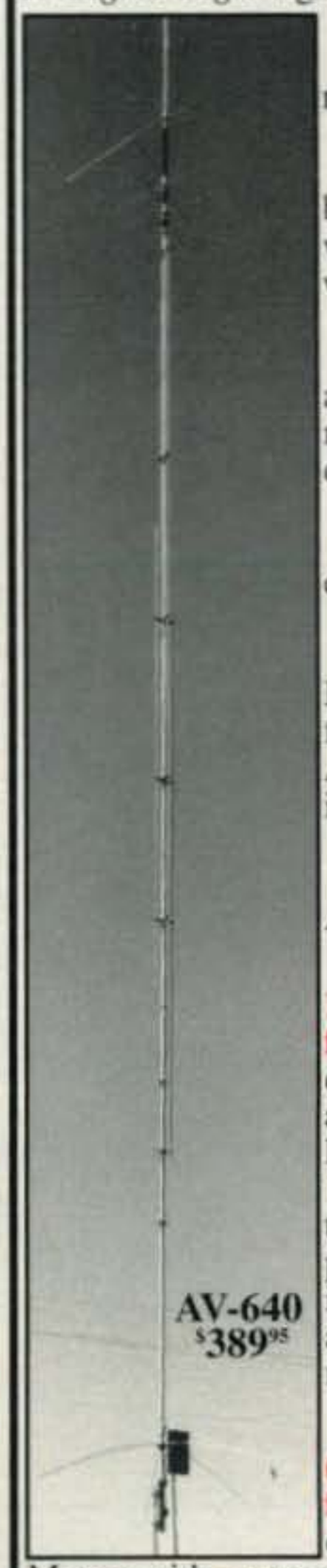

No ground or radials needed

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

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Built-to-last

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

hy-gain® warranty

Two year limited warranty. All replacement parts in stock.

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

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NEW IC-756PROIII

PORTABLE BIG GUN

The DX radio of choice. The success of the '756PRO Series incorporating '7800 breakthrough features.

The 756PRO series is legendary in DX circles – big enough in features to be the best in its field, but compact enough to fit in a Pelican® case and ship anywhere in the world. The first DX rig with 32-bit floating point IF-DSP. The first amateur rig with a large, TFT color LCD. The 756PROIII continues the legacy, advancing receiver performance with a +30dBm third order intercept (TOI) point and, to maximize sensitivity while minimizing distortion, 2 new 7800-style preamplifiers. See why '756PRO series rigs travel to all the hot spots. Visit your authorized Icom dealer today.

'756PROIII Specifications: • **TX**: HF + 6M • 100W, continually adjustable down to 5W • Adjustable SSB TX bandwidth • Digital voice recorder • Auto antenna tuner • **RX**: 30 kHz to 60 MHz • Quiet, triple-conversion receiver • 32 bit IF-DSP with 24-bit A/D D/A converters • 64 MHz roofing filter • 5" TFT color LCD • 8 Channel RTTY TX memory • Digital twin passband tuning • Auto or manual-adjust notch with 70 dB attenuation • 13.4" W x 4.4" H x 11.2" D • 21.1 lb • And much more

FREE | Purchase a new IC-756PROIII between Dec. 1st, 2004 thru Feb. 28th, 2005 and receive a 'PROIII Portfolio Case from Icom, while supplies last.

Heard it. Worked it. Logged it! x3

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Hams, Rose Parade, Part Ways

For the first time in four decades, amateur radio will not be providing communications for the annual Tournament of Roses Parade in Pasadena, California. The New Year's Day fixture has used amateur radio voice communications since the mid-1960s and amateur television since 1968, according to Newsline. Reports of a dispute between parade officials and members of the Tournament of Roses Radio Association were initially published in the *Pasadena Star* newspaper. Apparently, the disagreement involved the planned use of Nextel phones by parade officials. Nextel is a corporate sponsor of the event. It was unclear at press time whether Nextel, parade management, or the hams themselves were responsible for the dispute that led to the breakup of the 40-year informal association between the parade and ham radio.

DXers Head to Court Over Navassa and Desecheo

A federal court battle is looming over the refusal by the U.S. Fish and Wildlife Service (FWS) to permit amateur radio operations from Navassa (KP1) and Desecheo (KP5) islands. According to *The Daily DX*, a group of DXers led by Brad Farrell, K4RT, has been working for over two years through FWS administrative channels to overturn the 10-year-old ban. The administrative appeals have apparently been exhausted and K4RT has gone to federal court, seeking judicial review of the FWS action. He says there are many inconsistencies between the FWS policies and its own actions. The Lone Star DX Association is collecting tax-deductible donations to help defray legal expenses. Donations from individuals or clubs should be marked "Navassa-Desecheo Project" and mailed to the Lone Star DX Association, c/o Jim Bass, K5KQI, 2709 Monarch Dr., Arlington, TX 76006. More information is available online at <http://www.dxer.org>.

Computer Glitch Stops License Processing

The FCC was forced to stop issuing amateur licenses for about five days in early November as a result of problems caused by a software upgrade and aggravated by initial attempts to fix things. The ARRL Letter reported that a software upgrade erroneously caused all applications submitted by Volunteer Examiner Coordinators to be "flagged" for processing by hand, and that an attempt to fix that problem caused the computer system to start issuing out-of-sequence callsigns, such as 2×3 calls with WQ prefixes. About 130 of these erroneous calls were issued, then cancelled and replaced by correct sequential callsigns. The bugs were fixed and the computer system was back online as of November 10.

ARRL Tries to Influence BPL Industry Standards

The ARRL is taking an active role in the group developing technical standards for BPL, attempting to work with the industry on designing systems to minimize harmful interference on amateur frequencies. In Octobe, the ARRL's Ed Hare, W1RFI, made a presentation to the IEEE Broadband over Power Line Study Group. In addition, according to the *ARRL Letter,* ARRL Chief Technology Officer Paul Rinaldo, W4RI, has addressed meetings of the Power Line Communications Association and the BPL Task Force of the National Association of Regulatory Utilities Commissioners.

40-Meter Expansion Begins in Europe

The expansion of the 40-meter ham band in Europe from 7.1 to 7.2 MHz has begun, as administrations have started phasing in a shift of broadcasters out of the band segment that is supposed to be completed by 2009. The changes are a result of an agreement at the 2003 World Radiocommunication Conference to try to reduce interference between broadcasters and amateurs at 7 MHz.

According to the *ARRL Letter,* hams in Switzerland will get access to the 7.1–7.2 segment as of January 1, 2005. On October 31 the segment was opened on a secondary, non-interference basis to amateurs in the United Kingdom. They join hams in Croatia, Iceland, Ireland, Norway, San Marino, and Serbia-Montenegro as the only Europeans with access to the broader 40-meter band. The 7.2–7.3 MHz segment remains a ham band only in North and South America.

W1BKR Elected to Broadcasting and Cable Hall of Fame

Bill Baker, W1BKR, Chief Executive of New York Public Television, was inducted into the Broadcasting and Cable Hall of Fame in November, according to "Shoptalk," a TV industry newsletter. The Hall of Fame was established 14 years ago by Broadcasting and Cable magazine to honor pioneers or innovators in the fields of radio, television, cable, and satellite broadcasting. New York Public Television is the parent of WNET/Thirteen in New York City and WLIW21 on Long Island. Baker has been there since 1987.

Baker previously was President of Westinghouse Television, where he oversaw the launh of five cable networks, including the Disney Channel and the Discovery Channel. He is also an active ham.

Ham Fined for CB Violations

A Washington State ham has been fined $10,000 by the FCC for repeatedly operating a CB transmitter that was not FCC certified, and for running an illegal linear amplifier as well. According to FCC documents, Robert Spiry, KD7TRB, of Tacoma, Washington, told the Commission that he'd gotten an amateur license, stopped operating CB, and removed his CB antenna, and claimed he couldn't afford the $10,000 fine imposed. However, the FCC said Spiry did not submit the necessary financial data for considering fine reductions, and therefore it was assessing the full $10,000 penalty as originally proposed.

In Ohio, a CB store known as the CB Shop was fined for illegally selling CB linear amplifiers. According to the FCC, the store's owner did not respond to a Notice of Apparent Liability issued last May, so it was assessing the originally proposed fine of $7,000.

FCC Keeps After 10-Meter Truckers

Three trucking companies have been issued warnings by the FCC about unlicensed operation after their drivers were monitored making transmissions on 28.085 MHz in the 10-meter ham band. All of the trucks were in North Carolina when they were monitored. The companies were told to warn their drivers that they could face heavy fines and confiscation of their equipment if the illegal transmissions continued.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

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HAM-IV

HAM-IV
$559.95

The most popular rotator in the world!

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

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

TAILTWISTER SERIES II

T-2X
$649.95

T-2XD
$1029.95
with DCU-1

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

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

CD-45II

CD-45II
$389.95

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

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

HAM-V

HAM-V
$949.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

ROTATOR OPTIONS

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

AR-40

AR-40
$289.95

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

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

HDR-300A

HDR-300A
$1379.95

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

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

Digital Automatic Controller

DCU-1
$649.95

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

AR-35 Rotator/Controller

AR-35
$69.95

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

RBD-5
$29.95

NEW! Automatic Rotator Brake Delay

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

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zero bias - a CQ editorial

BY RICH MOSESON,* W2VU

On Turning 60 . . .

Happy birthday to us. With this issue, *CQ* magazine is 60 years old, beginning its 61st year, actually. For me, it's a triple anniversary. This issue also marks ten years since my first direct involvement with the production of this magazine. Yes, I'd written a few articles for *CQ* in the 1980s and had worked for CQ Communications since 1992, but it wasn't until I took on the job of coordinating the 50th anniversary, including the 72-page special anniversary insert, that my job responsibilities directly involved this magazine itself. Actually, the *CQ* 50th anniversary insert was my introduction to magazine journalism, since until then, I'd worked only in radio and television.

This is also my fifth anniversary as Editor of *CQ*. Yes, my name was on the masthead as Editor as of the November 1999 issue, and I wrote the November and December editorials, but the truth is that the November and December issues were largely put together by Managing Editor Gail Schieber, K2RED (then KC2DHK), and Publisher Dick Ross, K2MGA, while I tried to get my footing and wrap things up with the initial version of *CQ VHF*. I've always considered the January 2000 issue to be "my" first issue.

It's kind of a natural inclination when writing on a significant anniversary to look back at other milestones along the way. One of the first places I looked was this column in the January 1995 issue, as my predecessor, Alan Dorhoffer, K2EEK, looked back over 50 years of *CQ*s past. What he saw was a two-stranded continuum—twinlead, if you'd like—the technical side of *CQ*, featuring a half century of reporting on advances in technology, and the people side of *CQ*, featuring writing by some of the best and the brightest people our hobby has to offer. Among them were some of his personal ham radio heroes (a topic K1AR wrote about last year), especially those with whom he'd had the privilege to work with personally. For Alan, those heroes included people such as McMurdo Silver—a name I recall as an old-time radio manufacturer, but whom he remembered as a person, writing in *CQ* and other electronics magazines - as well as others such as Frank Jones, W6AJF, and Bill Scherer, W2AEF.

Often, you recognize people as heroes only in retrospect since, as Alan warned,

> ...at the time I had the privilege to meet and know some of these people, they just struck me as quirky and as playing with a few cards less than a full deck. I knew they were bright and innovative, but to what extent or how unique they were (and some still are) took a bit of time to sink in ... For 50 years, *CQ* has consistently offered the one intangible quality of amateur radio that originally drew me to the hobby. Each editor in turn offered each succeeding generation of amateurs a new or continued series of heroes and legends to look up to and admire. Yes, some did have feet of clay and were a bit quirky, but they all had the power to inspire us to be and do better with our amateur radio lives.

In looking back at that 50th anniversary issue, I see some names who at that point were just people I worked with, but whom I now recognize as ham radio heroes, for me if not for my generation of hams. These people include Bill Orr, W6SAI (SK); Don Stoner, W6TNS (SK), George Jacobs, W3ASK; Lew McCoy, W1ICP (SK); Owen Garriott, W5LFL, and of course, Alan himself.

A couple of months ago, we moved our offices from one floor to another in the same building. After I packed up everything in my (and Alan's) old office and moved it out, and after the movers came in and removed the furniture, I went up to do a final check and saw something on the floor, behind where my desk had been. It was a photo, one I'd never seen before, of Alan and me, sitting in the parking lot outside the *CQ* offices next to the ICOM "Funmobile," which was paying us a visit. Where the photo came from, I have no idea. Where it was for all these years, I have no idea. Why it showed up now ... well, I can only speculate. But if nothing else, it was a reminder of the continuity that has gone with occupying the Editor's chair at *CQ* over the past 60 years. I am the magazine's 11th editor. I've had the privilege of knowing and/or talking with five of my ten predecessors, particularly in the process of preparing the 50th anniversary issue, and while we all may have had different styles and different interests, we all have shared the common goals of trying to bring the best writers and the best writing to the amateur radio community, and of trying to promote the advancement and share the fun and excitement of amateur radio.

On that note, I'd like to close with two more quotes, one from the very first issue of *CQ* back in January 1945—our guiding light and mission statement for the past 60 years—and the second from K2EEK in his 50th anniversary editorial in 1995:

From the January 1945 issue:

> This, then, is the *raison d'etre* for *CQ*—a magazine for the radio amateur, with a particular invitation to the newcomer. It should not, however, be inferred that we shall confine ourselves to the ABC's of ham radio. We visualize *CQ* as a magazine that will stick with the ham long after the parts of his first rig are dust-laden in the junk-box, and as a monthly refresher course for the old timer. While placing some emphasis on the elementary, we are still under obligation to carry through with articles on modern techniques and apparatus. Similarly, we shall follow up tradition (with which every ham must be familiar) with all the vital news of amateur radio today and tomorrow.

From the January 1995 issue:

> When you consider all of the firsts in technology that *CQ* has published, it isn't too hard to understand why we have been in existence for 50 years. *CQ* has always fostered new ideas and provided a homebase for creative people who each editor felt were heroes in some respect. If you put that much talent together, you're bound to come up with lots of good ideas that motivate other people.

I hope that we have continued to motivate you and your fellow hams and that we will be able to continue doing so for at least another 60 years. And while we're not making the big deal of our 60th anniversary that we did of our 50th, we've still got some special features and activities in store. The biggest is the "CQ Gang" operating event that runs from January 1 to March 1—the first 60 days of 2005 (see details in last month's issue and on our website)—and the special operation of *CQ* club station WW2CQ. In addition, over the course of the year, we're planning some special articles looking back in time—plus we've got some things on the drawing board to help keep ham radio fun and exciting well into the future. It's what we've always been about.

Happy New Year and I'll look for you on the air.

73, W2VU

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

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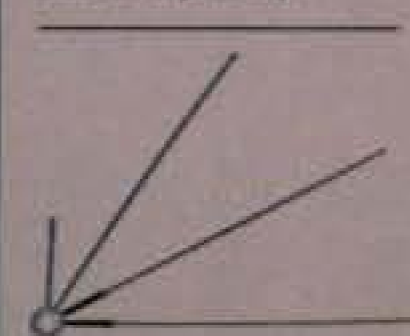

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announcements

Ham Radio University 2005 – The 2005 Ham Radio University and ARRL New York City/Long Island Section Convention will be held on January 9 at Briarcliffe College, Bethpage, Long Island, New York. HRU is a day of education about amateur radio. There will be many special forums geared to the new ham as well as the experienced amateur radio operator. In addition, tables will be set up by area organizations and clubs, plus the Red Cross, Salvation Army, National Weather Service, and others will be there to answer questions. There will be an HF special event station, a VE session, and the keynote speaker will be Riley Hollingsworth of the FCC Enforcement Bureau. For more information, go to <http://www.hudson.arrl.org/nli/hru2005.htm>; or e-mail: <N2GA@arrl.org>.

Skyview Radio Society Anniversary – The Skyview Radio Society, K3MJW, is celebratying its 45th anniversary in 2005. The club is located in Westmorland County, Pennsylvania and is active in Field Day, the Pennsylvania QSO Party, and VHF and other contests. For details, go to: <www.skyviewradio.net>.

• The following hamfests, etc., are scheduled for January:

Jan. 8, **West Allis RAC Hamfest/Swapfest**, Waukesha County Expo Center Forum, Waukesha, Wisconsin. Contact Phil Gural, W9NAW, 414-425-3649, or visit: <www.warac.org>. (Exams at AMF Waukesha Lanes, across from Expo)

Jan. 8, **Southwest Florida Hamfest & Computer Show**, Araba Shrine Auditorium, Fort Myers, Florida. Contact Earl Spencer, K4FQU, e-mail: <k4fqu@juno.com>, phone 239-332-1503, fax 239-334-9362. (Talk-in 146.880)

Jan. 15, **Colorado WinterFest 2005 Swapmeet**, McMillen Building, Loveland, Colorado. Contact Willis Whatley, WA5VRL, 970-407-6599. (Talk-in 145.115 [–offset 100 Hz CTCSS], 146.520 simplex; exams 10 AM)

Jan. 15, **Northwest Missouri Winter Hamfest**, Ramada Inn, St. Joseph, Missouri. Contact Neal & Carlene Makawski, WBØHNO/KAØIKS, e-mail: <nem3238@ccp.com>; phone 816-279-3406. (Talk-in 146.85, 444.925; exams)

Jan. 16, **Hazel Park ARC Hamfest**, Hazel Park High School, Hazel Park, Michigan. Contact Phil, AA8KR, e-mail: <AA8KR@arrl.net>, or 248-641-9723; <www.qsl.net/w8hp>. (Talk-in 146.640 [100 Hz PL])

Jan. 23, **Wheaton Community RA Midwinter Hamfest**, Pheasant Run MegaCenter, St. Charles, Illinois. E-mail: <info@wheatonhamfest.org>; telephone 630-604-0157; <http://www.wheatonhamfest.org>. (Talk-in 145.390; exams)

Jan. 23, **Tusco ARC Hamfest**, 965 North Wooster Ave., Strasburg, Ohio. Contact Gary Green, K8WFN, e-mail: <k8wfn@tusco.net>, phone 740-922-4454. (Talk-in 146.730)

Jan. 29, **Lockport ARA Hamfest**, South Lockport Firehall, Lockport, New York. Contact Duane Robinson, W2DLR, e-mail: <w2dlr@arrl.net>, phone 716-791-4096; <http://lara.hamgate.net>. (Talk-in 146.820 [107.2 PL])

"Welcome Back, W9CW"
Don Allen, W9CW, Named Advertising Manager of *CQ* and *CQ VHF*

CQ Communications President Dick Ross, K2MGA, has announced the appointment of Don Allen, W9CW, as Advertising Manager of *CQ* and *CQ VHF* magazines. Don will succeed Arnie Sposato, N2IQO, who is relocating to the west coast. Arnie will continue to be Ad Manager for *Popular Communications.*

Don is no stranger to CQ Communications or to the amateur radio industry. He was Advertising Manager of *Popular Communications* and *Communications Quarterly* from 1989 to 2001 and also worked as Sales and Marketing Manager for HAL Communications. Don will be responsible for *CQ* advertising as of the February 2005 issue and for *CQ VHF* as of the Winter 2005 issue.

Outgoing CQ Advertising Manager Arnie Sposato, N2IQO (left), greets his successor, Don Allen, W9CW.

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Every January, over a thousand hams travel to Quartzite, Arizona, for a week in the sun. They're all "RVers"—people who travel and sometimes live in big recreational vehicles. The gathering is actually much bigger, including hundreds of thousands of non-hams, but the hams have their own activities in a sub-event called Quartzfest.

Hams Rough it in Style at Quartzfest

BY GORDON WEST,* WB6NOA

Quartzite, in western Arizona, is 20 miles east of the Colorado River on Interstate 10. It has been a rock-hound's paradise since the early sixties, and lately has become the Mecca to well over a million visitors each year who converge on this small town in a wave of recreational vehicles during January and February.

Start off with 2000 vendors of fossils, rocks, gems, and minerals in outside displays. Now add eight major gem and mineral shows, and add to it the 21-year annual running of the Quartzite Sports Vacation & RV Show. Next add over 1000 ham radio operators with their big and small RVs showing up at the same time as the RV show, and then top it off with a personal ham radio welcome from Quartzite Mayor Verlyn Michel, W7BUE (photo A), and his wife, Sue, KC7POP.

Ham groups can be found everywhere. Hams who belong to the Good Sam group set up in their traditional spot right in the thick of the outdoor mineral displays. FMCA (Family Motor Coach Association) hams had *their* own spot among quarter-million-dollar motorcoaches, and other ham groups like "Escapees" were peppered throughout the hundreds of square miles of desert RV parking spots, charging their batteries from the sun during the day and becoming 100% self-sufficient in whatever type of RV or trailer they came in.

The largest collection of ham operators in one spot calls themselves "Quartzfest," parking their over 125 coaches, rigs, campers, cars, trailers, and motorcoaches five miles down the road at a turnoff simply called "Mile 99." Just look for the antennas! This year, as well as many years in the past, the ham hosts were Harvey and Margie, K5LJM and AB5ZX.

Photo A– Quartzite, Arizona Mayor Verlyn Michel, known as "Mayor Mike" to the 1-million-plus RVers who visit the region each winter, is known to hams as W7BUE! (All photos by the author)

"As you know, Quartzfest is a simple, little, informal, week-long campout in the desert," comments Harvey, adding, "We started inviting our friends out in 1997, and it seems more want to come each year. We had 100 rigs last January." Harvey and his wife, Margie, would be our master of ceremonies for a week-long schedule of ham radio events, including:

Sunday: Campfire get-together and introductions

Monday: Seminars and show-and-tell (photo B), all about Air Mail/Winlink by N4SVD (see "Winlink and Airmail: A Closer Look," for an introduction to this method of sending and receiving personal e-mail via HF amateur radio). Midday, ladies' welcome by Margie, AB5ZX. Four PM ham radio show-and-tell, with bonfire into the evening.

Tuesday: Seminars on noise elimination, BPL, and suppressing transmit interference to vehicle electronics, by Gordo, WB6NOA. Afternoon and evening get-togethers, including hobo stew by Bob, N4YWR, and Nan, KD4MZI.

Wednesday: VE test sessions by Bob, K9WMP, and Laura, K9BZY. Many informal afternoon show-and-tell sessions aboard multiple ham radio equipped motorhomes (photo C). Emphasis on Air Mail/Winlink.

Thursday: Full morning of antenna show-and-tell. Learn how other hams harness the sun for energy and use satellite antenna actuators to raise their panels and deploy their monster 20-foot RV antennas (photo D). WA7HRA conducts the individual vehicle tours with plenty of technical discussions on grounds and radiation patterns.

Friday: T-hunt morning, hosted by John, AE7P, and his wife. Pre-hunt show-and-tell of antennas, RF sniffers, and HT T-hunt techniques with body shielding. Mid-morning, 4-wheeling caravan over the mountains and down to the river, and back again. (Gordo goes out in his dune buggy, and while

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

Photo B– Quartzfest, a week-long gathering of hams among the annual visitors to Quartzite, includes morning and afternoon seminars that regularly draw 100 or more avid listeners.

prowling for gold nuggets, nearly steps on a coiled rattlesnake sunning itself on a rock.)

Saturday: Hams from all of the other gatherings descend on the Mile 99 Quartzfest to take part in the daybreak, tailgate yard sale (photo E). This event gets bigger every year, and hams such as Don Wilson, N9ZGE, and his wife, Linda, KB9OLC, drive halfway across the state to attend and help out, as they did throughout the week-long activities. Saturday afternoon, show-and-tell of good bargains we found and great deals we had passed on to other hams. Saturday night, farewell bonfire and cookout.

Formula for Success

The success of Quartzfest may be just the atmosphere of the event. Everyone is on their own, with no hook-ups other than one ham who had a complete-looking hook-up outside of his motorhome—electrical box, sewer line, and a water spigot. Of course, it was a tongue-in-cheek setup that had unsuspecting hams looking around to see where *their* desert hook-up was located!

"Everyone brings firewood for the community fire," comments Harvey. "At the campfire, bring your spouse and lots of tall tales," he adds. He points out that there are regular morning donut runs into town just 5 miles up the road, and every few days someone with a big pick-up truck offers to do a trash run back into town to keep our BLM (Bureau of Land Management) free camping grounds clean and tidy.

"We hope everyone this year will come up with new ideas and continue an evolving and ever-fresh approach to the activities at our campouts," continues Harvey, K5LJM, who can be reached for comments and suggestions at <azharvey@cox.net>.

"But the star attractions to this week-long event are not necessarily the specific seminars, but rather all of the individuals with so much talent that Quartzfest brings to ham radio and ham radio operating," adds Harvey, mentioning that one of this year's drop-in guests

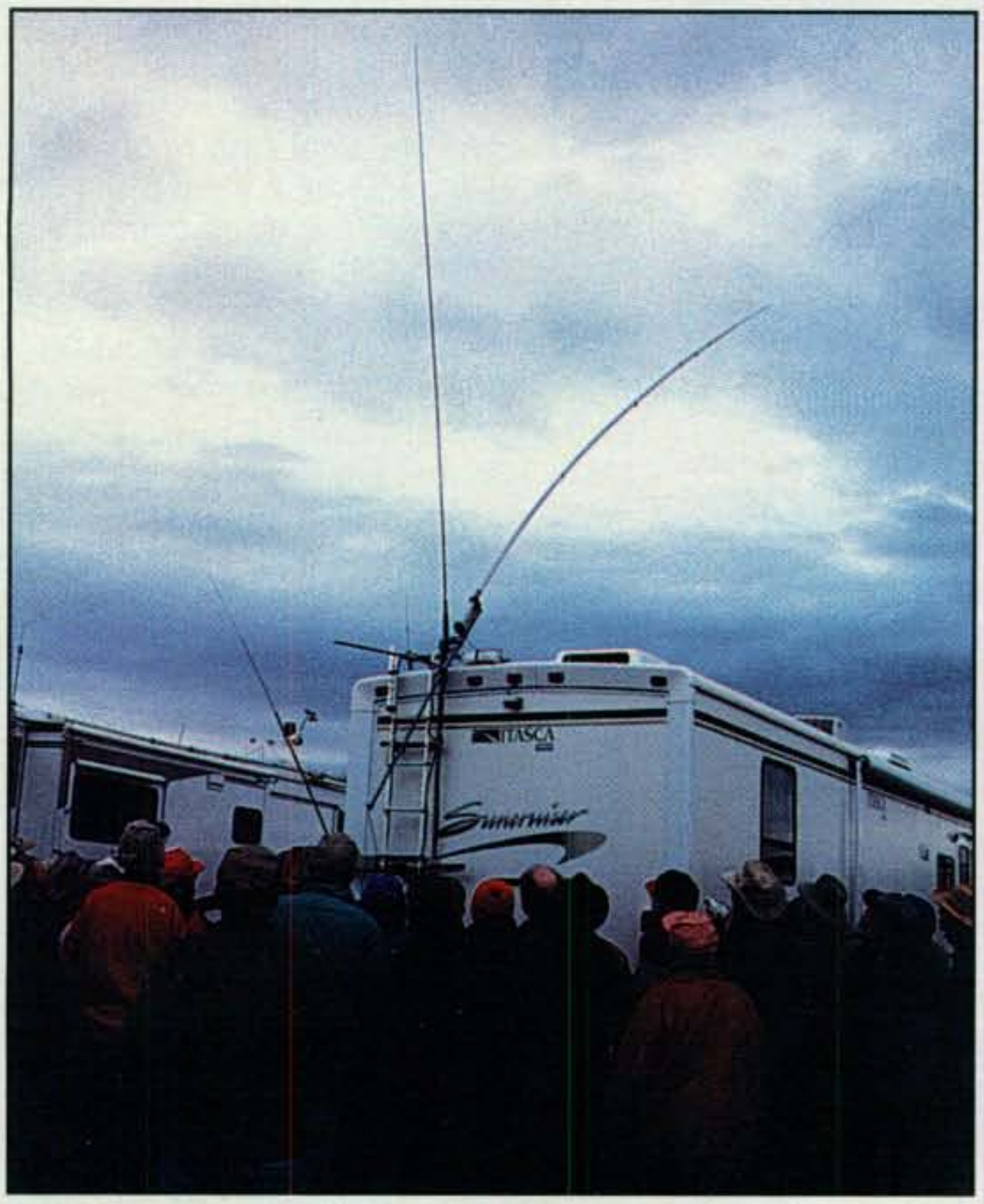

Photo C– Comparing antenna systems is a favorite activity at Quartzfest, including scheduled show-and-tell sessions describing different setups.

Photo D– Show-and-tell sessions included one on ways of using satellite TV antenna actuators to raise and lower ham antennas and solar panels, used to recharge RV/camper power systems.

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was one of the fathers of digital radio, Mike Lamb, K7ML, founder of AEA.

Winlink/Air Mail a Big Topic

Mike's attendance at the Monday morning seminar on Air Mail/Winlink e-mail on ham frequencies sparked a big discussion on the gradual migration away from PACTOR I to the more robust PACTOR II and III modes. Steve Waterman, K4CJX, presented a talking paper to the group discussing the system-wide PACTOR I use amounting to less than 7 percent of all Winlink traffic. Steve points out that PACTOR I users may generate more than 35 percent of all air time, and that it would take 80 minutes to pass an 80,000-byte file using PACTOR I, while the same file transmitted using the PACTOR II protocol takes approximately 18 minutes, and less than 7 minutes using PACTOR III.

However, many of the Quartzfest Winlink operators indicated it was not time just now to toss out your older PACTOR I equipment. In fact, many of the operators were continuing to support PACTOR I operation, and applauded those PACTOR I PMBOs (Personal Mail Box Operators) who will continue to offer their specific stations for passing this slower traffic.

Winlink now supports 4800 users, and with a push for the use of Winlink 2000 as a tool for emergency preparedness, the growth is going to continue at an ever-increasing pace.

"If in the future we find more suitable protocol, PACTOR II/III may make way for even newer technology—that is, up to the marketplace. Winlink will continue to adapt our user population with such enabling technologies when they arrive on the marketplace," comments Waterman, K4CJX.

Winlink shares spectrum with many other amateur activities, and they want to make it as efficient and unobtrusive as possible.

"Let's leave as small a footprint as we can," adds Waterman.

"Less scanning and faster protocols are both important ways to achieve that. The developers of Winlink 2000 are committed to this process," adds Waterman, with two people attending Quartzfest who have aided the Winlink development—Temp, W4HZV, and Tad, WA2FQO.

Sharing Technology

Throughout the week, all of the RV ham operators were doing something to demo new and exciting technology in their RVs. I saw a terrific APRS (Automatic Position Reporting System) tracker from Havacomm, developed by Dick Jernigan, W7DXJ. The device combines a GPS (Global Positioning System) receiver and tiny Trak 3 converter into a single package that gathers GPS data and converts it to packets of position information (see <http://www.havacomm.com>).

Photo E– Saturday morning at Quartzfest includes a ham radio "yard sale," which looks suspiciously like a flea market. Since the event is held on federal land, only personal sales are permitted and commercial activity is prohibited.

Ron Nilson, KD6LA, was showing off his homebrew ground stands for any type of HF mobile antenna (photo F). Just screw in the ground-plane components, screw your favorite mobile antenna into the 3/8 × 24 threads, add coax, and your ground plane is sufficient down to 40 meters. The stand's eight legs also serve as a counterpoise for a vertical antenna. "Water the base and you can easily get 75 meters, too," adds Ron (<rndn1@verizon.net>).

While there were some commercial vendors with their own personal motorhomes attending the week-long event, there was absolutely *no commercialism* by these avid RVers. ("Mile 99" is on BLM property and commercial exhibitions are strictly prohibited.) For example, attending this year's Quartzfest were Pat Marcy, W7PZ, of ICOM America, and Leon Hummel, N7IXX, of Ham Radio Outlet in Portland, Oregon. They were there simply to enjoy the event and answer general

Winlink and Airmail: A Closer Look

At the recent Quartzite ham radio gathering, the capability of sending and receiving free e-mails over the ham radio Winlink system was judged one of the greatest technological advances in ham radio communication for both RVers and sailors. The Air Mail program is written by Jim Corenman, KE6RK.

"Sending digital communications over amateur radio is nothing new, but recent advances in technology and software have made it easier than ever before for mobile hams to stay in touch via ham radio," commented Corenman. "All that is needed is some method to get messages to a fixed station, and from there to the internet. Thanks to the efforts of hundreds of dedicated system operator hams, and expert software developers, the pieces are in place," he added, suggesting that all hams should look at <http://www.airmail2000.com/pprimer.htm>.

Air Mail is a 32-bit program that runs under a variety of Windows programs. Many modems support PACTOR, including:

Kantronics KAM+ and KAM-98
AEA PK232, PK900, DSP1232, and 2232
MFJ 1276 and 1278B
Hal DXP-38
PTC Pactor modem

Thanks to the many Quartzite hams for their input, and next year at Quartzfest 2005 we may offer a full day of Air Mail PACTOR discussions and instruction.

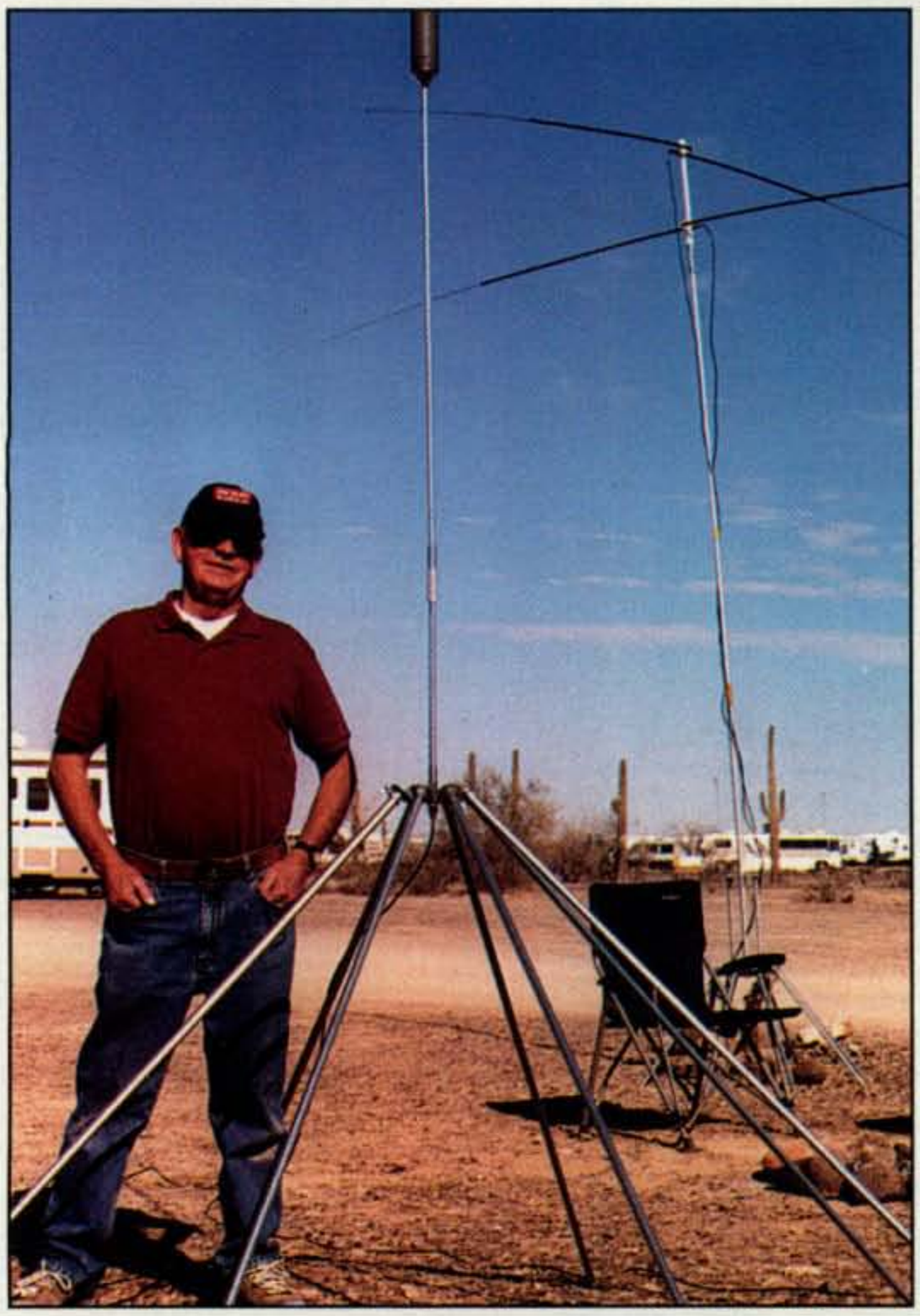

Photo F– Ron Nilson, KD6LA, shows off his "Oct-a-Pod" ground-plane base system for fixed use of mobile HF antennas. The eight legs also serve as radials and create a counterpoise.

questions about products in their area of expertise, but not to sell anything.

Planning for 2005

The big question for Quartzfest 2005 is exactly *how organized* the event may want to get. It was pointed out that any one person doing the major organizing of such an event could end up with not only the credit for everything that went well, but also the responsibility of anything that might go wrong. I don't think any single ham would want to take on this potential liability. Is there a ham radio club with ARRL insurance that might want to help sponsor Quartzfest '05, allowing Harvey and Margie to more structure the daily events and develop back-to-back seminars throughout the day? Quartzfest could easily turn into a fabulous week-long amateur radio RV show-and-tell by experts who literally live every day with their mobile ham radio setups.

The Saturday swapmeet alone could be well publicized and draw hams from hundreds of miles away, just like the thousands of rock hounds who come down and make their exchanges in the field. Take a look at the website and see for yourself all that Quartzite has to offer when it comes to hands-on ham radio education for next year! (go to: <http://members.cox.net/azharvey/quartzfest/quartzfest.htm>).

Quartzfest '05 could quadruple RV attendance at Mile 99 with plenty of room out in the high desert to enjoy a week of ham radio learning at its best! ■

BY FREDERICK O. MAIA,* W5YI

FCC Approves Rules for BPL
Details from the Report & Order

"We recognize the concerns of authorized radio service users in both the private and government sectors for the need to ensure that radio frequency (RF) energy from BPL signals on power lines does not cause harmful interference to licensed radio services. The record and our investigations indicate that BPL network systems can generally be configured and managed to minimize and/or eliminate this harmful interference potential."

FCC in ET Docket 04-37

The FCC's 86-page Report and Order adopting new rules providing for the widespread deployment of Broadband over Power Lines (otherwise known as BPL) was released just after our December issue went to press. Here are the details of the FCC's ruling, as well as some background on the proceeding and why amateur radio operators are concerned.

BPL is a technology that allows high-speed Internet access using the largely untapped communications capabilities of the nation's power grid. The FCC, a big supporter of the technology, said BPL "...offers the potential for the establishment of a significant new medium for extending broadband access to American homes and businesses [since] power lines reach...every community and geographic area...." The Commission also believes that BPL "...could serve to introduce additional competition to existing cable, DSL, and other broadband services," thereby driving down prices.

Last year, the National Telecommunications and Information Administration (NTIA) studied both BPL operating characteristics and interference risks to radio reception in the immediate vicinity of overhead power lines. NTIA, a part of the Commerce Deptartment, is the White House's advisor on telecommunications and spectrum management issues (see <www.ntia.doc.gov>). One of its responsibilities includes advancing the so-called Information Superhighway.

The NTIA's findings, published in an April 2004 report, made specific policy recommendations to the FCC to encourage the rapid introduction of BPL while protecting licensed radio services from harmful interference. NTIA's conclusion was that the potential public benefits of BPL warrant acceptance of a small and manageable degree of interference. NTIA focused on the need for rules that address both interference concerns and BPL operational requirements. Joining the BPL bandwagon, it urged the Commission to promptly adopt effective new technical and operating rules that would "...contribute significantly toward fulfillment of the President's vision for universal affordable broadband Internet access."

The FCC agreed. "This new technology offers the potential to give rise to a major new medium for broadband service delivery," it said, adding that the widespread nature of the electric power network "...could conceivably offer these services to virtually every element of the broadband market, including residential, institutional, and commercial users." The FCC also said it believed that BPL could "...provide a means to expedite the availability of broadband Internet service to consumers and business in rural and other underserved areas."

In deciding the BPL issue, the Commission worked closely with NTIA and the final rules incorporate many of its recommendations. The FCC said that the NTIA's response was particularly helpful in suggesting ways that would lead to an orderly and timely deployment of BPL devices in a manner that reduces harmful interference to licensed radio services. According to the FCC, the new BPL rules embody:

1. new operational requirements to promote avoidance and resolution of harmful interference;
2. new administrative requirements to aid in identifying BPL installations; and
3. specific measurement guidelines and certification requirements to ensure accurate and repeatable evaluations of BPL emissions and all other carrier current systems.

"We believe these actions will promote the development of BPL systems by removing regulatory uncertainties for BPL operators and equipment manufacturers while ensuring that licensed radio services are protected from harmful interference," the FCC said in the Report and Order.

The BPL proceeding has been put on the superfast track. The FCC issued a Notice of Inquiry on BPL technologies in April 2003 and followed it up with a Notice of Proposed Rule Making (NPRM) just a few months later. In late October, the Commission went to the final Report and Order stage...six months, start to finish, for a process that normally takes about two years.

What Did the Comments Say?

The FCC said in the NPRM that it wanted public input on what the Part 15 radiation limits and measurement procedures for BPL systems should be and how best to protect existing authorized services. The Commission also suggested a database of BPL locations.

The comments began pouring in last spring, and by summer over a thousand were received. As a group, ham operators by far submitted the most comments.

Not unexpectedly, comments from parties with a business interest in broadband service overwhelmingly supported the deployment of BPL. They included communications, manufacturing, government, broadband service providers, rural telecommunications providers, public safety providers, local municipalities, BPL equipment manufacturers, consumer electronics manufacturers, home security monitoring services, and electric power utility companies.

AT&T Corp. said that BPL "...can bring an end to the broadband duopoly of cable modem and DSL service." The Consumer Electronics Association

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What is this Proceeding About?

And how does it impact amateur radio?

Broadband over Power Lines (BPL) is a new type of "carrier current" system that uses electric power lines to carry communications by coupling very-low-power RF signals onto the AC (alternating current) electric wiring. These systems operate on an unlicensed, non-interference basis under Part 15 of the FCC's rules and must accept any interference that they receive.

Until recently these devices operated on frequencies below 2 MHz with very limited communications capability. Campus carrier current radio systems have been operating for over 50 years in the United States at many universities as unlicensed broadcast radio stations in the AM Broadcast band.

In the last few years, however, the availability of faster digital processing and sophisticated modulation schemes have allowed carrier current devices that can overcome the inherent noise and impedance mismatch of power lines.

These new designs have led to the development of Broadband over Power Line (BPL) systems that use spread spectrum and other modulation schemes to effectively counter the noise in the line. The consumer simply plugs a small power-line modem into an electrical outlet to receive a broadband connection from the BPL service provider.

BPL systems provide high-speed digital communications capabilities by coupling RF energy onto either the power lines inside a building (called "In-House BPL") or onto the medium-voltage power delivery lines ("Access BPL").

In-House BPL systems use the 110-volt power wiring within a building to transfer information between computers and between other home electronic devices, eliminating the need to install new wires between devices.

Access BPL systems typically use the medium-voltage exterior power lines (carrying between 1,000 and 40,000 volts) as a transmission medium to bring the high-speed Internet and other broadband services to neighborhood users.

Tests have shown that Access BPL can be an effective means for "last-mile" delivery of broadband services and may be a competitive alternative to digital subscriber line (DSL), cable modem services, and other high-speed Internet access technologies.

Ham operators are primarily concerned about Access BPL since overhead power lines are unshielded and can serve as radiating antennas. This signal leakage can become harmful interference if not carefully managed. That is, radio systems using the same frequency bands as those on which local Access BPL signals are transmitted could possibly receive harmful interference if adequate safeguards are not in place.

Most BPL systems operate in the range from 2 MHz to 50 MHz, with very low-power signals that are spread over a broad range of frequencies. These frequencies are also used by many licensed radio services (including amateur radio) and must be protected from harmful interference under the Commission's Part 15 rules for unlicensed devices.

(CEA) believes that "...BPL will advance consumer use of new technologies and products such as home networks.

Incumbent spectrum users were not so supportive, however. They expressed concern that the potential benefits of BPL would come at the cost of new interference to existing licensed radio services. Among these were public safety, ambulance, road service, and other assistance parties. They wanted their frequencies in the HF (2–7 MHz), low VHF (30–50 MHz), and VHF (72–76 MHz) bands protected from harmful interference.

Aeronautical and maritime radio interests said the same thing ... that BPL should not be permitted to operate in the frequency bands that are used by the aeronautical and maritime radio users. Shortwave listeners wanted international broadcasting services in the 5.9– 26.1 MHz frequency range protected.

Bell South Corp. and Verizon Communications feared that BPL could cause harmful interference with telephone network and DSL services, because power lines are parallel to unshielded telephone wires. CBers were concerned that BPL could cause harmful interference to the 27-MHz Citizens Band.

TV broadcasters urged that the FCC limit BPL to frequencies below 50 MHz and avoid operations in the low VHF TV band. The National Academy of Sciences wanted radio astronomy allocations in the HF and low VHF regions protected...and on and on. Like prisons, nobody wanted BPL "in their back yard."

Hams Echo ARRL Comments

Hams were particularly opposed to allowing the operation of BPL. More than 1500 submitted informal comments via the FCC's Electronic Comment Filing System (ECFS). Their statements generally reflected the position of the American Radio Relay League.

In summary, the position of the amateur radio community and the ARRL was: (1) BPL should not be authorized at this time, (2) if the FCC does proceed with BPL rules, any use of amateur radio allocations should be precluded, (3) radiated emission rules that are sufficient to predictably protect mobile radio stations from interference should be adopted, and (4) the FCC should require Access BPL operators to implement specific interference mitigation measures. The League also requested that the BPL matter be placed on-hold for one year "...in order to work out appropriate interference avoidance and resolution standards."

Interference "Not a Problem," Says Utility Companies

BPL system proponents and several electric utility services countered the interference claims with arguments that BPL systems are designed to avoid interference to radio services and that BPL operators have been willing to work with public safety and other radio service users to prevent or eliminate interference. They say their experience in trials shows little record of interference and that the few complaints of interference they did receive were resolved.

For example, one power utility company, PPL Telcom, stated that it had received only four complaints of "suspected" interference in nearly 30 months of BPL operation, all from amateur radio operators who were located a few hundred feet or less from BPL devices. Another power company, Progress Energy, similarly said that in its most recent tests "...no BPL site had any signal levels above S-0 in any amateur band with a single exception in one subdivision at approximately 25 meters from the extractor and that the level of emissions at that site would cause no interference unless an amateur were located practically on top of the BPL extractor."

The Envelope Please . . . The FCC Decision

After considering all of the comments, research, analyses, and practical experience, the FCC said it continues to believe that the interference concerns of licensed radio users can be adequately addressed. That position was not unexpected.

"Access BPL systems will be able to operate successfully on an unlicensed, non-harmful interference basis under the Part 15 model," FCC flatly ruled. "...(W)e find that the harmful interference potential from Access BPL systems operating in compliance with the existing Part 15 emission limits for carrier current systems is low in connection with the additional rules we

are adopting. ...[and] we observe that the potential for any harmful interference is limited to areas within a short distance of the power lines used by this technology."

The Commission disagreed with the ARRL's position that there is no reason to act now. The agency's position is that BPL offers "...an important opportunity for establishing a new medium for high-speed Internet access and for introducing new competition in the broadband market."

The FCC said the rules it adopted are more than sufficient to protect licensed services from harmful interference. "While some cases of harmful interference may be possible from Access BPL emissions at levels up to the Part 15 limits, we agree with NTIA that the benefits of Access BPL service warrant acceptance of a small and manageable degree of interference risk."

The Commission believes that "additional regulatory measures" can be implemented in cases where interference occurs or impacts critical services. These additional measures will generally require BPL operators to reduce emissions or avoid operation on certain frequencies in order to protect licensed services, to use equipment that can alter its operation by changing operating frequencies to eliminate interference, to make available information that will assist the public in identifying locations where BPL operations are present, and to provide notice to radio users before beginning local BPL operations.

"In this way, the new rules provide effective means for preventing any interference and will ensure that any instances of interference that may occur can be quickly identified and resolved. We emphasize that Access BPL systems will continue to be treated as unlicensed Part 15 devices and as such will be subject to the conditions that they not cause harmful interference and that they cease operation if they do cause such interference, as required by our rules," the FCC restated in the Report and Order.

Except for a few specific frequencies that are reserved for international aeronautical safety operations, the FCC declined to exclude BPL operations from frequencies used by any specific service including the Amateur Radio Service. "Rather, we believe requiring BPL equipment to have the capability to avoid any locally used frequency is the most effective approach to ensuring that harmful interference to licensed operations is avoided."

The Part 15 rules were amended, but with minimum changes ...intended to facilitate the early deployment of BPL

technology while protecting licensed users of the spectrum. "The benefits and advantages of BPL are just beginning to be recognized," FCC Chairman Michael Powell said. "That is why it is important for regulators to exercise restraint and avoid heavy-handed regulations ... We must allow the marketplace to develop the full potential of this technology."

The New Rules:

1. **Define Access BPL in Section 15.3 as:** "A carrier current system installed and operated on an electric utility service as an unintentional radiator that sends radio frequency energy on frequencies between 1.705 MHz and 80 MHz over medium-voltage lines or low-voltage lines to provide broadband communications and is located on the supply side of the utility service's points of interconnection with customer premises."

2. **Maintain the existing Part 15 emission limits for carrier current systems for Access BPL.** "We continue to believe that it is appropriate to apply the existing Part 15 radiated emission limits to Access BPL systems," the FCC said. "We are not persuaded by the arguments of ARRL and others representing licensed spectrum users that the current emission limits are insufficient to limit the general interference potential of these systems."

3. **Require that Access BPL devices employ "adaptive interference mitigation techniques"** to remotely reduce power and adjust operating frequencies:

"(In) most cases the level of emissions from Access BPL systems will be at or close to the noise floor at distances beyond a hundred meters of an installed power line. We recognize that some radio operations in the bands being used for Access BPL, such as those of amateur radio licensees, may occur at distances sufficiently close to power lines as to make harmful interference a possibility.

"We believe that those situations can be addressed through interference avoidance techniques by the Access BPL provider such as frequency band selection, notching, or judicious device placement. In addition, because power lines inherently can radiate significant noise emissions, good engineering practice is to locate sensitive receiver antennas as far as practicable from power lines." Notches are required to be at least 20 dB below the applicable Part 15 limits on HF and at least 10 dB below on VHF.

4. **Exclude certain public safety frequency bands from BPL operation** including "...national defense, maritime distress and safety, aeronautical navigation and communications, emergency response, and other frequencies that provide important safety and research services..."

The excluded frequency bands amount only to a total of 1731 kHz, or 2% of the spectrum within the 1.7–80 MHz band. Also established are "exclusion zones" in locations close to sensitive operations, such as Coast Guard or radio astronomy stations.

"For all other radio communication operations not addressed in these special provisions, radio operators have the opportunity to inform local BPL operators of the pertinent details of their operations and BPL operators have the opportunity to apply that information as appropriate to prevent interference," the FCC said.

"We do not see a need to establish Access BPL-free zones around airports, military bases, hospitals, police stations, and fire stations..." And no amateur radio bands were among those excluded from BPL operation. "We do not find that amateur radio frequencies warrant the special protection afforded frequencies reserved for international aeronautical and maritime safety operations," the FCC said, noting that, "...in many instances amateur frequencies are used for routine communications and hobby activities."

5. **Adopt requirements that BPL systems incorporate a "deactivation capability"** if they are found to cause harmful interference to licensed radio services. "Our approach is to provide Access BPL equipment manufacturers and operators with flexibility to design and implement a broad range of products and system designs to meet particular service and operational needs while ensuring that systems have the capabilities to make operational changes to avoid any interference that may arise.

"Parties who believe they are experiencing interference from an unlicensed device are first expected to bring the matter to the attention of the operator of the unlicensed device. If that action does not resolve the interference, the party may then seek intervention by the Commission.

"The Commission will instruct the BPL operator to take immediate remedial actions, such as 'notching' or avoiding specific frequencies, or ceasing operations." BPL providers must have the capability to remotely adjust or shut down any unit. FCC-ordered shut down will be the last resort if other mitigation techniques are ineffective in resolving the interference.

6. **Require that Access BPL system operators provide information on the areas where their systems are installed** and other technical parameters

in a central data base that would be accessible by the public.

An industry-operated, publicly-accessible database ensures that the location of Access BPL systems and their operating characteristics can be identified if harmful interference occurs. This database, which must be established within six months, will facilitate the activation of interference mitigation and avoidance measures. The information must include the name of the BPL provider, location (zip codes) of the installation, the type of equipment used, the frequency bands used, and proposed date of operation. According to the Report and Order:

"Anyone experiencing interference could query the database which would return general information on deployed BPL systems and direct the complainant to a single point-of-contact name and phone number at the BPL operator's company.

"We expect Access BPL operators to take every complaint of interference seriously and to diagnose the possible cause of interference quickly. At the same time, we expect the complainant to have first taken reasonable steps to confirm that interference rather than a receiver system malfunction is occurring and, to the extent practicable, to determine that the interference source is located outside the complainant's premises. We expect both parties to cooperate to determine a mutually acceptable schedule to diagnose and resolve the interference complaint...."

7. **Adopt specific measurement guidelines for both Access BPL and other carrier current systems** to ensure that radio frequency (RF) measurements are made in a consistent manner and provide for repeatable results in determining rule compliance.

8. **Require Access BPL equipment to be certified (rather than "verified"—a less stringent equipment approval process) by the manufacturer.** Initially, however, the BPL certification process will be performed by the Commission. "We conclude that the Certification procedure is appropriate for this new technology to allow us to maintain oversight until additional operational experience is obtained from its wide deployment."

The new Subpart "G" rules applying to Access BPL take effect 30 days after appearing in the Federal Register. That means the new rules should be effective about December 15, 2004. All Access BPL devices that are manufactured, imported, marketed, or installed on or after 18 months from that date must comply with the new requirements, including certification of the equipment.

73, Fred, W5YI

Results of the 2004 CQ WW WPX SSB Contest

BY STEVE MERCHANT,* K6AW

Conditions were not the greatest for the 46th running of the CQ WPX SSB Contest. However, despite much muttering and grumbling about declining propagation conditions, participation was equal to the prior year, and seven new world and continental records were set.

DX

From Cape Verde, D4B took the top Single Op All Band (SOAB) spot. Al, 4L5A, paid no attention to the poor conditions and set yet another world record with 25,955,444 points, surpassing his nearest competitor by over eight million points. Al also set another continental record for Africa. Second place went to Didier, FY5FY, followed by 9Y4ZC, operated by Jaroslav, OM3TZZ. Fourth place honors went to CT9A, operated by Jussi-Pekka, OH6RX, and in fifth position was P4ØY, operated by Andy, AE6Y. Sixth place went to Daniel at FM/T93M, and in seventh place was low power entry P4ØA (operated by John, KK9A). Eighth place was occupied by VC3E (Ron, VE3AT op); John, VE3EJ, was number nine; and WK4R (operated by Bill, K4XS) completed the top ten.

The 10-meter category was again dominated by South American stations as LU1HF, LO2F (LU1FAM op), and LU4FM (LU4FPZ) took the first three spots, respectively. Fourth place went to NP3X, and low power entry LU3HIP rounded out the top five. On 15 meters it was PX5E (Sergio, PP5JR) by over two million points over ED8EW (operated by Olli, OHØXX), while PJ2T operated by Marty, W1MD, took third place. LT1F (LW9EOC op) was in fourth place and Mike, KH6ND, took fifth. Twenty meters was dominated by 4L6AM, followed by 9A8A in second, and IU9S (Giuseppe, IT9BLB op) moved up to third place. VK1AA/4 was fourth and ZV5E (PP5KE op) was fifth. On 40 meters AN8AH (Pekka, OH1RY op) won, edging out YTØA (YU1EU op) who was second and T99W in third place. Fourth was SN7Q and TØA (YT6A op) took fifth place. Eighty meters saw SO2R (SP2FAX op) setting a new Europe record for the band over second-place Tine, S5ØA. 9AØAAA (9A5K op) was right behind in third, LX7I (LX2AJ op) was fourth, and YU7AV took fifth place. Top band was won by S57M, followed by OZ1HXQ second, HA8BE third, LY2BW fourth, and a low power fifth place score from LY5A (LY2PAJ op.)

World low power SOAB honors again went to John, KK9A operating P4ØA, who dominated the category. Second place went to ZX2B (PY2MNL op), and third was CS6T (CT1ILT op). Moving up to fourth place was LV7H (LU7HF op), 4L2M was fifth, NF4A was in sixth place, HK3JJH seventh, LVØN (LU2NI op) eighth, VP8DGA (GØWJN op) in ninth place, and UA4FER tenth.

D4B (Al, 4L5A op) was top SOAB high power and set a new world record.

Cesar, LU3HIP, won the low power 10-meter category by a slight margin, followed by PY2SBY in second place and PU2WDX third. LT7Y (LU7YZ op) was fourth and LU6HPF was fifth. On 15 meters low power AN8AG took first place, followed by KP4AH in second and Z37M (Z32PT op) third. AM7FTR was fourth and fifth place went to FM5FJ. The 20-meter low power category was a close race: HC1AJQ edged his second-place rival, AK2P (KC2LLM op), by less than 100k points. Third place went to 9A7D (9A3HX op) and fourth was SP3SLO. YUØHST (YT1BX op) was in fifth place. The 40-meter low power winner was NT1E (K3BU op), with T94DO second and YR5A (YO5TE op) third. HA6NL took fourth place and II3L was fifth. Eighty meters was won by 9A7DM, with SP4ZO in second and SQ9UM third. OM7AB took fourth place and S52W was fifth. The challenging 160-meter low power category was won by LY5A (LY2PAJ op), with SP6LUV in second. OZ3SK was third, VE3MGY fourth, and fifth was 9A3RE.

The Tribander/Single-Element category remains very popular. Emily at P43E was first, 9M2RPN (GM4YXI op) was second, and VO1AU was third. Low power entrant ZX2B (PY2MNL op) took fourth place and 9J2KC (JL1NKC op) was fifth. ZP1C (ZP5AZL op) took sixth place, AY8A (LU8ADX op) was in seventh place, HG8R was number eight, KG6DX nine, and PY7ZY was number ten. The 10-meter winner in the TS category was W7UPF, with K8OZ in second place. K8IA moved up to first on 15 meters, followed by JA1BPA in second and KBØENE in third place. Twenty meters was won by G3PJV, with PC2T in second and W4LC in third. Forty meters was taken by OE5CWL. On 80 meters EU1AZ won, with PAØMIR second. Top band TS honors went to OZ3SK, with ND8DX second.

The 2004 Rookie category winner was a low power entry from CS6T (operated by CT1ILT) with just under 5 million points, followed by KG4NEP, and W1AJT/VE3 in third place. UO6P (UN7PBY) took fourth and YT1LT's low power entry won him fifth place.

EC8ABT was the Band Restricted category winner.

Single Op Assisted was won by C4M (RW3QC op), followed closely by PS2T (Oms, PY5EG op), PJ4P (DF7ZS), RG9A (UA9AM op), and LU1NDC. The 10-meter Assisted winner was PP5JD (low power), with KO4MR second. On 15 meters LS7D (LU7DW op) won, followed by JI3OPA, 9A1P ((9A6NDX op), and OMØM (OM7ZZ op). On 20 meters first-place OE6Z turned in a very nice score, followed by YT7A (YU7GMN op). The 40-meter top spot in SO(A) Assisted went to 4NØØA (YZ1ZV op), with low power SV5RDS (SV5DKL op) in second place. Low power entrant SO6A (SP6IHE op) won 160.

The top QRP spot went to YT7TY, followed by UA3BL in second place. Chas, K3WW, was third, with LU1VK fourth and N8IE fifth. LW3DX was the top 10-meter op, EA8TX was the winner on 15 meters, RW9AB won 20 meters, ES6PZ was the 40 meter champion, and ES8SW won 80 meters. YU1RA took the Top band honors.

USA

The top three spots in SOAB USA were hotly contested this year. Bill, K4XS, took first place as WK4R, followed very closely by frequent winner Bob, KQ2M, and KN1DX (K4ZW op), with only a bit over 5,000 points separating the second- and third-place winners. The West Coast was well represented by Dan, N6MJ, who operated W6KP as

Ghis, ON5NT, one of the ops at A61AJ, the top world Multi-Operator, Two Transmitter station.

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KM7W for a nice fourth-place finish. KC3R (LZ4AX op) was fifth, with K7RL sixth and George, K5TR, again making the top ten in seventh place. WB9Z was eighth, NZ8O (W8MJ op) was ninth, and low power entrant NF4A took the tenth spot.

NA4W was the 10-meter champ, followed by W7EB. Bob, N4BP, was third as NU4BP, and low power entrants K9OM and W7UPF took fourth and fifth place, respectively. On 15 meters John, N3HBX, moved up to number one. Second place went to K9ES, followed by K7RI and K5ZO. W6AFA was fifth. Twenty meters was won by low power entrant AK2P (KC2LLM op), with WØAIH (K9MU op) in second place. W5FO was third; Joe, WA7AR (W7FP op) fourth; and low power entry W9IGJ fifth. On 40 meters Brad, K7ZSD, again was the clear winner, with NT1E (K3BU) in second and W8JWN third. Low power entries by KU6T for fourth and NR8U for fifth completed this band. The 80-meter winner was a repeat performance by AA1BU with a big lead over second-place KE1Y. W3BGN was third, with NE5D (K5RX op) fourth and NT6K fifth. On 160 meters Leo, AA4MM, moved up to number one, with ND8DX second, low power K4WI third, and KØCS fourth.

NF4A captured the US SOAB low power title, followed by Bill, ACØW, in second, with WB8TLI third, Tom, N6NF, fourth, and N4IG fifth. K9OM was the 10-meter winner, with W7UPF second and K8OZ third. Fifteen meters was again won by K8IA, with Dick, W7ZR, again second as WZ7ZR, and W4SVO third. AK2P (KC2LLM op) was the top 20-meter low power entry, followed by W9IGJ and WPX regular Ken, K6HNZ. Forty meters was won by NT1E (K3BU op), with Paul, KU6T, again in second place. K4WI again won 160 meters in this category.

NF4A won the US T/S category, followed by KG1E in second place. Jonathon, W1CU, repeated last year and came in in third place, N2GC was fourth, and Dick, W6TK, repeated as fifth. NF4A and WB8TLI were the top two low power winners in T/S category, followed by Paul, WN6K, W7UPF, and K8OZ. KG4NEP handily won the Rookie top spot, with W5TTX in second place and N4GRN in third.

Single Op Assisted top honors went to W2RE, with second place going to W1US (K1LZ op). WO8CC (Steve, N8BJQ op) was third this time, followed by NO2R and Glenn, WØGJ. KO4MR had the top 10-meter score, as did K7ZS on 15 meters and WB1HBB (W4WR) on 20 (low power).

The USA QRP winners were Chas, K3WW, in first place, with N8IE second, followed by WAØVBW, KR1ST, and KBØYH. Single band winners were W6QU (W8QZA op) on 10 meters, WB7ACV/2 on 15, and W6YJ on 20.

Multi-Ops

The Multi-Single category was won this time by VP51V, operated by K5CM, N5KW, and W5AO. WP2Z, operated by K9TM, K8CC, and WZ8P, came in second. CWØB was third and UA9AYA was fourth. IR4T moved up to fifth place, with OM7M in sixth. RZ9OZO was seventh, TO7T was eighth, LU2FA ninth, and LY9Y finished in the tenth spot.

This year W4PA won the top USA multi-single award with ops KØEJ, KD4HIK, K4JNY, K4RO, and W4PA. Second place went to KØDU with ops KØDU, NØZA, KØCL, WA4HND, and KCØDKX. Third place was claimed by NN4N, staffed by GM3POI, MMØEAX, and N4TO. Fourth place went to AJ9C and in fifth place was NW1E.

In the Multi-Two category the competition between first- and second-place entrants was ferocious , with A61AJ (A61AJ, K2GM, N2AA, ON5NT, S53R, and SM7PKK) setting a new Asia M2 record and narrowly defeating CQ9K (CT3BD, CT3DL, CT3DZ, CT3EE, CT3EN, CT3HK, CT3IA, CT3IQ, CT3KU, and CT3KY). ZW5B set a new South America record and was operated by PY2KC, PY1NX, PY1KX, PY5KD, and PY5CC. RU1A set a new Europe M2 record for fourth place, and KM4M took fifth.

The US M2 winner was KM4M, setting a new USA M2 record with ops K4JA, AJ3M, K9GY, KD4D, NW4V, RA3CO, W3BP, and WK4Y. Second place honors went to WX5S, with K6UFO, K6IF, W6RQ, WX5S, N7MH, KT6YL, KG6D, and W6LD operating from W6YX. Third place went to WR3Z, with WE3C in fourth and NM5O fifth.

First-place world Multi-Multi went to YW4M, operated by YV4BOU, YV5AMH, YV5EED, YV5IQJ, YV5LMW, YV5LMX, YV5MHX, YV5MSG, YV5NWG, YV5OHW, YY5AFD, YY5COR, and YY5HBO. In second place was 3B9C (ops DK7YY, EI5DI, F5VHN, G3BJ, G3RAU, G3SED, G3XTT, G4IUF, G4KIU, G4TSH, GU4YOX, JH4RHF, K3NA, KF7E, and N7CQQ). The third-place spot went to OT4A, operated by YV4BOU, YV5AMH, YV5EED, YV5IQJ, YV5LMW, YV5LMX, YV5MHX, YV5MSG, YV5NWG, YV5OHW, YY5AFD, YY5COR, and YY5HBO. Fourth place was won by UP5G and NQ4I was fifth.

NQ4I (NQ4I, WI4R, K4PK, W4DD, K9JS, OH7KD, K4BAI, WB4SQ, N4EVR, WW4LL, K4ZJ, KT4ZB, KU8E, and W4BD ops) took first place US Multi-Multi with a substantial margin over second-place NX5M, operated by NX5M, N5XJ, W5SB, KK5LO, W5PF, N1LN, KE4NT, KM5ET, KA5BKG, K5NZ, W5MN, W5MJ, N5XT, KG5U, K5GN, NT5TU, KC5YKX, and N5XZ. Third place went to NR6O, with WX3B fourth and NE1C fifth.

The Rest of the Story

Log submissions were about on a par with 2003. Most logs were sent in Cabrillo format, which is the default requirement. We continue to refine our log preparation instructions on the WPX contest website (http://www.cqwpx.com) so contestants will not have difficulties submitting their logs. 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, not a word processor. **There are two significant log submission changes for next year.** See the 2005 rules or the website for more information.

Dima, UA3AGW, participated in the contest on 40 meters.

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 CQ WW 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 are checking serial numbers. If we receive a log without sent or received serial numbers it will reclassified as a check log. If you encounter problems with serial numbers in your log, please take up the matter with your logging program author. With close to 5,000 logs to process each year it's impossible for us to fix everyone's log.

Biggest thanks go to Steve Bolia, N8BJQ. He has been tireless and is always ready to step in to help with the contest.

The 2005 WPX SSB Contest will be held on March 26 and 27. Please plan to participate. Rules can be found on both the *CQ* magazine site (www.cq-amateur-radio.com) and the WPX website (www.cqwpx.com). Also please submit all logs e-mailed logs in the Cabrillo format. Send SSB logs to <ssb@cqwpx.com>, or snail-mail logs to CQ WPX Contest, 25 Newbridge Road, Hicksville, NY 11801.

See you in the 2005 contest.

73, Steve, K6AW

(Continued on page 102)

Expanded Results

The list of multi station operators and expanded QRM can be found on the CQ website, <www.cq-amateur-radio.com>, in the contests section under "Expanded Results 2004 CQ WW WPX SSB Contest."

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C4	10/12/15/17/20/40m, 8 el	$799
C4S	10/12/15/17/20/40m, 7 el	$719
C4SXL	10/12/15/17/20/40m, 8 el	$1019
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C31XR	10/15/20m, 14 el	$1389

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BPL25G/45G/55G	$99/129/149
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SBB224NMO,2m/220/70cm	$69
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$55
SBB7NMO, 2m/70cm Mobile	$69
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LJ103BA/105CA/155CA	$145/259/379
LJ203BA/204BA/205BA	$289/479/679
TH3MK4/TH3JRS	$399/319
TH5MK2/TH2MK3	$849/319
TH11DX/TH7DX	$995/749
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35-40'	$1569

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NR770HBNMO/NR770RA	$55/49
X200A, 2m/70cm Vertical	$129
X500HNA/X700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

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MFJ

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269, Antenna Analyzer	$299
941E, Antenna Tuner	$109
945E, Antenna Tuner	$99
949E, Antenna Tuner	$139
969, Antenna Tuner	$169
986, Antenna Tuner	$289
989C, Antenna Tuner	$309
1798, 80–2m Vertical	$249
1796, 40/20/15/10/6/2m Vert	$199

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Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
Titan Guy Kit	$29
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Voyager Counterpoise	$49
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Yaesu G-800SA / G-800DXA	$329/409
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Yaesu G-2800SDX	$1089
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R62 (#18)	$.32/ft.
R81/82/84	$.25/ft./.39/ft./.85/ft.

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HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
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PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.89/ft
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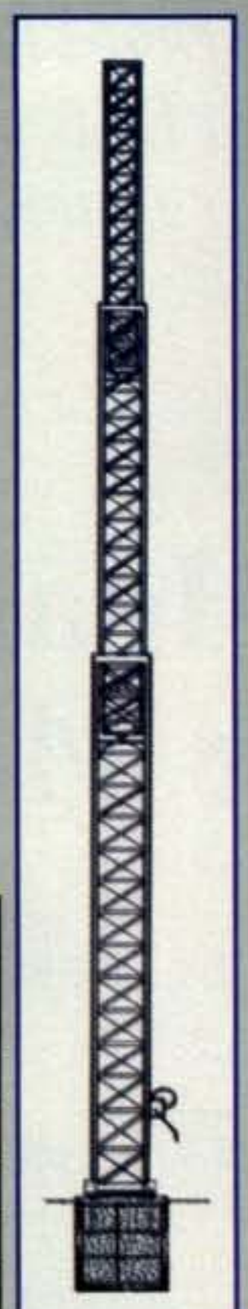

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TX SERIES HEAVY DUTY CRANK-UP TOWERS

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 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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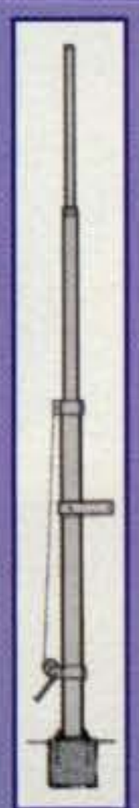

TMM SERIES COMPACT CRANK-UP TOWERS

• 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!

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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

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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If you have an older rig without digital signal processing (DSP), or a limited range of DSP options, consider two DSP solutions from GAP Antenna Products: the "Hear It" line of DSP speaker and inline module. Contributing Editor WB6NOA has our review.

CQ Reviews:

The GAP DSP "Hear It" Speaker and Inline Module

BY GORDON WEST,* WB6NOA

GAP Antenna Products is well-known for its major-size, vertical HF antennas, such as the Challenger, Eagle, Voyager, and an antenna I happen to own, the Titan DX. These exceptional antennas have been nicknamed "the ultimate verticals," and the dramatic increase in receive capabilities they provide has led GAP to introduce two digital signal processing (DSP) noise-elimination "black boxes" (literally) which we recently tested: the "Hear It" speaker and inline module. Designed by and imported from BHI in England, each product incorporates some exclusive GAP engineering that perfectly suits each DSP box to literally *any* type of receiver, including my Kenwood TS-570, which already has two levels of audio DSP built in. The multi-level GAP DSP units offered more variations in specific DSP levels.

Digital signal processing subtracts unwanted noise that routinely surrounds incoming high-frequency signals. First the analog audio is converted into digital logic. Then the DSP chips magically enhance the desired voice syllables and data signals while subtracting the rush of high-frequency noise that is riding along with the desired modulation you are attempting to decode in your brain or via computer. The DSP circuit is actually a powerful computer that has been preset to lower that high-frequency noise floor.

However, the DSP circuits are not completely magic; for mobile applications you should do everything you can to minimize ignition static as well as other vehicle noise that may creep in with the desired high-frequency signal. For maritime-mobile operation, DSP noise-canceling circuits work well, but only after you have shut down the Morse-Code-sounding Danfoss refrigeration system controller, as well as inverters and battery chargers. DSP noise-elimination circuits work best on atmospheric noise, *not* with mobile noise associated with your vehicle or boat. It's the same thing with home installations: The frying-eggs power-line noise and pending heterodynes of BPL won't magically disappear with even the best digital signal processing circuit, whether in the audio chain or down in the intermediate-frequency (IF) stage of your modern HF transceiver. Certainly, IF DSP noise elimination has advantages over audio DSP circuits, but as you will see from our tests, the GAP audio DSP black boxes worked very well!

Photo A– The "Hear It" speaker from GAP Antenna Products includes a built-in digital signal processing (DSP) filter and audio amplifier.

"Hear It" Speaker

This GAP "black box" builds everything into a common rectangular external speaker box. The DSP circuitry and built-in audio amplifier require 12 volts from a common 2.1-mm power connector, center-pin positive and fused. Typical power consumption is a half amp. You must have 12 volts feeding the box for the built-in quality speaker to work, and be careful when you plug in the power cord. If you have the speaker grounded to the top of your transceiver, plugging in a "hot" power connector requires precise alignment so you don't accidentally touch the center of the connector to the grounded metal nut surrounding the jack. Plug the cord into the speaker first, and then into the 12-volt source! You will

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be greeted with a red indicator light that shows the GAP "Hear It" speaker is powered up.

GAP also supplies the 3.5-mm mono jumper plug cable that goes between the radio speaker output and the speaker input. The supplied cord is nearly 7 feet long, so you should have plenty to reach between the speaker and your high-frequency rig. Of course, the "Hear It" speaker will work with any type of receiver, including scanner, shortwave, multi-mode VHF/UHF satellite, and even a common CB radio.

The Hear-It speaker with DSP noise elimination offers you eight discrete levels of DSP, set by a group of DIP switches on the back (see photo B). It comes from the factory preset to level 6, a moderate amount of DSP noise elimination that tends to make voice signals sound a bit rolling and metallic, as would any DSP noise-elimination system set to above-medium level. Level 6 would be good for pulling out a digital signal such as PSK31 or CW from a high atmospheric noise level on 80 meters. But for working voice on 20 meters or 15 meters, level 4 sounds much better.

For initial adjustment of the DSP speaker, start out at level 1 (the minimum level) with the DIP switches on the rear all in the "on" position. Run your radio volume at normal level for a normal sound out of the speaker, and then switch the top DSP switch to "on." Now adjust the sensitivity control (marked "volume") to about three-quarters full, which is a counter-clockwise turn of the little pot on the top of the speaker.

Next tune into a weak transmitting station on HF and listen to the difference in background noise as you turn noise cancellation off and on. Even level 1 should give you some relief from the atmospheric noise that rides along with the desired signal. Level 4 provided remarkable noise suppression, without making the SSB signal sound hollow and brassy. Level 6 is good for CW and data modes, while levels 7 and 8 offer about 20 dB of noise elimination but are really too much for most DSP work. We found the best settings for our needs to be between levels 4 and 6.

If the speaker is going to be installed in your mobile unit, you probably will not need to do any more adjustment of the DSP levels after you have found the level that's best for you. However, if you really like to play around with DSP levels, the archaic DIP-switch technique for level changes is cumbersome. It reminds me of the old days of CTCSS tone selection on the back of my HT. I would have preferred a rotary switch. However, since mobile installation of this speaker is most typical, you probably only need to work the switches once or twice.

"Hear It" Inline Module

Here is where the GAP "Hear It" inline module (photo C) comes into play – the same DSP chip-engine on the inside, but specifically designed to drive your existing mobile or base speaker system. The "Hear It" module runs with the common 12-volt plug, center-tip positive. It has a plastic ring around the entire jack, so you won't need to worry about accidentally blowing a fuse if you should fumble the power-plug connection.

Unplug your speaker from your main HF transceiver, and plug a patch cable

from the transceiver's speaker jack into the audio input jack on the "Hear It" inline module (see photo D for cable connections). Use the selector switch to select speaker output audio. There's also a position for line input for specific base-station applications. Your speaker plug, which you just removed from the radio, now plugs into the audio output jack. As soon as you turn on your rig, you will hear audio that is bypassed direct to the speaker. DC power is not required at this point.

Now adjust radio volume to normal, and set both the input level and the output level on the GAP module to about mid-scale. Turn your radio volume down, turn on the GAP's power switch, and adjust both input and output volume levels to your normal levels. Double-check that you are not lighting the red LED for input level, which indicates you are overdriving the input by turning up the volume too high on your transceiver.

Next tune in a noisy station, adjust the DSP filter level to 4, and then turn on the noise-cancellation switch. It takes about 3 seconds for the unit to electronically identify the target signal, deduce the constant atmospheric noise, and subtract it from the audio output stage. Once this is done, adjust the DSP level for your preferred amount of noise reduction.

During our tests, we tuned around and found an extremely weak signal coming in at a level 5 on the GAP DSP in-line module. When we switched out the DSP noise-cancellation circuit, we couldn't believe our ears; that weak little signal completely disappeared into the hash. However, flip the circuit back on, wait a couple of seconds, and magically the GAP noise-cancellation circuits pull the signal out of the noise and reduce the noise dramatically. We were impressed!

For home-station use, most hams will regularly fiddle with the DSP levels. Therefore, I was surprised to see that the level control on the in-line module is a tiny, hard-to-grasp finger control. I would have figured it would have been a natural-size knob like the input and output level controls. The input and output levels seldom change, so I would hope GAP gets enough feedback that it takes the 8-level DSP control and makes it a decent-size knob.

Overall Impressions

Other than that, both the little black box speaker and the in-line module from GAP worked well. If your present mobile rig doesn't have a lot of audio output driving the speaker, both of these units have built-in amplifiers to dramatically boost output volume. There is also a nifty AGC (automatic gain control) built in so that extremely strong signals won't blast you out of the car, and extremely weak signals cleaned up by the built-in DSP circuitry are pulled up to a normal volume level. All this takes place without your having to reach over and adjust the volume control of the main rig.

While I have seen one other "black box" speaker with built-in DSP, it only offers two levels of DSP as opposed to the GAP unit, which offers seven levels of DSP plus an eighth position for amplifying the audio without adding DSP. It's the same thing for the in-line module—seven levels of adjustable DSP plus amplified straight-through audio.

The seven DSP levels are spaced apart just far enough so that you won't need to worry about any level in between a specific level. Also, the seven levels are placed just right on the DSP curve so that level 1 is minimum DSP, with level 7 and 8 being about the maximum you would ever want. Again, 4 to 6 were my favorite levels for both voice and data.

Photo B– DIP switches are used to control the DSP setting on the GAP "Hear It" speaker. Level 1 is minimum DSP, while level 8 is maximum.

Photo C– The GAP "Hear It" inline module is intended to provide the same levels of DSP noise elimination for setups in which you don't want to replace your current speaker.

Photo D– Audio input and output cables plug into the side of the "Hear It" module. There are audio-level and line-level connections for both input and output.

If you wire the GAP speaker into your vehicle, keep in mind that it will continue to draw a half-amp even after you have turned off your radio. The red indicator light will remind you to disconnect the fuse if you plan to leave the vehicle for a week or two without running it. I don't recommend unplugging the little plug on the back of the "Hear It" speaker, because you could accidentally short out the plug when trying to reattach the cable without actually eyeballing the connection for proper alignment.

The GAP "Hear It" DSP noise-elimination speaker is seen selling for $159, and the GAP in-line module for DSP noise elimination for $199. For more information and the full spec sheet, log onto <http://www.gapantenna.com>, or call 772-571-9922. GAP is located in Fellsmere, Florida and is a regular attendee at large hamfests, where company representatives set up their antennas and provide live demos. Most important, they are available at every hamfest they attend to spend time with us, the prospective buyers of their products. I always enjoy the GAP experience, and they are just as friendly on their telephone help line as they are in person.■

See our WWPX RTTY Rules on page 36.

Remember the movie Frequency, *in which the main character uses ham equipment to communicate with his deceased father? While QSOs with the past remain in the realm of science-fiction (for now), amateur radio still provides a connection between the author and his late father.*

My Father, Ham Radio, and Me

BY PETER BRANDENBERG,* K2MMT

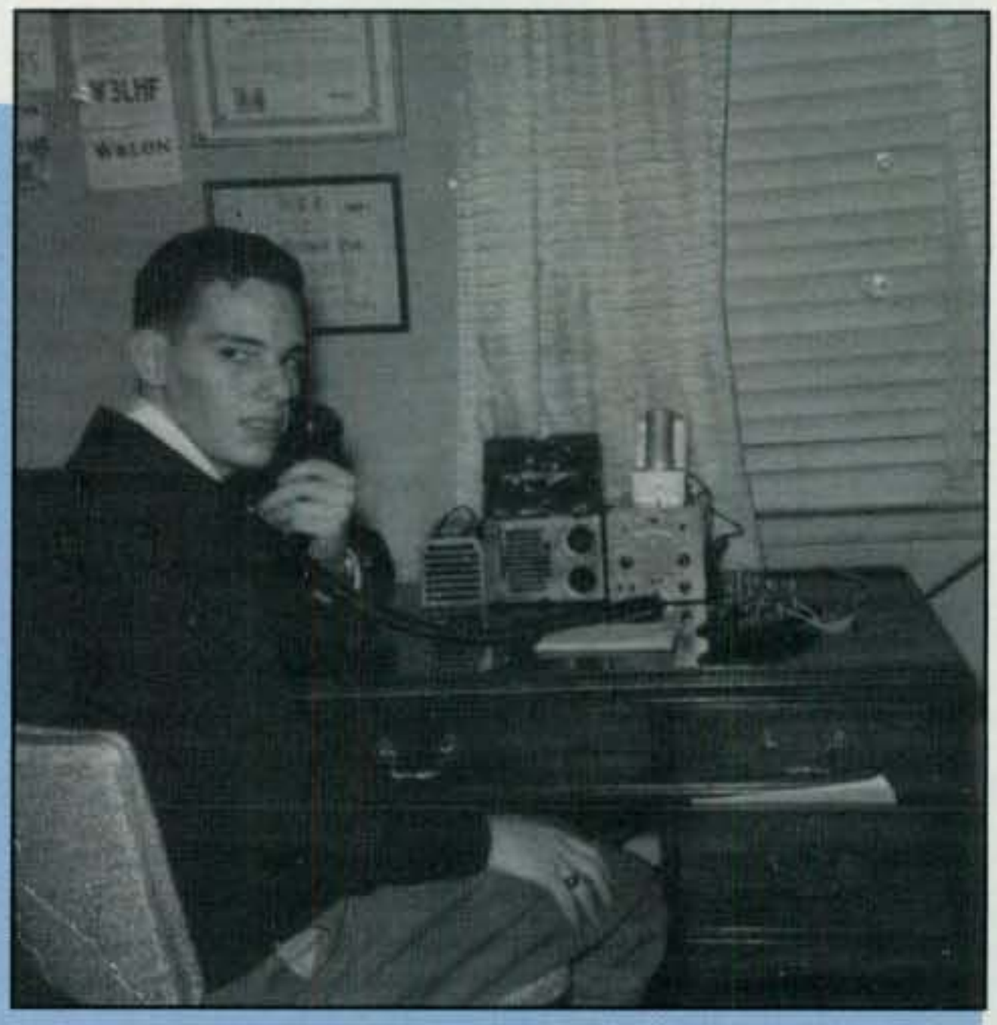
I grew up in The Bronx in the 1940s. My father's job kept him traveling throughout the country, always by train (in those days, non-military air travel was a luxury few could afford). My time with my father was limited to a weekend every few months, when his schedule and budget allowed him to come home. As a young boy, I didn't realize how angry with him I was him for not being home like my friends' fathers. He'd always take me to a baseball game when he came home, but I wasn't much of a fan and it didn't do anything to help our relationship.

When I was 10, he was based in Philadelphia, living in a studio apartment. Once my mother and I took the train to visit him. He took us to the Franklin Institute, a wonderful science museum. That day was the best I ever had with my father, because we did something I enjoyed. One exhibit at the museum was about ham radio. I remember entering a room filled with shiny radio equipment with blinking lights and jumping meters. The operator, who was on the air at the time, allowed me to talk to the person he had contacted. I don't think I said more than "Hello, my name is Peter" when a voice boomed back, saying "hello" to me. I will always remember that day.

A Passion for Ham Radio

From then on I had a passion for ham radio. I talked to my teachers and went to the library to learn as much as I could about becoming a ham. The test for a Novice license required that I learn Morse code at 5 wpm and take a written exam on FCC Regulations and basic radio technology. My father was rarely at home and wasn't able to help me, but he'd often call on the phone or send a post card from one of the interesting places he was, and he encouraged me to pursue my interest in radio. For my birthday he bought me my first receiver, a National SW-54. From my bedroom I listened to police, airplanes, ship-to-shore, and hams around the world.

I studied hard for the Novice exam and listened to CW stations with my receiver. I finally was able to take the Novice test, which was given to me by someone I didn't know until that day. His name was "Bing," W2CMM, and he lived only a few blocks away. I remember the excitement when the mail arrived with my license and my first call, KN2MMT. In those days, the "N" meant I was a Novice and could only operate for one year unless I was able to get my General, which I did in about six months.



The author as a teenager with his 6-meter AM rig. He says it was a "teeny tiny rig I put together using my father's first 'portable' AM radio (tubes but small Motorola) and a 6-meter transverter," adding, "It doesn't look too ham-radioish, does it?" (Photos courtesy of the author)

I built my first transmitter, a Heathkit AT-1. I remember coming home from school and making my first contact. It was with Lou, W2IVG, who lived only a few miles away. Lou invited me to see his station. When I arrived at his house, I was surprised to find that he was blind. He lived with his wife and his seeing-eye dog, Lassie. Lou became my mentor, someone I could call with questions about our shared hobby.

One day Lou called to ask me for a favor. He had just designed and built a 2-meter AM transmitter and receiver, and he explained to me that the designing, drilling, wiring, and soldering were the easy part, but without sight he couldn't plug its miniature tubes into their tiny sockets. He needed my eyes. I was only 12, but my mother allowed me to take the subway to visit my grandparents, and now my new friend Lou. When I arrived, it took only a minute for me to plug in the dozen little tubes, but I felt it was incredible that a man who could not

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e-mail: <Peter@brandenberg.tv>

The author today on the beach at Amagansett, New York, where he says he's spent many happy hours hamming with his QRP rig.

see was able to design and build such a complicated electronic device. We turned it on and immediately had contacts with other hams in the area. That was 50 years ago.

A Lifetime of Friendships

My dear friend Lou died many years ago, but my interest in ham radio has helped me develop many wonderful friendships, both nearby and across the globe. In the mid-1980s I had a heart attack and my second heart surgery. While recuperating at home, I had a QSO with Jeff, ZS6AWX, in Klarksdorp, South Africa. We had a lot in common, so we arranged a sked the following weekend. Thereafter he and I continued our scheduled weekend contacts for seven years, until he and his wife (ZS6AWY) left South Africa. They moved to Melbourne, Australia, where one of their sons lived. They settled into a small condo, and he no longer could have a beam and had no place to use his rig. We still speak on the phone and communicate via e-mail.

The relationship we developed was very special, and through it we got to know a great deal about one another and each other's families. They have visited and stayed with us when they come to see their other two children, who live with their families in Atlanta and Boca Raton.

My wife Barbara and I have two wonderful daughters and recently became grandparents. As my daughters grew up, I remembered my distant relationship with my father and those baseball games. I would have been thrilled if my daughters shared my hobby, but they didn't. However, when they were young they honored me by allowing me to come to their schools to share my interest in ham radio with their friends. I used to bring a mobile whip or MFJ loop that I set up either on the roof or out the classroom window. I remember the kids loving the experience, and on a few occasions I was lucky enough to have some enjoyable contacts, even with some DX. I don't think my daughters know how much those school visits meant to me, and although my hobby wasn't their choice, I always took interest in their activities. I enjoyed every school play, dance recital, sports activity, and concert … the events my father never shared with me.

Looking back, however, I realize that my father did something just as important for me: He introduced me to the lifelong adventure of ham radio and supported my interest. In that way, he gave me—and continues to give me— many great memories.

Recently, my wife and I moved to a condo. It meant giving up my tower, beams, and kilowatt. However, I've developed a new, more exciting way to enjoy ham radio. Earlier this year I built an Elecraft KX1 QRP rig. It fits in my hand and has more bells and whistles than the radios that used to fill my bedroom when I was a child. It runs only 3 watts, a fraction of the 1,000 watts I used to run, but I'm still having a ball with it, making contacts all over the world. I recently completed my latest project, building a 500-milliwatt Rock-Mite for 20 meters.

I continue to make new friends while enjoying the challenge of using the CW I learned a half century ago, and now I can do it with far less power and extremely small antennas.

Thanks, Dad. ■

Announcing:

2005 Nominations Open for the *CQ* Amateur Radio Hall of Fame

Amateur radio operators have been responsible for many advances in communications technology, and entire industries have been built on the foundation of amateur radio experimentation and activity. In an effort to recognize outstanding amateurs and their achievements, and help the public appreciate the far-reaching and long-standing value of amateur radio in our society, we have established the *CQ* Amateur Radio Hall of Fame. Nominations for the 2005 "class" are now open. Members of the 2004 "class" were announced last May and appeared in the July issue of *CQ*.

The *CQ* Amateur Radio Hall of Fame honors those whose technical or other accomplishments have helped propel amateur radio forward, or whose achievements in other areas of life have helped improve ham radio's reputation simply through association. Nominees for the *CQ* Amateur Radio Hall of Fame will be judged on the basis of qualifying in one of two broad areas: those individuals—whether licensed amateurs or not—who have made significant contributions to the amateur radio hobby; and those radio amateurs who have made significant contributions to society in general. Nominees must have made *significant* contributions of nationwide or worldwide impact.

Nomination Period Closes March 31

Between now and March 31, 2005, we will be accepting nominations for the 2005 "class" of the Amateur Radio Hall of Fame. Nominations received after that date will be considered for future selection. You may either use the form on the following page or on our website, or simply write us a letter stating your candidate's name, where to contact him/her if still living, for which category you are nominating him/her, and a brief one- to two-paragraph description of this person's accomplishments. Please include your name and contact information as well. E-mail to <hall-of-fame@cq-amateur-radio.com> or mail to *CQ* Amateur Radio Hall of Fame, 25 Newbridge Rd., Hicksville, NY 11801. If you feel someone has earned this recognition, please submit a nomination. Please *don't* assume that someone else will nominate the person you may have in mind.

We'll be making up our own candidate list at the same time, and will announce this year's selections at the Dayton Hamvention in May 2005. Please help us recognize these "ham radio heroes" whose contributions have helped shape our hobby, our nation, or our world.

(Official nomination form is on page 34.)

CQ DX and Contest Halls of Fame

Nominations are also open for the **CQ DX Hall of Fame** and the **CQ Contest Hall of Fame**, which recognize those amateurs who have made major contributions to DXing and contesting, respectively. The activities and accomplishments that qualify one for membership in these elite groups involve considerable personal sacrifice and can usually be described by the phrase "above and beyond the call of duty."

Nominations for the Contest and DX Halls of Fame are made by **contesting or DX clubs or national organizations,** and must be submitted by **March 1** of each year to be considered. A maximum of two (2) people may be inducted into each hall of fame each year. Nominations for the CQ Contest and DX Halls of Fame should be directed to Bob Cox, K3EST, c/o CQ Communications Inc., 25 Newbridge Rd., Hicksville, NY 11801; or via e-mail to <k3est@cqww.com>.

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CQ Amateur Radio Hall of Fame Nomination Form

The purpose of the CQ Amateur Radio Hall of Fame is to recognize individuals who have made significant contributions to the amateur radio hobby, and/or radio amateurs who have made significant contributions to society at large.

Name of Person Nominated: _____

Callsign (if licensed amateur/if multiple callsigns, list most recent): _____

If your nominee is still living and you know how to contact him/her, please supply the following contact information:

Mailing address: _____

City: _____ State/Prov. _____ Zip/Postal Code: _____

Country: _____

Phone: _____ Fax: _____

E-mail address: _____ @ _____

Please write a brief (one to two paragraph) description of this person's accomplishments/achievements and why you feel he/she should be elected to the CQ Amateur Radio Hall of Fame (if you need more room please attach a separate piece of paper):

Nominator Information

(This is only for the purpose of contacting you in case of questions, and will not be published.):

Your name: _____ Callsign: _____

Mailing address: _____

City: _____ State/Prov. _____ Zip/Postal Code: _____

Country: _____ Phone: _____ Fax: _____

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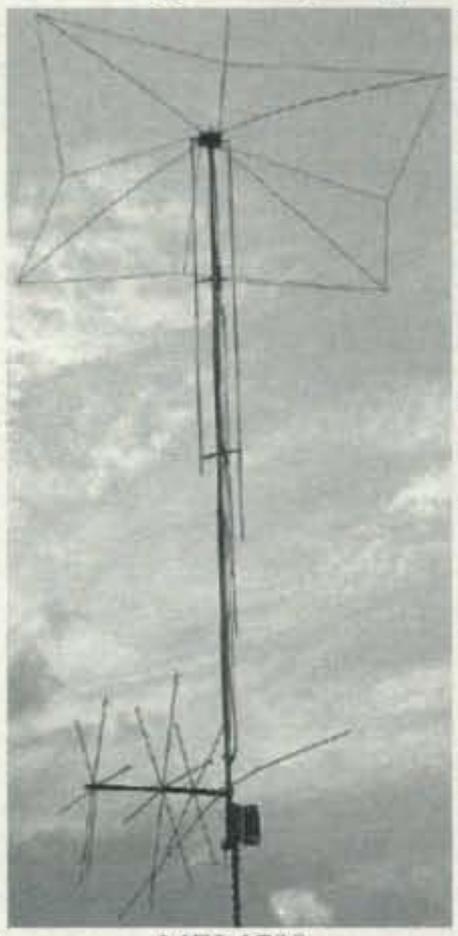

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Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

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.

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Built to Last

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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.

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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.

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MFJ-1778

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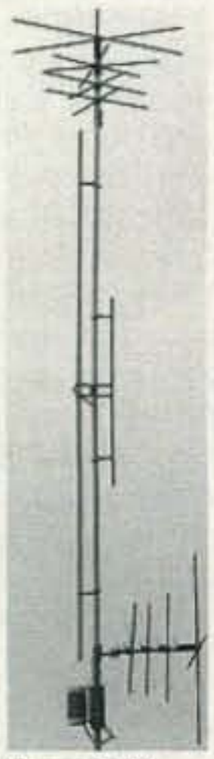
MFJ halfwave vertical

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



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Announcing:

The 2005 CQ World-Wide RTTY WPX Contest

February 12–13, 2005

Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday

Logs are due no later than March 11, 2005

I. Period of Operation: Single Operator stations may operate only 30 hours of the 48-hour contest period. Off time periods must be a minimum of 60 minutes in length and must be clearly marked on the Summary Sheet. Multi-Operator stations may operate the entire 48-hour contest period.

II. Objective: The object of the contest is for amateurs around the world using RTTY to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 3.5, 7, 14, 21, and 28 MHz bands may be used. No 1.8 MHz or WARC bands. **Observance of established band plans is strongly encouraged.**

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high power categories must not exceed 1500 watts total output power on any band. Only the entrant's callsign may be used to aid the entrant's score. RTTY (Baudot) mode only. No unattended operation or contacts through gateways or digipeaters are permitted.

Any form of DX alerting assistance is permitted in ALL categories.

V. Categories:

1. Single Operator (Single Band and All Band)

(a) Single Operator stations are those at which one person performs all of the operating, logging, and spotting functions. Only one transmitted signal is allowed at any time.

(b) Low Power: Same as 1(a) except that (i) output power is 150 watts or less and (ii) only All Band entrants may enter the Low Power category. Stations in this category compete with other Low Power stations only.

(c) Rookie: An entrant in this category shall, at the time of the contest, have been licensed as a radio amateur for three years or less. If you are entering this category, please indicate it on your Summary Sheet.

2. Multi-Operator (All Band operation only)

(a) Single-Transmitter: Only one transmitted signal at any time. Limited to 6 band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the 6-band change rule will result in reclassification to the Multi-Multi category.

(b) Multi-Two: A maximum of two transmitted signals are allowed as long as each transmitter is on a different band. Each of the two transmitters is limited to 6 band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the 6-band change rule will result in reclassification of the entry to the Multi-Multi category. Each transmitter must keep a chronological log containing its own serial numbers and unique transmitter identifier (0 or 1 in the Cabrillo format).

(c) Multi-Transmitter: No limit to transmitters, but only one signal and running station allowed per band.

3. SWL: SWLs are required to log the callsigns of both the heard and correspondent station. Scores are based only upon the heard station, using the same rules as transmitting stations. Correspondent callsigns may not appear more than three times per band in your log.

VI. Exchange: RS(T) report plus a progressive contact three-digit serial number starting with 001 for the first contact. (Continue to four digits if past 999.) Your log MUST show the correct serial number sent and received for each contact.

VII. Serial Numbers and Identification of Transmitters: Single Operator log entries must contain a progressive three- (or four-) digit serial number sequence starting with 001 for the first contact. Multi-Two log entries must follow the same serial number scheme for each transmitter separately, and identify the transmitter (0 or 1) that makes each QSO. Multi-Transmitter (Multi-Multi) log entries must follow the same serial scheme as Single Operator log entries, but use separate serial numbers for each band.

VIII. QSO Points:

1. Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7 and 3.5 MHz.

2. Contacts between stations on the same continent but in different countries, and contacts with maritime mobile stations, are worth two (2) points on 28, 21, and 14 MHz and four (4) points on 7 and 3.5 MHz.

3. Contacts between stations in the same country are worth one (1) point on 28, 21, and 14 MHz, and two (2) points on 7 and 3.5 MHz.

IX. Multiplier: The multiplier is the number of "valid" prefixes worked. A prefix is counted only once regardless of the number of times the same prefix is worked.

1. A prefix is the letter/numeral combination which forms the first part of the amateur call. Examples: N8, W8, AB8, DL5, DJ2, HG1, WD200, WF96, 3DAØ, GB75, ZS66, U3, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation the portable designator will then become the prefix. Example: AB5KD operating from Wake Island would sign AB5KD/KH9 or AB5KD/NH9. American DX (KL7, KH6, KP2, KH3, etc.) operating within the 48 states must sign with a full designator of their choice. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (W8, K8, etc.). United States portable stations are not permitted to select a portable prefix designation. For example, WS7I/2 is permitted, but WS7I/WY2 or WS7I/KZ2 is not. Portable designators without numbers will be assigned a zero (Ø) after the second letter of the portable designator to form a prefix. Example: N8BJQ/PA would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

2. Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

X. Scoring:

1. Single Operator: (a) **All Band** score = total QSO points from all bands multiplied by the number of different prefixes worked (prefixes are counted only once). (b) **Single Band** score = total QSO points on the band multiplied by the number of different prefixes worked.

2. Multi Operator: Scoring is the same as Single Operator, All Band.

3. A station may be worked once on each band for QSO point credit.

XI. Awards: First-place certificates will be awarded in each category listed under Section V in every participating country and in each call area of the United States, Canada, Australia, and Japan. All scores will

be published. To be eligible for an award a Single Operator station must operate at least 12 hours. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. (Single-band entrants who also operate on other bands are encouraged to submit their logs to aid in the log-checking process. *Note:* Logs containing more than one band will be judged as all-band entries unless they are submitted in Cabrillo format and the single band entry is specified in the Cabrillo header.) All certificates and plaques will be issued to the licensee of the station used. To the extent sponsors or winners purchase plaques through the Contest Director, plaques will be awarded in the following geographical areas for each of the categories listed in Rule V: World, North America, USA, Canada, South America, Africa, Europe, Asia, and Oceania.

XII. Instructions for Preparation of Logs:

1. We want your electronic log. It should be submitted in Cabrillo format via e-mail to <wpxrtty@ kkn.net>. Logs must be submitted no later than March 11, 2005. **In the "Subject:" line of your e-mail message please include your callsign**. Logs should be sent as an e-mail attachment, not in the text of the e-mail, and the filename for the log should be *yourcall.log*. Receipt of all e-mailed logs will be confirmed via return e-mail. To view a sample Cabrillo QSO template for this contest, go to <www.kkn.net/~trey/cabrillo/ wpx-rtty.txt>.

2. Entries from Multi-Two and Multi-Multi stations must be merged into a single chorono-logical log. In the case of Multi-Two stations, the log must also indicate clearly which station (shown as 0 or 1 in column 81 of the Cabrillo log) made each contact.

3. If the Cabrillo format is unavailable, contact the Log Checker, Joe Wittmer, K9SZ, at <k9sz@wittmer.us>.

Other questions pertaining to the CQ WPX RTTY Contest may be sent to the WPX RTTY Contest Director, Glenn Vinson, W6OTC, 488 Locust Street, #401, San Francisco, CA 94118 USA, e-mail: <w6otc@garlic.com>.

4. If you must submit a disk or paper log, send it to CQ RTTY WPX Contest, 25 Newbridge Road, Hicksville, NY 11801 USA. However, all logs containing more than 100 QSOs and which were generated using a computer program ***must*** be submitted via e-mail or on a 3.5-inch floppy disk. Log and summary sheets are available for download on the CQ website, <www.cq-amateur-radio. com>, or with SASE from CQ at the address listed above.

XIV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is deemed by the WPX RTTY Contest Committee to contain a large number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he or she will be ineligible for any CQ contest awards for three years.

XV. Deadline: All entries must be submitted NO LATER than **March 11, 2005.** E-mail logs are subject to the same deadline. Logs postmarked after the deadline may be listed in the results but will be ineligible for any awards.

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Don't Do This at Home: Useless and Needless Testing on the Repeater

I was puttering in my workshop while waiting for the weekly RACES net to start at 1915 local time. The radio was quietly ready in standby mode (receive). I was enjoying the solitude after a long, hard day at the office. Then, it started.

Kerchunk, beep . . . Kerchunk, beep.

I sighed, knowing that the pattern would begin. It was 1900 or so, just before the start of the net.

Kerchunk beep.

The unidentified "test" or "kerchunk" of the repeater (the squelch-tail and usually a courtesy tone) is usually not intentionally meant to be malicious or bad; some people think this is the way to see if their radio or the repeater is working.

It is not.

This unidentified "testing" of the rig or the repeater is against FCC Rule 97.119 on station identification. Perhaps even more important, it is more irritating than watching TV without being in control of the remote. You are helpless to change the situation, and you are forced to listen to what is very much like a form of torture.

As with any form of communication, including your operations on the local repeater, we must always ask ourselves the very first question before keying the microphone: "What is the reason for this transmission?" In other words, we should always think before we speak.

What has changed since the last time you used your radio? If you are using a hand-held radio ("HT," or "handie-talkie"), and you are able to "make it" into the repeater, then there is no reason to test your radio, right? If you are in your car and are using a higher powered mobile rig, the same idea applies—you already know that your rig works, so do not test it. Plus, it's not even a reliable test. Your signal may be strong enough to key up the repeater but not to provide reliable communications *through* the repeater.

What about the repeater? Has it moved? Has something changed on the repeater? Repeater systems are usually complex machines (see photo) that are designed to enhance or improve communications. They are not designed to make things worse, so why should you test the repeater to see if its performance has changed for the worse, not the better?

Sometimes kechunking occurs unintentionally. For example, radios without alphanumeric displays sometimes create confusion as to what repeater the radio is tuned to. In other words, sometimes the dial frequency is not enough. Rather than wait for the repeater identifier to come on, or having another station come on frequency,

A repeater is a complex, rugged radio machine usually located in a remote location such as a mountaintop or a skyscraper roof. It is designed to boost the effectiveness of radio signals and is expensive to build and maintain. Treat the machine with the care it deserves, and do not abuse it. (Photo by Tim Sawyer, WD6AWP)

some people will kerchunk the repeater and listen to the courtesy tone or force the repeater to identify. This is not a good practice.

Another occasion for the kerchunk is when propagation conditions enhance (in this case, complicate?) reception of farther than normal signals that can falsely key the repeater. Another nearby radio system can also cause unintentional interference, resulting in kerchunking. Sometimes this can be cured by installing "tone access" on the repeater. Tone access is also referred to as "PL" or subtone. It is a subaudible tone that is transmitted with your voice and "opens" the repeater. One purpose of a sub-tone is to make a repeater "private"—that is, that the tone is a secret and those who do not belong cannot access the repeater. In most cases outside southern California, however, the subtone is used to help prevent interference.

A quick check via telephone or e-mail with the repeater technical committee or personnel will probably provide you with an explanation of what is going on with the system.

Notice that I suggest that a conversation like this should not take place on the radio. The reason for this is simple: If the interference is inten-

*16428 Camino Canada Lane, Huntington Beach, CA 92649
e-mail: <kh6wz@cq-amateur-radio.com>

Ten Commandments of Repeater Operating Techniques

The following comes from the website of the Clark County Amateur Radio Club in Vancouver, Washington <http://www.pacifier.com/~aiaweb/RptOper.htm>:

1. FIND a repeater using a repeater directory. Avoid "kerchunking."
2. LISTEN: Familiarize yourself with its operating procedures.
3. TRANSMIT: "(your callsign) Monitoring" is all that needed to attract someone's attention. Don't call CQ on repeaters.
4. To JOIN a conversation in progress, transmit your callsign between transmissions. Don't use "break" unless it's an emergency. *(This may vary in different areas. Listen to your local repeaters to learn what the convention is in your area. However, "break-break" is nearly universally reserved for emergencies.—ed.)*
5. BE COURTEOUS: Acknowledge any station wishing to use the repeater. Invite him or her to join in or make a short call to another station that may be monitoring the frequency.
6. PAUSE between transmissions to allow others to join in. Wait for the courtesy "Beep."
7. BREVITY: Keep transmissions short. This permits more people to use the repeater.
8. Always IDENTIFY at end of each series of transmissions or every 10 minutes. You do not need to transmit any other station's callsign. Just yours.
9. Use SIMPLEX whenever possible. Adhere to the band plan.
10. SUPPORT your local repeater groups.

tional, the culprit will have the satisfaction of knowing that his efforts to bother people and ruin everyone's day are working. Continuously and intentionally kerchunking the repeater is a form of jamming the repeater, just like any malicious and unwanted garbage.

Jammers and people who perform malicious interference are people who crave attention. There are many solutions to a jamming or malicious interference problem, some good, some bad, and some illegal. Let's concentrate on the best solution to the problem, which is both very easy and very hard to do at the same time: You should do nothing.

Do not comment on the interference or noise. Do not yell at the operator who kerchunks the repeater. Just ignore it. If it is accidental, then chances are good that it will not happen again.

If it continues, and you are able to positively identify who the kerchunker is, calmly explain to him or her (again, off the air) that this is a very bad thing to do. Teach the offending person that kerchunking creates *needless* wear and tear on the repeater system and is extremely irritating to everyone listening. Sometimes a little bit of knowledge can go a long way, and the person stops because he or she has learned that it is wrong to kerchunk the repeater.

However, if it keeps up after the teaching session, the most likely result will be that no one will talk to that person on the radio, effectively silencing the kerchunker. This is "soft" punishment for bad behavior. However, if the person is new to ham radio, continue to teach him or her that this is poor practice and that kerchunking the machine is not acceptable.

Politically Correct Ways to Test Stuff

Now we have to figure out a politically correct way to test our VHF/UHF rig and avoid interference or kerchunking the repeater. This is not that hard to do, and there are at least two ways to test your rig. The first way to test your gear does not require any test equipment or fancy accessories. All you have to do is use your radio normally! Just get on the radio and talk to someone. Remember the FCC rules on identification (once every ten minutes during a contact, and at the end of each contact). If you have a second radio, such as an HT in the house or a mobile radio installed in your vehicle, you should be able to hear your conversation with the other person. If no one is around to talk with you, short test transmissions are okay, but be sure to identify and state that you are testing.

The second way is to perform your testing with what the FCC calls "good engineering practice." Use a dummy load and a power meter. These two items should be part of any ham station anyway. Make sure the dummy load and the meter are rated for your transmitting gear for both power and frequency. See "That Brand New Rig" in "Beginner's Corner" for July 2003 for guidelines on simple power measurements. See "Is it Really Broken?" in the March 2003 issue for very simple radio checks you can do as well.

For a lot of folks, however, testing a radio on a bench with test instruments is not as much fun as operating the equipment. Thus, don't be afraid to use your radio, but at the same time do not pick up any bad operating habits that may give you the reputation of having "radio halitosis."

References

The Old Post Amateur Radio Society (OPARS) has a nice section on repeater operations: <http://w9eoc.tripod.com/repeaterguidelines.htm>.

The San Diego Repeater Association: <http://www.wb6wlv.com/index.htm>.

The TEARA (Triangle East Amateur Radio Association) in Wendell, NC has a very good page called "Your First Transmission": <http://www.ipass.net/teara/hb6.html>.

For repeater owners, the Two-Meter Area Spectrum Management Association (TASMA) in Orange, CA has some good technical advice: <http://www.tasma.org/>.

What You've Told Us...

The September 2004 survey was a repeat of the September 2001 survey—about your Morse code usage—to see how things have changed in the past three years. Short answer: not much.

We again had a huge response, and 80% of you still regard your code skills as at least intermediate, with 18% rating yourselves as experts (down from 20% in 2001), 33% advanced (up from 32%), and 29% intermediate (vs. 30% in 2001). Interestingly, 17% of you rated yourselves as CW beginners, up significantly from 11% three years ago. And the number who don't know code at all was 4%, a drop from 6% in 2001.

Regarding your level of CW activity, 14% of you say you operate CW exclusively (same as 2001), while 27% use code most of the time (down from 32%), 18% about half the time (up from 17% three years ago), 14% once in a while (vs. 13%), 10% rarely (vs. 11%), and 16% never (up from 14%).

What you do on CW also hasn't changed much since 2001, with HF DXing being the prime activity (39% most of the time, vs. 34% in '01; 22% some of the time, vs. 23%), followed by rag-chewing (31% most/25% some, vs. 32%/23%), contesting (27% most, 23% some, vs. 21%/20%), none (18% most/13% some vs. 15%/17% in 2001), other (6% most, 9% some, vs. 5%/8%), and traffic-handling (3% most, 5% some, vs. 4%/6%).

Enjoyment of the mode continues to be majority's prime reason for operating CW (53% in 2004 vs. 55% in 2001), followed by code's ability to get through in marginal conditions (20% vs. 22%), don't operate CW (17% vs. 15%), its simplicity and efficiency (13% vs. 15%), better behavior among CW ops (12% vs. 11%), and other (8%, unchanged).

Finally, the number of you who would have learned the code if it was not a licensing or upgrading requirement dropped slightly, from 54% in 2001 to 51% in 2004. The number who said no went up by the same amount, to 29% from 26%, and 14% (vs. 13%) said they don't know, while 3% (vs. 4% in '01) have not learned Morse code.

This month's free subscription winner is David Wiesen, K2VX, of Reston, Virginia.

Reader Survey January 2005

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

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

This month, as we celebrate our 60th anniversary in print, we'd like you each to look into your crystal ball and tell us what you see in ham radio's future.

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

1. Do you feel amateur radio will still exist 60 years from now, in 2065?
Yes 1
No 2
Unsure 3

2. Do you feel amateur radio will still exist 30 years from now, in 2035?
Yes 4
No 5
Unsure 6

3. IF amateur radio ceases to exist in the next 30–60 years, what do you think will most likely be primarily responsible (choose one)?
Lack of interest 7
Loss of frequencies to commercial interests 8
Interference from competing spectrum uses, such as Broadband over Power Lines 9
Government shutdown for security or other reasons 10
Something as yet unforeseen 11
Don't know 12
I am certain amateur radio will continue to exist 13

4. Assuming amateur radio DOES still exist 30 years from now...
a. ...do you think there will still be a code requirement for any class of license in 2035?
Yes 14
No 15
Unsure 16
b. ...do you think Morse code will continue to be used on the air in 2035?
Yes, by a significant number of hams 17
Yes, but by very few hams 18
No 19
Unsure 20
c. ...do you think that today's major analog voice modes, such as SSB and FM, will still be in use in 2035?
Yes, by a significant number of hams 21
Yes, but by very few hams 22
No 23
Unsure 24
d. ...do you think that the majority of amateur communications will be digital (including digital voice) in 2035?
Yes 25
No 26
Unsure 27
e. ...do you think that the HF bands will still be used by a significant number of hams in 2035?
Yes 28
No 29
Unsure 30
f. ...do you think that a significant number of hams will have migrated to digital networks on the microwave bands in 2035?
Yes 31
No 32
Unsure 33

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

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DJ-196T (2M) DJ-296T (222 MHz) DJ-496T (440MHz) HT

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A Remote-Linked HF Station Concept

BY DAVE INGRAM,* K4TWJ

Visualize the following peek into the future, friends. The year is 2010, and after numerous disruptions to commercial, military, and amateur communications alike, Broadband over Power Lines (BPL) has been declared unfit for internet access at any level. Another and even more challenging obstacle, however, slowly has been gaining momentum and now threatens our existence: Home Owner Association-imposed CC&Rs. Indeed, special groups are now conducting weekly search-and-report investigations to expose tenants who do not abide by the rules. We heard tales of a leading DXer living in a heavily restricted subdivision, and we are visiting him to learn his secrets for continuing ham radio enjoyment.

As we approach the area, we notice there are no overhead power lines, no tall trees, no visible outdoor wires or cables—and all of the dwellings look similar. Convinced we are at an incorrect address, we hesitantly ring the doorbell. DX Dan answers and welcomes us in. We tip-toe through the living room to the den, and the marvelous sounds of a big-time 20-meter DX pile-up fill the room (which, incidentally, has been soundproofed with cork walls, like a recording studio). Dan invites us to give the DX station a call.

"How can the foreign station possibly hear us?" we ask. "The rig is probably running QRP to an attic-mounted dipole, right?"

"Not really" says Dan. "Here—I will switch on the big KW amplifier and swing the beam right toward him. You can't miss."

What? We did not hear a linear amplifier fire up. There is not even an amplifier in the room (only a small transceiver) and there definitely isn't a beam or tower outside.

"Go ahead, work him," encourages Dan, so we call and receive an immediate reply with an impressive 5 by 9 plus-plus report. "Tune the band and work another one," says Dan, "and check out 17 meters, too. It has been hot lately."

Whoa, Nellie. Wait a minute. What's happening here? We are apparently operating a dream station—a super stealth setup military and paramilitary groups could truly use to advantage—but we only see a small transceiver and an interface box.

Dan walks us to a nearby window and explains his setup: "Use these binoculars and notice the big beam towering above the trees on that distant mountaintop. Now notice the small 10-GHz Gunnplexer and tiny dish in my den window. All the RF equipment is at that remote site; the IF, AF, tuning, and signal-processing sections are here in my transceiver; and the full 1.8- to 30-MHz range plus all control signals are relayed—both ways—via the 10-GHz link. I can get on any HF band anytime I desire with a great signal and super-clear reception. The remote link can even be used while mobiling in the general neighborhood."

Farfetched? Not at all. In fact, several amateurs have already pioneered first generations of this system with remote HF base setups, and all the items to develop a full 30-MHz wide remote RF-to-IF link are readily available at the present time. This concept is also quite attractive in military and paramilitary applications for stealth Command, Communications, and Control Intelligence (C3I) centers. Think about that—a full communications center can be located 20, 30, or 50 miles from its apparent location. Once again, radio amateurs can turn lemons into lemonade while pioneering new frontiers. Doesn't that make you proud to be a ham?

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

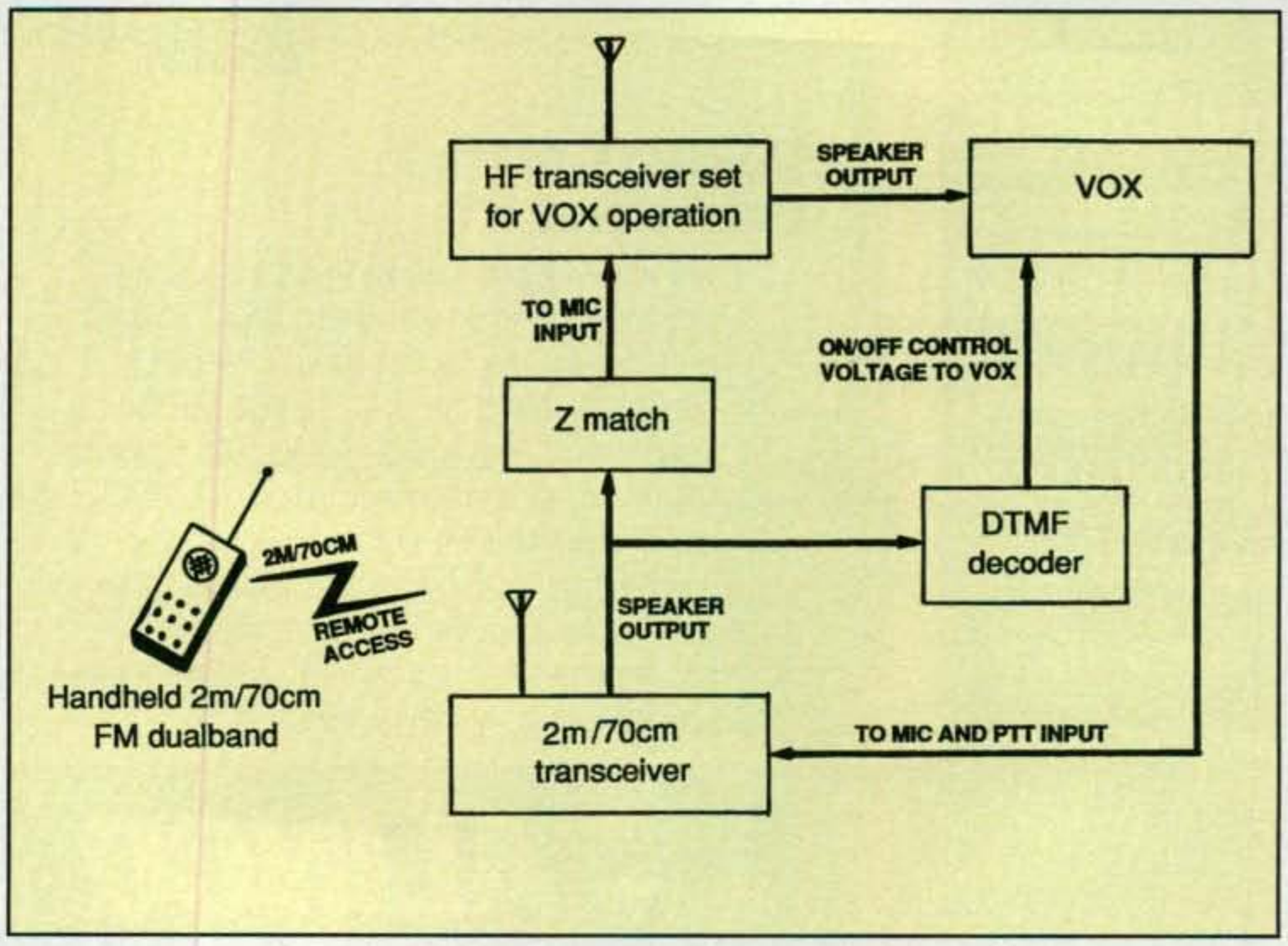

Fig. 1– Outline of a strictly "bare bones" remote base setup for around-home use. The HF transceiver is tuned/set to a desired frequency and then accessed with a full-duplex 2m/70cm FM talkie as discussed in the text.

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Tiny Travel Tuner with Cross-Needle SWR/Wattmeter

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

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10 Feet

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

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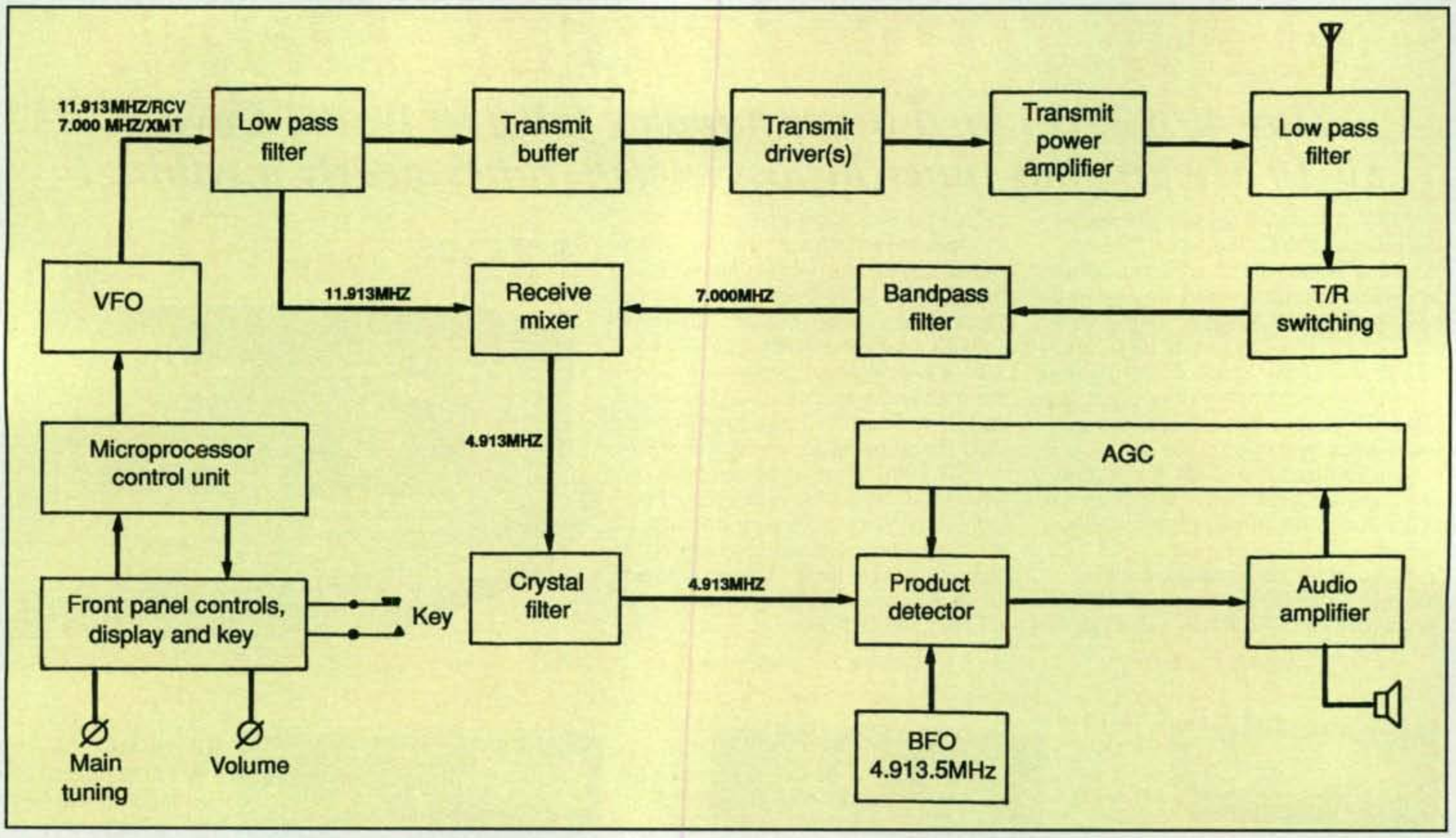


Fig. 2– Block diagram of an unmodified Elecraft KX1 transceiver, which we will break apart for remote operation. The KX1 is a 40- and 20-meter transceiver (with 30 meters optional), but here we are considering only one band for simplicity.

New ideas and technologies typically start with simple and easy-to-copy concepts, then increase in complexity as they are understood and implemented. Bearing that thought in mind, let's consider how we get from point A to points B, C, and D, so to speak. You may need to read the following discussion once to get the full picture and again for a better understanding. Remember, too, this is a concept/plan that you can experiment with and expand to your heart's content.

A First-Generation System

The general outline of a simple *single-band, single-frequency HF remote base system* is illustrated in fig. 1. Yes, you may have heard some creative-minded amateurs using setups like this on 20 meters in the past. Here, the in-shack HF transceiver is manually tuned to a desired frequency and then accessed from around the house or the backyard patio with a full-duplex, dual-band, FM handheld transceiver. There are some restrictions on using 2 meters and 70 cm in remote setups,[1] but here both (FM) rigs operate at less than 1/2 watt and use tiny antennas to limit range to less than a quarter mile. Full-duplex operation also allows the owner to remotely key the HF rig's VOX or PTT at any time, plus a DTMF decoder can be added to disable the 2m/70cm rig at any time desired. Notice the (almost) plug-in convenience here, friends. Everything connects via microphone and speaker sockets, and VOX handles T/R switching. Now let's raise the bar a notch.

A Second-Generation System

The next step up is a *single band and frequency-tunable remote base setup* as illustrated in fig. 3. A little Elecraft KX1 is used in this example (and its unmodified block diagram is shown in fig. 2 for introductory purposes). The KX1 has been separated between its RF and IF/audio/control sections and "reconnected" via a wide-band 1.2-GHz remote link. Several different types of transceivers could have been used in this example; I chose the KX1 because it is a popular kit, it is easy to build, and its block diagram is easy to understand. The remote link could be via 1.2, 2.3, or 10 GHz; I chose 1.2,GHz for economy.

Simply explained, the (unmodified) KX1 works as follows: During receive, the microprocessor control unit (MCU) directs the VFO to output an 11.913- to 12.413-MHz signal for mixing with incoming signals between 7.000 and 7.500 MHz to produce an IF output of 4.913 MHz. That signal is then crystal filtered, product detected, amplified, and output to an earphone or speaker. During

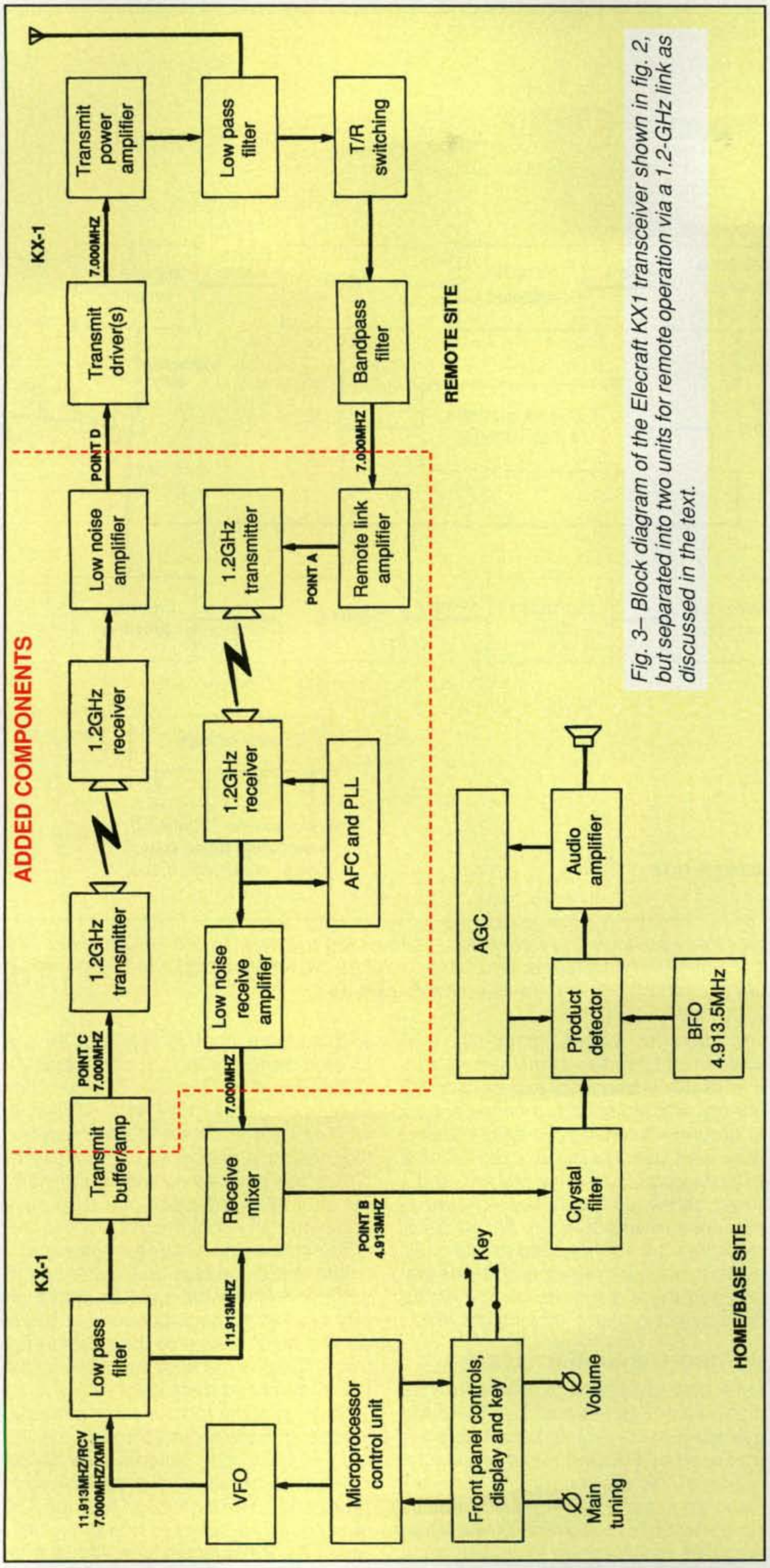


Fig. 3– Block diagram of the Elecraft KX1 transceiver shown in fig. 2, but separated into two units for remote operation via a 1.2-GHz link as discussed in the text.

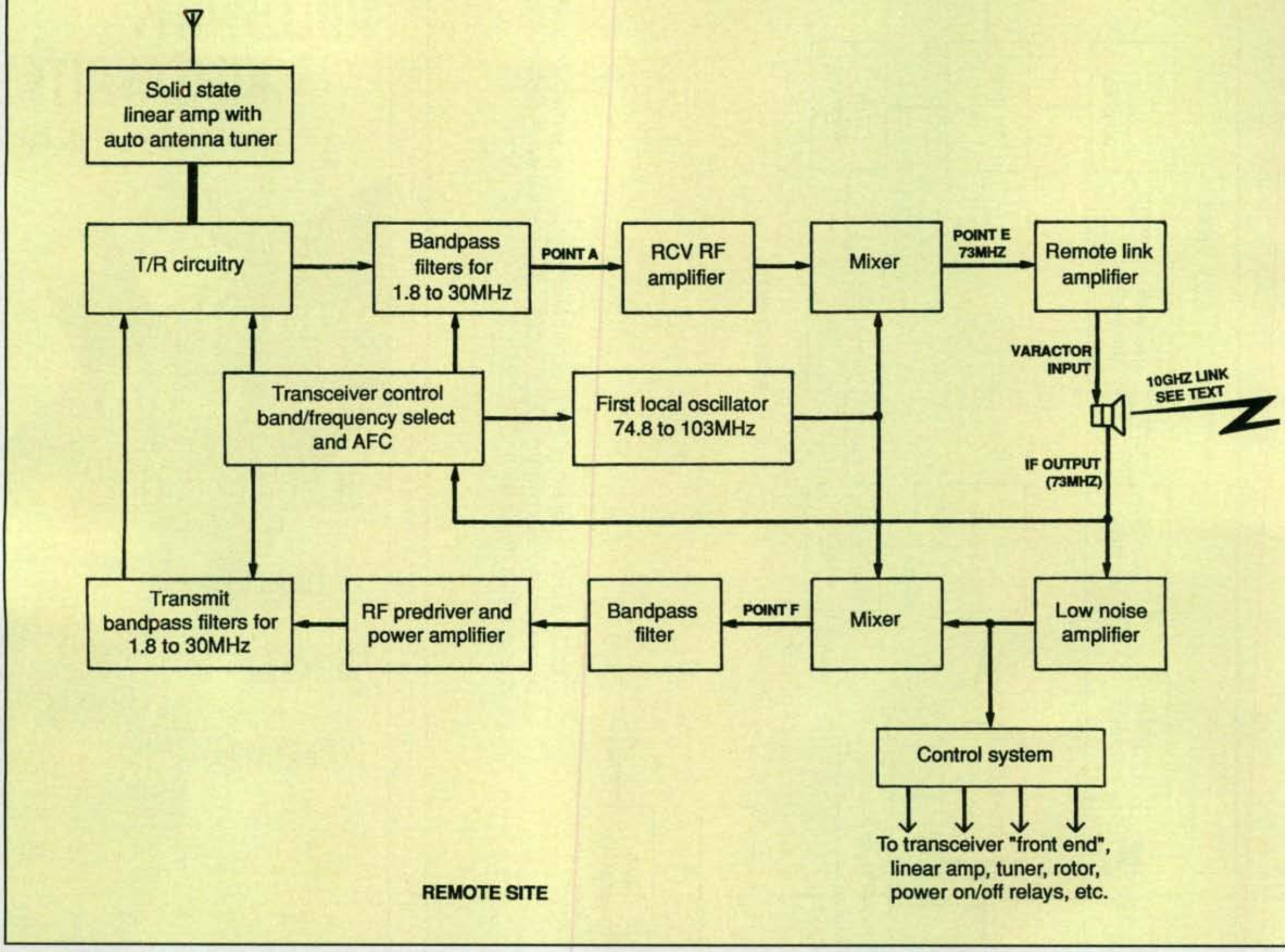


Fig. 4– Outline of a multiband HF transceiver that has been separated and reconnected (remoted) via a 10-GHz link. The transceiver's RF section or "front end" plus a mating linear amplifier and beam antenna are located atop a mountain, while IF and control sections are in a home several miles away.

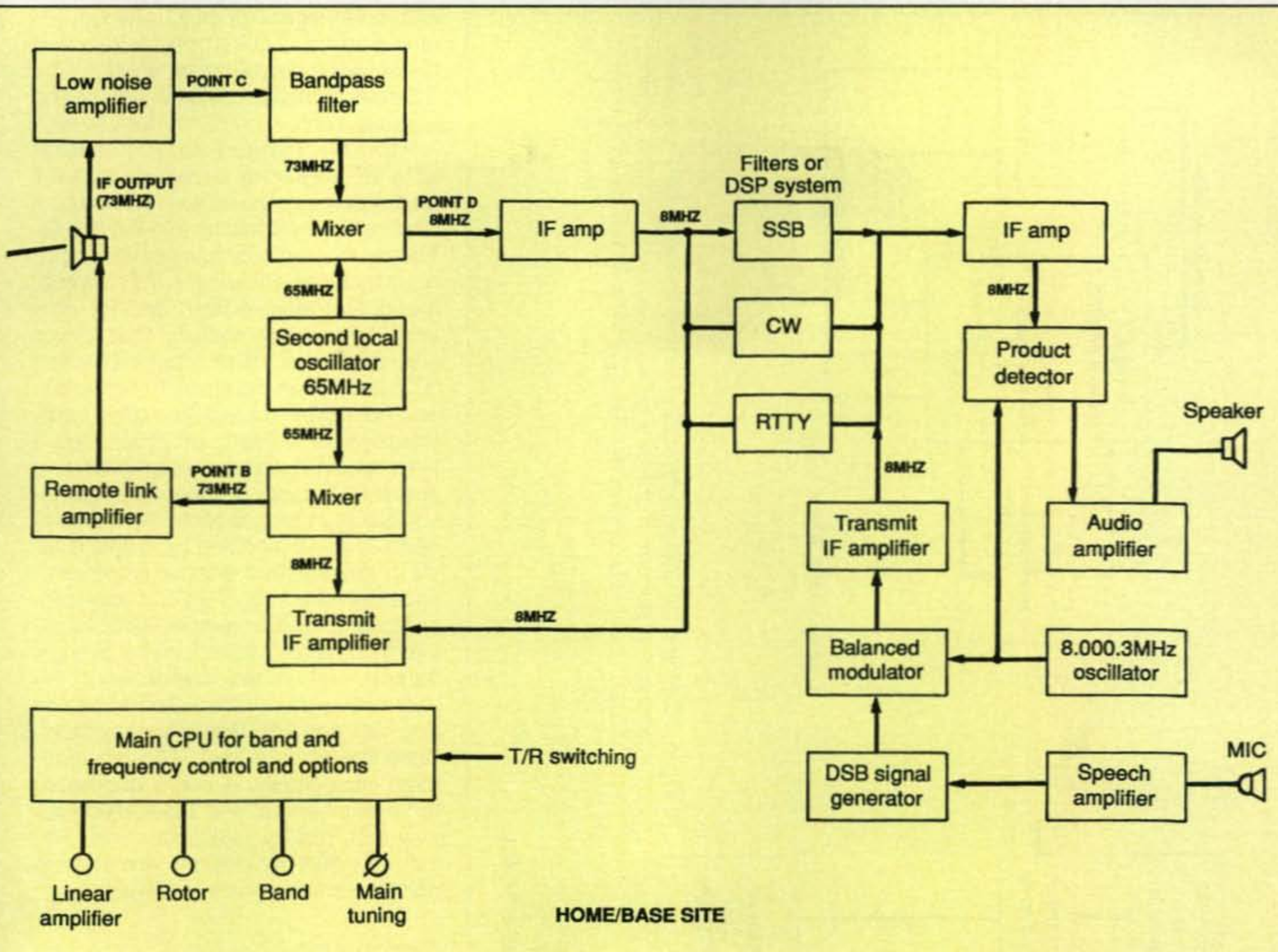
transmit, the MCU directs the VFO to shift frequency and output a 7.000- to 7.300-MHz signal for driving the buffer, driver, and power-amplifier stages.

Now look at fig. 3 and notice how the KX1 has been split, and 1.2-GHz transmitters and receivers plus remote-link transmit amplifiers and low-noise receive amplifiers have been added for the remote link. On receive, incoming signals are bandpass-filtered, so only 7.0- to 7.5-MHz range signals pass to the remote link amp and 1.2-GHz transmitter (point A). The 1.2-GHz-relayed signal is then boosted by an LNA and applied to the KX1's "front end" mixer, where it beats with the VFO's 11.9- to 12.4-MHz signal to produce the 4.913-MHz IF (point B). On transmit, the transmit amp boosts the VFO's output for driving the 1.2-GHz transmitter (point C). An LNA at the remote site retrieves the 7-MHz signal, which drives transmit stages (point D). T/R switching is handled at the remote site. It is simply a transistor that senses RF energy and shunts the receiver's input to ground. Retuned ATV-type 1.2-GHz gear was used in the link, because it exhibits good frequency stability and a wide bandwidth with flat frequency response (over 500 kHz). A number of refinements can be added to this basic system, but our magazine space is limited and there are more design evolutions awaiting study. Moving on now…

A Third-Generation System

Let's now jump several steps forward and take a look at an all-band and frequency-tunable remote base setup like that used by DX Dan in the introductory part of this column (fig. 4). Here the "front end" or RF sections of a deluxe HF transceiver plus a high-power linear amplifier, multiband beam, tower, rotor, and fail-safe control systems all are located remotely and "reconnected" via a 2.3-GHz or 10-GHz link. Choice of link frequency, incidentally, is a subject in its own right and extends well beyond this column's space. A 10-GHz Gunnplexer can pass a very wide bandwidth, for example, and open the door to a complete "any frequency at any instant" HF remote setup. One Gunnplexer in a linked setup can also be frequency-offset from the other to yield an output on any desired IF range between 100 kHz and 30 MHz. Visualize the possibilities there. They are awesome! Now follow our streamlined description in fig. 4.

Starting at the remote site's antenna, incoming signals pass through the linear amplifier and automatic antenna tuner and arrive at the transceiver's "front end." The signals go through T/R circuitry and a selected bandpass filter (point A). Preselected signals are then



amplified, up-converted to a first IF of 73 MHz (point B), further amplified for application to the Gunnplexer, and transmitted to the home/base remote site. The 73-MHz signal is superimposed on the transmitted 10-GHz signal. The receiver frequency is offset from the transmitted frequency by 73 MHz .There the incoming 73-MHz signal is low noise amplified (point C), filtered, and converted to a second IF of approximately 8 MHz (point D). The signal is then further amplified, crystal filtered, and/or DSP enhanced, detected, amplified, and audio reproduced.

Band selection and frequency tuning normally are accomplished in a transceiver's "front end," so here the related first local oscillator (plus bandpass filters for 1.8 to 30 MHz) are included at the remote site. Voltages for selected filters and tuning the first LO between 74.8 and 103 MHz are superimposed on the base-to-remote site signal (which also conveys HF transmissions from the base to remote site). These control signals also include T/R switching, rotor positioning, AFC voltage for stabilizing the Gunnplexers, and on/off pulses for hard-disconnecting antenna and power lines.

On transmit, all audio and tone-to-RF processing and conversion, including sideband filtering and up-converting the resultant signal to 73 MHz, is handled at the base section (point E). The 73-MHz signal is then transmitted over the microwave link, down-converted to a

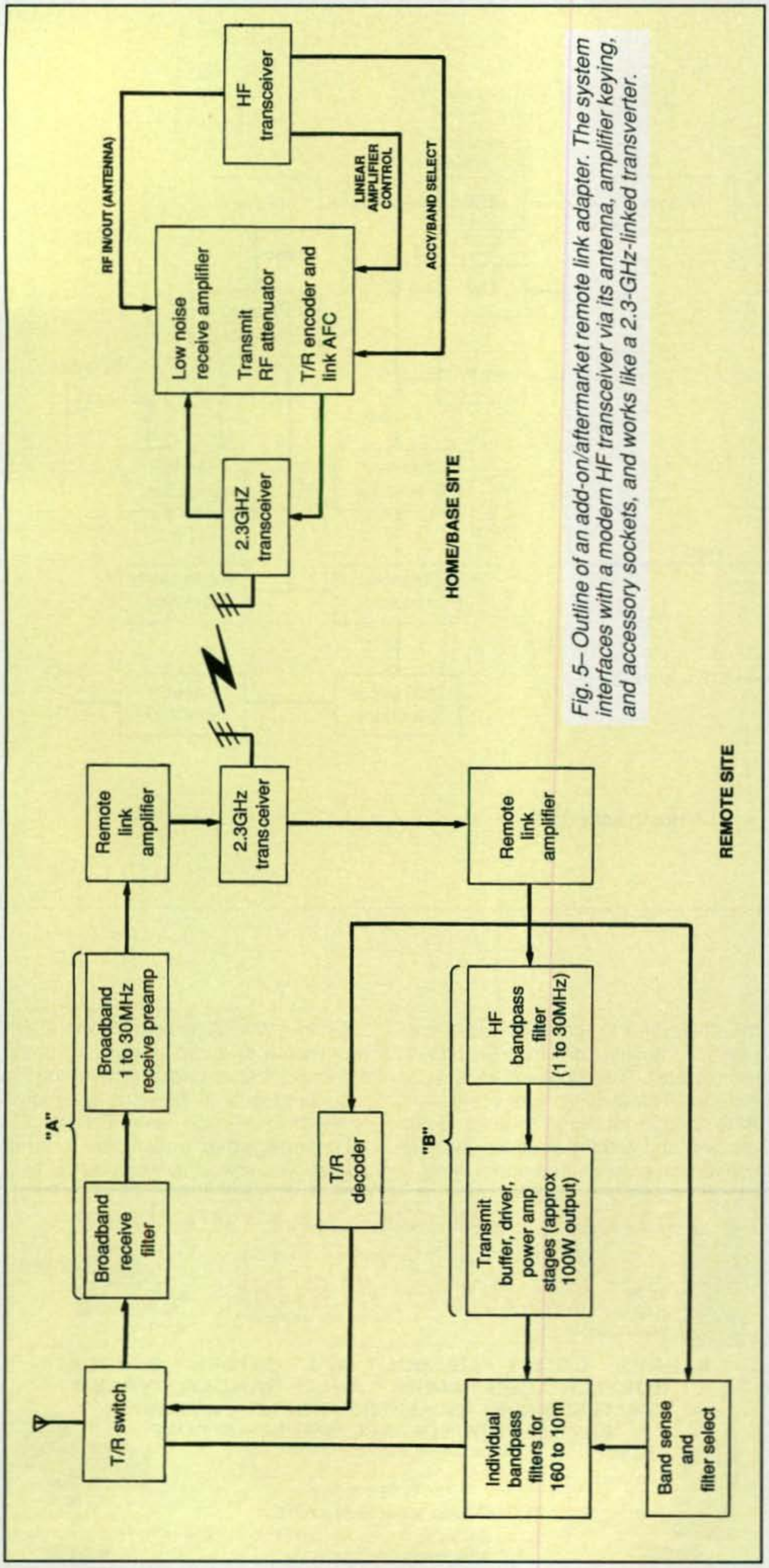


Fig. 5– Outline of an add-on/aftermarket remote link adapter. The system interfaces with a modern HF transceiver via its antenna, amplifier keying, and accessory sockets, and works like a 2.3-GHz-linked transverter.

ham-band signal (point F), filtered, RF amplified to a DX-worthy level, and transmitted toward distant areas.

Earlier in this discussion I mentioned a "remote setup" converter for use with existing HF transceivers. The concept here is *similar to a remote-located transverter connected to a home/base transceiver via a microwave link* (fig. 5). The remote unit's circuitry consists of a reed-relay or PIN-diode T/R switch, broadband receive filter, and RF preamp (section "A"); transmit filter, driver and power amplifier stages (section "B"); plus link amplifiers for boosting levels and required control/switching logic. Inclusion of a linear amplifier, beam antenna, hard-disconnect antenna, and power relays, etc., is optional. The associated home/base converter unit connects to an unmodified HF transceiver via its antenna and external amplifier or accessory sockets. This unit may consist of a low-noise receive amp, transmit RF attenuator (to reduce the HF rig's output and avoid overdriving the microwave transmitter), a T/R switch encoder, and AFC (for frequency-stabilizing the remote link). This arrangement, incidentally, is easily duplicated or "re-engineered" and assembled your way with readily available parts. Remember that my designs are starting points to kindle your own thoughts.

Conclusion

Attempting to squeeze all the fine details of new ideas in limited column space obviously is impossible. Also, as with my discussion of wireless high-speed e-mail and internet links in my 1985 *Microwave Handbook* (page 126), or warnings of an Al Qaida terrorist attack on New York City or D.C. in my 1996 *Survival Communications Guide* (pages 8 and 22), I probably am ahead of my time. However, by bringing these thoughts to light now, maybe it will inspire interest in future developments. I am also receptive to working with progressive-minded companies in making this vision a reality. Any takers?

73, Dave, K4TWJ

Note

1. While auxiliary operation—what you would use for any of the remote-control setups described here—is not currently permitted on 2 meters, the FCC has proposed changing that rule to allow it. The proposal is part of the "omnibus" rule-making proceeding awaiting Commission action. It is possible that a decision will be out by the time you read this.

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BY BOB JOSUWEIT,* WA3PZO

Field Day is Not Enough

It's the beginning of a new year. If you're in an area where it's cold outside, you may have some time to sit and catch up on some of your favorite reading, including *CQ*. As you look back on your ham radio activity, you might think that you got your training in emergency communications. After all, you have checked into the local club net, helped out at a walk-a-thon last spring, and participated in Field Day.

The Fourth Weekend of June

It's one of the standard catch phrases for Field Day: "always the fourth weekend of June." Can anyone wait that long to brush up on his or her emergency communications skills? At first glance, you might think so. After all, your Field Day group raises antennas, sets up radios, gets a generator going, cooks at least three meals, makes Field Day contacts, passes messages, uses alternate forms of power, and deals with both the public and the news media.

In simple terms, Field Day is a communications test, a learning experience, a contest, and a social event. Field Day is *fun!* You can do what you enjoy doing. You can operate HF, CW, digital modes, and VHF and above. More than likely you'll stay with what you are comfortable with. If band conditions are really bad, you can sit back, tell a few stories, and not have to worry about making any contacts.

In a real emergency, however, you won't have the luxury of relying on a group of people to do what they know how to do best. You may be responsible for the entire operation at your site. You know you are under pressure and facing a deadline to get a station up and running as quickly as possible.

Not a Cloud . . .

Wouldn't it be a benefit if every disaster occurred under a sunny sky with a cool breeze blowing and a nice tent from which to operate? Well, it doesn't take much to realize that we can't be that lucky. Disasters come in all shapes and sizes. They vary in magnitude, needs, and duration. There may be some advance notice, as in the case of a hurricane, or there may be no notice, as in the case of an explosion. Even the location of the disaster could alter your response to the emergency. Suppose your antenna expert all of a sudden found his home underwater and he was unable to assist with communications? Would you be able to step in and fill the void? Take a look at your community and see what type of disasters could happen, and possibly ask what would happen if a disaster happened at your place, or at the home of the club public-service director, the county radio officer, or the emergency coordinator? Who would pick up

Would you be able to operate an APRS station at a disaster site? (Photo courtesy Jim Gerhart, WA3DIT)

their responsibilities? Would you be ready to fill in? Is Field Day really enough training?

Resources Stretched Thin

Not all disasters are over within a short period of time. Many aren't even finished in a day. During Hurricane Charley in Highland County, Florida hams had to work in 24-hour shifts. They were required to cover shelters days before the hurricane hit and were still on duty long after the hurricane had left. For the six days after the hurricane, hams assisted with cleanup operations in 12-hour shifts. If that wasn't bad enough, Hurricane Frances arrived five days later, requiring operators to work 36–48-hour shifts and additional 12-hour shifts during the cleanup. Meanwhile, they wondered what was going on at their own homes.

Need to Know

Because of the hurricanes, for two months hams were responsible for net and resource management, keeping equipment working and making sure all positions were filled when needed. In addition, they had to support multiple agencies, worry about their homes and families, and staying healthy.

Unfamiliar pieces of radio equipment were either brought into the disaster area or left by another volunteer. This presented many challenges to those arriving on location, as they knew they had to figure out how to use the equipment. Others had to be involved with the vehicle, power, and antenna setups.

Emcomm is More Than Operating a Radio

Besides knowing how to operate a radio, put up antennas, and supply power to the radios, emergency communication providers are being asked to know about the Incident Command System, weather terminology, mapping techniques, GPS

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navigation systems, damage assessment, and much more. We also need to know how to take care of ourselves and look out for one another. During hurricane relief efforts reports surfaced of broken bones, dehydration, and heat stroke. The key is to remember to take care of yourself so that you don't become one of the casualties. Since September 11th our vocabulary has changed. There is a need to keep up with the latest in emergency management.

Understanding the Problem

It seems that with every critique of a disaster similar communications problems are reported. This includes radio systems failing or being overloaded with traffic. During the hurricanes, many first responders were unable to communicate with one another because their radios were on different frequencies. Cell phones didn't work, and in many cases the responders didn't use the same terminology. Secretary of Homeland Security Tom Ridge summed up what was needed now. He said, "You have to do something. You can't wait until you have it all . . . Our goal is to achieve seamless protection, a nation knit tightly together by shared vigilance, readiness, and communication." Ham radio is and can be part of the solution.

Are Hams Still Needed?

Just ask anyone in a number of agencies. Max Mayfield, Director of the National Hurricane Center, said, "Ham radio operators remain a critical component." Dennis Decker with the Melbourne, Florida office of the National Weather Service said, "You helped us verify the severity of the winds around the eye wall and pass that info to the public as the storm crossed the area." A Salvation Army Major in charge of a base camp in Tampa, Florida said, "I don't know what we'd do without you guys." All of the praise also comes with a sense of caution from Dale Hatfield, WØIFO, former FCC Director of Engineering and Technology. He said, "I would urge you to continue shifting towards more spectrally efficient communications techniques, especially digital techniques."

More Requests for Hams

Agencies and groups are seeing the need to embrace amateur radio emergency communications. In Florida we saw animal shelters request amateur radio communication links. One surprise came from Palm Beach. In an article on home owner associations, the *Palm Beach Post* reported, "That's why groups, who once devoted hours to debating what color cabanas they should buy for their pool decks, are now discussing purchasing generators and high-tech radio systems. They are making lists of ham radio operators, nurses, and health professionals in their neighborhoods..." For anyone involved with antenna restrictions, this should come as good news. Ron Castleman, CEO for the Homeland Security Department's Emergency Preparedness and Response Directorate, told a crowd, "When something adverse does happen, they're the first to keep the information flowing, often without electricity."

Telling Our Story

"Amateur radio's been in the shadows for 75 years," said ARRL President Jim Haynie, W5JBP. "We always did our

Charles Martin, KB3CO, helps coordinate activities from a field command post in suburban Philadelphia. (Photo courtesy Andy Shecktor, N3OMA)

thing and then went home; we are own worst publicists." Most clubs will write a story about the event for their club newsletter, they may post a story on the club web site, and they give the event and the participants high marks at a club meeting. We are not telling our communities, our served agencies, and our friends and co-workers.

There are several possible stories in which the community and local newspapers most likely would be interested. Some examples include a ham completing a course or training program, a local club assisting with a run/walk-a-thon or a parade, a local ARES/RACES group participating in a drill or being activated by the National Weather Service for a Skywarn event. Maybe even your monitoring events in another section or area of the country would be an interesting story. In effect, you might be standing by to offer assistance.

A News Perspective

Understanding how a news reporter looks at an event will help you get some news coverage of your own. Let's take a look at a hurricane hitting Florida.

The big national story is that Florida is being hit by a hurricane. The story may even be Floridians prepare for third hurricane in as many weeks. In Florida the perspective is local hams providing emergency communications. If the storm is on track to hit other states, then the local story is hams preparing for hurricane duty.

If you are totally out of the storm's path, there are still some possibilities for local news coverage. These might include local hams monitoring communications from a disaster area. There may be other ham radio operators traveling to the disaster area to help, or they may be assisting from home. There are also other stories to report on, including local hams supporting a local agency in their mission or local hams training just in case a disaster happens in their area.

How to Get Started?

Most hams would agree that their work is often ignored by the press. More accurately, we're not out there telling our story as well as we should be. Some might say that they know more about putting radios together than putting words in the right order. There are several sources of help available. First take a look at the ARRL Public Relations web pages at <www.arrl.org/pio>. There is information on how to be a public-information officer and some sample press releases. In addition, there is the monthly public-relations newsletter called "Contact!" Also within the ARRL Field Organization are a section Public Information Coordinator and local Public Information Officers. These people can be a great resource. If you still have a question, drop us a line.

Interagency Training

While most eyes were focusing on the presidential election in November, public-safety professionals and volunteers were planning a major disaster-preparedness drill in suburban Philadelphia. Representatives from several hospitals, fire companies, search-and-rescue units, the Pennsylvania Emergency Management Agency, and members of the PA National Guard didn't have to go far to find a scenario that would serve as a good exercise. They just took it out of the newspapers.

Late season Hurricane Larry sliced its way across the mid-Atlantic region and hit Montgomery County. Phone service was devastated. With over seven inches of rain, streams and rivers overflowed their banks, wiping out dozens of homes. Two small tornadoes hit, serious injuries mounted, and area hospitals were overwhelmed with dozens of people hit hard by nature's worst. Cell phones were rendered useless as power failures rolled throughout the region. Communications systems were overwhelmed. Montgomery RACES/ARES responded to hospitals within the county and set up communications posts to relay critical hospital information.

After four hours with no power, cellular systems began to fail and backup power to repeaters failed. All amateur repeaters in Montgomery County were either destroyed or were non-operational due to lack of power. The National Guard was called in and set up a command post at a local park along with PA Army MARS, RACES/ARES, and the fire/police units. Montgomery County RACES/ARES implemented a simplex-mode plan for communications. In addition, an HF station was established.

While many residents were enjoying a nice day in the park, Steve Pearl, N3LJZ, said that for the professionals and volunteers involved in the drill it might as well have been the "real thing."

Amy Brady (not related to Chris, N3CB) at the microphone making a contact with Chuck Kimball, NØNHJ. Caitlin Brady, W3CJB, Chris's daughter, is at the far left in the photograph. Presently, Caitlin is the only licensed ham in the school and has held her ticket for two years. (Photo courtesy Chris, N3CB)

Public Service Through Education

Students at the Epiphany of Our Lord School in Plymouth Meeting in suburban Philadelphia were all eyes and ears as Chris Brady, N3CB, brought the world to the classroom. Brady said, "The demonstration was awesome!" He also said that in four classes he didn't see one face that wasn't interested. Brady spoke for about 20 minutes, then went to the mobile rig for some pre-arranged contacts via IRLP. "I had Australians lined up for the first two classes," said Brady, "and then we moved on to Chuck Kimball, NØNHJ, at Palmer Station, Antarctica, for the remaining two. We also spoke to stations on the Outer Banks and in British Columbia."

"I think the kids saw some benefit in being able to communicate with each other between homes or while on vacation," said Brady. "Obviously, the few DX contacts were an eye-opener!"

"I set up my dual-band mobile rig using a mag-mount to reach the IRLP node at my home. I had the FT-920 HF rig connected to a 40-meter Hamstick on my car in the parking lot and passed around a VX-5R HT."

Brady said one of his bullet-points was that if there was sufficient interest, he would be happy to instruct a Technician-level class in the near future. Their science teacher, Kristen Albone, offered all of her science classes that day for the ham radio demonstration. If there is continued interest, Kristen will also attempt to pass her Technician license so that she can act as a moderator for a potential club station. There is obvious benefit to adding amateur radio to the curriculum, if even as a recess/lunch-time hobby.

Another Month . . .

This month we took a look at the need for emergency communication training on a regular basis. As hams in Florida found out, they could be called to provide a public service and yet have to worry about their own families and homes. We also took a look at news reporting during a disaster and how to use the news to formulate a drill. Finally, we mentioned how public service involves education. It's never too early to get more people into the hobby as more groups look to ham radio for emergency communications.

Do you have a story to tell of amateur radio serving in the public interest? Drop us a note. Until next time . . .

73, Bob, WA3PZO

antennas

BY KENT BRITAIN,* WA5VJB

Wounded Wings: What Happens to Your Signal when an Element Breaks?

I would like to thank Ron, one of our readers, for suggesting this month's topic: What happens to the pattern of a Yagi when an element breaks off? If you've had antennas in the air, you most likely have lost an element (see photo A). Birds, ice, wind, storms, loose hardware, or just fatigue, and you find an element in the yard or hear a loud noise as it hits the roof. How many dB have you lost? I decided to do some objective testing on my antenna range.

For these tests I took an 11-element Yagi design I had for ATV (amateur television) work and made an antenna with removable elements (photo B). Now I could measure gain off the front, gain or lack of it off the back, and return loss *(I'll cover return loss vs. SWR in the next column).* I then could start taking off elements or replace one with a half element, simulating what happens when only half an element breaks off.

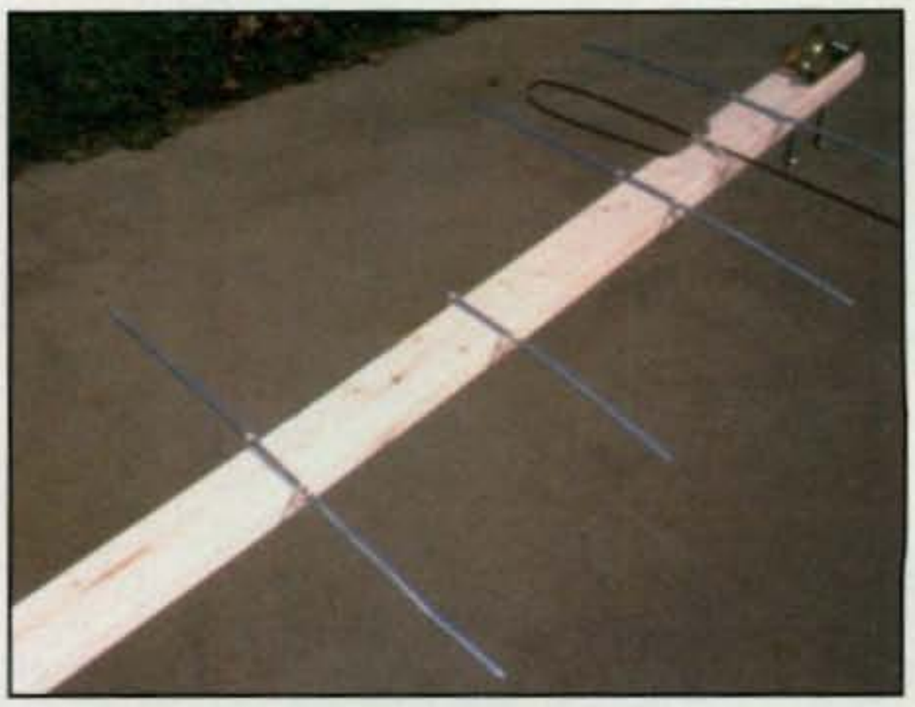

Photo B– Test Yagi with half of the second director missing. See Table I for measured changes in gain and SWR with half or all of the various elements removed.

Half Gone vs. All Gone

Often just one side of a Yagi element breaks off, so I did some quick tests of half an element vs. just taking off the whole element. There was not much difference—perhaps 1/20th of a decibel (dB). Thus, if the reflector, or one of the early directors, falls off, the antenna loses about 2 dB of gain. If only half of the reflector or director falls off, then it's only a 1.95-dB loss in gain. The same was true for the pattern. This antenna pattern had over 30 dB front-to-back ratio, and with half or all of the reflector gone, the front-to-back was only 13 dB. (We usually would specify a Yagi's pattern as both a forward gain and a front-to-back ratio, but this time it made more sense just to measure the gain —or lack thereof—in straight dBs.) See Table I for measured results.

Field experience suggests that the more tightly tuned high-performance Yagis would detune more than my low-Q Cheap Yagis. That sounds like a good topic for a future column. Also, limiting the study to 3- or 4-element Yagis might have some good benefits as well. However, I think those projects will have to wait for much better weather.

Conclusions

Driven Element: If any part of the driven element falls off, you're pretty much talking on an air-cooled dummy load! Gee, what did you expect?

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Photo A– A lobotomized 6-meter beam. Notice the missing front element. (Photo courtesy KØCQ)

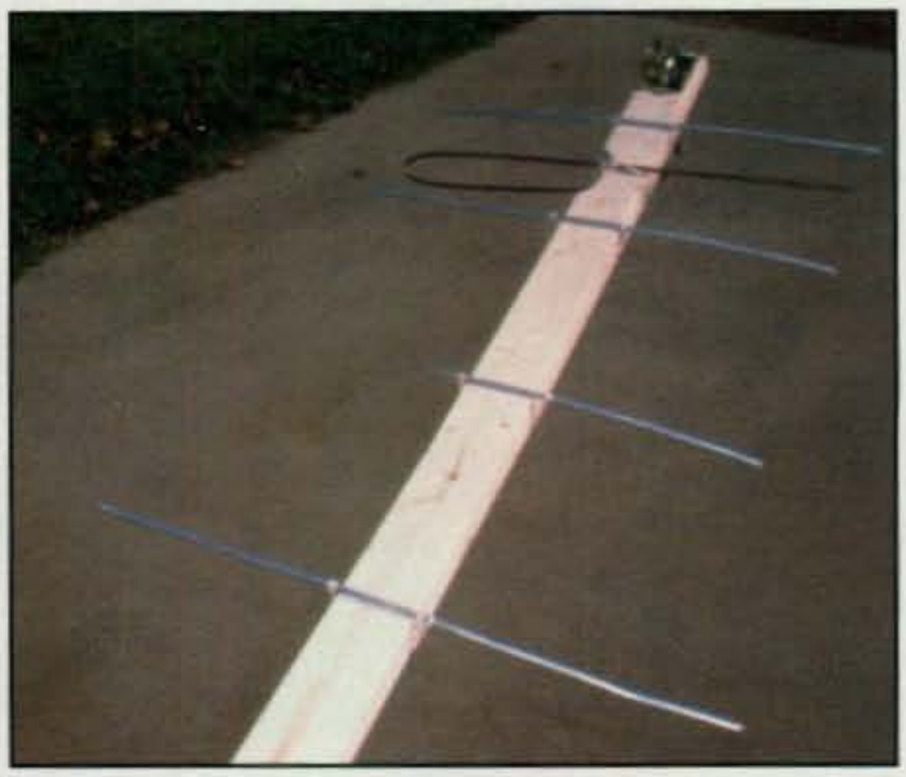

Photo C– Another view of the test Yagi with half an element missing. Tests showed that losing half an element was basically just as bad as losing a whole element.

Another Fun Yagi

Here is another fun antenna that showed up for me to measure at the Central States VHF Society antenna contest last summer. VE3SMA had built this 36-element Yagi for 2.3 GHz by using hot-melt glue and Styrofoam! For a variety of reasons this antenna didn't work well, but the construction method is valid.

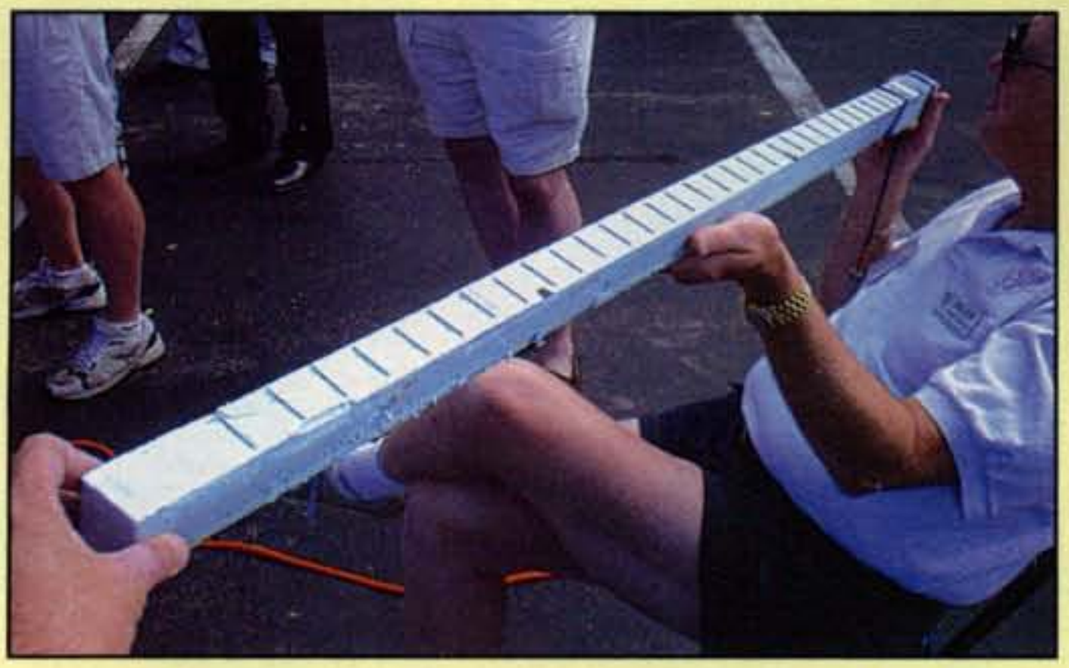

Photo D– Yes, folks, that's actually an antenna! The 2.3-GHz elements were hot-glued to a boom made from a block of Styrofoam. While this particular antenna did not perform well on the test range, the basic design concept is valid.

The hot-melt glue and Styrofoam load down the elements by about 200 MHz, so design a 2.3-GHz Yagi and then design a 2.5-GHz Yagi. Using the element lengths calculated for 2.5 GHz and the spacings calculated for 2.3 GHz should be a good starting point.

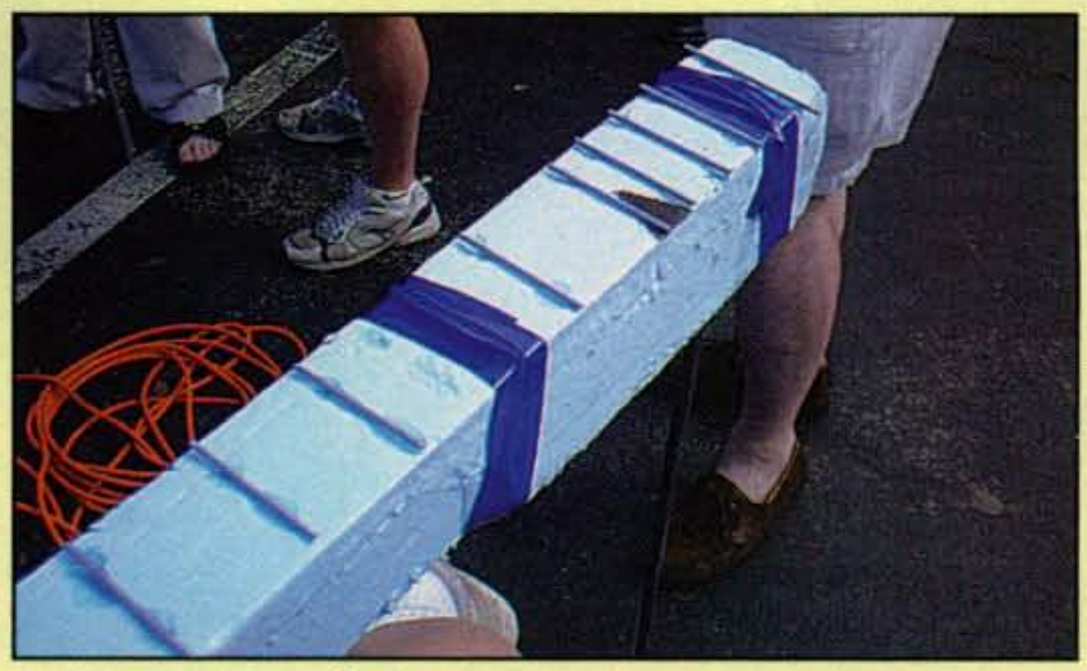

Photo E– Close-up of the Styrofoam Yagi elements. Since the Styrofoam detunes the antenna by 200 MHz (!), you should cut the elements for 2.5 GHz but use 2.3-GHz spacing between them (See text for details.)

SWR: This was pretty consistent for all the Yagis I played with on the antenna range, and several of the computer simulations. The SWR went from flat to about 2 to 1 when measured near the antenna, no matter which element fell off. Therefore, SWR goes up a bit, but most rigs will still drive the antenna, especially if there is a modest length of coax and its associated loss. However, the increased SWR can have an effect on . . .

Gain: There are two factors that reduce gain. The first is SWR. When an element falls off, the impedance of the driven element changes. This impedance change means some of the RF power is reflected back down the coax. This lost power effectively reduces the gain of the Yagi. On the antenna range I could only measure total loss, but NEC simulations put this loss in the .3 to .5 dB range.

Thanks again to Ron for suggesting this month's topic. Some of the best topics for columns come from you, our readers, so keep those ideas coming. Remember, anything in the air works better that the world's greatest antenna design still on the ground, so when the weather gets better, get some aluminum in the air! 73, Kent, WA5VJB

Baseline Antenna

Gain Front (dBi)	Gain Rear (dBi)	SWR
13.8	–17	< 1.1

Results with various elements removed

Element	Gain Front (dBi)	Gain Rear (dBi)	SWR
1/2 Reflector	12.1	–.5	1.9
Reflector	12.2	–1	1.9
Driven Element	dead!	—	—
1/2 Director 1	12.3	–5	1.8
Director 1	12.3	–5	1.8
1/2 Director 2	12.5	–4	1.6
Director 2	12.5	–3	1.6
Director 3	12.9	–2	2.0
Director 4	12.7	0	2.2
Director 5	13.2	–4	1.9
Director 6	13.1	+1	2.0
Director 7	13.0	–1	2.0
Director 8	13.1	–1	1.8
Director 9	12.9	–4	1.5

Table I– Antenna-range results.

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Math's notes

BY IRWIN MATH,* WA2NDM

Reflections

Before starting 2005, I would like to wish a very happy and healthy New Year to all of my readers. As I have said for the past 30+ years, I sincerely hope that this will be the year when all of your hopes and dreams are realized. Since I often reflect on the past and the future at the beginning of a new year, I would like to pass along a few personal comments and observations this month.

Due to many reports concerning the gradual loss of the U.S.'s leadership role in technology to various foreign nations, I have become concerned about where we really are going with regard to motivating our technically oriented youngsters. My conclusions have led me to believe that many such children of today are underprivileged (to some degree) compared to the way I grew up.

In my day we didn't have television or computers, so we had to make do with our imaginations. We didn't have complex devices such as cell phones, Palm Pilots, FRS (Family Radio Service) radios, and the like. Whatever we wanted we had to build from scratch and we then had to experiment, debug, and tinker until the device worked the way we wanted it to. I believe that TV, video games, and the like (when indulged in to an extreme) have a destructive effect on young people, since in reality, all one really does is observe or directly react by pushing buttons. However, if you read a book, build something, or even just listen to a radio, your imagination is working. Possibly this is part of the reason why the motivation and excitement that I felt as a young person is not as prevalent in the youth of today. Too much is done for them (according to someone else's idea of what is supposed to be interesting), and they simply become spectators, not a truly creative participants.

When I first became interested in electronics (at an early age), it was because my father brought home a crystal set (with a real galena crystal in a lead holder, not an encased-in-glass pre-adjusted diode). Then the two of us climbed onto the roof of the six-story apartment building to put up an antenna. Just getting the lead-in wire down to our sixth floor apartment from the roof was an adventure in itself (for a 12 year old), but we did. The best part, however, was putting on the earphones and poking the cat's whisker around on the surface of the crystal, searching for a sensitive spot. To this day, I still remember the thrill of hearing the local station "booming in" when we found it. Today I do not know what exists that is similar, and I certainly do not think that surfing the web or defeating aliens in a video game has the same lasting impact.

Don't get me wrong. I am not against advances in technology—far from it. In fact, I love what we are achieving. It's just that I wish there was a way that more young people could be made aware of the joy of truly creating something on their own.

During those "formative" years I had a close friend who had similar interests. He lived across the street on the fifth floor of another apartment building, and his bedroom window faced mine (on the sixth floor of our building). We longed to have a way to communicate privately with one another. Since you could not simply go to the local department store and buy a couple of FRS radios, we had to figure out a way. Blinking flashlights using Morse code was the first attempt (which did work pretty well), but it was deemed too cumbersome, since even 5 words per minute was difficult for teen-agers (we had just reached the age of 13 at the time) on a regular basis.

The answer came when we acquired two old telephones. These were nothing like the clever devices of today, but were actually neat-looking, black candlestick phones, manufactured by the Kellogg company, that someone had thrown out (I wish I still had them, as they are probably worth a small fortune today). The circuit for these was so simple (and included on a neatly folded circuit diagram within the base of each phone) that even we could understand it. There was no dial, only a carbon microphone, an earphone, a hook switch, and a couple of small components that were unrecognizable. Connecting both phones in series with two No. 6 dry cells allowed clear, loud communication. This was our answer! Now the problem was to get the two conductors required across a city street.

In my day there were numerous old radios that were being discarded and replaced by the new so-called "5-tube AC/DC Specials." Most of these consisted of only the chassis, since the cabinets, which in many cases were really fine furniture, were then converted into bookshelves, liquor cabinets, dining room servers, and the like. The speakers, of course, were discarded along with the rest of the "innards." From this "junkbox of the street" we acquired a large dynamic speaker with a broken paper cone. Taking it apart (everything was screwed or bolted together in those days, so disassembly was relatively simple), we wound up with a neat coil of at least 1/4 mile of No. 28 enameled wire. Dropping the entire spool from my sixth floor window to my friend waiting at street level (with a pillow to catch the spool) while the wire unwound was simple. Walking across the street letting out more wire was also no problem, and when he let a rope down to me from his fifth floor window, I tied the coil of wire to the rope and he carefully pulled it up. We then repeated the entire process in reverse for the other conductor.

When all finally was hooked up, the thin wires were virtually invisible from the street and we had a neat two-way communications link that, believe it or not, worked for more than two years. It was

*c/o CQ magazine

not high technology by any standard, but we did it ourselves and it worked perfectly!

I would love to hear from readers, or their offspring for that matter, who have done something similar today.

This is my point. Experiences such as the telephone and crystal sets that I had as a youngster all were based on what my friends or I could come up with from the limited resources at our disposal. There was no RadioShack on every corner. Even the famous Heathkit Company products were a little too expensive for a budding teenager. The only components we could find were from the street source I previously mentioned or from New York City's Canal/Cortland Street "Radio Row," where the electronic remnants of World War II were displayed on the sidewalks for less than 10 cents on the dollar. The results are still clearly etched in my mind almost a half-century later.

When I finally got my amateur radio license, I still did not have the budget to purchase the commercially manufactured equipment that was slowly becoming available. A second-hand Hallicrafters S-85 was the best I could do. Fortunately, the old RCA 630 TV chassis and its cousins had now become the predominant item in the "junkbox of the street," and the power transformer, 5U4 rectifier, and 6BG6 horizontal sweep tube only had to be re-arranged to build a workable transmitter. When this collection of "junk" allowed actual worldwide contacts to be made the gratification was beyond belief.

I hope by this time you are getting my point. Nothing was served to us on a silver platter, but whatever we "cooked up" tasted wonderful.

When I first started writing "Math's Notes," there were many readers who wrote to me describing their projects and asking numerous technical questions. In fact, there was a point in time, in the late 1970s, when I could not even get on the air without someone recognizing my call and bombarding me with questions. It seemed that almost everyone was building something. Today too much of that has disappeared. I do get many letters from readers, but not much from true, dyed-in-the-wool home-brewers or experimenters. I believe that this has to change if our country intends to maintain its leadership role in technology. We have to somehow encourage our youth to experiment, or at the very least build something, so they get a personal, hands-on experience of what technology is all about!

I don't have the answers, but I do know the feeling one gets when something one builds from scratch finally works. I do know the difference between working someone thousands of miles away with a collection of scavenged parts on a wood base compared to doing it with a nice $2000+ factory-built transceiver that has been professionally tested, aligned, and then simply plugged in by the user like a toaster. The only challenge here, unfortunately, is determining what knob to turn and when.

If we can somehow rekindle the spirit of the "old days," it might actually go a long way toward creating the world of the future that I always thought the 21st century would be. The job of the Elmers of today is not only to help newcomers to amateur radio, but in many cases it is also to make them aware of the possibilities that exist through amateur radio and technology that could indeed change their entire lives.

Thanks for your time. I would love to hear your comments on all of this, and I promise that next month we will get back to "normal" (whatever that is!).

73, Irwin, WA2NDM

magic in the sky

BY JEFF REINHARDT, AA6JR

Amateur Radio Was Calling Me Back

By Sean Barnes,* N3JQ
Guest Columnist

"Magic in the Sky" columnist Jeff Reinhardt, AA6JR, was cavorting around Europe (reportedly visiting with Prof. Emil Heisseluft at the Lauton Institute) when he was supposed to be writing his column. In Jeff's absence, we've invited Sean Barnes, N3JQ, a physics teacher at Trinity High School in Camp Hill, Pennsylvania, to share his story of how the magic of ham radio wouldn't leave him alone, and as a result, nearly 150 of his students have now joined the ranks of amateur radio operators. — *W2VU*

On November 9, 2004 Trinity High School (N3THS) added 65 more licensed Technician class operators to the 21 licensees already residing at the Camp Hill, Pennsylvania high school. Four physics classes, totaling 65 students, spent the first marking period learning electromagnetism via amateur radio, and then took and passed their license exams. This brings the Trinity High School license count for the past three years to 146 (28 in the 2002/03 school year, 53 in 2003/04, and 65 more [so far] in 2004/05). Another 13 students expect to take the Technician test the next time it is offered by the VE team from the Harrisburg Radio Amateur Club.

I'm in my fifth year of teaching at Trinity HS. I worked from 1983 to 2000 in electrical engineering at companies such as Link Flight Simulation, General Electric, Lockheed-Martin, and Raytheon. My interest in electrical engineering all came from my experience in the 8th grade, when I was licensed as WN3WUZ. In the 1990s, while continuing to work in engineering, I returned to school part-time to pursue my masters degree in physics. This allowed me to teach, whereby I came to Trinity HS in 2000.

"Hands-On" Physics

We have three levels of physics classes at Trinity: General, Academic and Honors. I teach the General and Academic levels, as well as Honors Algebra 2. After two years of teaching traditional-style physics, I wanted a more "hands-on" approach with my General Physics students, and I had my radio interest piqued by an astronomy club I started at school. We inquired about making a

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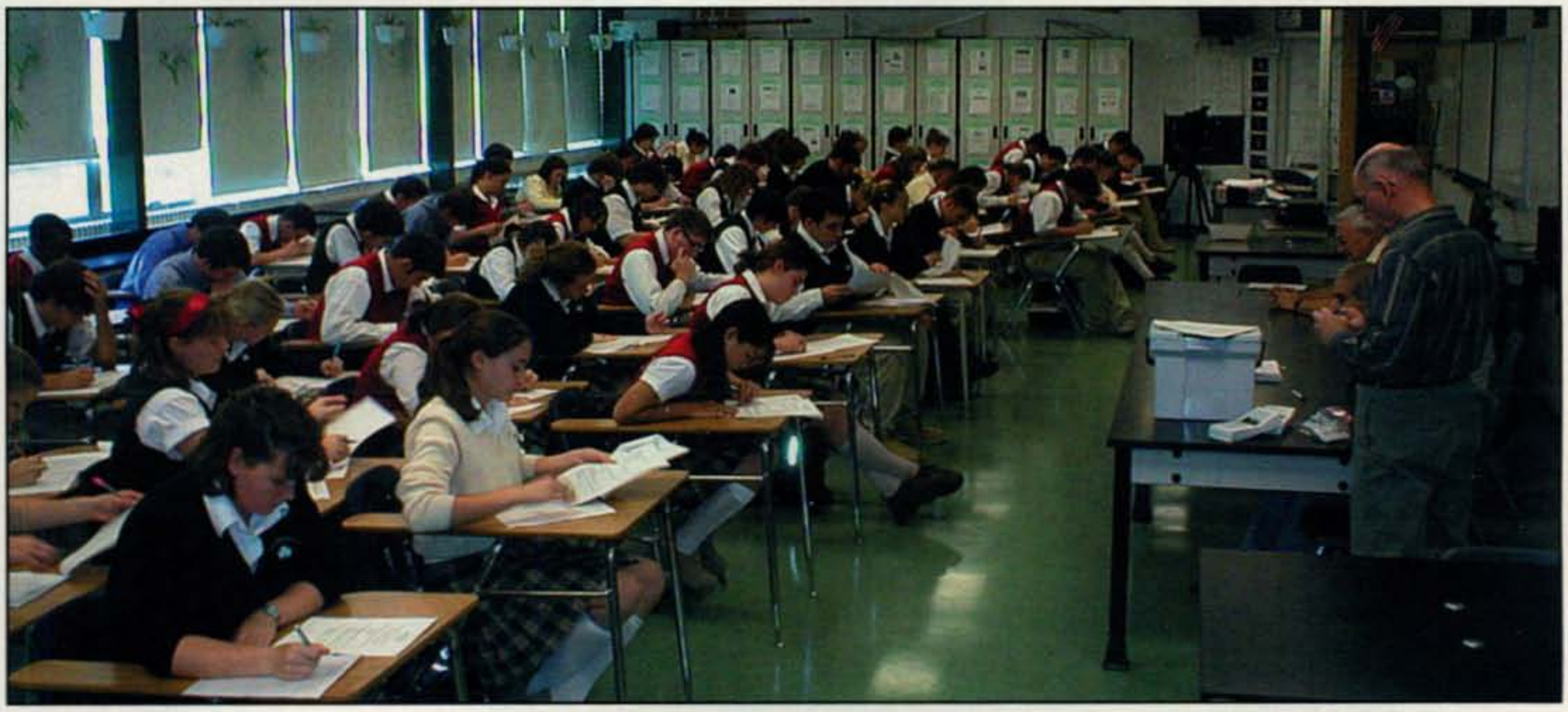
The 65 newly-licensed hams in Sean Barnes' physics classes at Trinity High School in Camp Hill, Pennsylvania.

radio telescope while attending a telescope viewing session set up for Trinity at the Astronomical Society of Harrisburg (ASH). ASH Vice President, Dick Goodman, WA3USG, told me about a radio telescope design he had made. I had also talked to a radio telescope design engineer at the National Radio Astronomy Observatory headquarters at the University of Virginia while refereeing water polo there in the spring of 2002. It appeared that amateur radio was calling me back.

I convinced myself to return to amateur radio and use it as a tool to teach my General-Physics class for the following school year, 2002/03. But how? It was then the summer of 2002, and the school year was starting in just a couple of months. I researched the ARRL and found about "The Big Project," the League's amateur radio in education program. I was still unlicensed, but joined the ARRL. I called concerning getting funding, and was told that my application would need to go through an approval process that would take longer than the 60 days remaining before school started. However, I also found out about a large amateur radio club called the Harrisburg Radio Amateur Club, which meets just 5 miles away from Trinity High School. I attended a meeting in August, just 20 days prior to school starting. I was hooked, and more important, so was HRAC president Pete de Volpi, K3PD.

Pete invited me over to his house and shack. He gave me some starter material and a set of test questions to study. I called the ARRL and ordered a set of *Now You're Talking* books for my single General-Physics class at Trinity. I was going to leave my other two Academic-Physics classes alone for this "trial year." I had just picked up an AP Calculus 2 course to teach as well, giving me four separate lessons to plan per day. I wanted to carefully control this trial with amateur radio. Heck, I wasn't even licensed yet myself!

Pete asked the HRAC to loan me a few pieces of equipment to allow students to listen to amateur radio at the school. We set up a shack in a dusty but spacious storage area behind the physics room. I taught right from the *Now You're Talking* textbook using a downloaded set of FCC questions ported into Excel® to generate randomized tests. I took the test (along with two girls in my class) about 30 days earlier than most of my class, getting my Technician license. Lenore Brown got KB3IUP. I got KB3IUQ, and Meg McCormick got KB3IUR. Lenore went on to become president of our school club, and Meg got a raise at the Harrisburg radio sta-



Volunteer Examiners from the Harrisburg Radio Amateur Club administer the Technician exam at Trinity High School on November 9, 2004. All 65 students who took the test passed.

tion, where she worked part-time, as soon as she told them about her license.

My students all took the test right at Trinity HS. The Volunteer Examiner (VE) team associated with HRAC, led by George Burkett, N3YB, graciously agreed to come to Trinity to administer a test session in December. Pete de Volpi showed up for the test session with a Christmas present for the school: a Hammarlund HQ-120 receiver that he had recently purchased and restored to excellent working condition. We tuned in stations immediately.

Not all the students passed that day. Those who failed returned to the HRAC Saturday test site a month later, where the majority finally passed. Twenty-four amateur radio licenses were ultimately garnered: 21 students; myself (now vanity callsign N3JQ); the father of one of the students (getting back-to-back callsigns with his daughter in class—Liz and Bill Moser, KB3IYZ and KB3IZA, respectively); and ARCoT, the Amateur Radio Club of Trinity High School, N3THS, an ARRL-affiliated club. We started a monthly meeting of our school ham club, through which four more non-physics underclassmen were also licensed.

Required Contacts

Once licensed, I required each of the students to make 30 contacts, with a minimum of one made on the Trinity ham shack equipment, and at least 10 with stations outside North America. Some students didn't have a single study-hall, and limited equipment kept me from having an entire class dedicated to contact time, so I also required the students to download Echolink[1] and make contacts from their computers if they didn't have enough radio time. It was a great success. I made them verify their contacts by having the contacted person send an e-mail to me, the teacher. There was about a 20% non-return rate on the e-mails, so I gave a "100" to any student getting 30 contacts and 20 e-mails. To further evaluate the contact, I had the students ask a list of basic questions (QTH, rigs at home, years as a ham) of whomever they contacted.

This success propelled me to get my General Class license two months later, my Extra Class license two months after that, and my VE certificate a few months after that. My background in electrical engineering and physics helped greatly. My old Novice license grandfathered me out of the code test requirement, although I had myself back up to 10 words per minute (wpm) with some tapes I had.

Expanding the Program

I felt confident enough to add amateur radio to my two Academic-Physics classes for the 2003/04 school year. I became more efficient with this group and had them ready for the license exam by early November. On November 17, 2003, we had another 49 students licensed at Trinity HS between the single General-Physics class and two Academic-Physics classes. Four additional students were licensed through ARCoT club meetings. A couple of months later, five of my students also took the General Class Element 3 test and passed it, but they did not take the Element 1 Morse Code test. Regardless, I gave them extra credit for passing any additional element.

I did the same thing with Echolink again, although the receipt of roughly 1500 e-mails was a bit of a challenge for me to manage. I kept separate e-filing cabinets for each student and posted results as they arrived. Again, great success, with very positive Echolink replies. I continued through the year to give extra credit for every Trinity ham shack real-radio contact that they made —one free extra-credit point per contact, up to a limit of 25. Every contact—on-air or on Echolink—had a form-paper with standard questions I asked the students to ask. This helped them as an ice-breaker and led to some great contacts. Students came to me each day and told me of another new and positive experience through Echolink.

Echolink has been a fantastic tool. None of the kids I've taught had an amateur radio licensed relative at home when they enrolled in my physics class. So no one had any equipment at home, but they all had computers and internet access. I was worried that they would take too strongly to the internet and not enjoy the fun of a real radio contact, but instead I found the students still loved the feeling of a real microphone connected to a radio. A few students have even purchased their own equipment. (I need to look into getting together a package deal for new licensees, something like a dual-band HT with a mag-mount antenna, at a good starter price.)

Each year I have taught Morse code for a week. This represents about three total hours of code instruction. The students learn it enough to identify all the characters for a matching written test, but I leave it to them to continue to learn the code to be test-level proficient. I have raised my offer of extra credit for passing the code this year. We'll see if this gets more response.

At the end of the 2002/03 school year I prepared a presentation for the Central Pennsylvania chapter of the American Association of Physics Teachers, which I delivered at Bucknell University last March. About 30 physics teachers from throughout central Pennsylvania, including both high school teachers and college professors, attended the session. Although not at my meeting, Nobel Prize winner Leon Lederman (1988, muon neutrino) was at the conference.

He is the leading advocate in the United States for "Physics First," a concept of teaching basic physics in 9th grade, before biology or chemistry.[2] I met Lederman after his particle physics presentation and attended a dinner with him. When I talked briefly with Dr. Lederman after his lecture, I told him how I've added amateur radio to my curriculum, and could see using ham radio as a great way to teach the 9th grade "Physics First" students. He encouraged me to continue my pursuits in this direction.

More Magic

I've had the pleasure of guest speakers coming in from the local amateur radio community, many of whom I met on the air. Jon Kohn, N3AJB, let us borrow his Heathkit SB-101 and showed us some early 2-meter contacts. Tom Miller, KB3CVO, from the South Mountain Repeater Association, showed us SSTV (slow-scan TV). Dave Hoffman, N3PRO, showed the class how to use the Central Pennsylvania Repeater Association repeater for an IRLP[3] connection. Bob Marzari, W3PT, came in and did an analysis of our shack for aiding in antenna design. Bob also helped me get hooked on contesting, as I helped at his shack working 100+ contacts for the W3UU HRAC station, which was the bonus-point station for this past year's Pennsylvania QSO Party. Kurt Wann, K4ITO, came to class to tell students where amateur radio might lead them in a career. Kurt worked for IBM and has gone to schools to give Engineering Week talks about careers. He nicely tied amateur radio into his discussion. John Jaminet, W3HMS, was scheduled to come in during late November to talk to my class about Amateur TV and satellites.

We have a tight budget at Trinity, so gifts from Pete de Volpi[4] and other hams have been most welcome. Pete donated an HF rig, a 2-meter mobile radio, two HTs, lots of antenna wire, coax, insulators, a 10-meter mag-mount mobile antenna, a year's worth of *CQ* and *QST*, miscellaneous tubes, relays, crystals, and his recent copies of the *ARRL Handbook* and *Antenna Book*. A 2-element HF antenna followed in the spring. Our Trinity HS shack is truly "The Shack that Pete Built." Pete also encouraged donations from other hams, including an HT from Jeff Kisner, W3JWK, and a 2-meter mobile radio from Mary Crider, WA3HUP.

All this equipment went into the newly refurbished ham shack at Trinity. The physics room and ham shack underwent an entire remodeling just prior to the 2003/04 school year, thanks to a grant from the Whitaker Foundation and Fred and Kathy Alba. This had been a planned remodeling for the physics room and lab and fortuitously benefited the ham radio club.

The shack is a little bit of a wreck during the first marking period, since I keep a lot of the equipment out on the teacher's front table. I use it daily in lectures. It is great having all of this actual equipment to immediately show the students first-hand as they learn about it. However, the shack remains open all school year for any licensed student to use anytime. Students may use it before school, during study halls, at lunch, or after school. Equipment may be signed out overnight.

Teaching Tools

I integrate amateur radio into seven different labs during the first marking period. No. 1 is on compass heading and vector addition. No. 2 is wave fundamentals with a Slinky. No. 3 is wave reflection, refraction, diffraction, and interference with a water wave tank. No. 4 is electrostatics. No. 5 is Ohm's Law. No. 6 is series and parallel circuits. And No. 7 is building a 2-meter wire dipole antenna, with lowest SWR at 146.0 MHz. The students definitely like the antenna lab, because we do some soldering and building. The initial cut of the antenna at 468/146.0 yields an antenna with which I immediately make a contact on a local repeater. The students are impressed, to say the least. I did receive an amplifier lab through an ARRL-sponsored gift. I am still working on its integration into the curriculum.

I'd like to thank the designers of two great study-tool websites. Sample tests at <http://www.qrz.com> are fantastic. Two weeks prior to the FCC test I have the students turn in daily tests taken from home on the QRZ site. I simply have them print the last page of the test, showing their score. I ask that they get a 60+% for the first five daily tests, and 74+% for the final five. I give them 10 points for each test turned in, as long as they exceeded the minimum percentages just stated.

The other site is Ham Academy at <http://www.ah0a.org>. This free tool lets you do drills on isolated chapters and/or sub-chapters. This is a great site to use weekly as the students study for the tests I give them. I give tests after chapters 1, 2/3, 4/5, 6, 7, 8a, 8b, 9, and 10 in *Now You're Talking*, 5th edition. Basically, once we've covered enough text to cover 50+ questions worth of material, I give them a 50-question random test on the material just covered. I also give a halfway exam when we've covered 250+ of the 511 total question pool for the Technician license. These 50-question tests usually take about 20 minutes, allowing me the remaining half of the class time to cover new material.

I have the entire course prepared as a set of Power Point® slides. On the slides where a statement is written that directly pertains to a test question, I have the test question number listed in parentheses on the slide. One day I might link the actual test question to the parenthetical test-question number to pull the test question up immediately with the slide. This is just a thought for now.

I also have a SmartBoard up front in my classroom. It is a touch-sensitive 4×5 foot board onto which I project the computer image. I can touch the screen just like my hand is a mouse. I can pick up "pens" and write on the board electronically, to circle key items, etc. I can simply have a blank computer display on the screen and use the empty board for doing all my writing. Erasing is done by a simple touch of the board — no dust!

I ordered a total of 40 General Class study books from the ARRL for the students who wish to work toward Element 3. I give strong extra credit for passing this element, and even more extra credit for passing the 5 wpm code test. I hope to get some past the Element 1 this year, since I want to be competitive in the School Club Roundup and need students with their HF privileges, which (for now, at least) is General class and above. Additional extra credit can be achieved by participating in the School Club Roundup, going to local amateur radio club meetings, participating in public-service events using amateur radio, or making additional radio contacts.

Getting Parents on Board

At Back-to-School Night I meet with all of my student's parents for about 12 minutes. I explain my curriculum to them and show them our equipment. I reference VoIP articles from *Money Magazine,* etc., to show them how Echolink has been on this cutting edge. I had a parent come up to me this past October and ask if he could take my class! I also make a quick contact, usually Australia (about as far away as you can get) on Echolink. My random contact with New Zealand this past year was with a guy who already knew me! He recalled my students' project on Echolink from the previous year. I could not have planned his accidental comments better. He was looking forward to contacting more students this year. I told him how my students like the English-speaking countries such as Australia, New Zealand, and England ... but I like to be daring and try countries I have to look up on a map!

Teaching amateur radio at the beginning of the school year allows me to get the students to use their licenses on the equipment at school. I feel responsible for them as their Elmer. I want them to get off to a good start and have me available to answer any of their questions. At the end of the school year, I have my graduating students research the college or university that they are going to attend and find its amateur radio club. For those seeking other endeavors, I simply have them research an amateur radio club in the city where they will be living after graduation. I want to be sure that I'm turning them over to another Elmer.

I also encourage the students to apply for some of the many scholarships listed through the ARRL. Hopefully, one of my students will get one. We have an assembly at the end of the school year to honor the scholastic achievements of our students. I hope to have one of my students gain a scholarship and go forward for recognition. I'd then like to have all those in the school body who have their amateur licenses stand up. With 600 students in grades 9–12, we'll see almost 100 of them stand up in the auditorium at the end of this school year. That should look impressive. One in six students at Trinity HS will have an amateur radio license. Awesome!

Growing Popularity

Well, word on the street at Trinity concerning physics with amateur radio must be good. For the current school year I had to drop teaching my two Honors Algebra 2 classes, because enrollment in Academic Physics increased by 48%! My additional 24 students enrolled this year pushed me to add two more physics classes to teach. I now have one General class of nine students, and four Academic classes, totaling 65 more. It was this entire group of 65 Academic-Physics students who passed their tests on November 9th. The General-Physics class will take it a little later.

Their culmination project of 30 contacts really pulls it all together. The students are a little skeptical at first, with these random conversations with people they don't know. However, they quickly come to realize the "family" that our amateur radio community really is. The students are at a very competitive age in their lives, when they are seeking out who they are and competing for scholarships and college entrance. Amateur radio is such a refreshing academic course, because every licensed amateur radio operator, in every country, seems willing to help the students ... adding tremendously to the "Magic in the Air."

Notes

1. Echolink is a system using the internet to link amateur radio repeaters and operators around the world. Licensed hams may access it over the air via linked repeaters or directly from their sound-card equipped computers. For details, see N2IRZ's Digital column in last month's issue of *CQ*, December 2004, p. 40.

2. "Physics First" is a concept that physics should be a mandatory 9th-grade class, since it is the basis for all science. Just take out some of the strong math in current physics courses and teach it conceptually to 9th graders. Then allow them to then take "Physics II" their senior year, just as Biology II and/or Chemistry II classes are given now. This Physics II would be the strong-math-oriented physics. The new approach to teaching science has been adopted in more than 250 schools around the country, including San Diego and Chicago. For more information, see the Physics First homepage at <http://members.aol.com/physicsfirst/>.

3. IRLP is the Internet Repeater Linking Project, another Voice over Internet Protocol (VoIP) system that links repeaters via the internet. User access to IRLP is by radio only.

4. *CQ* thanks Pete deVolpi, K3PD, for bringing Sean's story to our attention and helping bring all the pieces together.

Looking Ahead in CQ

Here's a look at articles we're working on for upcoming issues of *CQ:*

- "Still Chasing the Invisible Wave," by RV3IZ
- "A Mobile Mount for the SG-2020," by AD5X
- "Morse Code the Old Way," by WA8SME
- "HF Meteor Scatter," by VE3ACK

Do you have a ham radio story to tell? See our writers' guidelines on the CQ website at <http://www.cq-amateur-radio.com/guide.html>

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SS-30	25	30	3¼ x 7 x 9⅝	5.0

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SRM-30	25	30	3½ x 19 x 9⅝	7.0

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅜	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅜	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 9⅜	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

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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

how it works

BY DAVE INGRAM,* K4TWJ

A Behind-the-Dial Look at Receivers

Modern receivers are amazing examples of electronic technology. They pull signals out of thin air, minimize noise pickup, filter out interference, and give us the ability to communicate over very long distances. What is inside the cabinet of these receivers or transceivers and what features or circuit designs help them to work so effectively? That is the topic of this month's column, and it promises to be a most enlightening discussion you surely will find useful for many years hence. I also welcome your input on related areas you would like to see further explained or clarified along the way. Let's start when radio was young and work our way forward from that point.

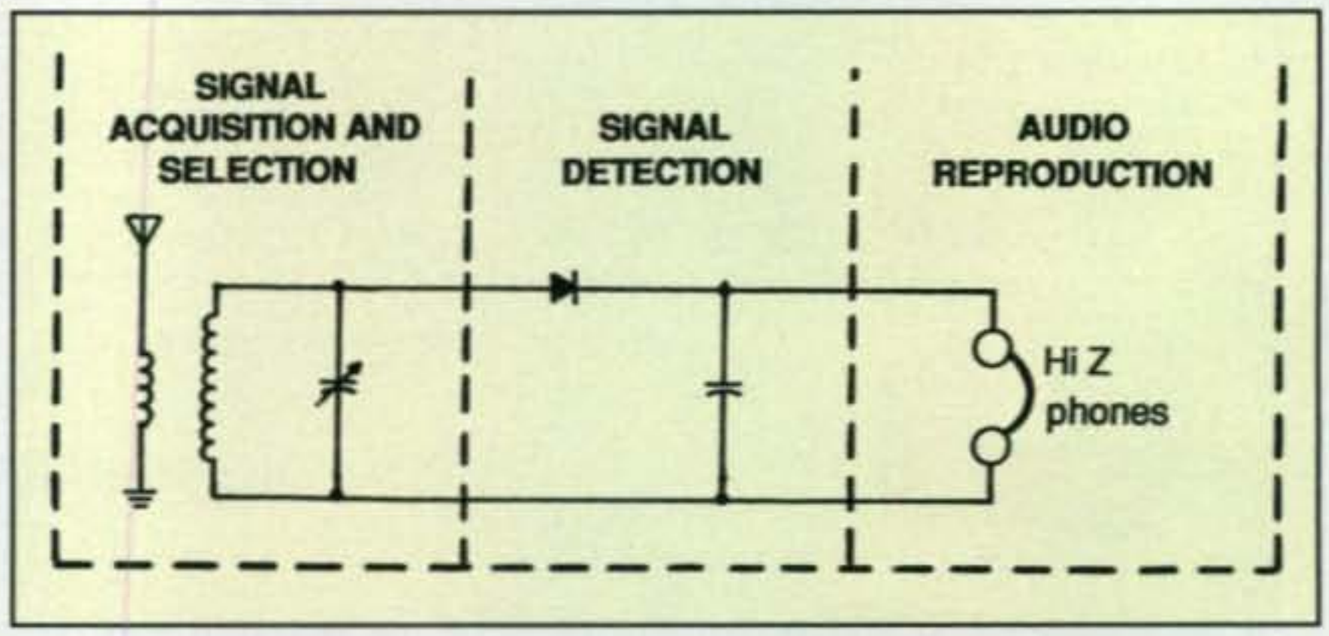

Fig. 1– Although shy in signal amplification abilities, the classic crystal set still serves as a viable example of the basic requirements for reception of radio signals. It performs signal interception and selection, detection, and reproduction of the transmitted intelligence.

Early Receivers

The first type of equipment used for wireless communication was a spark-gap transmitter and a simple crystal-set receiver. One of the most notable examples of spark-gap rig use is linked to the sinking of the *Titanic* in 1912. Radio operators throughout the eastern U.S. copied the big ship's famed S.O.S. on their homebrew crystal-set receivers—a remarkable feat, and one which also ushered in what we know today as the era of radio communications.

Signals from a spark-gap transmitter produced damped waves which, similar to lightning, covered a rather large part of the LF and HF spectrum. As a result, operation of spark transmitters is now prohibited (super QRM generators they are indeed!). Crystal sets, however, are still popular homebrew items among electronic enthusiasts of all ages. That is one reason why annually I strive to feature the little gems in our "World of Ideas" column. Studying crystal-set circuitry is also great for visualizing the basic requirements for receiving radio signals. Fig. 1 illustrates that fact. The crystal set's antenna, ground, and input tuned circuit perform signal acquisition and selection; the crystal or diode and RF bypass capacitor performs signal detection; and the earphone performs audio reproduction. A crystal set does not have an RF amplifier section, but its tuned circuit's resonant rise at a selected frequency helps here by boosting one signal more than others.

Crystal sets sort of faded into the shadows of time after Flemming and DeForest invented the diode and triode electron valves, or vacuum tubes as they are affectionately called in the U.S. (our British friends still call them valves). Soon thereafter, Major H. C. Armstrong developed the classic regenerative detector-type receiver, such as that illustrated in fig. 2. In many ways this receiver resembles a glorified crystal set and represents the next step up in technology. Signal reception is again accomplished by the input tuned circuit with the valve's—err . . . *tube's*—grid circuit performing diode detection while its plate circuit performs amplification. The (tube's) output signal is also fed back to the input circuit, increasing receiver gain or sensitivity. Setting the regeneration control on the threshold of feedback causes the circuit to oscillate when receiving a signal, and the resultant beat note permits copy of CW (or SSB) signals. Regenerative-type receivers were quite popular for several years (and still are today). They are quite sensitive and they also make neat, easy-brew fun projects, but they lack the high selectivity often desired for single signal reception on today's busy bands.

Following several varieties of "regens," tuned RF receivers such as the one shown "block-diagram style" in fig. 3 moved into the limelight. The theory supporting this concept was also understandable. Every RF stage helps improve a receiver's sensitivity, and every tuned circuit used in those stages helped to improve its selectivity. Multiple RF stages thus offered double rewards. The drawback was obtaining too much gain and getting the stages tuned without oscillating—a rather tedious process. Then a revolutionary new idea of heterodyning and frequency converting—a concept known as the *superheterodyne receiver*—came on the scene.

Evolution of the Superhet

The vast majority of receivers utilized in radio communications today employ some form of RF ampli-

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

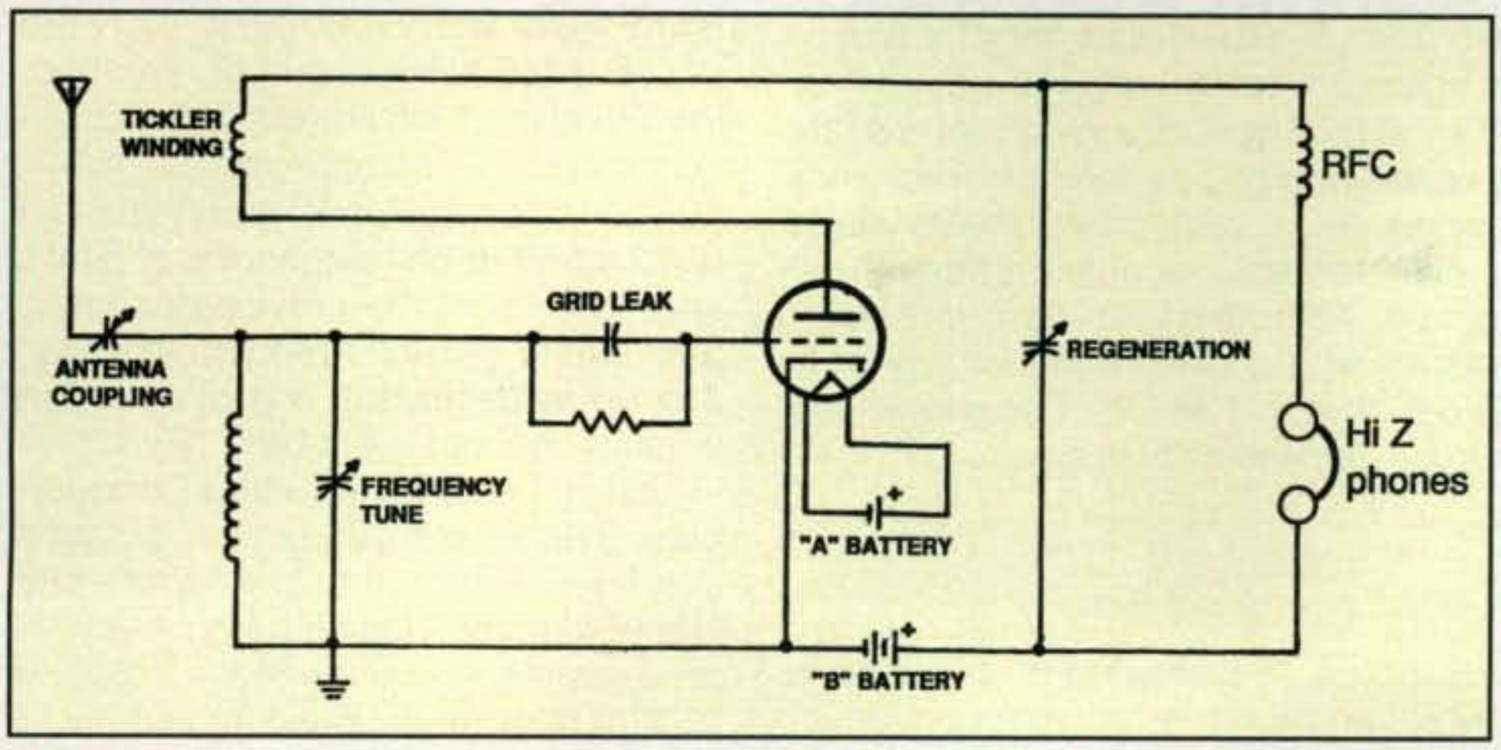


Fig. 2– The regenerative receiver gained widespread popularity after vacuum tubes came on the scene, and this design by Major H. C. Armstrong was one of the most popular for several years. It was (and still is!) capable of receiving weak signals from thousands of miles away.

fication, a local oscillator and mixer, plus two or more stages of IF amplification prior to detection—the superheterodyne concept. The basic form of "superhet" is called single conversion, as illustrated in fig. 4. Here signals arriving at the antenna are boosted in level by the RF amplifier and applied as one of two inputs to the mixer. A second (beat frequency) signal is generated by the local oscillator and applied as a second input to the mixer to yield a resultant IF signal at a set frequency. This change of frequencies is why the receiver is called *single conversion*. If the frequencies were changed two times, it would be double conversion. If the frequencies were changed three times, it would be triple conversion. The IF signal plus a BFO signal a couple of hundred Hertz above or below it are then mixed in the product detector, converting a CW or SSB signal to an audio signal that is then amplified and applied to the speaker. Fancy frills such as filters, AGC loops, a noise blanker, etc., were omitted from our description for simplicity. Otherwise, it is similar to a modern radio. Now let's add some typical operating frequencies to fig. 4 for clarity.

Assuming 40-meter reception, bandpass filters "before" and/or "after" the RF amplifier ensure signals in the approximate range of 7.0 to 7.3 MHz are boosted and directed to the mixer. The local oscillator then tunes 7.455 to 7.755 MHz and the mixer outputs the sum, difference, and the two original frequencies (plus an image frequency we will discuss later). Assuming the receiver is tuned to 7.100 MHz, those four frequencies will be 14.655, .455, 7.100, and 7.555 MHz plus the image frequency of 8.010 MHz. The IF's input and output circuits are tuned to 455 kHz (approximately) and the product detector's output is approximately 300 to 3000 Hz, depending on IF-stage bandwidth. The resultant audio signal is then amplified, possibly DSP (digital signal processing) enhanced, and then applied to the speaker for us to hear.

The ever-continuing quest for greater selectivity or "single signal reception"

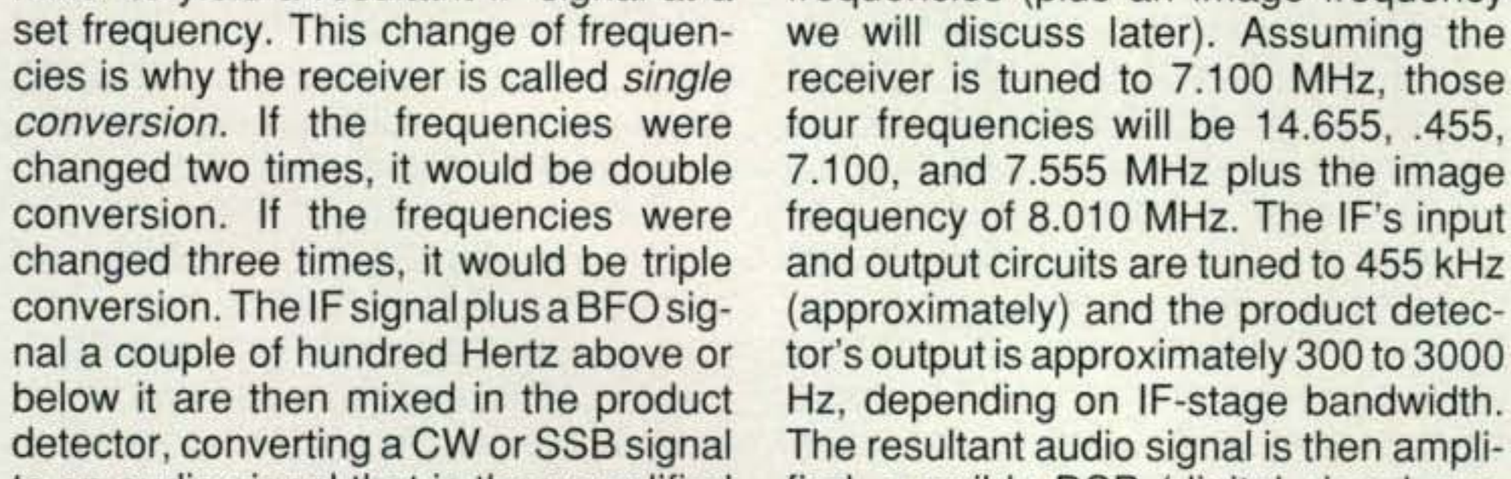
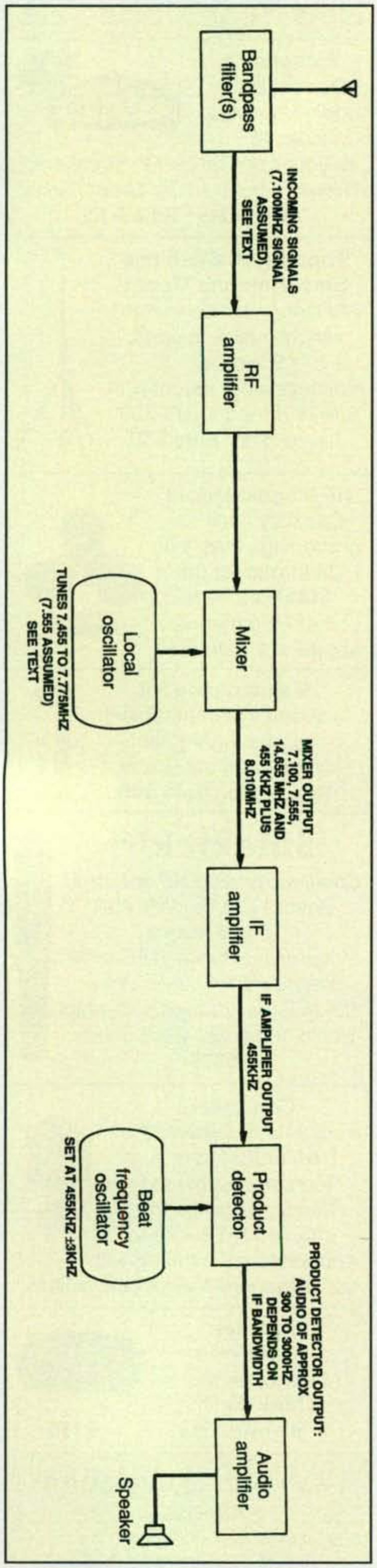


Fig. 3– Block diagram of the tuned RF receiver, a forerunner of today's superheterodyne receivers. Several independently tuned RF amplifier stages preceded the detector, which was followed by one or more audio amplifier stages. The design was cumbersome, but proved the benefits of multiple tuned circuits for improving selectivity.



← *Fig. 4– Block diagram of a typical single-conversion receiver with an IF of 455 kHz. Here incoming signals are preselected by approximate frequency range, RF-amplified, and mixed with a local oscillator signal to produce an IF signal. That signal, in turn, is heterodyned with a beat-oscillator signal to produce audio which is amplified and applied to a speaker.*

prompted development of double, triple, and even quadruple conversion concepts, plus crystal and mechanical filters as used in modern receivers and transceivers.

Let's look at each of these designs, beginning with double conversion and using fig. 5 as an example. Here, incoming signals are filtered according to a desired band or frequency range and preamplified or direct-fed to the first mixer according to the operator's activation of a front-panel button. Simultaneously, a frequency-selecting local-oscillator signal, which you set with the main tuning knob (and which is removed from the incoming frequency by the amount/frequency of the first IF), is also directed to the mixer. The mixer's sum, difference, image, and two original frequencies are then output and narrowed down to one signal by the first IF's tuned circuits and filter(s), amplified, and passed to the second mixer. A set-frequency or heterodyne-oscillator signal is also fed to the second mixer, resulting in a lower frequency second IF, or double conversion (so named because the original received frequency has been converted twice in frequency). The second mixer's output is then narrowed and shaped to pass a CW, SSB, or AM signal according to its crystal or mechanical filter's width, amplified, and passed to the product detector. A beat frequency is also fed to the product detector, producing an audio output signal which is then amplified and applied to the speaker.

Once again let's add some approximate but typical operating frequencies for clarity. Let's again assume 40-meter reception, but this time with a tuned-in frequency of 7.200 MHz, a first IF of 8.00 MHz, and a second IF of 455 kHz. The RF amplifier is untuned and broadbanded, so it passes the full 7.0- to 7.3-MHz range as defined by its bandpass filter. The main tuning (which controls the local oscillator's frequency) is set to produce a signal on 15.2 MHz, so 15.2 – 7.2 = 8.0 MHz first IF. Heterodyning 8.455 MHz with 8.000 MHz then produces a 455 kHz second IF, and beating 455 kHz ±1500 Hz with 455 kHz produces audio in the approximate 300- to 3000-Hz range. Understand that we used rounded-off frequencies of 8 MHz and 455 kHz in the previous example, and while exact frequencies vary among transceivers, the overall conversion concept is similar.

Earlier I mentioned image frequencies. These are defined as potential interference spots that are two times the first IF plus the incoming frequency. As an example, 2 × 8.0 = 16 + 7.200, or 23.200 MHz. If you are listening on 7.2 MHz and a nearby station is transmitting on 23.2 MHz, your receiver can be "blocked" or desensed by image reception. The second IF is isolated from the RF input, incidentally, so a potential image on (910 kHz + 7.200 MHz) 8.110 MHz is not a significant problem.

As the number of stations and services using our HF spectrum increased, the need for higher selectivity and image rejection also increased. Triple and quadruple conversion plus up conversion and DSP address these needs. The operational concept of triple conversion is similar to double conversion except an additional oscillator, mixer, and IF section (operating at a different set of frequencies) are added "in front of" the first mixer and IF section. Assuming up conversion and again using approximate or "rounded off" frequencies for discussion, the added local oscillator would tune 70.550 to 100.00 MHz to mix with 550 kHz to 30 MHz and produce a first IF of 70 MHz. Image frequencies would then be between 140.5 and 170 MHz, and "front end" HF bandpass filters would reject frequencies about 30 MHz to eliminate images. Ceramic filters included in the 70-MHz IF plus multipole crystal or mechanical filters in the (again approximate) 8-MHz and 455-kHz IFs would further enhance selectivity.

Quadruple conversion works in basically the same way except a fourth oscillator, mixer, and IF section are added between the 455-kHz IF and the product detector. The added section functions at a quite low Intermediate frequency, usually between 30 and 40 kHz. Most IF-level DSP systems work at this level. Their performance is usually better than audio level or external DSP, but not as good as second or third IF-level DSP. That is because it is difficult to correct overload and blocking from strong signals that have already "blown past" IF filters and acted on a receiver's AGC (automatic gain control) circuit.

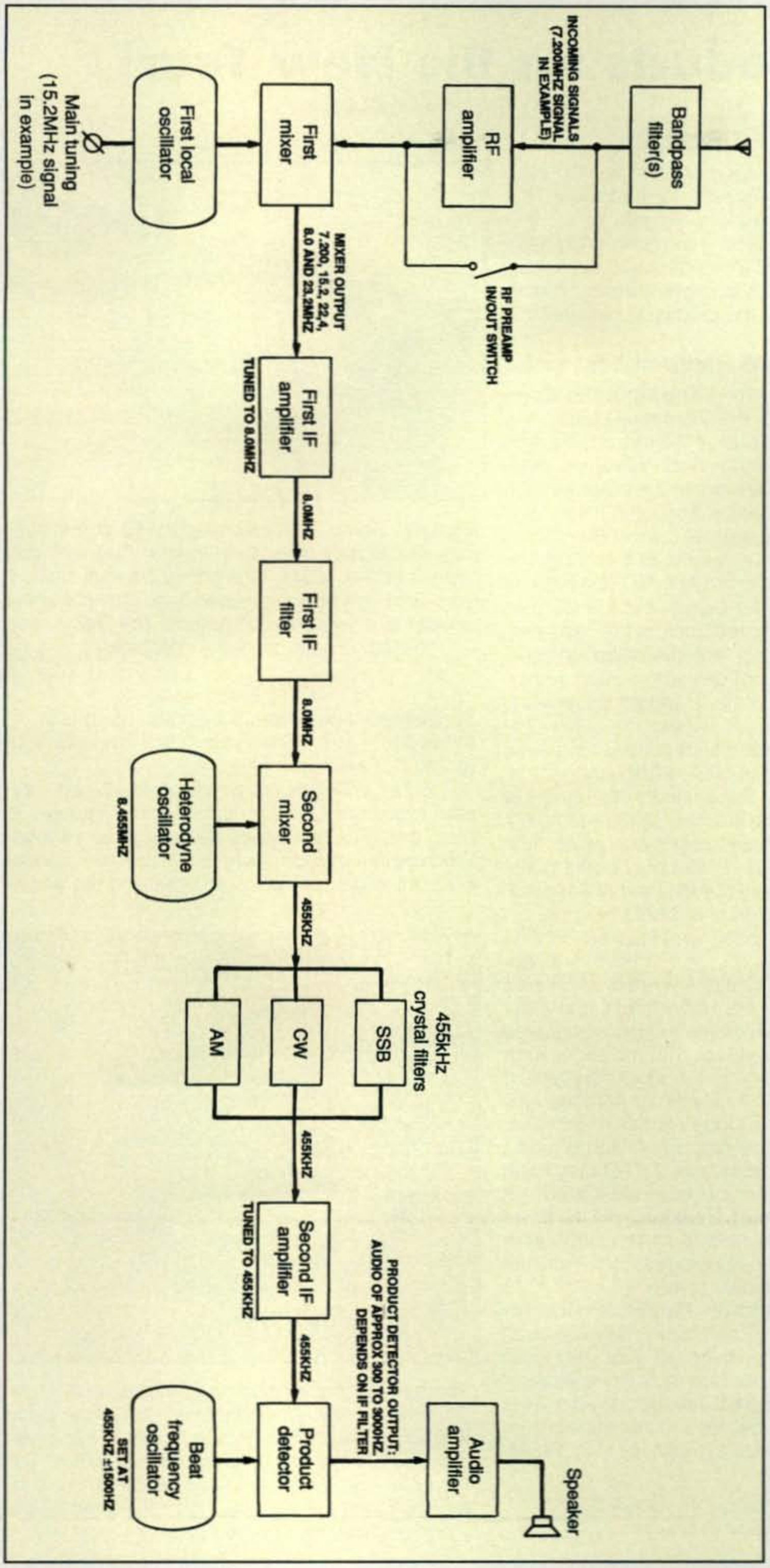


Fig. 5– Block diagram of a double-conversion receiver with panel-selectable RF amplifier for varying "front end" sensitivity plus crystal filters for enhancing selectivity. A triple-conversion receiver is similar except it has an additional LO mixer and IF amplifier "before" the first mixer. A quadruple-conversion receiver adds another LO, mixer, and IF amplifier "after" the second IF amplifier. (Discussion in text.)

Explaining how AGC loops (plus "clocked date" in IF-level DSP) work is yet another topic that must wait until another time for discussion. Right now, we have reached the closing wire and must bow out for another month. More details on several of the previously highlighted areas such as RF amplifiers, IF stages, filters, etc., will be covered in future columns. Remember that this month's column was only a familiarizing overview. Watch for the next part in this series in two months, and be sure to enjoy some good on-the-air QSOs every day.

73, Dave, K4TWJ

what's new

BY KARL T. THURBER, JR.,* W8FX

New Products for the New Year!

A very happy, prosperous, and healthy New Year to all our readers, far and wide! That having been said, let's dig right in.

This month we'll focus on some noteworthy ham-shack accessories, antennas and antenna accessories, software, books, and other items of interest to you as we enter the promising new year.

Accessories for the Radio Shack

Classy New Products from The Vibroplex Company. Over the years, the Vibroplex® name has come to represent the best of the telegraphic, and later amateur radio, industries. Vibroplex celebrated the 100th anniversary of the patent for the Original Bug, registered on August 9, 1904, with the 100th Anniversary Special Edition Bug (photo A). (See the article "Centennial of the "Bug," by Mitch Mitchell, W4OA, in the August 2004 issue of *CQ*.) The black, powder-coated base duplicates the smooth but "weathered" look of the early cast bases. This early model features distinctive gold pin striping and gold-leaf designs in each corner. The current, bright-chrome, standard upper parts are used with black finger pieces.

The unique Vibroplex serial plate is engraved with "100th Anniversary, 1904–2004" and special run serial numbers. Suggested retail price is $199.95. Also available is a new display case with its exotic hardwood base, plexiglass cover, feet holes for most keys, and Vibroplex serial plate. Optional matching serial number plates are available. Suggested retail price is $129.95.

Vibroplex also has announced the new Chrome Warrior (photo B). This deluxe version of the popular Code Warrior Jr. features a brushed chrome base with polished brass upper parts and clear paddles. The distinctive Vibroplex logo is engraved on the top of the center block with the serial number engraved on the end of the block. Suggested retail price is $139.95. Available for both the new Chrome Warrior and the Code Warrior Jr. are clear, plastic dust covers and red conversion paddles ergonomically designed to give the sending hand more support. Cords are available separately.

Contact The Vibroplex Company, 11 Midtown Park East, Mobile, AL 36606-4141 (1-800-840-8873; e-mail: <catalog@vibroplex.com>; on the web: <http://www.vibroplex.com>).

FingerDimple® Add-on Finger Device for Your Radios. Wayne Smith, K8FF, says he used a Kenwood TS-850 for over ten years and had always wanted a spinner or dimple to make rapid QSY easier. His Elecraft K2 needed one also. After searching high and low for an attachment that would suffice, he decided to make his own. He experimented with different designs, materials, dimensions, and adhesives. The FingerDimple (photo C) finally emerged.

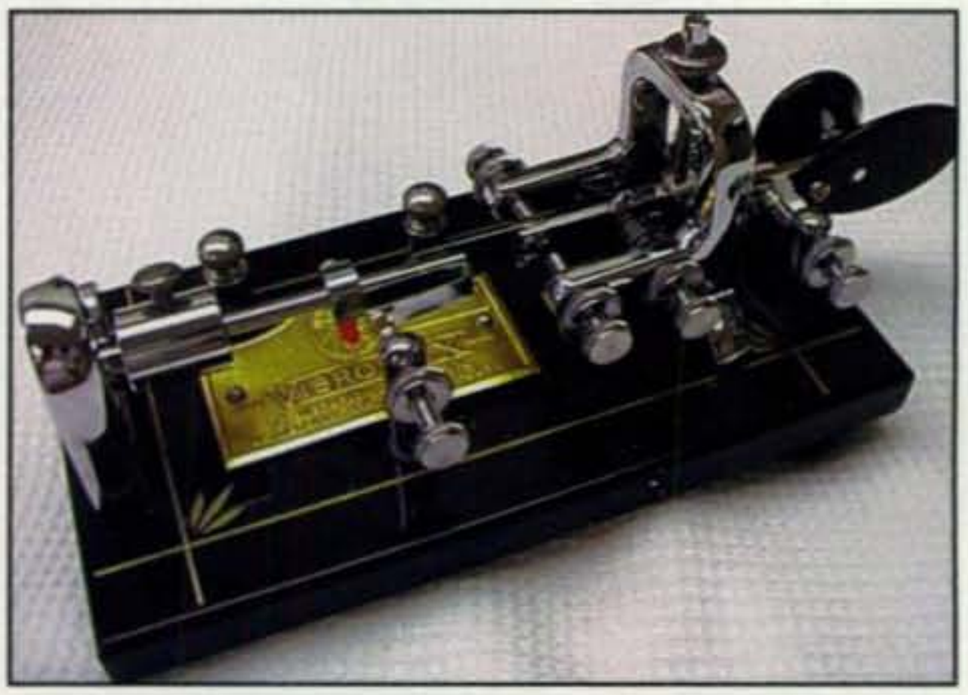


Photo A– Vibroplex® celebrated the 100th anniversary of the patent for the Original Bug with the release of the 100th Anniversary Special Edition Bug. The black powder-coated base duplicates the smooth but "weathered" look of the early cast bases. (Photo courtesy Vibroplex)

The FingerDimple is a precision-machined, self-stick attachment for your tuning knob. It comes in black and gray and blends well with factory knobs. Since its introduction, owners of Kenwood, Yaesu, Elecraft, and other radios are enjoying the added

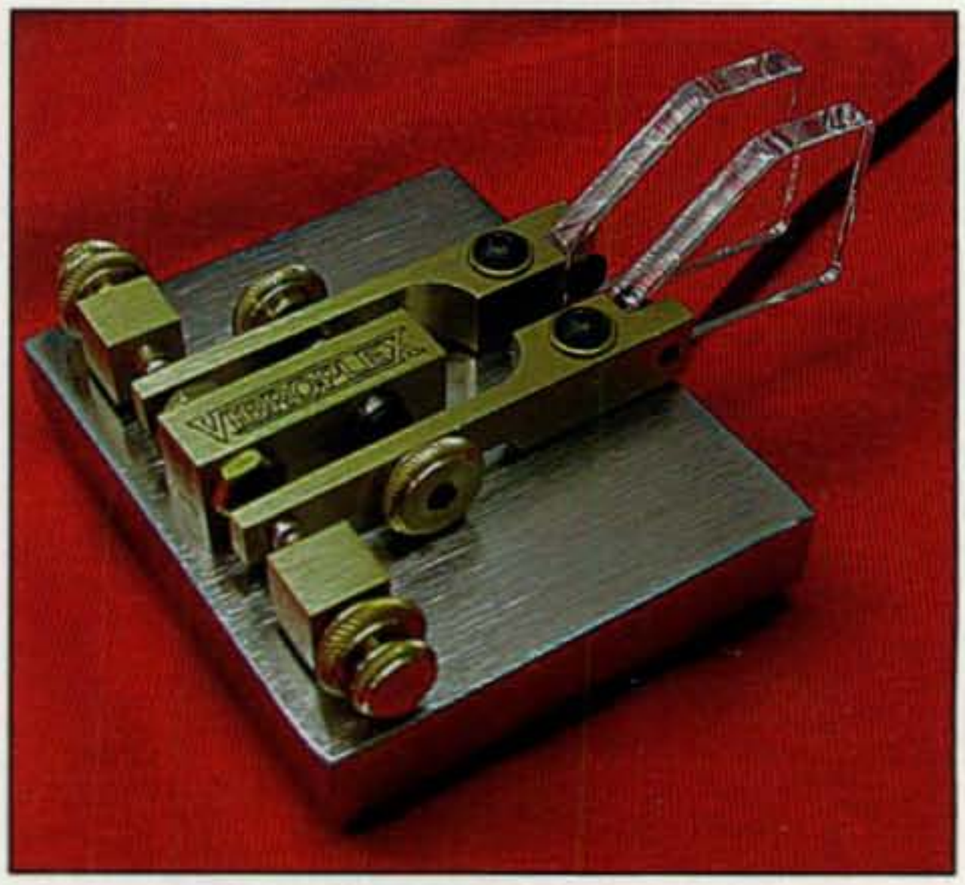


Photo B– Vibroplex also has announced the new Chrome Warrior. This deluxe version of the Code Warrior Jr. features a brushed-chrome base with polished brass upper parts and clear paddles. The Vibroplex logo is engraved on the top of the center block with the serial number engraved on the end of the block. (Photo courtesy Vibroplex)

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

Photop C– The FingerDimple® is a precision add-on finger device to make a rotary dial spin easier for a rapid QSY. The self-sticking dimples come in black and gray, and they blend well with factory knobs. Here's a Kenwood TS-850S with a gray FingerDimple installed. (Photo courtesy Wayne Smith, K8FF)

convenience of the FingerDimple. A simple addition that takes seconds to install results in added operating convenience at a very reasonable cost—$6.00 U.S. postage included, check or money order, for a pack of two postpaid. Specify your color choice: either both black or gray, or a mixed pack of one each color.

For more information, contact Wayne Smith, K8FF, at FingerDimple.com, 19121 Cascade Ct., Aurora, OH 44202 (440-439-8811; e-mail: <sales@fingerdimple.com>; on the web: <http://www.FingerDimple.com>).

Special Note: Wayne also tells us that his FingerDimple has received some excellent reviews posted to the popular eHam.net website by users. You'll find the website reviews under the "Ham Shack Accessories" category of the site's Product Reviews section. Point your browser to <http://www.eham.net>.

Antennas and Antenna Accessories

New ZM-1 Mobile Antenna Autotransformer from Martronics. *According to* Martronics proprietor Dave Martin, WA6TYJ, the Martronics ZM-1 is a new spin on an old device that's no longer available, one which he tells us was produced by Atlas Radio many years ago. The unun (sometimes also known as an "UNUN" or "UN-UN") is unlike a balun in that instead of transitioning from balanced line to unbalanced line, it transitions from unbalanced to unbalanced conditions and is referenced to ground.

The ZM-1 Mobile Antenna Autotransformer (photo D), also known as a "dual unun 50-ohm Z-match," is a device that when used with your mobile center- or base-loaded antenna from 80 to 12 meters will aid in matching your transmitter to the antenna. Dave says the probable result of using the ZM-1 will be higher efficiency than you would likely experience than when simply attaching the coaxial cable to the base of the antenna mount. The ZM-1 is installed near the antenna mount, and the flange mount is attached to a good ground on the vehicle. Installation is completed by using the supplied banana plug, attaching a wire from the antenna base to the ZM-1, and selecting the correct impedance marking on the ZM-1 for the band in use. An additional connector for straight-through connection without using the device is provided. (On 10 meters the antenna impedance is usually very close to the impedance of the transmitter, so using the ZM-1 on 10 meters is not necessary.)

It's very important to install the unit to a good ground: The ZM-1 will not work properly on a plastic car or boat without providing a good ground. The unit also provides a DC ground for your antenna, which reduces static buildup.

For more information, contact Martronics, 4820 Deer Creek Way, Paso Robles, CA 93446 (1-805-239-1932; e-mail: <Martronics@TCSN.net>; on the web: <http://martronics.org>). Check out the Martronics website, which also includes information on David's line of discone antennas and antenna accessories.

Heavy Duty Fiberglass Telescopic Poles from The Mast Company. Henry Pollock, K4TMC's The Mast Company has announced new 32 Ft. Heavy Duty Fiberglass Telescopic Poles, suitable for supporting vertical wire antennas and lightweight dipole arrays. The dark-green poles (photo E) are especially suitable for use in antenna-restricted neighborhoods where the green color will blend with background vegetation. The poles are very strong, with a heavy-duty, stiff, large-diameter ($^5/_{16}$ inch) top section.

The 32-ft. poles are constructed of ten sections with wall thickness of $^1/_{16}$ inch, collapsing to 46 inches for easy storage and transportation; the outside diameter (OD) of the base section is $1^7/_8$ inches. Other telescopic pole sizes (19 to 28 ft.) also are available, and some can be stacked to reach over 40 ft.

Introductory pricing of the 32-ft. poles is $115, shipped anywhere in the continental U.S., and including application notes. You can extend the height of the poles to 38 ft. by stacking one of the 10-ft. red poles ($15) over the top.

The company continues to offer its line of military-surplus stackable aluminum mast sections, along with new accessories that make the installation process easier. For more information, contact The Mast Company, P.O. Box 1932, Raleigh NC 27602 (e-mail: <k4tmc@aol.com>; on the web: <http://www.TMastCo.com>).

DX Engineering RR8-HD Remote Antenna Switching System. The folks at DX Engineering bill themselves as "your source for complete antennas and professional-grade antenna parts." Along this line, they recently developed the handy RR8-HD Remote Antenna Switching System (photo F), which lets users select multiple ports for stacking and phasing applications.

Photo D– The ZM-1 Mobile Antenna Autotransformer, when used with your mobile center- or base-loaded antenna from 80 to 12 meters, will aid in matching your transmitter to the antenna. See the column text for details. (Photo courtesy Martronics)

Photo E– The Mast Company offers new 32 Ft. Heavy Duty Fiberglass Telescopic Poles for supporting vertical wire antennas and lightweight dipole arrays. The poles are suitable for use in restricted neighborhoods where the green color will blend with background vegetation. (Photo courtesy The Mast Co.)

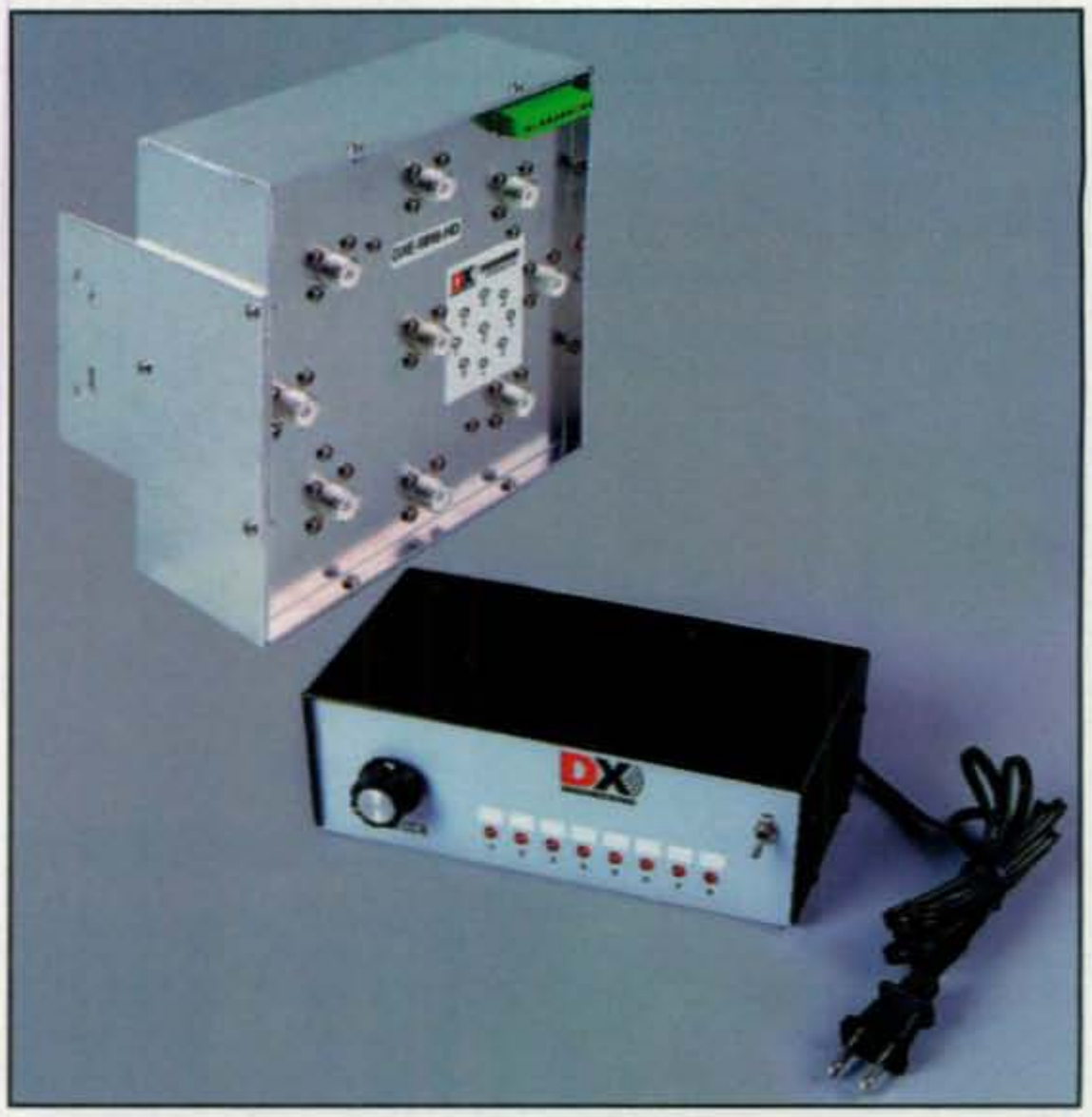


Photo F– DX Engineering's new RR8-HD Remote Antenna Switching System features a plug-in control line connector that eliminates the need to disassemble the unit on the tower. The RR8-HD also offers built-in lightning protection. See the column for more details. (Photo courtesy DX Engineering)

DX Engineering's RR8-HD features a plug-in control line connector that conveniently eliminates the need to disassemble the unit on the tower. Users can select a single port, or multiple ports for antenna stacking and phasing applications. They also can designate unused ports to be open or grounded.

The RR8-HD offers built-in lightning protection and unterminated port-to-port isolation more than 70 dB at 30 MHz, said to be significantly better than the nearest competitor. Rated at over 2 KW CCS RTTY, the unit features sealed 20-amp relays, an aluminum enclosure with stainless-steel hardware, and silver and Teflon® UHF connectors.

The RR8-HD allows the use of inexpensive control cable and includes a 12-volt control console, the CC-8. The control console includes thermal, automatically resetting fuses that never need to be replaced, adjustable LED brightness, and a solderless connector on the back panel for easy installation and portability. The CC-8 is powered by 120 or 240 VAC with outputs of 12 VDC at 1.5 amp or 24 VDC at 0.75 amp. The price is $249.95 for the pair (also available separately).

Contact DX Engineering, P.O. Box 1491, Akron, OH 44309 (telephone 1-800-777-0703; e-mail: <dxengineering@dxengineering.com>; and on the web: <http://www.dxengineering.com>).

Comet CMX-1 Remote Cross Needle PWR/VSWR Meter. NCG Company, Inc.™ specializes in the export and import of communications products and various specialty items, not only for the amateur market, but also products for land mobile and Wi-Fi use. NCG is the distributor for several Japanese-based product lines and companies, including Comet, Maldol, Daiwa, and others.

A "back by popular demand" product is the Comet CMX-1 Remote Cross Needle PWR/VSWR Meter (photo G). According to NCG Company's Mick Stwertnik, KB6JVT, the meter was available many years ago but sales were slow, so it was discontinued. Right after Comet stopped production, many HF/6-meter mobile radios were introduced. Recently, NCG began getting requests for the CMX-1, so Comet started up the production line again to meet this demand.

You can use the CMX-1 as a bench or mobile meter. An included 6-ft. cable separates the RF sensor and meter so the illuminated, color meter face can be positioned anywhere it is conveniently viewed. The cross-needle function displays forward power, reflected power, and VSWR simultaneously.

The CMX-1 display is extremely bright, and the meter can be placed within easy view, making it safe to use while mobile. The CMX-1 covers 1.8–60 MHz and has ranges of 30 watts, 300 watts, and 2 KW; input loss of less than 0.2 dB; minimum power for SWR measurement of approximately 6 watts; SO-239 coax connectors; and a lighted face. A 10-ft. optional cable extension is available, making the total cable extension almost 16 ft.

MSRP is $184.95; the units are available at all Comet antenna dealers. For more information, contact NCG Company, Inc., 1275 North Grove St., Anaheim, CA 92806-2114 (1-800-962-2611; e-mail: <sales@natcommgroup.com>; on the web: <http://www.cometantenna.com>).

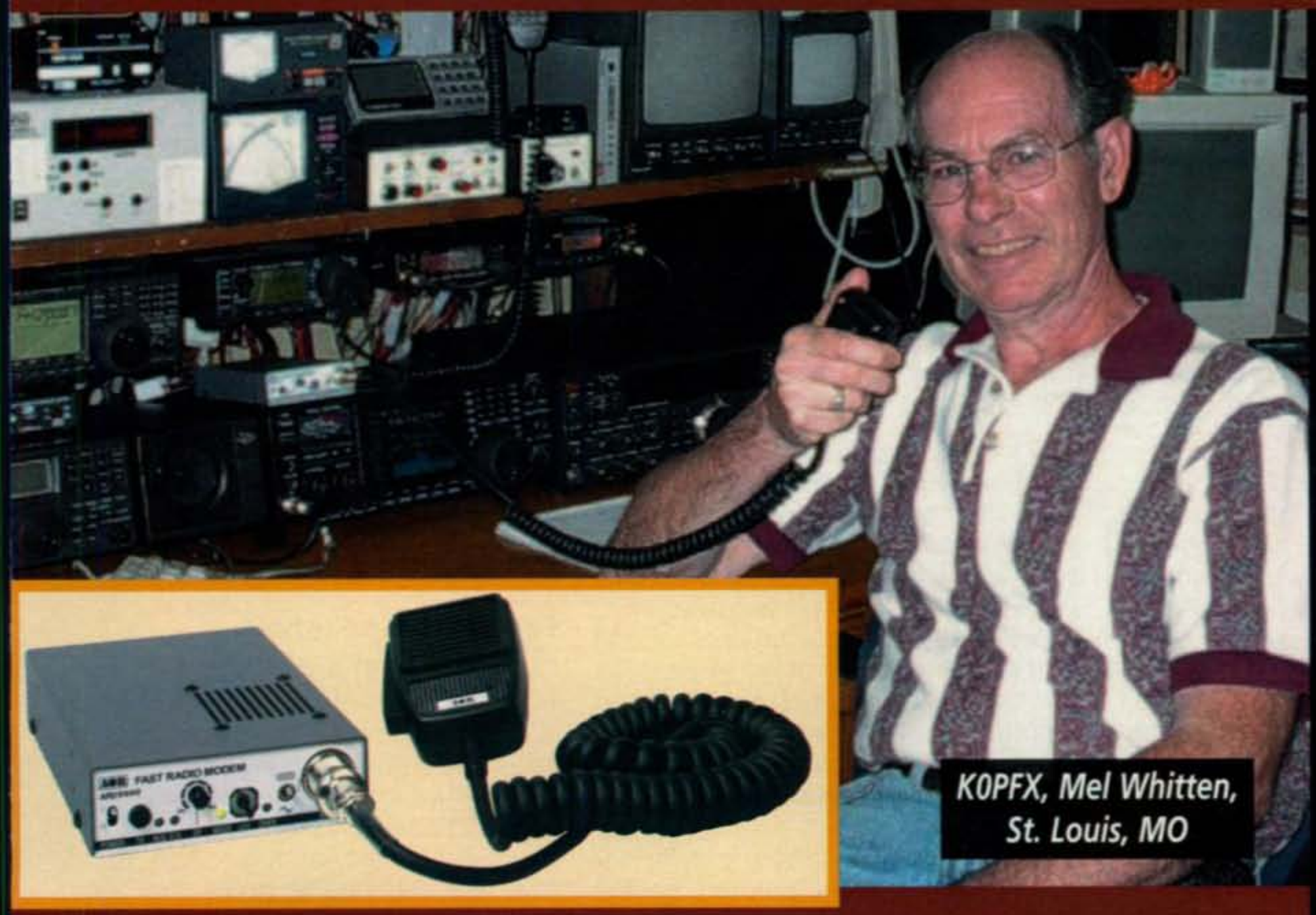
Software and Computers

New EZNEC Versions from W7EL. EZNEC 4.0 and EZNEC+ 4.0 are powerful but easy-to-use programs for modeling and analyzing nearly any kind of antenna in its actual operating environment (see fig. 1). EZNEC plots azimuth and elevation patterns; tells you gain, feedpoint impedance, SWR, and current distribution; finds and reports beamwidth, 3-dB pattern points, F/B ratio, takeoff angle, and sidelobe characteristics; and more.

All information, including patterns, can be displayed on screen or printed. Also, EZNEC is user-friendly, with its menu structure, spreadsheet-like entry, and many shortcut features. You describe the antenna as a group of straight conductors, choosing the orientation, length, and diameter. You add sources at the feedpoints and, if desired, transmission lines, a realistic ground, and loads to simulate loading coils, traps, or similar components. Using this description method, you can quickly analyze Yagis, quads, phased arrays, towers, loops—nearly any type of antenna or parasitic structure.

EZNEC features an innovative 3-D pattern display that

"Thanks AOR! The ARD9800 put the *FUN* back into Amateur Radio!"



K0PFX, Mel Whitten, St. Louis, MO

The AOR ARD9800 could be the biggest revolution in HF radio since SSB!

The audio quality is something you have to hear to believe. Amazing doesn't seem strong enough to describe it.

With an **ARD9800**, any ham can convert an existing analog transceiver to work digital voice & image in one easy step! No transceiver modifications are necessary. The unit automatically detects the digital signal and decodes it, so you also maintain analog capabilities. Whether a contact comes in as digital or analog, the **ARD9800** can handle it.

"The performance is unlike anything I've heard in ham radio – it really sounds like a local telephone call."
– QST Review, February 2004

"On a solid link, this audio is just as rich and full-bodied as anything coming out of an AM or FM transmitter, with absolutely no noise."
– CQ Review, June 2004

Try it for yourself!

You'll be amazed at what a breakthrough in communications technology this is. And you'll find yourself having a lot of fun working ham radio digital mode.

- **No transceiver modifications necessary**
- **Digital voice communications using existing analog 2 way radios.**
- **Works on Single Side Band (SSB) mode.**
- **Automatic digital receive**
- **Optional interface cables for most popular transceivers**
- **Digital Slow Scan TV***
- **Built-in high grade Vocoder (AMBE)**
- **Built-in FEC error correction**
- **Small and compact unit. Easy to operate.**
- **Utilizes a uniquely designed high performance DSP engine**
- **Uses the established G4GUO open protocol**

Be sure to check the website at www.aorusa.com for FAQs, links to user groups and more!

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Authority On Radio

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Tel: 310-787-8615 Fax: 310-787-8619
info@aorusa.com http://www.aorusa.com

**requires optional memory module.*
Specifications subject to change without notice or obligation.

"Special Purchase Discounts Available for Ham Radio Clubs!"

Photo G– The Comet CMX-1 Remote Cross Needle PWR/VSWR Meter, offered by NCG Company, can be used as a bench or mobile meter. The display is extremely bright, and the unit can be placed within easy view, making it safe to use while operating mobile. (Photo courtesy NCG Company)

allows you to highlight any azimuth or elevation "slice" and directly read the gain at any angle with a fully positionable cursor, or immediately switch to a 2-D display for more detail. It is easy to use, while taking full advantage of the powerful, versatile NEC-2 calculating engine. EZNEC is menu driven; all entries and changes are done directly and quickly. Wire, source, load, transmission-line, and ground entries are done in a spreadsheet-like format. Many shortcuts are built in, and other features are included—too many to describe here.

EZNEC+ is for the advanced experimenter. It has the same friendly interface as EZNEC, and four additional features: (1) 1500 segments vs. 500 for the standard program, allowing very complex antennas to be analyzed; (2) circular-polarization far-field analysis in addition to the linear-polarization capability of the standard program; (3) double-precision calculating engine in addition to the standard mixed-precision engine; and (4) easy importation of wire coordinates (GW lines) from NEC-format files.

Both programs are available by direct web download, or they may be ordered on CD-ROM, either on the web or by mail; check the website for pricing and delivery options. Contact Roy Lewallen, W7EL, P.O. Box 6658, Beaverton, OR 97007 (503-646-2885; e-mail: <w7el@eznec.com>; on the web: <http://www.eznec.com>). The website offers a free EZNEC 4.0 demo version; check it out!

New Awards Tracking Software from N4YB. James L. Gatlin, N4YB, developed an ambitious awards tracking software package for the popular Japanese Century Cities (JCC) and Japanese Century Guns (JCG) awards. The new program, dubbed "Awards JCC, JCG" allows radio amateurs to keep track of their contacts towards the Japan Amateur Radio League (JARL) sponsored JCC and JCG awards. The program is written in Visual Basic and works quite well in keeping database records of the contacts for these two awards.

You're able to view and print reports on the various levels of the awards, as well as keep a total check of worked and confirmed contacts (at this time, the program does not provide for endorsements). Bands covered are the HF bands plus 6 meters.

James says that, if there is sufficient interest in making the program handle all the various forms of these awards, he will modify the program later to include the areas of interest. When such changes and other program updates are made, they will be sent to registered owners at no cost if their registration date is less than a year old, and at only a small charge for others.

The program cost is U.S. $10.00 plus shipping ($3 inside the U.S. and $4 elsewhere), payment by check or money order, with update policy as noted above. James says the program will be sent on CD packed in a case, sent by regular mail unless there is a special request for other shipping methods. He asks you to include your e-mail address (to receive program updates) and callsign (which is used within the program).

James expects that he will offer software for other awards in the future. For more information, contact James L. Gatlin, N4YB, 10700 U.S. Hwy. 301 South, Benson, NC 27504 (919-894-3484; e-mail: <n4yb@earthlink.net>).

From the Bookshelf

Classic WB5IIR Antenna Book Newly Reprinted. The late John M. Haerle, WB5IIR, was highly respected for his straightforward, on-the-mark approach to antennas for the amateur radio community. Especially popular was his no-nonsense antenna book, *The Easy Way: HF Antenna Systems,* first published in 1984. Now, Worldradio Books has reprinted John's timeless book as a second edition.

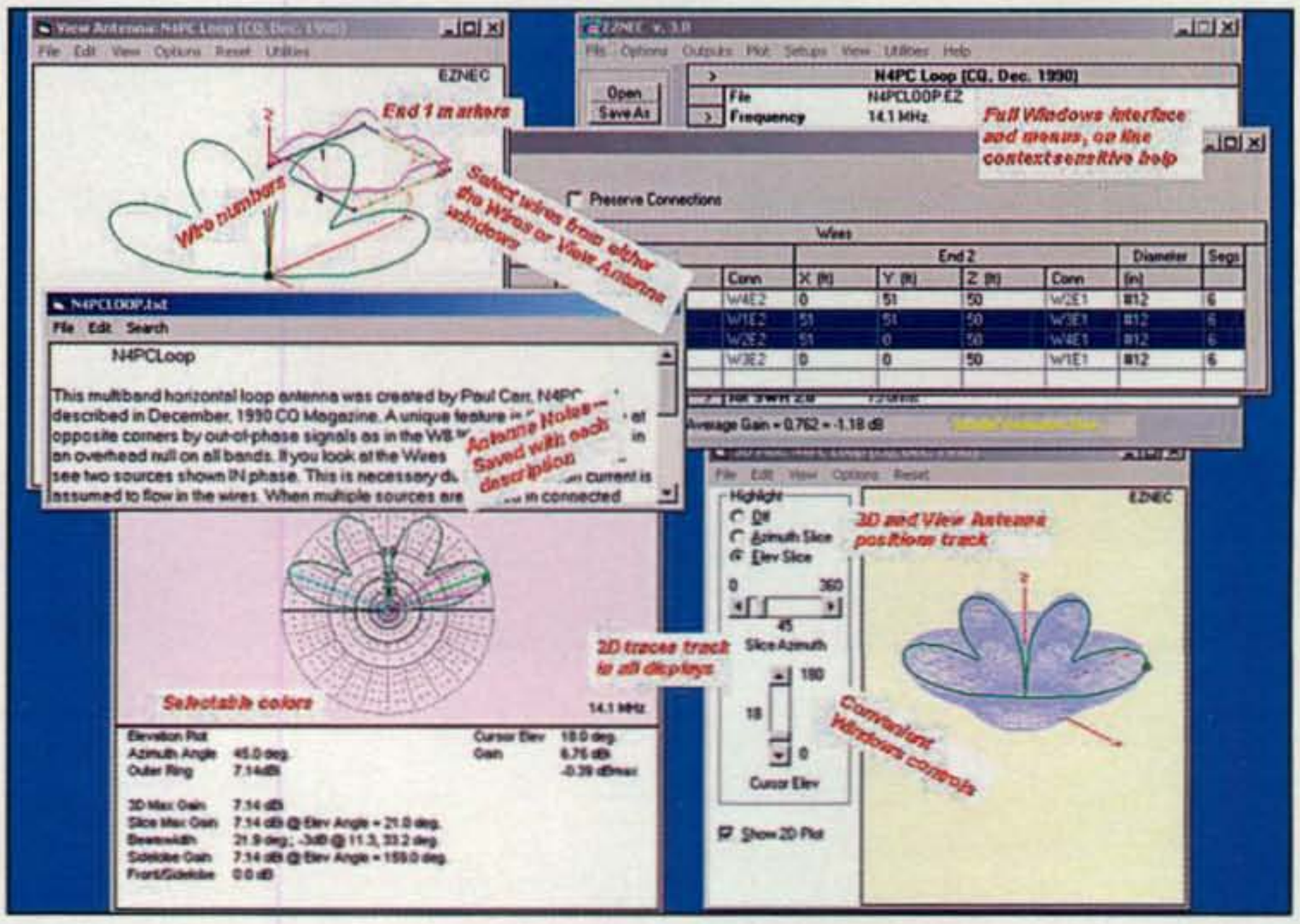

Fig. 1– EZNEC 4.0 and EZNEC+ 4.0 are full-featured, 32-bit Windows® applications—powerful but very easy-to-use programs for modeling and analyzing nearly any kind of antenna. The two programs are similar, with EZNEC+4.0 offering added features. See the column for details. (Graphic from the W7EL website)

The 96-page, large-format HF antenna compendium is said to be a learning experience in itself, covering as it does a wide variety of HF antenna topics. Major book sections include those on antenna fundamentals; basic antennas (such as the dipole, Zepp, G5RV, Windom, and coaxial dipole); some "special" antennas (slopers, DDRRs, Beverages, and folded unipoles); various beam antennas (including the W8JK, Yagi, and two-element quad); and even specialized antennas and preamps for 160 meters.

The WB5IIR book is priced at $12 plus $2 s/h. For more information, contact Worldradio Books, P.O. Box 189490, Sacramento, CA 95818 (916-457-3655; <http://www.wr6wr.com>).

NRC Antenna Reference Manual Volume 3. Your column editor frequently is surprised by the number of licensed radio amateurs (including myself) who also are listeners to DX mediumwave (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 online catalog of MW-related publications at <http://www.nrcdxas.org>.

One of NRC's premier publications is the *Antenna Reference Manual Volume 3,* a comprehensive book about MW receiving antennas, coordinated and edited by Wayne Heinen, NØPOH. Volume 3 contains articles on experiments and test results conducted by members over the past five years. A variety of well-designed whip, loop, and longwire receiving antennas are described in the book.

According to NRC Promotions Director John Bowker, WA2WEN, the 123-page, large-format volume should be of special interest to apartment dwellers needing relief from electrical noise, while being restrained by rental covenants. They should find the book of considerable help in their quest for hearing the more distant stations without disturbing the landlord or their neighbors. The well-organized *Antenna Reference Manual Volume 3* is written in a tone designed to hold one's attention. The volume is $16.95 postpaid in the U.S. to nonmembers.

NRC also has announced *The AM Radio Log, 25th edition,* for the 2004–2005 DX season. This annual edition, edited by Wayne Heinen, WØPOH, and Joan Heinen, KBØYRX, contains 294 pages in an 8$^{1}/_{2}$" × 11", three-hole punched, looseleaf format. It has over 5200 detailed AM radio station listings for the U.S. and Canada, with cross-references by city/state and by call letter. The new book's cost is $25.95 postpaid in the U.S. to nonmembers.

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

Wrap-Up

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

Overheard: Are you a "thinker" or a "doer"? Guess you can be both. Just remember that thought is a guide to action, but not a substitute for it.

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.*

vhf plus

BY JOE LYNCH,* N6CL

Record-Setting Aurora

Those faithful VHF+ operators who happened to be on the air on Sunday afternoon November 7th were treated to aurora on both 6 and 2 meters. What follows are reports gleaned from the W6YX VHF reflector, the *ARRL Letter,* and reports sent directly to me.

Paul Kelley, N1BUG, reported the following via the VHF Reflector:

What can I say except—Wow! Nothing gets me fired up like a good aurora!

My radio aurora report is below, and it's nothing special. But I got my excitement from watching the space weather data. This was one severe geomagnetic storm!

Solar wind shocks arrived at ACE near 7 Nov 0220 UT and 7 Nov 1020 UT, but did not spark a strong geomagnetic disturbance. Magnetic fields within these disturbances were fairly weak and mostly oriented northward. Around 1800 UT a much more impressive shock arrived. Following this one the magnetic field became very strong, exceeding 60 nT at times. Strong geomagnetic storming commenced after 2000 UT, and became very severe several hours later when Bz went very strongly southward. For many hours it ranged between –40 and –50 nT, at times peaking even more. This was truly a rare storm.

Yet another disturbance arrived shortly after 0400 UT November 8, this one with weaker magnetic component. This produced something this observer has never seen before: Instead of throwing the IMF vectors into a frenzy (as often happens in the initial hours after a shock passage), the Bz remained stable and southward, only less strongly so.

Radio aurora was "OK" to good during much of the 2030Z to 0700Z period. The aurora was still going strong when I went to bed, but I just couldn't keep going any longer. Once again I believe I may have been a bit too far north to take full advantage of it. I say this for several reasons. I was not hearing or working anything like what those a bit farther south were. Signals were generally on the weak side and at times completely disappeared. When the far southern stations reported they had lost the aurora, it got better here. And when the IMF Bz component finally eased up a bit (became less southward), the aurora intensified greatly for me.

This was not an event for long-distance contacts from my central Maine/FN55 location. I struggled to work stations at 900 miles in this one! Only once did I hear the "EN34 beacon," Terry, WØVB, and that was the most distant station heard during the entire event. But I did have fun, concentrating on 222 and therefore missing a lot of potential contacts on 144. A 144 MHz contact with KØSM, FN13ed is worthy of note. Andy reports running a true QRP setup, but I wouldn't have known if he didn't tell me! His signal was remarkably strong for his working conditions. This occurred well after the last shock arrival when the aurora was retreating somewhat northward—and this is when signals were best at my location.

The next day Paul reported the following:

This event was perfect timing for me. The arrival of a strong shock in the afternoon hours followed by southward Bz just in time for the natural late afternoon peak for auroral backscatter. Aurora came up fast, and suddenly 2 meters filled with strong buzz signals. Worked as far south as EM66.

Then WB2SIH asked me to QSY to 222 at the perfect time! TNX! Worked him, then K8WW EN81, then VE1MR (on SSB!), then K4AL EM66 (new state!!! and, I think, my best 222 aurora DX yet, at 1110 miles!). Wow, what fun!

I alternated back and forth between 2 and 222 for a while, working a few more on each band. W8GG EM88 on 2 meters was a nice one; from my perspective that's a rare grid (it may even be a new one for me, but I'd have to check).

It was to be short lived, however. Bz went very strongly northward around 2030Z, and by 2130 the aurora was pretty much gone.

VHF Plus Calendar

Jan. 2	Moderate EME conditions.
Jan. 3	Last Quarter Moon.
Jan. 4	*Quadrantids* Meteor Shower Peak.
Jan. 9	Very poor EME conditions.
Jan. 10	New Moon.
Jan. 10	Moon Perigee.
Jan. 16	Moderate EME conditions.
Jan. 17	First Quarter Moon.
Jan. 22–24	ARRL VHF Sweepstakes contest. See text for details.
Jan. 23	Moon Apogee. Poor EME conditions.
Jan. 25	Full Moon.
Jan. 30	Moderate EME conditions.

—EME conditions courtesy W5LUU.

The following is from **Dana Shtun, VE3DSS**, as it appears in his "Six Metres and Down" column in the January/February 2005 issue of *The Canadian Amateur* magazine:

Well, the bands sprung open on aurora on Sunday afternoon November 7, staying open until the wee hours of the morning, and opened again on aurora on November 9 and 10! Your editor got on and had a ton of fun working 144 MHz aurora, as did numerous other Canadians from coast to coast!

50 MHz: During the auroral openings of November 7–9, the guys at the lower latitudes were having much fun, with Hawaii being worked from Florida, and numerous contacts into LU, CX, OA, FY from KH6 stations. In Europe there were reports of strong N/S propagation with 5B4FL working into ST2 and elsewhere in Africa. So as you can see, even without the solar max, disturbances can stimulate HF-like propagation at 50 MHz via TE and *E*-skip propagation. So there really is no time when 6 meters is really truly "dead"!

144 MHz: November 7 brought a huge auroral opening, and many Canadians got in on the action on 144 MHz. Checking the band at 2225 UTC found strong auroral signals from the east coast with N7BV/1 pounding in at 20 over S9 in Toronto on 50 MHz; quick QSOs with K3KYR (FN24) and VE2XK (FN07); and we QSYed to 144 MHz and found WØVB Terry in Minnesota pounding in with his usual 60 over S9 signal! This was followed by K9EA EN71, NJØU (EN71), WO4Y (EM66), K4XR (EM64) in Alabama!

Then through the QRM came a call from a K5! A quick QRZ and K5SW Sam in Oklahoma (EM25) was calling with a 55A report at 0015 UTC. That QSO was the longest for me that night and the farthest south at 1600 km. The

e-mail: <n6cl@sbcglobal.net>

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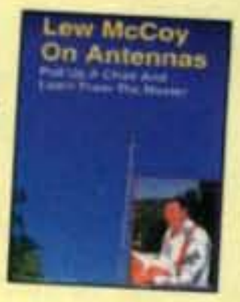

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next contact was with WO4Y in Tennessee (EM66), then N8OB (EM63), KN4SM (FM16), N9XG (EN60), KØKP (EN36) in Iowa, KØCJ (EN34), VE3CVG (FN25), N9IW (EN65), K8PT (EN66), and K8GUN FM09 at 0249 UTC. Then the aurora started to fade, as did your editor, so I called it a night.

November 10 brought more aurora, with N9XG (EN60) pounding in at 59A, W8AAX (EN72), N8IR (EN71), KAØPQW (EN33), WØI? (EN59), W9ZIH (EN51), KØPB (EM39), K8OM (EN42), and KØDAS (EN42), who was the last contact of the evening at 0301 UTC. The following morning the aurora was still going, and VE3SPW Peter in FN04 was worked, along with KØAWU (EN 37) at 1214 UTC and KØKP in EN36 at 1220 UTC. Signals were still in and out during the morning, but alas I had to head off to the office. I spent considerable time looking for W1IPL/7 in Wyoming...but no luck this time.

The auroral openings continued on November 11, after another X-class flare was observed late on the 10th. VE2XK reported K1SIX in FN43 pounding into FN07 around 0155 UTC on the 12th. If you have never heard an aurora signal you haven't lived!

Art Seto, KH6SX, reports on his website (http://home.hawaii.rr.com/kh6sx/) that on November 8 he completed the first known aurora QSOs in Hawaii with the following stations on 6 meters via AU/AU, AU/AU-E: K7JA, W6YM, WA6KLK, JA2DDN, KE7V, JI1UHZ, JL1IHE, KG6I, JR9OPJ, K7CW, KE7V, N7EPD, JG3LEB, JE4WOK, KL7FZ, W7EW, and K7AD.

Sam Whitley, K5SW, reported the following on 2 meters: "At 2340 UTC it happened for me. First signal was W1IPL/7, WY, DN62. By 2344 UTC I had worked K2TXB, FM29, NJ. I proceeded to work EN12 in IA, VE3DSS, FN03, ONT, EN33, and EN34 in MN, EN53 in WI, plus a lot of closer-in grids. If the UT and ID stations that showed up later in opening had been there by 0000 UTC on 11/8 I feel I could have worked them. The AU had already pulled back north and I had no chance for them. The last signal was heard about 0330 UTC."

The following is from **Tad Cook, K7RA**, via the *ARRL Letter:*

Chip Margelli, K7JA, sent an interesting note concerning HF conditions at the end of the ARRL November Sweepstakes (CW) last weekend followed by a lot of excitement on 6 meters. He said that some signals on 15 meters had a distinct auroral flutter, but others were completely flutter-free and quite loud. About 50 percent of the stations east of his southern California location had an auroral characteristic. Here's the rest of his account:

"About 0545 UTC November 8 (late Sunday night in California), KH6SX reported on the 50 MHz Propagation Logger that he was hearing the K6FV beacon on 6 meters. I quickly rotated my beam in his direction, and with one call I had him in the log. His signal was full of rapid aurora flutter, which is astounding for a path to Hawaii!

"The opening then moved westward, with W6YM, WA6KLK, KG6I, and others in northern California working him. It progressed to the Northwest, where N7EPD, KE7V, K7SS, and undoubtedly more logged him. Then farther west to KL7FZ in BP51! And then JA2DDN and a host of other JAs were worked by KH6SX!

"From here in southern California, the signal characteristics suggest some odd aurora-*E* to AU link. It's hard to imagine a "normal" *E* opening with such a wide distribution, and the westward progression suggests an enhancement ahead of the heliopause. But I think the book may need some rewriting on this one, and the exact mechanics are a bit of a mystery to me. I bet an inspection of the solar wind velocity plots after 0500 UTC would make interesting reading.

"No easterly propagation was observed, to my knowledge, from southern California prior to the KH6 event. If this really was an aurora event worked from Hawaii, this may be a 'first,' and KH6SX is to be congratulated for being so on the ball!"

Tad continues:

K7SS here in Seattle related moments of sheer joy on 6 meters. ARRL Sales and Marketing Manager Dennis Motschenbacher, K7BV, in Connecticut bagged his 50th state on 50 MHz when he worked Kevin Forster, NL7Z, in Wasilla, Alaska via aurora.

Dave Bernhardt, N7DB, reports the following:

Well, finally the shockwave that many of us were anticipating hit Sunday. I have been on the air for many AU events over the years. The November 7–8, 2004 AU was probably distinguished by its length. First AU was notice here at 2325 UTC and ran continuously on 2 meters until 0321 UTC. Conditions fizzled some at that point, but came back later with other interesting variations. I was not able to get on 6 to catch the fun there, but I noted the transcontinental AU-E around 0500 UTC, plus the linkup that a number of stations had to KH6SX later in the evening. I have heard reports of some 222 and 432 AU activity, but not as strong as some of the other historic big AU events. After all, we are getting close to the end of Cycle 23! Another interesting note was to see the planetary *K*-index of 9 for three straight reporting periods.

Here is what was worked on 2 meters plus heard on 6 meters: W7IUV 55A 2344Z; K7XC 52A 0003Z; K7GS 56A 0014Z; WA6KLK CM89 52A 0018Z; VE7DXG 57A 0048Z; N7EPD 55A 0054Z; N7SC CN82 55A 0100Z; WA7ADK DN31 53A 0102Z; KU7Z DN41 52A 0103Z; K7ICW DM26 52A 0113Z; W7GLF 55A 0120Z; W7MQY CN82 52A 0124Z; K7CW 55A 0135Z; W7YOZ 55A 0201Z; WA7SKT 55A 0219Z; NT6K CN91 52A 0229Z; KB7DQH 53A 0240Z; AA7CQ 51A 0254Z; K6AAW CN80 52A 0308Z; WA6KLK again 55A 0315Z; VE7DAY CO70

55A 0444Z; WA7GSK DN13 53A 0454Z; and W7FKI 52A 0504Z. These contacts were made with a TS-700A + 60W to an 11-element up 17 feet. Other interesting signals heard: 2M—KA7BGR/b 51A (CN82) and KJ6KO/b 52A (CM88) both at 0127Z. I heard W1IPL at 0144Z, but no contact.

On 6 meters I heard the following: KA7BGR/b (yes, the 6-meter beacon) 41A, K6FV/b 51A, NØUD/b 419, and WA7X/b 41A at 0156Z. Heard the WA7X/b again at 0500 UTC, along with WØAMY (EN34) via AU-E. Missed hearing the transcontinental AU-E stations on 6, which happened right about this time. WØRLI (CN85) told me this morning that he worked into CT via the AU-E on 6. WA7GCS (CN85) was on when KH6SX made it up into the PNW around 0600 UTC.

Jeff Klein, K1TEO, reported the following: "Was on for awhile last night on 2-meter aurora. Most of my operating was in bits and pieces between 2300Z and 0200Z. Did check 222 but only heard relatively local sigs. On 2 meters worked as far south as AL and TN. To the west worked MO, IA, and MN. Lots of stuff in between with about 35 QSOs in all. Signals were quite good with moderate activity."

Pete Heins, N6ZE, reported the following from the cockpit of his commercial airliner while flying on Sunday night: "Huge Visual Aurora (Northern Lights) observed from 37,000 ft. from over Rockies (Denver, DM58) to New York City, FN20. Continual displays from heading 300 degrees to 060 degrees. Occasional pulsing up to 50 degrees above horizon."

European 2-Meter Fall Sporadic-*E*

On the heels of the North American aurora propagation came hours of sporadic-*E* propagation across parts of Europe. What follows are reports from the **Udo Langenohl, DK5YA**, website (http://www.vhfdx.de/es_summary_04_november_10.htm).

Udo comments: "November 10? Are you kidding? No! Yes, it's true and thanks to that huge geomagnetic disturbance that lasted for several days. Seems that the ionosphere was loaded with electrons, causing a sudden and extremely rare November 144 *Es* opening in the late afternoon today, while there was still aurora in the north, amazing. I was trying hard to find anything like that happening before but I didn't. Yes, we had several auroral *E*'s before in the north but never something like that in the south. This was a sporadic-*E* event, not auroral-*E*."

From **DH4FAJ, JN49ex:** "On 10th of November I listen with IC-821 on 144.070 on aurora signals at 17.00 UTC. Then I turned on the FT-857d on

144.300 to listen for some Au signals in SSB. 17:20 some signal on 144.300 very loud. I couldn't believe that I am hearing SV2DCD with 59+. Two calls and the QSO is complete! Very surprised about *Es* in November! 17:20 SV2DCD KN00NF 1470,9Km."

From **DF6NA, JN49xs:** "17:15 SV3GKE KM08vf 59 59."

From **Thomas, DF8KK, JO30nv:** "17:03 SV3GKE KM08VF 59 59 1818km; 17:15 SV2DCD KN00NF 59 59 1604km. At 17:00, I thought I'm dreaming. Listen once, listen twice. My FT817 picked a SV callsign on 144.300. First I answered on SV3GKE CQ only with 5 watts while the PA was starting. He answered after my first call, and after that my 100 watts were ready. I turned my Flexayagi FX224 but no more stations. Others answered 'GKE' when suddenly 'DCD' came up. He also answered in the first time on my call. His sigs faded, but it was no problems to work him. That was all, but very funny and big surprise. My QTH is only 70 m over ground plus 12 m antenna height for the 11 elements. Only the 144.300 was used, so there was a double-pile-up with these two Greek stations it sounds to me. Is the sporadic-*E* season now closed? I'll listen to my radio."

From **DL1GGT, JN58ao:** "1707 SV3GKE KM08VF 59/59; 1719 SV2DCD KN00NF 59/59; they have been here 59 for half an hour with deep QSB. Very nice *Es* in November."

From **DL3IAS, JN49ej:** "1714 SV2DCD 53 59 KN00NF. Unbelievable, sporadic-*E* after we have got the first snow here! I also heard a second station (SV3) from KM08 at the same time on 144.300. Rig: IC-735/LT2S with BF981, 20 watt and 10 ele. DK7ZB."

From **DL8EBW, JO31nf:** "1715 SV2DCD KN00NF 57 59 2 m. SSB 1630 km; 17:22 SV3GKE KM08VF 55 59 2 m. SSB 1845 km."

From **Tim, G4LOH, IO70jc:** "I missed the *Es* here but looks like it didn't reach me anyway. The map clearly shows a sporadic-*E* (*Es*) opening not auroral-*E* (Au-*E*) (sometimes incorrectly referred to as auroral-*E*). The 6/11/2000 event which also happened in a big proton event aurora was also *Es* and not Au-E. (I worked RA3AET at 2500 km in this opening and would love to claim it as a record for Au-*E* but it was *Es*!) Auroral-*E* sounds different and has a wide reflection area, for instance, on 18/6/03 I worked TF/G4ODA from IO94 (1400km) he was 59 on SSB. He was heard at exactly the same time in JO33 and IO80; the signal lasted over an hour and did not have the rapid fading of *Es*."

From **G4RGK, IO91on:** "At 1710 tuning around the band I found an LZ on around 144.295 very weak couldn't figure out the call. Didn't hear any sign of the SV's here in IO91. Seem to remember another *Es* opening October or November, years ago straight after a big aurora. Station: 17el, 8930 amp, MGF1302 preamp."

From **Reg, G8VHI, IO92fm:** "I have always said that Au will not stop *Es* and I now think I am right. Many say there will not be sporadic-*E* when we have an Au; maybe now they will have to think again! I missed it here – QRL, hi."

From **Ben, HB9SJV, JN36bk:** "LZ1ZP KN22id 1650 QSO on 50 MHz; 1714 QSO on 144 MHz. 100W + 11y 1000 m asl."

From **Gaetano, IW2NOR, JN45on:** "Only two QSOs via *Es* in mid-November wow! 17.13 LZ1ZP 57/59 kn22id 1297 km; 17.15 LZ1GC 58/59 kn21 1400 km. Rig: Kenwood TS2000 + 'enough power'; ant: 2X17 F9FT @ 40mAGL."

From **I8MPO, JN70fp:** "17:13Z heard DJ5BV calling somebody on 144.300 via *Es* for less than one minute. To my experience this was genuine sporadic-*E* and not meteor scatter. Quite amazing this time of the year but the protons connected with the big Au going on since days up north evidently are the key to this very unusual occurrence. Just too bad I couldn't take advantage of it."

From **George, LZ1ZP, KN22id:** "I have never worked such late *Es* on 144 MHz! Everything started here around 15.45 when I heard first signals on 50 MHz. Then, very quickly *Es* on 6 meters covered huge area from 4X to G. Some stations were coming on 59 +60 dB and some short distance contacts were made with 9A (abt 700 km). At 16.53 I worked HB9SJV and discussed with him (with a joke) about the possibility to work on 144 MHz. Around 16.55 I checked FM BC band. What a surprise; band was full with Italian stations up to 108 MHz. Even more it was a mixture of sounds (one upon another) like during fast rising MUF! Then, 17.10 IW2NOR heard him for the first time. 17.13 HB9SJV 59/59 JN36; 17.14 IW2NOR 59/57 JN45; 17.24 F1DLT 59/52 JN27. That's it. Nice job at the start of the winter! Rig here: 100W 11-ele. DJ9BV."

From **Johannes, OE3JPC, JN87ew:** "I remember a similar opening late in the year some 3 or 4 years ago. While there was aurora in northern Europe we made lots of *Es* QSOs to central SM. At the same time there was some FAI when I heard RX1AS with typical FAI-tone."

From **Jussi, OH5LK, KP30on:** "I disagree with the statement that there has never before been a similar sporadic-*E* opening. On 6th November 2001 (or was it 2000?) we had a 144 MHz sporadic-*E* opening in the evening. The tone was typical *Es* and the signal strength was typical *Es* (I worked for example an LX station that was using a ground plane). The reason why I can distinguish it from an auroral-*E* opening is that there was only a single reflection point. Meaning that at the same time that I was working into DL, a station 200 km east from me (St. Petersburg) was working stations 200 km far away to the west, into PA. In an auroral-*E* opening there is always a larger reflection area, meaning that by beaming to slightly different directions I can work stations from different geographical areas at any given time.

"I feel sorry that many operators have reported this 6th November opening as an auroral-*E* opening. For example, many ODX on auroral-*E* mode in various lists have been made in a sporadic-*E* opening on this opening on 6th November."

From **Chris, PA2CHR, JO22xa:** "1714 SV2DCD KM00NF 55 59 144.300; 1718 SV3GKE KM08VF 55 59 144.300. Very unusual *Es* in November."

From **PA3DZL, JO21hm:** "17.19 SV2DCD 59/59 KN00NF; very surprised to work *Es* in November! Rig: 4×17-ele and 100W."

From **PA3FPQ, JO22xe:** "17:21 SV3GKE KM08VF 59 both ways. Heard SV2DCD during heat up of the power amp."

From **Allard, PE1NWL**, owner of DX-Robot: "The *Es* opening we had yesterday was indeed surprising! Unfortunately I had already disabled the DXrobot *Es* warning system for the winter period. Pity."

From **Leo, SV2DCD**, **KN00nf:** "Thanks to everyone for the 35 unexpected *Es* QSOs during the 10-11-2004 sporadic-*E*. The signals were very strong from DL, PA, and ON. Although I had a report from a G station, I didn't work anyone. Also a couple of F stations called me but I did not work them. My antennas here 2×11-el F9FT and PA 300W."

Current Contest

The ARRL VHF Sweepstakes is scheduled for the weekend of January 22–24. Complete rules for the ARRL contests can be found in the *QST* issue the month prior to the contest or the month prior to the first weekend of contests extending over two or three months. Complete rules can also be found on the League's URL: <http://www.arrl.org>.

Current Meteor Shower

January: The *Quadrantids*, or *Quads*, is a brief but very active meteor shower. The expected peak is on 3 January. The actual peak can occur three hours before or after the predicted peak. The best paths are north-south. Long-duration meteors can be expected about one hour after the predicted peak.

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 . . .

I have used up my allocated space for this column and then some. Thanks for keeping me in the loop with your reports.

Until next month...

73 de Joe, N6CL

dx

BY CARL SMITH,* N4AA

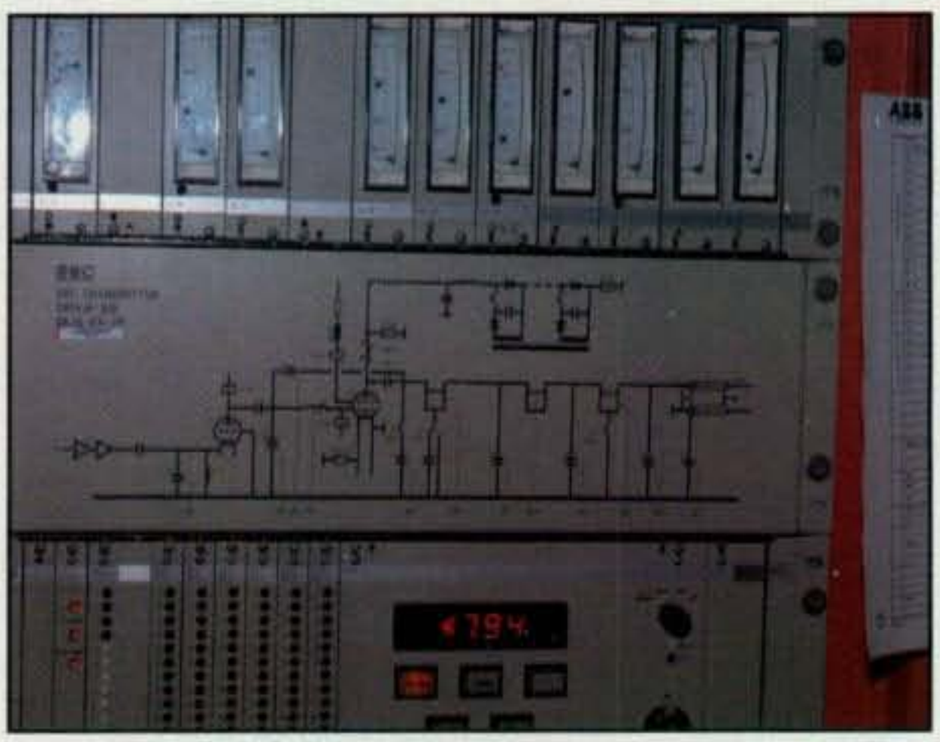
"Peculiar" Conditions on HF and VHF

Let there be peace on earth and good will to all men as we go into a new year. I trust that everyone had a happy and safe holiday season and that now we can begin 2005 with hope for a good year ahead.

We've had a good year for DXing and contesting. The recent CQ WW DX SSB Contest was one for the books. In spite of our position in the solar cycle, we were blessed with outstanding conditions for the higher frequency bands. Those better than expected conditions allowed some rather unbelievable scores in the contest. Unfortunately, those conditions didn't last nearly long enough, as they changed dramatically just a week later at the end of the ARRL Sweepstakes on CW. For days we had extremely poor propagation. Some bands were virtually "dead" and others exhibited "peculiar" conditions. Huge areas were treated to the visual effects, with aurora displays being reported far south in the U.S. In my 50 years of ham radio experience, I don't recall anything to compare with this period of time. The HF bands were almost useless, but the "Magic Band," 6 meters, provided some interesting periods of activity. Many stations in the U.S. were treated to an opening to Alaska, as well as other areas. Literally dozens of reports of 6-meter activity outnumbered HF spots on the packet cluster networks.

Things are slowly getting back to a more normal situation here in early November as I write this and as we look forward to the ARRL Sweepstakes on SSB following by the CQ WW DX CW Contest the end of this month. It's doubtful that we will again see the great conditions we had for the CQ WW SSB Contest, but hopefully they will be at least better than they were for that week or so earlier in November.

The antenna system used by the broadcast station of Radio Switzerland International.



This is the transmitter used by RSI, and yes, that nameplate does say 500 KW.

DX Special Events

HE3RSI. It's always interesting to hear about and see antenna systems. On that note, I recently received from Radio Switzerland International (RSI) a notice of a special event activity in Switzerland. For the month of November Swiss hams operated from a station as HE3RSI. They operated with 1 KW, but an ERP of nearly 100 KW. Included this month are a few pictures of the antenna system as well as the transmitter used by RSI. Yes, that name plate does say "500 KW." I heard HE3RSI operating on 40-meter PSK the weekend of November 13–14 and the signal was well over S-9 here in North Carolina. I worked them on 40 CW the next night and again the signal was *very* strong.

Here's a bit of info on their antenna: It was one of the largest antennas in the world, with an average gain of 20 dB, 7–30 MHz. It was just over 200 feet high, weighing 135 tons (metric?), and was *fully rotatable*—in 15 minutes. Disassembly of the station was to begin on December 6.

PC100H. Hopefully this issue of *CQ* will reach you in time for you to work PC100H. Hans, PA1HR, says:

> On 19th December 2004, it is exactly 100 years ago that the Dutch Coastal Station PCH Scheveningen Radio was founded, sufficient reason to organize an event for radio amateurs all over the world! The 75th, 85th, and 90th anniversaries and the closure of the station on 31st December 1998 were celebrated with the opportunity to make radio contact with the coastal station. Especially during the last days of operation, the possibility to make cross-frequency contact with PCH on maritime frequencies caused tremendous and hour-long pile-ups.

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5 Band WAZ

As of November 1, 2004, 662 stations have attained the 200 zone level and 1414 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)	N4MM, 199 (26)
W4LI, 199 (26)	EA7GF, 199 (1)
K7UR, 199 (34)	N4PQX, 199 (26)
WØPGI, 199 (26)	DL2KQ, 199 (31)
W2YY, 199 (26)	JA5IU, 199 (2)
VE7AHA, 199 (34)	CT3DL, 199 (26)
IK8BQE, 199 (31)	EA5BCX, 198 (27, 39)
JA2IVK, 199 (34 on 40m)	G3KDB, 198 (1, 12)
IK1AOD, 199 (1)	KG9N, 198 (18, 22)
DF3CB, 199 (1)	JA1DM, 198 (2, 40)
GM3YOR, 199 (31)	9A5I, 198 (1, 16)
VO1FB, 199 (19)	K5PC, 198 (18, 23)
KZ4V, 199 (26)	K4CN, 198 (23, 26)
W6DN, 199 (17)	G3KMQ, 198 (1, 27)
W6SR, 199 (37)	N2QT, 198 (23, 24)
W3NO, 199 (26)	OK1DWC, 198 (6, 31)
HB9DDZ, 199 (31)	W4UM, 198 (18, 23)
RU3FM, 199 (1)	US7MM,198 (2, 6)
HB9BGV, 199 (31)	K2TK, 198 (23, 24)
N3UN, 199 (18)	K3JGJ, 198 (24, 26)
OH2VZ, 199 (31)	W4DC, 198 (24, 26)
K5MC, 199 (22)	N4XR, 198 (22, 27)
W1JZ, 199 (24)	RU3DX, 198 (1, 6)
W1FZ, 199 (26)	N6HR/7, 198 (34, 37)
SM7BIP, 199 (31)	OE2LCM, 198 (1, 31)
PY5EG, 199 (23)	W7SX, 198 (18, 23)
SP5DVP, 199 (31 on 40)	HA1RW, 198 (1, 31)
W8AEF, 199 (40)	WK3N, 198 (23, 24)
K8RR, 199 (26)	HA9RT, 198 (1, 31)
UU5JR, 199 (4)	W9XY, 198 (22, 26)
W8GF, 199 (22)	KZ2I, 198 (24, 26)
N4NX, 199 (26)	

The following have qualified for the basic 5 Band WAZ Award: none

Endorsements:

KX2P (185 zones)
K2JG (171 zones)
SMØKRN (170 zones)

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

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WPX Program

SSB

2917.....EC1ARM
2918.....KF7RO
2919.....WA2BEV
2920.....EA7HY

CW

3144.....DK5DBH
3145.....IZ3ETU
3146.....DS5KJR

CW: 350 DS5KJR. 2050 VE6BF.
SSB: 400 EC1ARM. 550 KF7RO. 750 IZØBNR. 950 EA7HY.
MIXED: 1850 WZ4P. 2200 VE6BF.

10 Meters: PP6CW, W9BOK
20 Meters: RW9RF
40 Meters: W9BOK

South America: W9BOKL

Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP K0JN, W4VQ, KF2O, W8CNL, 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, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4BP, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT.

160 Meter Endorsement: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK3AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WBØDD, IØRIZ, I2MQP, F6HMJ, HB9DZZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA5CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, UAØFZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, KUØA.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. *Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

Please Note: As of February 2004, the price of the 160 meter bar for the Award of Excellence is now $6.50.

DXpeditions to Note

Ascension ZD8 and St. Helena ZD7. Martin, G3ZAY, was visiting both islands during the Christmas holiday period. He should have been on Ascension December 21–22 and again will be there January 3–7 signing ZD8ZA. He will be on St. Helena December 24 to January 1 signing ZD7ZA. Martin will operate mostly SSB, but will do some CW as well. Activity on 80 meters will depend on the antenna situation, and he probably will not be able to operate 160. QSL requests should go via his home call.

Peter I. 3YØX will be the focus for DXers in the month of January, as the team will activate this Most Needed one for about two weeks. Operation is expected to begin January 20, but that is subject to the weather they may encounter during the trip to the island. This is a major DXpedition to a very dangerous place by a dedicated team of DXpeditioners. For full details on the operation go to:<http://www.peterone.com>.

Andaman VU4 has been at or near the top of the Most Wanted lists for some time. By the time you read this an operation may have taken place by VU2RBI. I can only hope that it was sometime in December. Bharathi (XYL)

As a final event, on 18th and 19th December 2004, the 100th anniversary of the founding of PCH Scheveningen Radio will be commemorated with a special amateur radio station. This time we will use the callsign PC100H. You are kindly invited to make contact with PC100H, which will be active from Saturday 18th December 0700 UTC until Sunday 19th December 1900 UTC. Frequencies: CW 1.830, 3.530, 7.030, 10.130, 14.030, 18.090, 21.030, 28.030; SSB 1.850, 3.650, 7.050, 14.250, 18.150, 21.250, 28.250, 144.250; 10.145 RTTY/PSK31; and 145.250 MHz FM. For the actual schedule, please refer to <www.remeeus.nl/pch/pc100h.htm>. Further information can be obtained from <hans@remeeus.nl>.

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	K4MQG 334	N5FG 333	N4CH 332	YU1TR 330	K4JLD 327	YV5ANT 324	OZ5UR 319	VE7KDU 300
K2FL 334	EA2IA 334	N7RO 333	K6LEB 331	W4UW 330	W6OUL 327	9A2AJ 323	PY4WS 319	KØHQW 299
K9BWQ 334	PA5PQ 334	K4CN 333	VE3XN 331	G3KMQ 329	IT9TQH 326	W6SR 323	G3KMQ 317	WG7A 295
K9MM 334	K3UA 334	W4MPY 333	W1WAI 331	KZ4V 329	I2EOW 326	N5ZM 323	YT1AT 317	KE3A 295
W7OM 334	DL3DXX 334	PY2YP 333	K2JF 331	N5HB 329	W7IIT 326	KUØS 322	K8JJC 315	K4IE 291
K2JLA 334	K2ENT 334	W8XD 333	K3JGJ 331	W9IL 329	SM5HV/HK7 326	KE5PO 322	CT1YH 313	KD8IW 288
N7FU 334	OK1MP 334	W2VJN 333	PT2TF 331	K1HDO 329	K6CU 326	HA5DA 321	N1HN 313	WA4DOU 286
K2OWE 334	NC9T 334	KA7T 332	WA8DXA 331	K7JS 329	W4LI 325	IKØTUG 321	W6YQ 313	G3DPX 284
N4MM 334	WB5MTV 333	WØJLC 332	K9IW 331	K9OW 328	I5XIM 325	VE7DX 320	K9DDO 312	EA3BHK 282
F3TH 334	W7CNL 333	K8LJG 332	WB4UBD 331	K8PV 327	K5UO 325	IKØADY 320	W3II 312	YC2OK 282
F3AT 334	YU1HA 333	YU1AB 332	W2UE 330	W4QB 327	IK2ILH 325	WG5G/QRPp 320	UA9SG 309	DJ1YH 281
DJ2PJ 334	IT9QDS 333	K5RT 332	I4LCK 330	I1JQJ 327	N5FW 325	N7WO 320	KF8UN 308	XE1MD 278
WA4IUM 334	G4BWP 333	YU1AB 332	VE7CNE 330	I4EAT 327	9A2AA 325	F5OIU 320	YU7FW 306	EA2CIN 278
W4OEL 334	K4CEB 333	NØFW 332	4N7ZZ 330	DL8CM 327	N4OT 325	KA3S 320	LU3DSI 302	I3ZSX 276
W2FXA 334	K4IQJ 333	N4AH 332	W6DN 330	SM6CST 327	LA7JO 324	HA5NK 319	N1KC 302	
N4JF 334	WØHZ 333	HB9DDZ 332	K7LAY 330	N4KG 327	K1FK 324	F6HMJ 319	KH6CF 301	

SSB

K6YRA 335	4Z4DX 335	W5RUK 334	YV1AJ 332	K2JF 329	IT9TQH 327	WA4ZZ 322	YV5NWG 311	WA1ECF 295
K2TQC 335	N7RO 335	K4CN 334	KSØZ 332	ZL1AGO 329	DK5WQ 327	WN9NBT 322	LU3HBO 310	KW1DX 295
W6EUF 335	IØZV 335	EA3KB 334	LU4DXU 332	W9OKL 329	UY5XE 327	WW1N 322	HA6NF 310	K7ZM 292
K2JLA 335	EA2IA 335	N4CH 334	VE4ROY 332	I2EOW 329	KE5K 327	W6OUL 322	WA5MLT 310	OA4EI 292
K4MQG 335	IN3DEI 335	K3UA 334	W7FP 332	VE7DX 329	I1JQJ 327	N3RX 321	XE2LV 310	K7ZM 292
IK1GPG 335	EA4DO 335	K4JLD 334	K9HQM 332	W2FGY 329	CP2DL 327	XE1CI 321	XE2NLD 310	K1RB 292
K5OVC 335	PA5PQ 335	N5ZM 334	CT1EEB 332	CT1CFH 329	NI5D 327	CT1ESO 321	EA3BHK 307	KØOZ 291
NØFW 335	K9OW 335	PY2YP 334	W2FKF 332	EA1JG 329	W6SR 326	EA8TE 321	RW9SG 307	W9ACE 291
K9MM 335	W6DPD 335	AA4S 334	CT1EEN 332	KE4VU 328	N4KG 326	W6MFC 321	W9IL 306	I3ZSX 290
W6BCQ 335	XE1VIC 335	CT3DL 334	DL9OH 331	K5UO 328	K7TCL 326	KD5ZD 321	XE1MDX 305	N2LM 286
XE1AE 335	K2ENT 335	NC9T 334	N2VW 331	KF8UN 328	W9HRQ 326	N4CSF 320	EA5OL 305	KKØDX 285
W7OM 335	OK1MP 335	W9SS 334	YV1JV 331	WØULU 328	W4QB 326	N4HK 320	WB2AQC 305	VE7HAM 285
KZ2P 335	IZ6GPZ 335	VE7WJ 334	WA4WTG 331	K1EY 328	K8PV 326	KØFP 320	VE7SMP 305	F5RRS 284
IK8CNT 335	K1UO 335	VE2PJ 334	W8KS 331	KZ4V 328	DL6KG 326	EA7TV 320	KC4FW 304	N8LIQ 284
VK4LC 335	I8KCI 335	W3AZD 334	YV5IVB 331	XE1D 328	W4LI 326	SV1RK 320	K3BYV 303	WØIKD 283
OE7SEL 335	I8LEL 335	YZ7AA 334	KX5V 331	KD8IW 328	N1ALR 326	N1KC 320	YC2OK 303	KBØRNC 282
VE3MR 335	DU9RG 335	CT3BM 334	K3JGJ 331	KE3A 328	HB9DDZ 326	W5GZI 320	WB2NQT 303	WN6J 281
VE3MRS 335	DU1KT 335	4N7ZZ 333	N5ORT 331	W9IL 328	WR5Y 325	SV3AQR 320	VK3IR 303	IK8TMI 281
K4MZU 335	WDØBNC 334	KE5PO 333	PT2TF 331	K3LC 328	WA4JTI 325	WA4DAN 319	KK4TR 303	F5JSK 281
OZ5EV 335	K2FL 334	VE1YX 333	CT1AHU 331	K8DXA 328	KC4MJ 325	CE1YI 318	JR4NUN 303	KA5OER 280
N7BK 335	WØYDB 334	I4LCK 333	EA3JL 331	LU5DV 328	PY2DBU 325	W5OXA 317	VE7KDU 302	KK5UY 280
K7LAY 335	W4UW 334	W2JZK 333	K9IW 331	I1EEW 327	IKØIOL 325	YV4VN 317	W5GZI 302	F5INJ 279
ZL3NS 335	K9BWQ 334	K8LJG 333	K1HDO 331	SV1ADG 327	YT1AT 325	EA5GMB 317	N5QDE 302	K7SAM 279
N4MM 335	W4NKI 334	VE4ACY 333	W6DN 330	DL8CM 327	K7HG 324	KE4SCY 317	KD4YT 302	EA3CWT 278
OZ3SK 335	WB4UBD 334	KØKG 333	K8CSG 330	F9RM 327	AC7DX 324	K6RO 316	YV2FEQ 301	VE2DRN 277
K7JS 335	W4UNP 334	W4WX 333	YV1CLM 330	XE1MD 327	KØHQW 324	N5HSF 316	SV2CWY 300	9A9R 277
XE1L 335	W8AXI 334	VE2WY 333	LA7JO 330	I4EAT 327	EA3BKI 323	N8SHZ 316	4X6DK 300	W6UPI 276
YU1AB 335	VE2GHZ 334	WB3DNA 333	AB4IQ 330	W3GG 327	K4JDJ 323	WZ3E 314	YT7TY 300	W5GT 276
OE3WWB 335	OE2EGL 334	K9PP 333	AE5DX 330	AA6BB 327	W6WI 323	IZ6CST 314	N5WYR 300	Z31JA 275
K5TVC 335	WA4IUM 334	W2CC 333	KB2MY 330	SM6CST 327	EA3CYM 323	K9YY 313	K4IE 300	G4URW 275
N5FG 335	K5RT 334	DL3DXX 333	K3PT 330	WD8MGQ 327	F6BFI 322	NØMI 313	W4PGC 300	VE2AJT 275
DJ9ZB 335	W2FXA 334	EA3BMT 333	ZL1BOQ 330	CX4HS 327	K6CF 322	W7GAX 312	K6GFJ 299	4Z5FL/M 275
PY4OY 335	N4JF 334	EA3EQT 333	KW7J 330	IØSGF 327	LU7HJM 322	VE3CKP 311	AC6WO 297	KU4BP 275
VE3XN 335	W6SHY 334	YV1KZ 332	WS9V 329	IT9TGO 327	K5NP 322	CT1YH 311	WØROB 296	

RTTY

K2ENT	333	K3UA	327	EA5FKI	320	W2JGR	316	OK1MP	312	KE5PO	297	I2EOW	291	W4QB	280	YC2OK	280
WB4UBD	330	NI4H	325	N5FG	318	G4BWP	312	PA5PQ	311	W4EEU	297	I1JQJ	289				

was working with the National Institute of Amateur Radio of India to try and put together the permission and equipment to make the trip to Andaman. If it didn't happen, at least the door has been left slightly open for an operation in the future. I can say from my work on *The DX Magazine* Most Wanted Survey for several years that Andaman is on the very short list for most DXers around the world. The others at the top of that Most Wanted list include entities such as Lakshadweep VU7 and Scarborough Reef BS7. Literally dozens of DXers need only one of these three to have worked them all.

Other DXpeditions to look forward to in early 2005 are **Somalia 6O** in February and **Kerguelen FT5X** in March. There is also an operation planned for **Glorioso FR/G** in March. All of this in addition to all of the contests we have to look forward to in the next few months.

The QSL card for 6O1Z, an operation by Baldur, DJ6SI, and Franz, DJ9ZB, in 1999. QSOs for this operation are now being accepted for DXCC credit.

Reminiscing with an Old Friend

In my November column I mentioned some of my ham activity as a teenager in Kansas City. One never knows what may

The WAZ Program

10 Meter CW

190 ..... JA8IYI

17 Meter CW

53 ..... N7WO

20 Meter CW

546 ..... UA4RC

80 Meter CW

63 ..... SMØBFJ

6 Meters

67 ..... W3TC

All Band WAZ

SSB

4939 ..... IT9VCE
4940 ..... DU1UGZ
4941 ..... DU1IVT
4942 ..... AD6DK
4943 ..... WA7AJ

Mixed

8326 ..... VQ9LA
8327 ..... KB3CAB
8328 ..... N8WRL
8329 ..... YL2GQT
8330 ..... JE1ABU
8331 ..... HL1IWD
8332 ..... DS4DBF

All CW

441 ..... JF1EGO
442 ..... N7YY
443 ..... 4L1MA
444 ..... JR7HAN
445 ..... JA7GUT
446 ..... JI5RPT

RTTY

152 ..... KØDEQ
153 ..... JH3QFY
154 ..... HL3GOB

EME

002 ..... DL9KR

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 Awards Program

SSB

2447 ..... W5GT
2448 ..... K9DXR

CW

1063 ..... WB7RHT

SSB Endorsements

320 ..... CT3BM/334
275 ..... W5GT/276
28 MHz W5GT

CW Endorsements

275 ..... G3DPX/284
150 ..... WB7RHT/150

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.

As this is written, we are praying that Ray, G3NOM/HSØZDZ, recovers from a heart attack (November 11). As of November 14 he was in a coma at a Bangkok hospital. Ray is well known in DX circles as the International Vice President for the IARU member – Radio Amateur Society of Thailand (RAST) and the station manager for the RAST club station, HSØAC/HS72B.

come of a casual comment. As a result of my mentioning Kansas City, etc., I received an e-mail from a reader who thought it sounded very familiar. To make a long story short, we got together on the phone a few weeks ago, and it turns out that we did know one another way back then. We spent about two hours on the phone getting re-acquainted and discussing our lives over the last 50 years. Mike, KØIQA, and I (as WØYFT) remembered many old friends in the Kansas City area back then (DXers and contesters), and I'm sure we will stay in touch in the future. Thanks, Mike, for sharing your memories of those days of our youth with me.

In Closing . . .

As I spend more time on 17 and 12 meters these days, I hear many familiar callsigns. Big-time DXers are spending more of their time on these bands too as they build their band/modes totals for the ARRL's Challenge Award. Competition at times is really serious, but it only adds to the fun of the chase.

Until next time, enjoy the chase and remember—have fun!

73, Carl, N4AA

QSL Information

3D2AH via DL2AH
3D2EE via WA4WTG
3D2KW via WA4WTG
3D2OK via WA4WTG
3D2PX via AI5P
3D2SS via WA4WTG
3D2TS via WA4WTG
3D2XA via WA4WTG
4S7CF via 4S7CF
5B/HA5RT/QRP via HA6NL
5B/HA6NL via HA6NL
5B/HA6PS via HA6PS
5B/HA6ZV via HA6ZV
5B/HA7JJS via HA7JJS
5B4WN via LoTW
5N44EAM via IK2IQD
5T5DY via F6GDC
5X4/KH9AE via W5WP
5X4CM via W5WP
5Z4YT1CS via YT1CS
6OØJT via VA6JWT
9A/PA4JJ via PA4JJ
9A/PA9JJ via PA4JJ
9G5JH via PAØCJH
9G5ZS via ZS6EGB
9H3AP via DL1CW
9H3IC via M5RIC
9L1ADA via 9A3A
9N7BCC via DK7YY
9V1CW via PAØKHS
9Y4/DK1MM via DK1MM
9Y4/DL2CC via DL2CC
9Y4ZC via DK1MM
A5/F2VX via F9DK
A5/F5LMJ via F9DK
A5/F9DX via F9DK
A5/GØLMX via F9DK
A52CDX via F9DK
A61R via EA7FTR
AA4V/KP2 via LoTW
B1Z via EA7FTR
BOØK via BV4YB
C6ATP via OK1TD
C6AUR via W3MMM
C6AVV via K1JB
C6DX via W8QID
C93Q via VK4VB
CN2KM via SM2EKM
CP6/KMØO via KMØO
CP6/NØAT via NØAT
CP6/NØSTL via NØSTL
CP6/WØOR via WØOR
CP6/WØZR via WØZR
CP6CW via WØZR
CT/GWØVML/P via GWØVML
CT2CQ via LoTW
CU2/DF8XC via DF8XC
CU2/DH4JQ via DH4JQ
CU2/DJ8VC via DJ8VC
CU2/DL1EK via DL1EK
CU2/DL1YFF via DL1YFF
CU2/DL3PS via DL3PS
CU2/DL7AOS via DL7AOS
DF2CK via LoTW
DF2LH via LoTW
DJØTP via LoTW
DJ4EY via LoTW
DJ5JH via LoTW
DK5WL via LoTW
DL6GV via LoTW
DL8PG via LoTW
DM2AWM/P via LoTW
DT4ØYL via HL1OYF
DU6/DL1PBC via DL1PBC
EA1RT via LoTW
EA6/LY1DF via LY1DF
EA8/DL2HBX via LoTW
EA8ZS via OH1JT
EI3IO via LoTW
EI9ES via LoTW
EP2FN via W2MS
ER1QQ via ER1DAF
ES6CO via LoTW
EX9A via UA3DPX
FH/F6BEG via F6BEG
FK/IK6CAC via IK6CAC
FK/IV3FSG via IK3GES
FR/PA3GIO/P via PA3GIO
FT1ZL via F2YT
FT5WG via F5BU
G3KWK via LoTW
G3LPU via LoTW
G3SHF via LoTW
G3YYD via LoTW
G4DRS via LoTW
G4PDQ via LoTW
G4PWA via LoTW
GB2TL via GMØJHF
GB5HW via GØIYZ
GMØVIT via LoTW
GM4DMZ via LoTW
GTØSTH via G4DIY
GW4MVA via LoTW
H8A via DL6MYL
HA3/N1BCL via N1BCL
HBØ/DL6KAC via DL6KAC
HB9DTE via LoTW
HC2CC via LoTW
HKØTU via HK3SGP
HS8AC via E21EIC
I6GAS via LoTW
IIØRAI via IKØZRR
II9RAI via IKØZRR
IZ8ATP via LoTW
J79A via K7GK

(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

USA-CA Q&A

A very Happy New Year to all readers of this column. May this be the year that you get the QSLs that finally complete the award you've been working toward all these years, or the year you get that last county for USA-CA All Counties, or both!

USA-CA Questions

Q: I worked N4BAA in Virginia Beach, VA. His QSL card says Virginia Beach City County. That county is not listed as one of the 95 Virginia counties. Any map I can find has "Virginia Beach" County. What does it count for?

A: The City of Virginia Beach is an "Independent City" in the state of Virginia. About 30 cities in the state have this status. (Other Independent Cities are Carson City, Nevada and Washington, D.C.) USA-CA rules state that you may count any of the counties that touch the border of the city one time. In the case of of Virginia Beach, Isle of Wight County completely surrounds the city, so that contact will count as Isle of Wight. In the case of some other Virginia cities, two or three counties touch their borders, so the rules say you may count any of them, but you can do this only one time per independent city. That is, if you work another station located in that same city, you cannot choose another needed county.

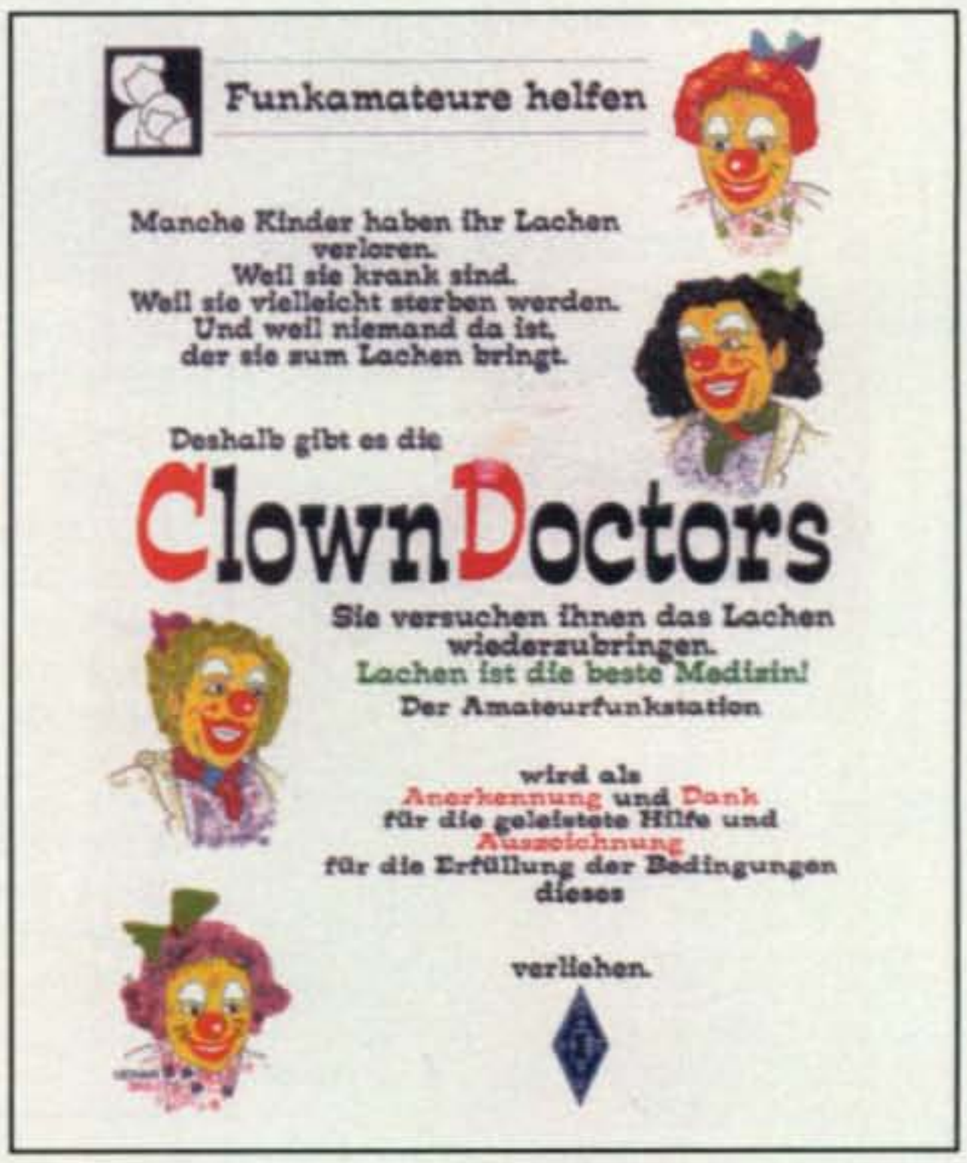
Q: I'm a new county hunter. When I apply for the first award, do I have to submit QSL cards or Mobile Reply Cards (MRCs)?

A: MRCs are the same as QSL cards, the only exception being that they are designed to hold a large number of contacts with the same station, all in different counties. This has the good secondary effect of reducing postal costs. In fact, you can submit a list of 100 or 200 counties, all from the same station, in the form of a letter, and as long as the QSO data is all there and it is signed by the operator, it may be used as a QSL.

Note that you don't have to submit cards until you complete all the counties and tell me that you are ready to apply for the highest level of the award. At that time, I will give you a small list of cards or MRCs that I want you to submit along with your application. USA-CA is a program of honor and trust, and I hope it always remains this way.

DX Awards

Amateur Radio Federation of Salzburg Award Series. While doing some internet research to determine a changed address of an awards sponsor, I ran across the website run by Kurt Wingelmayer, OE2KWN, who is the custodian of the Amateur Radio Federation of Salzburg, Austria. I was impressed by the obvious effort that this group, the Salzburg Section of Oe. V.S.V., has done in designing an attractive awards series. While the fees are a little high, they carefully explain that all excess proceeds received will be used to support a number of charities dealing with ill children and disabled persons.



The Amateur Radio Federation of Salzburg, Austria sponsors the ClownDoctors Award. ClownDoctors visit ill children in hospitals, and any financial benefits are given to the group of ClownDoctors in the city of Spittal.

General Requirements: All bands and modes, except as the rules specify. SWL okay. GCR list and fee as specified in each set of rules should be sent to: Ing. Kurt Wingelmayer, OE2KWN, Franz-Josef-Str. 15 Top 1, A-5020 Salzburg, Austria; e-mail: <oe2kwn@oevsv.at>; <http://www.oe2oevsv.at>.

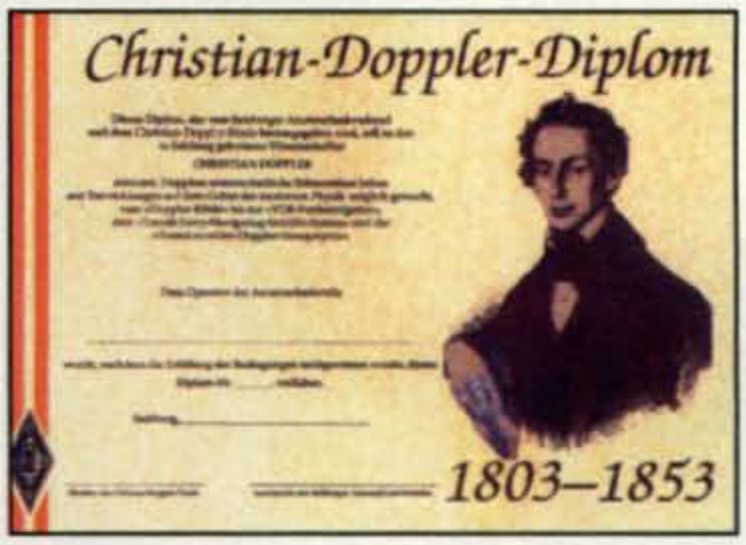
ClownDoctors Award. The clown doctors visit ill children in hospitals and try to cheer them up. They are specially trained to work with children who have cancer. Any financial benefits will be given to the group of ClownDoctors in the Austrian city of Spittal. The award is available in four classes:

1. Shortwave—use any suffix letter from 36 different stations located in at least six DXCC countries to spell out "ClownDoctors—lachen ist die beste Medizin" (translation: "Clown doctors—laughing is the best medicine"). All bands and modes.

2. VHF/UHF—use any suffix letter from 36 different stations to spell out "ClownDoctors—lachen ist die beste Medizin."

3. VHF/UHF—use any suffix letter from 24 different stations to spell out "lachen ist die best Medizin."

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



The Christian Doppler Award is co-sponsored by the Amateur Radio Federation of Salzburg and the Christian Doppler Fund to commemorate the important locations in the life of the physician Doppler, who was born in Salzburg, Austria.

4. VHF/UHF—use any suffix letter from 12 different stations to spell out "ClownDoctors."

Fee is 15 Euros or $US15.

Christian Doppler Award. This award is co-sponsored with the Christian Doppler Fund to commemorate the important locations in the life of the physician Doppler, who was born in Salzburg. Contacts on or after 11 November 1953 (150th birthday of Doppler) with eligible stations as shown below. The following contacts are required: three in the City of Salzburg, three in the city of Linz, three in the city of Vienna, one in the city of Prague, and one in the city of Venice.

A contact with one of the below listed stations may replace either a missing station in Prague or Venice:

OE1XA—HQ station of Oe. V.S.V.

OE1XEC—HQ station of Vienna Military Section of Oe. V.S.V.

OE1XXK—HQ station of the Austrian Red Cross

OE2XAL—HQ station of the Salzburg Section of Oe. V.S. V.

OE2XEL—OE2 DX Group

OE2S—OE2 Contest Group

OE2XAM—Austrian Military Station OE2

OE5XJM—HQ station of Upper Austria Section of Oe. V.S.V.

OE5XLM—HQ station Upper Austria Red Cross Linz

Send GCR list and fee of 10 Euros or $US10.

Salzburg Award. Contacts with stations in Salzburg (OE2) after 1 January 1996 are valid. OE2 stations need 50 points; other OEs need 40; EUs need 30; and all others 15.

Point values are as follows: FM = 1, SSB = 2, CW = 3, RTTY/AMTOR/PACTOR = 4, ATV/FAX/SSTV = 5.

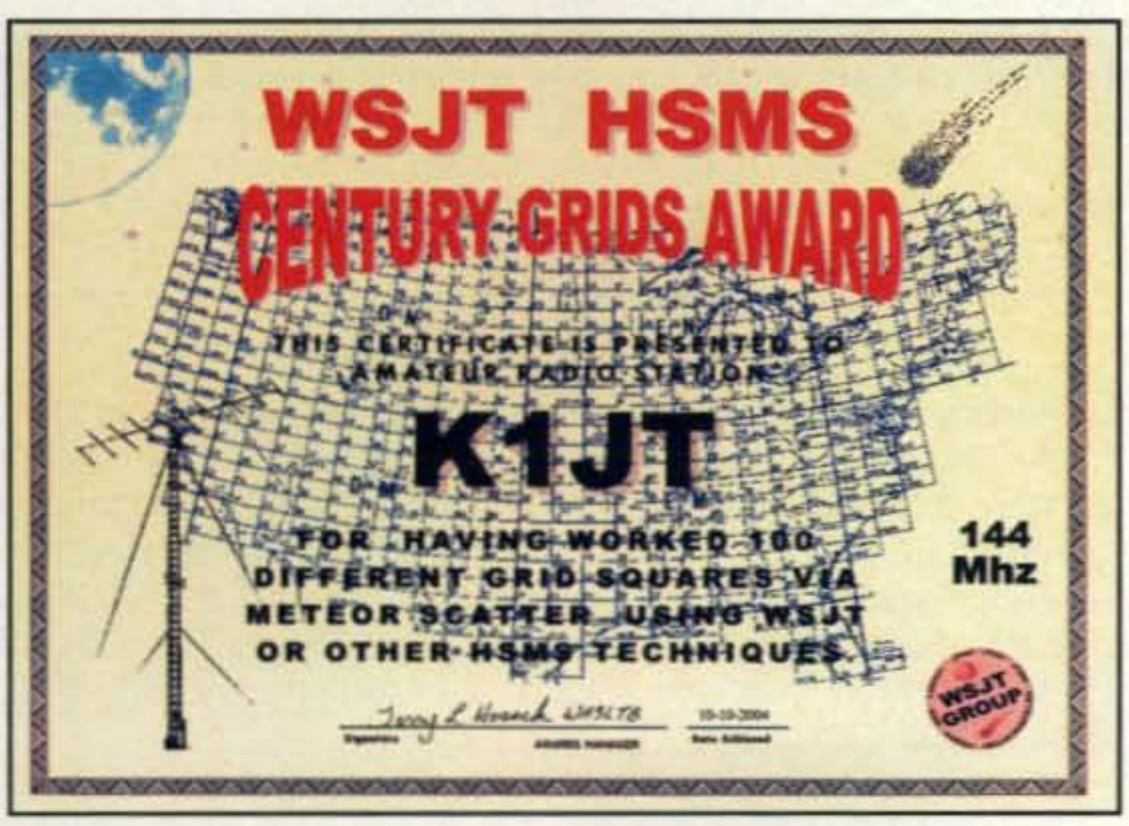
Contacts on 70 cm as well as on the official holiday (24 September) count double. You need at least four different ADLs from the following: ADL201 (mandatory), 202, 203, 204, 205, 206. Any missing ADL may be replaced by OE2XAL (Salzburg club station), OE2XEL (OE2 DX Group), and OE2S (OE2 contest group). Fee for this award is 10 Euros or $US15.

For the Salzburg Award contacts with stations in Salzburg (OE2) after 1 January 1996 are valid.

U.S. Awards

VHF Century Grid Award. This award honors those VHF enthusiasts who use WSJT or other high-speed meteor-scatter propagation techniques to work long distance on 6 and 2 meters. It's definitely a tough specialty on the frontiers of the DX field.

Based on the ARRL's VUCC Award format, the Century Grid Award is available to operators who work 100 different grids on 50 and 144 MHz or 50 grids on 222 MHz using WSJT or other high-speed meteor-scatter techniques. All contacts must have been made by meteor-scatter propagation. Endorsement stickers are also available for additional contacts in multiples of 50 above the initial 100 contacts. Cards are not required; the honor system applies. The award is equally available to foreign operators who meet these requirements. A log with all pertinent QSO information and fee of $US5 for U.S. and $US9 for DX appli-

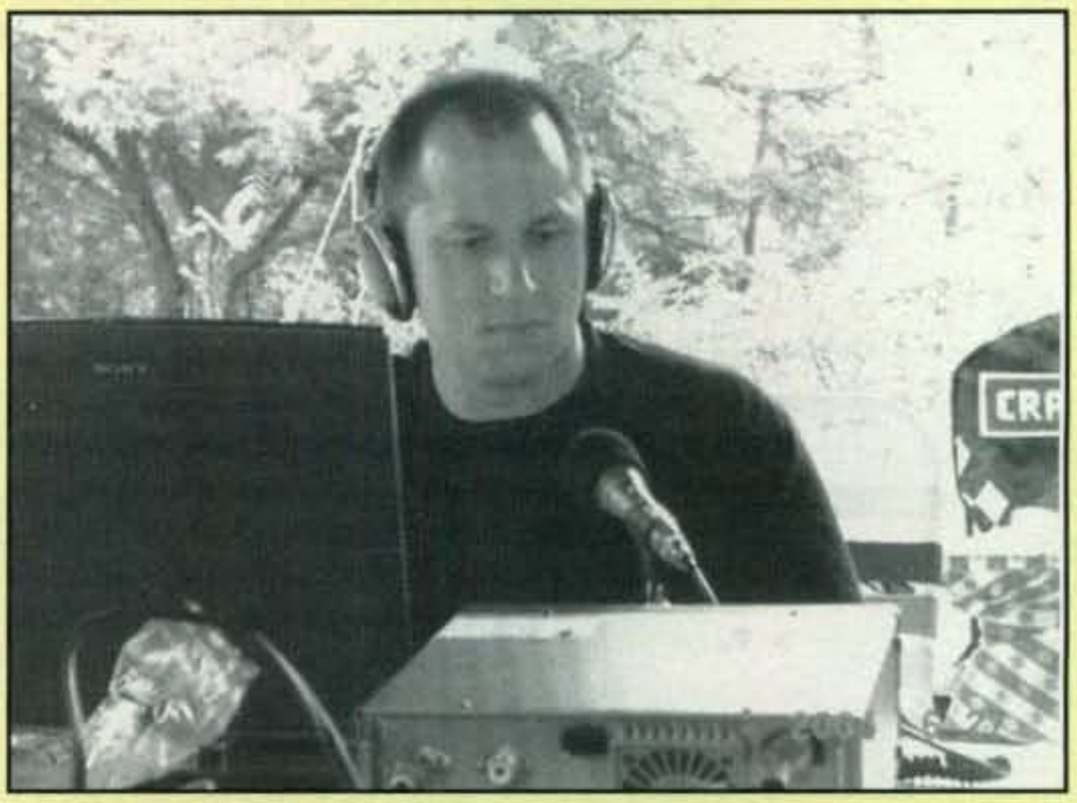


The VHF Century Grid Award is for those VHF enthusiasts who use WSJT or other high-speed meteor-scatter propagation techniques to work long distance on 6 and 2 meters.

The Kings County Repeater Association sponsors the Five Borough Award to promote awareness of the political subdivisions of New York City.

John M. Hoyt, W5UGD
USA-CA All Counties #1103

This time we hear from John, W5UGD, who was awarded USA-CA All Counties #1103 on September 30, 2004.



John Hoyt, W5UGD, USA-CA All Counties #1103, September 30, 2004.

Hey, I did it! Now let me tell you why . . . My mom and dad were avid county hunters when I was growing up, and boy was it annoying to stop on county lines on every trip so they could "put out a county." Now, 30 years later, I am grown up and I do the exact same thing. In fact, most trips revolve around what counties I can put out!

I guess county hunting is special to me primarily because it is something I share with my father (Dick, W5RIT) and my late mother, the original holder of W5UGD. Mom (Violet "Suzie" Hoyt) died in 1997, and I applied to the FCC to get her callsign via the Vanity licensing system. On November 12, 2001, after upgrading to General class, I worked my first county. That contact was with my dad while he was mobile in his home county of Washington, AR. I was at home in Anderson, SC using the TS-430 I had borrowed from him and a short B&W whip antenna hanging out the window of the "shack." Almost three years later and I have finished up the first time!

The real honor for me will not be the beautiful certificate from *CQ* magazine, but the fact that my certificate will hang side-by-side with my mother's, and eventually with my dad's.

Here are some interesting facts:

Most of the contacts were on 20 meters SSB via the County Hunters Net. A large number of them were while I was mobile using an ICOM 706 Mk2G and ATAS 100. The rest were made with a very low G5RV antenna (18 ft. at the center). The secondary rig was a TS-570D.

The MARAC chat room was a huge asset, as were the K3IMC Special Needs list and the many individuals who went out of their way to put out the counties I needed.

Jerry, KAØLJO, put out the last county for my "whole ball of wax"—Franklin, NE. Thank you, Jerry!

I would also like to thank Jim, K2JG/KZ2P, for all the work he does for us. It would have taken many years to finish up without him there to assist. There are quite a few people whom I would love to thank personally here, but space does not permit it. Just know, you *are* appreciated!

As I write this, it is almost time for me to load the car and head off to my third "3M," the MARAC South Eastern Mini Convention, where county hunters meet each year in Tennessee. At the last 3M someone asked me what my most memorable county hunting moment was, and without question it was when I was putting out a county line and looked in the rear-view mirror to see an 18-wheeler coming up behind me with his trailer off the road, sideways. I guess you figured it out already . . . He missed me, but I now hesitate to run interstate county lines, and when I do, I watch the rear-view mirror a little more closely, not that I could avoid the hit if I saw it coming!

In case you are wondering, county hunting is not all I do. Actually, emergency communications holds the biggest interest for me. I am the ARES Emergency Coordinator for Pickens County, SC and also enjoy Sky Warn, fox hunting, APRS, PSK31, SSTV, satellites, kit/project building, and participating in local clubs, especially the Foothills Amateur Radio Club (www.wt4f.org).

Thanks to all who helped me get USA-CA #1103! This was a hard goal to achieve, and though frustrating at times, over all it has been a very enjoyable experience. The second time around will be easier, though . . . no more MRCs, no more postage, no more writing everything by hand since I switched to computer logging!

—73, John, W5UGD

W5UGD's Favorite County Hunter Resources

Live county spots, as well as real-time chat with other county hunters, are available at <www.superhosts.net/marac.html>. Almost every mobile running anywhere is "spotted." Several bands and modes are watched by this group.

W6RK has made a very nice web interface for live spots from the chat channel and a search engine to find past spots from the database of over 30,000 runs! <http://ch.w6rk.com>

K3IMC provides a website with forums, special needs, wants, etc. Go to <www.cquest.com/ch>.

KK7X's <www.CountyHunter.com> has forums and more.

MARAC offers the county hunter a lot, too. You can join by going to: <www.marac.org>.

cants should be sent to: Terry Hosack, WA3LTB, 9852 Martin Avenue, Lake City, PA 16423 (e-mail: <wa3ltb@juno.com.; on the web: <http://www.vkc.com/wa5uth/>).

Five Borough Award. Everyone should be able to locate New York City on a map of the United States, but not all realize that the city is divided into five boroughs (Brooklyn, Manhattan, Queens, Staten Island, and The Bronx), all of which are separate counties. The Kings County Repeater Association sponsors this award to promote awareness of these political sub-divisions.

The award is offered for two contacts with each of the five boroughs of New York City, for a total of ten contacts. Mobile and portable contacts are not permitted unless they are with a Special Event station operating within the confines of New York City. All bands and modes, including PSK31. No use of repeaters or packet allowed. Photocopies of the cards should be attached to your application. The application is available at <http://www.kc2ra.org/award.htm>, or send an SASE to the address shown below. Send application and fee of $US5 to: KCRA Five Borough Award, Ed Madison, W2SN, P.O. Box 280285, Brooklyn, NY 11228-0285.

With the start of a new year, it is also time to promote your group or club's awards program. Send the information to me and *CQ* magazine will provide the publicity you need.

73, Ted, K1BV

60 Great Things About Ham Radio

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

Let's get started …

1. Ham radio works when nothing else does—This is what keeps us "in business," so to speak. The primary reason we still have frequencies and government agencies around the world go to the trouble of testing and licensing us is ham radio's unparalleled ability to get through when nothing else will. When disasters knock out or overload traditional communications systems, ham radio still works, still gets the message out.

2. Being a ham makes you part of a worldwide community—Your ham license is your membership card to a *unique* worldwide fraternity. No matter where in the world you are, if there's a ham nearby, you have a friend.

3. Unexpected band openings— You read the charts, you check the solar flux, and you know that by all rights the band you're on should be dead as a doornail. But there it is, defying all logic, a band opening that lets you make the "impossible" contact. And if you're lucky enough to be there, make the contact, and get the QSL card, you get bragging rights until the next unexpected band opening comes along.

4. Working DX while mobile or hiking —Until recently, only a select few had this capability, but today it's increasingly common. And what a thrill it is to be driving down the road, or hiking on a trail, and talking to someone halfway around the world. It's nearly as much fun to be at the other end of such a contact.

5. Where else can you play with meteors?—This is my son's favorite reason for becoming a ham (which he hasn't done yet!). But think about it. What other hobby gives you the chance to use natural phenomena such as meteors, the aurora, or the ionosphere as part of your everyday activities?

We'll be back next month with another installment…

Don't Forget! Join in the CQ Gang Activity

In honor of *CQ*'s 60th anniversary this year, we're sponsoring a special on-the-air activity during the first 60 days of 2005, from January 1 through March 1. Any ham who's ever had any connection with *CQ* magazine, as a columnist, author, or even subscriber, may sign "/60" after his or her callsign during this period and everyone's invited to contact enough "/60" stations to qualify for the "CQ Gang Award."

Plus, CQ club station WW2CQ will be on the air from around the country, signing "/61" for operation in the first call area, "/62" from the second call area, etc. We're offering a special certificate for contacting WW2CQ in all ten US call areas. See complete details on both the CQ Gang Award and the WW2CQ operation in last month's issue of *CQ* (December 2004, page 22), or on our website at <http://www.cq-amateur-radio.com>.

Oops…

Mystery Ops Identified

When the November issue of *CQ* went to press, we didn't have a complete list of the ham operators shown in our photo from the National Hurricane Center that ended up on the cover. At the time, we opted to list no names rather than a partial list. We now have the complete list. Amateurs shown at the National Hurricane Center, WX4NHC, are, from left, John McHugh, K4AG; Joanne Carbana, KG4GKU; David Knight, WN4F; Caesar Carbana, KG4BZA (OM of KG4GKU); and Julio Ripoll, WD4R. Tnx to WD4R for the photo and the IDs.

QPC Correction

In both our October and November issues, in listing the new members of the National Conference of Volunteer Examiner Coordinators (NCVEC) Question Pool Committee (QPC), we accidentally omitted the name of former QPC Chairman Scotty Neustadter, W4WW. He continues to serve as a member of the committee. We apologize for the omission.

BY JOHN DORR,* K1AR

Measuring Contesting's Gray Line

January's Contest Tip

I have found beacons to be quite useful under so-called "dead band" conditions. Many times when hearing nothing on 10 meters, for example, I'll tune to the 10-meter beacon frequency (28.200 MHz) and listen and find that many of them can be heard (even at low power levels). You can find out more information about available beacon stations by visiting <www.ncdxf.org/Beacon/intro.html>. It's not a cure-all, just another tool in the toolbox. *(Tnx to Bob, K1VU)*

Calendar of Events

Dec. 18	OK DX RTTY Contest
Dec. 18	RAC Winter Contest
Dec. 18–19	Stew Perry Topband Challenge
Jan. 8–9	ARRL RTTY Roundup
Jan. 8-9	North American CW QSO Party
Jan. 9	NARU-Baltic Contest
Jan. 9	Kid's Day Contest
Jan. 15–16	Hungarian DX Contest
Jan. 15–16	North American SSB QSO Party
Jan. 22–23	BARTG RTTY Sprint
Jan. 22–24	ARRL January VHF Sweepstakes
Jan. 29–30	**CQ WW 160 Meter CW Contest**
Jan. 29–30	REF CW Contest
Jan. 29–30	UBA SSB DX Contest
Feb. 5	Minnesota QSO Party
Feb. 6	North American CW Sprint
Feb. 5–7	Delaware QSO Party
Feb. 12–13	**CQ WW RTTY WPX Contest**
Feb. 26–27	**CQ WW 160 Meter SSB Contest**
Mar. 27–28	**CQ WW WPX SSB Contest**

For the record, this is not a column devoted to propagation. For that you need to turn a few pages and read what Tomas, NW7US, has to say. When it comes to a discussion about contesting's operational gray line, there is a whole lot to talk about, and this is the place we're going to do it . . . and none of it has anything to do with the sun.

On the various Internet e-mail reflectors and elsewhere over the past few weeks, there has been endless dialog around one central theme: How should we interpret and take action on the gray areas of contest rules? Put another way, is contesting like doing your taxes? Is there a certain measure of interpretation that needs to take place regarding the rules that guide how you act when things are not so black and white? Frankly, I've been surprised by how many people have reacted to the subject. In fact, so many of you became engaged in the discussion that it only seemed right to put the subject on stage in this column.

Most of you have heard the old cliché that being honest in life allows one to sleep soundly at night. To set the record straight, we're not going to have a discussion about the ethics of contest operators. That subject will have to be reserved for another day. The issue at hand actually has nothing to do with cheating *per se,* but with the legitimate interpretation of contest rules and how they get implemented in the heat of battle.

Over the years, contest adjudicators have done a masterful job of defining contest rules in a way that leave little to the imagination. It's a good thing that this is the case, as I don't think very many of us are ready to hire a lawyer before submitting our next contest scores. Of course, there have been a number of mid-course corrections over the years, many of which evolved with the advancement of technology and other factors. I'm sure some of you remember a famous addition to the CQ WW rules that specifically precludes the use of non-amateur radio communications during a contest to solicit QSOs. This was in response to a famous multi-op entrant who used the telephone to arrange schedules and QSOs, which at the time was not expressly prohibited. It's exactly situations such as this that are in the spirit of what we will discuss this month.

When it comes to staying on the proper side of contest rule interpretation, most of us subscribe to what our "gut" tells us. In reality, it's really not more complicated than that. In a recent e-mail message published by K5TR, George outlined several examples of where he does not cross the line, as follows:

- Making skeds before the contest.
- Sending e-mail messages "reminding" people to work me in the contest.
- Warming up a frequency 30 minutes before the contest. (I will get on and tune around a bit and work some guys to find out if my station is still working.)
- Using other bands in the 10-meter contest or in a single-band effort to find stations and move them to the band I am on for the weekend.
- Using databases of past exchanges or callsigns (e.g., super check-partial).
- Using packet to fill up the band maps before the contest starts and then turning it off as the contest begins while operating as a single operator.
- Running my amp when I am low power in an effort to get to the 150- or 200-watt limit.
- Having my friends feed me callsigns that no one else will work.

In addition to George's view of the world, there are other factors to consider, especially as they pertain to the single operator class, as follows:

- The legitimacy of having access to real-time Internet-fed propagation data.
- Establishing instant-messaging connections with other stations (not to obtain operating intelligence, but simply to chat).
- Utilizing a packet connection for the express purpose of outbound spots only.
- Having access to logistic support during a contest, ranging from food being served for you to the host operator fixing things on your behalf during the contest (e.g., equipment, antennas, computers, etc.).

As you quickly can see from the lists above, there are no clear answers to managing these issues (at least some of them). When considering K5TR's list, I personally agree that "spamming"

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the contest world with e-mails about your pending operation is not in the spirit of the rules. That said, I'm not so sure that establishing a run frequency before a contest begins is crossing any ethical lines. Nor do I agree that the use of super-check partial tools is violating any interpretation of the rules, provided you continue to actually copy and log what you hear.

An interesting sidebar to this subject is the way the interpretation of contest rules bleeds into some of the ugly habits that we now experience in modern contesting. For example, using a check-partial tool is not a rules violation, but it has fostered a shift from good, old-fashioned on-the-air data capture to dependency on what the computer tells you. The same problem exists for packet spotting. Let's allow the tool to give us the answer at the expense of getting it right ourselves. In recent weeks I've even seen some requests for an extension of call-sign databases to also include contest exchanges (such as for ARRL Sweepstakes). If these behavioral trends continue, one has to wonder why anyone would bother to operate a contest anymore. Let's just let the computers duke it out and may the best network win! The fact is, most of this nonsense actually hurts your score by virtue of bad data. The old-fashioned technique of actually copying stations "on the air" mercifully continues to prevail!

Given that so many of you have already expressed opinions on this month's subject demonstrates to me that the desire to do the right thing is what is really on most of your minds. To a certain extent, too, there is a fair measure of polarization. The extreme right would suggest that a contest starts at 0000Z and that's when the operator should sit down in the chair and begin the contest. There will be no pre-contest tuning, checking propagation on the various bands, running strings of stations, etc. In their minds, it's like starting a running race without the customary stretching of your leg muscles. The other extreme is endless pre-contest publicity (disguised under the auspices of ensuring that everyone is aware of the "rare one" that's about to come on), pre-contest skeds, "thanks for calling and please stay here for the next 20 minutes and work us in the contest," and on it goes.

At the end of the day, most of us know how to do the right thing when figuring out the limits of contest operating and the rules that guide us. It comes down to one simple question that you need to ask yourself: Are the actions I'm taking outside of the spirit of what was intended and do they provide me with an unfair competitive advantage? The other challenge I would offer is for you not to fall into the trap of convincing yourself that because you have big antennas, fast computers, and strong ergonomic station design you are entitled to other advantages as well. Reality teaches us that not all station "enhancements" are created equal in the eyes of the adjudicators. Having the ability to own the band edge for hours at a time is not the same as asking a friend to hold it for you while you take five minutes to execute a "bio break." Being a system administrator for a packet node is not the same as feeding yourself with tons of internet-generated automated information that you did not discover on your own "single op" time.

I realize that in writing this month's column I sound a bit like I'm lecturing. To be honest, I've struggled with many of these issues myself and wondered how to draw the line. The important thing is for all of us to consider them often and be open-minded to other opinions. Peer pressure is one of contesting's greatest assets. If you feel comfortable sharing your rulemaking interpretations with the masses, then you're likely to be doing the right thing. If public opinion says you should change a particular behavior, then do it! That's just one of many factors that make contest competitors into great ones.

What do you think? Don't hesitate to let me know.

Final Comments

I think it's safe to assume that I'll be getting my share of e-mail responses to this month's topic. On the other hand, maybe you're all sick of the subject and want to move on. Whatever your response, taking the occasional introspective look at your operating habits is a good thing and I encourage it.

Again, I have to apologize for delaying the CQ Contest Survey results for one more month. The good news is that you have responded with new levels of participation. The challenge is that you have deluged me with data at a time that is particularly crazy for me at work (yes, there are things other than ham radio to keep us busy!). Thanks in advance for allowing me one more month on this one!

For now, be sure to enjoy the winter conditions on the low bands (with apologies to the Southern Hemisphere). There are going to be some great DXpeditions and contests coming up over the next few weeks. See you on the air for sure! 73, John, K1AR

BY TOMAS HOOD,* NW7US

PropNET; Good Conditions for '05

A Quick Look at Current Cycle 23 Conditions

(Data is rounded to nearest whole number)

Sunspots
Observed Monthly, October 2004: 48
Twelve-month smoothed, April 2004: 46

10.7 cm Flux
Observed Monthly, October 2004: 106
Twelve-month smoothed, April 2004: 112

***Ap* Index**
Observed Monthly, October 2004: 9
Twelve-month smoothed, April 2004: 16

An automated and well-organized beacon effort has been developed on 10 meters and above. Much like BeaconNET, which uses additional HF bands, PropNET <http://propnet.org/> gathers beacon data using computers and helps not only in discovery of openings, but has helped discover details about propagation modes.

PropNET is a tool, an ionospheric and propagation probe, and not a substitute for being a good operator. It runs in the background on a computer and uses an idle radio. When you see an opening, you can pick up the microphone, or dust off the key or bug, and start making contacts.

PropNET uses APRS technology via either PSK-31, known as PropNET^31, or AX.25 (Packet), known as PropNET.25. PropNET.25 is no simple propagation beacon system. It is a full-function transmit and receive network that not only uses the concept of "digipeating" to extend one's vision of propagation conditions, but it is also capable of keyboard-to-keyboard messaging once a path is established.

The concept is simple. Participants embed their 6-cypher grid locator in each transmission. When another PropNET participant decodes that transmission, a symbol is placed on the receiver's computer screen. This symbol corresponds to the transmitting station's exact location on a map. If the band is "open," a symbol appears. If it is not, then no symbol appears. This is much like APRS, but for propagation openings.

PropNET^31 does things much the same way, but does not allow for digipeating. To join in, you need a standard PSK-31 sound-card audio connection between your computer and transceiver (visit <http://www.packetradio.com> for plans), special PSK-31 "modemware," and then the software that controls it all (see <http://propnet.org/> for software options).

This ad-hoc PSK-31 and AX.25 network of propagation enthusiasts probe the ether for previously unknown openings. Sometimes they stumble across long forgotten or yet to be officially discovered phenomena.

Compare the useful information that is conveyed in a typical PropNET transmission with that of a CW beacon or a voice QSO that is in progress. PropNET is geometrically a more powerful tool than either of those methods of determining the quality of an opening.

After some observation, a PropNET observer should be able to determine if a 25-watt PropNET^31 catch is equivalent to a 100-watt SSB "opening" in a particular direction, at least for the observer's latitude. By the same token, some folks may wish to use PropNET^31 as a "wake-up alarm." Even if the band can't propagate SSB (or even CW) at 100 watts, knowing that the band is open for 25-watt PSK-31 gives them hope.

Incidentally, K1JT (of WSJT fame) says PSK-31 is only 3 dB less effective than his well-respected system. Of course, 3 dB can be the difference between making and not making a contact. This begs another question: What defines a "band opening"? A band can be "open" for a 1 KW station, while not for a 10-watt station.

The PropNET work is particularly significant because it is the first generation of propagation beacons for amateur radio's digital millennium. No other system comes close to what PropNET can do. Folks just need to start to think differently about propagation research.

10-meter Beacons. There is an active group of 10-meter "activists" who work hard to keep the 28- to 29-MHz band alive, no matter what phase of the solar cycle we go through. This is a large group known as Ten-Ten International <http://ten-ten.org/> and is made up of members from around the world. Many members have been with the group for many years and have seen at least one complete solar cycle. Others are new and are just beginning to discover the unique challenges of working 10 meters during the decline of a solar cycle.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected forJanuary 2005

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 7-14, 16-19, 21-27	A	A	B	C
High Normal: 15, 20	A	B	C	C-D
Low Normal: 5-6	B	C-B	C-D	D-E
Below Normal: 1, 28	C	C-D	D-E	E
Disturbed: 2-4, 29-31	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 fair to poor (C-D) on Jan. 1st, poor (D) on Jan. 2-4, and fair to good (C-B) on Jan. 5-6, etc.

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e-mail: <cq-prop-man@hfradio.org>

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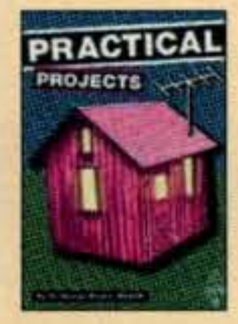

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RSGB, 1st Ed., 2000, 208 pages.
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RSGB Prefix Guide

By Fred Handscombe, G4BWP.
RSGB. 6th Ed., 2003. 48 pages.
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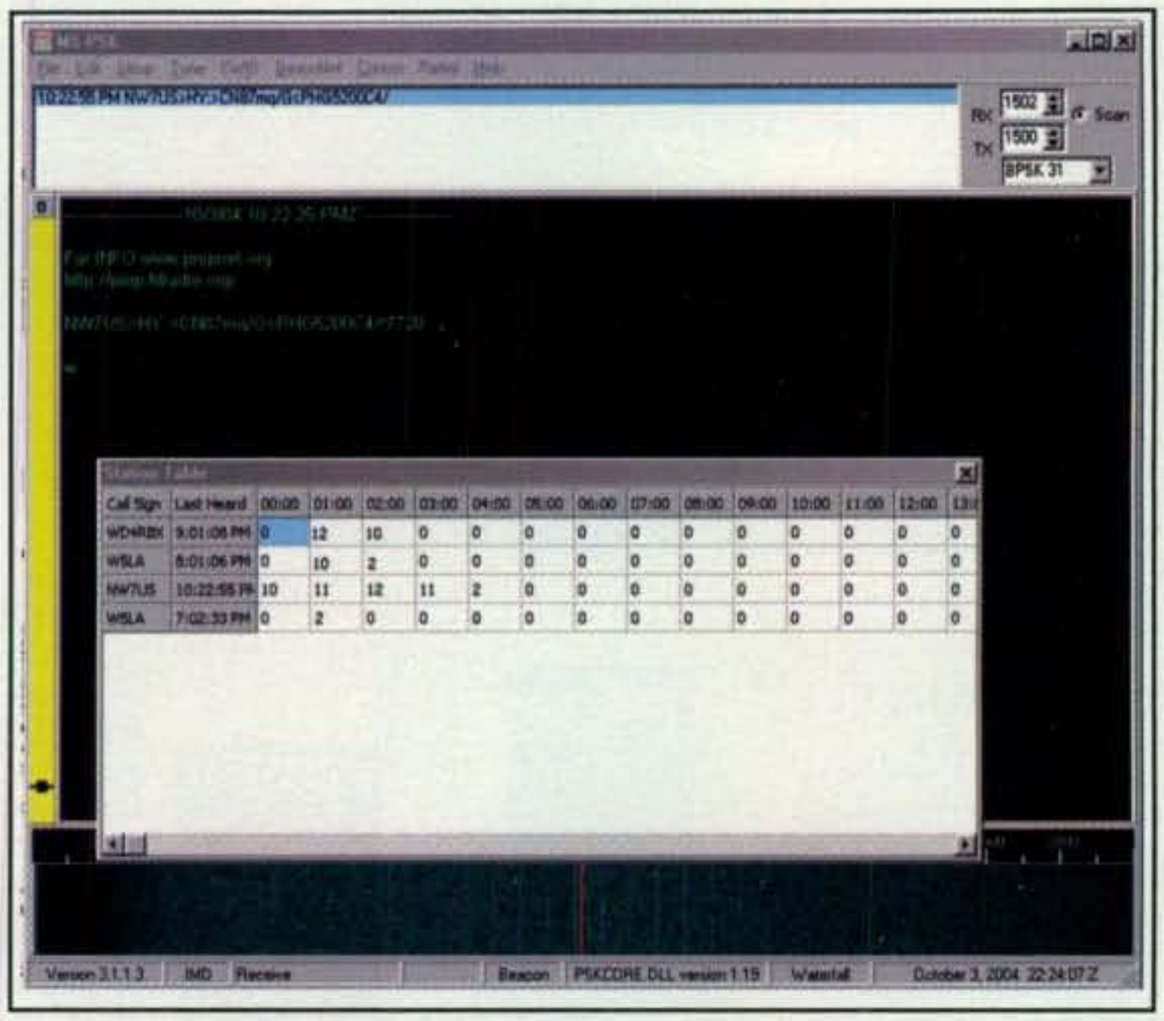
A screen capture of the PropNetPSK software running with six concurrent channels. This shows how six different beacons may be "captured" at the same time on a 400-MHz Pentium computer. It shows the waterfall with a trace signal being decoded in one of the channels (channel 5, colored purple).



This view of MS-PSK software shows the stations that the PSK-31 beacon software heard.

PropNET on 10 meters is a very useful tool for such a large group of avid hams to take advantage of. If we could drum up some more interest among 10-10ers, especially as conditions become more challenging, we might be able to illustrate its value to individual operators.

Some of the PropNET participants who have been active with a 10-meter beacon many times have witnessed when 10 meters is open but nobody knows. They then take advantage of this by calling and contacting operators in areas of the country that the PropNET systems show to be active at the time, often even when the DX Clusters or the 10-10 list isn't showing any activity to or from the area. I encourage anyone who has fun operating 10 meters to power up on PropNET and set up your probes, especially as the cycle wanes.

Speaking of PropNET and Research...

Rich, WD4RBX, is one of several people who are using PropNET to discover new facets of propagation on 10 meters, as well as on VHF. Rich is trying to see if a meteor burn at 10 meters could propagate a PSK31 signal. He is looking for amateurs who are in the right geographical areas to join the PropNET. He plans to use the NAVSPASUR radar along with PropNET data to show the meteor burn at 218 MHz and PropNET station at 10 meters or above.

Another project WD4RBX is working on with the team is seeing if it is possible for a radio wave to bounce off two well-timed meteor burns. Ev Tupis, W2EV, explained that this propagation research (using a non-amateur transmitter, NAVSPASUR, as a signal source) explores the several theories going around about the ability to link two well-placed meteor burns to allow for multi-hop meteor-scatter QSOs. To date this is not a mode that has been authoritatively observed at amateur power levels on any band.

With that in mind, Rich stepped forward to attempt to document a double-hop meteor-scatter (MS) ping using the NAVSPASUR curtain. His location is almost perfect for such an attempt. If Rich can document a ping from a 218-MHz 1-megawatt NAVSPASUR station that is farther than a single MS hop away, then we at least can infer that the mode is possible. The next question is if the success (if/when it occurs) can be duplicated on 2 meters at amateur power levels. If it can, then a bunch of things "change" in our understanding of what we amateurs can do.

At one time, a group of PropNET participants—including Butch Mason, W6KAG, Ev, W2EV, and others—explored the data gathered by the PropNET software running at Rich's station and compared it with the NAVSPASUR radar at Gila River, Arizona. Rich was sending Butch captured PropNET waterfall images. Rich thought that they were meteor reflections, but Butch kept asking, "Do you realize the significance of what you have captured?" Butch and others feel that they may have captured images that prove that LEO satellites drag ionization with them. Butch told Rich that this was theorized back in the 1960s. Rich plans to dig deeper into this soon.

The KF6XA/W3NRG propagation experiments have resulted in almost four years of data on rather unique paths that exist between these two stations. The effect was first noted in WW II military research on propagation work on the West Coast. The most recent article covering this work was published in the TAPR/ARRL 2004 Digital Communications Conference Proceedings.

N7YG and W3NRG have been experimenting with real-time text to speech "translation" of PSK-31 data strings. This work resulted from the community of ham contacts assembled by the BeacoNET/PropNET effort by Ev Tupis. Where it relates to propagation is in the fact that you can monitor DX activity on the PSK-31 frequencies without having to look at a computer screen. That work is documented on pages 48 and 49 of the October 2004 issue of *CQ*.

Another project of exploration is Aircraft scatter, which will require a dedicated 223-MHz or other VHF/UHF PropNET station at the other end. Or, how about exploring whether a radio signal on 10 meters, 2 meters, and higher is being bounced off satellite ionization and no one knows it? If enough people take a dedicated interest in PropNET, we can find the answers to this and many more questions.

If you are a VHF/UHF and above contester or maybe going for some distance record, you certainly would want to know what types of propagation could exploited, especially something no one has ever tried to use. There might not

be any other group better equipped than PropNET to find the answers.

Thanks to daily reporting programs authored by N7YG and others, some of the PropNET participants have 10-meter coast-to-coast propagation records going back over four or five years. This collection of important propagation data enables research of the modes and trends as we came off the peak of the current solar Cycle 23.

To learn more about PropNET, and to download the software and installation and configuration instructions, visit <http://hfradio.org/propnet-info.html>. The official PropNET site is <http://propnet.org/>.

Good Conditions for 2005

Here is an overview of expected propagation conditions on each amateur band between 6 and 160 meters for 2005.

6 Meters: About the only real action on 6 meters will be during the summer season's troposcatter and sporadic-*E* activity. Aurora will play a minor role during spring and fall. Meteor-scatter propagation might offer an occasional peak in activity, as well.

10 and 12 Meters: These bands will be fair to poor, except during times of sporadic-*E* activity. Expect most DX openings to be mostly on north and south paths. Most of the time the solar activity will not support propagation on higher bands.

15 Meters: This band will be fair to good, seeing worldwide openings during the daylight hours of all seasons. Most openings, though, will be short, except for the strong and frequent north/south path openings.

17 Meters: This band should behave much like 15 meters, but you will find it open more often, with it remaining open for DX an hour or two longer than 15.

20 Meters: This band is going to be the main player during this year of moderate solar activity. Expect good conditions during the daylight hours, with worldwide DX openings possible throughout the year. DX conditions on this band tend to peak for a few hours after local sunrise and again during the sunset period. During the summer expect this band to remain open for DX several hours after local sunset, occasionally later into the night. In the winter months of 2005 some nighttime DX openings are expected.

30 Meters: As Cycle 23 continues to decline in activity, this band will offer moderate openings, especially a few hours before sunset until a few hours after sunrise. In 2005, 30 meters will be an exciting band for those low-power digital signals. Winter brings longer nights, providing the right mix for exceptional worldwide DX.

40, 60, 80, and 160 Meters: These are nighttime DX bands. Great worldwide DX should continue on 40 meters from about two hours before sunset to approximately two hours after sunrise during all seasons. Expect coast-to-coast DX on 60 meters. DX openings on 80 and 160 should peak during the early spring, late fall, and winter months. Expect somewhat stronger signals than those of last year.

January Propagation

It should be a toss-up between 15 and 17 meters for some great DX propagation openings during the daylight hours. These bands should open to most areas of the world, often with very strong signals. Fifteen meters may have a slight edge before noon, with 17 meters taking the lead after noon and becoming the optimum DX band during the late afternoon hours. Short-skip openings between distances of about 1200 and 2300 miles should be excellent during the daylight hours. Excellent short-skip openings are expected on 15 and 17 meters from shortly after sunrise through the early evening hours for distances between 1000 and 2300 miles.

Twenty meters is expected to be a solid band with excellent around-the-clock openings for both DX and short-skip. DX conditions should peak during a window of an hour or so right after sunrise and again during the late afternoon and early evening hours. Short-skip openings between approximately 1300 and 2300 miles should be possible from just after sunrise to as late as midnight. Shorter distance openings should also be possible from mid-morning to mid-afternoon.

The optimum band for DX conditions during the hours of darkness should be 40 meters. Expect openings to most areas of the world from shortly before sundown, through the hours of darkness, and until shortly after sunrise. Signal levels may be exceptionally strong at times. During the daylight hours, short-skip conditions should be optimal for openings between approximately 100 and 600 miles. Skip will lengthen during the late afternoon, and by nightfall short-skip conditions should be optimal for openings between 800 and 2300 miles.

Expect 60 meters to play a significant role in nightly DX across the United States. With very low noise levels this month, the weaker signals of 60 meters will be easy to copy.

Because atmospheric noise levels

Unexpected 2004 WW DX SSB Contest Conditions

The 2004 CQ World-Wide DX SSB Contest weekend of October 30–31 started off with great conditions. The few days leading up to the contest saw quiet to active geomagnetic conditions (with single-digit planetary *A*-index [*Ap*] readings), so the ionosphere was mostly stable. What's more, the sun had decided to wake up a bit and provide moderate activity. The week prior to the start of the contest, we saw the 10.7-cm solar flux index stay between 140 and 129. By the start of the contest, most of the HF contest bands were usable and contestants were excited by the opportunity to experience great contest conditions.

However, not more than a short while into the contest and the geomagnetic field became active, with planetary *K*-index (*Kp*) readings as high as 4. This was due to the minor influence of a Southern Hemisphere solar coronal hole. This elevated the solar wind speed, and the Interplanetary Magnetic Field's orientation moved southward, causing the geomagnetic field to become unsettled to active.

Also, as the contest period started, active sunspot region 691 developed new polarities that spawned three successive M-class flares. Then, at 1136 UTC, an X1.3 flare erupted, peaking at 1146 UTC. A small enhancement of the proton flux was also observed in GOES data. This flareup was totally unexpected by forecasters around the globe.

Geomagnetic activity tends to cause a recombination of the ionosphere, much like what happens during the hours of darkness. This lowers the frequencies that are refracted by the ionosphere over a given path, by up to 30% during the stronger storms. The activity on the first day of the contest depressed the usable frequencies on some paths by about 10% to 15% under that of normal conditions based on the flux level observed. This put some brakes on low-frequency performance, and clipped the wings of the higher band signals. DX cluster spotting on the low bands did not indicate as high an activity level as was expected, although that could have been due to the lack of reporting by contest stations. Nevertheless, the geomagnetic conditions and the series of flares did not seem to cause too much of a degradation, at least from the perspective of 10-, 15-, and 20-meter DX spots shown on the reflectors. On Saturday, Pete, N4ZR, wrote to me to report that "at this QTH, 10 meters is showing 46 mults and 106 new stations spotted in the last 30 minutes. Not bad for this part of the cycle, I'd say."

By the second day the geomagnetic activity settled down nicely and the higher bands really came alive. The highest *Kp* reading during the last day of the contest was 3. With an increase in solar activity, even 10 meters was a major player in the 2004 WW SSB Contest.

The solar-flux indices for the contest weekend were better than expected, with 136 for October 30 and 139 for October 31. This is not much lower than the last few contest years. Sunspot counts were 153 and 163 for each day. The *Ap* was 17 on the first day and 10 on the second day.

will be at seasonally minimum levels in the Northern Hemisphere during January, the 80- and 160-meter bands should also be hot. Expect some good openings to many parts of the world on 80 meters during the hours of darkness and the sunrise period. Short-skip openings between distances of 50 and 250 miles should be optimal on 80 meters during the daylight hours. During the later afternoon and early evening hours, short-skip openings should increase to between 250 and 1500 miles, and by nightfall openings up to and beyond 2300 miles should be possible.

Expect some DX openings on the 160-meter band during the hours of darkness. Openings towards Europe and the east should peak at about midnight. Openings towards the South Pacific and in a generally southerly direction, as well as openings into Asia and North Pacific, may be possible just before daybreak. Short-skip openings up to 1300 miles should be possible during the hours of darkness, and frequently the skip will extend out as far as 2300 miles. During the daylight hours intense ionospheric absorption will severely limit openings, although some may be possible at times up to 150 miles or so.

VHF Conditions

Sporadic-*E* can occur during January, so be on the lookout. Very little aurora is likely to occur, however, so don't expect auroral-*E* propagation.

The *Quadrantids* meteor shower is the major meteor shower for January and it can appear any time during the first week of January. This can sometimes be quite intense, so it may be a good idea to set up some 2- and 6-meter schedules. Morning meteor openings may be the best bet during this month. The hourly rate can be as high as 120 this year. View <http://www.imo.net/calendar/cal05.html> for a complete calendar of meteor showers in 2005.

Check out my *CQ VHF* magazine propagation column for an in-depth look at propagation on VHF and above.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for October 2004 is 48, up from September's 28 and August's 41. The lowest daily sunspot value during October was recorded on October 10, with a count of zero. The highest daily sunspot count was 99 on October 24. The 12-month running smoothed sunspot number centered on April 2004 is 46, a point under March. A smoothed sunspot count of 25 is expected for January 2005, 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 106 for October 2004, up three points from September. The 12-month smoothed 10.7-cm flux centered on April 2004 is 112, down from March's 115. The predicted smoothed 10.7-cm solar flux for January 2005 is about 87, give or take about 16 points.

The observed monthly mean planetary *A*-index (*Ap*) for October 2004 is 9,

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. On 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.

CQ Short-Skip Propagation Chart
January & February 2005
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	10-15 (0-1)	10-15 (1) 15-16 (0-1)
15	Nil	10-16 (0-1)	08-10 (0-1) 10-15 (1-2) 15-16 (1) 16-18 (0-1)	08-09 (1) 09-10 (1-2) 10-15 (2-3) 15-16 (1-2) 16-18 (1) 18-19 (0-1)
20	Nil	08-10 (0-1) 00-12 (0-2) 12-14 (0-3) 14-16 (0-2) 16-22 (0-1)	06-07 (0-1) 07-08 (0-2) 08-10 (1-4) 10-12 (2-4) 12-14 (3-4) 14-16 (2-4) 16-17 (1-3) 17-18 (1-2) 18-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (4) 16-17 (3-4) 17-18 (2-3) 18-19 (1-2) 19-20 (1)
40	07-09 (0-1) 09-10 (1-3) 10-11 (3) 11-15 (3-4) 15-16 (3) 16-18 (1-2) 19-20 (1-2) 18-20 (0-1)	07-08 (1-2) 08-09 (1-3) 09-11 (3-4) 11-15 (4-3) 15-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-02 (0-2) 02-07 (0-1)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-16 (4-2) 16-18 (3-4) 18-20 (2-4) 20-02 (2-3) 02-07 (1-2)	07-08 (2-1) 08-15 (1-0) 15-16 (2) 16-18 (4-3) 18-20 (4) 20-02 (3-4) 02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-18 (4) 18-21 (2-3) 21-23 (1-2) 23-03 (1) 03-07 (0-1)	07-08 (2) 08-10 (4-2) 10-16 (4-1) 16-18 (4-2) 18-21 (3-4) 21-23 (2-3) 23-03 (1) 03-07 (1-2)	07-08 (2-1) 08-10 (2-0) 10-16 (1-0) 16-18 (2-1) 20-21 (4) 21-23 (3-4) 23-03 (3) 03-07 (2) 18-20 (4-3)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-06 (2) 06-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1) 07-08 (1-0)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

ALASKA
Openings Given In GMT#

To:	10/15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	21-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	03-10 (1) 10-12 (2) 12-13 (1)	07-12 (1)
Central USA	20-23 (1)	18-22 (1) 22-00 (2) 00-02 (1)	03-11 (1) 11-13 (2) 13-14 (1)	07-12 (1)
Western USA	20-00 (1)	17-18 (1) 18-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	04-05 (1) 05-12 (2) 12-15 (1) 15-16 (2) 16-17 (1)	05-12 (1) 12-15 (2) 15-17 (1) 12-15 (1)*

HAWAII
Openings Given in HST#

To:	10/15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	06-07 (1) 07-08 (2) 08-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1)	19-21 (1)* 21-01 (2) 01-03 (1) 23-02 (1)*
Central USA	06-07 (1) 07-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1)	19-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-05 (1) 23-03 (1)*
Western USA	12-15 (1) 06-07 (1) 07-08 (2) 08-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1)	19-20 (1) 20-22 (2) 22-04 (3) 04-05 (2) 05-07 (1) 22-05 (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.
**Indicates best times to listen for F-2 layer openings on 6 meters.
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.

down a point from September. The 12-month smoothed *Ap*-index centered on April 2004 is 16, about one point down from March. Expect the overall geomagnetic activity to be quiet to active during most days in January, although there is a possibility for a strong geomagnetic storm. Refer to the Last-Minute Forecast at the beginning of this column for the outlook on what days this might occur.

Please come and participate in my online propagation discussion forum at <http://hfradio.org/forums/>. I've also enhanced my Space Weather and Radio Propagation center at <http://prop.hfradio.org>, so come take a look. These resources may also be viewed on a cell phone 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'd also love to hear any feedback you might have on what I have written. Until next month . . .

73, Tomas, NW7US/AAAØWA

QRM

Nice pleasure wkg WPX from 3D2 land before T33C DXpedition. . . . **3D2AY**. So enjoyed at the WPX Test because MNI stn QRV on 10m. The day without Test, no one's around there. PSE on the air on 10m!! Am JA's 3rd Class licensed, only 10W output and using whip antenna up about 13mh, MNI TNX 4 UR works! . . . **7K2PBB**. I enjoyed this spring CQ WPX contest. WPX is one of the "must" contests of the year. This year I decided to try 40m and use the 2× 3-el Yagis I installed last year. The condx were not the best with heavy aurora on Saturday afternoon and night. I am very pleased with the result but still waiting for a WPX SSB without aurora. . . . **7S2E**. All clubs in Zagreb can use 9A8Ø prefix plus own suffix till the end of 2004, celebrating 80 years of Radio Club Zagreb, the first radio club established in this part of Europe. . . . **9A8ØA**. I was on target to make more QSOs than last year, but then my voice went (old age and early spring cold) and I was unable to continue. I listened around after going QRT and there was plenty of activity. Never mind. There is always next year to look forward to (hopefully). . . . **9H1DE**. Last hour was HOT! . . . **AB5XZ**. Thank you everyone. All 160 contacts brought me 30,171 pts and near clean sweep W# and K#, missing W2 and W9 and K1, K2, K8, K9. Hope to clean sweep W, K, N next year hi hi! . . . **AD7BK**. Had very loud line noise entire contest. . . . **AE4EC**. OT4A was only six-band QSO! . . . **AK1W**.

A big time to stay with a big friends. Propagation so poor and many QRM because a weekend huge storm (we were on red alarm). Thanks to everyone who call us although we don't hear u. Thanks. . . . **AM5KB**. Very bad conditions on 10m all Sunday. . . . **AM7KJ**. Good conditions, but lack of people! . . . **AN8AH**. Special callsign obtained for Elephanta island; AS-169 for the first time participated in contest from the island. Rig Ten-Tec Triton 540, lovely gift from N7XM and WX7M. Power output only 40–50 watts. Antenna inverted Vee. . . . **ATØBI**. Six hours total. All I could spend due to family commitments and that my XYL doesn't like phone contests! All in all had a great time. See u all in CW part. . . . **BW4/UA3VCS.** We made the setup for a Multi-Two operation this time. The experienced operators were few, and we needed to put the less experienced members operating in a real contest situation. All the best to every participant, we thank all the stations who contacted us and also a very big thanks to everyone who spotted us on the cluster. It was really a big help. . . . **CQ9K**. Not a good condx but I hope that will be new world record. . . . **D4B**. Only worked with dipoles and it is hard, but if you made it, it is fun. Next time I must plan better food preparation and operator feed times. After the contest my TS850 crashed! . . . .**DG7RO**.

This contest is one of the best on short wave. The WPX contest is a very good place to check the daily running equipment. Thanks for the nice activation from a lot of stations around the world, and special thanks to 3B9C for the very good expedition and activation in WPX as well. 73 Mirko DJ1AA/ABØDL/5Z4HU. . . . **DJ1AA**. Most of time signals were "surfing" over the QSB waves! With 100W PEP and a vertical at downtown it's really a challenge. But, as ever, it was a nice contest! . . . **EA3ALV**. My fist WPX Contest. I've enjoy a lot and I hope to repeat again next year from my mobile station. . . . **EA5BWR/M**. After suffering a very crowded 15m during the ARRL contest, I decided it was time for a relaxing contest on 10m, perhaps the last opportunity to work 10m monoband this cycle. Surprising how much DX I was able to work on Saturday. Depressing to see how closed the band was on Sunday. Are we still having fun? You bet! . . . **EA5ON/M**. The band was really humming (20m) with activity and it is hard to believe we are not at the peak of the sunspot cycle! . . . **EI4CF**. Haven't done an Assisted contest for a while. Good fun to chase mults and friends. . . . **GØMTN**. When we did the reconstruction on HB9AEM's portable QTH it was a hot sunny day. But when arriving on Friday we found 25 cm of snow, 20 km off the city of Zurich and not even 800 masl. During the night temp dropped to –8C. A real winter Field Day, but fun it was! . . . **HB75A**.

First contest in 20 years (co-founder of KL7IRT; home call KL7ENY). First time on the air in about 20 years; first time to use computer logging (that is why this is a check log; made too many mistakes). Great to be back on again and giving the HSØ multiplier to many on 10 and 15 meters. Lots of disbelief when they finally got the call right. But this is a really bad call to say after 30 hours! Ran barefoot with a tribander. Tried to do multi-one all low power SSB. . . . **HSØZCG**. First time in contesting. I had so much fun I'm going to contest over and over! . . . **IZ6FXS**. Entry on single-op 80m low power. The condition between the USA and JA was not so good. I could hear many USA stations before the sunrise time of the USA, but I could get no answer from them. When the sunrise time of the USA west coast the condition was getting well. I could get the answer to my "CQ" from the USA. I tried to experiment with my new antenna, "non-radial coaxial monopole antenna." I used two types of antenna in this con-

TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND

WORLD: Stanley Cohen, W8QDQ Trophy. Won by. **D4B operated by Alexander Teimurazov, 4L5A.**
World Low Power: Caribbean Contesting Consortium Trophy. Won by: **John Bayne, P40A (KK9A).**
USA: Atilano de Oms, PY5EG Trophy. Won by: **WK4R operated by Bill Kollenbaum, K4XS.**
USA Zone 4: Society of Midwest Contesters Trophy. Won by: **George Fremin III, K5TR.**
USA Low Power: Terry Zivney, N4TZ Trophy. Won by: **Charles Wooten, NF4A.**
USA Zone 4 Low Power: Society of Midwest Contesters Trophy. Won by: **Bill Lippert, ACØW.**
AFRICA: Peter Sprengel, PY5CC Trophy. Won by: **CT9A operated by Jussi-Pekka Sampola, OH6RX.**
EUROPE: Jim Hoffman, N5FA Trophy. Won by: **Vlad Zaitsev, RK4FF.**
SOUTH AMERICA: Ron Moorefield, W8ILC Trophy. Won by: **Didier Bironneau, FY5FY.**
OCEANIA: Philip Fraizer, K6ZM Memorial. Won by: **Joel Chalmers, KG6DX.**
JAPAN: The DX Family Foundation Trophy. Won by: **Masaki Okano, JH4UYB.**
USA QRP/p: Doug Zwiebel, KR2Q Trophy. Won by: **Charles Fulp, Jr., K3WW.**

SINGLE OPERATOR, SINGLE BAND

WORLD:: Steve Merchant, K6AW Trophy. Won by: **PX5E operated by Sergio Lima De Almeida, PP5JR (21 MHz).**
WORLD 28 MHz: Alan Dorhoffer, K2EEK Memorial Trophy. Won by : **Juan Manuel Morandi, LU1HF.**
WORLD 7 MHz: William D. Johnson, KVØQ Trophy. Won by: **AN8AH operated by Pekka Kolehmainen, OH1RY.**
USA 3.7 MHz: Lance Johnson Engineering Trophy. Won by: **Joe Gagliardi, AA1BU**.
USA - 14 MHz Low Power: Boomer Contest Club Trophy. Won by: **AK2P operated by Yuriy Ryabinin, KC2LLM.**
USA 21 MHz: Bernie Welch, W8IMZ Memorial. Won by: **John Evans, N3HBX.**

MULTI-OPERATOR, SINGLE TRANSMITTER

USA: Steve Bolia, N8BJQ Trophy Won by: **W4PA operated by KØEJ, KD4HIK, K4JNY, K4RO and W4PA.**
USA Zone 4: Society of Midwest Contesters Trophy. Won by: **KØDU operated by KØDU, NØZA, KØCL, WA4HND and KCØDKX.**
ASIA: W2MIG Memorial Trophy sponsored by Ed Campbell, NT4TT. Won by: **UA9AYA operated by UA9BA, RA9AB, RW9MG/9, UA9AR, RA9CKQ, RV9CTD, RZ9CO, and UA9CDV.**

MULTI-OPERATOR, TWO TRANSMITTER

WORLD: Doris Wong, AG1RL Trophy. Won by: **A61AJ operated by A61AJ, K2GM, N2AA, ON5NT, S53R and SM7PKK.**

MULTI-OPERATOR, MULTI-TRANSMITTER

WORLD: Gail Schieber, K2RED Trophy. Won by: **YW4M operated by YV4BOU, YV5AMH, YV5EED, YV5IQJ, YV5LMW, YV5LMX, YV5MHX, YV5MSG, YV5NWG, YV5OHW, YY5AFD, YY5COR, and YY5HBO.**

CONTEST EXPEDITION

WORLD: Kansas City DX Club Trophy. Won by: **5TØEU operated by ON5GA, ON8RA, F5VHA, and ON4HVO.**

test. One was a 1/4-wavelength inverted L antenna and the other was the "non-radial coaxial monopole antenna." I used antenna switch. The "non-radial coaxial monopole antenna" was about only 26m and 1/2 wavelength of 3.8 MHz electrical length. It was very low vertical radiation angle so it is best for low-band DXing. I presented this antenna in Japanese *CQ* magazine March 2004. . . . **JE1SPY**.

Most points scored in WPX contest so far over last 10 years! . . . **K6TIM**. A few personal observations and thoughts during a very part-time on/off participation from my teenie-weenie "Practice Station" before getting to play with the folks at NR6O on Sunday for a while. What an Antenna Farm Ken has there!! (1) One USA station repeatedly gave out only serial numbers with no signal report. I wonder how legal the logs are for those who QSO'd this station. Hmmm. (2) DVK units that produce a jet engine noise background and wide splatter should be NUKED off the planet. (3) There must be some legal way of disabling or dismembering the Foreign Broadcast stations in the 40 meter phone band. (4) Big towers with multi-stacked beams are beautiful works of Art & Science and should end up in the Smithsonian at some point. . . . **K6VVA**. Many interruptions, but had a good time anyway. Thanks to those who patiently dug my QRP signals out of the noise! . . . **KBØYH**. This was a contest to test a beginner's mettle. Two days before as I was going to complete my horizontal loop setup, I sprained my toe. The day of the contest, the XYL was told that she would likely go into labor within 24 hours. Sunday AM with a real chance to improve on last year, I got the word to head for the hospital. With two hours to go, beautiful baby girl Serena was born. Unfortunately (or perhaps not!), the XYL nixed "WPX" as a second name. Lots of fun all around! . . . **KCØIGY**. Well I just upgraded my callsign and I am out to a good start. However I need to concentrate on putting up some serious antennas if I want to compete with the big guys. I look forward to more contesting in the future when I can work the stations I hear. . . . **KC7RSO**. Met a lot of old friends, had fun. That's what it's all about. . . . **KG6DX**.

What a struggle! Only a handful of EU stations made it over the S9 mark but still managed to work most of the new prefixes I heard and that to me is what this contest is all about. Thanks to all those guys who got special calls! . . . **KS7T**. Only entered for a bit of fun, to pass the weekend, but really enjoyed working the contest. Added to my DXCC, with some good ones. I'm amazed to find what you can work in a contest with 100W and a ground-mounted vertical! . . . **MØRNR**. First entry in CQ WPX. Hard going with 5W but pleased with 400+ QSOs. Operated for 34 hours. Got three new DXCC in the contest—A71, PJ4, and P4. See you next time. . . . **M3RCV**. Great contest, loved it. Condx weren't bad but the last day solar activity was high. Like this contest, fast paced and everyone works everyone. . . . **M4F**. Have never entered a contest until this March and had great fun. First ever contest, biggest contest was with father (MM3JHS) to get on. . . . **MM3YDH**. Started off fine then the thunderstorms rolled in for the rest of Friday and most all Saturday. Ended up building a 10 meter beacon with my spare time. . . . **NØWY**. Wow! This was my first contest running QRP. What a blast! Ran 3W and a 30m dipole and had a lot of fun. Hopefully next year

WORLD TOP SCORES

HIGH POWER SINGLE OPERATOR ALL BAND

D4B (4L5A)	25,955,444
FY5FY	17,072,370
9Y4ZC (OM3TZZ)	16,235,373
CT9A (OH6RX)	15,516,202
P4ØY (AE6Y)	15,328,716
FM/T93M	13,840,638
*P4ØA (KK9A)	13,070,211
VC3E (VE3AT)	8,858,176
VE3EJ	8,181,393
WK4R	7,711,200
P43E	7,526,568
KQ2M	7,411,635
KN1DX (K4ZW)	7,406,476
9M2RPN (GM4YXI)	7,039,960
5U7JB	6,658,550
VY2/DK1MM	6,470,178
VO1AU	6,353,232
KM7W (N6MJ @ W6KP)	6,306,911
RK4FF	6,226,180
JH4UYB	6,093,886

28 MHz

LU1HF	8,511,708
LO2F (LU1FAM)	7,769,075
LU4FM (LU4FPZ)	5,654,199
NP3X	2,606,084
*LU3HIP	1,956,425
*PY2SBY	1,919,133
*PU2WDX	1,495,186
*LT7Y (LY7YZ)	1,375,963
*LU6HPF	1,374,700
*LU7YW	1,295,458

21 MHz

PX5E (PP5JR)	12,568,343
ED8EW (EA4BQ/OHØXX)	10,169,685
PJ2T (W1MD)	6,657,690
LT1F (LW9EOC)	6,530,336
KH6ND	6,379,540
LU5FC	5,014,110
CT8T	4,499,360
9A8ØA (9A9A)	3,796,884
LU2QC	3,376,354
OE4A (OE1EMS)	3,277,930

14 MHz

4L6AM	5,905,845
9A8A	4,589,634
IU9S (IT9BLB)	4,301,000
VK1AA/4	4,283,664
ZV5E (PP5KE)	3,821,867
LU5HM	3,346,109
UN9LW	3,185,718
DL4MCF	2,936,042
YZ9A (YU1AU)	2,824,465
HG3M (HA3MY)	2,572,056

7 MHz

AN8AH (OH1RY)	5,560,650
YTØA (YU1EU)	4,372,144
T99W	3,705,504
SN7Q	3,627,303
T9ØA (YT6A)	3,450,867
IO4C (IZ4DPV)	3,106,041
HA5A (HA5IW)	3,044,898
SO6X	2,661,920
H22H	2,626,320
LX1KC	2,385,710

3.7 MHz

SO2R (SP2FAX)	2,543,708
S5ØA	2,316,776
9A8ØAAA (9A5K)	2,058,000
LX7I (LX2AJ)	1,673,378
YU7AV	1,553,105
AA1BU	1,312,020
S53F	1,171,716
OH5B (OH5BM)	1,052,942
IQ5PO (IK5ZTW)	993,598
KE1Y	948,090

1.8 MHz

S57M	468,531
OZ1HXQ	413,630
HA8BE	386,250
LY2BW	333,042
*LY5A (LY2PAJ)	309,680
UT3SA	285,947
LY2HM	257,964
SN6C	240,611
Z33F	229,665
DJ6QT	222,865

LOW POWER SINGLE OPERATOR ALL BAND

P4ØA (KK9A)	13,070,211
ZX2B (PY2MNL)	6,060,164
CS6T (CT1ILT)	4,925,620
LV7H (LU7HF)	4,139,100
4L2M	3,727,963
NF4A	3,283,704
HK3JJH	2,384,100
LVØN (LU2NI)	2,364,570
VP8DGA (GØWJN)	2,364,348
UA4FER	2,277,520
RUØAW	2,246,896
TI5N (NØKE)	2,237,175
YIØM	2,214,562
FK8HN	2,163,447
AN5DF (EA5DF)	2,071,654
PV8DX	2,018,792
EA3CI	1,946,880
RU9DD	1,890,624
EX2X	1,878,800
H6C (YN4SU)	1,863,052

28 MHz

LU3HIP	1,956,425
PY2SBY	1,919,133
PU2WDX	1,495,186
LT7Y (LU7YZ)	1,375,963
LU6HPF	1,374,700
V51/DL5XL	1,319,136
LU7YW	1,295,458
CX1AV	995,136
LU6FOV	392,763
PY2BT	353,600

21 MHz

AN8AG	1,811,524
KP4AH	1,385,350
Z37M (Z32PT)	1,260,480
AM7FTR	1,224,990
FM5FJ	1,215,493
UN7JX	987,624
DZ1BP (DU1BP)	850,500
CM8WAL	790,164
ER1Q (ER1QQ)	751,296
EX7ML	727,610

14 MHz

HC1AJQ	1,562,320
AK2P (KC2LLM)	1,474,248
9A7D (9A3HX)	1,279,818
SP3SLO	1,148,284
YUØHST (YT1BX)	1,131,416
RA9AU	866,310
ERØFEL (UR5FEL)	622,224
EI4CF	595,518
W9IGJ	540,790
K6HNZ	505,134

7 MHz

NT1E (K3BU)	420,876
T94DO	401,280
YR5A (YO5TE)	388,959
HA6NL	244,664
II3L	188,497
IV3SDE	179,670
SP4AQD	168,840
YO2LZP	155,540
9A8DX	131,600
ON4MGY	89,614

3.7 MHz

9A7DM	833,976
SP4ZO	405,153
SQ9UM	328,800
OM7AB	316,316
S52W	302,005
RV3WT	249,162
DL3LE	163,240
PA2SWL	115,050
PAØMIR	111,936
RN6AL	98,820

1.8 MHz

LY5A (LY2PAJ)	309,680
SP6LUV	210,798
OZ3SK	144,612
VE3MGY	98,865
9A3RE	41,114
UA9QFF	34,200
RX3QDF	30,393
UA9SLX	27,520
UR5ZLK	20,424
RK6ATQ	11,088

TRIBANDER/ SINGLE ELEMENT

P43E	A	7,526,568
9M2RPN (GM4YXI)	A	7,039,960
VO1AU	A	6,353,232
*ZX2B (PY2MNL)	A	6,060,164
9J2KC (JL1NKC)	A	5,475,547
ZP1C (ZP5AZL)	A	5,159,502
AY8A (LU8ADX)	A	4,954,304
HG8R	A	4,458,048
KG6DX	A	3,999,272
PY7ZY	A	3,968,968
BY1DX (OH2PM)	A	3,862,104
YR9P (YO9HP)	A	3,310,155
*NF4A	A	3,283,704
KG1E	A	2,619,755
MU2Z (M5RIC)	A	2,324,811
*W7UPF	28	91,344
*K8OZ	28	56,771
*K8IA	21	649,020
*JA1BPA (JA6-9330)	21	107,501
KBØENE	21	105,468
*G3PJV	14	385,110
*PC2T	14	311,787
*W4LC	14	288,426
OE5CWL	7	1,088,612
EU1AZ	3.7	874,578
*PAØMIR	3.7	111,936
*OZ3SK	1.8	144,612
ND8DX	1.8	7,296

ROOKIE

*CS6T (CT1ILT)	A	4,925,620
KG4NEP	A	1,713,987
W1AJT/VE3	A	1,300,032
*UO6P (UN7PBY)	A	1,170,866
*YT1LT	A	813,174
W5TTX	A	549,400
N4GRN	A	310,154
*VE7KET	A	268,398
*ES8DH	A	203,050
*VE2QIP	A	201,411
*PP5WF	28	186,276
*UR5MIW	21	87,320
*PE2T	21	50,697
*KG4VKQ	14	462,162
*UA9LAU	14	79,926
I03Z (IV3ZXQ)	7	573,024
*YO2LZP	7	155,540
EA5JK	3.7	73,200
*YY5YMA	3.7	66,880

BAND RESTRICTED

*EC8ABT	A	682,808
*DK8AX	A	100,440
*MM3JHS	A	46,800
*JL7XBN	A	44,400
*PU5RAS	28	11,514
*EC3CJN	21	41,328

QRP/p

YT7TY	A	800,664
UA3BL	A	628,965
K3WW	A	452,640
LU1VK	A	446,336
N8IE	A	323,832
HA1CW	A	252,702
SM3C (SM5CCT)	A	241,678
YU1LM	A	212,220
RD4M	A	203,756
WAØVBW	A	193,980
LW3DX	28	305,074
TI3MAO	28	205,642
W6QU (W8QZA)	28	52,440
EA8TX	21	400,980
RA9UAD	21	148,022
UU4J (UU4JO)	21	46,080
SP4GFG (SP4GFG)	21	44,375
RW9AB	14	809,216
YT1CS	14	419,672
RZ9IB	14	56,560
ES6PZ	7	57,820
8S5A (SM5AJV)	7	3,534
ES8SW	3.7	34,884
OL4W (OK1IF)	3.7	10,710
YU1RA	1.8	11,169
RZ3VA	1.8	2,208

SINGLE OPERATOR ASSISTED

C4M (RW3QC)	A	14,190,540
PS2T (PY5EG)	A	13,626,240
PJ4P (DF7ZS)	A	12,441,348
RG9A (UA9AM)	A	9,638,179
LU1NDC	A	7,244,520
LTØH (LU3HY)	A	7,212,370
W2RE	A	5,773,432
UT7QF	A	5,674,872
W1US (K1LZ)	A	4,545,935
LY4XX	A	4,501,052
S52ZW	A	4,362,504
RN3QO	A	4,095,300
DL1IAO	A	4,015,340
SN8F (SP8FHK)	A	3,357,200
S53O	A	3,323,510
WO8CC (N8BJQ)	A	2,362,565
DK9TN	A	2,057,361
OH6NIO	A	1,977,927
JS3CTQ	A	1,957,328
*SX9F (SV9FBM)	A	1,951,360
*PP5JD	28	1,533,114
KO4MR	28	24,386
LS7D (LU7DW)	21	4,399,954
JI3OPA	21	4,213,708
9A1P (9A6NDX)	21	3,006,750
OMØM (OM7ZZ)	21	1,612,468
OE6Z	14	3,390,700
YT7A (YU7GMN)	14	2,423,640
JG3KIV	14	2,036,112
UV8M (UX3MR)	14	1,518,473
4N6ØØA (YZ1ZV)	7	3,505,216
*SV5RDS (SV5DKL)	7	1,199,220
S51CK	7	430,320
*SO6A (SP6IHE)	1.8	21,690

MULTI-OP SINGLE TRANSMITTER

VP51V	17,939,600
WP2Z	16,508,772
CWØB	16,398,356
UA9AYA	12,712,275
IR4T	12,450,240
OM7M	10,925,454
RZ9OZO	10,289,996
TO7T	9,771,685
LU2FA	9,751,680
LY9Y	9,464,042
RKØAXX	8,946,102
RL3A	8,347,739
RKØAYB	8,204,277
HG1S	8,080,080
OE2S	8,078,628

MULTI-OP TWO TRANSMITTER

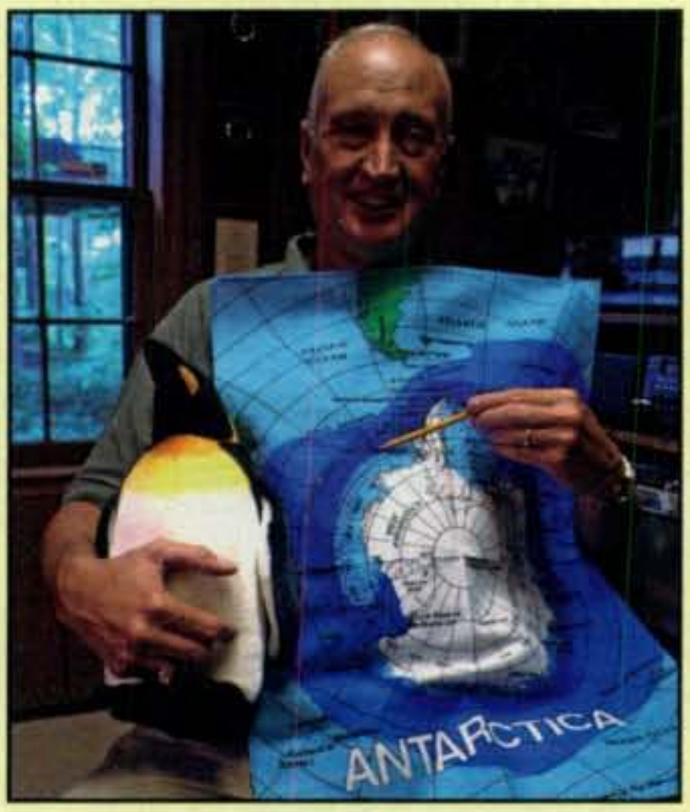
A61AJ	30,157,650
CQ9K	30,061,889
ZW5B	26,849,550
RU1A	16,054,404
KM4M	13,025,033
ZX3S	9,238,776
YT9X	9,121,375
PX2A	8,758,920
WX5S	7,777,539
VE7SV	7,690,886
WR3Z	7,117,235
WE3C	6,213,361
OL7R	5,991,040
VE6FI	5,011,824
SO6Y	4,955,742

MULTI-OP MULTI-TRANSMITTER

YW4M	32,037,671
3B9C	24,210,579
OT4A	19,229,184
UP5G	18,934,745
NQ4I	17,627,499
LZ9W	14,600,512
DAØBCC	13,485,896
ZL6QH	12,904,448
LY7A	11,037,897
NX5M	10,786,608
T49C	10,769,121
NR6O	10,174,112
EA4URE	9,439,748
WX3B	6,830,430
6Y2RZ	6,468,756

** Denotes low power*

On the Cover



In late January, 21 operators from eight countries will be descending, literally, on the Antarctic island of Peter I for a two-week DXpedition as 3YØX. Expedition co-leader Bob Allphin, K4UEE, of Marietta, Georgia—shown on this month's cover with a map of Antarctica and his "pet" penguin—says the group will be active on all bands from 160 to 10 meters, on CW, SSB, RTTY, and PSK-31. Their goal is to make at least 100,000 contacts. Bob's partner in planning the expedition is Ralph Fedor, KØIR, of Waite Park, Minnesota (who was featured on our February 2004 cover).

According to Bob, the group will assemble January 12 in Punta Arenas, Chile, then leave on the 14th for a five-to-six–day sea voyage, starting with a two-day crossing of the Drake Passage, "one of the roughest, most unpredictable areas of the world." Bob says those first 48 hours "will be kind of rough" and expects most team members to spend most of that time in their bunks. The next three days should offer calmer seas, he says, and will be devoted to additional meetings, planning, and practice.

Once the group arrives at Peter I, they'll have to shuttle themselves and all their gear onto the island by helicopter—the only way on or off—and are hoping for reasonably good weather in which to set up their nine stations (all but 30 meters with kilowatts) and 15 antennas. They plan to be on the air 24 hours a day until it's time to pack up and head home—no later than February 5, as their boat needs to be back in Chile by the 10th.

For more information on the 3YØX DXpedition, or to help out with a contribution (this is not a cheap trip!), see the group's website at <http://www.peterone.com>. Cover photo by Larry Mulvehill, WB2ZPI.

I'll have more time to operate! . . . **N1SZ**. Very enjoyable to participate but time limited to family. Very interesting to hear the "Big Guns" talking on 15m before the contest started, joking around. Best moment was finding 3B9C in the clear on 20m and getting him with only one call! Hope to be back next year. . . . **N4HXI**.

The contest started on my birthday. What a great present! . . . **P4ØA**. After 2 years, finally the station is getting assembled again. On day 1, I had to get accustomed back to contesting. My ears, brain, and fingers did not synchronize, but on day 2 it went much better. Given that I actually made more Q's on day 2, Sunday did not seem slower. It is so great to be back, and WPX is always a favorite. Thanks to everyone who called. See you again next year. . . . **P43E**. Pleasant to participate again in this great game. Now if only I could hold a run frequency with my low power! Anyway, the most important thing is: having fun. . . . **PAØMIR**. Nice to catch HNØZ on an almost dead 10m band calling CQ and no takers! And to do it again later on 20! . . . **PA9ZZ**. Nice to catch so many old friends in WPX. Thanks for been in my log—Oms, PY5EG. . . . **PS2T**. Great spot for a first time at the DX end of the contest. The crash of 20 meters on Sunday killed our totals, as 20 was our best band until then. Never Never try to run with a brand new PC. Network issues cost us at least 50 Qs and 10 mults :(. All in all a great time though. Really a different experience from that part of the world. . . . **V26DX**. It was fun to join the CQ WW WPX contest for a few hours during our holiday in Namibia. I was using an ICOM IC-706MKIIG which fed 100 watts of power into a TH7DXX antenna. The location was Tsumeb in the northern part of Namibia, near the Ethosha National park. . . . **V51/DL5XL**.

Even though conditions were poor, CQ contests always provide lots of fun. Sure is good to hear old friends on the air. . . . **VE3JAQ**. Operated from the mobile with Hamstick antennas and a deep-cycle battery. Surprised and please to work A61AJ long path on 20m, as DX on 20 was a chore. . . . **VE3XD/W4**. On the first day could not operate during prime opening time to USA. Second day band closed to all directions except to Europe. Still lots of fun with personal highest WPX score. 36 hours operating time for single op is great. I just love WPX. CU in May! . . . **VK1AA/4**. Let's see—one blown tube, one blown balun, mediocre conditions, but I still had fun. . . . **VO1AU**. Great fun with the new VP51 prefix. Condx better the first day. . . . **VP51V**. A little time to contest equals a lot of fun. At 77 I don't contest much anymore but I love this WPX and had to make a few contacts just for fun. . . . **W3MGL**. Lots of frustrating fun. Thanks to all who were able to pull my signal out of the mud. The high point of the contest was working VK2CZ late in the contest on Sunday on an otherwise mostly "dead" 10 meters. With no QRM, he was able to get my call and exchange with no repeats. That's surely a testament to a good station on his end, and

USA TOP SCORES

HIGH POWER SINGLE OPERATOR ALL BAND

WK4R	7,711,200
KQ2M	7,411,635
KN1DX (K4ZW)	7,406,476
KM7W (N6MJ@W6KP)	6,306,911
KC3R (LZ4AX)	5,871,330
K7RL	5,677,872
K5TR	5,152,264
WB9Z	4,964,420
NZ8O (W8MJ)	3,371,830
*NF4A	3,283,704
K4PV	2,705,192
KG1E	2,619,755
W1CU	2,208,000
KW9N (N9RV)	2,085,340
WW4R (N4ZZ)	2,000,130

28 MHz

NA4W	578,354
W7EB	231,346
NU4BP (N4BP)	195,360
*K9OM	139,314
*W7UPF	91,344

21 MHz

N3HBX	1,803,984
K9ES	1,552,892
K7RI	1,130,460
K5ZO	1,016,992
W6AFA	661,290

14 MHz

*AK2P (KC2LLM)	1,474,248
WØAIH (K9MU)	1,417,890
W5FO	1,053,552
WA7AR (W7FP)	592,272
*W9IGJ	540,790

7 MHz

K7ZSD	1,019,560
*NT1E (K3BU)	420,876
W8JWN	214,520
*KU6T	20,400
*NR8U	7,344

3.7 MHz

AA1BU	1,312,020
KE1Y	948,090
W3BGN	527,626
NE5D (K5RX)	475,398
NT6K	79,659

1.8 MHz

AA4MM	22,413
ND8DX	7,296
*K4WI	805
KØCS	450

LOW POWER SINGLE OPERATOR ALL BAND

NF4A	3,283,704
ACØW	1,039,724
WB8TLI	982,949
N6NF	893,490
N4IG	861,075
N5DO	820,512
WN6K	702,072
AC5FL	664,556
WA2JQK	637,839
N7LOX	611,310

28 MHz

K9OM	139,314
W7UPF	91,344
K8OZ	56,771
KA2DIV(N4GM)	52,578
WN4DX	16,650

21 MHz

K8IA	649,020
WZ7ZR (W7ZR)	537,234
W4SVO	462,162
N4MO	398,151
N8RY	220,410

14 MHz

AK2P (KC2LLM)	1,474,248
W9IGJ	540,790
K6HNZ	505,134
KG4VKQ	462,162
W4LC	288,426

7 MHz

NT1E (K3BU)	420,876
KU6T	20,400
NR8U	7,344

1.8 MHz

K4WI	805

TRIBANDER/SINGLE ELEMENT

*NF4A	A	3,283,704
KG1E	A	2,619,755
W1CU	A	2,208,000
N2GC	A	1,944,383
W6TK	A	1,493,800
N3UM	A	1,087,394
*WB8TLI	A	982,949
K3TW	A	974,120
*WN6K	A	702,072
KO7X	A	545,875
*W7UPF	28	91,344
*K8OZ	28	56,771
*K8IA	21	649,020
KBØENE	21	105,468
*W4LC	14	288,426
*NN5Z (K5PX)	14	178,470
NT6K	3.7	79,659
ND8DX	1.8	7,296

ROOKIE

KG4NEP	A	1,713,987
W5TTX	A	549,400
N4GRN	A	310,154
K4XZ	A	131,626
*N6WK	A	130,660
*K9RJM	A	124,068
*N2LWL	A	83,072
*W2WJO	A	68,052
*W8SGZ	A	52,260
K7AEK	A	49,232

QRP/p

K3WW	A	452,640
N8IE	A	323,832
WAØVBW	A	193,980
KR1ST	A	90,306
KBØYH	A	82,521
W6QU (W8QZA)	28	52,440
WWØWB	28	26,660
WB7OCV/2	21	17,756
WA6FGV	21	16,005
W6YJ	14	39,168
NA4BW	14	11,178

SINGLE OPERATOR ASSISTED

W2RE	A	5,773,432
W1US (K1LZ)	A	4,545,935
WO8CC (N8BJQ)	A	2,362,565
NO2R	A	1,553,660
WØGJ	A	1,309,280
WD4DDU	A	1,184,020
KOØU	A	1,111,628
KC1F	A	809,732
*N9LF	A	763,812
N2BJ	A	684,129
KO4MR	28	24,386
K7ZS	21	550,573
*WB1HBB (W4WR)	14	170,816

MULTI-OP ONE TRANSMITTER

W4PA	6,204,012
KØDU	6,015,296
NN4N	4,674,855
AJ9C	4,397,221
NW1E	3,168,026
W5KFT	3,136,592
WX6V	2,722,416
KN5H	2,624,820
NJ6N	2,533,760
NZ1U	2,488,650

MULTI-OP TWO TRANSMITTER

KM4M	13,025,033
WX5S	7,777,539
WR3Z	7,117,235
WE3C	6,213,361
NM5O	4,801,608
AG1RL	4,043,714
KE1J	3,581,925
W8FT	2,879,647

MULTI-OP MULTI-TRANSMITTER

NQ4I	17,627,499
NX5M	10,786,608
NR6O	10,174,112
WX3B	6,830,430
NE1C	6,043,484

** Denotes low power*

to the nature of 10 meters. That's the sort of thing that makes contesting really fun. . . . **W4KAZ**. 10 meter QRP is tough from the West Coast. I never heard Europe, and only worked one Africa. But lots of South American activity helped my score! . . . **W6QU**.

Limited operating time due to previous commitments but really had a blast. Very little Europe and no Japan heard here in the "Black Hole." Great activity from South America and, of course, stateside. A fun contest for QRP, although 40 and 80 were a bit of a struggle. See ya next year! . . . **WAØVBW**. Nice working ZS6 and ZS9 on long path and nice DX 3B9C, A61AJ, 4L6AB, and many others. . . . **WA7AR**. My first ever CQ WPX SSB contest running QRP. Op time very limited this contest (11.7 hours total). Mni tnx to stns who required repeats to complete an exchange. S9 noise level on 40m and only 5 QSOs on that band. 80m even worse! 20 meters hot around the clock! Happy as a Flying Pig in slop! No JA, VK, ZL, KH6, KL7 heard at any time! . . . **WA8REI**. Surprisingly, conditions were pretty good. This is my first WPX test and I enjoyed it very much. I'll be back next year. . . . **WB8RFB**. Operated only a few hours due to other commitments. Really enjoyed working 5U7JB early in the contest because my oldest daughter and family are stationed in Niger with SIM as missionaries. Used the callsign of the Old Dominion Chapter #202 of QCWA to provide the somewhat unique "WW2" prefix. It often took some repeats to get the receiving station to properly get the WW2DDM call. . . . **WW2DDM**. Should have spent Sunday in the hammock. If your equipment doesn't break, you aren't going hard out. . . . **ZL1ANH**. My first DX HF contest. Had a lovely time and learned a heck of a lot. Also found participants to be very friendly despite competition being rather fierce at times. . . . **ZS5SAM**.

CQ WW WPX SSB CONTEST ALL-TIME RECORDS

The contest is held each year on the last full weekend of March. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	VA1A('99)	535,225	271
3.5	EA8/OH1MA('97)	4,317,284	562
7.0	ZX9A('97)	10,787,128	814
14	EA8AH('97)	11,142,198	981
21	ZW5B('95)	14,095,142	1054
28	D44AC('02)	15,707,401	1123
AB	D4B('04)	25,955,444	1306
QRP/p	HC8A('94)	7,520,562	714

Multi-Operator Single Transmitter

D44TD('02)		33,443,856	1332

Multi-Operator Two Transmitter

STØRY('03)		30,346,161	1119

Multi-Operator Multi-Transmitter

HC8N ('03)		60,703,452	1476

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95)	327,712	308
3.5	WE3C('95)	1,519,300	475
7.0	KC7EM('95)	1,950,228	495
14	KK9A('00)	6,621,446	962
21	KX8R('00)	7,556,250	930
28	NY4A('00)	6,006,573	877
AB	KQ2M('00)	11,875,240	1066
QRPp	KR2Q('00)	2,688,158	649

Multi-Operator Single Transmitter

KM3T('99)		14,091,468	1077

Multi-Operator Two Transmitter

KM4M('04)		13,025,033	1171

Multi-Operator Multi-Transmitter

KM3T('00)		29,338,460	1355

CLUB RECORD
Contest Club Finland ('00) 250,320,141

QRPp RECORD
HC8A('94) 7,520,562

WPX (Prefix) RECORD
OTØA('00) 1528

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	EA8/OH1MA('99)	404,976	208
3.5	EA8/OH1MA('97)	4,317,284	562
7.0	EA8AH('96)	7,101,380	715
14	EA8AH('97)	11,142,198	981
21	EA8AH('01)	12,387,139	1063
28	D44AC('02)	15,707,401	1123
AB	D4B('04)	25,955,444	1306

ASIA

1.8	UL7ACI('91)	331,008	128
3.5	UA9CSS('94)	1,074,780	315
7.0	H24LP('87)	5,348,975	503
14	H2A('91)	6,297,464	758
21	7L1GVE('92)	6,848,136	838
28	H22H('00)	9,092,146	931
AB	JY9NX('01)	15,463,485	1017

EUROPE

1.8	LY6K('95)	481,164	303
3.5	SO2R('04)	2,543,708	643
7.0	9A9A('99)	4,624,188	724
14	DJ7AA('00)	7,955,224	1052
21	CQ1BOP('00)	6,989,997	1029
28	GM7V('00)	8,305,756	982
AB	OK1RI('01)	10,844,592	1034

NORTH AMERICA

1.8	VA1A('99)	535,225	271
3.5	VE1BY('00)	2,226,300	492
7.0	TE1C('95)	7,281,630	745
14	KP2A('95)	7,088,976	912
21	WP3R('98)	10,167,632	986
28	KP2A('00)	11,385,710	1046
AB	TI1C('99)	17,078,930	1117

OCEANIA

1.8	AH6PR('99)	18,963	49
3.5	WH7Z('03)	1,208,900	308
7.0	WH7Z('99)	4,582,773	507
14	KH6ND('03)	6,493,727	887
21	AH7DX('00)	7,645,990	890
28	TXØDX('00)	12,049,422	847
AB	KH6ND('01)	15,498,798	1029

SOUTH AMERICA

1.8	YV5JEA('84)	40,320	63
3.5	P4ØA('96)	1,715,076	426
7.0	ZX9A('97)	10,787,128	814
14	PYØFM('95)	9,660,432	939
21	ZW5B('95)	14,095,142	1054
28	ZX5J('99)	14,405,820	1095
AB	HC8A('01)	25,180,199	1199

MULTI-OPERATOR SINGLE TRANSMITTER

AF	D44TD('02)	33,443,856	1332
AS	A61AJ('02)	23,610,785	1243
EU	9A7A('02)	19,034,950	1306
NA	VP2EC('92)	24,409,580	1115
OC	T33RD('99)	17,778,372	998
SA	HC8A('93)	32,502,677	1107

MULTI-OPERATOR TWO TRANSMITTER

AF	STØRY('03)	30,346,161	1110
AS	A61AJ('04)	30,157,650	1255
EU	RU1A('04)	16,054,404	1257
NA	V47KP('03)	15,958,488	1092
OC	No Entry		
SA	ZW5B('04)	26,849,550	1365

MULTI-OPERATOR MULTI-TRANSMITTER

AF	CN8WW('99)	55,151,562	1334
AS	P3A('00)	53,554,592	1456
EU	9AY2K('00)	42,477,343	1493
NA	WL7E('00)	42,013,215	1395
OC	KH7R('02)	32,806,032	1304
SA	HC8N('03)	60,703,452	1476

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.)

SSB RESULTS
QRP/p

YT7TY	A	**800,664**	**796**	**457**
UA3BL	A	**628,965**	**782**	**405**
OM7DX	A	**599,960**	**704**	**424**
K3WW	A	**452,640**	**540**	**328**
LU1VK	A	**446,336**	**552**	**317**
N8IE	A	**323,832**	**496**	**309**
HA1CW	A	**252,702**	**443**	**278**
SM3C	A	**241,678**	**449**	**298**
				(Op: SM5CCT)
YU1LM	*	212,220	405	270
RD4M	*	203,756	390	266
WAØVBW	A	**193,980**	**407**	**244**
JH7RTQ	A	**190,216**	**322**	**236**
M3RCV	A	**181,470**	**408**	**263**
CT1ELF	A	**168,664**	**333**	**232**
AM3FF	A	**158,515**	**319**	**245**
JA2AXB	*	150,894	311	202
I1BAY	A	**133,560**	**279**	**210**
JA2MWV	*	119,616	254	178
SP9RQH	A	**114,168**	**279**	**201**
KR1ST	A	**90,306**	**258**	**174**
MM3AWD	A	**85,536**	**262**	**198**
KBØYH	*	82,521	234	173
DL1ARJ	A	**70,930**	**220**	**173**
OK1VBA	A	**68,888**	**204**	**158**
RL3DZ	*	60,480	200	160
WB6BWZ	A	**48,860**	**212**	**140**
RW3AI	*	47,034	188	134
OZ6XR	A	**45,864**	**200**	**156**
VA3JFF	A	**30,470**	**110**	**110**
N4ZAK	*	30,284	148	113
EA3HFC	*	29,500	179	125
RA4AUH	*	28,842	139	114
N1TM	A	**28,220**	**102**	**85**
KA1LMR	*	27,645	121	97
LY2FE	A	**25,190**	**127**	**110**
GØDCK	*	19,998	115	99
W2BVH	A	**19,834**	**117**	**94**
YO2CJX	A	**19,314**	**104**	**87**
WA8REI	*	18,473	110	91
OM/WØYR	*	14,952	94	84
UAØSBQ	A	**13,376**	**81**	**64**
GM4HQF	*	11,726	97	82
MØ/EA1BP	*	11,169	82	73
SP9UML	*	10,944	68	64
USØYA	A	**8,640**	**60**	**54**
DJ1AD	*	8,100	73	60
N8XA	*	8,050	56	50
W2JEK	*	7,367	71	53
K5MQ	A	**5,612**	**48**	**46**
GM4ELV	*	5,040	64	63
G3JJZ	*	3,969	52	49
N1SZ	*	2,205	39	35
VE3IGJ	*	1,924	35	26
W4WNT	*	1,890	34	30
W3AG	*	1,708	28	28
PAØFAW	A	**713**	**25**	**23**
W7PW	A	**442**	**18**	**17**
LW3DX	28	**305,074**	**404**	**283**
TI3MAO	28	**205,642**	**408**	**229**
W6QU	28	**52,440**	**167**	**138**
				(Op: W8QZA)
JR3RWB	28	**30,634**	**133**	**106**
WWØWB	28	**26,660**	**114**	**86**
PY4PW	28	**16,600**	**102**	**83**
WBØIWG	*	11,937	80	69
LU2EPF	*	8,470	62	55
EW6DX	28	**108**	**6**	**6**
EA8TX	21	**400,980**	**416**	**326**
RA9UAD	21	**148,022**	**345**	**218**
UU4J	21	**46,080**	**154**	**128**
				(Op: UU4JO)
SP4GFG	21	**44,375**	**151**	**125**
I1ZHH	21	**42,244**	**136**	**118**
ES1CR	21	**28,800**	**160**	**144**
DF1RK	21	**24,440**	**112**	**94**
JR1NKN	21	**23,828**	**111**	**92**
WB7OCV/2	21	**17,756**	**101**	**92**
WA6FGV	21	**16,005**	**112**	**97**
7N4WPY/1	*	14,089	85	73
HAØGK	21	**13,248**	**79**	**64**
RA3XEV	*	8,140	66	55
W1KLM	21	**7,224**	**65**	**56**
8S5X	21	**2,842**	**34**	**29**
				(Op: SM5HJZ)
RW3VZ	*	2,550	35	30
JI8GZS/1	*	1,175	25	25
OH6GFI	*	24	4	4
RW9AB	14	**809,216**	**674**	**436**
YT1CS	14	**419,672**	**694**	**418**
HA1RS	14	**83,514**	**285**	**186**
RZ9IB	*	56,560	160	140
LY3BY	14	**51,626**	**221**	**166**
W6YJ	14	**39,168**	**157**	**136**
IZ8EWD	14	**21,894**	**138**	**123**
SP9BMH	14	**16,920**	**112**	**90**
SP9EWO	*	11,704	87	77
NA4BW	14	**11,178**	**99**	**81**
EA1BYA	14	**3,300**	**60**	**55**
VA3VF	14	**360**	**12**	**12**
K4IU	*	228	12	12
ES6PZ	7	**57,820**	**170**	**140**
8S5A	7	**3,534**	**39**	**38**
				(Op: SM5AJV)
ES8SW	3.7	**34,884**	**148**	**114**
OL4W	3.7	**10,710**	**80**	**70**
				(Op: OK1IF)
SP5AHY	3.7	**5,772**	**58**	**52**
YU1RA	1.8	**11,169**	**78**	**73**
RZ3VA	1.8	**2,208**	**35**	**32**
YO5OHZ	1.8	**1,980**	**33**	**30**
UA3LHL	*	720	20	18
DJ3GE	1.8	**200**	**12**	**10**

SINGLE OPERATOR
NORTH AMERICA
UNITED STATES

KQ2M	A	**7,411,635**	**2908**	**1023**
KG1E	A	**2,619,755**	**1512**	**709**
W1CU	A	**2,208,000**	**1344**	**690**
AK1W	*	941,553	742	449
				(Op: K5ZD)
KO1N	*	676,172	710	434
				(Op: K1KO)
N1BCL	*	254,736	394	261
W1EBI	*	205,646	355	259
NA1VT	*	112,041	242	177
K1YA	*	104,286	236	182
K1SND	*	79,686	237	171
W1RY	28	**51,435**	**169**	**127**
WA1JMP	21	**384,489**	**555**	**359**
K1JB	21	**100,394**	**245**	**202**
AA1BU	3.7	**1,312,020**	**731**	**444**
KE1Y	3.7	**948,090**	**672**	**390**
***WS1A**	A	**396,884**	**453**	**317**
***K1BV**	A	**242,730**	**407**	**270**
***K1HT**	A	**182,427**	**295**	**219**
*W1JQ	*	163,797	327	213
*W1AIR	*	122,683	325	209
*K1VU	*	120,950	270	205
*KA1EKR	*	103,125	229	165
*KA2KON	*	96,068	227	188
*N1WI	*	38,776	173	131
*KB1HDO	*	27,141	143	109
*AA1MM	*	23,166	121	99
*W1AAD	*	21,056	109	94
*W1CRK	*	6,426	62	54
*K1VSJ	*	6,321	54	49
***N1DC**	21	**13,090**	**88**	**77**
***WG1Z**	14	**116,406**	**260**	**223**
N2GC	A	**1,944,383**	**1343**	**623**
W2OO	A	**461,588**	**493**	**334**
KC2KWK	A	**177,372**	**329**	**234**
WB2LEZ	*	111,125	220	175
W2FUI	*	82,566	205	139
N2CU	*	73,005	208	157
N2GM	21	532,032	648	408
***WA2JQK**	A	**637,839**	**645**	**393**
***NJ1F**	A	**594,033**	**660**	**383**
***KM2O**	A	**198,609**	**347**	**239**
*N2MUN	*	187,920	355	232
*N2MTG	*	165,288	348	213
*K2YLH	*	128,734	285	191
*KV2M	*	104,566	264	194
*W2DKM	*	96,849	211	153
*N2SQW	*	94,464	222	164
*N2LK	*	86,500	221	173
*N2LWL	*	83,072	254	176
*WV2ZOW	*	80,496	218	172
*N2BZP	*	75,517	203	157
*W2WJO	*	68,052	218	159
*KW2P	*	64,207	194	143
*K2TV	*	62,212	201	151
*W2WB	*	58,950	171	131
*N2OPW	*	49,149	164	127
*K2RET	*	45,375	149	125
*WA2BKN	*	32,224	186	76
*N2LQQ	*	25,970	118	98
*KV2X	*	23,343	106	93
*WB2SXY	*	17,600	118	88
*W2VU	*	15,695	91	73
*WA2IAU	*	11,820	63	60
*N2WRD	*	11,786	82	71
*KC2MDQ	*	3,382	40	38
***AB2NM**	28	**2,442**	**37**	**33**
***KS2G**	21	**98,208**	**250**	**198**
*K2BQW	*	50,750	182	145
*KC2HTP	*	1,050	21	21
***AK2P**	14	**1,474,248**	**1108**	**636**
				(Op: KC2LLM)
*K2HVE	*	35,712	137	124
*KC2FYJ	*	1,500	33	30
***NT1E**	7	**420,876**	**477**	**324**
				(Op: K3BU)
KC3R	A	**5,871,330**	**2486**	**890**
				(Op: LZ3AX)
N3UM	A	**1,087,394**	**859**	**506**
K3TW	A	**974,120**	**843**	**497**
W3PT	*	559,314	561	386
N3ZR	*	411,372	569	351
K3MD	*	122,748	266	193
K3PN	*	86,907	234	177
W3TZ	*	65,100	192	150
AA3B	*	37,521	107	99
W3FQE	*	9,075	60	55
AA3VA	*	864	19	16
N3HBX	21	**1,803,984**	**1328**	**637**
W3BGN	3.7	**527,626**	**547**	**319**
***KI3O**	A	**448,758**	**576**	**321**
***W3LL**	A	**408,002**	**507**	**302**
***KA3FZN**	A	**108,647**	**250**	**187**
*WR3Y	*	87,822	203	153
*KU3O	*	68,747	228	161
*NS3T	*	67,782	230	158
*WBØYJT	*	64,872	195	153
*K3ZE	*	42,229	178	121
*N3XL	*	35,264	144	116
*N3FNE	*	27,540	139	102
*W3EH	*	5,031	51	43
*W3MGL	*	4,000	43	40
*WA3G	*	1,296	28	27
***KB3AGZ**	14	**87,438**	**192**	**177**
WK4R	A	**7,711,200**	**3391**	**1008**
KN1DX	A	**7,406,476**	**2871**	**973**
				(Op: K4ZW)
K4PV	A	**2,705,192**	**2052**	**721**
WW4R	*	2,000,130	1706	638
				(Op: N4ZZ)
KG4NEP	*	1,713,987	1234	597
N4NX	*	417,252	518	348
W4ARM	*	411,546	702	339
N4GRN	*	310,154	417	302
KU4FP	*	306,900	409	279
NJ4I	*	282,747	393	307
				(Op: K4LTA)
W4NTI	*	145,692	337	213
K4XZ	*	131,626	248	193
K4OH	*	126,812	258	196
N4MM	*	123,213	248	201
WZ4V	*	111,305	279	197
				(Op: K4BP)
W7QF	*	106,216	252	187
AA4GR	*	71,940	193	165
K4AMC	*	49,911	159	131
WY4Y	*	41,175	203	135
				(Op: N4EIL)
KE4OAR	*	20,832	120	96
N3ISH	*	16,082	98	86
NC4MI	*	2,304	32	32
N4GI	*	403	13	13
NA4W	28	**578,354**	**841**	**379**
NU4BP	28	**195,360**	**451**	**240**
				(Op: N4BP)
K4RDU	*	46,098	152	117
K9ES	21	**1,552,892**	**1236**	**638**
W4NZ	*	172,797	306	239
N4PN	*	115,659	310	213
W4CEB	*	27,556	166	166
KG4FPJ	14	**792**	**18**	**18**
				(Op: N4GI)
AA4MM	1.8	**22,413**	**162**	**93**
***NF4A**	A	**3,283,704**	**2247**	**773**
***N4IG**	A	**861,075**	**781**	**445**
***AC5FL**	A	**664,556**	**651**	**412**
*WD4AHZ	*	506,684	738	394
*NA4K	*	461,315	544	359
*NJ2F	*	349,809	559	323
*WB2RHM	*	309,166	461	299
*AA4RX	*	285,600	396	272
*AB4GG	*	260,490	442	285
*W4KAZ	*	222,000	361	250
*WB4TON	*	182,178	347	261
*K4KO	*	180,357	327	237
*K9RJM	*	124,068	308	196
*N4JED	*	121,095	287	195
*VE3XD/W4	*	95,496	244	184
*AC4PY	*	92,682	243	171
*W4TDB	*	79,192	219	152
*WA2SRY	*	73,416	194	152
*K3HE	*	65,940	190	157
*WA4OSD	*	65,410	210	155
*K4DET	*	62,604	197	148
*AF4UU	*	57,404	157	127
*K4EU	*	52,197	164	137
*KG4OJT	*	47,250	178	135
*NJ8J	*	44,478	156	126
*KF4MK	*	38,340	128	108
*AE4EC	*	32,816	141	112
*K2PAL	*	31,312	124	103
*K4RVH	*	31,165	131	115
*K3MZ	*	25,996	116	97
*N4UH	*	25,276	100	89
*W4TME	*	24,288	112	92
*KG4RZH	*	22,848	129	96
*N4HXI	*	21,004	107	89
*AA4RT	*	20,792	122	92
*K4WES	*	12,212	82	71
*AE4PN	*	12,070	81	71
*WW2DDM	*	11,220	80	66
				(Op: K4UK)
*KF4CQS	*	9,996	73	68
*K4FTO	*	9,174	75	66
*K4GM	*	8,960	73	56
*WA4FXX	*	7,824	57	48
*WA4JA	*	7,440	67	62
*W4BCG	*	5,044	59	52
*KG4MWO	*	3,698	43	43
*KV4DJ	*	3,444	50	41
*AF4QZ	*	2,850	39	38
*KI4ASK	*	1,740	32	29
*K4IR	*	800	23	20
*KG4ECI	*	798	19	19
***KA2DIV**	28	**52,578**	**174**	**138**
				(Op: N4GM)
*WN4DX	*	16,650	87	74
***W4SVO**	21	**462,162**	**703**	**391**
***N4MO**	21	**398,151**	**480**	**369**
*N3AFM	*	9,928	77	68
*NQ4K	*	4,920	45	41
***W9IGJ**	14	**540,790**	**671**	**410**
***KG4VKQ**	14	**462,162**	**121**	**100**
*W4LC	*	288,426	374	318
*AI4AQ	*	47,538	154	139
***K4WI**	1.8	**805**	**26**	**23**
K5TR	A	**5,152,264**	**3045**	**856**
KW5DX	A	**1,585,340**	**1351**	**620**
				(Op: K1NT)
N5PA	A	**740,328**	**738**	**436**
W5TTX	*	549,400	741	410
K5MA	*	113,904	201	168
WD5JNC	*	45,484	168	137
WA5VGI	*	17,784	83	76
W5IL	*	126	7	6
K5ZO	21	**1,016,992**	**1037**	**521**
W5FO	14	**1,053,552**	**1127**	**564**
W5LL	7	**2,856**	**30**	**28**
NE5D	3.7	**475,398**	**624**	**343**
				(Op: K5RX)
W5PR	*	73,200	266	150
***N5DO**	A	**820,512**	**830**	**444**
***KU5S**	A	**396,458**	**525**	**334**
***NI5F**	A	**252,217**	**444**	**263**
*W5PUF	*	221,364	412	258
*AF5Q	*	181,699	465	257
*KE5OG	*	159,809	386	247
*KD5LNO	*	127,656	302	216
*AB5XZ	*	113,032	309	199
*AD5CQ	*	48,927	200	141
*WØVX	*	43,596	166	126
*WF5X	*	42,918	178	138
*AD6G	*	38,552	148	122
*KC5RJV	*	35,224	139	119
*W5SSG	*	15,721	86	79
*NT5TU	*	15,576	114	88
*KC5TA	*	9,916	93	74
*AD5LU	*	7,080	76	60
*N5DTT	*	468	18	18
***WA5SWN**	28	**5,544**	**49**	**42**
*KA5PQD	*	1,452	25	22
				(Op: W5GN)
***K5IX**	21	**55,632**	**172**	**152**
***NN5Z**	14	**178,470**	**383**	**270**
				(Op: K5PX)
*KB5UOK	*	12,699	135	83
KM7W	A	**6,306,911**	**3257**	**871**
				(Op: N6MJ @ W6KP)
WK6I	A	**1,596,963**	**1481**	**543**
W6TK	A	**1,493,800**	**1418**	**550**
N6AA	*	1,437,066	1250	522
W6QEU	*	702,960	776	404
KE6ZSN	*	593,217	1049	381
K6QK	*	476,159	734	361
WR6M	*	407,160	529	216
K6TIM	*	361,032	477	307
WA6ST	*	282,072	492	292
N6AJR	*	128,724	323	204
NO6X	*	120,963	305	183
K6RAD	*	95,403	248	177
W6XJ	*	33,240	139	120
W6FRH	*	20,056	110	92
KJ6RA	*	14,195	103	85
W6OUL	*	8,468	67	58
NU6T	*	5,253	59	51
N6BXO	*	4,640	44	40
NY6Y	*	176	8	8
KX6SUB	28	**21,854**	**98**	**98**
				(Op: K6III)
W6ISQ	*	4,797	42	41
W6AFA	21	**661,290**	**760**	**402**
WK6LA	*	345,384	649	324
				(Op: K6LA)
WR6WR	14	**491,225**	**785**	**401**
N6VI	*	1,485	33	33
NT6K	3.7	**79,659**	**273**	**159**
***N6NF**	A	**893,490**	**1036**	**474**
***WN6K**	A	**702,072**	**912**	**398**
***AK6DV**	A	**255,528**	**494**	**273**
*KO6LU	*	177,457	418	251
*K6UM	*	150,202	324	218
*K6SGH	*	132,300	286	196
*N6WK	*	130,660	303	188
*KG6NDO	*	128,945	312	205
*NC6CC	*	109,823	302	203
				(Op: N6ZFO)
*K6VVA	*	107,184	308	174
*KD6PQF	*	91,410	269	165
*KK6XN	*	77,558	244	157
				(Op: W6KY)
*KQ6MU	*	69,003	233	153
*WB6NFO	*	66,728	222	152
*K6EY	*	62,757	171	171
*AA6EE	*	44,685	182	135
*KE6QR	*	39,184	176	124
*K6BIR	*	32,809	166	109
*K6CSL	*	27,913	117	103
*N6RZR	*	26,754	130	98
*K6WV	*	6,696	58	54
*WB6NL	*	2,574	48	39
*KQ6TW	*	1,827	31	29
*W6ZZZ	*	855	25	19
***W7UPF**	28	**91,344**	**223**	**176**
***NP4IW/WY6**	21	**102,335**	**290**	**211**
*WB6RNS	*	27,972	123	111
***K6HNZ**	14	**505,134**	**788**	**399**
*WA6NOL	*	27,730	125	118
***KU6T**	7	**20,400**	**88**	**80**
K7RL	A	**5,677,872**	**2604**	**851**
KO7X	A	**545,875**	**878**	**397**
W6AEA	A	**402,420**	**536**	**353**
W7QN	*	250,800	475	285
N7RO	*	177,360	318	240
K7VIT	*	155,216	347	218
KS7T	*	104,652	272	204
KC7UP	*	76,320	199	160
KG7P	*	67,680	233	160
K7JJ	*	64,320	218	160
W7BJ	*	52,392	178	111
WJ7H	*	50,662	193	146
K7AEK	*	49,232	177	136
N7QNO	*	7,392	74	66
W7EB	28	**231,346**	**543**	**262**
W7AYY	*	7,084	55	46
K7RI	21	**1,130,460**	**1290**	**498**
KC7V	*	436,179	578	347
WA7AR	14	**592,272**	**706**	**457**
				(Op: W7FP)
NR7DX	*	155,871	305	251
				(Op: K7ABV)
W7LKG	*	240	10	10
K7ZSD	7	**1,019,560**	**749**	**355**
***N7LOX**	A	**611,310**	**883**	**410**
***KE7RT**	A	**410,040**	**590**	**340**
***K7AWB**	A	**268,058**	**516**	**287**
*K7TR	*	190,070	410	229
*NK7J	*	154,280	334	232
*KI7Y	*	150,302	355	223
*WI7F	*	88,044	291	174
*N7XY	*	67,230	225	162
*W7YAQ	*	56,832	148	148
*K7ACZ	*	50,630	162	122
*KD7JGI	*	28,340	152	109
*AD7BK	*	27,720	153	110
*W7GTO	*	27,440	142	98
*KJ7WN	*	16,835	121	91
*KT7G	*	14,400	103	80
*N7BF	*	14,352	109	78
*NW7DX	*	10,676	88	68
*KC7RSO	*	4,165	59	49
*K7EKM	*	880	20	20
*KD7RVK	*	560	14	14
*AC7ZF	*	513	21	19
*K8LJK	*	77	7	7
***K8IA**	21	**649,020**	**836**	**435**
***WZ7ZR**	21	**537,234**	**792**	**391**
				(Op: W7ZR)
*W7YVK	*	17,808	89	84
*W3CP/7	*	5,457	51	51
NZ8O	A	**3,371,830**	**2252**	**770**
				(Op: W8MJ)
W8JY	A	**537,092**	**603**	**382**
K8SAK	*	192,131	334	229
K8VUS	*	105,020	257	178
W8JWN	7	**214,520**	**368**	**248**
ND8DX	1.8	**7,296**	**85**	**64**
***WB8TLI**	A	**982,949**	**826**	**463**
***KA8Q**	A	**564,358**	**589**	**362**
***N8II**	A	**414,004**	**494**	**332**
*N8WK	*	231,686	374	266
*NF8M	*	84,328	238	166
*W8SGZ	*	52,260	194	134
*WB8RFB	*	44,208	183	144
*N8NB	*	42,592	151	121
*W8KNO	*	39,900	149	140
*KE8FO	*	25,047	121	99
*KC8RAN	*	20,910	113	85
*AB8ND	*	14,898	94	78
*N8UZE	*	8,816	73	58
*N8NX	*	8,360	58	55
*W8VE	*	5,808	54	48
*KC8WTP	*	1,296	24	24
*W8TK	*	437	20	19
*W8IDM	*	330	11	11
***K8OZ**	28	**56,771**	**188**	**143**
*W8UMR	*	13,561	78	71
***N8RY**	21	**220,410**	**489**	**279**
***WD8LQB**	14	**7,448**	**65**	**56**
*AF8C	*	6,156	57	54
***NR8U**	7	**7,344**	**80**	**68**
WB9Z	A	**4,964,420**	**2682**	**890**
KW9N	A	**2,085,340**	**1268**	**635**
				(Op: N9RV)
NX9T	A	**1,120,952**	**1045**	**518**
W9OP	*	953,317	825	463
NC9F	*	414,687	484	343
NA9D	*	389,587	757	331
				(Op: N9LAH)
KB9KEG	*	153,454	354	226
NR9J	*	146,065	335	223
WW9R	*	67,353	234	143
K9UQN	*	53,067	169	147
WM9M	*	5,760	42	40
KG9N	14	19,278	130	102
***KB9YEY**	A	**184,158**	**353**	**234**
***K9JE**	A	**136,320**	**292**	**213**
***K9JIG**	A	**93,972**	**273**	**191**
*NI9C	*	93,160	230	170
*N9KO	*	62,205	220	145
*KB9WBM	*	59,736	202	152
*KS9WI	*	56,625	179	151
*W9THD	*	42,471	146	121
*W9CEO	*	35,802	152	117
*W9LYA	*	28,196	126	106
*K9DXR	*	22,698	106	97
*NM9P	*	11,880	83	72
*AA9RT	*	10,833	87	69
*N9LYE	*	6,625	65	53
*K9QH	*	6,486	54	46
*WE9V	*	4,366	40	37
*KA9ZFW	*	518	14	14
*KI9R	*	363	11	11
***K9OM**	28	**139,314**	**321**	**214**
*WD9EWK	*	7,152	56	48
*W9AEM	*	6,321	55	49
***WD9DZV**	21	**151,250**	**337**	**242**
***K9OP**	14	**197,169**	**398**	**287**
*WD9DJD	*	54,405	177	155
*N9OE	*	20,100	112	100
*K9EMF	*	16,275	105	93
*AB9IO	7	1	1	1
KTØR	A	**1,177,544**	**1337**	**508**
WØZA	A	**881,790**	**1087**	**455**
WØBH	A	**734,886**	**981**	**439**
NKØM	*	627,370	804	430
				(Op: KØDEQ)
KØGAS	*	494,157	808	381
WDØJ	*	383,616	802	324
KØJJ	*	301,928	543	292
KØDAT	*	168,264	270	228
WØPPF	*	147,200	332	230
NØUU	*	139,097	283	217
KØCAT	*	80,500	254	175
				(Op: K9WIE)
WØYC	*	63,273	202	161
				(Op: K8GU)
KIØHA	*	62,745	184	141
KØFX	*	36,720	133	102
KØUK	*	27,500	117	100
ABØYM	*	15,136	123	86
KØRH	28	**73,839**	**200**	**151**
KBØENE	21	**105,468**	**258**	**204**
WØAIH	14	**1,417,890**	**1402**	**626**
				(Op: K9MU)
KØCS	1.8	**450**	**19**	**18**
***ACØW**	A	**1,039,724**	**1151**	**497**
***KBØBUV**	A	**283,624**	**450**	**293**
***NØAB**	A	**249,862**	**423**	**271**
*KØHW	*	233,618	471	259
*NØXG	*	121,264	330	208
*KBØARZ	*	116,032	266	196
*WØDEW	*	99,360	283	184
*KAØZPP	*	97,310	250	185
*KCØIGY	*	92,752	277	176
*NØALH	*	74,128	219	164
*KAØZIA	*	70,119	228	147
*NØWY	*	61,858	203	157
*KIØY	*	54,981	205	149
*WØCBH	*	48,714	161	138
*NT3R	*	40,448	146	128
*NØGVK	*	25,511	110	97
*WAØKDS	*	20,648	106	89
*KAØEIC	*	18,512	99	89
*NØICV	*	8,586	63	53
*WBØBMO	*	5,671	63	53
*NØOA	*	2,898	45	42
*NØAT	*	1,664	28	26
*WDØBGZ	*	1,625	29	25
*KCØLFQ	*	476	17	17
***KIØEO**	28	**160**	**8**	**8**

CUBA

CO8ZZ	21	**487,040**	**707**	**320**
***CO8KA**	A	**228,206**	**372**	**242**
***CO2TK**	28	**171,936**	**391**	**199**
***CM8WAL**	21	**790,164**	**839**	**423**

MARTINIQUE

FM/T93M	A	**13,840,638**	**4612**	**1074**
***FM5FJ**	21	**1,215,493**	**991**	**521**

DOMINICAN REPUBLIC

***HI3NR**	A	**88,768**	**203**	**146**

HONDURAS

HR1CP	A	**848,070**	**820**	**405**
***HR1RBM**	A	**79,674**	**189**	**147**

GRENADA

***J3/OH2YY**	A	**939,160**	**969**	**424**
***J37LR**	A	**330,876**	**542**	**273**
				(Op: VE3EBN)

ALASKA

***AL9A**	A	**9,282**	**65**	**51**

VIRGIN IS.

***KP2BH**	1.8	**360**	**10**	**8**

PUERTO RICO

NP3X	28	2,606,084	1996	598
*WP4LNY	A	771,477	1009	357
*WP3GW	*	207,245	328	229
*KP4JFR	*	67,896	184	138
*KP4AH	21	1,385,350	1287	515

GREENLAND

*OX2KAN	14	2,184	31	28

COSTA RICA

*TI5N	A	2,237,175	1724	549
			(Op: NØKE)	
*TI2KAC	*	471,510	711	310
*TI2DLL	14	99,828	243	177
*TE2M	3.7	57,512	128	104

CANADA

VC3E	A	8,858,176	3187	976
			(Op: VE3AT)	
VE3EJ	*	8,181,393	2972	957
VY2/DK1MM	A	6,470,178	2397	858
VO1AU	A	6,353,232	2324	856
VO1TA	*	1,599,772	1120	524
W1AJT/VE3	*	1,300,032	981	488
VE9MY	A	540,960	484	392
VA3EC	*	479,009	535	323
VE5FX	A	428,904	557	333
VO1MP	*	409,370	443	335
VE3KZ	*	175,480	325	214
VE7XO	A	138,516	277	204
VY1CQ	A	94,856	244	167
VA6MM	A	58,916	179	143
VE3OBU	*	40,680	132	113
VE6JY	*	320	12	10
VA7AM	21	1,270,665	1231	453
VB5C	14	2,716,896	1878	672
			(Op: VA5DX)	
VE7AV	14	1,863,972	1381	594
VA7RR	7	2,122,260	1051	434
*VE3AGC	A	1,238,932	1027	452
*VE3JAQ	*	1,225,854	885	483
*VE3DZ	*	1,071,850	808	485
*VE3CR	*	794,748	696	412
*VA3OX	*	621,000	606	375
*VE7XF	A	598,671	608	389
*VE5SF	A	564,504	771	344
*VE1YDX	A	512,640	510	356
*VA3SWG	*	458,297	505	329
*VE3TW	*	415,800	508	300
*VE2AWR	A	415,090	510	310
*VE7KET	*	268,398	364	279
*VE4YU	A	253,272	421	244
*VE2QIP	*	201,411	299	207
*VA3GD	*	198,543	341	229
*VA3IX	*	108,279	248	159
*VE4HAZ	*	89,647	257	157
*VE3JDF	*	88,536	202	168
*VE3XAT	*	87,730	218	155
*VE3GLO	*	74,124	216	142
*VE3KP	*	53,130	151	115
*VA7IRL	*	47,250	153	105
*VA7MJR	*	25,938	116	99
*VA7CAB	*	10,065	70	61
*VA3HUN	*	4,332	43	38
*VE2OWL	*	3,096	40	36
*VE3TLY	*	3,026	38	34
*VE3RER	*	1,794	27	26
*VE7WWW	28	1,242	25	23
*VA3SPN	*	40	4	4
*VE7IN	21	115,280	307	176
*VA3FP	*	97,152	208	184
*VE7NI	*	1,155	24	21
*VE2OTT	14	88,704	186	176
*VE3RCN	*	24,010	98	98
*VE3MGY	1.8	98,865	230	117

NICARAGUA

*H6C	A	1,863,052	1603	513
			(Op: YN4SU)	

MEXICO

XE1MM	A	1,663,101	1515	471
XE2K	14	1,664,116	1322	541
*XE1CQ	A	1,399,525	1433	445
*XE2AUB	A	1,012,059	1062	417
*XE1XOE	*	464,814	658	294
*XE1NK	*	65,124	158	134
*XE2MVS	*	4,879	46	41
*XE1CT	21	711,614	848	383

CAYMAN IS.

ZF1A	14	1,955,084	1547	569
			(Op: W6VNR)	

AFRICA

MADAGASCAR

*5R8FU	21	234,780	312	258

NIGER

5U7JB	A	6,658,550	2516	815

KENYA

*5Z4HT	21	711,540	606	402

ZAMBIA

9J2KC	A	5,475,547	2309	799
			(Op: JL1NKC)	

MADEIRIA IS.

CT9A	A	15,516,202	4490	1091
			(Op: OH6RX)	
CT3LG	*	2,494	30	29
*CS3MAD	28	455	13	13

CAPE VERDE

D4B	A	25,955,444	6252	1306
			(Op: 4L5A)	

CANARY IS.

ED8EW	21	10,169,685	3211	1061
			(Op: EA4BQ/OHØXX)	
EA8LS	21	2,937,600	1458	675
AN8AH	7	5,560,650	1378	675
			(Op: OH1RY)	
AN8CAC	3.7	557,274	360	262
			(Op: EA8CAC)	
*ED8BTM	A	1,479,444	977	492
*EC8ABT	A	682,808	610	356
*EA8/DJ1OJ	*	201,331	307	221
*AN8AG	21	1,811,524	1063	572
*EC8ADN	*	7,252	50	49
*EA8ARG	14	52,932	135	132

NAMIBIA

*V51/DL5XL	28	1,319,136	976	453
			(Op: DL5XL)	

CHAGOS IS.

VQ9LA	A	658,112	610	364

SOUTH AFRICA

ZS5T	A	1,879,360	1140	560
			(Op: ZS5BBO)	
ZS9Z	21	589,560	592	340
ZS5NK	*	229,565	317	245
*ZS6EGB	A	156,555	261	213
*ZS5SAM	A	105,878	218	167
*ZS4BS	*	56,502	156	129
*ZS4JAN	*	15,400	80	70
*ZS6MG	7	5,340	31	30

ASIA

AZERBAIJAN

*4K9W	A	10,736	63	61

GEORGIA

4L4KW	A	8,024	42	34
4L6AM	14	5,905,845	2447	873
*4L2M	A	3,727,963	1893	659

ISRAEL

4X6FR	A	1,888,145	1303	511
4X1IM	3.7	785,664	508	279
*4X6DK	A	413,100	426	300
*4X6UU	*	56,854	146	131
*4Z5MO	*	16,632	78	77

CYPRUS

H22H	7	2,626,320	940	496

WEST MALAYSIA

9M2RPN	A	7,039,960	3341	860
			(Op: GM4YXI)	
*9M2TO	A	1,592,520	1328	552

SINGAPORE

9V1YC	28	886,388	967	436
*9V1GO	21	34,485	137	121

CHINA

BY1DX	A	3,862,104	2321	716
			(Op: DH2PM)	
*BW4/UA3VCS	28	42,840	214	119

KYRGYZSTAN

EX8AA	28	36,084	128	97
*EX2X	A	1,878,800	1327	560
*EX8LS	28	84,781	213	149
*EX7ML	21	727,610	703	386

TAJIKISTAN

EY7AF	A	893	19	19

TURKMENISTAN

*EZ8CW	A	76,254	188	142

SOUTH KOREA

HL3AHQ	A	40,916	167	106
HL5UOG	A	36,920	142	104
HL1/VE3LBQ	21	200,396	378	238
*HL1/WX8C	A	234,360	424	252
*6K2CLF	A	193,434	506	206
*DS5KJR	*	156,240	395	186
*HL2FDW	*	98,029	298	167
*DS5DNO	*	56,826	194	123
*HL5AP	21	39,984	138	119
*HL2/JH1FXF	*	4,186	53	46

THAILAND

*HS1PDY	A	419,012	564	356
*E21EIC	21	150,516	284	225
*HS1JNB	14	52,380	172	135

JAPAN

JH4UYB	A	6,093,886	2481	841
JA7NVF	A	3,324,880	1740	695
JM1XCW	A	2,848,980	1478	618
JA2BNN	*	915,798	834	398
JA2FSM	*	492,982	520	322
JO7KMB	*	199,808	337	223
JA2BQX	*	135,604	298	203
JA5CPO	*	56,985	182	131
JF9JTS	*	47,436	148	118
JS1DCZ	*	27,300	123	100
JA3QOS	*	23,636	116	76
JA1TGC	*	21,962	95	79
JA7IC	*	20,088	104	81
JA1ISJ	*	19,762	97	82
7J1ABD	*	19,536	90	74
JG2REJ	*	15,170	76	74
JR3NDM	*	11,424	74	68
JH3VEY	*	4,242	45	42
JA1FBH	*	900	20	18
JA1BNW	*	171	9	9
JG2SON	28	21,000	116	70
JH1EAQ	21	2,037,390	1246	601
JA5APU	21	649,568	652	383
JH1AZO	*	59,584	166	133
JH2BTM	*	23,670	105	90
JA6GCE	14	2,291,009	1321	643
JA3ORD	*	12,390	75	70
JJ2PUG	*	6,834	52	51
JH7XMO	7	470,322	363	261
JA5IP	*	20,332	75	68
*JR3RIY	A	484,354	534	338
*JA1KK	A	172,387	322	211
*JHØNVX/1	A	151,902	304	194
*JA1GYO	*	107,970	234	177
*JAØBMS	*	105,952	266	172
*JM1GHT	*	97,440	202	168
*JL3SIK	*	92,990	225	170
*JA1BUI	*	90,558	211	162
*JA1XUY	*	72,562	204	146
*JA2GHP	*	69,654	218	141
*JE1COB	*	63,063	185	143
*JA1CP	*	57,856	184	128
*JR1MRG	*	50,283	172	111
*JA4BAA	*	47,740	169	110
*JL7XBN	*	44,400	153	120
*JR1WYV	*	42,265	149	107
*JK2VOC	*	41,697	152	113
*JA1ALX/9	*	40,432	159	112
*JH1FNU	*	40,150	147	110
*JA2KPW	*	39,376	146	107
*JA1XPU	*	39,208	136	116
*JQ1AHZ/2	*	38,584	159	104
*JI3MJK	*	38,295	131	115
*JL3RDC	*	34,775	139	107
*JR1SGU	*	33,216	129	96
*JR1CCP	*	28,560	118	102
*JE2HCJ	*	27,664	108	91
*JA1IZ	*	19,656	96	84
*JA5FBZ	*	18,500	83	74
*7J1BAR	*	16,810	87	82
*JJØAEB	*	13,928	79	66
*JA1RRA	*	11,748	74	66
*JR3NZC	*	11,387	65	59
*JR5NMD	*	9,440	72	59
*7J1AIL	*	7,056	60	49
*JM1KNI	*	4,368	48	42
*JA1HG	*	3,800	41	38
*7L3IUE	*	3,276	40	36
*JE8KKX	*	1,408	24	22
*JG1FGL	*	960	22	20
*JM3HYL	*	458	14	14
*JR1UMO	*	96	6	6
*JF3BFS	28	85,617	251	151
*7N2UQC	28	22,227	121	93
*JA6EFT	*	15,533	93	81
*JA7KM	*	4,995	53	45
*7K2PBB	*	2,700	39	36
*JA1AAT	*	297	11	9
*JJ8JML	21	530,280	565	360
*JL3VUL/3	21	436,832	510	352
*JF3IYW/3	*	141,911	281	209
*JA1BPA	*	107,501	235	193
			(Op: JA6-9330)	
*JA5EO	*	101,551	215	173
*JA4AQR	*	90,415	209	169
*JR7LVK	*	52,904	145	136
*JR4GPA	*	33,252	126	102
*JA2KKA	*	24,816	114	94
*JI7WPV	*	17,010	90	81
*JA3PYH	*	15,600	85	80
*JA7ADV	*	11,340	162	70
*JK1BII	*	7,755	59	55
*JE1REU	*	7,155	57	53
*JA3LKE	*	6,440	50	46
*JR3KAH	*	3,640	45	40
*JF7GDF	*	1,302	22	21
*JH1RMH	*	1,298	23	22
*JG1GCO	*	779	19	19
*JH1TUX	*	731	19	17
*JA3AVO	*	435	15	15
*JA1LBZ	*	260	10	10
*JN1DNV	*	171	9	9
*JR1BSV	*	9	3	3
*JI1FDF	14	157,941	297	207
*JR4FLW	14	48,260	148	127
*JE1GZB	*	12,261	75	67
*JH9URT	7	32,214	134	91
*JE1SPY	3.7	5,145	47	35
*JM4WUZ	*	4,433	38	31
*JM2RUV	*	78	7	6

OGASAWARA

*JD1BIA	A	60,501	258	129

MONGOLIA

JT1KAA	14	235,056	522	249
			(Op: JT1DA)	
*JT1CO	A	59,595	229	145

TURKEY (ASIATIC)

*TA5FA	A	141,040	298	172
*TA3YJ/4	A	5,952	35	32
*TA3J/4	*	4,480	30	28
*TA3BE	*	1,098	18	18

ASIATIC RUSSIA

UA9CLB	A	5,936,112	2478	728
RW9HA	A	5,240,926	2237	818
RA9ST	A	1,964,928	1193	516
RV9SV	*	1,009,620	733	395
RK9KWI	*	352,569	427	309
			(Op: UT7CR)	
UA9XF	*	340,575	383	239
UA9OS	*	314,080	408	302
RW9TA	*	279,616	390	257
RV9JE	*	25,576	104	92
UA9KM	28	135	9	9
RW9CF	21	2,359,682	1488	611
UA9ZZ	21	2,080,890	1483	630
RZ9OO	14	1,884,800	1158	620
RA9JM	14	840,886	736	433
RV9BI	*	497,728	546	352
UA9KJ	*	359,112	451	312
RW9QA	*	288,100	393	268
RK9QWZ	*	9,828	65	52
			(Op: UA9QFF)	
RN9XA	3.7	111,540	150	132
*RU9DD	A	1,890,624	1221	516
*RV9AZ	A	1,130,112	836	432
*RN9RZ	A	1,017,591	743	431
*RK9CR	*	806,981	694	383
*UA9MQR	*	705,294	656	353
*RA9DA	*	546,277	534	337
*UA9OUU	*	487,620	629	324
*RU9AC	*	474,920	544	310
*RV9UP	*	472,006	533	331
*RX9WN	*	396,544	438	307
*RX9UKF	*	297,979	399	263
*RA9XF	*	283,148	401	284
*RA9JR	*	273,182	392	266
*RZ9HG	*	64,845	129	99
*UA9AX	*	47,311	141	121
*RX9AOG	*	24,366	102	93
*RA9FTM	*	22,599	101	93
*RA9KM	*	14,129	77	71
*RA9AC	*	10,150	63	58
*RW9UOB	*	2,201	36	31
*RA9UAG	28	1,680	28	28
*RA9UA	*	140	10	10
*RA9JP	21	497,000	604	355
*UA9FGJ	*	102,765	231	195
*RA9XU	*	46,845	159	135
*RA9AU	14	866,310	736	431
*RA9FEL	14	232,921	353	247
*RX9FG	*	189,049	299	239
*UA9LAU	*	79,926	195	154
*UA9ORQ	*	2,700	30	30
*UA9XRV	*	1,040	20	20
*UA9QFF	1.8	34,200	110	72
*UA9SLX	1.8	27,520	93	64
RTØQ	A	4,615,650	2505	789
			(Op: RZ3BY/Ø)	
UAØAZ	A	769,557	626	437
RWØCF	*	7,380	45	41
RZØSR	7	547,120	488	280
RSØF	21	682,176	802	408
UAØSMF	*	452,904	592	339
*RUØAW	A	2,246,896	1378	634
*UAØSE	A	1,465,296	1175	534
*UAØSC	A	1,405,368	1098	524
*UAØSR	*	609,703	671	349
*UAØAPV	*	278,913	312	239
*RAØSDW	*	149,076	276	202
*RAØFF	*	116,028	277	198
*UAØWW	*	90,856	238	164
*UAØFBS	*	89,677	328	161
*RWØBG	*	17,538	89	74
*RUØST	*	12,062	83	74
*RUØAE	*	11,224	74	61
*RKØSZZ	*	1,160	23	20
*RUØSN	28	24,102	150	103
*RWØUZ	14	194,292	413	252
*RWØUM	*	118,998	291	198

UZBEKISTAN

*UK/JI2MED	A	840,826	893	406

KAZAKHSTAN

UN7QF	A	80,937	205	153
UN9LW	14	3,185,718	1646	681
UN8LF	7	169,031	198	163
			(Op: UN9LEZ)	
*UO6P	A	1,170,866	971	454
			(Op: UN7PBY)	
*UN7FW	28	45,016	181	136
*UN7JX	21	987,624	924	473
*UQ1D	14	580,424	534	348
			(Op: UN7DA)	
*UN6LN	*	444,880	486	332
*UP5F	*	178,304	308	224
			(Op: UN7FW)	

HONG KONG

VR2BG	21	8,816	72	58

INDIA

*AT8D	14	48,093	189	123

MACAU

*XX9AU	21	1,050	32	25

IRAQ

*YI8M	A	2,214,562	1533	499

EUROPE

SICILY

IT9VCE	21	122,434	308	221
IU9S	14	4,301,000	2654	935
			(Op: IT9BLB)	

CONTINENTAL LEADERS

AFRICA

1.8	No Entry	
3.5	AN8CAC	557,244
7	AN8AH	5,560,650
14	EA8ARG	52,932
21	ED8EW	10,169,685
28	V51/DL5XL	1,319,136
AB	D4B	25,955,444

ASIA

1.8	UA9QFF	34,200
3.5	4X1IM	785,664
7	H22H	2,626,320
14	4L6AM	5,905,845
21	RW9CF	2,359,682
28	9V1YC	886,388
AB	9M2RPN	7,039,960

EUROPE

1.8	S57M	468,531
3.5	SO2R	2,543,708
7	YTØA	4,372,144
14	9A8A	4,589,634
21	CT8T	4,499,360
28	9A5Y	423,640
AB	RK4FF	6,226,180

NORTH AMERICA

1.8	*VE3MGY	98,865
3.5	AA1BU	1,312,020
7	VA7RR	2,122,260
14	VB5C	2,716,896
21	N3HBX	1,803,984
28	NP3X	2,551,145
AB	FM/T93M	13,840,638

OCEANIA

1.8	No Entry	
3.5	No Entry	
7	YB1DX	197,920
14	VK1AA/4	4,283,664
21	KH6ND	6,379,540
28	VK2CZ	402,462
AB	KG6DX	3,999,272

SOUTH AMERICA

1.8	YV2IF	5,248
3.5	YV5LIX	658,580
7	YY5BDP	41,366
14	ZV5E	3,821,867
21	PX5E	12,568,343
28	LU1HF	8,511,708
AB	FY5FY	17,072,370

MULTI-OPERATOR SINGLE TRANSMITTER

AF	CQ3T	4,563,548
AS	UA9AYA	12,712,275
EU	IR4T	12,450,240
NA	VP51V	17,939,600
OC	3D2AY	3,460,380
SA	CWØB	16,398,356

MULTI-OPERATOR TWO TRANSMITTER

AF	CQ9K	30,061,889
AS	A61AJ	30,157,650
EU	RU1A	16,054,404
NA	KM4M	13,025,033
OC	No Entry	
SA	ZW5B	26,849,550

MULTI-OPERATOR MULTI-TRANSMITTER

AF	3B9C	24,210,579
AS	UP5G	18,934,745
EU	OT4A	19,229,184
NA	NQ4I	17,627,499
OC	ZL6QH	12,904,448
SA	YW4M	32,037,671

*Denotes Low Power

IT9STX	**14**	**1,830,150**	**1570**	**735**
IR9M	*	1,603,392	1658	672
***IT9RJE**	**A**	**255,640**	**425**	**308**
*IT9ORA	*	13,776	94	82
*IT9FGA	*	5,658	47	41
***IT9SGN**	**21**	**121,410**	**316**	**213**
***IT9WMD**	**14**	**18,618**	**132**	**107**
CROATIA				
9A7V	**A**	**544,896**	**634**	**384**
9A5Y	**28**	**423,640**	**556**	**356**
			(Op: 9A3LG)	
9A8BA	**21**	**3,796,884**	**1856**	**819**
			(Op: 9A9A)	
9A8A	**14**	**4,589,634**	**2297**	**938**
9A8BAAA	**3.7**	**2,058,000**	**1361**	**588**
			(Op: 9A5K)	
***9A7ZZ**	**A**	**363,825**	**508**	**315**
*9A2GA	*	50,304	167	131
***9A4VM**	**28**	**14,720**	**80**	**64**
***9A7D**	**14**	**1,279,818**	**1149**	**582**
			(Op: 9A3HX)	
*9A4RV	*	212,695	451	295
*9A3ND	*	47,736	184	156
***9A8DX**	**7**	**131,600**	**295**	**200**
***9A7DM**	**3.7**	**833,976**	**845**	**429**
***9A3RE**	**1.8**	**41,114**	**169**	**122**
MALTA				
***9H1DE**	**A**	**132,096**	**318**	**258**
*9H1XT	*	6,174	51	49
PORTUGAL				
CT1AGF	**A**	**5,499**	**47**	**47**
CT8T	**21**	**4,499,360**	**2266**	**922**
***CS6T**	**A**	**4,925,620**	**2459**	**932**
			(Op: CT1ILT)	
*CS8EGW	*	452,575	660	421
*CT1DYV	*	117,810	240	187
***CT1BNW**	**14**	**65,148**	**206**	**183**
AZORES				
***CU2YK**	**A**	**109,296**	**274**	**207**
GERMANY				
DL3TD	**A**	**6,000,064**	**2603**	**908**
DL8OV	**A**	**2,470,320**	**1533**	**720**
DL1NEO	**A**	**692,406**	**733**	**429**
DL4WA	*	555,240	632	420
DL7JAN	*	537,234	654	391
DJ9HX	*	371,250	446	330
DL9DYL	*	318,052	444	307
DK1MAX	*	295,812	394	332
DL1PT	*	272,970	418	270
DF3IS	*	235,419	389	291
DH2PG	*	235,053	364	273
DJ4PI	*	184,847	306	241
DF2RG	*	155,411	283	233
DK4IO	*	136,752	296	222
DL1DTC	*	80,600	191	155
DK6CQ	*	53,632	153	128
DF5BX	*	53,544	183	138
DJ6UP	*	42,120	161	135
DL8DXL	*	18,601	98	89
DL3APZ	*	1,110	31	30
DL9UBF	*	363	11	11
DF9ZP	**21**	**1,195,640**	**873**	**568**
DF3KV	**21**	**964,600**	**813**	**520**
DB6OA	*	408,421	517	353
			(Op: DL8OBQ)	
DL4MCF	**14**	**2,936,042**	**1758**	**789**
DJ6QT	**1.8**	**222,865**	**433**	**265**
***DJ1AA**	**A**	**1,112,856**	**1026**	**521**
***DJ8UV**	**A**	**931,584**	**961**	**494**
***DL4ZBC**	**A**	**578,675**	**639**	**395**
*DKØMN	*	481,338	653	363
			(Op: DJ7MGQ)	
*DL1DUO	*	353,584	469	328
*DH5AO	*	274,428	434	297
*DK6AY	*	155,440	326	232
*DF2FM	*	153,504	306	234
*DK7OM	*	131,760	293	216
*DM2AWM	*	129,580	318	220
*DL6RBH	*	126,140	265	212
*DF2KD	*	115,872	286	213
*DL8HCO	*	111,888	282	216
*DK8AX	*	100,440	229	180
*DH2MA	*	99,138	264	186
*DB8NI	*	90,582	244	186
*DF6WE	*	87,966	242	181
*DK7MCX	*	65,826	201	159
*DL3SCN	*	63,550	193	155
*DG2MIC	*	59,784	206	159
*DL7EF	*	59,517	182	153
*DK3GI	*	49,580	154	134
*DL7UXG	*	48,374	165	134
*DL2ANM	*	47,320	170	130
*DL1MGB	*	46,230	164	134
*DH5WB	*	42,164	168	127
*DL8SDC	*	37,920	146	120
*DL2YET	*	20,116	110	94
*DL8NCR	*	18,860	104	92
*DL5EBS	*	17,388	78	69
*DH6AB	*	14,760	97	82
*DL7FA	*	14,040	108	90
*DL2GMI	*	12,282	74	69
*DL3YEI	*	11,858	85	77
*DJ5MW	*	11,122	77	67
*DL8SDI	*	8,550	64	57
*DL3DRN	*	7,744	68	64
*DK7FP	*	7,112	57	56
*DB4SP	*	5,208	59	56
*DK2ZO	*	2,520	36	35
*DJ6TK	*	2,520	38	36
*DF5AU	*	1,300	24	20
*DJ1VQ	*	660	20	15
***DL7IZ**	**28**	**545**	**14**	**13**
***DF7YU**	**21**	**397,860**	**476**	**349**
*DL3ZAI	*	28,500	124	95
*DL3BRA	*	20,520	96	76
***DFØBBG**	**14**	**37,128**	**180**	**136**
*DL2QT	*	495	15	15
*DJ6XB	*	16	4	4
***DL7UIO**	**7**	**20,680**	**103**	**88**
***DL3LE**	**3.7**	**163,240**	**277**	**220**
SPAIN				
EA5DFV	**A**	**4,099,060**	**2197**	**805**
EA3PT	**A**	**938,139**	**1068**	**537**
EA3CDN	*	522,372	625	404
EA7RU	*	340,480	499	320
EA7ATX	**28**	**173,943**	**313**	**231**
EA5KV	**21**	**577,353**	**595**	**399**
ED1DGZ	**14**	**206,193**	**437**	**311**
EA3BOX	**7**	**828,971**	**618**	**403**
EA5JK	**3.7**	**73,200**	**184**	**150**
EA5AT	**1.8**	**17,901**	**88**	**81**
***AN5DF**	**A**	**2,071,654**	**1537**	**731**
			(Op: EA5DF)	
***EA3CI**	**A**	**1,946,880**	**1369**	**624**
***ED1WS**	**A**	**1,305,426**	**1093**	**582**
			(Op: EA1WS)	
*AN3FCQ	*	455,455	644	385
			(Op: EA3FCQ)	
*AN3GHZ	*	417,924	470	342
*AM7IA	*	407,009	532	353
*EA5ASF	*	317,951	482	317
*AM1CNF	*	212,132	430	293
*EA3AGB	*	199,410	324	255
*EA4DXP	*	194,620	369	263
*EA3NA	*	193,192	324	248
*AM1AUM	*	188,940	435	268
*AM7GXW	*	188,048	488	292
*AN1BXQ	*	165,663	306	233
*EA5GFK	*	159,530	337	265
*EA1ASG	*	150,202	283	218
*EA4YK	*	142,072	296	236
*EA3NP	*	131,976	277	234
***EA7ANM**	**21**	**303,100**	**586**	**350**
*EC7ALW	*	218,272	608	359
*EF7ABV	*	195,755	595	329
*AN1MK	*	141,120	284	210
			(Op: EA1MK)	
*EA3EYD	*	116,688	242	204
*EA5BWR/M	*	62,212	172	151
*EC3CJN	*	41,328	187	144
*EF3PL	*	12,375	89	75
			(Op: EC3CMT)	
*EA7EYQ	*	9,450	68	63
*EC1DMQ	*	7,139	63	59
*EC2AH	*	290	11	10
***EA3AKA**	**14**	**115,680**	**290**	**240**
***EA1AAW**	**14**	**92,180**	**259**	**220**
*EA3ALV	*	67,262	222	199
*AN1QA	*	50,286	195	174
***EA1ZH**	**3.7**	**14,476**	**85**	**77**
BALEARIC IS.				
***AM6AZ**	**A**	**139,482**	**325**	**245**
*EA6TU	*	71,736	214	183
IRELAND				
EI2JD	**A**	**478,750**	**642**	**383**
***EI6JK**	**A**	**65,052**	**206**	**156**

*EA1BIM	*	120,960	248	210
*EA7GGU	*	111,911	299	227
*EA2BNU	*	109,620	244	203
*AM7EWX	*	104,442	251	206
*EA3GHQ	*	104,120	240	190
*EA3DVJ	*	69,190	216	170
*EA7TG	*	61,060	167	142
*EA3CZR	*	53,067	169	147
*EA7GV	*	52,264	172	139
*EA5FST	*	49,580	159	134
*EA7CWA	*	44,516	147	124
*EA7HE	*	43,180	178	127
*EA1GAR	*	42,920	187	145
*EA3EAN	*	27,216	126	108
*EA1BZP	*	20,273	111	97
*EF5CIA	*	14,344	105	88
			(Op: EC5CIA)	
*AM4DQX	*	10,132	75	68
			(Op: EA4DQX)	
*AM5AAJ	*	8,904	62	56
*EA4CU	*	7,830	61	58
*EA2CHL	*	7,315	119	72
*EA5FWW	*	2,494	30	29
*EA1WX	*	528	17	16
***AM7HBP**	**28**	**128,502**	**273**	**198**
			(Op: EA7HBP)	
***EA5ON/M**	**28**	**68,688**	**179**	**144**
*EA7HBP	*	36,888	140	116
*AM7KJ	*	35,600	130	100
*EA7FRX	*	18,673	89	71
*AN2AYD	*	9,120	64	57
			(Op: EA2AYD)	
***AM7FTR**	**21**	**1,224,990**	**1052**	**585**
*EI7CC	*	25,863	127	111
*EI7JK	*	3,825	55	51
***EI4CF**	**14**	**595,518**	**683**	**462**
*EI9HQ/M	*	440	20	20
MOLDOVA				
***ER5DX**	**A**	**623,516**	**630**	**388**
*ER3CT	*	504,144	685	389
***ER1Q**	**21**	**751,296**	**819**	**448**
			(Op: ER1QQ)	
***ERØFEL**	**14**	**622,224**	**978**	**447**
			(Op: UR5FEL)	
ESTONIA				
ES5TV	**A**	**6,074,155**	**2695**	**941**
ES9A	*	**2,538,275**	**1803**	**725**
ES5MC	**21**	**1,054,215**	**885**	**513**
ES5RW	**14**	**1,481,556**	**1324**	**662**
ES5MG	**7**	**469,224**	**494**	**342**
ES5QX	**1.8**	**15,750**	**90**	**75**
***ES8DH**	**A**	**203,050**	**398**	**262**
*ES5RIM	*	39,330	145	138
***ES5CX**	**21**	**5,192**	**54**	**44**
***ES5JR**	**7**	**4,992**	**50**	**48**
BELARUS				
EU1SA	**14**	**167,832**	**390**	**252**
EW1CQ	*	45,602	188	151
EU1AZ	**3.7**	**874,578**	**892**	**426**
***EW6AF**	**A**	**485,940**	**783**	**420**
***EU4LY**	**A**	**96,162**	**246**	**186**
***EU2MM**	**A**	**84,251**	**209**	**173**
*EV6M	*	62,370	194	135
*EW6GL	*	55,420	196	163
*EW2BX	*	30,800	226	70
*EU6NN	*	25,172	134	116
*EU1GA	*	13,706	91	77
***EU6FF**	**28**	**2,210**	**31**	**26**
*EW1ABF	*	1,850	28	25
*EW1GA	*	3	1	1
***EW6EW**	**21**	**31,635**	**149**	**111**
***EU1CC**	**14**	**1,189**	**29**	**29**
*EW6AW	*	882	19	18
FRANCE				
TM5A	**A**	**2,341,248**	**1527**	**672**
			(Op: F5VHJ)	
F5NBX	**A**	**1,306,368**	**1056**	**576**
F5BBD	**A**	**973,126**	**951**	**497**
F5PZK	*	78,200	193	184
***F8AKS**	**A**	**1,421,937**	**1146**	**583**
***F8DBF**	**A**	**666,624**	**714**	**434**
***F6BAT**	**A**	**185,652**	**338**	**243**
*F8EEQ	*	89,892	238	198
*F6FJE	*	79,971	211	183
*F2RO	*	64,464	192	158
*F6CZV	*	25,192	105	94
*F6FTB	*	22,386	108	91
*F5NBK	*	22,000	120	100
*F8BTR	*	16,095	98	87
***F5JY**	**28**	**49,228**	**153**	**124**
ENGLAND				
GØVXE	**A**	**356,210**	**513**	**358**
GX6UW	**21**	**109,980**	**246**	**195**
			(Op: MØBLF)	
***MØDDT**	**A**	**195,780**	**355**	**260**
***G4DFI**	**A**	**160,500**	**350**	**250**
*G4NXG/M	*	62,040	168	141
*M5FUN	*	60,352	193	164
*GØMRH	*	55,444	210	166
*MØRNR	*	43,344	164	144
*G6CSY	*	24,300	123	108
***G4DBW**	**21**	**37,542**	**141**	**118**
***G3PJV**	**14**	**385,110**	**674**	**389**
*MØWTD	*	10,560	198	40
*2E1GUA	*	4,800	66	60
*G7UGC	*	2,835	47	45
*G5T	*	3	1	1
			(Op: G6Y @G6U)	
NORTHERN IRELAND				
***GI4AAM**	**A**	**171,028**	**385**	**253**
SCOTLAND				
***MM3JHS**	**A**	**46,800**	**176**	**156**
*MMØLEO	*	38,493	163	141
*MM3SOZ	*	9,576	78	72
***MM3YDH**	**14**	**6,771**	**63**	**61**
GUERNSEY				
MU2Z	**A**	**2,324,811**	**1704**	**709**
			(Op: M5RIC)	
***MUØFAL**	**A**	**113,360**	**287**	**218**
*MU3GSY	*	53,265	205	159
*GUØSUP	*	60	6	6
WALES				
***GW3YVC**	**A**	**18,952**	**117**	**103**
HUNGARY				
HG8R	**A**	**4,458,048**	**2151**	**856**
HA9PP	*	246,253	407	277
HG3M	**14**	**2,572,056**	**1726**	**771**
			(Op: HA3MY)	
HG9X	**14**	**2,323,356**	**1542**	**714**
			(Op: HA8IB)	
HG4F	*	687,280	872	440
HG6V	*	528,304	746	424
			(Op: HA6FQ)	
HA5A	**7**	**3,044,898**	**1521**	**678**
			(Op: HA5IW)	
HA8BE	**1.8**	**386,250**	**558**	**309**
***HA6IAM**	**A**	**299,592**	**473**	**292**
***HA5OAF**	**A**	**131,405**	**326**	**205**
*HA2ØØ4EU	*	15,488	107	88
*HA5X	*	4,753	57	49
			(Op: HA5X)	
***HA1WD**	**28**	**16,133**	**83**	**73**
*HA8CQ	*	8,379	59	49
***HA6IGM**	**21**	**12,480**	**76**	**60**
***HA6NL**	**7**	**244,664**	**359**	**257**
***HA8T**	**3.7**	**4,515**	**47**	**43**
SWITZERLAND				
HB9XJ	**A**	**299,000**	**415**	**299**
HB9CPS	*	50,955	160	129
HB9CVE	**28**	**816**	**17**	**16**
HB9DWU	**7**	**34,402**	**115**	**103**
***HB9HQX**	**A**	**10,512**	**83**	**72**
ITALY				
II4A	**A**	**1,420,848**	**1091**	**572**
IK2SND	**A**	**982,500**	**921**	**500**
IV3RAV	**A**	**635,800**	**665**	**440**
IZØBVU	*	282,974	489	302
IK4QJF	*	220,218	347	254
IK2GWH	*	54,320	161	140
IK2AIT	*	15,476	81	73
IZØEGA	**28**	**4,158**	**22**	**22**
IU3A	**21**	**1,518,870**	**1060**	**591**
IR4R	21	474,020	526	346
IU1A	**14**	**59,304**	**187**	**168**
			(Op: IK1SPR)	
IO4C	**7**	**3,186,041**	**1455**	**581**
			(Op: IZ4DPV)	
I2IFT	**7**	**900,928**	**864**	**448**
IO3Z	7	573,024	644	376
			(Op: IV3ZXQ)	
IQ5PO	**3.7**	**993,598**	**831**	**463**
			(Op: IK5ZTW)	
IO2C	**3.7**	**391,094**	**563**	**319**
IK3STG	*	355,570	481	310
***IZ7EVZ**	**A**	**475,888**	**558**	**392**
***IK7RVY**	**A**	**287,647**	**465**	**313**
***IZ7DOK**	**A**	**266,710**	**477**	**298**
*IK2SAI	*	211,900	366	260
*I8TWB	*	150,274	310	227
*IK7SBU	*	149,322	282	246
*IKØXBX	*	146,757	269	213
*IK2THN	*	128,077	264	211
*IZØBXZ	*	103,086	270	207
*IZ2ABN	*	91,314	209	178
*IK3SCB	*	84,088	251	184
*IT9YSW	*	76,125	245	203
*IO1T	*	74,992	204	172
			(Op: IK1RQT)	
*IZ1CQZ	*	74,443	184	151
*IZ8CEV	*	72,765	228	165
*IK2ZJN	*	72,128	201	161
*IQ2VA	*	50,274	164	147
			(Op: IK2TDM)	
*IK7WPD	*	41,344	152	136
*IZ4DIG	*	34,510	143	119
*IZ1AOD	*	30,210	145	114
*IZØBNR	*	23,532	117	106
*I1YGQ	*	22,834	117	98
*IZ6FXS	*	21,708	114	108
*IK2WZQ	*	17,850	89	75
*IV3IDP	*	17,622	116	99
*IZØEOU/3	*	16,640	93	80
*IV3KSE	*	15,990	87	82
*IZ3DBE	*	14,600	116	100
*IK2REA	*	14,364	89	76
*IZ7EUB	*	11,286	68	57
*IKØOTJ	*	9,039	69	69
*IV3TYS	*	7,748	53	52
*IK8IFW	*	5,488	57	56
*IK8NBL	*	3,416	47	46
*IKØVAQ	*	2,295	17	17
*IZØFVD	*	1,716	27	26
***IKØEIE**	**28**	**57,456**	**162**	**133**
***IK4QJM**	**21**	**127,032**	**262**	**201**
*IZ7EDQ	*	94,350	232	185
*IØQM	*	54,627	159	139
*IZ4AFW	*	10,176	73	64
***IR8C**	**14**	**73,629**	**239**	**199**
*IZ5DKF	*	56,440	202	170
***II3L**	**7**	**188,497**	**401**	**233**
*IV3SDE	7	179,670	270	226
SARDINIA				
***ISØLLJ**	**A**	**165,154**	**375**	**263**
NORWAY				
LA6FJA	**A**	**608,715**	**659**	**405**
***LA1PHA**	**A**	**36,156**	**156**	**131**
***LA7TN**	**A**	**26,180**	**154**	**119**
*LA7SI	*	21,293	118	107
*LB8AE	*	12,905	90	89
*LA1YE	*	12,367	93	83
LUXEMBOURG				
LX4A	**A**	**17,819**	**117**	**93**
LX1NO	**21**	**245,756**	**405**	**268**
LX1KC	**7**	**2,385,710**	**1419**	**610**
LX7I	**3.7**	**1,673,378**	**1151**	**553**
				(Op: LX2AJ)
LITHUANIA				
LY2FN	**A**	**897,408**	**863**	**456**
LY4CW	**A**	**790,225**	**843**	**433**
LY2MM	*	265,540	428	284
LY2PX	*	42,402	168	111

LY3BH	*	36,340	133	115
LY1FW	14	1,286,430	1161	626
LY2BW	1.8	333,042	513	282
LY2HM	1.8	257,964	447	259
LY2OU	*	49,920	181	130
*LY2TE	A	638,724	801	404
*LY3CY	A	263,580	464	276
*LY2OM	A	160,537	332	233
*LY2HK	*	60,225	197	165
*LY2OO	*	44,416	165	128
*LY2BBF	*	21,755	118	95
*LY3SL	*	8,710	73	67
*LY1DI	14	188,160	392	280
*LY2CU	*	1,938	35	34
*LY2LF	7	7,865	60	55
*LY5A	1.8	309,680	493	280
			(Op: LY2PAJ)	

BULGARIA

LZ1ABC	A	3,449,898	2110	783
LZ1BJ	A	1,782,326	1336	637
LZ1AQ	*	34,560	162	135
LZ1RW	*	32,857	115	103
LZ8A	21	337,393	455	307
			(Op: LZ3DJ)	
*LZ2DF	A	301,464	490	318
*LZ2ZY	A	283,250	423	275
*LZ3SM	*	97,902	239	189
*LZ2JA	28	11,948	74	58
*LZ1EP	*	4,560	41	38

AUSTRIA

OE1WWL	A	11,328	67	64
OE4A	21	3,277,930	1640	815
			(Op: OE1EMS)	
OE5CWL	7	1,088,612	977	476
*OE8OLK	A	25,544	114	103

FINLAND

OH1F	A	4,403,238	2311	881
			(Op: OH1NOA)	
OH2PM	A	2,868,572	1642	742
			(Op: OH1WZ)	
OH1BV	*	464,358	625	386
OH1MM	*	1,272	25	24
OH6NV	*	14	3	2
OH7WV	21	862,080	800	449
OH5B	3.7	1,052,942	853	458
			(Op: OH5BM)	
*OI4PM	A	1,790,982	1509	657
			(Op: OH4JFN)	
*OI6AY	A	899,704	965	533
			(Op: OH4II)	
*OH6SO	*	63,640	225	172
*OH6GDX	*	27,120	142	113
*OH4TY	14	105,994	283	226
*OH6IU	21	29,103	123	109

ALAND IS.

OHØV	21	700,650	701	450
			(Op: OH6LI)	

CZECH REPUBLIC

OK1RF	A	5,290,734	2110	839
OK8YD	A	1,523,928	1135	579
			(Op: DL1YD)	
OK1EP	A	1,281,402	1053	554
OK1XC	21	117,215	239	197
OK5DX	14	1,510,443	1183	627
*OL6P	A	989,010	902	495
*OK2BYW	A	949,660	824	461
*OK2MBP	A	639,144	772	396
*OK1AY	*	630,021	720	399
*OK1VD	*	436,752	529	337
*OK2AB	*	408,680	554	340
*OL6W	*	375,081	519	337
			(Op: OK2FB)	
*OK1BA	*	302,176	478	304
*OK2BEN	*	237,705	396	265
*OK2CLW	*	163,072	296	224
*OK1FMX	*	159,852	345	231
*OK2TBC	*	90,459	251	171
*OK2BQL	*	79,632	221	168
*OK1MJA	*	56,628	181	143
*OK2TCW	*	47,064	148	148
*OK2BRQ	*	42,568	173	136
*OK1FCA	*	3,564	46	44
*OK2BRA	28	9,650	69	50
*OK2NN	21	265,500	370	295
*OK2HZ	21	178,478	296	233
*OK1MMN	*	34,768	126	106
*OK1BLU	14	20,188	122	98
*OK1KZ	7	42,840	137	119
*OL3X	3.7	73,760	215	160
			(Op: OK1FC)	
*OK2PXD	*	18,444	100	87
*OLØA	1.8	8,479	72	61
			(Op: OK1CZ)	

SLOVAKIA

*OM4DN	A	566,720	684	368
*OM3YK	A	363,075	486	309
*OM6TX	*	251,328	464	272
*OM7YC	*	167,739	314	221
*OM1AW	*	112,908	258	194
*OM7VF	*	15,642	99	79
*OM4DA	*	15,228	96	81
*OM5CD	28	143,037	295	207
*OM4WW	14	42,525	167	135
*OM7AB	3.7	316,316	503	286
*OM4APD	*	8,820	71	63

BELGIUM

*ON4XG	A	140,070	273	210
*ON7BS	A	138,990	319	246
*ON6LY	*	69,216	219	168
*ON5JD	*	66,805	194	155
*ON7VZ	*	13,920	101	87
*ON6OM	*	9,420	63	60
*ON4KVA	*	2,146	38	37
*ON4MGY	7	89,614	212	173

DENMARK

OZ5EV	A	436,044	499	1074
OZ4RT	*	33,292	134	116
OZ1HXQ	1.8	413,630	579	311
*OZ1ACB	A	251,120	426	292
*OZØF	*	99,840	273	195
*OZ8AE	21	4,484	42	38
*OZØAP	7	2,960	40	37
*OZ3SK	1.8	144,612	336	206

THE NETHERLANDS

PAØJNH	A	392,450	520	334
PA9ZZ	A	337,124	519	311
PE2SVN	*	103,740	253	210
PC1A	14	1,118,862	998	549
PAØLIM	3.7	382,236	555	318
*PF9A	A	399,600	540	360
*PC4M	A	384,540	540	340
*PA9KW	A	126,260	294	214
*PAØKDM	*	101,184	237	186
*PE2GER	*	65,208	191	156
*PA3GBI	*	43,014	155	134
*PA5O	*	39,960	149	120
*PAØLRK	*	38,936	132	124
*PA1PAT	*	34,020	148	126
*PG7V	*	15,540	85	84
*PAØLSK	*	11,169	79	73
*PE8ROB	*	1,102	30	29
*PE2T	21	50,697	151	131
*PC2T	14	311,787	481	343
*PA2SWL	3.7	115,050	260	195
*PAØMIR	3.7	111,936	233	192

SLOVENIA

S57DX	A	4,202,982	2023	803
S51FB	21	1,590,408	1052	597
S51DX	*	864	18	18
S53M	14	2,006,900	1438	658
			(Op: S51ZO)	
S51OI	7	1,732,320	1055	540
S5ØA	3.7	2,316,776	1244	616
S53F	3.7	1,171,716	1041	481
S57M	1.8	468,531	621	333
*S56A	A	1,117,954	916	502
*S58RU	*	268,380	436	284
*S57AL	21	180,306	302	243
*S52W	3.7	302,005	450	289

SWEDEN

8S6E	A	575,784	674	396
			(Op: SM6FUD)	
SM7CQY	A	379,216	533	346
SM7BJW	A	114,938	257	202
SM7DXQ	*	93,017	219	191
SM3LIV	*	72,254	243	182
SC1AG	*	15,147	100	81
			(Op: SM1TDE)	
SM1TDE	*	90	6	5
SLØW	21	125,080	266	212
			(Op: SMØAJU)	
SM3FJF	14	16,642	123	106
SM6CDG	*	140	10	10
7S2E	7	1,633,344	1073	543
			(Op: SM2DMU)	
*7S7V	A	897,197	919	469
*SKØHS/Ø	A	330,776	503	346
			(Op: SMØMPV)	
*SM6CRM	A	135,228	292	236
*SM6XKB	*	129,108	321	212
*SMØBDS	*	36,696	141	132
*SMØFM	*	11,454	72	69
*SM3EAE	*	10,948	77	68
*7S3F	*	5,120	70	64
			(Op: SM3AF)	
*SM3D	*	130	10	10
			(Op: SM3WMU)	
*8SØF	14	99,450	309	234
			(Op: SMØOGQ)	
*SM2YIZ	*	67,318	251	194
*SM7HSP	*	3,366	52	51
*SMØWVH	*	851	25	23
*SM5T	7	11,115	68	65
			(Op: SM5TSP)	
*SM5AJV	*	1,275	26	25

POLAND

SP9LJD	A	2,613,465	1550	729
SP6T	A	145,635	292	219
SP5GMM	*	93,568	214	172
SP4AVG	*	29,193	134	111
SP6RLK	*	26,433	107	99
SP9RPW	28	31,020	118	94
SP9W	*	19,418	94	73
SP4DEU	14	1,497,392	1130	626
SN5N	*	245,664	435	288
SN7Q	7	3,627,303	1595	717
SO6X	7	2,661,920	1655	635
SP9NFB	*	33,660	106	99
SO2R	3.7	2,543,708	1389	643
			(Op: SP2FAX)	
SQ4MP	3.7	878,430	875	445
SN6C	1.8	240,611	453	259
*SP1GZF	A	1,146,600	1001	520
*SP9QMP	A	920,457	837	467
*SP9HQC	A	520,666	602	382
*SP2DNI	*	350,910	537	315
*SQ9MZ	*	346,359	491	321
*SP4SHD	*	343,332	526	306
*SP8EDD	*	263,427	459	277
*3Z6V	*	259,652	424	278
			(Op: SP6DVP)	
*SQ7B	*	197,104	377	254
*SQ1WO	*	109,354	296	214
*SQ3A	*	106,812	237	207
*SP1MVG	*	104,256	247	181
*SP3BVI	*	97,552	247	182
*SP9MRQ	*	91,080	226	180
*SP1BZZ	*	81,225	209	171
*SP1MWF	*	76,670	222	170
*SP3XR	*	74,880	214	156
*SP2JSS	*	73,386	189	151
*SP4CQU	*	45,339	149	119
*SP9RTL	*	43,594	159	142
*SP1RW	*	36,039	144	123
*SP4FCP	*	33,072	155	104
*SP9GFI	*	27,832	123	98
*SP6KEP	*	24,596	96	86
*SP9XUE	*	21,948	102	93
*SP6NVK	*	8,379	63	57
*SP6IEQ	*	7,482	60	58
*HF85AMU	*	7,424	62	58
			(Op: SQ3EQ)	
*SP9IKN	*	6,305	122	108
*SP9ADV	*	4,950	52	45
*SQ9ITH	*	2,450	35	35
*SP3OL	*	216	9	8
*SP4DM	28	11,484	68	58
*SQ9HZM	28	9,720	62	54
*SP9OJQ	*	4,440	40	37
*SQ6ELV	*	3,502	35	34
*SP4DC	*	546	15	14
*SP4JCQ	21	159,174	293	222
*SP4AXU	*	31,621	125	103
*SP2AYC	*	8,965	71	55
*SP3SLO	14	1,148,284	1048	551
*SP5ECC	*	60,590	215	166
*SP3ZAH	*	47,531	203	149
*SP2FTL	*	23,632	135	112
*SP4ICD	*	11,656	106	94
*SP7FBQ	*	6,728	58	58
*SP9PTG	*	4,557	51	49
*SP2AVE	*	1,568	32	28
*SP4AQD	7	168,840	257	210
*SP4AAZ	7	34,882	120	107
*SP9KGG	7	7,448	51	49
*SP6PAX	7	7,074	56	54
*SP4ZO	3.7	405,153	539	327
*SQ9UM	3.7	328,800	491	300
*SP3GHK	*	85,618	230	178
*SP2DKI	*	777	21	21
*SP6LUV	1.8	210,798	407	239
*SP4LVK	*	8,540	71	61

GREECE

SV8CRI	A	512,827	701	427
SV1DPI	*	306,946	541	334
SV1BFW	21	137,445	393	245
SV8CS	28	83,226	216	143
*SV1NK	A	167,061	322	233
*SVCIB	*	21,733	113	103
*SV1BJW	21	312,504	576	348
*SV1JCV	14	88,356	284	222

CRETE

SV9FBG	14	728,686	1142	511

BOSNIA & HERZEGOVINA

T99W	7	3,705,504	1655	726
T9ØA	7	3,450,867	1612	707
			(Op: YT6A)	
*T94DO	7	401,280	501	330

TURKEY (EUROPE)

*TA1FA	21	120,280	290	194

ICELAND

*TF3AM	A	5,520	60	60
*TF3MA	14	50,064	188	168

EUROPEAN RUSSIA

RK4FF	A	6,226,180	3200	965
RX3DCN	A	1,308,592	1204	566
RW3GU	A	1,295,648	1217	608
RN4WA	*	988,274	1161	511
UA6AF	*	385,365	488	345
UA4NCI	*	341,248	553	344
RA6XNR	*	221,288	453	278
RW3FY	*	196,272	387	282
RX3AEX	*	148,884	327	228
RA3TT	*	147,456	358	256
RA3FC	*	143,451	287	231
UA4SU	*	121,878	320	222
UA4NC	*	109,416	255	194
RA3XO	*	21,750	100	87
RV1CC	*	21,004	105	89
UA1AKE	*	6,031	54	37
RZ3DA	*	4,500	45	45
RA3IS	*	2,730	33	30
UA3BM	*	658	14	14
RX4HX	*	540	18	18
RUØSU	28	106,266	376	178
RW6FO	21	361,276	632	362
RV3NA	*	39,600	132	120
RA4LW	14	1,286,846	1159	638
RF4R	*	791,764	825	524
			(Op: UA4RC)	
UA4LCH	*	243,960	400	285
RA6DB	7	245,532	348	259
RA6AFB	3.7	376,650	518	310
RW4PL	3.7	193,430	348	230
RA6AK	*	145,145	308	203
UA6AKD	*	14,835	85	69
RK6AIQ	1.8	14,328	92	72
*UA4FER	A	2,277,520	1701	686
*UA3ABJ	A	1,029,490	980	490
*RW3GB	A	969,617	932	487
*RW3DL	*	527,304	681	381
*RK6LZS	*	368,772	636	316
*UA4WL	*	264,183	449	321
*UA3OQ	*	233,465	453	265
*RV3QX	*	212,760	415	270
*RA6AAW	*	202,788	395	262
*RU6FA	*	176,175	367	243
*RU4PN	*	175,930	389	241
*UA6ECU	*	155,540	319	220
*RW6BN	*	139,200	327	240
*UA1ANA	*	136,136	294	221
*UA4FEN	*	127,920	310	208
*US5IND	*	98,102	284	181
*RV3YR	*	82,720	254	188
*RV3IC	*	79,640	248	181
*UA3FDX	*	78,735	239	181
*UA1CBM	*	69,323	235	181
*RA1QX	*	60,516	221	164
*UA1AFZ	*	56,880	208	158
*RU3WR	*	53,875	182	125
*RA3DNC	*	48,191	162	143
*RX6LSZ	*	47,886	194	138
*RU3DVR	*	36,340	142	115
*RN6FA	*	31,621	119	103
*RW1AU	*	28,290	128	115
*RU3DM	*	27,744	122	96
*UA6HON	*	21,930	103	85
*RN4AAK	*	20,882	112	106
*UA3LEL	*	18,328	84	79
*RU4LM	*	15,300	93	85
*RA4NF	*	14,432	99	82
*RD4WA	*	13,020	98	84
*UA1OAM	*	12,720	93	80
*UA3VFI	*	11,954	99	86
*RW1QN	*	9,656	76	68
*RA3VR	*	6,656	61	52
*RW3PN	*	6,489	71	63
*RN1AO	*	5,487	67	59
*RN1AW	*	4,185	48	45
*RA3AMG	*	3,772	44	41
*RA4SD	*	270	11	10
*RV6BC	*	8	2	2
*UA6ADC	28	65,469	191	139
*RU3XB	*	600	18	15
*RV3APM	*	532	14	14
*UA4FRL	21	140,606	292	229
*RW4LQ	*	24,453	101	99
*UA4AAC	*	3,960	41	40
*RU3HD	14	450,264	780	438
*RA3OU	14	343,252	617	364
*RA6CT	*	333,960	554	345
*RA3XAU	*	315,875	587	361
*RW6AH	*	100,749	291	213
*RL3AW	*	46,916	153	148
*RA1OK	*	14,800	118	100
*RN3AQ	*	7,296	66	57
*RU3DX	*	3,127	59	53
*RX3AHL	*	143	11	11
*RZ6LW	7	87,550	200	170
*RV3WT	3.7	249,162	416	262
*RN6AL	*	98,820	247	180
*RX3QDF	1.8	30,393	136	99
*RK6ATQ	*	11,088	77	56

KALININGRADSK

*UA2FT	A	33,696	140	117
*RA2FIA	7	5,950	58	50

UKRAINE

UV7D	A	2,408,856	1576	696
			(Op: UT7DX)	
UY5ZZ	A	1,729,573	1609	691
UYØIX	A	893,061	986	449
US1MM	*	132,300	298	225
UT4MW	*	46,720	183	146
UT7MD	*	39,780	144	130
UW7W	*	13,780	74	65
UR7EU	*	12,546	89	82
UR7EM	*	4,692	52	46
UT7QL	28	33,300	127	100
EN35F	21	2,792,088	1670	741
			(Op: UXØFF)	
UW8M	21	1,658,324	1310	607
			(Op: UR5MID)	
UT6IS	*	175,824	420	264
UR4EI	*	867	19	17
URØUL	14	324,202	541	346
UT4EK	*	42,256	176	139
UX5I	3.7	354,464	504	304
			(Op: UT5IZ)	
UYØZG	*	154,660	315	209
UX1VT	*	16,892	96	82
UT3SA	1.8	285,947	486	269
*UR7M	A	1,045,971	1031	489
*UW5U	A	808,335	896	495
			(Op: UY2UA)	
*US5II	A	642,720	735	412
*UR5MNZ	*	409,142	555	314
*UX4UA	*	397,062	533	342
*US5UO	*	226,570	411	278
*UR5GMG	*	161,772	395	244
*UR6MX	*	126,048	238	208
*UY5TE	*	117,208	291	196
*UR6QS	*	106,932	288	201
*UT8IT	*	78,596	235	196
*USØKF	*	57,280	202	160
*UT5UKY	*	38,396	144	116
*UX8MM	*	31,400	118	100
*UU2JA	*	17,577	98	81
*US9QA	*	1,092	24	21
*US5WMS	28	7,203	51	49
*UR3QFB	*	5,980	54	46
*US7IA	*	9,016	65	56
*UR5MIW	21	87,320	248	185
*US2WU	*	82,458	191	162
*UR6GWZ	14	339,592	608	374
*US6IMA	*	156,600	392	270
*UR8QR	*	97,020	246	245
*UW7M	*	18,871	139	113
			(Op: UR3MP)	
*USØHZ	7	60,345	180	149
*UT8EL	*	30,179	115	103
*UR5ZLK	1.8	20,424	106	92

LATVIA

YL2KO	A	3,278,295	1931	789
YL6W	14	1,799,444	1388	698
			(Op: YL2GD)	
YL1ZJ	3.7	112,761	276	187
*YL2TW	A	196,560	433	273
*YL2NK	*	45,021	155	129
*YL2CR	*	20,160	106	90
*YL2PA	*	72	6	6
*YL3BZ	21	60,450	180	150
*YL5W	14	446,125	743	415

ROMANIA

YR9P	A	3,310,155	2004	765
			(Op: YO9HP)	
YR4R	21	710,640	738	420
			(Op: YO4RDN)	
YO4OED	14	48,048	194	154
YR7M	7	1,715,003	1127	557
			(Op: YO3JR)	
YR2I	3.7	915,084	791	444
			(Op: YO2DFA)	
YO2RR	1.8	45,864	177	126
*YO4GDP	A	523,008	740	384
*YO3CZW	A	487,376	615	367
*YO3XL	A	144,074	302	251
*YO3BL	*	119,538	315	229
*YO7LGI	*	104,873	259	199
*YO4AUP	*	101,505	274	201
*YO4RLP	*	69,660	231	172
*YO6ADW	*	35,432	120	103
*YO5QCD	*	22,654	107	94
*YO4GNJ	*	15,168	90	79
*YO2LSK	*	11,745	90	81
*YO4ATW	28	22,230	99	78
*YO4GJH	*	11,328	66	59
*YO5PCY	*	4,366	40	37
*YO3RU	21	19,278	100	81
*YO6EZ	*	6,345	59	45
*YO6QT	14	106,964	278	221
*YR5A	7	388,959	507	317
			(Op: YO5TE)	
*YO2LZP	7	155,540	281	220
*YO9HG	7	6,944	63	56

SERBIA & MONTENEGRO

YU1TT	28	49,257	155	117
YT7Z	21	1,247,451	935	537
			(Op: YU7EE)	
YZ9A	14	2,824,465	1893	799
			(Op: YU1AU)	
YT1BB	*	775,320	974	497
YTØA	7	4,372,144	1683	758
			(Op: YU1EW)	
YU7ZZ	7	952,965	1073	543
YU7AV	3.7	1,553,105	1067	535
*YT1LT	A	813,174	872	433
*YZ1V	A	294,775	490	325
			(Op: YT1HA)	
*YU7YZ	*	225,071	343	259
*4N7TA	*	45,408	160	129
*YU1PJ	*	45,212	157	127
*YU1EQ	*	40,788	154	132
*YT1AT	*	19,740	94	84
*YU1IG	21	149,454	292	207
*YUØHST	14	1,131,416	1262	598
			(Op: YT1BX)	

MACEDONIA

Z33F	1.8	229,665	408	251
*Z36W	A	356,132	493	316
*Z37M	21	1,260,480	1056	520
			(Op: Z32PT)	

OCEANIA

WESTERN SAMOA

*5WØKE	A	488,268	562	297
*5WØSS	*	37,904	142	92

THE PHILIPPINES

4D9RG	A	3,521,336	1780	637
4D9D	7	186,055	276	127
			(Op: DU9AXJ)	
*4F4ACV	A	18,546	128	103
*DU7/G4DUM	*	10,730	66	58
*4E1SAN	28	49,808	190	88
			(Op: DU1SAN)	
*DZ1BP	21	850,500	926	315
			(Op: DU1BP)	
*DU8UTC	21	87,843	217	141
*DU1DX	14	125,489	221	197

NEW CALEDONIA

*FK8HN	A	2,163,447	1409	533

GUAM

KG6DX	A	3,999,272	2029	664

HAWAII

K1ER/KH6	A	76,275	171	135
KH6ND	21	6,379,540	2959	740
*KH6GMP	A	373,250	504	250
*KH6QJ	*	86,317	214	133
*AH6HH	*	16,128	79	72

AUSTRALIA

VK6HZ	A	1,134,420	864	444
VK3TZ	A	1,031,058	759	441
VK3IO	*	557,775	484	333
VK7GN	A	409,906	421	322
VK2BCQ	A	34,675	125	95
VK1AA/4	14	4,283,664	1852	798
VK2CZ	28	402,462	542	261
*VK3DBQ	A	171,258	280	219
*VK4XES	A	61,064	159	136
*VK3EVG	*	4,510	43	41
*VK4FJ	*	4,477	43	37
*VK2AAC	21	1,012	22	22

INDONESIA

YB1DX	7	197,920	215	160
YBØIR	14	2,552	30	29
*YBØWWW	A	706,160	638	388
*YB1AR	A	271,962	369	261
*YC2ECG	21	282,112	382	256
*YBØJS	*	110,596	217	172
*YB8HZ	14	107,380	210	182
*YBØECT	*	33,488	110	104
*YB2VTO	7	3,753	28	27

NEW ZEALAND

ZL1ANH	A	1,210,720	890	460
ZL1ALZ	*	422,940	509	285
ZL1ANJ	*	108,864	218	168
*ZL3DW	14	3,465	35	35

SOUTH AMERICA

TRINIDAD

9Y4ZC	A	16,235,373	4608	1049
			(Op: OM3TZZ)	

CHILE

*CE1L	A	374,532	513	276

BOLIVIA

*CP1FF	28	26,695	125	95

URUGUAY

*CX1AV	28	995,136	794	438

FRENCH GUIANA

FY5FY	A	17,072,370	4984	1134

ECUADOR

*HC1AJQ	14	1,562,320	1120	472
*HC1JQ	21	174,000	312	200

COLOMBIA

HK6PSG	A	35,793	125	97
*HK3JJH	A	2,384,100	1437	540
*HK3AXY	*	138,885	252	197

ARGENTINA

AY8A	A	4,954,304	2157	796
			(Op: LU8ADX)	
LT5Y	A	1,347,632	855	589
			(Op: LU1YU)	
LT1D	A	1,086,288	882	424
			(Op: LU4DJC)	
LU2OF	*	727,160	677	392
LU1AEE	*	70,700	201	140
LU5HM	14	3,346,109	1611	713
LT1F	21	6,530,336	2474	899
			(Op: LW9EOC)	
LU5FC	21	5,014,110	2041	842
LU2QC	21	3,376,354	1725	667
LU1HF	28	8,511,708	3102	937
LO2F	28	7,769,075	2881	925
			(Op: LU1FAM)	
LU4FM	28	5,654,199	2345	827
			(Op: LU4FPZ)	

*LV7H	A	4,139,100	1943	730
				(Op: LU7HF)
*LVØN	A	2,364,570	1404	611
				(Op: LU2NI)
*L2ØE	*	460,252	516	334
				(Op: LU5EVK)
*LW7HW	*	373,272	473	309
*LU2EE	*	249,033	350	257
*LU1ARV	*	61,306	168	151
*LU5FF	*	32,689	127	97
*LU3HIP	28	1,956,425	1213	563
*LT7Y	28	1,375,963	991	493
				(Op: LU7YZ)
*LU6HPF	28	1,374,700	1034	466
*LU7YW	*	1,295,458	964	467
*LU6FOV	*	392,763	441	317
*LW1HDJ	*	24,024	110	77
*LW8EXF	*	15,168	85	64
*LU2JCW	7	32,619	91	83

ARUBA

P4ØY	A	15,328,716	4683	1013
				(Op: AE6Y)
P43E	A	7,526,568	2924	852
*P4ØA	A	13,070,211	4456	959
				(Op: KK9A)
*P4ØDX	14	106,596	206	189
				(Op: W5JON)

NETHERLANDS ANTILLES

PJ2T	21	6,657,690	2851	794
				(Op: W1MD)

BRAZIL

PY7ZY	A	3,968,968	1812	724
ZX7U	A	2,482,389	1363	637
				(Op: CT1AHU)
PY3PA	A	733,822	670	382
PR7AB	*	323,244	410	246
PY2YU	*	303,420	418	260
PR2F	*	255,374	374	238
				(Op: PY2NDX)
PY4ZN	*	97,626	197	159
PX5E	21	12,568,343	3645	1171
				(Op: PP5JR)
ZV5E	14	3,821,867	1707	763
				(Op: PP5KE)
*ZX2B	A	6,060,164	2489	836
				(Op: PY2MNL)
*PV8DX	A	2,018,792	1247	508
*PY7EG	A	1,746,324	1130	537
*PP5ZP	*	1,336,826	983	502
*PY2LTY	*	892,804	777	412
*PT2BW	*	257,012	403	268
*PY7GK	*	85,504	196	167
*PY2RDS	*	45,582	147	107
*PY2NA	*	33,900	119	100
*PY3AJB	*	18,620	103	98
*PY8DAN	*	16,810	89	82
*PP2JP	*	8,174	68	61
*PU7MMF	*	3,234	36	33
*PU7MDF	*	2,523	31	29
*PY2SBY	28	1,919,133	1215	551
*PU2WDX	28	1,495,186	1024	511
*PY2BT	28	353,600	486	260
*PY2DJ	*	262,080	394	252
*PP5WF	*	186,276	299	228
*PY2ER	*	132,600	254	204
*PY2BRZ	*	70,072	187	152
*PY2NB	*	58,374	166	141
*ZW2TV	*	43,512	148	111
				(Op: PY2TV)
*PY1KIH	*	32,754	125	106
*PY1CMT	*	16,686	96	81
*PY5TJ	*	12,802	85	74
*PU5RAS	*	11,514	70	57
*PY3FBI	21	123,134	244	193
*PY2ZR	21	95,700	208	174
*PY3SGO	*	92,232	203	168
*PT2OO	*	7,076	58	58
*PR7QI	14	487,971	491	341
*PY2NY	14	480,469	503	341
*PR7FMT	*	336,377	441	263
*PT2ND	*	166,752	280	216
*PY3OL	*	53,439	149	141
*PT2OP	*	43,648	139	128
*PY2SAA	7	3,120	32	30

FALKLAND IS.

*VP8DGA	A	2,364,348	1415	588
				(Op: GØWJN)

VENEZUELA

YV1/K3UOC	A	519,363	617	299
YV5LIX	3.7	658,580	442	260
YV2IF	1.8	5,248	46	41
*4M5T	A	127,344	233	168
				(Op: YV5JBI)
*YY5JRU	*	118,802	270	191
*YV5KXE	21	16,640	80	80
*YV5IAL	14	5,217	47	47
*YY5BDP	7	41,366	91	86
*YY5YMA	3.7	66,880	126	95

PARAGUAY

ZP1C	A	5,159,502	2336	762
				(Op: ZP5AZL)

TRIBANDER/SINGLE ELEMENT

UNITED STATES

KG1E	A	2,619,755	1512	709
W1CU	*	2,208,000	1344	690
N2GC	A	1,944,383	1343	623
W6TK	A	1,493,800	1418	550
N3UM	A	1,087,394	859	506
K3TW	*	974,120	843	497
KO7X	A	545,875	878	397
N1BCL	*	254,736	394	261
W7QN	*	250,800	475	285
K7VIT	*	155,216	347	218
WØPPF	A	147,200	332	230
NR9J	A	146,065	335	223
W4NTI	A	145,692	337	213
NØUU	*	139,097	283	217
N6AJR	*	128,724	323	204
K1YA	*	104,286	236	182
KØCAT	*	80,500	254	175
				(Op: K9WIE)
KC7UP	*	76,320	199	160
N2CU	*	73,005	208	157
W3TZ	*	65,100	192	150
K7JJ	*	64,320	218	160
K9UQN	*	53,067	169	147
WD5JNC	A	45,484	168	137
N7QNO	*	7,392	74	66
NC4MI	*	2,304	32	32
KBØENE	21	105,468	258	204
NT6K	3.7	79,659	273	159
ND8DX	1.8	7,296	85	64
*NF4A	A	3,283,704	2247	773
*WB8TLI	A	982,949	826	463
*WN6K	A	702,072	912	398
*WD4AHZ	*	506,684	738	394
*NA4K	*	461,315	544	359
*NJ2F	*	349,809	559	323
*WB2RHM	*	309,166	461	299
*KØHW	A	233,618	471	259
*K7TR	A	190,070	410	229
*W1JQ	*	163,797	327	213
*NK7J	*	154,280	334	232
*KI7Y	*	150,302	355	223
*K6UM	*	150,202	324	218
*K9JE	A	136,320	292	213
*KA1EKR	A	103,125	229	165
*W2DKM	A	96,849	211	153
*KD6PQF	*	91,410	269	165
*WI7F	*	88,044	291	174
*WV2ZOW	*	80,496	218	172
*KW2P	*	64,207	194	143
*W2WB	*	58,950	171	131
*KS9WI	*	56,625	179	151
*K4EU	*	52,197	164	137
*K7ACZ	*	50,630	162	122
*AA6EE	*	44,685	182	135
*NJ8J	*	44,478	156	126
*N8NB	*	42,592	151	121
*NT3R	*	40,448	146	128
*KF4MK	*	38,340	128	108
*W9LYA	*	28,196	126	106
*NØGVK	*	25,511	110	97
*K9DXR	*	22,698	106	97
*KC8RAN	*	20,910	113	85
*N2WRD	*	11,786	82	71
*WA4FXX	*	7,824	57	48
*K1VSJ	*	6,321	54	49
*W6ZZZ	*	855	25	19
*W8IDM	*	330	11	11
*W7UPF	28	91,344	223	176
*K8OZ	28	56,771	188	143
*K8IA	21	649,020	836	435
*W4LC	14	288,426	374	318
*NN5Z	14	178,470	383	270
				(Op: K5PX)
*WA6NOL	14	27,730	125	118
*AF8C	14	6,156	57	54

DX

P43E	A	7,526,568	2924	852
9M2RPN	A	7,039,960	3341	860
				(Op: GM4YXI)
VO1AU	A	6,353,232	2324	856
9J2KC	A	5,475,547	2309	799
				(Op: JL1NKC)
ZP1C	A	5,159,502	2336	762
				(Op: ZP5AZL)
AY8A	A	4,954,304	2157	796
				(Op: LU8ADX)
HG8R	A	4,458,048	2151	856
KG6DX	A	3,999,272	2029	664
PY7ZY	A	3,968,968	1812	724
BY1DX	A	3,862,104	2321	716
				(Op: OH2PM)
YR9P	A	3,310,155	2004	765
				(Op: YO9HP)
MU2Z	A	2,324,811	1704	709
				(Op: M5RIC)
RA9ST	A	1,964,928	1193	516
4X6FR	A	1,888,145	1303	511
UY5ZZ	A	1,729,573	1609	691
VO1TA	*	1,599,772	1120	524
OK8YD	A	1,523,928	1135	579
				(Op: DL1YD)
RX3DCN	A	1,308,592	1204	566
RW3GU	*	1,295,648	1217	608
OK1EP	*	1,281,402	1053	554
VK3TZ	A	1,031,058	759	441
RV9SV	*	1,009,620	733	395
VK7GN	A	409,906	421	322
PAØJNH	A	392,450	520	334
GØVXE	A	356,210	513	358
PA9ZZ	*	337,124	519	311
HB9XJ	A	299,000	415	299
JO7KMB	A	199,808	337	223
HK6PSG	A	35,793	125	97
JA1ISJ	*	19,762	97	82
OE1WWL	A	11,328	67	64
4L4KW	A	8,024	42	34
OE5CWL	7	1,088,612	977	476
HB9DWU	7	34,402	115	103
EU1AZ	3.7	874,578	892	426
*ZX2B	A	6,060,164	2489	836
				(Op: PY2MNL)
*EA3CI	A	1,946,880	1369	624
*ED8BTM	A	1,479,444	977	492
*SP1GZF	A	1,146,600	1001	520
*VE3DZ	A	1,071,850	808	485
*UA3ABJ	A	1,029,490	980	490
*7S7V	A	897,197	919	469
*PY2LTY	*	892,804	777	412
*F8DBF	A	666,624	714	434
*VE1YDX	A	512,640	510	356
*JR3RIY	A	484,354	534	338
*RV9UP	A	472,006	533	331
*TI2KAC	A	471,510	711	310
*XE1XOE	A	464,814	658	294
*HS1PDY	A	419,012	564	356
*PC4M	A	384,540	540	340
*OL6W	A	375,081	519	337
				(Op: OK2FB)
*KH6GMP	A	373,250	504	250
*OM3YK	A	363,075	486	309
*SKØHS/Ø	*	330,776	503	346
				(Op: SMØMPV)
*YB1AR	A	271,962	369	261
*VE7KET	A	268,398	364	279
*OZ1ACB	A	251,120	426	292
*MØDDT	A	195,780	355	260
*JA1KK	*	172,387	322	211
*VK3DBQ	A	171,258	280	219
*IKØXBX	A	146,757	269	213
*AM6AZ	A	139,482	325	246
*9H1DE	A	132,096	318	258
*4M5T	A	127,344	233	168
				(Op: YV5JBI)
*EA3GHQ	*	104,120	240	190
*YO4AUP	A	101,505	274	201
*KH6QJ	*	86,317	214	133
*F6FJE	*	79,971	211	183
*G4NXG/M	*	62,040	168	141
*UA1AFZ	*	56,880	208	158
*VE3KP	*	53,130	151	115
*JR1MRG	*	50,283	172	111
*RA3DNC	*	48,191	162	143
*4N7TA	A	45,408	160	129
*JL3RDC	*	34,775	139	107
*LU5FF	A	32,689	127	97
*EA3EAN	*	27,216	126	108
*VA7MJR	*	25,938	116	99
*EI7CC	A	25,863	127	111
*PY8DAN	*	16,810	89	82
*HA2ØØ4EU	A	15,488	107	88
*JJØAEB	*	13,926	79	66
*RA9AC	*	10,150	63	58
*AM5AAJ	*	8,904	62	56
*EA4CU	*	7,830	61	58
*EA2CHL	*	7,315	119	72
*7J1AIL	*	7,056	60	49
*DB4SP	A	5,208	59	56
*HA5X	*	4,753	57	49
				(Op: HA5X)
*7N2UQC	28	22,227	121	93
*JA1BPA	21	107,501	235	193
				(Op: JA6-9330)
*YV5KXE	21	16,640	80	80
*IZ4AFW	21	10,176	73	64
*JA3LKE	*	6,440	50	46
*G3PJV	14	385,110	674	389
*PC2T	14	311,787	481	343
*EA3AKA	14	115,680	290	240
*VE3RCN	14	24,010	98	98
*ZS6MG	7	5,340	31	30
*PAØMIR	3.7	111,936	233	192
*OK2PXD	3.7	18,444	100	87
*OZ3SK	1.8	144,612	336	206

ROOKIE

UNITED STATES

KG4NEP	A	1,713,987	1234	597
W5TTX	A	549,400	741	410
N4GRN	*	310,154	417	302
K4XZ	*	131,626	248	193
*N6WK	A	130,660	303	188
*K9RJM	A	124,068	308	196
*N2LWL	A	83,072	254	176
*W2WJO	*	68,052	218	159
*W8SGZ	A	52,260	194	134
K7AEK	A	49,232	177	136
*KG4OJT	*	47,250	178	135
*AD7BK	A	27,720	153	110
*KB1HDO	A	27,141	143	109
*KG4RZH	*	22,848	129	96
*K9DXR	A	22,698	106	97
*KC5TA	A	9,916	93	74
*K6WV	*	6,696	58	54
NU6T	A	5,253	59	51
*KC7RSO	*	4,165	59	49
*KC2MDQ	*	3,382	40	38
*WDØBGZ	A	1,625	29	25
*KC8WTP	*	1,296	24	24
*KG4VKQ	14	462,162	121	100
*AI4AQ	*	47,538	154	139
*K9EMF	14	16,275	105	93
*AB9IO	7	1	1	1

DX

*CS6T	A	4,925,620	2459	932
				(Op: CT1ILT)
W1AJT/VE3	A	1,300,032	981	488
*UO6P	A	1,170,866	971	454
				(Op: UN7PBY)
*YT1LT	A	813,174	872	433
*VE7KET	A	268,398	364	279
*ES8DH	A	203,050	398	262
*VE2QIP	A	201,411	299	207
*6K2CLF	A	193,434	506	206
*YY5JRU	A	118,802	270	191
*SQ1WO	A	109,354	296	214
PE2SVN	A	103,740	253	210
*F8EEQ	A	89,892	238	198
*KP4JFR	A	67,896	184	138
*PE2GER	*	65,208	191	156
*VK4XES	A	61,064	159	136
*MU3GSY	A	53,265	205	159
*VA7IRL	A	47,250	153	105
*MM3JHS	A	46,800	176	156
*PY2RDS	A	45,582	147	107
*OH6GDX	A	27,120	142	113
*OE8OLK	A	25,544	114	103
*EA1BZP	A	20,273	111	97
*ZS4JAN	A	15,400	80	70
*MM3SOZ	A	9,576	78	72
*HF85AMU	*	7,424	62	58
				(Op: SQ3EQ)
*IT9FGA	A	5,658	47	41
*VA3HUN	*	4,332	43	38
DL3APZ	A	1,110	31	30
*PP5WF	28	186,276	299	228
*AN2AYD	28	9,120	64	57
				(Op: EA2AYD)
*YO5PCY	28	4,366	40	37
*UR5MIW	21	87,320	248	185
*PE2T	21	50,697	151	131
*UA9LAU	14	79,926	195	154
RK9QWZ	*	9,828	65	52
				(Op: UA9QFF)
*MM3YDH	14	6,771	63	61
*SMØWVH	14	851	25	23
*G5T	*	3	1	1
				(Op: G6Y @G6U)
IO3Z	7	573,024	644	376
				(Op: IV3ZXQ)
*YO2LZP	7	155,540	281	220
*YY5BDP	7	41,366	91	86
EA5JK	3.7	73,200	184	150
*YY5YMA	3.7	66,880	126	95

BAND RESTRICTED

*EC8ABT	A	682,808	610	356
*DK8AX	A	100,440	229	180
*MM3JHS	A	46,800	176	156
*JL7XBN	A	44,400	153	120
*EF5CIA	A	14,344	105	88
				(Op: EC5CIA)
*RA9KM	A	14,129	77	71
*ON4KVA	A	2,146	38	37
*PU5RAS	28	11,514	70	57
*EC3CJN	21	41,328	187	144
*EC1DMQ	*	7,139	63	59
*MM3YDH	14	6,771	63	61

ASSISTED

W2RE	A	5,773,432	2450	917
W1US	A	4,545,935	1875	785
				(Op: K1LZ)
WO8CC	A	2,362,565	1526	685
				(Op: N8BJQ)
NO2R	*	1,553,660	1011	593
WØGJ	A	1,309,280	1120	560
WD4DDU	A	1,184,020	881	530
KOØU	*	1,111,628	1119	518
KC1F	*	809,732	728	484
N2BJ	A	684,129	659	457
W5GN	A	670,482	653	386
N4GG	*	582,175	610	365
AD4EB	*	566,874	675	409
NF6A	A	443,932	527	356
				(Op: K6XX)
N4WW	*	438,240	509	352
W9GE	A	432,866	485	343
N6CCL	*	421,605	560	347
W2YC	*	411,600	490	336
N4LR	*	399,854	559	338
KI6T	*	388,008	575	317
WØTT	*	362,208	544	352
KYØW	*	359,352	498	322
				(Op: WØYK)
K4YT	*	266,208	390	282
WF2B	*	195,840	352	255
W7SW	A	162,000	339	216
KD2HE	*	154,308	322	231
KØAD	*	115,659	336	213
N2SY	*	113,820	299	210
K3KO	*	105,730	195	194
N3HS	*	99,072	207	172
NF1A	*	79,234	215	173
N1IW	*	56,677	188	157
N4TL	*	35,504	136	112
W3BW	*	21,952	111	98
AJ1M	*	17,460	119	90
W6SZG	*	8,680	56	56
N4XMX	*	6,345	55	47
WØMN	*	3,698	51	43
NØRQ	*	2,212	30	28
W6OAT	*	2,190	32	30
WR9K	*	260	13	13
KO4MR	28	24,386	99	89
K7ZS	21	550,573	812	401
*N9LF	A	763,812	780	441
*N6QQ	A	486,234	627	357
*K6EU	*	382,311	571	321
*KS1J	*	326,045	407	305
*N8CN	A	312,444	471	297
*KA2D	A	299,320	367	280
*KB1ESI	A	276,165	449	285
*K1RQ	*	272,250	412	275
*WA1ZYX	*	210,049	342	259
*NP3D	*	157,685	382	235
*WAØMHJ	A	151,526	270	239
*KJ9D	*	104,910	217	195
				(Op: WN9O)
*KG6UED	*	75,500	239	151
				(Op: K6OWL)
*K5WW	A	72,311	246	167
*W5NN	*	64,408	252	166
				(Op: K5NZ)
*AC7JD	A	46,920	187	136
*W1MVY	*	42,036	172	124
*W7SST	*	40,051	167	121
*N1JAC	A	36,960	157	112
*AAØBA	*	34,650	130	105
*N8USK	*	33,292	142	116
*WR3L	A	29,973	110	103
*K9OSH	*	24,347	110	97
*N4JN	*	19,620	104	90
*WD9GMK	*	10,494	82	66
*KZ8E	*	8,109	55	53
*K3IXD	*	7,344	57	51
*W1TO	*	4,485	46	39
*W5TM	*	660	20	20
*W4ATL	*	12	6	2
*NEØP	28	21,684	104	78
*WB1HBB	*	170,816	400	272
				(Op: W4WR)
*W1RM	3.7	6	1	1

DX

C4M	A	14,190,540	4497	966
				(Op: RW3QC)
PS2T	A	13,626,240	4039	1128
				(Op: PY5EG)
PJ4P	A	12,441,348	3839	1044
				(Op: DF7ZS)
RG9A	A	9,638,179	3034	899
				(Op: UA9AM)
LU1NDC	A	7,244,520	2780	876
LTØH	*	7,212,370	2849	865
				(Op: LU3HY)
LY4XX	A	4,501,052	2124	844
S52ZW	A	4,362,504	2067	804
RN3QO	A	4,095,300	2204	876
DL1IAO	A	4,015,340	1923	812
SN8F	A	3,357,200	1845	763
				(Op: SP8FHK)
S53O	*	3,323,510	1839	755
DK9TN	A	2,057,361	1346	673
OH6NIO	A	1,977,927	1352	679
JS3CTQ	A	1,957,328	1269	568
DAØINN	*	1,033,257	958	489
				(Op: DL2RMC)
VE1OP	A	987,552	890	486
AM5YJ	A	949,996	924	541
				(Op: EA5YJ)
SM3W	A	920,700	989	495
				(Op: SM3WMV)
SM2EKM	*	625,425	758	465
XE2AC	A	598,794	679	371
7S6N	*	568,650	590	425
				(Op: SM6CNN)
DHØGHU	*	438,000	535	365
8P2K	A	434,910	741	285
				(Op: 8P6SH)
GØMTN	A	431,681	618	379
IV3NVN	A	373,746	430	373
SM7E	*	338,664	518	309
				(Op: SM7BHM)
OK2ZW	A	251,706	374	273
OK1FDY	*	250,572	386	266
OM7PY	A	210,129	342	267
OE8CIQ	A	197,099	389	259
II1M	*	159,848	302	232
				(Op: IK1SOW)
VE2DC	A	135,240	253	196
DKØED	*	99,369	223	183
				(Op: DL4YAO)
EA5FID	*	94,560	222	160
EY8MM	A	93,492	218	159
DJ3IW	*	89,708	196	164
OE8YDQ	*	63,468	194	164
DL1HCM	*	47,754	148	126
DL6RAI	*	21,040	108	80
DF2LH	*	11,736	81	72
DF3CB	*	5,220	50	45
JY9QJ	A	598	15	13
LS7D	21	4,399,954	1881	806
				(Op: LU7DW)
JI3OPA	21	4,213,708	1910	802
9A1P	21	3,006,750	1553	750
				(Op: 9A6NDX)
OMØM	21	1,612,468	1103	572
				(Op: OM7ZZ)
UXØIB	21	459,720	595	360
DL2YL	21	407,984	488	344
LY2IC	21	86,673	223	167
F5IN	21	70,224	190	154
OE6Z	14	3,390,700	1932	827
YT7A	14	2,423,640	1689	760
				(Op: YU7GMN)
JG3KIV	14	2,036,112	1203	624
UV8M	14	1,518,473	1467	671
				(Op: UX3MR)
RAØAM	14	178,088	296	226
4N6ØØA	7	3,505,216	1776	704
				(Op: YZ1ZV)
S51CK	7	430,320	565	330
4N2ØØA	1.8	2,409	39	33
				(Op: YU1UA)
*SX9F	A	1,951,360	2010	640
				(Op: SV9FBM)
*S5ØG	A	1,625,635	1240	605
				(Op: S58M)
*ZZ8Z	A	1,198,368	952	456
				(Op: PY8AZT)
*RW3DU	A	729,330	895	453
*DL4GBA	A	374,248	490	326
*DL4RCK	*	341,448	462	328
*OK1VVW	A	262,208	419	272
*S57MTA	A	233,856	336	261
*DG7RO	*	217,152	396	261
*OH2FS	A	215,292	321	308
*OK1CJN	A	144,318	273	201
*PAØKHS	A	101,074	277	194
*EA8AJO	A	59,805	159	135
*YC3MM	A	45,981	135	117
*JA3PYC	A	45,580	145	106
*EA1GL	A	40,535	135	121
*ON5ZO	A	35,211	143	121
*OK2PMS	*	33,500	121	100
*EA1AK/7	*	30,397	125	113
*SP8QED	A	8,280	67	60
*RAØANO	A	3,441	40	37
*SM6RXZ	A	55	5	5
*PP5JD	28	1,533,114	1013	534
*PR7FN	28	24,192	128	96
*SQ4HRN	28	21,141	95	81
*HA3OV	21	324,615	415	323
*ES5RY	14	583,160	720	478
*EA1CS	14	295,630	549	370
*JH1UUT	14	65,376	180	144
*SV5RDS	7	1,199,220	840	460
				(Op: SV5DKL)
*SO6A	1.8	21,690	122	90
				(Op: SP6IHE)

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

W4PA	6,204,012	2778	942
KØDU	6,015,296	2931	928
NN4N	4,674,855	2514	893
AJ9C	4,397,221	2473	859
NW1E	3,168,026	1705	733
W5KFT	3,136,592	2380	752
WX6V	2,722,416	1849	688
KN5H	2,624,820	2033	660
NJ6N	2,533,760	1909	640
NZ1U	2,488,650	1582	705
KRØB	2,426,257	1903	697
K5UA	2,280,055	1706	655
WA7LT	1,871,276	1745	599
KI1W	1,803,683	1314	659
KDØS	1,742,142	1478	618
NN6X	1,392,090	1330	490
KC9ARR	1,327,092	1329	564
WG7X	1,300,365	1339	555
N7YX	1,269,621	1198	531
WX7P	703,395	941	441
W6TE	696,378	784	419
WV7T	600,561	725	377
AIØL	559,874	789	406
W5LCC	549,796	950	388
NW7MT	362,406	584	289
WZ7M	242,814	491	283
N1SV	188,936	313	226
WB6HII	66,600	223	150
N4CW	64,184	147	142
KØUH	53,960	199	142

NORTH AMERICA

VP51V	17,939,600	6156	1192
WP2Z	16,508,772	5733	1134
TO7T	9,771,685	4286	935
HI3TEJ	6,988,995	3247	845
VE6SV	5,835,936	2588	888
VE7GL	5,148,225	2115	783
HI3CCP	5,007,852	2445	801
VE6AO	2,816,226	1926	651
VA3OC	1,132,860	863	474

AFRICA

CQ3T	**4,563,548**	**1688**	**748**
5TØEU	**1,831,224**	**3722**	**492**

ASIA

UA9AYA	**12,712,275**	**3648**	**999**
RZ9OZO	**10,289,996**	**3202**	**1004**
RKØAXX	**8,946,102**	**3000**	**979**
RKØAYB	8,204,277	2926	951
RK9WZZ	7,230,548	2510	844
JM1LPN	**4,417,518**	**1939**	**807**
EXØM	**3,916,694**	**2080**	**653**
JU1DX	**3,908,792**	**2290**	**718**
JI2ZEY	2,640,987	1444	639
RK9CWW	2,365,810	1270	659
JA2ZJW	2,158,752	1272	597
RW9OWD	846,469	746	437
JA4YHX	322,054	433	283
ATØBI	**15,836**	**87**	**74**
HS8KAY	**5,712**	**52**	**48**

EUROPE

IR4T	**12,450,240**	**3611**	**1188**
OM7M	**10,925,454**	**3437**	**1167**
LY9Y	**9,464,042**	**3419**	**1106**
RL3A	**8,347,739**	**3325**	**1063**
HG1S	**8,080,080**	**2923**	**1048**
OE2S	**8,078,628**	**2880**	**1074**
DL2ARD	**7,761,720**	**2901**	**1065**
TM7F	**7,657,654**	**2995**	**998**
RD3A	6,529,815	2897	1035
M2A	**6,193,666**	**2687**	**974**
IR3P	6,182,016	2469	947
AM5KB	**5,877,627**	**2710**	**989**
4U1ITU	**5,526,416**	**2439**	**931**
IO4T	5,074,056	2208	936
IR2C	5,018,496	2192	896
IQ5LV	4,544,739	2069	831
LN8W	**4,476,689**	**2322**	**887**
YP3A	**4,473,540**	**2338**	**857**
AN1COZ	4,317,776	2079	842
YU1ARC	**3,874,283**	**2021**	**833**
LX8M	**3,741,957**	**2122**	**783**
J42T	**3,694,950**	**2715**	**805**
OT4P	**3,633,345**	**1982**	**789**
OZ5E	**3,278,870**	**1766**	**810**
OH3MMM	**3,268,188**	**1934**	**786**
G6PZ	3,088,375	1741	775
RZ1QZZ	2,750,517	1969	693
OL3Z	**2,589,119**	**1631**	**719**
OM4A	2,440,704	1519	672
HB75A	**2,324,249**	**1478**	**683**
SY3Y	2,235,532	2146	676
SC3AG	**2,170,050**	**1460**	**690**
S53S	**2,151,342**	**1465**	**642**
UZ4E	2,146,677	1737	741
DLØDX	2,122,560	1429	660
IV3OWC	1,930,704	1227	584
LA2Z	1,806,750	1368	657
G6M	1,769,375	1397	625
DLØMB	1,696,194	1162	606
AM5RCG	1,642,356	1376	666
EA2AAZ	1,491,567	1194	587
OE3I	1,478,438	1113	563
AM7RCT	1,467,652	1307	652
RK4WWA	1,404,198	1408	543
DL3ABL	1,343,775	1080	575
OZ5ESB	1,266,738	1002	561
IK5ROS	1,183,105	1011	539
YZ1ZA	1,158,912	991	503
OL1C	1,108,140	1061	506
UR6GWJ	**1,103,856**	**1087**	**488**
RK4WWF	1,053,864	1100	504
SP9KDA	1,050,920	904	520
DC6RI	934,365	841	501
LN1B	914,265	937	495
OT4O	902,988	820	486
IQ8PD	867,735	852	495
ED2BI	851,500	921	524
OK1KDO	789,276	789	438
M4U	781,927	824	457
OR4R	669,630	753	442
M4F	606,636	702	411
TM4Z	**598,800**	**728**	**400**
YL1YF	568,800	708	395
TF3W	**548,215**	**658**	**415**
9A1CMS	490,347	597	381
IR9K	476,388	635	401
LY8X	474,500	608	365
S53P	463,985	552	355
SN2V	437,524	561	356
SP9KRT	420,794	591	341
OL9S	410,550	550	357
SM5U	369,352	525	337
DNØIU/P	340,754	508	347
UT4IYZ	338,283	540	297
OK1KMG	270,630	512	279
SK6HD	264,872	464	293
CT7Z	**216,039**	**405**	**303**
RKØSXR	204,584	400	239
AM2WP	199,791	399	281
UR4PWC	191,772	357	252
II1D	179,095	323	245
DLØER	146,160	317	232
SP9KJT	106,400	249	190
SP9KOV	103,411	242	187
LA3SRK	93,112	293	206
PA6F	**90,916**	**243**	**191**
RU3QR	71,022	219	178
GX1WAC	38,352	167	136
LA1K	29,256	177	138
F6KDH	28,930	127	110
LN1K	27,675	172	135
SP1YSZ	1,539	26	19
SN4L	663	19	17

OCEANIA

3D2AY	**3,460,380**	**1924**	**642**
4E1X	**3,197,120**	**1941**	**515**
4D2X	3,060,684	1833	531
YBØZZ	**14,076**	**78**	**69**

SOUTH AMERICA

CWØB	**16,398,356**	**4299**	**1196**
LU2FA	**9,751,680**	**3438**	**960**
CEØEIO	**6,834,562**	**2721**	**854**
ZY7C	**5,208,550**	**2181**	**730**
PW7A	4,492,388	1966	788
LU3HS	3,904,101	1899	711
3G2S	**200,582**	**339**	**237**

MULTI-OPERATOR TWO TRANSMITTER

UNITED STATES

KM4M	**13,025,033**	**4403**	**1171**
WX5S	**7,777,539**	**3633**	**903**
WR3Z	**7,117,235**	**3114**	**995**
WE3C	6,213,361	2608	959
NM5O	**4,801,608**	**2928**	**882**
AG1RL	4,043,714	2359	766
KE1J	**3,581,925**	**1817**	**815**
W8FT	**2,879,647**	**1841**	**727**

NORTH AMERICA

VE7SV	**7,690,886**	**3236**	**826**
VE6FI	**5,011,824**	**2544**	**772**
V26DX	**2,846,630**	**1705**	**655**
AL1G	**1,622,880**	**1231**	**504**

AFRICA

CQ9K	**30,061,889**	**6377**	**1339**

ASIA

A61AJ	**30,157,650**	**7454**	**1255**

EUROPE

RU1A	**16,054,404**	**5433**	**1257**
YT9X	**9,121,375**	**3888**	**1075**
OL7R	**5,991,040**	**2670**	**920**
SO6Y	**4,955,742**	**2543**	**891**
GM7M	**2,368,212**	**1568**	**699**
EA4RCT	**1,794,170**	**1470**	**665**
M8C	**1,523,508**	**1256**	**588**
YR7C	**658,098**	**726**	**378**

SOUTH AMERICA

ZW5B	**26,849,550**	**6407**	**1365**
ZX3S	9,238,776	3151	984
PX2A	8,758,920	3207	940
CX1TA	**34,935**	**96**	**85**

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UNITED STATES

NO4I	**17,627,499**	**6422**	**1271**
NX5M	**10,786,608**	**5663**	**1107**
NR6O	**10,174,112**	**5256**	**962**
WX3B	**6,830,430**	**3238**	**1003**
NE1C	**6,043,484**	**3103**	**983**
WF6C	926,380	1094	455
N7VF	**565,730**	**692**	**370**
KI3DS	249,700	436	275

NORTH AMERICA

T49C	**10,769,121**	**4864**	**957**
6Y2RZ	**6,468,756**	**4021**	**742**
VE7FO	**557,175**	**628**	**345**

AFRICA

3B9C	**24,210,579**	**6804**	**1149**

ASIA

UP5G	**18,934,745**	**5791**	**1165**
JA1YPA	**1,160,352**	**869**	**474**

EUROPE

OT4A	**19,229,184**	**6057**	**1284**
LZ9W	**14,600,512**	**5100**	**1216**
DAØBCC	**13,485,896**	**4850**	**1156**
LY7A	**11,037,897**	**4457**	**1107**
EA4URE	**9,439,748**	**3857**	**1076**
DAØWPX	**5,334,728**	**2905**	**878**
PI4FRG	**89,170**	**243**	**185**

OCEANIA

ZL5QH	**12,904,448**	**4020**	**1024**
4G9K	**4,365,625**	**2131**	**635**
DX1DBT	1,252,910	1091	359

SOUTH AMERICA

YW4M	**32,037,671**	**7417**	**1279**

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our readers say

What You Didn't Tell Us...

Editor, *CQ:*

Regarding "What You Told Us" in September *CQ*, there is probably more than one opinion on the last information of the second paragraph pertaining to classes of licensees that voted shows. To me it shows that Novice and Tech are as complacent about voting as they are about studying for upgrades. Just my two cents. Enjoyed your beach time article.

George Lee, KR5C

W2VU responds:

George, I think the "voting," as you put it, is more representative of the overall readership of CQ than of anyone's motivation (or lack of motivation). My reason for bringing up those numbers was to point out that while a slight majority of readers (53%) disagreed with the ARRL's proposal to shrink exclusive Advanced/Extra phone subbands as part of an overall phone band expansion sought in its Novice "refarming" petition, the reader should realize that nearly three-quarters of those responding to the survey (73%) stand to lose out if the proposal is adopted as is. It also means that 20% approve of the plan even though they stand to lose some exclusive frequencies.

Living in the Real World

Editor, *CQ:*

I very much enjoyed reading your comments in the Sept. 2004 *CQ*. It sounds like you had a good trip. I think you were right on with your comments regarding helping the hobby grow. It was refreshing to know that although you tried for some QSOs with your QRP rig you were unsuccessful, not that I would wish that upon you. Some of the stories I have read about working four continents and WAS with 3 watts and a coat hanger antenna in four days are just a bit hard to believe. So, it is good to know that the editor lives in the real world and tells it like it is.

I am newly licensed after about a 50- year lay-off. Perhaps we will meet on 20 one day. Thanks for an interesting and informative *CQ*. It is better than I remember it being in the 1950s.

Gene Von Dohlen, KE5CFA

Cheap Yagis

This letter was addressed to Antennas Editor Kent Britain, WA5VJB:

Kent,

Loved the article on the Cheap Yagis! Finally an article that does not assume the beginning ham has a degree in electronic engineering, a complete electronics workshop, or a huge inheritance! I plan on making several of these and using them for fox hunts for the campus ham radio club. I looked on the web and found info on 2-meter Cheap Yagis, and hope to make one for use at home.

How about Cheap Yagis for 6 meters? Six is the best chance new Tech licensees have for DX, and making a Cheap Yagi would be much less intimidating than many other antenna plans out there.

Thanks again for the article. Ham radio needs more practical and cheap equipment for young people and beginners, and your article hit it right on the spot.

Taylor Mack, KD5ZJZ
Asstistant Professor
Deptartment of Geosciences
Mississippi State, MS

WA5VJB responds:

I've had a 6-meter Cheap Yagi in the air for eight years now, but since it's made out of salvaged parts from three old TET Yagis, even I couldn't build a second one.

The 6-meter version has been a mechanical, not an electrical challenge. Wood and wire just aren't going to make it with 110-inch-long elements. And while I could specify hardware from a dealer, I really want to use stuff that's easily available everywhere. My wanders though Home Depot and Ace Hardware are quests for that perfect mounting method (or at least a good excuse)!

I'm open to suggestions. Glad you enjoyed the article.

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