ICD 08241

Amateur Radio

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

CQ

SERVING AMATEUR RADIO SINCE 1945

OCTOBER 1999

In This Issue:

- **Sunspots Soar—Highest Since 1991 (p. 90)**
- **90 Years of the Harvard Wireless Club (p. 11)**
- **All-Time CQ WW DX Contest Records (p. 50)**
- **High-Speed Packet Backbone Nodes (p. 58)**
- **CQ WW DX CW Contest, Full 1998 Results (p. 17)**

U.S. $[illegible]

On the cover: W1AF, Club station of the Harvard [illegible]s Club, Boston, MA

THE RADIO AMATEUR'S JOURNAL

are you ready?

1999 Contest Equipment Checklist

Transceivers:

- [x] IC-706MKIIG *Glad I picked up this new little hummer. Super backup radio; also use as 2nd rig for multiplier hunting - or upcoming rover class contesting on VHF/UHF.*

IC-706MKIIG

- [x] IC-746 *What bang for the buck! Real HF performance, PLUS 6 + 2 meters. Twin PBT, IF-DSP, dual IF filtering, auto antenna tuner...that low ICOM Rx noise floor, too.*

IC-746

- [x] IC-756 *Real time band scope AND TRUE dual watch! IF-DSP, twin PBT. That receive-only ant jack will come in handy for lowband contesting ...wow!*
- [x] IC-775DSP *Exceptionally clean TX audio; quiet Rx noise floor, IF-DSP, all the bells & whistles. 200 watts out, runs cool even after 48 hours in barefoot class contests.*

IC-756

- [x] IC-781 *Still a ham's dream rig The ultimate!*

Each 100% duty cycle Tx!

Linear Amps:

- [x] IC-PW1 *Small footprint, remotable head with full metering, auto band switching with other ICOMs (great for quick bandhopping), a full kW on 6 meters ...neat!*

IC-775DSP

Accessories:

- [x] SM-20 Desktop mic *easy front panel connect*
- [x] SP-20 Deluxe speaker *('775, '781)*
- [x] SP-21 Standard speaker *('706G, '746, '756)*
- [x] SP-10 Mobile speaker *excellent with '706G*
- [x] CT-17 Computer interface *get PC ready!*
- [x] PS-85 DC power supply *for '706G, '746, '756*
- [x] AT-180 Auto antenna tuner *for coax fed anten*
- [x] AH-4 Auto antenna tuner *longwire operat*

IC-781

IC-PW1

ICOM®

www.icomamerica.com

Go Mobile, get there with COMET!

*NEW **MH-209SMA** • Dual-band 146/446MHz HT Antenna w/SMA Conn
Gain & Wave: 0 1/4 wave • Length: 3" Flexible rubber • Conn: Male SMA • Max Pwr: 5W

NEW **SMA-503** • Dual-band 146/446MHz HT Antenna w/SMA Conn
Length: 8.75" • Conn: Male SMA • Max Pwr: 10W

*NEW **MH-510** • Tri-band 52/146/446MHz HT Antenna w/SMA Conn
Gain: 0/0/ 3.2dBi • Length: 20.75" • Conn: Male SMA • Max Pwr: 10W

SB-15 • Tri-band 52/146/446MHz w/fold-over
Gain & Wave: 52MHz 0dBi 1/4 wave • 146MHz 4.5 dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

SBB-7 **SBB-7NMO** • Dual-band 146/446MHz w/fold-over NEW BLACK COLOR
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: SBB-7 PL-259/SBB-7NMO NMO • Max Pwr: 70W

SBB-5 **SBB-5NMO** • Dual-band 146/446MHz w/fold-over NEW BLACK COLOR
Gain & Wave: 146MHz 2.5dBi1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: SBB-5 PL-259/SBB-5NMO NMO • Max Pwr: 120W

THEFT **Z750** • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: Gold-plated PL-259 • Max Pwr: 200W

THEFT **Z780** • Dual-band 146/446MHz w/fold-over • Includes COMET exclusive theft-resistant lock!
146MHz 6/8 wave 4.5dBi • 446MHz 5/8 wave x 3 7.2dBi • Length: 62" • Conn: Gold-plated PL-259 • Max Pwr: 150W

B-20 **B-20NMO** • Dual-band 146/446MHz w/fold-over
Gain & Wave: 146MHz 2.15dBi 1/2 wave • 446MHz 5.0dBi 5/8 wave x 2 • Length: 30" •
Conn: B-20 PL-259/B-20NMO NMO • Max Pwr: 50W

B-10 **B-10NMO** • Dual-band 146/446MHz cellular look-a-like •
Gain & Wave: 146MHz 0dBi 1/4 wave • 446MHz 2.15dBi 1/2 wave • Length: 12" •
Conn: B-10 PL-259/B-10NMO NMO • Max Pwr: 50W

• The **CA-UHV** is a 6M/2M/70cm triband antenna. Add 2-3 of the stock or optional coils for 5-6 band operation.
• HF-70cm all in one economical easy to mount antenna.
• Fold-over hinge built in.
• Select the correct duplexer or triplexer for your specific radio (s).
• CF-706A, CF-530, CFX-514N (Ask your dealer)

*NEW **CA-UHV** • HF/6M/2M/70cm Mobile Antenna40/*20/*17/15/10/6/2M/70cm **40M Thru 70cm!**
Gain & Wave: HF-6M 1/4 wave • 2M 3.4dBi 5/8 wave • 70cm 2.15dBi 1/2 wave • VSWR: HF 1.6:1 or less • 6M-70cm 1.5:1 or less • Length: 6'2" •
Max Pwr: HF 120W SSB • 6M 200W SSB/100W FM • 2M/70cm 100W FM • *L-14 Optional 20M coil • *L-18 Optional 17M coil

*NEW **M30-100DC** • Dual-band 146/446MHz w/spring whip and fold-over
Gain & Wave: 146MHz 2.15dBi1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 • Length: 39" • Conn: PL-259 • Max Pwr: 120W

*NEW **M30-110DC** • Dual-band 146/446MHz w/spring whip and fold-over
Gain & Wave: 146MHz 3.5dBi1/2 wave • 446MHz 6.0dBi 5/8 wave x 2 • Length: 43" • Conn: PL-259 • Max Pwr: 150W

COMET™

1275 N. Grove Street • Anaheim • California 92806
(714) 630-4541 • (800) 962-2611
Fax: (714) 630-7024 • www.cometantenna.com

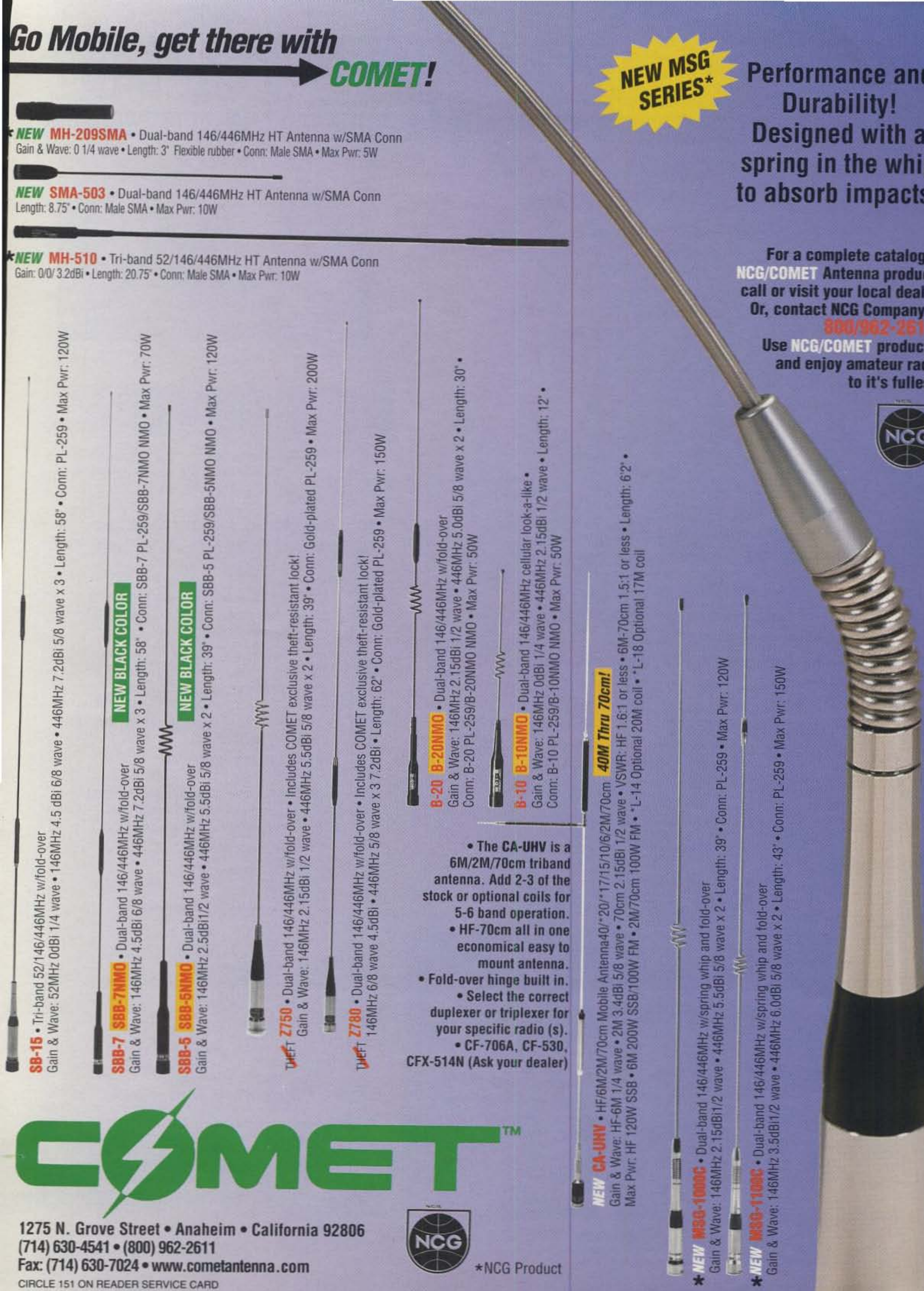
*NCG Product

NEW MSG SERIES*

Performance and Durability! Designed with a spring in the whip to absorb impacts.

For a complete catalog of NCG/COMET Antenna products call or visit your local dealer. Or, contact NCG Company at 800/962-2611. Use NCG/COMET products, and enjoy amateur radio to it's fullest!

NCG



CQ Amateur Radio

OCTOBER 1999 VOL. 55, NO. 10

FEATURES

page 11

page 17

DEPARTMENTS

page 45

ON THE COVER: We're proud to help celebrate a huge milestone in collegiate amateur radio—the 90th anniversary of the founding of the Harvard Wireless Club. Pictured here at the recently refurbished club station are (front to back): Nick Guydosh, N2MSE; Frank Wright, N3OQB; and Dennis Feehan, KD4SBN. There's a neat operating event scheduled for October 2 and 3 which will celebrate the occasion, and you'll find all the details beginning on page 11. (Photo by Larry Mulvehill, WB2ZPI)

Looking For DSP Performance?

Kenwood has a full line of "True" HF products ready to meet your current needs

KENWOOD has been known for high performance products since 1946. Over the years, Kenwood has produced and distributed more HF Amateur radios than any other manufacturer worldwide. Beginning in the early 1970's the legendary TS-520S first appeared in the U.S.A., then other world class products followed. Over the years Kenwood has produced HF transceivers with unparalleled performance and reliability. Many of our HF models manufactured in the early 1970's are still in service today! Compare Kenwood HF audio performance against the competition. You'll understand why Kenwood is still #1 in "TRUE" HF performance.

Hat styles may vary due to availability.

$799

TS-50S

- HF All Mode
- Rugged Compact Design
- Easy To Use
- Fuzzy Logic VFO
- Adjustable Power Output
- Auto Tuner Available

$1399

TS-570S(G)

- HF All Mode w/6 Meters
- Built-In Antenna Tuner
- 46 Easy Menu Items
- DSP Plus SSB/CW Filter Opt.
- Voice Synthesizer Opt.

$3999

TS-950SDX

- HF All Mode
- #1 Contest HF With DSP
- Digital AF Filters
- 150 Watts Mos-Type FET Finals
- Dual Digital VFO's
- Built-In Power Supply

$1199

TS-570D(G)

- HF All Mode
- Built-In Antenna Tuner
- CW Auto Tune/Kenwood First
- 441 Combinations Of DSP Filtering
- RCP2 Computer Control*

$2399

TS-870S

- HF All Mode
- True IF Stage DSP Noise Reduction
- 1st 100% Digital DSP Filtering System
- Logikey Electronic Keyer
- Built-In Antenna Tuner
- Beat Cancel

$429

VC-H1

- SSTV Visual Communicator
- Use with any VHF/UHF/HF/UBZ

* **FREE** Operating Manuals via the FTP site

**Win a Kenwood TH-D7A, Garmin® III+ & Palm IIIx PC. See your Kenwood dealer or visit http://www.kenwood.net for details.

***Purchase any new Kenwood Amateur radio between Aug. 15th & Oct. 31st 1999 and get a free hat. Submit a copy of your bill of sale that includes date of purchase, serial number as well as the product information card (pink) to the address below. Your FREE hat will be sent. (Allow 4-6 weeks for processing)

The above prices are estimated street prices, actual selling price may vary!

(Promotions & special giveaways apply to US residents only)

KENWOOD
Amateur Radio Products Group

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. Box 22745, 2201 E. Dominguez St.,
Long Beach, CA 90801-5745, U.S.A.
Customer Support/Brochures (310) 639-5300 99ARD-1907/#062599

ISO 9001
JQA-1205
Communications Equipment Division
Kenwood Corporation
ISO9001 certification

INTERNET
Kenwood News & Products
http://www.kenwood.net
Kenwood Bulletins
ftp://ftp.kenwood.net

Zero Bias

An Editorial

Alan Dorhoffer, K2EEK (SK): A Tribute

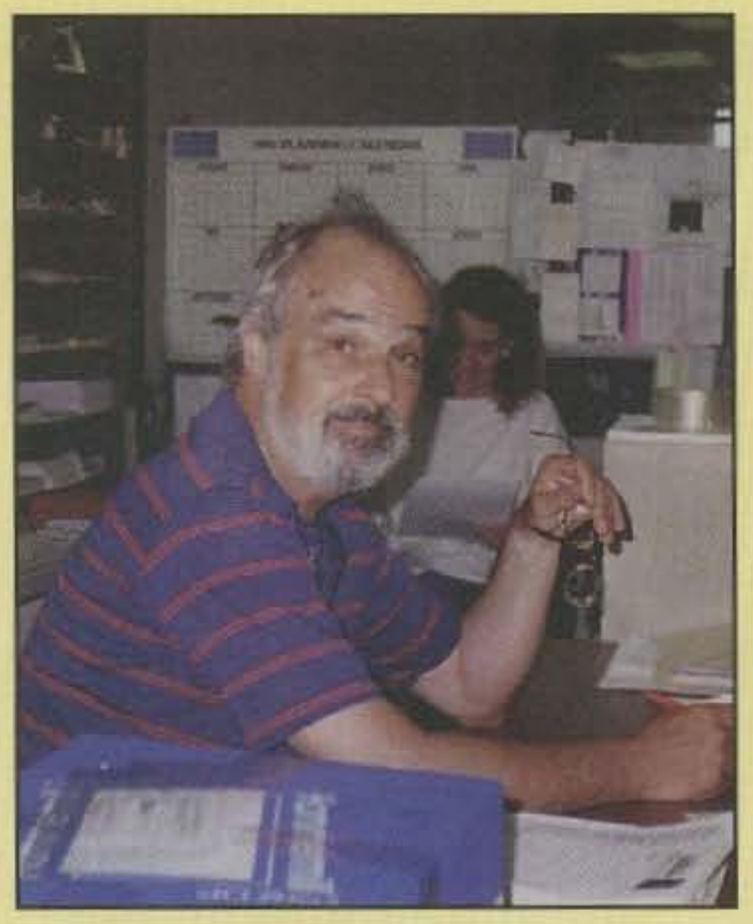
The Zero Bias in last month's *CQ* was written as we were in the process of laying to rest a dear friend and colleague, Alan Dorhoffer, K2EEK, long-time Editor of *CQ*. As word of Al's death spread throughout the amateur radio community, we began to receive a flood of cards, letters, e-mails, and phone calls from around the world, all expressing their feelings and remembrances of the man so many had come to know as the face and voice of *CQ*.

As a final tribute to Al, we're pleased to present a sampling of the comments received over the past month, beginning with a short essay by Gail Schieber, KC2DHK, long-suffering Managing Editor to Al for the past 20 years.

Al will certainly be missed. Hardly a day passes without the thought entering my mind that "Al would know the name of that person," or "I've got to share this story with Al," or "I wonder what Al would think about this." The thoughts are immediately brushed aside by the realization that my slightly disheveled, always clever friend and colleague of the past 42 years is no longer here to fill in the gaps in our lives.

But business, like life, goes on. With the next issue of *CQ* we will announce the new Editor of *CQ*. Bear in mind that anyone stepping into another's shoes under circumstances like these cannot fairly be called a "replacement." Editors, like all people, are unique in their character and approach to their life and their work. In that uniqueness lies the opportunity for growth and change, and that is what we all can expect from *CQ* in the months and years ahead.

–K2MGA



Life at the CQ offices has always been pretty democratic, with every able-bodied person doing whatever is necessary to get the product out the door. Here Al has just finished packing up another carton of WW DX Contest logs to be shipped to the committee for checking. And you thought it was done by a cast of thousands.

Zero Bias, The Process

Until last month, each month since the May 1976 issue of *CQ* we have published the words of Alan, K2EEK, on this page. With his passing on July 19 ends Al's "Words of Wisdom," as he and I came to fondly call this sometimes cajoling, sometimes purely entertaining, sometimes feather-ruffling mix of words and phrases. For many of you, this is the first page you turn to when you receive your copy of *CQ*. Often we would receive letters, e-mails, and phone calls agreeing with or disagreeing with Al's point of view. And then there were those who just wanted to say thanks, I appreciate what you have said and what you are doing for the hobby.

What went on behind the scenes of Al's editorial process is a story in itself. Each month's "Zero Bias" entailed a creative process that took about a week to complete. Some of us here in the office, myself included, would often wonder how it could take so long to produce one page! In the monthly magazine business, especially when there are multiple publications in progress at any given moment, it seemed a luxury to have a *whole week* to produce one single page. The deadline for an issue would be at hand, all articles and advertising complete, and Al would still be typing away on his blue IBM Selectric II (a treasure dragged here to Hicksville when we moved from our Port Washington offices in 1979), creating an editorial that usually caught the attention of even the most jaded reader.

I knew not to bother him when the words were flowing so as not to break his train of thought. If things were going well, he would not emerge from his office for several hours. The sound of the clacking of the typewriter keys could be heard, with bursts of speed and long pauses intermingled with the sound of the chair crashing into the wall behind my office as Al leaned back to reflect and perhaps light a cigarette. If in a given month the words did not come quite as easily ("They all can't be gems," he would say.), he would be in and out of his office, stopping to sit in my office to chat, or wandering down the hall to Dick or Arnie's office to see what was new. It was a break which allowed him to regroup his thoughts and stretch his legs, while at the same time checking in with the rest of us who were wondering just when the master would be finished, allowing us to wrap up yet another month.

Al's thoughts on the hobby he loved so much ranged from the purely pragmatic to the somewhat esoteric. On this page at one time or another he stated his feelings on almost every aspect of the hobby, from the "perfect" antenna weather (sometime in mid-January here in the northeast), to the "toys" that every self-respecting ham must have, the emergency communications of which we all are so very proud, the steadfastness of those who sing the praises of CW (and yes, those who will not let go of it as a measure of a ham's worth), the drive with which some of us face the challenge of the contest and award chase, the camaraderie of the ham community, the quality of the food at hamfests (a subject that is remembered fondly by many of you, I'm sure), and most of all, the FUN that to Al was the essence of amateur radio.

As purely a wordsmith, Al was the best I have ever worked with. He was in his glory when he could find a word that would challenge the reader (and me) to go to the dictionary (sometimes the unabridged dictionary at that!) to find the meaning of the word. And one of my main tasks when all was said and done was to actually attempt to *find* the word in the dictionary, as Al readily admitted to his lack of skill in the spelling arena and would spell a word just as it sounded—sometimes close, sometimes not, and a challenge nonetheless.

I was always amazed by Al's ability to begin with a topic, weave his way through the paths and intricacies of his chosen subject, and ultimately come to, as he would say, the *denouement*—all in four typewritten pages, a number forever etched in my mind. If one month's editorial was a particularly laborious task, there would be periodic updates: "I have two pages done"; "finished page three"; "only the last paragraph still to go!" It was a work in progress with a master at the helm.

As the years pass, I, for one, will always remember not so much the content of "Zero Bias," but the man and the process: the sounds of the typewriter clacking away, Al's poking his head around the door to pass a few minutes while the thoughts and words jelled, discussions of where he was going with the subject at hand, and the ultimate "tah dah!" when the editorial was finally finished after a week of us saying, "Aren't you finished yet?" to which he would respond, "Don't worry. It will get done. Why? Because we're professional!"

I feel very fortunate and proud to have been a part of that process, a part of one of Al's favor-

(Continued on page 8)

Jeff Savasta, KB4JKL, with K2EEK at the CQ Industry Reception at Dayton in 1997.

THE DIRECTOR
HF Multiband Beam Antenna

SMALL FOOTPRINT BIG SIGNAL

Cushcraft's newest multiband HF antenna provides 5 band directivity in a package small enough to mount to a tripod. The **MA5B** is a design that does not sacrifice ruggedness, performance and power handling for size and ease of installation.

▪Easy To Tune
No complicated gamma matches to adjust.

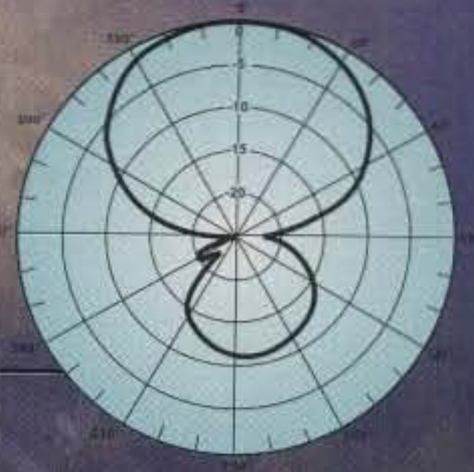
▪Easy To Turn
With a boom length of 7 feet and a longest element length of 17 feet, a lightweight TV rotor will do the trick.

▪Low VSWR
Flat response across all 5 bands. VSWR minimum 1.2:1.

▪Rugged Construction
Cushcraft's tried and true stainless steel mounting hardware and heavy wall aluminum tubing make for a rugged,long lasting antenna.

▪Single Feed Point
Only one coaxial feed line is necessary for all 5 bands.

High Front To Back Ratio On 10/15/20m



MA5B SPECIFICATIONS						
FREQUENCY	10	12	15	17	20	Meters
ELEMENTS	2	1	2	1	2	per band
GAIN	5.3	1.0	4.8	1.0	3.6	dBi
FRONT TO BACK RATIO	10	0	12	0	22	dB
SIDELOBE ATTENUATION	25	25	25	25	25	dB
VSWR 2:1 BANDWIDTH	665	>110	255	>100	90	kHz
LONGEST ELEMENT	17.1ft (5.2m)					
TURNING RADIUS	8.8ft (2.7m)					
BOOM LENGTH	7.3ft (2.2m)					
BOOM DIAMETER	1.5in (3.8cm)					
MAX. WIND SURFACE AREA	3.22 ft² (3 m²)					
MAX. POWER HANDLING	1.2 kw					
WEIGHT	26.5 lbs. (12 kg)					

For more information on this outstanding HF Multiband Beam Antenna, visit our web site at **http://www.cushcraft.com** or contact any one of our dealers worldwide.

CUSHCRAFT
COMMUNICATIONS ANTENNAS
48 PERIMETER ROAD, MANCHESTER, NH 03103 USA
(Tel.) 1-603-627-7877 • (Fax) 1-603-627-1764

Announcements

• The following Special Events are scheduled for October:

YLAP, sponsored by YLRL. CW from 1400 UTC Oct. 7 to 0200 UTC Oct. 9; SSB from 1400 UTC Oct. 21 to 0200 UTC Oct. 23. YLs only. Exchange QSO number, RS(T), and ARRL section/province/country. For more information, contact Cleo Bracket, KØJFO, 810 Towne Square Dr., Fremont, NE 68025-7000.

N2MO, from the old Marconi Hotel, Wall Township, NJ. Celebrating the Marconi Test Facility in Wall; 1300 UTC Oct. 3, 2100 UTC Oct. 9; 3.875, 7.235, 14.240, 21.325 MHz. Sponsored by Ocean/ Monmouth ARC; certificate or QSL available. QSL via OMARC, P.O. Box 267, Oakhurst, NJ 07755.

W2GSA, from the Twin Lights Lighthouse, Atlantic Highlands, NJ. Celebrating the 1st practical use of a wireless transmission; 1300 UTC Oct. 13, 2100 UTC Oct. 17; 3.875, 7.235, 14.240, 21.325 MHz. Sponsored by Garden State ARA; certificate or QSL. P.O. Box 34, Fair Haven, NJ 07704.

W2OD/MM, from New York Harbor. Simulated spark gap transmission from a ship at sea; 1400 UTC Oct. 16, 1400 UTC Oct. 17; 3.875, 7.235, 14.240, 21.325 MHz. Sponsored by Garden State ARA; certificate or QSL available. For information, contact Bob Buus, W2OD, 8 Donner Street, Holmdel, NJ 07733.

WA2GM, from the Twin Lights Lighthouse, Atlantic Highlands, NJ. Celebrating the 100th anniversary of NY Yacht Race transmission from New York Harbor; 1300 UTC Oct. 20, 2100 UTC Oct. 24; 3.875, 7.235, 14.240, 21.325 MHz. Sponsored by Marconi Chapter of the QCWA #138; certificate or QSL available. For information, contact Mike B. Feher, N4FS, 89 Arnold Blvd., Howell NJ 07731.

K4HXZ, from Devil's Courthouse, Transylvania County, NC (weather permitting); 1800Z–2359Z Oct. 31; 7.237, 14.295, 21.365, 28.335 MHz SSB and 146.52 FM simplex. Sponsored by Transylvania County ARC. For certificate, send a business- size or 9×12 SASE to TCARC, P.O. Box 643, Brevard, NC 28712. For more information, contact Fred Hatfield, W9MMZ, 458 Still Branch Road, Brevard, NC 28712.

N4M, from Arlington, VA, and Washington, DC. Celebrating the 24th running of the Marine Corps Marathon; 1200Z–2200Z Oct. 23 and 1300Z–2300Z Oct. 24; 1.845, 3.855, 7.263, 14.255, 21.305, 28.355 MHz. Sponsored by the Fauquier ARA. For certificate send 9×12 SASE with QSL. For info, contact FARA-Marathon, P.O.B. 752, Warrenton, VA 20186.

W8MCC, from Woodsfield, OH. Commemorating Monroe Co. Black walnut festival at Monroe Co. Fairgrounds; 1400 UTC Oct. 9 to 2100 UTC Oct. 10; 7.250, 14.300, 21.400, 28.480, 50.150 MHz. Sponsored by Monroe County Communicators. For certificate, send a 9×12 SASE to Bob Simpson, KB8UTE, 44480 Pfalgraf Ridge Rd., Woodsfield, OH 43793. For more information, call 740-472-0512.

W8NCK, will be participating in the sesquicentennial (150 years) celebration of Fremont, OH; Sandusky Valley ARC, Oct. 16; 7.225, 14.225, 21.325, 28.325 MHz.; For QSL, send QSL and SASE to SVARC, P.O. Box 1072, Fremont, OH 43420.

W9CEQ, the Fox River Radio League will be commemorating their 75th anniversary; 1700Z Oct. 15 to 2300Z Oct. 17; suggested frequencies SSB 7.260, 14.260, 21.300, 28.300 MHz; CW 7.130, 14.100, 21.150, 28.150 MHz. For certificate, send a QSL and 9×12 SASE to Fox River Radio League, Box 673, Batavia, IL 60510-0673.

W9L, from Mooresville, IN. Commemorating the 60th anniversary of Goethe Link Observatory; 1000 UTC Oct. 22 to 2330 UTC Oct. 24; General portions of 20, 40, 80 meters, phone and CW; Novice portion of 10 meters. Sponsored by Indiana Astronomical Society. For certificate, send QSL and large SASE to Goethe Link Special Event Station, c/o 5431 Padre Ln., Indianapolis, IN. For info, contact Rick Reneau, KB9NDF, <kb9ndf.arrl.net>.

WØUK, from Nowhere, KS. Celebrating the Baldwin City Maple Leaf Festival; 1400–2100 Oct. 16; lower General 40–10 meters; 14.240 main frequency. Sponsored by Douglas Co. ARC. Certificate. Contact Ken Blair, KCØGL, 1711 W. 19th Terrace, Lawrence, KS 66046.

• The following hamfests are scheduled for October:

Oct. 1–2, **NWAARC Hamfest '99**, Jones Center for Families, **Springdale, AR**. Contact Northwest Arkansas ARC, P.O. Box 24, Farmington, AR 72730 or Clarence Morrow, KC5UEW, phone 501-631-9231. (Exams)

Oct. 1–3, **23rd Mid-Atlantic States VHF Conference**, Hampton Inn, **Willow Grove, PA**. Sponsored by the Mt. Airy VHF Radio Club (the Packrats), followed by Hamarama '99 on Sunday at Middletown Grange Fairgrounds, Wrightstown, Pennsylvania. Contact John Sorter, KB3XG, 1214 N. Trooper Rd., Norristown, PA 19403; e-mail: <johnkb3xg@aol.com>; phone 610-584-2489; see PackRat Web site at <http://www.ij.net/packrats> for location maps and additional information; or e-mail John Sortor, KB3XG, <johnKB3XG@aol.com>.

Oct. 2, **Ham Expo '99 Fall Fest**, Bell County Expo Center, **Belton, TX**. Contact Mike, WA5EQQ, 254-773-3590; e-mail: <hamexpo@tarc.org>; on web: <www.tarc.org>.

Oct. 2, **Garden State Hamfest '99**, Croydon Hall, **Leonardo, NJ**. Contact GSARA, c/o Mario Sellitti, P.O. Box 286, Keansburg, NJ 07734, <http://www.monmouth.com/~gsara>. (Exams)

Oct. 2, **SVARC Computer, Amateur Radio & Electronics Show**, Silver Moon Antique and Flea Market Show Arena, **Hummels Wharf, PA**. Contact George Machesic at <gpmac@netscape.net>; answering machine 570-286-2086; web: <http://loveland.dynip.com/svarc>; Dave Weker at <k3si@hotmail.com>. (Handicapped accessible)

Oct. 2, **York County ARS Hamfest,** Knights Stadium, **Ft. Mill SC**. Contact YCARS Hamfest, 2129 Squire Rd., Rick Hill, SC 29730, or call Haney Howell, K2XN, at 803-323-4534, or <www.ycars. org>.

Oct. 2, **RAGS 1999 43rd Hamfest**, Pompey Fire Department, **Syracuse, NY**. Contact Vivian Douglas, WA2PUU, 315-469-0590, or visit <www.pagesz.net/~rags>. (Exams)

Oct. 3, **Mt. Airy VHF Radio Club HAMARAMA**, Middletown Grange Fairgrounds, Penns Park Rd., **Wrightstown, PA**. Contact Mark Schreiner, NK8Q, e-mail: <nk8q@amsat.org>; phone 215-847-2285.

Oct. 3, **1999 Hall of Science ARC Hamfest**, New York Hall of Science parking lot, Flushing Meadow Corona Park, **Queens, NY**. Contact Stephen Greenbaum, WB2KDG, 718-898-5599 (evenings only); e-mail: <WB2KDG@Bigfoot.com>.

Oct. 8–10, **AMSAT-NA Annual Meeting and Space Symposium**, **San Diego, California**. For details, see the AMSAT Web site at <http://www.amsat.org>, or contact AMSAT, P.O. Box 27, Washington, DC 20044; phone 310- 589-6062; fax 301-608-3410.

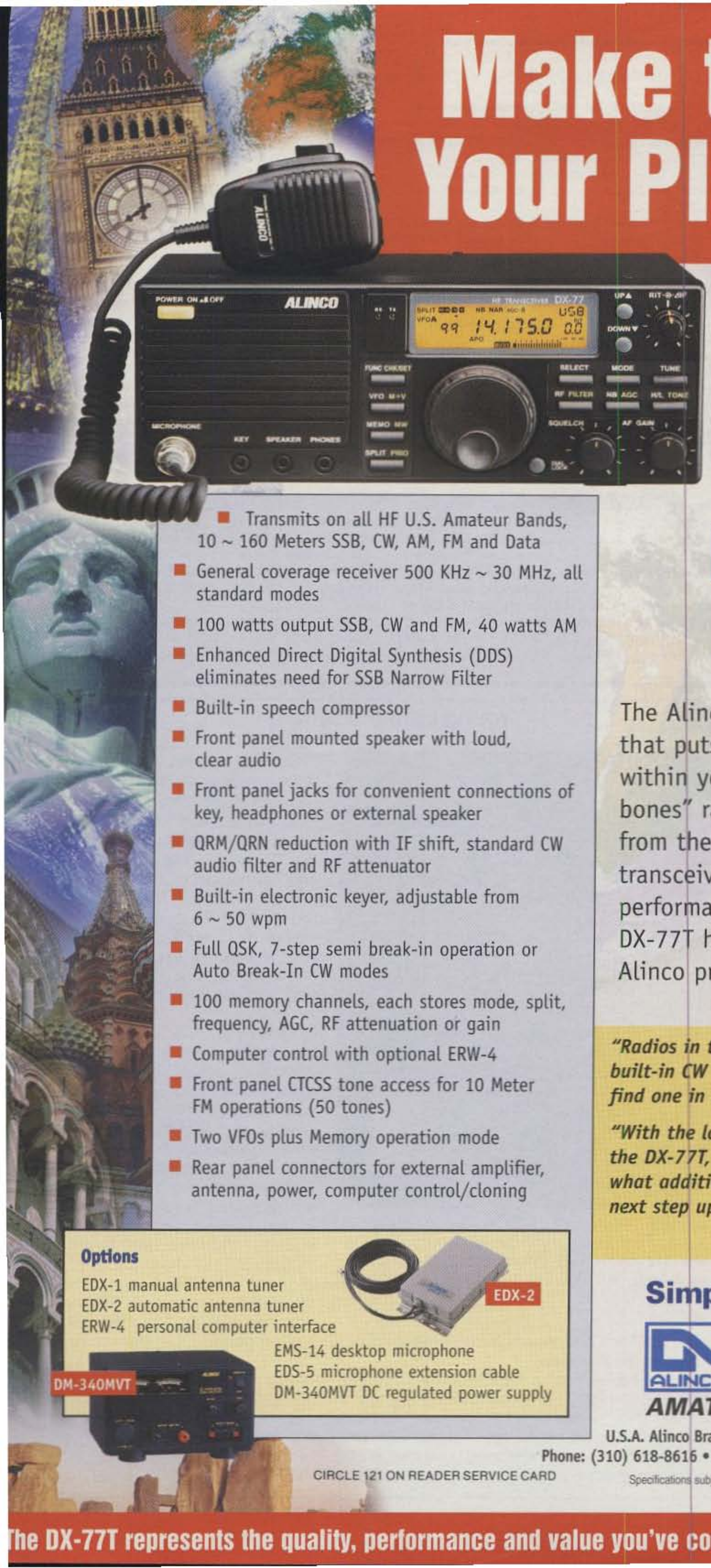
Oct. 8–11, **17th Space Symposium/ AMSAT-NA Annual Meeting**, Hanalei Hotel, **San Diego, CQ**. Contact Duane Naugle, KO6BT, at <ko6bt@amsat.org>; visit the AMSAT-NA web page at <http://www.amsat.org>; or contact AMSAT, P.O. Box 27, Washington, DC 20044 (phone 310-589-6062; fax 301-608-3410).

Oct. 9, **North Kitsap ARC Hamfest**, President's Hall, Kitsap County Fairgrounds, **Bremerton, Washington**. Contact Marcie Stilwell, KC7DAT, P.O. Box 2268, Silverdale, WA 98383-2268 (360-697-2797; e-mail: <nkarc@yahoo.com>).

Oct. 9, **RSGB Int'l HF & IOTA Convention**, Beaumont Conference Centre, **Old Windsor, Berks, England**. Contact RSGB, Lambda House, Cranborne Rd., Potters Bar, Herts, EN6 3JE, UK; phone +44 (0) 01707 659015; web: <www.rsgb.org>; for details on accommodations packages, contact Marcia Brimson, 2E1DAY, <marcia.brimson@rsgb.org.uk>.

Oct. 9, **Bergen ARA Hamfest,** Fairleigh Dickinson

Make the World Your Playground!



- Transmits on all HF U.S. Amateur Bands, 10 ~ 160 Meters SSB, CW, AM, FM and Data
- General coverage receiver 500 KHz ~ 30 MHz, all standard modes
- 100 watts output SSB, CW and FM, 40 watts AM
- Enhanced Direct Digital Synthesis (DDS) eliminates need for SSB Narrow Filter
- Built-in speech compressor
- Front panel mounted speaker with loud, clear audio
- Front panel jacks for convenient connections of key, headphones or external speaker
- QRM/QRN reduction with IF shift, standard CW audio filter and RF attenuator
- Built-in electronic keyer, adjustable from 6 ~ 50 wpm
- Full QSK, 7-step semi break-in operation or Auto Break-In CW modes
- 100 memory channels, each stores mode, split, frequency, AGC, RF attenuation or gain
- Computer control with optional ERW-4
- Front panel CTCSS tone access for 10 Meter FM operations (50 tones)
- Two VFOs plus Memory operation mode
- Rear panel connectors for external amplifier, antenna, power, computer control/cloning

Options

EDX-1 manual antenna tuner
EDX-2 automatic antenna tuner
ERW-4 personal computer interface

EMS-14 desktop microphone
EDS-5 microphone extension cable
DM-340MVT DC regulated power supply

Alinco DX-77T Desktop HF Transceiver

Loaded with features at an affordable price!

The Alinco DX-77T is a design achievement that puts a new desktop HF transceiver within your reach. And this is no "bare bones" radio! The DX-77T was designed from the beginning to be a quality HF transceiver, full of features to enhance its performance and your enjoyment. The DX-77T has "big radio" features at a low Alinco price!

"Radios in this price class typically don't include built-in CW keyers, so it was a pleasant surprise to find one in the DX-77T. Nice going, Alinco!"

"With the long list of features already included in the DX-77T, first-time buyers may be curious as to what additional capabilities they would find in the next step up."

—QST Product Review, June 1998

Simple ▪ Clean ▪ Dependable

ALINCO®

AMATEUR RADIO'S VALUE LEADER℠

U.S.A. Alinco Branch: 438 Amapola Ave. • Suite 130 • Torrance, CA 90501
Phone: (310) 618-8616 • Fax: (310) 618-8758 • Internet: http: //www.alinco.com

CIRCLE 121 ON READER SERVICE CARD

The DX-77T represents the quality, performance and value you've come to expect from Alinco!

University, **Teaneck, NJ**. Contact Jim Joyce, K2ZO, 201-664-6725 (before 10 PM). (Exams)

Oct. 10, **LCDRA & CMARC HamFair & Computer Show**, Ingham County Fairgrounds Community Center, **Mason, MI**. Contact Don Tillitson, WB8NUS, 517-321-2004. (Handicapped accessible)

Oct. 10, **Maysville Hamfest**, Community Center, **Maysville, NC**. Contact Jo Ann Taylor, WD4JYR, 252-393-2120. (No exams)

Oct. 10, **Nutmeg Hamfest & Computer Show**, Mountainside Special Event Facility (Indoor Exhibit Hall), **Wallingford, CT**. Gordon Barker, K1BIY, 9 Edge Wood Rd., Portland, CT 06480; <www.wsl.net/nutmeghamfest>; e-mail: <nutmeghamfest@qsl.net>.

Oct. 10, **Lima Hamfest & Computer Show**, Allen County Fairgrounds, **Lima, OH**. E-mail: <Gas1950@aol.com>; web: <www.Anglefire.com>.

Oct. 16, **OPRC/ARCA Swapmeet/Hamfest**, Sabbar Shrine Temple, **Tucson, AR**. Contact Glen Henderson, WA7OBG, at 520-749-5478; e-mail: <linus@primenet.com>. (Exams, Handicapped accessible)

Oct. 16, **14th Annual Tri-Cities Hamfest**, Appalachian Fair Grounds, **Gray, TN**. Mail inquires to P.O. Box 3682, CRS Johnson City, TN 37602.

Oct. 16, **Mid-West Amateur Radio & Computer Expo**, Lewis & Clark Community College (River Bend Arena), **Godfrey, IL**. For info, write to Lewis & Clark Radio Club, P.O. Box 553, Godfrey, IL 62035; e-mail: <n9whh@ezl.com>; web: <http://www.ezl.com/~lmiller/lcrc.html>. (Exams, handicapped accessible)

Oct. 17, **North Central Ohio Hamfest & Computer Show**, Ashland County Fairgrounds, **Ashland, OH**. Contact David Fike, N8UCA, 979 Twp Rd., 1654 RFD 6, Ashland, OH 44805, or call 419-289-1085.

Oct. 17, **Tailgate Electronics, Computer & Amateur Radio Fleamarket**, Albany & Main St., **Cambridge, MA**. Contact W1GSL, P.O. Box 397082 MIT BR., Cambridge, MA 02139-7082. (Handicapped accessible)

Oct. 17, **Kalamazoo Hamfest**, Kalamazoo County Fairgrounds, **Kalamazoo, MI**. Contact <ka8blo@net-link.net>, or <www.qsl.net/ka8blo/hamfest.html>.

Oct. 23, **Swap-Toberfest, Amateur Radio Emergency Services Convention**, Polk County Fairgrounds, **Rickreall, OR**. Contact Bob Boswell, W7LOU, 503-623-2513, e-mail: <w7lou@goldcom.com>, or download a flyer and pre-registration form: <http://www.teleport.com/~n7ifj/swaptobe.htm>. (Handicapped accessible)

Oct. 23, **Chattanooga Hamfest**, Camp Jordan Arena, **East Ridge, TN**. Contact David Hoffman, KE4FGW, 423-877-7398; web: <http://www.qsl.net/w4am/carc_index.html>.

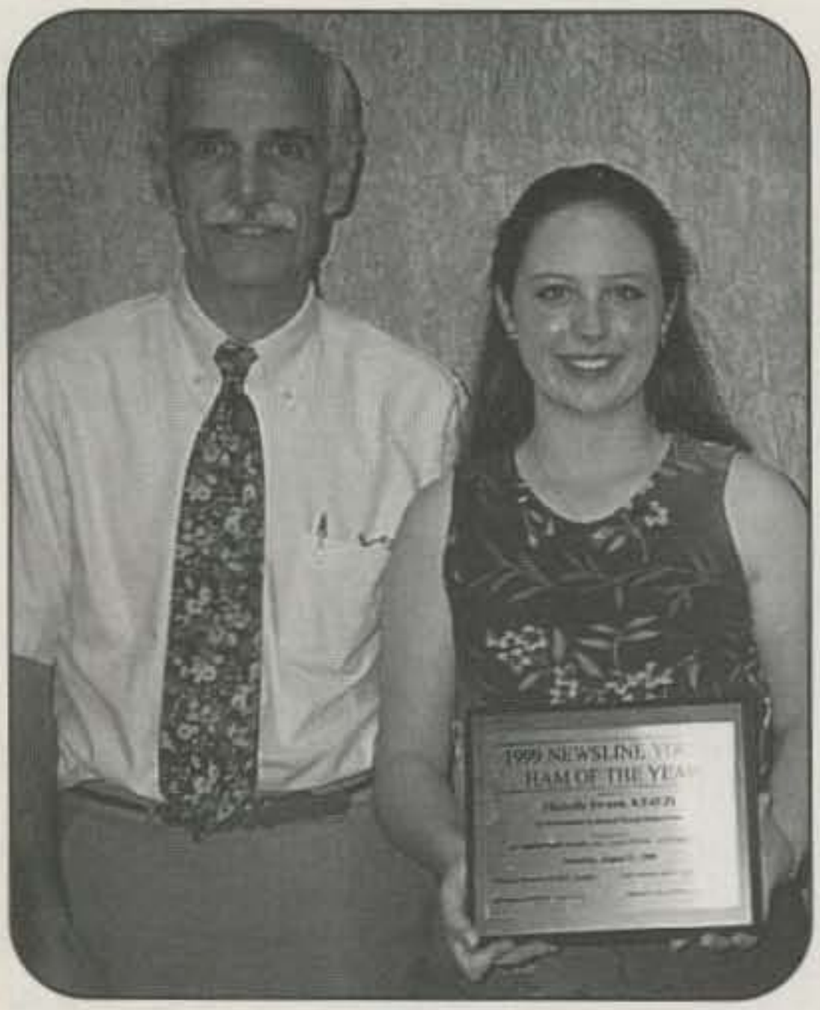
Oct. 24, **Mason-Dixon Computer & Hamfest**, Carroll County Agricultural Center, **Westminister, MD**. Visit <http://www.qis.net/~k3pzn>, or phone/fax 410-795-2556. (Exams)

Oct. 29–30, **Amateur Radio & Computer Show**, Morocco Shrine Auditorium (new location), between Jacksonville and the Beach, **Jacksonville, FL**. Write to Greater Jacksonville Hamfest, P.O. Box 9673, Jacksonville, FL 32208, or visit: <http:// www.ccse.net/~1rich/hamfest98.htm>. (Exams)

Oct. 30, **Hamfest Minnesota/Computer Expo**, St. Paul River Centre, **St. Paul, MN**. Contact Mark Roberts at 651-460-6050 or e-mail to <nØpfy@pclink.com>.

Oct 31, **Halloween Hamfest, St. Louis, MO**. Contact Steve Welton, WBØIUN, 9847 Arv-Ellen, Affton, MO 63123 (314-638-4959). (Exams)

Young Ham of the Year



Michelle Swann, KE4EZI, holds her Newsline Young Ham of the Year commemorative plaque. With Michelle is Arnie Sposato, N2IQO, CQ Advertising Manager. (Photo by Don Wilbanks, KC5MFA)

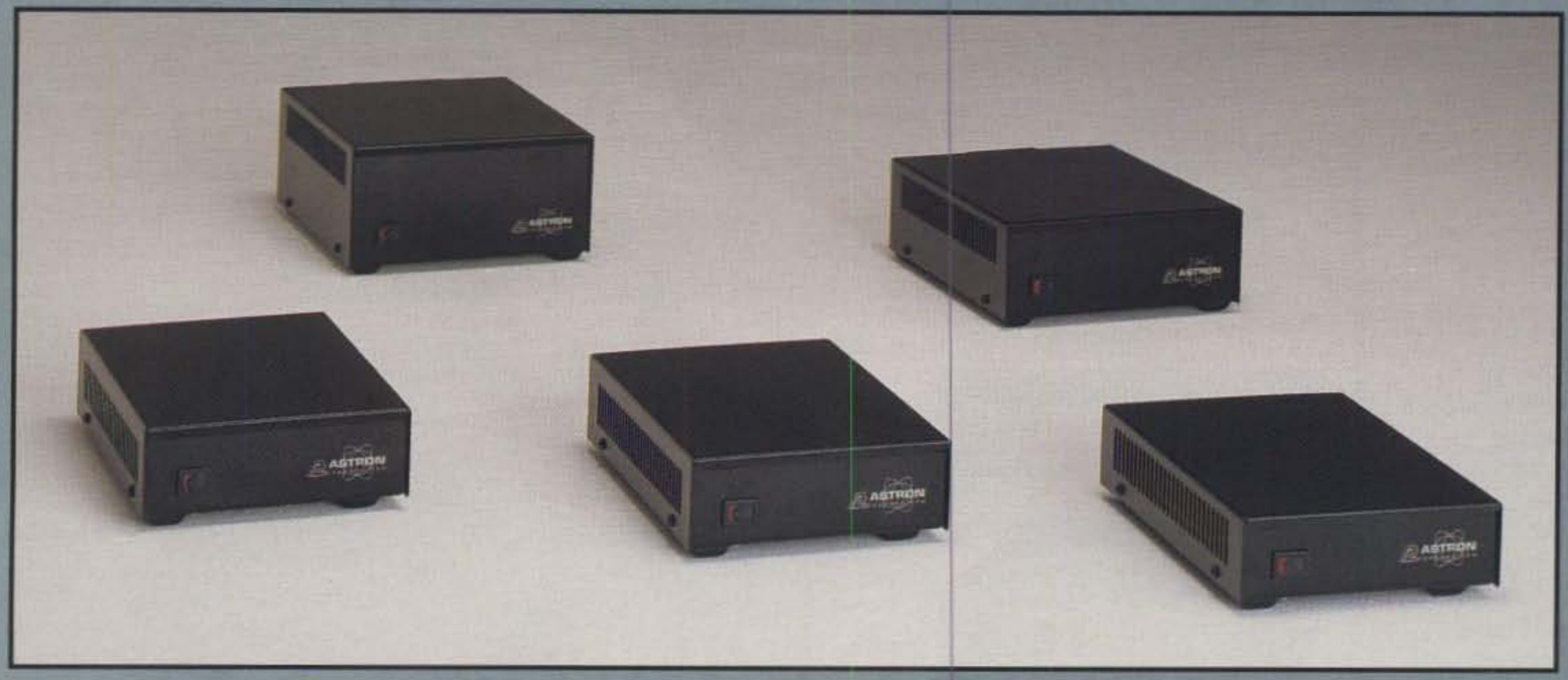
Michelle Swann, KE4EZI, of Warner Robins, Georgia, has been named the 1999 "Newsline Young Ham of the Year" (YHOTY). The award is jointly sponsored by Amateur Radio Newsline, Yaesu USA, and *CQ* magazine. Michelle is 17 and a member of a four-ham family. Her father, Mark, is KR4YH; her mother, Jean, is KE4GRO; and her younger sister, Tiffany, is KF4DGT.

According to a news release from Newsline, Michelle was selected as this year's YHOTY recipient based upon her six-year amateur radio career that has been dedicated almost exclusively to public service work, including support communications during the 1994 Georgia floods and last year's Atlanta tornadoes.

A recent graduate of Houston County (Georgia) High School, Michelle was accepted to some of the nation's top engineering schools, including the Georgia Institute of Technology, the Massachusetts Institute of Technology, the California Institute of Technology, and Stanford University. She chose Cal Tech and began classes in September. One of her possible long-term goals is to become an astronaut.

As "Young Ham of the Year," Michelle received, courtesy of Yaesu USA, an expense-paid trip to the 1999 Huntsville Hamfest, along with a gift of Yaesu ham radio equipment. *CQ* magazine treated her to an expense-paid week in Spacecamp Huntsville, as well as a variety of CQ products. Newsline provided Michelle with a commemorative plaque, whose cost this year was underwritten by Dave Bell, W6AQ, President of DBA Entertainment Inc., Hollywood, California. Congratulations, Michelle, from the whole CQ family.

.... POWER ON WITH ASTRON
SWITCHING POWER SUPPLIES ....



SPECIAL FEATURES:

- HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT, FOR ALL FREQUENCIES INCLUDING **HF**.
- HEAVY DUTY DESIGN
- LOW PROFILE, LIGHT WEIGHT PACKAGE.
- EMI FILTER
- MEETS FCC CLASS B

PROTECTION FEATURES:

- CURRENT LIMITING
- OVERVOLTAGE PROTECTION
- FUSE PROTECTION
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 90-132 VAC 50/60Hz
OR 180-264 VAC 50/60Hz
SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8 VDC

MODEL	CONT. AMP	ICS	SIZE (Inches)	WT.(LBS)
SS-10	7	10	2.3 x 6 x 9	3.2
SS-12	10	12	2.3 x 6 x 9	3.4
SS-18	15	18	2.3 x 6 x 9	3.6
SS-25	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30	25	30	3 3/4 x 7 x 9 5/8	5
SS-25M*	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30M*	25	30	3 3/4 x 7 x 9 5/8	5

- *with separate volt & amp meters
- All SS power supplies are available in a RACK MOUNT VERSION (3.5 x 19 x 9 3/8)
- To order Rack Mount Version change SS to SRM (example: SRM-10)

ASTRON CORPORATION

9 AUTRY, IRVINE, CALIFORNIA 92618
949-458-7277 FAX 949-458-0826
www.astroncorp.com

CIRCLE 163 ON READER SERVICE CARD

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA
510 Lawrence Exp. #102
94086
(408) 736-9496
(800) 854-6046
Ken, K1ZKM, Mgr.
So. from Hwy. 101

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Rich, KK7PL, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
Joe, KDØGA, Mgr.

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Phil, N4DRO, Mgr.
Doraville, 1 mi. no. of I-285

WOODBRIDGE, VA
(Near Washington D.C.)
14803 Build America Dr.
22191
(703) 643-1063
(800) 444-4799
Mike, N4MDK, Mgr.
Exit 161, I-95, So. to US 1

SALEM, NH
(Near Boston)
224 N. Broadway, 03079
(603) 898-3750
(800) 444-0047
Chuck, KM4NZ, Mgr.
sales@hamradio.com
Exit 1, I-93;
28 mi. No. of Boston

12 Store Buying Power!

HAM RADIO OUTLET

WORLDWIDE DISTRIBUTION

YAESU

Call For Low Autumn Pricing!

FT-840

- 100W • 12V DC • DDS
- Gen. Cov. Rx, 100 mem.
- Optional Ext. Auto • Tuners Available

Call Now For Our Low Pricing!

VX-5R

NEW!

50/2M/440HT

- Wideband RX, 6M-2M-440TX
- 5W output
- 220 mems, opt. barometer unit
- Alpha Numeric Display
- CTCSS/DCS built-in
- Li-Ion Battery

Call For Low Intro Price!

FT-847

Ultimate Base Station, HF, VHF, UHF

- 100w HF/6M, 50w 2M/430 mHz
- DSP • Full Duplex Cross-band
- 1200/9600 Baud Packet Ready

NEW!

Call for Low Price!

FT-90R

2M/440 Mini Dualbander Transceiver

- 50w 2m, 40w 440mHz
- Wide Rx • Detachable Front Panel
- Packet Ready 1200/9600 Baud
- Built-in CTCSS/DCS Encoder/Decoder
- Less than 4" wide!

NEW!

Call for Your Intro. Low Price!

FT-1000MP HF Transceiver

- Enhanced Digital Signal Processing
- Dual RX
- Collins SSB filter built-in
- 100W, Power supply built-in

Call Now For Low Pricing!

VX-1R

2M/440 Sub-Mini HT

- 290 Memory Channels
- .5W output
- Receives 76-999mHz plus AM BCB (Cell Band Blocked)
- Lithium Ion Battery

Call Now For Your Low Price!

FT-920 HF+6M Transceiver

- 100w 160-6M, 12VDC
- Built-in DVR, CW Memory Keyer
- DSP, Auto-Notch • 99 Memories
- Computer controllable, CAT System

Call For Low Pricing!

FT-100 HF/6M/2M/70CM Transceiver

- Compact Transceiver w/detachable front panel
- Rx 100kHz to 970mHz (cell blocked)
- Tx 100W 160-6M, 50w 2M, 20W 70CM
- Built-in DSP, Vox, CW keyer
- 300 Memories

NEW!

Call Now For Low Pricing!

FT-50RD

2M/440mHz Compact HT

- DVR, Decode, Paging Built-in
- Alpha numeric display
- Wide Band receive
- Battery Saver
- 112 Memories
- Mil-Spec
- HiSpeed scanning

Call For Your Low Pricing!

FT-8100R 2M/440 Mobile

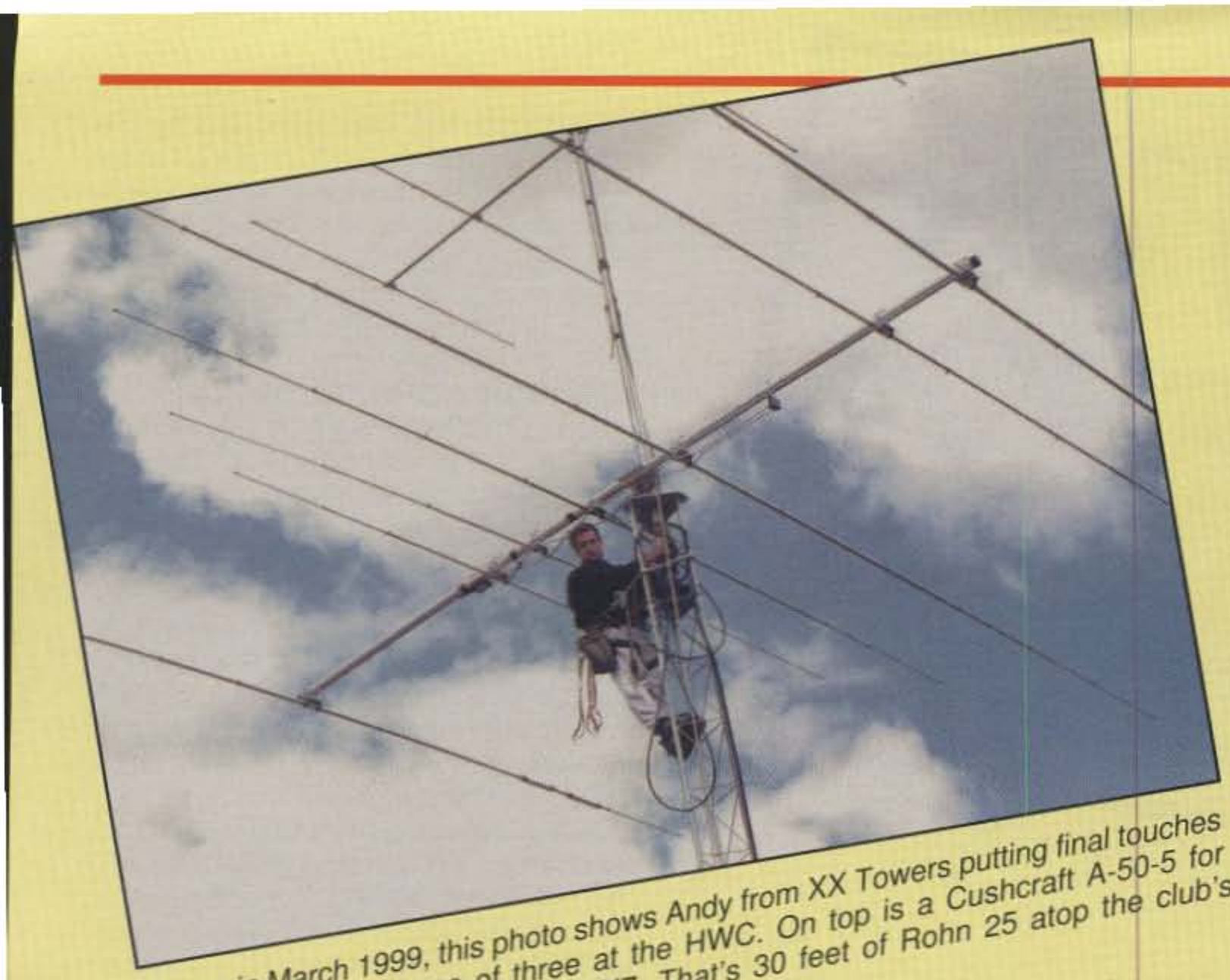
- Ultra Compact • 50w/35w 2m/440
- 110 memories • Wide Band RX
- Backlit mic • Remotable front panel w/opt. YSK-8100

Call Now For Special Pricing

AZ, CA, CO, GA, VA residents add sales tax. Prices, specifications, descriptions, subject to change without notice.

Look for the HRO Home Page on the World Wide Web
http://www.hamradio.com

COAST TO COAST FREE SHIPPING
UPS - Most Items Over $100
Rapid Deliveries From The Store Nearest To You!



Taken in March 1999, this photo shows Andy from XX Towers putting final touches on the new tower, one of three at the HWC. On top is a Cushcraft A-50-5 for 6 meters. Below is a Cushcraft X7. That's 30 feet of Rohn 25 atop the club's 50 ft. high building.

In the background is the big tower (60 ft. of Rohn 45 at 55 ft. above street level), which has a 10-element log periodic and above that a 2-element 40 meter beam. Lots of wire antennas are also attached to this support. On the left is Frank Wright, N3OQB, HWC President. On the right is Mike Manafo, K3UOC, the author, and HWC Trustee.

On October 2–3 the Harvard Wireless Club will be on the air signing W1AF to celebrate their 90th anniversary. Here is some of the history of America's oldest amateur radio club.

A Collegiate Radio Milestone

The Harvard Wireless Club 90th Anniversary Celebration

BY MIKE MANAFO,* K3UOC

"CQ CQ, this is W1AF at Harvard University, special event station, celebrating 90 years as America's oldest amateur radio club . . ."

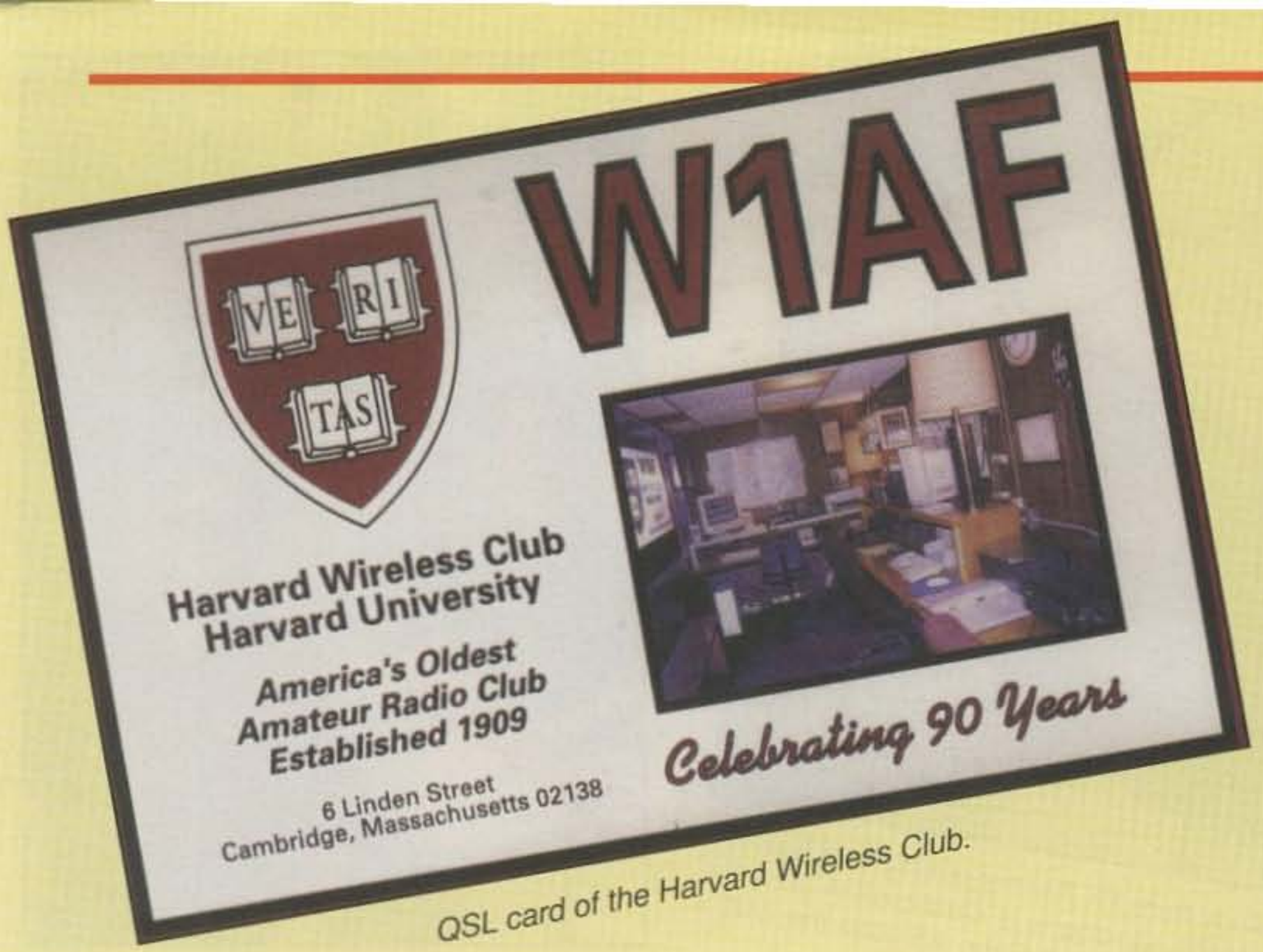
Tuning the bands on the weekend of October 2–3 this year, one will likely hear this transmission coming from Harvard Square in Cambridge, Massachusetts. America's oldest amateur radio club will be celebrating its 90th anniversary over these two days by working as many amateur radio operators as possible throughout the world. We invite all stations to work W1AF and join the celebration. Let the pileups begin!

**6 Linden St., Cambridge, MA 02138*
e-mail: <k3uoc@aol.com>

Founded in 1909

The first club record book in the Harvard University Archives tells us that The Radio Society of the Institute for Geographic Exploration at Harvard was formed in early 1909 by Professor George W. Pierce.[1] By 1910 this group was known as the Harvard Wireless Club (HWC). Pierce, who was Rumford Professor of Physics and Director of Crufts High Tension Laboratory, was an early experimenter with the new super-heterodyne receiving circuit. Experimenters still study and work with his Pierce oscillator circuit today.

The club averaged about 25 members in those early days. In March 1912 the HWC published *Amateur Wireless Stations within 20 miles of Boston*, listing over 300 stations in the area.[2] This callbook predates all Commerce Department list-



QSL card of the Harvard Wireless Club.

ings of amateurs as well as the ARRL's first callbook in 1915. At the time of this book's publication, HWC members were using the call "HDU" (Harvard University) from a station located in Jefferson Laboratory of the Physics Department. Within a few short years operators would be signing 1AF and 1XJ.

Between the Wars

The post-war period between 1921 and 1925 witnessed tremendous advances in radio, with 1AF at the forefront. After three or four moves around campus, HWC operators finally found their ideal QTH atop Harvard football stadium. The station boasted CW and phone capability, two receivers, and two 60 foot masts 150 feet apart to support the antenna. This premier setup was featured in the *Harvard Alumni Bulletin*, *The New York Times*, and in the July 1925 issue of *QST*. Unfortunately, this station was destroyed by a fire caused by an overheated wood-burning stove during the winter of 1929.

The 1930s and 1940s were hard times for the HWC as first the Great Depression set in followed by rising world tensions and the outbreak of World War II. Alumni from that era remember W1AF as in a period of decline and sometimes without a home. At other times, the Harvard Wireless Club went by the call W1JOO and operated from the Harvard Law School. The callsign W1AF was even lost, twice— once to Bill Coburn, who taught a course at Harvard in communications for geographical explorers, and several years later to a Medford, Massachusetts amateur named Frank Gow, who published two excellent construction articles in *QST* in 1936. Of course, all amateur communications ceased at Harvard and elsewhere during World War II.

36 Years at 52 Dunster Street

Following the war, the club eventually reformed in 1949–1950 under the leadership of club president Bill Hampton, ex-W9SWQ. During the 1950s a magnificent Collins station was assembled, antennas were erected, and membership increased rapidly. There are so many stories from this era that we consider this to be the golden age of the HWC. Dozens of operators built, experimented, and operated from the third floor of 52 Dunster Street. For several years W1AF operators ran mountaintop DXpeditions up in Vermont. The HWC President for 1954–55, Carter Pfaelzer, W1TCD (SK), was instrumental in garnering resources and support for the club.

As in the 1930s and 1940s, things slowed down again for W1AF in the 1960s. In reading back through the old station logs, one finds that reliable equipment was the major concern during this era. The old Collins gear was constantly on the workbench; finding new equipment and resources was a never-ending quest. In the mid-1960s one HWC president came back from summer vacation to find several important pieces of equipment had been stolen. HWC operators were most certainly disheartened by these turns of events, but eventually some newer Collins and National gear found its way to 52 Dunster Street via the estate of a deceased alumnus.

Interestingly, in 1960 the HWC welcomed renowned operator Katashi Nose, KH6IJ (SK) as a member. Nose had come to Harvard to pursue his Masters degree in education and often dropped by the shack to operate or just to chat with other members. In a 1989 letter to the HWC, Nose recalls that he was known less for his operating talents at W1AF than he was for his skills at preparing tantalizing Japanese barbecue during the 1961 HWC Field Day outing.

During the mid-1970s, HWC operators turned toward contesting as several new beam antennas went up at 52 Dunster Street. We suspect that Fred Hopengarten, K1VR, an MBA student at the time, had something to do with this particular agenda. The station log also tells us that a local operator named Ken Wolff, K1EA, began dropping by the club and working contests frequently from W1AF. In fact, we have several *handwritten* contest logs in our archives from a young Mr. Wolff! Now that's something unique!

During that same era another MBA student passed through Harvard and W1AF. This was noted IOTA DXpeditioner A.E. "Buzz" Jehle, N5UR. Buzz left his mark on the HWC by taking it upon himself to preserve all the club's valuable documents by making copies and then placing the originals in the University Archives. Without his foresight, much of our important heritage could easily have been lost.

Disaster and Rebirth

During the early 1980s, the HWC became involved in traffic handling, and many of the hot CW operators of the day kept regular schedules handling net and emergency traffic. However, as in 1929, disaster struck again at the HWC in 1986. After 36 years at 52 Dunster Street, Harvard preempted the station space and the HWC was again without a home. For several years after, a small, determined group of members kept the W1AF flame alive, operating from the dorm room of club president Lisa Rees Miller, N9LM.

Finally in 1989, the HWC relocated to 6 Linden Street, where we reside today. With hard work and generous assistance from the administration and alumni, HWC members turned an old storage room and a squash court into a handsome station/clubroom complex. In October 1989 the new station was rededicated and a special event operation commemorating the 80th anniversary of the club was held.

Over the next several years HWC membership grew to an all-time high of 35, including undergraduate and graduate students, faculty, staff members, and Harvard alumni. Then in 1990, W1AF carried out a reciprocal exchange with a club in the Soviet Union and the US1A operation was launched. This was followed in 1991 by a DXpedition to St. Maarten (PJ1A) and a mountaintopping Field Day excursion up to Vermont (W1AF/1) in the spirit of those adventurous HWC operators of the '50s.

This is a picture of Carter P. Pfaelzer, W1TCD, who was President of the HWC, 1954–1955. Carter was largely responsible for the growth and development of the HWC in the post-war era. Then during the 1980s and 1990s his generous contributions led to the purchase of much new equipment and support for the US1A exchange in 1990. Carter passed away in October 1998.

We actually date this photo at about 1954 or 1955. HWC was located at 52 Dunster Street up on the third floor. That was the W1AF QTH from 1950–1986, the longest W1AF had been at any of its dozen or so QTHs on campus since 1909. The Collins gear seen here was donated by an alumnus and served W1AF for nearly 20 years.

Over the past decade, HWC members have added several new operating positions; erected new HF, VHF, and satellite antennas; worked numerous contests, held licensing sessions; and carried out a whole host of activities that amateur radio clubs do. During 1998–1999 we have again completely renovated the station, clubroom, and antenna system. We are pleased that the HWC is in excellent condition today and that our membership is once again on the rise. The HWC is continually on the lookout for new members (licensed or not) from within the Harvard University community.

This is a recent photo that appeared in the March 1999 issue of the Harvard Gazette. Pictured are Frank Wright, N3OQB, HWC President (background) and Nick Guydosh, N2MSE, HWC Vice President. The ops are fine-tuning a Heath Mohawk receiver (next to the Apache transmitter, both vintage 1955). Sitting atop the gear are "Ernestine and Rebecca," the transmitting tubes of the HWC in the 1930s. This photo represents three different eras in the life of the HWC.

Visiting W1AF today, you will find four operating positions, including two state-of-the-art HF installations, a fully operational Heath vintage station, and a VHF position with satellite capabilities. Up on the roof of 6 Linden we have two HF towers sporting antennas for all bands except 160 and a VHF azimuth installation for satellite work. For an in-depth look at the HWC, take the Virtual Tour on our web site at: <http://www.hcs.harvard.edu/~w1af/>.

Tomorrow's Challenges

As with many collegiate clubs across America, we see our largest challenge as recruiting new student members. We will always have our alumni, faculty, graduate students, and staff members, but the life blood of the HWC has always been the undergraduates, and we are working hard to keep our students at the core of club activities. We believe that colleges can be fertile territory for attracting new members to the amateur ranks. In that sense, collegiate clubs have the same mission as the many elementary and secondary school radio clubs across the country.

At the same time, we realize that collegiate clubs must change with the times. We need to stay abreast of new communications technologies without extending

TRUE MIL-SPEC TOUGHNESS

THE HERITAGE CONTINUES

US MILITARY APPROVED MIL-STD 810

FT-2600M

HEAVY-DUTY VHF FM TRANSCEIVER

The FT-2600M is a deluxe, compact FM mobile transceiver providing high power output and outstanding receiver performance for the 144 MHz band. Included in the FT-2600M's feature complement are:

Features

- 60 Watts of power output, with selection of four power levels for every operating situation.
- Expanded receiver coverage: 134-174 MHz.
- Keyboard entry of operating frequencies from the microphone.
- Excellent protection from receiver intermodulation distortion, thanks to Yaesu's renowned Advanced Track Tuning front end.
- Outstanding packet radio capability at 1200 or 9600 bps with easy interface via a dedicated rear-panel jack.
- 175 memories which can store repeater shifts, odd repeater shifts, CTCSS/DCS tones, and 8-character Alpha-Numeric labels.
- Built-in CTCSS and DCS Encoder/Decoder circuits.
- The Smart Search™ feature automatically sweeps a band and loads active frequencies into a dedicated memory bank.
- The Yaesu-exclusive Omni-Glow™ multi-function LCD display.
- Yaesu's exclusive ARTS™ (Auto-Range Transponder System), which alerts the operator when an "out-of-range" condition exists with another ARTS™- equipped station. This feature is especially valuable during search-and-rescue operations with hand-held units.
- Extensive MENU system, which allows customization of a number of transceiver performance characteristics.
- Additional features include a transmit Time-Out-Timer (TOT), Automatic Power-Off (APO), Automatic Repeater Shift (ARS), plus provision for reduction of the TX deviation in areas of high channel congestion. And an all-new S-Meter Squelch circuit allows the owner to set the squelch to open at a programmable setting of the S-Meter, thus reducing guesswork in setting the squelch threshold.

YAESU
Choice of the World's top DX'ers

For the latest news, hottest products:
Visit us on the Internet! http://www.yaesu.com

HF ENTHUSIASM

Yaesu, Choice of the World's top DX'ers

MICRO MOBILE FT-100

Over 40 years of experience in HF transceiver design has firmly established Yaesu as the choice of the world's top DX'ers. The knowledge that produced unequaled RF technology and design that is found in the State of the Art FT-1000MP can also be found in the miniature FT-100. The FT-100 while small in size 6.3" × 2.1" × 8.1"(160 W × 54 H × 205 D mm :w/o knob) is large in features and performance. This is accomplished by using the most advanced manufacturing techniques and component mounting technology. High Dynamic range RF front-end technology and Advanced Digital technology such as DSP sets a new standard of receiver performance for miniature HF transceivers. The single piece die cast frame, dual cooling fan system and revolutionary RF high power design technique keeps the FT-100 running cool and smooth in the most adverse operating environments. (TX Power output=100W HF, 50W VHF/20W UHF) The TX Equalizer offers crisp, clear and clean TX audio reproduction that until now was only found in top of the line HF base stations. The optional ATAS-100 (active tuning antenna system) ushers in a new age of mobile and field day operation (from HF to UHF frequencies). Add the optional ATBK-100 base kit (Good for limited space, simple setup.) and you've got a base station that ranks among the best in the world.

Features

- Frequency coverage:
  RX : 100 kHz-961 MHz (cellular blocked)
  TX : 160-6 m/144-148 MHz/430-450 MHz
- Power output : 100 W (160-6 m), 50 W (144 MHz), 20 W (430 MHz)
- DSP Bandpass Filter, Notch Filter, Noise Reduction, and Equalizer
- IF Noise Blanker
- SSB, CW, AM, FM, AFSK, Packet (1200/9600 bps) operation
- Detachable Front Panel
- Two Antenna Jacks (HF/50 and 144/430)
- IF Shift
- VOX
- Dual VFOs
- Available IF bandwidths of 6 kHz, 2.4 kHz, 500 Hz, and 300 Hz (6 kHz, 500 Hz, 300 Hz filters optional)
- Built-in Electronic Memory Keyer
- Speech Processor
- Built-in CTCSS and DCS for FM operation
- Automatic Repeater Shift and Auto-Range Transponder System
- Smart Search™ Automatic Memory Channel Loading System
- 300 memory Channels
- Quick Memory Bank (QMB)

- Bright LCD with multi-function display
- Optional FC-20 External Antenna Tuner
- Compatible with ATAS-100 Active-Tuning Antenna System. Add the optional ATBK-100 base kit

MICRO MOBILE SERIES

FT-100

Ultra-Compact HF/VHF/UHF Transceiver

YAESU
Choice of the World's top DX'ers

For the latest news, hottest products:
Visit us on the Internet! http://www.yaesu.com

"Ham" Originates at Harvard?

Perhaps you've heard the story about the term "ham" having originated at Harvard. This story has been published and told by word-of-mouth countless times over the past decades. Here's how it goes:

Have you ever wondered why we radio amateurs are called hams? Well, the word *ham* originated in 1908 and was the call letters of one of the first amateur wireless stations operated by some members of the Harvard Wireless Club. They were Albert Hyman, Bob Almy, and Peggie Murray. At first they called their station Hyman-Almy-Murray. Tapping out such a long name in code soon called for a revision, and they changed it to Hy-A1-Mu, using the first two letters of each name. However, early in 1909 some confusion resulted between signals from HYALMU and a Mexican ship named Myalmo, so the operators decided to use only the first letter of each name and from that point on identified their station as HAM.

In the early pioneer and unregulated days of radio, amateur operators picked their own frequencies and call letters. Then, as now, some amateurs had better signals than some commercial stations. The resulting interference finally came to the attention of Congressional Committees in Washington, and they gave much thought to proposed legislation designed to critically limit amateur activity.

In 1911 Albert Hyman chose the controversial Wireless Regulations Bill as the topic of his Senior Thesis at Harvard. His instructor insisted that a copy be sent to Senator David Walsh, a member of the committee hearing the Bill. The Senator was so impressed that he sent for Mr. Hyman to appear before the Committee. Hyman was put on the stand and described how the little amateur station, HAM, was built. Then, in an emotional statement, he told the crowded committee room that if the bill went through, the three operators would have to close down HAM because they could not afford the license fees and other requirements which were called for in the bill.

The debate started and the little station, HAM, became a symbol of all the little amateur stations in the country that were crying out to be saved from the menace and greed of the big commercial stations who didn't want them around. Finally, the Wireless Regulations Bill got to the floor of Congress and every speaker talked about the poor little station, HAM. Because of Hyman's stirring testimony, Congress voted to save amateur radio and limit the power and influence of commercial radio. Thereafter, nationwide publicity identified the station HAM with amateur wireless operators. From that time to this, and probably to the end of time, in radio every amateur is a ham. And, that's how it all got started.

Great story isn't it? Thanks to Harvard's Albert Hyman for saving amateur radio and providing us with the "ham" label as well! Unfortunately, "it just ain't so." HWC members have thoroughly researched this story over the years. Albert Salisbury Hyman actually did graduate from Harvard College in 1915 and then went on to earn his M.D. degree from Harvard in 1918. He was a prominent cardiologist in New York City and is credited with introducing the first heart pacemaker in 1932. However, Hyman is not listed on the early membership rosters of the HWC. Furthermore, there is no mention in the Harvard Archives of Dr. Hyman ever being involved in amateur radio or ever testifying before Congress. Additionally, neither Almy nor Murray appears in any alumni records of the time. We have to admit, though, it's a very entertaining story. And where it came from, we haven't a clue . . . .

ourselves into unsupportable projects. We need to offer activities and programs that rival the allure of the Internet without abandoning amateur radio. We need to sell ourselves to prospective members and then keep them interested once they are involved and licensed. We need to promote our presence on campus and in the amateur radio press. Did you know that there are more than 200 active collegiate clubs and stations in the United States and that new clubs pop up every year? There are many challenges and opportunities facing both the HWC and all collegiate radio in the future. And in celebration of what the future holds in store for all of us, let's have some fun!

Footnotes

1. Much of the early club history is taken from *The Harvard Wireless Club: 80 Years History of W1AF* by Dr. Gene Simon, W2KOY (SK).

2. This early callbook and many other club primary source documents are available on the HWC website at: <http://www.hcs.harvard.edu/ ~w1af/>.

About the Author

Mike Manafo, K3UOC, holds an Extra Class license and has served as Trustee of W1AF, the Harvard Wireless Club, since 1988. Over the past 20 years, he has operated under a number of DX calls, including 7Z5OO, 7Z1AB, PJ5AA, PJ8H, 4M5V, YXØAI, US1A, 4M4A, P46S, and a host of portable K3UOC operations mostly from Venezuela and the Dutch Caribbean. He holds a doctorate in educational administration from Harvard and is the proud father of Molly, born July 16, 1999. Visit his web site at <http://members.aol.com/k3uoc/index.htm>. ■

A Special Event

The Harvard Wireless Club celebrates the 90th anniversary of its founding by Professor George W. Pierce in early 1909.

On Saturday and Sunday, October 2 and 3, 1999, between 1200Z–0000Z both days, listen for W1AF on the following frequencies: HF SSB 3.890, 7.270, 14.270, 21.370, and 28.390; HF CW 35 kHz up from the lower band edges; VHF SSB 50.150, 14.200, 432.150.

A special 90th anniversary QSL will be sent to all those requesting a confirmation. In addition, each request enclosing an SASE will receive complimentary souvenir QSL cards from past W1AF DXpeditions, including US1A, PJ1A, and PJ8H.

Our mailing address is: Harvard Wireless Club (W1AF), Harvard University, 6 Linden Street, Cambridge, MA 02138.

For further information, contact club officials at <w1af@harvard.edu>.

Results of the 1998 CQ WW CW Contest

BY BOB COX*, K3EST

Contesters were hoping that conditions would improve. At least they were hoping that CW would be better than the variable phone weekend had been a month earlier. As the CW weekend approached, thousands of contesters from all over the world were putting the final touches on all their preparations to do well in the contest. What happened during the CW weekend was unexpected and wonderful. For most of the world, conditions were fantastic on *all* bands. The 1998 CQ WW CW will be remembered for some of the best conditions across the spectrum many of us have seen in a long time. This is best summed up by "a contest to remember for all time"—*W9RE (N9RV)*.

After all the logs were counted, there were a total of 3345 CW logs, which is only a little down from the SSB total. It seems that CW can generate a lot of fun for many people. So how did it all turn out? Keep reading to find out.

Jan, 4X1VF.

High Power

The battle for the top spot this year was as competitive as ever. Who are the best operators in the world? Each year the box of top ten finishers in the WW gives an answer to that age old question.These operators travel to places around the globe where the propagation might be a little bit better than at your QTH. But once they get there, they have to do everything right, because the pressure of the competition is tremendous.

Jose, CT1BOH (P4ØE), handled the pressure pretty well. He jumped on a jet and made his way to the QTH of Jacky, P43P, which is located on the north shore of Aruba. This is a wonderful station in an ideal location. P4ØE's big low band numbers helped him not only grab the top spot in the world AB, but led to a new all-time record as well. Fighting off the sea's corrosion on the towers and antennas long enough to finish in second place was Ville, OH2MM, who has won the CQ WW more times than one can remember. It was only a little over a year ago when nothing existed at the HC8N QTH except shrubbery. Now Trey, N5KO, has keyed this well-crafted new station to third world high, and the view isn't bad either. Kudos are also due to top ten finishers K4BAI (John set a new North American record.) and DL6FBL—operators of 8P9Z and CN8WW, respectively—for their extremely accurate logs.

The outstanding conditions allowed almost every corner of the European continent a shot at the SOAB standings. GIØKOW and S58A slugged it out for 48 hours, and when it was all done, it was Andy, GIØNWG at KOW who prevailed. The British Isles stations used their low band advantage to capture four of the top ten spots, but super efforts on the higher bands helped the central and southern EU boys to the glory as well.

What was happening in the USA? A lot! Three stations finished with over 7 million points. The competition was the best it has been in years. Top USA honors went to Greg, W1KM. He edged out Bill, W4AN, who in turn just edged out Jeff, K1ZM. Special mention must go to W9RE operated by Pat, N9RV. What a terrific score from Indiana.

Low Power

You can sure work a lot of stations running a hundred watts. Just look at the score of AA3B, who keyed V26K to victory. Bud set an all-time low power record with his fine accuracy and skills. In 1997 it was VP2EEB, and now V26K. What will Bud try this year?

In the low power USA category the old record was totally demolished by Jeff, N5TJ, with over 3.1 megapoints. Is there anything this guy can't win? We took some time to ask Jeff why he has ventured into the low power category; his answers are very interesting: "I am a two-radio man, and if I operate QRO too much interstation QRM to use 2 radios. One radio = no fun. QRO and neighbors don't go together for 48 hours when living on a one-third acre lot. I can't be competitive QRO from home."

We also asked about antennas: "A single crankup w/160 shunt fed, 80 meter sloper, Force 12 402/204 interlaced, homebrew (NW3Z design) 515/510 interlace, A3 on sidemount at 30 feet." While that's not a trapped dipole in the attic, it sure isn't stacked monobanders either. Incredible job, Jeff! Second place went to W2TZ with 2.6 meg, and third slot went to N8AA with 2.4 meg.

In Europe after the dust settled Franc, S59AA, operating from his home in the suburbs of Ljubjana, pushed his station to claim top honors. At the other end of zone 15, second-place Europe went to Gediminas, LY3BA. Third place was won by HA1CW. But the real story in Europe was that all ten top scorers finished within 500K of each other. That's intense!

QRP

QRP is an interesting category. One entrant runs 100 mW while the next runs 5 W. No other category has such power differences. That's what makes QRP fun. It's a personal challenge.

The QRP scores are once again crossing the mega-point level. Congratulations to HA2SX for winning it worldwide with just over 1 meg. Second-place world and first-place USA went to N6MU from . . . *California!* John has done the seemingly impossible; he won *both modes* QRP USA from the West Coast. Wow! And his score of 857k is nothing to be embarrassed about either. Third-place world and second-place Europe went to LY2FE with just under 800k points. These are very impressive scores for stations running just 5 watts. Second- and

*1816 Poplar Lane, Davis, CA 95616
e-mail: <k3est@cqww.com>

TEAM CONTESTING

1. The Team: 55,395,494. P4ØE (CT1BOH), EA8EA (OH2MM), CN8WW (DL6FBL), C4A (9A3A), WP3R (DL2CC).

2. Handkey Team #2: 27,107,560. K6LA, N2NT, W1KM, WC4E, W9RE (N9RV).

3. Handkey Team #3: 23,826,619. V26K (AA3B), W4AN, K1TO, N4ZR.

4. Handkey Team #1: 21,760,658. DKØMM (DJ7IK), VP5GN (K5GN), AA4S, W6AX (N6IG), N4AF.

5. Contest Club Finland #1: 21,620,846. OH5LF (OH1WZ), OH1MM, PZ5JR (OHØXX), OH6RX, XX9X (OH2PM).

6. Handkey Team #4: 14,026,178. N5TJ, NA2U, K3MD, WT1O, W1WEF.

7. Team Nippon: 13,160,991. FG5BG (JF2DQJ), V8A (JO1RUR), 9M2TO (JAØDMV), 9M8YY (JR3WXA), 9M6NA (JE1JKL).

8. Moscow Contest Team: 10,534,747. RZ3BW, RZ3AZ, RA3CW, RX3APM, RO3A.

9. The Dream Team: 6,874,159. LY2KM, LY2MM, LY2OX, LY5W (LY1DR), LY6M (LY1DS).

10. Team Chihuahua Uno: 4,818,784. W4PA, WO4O, N4IR, NN4T, N4KN.

11. ZA-TE Plus Team: 4,275,169. 9A9A, 9A5W, 9A6A, 9A3GW, 9A2EU.

12. Russian Woodpeckers: 3,931,262. UA1OMS, UA1OZ, RA1OJ, UA1OMX, RW1ON.

13. Contest Club Finland #4: 3,671,941. OH3WW, OH8BQT, OH8LAE, OH2LU.

14. **Contest Club Finland #3: 3,043,554. OHØJJS (OH6LI), EA8/OH2BCI, OHØZ (OH2MAM), OH1F (OH1NOA), OH1F (OH1MDR).

15. Contest Club Finland #2: 2,717,112. OH4JFN, OH5BM, VR2/OH6YF, OH9DX.

16. Contest Club Finland #5: 1,746,629. OH2BSQ, OHØJJS (OH4JLV), OH6KN, OH1ZAA.

***Single Band Team.*

third-place USA went to N1TM and K1RC, respectively.

Assisted

It took a while, but the winner of the assisted category *beat* the all band high power category and by quite a bit. All those years of learning what to do, when to look at the packet screen, when to avoid screen chasing, paid off big time for Charlie, K3WW. Not only did he win, he set a new USA record. Second place went to Yankee Clipper power house KI1G, and Noah, K2NG, took third. The top European scorer was Igor, RZ3BW. This was the first time that the assisted category was won so far east in Europe. Second place went to Bernd, DF3CB, operating from Munich next to a recording studio.Quite a FB effort, Ben! Special mention must be made of the far Pacific effort of KH2/N2NL. Stationed on Guam, he made good use of his location.

Multi-Single

The multi-single category is one of the most competitive. There were over 275 entrants who spent long hours building their stations and training their operators. The 1998 contest final MS results produced some of the most interesting final scores in this category in many years. The world winner was K1AR. Yes, a USA MS took the world top slot. Not only did the three-man crew do that, they set a new North American record. It has been a *long* time since a USA station finished #1. The #2 world and #1 Europe station was TM2Y operating from F6BEE's station in the French countryside. Their log was very accurate. Third-place world was Sig, N3RS, and his crew in eastern Pennsylvania. Second-place Europe and #4 world was EA6IB operating from the lovely isla Ibizia. Congratulations to all the winners, who showed us what is possible when conditions really are good.

Multi-Multi

The multi-multi stations are the beacons of contesting. They provide benchmarks for all of us. A sure sign of improving conditions was that 12 stations broke 20 million, compared to only the top three last year. In a reversal of fortunes, the 6Y2A team defeated the Voodoo group at 5V7A. The 6Y2A crew planned for months what their strategy would be. They used verticals, almost exclusively, set up on the beach of the north coast of Jamaica. Their hard work sure paid off with a new world multi-multi CW record, accomplished from a two-point area! Second place went to the "Voodudes" who did a marvelous job after scrambling to relocate when their hotel was not available.

Three North American stations finished in the top six box, with TI1C operating at TI2CF's QTH coming in third and J6DX at number six. The crew at EA9EA finished second in Africa and number four overall. A61AJ at number five was the highest scoring multi-multi from Asia setting a new Asian record. For the USA championship, Matt and his team at KC1XX finished first again this year, just ahead of W3LPL and K3LR. Europe was lead by DFØHQ, the famous quad station located in eastern Germany. They just edged out the OH2U team formerly known as OH2HE.

In Japan at the mountain QTH of JA5BJC, they cranked up their towers, set up the station, and keyed their way to a new all-time Japanese multi-multi record. Congratulations.

Team Contesting

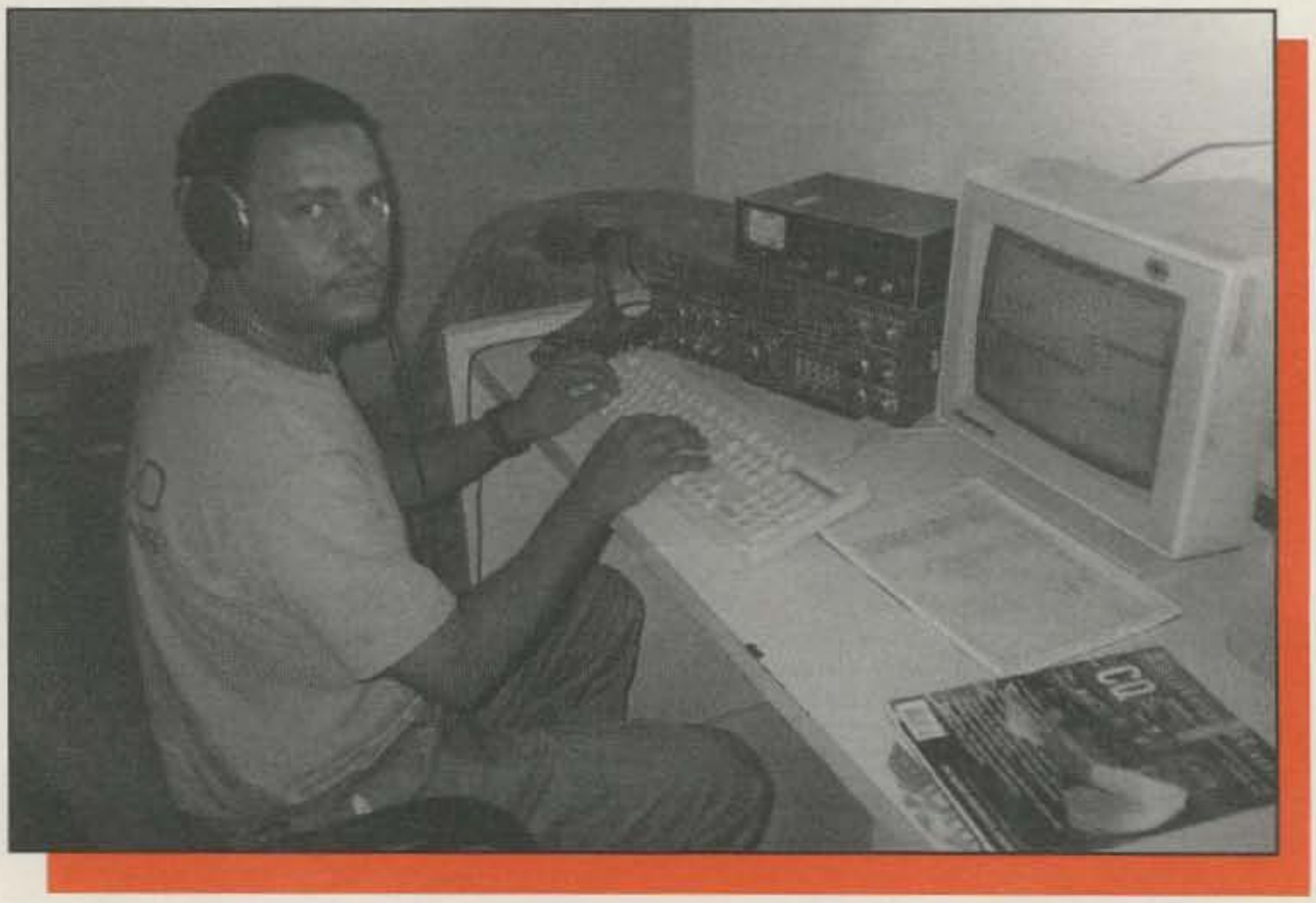
Get five contesters together from anywhere in the world and you have a team entry in the CQ WW. That's just about what "The Team" did with representatives from four continents. Doubling the total score of the second-place team, "The Team," had four finishers in the top ten world box. In terms of real competition, the battle for second through fourth place among Handkey teams was intense. Team Handkey #2 took second place with a group from five USA call areas.

Joining a team does not in any way prevent you from submitting your score for your local club. Team contesting allows for some interesting global alliances and more fun for everyone.

Clubs

A lot of club spirit plus getting everyone on the air, coupled with DXpeditions, is the formula for a winning club effort. The number one club this year was the Yankee Clipper Contest Club. Through a well-orchestrated campaign of phone calls and just plain hard work, this NE USA giant set the all-time club record of 460 million points! Not far behind was perennial club winner, the Frankford Radio Club. The YCCC, FRC, and third-place Potomac Valley Radio Club launched many DXpeditions. Last year we predicted that it might not be long before the top three clubs would top a billion points. Well, this year 1.06 billion points were accumulated by the top three alone!

Setting a new DX club record with over 164 million points generated by a determined club effort was the Bavarian Contest Club. When you look at the results, you will find many DXpeditions mounted by the BCC, second-place finisher Contest Club Finland, and frequent winner, the Rhein-Ruhr DX Association. The



Julio, HI3K.

AMERITRON *True Legal Limit™* Tuner

Easily handles 1500 Watts continuous carrier even on 160 Meters . . . High-current edge-wound silver plated Roller Inductor . . . Two 500 pf high capacitance tuning capacitors with 6:1 vernier reduction drives . . . 3 core choke balun . . . Six position antenna switch . . . True peak reading Cross-Needle SWR/Wattmeter . . .

Call your dealer for your best price!

AMERITRON ATR-30

$599

Suggested Retail

- *Handles 1500 Watts carrier*
- ***Super High Current edge-wound silver plated Roller Inductor***
- ***500 pf tuning capacitors with 6:1 vernier reduction drives***
- ***3 core choke balun***
- ***6 position antenna switch***
- ***True peak reading meter***

AMERITRON's ATR-30 *True Legal Limit*™ roller inductor antenna tuner is ham radio's toughest! It'll handle 1500 Watts *continuous carrier output* on *all* modes and *all* HF bands into most antennas -- even on 160 Meters where most antenna tuners fail.

It's perfect for Ameritron's most powerful amplifiers where the ATR-30 just loafs.

All band coverage lets you operate 1.8-30 MHz including all MARS and WARC bands.

Super High Current Roller Inductor

You'll see Ameritron's new *super high current* air core roller inductor. It's *edge wound* from a thick solid copper strip and silver plated. This produces a large surface area and a massive conductor. It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn ordinary roller inductors.

A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

6:1 vernier reduction drives makes capacitor tuning smooth and easy.

Super Balun, 6 position Antenna Switch

Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

Read *true* Peak Power

Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

Roomy Cabinet maintains High-Q

Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

AMERITRON ATR-15 Antenna Tuner

ATR-15, $399. Handles 1500 Watts RF output. Slightly less on 160 Meters. Bandswitched T-Network, peak reading SWR/ Wattmeter, covers 1.8-30 MHz, 6 pos. antenna switch, balun. 13½ W x5½x13¼ in. Perfect for AL-80B/AL572.

Ameritron has the best selection of *TrueLegalLimit*™ HF Amplifiers

AMERITRON's legal limit amplifiers use Peter Dahl super heavy duty Hypersil power transformer capable of 2500 Watts!

Ameritron's *most powerful* Amp

with Eimac® 8877 ceramic tube

AL-1500

$2845

Suggested Retail

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 pounds, 18½Dx17Wx10H in.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube

AL-1200

$2295

Suggested Retail

TrueLegalLimit™

Get ham radio's *toughest* tube with AL-1200. The Eimac® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 18½Dx17Wx10H in.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500ZG tubes

AL-82

$2295

Suggested Retail

TrueLegalLimit™

Most linears using 3-500s can't give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500 amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 18½Dx17Wx10H inches.

1.5 *plus* kW SSB HF Amp

with 2 Eimac® 3CX800A7 tubes

AL-800H, $2395 suggested retail. Two Eimac® 3CX800A7 tubes produces 1500 *plus* Watts SSB PEP with 55 Watts drive. 52 lbs., 8½Hx16½Dx14¼W in. **AL-800, $1695** suggested retail, single 3CX800A7, 1250 Watts out with 70 Watts drive.

NearLegalLimit™ Amp

with four Svetlana® 572B tubes

AL-572, $1395 suggested retail. New class of *Near Legal Limit*™ amplifier gives you 1300 Watts SSB PEP power output (70 Watts drive) for 65% of price of full legal limit amps! Instant 3-second warm-up. 40 lbs. 8½Hx15½Dx14½W inches.

1 kW Desktop HF Amp

with Amperex® 3-500ZG tube

AL-80B, $1299 suggested retail. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk- top linear. 8½x14x 15½ in. Plugs into 120 VAC outlet. Graphite plate *Amperex®* 3-500ZG tube. Nearly 70% efficiency. Weighs 48 lbs.

Precision SWR/Wattmeter

AWM-30, $149 suggested retail. Active circuit gives *true* peak/average readings on lighted Cross-Needle meter. 3000/300 Watt ranges. Remote sensor.

Call your dealer for your best price!

Free Catalog: 800-713-3550

AMERITRON®

. . . the world's high power leader!

116 Willow Road, Starkville, MS 39759
TECH (601) 323-8211 • **FAX** (601) 323-6551
8 a.m. - 4:30 p.m. CST Monday - Friday
For power amplifier components call (601) 323-8211
http://www.ameritron.com

CIRCLE 152 ON READER SERVICE CARD

TROPHY WINNERS AND DONORS CW

SINGLE OPERATOR, ALL BAND
World
P4ØE (Opr. Jose Carlos Cardoso Nunes, CT1BOH)
Donor: Albert Kahn, K4FW
W9IOP Memorial

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

World QRPp
Peter Kalocsa, HA2SX
Donor: Gene Walsh, N2AA

World Single Operator Assisted
Charles Fulp, Jr., K3WW
Donor: Snake River Contest Club

U.S.A
Gregory Cronin, W1KM
Donor: Frankford Radio Club

U.S.A. Low Power
Jeffrey Steinman, N5TJ
Donor: North Coast Contesters

U.S.A. - Zone 3
W6AX (Opr. James Pratt, N6IG)
Donor: Bill Fisher, W4AN

U.S.A.- Zone 4
W9RE (Opr. Patrick Barkey, N9RV)
Donor: Bill Fisher, W4AN

Canada
Phil Goetz, N6ZZ/VE2
Donor: CQ Magazine

Caribbean/C.A.
8P9Z (Opr. John Laney III, K4BAI)
Donor: Chuck Shinn, W7MAP

Europe
GIØKOW (Opr. Andrew Williamson, GIØNWG)
Donor: Edward Bissell, W3AU

Europe - Low Power
Franc Bogataj, S59AA
Donor: Scott Jones, N3RA, & Tim Duffy, K3LR

Africa
EA8EA (Opr. Ville Hiilesmaa, OH2MM)
Donor: Gordon Marshall, W6RR

Asia
C4A (Opr. Ivo Pezer, 5B4ADA)
Donor: Chuck Shinn, W7MAP

Japan
Satoshi Hara, JH5FXP
Donor: Japan Crazy Contesters Club

Oceania
9M6NA (Opr. Saty Nakamura, JE1JKL)
Donor: Peahi Contest Club

South America
HC8N (Opr. Trey Garlough, N5KO)
Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND
World - 28 MHz
ZW5B (Opr. Randall Thompson, K5ZD)
Donor: Joel Chalmers, KG6DX

World - 21 MHz
5X1Z (Opr. Mats Persson, SM7PKK)
Donor: Don Busick, K5AAD (N5JJ Memorial)

World - 14 MHz
Jaromir Klimosz, 5NØ/OK1AUT
Donor: W2JT Memorial (North Jersey DX Assn)

World - 7 MHz
V8A (Opr. Hajime Kato, JO1RUR)
Donor: Alex M. Kasevich, VP2MM/4

World - 3.5 MHz
Martin Huml, IH9/OL5Y
Donor: Fred Capossela, K6SSS

World - 1.8 MHz
VA1A (Opr. Yuri Blanarovich, K3BU)
Donor: Kenneth Byers, Jr., K4TEA

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

USA - 21 MHz
David Donnelly, K2SS/1
Donor: Wayne Carroll, W4MPY

USA - 14 MHz
Walter Kornienko, K2WK
Donor: Northern Illinois DX Association

USA - 7 MHz
David Blaschke, W5UN
Donor: W6AM Memorial (Jan Perkins, N6AW)

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

USA - 1.8 MHz
Wallace Eckles, W8LRL
Donor: Dave Patton, NT1N, & Mark Obermann, AG9A

Canada (28 MHz)
Lajos Laki, VA3RU
Donor: Radio Amateurs of Canada

Carib./C.A. (28 MHz)
WP2Z (Opr. David Harper, WD5N)
Donor: Snake River Contest Club

Europe - 28 MHz
9HØA (Opr. G. Morris, 9H1EL)
Donor: John Pryor, K4OGG

Europe - 21 MHz
IR4T (Opr. Stafano Brioschi, IK2QEI)
Donor: Robert Naumann, N5NJ

Europe - 14 MHz
OHØZ (Opr. Jukka Kulha, OH2MAM)
Donor: G3FXB Memorial (Maud Slater)

Europe - 7 MHz
Zdravko Balen, 9A9A
Donor: Ivo Pezer, T93A/5B4ADA

Europe - 3.5 MHz
Tine Brajnik, S50A
Donor: K3VW Memorial (Frankford Radio Club)

Europe - 1.8 MHz
IR4T (Opr. Gabriele Macchi, IK4UPB)
Donor: Pat Barkey, N9RV, & Terry Zivney, N4TZ

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

Japan - 14 MHz
Syuichi Sato, JA7FTR
Donor: Mitsuhiro Nishimura, JA7WME

MULTI-OPERATOR, SINGLE TRANSMITTER
World
K1AR (Oprs. K1AR, K1EA, W2RQ)
Donor: Anthony Susen, W3AOH

U.S.A.
N3RS (Oprs. N2SR, N3ED, N3RD, N3RS)
Donor: Douglas Zwiebel, KR2Q

Canada
VE6SV (Oprs. VE6EX, VE6EKP, VE6EZ, VE6AKY, VE6NTF, VE6NAP)
Donor: Eastern Canadian DX Assn.

Africa
D44BC (Oprs. D44BC, DL2OBF, DK7YY)
Donor: Harry Booklan, RA3AUU

Asia
8Q7DV (Oprs. UA9CI, UA9CDC, UA9CDV, UA9CLB, UA9CFF, UA9CKP)
Donor: Steve Merchant, K6AW

Europe
TM2Y (Oprs. F6BEE, F6ARC, F6FGZ, F6FVY, F5MUX, F5NLY)
Donor: Bob Cox, K3EST

Oceania-Pacific Rim
AH2R (Oprs. KH2/JHØUSD, KH2/JRØBQD, JR7OMD/WI3O)
Donor: Junichi Tanaka, JH4RHF

South America
CE3F (Oprs. CE3/SM3SGP, CE3FIP)
Donor: Tyler Stewart, K3MM

MULTI-OPERATOR, MULTI-TRANSMITTER
World
6Y2A (Oprs. K2KW, N6BT, N6TV, N6BV, AF7Y, K7CO, W4SO, KE7X, AG9A, W9QA)
Donor: K2GL Memorial (Doug Zwiebel, KR2Q)

U.S.A.
KC1XX (Oprs. KC1XX, KM3T, K1GQ, K1DG, N1RR, N2IC, T93M, Christine)
Donor: N6RJ Memorial (Bob Ferrero, W6RJ)

Europe
DFØHQ (Oprs. DK8YY, DL1AUZ, DL3ALI, DL3OI, DL3TD, DL4ALB, DL5ANT, DL5AXX, DL5LYM, DL5MX, DL7URH, DL7VOA, DL8WAA)
Donor: Finnish Amateur Radio League

Japan
JA5BJC (Oprs. JA5BJC, JA5FDJ, JA5JCC, JA5THU, JH5RXS, JR5JAQ, JR5VHU)
Donor: Ryozo Goto, JH3JYS

World - SSB/CW Combined
KH7R: 47,345,300
Donor: Alpha/Power, Inc.

CONTEST EXPEDITIONS
World Single Operator
Thomas Poland, 3A/N9NC
Donor: Yankee Clipper Contest Club

World Multi-Single
VK9LX (Oprs. K6KM, N4RU, NØTT, NM7N, VK2ICV)
Donor: Carl Cook, AI6V

World Mult-Multi
XZ1N (Oprs. WA6CDR, N5IA, AF7O, N7MB, K7SP, WF5T)
Donor: Bill Schneider, K2TT

SPECIAL - SINGLE OPERATOR AWARDS
World SSB/CW Combined
CN8WW (Opr. Bernd Och, DL6FBL)
Donor: Hrane Milosevic, YT1AD

World All Band: Under 21 years old
Marcus Ilvonen, OF3KCB
Donor: Chuck Shinn, W7MAP

SPECIAL EVENT AWARD
JT1A (Oprs. JT1BH, JT1BV, JT1CD, OH1RX, OH2BH, OH8PF)
Donor: CQ Contest Magazine

CLUB
World SSB/CW
Yankee Clipper Radio Club: 460,442,158
Donor: W1WY Memorial (CQ Magazine)

NON-USA SSB/CW
Bavarian Contest Club: 164,991,164
Donor: N6AUV Memorial (No. Calif. Contest Club)

GORDON WEST
WB6NOA

2414 COLLEGE DRIVE (at Nassau)
COSTA MESA, CALIFORNIA 92626
Call (714) 549-5000 Monday-Friday 10:00 a.m.-4:00 p.m.
24 HR FAX (714) 434-0666

June 29, 1999
From: Gordon West
To: Don Tyrrell and Jim Burns, Alpha Delta
Re: **Outbacker** Performance On Radio School Van

Hi Don and Jim!

In our NEW communications van installation, we run with the **Outbacker Perth**, the regular **Outbacker** with the short stainless steel whip tip, and when we're parked, the 500 watt **Outreach**. When compared to other mobile antennas at the same approximate length, the **Outbackers** and the **Outreach** are equal if not better performers, and I don't need to unscrew them when we change bands. We have logged over 30,000 miles with all of our **Outbackers** constantly up in the air, and now and then tangles with trees failed to slow them down one bit!

Many of our graduating students who have earned their General class license have gone with our recommendation of the **Outbacker** over the less-expensive mobile whips. The benefit of all bands on one shaft is well worth the money. No extra loading coils–no extra whip tips–no extra shafts to carry...all the bands on just one nice, neat jet-black body.

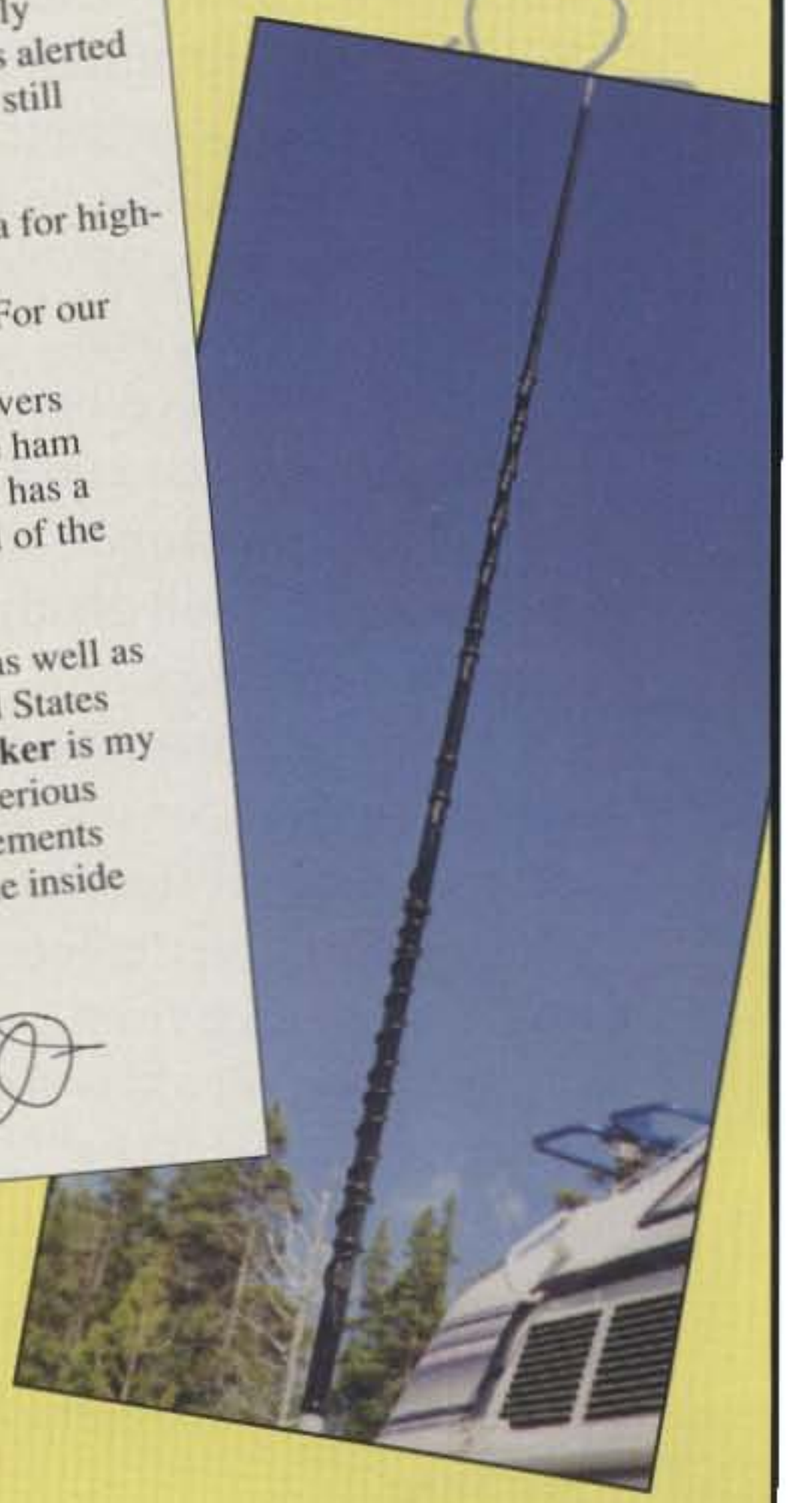
The 500-watt **Outbackers** can really handle the power, coolly. None of these 600-watt amps have been able to blow up the 500-watt **Outbackers**.

Many of our classroom demos use a single **Outbacker** and your tripod, and it works every time over almost any type of ground conductivity. And when we placed the tripod with the **Outbacker** over sea water, whowzers–what a signal!

One of our students dropped his marine **Outbacker** in the bay. After he dried it out, it still continues to work at optimum. Another student forgot to tighten his **Outbacker** into the mount, and it finally vibrated loose and dragged behind the vehicle–still attached by the fly lead–for about 5 miles until other motorists alerted him to the problem. It was scuffed up, but still continued to work great.

I wouldn't have any other mobile antenna for high-frequency work on our communications van than the proven **Outbacker** series. For our emergency Red Cross work, I use the international I.T.U. **Outbacker** that covers those frequencies above and below the ham bands. And if I need both, **Outbacker** has a combination ham/I.T.U. whip with all of the band taps on it clearly marked.

I have run the antenna both mobile as well as maritime mobile all over the United States and coastal waters, and the **Outbacker** is my favorite and ultimate choice for a serious HF whip that can withstand the elements with really nothing movable on the inside to go wrong.



top six clubs set a new standard by amassing 1.4 billion points!

New All-Time CW Records

World: AB P40E (CT1BOH); 28 ZW5B (K5ZD); LA V26K (AA3B); Q3.5 HA8LUH; A28 KH2D; A21 OHØJJS (OH6LI); A14 LA9GX; A3.5 YTØA (YT7AO); MM 6Y2A.

Africa: AB EA8EA (OH2MM); L21 EA8NN; MM 5V7A.

Asia: AB C4A (5B4ADA); 21 5B4AGC; A28 JH1FSF; MM A61AJ.

Europe: AB GIØKOW (GIØNWG); 28 9HØA (9H1EL); L28 9A7R; L21 9A6A; Q28 GØTDX; Q21 OH7NVU; Q3.5 HA8LUH; AA RZ3BW; A21 OHØJJS (OH6LI); A14 LA9GX; A3.5 YTØA (YT7AO); MS TM2Y.

CLUB SCORES

USA

Yankee Clipper Contest Club	460,442,158
Frankford Radio Club	432,136,542
Potomac Valley Radio Club	194,995,771
North Coast Contesters	92,006,148
Society of Midwest Contesters	77,380,640
Southern California Contest Club	75,484,465
Northern California Contest Club	67,112,309
Mad River Radio Club	34,331,846
Southeast Contest Club	33,155,304
Central Arizonia DX Assn.	31,423,961
North Texas Contest Club	31,247,010
Florida Contest Group	26,284,422
Southwest Ohio DXA	25,968,544
Florida Contest Club	21,697,656
Western Washington DXC	21,374,682
Minnesota Wireless	19,914,334
Tennessee Contest Group	14,312,616
Southern California DX Club	13,874,813
Texas DX Society	12,379,560
River City Contesters	11,063,399
Oklahoma Dx Assn.	9,536,853
Willamette Valley (W7)	9,029,390
Central Texas DX & Contest club	8,859,146
San Diego Dx Club	8,482,368
Mile High DX Assn. (WØ)	8,354,164
Carolina DX Assn.iation	8,201,653
North Florida DX Assn.	8,072,273
Rochester DX Assn.	8,050,648
Grand Mesa DX Club	7,649,925
Western New York DXA	7,138,765
Central Florida DX Assn.	4,615,468
Kentucky Contest Group	3,579,724
Northern Ohio DX Assn.	3,060,619
CT & RI Contest Group	2,960,756
Hoosier Contesters	2,743,635
Kansas City DX Club	2,509,171
CA Central Coast DX Club	2,502,153
Salt City DX Club (W2)	2,125,217
Ozaukee Radio Club (W9)	1,844,240
Southeast DX Club	1,720,140
Eastern Iowa DX Assn.	1,671,843
World Radio Staff ARC	1,616,619
Mother Lode Contest & DXC (W6)	1,122,346
Northern Arizonia DXA	1,065,454
Sterling Park ARC (W4)	826,844
Northern California DX Club	820,657
West Park Radio Ops (W8)	777,153
Central West VA Club	772,382
Northrop-Grumman RC	669,070
Redwood Empire DXA	660,754
Order of Boiled Owls NY	580,634
Athens (Ohio)	551,952
Heartland DXA (WØ)	527,549
American Red Cross EC	485,542
Yoder ARC (WØ)	460,671
Metro DX Club (W9)	449,585
Mississippi Valley DXCC	446,992
Northern Illinois DXA	391,851
Weekend Warriors Contest Club (W3)	193,800
Tolersville ARC (W4)	56,047
Northern Shenandoah DXA	50,694

DX

Bavarian Contest Club	164,991,164
Contest Club Finland	128,830,292
Rhein-Ruhr DX Assn.	110,563,813
Russian Contest Club	52,841,713
Slovenian Contest Club	50,130,827
Marconi Contest Club (I)	42,255,503
Ural Contest Group (UA9)	40,678,033
Nicosia Contest Group	32,846,224
Japan Crazy Contesters	31,421,879
YU Contest Club	30,497,391
Lithuanian DX Group	29,495,609
UA2 Contest Club	28,317,541
SP DX Club	26,819,602
Ukrainian Contest Club	25,985,197
Kaunas Technical University RC	25,612,343
Croatian Contest Club	23,929,311
Low Land Crazy Contesters (PA)	22,230,065
LYNX DX Group (EA)	22,037,127
French Contest Club	21,951,872
Chiltern DX Assn. (G)	20,282,076
HA DX Club	20,218,058
Top of Europe Contesters	16,419,407
GPDX (CT)	16,180,833
LU4FM Club	13,423,392
Araucaria DX Group	13,419,169
Czech Contest Club	13,146,205
LA Contest Club (LA)	12,060,623
LNDX (F)	11,869,351
Rosario RC (LU)	11,778,628
BC DX Club (VE7)	9,300,810
Moscow City Radio Club	8,739,248
Aruba Radio Club	6,907,354
Z30M Contest Team	5,676,466
YU DX Club	5,593,184
Taganrog Contest Club	5,312,822
Koryazhma DX Company	5,042,310
TuPY (PY2)	4,624,194
Danish DX Group	4,534,267
Udmurita Contest Club (UA4W)	4,156,384
LY CW Contest Club	3,721,963
Lithuanian CW Contest Club	3,721,963
Vojvodina Contest Club (YU)	3,714,692
Far East Island DX Club	3,693,778
Sarajevo Dx Group (T9)	3,679,445
LU4AA Club	3,506,589
Beemster Contest Club	3,392,746
GADX (LU)	3,340,414
GACW (LU)	2,667,138
Osona (EA3)	2,572,218
Bavarian DX Group	2,403,399
SP Contest Club	2,303,207
St Petersburg ARS (UA1)	2,030,209
Southern Germany DX Group	1,843,520
Sao Paolo Contest Group	1,517,596
Sky Sat Contest Club (YU)	1,505,658
Shizuoka DX Assn. (JA2)	1,408,548
Sudaca's Contest Gang (LU)	1,379,455
Northern Lithuania DX Group	1,019,577
North Patagonia DX Group (LU)	995,996
Fox Contest Club (YU)	946,173
LU4HH Club	906,301
YO4KCA Club	816,430
Amsterdam DX Club	684,178
Kharkov Region ARS (Ukraine)	683,200
NOL (ON)	668,279
Ivanovo DX Club	667,072
Macedonia DX Club	512,444
Globus (Ukraine)	454,956
Obninsk"QRU"Club (UA3X)	453,156
S59DBC Club	449,961
Northern Greece Contest Team	433,432
Crimean Contest Club	400,026
SV1SV Club	277,255
ARUK (EX)	234,446
Tallinn Radio Club	164,627
Geo DX Group (DL)	141,927
GUARA (PY7)	69,667

North America: AB 8P9Z (K4BAI); 1.8 VA1A (K3BU); LA V26K (AA3B); L28 WP2Z (WD5N); AA K3WW; A21 AA8U; MS K1AR; MM 6Y2A.

Oceania: L28 WHØV; QA NØKE/KH6; Q7 W8QZA/KH6; AA KH2/N2NL; A28 KH2D; MS AH2R.

South America: AB P4ØE (CT1BOH); 28 ZW5B (K5ZD); L28 CX5AO; Q28 PY2TNT; A28 LU1APG; A21 LU7EAR.

Special Mention

The CQ WW brings out intrepid travelers from all over the world who head out to far-flung QTHs. A fast count of the number DXpeditions for the contest yielded about 100! Of course, there are many that go unnoticed if an exotic callsign is not involved. Why don't you try a DXpedition this year? You can travel light, set up with a vertical on the beach or hotel roof, and work thousands of QSOs. Once you take that first trip and find yourself knee deep in your own pile-up, you will want to go back and back.

All of those operations put their calls into a lot of logs. A group of W5, 6, and 7's made a lot of contesters and DXers happy with XZ1N. Phil, N6ZZ, traveled up to zone 2 and set a new zone record with his effort. Out in the west of the USA, the competition in the seventh call area was fierce. Five stations finished above two million points. N7DR and W7GG finished in a dead heat, with N7DR winning by the point value of one multiplier. Out in the western USA, W6YA and W6NL shifted their efforts to 28 MHz. Jim, W6YA, just edged out Dave, W6NL.

Dave, K2SS/1, and George, WØUA (WØUN), put their considerable talents into 21 MHz. The scores were close, with Dave taking top place. Take a look at the heated competition in Slovenia on 7 MHz. S57AL just edged out S57DX and S52O.

Martti, OH2BH, and friends, and with the efforts of JT contesters, put together a special event station from JT1A. Thanks to the JT's and OH's, many contesters worked the elusive zone 23 for the first time.

A real special mention is made of KH7R, who reprised their outstanding 1997 effort in 1998. They had the highest combined SSB/CW multi-multi total in the contest. Operating from zone 31 and winning the highest MM combined trophy is tough.

The two Russian multi-op groups (mostly UA9's) again headed to south Asia. The P3A group finished just behind A61AJ, while 8Q7DV blasted through on all bands.

Special mention must be made of new QSO records set in the contest. Jose, CT1BOH (P4ØE), made 6853 QSOs, and the MM station 6Y2A had a 40 meter QSO total of 3896 on 7 MHz for a new band record.

Comments

Last year the first UBNs were released to everyone who submitted an electronic log. We

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSOs/Zones/Countries on each band

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
P4ØE	351/15/52	727/25/74	1188/30/92	1232/37/114	1821/37/120	1521/32/99
EA8EA	152/13/41	512/24/72	1161/30/84	1295/35/107	1254/38/119	2166/36/120
HC8N	98/13/22	406/23/61	1099/31/89	1223/35/109	1517/37/117	2317/32/120
P4ØW	281/14/45	803/24/85	988/28/92	970/31/103	1268/31/105	1952/31/109
CN8WW	157/9/33	829/19/71	1260/23/83	1067/31/99	1078/32/101	2100/29/102
8P9Z	302/15/45	694/19/66	1223/31/87	1213/33/87	1386/32/87	1681/25/82
C4A	385/17/64	718/21/72	1373/29/97	913/32/87	743/32/87	1376/31/96
A45XR	187/13/44	315/18/65	1084/28/92	871/32/93	1146/35/111	1219/34/121
3V8BB	243/11/57	782/19/75	1107/26/83	1023/31/95	798/32/94	1077/30/81
6V6U	40/7/11	214/15/45	602/22/70	1253/28/89	1196/27/93	2012/29/92

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
W1KM	104/14/47	690/22/79	902/29/89	731/31/96	764/31/90	835/28/87
W4AN	53/12/31	241/20/67	1021/35/99	907/34/106	746/31/104	873/30/102
K1ZM	98/19/56	440/23/76	1134/31/98	503/35/93	598/31/89	1059/30/104
W9RE	26/10/19	157/20/62	1040/31/99	884/36/103	941/33/97	889/27/88
K1TO/4	38/13/30	218/18/64	827/29/100	881/36/101	927/33/108	610/28/92
KQ2M/1	47/10/33	402/20/72	1003/29/90	595/34/106	771/31/101	605/25/98
N2NT	59/12/38	403/17/7	684/30/88	738/35/110	1059/32/99	519/26/88
K3ZO	42/11/31	296/18/64	771/32/91	691/34/99	985/33/100	656/26/85
N2LT	49/12/32	278/16/64	641/34/95	744/27/94	785/31/101	793/27/94
K1RU	20/9/15	220/17/57	840/28/82	700/29/91	898/30/92	812/23/74

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

K1AR	49/13/46	569/27/101	1384/35/136	991/38/151	999/36/135	1083/32/132
TM2Y	208/18/68	568/25/99	1303/36/127	943/35/127	1132/39/136	1326/35/121
N3RS	53/16/51	425/29/100	1202/34/125	793/37/145	892/36/130	856/31/126
EA6IB	77/14/57	640/21/89	1581/35/119	1371/36/128	1169/39/129	1307/34/121
N2NU	59/15/58	198/29/97	912/34/120	912/37/145	1085/37/131	755/30/126
K8AZ	47/17/44	225/25/97	990/36/120	959/37/140	987/34/139	958/30/127

USA MULTI-OPERATOR SINGLE TRANSMITTER

K1AR	49/13/46	569/27/101	1384/35/136	991/38/151	999/36/135	1083/32/132
N3RS	53/16/51	425/29/100	1202/34/125	793/37/145	892/36/130	856/31/126
N2NU	59/15/58	198/29/97	912/34/120	912/37/145	1085/37/131	755/30/126
K8AZ	47/17/44	225/25/97	990/36/120	959/37/140	987/34/139	958/30/127
K1ZZ	67/17/56	418/26/100	741/34/121	931/37/140	919/35/131	645/31/125
K8LX	42/13/35	178/25/90	807/33/113	797/37/138	1061/36/130	410/31/122

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

6Y2A	1139/20/82	1867/28/106	3896/35/132	4099/38/151	3433/31/147	3175/32/120
5V7A	208/15/48	683/25/79	2298/35/118	3526/38/146	4485/39/151	3182/35/137
TI1C	768/17/63	1689/28/97	2976/32/119	3459/38/147	3217/39/147	3304/35/138
EA9EA	52/5/22	1804/22/94	2815/37/132	3225/38/147	2732/38/144	2213/36/124
A61AJ	530/21/67	1359/28/95	2957/35/133	2946/39/146	2331/36/141	2569/36/136
J6DX	627/17/54	1368/26/84	2372/31/103	2986/36/121	3795/36/135	3148/33/123

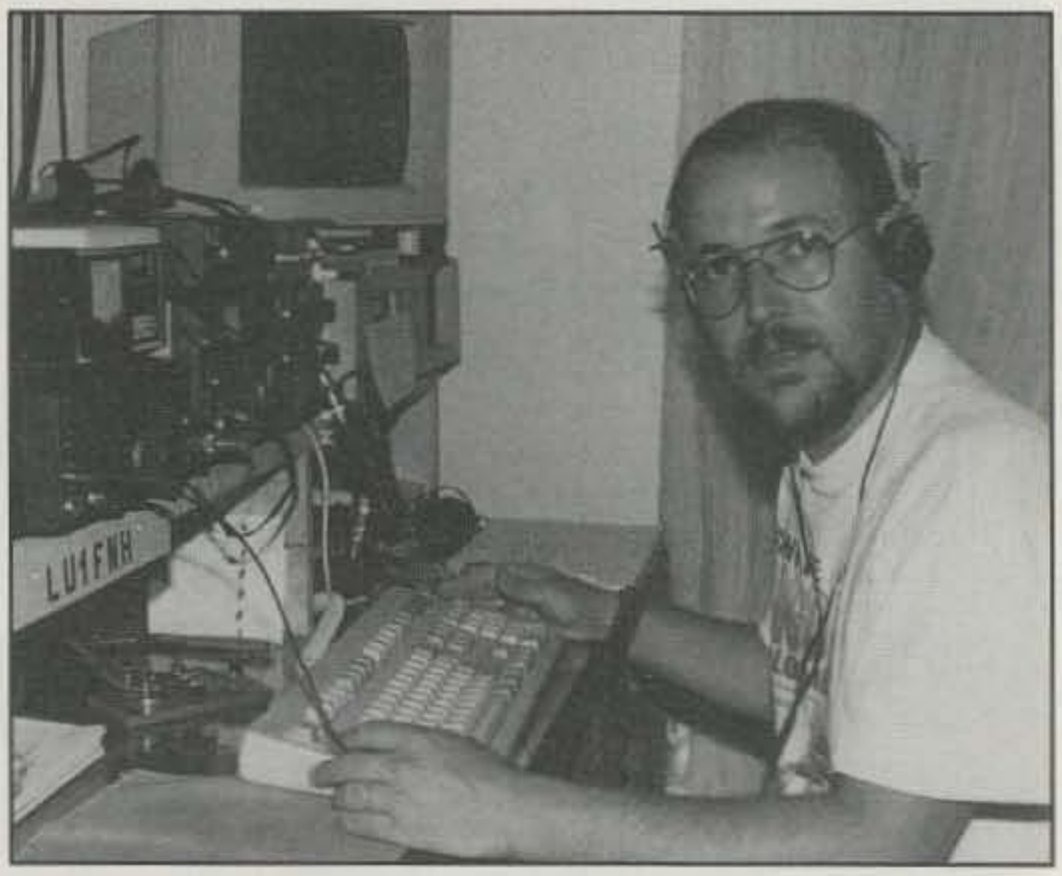
USA MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	238/21/75	971/29/113	2120/37/142	2228/38/157	1812/39/143	1565/35/133
W3LPL	208/22/70	1003/31/115	1798/37/139	2104/39/158	1743/39/148	1445/34/133
K3LR	200/21/67	660/29/110	1971/38/144	1942/37/156	1773/37/145	1554/35/140
K1KI	144/16/59	809/29/106	1664/37/137	1833/38/152	1764/37/138	1121/33/128
K2LE/1	108/13/41	572/21/95	1389/33/127	1769/37/139	1223/35/123	1104/34/123
K9NS	76/18/36	406/28/95	1229/37/133	1676/39/149	1441/36/134	1075/31/120

ZONE LEADERS SINGLE OPERATOR

Zone	Call	Score	Zone	Call	Score
1	KL7AC	1,263,542	21	A45XR	9,067,345
2	VE2/N6ZZ	7,023,425	22	AT2AJ	34,532
3	W6AX	4,417,426	23	JT1CO	1,235,806
4	W9RE	6,875,625	24	XX9X	3,795,670
5	W1KM	7,379,711	25	JH5FXP	4,857,376
6	6D2X	4,338,864	26	3W7TK	2,720,442
7	3E1AA	7,002,610	27	DU1/DL5ZAH	889,680
8	8P9Z	9,991,863	28	9M6NA	5,979,138
9	P4ØE	14,372,964	29	VK6VZ	451,584
10	HC8N	12,971,803	30	VK2AYD	1,386,240
11	ZW5B	1,991,895	31	NH7A	2,648,535
12	*CE3AA	735,715	32	KH8/N5OLS	2,889,842
13	*LT1F	1,824,312	33	EA8EA	13,717,801
14	GIØKOW	6,961,240	34	5A1A	450,865
15	S58A	6,628,059	35	6V6U	8,127,504
16	EW8EW	2,665,131	36	No Entry	
17	EX8W	4,373,712	37	5H3US	791,427
18	RZ9UA	3,927,066	38	ZS6EZ	5,379,840
19	UAØJQ	2,220,574	39	3B8/DL9GFB	1,024,920
20	C4A	9,904,510	40	No Entry	

** Low Power*



LU1FNH, number one on 21 MHz Argentina.

did the same this year. The difference between the two years is that the contest community is becoming more and more knowledgeable about how errors can occur. With the ever increasing number of tools available to validate the scores and allow the winners to really celebrate their win, there might be a tendency to lose focus about what contesting is about. The UBN is a learning tool which if you take the time can help you become a better contester.

The reason you enter a contest is to have *fun!* To repeat from last year's writeup, "The buzz of the bands coming to life is a siren's song that can't be resisted. The new ones you might work, finding that your signal *can* work a lot of people, and your personal motivation to do well are just the tip of the iceberg. Each contest is a learning experience about propagation, your own skills, and learning from others."

Please send us your log in electronic format. No matter how small or large, mail your CW log via the Internet to <cw@cqww.com> and your SSB log to <ssb@cqww.com>. It is cheaper and less trouble to e-mail your log. Each log helps to make the whole contest better and truer. You can check the CQ WW home page at <http:\\www.cqww.com>. There you will find the latest rules and other interesting information including directions on how to submit an e-mail log entry.

Power

Everyone knows that when you enter a contest, you are on your honor to run the power that your category allows. It is unsettling to see logs that claim low power but clearly are running more than what is allowed. It is a false victory to beat other competitors when they all are running 100 W or less and you decide to run 500 W. We all have heard many reasons to justify this type of thinking: "I live too far from competitive areas."; "How can that top station win? He must be cheating. I have to cheat to be competitive."; "I'll run 500 W because my antenna is not very good." It sure makes life easier and your score bigger if you cheat by running high power. The truth is that almost everyone really does obey the power limitations. It is much more satisfying to obey the rules and find out just how well you can do from your QTH.

EUROPE TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
GIØKOW	249/13/57	662/19/77	1166/32/97	716/37/107	1066/35/110	929/28/103
S58A	113/15/56	416/17/78	1563/34/109	905/35/103	772/33/99	772/34/114
G4BUO	177/15/52	591/18/71	583/25/73	846/31/93	761/31/94	608/28/84
GU6UW	350/8/49	576/15/65	852/23/74	681/24/72	733/27/79	1002/30/89
4N9BW	180/11/51	369/18/66	989/32/92	873/28/85	928/33/102	760/33/94
DL4NAC	66/12/43	220/17/67	1085/34/99	626/29/80	660/32/100	559/30/98
GØIVZ	270/11/52	550/16/65	778/22/72	779/27/92	657/30/97	701/29/85
OH1MM	100/9/40	360/17/77	524/29/89	1080/27/82	820/32/105	495/29/88
OM5M	60/7/35	437/18/67	932/31/89	671/29/80	783/32/86	511/33/81
OH5LF	104/10/49	259/18/62	375/28/83	880/33/90	829/34/101	647/33/107

EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

TM2Y	208/18/68	568/25/99	1303/36/127	943/35/127	1132/39/136	1326/35/121
EA6IB	77/14/57	640/21/89	1581/35/119	1371/36/128	1169/39/129	1307/34/121
RU1A	126/19/75	753/35/128	843/38/136	1321/37/139	1085/39/140	451/35/133
SQ6Z	181/18/66	608/26/95	1397/35/125	1304/36/127	992/38/122	660/35/117
DL2NBU	140/18/70	607/25/96	1171/33/112	774/37/130	883/38/131	648/35/125
OM8A	198/17/72	468/18/74	1345/37/122	1232/37/138	791/38/123	635/34/120

EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

DFØHQ	832/23/85	1837/32/111	2461/37/138	1976/37/138	1805/37/142	1378/37/137
OH2U	638/23/88	1088/31/120	2101/37/145	2439/39/158	1825/38/146	1287/37/145
RW2F	895/28/94	1622/31/117	2121/38/143	2158/39/146	1275/38/135	1181/37/145
SL3ZV	826/23/89	1092/33/114	2045/35/132	2385/37/137	1593/39/140	673/33/116
DLØCS	731/22/90	1257/33/120	1541/37/130	1519/36/133	1458/38/138	851/36/130
EA4ML	613/16/63	1223/22/82	2106/31/113	2235/36/121	1469/36/120	1102/32/94

TOP SCORES IN VERY ACTIVE ZONES

ZONE 3

W6AX	4,417,426
W6RU	3,141,840
K6LA	2,851,800
*XO7X	2,584,983
N7DR	2,568,104
W7GG	2,561,988
W2VJN/7	2,133,130
N7TT	2,053,425
K4XU/7	2,015,248
AA7A	1,992,810

ZONE 4

W9RE	6,875,625
KØRF	4,029,435
W4PA	3,555,681
K5YAA	2,959,691
K9MA	2,887,213
K9AN	2,781,072
WBØO	2,511,587
KØEU	2,495,724
KØCAT/9	2,375,505
NA5B	2,251,855

ZONE 5

W1KM	7,379,711
W4AN	7,141,453
K1ZM	7,119,308
K1TO/4	6,293,104
KQ2M/1	6,112,282
N2NT	6,086,220
K3ZO	6,054,048
N2LT	5,831,100
K1RU	5,214,551
W3BGN	5,008,964

ZONE 14

GIØKOW	6,961,240
G4BUO	5,073,750
GU6UW	5,047,170
DL4NAC	4,872,882
GØIVZ	4,722,406
G4BJM	3,826,284
OZ1LO	3,779,440
CU2V	3,728,724
EA3NY	3,215,612
TM9C	2,928,660

ZONE 15

S58A	6,628,059
4N9BW	5,016,810
OH1MM	4,374,240
OM5M	4,157,721
OH5LF	3,994,272
HA8FM	3,734,322
SP4Z	3,658,850
LY5W	2,988,110
HA8JV	2,865,016
OH6RX	2,725,254

ZONE 25

JH5FXP	4,857,376
JH4UYB	4,470,430
JH7AFR	3,788,148
JH7WKQ	3,494,880
JS3CTQ	2,842,494
JA8RWU	2,712,231
JH7XGN	2,057,950
JH1OGC	1,979,356
*JEØUXR	1,533,600
*JL1ARF	1,530,450

*Low Power

(Continued on page 70)

This time VE3ERP brings back a golden oldie that has not seen the light of day in a while.

High-Capacity, High-Voltage Varicaps From the Scrap Heap

BY GEORGE MURPHY*, VE3ERP

CONSTRUCTION

Making heavy-duty capacitors from scraps of pipe or tubing is not a new idea. It just doesn't seem to have seen the light of day in the popular amateur literature for quite a while. Somebody mentioned that somebody else should bring it to light again, so here goes.

Fig. 1 shows the principle of the concept, together with a table of standard copper pipe sizes[1] and how they fit together to produce custom capacitors. Fig. 2 shows a typical application—a tuning system for a miniature loop antenna[2, 3].

The design equations[4] for concentric conductors with air dielectric (e.g., one tube within another) are:

$$C_{cent} = \frac{0.2413}{\log_{10}(\frac{D}{d})} \qquad C_{inch} = \frac{0.6128}{\log_{10}(\frac{D}{d})}$$

where:

C_{cent} = capacity in pF per centimeter of overlap

C_{inch} = capacity in pF per inch of overlap

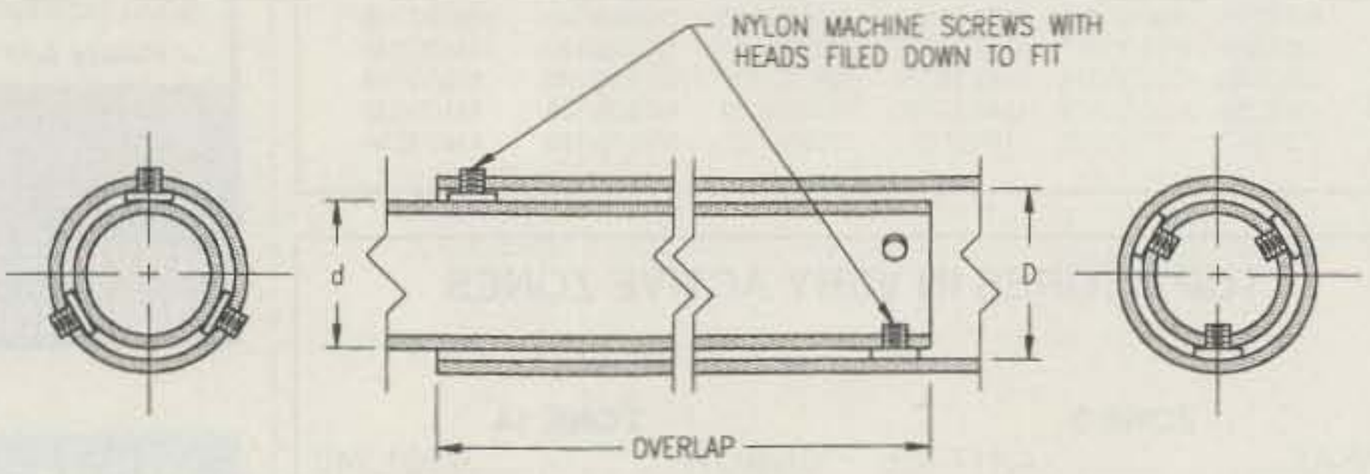
D = inside diameter of outer cylinder

d = outside diameter of inner conductor

D and d are in the same units (e.g., centimeters or inches)

These equations are actually for transmission lines where the length-to-diameter ratio of the conductors is very large. When applied to the comparatively very short overlaps under discussion here, the actual capacitances are about 1 1/2% greater than the equation values. This is due to end effect[5] at the end of each ele-

**77 McKenzie Street, Orillia, ON L3V 6A6 Canada*
e-mail: <ve3erp@encode.com>



Standard TYPE L HARD Copper Pipe
(All decimal dimensions are in inches)

Nominal Pipe Size	Outside Diameter	Wall Thickness	Inside Diameter	Fits Inside Pipe Size	With Air Gap of	Overlap pF per Inch	Breakdown Voltage
1/4"	0.375	0.030	0.315	3/8"	0.028	10.3	578
				1/2"	0.085	3.77	1785
3/8"	0.500	0.035	0.430	1/2"	0.023	16.4	473
				5-8"	0.083	4.92	1743
1/2"	0.625	0.040	0.545	5/8"	0.021	22.2	431
				3/4"	0.080	6.19	1680
5/8"	0.750	0.042	0.666	3/4"	0.018	30.9	368
				1"	0.137	4.52	2887
3/4"	0.875	0.045	0.785	1"	0.075	8.92	1575
				1-1/4"	0.195	3.83	4095
1"	1.125	0.050	1.025	1-1/4"	0.070	12.0	1470
				1-1/2"	0.190	4.85	3990
1-1/4"	1.375	0.055	1.265	1-1/2"	0.065	15.6	1365
				2"	0.305	3.84	6405
1-1/2"	1.625	0.060	1.505	2"	0.180	7.05	3780
				2-1/2"	0.420	3.39	8820
2"	2.125	0.070	1.985	2-1/2"	0.170	9.51	3570
				3"	0.410	4.32	8610
2-1/2"	2.625	0.080	2.465	3"	0.160	12.3	3360
				3-1/2"	0.400	5.30	8400
3"	3.125	0.090	2.945	3-1/2"	0.150	15.4	3150
				4"	0.390	6.33	8190
3-1/2"	3.625	0.100	3.425	4"	0.140	19.0	2940
				5"	0.625	4.76	13125
4"	4.125	0.110	3.905				
5"	5.125	0.125	4.875				

Fig. 1– The principle of the concept, together with a table of standard copper pipe sizes and how they fit together to produce custom capacitors.

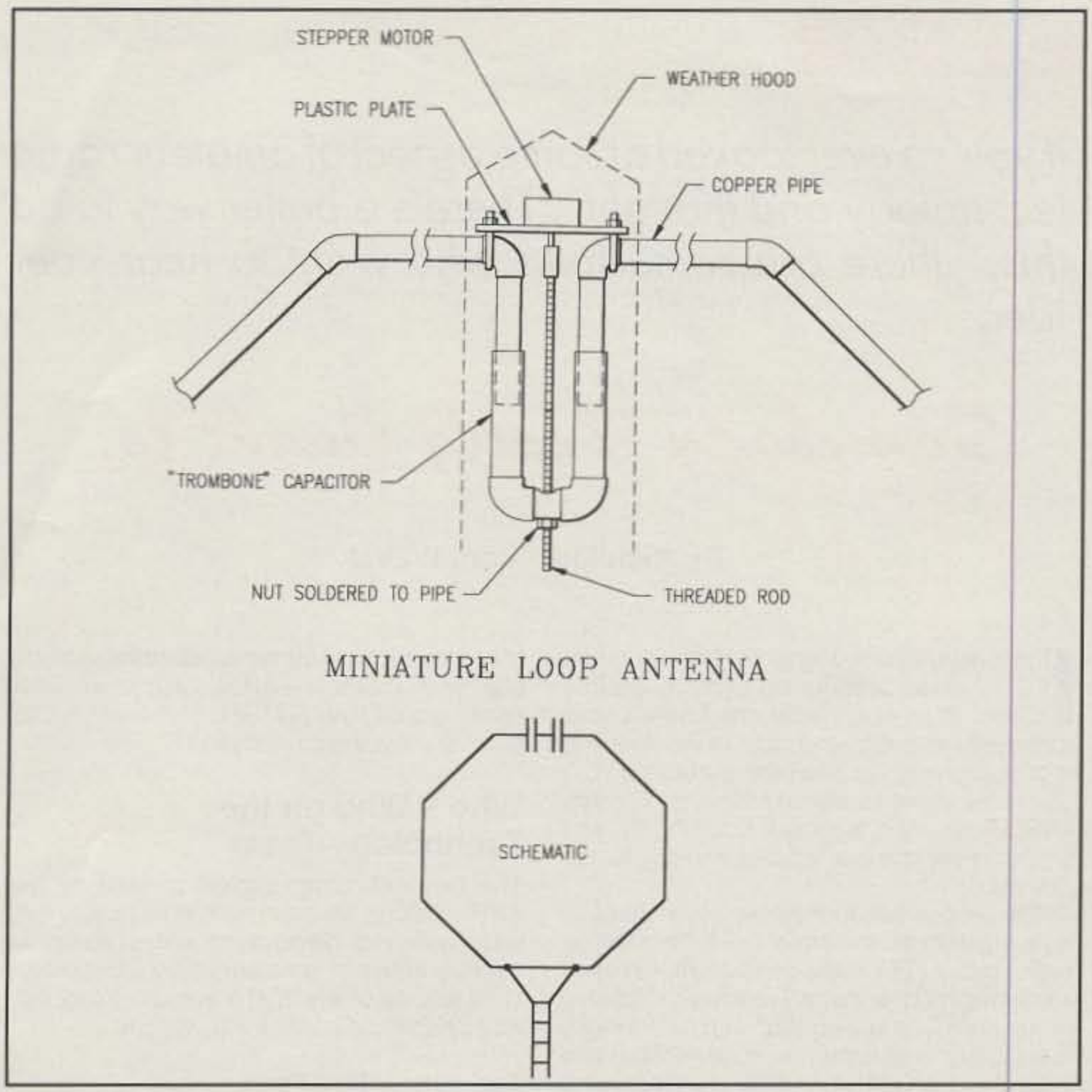


Fig. 2– A typical application—a tuning system for a miniature loop antenna.

ment where it can "see" a little beyond the end of its own "reflection" on the surface of the other element. This difference is much smaller than the tolerances of many commercially available capacitors and can be ignored for most practical amateur radio applications.

Using the design table is straightforward. Suppose you need a capacitor that can withstand 1000 volts across it. Allowing a 50% safety factor, look in the table for a breakdown voltage of about 1500 volts. Both a 1/2 inch pipe inside a 3/4 inch pipe (1680 volts) and a 1 inch pipe inside a 1 1/4 inch pipe (1470 volts) will do the job. The only difference between the two combinations is the capacity per inch of overlap: the first pair, at 6.19 pF/inch, will produce a finer tuning rate than the other pair, at 12 pF/inch. To determine the length of overlap in inches, divide the required capacity in pF by the overlap pF/inch shown in the table.

Construction is simple. Avoid the temptation to merely wrap enough tape around the inner pipe to provide spacing. You will end up with a lossy dielectric in a pneumatic piston that is great for pumping up tires. Instead, you will need some short Nylon® or Teflon® machine screws[6], a hand or power drill, and a coarse file.

Drill holes in each pipe end just big enough to fit the screws, as shown in fig.1. There is no need to tap the holes once the screws are dropped in and the pipes are assembled, as the screws are trapped and can't go anywhere. File down the heads of the screws just enough to allow a free-sliding fit. Try to take about the same amount of material off the head of each of the three screws at each location. This is not too critical, but if there is a significant difference in the head thicknesses of the three screws, the breakdown voltage will be less than shown in the table.

Actuation of the variable capacitor is left to the ingenuity of the designer. All other construction details are left to the plumber.

Footnotes

1. Aluminum tubing can also be used. The complete design procedure using tubing of any appropriate material, including all the math in both metric and American dimensions, is contained in the *HAMCALC version 40* program "Capacitors—Telescoping Variable."

HAMCALC is free software containing more than 200 programs of interest to amateur radio enthusiasts. It is obtainable from the author at the address which appears at the beginning of this article. To cover my costs of materials, documentation, and airmail shipping, please send US$6.00 for *HAMCALC, version 40* and *GWBASIC.EXE* (two diskettes), or US $5.00 for a single *HAMCALC* diskette if you already have *GWBASIC.EXE* installed in your computer.

2. Ted Hart, W5QJR, "Small High Efficiency Loop Antenna," *The ARRL Antenna Book, 17th edition*, pp. 5-10 to 5-16.

3. *HAMCALC* "MINILOOP Miniature Tuned Loop Antenna" design program (variation of W5QJR's design, by Harold Kane, W2AHW).

4. F. E. Terman, *Radio Engineers' Handbook*, 1943, p. 119.

5. Doug DeMaw, W1FB, in personal correspondence with the author.

6. Available at your local supplier to machine shops, tool and die makers, etc.

TECHNOLOGY

If you've ever looked at some aspect of amateur radio technology and thought, "There's a better way to do this," there are some folks who want to hear your ideas.

Somebody Really Ought to...

By Rich Moseson, W2VU

If you have ever thought, "Somebody ought to . . . " do such-and-such to improve some aspect of amateur radio, then here's your opportunity to get "somebody" to listen who is in a position to do something about it. CQ Communications is working together with the ARRL in an effort to search out, identify, and promote new amateur radio technology for the 21st century.

The League has formed two committees to work together on the project — a Technology Task Force (TTF) made up of ARRL directors and vice directors, and a Technology Working Group (TWG), made up of other amateurs with specific areas of expertise in developing and evaluating technology (see "Who's Who on the Technology Team"). The groups will collect proposals and ideas from the broad amateur radio community, study those which show promise, and make recommendations for bringing the most promising ideas into the mainstream of amateur radio.

The TTF and TWG invite formal or informal proposals, or even ideas of what needs fixing and how someone with the right technical know-how might go about trying to improve it. You don't even have to have a specific proposal in mind; a general idea of directions to go and paths to follow are welcome as well. Don't be afraid to "think out of the box" and suggest truly innovative approaches to future amateur radio technology. (However, try to stay within the realm of possibility. "A device to get Joe to talk less and help more at club meetings" probably won't go too far, unless, of course, you've designed such a device!)

In order to keep things from getting bogged down forever, the ARRL Board has given the TTF and TWG a timetable to follow, and part one, for submission of initial ideas and proposals, has a deadline of October 31, 1999. If you have something to offer—and I'm willing to bet that lots of you do—there are three ways to submit your idea or proposal: "snail mail," e-mail, and the World Wide Web. A form has been developed for ease of submission, but you may also just send a letter saying who you are, what your idea or proposal is, and how it might be used in and benefit amateur radio.

The input form and information about the TTF and TWG are available on the TTF website at <http://www.arrl.org/news/ttf/>. Input may also be sent by e-mail to <ttfinput@arrl.org> or by mail to the ARRL Technology Task Force, c/o Ed Hare, W1RFI, Staff Liaison, 225 Main St., Newington, CT 06111.

c/o CQ magazine

Who's Who on the Technology Team

The two technology panels created by the ARRL include amateur radio operators with a wide variety of background and expertise in various areas of amateur radio technology. Here is a list of who's who in each group, listed alphabetically after each chairman.

Technology Task Force

Steve Mendelsohn, W2ML, ARRL First Vice President, Chairman

Dennis Bodson, W4PWF, Roanoke Division Vice Director

Frank Fallon, N2FF, Hudson Division Director

Tom Frenaye, K1KI, New England Division Director

Art Goddard, W6XD, Southwestern Division Vice Director

Jim Maxwell, W6CF, Pacific Division Vice Director

Larry Price, W4RA, ARRL International Affairs Vice President

Walt Stinson, WØCP, Rocky Mountain Division Director

Ed Hare, W1RFI, ARRL Laboratory Supervisor, Staff Liaison

Technology Working Group

Rich Moseson, W2VU, Editor, *CQ VHF*, Chairman

Keith Baker, KB1SF, President, AMSAT-NA

Peter Coffee, AC6EN, author, *PC Week* columnist

Mike Cook, AF9Y, Chief Engineer, ITT, Fort Wayne, Indiana

Gene McGahey, NRØNR, Deputy Manager of Communications Technology, National Law Enforcement and Corrections Technology Center, Rocky Mountain Region

Paul Rinaldo, W4RI, ARRL Technical Relations Manager

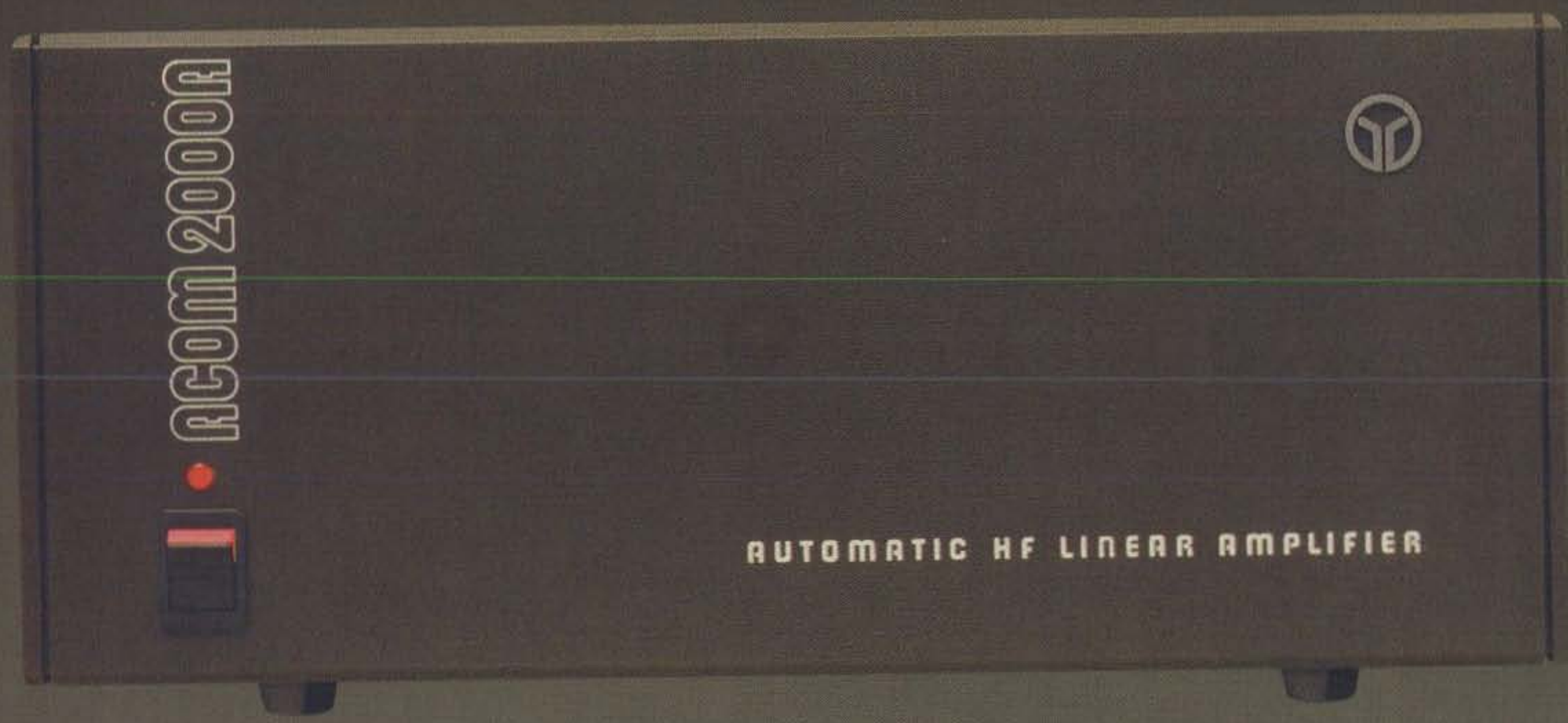
Dennis Silage, K3DS, Professor of Digital Signal Processing and Data Communications, Temple University, Philadelphia, Pennsylvania

Doug Smith, KF6DX, Editor, *QEX*, and Chief Engineer, Kachina Communications ■

- IT KNOWS ALL YOU NEED AND DOES IT AUTOMATICALLY
- A MUST FOR THE DX'ER AND CONTESTER

ACOM 2000A

AUTOMATIC HF LINEAR AMPLIFIER



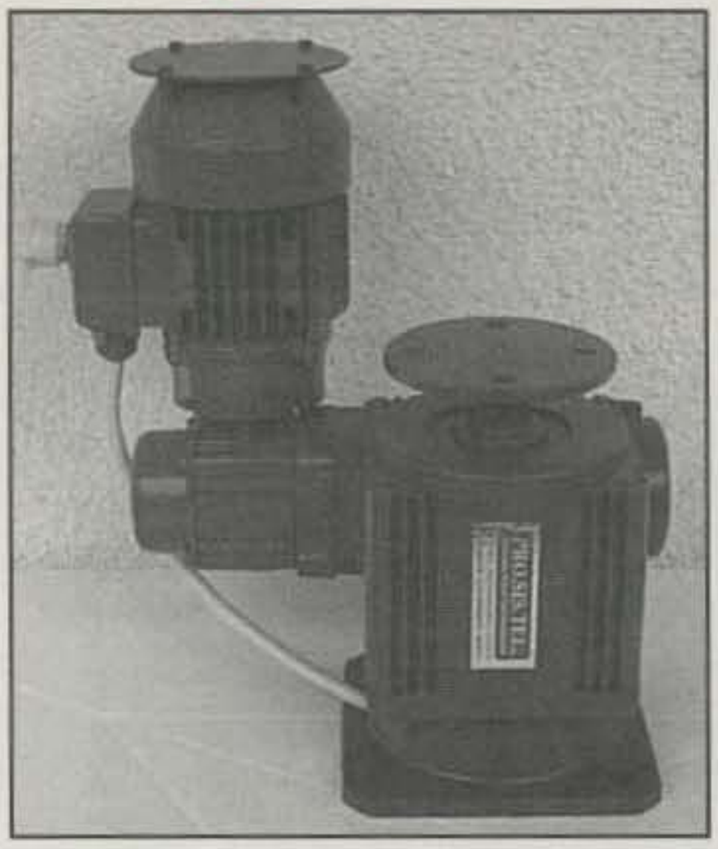
www.hfpower.com

The Intelligent Amplifier

phone: (978) 440 7555
fax: (978) 440 9008

ACOM INTERNATIONAL, INC.

CQ Showcase



Big Boy Rotators from First Call Communications

First Call Communications has announced Big Boy rotators by Prosistel, antenna rotators using advanced worm-gear technology and solid-state components. The line offers three different models, the largest of which is designed to handle up to an 81 sq. ft. wind load. Featured are high torque resistance; high starting torque (up to 26.800 in./lb.); large zincated steel output shaft to 1 1/2" (choose from three types of mast clamps); solid-state digital control box; Db9 rear connector for computer interfaces; high-strength aluminum gear box; 100-meters-plus cable; and more. Optional accessories include a foot-switch remote control, flexible mast clamp, and ARS by EA4TX universal computer interface.

For more information, contact First Call Communications, Inc., 32 Grove Street, Spring Valley, NY 10977 (800-426-8693; fax 914-357-6243; e-mail: <firstcall@cyburban.com>; <www.firstcallcom.net>), or circle 100 on the reader service card.

CAIG New R-5 Contact Cleaner

CAIG Laboratories has reintroduced its R-5 contact cleaner line, suited to use on switches, batteries, probes, connectors, plugs and sockets, edge connectors, terminal strips, interconnecting cables, and anywhere else metal conducts electricity. The new R-5 is reformulated to provide improved deoxidizing, cleaning, preserving, and lubricating characteristics. The new R-5 is nonflammable, fast evaporating, safe on plastics, and environmentally safer. It is available in a new pump non-aerosol spray or in liquid form.

For more information, contact CAIG Laboratories, Inc., 12200 Thatcher Court, Poway, CA 92064 (phone 800-224-4123; web: <www.caig.com>; e-mail: <caig123@aol.com>), or circle number 102 on the reader service card.

"Ham Radio 101" Radio Program

Hosted by Bill Lauterbach, WA8MEA, owner of DWM Communications, a small amateur radio and shortwave manufacturer/retailer, "Ham Radio 101" is a ham radio course being aired over WGTG shortwave. The course concentrates on the Novice/Tech theory with occasional Morse Code segments during some of the broadcasts. Bill is using Gordon West's *Technician No-Code Plus* as the textbook and is concentrating on the correct answer to the exam questions only, giving a detailed explanation of the question and answer. The programs are prerecorded and rotated, so new listeners can catch up with past programs.

The tentative schedule is Monday through Friday from 2300–2330 UTC summers and from 0000–0030 UTC winters on 6.890 MHz upper sideband. For confirmation of times and more information about "Ham Radio 101," visit the website at <http://www.erols.com/imageinn/dwm>, e-mail: <tinytenna@hotmail.com>, or call 517-563-9022.

PROBE Version 5.0 Software From DataFile, Inc.

PROBE Version 5.0 computer-controlled scanning software works exclusively with Optoelectronic's Optocom, Optoscan 456, 456 Lite, and 535 computer-to-scanner interfaces. It increases accuracy, speed, and control for unattended scanning, searching, and logging of active frequencies. Also included are enhanced frequency data management tools and more functions to improve the overall ease of use and computer control for optimum scanning performance.

PROBE V5.0 provides an enhanced

THE VECTRONICS HFT-1500 . . .
THE FINEST HIGH POWER ANTENNA TUNER MADE!

- *high current Roller Inductor*
- *SSB*Analyzer Bargraph™*
- *Cross-Needle Meter*
- *6 position Antenna Switch*
- *built-in 4:1 Balun*
- *gear driven Turns Counter*

HFT-1500
$459.95

The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a durable baked-on paint that won't scratch or chip.

The attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the HFT-1500 front panel as much as you want. *You won't leave a mark!*

Arc-Free Operation

Two *heavy duty* 4.5 kV transmitting variable capacitors and a massive *high current* roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

A sturdy hand cranked roller inductor lets you quickly *fly* from band to band. A precision 5-digit *gear* driven turns counter lets you accurately return to your previous settings.

Large comfortable knobs and smooth vernier drives on the variable capacitors make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

You can tune your SWR down to absolute minimum!

Why? Because *all* three matching network components, the roller inductor and both variable capacitors, are *fully* adjustable.

Tune any Antenna

You can tune any real antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, yagis, quads, long-wires, whips, G5RVs, etc . . .

*SSB*Analyzer Bargraph™*

VECTRONICS' exclusive 21 segment bargraph display lets you visually follow your instantaneous voice peaks. Has level and delay controls.

Accurate SWR/Power Meter

A *shielded* directional coupler and backlit Cross-Needle meter displays *accurate* SWR, forward and reflected power simultaneously. Reads both peak and average power on 300/3000 Watt scales.

6 Position Ceramic Antenna Switch

Select two coax fed antennas (tuned or bypassed), balanced line/wire or bypass.

Built-in Balun

A 4:1 Ruthroff voltage balun feeds dual high voltage Delrin terminal posts for balanced lines. HFT-1500 is 5.5x12.5x12 inches.

Try any product for 30 days

Call toll-free 800-363-2922 and order any product from VECTRONICS. Try it for 30 days. If you're not completely satisfied return it for a full refund, less shipping and handling -- no hassles. All VECTRONICS products come with a one year warranty.

300 Watt Antenna Tuner

VC-300DLP
$159.95

VECTRONICS uses the finest components available to build the highest quality 300 Watt antenna tuner ever made.

You can tune any antenna 1.8-30 MHz. Custom 48 position switched inductor and continuous rotation 1000 Volt capacitors provide arc-free operation. Handles 300 Watts PEP SSB, (150 Watts on 1.8 MHz).

8 position antenna switch, built-in 50 ohm dummy load, peak reading backlit cross-needle SWR Power meter, 4:1 balun for balanced line antenna. Scratch-proof Lexan front panel. 10.2x9.4x3.5 in. Weighs 3.4 lbs.

300 Watt *Mobile* Tuner

VC-300M
$109.95

The VC-300M *Mobile* Antenna Tuner is compact, lightweight, easy-to-operate and is our most economical tuner.

It's compatible with *any* mobile antenna and *any* mobile HF transceiver and is compact enough to fit in the most compact car.

It can also be used at home with dipoles, vees, verticals, beams or quads fed by coax.

Backlit dual movement meter simultaneously monitors Power and SWR. Covers 1.8-30 MHz. Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz.). 7.25x8.75x3.6 in. Weighs 3.4 lbs.

SWR/Power Meters

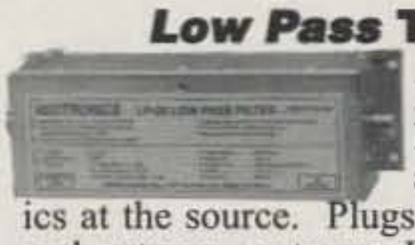
PM-30
$79.95
PM-30UV
$89.95

PM-30, $79.95, for 1.8 to 60 MHz. Displays forward and reflected power and SWR simultaneously on dual movement Cross-Needle Meter. True *shielded* directional coupler assures accuracy. Backlit meter displays peak or average power in 300/3000 Watt ranges. First-rate construction includes scratch-proof case/front panel. 5.3x5.75x3.5 inches. SO-239 connectors.
For 144/220/440 MHz, 30/300 Watt ranges. PM-30UV, $89.95, has SO-239 connectors. PM-30UVN, $89.95, has N connectors. PM-30UVB, $89.95, has BNC connectors.

1500 Watt *dry* Dummy Load

DL-650M, $64.95. Handles 100 watts continuous, 1500 Watts for 10 seconds to 650 MHz. Ceramic resistor. SWR < 1.3. SO-239 connector. **DL-650MN, $69.95** has N connector.

Low Pass TVI Filter



LP-30, $69.95. Eliminates TVI by attenuating harmonics at the source. Plugs between transmitter and antenna or tuner. Handles 1500 watts.

High Pass TVI Filter

HPF-2, $24.95. Installs between VCR/TV and cable TV or antenna lead-in cable. Eliminates or reduces interference caused by nearby HF transmitters.

VECTRONICS®

. . . the finest amateur radio products made

VECTRONICS 1007 Hwy 25 S, Starkville, MS 39759 USA **VOICE:** (601)323-5800 **FAX:** (601)323-6551 **Web:** http://www.vectronics.com

Free catalog, nearest dealer or to order call 800-363-2922

CIRCLE 15 ON READER SERVICE CARD

level of scanning speed and support for the Optocom's 38400 baud capability. It also supports access to features such as computer-controlled volume and squelch control and stand-alone scanner operation. For all Opto users, the "Autolock Hitcount" and "Automark Hitcount" automatically lock out and/or mark frequency records based on the number of hits in the log, providing assistance in searching unknown frequency lists or finding out what frequencies in a list are really active.

For more information, contact DataFile Inc., P.O. Box 20111, St. Louis, MO 63123 (e-mail: <Datafiles@aol.com>), or circle number 106 on the reader service card.

Hi-Res Communications' R-390A Addendum Video

Hi-Res Communications, Inc. has announced The R-390A addendum Video addition to the Collins Video Library. This new 3 hour 40 minutes video contains additional and detailed information on the R-390A that complements the original 7 hour long R-390A video which was produced two years ago and includes topics such as "How to pick out an R-390A," its "Modules," "Circuit Description," "Front and Rear Panel Detains," and much more. New and more detailed topics covered in the addendum video are "General Information," more detailed "Circuit Description," more "PTO" talk, "Quick Checks" to establish the electrical condition of an R-390A, "Restoration" and rebuilding considerations, and more.

The original 7 hour video was priced at $109.95. The new addendum is $49.95 plus s/h. For more information, contact Hi-Res Communications, Inc., 8232 Woodview Drive, Clarkston, MI 48348-4058 (phone/fax 248-391-6660; e-mail: <info@hi-rescom.com>; on the web: <http://www.hi-rescom.com>), or circle number 107 on the reader service card.

IC-T81A Four-Band Handheld From ICOM America

The new IC-T81A four-band handheld covers 6 meters, 2 meters, and 440 MHz at 5 watts output power and 1 watt on the 1.2 GHz band. It features 124 memory channels, water-resistant construction, a five-position "joy stick" control for ease of control of set mode, tone, duplex, volume, operating band, scanning, and more, plus an alphanumeric display for memory channel naming. The IC-T81A does not use function keys, and is easy to use, maker says.

The handheld is 2.3"W × 4.2"H × 1.1"D and weighs 9.9 oz. For more information, contact ICOM America, Inc., 2380 116th Avenue NE, Bellevue, WA 98004 (425-454-8155; for a free brochure call 425-450-6088; or check the website: <www.icomamerica.com>), or circle number 108 on the reader service card.

MFJ 1.8-170 MHz SWR Analyzer™

Reads complex impedance . . . Super easy-to-use

***New** MFJ-259B reads antenna SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . covers 1.8-170 MHz . . . built-in frequency counter . . . side-by-side meters . . . Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . and much more!*

***The** world's most popular SWR analyzer just got incredibly better and gives you more value than ever!*

MFJ-259B gives you a complete picture of your antenna's performance. You can read antenna SWR and Complex Impedance from 1.8 to 170 MHz.

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

You can determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open in feet.

You can read SWR, return loss and reflection coefficient at any frequency simultaneously at a single glance.

You can also read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information.

It has built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance over the entire spectrum 1.8-170 MHz!

Check SWR outside the ham bands without violating FCC rules.

Take the guesswork out of building and adjusting matching networks and baluns.

Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and approximate Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The

NEW

Call your favorite dealer for your best price!

MFJ-259B

$259.95

MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and much more!

Call or write for Free Manual

MFJ's comprehensive instruction manual is packed with useful applications -- all explained in simple language you can understand.

Take it anywhere

Fully portable, take it anywhere -- remote sites, up towers, on DX-peditions. It uses 10 AA or Ni-Cad batteries (not included) or 110 VAC with MFJ-1315, $14.95. Its rugged all metal cabinet is a compact 4x2x6¾ inches.

How good is the MFJ-259B?

MFJ *SWR Analyzers*™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Used worldwide by professionals everywhere.

More MFJ SWR Analyzers™

MFJ-249B, $229.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

MFJ-209, $139.95. Like MFJ-249B but reads SWR only on meter and has no LCD or frequency counter.

MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½ x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*™.

Genuine MFJ Carrying Case

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories.

Made of special foam-filled fabric, the MFJ-29C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs and connectors so you can use your MFJ *SWR Analyzer*™ without taking it out of your case. *Look for the MFJ logo for genuine authenticity!*

MFJ-99, $54.85. Accessory Package for MFJ-259/B/249/B/209. Includes *genuine* MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1315 110 VAC adapter. *Save $5!*

New! Tunable Measurement Filter™

MFJ-731, $89.95. *Exclusive* MFJ tunable RF filter allows accurate SWR and impedance measurements 1.8 to 30 MHz in presence of strong RF fields. Has virtually no effect on measurements. Works with all SWR Analyzers.

MFJ *No Matter What*™ warranty

MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

Free MFJ Catalog

Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

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

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**
Tech Help: (601) 323-0549

MFJ-224

$159.95

MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¼ in.

More hams use MFJ SWR Analyzers™ than any others in the world!

VHF Plus

BY JOE LYNCH, N6CL

All About The World Above HF

The 1999 Perseids

The following from Shelby Ennis, W8WN, pretty well summarizes the meteor activity for the 1999 *Perseids* meteor shower:

All reports so far say about the same thing—"dismal," "poorest *Perseids* in years," "no early peak at all," "worst ever in many years of operating," etc. Many are still hoping for a later-than-predicted second peak, so the ionospheric is still being kept hot at this time (and, the number of overdense bursts is probably about as good now as any time during the peak time, except for a couple of short enhancements).

There *was* a strong flurry of long overdense bursts on 13 August between 1030 and 1040 UTC. Several other reports from both Europe and North America indicate some overdense burns in the 2300–0100 period, although there is some question about this exact time.

Best single burn observed by a number of us in North America was Thursday at 2224 UTC, not the typical time for the *Perseids.*

Thus, from trying to watch the real-time NA and European web sites, plus the main MS reflectors, the early peak (and the meteors in general) just weren't there except for the normal background of underdense pings, until around 1000 UTC Friday. Since then things were better, and (at 1535 UTC) occasional overdense bursts were heard.

Did the *Perseids* just fail to produce much this year?"

A subsequent message contained the following reflections:

Messages continue to trickle in, but with no really new information. The question has logically been asked, since the predicted peak times occurred at generally "bad" times for the centers of activity (and also during daylight hours for many visual observers), are the poor results due to a lack of meteors or to the trail geometry due to the location of the radiant? At this time we don't have enough data to tell (that's why we're trying to stir up more info). But the reports so far indicate that the lack of a first (the "new") peak was real. The second ("old standard") peak *may* have been better than first thought, but was still poor, compared with previous years. Occasional overdense burns were heard from 1000 to about 1600 UTC on August 13, but remember this tends to be subjective. We're still spoiled by the large, early peaks earlier this decade, and by the fireballs of last year's *Leonids!* (For a summary of newest guesses on this year's *Leonids,* go to the hscw/HotNews section of my web site).

SSB was found by many to be nearly useless this year until after 1000 UTC on August 13 due to the lack of overdense trains. But there were still some underdense pings, making HSCW effective. In the 1000–1600 UTC period I don't have enough data yet to know which did better, though SSB *should* have been the mode of choice, especially for random work.

It's interesting to note that several 222 MHz contacts have been reported, and that, Holly, NØQJM (located in EN13, South Dakota), has now worked all the lower 48 states on 144 MHz *without* using EME! My completion with VE5UF (HSCW, 2273 km) was a surprise given the poor shower, as we have run a number of skeds during good periods of "better" showers. (He got only the two information-carrying pings on me, while I got five S1's and four S2's on him. And I had several dB more power.) So far I've seen no reports of 432 MHz completions, and no information on 50 MHz conditions have been seen.

What does all this mean?

1. Put all the experts in the world in a line and they'll never reach a conclusion.

2. Your results may be greatly different from everybody else's. It's yours that count for you.

3. We may pay too much attention to predictions based on too many unknowns, while neglecting the known characteristics of trail orientation, etc.

4. We need to be trying more, anyway! Poor shower or not, several did well in one way or another. And that's what counts!

5. There are many differences between the visual and forward-scatter radio results.

6. The use of the real-time MS web pages and e-mail has revolutionized acquiring schedules. But the North American "Hot Rocks" page can hardly handle the traffic at peak times. By the time you post a note and the next two-minute update period, it may be 10 lines down the page and off the screen.

7. North Americans need to use 144.100 ZB and letter-CQ's a *lot* more during these times. (Europeans may need to return to the CQ-letter system more).

8. Now is the time to repair equipment, make sure we have the latest version of WinMSDSP 2000, become more proficient at MS procedures, and get the boss to let us off for the *Leonids.*

P.O. Box 73, Oklahoma City, OK 73101
(phone 405-528-6625; fax 405-528-0746)
e-mail: <n6cl@fuller.edu>

VHF Plus Calendar

Oct. 1	Last quarter Moon.
Oct. 3	Moderate EME conditions.
Oct. 9	New Moon.
Oct. 10	Poor EME conditions.
Oct. 15	Moon apogee.
Oct. 16	Lowest Moon declination.
Oct. 17	First quarter Moon. Very poor EME conditions.
Oct. 21	*Orionids* meteor shower predicted peak.
Oct. 24	Full Moon. Good EME conditions.
Oct. 26	Moon perigee.
Oct. 29	Highest Moon declination.
Oct. 30-31	First weekend of the ARRL EME contest. (See text for details.)
Oct. 31	Last quarter Moon. Very good EME conditions.

NØQJM Completes Lower 48 WAS

The following is from Arliss, W7XU, via the VHF Reflector: "While many of us may have found the *Perseids* somewhat lacking this year, Holly, NØQJM (located in EN13, South Dakota), managed to complete schedules with W1AIM (Vermont) and W1JJM (Rhode Island) on 2 meters. With those QSOs she has now worked all lower 48 states on 2 meters without using EME. Congratulations, Holly!"

Current Contest

The first weekend of the ARRL annual EME contest is scheduled for the weekend of 30–31 October. The second weekend will be in November. The contest period is the entire 48-hour period, beginning at 0000 UTC. The object of the contest is to work as many stations as possible "off the moon." Categories include single operator, single band, single operator, multi-band, multi-operator, and commercial equipment. Each contact counts as 100 points. Multipliers include each U.S. and Canadian call district and each DXCC country worked. Conditions are expected to be moderate during the contest weekend. Complete rules are in the September issue of *QST* and can be found on their web site: <http://www.arrl.org/contests/announcements/99/rules-eme.html>.

Current Meteor Showers

According to the OH5IY meteor shower prediction software, the *Orionids* is predicted to peak around 21 October at approximately 2020 UTC. A characteristic of this shower is that it has several smaller peaks both before and after the main spike. The second major peak is expected approximately four days after the main peak. At peak the zenith hourly rate (ZHR, the number of predicted meteors falling per hour) is predicted to be around 25. Look for activity associated with this shower for approximately 16 days beginning a week before the main peak.

Current Conference

1999 Microwave Update: This year's Microwave Update is scheduled for sometime in October in the DFW area of Texas.

Detailed information on the conference was not available as of the deadline for this column. For up-to-date information, contact Kent Britain, WA5VJB, at <wa5vjb @flash.net>.

A Tribute to K2EEK

My wife, Carol, W6CL, and I were honored to be at the funeral of Alan, K2EEK, in July. The following are excerpts from the eulogy I delivered.

Under the leadership of Al, *CQ* magazine has become a place where many different facets of our hobby regularly get national and international exposure. We columnists come and go in the hobby. However, today the current longest running columnist in any publication is George Jacobs, W3ASK, with his "Propagation" column. Other columns deal with packet, DX, contesting, county hunting, and VHF and above. Those of us such as John Dorr, Chod Harris, and myself, who have inherited long-running columns, look over our shoulders at the great columnists before us and wonder if we are keeping up the traditions. All of this was made possible under the leadership of Al. There is nowhere in the world of ham radio that one can go and not know of the impact of *CQ* and what Al helped make it become.

Al kept us aiming for the best. Out of love for his hobby, Al guided the magazine editorially to become a respected voice within the amateur radio community. It is through Al's editorials that *CQ* became a sort of Torah for the ham radio fraternity. Al constantly chided us to strive for something better than we had become or were becoming. Via his "Zero Bias," time and again Al challenged us to measure up to a mark of a higher standard. For him, anything less was, well, unacceptable. However, Al could not have achieved such a forum without first creating a very successful magazine.

It was from his unique position in the history of our hobby that Al could make his observations. One of our last in-depth conversations was about the passing of so many of our hobby's heroes. The breadth of Al's stay in the hobby positioned him in such a way that he saw the dying embers of the influences that these heroes of the past had on our hobby, and he saw into the future of what our hobby would become. It was from that position that, as a good conscience, Al challenged us both to not forget our past and to move responsibly into the future.

In my heart, and in the hearts of so many of us in the fraternity, memories of Al's contributions will be with us as we move into the future of amateur radio.

And Finally . . .

Carol and I have finally completed our move to Tulsa, Oklahoma. Our e-mail address and P.O. Box remain the same. However, check the beginning of the column for our new fax number.

This move puts us in a different part of the state of Oklahoma and in a new grid locator—EM26. The bad news is that I get to start all over on my VUCC and WAS work on the VHF+ bands. I am now located within the magic ring of increased probability of being able to work all of the lower 48 states on 2 meters without the aid of the Moon. That ring is centered over the corner of Kansas, Missouri, Oklahoma, and Arkansas. While it is generally believed that operators located within that ring have an increased probability of working the 48 states over the rest of the country, it is not impossible for operators outside of that ring to accomplish that goal, as Holly, NØQJM, proved during the *Perseids* meteor shower.

Look for us to be on a bit more now that we have a new home for our antennas.

Next month will be coverage of the impending *Leonids* meteor shower which has the potential of being a storm. Until next month . . .

73, Joe, N6CL

Math's Notes

What's New And How To Use It

Op-Amp Update

Did you say that you needed a little more power in an op-amp? Did you say that the output of your op-amp cannot give you enough drive into a 50 or 75 ohm load? Well, if that's your problem, I have a set of chips for you! These, as you will see, can truly be called op-*amps!*

The new OPA5471819 series from Burr-Brown starts with the OPA547, a TO-220 packaged op-amp with an output peak current rating of 750 milliamperes that's three-quarters of an amp). This device can produce a continuous output of 1/2 amp and has a slew rate of 6 volts/microsecond, so it is fine for use up to a MHz or so and will provide 50 volts pp into 50 ohms with a THD of only 0.004% at that frequency (gain of 1). Fig. 1 shows the power package for the op-amp, and fig. 2 shows the typical schematic diagram. Notice the exact similarity to conventional op-amp design.

Other than the high power output, the device can be used for all usual op-amp circuitry. Additional parameters include a ±30 volt dual or +60 volt single-ended power supply range, an operating temperature range of –40° to +125° C, and an open loop gain of 115 dB. Cost for this device is $4.09 in large quantities and somewhat more for single pieces.

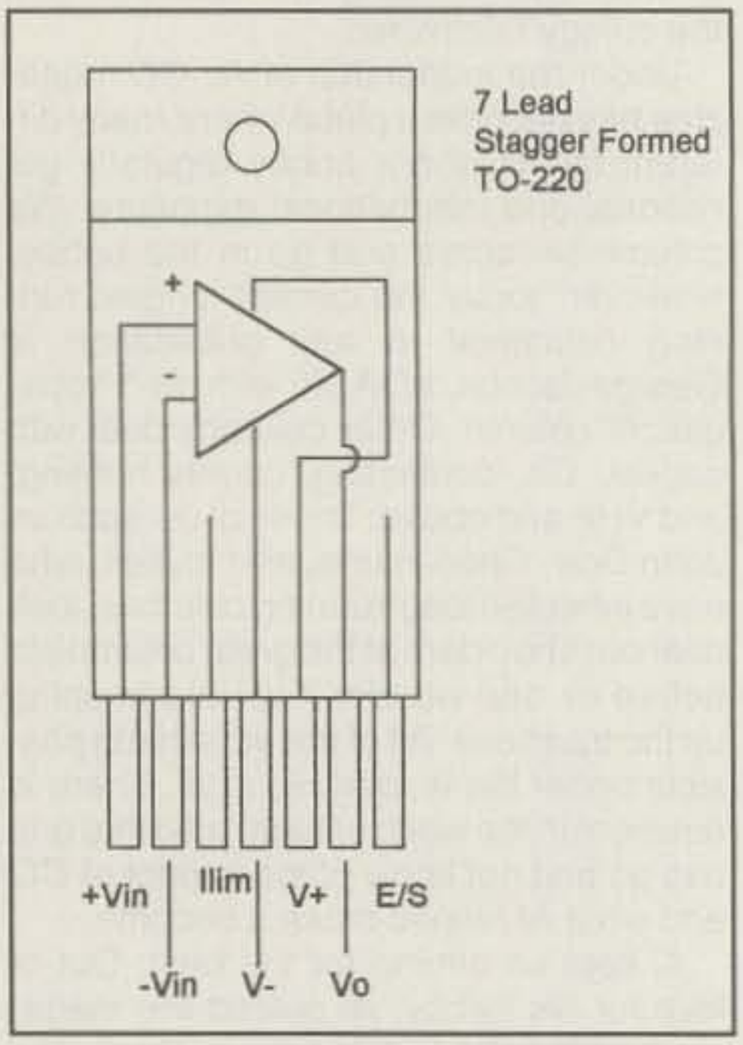


Fig. 1– The OPA547/8 package.

If that is not enough, we now move on to the OPA-548. Now the output peak current rating jumps to 5 amps with 3 amps continuous! The package remains the same, but now this baby will provide the

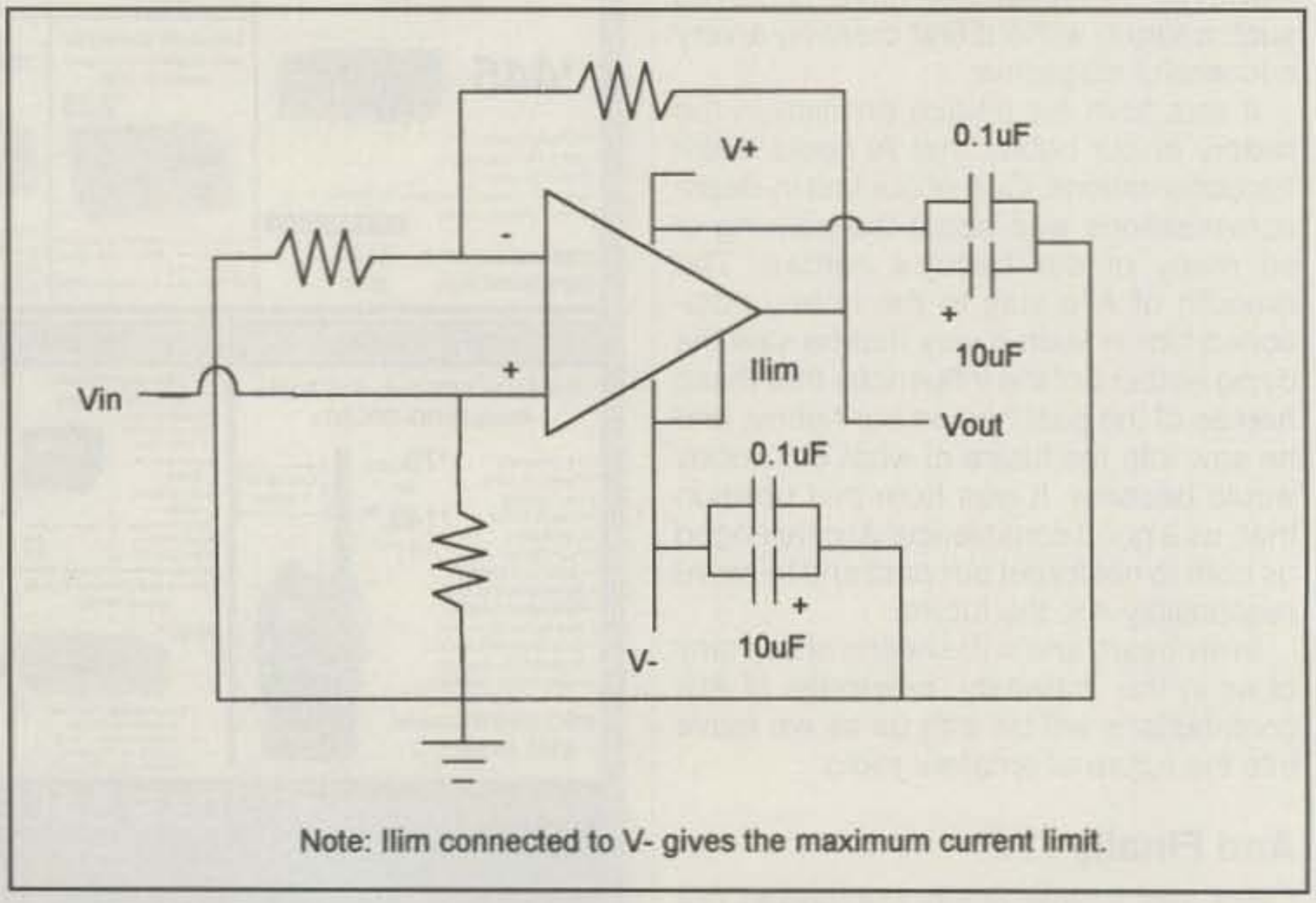


Fig. 2– Typical non-inverting op-amp circuit using OPA547/8/9 devices.

c/o CQ magazine

BY IRWIN MATH, WA2NDM

50 volt pp output into 8 ohms. Boy, what an audio amplifier you can build! Total harmonic distortion is only 0.02%, and open-loop voltage gain is around 98 dB. Power-supply range is the same, and now the real issue becomes proper heat sinking. Cost for the OPA548 is $5.45 in large quantities with somewhat more for single pieces.

For the ultimate, Burr-Brown also has the OPA549, which was just released in April. This device will provide 10 amps peak output and 8 amps continuously. Data sheets were not available at the time this column was written, but the press release indicated a slew rate of 10 volts/µsec, which still equates to better than a MHz of bandwidth. The package is a so-called 11 lead power ZIP (?), and from the press release the other parameters seem to simply be an extension of the lower current devices. By the time you read this, there probably will be more information available from the company. Cost for the OPA549, by the way, is $12.00 in large quantities with again somewhat more for single pieces.

So what can you do with such high-power op-amps? You can build audio amplifiers as we have already mentioned. You can drive various transducers or even motors and develop accurate feedback speed controls. You might be able to push the devices into service at 160 meters, or you can build accurate regulated power supplies. Fig. 3 is a schematic diagram of a manufacturer-suggested power supply circuit using these devices. It is simple to build and has applications for both a bench-top lab supply or as part of some other circuit where high currents are needed. Either way be certain to assure proper heat sinking. These devices will get quite hot.

Before building anything, however, I strongly suggest that you contact Burr-Brown at <http://www.burr-brown.com> for further details and download the data sheet for the device that interests you.

As a final note, I am deeply saddened by the passing of my friend and colleague Alan Dorhoffer, K2EEK. We had been friends since the start of "Math's Notes" in the early '70s, and he was always, in my opinion, one of the true spokesmen of amateur radio. Al was never afraid to express his views verbally or in his "Zero Bias" editorial each month, and every time we got together (which in retrospect was not often enough) the result was always a lively discussion that I am certain we both enjoyed. I only wish there were more like him. I will truly miss Al in the years to come.

73, Irwin, WA2NDM

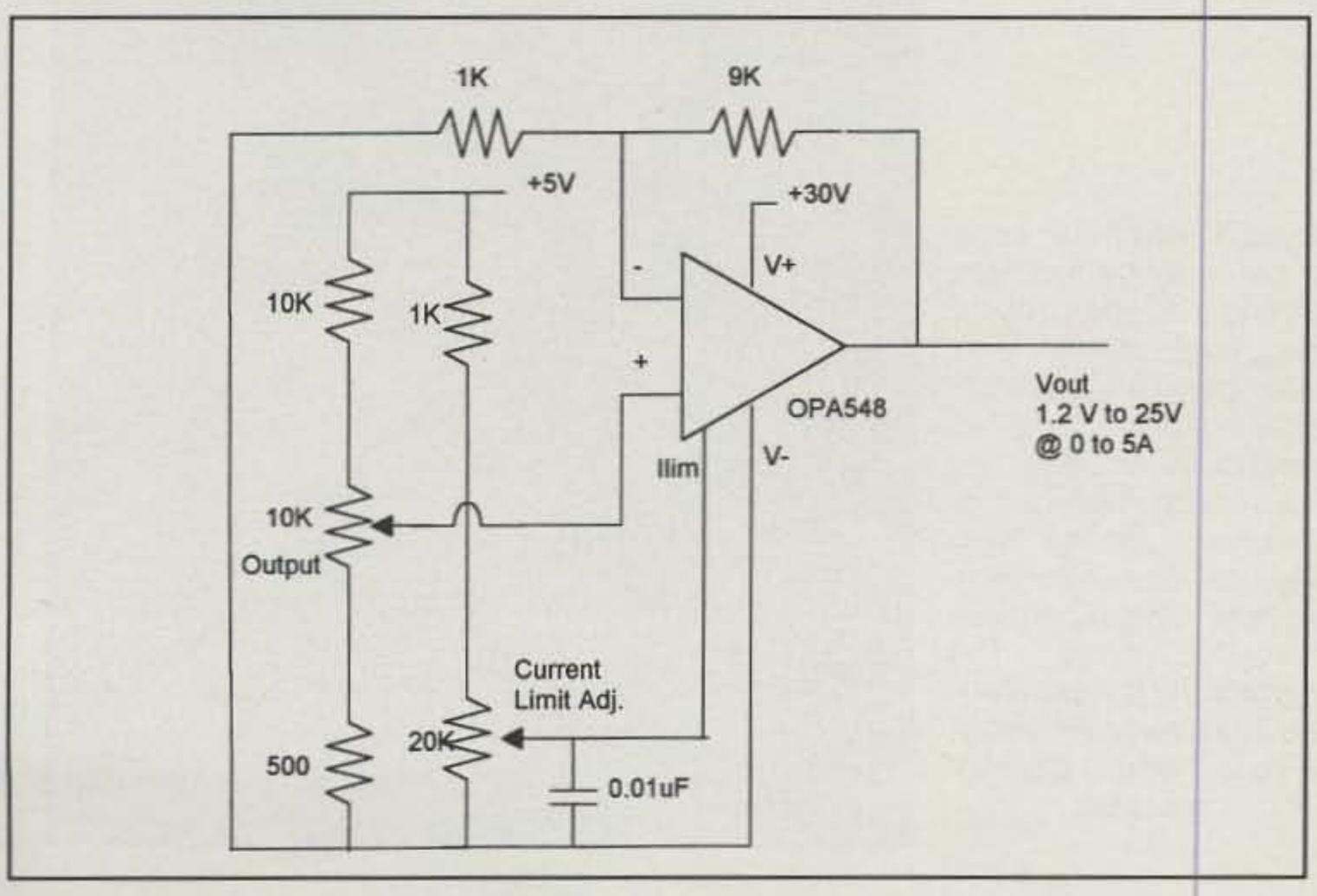


Fig. 3– Lab-type power supply using OPA548.

The Digital Dipole

From Software Through Antennas For The Shack

BY KARL T. THURBER, JR., W8FX

Welcome to Fall '99

How the year 1999 has flown! Already we've been through about three-quarters of the year, the last one of this century. By the time you read this, the calendar will have advanced into fall, when we see the first signs of antenna season waning for another year. In any case, let's begin our fall excursion by setting our sights squarely on the antenna notebook.

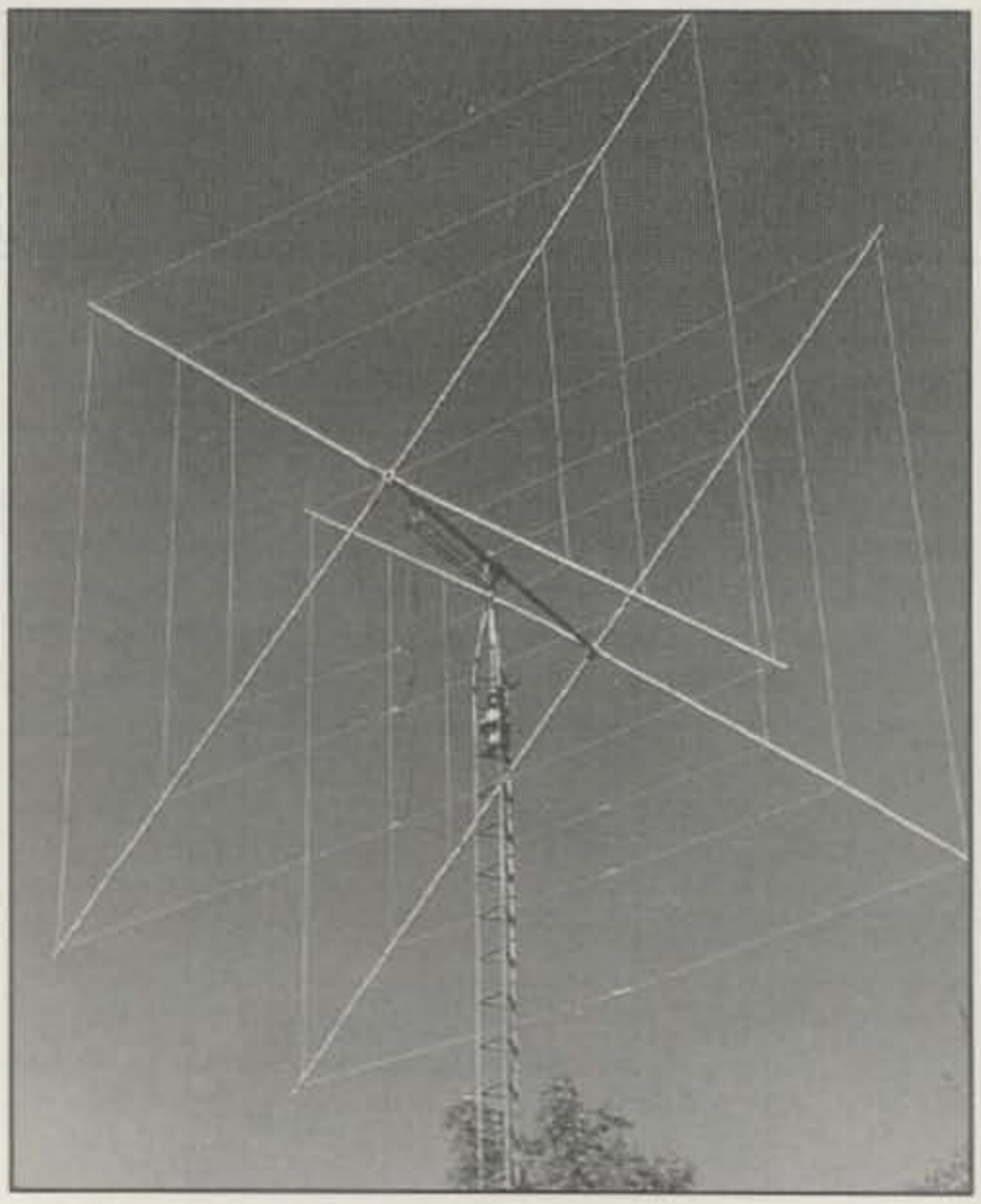
Antenna Notes

CUBEX Quads: New Location, New Products. In the March and November 1996 columns we profiled some of the rugged quad antennas from CUBEX Company, whose motto is "You can't say quad better than CUBEX." The firm, which has been in the antenna business for some 40 years, offers complete quads and quad kits for 2 through 40 meters. All CUBEX models are built using high-quality materials, among them the cast aluminum alloy spiders and fiberglass spreader arms.

About a year ago CUBEX president Norman Alexander, W4QN, announced the relocation of the firm to new and better facilities in Jupiter, Florida, after serving the amateur radio market for some 40 years from southern California and south Florida locations. The move to better quarters is complete now, and several antennas have been announced and promoted recently.

Among these are the CUBEX MANTIS Series Quads. They claim 6+ dB gain on 40 meters, and more gain on other bands, using a 24 or 30 ft. boom (the 40 meter only MANTIS has a 15 ft. boom). The 140 lb. antennas are about 52 ft. tip-to-tip, 36 ft. on each side; wind loads are 17 to 21 sq. ft., depending on the model.

Four MANTIS Series "Monster" models are available. These include the MANTIS II – PT1B, offering two elements on 40 meters ($1325.95 plus s/h); the MANTIS II – PT4B, with four elements on 10/15/20 meters and two elements on 40 meters ($1825.95); the MANTIS II – PT6B, with four elements on 10/12/15/17/20 meters and two elements on 40 meters ($1945.95); and the MANTIS III – PT6B, with four elements on 10/12/15/17/20 meters and three elements on 40 meters ($2449.95). Among



CUBEX, which has been in the antenna business for some 40 years, offers complete quads and quad kits. They currently offer antennas for 2–40 meters. All models are built using high-quality materials, among them the cast-aluminum-alloy spiders and fiberglass spreader arms. The rugged and durable models boast easy assembly. (Photo from CUBEX website)

289 Poplar Drive, Millbrook, AL 36054-1674

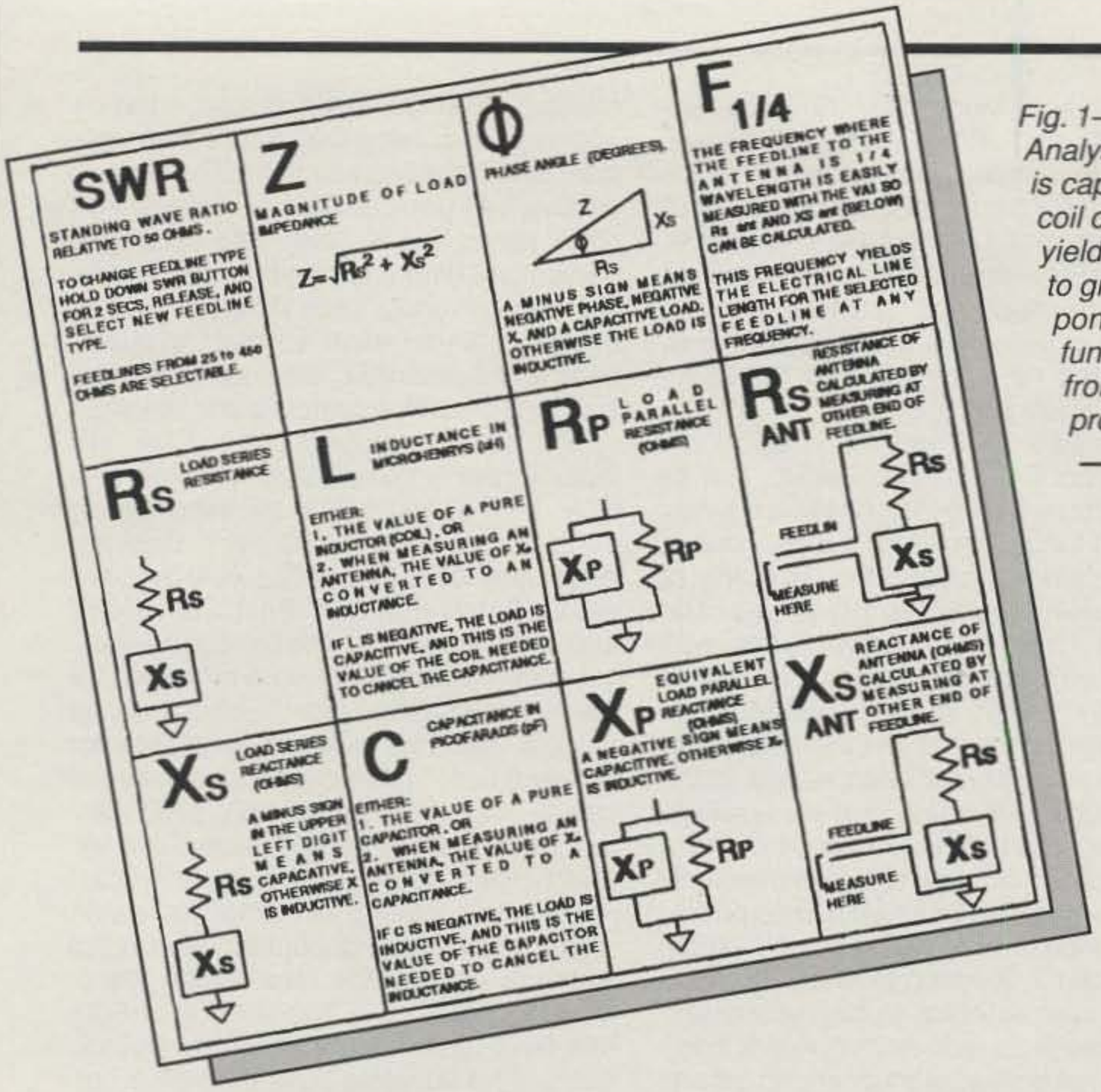


Fig. 1– With the new Autek Research Model VA1 Vector RF Analyst you can easily and instantly tell whether your load is capacitive or inductive, and even find out what value of coil or capacitor to add to eliminate series resistance and yield a lower SWR. The VA1 adds a true phase detector to give you antenna or load R as well as "signed" X components. It also offers other important, easy-to-use functions, as this chart, derived from the instrument's front panel, shows. (Illustration from Autek Research product literature)

other new products are the MF VHF dual-band 2 and 6 meter quad ($112.95) and the SCORPION, a 7-element, 2 meter quad ($94.95), an addition to the popular YELLOW JACKET 4-element, 2 meter quad antenna.

CUBEX also offers the intrepid quad builder a complete line of hardware, rope, and parts. Available components include spiders, fiberglass arms, elements, boom/mast couplers, matching transformers, arm clamps, booms, Dacron® polyester rope, a "high wind kit," and other necessary or nice-to-have goodies.

For a free flyer, including some interesting "Quad vs. Yagi" comparisons and contrasts, contact CUBEX Company, Inc., 228 Hibiscus Street, Jupiter, FL 33458 (561-748-2830; e-mail: <CubexCo@aol.com>; on web: <http://www.cubex.com>).

Autek Research Model VA1 Vector R-X Antenna Analyst. In the October 1994 column we profiled the Autek Research RF1 Antenna Analyst™. As we noted in that writeup, Autek Research has been turning out high-quality amateur radio accessories since 1972 under the capable stewardship of Bill Onesky, N6WO.

The original Model RF1 Antenna Analyst was (and still is) a digitally based, "do-all" HF antenna analyzer with a microprocessor for digital readout of just about everything, not just frequency. As such, the $129.95 instrument greatly simplifies the construction, measurement, and adjustment of antennas, transmission lines, tuners, and RF networks from 1.2 to 35 MHz continuously.

In February 1998 we noted that Bill expanded his RF Analyst product line to include the new RF5 VHF Analyst. It's very similar in function to its RF1 older cousin, although it doesn't have the capability of directly reading out L and C values. The $229.95 RF5 VHF Analyst goes well beyond the frequency range of the RF1 to cover 35–75 MHz and 138–500 MHz.

The big news is that an innovative, third Antenna Analyst has been added to the product stable. It's designed especially to compete head-to-head with the new, sophisticated antenna test and measurement devices offered by MFJ Enterprises, AEA/Tempo, and others. The new Model VA1 Vector R-X Antenna Analyst™ adds a true phase detector, to give you antenna or load R as well as "signed" X components, plus several other important and easy-to-use functions (see the functions chart in fig. 1).

With the new device you can easily and instantly tell whether your load is capacitive or inductive, and even find out what value of coil or capacitor to add to eliminate series resistance and yield a lower standing wave ratio (SWR). The device also tells you the parallel reactance that will produce the lowest SWR. (The unit isn't limited to 50 ohm lines; you can measure SWR on over 10 feedline impedances from 25 to 450 ohms.)

The new VA1 even calculates the R and X components of your antenna when measuring at the far end of the feedline. No halfwave line is required; you just measure or calculate the feedline electrical length using the instrument. Like the RF1 (which still is available for those who are mainly concerned with SWR and Z measurements), the VA1 can cycle between several measured values so you can watch them together.

The VA1's illustrated instructions cover many typical hamshack applications, not just bare-bones instrument operations. The VA1 is $199.95 plus $6 s/h; RF1/RF5 and VA1/RF5 combo offers also are available for all-band coverage.

For a flyer with detailed specifications of all three instruments, contact Autek Research, P.O. Box 8772, Madeira Beach, FL 33738 (813-886-9515).

NewTronics Hustler Catalog. Newtronics Antenna Corp., with its line of Hustler antennas, is a supplier of CB, monitor, and amateur fixed-station and mobile antennas. The Texas-based firm offers a 26-page antenna and antenna accessories catalog that details their considerable antenna selections. The Hustler catalog also depicts mounts, springs, and other useful accessories. The catalog is particularly useful to beginners in that its sections covering each different type of antenna offered have succinct explanations of the antennas' electrical, mechanical, and mounting features and details.

The Hustler amateur product line still includes the extremely popular, classic 4-BTV, 5-BTV, and 6-BTV HF fixed-station vertical antennas, which trace their lineage back to the late 1950s. Also featured are the heavy-duty "HS" Spirit Series VHF and UHF antennas. These rugged vertical antennas originally were produced for the commercial and professional antenna market, but they now are available for amateur use. The catalog also shows the similar, very heavy-duty "HD" series antennas that, like the "HS" series, are virtually impervious to common antenna perils such as lightning, ice, wind, and water.

For a free catalog, contact Newtronics Antenna Corp., One Newtronics Place, Mineral Wells, TX 76067-9563 1-800-949-9490; web: <http://www.new-tronics.com>. The firm also sells through a network of over 60 dealers and distributors.

Soft Stuff

GeoClock. Way back in 1991 we profiled the very popular, DOS-based GeoClock precision map graphics program. Joe Ahlgren's versatile shareware application is thriving today, being offered in several highly capable DOS- and Windows®-based versions, so it's time to revisit it.

To briefly review, GeoClock shows the current time, based on your computer's system clock, on a high-quality map of the Earth. The Sun's current position is displayed, and the parts of the Earth that are in sunlight and in twilight are highlighted. This display is automatically updated every few seconds. Local sunrise/sunset, the Sun's azimuth and elevation, and times around the world are displayed. Various map backgrounds and other options are available.

GeoClock long has been distributed as shareware, or "try before you buy" software. With registration you get the latest program versions, some 44 maps, zoom and distance measuring capabilities, local time displayed next to city names, and immediate map displays. The program comes in DOS and Windows versions; both are included with registration. The Windows version also includes screen saver and "wallpaper" modes. Registration for the DOS and Windows programs (which are functionally and graphically very similar) is $35 with basic maps on a 3.5 inch floppy; upgrades from previous versions are $15.

The best news is that GeoClock now is available on CD-ROM. The CD contains the complete GeoClock suite with all options, including the revolving GeoGlobe; it's less only the specialized Ham add-in package, which requires a custom map. The CD also contains some 300 new maps, including 140 city maps and a large number of 800 × 600 maps; in total, there are over 500 maps. The GeoClock CD is $75, including registration, for new users; the price is $50 for owners of prior registered versions.

The ham add-in package for Windows and DOS offers several special functions of considerable interest to radio amateurs. It provides graphical display of remote station location, propagation path, and D- and F-layer illumination, together with key location, pointing, distance, and time data. The ham package includes a custom azimuthal-equidistant map centered on your station's location (QTH), a callsign database, and utility programs. The add-in requires a registered copy of GeoClock to run; it's $30, or $15 with the purchase of GeoClock on CD-ROM.

For more information on GeoClock, contact the program's author, Joseph R. Ahlgren, 2218 N. Tuckahoe St., Arlington VA 22205-1964 (703-241-5809; e-mail: <Joe@GeoClock.com>; web: <http://www.clark.net/pub/bblake/geoclock>). Program updates are available to registered users on the GeoClock Website.

HAMCALC: Still Another New Edition. In a number of "Digital Dipole" columns over the past several years, we have profiled the ongoing updates to George "Murph" Murphy, VE3ERP's excellent, free, DOS-based HAMCALC math and design programs. Murphy defines his very comprehensive software as providing "painless calculations for amateur radio operators."

In between writing several interesting feature articles for *CQ*, Murph is producing new versions of HAMCALC; a short while ago we received Version 38. (By the time you read this column, HAMCALC probably will be in another, even more improved version.)

According to Murph, the HAMCALC freeware package has prospered since its introduction as a reference and learning tool in 1993. The current version has over 200 math and design programs and program upgrades; included are calculation routines of interest not only to radio amateurs, but to professional engineers and university faculties alike.

You can find copies of the program for download on the Internet. However, the main (and preferred) method of distributing the program is through people ordering copies from Murph after reading about

it in *CQ* and other amateur radio publications. For a copy on a 1.44 Mb IBM-PC format diskette, send $5 (in U.S. funds, no stamps or IRCs) to cover the cost of materials and airmail worldwide, to George Murphy, VE3ERP, 77 McKenzie St., Orillia, ON L3V 6A6, Canada (e-mail: <ve3erp@encode.com>).

Note: A DOS-based program, HAMCALC is written in GWBASIC and requires you to have GWBASIC.EXE installed on your PC's hard drive. The disk tells you how to obtain this program easily if you don't already have it. Or, you can remit a total of $6 (instead of $5) if you want a GWBASIC.EXE diskette included.

From the Bookshelf

ARRL's Wire Antenna Classics. Are you "skyhooked" on HF wire antennas? Whether you hang 'em high or hang 'em low, you've probably found that wire antennas represent the best antennas to use to get on the air simply and inexpensively. I know that I have found this to be the case over an amateur radio career that has spanned nearly 45 years. And I've got just the book for you.

This new book, compiled by ARRL staffer Chuck Hutchinson, K8CH, is a collection of some of the best antenna articles from ARRL publications, a book of both antennas and ideas. Dipoles (including broadband and multiband types), loops, collinears, rhombics, wire beams, verticals, receive-only types, and more are featured. There's even a chapter on trees and tree-mounted antennas, including info on trees' care and feeding!

The ten-chapter book also makes an excellent wire-antenna historical resource. I say that because I was pleasantly surprised to find many of the original, trend-setting wire-antenna classic articles dating back to the 1950s included among more recent articles from the 1980s and 1990s.

ARRL's Wire Antenna Classics is $14 plus $4 s/h. It's available from the American Radio Relay League, 225 Main St., Newington, CT 06111-1494 (1-888-277-5289; e-mail: <pubsales@arrl.org>; web: <http://www.arrl.org/catalog>).

More Antenna Classics. While we're on the subject of antenna classics, we should point out that a nice companion to the new wire antenna book is *Vertical Antenna Classics*, at $12, also from the ARRL and compiled by Robert Schetgen, KU7G. It's a 1995 collection of 35 published articles on the vertical antenna from various ARRL publications. Chapters include theory and modeling, VHF and UHF, HF, directional arrays, reduced-size antennas, and radial and ground systems.

Going one step further, I'll state that both ARRL books make nice companions to *CQ*'s own antenna classic, the *Vertical Antenna Handbook*, by Paul H. Lee, N6PL. It's still in print and available from CQ Communications for $9.95 plus $4 s/h (the new *CQ* website also features secure online ordering). The classic Lee book helps you learn the theory, design, and practice of the vertical antenna, taking advantage of the late author's 20 years of research and practical experience as a naval communications engineer.

For a copy, contact CQ Communications, Inc., 25 Newbridge Rd., Hicksville, NY 11801 (1-800-853-9797; e-mail: <cq@cq-amateur-radio.com>; on web: <http://www.cq-amateur-radio.com>. (Don't forget to peruse the new *CQ* website. Although the website is still in its infancy, *CQ* is justifiably proud of it and has some great things planned. To start, you can e-mail most *CQ* authors, including yours truly, through the website.)

PCs Cheat Sheet. Are you just "getting your feet wet" on personal computers (PCs), and are you too busy to sit down and really study what they are all about? If so, check out *PCs Cheat Sheet*, by Shelly O'Hara. It's a unique, two-in-one book that offers fast answers for busy people, plus in-depth study for when you have the time. Each chapter of the 334-page, four-part, 56-chapter book starts with a "basic survival section" to get you going fast. When you're ready to do more, you can move on to clear, thorough coverage of the best ways to use PCs.

Taking a sort of schoolhouse approach, the most important material is already yellow-marker highlighted for you, to help minimize fumbling through the book when you need a quick solution. Each chapter includes handwritten notes and shortcuts.

The $14.99 book is available in local bookstores, or contact Macmillan Publishing USA, 201 West 103rd St., Indianapolis, IN 46290-1097 (1-800-858-7674) for a free computer books catalog. E-mail: <info@mcp.com>; on the web: <http://www.mcp.com>.

Incidentally, as we have mentioned previously, Macmillan's massive but easily navigable website is a treasure trove of useful information. The Macmillan site at <http://www.mcp.com> offers online computer resource centers, distance learning information, product support, software downloads, special offers, upcoming book previews, online Ebook viewing, and other features that supplement Macmillan's extensive line of computer books.

Wrap-Up

That's all for this time, gang. Next time more "Digital Dipole" topics of current interest. See you then.

Overheard: One thing I've learned from this hobby is that when erecting and disassembling antennas, almost anything is easier to get *into* rather than *out of*.

73, Karl, W8FX

World Of Ideas

BY DAVE INGRAM, K4TWJ

A Look At The World Around Us

Crystal Set Resurrection—Part I

This month's column features a special treat for our friends of all ages and backgrounds: a blowout review and heart-warming look at those ever-popular crystal sets of yesteryear (and today!). Many of us (including your author) had our very first exposure to homebrewing basic electronic projects through these low-cost delights, and they also (directly or indirectly) opened the door to amateur radio for us. As grade-school youngsters, our ability to read and understand circuit diagrams often left something to be desired, but that just emphasized the beauty and "forgiveness" of crystal sets. They worked despite our wiring errors and "self interpretations" of their diagrams.

Was it a fun time? The best! It always is when you are learning and growing. Yes, and just like eating potato chips, we could not stop with just one quickly assembled crystal set. (Stop? Making and selling them to other kids at school financed parts to build my first rigs. What about you?) We built crystal sets in such a wide variety of styles and—err—designs that we gave new meaning to the term "kitchen table construction." Yes, friends, and the good news is that those joys of home-assembling and experimenting with crystal sets continues alive and well today.

Crystal sets exhibit a simple and timeless elegance that transcends the annals of time, from the early 1900s to the 1950s, '60s, and beyond. Just like classic keys and bugs, they also represent a true piece of radio's proud history. Building, replicating collectible versions, and just experimenting with conventional types of crystal sets is one of life's special pleasures. In many ways, I see it as the "electronic equivalent" to making and flying kites of lightweight wood and newspaper. I know of no better way to indoctrinate that special person or next-generation family member in your life to the wondrous world of wireless communications and, yes, amateur radio!

Enough! Space is limited and some exciting notes and views await, so let's focus on some of the neatest little crystal sets I have seen. Then we will introduce the world-famous Crystal Set Society and discuss some circuits. This will be a fast moving tour, so hang on tight and let's get started!

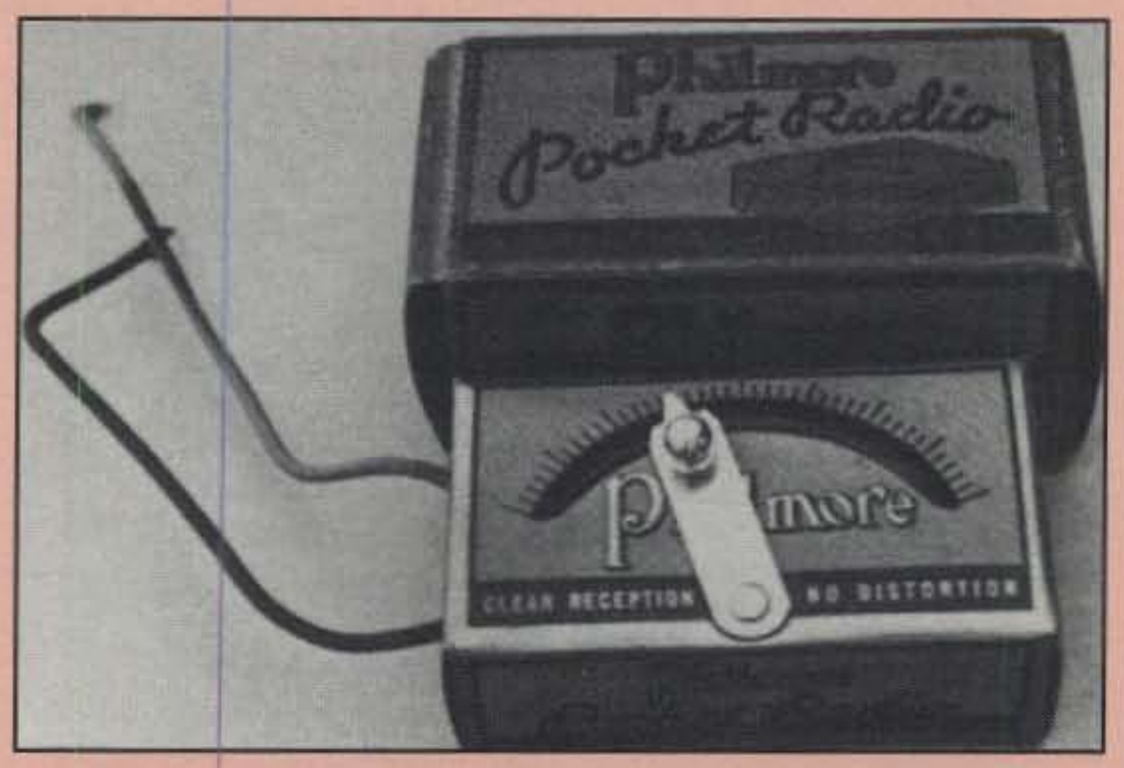


Photo 1– This Pocket Radio was made by the Philmore Mfg. Company of New York during the 1930s, and it is only one of many neat crystal sets produced by that well-known company between the 1920s and the 1980s. In many respects, Philmore could be called the "Vibroplex of crystal sets," and like Vibroplex, all past-era models are modern-day collectibles. (Photo courtesy Dr. M. L. Sievers and Sonoran Publishing Company)

Photo 2– Two versions of Pee Wee radios produced by the famed Midway Company of Kearney, Nebraska and sold by mail. Remember seeing these little plastic-cased heartthrobs advertised in Popular Electronics *during the 1950s? Where, oh where have they gone today! (Photo courtesy Dr. M. L. Sievers and Sonoran Publishing Company)*

Crystal Set Showcase

Although some folks might consider it a ploy to capture your attention and imagination (Would I do that?), let's begin with a couple of "bright lights and glamour" views of classic "store-bought" crystal sets (photos 1 and 2). These illustrations, incidentally, are samples from *Crystal Clear*, Volume I written by

4941 Scenic View Drive, Birmingham, AL 35210

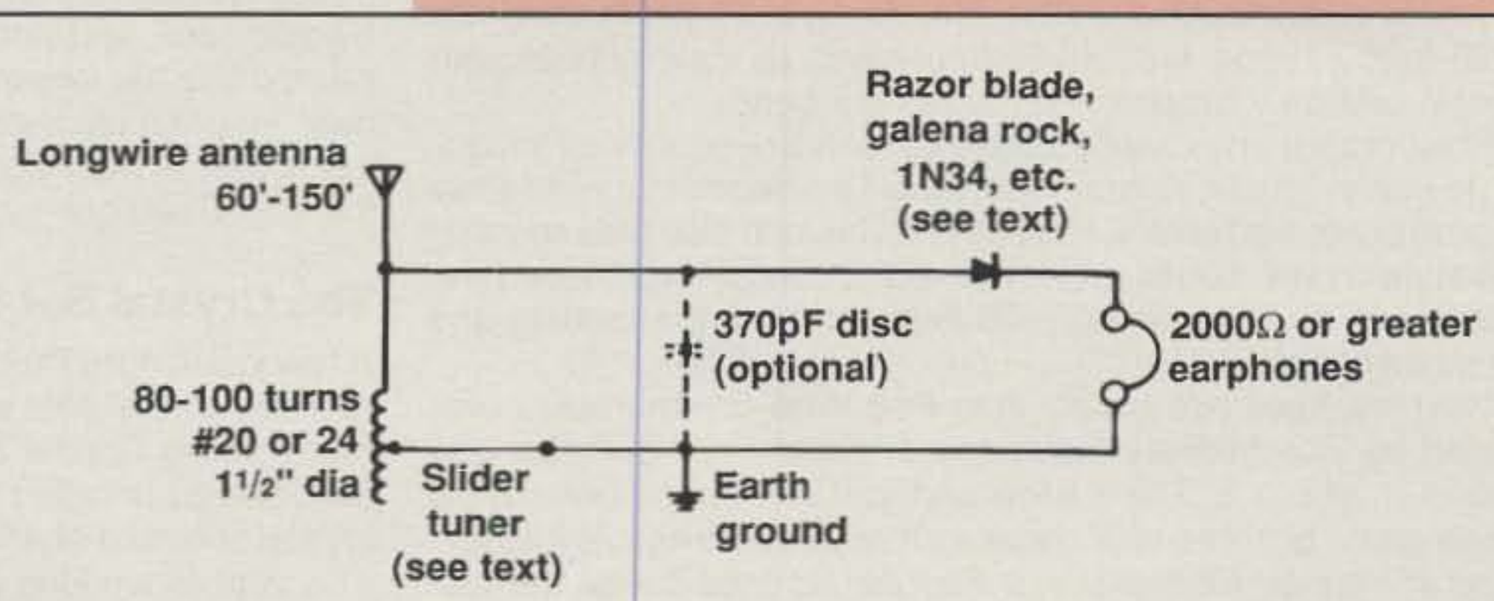


Fig. 1– Probably the most popular and widely duplicated crystal set circuit, past and present, is the one shown here. Some versions included the optional antenna coil for extra volume, some did not, and all worked great. Assuming a crystal set does not get zapped by lightning or rusted from negligent storage, it will work for years without batteries.

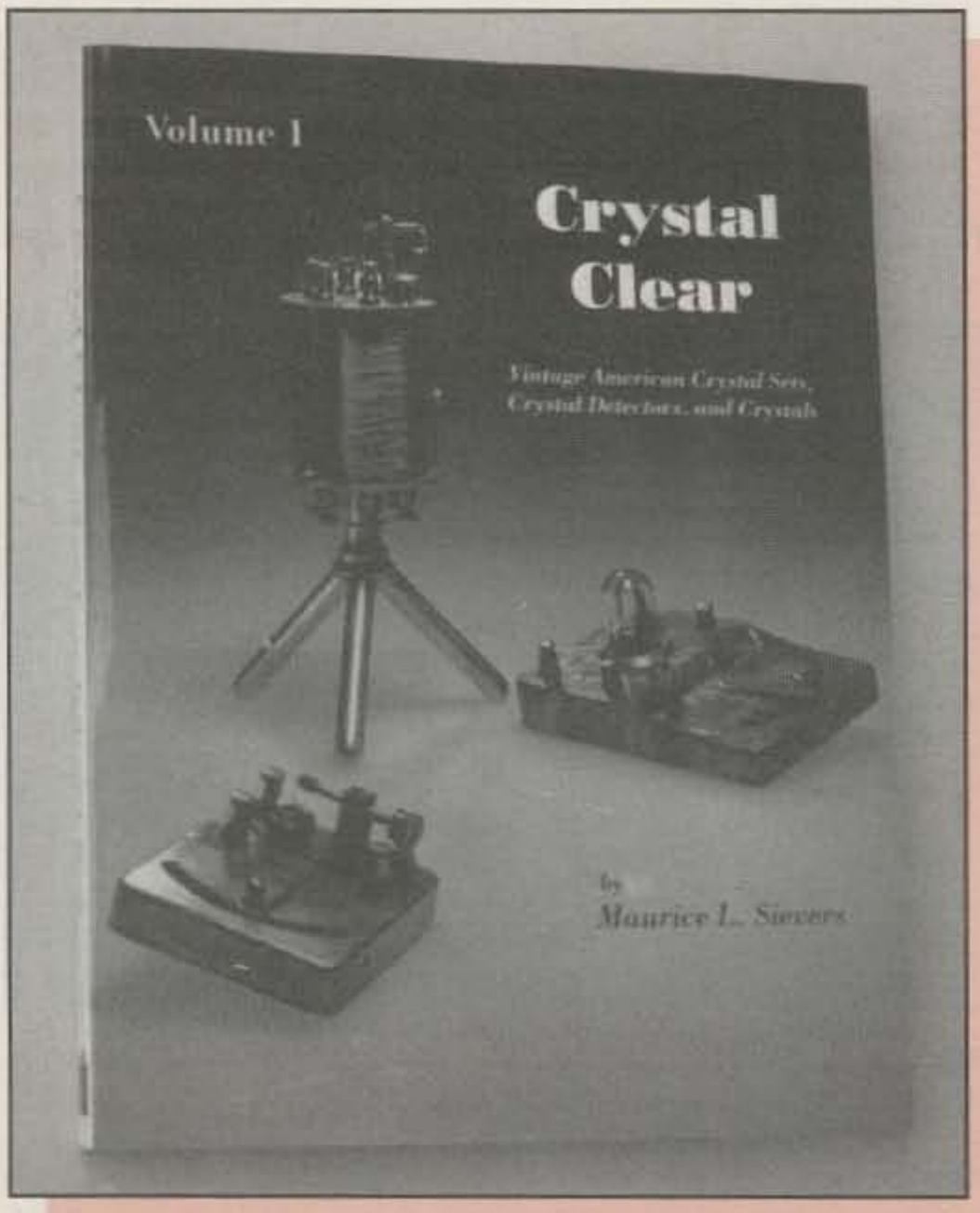


Photo 3– Crystal sets of every type, style, and era imaginable are brilliantly presented in this top-grade Crystal Clear *Volume I compiled and written by Dr. M. L. Sievers and printed by Sonoran Publishing Company of Arizona. Its "show and tell" format is similar to my popular* Keys, Keys, Keys *and* Keys II *books. (Details in text.)*

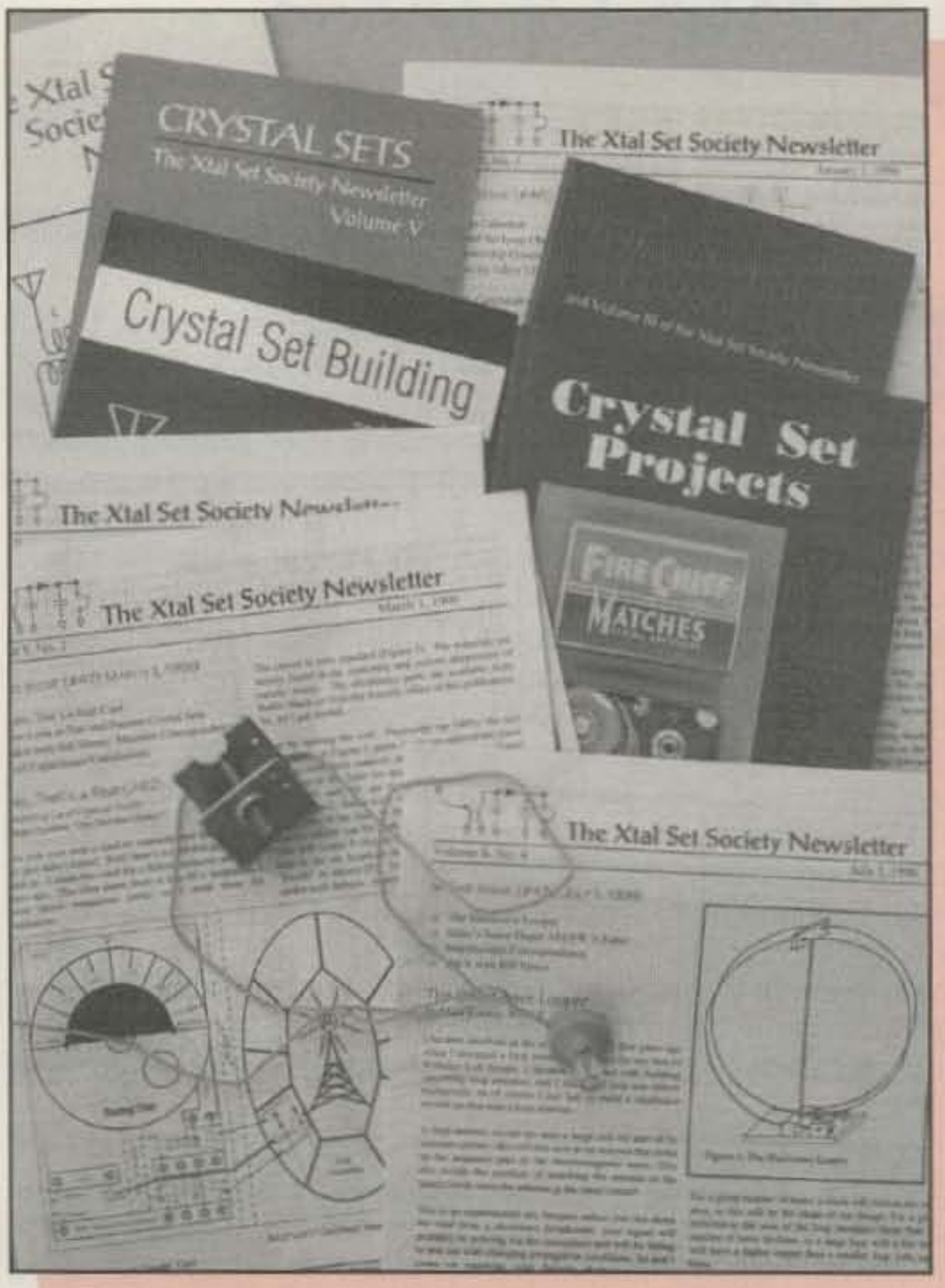


Photo 4– The Crystal Set Society is "world headquarters" for information and goodies relative to crystal-set receivers. Shown here is a sampling of some recent "XSS" newsletters, captivating books, and hard-to-find items such as a miniature open-frame 365 pFd tuning capacitor and a high-impedance crystal earphone.

Dr. Maurice L. Sievers and available through Sonoran Publishing LLC, 116 N. Roosevelt, Suite 121, Chandler, AZ 85226 (602-961-5176). This book is undeniably a crystal-set lover's dream (photo 3). It highlights over 500 crystal sets, 300 crystal detectors, and 200 crystals and galenas in its 268 pages, and all photos and illustrations (over 750 total!) are of super high quality. such as a coffee table book of the Titanic or WW II planes. If you are not a crystal- set enthusiast before reading *Crystal Clear,* you will be afterwards!

Now referring to photo 1, this little Pocket Radio was made by the Philmore Mfg. Company during the 1930s, and it works just as well today as it did 70 years ago. (There is really nothing to "go bad" in a crystal set.) Say the name sounds familiar? It should. Philmore was the industry's most well known and longest lived producer of crystal sets, with models such as the Supertone, Blackbird, and Little Wonder spanning the years from 1925 to the 1980s. Indeed, Philmore was as synonymous with crystal sets as Vibroplex is to bugs—a legend.

Philmore's many varieties of crystal sets are equally as intriguing to study— (well, almost!). Sets were produced in a wide array of case styles and colors. Post-WW II versions also utilized modern-style crystal diodes rather than point-contact-type detectors. Watch out, as collecting crystal sets can be habit forming and oh so enjoyable!

Next we have two classy little Pee Wee crystal radios produced by The Midway Company of Kearney, Nebraska and shown in photo 2. Think back and you will remember seeing these gems or some of Midway's other palm-size radios advertised in *Popular Electronics* or *Popular Science* during the fabulous '50s. Yes, and they really were enticing. You just had to clip the antenna lead to a (rotary) telephone's fingerstop, hold the ground clip or snap it on a cold-water pipe, and the radio would play indefinitely. (Was it really using all the phone lines in the city for an antenna?) This was also a radio you could lay on your pillow and listen to all night long without using batteries. Fun all the way! Midway, incidentally, was another big name in crystal sets, a name I would place parallel to Speed-X in bugs—number two or three in popularity, so to speak.

Other varieties of crystal sets include the famous Rocket Radio, pen radio, wallet radio, and more. They were produced by slightly less well known manufacturers such as Remco, Metro, Radioceptor, and dozens more and have unfortunately disappeared into the woodwork over the years (sigh!). Oh, if we had only bought a big batch of them back when we were young and penniless! Ah, but don't fret. There's still hope. Homebrewing is the key. Read on.

The Crystal Set Society

A few years ago, Phil Anderson, W44XI, of Kantronics notoriety realized crystal sets were an important part of radio history and founded the Crystal Set Society. The society's main goal was (and still is) bringing together those with a common interest in crystal sets and sharing views with via a bi-monthly newsletter. The plan is working great, and the "XSS" is enjoying healthy

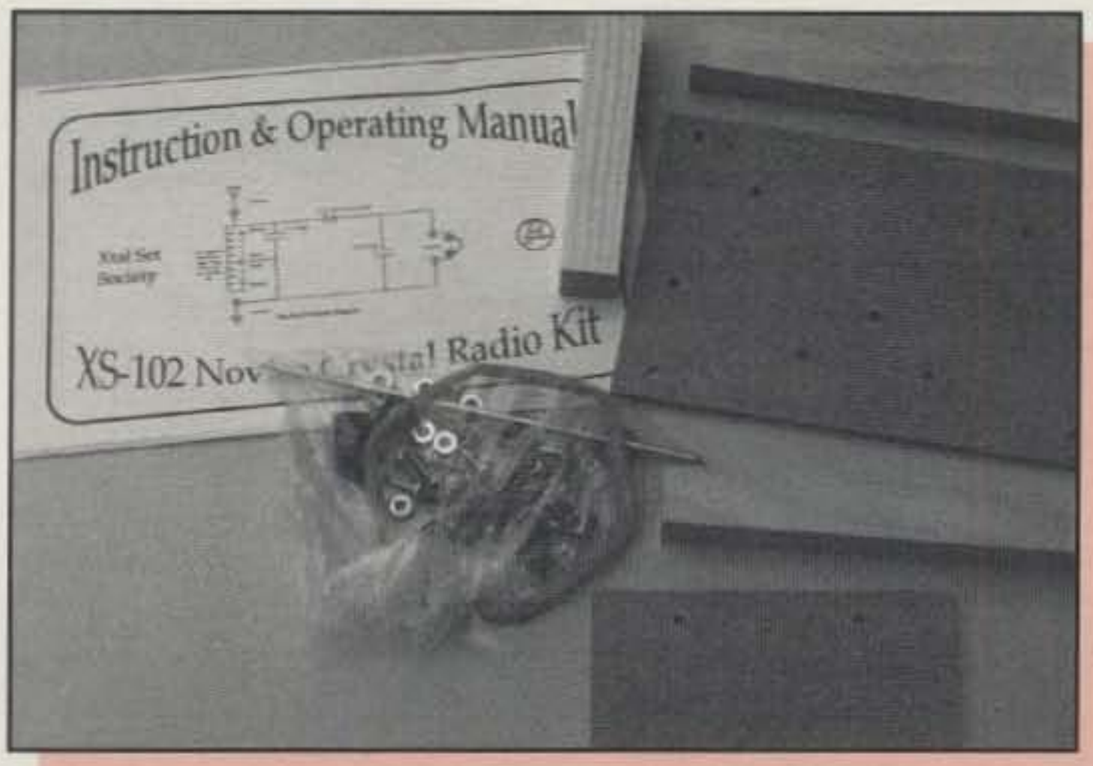


Photo 5– The Crystal Set Society's XS102 crystal radio kit as received and laid out for assembly. The item is well thought out, cleverly documented, and makes a dandy "first project" for kids from 8 to 80.

growth. Some recent newsletters, for example, have included "build 'em" details on sets in matchboxes, on Frisbees, in oatmeal boxes, and even a flat greeting-card version with spider-web coil. Some other issues highlighted the ten most popular crystal-set circuits. Can you believe it? Ten circuits on crystal sets, and those are just the most popular versions. The total count is even higher!

Today the Crystal Set Society is spearheaded by Phil's daughter, Rebecca A. Hewes, and has almost 1000 members nationwide and worldwide. Under Rebecca's dedicated care, the society also maintains an outstanding bookstore. It carries a wide array of books and crystal- radio kits plus difficult-to-find parts such as small open-air 365 pFd tuning capacitors, galena holder and catwhisker detector stands, and high-impedance crystal earphones (photos 4, 5, 6, and 7).

Just looking at the society's two main kits inspires unquenchable enthusiasm for building at least one crystal set. Their "starter model" XS102 (photos 5 and 6) makes a dandy indoor project for a cold winter day. The kit includes a parts/layout guide, easy-to-read and understand instructions, and goes together without any soldering. Their "fancy model" XS101 (photo 7) sports genuine spider-web coils and covers the approximate frequency range of 550 kHz to 8.0 MHz. Its optional wood case is unfinished pine wood and really makes the radio a showpiece. What a neat pair of heartthrobs!

If you have even a slight interest in crystal sets, ordering a membership and a big pile of goodies from the XSS is like open-

Photo 6– An assembled XS102 looks as good as it works. Decorative front panel and parts layout guide are included in the instructions and glue to boards for a nice finishing touch.

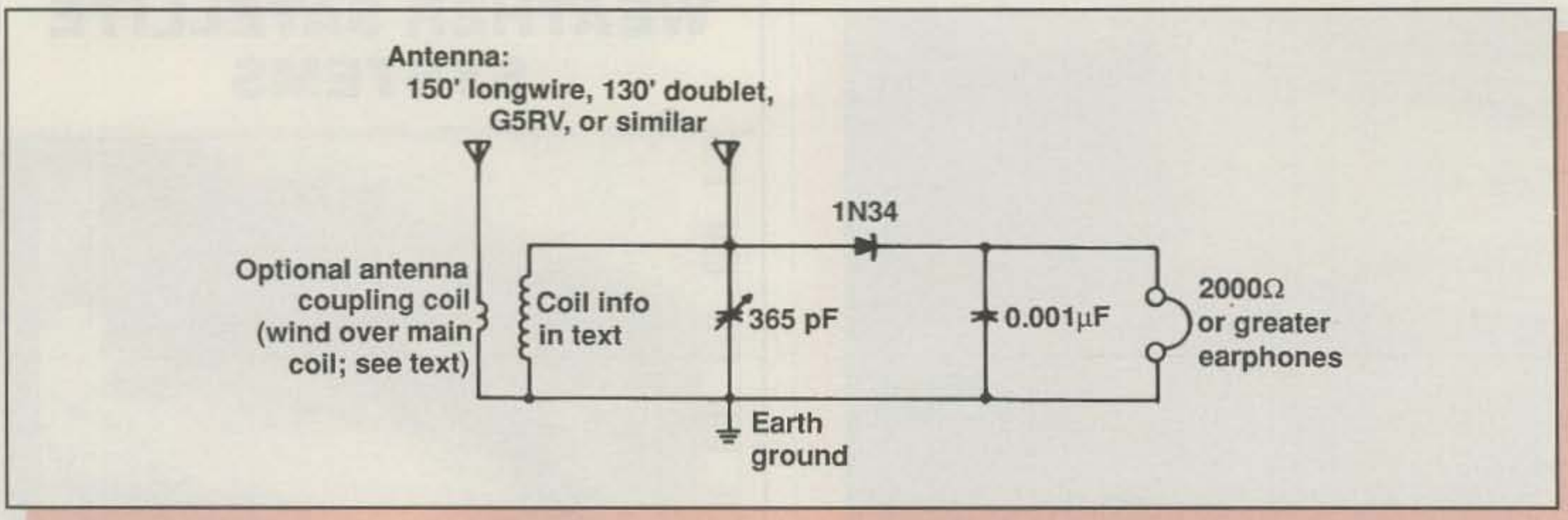


Fig. 2– Circuit diagram of the famous Foxhole Crystal Radio. It was typically assembled on a small board using mess- kit supplies such as a razor blade, lead from a pencil, a safety pin, and a tissue roller. The antenna was random length of wire and ground was wire wrapped around knife stuck in the ground.

ing the door to fantasyland. Membership and integral newsletter subscription is $10.95 a year U.S., $12 Canada, or $17 DX and goes to Rebecca A. Hewes at the Crystal Set Society, P.O. Box 3026, St. Louis, MO 63130. The XSS order line (only) is 1-800-927-1771, or you can e-mail XSS at <xtalset@midnightscience. com>. Go for it!

Dink Haven

So, friends, are you still sitting there reading about crystal sets rather than building one of your own just for fun? What is holding you back? Lack of a good circuit diagram and coil info? Okay, a couple of all-time favorites are shown in figs. 1 and 2. They are only a small sampling of the endless varieties, true, but they are all we can squeeze into remaining column space. More circuits are coming in Part II next month.

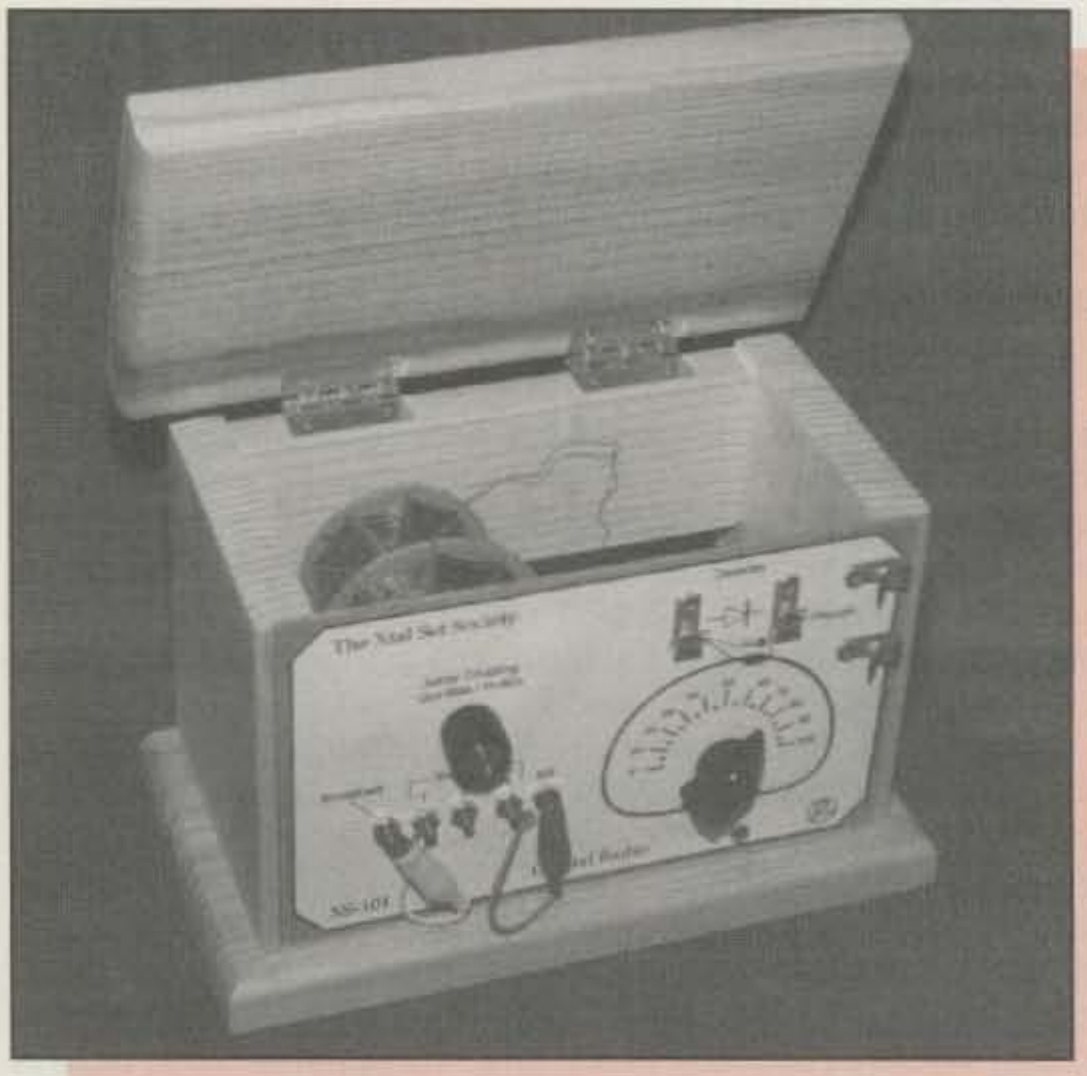


Photo 7– "First class and total flash" best describes this terrific XS-101 kit available today from the Crystal Set Society. It features dual spider-web coils, optional wood case with hinged top, plus front- panel overlay, and receives the AM broadcast band through approximately 8 MHz. (Photo courtesy Rebecca A. Hewes and the Crystal Set Society)

If you have never assembled a crystal set, some quick "get you going" notes follow. (Hopefully, some newcomers and younger amateurs are reading our column right along with the "old pros.")

First, the size or gauge wire used to wind a set's coil is not a critical matter. Using number 18, 20, 22, 26, or even 30 wire rather than number 24, for example, will not noticeably alter a set's performance. Using bare wire rather than enamel-coated

copper wire in a close-wound coil can prove troublesome, however, as all the turns will be short-circuited. Just think logically and you will do fine.

Folks have used everything from nuggets of fool's gold and razor blades to 1N64 and 1N82 diodes for detectors in crystal sets, and they all worked fairly well. For best results, however, I heartily recommend at least starting out with a modern glass-enclosed 1N34 (even Radio- Shack sells them). Once you confirm your set works, then you can make substitutes against that known-good reference. Need I repeat it? Start with a known-good 1N34!

Finally, a high-impedance (2000 to 20,000 ohms) crystal-type earphone rather than a low-impedance (8, 16, or 32 ohm) earphone or Walkman-type "earbud" must be used with a crystal set. Why? It is the diode's load resistance or impedance, and the higher its value, the more signal or voltage developed across it—and the louder its volume. An 8 ohm earphone acts like a dead short and kills all volume. A single (or a pair of 2000 ohm earphones is near ideal. "Perfect" is a pair of classic Baldwin earphones, but they are both rare and expense.

Now let's quickly discuss what many folks consider the most popular crystal-set circuit of all, shown in fig. 1. This set's main coil consists of 40 or 50 turns of number 20 or 24 enamel-coated copper wire wound on a form 3 inches in diameter and 3 inches long. An open-air 365 pFd variable capacitor is connected in parallel with it for AM broadcast band reception. (Have you listed to AM radio lately? It is making a comeback!) If desired, a coil of 10 turns (also number 20 or 24 wire) spaced equally along the form's full length and a parallel-connected 100 pFd tuning capacitor or the small section of an old-time "365 dual capacitor" will tune shortwaves. Coverage will be approximately 4 to 15 MHz. Alternately, consider using a unique spider- web coil such as featured in my October 1998 "Classics" column. That should really make it an attention grabber. An optional antenna coupling coil is also shown in fig. 1. Some folks included it in their sets, while some did not. It is thus your choice. If used, just remember to connect the antenna to the coupling coil, which is usually one-quarter to one-third the turns of the main coil. For simplicity, just use plastic-insulated doorbell wire and wind the antenna coil over the middle area of the main coil. It will step up incoming signal voltage and give a bit more volume.

A somewhat different form of crystal set is shown in fig. 2. This one depicts the well-known "foxhole radio" of WW II fame and could even be home-assembled as an authentic replica radio, if desired. Hopefully, old timers remember the physical details of this set and will share them with younger amateurs (the full story will fill a complete column). Alternately, drop me a note if you wish to see the Foxhole Radio as the main feature in a future column. I aim to please. Now let's squeeze in some notes as we approach the closing wire.

This radio's "diode detector" is a single- edge razor blade with a piece of lead snapped from a wooden pencil pressing against its surface like a catwhisker. The lead is wire-wrapped to the tip of a bent safety pin for support. The blade and pin, in turn, are screwed down to the radio's baseboard. Note stainless-steel blades will not work as detectors; use only a genuine "blue blade." To the best of my knowledge, there is only one type made today: the Pal Super Single Edge made by The American Safety Razor Company, P.O. Box 500, Staunton, VA 24401. This set's coil is 80–100 turns wound on a 1 1/2 or 1 3/4 inch tissue roller. Sand all coil turns down to the copper at the top, and then use a 7 inch piece of sanded, shiny clean coat hanger scraping over exposed wires as a tuning rod. A 150 foot longwire, 138 foot doublet, or G5RV makes a good antenna for any crystal set. Enjoy experimenting, and stay tuned for more super crystal radio fun next month!

73, Dave, K4TWJ

CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

Number groups after calls are: year of operation, total score, contacts, zones and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band WORLD RECORD HOLDERS

1.8	IG9/IV3TAN('96)	441,252	1,203	24	102
3.5	IG9T('95)	816,959	1,938	33	110
	(Opr. IV3TAN)				
7.0	IG9GSF('97)	1,249,236	2517	35	137
	(Opr. IT9GSF)				
14	PYØFM('94)	3,202,242	5,109	38	175
	(Opr. PY5CC)				
21	ZD8Z('94)	3,481,925	5,535	36	179
	(Opr. N6TJ)				
28	ZX5J('98)	3,322,230	5,392	39	183
	(Opr. PP5JR)				
	AFRICA				
1.8	IG9/IV3TAN('96)	441,252	1203	24	102
3.5	IG9T('95)	816,959	1,938	33	110
	(Opr. IV3TAN)				
7.0	IG9GSF('97)	1,249,236	2,517	35	137
	(Opr. IT9GSF)				
14	ZD8Z('95)	2,356,065	3,925	38	167
	(Opr. N6TJ)				
21	ZD8Z('94)	3,481,925	5,535	36	179
	(Opr. N6TJ)				
28	5X1T('98)	2,501,521	4,133	37	172
	(Opr. ON6TT)				
	ASIA				
1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	5B4/NP3D('98)	250,416	933	21	90
7.0	H21A('92)	736,422	1,812	32	107
	(Opr. 4N4OO)				
14	5B4AGC('97)	2,140,790	3,944	35	159
21	5B4AGC('98)	1,551,539	3,095	35	152
28	JH1AJT('88)	1,421,070	2,409	38	163
	EUROPE				
1.8	LZ2CJ('84)	107,818	1,319	13	61
3.5	HA8IE('90)	361,343	1,455	35	116
7.0	S59UN('92)	875,875	2,419	37	138
14	OH2BH('92)	1,870,170	4,008	39	154
	(Opr. OH2IW)				
21	4O6A('97)	1,980,046	3,280	37	145
	(Opr. YT6A)				
28	YU3ZV('88)	1,541,603	3,219	39	134
	NORTH AMERICA				
1.8	VE1BY('98)	148,798	806	21	76
3.5	TI1C('92)	498,037	1,695	31	108
	(Opr. TI2CF)				
7.0	TI1C('94)	1,108,140	2,882	31	134
	(Opr. TI2CF)				
14	KP2A('94)	2,255,250	4,810	38	156
	(Opr. KW8N)				
21	V26N('93)	2,159,460	4,623	36	150
	(Opr. KW8N)				
28	VP2ET('88)	2,423,880	5,137	37	143
	(Opr. K5RX)				
	OCEANIA				
1.8	KH6CC('85)	45,984	484	13	19
3.5	T32AF('85)	222,768	1,064	23	49
7.0	9M8R('95)	1,091,835	2,354	37	122
	(Opr.W7EJ)				
14	9M8R('97)	1,339,743	2,650	36	147
	(Opr. W7EJ)				
21	9M8R('98)	1,944,800	3,471	38	162
	(Opr. W7EJ)				
28	KD7P/NH2('88)	2,309,304	4,885	38	123
	SOUTH AMERICA				
1.8	P49I('95)	58,653	353	14	43
	(Opr. K4PI)				
3.5	P4ØR('87)	552,786	1,628	23	91
	(Opr. K4UEE)				
7.0	PJ9U('93)	1,199,968	2,637	34	120
	(Opr. OH1VR)				
14	PYØFM('94)	3,202,242	5,109	38	175
	(Opr. PY5CC)				
21	ZX5J('97)	3,181,696	5,264	37	175
	(Opr. PP5JR)				
28	ZX5J('98)	3,322,230	5,392	39	183
	(Opr. PP5JR)				

Single Operator/All Band

AF	CN8WW('98)	15,375,060	7,702	143	544
	(Opr. DL6FBL)				
AS	C4A('98)	9,781,930	5,105	146	548
	(Opr. 5B4ADA)				
EU	GIØKOW('98)	7,388,788	5,268	143	539
NA	KP2A('93)	13,202,298	8,691	148	506
	(Opr. CT1BOH)				
O	YJ1A('90)	9,516,731	6,429	160	381
	(Opr. OH1RY)				
SA	HC8A('98)	17,055,106	8,955	161	501
	(Opr. N6KT)				
QRP	PJ2FR('87)	3,171,166	3,212	100	234
	(Opr. K7SS)				
Low Pwr.	TI1C('97)	7,379,253	5,453	144	465
	(Opr. TI2CF)				
Asst.	P4ØW('94)	11,224,877	6,323	131	470
	(Opr. W2GD)				

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	90	10	17
HC8A	3.5	302	23	52
(Opr. N6KT)	7.0	953	28	82
(1998)	14.0	1,174	33	101
17,055,106	21.0	2,677	35	128
	28.0	3,764	32	121
	Total	8,955	161	501

Multi-Operator/Single Xmtr.

AF	C56T('98)	19,118,437	8,602	162	631
AS	P3A('97)	16,143,795	8,315	164	635
EU	IQ4A('90)	17,255,700	7,253	183	717
NA	VP2EC('92)	16,287,152	7,434	183	685
O	KH2S('91)	11,095,392	7,086	145	387
SA	PJ1B('93)	22,596,570	9,386	164	646

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	111	10	24
PJ1B	3.5	937	25	94
(1993)	7.0	1,055	29	114
22,596,570	14.0	2,011	38	147
	21.0	1,829	32	139
	28.0	3,443	30	128
	Total	9,386	164	646

Multi-Operator/Multi-Xmtr.

AF	EA9UK('93)	37,140,597	13,547	179	744
AS	P3A('98)	29,108,800	13,073	182	738
EU	LX7A('89)	26,578,978	14,947	175	751
NA	VP2KC('79)	37,770,012	17,767	175	677
O	KHØAM('90)	35,730,600	16,309	179	565
SA	PJ1B('90)	57,610,400	19,655	189	803

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	531	19	50
PJ1B	3.5	1,335	24	99
(1990)	7.0	2,104	31	117
57,610,400	14.0	4,860	38	179
	21.0	5,395	38	176
	28.0	5,430	39	182
	Total	19,655	189	803

CQ World-Wide DX Contest All-Time CW Records

BY FREDERICK CAPOSSELA, K6SSS

Single Operator/Single Band

WORLD RECORD HOLDERS

1.8	OHØMEP('95)	251,136	1,451	24	85
3.5	EA8EA('96) (Opr. OH2KI)	1,175,550	2,672	36	114
7.0	YV5A('95) (Opr. OHØXX)	1,364,465	3,095	35	122
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZD8Z('97) (Opr. N6TJ)	2,357,967	4,589	39	140
28	ZW5B('98) (Opr. K5ZD)	1,991,895	3,810	37	148

AFRICA

1.8	CT3/OH1MA('97)	144,760	542	20	74
3.5	EA8EA('96) (Opr. OH2KI)	1,175,550	2672	36	114
7.0	IG9/AC6WE('96) (Opr. UA3DPX)	1,234,317	2,677	37	122
14	CT3BX('97) (Opr.OH1EH)	1,461,397	3,164	37	124
21	ZD8Z('97) (Opr. N6TJ)	2,357,967	4,589	39	140
28	ZS6BCR('91)	1,397,658	3,209	34	112

ASIA

1.8	4X4NJ('95)	200,735	756	20	75
3.5	ZC4DX('87) (Opr. 4Z4DX)	430,560	1,318	29	88
7.0	C41A('93) (Opr. T93A)	1,307,944	2,972	34	133
14	9K2GS('97) (Opr. T97M)	1,242,439	2,718	39	140
21	5B4AGC('98)	1,139,608	2,698	37	130
28	4Z5DX('90)	826,759	2,003	39	120

EUROPE

1.8	OHØMEP('95)	251,136	1,451	24	85
3.5	ON4UN('95)	642,600	2,204	35	118
7.0	S59UN('92)	971,049	2,484	38	135
14	OHØBH('94) (Opr. OH2MAM)	1,003,353	2,957	39	130
21	OH6MCW('89)	775,620	2,208	37	102
28	9H1EL('92)	794,846	2,249	39	120

NORTH AMERICA

1.8	VA1A('98) (Opr. K3BU)	246,238	1048	21	85
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	ZF2TG('92) (Opr. WQ5W)	1,087,862	2,985	31	111
14	KP2A('94) (Opr. KW8N)	1,332,460	3,115	38	132
21	V29W('90) (Opr. KD6WW)	1,110,512	2,829	37	115
28	J79DX('89) (Opr. AA5DX)	859,360	2,661	33	98

OCEANIA

1.8	KH6CC('97)	69,693	593	17	22
3.5	9M6NA('96) (Opr. JE1JKL)	231,480	876	24	66
7.0	9M6NA('97)	1,041,012	2,342	37	116
14	ZL3GQ('91)	1,148,418	2,396	36	126
21	N7DF/NH2('89)	1,205,776	2,977	37	99
28	KD7P/NH2('88)	1,037,608	2,456	38	105

SOUTH AMERICA

1.8	YV3AGT('85)	147,588	591	21	63
3.5	P4ØJ('95) (Opr. WX4G)	641,245	1,650	28	103
7.0	YV5A('95) (Opr. OHØXX)	1,364,465	3,095	35	122
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZP5XF('97) (Opr. LU2BRG)	1,926,056	4,009	38	134
28	ZW5B('98) (Opr. K5ZD)	1,991,895	3,810	37	148

Single Operator/All Band

AF	EA8EA('98) (Opr. OH2MM)	13,717,801	6,563	176	543
AS	C4A('98) (Opr. 5B4ADA)	9,904,510	5,508	162	503
EU	ZB2X('93) (Opr. OH2KI)	6,129,904	4,606	147	491
NA	TI1C('93) (Opr. N6TR)	9,123,817	6,335	159	448
O	AH3C('90)	6,798,363	4,539	172	335
SA	P4ØE('98) (Opr. CT1BOH)	14,372,964	6,853	176	553
QRP	HI8A('91) (Opr. JA5DQH)	3,316,768	3,320	117	325
Low Pwr.	V26K('98) (Opr. AA3B)	7,185,562	5,337	135	406
Asst.	P4ØW('94) (Opr.W2GD)	10,288,950	5,541	155	460

WORLD RECORD

Station	Band	QSOs	Zones	Countries
P4ØE (1998) 14,372,964	1.8	351	15	52
	3.5	727	25	74
	7.0	1,188	30	92
	14.0	1,232	37	114
	21.0	1,821	37	120
	28.0	1,521	32	99
	Total	6,853	176	553

Multi-Operator/Single Xmtr.

AF	EA9EA('91)	13,096,080	5,854	170	582
AS	TA5KA('90)	13,915,044	7,201	175	527
EU	TM2Y('98)	10,357,360	5,480	188	673
NA	K1AR('98)	12,063,114	5,074	181	701
O	AH2R('98)	8,902,349	5,027	177	476
SA	HC8N('95)	14,302,820	7,252	162	503

WORLD RECORD

Station	Band	QSOs	Zones	Countries
HC8N (1995) 14,302,820	1.8	374	14	46
	3.5	712	26	77
	7.0	1,770	36	115
	14.0	2,128	37	119
	21.0	1,845	29	103
	28.0	423	20	43
	Total	7,252	162	503

Multi-Operator/Multi-Xmtr.

AF	5V7A('98)	34,658,186	14,381	187	679
AS	A61AJ('98)	28,014,492	12,692	195	718
EU	LX7A('89)	20,497,632	12,735	189	705
NA	6Y2A('98)	39,279,140	17,609	192	740
O	KHØAM('92)	23,951,385	11,253	190	527
SA	PJ1B('88)	38,415,760	14,921	194	672

WORLD RECORD

Station	Band	QSOs	Zones	Countries
6Y2A (1998) 39,279,140	1.8	1,139	20	82
	3.5	1,867	28	106
	7.0	3,896	35	132
	14.0	4,099	38	151
	21.0	3,433	31	147
	28.0	3,175	32	120
	Total	17,609	192	740

CQ World-Wide DX Contest All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World-Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	K1ZM('95)	55,420	215	15	70
3.5	K1ZM/2('96)	292,100	952	27	100
7.0	KC7EM('95)	409,446	1,083	34	95
14	K1OX('85) (Opr. KC1F)	1,131,328	2,176	36	140
21	K3RV/4('88)	1,270,478	2,298	39	148
28	WØZV('88)	1,145,368	2,158	39	142

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
K1AR (1992) 7,810,446	1.8	24	10	21
	3.5	239	15	73
	7.0	311	26	88
	14.0	969	39	133
	21.0	913	33	125
	28.0	1,292	32	119
	Total	3,748	155	559

QRP

KR2Q('90)	1,246,974	1,069	106	305

Low Power

N8II('92)	1,864,747	1,424	114	365

Assisted

WM5G('92) (Opr. KRØY)	6,631,513	2,800	171	662

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1990) 11,193,606	1.8	32	12	30
	3.5	197	18	76
	7.0	154	26	95
	14.0	1,370	39	167
	21.0	1,167	38	165
	28.0	1,517	37	170
	Total	4,437	170	703

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
N2RM (1992) 19,603,032	1.8	95	14	41
	3.5	485	23	98
	7.0	721	32	128
	14.0	1,654	40	178
	21.0	2,367	40	178
	28.0	1,688	36	170
	Total	7,010	185	793

CW

Single Operator/Single Band

1.8	K1ZM('95)	142,358	470	23	83
3.5	K1ZM('92)	416,160	1,059	30	106
7.0	K1ZM('90)	839,520	1,783	34	125
14	K2WK('98)	1,007,781	1,955	39	144
21	W7WA('89)	772,146	1,647	39	119
28	K1ZM('89)	732,564	1,447	37	134

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
K1AR (1997) 7,681,280	1.8	50	12	38
	3.5	400	20	79
	7.0	1238	32	105
	14.0	1063	38	118
	21.0	982	32	106
	28.0	314	24	76
	Total	4,047	158	522

QRP

AA2U('92)	1,188,000	938	118	332

Low Power

N5TJ('98)	3,157,053	1,976	149	452

Assisted

K3WW('98)	7,963,764	3,764	168	601

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1998) 12,063,114	1.8	49	13	46
	3.5	569	27	101
	7.0	1,384	35	136
	14.0	991	38	151
	21.0	999	36	135
	28.0	1083	32	132
	Total	5,074	181	701

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
KC1XX (1998) 22,473,282	1.8	238	21	75
	3.5	971	29	113
	7.0	2,120	37	142
	14.0	2,228	38	157
	21.0	1,812	39	143
	28.0	1,565	35	133
	Total	8,936	199	763

Club Record: Yankee Clipper Contest Club ('98) 460,442,158
Team Contesting: Phone – Neiger's Tigers Team #1 ('98) 63,665,482
CW – The Team ('98) 55,385,494

Contest Calendar

BY JOHN DORR, K1AR

News/Views Of On-The-Air Competition

Remembering a Contesting Friend—Alan Dorhoffer, K2EEK

As writing goes, this month is undoubtedly my toughest assignment to date. It's not because I'm pushing yet another deadline as I ride on a Delta Airlines flight destined for Seattle. Rather, it's because I'm thinking about a businessman/editor, former co-worker, and most importantly a fellow amateur and personal friend who has left us—Alan Dorhoffer, K2EEK.

In thinking through the myriad of experiences I've had over the years with Alan, I was struck by the complexity of our friendship. Some of you may know that my long association with *CQ* began over two decades ago as a member of the CQ WW Contest Committee. It was at the urging of my good friend Bob Cox, K3EST, that I undertook the task (with many others) of checking logs and being a participant in the "rest of the contest," as many committee folks would say. At that time, I really didn't know Alan very well. For the most part, I knew him simply as *CQ* magazine's longstanding editor. From that early perspective, he had the task of being a ham's ham. And certainly, I never viewed him as a contester per se. After all, Alan never submitted competitive scores. His station was modest at best. To me, Alan was part of the glue of *CQ*, but not the adhesive that made the contesting machine tick at the magazine. However, little did I know how wrong I was. You'll learn more about that later.

The first thing I learned about CQ Contest Committee operations in those early days was that there were a surprising number of times when the process included Alan. The more I worked with the contest, the more I learned what was really going on behind the scenes. It started with the logs themselves. In the 1980s there were no electronic logs. For you newcomers, we actually had to use paper and pencil, creating massive dupe sheets that required hours of post-contest work to prepare a log for final submission. And for hams around the world, those logs were mailed to 76 North Broadway, Hicksville, NY 11801. As it turned out, someone had to receive those logs, store them away, and eventually ship them to Bob Cox for adjudication by the committee. Well, you guessed it, that person was Alan, K2EEK. In fact, for years Alan kept a running tally of the shipping weight of *CQ*'s logs. It was a success metric of sorts, and one to which he was religiously dedicated year after year. This one simple function provided a window into the contesting friend we truly had at 76 North Broadway.

As the years passed, however, I learned something else about Alan. When it came to *CQ* company policy, there were no shortcuts accepted for its contests. What surprised me was that the driving force behind this philosophy was Alan himself. While there's always pressure to conserve editorial space in publishing, Alan never pushed back on providing reporting real estate in his magazine for *CQ*'s contests. This year's CQ WW results are no exception, as you can see in this very issue. In fact, robust contest reporting was encouraged by Alan, including the publishing of full rules, results, high-claimed scores, and yes, this very column—many items of which have become a thing of the past in other magazines.

As time moved into the mid-80s, I became even closer to Alan. It was at that time that the *CQ* magazine contest column was in transition from Frank Anzalone, W1WY, to myself. Frank, a friend to contesting in his own right, was predictably concerned about the transition of his column. After all, he didn't really know me, and he wanted to make sure that whoever picked up the reigns had the same level of commitment and desire that he had shown over the years. In the final analysis, it was Alan's urging that allowed the transition to take place. The urging of Alan quieted W1WY's concerns over some young 31-year-old author who had less usable experience than what Frank simply had forgotten over the years. I'll never forget Alan's support in those days.

Over the years of my producing this column (and there have been nearly 130 columns to date), I never once received any negative feedback from my editorial friend. Alan totally supported my efforts. He always knew that I was an avid aficionado of my sport and trusted me. It was that kind of relationship that made him a friend to contesting in general. Alan never saw my commentary on a controversial aspect of contesting as a negative. Never once did Alan cut my column back because of space. He believed in what I did and supported me to the hilt. If that's not a contesting friend, I don't know what one could be.

What else can one point to with Alan? How about the CQ Contest Hall of Fame? Yet again, Alan inserted his influence behind the scenes as an ardent supporter of this prestigious program. Alan insisted on being part of the selection process, even though he didn't necessarily personally know everyone who was nominated. That wasn't as important as the fact that he wanted to be involved. A subtle supporter of contesting was what Alan was all about.

Finally, there were the years when I joined *CQ* as a full-time employee. In the course of my employment at *CQ* I truly got to know and love Alan. We would spend hours together, both in the office and on the road, talking about contesting. Although he never obtained the skill himself, he often marveled at how operators could maintain the drive to participate for 45+ hours in contests. And how could they possibly work guys at 300+ QSOs/hour? While I worked at *CQ*, Alan developed a greater interest in operating contests himself. His scores were never "barn burners," but he was always a regular on 10 meters in most *CQ* contests. And he loved to tell me about his on-air experiences as well as brag to others about how he had heard his buddy, K1AR, running his brains out during a particularly good 10 meter opening to Europe.

In the years I spent playing a part in the hamfest circuit for *CQ*, I taught Alan a few

CALENDAR OF EVENTS

Sept. 25-26	**CQ WW RTTY DX Contest**
Sept. 25-26	Scandinavian Activity SSB
Sept. 26-27	Fall Classic Exchange
Oct. 2-3	VK/ZL SSB Contest
Oct. 2-3	California QSO Party
Oct. 2-3	F9AA Cup Contest
Oct. 3	RSGB 21/28 MHz SSB Contest
Oct. 7-9	YLRL Anniversary CW Party
Oct. 9	FISTS Fall Sprint
Oct. 9-10	VK/ZL CW Contest
Oct. 9-10	Pennsylvania QSO Party
Oct. 16-17	JARTS WW RTTY Contest
Oct. 16-17	Worked All Germany Contest
Oct. 17	RSGB 21/28 MHz Contest
Oct. 17-18	Illinois QSO Party
Oct. 21-23	YLRL Anniversary SSB Party
Oct. 23-24	Rhode Island QSO Party
Oct. 30-31	**CQ WW SSB DX Contest**
Nov. 6-8	ARRL CW Sweepstakes
Nov. 13-14	WAE RTTY Contest
Nov. 13-14	OK/OM DX Contest
Nov. 20-21	LZ DX Contest
Nov. 20-22	ARRL SSB Sweepstakes
Nov. 27-28	**CQ WW CW DX Contest**
Dec. 3-5	ARRL 160 Meter Contest
Dec. 11-12	ARRL 10 Meter Contest

2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

things about contesting and he helped me learn a great deal more about life. It was always a joy, together with Dick Ross, K2MGA, to speak on behalf of *CQ* in our booth or in a forum. Often I was the guy who had the predictable task of deciphering which one was Alan, as they both sported distinguishing beards. Now *CQ* only has one bearded gentleman, but the company can be proud to know that our other bearded comrade is watching from afar.

As I finish this month's column from 31,000 feet, I know I'm a little closer to Alan right now. He's watching me, saying, "John, will you ever get a column done on time?" Alan may be gone, but his influence on me in particular and contesting in general will remain forever. And, I know that every *CQ* contest log I submit in my remaining days will contain a thought of *CQ*'s contesting friend, K2EEK, because that's what Alan was—a friend to contesting and a great friend of mine. May you rest in peace, OM!

73, John, K1AR

Final Comments

As you might imagine, this was been a tough month for many of *CQ*'s authors and in-house staff, including myself. Hopefully, you've gained insight into a part of K2EEK that few hams ever knew. It's the least I could do this month in memory of a man who loved his hobby more than anyone will ever know. And, to the thousands of hams around the world who met Alan over the years,you're fortunate to have had the experience.

Well, the CQ WW contest season is upon us once again. As solar activity continues to improve, I hope you won't miss out on some of the finest operating available this fall. As always, please remember to send your contest calendar submissions to me for the January issue no later than November 1st.

73 John, K1AR

October's Contest Tip of the Month

One of the worst experiences in contesting is to be visited by a neighbor complaining about some form of interference. This month, take some good advice and prepare an "RFI kit" that can easily be used to solve RFI problems. An assortment of filters, ferrite, and other items in a shoebox may keep you on the air and help avoid more serious neighborhood problems. Take the time to be RFI prepared. Not only will your scores improve, so will your future operations as the neighbors spend more time talking to others on the phone and not yourself during the next contest.

California QSO Party

1600Z Sat. to 2200Z Sun. Oct. 2–3

This year's party is sponsored again by the Northern California Contest Club. The usual extraordinary effort has been made to activate all CA counties, making this the most successful of all state parties.

Operating time is limited to 24 out of the 30-hour contest period for single operator stations (multi-ops may use the entire 30 hours, but observe the standard 10-minute rule). Off-times must be at least 15 minutes and clearly indicated in the log.

The same station may be worked on each band and mode, and CA stations may contact other in-state stations for QSO and multiplier credit. CA mobiles may be worked in each county change.

All CW contacts must be made outside the phone sub-bands except for 160 meters. All contacts must be simplex. California stations that change counties are considered to be a new station and may be contacted again for point and multiplier credit. California stations operating on a county line may be counted as only one QSO.

Classes: Single Operator (High Power, Low Power, QRP), Multi-Single, Multi-Multi, California County Expedition, Mobile, Club, School, and Novice/Technician. Multi-Single entries must work only one band/mode for at least 10 minutes before changing band or mode. Single Operator and Multi-Single entries are allowed only one transmitting signal. All contacts must be simplex. Mobile is a station that is self-contained, capable of legal motion (street, water, or air) while operating, motion optional. A County Expedition is an operation from a temporary location using temporary antennas installed for the contest period, using temporary antenna supports (natural supports such as trees permitted). A Novice/Tech entry must use a Novice/Tech callsign and operate exclusively within the Novice/Tech bands.

Exchange: QSO number and QTH. County for CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts; 3 points on CW.

Multiplier: CA stations use states (50) and VE call areas (8). Out-of-state entries use CA counties (maximum of 58).

Final Score: Total QSO points times the sum of the multiplier.

Frequencies: 160 meters through 2 meters, except WARC bands. CW—1805 and 40 kHz up from band edge. Phone—1815, 3850, 7230, 14250, 21300, 28450. Novices work 10 kHz up from edge of Novice bands and 28450; try CW on the half hour; 160 meters at 0500 UTC; 80/75 meters at 0300 and 0700 UTC; 147.54 MHz at 2000, 0000, and 0400 UTC.

Awards: The CQP has more award

opportunities than almost any other contest. Special CQP T-shirts are available for any entry with over 100 QSOs. Include your size and $10 to order. A special award of a personalized bottle of California wine goes to the top 20 single operators in CA and out of state. There are a tremendous number of certificates and trophies available to winners of every category. Check out the contest at <www.cqp.org> for complete details and official rules, logs, and CQP logging programs.

Include a summary sheet showing the scoring, etc., and a dupesheet if you make more than 200 QSOs, with large SASE for a copy of the results. The mailing deadline is November 15th and entries go to: NCCC, c/o Al Maenchen, AD6E, 3330 Farthing Way, San Jose, CA 95132. Entries may be submitted in CT Version 8 or 9 format with .BIN, .SUM, and .ALL files on 5¼ or 3½ inch diskettes (no 2.88M diskettes) with a signed hard copy summary sheet. Label each diskette with call entry category and state/county/province/country. Electronic logs may also be submitted by e-mail to <cqp@contesting.com>. Electronic logs should be named with your call (for example, AD6E.SUM, AD6E.LOG, etc.), and preferably all files zipped into a single file such as AD6E.ZIP.

For a CQP paperwork package containing log and summary sheets, county abbreviations, and contest records, send a business-size SASE to Andy Faber, AE6Y, 16321 Ridgecrest Ave., Monte Sereno, CA 95030. A $1.00 donation to help defray the costs of printing and postage is encouraged.

For a copy of the two member-supported IBM contest logging programs for CQP, send $1.00 for postage and diskette to AE6Y. A Macintosh program is also available commercially. For software downloads, try the CQP web site at <www.cqp.org>.

VK-ZL-Oceania Contest

Phone: Oct. 2–3 CW: Oct. 9–10
1000Z Saturday to 1000Z Sunday

The object of this old classic is for stations throughout the world to contact as many stations as possible in VK, ZL, and Oceania (WAC boundaries) on 80–10 meters. Contacts between stations in different countries in Oceania are permitted, but contacts within the same country are disallowed.

Classes: Single Operator, Multi-Operator, and SWL.

Exchange: RS(T) plus a serial number indicating contact number.

Multipliers: The number of prefixes worked per band. The standard WPX prefix system is to be used.

Scoring: Credit 10 points/QSO on 80 meters; 5 points on 40; 1 point on 20; 2 points on 15; 3 points on 10 meters. The

final score is total QSO points multiplied by the total prefixes worked on all bands.

Awards: The CW entrant with the highest score will be awarded the Frank Hine, VK2QL, Memorial Trophy (plaque). In addition, special certificates will be awarded to the top scorers in each category per continent, country, and VK/ZL/JA call area. Single-band awards may be awarded as well.

Logs must be postmarked no later than November 14th and should be sent to: VK/ZL/Oceania Contest Manager, P. Nesbit, VK3APN, WIA, Box 2175, Caulfield Junction Vic. 3161, Australia.

Pennsylvania QSO Party

1600Z Sat. to 0500Z Sun., Oct. 9–10
1300–2200Z Sun., Oct 10

This one is sponsored again by the Nittany ARC of State College, PA. The same station may be worked on each band and mode for QSO points. PA stations may also work other in-state stations for QSO and multiplier credit, and mobiles in each county.

Classes: Single Operator Low Power (150 watts), High Power, QRP, and CW-only 150 watts (only one signal on the air at one time); Multi-Single, Multi-Multi, Portable, Novice/Technician, and Mobile, and a new Rover class. The Rover division is intended for stations that cannot go true mobile, but would like to activate some rare counties by going to a state park or farmer's field and operate "field day" style. You must make 10 QSOs from each location to qualify for bonus points.

Exchange: QSO number and county (PA stations); ARRL/RAC section or DXCC country for others.

Scoring: One point for SSB/FM contacts, 1.5 points for CW, 2 points on 80 or 160 meters. PA stations multiply total by (ARRL sections + PA counties + 1 DX country). Others use PA counties for their multiplier (total of 67 possible). Mobiles add 500 points for each county operated from with a minimum of 10 QSOs (Rovers must also make 10 QSOs). Mobiles on a county line give one QSO number but receive credit for 2 multipliers. QRP stations multiply their score by 2, Novice/Tech by 3 (times 5 if in both categories). This year the Carbon Amateur Radio Club (the Carbon ARCS) in recognition of their long-time support for the QSO Party will man the designated special event station using their club call, W3HA. Add 200 points for each QSO with this station. Bonus points are added after all other bonuses have been taken. Final score is total QSO points times multipliers.

Frequencies: CW—1810 kHz and 40 kHz up from bottom of each band. SSB—1840, 3980, 7280, 14280, 21380, 28310, 50125, and 146550 kHz. Try 160 meters at 0300Z on Sunday.

Awards: Plaques will be awarded to the top entries in all entry divisions plus single operator USA Time Zones, EPA, WPA, and others as warranted. Certificates will be sent to county and section winners. A trophy and gavel will be given to clubs with the top aggregate score (unlimited and local class [75 members]). There are many other awards available for this contest. You are encouraged to check out <http://members.aol.com/doughdh/paqsoparty> for additional information.

Logs need to be postmarked no later than November 15th and should be sent to: Douglas Maddox, W3HDH, Nittany Amateur Radio Club, RD #1, Box 760, Petersburg, PA 16669. E-mail logs are the preferred method of entry (out of state only). Send your entry as an e-mail attachment to: <na2x@arrl.net>. An information package for the contest is available by

sending $1.00 to the sponsor's address to help defray printing and postage costs .

Illinois QSO Party
1800Z Sun. to 0200Z Mon., Oct. 17–18

This is the 37th anniversary of the Illinois QSO Party sponsored by the Radio Amateur Megacycle Society. It's a shorty, only 8 hours long. Special band activity times: 10 meters 2000Z; 15 meters 2100Z; 20 meters 2200Z. Note that 6 and 2 meter QSOs are also allowed this year.

Frequencies: 160 through 2 meters, excluding 30, 17, and 12 meters. Suggested frequencies are 3550, 7050, 14050, 21050 and 28050 kHz for CW and 3890, 7290, 14290, 21390, 28390 kHz for phone. Novices call 30 kHz above bottom end of Novice subbands for CW and 28390 kHz for phone.

Exchange: Illinois stations give RS(T) and county; others give RS(T) and state, province, or country.

Scoring: Count 1 point per phone QSO, 2 points per CW QSO. No repeater contacts. Stations may be worked once per band and mode, and once per band/mode/county for Illinois mobile stations. Each vehicle is considered one station and must use only one call. All entries which embark as a mobile must use the mobile's call exclusively for the duration of the contest. Contacts with/by stations at the border of two (or more) counties count as two (or more) counties and QSOs, etc. Illinois stations multiply points by the sum of states, Illinois counties, VE provinces, and a maximum of 5 DXCC countries (W/K and VE included). Count additional DX as points but not multipliers. Non-Illinois stations multiply total points by the number of Illinois counties worked. All stations may earn one extra multiplier for every eight QSOs made with the same Illinois county. All stations may operate only one transmitter at a time.

Awards: Plaques will be awarded to the highest scoring Illinois fixed station and mobile station. Certificates will be awarded to the top 10 IL fixed stations; the top 5 IL mobile stations; the top IL county line portable station; the highest score (reporting at least 5 IL contacts) in each state, province, and country; and the highest team/club aggregate score.

Entrants must submit a log containing UTC, the call of the station worked, RST, state or province, Illinois county, band and mode. Please circle new multipliers as worked. Illinois mobiles must indicate county changes in the log. Any station with over 100 QSOs must submit a dupe sheet. A summary sheet must also be submitted with every log. Entries must be postmarked by November 15, 1999. Mail your entry to: RAMS, c/o John Matz, KB9II, 7079 West Ave., Hanover Park, IL 60103. To get a copy of the contest rules, summary sheet, and results, check out <http://www.megsinet.com/~jematz/rams.html>.

CQ World-Wide DX Contest
Phone: Oct. 30–31 CW: Nov. 27–28
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue. With the large number of operating categories, be sure to list your entry class on your summary sheet.

A few trophies have been eliminated, but there are many new additions which fill in quite a few of the category gaps of previous years. The detailed trophy list can be found in the rules announcement.

All entries must be postmarked no later than December 1, 1999 for the phone section, and January 15, 2000 for CW. **Please make note of *CQ*'s new mailing address. All logs must be sent directly to: CQ World-Wide DX Contest, 25 Newbridge Road, Hicksville, NY 11801. Be sure to indicate Phone or CW on the envelope.**

Packet User's Notebook

BY BUCK ROGERS, K4ABT

Connecting You And Packet Radio In The Real World

Higher Speed Backbone Nodes

Without editorializing, I'm going to define some of my recent comments regarding various networking protocols and techniques.

Survival of the Fit of the Fittest

By now you have seen and read about some of the new networking entries and schemes in the packet radio arena. Many of these new protocols are simply titles for an old technique. Others border on no more than someone's effort at changing a name in favor of an "ego" trip.

Whether it be the "fishNET," "CloNET," or "GooseNET," they all come down to one reality: They are still riding in the same AX.25 carriage that was defined over a decade ago by the ARRL and the Tucson Amateur Packet Radio (TAPR) associations. However exotic we make these networking protocols, we've yet to break away from the likes of the AX.25 undercarriage foundation.

We do have few tried and proven packet radio formats that work. As a seasoned user of packet radio networking protocols, believe me when I tell you that I've tried most of them, and I have found the best of the lot so far are contained in about five or six out of more than a dozen networking protocols being offered to the packet radio system node operators (SNOs).

The six packet radio networking protocols that I reference are:

1. X1J4 TheNET (Dave Roberts, G8KBB)
2. NETROM™ (Software 2000)
3. TheNET™ (NORD><LINK)
4. TheNET Plus (Bill Beech NJ7P)
5. ROSE (Tom Moulton, W2VY)
6. G8BPQ (G8BPQ)

If It Isn't Broken, Don't Fix It

In many cases I see SNOs attempting to fix a problem of congestion on a network by adding more 1200 baud nodes. Read carefully: I said, "1200 baud" nodes.

When I can connect to a local node in central Virginia and then connect to K4ICT in Macon, Georgia, more than 600 miles away, in less than 10 seconds, there is nothing broken in the packet radio protocol that we use. However, there is one item that is not often mentioned when discussing the speed and velocity of a network when making a trek across more than a couple of hundred miles.

The reason I am able to make this trek so fast is not due to some exotic networking protocol alone, but is due to two tried and proven factors, or methods, for data transmission. They are the speed and the protocol format. Notice I put "speed" first. I'll explain this in greater detail as you read on.

Not only am I able to have a keyboard-to-keyboard QSO with stations in central Alabama or Georgia, I have regular keyboard QSOs with Tom Nolan, KD4MWO,

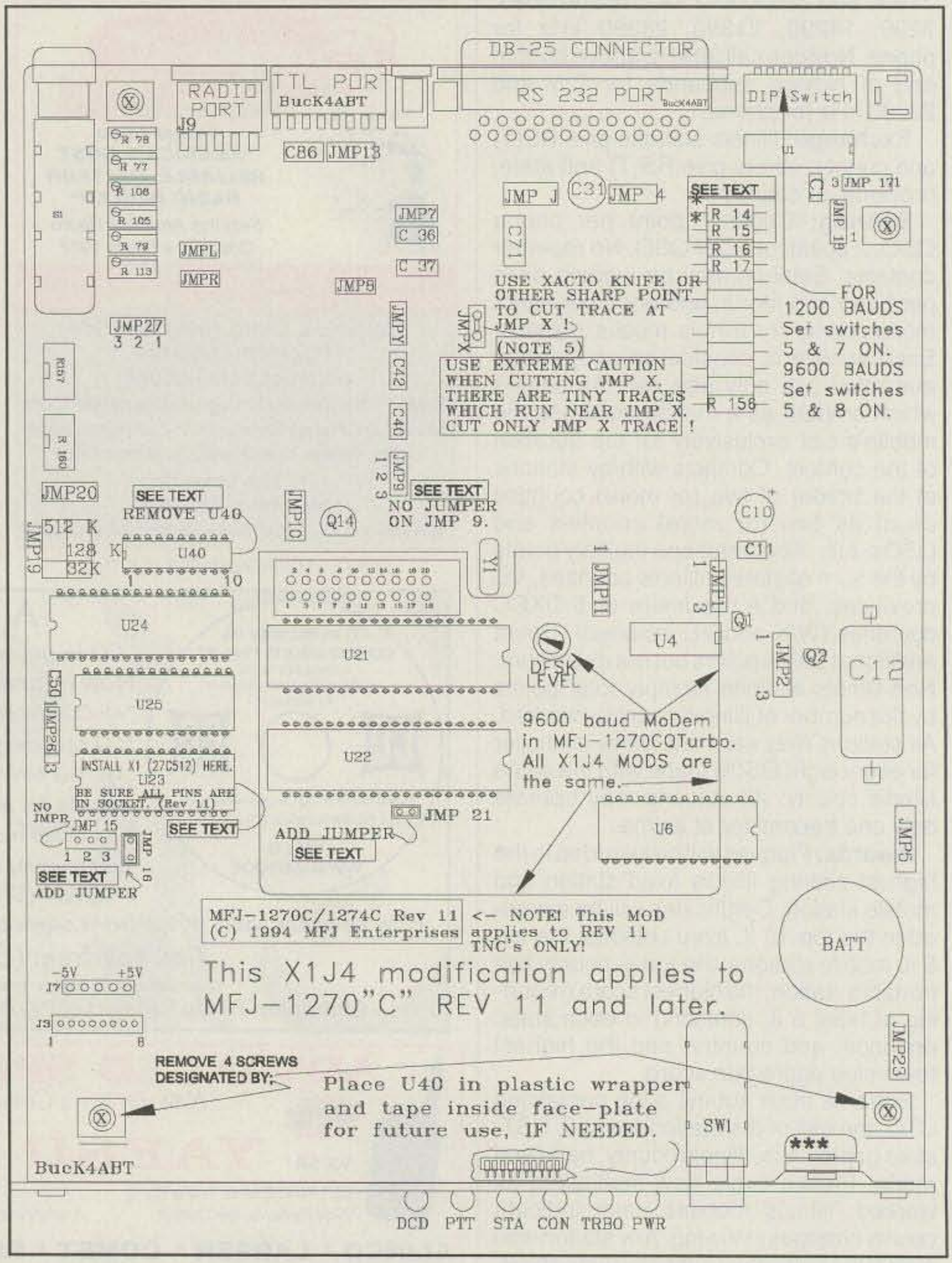


Fig. 1– Preparing the MFJ-1270"C" or "CQ Turbo" for X1J4 network node applications. The drawing shown here illustrates the changes made when modifying the 9600 baud version for backbone node use. To remove the PC board, remove the front faceplate (two screws), and then remove the screw that attaches Q3 (***) heatsink to the front of the TNC. Next remove the four screws that hold the PC board in place. Follow instructions in the text for complete TNC-to-node changes.

115 Luenburg Drive, Evington, VA 24550
e-mail: K4ABT@PacketRadio.com

in Jacksonville, Florida. This node route takes me through more than 1000 miles of SEDAN nodes.

While I'm putting mail into the mailbox of Frank, K4ICT-1, in Macon, Georgia, Tom, KD4MWO, is having a keyboard QSO with David, KE4UAS, in Griffin, Georgia. Joe (Buddy), WA4MVR, in Mullins, South Carolina is keyboarding with John in Columbia, South Carolina. Charlie, W4OQT, is having a QSO from south Georgia to his son in central Georgia, or to Dennis, KU4OY, near Milledgeville, Georgia. In the meantime, another Dennis, KT4BT, in central Alabama is leaving mail in my mailbox (K4ABT-1) in central Virginia.

The network that we use is called the Southeastern Emergency Digital Association Networks, or simply the SEDAN. The SEDAN now spans a breadth from near Washington, DC well into Florida, and from the east coast to eastern Mississippi. In a message from Dennis Willmon, KT4BT, in central Alabama last week, he says, he is committed to seeing the western border of the SEDAN at the Mississippi River by the year 2000—now two months away.

The X1J4 Speaks for Itself

This network protocol we use across the SEDAN is the X1J4 node code written by Dave Roberts, G8KBB. The release that we use on more than 200 SEDAN nodes was the final release by Dave in 1996. It has not broken since we placed the X1J node code into service, so with no great fanfare, the X1J4 theNET protocol speaks for itself.

The "Speed" Factor

The key to any packet radio network is not in the protocol alone. The "real," or crucial, factor for network continuity and reliability lies in the speed of the network "backbone."

Yes, I said, "the speed of the backbone." If you already have a network, but it is slow or it limits the distance over which you can communicate, you probably are relying on a 1200 baud LAN-to-LAN type network. A few years ago, many of us were caught up in the same trap. We expanded our networks, but we failed to make provision for the number of users and the distance these users would be traversing on our networks. As time passed, we found also that our 1200 baud networks could not support BBS forwarding and user keyboard-to-keyboard QSOs at the same time. Fortunately, the Internet came along around 1995 and gave us some relief by siphoning off some of the BBS traffic and users who just got tired of competing with the massive file transfers and BBS forwarding that was being dumped onto their single-line packets.

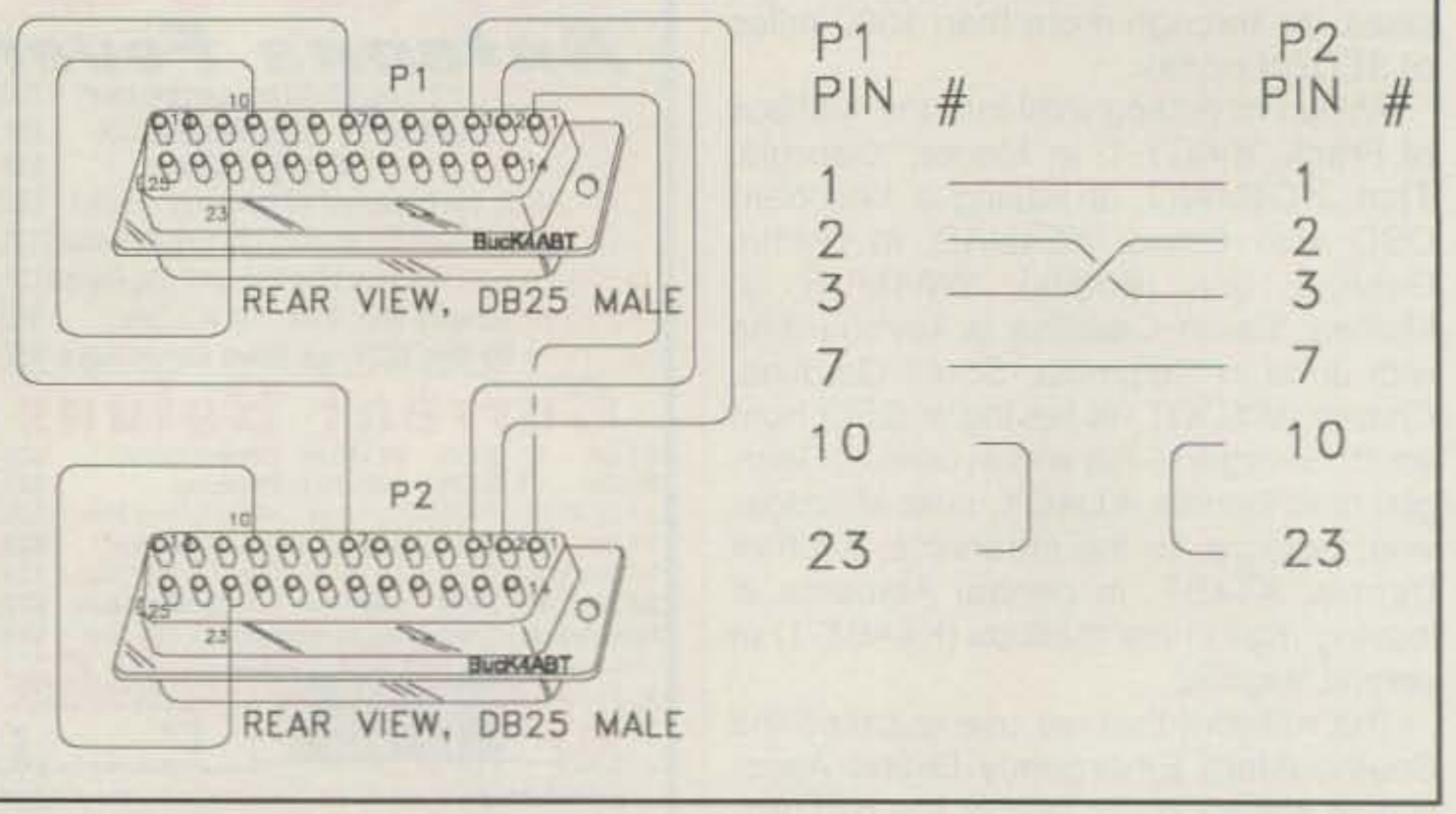


*Fig. 2– This drawing illustrates the comport, or gateway interface cable used between the 1200 and 9600 baud X1J4 nodes. Note that the transmit data and receive data lines between pins 2 (TxD) and 3 (RxD) are rolled (crossed) between connectors "P1" and "P2." **Do not** omit the jumper between pins 10 and 23 on each connector.*

Make Hay While The Sun Shines

This was a time for us to "make hay, while the sun was shining." We took advantage of the slump in network use and began building our 9600 baud backbone nodes. Never did we even dream that it would make such a difference!

Never thinking about the difference it would make, going from 1200 baud to 9600 baud, we soon discovered something wonderful: Not only was 9600 baud handling the packets faster, it was handling many more users at the same time—and with ease. Best of all, 9600 baud radios were becoming available from many surplus sources and most OEM vendors.

Eight Times Faster

What a "hoot"! We had hardly thought about all the benefits that would be manifested by opening a backbone that was eight times faster than we had been accustomed to with the old 1200 baud LAN-to-LAN nodes.

Many readers of this column can relate to what I'm saying here. Many new packet radio users are beginning to come online, and the fun we are having is more gratifying as we once again have QSOs with many of the callsigns we used to see on packet.

The novelty of the Internet is either wearing away, or there is a payoff from having added the higher speed backbones to our networks. The masses are now helping us build and expand our 9600 baud backbones.

In upcoming issues of *CQ* I will cover the techniques we use to address and configure out 9600 baud backbones. I'll also provide drawings and tables that will help you understand the hierarchy of data flow across the higher speed backbones, and how it is disseminated to the local area (LAN) nodes.

Reference and Support Material and Information

In the last six issues of *CQ* this column has covered several radio modifications for use at 1200 and 9600 baud. I'm now reminded that I should make certain that we include the modification of the TNC2 clones to 1200 and 9600 baud service to complete this duet.

To support this month's move to building high-speed backbone nodes, the reader should also refer to the most recent issues of *CQ* and the "Packet User's Notebook" articles of May, June, July, and August 1999 for specific 9600 baud modifications and radio-to-node interface configurations.

All of the TNC manufacturers offer some form of networking or node-based TNC EPROMs or TNC-to-node modification. I know of two TNCs that can easily be converted into X1J4 (theNet) network nodes. They are the PacComm and the MFJ-1270B and "C," which represent the TNC-2 or a clone thereof.

The Kantronics TNC or KPC will not work as an X1J4 node. However, Kantronics does offer an EPROM that enables a "TheNET" look-alike. When used in the KPC-9612, this networking EPROM offers a good theme for a gateway between 1200 and 9600 baud. In addition, it enables the gateway between the backbone frequency and the local area (LAN) frequency without having to build an umbilical node-to-node interface cable.

For now, let's look at one of the TNCs used for the X1J4 network node modifi-

cation. The only difference between X1J4 node modification of the MFJ-1270"C" (1200 baud TNC) and the MFJ-1270"CQ" Turbo (9600 baud TNC) is the addition of the MFJ-9600 baud modem already installed in the MFJ-1270"CQ" Turbo. Before you write to me asking, yes, the MFJ-1270"C" can easily be retrofitted with the MFJ-9600 modem.

Preparing the MFJ-1270C X1J4 (The NET™) for Node Mod

Here we are dealing with the MFJ-1270C, Rev 11, TNC with all mod notations and pointers to locations.

To remove the PC board, remove the front face plate (two screws). Then remove the screw that attaches Q3 (regulator) heat sink to the front of the TNC. Next remove the four screws which hold the PC board in place. Proceed as follows:

1. Disconnect all power-supply voltages from the TNC in which the installation to be done.

2. Remove all interconnecting cables, including terminal, power supplies, and computers.

3. Remove the four screws that secure the top cover and remove the top cover.

4. Remove the faceplate screws and remove the faceplate. Set the faceplate aside.

5. Remove all screws that secure the PC board and the voltage regulator to the chassis.

6. Remove the MFJ-TNC2 PC board from the chassis.

7. Locate IC **U40** on the MFJ-TNC2 PC board and remove it from its socket. This IC is not needed when running the X-1J4 firmware. Be sure to put it where you can find it at a later date, should you ever convert the MFJ-TNC2 back to normal.

The following steps outline the procedures to transform the MFJ-1270C Rev 11 (fig. 1) into a TheNET X-1J4 node.

1. Remove any jumper from JMP 9.

2. Remove IC U40. After the modification is complete, place U40 into a plastic wrapper and tape it inside the front faceplate for later use if the node is ever returned to normal TNC service.

3. Remove jumper from JMP 15.

4. *Add a jumper* at JMP 16.

5. *Add a jumper* at JMP 21.

6. Remove the TNC (stock) EPROM at IC location U23. *Carefully* install your new X-1J4 EPROM into the socket at U23. Be sure all pins are inserted into the socket (be sure there are no bent pins). Pin number 1 is *not* left out of the socket as it was with earlier revisions of this TNC. This modification applies only to MFJ-1270C "Rev 11."

7. Cut trace at JMP "X." Notice that tiny traces are close to JMP X: *Do not cut* any other trace. Cut *only* the trace between pads of JMP X. *Use extreme caution when cutting.* This jumper cut prevents the node from hearing itself. Cutting JMP "X" is optional. If you are concerned with the node hearing itself, then *cut* JMP "X."

Note: *For gateway operation* all MFJ-1270C Rev 11 built after July 1996 have R14 and R15 installed. If they are not installed in your MFJ-1270C Rev 11, there is no problem *unless you plan to use the TNC in a node gateway, between two frequencies, or in a node stack with a diode matrix.* If R14 and R15 are missing and your node is to be used between two frequencies or in a node stack with a diode matrix, then you should proceed to step 8.

8. If the TNC is to be used as a *gateway* between two frequencies or baud rates, ensure that R14 and R15 are installed. If they are not, remove the PC board and add R14 and R15. R14 and R15 are 100 ohms @ 1/4 watt each.

Fig. 2 illustrates the comport, or gateway, interface cable used between the 1200 and 9600 baud X1J4 nodes.

The X1J4 TheNET node code can be downloaded at: <http://wwwPacketRadio.com>. We're having fun at 9600 baud.

73 de BucK4ABT
k4abt@packetradio.com

DX

BY CHOD HARRIS, VP2ML

News Of Communication Around The World

Islands On The Air

This month we are presenting information on the IOTA Award which was published back a few years, with some updates. Chod had an illness in the family so he could not be with us this month, but he will be back with current DX happenings next time. —ed.

The premier DX awards are closed ended. That is, there are clearly defined limits to the total entities that qualify for the award, and it is possible to "work 'em all." The Worked All Zones Award from *CQ*, for example, provides recognition for working 40 zones. Once the DXer has worked (and confirmed) all 40 zones, that award offers no more challenges. The ambitious DXer can always work toward the most difficult of all the major awards, 5-Band WAZ, but again, once the 200 band-zones are worked and confirmed, the DXer is left without a goal.

The same holds for the DX Century Club. While it is very difficult to "work 'em all," it is a straightforward process. The active and well-informed DXer, by not missing any of the occasional operations from and DXpeditions to rare countries, can keep up to date, and need only read a DX newsletter to keep track of operations from the very rare countries. True, the DXCC country list changes from time to time, but only very slowly. Thus, the active DXer gets to the 290 level in a couple of years of serious operating and then waits for DXpeditions to activate the remaining countries. Aside from the 5-band and single-band awards, the DXCC program offers few challenges to that DXer.

There is one major, open-ended award, and that is the Worked All Prefixes (WPX) Award from *CQ*. There is a constant flow of new prefixes available, thanks to the FCC's system of issuing callsigns, and the fact that some countries' telecommunications departments are generous in granting special callsigns. However, thanks to the FCC's hard-nosed attitude about special-event callsigns, U.S. amateurs have great difficulty in coming up with "new ones" for WPX, except through new Extra class licenses.

There is one open-ended award program in which U.S. amateurs can be "rare" and maybe even activate a "new one." That program is the Islands On The Air (IOTA) program, handled by the Radio Society of Great Britain (RSGB). IOTA consists of a basic award for working and confirming stations on 100 off-shore islands, and a dozen or so additional awards for working more islands, or islands in particular parts of the world, such as the West Indies.

The IOTA program was started by DX Hall of Famer Geoff Watts in 1964. Geoff was then editor of the weekly newsletter "DX News Sheet" and noted that DXers were "retiring" after the superb conditions in the late 1950s had given many DXers all available DXCC countries. Geoff provides the rationale behind the IOTA program: "Now that propagation conditions are poor, DX getting scarce, the possibility of 'brand new' DXCC countries eventually becoming extremely remote, top DXers 'retiring' because there is nothing left to work, it is proposed that an entirely new DX-achievement 'yardstick' come into being, the All Islands of The World Award, to promote more activity and interest among DXers, many of whom could then go on a 'brand new island' DXpedi-

Wayne Mills, N7NG, was recently inducted into the CQ DX Hall of Fame.

P.O. Box 50, Fulton, CA 95439
e-mail: <chod@compuserve.com>

The WPX Program

SSB

2711.....JA1BUQ
2712.....HL5YAW
2713.....K9GWH
2714.....JK1QJE
2715.....HK3PLB

CW

3014.....IKØPAV
3015.....HB9JAP
3016.....WW5XX

Mixed

1839.....K9GWH

WPNX

283.....KB9SUP

CW: 350 HB9JAP, K9GWH, WW5XX. 400 HB9JAP, K9GWH. 450 HB9JAP, K9GWH. 500 HB9JAP, K9GWH. 550 K9GWH, WA2VQV. 2700 W4VQ. 2750 W4VQ. 2800 W4VQ. 2850 W4VQ. 2900 W4VQ. 2950 W4VQ. 3000 W4VQ. 3500 N4NO.
SSB: 350 JK1QJE, HK3PLB. 400 HK3PLB. 600 K9GWH. 650 K9GWH. 700 K9GWH. 750 K9GWH. 800 K9GWH. 850 K9GWH. 900 K9GWH. 1050 8K5MEQ. 1100 IK5MEQ. 1150 WM4R. 1300 VE6BF. 1350 VE6BF. 1400 VE6BF. 1650 I3ZSX. 2950 .N4NO. 4300 WA2HZR.
MIXED: 450 K9GWH. 500 K9GWH. 550 K9GWH. 600 K9GWH. 650 K9GWH. 700 K9GWH. 750 K9GWH. 800 K9GWH. 850 K9GWH. 900 K9GWH. 1150 K1NU. 1350 VE6BF. 1400 VE6BF. 1450 VE6BF. 2950 N4NO. 3000 IK2ILH. 3050 IK2ILH. 3950 N4NO. 4000 N4NO. 4450 W2FXA.

10 meters: VE6BF, HB9JAP, K1NU
15 meters: VE6BF, HB9JAP, JH7GZF
20meters: VE6BF, HB9JAP
40 meters: VE6BF, HB9JAP, JH7GZF
80 meters: HB9JAP
160 meters: HB9JAP, K1NU

Asia: VE6BF, HB9JAP, JH9GZF
Africa: HB9JAP
No. AmericaA: VE6BF, HB9JAP
So. America: VE6BF, HB9JAP
Europe: VE6BF, HB9JAP
Oceania: VE6BF, HB9JAP, JH7GZF

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4ØØ3, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, IQWXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP. OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, N5UR, VE3XN, DL3RK, OKMP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BU, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, 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-4ØØ3, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U.

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.

5 Band WAZ

As of July 30, 1999, 494 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

None

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

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199 (34 on 40)
K1ST, 199 (26)
ABØP, 199 (23)
KL7Y, 199 (34)
NN7X, 199 (34)
OE6MKG, 199 (31)
HA8IB, 199 (2 on 15)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
W6SR, 199 (37)
W3UR, 199 (23)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
N4CH, 199 (18 on 10)
OE1ZL, 199 (1)
W6DN, 199 (17)
W3NO, 199 (26)
K4UTE, 199 (18)
K5RT, 199 (23)
UT5UGR, 199 (10)
K4PI, 199 (23)
HB9DDZ, 199 (31)
N3UN, 199 (18)
UA3AGW, 198 (1, 12)
EA5BCK, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
DKØEE, 198 (19,31)
KØSR, 198 (22, 23)
K3NW, 198 (23, 26)
UA4PO, 198 (1, 2)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K4ZW, 198 (18, 23)
OH2VZ, 198 (1, 31)
RAØFA, 198 (2 on10,15)
LA7FD, 198 (3, 4)
K5PC, 198 (18, 23)
NT5C, 198 (18, 23 on 40)
VE3XO, 198(23, 23on40)
K4CN, 198 (23, 26)
KF2O, 198 (24, 26)

The following have qualified for the basic 5 Band WAZ Award:
Endorsements:
1096 Stations have attained the 150 Zone level as of July 30, 1999.

N8PR, 195 zones

****PLEASE NOTE: Due to supplier increases, effective September 1, 1998 cost of the 5 Band WAZ Plaque is now $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 Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

tion themselves, for there are few countries where amateurs could not make trips to several islands which could never count under present DXCC rules."

For many years the IOTA program enjoyed a limited popularity outside of Europe, where it was considered one of the top awards. During the years when the DXCC list stagnated, and few of the rarer DXCC countries came on the air, many U.S. DXers began to get involved in the IOTA program. Today there are hundreds of active, dedicated IOTA chasers, and dozens of island DXpeditioners who activate many of the rarer islands. Thousands more DXers collect islands more casually. The top certificate holder is F9RM, who is listed as being credited with 900, so there are at least this many islands available.

IOTA publishes an annual *RSGB IOTA Directory and Yearbook* with rules, lists, all certificate holders, island stories, etc. This is a 112-page slick, well-done publication and is available from RSGB IOTA Programme, P.O. Box 9, Potters Bar, Herts, England EN63RH. Price is UK 10.49 pounds, or US $17, or 26 IRCs for nonmembers of the RSGB. The price for members is UK 8.99 pounds, US $15, or 23 IRCs. (Add US$3 or 4 IRCs to these rates for airmail postage. RSGB accepts most credit cards.

The U.S. checkpoint is Dewitt L. Jones, W4BAA, P.O. Box 8695, Lacey, WA 98509. The book is available from him for US$16 postpaid.

Separate Islands On The Air have an IOTA designation consisting of the continental abbreviation and a serial number. Thus, Montserrat is (NA-103) and Western Samoa is (OC-97). Check the DX newsletters for IOTA activity. Also, the principal gathering place for IOTA enthusiasts is 14260 kHz. Other suggested frequencies are SSB 28560, 28460, 24950, 12260, 18128, 7055, 3755; and CW 28040, 24920, 21040, 18098, 14040, 10115, and 3530. Internet site is: <http://www.rsgb.org/operate/iota/iota.htm>.

The nature of the IOTA program encourages short, simple DXpeditions, especially on weekends. Many islands without resident amateurs are within driving distance of groups of amateurs, and in the summer many IOTA enthusiasts pack up

The WAZ Program

Single Band WAZ

12 Meter SSB

11 .....OH3BU

15 Meter SSB

525 .....JA1PAP 526 .....K4JLD

20 Meter SSB

1049 .....K2HJB

20 Meter CW

499 .....N7MQ

RTTY

115 .....ND5S

All CW

139 .....N5TK 140 .....N3NN

All Band WAZ

SSB

4501 .....N3ZOM
4502.....issued last month
4503 .....W5GWC
4504.....ZL3AZ
4505.....EA6BE
4506.....K9GWH
4507.....OZ5JQ

CW/Phone

7872.....K5VUU
7873 .....KD5AIJ
7874 .....K1NU
7875....JT1BH (All CW)
7876 .....K9GWH
7877 .....JA8GTO

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 Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4892 9A2AA	3482 N4MM	2990 HA8XX	2727 IK2ILH	2273 YU7JDE	2018 N3XX	1732 LU8DY	1389 KØKG	1223 VE6BMX
4773 F9RM	3424 SM3EVR	2940 K9BG	2689 HAØIT	2270 KS4S	2001 OE6CLD	1653 AE5B	1371 F6HMJ	1198 S52QM
4256 W2FXA	3405 YU1AB	2934 WB2YQH	2670 KØDEQ	2264 K2XF	1919 SM6CST	1628 JN3SAC	1339 N1KC	1195 W2CF
3891 EA2IA	3390 I21PJA	2926 YU7BCD	2669 S53EO	2259 W9IL	1875 HA9PP	1625 KØNL	1328 W9IAL	1162 JR3TOE
3889 F2YT	3386 N9AF	2926 KF2O	2660 4N7ZZ	2242 K5UR	1871 DJ1YH	1607 OZ1ACB	1319 WT3W	1142 VE6FR
3797 UA3FT	3262 N5JR	2906 I2MQP	2546 SM6DHU	2238 9A4RU	1851 VE4ACY	1591 W7CB	1311 WB2AQC	1058 RA9FY
3787 K6JG	3240 9A2NA	2832 HA5NK	2512 JH8GOE	2237 W6OUL	1836 F5NBX	1580 J1-21171	1308 WØIZV	1010 F5RRS
3775 W1CU	3103 I1EEW	2787 W9HA	2484 K8LJG	2224 W8UMR	1802 PY2DBU	1544 Z32KV	1307 NH6T	989 US7MM
3708 N4NO	3099 YU7SF	2776 W2ME	2346 S58MU	2218 F6IGF	1767 IØAOF	1522 AA1KS	1280 W2EZ	906 N3KR
3652 N6JV	3085 WA8YTM	2776 I1POR	2281 N6JM	2159 W4UW	1765 K5IID	1499 YU1ZD	1268 KW5USA	762 K6UXD
3566 VE3XN	3059 PAØSNG	2745 I2EOW	2276 WA1JMP	2019 G4OBK	1759 I2EAY	1395 VE6BF	1264 VE6BF	611 JH2IEE

SSB

4180 IØZV	2844 N4NO	2397 WA8YTM	2033 IN3QCI	1714 K2XF	1525 W2ME	1271 W2FKF	1010 EA7CD	792 EA5GMB
3743 VE1YX	2802 I2MQP	2396 I8KCI	1975 W4UW	1685 KS4S	1518 AE5B	1252 T30JH	1002 N1KC	790 N3DRO
3779 ZL3NS	2731 HA8XX	2385 4X6DK	1975 HAØIT	1659 K8LJG	1452 LU5DV	1229 YC2OK	965 DJ4GJ	786 N3SAC
3522 K6JG	2725 I1EEW	2380 I2EOW	1921 K5UR	1650 HA5NK	1451 IT9SVJ	1196 KØNL	954 EA1AX	729 F5RRS
3476 F6DZU	2714 N5JR	2329 KF7RU	1882 SM6DHU	1649 EA5CGU	1443 N3XX	1160 K4CN	946 LU4DA	703 VE6BMX
3384 I2PJA	2657 PAØSNG	2360 EA5AT	1867 OE6CLD	1569 K3IXD	1396 W9IL	1127 EA8AG	933 DF1IC	697 I2VGW
3049 N4MM	2509 CT1AHU	2291 YU7BCD	1809 LU8DY	1570 W6OUL	1395 EA5KY	1090 LU3HBO	921 HA9PP	660 F5LIW
2978 EA2IA	2507 9A2NA	2260 KD9OT	1802 OE2EGL	1567 CT1BWW	1366 DF7HX	1061 WT3W	919 CP1FF	643 BD4DW
2976 F2VX	2491 LU8ESU	2257 I1POR	1770 YU7SF	1560 K8MDU	1353 K5IID	1030 NH6T	896 JR3TOE	613 SM5DAC
2935 EA8AKN	2487 UA3FT	2213 EA1JG	1757 N6FX	1546 IKØEIM	1336 G4OBK	1028 DL8AAV	894 EA3EQT	608 LU3HL
2921 OZ5EV	2446 KF2O	2211 CX6BZ	1754 W2WC	1544 DK5WQ	1299 SV3AQR	1017 IK4HPU	894 EA5DCL	608 KE4SCY
2913 CT4AH	2401 PY4OY	2134 K5RPC	1741 KBØC	1535 I3ZSX	1288 I3UBL	1011 I2EAY	836 AG4W	605 N7VY
2888 I4CSP								

CW

3984 WA2HZR	2613 VE7DP	2127 HAØIT	1906 G4SSH	1694 N3XX	1513 IK5TSS	1270 W9IL	1055 W4UW	821 RAØFU
3638 N6JV	2479 G4UOL	2124 JA9CWJ	1871 OZ5UR	1652 KS4S	1509 9A3SM	1268 DJ4GJ	1041 W9IAL	820 K3WWP
3272 N4NO	2468 W2ME	2089 KA7T	1816 SM6CST	1651 IK3GER	1506 I2EAY	1217 AC5K	998 K2LUQ	815 WT3W
3251 UA3FT	2451 N4MM	2079 KF2O	1804 K5UR	1641 G4OBK	1482 EA7AAW	1211 I2MQP	993 HA9PP	741 DL3NEO
3239 VE7CNE	2423 N5JR	2046 HA8XX	1804 LU2YA	1621 DJ1YH	1411 SM5DAC	1175 EA2CIN	906 YU1TR	741 K6UXO
3049 K6JG	2415 LZ1XL	2043 S58MU	1799 I7PXV	1599 EA6BD	1349 N1IA	1156 4X6DK	884 PY4WS	725 KØNL
2940 EA2IA	2384 WA8YTM	1973 G3VQO	1798 W2WC	1590 JA1GTF	1335 VE6BF	1094 LU7EAR	870 HB9CSM	678 IK8VRP
2926 YU7LS	2362 YU7BCD	1956 K8LJG	1795 W1WAI	1546 9A2HF	1298 EA6AA	1083 I2EOW	847 NH6T	659 N1KC
2881 N4UU	2196 VR2UW	1954 TI4SU	1750 IT9VDQ	1537 JH3SAC	1271 LU3DSI	1078 9A3UF	844 JK1AJX	619 F5RRS
2811 K9QVB	2194 9A2NA	1927 SM6DHU	1711 W6OUL	1514 EA5YU	1270 K5IID	1058 DF6SW	823 VE6BMX	603 OE6CLD
2786 YU7SF	2179 HA5NK	1927 N6FX						

for a weekend mini-DXpedition to a rare island. Thanks to bridges and ferries, IOTA DXpeditioners can put many islands on the air without getting out of their car. Mount Desert Island in Maine, Martha's Vineyard, Chesapeake Bay islands, Hatteras islands, the Florida keys, the San Juan islands, and the Channel islands are examples of IOTA entities within the reach of any amateur. Other rarer islands may require more planning, but are still readily accessible. Many more IOTA islands await the DXpeditions. Will you be the next one to put a "new one" on the air for IOTA?

The Art of QSLing: Card Design

Successful QSLing begins with selection of a good QSL card design. Your choice of a QSL card can significantly improve your QSL return percentage. A distinctive card will stand out from the masses of nearly identical commercial cards. Here are some of the factors to consider when designing your card.

1. Use a one-sided card, or put your callsign on the back with the QSO information. QSL managers and DXpeditions who handle thousands of QSL cards hate the two-sided card. The person answering the card has to note the callsign, flip the card for the QSO data, flip it back to confirm the call, and flip it again when filling out the return QSL. Flip, flip, flip, flip. Soon the

CQ DX Awards Program

SSB

2279	KB5VNM	2281	K9EWH
2280	N3RB	2282	HK3PLB

SSB Endorsements

320	OZ5EV/330	320	W5RUK/325
320	XE1AE/330	310	CT1AHU/316
320	W4NKI/329	250	KA5OER/272
320	KX5V/327	150	HK3PLB/166

CW Endorsements

320	EA2IA/329	310	K1FK/311
320	VE7CNE/325	275	I3ZSX/276

RTTY Endorsement

320 ..... K2ENT/327

The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. 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. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 330 active countries. Please make all checks payable to the award manager.

manager wants to flip all two-sided cards into the trash can. If you must have a two-sided card, put your call in large letters on the back as well as on the front.

2. Include all basic information. The card should contain your callsign in large, easily read letters. This means avoiding the fancy typefaces. The card should also contain your name, full mailing address, exact QTH (if different from your mailing address), and DXCC country. Your grid square is very important if you operate above 30 MHz.

3. Use a large block-format for QSO data. QSO data should provide sufficient space for the DX station's callsign, the UTC date, UTC time, frequency (not band), RS(T), and mode, marked "2×." The words "confirming QSO" should precede the QSO data.

4. Optional information can include a list of amateur awards you have earned, former callsigns, ITU and *CQ* zones, membership in societies and foundations, and even equipment and antennas. Be careful about the latter, however, as many amateurs change rigs and antennas frequently. Don't put so much information on the card that it looks cluttered.

5. Use a standard card size. Cards smaller than 5 1/2" × 3 1/2" cannot be mailed in the U.S. Cards much larger than normal won't fit in a standard #6 envelope. Use a card stock heavy enough to survive mailing without an envelope, but not so thick that it increases your postage costs.

Thanks to sophisticated word-processing and graphics programs, many amateurs can design their own QSL cards for that personal touch. Quick-print shops can turn out a short run of a few hundred cards in a matter of days.

73, Chod, VP2ML

Zero Bias *(from page 4)*

ite phrases, "Words are our biz." Maybe someday we'll do a "Best of Zero Bias"; a colleague and I had once discussed this as being a perfect gift for Al. But the best part, for me, was the almost twenty years I was able to work side by side with him, as my co-worker and most of all my friend, doing what we both loved and did best. Thank you, Al, for all those years.

88s, Gail, KC2DHK
Managing Editor, CQ

My Memories of Al

This past July 19 a good friend of mine and amateur radio, Al Dorhoffer, K2EEK, lost his battle with cancer and passed on. There was certainly the side of Al that everyone saw at different public events which he attended as a member of the *CQ* staff. There was also another side of Al, and I would like to share some of my personal thoughts and memories of the man I knew.

I met Al approximately 11 years ago. My good friend and Elmer Ed Hammond, WN1I, who is with Cushcraft Corporation, introduced me to him at a lunch meeting he had with Al and Arnie Sposato to which I was invited to tag along. When I first met Al, I thought him to be a very quite individual. He didn't say too much to me at the time, and I felt that he was sort of studying me to actually see what I was like.

I started speaking to him about various subjects, and the subject of my occupation, law enforcement, came up. Al's eyes lit up and he proceeded to tell me of his experiences in law enforcement with the Glen Cove Harbor Patrol. Al was a New York State Harbor Master working for the city of Glen Cove at the time, and I could see that he had a genuine interest in this field of work. Next to writing, I always thought Al would have loved to be a law enforcement officer as a full-time career. He had a keen street sense and knew how to size up an individual quickly.

Most of Al's assessments on people were right on the money and it was downright uncanny how he was able to do this in such a short amount of time. I always considered him to be a real student of human nature, as he consistently studied people and made very quick assessments based on his observations. This was a real gift which I seldom see individuals grasp.

I became good friends with Al and invited him to attend a meeting of our newly formed club, the Suffolk Police Amateur Radio Club, which we held at Police Headquarters in Yaphank. Al really hit it off with all the guys, and we all had a great time. I showed him around headquarters, and he was extremely interested in the operation. He loved the whole experience and just liked being around cops.

I also experienced another side of Al, the side of him that was able to listen to a problem and come to a very logical conclusion as to the remedy of the situation. He always stressed that you should not worry about the small stuff and concentrate on the much broader context of the problem. In other words, get to the meat and potatoes of the problem and throw away all the small stuff because that just clouds up the situation. This was often told to me by him in a little more "colorful" terminology, but you get the picture. He wasn't afraid to vary his use of the English language to make his point.

Always his happiest after making a great discovery in a fleamarket, here's Al several years back proudly carrying his "fleamarket finds" back to the CQ booth at some hamfest or another. After attending several hundred over the last three decades, they seemed to blend together.

Al was never too busy for me and would always take my calls. I would often speak of the many problems of the job and my experiences with it and always felt much better about situations after I had spoken to him. I remember one instance in particular that comes to mind. I was involved in the recovery operation of the TWA flight 800 victims. I saw sights which I realized when I went into this occupation I might one day have to see, but never really thought that day would come. I was clearly out of sorts with the magnitude of this situation and it had visibly shaken me up. No person could really have prepared himself for the devastation that I witnessed, especially with young victims involved. I continued to do my job in a pro

The weeks that followed were difficult for me, and I felt the need to get out of the house and visit Al. I went to lunch with him at a local diner very close to the *CQ* offices. I remember how when we sat down and ordered he asked me, "How are you doing, Jeff?" I then went into the long explanations of what I had seen and what my feelings were. I rambled for approximately 15 minutes straight. He sat there for the whole time I was talking and just nodded his head with a concerned look on his face. Once I had finished, he looked at me almost like a concerned parent would and told me that the situation was beyond my control and no matter how bad it was at the time, I had to try to separate myself from the situation so that I could continue to do my job the best I knew how. He also told me how I had to protect myself by continuing to talk of my experiences and not holding these feelings inside.

Al always had some great advice, and I felt much better about things after I spoke to him. He had a very soothing voice and was very understanding.

On another occasion, I invited Al to ride with me while I was at work on a 4–12 tour. He observed everything that was going on while I completed my daily on-the-job routine. He admitted to me that it was a bit strange being on land enforcing the law, as he had always done it on the water. I jokingly offered to drive the car by a lake to make him feel more at home, but he said it wasn't necessary. He never felt apprehensive about my driving, so he must have been at ease and having to good a time. I must admit that I felt guilty because no one is allowed to have as much fun at work as I did with Al on that day. As much as he enjoyed being there, I enjoyed having him there with me more. I will never forget that day; it stands out as being one of the special days in my life, and I'm glad he was able to experience this, as he had always wanted to.

We often would speak of our mutual hobby, amateur radio. Al was probably one of the most devoted members of our ranks. He was never short of thoughts on the hobby, which he would share with me. I often told him that my highlight each month in getting my monthly issue of *CQ* was his editorials. They often made me think, ponder, and sometimes chuckle out loud. My wife sometimes couldn't figure out what I was so obviously mesmerized by at the beginning of each month. She stopped asking after she figured out that I had *CQ* in hand and knew not to bother me for at least 10 minutes until I had read the editorial. I remember in one issue he mentioned the ham who "had to have another handie-talkie even though he had six already, but he had to have it." That ham was me, and until now no one ever knew this except Al and myself. We laughed about this editorial often.

Most of Al's editorials really made you think, as they always made some very excellent points. There was one in particular which really hit home for me. It was around 1992, and he spoke about a nor–easter type storm which had just occurred here on Long Island. He went on to speak about just how ill equipped some government entities were at dealing with communications networks in disasters, and how ham radio operators seem to transcend these difficulties and always provide efficient, reliable communications at a fraction of the cost.

In this editorial Al also spoke of the 1990 Avianca plane crash in the nearby north shore of Long Island town of Cove Neck. Al did an excellent job of explaining how the crash took place in Nassau County, very close to the Suffolk County border. Multiple agencies from the Nassau, Suffolk, and New York City governments responded. Local hams also responded to lend a hand. The remarkable thing was that with all the top-line equipment all these agencies had, they had major problems communicating with each other. As it turned out, the hams ended up conducting the communications efforts for the local triage area to various hospitals. Al wrote at the end of this editorial, "We as amateurs manage to communicate with relative ease during any trying situation and also manage to organize as we go along. It is no longer amazing that we do it time after time. We know we can. What is amazing after all of this time is that no governmental agency, with all of their resources, can do it once." This was for me vintage Al Dorhoffer at his best. I still use this editorial at forums and talks about amateur radio I give.

Al will certainly be missed in amateur radio. With the changes occurring in this hobby due to all the competitive technologies, Al gave us a sort of reassurance that all was going to be

fine and that amateur radio would in fact emerge unharmed when the smoke cleared. He often spoke of how it would still go on for generations. He made us all feel good about our hobby and was always there to pick us up when we thought that something was wrong with the health of the hobby. In my opinion, Al was one of the best spokesmen for amateur radio. We need more people like him. Al's passing is amateur radio's loss.

Finally, on a very personal level, I will miss Al very much. I never got to work with him on a daily basis. As a matter of fact, I only saw him a couple of times a year and spoke to him on the phone a couple more times throughout each year. I now wish that it had been more. At Al's funeral I remember telling Dick Ross, K2MGA, how our life style in the New York area is so fast paced. We always say we want to get together more, but we seldom have time due to the many commitments in our life. New Yorkers always seem to have too many commitments. This was certainly my loss, for I wish I had seen and spent more time with my friend. The late Harry Chapin in the song "Cats in the Cradle" might have summed it up best when he sang about a father promising to spend time with his son. As the words state in the song, "we'll get together then, you know we'll have a good time then." Unfortunately, that day never comes.

If I have learned anything from my friend's passing, it is to pause in your life and think what a precious commodity life is. I will try to spend more time with those who mean something to me and not assume that there is always tomorrow, because tomorrow might not be here. I will miss Al dearly, and it will be difficult for me to visit my friends at *CQ* without Al being around. It certainly will not be the same for me, but I will still drop in from time to time just to say hello and maybe just to reflect on how Al was a very special person to me.

I can't help but think that Al is looking down at us and smiling. I'm sure he knows how positively he has affected so many people's lives and how he did make a difference for them. I would like to end these memories I have of Al with just a short common phrase which we use every day in our hobby. For some reason I think it is very appropriate for this occasion. I would just like to say to my good friend, " 'Til we meet again, best 73's my friend, and thanks so very much for the great contact!"

Jeff Savasta, KB4JKL

A Storehouse of Knowledge

Alan was one of the first hams I ever worked on 10 meters. I was surprised and overjoyed that a "famous" ham such as Alan was my neighbor back in 1975 when I was a resident of Port Washington and a new ham. A long friendship began back then with a visit to his shack and a look at some vintage gear of which he was very proud. Of course, I was thrilled to be able to visit the man who was the editor of a popular ham radio magazine. Even more so it was wonderful to be able to speak to Alan "off the record" about the ham issues of the day. He was a storehouse of knowledge about the hobby and the people in the hobby, of which then I knew very little.

In my shack there is a copy of *The Vertical Antenna Handbook* that Alan gave me back in 1976 when I was thinking of putting up a vertical antenna. He said, "Here, read this book and you will know all about vertical antennas!" Alan was always willing to help me out. I for one will miss him. We have lost a good friend and fellow amateur.

John Fisher, K2JX

ARC-5 Stories

Al was a genuine individual who was one of the shining stars of truth in our hobby. His uncanny ability to speak the truth, be it in person or in his editorial, will be sadly missed. Whether catching him at a show, while visiting *CQ* headquarters on Long Island, or even with a phone call, Al always had a kind word to say and was an upbeat and realistic person. I will miss his "ARC-5 stories" and the funny ramblings about the Gonset Gonkulators with a bright yellow Civil Defense sticker sitting in a bomb shelter somewhere in our past. Our hobby and the ham radio industry have suffered a great loss, and I can only hope and pray his efforts are carried on.

Ed Hammond, WN1I
Cushcraft Corp.

From Around the World

"When the late Jock White, ZL2GX, passed away, I inherited all his boxes of *CQ* magazines which go back many, many years. I think I might have read every one of Al's editorials up until the early 1990s, and these gave me a great deal of inspiration when I was Editor of our NZART Branch Newsletter for six years. They still do today! He will be sadly missed by many New Zealand amateurs."

Ric Coleman, ZL2RIC

"Alan was a true friend and strong supporter of AMSAT and the amateur radio satellite program over the years. His strong voice and perceptive editorial style will be sorely missed in amateur radio."

Keith Baker, KB1SF
President, AMSAT-NA

"Alan and I never met, but he was like an old friend. I guess I developed the feeling that I knew him well from his editorials. It always seemed as if he was talking directly to me."

George Murphy, VE3ERP

"Alan was a fixture in amateur radio, someone who was there for everybody—all the time. It's difficult to imagine *CQ* without him, as he actually 'was *CQ*' to us and had been for the more than 23 years that we knew him. He was always a pleasure to work with, and to say that we will miss him is an understatement."

Karl, W8FX, and Millie, KD4SHM, Thurber

"It is with great sadness that I learned through the ARRL of Alan's passing. I had a nice conversation with him at the 1996 Atlanta Hamfest. Although new to ham radio and sporting the 2×3 call KD4CDB, and my wife the brand new call KF4GPJ, Alan was friendly, informative, and very congenial. We talked about HF, DX, and VHF/UHF. He told me several anecdotes of his early days in ham radio and had the same enthusiasm level that you would find in a new ham like myself (licensed in 1991). While handing out free copies of *CQ*, K2EEK represented to me fellowship, respect, and Elmering, traits lacking in many amateurs today. In my opinion he was a credit to *CQ* and to ham radio in general. He will be missed on a grand scale."

James, W4AMP, & Donna, WA4SEX, O'Brien

"Alan was always a friendly face at hamfests and conventions. Years ago as part of the hamfest committee here in Atlanta, I always looked forward to his editorials on food at hamfests. For a couple of years Alan gave us the highest marks on hamfest cuisine, an honor we worked hard to achieve.

"He was a great guy, always positive but slightly jaded and off center. He could have increased *CQ* circulation by taking a negative editorial policy, but he never fell for such a quick fix. His editorials were thoughtful and contributed much to the common-sense dialogue among responsible hams."

Sandy Donahue, W4RU

"Seeing Alan and the crew at the various shows is one of the things I miss most after getting out of the amateur radio business, so I regularly read every word of his editorials. It has kept me connected to friends. His spirit will live on in everyone he touched."

Ken Sartain, KS9I

"I really enjoyed the time I had to visit with Alan at Dayton last year because I share his perspective on ham radio that it is supposed to be, more than anything else, fun. I looked forward to his editorials every month. I believe his perspective served us all well and reminded us why we got into this hobby in the first place."

Bill Cross, W3TN
FCC

"I remember Alan as a wonderful person deeply devoted to ham radio. Our meetings at Dayton each year were always special, and on each occasion they left something in me."

Alex Novelli, I6NOA

"Alan did the job the right way. He was the guy amateur radio needed to succeed, and it was under his reign that the French *CQ* magazine was born. *CQ* and the entire amateur radio world have lost a great "radio man."

Mark Kentell, F6JSZ
Editor, CQ Radioamateur

"Alan was a mentor for me when I entered this business, spending all the time I asked for to help me understand the ins and outs of the business and the hobby. He was always looking for a way to make things work out, with always a positive outlook. I respected his integrity and work ethic immensely."

Chris Lougee, N7TJM
ICOM America

"What I remember most vividly about Alan was that he was always having FUN in amateur radio and wanted others to share in that fun. Maybe it was not the same kind of fun (10 meter DX was his favorite), but he wanted you to get into ham radio and discover something new and different."

Chip Margelli, K7JA

"I got into ham radio probably at about the same time as Alan (1953 for me). I subscribed to *CQ* even before *QST* and was a subscriber when Alan came to *CQ*. I left the air in 1965 and returned in 1995, and there was Alan, still at *CQ*. What a record!

"Alan did indescribable good for ham radio and for *CQ* magazine. Long live *CQ!*"

George H. Shands, W9WUU

Thanks

Once again thanks to the CQ WW log checkers who helped validate the winners and provided insight into many contesting topics. The 1998 crew included: K1DG, K3UA, K3WW, K6NA, KR2Q, N2NC, N3ED, N6ZZ, N9RV, W7EJ. Special advisors were K3ZO, N8BJQ, N2AA, K3LR, N5TJ. Decoding problem logs was led by W3ZZ and his crew of N5NJ, JE1CKA, and I2UIY. Our DX advisors were helpful in offering good advice, providing information, and sorting out potential problems: CT1BOH, DL6RAI, EA3DU, F6BEE, G3SXW, HSØ/G4UAV, I2UIY, JE1CKA, OH2KI, OH2MM, ON6TT, PY5EG, S50A, UA9BA, VE3EJ. The CQ WW call database would not be of such a high quality if it were not for Dick, N6AA. He again spent countless hours to make the CQ WW database the best in contesting. The CQ WW uses the constantly updated software developed by Tree, N6TR, in order to create the database. John, K2MM, created the entire WWW log entry information. His robot worked smoothly in acknowledging receipt of a log. Tack, JE1CKA, has created the appearance and non-log data on <cqww.com>. Translations of the rules into Spanish, Japanese, German, and French were done by EA3DU, JE1CKA, DL6RAI, and F6BEE. Larry, N6TW, was invaluable in retrieving and processing data from e-mail submissions. Thanks to the counsel of John, K1AR, and his hard work to make the CQ WW successful.

Congratulations to all the winners! This year try to get a friend on in the contest. He and you will find the CQ WW a real contesting experience. To participate and have fun is what contesting is all about! 73, Bob, K3EST

DX QRM

ZM2K at 1412Z big shock; assume it was correct . . . ***9HØA.*** We did break the record score of OC Multi-Single which we made last year, if the reduced score is less than we expect . . . ***AH2R.*** I've beaten the guy I was competing against—myself (with last score)! . . . ***CT1BQH.*** Your super contests are the ideal lab for studying the frontiers of QRP operation. Lots of big ears are desperately looking for a multiplier, and a CW CT1 is not very common. I limited it to 100 mw. Maybe 143 QSOs or 20,145 claimed points is not very huge, but I think I could get one of the best scores of points per watt! . . . ***CT1ETT.*** I had a lot of fun with the 3-ele noodle beam (W9XR/W3GH design) at only 15m height. ! . . . ***DF4SA.*** It isn't easy to work single band with mostly just a dipole, but it was fun the whole time, especially if stations like VK9LX, 9M6AAC, and other rare DXers gave me a call. . . . ***DK8FD.***

My second CQWW CW entry from HI land. This was the most wet contest I ever worked . . . ***HI8/DL1HCM.*** Fifty percent more points than the old Low Power DL record, but with condx like these I may end up as #3 in DL only. . . . ***DL2HBX.*** Most of the stations I called often returned at once. Low power and a German callsign seem to be a handicap . . . ***DL2HQ.*** Final tuning of the C31XR beam was made on the tower at minus 15 degrees Celsius. Thanks to Force 12 and SWL Holgi. . . . ***DL4NAC.*** High sunspots and low noise—cool! Tnx again to our friends in Ibiza . . . ***EA6IB.*** Apologies to all who tried a 160m QSO with us and got no reply. A broadcast AM station just 50 meters away on 1584 Khz kept 1.830-1.850 segment quite "clean," making reception almost impossible . . . ***EA9EA.***

My computer was broken after 1300 QSOs! I have now only last part of the log, which I made on paper . . . ***ER5AA.*** No team to use TM1C, so I took the antenna farm for a week for the CQ WW CW. I tried a single band 10m. My CW level is not very high. I trained with PED to improve my code speed. Thanks very much to many American stations who repeated their calls and made a little QRS for me! I was pleased to contact China and Mongolia. 3E1AA was going too fast. It took 10 minutes to understand his call. . . . ***F5ITK.*** QRP is the best; with a good antenna you don't need lots of power . . . ***GØVQR.*** Fifteen meters was in very good shape, but with hindsight I think it would have been even better on 10m. . . . ***G3MXH.*** Enjoyable as always, but I cannot get near GIØKOW's scores from plain old G-land. Great conditions on 10m, but the HF bands are still shutting early. It can get better than this! . . . ***G4BUO.*** This is my best score to date and the first one from GD where I spent a lot of the time CQing for a change and holding the frequency, on 100W! The rotator for the 3-ele Yagi was damaged in the recent storms, so the whole contest had the Yagi facing East. . . . ***GD4UOL.***

Amazed to make over 2000 QSOs; disappointed to not get all 40 zones, as I know zones 2 and 34 were active . . . ***GM4YXI.*** On Sunday afternoon we had all six bands open. Practically impossible to find few hundreds of Hertz free for running . . . ***IKØHBN.*** Really great 15 and 10 meters! For me 1,127 QSOs and 791,700 points was a dream before now. Only wire antennas and 100W, but next year hope better antennas . . . ***IK4EWX.*** Strong signals from USA and many stations from Japan. Great pile-up on 40m for XX9X and XZ1N . . . ***IQ6T (Op.IK6SNQ).*** Wind broke my antenna at half of the contest . . . ***IR9T (Op. IT9GSF).*** Finally, I've got zone 01! . . . ***IT9TWC.***

As the condx during test was good, I enjoyed very much. But I lost many mults because of pile-up . . . ***JQ3UDL.*** It was suffering in freezing temperatures—minus 35 both C and F—assembling beams and struggling through 48 hours with three stations, but it was fun to experience that rare zone 23 and meet those who provides it regularly to us Deserving . . . ***JT1A.*** Have not heard for years such a fine contest. I was assisted by my son LZ1ABC . . . ***LZ1AQ.*** Thanks to LZ1DB, the President of "TELZET," for equipping the station with transceiver and amplifier. Great propagation to JA! . . . ***LZ5W.*** Sunspots are back! Had a clean sweep on 15 into NA. Highlight: Getting called by KC1XX and others on 80m . . . ***OE5OHO.***

Missed VK6; heard later a couple of others missed them, too. This time heard only a few mults that could not hear me; the /VE2 was one of them. I hope conditions would be better to Japan next year also on CW. Hear you all next year with a shorter callsign! . . . ***OHØJJS (OH6LI).*** First time trying to put some signals in the air from Argentina. I wish I could get a local call next year . . . ***LU/OHØWW.*** The biggest thrill was to work V63X through W/JA pileup at 2200Z on Sunday just after JX7DFA double mult! . . . ***OH1F (OH1NOA).*** What a great contest! Passing mults to other bands went also very smoothly. The highlight was XU1A answering to our CQ on Sunday 2050Z. . . . ***OH2U.***

The very best of all operators I heard was HC2SL . . . ***OZ8AE.*** After many years of single-band operating, I wanted to try something new in the form of an all-band attempt. By the way, I really appreciate the UBN report. It gives very good advice for self-improvement . . . ***PA3AAV.*** Back to basics: no more DXcluster, no more big Yagi, no more 3-500Z, but had the best time in years! Contesting as it is supposed to be? . . . ***PA3BUD.*** 300 QSOs on first 3 hours! 22 hours of operation and more QSOs than WW SSB—breaking my own record using R7 vertical—no other antenna, no amplifier . . . ***PY2NY.***

Was lucky to find nice conditions on 15m in RA3-land after many years of waiting. Have got joy . . . ***RA3XO.*** We've just finished the construction of 3-el Yagi for 80m 3 hours before the contest began. Antenna worked fantastic! It was the first time for us we've made QSO in contest on 80m with 6D2X, zone 6 through big pileups USA, KL7Y, long path 3 zone W6RJ . . . ***RU1A.*** 80m is a real band . . . ***S50A.*** Better than last year on 10 meters! Couldn't work zones 6 and 29. No aurora. Funny reports received as ENNN . . . ***SP5DDJ.*** I love CW. I am 17-year-old blind boy . . . ***SQ9BZK.*** OT of 82 years. Most QSOs ever in CQ WW SSB or CW. Tried manual and computer log at same time! Previously V2/G6QQ, but now been given local license . . . ***V29QQ (G6QQ).*** Biggest thrill was breaking the pileup on the Azores on 15. Thanks to VE7CFD, for his hospitality and use of his station. Original goal was to break 500 Qs; maybe 1000 Qs will be possible for QRP from the west coast soon. . . . ***VE7CFD (VE7CQK).***

What a weekend for a contest! Tnx to VP5JM . . . ***VP5GN (K5GN).*** This old goat only managed 38 hours operating, which included some equipment problems. Band conditions were great, but I lacked the antennas to take full advantage of the conditions. Next year I'll be better prepared and hope that conditions are as good . . . ***VP5M (N4TO).*** Many thanks to VE1JF (Jim and Hannalore) for hosting my DXpedition to Nova Scotia . . . ***XJ1JF (VE7SV).*** All bands were UFB, and specially 15m and 10m. This is my best effort in this category . . . ***Z31JA.*** First time like "BIG GUN." Excellent conditions on 40m. Sorry for many stations from W6/7 and JA I couldn't copy because my receiver was very poor . . . ***Z39Z.*** I operated from Quartz Hill Amateur Radio Station located on a farm near Wellington. The station is a former Radio New Zealand facility for reception of international broadcasts. ZL6QH is a special callsign for use by members of the Quartz Hill User Group . . . ***ZL6QH (ZL1AZE).*** Thanks to PY5EG for a memorable experience and a new world record! . . . ***ZW5B (K5ZD).***

USA QRM

Goal was 100 countries on single band. Close but no cigar . . . ***AAØTY.*** Thanks to Roger, K1DQV/3, for hospitality and opportunity to test drive his new installation. First contest from U.S. in 12 years. Won the national championship in the last one (ARRL DX CW) from W3GRF. Won't even make top ten this time. What a difference a decade makes! . . . ***KØDQ.*** This is my first CW entry, although I've operated in CQ WW for years now. Hope to make a better showing next year when I get the tower up. Using only verticals can be a real handicap in pileups, but it can still be fun, too! . . . ***KØIL.*** Thanks to the sunspot gods for excellent 10/15m condx. That's the most fun I've had on 10 for a long time. Sigs coming from everywhere at once. Had to use the Zepp so I wouldn't miss anything . . . ***K1RC.***

Best conditions in years! And the YCCC really motivated us little pistols to operate! . . . ***K1TH.*** This was the best ever result in 20 years of contesting from Vermont. Better than 50% improvement over last year's score thanks to improved 10/15m antenna setup and propagation. Even more important, we managed to have FUN. Thanks to our hard-working crew . . . ***K2LE/1.*** Motor skills and brain neurons are sharpened up as a result of working single band 40m. Loved it! . . . ***K4LDR.*** The person who said, "There ain't no meters like 10 meters" was certainly right this weekenders generated twice as many points as any other band for me . . . ***K4LTA.*** Wish I could have spent more time on the bands. Did get to enjoy some good 10m openings after local sunrise . . . ***K4RO.***

We should be classed as multi-multi unassisted as we do not use packet, the Internet, or any other outside sources for our contacts as the east coast packet slaves do! All of our contacts came from inside the shack . . . ***K4VX/Ø.*** Welcome back sunspots! This is what we've been waiting for since 1993 . . . ***K5MDX.*** Like so many others this is a personal best for me. Was great fun, even with modest antennas and low power . . . ***K7HBN.*** All I could get up before the contest was a 2-ele 40 at 130 ft. Just thought I would work a few guys and have some fun. Turns out that I was competitive! . . . ***K8DX.*** This looks like a new CQ WW CW M/M record! Conditions were outstanding on all bands! Ed, K1TR, graciously helped out on 20m and on the spotting radio setup. Thanks, Ed! As usual, Matt's XYL, Christine, provided moral support and food throughout the contest . . . ***KC1XX.*** First ever CQ WW on CW. Thanks to all who slowed down for my slow copy. Really got my code speed back up, though. . . . ***KE1FO.***

After 20 years without a single CW QSO I made 175 in just under 13 hours! . . . ***KE1KD.*** This was a great effort for the first time in this contest, with a great team of operators. We missed the first 38 minutes of the contest, as we were still outside raising antennas! . . . ***KG6OK.*** Set a goal to beat my last year's scores and totals. With a modest station I could not hold a run frequency, but maybe that was good, as S&P and the TR bandmap yielded a wealth of multipliers, especially on 10! . . . ***KJ9C.*** What a contest! Can't imagine what the top of the cycle will bring in a few years. Activity this weekend puts claims of dying interest in CW to rest for good! . . . ***N1DG.*** This was my personal best all time from Stateside in CQ WW. . . . ***N2BA.***

Great conditions all around. Highlights: three new countries worked (280), busting pileups. Lowlights: not even hearing XX9 . . . ***N2CU***. For the most part I was "packet pouncing," but there was so many spots I was kept busy all weekend. Were I a better CW operator I would have been able to run. Conditions were really great and I was hoping to work over 100 countries on 10, 15, or 20 meters . . . ***N2FF.*** Could not find much chance for sleep. Shut down after EU sunrise for an hour, got up to check EU secondary, only to hear JT1 booming through. Hard to believe WW condx can improve much over what they were this weekend, but sorry to see beloved low bands suffer . . . ***N4AF.*** Biggest thrill: finding VK9LX all alone on 20m after midnight and working them first call! . . . ***N5TW.***

This was my first contest from the home QTH using a beam. What a difference over wires! Working XZ1N just after sunrise on 20m (first call) and VK's, VK9LX long path on 15m just before our sunset . . . ***N6RFM/1.*** JA runs went for many hours and running Europe on 10 meters made me feel like I had moved to the east coast! 1999 should be a really great DX and contest year! . . . ***WØTM.*** This is as good as it gets! My best score ever, and longest time awake . . . ***W1WEF.***

What a thrill to break the LP record! This contest was action-

packed the whole time; there really were no totally dead periods.Warmest congratulations to Jeff, N5TJ, who looks to have run away with it. . . . ***W3EF.*** Most impressive score goes to N9RV operating at W9RE . . . ***W4AN.*** More fun than should be allowable. My second run at this game again from the /M platform. My daughter Katy (also a ham) was with me during the trip. Many thanks to all who pulled me out of the mud to make this another memorable event! . . . ***W4CAT (K1KY).*** Yo quiero 10 meters . . . ***W4PA.*** Ninety years old and I still love DX contests! . . . ***W6BA.*** It was wonderful to have openings to Europe (on 10) after such poor conditions in the SSB contest last month. It wasn't quite good enough to hear zones 18, 21, 22, 23, 34, 37, 39 . . . ***W6YA.*** A contest to remember for all time . . . ***W9RE(N9RV).***

Station Operators
Multi-Op Single Transmitter

4U1VIC: DJ0IP, DJ1AT, DL1MGB, DL3NCI, DL5RDO, DL5RMH, DL6RDR, DL9NEI, S57NW. **8Q7DV:** UA9CI, UA9CDC, UA9CDV, UA9CLB, UA9CFF, UA9CKP. **9A5D:** 9A3DU, 9A3NY, 9A4NC, 9A4SG, 9A6DX, 9A6KKB. **AA2FB &** K2QMF. **AA3JU &** WF3H. **AE2F &** WR2I. **AH2R:** KH2/JH0USD, KH2/JR0BQD, JR7OMD/WI3O. **CE3F:** CE3/SM3SGP, CE3FIP. **CT3FN &** CT3/DL2HYH. **D44BC &** DL2OBF, DK7YY. **DF0CI:** DL5ZL, DL8AKI. **DF0XG:** DL4FCX, DH8MCB, DJ3XG. **DJ6QT &** DL1EFD, DL1EFO. **DK0FFO:** DL1BZA, DL2BWM, DL7UGN **DK0TZ:** DL1SBF, DL4AAE, DF5EN. **DK0ZG:** DJ5WG, DL6MPG, DL8CYG, DL8MUG. **DK1II &** DL5EBE. **DK5MV &** DL7MAE. **DL0AO:** DJ3TF, DJ5RE, DJ6RN, DK1RP, DK6NJ, DL6RDE. **DL0B0/P:** DF2CH, DJ8BD, DL3DAZ, DL4DZ, DN1DF. **DL2NBU &** DL4RDJ, DL6RAI. **EA5BY &** EA3C8, EA5ABE, EA5BXT, EA5EU, EA5FID, EA5GRV, EA5KW, EA5SM.

EA6IB: EA3AIR, EA3AJW, EA3ALV, EA3DU, EA3GGO, EA3KU, EA5BM, EA5ZF, EA6ACC, EA6FB. **ED7UR:** EA7BJV, EA7ESH, EC7AEN, EC7DZD, EC7AJL. **F5KPG:** F5SDT, F5TLF, F6IFY. **F5PED &** F5CW. **F6ENO &** F6CEL F6DKV F5AKL. **G3TMA &** G0WAT. **GM8C:** GM4WLN, GM0KMD, GM0RLZ, MM0BSM, GM0KWL, GM0AZC. **HA1KRR:** HA1ZZ, HA1ZN, HA1XU, HA1XO, HA3KW, HA1DRR. **HG1S:** HA1TJ, HA1DAE, HA1DAC, HA1AH, HA1DAI. **HS0AC:** HS1BZY, HS1CKC, HS0SCK, HS0GBI, HS6NDK, E21EIC, E21ENF. **HS5AC:** HS1NIV, HS0OAG. **II3T:** IV3TAN, IV3TRK, IV3YYK, IV3SHF, IV3OWC, IV3ZLC, I3BLF, IK2NCJ, IK2JUB. **IK1QBT &** IK1LWL, I1NVU, IK1CLP, I1WXY. **IO2A:** IK2HKT, IK2CIO, I2IFT, IK2AHB, IK2PFL, I2CZQ. **IO2L:** IK2NCF, IK2PIG, IZ2AAJ. **IU2C:** Club. **IY2ARI:** IZ2AVK, IK2UCK, IK2XYU, IK2BUF, IK2NVU, I2MQP.

JA1YQH: JI7GBI, JR0EFE. **JA2ZJW:** JM2NFQ, JE2PCY, JH2CMI, JL2ICO. **JA9YBA:** JR9QNJ, JF0EGG. **JE2YHS:** JA2OLJ, JE2WWB, JG2NUD, JR2JVR. **JF2SKV &** JE6MYI. **JH7PKU:** JH7PKU + JA9SSY, JI1CUP, JN3PYQ, JO1BMV. **JI2ZEY:** JA2BIV, JA2BIL, JM2CCL. **JI3BFC &** JF3GKE. **JJ1ZXE:** JA1RIZ, JG1TCB, JL1RUC, JQ1SQI, JP1QGO. **JR1ZTT:** JK1JHU, 7L1ETP, JM3CRK, 7N3PZJ, JO2HKQ, 7L3CQP, JR0UUU, JR0XHL, 7M4AZB, JM4HHH, JH0KHR, K.Hiromi and Y.Megumi. **JY9QJ &** DL5MBY. **K0ZM &** K0VXU. **K1AR &** K1EA, W2RQ. **K1ZZ &** K1RO, N1RL. **K2TE &** K1HI. **K2XR &** WB2BHC, WB2WIK, K2OWR, N2YFH. **K3PH &** W3MF. **K3TUP &** KJ3L, ND8L, WA3SES, WA3HAE. **K5MDX &** WQ5L, W5UE, N5FG. **K6ANP &** N6AD. **K7ON &** NU7I. **K8AZ &** K8BL, K8MR, K8NZ, K8PP, W8CAR, W8GN, W8KIC, KG8TS, KQ8M, N8TR, W1MD, WB8K, WT8C. **K8LX &** K8GM, N8EA, WA8ZDT.

K9KJ & W9YYG. **KA1GJ &** K1VR. **KB0VVT &** KG0US. **KG6OK &** N6HC, W1HIJ, AA6PW, KI6X, KQ6ES, KJ6ZH, KA6SAR. **KH7R &** KH6ND, K1ER, K9PG, K9NW, WE9V, ND3A, K5TSQ, AH6LV, NH6XO, AH6OZ, AH7R, KH7L. **KL7Y &** WL7E, WA2GO, KL7U. **KQ4QM &** KF4KL. **KV0Q &** N0NR, W7XM, AE0Q. **LA1K:** LA7UJA, LB7JE, LB7VE. **LA8W:** LA4DCA, LA8SDA, LA9EEA, LA9HW. **LU8XW:** LU3XQ, LU6XQI, LU6XQG. **LW6EFP &** LW1EXU, LW9ETY. **LX/DL4SDX &** DL5SEJ, DL4SDW, DL8SCG. **LY3AV:** LY1CQ, LY1CX, LY3BP. **LZ1AQ &** LZ1ABC. **LZ5Z:** LZ1AX, LZ1UQ, LZ1BMV, LZ1HST, LZ3FN, LZ3FR, LZ3SM, LZ4AX, OK2DF. **LZ6A:** LZ2EG, LZ4BC, LZ2HR, LZ2VO. **LZ9A:** LZ2DF, LZ2EV, LZ2HM, LZ2JE, LZ2PL, LZ2PO, LZ2PS, LZ2WF, LZ3TX, LZ4UU. **N0IJ &** AA0BY, WJ0M, AA0AW, AA0SI. **N0LM:** W0ETT, W0NT. **N0NI:** N0AV, N0AC, K0RX, K0KD, WO0V, W0FLS. **N1AU &** WC1D.

N2LBR & WA1KKM. **N2NU &** K2WI, W2REH, WB2REM. **N2SS &** N2MT. **N3RS &** N2SR, N3ED, N3RD. **N3OC &** WR3Z. **N4RV &** N4RA, KT4W. **N8RA &** NJ2L. **NE3F &** K3ATO. **NY3M &** Dave Long. **OH5M:** OH5CW, OH5MLH, OH5UX, OH5TQ. **OH6NIO &** OH6KZP. **OH6X:** OH6UV, OH6MW, OH6NJ, OH6KSR, OH6MSZ. **OH7M:** OH4LYX, OH4XX, OH6LNI, OH7MS, OH7MHL, OH7KIR, OH7KD. **OK1KCF:** Club. **OK2KDS:** OK2VWB, OK2HIJ, OK2-22266. **OK2KOD:** OK2BNX, OK2BJ. **OK5W:** OK1AEZ, OK1CF, OK1WF, OK1TA, OK1FKD, OK1DDO, TA2ZW, OK1JR. **OL2A:** OK2PDK, OK2HBY, OK2PEM. **OL3A:** OK1AY, OK1CM, OK1DRQ, OK1DX, OK1FCJ, OK1FJD, OK1FWM, OK1MR. **OL5Q:** OK1HRA, OK1FLC, OK1AYE, OK1FFU. **OM3A:** OM3CGN, OM2DX, OM6TY, OM7RU, OM8AM, OM8AW, OM0WR. **OM8A:** OM3RM, OM3GI, OM3LU, OM3JW, OM3EA, OM3XX, OM5RW. **OT8K:** ON4ON, ON5DI, ON5SY, ON6HH, ON4ADZ, ON7PQ, ONL-3908, ONL-4531. **OT8P:** ON4GO, ON4LAM, ON4LDJ, ON5OO, ON6AH, ON6MH, ON6VL, ON6QR, ON7PC, ON5AV, Visitors ON5AV & ON4LZ.

PA3HBB & DF5RF. **PI4CC:** PA3ALK, PA3BSQ, PA3EPD, PB0AIT, PB0AIU. **PI4COM:** PA3BBP, PA3BWD, PA3CAL, PA3EBT, PA3ERC, PA3EWP, PA3FDO, PA3GBQ, JH9GGH. **RK0SXF:** RU0SN, RU0ST. **RK3AWE:** RU3DGD, RK3FM, RA3FF, RK3FT. **RK3PXP:** RW3PN, UA3PNO, UA3PBE, RV3PE, UA3PMT, UA3PMW. **RK3WWA:** UA3WU, RV3WW, UA3WGA, RA3WDK. **RK4CWA:** RA4CQ, RW4CG, RA4CTR, UA4CQM. **RK4WWA:** UA4WA, RW4WA. **RK4YYM:** Club. **RK6AYN:** UA6AH, RU6BP, RN6BP. **RK9AWN:** RA9AA, RA9AC, RA9AX, RN9AA, RZ9AW, UA9AR. **RK9CWW:** RZ9CO, RU9CO, RA9CMO, RA9CKO, UA9FQY, UA9CDT, UA9CIR. **RK9CXM:** Vlad Kaliichenko, Arkady Medyakov, Oleg Khabarov, Serge Bankin. **RK9KWI:** UA9KJ, UA9KDZ. **RM6A:** RN6BN, RA6CM, RA6CO, RA6AX, RX6BA, RW6YY. **RN3R:** UA3RAR, UA3RA, UA3RJ. **RU1A:** RW1AC, RV1AW, RU1AA, RN1AM, UA1ARL, RX1AA, RA1ARZ, R-1400, Alex, Vadim. **RY9C:** RW9CF, UA9CGA, UA9CR, UA9DD.

RZ1AWO: UA1ASG, RA1AIM, KB2WKC, UA1ACC, KB2WKD, UA1AQF. **RZ4SWM:** UA4SCB, UA4SBL. **RZ9AZA:** RU9AN, RU9AZ, RZ9AR, RZ9AZ, UA9BA, UA9AJ, UN4L, UN9LG. **S50G:** S51F, S56M, S57AW, S57MW. **S52C:** S52E, S52F, S51O, S52P, S58O. **SK2AU:** SM2VHD, SM2ODB. **SK6FM:** SM6BGA, SM6DYK, SM6FKF, SM6LJU, SM6MCN, SM7BUA. **SN0KRT:** SP9ADU, SP9EMI, SP9UXL, SP9-1753-KA. **SP1KYB:** SQ1DNJ, SQ1EIU. **SQ6Z:** SP3ASN, SP3HRN, SP3RBI, SP3RBR, SP6HEQ, SP8NR. **TA/DL5YM &** DL5YL, DL1CW. **TM2Y:** F6BEE, F6ARC, F6FGZ, F6FVY, F5MUX, F5NLY. **UA90XC:** RW90X, UA90SV, UA90QA. **UD6M:** UA6LO, UA6LV, RV6LNA, UR5MVZ, UA6LFQ, RN6LG, RU6LG, UA4AJF/6, UT6IZ/R6. **UR3IWA:** UR5IFB, UR3IBM, UR5IFX, US2IM, US2IES, US7IM, UY3IM. **UR4LWY:** UR5LJC, UR4LQA, US-L-1046. **UR4LZA:** UY5DV, UR4LEP, UR4LEQ. **UR4MWU:** UR5MB, UR0MM, UR4MEU, US5MAX, UR5MIA.

UT3IZZ: UT3IW, UX3IW, UT3IT, UA9KO, UX3IA. **UT7Z:** UR5ZMH, UR7ZZ, UT0ZZ, UT1ZZ, UT4ZO, UX0ZZ. **V63X:** WA1S, KQ1F, K1XM. **VE6AO:** VE6AMR, VE6CIZ, VE6KC, VE6SI, VE6ZE, VE6BIR, VE6JKZ, VE6RTL, VE6TC. **VE6SV:** VE6EX, VE6EKP, VE6EZ, VE6AKY, VE6NTF, VE6NAP. **VK9LX:** K6KM, N4RU, N0TT, NM7N, VK2ICV. **VQ9IO:** VQ9JT(K5DIY), VQ9QM(W4QM), VQ9SF(N5SF), VQ9SS(N6SS), VQ9ZX(K7ZX), VQ9MG(KB8YHV), Baran. **VU2WAP &** W1NN. **W1NR &** W1BK. **W1SRG:** N1XYR, KE4GI. **W2CG &** K2WJ, W2NO. **W2RE &** AA2DY, N2IX. **W2SEX:** K2YW, K2ZR. **W4PRO &** WB4DNL, W4HIR. **W6XR/2 &** N2AU. **W7LT:** K7TJR, K7ZUM, AL7W, WA0DIM. **W7VJ:** Others. **W8ZA &** WD3A, K8OQL, N8II. **W9JA &** K9GY, K9JY, N9AW, W9VU, W9XT, WG9L. **WN9O &** W9IU. **WR3L &** N3YHC. **WX0B/5:** AD5Q, NM5M, N5NU, K5OT, AD4PU, K5GA. **YT1Z:** YT1WN, YU1YR, YU1PD, Dragan Manojlovic, Ivan Petkovic, Sanja Jocic. **YU1HFG:** YU1ML, 4N1FTD, 4N1FMN, 4N1DX, 4N1YL, 4N1FYL, YT1SA, YT1PNR. **YU7AL &** YZ7EM, 4N7RGH. **YZ7A:** Lacy, YU7CM. **YZ7W:** Club. **ZM2K:** ZL2AZ, ZL2AGY, ZL2BA, ZL2BSJ, ZL2ST, G4PIQ, ZL2DX.

Station Operators
Multi-Op Multi-Transmitter

5V7A: G3SXW, G3VMW, G3ZEM, GM3YTS, G4FAM, G4BWP, G4ZVJ, K5VT, KC7V, KY7M. **6Y2A:** K2KW, N6BT, N6TV, N6BV, AF7Y, K7CO, W4SO, KE7X, AG9A, W9QA. **A61AJ &** KE3Q, PA4AO/T94S, T93Y, T97M, W3UR. **BW0R:** BV2KI, BV2KS, JH3GCN, JP1RIW. **DF0HQ:** DK8YY, DL1AUZ, DL3ALI, DL3OI, DL3TD, DL4ALB, DL5ANT, DL5AXX, DL5LYM, DL5MX, DL7URH, DL7VOA, DL8WAA. **DL0CS:** DF1LX, DF9LJ, DJ5LA, DK2OY, DK6WL, DK8LV, DL1QQ, DL8UD, DL8WPX, DL9LBA, HA1AG. **DL0KF:** DL4LBK, DJ3UL, DJ6TK, DJ6TN, DJ7SW, DL8PY, DL3HAX, DK3UA, DF4PA, DL3LBX, DL5XJ, DL2ZT, DF3LZ. **EA4ML:** EA1DAV, EA4AHD, EA4AKQ, EA4AMO, EA4ET, EA4KA, EA4MC, EA4TX, EA7WA, EB4AKI, EB4EPJ, EC4AGN. **EA9EA:** EA9AI, EA9AZ, EA9EU, EA9GK, EA9KB, EA9UG, EA7DPU, EA7GTF, EA7KW, EA7TL, EA5FV, EA5RS, EA4KR, EA2CLU, EA1AK. **ES5Q:** ES5MC, ES5MG, ES5QX, ES5RN, ES5RY, ES7RE. **EW1WN:** EW1FV, EW1MN, EU1CO.

HG6N: HA2RX, HA5BSW, HA6ND, HA6NF, HA6NL, HA6NQ, HA6NY, HA6OB, HA6OI, HA6ON, HA6OY, HA6PX, YO5BRZ. **J3A:** NJ1V, W5UDA, JK3GAD, W1WFZ, N9KAU/2(JF3NRI), K2KQ. **J45T:** SV5TH, SV5VR, SV5ADD, SV5BYT, SV5BYV, SV5DDP, SV5DZS, SV5DZT, KB4PMS, G4OBK. **J6DX:** AC0S, K8NOZ, K9JE, K9LU, K9MMS, KI6T, N2GA, N6JRL, N8BJQ, N8NR, N8SM, N9AG, S50R, W8ILC, W8OK, W8QID, W0CG. **JA1YPA:** JA1PEJ, JF1MIA, JH1HLC. **JA1YXP:** JE1CKA, JF7TFK, JG4KEZ, JG7PSJ, JH0NZN, JI2DLF, JL2FJA, JM1UWB, JP1OGL, JQ1BRW, N3NQL, H.Masuda. **JA3YKC:** JP3PZD, JS3QGO, JG4LSR, JJ4HWC, JL4CVB, JE5DTS, JE6EKC, JL6BMJ, JP6RBN, Sakusha. **JA4EKO:** JE3MAS, JG3KIV, JI3OPA, JA4EKO, JF4ETK, JF4FUF, JG4CLV, JH4NMT, JH4VDP, JN4FEU, JR4ISF. **JA5BJC &** JA5FDJ, JA5JCC, JA5THU, JH5RXS, JR5JAQ, JR5VHU.

JT1A: JT1BH, JT1BV, JT1CD, OH1RX, OH2BH, OH8PF. **K1KI &** K1CC, KM1P, W1RM, W2XX, W1NT, N2YHK. **K1RX &** K1EPJ, KR1G, N1TO, AA1SI, KF1V, K1OZ. **K2LE &** W2AX, W2LK, NB1B, N2UN, N1BB, W1MA, W1VE, W1FJ. **K3II &** K3CT, K3TEJ. **K3LR &** W2YQ, K3UA, K8GL, N2NC, N2AA, K3EST, N3RA, KA3JWJ, W9KNI, K9VV, K8CX. **K4VX &** K2VV, N5DX, K5GO, K5LG, KM5G, K9BGL, N9JF, KM0L, K0VBU, NS0Z. **K8CC &** AC8W, K8DD, K8JM, K8MM, K9TM, N8CQA, W8MJ, WD8S. **KB1H &** AA1CE, NB1U, K1EBY, KB1DFB, N1XS, K1NG. **KB1SO &** N1SNB, W1GQ. **K9NS:** AA9D, K9BG, K9DX, K9HMB, K9KM, K9PPY, K9PW, K9QVB, K9RS, KS9U, KS9W, WV9T. **KC1XX &** KM3T, K1GQ, K1DG, N1RR, N2IC, T93M, Christine. **KV1W &** K1IR. **LY5A:** LY2PAJ, LY2FY, LY1BA, LY2CO, LY4CW, LY2KW, LY2PX, LY2IJ. **LY7A:** LYR-346, LYR-728, LY2BMX, LY2OC, LY3DA, LY2FN, LY3KS, LY3HD, LY4AA, LY2KZ, LY2AO, LY2NK.

N2BIM & K2BM. **N2MM &** AA2WN. **NI5M &** K5RT. **NJ4F &** K7SV, K4EC, WA4JUK, K1SE, K4GMH, K5IMC. **OH1AJ:** OH1JM, OH1MKT, OH1WR. **OH2U:** OH1JT, OH2BVI, OH2BZY, OH2HE, OH2IW, OH2JA, OH2RA, OH2XX, OH6CT, OH6DD, OH6EI, OH7BX, OH7JR, OH8KXK. **OL7W:** OK1DUT, OK1FUT, OK1VBA, OK1FDR, OK1DRY, OK1FHL. **OZ5W:** OZ1FTU, OZ3W, OZ9Y. **OZ5WQ &** OZ1BIZ, OZ3PE, OZ3ZW. **P3A:** RA9JX, UA3DPX, RA9JR, RZ3TX, RZ3QU, UT7QF. **RW2F:** RA2FA, RA2FZ, RN2FA, EU1MM, UA2FB, UA2FF, UA2FJ, UA2FM, UA2FP, UA2FZ. **SK6NP:** SM6FUD, SM6BUV. **SL3ZV:** LA8ZJA, SM0TGA, SM2CEW, SM2EKM, SM2EZT, SM2ODB, SM3BDZ, SM3CER, SM3CVM, SM3GSK, SM3JLA, SM3OJR, SM3VDX, SM5CLE, SM3EQF, SM3HFD, SM3MXR, SM3PXO, SM3UKE, SM3SZW, SM3UQD. **SM5HJZ &** SM0GNS. **TI1C:** TI12CF, W6NV, N5RZ, N5ZO, N6TJ, K6NA, N6CW, N7BG, N7NG, OH2KI.

VE3EJ & G4VXE, UT4UZ, VA3NA, VE3FU, VE7CC, VE7NTT, VE7ZO. **W0AIH/9:** KB9S, KT0R, NE9U, K0TG, KU0J, N0STL, WA0RBW, KM0O, WR0DK, W0UC, K0AD. **W3EA &** W3CF, W8FJ, WB3FIZ, WQ3E, WT3Q, WU3M. **W3EA &** W3CF, W8FJ, WB3FIZ, WQ3E, WT3Q, WU3M. **W3EEE &** N3BNA. **W3FRC:** N3MKZ, WA2VYA. **W3LPL &** K1HTV, W2GG, K2YWE, ND3F, AA3KX, K3LP, K3MM, K3MQH, K3RA, K3RV, KD4D, K4ZW, K6AW. **W3MM &** W2YC, W3FV. **W3PP &** AA1K, KE3ZR, KS3F, KW3Z, NW3Y, NX3A. **W4MYA &** K4BAM, K4GAU, W4HZ, W4HJ, WA4ODM, WU4G, Lilly. **W6BA &** W6GA, W6KK, AD6DO, K6AM, N6AW, N6KI, N6RT. **W7RM &** KI7Y, K5ZM, N7WA, N0AX, N7EPD, WJ7R, K7NT, W7BX, KK7GW, KR7X, WG7A, N7OU, W7CAJ, DL6UST. **W8AV &** K3JT, K4LT, AF8A, K8KM, K8RF, KU8E, N8DCJ, W8RZ, W8WTS. **WO1N:** K1TTT, K1TWF, K1WD, KC2CIT, KG2JZ, KB1W, N1RHY, N1GA, N2TX. **XZ1N:** WA6CDR, N5IA, AF7O, N7MB, K7SP, WF5T. **ZP9X:** PY2TI, PY5BI, ZP9XG.

TOP SCORES

WORLD

Single Operator

All Band

P4ØE.....14,372,964
EA8EA.....13,717,801
HC8N.....12,971,803
P40W.....12,108,798
CN8WW.....11,904,984
8P9Z.....9,991,863
C4A.....9,904,510
A45XR.....9,067,345
3V8BB.....8,589,180
6V6U.....8,127,504

28 MHz

ZW5B.....1,991,895
LT1F.....1,824,312
ZY2DX.....838,532
HC2SL.....837,774
LU4FPZ.....789,888
H2ØA.....768,405

21 MHz

5X1Z.....1,361,360
9Y4VU.....1,222,485
5B4AGC.....1,139,608
CX5X.....935,375
ZV5A.....833,671
K2SS/1.....770,355

14 MHz

5NØ
/OK1AUT.....1,456,400
K2WK.....1,007,781
OHØZ.....901,230
OK1RF.....852,488
GM3POI.....820,080
DJ7AA.....768,768

7 MHz

V8A.....952,416
9A9A.....908,694
OT8T.....772,530
9A5Y.....734,570
LZ5W.....639,912
OH9DX.....608,548

3.5 MHz

IH9/OL5Y.....671,703
XJ1JF.....497,280
S5ØA.....458,738
SN3A.....437,904
W1MK.....413,576
5B4/EU1AA.....412,482

1.8 MHz

VA1A.....246,238
IR4T.....159,654
9A5W.....158,652
4X4NJ.....144,045
S5ØU.....134,784
OM5ZW.....117,771

Low Power

All Band

V26K.....7,185,562
N5TJ.....3,157,053
W2TZ.....2,678,662
S59AA.....2,595,303
XO7X.....2,584,983
LY3BA.....2,543,038
W3EF.....2,401,695
HA1CW.....2,331,648
T95A.....2,297,344
KM1X.....2,282,097

28 MHz

CX5AO.....887,556
WP2Z.....806,124
LU5WW.....689,568
9A7R.....536,580
NP3A.....477,664
KP3L.....468,814

21 MHz

EA8NN.....545,100
9A6A.....494,025
IK4DCT.....490,196
CT1BQH.....443,120
LU5FF.....424,799
UA4LM.....389,025

14 MHz

VK2APK.....442,566
S58AL.....388,680
CX9AU.....387,985
EA3BCM.....366,560
IT9XUC.....320,320
JR4PMX/1.....300,960

7 MHz

EA8CN.....519,932
HI3K.....372,372
LZ4ZP.....294,857
4L8A.....294,210
IQ7A.....292,420
UAØCM.....274,500

3.5 MHz

UA9JLJ.....166,200
TA3D.....163,846
UUØJM.....123,250
RA9AE.....119,935
HA8RH.....110,865
UT7CC.....107,507

1.8 MHz

HA3MQ.....49,192
EU1AZ.....47,047
EI7IU.....31,507
YU1RA.....28,535
LY2OU.....26,605
UXØHA.....25,264

QRP

All Band

HA2SX.....1,002,822
N6MU.....857,395
LY2FE.....795,874
N1TM.....701,679
SM3CCT.....666,050
K1RC.....659,880
W3ZZ.....628,304
N7IR.....569,192
NØKE/KH6.....532,575
JR4DAH.....528,363

Assisted

All band

K3WW.....7,963,764
KI1G.....6,477,468
K2NG.....5,951,043
K2TW.....5,685,240
WP3R.....5,495,235
KH2/N2NL.....5,406,660
N3AD.....4,964,695
W2UP.....4,695,670
K1TI.....4,649,790
RZ3BW.....4,642,688

Multi-Operator

Single Transmitter

K1AR.....12,063,114
TM2Y.....10,357,360
N3RS.....9,681,880
EA6IB.....9,522,048
N2NU.....9,313,019
K8AZ.....9,259,470

Multi-Operator

Multi-Transmitter

6Y2A.....39,279,140
5V7A.....34,658,186
TI1C.....32,783,400
EA9EA.....29,532,750
A61AJ.....28,014,492
J6DX.....25,596,764

USA

All Band

W1KM.....7,379,711
W4AN.....7,141,453
K1ZM.....7,119,308
W9RE.....6,875,625
K1TO/4.....6,293,104
KQ2M/1.....6,112,282
N2NT.....6,086,220
K3ZO.....6,054,048
N2LT.....5,831,100
K1RU.....5,214,551

28 MHz

N4BP.....483,705
K4WX.....422,919
K9IG.....415,552
W6YA.....371,159
W6NL.....359,077
W9WI/4.....339,456

21 MHz

K2SS/1.....770,355
WØUN.....713,565
NN4T.....584,824
W9LT/8.....535,804
WØSD.....501,234
K4OAQ.....443,022

14 MHz

K2WK.....1,007,781
W9OF.....382,356
K2BA.....310,542
W8UD.....168,750
AD7U.....149,643
W8TWA.....73,830

7 MHz

W5UN.....542,025
K8DX.....532,105
W3GG.....334,632
KØOD.....161,432
W6KP.....156,457
W6YJ.....104,448

3.5 MHz

W1MK.....413,576
K1LZ.....236,529
WB9Z.....120,797
K5NA.....94,581
N2GC.....77,616
WØSF.....34,040

1.8 MHz

W8LRL.....36,864
W8UVZ.....19,532
W2VO.....17,400
K1VW.....9,028
K4TEA.....5,130
W9PNE.....1,740

Low Power

All Band

N5TJ.....3,157,053
W2TZ.....2,678,662
N8AA.....2,474,012
W3EF.....2,401,695
KM1X.....2,282,097
NA2U.....2,213,580
K1VUT.....2,139,800
WT1O.....1,741,560
K5KLA.....1,437,000
WD5K.....1,420,923

28 MHz

WB4TDH.....208,372
W3EP/1..... 167,040
K2MFY.....159,453
N2OO.....156,500
K2ACW.....143,507
K9WA.....114,840

21 MHz

N4CT.....294,602
N4MO.....282,218
K9RN/M.....213,705
AF9DX.....122,884
AAØTY.....122,815
AE9F/6.....113,870

14 MHz

W8UMR.....97,030
WB2DVU.....94,764
N9WI.....17,760
WT8P.....15,643
K6CEO.....8,880
N9GBB.....8,800

7 MHz

N5DO.....102,340
K4LDR.....51,552
W5CWQ.....34,191

1.8 MHz

K9MK.....2,640

QRP

All Band

N6MU.....857,395
N1TM.....701,679
K1RC.....659,880
W3ZZ.....628,304
N7IR.....569,192
KV8S.....503,750
N9CIQ.....383,052
WA3NKO.....292,950
AA1CA.....203,058
K3WWP.....160,800

Assisted

All Band

K3WW.....7,963,764
KI1G.....6,477,468
K2NG.....5,951,043
K2TW.....5,685,240
N3AD.....4,964,695
W2UP.....4,695,670
K1TI.....4,649,790
K5MA/1.....3,961,105
K5KG/2.....3,780,392
K3NZ.....3,586,593

Multi-Operator

Single Transmitter

K1AR.....12,063,114
N3RS.....9,681,880
N2NU.....9,313,019
K8AZ.....9,259,470
K1ZZ.....8,930,278
K8LX.....6,701,035

Multi-Operator

Multi-Transmitter

KC1XX.....22,473,282
W3LPL.....21,271,495
K3LR.....20,897,569
K1KI.....17,808,700
K2LE/1.....13,276,122
K9NS.....11,526,040

EUROPE

All Band

GIØKOW.....6,961,240
S58A.....6,628,059
G4BUO.....5,073,750
GU6UW.....5,047,170
4N9BW.....5,016,810
DL4NAC.....4,872,882
GØIVZ.....4,722,406
OH1MM.....4,374,240
OM5M.....4,157,721
OH5LF.....3,994,272

28 MHz

9HØA.....840,434
GW3YDX.....726,193
G3MXJ.....620,172
GW3WVG.....511,932
T99W.....492,582
IQ4A.....487,494

21 MHz

IR4T.....769,484
DL1IAO.....723,492
GM4YXI.....672,175
OH1F.....607,338
4O6A.....589,842
OM7M.....584,150

14 MHz

OHØZ.....901,230
OK1RF.....852,488
GM3POI.....820,080
DJ7AA.....768,768
SN2B.....759,330
YT7A.....749,394

7 MHz

9A9A.....908,694
OT8T.....772,530
9A5Y.....734,570
LZ5W.....639,912
OH9DX.....608,548
S57AL.....532,526

3.5 MHz

S5ØA.....458,134
SN3A.....437,328
SP7GIQ.....343,476
GMØGAV.....249,000
OH1MA.....240,828
LA6YEA.....209,677

1.8 MHz

IR4T.....159,654
9A5W.....158,200
S5ØU.....134,784
OM5ZW.....117,771
LY3BS.....96,720
LX4B.....95,030

Low Power

All Band

S59AA.....2,595,303
LY3BA.....2,543,038
HA1CW.....2,331,648
T95A.....2,297,344
DL2MEH.....2,240,217
DL2HBX.....2,100,324
YU7CB.....2,025,342
9A2EU.....1,997,082
YO3APJ.....1,954,437
DKØMM.....1,908,816

28 MHz

9A7R.....536,580
9A1AA.....330,544
SP3SUX.....201,117
EI8GP.....191,394
ER1OO.....169,514
T99T.....165,891

21 MHz

9A6A.....494,025
IK4DCT.....490,196
CT1BQH.....443,120
UA4LM.....389,025
OH5BM.....359,531
EI6FR.....246,848

14 MHz

S58AL.....388,680
EA3BCM.....366,560
IT9XUC.....320,320
ES2RJ.....282,757
RU3HD.....274,822
RW4WM.....194,100

7 MHz

LZ4ZP.....294,857
IQ7A.....292,420
S54A.....217,800
S53F.....175,934
YZ7ED.....162,265
LY2BM.....158,136

3.5 MHz

UUØJM.....122,750
HA8RH.....110,865
UT7CC.....107,507
HA7JJS.....95,700
YU1CC.....86,102
OK1FHI.....85,025

1.8 MHz

HA3MQ.....49,192
EU1AZ.....47,047
EI7IU.....31,507
YU1RA.....28,535
LY2OU.....26,605
UXØHA.....25,264

QRP

All Band

HA2SX.....1,002,822
LY2FE.....795,874
SM3CCT.....666,050
DL3KVR.....525,358
OE2S.....507,000
YU1LM.....500,148
IØZUT.....452,403
GØOGN.....446,879
HA7YS.....340,901
F5NZY.....318,024
UR9MM.....304,370

Assisted

All Band

RZ3BW.....4,642,688
DF3CB.....3,640,994
M8Z.....3,295,396
UT5UGR.....3,235,392
YZ7AA.....2,798,640
OK2FD.....2,681,000
RZ3AZ.....2,504,584
SM3EVR.....2,450,682
DL7ON.....2,424,840
S56A.....1,977,570

Multi-Operator

Single Transmitter

TM2Y.....10,357,360
EA6IB.....9,522,048
RU1A.....9,044,874
SQ6Z.....8,775,480
DL2NBU.....7,925,400
OM8A.....7,360,440

Multi-Operator

Multi-Transmitter

DFØHQ.....18,897,540
OH2U.....18,387,820
RW2F.....16,862,016
SL3ZV.....14,495,360
DLØCS.....13,194,288
EA4ML.....12,587,520

C-31 XR *The Magnum Tribander that has no equal*
Anything else is just an antenna

> Based on our proven C-3, multi-monoband, no trap design
> Highest gain, superior patterns, stepped gain for stacking.
> Wide-spaced 3el 20 & 4el 15, 7el on 10 mtrs, all full size
> Single feedline OR individual feedlines, your choice
> 5KW, 100 mph standard, 31' tapered boom
> Less than 100 in/lbs mast torque @ 70 mph
> 30" open space for side mounting
> Fast, "plug and play" assembly

INTRODUCTORY PRICE $998 (reg $1,175)

The **C-31XR** is truly the next generation in tribanders; designed for maximum performance on 20-15-10 mtrs, plus strength, ease of assembly, low mast torque, side mounting and stacking. The **C-31XR** is 3 monoband Yagis overlaid on the same boom. There is a wide spaced 3el 20, a wide spaced 4el 15 and 7 elements for 10 mtrs. The gain target to beat was our own **C-3**, which was shown to have the most gain across 20 & 15 mtrs according to independent testing by K7LXC and NØAX. We did it! The **C-31XR** exceeds the C-3 by 1.4dB on 20, 1.5 on 15 and 3dB on 10 mtrs. F/B and side nulls are exactly what you would expect; excellent. There is nothing better than the **C-31XR**.

Specifications: 31' boom, 14 elements, 85lbs, 10.5sqft, 100mph, 5KW, single feedline, no traps, all elements full size

CONGRATULATIONS!

6Y2A set a new Multi-Multi CW World Record using all Force 12 antennas, primarily verticals. This is especially impressive, as it is from a 2-point country, with 18,000 QSO's (on CW!!).
P40E (Jose, CT1BOH) operating from P43P's QTH (Jacob) used all Force 12 antennas, too, to set a new Single Op CW World Record. These are all Force 12 Yagis, an EF-180B rotatable 80 and C-4XL. More and more top stations are putting up Force 12 antennas.

Force 12 Inc. is now the exclusive manufacturer and dealer for Tri-Ex Amateur Towers
call us for the finest crank-up, free standing and guyed towers

Call or write for a comprehensive brochure on the **Force 12** product line. The brochure includes true specifications and explanations of terms. For the best $10.00 you will ever spend ($12.50) w/postage), ask for the book entitled, **ARRAY OF LIGHT (Straight talk about Antennas and Related Information).** These 76 pages are a compilation of practical subjects, questions and answers, installation tips, operating helps and data on antenna design including a section on traps.

Force 12 - Proudly brings you the future. Electrically and mechanically superior. If it's riveted, it's a Force 12! There are more than 60 antennas to meet your needs and your dreams!

Force 12
Antennas and Towers

Order line: **800.248.1985,** Technical **805.227.1680,** FAX **805.227.1684**
Force 12 East: **Natan Huffman, W6XR (607) 275-9747**

Internet: force12e@lightlink.com www.force12inc.com

Why imagine the ultimate when you can have it?

FORCE 12, Inc.
P.O. Box 1349, Paso Robles, CA 93447

CIRCLE 22 ON READER SERVICE CARD

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (All country terminology reflects the DXCC list at the time of the contest.)

CW RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

W1KM	**A**	**7,379,711**	**4027**	**155**	**488**
K1ZM	**"**	**7,119,308**	**3837**	**169**	**517**
KQ2M/1	**"**	**6,112,282**	**3424**	**149**	**500**
K1RU	**"**	**5,214,551**	**3489**	**136**	**411**
W1WEF	*	4,972,275	2972	148	467
K1AM	*	3,691,149	2472	134	417
KC1F	*	3,540,731	2282	130	417
W1UK	*	2,707,146	2043	116	387
K1ZR	*	2,682,211	2546	109	360
W1ZT	*	2,282,148	1469	128	433
WC1M	*	2,236,600	1922	102	320
KS1J	*	2,046,148	1842	104	332
K1YT	*	1,675,590	1240	113	392
W1TE	*	1,228,110	983	110	360
WØMHK/1	"	1,221,759	959	112	339
KG1D	"	1,014,475	1375	99	286
N1RJF	"	908,269	1121	92	261
W1XK	"	795,960	711	94	308
K1SM	*	605,320	591	101	269
KE1FO	*	547,950	805	73	208
W8HAP/1	*	515,616	581	95	298
W1ZS	*	398,552	527	79	229
N1JP	*	375,873	540	84	275
K1CN	*	329,376	412	79	203
K1RM	*	302,064	615	34	140
K1DWQ	*	242,436	382	68	199
W1FV	*	238,572	478	50	138
NY1L	*	81,840	198	41	124
K2LP/1	*	43,306	132	42	76
N1MEZ	*	42,256	129	44	95
W1OHM	*	30,821	115	38	81
K1MV	*	5,041	51	31	40
WZ1K	*	100	235	62	157
K1SF	28	2,030	27	9	20
K2SS/1	**21**	**770,355**	**1812**	**34**	**125**
W1MK	**3.5**	**413,576**	**1103**	**30**	**106**
K1LZ	**"**	**236,529**	**831**	**25**	**98**
K1VW	**1.8**	**9,028**	**103**	**17**	**44**
***KM1X**	**A**	**2,282,097**	**1642**	**115**	**378**
***K1VUT**	**"**	**2,139,800**	**1514**	**116**	**404**
***WT1O**	**"**	**1,741,560**	**1398**	**109**	**351**
*W1EQ	*	1,320,200	1076	108	352
*K1NO	*	1,257,580	1057	114	340
*N1WR	*	1,133,860	948	108	337
*K1HT	*	1,070,182	925	98	323
*WF1L	*	938,196	913	96	282
*WA1FCN	*	773,836	806	99	307
*K1VSJ	*	419,276	516	79	207
*KD1YN	*	404,735	524	79	226
*AA1QD	*	382,228	612	60	178
*K1PY	*	331,800	494	82	218
*K1TW	*	267,441	391	61	178
*W1ZZ	*	190,076	286	62	182
*NY1E	*	160,832	307	57	167
*K1MAC	*	153,576	376	59	184
*N3KCJ/1	*	152,985	261	62	155
*N1ZPC	*	105,450	248	45	140
*KZ1O	*	104,742	258	59	139
*AB1BX	*	84,980	208	31	109
*KA1O	*	84,525	199	53	122
*N1HOQ	*	62,034	161	41	106
*AA1SU	*	51,554	199	63	110
*N1QDA	*	51,256	164	43	106
*KA1ZFK	*	43,292	159	44	114
*W1AZ	*	42,560	140	47	113
*WB1GEX	*	2,300	33	23	27
***W3EP/1**	**28**	**167,040**	**404**	**30**	**114**
*W1CI	21	4,234	119	13	45
N2NT	**A**	**6,086,220**	**3461**	**152**	**493**
N2LT	**"**	**5,831,100**	**3290**	**147**	**480**
N2BA	**"**	**4,618,074**	**2892**	**142**	**449**
N2RM	*	3,097,326	2286	124	365
N2CU	*	2,497,256	1657	131	410
W2EN	*	2,060,068	1542	129	353
K2NV	*	1,709,050	1238	124	390
K2FU	*	1,529,122	1171	122	356
N2ED	*	1,243,788	1109	120	349
K8FC/2	*	1,028,218	881	124	399
N2WLG	*	942,560	809	111	319
KW2J	*	727,726	731	100	291
WA2C	*	696,865	982	90	265
KE2WY	*	673,728	675	91	261
KC6ETY/2	*	638,469	786	111	348
N2WK	*	503,876	493	117	295
W2ZU	"	437,580	537	62	224
K2CS	"	359,984	495	80	222
W2GDJ	"	359,697	501	92	207
W2YK	*	350,880	508	95	249
WA2YSJ	*	326,695	408	83	210
K2ZD	*	319,587	375	80	227
K2DM	*	256,542	343	92	194
KU2X	*	244,133	361	68	173
W2EZ	*	238,492	350	54	164
K2JL	*	234,240	340	60	184
N2UM	*	206,050	337	96	221
KE2VB	*	204,525	324	56	169
W2HCA	*	202,536	318	63	169
W2OMV	*	159,080	274	54	151
KQ2O	*	141,321	327	49	114
W2BE	*	137,611	264	72	169
WF2Y	*	110,448	191	61	147
W2UDT	*	109,174	305	62	159
KG2BI	*	60,799	176	50	113
K2YR	*	48,910	139	53	93
N2LKF	*	35,910	150	36	99
W2OP	*	22,608	142	48	96
N2MR	*	21,400	81	39	61
K2FR	*	11,009	85	33	68
K2WB	*	312	8	5	8
KD2I	**28**	**335,020**	**940**	**27**	**113**
NA2X	*	128,385	342	29	106
K2WK	**14**	**1,007,781**	**1955**	**39**	**144**
K2BA	**"**	**310,542**	**832**	**35**	**111**
N2GC	**3.5**	**77,616**	**286**	**20**	**79**
W2VO	**1.8**	**17,400**	**106**	**20**	**55**
***W2TZ**	**A**	**2,678,662**	**1942**	**121**	**390**
***NA2U**	**"**	**2,213,580**	**1704**	**111**	**356**
*N2TN	*	1,016,834	754	130	388
*WK2G	*	974,247	1017	92	301
*K2UF	*	891,618	749	109	317
*KM2L	*	562,261	602	80	249
*WA2EYA	*	552,062	612	76	253
*KA2NDX	*	258,300	420	63	189
*N2DBD	*	237,503	344	71	188
*K2SIG	*	220,665	374	62	173
*K2YWE	*	195,529	352	67	184
*AA2WQ	*	175,720	281	65	165
*KC2TA	*	163,680	372	41	114
*N2ST	*	146,048	269	63	161
*W2CVW	*	85,794	182	54	127
*W2FUI	*	50,400	169	27	78
*K2GWL	*	39,176	332	33	85
*W3EH/2	*	33,456	118	35	88
*K2JF	*	29,785	160	53	132
*WA2VQV	*	26,224	111	26	62
*WW2J	*	16,836	118	27	65
*K2SWZ	*	14,507	63	34	55
*K3GYS/2	*	2,700	29	13	23
***K2MFY**	**28**	**159,453**	**448**	**27**	**112**
***N2OO**	**"**	**156,500**	**452**	**25**	**100**
***K2ACW**	**"**	**143,507**	**406**	**28**	**105**
*WA2RZJ	21	42,622	156	27	74
***WB2DVU**	**14**	**94,764**	**319**	**26**	**91**
K3ZO	**A**	**6,054,048**	**3441**	**154**	**470**
W3BGN	**"**	**5,008,964**	**2948**	**149**	**458**
KØDQ/3	**"**	**4,622,540**	**2814**	**139**	**459**
WF3J	*	1,737,024	1277	123	375
W3MC	*	1,624,398	1379	109	338
AA3TT	*	1,452,632	1203	103	325
K3OSX	*	1,351,818	1097	124	353
W3GN	*	1,059,288	972	107	330
W3RJ	*	931,233	1092	96	243
K4JLD/3	*	824,140	671	119	326
W2TN/3	*	706,128	678	104	272
N3KR	*	662,464	667	84	268
WF3M	*	640,224	730	64	240
W3AZ	*	617,474	700	91	283
N3AM	*	611,202	744	76	233
WE3E	*	273,267	503	60	201
W3BYX	*	251,812	370	51	185
W3BEN	*	207,200	360	63	196
W3IZ	*	140,760	296	57	147
NA3K	*	105,968	220	46	133
W3KN	*	65,985	161	45	114
W3AG	*	57,528	136	60	93
K3SX	*	52,605	143	54	113
KB3AFT	*	24,750	91	38	72
W3AS	*	9,240	51	30	40
KB3A	21	23,760	164	22	66
W3GG	**7**	**334,632**	**902**	**33**	**113**
***W3EF**	**A**	**2,401,695**	**1952**	**112**	**365**
***KB3MM**	**"**	**756,000**	**756**	**99**	**333**
*K1EFI/3	*	731,922	657	91	307
*WF3M	*	618,336	724	64	240
*W3DAD	*	467,688	561	72	240
*W3TB	*	365,490	486	84	226
*NI3I	*	347,700	412	61	160
*NY3C	*	329,705	382	82	223
*W7FKF/3	*	307,230	424	50	245
*AD8J/3	*	216,450	362	53	172
*W3EVW	*	194,208	295	72	166
*N3UN	*	180,499	328	76	193
*N3UMA	*	140,526	220	66	156
*N9GG/3	*	107,198	225	55	127
*N3NZ	*	83,053	201	44	113
*W3TWI	*	78,400	210	68	128
*K3TG	*	40,920	121	49	75
*N3RW	28	17,496	126	22	50
***W3CP**	**21**	**106,480**	**325**	**26**	**95**
*KB3AZK	*	14,964	88	15	43
*W3FQE	14	1,540	25	5	17
W4AN	**A**	**7,141,453**	**3841**	**162**	**509**
K1TO/4	**"**	**6,293,104**	**3501**	**157**	**495**
N4AF	**"**	**4,905,260**	**3025**	**140**	**450**
KT3Y/4	*	4,660,193	2969	144	443
WC4E	*	3,914,204	2632	145	457
W4RX	*	3,654,864	2326	149	463
W4MR	*	3,558,746	2244	138	440
			(Opr. N4CW)		
W4PA	*	3,555,681	2308	144	425
AA4S	*	2,867,580	1965	131	403
N6AR/4	*	2,709,564	1804	136	436
K4LTA	*	1,534,689	1402	131	376
AA4NN	*	1,274,400	1255	111	289
W3VT/4	*	1,246,233	907	124	363
W4YE	*	1,209,600	938	108	342
N4XM	*	831,402	724	116	302
W8PC/4	*	772,148	690	100	303
N4MM	*	758,334	628	114	308
K4LQ	*	529,184	552	99	269
K4YR	*	455,175	513	89	226
K9HUY/4	*	357,870	424	78	224
N3JT/4	*	303,163	476	70	199
W2YE/4	*	298,480	405	65	195
K4LM	*	249,033	304	85	238
W4IF	*	234,856	328	66	182
W4RW	*	152,672	266	56	152
K4NA	*	116,204	223	64	145
N8PR/4	*	94,600	193	73	142
W4KYW	*	85,808	175	56	117
N4EK	*	69,440	194	52	108
W4ZYT	*	61,612	154	54	92
K6ETM/4	*	44,895	137	41	82
K4ZT	*	44,022	177	21	66
N4GU	*	31,857	123	34	77
K4UX	*	25,894	92	43	64
K4VUD	*	23,920	75	44	71
KS4YT	*	20,384	75	34	64
KC4FWS	*	10,703	64	29	48
W4OGG	*	9,246	50	22	45
N4UH	*	8,255	55	25	40
K4EP	*	7,056	57	18	38
N4BP	**28**	**483,705**	**1292**	**29**	**106**
K4WX	**"**	**422,919**	**1149**	**27**	**110**
W9WI/4	**"**	**339,456**	**965**	**28**	**100**
WB4OSN	*	325,176	875	30	106
K4EA	*	296,088	829	32	124
K4AMC	*	241,296	676	27	105
AI2C/4	*	174,875	523	26	99
NN4T	**21**	**584,824**	**1358**	**38**	**126**
K4QAQ	**"**	**443,022**	**1152**	**34**	**107**
N4PN	*	394,856	1051	35	119
N4IR	*	295,867	734	31	112
W3AU/4	*	111,186	403	35	107
N4IJ	**14**	**47,726**	**208**	**26**	**72**
K4VV	"	9,062	75	15	31
W4DD	7	11,252	94	14	44
N4SLR	**3.5**	**28,014**	**179**	**19**	**68**
K4TEA	**1.8**	**5,130**	**47**	**16**	**29**
***WO4O**	**A**	**1,381,412**	**1093**	**128**	**354**
***NA4K**	**"**	**1,158,850**	**1016**	**125**	**348**
*W4HR	*	979,925	789	121	354
*K4FPF	*	771,897	661	98	315
*K4IE	*	718,960	675	102	278
*N4PSE	*	578,614	628	99	287
*K7CMZ/4	*	369,360	516	86	238
*N8LM/4	*	353,601	468	90	213
*N3TG/4	*	347,378	435	77	212
*K4MX	*	335,523	423	80	211
*W4WN	*	328,318	424	74	204
*AA4KD	*	176,870	331	61	169
*K4OGG	*	154,635	352	52	131
*K4UVT	*	123,050	212	59	155
*KS4S	*	95,804	224	51	121
*WB4DNL	*	60,028	180	59	113
*K4JYS	*	58,270	115	38	100
*N4GJ	*	35,741	136	32	71
*N4EL	*	29,607	124	48	91
*AC4ZD	*	23,400	130	39	81
*KC4GIA	*	22,680	107	40	100
*W4IDX	*	18,480	87	21	59
*KØEJ/4	*	15,980	87	38	47
*N4KN	*	100	358	32	81
*W8RTU/4	*	100	18	13	13
*KF4ZTJ	*	100	57	32	45
***WB4TDH**	**28**	**208,372**	**605**	**28**	**105**
*K4WW	*	49,203	201	25	74
*W4HM	*	47,957	190	23	68
*K4RO	*	45,844	237	17	56
*W4CAT	*	7,708	73	15	26
***N4CT**	**21**	**294,602**	**695**	**35**	**119**
***N4MO**	**"**	**282,218**	**792**	**34**	**112**
*KN4Y	*	2,574	276	18	48
***K4LDR**	**7**	**51,552**	**222**	**23**	**73**
K5YAA	**A**	**2,959,691**	**1891**	**142**	**421**
NA5B	**"**	**2,251,855**	**1976**	**129**	**356**
AC5KA	*	521,595	569	100	235
K5VG	*	436,150	512	82	243
K5YP	*	393,008	490	88	220
W5WMU	*	176,532	313	57	131
K5NZ	*	164,175	384	55	110
W5IBM	*	75,978	194	63	126
K5ZR	*	15,300	65	36	49
AC5RX	*	12,555	116	45	48
			(Opr. 7M4KSC)		
AE4PB/5	*	3,080	36	24	32
K5SZ	**28**	**230,489**	**631**	**30**	**103**
			(Opr. K5NU)		
NN5ZZ	*	59,986	282	25	64
N8RR/5	**21**	**325,080**	**705**	**37**	**135**
W6PU/5	*	185,008	621	33	91
W5JRP	14	13,338	81	19	38
W5UN	**7**	**542,025**	**1262**	**37**	**128**
K5NA	**3.5**	**94,581**	**334**	**27**	**86**
W5EU	*	21,208	125	21	67
***N5TJ**	**A**	**3,157,053**	**1976**	**149**	**452**
***K5KLA**	**"**	**1,437,000**	**1046**	**132**	**368**
***WD5K**	**"**	**1,420,923**	**1038**	**122**	**375**
*N5AW	*	1,043,474	817	123	355
*KY5N	*	571,272	666	81	231
*W5GAI	*	356,655	433	85	210
*NN5T	*	230,463	365	77	184
*AA5CK	*	208,427	369	86	171
*KN5L	*	100,926	234	59	130
*AF5Z	*	98,280	214	63	126
*WK5K	*	83,328	195	60	108
*AJ4F/5	*	38,316	134	43	81
*N5XT	*	31,152	110	41	77
*K5IUA	*	26,894	126	37	76
*K6AZA/5	*	20,235	97	43	52
***W5ZO**	**28**	**109,951**	**373**	**26**	**92**
*W5WYN	*	42,873	163	25	68
***N5DO**	**7**	**102,340**	**321**	**30**	**89**
***W5CWQ**	**"**	**34,191**	**166**	**24**	**63**
W6AX	**A**	**4,417,426**	**2733**	**165**	**433**
			(Opr. N6IG)		
W6RU	**"**	**3,141,840**	**2354**	**142**	**352**
			(Opr. KR6X)		
K6LA	**"**	**2,851,800**	**2252**	**128**	**362**
K6XV	*	1,367,409	1348	119	262
NW6S	"	1,066,720	901	122	350
AC6DD	*	596,400	682	115	240
WA5VGI/6	*	592,401	631	115	246
N6IC	*	557,550	580	110	240
K6NR	*	457,164	544	108	198
K6XX	*	415,548	647	94	144
W6FSJ	*	400,452	605	111	191
W6NKR	*	395,870	501	96	214
K6FO	*	382,109	444	113	210
K6GT	*	354,528	567	97	191
N6TW	*	322,624	432	95	189
W6KNB	*	289,413	437	84	159
K6III	*	259,854	411	95	174
WA6URY	*	159,796	320	71	111
W6WB	*	141,075	264	76	133
K6WC	*	136,026	251	73	125
KT6TT	*	130,548	191	65	107
W6OVO	*	101,016	148	65	119
AC6BW	*	90,545	236	70	129
K6ZM	*	75,078	291	50	79
N6IBP	*	68,250	152	70	112
N6VH	*	50,699	159	47	74
W6RFF	*	49,408	166	46	82
W6YM	*	37,700	136	36	64
W6MFC	*	30,956	113	41	68
NY6Y	*	11,913	75	24	33
W6YA	**28**	**371,159**	**932**	**32**	**117**
W6NL	**"**	**359,077**	**1066**	**29**	**108**
K6DB	*	318,816	854	31	113
W6DCC	*	92,800	287	29	87
K6MA	*	23,120	122	23	45
W6ISQ	*	7,524	47	22	35
KC6X	**21**	**201,150**	**532**	**34**	**116**
N6ZB	*	188,985	525	32	97
K6SE	*	87,312	331	30	72
KQ6EH	*	56,280	249	25	59
NU6I	*	21,450	137	20	45
W6MVW	14	13,064	67	28	64
W6KP	**7**	**156,457**	**554**	**29**	**74**
W6YJ	**"**	**104,448**	**335**	**36**	**100**
W7CB/6	*	88,500	300	33	85
W6RCL	*	36,309	172	28	63
N6HY	*	100	80	15	23
KX6E	**1.8**	**13,386**	**171**	**18**	**51**
N2KK/6	*	1,534	29	12	14
***W6JTI**	**A**	**1,099,929**	**905**	**132**	**305**
***K6UM**	**"**	**436,696**	**504**	**118**	**205**
*WN6K	*	398,784	742	85	163
*N6JM	*	222,547	349	83	164
*N6GL	*	169,119	334	81	126
*AA6EE	*	84,165	203	62	93
*KF6GUH	*	74,589	275	54	87
*AA6QY	*	66,178	155	57	106
*W6JTA	*	32,930	134	40	48
*W6PLJ	*	30,674	122	38	60
*N6WR	*	29,832	137	41	47
*KO6DJ	*	4,418	85	23	24
***W6EUF**	**28**	**63,690**	**203**	**28**	**82**
*WA6FGV	*	42,140	178	24	62
*NI6G	*	30,954	174	22	44
*KU6T	*	25,594	137	23	44
***AE9F/6**	**21**	**113,870**	**300**	**28**	**90**
*WD6DX	*	7,955	70	17	26
*K6CEO	14	8,880	92	21	53
N7DR	**A**	**2,568,104**	**1908**	**136**	**348**
W7GG	**"**	**2,561,988**	**2335**	**132**	**297**
W2VJN/7	**"**	**2,133,130**	**1506**	**156**	**359**
N7TT	*	2,053,425	1650	143	332
K4XU/7	*	2,015,248	1570	143	353
AA7A	*	1,992,810	1376	140	403
NI6W/7	*	1,147,180	1149	128	282
KA7T	*	521,265	625	105	190
KS7T	*	426,769	524	92	195
W7YS	*	415,716	556	98	205
W7IIT	*	363,197	499	90	161
W7QN	*	285,855	433	93	162
N7UN	*	234,608	411	96	248
N7JXS	*	164,710	333	59	123
KC7UP	*	130,290	308	72	130
W7ZI	*	43,681	131	42	79
KI7LS	*	858	27	15	18
K7QQ	**28**	**246,737**	**785**	**29**	**108**
K7NPN	**21**	**193,664**	**617**	**31**	**97**
NX7K	*	188,101	588	34	103
W8EQA/7	*	101,878	309	31	102
W7AYY	*	48,024	183	28	64
AD7U	**14**	**149,643**	**517**	**31**	**86**
W8AEF/7	**3.5**	**18,675**	**130**	**23**	**52**
***K7ZA**	**A**	**1,031,274**	**908**	**124**	**290**
***K7ED**	**"**	**953,771**	**1035**	**107**	**222**
			(Opr. WAØRJY)		
*K7HBN	*	809,640	817	114	246
*N7AN	*	697,956	840	94	200
*N7RO	*	654,775	887	87	188
*K7ZZ	*	580,290	710	98	192
*AB7RW	*	254,130	485	65	132
*W7HS	*	183,744	300	78	154
*W7QDM	*	160,506	278	78	144
*WX7G	*	100,398	215	64	110
*W7ZMD	*	77,462	290	60	94
*K7JJ	*	66,248	170	73	123
*KN7T	*	56,048	177	54	70
*WN7J	*	51,620	109	71	107
*WA2OCG/7	*	41,580	143	42	63
*N7YA	*	29,415	124	49	62
*AK7O	*	10,660	164	29	36
*KC7SSN	*	8,550	86	19	26
*W7GTO	*	7,336	49	23	33
*N7OU	28	17,368	130	19	33
*N7TNL	21	2,706	26	16	25
N4ZR/8	**A**	**3,206,500**	**2092**	**129**	**421**
K5IID/8	**"**	**1,121,730**	**993**	**107**	**310**
K8MR	*	1,054,918	1006	108	283
N8MZ	*	973,410	787	117	340
KF8TM	*	889,746	749	111	318
W4NTI/8	*	691,260	600	106	304
K8ER	*	588,907	1727	96	245
WA8TNO	*	490,490	553	92	251
W8KX	*	410,075	477	91	258
W8UPH	*	374,088	516	79	207
W8RSW	*	181,894	699	91	258
AA8PA	*	52,622	112	54	112
K8WK	*	52,560	325	73	167
N8LBI	*	20,910	90	26	33
W9LT/8	**21**	**535,804**	**1334**	**35**	**114**
W8UD	**14**	**168,750**	**643**	**33**	**92**
W8TWA	**"**	**73,830**	**266**	**28**	**79**
K8DX	**7**	**532,105**	**1431**	**36**	**125**
K8MD	**3.5**	**20,325**	**141**	**15**	**60**
W8LRL	**1.8**	**36,864**	**166**	**23**	**73**
W8UVZ	**"**	**19,532**	**120**	**21**	**55**
***N8AA**	**A**	**2,474,012**	**1569**	**133**	**436**
***WB8YJF**	**"**	**1,280,110**	**1147**	**120**	**310**
*K8EP	*	955,269	838	115	298
*W8GOC	*	461,440	512	88	232
*AA8UP	*	389,772	472	95	229
*WU8A	*	309,225	405	74	211
*N8NA	*	296,867	405	75	208
*K8AB	*	221,235	903	71	174
*K8CV	*	205,792	365	61	157
*W8IDM	*	177,372	280	68	166
*W8PN	*	157,762	295	60	142
*W8VE	*	151,984	325	72	164
*N8IA	*	106,480	230	51	125
*KG8DH	*	84,448	194	51	131
*W8CS	*	45,560	144	41	95
*N8WS	*	35,568	117	40	74
*K8LN	*	5,320	49	22	34
*KC8IUM	28	1,612	27	9	17
***W8UMR**	**14**	**97,030**	**307**	**32**	**92**
*WT8P	*	15,643	116	14	39
*AF8C	*	3,367	35	13	24
W9RE	**A**	**6,875,625**	**3936**	**157**	**468**
			(Opr. N9RV)		
K9MA	**"**	**2,887,213**	**1852**	**147**	**406**
K9AN	**"**	**2,781,072**	**1817**	**140**	**418**
KØCAT/9	*	2,375,505	1757	133	362
			(Opr. K9WIE)		
WI9WI	*	1,996,749	1733	125	322
W9OP	*	1,546,232	986	137	420
K9ZO	*	1,494,954	1131	139	390
K9CAN	*	1,130,372	858	121	340
WA9TPQ	*	731,352	788	105	267
K9UQN	*	722,007	703	93	270
K9BWI	*	678,612	847	85	206
KI9A	*	327,915	462	92	223
W9KTP	*	119,054	385	70	171
AA9TK	*	14,364	65	22	54
N9WKW	*	1,025	257	72	133
K9IG	**28**	**415,552**	**1008**	**32**	**119**
W9GIL	*	100,838	346	26	101
W9OF	**14**	**382,356**	**781**	**37**	**135**
K9CJ	**7**	**69,312**	**270**	**28**	**86**
W9GXR	*	57,116	218	28	81
WB9Z	**3.5**	**120,797**	**457**	**26**	**87**
W9PNE	1.8	1,740	34	12	17
***W9AU**	**A**	**973,854**	**884**	**109**	**304**
***KJ9C**	**"**	**735,968**	**676**	**110**	**312**
*W9MSE	*	405,748	493	85	216
*K9YAX	*	349,508	469	66	196
*W9WUU	*	321,212	434	74	188

*W9IL	"	275,730	385	80	193
*AK9N	"	249,255	429	73	188
*K9WX	"	63,744	177	53	113
*N9NW	"	46,150	130	39	91
*N9TU	"	14,751	103	32	67
*W9RM/M	"	13,588	70	32	54
*KB9MU	"	10,480	72	30	50
*W9FHA	"	9,153	84	21	60
*K9PY	"	9,089	57	27	34
*WB9AYW	"	3,350	46	17	31
***K9WA**	**28**	**114,840**	**348**	**25**	**95**
***K9RN/M**	**21**	**213,705**	**536**	**30**	**105**
***AF9DX**	**"**	**122,884**	**359**	**30**	**94**
*N4TZ/9	"	60,027	207	26	81
*NN9K	"	56,842	281	25	72
*W9DYQ	"	51,704	227	23	69
*N9WI	14	17,760	99	18	56
*N9G8B	"	8,800	63	14	36
***K9MK**	**1.8**	**2,640**	**38**	**11**	**22**
KØRF	**A**	**4,029,435**	**2511**	**153**	**440**
WBØO	**"**	**2,511,587**	**1697**	**159**	**400**
KØEU	"	2,495,724	1876	146	372
WØML	"	451,220	536	84	209
WØHW	"	414,090	468	108	213
NØRN	"	286,520	429	74	173
KSØM	"	211,905	312	77	178
WØYK	"	149,384	277	100	184
KØRY	"	86,172	248	53	119
KØJPL	"	40,256	116	53	83
KCØCOP	"	31,392	129	43	66
KØXD	"	24,150	130	61	89
KIØE	"	15,210	115	24	45
WØUN	**21**	**713,565**	**1682**	**35**	**122**
				(Opr. WØUA)	
WØSD	**"**	**501,234**	**1326**	**32**	**107**
				(Opr. WØDB)	
WØRA	"	105,240	349	32	88
KGØUA	"	102,684	288	31	98
KØOD	**7**	**161,432**	**484**	**32**	**104**
WØSF	**3.5**	**34,040**	**147**	**23**	**69**
KØCS	**1.8**	**1,408**	**34**	**13**	**19**
WØRXL	"	1,344	28	11	13
***KØFX**	**A**	**806,912**	**801**	**118**	**276**
***KEØUI**	**"**	**463,203**	**672**	**96**	**237**
*NN7A/Ø	"	351,101	404	108	215
*KØCF	"	114,840	230	65	133
*AAØAI	"	58,320	211	46	116
*ADØH	"	5,160	69	39	47
*KKØDX/Ø28		10,416	61	17	45
*AAØXJ	"	2,852	56	14	17
***AAØTY**	**21**	**122,815**	**447**	**31**	**90**
*KØVX	"	35,036	169	19	57
*KØBCN	"	7,474	85	12	25
*WBØB	14	2,378	29	12	17

ALASKA

KL7AC	**A**	**1,263,542**	**2183**	**86**	**152**
KL7RA	**21**	**538,208**	**1931**	**33**	**88**
***KL1R**	**A**	**448,945**	**1485**	**54**	**73**

ANTIGUA

***V26K**	**A**	**7,185,562**	**5337**	**135**	**406**
				(Opr. AA3B)	
*V29QQ	"	639,956	989	74	204

BAHAMAS

***C6AKP**	**A**	**675,393**	**1269**	**91**	**198**
				(Opr. N4RP)	

BARBADOS

8P9Z	**A**	**9,991,863**	**6498**	**155**	**454**
				(Opr. K4BAI)	

BRITISH VIRGIN ISLANDS

VP2VF	**A**	**5,811,300**	**4327**	**147**	**440**
				(Opr. KL2A)	

CANADA

VE1GN	**A**	**3,804,320**	**3018**	**121**	**375**
VO1MP	**"**	**2,608,872**	**2591**	**101**	**323**
VE1ZJ	"	2,283,730	1835	118	352
VE1AI	"	1,084,274	1174	95	291
XJ1JF	**3.5**	**497,280**	**1740**	**29**	**99**
				(Opr. VE7SV)	
VA1A	**1.8**	**246,238**	**1048**	**21**	**85**
				(Opr. K3BU)	
***VE1GPL**	**A**	**393,119**	**500**	**78**	**203**
*VE9DX	"	60,858	201	41	85
VE2/N6ZZ	**A**	**7,023,425**	**5295**	**138**	**425**
VE2AYU	"	1,776,430	2066	100	301
VE2SG	"	184,008	498	51	136
VE2FFE	"	37,468	157	42	74
***VE2AWR**	**A**	**858,544**	**1000**	**95**	**273**
*VE2WAT	"	368,010	574	85	205
*VE2MAQ	"	25,050	230	14	36
***VE2BWL**	**21**	**87,324**	**399**	**27**	**87**
VE3AT	**A**	**1,837,170**	**1724**	**98**	**313**
VE3XN	**"**	**1,254,428**	**937**	**129**	**368**
VE3ST	"	456,500	487	30	120
VE3DC	"	451,260	725	80	196
VE3BR	"	1,155	20	9	12
VA3RU	**28**	**516,802**	**1500**	**30**	**109**
VE3KZ	**"**	**459,492**	**1370**	**27**	**105**
VE3ZT	"	200,445	788	25	90
VA3KA	"	166,320	558	25	95
VE3KLM	"	13,038	122	15	38
VE3QAA	**21**	**154,308**	**480**	**30**	**102**
VE3WQ	7	107,118	658	14	52
VE3DO	**1.8**	**16,758**	**138**	**17**	**40**
***VE3KP**	**A**	**865,908**	**1103**	**104**	**255**
***VE3STT**	**"**	**700,572**	**916**	**77**	**239**
*VE3RZ	"	616,560	748	86	250
*VE3OM	"	465,864	503	89	242
*VE3OTL	"	439,560	908	89	207
*VE3UOL	"	394,702	621	67	175
*VE3GFN	"	267,028	452	61	180
*VA3RJ	"	150,331	242	71	168
*VA3SWG	"	32,451	172	34	53
*VA3JPM	"	17,386	222	35	79
VE4JB	**A**	**286,642**	**526**	**76**	**175**
*VE4MF	21	30,444	128	28	58
***VE5SF**	**A**	**1,309,279**	**2041**	**99**	**214**
*VE5CPU	"	100,492	384	54	94
*VE5AAD	21	73,130	454	22	49
VE6JY	3.5	4,050	83	11	14
***VE6BMX**	**21**	**186,784**	**856**	**27**	**77**
VE7IN	**A**	**269,720**	**527**	**81**	**139**
VE7FJE	28	67,008	434	22	42
VA7A	**14**	**445,248**	**1349**	**34**	**110**
***XO7X**	**A**	**2,584,983**	**2830**	**135**	**282**
				(Opr. VE7AHA)	
*VE7UF	28	62,031	451	23	46

CAYMAN ISLANDS

ZF1A	**A**	**1,139,448**	**2694**	**56**	**141**
				(Opr. W5ASP)	
ZF2LA	**1.8**	**88,515**	**698**	**15**	**48**
				(Opr. K9LA)	

CUBA

***CO8ZZ**	**A**	**706,368**	**1546**	**60**	**148**
*CO8LY	"	431,023	655	97	240
*CM2KC	"	313,560	663	45	156
***CO8DM**	**14**	**89,958**	**467**	**23**	**64**
***CO2JD**	**7**	**234,825**	**1261**	**24**	**77**
***CO8TW**	**1.8**	**2,793**	**75**	**6**	**13**

DOMINICAN REPUBLIC

HI8					
/DL1HCM	**A**	**2,597,125**	**3092**	**98**	**297**
*HI3LFE	28	5,358	136	10	9
***HI3K**	**7**	**372,372**	**1463**	**28**	**96**

GUADELOUPE

FG5BG	**A**	**4,480,538**	**3932**	**141**	**373**
***FG5EY**	**A**	**1,804,176**	**2201**	**99**	**297**

MARTINIQUE

FM5BH	**A**	**4,687,712**	**4216**	**129**	**397**
FM5FJ	"	102,968	359	63	148

MEXICO

6D2X	**A**	**4,338,864**	**4707**	**139**	**325**
				(Opr. W5VX)	
XE1VV	"	713,790	1335	91	218
XE2MX	"	638,608	776	110	224
***XE1RGL**	**7**	**84,000**	**589**	**21**	**54**

PANAMA

3E1AA	**A**	**7,002,610**	**5311**	**143**	**422**
				(Opr. DL5XX)	
***HO3A**	**A**	**490,325**	**796**	**84**	**191**
				(Opr. KG6UH)	

PUERTO RICO

KP3W	**28**	**122,010**	**645**	**22**	**61**
NP3D	"	6,858	55	18	36
NP3D	7	10,912	80	20	42
***WP3C**	**A**	**949,284**	**1799**	**70**	**182**
*WP4LNY	"	45,198	223	27	54
***NP3A**	**28**	**477,664**	**1853**	**29**	**89**
***KP3L**	**"**	**468,814**	**1732**	**27**	**91**

ST. KITTS & NEVIS

V47KP	**A**	**1,146,346**	**1917**	**83**	**228**
				(Opr. W2OX)	

TURKS & CAICOS ISLANDS

VP5GN	**A**	**7,661,577**	**5765**	**139**	**422**
				(Opr. K5GN)	
VP5M	"	5,087,556	4523	126	363
				(Opr. N4TO)	

U.S. VIRGIN ISLANDS

***NP2L**	**A**	**436,852**	**841**	**67**	**204**
***WP2Z**	**28**	**806,124**	**2458**	**30**	**102**
				(Opr. WD5N)	

AFRICA

AFRICAN ITALY

IH9/OL5Y	**3.5**	**671,703**	**1899**	**28**	**99**

CANARY ISLANDS

EA8EA	**A**	**13,717,801**	**6563**	**176**	**543**
				(Opr. OH2MM)	
EA8					
/OH2BCI	**3.5**	**107,756**	**636**	**16**	**63**
EA8ZS	**1.8**	**79,350**	**453**	**15**	**60**
***EA8**					
/DJ1OJ	**A**	**1,130,058**	**1308**	**76**	**230**
*EA8ASJ	"	784,707	1774	58	173
*EA8AF	"	4,312	33	21	28
*EA8BYL	"	1,480	19	18	19
***EA8NN**	**21**	**545,100**	**1400**	**31**	**107**
*EA8IN	14	11,985	80	12	34
***EA8CN**	**7**	**519,932**	**1484**	**29**	**95**
*EA8NQ	"	173,952	650	21	75

IVORY COAST

TU2MA	**28**	**207,603**	**1286**	**24**	**75**

LIBERIA

***EL2WW**	**A**	**1,570,426**	**1956**	**80**	**206**
				(Opr. ON4WW)	

LIBYA

***5A1A**	**A**	**450,865**	**779**	**48**	**145**

MALI

TZ6DX	**A**	**1,514,760**	**2004**	**65**	**195**
				(Opr. K4RB)	

MADEIRA ISLANDS

***CT3KN**	**A**	**37,430**	**266**	**28**	**67**
*CT3					
/DF5AN	28	37,548	283	23	61

MAURITIUS

***3B8**					
/DL9GFB	**A**	**1,024,920**	**1188**	**85**	**207**

MOROCCO

CN8WW	**A**	**11,904,984**	**6492**	**143**	**489**
				(Opr. DL6FBL)	

NIGERIA

5NØ					
/OK1AUT	**14**	**1,456,400**	**2954**	**38**	**138**
***5N3CPR**	**28**	**211,680**	**869**	**22**	**68**

SENEGAL

6V6U	**A**	**8,127,504**	**5316**	**128**	**400**
				(Opr. K3IPK)	

SOUTH AFRICA

ZS6EZ	**A**	**5,379,840**	**3328**	**156**	**420**
ZS6KR	**28**	**439,965**	**1271**	**31**	**104**
***ZS6AJS**	**A**	**225,568**	**470**	**72**	**140**
*ZS1NF	28	39,974	150	24	55
*ZS5RON	"	782	37	7	10

SWAZILAND

3DAØCA	**A**	**1,322,362**	**1555**	**109**	**214**

TANZANIA

5H3US	**A**	**791,427**	**1061**	**84**	**189**
				(Opr. K8MN)	

TUNISIA

3V8BB	**A**	**8,589,180**	**5033**	**149**	**487**
				(Opr. YT1AD)	

UGANDA

5X1Z	**21**	**1,361,360**	**2790**	**38**	**138**
				(Opr. SM7PKK)	

ASIA

ARMENIA

*EK4JJ	A	10,020	59	25	35

ASIATIC TURKEY

*TA4					
/OK8EAN	A	1,050	19	14	16
***TA3D**	**3.5**	**163,846**	**969**	**15**	**64**

ASIATIC RUSSIA

RZ9UA	**A**	**3,927,066**	**2681**	**145**	**452**
RK9CZO	**"**	**1,461,636**	**1395**	**101**	**295**
				(Opr. RX9CAZ)	
UA9MR	"	825,552	650	126	378
UA9KM	"	692,241	793	104	259
RA9UOZ	"	610,540	894	110	246
RW9QA	"	609,178	785	83	240
RU9DJ	"	547,170	641	89	256
UA9XEN	"	234,210	83	46	211
RZ9UR	"	183,074	348	81	158
UA9OS	"	76,076	179	63	146
RX9LW	**28**	**100,144**	**467**	**22**	**66**
RX9JC	"	14,040	168	16	44
RA9JP	**21**	**243,593**	**986**	**30**	**89**
RU9WZ	"	114,716	456	24	68
UA9JEP	"	7,316	254	18	44
RX9SX	**14**	**583,072**	**1436**	**36**	**116**
RA9DZ	"	297,346	940	33	101
RA9FF	7	40,768	175	23	68
UA9AT	**1.8**	**44,793**	**304**	**11**	**52**
***RV9XF**	**A**	**1,300,444**	**1381**	**77**	**255**
***RV9JR**	**"**	**788,389**	**1005**	**73**	**214**
*RN9XA	"	732,354	799	106	265
*RU9CZ	"	440,220	499	98	250
*RZ9WZ	"	370,800	565	75	225
*UA9JMS	"	273,000	510	57	153
*UA9JKT	"	206,388	484	53	129
***RZ9OU**	**28**	**213,060**	**979**	**23**	**83**
*RX9SR	"	127,872	600	27	84
*UA9SBC	"	20,865	135	18	47
*RA9MC	"	19,665	109	19	50
*UA9WQK	"	16,280	131	17	41
***RX9FB**	**21**	**214,743**	**582**	**31**	**110**
*UA9AB	"	98,900	350	23	77
*RA9AUH	"	85,428	304	25	83
***UA9BS**	**14**	**281,484**	**805**	**32**	**94**
*RZ9AN	"	115,440	425	29	75
*RA9AN	7	43,384	209	23	65
***UA9JLJ**	**3.5**	**166,200**	**773**	**22**	**78**
***RA9AE**	**"**	**119,935**	**607**	**15**	**70**
*RW9AV	"	88,506	501	13	53
*UA9FGJ	"	21,015	165	7	38
***RW9TA**	**1.8**	**19,845**	**184**	**8**	**37**
*UA9LGL	"	7,424	90	5	24
RAØFU	**A**	**390,788**	**616**	**103**	**199**
UAØJDD	**"**	**384,175**	**723**	**90**	**185**
UAØAGI	"	368,262	501	109	260
RAØAM	"	100	320	45	122
UAØCC	**7**	**60,984**	**467**	**23**	**54**
RAØCG	**3.5**	**77,616**	**601**	**22**	**44**
UAØSR	"	27,790	191	14	39
***UAØJQ**	**A**	**2,220,574**	**3022**	**161**	**381**
***RUØLL**	**"**	**1,355,250**	**1904**	**125**	**250**
*UAØANW	"	556,885	1036	68	177
*UAØSJ	"	515,171	913	83	188
*UAØYAY	"	513,890	718	80	215
*RAØJX	"	283,140	900	80	118
*UAØUAG	"	191,897	599	47	80
*RUØAT	"	102,222	361	48	114
*RAØZD	"	101,660	189	90	131
*UAØZC	"	58,975	173	70	105
*UAØZY	"	19,006	92	35	51
***UAØLH**	**28**	**103,900**	**382**	**30**	**70**
***UAØSAD**	**14**	**164,917**	**610**	**30**	**79**
*RUØUQ	"	88,020	396	30	78
*UAØYM	"	26,334	183	23	40
***UAØCM**	**7**	**274,500**	**1032**	**32**	**93**
*RUØBB	"	70,560	320	26	70
*UAØBGZ	"	60,171	297	27	66
*UAØCAY	3.5	1,479	77	9	8

AZERBAIJAN

***4K9W**	**A**	**547,962**	**746**	**70**	**201**

CHINA

***BY4SZ**	**A**	**532,480**	**1228**	**78**	**130**
				(Opr. BD4ST)	
*BD4DW	"	221,960	677	56	99

CYPRUS

C4A	**A**	**9,904,510**	**5508**	**162**	**503**
				(Opr. 5B4ADA)	
C4W	**"**	**5,341,945**	**3958**	**138**	**413**
				(Opr. 5B4WN)	
H2ØA	**28**	**768,405**	**2169**	**34**	**131**
				(Opr. YL3CW)	
5B4AGC	**21**	**1,139,608**	**2698**	**37**	**130**
P38M	"	600,150	1732	35	115
				(Opr. YL2KL)	
5B4					
/EU1AA	**3.5**	**412,482**	**1478**	**32**	**106**

GEORGIA

4L2M	**3.5**	**207,756**	**884**	**18**	**87**
*4L1UN	21	60,940	382	12	43
***4L8A**	**7**	**294,210**	**1173**	**23**	**82**

HONG KONG

VR98BG	**14**	**707,190**	**1955**	**37**	**128**
***VR2**					
/OH6YF	**A**	**368,683**	**923**	**71**	**146**
*VR2LL	"	73,416	198	59	102

INDIA

*AT2UR	28	14,400	85	21	51
***AT2AJ**	**21**	**34,532**	**154**	**25**	**64**

ISRAEL

4X/OL7D	**21**	**666,400**	**1486**	**38**	**132**
4X4WN	**3.5**	**211,200**	**1214**	**21**	**79**
4X4NJ	**1.8**	**144,045**	**605**	**22**	**77**
*4Z5DB	A	47,960	188	36	74
***4X**					
/TF1MM	**28**	**121,440**	**673**	**17**	**49**
***4Z5FW**	**21**	**225,504**	**974**	**18**	**63**
***4Z4TA**	**14**	**88,320**	**376**	**21**	**59**
*4X1VF	3.5	23,171	170	7	40

JAPAN

JH1OGC	**A**	**1,979,356**	**1615**	**142**	**277**
JA1QOW	**"**	**607,724**	**685**	**122**	**216**
JA1HP	"	411,247	556	98	191
JA1GTF	"	289,541	406	115	196
JR1LEV	"	211,974	379	88	118
JJ1VEZ	"	157,710	281	82	128
JH1CTV	"	74,800	202	66	104
JO1QZI	"	20,726	91	29	57
JH1YHS	"	11,371	82	31	52
JH1NXU	"	6,448	50	23	29
JS1KQQ	28	2,262	30	11	18
JA1YBK	**21**	**421,200**	**1104**	**35**	**100**
				(Opr. JL1WFD)	
JJ1JRH	"	20,938	141	20	38
JA1BHZ	"	13,797	116	25	38
JA1YGX	"	4,905	74	19	26
				(Opr. 7L4WEZ)	
JR1XFS	**14**	**267,502**	**713**	**33**	**98**
JK1LUY	"	24,030	110	27	62
JH1RFM	**7**	**135,176**	**406**	**32**	**90**
JF1NZW	"	42,024	160	31	72
JK1AFI	"	39,121	198	22	49
JA1XEM	"	13,939	103	19	34
7M3RSK	"	5,588	52	17	27
JH1AEP	**3.5**	**49,875**	**298**	**25**	**50**
***JL1ARF**	**A**	**1,530,450**	**1384**	**143**	**307**
***JS1OYN**	**"**	**891,790**	**996**	**126**	**221**
***JF1SQC**	**"**	**759,182**	**848**	**113**	**221**
*JJ1VRO	"	740,558	865	116	222
*JK1ASO	"	610,500	775	114	186
*JN1NOP	"	529,802	689	108	179
*JR1XKU	"	511,589	636	106	193
*JI1RXQ	"	382,536	584	102	162
*JH1SVO	"	351,152	481	94	178
*JA1IVL	"	318,420	470	99	162
*JK1ATT	"	318,283	465	103	184
*JN1MSO/1	"	288,704	522	83	125
*JH8KYU/1	"	264,196	400	95	162
*JA1BUI	"	255,252	410	94	145
*JF1RPZ	"	216,812	348	98	170
*JJ1JGI	"	215,340	360	82	140
*JJ1QJP	"	205,119	367	79	134
*7L4IOU	"	195,576	306	115	166
*JA1BPN	"	194,728	371	77	125
*JA1TRP	"	193,456	344	78	136
*JA1CP	"	189,072	355	81	127
*JA1PS	"	188,256	332	84	128
*JF1FEV	"	138,205	265	78	133
*7K4GUR	"	119,320	271	50	107
*JA1XUY	"	118,608	274	72	96
*JM1KNI	"	116,450	283	64	106
*JP1SRG	"	111,232	252	64	94
*JA1WHG	"	84,304	181	80	96
*JR1KSK	"	83,790	247	54	79
*JG1TVK	"	80,004	172	71	106
*7M3LDC	"	77,010	173	69	101
*JA1KI	"	70,668	176	61	90
*JH1PXY	"	66,300	186	55	75
*JE1REU	"	58,813	210	40	63
*JF1LKM	"	55,912	183	47	69
*JA1PUK	"	53,784	174	68	94
*7K1EQG	"	46,990	148	56	71
*JF1LQP	"	44,020	145	60	82
*JG3NKP/1	"	38,064	134	39	65
*JH1OLB	"	35,802	128	47	70
*JA1BCP	"	27,435	103	42	50
*JH1SBE	"	25,814	188	54	82
*JR1LQK	"	25,511	127	44	53
*JE1QHT	"	24,480	129	48	54
*JA1KZP	"	15,747	76	27	60
*JA1EJD	"	14,690	85	31	34
*7M4SZG/1	"	1,782	31	14	19
*JA1MQS	"	1,296	19	11	13
*JG1FGL	"	320	8	8	8
***JR1BTG**	**28**	**201,528**	**659**	**32**	**76**
*JA1NLX	"	68,544	298	28	56
*JH1DYV	"	55,980	245	30	60
*JH1BDS	"	44,252	221	25	49
*JA1SJV	"	40,875	190	26	49
*JG1OWV	"	6,171	45	23	28
*JR7CJO/1	"	4,324	57	19	28
*JA1AAT	"	3,816	210	15	21
*JE1HXZ	"	3,472	43	13	18
*JP1IXV	"	3,070	37	13	17
*7K2PBB	"	1,482	23	12	14
*7N3WRN	"	406	13	6	8
***JH1SWD**	**21**	**161,928**	**526**	**32**	**85**
*JJ1GQH	"	99,042	360	29	73
*JA1EA	"	12,992	88	23	33
*7M1LOT	"	8,944	95	21	31
*JE1HJV	"	7,125	74	22	35
*JR1UMO	"	7,124	51	19	33
*7K3BKY	"	6,510	77	14	16
*JO1ZGN	"	4,752	41	20	28

*7L2VOB	*		24	4	2	2
***JR4PMX/1**	**14**		**300,960**	**699**	**35**	**125**
*JL1MUT	*		177,580	551	34	96
*JA1XPU	*		1,296	24	9	18
*7L2ICS	*		279	13	3	6
***JH1AZO**	**7**		**49,680**	**230**	**28**	**52**
*JS1UMQ	3.5		6,164	64	19	27
*JE1LPZ	*		5,838	83	18	24
*JM1NKT	*		1,760	38	9	11
*JE1SPY	1.8		476	14	8	9
JH2BCN	**A**	**1,125,940**		**1212**	**126**	**254**
JA2VQF	**"**		**609,588**	**780**	**100**	**187**
JA2AXB	*		608,855	693	114	209
7J6AAK/2	*		154,440	260	86	120
				(Opr. VK2EKY)		
JA2QVP	*		106,872	242	78	105
JF2FIU	*		57,086	164	58	88
JE2LUN	**28**		**52,690**	**184**	**33**	**77**
JA2MOG	**14**		**78,200**	**288**	**28**	**72**
JA2QXP	*		45,500	185	28	63
***JA2BY**	**A**		**799,693**	**823**	**123**	**244**
***JH2NWP**	**"**		**556,100**	**643**	**114**	**218**
*JA2UOT	*		468,006	715	90	141
*JA2CUS	*		372,145	545	95	188
*JA2KKA	*		273,702	419	87	155
*JA2OJ	*		171,495	341	72	113
*JH2AMH	*		169,391	358	91	142
*JJ2TKX	*		63,756	190	56	76
*JA2HO	*		26,334	85	56	70
*JA2IU	*		22,509	125	28	33
*JE8KKX/2	*		7,975	54	25	30
*JJ2IER	*		234	9	6	7
***JG2MLI**	**28**		**139,536**	**519**	**32**	**76**
*JA2KVB	*		111,244	359	34	82
*JA2MEI	*		7,056	65	18	24
***JQ2FFS/Z21**			**78,200**	**313**	**30**	**62**
*JA2BQX	*		14,454	130	23	50
*JG2NMY	*		10,074	77	20	26
*JI2LCE	*		5,530	60	16	19
***JL2LPX**	**14**		**50,460**	**217**	**25**	**62**
*JH2WIC	*		20,221	111	19	54
*JA2MZ	*		2,912	33	14	18
JS3CTQ	**A**	**2,842,494**		**2299**	**140**	**314**
JF3CCN	**"**	**1,181,521**		**1078**	**139**	**268**
JQ3UDL	*		640,946	753	106	228
JA3ARM	*		316,968	430	101	181
JA3UWB	*		213,640	382	67	151
JA3IKG	*		132,342	294	59	102
JA3CE	*		3,375	27	22	23
JA3XOG	**28**		**120,450**	**400**	**32**	**78**
JR3NZC	**21**		**267,145**	**800**	**35**	**88**
JM3LWR	*		2,450	31	15	20
***JE3HHT**	**A**		**551,372**	**704**	**105**	**202**
***JH3CUL**	**"**		**227,959**	**374**	**91**	**166**
*JO3JYE	*		123,914	354	69	98
*JM3XEJ	*		83,380	299	82	138
*JF3BTR	*		77,044	191	75	112
*JH3TXP	*		54,120	167	43	77
*JA3AVO	*		18,711	72	41	58
*JA3BQC	*		15,910	83	34	40
*JH3BIL	*		12,616	76	39	44
*JA3HC	*		3,807	32	18	29
*JA3WFQ	*		1,333	17	16	15
*JA3QOS	*		100	39	26	26
***JA3GN**	**28**		**85,012**	**300**	**32**	**74**
***JH3AIU**	**21**		**243,711**	**858**	**32**	**85**
*JK3GWT	*		204,848	628	35	89
*JF3IYW/3	*		35,313	192	26	53
*JH3JZI	*		3,596	42	13	18
*JN3DSH	14		51,579	220	30	69
*JJ3QXW	7		390	13	5	5
*JR3EOI	3.5		31,185	174	24	53
*JG3LGD	*		207	11	5	4
JH4UYB	**A**	**4,470,430**		**2961**	**169**	**421**
JH4ADK	**"**		**812,058**	**976**	**135**	**242**
JA4ESR	*		192,303	346	78	129
JA4HIX	*		27,738	117	63	71
JA4XRN	28		43,125	214	23	46
JL4DJM	*		32,040	154	27	62
JH4JNG	**14**		**321,408**	**794**	**36**	**108**
JH4JUK	*		1,066	21	12	14
JH4CPC	3.5		20,400	122	23	52
***JE4MHL**	**A**		**301,461**	**454**	**92**	**165**
***JE4QGF**	**"**		**226,156**	**448**	**73**	**124**
*JA4CZM	*		194,256	353	73	140
*JA4BAA	*		167,616	333	65	127
*JJ4PPK	*		38,475	155	35	60
***JA4ETH**	**28**		**47,208**	**209**	**24**	**60**
*JA1XCZ/4	*		14,632	91	23	39
*JA4AQR	*		7,467	53	19	38
***JR4GPA**	**21**		**186,890**	**618**	**31**	**79**
*JK4BOX	*		22,508	131	28	40
*JE4GJV	*		5,226	50	17	22
*JL4LWL	*		3,959	41	17	20
*JI4HKA	3.5		6,696	58	21	33
*JA4YPE	1.8		150	7	5	5
				(Opr. JF3EBO)		
JH5FXP	**A**	**4,857,376**		**3313**	**159**	**385**
JA5DQH	**21**		**704,025**	**1479**	**37**	**138**
JA5APU	*		223,176	767	29	73
***JH5OXF**	**A**		**839,020**	**916**	**117**	**247**
*JE5XIC	*		10,496	68	29	35
*JR5EHB	28		28,258	149	25	46
*JF5FGY	*		10,146	72	23	34
*JA5JGV	*		4,864	45	17	21
***JA5APU**	**21**		**152,448**	**712**	**29**	**67**
*JA5PDS	3.5		740	26	10	10
JA6ZLI	**A**	**1,155,682**		**1137**	**130**	**271**
JQ6NAW	**"**	**1,030,324**		**1046**	**120**	**238**
JA6SRB	*		686,475	836	111	228
JA6COW	*		605,228	571	130	282
JO6GIV	*		114,432	227	73	119
JA6WW	*		76,130	260	95	135
JA6WIF	**28**		**226,380**	**587**	**35**	**105**
JA6TQ	*		60,662	233	30	68
JA6BZI	**7**		**100,710**	**309**	**37**	**98**
JA6ZPR	**3.5**		**46,725**	**251**	**24**	**51**
				(Opr. JH6SQI)		
***JA6UBK**	**A**	**1,020,832**		**895**	**141**	**296**
***JH6OPP**	**"**		**447,470**	**625**	**103**	**187**
*JH6TYD	*		313,491	459	90	159
*JA6AKV	*		78,472	214	53	83
*JA6QDU	*		76,840	205	58	78
*JA6JVY	*		71,466	204	53	76
*JA6HJP	*		23,432	92	36	65
*JM6CIP	*		14,317	141	44	59
*JK6ISK	*		6,440	50	21	25
***JA6WFM**	**21**		**154,330**	**574**	**31**	**84**
*JH6QIL	*		52,626	212	31	67
*JR6IKD	*		126	6	4	3
***JG6MQI**	**7**		**157,080**	**439**	**35**	**101**
*JE5JHZ/6	*		26,296	144	27	49
JH7AFR	**A**	**3,788,148**		**2537**	**168**	**378**
				(Opr. N6AA)		
JH7WKQ	**"**	**3,494,880**		**2711**	**142**	**338**
JH7XGN	**"**	**2,057,950**		**1988**	**128**	**267**
JA7JHT	*		254,826	442	93	141
JJ7SRA	*		170,640	308	83	133
JA7JI	**28**		**65,096**	**231**	**33**	**70**
JA7ERJ	*		1,178	24	10	9
JA7XBG	**21**		**391,756**	**998**	**36**	**112**
JA7FTR	**14**		**484,218**	**1177**	**36**	**126**
JA7COI	*		27,048	142	25	44
JA7EMH	3.5		10,488	88	21	36
JA7NI	**1.8**		**11,700**	**91**	**18**	**32**
***JA7NVF**	**A**		**505,175**	**663**	**106**	**169**
***JA7ARW**	**"**		**296,958**	**440**	**95**	**163**
*JI7OED	*		254,538	416	88	149
*JN7OJA	*		101,870	236	63	104
*JA7DNO	*		85,329	230	60	111
*JA7SYA	*		58,220	173	61	81
*JF7GDF	*		18,531	105	32	39
*JM7JMG	*		13,790	75	30	40
*JA7MGH	*		8,856	74	16	25
*JM7JMG	*		5,760	48	21	24
*JH7FUI	*		3,168	34	14	19
*JA7AXP	*		1,736	24	14	17
*JR7HAN	28		24,684	135	27	41
*JA7VEI	*		15,602	100	23	35
***JI7NUF**	**21**		**181,485**	**581**	**35**	**76**
*JA7DOT	*		77,040	261	31	76
*JH7NPF	*		19,698	138	18	31
*JR7XGL	*		11,252	78	23	35
***JH7IMX**	**7**		**50,406**	**215**	**29**	**64**
*JH7CJM	3.5		2,028	46	12	14
*JH7FUJ	*		1,272	32	12	12
*JQ1UKK/71.8			294	12	7	7
JA8RWU	**A**	**2,712,231**		**2177**	**145**	**314**
JH8UQJ	**28**		**41,088**	**174**	**30**	**66**
JE8JYD	21		1,612	51	20	12
***JA8JCR**	**A**		**433,845**	**603**	**116**	**195**
*JA8DCG	*		198,387	111	71	130
*JA8XOD	*		130,400	269	72	128
*JA8LN	28		12,540	91	24	36
*JR8SGE	21		7,800	65	20	30
*JA8TEZ	7		742	19	8	6
JA9CWJ	**A**		**646,651**	**849**	**103**	**190**
JA9JFO	**14**		**118,720**	**386**	**30**	**82**
*JA9RO	A		11,830	72	23	42
***JH9VSF/9**	**28**		**107,800**	**505**	**30**	**68**
*JR9KZR/9	*		46,725	244	24	51
***JH9KVF**	**21**		**230,580**	**772**	**34**	**88**
*JR9NVB	*		191,757	552	32	91
*JA9TSI	*		100,266	435	29	73
***JM2FCJ/9**	**7**		**196,292**	**721**	**32**	**92**
JAØQWO	**A**		**808,520**	**963**	**114**	**226**
JHØGHZ	**"**		**703,179**	**681**	**133**	**254**
JRØWZR	*		457,832	556	105	197
JAØHC	*		195,500	339	82	148
JHØFUW	**28**		**336,336**	**910**	**34**	**98**
JHØFWV	21		21,824	89	29	59
JAØRCK	*		1,508	19	12	17
JAØFVU/Ø	14		756	13	9	12
***JEØUXR**	**A**	**1,533,600**		**1349**	**138**	**312**
*JAØNCE	*		81,130	233	74	116
*JEØKAM	*		26,445	101	41	88
*JHØNEC	*		25,920	103	58	77
*JAØBPY	*		16,400	96	34	46
*JAØGZ	*		8,591	59	33	38
*JAØGEY	28		3,330	45	15	22
*JAØIOF	21		17,696	118	21	35
*JAØDOW	*		480	18	12	12
***JHØEPI**	**14**		**148,851**	**513**	**35**	**76**
*JHØSGG	7		931	23	9	10
***JAØAOO**	**3.5**		**9,145**	**141**	**23**	**36**
*JAØADY	1.8		2	1	1	1

KAZAKHSTAN

UN7TX	**28**		**204,078**	**888**	**27**	**86**
UN9GD	*		53,760	281	26	70
UN5J	**21**		**237,276**	**784**	**34**	**122**
UP4L	**14**		**427,032**	**1163**	**35**	**127**
				(Opr. UN7LZ)		
UPØF	*		8,256	101	7	25
UPØL	**7**		**420,912**	**1483**	**35**	**113**
				(Opr. UN9LW)		
UN7JX	**1.8**		**34,122**	**207**	**15**	**51**
***UP6P**	**A**	**1,227,045**		**1620**	**125**	**332**
***UP6F**	**28**		**250,373**	**1084**	**28**	**81**
***UN7RBD**	**21**		**159,036**	**568**	**24**	**78**
***UP5F**	**14**		**154,215**	**548**	**31**	**84**
				(Opr. UN7FW)		
*UN7GG	7		39,474	172	23	63

KYRGYZSTAN

EX8W	**A**	**4,373,712**		**3608**	**124**	**380**
EX2A	**7**		**49,973**	**246**	**17**	**60**
***EX8MZ**	**A**		**165,034**	**633**	**24**	**77**

KOREA

***HL1CG**	**A**		**386,804**	**487**	**106**	**192**
*HL5BUV	*		60,564	200	57	90
***HL5AP**	**28**		**21,980**	**123**	**26**	**44**

LEBANON

***OD5PL**	**A**		**331,712**	**932**	**40**	**106**

MACAO

XX9X	**A**	**3,795,670**		**3249**	**163**	**402**
				(Opr. OH2PM)		

MONGOLIA

JT1CO	**A**	**1,235,806**		**2109**	**101**	**218**

MYANMAR

XZ1N	**28**		**174,240**	**1010**	**25**	**65**
				(Opr. N7MB)		
XZ1N	**21**		**384,370**	**1498**	**33**	**100**
				(Opr. AF7O)		

OMAN

A45XR	**A**	**9,067,345**		**4821**	**159**	**526**

PAKISTAN

***AP2NK**	**A**		**534,909**	**1027**	**63**	**174**

SAUDI ARABIA

HZ1HZ	**A**	**1,125,136**		**975**	**96**	**312**

TAIWAN

BV7FF	**28**		**237,765**	**999**	**34**	**87**
***BV /JH3GCN**	**28**		**147,684**	**774**	**27**	**66**

TAJIKISTAN

EY8MM	**A**	**3,598,356**		**2897**	**141**	**428**

TURKMENISTAN

***EZØAB**	**A**		**967,024**	**1178**	**74**	**230**
				(Opr. UA4FAO)		

VIETNAM

3W7TK	**A**	**2,720,442**		**2978**	**117**	**330**
				(Opr. OK1HWB)		

WEST MALAYSIA

***9M2TO**	**A**	**1,047,051**		**1395**	**120**	**247**

EUROPE

ALAND ISLANDS

OHØZ	**14**		**901,230**	**2957**	**37**	**128**
				(Opr. OH2MAM)		

AUSTRIA

OE5OHO	**A**	**1,153,185**		**1800**	**80**	**239**
OE9SLH	*		144,746	360	57	154
OE3I	**28**		**238,944**	**796**	**34**	**118**
				(Opr. OE1JNB)		
OE3TL	**21**		**68,788**	**300**	**26**	**90**
OE3GSA	**1.8**		**48,360**	**624**	**14**	**64**
***OE1EMS**	**A**		**609,180**	**886**	**102**	**288**
*OE1JIS	*		47,652	150	40	92
*OE1BKA	21		18,703	142	18	41

AZORES

CU2V	**A**	**3,728,874**		**4069**	**116**	**331**
				(Opr. DL3KDV)		

BALEARIC ISLANDS

EA6GP	**A**		**159,732**	**551**	**48**	**156**
*EA6YW	A		22,654	101	30	64
***EA6 /DL8NBY**	**21**		**48,840**	**249**	**23**	**65**

BELARUS

EW8EW	**A**	**2,665,131**		**2993**	**128**	**409**
EU2ØØA	*		797,742	979	115	359
				(Opr. EU4AA)		
EW2AA	*		511,868	816	98	264
EU5A	**7**		**352,314**	**1618**	**30**	**108**
EU1DX	*		301,344	1179	34	112
EW6TU	**3.5**		**68,552**	**708**	**15**	**61**
EW2DD	*		67,830	691	13	57
***EU1SA**	**A**		**297,171**	**523**	**79**	**188**
*EW1BA	*		20,909	78	41	62
*EU7SD	*		13,320	79	35	55
*EW4AB	*		13,248	141	10	59
*EW8DZ	*		12,975	270	42	70
*EW1NA	21		19,398	182	13	40
***EW8DX**	**14**		**76,700**	**529**	**28**	**72**
*EW8OS	*		50,787	376	16	65
*EW6BN	*		36,010	306	17	48
***EV6M**	**7**		**59,224**	**411**	**17**	**71**
*EW3CW	*		8,710	59	17	50
*EW3WJ	*		2,666	80	6	25
***EU6AA**	**3.5**		**34,170**	**416**	**12**	**55**
***EU1AZ**	**1.8**		**47,047**	**692**	**14**	**63**

BELGIUM

OT8A	**A**		**857,964**	**1098**	**101**	**325**
				(Opr. ON5UM)		
ON4CBW	*		61,152	326	46	122
ON4AKL	**14**		**365,516**	**1444**	**32**	**105**
OT8T	**7**		**772,530**	**2402**	**36**	**129**
				(Opr. ON5UK)		
ON4AEK	*		302,763	1485	28	101
***ON4XG**	**A**		**454,542**	**770**	**68**	**223**
*ON4ADL	*		116,427	340	52	145
*ON4OSA	*		104,859	501	44	147
*ON7SS	*		56,260	238	47	98
*ON4KMB	*		44,160	215	34	81
*ON7WF	*		29,532	184	23	69
***ON6NR**	**28**		**99,944**	**394**	**28**	**96**
				(Opr. ON4RU)		
***ON6TJ**	**21**		**96,193**	**396**	**24**	**83**
***ON6CW**	**14**		**85,170**	**576**	**27**	**75**

BOSNIA-HERZEGOVINA

T99W	**28**		**492,582**	**1536**	**37**	**122**
T94JS	7		3,350	58	9	41
***T95A**	**A**	**2,297,344**		**2833**	**119**	**393**
*T95C	*		90,396	289	50	112
***T99T**	**28**		**165,891**	**589**	**26**	**95**
***T95MZZ**	**21**		**45,290**	**547**	**18**	**52**
***T92M**	**7**		**108,205**	**804**	**21**	**74**
*T97Y	*		67,412	731	15	61
***T94YT**	**1.8**		**13,475**	**290**	**6**	**43**

BULGARIA

LZ1BJ	**A**	**637,871**		**1248**	**90**	**263**
LZ1LZ	*		510,624	718	95	324
LZ1QZ	*		245,072	627	68	221
LZ2DL	*		195,621	548	57	140
LZ1MC	*		52,746	178	57	92
LZ1RN	*		23,940	150	24	46
LZ1BG	*		9,804	51	32	44
LZ5QZ	*		160	12	9	11
LZ1NG	**28**		**198,240**	**871**	**36**	**124**
LZ2UF	*		27,755	215	20	41
LZ1CW	**21**		**175,674**	**652**	**31**	**103**
LZ5W	**7**		**639,912**	**2635**	**38**	**118**
				(Opr. LZ5DB)		
LZ1PM	**3.5**		**102,060**	**630**	**23**	**82**
LZ3AB	1.8		10,176	147	11	42
***LZ2NB**	**A**		**130,064**	**341**	**57**	**119**
*LZ4BU	*		21,912	100	35	48
***LZ2GS**	**28**		**87,543**	**325**	**33**	**104**
*LZ2RF	*		69,552	298	26	86
*LZ1CF	*		58,864	220	28	76
*LZ1IA	*		24,750	148	22	44
***LZ3YY**	**21**		**252,720**	**947**	**35**	**109**
*LZ1FJ	14		7,752	123	10	41
***LZ4ZP**	**7**		**294,857**	**1263**	**31**	**117**
*LZ2MP	*		11,100	119	15	45
*LZ3DP	*		4,855	60	15	30

CRETE

***SVØLK**	**A**		**389,367**	**895**	**79**	**218**

CROATIA

9A1O	**A**	**2,082,429**		**1972**	**132**	**415**
9A2AJ	**28**		**333,387**	**1031**	**33**	**120**
9A7A	**14**		**720,837**	**2134**	**38**	**145**
				(Opr. 9A7V)		
9A3GW	*		716,716	2213	37	142
9A9A	**7**		**908,694**	**2944**	**36**	**135**
9A5Y	**"**		**734,570**	**2462**	**37**	**133**
				(Opr. 9A4OZ)		
9A3MA	*		337,250	1536	33	109
9A3MR	*		283,016	1358	30	106
9A2WJ	*		36,177	245	20	73
9A4RU	**3.5**		**121,166**	**887**	**20**	**74**
9A5W	**1.8**		**158,652**	**1115**	**25**	**88**
9A4D	*		19,260	305	11	49
				(Opr. 9A2D)		
***9A2EU**	**A**	**1,997,082**		**1912**	**130**	**428**
*9A9R	*		864,604	1422	85	253
*9A2NO	*		553,781	766	102	299
*9A2TN	*		471,344	925	91	265
*9A3SM	*		361,872	617	84	252
*9A2UA	*		132,398	373	55	138
*9A3CY	*		69,160	360	32	108
***9A7R**	**28**		**536,580**	**1498**	**36**	**129**
***9A1AA**	**"**		**330,544**	**1001**	**34**	**112**
*9A7P	*		154,638	551	29	92
*9A2FK	*		104,748	537	26	60
*9A3RE	*		91,809	403	29	72
***9A6A**	**21**		**494,025**	**1572**	**39**	**136**
***9A5YA**	**14**		**67,680**	**450**	**23**	**67**
***9A5J**	**3.5**		**38,038**	**381**	**13**	**64**

CZECH REPUBLIC

OK1AVY	**A**	**1,716,286**		**1863**	**103**	**339**
OK1EP	**"**	**1,554,506**		**1749**	**121**	**370**
OK2PDT	**"**	**1,269,216**		**1512**	**97**	**319**
OK1FPS	*		1,139,476	1393	101	341
OK1DOL	*		876,544	1187	99	329
OL4M	*		783,840	1341	81	264
OK1JOC	*		696,340	986	89	281
OK2PAD	*		413,463	800	74	209
OK1AXB	*		356,644	587	87	239
OK2EQ	*		327,120	763	66	224
OK1FRO	*		202,658	569	61	153
OK2KJ	*		73,439	310	23	80
OK1AES	**28**		**132,264**	**386**	**32**	**100**
OK1AUC	*		83,032	390	29	78
OK2BJT	*		53,680	239	25	63
OK1FZM	**21**		**309,876**	**944**	**35**	**112**
OK2SAT	*		218,088	679	36	120
OK1RF	**14**		**852,488**	**2138**	**38**	**144**
OK2GZ	*		357,717	1279	33	108
OK1XC	*		129,010	629	33	100
OK2BVG	**7**		**209,592**	**762**	**31**	**111**
OK1IE	*		70,620	307	27	83
OK1CW	**3.5**		**183,718**	**1312**	**23**	**74**
OK2ZC	*		77,045	823	18	77
OK1KZD	*		76,630	747	18	79
				(Opr. OK1TO)		
OK1FC	*		75,081	696	18	69
OK1RP	**1.8**		**73,341**	**787**	**18**	**69**
OK1DWJ	*		2,052	25	13	23
OK1DJ	*		1,536	57	5	27
***OK1DSZ**	**A**	**1,415,477**		**1534**	**102**	**365**
***OK1BA**	**"**	**1,111,320**		**1283**	**107**	**334**
***OK1HX**	**"**	**1,106,640**		**1449**	**90**	**334**
*OK1PG	*		850,850	1148	102	323
*OK2TBC	*		737,100	1091	92	233
*OK1AYY	*		653,248	1064	77	269
*OK2PTZ	*		652,769	1120	87	250
*OK1ZP	*		650,760	1117	82	292
*OK2EC	*		570,710	922	75	235
*OK2PO	*		512,664	834	83	245
*OK2PMN	*		512,148	1011	72	222
*OK1FF	*		465,985	794	81	254
*OK5ACR	*		452,920	813	72	188
*OK1MKI	*		421,064	816	73	219
*OK1SI	*		419,661	815	77	220
*OK1HFP	*		388,561	675	79	258
*OK1MZO	*		387,192	701	79	233
*OK2HBR	*		379,638	879	67	195
*OK1BMW	*		342,090	657	78	237
*OK2BND	*		325,809	680	74	223
*OK1KZ	*		299,871	733	57	176
*OK2BRV	*		161,590	546	54	172
*OK2SWD	*		152,764	502	45	166
*OL7C	*		124,264	632	41	155
				(Opr. OK1FKV)		
*OK1FRT	*		91,530	354	44	162
*OK1FTW	*		71,394	198	71	75
*OK2AJ	*		54,655	304	25	60
*OK2BWC	*		14,700	182	17	67
*OK1DVX	*		10,368	98	26	55
*OK1DDV	*		7,125	102	16	41
*OK1JDJ	*		2,613	39	13	26
***OK1CZ**	**28**		**90,688**	**374**	**27**	**77**
***OK1MGW**	**"**		**73,831**	**304**	**26**	**75**
*OK2HZ	*		73,710	264	26	79
*OK1DKZ	*		64,818	333	20	58
*OK2PCL	*		60,515	232	28	63
*OK2BNF	*		54,774	243	25	62
*OK2PMM	*		29,040	161	22	44
*OK2BHE	*		12,740	106	17	32
*OK1DKM	*		6,790	74	14	21
***OK2SBL**	**21**		**183,820**	**690**	**34**	**106**
***OK1MNW**	**"**		**152,040**	**515**	**32**	**108**
*OK2QX	*		136,948	511	31	103
*OK2PCN	*		104,181	423	31	90
*OK2PKY	*		17,799	157	17	34
*OK1ILM	*		7,266	110	11	31
***OK2SGY**	**14**		**78,538**	**421**	**26**	**81**
***OK1DKO**	**"**		**70,416**	**273**	**26**	**82**
*OK1AXA	*		56,753	375	26	77
*OK1DVK	*		17,484	117	16	46
***OK1FCA**	**7**		**99,495**	**559**	**20**	**79**
*OK1GS	*		56,990	402	17	65
*OK2PBG	*		45,198	309	14	67
*OK2BRA	*		15,820	105	16	54
*OK1DXR	*		4,860	124	9	36
***OK1FHI**	**3.5**		**85,025**	**722**	**17**	**78**

***OK2HI**	"	**74,646**	**588**	**19**	**68**
*OK1FOG	*	59,670	469	16	74
*OK2DU	*	36,719	467	11	62
*OK2BTK	*	5,412	142	6	27
*OK2PSA	*	693	29	5	16
***OK2PWJ**	**1.8**	**11,725**	**147**	**12**	**55**
*OK1FFC	"	11,373	281	6	45
*OK2OU	*	693	37	3	21

DENMARK

OZ1LO	**A**	**3,779,440**	**3162**	**152**	**443**
OZ5MJ	*	456,435	725	78	267
OZ8SW	*	196,770	487	54	156
OZ5RM	*	12,403	122	22	57
OZ8RO	**7**	**92,493**	**352**	**33**	**96**
***OZ8AE**	**A**	**645,816**	**806**	**97**	**282**
*OZ8NJ	*	497,004	1051	78	254
*OZ5ABD	*	241,366	687	60	169
*OZ5UR	*	147,114	378	62	136
*OZ6TL	"	109,011	306	49	130
*OZ5DK	*	98,343	510	55	168
*OZ4FF	*	24,500	128	34	64
*OZ1APA	28	2,400	35	12	18
*OZ1AV	21	31,878	222	19	47
*OZ6NF	*	1,230	29	11	19
***OZ1BMA**	**14**	**56,463**	**327**	**23**	**64**
*OZ/SM7GCZ	*	37,754	213	19	67

DODECANESE

J45KLN	**A**	**569,772**	**1612**	**61**	**191**
					(Opr. SMØCMH)

ENGLAND

G4BUO	**A**	**5,073,750**	**3566**	**148**	**467**
GØIVZ	**"**	**4,722,406**	**3735**	**135**	**463**
G4BJM	**"**	**3,826,284**	**3780**	**125**	**367**
G3UFY	*	1,201,200	1415	93	307
G3TXF	*	944,125	1288	89	326
GØJQN	*	755,430	1319	84	254
G3WUX	*	226,003	562	60	133
M8W	*	220,088	426	70	174
					(Opr. G4IIY)
G3NAS	*	31,243	190	51	106
G3MXJ	**28**	**620,172**	**1577**	**36**	**125**
G3TBK	*	293,846	879	33	139
GØORH	*	221,112	1119	31	80
G4ODV	*	168,338	566	35	111
G8G	**21**	**412,794**	**1380**	**34**	**119**
					(Opr. GØLII)
G3PJT	*	375,744	1217	34	118
G4HTD	**7**	**359,226**	**1582**	**31**	**95**
G3WGN	**3.5**	**187,566**	**951**	**27**	**102**
***G3WGV**	**A**	**1,898,000**	**1963**	**112**	**388**
***G3KKP**	**"**	**745,500**	**1120**	**80**	**270**
*G5LP	*	727,909	1226	98	323
*G3NKS	*	713,754	1000	84	258
*GØLZL	*	572,592	1015	77	239
*G3RSD	*	459,218	910	70	228
*G3VQO	*	395,032	804	64	204
*G3KKQ	*	342,838	652	76	181
*G3JKY	*	252,120	631	50	170
*G3GGS	*	233,616	424	59	189
*G3HZL	*	106,743	328	51	170
*G3ECS	*	82,992	289	44	89
*G4DDX	*	36,138	195	33	81
*MØAAA/P	*	7,906	103	14	53
***G3ESF**	**28**	**83,629**	**433**	**22**	**69**
*G4UZN	*	18,009	106	25	44
*G4ZME	*	12,060	131	14	22
***GØMTN**	**21**	**256,100**	**1018**	**32**	**98**
*G3VXJ	*	95,489	354	36	101
*G3MXH	*	50,112	312	21	66
*G3KTT	14	11,505	182	15	44
***G5MY**	**7**	**68,310**	**306**	**17**	**93**
*G3WRR	*	46,552	300	17	71
***GØBMS**	**3.5**	**23,856**	**298**	**13**	**58**

ESTONIA

***ES1QD**	**A**	**1,173,816**	**1410**	**134**	**414**
*ES4RD	*	179,346	468	63	150
***ES2NA**	**28**	**51,360**	**276**	**23**	**57**
*ES7LGM	*	26,424	162	22	50
*ES1TM	*	11,074	133	16	33
***ES3HO**	**21**	**36,036**	**200**	**23**	**68**
***ES2RJ**	**14**	**282,129**	**984**	**38**	**119**
*ES3BM	7	23,364	208	15	51
*ES6CO	3.5	1,225	43	9	26

EUROPEAN RUSSIA

UA4LU	**A**	**2,500,084**	**2689**	**135**	**482**
RN6BY	**"**	**2,348,400**	**2593**	**141**	**459**
UA4HTT	**"**	**2,207,413**	**2366**	**146**	**467**
RW4WR	*	1,892,134	1840	136	415
UA1OMS	*	1,716,336	1839	133	389
RA4AR	*	1,488,650	2088	114	361
RX3APM	*	1,286,376	1524	121	411
RO3A	*	1,280,994	2093	104	325
					(Opr. UA3-170)
RX3ARI	*	1,089,890	1548	93	272
RW1QW	*	974,525	1474	95	330
RK3AD	*	967,632	1285	111	345
RU6AV	*	863,898	1217	123	346
RV3LO	*	750,820	1066	103	331
UA3TU	*	747,088	1111	95	329
RA1OJ	*	632,082	883	93	273
UA1OZ	*	606,424	971	97	267
RK3DK	*	555,076	1119	78	224
RA3UF	*	315,000	664	92	268
UA1AUA	*	307,179	627	70	209
RV1CC	*	235,755	481	67	212
UA1AJW	*	212,444	356	79	228
RZ6FZ	*	184,440	487	75	190
UA4LY	"	76,760	204	71	131
RN3FA	*	63,492	236	53	90
RW4CW	*	61,824	268	37	124
UA3XGM	*	52,326	212	40	113
RX3AEX	*	51,404	270	55	126
RK3FY	*	41,503	150	48	73
RK3FV	*	14,184	111	30	42
UA3UCD	*	13,608	76	26	58
RA3XR	*	9,200	51	33	47
UA4RZ	**28**	**133,736**	**511**	**30**	**116**
RU4CO	*	111,800	430	29	101
RU4PL	**21**	**347,424**	**1134**	**40**	**128**
RA3XO	**"**	**309,424**	**901**	**37**	**129**
RX6LG	*	249,348	958	29	103
RV6YB	*	112,243	514	30	77
RU3ACE	**14**	**99,186**	**524**	**28**	**94**
UA4FEN	*	26,520	191	23	55
RA4CD	*	18,564	93	24	67
UA4LL	**7**	**296,670**	**988**	**37**	**128**
RW1ZZ	**"**	**256,908**	**843**	**34**	**124**
RV6YY	*	170,850	663	33	117
RW3WV	*	112,042	650	23	83
RW3FO	**3.5**	**98,792**	**709**	**25**	**81**
UA6BAD	*	66,458	628	19	75
UA6LTI	*	64,512	442	18	78
RW3XX	*	57,469	514	18	83
RA4PO	*	47,960	351	17	71
RX3AP	*	6,105	95	6	31
UA6XT	*	850	24	20	34
RA4NW	**1.8**	**47,386**	**375**	**22**	**64**
UA4CJJ	*	19,468	281	10	52
***RA1ACJ**	**A**	**1,055,556**	**1390**	**97**	**339**
***UA3ABJ**	**"**	**978,208**	**1330**	**102**	**295**
***UA4WAN**	**"**	**936,124**	**1259**	**115**	**354**
*UA4FER	*	917,285	1268	113	366
*RA3CW	*	820,105	1147	114	367
*UA4LA	*	818,040	1167	109	299
*RK3BY	*	720,892	988	111	347
*RW1AI	*	653,672	1043	91	313
*RV6LFE	*	539,537	997	83	254
*RW1ON	*	497,710	811	88	267
*UA1OMX	*	478,515	701	100	265
*RU3AQY	*	371,308	787	69	229
*RX4CD	*	323,010	688	81	210
*UA3AGS	*	307,008	554	82	206
*RA1QJA	*	282,653	573	61	210
*RA1QX	*	282,396	520	76	227
*UA4YG	*	250,952	711	56	161
*RA3UAG	*	246,400	572	73	235
*RV4LM	*	197,650	391	76	219
*UA6AK	*	174,900	330	62	150
*UA4SS	*	155,040	585	53	187
*RV3YR	*	154,395	549	58	177
*UA6AGK	*	131,100	257	79	149
*RX3AHY	*	125,664	403	47	140
*UA4QK	*	109,434	263	67	116
*RW1OX	*	108,953	397	59	162
*UA1RJ	*	93,771	199	78	129
*RA6LAE	*	93,280	250	46	130
*RU6JJ	*	60,344	226	51	101
*UA4AO	*	43,848	187	34	74
*RW1QF	*	27,720	129	41	79
*UA6JY	*	22,770	72	47	68
*UA3UMT	*	19,596	140	24	68
*RW3VA	*	11,468	83	28	33
*RA3XA	*	7,808	91	17	47
*UA3UKQ	*	950	27	16	22
*RV3UC	*	700	21	18	17
***RW6BN**	**28**	**43,674**	**247**	**24**	**63**
*UA3XBB	*	38,412	224	26	73
***UA4LM**	**21**	**389,025**	**1236**	**38**	**137**
*UA4PFO	*	159,294	604	33	90
*RN3AU	*	92,620	472	29	81
*UA3ABT	*	79,860	323	28	93
*UA3SAQ	*	41,515	400	29	86
***RU3HD**	**14**	**274,822**	**1107**	**31**	**106**
***RW4WM**	**"**	**194,100**	**711**	**36**	**114**
*UA1ANA	*	133,125	526	34	91
*UA3VCS	*	110,352	530	30	91
*RU4HH	*	101,036	478	30	86
*RX3RZ	*	44,344	276	25	67
***RW4PL**	**7**	**139,916**	**574**	**31**	**102**
*UA3VLO	*	10,880	124	12	52
***RZ6FR**	**3.5**	**87,696**	**797**	**14**	**70**
***UA1TAN**	**1.8**	**6,400**	**226**	**8**	**42**
*UA6LP	*	4,982	48	15	38

FAROE ISLANDS

OY1CT	**A**	**991,684**	**2074**	**69**	**263**

FINLAND

OH1MM	**A**	**4,374,240**	**3379**	**143**	**481**
OH5LF	**"**	**3,994,272**	**3094**	**156**	**492**
OH6RX	**"**	**2,725,254**	**2489**	**128**	**375**
OH8LAE	*	2,329,470	2022	137	448
OH4JFN	*	1,380,350	2051	117	358
OH5XL	*	1,336,552	1942	112	294
OH6KN	*	1,198,512	1318	117	387
OH6RE	*	577,486	838	83	183
OH1BV	*	153,360	412	55	158
OH1BOI	*	53,949	178	48	99
OH2AQ	**28**	**190,720**	**748**	**33**	**116**
					(Opr. OH2NRV)
OH7JL	*	39,990	210	23	70
OH1F	**21**	**607,338**	**1744**	**37**	**126**
					(Opr. OH1NOA)
OH2BR	*	383,308	1183	37	121
OH3WS	*	151,256	543	32	114
OH7WW	*	127,617	661	29	74
OH1F	**14**	**710,710**	**2127**	**36**	**118**
					(Opr. OH1MDR)
OH8LQ	*	417,152	1958	37	91
OH1ZAA	*	154,679	591	34	99
OH2BCD	*	25,296	228	16	51
OH9DX	**7**	**608,548**	**2051**	**36**	**131**
OH6ZH	*	51,040	187	30	86
OH1MA	**3.5**	**184,920**	**1094**	**29**	**109**
OH9UFO	*	101,480	685	24	94
OH9BVM	*	92,862	631	27	99
OH1SH	*	62,980	475	18	76
OH1PY	*	378	9	6	8
OH4MFA	**1.8**	**56,764**	**558**	**19**	**73**
OH5VT	*	54,223	460	20	77
OH4ML	*	33,264	353	15	62
OH7UE	*	5,070	453	16	62
***OH8BQT**	**A**	**1,012,095**	**1145**	**109**	**350**
***OH2NN**	**"**	**537,672**	**802**	**86**	**258**
*OH2VF	*	489,846	733	83	244
*OH6RC	*	200,645	338	80	234
*OH7HMC	*	144,207	435	49	140
*OH3NM	*	132,525	282	61	164
*OH3WW	*	128,616	371	48	136
*OH3IR	*	120,400	355	54	146
*OH2FS	*	97,554	216	72	141
*OH7JHI	*	87,840	277	44	139
*OH1JMH	*	87,468	162	43	154
*OH2MJW	*	66,552	311	36	105
*OH2LYP	*	56,496	446	41	135
***OH5PA**	**28**	**26,877**	**120**	**22**	**71**
*OH4LJL	*	22,493	118	23	60
*OH2EJ	*	21,250	104	22	63
*OH3KOH	*	2,015	26	12	19
***OH5BM**	**21**	**359,531**	**1205**	**35**	**116**
*OH8NLC	*	142,978	476	32	102
*OH3KRH	*	130,350	354	40	118
*OH7MN	*	79,121	401	30	97
*OH9JIW	*	57,816	258	26	73
*OH6MBQ	*	52,718	305	23	63
*OH1UP	*	11,417	116	15	34
***OH2LP**	**14**	**62,700**	**303**	**27**	**83**
*OH3MC	*	56,385	251	27	78
*OH2BPA	*	52,788	269	26	80
*OH4TY	*	38,016	243	25	63
***OH2BSQ**	**3.5**	**45,738**	**532**	**13**	**64**
*OH3GD	*	34,884	173	20	88

FRANCE

TM9C	**A**	**2,928,660**	**3701**	**101**	**298**
					(Opr. F5IN)
F6IRA	*	896,000	1329	86	264
F5RAB	*	219,258	459	61	173
F2AR	*	106,578	342	50	141
F6CWA	**1.8**	**39,585**	**411**	**18**	**69**
F5NBX	*	14,196	251	7	45
***F5JBR**	**A**	**664,815**	**974**	**82**	**263**
***F5TNI**	**"**	**472,815**	**1030**	**110**	**285**
***F5OIH**	**"**	**395,424**	**698**	**70**	**218**
*F5ROX	*	265,356	710	64	179
*F5NQL	*	258,120	746	64	206
*F5JLV	*	185,820	582	49	141
*F6DZD	*	172,608	504	42	132
*F6CAV	*	151,512	501	46	131
*F6ABI	*	90,720	540	42	126
*F5LBG	*	45,050	248	35	70
*F5OIU	*	38,784	199	36	65
*F5ORE	*	38,160	212	30	60
*F6DCH	*	15,884	125	29	59
*F5NLX	*	15,198	100	19	32
*F2FX	*	14,050	69	22	50
*F6FTB	*	12,848	118	24	64
***F5ITK**	**28**	**93,195**	**519**	**27**	**68**
*F5LJY	*	50,974	257	25	52
*F5TRO	*	18,984	158	19	37
***F6EXV**	**21**	**88,650**	**561**	**25**	**65**
***F/OK1EE**	**7**	**165,060**	**778**	**29**	**102**
*F5MMX	*	44,814	460	14	52
*F5JDG	*	25,200	236	15	55
*F5ICX	*	390	26	5	5
*F3AT	1.8	6,030	124	7	38

GERMANY

DL4NAC	**A**	**4,872,882**	**3216**	**154**	**487**
DK5PD	**"**	**2,159,616**	**1949**	**136**	**456**
DL4MCF	**"**	**2,083,816**	**1820**	**129**	**457**
DJ9DZ	*	1,878,963	1801	114	423
DJ5JH	*	1,721,590	1549	129	404
DL2DX	*	1,582,530	1436	143	367
DL4BQE	*	1,261,575	1522	98	347
DK3KD	*	1,067,556	1628	90	268
DL2KUW	*	988,172	1181	110	357
DL5BUT	*	975,456	1227	105	327
DFØFS	*	945,820	1447	88	292
					(Opr. DL1EKC)
DL6UNF	*	762,135	1033	87	254
DK7CX	*	708,630	905	94	296
DL1JF	*	706,482	1020	89	289
DL2MDU	*	678,972	890	108	305
DF1DV	*	601,762	937	95	276
DF3OL	*	514,745	741	97	288
DJ2IA	*	507,400	650	100	244
DL8UI	*	495,720	858	96	228
DL3BQD	*	476,088	866	76	256
DL8YR	*	457,600	774	78	247
DL6AG	*	427,720	647	82	214
DL9XY	*	350,703	786	68	211
DM3XRF	*	218,890	522	72	193
DJ8UV/P	*	216,619	556	58	189
DJ2YE	*	178,000	535	49	151
DL3DRN	*	129,115	280	57	160
DL4KBS	*	122,816	402	56	146
DK8RE	*	118,726	330	48	130
DL6DVU	*	115,045	341	54	119
DL3DBY	*	99,224	333	43	114
DL5ZB	*	77,973	180	87	150
DK7AN	"	39,675	150	39	76
DJ4QO	*	36,934	174	39	79
DL2DSA	*	26,596	100	50	82
DL3DCY	*	24,592	140	32	74
DK5EZ	*	11,308	93	22	22
DJ1YH	*	10,920	62	31	47
DL7MAE	*	54	3	3	3
DK5QN	**28**	**262,105**	**813**	**36**	**119**
DF9CY	**"**	**215,888**	**810**	**30**	**101**
DJ4KW	*	81,641	342	26	81
DK3WW	*	79,209	302	28	89
DL1IAO	**21**	**723,492**	**1815**	**38**	**136**
DKØSR	"	399,898	1266	37	121
					(Opr. DJ5PA)
DL8UAT	*	78,366	334	27	84
DLØLR	*	68,425	493	31	84
DJ7AA	**14**	**768,768**	**2070**	**37**	**145**
DHØDX	*	296,808	1268	37	112
					(Opr. DL1YAW)
DF4SA	**7**	**542,720**	**1633**	**35**	**125**
DK8FD	*	294,624	1093	31	113
DL5JAN	*	120,902	563	28	94
DL1EMH	*	106,359	508	28	93
DL7ALM	**3.5**	**100,152**	**683**	**21**	**83**
DJ7RJ	"	47,616	393	19	74
DK5IM	1.8	14,250	240	8	49
DJ3XD	*	7,585	200	6	31
***DL2MEH**	**A**	**2,240,217**	**2062**	**132**	**435**
***DL2HBX**	**"**	**2,100,324**	**1819**	**124**	**419**
***DKØMM**	**"**	**1,908,816**	**1725**	**126**	**420**
					(Opr. DJ7IK)
*DL3JAN	*	1,065,494	1367	104	342
*DL7QU	*	985,130	1220	97	298
*DL2HQ	*	875,350	1098	104	323
*DL7ANR	*	675,648	955	94	274
*DF3QG	*	655,285	794	110	305
*DL3BRA	*	607,750	925	94	280
*DL1SAN	*	559,650	1011	76	249
*DL8ZAW	*	558,126	858	78	229
*DL1VDL	*	462,000	632	91	239
*DL4JYT	*	433,805	778	67	198
*DK7ZH	*	420,576	660	80	232
*DJ8EW	*	365,637	705	72	235
*DL5JRA	*	354,705	834	63	192
*DFØIT	*	327,978	758	66	200
					(Opr. DF6QC)
*DL3ZAI	*	324,380	693	59	186
*DL7CF	*	297,250	535	69	181
*DL5SVB	*	289,710	558	71	190
*DL1TH	*	280,577	720	63	190
*DL1ARJ	*	273,728	306	125	204
*DL7IZ	*	260,100	485	56	169
*DL7UXG	*	200,128	548	60	176
*DL2ANM	*	194,964	419	76	155
*DL8DWW	*	181,888	449	57	167
*DF1QQ	*	162,732	400	58	155
*DL4TJ	*	162,400	400	53	150
*DL1ZU	*	151,088	281	88	216
*DF6VI	*	146,452	463	52	112
*DJ4PT	*	146,174	389	54	143
*DJ3OE	*	132,966	346	52	126
*DF1LON	*	127,218	369	51	131
*DL5WS	*	122,159	321	48	103
*DL8NBJ	*	120,712	337	53	138
*DL5ST	*	118,802	302	57	134
*DL2FDD	*	114,276	310	50	128
*DL8ULO	*	113,827	410	44	117
*DL5DBH	*	106,392	410	38	118
*DAØHSC	*	102,429	200	61	110
					(Opr. DL1ZQ)
*DL2GBB	*	102,120	340	40	98
*DL6QW	*	96,390	331	47	123
*DF1ZN	*	84,296	292	50	114
*DL6UAM	*	83,578	320	37	94
*DL3BZZ	*	80,707	261	41	80
*DL3HRT	*	71,980	237	30	92
*DL5AOJ	*	66,555	250	42	111
*DL3YEI	*	59,640	249	37	83
*DL7AXM	*	46,250	134	45	80
*DF1TJ	*	42,722	234	20	82
*DL6ZNG	*	42,182	160	48	83
*DM3XI	*	40,375	155	42	53
*DL4OCM	*	38,862	180	51	102
*DL1ECG	*	29,904	201	37	75
*DL2AL	*	27,462	290	32	71
*DL5JMN	*	27,300	153	27	51
*DL8UVG	*	24,864	146	27	69
*DK9KW	*	19,565	80	37	54
*DL4AAE	*	17,272	91	25	43
*DL2MIH	*	12,584	55	30	58
*DH3MG	*	12,103	150	28	63
*DL3JRA	*	10,864	76	24	32
*DL1IA	*	9,639	73	22	59
*DF5ZV	*	7,370	63	20	35
*DL5ANS	*	3,924	43	16	20
*DL4ABR	"	3,818	67	13	33
*DL6UOF	*	2,781	47	8	19
*DL5FCO	*	864	27	6	6
*DL5CX	*	480	10	7	9
***DL7AU**	**28**	**126,144**	**364**	**29**	**177**
***DL7VMM**	**"**	**119,320**	**357**	**38**	**114**
*DL4UL	*	77,226	296	33	89
*DJ2QV	*	66,726	255	24	75
*DL4WA	*	15,912	114	19	33
*DM3PKK	*	1,770	27	13	17
*DJ8FR	*	1,419	29	13	20
***DL3DTH**	**21**	**142,978**	**531**	**31**	**103**
*DJ5GG	*	100,572	390	27	89
*DF6LQ	*	41,537	239	22	51
*DL2YAK	*	35,568	242	22	54
*DL2NEQ	*	10,485	114	14	31
***DK3DM**	**14**	**253,151**	**873**	**35**	**114**
*DF7TU	*	46,893	300	18	69
*DL3HSC	*	34,410	199	23	70
*DJ5TU	*	15,680	56	10	28
***DJ2XC**	**7**	**66,872**	**310**	**23**	**81**
*DL2HX	*	17,760	149	19	61
*DL9CC	*	6,765	76	19	22
*DJ5MN	*	1,380	25	9	24
***DL6MTA**	**3.5**	**73,563**	**560**	**16**	**77**
*DF5WN	*	6,407	132	7	36

GIBRALTAR

***ZB2EO**	**28**	**65,475**	**348**	**24**	**73**

GREECE

***SV1DKR**	**A**	**961,630**	**2058**	**84**	**286**
*SV2BFL	*	195,206	410	75	134
*J41Y	*	117,260	706	58	162
*SV2BBJ	*	82,290	247	59	136
***SV1DPJ**	**21**	**175,734**	**1015**	**28**	**89**
*SV1RP/SV7	14	12,230	163	15	40

GUERNSEY

GU6UW	**A**	**5,047,170**	**4194**	**127**	**428**
					(Opr. G3XTT)

HUNGARY

HA8FM	**A**	**3,734,322**	**3955**	**142**	**385**
HA8JV	**"**	**2,865,016**	**2649**	**153**	**463**
HA3LI	*	1,628,121	2096	115	364
HAØIT	*	1,266,636	1498	115	361
HA5AGS	*	1,072,140	1387	105	323
HA3PT	*	124,925	742	64	199
HG1W	**28**	**296,072**	**1183**	**34**	**102**
					(Opr. HA1YA)
HA8UH	*	5,960	74	14	26
HA3JB	**21**	**118,708**	**445**	**31**	**87**
HG5J	**14**	**573,695**	**1627**	**37**	**142**
HG5C	*	277,065	1335	33	108
HA5JP	*	111,366	418	34	104
HG9X	**7**	**346,773**	**1500**	**32**	**115**
HG5A	**3.5**	**183,436**	**1332**	**27**	**94**
					(Opr. HA7VB)
HAØKHT	*	55,610	501	17	66
HA6VA	*	31,894	333	11	63
HA8BE	**1.8**	**82,800**	**756**	**20**	**80**
***HA1CW**	**A**	**2,331,648**	**2297**	**143**	**464**
*HA4YF	*	770,640	1163	94	296
*HAØHH	*	358,308	694	68	201
*HAØDD	*	191,672	434	66	181
*HA8IC	*	176,217	480	47	104
*HA6QD	*	24,045	144	36	69
***HA1VE**	**21**	**111,399**	**646**	**22**	**49**
***HA6KNX**	**14**	**121,278**	**467**	**30**	**93**
					(Opr. HA6NW)
*HA3RG	*	12,474	89	19	44
***HA8RH**	**3.5**	**110,865**	**954**	**18**	**77**
*HA7JJS	*	95,700	906	17	70
*HA8IB	*	78,015	776	21	84
*HG6V	*	59,007	540	16	73
***HA3MQ**	**1.8**	**49,192**	**657**	**14**	**74**

IRELAND

EI4BZ	**A**	**810,030**	**1295**	**83**	**252**
***EI4DW**	**A**	**680,685**	**1040**	**79**	**266**
*EI4II	"	198,000	546	58	142
***EI8GP**	**28**	**191,394**	**817**	**20**	**73**
***EI6FR**	**21**	**246,848**	**1171**	**32**	**101**
***EI7IU**	**1.8**	**31,507**	**482**	**11**	**50**

ISLE OF MAN

GD4UOL	**A**	**1,517,714**	**2402**	**101**	**362**

ITALY

I3EVK	**A**	**1,224,405**	**1538**	**113**	**342**
IQ6T	**"**	**1,171,170**	**1720**	**123**	**332**
					(Opr. IK6SNQ)
IK4WMB	*	1,107,294	1526	94	264
IK3ORD	*	624,169	902	89	272
I3FDZ	*	275,400	571	91	215

IR7A	*	271,260	643	72	202	
			(Opr. I7ALE)			
IK2EGL	*	106,683	501	45	84	
I6FDJ	*	91,800	381	43	110	
IZ4BBA	*	41,922	193	43	94	
IK1ZOH	*	21,836	101	44	62	
IQ4A	**28**	**487,494**	**1342**	**36**	**123**	
			(Opr. I4IND)			
IQ5Z	*	195,507	770	35	82	
			(Opr. IZ5AXA)			
IR4T	**21**	**769,484**	**1896**	**38**	**150**	
			(Opr. IK2QEI)			
IR2W	**14**	**729,444**	**2094**	**38**	**140**	
			(Opr. I2VXJ)			
IK2RJK	*	12,506	124	22	52	
II1H	**3.5**	**146,475**	**1062**	**23**	**82**	
			(Opr. I1HJT)			
IZ3ALF/3	*	36,032	441	13	51	
IR4T	**1.8**	**159,654**	**1051**	**26**	**92**	
			(Opr. IK4UPB)			
***I3JSS**	**A**	**1,712,050**	**1888**	**119**	**366**	
***IK1RQQ**	**"**	**1,430,805**	**1595**	**107**	**358**	
***IK4WMH**	**"**	**841,068**	**1141**	**92**	**291**	
*IV3TQE	*	723,320	900	101	327	
*IK4EWX	*	710,616	1102	84	264	
*IV3NVN	*	420,810	537	114	301	
*IZØAIS	*	310,310	491	78	232	
*I4FGG	*	235,470	523	62	173	
*IKØXFD	*	221,779	487	64	163	
*IK3HUG	*	196,600	614	46	154	
*IKØCNA	*	161,230	354	62	168	
*IØKHP	*	138,096	377	47	151	
*I2WIJ	*	133,824	327	54	110	
*IZ8BLZ	*	121,550	368	52	118	
*I4JEE	*	102,588	264	67	182	
*IK8WEI	*	91,935	337	41	94	
*IK2TQG	*	86,765	280	54	131	
*IQØA	*	79,376	281	47	117	
			(Opr. IKØXBX)			
*IZØANC	*	73,408	253	46	102	
*IK2AIT	*	42,880	209	30	50	
*I7PXV	*	41,340	145	35	71	
*IKØADY	*	32,970	169	34	71	
*IK7QHS	*	27,615	172	36	69	
*IK4NPC	*	23,625	183	25	50	
*IK6HWX	*	12,240	86	27	41	
*IK2IKW	*	10,906	62	34	48	
*IK1NLZ	*	9,504	93	16	38	
*IØLTX	*	6,642	94	27	54	
*IK8YFW	*	3,655	103	19	45	
*IV3KSE	*	3,600	46	20	28	
*IØYQV	*	1,888	45	15	17	
*IK1YEE	*	100	81	16	22	
*IK5RLS	*	100	11	8	10	
***I1XPQ**	**28**	**158,267**	**629**	**28**	**87**	
*I3MLU	*	56,700	284	24	66	
***IK4DCT**	**21**	**490,196**	**1350**	**36**	**128**	
***IK2YSE**	**14**	**43,962**	**241**	**25**	**77**	
*IZ3BQT	*	37,464	247	21	63	
***IQ7A**	**7**	**292,420**	**1328**	**31**	**105**	
			(Opr. IK7XIV)			
*I5OOV	*	4,788	94	9	27	
***II2P**	**1.8**	**15,216**	**289**	**7**	**41**	

JERSEY

***MJØASP**	**14**	**100,200**	**590**	**24**	**76**
			(Opr. F5SHQ)		

KALININGRAD

UA2CZ	**A**	**143,115**	**447**	**56**	**147**
RA2FB	**A**	**122,310**	**353**	**39**	**123**

LATVIA

YL2KO	**A**	**2,115,016**	**2133**	**117**	**365**
YL8ØMR	*	757,440	1468	80	240
YL2IP	*	160,550	300	69	178
YL2GN	**7**	**110,282**	**521**	**31**	**103**
YL3IZ	**3.5**	**190,266**	**1289**	**24**	**90**
YL2SM	**1.8**	**58,520**	**576**	**17**	**71**
YL2PJ	*	32,485	376	11	62
***YL2KA**	**A**	**967,542**	**1208**	**100**	**338**
*YL2KF	*	122,208	342	51	150
***YL3FW**	**14**	**105,040**	**635**	**27**	**77**
***YL2PP**	**7**	**18,160**	**174**	**19**	**61**

LITHUANIA

LY5W	**A**	**2,988,110**	**2585**	**154**	**501**
			(Opr. LY1DR)		
LY6M	**"**	**2,230,392**	**1587**	**145**	**452**
			(Opr. LY1DS)		
LY2MM	*	1,100,757	1259	108	483
LY2HN	*	897,128	1074	119	389
LY2DX	*	208,845	628	50	171
LY2BBF	*	93,626	312	45	124
LY3BU	*	46,767	317	34	97
LY2CI	**28**	**297,594**	**981**	**36**	**126**
LY2KM	*	178,996	571	32	114
LY2BR	*	100,983	344	26	97
LY8X	**14**	**280,756**	**1174**	**34**	**114**
			(Opr. LY1FF)		
LY2BN	*	265,968	993	35	109
LY1DI	*	58,752	465	24	72
LY3BX	**7**	**179,270**	**1038**	**29**	**101**
LY3BS	**1.8**	**96,720**	**743**	**22**	**82**
LY3CI	*	40,348	449	14	63
***LY3BA**	**A**	**2,543,038**	**2246**	**127**	**439**
***LY2BTA**	**"**	**1,835,808**	**2325**	**140**	**484**
*LY1BW	*	681,296	1187	69	247
*LY2GV	*	640,288	1069	86	266
*LY3CW	*	489,880	524	78	253
*LY2FN	*	450,522	901	73	236
*LY2LA	*	321,280	714	64	192
*LY1DM	*	133,724	304	54	148
*LY2PBM	*	128,872	525	39	139
*LY2GF	*	125,568	551	36	108
*LY2CX	*	60,280	250	42	95
*LY1XA	*	17,181	83	32	51
***LY2AT**	**28**	**38,412**	**180**	**25**	**74**
***LY2BM**	**7**	**158,136**	**796**	**30**	**102**
*LY3JY	*	134,504	713	32	104
*LY1DD	*	95,352	525	28	88
*LY2BLQ	*	67,588	564	28	94
***LY2OU**	**1.8**	**26,605**	**387**	**11**	**57**

LUXEMBOURG

LX4B	**1.8**	**95,374**	**1022**	**16**	**70**
			(Opr. OH2PQ)		
*LX1JH	A	42,880	192	38	90

MACEDONIA

Z31GB	**21**	**377,760**	**1267**	**37**	**123**
Z37FCA	14	722	18	8	11
Z39Z	**7**	**511,344**	**2188**	**33**	**111**
			(Opr. Z32AF)		
Z32KV	3.5	378	18	5	13
*Z31DZ	14	5,060	61	14	30

MALTA

9HØA	**28**	**840,434**	**2545**	**36**	**137**
***9H3YQ**	**7**	**107,779**	**963**	**20**	**69**
			(Opr. DJ7PR)		

MOLDOVA

ER5AA	**A**	**1,206,584**	**1851**	**92**	**284**
ER7N	**28**	**240,298**	**778**	**33**	**104**
ER10A	**21**	**114,950**	**489**	**33**	**88**
ER5					
/UX3FW	**14**	**296,209**	**1574**	**34**	**105**
ER2GR	1.8	8,722	149	8	41
***ER10O**	**28**	**169,514**	**665**	**34**	**97**

MONACO

3A/N9NC	**A**	**2,927,808**	**3211**	**127**	**417**

NETHERLANDS

PA3HBI	**A**	**325,710**	**617**	**78**	**204**
PA3GUA	*	89,240	352	34	81
PA3ADJ	21	18,120	210	12	28
PAØCLN	**1.8**	**64,032**	**583**	**18**	**78**
***PAØRCT**	**A**	**861,273**	**1549**	**78**	**265**
***PA3AAV**	**"**	**663,309**	**756**	**103**	**328**
*PAØLOU	*	522,792	663	110	301
*PAØJR	*	348,743	598	78	197
*PA3BFH	*	322,560	645	68	184
*PA3ELD	*	304,234	679	62	155
*PAØCOE	*	188,574	543	48	111
*PA3DUS	*	140,999	428	51	130
*PA3GRM	*	138,012	461	61	156
*PAØCOR	*	108,329	365	45	124
*PA3ECJ	*	81,760	281	46	100
*PA3GFH	*	52,316	242	42	122
*PAØSKP	*	46,498	208	36	98
*PA3DMH	*	44,799	155	45	92
*PA3ASC	*	10,541	73	25	58
*PAØRBS	*	8,804	100	31	31
*PA3BEJ	*	7,626	77	20	62
***PA3BUD**	**28**	**80,704**	**347**	**26**	**78**
***PAØJED**	**"**	**79,560**	**356**	**25**	**77**
*PAØPLN	21	31,076	201	21	47
***PAØMIR**	**3.5**	**22,632**	**273**	**13**	**56**

NORTHERN IRELAND

GIØKOW	**A**	**6,961,240**	**4788**	**164**	**551**
			(Opr. GIØNWG)		
***GI4SNC**	**A**	**398,736**	**794**	**56**	**178**
*GIØKVQ	21	19,844	234	12	32

NORWAY

LA7MFA	**A**	**1,595,230**	**1844**	**107**	**348**
LAØCX	*	951,180	1207	108	307
LA5ZC	*	281,274	764	51	130
LA6PB	*	205,568	526	65	191
LA4XT	28	23,256	130	22	54
LA1PHA	7	2,772	69	10	26
LA6YEA	**3.5**	**209,677**	**1174**	**28**	**99**
LA2O	1.8	10,120	241	8	47
***LA9HFA**	**A**	**720,360**	**1281**	**87**	**261**
*LA2HFA	*	400,810	708	71	227
*LA4XFA	*	55,890	200	38	97
*LA5KW	*	43,326	32	18	29
*LA9AU	*	19,228	159	21	71
*LA5TFA	*	7,081	84	27	46
*LA8LA	*	6,136	40	24	35
*LA2MJA	21	6,144	87	6	7
*LA8WG	1.8	11,352	144	10	56

POLAND

SP4Z	**A**	**3,658,850**	**3042**	**150**	**500**
SP8FHK	**"**	**1,474,739**	**1858**	**113**	**348**
SN7N	**"**	**1,025,766**	**1388**	**104**	**337**
			(Opr. SP7NMW)		
SP5UAF	*	454,080	700	92	252
SP3FZN	*	323,420	524	86	228
SP4KGB	*	283,575	705	82	203
SP3HUU	*	131,328	263	83	145
SP2IU	*	124,400	244	69	131
SP2KJH	*	112,117	364	50	141
SP6AZT	*	76,570	255	48	142
SP1PLA	*	41,280	113	57	103
SP2DKI	*	36,566	186	32	62
SP1MHV	*	30,600	89	58	78
SP4EAK	*	8,440	79	9	31
SP4TKO	*	2,992	71	8	36
SP6AYP	*	1,323	28	22	27
SP2FOV	**28**	**240,318**	**689**	**35**	**123**
SP3KFH	*	194,129	582	33	104
			(Opr. SP3GTS)		
SP5DDJ	*	144,300	478	34	96
SP7ELQ	*	96,228	295	32	100
SP6LV	*	44,469	233	23	58
SP6CIK	*	39,037	176	29	74
SP5GRM	**21**	**584,972**	**1546**	**40**	**139**
SP3SLA	*	355,907	1059	32	119
SP9W	*	260,420	1172	34	111
SP5BB	*	1,275	32	7	10
SN8V	**14**	**430,050**	**1506**	**35**	**115**
			(Opr. SP8GQU)		
SN2B	**7**	**759,330**	**2319**	**39**	**138**
			(Opr. SP2FAX)		
SP3EQE	*	64,155	318	25	80
SP9ABU	*	57,456	265	25	83
SN3A	**3.5**	**437,904**	**1870**	**34**	**110**
			(Opr. SP3HLM)		
SP7GIQ	*	343,980	1708	31	95
SP3KCL	*	78,960	731	18	76
SP5GH	*	48,600	182	18	90
***SP2QCH**	**A**	**1,532,440**	**1867**	**113**	**342**
***SP2EWQ**	**"**	**998,440**	**1309**	**106**	**352**
***SP6CYX**	**"**	**890,240**	**1360**	**100**	**316**
*SP1NY/MM	*	675,011	1241	76	261
*SP1AEN	"	621,810	850	90	288
*SP6CDP	*	504,252	749	81	241
*SQ9BZK	*	460,096	1027	84	232
*SP3VT	*	381,744	868	60	181
*SP9GKM	*	250,701	604	65	148
*SP8BSQ	*	229,824	613	59	193
*SP3JUN	*	216,153	657	51	168
*SP9NSV/7	*	199,987	518	57	170
*SP3MGP	*	165,148	511	52	160
*SP5GKN	*	150,480	349	54	136
*3ZØXR	*	136,000	383	48	112
*SP5CGN	*	126,474	386	61	136
*SP1DPA	*	104,720	273	58	118
*SP6CXH	*	97,580	314	49	121
*SQ2HEB	*	85,340	346	45	125
*SP6BEN	*	72,520	142	69	116
*SP6YGB/9	*	67,986	306	40	124
			(Opr. SQ9CAQ)		
*SQ5BUO	*	66,600	287	50	100
*SP8NTW	*	63,350	278	48	127
*SP5NZL	*	62,463	291	42	99
*SQ9DXN	*	60,102	195	57	132
*SP2MKT	*	51,183	218	41	100
*SP9KJU	*	26,976	159	25	71
			(Opr. SP9MDY)		
*SP9KAT	*	20,124	234	23	63
*SP2QVS	*	19,742	164	47	69
*SP6CRU	*	17,020	114	32	42
*SP6NIF	*	14,608	66	31	52
*SP7ICE	*	14,444	62	42	50
*SP3DBD	*	11,232	60	29	43
***SP3SUX**	**28**	**201,117**	**531**	**37**	**120**
*SP3LWP	*	102,250	351	31	94
*SQ5EWG	*	38,556	150	23	61
*SP5LCC	*	28,800	158	24	48
*SQ9HYM	*	25,023	173	18	39
*SP1AFU	*	20,680	160	17	38
*SP3AOT	*	13,426	111	19	30
*SP4AAZ	*	8,664	94	14	24
*SP3AZO	*	6,084	72	15	21
***SP9BBH**	**21**	**238,810**	**752**	**34**	**109**
***SP2AVE**	**"**	**191,268**	**636**	**31**	**107**
*SP9DAE/9	*	93,009	441	28	75
*SP9QJ	*	63,835	315	23	62
*SP1BLE	*	21,903	179	16	33
***SP8BAB**	**14**	**86,515**	**276**	**27**	**94**
*SP6SYF	*	48,958	288	22	69
*SP9OYK	*	45,448	337	18	58
*SP5ICS	*	27,750	233	19	55
***SP4DEU**	**7**	**65,920**	**389**	**23**	**80**
*SP3AIT	*	5,576	105	7	34
*SP3GTS	*	3,402	41	11	31
***SP9NLK**	**3.5**	**61,440**	**531**	**20**	**76**
*SQ1BVG	1.8	1,274	49	4	22

PORTUGAL

CT/F6EPY	**21**	**213,413**	**1211**	**26**	**75**
*CT1BNW	28	23,450	145	20	50
***CT1BQH**	**21**	**443,120**	**1606**	**35**	**110**
***CT1AOZ**	**3.5**	**73,514**	**536**	**19**	**70**

ROMANIA

YO3ND	**A**	**1,145,808**	**1709**	**107**	**329**
YO4FRF	**7**	**260,729**	**1190**	**26**	**93**
***YO3APJ**	**A**	**1,954,437**	**1891**	**133**	**458**
***YO3FRI**	**"**	**948,789**	**1311**	**104**	**319**
*YO3FWC	*	931,845	1657	92	273
*YO8FR	*	798,867	1003	76	257
*YO2DFA	*	780,278	1269	104	318
*YO6BHN	*	453,586	810	91	267
*YO8BPK	*	444,027	801	77	206
*YO4XF	*	145,008	374	60	161
*YO5DAS	*	48,604	262	36	80
***YO4GDP**	**21**	**84,788**	**491**	**25**	**69**
*YO4GJS	*	100	17	9	9
***YO3CTK**	**14**	**115,346**	**677**	**24**	**83**
*YR8A	*	54,963	346	26	67
			(Opr. YO8AXP)		
*YO8RXP	7	23,058	281	14	47
*YO9FJW	*	6,625	109	10	35
***YO9AYN**	**3.5**	**16,560**	**360**	**16**	**40**
*YO2CJX	1.8	2,079	80	4	23

SARDINIA

ISØ					
/YO3RA	**28**	**113,620**	**448**	**31**	**84**
***ISØHQJ**	**A**	**279,510**	**1061**	**63**	**179**
*ISØIGV	*	209,880	537	47	112
*ISØGSR	*	198,006	662	45	138
*ISØUWX	*	47,736	245	37	80
***ISØSDX**	**28**	**28,832**	**244**	**19**	**33**

SCOTLAND

GM4YXI	**21**	**672,175**	**2002**	**39**	**122**
GM3POI	**14**	**820,080**	**2517**	**36**	**117**
GMØGAV	**3.5**	**249,500**	**1259**	**25**	**100**
GM4AFF	*	154,936	1152	20	87
***GM4SID**	**A**	**886,704**	**1199**	**92**	**300**
***GM3CFS**	**21**	**105,792**	**433**	**26**	**88**

SICILY

IR9T	**21**	**456,980**	**1582**	**35**	**111**
			(Opr. IT9GSF)		
***IT9ORA**	**A**	**256,486**	**619**	**67**	**190**
*IT9TWC	*	155,344	481	76	190
*IT9VDQ	*	45,220	185	43	90
*IT9ZYT	*	15,330	105	36	69
***IT9AF**	**21**	**138,508**	**787**	**31**	**93**
***IT9XUC**	**14**	**320,320**	**1593**	**26**	**86**

SLOVAK REPUBLIC

OM5M	**A**	**4,157,721**	**3393**	**150**	**437**
			(Opr. OM3BH)		
OM3OM	*	801,964	1778	90	289
OM8FF	*	160,857	394	57	126
OM1GM	*	23,874	120	32	37
OM7M	**21**	**584,150**	**1520**	**38**	**137**
			(Opr. OM5RM)		
OM3NA	**14**	**633,435**	**1995**	**37**	**128**
OM5ZW	**1.8**	**117,771**	**837**	**23**	**88**
***OM8ON**	**A**	**743,442**	**773**	**111**	**323**
***OM3GB**	**"**	**631,449**	**799**	**87**	**264**
*OM4DN	*	425,505	1029	62	223
*OM7PY	*	376,390	685	69	214
*OM3BA	*	208,600	406	70	210
*OM1AF	*	160,512	578	42	150
*OM1ADM	*	32,830	239	38	96
*OM7AG	*	31,312	118	43	60
*OM3CAE	28	15,652	153	14	38
***OM7YC**	**21**	**49,344**	**208**	**26**	**70**
*OM4RM	*	41,076	175	24	60
***OM9TR**	**14**	**46,251**	**332**	**20**	**61**
			(Opr. OM3TB)		
*OM2TB	*	21,150	154	20	55
*OM2AW	*	4,750	49	18	32
*OM3TU	*	4,530	100	11	20
*OM3ROS	*	4,250	70	10	30
			(Opr. OM3CMM)		
***OM4WW**	**7**	**83,304**	**457**	**22**	**82**
*OM1AW	*	20,100	211	12	55
*OM3CDN	3.5	11,730	193	8	43
*OM3WQQ	1.8	16,268	152	4	30

SLOVENIA

S58A	**A**	**6,628,059**	**4541**	**168**	**559**
S55A	**"**	**1,246,076**	**1513**	**102**	**301**
S53MA	*	1,052,312	1489	96	302
S59L	*	469,200	948	82	190
S51NY	*	268,758	567	73	170
S51AY	**28**	**385,352**	**1129**	**35**	**116**
S5ØK	**21**	**461,448**	**1460**	**36**	**117**
S53M	**14**	**416,100**	**1645**	**33**	**113**
S57AL	**7**	**532,526**	**1879**	**32**	**117**
S57DX	**"**	**531,180**	**1856**	**32**	**124**
S52O	*	519,680	2088	32	108
S53O	*	345,780	1482	35	118
S5ØO	*	197,640	1006	28	92
S5ØA	**3.5**	**458,738**	**1793**	**34**	**117**
S51OI	*	132,090	1031	27	75
S5ØU	**1.8**	**134,784**	**1024**	**23**	**85**
S57M	*	71,040	794	15	65
***S59AA**	**A**	**2,595,303**	**2034**	**148**	**483**
***S57J**	**"**	**1,415,232**	**1383**	**119**	**367**
*S54X	*	936,100	1198	104	303
*S53FO	*	672,008	987	84	250
*S51WA	*	570,266	717	93	256
*S55WW	*	555,900	916	77	263
*S51T	*	211,536	591	52	182
*S53AU	*	177,240	411	59	151
*S53BM	*	165,568	459	51	148
*S51NM	*	79,200	410	32	100
*S57CQ	28	100	163	15	41
***S51TA**	**21**	**230,945**	**826**	**34**	**109**
*S59DBC	*	195,582	841	31	80
*S51MF	*	102,360	352	31	89
***S58AL**	**14**	**388,680**	**1357**	**35**	**129**
***S54A**	**7**	**217,800**	**835**	**32**	**118**
***S53F**	**"**	**175,934**	**780**	**25**	**96**
*S54W	*	86,652	478	28	88
***S52GO**	**3.5**	**78,624**	**652**	**20**	**76**
*S51RJ	*	63,684	597	16	71
*S54AC	*	39,785	437	15	58

SPAIN

EA3NY	**A**	**3,215,612**	**3226**	**132**	**389**
EA1FBU	**"**	**491,470**	**1314**	**65**	**180**
EA2BDS	**"**	**358,924**	**732**	**66**	**178**
EA5DCL	**"**	**164,161**	**536**	**50**	**117**
EA1BHR	*	127,050	382	50	104
EA1BAE	*	103,936	452	55	148
EA1OJ	*	75,600	203	52	116
EA7CA	*	73,524	230	50	82
EA1EXV	*	54,846	192	58	140
EA7HAB	*	38,212	193	34	48
EA1BXW	*	29,876	114	42	55
EA1CMP	*	6,240	51	28	32
EA5WU	**28**	**303,455**	**1014**	**32**	**105**
EA5TD	*	26,059	118	32	71
EA1JO	**21**	**133,301**	**456**	**33**	**104**
EA1FEL	*	79,705	568	23	72
***EA7TG**	**A**	**1,122,917**	**1105**	**115**	**376**
***EA2BNU**	**"**	**868,335**	**1435**	**73**	**232**
***EA4DRV**	**"**	**481,683**	**932**	**73**	**234**
***EA3BOW**	**"**	**352,185**	**775**	**68**	**197**
*EA7AJR	*	297,330	681	71	184
***EC5AEB**	**"**	**259,056**	**797**	**41**	**127**
*EA5DNO	*	223,296	526	52	140
*EA5DWS	*	215,600	590	61	135
*EA7MT	*	200,028	453	61	150
*EA7GXX	*	197,010	439	58	141
***EA1FD**	**"**	**182,965**	**474**	**61**	**154**
*EA5LA	*	116,290	308	45	100
*EA5ARC	*	112,217	385	52	109
*EA5AGW	*	90,650	321	44	131
*EA4ECF	*	67,308	210	49	93
*EA4ANN	*	36,874	200	40	63
*EA2CR	*	32,340	180	26	80
*EA7FZ	*	27,225	161	23	52
*EA4BT	*	15,048	114	25	51
*EA4BNQ	*	13,926	119	26	40
*EC3AKC	*	10,920	90	17	43
*EA5IL	*	6,300	38	25	38
*EA7BUU	*	4,982	32	15	38
*EA5NU	*	2,982	25	17	25
*EA4CIE	*	2,142	25	19	23
*EA4ABP	*	1,876	42	8	21
*EA1BID	*	1,769	23	14	15
*EA1DFP	*	567	11	10	11
*EA7AFD	*	100	35	9	13
*EA3AQO	*	100	38	26	32
***EA2AZ**	**28**	**45,276**	**287**	**24**	**60**
***EA7AKJ**	**"**	**44,714**	**268**	**21**	**58**
*EA7ASZ	*	26,426	161	24	49
*ED7OO	*	22,043	161	12	35
			(Opr. EA7OO)		
*EA4ATI	*	4,158	81	9	18
*EC3ACR	*	4,130	59	11	24
*EA3EHE	*	100	33	9	13
***EA5KK**	**21**	**124,806**	**655**	**30**	**92**
***EA7GYS**	**"**	**59,058**	**373**	**24**	**78**
*EC3AHO	*	3,550	189	13	37
*EA1EVR	*	2,772	54	7	14
*EA5WX	*	875	27	7	18
***EA3BCM**	**14**	**366,560**	**1248**	**35**	**110**
***EA4BL**	**"**	**93,104**	**685**	**26**	**62**
*EA1ND	*	47,742	355	16	57
*EA5AFH	"	495	11	4	11

SWEDEN

SM6NM	**A**	**735,680**	**903**	**98**	**320**
SK6AW	*	598,752	826	95	301
			(Opr. SM6DER)		
SM7EH	*	229,779	550	55	156
SM7GIB	*	19,074	91	36	66
SMØKV	**21**	**333,576**	**973**	**38**	**126**
SMØDRD	*	200,925	722	32	109
SM2DMU	**14**	**513,560**	**1736**	**37**	**111**
SM5RE	*	12,276	141	15	29
SMØKCO	**7**	**521,444**	**1821**	**35**	**119**
SM2VHD	*	53,040	653	19	59
SM5CEU	**3.5**	**110,848**	**563**	**27**	**101**
***SMØBDS**	**A**	**545,006**	**852**	**77**	**241**
***SM6BSK**	**"**	**513,540**	**832**	**76**	**241**
*SM5JBM	*	430,947	774	69	228
*SM4SX	*	423,232	744	70	202
*SM2KAL	*	326,268	671	81	243
*SM7BHM	*	319,325	774	58	207
*SM5CIL	*	241,120	382	54	220
			(Opr. SM7CIL)		
*SK3LH	*	240,538	1081	61	193
			(Opr. SM3WMV)		
*SM7BJW	*	164,901	471	50	159
*SM5VZY	*	62,700	436	40	110
*SM3WMU	*	59,800	314	36	94

*SM7BQX	*	45,387	248	38	85
*SM5COP	*	19,500	93	40	60
***SMØDZH**	**28**	**45,592**	**250**	**21**	**61**
*SM6JY	14	25,460	236	17	50
*SK2IV	*	17,766	280	12	35
		(Opr. SM2CDF)			
*SM3ARR	*	506	16	6	5
***SM3DXC**	**7**	**19,458**	**147**	**17**	**52**
*SM5AJV	3.5	8,580	147	9	43

SWITZERLAND

HB9KC	21	35,883	171	20	61
HB9FMD	**3.5**	**67,795**	**718**	**18**	**73**
***HB9ARF**	**A**	**910,459**	**1143**	**101**	**306**
*HB9CBR	*	290,924	560	68	189
*HB9QA	*	37,675	131	49	88
*HB9NL	*	32,224	149	39	67
***HB9HAW**	**7**	**65,720**	**330**	**20**	**86**
*HB9CPS	*	1,734	61	9	25

UKRAINE

EN1I	**A**	**2,343,785**	**2279**	**150**	**485**
		(Opr. US1ITU)			
UX7IA	**"**	**2,195,578**	**2302**	**128**	**410**
UX5UO	**"**	**2,089,798**	**2321**	**123**	**403**
UX1UA	*	1,535,990	1668	126	412
UTØU	*	1,366,284	1803	121	371
UT5UB	*	1,125,894	1228	113	349
UR5UW	*	1,121,444	1343	112	379
UX3ZW	*	799,176	906	101	325
UT3UZ	*	722,533	1228	113	330
UT4EK	*	701,499	1047	98	299
UR5QN	*	694,260	996	108	327
UR7QM	*	625,800	1185	83	267
UR5E	*	486,048	855	78	254
		(Opr. UR5EDX)			
UT5HP	*	128,832	222	80	164
UR4SXU	*	108,768	449	67	166
UU2JA	*	104,880	256	61	167
UX1KR	*	79,373	314	41	78
US7VL	*	69,915	177	56	121
UU2JZ	*	67,344	163	68	115
UU2JQ	*	64,436	147	72	109
UT4ZO	*	37,490	108	60	103
UT8AQ	*	7,344	73	10	41
UT4UWC	*	5,755	52	15	29
		(Opr. US-U-Ø9)			
UR6QS	*	1,235	37	9	10
UR7VA	**28**	**343,441**	**992**	**33**	**130**
US6L	*	203,904	845	29	99
UT1IA	*	198,144	734	34	110
UT7LA	*	24,864	157	21	53
UR3QT	**21**	**267,057**	**1255**	**37**	**120**
UT8IM	**"**	**236,979**	**1000**	**36**	**95**
US1E	*	45,990	1196	35	111
		(Opr. UT7EZ)			
UX3HA	*	39,970	282	19	51
US5WE	**14**	**498,432**	**1541**	**37**	**140**
US9Q	**"**	**307,965**	**1351**	**35**	**112**
		(Opr. US9QA)			
UY5DX	*	269,988	1001	32	117
UY5ZZ	**7**	**464,023**	**1703**	**33**	**118**
US2IR	**"**	**313,852**	**1149**	**35**	**119**
US2YW	*	275,064	1509	33	113
UR3IOB	*	73,700	420	21	79
UT5UGQ	*	156	8	6	7
US2IZ	**3.5**	**63,519**	**534**	**18**	**75**
UU3JM	*	42,742	467	14	57
UR5FEL	*	35,700	594	19	66
US5ELM	*	27,010	250	13	60
UYØZG	1.8	7,182	88	7	47
***UY8IF**	**A**	**916,180**	**1891**	**98**	**282**
***UT2UZ**	**"**	**722,624**	**812**	**105**	**343**
***UY1HY**	**"**	**644,360**	**829**	**119**	**326**
*UT4XU	*	585,095	868	89	276
*US3IZ	*	550,376	893	86	270
*UY2UZ	*	545,650	1025	85	265
*UTØH	*	485,488	992	81	223
*UX5EF	*	428,687	793	78	251
*UY3QW	*	218,152	553	67	201
*UR5WII	*	206,736	772	44	129
*UT2IW	*	188,616	393	71	161
*UR4MRT	*	169,128	394	56	205
*UT8IT	*	167,616	459	56	160
*UR3UJ	*	167,433	477	52	149
*UT2IO	*	164,728	446	57	179
*UR5BCJ	*	130,200	318	57	118
*UT4XX	*	81,792	287	44	84
*UY2IZ	*	73,248	214	53	115
*UR5EIT	*	55,444	190	40	100
*UT4UM	*	34,385	212	26	89
*UT5HA	*	32,976	112	54	90
*UR5ZRK	*	12,628	120	21	61
*UY5YA	*	5,750	57	16	30
***UX8IX**	**28**	**162,900**	**537**	**34**	**116**
*UT4PZ	*	67,303	271	27	80
*UR8RF	*	61,568	264	27	77
*UT5ECZ	*	2,850	52	9	21
***UR4QOS**	**21**	**68,600**	**340**	**27**	**73**
*UR5EPV	*	51,708	243	33	60
*UR5TAU	*	43,470	221	26	64
*UY5WA	*	36,375	272	19	56
*UR3PFM	*	3,348	264	27	84
***UT7EG**	**14**	**45,479**	**383**	**20**	**69**
*UT3IB	*	5,346	83	13	41
***UUØJM**	**3.5**	**123,250**	**978**	**26**	**99**

***UT7CC**	**"**	**107,507**	**814**	**21**	**79**
*UT3QW	*	78,204	613	20	78
*UT1FA	*	76,500	576	18	72
*US2WU	*	47,712	216	23	89
*UY2ZZ	*	4,182	94	7	34
***UXØHA**	**1.8**	**25,264**	**367**	**12**	**53**
*UU4JMG	*	7,030	581	18	77

WALES

GW3JXN	**A**	**974,850**	**1335**	**110**	**292**
GW3KDB	**"**	**973,488**	**1294**	**99**	**309**
GW8K	*	885,236	1670	78	263
GW3YDX	**28**	**726,193**	**1966**	**35**	**134**
GW3WVG	**"**	**511,932**	**1600**	**35**	**113**
***GW3NJW**	**A**	**370,645**	**663**	**74**	**219**
*GW3SYL	*	176,730	398	62	153
*GW3WWN	*	63,675	389	23	52
***GW4MVA**	**14**	**53,238**	**226**	**29**	**85**

YUGOSLAVIA

4N9BW	**A**	**5,016,810**	**4099**	**155**	**490**
		(Opr. YU7BW)			
YT1AD	*	876,256	1504	106	288
		(Opr. YU1DX)			
YU7AM	*	360,000	781	65	185
YU1OL	**28**	**352,132**	**1013**	**34**	**117**
YT1MP	*	113,148	395	28	95
4O6A	**21**	**589,842**	**2321**	**37**	**125**
		(Opr. YT6A)			
YU1KX	*	529,872	1630	37	129
YT7A	**14**	**749,394**	**2245**	**38**	**148**
YZ9A	*	646,209	2064	37	134
		(Opr. YU1NW)			
YU1ZZ	*	606,884	1988	38	135
YU7NU	**7**	**551,925**	**1774**	**35**	**130**
YT1BB	*	374,884	1707	35	114
YU1KR	**3.5**	**168,010**	**1215**	**22**	**84**
YZ6A	**1.8**	**78,866**	**826**	**18**	**76**
***YU7CB**	**A**	**2,025,342**	**1816**	**132**	**447**
*4N7CA	*	403,112	750	88	240
*YU7KM	*	211,404	515	63	174
*YU7FY	*	105,704	266	72	109
*YU7LS	*	90,396	282	54	108
***YU1HA**	**28**	**129,536**	**435**	**28**	**100**
*YU7SF	*	53,486	234	24	70
*YU1QW	*	46,330	218	27	55
***4N1FG**	**21**	**76,612**	**360**	**30**	**77**
*YU7YZ	*	63,155	343	23	62
***YZ7ED**	**7**	**162,265**	**746**	**29**	**86**
*YZ1V	*	91,887	684	23	86
		(Opr. YU1AAV)			
*YU1FG	*	74,205	446	21	76
*4N7A	*	51,216	427	19	78
		(Opr. YU7AJH)			
***YU1CC**	**3.5**	**86,102**	**678**	**19**	**79**
***YU1RA**	**1.8**	**28,535**	**470**	**8**	**57**

MARITIME MOBILE

***KC7JEF/MM**	**A**	**983,467**	**1191**	**71**	**218**

OCEANIA

AMERICAN SAMOA

KH8 /N5OLS	**A**	**2,889,842**	**2412**	**152**	**281**

AUSTRALIA

VK4XY	**28**	**521,577**	**1626**	**33**	**86**
VK4EMM	**14**	**153,408**	**550**	**28**	**74**
VK6VZ	**7**	**451,584**	**1435**	**32**	**96**
VK3IO	1.8	860	34	9	11
***VK2AYD**	**A**	**1,386,240**	**1651**	**105**	**199**
***VK6AJ**	**28**	**23,616**	**102**	**22**	**60**
*VK4IV	21	19,110	100	25	45
*VK4XW	*	2,592	28	13	23
***VK2APK**	**14**	**442,566**	**1243**	**33**	**105**
*VK4TT	*	70,110	290	24	58
*VK2EBP	*	41,514	154	28	74

BRUNEI

V8A	**7**	**952,416**	**2339**	**36**	**108**
		(Opr. JO1RUR)			

EASTERN KIRIBATI

T32IW	**A**	**212,940**	**695**	**59**	**71**

EAST MALAYSIA

9M6NA	**A**	**5,979,138**	**3737**	**171**	**390**
		(Opr. JE1JKL)			
9M6AAC	**"**	**4,844,320**	**3537**	**150**	**394**
		(Opr. DK3GI)			
9M8YY	**21**	**701,848**	**1609**	**36**	**115**
		(Opr. JR3WXA)			

GUAM

KH2/K4SXT	**1.8**	**39,678**	**278**	**21**	**30**

HAWAII

NH7A	**A**	**2,648,535**	**3077**	**124**	**193**
KH6/AI6V	**21**	**498,512**	**1608**	**33**	**79**
KH6CC	**1.8**	**47,545**	**429**	**18**	**19**

INDONESIA

YC0LOW	1.8	144	8	5	7
***YE3C**	**A**	**858,261**	**1467**	**76**	**143**
*YB5QZ	*	482,118	918	93	180
*YB4JIM	*	95,200	273	52	108
*YB1KOR	*	36,414	163	54	99
***YB9BON**	**28**	**52,756**	**210**	**30**	**79**
***YB2UU**	**21**	**186,258**	**806**	**30**	**81**

NEW CALEDONIA

TX8UFT	**A**	**920,535**	**1532**	**86**	**145**
***TX8FU**	**14**	**131,313**	**424**	**30**	**81**
			(Opr. FK8FU)		

NEW ZEALAND

ZL6QH	**A**	**2,555,024**	**2558**	**120**	**248**
			(Opr. ZL1AZE)		
*ZL1ANJ	A	17,920	129	34	36

NORTHERN MARIANAS

***NHØE**	**A**	**388,104**	**992**	**63**	**94**
***WHØV**	**28**	**349,561**	**1303**	**32**	**69**

PHILIPPINES

DU3NXE	**A**	**541,371**	**1145**	**76**	**105**
***DU1 /DL5ZAH**	**A**	**889,680**	**1261**	**94**	**170**
*DU1ODX	*	621,225	1093	81	144
***DU3RCM**	**14**	**221,936**	**866**	**29**	**68**

TONGA

***A35RK**	**A**	**388,040**	**661**	**85**	**133**

SOUTH AMERICA

ANTARCTICA

EM1LV	**A**	**479,320**	**793**	**81**	**149**

ARGENTINA

LU /OHØWW	**A**	**614,262**	**988**	**73**	**154**
LW1DX	*	389,008	1103	51	113
LU7DW	*	43,368	199	48	56
LU5GPL	*	33,784	127	42	61
LT1F	**28**	**1,824,312**	**3886**	**35**	**133**
			(Opr. LU5CW)		
LU4FPZ	**"**	**789,888**	**2593**	**32**	**104**
LU5FA	**21**	**350,578**	**1480**	**35**	**83**
LU1FAM	*	124,047	563	31	68
***L36E**	**A**	**1,279,854**	**1288**	**107**	**239**
*LU1EWL	*	470,877	788	77	132
*LU3DSI	*	7,488	53	25	27
***LU5WW**	**28**	**689,568**	**1908**	**28**	**104**
*LW7DX	*	200,556	1004	23	58
*LU1AEE	*	186,750	815	24	66
*LW9DKB	*	181,280	888	22	66
*LU1XSI	*	56,925	326	14	55
*LW3HAQ/D	*	22,401	236	18	39
*LU4FAK	*	4,495	53	14	17
***LU5FF**	**21**	**424,799**	**1188**	**36**	**113**
*L5ØV	*	208,936	947	29	62
*LU7AWP	*	199,210	775	31	79
*LU3EAQ	*	5,664	47	20	28
*LW2EU	7	18,720	121	22	50

ARUBA

P4ØE	**A**	**14,372,964**	**6853**	**176**	**553**
			(Opr. CT1BOH)		
P4ØW	**"**	**12,108,798**	**6279**	**159**	**543**
			(Opr. W2GD)		

BOLIVIA

CP6AA	**A**	**415,480**	**1029**	**60**	**110**

BRAZIL

PY2GG	A	40,002	211	34	79
PX2A	*	9,243	68	35	44
			(Opr. PY2KP)		
PY2KQ	*	3,008	46	19	28
PY2NFE	*	2,135	51	25	36
ZW5B	**28**	**1,991,895**	**3810**	**37**	**148**
			(Opr. K5ZD)		
ZY2DX	**"**	**838,532**	**2005**	**36**	**128**
			(Opr. PY2QE)		
PP1CZ	*	62,050	310	20	53
ZV5A	**21**	**833,671**	**2299**	**35**	**116**
			(Opr. PY1KN)		
***PU1KDR**	**A**	**1,013,504**	**1486**	**79**	**177**
***PY2NY**	**"**	**723,841**	**1003**	**85**	**186**
*PY1KS	*	677,625	792	119	256
*PY5BLG	*	528,528	873	67	141
*PY2XE	*	349,272	663	57	139
*ZW2Z	*	295,856	619	54	122
			(Opr. PY2ZI)		
*PP7JR	*	129,870	339	55	130
*PY2MNL	*	114,342	252	60	117
*PP7CI	*	101,150	222	56	114
*ZW2F	*	58,322	215	43	78
			(Opr. PY2ORF)		
*PY4MBJ	*	51,062	180	44	77

*PP7CW	*	44,330	148	41	69
*PY2OJD	*	11,718	97	40	53
*PY2NZR	*	10,165	188	20	58
*ZZ4W	*	7,353	52	23	35
*PY2OZF	*	4,879	45	22	19
*PR2M	28	589	19	10	9
*PY2EL	21	19,136	232	22	30
*PY3FBI	*	11,072	224	15	17
*PR2W	*	9,381	113	19	34
			(Opr. PT2AW)		
*PY4ZF	*	6,191	55	19	22
*PY2WDM	*	1,540	23	14	14
***PR7FB**	**14**	**116,676**	**323**	**34**	**92**
*PS7ZZ	*	17,784	103	24	52
*PY3JRG	*	16,821	199	23	66
*PY1BLL	*	9,063	60	18	29
*PY2EYE	*	1,917	25	12	15
***PU2WMW7**		**28,046**	**133**	**21**	**53**
*PY2IQ	*	11,211	104	9	28
*ZZ3Z	*	304	31	8	8

CHILE

XR3Z	**A**	**347,956**	**776**	**65**	**107**
		(Opr. CE3/NE4F)			
***CE3AA**	**A**	**735,715**	**1090**	**89**	**180**
*CE6TBN	*	784	107	27	29

COLOMBIA

HK6KKK	**A**	**396,952**	**917**	**66**	**170**
HK5QGX	*	8,820	72	21	21
***HJ1RRL**	**A**	**536,544**	**1535**	**50**	**88**
*HJ3PXA	*	5,025	47	31	44

ECUADOR

HC2SL	**28**	**837,774**	**2404**	**29**	**97**

GALAPAGOS ISLANDS

HC8N	**A**	**12,971,803**	**6661**	**171**	**518**
			(Opr. N5KO)		

SURINAME

PZ5JR	**A**	**6,731,410**	**4644**	**141**	**377**
			(Opr. OHØXX)		

TRINIDAD & TOBAGO

9Y4VU	**21**	**1,222,485**	**2774**	**36**	**119**

URUGUAY

CX5X	**21**	**935,375**	**2005**	**39**	**136**
			(Opr. CX6VM)		
CX7BY	*	503,792	1310	36	112
***CX5AO**	**28**	**887,556**	**2206**	**33**	**115**
***CX9AU**	**14**	**387,985**	**1271**	**34**	**93**

VENEZUELA

*YV7QP	28	100	167	18	41
***YY4GLD**	**21**	**227,256**	**1077**	**28**	**74**

QRP

HA2SX	**A**	**1,002,822**	**1253**	**98**	**323**
N6MU	**"**	**857,395**	**798**	**119**	**266**
LY2FE	**"**	**795,874**	**1243**	**86**	**297**
N1TM	**"**	**701,679**	**722**	**87**	**276**
SM3CCT	**"**	**666,050**	**1076**	**78**	**268**
K1RC	**"**	**659,880**	**692**	**96**	**280**
W3ZZ	**"**	**628,304**	**683**	**100**	**267**
N7IR	**"**	**569,856**	**626**	**108**	**228**
NØKE/KH6	**"**	**532,575**	**754**	**105**	**158**
JR4DAH	**"**	**528,363**	**694**	**102**	**195**
DL3KVR	**"**	**525,358**	**839**	**84**	**263**
OE2S	**"**	**507,000**	**933**	**76**	**249**
			(Opr. OE2VEL)		
KV8S	**"**	**503,750**	**559**	**84**	**241**
YU1LM	**"**	**500,148**	**1084**	**68**	**229**
BMØQRP	**"**	**484,330**	**1260**	**83**	**155**
			(Opr. BV3FG)		
IØZUT	**"**	**452,403**	**742**	**73**	**228**
GØOGN	**"**	**446,879**	**846**	**63**	**208**
N9CIQ	**"**	**383,052**	**507**	**74**	**200**
HA7YS	*	340,901	715	71	209
F5NZY	**"**	**318,024**	**796**	**61**	**191**
UR9MM	**"**	**304,370**	**650**	**75**	**237**
VE7CFD	**"**	**298,908**	**882**	**68**	**103**
			(Opr. VE7CQK)		
I1BAY	*	296,460	829	70	235
WA3NKO	*	292,950	429	69	201
OK2PP	**"**	**271,776**	**807**	**69**	**229**
EA7AAW	**"**	**241,864**	**603**	**52**	**144**
PAØADT	**"**	**236,470**	**568**	**59**	**155**
UAØKCL/3	**"**	**227,745**	**400**	**63**	**178**
7K4QOK	**"**	**212,135**	**415**	**71**	**132**
			(Opr. JR2BNF)		
S59D	**"**	**204,732**	**656**	**70**	**212**
UA3AD	*	204,216	460	71	183
AA1CA	*	203,058	357	73	188
G4FDC	*	172,776	416	52	132
K3WWP	*	160,800	293	51	150
UA9SG	**"**	**156,620**	**340**	**62**	**143**
DK4CU	**"**	**143,000**	**450**	**49**	**151**
SM5DQ	*	139,968	357	56	187
UA4YJ	*	133,536	361	54	175

9A2EY	**"**	**124,758**	**505**	**38**	**136**
YO4AAC	**"**	**118,980**	**392**	**41**	**139**
KRØI	**"**	**117,392**	**246**	**59**	**117**
UT5UJY	*	115,813	469	44	135
DJ3GE	*	109,218	340	46	121
DH2UL	*	102,243	322	46	127
ON7CC	**"**	**98,638**	**358**	**39**	**110**
DL4XU	*	82,360	321	42	100
N5TW	**"**	**82,264**	**316**	**75**	**151**
RW3VM	*	80,017	268	42	119
DL1LAW	*	77,910	300	39	108
DK6AJ	*	74,698	350	54	115
OH6FW	**"**	**62,650**	**295**	**42**	**133**
JA5CDL	**"**	**60,900**	**194**	**60**	**80**
US8UA	*	57,280	214	39	121
OK1AIJ	*	57,112	319	28	90
KH6 /WB6FZH	*	57,057	210	47	44
NØUR	*	52,538	169	23	86
HB9XY	**"**	**52,514**	**271**	**30**	**91**
SP5FKW	**"**	**50,076**	**216**	**37**	**79**
K4GEL	**"**	**42,291**	**138**	**33**	**78**
LU5DYV	**"**	**42,192**	**240**	**32**	**40**
NQ7X	*	39,000	162	50	75
NM1K	*	35,754	114	38	80
US9PA	*	33,062	184	33	89
VE2ABO	*	29,988	135	35	63
KL7TS	**"**	**25,599**	**145**	**28**	**41**
NØQT	*	24,860	104	49	61
GØKZO	*	24,516	137	34	74
UT5IZ	*	23,349	216	36	93
AF9J	*	22,944	101	37	59
DJ5QK	*	22,791	213	26	81
AA3GM	*	21,525	130	45	60
K5OI	*	19,998	128	43	56
SP4CQU	*	18,357	100	33	54
OK1DMP	*	17,538	95	29	50
CT1ETT	**"**	**16,745**	**137**	**23**	**62**
DL1HTX	*	13,680	144	25	70
K6MI	*	8,330	59	33	37
JN2FSE	*	7,434	59	25	38
PAØRBO	*	5,626	58	15	43
DL2PY	*	5,610	60	15	29
OM3CUG	*	5,400	40	24	30
DL2TM	*	4,446	38	19	20
WO7T	*	3,024	29	15	21
EC5ALP	*	2,700	94	12	38
F5IYJ	*	255	21	7	8
KK7QX	*	100	48	21	23
GØTDX	**28**	**104,300**	**458**	**25**	**75**
W9JUV	**"**	**81,060**	**269**	**25**	**80**
JA2XI	**"**	**73,332**	**281**	**29**	**68**
HAØGK	**"**	**56,880**	**274**	**25**	**54**
2EØAOK	**"**	**52,890**	**284**	**23**	**63**
EA2CAR	**"**	**44,919**	**238**	**28**	**65**
JG2LGM	*	42,739	208	27	52
PY2TNT	**"**	**32,548**	**230**	**17**	**30**
K7MM	**"**	**27,216**	**146**	**23**	**49**
WT3W	**"**	**20,736**	**107**	**21**	**51**
W6ZH	**"**	**18,894**	**122**	**23**	**44**
UN6G	*	8,064	91	7	29
JL3SBE	*	6,380	58	20	24
HA8DL	*	5,110	65	13	22
JR3NDZ/1	*	3,780	48	14	16
LU1FNH	**21**	**147,204**	**672**	**25**	**69**
LU6HI	**"**	**144,552**	**491**	**33**	**81**
OH7NVU	**"**	**121,176**	**529**	**27**	**81**
US4EX	**"**	**106,424**	**495**	**28**	**78**
9A3GU	**"**	**74,970**	**336**	**25**	**77**
W4DEC	**"**	**63,750**	**251**	**23**	**79**
ES1CR	**"**	**55,648**	**299**	**25**	**69**
DL8TWA	**"**	**54,684**	**300**	**24**	**60**
			(Opr. K3TW)		
JR1NKN/2	**"**	**44,311**	**249**	**23**	**50**
OH2YL	*	31,936	213	17	47
K8UCL	**"**	**28,864**	**127**	**23**	**59**
SP6JOE	**"**	**21,528**	**172**	**18**	**51**
LY2TX	**"**	**20,769**	**189**	**20**	**49**
SP5MNJ/7	*	13,802	87	18	49
SP3FPF	*	11,682	77	19	47
I4KRF	**"**	**9,417**	**131**	**11**	**32**
JM1XTB	*	5,256	57	16	20
JJ4IYG	*	5,022	60	15	16
YO4ATW	*	3,128	50	9	14
2UØARE	*	2,492	74	8	20
JH3HYT	*	1,914	25	16	17
JH1HTK	*	1,060	25	10	10
HB9LDO	*	924	22	6	15
SM4KL	*	3	1	1	1
ES1CW	**14**	**123,340**	**458**	**34**	**106**
DF4ZL	**"**	**98,520**	**436**	**31**	**89**
VE3XL	**"**	**95,056**	**397**	**24**	**80**
JA2HUN	**"**	**43,990**	**205**	**23**	**60**
GØVQR/P	**"**	**13,301**	**164**	**12**	**35**
DL4OBJ	*	12,243	147	13	40
NP4FW	**"**	**10,906**	**120**	**11**	**30**
YO4CSL	*	5,150	89	10	40
RV9CLF	*	2,288	62	7	19
DL1DQY	*	752	17	8	8
SP2HPD	**7**	**46,458**	**436**	**17**	**70**
KH6 /W8QZA	**"**	**39,616**	**216**	**27**	**37**
JA6GCE	**"**	**36,360**	**186**	**24**	**48**
DL6MHW	**"**	**21,775**	**205**	**13**	**52**
RW3AX	**"**	**21,681**	**201**	**16**	**57**
NC6M	**"**	**17,537**	**104**	**24**	**47**
			(Opr. W6REC)		

RV6AF	*	17,490	153	15	51
G3VPW	**"**	**15,300**	**167**	**10**	**41**
UR4UU	**"**	**10,431**	**128**	**13**	**44**
SP9XCJ	*	8,614	120	11	32
ND8MS	*	2,530	50	13	33
				(Opr. NH7C)	
HA8LUH	**3.5**	**68,076**	**589**	**17**	**76**
UX3M	**"**	**37,206**	**356**	**13**	**65**
				(Opr. UR3MP)	
SP4GFG	**"**	**32,760**	**396**	**13**	**57**
RU3WW	**"**	**27,648**	**316**	**14**	**58**
UA3XAC	**"**	**16,929**	**308**	**8**	**49**
OM3TKR	**"**	**13,320**	**286**	**5**	**40**
OK2KRT	**"**	**8,160**	**193**	**5**	**35**
UT5UQV	*	3,995	93	8	39
JA1AA	*	1,104	31	11	13
HA9RA	*	266	21	3	13
OM2FY	**1.8**	**21,600**	**376**	**9**	**51**
DJ3RA	**"**	**15,904**	**262**	**8**	**48**
RA3FO	**"**	**13,110**	**201**	**9**	**48**
OMØTT	**"**	**6,837**	**161**	**8**	**35**

ASSISTED

NORTH AMERICA

UNITED STATES

KI1G	**A**	**6,477,468**	**3185**	**162**	**570**
K1TI	**"**	**4,649,790**	**2455**	**157**	**553**
K5MA/1	**"**	**3,961,105**	**2488**	**136**	**441**
K1YR	*	3,013,114	1967	139	439
W1NG	*	3,000,448	1576	160	544
W1GD	*	2,974,140	1696	140	480
KZ1M	*	2,145,798	1713	110	364
KA1CLX	*	1,637,185	1192	121	394
KS1L	*	1,569,893	986	140	473
N6RFM/1	*	1,416,584	1025	118	396
N1DG	*	1,330,369	929	133	430
W1BIH	*	1,317,593	894	140	449
K1VV	*	1,307,922	1142	97	302
W1CSM	*	1,289,834	1003	118	376
K1AJ	*	1,188,768	1069	96	331
W1HR	*	1,136,678	959	100	367
W1AX	*	1,119,560	800	125	395
W1RZF	*	1,100,268	1060	113	355
AA1V	*	1,094,608	743	138	454
W1RH	*	968,275	962	93	292
W1JR	*	918,592	707	133	363
W1CU	*	901,310	700	115	352
K1DC	*	762,439	683	108	323
K1NU	*	742,144	648	101	345
K1RV	*	664,306	693	95	291
K1MY	*	561,450	559	118	357
W1QK	*	478,160	537	95	249
NQ1K	*	472,056	453	106	302
N1KWF	*	463,570	584	81	221
K1AE	*	455,126	468	112	301
K1TH	*	440,412	588	78	243
AK1N	*	431,340	474	91	225
KT1M	*	408,807	548	78	231
K1JN	*	401,330	485	89	246
N1MD	*	330,435	382	76	239
NZ1Q	*	305,316	439	96	300
K1EO	*	246,561	513	99	314
K1ZO	*	223,020	364	76	194
N1SP	*	218,155	306	63	208
W1TO	*	197,446	286	76	193
K1EP	*	195,104	316	71	197
K1TR	*	169,650	273	66	159
NM1W	*	114,030	247	58	152
N1TB	*	82,386	384	55	144
WF1B	*	81,356	195	53	119
K1KU	*	75,240	204	53	145
KE1KD	*	70,680	168	64	122
N1KO	*	66,528	220	46	108
K1ST	*	60,021	147	59	112
N1AO	*	51,510	179	60	142
N1NQD	*	42,704	110	48	109
K1BW	*	39,468	93	59	84
WV1M	*	26,780	96	44	86
K1IR	*	26,144	128	20	56
W1AY	*	11,016	120	30	78
K2NG	**A**	**5,951,043**	**2659**	**183**	**668**
K2TW	**"**	**5,685,240**	**2774**	**156**	**574**
W2UP	**"**	**4,695,670**	**2523**	**152**	**534**
K5KG/2	**"**	**3,780,392**	**1927**	**155**	**567**
K2SX	*	3,576,780	2192	163	478
K2XA	*	3,473,550	1919	152	523
K2NJ	*	3,007,342	1739	139	472
K2RD	*	2,995,806	1753	142	485
AB2E	*	2,775,864	1625	145	506
K2ONP	*	2,643,511	1717	131	428
N2TX	*	2,035,135	1353	156	529
N2ZX	*	1,962,912	1388	122	386
KF2O	*	1,794,520	997	158	522
N2TK	*	1,106,830	622	161	572
N2CQ	*	901,476	713	119	372
K2XF	*	793,104	763	103	300
K2PS	*	776,620	684	100	312
KD2TT	*	727,320	671	97	343
K2OWE	*	711,619	750	105	334
N2JT	*	621,070	627	85	274
N2FF	*	477,576	463	97	305
WK2H	*	464,156	712	72	202
K2EP	*	443,118	499	80	258
N2VW	*	277,200	342	103	247
NA2M	*	217,160	308	85	220
K2BX	*	191,250	361	61	164
W2LK	*	139,564	361	39	109
AA2WN	*	116,580	276	84	206
WB2WPM	*	112,404	200	58	146
KA2AEV	*	59,410	174	33	97
N2KJM	*	15,168	74	26	53
K3WW	**A**	**7,963,764**	**3764**	**168**	**601**
N3AD	**"**	**4,964,695**	**2549**	**156**	**563**
K3NZ	**"**	**3,586,593**	**1775**	**166**	**595**
N3RR	*	2,373,065	1356	158	497
NN3Q	*	2,369,928	1524	132	441
K3KO	*	2,022,806	1373	134	413
K3MD	*	1,941,710	1446	137	425
K3SV	*	1,914,075	1277	113	430
W3OV	*	1,774,125	1382	116	359
K3ND	*	1,743,328	1024	153	475
N3DL	*	1,452,318	862	148	539
K3KY	*	1,451,790	1031	126	387
K3OO	*	1,435,700	1060	124	366
K3PP	*	1,364,769	897	128	453
K3SA	*	1,203,840	916	112	368
K3JGJ	*	1,193,696	900	129	382
W3HVQ	*	1,167,424	1045	120	344
W3GK	*	1,108,080	857	106	350
K3CP	*	964,910	755	107	363
N3ZA	*	940,056	697	138	414
W3AP	*	750,321	853	124	305
K3DI	*	715,002	612	111	332
WT3P	*	647,622	595	90	312
K3AR	*	593,145	518	103	338
W3KV	*	583,275	551	104	281
W3SB	*	509,220	520	86	283
N3MLV	*	499,626	491	109	260
KB3X	*	495,430	495	107	263
KE3VN	*	243,991	578	108	343
WF3T	*	237,533	487	47	132
KU3X	*	213,044	339	64	177
K3NL	*	95,216	196	47	129
KQ3F	*	72,320	168	44	116
N3QQ	*	58,437	160	47	104
W3TMZ	**7**	**47,120**	**145**	**29**	**95**
K3JJG	1.8	3,626	56	11	26
N4XR	**A**	**2,794,342**	**1776**	**135**	**431**
N4VZ	**"**	**1,957,248**	**1218**	**145**	**431**
N4ZJ	*	1,727,354	1194	123	419
W8ZF/4	*	1,406,444	973	143	416
N4DW	*	1,134,980	887	114	370
K4PB	*	921,456	713	124	350
NT4D	*	703,545	627	126	319
AA4R	*	684,740	546	130	381
K4MA	*	534,660	563	107	273
N1CC/4	*	319,335	396	83	222
N4GN	*	274,176	329	91	215
W4NZC	*	240,198	323	77	189
K4NR	*	144,926	244	70	163
W4WNT	*	34,071	103	45	78
W4SI	*	24,900	104	28	72
KUØC/4	**21**	**344,129**	**1036**	**37**	**114**
W4DR	**1.8**	**25,481**	**115**	**21**	**62**
N5JR	**A**	**1,928,838**	**1258**	**138**	**425**
KR5V	**"**	**1,238,076**	**790**	**151**	**427**
WQ5W	*	142,923	286	58	155
K5HDU	*	127,050	284	64	146
NA4M/5	*	124,488	220	75	159
N3BB/5	*	85,020	160	78	117
K5AM	*	64,030	153	70	120
KB5U	*	24,054	96	44	70
N5KB	*	16,443	104	27	60
KD6WW	**A**	**2,797,112**	**1589**	**163**	**465**
K7BV/6	**"**	**2,350,803**	**1639**	**161**	**392**
K6RO	*	1,286,936	1039	133	336
K6CT	*	923,991	749	127	352
W6OAT	*	493,641	430	139	284
K6CU	*	190,152	302	100	178
AJ6V	*	79,937	184	71	98
NF6R	*	73,753	203	51	80
AK6L	*	39,843	152	66	105
K6JG	*	21,012	77	42	60
K6CTA	*	20,516	90	38	54
KA6BIM	**28**	**108,609**	**371**	**28**	**95**
N6ND	**21**	**400,320**	**1002**	**37**	**123**
N7CW	**A**	**1,318,050**	**988**	**154**	**368**
K9JF/7	**"**	**1,263,693**	**1041**	**142**	**329**
W7OM	*	933,644	959	132	272
K7ABV	*	792,688	690	124	288
K7GJ	*	591,822	629	114	252
K7WP	*	377,300	450	119	231
W7NN	*	375,287	442	101	212
K7BG	*	195,138	270	96	197
W7UB	*	94,956	282	65	99
W7CT	**21**	**169,056**	**427**	**33**	**111**
W8JGU	**A**	**1,870,911**	**1266**	**131**	**382**
ND5S/8	**"**	**1,185,153**	**783**	**144**	**443**
NO8C	*	454,770	504	95	231
AA8TC	*	363,132	429	101	295
W8PT	*	179,775	330	77	178
K8PYD	*	132,440	230	80	140
AG8L	*	20,412	78	39	69
K8EI	*	14,288	80	29	47
AA8U	**21**	**414,951**	**1009**	**34**	**123**
WA8WV	3.5	11,505	75	14	45
N9UA	**A**	**1,525,898**	**1210**	**124**	**349**
NO9Z	**"**	**1,005,204**	**964**	**109**	**313**
WO9S	*	645,123	645	102	257
N9FH	*	593,325	602	100	305
N9XX	*	482,667	505	101	248
N9CK	*	381,744	520	75	189
W9RN	*	381,282	412	105	222
W9ILY	*	356,820	414	90	223
K9NI	*	283,751	406	76	223
KA9FOX	*	163,098	275	87	159
K9OSH	*	139,682	241	63	148
N9AU	**7**	**229,788**	**566**	**35**	**121**
WØTM	**A**	**1,714,895**	**1365**	**137**	**318**
WØWP	**"**	**1,369,197**	**1011**	**128**	**343**
NØAT	*	637,886	626	110	284
NSØB	*	290,136	372	102	212
KØIL	*	90,896	184	70	138
KZØC	*	32,656	112	59	98

CANADA

VE1RX	21	30,388	175	19	52
VA3DX	**7**	**201,856**	**561**	**34**	**118**
VE6LB	1.8	5,592	124	10	14

PUERTO RICO

WP3R	**A**	**5,495,235**	**4362**	**139**	**406**
				(Opr. DL2CC)	

U.S. VIRGIN ISLANDS

KP2AD	**A**	**3,562,181**	**3076**	**124**	**387**

ASIA

ASIATIC RUSSIA

RAØFF	**A**	**1,285,818**	**1293**	**146**	**300**

JAPAN

JH8SLS	**A**	**1,313,760**	**1221**	**141**	**279**
JA9XBW	**"**	**1,219,810**	**1035**	**140**	**306**
JE3HDD	**"**	**817,663**	**760**	**131**	**276**
JK2VOC	**"**	**461,760**	**716**	**116**	**204**
JH8MWW	*	376,970	554	91	162
JH7AJD/1	*	269,825	430	96	155
JA7SUR	*	269,618	458	92	134
JAØBMS/1	*	195,926	438	55	108
JJ6TYG	*	188,748	302	97	155
JAØBJY	*	156,022	320	71	110
JO1VRL	*	138,990	272	85	120
JR4QZH	*	90,131	200	67	126
JR3PZW/1	*	61,910	149	79	126
JH1FSF	**28**	**204,930**	**586**	**34**	**104**
JH6WHN	*	20,493	126	27	54
JQ1NGT	14	21,528	116	24	45
JA1KVT	**7**	**43,788**	**205**	**25**	**57**
JH1BBT	**3.5**	**27,448**	**148**	**25**	**48**

EUROPE

ALAND ISLANDS

OHØJJS	**21**	**716,520**	**2122**	**37**	**131**
				(Opr. OH6LI)	
OHØJJS	**3.5**	**173,850**	**1408**	**25**	**89**
				(Opr. OH4JLV)	

AUSTRIA

OE1TKW	A	24,047	117	49	90

CROATIA

9A3ZG	A	71,258	253	49	109

CZECH REPUBLIC

OK2FD	**A**	**2,681,000**	**1952**	**160**	**540**
OL6X	**"**	**1,547,635**	**1889**	**129**	**356**
				(Opr. OK1DIG)	
OK1FDY	*	1,411,254	1741	107	374
OK1DXW	*	397,769	727	78	233
OK1DWC	*	278,080	463	106	246
OK1DXI	*	53,360	218	38	77
OK1FPG	**28**	**35,442**	**155**	**26**	**73**

ENGLAND

M8Z	**A**	**3,295,396**	**3184**	**126**	**382**
				(Opr. G3VHB)	
G3RTU	*	48,506	244	38	120

EUROPEAN RUSSIA

RZ3BW	**A**	**4,642,688**	**3559**	**162**	**574**
RZ3AZ	**"**	**2,504,584**	**2324**	**148**	**526**
UA1QV	*	1,300,455	1616	118	395
UA1RG	*	100	93	31	53

FINLAND

OH2VZ	**A**	**292,000**	**549**	**75**	**217**
OH2LU	*	201,760	475	52	156
OH3BU	**3.5**	**65,637**	**547**	**18**	**81**
OH2BO	**1.8**	**23,205**	**162**	**20**	**71**

FRANCE

F6FII	**A**	**660,672**	**1075**	**78**	**255**

GERMANY

DF3CB	**A**	**3,640,994**	**2123**	**172**	**570**
DL7ON	**"**	**2,424,840**	**1981**	**162**	**498**
DL2ZAE	*	1,070,415	1645	93	312
DL6NCY	*	1,008,450	1062	117	369
DJ9IE	*	866,484	1064	104	348
DJ5BV	*	857,282	948	125	374
DJ9MH	*	835,758	1006	115	354
DL6KVA	*	294,100	319	120	220
DL1QW	*	189,996	434	72	212
DF6QV	*	161,728	384	61	163
DK9IP	*	151,536	267	76	170
DL4MFP	*	126,246	372	51	108
DF2UU	*	73,485	140	75	132
DF8MW	*	53,040	238	52	118
DL7BY	**28**	**142,245**	**447**	**33**	**112**
DL1LH	**21**	**273,300**	**841**	**35**	**115**
DJ6LV	**3.5**	**69,120**	**507**	**16**	**74**

HUNGARY

HAØHW	**A**	**600,122**	**883**	**98**	**284**

ITALY

IK5TSS	**A**	**1,133,902**	**1257**	**99**	**308**
IKØHBN	**"**	**938,598**	**922**	**125**	**378**
IK3SCB	*	140,418	392	54	120
IK3QAR	**28**	**250,952**	**757**	**35**	**117**
I4IKW	**7**	**722,736**	**2017**	**36**	**132**

LITHUANIA

LY2OX	**21**	**365,904**	**1183**	**34**	**120**

MACEDONIA

Z31JA	**A**	**2,271,840**	**2755**	**119**	**361**
Z31GX	**"**	**2,076,624**	**2435**	**119**	**394**

NETHERLANDS

PA3GDR	**28**	**85,300**	**439**	**26**	**74**

NORWAY

LA9GX	**14**	**761,200**	**2186**	**38**	**138**

POLAND

SP9LAS	**A**	**152,368**	**320**	**62**	**152**
SP3FAR	*	36,500	126	52	94

ROMANIA

YO2LDE	A	30,140	96	54	83

SLOVENIA

S56A	**A**	**1,977,570**	**1507**	**144**	**486**
S53R	**"**	**1,130,714**	**1087**	**141**	**413**
S58MU	*	223,944	483	68	190
S57IIO	**3.5**	**28,140**	**339**	**11**	**59**

SPAIN

EA7AGW	**A**	**1,011,172**	**1526**	**93**	**286**
EA3BHK	*	299,115	432	103	242
EA3AEK	14	31,525	259	25	72

SWEDEN

SM3EVR	**A**	**2,450,682**	**1732**	**164**	**538**
SM3PZG	21	537,795	1567	38	133

SWITZERLAND

HB9FAP	**A**	**806,174**	**1151**	**105**	**257**
HB5OK	*	342,768	1064	52	170

UKRAINE

UT5UGR	**A**	**3,235,392**	**3202**	**144**	**512**

YUGOSLAVIA

YZ7AA	**A**	**2,798,640**	**2700**	**142**	**443**
YTØA	**3.5**	**309,757**	**1493**	**32**	**105**
				(Opr. YT7AO)	

OCEANIA

AUSTRALIA

VK5GN	**A**	**1,090,795**	**1662**	**88**	**181**

GUAM

KH2/N2NL	**A**	**5,406,660**	**3991**	**154**	**336**
KH2D	**28**	**346,737**	**1022**	**36**	**87**

SOUTH AMERICA

ARGENTINA

LU1APG	28	51,060	389	23	51
LU7EAR	**21**	**94,636**	**338**	**32**	**86**

BRAZIL

ZZ2Z	**A**	**810,255**	**1203**	**81**	**204**
				(Opr. PY2YP)	
PS2E	*	220,206	575	48	99
				(Opr. PY2GX)	
PT2HO	*	29,256	109	46	60

CHILE

XR1X	**A**	**1,655,365**	**2226**	**106**	**249**

MULTI-OPERATOR

SINGLE TRANSMITTER

NORTH AMERICA

UNITED STATES

K1AR	**12,063,114**	**5074**	**181**	**701**
K1ZZ	**8,930,278**	**3724**	**180**	**674**
N1AU	1,396,564	1254	104	324
W1NR	1,053,290	742	143	431
KA1GJ	601,902	858	78	279
W1SRG	367,525	512	71	234
N2NU	**9,313,019**	**4053**	**182**	**675**
AA2FB	**5,079,408**	**2680**	**154**	**558**
K2XR	3,541,626	2264	157	525
W2RE	3,188,970	2146	144	491
W6XR/2	2,900,550	2073	156	454
K2TE	2,858,834	1628	146	507
W2CG	2,207,238	1350	148	483
N2LBR	1,314,402	998	109	365
N2SS	534,520	493	106	309
AE2F	308,698	434	92	311
W2SEX	58,212	137	47	107
N3RS	**9,681,880**	**4222**	**183**	**677**
K3TUP	**5,143,752**	**2828**	**155**	**563**
K3PH	3,007,092	1777	145	482
N3OC	2,872,653	1795	141	468
NE3F	1,549,104	1510	131	416
AA3JU	1,396,500	1289	105	395
NY3M	453,963	476	98	291
WR3L	279,708	685	34	122
N4RV	**3,374,752**	**2014**	**147**	**500**
W4PRO	1,371,573	1035	125	406
KQ4QM	818,448	683	119	353
WXØB/5	**5,781,600**	**2978**	**179**	**624**
K5MDX	2,118,711	1659	126	371
KG6OK	**2,026,525**	**1719**	**143**	**372**
K6ANP	1,207,650	986	144	341
W7VJ	**2,557,856**	**1865**	**152**	**380**
W7LT	1,224,671	1396	116	255
K7ON	486,528	588	108	228
K8AZ	**9,259,470**	**4164**	**179**	**567**
K8LX	**6,701,035**	**3297**	**175**	**628**
N8RA	4,061,808	2456	137	466
W8ZA	3,166,164	1857	156	510
W9JA	**5,123,928**	**2975**	**173**	**603**
WN9O	**1,347,570**	**996**	**153**	**477**
K9KJ	1,055,250	1005	121	329
NØNI	**5,590,850**	**2971**	**180**	**595**
KVØQ	**4,974,696**	**3039**	**171**	**477**
NØIJ	2,753,388	1926	140	421
KØZM	1,019,655	864	110	305
NØLM	262,440	467	78	192
KBØVVT	23,040	96	47	73

ALASKA

KL7Y	**8,758,280**	**5704**	**177**	**454**

CANADA

VE6SV	**3,293,024**	**3411**	**135**	**353**
VE6AO	497,466	1051	91	170

AFRICA

CAPE VERDE

D44BC	**7,453,420**	**5098**	**131**	**395**

CHAGOS ISLANDS

VQ9IO	**792,448**	**1007**	**90**	**238**

MADEIRA ISLANDS

CT3FN	**3,069,374**	**2832**	**103**	**315**

ASIA

ASIATIC TURKEY

TA4/DL5YM	**2,158,650**	**2277**	**86**	**283**

ASIATIC RUSSIA

RZ9AZA	**6,681,460**	**3834**	**164**	**576**
RK9CWW	**6,575,859**	**3213**	**172**	**599**
RK9AWN	4,528,160	2922	145	477
RK9KWI	1,951,190	1797	107	303
RK9CXM	1,519,890	1471	109	326

RY9C	1,177,813	3391	152	485
UA9OXC	267,716	705	77	177
RKØSXF	**1,087,016**	**1197**	**110**	**282**

INDIA

VU2WAP	**3,408,819**	**3478**	**130**	**359**

JAPAN

JH7PKU	**5,405,400**	**3239**	**170**	**460**
JR1ZTT	**4,343,125**	**2827**	**172**	**453**
JA2ZJW	**1,300,725**	**1414**	**120**	**249**
JI3BFC	**1,070,328**	**847**	**146**	**337**
JE2YHS	833,782	859	128	230
JF2SKV/2	447,460	765	92	168
JA1YQH	351,034	528	116	218
JJ1ZXE	59,478	216	55	83
JI2ZEY	6,528	70	30	34
JA9YBA	4,125	46	10	23

JORDAN

JY9QJ	**6,112,620**	**3967**	**139**	**441**

MALDIVE ISLANDS

8Q7DV	**7,391,820**	**4274**	**172**	**534**

THAILAND

HS5AC	**529,534**	**1304**	**82**	**189**
HSØAC	136,422	903	87	147

EUROPE

4U-VIENNA

4U1VIC	3,619,560	3823	147	473

BALEARIC ISLANDS

EA6IB	**9,522,048**	**6145**	**179**	**643**

BELARUS

EW1WN	**228,018**	**626**	**65**	**202**

BELGIUM

OT8P	**2,327,808**	**3106**	**116**	**332**
OT8K	506,482	1250	89	225

BULGARIA

LZ9A	**6,154,848**	**4841**	**167**	**607**
LZ5Z	**4,147,200**	**4363**	**175**	**625**
LZ6A	1,035,450	1509	96	294
LZ1AQ	929,788	1419	95	287

CROATIA

9A5D	**2,356,714**	**3377**	**117**	**337**

CZECH REPUBLIC

OK5W	**6,573,238**	**3898**	**187**	**667**
OL3A	**3,933,762**	**3444**	**163**	**524**
OL5Q	2,322,552	2878	105	321
OK2KOD	1,295,552	1393	116	380
OK2KDS	1,137,270	1284	107	347
OL2A	986,832	1698	85	251
OK1KCF	65,208	244	44	112
OK5SAZ	10,998	109	23	55

ENGLAND

G3TMA	**1,313,654**	**1799**	**122**	**344**

EUROPEAN RUSSIA

RU1A	**9,044,874**	**4579**	**203**	**751**
UD6M	**7,033,078**	**4841**	**184**	**690**
RM6A	**5,346,555**	**3966**	**183**	**644**
RK4WWA	2,246,412	2264	136	428
RZ1AWO	1,801,624	2273	112	360
RK3AWE	1,735,794	2414	108	330
RN3R	1,486,275	2553	118	357
RK6AYN	725,592	1490	100	292
RK3PXP	692,043	1151	75	238
RK4CWA	681,616	1314	90	287
RK3WWA	395,266	887	76	181
RK3YYM	205,800	815	67	213
RZ4SWM	42,276	323	35	121

FINLAND

OH7M	**6,776,410**	**3830**	**185**	**680**
OH5M	3,644,586	2848	164	535
OH6X	3,265,698	3047	160	559
OH6NIO	2,749,185	2311	137	460

FRANCE

TM2Y	**10,357,360**	**5480**	**188**	**678**
F5PED	2,561,382	2874	129	360
F6ENO	1,340,148	2511	91	257
F5KPG	407,238	780	80	219

GERMANY

DL2NBU	**7,925,400**	**4223**	**186**	**664**
DJ6QT	**4,847,840**	**3401**	**165**	**574**
DLØAO	2,449,645	2018	145	460
DK5MV	2,277,790	1964	143	458
DK1II	2,094,150	1998	132	443
DFØCI	1,433,498	1545	127	379
DKØTZ	1,343,314	1475	114	344
DKØZG	861,120	1803	97	263
DKØFFO	323,993	707	65	216
DLØBO/P	209,338	626	62	200
DFØXG	29,165	158	29	75

HUNGARY

HG1S	**8,601,558**	**5977**	**181**	**652**
HA1KRR	2,384,964	3000	117	316

ITALY

II3T	**4,982,934**	**3761**	**165**	**568**
IO2A	**4,293,828**	**3168**	**159**	**534**
IY2ARI	3,353,658	3157	133	428
IK1QBT	2,274,000	2458	121	379
IU2C	143,871	415	60	161
IO2L	70,720	340	33	52

LITHUANIA

LY3AV	**2,088,314**	**1960**	**137**	**441**

LUXEMBOURG

LX/DL4SDX	**3,193,992**	**3385**	**117**	**369**

NETHERLANDS

PI4COM	**5,094,642**	**4064**	**162**	**545**
PI4CC	3,622,227	3477	140	461
PA3HBB	1,425,110	1851	97	318

NORWAY

LA8W	**5,829,442**	**4289**	**166**	**552**
LA1K	5,848	69	25	43

POLAND

SQ6Z	**8,775,480**	**5142**	**188**	**652**
SNØKRT	780,896	1155	90	278
SP1KYB	81,286	443	23	74

SCOTLAND

GM8C	**1,243,452**	**1877**	**94**	**299**

SLOVAK REPUBLIC

OM8A	**7,360,440**	**4669**	**181**	**649**
OM3A	**6,005,610**	**4053**	**162**	**592**

SLOVENIA

S5ØG	**5,007,123**	**3418**	**161**	**572**
S52C	320,222	1425	35	143

SPAIN

EA5BY	**4,231,458**	**4074**	**138**	**464**
ED7UR	119,340	553	48	105

SWEDEN

SK6FM	**3,757,008**	**3244**	**164**	**532**
SK2AU	351,780	640	79	251

UKRAINE

UR3IWA	**4,607,850**	**3402**	**169**	**526**
UT7Z	**3,307,803**	**3566**	**140**	**431**
UT3IZZ	949,158	977	124	362
UR4LZA	294,415	665	60	205
UR4MWU	250,299	611	76	185
UR4LWY	86,526	245	62	145

YUGOSLAVIA

YU7AL	**1,978,812**	**2132**	**124**	**402**
YZ7A	765,600	1412	84	246
YZ7W	404,415	851	76	209
YT1Z	364,511	1011	67	234
YU1HFG	342,662	1339	37	109

OCEANIA

GUAM

AH2R	**8,902,349**	**5027**	**177**	**476**

LORD HOWE ISLAND

VK9LX	**6,154,205**	**4437**	**139**	**364**

MICRONESIA

V63X	**7,481,874**	**5020**	**161**	**373**

NEW ZEALAND

ZM2K	**6,239,018**	**4192**	**155**	**411**

SOUTH AMERICA

ARGENTINA

LU8XW	**515,619**	**1855**	**31**	**82**
LW6EFP	56,059	390	25	36

CHILE

CE3F	**4,170,642**	**3617**	**134**	**365**

MULTI-OPERATOR MULTI-TRANSMITTER

NORTH AMERICA

UNITED STATES

KC1XX	**22,473,282**	**8936**	**199**	**763**
W3LPL	**21,271,495**	**8303**	**202**	**763**
K3LR	**20,897,569**	**8101**	**197**	**762**
K1KI	**17,808,700**	**7334**	**190**	**720**
K2LE/1	**13,276,122**	**6165**	**174**	**648**
K9NS	**11,526,040**	**5900**	**189**	**667**
K4VX/Ø	**11,066,276**	**5691**	**176**	**591**
K8CC	**10,861,630**	**5426**	**184**	**661**
W3PP	10,682,007	5401	174	639
WO1N	10,428,219	5622	175	626
K1RX	10,328,448	5217	175	657
W4MYA	**10,219,584**	**4904**	**179**	**637**
W8AV	9,884,992	4749	182	650
W6BA	**8,973,690**	**4397**	**184**	**582**
WØAIH/9	**8,454,555**	**4405**	**179**	**622**
W7RM	**7,273,814**	**4441**	**185**	**509**
W3EA	7,184,826	4087	169	617
K3II	7,118,514	3554	163	591
W3EEE	6,510,520	3275	162	578
W3MM	6,141,913	3184	172	627
KB1H	5,828,103	3380	157	566
K4OJ	4,991,336	3028	160	526
NJ4F	4,908,915	3319	161	544
W3FRC	4,454,984	2278	157	555
N2MM	**2,931,066**	**1859**	**160**	**506**
N2BIM	2,922,368	1775	141	491
NI5M	**2,726,784**	**1811**	**157**	**491**
KV1W	1,650,285	1515	117	338
KB1SO	1,456,621	2583	134	437

CANADA

VE3EJ	**24,413,191**	**10539**	**190**	**739**

COSTA RICA

TI1C	**32,783,400**	**15414**	**189**	**711**

GRENADA

J3A	**14,680,370**	**10579**	**162**	**508**

JAMAICA

6Y2A	**39,279,140**	**17609**	**192**	**740**

ST. LUCIA

J6DX	**25,596,764**	**14292**	**179**	**620**

AFRICA

CEUTA & MELILLA

EA9EA	**29,532,750**	**12888**	**178**	**667**

TOGO

5V7A	**34,658,186**	**14381**	**187**	**679**

ASIA

CYPRUS

P3A	**24,422,471**	**12908**	**175**	**622**

JAPAN

JA5BJC	**14,115,675**	**6788**	**190**	**615**
JA4EKO	**9,968,112**	**5329**	**186**	**558**
JA1YXP	**9,623,520**	**5267**	**189**	**549**
JA3YKC	**4,941,032**	**3685**	**162**	**406**
JA1YPA	813,588	1087	109	193

MONGOLIA

JT1A	**10,771,354**	**8112**	**164**	**474**

MYANMAR

XZ1N	**5,464,341**	**5486**	**159**	**438**

UNITED ARAB EMIRATES

A61AJ	**28,014,492**	**12692**	**195**	**718**

EUROPE

CZECH REPUBLIC

OL7W	**3,252,510**	**3099**	**132**	**507**

DENMARK

OZ5W	**4,406,832**	**3752**	**144**	**462**
OZ5WQ	**3,483,311**	**3880**	**144**	**467**

DODECANESE

J45T	**2,909,592**	**6051**	**118**	**386**

ESTONIA

ES5Q	**5,250,636**	**3932**	**165**	**567**

FINLAND

OH2U	**18,387,820**	**9381**	**205**	**802**
OH1AJ	2,623,500	2542	133	450

GERMANY

DFØHQ	**18,897,540**	**10289**	**204**	**751**
DLØCS	**13,194,288**	**7356**	**203**	**741**
DLØKF	5,967,034	4829	169	618

HUNGARY

HG6N	**11,044,143**	**8269**	**180**	**663**

KALININGRAD

RW2F	**16,862,016**	**9251**	**211**	**781**

LITHUANIA

LY5A	**8,998,444**	**7300**	**186**	**640**
LY7A	6,995,150	6117	175	600

SPAIN

EA4ML	**12,587,520**	**8747**	**175**	**593**

SWEDEN

SL3ZV	**14,495,360**	**8616**	**200**	**728**
SK6NP	657,460	1283	86	269
SM5HJZ	458,591	529	112	231

OCEANIA

HAWAII

KH7R	**20,908,825**	**10430**	**192**	**541**

SOUTH AMERICA

PARAGUAY

ZP9X	**1,227,094**	**1759**	**83**	**206**

CHECK LOGS

Our thanks to the following stations who sent in check logs.

9A2OU, DJ6TF, DK5OS, DL1ARD, DL1DWT, DL2KWW, DL2RSH, DL2RU, DL3JON, DL3NEO, DL3PB, DL5AMF, DL5CD, DL5DSA, DL5NA, DL6KWU, DL6MWG, DL7AQT, DL7VAF, DL8DZV, DM5AA, EA1BYA, EA1FAE, EA3GIP, EA3JB, EA4FW, EA5AKM, EA5GRC, EA5OI, EA5QX, EA7KN, EC4CZE, EW3EO, GØWAZ, G3HCT, GWØVSW, HA5AEX, JA4XHF, K3APM, K3SWZ, K8KFJ, KA1RJI, KE9EX, LA1FW, LA2EG, LA4BN, LA4IAA, LA4NE, LA4OGA, LA4YW, LA5QC, LA7SI, LA8CD, LA8CE, LA8HGA, LA8XM, LA9DFA, LA9OI, LA9PHA, LA9VGA, LA9WDA, LZ1KZ, LZ1NJ, LZ2FM, LZ2SX, NØXCF, NJ9Z, NQ9M, OH2JXA, OH3TY, OH5JTT, OH5PT, OK1ABE, OK1DP, OK1DSF, OK1DSU, OK1DUB, OK2BCJ, OM5RJ, OZ5PA, OZ7QB, PAØRBA, PA3CNI, PA3GKK, PY1ARS/4, PY1LVF, PY2DBU, PY3CEM, PY3CJI, PY7OJ, RAØZN, RA4LC, RN3AM, RU3DG, RU3DX, RV6HA, RW3XA, RW9SG, SMØBNK, SMØCSX, SMØNJO, SMØXG, SM3CBR, SM4HCM, SM5BEU, SM5BFJ, SM5BUH, SM5CZK, SM5OJH, SM5OL, SM7CZC, SP2GUC, SP2HMT, SP2SCX/9, SP3MEP, SP3VA, SP4GDC, SP5AHR, SP5CEQ, SP5FLB, SP5OXJ, SP6AUI, SP6BGZ, SP6CES, SP7BDS, SP7EJS, SP7FCX, SP7FGA, SP7HQ, SP7XK, SP8FHM, SP8HKT, SP8JMA, SP9MDY, SQ2AJI, SQ2AJS, SV5DZX, UAØBA, UAØFGN, UAØFZ, UA3AFH, UA3LEO, UA3PIU, UA4RC, UA9XK, UN7FW, UN7FZ, UN9FB, US1PM, UT2XX, UUØJC, UY5TE, VE3AWE, W4WS, W5AN, WAØOTV, WB4FNH, WB4MSG, YO2AIX, YO2AQB, YO3BWK, YO5ALI, YO6ADW, YO6FGN/P, YO8GF, YO8MI, YO8OH, YO8ROO, YO9BGV, YO9GVN, YO9IF.

Books, Videos, Calendars, Cards!

Visit Our Web Site www.cq-amateur-radio.com

Fax us at 516-681-2926
Call us toll free at 1-800-853-9797

CQ Award Pins

If you've earned any of CQ's Awards, you can also display the corresponding CQ Award pin. Available for WAZ, 5 Band WAZ, 160 Meter WAZ, CQ DX, CQ DX Honor Roll, WPX, WPX Honor Roll, and USA-CA awards. **ONLY $5.00 EACH.**

Playing Cards

Top quality, plastic coated playing cards.
ONLY $9.95 per deck

1999/2000 Calendars

Summer Special! ~~$9.95~~ $5.95

Fifteen month calendars - January 1999 through March 2000

Please specify Amateur Radio or Classic Radio Calendar

FREE SHIPPING on orders over $50*

33 Simple Weekend Projects

by Dave Ingram, K4TWJ

Do-it-yourself electronics projects from the most basic to the fairly sophisticated. You'll find: station accessories for VHF FMing, working OSCAR satellites, fun on HF, trying CW, building simple antennas, even a complete working HF station you can build for$100. Also includes practical tips and techniques on how to create your own electronic projects.

Order No. 33PROJ.... $15.95

W6SAI HF Antenna Handbook

by Bill Orr, W6SAI

Inexpensive, practical antenna projects that work! Guides you through the building of wire, loop, Yagi and vertical antennas.

Order No. HFANT..... $19.95

The NEW Shortwave Propagation Handbook

by W3ASK, N4XX & K6GKU

A comprehensive source of HF propagation principles, sunspots, ionospheric predictions, with photography, charts and tables galore!

Order No. SWP $19.95

Amateur Radio Equipment Buyer's Guide

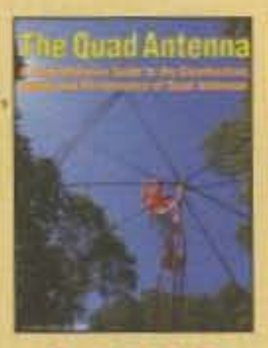
This 144-page book is your single source for detailed information on practically every piece of Amateur Radio equipment and accessory item currently offered for sale in the USA complete with specs and prices. Also includes the most comprehensive directory of Ham product manufacturers and dealers in the USA.

Order No. EBG..... $15.95

The Quad Antenna

by Bob Haviland, W4MB
Second Printing

An authoritative book on the design, construction, characteristics and applications of quad antennas.



Order No. QUAD $15.95

McCoy on Antennas

by Lew McCoy, W1ICP

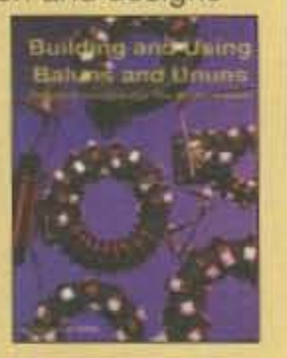
Unlike many technical publications, Lew presents his invaluable antenna information in a casual, non-intimidating way for anyone!

Order No. MCCOY $15.95

Building and Using Baluns and Ununs

by Jerry Sevick, W2FMI

This volume is the source for the latest information and designs on transmission line transformer theory. Discover new applications for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples.



Order No. BALUN . . . $19.95

The Vertical Antenna Handbook

by *Paul Lee, N6PL*

Learn basic theory and practice of the vertical antenna. Discover easy-to-build construction projects.

Order No. VAH..... $9.95

Keys, Keys, Keys

by Dave Ingram, K4TWJ

You'll enjoy nostalgia with this visual celebration of amateur radio's favorite accessory. This book is full of pictures and historical insight.

Order No. KEYS $9.95

Getting Started Videos - "How-To," Tips, Techniques & More!

Ham Radio Horizons: The Video . . *Order No. VHOR*
Getting Started in VHF . . *Order No. VVHF*
Getting Started in Ham Radio . . *Order No. VHR*
Getting Started in DXing . . *Order No. VDX*
Getting Started in Packet Radio . . *Order No. VPAC*
Getting Started in Amateur Satellites . . *Order No. VSAT*
Getting Started in Contesting . . *Order No. VCON*

Only $19.95 each
Buy more and save!
Buy 2 or 3 for $17.95; Buy 4 to 6 for $15.95
Buy all 7 for your Club for only $99.95

Name _____ Callsign _____

Strreet Address _____

City _____ State _____ Zip _____

Qty	Item #	Description	Price	Total Price
U.S. and possessions - add $4 shipping/handling. *FREE S/H on orders $50 and over. Foreign - shipping/handling charges are calculated by order weight & destination. *A $4 credit will be applied for Foreign orders over $50.			Shipping/Handling	
			Total	

Method of payment ☐ Check ☐ Money Order ☐ Visa ☐ MasterCard ☐ Discover ☐ American Express

Credit Card No._____ Expiration date_____

CQ Communications, Inc., 25 Newbridge Rd., Hicksville, NY 11801/516-681-2922; Fax 516-681-2926

Awards

BY TED MELINOSKY, K1BV

News Of Certificate And Award Collecting

The Seacoast Wireless Association, W1BQL (operated by Percy Ford, KA1JPR) earned USA-CA #966 in December of last year. The club had originally held the call KB1CCW, and Percy began his county hunting with that call. When Charlie Howe, W1BQL, passed away in 1998, the club took on his callsign. Charlie had begun his amateur radio operating in 1918, and was awarded a plaque in 1996 by the QCWA honoring his 75 years as a radio amateur.

Percy would like to thank those who helped him achieve USA-CA All Counties for the Seacoast Wireless club: all the mobiles and net controls and their assistants, and a special thanks to Jim Grandinetti, KZ2P, for getting the last county for the whole ball of wax.

Tips for Award Hunters

Use of *IRCs in Germany* for awards purposes is questionable because of the difficulty in exchanging the coupons at many post offices. When applying for a German award, consider substituting dollars for IRCs, or at least verify from the sponsor that IRCs are accepted.

Award certifications (GCR) when you live in a remote area. One reader says that he lives a very long distance from the next amateur who might be able to certify awards. "How do I handle getting two certifications for awards?" My suggestion is to be forthright about this situation when you apply for the award, and either send copies of the cards or offer to send representative cards on demand. This won't work for awards such as 5B WAZ or DXCC, of course, since the actual cards are needed. And I wouldn't try it for "inconvenient" distances to the next ham. I'd suggest it for the run-of-the-mill small organization or individual sponsored award. This advice is strictly unofficial, but I'll bet it works.

Awards Available

250th Anniversary York County, Pennsylvania (short-term award). Contact the York County ARC club special event station KY3ORK one time on any band during the period February 10, 1999 to December 31, 1999. The York ARC will distribute up to 2500 certificates by no later than March 1, 2000. The York County 250th Anniversary Commission has designed this award on high-quality gold parchment paper, displaying the history of York County in the 1800s with an artist's mural of York County's most famous buildings on the upper half of the certificate. The certificate is signed by the four commissioners of the county. Send a photocopy of your log or the received QSL with 3 IRCs or $US3 to: Pete deVolpi, KC3TL, 408 Hillside Ave., New Cumberland, PA 17070-3036. Check out their Internet page: <http://www.york250.com>.

Lebanon's Worked Oscar Delta Award. After several years of inactivity, as the country dissolved into war and anarchy, Lebanon is returning to normal. A good outcome of this is the re-establishment of amateur radio and an award as shown here.

The award is sponsored by the Association of Radio Amateurs of Lebanon (RAI) and is available to all amateurs worldwide who submit proof of having contacted a minimum of 5 different OD land stations in Lebanon, all bands and modes, on or after 1 January 1990. Contacts must have been made from the same location and must be confirmed in writing.

USA-CA Special Honor Roll

Arden H. Fonda AA0IP
USA-CA All Counties #975
July 7, 1999

Ronald P. Cox KE3DK
USA-CA All Counties #976
July 14, 1999

USA-CA Honor Roll

500		2000	
KE3DK	3083	N3TA	1163
ON7ZV	3084	AA0IP	1164
HB9APJ	3085	KE3DK	1165

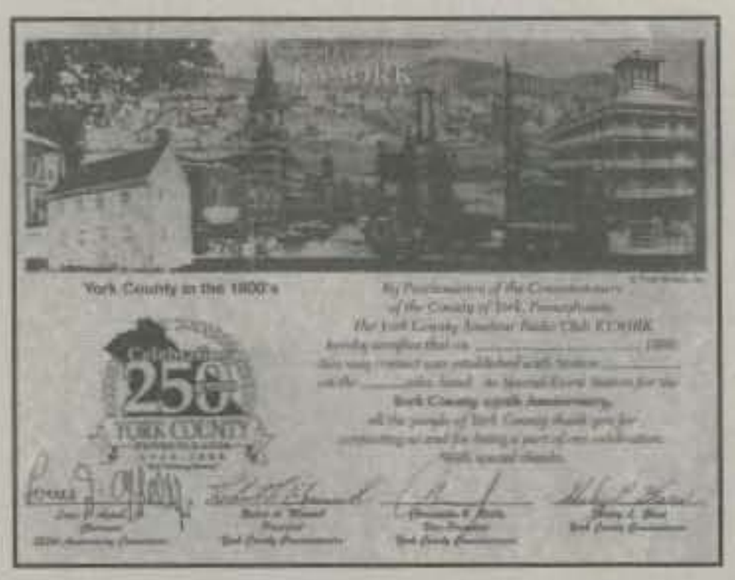
1000		2500	
AA0IP	1517	WA5VGI	1087
IK0AZG	1518	AA0IP	1088
KE3DK	1519	KE3DK	1089

1500		3000	
AA0IP	1264	AA0IP	992
KE3DK	1265	KE3DK	976

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated March 1, 1997. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

Alex Pashkov, UA9OA, Novosibirsk, Siberia, holder of USA-CA 500 county level #3053, December 1998. Alex is an enthusiastic awards chaser, as can be seen by the collection above his operating position. (Thanks, WV2B, for photo).

65 Glebe Road, Spofford, NH 03462-4411
e-mail: k1bv@top.monad.net



The award commemorating the 250th anniversary of York County, Pennsylvania. (Note that this is a short-term award.)

The Worked Oscar Delta Award sponsored by the Association of Radio Amateurs of Lebanon.

The Field Award offered for contacting different fields as defined by the Maidenhead locator system all over the Earth. The award is sponsored by The Swedish Radio Society.

The Worked All Sweden Award also offered by the Swedish Radio Society.

WASA Requirements and Swedish LANs

Class	Europeans Need	All Others Need
HF	3	All Lans on 2 bands; all callsign districts 0–7
2	All Lans on 3 bands	All Lans
1	All Lans on 4 bands	All Lans on 2 bands
Shield	All Lans on 5 bands	All Lans on 5 bands

Stickers available for 2× CW, 2× Phone, 2× SSB, and 2× RTTY. Fee for each diploma is SEK 30, 10 IRCs, or $5US.

Swedish Läns (22)

A	Stockholm City	OPR	Göteborgs and Bohus, Älvsborgs, Skaraborgs
B	Stockholms	S	Värmlands
C	Uppsala	T	Örebro
D	Södermanlands	U	Västmanlands
E	Östergötlands	W	Kopparbergs
F	Jönköpings	X	Gävleborgs
G	Kronobergs	Y	Västernorrlands
H	Kalmar	Z	Jämtlands
I	Gotlands	AC	Västerbottens
K	Blekinge	BD	Norrbottens
LM	Skane		
N	Hallands		

Table I- List of Swedish LANs and requirements for the Worked All Sweden Award.

No use of repeaters. All stations contacted must be land stations; contacts with ships or aircraft may not be counted. The OD station you contact must be a member of the RAI.

Write for the award application, which must be signed by two witnesses. Fee for the award is $US10 (or the equivalent in IRCs).Write to: Awards Manager, Association des Radio Amateurs Libanais, P.O. Box 11-8888, Beirut, Lebanon.

Swedish Radio Society Series (SSA). Following are the general requirements for this series of awards.Contacts must be made after 1 January 1988 and from the same QTH or within a radius of 150 km. Surface stations only, and no repeaters allowed. Endorsements for band, mode, or combination are available at the applicants request. GCR accepted.

Fees: Basic award is 30 SEK, or 6 IRCs. Sticker is 5SEK, or 1 IRC. Rosette (Field) is 30 SEK, or 6 IRCs. Plaque is 125 SEK, or 25 IRCs. (German, English, and American currency is accepted at current exchange rates.) Apply to: Diploma Manager—SSA, Ostmarksgatan 43, S-123 42 Farsta, Sweden.

Note: Comprehensive record books providing complete lists of LANs (WASA, HASA), Locators (SLA), and Fields (Field Award) with maps and room to record all necessary data are available from SM6DEC at a very reasonable cost. These are highly recommended tools for these awards. The cost for printed matter surface mail are 20 SEK, or 4 IRCs. Write to: Bengt Hogkvist, SM6DEC, Harengatan 11A, SE-531 34 Lidkoping, Sweden.

The Field Award. Contact different fields as defined by the Maidenhead locator system all over the Earth after 1 January 1985.

Six classes: Bronze (Basic) = 100, Silver (Rosette) = 150, Gold (Rosette) = 200, Platinum (Rosette) = 250, Plaque = 300, Gold Seal Plaquette = 324.

All modes and bands. No endorsements. Surface stations only. QTH must be on the QSL with enough accuracy so that the field may be determined. SSA reserves the option to request a sample of your cards. GCR list with name of city/town contacted, or in the case of Maritime Mobiles, the latitude and longitude.

Worked All Sweden Award (WASA). Contact Swedish counties (Lan) and callsign districts as shown in Table I.

Heard All Sweden Award (HASA). Available under the same conditions as WASA, but for SWLs only. No shields will be awarded.

Swedish Locator Award (SLA). Issued for verified contacts with various locator squares in Sweden as defined by the Maidenhead system. SWL okay. Basic diploma requires 25 squares. Endorsements at 35, 45, 55, 60, 61, 62, 63, and 64 squares.

URL of the Month

The newest category of "collectible" seems to be lighthouses. DXCC led the way with countries, then IOTA with islands, and then the Spanish / Portuguese with castles. K2JXW has a very interesting page with lighthouse awards at: <http://www.waterw.com/~weidner/ld.htm>. If you can pack a mobile or portable signal, and can't quite make it out to a rare Pacific atoll or a new country, per-

The Swedish Locator Award is issued for verified contacts with various locator squares in Sweden.

haps you can operate on or in the vicinity of one of the listed lighthouses and gain some degree of fame this way. All the data is there, and K2JXW has done a nice job organizing it.

I'm still looking for your club or group's award or certificate. Please send me details plus a sample and you'll get excellent publicity to jumpstart your program.

This column is being written just a few days after the sad news of K2EEK's passing was flashed over the Internet. Alan "recruited" me to write this column back in July 1997. He was a gentle but persuasive person who loved the "operating" side of our hobby, and his editorials stressed the "fun" aspect of modern amateur radio. All of us who enjoy operating have lost a dear friend.

73, Ted, K1BV

Washington Readout

Regulatory News In The World Of Amateur Radio

BY FREDERICK O. MAIA, W5YI

Sorting Out the New Amateur Application Forms Used in ULS

By the time you read this, the Amateur Service will have switched to the FCC's new Universal Licensing System. The objective of ULS is for all radio services to file electronically into one massive database which will contain all wireless radio services. ULS also reduces the number of application forms from 40 to just five. The new forms are FCC Forms 601, 602, 603, 604, and 605. As mentioned last month, the Amateur Service will use the new FCC Form 605 and its accompanying Schedule "D."

The FCC Form 605 is a general-purpose form consisting of a main form and several schedules for collecting information in five different radio services. Its lengthy title is the "Quick Form Application in the Ship, Aircraft, Amateur, Restricted and Commercial Operator, and the General Mobile Radio Services". The main form is to obtain information sufficient to identify the applicant and establish his or her basic eligibility. Schedule "D" is for additional data for the Amateur Radio Service. Also, there are nine pages of instructions, much of which does not apply to the Amateur Service.

The FCC's version of Form 605 is confusing at best to radio amateurs, since it uses two-letter Application Purpose codes and asks questions which are completely different from the current system. For example, you enter the letters "AU" (which stands for *Administrative Update*) when you merely change your mailing address, phone number, fax number, or e-mail address.

There are also blanks to request Special Temporary Authorizations, Amendments, or Withdrawal of pending applications, Requests for Waiver which are not used in the Amateur Service. A Request for Waiver is *not* the same as requesting a high-speed code exemption available to applicants who obtain a "Physician's Certification of Disability." You use Schedule "D" to request a 13 and 20 wpm code exam exemption.

The new ULS system uses the Taxpayers Identification Number (TIN)—in the case of an amateur, his or her 9-digit Social Security number (SSN)—as the "key" (or "unique identifier") with which to identify the record. A corresponding "Licensee ID" number (obtained by registering with the FCC) can be used in place of your SSN. The current amateur database uses the applicant's callsign as the "unique identifier."

For the first time, applicants for new, upgraded, or renewed amateur radio operator/station licenses are being asked to provide their Social Security number (SSN) to the FCC. This is being required of all government agencies by Congress as part of the Debt Collection Act of 1996.

The FCC Form 605 and its Schedule "D" are not enough to handle all of the collection needs of the Amateur Service, however. Neither of these two forms, for example, contain places where volunteer examiners (VEs) can enter such needed information as the applicant's license class, examinations passed, or blanks where Volunteer Examiners can certify that they have complied with the Administering VE requirements. The current FCC Form 610 provides for collecting this information.

VECs Agree on New NCVEC Form 605

The VECs have now agreed to use an internally created single-sheet application form they call the "NCVEC Form 605." It contains all the information needed to be collected by the new ULS and VEC System. It was designed to be very similar to the current FCC Form 610 to minimize confusion caused by the transition from the Form 610 to the new information collection requirements.

The NCVEC Form 605 is to be used to renew amateur licenses or in connection with the examination process carried out by Volunteer Examiners. It will also be used once the FCC assigns Club Coordinators to establish or renew amateur club or military recreation licenses and to renew RACES licenses.

It is important to know that this is an *internal VEC* form and *cannot be sent to the FCC*. The form can only be used in conjunction with applications filed electronically by a VEC. The "NCVEC Form 605" *must* be presented to a VE or forwarded to a VEC for handling. The FCC will still accept the manual filing of paper documents, but you must use their version of the Form 605 and Schedule "D".

FCC Details Use of Their FCC Form 605

On August 16, 1999 the Wireless Telecommunications Bureau began the use of the Universal Licensing System (ULS) for all application and licensing activity in the Amateur Radio Service.

ULS is a new, interactive licensing database developed by the Bureau to consolidate and replace eleven existing licensing systems used to process applications and grant licenses in wireless services, including the Amateur Radio Service. ULS provides numerous benefits, including fast and easy electronic filing, improved data accuracy through automated checking of applications, and enhanced electronic access to licensing information.

The FCC has now released a Public Notice explaining their FCC Form 605, which is used in cases not involving a VE or VEC. The Public Notice summarizes the procedures that took effect on August 16, 1999 for station and operator licensing in the Amateur Radio Service using ULS and in accordance with the ULS rules.

The conversion of the Amateur Radio Service to ULS will affect the filing of applications with the Bureau, and the FCC encourages licensees to become familiar with these changes now (even if you do not anticipate renewing or modifying your license in the near future). For further information regarding the ULS rules and procedures, refer to the FCC's ULS Internet site at <http://www.fcc.gov/ wtb/uls.

Overview of ULS Conversion

New FCC Form 605. On August 16, 1999 the Bureau will begin use of FCC Form 605 (OMB Control Number 3060-0850) for Amateur Service application filings for license renewals, modifications, cancellations, application withdrawals and amendments, requests for duplicate licenses, and administrative updates (i.e., a change of address or other clerical license modification). FCC Form 605 may also be used to apply for vanity callsigns under the Vanity Call Sign System program.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443)
e-mail <fmaia@prodigy.net>

Applications for new licenses, a change in operator class, or renewals filed by a VEC will continue to be filed through a Volunteer Examiner Coordinator. The NCVEC Form 605 is used for this purpose. Applications for Club, Military Recreation, and RACES licenses will continue to be made on FCC Form 610B until further notice.

New Filing Procedures

Renewals and "administrative updates" (address changes) may also be filed electronically by Amateur Service licensees using the interactive FCC Form 605 or manually (see "ULS Filing Procedures" below).

Electronically filed applications will be subject to automated edit checking, enabling the applicant to make corrections before filing the application. Manually filed applications will not be checked automatically, and may be subject to dismissal if they are defective or incomplete.

Amateur Service licensees may continue to use pre-ULS application forms (that is, the FCC Forms 610 and 610V) for a six-month transition period (i.e., until February 16, 2000) as long as the applicant provides his or her Social Security Number written in at the top of the form.

Beginning August 16, 1999 Amateur Radio Services licensing data will be available online to the public. The format will be different and the pre-ULS database will no longer be available online.

Under ULS, applicants may file FCC Form 605 electronically at any time 24 hours a day, seven days a week. Automated processing of electronically filed applications will occur nightly on each business day, beginning at approximately 11 PM EDT. When the nightly processing run is completed, ULS will generate a file listing the day's licensing activity, and processing results will be available for query through the ULS Internet public access system. Applications filed on weekends and holidays will be given a receipt date for, and will be processed on, the next business day.

Registration of Taxpayer Identification Numbers (TINs)

In order for an amateur to file any application in ULS electronically or manually, you must (1) register your TIN in ULS and associate your current callsign(s) with your TIN; and (2) provide your TIN on all applications filed on or after August 16.

For individuals, the TIN is your Social Security Number (SSN). For businesses, the TIN is the Employer Identification Number (EIN) of the business. Under some circumstances, Amateur Service applicants or licensees may not be required by law to have a TIN (e.g., citizens of foreign countries and certain nonresident aliens). The FCC will provide these applicants with an FCC-generated identification number for access to ULS if and only if they are not required by law to have a TIN. To determine whether you fall within this category, call ULS Technical Support at 202-414-1250. Foreign nationals taking VE-administered examinations will be supplied with an "Assigned TIN" (ATIN) by their VEC.

Trustees and custodians of Club, Military Recreation, and RACES licenses should not use their personal Social Security Number as the TIN for these licenses, but should instead use an EIN (when one is available). Otherwise, contact ULS Technical Support to obtain a FCC-generated identification number. It is possible that renewals of Club, Military Recreation, and RACES stations filed by a VEC may be able to be assigned an ATIN by the VEC. This procedure is being worked out.

The FCC urges Amateur Service applicants and licensees to register their TINs as soon as possible. You only need to register your TIN once.

Important: If you do not register your TIN, you will be *unable* to electronically file applications in ULS. Additionally, manually filed applications that do not contain your TIN on or after August 16 will be *dismissed* as defective.

There are several ways to register your TIN in ULS:

Electronic TIN Registration: The Bureau strongly recommends electronic registration. To register electronically, access the FCC's ULS Internet site at <http://www.fcc.gov/wtb/uls>, click on the "ULS TIN/Call Sign Registration" link, and follow the on-line instructions.

When you register your TIN electronically, you select a password to identify yourself in future private transactions with the FCC database. (This is analogous to setting a PIN when your bank gives you a new ATM card.) Your password can be 5 to 30 characters (letters and/or numbers) long and is case-sensitive. For additional security, you must also specify a personal or corporate identifier. We recommend you not use your Amateur Service callsign or any other callsign that can be associated with you as a password or identifier.

After registering your TIN, you will be asked to enter your callsign(s). Associating your callsign(s) with your TIN in ULS will enable you to file renewals, modifications, notifications, and other filings with respect to the callsign(s) identified.

Automatic TIN Registration Through VECs. As a convenience for Amateur Service applicants and licensees, the FCC has established an automatic TIN regis-

tration process for Amateur Service applications filed through VEs/VECs. If you are filing an application through a VE/VEC and have not previously registered your TIN, you may submit your TIN to the VE/VEC with the application. When the VEC files the application with the Commission on your behalf, your TIN will be automatically registered in ULS. Note that if you register your TIN through the automated VEC registration process, you must still obtain a password if you want to file in ULS electronically in the future. To obtain a password, call ULS Technical Support at 202-414-1250.

Manual TIN Registration: To register your TIN manually, use FCC Form 606 (TIN Registration Form). This form can be obtained from the Internet at <http://www.fcc.gov/formpage.html>, or by calling the FCC's Forms Distribution Center at 1-800-418-FORM (3676). FCC Form 606 also allows you to associate your call-sign(s) with your TIN. If you register your TIN manually, you must call ULS Technical Support at 202-414-1250 to obtain a password before you can file applications electronically in ULS.

A manually-filed FCC Form 606 should be mailed to:

Federal Communications Commission
Information Technology Division
Attention: Kathy McLucas
1270 Fairfield Road
Gettysburg, PA 17325-7245

For more information on TIN registration: Fact Sheet Number 206-U, released in April 1999, discusses TIN registration in a question-and-answer format. A link to this Fact Sheet is available on the ULS Internet site <http://www.fcc.gov/wtb/uls> under the "ULS Headlines" section. The ULS Internet site contains additional information about registering your TIN under the topic "Getting your Login and Password (Tin/CallSign Registration)." The site also contains a list of Frequently Asked Questions (FAQs) about TIN registration.

Confidentiality of TIN Information

Once registered, your TIN will not be disclosed to the public. Instead, the ULS will generate a *Licensee Identification Number* that will be used in place of your TIN on publicly available records.

Providing Your TIN On Applications

In addition to registering your TIN, you must also include the TIN (Social Security Number) or Licensee Identification Number on all applications filed in ULS. All applications filed on or after this date that do not include the information described below will be *dismissed* as defective.

All paper applications filed directly with the FCC or via Mellon Bank (i.e., Vanity Call Sign applications) must include a TIN.

For applications that a VEC files on your behalf after August 16, you will have the option of providing either your TIN or your Licensee Identification Number to the VEC. Because you obtain a Licensee Identification Number when you register your TIN, you:

- should register your TIN prior to qualifying for an Amateur Service license if you plan to provide a Licensee Identification Number; and
- cannot use the Automatic TIN Registration Through a VEC feature and provide the VEC your Licensee Identification Number as part of the same filing.

If you do not provide your TIN with an application filed on or after August 16, your application will be dismissed.

Filing Procedures Under ULS

FCC Form 605 replaces all letter requests and old forms (FCC Form 610 and FCC Form 610-V) previously used by Amateur Radio Service licensees (except Form 610B, as described below). FCC Form 605 will be used for all Amateur Service licensing applications filed directly with the FCC or via Mellon Bank. Manual filers must use an edition of FCC Form 605 with a July 1999 edition date or later. Filings on earlier editions of FCC Form 605 will be dismissed as defective.

To file FCC Form 605 electronically you must use your browser to connect to ULS through the Commission's wide-area network via a toll-free number: 1-800-844-2784. Instructions for connecting to ULS are contained on the ULS website at <http://www.fcc.gov/wtb/uls>. For instructions on filing FCC Form 605 manually, refer to the instructions on the form.

Required and Optional Applicant Information

All Amateur Radio Service licensees must provide a U.S. mailing address on their applications; the Bureau will not accept foreign addresses. FCC Form 605 also includes fields for applicant telephone number, fax number, and e-mail address. These fields are optional for amateur applicants and licensees, and any information that is provided in these fields will not be made available to the public.

Use of Pre-ULS Forms

Amateur Service licensees may continue to use FCC Form 610 and FCC Form 610-V until February 16, 2000, provided they submit their TINs and certain other required information with the application. Applications filed on FCC Form 610 and FCC Form 610-V after February 16, 2000 will be dismissed as defective.

Although licensees have the option of continuing to use pre-ULS forms during the six-month transition period, the Bur-

eau strongly urges applicants and licensees to begin using FCC Form 605 immediately. The choice of application form and filing method will affect processing in the following way:

1. FCC Form 605 filed electronically is the most efficient filing method and will result in expedited processing compared to filing manually.

2. FCC Form 605 filed manually will result in expedited processing compared to filing pre-ULS forms or letter requests.

3. Pre-ULS forms or letter requests is not recommended and will result in slower processing than the options described above.

Use of Form 610B for Club, Military Recreation, RACES

Until further notice, applicants should continue to use FCC Form 610B for Club and Military Recreation station licenses and requests for modifications and renewals of Club, Military Recreation, and RACES station licenses. In the future, ULS will accommodate the processing of these license applications through callsign administrators. This program is not yet in place.

Important: Beginning August 16 you must provide the EIN or FCC-generated ID number on each FCC Form 610B you submit. Applications that do not include this information are subject to dismissal.

Vanity Callsign Applications Which Require Fees

Amateur Service applicants filing vanity callsign applications in ULS remain subject to the current $14 application fees required under Section 1.1102 of the rules. ULS, however, will simplify the process of submitting fees to the Commission.

When an applicant submits an application electronically, ULS will assign a file number and show the correct fee amount due and the payment type code on a confirmation screen.

Clicking on the "Form 159" button will pre-fill this information on the FCC Form 159. ULS will then instruct the applicant on how to print out the pre-filled FCC Form 159 so that it can be mailed to Mellon Bank at the address specified below.

Note: Applicants who do not use the pre-printed FCC Form 159 in connection with an electronically filed application must enter the ULS-generated file number in the FCC Form 159 box labeled FCC Code 2. If problems arise while trying to print FCC Form 159, call the FCC Technical Support Hotline at 202-414-1250 for assistance (available Monday through Friday, from 8 AM to 6 PM EDT). Mellon Bank must receive the FCC Form 159 and accompanying fee within ten calendar days of submitting the application. In the near future, ULS will be capable of accepting credit card payments online. The Bureau will release a public notice and provide information on its web site when this option becomes available.

The FCC will still accept Vanity Call Sign filings made on FCC Form 610-V ("Amateur Station Vanity Call Sign Request"), provided the TIN (Social Security Number) is provided on the application.

Where to send payments for electronically-filed applications:

All payments for electronically filed applications should be sent to:
Federal Communications Commission
ULS Electronic Filings
P.O. Box 358994
Pittsburgh, PA 15251-5994

Manually filed applications that do not require fees should be sent to:
Federal Communications Commission
1270 Fairfield Road
Gettysburg, PA 17325-7245

Manually filed Vanity Call Sign applications that require fees:
Federal Communications Commission
Wireless Telecommunications Bureau
P.O. Box 358130
Pittsburgh, PA 15251-5130

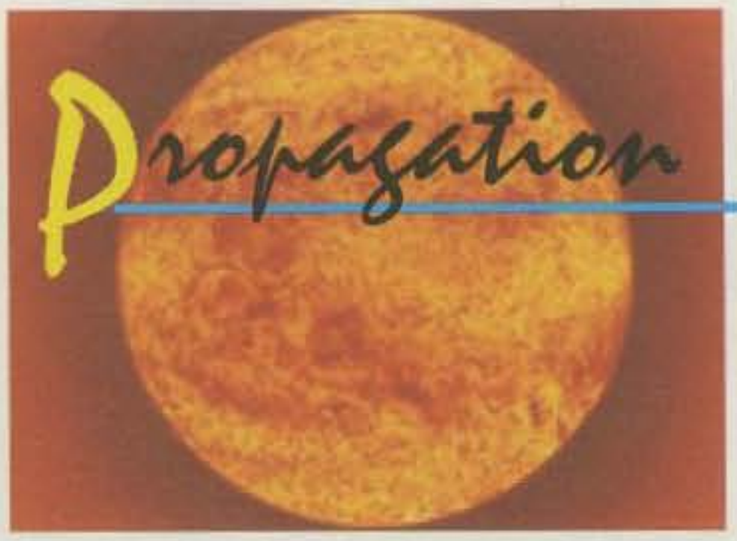
For Further Information Or Assistance

For general information about ULS, including answers to frequently asked questions regarding submitting applications, finding the status of pending applications, and searching the ULS database, the Commission recommends first consulting the ULS web page at <http://www.fcc.gov/wtb/uls>. Individuals having specific questions not addressed on the web page may contact Commission staff via phone or e-mail as described below.

FCC Technical Support Hotline: 202-414-1250, or via e-mail at <ulscomm@fcc.gov>. Contact the Technical Support Hotline about questions concerning computer access to ULS, TIN registration, uploading files, or submitting attachments in ULS. The hotline is available Monday through Friday, from 8 AM to 6 PM EDT. In order to provide better service to ULS users and ensure the security of the electronic filing system, all calls to the hotline are recorded.

ULS Licensing Support: 1-888-CALL-FCC (225-5322), or via e-mail at <ulshelp@fcc.gov>. Contact Licensing Support with questions about which application purpose(s) are appropriate for a particular filing, what information is being requested on a ULS Form or Schedule, or any other ULS-related licensing matter. ULS Licensing Support is available Monday through Friday, from 8 AM to 5:30 PM EDT. Comments on ULS should be sent via e-mail to: <ulscomm@fcc.gov>.

73, Fred, W5YI



BY GEORGE JACOBS, W3ASK

The Science Of Predicting Radio Conditions

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for October 1999

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 7-8, 15-16, 23	A	A	B	C
High Normal: 3-5, 9, 13-14, 17 24-25, 28-31	A	B	C	C-D
Low Normal: 1-2, 10, 12, 18 21-22, 26-27	B	C-B	C-D	D-E
Below Normal: 6, 20	C	C-D	D-E	E
Disturbed: 11, 19	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 S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, 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 good (C-B) on Oct. 1st and 2nd; good (B) on the 3rd through 5th; fair to poor (C-D) on the 6th, etc. Good conditions (B) are expected during the CQ WW DX SSB Contest weekend of Oct. 30–31.

Sunspot cycle 23 continues its rapid rise. A running smoothed sunspot number in the neighborhood of 110 is expected during the SSB weekend. This will be the highest level of solar activity during any CQ World-Wide DX Contest weekend since 1991, and on the order of 40 points higher than the count during last year's contest (see Table I).

High Normal Conditions For Most of SSB Contest

At the time of writing, during early August, a long-range *CQ* day-to-day forecast based primarily on the 27- day recurrence tendencies of geomagnetic, solar, and ionospheric conditions indicates a great probability for High Normal propagation conditions on October 30 and 31, and possibly increasing to Above Normal at times on middle- and low-latitude paths on the 30th. See the Last-Minute Forecast box for additional information concerning expected day-to-day conditions for the entire month of October. An updated day- to-day forecast for the SSB contest weekend will appear as a bulletin at the beginning of next month's column. The November issue of *CQ* should reach most subscribers before the SSB contest begins.

Remember to carefully check conditions on October 4 and 5, since this would be one 27-day cycle before the SSB contest weekend of October 30–31. There is better than a 90% chance that conditions observed on October 4 and 5 will recur during the contest weekend.

The rapid rise in the sunspot level, and the generally High Normal geomagnetic and ionospheric conditions expected during the SSB contest weekend, could result in record-breaking scores. At the very least, barring any solar flares or radio storms, this should be the best SSB contest weekend in the past eight years, particularly on the 10 and 15 meter bands.

11307 Clara Street, Silver Spring, MD 20902
e-mail: <george@gjainc.com>

Sunspots Soar!

Solar Cycle Progress

The monthly mean sunspot number for June 1999 as reported by the Royal Observatory of Belgium, was 137. A high count of 195 was recorded on June 24, with a low of 62 reported on the 20th.

June's mean level results in a 12-month running smoothed sunspot number of 78 centered on December 1998. This is an increase of five in the count from the previous month. A smoothed sunspot number of approximately 110 is predicted for October 1999.

Canada's Dominion Radio Astrophysical Observatory reports a corresponding 10.7 cm solar flux level of 175 for June 1999. This results in a smoothed value of 137 centered on December 1998. A smoothed solar flux level of approximately 157 is forecast for October.

If you plan to participate in the 1999 WW DX Contest, the DX propagation charts and other information appearing in this month's column are designed to help you stay sharp and informed, and to make the best use of the ionosphere for piling up as many contacts and points as possible.

Band-By-Band Conditions

The following is a band-by-band summary of DX propagation conditions expected

Great Conditions! Expect Record-Breaking CQ WW Contest

The 1999 CQ World-Wide DX Contest will be held on the following dates:

SSB: 0000 UTC Saturday, October 30 to 2400 UTC Sunday, October 31

CW: 0000 UTC Saturday, November 27 to 2400 UTC Sunday, November 28

For the 49th consecutive year, this month's Propagation column is devoted to special forecasts and information applicable to both the SSB and CW WW DX Contest weekends. The accuracy of the forecasts for the previous 48 contests is greater than 95%!

Included in this month's column is a summary of Internet web sites that can assist in optimizing scores during the contest.

W3ASK "salted the ionosphere" for this year's CQ WW DX Contest at the Galileo monument, University of Padua, Italy.

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
October	157	142	142	76	45	27	12	9	32	71	110*
November	158	142	138	74	41	26	11	10	35	73	113*

**Predicted values expected during the1999 contest.*

Table I– Smoothed sunspot numbers recorded during CQ WW DX since 1989.

from mid-October through mid-December and centered on the WW contest periods.

10 Meters: Best conditions in years expected. Good, solid openings should be possible to just about every corner of the world during the daylight hours, and the band should remain open to southern and tropical regions well into the early evening. Openings towards Europe and in a generally easterly direction should peak an hour or two before noon, while those towards South America and Africa are expected to peak during the early afternoon hours. Optimum conditions towards the Far East, Australia, southeast Asia, etc., are forecast for the late afternoon and early evening hours. Expect exceptionally strong signal levels on most openings, especially if conditions should rise to High or Above Normal.

15 Meters: Fantastic might well describe DX conditions expected on 15 meters! Excellent propagation conditions should exist from shortly after sunrise through the early evening hours, and possibly to as late as midnight. Look for a peak on 15 meters towards a particular geographical area about an hour or so after the peak has occurred to the same geographical area on 10 meters. Expect good, solid openings to all areas of the world, with exceptionally strong signals most of the time. This should be the best band for DX openings during most of the daylight hours, but it could be a toss-up with 10 meters during the afternoon.

20 Meters: DX openings should be possible on this band just about around the clock. Conditions should peak from about an hour or two after sunrise, and again during the late afternoon and early evening hours. Expect to work into most areas of the world between sunrise and sunset. Excellent openings should be possible to many areas of the world well into the hours of darkness as well. When conditions are High or Above Normal, expect 20 meters to remain open for world-

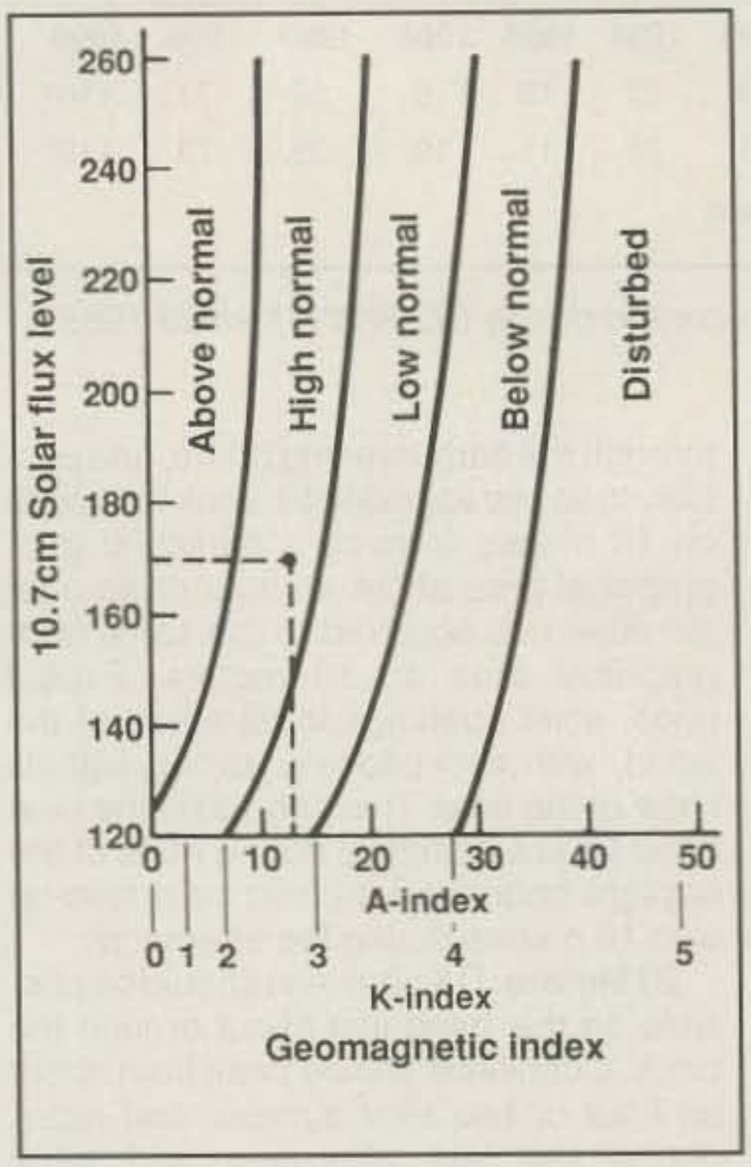


Fig. 1– Intersection of the given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: Solar flux is 170 and A-index is 13; expect High Normal conditions.)

wide DX during most of the night. Look for long-path openings for about an hour or so after sunrise and again for an hour or so before local sunset. Signal levels are expected to be exceptionally strong during peak periods of propagation. If you plan to operate on a single band during the contest, this should be it!

40 Meters: The band should open first for DX towards Europe and in a generally easterly direction during the late afternoon hours, and steadily improve towards evening. During the hours of darkness expect good DX openings to most parts of the world. Signals should peak from an easterly direction about midnight, and from a westerly direction just after sunrise. Conditions towards the south should be excellent throughout the nighttime period. When conditions are no better than Low Normal, 40 meters is likely to be the best band for DX openings during the hours of darkness. When conditions are High or Above Normal, this honor will be shared between 40 and 20 meters.

80 Meters: This should be a good band for DX openings to many areas of the world during the hours of darkness and into the sunrise period. The band should peak towards Europe and in a generally easterly direction around midnight. For openings in a generally westerly direction, expect a peak just after sunrise. The band should remain open towards the south throughout most of the night. Propagation on this band is quite similar to that expected on 40 meters, except signals will be somewhat weaker on the average, noise levels a bit higher, and the period for band openings in a particular direction a bit shorter.

160 Meters: Expect some DX openings on this band during the hours of darkness and into the sunrise period. Signals tend to peak at local sunrise at the more easterly terminal of a particular path. Greater ionospheric absorption, higher levels of static, and the lower power levels used on this band should result in generally noisy and weak DX openings, but some good ones should be possible. Look for openings towards Europe and towards the south from the eastern half of the USA, and towards the south, the Far East, Australasia, and the South Pacific from the western half of the country. Other DX openings should also be possible. The best propagation aid for this band (and for 80 and 40 meters as well) is a set of sunrise and sunset curves, since DX signals tend to peak when it is local sunrise at the easterly end of the path.

For up-to-the-minute information on Top Band propagation and DX check the web at: <http://solar.uleth.ca/solar/www/160pred.html/>.

For a grayline sunrise-sunset map, check: <http://solar.uleth.ca/solar/www/160gray.html/>.

Contest Work Charts

The DX Propagation Charts on the following pages show the times when each amateur band 10 through 160 meters is expected to open from the United States to the major areas of the world. The information contained in the charts can easily be reorganized into more convenient types of operational work plans, or operating schedules, which can serve as valuable guides during the contest. Experience gained during previous contests has shown that such plans can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table II is an example of one of several type plans that can be devised. It is a single-band operational work schedule for 20 meters, which shows the times when propagation conditions are expected to be optimum to various areas of the world (propagation index 3 or 4), for each three hour period throughout the day. A Pacific time zone QTH has been chosen for this example, but similar plans can be devised for other time zones and other bands.

WARC Bands

While the WARC bands are not yet included in the World-Wide DX Contest, expect 12 meter openings during the same time periods as shown for 10 meters, but with the band opening a bit more frequently

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates best time to check for 10 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

October 15 - December 15, 1999
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	06-07 (1) 07-08 (3) 08-13 (4) 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	04-06 (2) 06-09 (4) 09-10 (3) 10-12 (2) 12-14 (3) 14-18 (4) 18-20 (3) 20-22 (2) 22-00 (1) 00-02 (2) 02-04 (3)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-23 (2)* 23-01 (3)* 01-02 (2)* 02-03 (1)*
Northern Europe & European CIS	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (3) 08-13 (4) 13-14 (3) 14-15 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-01 (3) 01-04 (2)	17-19 (1) 19-02 (2) 02-04 (1) 20-03 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-13 (4) 13-14 (3) 14-15 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-22 (4) 22-00 (3) 00-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	06-07 (1) 07-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-05 (1) 05-07 (2) 07-14 (3) 14-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-03 (4)	18-22 (1) 22-01 (2) 01-03 (1) 00-03 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-12 (3) 12-15 (4)	06-07 (1) 07-09 (3) 09-13 (2) 13-15 (3)	03-05 (2) 05-09 (1) 12-14 (1) 14-16 (2)	19-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	06-09 (1) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-02 (3) 02-05 (2)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 20-22 (1)	07-08(1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 06-08 (1)
Southeast Asia	10-12 (1) 12-14 (2) 14-15 (1) 17-18 (1) 18-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	02-06 (1) 06-09 (2) 09-11 (1) 18-21 (2) 21-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-00 (3)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	13-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-13 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	07-08 (3) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1) 17-19 (2) 21-23 (1) 23-00 (2) 00-01 (3) 01-03 (4) 03-04 (3) 04-07 (2)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (2) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-02 (4) 02-03 (3) 03-06 (2) 06-07 (3)	18-19 (1) 19-21 (3) 21-04 (4) 04-06 (2) 06-07 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-20 (4) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	06-08 (2) 08-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-05 (2) 05-06 (3)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound, Antarctica	16-17 (1) 17-19 (2) 19-20 (1)	15-17 (1) 17-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	00-06 (1)

Time Zones: CST & MST
(24-hour time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40-80 Meters*
Western & Southern Europe & North Africa	06-07 (1) 07-08 (3)	06-07 (1) 07-08 (3)	03-06 (1) 06-08 (3)	17-18 (1) 18-20 (2)
Europe & North Africa	08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	08-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1) 00-03 (2)	20-23 (3) 23-01 (2) 01-02 (1) 19-20 (1)* 20-23 (2)* 23-00 (1)*
Northern & Central Europe & European CIS	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-22 (1) 22-02 (2)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (2) 08-11 (3) 11-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	17-19 (1) 19-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	06-07 (1) 07-11 (3) 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-10 (2) 10-14 (3) 14-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	05-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-05 (2)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-09 (1) 09-11 (2) 11-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-14 (1) 14-16 (2) 16-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-20 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-20 (4) 20-23 (3) 23-02 (2) 02-04 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1) 02-04 (2)	18-20 (1) 06-08 (1)
Southeast Asia	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 15-16 (1) 16-19 (2) 19-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-12 (2) 12-13 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-12 (1) 18-19 (1) 19-21 (2) 21-23 (1)	04-07 (1)
Far East	15-16 (1) 16-19 (3) 19-20 (2) 20-21 (1)	08-10 (1) 15-16 (1) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	04-05 (1) 05-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	02-03 (1) 03-07 (2) 07-09 (1) 03-06 (1)*
South Pacific & New Zealand	09-12 (1) 12-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	08-11 (1) 11-13 (3) 13-16 (2) 16-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	11-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-03 (3) 03-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-16 (3) 16-18 (4)	06-08 (1) 08-09 (3) 09-11 (2) 11-12 (1) 16-18 (1) 18-19 (2)	06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 15-17 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*

	18-19 (3) 19-20 (2) 20-21 (1)	19-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	20-22 (1) 22-00 (2) 00-04 (3) 04-06 (1)	
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-07 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	06-07 (1) 07-08 (3) 08-10 (4) 10-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 14-16 (1) 16-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	06-08 (2) 08-09 (1) 16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1)	23-05 (1)

Time Zone: PST (24-hour time)
WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (4) 14-16 (3) 16-18 (2) 18-20 (1) 23-01 (2)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Central & Northern Europe & European CIS	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 08-10 (3) 10-11 (2) 11-12 (1)	05-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-17 (3) 17-19 (2) 19-23 (1) 23-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-23 (1) 19-22 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1) 00-02 (1)	18-22 (1) 06-08 (1)
Western Africa	06-07 (1) 07-08 (2) 08-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-07 (2) 07-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-10 (1) 10-14 (2) 14-15 (3) 15-20 (4) 20-22 (3) 22-02 (2) 02-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-14 (3) 14-15 (2) 15-16 (1)	06-08 (1) 08-12 (2) 12-16 (3) 16-17 (2) 17-19 (1)	06-14 (1) 14-16 (2) 16-22 (3) 22-23 (2) 23-00 (1)	18-21 (1) 06-08 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-21 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	17-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
Central & South Asia	16-17 (1) 17-19 (3) 19-20 (1) 07-09 (1)	16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1) 07-09 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 16-17 (1) 17-19 (3) 19-21 (2) 21-22 (1)	17-19 (1) 04-09 (1)
Southeast Asia	08-09 (1) 09-10 (3)	07-08 (1) 08-11 (3)	06-07 (1) 07-08 (2)	02-03 (1) 03-06 (2)
	10-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 14-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	11-12 (2) 12-15 (1) 15-17 (3) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	08-10 (3) 10-11 (2) 11-12 (1) 19-22 (1) 22-01 (2) 01-03 (3) 03-06 (2)	06-08 (1) 03-06 (1)*
Far East	13-14 (1) 14-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-02 (3)	23-01 (1) 01-05 (2) 05-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	08-09 (1) 09-10 (2) 10-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	07-08 (1) 08-11 (4) 11-18 (3) 18-00 (4) 00-02 (3) 02-03 (2) 03-04 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-11 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 11-12 (2) 12-14 (4) 14-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America &	06-07 (1) 07-08 (3) 08-10 (4)	05-06 (1) 06-07 (2) 07-10 (4)	06-07 (3) 07-09 (4) 09-10 (3)	18-19 (1) 19-21 (3) 21-02 (4)
Northern Countries of South America	10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	10-13 (2) 13-15 (3) 15-23 (4) 23-01 (3) 01-06 (2)	02-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-23 (4) 23-01 (3) 01-03 (2) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-04 (2) 04-05 (1) 22-04 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-12 (1) 14-17 (1) 17-20 (2) 20-23 (3) 23-01 (2) 01-02 (1)	16-18 (1) 18-20 (2) 20-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

*Indicates best time 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. F-2 layer DX openings on 6 meters may occur at the same times and over the same paths shown with a propagation index of (4) under the 10 meter column.

*Indicates best time for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 30 meter openings.

than 10 meters. Seventeen meters should behave much as shown for 15 meters. Openings on 30 meters should resemble 40 meter openings during local sunrise and sunset times, but the band is expected to open less frequently than 40 meters during the hours of darkness.

Useful Web Page

Through the arduous efforts of Doug Brandon, N6RT, a web site is now available that contains dynamic ionospheric, geomagnetic, solar, HF propagation, and auroral data, and much more. The web site is: <http://dx.qsl.net/propagation>.

The N6RT Web Page summarizes a wealth of data from, and has links to, a large number of well-known research organizations throughout the world. Much of the information is real-time, updated every five minutes or so, or whenever new data is available.

The following is a sampling of the many useful items to be found on this web page:

• Current solar and geomagnetic indices (10 cm solar flux, A and K values) and three-day forecasts.

• WWV current solar and geomagnetic conditions and 24-hour forecasts.

• Penticon, Canada solar flux measurements.

• Recent major solar flare activity.

• NOAA daily sunspot (American) number. The International number runs approximately 70% of the American value.

* GOES-8 and GOES-10 satellite background solar X-ray flux.

• NOAA auroral activity reports, including real-time auroral maps.

• NASA current solar images from the SOHO satellite and Yohkoh soft-Xray telescope.

• A dynamic grayline map (sunrise-sunset) updated every five minutes.

• The Solar Terrestrial Dispatch worldwide MUF map which makes do-it-yourself, real-time band-opening prediction possible. The map also contains updated date and time, NOAA sunspot number, planetary A-index, grayline position, auroral data, and sun position!

If time is available during the WW DX Contest to check at least one web page, the N6RT site should be that one. It contains all of the necessary information that can be very useful in piling up points.

Again, the url for this web page is: <http://dx.qsl.net/propagation>.

The site can also be reached through my web: <http://www.gjainc.com>.

Amateur radio owes a big thank you to Doug Brandon for taking the time and making the effort to put together such an informative web page, and for keeping it updated. His e-mail address is: <n6rt@qsl.net>.

VOACAP for Windows Now Available

The VOACAP computer propagation program, used worldwide by communication professionals, is available in an updated and much easier to use version from the

PST Time	UT Time	Areas to which good openings are expected
00-03	08-11	SE Asia, Far East, South Pacific, New Zealand, Australasia, Antarctica
03-06	11-14	South Pacific, New Zealand, Australasia
06-09	14-17	Central and South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Europe, Caribbean, Central America, and Northern Countries of South America
09-12	17-20	Far east, Caribbean, Central America
12-15	20-23	Western & Central Europe, North Africa
15-18	23-02	Europe, Africa, Caribbean, Central America, South America
18-21	02-05	Africa, Central & South Asia, South Pacific, New Zealand, Caribbean, Central America, South America
21-24	05-08	Far East, South Pacific, New Zealand

Table II– Sample 20 meter single-band work plan for western USA QTH.

Institute of Telecommunication Sciences, U.S. Department of Commerce. Bundled with two other professional programs, ICEPAC and REC533, the three can be downloaded without charge from the following web site: <http://elbert.its.bldrdoc.gov/pc_hf/hfwin32.html>.

The new version of VOACAP, updated this past July, is for use with Windows 95/98 and NT. It will not work with Windows 3.1. Approximately 6 MB of hard-drive space is required for the download. The new version is well menued and easy to follow. VOACAP can also be downloaded from: <http://www.gjainc.com>.

Do-It-Yourself Forecasting

If you do not have access to the Internet, solar flux, geomagnetic indices, and ionospheric reports can be obtained by calling 303-497-3235, where a WWV recorded announcement is updated every three hours, or by calling the "on-duty forecaster" for a live report at the Space Environmental Center, 303-497-3171. WWV, Ft. Collins, Colorado, has similar geophysical alert broadcasts 18 minutes past each hour on 2.5,5,10,15, and 20 MHz. Similar information is also carried at 45 minutes past each hour on 2.5, 5,10, and 15 MHz from WWVH, Kauai, Hawaii.

Fig. 1 can be used to determine the quality of ionospheric propagation by using the solar flux values and geomagnetic indices that are provided by modem, telephone, or radio.

Radio Storm

If Mother Nature should play a trick and produce a radio storm during the contest periods, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending on the storm's severity. The storm's influence will generally extend outwards from the polar regions, the more severe the storm becomes. Under storm conditions, expect considerably fewer openings on 10, 15, and 20 meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid- and lower latitudes.

Conditions on 40, 80, and 160 meters are likely to become erratic as well. During certain types of storms conditions may actually improve at times for openings on all bands towards southern and tropical areas, and on 40, 80, and 160 meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on 10, 15, and 20 meters during the daylight hours. Check the 40, 80, and 160 meter bands for possible openings to some areas of the world during the hours of darkness.

VHF Ionospheric Propagation

Solar activity is now high enough so that exceptionally good DX openings can be expected on the 6 meter band during the hours of daylight. During October it should be possible to work stations in most areas of the world where this band is allocated for amateur use. Although the DX Charts contained in this month's column do not include the 6 meter band directly,6 meter DX openings can be expected at those times and to those areas of the world where 10 meter openings are shown with a propagation index greater than 3.

Generally speaking, check for openings from the eastern half of the USA towards Europe and the east before noon, and towards Africa an hour or so after noon. The best chance for 6 meter DX openings towards the Caribbean and Central and South America from *all* areas of the USA should be during the afternoon hours. Look for openings towards the Far East, the South Pacific area, New Zealand, and Australasia during the late afternoon hours. These openings will favor stations located in the western half of the USA, but some openings should extend considerably eastward. There will be lots of DX surprises in store for the 6 meter band during the next six months, with a good chance for some new DX records to be established.

Trans-continental and 6 meter openings over shorter distances are also expected to increase dramatically during October and the fall, winter, and early spring months, with conditions likely to peak during the afternoon hours.

A major meteor shower, which could produce meteor-reflection-type ionospheric openings on the VHF bands, is expected October 20–22. Called the *Orionids*, the shower should reach peak intensity on October 21, with an hourly meteor count of approximately 25. Peaks in minor meteor showers are expected on October 3 and 12.

Auroral activity generally increases during October, and an increase in auroral-scatter-type VHF openings can be expected. There is also the likelihood for increased short-skip sporadic-*E* propagation resulting from expected auroral activity, particularly on 10 and 6 meters. The best time to check for such openings is when conditions on the HF bands are expected to be Below Normal or Disturbed, as shown in the Last-Minute Forecast at the beginning of this column.

CW Contest Forecast

This month's DX Propagation Charts are valid for both the SSB and CW sections of the contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared last month.

The NEW Shortwave Propagation Handbook makes an excellent companion during the CQ WW DX Contest. It contains a considerable amount of additional information concerning propagation, radio storms, do-it-yourself forecasting, and computer propagation programs. Copies can be obtained from *CQ* by calling 1-800-853-9797 ($19.95 plus $4.00 s/h).

Experience from the past 48 contest years has shown that DX contests are excellent periods in which to test the accuracy of prediction and forecast methods used in this column. Contests generate a large amount of activity in every corner of the world and on all HF bands. Previous results and observations have helped considerably in improving the accuracy of this column. Comments concerning the 1999 contest and the accuracy of these forecasts and predictions would be appreciated, and should be sent to W3ASK, at P.O. Box 1714, Silver Spring, MD 20915, or e-mail to <george@gjainc.com>.

I would like to dedicate this special WW DX Contest column to the memory of the late Alan M. Dorhoffer, K2EEK. He was a fellow radio amateur, a fellow editor of *CQ*, and most important, a friend, and one heck of a guy. He will be sadly missed.

73, George, W3ASK

Ham Shop

Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are $1.00 per word. Boldface words are $1.50 each (specify which words). Minimum charge $2.00. No ad will be printed unless accompanied by full remittance. All ads must be typewritten double-spaced.

Closing Date: The 10th day in the third month preceding date of publication (example: Jan. 10th for the March issue). Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of *CQ* cannot vouch for the merchandise listed therein. The publisher reserves the right to reject any advertisement. Direct all correspondence and ad copy to: CQ Ham Shop, 25 Newbridge Road, Hicksville, NY 11801.

CB-TO-10M CONVERSIONS: Frequency modifications, FM, books, plans, kits, high-performance CB accessories. Catalog $3. CBCI, Box 1898A, Monterey, CA 93942. <www.cbcintl.com>

FOREIGN AIRMAIL POSTAGE for successful QSLing! Many countries, monthly bargains, plus **EUROPEAN NESTING AIRMAIL ENVELOPES!** We offer **QSLs, EYEBALL CARDS, QSL ALBUMS, Wall Hangers.** Bill Plum, 12 Glenn Road, Flemington, NJ 08822-3322 (weekdays: 908-788-1020; fax: 908-782-2612).

QSLs FOR DX STATIONS: Our new "International Division" was established to handle QSL needs of DX hams. We understand the problems of packaging, shipping, and dealing with the customs problems. You can trust us to deliver a quality QSL, usually much cheaper than you can find locally. Write, call, or FAX for free samples and ordering information. "The QSL Man—W4MPY," 682 Mount Pleasant Road, Monetta, SC 29105 USA. Phone or FAX 803-685-7117.

LEARN CODE BY HYPNOSIS: http://www.qth.com/cweasy/ or 1-800-425-2552.

TOWER HARDWARE, SAFETY EQUIPMENT, weatherproofing, T-shirts, and **MORE**. Champion Radio Products, telephone 888-883-3104, or <www.championradio.com>.

ALUMINUM CHASSIS-CABINET KITS, UHF and VHF Antenna Parts. K3IWK, 5120 Harmony Grove Road, Dover, PA 17315-3016.

AMERICAN HAM GEAR manufactured between 1930 & 1980 needed to illustrate *CQ* book and calendar projects. Photography can be done at your location. Contact Joe Veras, N4QB, P.O. Box 1041, Birmingham, AL 35201. Tel: 205-967-2384 days, 205-967-0639 evenings and weekends.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

HALLICRAFTERS Service Manuals. Amateur and SWL Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

FREE IBM DISK CATALOG! Ham Radio, Shareware, and CD-ROMs. MOM 'N POP'S SOFTWARE, P.O. Box 15003-HE, Springhill, FL 34609-0111 (phone 1-352-688-9108; e-mail: <momnpop@gate.net>).

B&B WITH A HAM! Enjoy hamming from Hawaii. Join those who have chased DX from beautiful upcountry Maui! (Non-smokers only, thanks.) "SEA Q MAUI," call 808-572-7914; <kh6sq@seaqmaui.com> <http://www.seaqmaui.com>.

FREE Ham Gospel Tracts, SASE. KW3A, 265 West Ave., Springfield, PA 19064.

NEW CD-ROM release for 1999, for the PC with the PicturePacket (LITE) program ready to install on your Windows 95, 98, or NT based PC. The CD also contains many of K4ABT's articles, PacketRadio Handbooks, and hundreds of TNC to transceiver drawings, transceiver modifications (both 9600 baud and some commercial radio conversions), TNC to node conversions, and text file radio modifications. Some documents are in MSWord format. Here is a library of files and drawings from 15 years of the "Packet User's Notebook." Most drawings are in GIF and JPG formats. All orders are shipped PRIORITY, FIRST-CLASS MAIL within 24 hours of received order. Send check or MO ($20.00 US) payable to Buck Rogers, K4ABT, 115 Luenburg Drive, Evington, VA 24550.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $19.50 annually to new subscribers! Money-back guarantee! FREE sample for S.A.S.E. (two stamps). W5YI, P.O. Box 565101, Dallas, Texas 75356.

ANTENNA HARDWARE – S.S. "U" bolts, Aluminum Saddles, Element and Boom Plates, S.S. Hose Clamps. Write for list to HARBACH ELECTRONICS – WA4DRU, 2318 S. Country Club Road, Melbourne, FL 32901-5809 (http://www.harbach.com).

SX88 Hallicrafters receiver wanted. Jim, W6OU, 714-528-5652.

WORK RARE CW DX? CW CONTESTS? Contest Code is the answer. Powerful hypnosis audio tapes teach you to copy High Speed (30/40 WPM) or Ultra High Speed (50/60 WPM). Subliminals speed you along! 20 min/day for 30 days yields results. Each tape $15.95 ppd US. $3.00 shipping/handling. Specify 30/40 or 50/60 tape. Amex/VISA/ MC Order now! Call 1-800-425-2552, Alternative Arts.

TRYLON SELF-SUPPORTING TOWERS: Steel towers available up to 96 ft. Terrific value and reliability. The popular T-500 72-footer will take 45 square feet of antennas at 70 mph and is only $1825.00. <www.championradio.com> or 888-833-3104 for more info.

PICTURE QSL CARDS of your shack, etc., from your photo or black-ink artwork. 500 $30.00, 1000 $44.50. Also non-picture cards. Custom-printed cards, send specifications for estimate. Send 2 stamps for illustrated literature. Generous sample kit $2.00, half pound of samples $3.00. **RAUM'S**, 8617 Orchard Road, Coopersburg, PA 18036. FAX or phone 215-679-7238.

FOR SALE: CQ/Ham Radio/QST/73 magazines and binders. SASE brings data sheet. W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

FREE HAM RADIO GOSPEL TRACTS: Christian youth leaders needed for out-reach areas. Membership is free. Send #10 SASE with call letters for details. Ray Bohmer, W1REZ, P.O. Box 8, Harmony, ME 04942.

P49V's ARUBA COTTAGE FOR RENT with 2 bedrooms, rig, and antennas. For info write Carl Cook, 2191 Empire Ave., Brentwood, CA 94513.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 1:00–3:00 PM Eastern. Sr. Noreen Perelli, KE2LT, 2755 Woodhull Ave., Bronx, NY 10469.

WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear—new, old, in any condition—to the Radio Club of Junior High School 22, the Nation's only full time non-profit organization working to get Ham Radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 18th year of service. It is always easier to donate and usually more financially rewarding, BUT MOST IMPORTANT your gift will mean a whole new world of educational opportunity for children nationwide. Radios you can write off; kids you can't. Make 1999 the year to help a child and yourself. Write, phone, or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Twenty-four hours call 516-674-4072; fax 516-674-9600; or e-mail <wb2jkj@juno. com>. Join us on the WB2JKJ Classroom Net, 7.238 MHz, 1200–1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC.

FOR SALE: **Transmission Line Transformers** (Baluns and Ununs). Due to QTH downsizing, I have to dispose of the many transformers used in my study of these broadband and highly efficient matching transformers. A suggested price is $20, covering labor, packaging, and shipping. Oldest transformers will be shipped first. They will include a short personal note on the particular experiment. Please, no special requests.Most transformers are uncased. Jerry Sevick, W2FMI, 32 Granville Way, Basking Ridge, NJ 07920 (908-766-6122). **Note:** These are one of a kind, for experimental use only.

VISIT THE "K8CX HAM GALLERY" at <http://paradox2010.com/ham/>, the largest Ham site on the Internet!

THE 59(9) DX REPORT: Weekly DX and Contest bulletin. SASE for sample. P.O. Box 73, Spring Brook, NY 14140.

ASTRON Power Supply, brand new w/warranty, RS20M $99, RS35M $145, RS50M $209, RS70M $249. Call for other models, AVT 626-286-0118 <www.aventrade.com>.

ATTENTION SB-200 & SB-220 OWNERS: Restore and up-grade your tired old amplifier with our parts and kits. Power supply boards, soft keys, soft starts, new fans & motors, many more items. Write for details—**Please specify the model**. Harbach Electronics—WA4DRU, 2318 S. Country Club Rd., Melbourne, FL 32901-5809 (http://www.harbach.com).

W7FG Vintage Manuals and Ladder Line: Most manuals in stock. SASE for Catalog. 600 Ohm Ladder Line. VISA/MASTERCARD accepted. **402731 W. 2155 Dr.**, Bartlesville, OK 74006 (telephone 918-333-3754 or 800-807-6146; website **http://www.w7fg.com**).

Advertiser's Index

(continued on page 99)

TRIBANDER COMPARISON REPORT: Find out the real lowdown on HF antenna performance. K7LXC and NØAX test the KT34XA, TH7, TH11, C-3, Skyhawk, and more. Over 60 pages. $15 plus $3.00 s/h. <www.championradio.com> or 888-833-3104.

PACKET RADIO AND MORE! Join TAPR, connect with the largest amateur radio digital group in the U.S. Creators of the TNC-2 standard, now working on Spread Spectrum technology. Benefits: newsletter, software, discount on kits and publications. $20/year US/Can/Mex; $25 elsewhere. Visa/MC. When joining, mention *CQ* and receive TAPR's Packet Radio: What? Why? How? ($12 value) FREE! Internet: tapr@tapr.org Web: <http://www.tapr.org> Phone: 817-383-0000 Address: 8987-309 E Tanque Verde Road, #337, Tucson, AZ 85749-9399.

PHASED ARRAY NETWORKS by COMTEK SYSTEMS deliver gain and front to back. Call 704-542-4808; fax 704-542-9652. COMTEK SYSTEMS, P.O. Box 470565, Charlotte, NC 28247.

QSL CARDS Many styles. Top quality. Order Risk Free. Plastic cardholders, T-shirts, Personalized caps, mugs, shirts. Other ham shack extras. Information and samples: **Rusprint 1-800-962-5783; 913-491-6689; or fax 913-491-3732.**

FREE GUIDE "THE TEN MOST COMMON TOWER BUILDING MISTAKES": Written by well-known tower expert Steve Morris, K7LXC, this guide will help you avoid dangerous mistakes. TOWER TECH, Box 572, Woodinville, WA 98072; e-mail <UpTheTower@aol.com> or call 800-TOWERS8 or on the web: <www.championradio.com>.

VP5 – Be DX: Newly constructed 2BR/2BA villa with rig and antennas overlooking north coast of beautiful Middle Caicos. Telephone 904-282-0158, or e-mail <islands@southeast.net>.

OVER 2500 DIFFERENT DX AWARDS from 122 DXCC countries listed. K1BV DX Awards Directory. Put your QSLs to work for you! $21 postpaid. Ted Melinosky, 65 Glebe Road, Spofford, NH 03462-4411. <http://top.monad.net/~k1bv>.

HEARD ISLAND commemorative T-shirts, same shirt as team is wearing on QSL card. Proceeds benefit VKØIR DXpedition. Personal checks on U.S. banks okay. Please no credit cards. Sizes remaining: large, extra-large. 100% cotton, U.S. made. $20 Priority Mail stateside, $25 DX Air Mail, postage included. Tom Anderson, WW5L, 3505 Cliffwood Drive, Bedford, Texas 76021-2043 (phone 817-498-2820; e-mail <WW5L@gte.net>).

RAINBOW AMATEUR RADIO Association, the gay/lesbian club. Active HF nets, newsletter, uncensored listserv, web page: <www.rara.org>. Privacy respected. E-mail: <rara@en.com> or Dept. A, P.O. Box 191, Chesterland, OH 44026-0191.

RF TRANSISTORS & TUBES: SD1446, 2SC1969, MRF454, MRF455, MRF422, 2SC2290, 2SB754, 2SC2312, 2SC2166, SAV17, MRF448, MRF151G, 3-500ZG, 3CX3000A7, 3CX400A7/8874, 4CX250B, 572B. WESTGATE 800-213-4563.

Join the LAMBDA AMATEUR RADIO CLUB (LARC) since 1975, the only open and visible public-service oriented ham club for gay and lesbian hams. Monthly newsletter, HF skeds, internet listserv and IRC, hamfest meetings, chapters, DXpeditions. Write LARC, P.O. Box 56069, Philadelphia, PA 19130-6069 or e-mail <lambda-arc@geocities.com>; <http://www.geocities.com/WestHollywood/1686>.

KK7TV COMMUNICATIONS: *See our display ad.*

QSLs & RUBBER STAMPS – Top Quality! Free Ebbert QSLPAK, D-2, P.O. Box 103, Prospecy, OH 43342.

GREAT CIRCLE MAPS computer generated for your exact QTH, $20 ppd worldwide. Printouts $12 ppd. SASE for info. Bill Johnston, K5ZI, Box 640, Organ, NM 88052 (505-382-7804).

MACINTOSH MULTIMODE SOFTWARE: CW/RTTY/SSTV/FAX/ACARS/PSK31/Hellschreiber and more, without any additional hardware, on your PPC Mac. Download functional demo from <http://www.blackcatsystems.com> or send $3 P&H for disk. Chris Smolinski, N3JLY, 4708 Trail Court, Westminster, MD 21158.

TUBES, USED: $2.00 each tested. Winton Radford, 1408 Second Rd., Baltimore, MD 21220.

19" RACKMOUNT PC CHASSIS <www.cti-texas.com>.

INTERESTED IN VIEWING the Earth from space? Subscribe to Weather Satellite Report. Since 1992 the international quarterly of Earth and atmospheric imagery. Woodhouse Communication, telephone 616-226-8873; fax 616-226-9073; e-mail <www.view2earth.com>.

SOVIET HAND CW KEYS, Svetlana tubes, and old radios for sale. Tony e-mail: <tony@megastyle.com>; site: <http://cq.hypermart.net>.

WANTED: (1) Vibroplex Deluxe Semiautomatic keyer in WW II battleship gray. (2) J-36 military keys by Vibroplex, Bunnell, Lionel, etc. (3) Coast Guard, Navy RM, or MM Radio Officer's speed key in carrying case—for private collection by senior Coast Guard officer. Also other straight keys/bugs/keyers with naval history and incomplete/broken bugs for restoration parts. <wb4rhb@arrl.net>

TESLA. WIZARD by Marc Seifer. Citadel Press. Definitive biography. "AN IMPORTANT BOOK," Newsday. **<www.netsense.net/tesla>**

WANTED: McMurdo-Silver 802 HF ham receiver, circa 1948. <jmiller@Basit.com>, 914-644-2603. Jim Miller, 32 Garretson Road, White Plains, NY 10604.

WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210.

CALLSIGN BRASS BUCKLES and Custom Ham Products. <www.TheMaineStore.com>

LIKE-NEW COPIES OF CQ December 1964 through March 1979; 73 November 1963 through December 1978; QST November 1963 through December 1978; HAM March 1968 through July 1979 available. Cost $2.00 per copy plus shipping. W.L. Brown, Box 541, Sullivan's Island, SC 29482 (843-883-3574).

RADIOAMADORES BRASILEIROS, compre ICOM, Kenwood no Brasil. Tel/Fax: +19-875-6174 ou <www.bestway.com.br/radiohaus>.

The famous copper **J-POLE** antenna for 2 meters. KF6TSS 5/8 wave version. $29.95. <http://home.earthlink.net/~drduggee/jpole.htm> or toll-free 1-888-881-5670.

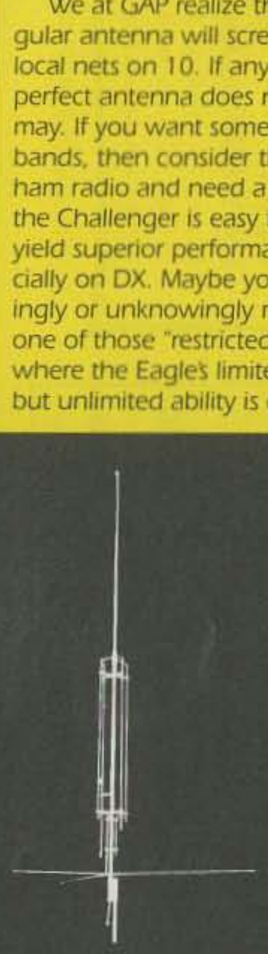
KENWOOD TS520S $350, TS530S $475, TS-830S $500. Yaesu FT901DM $500. K1BW, 413-538-7861.

Advertiser's Index *(cont'd)*

It's easy to advertise in CQ.
Let me know what I can do to help.
Arnie Sposato, N2IQO
(516) 681-2922 or FAX (516) 681-2926
e-mail:arniecq@aol.com

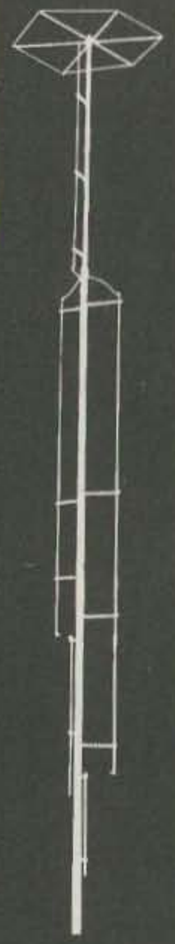
GAP: THE PERFECT ANTENNA

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Eagle DX

Challenger DX



Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

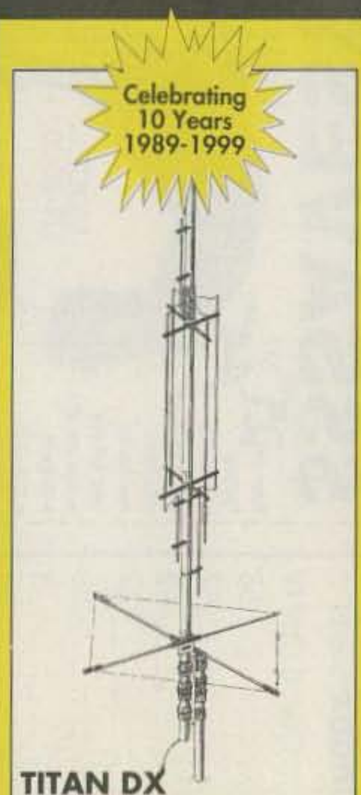
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

Celebrating 10 Years 1989-1999



TITAN DX

This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$279
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$289
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$319
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

GAP®

ANTENNA PRODUCTS INC.

99 N. Willow Street
Fellsmere, FL 32948

TO ORDER, CALL

(561) 571-9922

Come Visit Us At **gapantenna.com**

MasterCard VISA DISCOVER COD

MICRO MOBILE FT-90R

WORLD'S SMALLEST HIGH-POWER DUAL-BAND MOBILE!

Another Engineering Breakthrough from Yaesu : the FT-90R! Big Power, Big Performance, Micro-Miniature Size!

Actual Size

Features

- Frequency Coverage:
  RX : 100~230 MHz, 300~530 MHz,
  810~999.975 MHz (Cellular Blocked)
  TX : 144-146 MHz or 144-148 MHz (144 MHz)
  430-440 MHz or 430-450 MHz (430 MHz)
- 50 Watts Power Output (430 MHz: 35W)
- Ultra Compact: 100 mm x 30 mm x 138 mm WHD (3.9" x 1.2" x 5.4")
- AM Aircraft Receive
- Built-In CTCSS/DCS Encoder/Decoders
- Selectable TX Power: HIGH (50W), MID1 (20W), MID2 (10W) and LOW (5W)
- Programmable VFO Steps: 5/10/12.5/15/20/25/50 kHz per Step
- 186 Memories with 7-Character Alpha/Numeric Labels
- Direct Keypad Frequency Entry via MH-36A6J DTMF Microphone
- Smart Search™ Automatic Memory Loading
- Programmable Front Panel/Microphone Key Functions
- Battery Voltage Meter
- Auto-Range Transponder System (ARTS™)
- TX Time-Out Timer (TOT)
- Automatic Power-Off Battery Saver (APO)
- Remote-Head Operation using Optional YSK-90 Separation Kit
- 16-Digit 8-Memory DTMF Autodialer (requires MH-36A6J Mic)
- ADMS Windows™ PC Programmable
- Automatic Repeater Shift
- 1200/9600 bps Packet Compatible
- RF-Level Squelch for Quiet Monitoring of Busy Channels
- DCS Code # Search
- Versatile Scanning Features
- Priority Channel Monitoring
- Menu for Feature Customization
- Adjustable Display Brightness and Contrast
- Aluminum Diecast Chassis with Cooling Fan

MICRO MOBILE SERIES

FT-90R

VHF/UHF Dual Band FM Transceiver

YAESU
Choice of the World's top DX'ers

For the latest news, hottest products:
Visit us on the Internet! http://www.yaesu.com

U.S. version includes MH-36A6J DTMF Microphone.

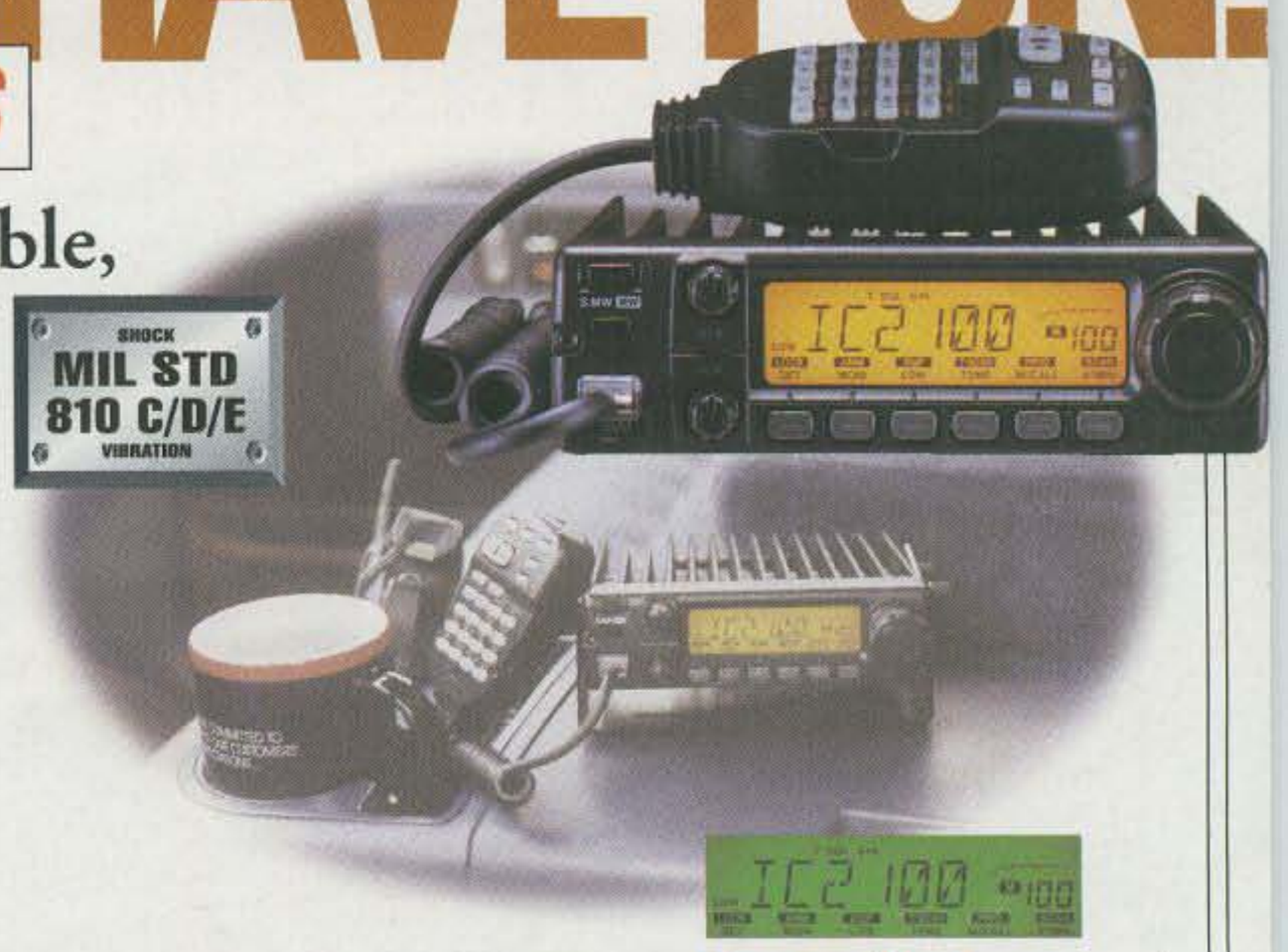
GET OUT. HAVE FUN.

ICOM MOBILES

Plenty of Power, PC Programmable, and Ready for FUN!

QST says:
"Those shopping for a wide variety of advanced features in an economically priced 2-meter mobile will find the ICOM IC-2100H worthy of serious consideration."
– QST, 1/99

IC-2100H ▶ 2 meters has never been easier or more fun! 55 watts of power; PC programmable*; 113 memory channels; die-cast aluminum chassis; full control mic; CTCSS; highly intermod resistant; and a cool DUAL color display.



GREEN OR AMBER
Select which color you want the display to show. The large alphanumerics and soft key controls are easy to see

ONLY 4.3" WIDE
The IC-207H's super compact remote head boasts a large display with soft key menu controls.*

◀ IC-207H The ultra-compact remote control* head of this 2 meter/440 MHz dual bander fits on just about any kind of dashboard. Also enjoy: CTCSS encode/decode; up to 9600 bps packet*; built-in duplexer; 182 memory channels; full control mic; auto repeater; and more.

IC-2800H ▶ Audio excellence, video excitement. 2M/440MHz dual bander with: remote control head; independent tuning & control knobs; cross band repeat; TFT color LCD display; NTSC video port; 118 - 174, 440 - 450 MHz wide band receive**; band scope; 9600 bps data port; CTCSS encode/decode; 232 memory channels; PC programmable*; die-cast aluminum chassis; full control mic; and MUCH more.

PC Ready!

*Optional equipment required. Check with your authorized ICOM dealer.

OPTIONAL WIRELESS MIC
Available for each mobile radio shown. Enjoy cable-free control and operation.

Get out and have MORE fun. Whatever your 2 meter or 440 MHz needs, ICOM has the rig for you. Contact your authorized ICOM dealer today or call for a free brochure, 24 hours a day: **425-450-6088**

ISO 9001 SQS

ICOM®

www.icomamerica.com