ICD 08241

Amateur Radio

SERVING AMATEUR RADIO SINCE 1945
OCTOBER 1998

CQ

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nd Dave, AB7VE, Amado, AZ

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THE RADIO AMATEUR'S JOURNAL

ICOM IC-746

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5-100 W variable

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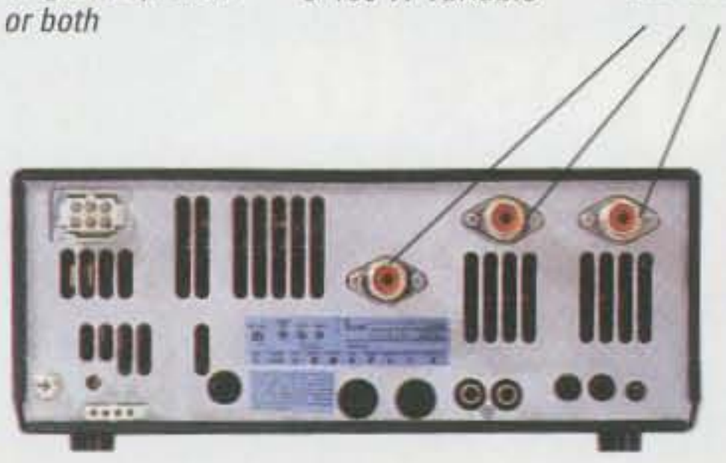

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Transmit: ..... HF/6 Meter/2 Meter, 100% Duty Cycle
Receive: ..... 30 kHz-60 MHz, 108-174 MHz Quadruple conversion superheterodyne
Mode: ..... AM, FM, FM-N, SSB, CW, RTTY
Power: ..... 5-100 Watts (2-40W, AM)
Power Supply Requirement: ... 13.8 V DC
Memory Channels: ..... 102 total, 99 regular, 2 scan edges, and 1 call
Size: ..... 11.3(W) x 4.7(H) x 12.5(D) in. 287(W) x 120(H) x 316.5(D) mm.
Weight (approx.): ..... 19 lb, 10 oz / 8.9 kg

FEATURES

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  - Noise Reduction
  - Automatic Notch Filter
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  - 2 for 9 MHz, 1 for 455 kHz
  - All Front Panel Selectable
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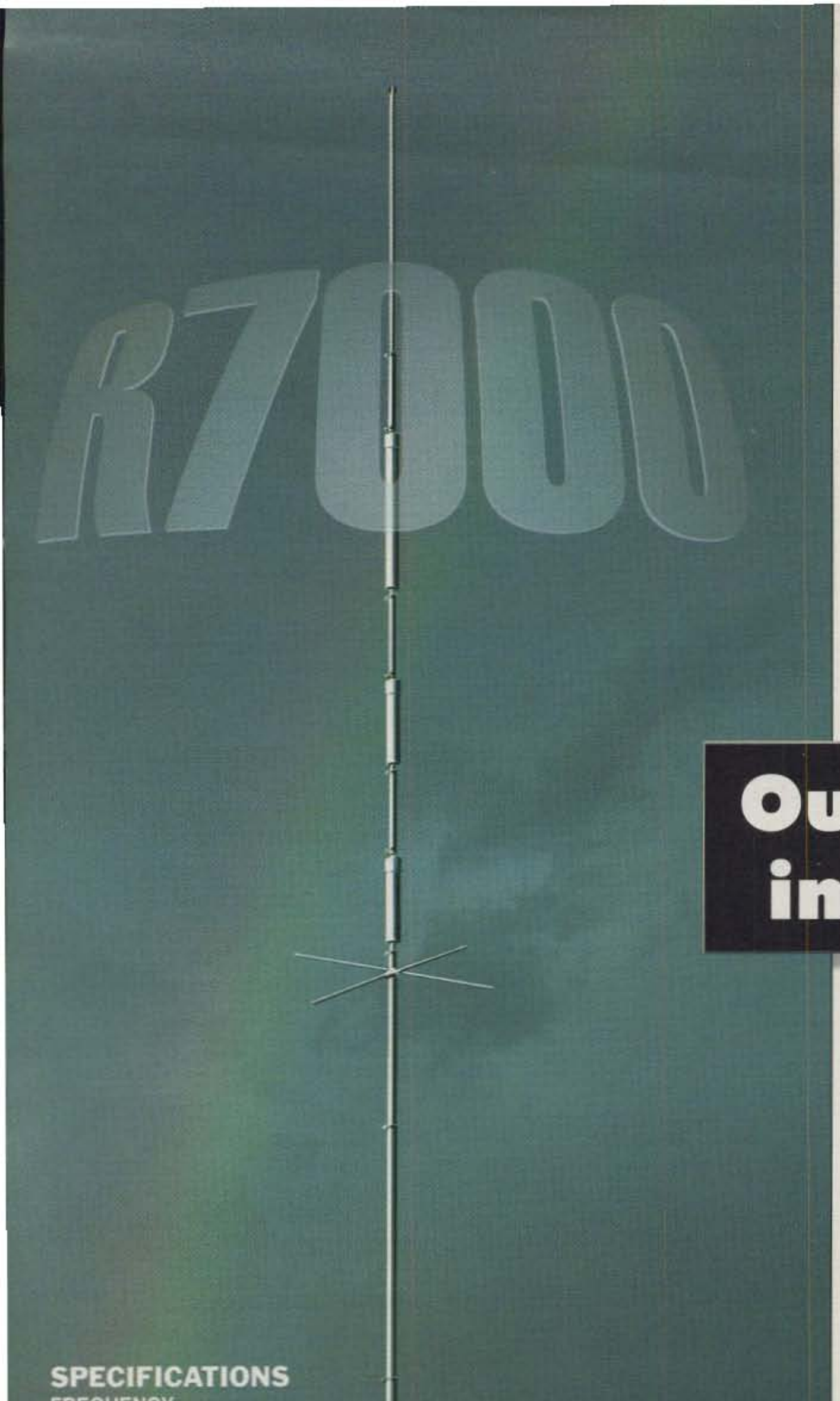

SPECIFICATIONS

FREQUENCY
10, 12, 15, 17, 20, 30, 40 M
(80 M with optional
R80 add-on)

HEIGHT
R7000 - 24 feet (7.3 M)
R7000+ (w/80m)
- 32 feet (9.8 M)

10, 12, 15, 17, 20, 30, 40 Meters

Outstanding Performance, Reliability, and Looks

The Cushcraft R7000 delivers top performance on seven bands in a package ready for home or portable use. The R7000 offers easy assembly, a small footprint, and a "stealthy" appearance in a manageable size. The R7000 is the best choice for all around HF use.

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CQ Amateur Radio

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FEATURES

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DEPARTMENTS

ON THE COVER: On The Cover: We'll often feature big-time DXers or high powered contesters on our cover, but this month it's our pleasure to feature a husband and wife team of operators who enjoy the pure pleasure of just chatting with other hams. Susan and Dave Sader of Amado, Arizona, spend the majority of their operating time on 17, 20, 160 or 2 meters. They enjoy participating in a variety of activities with the Green Valley Amateur Radio Club and Dave can often be found on various Christian nets. They're located at 4000' elevation, about 30 miles from the US-Mexican border. (Photo by Larry Mulvehill, WB2ZPI)

Shoot for the Stars

Kenwood's TS-570D/S(G) HF Transceiver incorporates an Advanced Technology Upgrade that propels your operating experience beyond the galaxy.

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Advanced Technology Upgrade

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Kenwood has not been standing still since the introduction of the TS-570D/S HF Transceiver last year. Now you can command even more of Kenwood's advanced DSP technology with the G model.

The **DSP** filters and extracts signals with digital technology that is unmatchable with standard analog circuits. It provides **CD-class transmit and receive audio quality** that can be shaped to your needs, and two powerful noise reduction systems: **Line Enhancer Method** for SSB/AM modes, and **Speech Processing by Auto Correlation** (SPAC) for CW mode. DSP also enables the **CW-Auto Tune** feature that automatically zero-beats CW signals.

The **Extensive Memory Functions** provide a bank of 100 memory positions split into 90 standard channels for general operation and 10 for programmable VFO, programmable scan and long-term memory. Memory contents can be scrolled, copied or locked out. In addition there are **5 quick memories** for storing frequencies and modes on the fly, perfect for the busy DX contester.

The powerful **Menu System** incorporates **46 menu features** and an **on-line guide** for instant reference. The **large amber backlit LCD display** provides 4 light levels for clear readability under any lighting conditions.

The TS-570D/S has no shortcomings in the construction and performance area. The **continuous-duty 100 watt transmitter** incorporates a large heavy-duty heat sink with integrated cooling fan for non-stop operation even under extreme environmental conditions. The **wide-band receiver** is rock-stable from 500 kHz through 30 MHz with **dual pre-amps** and **dual bandpass filters** for exceptional selectivity and sensitivity.

With the features and performance of a high-end radio integrated into an affordable mobile-size package, the TS-570D/S is the perfect choice for the field or to build a full station around at home.

- Beat cancel
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- CW auto tune adjust (a world's first)
- Channel scan, program band scan, memory scan with channel lock-out and group channel scan, all with TO (time operated) or CO (carrier operated) resume modes
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- Preset auto antenna tuner with 18 sub-bands
- Variable electronic keyer (0 and 100 wpm)
- Packet and FSK features
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■ TX sound quality monitor with 9-step monitor volume for absolute control over voice quality ■ NR1 (SSB) is operator controllable in 9-step increments, or automatically tracks input signal strength ■ New CW DSP Filters (80 Hz, 150 Hz and 500 Hz) give you a total of 11 user-selectable filters ■ NR1 and NR2 settings can now re-configure automatically when changing mode groups (SSB/AM/FM to CW/FSK) ■ Manual weight feature (with built-in electronic keyer) for adjusting the relative length of dots and dashes in 16 steps between 1:2.5 and 1:4.0 ■ Equalize receive signals, and use different settings for both TX and RX ■ "One-touch" DSP filter wide mode allows 'resurfacing' to check the band conditions when operating in narrow mode ■ Dual selectable Beat Cancel (BC) works against intermittent beat interference (except in CW mode) ■ CW auto tune mode links only with the RIT frequency without changing the transmit frequency.

Advance Technology Upgrade is available in new production models and for pre-existing TS-570D/S; contact you dealer for details.

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ZERO BIAS

AN EDITORIAL

Our lead article this month concerns all of us. Normally, we would have started with the CQ WW DX CW results, but due to late-breaking news, we begin with Fred Maia's "Washington Readout" column.

While many of you might have heard about these proposed changes, a number of you might not have heard, or fully understood, what's really happening. The big difference with these proposed changes is that they come in the form of an NPRM, a Notice of Proposed Rule Making, and not in the form of an NOI, Notice of Inquiry. At this stage, now, the FCC is not especially gathering information for some future changes, but they are saying that there will be changes, and these changes will be sooner rather than later. Yes, there is time built in for comments and reply comments, and amateurs are urged to make their thoughts known. At the end of the column Fred explains the comment process and how we can participate in it.

It would be ideal, nice, civil, and respectful, if we as a group could keep our comments cogent, non-inflammatory, and non-emotional, and specifically address the issues of amateur radio today and in the future. It is obvious where the government wants to go with respect to all regulation (things that cost money) and that they wish to streamline (reduce costs and overhead) procedures. It's the thing we yell and scream for at election time and rail against when it hits home.

The weekend after this came out, we were at the Huntsville Hamfest. Naturally, this was the big topic of conversation. It was amazing how many paranoid plots were described to me and how many versions there were of what would constitute the "new" amateur radio after the dust settled. Anyone's guess is a fact to hang onto as long as it's said with a straight face and a modicum of sincerity. Amateur radio, as with politics, has no shortage of self-appointed *doyens* (and *doyennes*, to be politically correct) who all seem to have secret hidden sources of information. We seem to have an underlying anxiety with regard to losing any privileges for ourselves, although we'd gladly accept more privileges during this change. In the same way, we sort of resent anyone with a lesser license gaining privileges, since they didn't take the appropriate test.

Sometimes it's quite difficult to reconcile what the ultimate good for the hobby is (that usually involves some sort of irritating change) with what will keep the rest of us complacent. To me, the hobby has changed its nature and regulations continually since the summer of 1953, when I became KN2EEK. I've seen all sorts of changes in rules and regulations, license classes, privileges taken and given, the incentive licensing fiasco, marvelous developments in new technology and modes, and an array of equipment and accessories I couldn't even begin to dream of in 1953. Nothing stays the same, and our memories of events are more selective than DSP.

On the left, Harold Ort, N2RLL, Editor of CQ's sister publication, Popular Communications, *congratulates Richard Paczkowski, KF4BIA, the 1998 Young Ham of the Year.*

One of the more pleasant aspects of the Huntsville Hamfest was the opportunity to meet Richard Paczkowski, Jr., KF4BIA, a sixteen-year-old amateur who was named "Young Ham of the Year" at this year's event. In four short years of being licensed, holding a license that many of you would not consider "real," Richard has compiled an extraordinary list of public-service accomplishments through perseverance, dedication, and an obvious willingness to serve. When you read about his organizational and leadership skills during the recent fires in Florida, when as Assistant Emergency Coordinator for Volusia County ARES he took over when the Emergency Coordinator became unavailable, what you and I would expect to see and meet is a much older person, seasoned with many years of experience and definitely holding a "real" license. Well, any older, more seasoned "real" license holder would and should be envious of this young man's record. He is what more of us should aspire to be.

Part of being named Young Ham of the Year is the recipient's being on the receiving end, instead of the giving end, for a change. It's a show of appreciation and recognition for helping to be a role model for young people and the rest of us. One of the major sponsors of the award, Yaesu, presented Richard with an FT-920, definitely to enhance his operating and amateur radio enjoyment. We at *CQ* also sponsor the winner with a week's stay at NASA Space Camp, which is located in Huntsville. When we checked with Richard prior to the hamfest about his ability to stay over for Space Camp, he decided that a better use for that particular gift would be to donate it to the Make-A-Wish Foundation to make some other young person happy. That story reached the Huntsville newspaper and local TV, and when the folks at Space Camp saw it, they made arrangements for Richard to be their guest for a week's stay. Richard's folks and the rest of us have many reasons to be extremely proud of this young man.

Now, if I can return to the FCC's NPRM for a moment, and if anyone is particularly interested in my prognostication, I'd like to offer an opinion. First, I'm one of the few who doesn't have numerous secret agents in Washington who feed me the latest of the latest of insider information. I guess what I hope to offer is common sense derived from what simply was presented. The document at first (and after several) reading appears to have been written hastily, containing errors, and authored by someone unfamiliar with amateur radio who probably was under a time constraint. Given that, I don't think it is or was any form of nefarious plot against us. What it looks like is a mix-up between a Notice of Inquiry and a Notice of Proposed Rule Making and appears as if the FCC is simply looking for useful, helpful information to make a decision.

At the moment, what looks like it makes the most sense is some form of the ARRL's proposal recently put forward. By anyone's definition, six classes of license is too many. My guess is that we could streamline that to three. I also see a reduction in the required code speeds to 5 wpm, and 8 or 10 wpm for the highest class. It simply is a slow phasing out process. Sure, some people will be unhappy and rant and rave about the good old days. Others will be happy because they get new opportunities. The concept of this change is not really an option or something that can be put off, or something to which, in effect, we can say no.

The hardest change that many of us, especially the bulk of ARRL members, have to deal with is the CW issue. It's not just here, it's worldwide, and it's happening now. For many of us, CW is very important as a mode and tradition, but it doesn't define us or describe what we do. When I thought about it at the hamfest, I thought about the young man, Richard, KF4BIA, and what we were honoring him for. Richard holds a Technician class license, and I don't really know if he ever aspires to have an Extra class license. What is evident and praiseworthy is that right now, today, he, more than any Top Gun CW Contest winner, exemplifies what amateur radio is and should be. We weren't there to laud Richard's code speed; we were there to praise his outstanding public service.

73, Alan, K2EEK

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ANNOUNCEMENTS

YLRL Anniversary Contest (YL-AP) CW 1400Z Oct. 7 to 0200Z Oct. 9; SSB 1400Z Oct. 22 to 0200Z Oct. 24. Exchange QSO number, RS(T), and ARRL section/VE province/country. All YLs within one of the US ARRL sections or within a Canadian province score one point for each QSO with another station located within a section or province. Score 2 points for each contact with a station not in an ARRL section or Canadian province. Multiply number of contact points by total number of different sections, provinces, and countries worked. If you have 200 or more QSOs, submit a separate log for each band along with a dupe sheet. Work 24 hours. Logs must show claimed score and state power output and should be sent within 30 days after the contest to: Cleo Bracket, KØJFO, 810 Towne Square Dr., Fremont, NE 68025-7000.

Pinellas Amateur Radio Emergency Services is sponsoring a free open house on Thursday, October 1 at 7 PM at the Sunstar Building, Largo, Florida. The theme of the evening is "An Introduction to Amateur Radio." Included will be guest speakers, demonstrations, and a video presentation. For more information, call 727-531-8135, or check the web site at <www.fgcarc.org/openhouse>.

• The following Special Events will take place during October:

K2BRK, from 18th annual Apple Festival, Hilton, NY, grid square FN13; Brockport ARK; Oct. 3–4, General portion of HF bands and 2m and 70 cm. For postcard, QSL, or an 8.5 × 11 certificate send SASE to John D. Hysell, KF2XC, 381 Fiesta Rd., Rochester, NY 14626-3843. For details see the BARK web site at: <www.frontiernet.net/~n2tuk>.

W2GLQ, from Nutley ARS 50th anniversary, Nutley, NJ; 1400Z Oct. 17 to 2300Z Oct. 18 on 3.940, 7.240, 21.375, 28.500 kHz ±20 kHz. For certificate send SASE to NARS, c/o Nutley Red Cross Building, 165 Chestnut St., Nutley, NJ 07110.

W2XRX, from 60th anniversary of invention of xeroography, Webster, NY; Xerox ARC; 0000–2400Z Oct. 24; SSB 7.240, 14.240, 21.250, 28.340 MHz; CW 25 kHz up from low end of corresponding General bands. For QSL or certificate send SASE and QSL to Xerox ARC, Bldg. 337 Wilson Research Center, 800 Phillips Rd., Webster, NY 14580 (or via the bureau). More info: <www.ggw.org/xarc>.

NY3EC, from the submarine *U.S.S. Requiun*, Carnegie Science center, Pittsburgh, PA; 1400–2100Z Oct. 4. The station will operate vintage CW equipment in the 40 meter Novice band and Novice portions of the 10 and 15 meters, if conditions permit. Phone operation in the General segment of 20 and 10 meters. For certificate and QSL card, send QSL and an 8½ × 11 SASE to Jack Buzon, KA3HPM, 47 Grubbs Road, Cheswick, PA 15024-9648.

AC4RC, from original radio room of battleship *USS North Carolina BB*, Wilmington, NC; Azalea Coast ARC; 10 AM to 3 PM EST Oct. 17. QSL to AC4RC, P.O. Box 4044, Wilmington, NC 28406. The club will also be hosting a JOTA Event from the Battleship Park Gazebo 10 AM to 3PM.

K4HXZ, from Devil's Courthouse, Brevard, NC; Transylvania County ARC; 1800–2359Z Halloween, Oct. 31; on 7.231, 14.295, 21.305, 28.335, and 145.52 MHz. Send large SASE to Fred Hatfield, W9MMZ, Rt. 1, Box 7, Brevard, NC 28712.

K4OZK, 25th Claybank Jamboree. Ozark, AL; 1600-2100Z Oct. 3, all bands. For certificate send SASE to Dale City Emergency Mgmt Sta., Box 817, Ozark, AL 36361.

N4M, from annual running of the Marine Corps Marathon, Washington, DC; Fauquier ARA and NCAC; 1700Z Oct. 23 to 0200Z Oct. 24, 1200Z Oct. 24 to 2200Z Oct. 24, 1200Z Oct. 25 to 2200Z Oct. 25. Four main (exact) frequencies (in MHz), within 20 kHz: 7.263, 14.255, 21.355, 28.455. For certificate send name, address, and QSL to: Fauquier ARA, P.O. Box 752, Warrenton, VA 20188.

K5WPH, Sun City ARC (DM61) 40th Anniversary Certificate Contest; 0700 to 1900 MST, Oct. 10; on 28.440 and/or 14.270. For certificate send SASE to K5WPH, 3709 Wickham Ave., El Paso, TX 79904.

K5ZRO, from AMSAT International Convention, Vicksburg, MS; Vicksburg ARC; 1300–2200Z Oct. 17; General portion of 40, 20, 17, 15, 10 meters. For QSL only: Ed Magruder, N5QDE, 2485 Warrenton Rd., Vicksburg, MS 39180-7610.

W9AA, from 65th anniversary of Hamfesters Radio Club, Chicago, IL; 1800Z Oct. 3 to 2300Z Oct. 10; on 28.410–28.500, 21.310–21.360, 14.250–14.290, 7.200–7.260, 3.00–3.950, plus CW frequencies possible. WAHM awards: inside IL 10 contacts, outside IL 5 contacts, outside US 3 contacts. Contact Dorothy Truhlar, N9ALC, 1701 W 101st St., Chicago, IL 60643.

W98ITU, from Plentipot Meeting, Minneapolis, MN; Oct. 2 through Nov. 7; all HF bands, CW, Phone, and RTTY. For QSL send SASE to W98ITU, P.O. Box 131415, St. Paul, MN 55113. DX cards will be handled directly or through the W9 bureau.

WØCXX/5, W5ROK, from Collins Collectors Assn. annual convention, Dallas, TX; Collins ARCs of Richardson, TX and Cedar Rapids, IA; 1400Z Friday through 2000Z Sunday, Oct. 15–18; 40–10 meters. For QSL send QSL and SASE to Gene Duprey, K1GD, P.O. Box 940714, Plano, TX 75094-0714.

WØFUN, Nowhere, Illinois; 1400–2100Z Oct.17 on 7.234 and 14.243 MHz. QSL with SASE to: Iowa Radiosport Society, P.O. Box 185, W. Burlington, IA 52655.

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

Oct. 3, **YCARS Hamfest**, Knights Stadium (baseball exit), Rock Hill, SC. Contact Pete Krenn, KC4ZAR, 803-366-5932; e-mail: <pete@cetlink.net>. (Exams)

Oct. 3, **Radio Amateurs of Greater Syracuse 42nd Hamfest**, Pompey Fire Department, Syracuse, NY. Contact Vivian Douglas, WA2PUU, 315-469-0590; or <www.pagesz.net/~rags>. (Exams)

Oct. 3, **1998 Mid-Atlantic States VHF Conference**, Hampton Inn, Warrington, PA. Contact John Sorter, KB3XG, 1214 N. Trooper Road, Norristown, PA 19403, e-mail: <johnkb3xg@aol.com>; or call 610-878-5674.

Oct. 4, **Annual HAMARAMA**, Bucks County Drive Inn, Warrington, PA. Contact Mark Schreiner, NK8Q, 662 Cafferty Rd., Ottsville, PA 18942, e-mail: <nk8q@amsat.org>; call 215-497-1414.

Oct. 4, **Hoosier Hills Hamfest**, Lawrence County 4-H Fairgrounds, Bedford, IN. Contact John Scheiwe, KB9LTI, RR 11 Box 1234, Bedford, IN 47421; or call 812-279-0050; e-mail: <jscheiwe@dmrtc.net>; or <http://dmrtc.net/~jscheiwe/hamfest.html>. (Exams)

Oct. 4, **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. 9–11, **1998 Region One USAF MARS Conference**, Lenox Inn, Reynoldsburg, OH. Con-

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tact Jerry Lowery, AFA1XZ, 2142 Belltree Dr., Reynoldsburg, OH 43068-3506 (614-866-8341 home; 614-692-6300 work).

Oct. 10, **Augusta Hamfest**, Evans Middle School, Evans, GA. Contact Frank at <ks4oc@bellsouth.net>; or Terry, KE4MHN, 706-796-7635; or write to: P.O. Box 3072, Augusta, GA 30914.

Oct. 10, **Bergen ARA Fall Hamfest**, Fairleigh Dickinson University, Teaneck, NJ. Call Jim Joyce, K2ZO, 201-664-6725 (before 10PM). (Exams)

Oct. 10, **North Kitsap ARC Hamfest**, President's Hall, Kitsap County Fairgrounds, Bremerton, WA. Contact Susan Johnson, AB7MD, P.O. Box 1226, Poulsbo, WA 98370, packet <AB7MD@N7WE.#WWA.USA.NOAM>; e-mail: <sujohnso@linknet.kitsap.lib.wa.us>.

Oct. 10–11, **Egypt Temple ARA Hamfest & Computer Show**, Unit Building, Tampa, FL. Contact J. F. Strom, K9BSL, 813-822-9107, or write to: 233 34th Ave. N., St. Petersburg, FL 33704-2241.

Oct. 10–11, **38th Memfest & Computer Show**, 2585 N. Hollywood at I-240, Memphis, TN. Contact Lee Bowers, KA4KVW, 901-867-3461, or Ben Troughton, KU4AW, 901-372-8031. (Exams)

Oct. 11, **Maysville Hamfest**, Community Center, Maysville, NC. Contact Jo Ann Taylor, WD4JYR, 252-393-2120. (No exams this year.)

Oct. 11, **LCDRA & CMARC HamFair**, Ingham County Fairgrounds, Mason, MI. Contact Don Tillitson, WB8NUS, 517-321-2004, or LCDRA, P.O. Box 80106, Lansing, MI 48908. (Handicapped accessible.)

Oct. 11, **Lima Hamfest & Computer Show**, Allen County Fairgrounds, Lima, OH. Contact the info phone 419-647-6321 or 419-358-7376 (before 9PM).

Oct. 16–18, **16th AMSAT Space Symposium and Annual Meeting**, Vicksburg, MS.Contact thei web site: <http://pages.prodigy.com/DXHF93A>. It is also accessible via the AMSAT www page.

Oct. 17, **Old Pueblo RC Swapmeet**, De Anza Drive-In Theater, Tucson, AZ. Contact George Lynch, KA1TY, P.O. Box 42601, Tucson, AZ 85733 (include e-mail address).

Oct. 17, **14th Annual Tri-Cities Hamfest**, Appalachian Fairgrounds, Gray, TN. Write to P.O. Box 3682 CRS, Johnson City, TN 37602.

Oct. 18, **RH Hill ARC Hamfest**, Sellersville Fire House, Sellersville, PA. Call Linda Erdman, 215-679-5764; web: <http://www.rfhill.ampr.org>. (Exams)

Oct. 18, **16th Annual Kalamazoo Hamfest**, Kalamazoo County Fairgrounds, Kalamazoo, MI. Send SASE to Gary Hazelton, N8GH, 75075 M-40, Lawton, MI 49065; web: <www.net-link.net/wmat>.

Oct. 18, **Tailgate Electronics, Computer & Amateur Radio Fleamarket**, Albany & Main St., Cambridge, MA. Call 617-253-3776. (Handicapped accessible.)

Oct. 18, **Foothills ARC Hamfest**, Hose Co. No. 1, Greensburg, PA. Homepage: <http://www.geocities.com/Heartland/Acres/7896>. (Handicapped/wheelchair accessible.)

Oct. 23–25, **Texoma Hamarama**, Texoma State Lodge, Kingston, OK. See the web page: <www.qsl. net/kc5sig/hamarama/>.

Oct. 24, **Southside ARC Octoberfest '98**, Grandview Middle School (East Junior High), Grandview, MO. Contact Donna Quick, KBØYJN, 816-537-7464, e-mail: <kbØyjn@juno.com>; or Mark Sevy, KBØVWD, 816-331-8948, e-mail: <kbØvwd@juno.com>. (Exams)

Oct. 24, **4th Annual Swap-Toberfest**, ARES Convention, Polk County Fairgrounds, Rickreall, OR. Contact Bob Boswell, W7LOU, 503-623-2513; e-mail: <w7lou@goldcom.com>; to download flyer visit web: <http://www.teleport.com/~n7ifj/swaptobe.html>. (Handicapped accessible)

Oct. 24–25, **1998 Southwest International Hamfiesta**, Ysleta Independent School District's Cultural Arts Center, El Paso, TX. Contact Clay Emert, K5TRW, P.O. Box 971072, El Paso, TX, 79997 (915-859-5502; e-mail: <cemert@dzn.com>; web: <www.hamfestia@dzn.com>.

Oct. 25, **Boone-Clinton Co. ARC Hamfest**, Boone Co. Fairgrounds, Lebanon, IN. Contact K9DFK, Don Lecklitner, 765-249-2020. (Exams nearby 9–11AM.)

Oct. 25, **25th Annual Hamfiesta & Computer Show**, Marion County Fairgrounds Coliseum, Marion, OH. Contact Karen Eckard, N8KE, 614-499-3565; or Betty Krist, N5UDT, 740-387-3533 (after 5PM).

Oct. 31, **Halloween Hamfest**, Kirkwood Community Center, St. Louis, MO. Contact Steve Welton, WBØIUN, 314-638-4959; <slw@partyline.net>. (Exams)

Oct. 31, **Hamfest Chattanooga**, Camp Jordan, East Ridge, TN. Contact Louise Carter, KE4DGW, 423-821-4043.

OUR READERS SAY

Not A "Local"

Editor, *CQ:*

Concerning Jim White, K1EXE's opinion of Yankees not be called on the air ("Our Readers Say," June 1998 *CQ*), Jim, I think you are a bit confused. It's not that you are a "Yankee." It's more than likely the fact that you are not a "local." I moved to a sleepy little place (at the time) known as Gainesville (take it easy, guys/gals) from the Niceville/Ft. Walton area. The *only* reason I was *ever* called on the air was because my call was *mistaken* for that of a "local"!

Don't feel like it's because you're a "Yankee," Jim. We don't all hold it against you.

Matthew Stennett, WA4TKG-/7J6CAT/1
Tokyo (the only APRS station in Japan)

Memorable Tour of Duty

Editor, *CQ:*

I would like to make a small correction to Bill O'Quin, WB4IBZ's letter ("Our Readers Say," p. 98, June 1998 *CQ*). He was not the only licensed ham on the ice during the 1959–60 wintering-over period.

I was at Williams field when Jules, K2KGJ, landed and watched as he was transported to "town" via dog sled.

I was chief operator of KC4USV during the long night, assisted by Chief Cary and Chief Cox, among others who operated the equipment for phone patches. Chief Cary and myself made a CW contact on 20 meters with a Russian station and received word of the birth of our resident Russian's child.

I enjoyed Bill's letter. I look for articles on the Antarctic, as that was my most memorable tour of duty.

Dick Bollinger, W4PYH
Rosman, NC

W2IYX Remembered

Editor, *CQ:*

I just wanted to thank Ted Cohen, N4XX, for his enlightening article on Harvey McCoy, W2IYX, in the June 1998 issue. Over the years Harvey had many more accomplishments to his credit, but I recognize that space was limited.

Jack M. Gutzeit, W2LZX
(former President LIDXA)
Flushing, NY

July Cover Comment

Editor, CQ:

As always, your *CQ* cover pictures are quite interesting, and the July 1998 issue is no exception. However, there was one aspect of the photograph that rather disturbed me. I do not think it was a good idea to show a shack with a KW linear amplifier (the modified Heath SB-220) sitting with the external cabinet removed and the internal high-voltage elements exposed to contact. This is a very dangerous, even lethal, situation that should not have been promulgated to the amateur community, especially the newer licensees who learn from the pictures and examples we show them.

Mike Baker, W8CM
Van Alstyne, TX

Among the Best in Its Field

Editor, *CQ:*

Congratulations on a job well done. I think that *CQ* is one of the best magazines in its field. As did many amateurs, I enjoyed the article about 160 meter propagation ("The 160 Meter Band," by Cary Oler and Ted Cohen, N4XX, March and April 1998 *CQ*), and also the article "A Five-Band Cubical Quad for Cycle 23" by Steve Root, KØSR, in the June issue.

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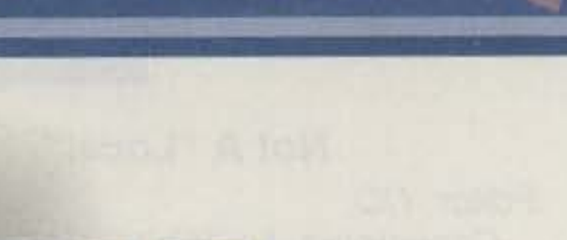

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Big things are happening in amateur radio licensing. W5YI explains what's happening, why it's happening, and how it's likely to affect us.

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

FCC Begins Proceeding to Change Amateur Service Rules

As part of their 1998 Biennial Review of unnecessary federal regulations, the FCC on August 10th released a 33-page Notice of Proposed Rulemaking (NPRM) which looks toward eliminating unnecessary rules and streamlining the Amateur Service licensing process. The review is required by the Communications Act and is completed in even-numbered years. The FCC said they " . . . believe it is appropriate to review all of our regulations relating to administering wireless services, not just those pertaining to providers of telecommunications services, to determine which regulations can be streamlined or eliminated."

The NPRM not only proposes new Part 97 rules, it asks the public to comment on several questions relating to the Amateur Service licensing and enforcement. The FCC wants to:

1. Reduce the number of license classes from 6 to 4,
2. Permit additional amateur licensees to act as volunteer examiners, and
3. Eliminate Radio Amateur Civil Emergency Service (RACES) licenses.

In addition, the Commission wants public input on:

4. Ideas to improve the Amateur Service enforcement process, and
5. Possible changes to the telegraphy requirements and the written examinations.

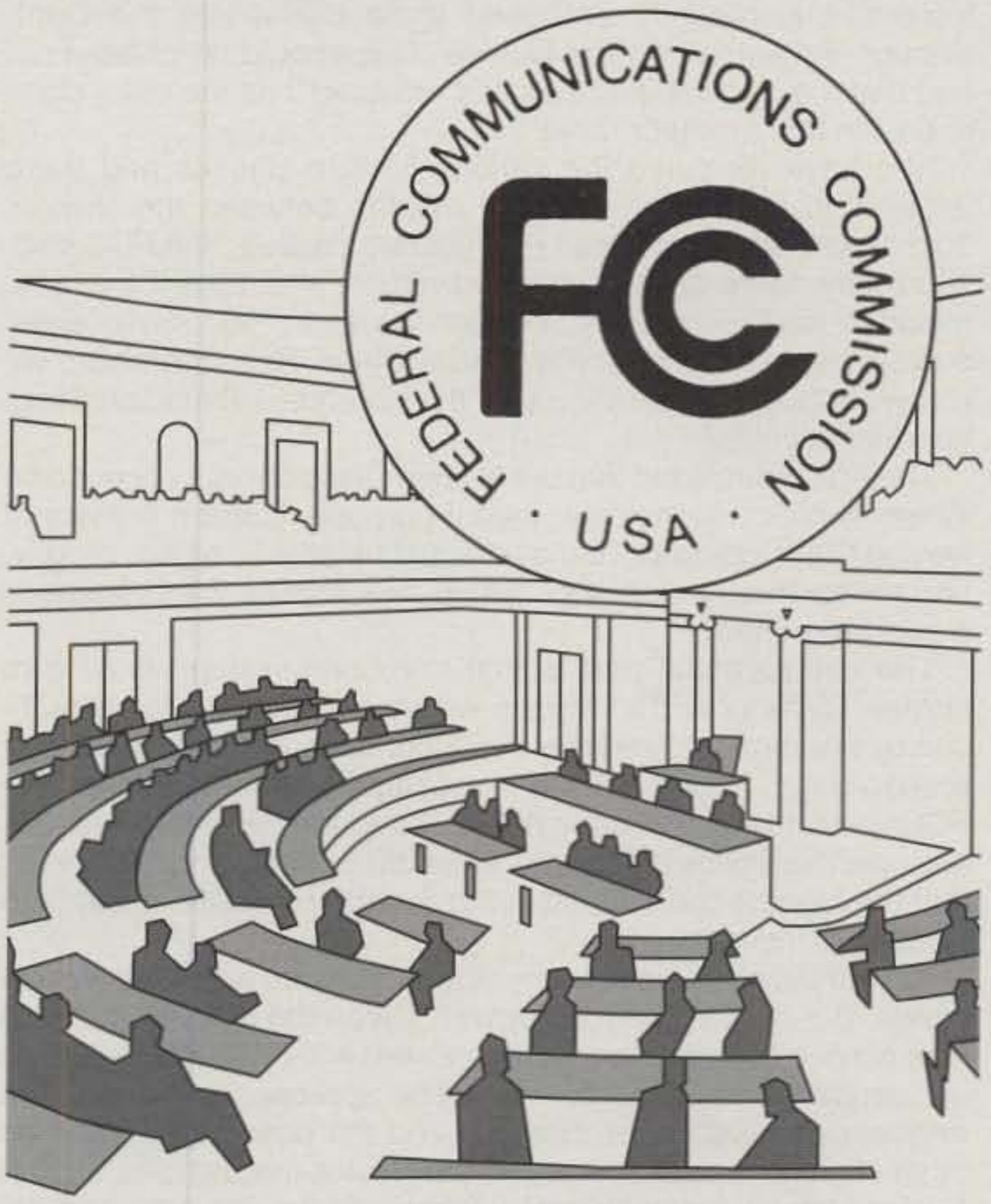
Background

There are currently six classes of amateur operator licenses. The higher the license class, the more expertise the licensee must demonstrate by examination and the greater the frequency privileges the amateur operator is authorized.

Novice Class licensees pass a slow- speed telegraphy examination and have limited frequency privileges. The Technician Class license holder may use any of 17 frequency bands above 50 MHz. Holders of the Technician Plus Class have additional privileges in four shortwave bands, between 3–30 MHz. The General Class carries privileges in all 27 amateur service bands.

The privileges of an Advanced Class license holder include 275 kHz of additional spectrum in the high-frequency (HF) bands. Amateur Extra Class licensees get even more HF frequencies—an additional 175 kHz. The license class is determined by the degree of skill and/or knowledge in operating a station that is demonstrated by the applicant during the examination.

The last major restructuring of the Amateur Radio Service Rules took place in 1989, when the FCC rules were completely rewritten to create a more meaningful and easy-to-use body of regulations. Since then, many new communication techniques have emerged, and the Commission believes this is an opportune time to add flexibility to the Amateur Radio Service Rules.



The NPRM also discusses three petitions for rulemaking filed by The American Radio Relay League, Inc. (ARRL). In RM-9148, the ARRL requests additional opportunities for VEs to prepare and administer examinations. In RM-9150, the ARRL proposes to create a private sector complaint procedure for resolving cases of malicious interference in the Amateur Service. In RM-9196, the ARRL wants changed the Morse code waiver procedures that lead to telegraphy examination credit for the handicapped.

Number of License Classes

There are six classes of operator licenses in the Amateur Radio Service: Novice, Technician, Technician Plus, General,

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443
e-mail <fmaia@internetMCI.com>)

Advanced, and Extra Class. VEs administer new examinations each time an amateur operator moves to a higher class, and the Commission must process the license transaction, modify the data base, and issue a license document. The VE system also must electronically process the new or upgraded application.

While the FCC believes there should be a number of license classes to encourage amateur operators to advance their skills, six classes of operator licenses may be too many and unnecessary.

"Reducing the number of classes of operator licenses would relieve the VEs from the tasks of preparing and administering unnecessary examinations. It would also ease the Commission's burden of providing oversight of the system and maintaining a data base of the current operator class for every amateur operator," the FCC wrote in the Notice.

In 1997, an ARRL committee recommended that the number of license classes be reduced from six to five, and more recently, the ARRL Directors voted for only four classes. No Code International recently proposed three classes to the Commission. All agree that the Novice class should be phased out and that the Technician class has replaced it as the entry class of choice into amateur radio.

"We have reviewed the various license classes and there appears to be an unnecessary overlap between the Novice, Technician, and Technician Plus license classes," the FCC said. "Currently, there are very few individuals who take the examination for the Novice Class operator license In 1997, we received only 961 applications for the Novice Class. By comparison, we received 21,416 applications for the no-code Technician Class operator license."

The FCC concluded that the Novice Class operator license no longer serves a significant, useful purpose. Current holders of Novice Class operator licenses would be able to retain, modify, and renew them indefinitely but no new Novice Class licenses would be granted.

The controversial part is that the Commission would give Novice Class operators with 5 words-per-minute Morse proficiency examination credit for the telegraphy requirement for any license class, including those which require 13 and 20 wpm. The FCC wants to know how the Amateur community feels about this and how the Novice bands should be used. Basically, this means that the highest code speed in the Amateur Service would be 5 words per minute.

"Currently, other class licensees can operate within the Novice bands, but only at reduced power. Given the small number of new Novice licenses now being issued, if we were to discontinue licensing new Novices, would it be appropriate to delete the frequency limitations on Novices and the power limitations on other classes of operators using the Novice frequencies, so that Novices would continue to be limited to 200 watts output power but could operate using the Morse code anywhere within the 80, 40, 15, and 10 meter bands?" the FCC asked.

The only difference between the Technician and Technician Plus Classes is that a Technician Plus operator has passed a five words-per-minute (wpm) telegraphy examination, while a Technician Class operator has not. Both Technician and Technician Plus Class licensees predominantly use FM voice and digital packet technologies on the amateur VHF and UHF bands. Therefore, the FCC also proposed that the Technician Plus Class also be phased out.

"Holders of an FCC-issued Technician Class operator license granted before March 21, 1987, have previously passed the written examination required to qualify for a General Class operator license. Other Technician Plus Class operators could qualify for a General Class operator license by passing written examination Element 3(B) which consists of thirty questions on the additional privileges of a General Class operator license and the 13 or 20 wpm telegraphy examination." The Commission said they wanted comments on this proposal.

Tech Plus Privileges Not Phased Out in the Rules

On the surface, it appears that the 5 words-per-minute code examination would no longer be needed or available since it is not a criterion for any of the four remaining classes (Technician, General, Advanced, and Extra) of operator license. However, that is not correct.

The appendix to the NPRM shows the new rules. But Section §97.503 (a) is not proposed to be changed! That rule provides for three telegraphy examinations—5, 13, and 20 wpm.

Furthermore, Sec. §97.505 (a)(6) still provides for element credit (and the issuance of a CSCE) when an examinee passes an examination element. Section §97.301(e) is revised to continue Novice and Technician Plus operating privileges to Novices and Technician Class operators " . . . who have received credit for proficiency in telegraphy in accordance with the international requirements."

While the FCC envisions that the Technician Plus Class would no longer exist, existing Novice HF privileges accorded Novice and Tech Plus operators—and Technician Class operators with a CSCE for Element 1A (5 wpm code)—will continue (i.e., 80 meters— 3.675–3.725 MHz; 40 meters—7.10–7.15 MHz; 15 meters—21.10–21.20 MHz, and 10 meters—28.10–28.50 MHz). In effect, a Technician holding a CSCE for 5 wpm more or less becomes a fifth class.

No new Novice or Technician Plus Class licenses would be issued (as per new Sec. §97.17(e). "Application for renewal of a Technician Plus Class operator/station license will be processed as an application for renewal of a Technician Class operator/station license" (as per new §97. 21(a)(3)). Currently held Novice licenses will be able to be renewed indefinitely.

While Novice Class operators would still be limited to 200 watts PEP transmitter power when operating on the HF bands (25 watts on 1.25 meters and 5 watts on 23 cm), other operator license classes are not so restricted (except in the 30 meter band). This is a change from the previous rules, which required all HF operators to observe the 200 watt Novice power levels.

The FCC also proposed in the NPRM to fold the Element 2 (Novice) question pools into the Element 3A pool. Passing Element 3A to qualify for the Technician license would require that 48 of 65 questions be answered correctly (see new §97.503(b)(1)).

Greater VE Opportunities

Currently, an Advanced Class operator cannot prepare or administer a telegraphy examination for an examinee for a General Class license. Only an Amateur Extra Class licensee can administer that examination. The ARRL requested in RM-9148 that the Amateur Radio Service rules be amended to permit Advanced Class operators who are VEs to prepare and administer examinations for a General Class operator license.

The FCC agreed with the ARRL that this was legal under the Communications Act and would help fulfill the need for more volunteer examiners. The FCC not only proposed to authorize Advanced Class operators to conduct examinations for the General Class, but proposed to permit General Class operators to administer examinations for the Technician Class as well.

"In all cases, examiners will be administering only elements which they themselves have received credit for. These proposals will benefit potential amateur service licensees by having additional volunteer examiners available for the examinations," the FCC said. "We seek comment on these proposals."

RACES Station Licenses

The Radio Amateur Civil Emergency Service (RACES) is a radio service using amateur stations for civil defense communications during periods of local, regional, or national civil emergencies. No new RACES station licenses have been granted since July

14, 1980, when they were discontinued to conserve Commission manpower and resources. At the time of that action, there were 611 RACES licenses. Currently, there are only 249 RACES licenses. The Commission is now proposing to phase out RACES station licenses by simply not renewing them.

"By eliminating the RACES licenses, the Commission is taking a step which not only will conserve the Commission's financial resources, but will also eliminate licensing duplication. It should be emphasized that the same emergency communications that are now transmitted by RACES stations can continue to be transmitted by primary, club, or military recreation stations."

"Our rules permit two types of stations to operate as part of RACES: (1) a licensed RACES station, and (2) any amateur station that has been properly registered with a civil defense organization (see Part 97.407). Thus, to engage in RACES communications, it is not necessary to have a RACES license with a separate and distinct call sign. We invite comments on this proposal."

Privatization of Certain Enforcement Procedures

The Communications Act provides for an Amateur Auxiliary which is composed of amateur operators who are recruited and trained by the Commission for the purpose of detecting, on a voluntary and uncompensated basis, improper radio transmissions. Advisory notices are issued by Auxiliary "Official Observer" members to persons who apparently have violated the Amateur Services Rules. Information concerning the violation is then conveyed to the Commission.

In rulemaking petition RM-9150, the ARRL stated that amateur operators in the Amateur Auxiliary could be used to a greater advantage. The ARRL suggested rule changes that would establish a private sector complaint procedure, permitting the volunteers to bring complaints of malicious interference directly to the Chief Administrative Law Judge (CALJ).

Upon receiving the complaint, the CALJ would determine whether the evidence submitted establishes a bona fide instance of malicious interference. If no such case is made, the information submitted would be returned to the volunteer observer and no further action would be taken. If the case appears legitimate, however, the matter would be assigned to an Administrative Law Judge (ALJ) for further action after an Order to Show Cause has been issued. The Wireless Telecommunications Bureau would be made a party and have responsibility for prosecuting the case. The League believes that the procedure it advocates would improve and increase the quantity and quality of enforcement of the amateur rules and also expedite the handling of malicious interference cases.

The FCC said that while it " . . . applauds the ARRL for its creative thinking about ways to improve the Commission's enforcement processes" its proposal is not legal under the law governing the role of administrative law judges. "Specifically, the assignment of duties to ALJs must be consistent with their duties and responsibilities as they relate to conducting formal hearing proceedings."

The Commission did say, however, that they do seek comment " . . . consistent with the ARRL's underlying concerns, on other ideas for improving our enforcement processes as they relate to amateur radio. One possibility, for example, would be to encourage or require persons bringing complaints of interference to the Commission to include a draft order to show cause to initiate a revocation or cease and desist hearing proceeding. We also request additional comments and suggestions on how we could better utilize the services of the Amateur Auxiliary, consistent with its statutory basis."

Telegraphy Examination Requirements

Currently, three different Morse code speed examinations are

administered by a team of three VEs to amateur operator applicants. Five words per minute is required for the Novice and Technician Plus license, 13 wpm for the General and Advanced Class, and 20 wpm for the Amateur Extra Class ticket. In a telegraphy examination, it is the VEs who determine the applicant's level of skill.

In the early days of amateur radio, radiotelegraphy was the primary communication mode of all radio operators, including amateurs. Today, radiotelegraphy is just one facet of many diverse modes of radio communication that require a technologically literate radio operator. Believing that telegraphers would be in less demand than electronics and communications experts, in 1990 the FCC established a codeless Technician Class operator license to attract technically inclined persons. Thus an entry level opportunity was created for otherwise qualified persons who found that telegraphy was a barrier to entering the amateur service.

The international Radio Regulations that apply to the Amateur Radio Service require that all amateurs licensed to operate below 30 MHz demonstrate their ability "to send correctly by hand and to receive correctly by ear, texts in Morse code signals." The Radio Regulations do not specify any particular speed.

The 1995 World Radio communications Conference (WRC-95) resolved that Article S25, which includes the international amateur code requirement, be considered at the 1999 WRC. Subsequently, this consideration was delayed to the WRC scheduled to be held in 2001.

In preparation for consideration of the code requirement at a future WRC, the ARRL surveyed amateur licensees, both members and non-members, to determine their attitudes on the Morse code requirement. Based in part on these survey results, an ARRL committee proposed to reduce the General Class code speed requirement from 13 to 10 wpm, and for all code examinations to specify one out of five minutes of copy.

The FCC said, "In view of changes in the technologies that amateurs use to communicate generally, and views with regard to the Morse code requirement specifically, we seek comment on all aspects of the Morse code standards used in our examinations. Do the three levels of 5, 13, and 20 wpm remain relevant to today's communications practices? Should we continue to have three different levels, or should these be reduced to one or two—and, if so, what should be the required speeds?"

"Were we to reduce the required Morse code elements, should we add elements to the written examination to ensure a working knowledge of the newer digital technologies which, in part, are replacing the Morse code? Or, should we consider specifying the method of examining for Morse code proficiency, such as requiring fill-in-the-blank or copying one out of five minutes sent, instead of allowing VEs to determine how to test for code speed? We request comment on these and any other issues related to our code speed requirements."

Telegraphy Waivers for The Handicapped

In RM-9196, the ARRL requested a change in the amateur rules which allow telegraphy examination credit for the higher telegraphy speeds to applicants with a certified disability. The ARRL wanted the disabled applicant to be required to attempt the higher speed telegraphy examination before examination credit is awarded as authorized by a doctor's certification. The League also wanted Volunteer Examiner Coordinators (VECs) to be required to request and review medical information about the applicant's disability from the certifying physician.

The Commission commented that " . . . these issues only remain relevant if we retain the higher telegraphy speeds requirement, since if the requirement were eliminated, a person with a disability would not have to apply for examination credit. We tentatively conclude that, if we do maintain the requirement, neither of these proposals is an appropriate means to address potential abuses of the physician certification requirement. We believe that these proposals place an unfair burden on examinees with disabilities, and raise serious privacy and confidentiality concerns. We seek comment on ARRL's proposal and our tentative conclusion."

Written Examinations

A written examination is administered to each applicant for an amateur operator license in order to demonstrate to the Commission that the applicant possesses the operational and technical qualifications required to perform properly the duties of an amateur service operator.

The written examination for each license class currently specifies ten general "subelements" (topics) and the number of questions for each topic that must be asked in an examination. A uniform national database of multiple-choice questions and answers is approved by the National Conference of VECs and is periodically updated on a regular basis so that all publishers and applicants have access to current materials. This is accomplished on a purely voluntary basis, without formal Commission involvement.

Determining the components of written examinations was carried over into the VE System from that used when the Commission handled the amateur examination program. Since the written examinations now have been prepared and administered under the VE System for over a decade, the FCC seeks comment on whether to permit additional VE and VEC flexibility in determining the make up of the written exams and the advantages and disadvantages to providing such flexibility.

In short, the FCC wants to know whether the ten general topics set forth in the rules adequately cover the information needed to become an amateur licensee. For example, does the current list of topics adequately cover current technology and contemporary amateur operating practices?

If you think some topics should be added or deleted, the FCC wants to know why. In addition, should the required number of questions from each general topic continue to be established by rule? "For those commenters who suggest altering the number of questions, we ask that they discuss alternative numbers or percentages and the reasons therefore."

The Commission said they were particularly interested in the views of VEs and VECs regarding any changes they would recommend, either individually or collectively, in the written examination requirements on the amateur community generally, as well as on the amateur examination process specifically, including how, if at all, they will affect the integrity of the examination and licensing process.

"For instance, we seek specific comment from VEs and VECs regarding how modifications to the written examination requirements would affect their ability to conduct examinations in an effective, efficient, and expeditious manner."

Comment Dates

Interested parties may file comments on or before **December 1, 1998** and reply comments on or before **January 15, 1999.** Comments may be filed using the Commission's Electronic Filing System (ECFS) or by filing paper copies.

Comments filed through the ECFS can be sent as an electronic file via the Internet to<http://www.fcc.gov/e-file/ecfs.html>. Generally, only one copy of an electronic submission must be filed.

Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, send an e-mail to <ecfs@fcc.gov>, and include the following words in the body of the message, "get form <your e-mail address>." A sample form and directions will be sent in reply.

Parties who choose to file by paper must file an original and four copies of each filing. All filings must be sent to the Commission's Secretary, Magalie Roman Salas, Office of the Secretary, Federal Communications Commission, 1919 M Street NW, Room 222, Washington, DC 20554.

73, Fred, W5YI

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Results of the 1997 CQ World-Wide DX CW Contest

BY BOB COX*, K3EST

The day finally arrived for the running of the CQ WW CW. Tens of thousands of amateurs from all over the planet were tuned into the annual CW fun festival. What DXpeditions would show up? Would the sun cooperate? Would the new rig and antenna work okay? It was going to be an exciting, fun time for all. The sun cooperated with a vengeance. The SFI was 116 (A and K = 0) until 15Z on the 29th, and after 15Z it only dropped to 112 with the K rising to 2 by the end of the contest. The bands were hopping. Ten meters presented a long-path gift at dawn from the USA east coast into zones 24 and 25.

This year's results were a high-water mark for CW logs. Over 3,250 logs were received from entrants—a big increase over 1996. It is very gratifying to see that CW is easily holding its own against SSB.

YC6PUP is an enthusiastic contester.

Single Operator High Power

José, CT1BOH, had traveled to P4 before. Sometimes he had bad luck by catching the flu just before the contest, but this time at P40E he did everything right. His rival at EA8EA operated by OH2MM was no newcomer. OH2MM had won more All Band world CW titles in the last ten years than anyone else. When the contest ended they had made 12,969 QSOs between them with only a difference of 23 QSOs to the QSO leader (OH2MM)! Jose's multiplier strategy was right on the money, and he took his 59 mult advantage to the bank to collect the world title. Congratulations, José!

Being at the western tip of Europe doesn't hurt, but you also need an expert behind the key. That expert is Andrew, GIØNWG, who pushed GIØKOW to top honors in Europe and very nearly a new European record. Second-place Europe was more of a struggle. The difference between second and sixth place was only 100K. Dave, G4BUO, pulled out all the stops in taking second place over DL6FBL.

Here in the US, it was an awed contest community after the contest ended. John, K1AR, had keyed himself to about a 3 million point lead over the second-place station! "Wow!" is all anybody could say. Operating from the ideal station and QTH of K1EA, John did more than everything right on his way to shattering the old US record by almost 2 million points. And conditions aren't even good yet. John also broke into the world top ten box (rare for the US) as number 7. Last year's number two reprised his role. Greg, W1KM, put his fabulous low band QTH to real advantage.

Single Operator Low Power

Traveling back to 3V8BB, Hrane, YT1AD, had one thing in mind: to try to set a new Low Power All Band record. The record had been set the previous year at the same station by Uli, DL2HBX. When the dust settled, Hrane had the new world record in hand. Not so far behind was Joe, AA3B, who took VP2EEB to new heights to claim a new North American Low Power record. In Europe, Tine, S50A, put aside his amp and from his countryside shack keyed his way to top honors. He was followed closely by his good friend Franc, S59AA. You can read more about their scores in *CQ Contest* magazine.

Stateside a new USA record was set by Brooke, N2BA. Not far behind was KN4T. This category continues to grow. It is very popular

E22AAA made a lot of people happy. Shown here ae E2ØHHK (left) and E2ØACU.

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

The shack of Multi-Multi NQ4I. Left to right are NQ4I, KS4Q, W1RR, and N4CM. K2UFT and K4OGG were also part of the team.

because it allows city dwellers as well as those living in restricted areas to participate.

QRP

The QRP category continues to provide a challenge for the dedicated. Running less that 5 watts can bring forth skills you did not know that you had. What is surprising is given the right conditions, 5 watts can be quite okay to attract an answer. The world top slot went to perennial QRPer Henry, AA2U. His score reflects a careful strategy of maximizing his chances. The YU presence on QRP is well known, and YT7TY took second place and number one in Europe.

Assisted

The secret to having a big Assisted score is to not be hypnotized by the packet screen. The second secret is to go somewhere where you can make lots of QSOs. Ranko, YT6A, left Europe and traveled to the sunny Caribbean, where he guest operated at FM5DN. He set a new North American record along the way to the top world Assisted score. In the USA another guest operator, Malcolm, KI1G, traveled over to Rhode Island and keyed K1NG to a new USA Assisted record. Meanwhile, over in Europe, Georgio, I2VXJ, activated his special call, IR2W, and outdistanced his German competitors led by DL2MEH.

Multi-Single

North America was well represented among the top six world multi-singles with four representatives. The leader of the pack was ZF1A. With four ops—including WRTC 1996 Champion K1TO, W5ASP, KØMK, and K9LA—they used their shortened callsign to advantage. Second place went to NW Cyprus, where a Russian team set up shop as P3A. Once again the men from Bologna put on quite a show. IQ4A, operating from their cave QTH, finished just ahead of OT7T. Each year the rivalry in Europe for Multi-Single is fierce. Obeying the distance rule and having no off-site personalized help and *still* winning must be quite satisfying to the top scorers. In the US, the crew of N2NU far outdistanced the competition to take top USA honors and to fall just short of the USA Multi-Single record. Second place went to the crew of K1ZZ. Dave's gang always does very well. It is interesting to note that two blackholers, W9JA and

TEAM CONTESTING

1. Neiger's Tigers Team #1: 43,205,232. By HC8N (N5KO), FS5PL (W2GD), P40E (CT1BOH), 9Y4H (K6NA), ZD8Z (N6TJ).

2. Contest Club Finland Team #1: 25,790,930. By 8R1K (OHØXX), CT3BX (OH1EH), DX1A (OH2PM), EA8EA (OH2MM), OH6WZ.

3. Team Nippon: 15,562,742. By 3DA5A (JM1CAX), 9M6NA (JE1JKL), JH5FXP, V8EA (JO1RUR), YN6WW (JA6WFM).

4. Yugoslavian Contest Team #1: 15,020,393. By YU7AV, 3V8BB (YT1AD), YT1AD, 4N9BW, YT7A.

5. Neiger's Tigers Team #2: 14,516,099. By YB1AQS, RKØFWL (N6AA), VK6BAT (N6ZZ), 5X1Z (SM7PKK), CT1ELP.

6. Desert Warriors Team: 13,993,941. By 9K9K, HZ1AB (SMØCXU), 7Z5OO (K3UOC), A45ZN, A45XR.

7. Contest Club Finland Team #1: 7,440,216. By OF1HS, OH6NIO, OH6RX, ZB2X (OH2KI).

8. Neiger's Tigers Team #3: 6,847,918. By N6BV/1, W2VJN/7, W7WHY, K6AW.

9. Tennessee Contest Gladiators #1: 6,315,247. By K4RO, WW4RR (N4ZZ), W4PA, W9WI, WO4O.

10. Lithuanian Team—Not High Power: 2,470,531. By LY2BM, LY2CX, LY2FE, LY2FN, LY3BA.

11. Russian Woodpeckers: 1,978,703. By UA1OMS, UA1OZ, UA1OMZ, UA1OMX, RW1ON.

12. Yugoslavian Contest Low Band Team: 1,390,994. By YU7AU, YT1BB, YU7NU, YU7CB, YU1KR.

13. Team Northern Lights: 1,328,187. By OH6MRA, OH8BQT, OF8LAE.

14. Great White North DX eh?: 1,296,599. By VE6JY (VE6WQ), VE1JF, VE6BMX, XM7A (VE7SV).

15. Yugoslavian Single Band Team: 1,067,455. By YTØT (4N1DXX), YU1AR, YZ1AU, YU1EA.

16. Tennessee Contest Gladiators #2: 41,836. By N4KN, NT4L, W4OGG.

Wes, SP4EEZ (SP4Z), up the tower with his brother placing the homebrew 6-element Yagi on the mast.

CW TROPHY WINNERS AND DONORS

Single Operator
All Band
World
P4ØE
(Opr. Jose Carlos Cardoso Nunes, CT1BOH)
Donor: Albert Kahn, K4FW
W9IOP Memorial

World Low Power
3V8BB (Opr. Hranislav Milosevic, YT1AD)
Donor: Slovenia Contest Club

World Single Operator Assisted
FM5DN (Opr. Ranko Boca, YT6A)
Donor: Snake River Contest Club

World QRPp
Henry Rand Jr, AA2U
Donor: Gene Walsh, N2AA

U.S.A
John Dorr, K1AR
Donor: Frankford Radio Club

U.S.A. Low Power
Brooke Allen, N2BA
Donor: North Coast Contesters

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

U.S.A.—Zone 4
Mike Wetzel, W9RE
Donor: Dennis O'Connor, K8DO

Canada
Augustus Thomas Samuelson, VO1MP
Donor: Canadian DX Association

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
Tine Brajnik, S5ØA
Donor: Scott Jones, N3RA & Tim Duffy, K3LR

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

Asia
Chris Dabrowski, A45XR
Donor: Chuck Shinn, W7MAP

Japan
Masaki Okano, JH4UYB
Donor: Japan Crazy Contesters Club

Oceania
VK6BAT (Opr. Phil Goetz, N6ZZ)
Donor: Peahi Contest Club

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

Single Operator, Single Band
World—28 MHz
CX5X (Opr. Jorge Diez Furest, CX6VM)
Donor: Joel Chalmers, KG6DX

World—21 MHz
ZD8Z (Opr. James Neiger, N6TJ)
Donor: Don Busick, K5AAD—N5JJ Memorial

World—14 MHz
P4ØJ (Opr. Robert Brockman, WX4G)
Donor: North Jersey DX Asociation
W2JT Memorial

World—7 MHz
C4A (Opr. Ivo Pezer, 9A3A)
Donor: Alex M. Kasevich, VP2MM/4

World—3.5 MHz
R. G. D. Stone, GW3YDX
Donor: Fred Capossela, K6SSS

World—1.8 MHz
Yuri Blanarovich. VE3BMV/1
Donor: Kenneth Byers, Jr., K4TEA

USA—28 MHz
Melvin Brafford, W4YV
Donor: CQ Magazine

USA—21 MHz
Charles Thompson, N4CT
Donor: Wayne Carroll, W4MPY

USA—14 MHz
WØUN (Opr. George Schultz Jr, WØUA)
Donor: Northern Illinois DX Association

USA—7 MHz
Larry Pace, N7DD
Donor: Jan Perkins, N6AW—W6AM Memorial

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

USA—1.8 MHz
Wallace Eckles, W8LRL
Donor: Peter Hutter, WW2Y

Canada (14 MHz)
VE6JY (Opr. Joel Weiner, VE6WQ)
Donor: Radio Amateurs of Canada

Carib./C.A. (21 MHz)
FM5DP (Opr. Durica Maletin, YU7DR)
Donor: Snake River Contest Club

Europe—28 MHz
ZB2X (Opr. Jorma Saloranta, OH2KI)
Donor: John Pryor, K4OGG

Europe—21 MHz
US1E (Opr. UT7EZ)
Donor: Robert Naumann, N5NJ

Europe—14 MHz
IR4T (Opr. Stefano Brioschi, IK2QEI)
Donor: Maud Slater—G3FXB Memorial

Europe—7 MHz
9A5Y (Opr. Sasa Pokorni, 9A3HM)
Donor: Ivo Pezer, T93A

Europe—3.5 MHz
SN3A (Opr. Czelaw Dubicki ,SP3HLM)
Donor: Frankford Radio Club—K3VW Memorial

Europe—1.8 MHz
Patrick Bittiger, TK5NN
Donor: Pat Barkey, N9RV & Terry Zivney, N4TZ

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

Japan—14 MHz
Ted Sakabe, JA7XBG
Donor: Mitsuhiro Nishimura, JA7WME

Multi-Operator, Single Transmitter
World
ZF1A (Oprs. K1TO, W5ASP, K9LA, K9MK)
Donor: Anthony Susen, W3AOH

U.S.A.
N2NU (Oprs. N2NU, K2WI, WW2Y, W2REH, N2NC, N2NL)
Donor: Douglas Zwiebel, KR2Q

Canada
VE3EJ (Oprs. VE3EJ, HA8FW, VE2ZP, VA3RU, VE3FU, VE3IY, VE3KZ, VE7CC, VE7NTT)
Donor: Eastern Canadian DX Assn.

Carib./C.A.
KP3Z (Oprs. NP4Z, KP4BZ, NP3A, KP3L, WP3A, NP3J, KP4RF, KP3P, NP3HM)
Donor: North Nevada DX Contest Club

Africa
5A2A (Oprs. DJ7IK, DL1GGT, DL2EBX, DL3KDV, DL8OBC)
Donor: CQ Magazine

Asia
P3A (Oprs. RA9JX, RA9JR, RVØAR, UN7FZ, UA9MA, UN7FK, UA9YAB, RU3AA, UA9NN, UA9LAC)
Donor: Steve Merchant, K6AW

Europe
IQ4A (Oprs. I4VEQ, I4IND, I4EAT, I4IKW, I4TJE, I4LCK, IK4EWK, IK4CZF, IK4XQH, IK4DCT, IK4MGP, IK4QJH, IK2NCJ, IK2JUB, IK2MRZ, IW4ANU)
Donor: Friends of K3AO—K3AO Memorial

Oceania
AH2R (Oprs. JF1SQC, JK3GAD, JR7OMD)
Donor: Junichi Tanaka, JH4RHF

South America
ZP9B (Oprs. PY2TI, PY5BI)
Donor: Tyler Stewart, K3MM

Multi-Operator, Multi-Transmitter
World
5V7A (Oprs. G3SXW, G3ZEM, G4FAM, GM3YTS, K5VT, K7PN, KC7V, N7BG, N7MB, W6RGG)
Donor: Doug Zwiebel, KR2Q—K2GL Memorial

World—SSB/CW Combined
KH7R: 30,186,719
Donor: Alpha/Power, Inc.

U.S.A.
KC1XX (Oprs. KC1XX, AD1C, K1ZM, K1DG, K1EA, K1GQ, KC1F, N2IC, KM3T, DL7ALM, Christine)
Donor: Bob Ferrero, W6RJ—N6RJ Memorial

Europe
OH2HE (Oprs. OH2HE, OH1JT, OH2BTI, OH2BVI, OH2BZY, OH2IW, OH2JA, OH2JTE, OH2XX, OH6CT, OH6DD, OH6EI, OH7BX, OH7JR, OH8KXK)
Donor: Finnish Amateur Radio League

Japan
JH7PKU (Oprs. JH7PKU, JA9SSY, JH7DXZ, JH7FQK, JO1BMV)
Donor: Ryozo Goto, JH3JYS

Contest Expeditions
World Single Operator
V8EA (Opr. Hajime Kato, JO1RUR)
Donor: Yankee Clipper Contest Club

World Multi-Single
5A2A (Oprs. DJ7IK, DL1GGT, DL2EBX, DL3KDV, DL8OBC)
Donor: CQ Magazine

World Multi-Multi
6Y4A (Oprs. K2KW, N6BT, N6TV, KE7X, AG9A, W9QA, W4SO, JE3MAS, JI3ERV)
Donor: Bill Schneider, K2TT

Special-Single Operator Award
World SSB/CW Combined
P4ØW/FS5PL (Opr. John Crovelli, W2GD)
Donor: Hrane Milosevic, YT1AD

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

Club
World SSB/CW
Frankford Radio Club: 366,666,652
Donor: CQ Magazine—W1WY Memorial

Non-USA SSB/CW
Rhein-Ruhr DX Association: 117,415,172
Donor: No. California Contest Club
N6AUV Memorial

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Multi-Multi

The work and planning necessary to produce a chance to finish in the top scores in this category are staggering. The dedication of hundreds of contesters to build bigger and better stations is good evidence that the art of station design is alive and well. On the pages of *CQ Contest* magazine you have read about 5V7A and 6Y4A. It is no coincidence that their results are outstanding. 5V7A, the Voodoo guys, put together another winning effort from their hotel setup in Togo. Second place went to 6Y4A. Their operation was extremely well thought out. Using verticals for the most part, their signals were really outstanding. Third place went to EA8ZS with a crew from mainland Spain.

It is rare for a US Multi-Multi to break into the world top six box. But that is exactly what KC1XX pulled off. Matt assembled a stellar crew to drain all the bands dry. Not that far behind was Tim, K3LR, with an international team. Third place went to Frank, W3LPL.

In Europe, the crown traveled to the north and landed on the head of OH2HE. Their efforts to build up a championship station have really paid off. Just over 100K behind was DFØHQ, the famous quad station. Their antennas sure do work!

Team Contesting

It was another year of continued growth with more teams than ever participating. This year 15 teams sent in lists before the contest. Averaging over 8.5 million points each, Neiger's Tigers Team #1 took top honors. The new Contest Club Finland gathered operators from all over the world to take second place, with Team Nippon third. Of the 15 members of the three top teams, 13 were DXpeditions for the contest! We all appreciate the dedication of these contesters.

As was mentioned in the SSB results, if this category gets much bigger, there could be various categories of teams: All Band, Single Band, Low Power, or Assisted. To form a team, just check out the rules in the September *CQ*. Congratulations to all the teams!

Clubs

Just how many points can a club make in a contest? Stay tuned. With the conditions improving, one-half billion is possible! This year the top three USA and top two DX clubs totaled 1.01 billion points! This represents months of planning, DXpeditions, getting everyone on the air, and finally making sure that logs are submitted on time. It's a big job. As the James Bond theme song says, "Nobody does it bette,r" and once again the Frankford Radio Club took top club world honors with a staggering 360 million points. Getting closer and closer each year is the Yankee Clipper Contest Club, who came in second in the world.

Over in Europe the friendly rivalry between the two German goliaths ended up with the Rhein-Ruhr DX Association edging out the Bavarian Contest Club. The new kids on the block, Contest Club Finland, finished a very close third.

New Records, Special Mention

WORLD: 21 MHz ZD8Z (N6TJ), LA 3V8BB (YT1AD), L21 VP5EA (WD5N), Q21 HK3/SM5CCT, A14 DL4NAC.

AFRICA: 21 MHz ZD8Z (N6TJ), 14 MHz CT3BX (OH1EH), 1.8 MHz CT3/OH1MA, LA 3V8BB (YT1AD), L21 7X2RO (OM3CGN).

ASIA: 14 MHz 9K2GS (T97M), L14 RA9AA, Q3.5 UAØQGQ, A3.5 JH1BBT.

EUROPE: L21 UA4LL, A21 DF9ZP, A14 DL4NAC.

NORTH AMERICA: LA VP2EEB, L21

6V1C operated by 6W1RE.

ZONE LEADERS SINGLE OPERATOR

Zone	Call	Score	Zone	Call	Score
1	KL7AC	940,470	21	A45XR	6,440,715
2	No Entry		22	**VU2NGB**	**133,172**
3	W6AX	3,024,213	23	**JT1BH**	**620,928**
4	W9RE	3,491,945	24	**BY4SZ**	**457,974**
5	K1AR	7,681,280	25	**JH4UYB**	**3,787,542**
6	**XE2DV**	**393,432**	26	**3W5FM**	**180,432**
7	**YN6WW**	**1,041,084**	27	**DX1S**	**4,292,160**
8	8P9Z	9,097,132	28	**V8EA**	**4,886,280**
9	P40E	12,668,701	29	**VK6BAT**	**5,034,769**
10	HC8N	10,475,365	30	**VK2AYD**	**1,311,771**
11	**ZPØZ**	**2,433,340**	31	**KH6TO**	**1,399,828**
12	CE3IDY	54,810	32	**FK8HC**	**764,218**
13	**AY1I**	**1,838,852**	33	EA8EA	11,794,880
14	GIØKOW	6,089,722	34	No Entry	
15	**4N9BW**	**3,892,152**	35	**6V1C**	**1,905,360**
16	**UT6Q**	**3,229,591**	36	ZD8Z	2,357,967
17	**UA9CDC**	**1,648,512**	37	**5X1Z**	**3,425,360**
18	**RZ9UA**	**2,303,818**	38	**3DA5A**	**4,946,766**
19	**RKØFWL**	**2,018,632**	39	**3B8/F6HMJ**	**173,664**
20	**JY9QJ**	**3,201,878**	40	**OX/OZ8AE**	**399,555**

TOP SCORES IN VERY ACTIVE ZONES

ZONE 3

W6AX	**3,024,213**
K6LA	**1,908,393**
W2VJN/7	**1,466,328**
K6ZM	**1,442,928**
***XO7X**	**1,112,756**
N6TU	**1,050,226**
N7TT	**1,032,300**
N6RV	987,374
W7SE	769,652
***W6JTI**	**763,889**

ZONE 4

W9RE	**3,491,945**
K5GN	**3,180,156**
K5YA	**2,704,156**
W4PA	**2,596,374**
KØEU	**2,421,384**
K5NA	**2,157,300**
K4AB	2,011,386
WBØO	**1,871,540**
K9MA	**1,739,814**
K9WIE	1,588,090

ZONE 5

K1AR	**7,681,280**
W1KM	**5,416,800**
K3ZO	**5,212,498**
KQ2M/1	**4,940,795**
W4AN	**4,818,683**
N6BV/1	**4,733,088**
W3BGN	**3,897,680**
K1RU	**3,548,171**
W1WEF	3,245,946
WC4E	**2,962,872**

ZONE 14

GIØKOW	**6,089,722**
G4BUO	**4,136,175**
DL6FBL	**4,088,526**
GØIVZ	3,270,960
OZ1LO	2,565,871
OZ1IOC	1,492,960
DF4SA	**1,430,208**
MJØAWR	1,246,780
DK5PD	1,215,812
DL4MCF	**1,204,347**

ZONE 15

4N9BW	**3,892,152**
S51BO	**3,660,589**
SP4Z	3,212,452
YU7AV	2,250,885
OH6RX	**2,087,940**
***S5ØA**	**2,037,464**
OH6WZ	**1,998,308**
LY3AV	**1,983,780**
***S59AA**	**1,924,320**
***HA1CW**	**1,896,450**

ZONE 16

RN6BY	**3,410,337**
UT6Q	3,229,591
UT4UZ	**2,821,250**
US1U	1,839,816
UA6LTI	1,539,522
UX1UA	1,062,480
UX4CW	919,125
UY1HY	904,791
UA1OMS	872,088
EM8I	867,588

ZONE 25

JH4UYB	**3,787,542**
JH5FXP	**3,647,600**
JH7WKQ	**2,429,616**
JA8RWU	**2,307,312**
JH7XGN	**2,127,034**
JHØFUW	**2,052,501**
JS3CTQ	**1,754,976**
JF3CCN	**1,125,237**
JA9CWJ	**1,089,842**
JH8SLS	776,340

MIRAGE ...160 Watts on 2 Meters!

Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer . . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

B-5016-G
$299
Suggested Retail

Power Curve -- typical B-5016-G output power								
Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard™*.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

RC-1B, $45, Remote Control. On/Off, preamp On/Off, selects SSB/FM. With 18-ft cable.

Draws 17-22 amps at 13.8 VDC. 12x3x5½ in.

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 watt mobile or base stations. 160 watts out for 25 watts in.

B-1016-G, $379. MIRAGE's most popular *dual purpose* HT *or* mobile/base amplifier. 160 watts out/10 W in. For 0.2-15 watt transceivers.

B-1016-G Great for ICOM IC-706!

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail

Power Curve -- typical B-310-G output power							
Watts Out	25	50	75	95	100	100+	100+
Watts In	¼	½	1	2	4	6	8

- *100 Watts out with all handhelds up to 8 watts*
- *All modes: FM, SSB, CW*
- *Great for ICOM IC-706*
- *15 dB low noise GaAsFET preamp*
- *Reverse polarity protection/SWR Protection*
- *FREE mobile bracket* • *Auto T/R switch*
- *FREE handheld BNC to B-310-G cable*
- *Ultra-compact 4¾x1¾x7¾ inches, 2½ pounds*
- *One year MIRAGE warranty*

***Boost** your 2 Meter handheld to 100 Watts!*

Ultra-compact all mode B-310-G amp is perfect for *all* handhelds up to 8 watts and multimode SSB/CW /FM 2 Meter rigs. *Great for ICOM IC-706!*

35 Watts for 2 Meter HTs

B-34-G
$89.95
Suggested Retail

Power Curve -- typical B-34-G output power								
Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	8

- *35 Watts Output on 2 Meters*
- *All modes: FM, SSB, CW*
- *18 dB GaAsFET preamp*
- *Reverse polarity protection*
- *Includes mobile bracket*
- *Auto RF sense T/R switch*
- *Custom heatsink, runs cool*
- *Works with handhelds up to 8 watts*
- *One year MIRAGE warranty*

MIRAGE RUGGED!

35 watts, FM only . . . $69.95

B-34, $69.95. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

MIRAGE RUGGED!

Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	30	40	45	45+	45+	45+	45+
Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

- *45 Watts on 2 Meters/35W on 440 MHz*
- *Auto Band Selection* • *Auto T/R switch*
- *Full Duplex Operation* • *5x1¾x5 inches*
- *FREE mobile bracket* • *"On Air" LEDs*
- *Single Connector for dual band radios and antennas*
- *Reverse polarity protection*
- *Works with all FM handhelds to 7 watts*
- *One year MIRAGE warranty*

Add this Mirage *dual band* amp and boost your handheld to a *powerful* mobile or base -- 45 watts on 2 Meters or 35 watts on 440 MHz! **Mirage's** exclusive *FullDuplexAmp™* lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation.* (Requires compatible HT).

6 Meter Amplifier

FCC Type Accepted

The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 watts out for 10 in. For 1 to 15 watt transceivers.

70cm Amplifiers (420-450 MHz)

D-3010-N, $365, -- 100 W out/30 in. For 5 to 45 watt *mobile/base*. **D-1010-N, $395**, 100 W out/10 in. *Dual purpose* -- for handhelds or mobile/base. **D-26-N, $269**, 60 W out/2 in, for *handhelds*.

Amateur TV Amps

Industry standard ATV amps -- **D-1010-ATVN, $414**, 82 watts PEP out / 10 in. **D-100-ATVN, $414**, 82 watts PEP out/2 in. (without sync compression).

Remote Control Head for Amps

RC-1, $45, remote controls most MIRAGE amps. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all modeFM/SSB/CW repeater amps for 6, 2, 1 1/4 Meters, 70cm, 450 MHz ATV.

Low noise GaAsFET preamps

KP-1

KP-2

High gain *ultra low noise* GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 160 Watts. **Choose** In-*Shack* model or *Mast-Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 watts out for 2 to 50 watts in, $129 to $655.

Commercial Amps ($199 to $395)

FCC Type Accepted

Commercial amps for 150 - 174, 450-470 MHz and VHF marine bands, 70 -130 watts out.

Accurate SWR/Wattmeters

Read SWR directly andForward/ Reverse, Peak/Average power. Remote Coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

One Year Mirage Warranty

Call your dealer for your best price!
Nearest Dealer/Free Catalog: 800-647-1800

http://www.mirageamp.com

Technical: 601-323-8287 Fax: 601-323-6551

MIRAGE
COMMUNICATIONS EQUIPMENT
300 Industrial Park Road
Starkville, MS 39759, USA

MIRAGE . . . the world's most rugged VHF/UHF amplifiers

CIRCLE 135 ON READER SERVICE CARD

TOP SCORES

WORLD

Single Operator

All Band

P4ØE 12,668,701
EA8EA 11,794,880
HC8N 10,475,365
8P9Z 9,097,132
9Y4H 9,063,469
FS5PL 8,639,730
K1AR 7,681,280
A45XR 6,440,715
8R1K 6,244,185
GIØKOW 6,089,722

28 MHz

CX5X 863,418
CX5BW 733,720
CX9BAG 527,975
KH8/N5OLS 399,872
PY2XB 397,026
9X0A 367,875

21 MHz

ZD8Z 2,357,967
ZP5XF 1,926,056
AY1I 1,838,852
FM5DP 1,045,050
9Y4VU 763,224
JA5DQH 575,952

14 MHz

P4ØJ 1,548,792
P4ØR 1,545,248
CT3BX 1,461,397
5X1T 1,243,315
9K2GS 1,242,439
5B4AGC 1,139,160

7 MHz

C4A 1,289,310
9M6NA 1,041,012
9A5Y 890,841
OK1RF 850,402
OHØMAM 763,506
JA5THU 726,033

3.5 MHz

GW3YDX 508,388
SN3A 489,402
TK5EP 364,650
SM4HCM 362,098
LY6K 314,557
W1MK 297,476

1.8 MHz

VE3BMV/1 170,400
TI1C 158,842
TK5NN 149,940
CT3/OH1MA ...144,760
UA2FJ 134,128
GW7J 122,364

Low Power

All Band

3V8BB 6,615,489
VP2EEB 5,444,340
WP2Z 3,678,426
UAØJQ 2,479,092
N2BA 2,169,720
KN4T 2,059,051
S5ØA 2,037,464
S59AA 1,924,320
FG5EY 1,750,012
K1VUT 1,656,348

28 MHz

AZ9W 685,170
LU9AUY 631,359
LW4DYI 552,288
LU2DPW 335,875
PU2RUX 316,479
LU3WEU 311,745

21 MHz

VP5EA 802,560
PU2MHB 508,896
7X2RO 382,044
LW9ETY 335,219
UA4LL 309,907
UA4POL 294,460

14 MHz

VK2APK 521,254
RA9AA 340,950
LU4FM 338,883
HA8RH 309,694
S58AL 297,024
JA7XBG 295,659

7 MHz

5B4/EU1AA 434,248
PA3AAV 328,017
T95A 234,496
OM5AW 192,194
VP5EA 188,595
CO2JD 143,699

3.5 MHz

IK4WMG 156,840
YU7CB 129,375
4L5O 122,375
YU1KR 112,765
HA8EU 107,278
YP2R 95,510

1.8 MHz

HA8BE 60,553
OM3OM 44,557
UU4JMG 37,347
HAØEQ 29,898
YU1RA 34,488
OK1JOC 26,260

QRP

All Band

AA2U 839,272
YT7TY 769,923
DL6RDR 726,396
LY3BA 617,100
WA2HZR 612,968
K3PH 507,540
K1RC 476,640
LY2FE 393,499
N7IR 386,450
DL3KVR 348,150

Assisted

All Band

FM5DN 7,215,779
K1NG 6,168,504
K3WW 5,585,568
K3MM 4,521,866
K2TW 3,961,313
K2NG 3,895,115
N3AD 3,340,500
K1AM 3,141,040
K3NZ 2,929,379
W2XX 2,867,193

Multi-Operator

Single Transmitter

ZF1A 11,971,520
P3A 11,755,121
KP3Z 10,135,725
5A2A 9,614,220
N2NU 9,139,372
6D2X 8,881,075

Multi-Operator

Multi-Transmitter

5V7A 31,971,148
6Y4A 29,752,404
EA8ZS 21,915,001
J39A 19,336,338
VE3EJ 18,437,120
KC1XX 16,680,192

USA

All Band

K1AR 7,681,280
W1KM 5,416,800
K3ZO 5,212,498
N2NT 5,207,938
N2LT 5,054,070
KQ2M/1 4,940,795
W4AN 4,818,683
N6BV/1 4,733,088
W3BGN 3,897,680
K1RU 3,548,171

28 MHz

W4YV 152,750
W4XJ 98,672
KZ5MM 80,569
NT6TT 54,400
W3NO 48,384
KØKE 47,380

21 MHz

N4CT 471,520
K9IG 441,524
K4ZA 435,587
WW4RR 393,000
W6YA 366,324
W6NL 335,064

14 MHz

WØUN 722,520
K8DX 556,160
W9IW 550,605
K9BG 414,024
N4PN 370,662
N7BZ 343,305

7 MHz

N7DD 488,160
W5UN 424,855
NX7K 375,914
K9DX 330,750
N2PP 326,808
W7GG 326,120

3.5 MHz

W1MK 297,476
WB9Z 99,232
K5NU 89,568
W8RT 81,918
W1UK 78,176
KØRF 65,439

1.8 MHz

W8LRL 20,999
K2XA 14,559
K8MK 12,408
W2VO 11,868
N6SS/7 10,058
K1VW 9,570

Low Power

All Band

N2BA 2,169,720
KN4T 2,059,051
K1VUT 1,656,348
WA1LNP 1,639,602
WA1S 1,622,464
KM1X 1,468,138
NA2U 1,341,649
W2TZ 1,145,388
WO4O 1,057,920
N8AA 949,172

28 MHz

K4WA 37,149
AI2C/4 36,576
W3EP/1 31,824
W5ZO 23,489
K9OM 14,012
N6EE 9,733

21 MHz

WB4TDH 237,020
WA1FCN 193,294
K2MFY 125,608
K2ACW/4 121,240
K5MU 117,602
K9RN/M 94,637

14 MHz

N4MO 241,251
K1NO 200,610
K7ZA 162,833
W8UMR 64,513
WØETT 57,039
WA2ASQ 34,679

7 MHz

N2TN 84,924
WØAH 75,537
KJØB 40,923
N4OT 32,969
K4LDR 30,030
W3CP 28,282

3.5 MHz

W4HM 6,120
KB3AFT 168

1.8 MHz

KG7D 4,375
W4WS 828

QRP

All Band

AA2U 839,272
WA2HZR 612,968
K3PH 507,540
K1RC 476,640
N7IR 386,450
N1TM 329,199
KG5U 187,935
W6YJ 183,975
N9CIQ 166,782
KV8S 138,067

Assisted

All Band

K1NG 6,168,504
K3WW 5,585,568
K3MM 4,521,866
K2TW 3,961,313
K2NG 3,895,115
N3AD 3,340,500
K1AM 3,141,040
K3NZ 2,929,379
W2XX 2,867,193
W3EEE 2,788,236

Multi-Operator

Single Transmitter

N2NU 9,139,372
K1ZZ 6,751,382
K8AZ 6,473,736
W4WA 4,548,258
W9JA 4,469,888
NØNI 4,459,806

Multi-Operator

Multi-Transmitter

KC1XX 16,680,192
K3LR 15,430,912
W3LPL 14,586,038
K1KI 14,480,136
N3RS 11,837,336
W1MD 9,982,868

EUROPE

All Band

GIØKOW 6,089,722
G4BUO 4,136,175
DL6FBL 4,088,526
4N9BW 3,892,152
S51BO 3,660,589
GØIVZ 3,270,960
UT6Q 3,126,126
RN6BY 2,885,145
UT4UZ 2,821,250
SP4Z 2,717,734

28 MHz

ZB2X 291,896
S53X 173,505
DK5QN 100,993
IR4D 97,626
EA2IA 92,153
OK1XW 48,888

21 MHz

US1E 506,527
CT1FJK 462,834
S50R 373,920
OM3PC 354,354
S54AA 329,586
OT7L 297,640

14 MHz

IR4T 744,040
YT7A 672,324
M7Z 551,418
YU1ZZ 494,649
F5PGP 493,334
S53M 464,725

7 MHz

9A5Y 890,841
OK1RF 850,402
OHØMAM 763,506
S52AW 741,650
S50C 716,096
TK/DF9LJ 563,030

3.5 MHz

GW3YDX 508,388
SN3A 489,402
TK5EP 364,650
SM4HCM 362,098
LY6K 314,557
SP7GIQ 284,445

1.8 MHz

TK5NN 149,940
UA2FJ 134,128
GW7J 122,364
S5ØU 106,215
SP5GRM 104,562
OY9JD 99,166

Low Power

All Band

S5ØA 2,037,464
S59AA 1,924,320
HA1CW 1,604,397
Z31JA 1,416,850
DL2OBF 1,326,214
S57DX 1,297,642
S51F 1,284,780
S57J 1,193,914
GD4UOL 1,058,742
S58MC 966,231

28 MHz

CU2/
G3WVG 172,161
SP9W 56,931
CT1AOZ 47,073
S52OT 43,296
S51W 34,335
S5ØQ 32,805

21 MHz

UA4LL 309,907
UA4POL 294,460
CT1BQH 293,624
HA3MQ 228,245
OK1FKM 173,100
Z38G 155,550

14 MHz

HA8RH 309,694
S58AL 297,024
U5WF 277,277
ES2RJ 273,812
RZ3FA 270,206
OK2PAY 252,770

7 MHz

PA3AAV 328,017
T95A 234,496
OM5AW 192,194
UT1FA 130,243
RW1ZZ 127,489
ON4AEB 116,166

3.5 MHz

IK4WMG 156,840
YU7CB 129,375
YU1KR 112,765
HA8EU 107,278
YP2R 95,510
SP5JTF 94,376

1.8 MHz

HA8BE 60,553
OM3OM 44,557
UU4JMG 37,347
HAØEQ 29,898
YU1RA 34,488
OK1JOC 26,260

QRP

All Band

YT7TY 769,923
DL6RDR 703,125
LY3BA 617,100
LY2FE 393,499
DL3KVR 348,150
OE2S 341,715
YU1LM 333,450
YU1EA 292,050
YU1KN 258,896
I1BAY 177,840

Assisted

All Band

IR2W 2,384,280
DL2MEH 2,283,147
DJ2YA 2,228,666
DL7ON 1,738,352
S58A 1,635,400
DF4RD 1,473,395
DL7MAE 1,207,584
DK9IP 1,166,592
IK5TSS 882,534
GW3JXN 873,964

Multi-Operator

Single Transmitter

IQ4A 8,660,429
OT7T 8,468,264
TM2Y 8,186,880
HG1S 7,642,128
OM8A 6,967,919
RU1A 6,942,530

Multi-Operator

Multi-Transmitter

OH2HE 12,140,675
DF0HQ 12,036,354
EA6IB 10,580,839
SL3ZV 10,498,326
TF3IRA 10,358,889
HG6N 10,295,646

KG7XC during the contest. (Photo by W7IVB)

VP5EA (WD5N), L3.5 XM7A (VE7SV); Q14 K3OO, AA FM5DN (YT6A).

USA: ALL K1AR, LA N2BA, Q14 K3OO, AA K1NG (KI1G).

OCEANIA: 7 MHz 9M6NA (JE1JKL), 1.8 MHz KH6CC, L14 VK2APK, Q21 KH6/W1VT, Q3.5 YC2OK.

SOUTH AMERICA: 21 ZP5XF (LU2BRG), L28 AZ9W (LU5UL), Q21 HK3/SM5CCT, A21 LU7EAR.

Several battles that bear special mention took place during the contest. Out in the western USA, it took a real effort to nail down first on 21 MHz in W6. Jim, W6YA, just edged out Dave, W6NL (ex-W6QHS), with K6AW (at N6RO) and N6MU not far behind. On 7 MHz in W7 four stations finished with over 1000 QSOs, with Larry, N7DD, leading the way. Over in Yugoslavia a similar rivalry occurred. YU7NU took first place over YT1BB and YT7AA.

If you really want to check out where heat was generated look at second place in the All Band High Power of W4. Seven stations led by Jeff, WC4E, broke the 2 million point barrier. They turned off their amps and went low power with a vengeance. In the first call area USA the battle was terrific for third place. Take a look at their scores. K1VUT was ahead at the bell over WA1LNP, WA1S, and KM1X.

The friendly 14 MHz rivalry between Bob, WX4G (P40J) and Bob, K4UEE (P40R) was a virtual dead heat. Congratulations to both fine operators. For top Multi-Multi honors above 60 degrees latitude the competition was tough, and when the aurora cleared up KL7Y had just edged out the fine Finnish station OH2HE. The new NA Low Power record belongs to VP2EEB (AA3B). Joe's log was *very* accurate. What a good job.

A real special mention must be made of KH7R, who had the highest combined SSB/CW Multi-Multi total in the contest. We all know that their effort was remarkable. They stuck with it and the trophy is theirs.

The long-anticipated DXpedition of a German team to activate 5A2A came off right on schedule. I imagine they were a new country and zone for thousands of the deserving. It took a lot of planning to bring about their effort. On SSB 5A1A submitted a log, and now there was the Multi-Single effort of 5A2A. Let's hope more chances occur for 5A activity.

Two Russian Multi-Op groups headed to warmer parts of Asia. The P3A group was mentioned earlier. The Multi-Single effort of 8Q7DV sure handed out a lot of the elusive zone 22 multipliers.

Special mention must be made of three new

CLUB SCORES

USA

Frankford Radio Club	360,666,652
Yankee Clipper Contest Club	296,323,389
Potomac Valley Radio Club	135,331,448
North Coast Contesters	71,646,476
Southern California Contest Club	63,201,476
Northern California Contest Club	38,745,146
Southeast Contest Club	35,595,321
Society of Midwest Contesters	34,906,592
Central Arizonia DX Association	28,732,781
Mad River Radio Club	27,739,830
North Texas Contest Club	21,731,953
Florida Contest Group	15,245,003
Southern California DX Club	14,802,986
Minnesota Wireless	14,691,580
North Florida DX Association	14,600,358
Tennessee Contest Group	12,890,801
Willamette Valley (W7)	12,212,833
Western Washington DXC	11,280,915
Texas DX Society	9,552,727
Rochester DX Association	9,267,057
Central Texas DX & Contest Club	8,989,189
Order Of Boiled Owls NY	8,347,756
Carolina DX Association	6,701,107
Kentucky Contest Group	6,439,882
Southwest Ohio DXA	6,340,185
Oklahoma Dx Association	5,404,169
Grand Mesa DX Club	5,381,721
River City Contesters	4,564,742
Mile High DX Association (WØ)	3,832,300
Southeast DX Club	3,493,434
Hoosier Contesters	3,100,356
Carolina DX Association	2,962,680
Western New York DXA	2,952,399
Eastern Iowa DX Association	2,927,536
Kansas City DX Club	2,729,716
Central Florida DX Association	2,048,640
Salt City DX Club (W2)	1,943,399
Northern Ohio DX Association	1,926,956
Mother Lode Contest & DXC (W6)	1,847,687
Northern Minnesota DX Association	1,799,927
American Red Cross EC	1,268,504
CT & RI Contest Group	1,089,088
No Dot Dxers (W9)	877,008
Metro DX Club (W9)	845,357
Northern California DX Club	817,081
Mississippi Valley DXCC	713,484
Northern Arizonia DXA	648,551
Sterling Park ARC (W4)	589,524
CA Central Coast DX Club	589,156
San Diego DX Club	567,877
Bay Area DXers (W8)	566,764
West Park Radio Ops (W8)	511,604
Valley RC of Oregon	448,890
Northern Shenandoah DXA	411,040
Great Falls ARC (W7)	403,118
Ozaukee Radio Club (W9)	378,491
Franklin Co ARC (W4)	245,661
Northrop-Grumman RC	172,084
Yegua Valley Contest Club (W5)	147,966
Roanoke Valley ARC	112,084
Downey ARC	104,823
Weekend Warriors Contest Club (W3)	66,121
South Jersey Radio Association (W2)	45,257

DX

Rhein-Ruhr DX Association	117,415,172
Bavarian Contest Club	100,424,862
Contest Club Finland	98,856,233
Russian Contest Club	64,250,564
French Contest Club	50,189,267
Marconi Contest Club (I)	49,525,800
Slovenian Contest Club	47,938,084
Araucaria DX Group	35,175,089
LYNX DX Group (EA)	35,081,467
Croatian Contest Club	28,300,977
Chiltern DX Association (G)	26,397,844
SP DX Club	23,883,031
YU Contest Club	22,747,850
Low Land Crazy Contesters (PA)	22,259,544
GPDX (CT)	21,638,374
Rosario RC (LU)	20,272,951
Kaunas University Technical College	19,015,762
Japan Crazy Contesters	17,380,502
Mt. RF (JA3)	17,263,731
HA DX Club	16,905,411
LNDX (F)	15,776,397
Sky Sat Contest Club (YU)	12,783,115
Vojvodina Contest Club (YU)	12,727,213
UA2 Contest Club	12,494,706
Lithuanian DX Group	12,481,569
Top of Europe Contesters	12,197,178
Ukrainian Contest Club	11,159,628
YU DX Club	9,946,743
Crimean Contest Club	8,443,562
Ural Contest Group (UA9)	7,673,454
Czech Contest Club	7,309,752
Lyon DX Gang (F)	7,093,526
Pretoria Contest Club	5,631,697
Taganrog Contest Club	5,617,137
TuPY (PY2)	5,545,415
OZ9EDR Club	4,649,135
Kharkov Region ARS (Ukraine)	3,973,675
Sao Paolo Contest Group	3,965,891
Far East Island DX Club	3,629,577
Bavarian DX Group	2,993,861
Danish DX Group	2,977,438
Koryazhma DX Company	2,792,782
LU4AA Club	2,450,380
Sarajevo DX Group (T9)	2,387,624
SP Contest Club	2,358,821
GADX (LU)	2,339,346
GACW (LU)	2,331,803
Z30M Contest Team	2,194,274
Radio Club Uruguay	2,137,678
SV2TSL Club	1,895,068
Fox Contest Club (YU)	1,554,303
West Island ARC (VE2)	1,487,082
Shizuoka DX Association (JA2)	1,466,799
NOL (ON)	1,223,032
Saipan ARC	1,196,429
Perugia Radio Club (I)	1,180,860
BC DX Club (VE7)	1,030,736
Southern Germany DX Group	1,019,636
Osona (EA3)	1,019,213
SN6O Club	1,007,591
CW Philippines	979,735
Susa Valley Team (I1)	913,208
Warsaw DX Club	844,906
Tallinn Radio Club	643,503
Granada (EA)	617,488
OH3NE Club	584,408
Nr. 13 (EA1)	533,059
Northern Lithuania DX Group	442,629
Globus (Ukraine)	422,030
Macedonia DX Club	323,684
Beenster Contest Club	256,277
Geo DX Group (DL)	235,193
French CQ Contest Gang	193,927
Tokyo Internationl ARA	173,597
LY CW Contest Club	148,273
Ivanovo DX Club	124,988
EA DX Club	69,801

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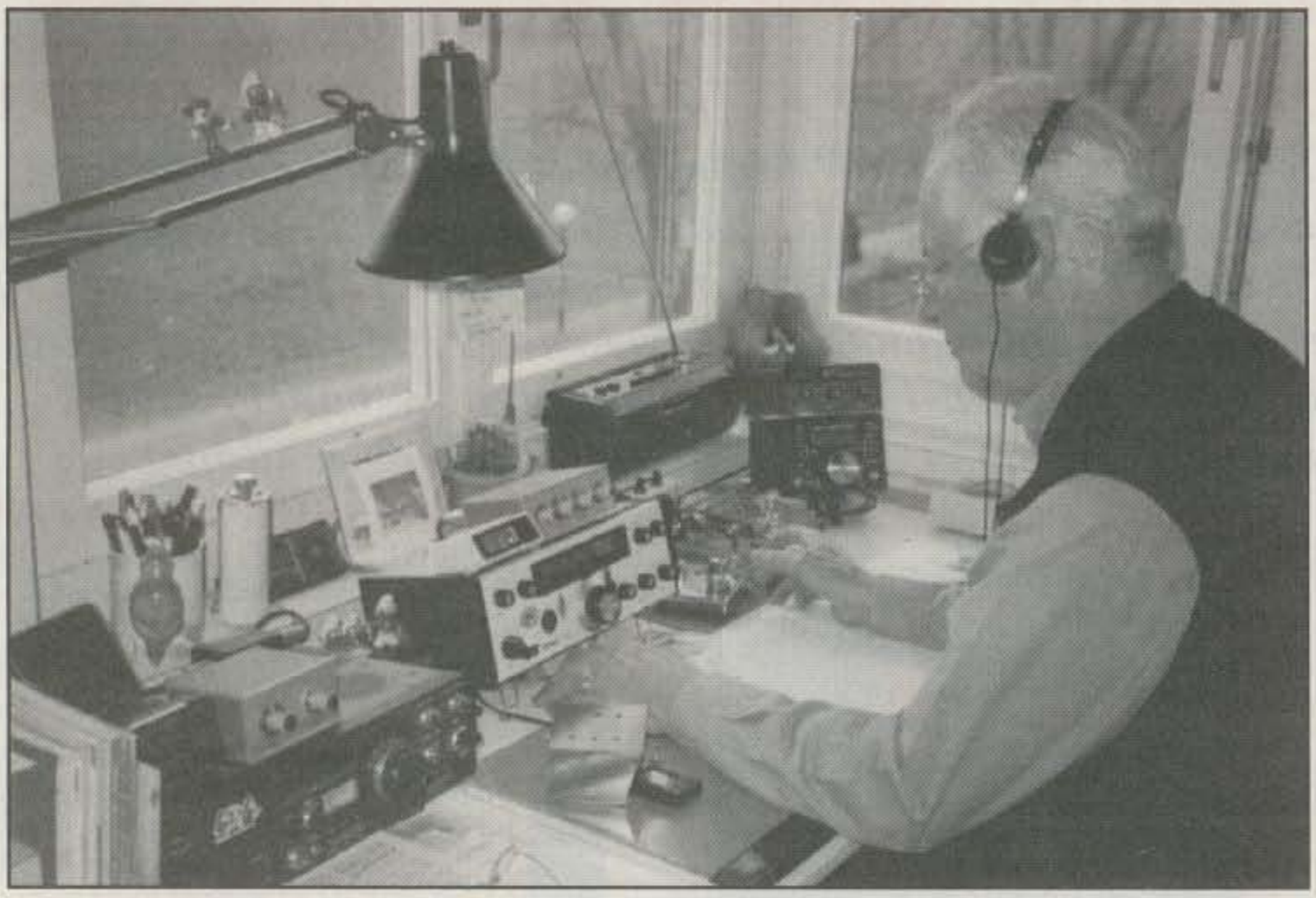


QRPer HB9XY puts another QSO in the log.

QSO records set in the contest. Jim, ZD8Z (N6TJ), made 4589 QSO on 21 MHz only! This is a new all-time single QSO total for any single band in the CQ WW CW. The Multi-Multi station 5V7A had a 20 meter QSO total of 4506 for a new 14 MHz QSO record, and the Multi-Multi 6Y4A had a 7 MHz QSO total of 3724 for a new Single Band record.

Comments

With all the modern 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. You enter a contest to have fun! 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 the skills of others. The UBN's that the CQ WW Contest Committee released about last year's contest were received with enthusiasm. Each entrant can privately review his log and other data in his/her directory on the CQ WW web site. What a great opportunity to have *fun* and increase your operating skills at the same time.

Please send us your log in electronic format. The easiest way to do this is to send your CW log to <cw@cqww.com> and your SSB log to <ssb@cqww.com>. Your log will help validate the winners, and you get something back, too. 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.

The Distance Rule

One of the unsettling parts of this job is the rumors each year we receive about some Multi-Op station that is operating in violation of the distance rule (Rule III). The rule states, "All transmitters and receivers must be located within a 500 meter diameter circle or within the property limits of the station licensee's address, whichever is greater." Some teams decide that they cannot win if they must be confined to only 500 meters. We have heard many reasons to justify this type of thinking: "We cannot afford it." We are in a city and can't find 500 meters." We find it easier to reduce interference if we locate stations 30 km apart; after all isn't everyone doing it?"

It sure makes life easier and the score bigger if 20 meters is in one city and 40 meters is in another! The multi can then even run two signals on each band. Many of these Multi-Op teams are driven by wrong information or past bad habits. The truth is that most Multi-Op entries obey the distance rule. Through their skill they have overcome station interference

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	352/16/32	778/23/79	1476/30/98	1085/30/98	1706/34/107	1076/28/76
EA8EA	112/14/44	751/22/67	1237/35/92	1473/35/92	1736/34/93	1187/27/94
HC8N	398/16/38	480/16/60	1122/28/84	878/30/84	2002/32/101	1312/26/71
9Y4H	239/13/35	396/21/66	1598/31/94	704/30/83	1355/31/87	999/30/78
FS5PL	283/11/29	726/18/71	1072/26/83	1111/33/91	1639/33/92	1341/28/78
K1AR	50/12/38	400/20/79	1238/32/105	1063/38/118	982/32/106	314/24/76
A45XR	174/7/37	354/19/60	718/27/74	779/33/97	1254/32/97	810/28/78
8R1K	97/9/17	304/13/50	1074/22/73	1031/32/89	1145/26/84	755/29/77
GIØKOW	350/14/62	824/18/75	1267/31/104	1056/30/90	942/29/94	470/19/53

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K1AR	50/12/38	400/20/79	1238/32/105	1063/38/118	982/32/106	314/24/76
W1KM	65/16/50	529/23/79	726/26/89	910/32/98	748/30/90	195/19/58
K3ZO	34/11/23	303/18/68	808/32/100	875/34/105	786/29/94	314/21/64
N2NT	49/14/29	201/17/62	1105/32/101	742/33/92	947/27/98	212/22/62
N2LT	28/11/20	238/14/62	669/34/107	804/36/107	904/29/94	335/24/77
KQ2M/1	47/13/37	246/19/69	1052/32/109	757/32/98	646/26/102	248/23/69
W4AN	32/10/20	76/19/53	839/30/95	763/35/109	1110/27/95	186/24/70
N6BV/1	44/13/33	204/13/59	815/23/86	835/34/102	863/24/91	252/21/65
W3BGN	54/13/39	150/17/58	596/30/95	704/32/91	642/24/91	281/24/73

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

ZF1A	121/16/44	568/20/76	2332/30/103	1397/38/130	2139/32/109	489/28/78
P3A	367/11/56	1223/21/89	1600/33/108	1152/35/116	1815/36/123	311/28/77
KP3Z	158/17/59	618/23/93	1780/28/102	945/37/126	1666/32/106	1015/31/91
5A2A	294/13/53	769/17/78	1530/29/95	760/33/103	1726/38/109	381/28/64
N2NU	51/17/58	198/23/91	1202/35/128	1072/38/132	1015/34/129	304/31/105
6D2X	255/14/30	517/22/70	2000/33/108	1136/37/108	1786/33/111	435/28/72

USA MULTI-OPERATOR SINGLE TRANSMITTER

N2NU	51/17/58	198/23/91	1202/35/128	1072/38/132	1015/34/129	304/31/105
K1ZZ	59/15/49	162/22/81	898/34/119	935/37/130	730/30/122	261/29/105
K8AZ	33/18/38	117/24/81	926/35/125	826/37/138	773/35/121	257/29/93
W4WA	22/14/29	107/21/69	656/34/114	512/38/121	902/33/119	134/28/82
W9JA	32/17/36	94/24/83	589/36/114	561/38/126	687/33/118	211/28/90
NØNI	59/15/30	92/21/75	777/36/109	708/38/122	632/33/117	87/26/80

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

5V7A	326/19/56	683/26/74	2805/38/120	4506/39/145	3725/38/136	1556/30/115
6Y4A	886/22/66	1908/28/95	3724/33/125	3719/40/148	3032/35/127	1501/29/88
EA8ZS	320/13/61	1066/22/81	2122/33/115	2738/37/138	2834/39/138	1068/31/101
J39A	395/14/49	1274/24/93	2381/31/109	3570/36/131	2371/33/113	1512/31/74
VE3EJ	671/17/55	1074/27/98	2382/36/132	2335/40/146	1894/34/124	820/30/93
KC1XX	175/20/75	672/26/100	1937/37/136	2011/39/141	1643/35/135	708/30/114

USA MULTI-OPERATOR MULTI-TRANSMITTER

KC1XX	175/20/75	672/26/100	1937/37/136	2011/39/141	1643/35/135	708/30/114
K3LR	141/22/64	520/30/102	1778/38/136	1768/40/149	1654/36/135	643/33/111
W3LPL	175/20/64	625/29/97	1550/36/134	2028/40/144	1526/33/129	641/31/109
K1KI	137/19/61	491/24/85	1555/38/129	2151/40/152	1531/34/129	415/30/105
N3RS	76/16/48	357/21/84	1484/36/128	1692/39/140	1458/34/133	495/39/102
W1MD	90/18/50	424/23/88	805/34/120	1734/38/139	1398/34/124	353/29/101

HZ1AB operated by Thomas, SMØCXU.

and other problems inherent in placing up to six stations in a confined area. Most Multi-Op entries are from well-populated areas of Europe and the US. If violations of the distance rule occur, others can see it or hear it. Competition is tough especially for the top positions. It makes it mean more if you place well and have obeyed the rules.

Thanks

Thanks to the CQ WW log checkers who validated the winners and provided insight into many contesting topics. The 1998 crew includes: K1DG, K3UA, K3ZO, K6NA, KR2Q, N2AA, N2NC, N3ED, N5TJ, N3RA, N6ZZ, N8BJQ, N9RV, W3ZZ, and W7EJ. Our DX advisors were very helpful in offering advice, providing information, and sorting out potential problems. They are CT1BOH, DL6RAI, EA3DU, F6BEE, G3SXW, HSØ/G4UAV, I2UIY, JE1CKA, OH2KI, OH2MM, OK2FD, ON6TT, PY5EG, S50A, SM3SGP, UA9BA, and VE3EJ.

A special thanks to Dick, N6AA, who again spent countless hours to make the CQ WW database the best in contesting. The CQ WW uses the software developed by Tree, N6TR, to create the database. John, K2MM, created the entire WWW log entry information. His robot worked smoothly in acknowledging receipt of a log. He also created the search engines utilized by committee members to aid in log checking. 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, respectively. Larry, N6TW, was invaluable in retrieving and processing data from e-mail submissions. Thanks to John, K1AR, for his advice and hard work to make the CQ WW so successful.

Congratulations to all the winners! Try to get a fellow contester on for a local, friendly competition. To participate and have *fun* is what contesting is all about!

73 and CU in '98!

Bob, K3EST

DX QRM

Goose bumps to listen to KH8 on 28 MHz! . . . *IV3TQE.* Because of TVI, I used 20W on 20m during the evening and I made a QSO with KL7RA with only 20W! We can only do this during the CQ WW Contest . . . *F5PHW.* At 2130Z, the bands 7–28 MHz were very open for DX . . . *LU3DSI.* A big thanks to WA7UVJ and W7KJI for tcvr. It is my second life. I have no left foot and with this tcvr I worked many stations . . . *UA4PA.* Throughly enjoyed the contest! The improved sunspot condx helped. However, I had to shut down twice due to lightning and thunderstorms overhead! Bloody amazing! We have not seen rain for months . . . *VK8AV.* I could work 6 continents on 3 bands with a simple dipole. Better condx are coming . . . *JL7PVR/1.* My operation is devoted to my beloved son, Zvonimir, who passed away Nov. 17, 1997 . . . *YU1BO.* Got the tower and beam up 48 hrs before the test. One hr before the test the Galah's decided it was the best perch in VK . . . *VK2AYD.*

My antenna is a fishing rod whip only up 3 meters . . . *JA1MXY.* This was the best contest I have ever taken part in! I have never heard 15 meters so open to the USA . . . *GØVQR.* Thanks agian to KH7R and KL7Y for precious multipliers . . . *CT1FJK.* I used this contest for hunting DX and meeting old friends . . . *OH2KQ.* Finding marvelous conditions on 15 . . . *G3ESF.* A great contest, lots of fun, and my code speed went up. Was sorry to see the contest end . . . *VE2SKA.* Many operators are very professional in automatic sending (very high speed from computer) but have difficulty receiving! . . . *SP3FIM.* My proficiency in CW is somewhat limited so I cannot be absolutely sure that all contacts are 100% correct. When answering me the speed of my counterpart was sometimes so high that I could have misheard their message . . . *SM5PEY.*

My first time in CW mode . . . *EA7FR.* Enjoyable though tiring. Next year must make a more serious effort to work more zone and country multipliers . . . *GØWHO.* First time QRV in a CW contest, but not the last one . . . *PAØIJM.* This is my second attempt at a major international contest, and I must say I gained a lot from the experience. I'll

(Continued on page 94)

2m/70cm Mobiles **FT-2500M/FT-7400H**

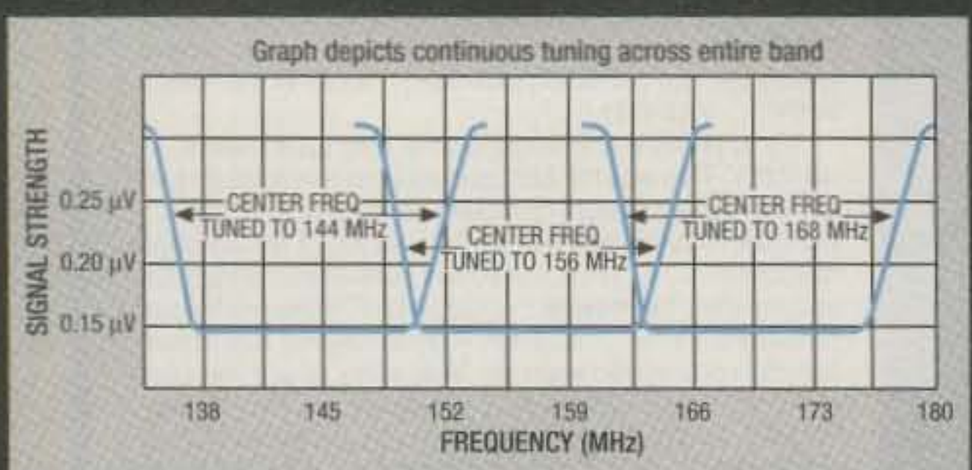
Advanced Track Tuning, Mil Spec, true FM. All in one radio!

Outside, you can easily see why the FT-2500M stands up to the shock and vibration like no other. We engineered the first mobile radio to meet the rigid standards set by the U.S. Military back in the '80s, and that same critical design is in the FT-2500M. From the simplified front panel, rubber coated knobs, durable pebbled finish coating, and huge Omni-Glow™ display to the one-piece die-cast chassis, the FT-2500M can take whatever you throw at it!

Inside, the electrical circuitry meets standards so uncompromising the FT-2500M can respond like no other radio. Built-in 3-Stage Advance Track Tuning (ATT), automatically retunes from 140 to 174 MHz permitting consistent receiver sensitivity across the entire band.

But there's more. Like alpha-numeric display capability! Lets you program a frequency or a 4-character name on any of the 31 memories. With three selectable power output levels and up to 50 watt power output, the FT-2500M extra large heat sink means forced air cooling is not necessary. And, as a bonus, Yaesu's exclusive backlit DTMF mic comes with every FT-2500M.

Experts say the FT-2500M is the only commercial-grade amateur radio available. So, for tough manufacturing standards, inside and out, with true FM clarity, and outstanding performance, the FT-2500M is your mobile.



3-Stage Advance Track Tuning (ATT) – The exclusive 3-Stage Advance Track tuning front end automatically adjusts band width sensitivity across the entire receiver range, while maintaining selectivity specifications. ATT significantly reduces interference from inter-modulation and front end overload.

Specifications

- **Frequency Coverage:**
  FT-2500M
  RX: 140-174 MHz
  TX: 144-148 MHz
  FT-7400H
  RX/TX: 430-450 MHz
- Rugged Military Spec Design
- Advanced Track Tuning (ATT)
- Selectable Alpha-Numeric Display
- Omni-Glow™ Display, largest available
- Power Output:
  FT-2500M 50/20/5 Watts
  FT-7400H 35/15/5 Watts
- Flip Up Front Control Panel hides seldom used buttons
- Backlit DTMF Mic
- 31 Memory Channels
- CTCSS Encode Built-in
- Automatic Power Off (APO)*
- Time-Out Timer (TOT)*
- Manual* or Automatic Backlighting Adjustment
- **Accessories:**

FP-800	20 Amp HD Power Supply w/ Front Mounted Speaker
FRC-6	DTMF Paging Unit
FTS-17A	CTCSS Decode Unit
SP-4	External Mobile Speaker w/ Audio Filters

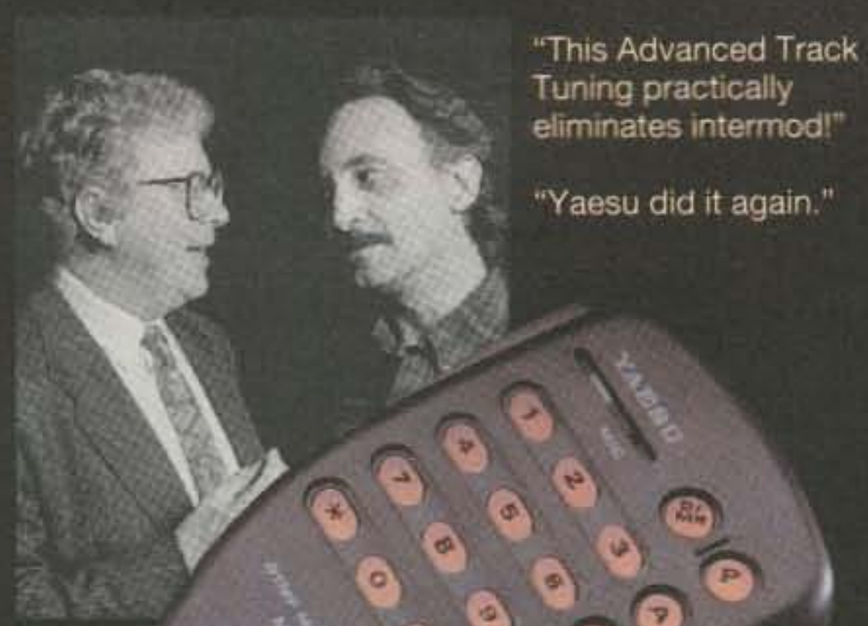
*FT-2500M

YAESU

Performance without compromise.℠

"Just look inside. Military spec really means something to Yaesu!"

"A QST review says 'the FT-2500M exhibited superior 10 MHz offset IMD dynamic range of 103 db!'"



"This Advanced Track Tuning practically eliminates intermod!"

"Yaesu did it again."

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High-Powered 2-m FM Transceiver
Feature-rich, 70 full watts of TX power, and built to the tough performance standards you've come to expect from Yaesu.
FEATURES • Frequency Coverage Wide Band Receive-- RX:110-180 MHz, 300-520 MHz, 800-999 MHz* TX:144-148 MHz • AM Aircraft Receive • MIL-STD 810 Rating • Interactive Programming • High Power Output: 70 Watts, plus 50, 25 and 10 Watts • Quick-Touch™ Dual Concentric Control Knob • Twin Cooling Fans • ADMS-2 Windows™ Programmable • Digital Coded Squelch (DCS) • 81 Memory Channels • Auto Range Transpond System™ (ARTS™) • 1200/9600 Baud Packet Compatible • Smart-Search™ • Alphanumeric Display • Dual Watch • Full line of accessories
*800 MHz Cellular blocked

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

Ultra Compact Dual Band Handheld **FT-50RD**

One tough little dual bander!

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  RX: 76-200 MHz, 300-540 MHz, 590-999 MHz*
  TX: 144-148 MHz, 430-450 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
- Digital Coded Squelch (DCS)
- 112 Memory Channels
- 12V DC Direct Input
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- Alphanumeric Display
- CTCSS Encode/Decode
- Auto Range Transpond System™ (ARTS™)
- Dual Watch
- Direct FM
- High Audio Output
- ADMS-1C Windows™ PC Programmable
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  Automatic Power-Off (APO)
  Receive Battery Saver (RBS)
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"Easy to operate, small, great price!"

"Yaesu did it again!"

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The foremost in top-performing, durable, dual band handhelds now includes the FTT-12 DTMF keypad with CTCSS enc/dec, DCS enc/dec, DVRS and paging/coded squelch. Manufactured to rigid commercial grade standards, the FT-50RD is the only amateur dual band HT to achieve a MIL-STD 810 rating. Already a winner; the deluxe keypad makes this stand-out HT even better! Water-resistant construction uses weather-proof gaskets to seal major internal components against the corrosive action of dust and moisture. And, the rugged FT-50RD withstands shock and vibration, so throw it in with your gear!

Exclusive features set the FT-50RD apart, too. Wide Band Receive includes 76-200 MHz (VHF), 300-540 (UHF), and 590-999 MHz*. Dual Watch checks sub-band activity while receiving on another frequency, then when a signal is detected, shifts operation to that frequency. Digital Battery Voltage displays current operating battery voltage. Digital Coded Squelch (DCS) silently monitors busy channels. Auto Range Transpond System™ (ARTS™) uses DCS to allow two radios to track one another. And, the FT-50RD is ADMS-1C Windows™ PC programming compatible, too. To round out the FT-50RD, it has four battery savers, and super loud audio—remarkable in an HT this size.

A reliable companion where ever you go, the FT-50RD is one tough little dual bander with all the features you want!

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FT-10/40R
Ultra Compact Handhelds
VHF or UHF. Similar to FT-50RD including MIL-STD 810, and other exclusive features.

A lot of us tend to build things from articles or handbooks and really give little thought as to how the device actually works. VE3ERP takes us on the hunt for the elusive Trap Troll to find (not the meaning of life) out how they actually work and how to design our own.

Trap Dipoles for Dummies

The Secrets of Trap Dipole Design Revealed In Plain Language!

BY GEORGE MURPHY*, VE3ERP

I am a real dummy when it comes to understanding antenna theory. However, that didn't stop me from trying to find a trap dipole design to cover both my favorite traditional HF phone band and one of the newer WARC bands. I couldn't find a design in any of the handbooks in my library, nor in any other place, that gave a complete description of how to design *any* trap dipole.

After much browsing, I finally did find an excellent not too technical paper[1] I could understand. This started me on a trail of fascinating clues, culminating in a HAMCALC (version 36 or later)[2] computer program. Early in my Sherlock Holmesing I discovered why the handbooks are somewhat vague and cagey about trap dipoles: The design process is neither simple nor straightforward, involving some nasty forays into the wilds of Iterative Algebra and beyond. For those of us who would rather not get involved in mathematical explanations, I offer the following findings about the trap dipole.

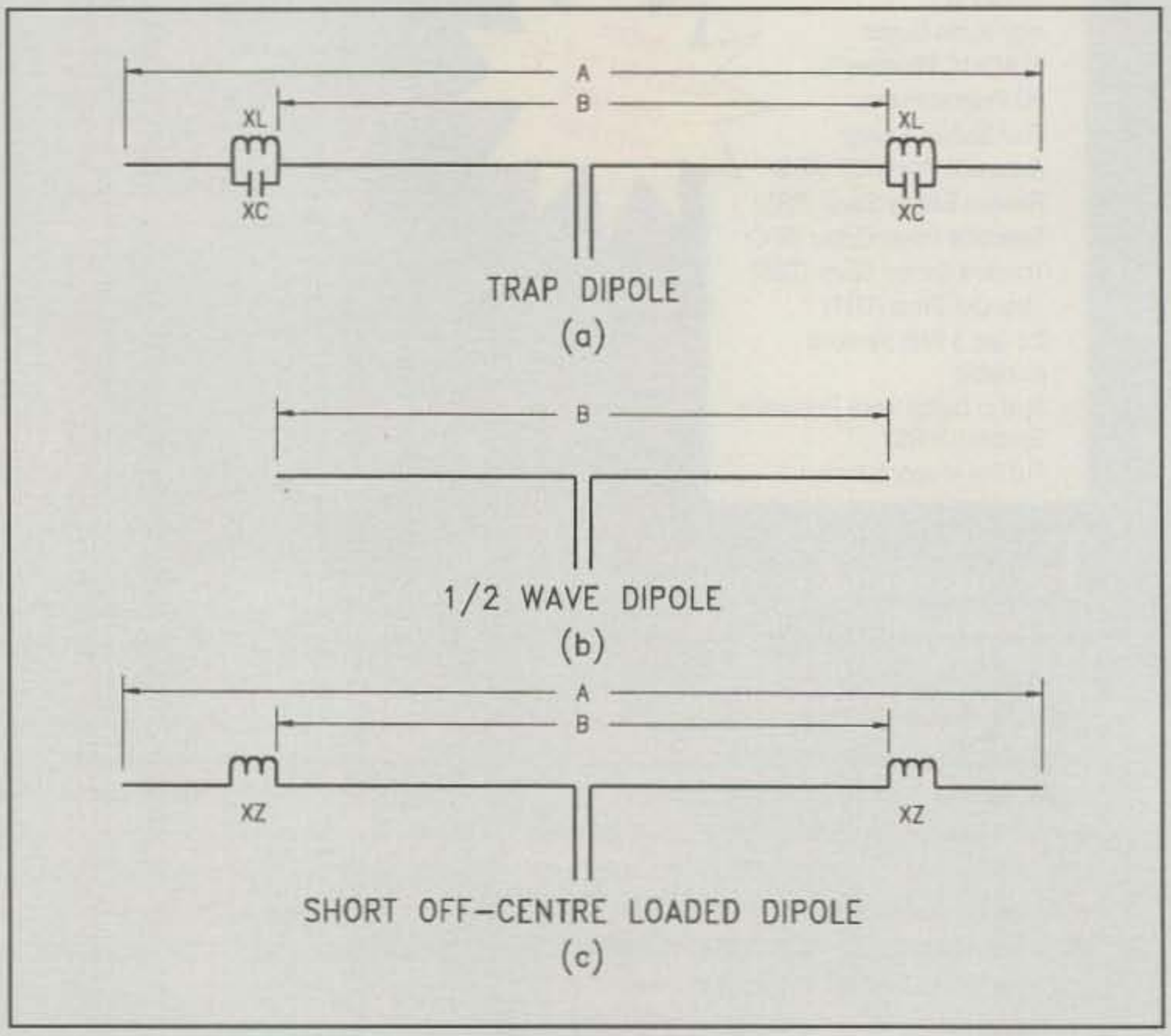

Fig. 1– The evolution of a trap dipole.

What It Is

A typical trap dipole is shown in fig. 1(A). It is a combination of fig.1(B), a simple 1/2-wave dipole, and fig.1(C), a short off- center loaded dipole which has no capacitors, only inductors. If you are not familiar with short off-center loaded dipoles, just picture two mobile whips (the kind with a loading coil somewhere near the middle) assembled base-to-base horizontally, with the center conductor of a coaxial line feeding one and the braid feeding the other.

How It Works

Each trap in fig.1(a) consists of a an inductor and a capacitor in parallel. The reactances (XL and XC, respectively) of each component vary with frequency; when the frequency is the resonant frequency of the dipole, then XL is equal to XC. This creates an extremely high impedance which prevents RF from travelling past the trap. At other frequencies the reactances of the trap components combine to form a single reactive component. At frequencies

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HIGHER FREQ.		LOWER FREQ.			TRAP				
					L				C
MHz	B FEET	MHz	A FEET	Xz ohms	uH	FORM DIA.	No. OF TURNS	LENGTH	pF
28.837 (10m)	16.23	24.940	17.87	1263	2.03	1.050 in.	13	2.15 in.	15
		21.224	20.17	5S1					
		18.118	23.04	382					
		14.174	29.01	238					
		10.125	41.02	147					
		7.148	59.52	97					
		3.742	118.53	49					
		1.897	240.10	24					
24.940 (12m)	18.77	21.224	20.94	1094	2.26	1.050 in.	14	2.26 in.	18
		18.118	23.65	545					
		14.174	29.34	298					
		10.125	40.98	172					
		7.148	59.21	111					
		3.742	117.93	54					
		1.897	239.43	27					
21.224 (15m)	22.05	18.118	24.52	1118	2.81	1.315 in.	13	2.30 in.	20
		14.174	29.74	452					
		10.125	40.69	232					
		7.148	58.36	142					
		3.742	116.54	68					
		1.897	237.81	34					
18.118 (17m)	25.83	14.174	30.71	738	3.22	1.315 in.	14	2.34 in.	24
		10.125	41.05	297					
		7.148	58.14	171					
		3.742	115.70	79					
		1.897	236.71	39					
14.174 (20m)	33.02	10.125	42.23	546	4.20	1.315 in.	17	2.72 in.	30
		7.148	57.97	253					
		3.742	113.82	106					
		1.897	234.10	51					
10.125 (30m)	46.22	7.148	57.97	515	5.75	1.660 in.	16	2.59 in.	43
		3.742	112.15	156					
		1.897	230.60	71					
7.148 (40m)	65.47	3.742	112.11	259	8.00	1.660 in.	21	3.39 in.	62
		1.897	226.60	103					
3.742 (80m)	125.07	1.897	220.85	264	16.45	2.375 in.	23	3.74 in.	110

Fig. 2– Design considerations for building your own trap dipole antenna. Values are based on #12 AWG wire construction with trap reactances near 375 ohms. Coil form sizes are schedule 40 black plastic pipe.

above the trap's resonant frequency the trap behaves as a capacitor, and below the resonant frequency the trap behaves as an inductor. Therefore, in fig.1(C) the single inductance XZ is actually the trap behaving as an inductor. What it all boils down to is this: When you have a dual-band trap antenna, you are running a 1/2-wave dipole at the higher frequency and an off-center loaded dipole at the lower frequency.

How To Make It Work

Let me lead you down the garden path for a few steps:

1. Decide what size wire you want to use for your antenna.

2. Determine center frequencies of two selected bands of interest. Depending on how fiddly you want to be, these may be the center of an entire band, or the center of any particular part of a band.

3. Determine length B of the 1/2-wave dipole, fig.1(B), for the higher of the two selected frequencies.

4. Determine values of the trap components. Any values of inductor L and capacitor C will work as long as their reactances are equal at the frequency of the higher of the two bands selected. Equal but relatively low reactances will produce high Q but very narrow bandwidth traps. Equal but relatively high reactances will produce more acceptable bandwidth, but at the expense of reduced Q. Reactances in the range of 300–450 ohms are recommended. Decide on a reactance (375 ohms is a good place to start) and calculate the values of C and L at the resonant frequency of the 1/2-wave dipole, fig.1(B).

5. Select a standard-value capacitor as near as possible to the optimum value determined in step 4.

6. Find or design the trap inductor.

7. Find reactance of each trap component at the lower of the two selected frequencies using the values of L and C determined in step 4.

8. Find net reactance XZ, fig.1(C), of the trap at the lower of the two selected frequencies.

9. Calculate length A, fig.1(C), for the lower of the two selected frequencies, from known factors B (step 3), XZ (step 8), and the diameter of the wire (step 1) to be used.

Final Comments

Since this article is primarily about design, I won't get into component selection or construction details. You can find this information in almost any amateur radio handbook.

Bench test the traps for resonance at the selected higher frequency before assembling the antenna and, if necessary, alter the coil turn spacing to adjust the frequency. As with most antennas, be prepared to do some pruning to achieve minimum SWR in your particular site environment. Antenna height, feedline factors, soil conditions, surrounding trees and buildings, and many other local conditions all affect performance. Prune only the wire lengths, as any further changes to the traps may upset the apple cart and you may have to start all over again.

If you want to design a trap dipole, you have a choice of three ways to do it:

a. The EASY way.
b. The HARD way.
c. The BEST way.

If you choose *a*, the easy way, then select one from fig. 2. It has already been designed for you. If you choose *b*, you can track down the same sources I had to find and do all the calculations by hand. Or, if you choose *c*, you can use your computer to design a trap dipole in the length of time it takes to make two keystrokes and enter four numbers—about 12 seconds. The 36 antennas listed in fig. 2 were designed (including the coils) in less than 10 minutes.

Now if only I could figure out how to program my VCR. . . .

Footnotes

1. *The ARRL Antenna Book*, 14th edition, pages 8–3 to 8–5.

2. HAMCALC is FREE software containing more than 200 programs (including trap dipole design) of interest to radio amateurs and professionals. To obtain it on an MS-DOS/Windows 3 1/2 inch diskette send USA$5 (to cover costs of materials and airmail anywhere in the world) to the author, George Murphy, VE3ERP, at the address shown at the beginning of this article. ■

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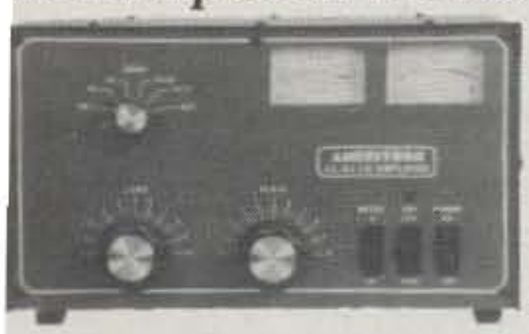

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Vernier reduction drives make tuning adjustments smooth and easy Ameritron's exclusive *Step-Start Inrush Protection™* stops damage to your amplifier from inrush current. Ameritron amps feature an attractive Lexan front panel decal and superior, all metal construction -- it's built to last! Ultra compact desktop size is perfect for your operating station. 8½x16½x14¼".

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To request a free catalog, contact Jensen Tools, 7815 S. 46th St., Phoenix, AZ 85044 (800-426-1194; fax 800-366-9662; <http://www.jensentools.com>); or circle number 101 on the reader service card.

Palstar AT300CN Antenna Tuner

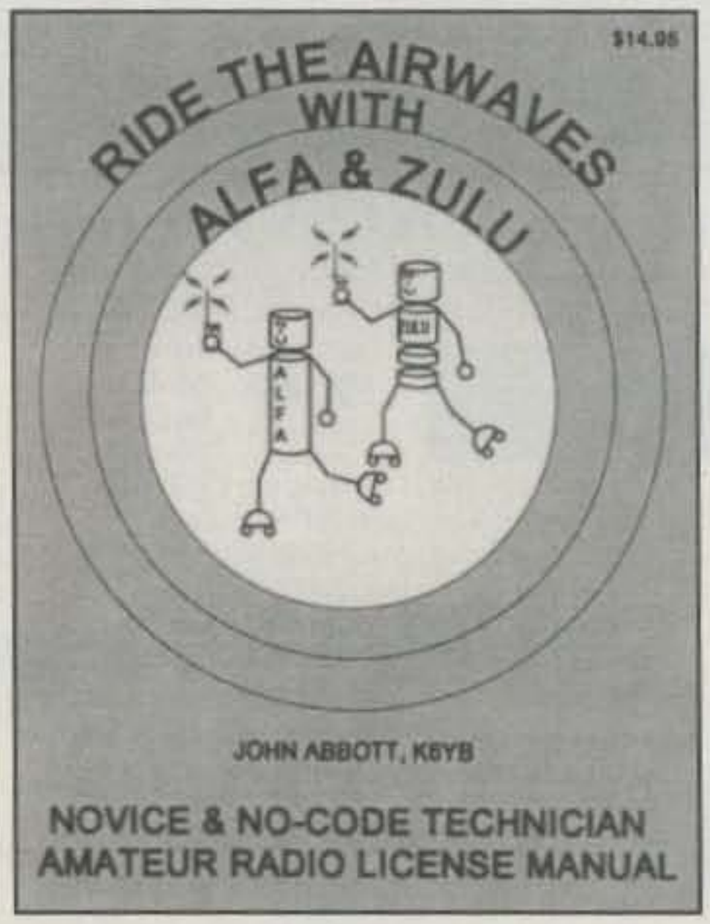
The AT300CN antenna tuner from Palstar provides adjustable impedance matching for all types of antennas. It measures power and SWR using an illuminated frequency-compensated SWR/Power single analog meter. Using a 48-position switched toroidal inductor with silver-plated double contacts, it is possible to adjust for the lowest possible SWR ratio on the selected transmit or receive frequency. It has a built-in dummy load, built-in 4:1 balun for balanced wire feeders, bypass position for straight-through antenna connection but still with SWR/Power monitoring, 8-position antenna selector switching, average power reading to 200 watts, and SWR measurements with dual cross-needle metering. Dimensions are 3.25"H × 8"W × 7.5"D; weight is 3 lbs. The unit is priced at $139.95.

For more information, contact Palstar Inc., 9676 N. Looney Rd., Piqua, OH 45356 (1-937-773-6255; fax 1-937-773-8003; e-mail: <palstar@erinet.com>; <www.palstarinc.com>), or circle number 105 on the reader service card.

Davis Wireless Weather Stations

Davis Instruments has introduced its new wireless weather stations: the Wireless Weather Monitor II® and the Wireless Weather Wizard III®. Each station comes completely preassembled, ready to mount on a roof or mast, and includes premounted sensors, a radiation shield, and a weather-tight shelter. The SensorLink™ transmitter sends data to the included display module up to 400 ft. away. As many display modules as wanted can be added without running wires or cables.

For more information and a free catalog, contact Davis Instruments, 3465 Diablo Ave., Hayward, CA 94545 (1-800-678-3669; <www.davisnet.com>), or circle 105 on the reader service card.



K6YB's Cartoon Novice and No-Code Tech LIcense Manual

Ride the Airwaves with ALFA & ZULU targets middle and high school students, or anyone who enjoys reading cartoons but doesn't want to become an electrical engineer in order to become a radio amateur. Written in the "keep it short and simple" format, there is information to whet

the appetites of those who may be inclined toward a career in electronics or science. More advanced material is referenced.

The book is 304 pages, completely illustrated, with 43 Morse code and 16 binary Phonetico™ cartoon characters. There are 80 Novice and 54 Technician lessons, and ham crossword puzzles. Written by John Abbott, K6YB, the book is priced at $14.95 and is available from Abtronix, P.O. Box 220066, Newhall, CA 91322-0066 (805-222-7384; fax 805-222-7385; e-mail <abtronix@earthlink.net>; <http://home.earthlink.net/~abtronix/>), or for more information circle number 102 on the reader service card.

Scancat-Gold for Windows® For the Ten-Tec RX320

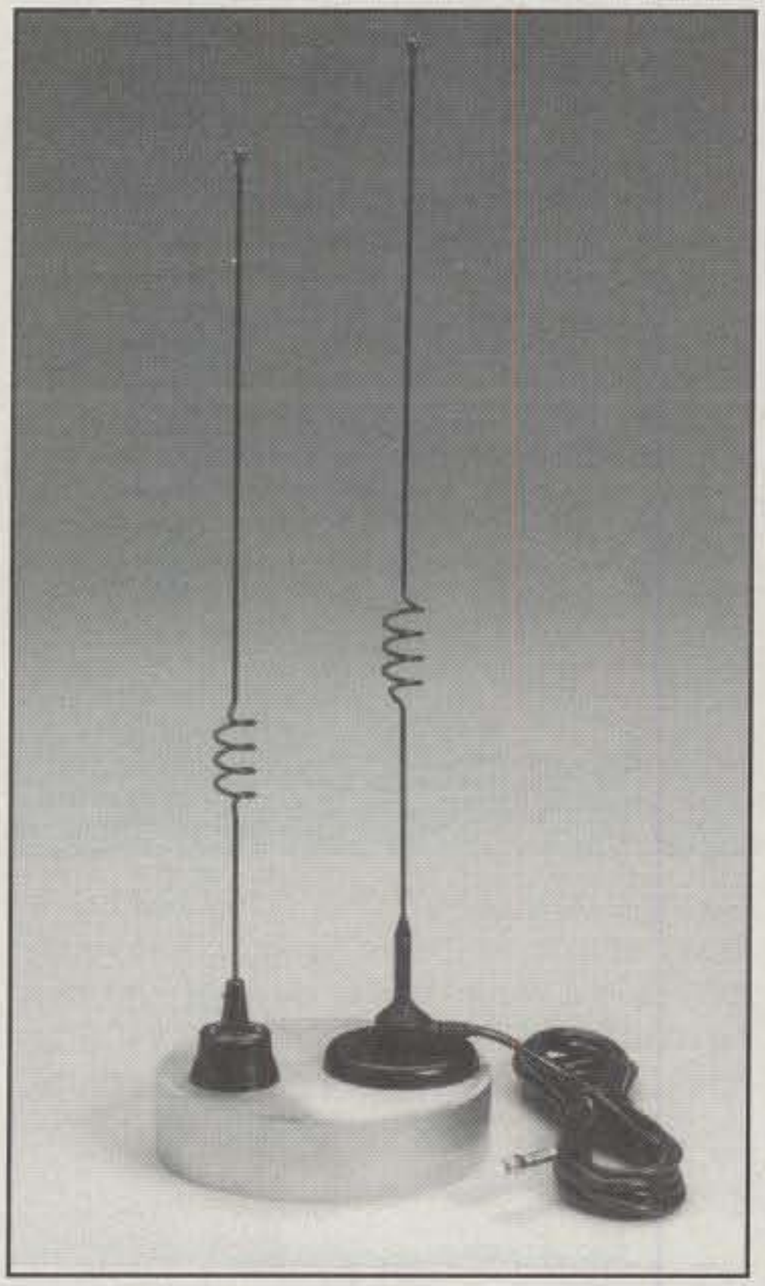
Computer Aided Technologies has announced Scancat-Gold for Windows® support for the RX320 from Ten-Tec. With Scancat you can use database support, scanning, logging, spectrum analysis, etc. Sound can be recorded to your hard drive with the company's "SE" option.

Scancat-Gold for Windows® – SE is priced at $159.95; Scancat-Gold for Windows® is $99.95. Upgrades for an existing Scancat program start at $29.95. For more information, contact Computer Aided Technologies, P.O. Box 18285, Shreveport, LA 71138 (1-318-687-2555; fax 1-318-686-0449; e-mail: <scancat@scancat.com>), or circle number 106 on the reader service card.

MFJ Code Tutor

MFJ's new Professional Classroom Tutor was specially designed for VE examiners, Vo-Tech/ham radio schools, clubs, and teachers. It includes an LCD readout, printer port, audio tape recording output, powerful audio with true sinewave and no keyclicks, computer interface, and HF/VHF radio interface for on-the-air practice. It also stores 16 FCC exams for VECs and is a full-featured memory keyer. The unit includes all the features of the MFJ-418 pocket-size code tutor, plus more. The user can build and save three custom sets (16 characters each) for extra practice. Random words can be customized for practice. The MFJ-414 can be used with a 144/440 MHz FM handheld or HF transceiver for on-the-air code practice. The memory keyer has 1000 character memory, semi/auto modes, iambic A/B, reverse paddle, change speed, and tone on-the-fly.

The MFJ-414 includes serial port cable and open-end patch cable (soldering required). It uses 12 VDC or 110 VAC and measures 8 1/2"W × 2 1/4"H × 6"D and is priced at $199.95. It comes with MFJ's "No Matter What™" one-year limited warranty. For more info, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (601-323-5869; fax 601-323-6551; e-mail <mfj@mfjenterprises.com>; <http://www.mfjenterprises.com>) or circle number 104 on the reader service card.



Larsen Disguise Antennas

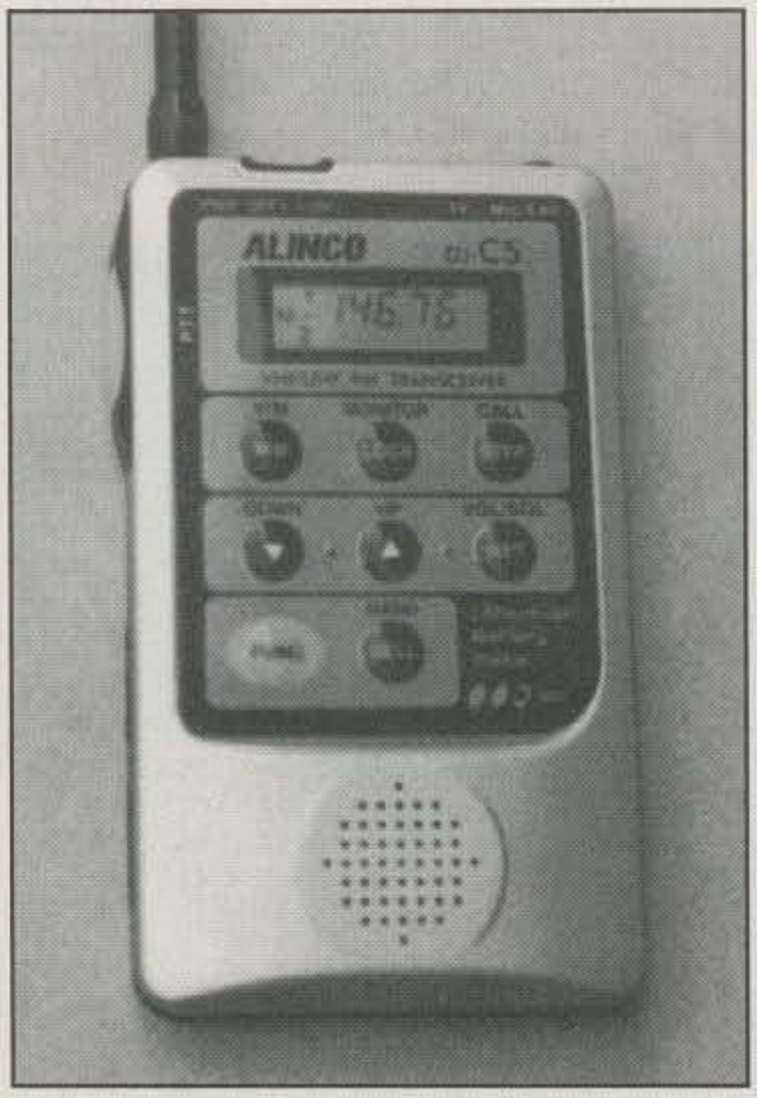
Larsen Electronics has introduced two new disguise antennas. The cellular look-alike mobile antennas are available in the standard NMO configuration or a complete compact magnetic-mount version. The design incorporates a heavy-duty .100 diameter, black Kulrod copper-plated, open coil whip for a cellular look. Each antenna is factory tuned and is available in either VHF or UHF frequencies.

The Larsen disguise line is backed by the industry's Three-Year No-Nonsense Warranty. For more information, contact Larsen Electronics, Inc., 3611 NE 112th Ave., Vancouver, WA 98682 (1-800-268-3662; fax 360-944-7556), or circle number 103 on the reader service card.

The Alinco DJ-C5 FM Dualband Micro Talkie

BY DAVE INGRAM*, K4TWJ

Today's world of FM handheld transceivers is thriving with fancy-featured do-everything rigs, and they are all terrific for on-the-spot hamming. In my opinion, however, Alinco's new DJ-C5 stands apart from the crowd in one very special and always appreciated aspect: its incredibly small size. This modern marvel of technology is only the height and width of a regular charge card—and only three or four charge cards thick! Larger handhelds may offer more output power for countryside and fringe area use, but for "carry it anywhere" convenience and emergency preparedness around the city, Alinco's DJ-C5 is tops. Speaking of fringe area operations, incidentally, the DJ-C5's shirt-pocket dimensions make it an ideal candidate for remote accessing and crossband repeating through a fancy dualband mobile rig such as Alinco's popular DR-605. We are jumping ahead of the basic DJ-C5 review, however, so let's drop back a notch or two and start with the pertinent details.



Alinco's new DJ-C5 dual-band FM talkie looks similar to a Star Trek communicator—and it works like a champ! The tiny rig measures only 3.75"H×2.25"W×.3"D, has a 4.25 inch tall mini duckie antenna, and goes anywhere!

Overview

At first glance, the silver case and exceptionally thin nature of this little transceiver give it the appearance of being a pocket calculator. However, closer investigation reveals a thin screw on/off mini duckie antenna, small front-mounted speaker, and side PTT switch. It is an FM talkie—and an impressive featured one to boot!

The DJ-C5 transceives from 144.0 to 147.995 and 420.0 to 449.995 MHz with 300 milliwatts output. It also receives NOAA weather stations in the 162 MHz range, marine and public services in the 156 to 162 MHz range, and aircraft in the 119 to 121 MHz range. Additional receiver coverage (380.0 to 472.995 MHz) plus MARS/CAP operation is also possible by cutting a small looped red wire right beneath the little rig's rear cover. Frequency selection is via up/down pushbuttons on the tiny talkie's front panel. In fact, all adjustments and operating parameters are selected or set by these pushbuttons—volume, squelch, repeater offsets, CTCSS tones, memories, etc. Changing the volume or squelch setting, for example, simply involves pressing the "VOL/SQL" button once for volume or twice for squelch, then pressing the "up" or the "down" button. Simultaneously, level adjustments are confirmed by indications such as SQL 0 through 4 in the rig's readout.

The more you operate the DJ-C5, the more you realize that although it is very small, it has many of the frills found in full-size and full-featured handheld transceivers. VFO tuning steps are selectable, for example, plus there is an easy-access fast/1 MHz tuning rate for wide QSYs. Selected frequencies (in or out of amateur VHF or UHF bands), repeater offsets (regular or odd splits), and CTCSS tones can be stored "mix and match style" in any of the DJ-C5's 50 memories. The memories, in turn, can be displayed by number and frequency as usual or by channel number for operating security/privacy (channel 1–50, for example).

Additional "big rig" features in the DJ-C5 include both CTCSS encoding and decoding, call channels for both 2 meters and 70cm, a bell/alert feature, battery save mode, and automatic power-off function. As you probably know, a CTCSS encoder superimposes a subaudible tone on a rig's transmitted signal for accessing tone-restricted repeaters. Another often-overlooked application is limiting access to your crossband repeating mobile transceiver by requiring a "secret" CTCSS tone from your handheld transceiver. In that case, your mobile rig must be equipped with a CTCSS decoder. Why then is a CTCSS decoder included in Alinco's DJ-C5, and what is its purpose or benefit? Simply explained, the decoder adds personal paging capabilities to the little rig. When the decoder is activated, the DJ-C5 can silently monitor any frequency—busy or quiet—hour after hour. When a signal with a CTCSS tone matching that of the decoder appears on frequency, the transceiver's squelch opens so you can hear the calling station. CTCSS paging is quite useful when coordinating public events or amateur radio family activities on "direct" frequencies (repeaters often have filters to remove subaudible or CTCSS tones). By assigning different tones to various group members, each person can be independently paged without disturbing others. This arrangement is quite useful and must be experienced firsthand to be fully appreciated.

The DJ-C5's bell feature is another neat asset worthy of quick mention. Simply explained, it allows the rig to monitor any selected frequency for any call (no CTCSS tone required). When a call is detected, an alerting electronic bell rings twice and the rig's LCD readout changes to blinking the word "BELL" rather than

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A closer look at the DJ-C5's LCD readout gives a hint of the radio's many special features and functions. AM appears when tuning aircraft band, T indicates CTCSS encoding, blinks when CTCSS decoding, frequency decimal blinks when scanning, etc.

The DJ-C5 is supplied with a deluxe two hour desktop charger that senses/monitors battery voltage and automatically switches off when fully charged. Rather than standing vertically, the rig lies flat in the charger. →

indicating the operating frequency. "BELL" continues blinking until reset, thus informing you of missed activity. The DJ-C5's battery save mode and auto off function are especially useful for "extended monitoring" enthusiasts. They shift the rig into "sleep" mode during quiet times, then switch the talkie off after 60 minutes of inactivity. Nice!

Scanning and Monitoring

A dedicated "SCAN" button may not be apparent on the front panel, but this popular feature is also included in the DJ-C5. Band or memory scanning is initiated by holding the Up or Down button depressed a couple of seconds. Scanning pauses on a busy frequency and resumes in 5 seconds unless you cancel it by pressing the PTT switch. Scanning NOAA weather channels and other continuously active frequencies is not too desirable, so any memory can be programmed with "scan skip" as desired. This "keep it simple" concept results in a very operator-friendly, convenient to use micro-transceiver. Yes, and assuming you clipped the little looped red wire mentioned earlier, some out-of-band activities can prove interesting monitoring. In addition to previously mentioned services, there are railroads in the 159 to 161 MHz range, border patrols and rangers in the 408 to 417 MHz range, U.S. Customs and ATF agencies in the 165 to 168 MHz region, and FRS plus GMRS in the 462.5 to 468 MHz region. Fun scanning galore!

The Lithium Ion Battery

A major limitation with any personal or handheld FM transceiver is battery size and weight (as Captain Kirk would say, "We need those dilithium crystals for power, Scottie."). Alinco could not journey to Kronos 5 for the crystals, so they installed the next-best choice in the DJ-C5: a trim 3.8 volt/600 ma lithium-ion battery. This battery can be recharged 500 times or more, it is not prone to developing a memory like nickel cadmiums, and it actually likes frequent top-ups for emergency preparedness. When used in a low-current rig such as the DJ-C5, a 600 maH lithium-ion battery yields approximately twice the operating time of usual talkies and battery packs.

On The Air

The Alinco's DJ-C5 is a delightful-to-use mini-rig, and its output power of 300 milliwatts is quite sufficient for working through neighborhood repeaters or communicating around hamfest sites. Even if left switched off much of the time or used only for occasional monitoring, just carrying a DJ-C5 adds an extra measure of security and emergency preparedness to any outing. That fact is particularly noticeable (and appreciated!) when transacting business in a bank, riding an elevator, or traveling by commercial airlines—times when larger handhelds are less accessible or inconvenient to carry. Considered from that "real life" viewpoint, I am convinced a talkie in the pocket is worth two in the car (or briefcase).

Operation-wise, the DJ-C5 is a cinch to use, and audio on both transmit and receive is crisp and clean. Some distortion or "rattle" from the thin internal speaker is noticeable at high volume, but that is natural; this gem is a personal transceiver of the smallest size, not a PA system. If I need room-filling volume and 5 watts of power, I can drag out a big talkie. If I need or want maximum portability and totally inconspicuous appearance, a DJ-C5 is the answer. Doesn't that make sense?

Personally, I see this "QRP side" of VHF/UHF FM activities as the wave of the future, and it is all one actually needs to access modern high-performance repeaters. Gearing up with a mini rig now just puts one at the forefront of evolution. If the DJ-C5 operated full duplex, transmitting on one band while simultaneously receiving on the other band (it doesn't), it could even be used for working AO-27 when the high-power guys are not looking. Hmmm, with some fast button pushing, a home-brew gain antenna, and a bit of luck, it might work! Do I like the DJ-C5? You bet! Would I recommend it to FM devotees? Absolutely!

Conclusion

All aspects considered, Alinco's DJ-C5 is, in my opinion, a winner. Getting both bands and extended receive coverage is the special topping. Alinco's DJ-C5 is supplied with mini duckie antenna, clear vinyl carry case, rechargeable lithium-ion battery, and desktop two hour quick charger. The DJ-C5 is priced at $249.00. Accessories include an EME-16 tie-pin-type speaker microphone, EME-17 telephone operator's type speaker microphone, EME-47 regular speaker microphone, and an EDC-36 car charge cable.

For more information and dealer details, contact Alinco US, 438 Amapola Avenue, Suite 130, Torrance, CA 90501 (telephone 310-618-8616; on the web: <http//www.alinco.com>). ■

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

More Vintage Tubes and Classic Rigs

Unbelievable but true! In today's world of deluxe-feature and super-elaborate gear, interest in classic rigs, keys, and vacuum tubes is growing like never before. Indeed, famous model equipment from big-time names such as Collins, Drake, Johnson, and Hammarlund is presently emptying wallets and filling basements in record number. Are we missing something here? Not at all. We are still buying and using modern gear as usual. We are just including a touch of romance and nostalgia with genuine "glow in the dark" transmitters and receivers added to our daily activities. Yes, and the good news is amateurs with limited funds and/or space for a large radio collection can also join the action. How? By home-brewing and occasionally using classic gear with collectible tubes and authentic-era parts. Not only will such equipment warm your heart and shack, it also has a rich and unique on-the-air sound that stands apart from the all-too-common solid-state crowd. Need I say more?

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Bearing the previous thoughts in mind, this month's column features two easy-to-assemble treats from yesteryear—and two more delights will be spotlighted next month. We aim to please—everyone! If building vintage gear does not capture your fancy, maybe we can inspire you to start a unique vacuum-tube collection. Like keys, tubes require minimum wall or windowsill space for display, and each one is a true "hold in your hand" piece of history from our glamorous past. Drag out some of your old-time favorite tubes tonight, study their inner beauty (applying low filament voltage helps), and start compiling your own special "want list" of collectible tubes.

Need more inspiration? Check out the few always-popular tubes shown in fig. 1. The tallest "bottle" is a 211A—the famous "50 watter" triode often pulled from big-time audio amplifiers and used in high-power Hartley and TNT transmitters of the 1930s. Amateurs fortunate enough to

Fig. 1– Starting your own mini-collection of classic vacuum tubes is easy, fun, and most heartwarming. Further, special tubes in a well-planned collection can occasionally be used in past-era gear for an extra treat. Tubes shown here are a tall 211A "50 watter," famous Taylor T-20, RCA 245, Western Electric 311B, Eimac 3ST, and a tiny 956 "acorn tube." (Details in text.)

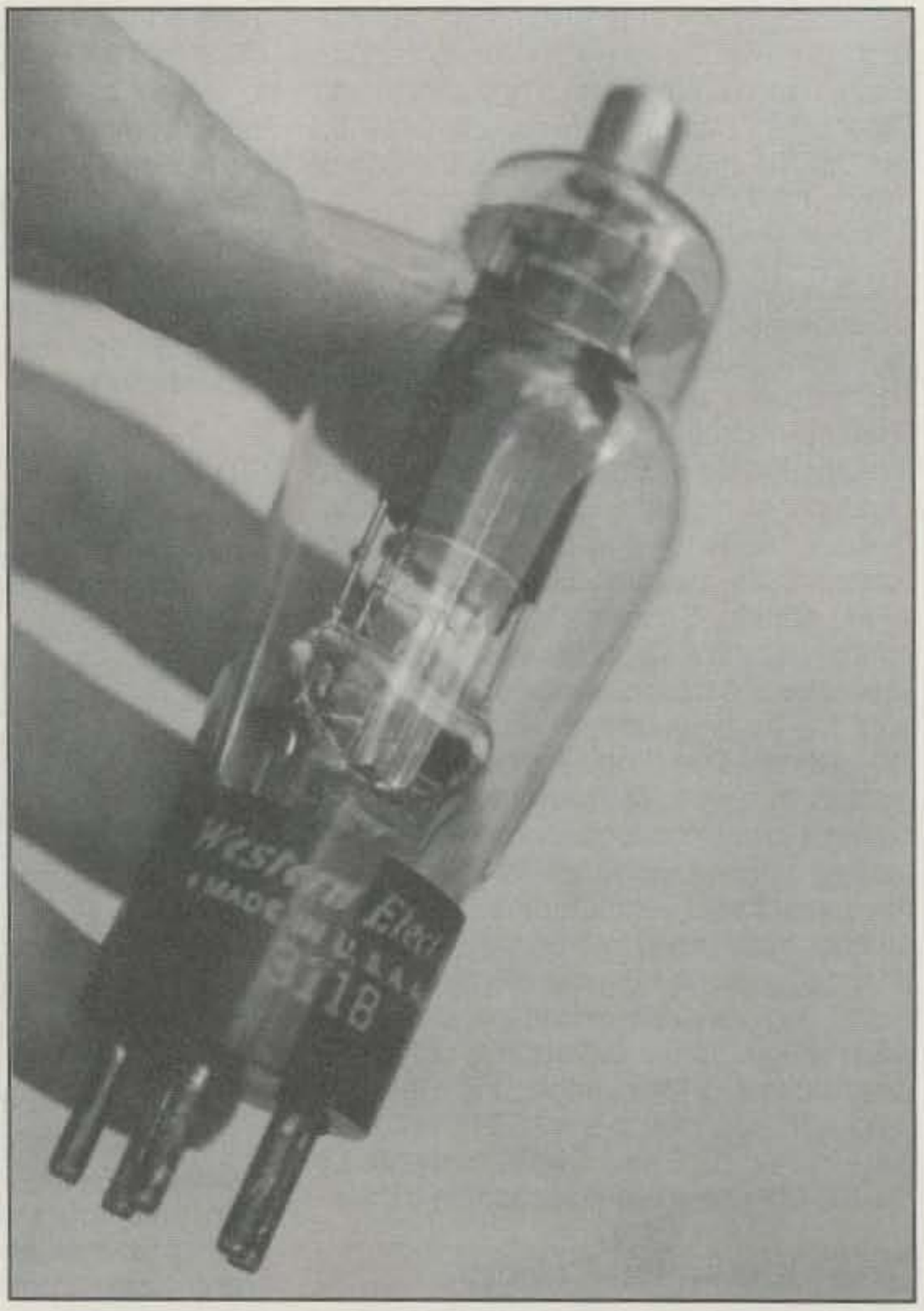
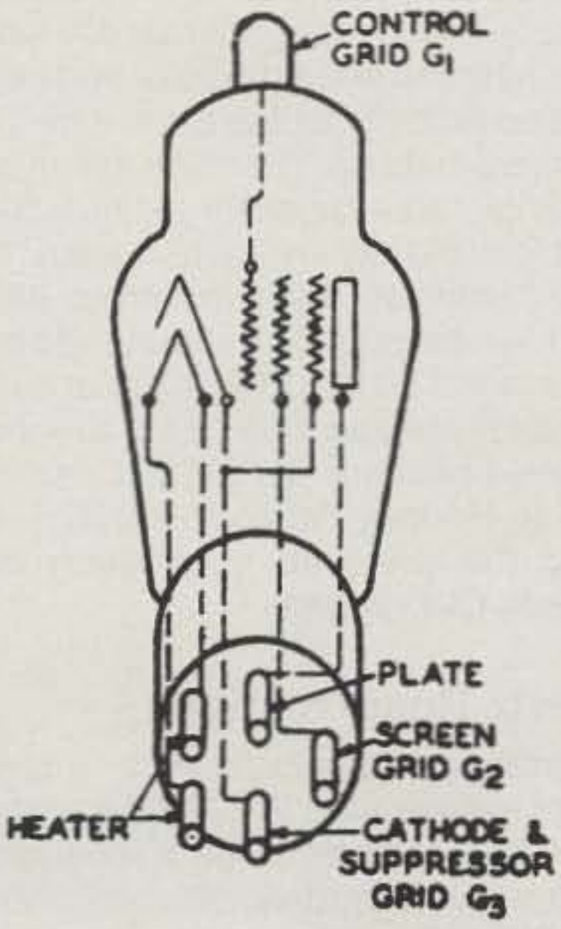


Fig. 2– Close-up view of the Western Electric 311B tube. Top cap is a control grid rather than plate connection. Base is the old 5-pin style.

IMPORTANT—READ CAREFULLY

Western Electric

311A Vacuum Tube



Classification

The 311A vacuum tube is a low power, suppressor-grid pentode having an indirectly heated cathode which permits operation of the heater element directly on alternating current.

It is intended for use as an audio, carrier or radio-frequency power amplifier where power outputs of approximately 2.0 watts are required and where the plate voltage is not in excess of 180 volts.

Base, Socket and Mounting

This vacuum tube employs a standard small five-pin thrust base suitable for use in a Western Electric 141A or similar type socket. The control-grid terminal is located at the top of the bulb.

The tube may be mounted in any position.

Heater Rating

Heater Voltage	10.0 volts, ac or dc
Nominal Heater Current	0.64 ampere

The heater element is designed to operate on a voltage basis and it should be operated as near the rated voltage as practicable. Operation at a higher voltage will definitely reduce the life of the tube.

Operating Conditions

Plate Volts	Screen-Grid Volts	Control-Grid Volts	Average Plate Current Values
135	135	−15	30
180 (max.)	150 (max.)	−18	32

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Fig. 3–Original "spec sheet" packed with WE311A/B tubes tells the full and most interesting story of this classic valve. Note the old-time sketch of the tube's "innards."

secure one of these impressive-looking tubes typically upgraded their 5 watt 210 or 245 transmitter with a larger tube socket, heftier power supply, and 10 dB stronger signal. Unofficially, I hear 211As are still made (overseas) for use in modern high-end audio gear.

The Taylor T-20 in fig. 1 is one of several custom-built tubes that challenged RCA for top RF honors in the 1930s and 1940s. This tube is similar to a "20 watt 210," quite attractive and exceptionally rugged. The tall, slender, white-based tube is an Eimac 35T. It has an inner plate structure that looks like a miniature 3-500Z, and it's a beauty. We will take a closer look at this tube next month, as it will be featured in a homebrew transmitter.

Finally, the top-capped WE-311B in fig. 1 is the star of this month's homebrew transmitter. More details straight ahead. Read on!

WE-311B Tele-Mitter

While discussing classic rigs with Rodney Schrock, KD3OR, a few months ago, he described a neat one-tube transmitter he built and used in a recent AWA contest and classic radio exchange. The more we talked about this vintage transmitter, the more I realized details of the little tyke would appeal to column readers—especially those with telephone company-related backgrounds. Rod felt likewise and agreed to share pertinent details with us. The "inside story" thus follows.

The heart of this transmitter is a classic WE-311B tube made by Western Electric during eras past. As you probably know, Western Electric was the major supplier of components used by various telephone companies. The 311 tube was utilized mainly as a power amplifier in frequency division multiplex telephone systems (fig. 2). It is electrically similar to a 6V6 or 6F6, except it has a 10 volt filament, which is quite common with Western Electric tubes. Since telephone systems must operate 24 hours a day with minimum maintenance and many longlines relay stations are located in areas of limited access, Western Electric tubes were especially known for their high quality and long life. Even a routine maintenance "pull-out" is a sought item. Lucky hunters finding a WE-311A or B might also seek out a WE-274A which is equivalent to a 5Z3 or a WE-274B which is comparable to a 5U4 for rectifier use in a power supply. First class for sure!

The WE-311 was produced in two versions—A and B. To the best of my knowledge, the only difference is the WE-311A has a maximum plate rating of 180 volts at 32 ma, while the WE-311B has a maximum rating of 250 volts at 40 ma. Both versions have 10 volt/640 ma filaments and identical base pinouts (fig. 3). A creditable number of WE-311A and B tubes were produced, but few seem to have been incorporated in homebrew projects, possibly because Western Electric maintained a rather stiff reign on distribution. WE-311A/B tubes are thus a tad scarce today, but they can still be found in basement collections, at hamfest fleamarkets, and on shelves of antique parts suppliers.

Shifting from tube background data to transmitter details, Rodney's homebrewed

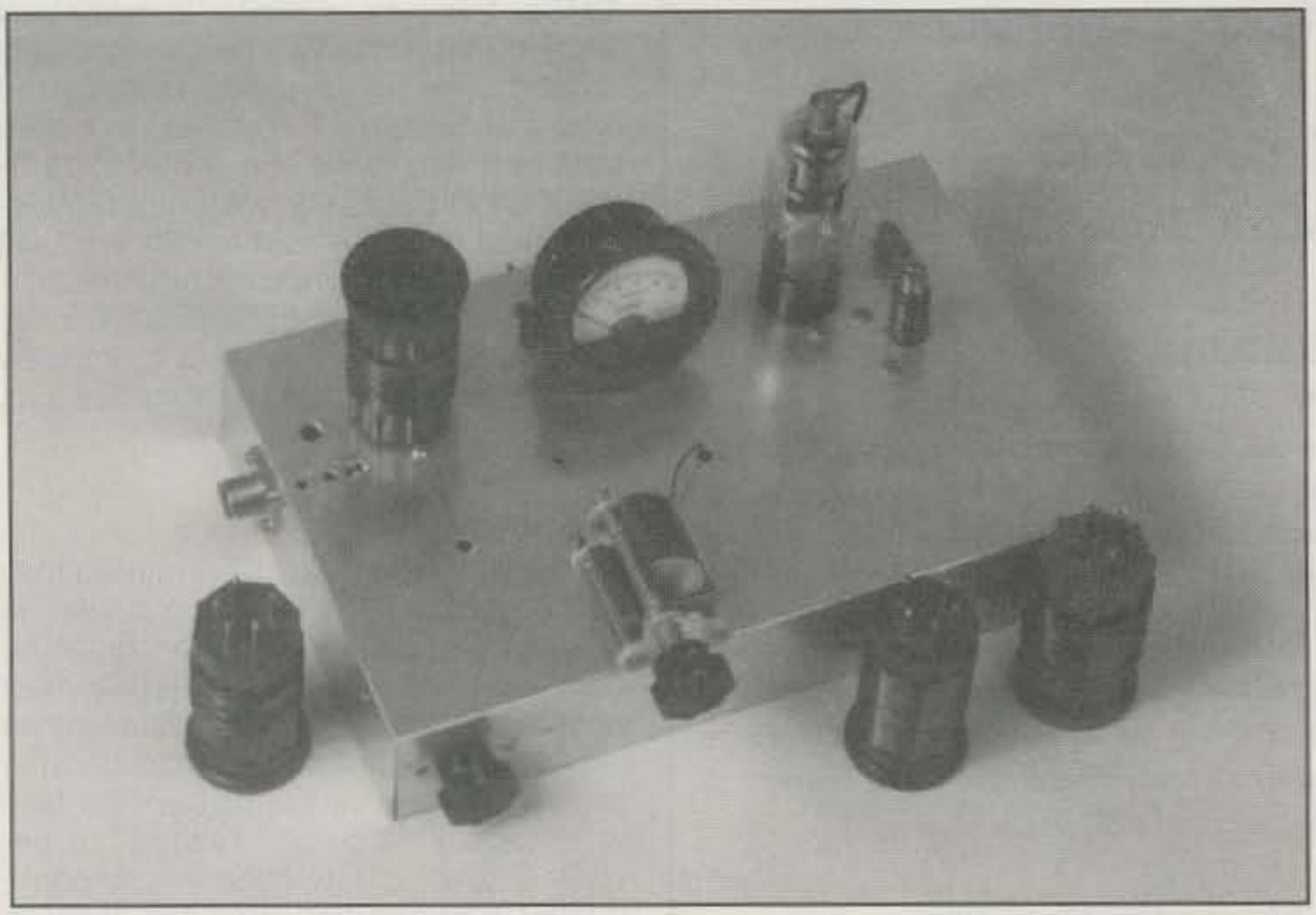


Fig. 4– Rodney Schrock, KD3OR, built his WE311B transmitter on an aluminum chassis, and it works as great as it looks. Rod has made contacts throughout the U.S. on 40 meters with this 3 watt output delight. (Photo via KD3OR)

version is shown in fig. 4 and its circuit diagram is shown in fig. 5. Basically, the rig is a crystal oscillator with a Pi-net output circuit, plate current metering, a pilot lamp for monitoring/limiting crystal/grid current, and a key click filter in the tube's cathode line. The output coil L1 is wound on a 1 1/2 or 1 5/8 diameter form using No. 20 wire. Approximately 30 turns are wound for 80 meters, 15 turns for 40 meters, and 12 turns for 30 meters. That is assuming an approximate 200 pFd variable capacitor is used for plate tuning. Increase the coil size two or three turns if a smaller capacitor is substituted, or decrease turns if a larger value capacitance is used. You can recognize when coil/ capacitor values are right by resonance (minimum plate current/ maximum RF output) occurring when the plate tuning capacitor is not fully meshed or fully open. A single- or double-section 365 pFd variable capacitor salvaged from an old radio or antenna tuner works fine for the Pi-net's output. If desired, the 2.5 mHy RF choke parallel-wired across it (to avoid applying DC to the antenna) can be eliminated. Do not eliminate the cathode's key click filter, however, as it ensures a clean on-the-air signal.

Rodney powers his transmitter from homebrew supply delivering 250 volts. A classic OD3/150 volt and OC3/100 volt regulator tube wired across the supply's output ensures stability under keying. A 10 ohm, 10 watt slider-adjustable resistor is connected in series with the power supply transformer's 12.6 volt filament winding to yield 10 volts for operating the '311B's filament.

Tune-up and operation of the transmitter is simple and straightforward. First a 50 ohm antenna like a dipole or vertical is connected to the output, and the tube's filament is warmed up. Then with the antenna loading/output capacitor set near minimum, close the key and quickly adjust the plate capacitor for minimum current. Alternate adjustments until minimum plate current is around 30 ma, check signal purity on a stable receiver, then hit the airwaves in style—nostalgia style! Our special thanks to Rodney Schrock, KD3OR, for sharing the previous information and notes with CW readers.

Reinartz Resurrection

Spotlighting an easy-to-assemble receiver to complement the WE-311B transmitter of KD3OR proved to be a formidable challenge. Fortunately, Robert Root, WD6DPU, of Downey, California stepped forward with his genuine spider-web-coil-equipped Reinartz 2 receiver shown in fig. 6. Perfect! Now this radio really looks like a classic! Every shack should have at least one such attention-grabbing item such as this! Yes, and spider-web coils are capable of incredible feats. They may even pull in original big-band music and

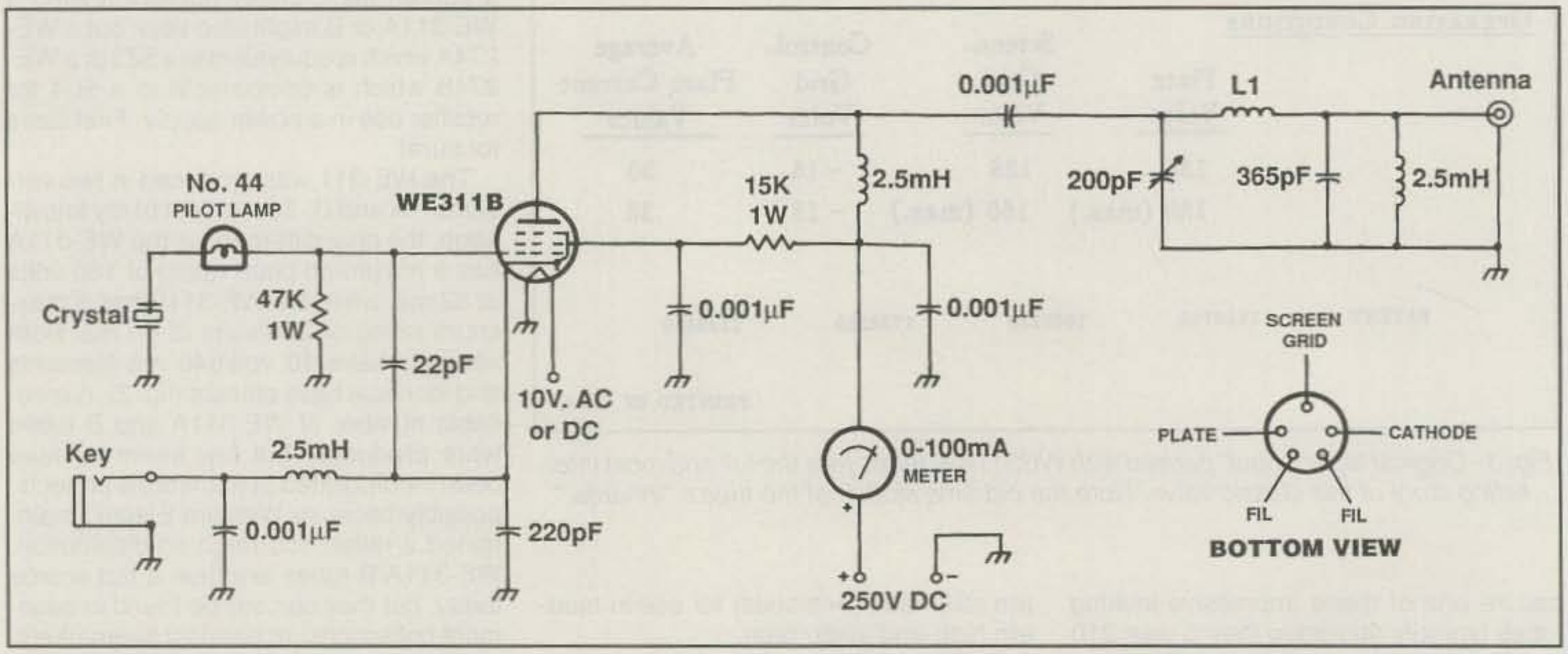


Fig. 5– Circuit diagram of the WE311B transmitter. If a WE311A tube is substituted, reduce plate potential to 130 volts—and expect 2 watts output.

Fig. 6– Dazzling spider-web-coil-equipped Reinartz 2 tube receiver built by Robert Root, WD6DPU. Front panel and rear shelf/chassis are bolted together to make an "L" assembly which mounts to a plaque-type baseboard with 1 inch spacers. "Below chassis" components fit between shelf and baseboard. Isn't that coil a heartthrob! (Photo via WD6DPU)

Tokyo Rose broadcasts from the 1940s! Would I jest?

Robert built this Reinartz 2 tube receiver from a Dick Smith Electronics replica kit available several years ago. Although Dick Smith is now gone and the kit is no longer available, creative amateurs should experience miniscule difficulty collecting near-original era parts to reproduce this delight today. The receiver's design is fairly simple, with a pair of medium impedance British HL2K (RAF type VT50) triodes and three plug-in coils delivering respectable CW/SSB and AM reception from roughly 1.5 to 20 MHz. British tubes are a bit rare, so American number 30 (or even US199) tubes can be substituted. If you are shy about trying this project, incidentally, I might also point out a somewhat similar (and easily obtained) one-tube spider-web-coil receiver kit covering 500 kHz to roughly 8 MHz is presently available from Antique Electronic Supply, 6221 S. Maple Avenue, Tempe, AZ 854283 (602-820-5411). The kit is their model K406. Old-style high-impedance earphones required for operation with either receiver (and tubes of all types!) are also available from Antique Electronic Supply, making them a prime source to remember for elusive parts. That is enough "getting started" information. Now let's discuss some interesting technical aspects of the little rig (fig. 7).

First, notice the Reinartz "signature" of using a variable capacitor (C3) rather than a potentiometer for regeneration/reaction adjustment. Second, notice the rotor on both the regeneration (C3) and main tuning capacitor (C2 A and B) are grounded-connected to minimize hand capacity. Next, notice R-C coupling (R2, C6, and R3) eliminates the need for a (rare) audio choke or interstage coupling transformer. Did you also notice grid leak resistor R1

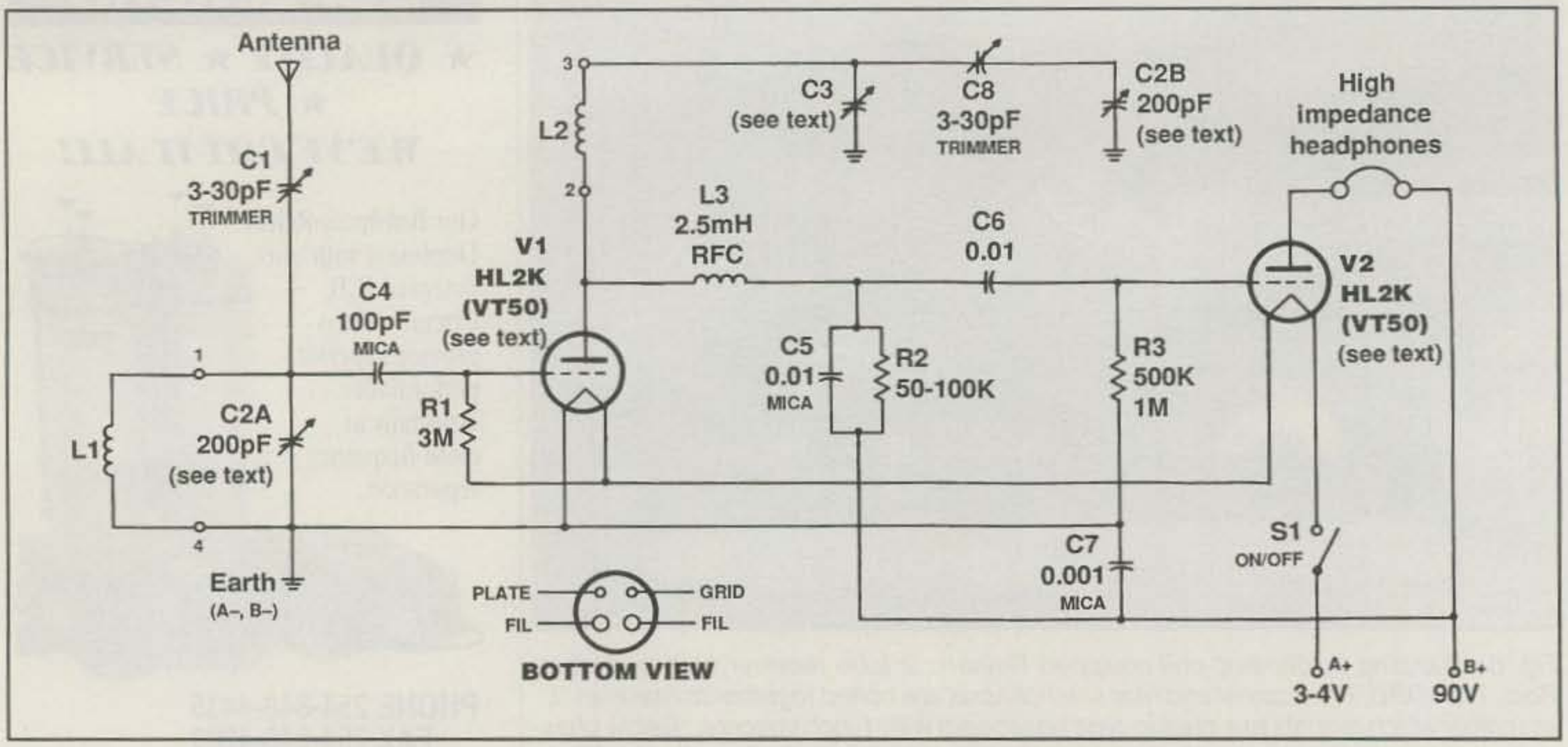
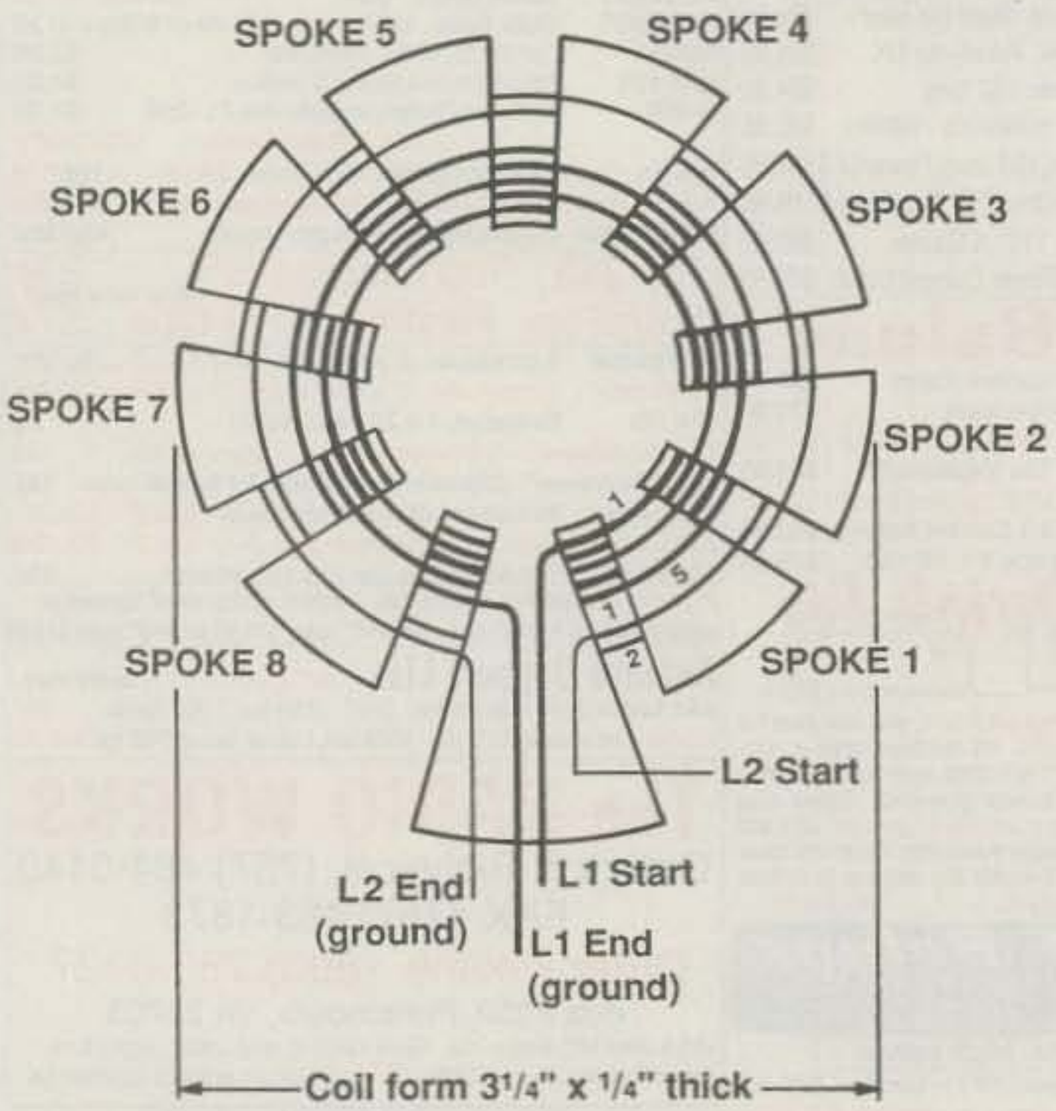


Fig. 7– Circuit diagram of the class spider-web-coil-equipped Reinartz 2 receiver. (Discussion in text.)

was connected to the filament's "positive side" rather than directly to ground? Why? It improves detector sensitivity. Every fine detail counts big in basic 'regen receivers! Finally, notice high-impedance (10K to 20K ohm) earphones are the plate load for tube V2. Do not substitute modern 8 or 16 ohm earphones; they will not work. If necessary, a small 10K ohm primary/8 ohm secondary audio output transformer can be wired in place of the high-impedance headphones (and modern low-impedance earphones wired to the transformer's secondary). But remember to unplug the earphones or transformer when switching the receiver off to avoid draining batteries. Ten 9 volt batteries work well for high voltage. Although tube filaments are rated at 2 volts each and series-wired to require 4 volts, a pair of fresh 1.5 volt "C" cells makes a good "A" battery.



APPROX FREQUENCY RANGE (MHz)	L1 (TUNING)	L2 (REACTION)
1.5 – 3.8	24T	14T
3.5 – 8	12T	7T
7 – 20	5T	4T

NOTE:

For simplicity and ease of copying form, only 5 turns are shown here for L1 (nearest middle) and 2 turns are shown for L2. L2 should extend to fill to outer edges of form.

Use number 24 or 26 wire

Fig. 8– Details of the 3¼ inch diameter by ⅛ or ¼ inch thick coil winding method. Note L1 is wound closest to the form's center and both coil windings zig zag counterclockwise between the form spokes. (Additional details in text.)

Finding both vintage and exact value parts can be challenging. Fortunately, this circuit is quite flexible to accommodate changes. C5 and/or C7, for example, may be 750 pFd to .001 mFd. R1 may be 2.7 to 3.9 meg ohm, and L3 may be 1 to 5 mHy. If you cannot find an exact-value tuning capacitor, consider "rolling your own" by removing a few rotor plates from a dual-section 365 pFd tuning capacitor. A few twists and a good pull with needle-nose pliers usually does the trick. This technique is effective but crude. Thus, exact tuning range with each (spider web) coil is only approximate. No problem—just remember fewer capacitor plates equals less capacitance and a higher frequency range (that can be offset somewhat by adding a few turns to the coil's main/L1 winding). Likewise, removing two or three main/L1 coil turns compensates for excess capacitance and increases a frequency tuning range slightly. (In other words, experiment with coil turns.)

If you have never wound a spider-web coil, taking a quick peek at a wooden-case or 1940-vintage AM radio's rear loop antenna is helpful for visualizing the concept. No old radio available for study? No problem. Just pattern your form (and coil) after our example shown in fig. 8. The actual form should measure 3 1/4 inches in diameter and consist of nine "spokes" (which includes the bottom support/mounting spoke). A cardboard form can be cut with a carpet knife. A thin wood form can be cut with a coping saw. Notice the coil's wire weaves between form spokes while progressively spiraling outward. In other words, a winding's first turn routes over spoke 1, under spoke 2, over spoke 3, etc. Then the winding's second turn routes under spoke 1, over spoke 2, under 3, etc. Practice cutting a form and winding a coil so turns are equally spaced and almost fill the form. Then make your "masterpiece coil." Include a bottom support/mount (a 4-prong tube base works nicely), secure the coil to it, and use your ingenuity in neatness!

The main/L1 coil is wound closest to the form's center, and the regeneration or reaction coil/L2 is wound in the form's outer area. Both windings are wound counter-clockwise. Space turns and windings evenly around the form. Separate L1 and L2 by 1/8 or 1/4 inch. Number 20 or 22 enameled wire is fine for L1. No. 24 or 26 cotton or plastic covered wire is fine for L2. Coil/turns data is included in fig. 8.

We are almost out of space, so operation of this receiver must be described quite briefly. Basically, it works like any great regenerative receiver (How's that for brevity?!). You connect a 25 to 50 foot longwire to the antenna terminal, run a ground wire to a cold-water pipe, set the main tuning at mid-range, and adjust the reaction until a howl or squeal is heard in the earphones. Then use an old-time or fast-tuning shortwave receiver to spot the regeneration signal and plot an exact tuning range. If the Reinartz fails to "gen" across its capacitor's full tuning range, try adding one or two turns to the reaction coil. If the receiver does not "gen" at all, try reversing connections on the reaction coil. After calibration, operation involves adjusting the reaction control until a "pre-howl hiss" is heard in the earphones, then slowly selecting frequencies with the main tuning control. Signals cause the circuit to oscillate, thus producing "BFO action"—neat and effective. This spider-web coil receiver can provide hours of enjoyable operation—especially when combined with the KD3OR WE-311B transmitter. Give one or both rigs a good old college try, and tune in next time for more classic rig views and discussion. Meanwhile, let's QSO on 30 meters one weeknight!

73, Dave, K4TWJ

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Isolation Circuits

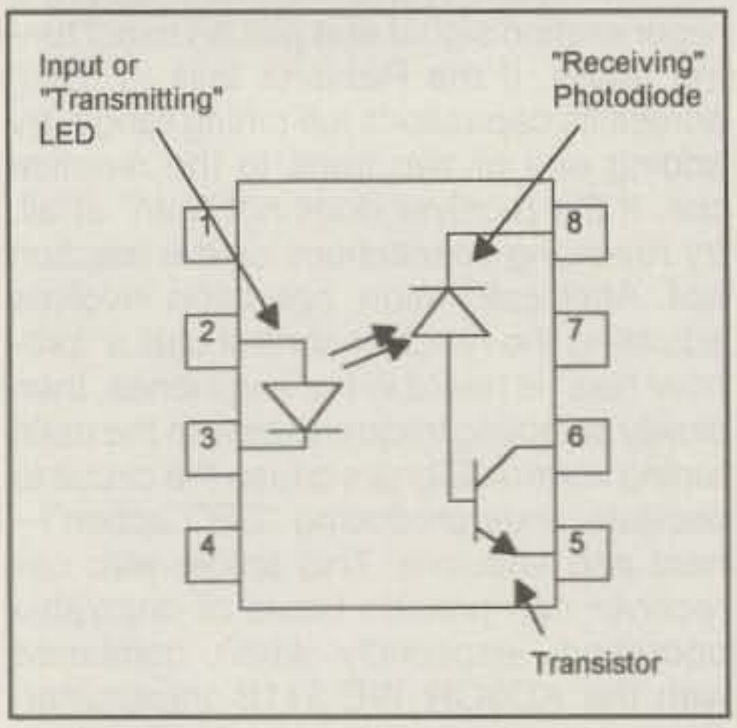


Fig. 1– Internal circuit of a typical opto-coupler.

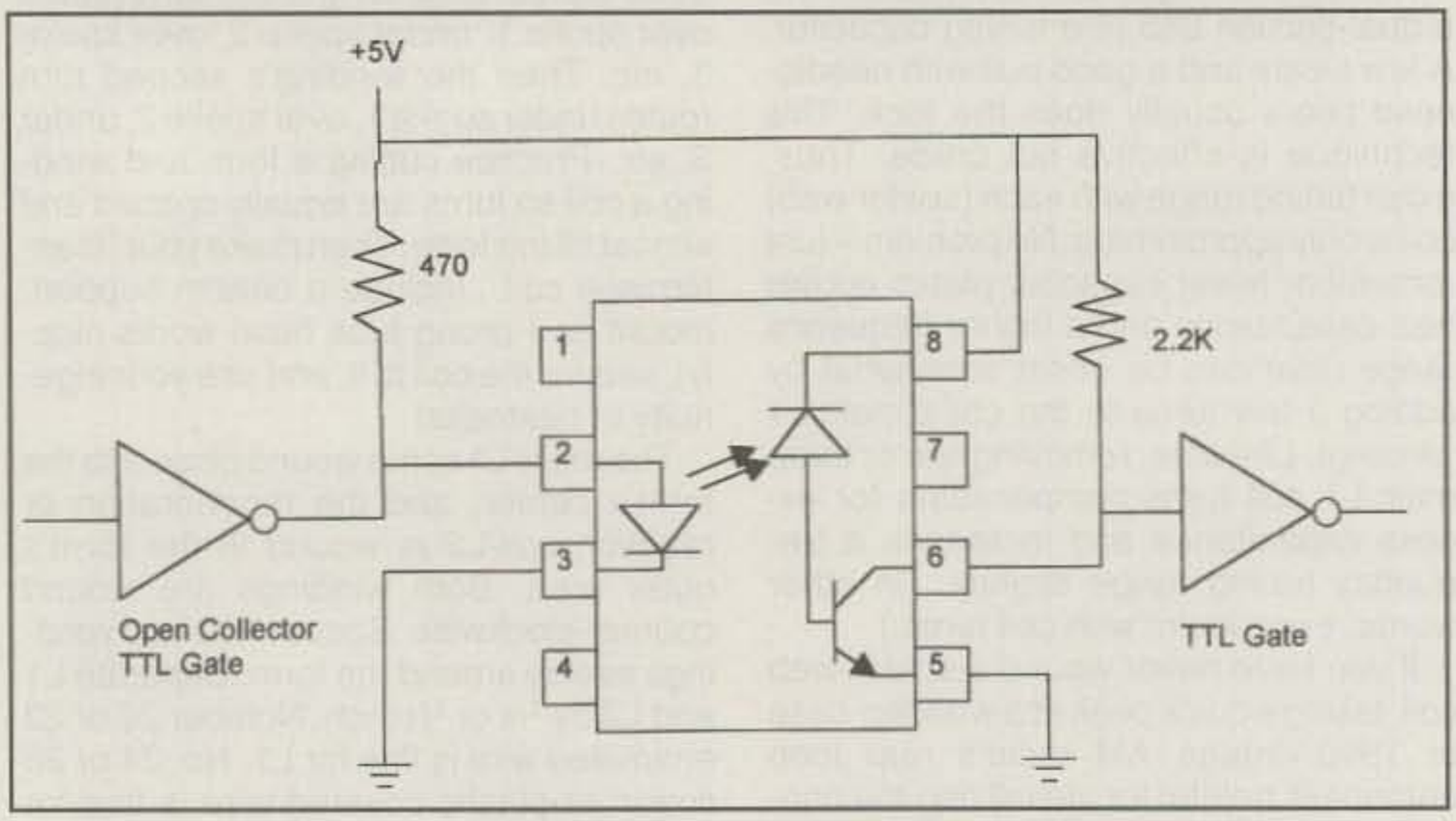


Fig. 2– Typical digital TTL isolation circuit.

When we wrote our series about fiber optics earlier this year, we mentioned that one of the benefits was the "perfect" isolation such circuits offered due to the fact that the carrier of information between input and output was light. The absence of any metallic conductor provided a ground-loop-free connection that could also sustain very high voltages between input and output. This month we would like to offer an alternate for those who need such isolation but do not want to go to the extreme of building an entire fiber-optic system. The approach we will describe is to use an opto-coupler.

An opto-coupler consists of an LED closely coupled to a photodiode or photo-transistor and, sometimes, some additional amplifier circuitry. There is no electrical connection between the two, and the only thing that passes between input and output is light. The result is a micro-fiber optic system, if you wish (but without the fiber). As a result of this, the isolation between input and output is almost perfect. Fig. 1 shows the internal circuit of a basic opto-coupler.

Fig. 2 shows a typical application of the opto-coupler in a digital logic circuit. In this example TTL pulses are used to drive a transistor that in turn drives the opto-coupler's LED while the coupler's photo-transistor and output stage convert the received light back into a reproduction of the original signal. Again, since the only connection between input and output is light, both sides of the opto-coupler are totally isolated up to the breakdown voltage of the device, which can sometimes extend into the thousands of volts. An arrangement of this kind is therefore ideal to interface a computer or other expensive device with homebrew circuitry without the fear of damaging anything from excessive voltage. The same configuration can also be used to isolate RS-232 signals as shown in fig. 3. Other logic families can also be accommodated by using the various protocol-to-TTL and TTL-to-protocol devices on the market. Since any protocol you would convert from would be turned into light-on and light-off, protocol converters (RS-232 to RS-422, for example) are easily configured.

If analog is your game, fear not. The opto-coupler can be used here as well. Fig. 4 is a basic schematic of a linear transmission scheme. You will note that in this case the opto-coupler's LED is connected to a common emitter stage that is biased so that a current equal to roughly one half of the maximum LED current flows with no signal. The application of a signal then "modulates" the current flows between approximately 10% and 90% of maximum. At the output, the internal transistor and external components convert the received modulated light back into a replica of the original signal. The diode in the "transmit" side of the opto-coupler, by the way, helps temperature stabilize the

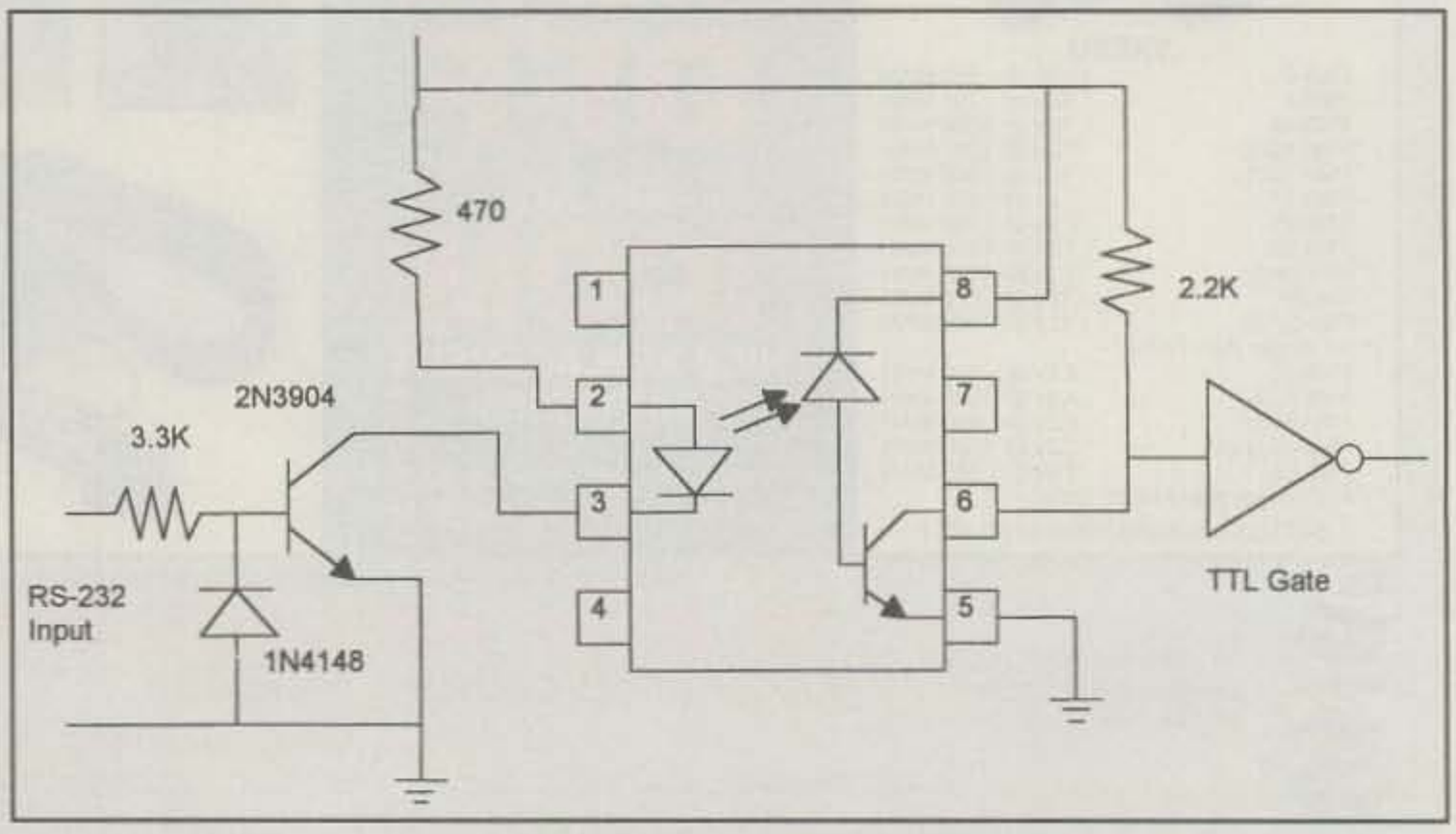


Fig. 3– RS-232 to TTL isolation circuit.

c/o CQ magazine

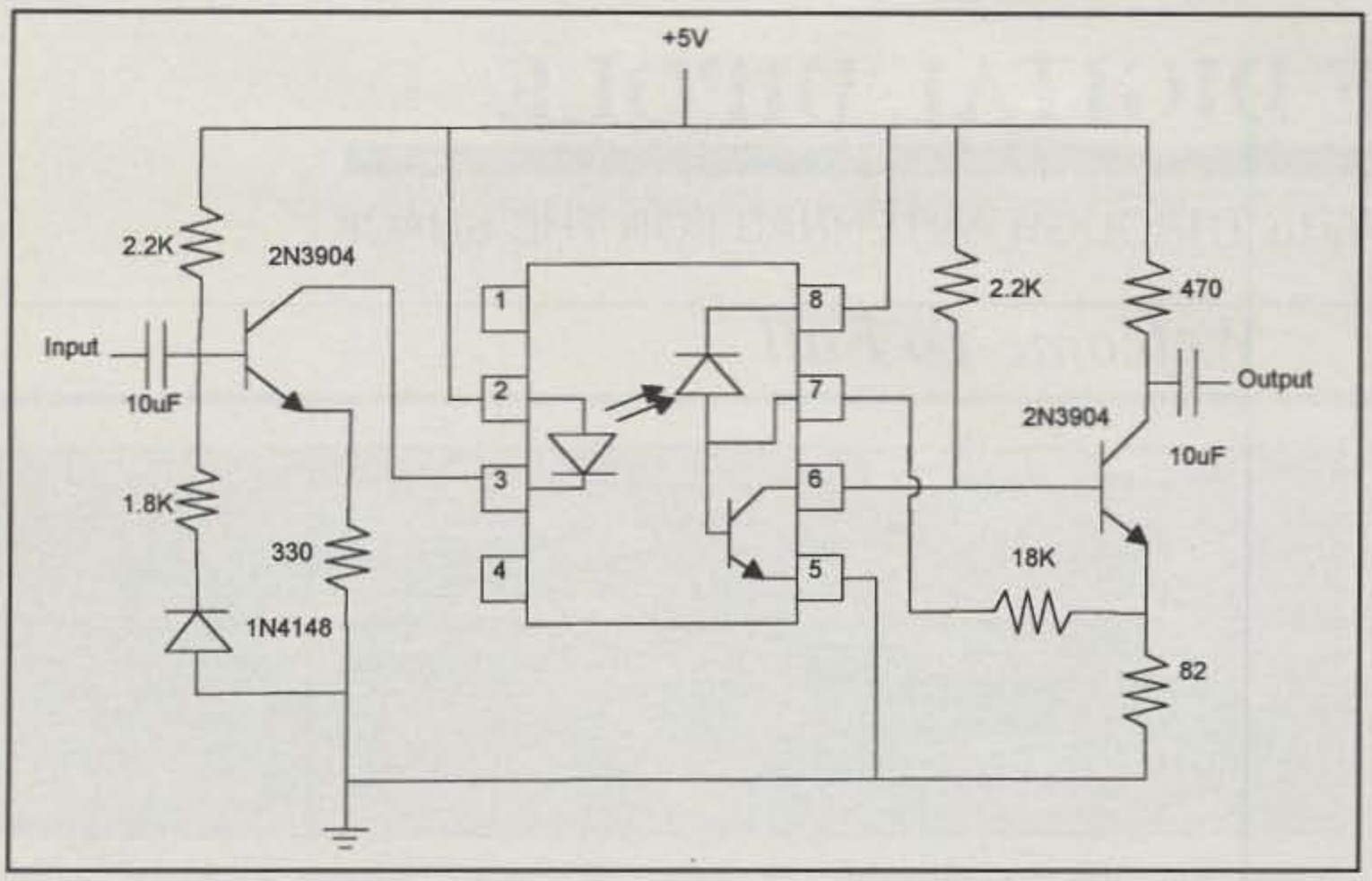


Fig. 4– Analog isolation circuit.

circuit. You will notice that this is an AC coupled circuit. As a result, any offsets caused by the biasing are effectively removed by the coupling capacitors.

Such an arrangement is limited in high-frequency roll-off by the components, and the low-frequency cutoff is a function of the values of the coupling capacitors. Operation into the MHz region, however, is easily achieved.

Next time you are anticipating the connection of signals to your $2000 computer, or using a similar device to drive devices connected directly to the AC line, consider the use of one of these isolation circuits. You can easily save a lot of aggravation and money in the process were something to go wrong.

73, Irwin, WA2NDM

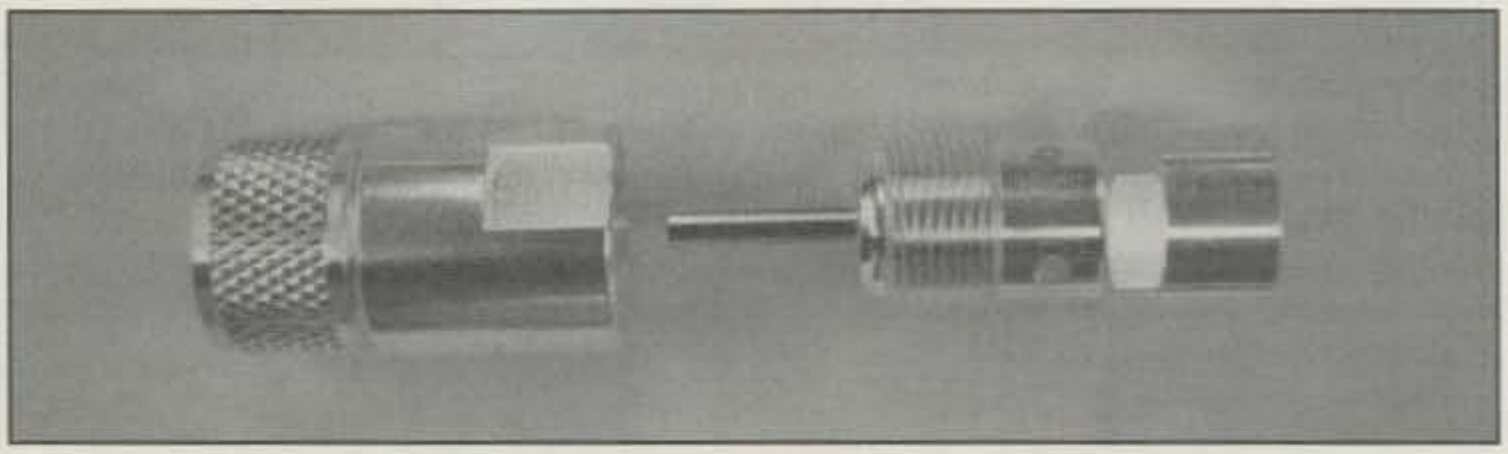
BY KARL T. THURBER, JR., W8FX

THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

Welcome To Fall

How the year flies by! Up to this point, we've already run through three-quarters of the year. The calendar now shifts to fall, which gives us the first signs of antenna season waning for another year. In any case, we'll begin our fall excursion by opening the antenna notebook, followed by our usual foray into software, books, and other items of interest.



A very useful product from Nemal is a new UHF plug (male connector) for RG-217/U coaxial cable. This new connector features two-piece design for ease of installation, and it allows for direct connection to equipment with UHF-type receptacles. The connector features a gold-plated center contact and Teflon® insulation for optimum performance, with a knurled body for ease of connection. (Photo courtesy Nemal Electronics International)

Antenna Notes

Focus on Nemal Electronics. Several times in the past we have updated our readers on the latest from Nemal, a major player in electronic cable and connectors. Recently, Benjamin L. Nemser, WA4DZS, the firm's president, provided some insight into Nemal—where it's coming from and where it's going. The firm is a manufacturer and distributor of much more than cable and connectors for amateurs and SWLs. They handle a wide range of cable, connectors, cable assemblies, and other products for broadcast, communications, data, and control applications.

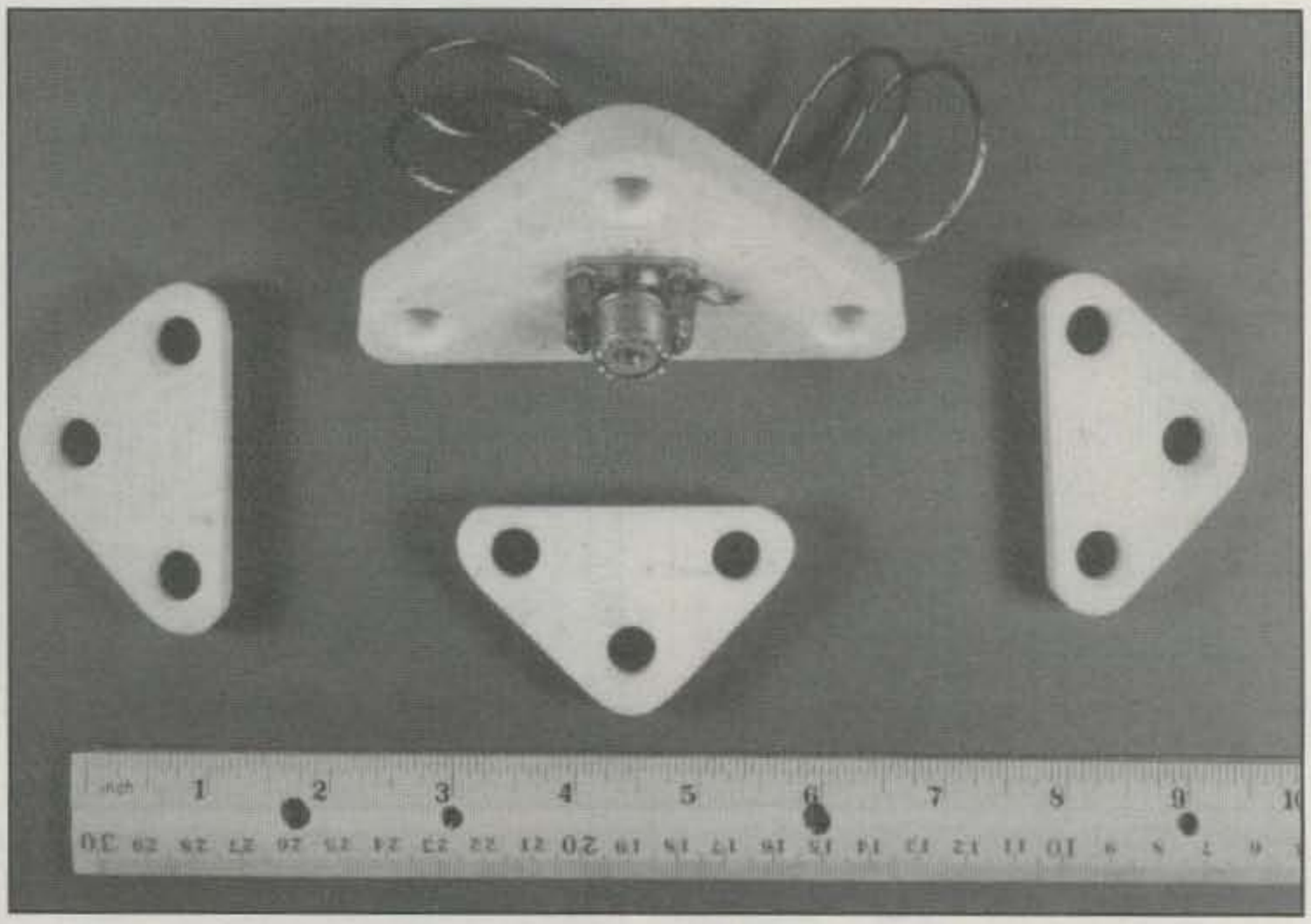
Since 1975 Nemal has served customers from south Florida. The main 14,000 sq. ft. building in North Miami houses their worldwide administrative headquarters. In this building they stock more than 3000 products and also produce cable assemblies, patch panels, and cable identification products. They're also able to produce standard and custom cables up to 1.2 inches in diameter. The facility includes a complete design and test laboratory and cabling, shielding, and special process equipment.

According to Nemal's president, of all the companies that cater to the amateur radio community, they're the only one that actually manufactures its own cable. Thus, the firm has the ability to quickly develop new products in-house specifically for amateur use. An example is their own popular "hamcable," a versatile, composite coax and rotor cable in one jacket.

A new product of interest is a UHF plug (male connector) for RG-217/U coaxial cable. The connector features two-piece design for ease of installation, allowing for direct connection to gear with UHF-type receptacles. It has a gold-plated center contact and Teflon®) insulation for optimum performance throughout the VHF and UHF spectrum. It also has a knurled body for ease of connection.

A 48-page "Cable & Connector Selection Guide," with technical information and specs on all products, is available at no charge on request with an order, or by sending a self-addressed 9" × 12" envelope with $1.30 postage to Nemal Electronics International, Inc., 12240 N.E. 14th Ave., North Miami, FL 33161 (1-800-522-2253; e-mail: <info@nemal.com>; web: <http://www.nemal.com>).

Schram-Tenna Center Insulators. New from Schram-Tenna are center insulators and insulator kits for dipoles and



New from Schram-Tenna are center insulators and insulator kits for dipoles and loops. The connectors are made of a high-density polymer that is virtually unaffected by RF, UV, IR, or the weather. Connectors can't come apart, and at no time is there any strain on the SO-239 coax center conductor or shield. (Photo courtesy Schram-Tenna)

289 Poplar Drive, Millbrook, AL 36054-1674

loops. According to the company's proprietor, R. J. Schram, K9KUV, more than a year has been spent developing "an easier and better way to construct a dipole antenna." The connectors are made of a high-density polymer virtually unaffected by RF, UV, IR, or the weather.

The connector can't come apart, and at no time is there any strain on the coax center conductor or shield. This is because the coax is brought into a SO-239 coax chassis connector and from there, strain relief wires are brought out to the dipole antenna wires. The SO-239 connector is attached to the polymer using stainless nuts and bolts; the hanger is countersunk to help prevent rope fray. Antenna wires are brought through the connector ends and then soldered to the strain relief wires.

The center insulators are available in 3/4 and 1/2 inch sizes in a variety of colors. The dipole center insulators are $8, a loop antenna kit is $25, and s&h is $5. Contact Schram-Tenna, 515 E. Washington Center Rd., Ft. Wayne, IN 46825 (telephone 219-483-1778).

New from Yaesu. I want to share with you information on the new Yaesu ATAS-100 Active-Tuning Antenna System for their FT-847 transceiver. The FT-847 is the firm's ultra-compact satellite and all-mode base-station transceiver that also can be expanded for mobile use on the 7, 14, 21, 28, 50, 144, and 430 MHz bands, such as by using the new ATAS-100 unit for 50, 144, and 430 MHz.

The ATAS-100 uses a motorized tuning system that mounts directly onto a standard mobile antenna mount without any additional wiring or use of monoband resonators or optional whips. A touch of the FT-847's Tuner key automatically begins the tuning process. On HF and 50 MHz, the ATAS-100 automatically adjusts itself to the best SWR by changing the length of its "accordion" tuning section. On 144 MHz and 430 MHz, the unit requires no tuning. On 144 MHz, it functions as a quarter-wave radiator, while on 430 MHz it serves as a 5/8-wave antenna.

Also new from Yaesu are two tower-mounted absorber joints for rotators, which install inside the tower between the rotator and tower mounting plate. The GA-2500 and GA-3000 Tower Mount Absorber Joints reduce stress to rotator gears and minimize the chance of binding. Made from high-density polypropylene, the absorber joints increase rotator performance by cushioning and absorbing shock produced by rotation start and stop, as well as by sudden wind gusts. The pivoting design allows the rotator base to compensate for up to 2 degrees of offset from vertical. The GA-2500 is for light- to medium-duty Yaesu rotators, while the GA-3000 is for heavy-duty installations.

For more information, contact Yaesu USA, 17200 Edwards Rd., Cerritos, CA 90703 (562-404-2700; web: <http://www.yaesu.com>).

Soft Stuff

Hourly Predictions for SWLs and Hams. Jacques d'Avignon, VE3VIA, is the North American distributor of the highly regarded Australian-based propagation forecasting software, the Advanced Stand Alone Prediction System (ASAPS). We reviewed the DOS and Windows versions in April 1994 and April 1997, respectively.

Recently, Jacques advised that the Australians now are offering a new customized service for the SWL and the amateur radio operator to help them in choosing the best frequency to use or to listen to. The Australian service is known as "Hourly Frequency Predictions for SWL and Ham."

The output supplied to the user is focused on his or her location, and it displays several hourly charts where, at a glance,

he or she can locate what should be the best frequency to use. IPS can prepare hourly area predictions for any location in the world; the cost of the monthly service is $AU40 (Australian dollars). The predictions are sent to your address by airmail.

For more information, contact Patrick Phelan, IPS Radio and Space Services, P.O. Box 1386, Haymarket, NSW 1240, Australia (e-mail: <patrick@ips.gov.au>; web: <http://www.ips.gov.au>).

AAA Map'n'Go 4.0. In several previous columns we highlighted various DeLorme CD-ROM based mapping software. We profiled AAA Map'n'Go 3.0 in the November 1997 column; that version bore the American Automobile Association's logo and included a massive amount of *AAA TourBook®* data.

Now DeLorme has come up with AAA Map'n'Go 4.0, which introduces a host of new features. Again, we won't rehash our previous review other than to note that the program is indeed a very comprehensive travel planner. It includes some 1 million miles of "routable roads," over 240 detailed maps of urban areas, 80 recommended scenic drives, compatibility with the DeLorme GPS Tripmate™ receiver, map customization tools, multiple printing options, sophisticated search capabilities, and more.

The new version includes 1998 *AAA TourBook* information, including 68,000 facilities; a new user-friendly interface with a neat "dashboard metaphor"; a slide show feature to let you insert your own photos into a travelogue; a "TripPix" feature that lets you place photos on the map; a budget planner; GPS voice navigation capabilities; 3Com® PalmPilot™ support; and even a "kids travel activities" section to keep them occupied.

There's also a separate application, Extractor™, which you can download from DeLorme (at <http://www.delorme.com>) for use with AAA Map'n'Go 4.0. Extractor lets you download map data for specific regions from the CD to a hard drive. You can then use the map data without the CD, particularly useful if your laptop computer isn't equipped with a CD-ROM drive.

AAA Map'n'Go 4.0 is designed for use with Windows® 95 or Windows NT® 4.0. Contact DeLorme, Two DeLorme Drive, P.O. Box 298, Yarmouth, ME 04096 (1-800-452-5931).

From the Bookshelf

New Edition: Shortwave Receivers Past and Present. In July 1997 we profiled *Shortwave Receivers Past and Present*, second edition, by Fred Osterman, N8EKU. As we noted, it's for the radio collector, the informed receiver buyer, or anyone who is interested in the history and development of shortwave radios.

Fred's book now is available in a brand-new third edition to help you become an "instant receiver expert." It's fatter now, topping out at 473 pages, covering communications receivers in a slightly expanded timeline of 1942 through 1997. Some 770 receivers from 98 manufacturers are featured, with commentary on an additional 660 variants; there are 840 photos. Entry information includes receiver type, date sold, photograph, size and weight, features, reviews, specifications, new and used values, variants, value rating, and availability. The book is a good value at $24.95.

For details, contact Universal Radio, Inc., 6830 Americana Pkwy., Reynoldsburg, OH 43068-4113 (1-800-431-3939; e-mail: <dx@universal-radio.com>; web: <http://www.universal-radio.com>).

Using America Online® 4. Recently, Macmillan Publishing USA sent me a new Que®-imprint book on America Online (AOL) that I'll share with you.

The Que book is *Using America Online® 4*, by Gene Steinberg. The almost encyclopedic book is a comprehensive guide to using AOL's latest user interface software, America Online Version 4.0. The book helps you master the vital tasks of the new interface with a thorough, simple reference; provides step-by-step lessons; offers useful tips and tricks; and covers a variety of other topics, including e-mail and chatting online.

The 620-page, well-indexed book is $29.99. It's divided into 30 chapters and five appendices. The 30 chapters are grouped into five parts, including an "AOL Quickstart"; communicating online; AOL as an Internet Service Provider; setting up a personal web page; and AOL's popular channel scheme.

For more information or a catalog, contact Macmillan Publishing USA, 201 West 103rd Street, Indianapolis, IN 46290 (1-800-428-5331; e-mail: <info@mcp.com>; web: <http://www.mcp.com>).

Note to overseas readers: Recently, a reader advised us that Macmillan won't ship catalogs overseas; instead, readers should contact the Macmillan distributor in their own country.

Several Books from Osborne/McGraw-Hill. One good thing about being a columnist is that your mailbox fills up with interesting books, magazines, catalogs, and CD-ROMs. The publisher was kind enough to send me three computer books for perusal and review recently. I'd like to go over them with you.

AOL for Busy People™, second edition, by David Einstein. In previous columns we highlighted several books in the popular "Busy People" series. These address an important group: busy users who are increasingly dependent on their PCs but don't have the time (or inclination) to immerse themselves in all the details. As

such, they're creatively billed as "the books to use when there's no time to lose." In the May 1997 column we reviewed *America Online for Busy People* in its initial edition.

The new second edition is similar but has been thoroughly updated to offer expert advice, tips, and techniques on the latest features of the new Version 4.0 software. The 288-page softcover has an easy-to-read, full-color format. It's $24.99.

Upgrading & Repairing Your PC Answers! Certified Tech Support. In the past we profiled several of the popular "Certified Tech Support" computer support and help books. One of the latest in the series, *Upgrading & Repairing Your PC Answers! Certified Tech Support,* by Dave Johnson and Todd Stauffer, is an encyclopedia of expert answers to today's top PC upgrade and repair questions. It offers more than 400 answers, plus a number of real-world shortcuts, work-arounds, and problem solutions.

The book is divided topically for easy reference, with each chapter tackling a different part of the PC. The book begins with answers to the top ten most frequently asked upgrade and repair questions. It then covers every PC component, including motherboards, hard drives, and input devices. The troubleshooting guide also offers expert notes, tips, and cautions on a wide variety of problems. The 496-page softcover is $24.99.

The Alta Vista Search Revolution, second edition, by Eric J. Ray, Deborah S. Ray, and Richard Seltzer. We profiled the book's First Edition in May 1997. To recall, it shows us how to use the powerful Internet search engine, Alta Vista, to find all kinds of information on the Internet.

The new second edition provides readers with more extensive information than that provided in the first edition, including chapters on Alta Vista's latest technologies, added subject capabilities, and more. The book shows you how to tailor Internet searches, master Alta Vista's updated interface and content, and explore its many new features. The book also goes into the fascinating history and development behind Alta Vista.

The 395-page softcover is $24.99. For a catalog, contact Osborne/McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710 (1-800-262-4729; on web: <http://www.osborne.com>).

Wrap-Up

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

Overheard: On-the-air rudeness is the hallmark of a weak person's sad imitation of other hams' strength.

73, Karl, W8FX

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

X-1J4 Features From the User's Point of View

Hamfest '98

Hamfest '98, presented by the Alford Memorial Radio Club of Stone Mountain, Georgia, will be held November 7–8, 1998, at the Gwinnett County Fairgrounds, Lawrenceville, Georgia. Featured will be prizes, vendors, fleamarket, tailgating, RV area, contests, and forums. The Southeastern Emergency Digital Association Networks Conference will be held on Saturday afternoon, November 7th, at 2 PM at the Lawrenceville Hamfest location. Talk-in on W4BOC repeaters: 146.760- (PL 107.2), 145.45-, 44.25 (PL 131.8). For hamfest information, e-mail <hamfest@radio.org> or call 770-410-3989.

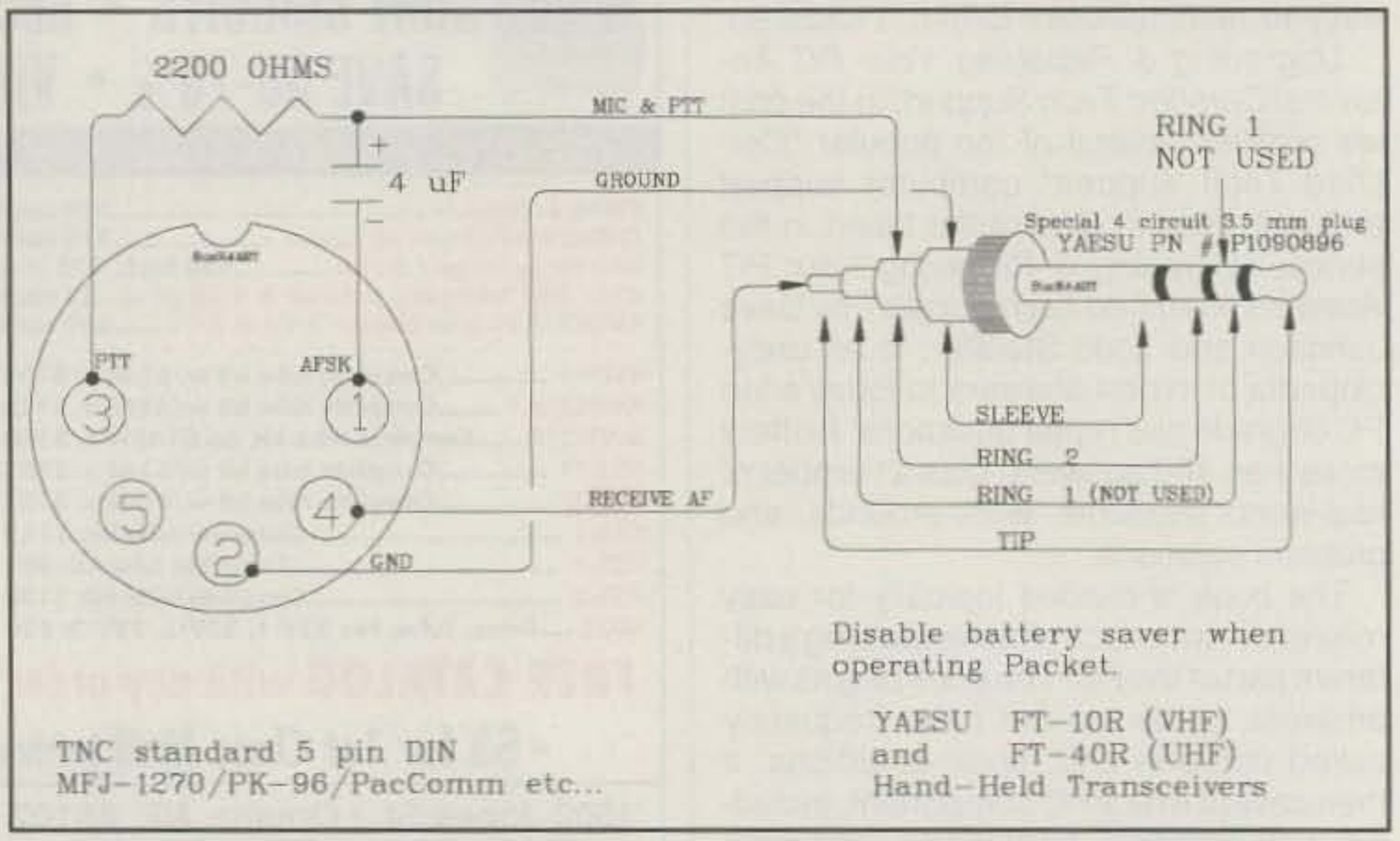


Fig. 1– Yaesu FT-10R (VHF) or FT-40R (UHF) to MFJ-1270, PK-96, PacComm, etc.

In keeping with the name of this column, I am including several drawings of a few of the late-model Yaesu transceivers as interfaced to various TNCs. These drawings are self-explanatory and should enable the packet radio operator to get started more quickly. Note again, I am not responsible for errors or mistakes, so verify all connections from your transceiver and TNC manual(s).

How Do You Know The Node is Broken?

The X1 system node operator (SNO) pays his way. However, there are times when we wonder why we spend our time and money building these nodes. The role of becoming a node SNO is not easy, but the task of implementing it is.

Having said that, I need to qualify these statements. The obvious situation is felt when a user calls to inform us that the node is "broken." We ask, "How is it broken?" The answer: "Well, because I can't get through it to Znode." We thank the caller for letting us know, and because it is 2 AM, we hang up the phone and go back to sleep. We'll check it out tomorrow when the sun is out, between our work schedule and before bedtime. At daybreak we try a connect to the node and—presto! It connects. Moreover, it is functioning as it should.

Lessons Learned

Before you telephone the SNO of the local node because it doesn't respond, make sure that your packet station is operating correctly. Too many times the above scenario has happened to me. I know I'm not the only SNO this happens to.

To be a system node operator takes a special kind of amateur radio operator. The SNO is a dedicated person, and in many cases he or she will gleam with a bit of pride in the performance of the node system for which he or she is responsible.

A few SNOs have more than one node. The reason is because there are not enough "movers and shakers" who will take the time, or share the expense, to build another node to link into other LANS. Thus, the burden is on the local SNO to blaze his own trail into other LANS, backbones, and trunks.

Without this kind of mover and shaker, we would not have continuity LAN to LAN, or even worse, we would not have the packet networks that so many of us rely on for fun and communications.

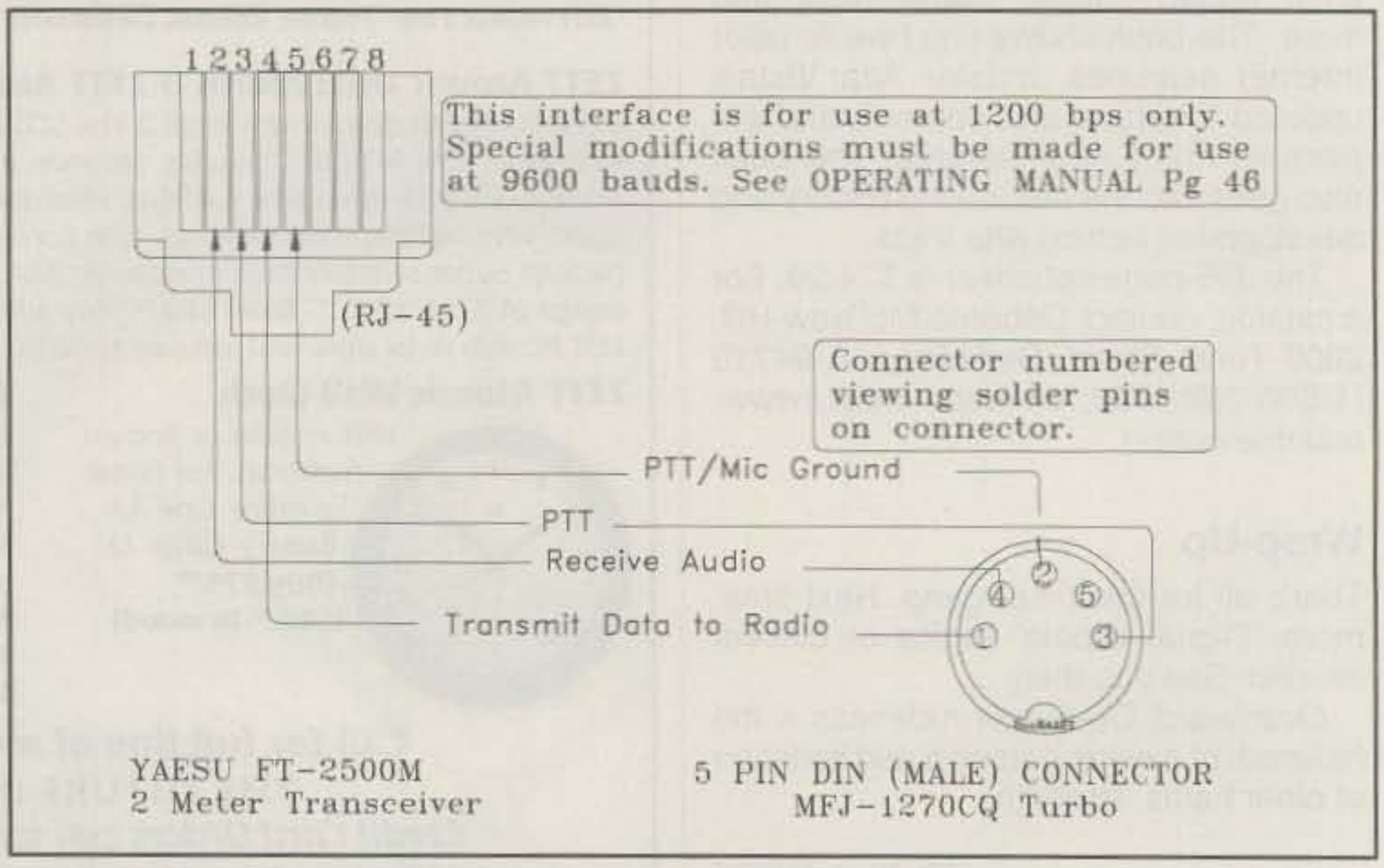


Fig. 2– Yaesu FT-2500M 2 meter transceiver to MFJ-1270CQ Turbo.

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

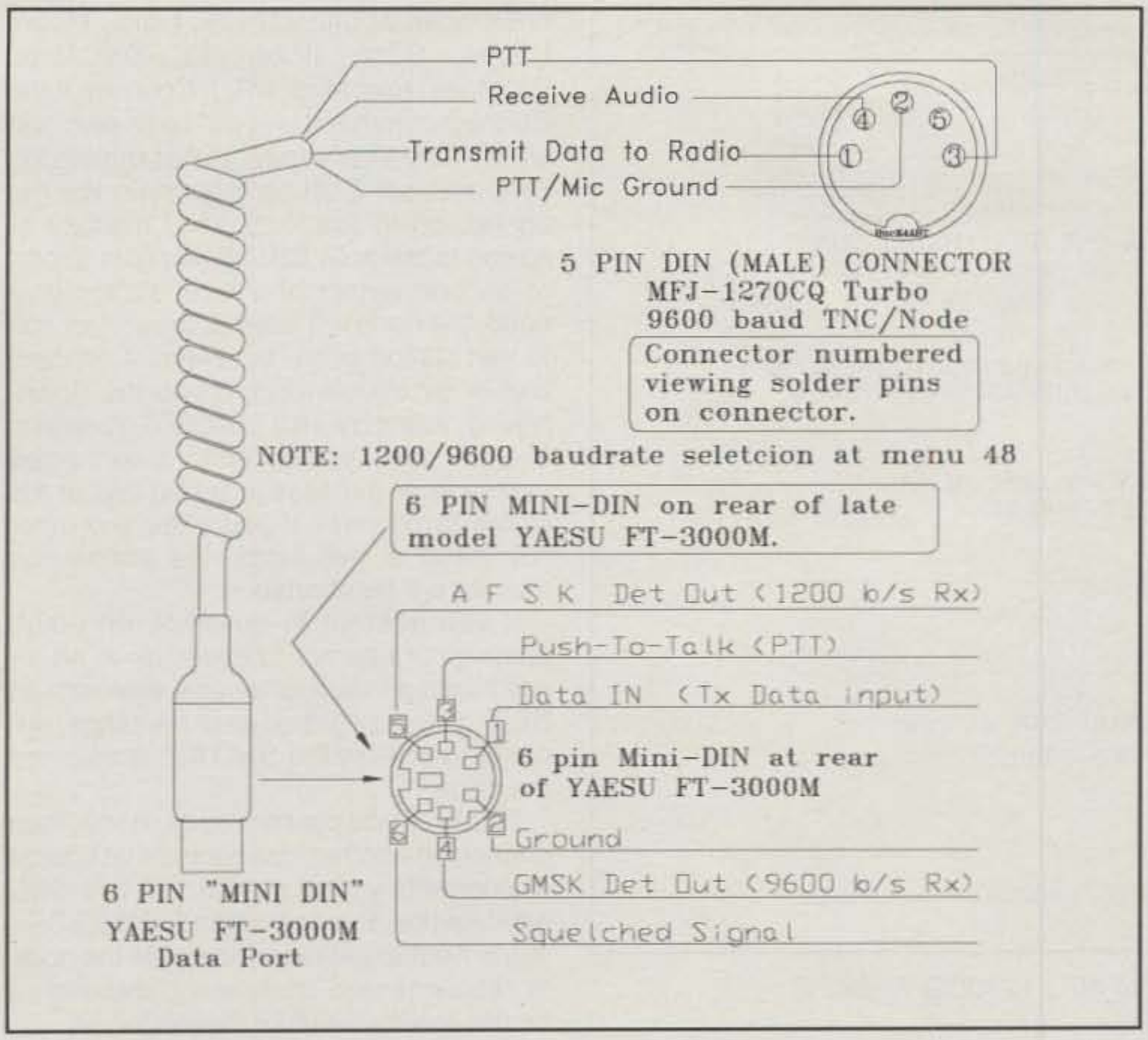


Fig. 3– Yaesu FT-3000M to MFJ-1270CQ Turbo.

The next time you have an occasion to speak to the SNO of your local node(s), ask if there is any way you can help, and at the least, say thanks. You may never know how much it means to hear someone say thanks for the help, but I assure you it makes a big difference.

There is one thing a system node operator likes to hear, and that is, "Hey, I know where there is a good site for a new node!" Now this is music to our ears, because we are always looking for an accessible mountaintop or a city water tank on which to install another node that will enhance our coverage area and enlarge our network.

In this month's "Packet User's Notebook" we are going to cover some of the features of the X-1J4 TheNET node. There is one difference, though. This time we are going to view the features from the packet user's point of view.

The X1J User's Guide

Here are the explanations and definitions that support the basic X1 commands. An

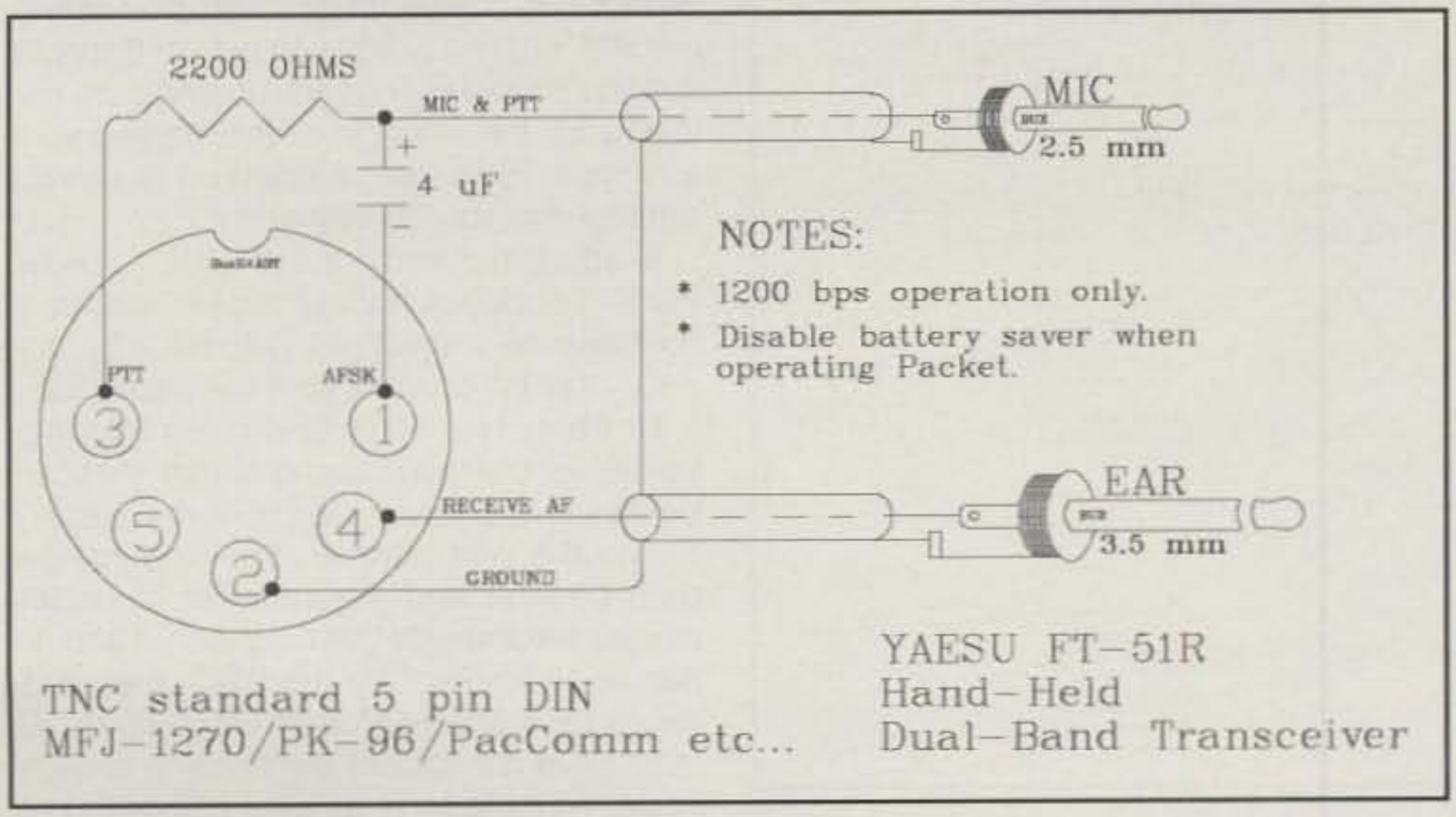


Fig. 4– Yaesu FT-51R hand-held to MFJ-1270, PK-96, PacComm, etc.

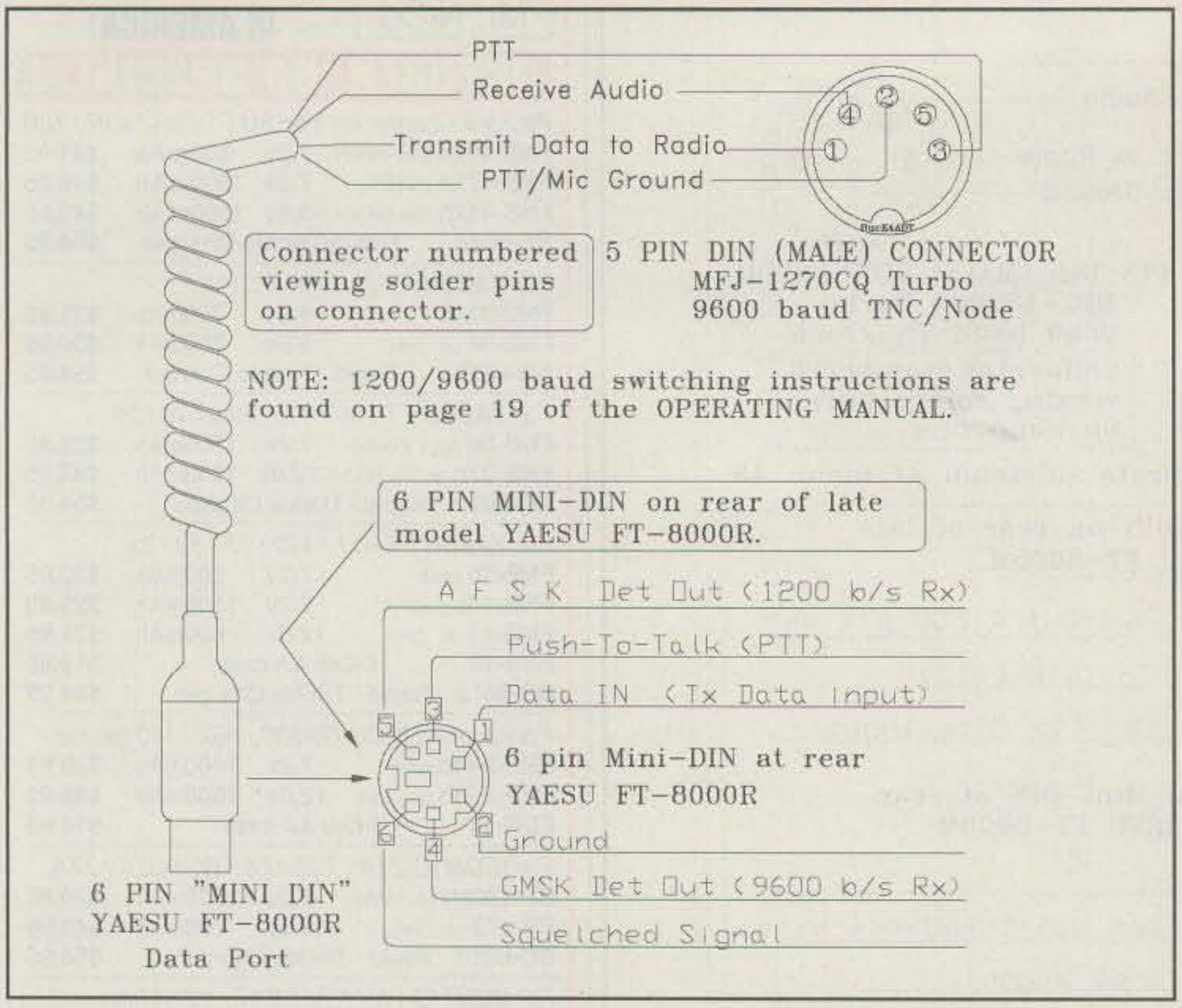


Fig. 5– Yaesu FT-8000R to MFJ-1270CQ Turbo.

X-1J4 TheNET node provides the following *user* commands: Connect, Info, Nodes, Routes, Users, Talk, CQ, BBS, Host, Meter, MHeard, Bye, DXcluster, IProute, ARP, Quit.

Not all commands are available on every node, as some commands may have been disabled by the SNO. If a command has been enabled, it will be displayed when you type an invalid command such as "?". In addition, there are some commands that are available, but are not displayed. The main ones of interest are: Links, Mode, Parms, Stats, IPAddress, DXCAlias, BBSAlias, HostAlias, MTU, Connect. If the Connect command is given on its own and without any alias or call, and assuming the SNO has set it up correctly, you will get connected to the local SNO mailbox or routed to the area BBS. If you give another callsign, either of a local station or a node, the node will attempt to connect you to that station either by a level 4 connection or by downlinking. If you are downlinking, you may also specify digipeaters. In either case, you get either a connected message or a message telling you of the failure to connect. If you enter any other command at this stage, the connection attempt will be aborted.

If you attempt to downlink with digipeating, or attempt to downlink to an invalid callsign such as a node alias with an SSID, you may get an error message, depending on how the SNO has configured the node.

Finally, if you connect to the node, then connect to another station and that station disconnects you (e.g., connect to a BBS and use the "Bye" command of the BBS), you will either get reconnected to the node or disconnected completely, depending on the configuration of the node.

Info. This command gives information about the node as a combination of a message stored in the EPROM and a message (up to 165 letters/characters) entered by the SNO.

Nodes. This command gives information about the distant nodes that this node thinks it can get to. With no parameter, it shows the alias and callsign of all the nodes except those staring with a "#" character. If a parameter of '*' is given, those "hidden" nodes will also be shown.

If a callsign or alias that the node does not know is given, it gives an error message. If the callsign or alias of a known node is given, the node gives details of the routes it knows about that lead to that destination. The display shows one option per line, each of which consists of the path quality, obsolescence count, and port, followed by the callsign of the neighbor. If any route is in use, a chevron is shown against the appropriate entry.

If so configured by the SNO, "Slime trails" (i.e,. nodes without aliases that have not been the subject of a valid node broadcast) may be omitted from the nodes list.

Routes. This command gives information about the neighboring nodes that can be heard. For each neighbor the display shows the port number, the callsign, the path quality, and the number of nodes accessible through this neighbor. If a route has been "locked" by the SNO, then a "!" character is shown after an entry. The SNO may have configured the node to display nodes as callsign or as alias:callsign. If so configured, then if a node is shown as a

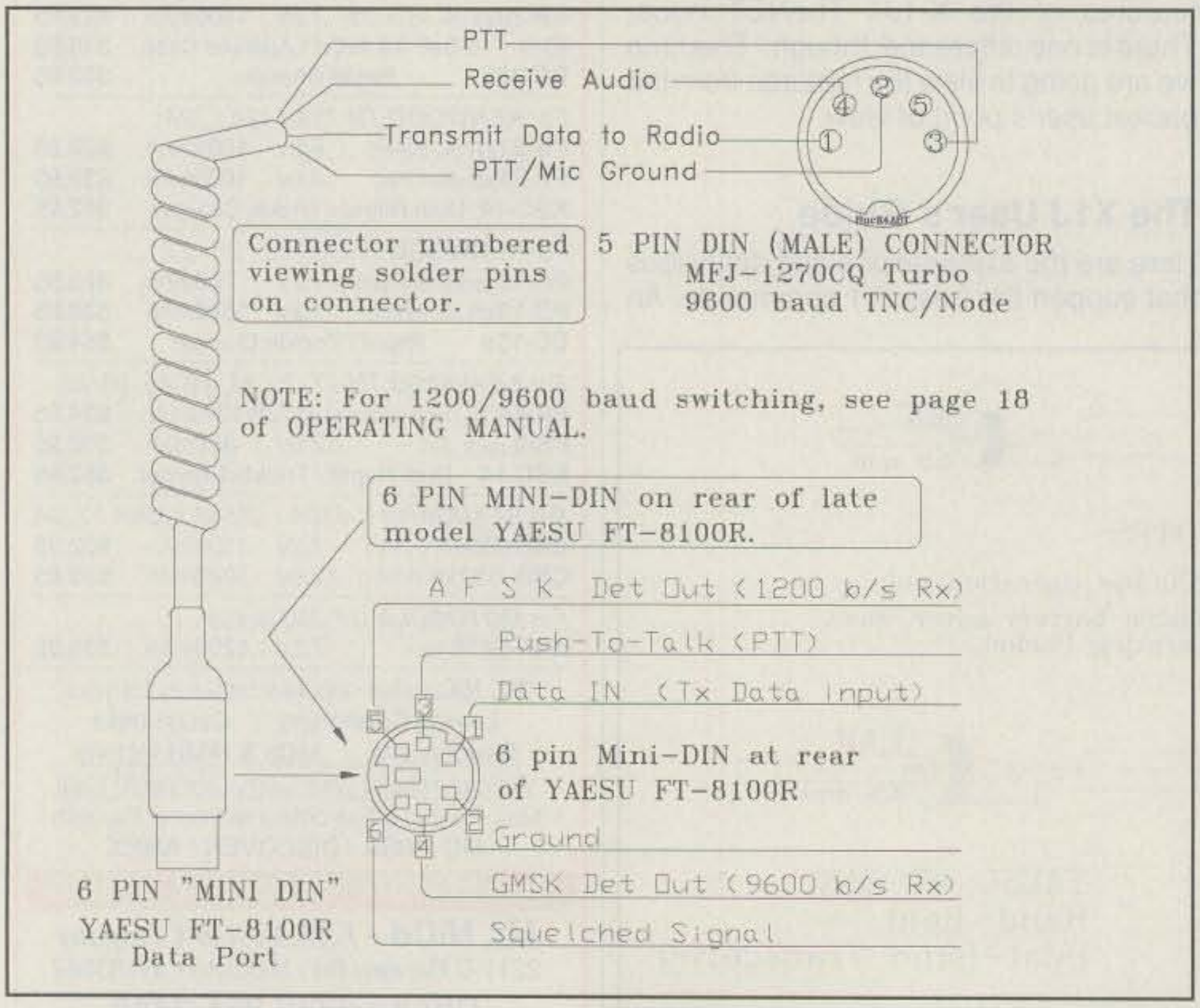


Fig. 6– Yaesu FT-8100R to MFJ-1270CQ Turbo.

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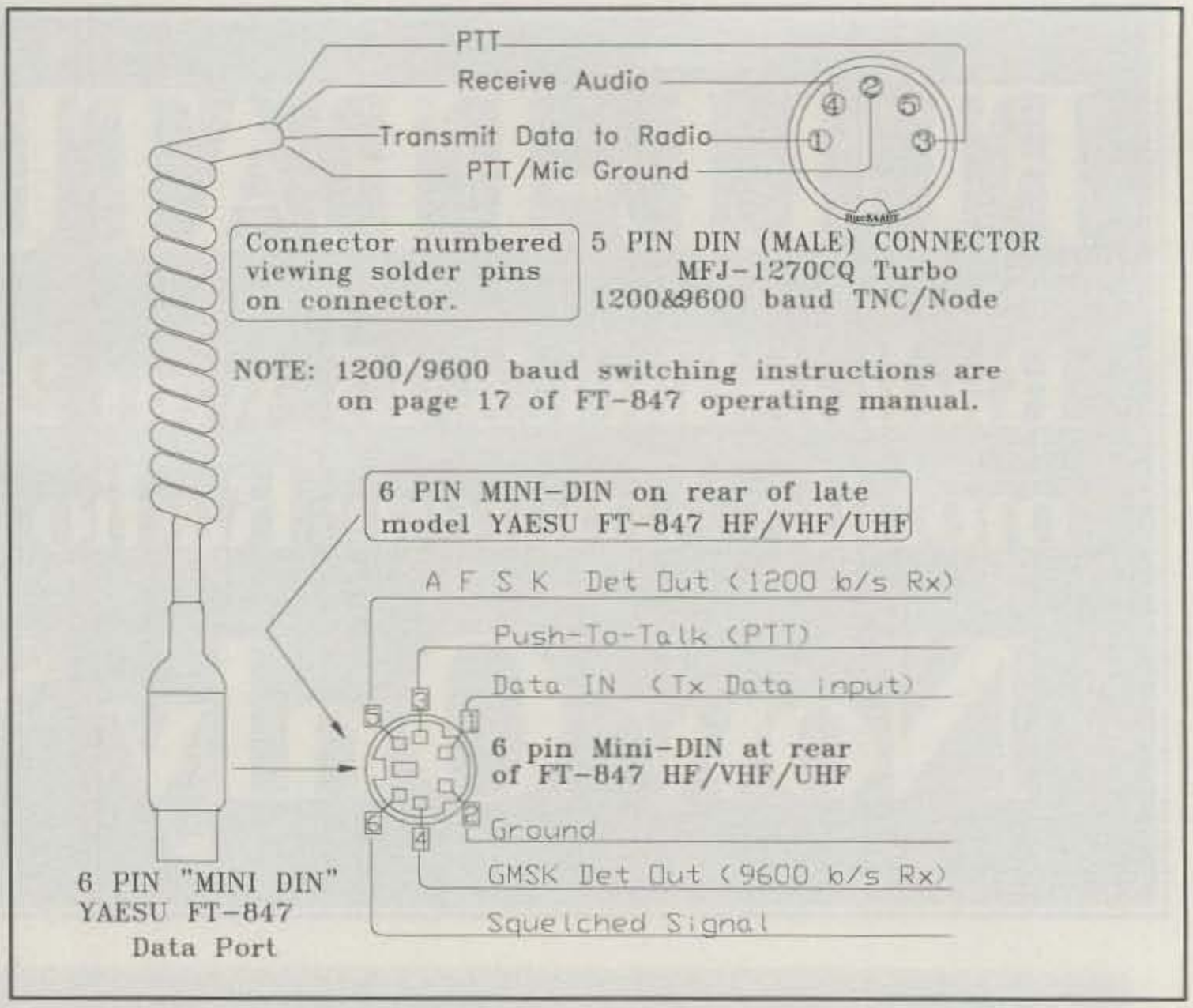

Fig. 7– Yaesu FT-847 to MFJ-1270CQ Turbo.

callsign alone, it means that it is not currently reachable, as its node broadcasts are not being received.

Users. This shows who is using the node. It does not show other nodes that are using the node as a level 3 relay, nor does it show those users who have connected to the node but otherwise have done nothing.

The display shows the through connections, followed by those users who are connected to the switch and "idle." It also shows those users who are connected to the conferencing facility.

The latter stations are shown connected to a destination called "Talk." In the case of connections, the two endpoints are shown. For connections, two symbols are used, "'<—>" and "<..>". The former is used for established connections, while the latter is used for connections being established.

Talk. Much like the CONVERS node, the Talk command/feature allows a group of users to hold a conference or packet radio roundtable. It also allows a user to send a message to another user of the node, provided that user is connected to the switch but is not patched/connected through the node to another station—and is not currently trying to connect to another station.

A user enters the conference by giving the command "Talk." He gets a message informing him of this and reminding him that the command to escape from the talk

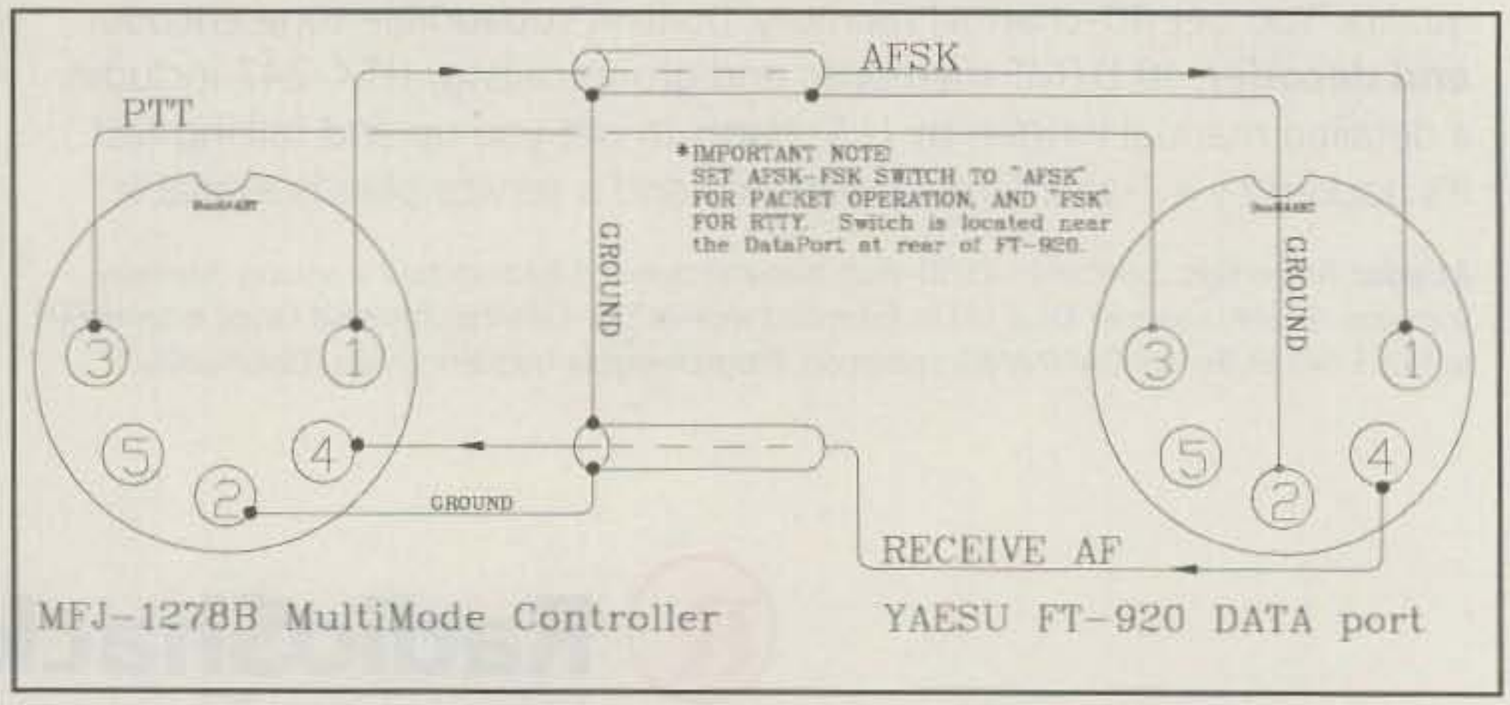

Fig. 8– Yaesu FT-920 to MFJ-1278B.

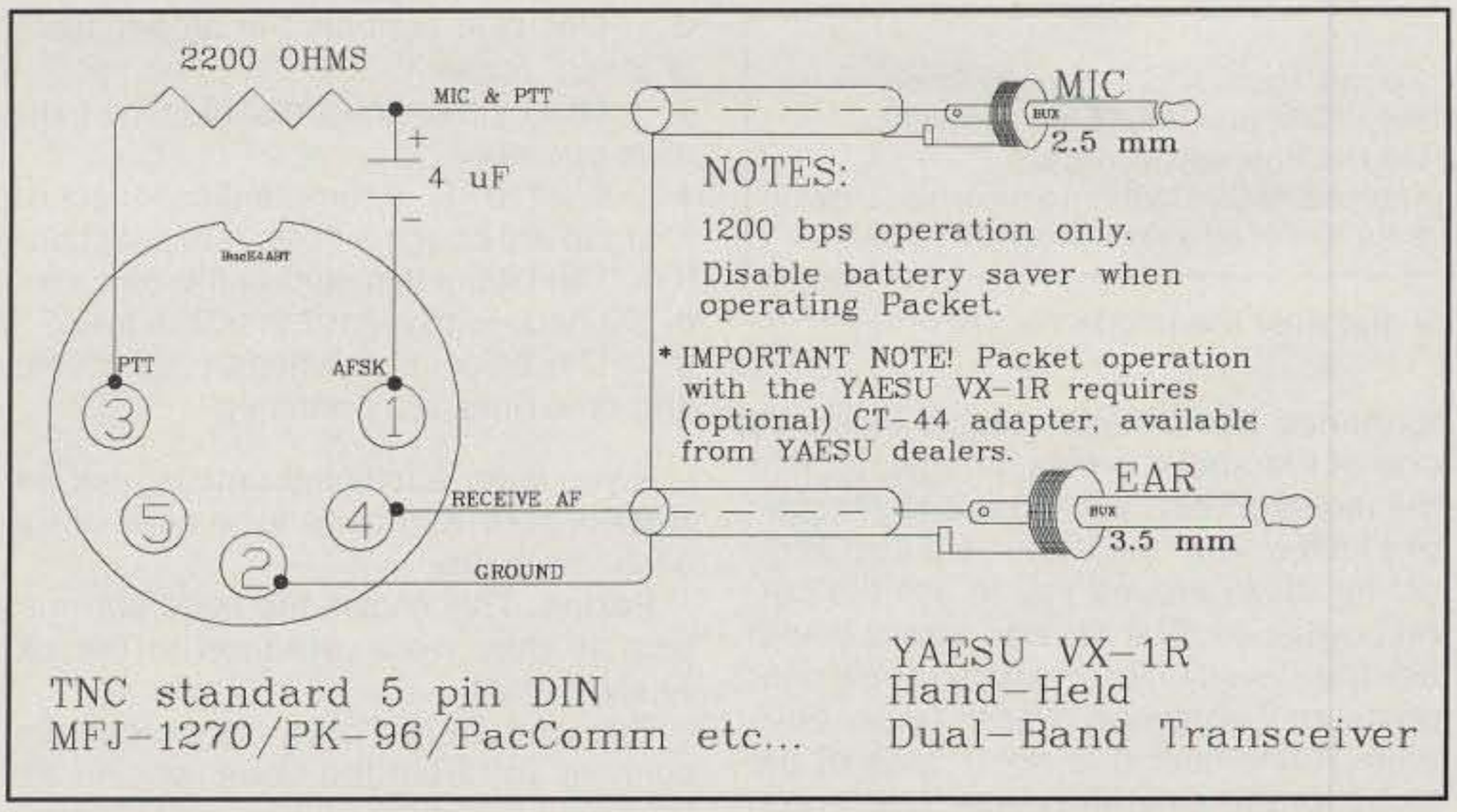

Fig. 9– Yaesu VX-1R hand-held to MFJ-1270, PK-96, PacComm, etc.

command is "/exit." Any other users currently in the conference get a message from the node telling them of the callsign of the user who has joined them.

At this point, every line sent by a user in the conference is copied to all other users in the conference, preceded by their callsign.

To exit from the conference, the command "/exit'" is used. This causes a response message to be sent to the user, and at the same time all of those left in the conference get a message from the node telling them of the station who has left the conference.

If you force a disconnect, the other stations are not told of your departure.

A string of text may be entered on the same line as the Talk command when the command is given. If this is done, before the user is connected to the conference, that string of text is sent to all the other users of the node who appear in the "User" list but are not connected to anything else. For example, if while I'm connected to the node as a user, W4WWQ connects to the node and types **TALK, Hello Buck can we have a chat? If so, PSE type TALK.** then I would receive the following on my screen. Additionally, any other users connected to the node and not connected through would see the following: W4WWQ > K4ABT>>**TALK, Hello Buck can we chat? If so, PSE type TALK**

The only exception to this is that SNOs are not sent the message.

CQ. This command is used to broadcast a CQ message. In addition, the fact that you are calling CQ is indicated in the User list. The callsign will be your own with a different SSID, and anyone else can connect to you by connecting to the callsign with the appropriate SSID.

The CQ remains "primed" for a while, and if any other command is given to the node the CQ will be cancelled.

BBS. When you issue the BBS command, assuming that the SNO has configured it, you will be connected to the local BBS. If you enter the command "BBS ?" then the current setting of the BBS will be displayed.

Host. The HOST command operates just like the BBS command. It may have been disabled by the SNO, it may have been set to connect to the same station as the BBS, or it may have been set to connect to another host system. If you enter the command "HOST ?" then the current setting of the Host will be displayed.

MHeard. If enabled, the Heard list shows the last few stations heard. The number of entries is limited and set by the SNO, so any stations not heard for a while may get pushed out of the list by others heard.

Assuming that a station is not pushed out in this manner, the display shows the number of packets heard from that station since it appeared in the list and the time since it was last heard. The time is hours, minutes, and seconds. The list also shows the port on which the station was heard (port 0 is the radio port), and if it hears IP frames or Net/Rom (TM software 2000) frames, it adds a note to show that the station is a node and/or a TCP/IP station.

If the list is long enough so that a station is not heard for 12 hours, it will get deleted anyway.

The list may also show a column headed "Dev". This will only be present where the SNO has added to the node a small hardware add-on (MFJ-52B) that measures the received signal audio level. Specifically, it gives an indication of the peak audio level. By means of a software configuration control and prior calibration, this gets converted into an indication of the transmitting station's deviation. It does this by sampling the audio level after every valid packet.

The **Meter** command is set on, or active, by the SNO by entering the command

Parameter	Default	Controls
1	256	The MTU for the radio port, AX.25 encapsulation
2	256	The MTU for the RS232 port, AX.25 encapsulation
3	236	The MTU for the Net/Rom encapsulation
4	257	The maximum number of data bytes in a received L2 frame
5	328	The maximum number of bytes in a received L2 frame

Table I– MTU parameters and their meanings.

mode using the password and then setting Meter to a number above 0 (zero) and 255. The SNO first calibrates the deviation meter within the node while it is on the bench and before installation at the node site. Setting the Meter command to 0 (zero) will turn the deviation feature Off.

Often, packet stations are set up and the audio level is tweaked until it appears to work reasonably error-free. The idea of this add-on is that having done this, you then connect to the node and display the **MHeard** list to see an indication of your actual deviation.

When the Meter command is activated by the SNO, and the hardware modification has been made to the node, the MHeard list will contain an new heading which reads "Dev." In addition to seeing the last 10 or 20 stations that were heard by the node, the node also displays the node or TCP/IP and "Deviation." You will see your own callsign in the MHeard list, and under the "Dev" heading you will see your modulation level expressed in kHz.

The SNO can fine-tune the Meter command to set the reading correctly. Local advice must be taken regarding the correct setting, as it depends on the channel spacing being used (e.g., 12.5, 25, or other kHz).

Provided the meter is calibrated according to the SNO's "Overview" manual, the SNO might set the Meter command to 20. Thus, the reading would be multiplied by 255, and equate to about 5 kHz for full-scale reading.

Meter 10 would therefore support a reading of 2.5 kHz full-scale—e.g.; 10 × 255 = 2550 Hz, or 2.55 kHz.

Once he has put the node at the final site, the Meter command may be used to tweak the Deviation for the final reading that corresponds to the deviation from a known source.

Care must be taken over its interpretation. It does not independently measure the two tone levels. It is assumed that whatever local standards relate to pre-emphasis (i.e., use it or not) have been implemented.

The Meter will give the wrong answer upon the following conditions:

- A badly distorted audio signal
- Badly off frequency
- Incorrect adherence to local pre-emphasis standards
- A very noisy signal

If you connect, then correct your deviation to the correct display, then find performance has deteriorated, it indicates one of the above problems. It is not that the meter doesn't work; it is an indication of a fault elsewhere. It is in your own interest for those around you to use the correct deviation. The list also allows you to see the deviation of others, so apply peer pressure if someone over or under deviates. Remember it is *not* a case of the higher or the lower the better. It is having the setting *right* (3 kHz).

The hardware PC board that enables deviation remote reading by/from an X-1J4 node is available from MFJ Enterprises Inc., 1-800-647-1800, or see your local MFJ dealer. The price of the MFJ-52B is around $50. The add-on PC board easily fits inside the MFJ-1270C TNC.

Note: To use the MFJ-52B with the MFJ-1270C node, the node must be using the X-1J4 TheNET node coded EPROM at U23.

Links. The Links command shows the level 2 connections to the node. This is usually of academic interest, but I use it in testing. The display shows the links, one per line, with the two callsigns, the link state, the port number, and the current number of retries.

Mode. The Mode command is a bit like the Parms command. It shows a number of additional parameters. These are as follows, as shown by example:

MODE BUX:K4ABT-3> 0 0 6 3 2 35 0 600 2 600 1 31 0 1 1 0 0

Here are the detailed meanings of each Mode feature/command:

0 Host mode protocol (0 = standard, 1 = DCD mode)
0 CWID period. Delay in seconds between CWID
6 CWID speed 10's of msec per dot. 6 equals 20 wpm
3 Enables/disables nodes broadcasts mask.
2 RS232 protocol, 0 = crosslink, 1, 2, or 3 are KISS
20 TxDelay in 10's of milliseconds (centiseconds??)
0 Full duplex control. 0 equals simplex
600 RS232 port nodes broadcast interval in seconds
2 Nodes broadcast algorithm port mask
600 Beacon period in seconds
1 "connect" redirector. 0 is to Host, 1 is to BBS
31 Each bit controls one of the "user" help messages
0 This byte controls the broadcasting of "hash" nodes
1 This byte enables/disables the extra alias operation
1 If set to "1", a remote disconnect on a circuit will cause a node reconnection
0 The bits of this control the operation of the node with regard to "slime trails"
0 This bit controls whether digi uplinks and downlinks are permitted

If you want additional details, ask the SNO of your X1J node for a copy of the overview guide.

Parms. This shows the node parameters as they were arranged in the old TheNET 1.01.

Bye and Quit. These commands disconnect you from the node, closing the link. It says goodbye before disconnecting you if it has been so configured by the SNO. Quit does just the same as Bye.

DXcluster. If there is a local DXcluster, this command may have been configured by the SNO to connect you to it. It therefore operates in a manner very similar to the BBS command.

Stats. The Stats command gives data about the node operation. A description of the information is contained in the overview document.

IProute. This command is used by the SNO to configure the IP route table. It may also be used to display the router table.

Arp. This command is similar to the IProute command, but shows the Arp table. The Arp table provides a translation from IP address to callsign.

IPaddress. This command is used to set or display the current node IP address.

BBSAlias, HostAlias, DXCAlias. These commands are used to set additional aliases for the node. It can be configured by the SNO to accept connect requests (uplinks) to the node callsign, the node alias, or the three aliases shown by these commands. When the node accepts a connection to one of these aliases, it will immediately invoke the BBS, DXC, or Host commands for you.

The way this would normally be used is as follows. Suppose your local (for example) BBS was not accessible on the frequency on which the node operates. The BBS alias can be configured to provide easy access across other nodes to the BBS.

MTU. This command allows configuration of the MTUs for IP users. The parameters have the meanings shown in Table I.

For more details on the IP router, see the August 1993 "Packet User's Notebook" column.

On the web, visit the Packet Radio Networking pages at: <www.packetradio.org>, <www.packetradio.com> or <www.sedan.org>.

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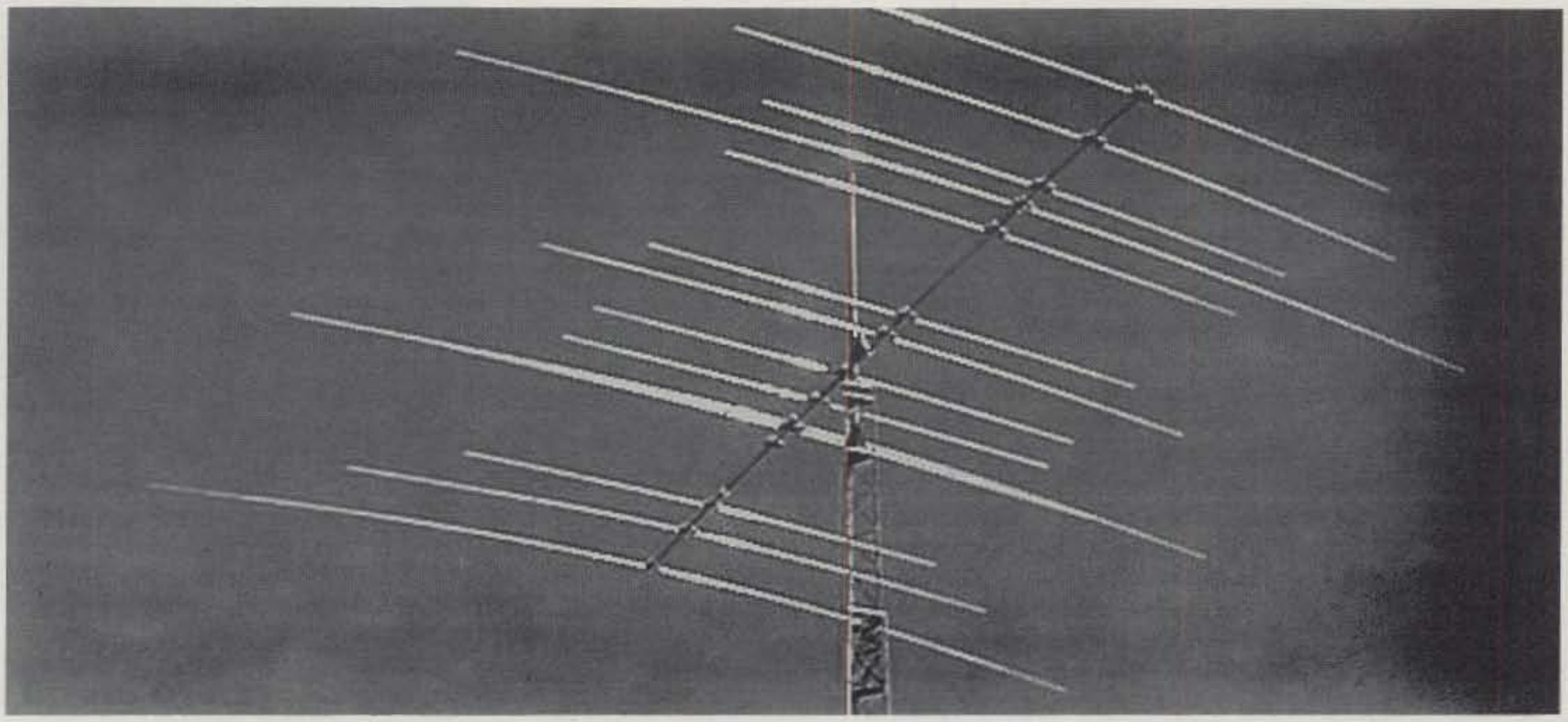

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CIRCLE 62 ON READER SERVICE CARD

BY JOE LYNCH, N6CL

VHF PLUS

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New 50 MHz Calling Frequency Proposed

During the Business Meeting of the 32nd annual Central States VHF Society, which was held in Kansas City, Missouri on Saturday, July 25, a proposal for moving the present 50 MHz DX calling frequency of 50.110 to 50.150 was put forward by representatives of the Six Meter International Radio Klub (SMIRK). This position did not meet with acceptance because it was viewed as both competing with the recently established DX calling frequency and not truly allowing for more operators to hear activity centered around the calling frequency and below it.

Another proposal was put forward to make 50.200 MHz the calling frequency, with domestic communication taking place down to 50.150 MHz. This proposal became the official position of the CSVHF Society when it was passed by a vote of those members present at the business meeting.

It is significant that the CSVHF Society, the oldest VHF society in the country, should take such a strong public stand concerning moving the calling frequency. It demonstrates that a significant number of active VHF-plus operators sense a need for a solution to the present problem of communications on 6 meters.

The present calling frequency worked somewhat through the past cycle. However, there were many problems with it. There were considerable problems of what constituted DX. Was a station operating in a rare grid locator but within the U.S. considered DX over a station operating in a foreign country that had plenty of operations from it? Many debates took place—sometimes over the air.

Another problem was that some North American operators on 50.125 MHz (the domestic calling frequency) tended to slide down to near 50.120 MHz. Furthermore, interference from computers and television sync signals tended to make the frequencies around 50.112 MHz unusable for hearing those weak signals. Sometimes these signals would be so strong that they would obliterate the calling frequency altogether.

As the number of countries on 6 meters continued to grow, more and more congestion occurred within the narrow band that was usable. During many openings, the DX was clobbered by a few North American stations working the DX within the 25 kHz window. The result was that not a lot of operators were successful in working the DX.

The increasing concern and interest in developing a working alternative (replacement) calling frequency grew out of the problems with the present one. For about two years now the idea of changing the calling frequency has been debated, both over the Internet and in publications. Your editor decided to stay out of the foray until something that was workable surfaced.

I listened to considerable discussions at the Central States VHF Society and what I heard about what has been voted upon by the members of the CSVHF Society makes lots of sense—for a number of reasons.

First, a bit of discussion concerning what is a calling frequency: Because activity is less frequent on the VHF-plus frequencies than on HF frequencies, certain calling frequencies have been established and agreed upon by a majority of operators on the VHF amateur bands. Whether you came from HF or repeater operation, or are a new ham, you may be familiar with FM calling frequencies. However, you may not be familiar with the weak-signal calling frequencies. The purpose of the calling frequency is to establish a gathering point for operators to initiate contacts. Once a contact has begun, operators are urged to move off the frequency in order to keep it clear for others to start contacts. Unfortunately, sometimes during band openings one station will stay on the calling frequency and dominate all contacts—unfairly reducing other operators' chances.

Each VHF-plus band has a calling frequency. However, each band's calling frequency functions differently from the next. Because the 6 meter band presents so many different opportunities for openings, the calling frequency for this band should function as a very brief way-station for operators to stop by to see if there is someone to work. Usually, however, be-

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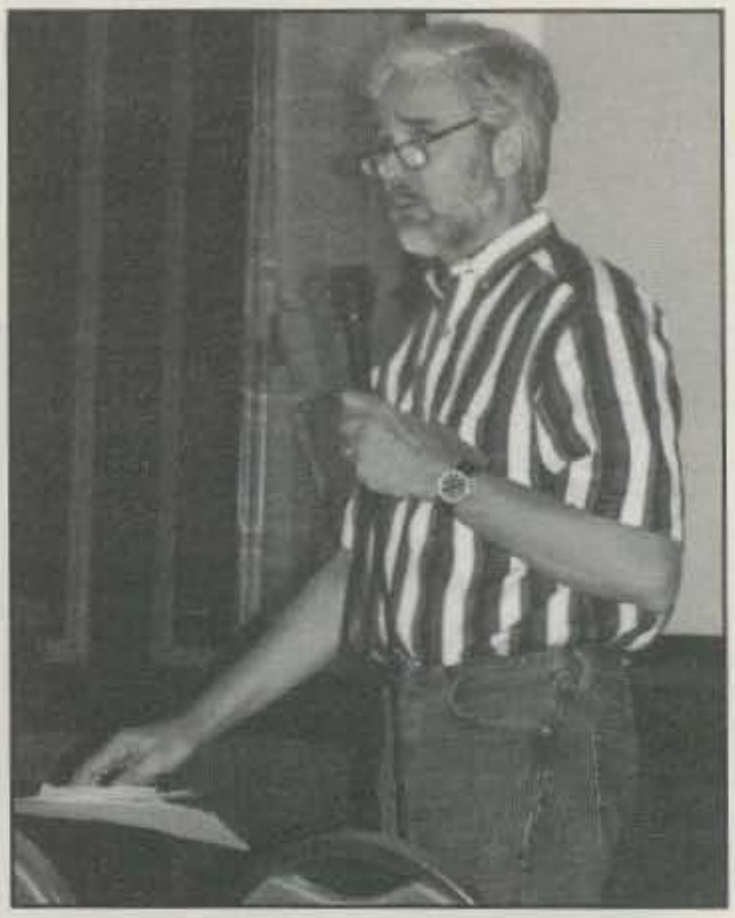
VHF Plus Calendar

Oct. 4	Poor EME conditions.
Oct. 5	Full Moon.
Oct. 7	Moon perigee.
Oct. 10–11	First weekend of the ARRL EME contest. *(See text for details.)*
Oct. 11	Highest Moon declination.
Oct. 12	Last quarter Moon. Moderate EME conditions.
Oct. 15–18	Microwave Update, Estes Park, CO. *(See text for details.)*
Oct. 19	Moderate EME conditions.
Oct. 20	New Moon.
Oct. 21	*Orionids* meteor shower peak.
Oct. 22	Moon apogee.
Oct. 26	Lowest Moon declination. Good EME conditions.



Jim McMasters, KM5PO, discusses high-speed CW via meteor scatter at the recent Central States VHF Society Conference.

Paul Shuch, N6TX, serenades the CSVHF Conference participants with a song about SETI, the Search for Extra Terrestrial Intelligence.

cause there is so much activity on 6 meters, operators tend to spread out away from the calling frequency—but not entirely. This tendency to congregate isn't necessarily all bad.

With this proposed new calling frequency, this gathering on one frequency away from the DX will present the possibility for the DX to hear us and for us to hear them. How is this possible? In IARU Region I (mostly Europe and Africa), there has been the establishing of a calling frequency of 50.150 MHz, with a DX window that extends between 50.100 and 50.130 MHz. In IARU Region III (mostly Asia and the western Pacific rim), there has been a previously established window of activity that also extends between 50.100 and 50.130 MHz. This is particularly evident in the Australia-New Zealand area, where 6 meter allocations are especially restricted because of commercial television allocations.

By putting the center of the North American activity on a frequency that is far enough away from the international calling frequency, we thereby create a possibility of split operation which would open up many more opportunities for communicating with DX. A DX operator on or around 50.150 MHz could announce that he is listening around 50.200 for calls. That DX operator (and other nearby DX operators) would not be clobbered by a North American operator trying to work the DX operators.

There is certainly impetus for all of us to adopt this new calling frequency. And, the sooner the better because of the impending onset of the new *F2* season. With more countries than ever anticipated to be on 6 meters, activity will be much higher, thereby increasing the congestion that exists with the present calling frequency.

FCC Proposes To Streamline Amateur Rules

The following is from the ARRL Bulletin 057: "The FCC has proposed to phase out the Novice and Technician Plus class licenses, leaving just four amateur license classes in place—Technician, General, Advanced, and Extra. The Commission also has asked the amateur community to express its opinions on Morse code requirements for licensing and testing, but offered no specific changes. And the FCC proposed to permit Advanced class licensees to administer amateur exams up through General class. The proposals were among several suggested rules changes and invitations to comment contained in an FCC Notice of Proposed Rulemaking, WT Docket 98-143, made public August 10.

"A copy of the complete NPRM has been posted on the ARRL Web page, <http://www.arrl.org>. The FCC NPRM can also be downloaded from the FCC

Rod Blocksome, KØDAS, congratulates Rich Westerberg, NØHJZ, on winning the "Big Bone" prize for the best overall Rover operation during the past contest season.

Web site in Word Perfect 5.1 and Text versions as: <http://www.fcc.gov/Bureaus/Wireless/Notices/1998/fcc98183.wp> and at <http://www.fcc.gov/Bureaus/Wireless/Notices/1998/fcc98183.txt>, respectively.

"The FCC set a longer-than-normal comment period. The deadline for comments is December 1, 1998. The deadline for reply comments is January 15, 1999. The FCC will accept electronic comments via the Internet at <http://www.fcc.gov/e-file/ecfs.html>."

For a complete discussion of the FCC's proposal, see this month's "Washington Readout" column by Fred Maia, W5YI.

Perseids Meteor Shower Activity Report

The following is from Shelby Ennis, W8WN: "There were lots of people oper-

Larry Hazelwood, W5NZS, is congratulated by Kent Britain, WA5VJB, at the CSVHF Conference banquet for winning the Wilson Award for service to the society and the VHF-plus community in general.

ating this year. A real-time web site was used heavily for exchanging notes. It appears that the peak was around 1430 UTC on 12 August. There seems to be no other reports on any other peaks.

"Agreed by all that the peak was small compared with last couple of years. Also, almost nothing the previous two days.

"Also interesting is that this peak did not support long-distance contacts. (Usual meteor scatter is about 600–1200 miles, with up to about 1400 miles possible.) Several (including myself!) found no support for contacts beyond about 1200 miles, even though many were trying. Most contacts this year were under 1000 miles or so. (Most contacts are in the range of 600–1000 miles. But I personally heard *nothing* over about 830 miles, even though I had a large number of long-distance schedules with well-equipped stations. (I was at least heard several times by a Canadian station at a distance of 1413 miles).

"Also, there was a great lack of long overdense burns. In the past few years, on the day of the Peaks, there has been an almost complete lack of underdense burns (on 144 MHz), far below the usual sporadic background for this time of year. But during and between the peaks, there would be long, overdense bursts, sometimes quite a few. This year there were some underdense pings and very few overdense bursts. These would imply a lack of large particles, and/or particles vaporizing high enough in the atmosphere.

"Below are 15 specific reports from North America and Europe, plus about that many additional 'schedule results' reports."

"I think the conditions during this year's *Perseids* were 'no-good.'"—SM5SJR, Sweden.

"The first peak was very sharp. Activity started at 1200 UTC and peaked around 1430 here. After 1500 very few reflections. This first peak seemed to support only short distances (<=1500km)." —W1FIG, FN41, Rhode Island.

"The *Perseids* meteors are not as high velocity as some other showers. The shower also doesn't favor east-west paths, which are usually the longest paths attempted. The peak is also not the best time for working long paths. The larger meteors, which cause significant ionization at a higher elevation, therefore providing longer paths, tend to lag the peak. We had a very good 'traditional' peak here in Colorado this morning from 1430–1600 UTC." (Comment from 35-year-Perseid veteran WØAH, ex-W2CRS, CO).

(Comment on Doug's comments, by me): "Agreed. But the *Perseids* has (since 1955) been the shower for most long-distance skeds. And compared with the past few years, this seemed poorer for them."

"Heaviest activity from my log was between 1430 and 1500 UTC. Cassette tape recording of this time shows almost 2 minutes of continuous ionization at 1442. A very definite peak observed here between 1430 and 1500. Every frequency I was monitoring got busy during this time. A two minute period at 1442 made 144.200 sound like a huge, widespread Es breakout. I heard and worked stations to the WNW, East, and ENE (total of six in this two minute period). Also noted (and new to me) was the frequency of backscatter burns from stations almost within tropo range of me." — KM5PO, AR.

"For me the peak was very obvious from about 1430 to 1630 UTC, and more precisely from 1500 to 1550 UTC. Last year I noticed very little N-S action and mostly NE-SW NW-SE but this year it seemed to be the other way around. A *sharper* peak than I have noticed in previous years." — VE2SWL/VE6, W. Canada

"The first sign of increased activity started at 1115Z. At this level I was hearing burns about every 5 minutes (at least 5 seconds long). This level stayed fairly constant until about 1415 UTC, at which time I was hearing burns at least one per minute until about 1435. From 1435 to 1520 I was hearing at least 3 burns per minute and they were 5 seconds or longer. From 1520 until about 1630 the burns thinned out until there were only 1 or 2 per minute. The most notable number of burns occurred between 1435 to 1450 and 1505 to 1515. During those time frames there were almost continuous signals. Most were very weak and short but readable." —K5IUA, TX.

"For what it's worth, the peak here (DO61) *may* have been at about 1530 UTC. That's when the backscatter from nearby stations peaked, but the peak itself was somewhat of a non-event. Compared to 1997, this year's was dismal." —73 Doug, VE5UF, in DO61ov, south central Canada.

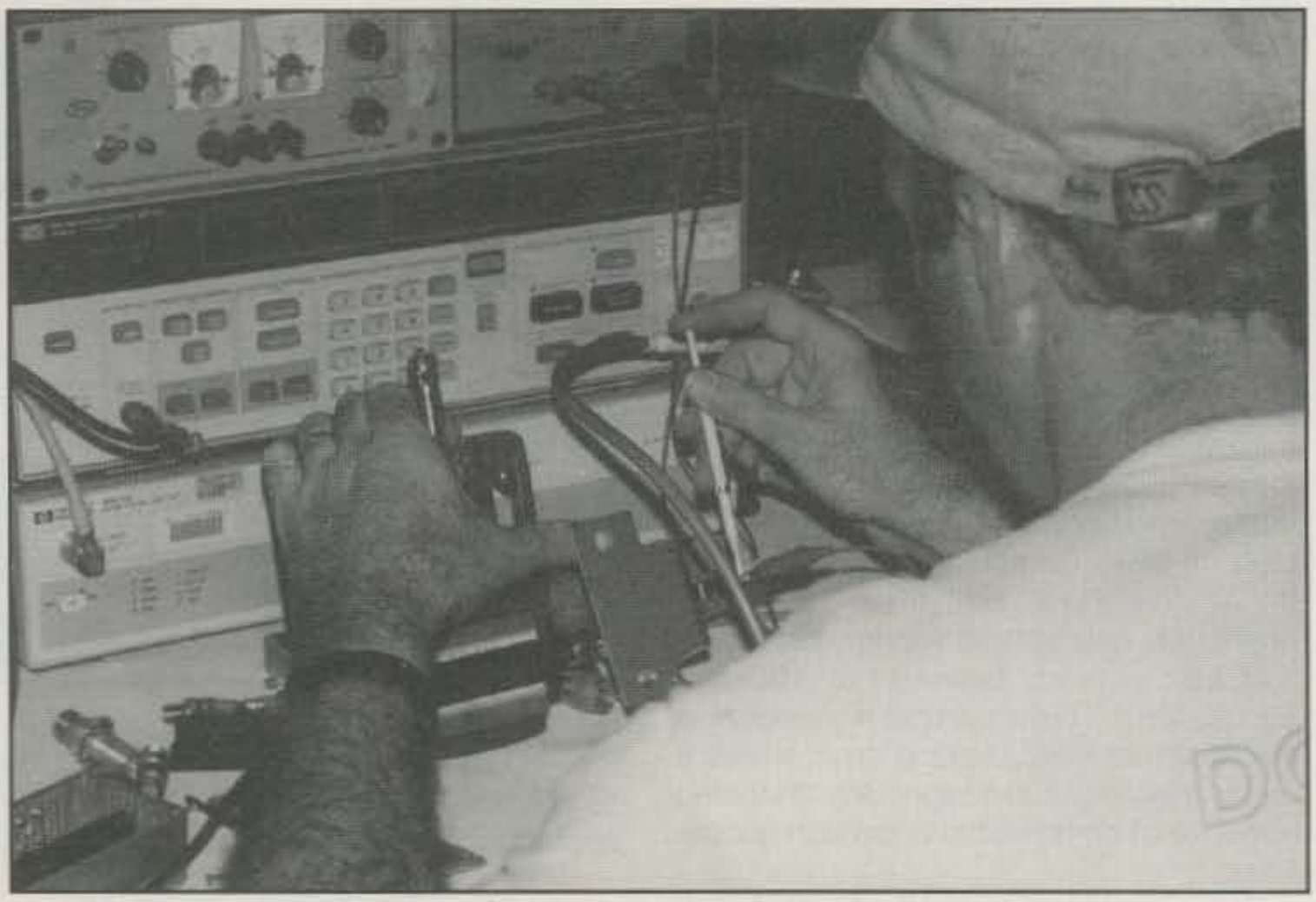
"Definitely the peak occurred in the 1400–1500 UTC range. The calling frequency of 144.200 MHz was a zoo with random meteors coming from the east and west. N5JHV in New Mexico was very loud and had some really long burns during the period. This year's shower was better than last year from this QTH." — KA9CFD, IL.

"I believe the peak of the *Perseids* occurred at around 1500 UTC on 12 August. This is based on monitoring the European SSB and CW meteor-scatter calling frequencies on 144.200 and 144.100 MHz which are the best benchmark in Europe." —73 Dave, G4RGK, England.

"The *Perseids* peak seems now to have passed over and I had a good high-speed CW meteor-scatter QSO with BY1QH on 144 MHz this morning."—JA9BOH, Japan.

Finally from W8WN, KY (EM77): "Note that these are comments on the time and intensity of the peak (and shower) only, in some cases pulled out of context. In spite of a poorer shower, some completed a good number of contacts, picking up a number of new grids. Many of these were due to the several HSCW grid 'expeditions' going on.

"However, in summary, the shower was poorer for most than the past two years, and the peak was less intense (expected). (Before the last two years, the new, early



Tommy Henderson, WD5AGO, makes noise-figure measurements at the conference. (Photo courtesy W2VU)

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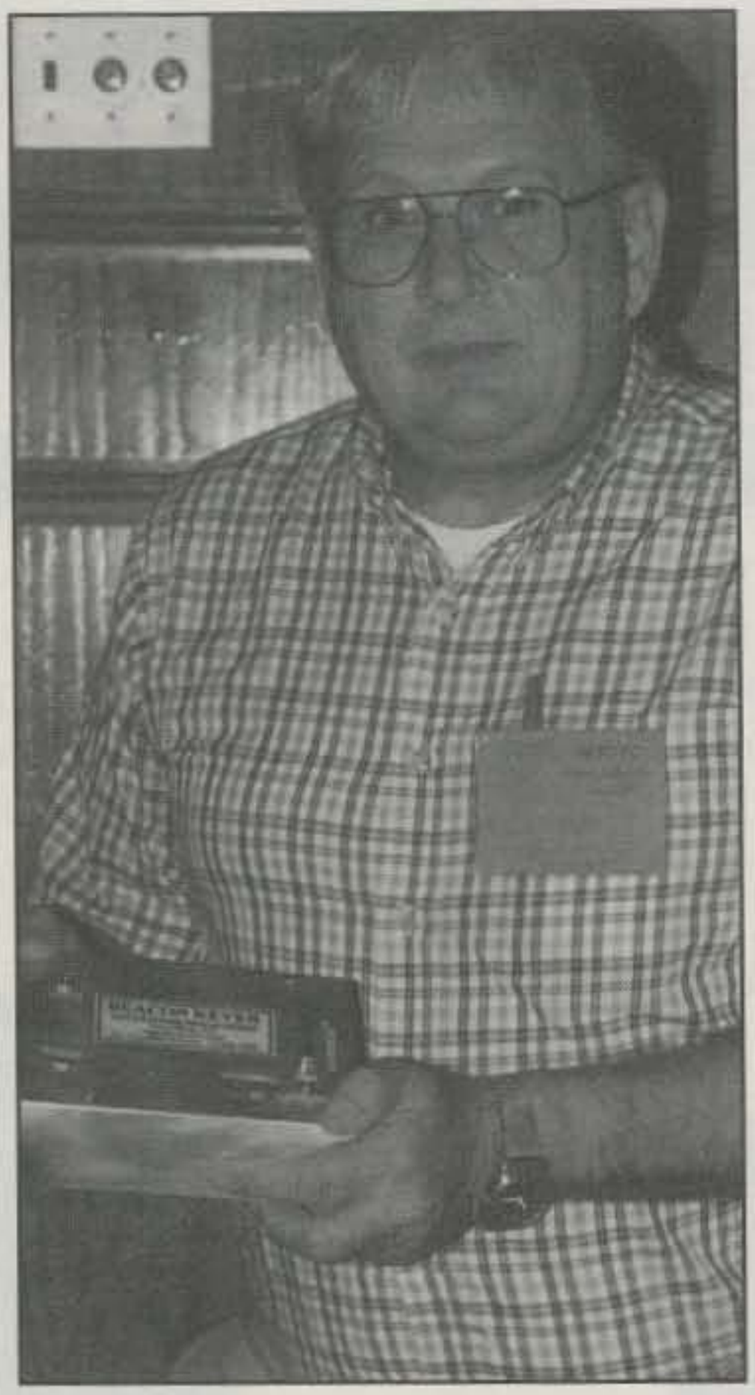

Bob Carpenter, W3OTC, shown here at the conference with a beacon keyer. (Photo courtesy W2VU)

peak got everybody 'spoiled,' I'm afraid, so didn't dare ask for any comparisons farther back).

"There were fewer long, overdense burns than the past two years. But there were as many or more very short, weak, underdense pings on the peak day. More backscatter was noted. (Why? Simply more operating? And lots of schedules posted on the HSCW and WSVHF Reflectors, or made on the real-time Hot Rocks Web page? Or a difference in the shower?) However, several noted the increased backscatter.

"The peak was at about 1430 UTC, as seen from Western Europe and all of North America. A number were on during the times of the other predicted peak(s), but reported no enhancement at those times.

"From the comments, and from some of the completed-contact reports, it appears that there were fewer signals propagated over even 'normally-long' distances (i.e., about 1200 miles or so) than in previous *Perseids*. (I personally was disappointed to not even hear a ping out of three long, but certainly possible, Rocky Mountain portable operations).

"Watching the reports from Europe (compared with our own) this summer has caused several fellows to dig into the *effectivity* section of OH5IY's MSSoft program. Before the peak day of the *Perseids* (as all this summer), the Europeans were reporting much better results than we were getting. This was not due to their higher density of operators, etc., for this often took the ping/burst count into consideration. Now a couple of fellows are planning to reset the .INI file and compare effectivities of different directions in northern Europe vs. North America, for they seem to be stealing all of our rocks! None of the long-time ping jockies have a handle on this one yet. But it's becoming disturbing when they report random contacts and schedules with totals of hundreds of pings, while those same days we get only a few. It appears that some of the Propagation Wizzards may have to dig into this one.

"Interestingly, after a *very* long session (and lack of sleep three other nights), this 'day after' is the best I've felt on this day in years. It's so much more relaxing with HSCW, as well as making contacts possible when they would have otherwise been impossible. It also made the occasional SSB sked a welcome (though frustrating) change. But even the HSCW didn't help when there weren't enough meteors at the right time and place to give even a single ping! Hi. Am anxious to read reports from the western mountaintop expeditions, since they as a group apparently did not do as well as was expected. 73, Shelby, W8WN, EM77bq; e-mail: <w8wn@ne.infi.net>"

Current Contest

The first weekend of the ARRL annual EME contest is scheduled for the weekend of 10–11 October. This year's contest is split over three months. The second weekend will be in December. 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*. They also can be found on their web site at <http://www.arrl.org/contests/announcements/97/eme.html>.

Current Meteor Showers

According to the OH5IY meteor shower prediction software, the *Orionids* is predicted to peak around 21 October at approximately 1410 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

1998 Microwave Update. This year's Microwave Update is scheduled for 15–18 October in Estes Park, Colorado. It will be held at the Holiday Inn Resort. You can reserve your room by calling 800-803-7837. This hotel is different from past conferences held in the Estes Park area. There are 50 rooms available at $75 per night. There may be some still available by the time you read this. However, you must make call them by September 28.

There will be the usual technical programs and antenna and pre-amp measuring activities. There is no formal spouse program planned. The banquet will be a buffet which will include both beef and chicken. For more information, check out their home page at <http://home.att.net/~n0ugy/MW_Update_98.html>.

And Finally . . .

This month's lead story concerns the proposed new 50 MHz calling frequency. It is anticipated that there will be some resistance to changing to this frequency. However, for all concerned who operate on that magic band, something must be done. And, as I stated above, this seems to be the best proposal to surface.

Calling frequencies are not rules that can be enforced. Rather, they are gentlemen's agreements that we ladies and gentlemen of the VHF-plus community strive to keep because we are ladies and gentlemen. So when you are on the air and are trying to conform to the new calling frequency, and your neighbor is not, please don't yell at him for not doing so. Please use your best diplomacy to give your neighbor good reasons to conform to the new calling frequency.

I was glad to see many of my long-time friends at the Central States VHF Society Conference. It was good to get back into a limited circulation after finishing school. It is too soon to tell if I will be able to go to Estes Park. I have weddings to perform the weekend before and after, so I will be quite busy. One of them is for fellow weak-signal operator Jerome Doerrie, K5IS's daughter, Elena.

Most of next month's column will be devoted to the *Leonids* meteor shower and the possibility of a storm. Thank you very much for your continued support of this, your column.

Until next month . . .

73, Joe, N6CL

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Navassa 1998

An experienced team of operators has its sights set on Navassa this fall. Led by Dan Flaig, K8RF (ex-WT8N), the team will leave from Guantanamo Bay Naval Base in Cuba for the 100 mile sail to Navassa (NA-098). The exact dates for the operation had not been determined by late July, but the team is aiming for October/November. Callsign is **N1V**. In addition to Dan, operators include Navassa veterans Murray, WA4DAN, and Will, AA4NC, as well as Bill, W4WX/KG4GC, Tom, KG4CQ, and Franz, DJ9ZB. They plan an all-band operation with four stations on the air 24 hours a day, for about 10 days. Cushcraft is supporting the operation with beam antennas. Navassa ranks 40th on *The DX Magazine*'s Most Wanted survey.

Navassa is an officially uninhabited island that lies about 30 miles west of Haiti, in the channel between that country and Jamaica, due south from Guantanamo Bay. It has been United States territory since 1857, but fishermen from Haiti frequently use the island as a base. The 1992 DXpedition to the island found the fishermen very helpful in setting up and removing their equipment.

The two-square-mile island is mostly covered with exposed rock and guano, with enough grass to support some goats, a scattering of trees, and some cactus.

Navassa rumors fly about pirates, drug runners, and even CIA-sponsored biological warfare attacks. The island's actual history is almost as fascinating as the rumors, including its amateur radio history.

Navassa's history dates to the Guano act of 1856, which provided that discovers of deposits of guano may claim unoccupied islands as part of the United States. In 1857 Peter Duncan claimed Navassa under the Guano Act. The Navassa Phosphate Company was later founded to mine the guano, starting in 1864. As many as 2000 people, mostly African-Americans from Baltimore, mined the guano deposits by hand, digging with picks and shovels on the rocky island.

Working conditions on the island were terrible. Workers signed on for 15-month stints, but with the company-town environment, many workers ended up owing the company more money than they made. Thanks to inadequate food, scurvy was common among the workers. There were also reports of torture and beatings by the white bosses.

From left: I2VXJ, I6JBL, IKØFVC, and I2UIY at the site of 1AØKM.

In September 1889 tensions boiled over into a riot. Using rocks, shovels, and an ax, the black workers attacked the small number of white bosses and their famyilies, murdering many of them and wounding others. The uprising was put down about a week later by the arrival of a British warship. Three black workers were convicted of murder in the riot by an all-white jury. The case eventually went to the Supreme Court on the argument that the United States lacked jurisdiction, but the Court ruled against the defendants, securing US possession of the island.

The guano mining continued until the outbreak of the Spanish-American War in 1898. Rather than defend the isolated island and its 100+ workers, the US government evacuated all the inhabitants, effectively closing down the mining operation, which never resumed after the war.

On January 17, 1916 President Woodrow Wilson granted ownership of Navassa to the US Coast Guard for lighthouse purposes. After World War I, the US built a 162 foot tall lighthouse and adjacent crew quarters on Navassa, and the light was manned from 1918 to 1928. The crew quarters were wrecked in a hurricane in 1929, and the island has officially been uninhabited since. Adding to the mystery and lore of Navassa are reports that one lighthouse keeper killed himself on the island, and another supposedly went insane from hearing voodoo drums.

The Navassa saga continues today, with one Bill Warren suing the US government for the right to mine guano on Navassa again today. Warren is fighting the US Department of the Interior, which is blocking his efforts to resume guano mining, according to Warren's suit. Warren says that the US ownership claim is flawed, and since the Guano Act has never been repealed, he wants the island for himself, under the terms of that Act. Don't look for this to be resolved quickly.

Following the abandonment of the crew quarters, the light was automated and subsequently serviced at six month intervals by the US Coast Guard. The Coast Guard maintains authority over the island, including permission to land. They do little to exercise this authority, however. It is this lack of supervision that has given rise to many rumors of Navassa as a pirate hangout, site of drug runners making transfers, and even a CIA-backed plot to smuggle swine fever virus into Cuba.

While those conducting illegal activities obviously don't seek US Coast Guard approval to use Navassa, those operating a DXpedition for which they will be seeking DXCC credit must do so. This fact became a turning point in the history of the DXCC program.

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I2UIY and I2VXJ at the operating position of 1A0KM.

In late 1966, Don Miller, W9WNV, and Herb Kline, K1IMP, operated from Navassa under the callsign **K1IMP/KC4**. They had FCC permission to operate from the island. What they *didn't* have was US Coast Guard permission to land there. Since they were unable to provide a copy of permission from the Coast Guard to land on Navassa, the ARRL contacted the Coast Guard directly. The letter clearly

The WPX Program

SSB

2677	CP5NU	2680	LU3HL
2678	KD6HWD	2681	ZF2JI
2679	RW9SG	2682	JL3IVX

CW

2989 ..... RW9SG

Mixed

1816 ..... PY4AUN

VPX

285 ..... UA9-130-1305

CW: 350 WA2VQV, RW9SG. 400 RW9SG. 450 RW9SG. 500 RW9SG. 550 JA3WFQ, RW9SG. 600 RW9SG. 650 RW9SG. 700 RW9SG, HB9CSM. 750 RW9SG, HB9CSM. 800 F5YJ, RW9SG, HB9CSM. 850 HB9CSM. 900 NS2H, HB9CSM. 1350 JA7FFN. 2050 G4SSH. 2850 K9QVB. 2900 K9QVB. 2950 K9QVB. 3000 K9QVB. 3150 WB2YQH. 4150 WA2HZR.
SSB: 350 CP5NU, KD6HWD, RW9SG, ZF2JI. 400 CP5NU, KD6HWD, RW9SG, ZF2JI. 450 CP5NU, KD6HWD, RW9SG, ZF2JI. 500 CP5NU, RW9SG, ZF2JI. 550 CP5NU, RW9SG, ZF2JI. 600 CP5NU, RW9SG, ZF2JI. 650 CP5NU, ZF2JI. 700 CP5NU, ZF2JI. 750 CP5NU, ZF2JI. 800 CP5NU, ZF2JI. 850 CP5NU. 900 CP5NU, LU1EYW. 950 CP5NU, LU1EYW. 1000 CP5NU, LU1EYW, N1RT. 1050 CP5NU, LU1EYW. 1100 CP5NU, LU1EYW. 1500 IK2AEQ. 2900 N4NO. 3200 F2VX. 3250 F2VX.
Mixed: 450 IK1NLZ. 500 IK1NLZ. 550 IK1NLZ. 600 JA3WFQ, IK1NLZ. 650 IK1NLZ, GØKRL. 700 GØKRL. 900 CP1FF. 950 CP1FF. 1000 CP1FF. 1050 CP1FF. 1100 CP1FF. 1150 CP1FF. 1300 WA3GNW, AA1KS. 2850 KS3F. 3850 N4NO. 3900 N4NO.

10 meters: KD6HWD, LU1EYW
15 meters: LU1EYW
20 meters: AA1KS, LU1EYW
40 meters: RW9SG
80 meters: RW9SG, LU1EYW

Asia: N1RT, LU1EYW
Africa: WA3GNW, RW9SG
No. America: KD6HWD, LU1EYW
So. America: LU1EYW
Europe: LU1EYW
Oceania: N1RT, N1KC

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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 88101-9511 USA.

stated that they had not even requested permission to land on Navassa. (The Coast Guard letter mentions "repeated requests" from radio operators to operate from Navassa and states that none of these requests had been granted. They had not even tried.)

The ARRL argued that without Coast Guard permission, it could not accept the Miller/Kline Navassa operation for DXCC credit. In fact, they had to go back into DXers' records and remove (suspend, they called it) credit for K1IMP/KC4. This established the precedent of requiring official, legally obtained permission to land on many DXCC entities for an operation to receive DXCC credit. While hammering free-wheeling DXpeditions, this insistence on appropriate documentation has helped ensure that the DXCC program does not encourage illegal or harmful landings on sensitive islands and lands. In addition, the continuing good record of those DXpeditioners with official permission in adhering to their restrictions has advanced the cause of DXpeditioners worldwide. Navassa deserves its small place in DX history.

The 1998 N1V Navassa operators won't have an easy time of it. Entry to the island is in Lula Bay, a small cove partly sheltered from the surf of the Caribbean. A 40 foot steel ladder hangs from a small platform over the bay. Operators have to time their jump between boat and ladder to catch the waves at the right levels. Then the DXpeditioners will have to haul their gear and supplies up to the top of the island, to the lighthouse, some 200 feet above the landing point. Other operating positions don't allow a good shot into Europe, where Navassa is more needed than in the US. The 1992 Navassa operation made good use of the remains of the crew quarters, setting up their stations in the ruins. A large cistern provides water for cleaning, but other supplies must be carried up (and back down) the hill.

Radio conditions should be very good for the trip. Solar flux topped 150 for the first time in five years in August, and the seasonal improvement in conditions during the next couple of months should only make the higher bands better. Stateside DXers should be able to work Navassa on several different bands, with long openings and excellent signal strengths. Europeans should have plenty of opportunities also, with all higher bands open in the 12–1600Z range and some good low-band openings around 22–0800Z. Sunrise in Navassa at that time of year is around 1100Z, with sunset near 2230Z.

The DXers who have the greatest interest in Navassa are those in Japan, where Navassa typically ranks in the Top Ten Most Wanted. A look at a globe will explain why. The great-circle path between Navassa and Japan passes very close to the

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

4773 F9RM	3183 YU1AB	2848 K9BG	2542 KØDEQ	2218 F6IGF	2001 OE6CLD	1696 PY2DBU	1328 W9IAL	1100 KB5OHT
4740 9A2AA	3114 YU2NA	2831 KF2O	2520 IK2ILH	2187 9A4RU	1919 SM6CST	1653 AE5B	1309 NH6T	1088 HB9BIN
3980 W2FXA	3103 I1EEW	2779 I2MQP	2512 JH8BOE	2175 W9IL	1836 F5HBX	1628 JN3SAC	1293 WØIZV	1074 W2EZ
3899 EA2IA	3040 F2YT	2776 W2ME	2500 HA5NK	2169 W8UMR	1778 DJ1YH	1625 KØNL	1257 WT3W	1073 JR3TOE
3629 K6JG	3039 WA8YTM	2690 WB2YQH	2484 K8LJG	2168 N6JM	1767 IØAOF	1607 OZ1ACB	1245 N1KC	1064 WB2PCF
3504 N6JV	3005 PAØSNG	2660 4N7ZZ	2376 HAØIT	2140 YU7JDE	1765 K5IID	1478 I1-21171	1224 AA1KS	1059 RAØFU
3413 VE3XN	2990 HA8XX	2645 I2EOW	2264 K2XF	2165 W6OUL	1732 LU8DY	1396 YU1ZD	1198 S52QM	
3363 N4MM	2966 YU7SF	2574 S53EO	2254 S58MU	2128 W4UW	1718 VE4ACY	1378 Z32KV	1197 KW5USA	
3305 SM3EVR	2926 YU7BCD	2546 SM6DHU	2229 K5UR	2019 G4OBK	1711 I2EAY	1371 F6HMJ	1151 VE6BMX	

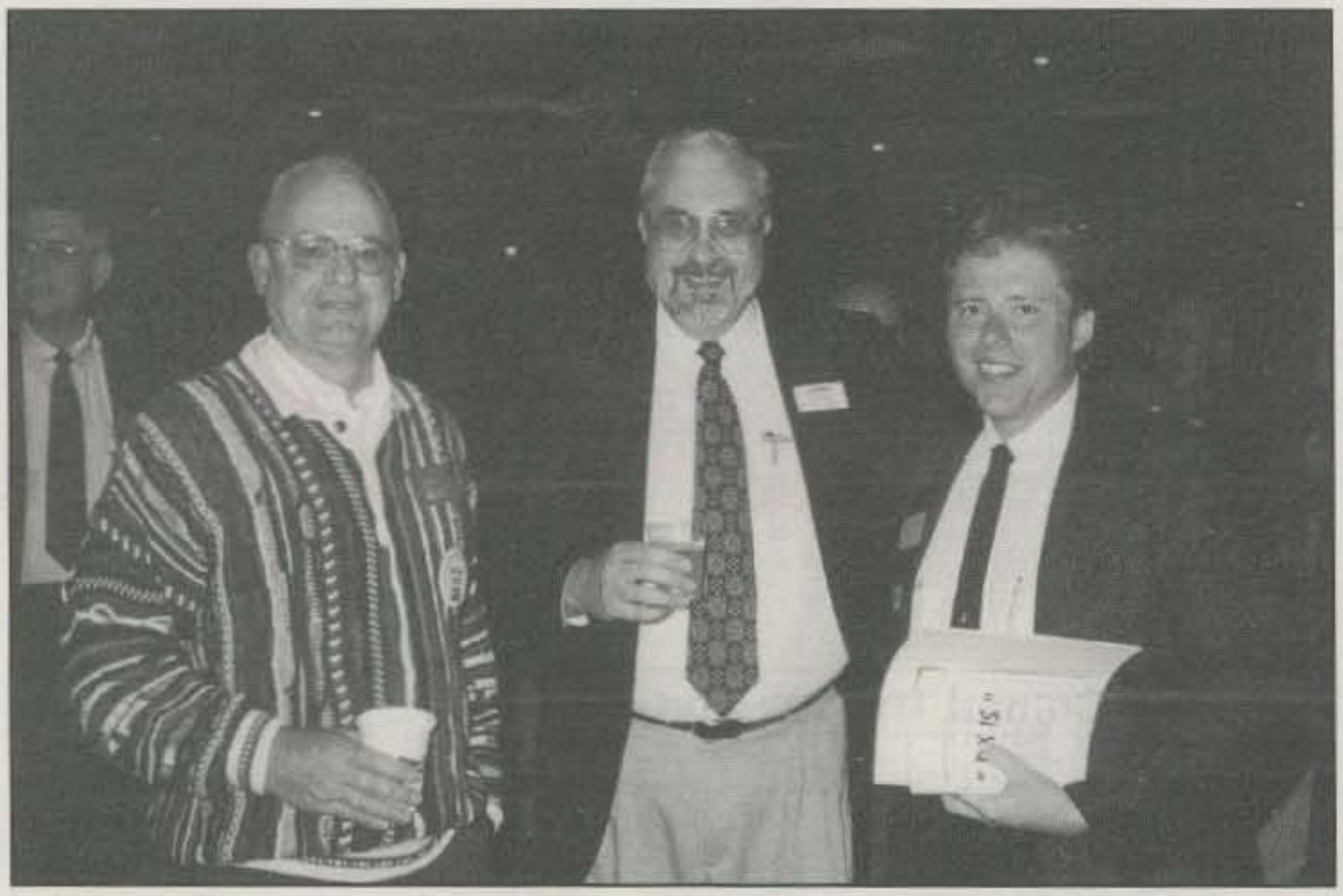
SSB

4122 IØZV	2731 HA8XX	2324 CT1AHU	2088 K5RPC	1703 N6FX	1497 DK5WQ	1243 DF7HX	1010 KI7AD	804 AG4W
3743 VE1YX	2725 I1EEW	2301 4X6DK	1958 IN3QCI	1703 NBØC	1489 K3IXD	1241 SV3AQR	1004 LU3HBO	792 EA5GMB
3656 ZL3NS	2707 N4NO	2296 I8KCI	1906 K5UR	1681 YU7SF	1473 K8MCU	1229 YC2OK	954 EA1AX	779 N3DRO
3404 F6DZU	2638 N5JR	2291 YU7BCD	1881 SM6DHU	1659 K8LJG	1458 IT9SVJ	1196 KØNL	936 IW3AY	675 VE6BMG
3371 K6JG	2612 PAØSNG	2281 I2EOW	1867 OE6CLD	1649 EA5CGU	1450 K2EEK	1182 WA2FKF	933 DF1IC	660 F3LIW
2949 N4MM	2581 I2MQP	2274 EA5AT	1809 LU8DY	1590 KS4S	1395 EA5KY	1125 LU5EWO	924 N1KC	613 SM5DAC
2935 EA8AKN	2434 LU8ESU	2203 KD9OT	1802 OE2EGL	1536 HA5NK	1353 K5IID	1145 K4CN	922 DL8AAV	608 LU3HL
2911 EA2IA	2411 9A2NA	2189 KF7RU	1760 HAØIT	1535 CT1BWW	1346 W9IL	1127 EA8AG	919 CP1FF	605 N7VY
2855 F2VX	2383 WA8YTM	2131 CX6BZ	1754 W2WC	1522 W6OUL	1335 G4OBK	1030 NH6T	894 EA3EQT	
2757 I4CSP	2378 KF2O	2097 EA1JG	1714 K2XF	1518 AE5B	1288 I3UBL	1016 WT3W	869 JR3TOE	

CW

3790 WA2HZR	2468 W2ME	2124 JA9CWJ	1954 S58MU	1795 W1WAI	1623 LU2YA	1168 AC5K	1032 W4UW	820 K3WWP
3489 N6JV	2401 G4UOL	2104 9A2NA	1954 TI4SU	1755 K5UR	1537 JN3SAC	1136 I2MQP	983 9A3UF	759 VE6BMX
3098 UA3FT	2362 YU7BCD	2050 KA7T	1927 SM6DHU	1750 K2XF	1527 EA6BD	1124 LU3DSI	982 LU7EAR	741 DL3NEO
3073 N4NO	2350 N4MM	2046 HA8XX	1876 HAØIT	1744 I7PXV	1458 I2EAY	1083 4X6DK	949 K2LUQ	730 WT3W
2895 K6JG	2337 N5JR	2035 HA5NK	1863 N6FX	1730 IT9VDQ	1454 EA5YU	1074 W9IL	906 YU1TR	725 KØNL
2887 EA2IA	2335 WA8YTM	1980 KF2O	1857 G4SSH	1690 DJ1YH	1411 SM5DAC	1058 DF6SW	884 PY4WS	678 IK8VRP
2881 N4UU	2319 VE7OP	1973 G3VQO	1816 SM6CST	1641 G4OBK	1293 IK5TSS	1041 W9IAL	847 NH6T	603 OE6CLD
2857 YU7LS	2196 VR2UW	1956 K8LJG	1798 W2WC	1641 W6OUL	1270 K5IID	1033 I2EOW	821 RAØFU	600 N1KC
2674 YU7SF								

**The above is not the most recent update. The Honor Roll will be updated in the December issue.*



From left to right: Ray, N6VR, George, N6ZS, and Bob, W9XY, at the Visalia DX Convention, which will be held in Frenso in 1999.

North Pole. Such high-latitude paths are weak and noisy, when they exist at all. Further, the Japanese have to listen through the entire US east coast, which lies on the direct path. The US stations are several hops and one auroral oval closer, and louder, than the Asian stations. When the Navassa operators ask the stateside stations to stand by for the JAs, please do so. The openings to Japan are very short, typically around 2200Z to 0200Z, with some long-path activity around 2200Z. The Japanese stand by while we try to work southeast Asia; the least we can do is return that courtesy.

For more information on Navassa, contact Dan Flaig at <k8rf@fuse.net> and see the June 1992 issue of *The DX Magazine*.

SMOM

At the end of July a team led by Francesco, IKØFVC, operated from the Sovereign Military Order of Malta (SMOM) as **1AØKM**. SMOM is a small enclave in the middle of Rome, not far from the Vatican, which is also a separate DXCC entity. Getting operating permission requires good contacts at a high level in the Catholic Church. The other operating hurdle is erecting effective antennas that can't be seen from the public areas of the enclave. This leads to exercises such as erecting antennas every sunset and taking them down every sunrise.

Advance Notice

The 1999 Joint Meeting of the Northern and Southern DX Clubs, otherwise known as the Visalia International DX Convention and the largest pure-DX convention anywhere, is moving north to Fresno. The sponsoring Northern California DX Club is returning to the Holiday Inn in Fresno, California, about 50 miles north of Visalia,

Some of the more active members of the RK1OWZ club station in Arkhangelskaya Oblast, Russia.

and considerably easier to get to by air. The DX convention is April 9–11, 1999. Rooms at the Holiday Inn are $83; call the hotel directly at 209-268-1000, 9–5 Pacific time, week days.

DX News

K4M will be activated by the Midway-Kure DX Foundation Sept. 20–25.

Luc Glary, I1YRL, will hit the European DXpedition trail again this fall, with stops planned for Monaco 3A, Liechtenstein HBØ, and 4U1ITU from ITU headquarters in Geneva. QSL via home call.

Jay Lira, PP5LL, reports that **PR2YL** on SSB and **PS2S** on CW will be active from Comprida Island (SA-024) Oct. 29 – Nov. 2. More information is available at <www.netlan.net>.

Team Antigua returns to Montserrat's nearest neighbor for this year's CQ WW DX SSB contest. Look for **V26B** on all bands during the contest in the multi-multi category. The team's web page is at <www.frc-contest.org>. Outside the contest, team members will be on RTTY, 160 meters, and the newer bands, from about Oct. 20 to Oct. 30. Some of the Antiguan callsigns to note, with operator and QSL route, are: **V26A** (N3BNA/WB3DNA), **V26AK** (N2TK/N2TK), **V26B** (WT3Q/WT3Q), **V26DX** (W3CF/KU9C), **V26FV** (W3FV/W3FV), **V26J** (WXØB/WXØB), **V26OC** (N3OC/N3OC), **V26R** (KA2AEV/KA2AEV), **V26RN** (N5NJ/N5NJ), **V26T** (K3MQH/K3MQH), and **V26U** (W2UDT/W2UDT).

In other CQWW SSB news, Ken, K7ZUM, and Craig, N7KG, will operate from St. Martin (the French side of the island), using the call **FS/K7ZUM**.QSL via the bureau or direct to K7ZUM (ex-KA7ZUM). Craig, N7KG, will be active on 160 meters during the test, under his own call FS/. QSL to his home call, direct or via the bureau system.

Jay, KØBCN, plans to be active as **V31MX** Oct. 21–26, with emphasis on 10, 15, and 20 meters outside the contest. QSL home call.

Note that there will be numerous groups and individuals traveling to interesting places for the contests. For those DXers who don't want to work these operations in the contest itself, the days just before the test are a good time to look for the DXpeditioners. Many arrive early to set up and test antennas. Also, many contest DXpeditioners will work the new bands before settling into the traditional bands for the contest.

Garard, PA3AXU, will operate from Tonga Oct. 21–28, but will concentrate on CW and RTTY. He has applied for **A35XU**. Gerard can be reached via e-mail at <dijkers@molyvos.net>.

Rolf Salme, SM5MX, has completed his extended operation from Vietnam as **XV7SW**. He made more than 25,000 contacts during his operation from the Swedish Embassy. QSL cards may be sent to his manager, SM3CXS, or direct to Rolf at Korpstigen 5 B, SE-135 53 Tyreso, Sweden.

DX news is thanks to the operators and "The Daily DX," a daily electronic DX newsletter. "The Daily DX" has a new address: <www.dailydx.com>. E-mail editor Bernie McClenny, W3UR, at <bernie@dailydx.com>.

QSL News

QSL the July Tok Island (AS-045) DXpedition of **6M5DX** and **D98TOK** via man-

CQ DX Awards Program

SSB

2255 .....WB2AQC

CW

977 .....K1FK

SSB Endorsements

320 .....W7BOK/328
320 .....W6SR/327
320 .....K5UO327
310 .....W2FKF/313
300 .....WB2AQC/305
250 .....LU1EYW/250
200 .....RW9SG/246

CW Endorsements

320 .....DJ2PJ/324
320 .....K5UO/323
300 .....K1FK/302

Total number of active countries is 328. 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. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

ager Mr. Y. J. Shin, HL5CL, P.O. Box 322, Pusan 600-603, Korea.

The new QSL manager for the extended round-the-world cruise of Steve Salmon, AA6LF, is Ron Lago, AC7DX, P.O. Box 25426, Eugene, OR 97402. Ron has the logs and cards from previous manager Gerry Branson, AA6BB, a Silent Key. These include Steve's operations from Palmyra, Minerva, Mellish, and others.

QSL the February operation of **8Q7VB** via operator Veikko Nurminen, OH2VB, Ollaksentie 3 C, FIN-02940 Espoo, Finland. Note that **8Q7BV** was a separate operation.

Steve, W6MD, reports that he is QSL manager for YB2BRW, direct or via the bureau system; **YB1XUR**, direct only; and **YC9WZJ**, again direct only. Steve also handles cards for **T93Y, T93Y/5B4**, and **T94EU**, direct preferred. Steve does **not** handle cards for YB2PBX; QSL Tony directly.

QSL the July operation of **MJØASP** via manager Jacky Gargot, F5OIU, 21 Allee Cabernet, 33140 Cadaujac, France.

QSL the September Sao Francisco Island **PU5U** (SA-027) operation via the Brazilian bureau or direct to Jay Lira, PP5LL, P.O. Box 08, Florianopolis/SC, 88010-970, Brazil.

And Finally . . .

Readers will note that there are no WAZ charts this month. Jim, K1MEM, however, will be back next month with updated WAZ information.

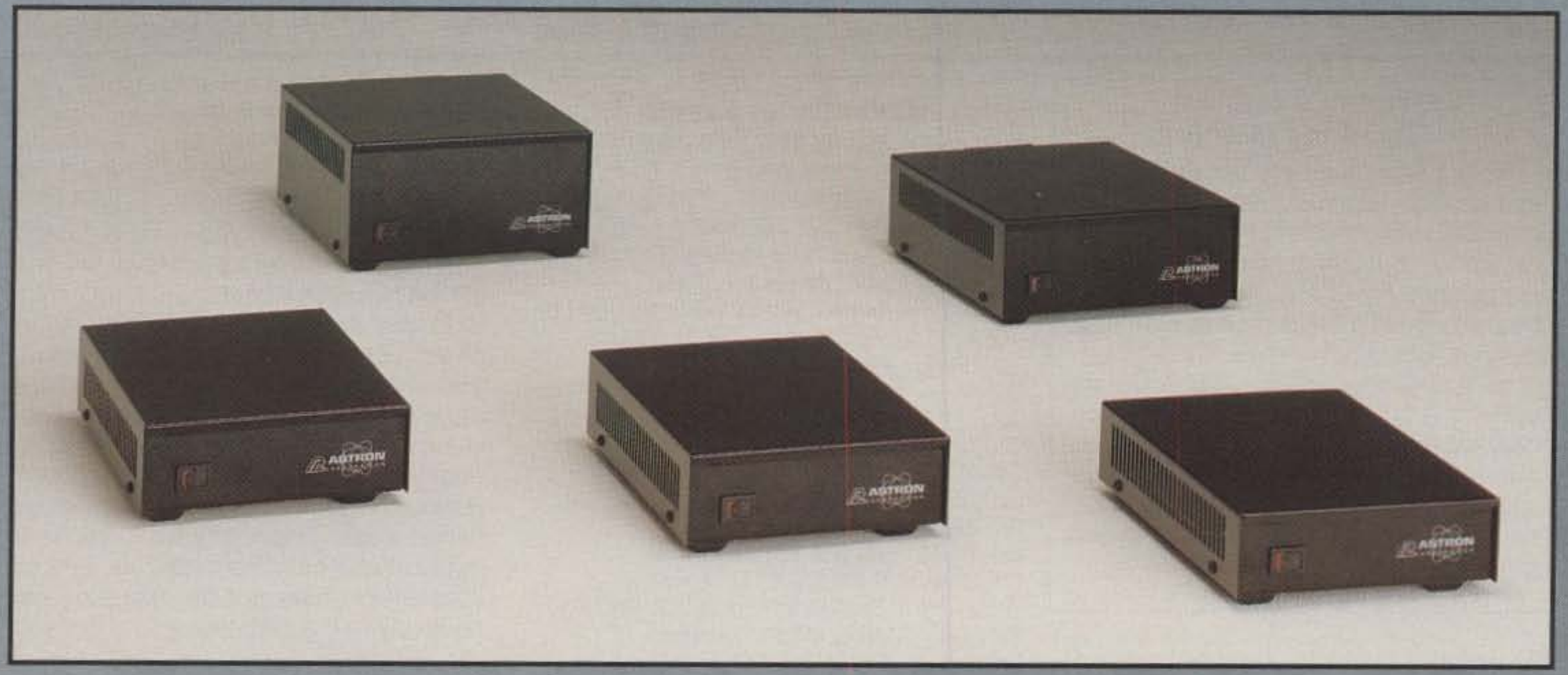
73, Chod, VP2ML

QSL INFORMATION

0SØD to OM9ALZ
3C1AGD to SMØAGD
3D2AH to ZL1BQD
3D2RJ to ZL1BQD
4K8ØADR to KJ9RI
4UØITU to I1YRL
5N4GG to I2EOW
5W1FP to ZL1BQD
6MØHZ to HL1XP
8J7BSJ to JARL
8PØV to K7BV
8P9AK to KT9P
8P9JJ to K7BV
8Q7AO to SM3CXS
8Q7JD to GØEZU
9G1OO to PA2FAS
9M6AG to JA9AG
A2CNN to SM3CXS
AYØZ to LU1SM
BI4M to W3HC
BO2YA to BV2KI
C3ØMF to EA1QF
C6AKL to N8ZJN
C6IOTA to WA8LOW
CE3/SM3SGP to SM3EVR
CE5/SM3SGP to SM3EVR
CH3LAS to VE3UDK
COØXE to XE1CI
CO4BM to CT1ESO
CT3/DL7UTM to DL7VRO
CY9AOE to VE1AOE
CZ1SSB to VO1GK
DK/MUØBKA to K4ZLE
DLØABT to DL7VRO
ED9DDC to EA9CE
EI4VVF/P to WØGLG
EJ2HY to EI2HY
EJ2IB to EI2IB
ER4OT to W3HNK
EU200A to EU4AA
EV2ØØM to EW4EW
EW2ØØM to EW4MM
EZØAB to UA4FAO
FKØRR to ZL1BQD
FP5AA to K2RW
FS/K9NW to WW9DX
FS/NØBSH to WW9DX
GD6YB/P to G3SWH
GT6YB/P to G3SWH
GUØMEU to ON4ON
GU8D to G3LZQ
H44AO to DL7VRO
HBØ/MUØBKA to K4ZLE
HC1MD/HC4 to K8LJG
HH2/KCØARG to F6DJB
IG9/I2VXJ to I2EOW
II6M to IK6WQU
IQ9L to I2EOW
J28ISL to SV2AEL
J5HTL to SM3CXS
JX1AO to UA6WAR
K1USN to W1QWT
KH6/ZL1BQD to ZL1BQD
KL7Y to N2AU
LX/MUØBKA to K4ZLE
LY1OXJ to LY3BA
LY6ØRMD to LY Bureau
NP3/NØBSH to WW9DX
NP4/NØBSH to WW9DX
OJØAU to DJ6LAU
OJØVR to OH1VR
P29BW to N5FTR
PJ7/NØBSH to WW9DX
PT8ZCB to DL9OT
PY1LVF/P to PY1NEZ
PY1MGM/P to PY1NEZ
PY1NEW/P to PY1NEZ
RAØFW to F6FNU
RK1B to RV1AC
RUØC to RA3DEJ
RW1ZZ/P to RA1QQ
SØ1HA to EA2JG
SØ7QF to EA1QF
S21YG to DL3NEO
SMØCNS/4E7 to SM6CNS
SNØWK to SP4KIE
SN7N to SP7NMW
SW8LTI to SV1ATV
SW8TLI to SV1ATV
T2ØYK to JA2ECL
T88AD to JR1MLU
T88AJ to 7N3AWE
T88HG to JA1HGY
T88ND to JA4DND
T88RK to JA1BRK
TAØ/TA3J to TA3YJ
TU/K4ZW to K4ZW
TZ6YL to AAØGL
UEØZZZ to RZØZWA
UE1QQQ to RA1QQ
UE1QQQ/1 to RA1QQ
UK8GK to RW6HS
UT5UJY to F6FNU
V2AMK to K9MK
V73PU to N6PU
VK9NR to ZL1BQD
VQ9VK to N1TO
VU2NTA to N2AU
WH7/K9NW to WW9DX
XE2NJ to F6FNU
XO1CWI to VE2CWI
YM75TA to TA3YJ
Z31FK to I1YRL
ZK3RR to ZL1BQD
ZLØAJW/8 to ZL1BQD
ZL8BQD to ZL1BQD
ZL9BQD to ZL1BQD
ZM1BQD to ZL1BQD
ZP6CW to ZP6CU
ZS1FJ to G4MFW
ZS6BNF/3D6 to SM3CXS
4S7BRG to Mario Primavesi, 327/3 Main Street, Ambalangoda, Sri Lanka
4S7TZ to Trevor Abeyesundere, 38/15, Gower Street, Colombo 5, Sri Lanka
4X/K4YT to Karl J. Renz, 26 Hate'ena St., 43577 Ra'ananna, Israel
5B4/UN7FK Willy Martemyanov, P.O. Box 2100, Pavlodar 637000, Kazakhstan
8P6FH to Rodney O'Neale, Upper Carlton #2, St. James, Barbados
9K2OK to Waleed A. Abul, P.O. Box 17292, 72453 Khaldiya, Kuwait
9K2SQ to Abdullah Ali al-Sayegh, P.O. Box 38899, Abdullah al-Salem 72259, Kuwait
BD4SE to Chen Yu Ming, 8 Taoyuan Road, Jinxi, Kunshan, Jiangsu 215324, China
BV4KR to Tasi Chung-Ming, P.O. Box 11-12, Miaoli 366, Taiwan
BV4YE to Miaoli Group Station, P.O. Box 35, Toufen, Miaoli, Taiwan
CN8YR to Agayr Mohamed, P.O. Box 1762, Casablanca, Morocco
DSØEZ to Sarang Nanugi Net, P.O. Box 54, Dongjak, Seoul 156-600, Korea
DS1CIT to Kim Sang Jin, P.O. Box 99, Yangchun, Seoul 158-600, Korea
DS1GNS to Yu Myung Ock, P.O. Box 99, Yangchun, Seoul 158-600, Korea
DS1ILV to Kim, P.O. Box 54, Dongjak, Seoul 156-600, Korea
DS2AGH to Kang, 938-24, Kesan 1-dong, Inchon 407-051, Korea
DS2CFQ to Hyeon Ok Nam, Hyundai APT 102-1110, Yonghyun-dong, Uijongbu, Kyungkido 480-050, Korea
DS2CYI to Dae Geun Kwon, P.O. Box 67, Suwon, Kyonggi 440-600, Korea
DS3CQU to Young Kuu Park, P.O. Box 17, Chon An 330-6, Korea
DS5RDA to Sang Un Lee, P.O. Box 23, Taegu 700-600, Korea
DS5ROJ to Jeongsoon Kang, 105-501, Daeyoung APT, Yongju 750-053, Korea
DS5SYF to Tai Sik-Choi, 1-15 Dae Do Dong, Pohang 790-140, Korea
K7DTS/DU1 to John Gibson, Barrio Salong, Calaca, Batangas, Philippines
E21EJC to Krissada Futrakul, P.O. Box 20, Bangkok 10163, Thailand
HL1OYF to Kim Dug Nam, P.O. Box 54, Dongjak, Seoul 156-600, Korea
HL1SRJ to Kwon Young Ouk, P.O. Box 54, Dongjak, Seoul 156-600, Korea
HL1SYB to Kim Yoo Sung, P.O. Box 54, Dongjak, Seoul 156-600, Korea
HL2DRY to Kim Sungjun, P.O. Box 12, Youngwol 230-800, Korea
HL2VNA to Dong Duk Seo, Hyundai APT 102-1110, Yonghyun-dong, Uijongbu, Kyungkido 480-050, Korea
HL3ENE to Shin Hyun Kyun, Donga APT 3-1303, Kyohyun-Dong, Chongju, Chungbuk 380-060, Korea
HL3QVZ to Young Kuu Park, P.O. Box 17, Chon An 330-6, Korea
HL5NLQ to Kang Young Tae, Green APT 219-301, Jigok-dong, Pohang 790-390, Korea
HL5NTN to Kim Suk Bong, 733-144, Dong Chun-Dong, Chongju 780-190, Korea
HL5YAW to Euljae Lee, 105-501, Daeyoung APT, Yongju 750-053, Korea
HL5YDP to Jung Weon Sik, 611-20, Chang Po-Dong, Buk-Gu, Pohang, Kyungbuk 791-250, Korea
HR5MAG to Miguel Gomez, "Los Gauchos", Barrio El Centro, Copan Ruinas, Honduras
J39JX to Floyd C. Dowden, Mt. Moritz, St. George's, Grenada
JRØBQD/JD1 Satoshi Honda, 1435 Oishi, Horinouchi, Kitauonuma, Niigata 949-7411, Japan
JW8AV to Egil Skudsvik, Brottet 120, 3029 Drammen, Norway
LX1SP to Schartz Louis, 3 Rue du Nord, L-4469 Soleuvre, Luxembourg
LX1TI to Trezzi Carlo, P.O. Box 117, L-4901 Bascharage, Luxembourg
P43T to Anthony Thiel, P.O. Box 614, Oranjestad, Aruba
P43W to Randy Geerman, P.O. Box 5160, Oranjestad, Aruba
V44KMC to K. McKoy, P.O. Box 505, Nevis
VQ9RU to James E. Thiessen, Urb. Monte Mar, Calle F-95, Fajardo, PR 00738
WH2U to John van der Pyl, P.O. Box 2679, Agana, GU 96932
YBØAI to Ir. Taufan Prioutomo, P.O. Box 7004 JKSKL, Jakarta 12070, Indonesia
YB9CCB to Andi Chandra, P.O. Box 2051, Kuta 80361, Indonesia
YCØHXH to N. Erwin Hanafiah, P.O. Box 7022 JATPB, Jakarta 13070, Indonesia
YC2JVQ to Muarief, P.O. Box 1019, Brebes 52212, Indonesia
YC7JEK to Hatirudin, P.O. Box 3, Banjarmasin 70001, Indonesia
YC9MKF to Ferdy Konay, P.O. Box 1021, Kupang 85000, Indonesia
YK1AH to Fadel Shehab, P.O. Box 9597, Damascus, Syria
ZF1PM to Peter H. Massie, P.O. Box 314, Savannah, Grand Cayman, Cayman Islands
ZP5DAV to Gustavo D. Paiva A., 14 de Junio #176 C/Gral. Santos, Asuncion, Paraguay

The table of QSL managers is courtesy of John Shelton K1XN, editor of The GOLIST, P.O. Box 3071, Paris TN 38242, phone 901-641-0109; e-mail: <golist@wk.net>.

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



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- 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
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- To order Rack Mount Version change SS to SRM (example: SRM-10)

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BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Are You Ready for SSB Operating in the CQ WW Contest?

October's Contest Tip of the Month

As we enter into this year's fall contest season, do you know who's planning on a contest expedition? A little research through the current magazines/newsletters and the Internet can help you build a list of probable multipliers that should be prominently displayed in front of your operating position for the upcoming fall contests. Always remember that extraordinary pre-contest preparation can dramatically improve your final standing and has little to do with signal strength or location. To put it in ham terms—it's free!

Calendar of Events

Sept. 26-27	**CQ WW RTTY DX Contest**
Sept. 26-27	SAC SSB Contest
Oct. 3-4	VK/ZL Oceania SSB DX Contest
Oct. 3-4	California QSO Party
Oct. 4	RSGB 21/28 MHz SSB Contest
Oct. 7-9	YLRL Anniversary Party
Oct. 10	Ten-Ten Int'l Net Fall Sprint QSO Pty
Oct. 10-11	VK/ZL Oceania CW DX Contest
Oct. 10-11	Pennsylvania QSO Party
Oct. 17-18	JARTS WW RTTY Contest
Oct. 17-18	Worked All Germany Contest
Oct. 17-18	QRP ARCI Fall CW QSO Party
Oct. 18	RSGB 21/28 MHz CW Contest
Oct. 18-19	Illinois QSO Party
Oct. 21-23	YLRL Anniversary Party
Oct. 24-25	**CQ WW SSB DX Contest**
Oct. 31-Nv. 1	B.A.R.T.G. RTTY Sprint
Oct. 31-Nv. 1	Ten-Ten Int'l Net Fall CW QSO Pty
Nov. 7-9	ARRL CW Sweepstakes
Nov. 7-8	Ukrainian DX Contest
Nov. 14-15	WAE RTTY Contest
Nov. 14-15	OK/OM DX Contest
Nov. 21-23	ARRL SSB Sweepstakes
Nov. 28-29	**CQ WW CW DX Contest**
Dec. 4-6	ARRL 160M Contest
Dec. 12-13	ARRL 10M Contest
Dec. 26-27	Stew Perry Topband Challenge
Dec. 27	RAC Canada Winter Contest

It seems that much more has been written over the years about improving one's CW skills than about SSB operating. Perhaps this is based on the assumption that CW is a more difficult operating mode or that we'll get more CW operators if only we focus on it more. After all, on SSB the skill is simply to talk fast with clarity, right? As you'll see this month, nothing could be further from the truth.

I believe that upgrading one's skills is more possible for a SSB-challenged operator that for one who has problems with CW. One reason is that we all begin with an ability to talk and speak a language. CW operating adds the complexity of "learning the code" before you even consider proficiency. Now while it's clear that some contesters seem to have God-given talents, there's plenty of opportunity to improve anyone's skillset. When considering SSB operating proficiency, a few skill categories come to mind: calling CQ, timing, phonetics, and a myriad of miscellaneous topics. With these subjects in mind, let's dive into the meat of the topic.

Calling CQ

The act of calling CQ seems simple enough, yet it is a skill in and of itself in the world of contesting. Consider one of the main goals of contesting: to make as many QSOs in as short a period of time as possible. Having said that, does it make sense to call CQ Contest like you would if you were DXing on a Tuesday afternoon? Calling an effective "contest" CQ requires several attributes. They include brevity, clarity, emphasis on your callsign, energy, and speed that reflects the conditions at the time. Let's unpack each of these areas in some more detail.

There's rarely, if ever, a scenario in which a long-winded CQ becomes a productive strategy in an SSB contest. Remember, the longer you're transmitting, the longer you're not working someone. Many stations simply will tune right by you, especially if you don't have one of the bigger signals on the band.

Speaking with a clear, unambiguous voice is an important attribute to phone operating. Just like your mother used to say, never mumble your words. While you can only control your signal strength to a certain point, articulation is a point that is entirely up to you.

When calling CQ, what is the piece of information that the other station doesn't have? You guessed it: your callsign. For that reason, it makes sense to emphasize that in your CQing style. Spending less time saying the words "CQ Contest" and more time signing your callsign will pay dividends.

Energy and speed go hand in hand when CQing. A station is much more likely to call you if you show some animation in your voice. Make it sound as if you're really into the event when you're transmitting—even when you're exhausted. This approach is infectious and will draw stations to your call. Speed is part of this equation as well. If you have a "snappy" approach to operating, the favor will be returned by most stations. Dull, uninspiring CQs are not the order of the day with phone contest operating. Also, remember that while speed is essential in most operating contexts, you don't want to sound like a speeding maniac when CQing on a nearly dead band or a QRN-laden low frequency. Also, it sometimes pays to slow things a little, especially when you're trying to attract calls from rare/unusual multipliers who may not be operating competitively in the contest.

Timing

Well, they say that timing in life is everything, and so it is with contest operating, too. Timing in pile-ups has as much to do with eventually working another station as does your signal strength. My experience in phone pile-ups is that short calls with small breaks in between is one of the best operating methods you can use to be successful. There will be a rare need to sign the other guy's call; after all, he already knows that! Every pile-up has its own characteristics. There's a kind of ocean wave effect to most pile-ups that is a timing opportunity for you. The secret to effective calling in phone pile-ups (and CW, for that matter) is to call when others are not. If the pile-up is big, delay the start of your call by a second or two. You want to be the guy whose callsign hangs out at the end of a series of calls so that the other station can say: "Something Alpha Radio, you're 5934!"

Tailending is another operating technique unto itself. Simply put, it is a calling method whereby you sign your call at the end of another person's QSO. You have to dance a fine line of acceptable calling procedure, with the guideline being that you never eradicate information the other station is trying to copy (i.e., callsign, exchange, etc.). That's one certain way you'll end up out of his log!

Tailending begins by trying to get a feel as to whether the other station accepts that kind of operating procedure. Ultimately, there's really only one way to find out, and that's to try to see if it works (or if you get yelled at!). Just as with any pile-up sit-

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uation, the secret is simple: Get your callsign heard when others are not calling.

Phonetics

The use of phonetics seems so simple, yet many operators are poor at its application. Always remember why we use phonetics on SSB. It's not so that we can sound cute or cool, but so that we can help the other station copy our callsign correctly. For that reason alone, always use common words for phonetics. The standard Alpha, Bravo, Charlie phonetic list was created for just that reason. While using "Kill One Albino Rabbit" may be cute, it will get "lost in the sauce" during a contest.

Another common error in use of phonetics is that we sometimes get stuck in a rut with our word choices. For example, I tend to be a Kilo One Alpha Radio kind of guy. Never forget to change the phonetics you are using if you're having trouble working someone. Your word choice may be a challenge to a non-English speaking operator, or it just may not break through a pile-up as well as another selection. Consider the trade-offs for such phonetic choices, such as "United vs. Union" or "Easy vs. Echo" or "Uncle vs. Uniform." Sharp, ear-piercing words are almost always more effective in phone operating.

Miscellany

There is a class of operating techniques that fits into the miscellaneous category. With that in mind, let me ramble a bit more!

Like most contest operators, I hate QRM. I live for the day when 10 meters comes back to life (this year?) so that I can hide high in the band and run guys for hours and be free of QRM. Unfortunately, in today's 20 meter SSB scenario, we're all left to "duke it out," fighting for precious running real estate on the band along with hundreds of others.

One technique I use is to preemptively strike when someone asks if my frequency is in use. By that I mean drop everything and respond. I do this even if the station is slightly off my "zero beat" frequency. Most stations will move immediately if you catch them right at the end of their first CQ. They are just as likely to stay if you don't respond right away! For this reason, I'll react right in the middle of an active QSO, if I have to, to maintain my frequency, even if I end up losing the QSO. In my book, a clear frequency is worth much more than a couple of lost QSOs here and there. I've also noticed that many incomplete QSOs end up being "reworked" later on, so the loss in score is minimized by the end of the contest.

Another factor to consider is the quality of your transmitter's audio. There are an amazing number of stations on the band with simply terrible, uninspiring au-

dio. And despite our reputation, contest audio is not generated by turning your processor all the way up. It does mean, however, that you need to evaluate audio settings on your transceiver—especially if it is new or unfamiliar to you. You should also invest in a good, high-quality microphone. Again, there is not a 1:1 VSWR between money spent and desired audio. Do your homework and make extensive tests before the contest. It's a shame to have all the operating pieces in place with the exception of your transmit audio. As an aside, I should mention that the same analysis applies to digital voice recorders. How many stations can you think of that sound just great until they hit the F1 key in their computer logging program?

Finally, I'd be remise if I didn't take the opportunity to point out the perils that come from not signing your entire callsign when calling someone. Not only is this poor contest operating, but it is a terrible practice for any mode of amateur radio activity. Simply put, signing a partial version of your call will almost always slow down the other station, resulting in an extra transmission to "fill in" the missing data. Unfortunately, this technique has grown from the net operations around the bands and has extended itself into contesting as well. Common sense should prevail here. If a station can copy your callsign in its entirety, what advantage comes from just signing part of it?

As you can imagine, I've only scratched the surface of phone operating techniques. Hopefully, you've gained some insight that will improve your next contest score. I'd like to hear about some of the tangible results that you obtained from this discussion.

Final Comments

That's all the space I have for this month. As always, remember to send your contest calendar submissions to me for the January issue no later than November 1st.

73, John, K1AR

California QSO Party

1600Z Sat. to 2200Z Sun. Oct. 3–4

This year's party is sponsored again by the Northern California Contest Club. The usual extraordinary effort has been made to activate all CA countries, 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 must observe the standard 10-minute rule). Off-times must be at least 15 minutes in length 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, Multi-Single, Multi-Multi, California County Expedition, Mobile, 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 great number of certificates and trophies available to winners of every category. Check the contest web site at <http://www.contesting.com/cqp> for complete details as well as official rules, logs, and CQP logging programs.

Include a summary sheet showing the scoring, etc., and a dupe sheet 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 (e.g., 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, <www.contesting.com/cqp>.

VK-ZL-Oceania Contest

Phone: Oct. 3–4 CW: Oct. 10–11
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; one 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 and receive an attractive wall plaque in permanent recognition of that achievement. 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 14, and should be sent to: Contest Coordinator, NZART, P.O. Box 40-525, Upper Hutt, 6415, New Zealand.

Pennsylvania QSO Party

1600Z Sat. to 0500Z Sun., Oct. 10–11
1300–2200Z Sun., Oct 11

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 operating "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), a maximum of 151. 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). The Murgas Amateur Radio Club in recognition of their long-time support for the contest will be the designated special event station using their club call, K3YTL. 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 must 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. An information package is available for the contest by sending $1 to help defray printing and postage costs to the sponsor's address.

Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 18–19

This is the 36th anniversary of the Illinois QSO Party sponsored by the Radio Amateur Megacycle Society. It's a shorty, only 8 hours long. 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

1997 CQ RTTY Contest Correction

In the "we made a *big* mistake" department, GIØKOW was left out of the results of the 1997 RTTY Contest. Robert set the new 80 meter, single band world record, and is therefore both a plaque and certificate recipient. His breakdown is as follows.

Call used: GIØKOW
Location: Northern Ireland
Entry Class: Single Op, Single Band 80 meters, Unassisted
Band: 80 meters
QSOs: 547
Points: 1242
QTH: 33
DX: 66
Zones: 12
Score: 137,862

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 parties which embark with 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 16, 1998. Mail your entry to: RAMS, c/o John Matz, KB9II, 7079 West Ave., Hanover Park, IL 60103. To receive a copy of the contest rules, summary sheet, and results, check out <http://www.megsinet.com/jematz/ilqso98.html>.

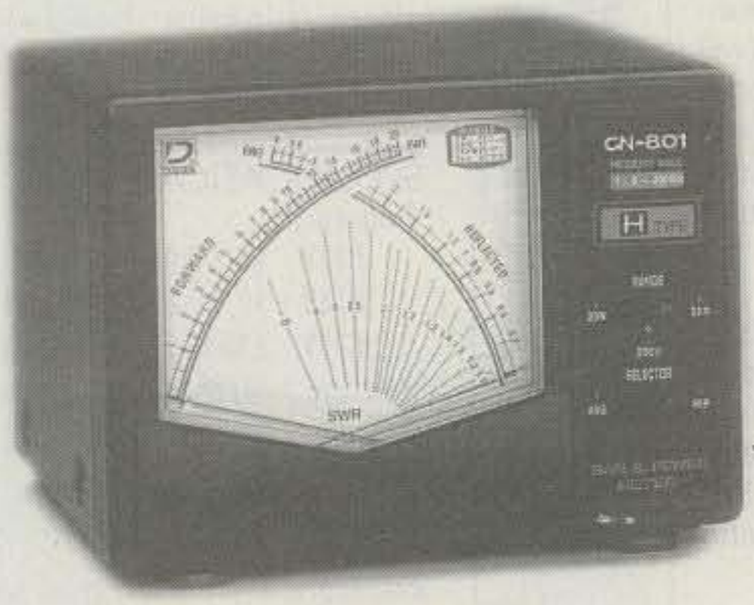
CQ World-Wide DX Contest

Phone: Oct. 24–25 CW: Nov. 28–29
0000Z Saturday to 2400Z Sunday

Complete rules were published in the September 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, 1998 for the phone section, and January 15, 1999 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 USA. Be sure to indicate Phone or CW on the envelope.**



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BY TED MELINOSKY, K1BV

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month's story of a USA-CA All Counties recipient is that of Kermit Gay, K4XI, USA-CA All Counties #948. County hunting became a new part of Kermit's amateur radio interests due to his retirement and the bottom of the sunspot cycle. Here is his background.

"DX has been my major interest in the 45 years that I have been a ham, after it was no longer a reasonable option to build your own equipment! My first mobile rig in the late 1950s was a Gonset Super-Six and a home-built 6146/6L6 transmitter. I still have a spring from the antenna mount that I use on my present mobile rig! My, we have come a long way.

"A local ham mentioned to me that now that I was retiring, with nothing to do, I should try county hunting. He meant it as a joke, but I had been reading the info in *CQ* on the USA-CA Award program, and I thought I would give it a try. Now I'm hooked!

"My first serious county hunting contact was on 14.336 MHz, which is the major net frequency, on August 20, 1994, with KD4ABC/M in Mercer, KY. I planned to retire in January 1995, and this was just to give me a slight head start! I had just spent 36 years with an aerospace company (Lockheed Martin) in various engineering and management positions.

"I found it interesting that of the total 3076 counties, 15% were from three mobile stations—N4CD, WAØSBR, and KC1NA. Of all the counties worked 78% were worked on 20 meters, 17% on 40, and 5% all others I have separate station for 40 and 20 so that I can monitor both major net frequencies at the same time.

"My last three counties provided the most excitement! I worked several approaches to get them. One was to check the Callbook CD to find a possible station in the needed counties that would help. As it turned out, my third from the last came from KGØBU in Taylor, IA, to whom I wrote blind and then corresponded via e-mail for a schedule, on April 27, 1998. Another county hunter, KA1JPR, was mobile near Charlton, GA, on April 28, 1998, and he went out of his way to give the next to last. That left Lincoln, AR, to which AI5P made a special trip to give me my last one on April 29, 1998. So after weeks of trying to get the last three, they came in three days in a row!

"It was fun working the mobile stations on the various net frequencies—CW and SSB—but there is also some skill required in collecting and managing 3076 QSL cards. As it turned out, many of my old QSL cards were duplicates from the major population centers. One surprise was the number of counties from 160 over the years. I guess you have to be in a rare one to have a big antenna. Obviously, a computer is the easy way to record the required information, but it still is a lot of work! I am well on the way to working them all for a second time—never thought I would want to try that again! Hope to operate mobile much more and give some of the stations who helped me a 'new one.'

—73, Kermit, K4XI"

65 Glebe Road, Spofford, NH 03462-4411
e-mail: k1bv@top.monad.net

USA-CA Special Honor Roll

David Splitt, KE3VV
USA-CA All Counties #950
July 7, 1998

William Wolfel, KC8IJ
USA-CA All Counties #951
July 8, 1998

Wendy D. Kincaid, KB1AF
USA-CA All Counties #952
July 25, 1998

USA-CA Honor Roll

500		2000	
KE3VV	3028	KE3VV	1132
KC8IJ	3029	KC8IJ	1133
WQ1H	3030		
KK5MI	3031	**2500**	
1000		KE3VV	1059
KE3VV	1478	KC8IJ	1060
KC8IJ	1479		
WQ1H	1480	**3000**	
1500		KE3VV	968
KE3VV	1231	KC8IJ	969
KC8IJ	1232	KB1AF	970
WQ1H	1233		

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.

New County Possibility

From the May 10, 1998 issue of the Ridgecrest, California "The Daily Independent" comes a brief story regarding the passage of Senate Bill 2022 calling for a statewide study to be conducted on the effectiveness of California's 58 counties. The outcome may allow for the creation of High Desert County. The final report and recommendation is to be presented to the California state legislature by July 1, 2000. These matters don't happen very often, as the last new county to be created in California was Imperial County in 1907. Thanks Jim, WA6TFZ, for the information.

30th MARAC National Convention

I was privileged to attend the 30th MARAC National Convention in San Antonio, Texas, from July 1 to 4. This gave me an excellent way to meet a large group of active county hunters in a short time. Clif, WB4FBS, handled the arrangements, which included an excellent room rate in a very high quality hotel and several local tours of interest covering downtown San Antonio (Alamo and world famous River Walk) and Fredericksburg/LBJ Ranch. The hotel parking lot gave ample proof that a group of HF operators were in attendance. The most interesting sessions were the daily get-togethers in the reception area and hospitality suite, where every aspect of county hunting and every personality was discussed in grand detail.

Awards Available

The Canada Worked Ontario "Ports" Award. Celebrating the commercial importance of water-borne transportation in "inland" Canada, this award requires contact with port cities in Ontario. The sponsor is also agreeable in helping to arrange

The Canadian Worked Ontario "Ports" Award.

schedules so you can get those last one or two cities needed. (A check of my VE3 cards shows that I only need nine more to qualify . . . hmmm.)

Work VE3 stations in the "Ports" of the Province of Ontario after 1 January 1990. All bands and modes. Contacts may be with fixed, portables, or mobiles. North Americans need 10 different, all others 5. SWL okay. Send copy of log and fee of $US2 or 2 IRCs to: Robert Morden, VE3EIM, 106 Renny Cres., London, Ontario, Canada N6E 2C5. The award pictures an old-fashioned lighthouse at Port Dover, Ontario.

Look for these port cities (each has the word "Port" in front of the city): Albert, Bruce, Credit, Elgin, Hope, Milford, Ryerse, Sydney, Alma, Burwell, Cunnington, Elmsley, Lambton, Perry, Sandfield, Talbot, Blake, Carling, Dalhousie, Franks, Loring, Robinson, Severn, Union, Bolster, Carmen, Darlington, Glasgow, Maitland, Rowan, Stanley, View Beach, Britain, Colbourne, Dover, Grandby, McNicoll, Royal, Stanton, Weller.

The French Diplome Des Isles Francaises D'Outremer (Overseas Islands) Award.

France's Diplome Des Isles Francaises D'Outremer (Overseas Islands) Award. The French overseas possessions include a number of exotic names and locations. DXers' ears perk up at the mention of Kerguelen, Clipperton, and Bora-Bora. What may not be so well known is that in addition to the better known islands, there are a large number of lesser known islands which are not separately counted for DXCC, but are valuable for IOTA and this award. This is a relatively new award that is sponsored by the Lyon DX Gang to encourage contact with these islands.

The basic award is earned for contacting 15 different French overseas islands. There are endorsements for each additional 5 islands. Contacts must be made from the same country. You must possess the cards. Photocopies of the cards must be submitted with your application. If you activate an island, you may also count it. SWL okay. Available in three divisions: Mixed, Phone, CW. All bands may be used. Submit copies of the QSLs, a list of contacts, and the basic award fee of FF60, $US12. Endorsements FF20 or $US4 each. (Add $US2 for return postage.)

Plaque: The top honor roll level earns a free plaque for QSOs with 35 islands, but you must have requested the endorsements for 20, 25, and 30.

The sponsor considers valid any island surrounded by salt water outside Europe and belonging to France. To be valid, an island must have an official name and a French Territory prefix. Would you believe that FK8-New Caledonia has 68 eligible islands for this award? A list of islands is available from the sponsor or K1BV for SASE/IRC. Also see the end of this article for the Internet List address. Apply to Joel Suc, F5JJW, La Grange, F-69440 Taluyers, France.

The Netherlands PA Century Club (PACC) Award. One of the old standard awards from the Netherlands has been redesigned and made available by VERON, the Dutch national amateur organization. Get out your PA/PI cards and put them to work for this award.

Work 100 different Dutch stations (PA, PB, PD, PE, PI) after 1 June 1945. Available for HF, VHF, UHF, or SHF contacts. Endorsements for each additional 100 more, up to a maximum of 900. No use of repeater or satellite modes. Apply with a GCR list and fee of Dfl10, or 7 IRCs, for each award. Endorsement stickers require only an SAE/IRC. Awards Manager: S. Wijbenga, PA3DKE, Prins Bernhardlaan 60, 8501 JG Joure, Netherlands.

The Netherlands PA Century Club Award.

The Netherlands Hart Van Brabant Award. Here's another Dutch award which might be a little harder, as it requires contacts with Tilburg in Regio 39 of Hol-

The Hart Van Brabant Award from The Netherlands.

land. What's a Regio? Each of the provinces of Holland is broken into smaller regions. Many of the Dutch awards require contacts with specific regions, which are probably on the order of a county or township. Here's a handy guide to the Regios of Holland printed here thanks to PA3EQU.

Province	Regio
Friesland	14
Zeeland	29, 33, 44, 47
Limburg	22, 31
N. Brabant	7, 13, 25, 35, 39
Groningen	19
N. Holland	1, 2, 4, 15, 23, 29, 45, 46
Utrecht	8, 30
Flevoland	41
Drente	11, 26, 27
Overysel	10, 32, 34, 40, 49
Gelderland	3, 5, 6, 21, 24, 35, 43, 48
S. Holland	9, 12, 16, 17, 18, 20, 28, 36, 37, 42

Contact 10 stations in Region 39 after 1 Jan 1995. SWL okay. Each station = 1 point; PI4HVB = 5. All bands and modes, except for packet and repeater QSOs. Send GCR list and fee of FI12.50 or $US10 to: Ad Kwantas, PA3GMR, Salesianenstraat 341, 5042 DT Tilburg, Netherlands.

The Work the Thirteen Member Countries of Caricom Award, sponsored by the Caribus Connection.

USA's Work The Thirteen Member Countries of Caricom. While listed as a USA award, the following certificate is awarded for working the 13 members of the 1993 CARICOM agreement. This award is an excellent example of modern technology using either a color copier or printer. Note that contacts must have been made since 1994. If you're short any of the countries, the next CQWW Contest will likely see activity from most of them.

This award is sponsored by the friendly Caribus Connection, a Caribbean/USA network which provides a forum for Caribbean-rooted amateurs and their counterparts. The award is available for contacting the 13 member countries of the Caribbean Community and Common Market called CARICOM. Contacts must have been made after 1 January 1994 with following member countries: Antigua V2, Dominica J7, Montserrat VP2M, Belize V3, Grenada J3, St. Kitts-Nevis V4, Bahamas C6, Guyana 8R, St. Lucia J6, Barbados 8P, Jamaica 6Y, St. Vincent/Grenadines J8, Trinidad & Tobago 9Y The award is a multicolored beauty displaying all the flags of the island nations—well worth the price. Send GCR list an. the fee of $US5 to Vincent Bacchus, KA2CPA, 130-72 227 Street, Laurelton, Queens, NY 11413.

Internet Site of the Month

The list of French overseas islands (Diplome Des Isles Francaises D'Outremers) described this month can be found on the Internet. Save yourself postage and time by printing this extensive and impressive list, which is found at <http://perso.easynet.fr/~f5nod/diforules.html>. The complete rules and islands list are to be found there.

And Finally . . .

I'm still looking to receive the rules and a sample of your group or organization's award or certificate. There are many people who are interested in awards available and only need to learn about yours.

73, Ted, K1BV

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	KM1H('93) (Opr. KQ2M)	1,001,035	1,892	39	146
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

N2BA('97)	2,169,720	1,651	120	372

Assisted

K1NG('97) (Opr. KI1G)	6,168,504	3,015	168	576

Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1989) 9,383,459	1.8	36	16	33
	3.5	313	26	75
	7.0	920	35	100
	14.0	1,139	37	128
	21.0	773	39	123
	28.0	920	37	129
	Total	4,101	150	588

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1992) 19,473,615	1.8	106	16	59
	3.5	726	29	107
	7.0	1,862	37	141
	14.0	1,721	39	156
	21.0	1,584	37	154
	28.0	1,128	34	136
	Total	7,127	192	753

Club Record: Frankford Radio Club ('92) 389,564,535
Team Contesting: Phone—Neiger's Tigers #4 ('97) 55,665,702
CW—Team N6TJ ('96) 49,912,140

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	ZV5A('91) 2,984,166	5,154	37	156
	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
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	ZD8Z('91) 2,341,866	4,521	33	141
	(Opr. N6TJ)			
	ASIA			
1.8	UG7GWO('87) 255,852	1,327	12	57
3.5	UW9AF('83) 222,192	554	19	53
7.0	H21A('92) 736,422	1,812	32	107
	(Opr. 4N4OO)			
14	5B4AGC('97) 2,140,790	3,944	35	159
21	JAØJHA('92) 1,430,856	2,912	37	130
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	VX3BMV/1('97) 132,890	712	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	AHØAB('82) 1,923,840	4,509	36	108
	(Opr. JA3DOC)			
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	ZV5A('91) 2,984,166	5,154	37	156

Single Operator/All Band

AF	CT3BH('90) 14,892,102	7,177	166	531
	(Opr. OH2BH)			
AS	H2ØA('94) 7,618,670	4,522	127	463
	(Opr. 5B4ADA)			
EU	S52AA('92) 7,134,192	4,378	151	473
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('92) 16,316,568	8,318	160	508
	(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	125	11	25
HC8A	3.5	357	20	51
(Opr. N6KT)	7.0	638	28	74
(1992)	14.0	1,166	34	111
16,316,568	21.0	2,031	36	127
	28.0	4,001	31	120
	Total	8,318	160	508

Multi-Operator/Single Xmtr.

AF	EA8AGD('88) 17,172,672	8,203	157	547
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	EW6V('82) 18,746,136	10,100	142	544
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	CXØCW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

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. DF5UL)	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	4Z4T('91) (Opr. 4Z4UT)	939,900	2,240	36	120
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	CG1ZZ('96) (Opr. VE3BMV)	218,715	898	22	83
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	CXØCW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

Single Operator/All Band

AF	EA8EA('91) (Opr. OH2MM)	13,225,295	6,490	171	514
AS	JY8VJ('92) (Opr. DL1VJ)	8,031,168	4,900	141	432
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	P4ØW('96) (Opr. W2GD)	12,742,731	6,315	159	524
QRP	HI8A('91) (Opr. JA5DQH)	3,316,768	3,320	117	325
Low Pwr.	3V8BB('97) (Opr. YT1AD)	6,615,489	4,447	135	422
Asst.	P4ØW('94) (Opr.W2GD)	10,288,950	5,541	155	460

WORLD RECORD

Station	Band	QSOs	Zones	Countries
EA8EA (1991) 13,225,295	1.8	254	14	57
	3.5	567	21	64
	7.0	1,114	30	90
	14.0	1,405	37	108
	21.0	1,374	36	100
	28.0	1,776	33	95
	Total	6,490	171	514

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	LZ9A('89)	9,962,386	5,342	200	626
NA	ZF1A('97)	11,971,520	7,046	164	540
O	AH2R('97)	7,892,928	4,938	170	398
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	CN5N('90)	33,659,256	14,179	178	644
AS	VS6WO('92)	17,799,960	9,841	190	570
EU	LX7A('89)	20,497,632	12,735	189	705
NA	KP2A('88)	32,325,150	15,198	191	631
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
PJ1B (1988) 38,415,760	1.8	717	17	65
	3.5	1,447	24	83
	7.0	3,119	37	133
	14.0	3,791	40	140
	21.0	2,997	39	134
	28.0	2,850	37	117
	Total	14,921	194	672

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspots Soar, Great CQ DX Contest Expected!

For the fourth consecutive year this month's propagation column is devoted to special forecasts for and information applicable to both the CQ World-Wide DX SSB and CW Contest weekends. The accuracy of the forecasts for the previous 47 WW DX contests is greater than 95%!

The 1998 CQ WW DX Contest will be held on the following dates:

SSB: 0000 UTC Saturday, October 24 to 2400 UTC Sunday, October 25

CW: 0000 UTC Saturday, November 28 to 2400 UTC Sunday, November 29

Sunspot Cycle 23 has begun to rise rapidly. A running smoothed sunspot number in the neighborhood of 100 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.

High Normal Conditions Expected for Most of SSB Contest Period

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 high probability for High Normal propagation conditions on October 24 and 25, possibly increasing to Above Normal at times on middle- and low-latitude paths. See the Last-Minute Forecast box at the beginning of this month's column 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.

The rapid rise in the solar activity, and the 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 seven years, particularly on the 10 and 15 meter bands.

Solar Cycle Progress

The monthly mean sunspot number for June 1998 as reported by the Royal Observatory of Belgium was 70.5. A high count of 109 was recorded on June 29, with a low of 45 reported on the 24th.

June's mean level results in a 12-month running smoothed sunspot number of 39 centered on December 1997. This is an increase of four in the count from the previous month. A smoothed sunspot number of approximately 100 is predicted for October 1998.

Canada's Dominion Radio Astrophysical Observatory reports a corresponding 10.7 cm solar flux level of 112 for June 1998. This results in a smoothed value of 96 centered on December 1997. A solar flux level of approximately 120 is forecast for October.

If you plan to participate in the 1998 CQ World-Wide 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.

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for October 1998

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 3, 7, 9, 17, 31	**A**	**A**	**B**	**C**
High Normal: 1-2, 4, 8, 15-16 18, 23-25, 29-30	**A**	**B**	**C**	**C-D**
Low Normal: 6, 10-11, 14, 19-22, 26-28	**B**	**C-B**	**C-D**	**D-E**
Below Normal: 13	**C**	**C-D**	**D-E**	**E**
Disturbed: 5, 12	**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 and 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 good (B) on Oct. 1st and 2nd, excellent (A) on the 3rd, good (B) on the 4th, poor (D) on the 5th, etc. Signal quality should be good (B) on both Oct. 24th and 25th during the CQ WW DX SSB Contest weekend.

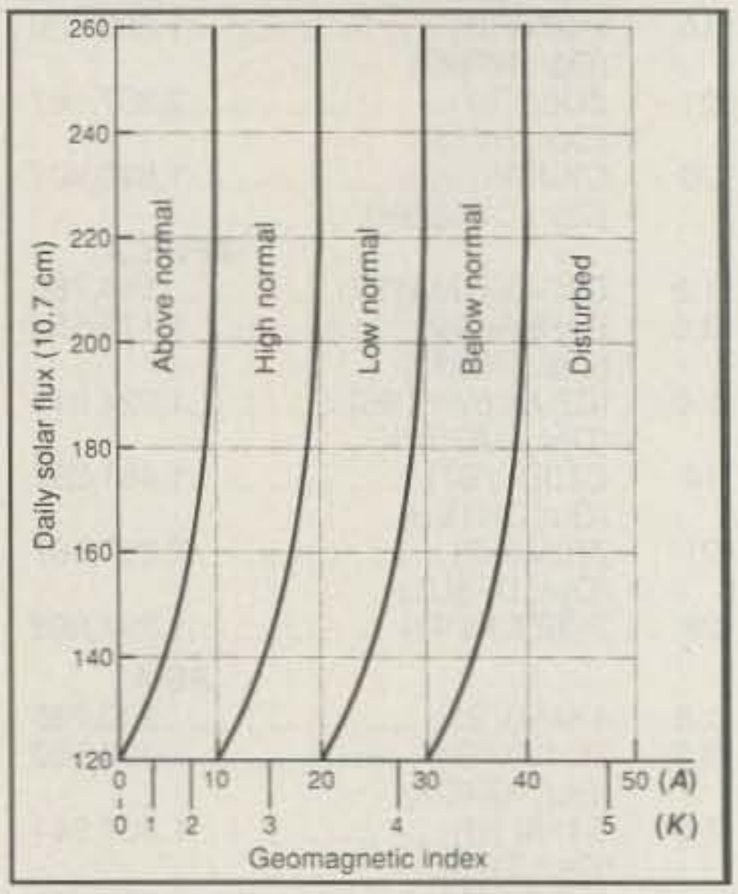

Fig. 1– Intersection of given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: Solar flux is 130 and A-index is 10; expect High Normal condition.)

General Conditions, Band By Band

Following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December 1998 and centered on the WW DX Contest period. For a more detailed circuit-by-circuit analysis, refer to the DX Propagation Charts that appear on the following pages.

10 meters: Good, solid openings should be possible to just about every corner of the world during the daylight hours, and the band may remain open to southern and tropical areas into the early evening. DX openings should begin an hour or so after sunrise towards Europe, Africa, and the east, as well as in a southerly direction towards the Caribbean and Central and South America. Signals should peak in intensity towards Europe and the east an hour before noon, towards Africa about an hour or so after noon, and towards the south during the late afternoon. Optimum conditions towards the Far East, Australasia, Southeast Asia, etc., are forecast for the late afternoon and early evening

Time EST	Optimum Band (Meters)	Areas To Which Band Is To Be Open
00–02	40	Most of Europe, Eastern Mediterranean, and Middle East. Most of Central and South America. A few African areas and possibly Antartica.
02–04	20	Some South Pacific, New Zealand, and Australasia. A few Far East and Asian areas. Some South America and Antarctica.
04–06	40	South Pacific, New Zealand, Australasia. Many South American areas. A few Far Eastern and Asian areas. Possibly Antarctica.
06–08	20	Most of Europe, South Pacific, New Zealand, and Australasia. Most of Central and South America. A few African areas. Some Far East and Asian areas.
08–10	15	All of Europe, Eastern Mediterranean, and Middle East. Some of Africa. Most of Central and South America. South Pacific, New Zealand and Australasia. A few Asian areas.
10–12	10	Most of Europe and Africa. Most of Central and South America. A few Asian areas, New Zealand, South Pacific, and Australasia.
12–14	15	Some of Europe and most of Africa. Most of Central and South America. A few areas of South Pacific, New Zealand, and Australasia.
14–16	15	Most of Africa, and Central and South America. Some of South Pacific, New Zealand, and Australasia. A few Asian areas.
16–18	20	Most of Europe, Eastern Mediterranean, and Middle East. All of Africa, and Central and South America. A few Australasian areas.
18–20	15	Lots of South Pacific, New Zealand, and Australasia. Some of Far East and Asia. Most of Central and South America. Possibly Antarctica.
20–22	20	Most of Africa, Far East, South Pacific, New Zealand, Australasia, Central and South America. A few European areas and Middle East. Some Antarctica.
22–00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few African and Asian areas. Antarctica.

**Similar work plans can be devised for single-band operation or for openings to specific DX areas.*

Table I– Sample multi-band work plan for Eastern USA QTH.

hours. Exceptionally strong signal levels can be expected on many openings, particularly when conditions rise to High or Above Normal.

15 meters: This band should be jumping during most of the daylight hours. Excellent propagation conditions are expected from shortly after sunrise through the early evening hours. The band could remain open well into the evening towards southern and tropical areas. Peak openings should occur towards a specific geographical area about an hour or so after the peak has occurred to the same area on 10 meters. Openings are expected to all areas of the world, and exceptionally strong signals should be possible most of the time. Fifteen meters is likely the best DX band during the daytime hours, but at times it will be a toss-up with 10 meters.

20 meters: Expect good-to-excellent DX openings almost around the clock. Signals should peak from all directions for about an hour or two after sunrise and again during the late afternoon and early evening. Excellent openings are expected to many southern and tropical areas well into the hours of darkness, and when conditions are High Normal or better, the band should remain open for DX during most of the night. Expect *long-path* openings on this band 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 propagation periods on 20 meters. This should be the band that will produce the longest period for DX openings, the strongest signals, and openings to more areas of the world than any other single band during the contest periods.

40 meters: This should be a prime DX band during the hours of darkness as summer static fades into oblivion. DX openings should begin during late afternoon, continue through the hours of darkness, and last until an hour or two after sunrise. The band should open first for DX towards Europe and the east during the late afternoon. Signals should increase in intensity as darkness approaches. During the hours of darkness expect good DX openings to most areas of the world. Signals should peak from an easterly direction about midnight, and from a westerly direction just after sunrise. Excellent openings towards the south should be possible throughout most of the nighttime

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.

period. Forty meters is likely to be the best band for DX during the hours of darkness, although at times it may be nip and tuck with 20 meters for this honor.

80 meters: While not quite as good a nighttime band as 40 meters, expect some good DX openings on this band to many areas of the world during the hours of darkness. The band will open later, close earlier, and be somewhat noisier than 40 meters. Signals should peak towards Europe and the east around midnight, and towards the west just before sunrise. Expect good openings towards the south throughout most of the night.

160 meters: Considerably decreased static levels and longer hours of darkness in the Northern Hemisphere should welcome back DX openings in this band during the hours of darkness and into the sunrise period. Because of relatively high signal absorption and the lower power levels used in this band, openings will often be weak and noisy, but some fairly good ones should be possible. Best bets are for openings towards Europe and towards the Caribbean and Latin America from the eastern half of the country, and towards the Far East, Australasia, the South Pacific, and Latin America from the western half of the country. DX openings to other areas of the world may also be possible. The best propagation aid for this band (and for 40 and 80 meters as well) is a set of sunrise and sunset tables, since DX sig-

October 15 - December 15, 1998
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

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 (2)	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) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-22 (2) 22-00 (1)	03-05 (2) 05-09 (1) 12-14 (1) 14-16 (2) 16-17 (3) 17-01 (4) 01-03 (3)	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:

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (1) 08-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	03-06 (1) 06-08 (3) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1) 00-03 (2)	17-18 (1) 18-20 (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	07-11 (3) 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-10 (2) 10-14 (3) 14-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	05-06 (1) 06-10 (2) 10-14 (3) 14-18 (4) 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) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (1) 08-09 (3) 09-11 (2) 11-12 (1) 16-18 (1) 18-19 (2) 19-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 20-22 (1) 22-00 (2) 00-04 (3) 04-06 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (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)

October 15 - December 15, 1998
Time Zone: PST (24-Hour Time)
WESTERN USA TO:

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) 07-08 (2) 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) 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)	07-08 (1) 08-11 (3) 11-12 (2) 12-15 (1) 15-17 (3) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 19-22 (1) 22-01 (2) 01-03 (3) 03-06 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	13-14 (1) 14-15 (3) 15-19 (4) 19-20 (3)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3)	23-01 (1) 01-05 (2) 05-07 (3) 07-08 (1)
South Pacific & New Zealand	20-21 (2) 21-22 (1)	13-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-02 (3)	01-05 (1)* 05-06 (2)* 06-07 (1)*
Australasia	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 & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-07 (2) 07-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-23 (4) 23-01 (3) 01-06 (2)	18-19 (1) 19-21 (3) 21-02 (4) 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 for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meters.

Point to point HF predictions anywhere in the world (Short Path).

Day:	24
Month:	10
Year:	1998
Transmitter Name:	Silver Spring, MD
Transmitter Latitude:	39.00
Transmitter Longitude:	283.0
Receiver Name:	St. Helena Island
Receiver Latitude:	-15.60
Receiver Longitude:	354.0

T index: 97.55 SSN: 100 10CM FLUX: 146.93

Table II– Data entry menu for IPS realtime HF prediction for Silver Spring, Maryland to St. Helena Island path.

nals tend to peak when it is *local sunrise* at the *easternmost* point of a path.

Contest Work Charts

The DX Propagation Charts on the following pages show the times when each amateur band from 10 through 160 meters is expected to open from each time zone area in the continental USA to the major DX areas in the world. The information contained in the charts, while useful during the contest period in their present for format, can easily be reorganized into more convenient formats to meet specific operational work plans or schedules.

```
IPS GRAFEX HF FREQUENCY PREDICTIONS                              ADDRESS NO. 1234
================================================================================
Circuit: Silver SpriSt. Helena          Date:  24 October, 1998    T-index:  97
Bearings: 114 313                       Distance: 9531 km
First Mode          |--------F r e q u e n c y  (MHz)---------|       Second Mode
3F 1-5   3E 0       1   5   10    15   20    25   30    35   40     4F 6-11  4E 0
UT  OWF EMUF  ALF |...|....| ....|....| ....|....| ....|....|  OWF EMUF  ALF UT
00 17.7  0.0   0.0 MMMMMMMMMM MMMMMMMM% %%....                  15.5  0.0   0.0 00
01 16.0  0.0   0.0 MMMMMMMMMM MMMMMM%%% ...                     13.8  0.0   0.0 01
02 15.3  0.0   0.0 MMMMMMMMMM MMMMM%%%. ...                     13.0  0.0   0.0 02
03 15.1  0.0   0.0 MMMMMMMMMM MMMMM%%.. ..                      12.7  0.0   0.0 03
04 14.8  0.0   0.0 MMMMMMMMMM MMMM%%%.. ..                     12.4  0.0   0.0 04
05 14.4  0.0   0.0 MMMMMMMMMM MMMM%%%.. .                      12.0  0.0   0.0 05
06 13.0  0.0   0.0 MMMMMMMMMM MMM%%%...                        11.3  0.0   0.0 06
07 13.3  0.0   0.0 MMMMMMMMMM MMM%%%...                        10.9  0.0   6.2 07
08 12.2  0.0  10.4          A MMM%%..                          10.4  0.0  10.0 08
09 11.3  0.0  12.3            A%%..                             9.7  0.0  11.5 09
10 14.6  0.0  13.4             AF%%%...                        11.3  0.0  12.5 10
11 23.4  0.0  14.2               SMMMMMM MFF%%%%...            17.8  0.0  13.1 11
12 28.2  0.0  14.6               SMMMMMM MMMMMFF%% %.....      23.3  0.0  13.4 12
13 28.2  0.0  14.7               AMMMMMM MMMMMFF%% %.....      23.7  0.0  13.5 13
14 28.7  0.0  14.6               SMMMMMM MMMMMMF%% %%.....     24.2  0.0  13.4 14
15 29.0  0.0  14.3               SMMMMMM MMMMMMMM%% %%%.....   24.6  0.0  13.2 15
16 29.4  0.0  14.1              ASMMMMMM MMMMMMMF% %%%......   24.9  0.0  12.8 16
17 29.4  0.0  13.5              SMMMMMMM MMMMMMMF% %%%......   24.9  0.0  12.4 17
18 29.2  0.0  13.1             ASMMMMMMM MMMMMMMM% %%%%.....  25.2  0.0  12.0 18
19 28.4  0.0  12.4              SMMMMMMM MMMMMMMM% %%%%....   24.5  0.0  11.4 19
20 28.4  0.0  11.2             SMMMMMMMM MMMMMMMM% %%%%....   23.6  0.0  10.4 20
21 27.0  0.0   8.8          AM MMMMMMMMM MMMMMMMM% %%....     24.2  0.0   8.6 21
22 23.6  0.0   0.0 MMMMMMMMMM MMMMMMMMM MMMMM%%%. ...        21.1  0.0   0.0 22
23 20.3  0.0   0.0 MMMMMMMMMM MMMMMMMMM MM%%%.....           17.9  0.0   0.0 23
UT  OWF EMUF  ALF |...|....| ....|....| ....|....| ....|....|  OWF EMUF  ALF UT
================================================================================
|.  USABLE LESS THAN 50% OF DAYS|%  USABLE  (50%-90%) OF DAYS      |
|B  BOTH E&F MODES 90% OF DAYS  |M  MIXED                          FIRST AND SECOND F MODES
|F  FIRST F MODE ONLY           |E  E LAYER PROPN                  | P  90%E &50-90%F|
|S  SECOND MODES ONLY           |A  HIGH ABSORPTION                | X  COMPLEX MODES|
   (c)  3-Aug-98 IPS Radio & Space Services, Sydney Australia +61 2 92138000
```

Table III– Resultant HF real-time IPS prediction for Silver Spring, Maryland to St. Helena Island. Note 10 meter openings between 11 and 21 UT, peaking at 16–17 UT.

Experience gained during previous contests has shown that specifically tailored schedules derived from the charts can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table I is an example of one of several types of plans that can be devised. It is a *multi-band* operational work plan, which shows the times and bands when propagation conditions are expected to be optimum to various areas of the world for each two-hour period throughout the day. An Eastern QTH has been chosen for this example, but similar plans can be devised for Central and Western locations.

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 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.

Do-It-Yourself Forecasting

A wealth of updated and real-time solar, geomagnetic, ionospheric, and HF propagation data can be obtained on the Internet from web pages sponsored by well-known research organizations throughout the world. Having such information available could be of great assistance during the 1998 CQ WW DX Contest periods.

For the convenience of readers of this column, I maintain a *single* web site (<http://www.gjainc.com>) that has links to the following major sources of solar, geomagnetic, and ionospheric web sites:

NOAA Space Environmental Center
<http://www.sel.noaa.gov>

IPS Australia
<http://ips.gov.au>

DX Listeners Club
Norway<http://dxdc.com>

Solar-Terrestrial
Dispatch<http://holly.cc.uleth.ca>

Royal Observatory
Belgium<http://www.oma.be>

The NOAA site has recently been reorganized and upgraded. It contains a library of information and is well menued. Here is how you can use it to know what's going on with the sun, the geomagnetic field, and the ionosphere during the contest period.

From the Home page, select "Gopher Data Directories." From the list of Directories, select "Latest Solar-Geophysical Data." From this directory select the subdirectory "USAF High Frequency Radio

Propagation Report." This will give you in tabular form a summary of worldwide HF propagation conditions (which is updated every six hours), the latest value of sunspot count and 10.7 cm solar flux, and the latest geomagnetic indices. Other directories and sub-directories will provide additional solar and geophysical information, current radio storm alerts and warnings, auroral activity, and detailed ionospheric data. Elements of the USAF report can also be obtained by telephone from the on-duty forecaster at 719-567-6312.

The IPS Radio and Space Services site in Australia supplies a storehouse of useful data, including *real-time* HF propagation band predictions. Among such forecasts are "Hourly Area Predictions" (HAP). They contain frequency predictions which are superimposed on area maps, given in UT, and upgraded every hour. HAPs for North America are available in brilliant color, where different colors represent different frequency ranges. They are available centered on Boston, Boulder, Montreal, New Orleans, San Francisco, Vancouver, White Horse, and Winnipeg. Similar HAPs are available for the Northern Atlantic and other regions of the world.

IPS permits you to make your own propagation forecast for anywhere in the world (short path), based on real-time data. These are called "Grafex HF Predictions." Table II shows the data entry menu for a Grafex prediction for the path from Silver Spring, Maryland, to St. Helena Island. Table III shows in tabular form the resultant IPS Grafex Prediction for this path, which was calculated in a matter of seconds. Note the predicted 10 meter openings between 11 and 21 UT, peaking between 16 and 17 UT.

The other web sites linked to my page are sources of both real time and archives of solar, sunspot, geomagnetic, and ionospheric data.

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 Storms

The forecasts discussed in this column are based on *normal* propagation conditions expected with a sunspot level in the low teens. If actual conditions during the contest turn out to be *above normal*, DX openings on 10, 15, and 20 meters are likely to be somewhat better than shown in the charts. On the other hand, if Mother Nature should play a trick and produce a radio storm during the contest period, 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 outward 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 hours of darkness.

VHF Ionospheric Propagation

The sunspot count has now risen to a point where some 6 meter *F-2* layer DX openings may be possible during the daylight hours. The best possibilities would be towards South America from all areas of the USA. An occasional opening may be possible from the eastern half of the country to central and southern Africa before noon, and from the western half of the country to Australia and the South Pacific area during the late afternoon hours.

Orionids, a major meteor shower, is expected to begin around October 20th and last for about two days. Expect as many as 25 meteors an hour to enter the Earth's atmosphere during the peak of the shower. This should make possible some fairly good meteor-type ionospheric openings on the VHF bands.

There is usually a seasonal increase in auroral activity during October. This should result in an increased number of auroral-scatter-type openings on the VHF bands. There are also increased chances for short-skip sporadic-*E* propagation during periods of auroral activity, particularly on 10 and 6 meters. Check the Last-Minute Forecast at the beginning of this column for the days that are expected to be Below Normal or Disturbed. These are the days upon which auroral activity is most likely to occur during the month.

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 in last month's column.

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 47 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 1998 contest and the accuracy of these forecasts and predictions would be appreciated, and should be sent directly to W3ASK, at P.O. Box 1714, Silver Spring, MD 20915, or e-mail to <george@gjainc.com>. Good luck in this year's CQ WW DX Contest! 73, George,W3ASK

manage a tribander of some sort in the new year and look forward to improving over this year's efforts . . . *GI4SNC.* Wanted to try to see if DXCC could be worked on 80 CW during a single contest weekend with my decidely modest setup. With skill, persistence, patience, luck, and great condx, it can be done! Even missed 8 countries that I heard . . . *OH2EA.* In Japan "Loran type A" on 1850 kHz has stopped. But low edge (1800 to 1810 kHz) is clearer than world-wide DX windows (1820–1850 kHz)! Please transmit on these clear frequencies. There are many beacons on 1810–1820 kHz, so it is difficult to receive in this frequency range . . . *JE1SPY.* I learned something. Don't try QRP on 10m during the sunspot minimum . . . *2MØAOK.*

I learn how to make the best use of time each year . . . *G3RSD.* My operating time was less than 14 hours because my XYL decided to make my daughter's wedding party on Nov 29th. Some people don't want to understand ham radio! . . . *XE1VV.* The CQ WW DX Contest was, as expected, a very fine contest with lots of rare DX stations to hear and work. I decided to work only top band, as I would like to test my newly designed antenna . . . *LA7AK.* Ten meters suddenly exploded on Sunday afternoon. Just one country short of DXCC . . . *PAØLOU.* I am QRS operator. I am glad to answer entrants, especially to the usual contest friends . . . *IØKHP.* I am glad to get all seven continents on 10m during the contest . . . *OH5PA.* Fabulous pile-ups on 10m . . . *ZS6KR.* After working KC1XX on 40m at 0858Z, I thought boy, he must have some dipole. Condx on 40 were fabulous. You could hear ZL3CW at noon! . . . *9A2OO.* CQ WW is a tradition I cannot miss . . . *IK5RLS.* Nice contest. My first CQ CW. Hope to do better next year . . . *YB4JIM.*

Nice multipliers from the Pacific area on 10m, but no NA or SA. Propagation is part of our hobby . . . *YO9HP.* I'm 15 years old. It's my first WW DX Contest! . . . *UK8ICO.* I love CW and CQ WW DX CW. Age here is 71 . . . *OL4M.* When I will be president of Russia, all broadcasting television will be prohibited on the whole territory of the Russian Federation . . . *UA1OMS.* This is my first CQ WW DX CW. I am 17 years old . . . *SQ3DWR.* My socks rolled down and up when I put 5V7A in my 160 log . . . *RAØFA.* Conditions on 40m better than on 20m . . . *UX5VK.* My wife had a baby boy two days before the contest. The planned MS with VK6LW and VK6HD got turned into a 160m single band. The highlight was my last QSO with 5V7A . . . *VK6VZ.* My first WW contest on 40m. Very interesting! Thanks for the best contest in the world! . . . *UN7LG.*

Great contest. Looking forward to next year . . . *YC6PUP.* This is my first try in CQ WW on QRP. QRP is marvelous . . . *JJ1JGI.* I made more QSOs on 160m than on 80m. Incredible! . . . *LU1EWL.* My hand shook because it was my first time in a CW contest . . . *DU3RCM.* I could make 100 more QSOs than last year, but the same mult. I need better antennas . . . *JH2NWP.* It was difficukt with 3 letters in the prefix. Next time I will use FK8 . . . *TXK8FU.* It was my first contest with a big score. I am very happy. I used my new call. It is easier to send than SP4EEZ . . . *SP4Z.* The best contest of the year without a doubt . . . *M7C (G3KKQ).* Not as much fun as running the contest from Greenland, but I did my best . . . *OZ1AV.* Nice contest with my 4W QRP. Very difficult but funny . . . *EA7AAW.* It was my first time to take part in an international DX contest. I don't have a computer and it was an interesting experience . . . *LW3HAQ/D.* QRM from hurricane Pam wiped out 80 and 160. Pam hit Raratonga a few days later. Evacuated the beach wing at the resort; packed the gear during the worst wx. We were finally picked up by Air New Zealand and flown to ZL . . . *ZK1TB (W7TB).* 6D2X made my day. For the first time in my life a Mexican station called me on 7 MHz . . . *OF3WS.*

I like this contest very much. But it is hard to do it QRP because the QRP technique is a handicap when you can "answer" only! . . . *HB9XY.* I am 15 years old and this was my first CQ WWDX . . . *YO2LLG.* YP2R is a special call of YO2KJI, the Children's Radio Club . . . *YP2R.* All the MS stations with a few exceptions did QSY upon request. The big frustration was being so close to the world record at the end . . . *P40E (CT1BOH).* Still one of the most exciting contests . . . *HB9AYZ.* A great pleasure to compete in the QRP category . . . *ON6TJ.* Good opening to the east coast of the USA. Condx are getting great . . . *JA7COI.* Very thanks to Rick, DJØIP, who gave me the chance to operate from his QTH . . . *DL6RDR.* Who said that semiconductor's life is based on the flow of electrons and holes? Wrong! It is based on smoke. How? Simply, if smoke goes out of it,it is dead . . . *ES2RJ.* This was an old-fashioned operation. Handwriiten logs and hand keying. But the critical problem was an island-wide shortage of Carib beer . . . *VP2EST (KT8Y).* Nobody got my call the first time. Suggest a new category: ABBC = All Bands Bad Callsign. Hi . . . *Z37FCA.* Big contest. My low power was not sufficent to work Asia and Pacific . . . *I1XPQ.*

It was great fun. I enjoyed it every bit. The log is a result of my right hand and my human memory taxed for the weekend . . . *VU2BGS.* This is my first CQ WW CW . . . *CX9BAG.* I was too weak for CT3/OH1MA, EX8W, HC8N, TI1C, 6Y4A, P40E, and KC1XX (all on 160m) . . . *HAØEQ.* A DXCC single band and QRPp in one day is too high a goal. However, it's very possible in a weekend . . . *DL9YX.* Where were the PY's, ZS's, and Zone 2? Good contest nevertheless . . . *GM3CFS.* My antenna is only 7 meters up. So I am very glad for 300 QSOs . . . *RV4LC.* First QRV with CW for the CQ WW. FB! . . . *7M3RSK.* I lost my power supply with 256 QSOs. It was terrible for me because I have been working this test since 1986 . . . *CE3IDY.* 40m never closed for DX through the entire 48 hrs. It was a humbling experience trying to work among so many good CW ops . . . *GM4YXI.* 5V7A had a very big pile-up on 160m! He was 59 in JA . . . *JE2LPC.* I was very surprised at the strength of 6Y4A on 80m. My first zone 8 . . . *JS1UMQ.* My compliments to all the DX operators who managed to get my weak signal on 40m . . . *ES1CW.* Pleased to make 1 meg points for first time . . . *GW7K (GW4BVJ).* Conditions on 80m quite good . . . *VE6BF.* Great to work 5V7A on 160! My first African on top band! . . . *JA8RWU.* I sent my results and would like to devote them to my little son: Vasilij (3 months) . . . *UA1PAC.*

USA QRM

When the neigbor boy came to my door and told me that the vertical was arcing badly, it was! . . . *KW2J.* A lot of stations on the air . . . *WA4JUK.* 40 wpm ops miss many opswho can't copy above 30 wpm . . . *K8AB.* Friday night lightning severed the power lines coming to my house. Sat. I had S9 rain static, but Sun. morning made up for the whole mess! Worked VR2 and YB for my first 10m LP experience . . . *K4JYO.* I made a goal of working KH6 on 160m to finish WAS. Then I did it twice in 7 QSOs. Thanks to KH6CC and KH6AT . . . *KJ5WX.* Lost my beam! Wish I had a directional antenna. Sunspots are fine! . . . *N7JXS.* Great time! I just wish these so-called big guns had big ears. They need to calm down and listen, listen. They would work even more . . . *WA2ASQ.* Great contest. Band condx great. Some ops should send call signs more often . . . *N4GJ.* Tried for 15 min to work KH2/K9AW through the immense pile-up on 15m without success and then worked AH2R 25 kHz away on the first call . . . *KU6T.* Great to snag E21CJN . . . *W4YE.*

Can't say enough about band conditions! Nothing like 59 signals on 10 and 15 to rekindle the ham radio spirit. Had a super time . . . *K9WA.* Hello sunspots! Hello QRP contesting again! . . . *WA2HZR.* Sure could use more JA activity on 10 and 15 to the west coast, but I doubled last year's score! . . . *N6NG.* Why is it after failing to break a pile-up, I worked another station with a single call and broke the pile-up first try? . . . *N6JM.* I found that most of the DX spots on packet were provided by ops who used 100 ft. plus towers. Although the packet was connected for the duration of the contest, I mostly relied on a zone map for beam headings and my timing and listening experience to find stations . . . *KG7XC.* Sixty-three countries using 5 watts and a low tribander—the spots are back! . . . *W8QZA/6.*

QRN was non-existent most of the time, which sure helps if your antenna is a vertical . . . *WD6DX.* First year with a tower and a beam. I'll spend more time in the contest next year. Bring on the sunspots! . . . *WBØB.* Great to 10 and 15 hot! Great fun . . . *K2NV.* Ten meters came alive to Europe the second day. The first time in several years. Reached my 80th birthday just before the test. Hoping to enjoy at least one more sunspot cycle! . . . *W3VT/4.* What a contest! Great operators and conditions. Next year more hours, less family, and better score! . . . *K9JWV/4.* New country, 5V7A. Lucky I found him calling CQ and got him first call . . . *K8IP.* Ditch the RST. It is meaningless. Replace it with QSO# + zone or operating class + zone . . . *WD9IAB.* Op is 80 years old living a retirement home . . . *N6IBP.* Despite antenna restrictions, neighbors with TVs susceptible to front-end overload, and limited working sked, this is still the best contest of the year! . . . *KA6SGT.*

This was the first contest that I entered. It was a blast! Next year I'll have some real antennas . . . *N4HA.* Great condx on 15m, but rain and cold limited my sitting in the car . . . *K9RN/m.* Happy days are here again . . . *WA1FCN.* Why do I love this stuff? Let me count the ways: (1) low power, (2) low antenna, (3) thrill of the chase, (4) Morse code . . . *K4LDR.* My dad died of cancer on Saturday at 1215 PM. He was 82. I had to make 82 QSOs for my dad . . . *K9UQN.* VK9LX, first call in massive pile-up . . . *W8EQA/7.* Worked 2 new countries on 10 meters . . . *K2HT/Ø.* Ten meters Sunday morning was wonderful . . . *KMØL.* I have been licensed since 1953 and this is my first contest. A blast! . . . *WC7N.* Getting 3DA5A on 40 was a real coup for me . . . *W6UDX.* BA4TB called me during the last half hour! . . . *N4CT.* Thanks to all who dug my signal out of the QRM, especially, the op at 5V7A. I just turned 17 before the contest. Talk about celebrating in style. Thanks for the great contest . . . *AA8UP.* Great to hear the bands improving . . . *W6TKF.*

Experienced great conditions on 10m Sunday morning. But when the band closed the NE was still running them . . . *N4BP.* Ten meters was in unexpectedly good shape. Greatest surprise was an opening an hour or so long path to Asia Saturday and Sunday mornings . . . *W3EP/1.* Glad to hear 10m finally start to open . . . *KGØDS.* My best score after 65 years of operating! . . . *K2AW.* This is the greatest DX contest, bar none. Thank you for sponsoring it . . . *NN4T.* First ever CW contest . . . *KD4HXT/7.* Had a great time. Heard lots of Eur and Asia calling CQ but not hearing us. Heard JAs on Sat AM but no luck . . . *W2VO(1.8MHz).* I really put a lot of effort into this contest. It was very rewarding to work so many stations . . . *KC6LDO.* VR2 and JA on 10m Long path—Wow! . . . *W1ZK.* Forty meter conditions were great, but 80 and 160 poor. Ten was a welcome surprise . . . *KQ2M.* At age 72 can still hang in there for the entire test, but tough . . . *W6EUF.* More Far East this year than in a few years . . . *WB8YJF.* Great LP conditions to SE Asia on Sat morning . . . *AI2C/4.*

The climb up the solar cycle sure is a slow one. But were are getting there . . . *KS7T.* Thanks to all the fine DX ops! Goal was to breal 100K. Beat last year's score by 100K! Great contest! . . . *AAØTY.* Nice to work zone 1 again! First ever QSO with C2 and TF! Go sunspots! . . . *N3KCJ.* Best high band conditions in years. Already looking forward to next year . . . *WI9WI.* Thanks to all the DX who struggled to get my QRP call . . . *N7RO.* Call at 50 WPM helped me pass my Extra exam the next week! . . . *W2SSB.* We had big Murphy problems! With one new operator, AA2VG, and 13-year-old KG2HV operating for the second year, it was a good learning experience for all . . . *N2FF.* It was a refreshing change of pace to work the contest using low power. It is a new kind of rush to hear the DX station come back to my call . . . *W5CWQ.*

Station Operators
Multi-Op Single Transmitter

3E1DX: DL5XX, S57NW. **4G1A:** 4F1BYN, 4F1FZ, 4F1ARC, DU1RCF, 4F3CV, 4F3GDX. **4NØS:** Lacy, Sam, Norby, Gabi, Rexy, Andor, Li, YU7CM. **4U1ITU:** K3IPK, K5RS. **5A2A:** DJ7IK, DL1GGT, DL2EBX, DL3KDV, DL8OBC. **6D2X:** K5TR, K5TSQ, N5JA, N5RZ, N5YK, W5VX, XE2XDX, XE2YNE. **8Q7DV:** Loginov, Usov, Ovsiannikov. **9A5D:** 9A2FK, 9A3GA, 9A3ID, 9A3VM, 9A4AQ, 9A4KS, 9A4NC, 9A4SG, 9A4VN, 9A5DU, 9A5LU, 9A6DX, 9A6AOQ, 9A6KKB. **9A9D:** 9A4KK, 9A4UU, 9A4DD, 9A4OO, 9A5YA, 9A2QU, 9A7GIH. **9G5VJ:** G3VMW, G4RWD, G4ZVJ. **9U5CW:** EA1FH, PA3DZN. **AA1ON &** W1RH. **AA2FB &** K2QMF. **AE4RO &** AE4SW. **AH2R:** JF1SQC, JK3GAD, JR7OMD. **DFØFS:** DL1EKC, DL3NCW. **DFØHTE:** DK1SAM, DK7TL, DL3SBI, DL5NAH. **DFØRI:** DK3DM, DL3LAR, DL6LAU, DL8OBQ. **DJ7TO &** DJ6TF, DL1KWK, DL6UST, DL7AKC, DL7URH. **DKØFFO:** DL7UGN, DL2BWM. **DKØTZ:** Club. **DF3CB &** DK4WA, DK6WL, DK7YY, DL1MFL. **DK1II &** DJ7MG, DL5EBE. **DK1RP &** DJ3TF, DJ5RE, DK6NJ. **DLØDX:** DL1QQ, DL5KUT, DK2OY. **DL3SKF &** DL4SKF. **DL4SKF &** DL3SKF. **DL6RAI &** DL2HBX, DL2NBU, DL4RDJ. **DL6YZ &** DL2MDU. **DL7BY &** DL7AU, DL7UTM, DL7UBA. **DX1HB:** JA1KJK, JE8IVFM JK1CWR.

E22AAA: EY8MM, HS1CHB, JR3XMG, HS1CKC. **EU5F:** EU6DX, EW6EW, EW6AF, EV6M, EV6Z. **EU8T:** Club. **EW1WN:** EW1MN, EW1AM. **EW35WB:** EU1AZ, EU1DX, EU1TU. **EX9A:** EXØM, EX2M, EX7MM. **F5KAC:** F6JSZ, FB1IPH. **F8KCF:** F6IFY, F6FNL, F6BNH, F5LJY, F5UAM, FA1ITF, FB1CMF, F6BGC, F5IQA, F5SDT, F5DJL. **GM7R:** GM3YOR, GMØNAI, GMØWDF, GMØICF. **HA1KSQ:** HA1ASY, HA1SQ, HA1DDU, HA1SF, HA1TG, HA5KF. **HA3KNA:** HA3NU, HA3NS, HA3OV. **HBØ/HB9LF:** Club. **HB6FG:** HB9BOU, HB9BQP, HB9CYY, HB9DLZ, HB9HFK, HB9HFN. **HB9AA:** HB9ARF, HB9IAE, HB9DCM, HB9AMO, HB9BZA. **HG1S:** HA1TJ, HA1DAE, HA1DAC, HA1AH, HA1BN, HG1DAI. **HG5C:** HA5LV, HA5MA, HA5WE, HA7XQ, Dj. David. **HI3/DL1GKG &** DL2GGA/HI3, DJ4GX/HI3, DL1CW/HI3. **HS5AC:** HS1NIV, HS5RGP, HS4AWF. **HS8AS:** E21AOY, HS5JRH. **IH9/OL5Y:** OK1FUA, OK1CW, OK1MM, OK2GG, OK2BFN. **IO2A:** I2IFT, IK2AHB, IK2CIO, IK2HKT, IK2PFL. **IO2L:** IZ2ACZ, IK2PIG, OK2MLV, IK2NCF, IW2FSG. **IQ4A:** I4VEQ, I4IND, I4EAT, I4IKW, I4TJE, I4LCK, IK4EWK, IK4CZF, IK4XQH, IK4DCT, IK4MGP, IK4QJH, IK2NCJ, IK2JUB, IK2MRZ, IW4ANU. **IQ4T:** IK3QAR, IK4SXJ, I4YTE, IK4WMH, IK4ZHH, IK4HVR, IZ4AKS, I4IFL. **IR5R:** IK5QQE, IK5YZT.

JA1ELY & JA1IDY. **JA1YPA:** JH1AZO, JM1NKT, JA,PPEJ. **JA2ZJW:** JH2CMI, JL2ICO, JM2NFQ, JA2MNB, JI2UNR, JE2PCY, JI2KGI, JF2WEQ, JH2SON. **JA3YDH:** JN3ACR, JA3BCT. **JA6ZLI:** JJ4HWC, JG6POJ, JJ6WYS. **JA7YAA:** JG7PSJ, 7M1JAS, JHØNZN. **JA7YAI:** JA7-3Ø825, Maruyama. **JE2YHS:** JA2OLJ, JR2JVR, JG2NUD, JE2WWB, JJ2CEE, JI2XUT, JR2JPU. **JH7PKU &** JA9SSY, JH7DXZ, JH7FQK, JO1BMV. **JR1ZTT:** JK2FGD, JR8OFE, JEØUXR, JHØKHR, JRØUUU, JRØXHL, T. Awoki. **JT1T:** JT1CD, JT1BL. **K1EU &** W1DEO, K1JB. **K1GW &** W6PH, K1VA. **K1ZR &** KB1SO. **K1ZZ &** K1RO, N1RL. **K2OWE &** WK2G. **K3SX &** others. **K4NR &** KK4TK. **K4NR &** KK4TK. **K4OJ &** W1CW, W1YL, NA4CW, WD4AHZ, AE4MH, KF4RZI, Jay. **K6ANP &** K6LRN, N6AD. **K6III &** others. **K8AZ &** K8NZ, K8MR, K8PP, K8RM, W2UP, N8TR, W8GN, W8KIC, KQ8M. **K8DD/C6A &** AC8W, N8KR. **K8LX &** N8EA, WA8ZDT. **KAØBWH &** Don. **KB5U/2 &** NO2R. **KN6DV &** K1TA. **KO7X &** NY4I. **KP3Z:** NP4Z, KP4BZ, NP3A, KP3L, WP3A, NP3J, KP4RF, KP3P, NP3HM. **LA1K:** LA1BFA, LA5NJA. **LA6YEA &** LA9VDA, LA5UF,

LA9GX. **LA8W:** LA4DCA, LA7SL, LA8SDA, LA9EEA, LA9HW. **LX/DL4SDX:** DL4SDX, DL5SEJ, DL4SDW, DL8SCG. **LY2OM &** LY2BUU, LY2TX. **LY3MV:** Aleinikovas, Kunickis, Ceckauskas. **LZ7M:** LZ/OK1DF, LZ1AX, LZ1GHT, LZ1HST, LZ1ZD, LZ2HM, LZ3AS, LZ3FR, LZ3FN, LZ3SM, LZ3UA, LZ4AX, LZ4FN, LZ5VK.

NØNI & WØFLS, KØRX, KØKD, WOØV, NØAV, NØAC. **NØZA &** NNØM. **N2FF &** N2GA, KG2HV, K2KV, AA2VG. **N2NU &** K2WI, WW2Y, W2REH, N2NC, N2NL. **N2SS &** N2MT. **N5TW &** AF5Z, AG5W. **N7DR/Ø &** KØKR. **N7FE &** N7RD, W7DOZ. **N8NR &** K9JE, K9LU, KA8CFU, N8BJQ, N9AG, W8QID. **NE3F &** KS3F, NT3V, K3ATO, N9GG. **NJ4F &** K7SV, K4GMH, WA4JUK, KA4RRU, K5IMC, K4EK, Daisy. **OF1AF:** OH1HEV, OH1LUZ, OH1MDR, OH1MM, OH1NOA, OH1XT. **OF5M:** OH1WZ, OH5CW, OH5MLH, OH5TQ, OH5NQ. **OF6NIO:** OH6NIO, OH6KZP. **OF8AA:** OH8PF, OH8LQ, OH8MCT. **OH1AD:** OH1BOI, OH1MLZ. **OH1TV &** OH2FU. **OH3AT:** OH3DC, OH3NBJ. **OH6AW:** OH6MW, OH6EME, OH6UV. **OH7AAC:** OH4LYX, OH6LNI, OH7KD, OH7KIR, OH7LTK, OH7MHL, OH7MS, OH7WV. **OK1KAO:** OK1MPM, OK1FMX. **OK1KQH:** OK1XH, OK1FC, OK1DEK, OK1DOS. **OK1KUO:** OK1UG, OK1FFC. **OK1KZD:** OK1TO, OK1JEF. **OK2KDS:** OK2VWB, OK2HIJ, OK2-22266. **N8PR/4 &** N4QV. **OK2KOD:** OK2BDI, OK2BNX, OK2BJ. **OK5W:** OK1AEZ, OK1CF, OK1WF, OK1WT, OK1JKT, OK1TN, OK1TA, OK1FKD, TA2ZW. **OL2A:** OK2PDK, OK2HBY, OK2PEM. **OL3A:** OK1AY, OK1CM, OK1DRQ, OK1DX, OK1FCJ, OK1FJD, OK1FWM, OK1MR. **OL5Q:** OK1HRA, OK1FFU. **OL5T:** OK1KT, OK1NR, OK1TC, OK1VD, OK1DNR, OK1DXF, OK1FHI, OK1FLM, OK1HSK, OK1MUJ.

OM3A: OM3DX, OM7RU, OM7ZZ, OM8AM, OM8AW, OMØWR. **OM7F:** OM7PY, OM7IR, OM3WBC, OM7PA, OM7ARI, OM7ATI, OM7ALC. **OM8A:** OM2RA, OM2VL, OM3BH, OM3CW, OM3EA, OM3GI, OM3JW, OM3LU, OM3NA, OM3RM, OM5DX. **OT7P:** ON4LAM, ON5OO, ON6AH, ON6MH, ON6VL, ON6QR, ON7PC. **OT7T:** RA3AUU, RU3FM, RA3AUM, DJ4AX, ON4WW, ON5UK, ON4UN, ON4JO, ON4AFZ, ON4MA. **OZ8JYL:** OZ1KHZ, OZ2CGN. **P3A:** RA9JX, RA9JR, RVØAR, UN7FZ, UA9MA, UN7FK, UA9YAB, RU3AA, UA9NN, UA9LAC. **PI4CC:** PAØVHA, PA3BSQ, PA3EPD, PA3FVW, PBØAIU. **PI4ZLD:** PA3BTH, PA3EOB, PA3GCU, DF6JC, NL8884. **RK1OWZ:** UA1OMS, UA1OUT. **RK3IXX:** UA3IKO, UA3IKJ. **RK4HWW:** RZ4HN, UA4HVX, RW4HS. **RK4WWA:** UA4WA, RW4WA, UA4WAN. **RK6AYN:** RV6ARU, UA6AHY, RN6BP. **RK9AWN:** UA9AR, RA9AX, RZ9AW, RN9AA. **RK9CWW:** RZ9CO, RA9CKQ, UA9CDT, RA9CMO. **RK9CWY:** RX9CAZ, RZ9CX. **RK9CXM:** Kalinichenko, Medyakov, Khabarov. **RK9KWI:** UA9KJ, UA9KDZ, UA9KE. **RK9SWF:** RA9CG, UA9SDB, UA9SBM, RA9SF, RA9ST. **RN4W:** RU4WJ, RW4WM, RW4WR, UA4WJF. **RS3A:** RZ3BW, RA3CW, RX3APM, RV3BR, RZ3AZ. RS3A: RZ3BW, RA3CW, RX3APM, RV3BR, RZ3AZ. **RU1A:** RU1AA, RW1AC, RV1AW, RN1AM, RX1AA, UA1ARL, RZ1AJ, RA1ARZ, RN1AN, Vadik, Al. **RU3WWR:** RW3WX, RU3WR.

RW3WWW: Shilov, Salov, Shor, Doljenkov, Tolmachev, Pikkiev, Shalagin, Zabugin, Chepurnih, Ivanov, Mineev, Efanov. **RZ1AWD:** RV1CW, Lazurin. **RZ1Z:** RA1ZF, RA1ZW, RU1ZE, RW1ZA, RW1ZM, RZ1ZZ, UA1ZA, UA1ZAO, UA1ZO, UA1ZX. **RZ4PZL:** Kulikov, Khmyz, Simonenko. **RZ9AZA:** UA9ABM UA9BA, UN4L, RA9AQT, RU9AN, RZ9AR, RZ9AZ, Ilya. **RZ9AZA:** UA9AB, UA9BA, UN4L, RA9AQT, RU9AN, RZ9AR, RZ9AZ, Ilya. **RZ9UWG:** RZ9HT, RZ9IR, RW9UT, RU9UW. **S5ØG:** S58M, S56M, S53G, S51QN. **S59DHP:** S51QA, S51Z, S57Q. **SK6NP:** SM6FUD, SM6FKF, SM6BUV. **SN2B:** DJØIF, SP2BMX, SP2FAX, SP2UKB, SP2QVI, SP2WKB, US5WDX. **SP9KRT:** SP9ADU, SP9EMI, SP9UXL, SP9ZW. **TM2Y:** F6BEEM F6ARC, F6FGZ, F5NLY, F6FVY. **TM5DX:** F5EJC, F5SXD, F5SKW, F5NGA, F5UOW, F6DTZ, F6AWN. **TM6CEL:** F6CEL, F6ENO, F6DKV, F5AKL. **TM9C:** F5IN, F5QF, F6DZQ, F5IXR. **UA2AA &** UA2FB, UA2FC, UA2FF, UA2FX, UA2FZ, RA2FA, RA2FBA, RN2FA. **UR4LZA:** UY5DV, UY4LI, UR4LEQ. **UR4MWU:** UR5MB, UR5MA, UR4MT, US3MP, UR-M-Ø55. **UR4PWC:** UT4PZ, US-P-272, US-P-273. **USØQ:** UR3QT, UR4QFE, UR4QFG, UR5QN, US5QRW, UT2QT, UX7QQ, UY3QW, UY5ZZ. **UT3IZZ:** US3IQQ, US3IRX, US3IMZ. **KVØQ &** NØNR, KØFX, N7XM. **UT7L:** UR4LQA, UR4LRG, UR4LSB, UR4LTX, UR8LA, US4LGW. **UT7Z:** UTØZZ, UT1ZZ, UR7ZZ, UR5ZOS. **UU5J:** UR7CA, UT7CR, UU1JA, UU2JQ, UU2JZ, UU3JD, UU5JR, UUØJX. **VE3DC:** VE3SS, VE3OCY, VE3OZY, VE3OZO, VE3VMO. **VE9DH &** K2NJ, VE1ASE, VE2QV, VE9DX, W2EN. **VK9LX:** VK2ICV, K8RF. **VP5DX:** N4KE, NU4Y.

WØCQC: KØFRP, WØHEP, KBØWQT, KØZA. **WØTM &** NØKE, KØCL, KRØU. **W1BK &** W1NR, K1TXH. **W1SRG:** N1XYR, N1XYS. **W2CG &** W2NO. **W3GG &** AA3KX, WD3I. **W4PRO &** KO4NX, WB4DNL, W4LSG. **W4WA &** AA4GA, AA4NC, K4MA, KB4GID, N9HZQ, KF4UNX. **W7VJ:** others. **NØIJ &** AAØBY, WJØM. **W9JA &** K5TA, K9GS, K9JY, KF9T, KS9W, N9BR, N9FH, W9MU, W9XT. **WA4FLZ &** K7UPJ. **WC7N &** W7IX. **WN9O &** K9DAL. **WR3L &** WV3B, WR3Z. **YTØX:** Ivan, Goran. **YZ1V:** Zoki, Pika, Nemanja, Aca. **YZ1V:** Zoki, Zika, Nemanja, Aca.

ZF1A: K1TO, W5ASP, K9LA, K9MK. **ZF2RV:** K7AR, K7DBV, N7MQ, N7NU, WJ7R. **ZM2K:** ZL2AGY, ZL2DX, ZL2ST, ZL2IN, ZL2BSJ. **ZP9B:** PY2TI, PY5BI.

Station Operators Multi-Op Multi-Transmitter

5V7A: Operators. **6Y4A:** K2KW, N6BT, N6TV, KE7X, AG9A, W9QA, W4SO, JE3MAS, JI3ERV. **9A1A:** OH6XY, S52OP, 9A5W, 9A2DQ, 9A3GW, 9A2TS, 9A2EU, 9A3NR, 9A7R, 9A6M, 9A4OM, 9A2B, 9A2R, 9A3ZA, 9A2HW, 9A7DLA, 9A9A. **A61AJ:** KE3Q, K3LP. **DFØHQ:** DK8YY, DL1AUZ, DL3OI, DL5ANT, DL5AXX, DL5MX, DL7VOA, DL8WAA. **DK5EZ &** DJ2YE, DK4TP, DK7QB, DL1QW, DL3EBX, DL7ET, DL8EAQ. **DLØKF:** DF3HU, DF3LZ, DF4PA, DJ3UL, DJ4FZ, DJ6TK, DJ6TN, DJ7AO, DJ7SW, DK5TI, DK8LV, DL2ZT, DL4LBK, DL5HCK, DL5XJ, DL8LAQ, DL8PY. **DL5RBR &** DL6RCD. **EA4ML:** EA4MJ, EA4KA, EA4BB, EA7WA, EA4ET, EA4TX, EA4CJA, EB4EPJ, EB4AKI, EC4ANR, EA4AWF. **EA6IB:** EA3AIR, EA3AJW, EA3AKY, EA3ALV, EA3DU, EA3KU, EA3GGO, EA5BM, EA5FX, EA5KK, EA5WU, EA6ACC, EA6FB. **EA8ZS &** EA1AK, EA2CLU, EA4KR, EA5BY, EA5EU, EA5FID, EA5FV, EA7IL, EA7KW, EA7TL, EA9KB, EA5GRV, EA5AJE. **HG6N:** HA2RX, HA6OQ, HA6ON, HA6ND, HA6NF, HA6NL, HA6NQ, HA6NY, HA6PS, HA6PX. **HG6Y:** HA6DX, HA4OB, HA6OY, HA6KNV, HA5BSW, HA6OI. **J39A:** K1XM, KQ1F, KM1P, W1FJ, K2KQ, K1XX, K1CC, KA1CI. **J45T:** SV5TH, SV5VR, SV5ADD, SV5BYT, SV5BYV, SV5DZS, SV5DZT, KB4PMS. **JA1YFG:** JP1OGL, N3NQL, JS1MJE, JP1JFG, JP1CWU, JF7TFK. **JA3YKC:** JP2BZE, JP3PZD, JG4LSR, JL4CVB, JE6EKC, JL6BMJ, JP6RBN. **JA3ZOH:** JH3PRR, JG3KIV, JI3OPA, JM3XKG, JH4CES, JH4IFF, JH4NMT, JR4ISF. **JH5ZJS:** JA5BJC, JA5FDJ, JH5RXS, JR5JAQ, JR5PDX, JR5VHU, JL2TAW.

K1CN & K1XQ. **K1KI &** K1PI, NQ1K, W1OD, WA2GO. **K1RX &** KF1V, K1EPJ, AA1LN, AA1SI. **K1WD &** N1IWV, W1IA, W1MJ, WO1N, NT2X, N1YGW, KG2JZ, KB1W, OK1DIX, K1TWF, K1MBO. **K2LE/1 &** W2AX, K2SX, N1BB, W2LK, K1CB. **K2WS &** K2BU. **K3ANS &** WF3H, AJ2U, N2KJM, K3YD, K3ZTJ. **K3KNH &** NU3Y, W3DMC. **K3LR &** N3RA, K8GL, K3UA, K3EST, N9RV, N2AA, N5ZO, ND8L, KA3JWJ. **K4VX &** K2VV, K5GO, N5DX, K9BGL, N9JF, NØNX, KØCA, NSØZ. **K5RT &** N5KM. **K6SG &** KV6H. **K8CC &** AA8U, K8JM, K8KS, K8SIA, N8CC, W8LU, W8MJ, WA8RRR, VA3NA. **KB1H &** AA1CE, NB1U, K1EBY. **KC1XX &** AD1C, K1ZM, K1DG, K1EA, K1GQ, KC1F, N2IC, KM3T, DL7ALM, Christine. **KH7R:** WE9V, K9PG, K9NW, K9ZO, KH6ND, KH7U, K1ER, NH6XO, AH6OY, AH6OZ. **KL7Y &** KL7PJ, KL2A, KL5E, KL5T, WL7E, WL7KY, N6NT, N7DF, KL7XX, KL7FH. **LY5A:** LY2IJ, LY1BA, LY2BKW, LY2LA, LY2MW, LY2PAJ, LY2PX, LY3JY. **LY7A:** LYR-346, LY2BMX, LYR-728, LY4AA, LY3DA, LY3NJM, LY1EE, LY2UF, LY3BN, LY4AF, LY2KZ, LY2AO, LY2NK, LY3MU.

N1MD & KZ1M. **N2LBR &** WA1KKM. **N2RM &** K2PS, WA2VYA. **N2RM &** K2PS, WA2VYA. **N2RM &** K2PS, WA2VYA. **N3DL &** AA3JU, AA3TT. **N3RS &** N3RD, AA1K, N3ED, N2SR. **NQ4I &** N4CN, K4OGG, W1RR, KS4Q, K2UFT. **OH2HE &** OH1JT, OH2BTI, OH2BVI, OH2BZY, OH2IW, OH2JA, OH2JTE, OH2XX, OH6CT, OH6DD, OH6EI, OH7BX, OH7JR, OH8KXK. **OK1KIR:** OK1PG, OK1IPN, OK1AWH, OK1FED. **OK1OKE:** OK1DUT, OK1FUT, OK1VBA, OK1DSG. **OZ5WQ &** OZ1BIZ, OZ3PE, OZ3ZW. **PI4COM:** PA3ABA, PA3BBP, PA3BWD, PA3CAL, PA3CTM, PA3ERC, PA3EWP, PA3EYZ, PA3FQA, PA3FRN, PA3GBQ, PA/HA1AG. **RW6AWT:** RN6BN, RA6CO, RA6CM, RW6BQ, UA6AAY, RV6YZ, RW6ADA, RA6AX, RA6YY, RA6YDX, UA6YW, UA6YP, RX6BA, RW6YY. **RZ3Q:** RW3QC, RW3QNZ, UA3QDX, UA3QOQ, UA3QG, RU3QW, RX3QAM, RN3QO, RV3BA/3, UA9XFY/3, UA4WIN/3. **SL3ZV:** SMØNSJ, SMØTXT, SM2CEW, SM2EKM, SM3BDZ, SM3CVM, SM3CER, SM3DJC, SM3DMP, SM3EVR, SM3GSK, SM3JLA, SM3OJR, SM3OSM, SM3VDX, SM3EQF, SM3HFD, SM3MXR, SM3PXO, SM3UKE, SM3URI. **T49C:** SMØDRD, SMØKCO, SMØTQX, SM3TLA, SMØFIB, SM3COL, SM3UZS, OZ1FTU, CO8ZZ, CO8NA, CM8DM, CO8JY. **TF3IRA:** N4GN/OH4GN, N6HR, OH1EB, OH1RX, OH2BH, OH2TA, TF3GB. **TU3F:** F3KT, F5EQ, F6ECX, ND3D, TU2XP, V26KW: K3TEJ, AB2E, WA3WSJ.

VE3EJ & HA8FW, VE2ZP, VA3RU, VE3FU, VE3IY, VE3KZ, VE7CC, VE7NTT. **VE5RI:** VE5FN, VE5WI, VE6EZ, VE6FW. **WØAIH/9 &** KTØR, NØKK, KØMX, KØAD, NE9U, KSØT, KØOB, WAØRBW, KB9S. **W1MD &** K1TI, K1CA, K1TR, K1ART, T93M, K1FWE. **W2YC &** N2CQ. W3EA & W3FV, W8FJ, WB3FIZ, WU3M. **W3LPL &** NB1B, K1HTV, K2YWE, ND3F, AI3M, K3MQH, N3OC, K3RA, K3RV, W3UR, KD4D, N8II. **W3MM &** N2BIM, K2WK. **W3PP &** N6ZO, NX3A, WB4FDT, NW3Y, NX3A, W3KQ. **W4MYA &** N4EHJ, WA4DAI, WA4QDM, AE4TC. **W4ZR:** W4FDA, W4UE, AB4XA, W1LR. **W6BA &** W6KK, AD6DO, K6HMS, K6WS, N6AW, N6RT. **W7RM:** K7NT, NØAX, N7EPD, K5ZM, W7BX, AA7KF, K7OQ, KI7Y, K6KR, W7WZ, WAØRJY, N7WA. **W8AV &** K4LT, AF8A, KU8E, N8DCJ, W8RZ, W8WTS, WØCG.

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

K1AR	**A**	**7,681,280**	**4047**	**158**	**522**
W1KM	**"**	**5,416,800**	**3173**	**146**	**464**
KQ2M/1	**"**	**4,940,795**	**2996**	**145**	**484**
N6BV/1	**"**	**4,733,088**	**3013**	**128**	**436**
K1RU	**"**	**3,548,171**	**2591**	**123**	**394**
W1WEF	*	3,245,946	2296	126	400
W1ECT	*	1,753,440	1553	93	297
K5ZD/1	*	1,552,500	1235	112	338
W1ZK	*	914,163	782	117	344
W1TE	*	890,102	776	108	359
K1YT	*	853,622	680	124	358
K5MA/1	*	734,349	782	99	258
W1AX	*	600,561	626	93	284
W3SOH/1	*	324,618	456	58	204
K1BV	*	282,680	527	53	132
AK1N	*	247,442	338	93	214
K1DC	*	217,170	321	73	181
N1RJF	*	164,154	325	58	160
W1ZS	*	155,904	320	59	165
W1FV	*	16,650	79	20	54
K1MEM	*	6,656	36	30	34
K1DX	*	6,380	114	36	74
W1/KL7DN	*	100	40	18	32
K1MV	*	1,643	24	14	17
N1HRA	21	7,592	61	13	39
K1DKX	**14**	**287,280**	**876**	**30**	**96**
WA1RR	*	20,405	118	21	56
			(Opr. KB1LN)		
W1BR	**7**	**98,770**	**294**	**28**	**91**
W1MK	**3.5**	**297,476**	**892**	**29**	**95**
W1UK	*	78,176	289	23	89
K1VW	1.8	9,570	98	16	42
***K1VUT**	**A**	**1,656,348**	**1244**	**118**	**380**
***WA1LNP**	**"**	**1,639,602**	**1253**	**126**	**396**
***WA1S**	**"**	**1,622,464**	**1210**	**115**	**387**
***KM1X**	**"**	**1,458,138**	**1259**	**103**	**320**
*K1HT	*	816,102	814	87	270
*WF1L	*	631,952	762	79	232
*W1EQ	*	399,464	496	78	221
*NY1S	*	276,100	421	67	208
*KD1YN	*	162,970	304	57	158
*N3KCJ/1	*	119,048	238	51	133
*W1ZZ	*	57,275	150	48	97
*K1VSJ	*	42,300	152	32	68
*AB1BX	*	9,600	100	14	18
*K1EP	*	6,200	50	21	41
*K2MN/1	*	5,324	41	13	31
***W3EP/1**	**28**	**31,824**	**163**	**27**	**77**
***WA1FCN**	**21**	**193,294**	**634**	**26**	**94**
***K1NO**	**14**	**200,610**	**568**	**31**	**104**
			(Opr. K5FUV)		
*AB1U	*	7,623	46	19	44
N2NT	**A**	**5,207,938**	**3256**	**145**	**444**
N2LT	**"**	**5,054,070**	**2978**	**148**	**467**
NJ2L	**"**	**3,269,035**	**2239**	**139**	**400**
K2TE	*	1,854,702	1384	116	385
K2DB	*	686,490	660	116	351
KW2J	*	592,280	621	98	242
N2WK	*	558,108	567	117	302
K2AW	*	534,742	617	76	238
K2DM	*	508,870	592	85	252
WB2YQH	*	436,560	461	86	254
KE2WY	*	402,582	499	83	210
K2MP	*	353,430	426	87	219
N2MR	*	313,317	451	73	206
K2AV	*	262,990	401	80	209
W2HCA	*	217,532	365	70	168
K2ZD	*	183,708	276	70	173
W2YK	*	152,400	291	67	173
W2YE	*	167,960	281	63	158
KG2BI	*	69,420	206	47	109
W2EZ	*	69,083	200	45	94
W2GDJ	*	55,614	196	47	91
N2CU	*	55,485	154	45	92
KE2VB	*	47,978	143	44	105
NC1A/2	*	47,112	177	52	104
W2OP	*	40,460	144	44	96
K2FR	*	14,500	108	38	78
NN2Y	*	7,735	49	29	36
NA2X	**21**	**153,439**	**381**	**30**	**113**
KD2HE	*	54,782	222	21	70
N2PP	**7**	**326,808**	**951**	**33**	**103**
W2FU	**"**	**313,908**	**816**	**32**	**116**
KR2Q	*	72,261	259	23	88
N7UN/2	*	11,151	93	15	48
N2GC	3.5	31,760	147	16	64
W2FR	*	8,848	60	14	42
K2XA	1.8	14,559	92	17	52
W2VO	*	11,868	89	18	51
KN2T	*	2,201	44	11	20
***N2BA**	**A**	**2,169,720**	**1651**	**120**	**372**
***NA2U**	**"**	**1,341,649**	**1310**	**96**	**287**
***W2TZ**	**"**	**1,145,388**	**1235**	**100**	**272**
*N2ED	*	770,245	748	102	271
*K2JL	*	480,810	548	93	237
*K2UF	*	443,540	494	89	242
*NA2Q	*	354,016	531	85	214
*KM2L	*	324,162	456	68	193
*N2KJM	*	257,466	363	77	205
*KA2CDJ	*	254,334	383	75	216
*K2CS	*	211,344	331	71	167
*WA2YSJ	*	210,154	328	62	176
*N2DBD	*	155,925	309	54	121
*WA2RZJ	*	151,755	345	44	107
*KC2TA	*	110,047	207	60	139
*WB2HMF	*	105,774	240	48	135
*WB2DVU	*	80,106	178	51	118
*W2SSB	*	59,032	141	47	110
*W2UD	*	37,506	138	36	78
*W2LB	*	30,960	137	40	80
*W3EH/2	*	27,216	97	35	73
*WA2OCG	*	24,150	119	25	45
*K2GWL	*	23,422	239	32	66
*WA2VQV	*	1,145	26	17	22
***K2MFY**	**21**	**125,608**	**349**	**29**	**112**
*K2ZA	*	24,450	126	18	57
*WA2ASQ	14	34,679	144	22	74
*KD2P	*	5,805	50	14	31
***N2TN**	**7**	**84,924**	**250**	**29**	**97**
K3ZO	**A**	**5,212,498**	**3120**	**145**	**454**
W3BGN	**"**	**3,897,680**	**2427**	**140**	**447**
KT3Y	*	1,845,328	1432	111	353
K3KY	*	1,693,874	1200	131	402
W3MC	*	1,347,225	1464	92	253
W3GN	*	1,185,468	956	109	334
WG3U	*	1,131,900	958	121	299
K3JT	*	1,081,940	877	124	346
K3OSX	*	892,847	861	105	304
W3HVQ	*	829,850	983	94	256
W3AZ	*	628,260	686	90	280
W2TN/3	*	557,550	592	93	261
K3IE	*	535,500	633	89	251
K4JLD/3	*	534,769	512	112	267
KX2A/3	*	380,457	441	73	224
W3EKT	*	350,163	430	78	219
N3KR	*	334,671	433	76	205
NY3C	*	297,693	375	74	217
K3UL	*	156,024	388	82	182
W3NX	*	65,824	279	48	139
W3BEN	*	54,080	159	56	113
K3ATO	*	47,560	131	56	89
K2LNS/3	*	41,600	156	33	67
W3TB	*	30,030	115	38	67
AD8J/3	*	28,152	107	29	40
W3FQE	*	23,688	102	27	57
W3EVW	*	13,248	93	29	63
W3NO	**28**	**48,384**	**171**	**29**	**83**
W3KHQ	*	8,112	61	17	35
W3CC	14	150	8	7	8
WA3DMH	3.5	2,916	31	11	25
W2FCR/3	1.8	3,330	41	12	25
***W2GG/3**	**A**	**901,716**	**726**	**103**	**358**
***WW3S**	**"**	**838,715**	**769**	**105**	**310**
*W3UJ	*	682,770	726	110	220
*WA2C/3	*	363,120	648	69	198
*KB3MM	*	271,478	434	74	224
*W3DAD	*	213,150	330	65	180
*W3DF	*	178,620	325	63	166
*N3TG	*	103,641	211	59	134
*N3UMA	*	46,843	126	42	97
*K3FH	*	41,783	137	41	86
*WD3A	*	17,205	90	42	69
*KB3AZK	21	3,422	41	7	22
*W3CP	7	28,282	145	19	60
*KB3AFT	3.5	168	19	5	9
W4AN	**A**	**4,818,683**	**3006**	**145**	**442**
WC4E	**"**	**2,962,872**	**2313**	**130**	**392**
N4AF	**"**	**2,939,085**	**2094**	**120**	**411**
W4PA	**"**	**2,596,374**	**1967**	**129**	**388**
W4MR	*	2,246,398	1636	123	380
			(Opr. N4CW)		
N4TO	*	2,071,656	1406	141	411
K4AB	*	2,011,386	1675	128	354
N6AR/4	*	2,004,366	1438	134	412
N4VZ	*	1,981,350	1243	145	450
AA4S	*	1,980,381	1532	124	369
W4RX	*	1,717,500	1320	124	376
N4BP	*	1,503,765	1293	113	310
K4RO	*	1,397,737	1213	116	333
W4OX	*	1,353,748	1100	126	358
W3VT/4	*	1,051,296	813	116	350
K4LM	*	983,116	876	121	307
N4RV	*	904,255	730	119	332
W9WI/4	*	870,216	906	106	253
K4LQ	*	550,593	556	111	282
W4YE	*	520,866	552	88	254
K4LTA	*	509,124	606	97	222
N4KW	*	491,520	637	100	220
N3JT/4	*	483,968	570	88	216
AA4NN	*	440,664	577	100	266
NW6S/4	*	414,882	442	99	252
K4PB	*	406,588	484	102	262
N4MM	*	374,340	405	93	247
W4ZYT	*	312,950	406	77	198
WØYR/4	*	257,201	487	53	150
WA4JUK	*	200,997	350	52	155
N4AA	*	139,671	739	47	142
W4IF	*	138,700	260	50	140
WB4OSN	*	127,078	227	56	147
W4RW	*	120,848	195	50	116
K4IT	*	54,796	151	48	85
NK6F/4	*	50,193	143	48	95
N4EK	*	48,230	175	38	92
N4XM	*	35,632	103	53	83
WA4MSU	*	26,677	94	40	63
W4OGG	*	12,994	63	23	50
K4UX	*	11,036	60	20	42
W4YV	**28**	**152,750**	**449**	**32**	**98**
W4XJ	**"**	**98,672**	**365**	**26**	**86**
K4JYO	*	27,450	170	21	54
WB4UBD	*	19,460	100	18	52
NT4L	*	1,584	39	12	21
			(Opr. W4KH)		
N4CT	**21**	**471,520**	**1210**	**31**	**109**
K4ZA	**"**	**435,587**	**1255**	**34**	**104**
WW4RR	*	393,000	1082	29	102
			(Opr. N4ZZ)		
N4IR	*	295,416	799	30	102
KN4Y	*	29,070	254	19	66
N4PN	**14**	**370,662**	**934**	**36**	**127**
K4WJ	*	66,045	195	30	89
W4VC	*	37,240	140	25	70
N2FY/4	7	22,260	112	19	51
WA4DOX	*	7,625	50	17	44
K4PI	**3.5**	**45,864**	**191**	**24**	**74**
K4OAQ	*	8,427	74	11	42
K4TEA	1.8	6,076	58	16	33
AD4Z	*	3,071	45	11	26
***KN4T**	**A**	**2,059,051**	**1475**	**130**	**393**
***WO4O**	**"**	**1,057,920**	**976**	**114**	**321**
*N4IG	*	350,703	491	66	213
*N4HA	*	301,636	382	79	213
*N4GJ	*	244,760	415	62	170
*N8LM/4	*	230,230	360	71	182
*K7CMZ/4	"	164,328	305	66	180
*W4SD	*	123,826	230	59	143
*N4PSE	*	64,255	164	63	118
*W4KYW	*	48,852	155	35	83
*K4UK	*	44,933	133	45	86
*WM4I	*	43,758	139	48	95
*K4ORD	*	42,127	149	35	114
*N4KN	*	27,258	29	30	160
*WB4DNL	*	25,942	90	45	74
*N4BTO	*	20,933	122	44	77
*K4PHE	*	12,000	97	31	69
*AA4KD	*	11,360	57	34	46
*KA4IKH	*	10,400	58	22	43
*AE4QG	*	9,842	79	33	73
*AA4LR	*	504	20	13	15
***K4WA**	**28**	**37,149**	**158**	**26**	**65**
***AI2C/4**	**"**	**36,576**	**158**	**26**	**70**
***WB4TDH**	**21**	**237,020**	**667**	**30**	**112**
*K2ACW/4	*	121,240	334	29	111
*KN4Y	*	64,080	292	21	68
*K4WW	*	42,180	160	27	68
*W4CAT/M	*	31,266	161	21	60
			(Opr. K1KY)		
***N4MO**	**14**	**241,251**	**658**	**34**	**107**
*K4DGJ	*	15,762	84	22	49
*K9JWV/4	*	12,871	77	16	45
*N4OT	7	32,969	151	22	68
*K4LDR	*	30,030	140	20	67
*W4DC	*	8,151	51	15	42
*W4HM	3.5	6,120	52	15	36
*W4WS	1.8	828	37	8	15
			(Opr. N4VHK)		
K5GN	**A**	**3,180,156**	**2234**	**153**	**425**
K5YA	**"**	**2,704,156**	**2167**	**127**	**349**
K5NA	**"**	**2,157,300**	**1676**	**140**	**370**
N5AW	*	1,524,006	1090	147	390
K5YAA	*	1,293,123	1110	119	348
KM5G	*	1,246,580	1107	110	295
K5KLA	*	868,765	792	110	295
N5LZ	*	694,892	759	110	264
W5OM	*	650,671	679	96	247
N5OK	*	562,494	612	111	278
AC5AA	*	129,108	240	77	135
K5YP	*	70,168	190	64	115
KJ5WX	*	32,000	122	50	78
KZ5MM	**28**	**80,569**	**379**	**30**	**83**
			(Opr. N5RP)		
KD5BXQ	*	1,890	31	15	20
K2BA/5	**14**	**242,720**	**632**	**39**	**121**
W5UN	**7**	**424,855**	**1093**	**35**	**120**
K5NU	**3.5**	**89,568**	**368**	**23**	**73**
NX5M	1.8	1,596	32	9	19
***WD5K**	**A**	**771,732**	**748**	**111**	**277**
*W5CWQ	*	148,000	278	90	160
*W5GAI	*	135,031	235	72	149
*AA5CK	*	92,820	249	71	133
*N5XUS	*	65,910	224	68	127
*NN5T	*	42,920	132	50	95
*AB5C	*	35,500	121	51	91
*NA4M/5	*	34,809	113	40	83
*N5ZC	*	16,340	96	26	50
*K5QF	*	76	313	10	14
***W5ZO**	**28**	**23,489**	**138**	**24**	**59**
***K5MU**	**21**	**117,602**	**373**	**30**	**97**
*WA5JWU	7	11,160	72	18	44
W6AX	**A**	**3,024,213**	**2230**	**147**	**372**
			(Opr. N6IG)		
K6LA	**"**	**1,908,393**	**1798**	**126**	**295**
K6ZM	**"**	**1,442,928**	**1442**	**109**	**259**
			(Opr. KD6RMN)		
N6TU	*	1,050,226	1097	121	270
N6RV	*	987,374	1049	123	260
K6SE	*	541,492	610	117	215
KI6T	*	497,900	560	102	223
N6IC	*	391,812	461	111	206
AC6DD	*	384,720	577	97	183
N6TW	*	365,612	494	100	216
K6NR	*	288,000	425	90	166
N6NG	*	264,158	360	97	172
K6FO	*	242,064	365	85	161
W6NKR	*	238,080	366	84	164
N6YEU	*	184,254	315	77	137
K6GT	*	183,799	3985	81	136
W6DCC	*	181,302	322	85	161
N6KN	*	157,353	347	55	122
W6KNB	*	149,688	305	74	115
WA5VGI/6	*	144,113	256	77	134
W6UDX	*	134,140	251	73	117
N6VH	*	128,712	282	77	109
K6KM	*	111,384	238	64	104
N6GG	*	96,628	183	80	123
W6VG	*	73,920	192	50	90
W6FSJ	*	73,800	215	57	93
N6PLQ	*	68,834	194	44	83
W6ISQ	*	60,502	145	63	106
W6RFF	*	58,480	198	68	102
W6HAL	*	56,592	162	52	79
K6MA	*	46,872	140	49	77
AJ6V	*	44,829	127	70	83
W6BIP	*	22,110	79	45	65
NT6TT	**28**	**54,400**	**363**	**25**	**60**
			(Opr. K6PU)		
W6YA	**21**	**366,324**	**966**	**35**	**112**
W6NL	**"**	**335,064**	**933**	**33**	**105**
K6AW	*	326,757	1110	32	97
N6MU	*	308,016	811	33	105
KC6X	*	153,401	476	31	100
KO6N	**14**	**289,070**	**1059**	**38**	**99**
			(Opr. AEØM)		
KA6W	*	247,324	598	37	109
W6KP	*	147,300	510	28	72
W6SSY	*	137,411	405	34	103
W6OK	*	16,575	112	19	32
K6CU	**7**	**112,774**	**389**	**33**	**80**
W7CB/6	*	91,512	313	31	92
KM6F	*	16,188	103	22	35
W6VNR	*	9,180	62	20	34
N6HY	*	6,552	60	15	21
***W6JTI**	**A**	**763,889**	**772**	**117**	**254**
***K6UM**	**"**	**199,353**	**339**	**88**	**143**
*KQ6ES	*	169,454	340	71	122
*N6JM	*	146,580	289	76	134
*N6NF	*	111,864	262	66	111
*N6NM	*	109,968	302	93	144
*NU6I	*	109,089	305	81	126
*WD6DX	*	86,350	210	65	92
*N6IBP	*	61,664	131	81	107
*W6JTA	*	60,888	177	52	77
*AA6EE	*	50,568	158	56	73
*W6JD	*	49,350	128	56	85
*N6GL	*	48,106	155	58	76
*W3SE/6	*	38,151	148	69	88
*W6EV	*	34,594	353	44	54
*W6VM	*	31,714	106	38	63
*W6KY	*	26,643	105	46	61
*N6PM	*	22,680	107	42	48
*WX6V	*	16,766	66	43	58
*K6HRT	*	5,712	50	25	26
*W6ZL	*	5,123	44	19	28
*K6EP	*	2,538	29	23	24
***N6EE**	**28**	**9,733**	**68**	**21**	**38**
***W6EUF**	**21**	**81,699**	**254**	**28**	**85**
*WA6FGV	21	50,600	201	26	66
*KU6T	*	28,512	144	23	49
*K6CEO	14	14,606	81	21	46
*KC6LDO	7	12,087	115	18	33
*N7FF/6	*	7,525	92	15	28
W2VJN/7	**A**	**1,466,328**	**1285**	**133**	**295**
N7TT	**"**	**1,032,300**	**1212**	**99**	**211**
W7SE	*	769,652	854	114	247
K7HBN	*	362,576	520	92	180
W7CT	*	371,763	504	93	188
W7YS	*	348,216	480	85	179
AA7FL	*	319,866	443	93	174
K7BG	*	263,016	382	94	187
W7ZMD	*	227,767	489	84	155
KS7T	*	187,542	329	72	135
W7LGG	*	187,278	334	91	182
K7BTW	*	160,056	405	84	144
AB7II	*	166,968	350	73	143
W7IIT	*	175,875	335	80	121
W7HS	*	163,548	278	88	148
K7ABV	*	158,550	274	75	135
W7QN	*	151,810	322	70	120
KC7UP	*	111,756	277	72	129
N7JXS	*	127,088	261	66	122
AF7O	*	117,414	402	75	123
K7FR	*	62,972	168	72	110
N7OR	*	54,740	164	44	75
W8EQA/7	*	53,008	358	51	121
W7ZI	*	24,304	95	39	59
AAØCY/7	*	22,220	91	44	57
AK7O	*	19,888	93	34	54
K7PVT	*	16,060	100	22	51
W2UE/7	*	6,426	50	28	35
W7AYY	21	56,640	212	27	69
N7BZ	**14**	**343,305**	**1032**	**33**	**102**
K7ZZ	*	223,210	626	32	98
W7VV	*	164,604	503	31	98
W7/VE7UF	*	94,416	398	29	83
N7DD	**7**	**488,160**	**1494**	**37**	**123**
NX7K	**"**	**375,914**	**1014**	**35**	**119**
W7GG	**"**	**326,120**	**1063**	**32**	**95**
KX7M	**"**	**296,208**	**1122**	**32**	**89**
K7XX	*	24,360	102	26	58
W7TSQ	*	6,776	57	19	25
K9JF/7	**3.5**	**20,790**	**108**	**26**	**51**
K7LUH	*	6,045	63	16	23
N6SS/7	**1.8**	**10,058**	**90**	**18**	**29**
***K7GM**	**A**	**414,494**	**477**	**80**	**254**
***N7LOX**	**"**	**186,313**	**369**	**82**	**129**
*W7QDM	*	167,832	329	82	134
*KK7JP	*	59,396	256	56	68
*KK7A	*	53,375	161	46	79
*KD4HXT/7	*	47,864	164	48	76
*AB7RW	*	28,290	140	34	48
*KU7K	*	20,960	94	30	50
*K7ZO	*	18,693	108	26	41
*KI7LS	*	3,321	33	18	23
***KX7J**	**21**	**30,723**	**138**	**22**	**55**
*N4KOP/7	*	11,880	82	22	32
***K7ZA**	**14**	**162,833**	**443**	**33**	**98**
***KG7D**	**1.8**	**4,375**	**74**	**13**	**22**
N4ZR/8	**A**	**2,248,479**	**1605**	**121**	**392**
W9LT/8	**"**	**1,659,585**	**1327**	**120**	**345**
W8KX	*	932,960	691	119	357
KB8TI	*	704,410	624	99	307
KF8TM	*	699,600	640	106	294
K8DI	*	375,642	526	65	181
N8TC	*	343,650	466	75	215
N8MZ	*	229,704	400	52	152
W8UPH	*	222,748	371	64	175
W8ILC/M	*	202,275	288	79	182
N8KSO	*	158,883	307	61	150
N8ET	*	158,466	270	75	156
K8LJG	*	72,144	180	43	101
K8CV	*	69,462	180	50	103
WD8S	*	51,336	143	47	91
K8SW	*	16,188	150	62	74
W8KH	*	3,612	36	18	24
K8DX	**14**	**556,160**	**1577**	**36**	**122**
W8UD	*	166,173	529	29	94
K8LN	7	17,984	104	17	47
W8RT	**3.5**	**81,918**	**329**	**24**	**87**
			(Opr. W8UVZ)		
K8MD	*	22,896	116	16	56
W8LRL	**1.8**	**20,999**	**127**	**22**	**61**
K8MK	**"**	**12,408**	**123**	**18**	**48**
			(Opr. K8LR)		
K8IP	*	4,905	52	15	30
***N8AA**	**A**	**949,172**	**817**	**111**	**325**
***WB8YJF**	**"**	**836,074**	**801**	**108**	**271**
*W8GOC	*	331,098	438	75	203
*K8GT	*	243,771	357	80	187
*K8ME	*	172,104	301	56	157
*W8IDM	*	155,008	268	71	153
*W8JY	*	106,624	251	53	143
*WT8P	*	98,252	330	37	117
*AA8UP	*	104,907	244	56	132
*N8YYS	*	75,075	195	51	114
*N8WS	*	59,343	167	36	95
*K8AB	*	16,770	76	31	55
*N8GA	*	12,012	187	22	50
*W8PN	*	10,008	58	31	41
*AF8C	*	4,606	37	22	27
***W8UMR**	**14**	**64,513**	**241**	**26**	**85**
W9RE	**A**	**3,491,945**	**2415**	**136**	**399**
K9MA	**"**	**1,739,814**	**1414**	**122**	**339**
K9WIE	*	1,588,090	1312	127	336
WI9WI	*	1,285,130	1290	106	279
N9UA	*	1,165,185	1039	103	302
W9OP	*	1,107,108	825	127	359
N9CO	*	729,714	968	96	250
K9QVB	*	550,464	734	97	269
W9YYG	*	365,581	476	84	197
WO9S	*	277,622	398	80	174
K9WA	*	247,025	379	68	173
W9KTP	*	202,860	315	59	171
AA9TK	*	175,017	261	82	175
K9MDO	*	165,865	253	75	170
W9MSE	*	77,677	176	58	115
K9HUH	*	47,444	147	39	77
WA9TPQ	*	46,512	141	50	102
K9NR	*	10,934	55	33	44
K9OM	**28**	**14,012**	**102**	**18**	**44**
K9IG	**21**	**441,524**	**1051**	**33**	**118**
W9GIL	*	144,480	397	30	99
NN9K	*	16,426	194	23	63
K9UQN	*	14,626	82	22	49
W9IW	**14**	**550,605**	**1282**	**39**	**126**
			(Opr. ES2RR)		
K9BG	*	414,024	999	38	118
W9OF	*	253,084	565	36	121
K9CAN	*	197,250	455	35	115
K9DX	**7**	**330,750**	**946**	**35**	**115**
K9CJ	*	46,830	210	26	79
WB9Z	**3.5**	**99,232**	**360**	**25**	**87**
W9RN	*	23,220	129	19	67

W9PNE	1.8	1,475	29	8	17
***W9AU**	**A**	**569,088**	**634**	**94**	**248**
***KJ9C**	**"**	**415,996**	**490**	**87**	**245**
*N9CK	"	284,000	373	85	199
*WT9U	"	227,592	363	65	167
*K9MMS	"	219,098	333	84	169
*W9ILY	"	178,563	303	73	158
*W9WUU	"	73,292	179	46	100
*K9YAX	"	64,628	167	46	105
*N9NW	"	18,640	85	26	54
*WB9AYW	"	8,233	88	21	59
*N9WKW	"	4,891	52	31	42
***K9OM**	**28**	**14,012**	**102**	**18**	**44**
***K9RN/M**	**21**	**94,637**	**313**	**27**	**91**
*N9GBB	14	4,859	42	11	32
*K7CK/9	7	19,028	102	20	51
*N9ENA	"	1,258	31	12	25
KØEU	**A**	**2,421,384**	**1839**	**135**	**362**
WBØO	**"**	**1,871,540**	**1379**	**133**	**384**
KMØL	"	738,395	808	106	259
WØHW	"	396,140	493	85	205
WKØF	"	224,316	386	80	199
WØTT	"	176,874	281	82	164
KØJPL	"	145,376	261	71	153
KGØUA	"	128,310	276	63	119
WØUY	"	102,212	228	66	136
NSØB	"	89,938	188	64	129
KSØM	"	69,713	158	53	108
NØXW	"	65,987	320	48	103
NØIN	"	12,834	65	24	45
KØDI	"	5,828	51	25	22
KØKE	**28**	**47,380**	**213**	**27**	**65**
KØUK	"	10,720	141	20	47
KJØG	**21**	**90,288**	**306**	**30**	**84**
WØID	"	58,302	270	27	52
KØRI	"	38,130	197	24	69
WØUN	**14**	**722,520**	**1655**	**38**	**124**
			(Opr. WØUA)		
KØRWL	"	103,362	285	34	104
KØOD	**7**	**156,768**	**445**	**34**	**108**
KØAV	"	114,294	346	34	95
NIØG	"	54,320	174	30	82
WØSF	"	22,384	217	27	89
KØRF	**3.5**	**65,439**	**281**	**23**	**76**
ACØS	"	10,149	78	17	34
KØCS	**1.8**	**3,900**	**50**	**13**	**26**
WØETC	"	1,938	36	12	22
WØRXL	"	1,113	27	9	12
***KGØDS**	**A**	**252,080**	**398**	**68**	**162**
*NN7A/Ø	"	186,367	300	67	160
*AAØTY	"	86,984	302	50	116
*KØRY	"	44,700	153	50	100
*KKØDX	"	8,856	53	27	45
*K2HT/Ø	"	697	28	17	24
***WØETT**	**14**	**57,039**	**227**	**25**	**77**
*WBØB	"	4,600	36	18	28
***WØAH**	**7**	**75,537**	**304**	**29**	**80**
*KJØB	"	40,923	187	23	64

ALASKA

KL7AC	**A**	**940,470**	**1683**	**77**	**158**
KL7RA	**14**	**640,320**	**2118**	**34**	**104**
WL7DB	"	48,025	210	28	57
NL7Z	**1.8**	**14,014**	**246**	**13**	**13**
***KL1R**	**A**	**230,126**	**931**	**43**	**63**

ANGUILLA

***VP2EEB**	**A**	**5,444,340**	**4948**	**115**	**337**
			(Opr. AA3B)		
*VP2EST	"	635,559	1750	58	125
			(Opr. KT8Y)		

BAHAMAS

***C6A/N4RP**	**A**	**495,675**	**1124**	**69**	**156**

BARBADOS

8P9Z	**A**	**9,097,132**	**6244**	**149**	**434**
			(Opr. K4BAI)		

CANADA

VO1MP	**A**	**1,813,136**	**2006**	**94**	**285**
VE1ZJ	**"**	**907,180**	**1077**	**90**	**245**
VE9HF	"	39,710	200	34	61
VE1JF	**3.5**	**183,552**	**889**	**20**	**76**
VE3BMV/1	**1.8**	**170,400**	**828**	**21**	**75**
***VO1GO**	**A**	**315,270**	**468**	**67**	**212**
*VE1GPL	"	83,076	200	59	113
*VE1LV	"	2,200	61	14	30
VE2AYU	**A**	**1,572,528**	**1869**	**94**	**268**
VE2ATL	"	66,885	200	50	97
VE2ZDR	"	70	22	6	4
***VE2AWR**	**A**	**508,125**	**807**	**76**	**195**
*VE2WAT	"	132,600	403	49	121
*VE2OWL	"	7,378	126	17	14
***VE2SG**	**28**	**46,308**	**365**	**20**	**48**
*VE2SKA	7	1,190	40	7	7
VE3KP	**A**	**1,054,579**	**1269**	**106**	**283**
VE3AT	**"**	**1,104,561**	**1283**	**87**	**246**
VE3XN	"	821,106	839	101	276
VE3ST	"	247,230	413	45	160
VE3STT	"	51,888	165	48	90
VE3YGN	"	4,446	81	16	23
VE3HX	**28**	**57,772**	**239**	**25**	**76**
VE3DO	**1.8**	**31,323**	**294**	**15**	**38**
***VE3NTW**	**A**	**270,732**	**496**	**61**	**170**
*VE3TDG	"	105,506	700	54	88
			(Opr. VA3SYL)		
*VA3IX	"	75,904	235	43	85
*VE3ZT	"	63,404	238	44	87
*VE3OTL	"	5,994	89	34	40
***VA3MG**	**21**	**133,176**	**969**	**25**	**68**
VE4JB	**A**	**311,014**	**640**	**66**	**145**
*VE4MF	21	14,536	93	22	57
VE5AAD	**A**	**146,558**	**513**	**46**	**81**
VE5MX	"	48,776	218	49	55
***VE5SF**	**A**	**496,503**	**1176**	**78**	**135**
VE6BF	**A**	**553,992**	**1032**	**81**	**165**
VE6JY	**14**	**957,654**	**2444**	**38**	**128**
			(Opr. VE6WQ)		
VE6LB	1.8	4,020	109	10	10
***VE6EX**	**A**	**292,168**	**1358**	**48**	**70**
*VE6HPT	"	18,360	165	18	33
***VE6BMX**	**28**	**68,748**	**698**	**21**	**30**
*VE6HPT	21	12,144	155	18	28
VE7AV	**14**	**268,450**	**1071**	**31**	**87**
VE7IN	"	173,054	782	29	65
***XO7X**	**A**	**1,112,756**	**1980**	**100**	**183**
			(Opr. VE7AHA)		
***VE7FJE**	**21**	**81,525**	**419**	**26**	**49**
***XM7A**	**3.5**	**86,645**	**587**	**24**	**41**
			(Opr. VE7SV)		
***VE7SV**	**1.8**	**7,644**	**185**	**10**	**11**
VY1JA	**A**	**843,999**	**1990**	**72**	**129**

COSTA RICA

TI1C	**1.8**	**158,842**	**988**	**20**	**66**
			(Opr. TI2CF)		

CUBA

CO2JA	**A**	**346,275**	**958**	**77**	**148**
***CO8LY**	**A**	**508,525**	**974**	**67**	**160**
***CO2JD**	**7**	**143,699**	**939**	**20**	**62**

DOMINICANA

***HI8/ DL1HCM**	**A**	**858,960**	**1836**	**76**	**164**

FRENCH SAINT MARTIN

FS5PL	**A**	**8,639,730**	**6172**	**150**	**444**
			(Opr. W2GD)		

GREENLAND

***OX/OZ8AE**	**A**	**399,555**	**979**	**55**	**140**

GUADELOUPE

***FG5EY**	**A**	**1,750,012**	**2369**	**93**	**248**

MARTINIQUE

FM5DP	**21**	**1,045,050**	**2957**	**35**	**115**
			(Opr. YU7DR)		
***FM5CW**	**A**	**226,005**	**481**	**51**	**144**

MEXICO

XE2DV	**A**	**393,432**	**1130**	**75**	**94**
XE1VV	"	269,445	460	87	166
***XE2MX**	**A**	**193,930**	**488**	**78**	**137**
*4B1BEF	"	12,658	254	12	10
			(Opr. XE1BEF)		

NICARAGUA

YN6WW	**A**	**1,041,084**	**2297**	**75**	**164**
			(Opr. JA6WFM)		
YN4/WK60	"	975,730	1655	84	179

PANAMA

HO3A	**A**	**426,888**	**1073**	**64**	**134**
***HP1XBI**	**A**	**634,886**	**1884**	**69**	**133**
			(Opr. F2JD)		
*HP2CWB	"	149,240	605	52	78

PUERTO RICO

NP3D	**3.5**	**101,303**	**516**	**24**	**77**
KP3W	**1.8**	**15,372**	**246**	**11**	**25**

TURKS & CAICOS

***VP5EA**	**21**	**802,560**	**2755**	**27**	**93**
			(Opr. WD5N)		
***VP5EA**	**7**	**188,595**	**807**	**22**	**77**
			(Opr. WD5N)		

ST. CHRISTOPHER & NEVIS

V47KP	**A**	**1,406,050**	**2488**	**85**	**220**

U.S. VIRGIN ISLANDS

***WP2Z**	**A**	**3,678,426**	**3455**	**116**	**343**
			(Opr. K4FXN)		

AFRICA

ALGERIA

***7X2RO**	**21**	**382,044**	**1094**	**32**	**92**
			(Opr. OM3CGN)		

ANTARCTICA

R1ANL	**A**	**660,992**	**897**	**90**	**166**

ASCENSION ISLAND

ZD8Z	**21**	**2,357,967**	**4589**	**39**	**140**
			(Opr. N6TJ)		

CANARY ISLANDS

EA8EA	**A**	**11,794,880**	**6496**	**155**	**465**
			(Opr. OH2MM)		
***EA8/ DJ1OJ**	**A**	**587,052**	**789**	**66**	**210**
*EA8ASJ	"	368,031	755	51	150
*EA8/ LA4XFA	"	87,984	257	29	88
*EA8BYL	"	5,133	33	26	33
*EA8AF	"	3,900	32	28	32
***EA8ADJ**	**28**	**151,152**	**546**	**20**	**74**
***EA8NQ**	**7**	**45,091**	**235**	**15**	**52**
*EA8AMW	"	17,388	182	10	32

CEUTA & MELLILA

EA9UG	**7**	**209,832**	**1029**	**20**	**64**
***EA9EU**	**A**	**400,176**	**1175**	**30**	**96**

IVORY COAST

TU2MA	**28**	**38,780**	**248**	**18**	**52**

MADEIRA ISLANDS

CT3BX	**14**	**1,461,397**	**3164**	**37**	**124**
			(Opr. OH1EH)		
CT3/ OH1MA	**1.8**	**144,760**	**542**	**20**	**74**

MAURITIUS

***3B8/ F6HMJ**	**28**	**173,664**	**671**	**25**	**71**

NIGERIA

5NØT	A	10,752	74	28	36

RWANDA

9XØA	**28**	**367,875**	**1005**	**32**	**103**
9X/RE3A	14	19,176	147	20	27

SENEGAL

6V1C	**A**	**1,905,360**	**2739**	**36**	**257**
			(Opr. F5OGL)		

SOUTH AFRICA

ZS6KR	**A**	**1,006,696**	**1182**	**120**	**238**
ZS6EZ	**3.5**	**34,265**	**168**	**25**	**52**
***ZS6AJS**	**A**	**398,093**	**662**	**90**	**167**
*ZS/ PAØQRP	"	333	19	5	4

SWAZILAND

3DA5A	**A**	**4,946,766**	**3666**	**129**	**353**
			(Opr. JM1CAX)		
3DAØCA	**28**	**48,972**	**245**	**21**	**56**

TUNISIA

***3V8BB**	**A**	**6,615,489**	**4447**	**135**	**422**
			(Opr. YT1AD)		

UGANDA

5X1Z	**A**	**3,425,360**	**2757**	**128**	**342**
			(Opr. SM7PKK)		
5X1T	**14**	**1,243,315**	**2594**	**35**	**132**
			(Opr. DL2CC)		

ASIA

ASIATIC TURKEY

***TA3D**	**A**	**1,047,255**	**1725**	**96**	**267**
***TA3BN**	**"**	**124,960**	**296**	**33**	**109**

ASIATIC RUSSIA

RZ9UA	**A**	**2,303,818**	**2052**	**128**	**378**
UA9CDC	**"**	**1,648,512**	**1609**	**115**	**317**
UA9BT	"	354,090	497	85	205
UA9OS	"	232,155	475	71	160
UA9XEN	"	69,290	160	59	110
RA9JP	**21**	**74,412**	**500**	**19**	**59**
RX9SX	**14**	**561,756**	**1369**	**37**	**119**
RV9JR	"	294,999	1055	31	76
RA9FF	"	65,032	293	22	66
RU9CZ	**3.5**	**203,528**	**716**	**23**	**81**
UA9XS	"	38,500	199	15	55
UA9AT	**1.8**	**69,083**	**973**	**15**	**56**
***RA9AE**	**A**	**434,564**	**620**	**75**	**199**
*RW9QA	"	285,975	501	52	153
*RA9JW	"	233,000	438	74	159
***RZ9OU**	**21**	**137,264**	**861**	**24**	**68**
*RA9DL	"	120,786	529	26	74
*RN9HM	"	110,058	467	26	76
*RN9XA	"	24,414	144	25	53
***RA9AA**	**14**	**340,950**	**889**	**35**	**115**
***RW9AV**	**3.5**	**77,056**	**434**	**12**	**52**
*UA9CBM	"	76,510	394	15	55
*RK9AY	"	75,480	409	15	53
RKØFWL	**A**	**2,018,632**	**2137**	**135**	**271**
				(Opr. N6AA)	
RUØLL	"	1,126,940	1621	120	215
UAØWY	"	1,044,568	1411	84	238
UAØZY	"	338,776	672	85	127
UAØLCZ	"	183,915	502	73	110
RAØAM	"	22,200	164	47	73
UAØAGI	**7**	**453,974**	**1580**	**35**	**104**
UAØLS	"	8,976	88	19	29
RAØCG	**3.5**	**52,928**	**586**	**21**	**43**
RAØFA	1.8	2,378	47	13	16
***UAØJQ**	**A**	**2,479,092**	**2940**	**145**	**326**
***RAØFF**	**"**	**1,115,625**	**1437**	**127**	**248**
*RUØLL	"	1,031,856	1591	119	213
*UAØFDX	"	602,624	995	96	160
*RSØF	"	580,330	956	105	162
*RAØJX	"	206,510	500	83	131
*UAØSJ	"	193,728	641	68	124
*UAØZAM	"	101,974	512	63	71
*UAØFH	"	31,830	216	50	88
*UAØUAG	21	18,172	211	19	25
***RWØQJ**	**14**	**67,500**	**750**	**27**	**63**
*UAØYAY	"	52,125	351	21	54
*UAØKA	7	6,123	64	18	21
*UAØSR	3.5	8,832	78	13	35

AZERBAIJAN

4K9W	A	76,020	207	103	37

CHINA

BY1QH	**14**	**410,634**	**1388**	**34**	**92**
			(Opr. ES5MC)		
***BY4SZ**	**A**	**457,974**	**1247**	**78**	**120**
			(Opr. BZ4SCT)		
*BA4TB	"	265,524	725	73	130

CYPRUS

5B4AGC	**14**	**1,139,160**	**2642**	**37**	**128**
C4A	**7**	**1,289,310**	**3023**	**36**	**129**
			(Opr. 9A3A)		
***5B4/ EU1AA**	**7**	**434,248**	**1351**	**31**	**105**

GEORGIA

***4L5O**	**3.5**	**122,375**	**770**	**9**	**55**

INDIA

***VU2NGB**	**A**	**133,172**	**303**	**61**	**136**
***VU2BGS**	**21**	**129,240**	**433**	**33**	**87**

ISRAEL

4X/ OK1DTP	**A**	**1,730,468**	**1922**	**85**	**246**
4Z4TA	**7**	**167,160**	**694**	**20**	**64**
*4X1VF	28	15,264	163	19	34
*4Z5FW	21	37,752	260	17	35

JAPAN

JA1JKG	**A**	**596,232**	**947**	**90**	**162**
JA1QOW	**"**	**410,543**	**606**	**99**	**164**
JA1HP	"	247,380	440	78	139
JH1CTV	"	99,072	226	68	104
JA1SJV	"	79,060	212	78	56
JA1HFY	"	43,290	152	51	66
JH1FNU	"	33,320	152	35	50
JR1GRF	"	14,364	115	47	69
JA1AAT	28	3,640	48	12	14
JS1KQQ	21	10,260	84	20	25
JA1OHD	14	25,839	120	31	50
JK1LUY	"	13,325	77	24	41
JH1AEP	**3.5**	**86,760**	**375**	**26**	**64**
JO1QZI	"	2,640	36	14	19
***JK1JHU/1**	**A**	**605,635**	**844**	**108**	**187**
***JS1OYN**	**"**	**587,444**	**823**	**104**	**182**
***JJ1VRO**	**"**	**523,684**	**635**	**110**	**207**
*JL7PVR/1	"	257,795	428	86	149
*JA1CP	"	224,108	327	70	109
*JK1ASO	"	211,952	392	84	124
*JA1BUI	"	209,000	373	85	124
*JN1NOP	"	207,858	416	82	120
*JI1RXQ	"	193,314	369	81	121
*JA1TRP	"	188,190	349	77	128
*7N2UTO	"	184,896	319	80	134
*JE1REU	"	121,435	264	63	100
*JH7AJD/1	"	118,320	298	71	99
*JJ1VEZ	"	119,543	261	69	104
*JR1XKU	"	109,746	296	57	77
*JP1SRG	"	89,523	221	66	81
*JA1KI	"	86,515	232	59	84
*JA1AB	"	84,152	236	56	78
*7J1ABD	"	68,870	187	60	82
			(Opr. WA6URY)		
*JA1PS	"	49,500	170	45	65
*JG1TVK	"	47,214	144	53	76
*7K1EQG	"	45,760	172	52	58
*JA1PUK	"	41,789	146	57	74
*JH1KSB	"	43,092	158	48	66
*JA1XUY	"	42,601	145	49	64
*JA1WHG	"	33,810	133	46	52
*JG3NKP/1	"	32,928	120	38	60
*JH1PXY	"	27,548	116	47	50
*JF1LKM	"	27,306	138	36	46
*JM1NOQ	"	22,576	122	31	37
*JH1YHS	"	20,700	112	41	49
			(Opr. JR1TMI)		
*JR3PZW/1	"	18,900	71	47	61
*JA5MOO/1	"	16,826	75	43	51
*JE1KUP	"	14,800	75	35	45
*JA1BCP	"	11,115	141	46	53
*JJ2HPA/1	"	6,840	69	21	36
*JI1RCB	"	5,760	48	19	29
*JH1DYV	"	5,029	40	18	29
*JG1BUG	"	4,712	58	14	17
*7M3RSK	"	4,512	40	24	23
*JR1LQK	"	3,111	51	25	26
*JG1FGL	"	1,891	27	15	16
*7K4MMH	"	136	7	4	4
***JA1NLX**	**28**	**7,106**	**70**	**16**	**22**
*JH1FSF	"	5,805	55	17	26
*JA1AAV	"	660	16	7	8
*JA1XPU	"	546	15	6	8
*JA1SKY	"	105	6	4	3
***JE1BDC**	**21**	**189,525**	**645**	**31**	**74**
***7J1AZL**	**"**	**130,758**	**548**	**29**	**64**
*JL1MWI	"	48,068	284	23	38
*JJ1GQH	"	45,264	215	28	54
*7K4GUR	"	35,190	152	30	55
*JF1LAU	"	22,494	129	24	45
*JJ1JRH	"	12,096	33	12	12
*JA1AZS	"	10,192	78	19	33
*7K2GMJ	"	4,068	48	16	20
*JE1HXZ	"	2,200	32	13	12
***JL1MUT**	**14**	**227,203**	**646**	**36**	**91**
*JR4PMX/1	"	142,621	441	37	90
*JH1SWD	"	87,984	310	32	72
*JA1JQY	"	66,060	272	28	62
*JM1VBW	"	14,508	99	18	34
***JH1RFM**	**7**	**62,130**	**319**	**31**	**78**
*JK1AFI	"	21,228	137	18	40
*7L3FJP	"	15,012	107	20	34
*JA1NYV	"	14,148	44	18	36
*JF1FYB	"	4,515	48	14	21
*JA1MXY	"	1,176	20	11	10
*JS1UMQ	3.5	5,428	54	18	28
JH2AMH	**A**	**578,495**	**810**	**102**	**163**
JF2SKV	**"**	**427,440**	**667**	**90**	**150**
JH2NWP	"	416,780	612	89	171
JA2AXB	"	337,566	503	95	159
JA2VQF	"	224,746	412	75	131
JA2QVP	"	34,202	135	47	51
JF2FIU	"	5,450	51	21	29
JH2BCN	21	12,600	211	10	10
JA2QXP	**14**	**75,808**	**269**	**30**	**73**
JE2LUN	"	57,904	192	35	77
***JA2BY**	**A**	**652,568**	**704**	**122**	**222**
*JA9DDF/2	"	292,896	481	87	139
*JA2OJ	"	143,286	318	66	101
*JA2UOT	"	104,120	282	61	76
*JQ2LGS	"	102,507	273	59	82
*JA2HO	"	100,367	228	66	101
*JA2MZ	"	32,669	141	45	46
*JE8KKX/2	"	6,844	49	24	35
*JN2QYN	"	1,598	21	17	17
***JA2FMW**	**28**	**10,250**	**78**	**20**	**30**
*JR2TMB	"	3,828	44	15	18
*JF2WXS	"	1,296	20	9	15
***JK2EIJ**	**21**	**125,200**	**119**	**20**	**30**
*JQ2FFS/2	"	38,220	178	28	56
*JA2KKA	"	31,680	184	28	38
***JA2XI**	**14**	**212,680**	**599**	**35**	**95**
*JA2MOG	"	27,370	153	25	45
*JL2LPX	"	27,001	166	22	45
*JA2GAL	"	10,305	169	23	47
*JE2HVC	7	896	20	8	8
***JE2LPC**	**1.8**	**2,196**	**24**	**16**	**20**
JS3CTQ	**A**	**1,754,976**	**1640**	**135**	**269**
JF3CCN	**"**	**1,125,237**	**1135**	**121**	**240**
JA3ARM	"	89,030	229	58	87
JF3BTR	"	51,480	177	59	84
JA3AVO	"	22,968	111	27	45
JA3XOG	**28**	**15,075**	**126**	**18**	**27**
JR3NZC	**21**	**246,996**	**781**	**32**	**76**
JG3EHD	7	288	12	4	4
JA3BCT	3.5	4,056	37	19	33
JA3CE	"	1,380	30	19	24
JN3ILI	"	6	1	1	1
***JH3CUL**	**A**	**277,000**	**439**	**99**	**178**
*JG3WCZ	"	42,336	165	52	56
*JA3WFQ	"	3,382	35	18	20
*JA3DBO	"	1,881	33	10	9
*JO3JJN	"	1,325	19	12	13
***JK3GWT**	**21**	**104,312**	**407**	**32**	**72**
*JQ3UDL	"	72,558	306	27	60
*JR3SAY	"	4,366	44	10	17
***JH3AIU**	**14**	**163,285**	**570**	**30**	**83**
*JA3HPD	"	96	6	3	3
*JJ3VPY	7	8,721	69	20	31
*JF3PNQ	3.5	1,470	24	13	22
***JI3KDH/3**	**1.8**	**4,662**	**51**	**17**	**25**
JH4UYB	**A**	**3,787,542**	**2752**	**156**	**361**
JA4ESR	"	176,596	823	96	116
JA4AQZ	"	17,434	156	50	61
JA4CSH	**7**	**102,510**	**367**	**30**	**72**
JH4ADK	**"**	**65,859**	**338**	**28**	**59**
JA4DHN	"	704	12	10	12
JA4EKO	**3.5**	**93,696**	**443**	**27**	**69**
JH4JNG	"	54,870	241	26	67
JH4CPC	"	22,200	137	21	53
***JR4GPA**	**A**	**204,400**	**433**	**59**	**116**
*JA4BAA	"	155,236	311	56	141
*JM4WUZ	"	53,198	157	56	78
*JA4AQR	"	12,598	62	24	45
*JK4BOX	"	5,040	60	28	32
*JR4ISK	"	2,800	38	18	21
*JA4ETH	28	4,810	51	14	23
*JE4GJV	21	3,906	39	20	22
***JG6URG/4**	**14**	**128,428**	**472**	**28**	**69**
*JA4CTL	"	46,098	214	23	55

*JA4XRN	*	42,624	206	26	46
*JH4JUK	*	567	20	11	10
*JI4HKA	3.5	1,519	23	15	16
JH5FXP	**A**	**3,647,600**	**3158**	**137**	**303**
JA5AIQ	*	27,000	100	37	63
JA5DQH	**21**	**575,952**	**1370**	**37**	**119**
JA5JGV	*	2,345	26	15	20
JA5APU	**14**	**104,058**	**448**	**26**	**56**
JA5THU	**7**	**727,797**	**1773**	**35**	**112**
JA5IP	*	31,392	154	24	48
JA5WTL	3.5	26,082	33	14	23
***JA5DIM**	**A**	**163,938**	**350**	**65**	**113**
***JA5PQ**	**28**	**7,875**	**67**	**17**	**28**
*JF5FGY	21	1,932	25	15	13
***JA5TXA**	**14**	**60,802**	**273**	**28**	**58**
JE6IBJ	**A**	**113,848**	**218**	**88**	**126**
JA6JVY	*	50,616	172	44	67
JH6TNH	*	6,900	45	25	35
JR6CF	*	612	12	7	10
JA6WJL	**28**	**18,090**	**109**	**27**	**40**
JJ6TYG	14	27,576	153	24	48
JA6TQ	**7**	**41,022**	**178**	**27**	**59**
JJ6DGP	*	26,732	118	27	55
***JA6UBK**	**A**	**719,832**	**801**	**113**	**224**
*JH6TYD	*	328,636	508	88	154
*JA6SRB	*	299,754	427	97	176
*JA6CM	*	76,380	205	52	82
*JA6AKV	*	65,268	196	50	76
*JK6ISK	*	55,860	185	45	69
*JA6HJP	*	38,440	120	49	75
*JO6GIV	*	22,656	106	41	55
*JA6EOD	*	12,024	71	35	37
*JA6QDU	*	9,152	64	25	27
*JF1VXB/6	28	414	20	9	12
***JG6MQI**	**7**	**104,676**	**292**	**32**	**100**
*JO6NAW	*	20,882	145	20	33
JH7WKQ	**A**	**2,429,616**	**2291**	**119**	**273**
JH7XGN	**"**	**2,127,034**	**1978**	**127**	**279**
JA7RHJ	*	477,126	733	83	151
JA7COI	14	39,312	198	27	45
JA7JI	**7**	**55,958**	**200**	**30**	**68**
JA7NI	**1.8**	**30,420**	**168**	**22**	**43**
***JA7KM**	**A**	**174,345**	**369**	**70**	**107**
*JR7HAN	*	158,004	317	74	115
*JI7VUR	*	81,224	212	62	81
*JN7QJA	*	31,213	131	35	56
*JH7CJM	*	21,432	74	48	66
*JA7AXP	*	21,208	87	38	50
*JH7FUJ	*	20,960	101	32	48
*JA7ASD	*	16,616	184	36	65
***JA7AMK**	**21**	**83,754**	**351**	**32**	**62**
*JA7NVF	*	54,144	271	25	47
*JM7EZZ	*	21,546	128	22	41
*JH7NPF	*	1,320	40	6	5
*JR7XGL	*	592	16	8	8
*JA7ADV	*	513	13	8	11
***JA7XBG**	**14**	**295,659**	**827**	**36**	**97**
*JA7VEI	*	13,621	101	19	34
*JA7QQK	7	22,050	113	27	48
*JAØRYN/7	3.5	6,318	52	20	34
*JA7GAX	*	2,706	36	14	19
JA8RWU	**A**	**2,307,312**	**1963**	**142**	**290**
JH8SLS	*	776,340	872	119	222
JH8UQJ	28	14,280	122	19	23
***JA8DIM**	**A**	**489,104**	**619**	**111**	**197**
*JA8JCR	*	394,834	568	102	172
*JA8AJE	*	210,938	431	72	110
*JA8JDQ	*	70,356	196	67	89
*JA8XOD	*	28,980	111	45	70
*JA8TEZ	*	1,608	27	12	12
***JA8LN**	**7**	**57,504**	**215**	**30**	**66**
JA9CWJ	**A**	**1,089,842**	**1241**	**115**	**219**
JH9KVF	**21**	**258,544**	**809**	**32**	**81**
JA9JFO	*	165,148	551	32	74
JA9TSI	*	99,728	459	31	61
*JE9VOI	A	68,400	184	65	85
***JN2QCV/9**	**14**	**167,768**	**520**	**37**	**97**
***JM2FCJ/9**	**7**	**91,982**	**347**	**32**	**81**
*JR9NVB	*	58,330	227	29	66
*JA9IKL	*	690	18	7	8
*JA9DOF	3.5	3,200	38	13	19
JHØFUW	**A**	**2,052,501**	**1913**	**128**	**279**
JAØQWO	**"**	**733,838**	**999**	**107**	**194**
JHØGHZ	*	508,388	624	100	198
JRØWZR	*	278,529	443	85	142
JAØAXA	*	80,080	215	56	74
JHØFWV	21	16,776	86	28	44
JAØHC	*	150	10	3	2
***JAØNCE**	**A**	**147,609**	**304**	**74**	**115**
*JHØNEC	*	87,711	197	67	102
*JAØGZ	*	10,412	57	36	40
*JAØGEY	*	7,612	63	22	22
*JAØBPY	*	4,606	36	24	25
***JHØEPI**	**21**	**226,996**	**658**	**36**	**85**
*JFØSGW	*	120,330	491	29	61
*JFØFOH	14	792	22	10	12
***JAØAOQ**	**3.5**	**30,807**	**202**	**21**	**42**

JORDAN

JY9QJ	**A**	**3,201,878**	**2564**	**115**	**343**

KAZHAKSTAN

UN9LW	**21**	**358,430**	**1181**	**35**	**111**
UN7LG	**7**	**611,618**	**1673**	**38**	**120**
UN7TX	*	207,524	730	32	84
***UN6P**	**A**	**1,314,223**	**1361**	**123**	**326**
***UN7RBD**	**21**	**62,712**	**296**	**22**	**56**
*UN5J	1.8	27,690	198	18	47

KOREA

***HL1CG**	**A**	**395,595**	**504**	**101**	**194**
*HL5AP	*	117,264	561	72	96

KUWAIT

9K9K	**A**	**1,607,960**	**2162**	**69**	**236**
			(Opr. 9K2RR)		
9K2GS	**14**	**1,242,439**	**2718**	**39**	**140**
			(Opr. T97M)		

LEBANON

OD5PL	**A**	**113,328**	**313**	**39**	**105**
*OD5NJ	A	14,661	96	26	55

MONGOLIA

JT1BH	**A**	**620,928**	**1529**	**85**	**167**

OMAN

A45XR	**A**	**6,440,715**	**4089**	**146**	**443**
A45ZN	*	1,173,666	1441	103	264

SAUDI ARABIA

7Z5OO	**A**	**4,389,372**	**3463**	**124**	**344**
			(Opr. K3UOC)		
HZ1HZ	*	859,866	1189	95	259
HZ1AB	**14**	**382,228**	**993**	**37**	**109**
			(Opr. SM0CXU)		

SINGAPORE

***9V1ZB**	**A**	**977,738**	**1963**	**106**	**192**

THAILAND

***HSØ/ VK3DXI**	**A**	**162,558**	**463**	**68**	**130**
*HSØGBI	*	60,144	223	69	110
*HS2PF	21	23,744	246	16	40

TAIWAN

BV7FF	**21**	**193,024**	**974**	**30**	**74**
*BV/ JH3GCN	28	2,376	72	11	11

UZBEKSTAN

***UK7F**	**A**	**126,820**	**300**	**52**	**117**

VIETNAM

3W5FM	**A**	**180,432**	**554**	**67**	**101**
			(Opr. UAØFM)		

WESTERN MALAYSIA

***9M2TO**	**A**	**1,168,077**	**2012**	**116**	**237**
			(Opr. JAØDMV)		

EUROPE

ALAND ISLANDS

OHØMAM	**7**	**763,506**	**2757**	**36**	**126**
OHØJJS	**3.5**	**196,630**	**1530**	**22**	**84**
OFØRJ	**1.8**	**42,224**	**678**	**11**	**47**

AUSTRIA

OE2BZL	**A**	**853,468**	**1453**	**90**	**284**
			(Opr. DK5AD)		
OE9SLH	*	169,950	420	53	153
OE3GSA	**3.5**	**111,588**	**1128**	**20**	**82**
OE5OHO	1.8	5,100	182	4	30
***OE2GEN**	**A**	**176,064**	**432**	**66**	**158**
*OE1BKA	*	3,570	52	14	37
*OE3VIA	7	1,290	65	5	25

AZORES

***CU2/ G3WVG**	**28**	**172,161**	**990**	**25**	**74**

BALEARIC ISLANDS

***EA6GP**	**A**	**120,510**	**465**	**50**	**145**

BELARUS

EU4AA	**A**	**657,800**	**867**	**106**	**334**
EW2AA	*	519,840	903	100	261
EW3LN	*	146,264	403	64	124
EW1BA	*	30,492	90	50	76
EW2AO	*	11,998	105	21	53
EW5R	**7**	**345,144**	**1662**	**34**	**112**
			(Opr. EU1FC)		
EW6AL	*	97,536	427	31	97
EW3CW	*	26,132	135	21	73
EW6TU	**3.5**	**80,812**	**729**	**20**	**69**
EU1AI	*	52,744	587	16	61
EW2DD	*	49,284	583	13	61
EU1DM	*	31,980	424	10	55
***EU1CL**	**A**	**323,760**	**712**	**73**	**211**
*EW6BI	21	8,850	69	18	32
***EW6DX**	**14**	**61,380**	**410**	**23**	**70**
*EU6EU	7	620	11	10	10
***EU6AA**	**3.5**	**32,160**	**430**	**12**	**55**
*EW3AC	*	18,130	349	6	43
*EW6GB	*	17,287	243	10	49

BELGIUM

ON4XG	**A**	**345,144**	**678**	**68**	**224**
OT7L	**21**	**297,640**	**985**	**33**	**107**
ON5LL	**3.5**	**176,400**	**1326**	**23**	**82**
ON4AEK	**1.8**	**31,752**	**620**	**16**	**65**
*ON7SS	A	43,332	213	43	95
*ON7WF	21	27,606	166	31	55
***ON6CW**	**14**	**110,583**	**571**	**26**	**63**
*ON4PX	*	15,486	154	15	43
***ON4AEB**	**7**	**116,166**	**698**	**23**	**91**

BOSNIA-HERZEGOVINA

T99DX	**A**	**1,813,263**	**2140**	**118**	**373**
			(Opr. DL3NCI)		
T99W	**7**	**552,811**	**2224**	**33**	**118**
***T93Y**	**14**	**244,282**	**1028**	**31**	**103**
***T95A**	**7**	**234,496**	**1194**	**29**	**99**
***T94YT**	**3.5**	**85,941**	**928**	**12**	**69**

BULGARIA

LZ1KSZ	**A**	**207,613**	**480**	**74**	**149**
			(Opr. LZ1MC)		
LZ1QZ	*	128,310	489	52	143
LZ2DL	*	100,992	299	51	141
LZ2GS	28	13,578	67	24	49
LZ1WG	**21**	**62,916**	**325**	**26**	**58**
LZ1KPP	**14**	**237,870**	**1388**	**33**	**102**
LZ5XQ	**7**	**77,622**	**1014**	**24**	**78**
LZ3AB	3.5	25,461	314	12	57
LZ1ZD	*	11,160	230	9	36
***LZ1VQ**	**A**	**61,952**	**394**	**30**	**91**
*LZ2MP	*	48,990	164	52	86
*LZ4BU	*	19,040	88	33	47
*LZ1IA	28	1,581	19	15	16
***LZ1CW**	**21**	**116,928**	**470**	**29**	**83**
*LZ1CF	*	107,380	353	32	98
*LZ2TW	*	82,810	343	21	70
*LZ1KNP	14	22,649	133	21	50
			(Opr. LZ1-N-143)		
*LZ1FJ	7	3,627	80	6	33

CORSICA

TK/DF9LJ	**7**	**563,030**	**2274**	**33**	**109**
TK5EP	**3.5**	**364,650**	**1776**	**29**	**114**
TK5NN	**1.8**	**149,940**	**1215**	**19**	**83**
*TK5BC	A	8,288	86	22	52

CRETE

J49IL	**14**	**138,635**	**907**	**32**	**87**
			(Opr. DJ5IL)		

CROATIA

9A5I	**A**	**1,043,259**	**1201**	**19**	**37**
9A2TN	*	230,725	668	74	201
9A5Y	**7**	**890,841**	**2684**	**37**	**140**
			(Opr. 9A3HM)		
9A3MR	*	331,773	1559	29	112
9A2A	*	159,820	680	31	100
9A7A	**3.5**	**247,236**	**1611**	**28**	**104**
			(Opr. 9A4RX)		
9A2AJ	*	161,660	1221	25	93
9A7D	*	74,534	862	15	68
			(Opr. 9A2SD)		
***9A3SM**	**A**	**301,630**	**504**	**90**	**220**
*9A5J	*	273,776	717	58	183
*9A2NO	*	224,175	415	77	228
*9A3VL	*	125,433	475	45	136
*9A2OO	*	92,880	359	48	132
*9A2WJ	*	57,528	234	42	94
*9A3CY	*	23,490	194	24	66
*9A4BT	*	22,523	212	25	76
***9A7P**	**28**	**13,104**	**130**	**13**	**26**
			(Opr. 9A5AEI)		
*9A1CHP	21	16,598	150	15	28
			(Opr. 9A6NHH)		
*9A3MW	*	3,240	63	8	10
***9A1AA**	**14**	**92,781**	**496**	**29**	**88**
***9A1HBC**	**3.5**	**46,231**	**566**	**16**	**67**
			(Opr. 9A5MR)		
*9A4RU	*	60,673	639	16	67

CZECH REPUBLIC

OK1FPG	**A**	**793,650**	**1021**	**107**	**322**
OK1EP	**"**	**697,641**	**864**	**106**	**311**
OK7DX	*	628,804	1393	84	257
OL4M	*	604,423	1102	82	257
OK2ABU	*	561,623	1163	75	238
OK2EQ	*	439,139	881	77	236
OK1SI	*	288,666	600	69	192
OK2PAD	*	204,768	592	54	162
OK1DWC	*	149,504	293	96	196
OK2SG	*	25,020	106	35	55
OK2BJ	*	5,244	38	26	31
OK1XW	**28**	**48,888**	**275**	**24**	**60**
OK1AXB	**21**	**153,639**	**591**	**35**	**94**
OK1FZM	*	153,408	472	33	103
OK2SAT	*	145,014	486	32	104
OK1AES	*	100,230	292	33	97
OK1XC	*	93,744	375	33	93
OK2BJT	*	43,510	182	27	53
OK2GZ	**14**	**312,169**	**1005**	**35**	**108**
OK1RF	**7**	**850,402**	**2388**	**35**	**126**
OK1IE	*	38,164	193	20	74
OK1EW	**3.5**	**62,000**	**988**	**22**	**78**
OK1JST	*	21,442	202	13	57
OK1DWJ	1.8	6,633	62	13	54
***OK1MD**	**A**	**791,604**	**1227**	**94**	**302**
***OK1FPS**	**"**	**706,108**	**1095**	**83**	**284**
*OK1AVY	*	669,844	987	92	237
*OK2QX	*	613,795	1039	88	267
*OK1ZP	*	547,426	1045	69	229
*OK1DOL	*	503,370	897	75	254
*OK1HX	*	419,917	878	72	217
*OK1FCA	*	305,102	892	44	173
*OK1BMW	*	278,400	671	72	228
*OK1DDO	*	261,126	488	86	240
*OK2DU	*	249,174	786	63	191
*OK2PHC	*	245,410	684	62	168
*OK1KZ	*	235,350	627	53	172
*OK2HI	*	212,010	597	57	165
*OK1KW	*	172,306	422	59	143
*OK1DMS	*	132,750	462	36	114
*OK1FKV	*	127,400	455	43	153
*OK1AYY	*	127,062	443	42	139
*OK1AOU	*	106,200	367	46	134
*OK2SWD	*	61,160	290	29	110
*OK1DSZ	*	56,810	211	40	90
*OK1DCF	*	52,785	204	42	111
*OK2BHE	*	52,094	250	40	82
*OK2BNC	*	44,833	180	42	65
*OK2PSA	*	16,950	192	17	58
*OK2BRV	*	9,263	108	19	40
*OK2BDI	*	2,795	23	20	23
*OK2PTZ	28	1,562	25	10	22
***OK1FKM**	**21**	**173,100**	**470**	**36**	**115**
*OK2PCN	*	69,102	299	30	69
*OK2PCL	*	50,139	210	29	52
*OL3C	*	17,690	120	17	41
***OK2PAY**	**14**	**252,770**	**835**	**36**	**125**
*OK2TBC	*	99,522	417	30	84
*OK1DKO	*	31,623	169	23	60
*OK1AXA	*	26,486	207	21	61
*OK2BOB	7	41,760	275	10	68
*OK2PBG	*	36,708	259	16	68
*OK1ACF	*	32,220	197	22	68
*OK2PLK	*	6,136	94	12	40
***OK2PMN**	**3.5**	**57,685**	**691**	**16**	**67**
*OK1FOG	*	32,292	412	13	56
*OK2BWJ	*	16,854	313	8	45
*OK1ILM	*	3,220	91	5	30
*OK1XIV	*	1,568	54	5	23
***OK1JOC**	**1.8**	**31,040**	**481**	**9**	**55**
*OK1MNW	*	8,370	148	7	47
*OK1ABF	*	4,100	101	5	36

DENMARK

OZ1LO	**A**	**2,565,871**	**2662**	**126**	**391**
OZ1IOC	*	1,492,960	2071	110	320
OZ8SW	*	203,056	628	59	137
OZ7BW	*	142,324	330	60	161
OZ6EI	*	50,292	223	65	99
OZ9Y	**14**	**164,730**	**879**	**28**	**57**
OZ3W	**7**	**227,560**	**726**	**38**	**119**
***OZ8NJ**	**A**	**286,440**	**903**	**58**	**159**
*OZ5ABD	*	248,193	808	49	158
*OZ4FF	*	102,515	275	60	143
*OZ5UR	*	73,080	273	47	121
*OZ4DX	*	39,675	216	35	80
*OZ1AV	*	9,030	96	17	53
*OZ1BMA	*	8,832	120	9	60
*OZ1APA	21	5,499	48	16	31
*OZ/ SM7GCZ	14	30,340	88	19	63
*OZ7JQ	*	29,184	40	16	19
*OZ1FAO	1.8	608	32	2	17

DODECANESE

SV5/ SMØCMH	**A**	**362,526**	**1270**	**58**	**155**

ENGLAND

G4BUO	**A**	**4,136,175**	**3207**	**145**	**448**
GØIVZ	**"**	**3,270,960**	**3506**	**113**	**359**
G3PJT	**"**	**1,187,698**	**1374**	**108**	**338**
G3UFY	*	1,094,808	1426	90	287
G3TBK	*	1,014,768	1449	103	329
G3XVR	*	712,380	1052	90	293
G3TXF	*	649,584	892	82	265
G4BJM	*	468,384	1092	77	210
GØJQN	*	424,265	1087	58	207
G3WRR	*	153,162	353	61	140
G3NAS	*	52,545	190	51	104
G4ZME	*	35,017	200	29	68
GØAEV	**28**	**39,933**	**176**	**23**	**64**
G3UOF	**21**	**211,250**	**658**	**28**	**97**
G3RTE	**"**	**197,640**	**647**	**33**	**102**
G4TSH/P	*	168,633	585	32	91
M7N	*	80,475	481	26	61
			(Opr. G3RVM)		
M7Z	**14**	**551,418**	**2134**	**34**	**99**
			(Opr. G3VHB)		
G3XTT	*	450,131	1547	33	118
G7G	**7**	**196,977**	**1074**	**31**	**110**
			(Opr. GØNUP)		
G3XSV	**3.5**	**39,606**	**469**	**14**	**55**
***G3SWH**	**A**	**914,868**	**1276**	**82**	**305**
***G3NKS**	**"**	**612,300**	**999**	**71**	**229**
*GØLZL	*	404,490	833	67	224
*M7C	*	338,520	712	67	193
			(Opr. G3KKQ)		
*G6QQ	*	285,387	612	59	192
*G3RSD	*	267,919	677	57	182
*G3GGS	*	248,262	433	59	198
*G3JKY	*	189,995	627	45	140
*G3VNG	*	31,096	275	21	83
*GØWHO	*	18,174	129	28	50
*GØMRH	*	5,610	106	16	50
***G3ESF**	**21**	**57,525**	**325**	**20**	**55**
*GØWAT	*	31,892	197	18	50
***G3RXP**	**14**	**119,598**	**632**	**21**	**72**
***G5MY**	**7**	**70,446**	**309**	**22**	**96**
*M7U	*	13,677	217	12	35
			(Opr. GØDVJ)		
*GØBMS	3.5	10,175	246	7	48

ESTONIA

ES5QX	**A**	**1,064,637**	**1953**	**95**	**292**
ES1QD	*	561,078	779	115	323
ES4RD	*	39,402	470	13	53
ES7RE	**14**	**348,435**	**1360**	**34**	**101**
ES1RA	1.8	11,172	95	13	63
*ES6DO	A	128,235	284	53	196
***ES2RJ**	**14**	**273,812**	**1180**	**34**	**93**

EUROPEAN RUSSIA

RN6BY	**A**	**2,885,145**	**3108**	**149**	**498**
UA6LTI	**"**	**1,539,522**	**1480**	**132**	**402**
UA1OMS	**"**	**872,088**	**1387**	**102**	**304**
RU4WE	*	659,610	1180	89	260
RK3AD	*	610,335	885	105	300
UA1OZ	*	602,217	1177	92	271
RA3XO	*	373,014	496	92	299
UA6JY	*	370,530	482	111	234
UA1OMX	*	324,362	637	87	227
UA1PAC	*	320,408	625	68	174
UA3RO	*	269,072	718	57	194
RU3ZV	*	161,616	495	56	166
UA4LY	*	130,824	337	55	152
UA3UCD	*	103,095	263	66	171
RK6BZ	*	87,204	429	32	124
UA4AO	*	42,840	133	53	73
UA3XBB	*	35,328	124	53	85
UA3UAR	*	18,304	140	28	60
UA1OIZ	*	29,700	90	48	84
RV6LOB	*	8,064	70	26	46
RX3RT	*	1,520	26	13	25
RW3ZC	21	61,586	252	31	75
RW1ZA	**14**	**421,298**	**1483**	**37**	**125**
RO3A	**"**	**374,136**	**1413**	**32**	**104**
					(Opr. RV3ACA)
RV6YB	*	88,928	424	29	83
UA3AD	*	32,528	173	22	51
RA4AG	**7**	**297,212**	**1268**	**31**	**103**
RN6AL	**"**	**293,150**	**1200**	**37**	**117**
RU4AA	*	285,656	1009	32	109
UA3LIO	*	101,178	469	28	98
UA1OMZ	*	50,871	437	20	73
RZ6FA	**3.5**	**182,343**	**955**	**31**	**102**
UA3AB	*	106,318	785	27	91
RW3FO	*	99,788	820	21	80
RV3FF	*	48,960	444	19	42
RW3YA	*	31,672	355	12	62
RK3BI	*	19,840	293	11	51
RA4PO	*	17,856	209	12	50
RX3AP	*	4,600	108	34	81
RZ3QU	**1.8**	**70,700**	**566**	**23**	**77**
RA4NW	*	49,728	363	20	64
UA4PWW	*	37,682	312	18	65
					(Opr. RW4PL)
***RA3AF**	**A**	**846,584**	**1298**	**112**	**316**
***UA3ABJ**	**"**	**821,096**	**1155**	**104**	**290**
*UAØZDA/6	*	650,754	1064	98	253
*UA3PW	*	528,148	941	79	235
*RV3LO	*	432,180	1004	66	228
*RZ6FZ	*	423,720	864	86	235
*RW1AI	*	410,508	830	100	224
*UA3LPF	*	247,507	900	53	188
*RX3RB	*	219,492	651	49	185
*UA4SS	*	212,394	561	52	221
*RA3SL	*	171,450	376	73	181
*RX6AY	*	165,039	462	55	148
*RW1ON	*	129,165	316	70	167
*UA4YG	*	123,255	565	38	127
*UA3LIZ	*	117,175	374	49	166
*UA4LU	*	105,072	351	49	127
*RK3BY	*	90,475	259	56	119
*RV4LC	*	86,866	307	38	131
*UA4QK	*	81,648	199	46	98
*UA1ANA	*	76,700	351	27	103
*RX3DRU	*	53,291	225	37	124
*UA6AGK	*	46,505	131	56	75
*RW4HFH	*	44,112	265	20	76
*RX3DIA	*	26,790	127	32	62
*UA3XDS	*	15,741	113	23	30
*RU6BV	*	5,031	41	19	24
*RW4YA	*	2,588	44	12	22
***UA4LL**	**21**	**309,907**	**1196**	**34**	**118**
***UA4POL**	**"**	**294,460**	**1210**	**35**	**108**
*RV3AH	*	62,856	299	29	79
*UA6AK	*	18,768	125	24	44
*UA6LHM	*	9,752	108	13	33
*UA3ABT	*	6,960	50	21	27
*UA1ACC	*	3,852	69	9	36
*UA3UMT	*	3,589	86	6	31
***RZ3FA**	**14**	**270,206**	**1090**	**34**	**110**
*UA4PA	*	139,490	591	33	97
*RU4HH	*	85,850	440	26	75
*RA3PP	*	72,215	371	28	73
*RK3FT	*	67,896	435	25	67
*UA3YJU	*	61,698	348	26	65

*RA4LH	*	55,625	360	22	67	
*RA1QX	*	22,308	156	17	49	
*RV6APJ	*	9,185	143	15	40	
***RW1ZZ**	**7**	**127,489**	**550**	**35**	**103**	
*RW3WV	*	101,520	594	29	96	
*UA3SEG	*	102,942	504	31	95	
*UA3VLO	*	27,300	207	17	67	
*RK3BX	*	22,680	197	23	67	
***RA3UAG**	**3.5**	**39,234**	**405**	**13**	**65**	
*UA3TU	*	17,304	128	18	66	
*UA3LEO	*	13,500	200	9	51	
***RV1CC**	**1.8**	**23,325**	**283**	**14**	**61**	

FAROE ISLANDS

OY1G	**A**	**71,669**	**529**	**27**	**122**
OY1CT	**7**	**440,815**	**2342**	**31**	**100**
OY9JD	**1.8**	**99,166**	**1020**	**19**	**75**

FINLAND

OH6RX	**A**	**2,087,940**	**2287**	**117**	**328**
OH6WZ	**"**	**1,998,308**	**2095**	**116**	**347**
OF1HS	*	1,779,904	1909	118	346
OF3KCB	*	1,054,144	1387	109	307
OH2BR	*	1,003,380	1196	105	315
OH8BQT	*	977,262	1182	101	301
OF3WS	*	397,936	662	96	278
OH6RE	*	370,756	854	56	180
OH7MA	*	218,504	582	60	131
OF2LNH	*	106,020	360	48	138
OH3JR	*	100,230	249	69	188
OF1BV	*	33,475	200	28	75
OH2KQ	*	19,760	69	41	63
OH3MMH	**28**	**17,080**	**102**	**25**	**45**
OH6MRA	**21**	**251,451**	**952**	**35**	**104**
OH2BCD	14	63,325	414	25	60
OF1JD	**7**	**517,852**	**1877**	**34**	**114**
OF5BM	*	397,936	1517	34	118
			(Opr. OH5BM)		
OH6ZH	*	5,400	55	13	23
OH2AQ	**3.5**	**149,175**	**988**	**30**	**105**
			(Opr. OH2NRV)		
OF9BVM	*	132,080	811	27	100
OH1TN	*	131,440	709	27	97
OF8LAE	*	99,474	649	25	93
OH1SH	*	73,416	435	27	87
OH3RF	*	36,520	338	17	66
OH5VT	**1.8**	**67,611**	**582**	**20**	**73**
OH2BCI	*	43,440	499	17	63
***OH2UBF**	**A**	**160,524**	**371**	**71**	**202**
*OH2LNH	*	125,376	375	49	143
*OH2LYP	*	109,725	413	39	126
*OF3VX	*	48,360	198	38	117
*OH5NE	*	32,604	207	28	86
*OH2MJW	*	24,843	190	29	62
*OH7JHI	*	21,912	168	20	68
*OH6RC	*	14,880	70	35	61
*OH6CK	*	7,700	36	10	15
*OH1KF	28	13,330	78	22	40
*OH5PA	*	5,876	42	21	31
*OH3KRH	21	66,234	202	34	99
*OH6MBQ	*	47,005	215	22	63
*OF3NM	14	57,998	290	25	69
*OH6BI	*	8,160	97	16	18
*OF1UP	*	4,884	62	12	25
***OH4JLV**	**7**	**111,150**	**738**	**31**	**83**
*OH2OA	*	8,424	133	12	42
			(Opr. OH9MM)		
*OH2BSQ	3.5	8,700	180	9	41
*OF3FS	1.8	1,508	56	4	22

FRANCE

F6HWU	**A**	**520,948**	**792**	**88**	**238**
F6IRA	**"**	**502,680**	**971**	**86**	**269**
F5NKX	*	327,474	658	54	153
F5NCU	*	126,763	436	45	154
F5PGP	**14**	**493,334**	**1627**	**36**	**110**
F5DQU	*	243	9	5	4
F5NBX	**3.5**	**172,155**	**1086**	**21**	**94**
F6CWA	**1.8**	**20,461**	**240**	**17**	**62**
***F6IIE**	**A**	**608,115**	**1038**	**93**	**262**
***F6ACD**	**"**	**541,455**	**923**	**69**	**254**
*F5PHW	*	527,124	921	78	249
*F6FTB	*	435,972	788	71	211
*F5JBR	*	393,206	777	73	220
*F6FII	*	370,186	790	67	204
*F5JLV	*	336,490	500	72	250
*F5RAB	*	271,605	548	74	211
*F5NQL	*	207,400	686	54	190
*F5TNI	*	166,880	586	77	203
*F5OIU	*	160,716	347	68	159
*F5ROX	*	153,216	589	46	146
*F5TMJ	*	129,406	375	47	131
*F6HHR	*	128,975	400	48	127
*F6BBQ	*	123,370	366	46	123
*F5DZD	*	121,068	400	43	128
*F6GIN	*	119,405	363	44	99
*F5OEV	*	104,410	359	39	67
*F6CAV	*	91,008	335	47	111
*F9EW	*	86,500	221	57	116
*F5OIH	*	81,585	352	39	108
*F6GQO	*	68,680	298	43	127
*FB1PDR	*	65,600	258	41	59
*F6CYT	*	54,431	264	32	71
*F5POJ	*	48,411	248	27	72
*F5JDG	*	46,480	228	30	82
*F5OWL/P	*	44,310	263	31	74
*F6DLM	*	40,552	162	39	98
*F6DCH	*	22,920	154	26	94
*F5RPB	*	16,965	107	27	60
*F8IN	*	11,232	121	16	23
*F5NSO	*	10,117	67	26	41
*F5ICX	*	7,986	78	24	42
*F5GEG	*	2,584	34	15	23
*F8BDU	*	2,480	39	18	22
*F5ORE	*	37,500	155	50	75
***F6DYX**	**28**	**18,001**	**139**	**12**	**35**
*F5TVG	*	3,339	53	9	12
***F9DK**	**14**	**41,001**	**299**	**20**	**59**
***F/OK1EE**	**7**	**105,056**	**614**	**22**	**90**
*F5SHQ	*	47,855	411	15	70
***F5NOD**	**3.5**	**58,080**	**750**	**15**	**73**
*F3AT	1.8	4,830	103	8	38

GERMANY

DL6FBL	**A**	**4,088,526**	**3256**	**140**	**458**
DF4SA	**"**	**1,430,208**	**1564**	**114**	**354**
DK5PD	**"**	**1,215,812**	**1385**	**102**	**352**
DL4MCF	**"**	**1,204,347**	**1372**	**111**	**360**
DL2DX	*	1,194,930	1277	116	310
DJ6QT	*	1,048,512	1091	125	383
DL5JAN	*	849,600	1198	100	300
DF4PD	*	849,537	821	108	369
DK5IM	*	782,920	1250	92	278
DK3KD	*	776,832	1133	101	307
DL5YM	*	727,200	1052	110	290
DK3YD	*	626,052	987	89	259
DL1JF	*	616,691	826	93	260
DL3ZI	*	527,289	1477	86	271
DL2NWK	*	458,240	742	83	275
DL5JAB	*	440,325	928	82	227
DL7BQ	*	434,467	768	72	239
DL5BUT	*	426,420	837	80	229
DF1DV	*	424,305	805	79	236
DL6UNF	*	407,450	791	70	220
DJ6LV	*	369,792	1152	89	232
DJ8CR	*	349,253	749	77	234
DF6QV	*	333,213	747	82	245
DJ4PT	*	331,422	647	72	201
DL8YR	*	330,460	605	69	241
DL3BQD	*	329,394	686	73	236
DL1VDL	*	298,934	600	70	204
DL6AG	*	293,670	569	66	168
DF3OL	*	280,962	507	80	217
DK5QK	*	226,244	522	86	240
DK3AX	*	215,552	484	65	191
DL1TH	*	191,744	596	60	164
DF3XZ	*	184,945	510	60	175
DL6MHW	*	176,400	410	70	182
DL6DVU	*	172,224	444	53	154
DF9SI	*	168,036	468	60	149
DL5ZB	*	153,160	287	82	198
DL9NCR	*	152,852	326	65	147
DL8UCC	*	146,640	256	80	115
DL4OCL	*	142,569	432	60	157
DF8WS	*	115,566	316	54	133
DL3DRN	*	93,366	260	52	130
DL3NEO	*	88,000	313	47	113
DK7AN	*	66,374	192	51	103
DL3KWR	*	64,528	269	37	111
DJ6UP	*	64,219	217	41	108
DL3DBY	*	61,568	312	31	117
DF8MW	*	59,947	229	42	109
DL4AAE	*	53,142	196	39	63
DL7YS	*	52,704	186	48	96
DL5AUJ	*	26,524	122	37	88
DJ2IA	*	17,000	85	20	80
DL6DH	*	13,800	82	35	65
DL8UFO	*	8,836	70	21	26
DL4SXB	*	6,888	42	20	42
DL6ECA	*	6,867	85	18	45
DL6MDT	*	6,432	93	25	42
DL3DCY	*	5,246	66	20	41
DK5MV	*	4,218	30	27	30
DK5QN	**28**	**100,993**	**441**	**29**	**74**
DKØSR	*	45,600	239	25	70
			(Opr. DJ5PA)		
DJ7PT	*	23,628	144	20	46
DJ4KW	*	16,744	120	17	39
DJ5JH	**21**	**152,064**	**488**	**33**	**99**
DK2GZ	**14**	**261,366**	**957**	**36**	**111**
DL3HWW	*	16,107	136	16	43
DF8AE	**7**	**277,886**	**1028**	**37**	**124**
DL1EMH	*	123,012	542	30	104
DK5JM	*	31,464	483	29	85
DL7VMM	**3.5**	**33,336**	**373**	**12**	**60**
DL4YAO	*	26,524	319	13	63
***DL2OBF**	**A**	**1,412,670**	**1552**	**104**	**361**
***DL7QU**	**"**	**753,818**	**1061**	**85**	**282**
***DL1MGB**	**"**	**669,175**	**942**	**90**	**265**
*DL3JAN	*	603,328	967	85	267
*DJ5GG	*	447,984	709	78	228
*DL7ANR	*	429,624	761	71	235
*DK7CX	*	411,522	687	85	236
*DL2GBB	*	299,538	630	62	196
*DL1SAN	*	245,364	622	64	190
*DF6QC	*	209,664	615	56	178
*DL4WA	*	207,669	521	56	161
*DL3ZAI	*	200,725	495	53	164
*DL9XY	*	200,220	602	59	176
*DL9LBI	*	198,288	574	53	163
*DL7CF	*	192,262	441	57	160
*DJ8EW	*	184,950	546	57	168
*DL8NBJ	*	181,300	496	59	186
*DL1IA	*	164,060	364	62	198
*DL5SVB	*	162,494	384	73	153
*DLØSA	*	160,230	465	51	159
			(Opr. DL3KWF)		
*DL6UKL	*	152,358	578	41	160
*DL2YBF	*	148,599	549	52	157
*DL5JRA	*	139,842	372	48	105
*DF9LB	*	133,254	306	78	120
*DL4XU	*	114,736	405	40	102
*DL2RYL	*	110,732	377	40	148
*DL8ULO	*	106,272	365	44	120
*DK5ZX	*	103,190	333	47	123
*DL5DSA	*	102,084	278	61	127
*DL6KVA	*	94,860	173	72	132
*DL4VBP	*	93,060	231	66	154
*DL4VAD	*	92,496	276	48	140
*DL6UAM	*	89,972	354	40	126
*DL8UVG	*	82,070	307	39	106
*DJ7RI	*	75,213	239	46	91
*DJ9DZ	*	69,760	224	46	82
*DJ4QO	*	67,257	272	49	110
*DJ5CL	*	63,175	351	37	96
*DL1FDV	*	62,456	163	54	94
*DL4OCM	*	58,432	242	46	120
*DL3YEI	*	55,380	265	33	109
*DF5WN	*	56,000	237	37	75
*DL5ST	*	54,776	227	43	124
*DL5AOJ	*	54,450	236	50	100
*DL3HSC	*	45,612	240	30	96
*DL2TG	*	45,384	150	50	72
*DLØFMC	*	38,390	170	35	75
			(Opr. DL1ZQ)		
*DH2UL	*	29,232	239	22	62
*DK7ZH	*	26,814	99	45	64
*DL7UXG	*	23,940	179	28	77
*DJ3GE	*	20,925	114	36	57
*DL6KHW	*	14,628	121	18	28
*DJ8EF	*	13,048	143	16	40
*DL4KBS	*	7,000	73	15	25
*DL6UOF	*	5,842	63	17	29
*DL1AQB	*	5,800	58	18	22
*DK6CQ	*	5,046	62	21	37
*DL3HWM	*	3,081	27	16	23
*DL5CX	*	1,863	25	11	16
*DJ8UV/P	*	1,309	114	24	53
***DL4UL**	**21**	**86,001**	**316**	**31**	**78**
*DF7TU	*	66,675	245	32	73
*DL3BRA	*	59,185	260	32	57
*DL2YAK	*	33,600	221	22	42
*DFØDFS	*	24,318	200	22	41
			(Opr. DL9NEI)		
***DK3DM**	**14**	**98,440**	**434**	**23**	**84**
*DF6VI/P	*	54,384	342	22	66
*DL6UBF	*	5,980	48	15	31
*DL3BYE	*	3,956	55	11	32
***DK8FS**	**7**	**86,724**	**471**	**22**	**86**
*DL1EFD	*	75,325	385	25	90
*DL5LAW	*	64,182	563	23	91
*DL6AT	*	5,989	103	9	44
*DL9CC	*	1,608	75	6	21
***DL3HRT**	**3.5**	**46,488**	**502**	**15**	**63**
*DLØKWH	*	8,673	178	7	42
			(Opr. DL2RMS)		
*DJ3RA	1.8	9,169	170	7	46
*DL3BRA	*	6,075	158	6	39

GIBRALTAR

ZB2X	**28**	**291,896**	**1137**	**31**	**93**
			(Opr. OH2KI)		
ZB2/OH2DT	**7**	**55,760**	**459**	**17**	**63**
*ZB2EO	A	48,735	157	42	93

GREECE

SV2AVP	1.8	12,705	174	10	45
***SV2BOH**	**A**	**436,320**	**871**	**89**	**199**
***J41DKL**	**"**	**219,912**	**744**	**74**	**190**
			(Opr. SV1DKL)		
*SV2BFL	21	6,040	53	16	24
*SV1CDN/314		21,696	366	16	48

HUNGARY

HA3LI	**A**	**763,599**	**1288**	**103**	**290**
HA4FF	*	556,661	1128	84	197
HA5BPC	*	482,030	1004	78	217
HA4YF	*	405,414	791	76	227
HA3PT	*	269,352	711	66	192
HA7PF	*	256,594	570	72	206
HA6KZS	*	22,515	342	23	72
HA3GF	*	20,406	132	26	31
HA3O	**7**	**510,027**	**2031**	**35**	**114**
HA2MV	*	122,264	476	32	104
HA4YG	*	48,060	332	21	68
HA6VR	**3.5**	**57,528**	**784**	**12**	**60**
HA6VA	*	45,192	447	14	70
***HA1CW**	**A**	**1,604,397**	**1960**	**125**	**413**
***HAØIT**	**"**	**940,704**	**1465**	**103**	**330**
*HA8IB	*	1,056,812	1379	109	322
*HA8XX	*	401,240	737	81	199
*HAØDD	*	154,633	388	63	176
*HA8ZO	*	96,726	252	50	91
*HA9PB	*	58,512	220	37	122
*HG4DFR	*	28,475	279	20	65
***HA3MQ**	**21**	**228,245**	**699**	**35**	**113**
*HA8YU	*	32,916	169	25	53
***HA8RH**	**14**	**309,694**	**1145**	**37**	**117**
*HA8FK	*	185,706	852	29	85
*HA3JB	*	98,646	381	30	63
*HA5JP	*	80,444	356	31	88
*HA6NW	*	34,444	202	22	57
*HA2QW	*	25,012	190	24	50
***HA8EU**	**3.5**	**107,278**	**1118**	**18**	**76**
*HA4FV	*	65,664	900	13	59
***HA8BE**	**1.8**	**60,553**	**683**	**19**	**73**
***HAØEQ**	**"**	**29,898**	**433**	**13**	**63**

IRELAND

***EI4DW**	**A**	**706,552**	**1327**	**60**	**199**
***EI6FR**	**3.5**	**56,161**	**742**	**12**	**59**

ISLE OF MAN

***GD4UOL**	**A**	**1,058,742**	**1770**	**83**	**310**

ITALY

I3EVK	**A**	**839,019**	**1216**	**123**	**324**
IK2UCK	*	665,347	1199	80	202
IK6SNQ	*	597,820	979	105	250
IKØUUM	*	259,347	961	81	238
I3FDZ	*	150,501	425	67	160
II2X	*	121,056	325	56	152
IR7A	*	77,787	207	67	134
			(Opr. I7ALE)		
IK8TPJ	*	56,210	182	60	94
IK1GPG	*	9,628	54	32	48
IK1ZNQ	*	7,600	54	32	48
IØLTX	*	1,960	62	17	39
IR4D	**28**	**97,626**	**415**	**26**	**80**
IU2E	*	43,914	282	23	55
			(Opr. IK2VUE)		
IR4T	**14**	**744,040**	**1958**	**39**	**139**
			(Opr. IK2QEI)		
I5ZUF	*	148,371	515	32	105
IK2YLV	**7**	**278,695**	**1283**	**33**	**106**
IU3V	*	139,778	1080	20	74
			(Opr. N7OV)		
IU2X	**3.5**	**157,624**	**1241**	**25**	**97**
			(Opr. IK2GSN)		
I3VHO	*	45,756	450	19	74
***IUØX**	**A**	**883,872**	**1465**	**91**	**281**
			(Opr. IKØFWI)		
***I3JSS**	**"**	**699,864**	**1180**	**92**	**271**
***IK4MTF**	**"**	**691,795**	**896**	**90**	**277**
*IK1RQQ	*	629,890	947	87	287
*IV3TQE	*	369,628	544	86	221
*IK4EWX	*	366,864	766	76	220
*IZØAIS	*	218,086	500	78	175
*I4FGG	*	160,303	501	52	157
*IN3QBR	*	138,908	506	63	179
			(Opr. ABØCQ)		
*IK3SCB	*	133,950	405	45	105
*IZØAEH	*	85,337	377	47	120
*IK2AIT	*	98,000	357	42	98
*IØKHP	*	96,481	314	46	133
*IK1ZNL	*	67,500	501	31	104
*I4JEE	*	63,581	236	55	162
*IK2TQG	*	45,885	208	43	118
*IK5RLS	*	45,552	149	48	98
*IK2NVE	*	33,372	141	39	64
*I4VJC	*	32,264	171	33	76
*IZØANC	*	22,407	129	30	47
*IZ1ASP	*	22,880	141	31	73
*IK3UVK	*	18,009	113	27	42
*IQØA	*	16,704	113	39	77
			(Opr. IKØXBX)		
*IKØYUM	*	14,592	103	24	40
*IK8WEI	*	13,132	100	25	42
*IK8YFW	*	11,224	92	23	38
*IK2IKW	*	11,088	68	30	54
*IK1YEE	*	5,846	123	23	51
*IV3KSE	*	5,406	68	17	34
*I6NOA	*	3,680	60	12	34
*IK3SSJ	*	1,480	37	18	22
*IK2IAR	*	1,092	15	13	15
*IK6HWX	*	120	8	6	6
*IK5TBK	28	2,080	46	14	18
*I3MLU	*	4,620	55	12	18
***I1XPQ**	**21**	**137,100**	**551**	**29**	**71**
***IQ7A**	**14**	**234,016**	**1040**	**33**	**109**
*I3JTE	*	191,842	706	34	108
*IZ3BQT	*	36,652	236	15	62
*IK2ULV	*	19,765	208	16	43
***IK4WMG**	**3.5**	**156,840**	**980**	**24**	**96**
*I5OQV	*	814	37	4	18
*IK2IQV	1.8	15,128	217	12	50

JERSEY

MJØAWR	**A**	**1,246,780**	**2243**	**77**	**263**
			(Opr. K2WR)		

KALININGRAD

UA2FP	**A**	**415,220**	**1155**	**59**	**201**
RA2FZ	*	197,775	403	67	158
UA2CZ	14	11,252	102	17	41
UA2FJ	**1.8**	**134,128**	**1134**	**20**	**81**
*UA2FT	7	4,896	68	10	41

LATVIA

YL2KO	**A**	**1,334,219**	**1559**	**116**	**351**
YL2SM	**1.8**	**89,089**	**820**	**19**	**72**
***YL2GN**	**A**	**565,250**	**1252**	**71**	**252**
*YL2KA	*	439,873	906	80	249
*YL2TW	*	348,648	832	57	235
***YL2UZ**	**7**	**47,376**	**363**	**20**	**74**

LITHUANIA

LY3AV	**A**	**1,983,780**	**2040**	**127**	**408**
LY2PAQ	*	723,492	972	97	309
LY5W	*	610,566	999	100	263
			(Opr. LY1DR)		
LY5W	*	554,778	987	99	258
LY3CW	*	484,962	800	66	196
LY3BU	*	418,547	886	68	209
LY2KM	*	254,208	420	81	250
LY2DX	*	95,025	393	41	134
LY2BTA	*	27,265	975	69	218
LY2OU	28	40,400	290	17	63
LY2BNZ	21	11,076	86	20	32
LY2BN	**14**	**150,257**	**596**	**32**	**99**
LY2LF	*	138,866	765	23	68
LY1CM	*	92,400	457	28	82
LY2OX	*	82,532	419	24	70
LY6M	**7**	**472,716**	**1669**	**37**	**125**
			(Opr. LY1DS)		
LY3BX	*	226,431	1155	32	107
LY1DZ	*	55,700	408	24	76
LY6K	**3.5**	**314,557**	**1504**	**31**	**108**
LY2GV	*	67,728	748	15	68
LY3ID	*	61,290	477	18	72
LY2BR	**1.8**	**69,570**	**746**	**13**	**61**
LY2HN	*	36,708	359	18	66
***LY2BM**	**A**	**858,284**	**1372**	**123**	**304**
*LY2FN	*	577,096	1117	80	278
*LY2PBM	*	52,393	315	32	89
*LY2CX	*	24,552	138	27	61
*LY3GJ	14	26,703	232	13	56
***LY1DD**	**7**	**63,280**	**359**	**28**	**85**
***LY2BZ**	**3.5**	**41,968**	**370**	**14**	**72**

LUXEMBOURG

LX4B	**3.5**	**176,410**	**1217**	**22**	**93**
			(Opr. OH2PQ)		

MACEDONIA

Z31RB	**A**	**130,686**	**403**	**47**	**91**
***Z31JA**	**A**	**1,416,850**	**2212**	**102**	**326**
*Z37FCA	*	3,672	28	23	28
*Z32KV	28	1,701	27	8	13
*Z32MB	*	882	15	10	11
***Z38G**	**21**	**155,550**	**795**	**33**	**89**
			(Opr. OH3MIG)		

MOLDOVA

ER5AL	**A**	**855,910**	**1669**	**90**	**251**
ER1OA	*	355,750	912	62	188
ER2GR	1.8	6,380	132	7	37
***ER1CW**	**3.5**	**42,090**	**705**	**11**	**50**

NETHERLANDS

PI4DEC	**A**	**1,186,944**	**1612**	**92**	**292**
			(Opr. PA3AAM)		
PAØRCT	*	715,575	1497	71	258
PAØLOU	*	269,700	464	82	228
PA3DKX	21	25,991	138	19	60
PAØCLN	**1.8**	**53,004**	**519**	**16**	**68**
PA3BUD	*	11,224	180	10	51
***PA3FHA**	**A**	**463,246**	**806**	**79**	**247**
*PAØJED	*	103,182	338	49	125
*PA3GUA	*	51,336	250	30	63
*PAØRBS	*	50,836	310	33	109
*PAØEHF	*	1,188	18	11	16
*PAØPLN	21	14,960	143	22	33
***PA3AAV**	**7**	**328,017**	**1304**	**36**	**123**
***PAØCYW**	**3.5**	**84,645**	**739**	**18**	**81**
*PAØMIR	*	7,854	136	9	42
*PAØIJM	*	2,170	63	5	26

NORTHERN IRELAND

GIØKOW	**A**	**6,089,722**	**4909**	**141**	**478**
			(Opr. GIØNWG)		
***GI4SNC**	**A**	**169,388**	**535**	**44**	**144**
*GIØKVQ	21	19,383	228	13	26

NORWAY

LA5ZC	**A**	**182,186**	**598**	**43**	**99**
LA9DK	*	58,860	245	33	75
LA8GK	*	47,124	192	43	76
LA4XT	21	16,536	130	16	36
LA7MFA	**14**	**170,034**	**866**	**29**	**73**
LA2IR	*	23,896	182	16	42
LA7AK	1.8	11,275	181	10	45
***LA2HFA**	**A**	**295,240**	**650**	**57**	**187**
*LA1YE	*	252,945	652	56	175
*LA2O	*	246,975	697	46	139
*LA1VFA	*	240,195	702	53	148
			(Opr. LA9DM)		
*LA8LA	*	86,814	254	62	120
*LA8CE	*	65,800	210	72	68
*LA5KW	14	3,600	12	10	10
*LA8WG	1.8	9,792	172	6	42

POLAND

SP4Z	**A**	**2,717,734**	**2749**	**146**	**440**
SP8FHM	*	809,867	1140	107	314
SP8FHK	**"**	**780,626**	**1180**	**98**	**309**
SP2AQP	*	115,168	325	63	173
SP9KJM	*	102,245	305	51	118
			(Opr. SP9IIL)		
SP3VT	*	85,410	425	39	107
SP7EJS	*	72,896	212	45	91
SP2DDX	*	64,792	198	54	128
SP5CEQ	*	57,196	185	57	101
SP2IU	*	31,350	157	39	75
SP6BEN	*	19,012	74	39	59

SP6AYP	*	576	17	16	16
SP5DIR	**28**	**39,933**	**181**	**28**	**59**
SP5DDJ	*	19,459	127	22	39
SP3SLA	**21**	**282,948**	**760**	**36**	**110**
SP9DTH	*	85,680	302	33	79
SP2AEK	*	23,694	133	25	41
SP2EBG	**14**	**426,597**	**1304**	**37**	**122**
SP6XRZ	**"**	**402,002**	**1365**	**33**	**109**
SP3CCT	*	127,968	496	30	99
SP9EMV	*	15,498	108	23	40
SP6BBE	*	216	6	6	6
SP9KAO	7	23,088	166	19	55
			(Opr. SP9JZT)		
SP4GAP	*	6,811	104	10	39
SN3A	**3.5**	**489,402**	**2037**	**36**	**123**
			(Opr. SP3HLM)		
SP7GIQ	*	284,445	1533	30	99
SP9NLK	*	71,101	723	22	75
SP3GTS	*	67,124	640	18	79
SP8WJT	*	20,405	353	9	44
SP5GRM	**1.8**	**104,562**	**817**	**22**	**89**
***SP2QCH**	**A**	**1,026,800**	**1450**	**103**	**297**
***SP6NIC**	**"**	**949,540**	**1277**	**92**	**302**
***SP6CYX**	**"**	**664,794**	**1127**	**82**	**269**
*SP6CDP	*	436,305	770	71	224
*SP2AVE	*	327,402	524	78	204
*SP6CPF	*	252,960	581	61	187
*SP1AEN	*	199,563	454	61	160
*SP6AUI	*	187,332	410	62	171
*SN3P	*	162,080	472	51	155
*SP6CXH	*	140,007	404	49	128
*SQ9BZK	*	114,996	410	40	108
*SQ3DWR	*	112,905	327	52	147
*SP5ASY	*	112,406	284	68	149
*SP9GKM	*	100,128	413	49	100
*SP1MHV	*	84,561	177	74	139
*SP1AFU	*	69,552	297	47	114
*SP5NZL	*	66,600	304	41	107
*SP1RKB	*	66,584	328	58	145
*SP9AGS	*	63,990	322	31	103
*SP3DBD	*	51,646	213	34	85
*SP4BOS	*	43,470	227	35	103
*SP9ZD	*	39,729	167	44	79
*SQ9DXN	*	37,950	140	43	95
*SP8GEY	*	33,522	137	43	68
*SP6NIF	*	24,182	81	47	66
*SP9KJU	*	24,056	131	31	66
			(Opr. SP9MDY)		
*SP2EFU	*	20,944	75	51	68
*SP9QLK	*	20,900	85	46	54
*SP5AHZ	*	18,865	132	20	47
*SP3XR	*	14,056	99	22	34
*SP4EDW	*	13,936	90	25	79
*SP4HHI	*	10,797	108	14	44
*SP6CRU	*	4,266	67	24	34
*SQ2DMR	*	3,066	34	18	24
*SP4DZT	*	1,480	19	11	19
***SP9W**	**28**	**56,931**	**356**	**29**	**74**
			(Opr. SP9HWN)		
*SP3LWP	*	13,600	102	17	33
*SP9AVR	*	6,760	59	18	22
*SP9HOF	*	3,726	50	11	16
*SP3AOT	*	2,232	32	12	12
*SP5LCC	*	592	19	7	9
***SP9BBH**	**21**	**146,931**	**454**	**33**	**96**
*SP6YGB	*	57,504	245	30	66
*SP9QJ	*	56,210	195	35	75
*SP5CGN	*	18,585	124	21	38
*SP3TYF	*	12,844	100	21	31
*SP5CPR	*	11,500	91	20	30
*SP2QVS	*	11,449	97	15	26
*SP1BLE	*	6,330	21	15	15
*SP3AAI	*	5,952	87	10	20
*SP9LDO	*	4,176	50	15	21
*SP3MY	*	1,684	44	6	6
***SP8BAB**	**14**	**65,016**	**239**	**31**	**77**
*SP6SYF	*	32,916	216	20	58
*SP9RTZ	*	13,058	111	18	40
*SP9OYK	*	12,250	128	14	36
*SP6STS	*	7,095	59	20	35
*SP9NSV	*	6,844	69	17	41
*SP4MPG	*	6,384	103	8	40
*SP7FGA	*	5,538	84	10	29
*SQ9BDV	*	4,326	56	13	29
*SP6DHH	*	3,524	85	8	23
***SP3EQE**	**7**	**57,324**	**298**	**25**	**77**
*SP5CNA	*	38,800	310	18	62
*SP9ABU	*	37,720	222	22	70
*SP3FIM	*	9,858	77	14	48
***SP5JTF**	**3.5**	**94,376**	**910**	**18**	**76**
*SP2EXN	1.8	12,070	67	5	34
*SP5GH	*	8,094	71	10	61

PORTUGAL

CT1FJK	**21**	**462,834**	**1774**	**37**	**125**
			(Opr. OH2BZ)		
***CT1ELP**	**A**	**237,838**	**809**	**56**	**162**
*CT1BNW	*	5,929	51	21	28
***CT1AOZ**	**28**	**47,073**	**272**	**22**	**49**
***CT1BQH**	**21**	**293,624**	**1269**	**31**	**96**

ROMANIA

YO3APJ	**A**	**1,756,160**	**1953**	**142**	**418**
YO9HP	**28**	**18,392**	**109**	**26**	**50**
YO3FF	14	40,005	202	28	77
YO3ND	**7**	**227,265**	**1050**	**31**	**108**
YO3NL	*	46,800	203	18	60
***YO3FWC**	**A**	**431,154**	**1056**	**80**	**226**
***YO3FRI**	**"**	**424,080**	**916**	**77**	**227**
*YO3CTK	*	325,500	659	78	222
*YR8A	*	237,360	752	85	130
			(Opr. YO8AXP)		
*YO5BRZ	*	103,452	241	75	147
*YO4GDP	*	89,535	420	39	88
*YO2BZ	*	55,692	227	38	88
*YO2ARV	*	54,812	193	50	92
*YO5ALI	*	36,582	163	42	59
*YO2QY	*	12,844	59	35	41
*YO4CBT	*	2,035	56	9	28
*YO2DFA	*	1,785	19	17	18
***YO2BP**	**21**	**91,700**	**310**	**20**	**80**
*YO4ZF	*	30,825	156	29	46
*YO3RK	*	16,870	101	4	24
***YO4ATW**	**14**	**64,100**	**316**	**25**	**75**
*YO4BBH	*	63,457	440	23	66
*YO4DCF	*	36,340	236	24	68
*YO6MK	*	32,208	192	26	62
*YO2LDC	7	30,900	132	23	77
***YP2R**	**3.5**	**95,510**	**1007**	**21**	**75**
			(Opr. YO2DFA)		
*YO2LIN	*	4,318	119	6	28
*YO2AQB	1.8	2,686	80	4	30

SARDINIA

IS0OMH	**A**	**182,691**	**669**	**43**	**116**
***IS0HQJ**	**A**	**166,060**	**471**	**56**	**134**
*IS0IGV	*	148,149	445	49	128
*IS0UWX	*	23,387	161	28	63
*IS0WBT	*	2,928	41	17	31

SCOTLAND

GM7X	**21**	**206,283**	**854**	**33**	**100**
GM4YXI	**7**	**224,532**	**1161**	**29**	**97**
***GM4SID**	**A**	**621,091**	**1134**	**74**	**263**
***GM3CFS**	**14**	**106,596**	**528**	**24**	**84**

SICILY

IT9XUC	**14**	**416,260**	**1986**	**31**	**99**
***IT9ORA**	**A**	**149,920**	**489**	**53**	**137**
*IT9DEC	28	6,716	58	18	28
***IQ9AF**	**21**	**145,730**	**595**	**32**	**86**

SLOVAK REPUBLIC

OM3PC	**21**	**354,354**	**922**	**38**	**116**
			(Opr. OM7M)		
OM5ZW	**1.8**	**77,714**	**761**	**18**	**73**
			(Opr. OM7M)		
OM5ZM	*	33,375	306	18	71
***OM6DM**	**A**	**494,216**	**1018**	**73**	**253**
***OM8ON**	**"**	**486,537**	**582**	**98**	**283**
*OM3IAG	*	345,520	805	86	194
*OM1AF	*	178,068	649	46	163
*OM3BA	*	116,424	400	43	146
*OM3CDZ	*	71,128	450	32	104
*OM3GB	*	65,660	199	47	87
*OM7AG	*	31,000	124	30	70
*OM3T	*	18,750	212	16	59
*OM7AT	*	15,481	112	22	40
***OM7YC**	**21**	**38,628**	**163**	**25**	**62**
*OM2SS	*	38,316	156	26	67
*OM7PY	*	27,249	114	28	65
*OM3PQ	*	19,384	149	19	29
***OM4DN**	**14**	**60,879**	**367**	**26**	**65**
*OM9TR	*	38,394	280	20	59
***OM5AW**	**7**	**192,194**	**945**	**34**	**114**
*OM3CDN	*	20,020	200	14	63
*OM6TX	*	6,956	130	8	29
***OM5KM**	**3.5**	**73,800**	**759**	**14**	**68**
*OM3ZIR	*	50,049	671	11	56
***OM3OM**	**1.8**	**44,557**	**549**	**15**	**69**
*OM3TZU	*	12,730	165	12	55

SLOVENIA

S51BO	**A**	**3,660,589**	**2758**	**147**	**446**
S55A	*	1,048,416	1355	103	299
S53X	**28**	**173,505**	**626**	**31**	**98**
S50R	**21**	**373,920**	**1139**	**38**	**122**
S54AA	**"**	**329,586**	**986**	**37**	**126**
S53M	**14**	**464,725**	**1632**	**36**	**109**
			(Opr. S51ZO)		
S50K	**"**	**397,848**	**1727**	**33**	**99**
S52AW	**7**	**741,650**	**2429**	**38**	**125**
			(Opr. S57AD)		
S50C	**"**	**716,096**	**2176**	**38**	**129**
			(Opr. S53CC)		
S530	*	349,284	1365	38	118
S59L	*	237,393	1178	27	90
S54A	*	180,334	818	35	119
S53R	**3.5**	**238,158**	**1298**	**31**	**108**
S50Y	**"**	**165,723**	**1312**	**26**	**85**
S57M	*	99,500	978	22	78
S57KM	*	68,373	896	13	58
S50U	**1.8**	**106,215**	**1053**	**18**	**79**
***S50A**	**A**	**2,037,464**	**1778**	**136**	**412**
***S59AA**	**"**	**1,924,320**	**1738**	**145**	**425**
*S57DX	*	1,297,642	1491	134	392
*S51F	*	1,284,780	1507	113	347
*S57J	*	1,193,914	1278	121	361
*S58MC	*	966,231	1201	110	331
*S57U	*	835,875	1161	91	284
*S54X	*	388,648	801	74	222
*S53AAA	*	387,236	901	70	192
			(Opr. S57MW)		
*S53AJK	*	345,306	652	68	179
			(Opr. S51TA)		
*S52FB	*	295,604	775	66	202
*S52LW	*	252,069	877	48	171
*S51MF	*	228,228	382	81	185
*S51ND	*	159,800	460	60	140
*S51NM	*	39,928	262	34	90
*S57IIO	*	8,064	120	13	50
***S52OT**	**28**	**43,296**	**247**	**32**	**56**
*S50Q	*	32,805	195	26	60
*S51W	*	34,335	250	19	44
*S52SK	*	30,475	164	26	57
***S51VC**	**21**	**40,290**	**222**	**28**	**57**
*S51TE	*	39,204	194	28	61
***S58AL**	**14**	**297,024**	**1095**	**38**	**118**
*S53BM	*	219,726	955	29	88
***S53F**	**7**	**88,928**	**445**	**42**	**80**
*S58MU	*	70,498	426	21	80
***S59KW**	**3.5**	**86,668**	**811**	**17**	**77**
***S51OI**	**"**	**64,315**	**664**	**19**	**76**
*S52GO	*	29,380	399	11	54
*S51AY	*	19,712	306	10	54

SPAIN

EA1JO	**A**	**526,848**	**771**	**85**	**258**
EA3AR	**"**	**416,556**	**694**	**82**	**170**
EA7TG	**"**	**275,560**	**432**	**83**	**249**
EA1EWG	**"**	**140,270**	**400**	**44**	**125**
EA1FBJ	*	43,680	278	38	118
EA1OJ	*	31,992	117	49	80
EA4AQT	*	20,532	148	26	61
EA5DCL	*	14,110	92	31	52
EC5ALD	*	6,420	46	28	32
EA4EIS	*	2,016	48	17	39
EA7FR	*	1,421	17	12	17
EA2IA	**28**	**92,153**	**451**	**25**	**67**
EA4MZ	*	17,745	116	21	44
EA5TD	7	16,168	100	24	70
***EA7GTF**	**A**	**675,190**	**1537**	**69**	**200**
***EA2BNU**	**"**	**442,298**	**1022**	**65**	**213**
*EA7KN	*	328,856	872	74	222
***EA4AAF**	**"**	**327,540**	**709**	**65**	**198**
***EA5YU**	**"**	**290,924**	**637**	**60**	**197**
*EA7MT	*	217,156	590	65	168
***EA3BOW**	**"**	**154,483**	**563**	**52**	**151**
*EA1MV	*	122,904	365	66	151
*EA1BAE	*	117,197	348	45	118
*EA4BSC	*	115,132	238	66	148
*EA3BHB	*	95,149	280	60	133
*EA4CIE	*	78,209	213	54	143
*EA1BMA	*	62,205	294	38	105
*EA2GC	*	57,959	233	30	90
*EA5ARC	*	56,270	220	56	114
*EA7GXX	*	54,859	197	39	80
*EA5AKR	*	47,376	159	48	78
*EA4AV	*	46,200	147	54	111
*EA4BGM	*	39,585	254	34	71
*EA7OK	*	31,108	118	38	63
*EA1BEE	*	31,058	239	25	81
*EA5AGW	*	25,792	150	39	65
*EA5GRC	*	22,540	128	27	43
*EA5AFH	*	21,830	148	42	88
*EA5ABH	*	19,530	88	38	67
*EA4ND	*	18,480	138	24	53
*EC2AHR	*	16,678	113	22	35
*EA1EXV	*	15,950	101	37	73
*EA3AFW	*	15,300	101	34	66
*EA4OA	*	14,661	106	27	54
*EA1AAA	*	12,950	113	23	51
*EC5AKR	*	10,710	79	25	45
*EC1ACW	*	7,749	101	11	30
*EA1DFP	*	1,118	15	12	14
*EA4IE	*	54	6	3	6
***EA7BJV**	**28**	**24,310**	**194**	**20**	**45**
*EA7AKJ	*	5,715	70	18	27
*EA2CAR	*	1,568	39	13	15
***EA1CW**	**21**	**88,078**	**509**	**26**	**68**
			(Opr EA1FDO)		
*EA1BHR	*	15,174	134	17	37
*EA5WX	*	3,813	53	11	20
***EA1ND**	**14**	**47,600**	**336**	**14**	**42**
*EA1FEL	7	19,044	189	13	56
*EA2CR	*	5,311	86	7	40

SVALBARD

JW5NM	**A**	**1,047,792**	**1186**	**102**	**230**
JW1CCA	*	379,682	739	76	153

SWEDEN

SM5COP	**A**	**954,162**	**1344**	**84**	**282**
SM5AOE	**"**	**768,517**	**1176**	**98**	**238**
SM5CLE	*	608,970	886	93	290
SM6DYK	*	535,824	980	107	259
SM0AJV	*	94,392	379	42	129
SM0XG	*	66,834	262	45	69
SM3AF	*	56,544	212	76	152
SM7GIB	*	23,280	110	43	77
SM5RE	*	23,051	195	26	63
SM5IRV	*	4,505	91	15	38
SM0DZH	28	5,313	58	14	19
SM0KV	**21**	**140,436**	**452**	**37**	**104**
SM6NM	*	73,130	330	25	78
SM6JY	14	17,199	171	17	46
SM2DMU	**7**	**323,180**	**1462**	**34**	**109**
SM6DER	*	116,640	510	32	103
SM4HCM	**3.5**	**362,098**	**1445**	**34**	**117**
SM5CEU	*	51,688	406	20	71
SM6CPY	**1.8**	**71,392**	**776**	**19**	**73**
SM0AJU	**"**	**65,070**	**665**	**21**	**69**
***SM0BDS**	**A**	**394,912**	**715**	**75**	**212**
*SM2KAL	*	153,888	339	61	168
*SM4SX	*	122,159	417	46	105
*SM0NJO	*	33,408	90	47	69
*SM6HVR	*	26,790	235	31	83
*SM5VZY	*	26,058	165	28	73
*SM0JHF	*	24,806	108	35	44
*SM7BHM	*	22,200	139	24	50
*SM2DVT	*	20,148	114	31	42
*SM7BZV	*	18,532	149	21	61
*SM2ODB	21	8,415	140	15	40

SWITZERLAND

HB9FBS	**A**	**98,175**	**548**	**39**	**126**
HB9KC	21	42,952	191	25	66
HB9CIP	**7**	**85,488**	**491**	**33**	**104**
HB9FMD	**3.5**	**39,664**	**464**	**17**	**57**
***HB9CBR**	**A**	**190,890**	**433**	**58**	**152**
*HB9CPS	3.5	18,815	116	8	44

UKRAINE

UT6Q	**A**	**3,126,126**	**3160**	**141**	**462**
			(Opr. UR6QA)		
UT4UZ	**"**	**2,821,250**	**2518**	**149**	**461**
US1U	*	1,839,816	2073	126	380
UX1UA	*	1,062,480	1370	114	352
UX4CW	*	919,125	1370	101	274
UY1HY	*	904,791	1159	109	362
EM8I	*	867,588	1400	97	297
UT3UZ	*	725,418	1409	91	331
UX3ZW	*	555,758	787	96	275
UT5UDX	*	466,030	1000	77	213
UT4EK	*	407,535	799	75	228
UT2IW	*	214,137	531	77	232
UT5HP	*	83,436	235	55	149
UX5VK	*	78,650	305	32	98
UT1KT	*	42,120	195	37	125
UY5YY	*	16,020	98	30	60
UR7VA	**28**	**40,085**	**200**	**28**	**70**
UX8IX	*	35,090	150	29	81
UT1IA	*	30,340	240	26	56
UT5UGR	*	8,904	140	26	58
US1E	**21**	**506,527**	**1598**	**37**	**135**
			(Opr. UT7EZ)		
UU9JH	*	258,912	900	34	110
UT7LA	*	205,506	608	33	114
UX2MM	*	21,465	172	23	58
UR4SXS	*	858	14	8	14
UT3QW	**14**	**243,576**	**912**	**35**	**118**
UY5QO	*	118,708	644	33	85
UR5EPV	*	23,380	191	21	49
UR7IA	*	18,392	121	24	64
UR3SG	*	8,148	134	12	30
US2YW	**7**	**253,008**	**1207**	**37**	**131**
UT7ND	*	195,156	769	31	108
UX5NO	*	54,830	374	20	75
UT0QA	*	25,070	298	13	33
UT1KY	*	12,148	116	34	70
UT2IY	**3.5**	**164,715**	**946**	**32**	**101**
UU0JM	**"**	**136,500**	**1237**	**27**	**103**
UX1VT	*	38,847	489	10	59
UY0ZG	*	37,715	280	17	78
UT1WZ	*	31,257	380	10	59
US2IZ	*	28,650	379	14	61
UR5LF	*	20,724	230	11	55
UY6I	1.8	7,526	166	8	45
			(Opr. UX7IA)		
***UR5U**	**A**	**753,536**	**1098**	**89**	**317**
			(Opr. UR5UW)		
***UT5UN**	**"**	**499,950**	**901**	**84**	**246**
*UX5EF	*	428,884	761	98	260
*UT4XU	*	340,480	658	74	206
*UR3IOB	*	288,522	567	75	199
*UY5TE	*	237,752	739	45	181
*UT3UA	*	218,139	452	82	185
*US8IBJ	*	209,664	476	67	185
*UU2JA	*	207,656	400	62	195
*UX7QQ	*	175,948	410	86	212
*UT5ECZ	*	95,387	376	44	137
*UR5BCJ	*	67,670	213	45	89
*UY0QW	*	64,680	242	39	108
*UT5UGQ	*	62,328	224	39	120
*UY3QW	*	45,592	227	37	102
*U5MZ	*	18,009	75	39	48
*UR5EIT	*	4,998	77	38	59
*UR4QOS	21	20,010	209	16	30
***U5WF**	**14**	**277,277**	**977**	**36**	**114**
*UY8IF	*	242,481	1076	33	98
*UT7EG	*	52,510	367	29	60
*UT3EM	*	44,678	257	25	64
***UT1FA**	**7**	**130,243**	**644**	**33**	**103**
*UX3M	*	110,301	625	26	97
			(Opr. UR3MP)		
*UR6EA	*	72,459	470	23	74
*UT8AS	*	60,165	338	25	80
*UR4QKD	*	24,395	159	25	60
*UR5ZCL	*	23,232	178	28	93
*US1PM	*	20,160	209	13	51
***US2WU**	**3.5**	**58,869**	**502**	**17**	**76**
*UX3MO	*	29,028	470	8	51
*UY5WA	*	16,014	268	7	44
***UU4JMG**	**1.8**	**37,347**	**443**	**15**	**66**
*UT8IT	*	16,695	212	11	52
*UX0HA	*	13,311	226	8	43
*UR4MRT	*	5,940	106	7	37
*UU8JK	*	99	5	4	5

WALES

GW7K	**A**	**1,050,180**	**1695**	**81**	**264**
			(Opr. GW4BVJ)		
GW3SYC	*	14,210	126	21	49
GW0GEI	28	11,368	118	14	35
GW3YDX	**3.5**	**508,388**	**2186**	**30**	**119**
GW7J	**1.8**	**122,364**	**1191**	**21**	**82**
			(Opr. GW4VEQ)		
***GW3KDB**	**A**	**388,740**	**670**	**74**	**236**

YUGOSLAVIA

4N9BW	**A**	**3,892,152**	**3299**	**151**	**490**
			(Opr. YU7BW)		
YU7AV	**"**	**2,250,885**	**2233**	**157**	**438**
YT1AD	*	1,589,543	2263	112	321
			(Opr. YT1AU)		
YU1OL	*	1,413,378	1653	111	355
YU1AR	*	537,950	1231	100	250
YU1CV	**28**	**29,667**	**148**	**23**	**70**
YZ1AU	**21**	**258,984**	**822**	**38**	**114**
YT7A	**14**	**672,324**	**2082**	**39**	**140**
			(Opr. YZ7UN)		
YU1ZZ	**"**	**494,649**	**1813**	**36**	**117**
YU1S	*	219,362	817	33	110
			(Opr. YU1VG)		
YU7NU	**7**	**562,839**	**1845**	**35**	**128**
YT1BB	**"**	**502,392**	**1888**	**35**	**129**
YT7AA	*	489,055	1626	36	121
YU7AU	**1.8**	**63,096**	**631**	**18**	**70**
YU1AST	*	3,496	89	5	33
			(Opr. YZ1EA)		
***YU7SF**	**A**	**169,344**	**420**	**64**	**152**
*YU7KM	*	155,040	470	57	147
*YU1BO	*	80,444	311	41	128
*YU1BSZ	*	47,512	312	33	75
			(Opr. YU1SV)		
*YU7FN	*	28,363	131	40	73
***4N1N**	**21**	**158,903**	**509**	**34**	**97**
*YU7YZ	*	70,296	307	27	60
***YU1HA**	**14**	**164,124**	**678**	**34**	**107**
*YU1EL	*	85,632	430	32	96
*YU7KW	*	105,391	436	31	90
***YU7CB**	**3.5**	**129,375**	**890**	**23**	**92**
*YU1KR	*	112,765	1066	20	74
*YU1CC	*	24,278	375	13	48
***YU1RA**	**1.8**	**34,488**	**526**	**9**	**63**

OCEANIA

AMERICAN SAMOA

KH8/ N5OLS	**28**	**399,872**	**1154**	**34**	**94**

AUSTRALIA

VK6BAT	**A**	**5,034,769**	**3717**	**137**	**342**
			(Opr. N6ZZ)		
VK8VJ	**"**	**4,263,000**	**3131**	**142**	**358**
			(Opr. DL1VJ)		
VK8AV	*	1,696,549	1580	122	269
VK1FF	*	757,932	984	92	202
VK2EKY	*	221,788	870	26	89
VK6HG	*	121,011	579	70	139
VK5GN	**21**	**437,814**	**1432**	**34**	**83**
VK3APN	**7**	**145,890**	**582**	**27**	**63**
VK6VZ	1.8	3,219	33	16	21
***VK2AYD**	**A**	**1,311,771**	**1654**	**95**	**194**
*VK2VM	*	288,765	637	51	104
*VK4ICU	*	247,976	456	77	146
*VK2EL	*	220,520	55	37	40
***VK4XA**	**28**	**247,265**	**1008**	**25**	**60**
*VK5AI	*	74,480	371	21	49
*VK5XE	*	29,835	256	15	24
*VK4XW	21	11,255	87	14	36
*VK5BS	"	1,736	22	12	19
***VK2APK**	**14**	**521,254**	**1467**	**35**	**105**
*VK4TT	*	118,534	1222	28	69

BRUNEI

V8EA	**A**	**4,886,280**	**3538**	**153**	**337**
			(Opr. JO1RUR)		

EASTERN MALAYSIA

9M8YY	**A**	**1,795,134**	**1744**	**121**	**233**
			(Opr. JR3WXA)		
9M6NA	**7**	**1,041,012**	**2342**	**37**	**116**
			(Opr. JE1JKL)		

HAWAII

KH6TO	**A**	**1,399,828**	**2217**	**102**	**142**
NH7A	**14**	**493,164**	**1422**	**35**	**91**
			(Opr. AI6V)		
KH6CC	**1.8**	**69,693**	**593**	**17**	**22**
***KH6/K6XX**	**A**	**100,485**	**411**	**43**	**44**

INDONESIA

YB1AQS	**A**	**3,799,500**	**2933**	**148**	**352**
			(Opr. DL8WPX)		
YB3ZBZ	21	17,202	132	17	30
YC0LOW	1.8	384	11	7	9
***YB2UDH**	**A**	**302,111**	**425**	**87**	**182**
*YB5QZ	*	286,888	778	81	137
*YC6PUP	*	189,150	519	45	85
*YB2BRW	*	161,936	357	83	149

*YB4JIM	*	145,350	232	59	112	
*YB2PBX	*	17,228	77	44	74	
*YB9BON	28	15,695	81	25	48	
***YBØECT**	**21**	**283,671**	**758**	**36**	**93**	
*YC1RPN	*	1,512	30	13	15	

NEW CALEDONIA

***FK8HC**	**A**	**764,218**	**1193**	**98**	**168**
*TXK8FU	14	64,080	278	25	55
			(Opr. FK8FU)		

NEW ZEALAND

ZL3CW	**7**	**703,664**	**2108**	**33**	**103**
			(Opr. F2CW)		

NORTHERN MARIANAS

WHØAAV	**21**	**50,569**	**355**	**25**	**36**
*AHØD	A	9,779	153	31	46

PHILIPPINES

DX1S	**A**	**4,292,160**	**3180**	**145**	**335**
			(Opr. OH2PM)		
DU3NXE	*	760,554	1549	73	113
DU1COO	**21**	**113,387**	**590**	**28**	**43**
***DU7/N7ET**	**A**	**186,048**	**400**	**71**	**100**
***DU3RCM**	**21**	**258,633**	**848**	**32**	**71**
*DU9HKD	*	9,176	125	14	17
***DU1/ DL5ZAH**	**14**	**85,136**	**536**	**24**	**44**
*DU9HKD	7	2,400	63	7	8

SOUTH COOK ISLANDS

***ZK1TB**	**A**	**584,004**	**743**	**101**	**146**
			(Opr. W7TB)		
*ZK1DI	3.5	9,196	166	9	10
			(Opr. DF4DI)		

SOUTH AMERICA

ARGENTINA

LU3FSP	**A**	**1,296,420**	**2091**	**78**	**168**
LU8EHW	*	495,558	1167	68	103
LU5GPL	*	36,134	143	39	50
LU3HIP	**28**	**152,736**	**729**	**25**	**61**
AY1I	**21**	**1,838,852**	**4137**	**39**	**133**
			(Opr. LW9EUJ)		
LU4FPZ	*	560,634	1718	35	94
LT5V	**14**	**97,691**	**699**	**24**	**59**
			(Opr. LU8VCC)		
***LU8HSO**	**A**	**700,290**	**1321**	**78**	**173**
***LU1EWL**	**"**	**609,477**	**845**	**87**	**166**
*LU1AEE	*	557,608	1112	70	118
*LU4HKN	*	178,000	627	52	73
*L5ØV	*	125,400	597	36	59
*LU3DSI	*	54,662	145	56	95
*LU7HTJ	*	51,744	303	32	45
*L25EY	*	7,905	105	23	28
			(Opr. LU7DW)		
***AZ9W**	**28**	**685,170**	**1866**	**31**	**107**
			(Opr. LU5UL)		
***LU9AUY**	**"**	**631,359**	**2016**	**28**	**95**
*LW4DYI	*	552,288	1515	32	100
***LU2DPW**	**"**	**335,875**	**951**	**32**	**93**
*LU3WEU	*	311,745	1135	25	80
***LW9ETY**	**21**	**335,219**	**1188**	**28**	**73**
*LU5HT	*	40,404	206	26	48
*LU3EAQ	*	21,540	130	21	39
*LW3HAQ/D	*	4,935	79	12	9
***LU4FM**	**14**	**338,883**	**1301**	**35**	**94**
			(Opr. LU5FF)		
*LU1XSI	*	162,052	492	31	85

ARUBA

P4ØE	**A**	**12,668,701**	**6473**	**164**	**513**
			(Opr. CT1BOH)		
P4ØJ	**14**	**1,548,792**	**3352**	**38**	**130**
			(Opr. WX4G)		
P4ØR	**"**	**1,545,248**	**3145**	**39**	**133**
			(Opr. K4UEE)		

BRAZIL

PY2XB	**28**	**397,026**	**1039**	**34**	**103**
PY1KS	*	199,680	725	35	85
PY4OD	21	289,560	829	34	86
PY7OJ	14	17,152	102	21	43
PY1BVY	**1.8**	**5,600**	**78**	**11**	**14**
***PY5BLG**	**A**	**308,370**	**567**	**68**	**122**
***PY2EYE**	**"**	**219,830**	**427**	**73**	**105**
*ZW2Z	*	183,134	505	40	87
			(Opr. PY2ZI)		
*PW2N	*	173,040	434	64	104
			(Opr. PY2NY)		
*ZX2P	*	101,757	356	41	66
			(Opr. PT2NP)		
*PT4M	*	83,348	22	64	73
			(Opr. PY4MBJ)		
*PY2IQ	*	77,953	231	56	81
*PY1OB	*	56,420	164	52	72
*PP7CW	*	28,458	125	35	58
*PY2OJD	*	24,582	137	33	69
*PU1KDR	*	24,489	164	33	38
*PP7CI	*	6,879	176	45	79
*PY4CEL	*	484	51	10	12
*ZY2KQ	*	448	20	7	9
			(Opr. PY2KQ)		
*PY3FBI	*	35,400	207	24	35
*PY4ZF	*	68,875	250	40	55
***PU2RUX**	**28**	**316,479**	**1016**	**32**	**91**
*PY2DUN	*	6,716	65	17	29
*PU2NKU	*	442	23	8	9
*PU3LSP	*	16	5	2	2
***PU2MHB**	**21**	**508,896**	**1284**	**36**	**108**
*PY3JRG	*	56,170	200	21	61
*PY1AJK	*	45,978	205	22	57
*PY2APQ	*	20,500	152	17	33
*PV8OVU	*	11,400	118	15	23
*PY2NZR	*	10,263	160	22	55
*PY3UEB	*	900	23	8	7
*ZY2RNJ	14	34,029	225	20	37
			(Opr. PY2RNJ)		
*PR2W	*	28,812	218	19	30
			(Opr. PT2AW)		

CHILE

*CE3IDY	14	54,810	313	24	39
*CE8GLQ	*	17,820	140	16	29

COLOMBIA

HK6KKK	**A**	**2,345,541**	**2386**	**90**	**249**
HK5QGX	*	27,482	106	44	47

ECUADOR

*HC1HC	A	10,914	74	21	30

FERNANDO DE NORONHA

PYØFF	**3.5**	**210,060**	**904**	**20**	**70**

GALAPAGOS ISLANDS

HC8N	**A**	**10,475,365**	**6192**	**151**	**438**
			(Opr. N5KO)		

GUYANA

8R1K	**A**	**6,244,185**	**4406**	**131**	**390**
			(Opr. OHØXX)		

PARAGUAY

ZPØZ	**A**	**2,433,340**	**2552**	**114**	**268**
ZP5R	*	422,625	921	63	112
			(Opr. ZP5KO)		
ZP5XF	**21**	**1,926,056**	**4009**	**38**	**134**
			(Opr. LU2BRG)		
*ZP6CW	28	5,400	45	17	23

TRINIDAD & TOBAGO

9Y4H	**A**	**9,063,469**	**5291**	**156**	**443**
			(Opr. K6NA)		
9Y4NW	*	621,731	781	92	227
			(Opr. DL4MEH)		
9Y4VU	**21**	**763,224**	**2005**	**32**	**100**

URUGUAY

CX5X	**28**	**863,418**	**2011**	**36**	**115**
			(Opr. CX6VM)		
CX5BW	**"**	**733,720**	**2040**	**32**	**104**
CX9BAG	*	527,975	1576	35	96
CV1A	**21**	**510,598**	**1361**	**35**	**113**
CW5W	**14**	**540,540**	**1353**	**38**	**116**
			(Opr. CX7BY)		
***CX9AU**	**14**	**311,049**	**1000**	**31**	**76**

VENEZUELA

YV7QP	28	6,264	138	14	15
YX1D	**3.5**	**146,450**	**679**	**22**	**79**
			(Opr. YV1DIG)		

QRP

All Band

AA2U	**A**	**839,272**	**795**	**93**	**299**
YT7TY	**"**	**769,923**	**1198**	**94**	**269**
DL6RDR	**"**	**726,396**	**940**	**93**	**306**
WA2HZR	**"**	**612,968**	**658**	**94**	**269**
LY3BA	**"**	**617,100**	**1119**	**82**	**258**
K3PH	**"**	**507,540**	**569**	**81**	**249**
K1RC	**"**	**476,640**	**578**	**80**	**251**
LY2FE	**"**	**393,499**	**975**	**67**	**226**
N7IR	**"**	**386,450**	**492**	**98**	**197**
DL3KVR	**"**	**348,150**	**795**	**67**	**208**
OE2S	**"**	**341,715**	**722**	**69**	**216**
			(Opr. OE2VEL)		
YU1LM	*	333,450	893	68	217
N1TM	*	329,199	469	75	224
YU1EA	*	292,050	597	90	240
YU1KN	*	258,896	473	85	216
HP1AC	**"**	**193,610**	**443**	**62**	**128**
W6YJ	**"**	**183,975**	**389**	**91**	**155**
F6OIE	**"**	**160,6378**	**492**	**55**	**163**
RU3WW	**"**	**160,042**	**465**	**58**	**177**
KG5U	**"**	**187,935**	**334**	**77**	**178**
JH1HRJ	**"**	**182,611**	**451**	**54**	**89**
I1BAY	**"**	**177,840**	**583**	**69**	**216**
G3VQO	**"**	**174,708**	**589**	**48**	**159**
N9CIQ	**"**	**166,782**	**294**	**66**	**143**
KV8S	**"**	**138,067**	**281**	**61**	**143**
I3BBK	*	158,517	574	42	129
W8QZA/6	*	154,368	292	74	127
S59D	**"**	**151,788**	**531**	**76**	**197**
PAØADT	**"**	**149,868**	**462**	**47**	**134**
AJ2U	*	136,416	292	55	148
7K4QOK	*	136,286	329	62	104
EA7AAW	**"**	**135,432**	**432**	**40**	**122**
VE7CFD	**"**	**135,432**	**651**	**52**	**61**
RA6ABK	*	133,570	404	53	137
IKØCNA	*	131,535	409	52	133
GØVQR	*	129,150	526	34	141
RU9UN	**"**	**114,072**	**239**	**62**	**132**
UA9SG	*	106,288	217	62	120
N1SNB	*	104,308	222	53	125
EA3CKX	*	104,092	333	56	156
ON6TJ	**"**	**87,096**	**375**	**35**	**117**
AA1CA	*	76,540	223	56	122
JJ1JGI	*	72,576	206	46	80
ON7CC	*	69,048	357	31	95
W9UR	*	67,200	170	49	101
RW3VM	*	64,752	288	33	119
DF1QF	*	62,270	302	30	100
K3WWP	*	58,000	167	46	99
SM5DQ	**"**	**56,743**	**249**	**39**	**140**
WP4JXD	**"**	**55,902**	**475**	**21**	**45**
DK4CU	*	53,900	242	33	107
WZ2T	*	52,801	191	40	93
WA9FWO/4	*	50,996	151	36	86
EA3AEK	*	44,336	226	47	116
WD3P	*	40,737	130	27	84
JA5CDL	**"**	**39,060**	**161**	**54**	**70**
G4FDC	*	34,992	154	30	78
HB9XY	**"**	**34,335**	**217**	**25**	**84**
HB9AYZ	*	32,445	232	23	82
OH2YL	**"**	**31,600**	**166**	**28**	**67**
DK6AJ	*	27,508	190	35	57
DL1LAW	*	24,990	210	21	81
VU3CRJ	**"**	**24,885**	**106**	**35**	**70**
YO4AAC	**"**	**24,832**	**192**	**24**	**54**
NQ7X	*	22,339	95	33	56
DJ5QK	*	16,422	161	21	81
N1AFC	*	14,335	83	13	48
VE6GK	**"**	**14,148**	**135**	**27**	**27**
JL3SBE	*	13,335	83	34	40
F6ABI	*	13,284	135	20	62
EA7HCB	*	12,308	140	25	43
NM1K	*	12,012	60	35	56
K5OI	*	11,880	69	30	36
YO6ADW	*	11,786	115	18	65
VE2ABO	*	11,368	103	18	31
RA3FO	*	8,736	144	8	40
KL7UR	*	8,308	115	15	16
UT5USX	*	6,489	43	27	36
DF8AN	*	5,929	130	16	33
JN2FSE	*	4,500	55	27	33
VA3JFF	*	4,480	61	27	33
WD9IAB	*	3,827	42	23	30
W2JEK	*	3,525	31	19	28
EU6TV	*	3,388	68	13	31
K1EQA	*	2,886	43	20	17
YO2LLG	*	2,760	31	14	26
DL2PY	*	2,310	55	10	20
DL1HTX	*	1,023	23	11	16
JM2RUV	*	840	15	15	15
4X1IF	**28**	**17,522**	**120**	**22**	**34**
KY5N	**"**	**13,740**	**93**	**16**	**44**
2MØAOK	**"**	**8,112**	**121**	**9**	**15**
UX3HX	**"**	**3,478**	**38**	**16**	**21**
JG2LGM	**"**	**2,184**	**36**	**11**	**15**
HK3/ SM5CCT	**21**	**172,773**	**786**	**19**	**62**
JR4DAH	**"**	**102,114**	**407**	**29**	**64**
LU6HI	**"**	**90,861**	**400**	**28**	**65**
KS9U	**"**	**72,836**	**245**	**31**	**100**
GØTDX	**"**	**68,730**	**359**	**21**	**58**
W4DEC	**"**	**59,085**	**225**	**23**	**78**
BV3FG	**"**	**47,348**	**476**	**24**	**52**
ZW2F	**"**	**44,620**	**254**	**29**	**68**
			(Opr. PY2ORF)		
JR7RJZ	**"**	**37,000**	**193**	**25**	**49**
JR1NKN/2	*	30,624	191	24	42
KH6/W1VT	**"**	**29,750**	**230**	**21**	**29**
9A3GU	**"**	**24,426**	**200**	**17**	**29**
JQ1NGT	*	12,712	116	23	33
RW6AHO	*	12,690	186	15	39
K8UCL	**"**	**11,470**	**70**	**17**	**45**
RVØAOZ	**"**	**11,000**	**142**	**16**	**39**
ES1CR	**"**	**10,530**	**88**	**17**	**37**
UAØZBK/Ø	*	4,675	100	9	8
KA6SGT	**"**	**4,644**	**72**	**14**	**13**
K3OO	**14**	**125,622**	**354**	**28**	**98**
VE7SBO	**"**	**102,245**	**389**	**33**	**88**
UAØKCL	**"**	**98,045**	**491**	**22**	**57**
YU1GN	**"**	**66,600**	**339**	**38**	**83**
GØOGN	**"**	**54,115**	**422**	**20**	**59**
RW9LL	**"**	**49,270**	**273**	**15**	**50**
VE3XL	**"**	**48,052**	**289**	**20**	**62**
EA3IW	**"**	**45,484**	**321**	**18**	**65**
US8UA	**"**	**37,996**	**222**	**25**	**67**
K4GEL	**"**	**29,100**	**138**	**17**	**58**
M7O	**"**	**20,928**	**209**	**18**	**46**
			(Opr. G4JZO)		
JA2HUN	**"**	**17,192**	**128**	**22**	**34**
DL4OBJ	**"**	**10,058**	**132**	**17**	**30**
SM6AHU	*	2,697	61	9	20
ES1CW	**7**	**76,035**	**441**	**26**	**85**
G3JXC	**"**	**56,938**	**353**	**19**	**79**
DL9YX	**"**	**16,170**	**137**	**17**	**81**
VE3SMA	**"**	**15,624**	**213**	**10**	**26**
SP5XSB	**"**	**14,905**	**241**	**8**	**47**
UK8ICO	*	7,080	84	7	23
G3VPW	*	5,332	86	8	35
N7RAP	*	2,720	75	8	9
KL7FAP	*	70	5	4	3
JA8HSC	*	24	5	3	3
4N1A	**3.5**	**35,014**	**408**	**14**	**68**
			(Opr. YU1YV)		
SP4GFG	**"**	**32,925**	**473**	**12**	**56**
RW3AI	**"**	**12,992**	**185**	**9**	**49**
SP4TBM	*	9,741	170	8	43
YC2OK	**"**	**4,130**	**43**	**11**	**24**
UAØQGQ	**"**	**3,465**	**68**	**14**	**21**
NC6M	*	1,104	22	11	12
			(Opr. W6REC)		
HA9RA	*	760	42	4	15
RA9CTK	**1.8**	**10,491**	**95**	**7**	**32**
UA4YKA	*	1,469	68	5	13
YT1T	*	624	24	5	21
			(Opr. YU1UA)		

ASSISTED

NORTH AMERICA

UNITED STATES

K1NG	**A**	**6,168,504**	**3015**	**168**	**576**
			(Opr. KI1G)		
K1AM	**"**	**3,141,040**	**2074**	**130**	**430**
N4XR/1	**"**	**1,743,694**	**1150**	**137**	**440**
NZ1W	*	1,291,213	1191	103	348
WC1M	*	1,225,080	1285	104	265
W1ZT	*	1,230,240	882	119	409
W1NG	*	1,160,016	772	139	433
KS1L	*	1,058,400	737	137	423
W1CSM	*	952,204	859	99	319
W1BIH	*	883,008	706	129	382
N1DG	*	829,837	679	125	374
K1AE	*	740,784	614	126	362
W1RZF	*	674,370	836	95	286
K1HI	*	456,388	733	76	208
K1TH	*	454,163	576	74	239
N6RFM/1	*	432,706	486	99	287
KA1CLX	*	420,965	582	77	218
W1CU	*	318,990	391	93	217
K1KP	*	301,806	584	48	159
K1MY	*	217,373	305	74	225
K1RV	*	189,999	301	69	158
NZ1Q	*	180,936	298	100	259
K1VV	*	62,329	142	52	105
K1NU	*	60,342	158	53	125
K1SM	*	60,192	165	38	94
N1SP	*	59,906	157	39	115
K1GE	*	49,248	141	66	96
N1NQD	*	20,989	93	54	85
WW1E	*	14,276	75	22	61
K1RM	21	62,871	392	8	49
W1YY	1.8	15,732	97	19	50
K2TW	**A**	**3,961,313**	**2198**	**154**	**513**
K2NG	**"**	**3,895,115**	**1996**	**170**	**593**
W2XX	**"**	**2,867,193**	**1698**	**149**	**490**
N2MM	**"**	**2,625,168**	**1675**	**148**	**476**
W1GD/2	*	1,702,134	1140	132	421
K2ONP	*	1,479,888	1195	126	390
K2NV	*	1,218,676	1069	104	294
W9NGA/2	*	1,175,518	960	125	389
K2SG	*	1,164,900	1183	80	273
W6TER/2	*	872,298	767	118	365
W2YR	*	759,024	551	128	374
K2AZ	*	749,523	685	107	326
N1CC/2	*	661,260	623	102	310
K2BM	*	571,200	578	96	304
KF2O	*	463,986	399	126	321
K2XF	*	448,465	498	95	254
K3JGJ/2	*	356,536	426	96	232
K2EP	*	180,792	274	63	185
W2BE	*	105,652	269	67	177
N2UM	*	79,488	190	72	135
K2BX	*	47,256	145	42	90
N2VW	*	41,827	126	46	105
K2JF	*	25,752	136	43	105
K2PF	**21**	**306,918**	**406**	**76**	**213**
N2UN	**7**	**109,980**	**280**	**45**	**111**
K3WW	**A**	**5,585,568**	**2939**	**159**	**542**
K3MM	**"**	**4,521,866**	**2471**	**160**	**514**
N3AD	**"**	**3,340,500**	**1923**	**158**	**497**
K3NZ	*	2,929,379	1679	149	528
W3EEE	*	2,788,236	1856	138	456
WF3T	*	2,684,000	2058	118	370
N3RR	*	2,187,936	1275	157	482
K3MD	*	2,053,626	1480	129	414
NN3Q	*	1,755,360	1292	123	407
W3OV	*	1,644,320	1317	116	362
K3ND	*	1,371,700	903	140	440
K3DI	*	1,243,398	968	121	373
N3II	*	1,104,092	816	123	383
K3II	*	1,055,792	729	144	460
ND3F	*	1,003,435	799	117	388
K3SA	*	964,090	839	108	313
N3AM	*	937,902	877	106	305
W3GK	*	915,264	734	110	338
WT3P	*	691,460	718	90	295
N3ZA	*	662,226	538	114	357
NM3K	*	524,107	556	104	297
W3CF	*	517,950	479	106	344
N3MKZ	*	502,124	490	113	341
K3CT	*	461,550	471	118	307
W3KV	*	372,096	440	82	222
KU3X	*	263,626	369	62	191
K3CP	*	237,327	325	85	246
KQ3F	*	213,368	412	55	124
W2UP/3	*	135,121	262	62	137
N3QQ	*	132,978	245	62	160
N3FDL	*	121,495	187	64	171
WT3W	*	120,848	223	59	149
K3AR	*	109,510	203	67	166
N3NZ	*	105,138	236	51	126
KB3TS	*	76,728	179	46	138
AA3JU	*	73,710	173	59	151
N3UN	*	64,064	154	57	125
W3AG	*	60,102	138	62	100
K3ATO	*	47,560	131	56	89
W3AP	*	45,453	129	39	100
K3PP	*	32,376	98	48	94
KE3VN	*	9,159	209	59	154
KA3MYM	*	989	16	10	13
NY3Y	*	805	16	8	15
W3TMZ	**7**	**40,736**	**149**	**32**	**102**
NN4T	**A**	**2,549,442**	**1752**	**149**	**457**
W4AU	**"**	**514,491**	**619**	**87**	**230**
W4UD	*	329,184	390	87	237
K4VV	*	206,800	321	74	161
K4ZAM	*	149,814	281	72	174
K2SD/4	*	106,358	231	72	142
K3KO/4	*	57,663	156	47	102
KT3T/4	*	40,320	246	70	140
W4WNT	*	34,071	103	45	78
N4KU	*	17,538	75	27	52
K7UPJ/4	*	16,984	93	35	53
KD4RIX	**28**	**26,316**	**115**	**22**	**64**
K4AMC	**21**	**407,012**	**766**	**49**	**145**
K4UJ	*	171,879	507	30	111
KD4OJM	7	52,300	191	27	73
W4DR	**1.8**	**10,788**	**73**	**17**	**45**
N5JR	**A**	**969,873**	**814**	**121**	**332**
K5LP	**"**	**945,472**	**683**	**146**	**398**
N5TJ	**"**	**944,646**	**694**	**146**	**388**
WQ5L	*	767,380	763	105	265
K5XM	7	60,794	209	31	82
K6XT	**A**	**914,850**	**685**	**151**	**384**
K6RO	**"**	**885,778**	**854**	**130**	**292**
K6ZZ	*	613,548	589	135	302
KD6WW	*	455,096	506	102	224
W6OAT	*	362,444	379	122	239
W6TKF	*	210,795	367	87	148
K6ZH	*	162,024	250	93	165
W6QK	*	142,105	261	93	200
W6RCL	*	104,940	242	74	124
K6UC	*	97,920	208	69	123
N6ED	*	22,321	83	36	65
N6ND	**21**	**402,051**	**949**	**43**	**126**
NO6X	*	157,563	583	32	91
W6EU	**7**	**486,720**	**1180**	**37**	**119**
N7NG	**A**	**955,719**	**848**	**134**	**303**
W7OM	**"**	**659,792**	**818**	**121**	**223**
N7RT	*	498,000	508	128	287
K7GQ	*	421,176	508	101	226
W7LR	*	345,886	394	115	211
KG7XC	*	331,702	491	89	177
W7WHY	*	321,745	495	95	186
W7NN	*	248,305	339	89	176
W8AEF/7	*	212,105	340	99	196
K7NPN	*	181,630	377	74	131
N7RO	*	138,788	321	58	99
K7WP	*	128,752	228	84	124
W7UB	*	64,076	217	62	104
K7ZUM	*	55,488	261	60	76
N7UJJ	*	47,320	144	50	90
K7ZD	*	4,592	38	24	32
K8MFO	**A**	**2,272,556**	**1290**	**150**	**488**
ND5S/8	**"**	**899,418**	**688**	**123**	**384**
W8JGU	*	888,840	862	96	264
KT8X	*	864,892	953	91	225
K8CX	*	360,732	492	79	197
N8RF	*	325,704	385	90	238
AA8OY	*	283,968	351	82	206
N8TR	*	126,444	195	72	185
KB3X/8	*	52,470	128	63	102
AA8LL	**28**	**34,056**	**160**	**22**	**66**
W8RU	7	16,548	78	24	60
W9OA	**A**	**256,834**	**377**	**82**	**199**
KC9TV	**"**	**196,080**	**371**	**76**	**209**
N9XX	*	185,741	264	89	192
WD9GGY	*	130,072	248	76	153
WE9A	*	124,660	204	85	145
KA9FOX	*	12,144	71	38	50
N9AU	**7**	**142,444**	**366**	**34**	**115**
N9AW	*	93,456	254	32	100
KØKX	**A**	**1,390,744**	**1015**	**140**	**386**
NRØX	**"**	**929,826**	**734**	**133**	**381**
NØAT	*	869,960	658	133	387
N5IN/Ø	*	362,135	557	111	224
WØWP	*	361,488	469	76	196
KUØA	*	250,290	301	100	209
KØBX	*	45,780	150	45	95
WB8ZRL/Ø	7	54,990	150	33	97

ALASKA

KL7VIC	A	48,418	237	36	50

CANADA

VA3NR	A	443,308	648	88	219

JAMAICA

6Y5/ JJ3TMW	A	42	7	7	7

MARTINIQUE

FM5DN	A	7,215,779	5687	141	442

(Opr. YT6A)

PUERTO RICO

WP4LNY	A	19,608	156	25	32
WP4KDE	"	2,139	40	10	13

ASIA

ASIATIC RUSSIA

UAØDC	A	389,398	828	89	137

HONG KONG

VR97BG	A	2,074,888	2398	129	290

JAPAN

JF1SEK	A	930,020	912	118	246
JA9XBW	"	801,528	843	131	236
JK2VOC	"	567,325	905	98	177
JH5OXF	"	303,000	482	90	160
JAØBMS/1	"	210,040	477	62	116
JAØBJY	"	32,732	123	35	63
JO2AXB	"	8,370	66	28	34
JJ2TKX	"	8,260	70	28	31
JH1FSF	28	5,805	55	17	26
JE9LLO	21	57,534	252	26	60
JK1OXU	14	25,604	127	25	49
JE9PFD	7	22,242	128	24	42
JJ3VPY	"	8,109	68	20	31
JHØTYE	"	1,584	20	13	20
JH1BBT	3.5	57,510	258	24	57
JK1GKG	"	23,892	148	21	45
JF3PNQ	"	1,470	24	13	22
JL1ARF	1.8	6,987	56	20	31
JE1SPY	"	598	21	6	7

EUROPE

AUSTRIA

OE1XIC/3	21	164,400	500	35	102

(Opr. OE1JNB)

BELGIUM

ON4CAS	A	188,466	497	56	146
ON5UM	14	145,530	722	30	80

CROATIA

9A3ZO	A	62,280	225	52	128

CZECH REPUBLIC

OK2XTE	A	227,022	388	91	223
OK1PG	"	42,828	144	48	81
OK2PDT	21	81,600	335	29	71
OK1MKI	14	76,590	373	27	84
OK1FDY	1.8	67,035	643	12	62

ENGLAND

G5LP	A	693,888	1338	90	326
G3NKC	"	627,800	818	99	331
GØMTN	"	174,795	514	54	161
M7P	28	30,959	153	23	60

(Opr. G4TNB)

EUROPEAN RUSSIA

RX3ARI	A	309,264	668	80	192

FINLAND

OH3BU	A	773,808	1106	101	291
OH2VZ	"	118,116	253	69	135
OH2LU	"	40,768	151	39	73
OH2EA	3.5	62,361	382	26	97
OH2BO	1.8	32,352	221	22	74

FRANCE

F5RBG	A	338,889	831	59	190
F5YJ	"	210,688	535	65	191
F5JOT	"	76,995	277	38	107

GERMANY

DL2MEH	A	2,283,147	1811	149	490
DJ2YA	"	2,228,666	1591	157	492
DL7ON	"	1,738,352	1603	160	456
DF4RD	"	1,473,395	1133	144	479
DL7MAE	"	1,207,584	1302	123	381
DK9IP	"	1,166,592	993	149	439
DL7VOG	"	820,854	833	121	365
DJ1YH	"	439,920	618	87	273
DL1IAO	"	394,492	881	64	129
DL8ZAW	"	379,942	716	64	207
DL5DXF	"	348,161	508	87	254
DL8KAW	"	336,217	562	75	226
DL8AAM	"	317,338	696	57	209
DJ9MH	"	306,527	510	89	234
DF3IAL	"	250,040	500	62	218
DL5OBZ	"	236,900	515	65	165
DL9SEV	"	214,630	499	71	183
DF2RG	"	182,490	411	66	171
DL4RCK	"	107,184	352	54	149
DK9DA	"	91,464	189	69	137
DK4QT	"	86,970	202	70	125
DJ5MN	"	65,481	170	59	160
DK8NX	"	39,837	103	60	87
DK2FR	"	20,670	125	35	71
DL2NEO	"	9,650	94	19	31
DLØYE	28	16,020	128	16	29

(Opr. DL9LAI)

DF9ZP	21	488,141	1256	38	129

(Opr. DK8ZB)

DL4NAC	14	615,416	1579	38	134
DJ4SO	3.5	136,962	761	28	98
DK5RK	"	14,040	203	12	53

HUNGARY

HAØHW	A	313,577	700	81	238
HA/N9NC	"	164,907	443	70	181

IRELAND

EI8GP	14	33,150	241	17	48

ITALY

IR2W	A	2,384,280	2012	141	414

(Opr. I2VXJ)

IK5TSS	"	882,534	1183	97	315
IKØHBN	"	558,125	636	127	348
IK4WMB	"	348,082	587	93	236
IK1YLL	"	92,538	265	43	116

MACEDONIA

Z3ØZ	7	246,500	1028	34	111

(Opr. Z32AF)

Z31GX	3.5	226,512	1508	25	96

NETHERLANDS

PI4TUE	21	166,980	579	31	90

(Opr. PA3EZL)

NORWAY

LA9GY	A	44,247	192	43	86

POLAND

SP7NMW	A	517,920	845	98	292
SP5ELA	"	516,078	1051	90	252
SP9LAS	"	19,097	93	30	49
SP3FAR	"	4,536	38	26	37

SLOVENIA

S58A	A	1,635,400	1642	124	357
S56A	"	775,024	956	117	355
S51NY	"	332,949	847	62	205

SPAIN

EA3BHK	A	178,784	318	91	205
EA4ECF	"	82,134	300	52	117
EA3AOK	"	67,614	165	55	122
EA7PN	"	56,286	134	62	115
EA4BT	"	52,632	228	41	88
EA4AUF	"	828	19	8	10

SWEDEN

SM5IMO	A	784,660	1217	88	244

SWITZERLAND

HB9FAP	A	673,344	1099	74	214
HB9AFH	"	29,606	88	52	79

WALES

GW3JXN	A	873,964	1247	94	270

YUGOSLAVIA

YTØT	3.5	141,327	1134	26	97

(Opr. 4N1DXX)

SOUTH AMERICA

ARGENTINA

LU7EAR	21	47,430	267	25	68
LU1BW	"	6,960	101	17	31
LW2EU	14	54,600	248	31	74

BRAZIL

ZZ2Z	A	779,824	1292	78	166

(Opr. PY2YP)

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1ZZ	6,751,382	3138	167	606
K1ZR	3,374,514	2374	126	424
AA1ON	1,281,892	1209	100	304
N1AU	589,612	501	109	337
W1QK	463,638	476	106	293
W1BK	335,124	364	122	306
K1EU	215,358	369	76	175
W1SRG	154,080	328	64	176
N2NU	9,139,372	4122	178	643
AA2FB	2,913,251	2059	137	446
W2CG	973,095	894	99	336
N2FF	902,853	941	113	346
K2OWE	858,192	874	114	342
N2LBR	800,162	743	98	309
KB5U/2	507,025	634	107	318
N2SS	326,697	385	89	240
W3GG	2,904,618	2050	139	438
WR3L	1,567,544	1147	120	397
NE3F	1,196,184	1139	134	418
K3SX	53,120	148	55	111
W4WA	4,548,258	2593	168	534
K4OJ	3,476,795	2283	150	467
NJ4F	2,974,536	2379	145	441
N8PR/4	1,201,516	879	146	410
AE4RO	1,148,736	842	130	366
W4PRO	866,628	795	131	412
K4NR	32,660	123	35	80
WA4FLZ	22,365	98	34	71
WXØB/5	2,674,026	1922	155	466
NA5B	1,817,984	1897	128	320
N5TW	512,624	584	100	222
K6ANP	943,599	755	143	310
KN6DV	171,628	468	74	140
K6III	151,008	288	92	150
W7VJ	1,814,400	1562	139	311
K7SP	1,703,349	1642	133	326
N7FE	863,550	1032	105	237
KO7X	410,345	523	108	187
WC7N	268,812	422	91	171
K8AZ	6,473,736	3167	179	596
K8LX	4,203,064	2389	159	515
N8NR	3,646,350	2067	155	520
W8ZA	293,260	395	87	223
W9JA	4,469,888	2427	176	567
WN9O	820,800	734	137	403
NØNI	4,459,806	2570	169	533
KVØQ	3,937,182	2619	166	440
N7DR/Ø	2,562,750	1886	135	375
NØIJ	2,509,353	1933	129	368
WØTM	1,930,860	1449	139	371
WØCQC	290,273	393	91	190
NØZA	243,360	368	76	164
KAØBWH	155,320	330	61	159

BAHAMAS

C6A/K8DD	3,522,657	3918	110	327

CANADA

VE9DH	7,222,328	4563	149	515
VE3DC	282,480	551	68	172

CAYMAN ISLANDS

ZF1A	11,971,520	7046	164	540
ZF2RV	3,782,254	3723	128	354

COSTA RICA

TI5N	3,816,253	4070	146	407

DOMINICANA

HI3/ DL1GKG	4,313,936	3918	117	391

MEXICO

6D2X	8,881,075	6129	166	499

PANAMA

3E1DX	5,914,270	5508	140	390

PUERTO RICO

KP3Z	10,135,725	6262	168	577

TURKS & CAICOS

VP5DX	3,454,705	3189	134	371

AFRICA

AFRICAN ITALY

IH9/OL5Y	6,228,264	4770	123	401

BURUNDI

9U5CW	2,103,904	2353	87	257

GHANA

9G5VJ	6,667,100	4962	121	354

LIBYA

5A2A	9,614,220	5460	158	502

ASIA

ASIATIC RUSSIA

RZ9AZA	6,583,164	3803	173	546
RK9CWW	4,133,540	2575	142	478
RK9CXM	1,303,686	1377	110	304
RK9KWI	1,527,630	1542	106	284
RK9AWN	1,249,560	1441	93	267
RK9SWF	971,536	1133	83	245
RK9CWY	805,896	1138	75	212
RZ9UWG	589,088	837	93	235

CYPRUS

P3A	11,755,121	6478	164	569

HONG KONG

VR2WO	4,397,067	4178	142	351

JAPAN

JH7PKU	3,584,480	2620	160	361
JR1ZTT	3,095,664	2341	165	363
JA7YAA	2,533,209	2361	150	347
JE6ZIH	2,464,592	2298	133	309
JA1ELY	1,456,260	1365	137	253
JA2ZJW	970,613	1297	111	202
JA6ZLI	633,548	810	106	192
JE2YHS	549,440	935	98	174
JA1YPA	340,068	705	71	133
JA7YAI	244,800	450	77	127
JA3YDH	96	4	4	4

KHIRGHIZIA

EX9A	4,764,842	4013	124	393

MALDIVE ISLANDS

8Q7DV	4,721,256	3832	146	406

MONGOLIA

JT1T	1,254,855	2343	108	215

THAILAND

HS8AS	527,172	1770	62	161
HS5AC	497,724	1176	74	162
E22AAA	299,512	849	94	138

EUROPE

BELARUS

EU8T	4,567,600	5183	137	460
EU5F	1,795,771	2651	117	362
EW35WB	980,463	1514	103	304
EW1WN	226,310	434	74	197

BELGIUM

OT7T	8,468,264	4506	188	666
OT7P	2,796,207	2736	129	392

BULGARIA

LZ9A	5,961,228	4833	169	552
LZ7M	4,735,700	5119	175	550

CROATIA

9A5D	2,353,225	2711	107	318
9A9D	822,140	1405	80	290

CZECH REPUBLIC

OK5W	5,930,442	3825	182	601
OL3A	3,440,770	3209	158	516
OL5T	2,188,021	2597	131	420
OL5Q	1,808,961	2327	119	332
OK1KQH	1,148,350	1661	89	261
OK2KOD	907,536	1169	112	326
OK2KDS	833,580	1215	93	303
OK1KZD	775,880	1688	84	256
OL2A	354,570	728	79	186
OK1KAO	60,264	504	28	96
OK1KUO	37,329	231	23	46

DENMARK

OZ8JYL	69,795	360	38	127

ENGLAND

M7A	2,428,225	3179	128	387

EUROPEAN RUSSIA

RU1A	6,942,530	4268	188	638
RS3A	6,206,706	4528	178	596
RZ1Z	4,791,888	3561	149	473
RN4W	2,590,851	2679	156	473
RK4WWA	1,779,769	2033	138	385
RW3WWW	1,108,492	1563	110	317
RK4HWW	1,074,276	1677	101	277
RK6AYN	936,594	1784	93	273
RZ4PZL	690,530	1258	97	250
RU3WWR	252,217	644	66	197
RZ1AWD	179,828	325	64	180
RK3IXX	152,030	507	58	172

FINLAND

OH7AAC	5,744,592	4099	176	562
OF1AF	5,298,530	3935	166	540
OF5M	5,013,796	3321	168	535
OF6NIO	3,280,476	2551	145	448
OF8AA	2,718,720	3065	119	361
OH6AW	1,777,230	2083	132	414
OH1TV	343,026	440	100	223
OH1AD	12,070	66	27	44
OH3AT	3,348	76	10	26

FRANCE

TM2Y	8,186,880	4985	176	592
TM9C	3,026,985	3187	133	426
F8KCF	2,049,840	2564	109	359
TM5DX	1,254,176	2151	89	263
TM6CEL	1,091,512	2691	83	251
F5PED	564,460	984	89	249
F5KAC	9,520	97	14	54

GERMANY

DL6RAI	6,275,512	3598	177	599
DF3CB	4,370,702	2900	170	551
DJ7TO	2,188,296	2258	141	473
DL7BY	2,140,333	1946	149	462
DLØDX	2,125,032	2055	123	433
DK1II	1,332,730	1417	131	422
DFØRI	928,550	1166	121	369
DK1RP	849,106	1164	113	344
DKØTZ	727,790	1056	92	278
DFØHTE	718,404	999	94	299
DFØFS	539,349	1357	79	260
DKØFFO	467,480	912	73	237
DL6YZ	398,310	689	81	249
DL4SKF	3,111	64	20	31
DL3SKF	2,200	49	17	23

HUNGARY

HG1S	7,642,128	5386	179	605
HG5C	1,043,748	1957	91	276
HA3KNA	1,100,190	1681	100	303
HA1KSQ	156,456	439	68	144

ITALY

IQ4A	8,660,429	4628	185	638
IO2A	3,030,872	2635	144	460
IQ4T	2,936,784	3095	114	358
IO2L	552,526	1114	70	199
IR5R	290,940	790	55	140

KALININGRAD

UA2AA	6,495,192	4345	194	640

LEICHTENSTEIN

HBØ/ HB9LF	2,394,294	2875	112	411

LITHUANIA

LY8X	2,863,452	2716	152	509
LY2OM	259,096	751	68	210
LY3MV	41,968	218	35	87

LUXEMBOURG

LX/ DL4SDX	1,971,156	2647	106	330

NETHERLANDS

PI4CC	1,833,627	2461	125	394
PI4ZLD	1,252,580	1808	116	344

NORWAY

LA8W	3,397,771	3498	149	462
LA6YEA	980,558	1608	81	226
LA1K	380,046	925	70	221

POLAND

SN2B	6,437,299	3841	179	590
SP9KRT	562,401	883	77	262

SCOTLAND

GM7R	2,575,848	2669	112	372

SLOVAK REPUBLIC

OM8A	6,967,919	4621	181	610
OM3A	3,549,825	3038	163	512
OM7F	6,586	80	13	24

SLOVENIA

S5ØG	2,817,936	2720	147	446
S59DHP	1,110,136	1626	99	287

SWEDEN

SK6NP	535,804	956	75	223

SWITZERLAND

HB9AA	2,262,498	2481	131	392
HB6FG	1,549,935	2178	103	284

UKRAINE

UU5J	3,385,475	2983	164	545
USØQ	3,261,511	4306	153	466
UT7L	2,446,402	2445	130	411
UR4PWC	1,195,155	1644	94	311
UT3IZZ	549,021	873	100	281
UT7Z	419,724	918	75	192
UR4MWU	236,192	792	65	179
UR4LZA	150,400	485	50	150

YUGOSLAVIA

YTØX	1,677,849	1852	129	372
YZ1V	591,375	968	90	285
4NØS	563,807	1190	82	222

4U-GENEVA

4U1ITU	3,893,197	4075	132	407

OCEANIA

AUSTRALIA

VK4EMM	2,646,498	2515	120	274

GUAM

AH2R	7,892,928	4938	170	398

LORD HOWE ISLAND

VK9LX	4,920,000	4389	129	302

NEW ZEALAND

ZM2K	4,212,468	3551	135	333

PHILIPPINES

DX1HB	2,583,031	3032	110	213
4G1A	555,9795	1165	77	130

SOUTH AMERICA

PARAGUAY

ZP9B	1,395,300	1794	94	206

MULTI-OPERATOR MULTI-TRANSMITTER

NORTH AMERICA

UNITED STATES

KC1XX	16,680,192	7146	187	701
K3LR	15,430,912	6504	199	697
W3LPL	14,586,038	6545	189	677
K1KI	14,480,136	6280	185	661
N3RS	11,837,336	5562	177	635
W1MD	9,982,868	4804	176	622
K8CC	8,976,852	4566	174	600
K2LE/1	8,648,220	4735	157	551
K1WD	8,630,136	4645	181	623
N2RM	8,147,220	4276	159	531
K4VX/Ø	7,920,933	4382	165	526
W3EA	7,162,430	3786	170	575
WØAIH/9	6,902,082	3851	173	553
NQ4I	6,631,020	3726	170	578
K1RX	6,414,510	3831	160	570
W3MM	6,155,360	3215	164	566
W8AV	5,541,184	3146	169	535
W6BA	5,460,852	3304	170	472
W4MYA	5,411,916	3276	156	510
W3PP	4,593,653	2773	165	536
W7RM	4,293,622	3152	162	424
KB1H	3,708,787	2400	144	473
K2WS	3,252,080	1920	156	533
K5RT	2,695,625	1597	158	467
N3DL	2,670,392	1944	144	487
K1GW	2,436,885	1804	134	413
W2YC	1,337,526	1171	135	423
W4ZR	1,208,151	1247	117	336
K6SG	1,201,830	986	140	345
K3KNH	720,564	814	106	341
K3ANS	659,694	759	104	313
N1MD	564,186	549	92	307
K1CN	215,710	311	78	187

ALASKA

KL7Y	12,699,080	9391	167	417

ANTIGUA

V26KW	9,902,857	7525	138	451

CANADA

VE3EJ	18,437,120	9176	184	648
VE5RI	560,443	1129	91	156

CUBA

T49C	7,352,694	7627	128	358

GRENADA

J39A	19,336,338	11503	169	569

JAMAICA

6Y4A	29,752,404	14770	187	649

AFRICA

CANARY ISLANDS

EA8ZS	21,915,001	10148	175	634

IVORY COAST

TU3F	1,640,412	2250	92	240

TOGO

5V7A	31,971,148	13601	190	646

ASIA

UNITED ARAB EMIRATES

A61AJ	9,108,396	6793	142	452

JAPAN

JH5ZJS	10,120,230	5545	186	504
JA3ZOH	9,416,844	4976	182	487
JA1YFG	3,954,720	3216	163	365
JA3YKC	3,221,240	3262	136	304

EUROPE

BALEARIC ISLANDS

EA6IB	10,580,839	8339	172	579

CZECH REPUBLIC

OK1OKE	545,072	1219	69	235
OK1KIR	429,307	684	87	244

DENMARK

OZ5WQ	2,458,979	3357	122	387

DODECANESE

J45T	1,102,686	4397	93	309

EUROPEAN RUSSIA

RZ3Q	6,664,224	5915	176	576
RW6AWT	6,349,716	5617	173	584

FINLAND

OH2HE	12,140,675	7062	205	690

GERMANY

DFØHQ	12,036,354	7607	186	657
DLØKF	5,570,565	4600	168	567
DK5EZ	2,028,024	2225	114	378
DL5RBR	27,768	159	27	62

HUNGARY

HG6N	10,295,646	7242	186	611
HG6Y	3,291,314	3735	133	421

ICELAND

TF3IRA	10,358,889	10210	134	445

LITHUANIA

LY5A	7,478,400	5677	178	582
LY7A	4,048,328	4480	156	487

NETHERLANDS

PI4COM	7,876,140	6362	174	571

SPAIN

EA4ML	8,489,760	7128	155	535

SWEDEN

SL3ZV	10,498,326	7594	180	573

OCEANIA

HAWAII

KH7R	15,794,111	8765	183	470

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Our thanks to the following stations who sent in check logs:

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THE 59(9) DX REPORT: Weekly DX and Contest bulletin. SASE for sample. P.O. Box 73, Spring Brook, NY 14140.

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PY QSLs: I accept donations of old Brazilian QSL cards (before 1950). I am preparing a report about amateur radio history in Brazil. Pse, send to Ronaldo Reis, PS7AB, P.O. Box 2021, Natal/RN 59094-970, Brazil.

ASTRON Power Supply, brand new w/warranty, RS20M $99, RS35M $145, RS50M $209, RS70M $249. Call for other models, AVT 626-286-0118.

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Advertiser's Index

(continued on page 107)

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WANTED: High-capacity 12V solar panels for repeater. <KK4WW@fairs.org> or 1-540-763-2321.

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SX88 Hallicrafters receiver wanted. Jim, W6OU, 714-528-5652.

RAINBOW AMATEUR RADIO Association, the gay/lesbian ham club. Active nets, newsletter, uncensored listserv. Privacy respected. E-mail: <RARA@EN.COM> or Dept. A, P.O. Box 191, Chesterland, OH 44026-0191.

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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>.

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/West Hollywood/1686>.

CASH FOR COLLINS: Buy any Collins Equipment. Leo, KJ6HI, Phone/Fax 310-670-6969, <radioleo@earthlink.net>.

MOTOROLA MICOR REPEATERS: 2m, 440, GMRS; $400. Complete UHF repeaters with duplexer; $600. Matt Bush, 941-694-5911.

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TRANSCEIVERS: Kenwood TS-520S $350, TS-820S $450, TS-530S $500, TS-830S $575. ICOM IC-761 $1095, IC-735 $600. K1BW 413-538-7861.

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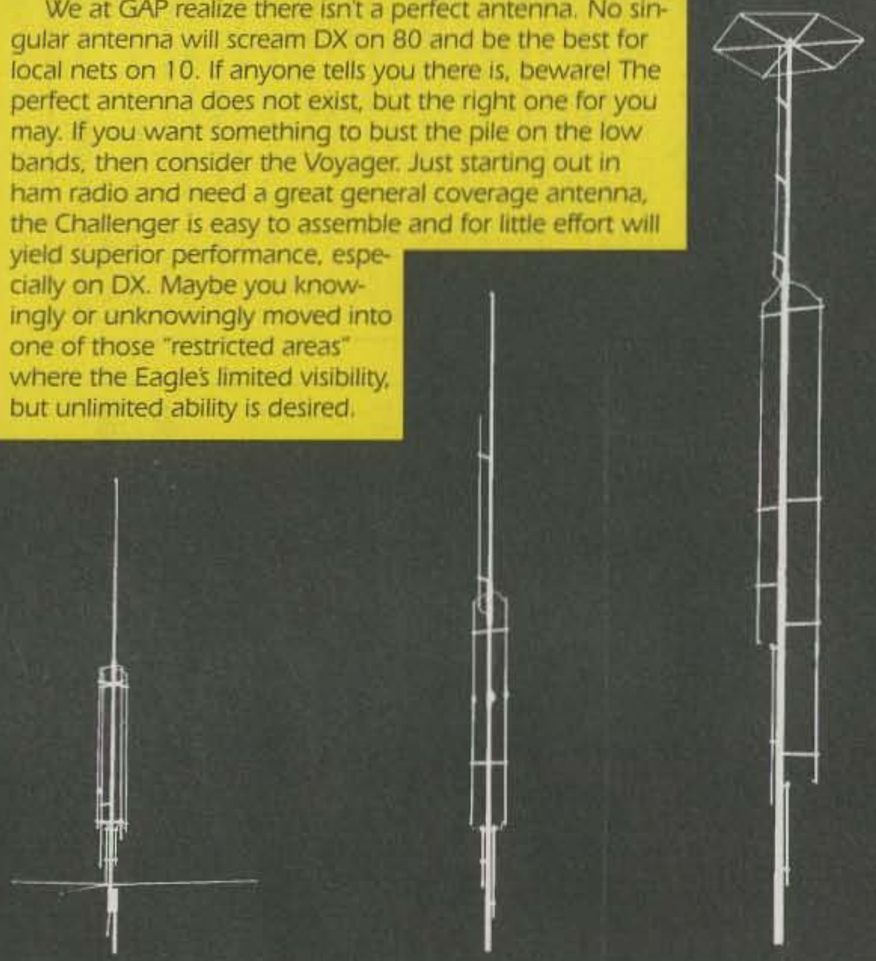


Eagle DX

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."

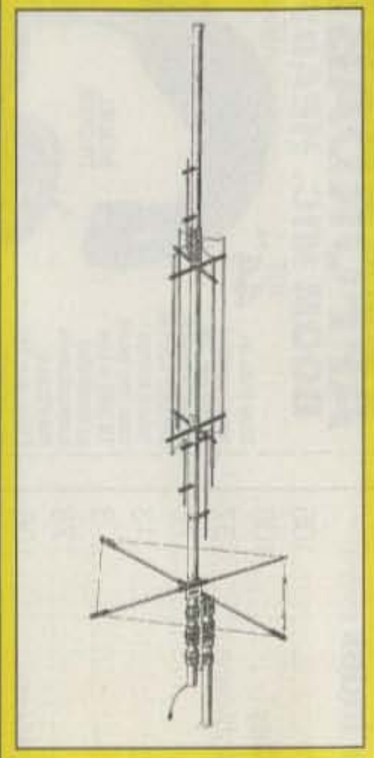
73–"This is a real DX antenna, much quieter than other verticals."

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."

Latest Release: **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'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$299
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

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FT-920
All-Mode HF/6m Transceiver

• High-Performance 33MIPS* DSP • HF + 50 MHz w/100 Watts-all Bands • MOSFET PA Finals • High Speed Auto Antenna Tuner (works on RX & TX) • Omni-Glow™ Dual Display • Twin VFO Knobs • FET RF Amplifier for High & Low Bands • Digital Voice Memory System • Quick Memory Bank (QMB)Frequency System • 127 Memories. *Million Instructions Per Second

FT-847
HF/50/144/430 MHz All Mode Transceiver DSP Filters--notch, NR and BPF •Built-in 6-Meter •Voice Monitor •Separate Sub-Band Dial •Shuttle Jog Dial •Smart Search •Digital Meter •19 Memories •100W for HF/6-Meter; 50W 2-Meter/430 MHz •Crossband Full Duplex •Normal/Reverse Tracking •CTCSS and DCS Encode/Decode •Direct Keypad Frequency Entry •1200/9600bps Packet-Ready

FT-840
High Performance Compact HF Transceiver

• High Receiver Dynamic Range • Dual Band Stacking VFOs with Direct Digital Synthesis (DDS) • 100W PO • IF Shift • IF Noise Blanker • Digital Mode Interface • CW-Reverse feature • Adjustable Repeater CTCSS Tones • Optional (External) Automatic Antenna Tuner • 100 Memories.

FT-600
Multi-Purpose HF SSB Transceiver

Frequency Range: RX: 50 kHz - 30 MHz; TX: 160-10M • 100W PO • MIL-STD 810 Rating • Alphanumeric Omni-Glow™ LCD Display • Keypad Frequency Entry • Optional CW (500 Hz) and AM (6 kHz) filters available • Dual Watch • Front-mounted Speaker with High Audio Output • PC Programmable • 100 Memories (in 4 banks of 25).

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*Optional equipment required

IC-756
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