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OCTOBER 1995

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Cover: Jeff Briggs, K1ZM, Hopewell Junction, NY

ADIO AMATEUR'S JOURNAL

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Introducing the remarkable new TS-870S HF All-Mode Transceiver with Next Generation IF-Stage DSP

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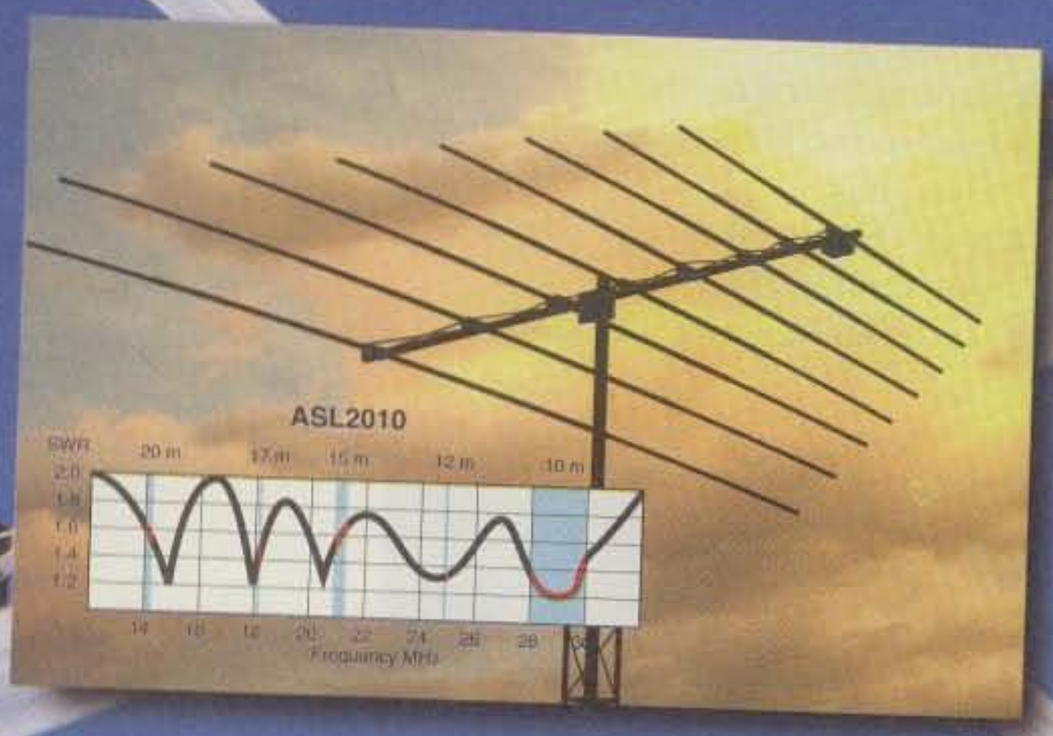

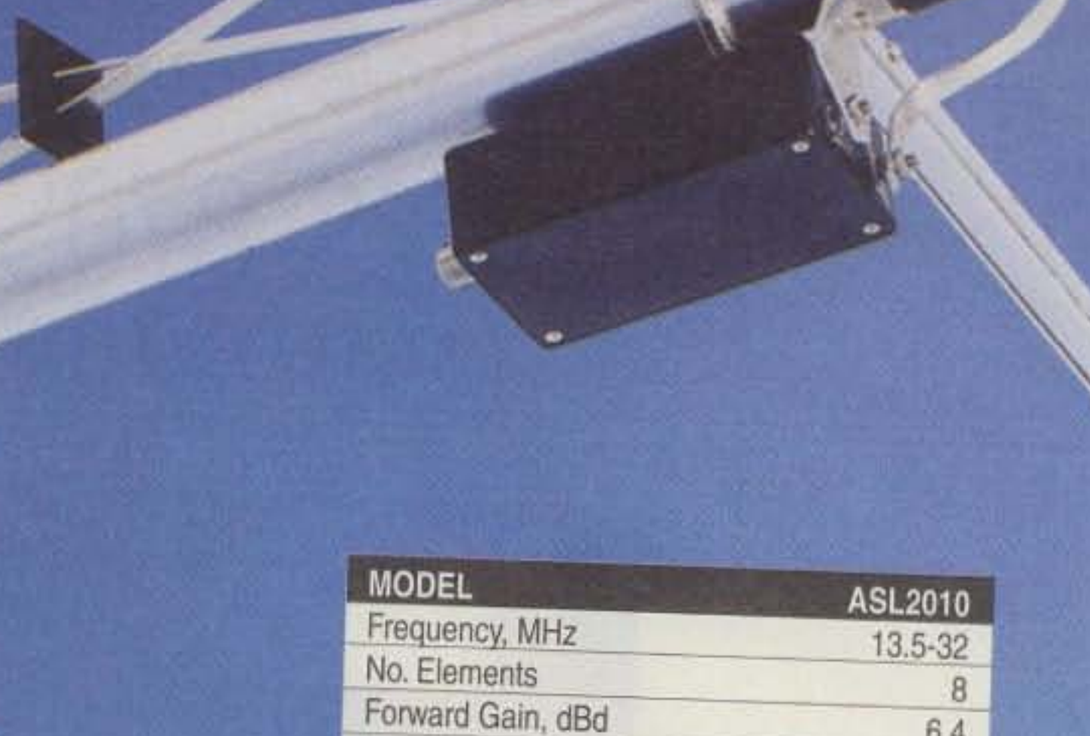

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- **6.4 dBd gain, 65 degree beamwidth**
- **20, 17, 15, 12 and 10 meters with one antenna**
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MODEL	ASL2010
Frequency, MHz	13.5-32
No. Elements	8
Forward Gain, dBd	6.4
Front to Back Ratio, dB	15-20
SWR 1.2:1 Typical 2:1 Bandwidth	18.5 MHz
Power Rating, Watts	2000
3 dB Beam Width, Deg. E Plane	65
Boom Length, ft (m)	18 (5.48)
Boom Diameter, In (cm)	2.0 (5.08)
Longest Element, ft (m)	38 (11.58)
Element Center Dia. in (cm)	1.25 (3.18)
Turning Radius, ft (m)	19.25 (5.86)
Mast Size Range, in (cm)	1.5-2 (3.18-5.08)
Wind Load, ft^2 (m^2)	10.1 (.93)
Weight, lb (kg)	55 (25.5)

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A publication of

CQ Communications, Inc.
76 North Broadway
Hicksville, NY 11801-2953 USA.

Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: (516) 681-2922. FAX (516) 681-2926. CQ (ISSN 007-893X) is published monthly by CQ Communications Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices (all in U.S. dollars): Domestic—one year $24.95, two years $44.95, three years $64.95; Canada/ Mexico—one year $37.95, two years $70.95, three years $103.95; Foreign—one year $39.95, two years $74.95, three years $109.95; Foreign Air Mail—one year $84.95, two years $164.95, three years $244.95.
U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government, including military services, only on a cash with order basis. Requests for quotations, bids, contracts, etc. will be refused and will not be returned or processed.

Printed in the United States of America.
Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

The Radio Amateur's Journal

ON THE COVER: Fierce contest competition and Jeff Briggs, K1ZM, go hand in hand. Here's Jeff's operating position, which has dominated 80 and 160 meters over the past few years. (Photo by Larry Mulvehill, WB2ZPI)

OCTOBER 1995 **VOL. 51 NO. 10**

FEATURES

DEPARTMENTS

ZERO BIAS

AN EDITORIAL

The world's greatest and biggest DX contest takes place later this month. While combining contesting and DXing produces an even greater anathema to some, the event itself momentarily raises then quickly buries any finite or even philosophical discussion of what is a country. In this month's DX column Chod Harris reports on all of the considerable machinations of the ARRL in their search for a proper definition of a country and for the perfect "who and how" used to make that definition. Pratas Island and Scarborough Reef are basically constructs of one's imagination. I don't believe either one has a Permanent Mission to the UN, local currency, postal stamps, or even one lone souvenir stand selling knikknaks to tourists.

Maybe it's something in the nature of amateurs that makes us want to take an inanimate construct and turn it into a carbon-based entity. We firmly believe that there are about 328 countries out there, with another almost 50 floating in historical ether, to which some of us lay claim. They're real, alright, as real as we want to make them. One's point of view is focused perhaps with respect to having worked the "country" or not. Another point of view might lend credence to something, by having several committees with important sounding names audaciously and interminably discuss the matter at length, then table it for future discussions. Something that serious must be real. With all that talk, one would think the fate and balance of the world was at stake.

If you remember, it wasn't too long ago when there was a tremendous discussion going on about the emergence of Albania resuming amateur radio activity. In the beginning it was almost a zoo, with real Albanians, not so real Albanians, and phony Albanians all getting on the air within a few blocks or so from each other. Who would "count"? Who didn't "count"? Who had permission and who didn't, and from which part of the Albanian administration? It didn't take very long for those to become academic questions as everybody had their fill of ZA contacts, and on a good day there were just about as many ZAs on the band as W4s.

In reality, all the amateur world had at that moment was a number of voices "saying" they were in Albania and using ZA calls. Most of us wouldn't readily recognize an Albanian accent, and so we took it on faith that whoever was saying we were 5/9 was actually in Albania and had someone's authority and permission to do so. Later on, a number of people who were not Albanians, and who did not live there, ultimately decided whether or not Albania was real and which Albanians were more real than others. Makes perfect sense to me.

Our level of confidence is somewhat increased if the operator or group is known to most other amateurs. We presume that if so-and-so says he is at Point X, then he is, no question. Historically, though, we know that isn't always the case. Some folks like to point their fingers at one particular individual who was famous (or notorious, depending on how you looked at it) for "shocking" the DX community by his alleged actions. Principally, his shortcoming in that affair was his personality. What he allegedly did was no different than many other operations of the day (and earlier). He didn't play the game the same way the others did and wasn't as well liked personally. Some of the others were indeed well liked, and it really didn't matter that they weren't exactly at or on Point X. Sometimes it was good enough just for them to "see" Point X. In some cases even that delicate distinction was overlooked. It was good enough that we wanted them to be there and we accepted whatever they said.

Is Scarborough Reef a country or will it ever be a country in the traditional sense? Well, I doubt that it ever will be divided into states or provinces complete with a major highway network, or boast a modern urban capital city. Tourists may never get the opportunity to go downtown in the capital city to visit the Scarborough Museum of Natural History to see the rich and varied record of the evolution of both man and the ecology of the reef. On the other hand, Scarborough Reef can obviously take pride in an extremely low crime rate—in fact, it's nil.

Is it then a country? In terms of amateur radio it is. Amateurs went there and operated from there, and I guess those aspects can be substantiated somehow, if it's really important to know. Is it a country in terms the rest of the world would understand? I think they would think we were crazy to even consider it or spend so much time, effort, and money over the remote possibility that it was a separate geographic entity. I think that just the simple fact that the host government went out of its way to encourage this cooperative venture is substantiation enough, at least in amateur radio terms. It's just as real as a piece of uninhabited frozen real estate in the middle of nowhere, supporting some birds and a lot of cryogenically preserved guano. Maybe we need a guano faction or some acceptable level of guano to state definitively that this indeed is a country.

If we want to get truly literal as to what a country is, then at some point we have to consider a local population, currency, postal system, economy, and, yes, a capital city. As amateurs we've always opted for a looser interpretation which would tend to increase the total number. We like to accumulate. Whatever it is, more is definitely better and certainly increases our standing within the community. More even includes the phrase "I've got more deleted countries than you." Try to explain that concept to a non-amateur. The one thing that most amateurs are not interested in is the concept of a "level playing field" or total equality in opportunity. Somehow I find it difficult to imagine all of us using the same one-tube rig and wire dipoles, and every couple of years doing away with our award and honor roll system just to be able to start clean once again so that all of us stay even.

I don't think that we're likely to have too many entrants in the CQ World-Wide from Scarborough Reef this year, so for most of us, working Scarborough Reef is still a long way off. It's also not too likely that we'll see a Delegate or Legation to the UN from Scarborough Reef show up this year. On the other hand, we're still waiting for the Permanent Legations from Hawaii and Alaska to show up, and they've been foreign countries for a long time. That possibly can be explained by some local confusion in that the indigenous population seems to feel that they're States, and part of the United States. Obviously, they're misguided and haven't read all of the committee reports.

We seem to have done this before with some fellow amateurs who said they were in Burma, who even received and sent mail from someplace called Burma. Some of us said they were real and some of us said they weren't. Overall, however, what was paramount was what the people in that place they called Burma called themselves. Maybe that's not important, and more time and effort should be spent convincing the Alaskans and Hawaiians that they're really foreigners residing in sovereign nations.

If either Scarborough Reef or Pratas show up in the CQ World-Wide, work them. We'll count them as countries even though our meetings weren't as convoluted and lengthy as some. Cass says "DX is" and he's right. It's an emotion, a feeling that's impossible to describe let alone dissect into discrete rational elements. It's the same with contests. It's feeling the fire and sensing the heat that makes you eager to jump in and be part of a great experience. Leave logic and reason behind, the same way you did when you first got interested in amateur radio. It was a flight of imagination as to a whole new world opening up, and you know, you were right. Something is, by virtue of believing it is. Maybe, every so often, we tend to forget what it's all about and impart meaning where none exists. Relax and enjoy yourself, and have a good time in the contest. See you there.

PS: You will not find an "Awards" column this month. Norm was in the hospital for a bit, but is right as rain and will be back next month!

73, Alan, K2EEK

0 to 9600

NEW GPS

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ANNOUNCEMENTS

• **The Bighorn Museum** of amateur radio has moved to Genoa, Colorado. They currently have over 600 pieces of restored working gear dating from the 1920s to the '70s, and amateur publications, periodicals, catalogs and memorabilia from the '20s to the present. There are nine operational stations on the air with future plans for an intricate linked UHF/ VHF/HF FM system and for a full-service packet BBS and link. The museum, which is fostered by The Colorado Bighorn ARC, Inc. also has a VE testing team. Donations are currently being solicited and accepted to make maintenance and operation of the museum possible. Organizations and corporations who donate to the museum will be encouraged to display their banners, brochures, publications or equipment within the museum. All who donate will be comemorated on a plaque which will be on permanent display in the museum. Direct all donations and inquiries to: The Bighorn Museum, Mr. Don Zielinski, KØPVI, Curator of Collections, P.O. Box "DX," Genoa, CO 80818-0119 (303-822-9868).

• **BMHA**—Continuing its policy of presenting informational programs to both the ham and non-ham public, the Bicycle Mobile Hams of America has announced a program/demonstration of bicycle-mobile VHF and HF equipment and techniques. The event will take place at the west coast's largest gathering of hams in Pacificon, Concord, California on Oct. 20–22. Neil Fullagar, KE6NCX, will coordinate the presentation. For more information, contact BMHA, Box 4009, Boulder, CO 80306 (303-494-6559).

• **Satern Emergency Services Seminar**—to commemorate the third annual conference, Oct. 13–15, in Kenosha, Wisconsin. Activities are planned for the lower portion of the General and Novice subbands. Digital activites are also planned. For commemorative QSL card, send your card and SASE, and name of operator worked to NH2Z, Al Shaver, Apt. #608, 84-265 Farrington Hwy., Waianae, HI 96792; or directly to operator contacted. Exams will be conducted at Camp Wonderland in Kenosha on Oct. 14.

• **Convention Radiantistica Internazionale** is commemorating the first centenary of wireless telegraphy and celebrating Guglielmo Marconi as their "Past President." The Bologna section on behalf of the National Steering Committee A.R.I. is organizing an International Meeting for Oct. 13–15. For information, contact: ARI, Comitato Celebrazioni Marconiane, c/o Sezione ARI G. Sinigaglia, C.P. 2128-40100 Bologna.

•These Special Events are scheduled for Oct.:

W2GSA, to commemorate the 100th anniversary of Ft. Hancock, and the site of the oldest continuously working lighthouse in the US at Sandy Hook, New Jersey; The Garden State ARA; 1400–2300Z Oct. 21 and 1300–1700Z Oct. 22; operating frequencies 3.840, 7.240, 14.280, and 145.485 repeater. Send 9 × 12 SASE with two units of first-class postage and QSL to Bob Roman, N2DR, 28 Catherine Ave., Red Bank, NJ 07701.

W3XX, from the submarine *U.S.S. Requin*, centennial of the Carnegie Science Center, Pittsburgh, Penn-sylvania; The Breezeshooters ARC; 1400Z– 2100Z Oct. 7–8; operation on vintage CW equipment in the lower half of the Novice subbands; phone in the General class segment of 20 and 40 meters. For certificate and QSL, send QSL and 8-1/2 × 11 SASE to Ron Berry, WB3LHD, 326 Sunset Drive, Bethel Park, PA 15102.

WI3A, from 95th anniversary of the first AM transmission, Cobb Island, Maryland; Southern Maryland ARC; 1500–2100Z Oct. 29; lower portion of the General 40, 20, and 15 meter phone subbands and Novice 10 meter phone subband. For QSL send QSL and SASE to Southern Maryland ARC, P.O. Box 273, Clinton, MD 20623.

KB3BHS, from the Houston, Pennsylvania Pumpkin Festival; WACOM; 1400–2000Z Saturday and 1600–2000Z Sunday, Oct. 14–15; in the upper portion of 40 and 20 meter bands and 28.340 on 10 meters. For a QSL, send SASE to WACOM, Box 1386, Washington, PA 15301.

KE4YVV, from 214th anniversary of the surrender of Cornwallis, Yorktown, Virginia; Williamsburg Area ARC; 1300–2300Z, Oct. 21; on 28.350, 24.950, 21.350, 18.150, 14.270, 7.270, and 3.870. For unfolded certificate, send QSL and 9 × 12 SASE to Hershel Kreis, KE4GWV, 145 Sand Hill Road, Williamsburg, VA 23188-6609.

KC4ZSV, to recognize the first settlement of Ashland, Kentucky over 200 years ago; Sept. 26; operation on 40 meters phone. For certificate, send business-size SASE to KC4ZSV, P.O. Box 612, Ashland, KY 41105.

KF4BHC, from Ft. Pickens, Santa Rosa Island; The Serious Hams ARC of Pensacola, Florida (IOTA NA-142); 1230–1800Z, Oct. 14. For QSL send SASE to N4MAD, Mike Brown, 519 S. Edgewood Circle, Pensacola, FL 32506.

KE4ZIS, from Halloween celebration, The Devil's Courthouse, Transylvania County, North Carolina; Transylvania County ARC; 2100Z Oct. 31 to 0100Z Nov. 1; on 7.234, 14.295, 21.365, and 28.335 SSB, and 146.52 FM simplex. For certificate, send a business-size or 9 × 12 SASE to TCARC, P.O. Box 643, Brevard, NC 28712.

N5SUM, from annual induction ceremonies, International Space Hall of Fame & Museum, Alamogordo, New Mexico; The Alamogordo ARC; 1500–2300Z Oct 21; SSB 28.475, 21.375, and 14.275. CW to be announced on the air. A QSL picturing the Space Hall will be mailed to all two-way/SWL requests received and confirmed. No SASE required or requested. Mail *must* be addressed to: International Space Hall of Fame, Attn: N5SUM, Route 2001, P.O. Box 533, Alamogordo, NM 88311-0533.

N5JRF and **N5UJA**, from Fifth Annual MissionFest. Co-sponsored by Christ Lutheran of Wichita Falls, Texas and Elim Lutheran of Lake Stevens, Washington; to talk with and encourage Christian missionaries throughout the world; 1500–0600Z Sat., Oct. 7 and 1900–0100Z Sun., Oct. 8; on 28.420, 21.420, 14.278, and 7.278 MHz. For more information, call 817-528-2474; or 206-334-2540.

KE5TC, to honor those serving on WWII submarines, aboard the WWII submarine *U.S.S. Batfish*, Muskogee, Oklahoma; Eastern Oklahoma Area Hams; 1400–2130Z Oct. 7 and 1700–2130Z Oct. 8; in the 80, 40, 20, 15, and 10 meter phone subbands. For QSL, send SASE to KE5TC, P.O. Box 436, Keota, OK 74941.

W6CUS, from observance the 90th birthday of the City of Richmond, California; The East Bay ARC; 0100–0500Z and 1700–2400Z Oct. 14, and 0000–0400Z and 1700–2400Z Oct. 15; General subbands on 80, 40, 20, and 15 meters; Novice subbands on 10 and 2 meters. For certificate, send QSL and 9 ×12 SASE to EBARC, P.O. Box 1393, El Cerrito, CA 94530.

KA6SPQ, to commemorate the Pt. St. George Light House, Crescent City, California; 1500–0000Z Oct. 21–22; General portion of the phone subbands. For certificate and QSL, send SASE to KA6SPQ, Bill Wortell, 110 Cannon Drive, Crescent City, CA 95531.

K8SCH/TS, W8DZ/TS, and **W8VND/TS** (plus others with the /TS suffix), from 1995 Tall Stacks Celebration, tri-state area around Cincinnati, Ohio; Oct. 11–15; operation on all bands and modes through 70cm. For special QSL send QSL to the Callbook addresses or N8FU, SASE or via bureau.

KCØGL, from Nowhere, Kansas, in conjunction with the Baldwin City, Kansas Maple Leaf Festival; also KCØGL/RR Mobile will be aboard the Midland Historical Railway caboose running between Baldwin City and Nowhere; 1400–2100Z Oct. 21; in lower General subbands 40–10 meters. Send QSL and 9 × 12 SASE for certificate to: Ken Blair, KCØGL, 1711 West 19th Terrace, Lawrence, KS 66046-2549.

KØRW, from Nowhere, Illinois *(in conjunction with the KCØGL Nowhere, Kansas operation)*; The Iowa Radiosport Society; 9 AM to 4 PM Central time, Oct. 21, the lower portion of the General 40 and 20 meter phone subbands. QSL requests with SASE to: P.O. Box 68, Burlington, IA 52601-0068.

NCØA, from the world's highest suspension bridge over the Royal Gorge, Cañon City, Colorado; The Royal Gorge ARC; 1400–2100Z Oct. 21; lower portion of the General 40, 20, and 15 meter subbands, and in the Novice 10 meter subbands. For certificate, send QSL and 9 × 12 inch SASE to RGARC, P.O. Box 2044, Cañon City, CO 81215.

WØIND, from 50th anniversary of closing of German POW camp near Concordia, Kansas; Kansas-Nebraska ARC; 1400–2000Z Oct. 21; lower 25 kHz of General phone portions of 80, 75, 40, 20, 15 meters, packet on 145.01 MHz. For QSL certificate send QSL and large SASE to Kansas-Nebraska ARC, c/o Arlan R. Campbell, WØNBT, Rt. 3 Box 20-A, Concordia, KS 66901.

OS4CLM, from the Canadian Liberation March, Belgium; Belgian Air Force ARA and Royal Naval ARS and the Belgian YL Club, to remember fallen Canadians during Canadian Week; Oct. 27–Nov. 5; SSB 3.685, 7.045, 14.145, 21.245, 28.545, 14.250; and CW 3.515, 7.012, 14.020, 21.020, 28.020, 144.020; FM 145.475; and packet OS4CLM@ON4KTK. An award will be available to all licensed amateurs and SWLs for any contact with this special event station. To get a QSL card and an award, send $5 (US) or 10 IRCs (proceeds go toward maintaining memorials and keeping the station on the air) to: ONL 453 (N1TBH), Bob Dyserinck, Vuurtorenstraat 12, B-8301 HEIST aan Zee, Belgium; or OS4CLM, Post Box 110, B-8300 KNOKKE, Belgium.

YW6AF, from top of the world highest water fall, the Angel Waterfall (El Salto Angel), Canaima National Park, Venezuela; The Radio Club Venezolano; 0000Z Oct. 21 to 2400Z Oct. 22; operation on 10, 20, 40, and 80 meters SSB, CW, RTTY, and packet. QSL cards given via YV6AG, P.O. Box 73, C. Postal 8024-A, Pto. Ordaz, Estado Bolivar, Venezuela.

• The following hamfests, etc., are slated for Oct.:

Oct. 1, **NW Ohio ARC Hamfest,** Allen County Fairgrounds, Lima, Ohio. Contact Jon Solomon, W8TY, 1370 Stevick Rd., Lima, OH 45807. (Handicapped accessible; exams.)

Oct. 1, **The Hall of Science ARC Hamfest**, New York Hall of Science parking lot, Queens, New York. Call evenings only: Charles Becker, WA2JUJ, 516-694-3955; or Arnie Schiffman, WB2YXB, 718-343-0172.

Oct. 1, **North Central Ohio Hamfest**, Ashland County Fairgrounds, Ashland, Ohio. Contact Wally Green, W3YXS, 3 East Liberty Street, Ashland, OH 44805.

Oct. 1, **Huntington ARS Hamfest**, PAL Club, Huntington, Indiana. Contact Chris Richardson, N9QVI, P.O. Box 284, Huntington, IN 46750 (219-356-0319). (Handicapped accessible; exams.)

Oct. 6–8, **Second Annual CVARC Hamfest**, Costerisan Lake, Bakersfield, California. Contact Al Chadwick, c/o KC-VARC, Inc., P.O. Box 743, Bakersfield, CA 93302 (phone 805-396-1012; fax between 8 AM and 4 PM PST 805-872-8774).

Oct. 7, **YCARS Hamfest**, Knights Stadium, Fort Mill, South Carolina. Contact George Trunk, AB4BG, 803-327-4344. (Exams.)

Oct. 7, **Bergen ARA Annual Spring Hamfest**, Fairleigh Dickinson University, Teaneck, New Jersey. For hamfest information call Jim Joyce at 201-664-6727; for exam info call Bob Neukomm at 201-427-3568 (before 10 PM). (Exams.)

Oct. 7, **St. Petersburg, Florida ARC Autumn Hamfest**. For information, contact Mark Farr, N9MIU at 813-895-9210.

Oct. 7, **Ham Expo '95**, Bell County Expo., Belton, Texas. Write to Temple ARC, 2014 S. 53rd, Temple, TX 76504; call Mike, WA5EQQ, 817-773-3590; e-mail: 72437.424@compuserve.com or laird@vvm.com. (Handicapped accessible). (Exams.)

Oct. 7, **Forx ARC Hamfest/Computer Fair**, University Lutheran Church, Grand Forks, North Dakota. Contact the chairman: Jeff Sorell, NØPPW, 701-594-5013. (Exams.)

Oct. 7, **Tri-City ARC Fallfest**, Chamber of Commerce Building, Bullhead City, Arizona. Call Dave Sumner, KG7XZ, at 520-763-2589 (home).

Oct. 7–8, **International HamFiesta**, Texas National Guard Building, El Paso, Texas. Contact Clay Emert, K5TRW, P.O. Box 10496, El Paso, TX 79995 (915-859-5502).

Oct. 7–8, **Swedish Annual DX Convention**, Karlsborg, Sweden. Sponsor: Lake Wettern DX Group. Contact SM6CTQ.

Oct. 8, **1995 Nutmeg Hamfest**, Durham Fairgrounds, Durham, Connecticut. Contact Bill Wawrzeniak, W1KKF, at 203-269-8252 (eves.). (Exams.)

Oct. 8, **Seventh Annual Shore Area Hamfest/NJ State Convention**, Brookdale Community College, Lincroft, New Jersey. Contact Al Allen, K2LG, at 908-495-3246. (Handicapped accessible.)

Oct. 8, **Maysville Hamfest**, Maysville, North Carolina. Contact Jo Ann Taylor, WD4JYR, 919-393-2120.

Oct. 8, **Springfield Annual Hamfest**, Clark County Fairgrounds, Clark County, Ohio. Call Ron, KB8JTD, 513-964-8618. (Handicapped accessible; exams.)

Oct. 8, **Shore Area Hamfest '95/ARRL New Jersey State Convention**, Brookdale Community College, Lincroft, New Jersey. Call the Hamfest Hotline at 908-495-3246. (Handicapped accessible; exams.)

Oct. 13–14, **QCWA National Convention**, Holiday Inn, Manchester, New Hampshire. Contact Gladys Chase, W1VPF, 203-668-0845.

Oct. 14, **Waycross Area Repeater Association Third Annual Hamfest**, Waycross Ware County Fairgrounds, Waycross, Georgia. Contact David Sweat, KD4FGC, 912-283-4603; 358 Pineview Drive, Waycross, GA 31501. (Exams.)

Oct. 14, **Augusta Hamfest**, Evans Middle School, Evans, Georgia. Contact Richard, KR4XN at 706-860-3828; or Rhonda, KE4DIM, at 706-560-9600; or write to P.O. Box 3072, Augusta, GA 30914.

Oct. 14–15, **The Greater Louisville Hamfest/ ARRL Kentucky State Convention**, Kentucky Fair & Expo Center, Louisville, Kentucky. Write to P.O. Box 34444-Q, Louisville, KY 40232-4444 (812-948-0037).

Oct. 14–15, **MemFest '95**, Shelby Farms Show Place Arena, Germantown, Tennessee. Call Mary Moore, AC4GF, 901-758-0661. (Exams.)

Oct. 15, **Centralia Wireless Association Annual Hamfest**, Kaskaskia College Gymnasium, 3 miles Northwest of Centralia, Illinois. Contact Bud King, WA9U, 618-532-6606. (Exams.)

Oct. 15, **KMRAC 17th Annual Ham Radio and Computer Swapfest**, Waukesha County Exposition Center, Waukesha, Wisconsin. Write to KMRA Swapfest, S46 W32264 Highview Drive, Waukesha, WI 53188. (Exams.)

Oct. 15, **13th Annual KARC/SMART Annual Hamfest**, Kalamazoo County Fairgrounds, Kalamazoo, Michigan. Call 616-657-4482.

(Continued on page 146)

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NR-73BNMO	2m/70cm	2.15/5.3	100	NMO	33.5	1/2 λ ,2-5/8 λ
NR-770SA	2m/70cm	2.15/2.15	100	UHF	16.9	1/4 λ ,1/2 λ
NR-770HA	2m/70cm	3.0/5.5	200	UHF	40.2	1/2 λ ,2-5/8 λ
NR-770HNMO	2m/70cm	3.0/5.5	200	NMO	38.2	1/2 λ ,2-5/8 λ
NR-770RA	2m/70cm	3.0/5.5	200	UHF	38.6	1/2 λ ,2-5/8 λ
NR-790A	2m/70cm	4.5/7.2	120	UHF	57.5	6/8 λ ,3-5/8 λ
SG-7000	2m/70cm	2.15/3.8	100	UHF	18.5	1/4 λ ,6/8 λ
SG-7200NMO	2m/70cm	3.2/5.7	150	NMO	36.6	1/2 λ ,2-5/8 λ
SG-7500A	2m/70cm	3.5/6.0	150	UHF	40.6	1/2 λ ,2-5/8 λ

MODEL	BAND	GAIN(dBd)	POWER (w)	MOUNT	HT (IN)	ELEMENT PHASING
SG-7900	2m/70cm	5.0/7.6	150	UHF	62.2	7/8 λ ,3-5/8 λ
SG-2000	2m	5.2	150	UHF	62.6	7/8 λ
NR-140A	1-1/4m	3.8	100	UHF	36.2	5/8 λ
NR-124	23cm	8.4	100	N	25	4-5/8 λ
CR-214S	2m/1-1/4m	2.15/3.4	120	UHF	37	1/2 λ ,5/8 λ
CR-224A	2m/1-1/4m	5.0/6.0	150	UHF	68.5	7/8 λ ,2-5/8 λ
CR-320A	2m/1-1/4m/ 70cm	2.15/3.8/5.5	200/ 200/100	UHF	37.4	1/4 λ ,1/2 λ , 2-5/8 λ
NR-2000NA	2m/70cm/ 23cm	3.15/6.3/9.7	100	N	39	1/2 λ ,2-5/8 λ , 5-5/8 λ

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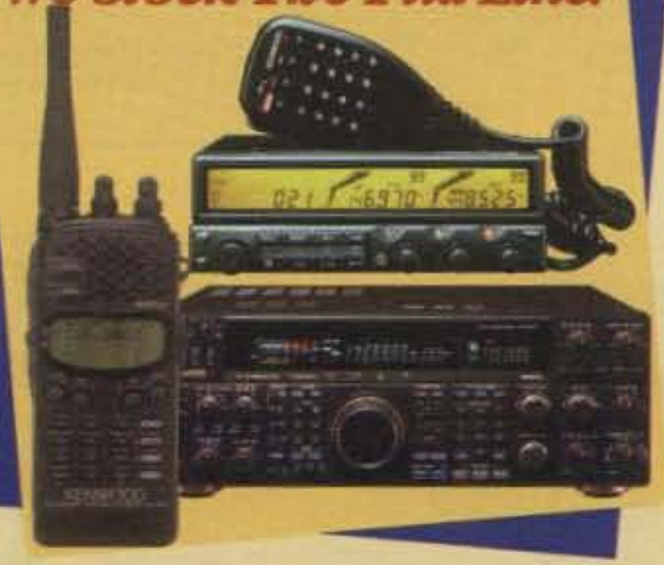

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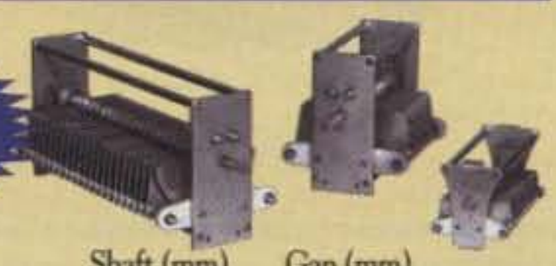

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CB-A-1400	1.2 kV	40 / 1,400	260 / 152 / 168	9.5 / 60	1.2	$89.95
CB-B-250	3.0 kV	32 / 250	237 / - / -	6 / 30.7	3	$49.95
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Results of The 1994 CQ World-Wide DX CW Contest

BY BOB COX*, K3EST

Planning does make for perfect. Ville, OH2MM, had planned his operation from EA8EA to go for the world all-band title. Operating from inside a converted water storage shed overlooking the Atlantic for 270 degrees, he keyed himself into the record books by winning a world championship at least once in each of three different decades! He first accomplished it as ZD3Z back in 1972—quite a great feat, Ville!

Venturing out on his first DX try at the top spot, Jeff, KRØY, operating at P4ØF, proudly claimed second place. Jeff also set a new CW QSO record of 6557 QSOs. Jose, CT1BOH, the SSB champion, rounded out the top three from the QTH of PYØFF.

There were three Asian stations in the top 10: H2ØA (Opr. 5B4ADA), A71CW (Opr. SP5EXA), and VS6WO (Opr. WX3N). Considering his distance from Europe and North America, Dave at VS6WO did an outstanding job getting those three pointers. Falling just outside the top 10 box at #11 was 9M8X (operated by OH2BH) and #12 Chris, ZS6EZ.

Congratulations to S59A, the top European score on both modes. You can sure tell that the sunspot minimum is hard upon us. Just like phone, the USA was often an afterthought on 10 and 15, especially from eastern Europe. One-sixty and 80 are now assuming more and more importance. Scores on CW were very tight with less than one million points separating first place from tenth place in Europe. The difference was often the number of 3 point QSOs and how error-free a log was submitted.

Second place went to YU7AV, Vojislav, operating from near the YO border. Ben, DL6RAI, carrying the flag of the Bavarian Contest Club, was third. Conditions were very strange, as seen by the fact that the highest European QSO totals were racked up by EMØF and UT2QT from the Ukraine.

A careful check of the top US logs revealed that the winner was Randy, K5ZD/1, over Bob, KQ2M, operating at KM1H. Out of 4931 QSOs only 11 QSOs and 2 multipliers separated the two stations. Wow! Randy's unique rate was very good, and he ended up as the USA all-band champion. Remember that the SSB top 10 had several non-east coasters. The conditions on CW were such that the top 10 guys stretched from Larry, N6AR, in Florida to KM1H in New Hampshire. The farthest west station was N6AR!

So how did the competitors do farther west (I mean really west)? K5MR led the pack, followed by KØRF and W9RE. Check out the new top scores in the active zone box for other worthy scores.

The top world score in the barefoot category went to 9X5EE operated by PA3DZN. Having

QTH of PYØFF operated by Jose, CT1BOH, on the left.

100 watts in Rwanda sure adds 10 dB to your signal. Working in war-torn Rwanda, he took time to hand out a rare multiplier. I think I can speak for everyone by saying, thanks for the rare one.

The world second-place, low power score was quite remarkable. Angel, EA7CEZ, operating with a KT34XA, Cushcraft 2-element 40 meter beam, a sloper on 80, and a LW on 160 took top European honors. But there is more to the story. He also was the top European score regardless of power! Of course we didn't believe it either, but a thorough check of his station and him proved that indeed he was the real thing. Being on the Iberian peninsula and having "spot-light" conditions allowed Angel to have an unprecedented result. Congratulations. Third place in the world went to J8ØC

Shown here is the ZF1A multi-single team. Left to right, front row, K9LA and K4UVT; back row, WA6VNR and W6OSP.

*1816 Poplar Lane, Davis, CA 95616

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
EA8EA	180/14/50	729/30/78	1299/30/94	1592/33/95	1658/32/102	946/23/89
P4ØF	319/15/49	732/20/70	1408/27/94	1376/30/97	1732/32/99	994/26/79
PYØFF	231/13/47	585/18/62	723/26/81	1701/35/100	1558/29/101	1100/21/82
HC8N	157/12/22	658/22/66	1037/30/86	1475/34/97	1582/29/89	956/22/74
PZ5JR	67/8/15	422/24/48	789/28/94	1269/30/95	1627/27/92	936/24/74
H2ØA	183/11/53	434/19/69	948/29/94	951/28/88	1157/31/87	722/17/66
HC1OT	35/9/14	393/14/41	1298/25/79	1050/30/85	1387/27/87	623/21/63
A71CW	178/11/47	497/24/67	681/27/88	891/35/105	1257/30/93	271/25/67
VS6WO	157/20/32	417/24/57	973/30/81	1035/33/79	1404/34/83	570/25/64
HC8KU	9/7/7	369/16/30	754/21/48	1321/28/80	1529/22/68	743/19/53

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K5ZD/1	97/13/43	265/18/64	627/31/104	823/34/108	614/23/77	45/13/34
KM1H	45/7/30	317/19/62	687/34/106	775/32/103	572/25/94	64/14/38
W1KM	35/10/29	401/23/78	599/28/101	674/29/100	457/22/76	38/14/30
N2NT	58/12/34	269/20/64	422/26/90	821/32/98	531/25/91	53/17/37
N4RJ	29/11/22	137/22/54	551/30/95	819/34/101	534/30/87	39/14/32
N2LT	46/12/30	165/15/54	447/32/99	893/37/111	385/23/84	31/12/26
N6BV/1	66/8/27	297/16/57	452/28/87	527/33/100	647/22/83	47/9/24
K3ZO	19/7/15	228/20/67	458/37/102	725/36/94	441/24/89	25/7/14
W2SC	22/7/15	203/15/60	375/29/79	708/33/97	495/26/82	28/11/17
N6AR/4	50/13/36	171/25/69	360/32/103	384/35/108	357/29/92	66/20/44

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A	70/16/69	448/29/98	1446/37/137	1241/39/137	1205/38/132	140/31/103
NP4Z	113/12/22	486/19/68	1476/25/88	1191/35/100	1323/29/100	528/21/72
OT4T	328/16/83	937/32/108	965/38/136	918/37/138	805/38/137	164/29/108
LZ9A	196/18/74	267/27/98	1874/36/134	1214/38/135	1044/37/129	259/29/90
HZ1AB	63/11/42	695/18/65	1302/31/98	943/35/112	1015/29/96	60/22/39
OH2M	75/12/60	343/28/87	1087/38/113	1696/37/120	756/36/120	71/26/69

USA MULTI-OPERATOR SINGLE TRANSMITTER

K1AR	52/13/47	496/22/92	669/35/122	1245/39/142	591/27/114	71/19/69
N2NU	61/18/56	430/23/90	406/36/120	1057/39/139	569/33/118	64/19/63
KC1XX	61/13/48	501/20/83	596/33/113	920/38/125	619/29/114	76/19/63
N3RS	35/12/32	255/21/84	932/37/137	711/40/138	591/33/124	60/16/58
K1TR	28/9/27	365/20/81	505/33/115	897/39/132	577/28/104	60/19/59
K8AZ	45/17/44	156/20/72	595/37/122	1153/38/130	322/32/107	51/18/50

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

9G5AA	91/7/28	939/22/75	2105/30/104	3610/35/131	2995/32/120	1323/28/85
VP5VW	869/18/72	1616/25/92	2994/33/122	3375/38/122	2271/31/104	615/24/74
KHØAM	297/19/26	830/31/60	1986/37/112	2537/37/121	1998/38/109	790/31/65
HG73DX	876/21/66	1800/32/120	2121/39/140	2147/39/151	1581/39/143	443/28/103
9A1A	991/18/79	1530/31/105	2299/34/128	2225/38/138	1783/38/127	224/28/83
YKØA	328/10/46	1248/19/69	2111/28/95	1803/34/95	1439/23/71	422/18/48

USA MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	117/20/66	544/26/99	1067/38/143	1539/39/152	707/35/132	222/23/74
N2RM	151/18/65	484/27/97	1114/36/132	1381/39/145	763/34/128	177/20/63
K1KI	150/12/52	453/21/84	925/35/132	1515/39/140	682/33/121	136/20/65
K3LR	166/17/59	342/24/88	996/37/126	1297/37/134	620/32/112	125/19/59
KY1H	197/14/56	478/21/87	383/33/107	1055/37/130	619/31/110	114/17/54
KY3N	60/16/41	276/24/88	568/35/123	977/38/139	484/33/117	79/18/49

operated by DL3KDV on a DXpedition for the BCC.

The second place in Europe slot went to EA5WU, who also put his EA location to advantage. Third place in Europe went to Franz, S59AA, who is always among the top scores and cooks a delicious fresh-water fish dinner.

Single op, all band, low power for the USA was won by Barry, W2UP/3. Barry fell into this category due to TVI problems; we all should have such "bad" luck! W1PH and K7GM/4 followed closely behind, taking second- and third-place spots. Also noteworthy was K2QMF, who despite having only 50% of the first-place QSOs, managed to have nearly the same (or more than) number of mults as the top three!

QRP

In the QRP category, TA4ZM (aka DK5WL) won for the world. Heinz-Josef found that moving from DL to TA enabled him to increase his score eight-fold, netting over 1600 QSOs with just a Buttnernut vertical and 5 watts. And thanks for the multiplier! Taking second-place world, and first-place USA (again) was perennial QRP winner Randy, AA2U. It is interesting that both Randy and Heinz-Josef each worked a total of 97 different countries, despite the ever-fading SFI. Even more interesting is the value of being a multiplier. Compare the TA4ZM score of 1.7 meg using a vertical with AA2U's second-place score of 486k using stacked KT34XA's at 90 and 38 feet, a 2-element 40 meter Yagi at 97 feet, and a full-sized 80 meter loop! Maybe we all should spend our funds having a fun vacation instead of laboring with hardware.

Assisted

The Single-Operator Unlimited category was won this year by John Crovelli, W2GD, operating at P4ØW in Aruba, with a new world record of over 10 million points. His score would only have been fifth in the world in the single-operator category, proving that the optimum use of packet spotting has not yet been found. Second place and first in the U.S. was Jeff, K1ZM, with 3.3 million. His score would have been fifth in the U.S. in the single-op category. Jeff was followed by OM3NA (top European scorer) with just under 3 million, which would have been sixth in Europe in the single-operator category.

The use of packet spotting assistance continues to spread worldwide, with a growing number of European entrants and even one from Hong Kong this year (VS6BG, top Asian scorer). However, it is clear from the log checking that many stations are assuming the callsign sent out on packet is correct. Many logs lost contacts (including some nice multipliers) by logging the callsign spotted on the packet system instead of the callsign sent by the station they have worked.

Multi-Single

In the fiercely competitive Multi-Single category, the world winner was the team from the mountain overlooking Bologna. Operating from inside a narrow cave, they outkeyed the second-place team of NP4Z. Felipe's crew consisted of three guys. What a great job! The Europeans take their multi-single seriously, as

Traveling down to HC, S53R (on the left) operated HC1OT (right).

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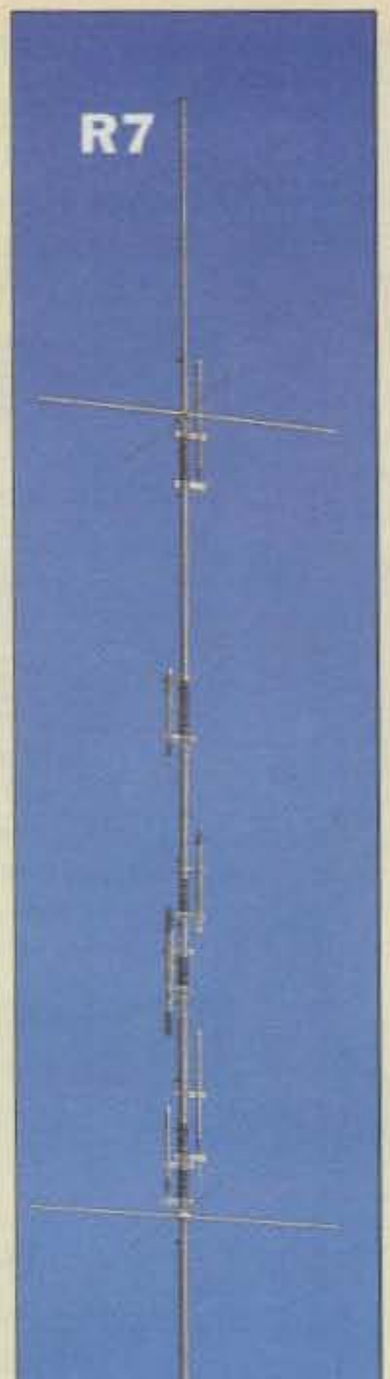

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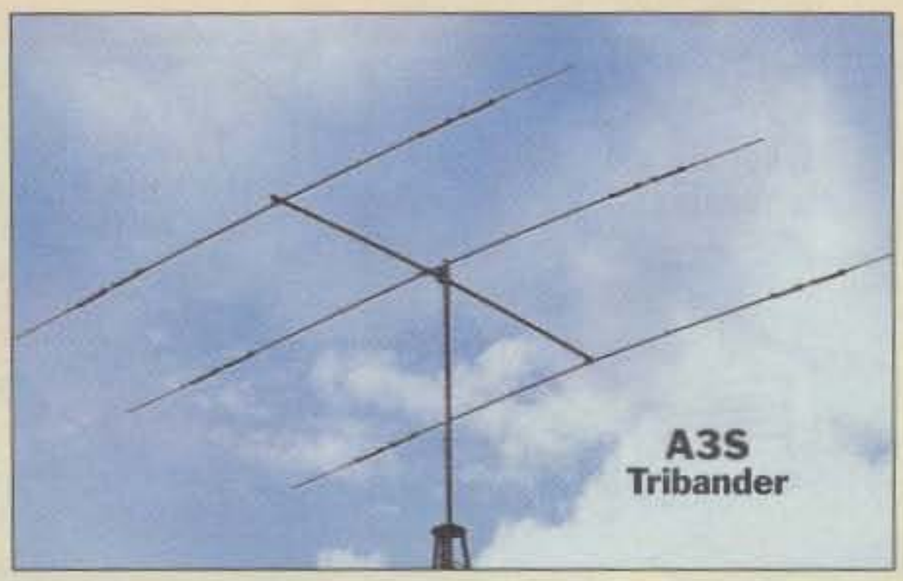

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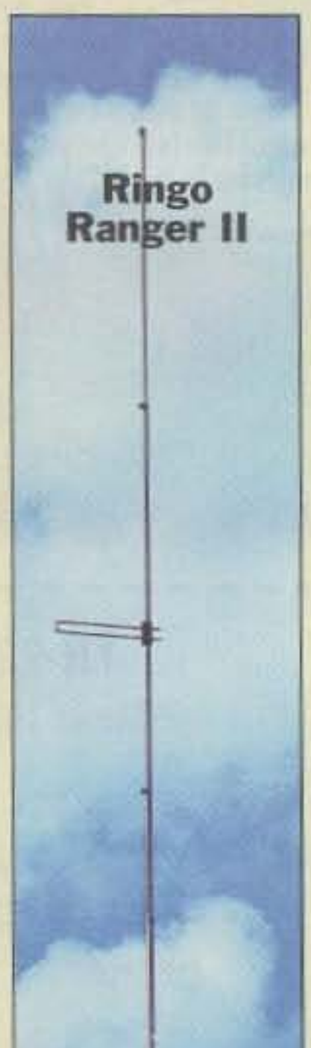

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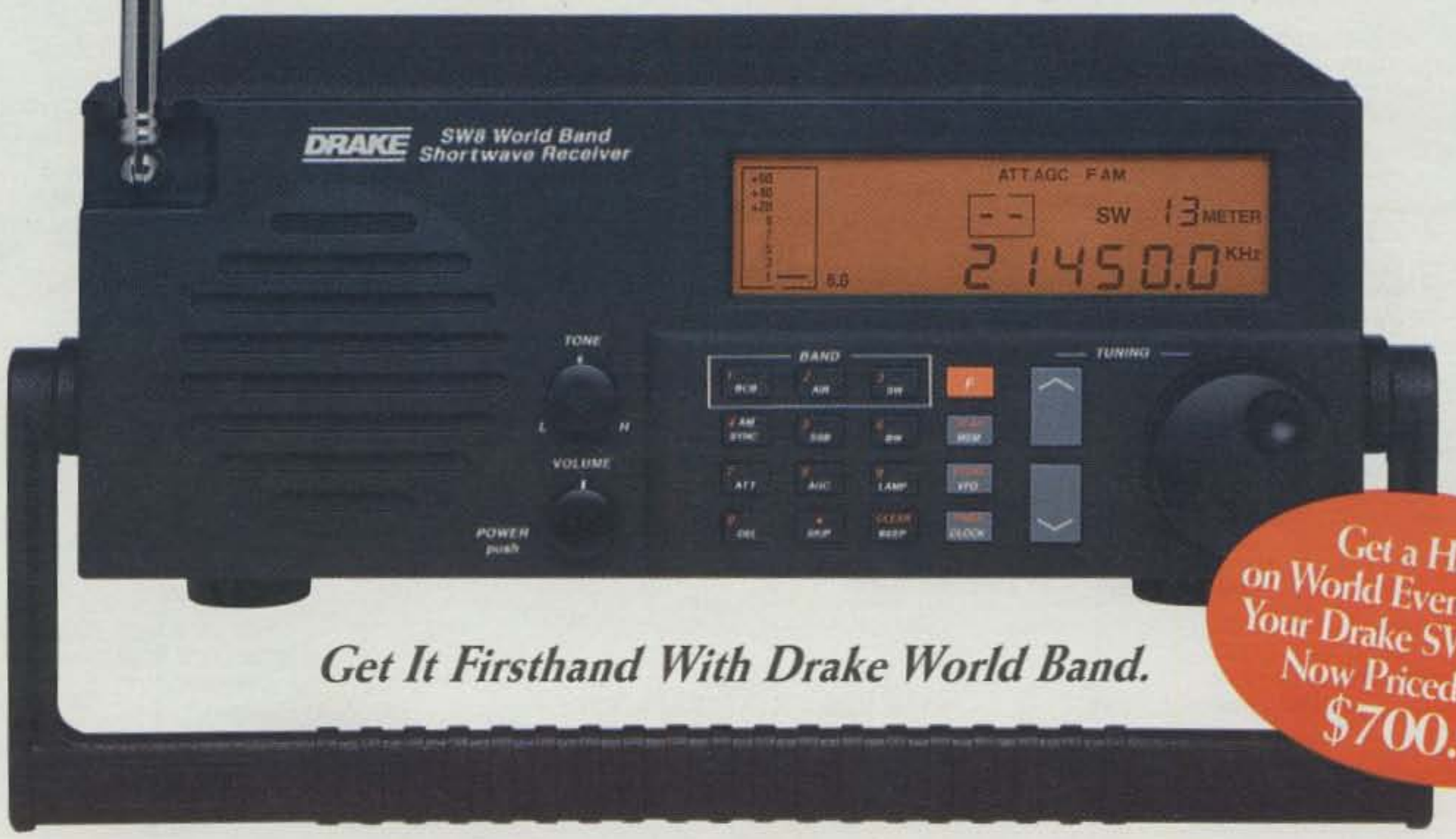

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9X5EE (Opr. Alex C.J. van Eijk, PA3DZN)
Donor: Slovenia Contest Club

World QRPp
TA4ZM (Opr. Heinz Josef Pick, DK5WL)
Donor: Gene Walsh, N2AA

World Single Operator Assisted
P4ØW (Opr. John Crovelli, W2GD)
Donor: Snake River Contest Club

U.S.A
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Donor: Frankford Radio Club

Canada
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Europe
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Oceania
9M8X (Opr. Martti Laine, OH2BH)
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P4ØF (Opr. Jeffrey Steinman, KRØY)
Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND
World—28 MHz
Jan van Niekerk, ZS6NW
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World—21 MHz
ZPØY (Opr. LW9EUJ)
Donor: Don Busick, K5AAD
N5JJ Memorial

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

World—7 MHz
Guillermo Perea Gonzalez, EA9EO
Donor: Alex M. Kasevich, VP2MM

World—3.5 MHz
ZB2X (Opr. Jorma Saloranta, OH2KI)
Donor: Fred Capossela, K6SSS

World—1.8 MHz
Richard Kline, 4X4NJ
Donor: Kenneth Byers, Jr., K4TEA

USA—28 MHz
Richard Boyd, KE3Q
Donor: Robert Clark, K6JYO

USA—21 MHz
Stephan Sacco Jr, KC2X/4
Donor: Wayne Carroll, W4MPY

USA—14 MHz
Robert Cox, K3EST
Donor: Northern Illinois DX Association

USA—7 MHz
Steven Kelly, KC7EM
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W6AM Memorial

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Europe—21 MHz
Jose R. Hierro, EA7KW
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Europe—14 MHz
OHØBH (Opr. Jukka Kulha, OH2MAM)
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G3FXB Memorial

Europe—7 MHz
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Europe—3.5 MHz
SN3A (Opr. Czeslaw Dubicki, SP3HLM)
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K3VW Memorial

Canada—14 MHz
Robin Eschauzier, VE9ST
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Carib./C.A.—14 MHz
KP2A (Opr. Robert Hayes, KW8N)
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SINGLE TRANSMITTER
World
IQ4A (Oprs. I4EAT, I4IKW, I4IND, I4LCK, I4LEC, I4PVP, I4TJE, I4VEQ, IK4CZF, IK4DCT, IK4DKO, IK4EWK, IK4QJH, IK2NCJ)
Donor: Anthony Susen, W3AOH

U.S.A.
K1AR (Oprs. K1AR, K1EA, K1GQ)
Donor: Douglas Zwiebel, KR2Q

Canada
VE3EJ (Oprs. VE3EJ, VA3DX, VA3EU, VA3NA, VA3RU, VE3CDX)
Donor: Eastern Canadian DX Assn.

Carib./C.A.
NP4Z (Oprs. NP4Z, WC4E, KP4EJ)
Donor: Ralph Bellas, Jr., K9ZO

Europe
LZ9A (Oprs. LZ1JY, LZ1UK, LZ2CC, LZ2DF, LZ2HE, LZ2II, LZ2JE, LZ2PL, LZ2PO, LZ2PS, LZ2TT, LZ2UU, LZ2WF, LZ2XA, LZ3DJ, LZ3SM, LZ5JW,LZ2-F-319, Vasko)
Donor: Friends of K3AO
K3AO Memorial

Oceania
WH6R (Oprs. WH6R, N6VI/KH6, AH6MZ)
Donor: Junichi Tanaka, JH4RHF

MULTI-OPERATOR
MULTI-TRANSMITTER
World
9G5AA (Oprs. G3SXW, GM3YTS, KC7V, K7GE, N7BG)
Donor: Hazard Reeves, K2GL Memorial

U.S.A.
W3LPL (Oprs. W3LPL, WR3E, W3EKT, AI3M, KE3Q, KF3P, K3RA, N3RR, W4BQF, KO7V, KE9A, KP4XS)
Donor: Bob Ferrero, W6RJ
N6RJ Memorial

Europe
HG73DX (Oprs. HA1AH, HA1DAC, HA1DAE, HA1TJ, HA2RV, HA2RX, HA5AWH, HA5CCC, HA5FM, HA5GF, HA5IW, HA5ML, HA5OM, HA5TI, HA5WE, HA6NF, HA6ND, HA6NL, HA6NQ, HA6NY, HA6ON, HA6PX, HA6WX, HA7RY, HA7VB)
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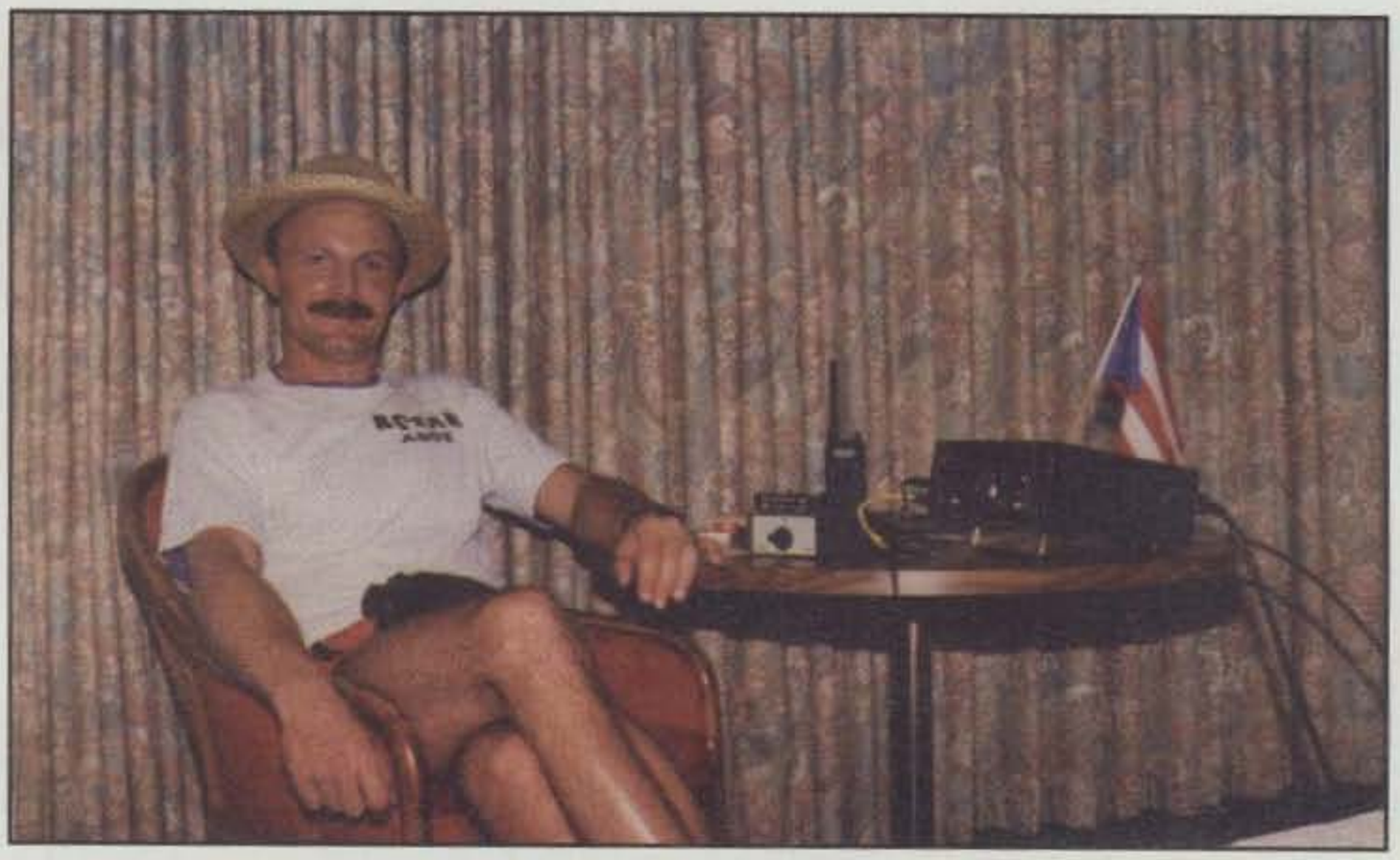

Andy, RC2AZ, happy at last from WP4/AA3BG.

you can see by the fact that four of the top six stations were from Europe. Finishing second in Europe and third in the world was the powerhouse of OT4T. Putting ON4UN's knowledge of antennas to work, they almost overcame their propagational disadvantage compared to stations farther south. The boys of HZ1AB should feel pretty good. They broke into the top six box. They made a lot of guys happy on the west coast of the US when their signal came booming in on the morning long path.

Finishing just below the world top six but finishing first in the US was the crew of K1AR, alias K1EA. They won by over 1 million points. They re-enforce that famous saying and add to it: Loud is good. Being in New England is good. And it's good to see Europe with a good pair of binoculars. Finishing second down FRC way was the excellent station of N2NU and crew. They edged out KC1XX, who came in third.

Multi-Multi

This category is always a battle. Five different continents are represented in the top six score box. You cannot ask for diversity. The winner was 9G5AA. These guys put a rare CW country into over 11,000 logs! Many comments from entrants offered their appreciation to that DXpedition for a new band or mode country. Second place went to the gang at VP5VW. They had more QSOs than anyone in the contest. The computer program they were using could only handle 10,000 QSOs, so they had to scramble when that number was exceeded! Third place went to the JA gang, who traveled to KHØAM. They were easy to work. Boy you would drool if you could see their 160 log into JA. The top European score was HG73DX, who edged out their rivals farther south in Croatia, 9A1A.

In the US Frank's crew at W3LPL is sure pushing the edge. They were tops in all three categories: QSOs, zones, and countries. Diversity of antennas and heights is sure paying off. To find out who was responsible for the score, check out the operator list. Located at almost the same latitude but farther east in the New Jersey pine barrens was the fine crew of

College student enthusiasts from the Chiba Institute of Technology at breakfast (not sushi) after operating JA1YDU.

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CLUB SCORES

USA

Frankford Radio Club	251,636,558
Yankee Clipper Contest Club	139,840,284
Northern California Contest Club	63,342,527
Southern California Contest Club	60,104,394
Potomac Valley Radio Club	53,156,219
Society of Mid-west Contesters	26,377,569
North Texas Contest Club	24,468,002
S.E. DX Club	17,279,099
FLA CW Contest Group	13,961,280
Oklahoma DX Association	12,990,580
Carolina DX Association	12,748463
Mile High DX Association	12,130,967
Texas DX Society	11,654,935
North Florida DX Association	10,779,947
Mad River Contest Club	10,182,631
Northern Alabama DX Club	8,455,575
Dixie Dxers	7,770,212
Central Virginia Contest Club	6,274,905
Willamette Valley DX Club	6,195,389
North Coast Contesters	6,193,010
Minnesota Wireless	5,624,698
Southwest Ohio DX Association	5,234,958
Kansas City DX Club	4,479,804
Lone Star Contest Club	4,380,419
River City Contesters	4,196,226
Southern California DX Club	3,880,419
Western Washington DX Club	3,710,409
Northern California DX Club	3,611,810
Order of Boiled Owls New York	2,984,003
Kentucky Contest Group	2,536,576
Hoosier Contesters	2,485,227
Rochester DX Association	2,042,715
Western New York DX Association	1,856,849
Northern Ohio DX Association	1,742,092
Central Texas DX Contest Club	1,390,899
Salt City DX Association	1,367,694
San Diego DX Club	1,293,891
Mississippi Valley DX Contest Club	1,172,662
South Florida DX Association	1,161,541
Northern Shenandoah DX Club	1,123,786
Glocester County ARC	1,108,477
Amarillo DX Society	891,486
Redwood Empire	639,274
Long Island DX Association	571,349
Genesee County Radio Club	497,240
Santa Barbara	479,680
Albany ARA	436,049
California Central Valley Contest Club	397,353
Central Arizona DX Association	303,844
South Jersey Radio Association	239,926
Williamsburg ARC	173,785
Grumman ARC	141,231
Easten Iowa DX Association	94,652
Sterling Park ARC	71,544
Valley Radio Club	60,948
Westpark ARC	60,451

DX

Bavarian Contest Club	83,215,092
Rhein-Ruhr DX Association	82,081,388
Slovenian Contest Club	39,957,790
Ukrainian Contest club	37,971,085
OH DX RING	37,129,792
Hungarian DX Club	28,649,328
LNDX	18,104,218
Croatian DX Club	17,593,490
Chiltern Contest Club(G)	15,882,795
Delta Mike(I)	15,254,748
Kaunas University Radio Club	14,777,590
LYNX	14,580,040
SP DX Club	9,894,299
Vojdovina Contest Club(YU)	8,694,193
YU DX Club	7,749,941
Alaska DX Association	5,498,563
Tupy Contest Club (PY)	4,835,704
Top of Europe Contest Club	3,507,123
Danish DX Group	3,246,305
Lithuanian DX Group	3,179,378
Bavarian DX Club	2,799,798
RAST (HS)	2,722,490
Beemter Contest Club (PA)	2,440,957
OH3NE	1,949,804
Fraser Valley DX Club(VE)	1,457,718
Perugia DX Club (I)	1,404,241
Sarajevo Contest Group	1,379,522
Dream Team (S5)	1,364,326
GACW (LU)	1,101,578
FOX Contest Club (YU)	767,794
Belarus Activity Group	725,564
Bavarian DX Group	713,644
Berghem Contest Club (PA)	662,921
Calgary ARA	660,977
Amsterdam Contest Group	637,164
South German DX Group	489,886
Berlin DX Group	489,514
Czech Contest Club	435,689
YV DXPERT'S Team	306,369
OZ9EDR	288,596
Kaunas Radio Club	246,384
Tiara Club (JA)	184,749
Tartu Radio Club (ES)	157,753
SP Contest Club	128,891

Bob, N2RM. Third place was taken by the new multi-multi K1KI.

We would be remiss if we did not mention the winners of the multi DXpedition trophy, YKØA. A special DXpedition which was centered around the CQ WW, they offered RTTY, WARC band contacts to the deserving before and after the contest. They are to be congratulated for the goodwill they generated in Syria for amateur radio. Well done, guys.

Records

The following outstanding operators set new World records: 4X4NJ (1.8), 9X5EE (Opr. PA3DZN) (Low All Band), PT7CB (Opr. YU1RL) (Low 14), P4ØW (Opr. W2GD) (Assisted All Band), IT9XUC (Assisted 14), PA3EBT (Assisted 3.5), OHØBCI (Assisted 1.8). Other

TEAM CONTESTING

1. **FRC and the Cookie**: 31,306,866. By N2NT, N2LT, W3BGN, P4ØF (KRØY), P4ØW (W2GD).
2. **Team from Cyberspace**: 26,173,840. By HC8N (WN4KKN), VS6WO (WX3N), N4RJ (KM9P), K5ZD/1, N6BV/1.
3. **OH-DX-Team**: 22,857,620. By 9M8X (OH2BH), DX1EA (OHØXX), EA8EA (OH2MM), ZB2X (OH2KI), LX4B (OH2PQ).
4. **Top Guns**: 10,770,786. By W2SC, WJ2O/KP2, OH6KIT, W1WEF, K3TUP.
5. **Wild Wild West**: 6,059,933. By N5RZ, K5MR, K6XO, ZF8BS (AA6KX).
6. **Barefoot Men**: 3,623,924. By AA4GA, K7GM/4, K7SV/4, XE1/AA6RX.
7. **The Uno-banders**: 2,790,571. By UN2L (UA9BA), 9M6NA (JE1JKL), IO9T (IT9TQH), NQØI, DLØIU (DL4AAE).
8. **Jorge Bozzo, LU8DQ, Memorial**: 2,275,903. By ZPØY (LW9EUJ), LU1ICX, LU6ETB (LU2CW).
9. **Slovenian Contest Club #2**: 1,434,002. By S5ØA, S59L, S5ØK.
10. **Slovenian Contest Club #3**: 524,835. By S57U, S57W, S53EA, S51AY.
11. **Top of Europe Contesters**: 482,854. By SM5IMO, SM3SGP.
12. **Elettra Marconi (YL's)**: 417,268. By I2RLX, I5AZX, I5UNA, IKØPXD).
13. **Five is Enough (Most QRP)**: 113,016. By VE6SH, VE6GK, N7ENU.

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TEN-TEC

Multi-single OE2S was manned by OE2GEN and OE2LGM.

than those above, the following set continental records: EA9EO (7), ZL3GQ (7), JA7SSB (Low 14), OHØBH (Opr. OH2MAM)(14), EA7CEZ (Low All Band), OL7Z (Opr. OK2PAY) (Low 14), US4EX (QRP 21), II8W (Opr. IK8JSV) (Assisted 7), KP2A (Opr. KW8N) (14), CO2VG (Low 3.5), KIØG (QRP 1.8), W8UVZ (Assisted 1.8), P4ØF (Opr. KRØY) (All Band), YV3AJ (Low 28), and 4M7A (Low 3.5). Congratulations to all!

Clubs

What a job! I guess those words have been said almost every year when describing the Frankford Radio Club's gigantic score. Not only did they win, but thanks to efforts of K3WW and others, they also submitted the easiest to process logs. They all arrived in one box (no envelopes). SSB and CW were submitted separately, and all the computer files were properly named and on one disk! Other clubs please take note.

Also leaving nothing to chance were the top two European club entries. They both submitted most of their logs as a unit in one box. The scores were very close. After careful checking, the Bavarian Contest Club was declared the winner of the DX club trophy.

Comments

If you could hear all the data going back and forth on internet concerning the CQ WW contests, you would swear that you were in an enormous pile-up! Thousands of crosschecks, thousands of logs looked through. The information highway was very busy. Next year we

(Continued on page 116)

On the left CR3U operated by DL2HYH, and on the right CT3FN operated by HB9CRV.

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Business travelers and vacationing hams typically set up a briefcase or small travel bag to include the 5 lb SCOUT, wire or whip antenna and lightweight power supply like our Model 938 switcher (its only 3 lbs!). It is surprising how many hikers and cyclists take along their SCOUT using some clever battery arrangement.

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Our peripatetic friend WB2AQC takes us to meet some new friends in Romania.

The Amateurs of Bucharest, Romania

BY GEORGE PATAKI*, WB2AQC

Bucharest, the capital of Romania, is the largest city of the country and has the biggest amateur radio population of all the urban centers. In the United States the federal capital of Washington, DC is not the largest city of the country, and the state capitals are not necessarily the largest municipalities of their regions. In the European countries, however, usually the most populated and developed cities are their capitals. The number of amateur radio operators in big cities is larger than the average per capita because there exist more educational possibilities, and more people. Bucharest is the power center of the country, and the ones closest to that power receive the most benefits.

The Federation of Romanian Radio Amateurs is in charge of organizing the activities of Romanian amateurs. It is sponsored by the Ministry of Youth and Sport and is subsidized as a technical sport, emphasizing participation in competitions. The General Secretary of the Federation and his deputy work in Bucharest, but they often visit amateurs and radio clubs of other cities. The country has 40 counties and the majority have county radio clubs with full- or part-time employees or chiefs of the clubs. There are also municipal radio clubs run by volunteers, except for Bucharest, which has a full-time chief.

The incoming YO-QSL bureau is located at the Federation, where received cards are sorted and distributed to the county clubs. However, each county club is responsible for its outgoing QSL service. The radio station of the central radio club, YO3KAA, active mostly in contests, is also at the Federation.

The municipal radio club has its own station—YO3KWA. Every Tuesday afternoon after 4 PM the local amateurs gather there to pick up their QSL cards, to borrow or return books and magazines from the club's library, and to exchange news and gossip. Once a week a course in electronics and rules and regulations, plus a code practice session, is held for those who want to take the licensing test.

At the club I met people in all kinds of professions. Many were high-ranking officers, some were retired, and others were still on active service. Some of them were from the armed forces, while others were from the secret police. As I said, some were retired and others were still in active service. Often I did

*84-47 Kendrick Place, Jamaica Estates, NY 11432

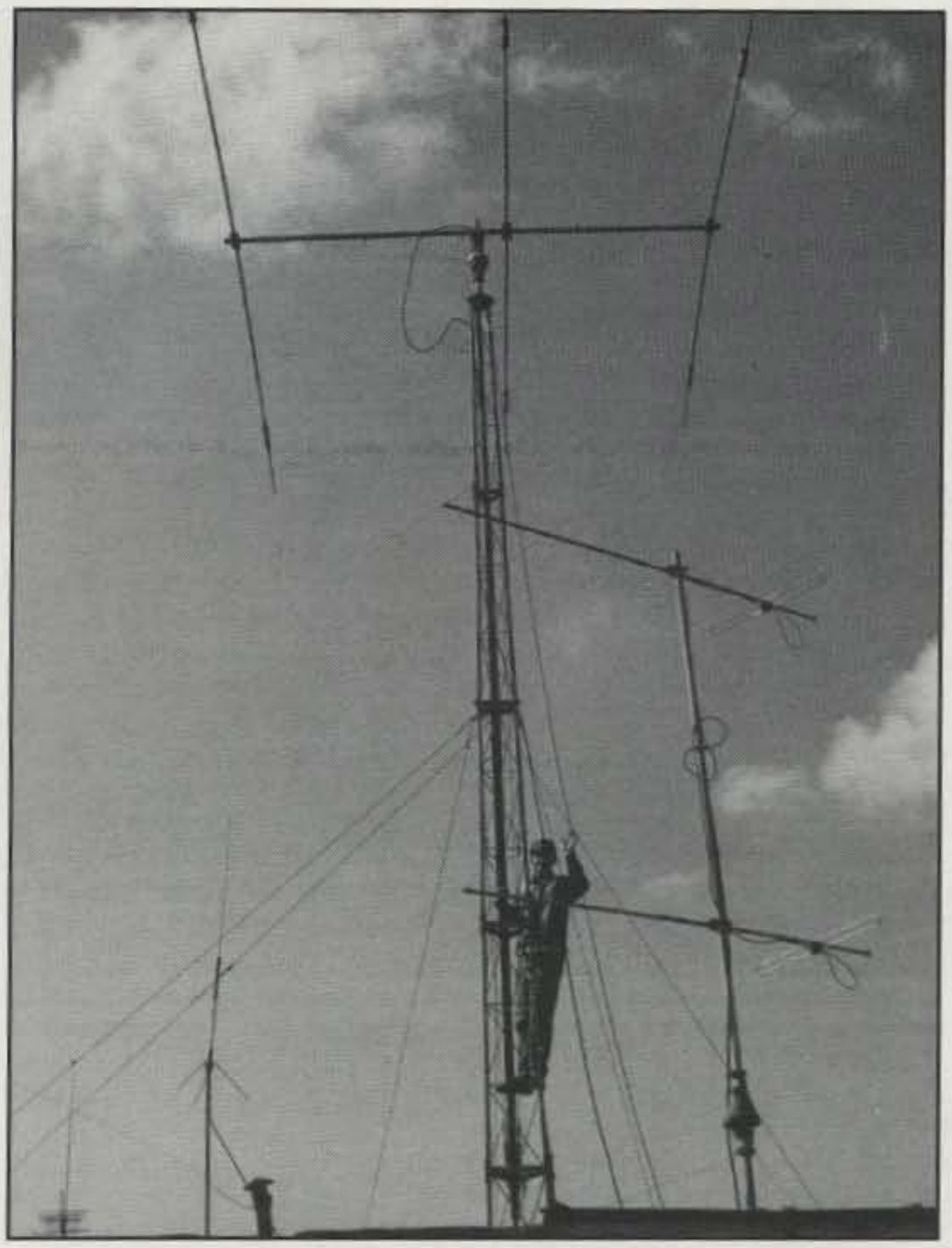
Joska, YO5AVN/3, uses both factory-made and homebrew equipment.

Mitica, YO3BFL, operates CW using a special keyboard made for the blind.

The father-and-son team of Costi, YO3ACX, and Paul, YO3GMP, shares a well-equipped station, a vertical antenna, and wire dipoles on the roof of their ten-story apartment building.

Iosif, YO3JP, at the YO3KAA club station in Bucharest.

Yani, YO3XQ, is a veteran CW operator who uses homebrew equipment.

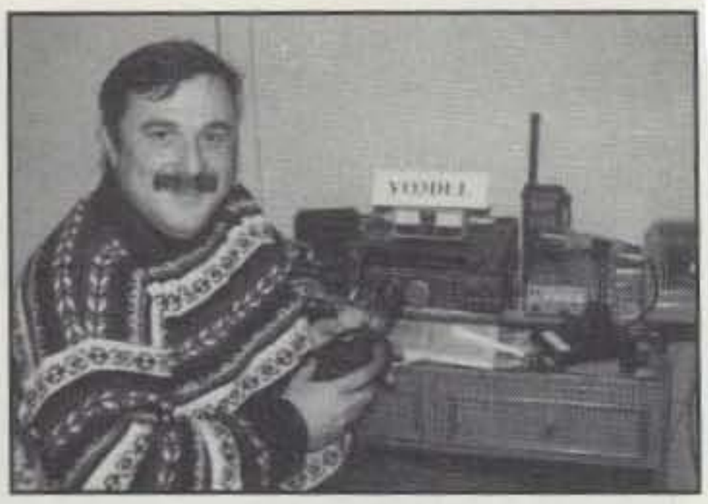


Matei, YO3GEK, is a 17-year-old amateur who has modern, factory-made equipment and a computer for packet operation.

Adrian, YO3APJ's three-element beam is on the top of a tall apartment building with wide-open space in every direction.

Nick, YO3BWK, has all kinds of foreign-made transceivers and test instruments.

Aurel, YO3CDN, is a civilian electronics specialist who has a neat station equipped with a computer.



Liviu, YO3DLL, is very active with his small station. He is in charge of the electrical energy supply for the telephone company.

Toto, YO3NL, President of the Federation of Romanian Radio Amateurs and a member of the YO DX Club. He has 275 countries confirmed and 5BDXCC.

not know which was which. While on this subject, I heard a local story. On a battleship an officer was testing a seaman, asking him, "What would you do if another sailor fell into the water?"

"I would throw him a life preserver, Sir," was the prompt answer.

"And what would you do if an *officer* fell overboard?" was the next question.

The seaman hesitated for a minute and then asked, "Which officer, Sir?"

There are several other club stations, some more active than others. At the "Children's Palace" YO3KPA is run by two instructors—Sandy, YO3AWC, and Nicu, YO3CB. A couple of small private companies in which the owners are amateurs have organized radio clubs: YO3KWT of Adcon Computers has Lix, YO3NP, as chief operator, while Costel, YO3GDS, is in charge along with YO3KBN of Conex Electronics.

Speaking of radio clubs, I heard that at one of the meetings a member got very upset because things were not going his way and yelled, "Half of the members of this club are idiots!"

All the amateurs jumped on him and demanded an apology and a retraction.

"OK," mumbled the angry man, "I apologize. Half of the members of this club are not idiots!"

There are many amateurs with personal stations. One of the most active ones is Adrian, YO3APJ. He uses a small transceiver and very big linear amplifier resting on the floor. Adrian's three-element beam is on the roof of a tall apartment building with wide-open space in every direction. No wonder he is on the Honor Roll and has 5BDXCC. Every Thursday at 6 PM local time Adrain conducts (on 3.650 MHz) a DX forum, giving the latest news about DXpeditions, QSL managers, etc. Lots of Romanian-speaking amateurs check in with questions and answers.

Joska, YO5AVN/3, is another very active amateur who uses both factory-made and home-brew equipment. Toto, YO3NL, President of the Federation of Romanian Radio Amateurs, is a member of the YO DX Club and has 275 countries confirmed and 5BDXCC.

Yani, YO3XQ, is a veteran CW operator who uses homemade equipment. On the other end of the age spectrum is 17-year-old Matei, YO3GEK, who has a modern, factory-made transceiver and a computer for packet radio.

The father-and-son team of Costi, YO3ACX, and Paul, YO3GMP, shares a well-equipped station, a vertical antenna, and some wire dipoles installed high up on the roof of their ten-story building. Costi is a flight radio operator on IL18 Russian-made airplanes, and Paul is a 15-year-old high school student.

Mitica, YO3BFL, is sightless. He operates CW using a special keyboard made for blind people. Nick, YO3BWK, is blessed with all kinds of foreign-made transceivers and test instruments.

Aurel, YO3CDN, is a civilian electronics specialist who works for the army. He has a neat station equipped with a computer. I worked him on 20 meter SSB and received his QSL. Liviu, YO3DLL, is in charge of the electrical energy supply for the telephone company. He is very active with his small station.

Calin, YO3RA, spent some years in a labor camp for political prisoners. After the 1989 revolution/coup d'etat he was one of the many who ran for the office of president, but unfortunately for YO amateurs, he didn't make it. Anyway, why would a nice person like Calin want to get in a business like that?

Tina, YO3FRI, a wife and the mother of two, is very active on SSB, CW, and RTTY. Luky, YO3DCO; Nelu, YO3CZ; Petrica, YO3ZR; and Mihai, YO3CV are the big guns of Bucharest, and they do QSL sometimes. On the other hand, I have a long black-list of amateurs from the capital city whom I worked and sent my card, but I did not receive theirs in return.

As in many countries, the amateurs of Bucharest are a diverse group, and I am glad I had the opportunity to meet many of them.■

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Most popular *dual purpose* handheld *or* mobile/base amplifier -- B-1016-G, $379 --160 watts out for 10 in. B-108-G, $299, 80 watts out for 10 in. For 0.2 to 15 watt transceivers.


B-23-G

Most popular *handheld* amps -- B-215-G, $379 -- 150 watts out/ 2 in. B-23-G, $169, 30 watts out/ 2 in. For 0.1 to 5 watt handhelds.

2 Meter Amplifiers (144 - 148 MHz)

Suggested Use	Model Number	Retail Price	Power In (watts)	Power Out (watts)	Preamp gain/NF	Size (inches)
handheld	**B23**	**$129**	**2**	**30**		**4x2x4½**
handheld	B23G*	$169	2	30	20/0.6	3½x2x7
dual purpose	**B108G***	**$229**	**10**	**80**	**20/0.6**	**8x3x5½**
handheld	B215G*	$379	2	150	20/0.6	12x3x5½
dual purpose	**B1016G***	**$379**	**10**	**160**	**20/0.6**	**12x3x5½**
mobile/base	B2516G*	$299	25	160	20/0.6	12x3x5½
mobile/base	**B5016G***	**$299**	**50**	**160**	**20/0.6**	**12x3x5½**
dual purpose	B1030G	$689	10	300	20/0.6	10x12x5
mobile/base	**B2530G**	**$689**	**25**	**300**	**20/0.6**	**10x12x5**
mobile/base	B5030G*	$669	50	300	20/0.6	10x12x5
dual purpose	**B1060G**	**$1094**	**10**	**600**	**20/0.6**	**10x12x5**
mobile/base	B2560G	$1094	25	600	20/0.6	10x12x5
mobile/base	**B5060G**	**$1094**	**50**	**600**	**20/0.6**	**10x12x5**

Most popular 70 cm amps

D-3010-N

MIRAGE's *most popular 70 cm amplifier* -- the D-3010N, $365 -- gives 100 watts out for 30 in. For 5 to 45 watt mobile/base.

70 cm Amplifiers (420-450 MHz)

handheld	**D15N**	**$189**	**1**	**15**	**7¼x3½x2**
handheld	D26N	$269	2	60	8¼x2½x7
dual purpose	**D1010N***	**$395**	**10**	**100**	**12x3x5½**
mobile/base	D3010N*	$365	30	100	12x3x5½

Most popular 6 Meter amp

A-1015-G

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

6 Meter Amplifiers (50-54 MHz)

mobilebase	**A1015G***	**$389**	**10**	**150**	**20/0.6**	**12x3x5½**
mobile/base	A1035G	$659	10	350	20/0.6	12x3x5½

** most popular models*

1¼ Meter Amps (223-225 MHz)

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

Repeater Amps

11 models -- *continuous duty* all mode FM/SSB/CW repeater amps for 6, 2, 1¼ Meters, 70 cm, 450 MHz ATV.

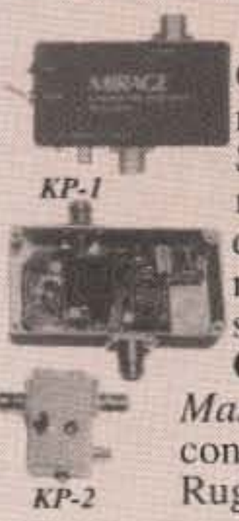
Amateur TV Amps

Industry standard ATV amps -- D-105-ATV, $414, 52 watts out / 10 in. D-25-ATV, $414, 52 W out / 2 in.

Commercial Amps

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

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

Accurate SWR/Wattmeters

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

Remote Control Head for Amps

Remote controls most MIRAGE amps. Power On/ Off, preamp On/ Off, switch for SSB/FM. 18 foot cable (longer available). 1¾x 3¾x2½ inches. RC-1, $45.

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

CIRCLE 14 ON READER SERVICE CARD

CQ REVIEWS:

The HAL Communications P38 HF Radio DSP Modem

BY JAY TOWNSEND*, WS7I

The digital operator is in the midst of a rapidly evolving part of amateur radio. There have been many advancements in digital technology with new modes, new techniques, and new challenges all providing additional capabilities and expanding the usefulness of the digital modes.

When HAL Communications, Inc. brought out the P38 board at the Dayton Hamvention this year, they quickly arrived in the midst of the revolution. HAL has been long recognized as one of the leaders in digital communication devices. The P38 born out of the earlier PCI-4000 Clover II DSP board directly answered the questions that digital operators had about price vs. performance.

Specifications

P38 comes as a full-size PC board and will require a full-size slot in an AT-type computer (a 286, 386 ,or 486 machine). It uses the 16-bit AT bus of the mother board. The other part of the P38's system is user software which is called P38-COMM.

Hardware is a 16-bit TMS320C25-50 DSP chip with a 14-bit TLC320AC01 A/D and D/A converter. It has a dual FIFO (first in first out) buffer interface to the PC bus and the P38 is a four-layer circuit board.

*P.O. Box 644, Spokane, WA 9210
jayt@comtch.iea.com

P38 Features

Modern HF radio modem design requires that the device be capable of doing four digital modes: Amtor, Baudot (RTTY), Pactor, and one other mode. The other mode these days usually seems to be proprietary. In the case of the P38 it is Clover II.

Amtor is used for casual keyboarding and for contacting HF BBS systems. Baudot (RTTY) is the king of DXing and digital contesting. Digital DXing and contesting are two of the fastest growing segments of interest in amateur radio these days. Pactor seems to have overtaken RTTY for the keyboarding mode of choice. Clover II is one of the best methods of moving high volumes of digital data. Clover II is well suited for poor band conditions, the low bands, and for crowded band conditions. Clover may well be the future of digital radio.

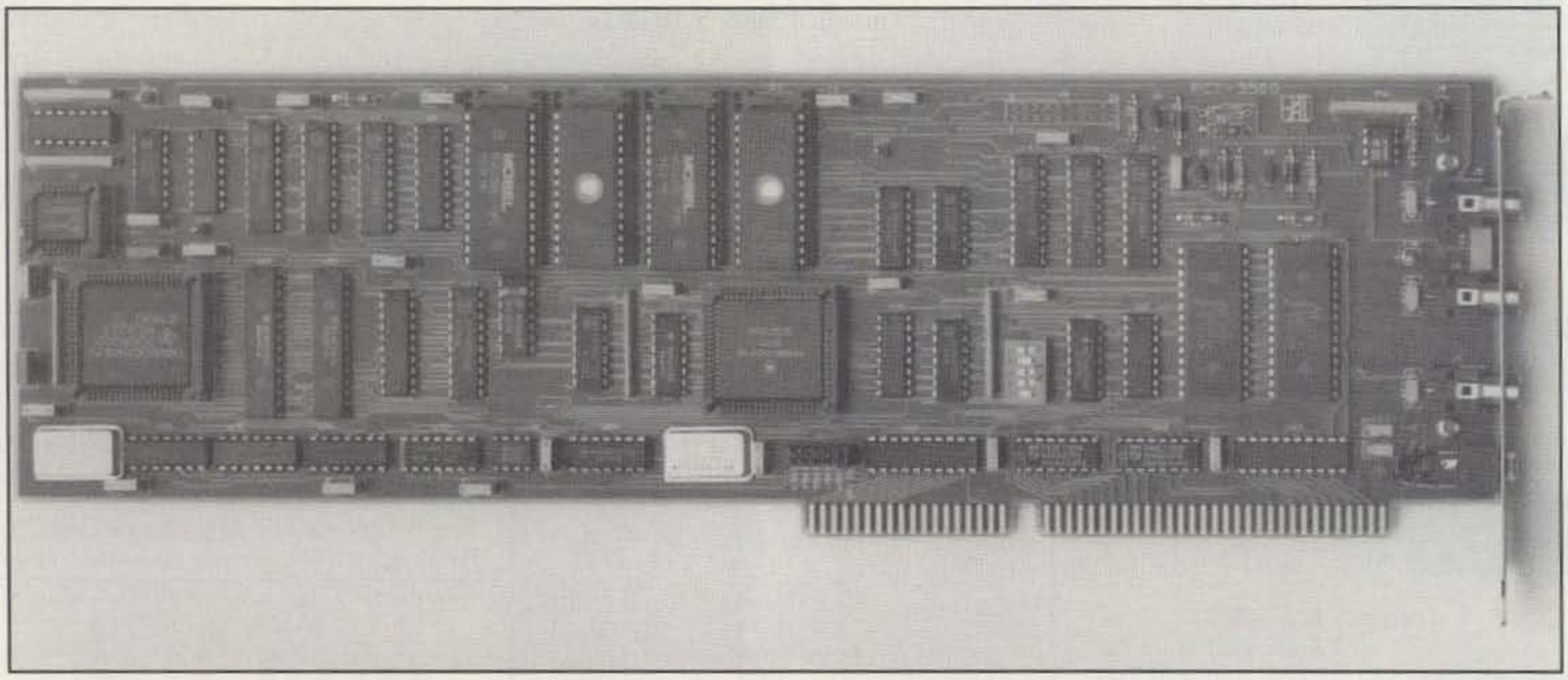
One of the negative comments most often heard about the P38 is that it is a drawback to have a plug-in card that must be installed inside the PC. This is actually one of its main features.

The problem with modems in cabinets that are external to the PC ("stand-alone boxes") is that they have to share the data stream with status and control signals from modem to the PC. This creates a huge choke point. Having the ability to generate multiple different interrupts and having a large FIFO (first in first out) buffer as well having DMA (direct memory access) to the main computer memory for data transfer gives the P38 great power and many technical advantages.

Use of the plug-in board format also greatly reduces the manufacturing cost of the P38 since expensive cabinet, power-supply, and front-panel parts are not required. They directly relate to cost savings. In many instances it makes the entire system easier to connect and gets rid of the need for additional table space and room in the shack. The P38 does not require yet another RS-232 port, cable, and IRQ (interrupt), which makes installation a lot easier.

Hooking It Up

Interfacing the P38 modem to your rig is quite easy. Input and output to the P38 are by four connectors on the edge of the P38 computer card. Three of these are RCA phono jacks and the other is a mini stereo jack. These connectors handle the five inputs/outputs from the unit: audio from the receiver to the P38; audio output to the transmitter; push-to-talk control for the radio; FSK (frequency shift keying) for



The HAL Communications P38 HF DSP Modem. Installation is quite straightforward. Input and output to the board is via the three RCA phono jacks and the mini stereo jack on the right of the board.

he transmitter; and a selective call (SELCAL) control line for the software/hardware for scanning is the last connection.

Complete Unit

Unlike most other digital products, the P38 modem comes complete with the user software and hardware. This is probably one of the best kept secrets about the P38 system. The user manual that comes with the unit is really two manuals in one. There are complete instructions on how to install the modem in the computer and to your HF radio.

Most of the operating guide is spent in examining actual operation of the four supported modes using the P38-COMM software. There is a wealth of data on how the system can be used and operated in very detailed step-by-step terms. This manual has very nice large type and is easy on the eyes.

Flying The P38

Pactor is one of the most fun modes and this mode was tried first. I made a number of contacts and quickly discovered that the P38 was well designed for this mode. I did not have much of a learning curve on the software and quickly tested Amtor, Clover, and saved RTTY for last. Baudot is my first love in digital, and I was curious to see how the P38 stacked up to a several different devices I have in the shack.

Tuning on the P38 is done using the DSP software and the user program. Tuning bars are used. Bar tuning worked quite well for me during my tests. Each user program approached tuning in a little different manner. A few "old-timers" will long for the familiar green glow of a scope while doing RTTY. There is not a method for hooking up a scope on the P38, since this is DSP and the unit has no hardware filters.

Smoke tests were run using a number of bands and the P38 was off and flying. RTTY performance seemed to be good on the upper HF bands (30 meters and up), but were spotty on the low bands (80 and 40 meters) at night. HAL is working on this and assures me that a new software version will be available soon. Eighty and 40 meter bands put some unusual demands on an HF demodulator (modem). Selective fading becomes a big problem. This was one of the design criteria for the Clover II mode. Clover II on 80 and 40 meters is better than any other mode by a very large factor. You might notice that most tests on proprietary modes are done on 20 meters or above 7.5 MHz.

Design Pays Off

From the initial Clover II experiments to the development of the HAL Communications PCI-4000 board and now to the P38, a design was put forth which now returns a big payoff. Rather than the normal industry standard which uses EPRO's, HAL used code that is downloaded from the host computer to the board when it is first initialized. This offers a big advantage to HAL and to the amateur. When changes are done in the P38 code, they can be distributed to the amateur via modem, Internet, or even diskette.

What this means is that bug fixes can be distributed cheaply and quickly. It also means that enhancements (as bug fixes are usually called by the manufacturer) can be done often. EPROMs are very expensive to make and to distribute. A change often is ignored rather than sent out to all the end-users. With the PCI-4000 and now the P38, these units can have new code days after development with little cost to the user or to the manufacturer—a great concept and one which should be more of a standard.

When it was discovered that low band RTTY performance of the P38 had problems, I called HAL and they quickly attacked the problem, verified it, and began working on the fix. An early beta-test version delivered to me already shows improved performance. This speaks highly of HAL's engineering staff.

More changes will probably be made over the next few months—and indeed years—as the product is enhanced. For example, what started out as a Clover II only modem, HAL's PCI-4000 now supports these modes: RTTY, Amtor, and Pactor. This was all done with the subtle little software changes in the code sent out over the HAL Communications BBS system reached at 217-367-5547. This BBS operation is professionally done.

P38 vs. PCI-4000

As a result of the in-process improvements being made to the P38's RTTY and FSK modes, the P38 actually works a little better then the

PCI-4000 at present on RTTY. However, HAL tells me that the P38 improvements of course wil be added to the PCI-4000 as soon as possible. Clover tones are fixed center frequency on the P38, but the tones can be inverted. FSK tones and shifts are also fixed on the P38. Clover linking on the P38 has only one link method, which is the long burst, "Robust link." This will make scanning mailbox operations slower, but avoids link problems that existed with the "short burst" on DX paths. HAL's P38 has a little less "horse power" than does the PCI-4000, but the Clover on the P38 is always compatible to the Clover on the PCI-4000.

Other Software

Windows is spoken on the P38 board using a couple of other programs. First is *Ragchew*[1] by Jim Jennings, KE5HE. This program does Amtor, Baudot, and Pactor on the P38 under Windows. It has both a mailbox and a logging program. This software has very quickly become my favorite for casual use.

Express[1] *2.0* by TY1PS does Clover II in a big way with compression, mailbox, radio control, pictures, and lots of fun things. It is a Windows program.

Digital's Future

Express 3.0, which shipped in July 1995, has all four modes. Pactor and Amtor have a full mailbox (Winlink/RLI compatible). *Express 3.0* supports cross linking on all modes. When in standby, the mailbox accepts links in Pactor, Amtor, and Clover. *Express 3.0* systems now automatically exchange little portraits at link time. These pictures are kept on disk, and whenever you link, *Express 3.0* will show a photo of the person you linked to. If there is no photo available on your local disk Express will automatically request it from the other side. A new feature is the sketch board. This is an on- line sketch pad that is working across the link. Operation is similar to paintbrush, but with the difference being what you paint appears on the other side of the link and vice versa. You can chat and send files while drawing a picture. The mailbox file is now in DBF(data base format).

In Clover you can attach binary files (pictures, for example), music, and voice, to a message and they will be forwarded along with the message. Full variable control by mode has arrived. Things such as date, time, call, RST, etc., can be stored and sent. This way you can make up contest exchange buffers. A contest serial number counter is also included. The program has a complete logbook that also uses a DBF formatted file (same format as LAN-Link). You can snatch calls, RST, serial numbers, and names, comments from the received text with a mouse click without typing. *Express 3.0* will automatically read frequency and S-reading from your radio and fill the logbook accordingly. You can now backspace on all modes to correct typing errors. The backspaces are transmitted and correct the text on the other end of the link, much as is done in Pactor. This feature alone will make it a favorite program.

The final entry in software tested with the P38 is *RTTY by WF1B*[1], the standard in RTTY contesting programs. I cannot guarantee higher contest scores using either the P38 or WF1B software—only good operators can do that—but I can say that these two products used together make RTTY contesting a whole bunch easier and a lot more fun.

Final Impression

The P38 is a hardware/software product, that much like its famous World War II namesake, has the capability of revolutionizing the HF data modem market. It offers low-cost, quality performance, and cutting-edge technology by one of the leaders in the digital communication arena. It has the built-in flexibility to grow as necessary to be useful today and tomorrow.

The P38 is priced at $395 and is available from HAL Communications, Inc., P.O. Box 365, Urbana, IL 61801 (217-367-7373).

Further articles of interest on Clover and the developments of the P38 board and the PCI-4000 board can be found in the following articles: *CQ* May 1992, *RTTY Journal* April 1993, *Digital Journal* August 1994.

Footnotes

1. Ragchew, Express, and RTTY by WF1B are all available from the International Digital Radio Assn., P.O. Box 2550, Goldenrod, FL 32733-2550 (407-677-7000). ■

Expand your Horizon

The C-4: 40-20-15-10

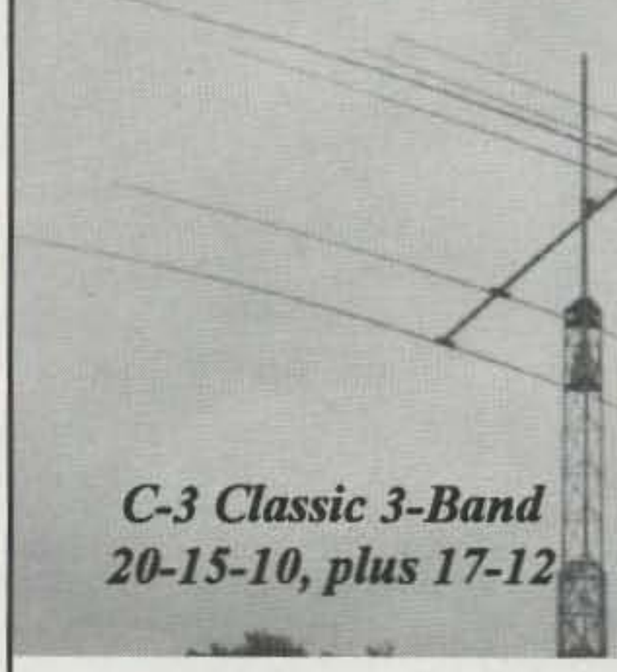
Plus 17 & 12

Ham Radio Outlet
Sunnyvale, CA
(bird not included)

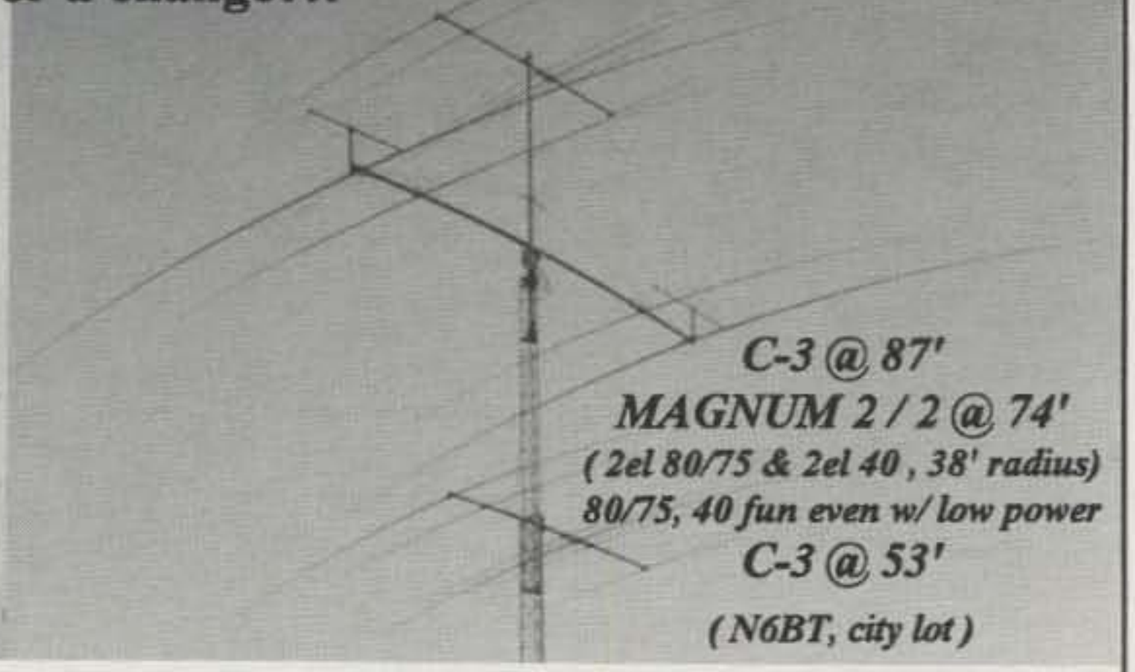
Our customers tell us that the *C-3*, and now the the *C-4*, outperforms every commercially made, trapped tribander, regardless of boomlength. And, the *C-3* is the easiest to assemble and put up, plus coverage on 17 and 12 mtrs. The forward gain is superior to high-claimed marketing numbers from trapped antennas.

That's why these antennas really "work."

Isn't it time for a change?!!



C-3 Classic 3-Band
20-15-10, plus 17-12



C-3 @ 87'
MAGNUM 2 / 2 @ 74'
(2el 80/75 & 2el 40 , 38' radius)
80/75, 40 fun even w/ low power
C-3 @ 53'
(N6BT, city lot)

C-3 = No Traps = More QSO's + More 59&599's + 40 mtrs = C-4

You will be amazed at the improvement between the ***C-3*** and trapped antennas. The receiver will sparkle. Running barefoot will be fun. And now, the fantastic ***C-3*** performance has been extended to 40 meters. The ***C-4*** incorporates a re-designed EF-140S 40 mtr element on the standard ***C-3*** boom for more than 100 kHz 2:1 VSWR coverage on 40 mtrs. If you are presently enjoying the great performance of a ***C-3***, upgrade to a ***C-4!***

- The ***C-3*** : 7 elements: riveted and tapered for a low profile, pleasing look; 18' boom, 5.6 sqft, 32 pounds, Easy-On™ mount.
- The ***C-3*** has deep side nulls and a fine pattern; F/B 14-18 dB; fed with a single 50 ohm coax; 19.8' turning radius.
- The element-to-boom brackets are pre-aligned on the boom, so every element is straight and will not move.
- The ***C-4*** maintains the same turning radius, weighs about 40 pounds, with separate feedline so that the ***C-3*** remains intact.
- **Force 12** has more than 60 HF antennas from 3 el 80/75 mtr yagis to 6 mtr beams. The ***MAGNUM 2 / 2*** shown above is a 2el 80/75 and 2el 40 mtr on a single boom with two feedlines. The ***MAGNUM 2 / 2*** uses EF-180B (66.5') elements on 80/75 and EF-140 (44.5') elements on 40. At about 14 sqft, the ***MAGNUM 2 / 2*** is the answer to gain on both bands. Other 80/40 available.
- **Force 12** now offers **magnetic transmitting / receiving loops** for 40 and 80/75, perfect for limited space and **NVIS** use: the ***MTR-66*** (6'x6') and the ***MTR-618*** (6'x18'), both made with 2" tubing. These mount vertically on the ground, deck, balcony, etc.
- **Force 12** has verticals for 40, 80/75 and 160 mtrs. Add to this the several 20-40 yagis, the 40-30-20 yagi and multiple band antennas like the 5BA (20-10) and the 4BA (17-10). **Force 12** offers a pair of 50 ohm 1:1 baluns; fully tested and vacuum impregnated for reliability. The B-1 is rated at 3KW and the B-1/C commercial version with N-connector, rated at 25KW.

The C-3 is available at all 12 HAM RADIO OUTLET stores. List is $489.00. The C-4 lists at $649.00. Buy now & have fun!

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Antennas and Systems

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Results of the 1994 CQ WW VHF WPX Contest

BY JOE LYNCH*, N6CL

Participation was up from the 1993 contest. Over 120 of you submitted logs. Also up were the scores attesting to the better conditions and the more entrants in the contest.

As mentioned above, conditions overall were better than last year. Some double-hop sporadic-E gave Tim Marek, NC7K, almost an exclusive opening into the east, while John Godwin, KB5IUA, took advantage of some good tropo to generate his high score.

In the are of DX, thanks to publicity by our sister publication *CQ Español*, a fair share of log entries were received from Spain and other European countries. In the single operator category DL1ZC was again the European winner. Operating on 144, 432, and 1296 MHz, he accumulated over 34k points. Again this year by far the biggest point total came from PA6VHF, a portable Multi-Op Class II entry that amassed almost 248k points.

In North America, the winner in the single op category was KB5IUA, who totaled almost 168k points. In the Portable Station Single Op category NC7K took advantage of that double-hop east coast pipeline to amass over 86k points. The top Rover scorer was NØLRJ, who scored over 188k points.

Scoring again was a problem with over 80 percent of the entries having errors. Hopefully the 1995 contest, which did away with the dual multiplier, will have fewer scoring problems than last year.

The QRP category is gaining in popularity with double the entries from 1993. The 1994 category winner, Tyler Stewart, KF3P, amassed more than 150k points.

*P.O. Box 73, Oklahoma City, OK 73101

At the end of a long drive, award-winning Rover Randy Simons, NØLRJ, parks his vehicle and gives out a few more contacts from yet another rare grid. (Photo courtesy NØLRJ.)

My apologies go to Zack Sadecki, KB7FUV, who sent me a log request (rather than sending it to *CQ* headquarters). Unfortunately, noticing that the address indicated VHF WPX Contest, I placed it in the box with the entries and only opened it when I started scoring the logs, way too late for Zack to enter.

I hope you all had fun in the 1995 contest!

73, Joe, N6CL

PLAQUE WINNERS

FIXED STATION SINGLE OPERATOR
Winner: **KB5IUA** (score 167,790)
Donor: PY5CC

FIXED STATION MULTI-OPERATOR CLASS I
Winner: **KC6WLC** (score 34,100)
Donor: CQ Magazine

FIXED STATION MULTI-OPERATOR CLASS II
Winner: **KB5TZJ** (score 19,520)
Donor: CQ Magazine

PORTABLE STATION SINGLE OPERATOR
Winner: **NC7K** (score 86,564)
Donor: N5JHV

PORTABLE STATION MULTI-OPERATOR CLASS II
Winner: **PA6VHF** (score 247,940)
Donor: Oklahoma Comm Center

QRP
Winner: **KF3P** (score 152,844)
Donor: CQ Magazine

ROVER STATION
Winner: **NØLRJ/R** (score 188,952)
Donor: Rochester VHF Group

Number groups after call letters denote following: Final score, Number of QSOs (including multipliers for band and CW contacts), Combined total of prefixes and grid locators, Bands operated (A = 50, 7 = 70, B = 144, C = 222, D = 432, 9 = 902, E = 1296, F = 2304, G = 3456, H = 5670, I = 10G, J = 24G, L = Light), (and in the case of Rovers) number of grid locators activated. Certificate winners are listed in boldface type.

FIXED STATION SINGLE OPERATOR NORTH AMERICA

UNITED STATES

WA2TEO/1	**82,945**	**313**	**265**	**ABCD9E**
K5MA/1	32,032	182	176	ABCD
K1TR	15,561	133	117	ABCD
N1FUS	7,371	81	91	ABC
W3EP/1	5,695	67	85	A
KA1EKR	4,336	59	74	ABCD
WB2VVV	**74,104**	**314**	**236**	**ABCD9E**
WA2BAH	23,856	168	142	ABCDEI
KA2MCU	3,364	58	58	ABCDE
N2UAH	2,714	46	59	A
WB2YEH	1,620	36	45	ABCD9E
N2QHS	660	22	30	ABD
N3QYA	**27,702**	**171**	**162**	**ABD**
AC3T	16,128	128	126	A
N3OPM	4,680	117	40	B
K3ZO	3,717	59	63	AB
KH2CY/3	1,785	59	45	ABCD
K3UA	312	13	24	A
KA2DRH/4	**106,392**	**341**	**312**	**ABCD**
WB2QLP/4	47,515	221	215	AB
WD4HHA	28,864	176	164	A
KS4S	3,570	51	70	A
KE4AGT	1,218	29	42	A
AD4F	874	23	38	A
AJ4F	598	26	23	B
N4MM	288	12	24	A
KB5IUA	**167,790**	**470**	**357**	**ABCDE**
N5RZ	**88,443**	**317**	**279**	**ABDE**
WD5K	78,003	321	243	A
N5HHS	18,396	126	146	AB
W5OZI	8,748	81	108	AB
W6GGV	**6,816**	**96**	**71**	**ABCDE**
W6SYA	4,980	80	62	ABDE
KD6WVL	1,404	39	36	B
KD6RXT	820	41	20	B
N7AVK	**51,574**	**41**	**214**	**ABCDE**
KE7CX	47,476	246	193	ABCD9E
K7CW	19,800	132	150	ABDE
KG7FV	14,310	135	106	ABCD9E
N7BUP	11,328	96	118	AB
WB7QBC	11,300	113	100	ABD
W7FSO	10,900	100	109	ABD
K7NV	2,496	48	52	AB
NOØY/7	9	3	3	B
KE8FD	**38,808**	**198**	**196**	**ABCDE**
W8WG	18	3	6	A
NEØP/9	**1,350**	**30**	**45**	**A**
W9VA	323	17	19	A
N9SND	264	12	22	A
WD9EXD	112	8	14	A
NØLL	**117,670**	**410**	**287**	**ABCDE**
WAØX	65,682	267	246	ABD
WBØCQO	22,165	143	155	ABD
KSØF	9,540	90	106	AB
WØJRP	5,124	61	84	ABCD
WBØCLL	3,720	62	60	ABCDE

CANADA

XL7XF	**11,739**	**129**	**91**	**ABDE**
			(Opr VE7XF)	
VE7SKA	3,135	57	55	ABD
VE3RLW	1,904	34	56	A

MEXICO

XE2HWB	**1,102**	**29**	**38**	**A**

AFRICA

CANARY ISLANDS

EA8ACW	**150**	**10**	**15**	**B**

REP. OF SOUTH AFRICA

ZS94B	**336**	**28**	**12**	**ABD**
			(Opr ZS6WB)	
ZR1AEZ	36	9	4	A

EUROPE

GERMANY

DL1ZC	**34,185**	**265**	**129**	**BDE**

SPAIN

EA1FH	**8,190**	**126**	**65**	**BD**
EA1DDU8	4,872	84	58	B
EB1DMS	3,968	64	62	BDE
EA1ACL	980	28	35	B
EA1BJW	528	22	24	B
EE4RAM	480	20	24	B
			(Opr EB4EEY)	
EA3EAN	228	19	12	B
EA3AYK	208	16	13	B
EA4EJR	180	12	15	B

PORTABLE STATION SINGLE OPERATOR NORTH AMERICA

UNITED STATES

KB3PW	**6,162**	**79**	**78**	**ABD**
KN6WY	**4,263**	**87**	**49**	**B**
W6JEX	4,130	59	70	A

Tim Marek, NC7K, makes final adjustments on his antenna array before getting on the air during the contest. (Photo courtesy NC7K.)

KJ6KO	4,030	62	65	ABCD
NC7K	**86,564**	**323**	**268**	**ABD**
WA2HFI/Ø	**19,221**	**149**	**129**	**ABD**

AFRICA
CEUTA & MELILLA

EA9AI/P	**294**	**21**	**14**	**B**

EUROPE
PORTUGAL

CT1EAT/P	**3,233**	**53**	**61**	**AB**
CT1CLR/P8	1,184	37	32	B
CT4LV	1,073	37	29	B

FIXED STATION MULTI-OPERATOR CLASS I NORTH AMERICA
UNITED STATES

KC6WLC	**34,100**	**220**	**155**	**ABCDE**

FIXED STATION MULTI-OPERATOR CLASS II NORTH AMERICA
UNITED STATES

KB5TZJ	**19,520**	**160**	**122**	**ABD**
			(Plus Opr N5OBA)	

PORTABLE STATION MULTI-OPERATOR CLASS II NORTH AMERICA
CANADA

VE7MDX	**6,225**	**83**	**75**	**ABD**
	(Oprs VE7ZZX/VDX, VE7HKZ/MDX, VE7MJA)			

EUROPE
THE NETHERLANDS

PA6VHF	**247,940**	**805**	**308**	**ABD**
	(Oprs DG3LB, DG8LAV, PE1s, BBI, DCY, LAU, LWT PA3s, BIX, CNX, DCO, DQJ, FBN, FOD, FPQ, FUH, PEØWGA)			

SPAIN

EA1RCI	**7,257**	**123**	**59**	**B**
	(Oprs EB1ADD & EA1FDI)			
EA7ERP/P	1,976	52	38	B
	(Oprs EA7ERP, EB7s BFJ, DYV, EUD)			

QRP NORTH AMERICA
UNITED STATES

KH6CP/WW1	**49,640**	**292**	**170**	**ABCD9EFGHI**
KF3P	**152,844**	**564**	**271**	**ABCD**
NU4Y	**18,480**	**140**	**132**	**A**
N4YKD	696	29	24	BCD
KB5OAI	**23,166**	**143**	**162**	**A**
KF5RM	4,887	91	117	A
KD6UIH	**2,646**	**63**	**42**	**BD**
N7WNC	**1,131**	**39**	**29**	**B**
N8AXA	**3,596**	**58**	**62**	**ABC**
N8ZAW	252	18	14	A
N8ZAT	48	6	8	AB
N9LAG	**12,969**	**131**	**99**	**ABCD**
KFØGX	**2,448**	**48**	**51**	**ABD**
KBØMWV	280	20	14	B
NØYYO	182	13	14	B

CANADA

VE7XQ	**90**	**9**	**10**	**ABD**

MEXICO

XE3WP	**18,221**	**137**	**133**	**A**
XE2/NH6ZF	1,650	33	50	AB

EUROPE
PORTUGAL

CT1DIZ/p	**7,200**	**75**	**96**	**A**

SPAIN

EA3AEL/P	**575**	**27**	**25**	**B**
EA1DVY	520	20	26	B
EA2CRP	126	9	14	B

ROVER NORTH AMERICA
UNITED STATES

K6AAW/R	**12,138**	**102**	**119**	**B**	**8**
AA7VT/R	**2,773**	**47**	**59**	**ABD**	**3**
N7MLD/R	2,665	41	65	ABD	3
NZ7T/R	1,330	35	38	B	5
NØLRJ/R	**188,952**	**432**	**436**	**ABCDE**	**9**
AJØE	**99,450**	**325**	**306**	**ABCDE**	**4**
			(Opr KØTLM)		
KAØOWT/R	2,205	35	63	A	3
			(Opr NØJAS)		

CANADA

VE7NUT/R	**1,258**	**34**	**37**	**A**	**2**
	(Oprs VE7BEE & VE7RJ)				

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Where Things Stand! The Status of FCC Rulemaking

The following lists the regulatory items that impact personal, amateur, and commercial radio and that are currently being considered.

Family Radio Service

Proposal: On July 20, 1994 the Radio Shack division of the Tandy Corporation petitioned the FCC to create an unlicensed UHF-FM, low-power, two-way voice Family Radio Service (FRS). The new service would share unused and little-used General Mobile Radio Service (GMRS) spectrum at 462 and 467 MHz. Tandy told the FCC that FRS would help meet the growing public demand for an affordable and convenient way of direct communication among individuals. The FCC accepted the proposal as having merit and assigned it file No. RM-8499.

Status: After a preliminary round of comments, the FCC proposed new rules on June 22, 1995 seeking to implement the Family Radio Service as requested by Radio Shack. The Commission said it will encourage rapid deployment and growth of inexpensive low-power communications equipment for use by groups and families in which members need to communicate over very short distances.

The new service will share seven existing GMRS channels that are not used for repeater operation, as well as utilize seven unassigned channels that are located between certain GMRS channels. All fourteen channels are called "interstitial" frequencies since they are sandwiched in between the existing eight GMRS duplex channel pairs.

Tandy says the current non-repeater channels are "underutilized"—a claim which is strongly disputed by the Personal Radio Steering Group, a GMRS user association. PRSG is vehemently opposed to mixing licensed and unlicensed operators on the same frequencies, and they believe that FRS will "disrupt and impair both current and future GMRS operations. . . . "

REACT International, basically a CB association, supports the concept of the Family Radio Service, but opposes the use of GMRS spectrum for it. Motorola, on the other hand, supported the Tandy/Radio Shack proposal " . . . the public interest is better served by the creation of a new unlicensed personal radio service that offers consumers improved communications options in a cost-effective manner."

The Telecommunications Industry Association foresees a "potential strong market" for FRS with applications varying from " . . . parents keeping in contact with children, local watch patrols monitoring neighborhood activities, small businesses improving efficiency through radio, and outdoor recreationists enhancing the enjoyment of their activity while increasing their safety as well."

FRS would be a Part 95 Personal Radio Service, the same as CB radio. The proposed direct frequencies are:

1. 462.5625 MHz
2. 462.5875 MHz
3. 462.6125 MHz
4. 462.6375 MHz
5. 462.6625 MHz
6. 462.6875 MHz
7. 462.7125 MHz
8. 467.5625 MHz
9. 467.5875 MHz
10. 467.6125 MHz
11. 467.6375 MHz
12. 467.6625 MHz
13. 467.6875 MHz
14. 467.7125 MHz

Family Radio Service users would use palm-size, 1/2 watt output radio units to communicate while on outings such as visiting shopping malls and amusement parks, attending sporting events, camping, and taking part in other recreational activities. Tandy stated " . . . many persons could benefit from such a service, particularly for personal security, due to the low cost of the units and the communication capability."

Tandy has already tested the feasibility of FRS under a five-channel Special Temporary Authorization (or STA) conducted at the Disney World theme park in Orlando, Florida, where visitors were provided with Radio Shack's own Model PRS-100 handheld, which operates only on the interstitial frequencies.

The FRS proposal is now in the formal public comment period following the FCC Notice of Proposed Rulemaking.

The FCC also wants to know whether interconnection to the public telephone network should be approved. The Commission agreed that selective calling would enhance the appeal of the Family Radio Service by allowing users to answer calls addressed only to them without having to also monitor all other communications on the channel. The new proposed rules allow equipment suppliers to incorporate this option.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, Texas 75356-5101 (817-461-6443)

Lifetime Operator License

Proposal: The American Radio Relay League proposed on January 6, 1994 that all amateur operator (but not station) licenses should be issued for the lifetime of the operator. The League's petition (assigned RM-8418) also asked that the lifetime license be made retroactive to any previously licensed amateur whose license had already expired. The objective of this provision was to permit persons with new-found interest in amateur radio to return to the service without the need for relicensing.

The ARRL also believed their proposal would reduce the burden on the Volunteer Examiner program, since previously licensed amateurs would not have to be re-examined.

Status: The FCC issued a Notice of Proposed Rulemaking on April 25, 1995. The comment period closed on July 14th. The Commission's version of a lifetime license was far different from that of the League, however. Rather than create a lifetime operator license, the FCC proposed to give examination credit for the fewest examination elements necessary for the license class previously held. The result was essentially the same, though. Under the Commission's plan, the former licensee would not have to retake the examination elements.

In their comments, the ARRL said that the VEC System has no authority to process renewal applications, which is what the League believes that FCC's proposal amounts to. The ARRL requested that the Commission not adopt their proposal. "Instead, the Commission should adopt the rule changes proposed in the League's petition, RM-8418, which provides for a lifetime operator license."

The National Conference of VECs, an organization made up of representatives of all VEC organizations, also asked that the FCC not adopt their proposal, but for a different reason. NCVEC believes that amateurs with long-term expired licenses—longer than the current two-year grace period—should be re-examined.

"The NCVEC believes there is a fundamental difference between an individual who has let his/her license lapse 'years ago' and an amateur who has kept renewing. The difference is that currently licensed amateurs are more up-to-date on FCC rules and technology. Amateurs who have been away from the hobby for long periods of time will find that the amateur service and its regulations have changed drastically. They should undergo some sort of training or refresher course. The examination syllabus provides the needed curriculum."

The FCC will now have to decide whether or not to implement any version of a lifetime license.

Club Definition

Proposal: As of this past spring, the FCC resumed issuing club station licenses. Once the vanity callsign system is implemented, clubs will be able to trade in this callsign for a specific callsign chosen by the trustee.

The ARRL petitioned the FCC to change the rules to increase the minimum number of members required to constitute a club from two to four persons. Assigned RM-8462, the League points out that it is important for the FCC to determine that applicants for a club station license are legitimate clubs and not just persons pursuing an additional callsign.

Status: The FCC agrees that there is merit to ARRL suggestion and has issued a Notice of Proposed Rulemaking seeking to increase the eligibility requirement to four persons for a club station license. The comment period on the NPRM has already closed.

While the ARRL believes that this will discourage " . . . two individuals who simply wish to obtain a distinctive alternate callsign but who do not function as . . .a normal amateur radio club," the W5YI Group pointed out that increasing the club eligibility from two to four club members would not in itself prevent abuse, and that at least one family of four has already obtained 23 different club callsigns.

VE Session Manager

Proposal: In a Petition for Rulemaking filed July 15, 1993 the National Conference of VECs asked the FCC for a rule change that would recognize in the rules the existence of a volunteer examiner (VE) on-site manager at li-

cense examination sessions.

Status: The FCC issued a NPRM on April 26, 1995 looking toward adopting the NCVEC petition. In their formal comments the NCVEC said that all VECs utilize the services of a VE who is considered to be in charge and accountable for the proper conduct of the test session. While VEs are organized into teams of three of more persons, it is almost always one examiner who organizes and supervises the activities of the other VEs.

This lead examiner usually has custody of the examination materials, submits the test results to the VEC, and maintains the session records. " . . . the lead VE organizes the test session, supervises the VEs, and is responsible for the integrity of the test session. It thus follows that the VE who manages the examination session should be more accountable for its conduct and reliability than the other VEs who essentially assist." NCVEC noted that three VEs would still be required to conduct all examinations.

Holding the three certifying VEs equally accountable " . . . can make enforcement action difficult should an examiner team be found to be knowingly and willfully disregarding or circumventing proper examination practices. Having three examiners certify examinations often divides the responsibility to the point where no one can be held responsible."

The NCVEC also pointed out that VE teams often utilize a "production line" system of more than three examiners at large test sessions and that " . . . the three VEs who certify the FCC Form 610 application are frequently not the same ones who administered or observed all of the examinations to the examinee."

The ARRL opposed the concept of the VE Session Manager and believes "To permit a single person to bear the responsibility for the proper conduct of an examination session makes it far easier for an examination session to be compromised, without detection. . . . The issue of a VE Session Manager should be a matter subject to the discretion of the VE teams, rather than a regulatory requirement."

The League said, " . . . the system is not broken, doesn't need fixing, and the Commission's proposal is extreme overregulation."

The comment period has closed on this item and the amateur community awaits a final FCC ruling on RM-8301.

Vanity Callsigns

Proposal: It is a long story as to how specific amateur callsigns chosen by the licensee got included as a regulatory fee in the Clinton budget. Basically, it was the incredibly persistent work of a single amateur, Jim Wills, N5HCT, of Tyler, Texas, who wanted his previous callsign, WA4EHQ, re-issued to him.

Wills filed a Petition for Rule Making in June 1990 requesting that amateurs be allowed to specify three callsign choices in order of preference in exchange for paying a $30 fee to the FCC. He said, "The Federal Budget and the amateur community all gain from this proposal."

That petition was denied because of the statutory exemption of amateur service applications from fees. But it started the ball rolling. Wills later contacted his Congressman (Ralph Hall, D-TX), and with the help of Telecommunications Subcommittee Chairman Edward J. Markey, who wrote to FCC Chairman Al Sikes, got the "vanity" callsign proposal included in the Clinton Deficit Reduction Plan.

It was an unbelievable accomplishment to pull off! The initial annual fee proposed in the Clinton budget for vanity callsigns was $7.00—or $70 for a ten-year license term. The American Radio Relay League later requested that this fee be increased to $150 and changed to a one-time application fee.

Status: It now appears certain that Jim Wills original request for a $30 fee for an amateur callsign of choice will be the cost you will pay for the callsign you want! On June 14, 1995 the FCC adopted a revised schedule of Regulatory Fees and vanity amateur callsigns were reduced to $30.

The basic concept of regulatory fees is to charge those who benefit from FCC services rather than all taxpayers. The authority to impose and collect regulatory fees is contained in the Omnibus Budget Reconciliation Act of 1993.

The FCC Form 610-V vanity callsign application form still has not yet been released. And the FCC can't release the form until five Petitions for Reconsideration of the vanity callsign rules are disposed of. We have a standing order at the FCC for the new Form 610-V, and anyone wishing a free form should send us a business-sized, self-addressed stamped envelope. (Send to W5YI Group, P.O. Box 565101, Dallas, TX 75356.)

At press time here are the vanity callsign rules that have been nailed down so far.

1. Any licensed amateur is eligible to choose a special callsign. Trustees of club stations are eligible, but RACES (Radio Amateur Civil Emergency Service) and military recreation stations are not.

2. The FCC will notify the amateur community when they may apply for a special callsign. Applications will be accepted in four phases.

Gate One: Applications for previously held callsigns and for the callsign of a close deceased relative;

Gate Two: Extra Class amateurs may apply;

Gate Three: Advanced Class amateurs, and finally;

Gate Four: Would open the vanity callsign system to all others.

3. Amateurs may select up to 25 callsigns in order of preference. These callsigns must be currently unassigned and from the callsign group appropriate for your class of license (see exception below). The private sector will supply lists of available callsigns. (Please note our advertisement elsewhere in this issue.)

4. Expired, cancelled, voided, revoked, set-aside callsigns, and callsigns of deceased amateurs are available for reassignment after two years (see exception below).

5. Club stations with written permission of close relatives, and close relatives of deceased amateurs, may immediately apply for their callsign. Club stations and close relatives do not have to conform to the appropriate callsign group requirement.

6. The first assignable callsign from the applicant's list will be shown on the license grant. The Form 610-V application and $30 payment must be sent to the FCC's bank. That address is: FCC, Amateur Vanity, P.O. Box 358924, Pittsburgh, PA 15251-5924. The Mellon Bank will process the payment and forward the application to the FCC in Gettysburg, PA, for vanity callsign assignment.

We will publish a complete wrap-up of the Vanity Call Sign System once the FCC Form 610-V is released, the Petitions for Reconsideration have been resolved, and the Commission is ready to begin accepting applications.

Special Event Callsigns

Proposal: The FCC said when they adopted rules to implement vanity callsigns that they would be setting aside the one-by-one callsign block for special event callsigns. A one-by-one call sign consists of a single prefix letter (K, N, or W), the region number (Ø to 9), and a single suffix letter (A to Z). There are 780 such callsigns.

Status: In its comments concerning the vanity callsign system, the American Radio Relay League had requested that one-by-one callsigns be reserved for assignment to stations operating in conjunction with short-term events of national significance.

The FCC wants stations wishing to obtain a special event callsign to indicate the nature of the event at least 120 days in advance and certify that it is of special significance to the amateur service community. In addition, the licensee would submit a list of one-by-one format callsigns, in the order of preference.

This list could be included in a letter or on a form prepared by the applicant or supplied by an outside source. Unlike ten-year-term vanity callsigns which are scheduled to cost $30, special event vanity callsigns are proposed to be free. The first assignable callsign on the list would be stamped "granted" and a copy of the list would be returned to the person making the request.

The special event vanity callsign could be used for a period not to exceed that of the special event, or for 15 days, whichever is less. The FCC is still considering comments from the amateur community on this matter.

Self-Assigned Indicators

Proposal: The FCC has proposed to allow amateurs to use any self-assigned indicator before, after, or before and after their station callsign.

Status: The FCC said it has received several informal requests for clarification of the station identification rules which provide that "An indicator may be included with the callsign. It must be separated from the callsign by the slant mark or by any suitable word that denotes the slant mark. If the indicator is self-assigned, it must be included after the callsign and must not conflict with any other indicator specified by the FCC Rules or with any prefix assigned to another country."

The FCC said it is getting requests to include a self-assigned indicator before rather than after the assigned callsign as provided in the current rule. For example, the licensee of amateur station W1AA in Boston, Massachusetts, decides to operate the station while vacationing in the Virgin Islands. In order to direct more attention to the station, the licensee may include a self-assigned indicator such as /KP2 in the station identification announcement. (Stations located in the Virgin Islands are normally assigned a callsign with the prefix KP2, NP2, or WP2.) The callsign given in the station announcement, therefore, would be W1AA/KP2.

The FCC said, "We propose to permit also the station announcement KP2/W1AA and KP2/W1AA/KP2. We believe that allowing indicators to be included before, after, or both before and after, the assigned callsign will provide the amateur service community better flexibility when making the station identification announcement." The proposal is also in the comment period.

Privatizing Interference Handling

Proposal: The FCC is looking into letting the private sector handle radio frequency interference complaints. The Commission would not get involved until an authorized service agent had determined that the problem could not be resolved at the local level.

Status: The Federal Communications Commission alone receives approximately 30,000 complaints a year of radio frequency interference to home electronics equipment. And this may only represent 10% or 20% of the problem. Due to the FCC's limited resources, it is not possible for the Commission to resolve these individual RFI problems, and it is now Commission policy not to further investigate them. The FCC also does not offer any protection from interference.

According to the Commission, interference to home electronic equipment is a major problem in the United States that they must deal with in order to ensure communications excellence for the American public.

The FCC is now looking into the possibility of having the private sector become involved in resolving these interference problems. The Tampa Office of the FCC's Compliance and Information Bureau is undertaking a pilot project to determine the feasibility of such a program. Canada and Great Britain already have privatized RFI handling.

To get the project underway, a fact-finding meeting was held in Tampa on July 19th. The meeting was moderated by FCC Engineer-in-Charge Ralph Barlow of the Tampa field office with Robert McKinney, EIC of the Vero Beach, Florida assisting. The Commission is now in the process of determining how to proceed with this program.

Commercial Radio Testing

Proposal: Like amateur radio operator testing, commercial radio operator examinations are also conducted in the private sector. The FCC has now ruled on regulatory fees for commercial radio operators and new question pools.

Status: As of July 1st, the $35 regulatory fees—which are in addition to examination fees—have been eliminated. The only fee that a new commercial radio operator applicant will pay is the examination charge, which can vary depending upon the testing service used. Commercial radio operators who renew their license will pay only an application fee of $45.

The FCC will also revise their commercial radio operator question pools with new questions showing up in examinations 90 days after

their release to the public. Table I shows the schedule.

Morse Code Requirement

Proposal: Proficiency in the radiotelegraphy is required in the Amateur Service due to Radio Regulation 2735 of Article 32 of the International Radio Regulations. A move is underway to eliminate this requirement.

Status: New Zealand is leading an effort to abolish RR-2735 in view that the following regulation, RR-2736, contains " . . . ample scope to require competency in Morse code or not as deemed appropriate."

Eliminating the Morse Code requirement from the Amateur Service is opposed by the American Radio Relay League and the International Amateur Radio Union, an organization made up of national amateur radio societies.

The suppression of RR-2735 will be brought up at the upcoming World Administration Radio Conference to be held beginning October 23rd in Geneva.

Electronic Application Filing And Renewals

Proposal: The FCC proposed to speed up application handling by implementing electronic filing of amateur radio operator applications and implementing a new renewal system.

Status: Electronic filing of amateur radio operator Form 610 applications has now been implemented by all VE Coordinators. Basically, it works like this. Successful applications are received by the VECs from the volunteer examiners. This transfer is either made by mail or via modem. The W5YI-VEC is currently the only VEC that is electronically transferring the application data—computer-to-computer right from the VE team.

Once received, the application information is keyed into a computer program and then transmitted over the telephone lines directly into the FCC's computer database, which is maintained in Washington, DC. The FCC's computer immediately authorizes a license grant and callsign and the examinee may begin operating on the amateur bands as soon as this callsign is determined.

The FCC posts every license grant to the Internet and VECs download this information daily. To obtain your new callsign, simply call 1-800-669-9594 if the examination was coordinated by the W5YI-VEC, or 1-800-326-3942 if an ARRL exam. There are sixteen VEC organizations, but W5YI and ARRL account for nearly 90% of all examinations administered.

New callsigns and license grants are also posted daily to the World Wide Web page of the University of Arkansas at Little Rock. Their web server address is:

http://www.ualr.edu/doc/hamualr/callsign.html

They download the new FCC database data at night and have it ready for access by the public the following morning.

Under the new policy, new amateur operators no longer have to wait until they have their license in their possession before getting on the air. You are considered licensed once the FCC's database has been updated, and that is immediately after transmission by the VEC into the FCC's computer.

Elements	Release Date	Effective Date
7 and 9	Sept. 1, 1995	Dec. 1, 1995
1, 3, and 8	Oct. 1, 1995	Jan. 1, 1996
5 and 6	Nov. 1, 1995	Feb. 1, 1995

Elements 7 and 9: GMDSS Radio Operator and Maintainer pools.

Elements 1, 3, and 8: Marine radio law, electronics, and the radar endorsement pools.

Elements 5 and 6: Basic and advanced radiotelegraph.

Table I– Commercial Radio operator question pools, their release dates and effective dates for new questions.

Amateur radio operator license grants are being handled quicker than ever! Depending upon how fast the VE team handles their paperwork, you could even have your new license grant and callsign within a couple of days of testing. The average waiting time, however, is about a week. In any event, it is certainly a lot faster than the two to three months that new amateurs used to wait!

A new amateur operator license renewal procedure will begin shortly. An FCC Form 610-R "return card renewal" will be sent to all licensees whose licenses expires in December and afterward. You need only sign and return the card to the FCC to renew your ticket.

73, Fred, W5YI

Just when you think that it's all been done, found, explored, and unearthed, a new name pops up and fuels the fire of imagination that burns deep in the heart of every DXer.

Close, But No Cigar

The Discovery of A New "Country"—Almost!

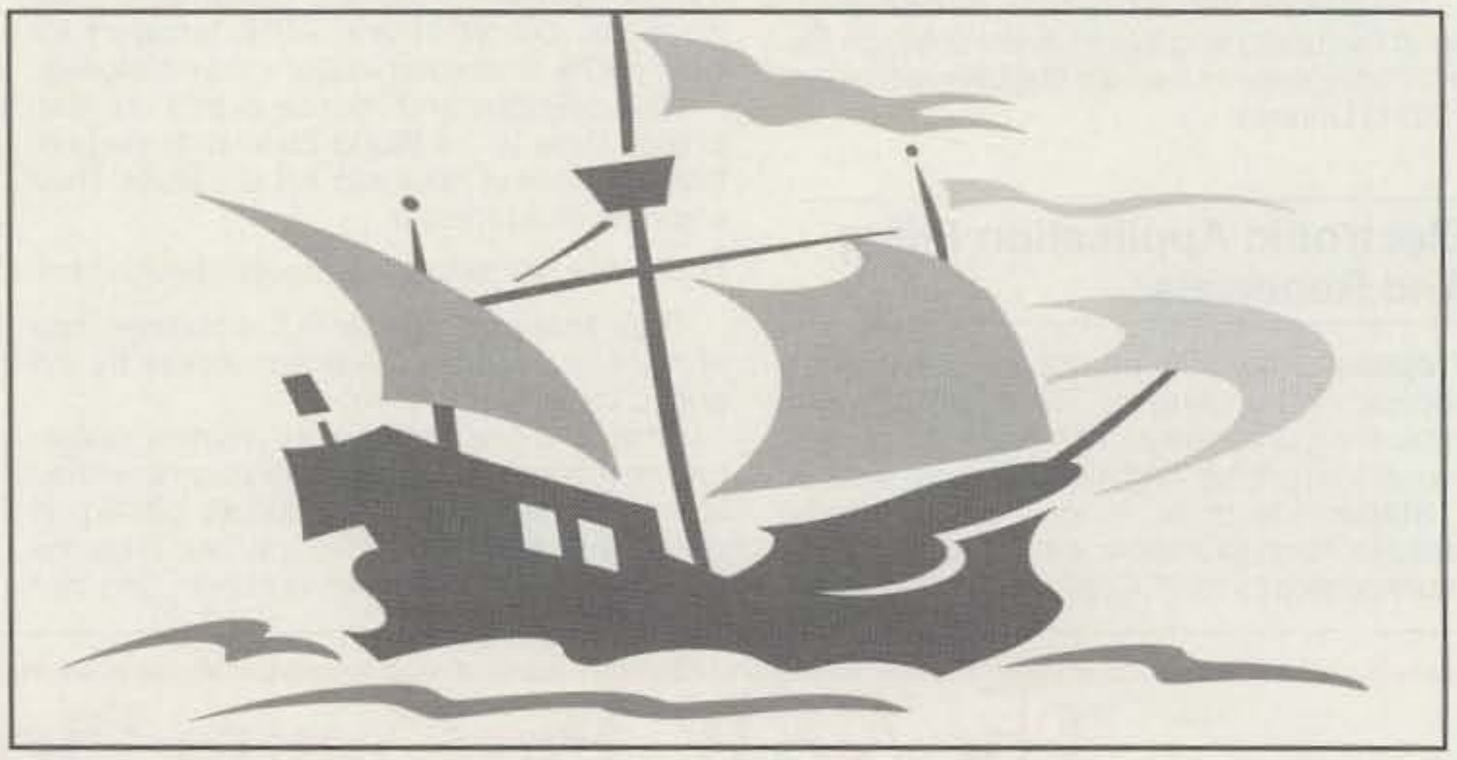
BY DR. THEODORE J. COHEN*, N4XX

What is it with DXers?! It starts with that first DX QSO, perhaps to some semi-rare country on the other side of the world, and then escalates into an addiction that causes us to build super stations, skip meals, miss sleep, stay home from work, rearrange vacations, and do all sorts and manner of weird things, all in the name of DX. But we can't stop there. Soon we're thinking about other worlds to conquer, with some among us searching out rocks that are barely above sea level on which to establish a new "country." Just the mere possibility that some piece of ground out there might count as a new one is enough to make our hearts beat faster. Such was the experience I recently had while reviewing the history of an expedition to the North Pole that took place in the late 1870s.

It all began with a casual trip to a used book store in Alexandria, Virginia. There, in the back, among the musty stacks of old and worn books, rested a worn and discolored volume entitled *Hell On Ice*, written by Commander Edward Ellsberg (Ref. 1; see also Ref. 2). Somewhat of a buff on polar adventures, I bought the volume for a buck and turned to it during a recent bout of low solar flux and high geomagnetic activity.

The saga, in a nutshell, involved an ill-fated expedition to the North Pole aboard the sailing ship *Jeannette*. Originally commissioned as the *Pandora* in the Royal Navy, she had been bought by James Gordon Bennett, owner of the *New York Herald*, who was seeking new worlds to conquer in the name of journalism. (History buffs will recall that it was Bennett who sent Stanley into the wilds of Africa to find Livingstone.) Bennett, a powerful figure of the time, even succeeded in getting a bill passed in Congress that made the *Jeannette* an official U.S. Navy vessel. Thus, while he put up the money for the expedition, all of the personnel aboard the ship were Naval officers or enlisted men. The ship's captain was George Washington DeLong, who was eager to discover what was to be found at the pole.

After being outfitted in San Francisco, the *Jeannette* sailed for Alaska on July 8, 1879. By September of that year, the ship had traveled to the northeast of Herald Island (which is just to the northeast of Wrangel Island). There, on September 9th, she became frozen in the ice, and drifted, at times aimlessly, for over 20 months. On September 6, 1881, following a heavy gale, the ship was located near 77°16' N, 159°33' E, and it was there that DeLong spotted two islands. He named the first Jeannette Island (after Bennett's sister, for whom the ship also had been named); the second was named Henrietta Island, after Bennett's wife. DeLong sent a small landing party over the ice to take possession of Henrietta Island and to explore it. Led by the ship's Chief Engineer, George Wallace Melville, the party reached the island on June 2nd, and claimed it, and Jeannette Island, *in the name of the United States*.



Whoa! What's this!? Two islands, claimed in the name of the United States, which, taken together, might constitute a new "country." I continued to read, my interest piqued. The trials of the *Jeannette* and her crew continued, until the ship was crushed in the ice and sunk on June 17, 1881.

The crew of the *Jeannette* then set off on foot, with small boats, sleds, and sled dogs, in an attempt to reach the coast of Siberia. On the way, they discovered still another island, which they named Bennett Island and which they also claimed in the name of the United States. Taken together, the three islands—Bennett, Henrietta, and Jeannette—comprise what today are known as the DeLong Islands.

The question now, of course, was whether or not the islands indeed belonged to the U.S. A check of the atlases in the local library provided little information on this score, though all showed that the islands still retained the names they had been given by DeLong. It wasn't until I placed a call to the Reference Desk of the National Geographic Society in Washington, DC, that I learned the answer: the island chain belonged to Russia.

To say that I was disappointed is an understatement. But I should have guessed that this would be the case. With the likes of OH2BH and others searching the world for new "countries," it seemed unlikely that they would have overlooked the DeLong Islands, regardless of their remoteness.

Well, it was a nice thought while it lasted. Did the islands ever belong to the U.S.? And if they did, when were they ceded to Russia? Perhaps the answer lies in The Congressional Record.

But that's the way it is with DXers. We're always pouring over documents, maps, and photographs, looking for "the next one" from which to operate. Why do we do it? I'm not sure. Perhaps Hugh Cassidy, WA6AUD, founder and former publisher of the *West Coast DX Bulletin* said it best: "DX is!" That's good enough for me!

*8603 Conover Place, Alexandria, VA 22308

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About The Author

Ted Cohen is no stranger to polar exploration. Near the end of 1961, he joined the XVI Chilean Antarctic Expedition and spent almost two months "on the ice." When time permitted, he operated from CE9AF (North Antarctic Peninsula), CE9AS (South Shetland Islands), and CE9AY/mm and CE9AW/mm in the South Atlantic and polar seas. In honor of his work, the U.S. Board of Geographic Names, National Science Foundation, named four islands in the Cape Legoupil area, Antarctica, the "Cohen Islands."—*K2EEK* ■

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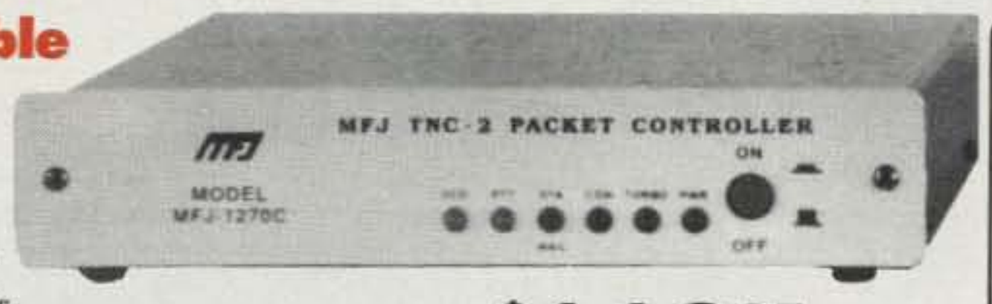

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Radios \ TNC Type	All MFJ TNCs/ PK900/PK96/ PK12/PacCom/ other TNC-2 compatibles	KAM VHF[5]/ KAM HF[5]/ KPC3[5]/ KPC9612[5]	PK-232	PK-88
Icom[1]/Yaesu/ Alinco/Radio Shack HTs	MFJ-5024	MFJ-5024YV	MFJ-5024X	MFJ-5024Z
Kenwood[2] HTs	MFJ-5026	MFJ-5026YV	MFJ-5026X	MFJ-5026Z
Yaesu 8-pin	MFJ-5080	MFJ-5080YV MFJ-5080YH	MFJ-5080X	MFJ-5080Z
Icom[3] 8-pin	MFJ-5084	MFJ-5084YV MFJ-5084YH	MFJ-5084X	MFJ-5084Z
Kenwood/Alinco 8-pin	MFJ-5086	MFJ-5086YV MFJ-5086YH	MFJ-5086X	MFJ-5086Z
Yaesu 8-pin modular	MFJ-5080M	MFJ-5080MYV	MFJ-5080MX	MFJ-5080MZ
Icom[4] 8-pin modular	MFJ-5084M	MFJ-5084MYV	MFJ-5084MX	MFJ-5084MZ
Kenwood 8-pin modular	MFJ-5086	MFJ-5086MYV	MFJ-5086MX	MFJ-5086MZ
Radio Shack 8-pin modular	MFJ-5088M	MFJ-5088MYV	MFJ-5088MX	MFJ-5088MZ

1. does not include IC-W2A
2. does not include 2500
4. does not include IC-100H, IC-2700H
5. YV for KAM VHF port, YH for KAM
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WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

New Life For Old Bugs

During the last few years I have refurbished a creditable number of semi-automatic keys for my own use and for others. Many of you have asked me to describe the procedure, but squeezing those details into my "Keys Special" columns; *Keys, Keys, Keys* book; or new self-published *Keys II* book has been difficult. They have all been overloaded with photos and details of marvelous keys (and more are still coming in next year's columns!). This month's column thus summarizes my "quick and easy" restoration process, and also explains how to adjust a bug for great on-the-air operation. I am sure you will find this information beneficial for cleaning up your CW treasures and using classic keys today.

First of all, I should emphasize that both classic rig collectors and key collectors have their personal preferences in restoration and use of newly acquired items, and a single process obviously does not apply to all cases. One person may elect simply to dust off an item with a soft brush to retain full authenticity; another may prefer doing a "full rebuild" complete with repainting and rechroming. My preference is about midway between those extremes. It is inexpensive, not too lengthy (10 to 20 hours per bug), retains authenticity, and produces a "well-seasoned yet exceptionally well-preserved" appearance. Since I also use my collectible bugs on the air, they must emerge from refurbishing with a good feel and smooth handling action, otherwise they could be replaced with a fancy modern paddle. Now on to the cleanup process!

Photo 1– Clip leads are convenient for quick-checking a bug and troubleshooting bad connections. The Deluxe Speed-X shown here was an absolute basket case I thought would never clean up or work again. Now it is a delight to use (but still needs rechroming).

Pieces Galore!

After visually inspecting a newly acquired key, I quick-connect it to an oscillator or transceiver with clip leads and check operation (photo 1). If the key does not work, I can easily move the clip leads from point to point for spotting the troubled area. Bugs I have acquired that are in poor condition are torn down immediately after testing (usually at night, when photographing is difficult). Consequently, I have only one good "before restoration" photo at this time (photo 2). Bugs in good condition are also torn down. However, "before" and "after" photos of those items seldom reveal improvements. One must actually see the key to appreciate refurbishing results.

All parts are then carefully laid out in an "exploded view" manner on a towel placed in the lid of a large cardboard box. This arrangement is necessary, as the key must move between shack, sink, and outdoor deck during refurbishing (sunlight helps reveal overlooked blemishes).

All parts, including the base but excluding plastics/fingerpieces, are cleaned using a soft toothbrush and a mild mix of Comet and water. Each piece is then dried with a towel and hair blow-dryer, and then "sunned" for 30 minutes. Next, tarnished chrome and time-grunged screws, springs, and even pinion rods are soft polished to as new as possible using steel wool. A sharp eye and good judgment are important here, as ultra-thin chrome is easily removed. Steel wool should never be used on nameplates or plastic. Although some folks may disagree, I also polish the key's contacts and sharp-tipped/pointed pivot points to like new with steel wool (photo 3). New replacements are desirable, but not always available (nor do they match other "aged" parts). Leaving old contacts as-is (dark with age and pitted with use) causes scratchy and choppy dots. Contacts I have polished to shiny new with steel wool have stayed shiny new, so I can honestly say it works—and ensures good keying. All parts are then recleaned (more Comet

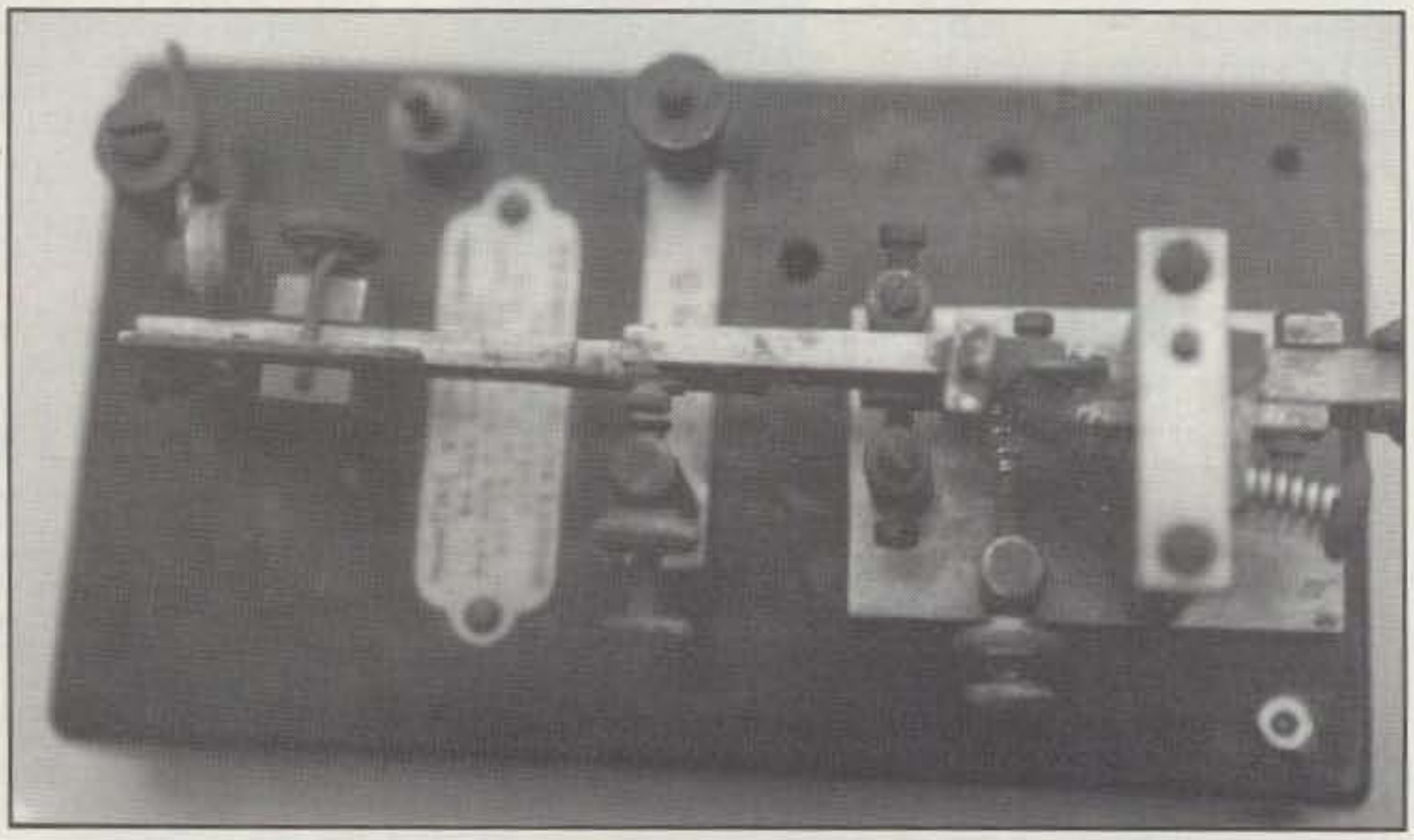

Photo 2– Before-restoration view of Vibroplex model "X" bug. It looks in bad shape, but there is beauty under that grime!

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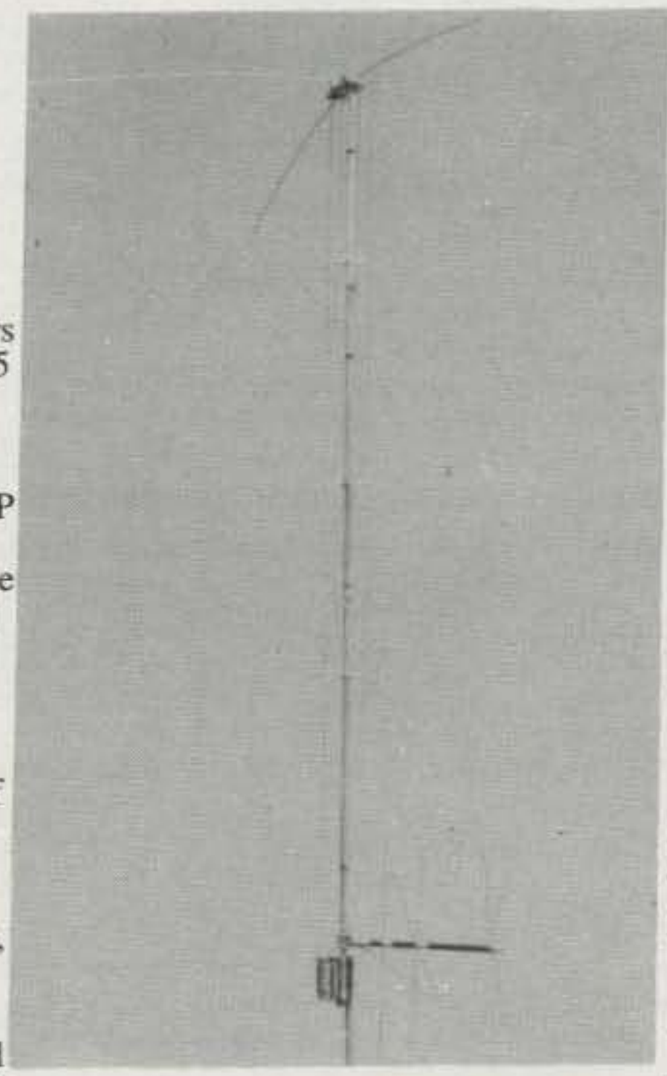

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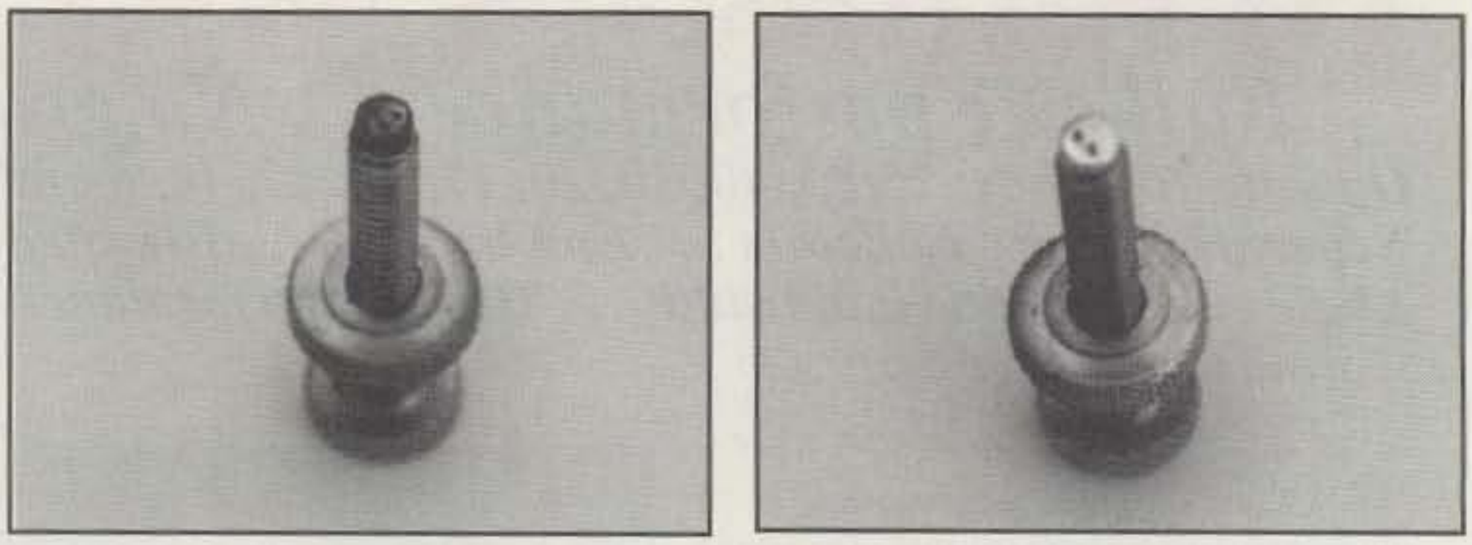


Photo 3– Super-close-up photo of a dot contact before (left) and after (right) cleaning/resurfacing with steel wool. Deep pits call for removing too much contact surface and must be left.

and water), dried, and reinspected with a magnifier. In the meantime, the key's (previously cleaned) painted base is anointed with two or three light coats of hair spray (with 10 minutes of "sunning time" between coats) to give it a just like new, but not phony, lustre. Most of the key's parts (excluding base, pivot points, contacts, screw threads, springs, plastics, and wiring strap ends) are then polished/protected with a good chrome/aluminum wax product as shown in photo 4. The best products I have found to use here are Eagle 1, Harley Davidson, and Mother's Gold. I photographed the Vibroplex model "X" during refurbishing, and it is shown in photo 5, but I am unsure if all its glamor will be picked up by magazine reprinting. Before refurbishing, dot contacts were black as the base, chromium parts were dull with black streaks, and the nameplate was barely readable. The refurbished and reassembled model "X" (photo 6) now looks and handles like the authentic classic it is, right down to a couple of slightly tarnished shorting straps and blackened with age yoke screws. As a final topping, original plastic pieces are handwashed in dishwashing detergent, and old tensionless springs are replaced with modern substitutes. Finally, I should point out the model "X" is a superb showpiece, but it has only one set of contacts to make both dots and dashes—and thus has a cumbersome "flat" feel. In other words, it is not an item one would use daily, regardless of how well it is adjusted. That statement brings us to the next section.

Brother Dave's Bug Tips

Most well-adjusted and skillfully handled semi-automatic keys can produce beautiful sounding Morse and make an electronic keyer seem rather impersonal by comparison. Their interactive feel or "tactile feedback" during use also makes hand-sending pleasantly addictive: the more you use a bug, the more you want to use and enjoy it. The problem, however, is most

Photo 4– Main items/products used in "light refurbishing" of bugs, as discussed in text. I prefer retaining all possible authenticity, so except for springs, few parts are replaced/substituted.

Photo 5– The Vibroplex model "X" shown disassembled here has just undergone refurbishing as described in text.

operators adjust their bug for a light touch and a short fingerpiece travel distance (which is fine for a paddle and keyer, but not for a bug—especially below 30 wpm). Off-the-air practicing also tends to be overlooked, resulting in many slower speed operators actually sending more readable code with an electronic keyer and paddle than with a bug.

What is a good solution? At the risk of unpredictable scorn from lifelong professional telegraphers, I have a few suggestions. Let's begin by assuming you have cleaned and reassembled your bug, and/or its main adjustments are close to your normal preference. We will first focus on adjustments to give your bug a good feel and solid rig keying, then we will hit adjustments to produce slower dots and more controlled dashes (the most popular request).

First, check to ensure accurate seating of the main arm and pendulum assembly's sharp-tipped pinion rod in mating pinion set screw sockets on the yoke's top and bottom (A in fig. 1). Proper seating assures the pendulum is in line with the base (straight horizontally and vertically) and swings freely. If the pendulum exhibits excessive vertical "play" at its far end (near damper), slack can be reduced by tightening the top pinion set screw (B) very slightly. Careful—this adjustment influences the bug's "feel" and agility. If the screw is set too tight, the main arm will feel stiff and impersonal. A bare (and I say, bare!) amount of vertical wobble at the pendulum's far end usually enhances the bug's feel; you can sense a slight "kickback action" in your fingers as the pendulum vibrates to make dots. This interaction between operator and bug differs with every fist and every bug (each one's flexible mainspring has aged and tempered differently), but striving to enhance it is always worthwhile!

Next scrutinize both dot and dash contacts (C and D) for solid surface mating. Use a magnifying glass if necessary. These contacts are responsible for giving your signal a clear and solid CW signal. Reset the pendulum-mounted "U" shaped dot contact spring (E) and dash slider contact (F) as necessary. These adjustments can be tedious, so be patient and strive for accuracy.

Your bug is now well on its way to pleasant perking, so let's concentrate on taming its high-speed dots and minimizing "double dashing" errors. Start by readjusting the bug's dot and pendulum travel-setting screws (G

and H in fig. 1) so the fingerpiece must move callsign 1/8 inch to make a series of dots. Set the right travel screw (H) so the damper wheel is not heavily "banged" by the pendulum after wide swings from making dots and dashes (as when sending "so"). A slight movement of the damper wheel is necessary, however, to stop further vibration (like the "HW copy" after "so"). Back out the dot and dash contacts (I and J) accordingly. The fingerpiece should move 1/8 inch in the opposite direction to make dashes (1/4 inch overall travel). Now increase dot and dash spring tension (K and L) to almost double their previous/usual amount. You should now notice a positive "no error" snap action in the bug. Move the weights (M) to the pendulum's far end (N) for its slowest speed, then use your rig's CW sidetone for monitoring (not on the air, though!) while "re-tweaking" the previous adjustments to perfection. I heartily encourage running the dot contact (I) in far enough to produce only 10 to 20 dots before the pendulum rests in "key down" condition. This adjustment will result in the most solid and DX worthy (heaviest) dots consistent with a wide range of CW speeds. Now you can understand why I previously suggested 1/8 inch fingerpiece travel: it ensures the pendulum taps the left travel limiting screw (G) with plenty of momentum to set up good slow dot-producing vibrations. A short travel distance works for speeds above 25 wpm, but a longer travel distance is the keynote to slower speeds.

Closing Notes

Some operators tell me they have stopped using their bug(s) on the air, and some bug users I hear on the air really should, err, work

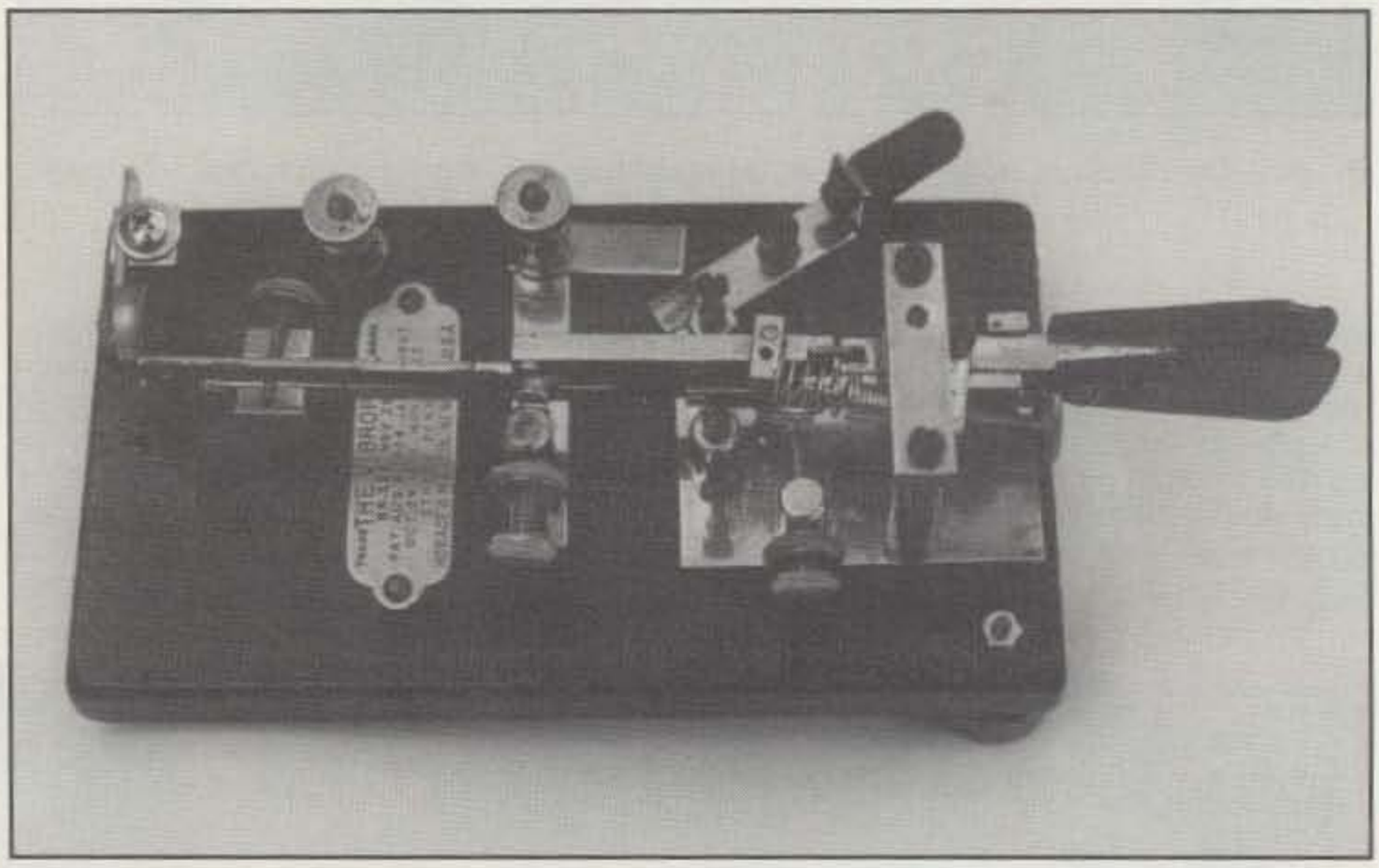


Photo 6– Reassembled, fitted with new springs, and meticulously readjusted—the Model "X" is a real attention grabber. Quite an improvement from "before."

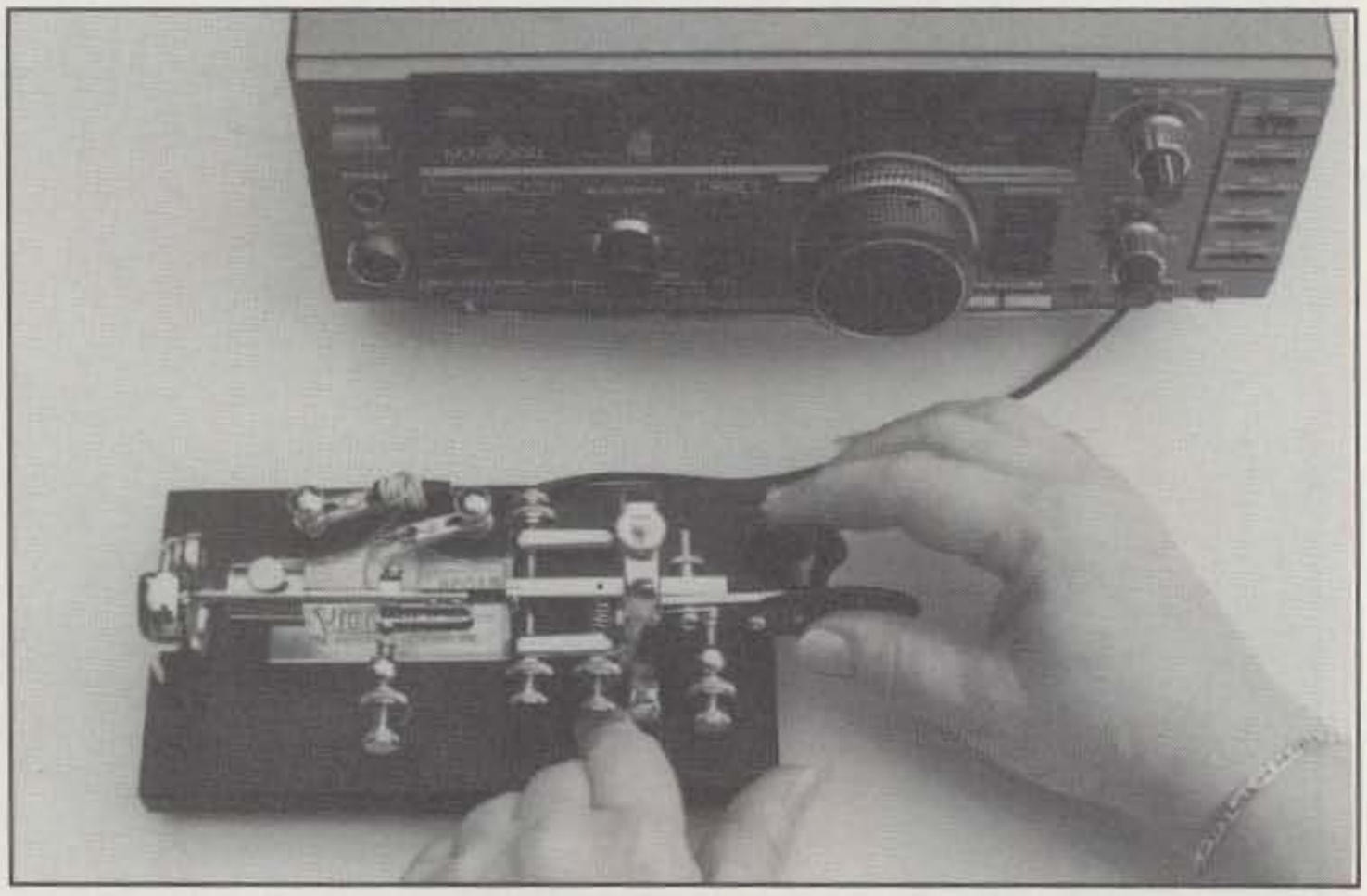


Photo 7– My suggested method for positioning and using a bug. Arrangement overcomes "stiff fingers," and really makes operating CW fun.

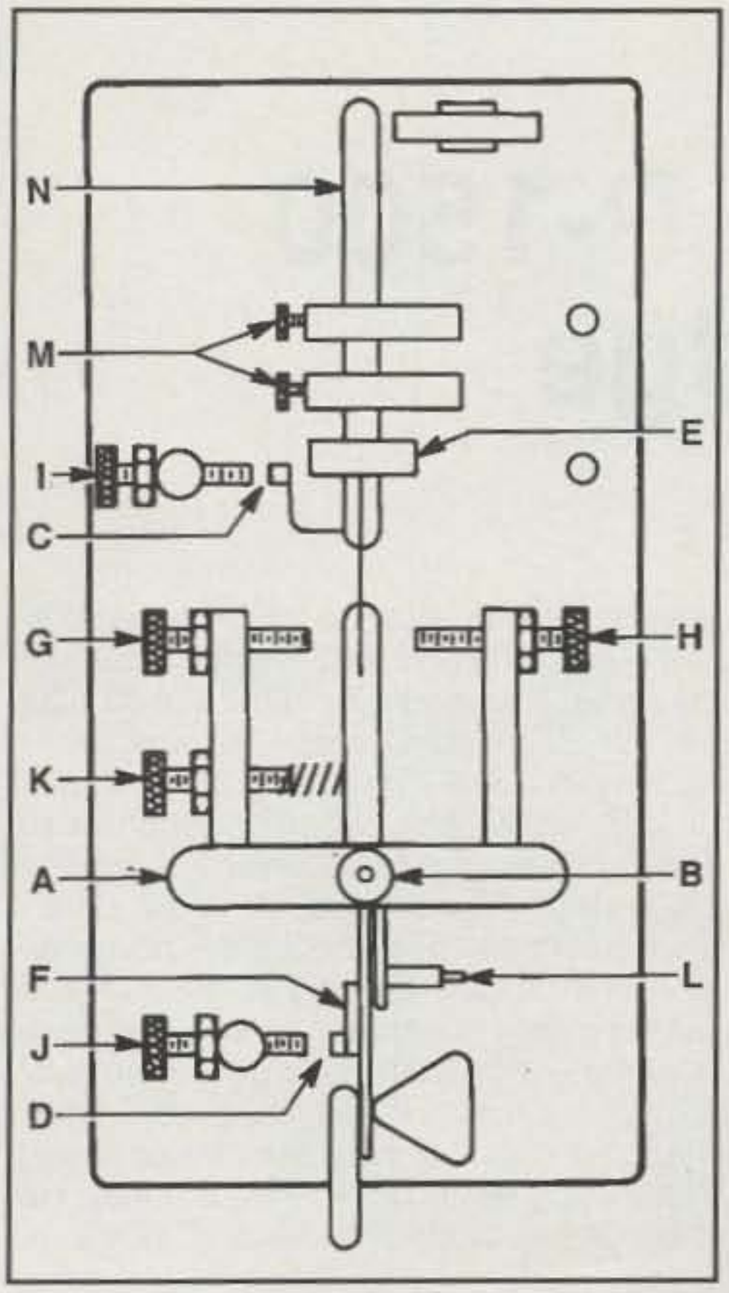


Fig. 1– Layout of adjustments of a bug. (See discussion in text.)

on improving their fists. Maybe the following quick notes will help both groups. Connect your bug to your rig's sidetone monitor for practicing, and strive to duplicate the "perfect CW" like that produced by an electronic keyer (do not go for a personalized "swing" until mastering this step, please!). If you have a computerized packet and CW setup, work on good sending until accurate copy shows on the screen. If controlled wrist action is a problem, try these changes. Position the bug "broadside" in front of you—between you and your rig. Then position your arm parallel to the rig's front panel so your wrist faces the bug's fingerpieces as shown in photo 7. Got it? Okay, now move the bug toward the rig slightly so your finger's position on the fingerpiece almost makes a dash while "at rest" (moving your wrist back to avoid sending undesired dashes is easier than moving it forward to make dashes). Hold the bug's base or dot contact screw with your left hand to increase accuracy and confidence (most operators are concerned with a bug "walking" or tilting, and unconsciously handle it too gingerly for positive action).

Are semi-automatic keys worth the time and effort associated with adjusting and using them? You bet! In the same way that vacuum tubes produce glamorous full-bodied audio unequalled by transistors, bugs can sing beautiful Morse that cannot be equalled by an electronic keyer. Expertise in finding, refurbishing, adjusting, and using the bug best suited to your fist, however, is the secret. Good luck in the pursuit, and I will be listening for your good fist on 30 meters!

73, Dave, K4TWJ

CQ REVIEWS:

The RF Applications P-1500 Power SWR Bridge

BY LEW McCOY*, W1ICP

The RF Applications P-1500 is a very unusual piece of equipment in that it serves as a constant bar-graph monitor of your transmitter and antenna system. It accomplishes this feat by providing a visual indication of four switchable items. These include the forward and reflected power readings, the standing-wave ratio, and last—and to this reviewer most important—the true power in the line going to the antenna.

Before going further, let's look at the specifications. The unit measures 3.5" × 4.0" × 4.0". It is powered by a separate 12 volt DCsupply (provided). The power measurement range is from 15 to 1500 watts. The SWR range is from 1:1 to 19:1. The accuracy of power and SWR is ±10 percent with a frequency range from 1.8 through 30 MHz.

There are four switchable readings available. First is forward power (FOR); next is VSWR; then reflected power (REF); and last, true power in the line, which is forward minus reflected.

The P-1500 is an extremely accurate device. I carefully checked the power reading against some of my test devices. The reading accuracy is rated at ±10 percent of the reading. I found that in my checks I easily could have made the rating at better than 5 percent. There are three scales, or ranges, of the bar-graph readings: 120 watts, 750 watts, or 1500 watts. There is also a jumper setting that changes the lowest range to 200 watts. Four LEDs at the right of the bar graph show what mode you are in. From the top, they are FOR (forward power), VSWR, REF, and the last, TRUE power.

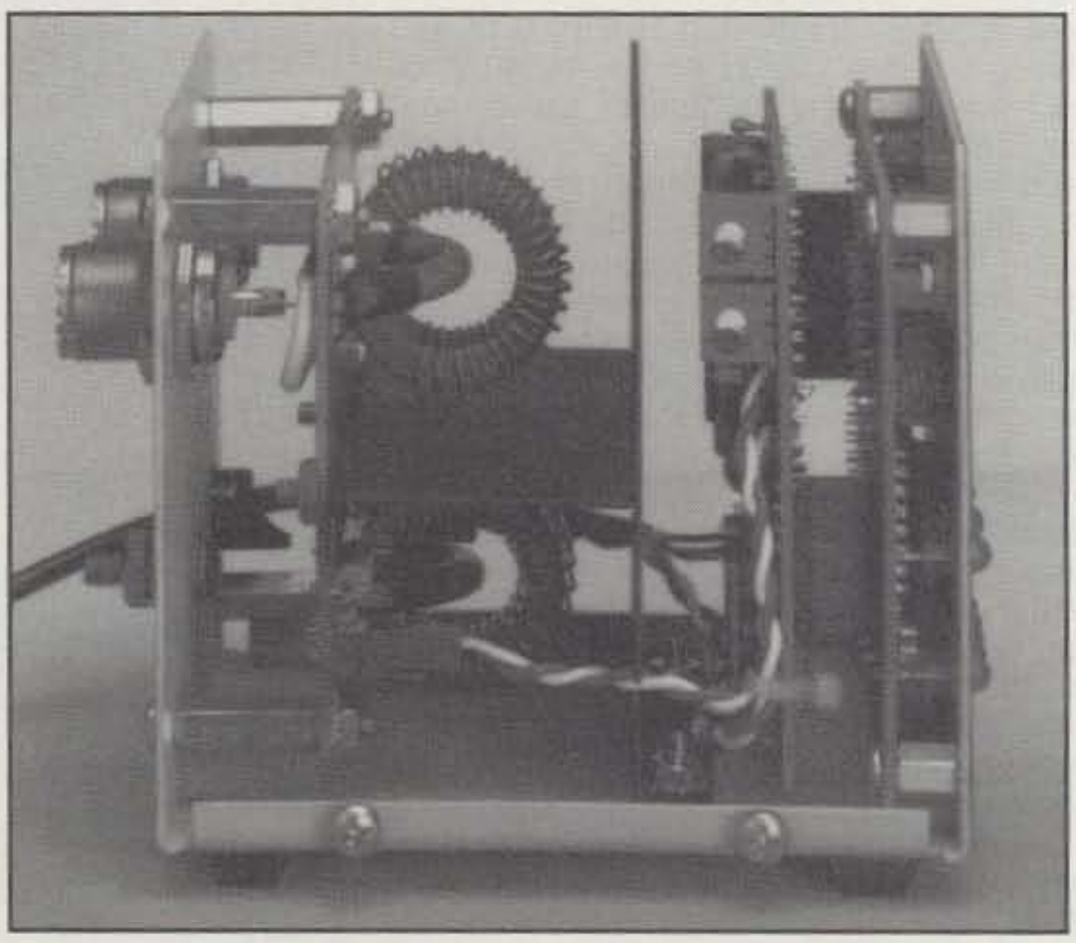
I set up various SWR conditions to see how the accuracy checked, and it was outstanding. What was interesting and should be a revelation to many users is the TRUE power readings that one gets with varying SWR conditions. I was using a rig that has a maximum power output of 100 watts. Under one SWR condition I noticed that I was showing a FORward power of 157 watts and a REFlected power of 80 watts. This would be a total of 80 plus 157, or 237 watts. There was absolutely no way that this rig could put out a total of 237 watts. *But*, when I switched to TRUE power, the real power leaving the rig, it read 77 watts, which is the difference between 157 and 80! SWR and power readings can be very confusing and not very easy to explain; at least there are no simple, non-mathematical methods of explaining them. If you want more information on this subject, then I recommend Walt Maxwell's book *Reflections*. He treats the subject of "reflected" power in great detail.

So what do I think of the P-1500? It must be obvious from this review that I feel this is a very excellent piece of gear. It is very easy to read, is extremely accurate, and tells you what you want to know.

The P-1500 is priced at $219.95. The unit is made by RF Applications, Inc., 9410 Little Mountain Road, Kirkland Hill, OH 44060 (216-974-1961). ■

*Technical Editor, CQ, 1500 W. Idaho Street, Silver City, NM 88061

This view shows the P-1500 from the front. At the lower left are the lights indicating power and percentage of power. At the upper right are the four lights for FOR, REF, VSWR, and TRUE. The actual power indicator is at the top center. The black square to the left of the readout (labeled MODE) is actually a "pushbutton" switch. By pushing the switch, you cycle through the various indicator readings. The normal position for the readout is forward power (FOR).



Here is a side view of the inside of the unit. Two SO-239 type coax fittings serve for the input and output. The cord off the bottom rear is to the power supply (furnished). Construction is first class.

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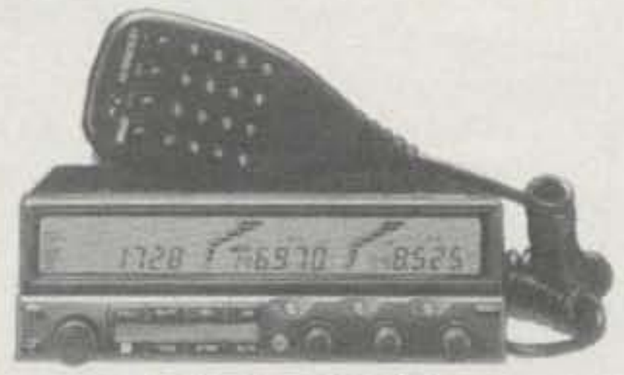

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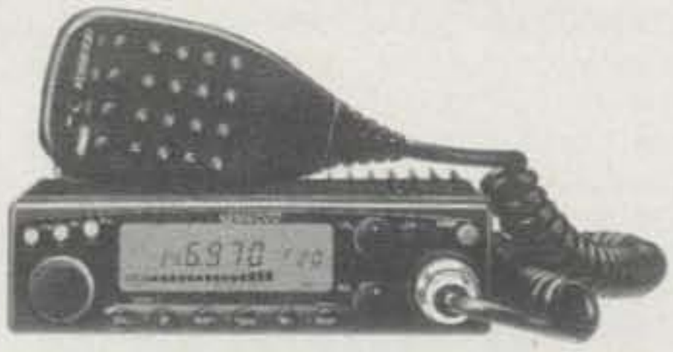
TS-850S

TH-79A(D)

TM-733A

TS-450S

TH-28A



TM-241A

TS-50S

TM-255A

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Short Takes

To tell you about some of the neat things that have come my way the past few months, this month we'll cover a great deal of territory—perhaps in somewhat less detail than usual, but with lots of graphics. With that caveat in mind, let's get started.

Antenna Notes

PAR Electronics 2-Meter Intermod Filters. In January 1995 *CQ*, Ed Juge, W5TOO, reviewed the PAR Electronics VHFDN152 2 Meter Intermod Filter, stacking it up against more expensive cavity-type bandpass filters as an intermod solution. He found that the PAR filter seemed to work as well as the more expensive cavity, cost less, and was smaller and easier to install.

PAR Electronics' Dale Parfitt, WA2YPY, contacted us with more information about his filter, advising that he now has an HT version. The response to Ed's review has been encouraging, as have been testimonials from amateurs who had about given up on solving the intermod problem in their situations.

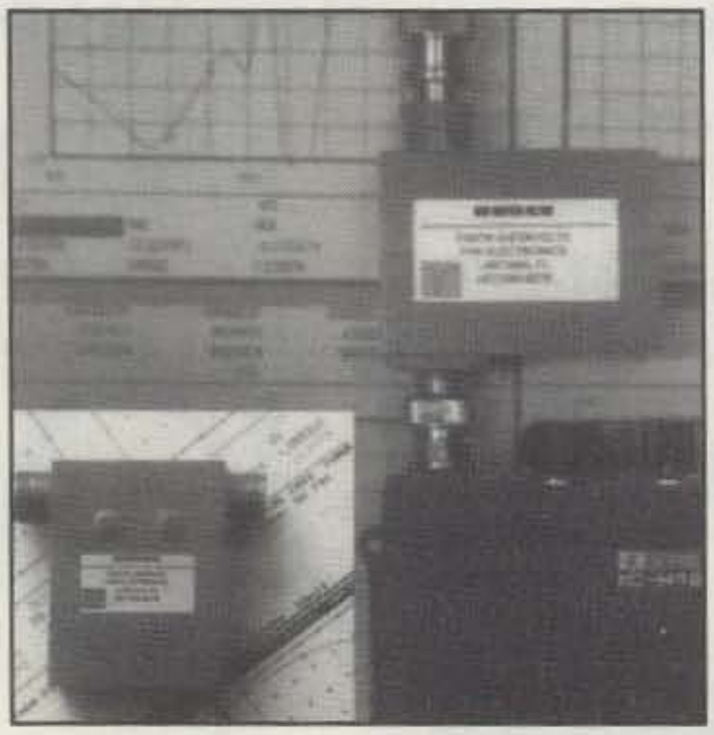
Since Ed reviewed the filter it's been improved greatly. The improvements include increasing the notch depth another 8 dB, to about 50 dB; minimizing the SWR at 70 cm (initially about 2.8:1) to make the filter essentially transparent to dual-band radios; and developing a smaller version of the filter with male and female BNC connectors for direct connection to an HT. The original VHFDN152 is $62, while the VHFDN152HT is $68; the latter is pricier because of the expensive gold/teflon BNC (see photo).

For more information, contact Dale at PAR Electronics, 6869 Bayshore Drive, Lantana, FL 33462 (407-586-8278).

Mobile Antenna Tip de WAØKKC. Frequent correspondent Richard Mollentine, WAØKKC, regularly FAXes us "quickie" antenna- and tower-related hints and tips, many of which we share with *CQ* readers. Richard observes that the majority of commercially built mobile antenna bases are hollow, and a hollow base eventually will "suck" air, moisture, rain, humidity, snow, etc. This may rust the connections. To prevent this problem, just open the bottom of the base and completely fill it with clear silicone. The homebrew potting should last for years.

Broadbander BB3 Mobile Antenna. The past several years have seen the development of several heavy-duty, high-efficiency HF mobile antennas. There's yet another one now, the Broadbander BB3 All-Band Mobile Antenna. It's for use on automobiles, mobile homes, RVs, and even as a fixed station antenna.

The BB3 is a 10 through 80 meter motorized antenna that tunes all bands at the flip of a switch. This feature eliminates the need to adjust taps or change loading coils to switch from one band to another. The antenna uses a motor-driven center loading coil; the coil slides down inside a copper mast as you move up and down in frequency. The top whip may be any length; a 102 inch stainless-steel whip is suggested. You also can operate the BB3 as an inverted-"L" if antenna height is a problem.



Shown here are the two 2 meter intermod filters offered by Dale Parfitt, WA2YPY, of PAR Electronics. The original VHFDN152 filter is on the left; the new VHFDN152HT is on the right. Both filters provide a very deep notch on 2 meters. They are comparable to the notches offered by more expensive cavity-type bandpass filters. (Photo courtesy PAR Electronics)

The heart of the antenna is its beryllium copper finger stock, sweated into the copper tubing; 68 fingers make contact with the coil. This makes for very low loss and an anticorrosive environment. The antenna also uses a sleeved bearing for the coil to ride on, allowing tuning smoothly while in motion.

The motor that raises and lowers the coil is mounted inside the copper tubing. A two-wire shielded cable comes out of the bottom side of the antenna to control the motor. A DPDT switch and a pushbutton control the direction and operation of the motor; coil travel time across the 3–30 MHz range is less than 60 seconds. The antenna handles 1500 watts SSB, and its weight is 9.5 lbs. A broadband transmission line transformer is included.

The BB3 with matching network is $265. Several options are available, including a 160 meter coil, remote-control unit, and whip. For more details, contact the T. J. Antenna Co., 1055 North First Place 3-E, Hermiston, OR 97838 (1-800-443-0966).

XMATCH™ Antenna Tuner. Paul Schrader, N4XM, has announced his custom-built transmatch, the XMATCH™ Antenna Tuner. The high-power patented circuitry used in the XMATCH reportedly yields high efficiency and overall good performance even on 160 meters. It can handle full legal power at up to a 5:1 SWR over the full HF range 1.8–29.7 MHz. The unit features continuous coverage and tuning ease, and it has a high-quality counter dial, heavy-duty bandswitch, and classic appearance.

Further information is available from Paul D. Schrader, N4XM, 7001 Briscoe Lane, Louisville, KY 40228-1653. Paul also offers detailed technical information on the XMATCH for $3.

Emoto Rotators. Emoto "EMOTATORS," distributed by Electronic Distributors Co. (EDCO), are becoming well known in the industry. The imported rotators feature strong machined aluminum cases and steel gears, watertight connectors in most models, automatic brake release and set, 360-degree compass indicator, and computer compatibility in the larger rotators.

Emoto recently introduced two new models, the EV800DX AZ-EL and EV800X elevation-only models. The EV800DX, a follow-on to the popular EV700 series, offers a digital controller, almost zero backlash, and ±1 degree accuracy for both elevation and horizontal rotation. Remote terminals on the rear panel of both rotators are standard. These allow for automatic computer control using your compatible computer and appropriate software. All mounting hardware, connectors, and weatherproofing boots are included. Also, the optional 891E3DX controller offers programmable presets and fully automatic tracking operation.

For pricing and spec sheets, contact Electronic Distributors Co., 325 Mill St. N.E., Vienna, VA 22180 (703-938-8105).

RF Applications Update. Bruce R. Knox, N8LXS, set up RF Applications, Inc. "to develop and market interesting and useful products to the amateur radio community." The company's first product was the D-144 Two Meter Deviation Monitor; the second was the P-3000 Digital RF Power/VSWR Indicator, a microprocessor-based instrument that gives fast and accurate power and VSWR readings in real time, with no adjustment or calibration required. We described the P-3000 ($299.95) in May 1994.

Since May '94, RF Applications has introduced a second unit, the P-1500 Digital RF Power/VSWR Indicator. The new unit, much like the P-3000, offers virtually instant, adjustment-free VSWR measurement, an autoranging bar graph, and a four-digit LED display. The P-1500 is for use in 50 ohm lines and can display power from about 15 to 1500 watts. Unlike the P-3000, which has two modules (a directional coupler and a separate display unit), the P-1500 has a built-in coupler. Price is $219.95; an optional power pack is $16.95.

For detailed specs, contact RF Applications, Inc., 9310 Little Mountain Road, Kirtland Hills, OH 44060 (1-800-423-7252).

New Antenna Pubs de I.C.E. In several columns we mentioned the free Industrial Communication Engineers, Ltd. catalog. I.C.E. offers a wide range of accessory products,

289 Poplar Drive, Millbrook, AL 36054-1674

notably for lightning protection and grounding. The catalog is an excellent reference.

In February 1993 we also brought to your attention the free one-page technical publications I.C.E. offers for customer reference. The mini-reports are single sheet, 8½" × 11" in size, and they cover a variety of subjects related to the use of their products, station design and construction, lightning protection, and product comparisons. The publications are written in easy-to-understand language for the nontechnical user, and they contain capsulized information not found easily elsewhere.

Recently, I.C.E. added seven new reports to their growing list. The new pubs include gas tubes as lightning protectors (#34); earth-grounding construction materials (#35); fighting broadcast-band (BCB) interference (#40); resolving 6 meter amateur interference (#42A); mobile-radio noise elimination (#44); AC power-line noise (#47); and one creatively entitled "The Infamous Arc—The Hidden Interference Generator" (#48).

Other still-current pubs include: conducting noise audits (#10); Beverage antennas (#11); lightning protection (#30, 30A, and 30B); grounding techniques (#31 and 31A); cold-water-pipe grounds (#32); coax lightning arrestors (#33); grounding coax-cable shields (#36); lowpass filters (#42); highpass filters (#43); solving telephone RFI (#46); using antioxidants for good interconnections (#60); and DC grounded antennas (#80).

For a complete listing of the free publications or to order a pub or catalog, contact Industrial Communications Engineers, Ltd., P.O. Box 18495, Indianapolis, IN 46218-0495 (1-800-423-2666).

Telex/Hy-Gain Update and 1995 Catalog. Telex Communications has been around for many years in amateur radio circles, although we've known the company under different names. In 1978 Telex purchased the antenna portion of Hy-Gain Electronics, and in 1981 acquired the antenna rotator system part of CDE. Today Telex/Hy-Gain offers an extensive line of antennas, rotators, and towers. As a large-scale manufacturer, it has excellent facilities and capabilities that many small producers can't afford.

The Telex/Hy-Gain design and manufacturing plant in Lincoln, Nebraska is on a 35-acre rural site, with plenty of room for antenna test ranges. There the company evaluates new designs under field conditions using test equipment that can measure virtually any conceivable performance parameter.

Since 1982, when MININEC-2 and NEC-2 first became available, Telex/Hy-Gain has been using computer-aided design (CAD) techniques in antenna design and modeling. Since then they have used many other CAD programs such as Yagi Optimizer©, MN, MININEC-3, NEC-3, NEC-2PC, NEC401, IGUANA, and Yagi Stress©. We have profiled several of these programs in this column.

The 20-page 1995 catalog of Telex/Hy-Gain antennas, towers, and rotators is free. For more information, contact your dealer or Telex Communications, Inc., 8601 E. Cornhusker Highway, P.O. Box 5579, Lincoln, NE 68505 (402-465-7076). A master price list and a list of dealers also is available.

Computer and Software Notes

DX Desktop™. DX Desktop, which represents

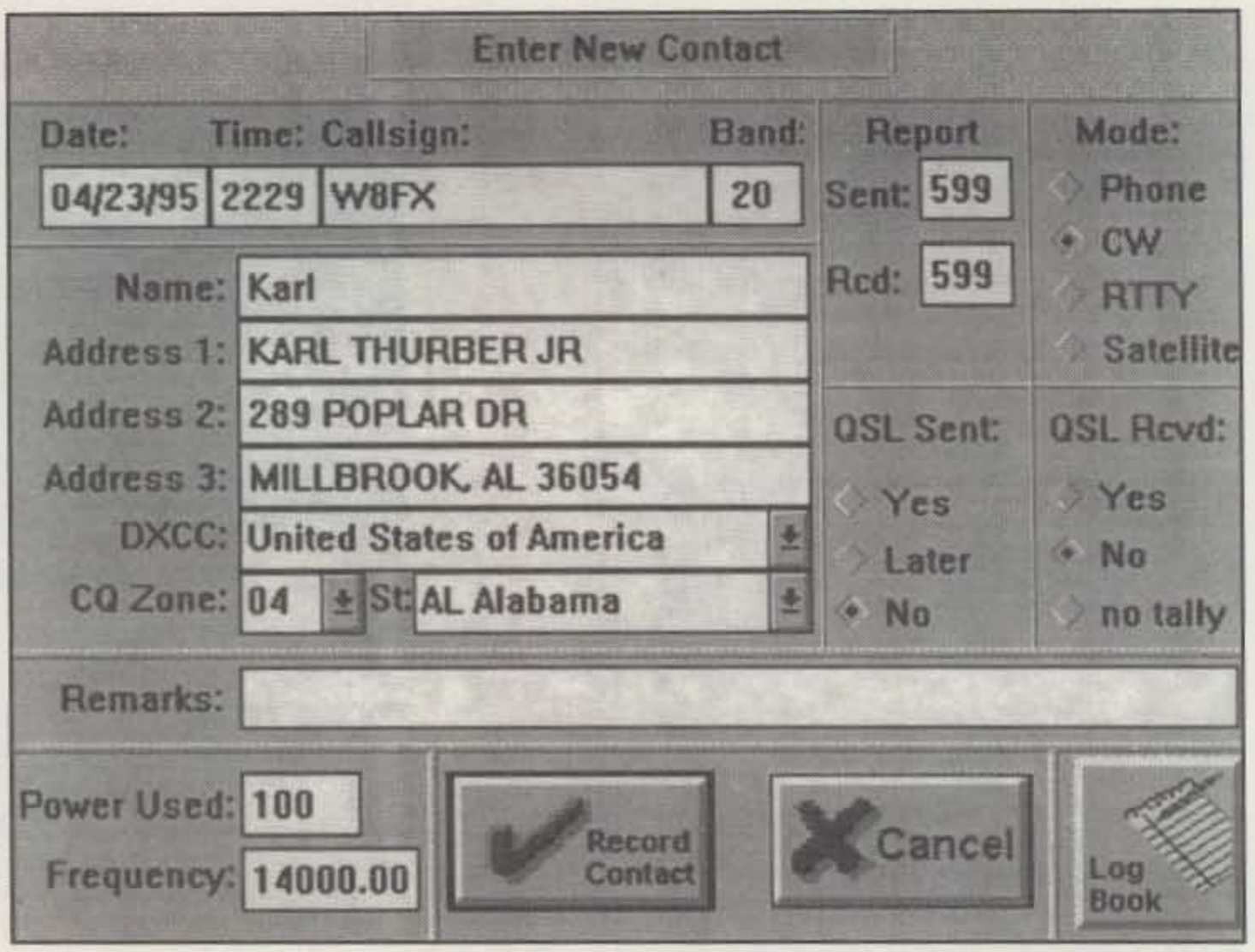


Fig. 1– DX Desktop Logbook main-entry screen. DX Desktop is a Microsoft Windows™ based collection of software and hardware to assist you in equipment control and QSO data handling. It is, at heart, a very capable logger that handles DXCC, WAZ, and WAS records with ease and includes Buckmaster HamCall™ and SAM callsign lookup. The Logbook provides a specialized database management system for QSO data.

"technology by DXers for DXers," is a Microsoft Windows™ based collection of software and hardware to assist in equipment control and QSO data handling. DX Desktop V2.5 includes the rotator control hardware and is $329.99. DX Desktop V2.5 Lite (which I tried out) is similar but is furnished less the rotator control hardware; it's $99.99. (The full version includes a circuit board for an eight-bit PC/AT slot. The board provides rotator control and serial communications with an HF radio that doesn't tie up a COM port, as well as other TTL inputs and outputs.)

The software included with the package

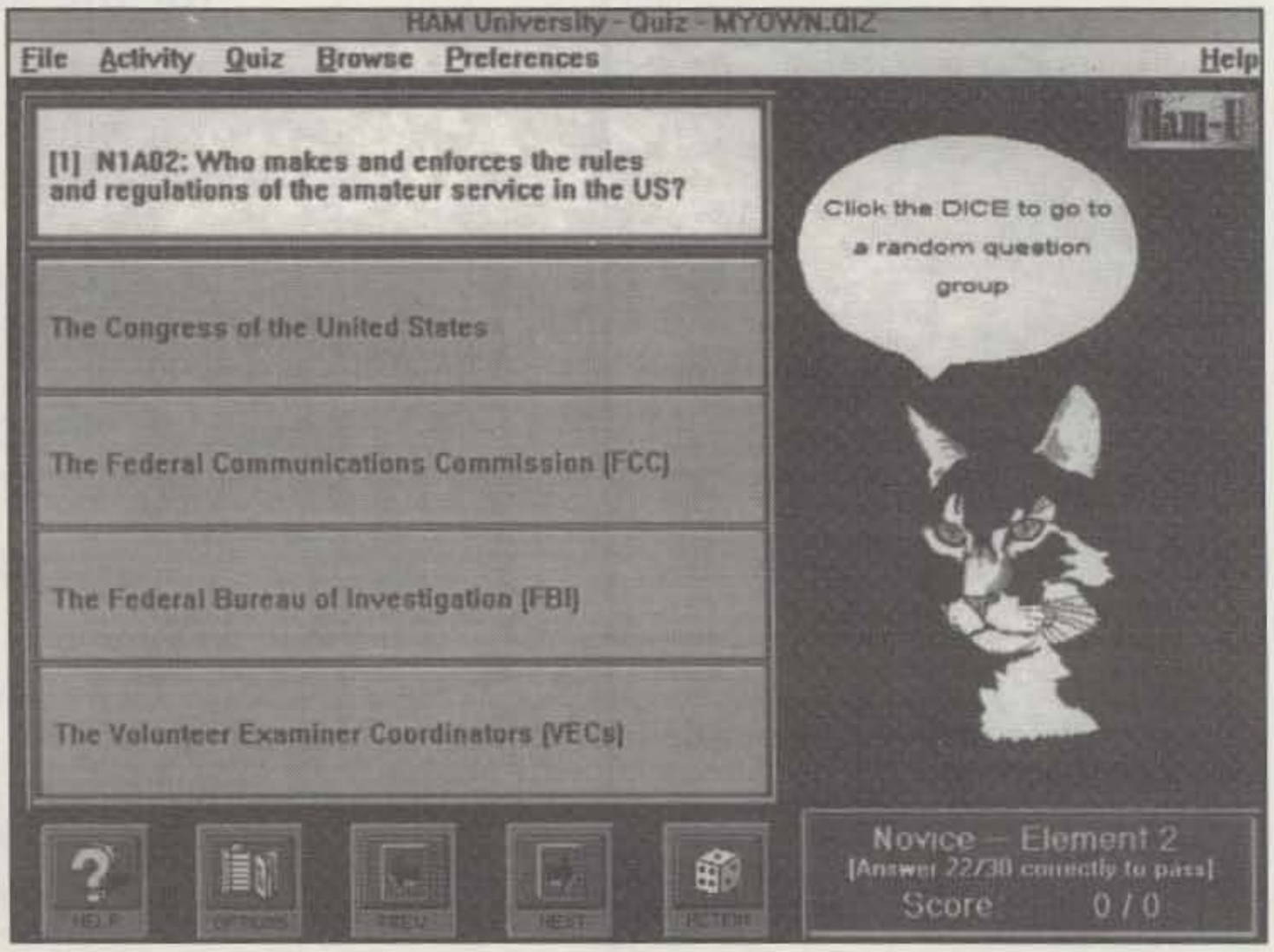


Fig. 2– Ham University example quiz screen. For the written exam, there's a quiz section that lets you browse through the questions and test yourself on them as you like. Complementing this is the exam section that administers a practice exam. There are extensive hypertext explanations of each question in the subject help files.

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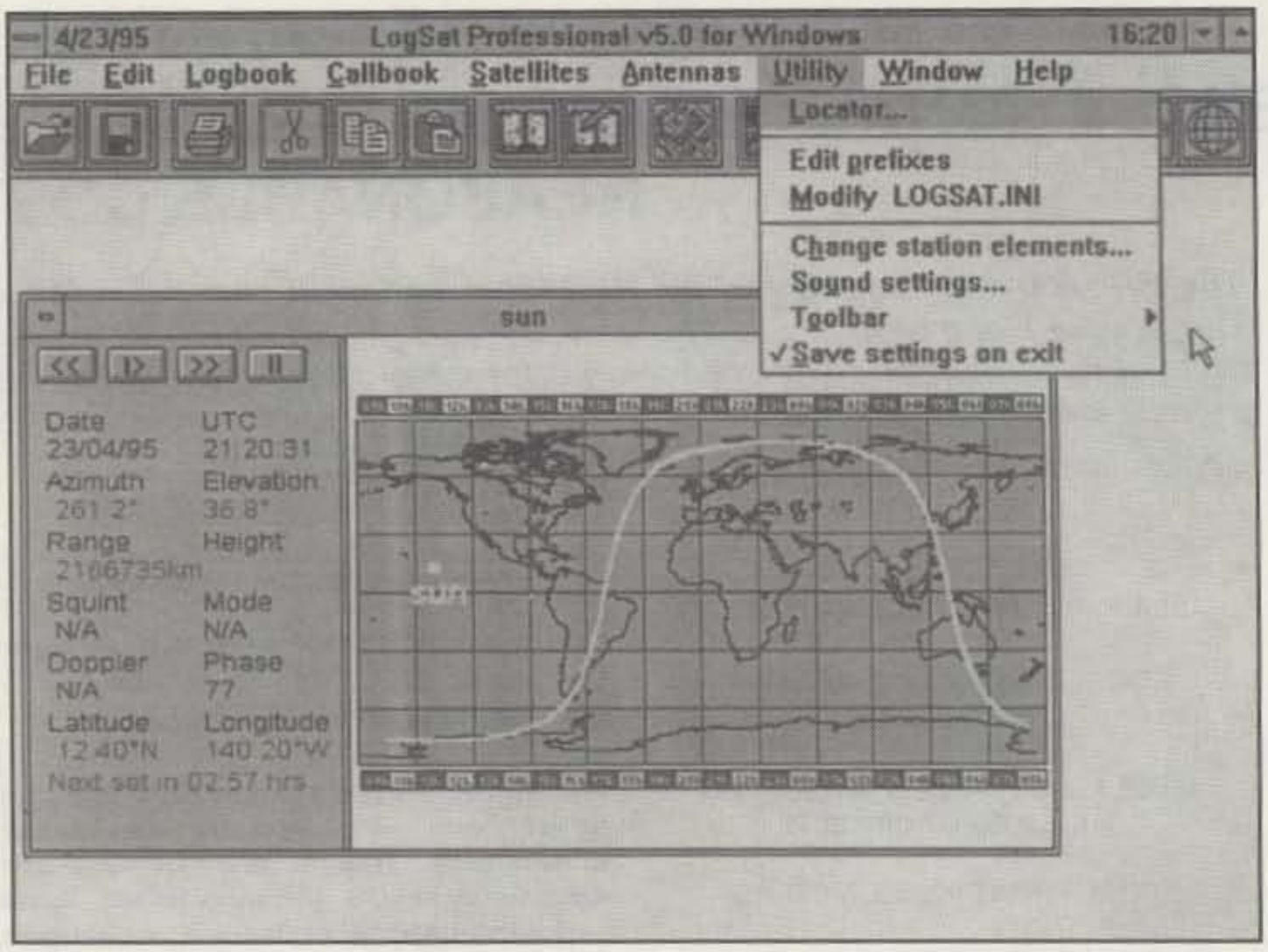


Fig. 3– LogSat Professional for Windows, showing equidistant cylindrical map projection. After you select a satellite (or another body, such as the sun in this case) in LogSat Professional for Windows, you can choose the type of map on which you wish to view the satellite. The available projections are Mercator, Sinusoidal, Hammer, Orthographic, and Equidistant Cylindrical (selected here). The program has a complete toolbar with pop-up help descriptions.

includes several modules. These include Logbook, for QSO records; DXCC Database, for awards recordkeeping and callsign lookup; RComm™, a VHF packet terminal for use with the DX packet spotting network; Rotator-Control, used to automate the operation of the rotator motor on your beam; RadioControl drivers for control of most current serial port-equipped HF radios; ClockSet, to set your computer's clock to National Institute of Standards and Technology (NIST) accuracy using a telephone dial-up procedure; and a utility program for maintaining your database file system.

I found that DX Desktop is an excellent, tightly integrated product. It is, at heart, a very

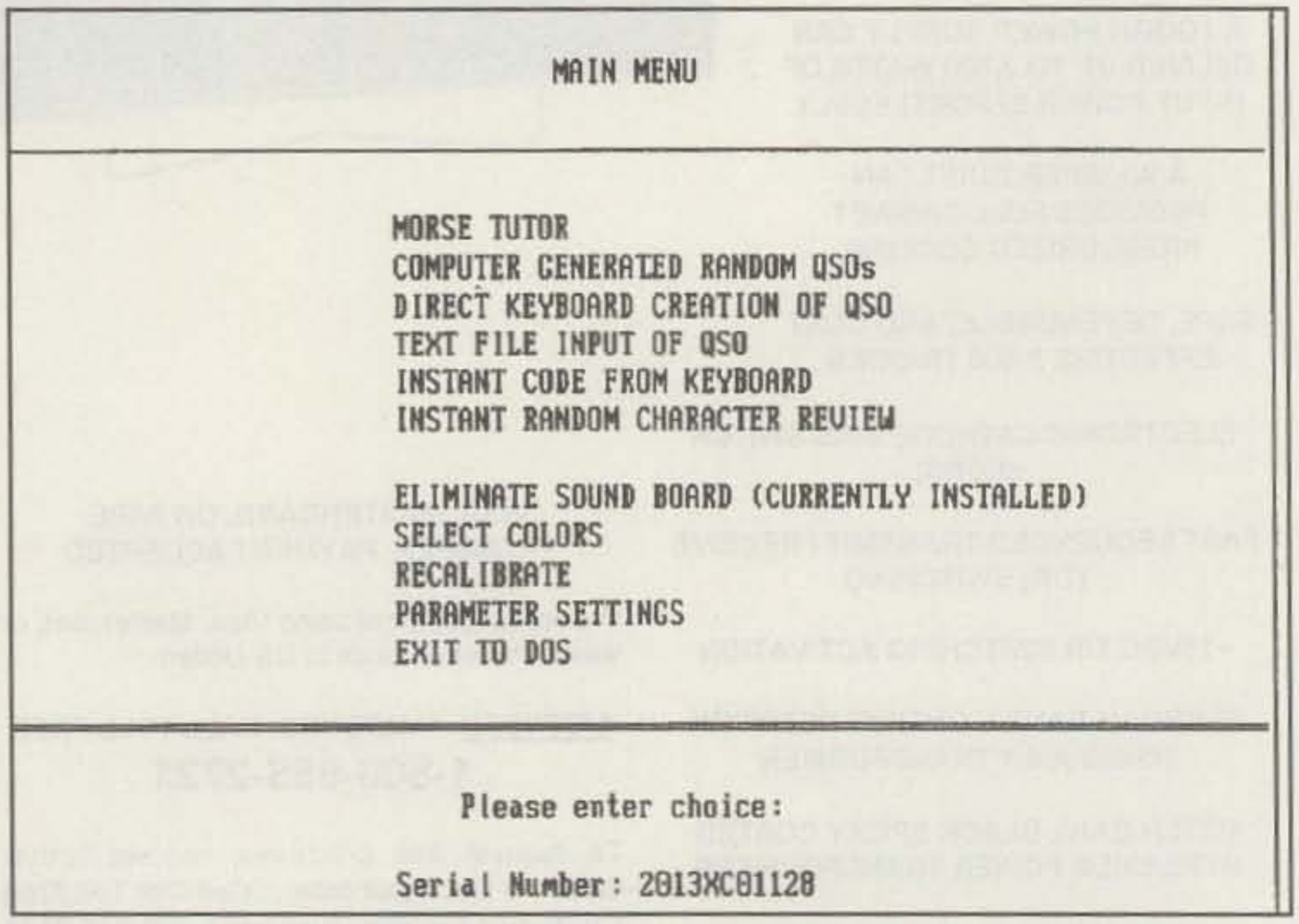


Fig. 4– Here's the main menu of Morse Tutor Gold. Besides the basic capabilities of its predecessor, Morse Tutor Gold adds enhanced drill capabilities, "type-along" support for most modules, and "instant code" in which you can type a forgotten character on the keyboard and immediately hear it in code.

capable logger that handles DXCC, WAZ, and WAS records with ease and includes SAM and Buckmaster HamCall™ callsign lookup. It also puts Windows to good use with its non-preemptive multitasking and Direct Digital Exchange (DDE) to automatically update awards records. The package comes with a nicely printed, well-illustrated, 113-page operating manual that's something of a rarity today.

For more information, contact Tom Case, K8CLA, or Bob Craig, K8RC, at Debco Electronics, Inc., 4025 Edwards Road, Cincinnati, OH 45209 (1-800-423-4499). (See fig. 1.)

Ham University™. Ham University is a new Windows program from Amateur Radio Education (ARE) to help you pass the FCC amateur radio exams. It covers both Morse Code and the written elements, and includes two sections to help with the written exam and two sections for Morse. There's also an addictive on-screen game, PENTODE, to help you master Morse and have fun doing it.

For the written exam, there's a quiz section (see fig. 2) that lets you browse through the questions and test yourself on them as you like. Complementing this is the exam section that administers a practice exam. There are extensive hypertext explanations of each question in the subject help files, in case you have problems with any of the questions.

For learning Morse, there's the lessons section, a series of lessons that introduces the code gradually, for 20 minutes once a day. There's also a less-structured, flexible exercises section that lets you teach yourself Morse "your way."

If neither of these approaches works for you, there's a built-in game, PENTODE, where you can master Morse while having fun. PENTODE even keeps a "Hall of Fame" to keep track of who *really* has the code down pat.

The program, priced at $69.95, has the distinct advantage of having the code, theory, and game modules all together in one graphical, Windows-based product. Plus, the program makes good use of graphics and the sound card capabilities of many new PCs. And, although it's designed for all ages, the program should be particularly useful in interesting youngsters in learning Morse Code and getting into amateur radio.

For more information, contact Bob Gregg, AB6CH, or Roy Stephens, AC6CQ, at Amateur Radio Education, Inc., 19032 Pauline Lane, Huntington Beach, CA 92646 (714-968-0042).

Scan*Star™ Commercial Edition. Advanced shortwave listeners (SWLs) and scanner buffs often employ "smart" computer control of various radio functions. Many modern radios have interfacing ports (usually RS-232 serial based) that allow computer control of most functions using software and/or hardware "rig control" systems. To this end, several firms have developed software to control the scanning pattern and other frequency functions of ICOM, Kenwood, Yaesu, JRC, AOR, and other radios.

Signal Intelligence offers the high-end Scan*Star Commercial Edition for computer-aided radio monitoring. It purports to provide a rich feature set, to support a broad range of radio equipment, and to offer excellent overall performance.

Key features include blending multiple search and scan groups in a single scan program; a graphical "all in view" scan window; mouse support; spectrum analysis, on certain

```
VHF-DX  ver 2.0 VHF/UHF CONTEST LOGGING PROGRAM

Copyright (C) 1994, 1995
All Rights Reserved
This software is not shareware and is not public domain.

VHF PRODUCTS
P.O. Box 23391
Chagrin Falls OH 44023-0391

• Use menu to change your time zone difference from UTC if needed.
  (this allows you to leave your computer clock set to local time)

• VHFDAT.DAT must be in the same directory as VX.EXE.

Press a key to continue
```

Fig. 5– VHF-DX V2.0 is for VHF/UHF contesting, VHF/UHF Century Club (VUCC) award tracking, DXing, and OSCAR satellite operation on 50 MHZ to 10 GHz. It works in a real time mode, displays QSO and grid totals by band, and performs "new grid" and duplicate checking. The recently enhanced program also lists previous QSOs; displays confirmed grid count by band for VUCC tracking; logs OSCAR contacts as well as simplex, SSB, and CW contacts; and more.

radios; multi-receiver scan strategies; air time and "hit count" logging; a "monitoring assistant," for logging with communications receivers; export and import of data to and from other formats; and more. It's $129.97 plus shipping and handling; the Scan*Star Professional version, with a somewhat reduced set of features, is $79.97.

For more information and technical details, contact Signal Intelligence, P.O. Box 640891, San Jose, CA 95164-0891 (1-408-926- 5630). (Demos of both programs are available for

```
N1BIC, Advanced
Jack A Speer
Rt 4 Box 1630
Mineral, VA 23117

Previous Callsign:                 Previous Class: General
   License issued: 04-28-1992      License expires: 04-28-2002
     Process date: 04-28-1992           Birth date: 07-03-1941

Last transaction(s):

      Latitude: 37.9918 N          Longitude: 077.8970 W
  Grid Square: FM17BX                 County: Louisa
Hours past GMT: 5                  Area Code: 703

Enter Callsign [          ]  Print  Print to File  Exit

ICALL version 5.4                          Press F1 for help
```

Fig. 6– Buckmaster HamCall Windows lookup. A particularly nice HamCall feature is an attractive Windows-based callsign lookup program, ICALLW, in addition to the DOS-based ICALL. The DOS and Windows programs even return U.S. licensees' approximate latitude and longitude, grid square, telephone area code, county, and GMT time adjustment. A new, user-friendly beam heading and distance calculation (between U.S. points) is forthcoming in the next edition of HamCall.

download from the company's BBS. You can reach it at 408-258-6462.)

LogSat Goes Commercial. In the January 1995 column we highlighted LogSat, a multipurpose satellite-oriented Windows program designed by Roberto Franceschetti, IK8SQI. His shareware program concentrated primarily on the real-time tracking of satellites orbiting the earth. But it also kept a logbook and callbook, analyzed antennas, and did several other neat things. It's done these things so well that it's no longer shareware, and now is offered as a slick, regular commercial software package by LogSat Software Corporation of Orlando, Florida.

LogSat Professional for Windows is designed to serve the amateur radio operator and the "average computer user," enabling both to track and view satellites of all types, and incorporating quality graphics, sound, and text. Ease-of-use considerations are given to home-based owners with satellite dishes who want to watch overseas programs as well as ship and aircraft captains who rely on Global Positioning System (GPS) tracking fixes.

Some of the program's features, several of which are new, include multitasking real-time satellite tracking, with the ability to track up to 500 satellites per window, in dozens of windows; five global map projections with zoom in-and-out capability; personal logbook and callbook management; and several types of antenna pattern analysis.

The program also offers radio-wave propagation analysis, a global locator (grid to and from latitude and longitude), global time zone indicators, detailed printouts of scheduled satellite passes, and considerably more. The new version offers a 4000-plus satellite database and features satellite selection based on user-specified criteria, such as height and/or range from QTH, or time of acquisition. (See fig. 3.)

You can display all data in either English or metric formats; maps can either be centered automatically on your QTH or they can center themselves on the satellite. Three different types of visible pass schedules can be printed out, and the Keplerian elements can be

updated with NASA or AMSAT formats.

The program is $39.95 from LogSat Software Corporation, 425 S. Chickasaw Tr., Suite 103, Orlando, FL 32825 (1-800-350-3871).

Morse Tutor Update. Warren Hoffnung, KF6VV, has introduced a nicely upgraded IBM PC product, Morse Tutor Gold™, a follow-on to his popular Morse Tutor Advanced Edition. Since 1987 the Morse Tutors have guided thousands of amateurs and prospective amateurs in Morse instruction from beginner to Extra Class in self-paced lessons. Warren notes that he changed the name of the program from "Advanced Edition" to "Gold" since some customers thought the program was only for the Advanced class or higher.

Besides the capabilities of its predecessor Advanced Edition, which we highlighted in the January 1992 column, Morse Tutor Gold adds enhanced drill capabilities. For example, you can just enter the problem characters and the program will send you a random drill containing only those characters. There's also "type-along" support for most modules, so that if you prefer to write what you hear you may do so just as if type-along were not present. There's also a feature called "instant code" in which you can type a forgotten character on the keyboard and immediately hear it in code.

The program reportedly supports all sound cards and provides volume control of the sound card from within the program. Of course, if you don't have a sound card, you can use your internal computer speaker—although the sound quality won't be as good.

Morse Tutor Gold is for IBM PCs and compatibles. The program is available from dealers, *73 Amateur Radio Today*, the ARRL, or directly from GGTE. The price is $29.95 plus shipping and handling. For more information, contact GGTE, P.O. Box 3405, Newport Beach, CA 92659 (714-968-1571). (See fig. 4.)

VHF-DX Contest Logger Update. Recently, we covered VHF-DX, Version 1, designed by Mark Hoersten, N8VEA, for VHF and higher operation and logging. As we noted, the program supports various ARRL VHF/UHF contests, tracks grid squares, and logs OSCAR satellite contacts on the bands 50 MHz to 10 GHz. VHF-DX handles four- or six-character grid locators and keeps track of both worked and confirmed QSO and grid count by band.

As that column was going to press, Mark released Version 2 (see fig. 5), which offers a number of impressive new and enhanced features. These include tracking of states worked and confirmed by band; a manual QSO entry mode; several new reports and forms, including listing confirmed/worked QSOs by grid or state; *QST* "World Above 50 MHz" column standings and *CQ* "VHF Plus" column report forms; contest log merging; and the ability to handle some 7000 QSOs.

VHF-DX Version 2 is $16.95 postpaid and includes a printed 32-page manual; specify disk media. Contact VHF Products, P.O. Box 23391, Chagrin Falls, OH 44023-0391 (216-543-2748).

Buckmaster HamCall™ Update. In the September and December 1993 columns we highlighted the HamCall callsign database. HamCall is a CD-ROM database of all 685,000 FCC-licensed amateur stations, including over 2400 club, military, and RACES entries, plus international listings. With HamCall you can retrieve data by callsign, name, address, city, state, ZIP code, or license class; copy output to disk, a database, or printer; generate labels; and manipulate callsign data in various ways. Updates are issued at the end of October and April.

HamCall has gone through various incremental improvements over the past several years. It now contains more than 380,000 international amateur callsign listings from 113 countries.

This is impressive, since lots of international callsigns are hard to obtain today in that many countries are pending settlement of political boundaries or are unwilling to release their callsign data. Also, some countries prohibit distribution of licensing data in machine-readable form. The new CD-ROM also has over 105,000 cross-references from old calls to new calls. In total, well over a million callsigns are included.

Besides the callsign data, the CD-ROM includes more than 800 PC public-domain programs and many data files of various types—there are over 200 ZIP (archived) files. Both the IBM PC and Apple Macintosh can access the CD-ROM for callsign lookup.

A particularly nice HamCall feature is an attractive, Windows-based callsign lookup program, ICALLW, in addition to the DOS-based ICALL (see fig. 6). The DOS and Windows programs even return U.S. licensees' approximate latitude and longitude, grid square, telephone area code, county, and GMT time adjustment. The CD-ROM can be accessed by most popular logging programs for nearly instant callsign lookup. A new user-friendly beam heading and distance calculation capability is forthcoming.

Buckmaster also has released a variety of other CD-ROMs. Probably the most interesting from our standpoint is The 1995 Electronics Software Compendium (ESC). It's a massive collection of shareware programs and data-files that pertain to electronics, broadcasting, amateur radio, and SWLing. There are over 25,000 files in total, with automatic unzipping to your hard drive—some 300 MB of PC material and 50 MB of MAC stuff on the CD-ROM. There are some 1900 ZIP files and over 300 indexed, informational text files on the disc. ESC is updated annually in April.

Buckmaster also has introduced or announced several other CD-ROMs. These include an indexed and text-searchable reference disc, News-to-Go™, of special interest to news enthusiasts, students, and educators. It contains over 60,000 indexed, full-text current news articles. There also are two CD-ROM discs, as well as a book, having to do with advanced cryptography topics.

The HamCall CD-ROM is $50, The Electronics Software Compendium CD-ROM is $25, and News-to-Go is $60, plus $5 shipping and handling. They're from Buckmaster Publishing, Route 4, Box 1630, Mineral, VA 23117 (1-800-282-5628). Flyers that describe HamCall and other new products are available.

Book Notes

Three from Tiare. As we've noted previously, Gerry Dexter, of Tiare Publications, offers a good selection of books on SWLing, scanner and utility monitoring, broadcasting, and related pursuits. Recently he's added several new titles to both the flagship Tiare and the new Limelight Books imprints.

One of the new Tiare releases is *Computerized Radio Monitoring*, by Todd D. Dokey (125 pages, $22.95). This very interesting book presents a wealth of ideas on successfully marrying your PC and your shortwave or scanner radio. It covers planning the computerized radio shack; managing, storing, and getting results from your data; computer monitoring; automated logging; remote receiver monitoring; and more.

A second new Tiare release is *The Outer Space Frequency Directory*, by Anthony R. "Tony" Curtis, K3RXK (67 pages, $17.95). This creatively titled book covers the whole range of possible extraterrestrial signals, including satellites, space shuttles, space stations, probes, and even signals from deep space. Tony also discusses the receivers and antennas you need for each type of reception. There's also a section on amateur radio astronomy and a master list of over 2000 space and related frequencies.

A new Limelight Books release is *The Electronic Gateway*, by David T. Kruchowski (123 pages, $19.95). This A-to-Z book provides practically everything you need to know about hooking up and communicating using your PC. It includes reviews of the major and several less-well-known online communications services, as well as the Internet. It helps you get going with E-mail, message bases, file transfers, modems, and terminal programs.

A new "Great Radio Reads" catalog is $1 from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 (414-248-4845).

The Internet Yellow Pages, Second Edition. Can reading a telephone "yellow pages" book actually be interesting? Not usually, but in this case doing so is quite intriguing, and even entertaining as well. *The Internet Yellow Pages*, by Harley Hahn and Rick Stout, is a massive (812-page) compendium of just about everything you're likely to find on the Internet.

The book constitutes an excellent guide to the Internet, including the popular Usenet Newsgroups and the ever-growing World Wide Web, for users of any skill level. This reference greatly assists you in finding whatever information you need quickly and easily; practically every type of human activity is represented. The book has descriptions of about 5000 separate items, grouped into some 185 categories. Even amateur radio is covered, both under "hobbies" and under "radio." The book has a detailed table of contents and an impressive index.

The book is available in bookstores at $29.95. A catalog of computer books is available from the publisher, Osborne McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710 (1-800-227-0900).

Looking Back Five

Now you know what the column looks like in October 1995. But what were the hot topics of discussion in the column of October 1990?

The October 1990 column was "Thoughts on Multiband Antennas and More." We featured an essay on the challenge of multiband antennas by Harry Wolf, W6NKT. In it, he aired his views on HF wire antenna systems, coaxial cable, and matching, noting that it's not easy to design a good multiband antenna that will match the frequency diversity of the modern transceiver. We featured a discussion of using an electric engine block heater to warm a rotor. Equipment-wise, we highlighted the Palomar Engineers M-835 SWR and Power Meter and the PA-360 Amplifilter; and the SGC-303 marine and mobile HF antenna from SGC, Inc.

Software-wise, we featured the Diamond Systems license study courses; the Six Shooter Morse code program and the QLog contest loggers for the Macintosh PC, offered by John Olapurath, KE1Z, of ZCo. Corp.; the Key-Notes® Electronic Reference Library series of programs from Digital Learning Systems; and the Grammatik IV grammar and style checker from Reference Software International.

If you find a topic we covered in this or a previous column to be of interest, please obtain the back issue directly from *CQ*'s Hicksville, New York office, rather than requesting the article from us. Most back issues are available from *CQ* for $3.50 postpaid. (*CQ* also offers various "back issues specials" to complete your collection. Check their ad in this issue, or call them at 1-800-853-9797 to order back issues.)

Wrap-Up

That's all for this time, gang. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: Isn't it always the case? The person who has the least expertise has the strongest opinions.

73, Karl, W8FX

CQ SHOWCASE

Palomar Jones Key

Palomar Engineers has announced a new addition to their line of Jones keys—Model PK-203, a single-lever key. The lever features dual rotary ball-race bearings, individual spacing and spring tension for dot and dash contacts, adjustable centering force, and individually adjustable paddle heights. The key and its base are made entirely of brushed finish brass. The serial number is engraved on each key. Adjustments are made by fine-pitch screw threads with instrument-knurled thumbscrews. No tools are required. The key weighs 3¾ pounds and is priced at $195 +$6 shipping and handling.

For more information, contact Palomar Engineers, P.O. Box 462222, Escondido, CA 92029 (phone 619-747-3343; FAX 619-747-3346); or circle number 101 on the reader service card.

Shape Shifter From Gatewave

The Shape Shifter Model SL55 from Gatewave is a stepped-impedance tubular filter that provides both design software and reconfigurable hardware. The SL55 covers cut-off frequencies from 500 to 5500 MHz with up to 11 sections. Typical insertion loss is 0.2 dB at 1 GHz and 1 dB at 5 GHz. The specific parameters of the kit's hardware are embedded in the synthesis routines of the software, allowing for rapid design and construction of custom lowpass filters for lab use. The software

may also be used to analyze user-defined configurations. Macintosh and PC platforms are supported.

For more information write to Gatewave, 565 Science Drive, Madison, WI 53711 (phone 800-797-9283; FAX 608-238-5120), or circle number 102 on the reader service card.

Kantronics' KPC-3 Now GPS Compatible

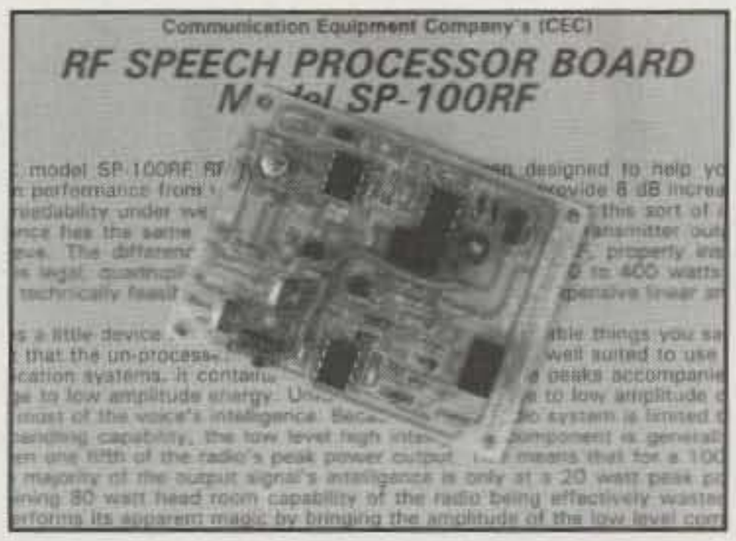
Kantronics' KPC-3 now offers GPS capabilities. To receive and re-transmit GPS (global positioning system) data, the KPC-3 connects to GPS receivers with NMEA-0183 interfaces. GPS capabilities include: Multiple string parsing (users select as many as four of the GPS unit's NMEA data strings); storage of outgoing data in tracking buffers (GPS data can be stored for later retrieval and is accessible via the KPC-3's mailbox); time-slotted location broadcasting based on the GPS clock (users specify beacon start time and amount of time between beacons, so multiple stations report without collision); remote access (system operator can reconfig-

ure the GPS unit from a remote location); and the KPC-3 is APRS compatible.

All these features are now standard in the KPC-3 version 6.0. For versions prior to 6.0, Kantronics offers an EPROM upgrade. Contact your authorized Kantronics dealer or Kantronics, 1202 E. 23rd Street, Lawrence, KS 66046 (phone 913-842-7745; FAX 913-842-2021), or circle number 103 on the reader service card.

GFS Electronics SP-100RF RF Speech Processor Board

GFS Electronics manufactures a new small board level RF speech processor for internal mounting. The SP-100RF provides an 8 dB increase in a signal's readability under weak and noisy receive conditions for SSB radio equipment. It brings the amplitude of the low-level component up close to that of the peaks, de-



creasing the average-to-peak power ratio. It is a 55 mm × 75 mm PC board requiring +8 volts or +12 volts DC. It connects in series with the microphone's audio line.

The SP-100RF is priced at $75 plus freight from Australia. For more information, contact GFS Electronics, P.O. Box 97, Mitcham, 3132 Victoria, Australia (phone 61 3 9873 3777; FAX 61 3 9872 4550), or circle number 104 on the reader service card.

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

Déjà Vu—I've Done That; I've Seen That; I've Been There!

A few months back I wrote about the Kantronics KPC-9612 and the addition of the new K-NET firmware. While I was writing that article, I mentioned to Phil Anderson, WØXI, that it would be great to have a similar K-NET node firmware available in his Kantronics KPC-3. He said that might just be possible. I responded that if Kantronics did implement the K-NET into the KPC-3, I would let the packet world know about it. Well, here's keeping my word.

First I'll point out some of the nice features of the KPC-3. The NEWUSER command (default setting) enables the new packet radio user to get started on packet with a subset of the larger command set in the KPC-3. The INTERFACE command allows the seasoned packeteer to access the Terminal mode or KISS mode, etc., by choosing any one of the six available commands. Again it's a simple keyboard command to the KPC-3 that allows the operator to advance to the next operating level of packet.

The KPC-3 is equipped with an internal personal mailbox, which offers all the latest forwarding and reverse-forwarding features. If you are operating on a local area network and wish to enable a community maildrop/PBBS, then I suggest that you add the 128K RAM.

Guidelines For Interfacing And Node Stacking

The KPC-3 can operate from any 7 to 24 volt DC power source. I have one of my KPC-3's operating from an internal (easy to install) 9 volt battery. Current drain is less than 25 ma. All input/output (I/0) is made at the rear panel of the KPC-3 (see fig. 1).

Also on the rear of the KPC-3 are two D-type connectors that allow interconnection(s) to the transceiver and the DB25 connector interfacing to the terminal or computer.

The DE9 nine-pin connector shown as port 1 in fig. 1 is provided for 1200 baud PTT, transmit AFSK, and receive data.

Fig. 1 provides a quick reference to the port assignments. In figs. 2, 3, 4, and 5 I've included enough interface information to enable the new KPC-3 owner to have the unit on the air as a 1200 baud node or in a node stack providing gateway to other frequencies and bauds.

It's "A Piece of Cake"

Once you have the KPC-3 interfaced to your terminal and transceiver(s), the rest is easy. Boot the terminal or terminal program (a disk with a terminal program is included for the IBM PC and compatibles) and turn on the KPC-3. The KPC-3 will exercise an autobaud routine. During the autobaud scanning you may press the asterisk (*) and the autobaud will lock and ask you to enter your callsign. From this point forward you are in control.

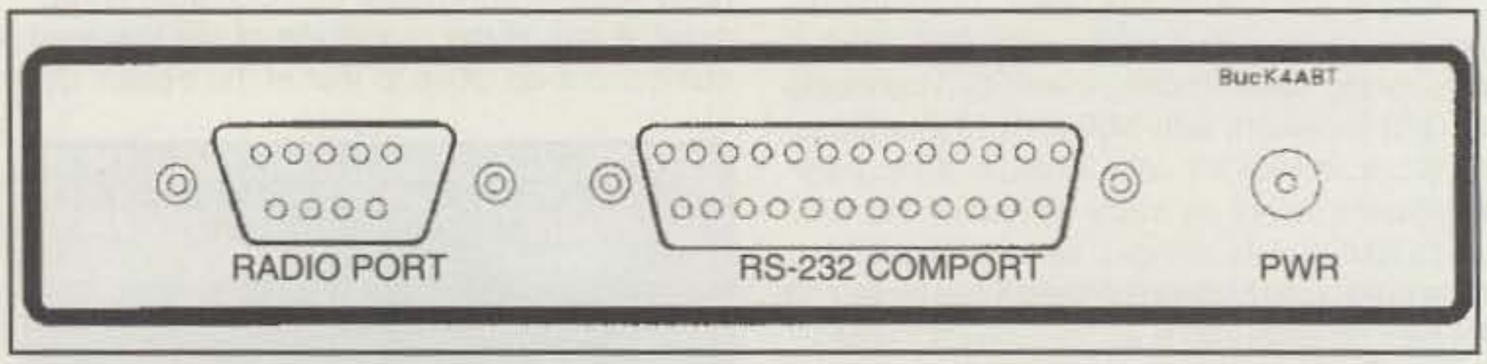


Fig. 1– The rear of the KPC-3 has all input/output connections readily accessible to the user. The DE9 is the radio port, and the DB25 is the comport for the terminal (RS232) connection.

If for any reason you find a need do a hard reset of the KPC-3, follow the procedures outlined on page 105 of the KPC-3 manual. If you are using the default terminal baudrate of 1200 baud, watch as the hard reset signs on and initializes the RAM.

When adding more RAM or when installing the K-NET EPROM, use the same procedure after the RAM or EPROM installation. The sign-on will also indicate the RAM size as it performs the hard reset. Be sure to return J7 to its normal position (on one post only) after performing the hard reset. At turn-on, the KPC-3 defaults to the monitor mode. Any packet signals heard on frequency should display on the screen.

The KPC-3 can be accessed by using the remote access call and entering the sysop password (RTEXT). Remote configuration is easy. There is more about this feature in the very well documented and concise manual that accompanies the KPC-3.

Building A Net Using The KPC-3

Here is your chance to build a TheNET, X-1J, or NetROM compatible node using a TNC in the $100 class. The extra benefit of using the KPC-3 in a node stack is having the added feature of a community mailbox/PBBS in it. If you add the 128 KB RAM, the node and PBBS can have all the space needed to allow users to leave mail at the node and enable the node buffers to expand to larger routing tables. The System Node Operator (SNO) has the remote access option available to clear old messages and set parameters of the K-NET node from the home QTH or any other remote location.

Because the interest in node building is high on our networking lists, I've included several

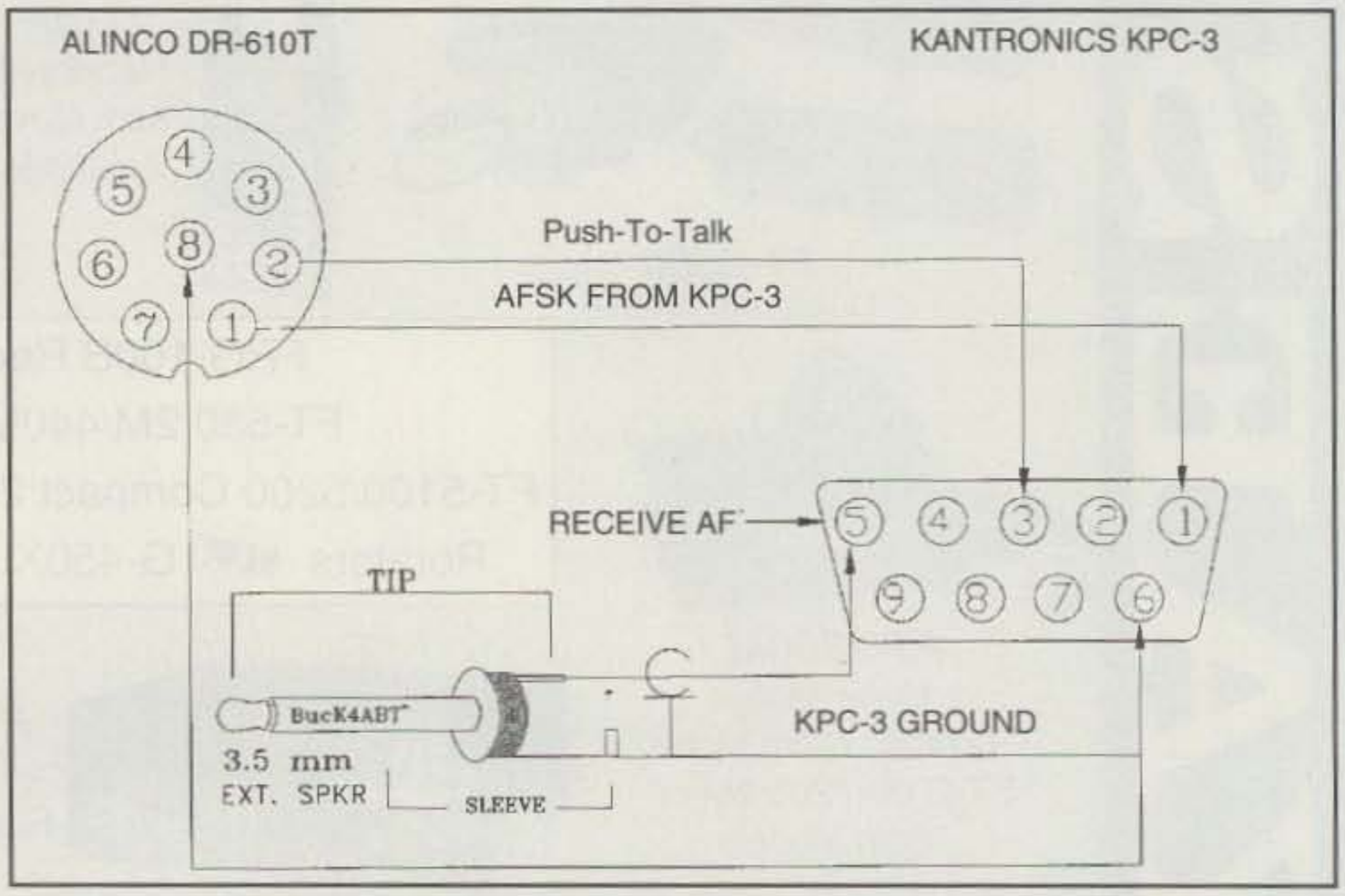
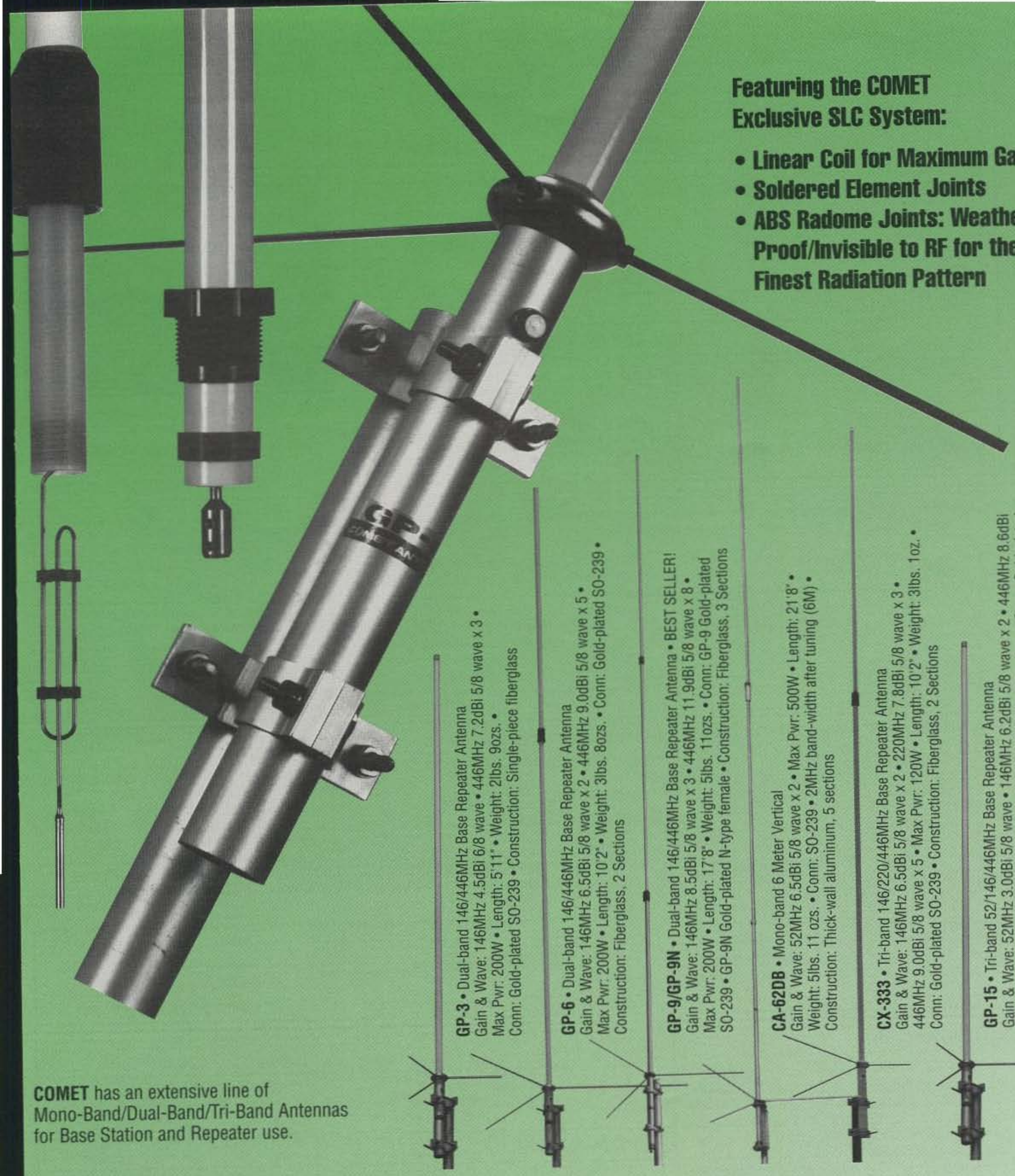


Fig. 2– The KPC-3 is easily interfaced to the Alinco DR-610 dual-band transceiver. Note that the Alinco DR-610T dual-band VHF/UHF transceiver is also 9600 baud ready.

211 Luenburg Drive, Evington, VA 24550



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GP-3 • Dual-band 146/446MHz Base Repeater Antenna
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Max Pwr: 200W • Length: 5'11" • Weight: 2lbs. 9ozs. •
Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

GP-6 • Dual-band 146/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 446MHz 9.0dBi 5/8 wave x 5 •
Max Pwr: 200W • Length: 10'2" • Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 •
Construction: Fiberglass, 2 Sections

GP-9/GP-9N • Dual-band 146/446MHz Base Repeater Antenna • BEST SELLER!
Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 • 446MHz 11.9dBi 5/8 wave x 8 •
Max Pwr: 200W • Length: 17'8" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated
SO-239 • GP-9N Gold-plated N-type female • Construction: Fiberglass, 3 Sections

CA-62DB • Mono-band 6 Meter Vertical
Gain & Wave: 52MHz 6.5dBi 5/8 wave x 2 • Max Pwr: 500W • Length: 21'8" •
Weight: 5lbs. 11 ozs. • Conn: SO-239 • 2MHz band-width after tuning (6M) •
Construction: Thick-wall aluminum, 5 sections

CX-333 • Tri-band 146/220/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 220MHz 7.8dBi 5/8 wave x 3 •
446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz. •
Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

GP-15 • Tri-band 52/146/446MHz Base Repeater Antenna
Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 8.6dBi
5/8 wave x 4 • Max Pwr: 300W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated
SO-239 • 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass

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CIRCLE 170 ON READER SERVICE CARD

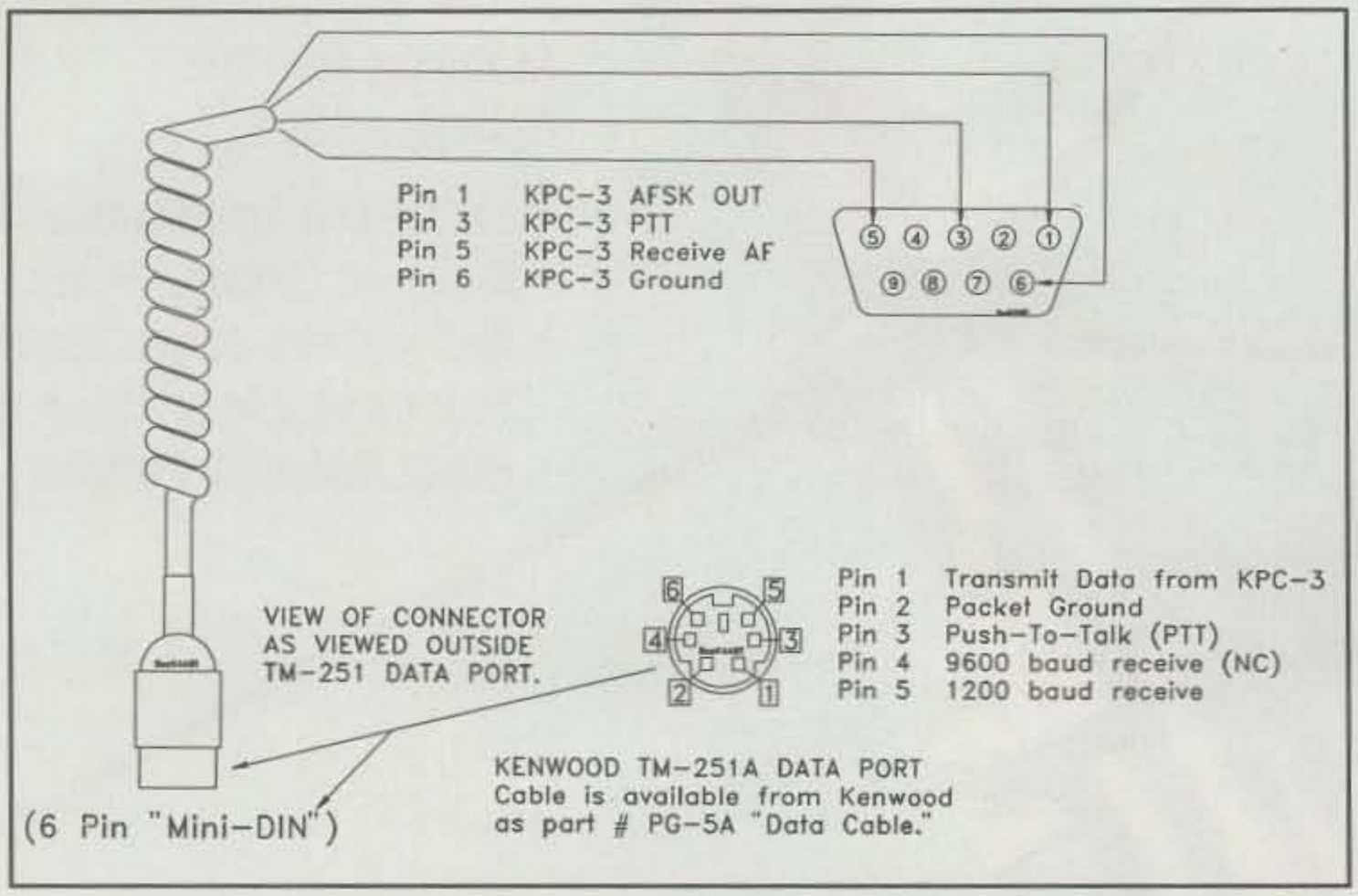


Fig. 3– This interface to the Kenwood TM-251 requires the new six-pin "mini-DIN" connector. Make sure the KPC-3 receive audio is from the 1200 baud receive line of the Kenwood TM-251.

diagrams for the KPC-3 to interface to some of the latest VHF and UHF transceivers. Many other KPC-3-to-transceiver interface drawings are in my *Packet Radio Operator's Manual* book and previous "Packet User's Notebook" columns in *CQ*.

Who's On First?

If you plan to implement this new firmware, it would be in your best interest to become familiar with the use and application of NET/ROM and TheNET derivatives. The K-NET PROM is KPC-3 specific and *must* be installed in a KPC-3 Controller. It will not operate if installed in any other TNC.

Since K-NET operation requires more RAM than traditional TNC operation, additional RAM is recommended to allow for a larger PBBS. Available from Kantronics are 128K static RAM chips (optional, but recommended).

In the August 1995 edition of the "Packet User's Notebook" I covered much of the basics of packet networking. That article begins on page 100 of August 1995 *CQ* and fills almost 10 pages with good networking practices.

Installing The K-NET PROM In The KPC-3

The K-NET EPROM adds the function of a network node to the operation of the KPC-3. All the original features of the KPC-3 are retained, including your PBBS, simultaneous keyboard operations, and remote access. This means that you can still use the KPC-3 as you now do, and add the K-Net PROM, to provide your local area with a dual-port network node that operates in the background of your normal TNC operations!

To install the K-NET PROM you will need to remove the cover of the KPC-3, locate and remove the old PROM (U10), insert the new K-NET PROM, perform a hard reset, and then reattach the cover as follows:

1. Turn the KPC-3 off.

2. Remove the two screws (one on each side) that secure the top cover to the case and remove the top cover.

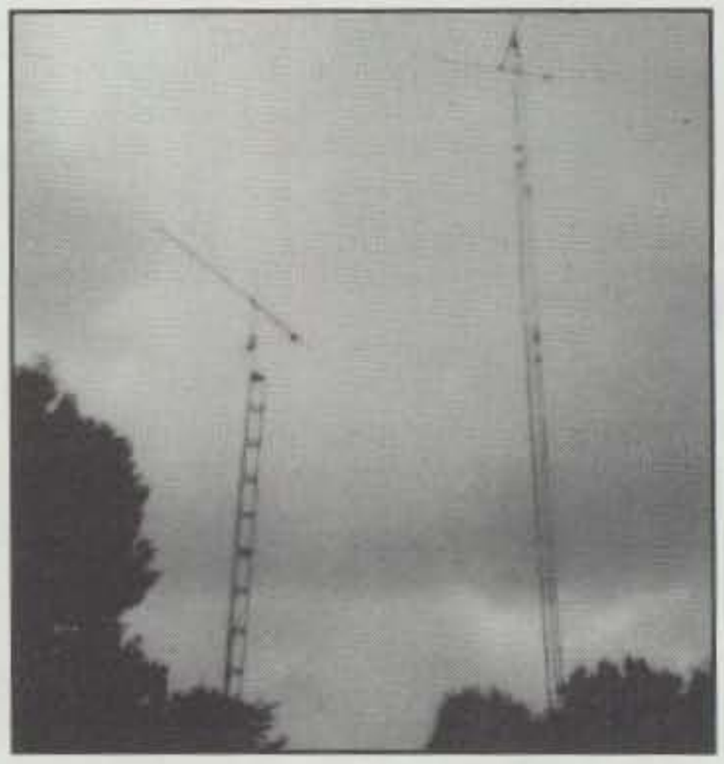
3. Observe proper anti-static precautions and *remove* the PROM from socket U10. The PROM has a white Kantronics label on it.

4. Carefully *insert* the new K-NET EPROM in socket U10, ensuring that pin 1 (notch end) of the EPROM is located closest to the ON/OFF switch. The K-NET PROM will use all pins of socket U10. When inserting the new (KPC-3 version 6.0N) EPROM, be careful not to bend any of the pins underneath the EPROM.

5. Perform a hard reset as described on page 105 of the KPC-3 Reference Manual and reassemble the KPC-3.

Broadcasting From Atop "Sunburst" Ridge

The K-NET node antenna here at our QTH is at 1240 feet AMSL (see photo; Isopole is at the top of the center tower). No, the towers are not



The "EVA" K-NET node is attached to the Isopole at the top of the tower. EVA is one of the SEDAN nodes (see text).

leaning; it's the way I was standing on my head when I took the photo.

The "EVA" node is a vital contributor to our network and a link into the SEDAN 9600 baud backbone at 223.700 MHz. The K-NET is operated by my wife, Jean Ann, as WB4EDZ-7 with the alias of "EVA," alias for "Evington, Virginia"). In addition to the KPC-3 node we have a KPC-9612 that enables access to the 9600 baud backbone and to another 1200 baud frequency that gateways into a local area network which is unable to access the SEDAN on 145.770. This requires a two-port node-stack interface cable as outlined in fig. 4. When more than two KPC or TNC nodes are needed, the interface cable at fig. 5 may be required.

The KPC-3 provides a 1200 baud node and user access to other nodes and users on 145.770 MHz. The node is fully compatible with the rest of the 100-plus X-1J4 and K-NET nodes on the Southeastern Emergency Digital Association Networks (SEDAN). The SEDAN nodes extend from Washington, DC to Orlando, Florida and Atlanta, Georgia, Harlan, Kentucky, and east to the coast. As I write this month's column, hurricane Erin is making landfall into

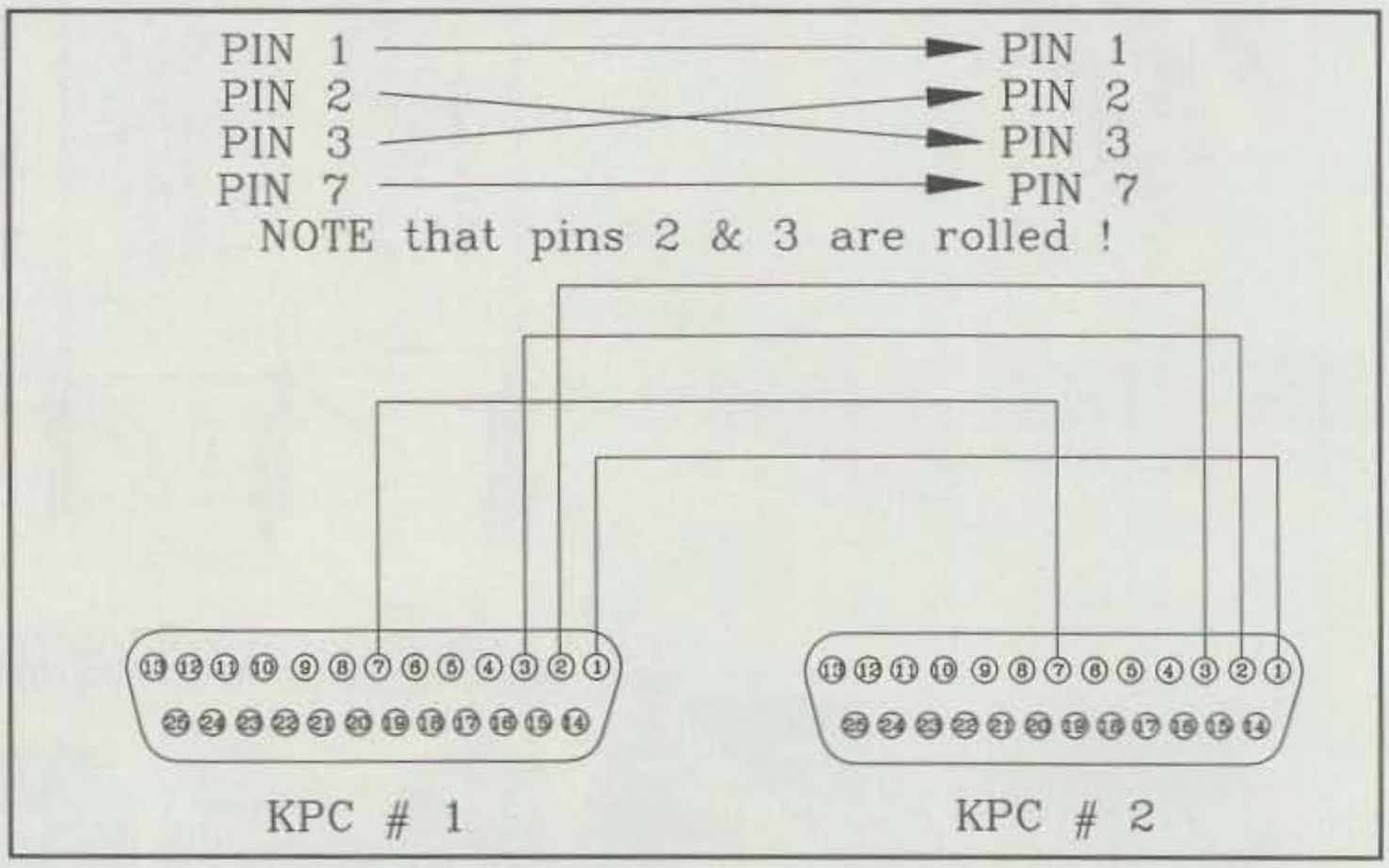


Fig. 4– When porting the KPC-3 to another node, use this two-port node interface cable. This interface may be used to build a gateway to other bauds and/or frequencies. When implementing the K-NET for gateway use, be sure to set the INTerface command to NET.

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Bearcat 148XLT-U base with weather alert $83.95
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The Weather Monitor II (7440) comes complete with anemometer with 40 feet of cable, external temperature sensor with 25 feet of cable, function box with 8 feet of cable, AC-power adapter, detailed instruction booklet and one year limited factory warranty.

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Davis Rain Collector II 0.2 mm 7852METRIC-U $59.95
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6-Conductor 40' (12.2 m) extension cable 7878-U $21.95
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8-Conductor 50' (15.2 m) junction box cable 7881-U $24.95
8-Conductor 100' (30.5 m) junction box cable 7882-U $44.95
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Car/Boat/RV Lighter Power Cord 7873-U $9.95
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Cobra HH40-U CB 40 channel handheld transceiver $99.95
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Uniden GMR100-U GMRS handheld transceiver $144.95
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Other neat stuff

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WB-U USA Today The Weather Book, Guide to USA weather by Jack Williams $15.95
PSUN-U Partly Sunny, Weather Junkie's Guide to Weather by Alan Fields $11.95
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Grundig Yacht Boy 230-U portable shortwave receiver $109.95
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Bogen FR0018-U memory module, doubles recording time to 36 minutes $79.95
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SNI ID200-U Bouncer name/number caller ID, call reject, forward $89.95
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Uniden LRD6399SW-U Super Wideband Laser/Radar receiver-VG2 protection $99.95
ANTK-U VHF scanner/VHF transmitting antenna PL259 connector $29.95
ANTMMBNC-U magnet mount scanner antenna w/ BNC connector $29.95
ANTMMMOT-U magnet mount scan antenna w/Motorola plug $29.95
ANTMMPL-U magnet mount scan antenna with PL259 connector $29.95
ANTSGBNC-U glass mount scanner antenna with BNC connector $29.95
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CIRCLE 159 ON READER SERVICE CARD

Florida. This is when the Southeastern Emergency Digital Association Networks (SEDAN) really gets a workout.

Filling in The Blanks

Note that after the K-NET PROM is installed, the KPC-3 will power up in the AUTOBAUD mode and all commands are reset to factory defaults. Before you install the K-NET PROM, it's a good idea to use the DISPlay command and make a print-out (or disk file) of your present parameters.

The factory default values in the K-NET PROM have the network node operation disabled. To enable the K-NET node, the NETALIAS and the NETCALL must be entered. It is assumed that you are connected to the RS232 port of the KPC-3. Many of these commands and features may be set after the K-NET node is relocated to the remote site. However, the user must be the node sysop and give the appropriate password (RTEXT).

The NETALIAS is usually a mnemonic that gives users an idea about where the node is located (other network nodes do not care what the alias is). For example, EVA is a good NETALIAS for Evington, Virginia. The NETCALL is the callsign of the node. The NETCALL consists of your callsign plus an optional SSID (example, K4ABT-7). It *must* be different from any other callsign used in the KPC-3 (MYPbbs, MYGate, MYAlias, MYNode, etc.).

Use the DISPlay Id command to make sure that the NETCALL you select is different from the other callsigns that are in use by the KPC-3. Many times local "customs" will serve as guidelines for what NETALIAS and NETCALL to use. In the paragraphs that follow, all callsigns and aliases are examples only. When building your KPC-3 node(s), use the callsigns and aliases applicable to your node and area. In the example below I'll use the same alias as we've selected here in Evington, Virginia.

Enter the NETALIAS: At the cmd: prompt type & <enter>**NETALIAS EVA**

Next set the NETCALL: cmd: **NETCALL WB4EDZ-7**

This command will cause the KPC-3 to perform a soft reset as memory is allocated for the K-NET node operation. Your K-NET node is now in operation! There are six additional "NET" commands that are only available from the command prompt of the KPC-3. These commands and their current settings can be displayed with the DISP N command.

Most other node commands are accessed by connecting to the node either locally with your terminal or remotely. If connected remotely, SYSOP access (see SYSOP command) is required to list and change SYSOP-related parameters. *Note:* RTEXT command in the KPC-3 *must* be set to allow remote SYSOP access).

When you connect to your K-NET node, you will *not* receive a command prompt (cmd:). Hitting the ENTER key will display the commands available to you. To see the current setting of any of the commands, just enter the command and hit the ENTER key. Whenever you are at this "invisible command prompt," you automatically have access to the entire command set, since you are assumed to be the system operator (sysop).

A short help description of each command is available by entering H(elp) or ? followed by the node command.

The entire HELP contents can be displayed by entering H H<cr> (see Table I). If Jean Ann

H H
EVA:WB4EDZ-7]

ADDNODE	[alias:]call port neighbor [via digi1[,digi2]] quality [obscnt]
ADDROUTE	port call [via digi1[,digi2]] quality [!]
BYE	causes this node to disconnect you
BBS	[/S] causes internal connect to BBS
CONNECT	[[port] calllalias [/S]] to host or another node or end user
CQ	[UI text] puts you in CQ mode
CQBC	enables UI broadcasting for CQ command
CTEXT	Text sent first to someone else connecting to NETALIAS
DELNODE	[alias:]call port neighbor [via digi1[,digi2]]
DELROUTE	port call [via digi1[,digi2]] quality
INFO	Data sent in response to INFO command
IDINT	Number of minutes between node id (0-255)
LINKS	Status of level 2 links
L3TTL	Max # of L3 hops (0-255)
L4DELAY	Level 4 acknowledge delay in seconds (1–60)
L4LIMIT	No activity timeout in seconds (0–65535)
L4N2	Level 4 retry count (1–127)
L4T1	Level 4 retry timer in seconds (5–600)
L4WINDOW	Max # of unacked packets for each circuit (1–127)
MHEARD	[LONGISHORT] Displays list of callsigns heard
MINQUAL	Minimum quality in order to add to nodes table
NODES	[[* I alias I call]]
NODESINT	Number of minutes between node broadcasts (0–255)
OBSINIT	Initial L4 obsolescence value (0–255)
OBSMIN	Minimum obsolescence count in order to broadcast (1–255)
QUALITY	Port quality
PORTS	Displays messages about radio ports
ROUTES	Displays neighbors
STATS	Displays users connected to node
SYSOP	allows log-in of authorized sysop

Table I– Example of the entire HELP contents.

EVA:WB4EDZ-7] Nodes:

77:K4ABT-6	6684:WB4QOC-3	BIGIVA:K4ABT-8	BLTV:WA4CBX-7
CFNC:N4ZRT-7	SNC:WA4PVI-8	DVA:KN4UN-7	MVA:KC4SUE-7
MADVA:WA4FRB-6	MILEHI:WB4QOC-5	PNC:WA4PVI-7	SBV:AB4YR-7
SHELBY:WB4QOC-4	SWVA:KD4BNQ-8	WNC:WA4GSO-7	YNC:KD4SFU-7
HKY77:KD4CDX-7			

Table II– The node list is displayed when a nodes list is pulled from the K-NET node "EVA.

TheNET X-1J/K-NET CROSS-REFERENCE GUIDE

	X1-J PARAMETER	K-NET COMMAND
1.	Max. Destination Node Size	NETDest
2.	Min. Auto update quality	MINqual
3.	Neighbor default quality	Quality
4.	RS-232 default quality	N/A
5.	Initial obsolescence count	Obsinit
6.	Min. Obs. count to broadcast	OBSMin
7.	Node broadcast interval	NODESInt
8.	Initial Time-to-Live	L3ttl
9.	Transport Frack timeout (sec)	L4T1
10.	Transport Retry counter	L4N2
11.	Transport Ack Delay (sec)	L4delay
12.	Transport Busy Delay (sec)	N/A
13.	Transport Window Size (frames)	L4Window
14.	Transport Overfill Limit (frames)	N/A
15.	No Activity Time Out	L4Limit
16.	Persistence	cmd: PERsist
17.	Slot	cmd: Slottime
18.	Link Frack (T1)	cmd: FRrack
19.	AX.25 Maxframe	cmd: MAXframe
20.	AX.25 Retries	cmd: RETry
21.	Link Response Time (T2)	N/A
22.	Active Check (T3)	cmd: CHeck
23.	AX.25 Digipeat	cmd: DIGipeat
24.	Validate Callsigns	N/A
25.	ID Beacon	cmd: IDINT
26.	CQ Broadcasts	CQBc

Table III– The X-1J/K-NET cross-reference guide.

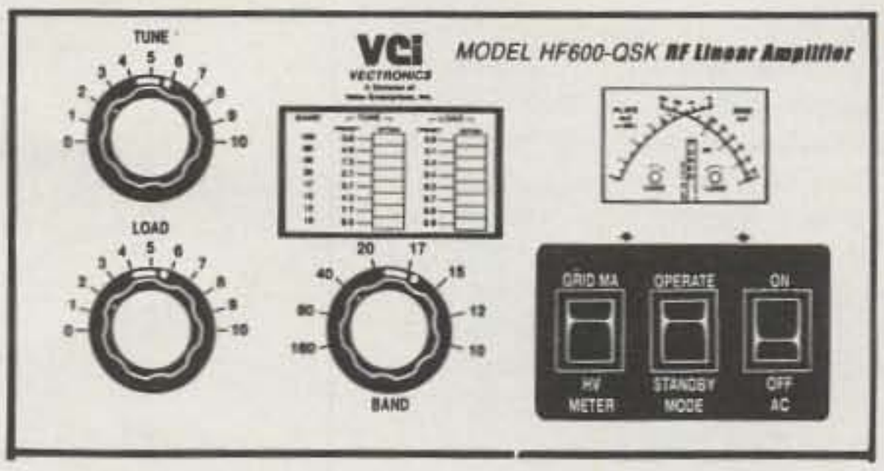
VECTRONICS™

VC300M 300W Mobile Tuner

DL300M
300 Watt,
150 MHz, Dry
Dummy Load

VC300DLP 300W Antenna Tuner

DL650M
1500 Watt,
650 MHz, Dry
Dummy Load

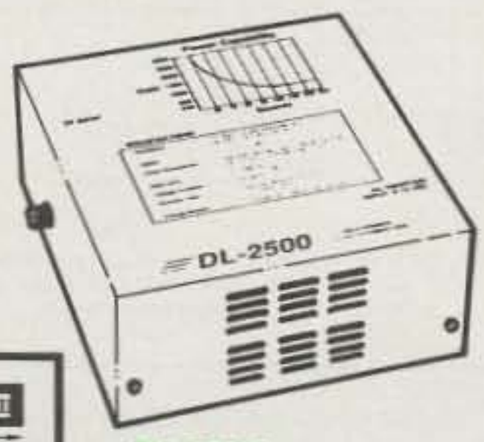


HF600QSK
1kW HF RF Linear
Amplifier with
built-in QSK.

HPF1
High Pass
TV Filter

AT100
Mobile
Active
Antenna/
Tuner

VC300D 300W Digital Antenna Tuner



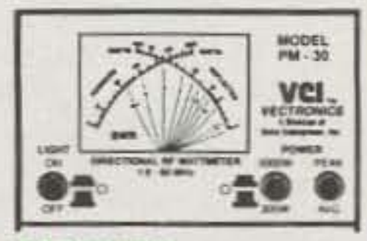
DL2500
2500 Watt, 150 MHz,
Dry Dummy Load

LP30
1500W Low Pass TVI Filter
(Also available: **LP2500**;
2500W Low Pass TVI Filter)

PM30
300W/3kW Wattmeter

HFT1500 1500W Antenna Tuner

CK200 Deluxe CW Keyer



PM30UV
30W/300W Wattmeter

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Mag Mount
Antenna Kit
with RG58
Coax and
PL-259.

DB240
Dual Band Base
Station Antenna
to cover both 2
meter and UHF.

NEW

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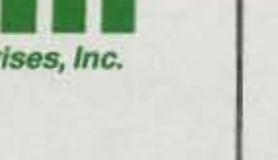
mits at 144-148 MHz
(2m), 440-450 MHz
(UHF), and 824-896
MHz (Cellular), and
receives in the range
of 100-1200 MHz.



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Dual Band
Antenna.
144-148 and
440-450 MHz.

MM450B
MICRO-MAG®
Mobile Antenna.
440-450 MHz.

MOM144-440
Dual Band Magnet
Mount Kit to cover
144-440 MHz.

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Band
"Rubber
Duck"
covers
2 meter
and UHF.

AB5
Complete 5 band
HF Mobile An-
tenna System w/
resonators for
10, 15, 20, 40,
and 75 meters.

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3-3/4" Chrome Magnet
Mount Kit. (Black: **PAMB**)

PAM2
3-1/4" Chrome Magnet
Mount Kit. (Black: **PAM2B**)

PAM4
5" Chrome Magnet Mount
Kit. (Black: **PAM4B**)

PAS
Surface Mount
Kit for 3/4" hole.

PAT2
Trunk Lip Mount
Kit. (Black: **PAT2B**)

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CIRCLE 166 ON READER SERVICE CARD

is not in the sysop mode and she issues the "H H" request, the node will respond with an abbreviated (user) subset of these commands. The MHeard command may be sent to the K-NET in either of two ways: M S(hort) will return a list of recent "heard" stations without their paths to the node, while issuing an M L(ong) to the node returns a long list that also gives the paths that were used by the "heard" stations. The node list is displayed when we pull a nodes list from the K-NET node EVA <enter> *n*. (See Table II.)

More Information About The K-NET

Although the default parameters of the K-NET node will get you "up and running," there are some guidelines that can enhance the desired operation. Good-neighbor relationships are really the key to good networks.

In the August 1995 column we covered the configuration and fine-tuning of the K-NET. You may refer to that column for more information regarding the setup and configuration of your K-NET.

Table III is a cross-reference guide to assist in the configuration of node parameters if an X-1J node is located in your area. The basic X-1J PARMS can be listed by connecting to an X-1J node and giving the "P" command. This should precipitate meaningful discussion among node sysops in an attempt to arrive at a "Network Standard" of node parameters that benefits all users.

Ordering Information

The K-NET node EPROM is priced at $34.95 each and is available from Kantronics Inc., 1202 E. 23rd Street, Lawrence, KS 66046-5099. Order phone is 913-842-7745 or FAX 913-842-2031.

Be sure to specify the K-NET EPROM for the KPC-3 if that is what you are using, as Kantronics also has the K-NET EPROM for the KPC-9612 dual-port, dual-baud packet controller. The KPC-3 and the KPC-9612 EPROM are the same price. The two EPROM's are different type devices and are not interchangeable, however.

Still having fun packeting!

73 de BucK4ABT

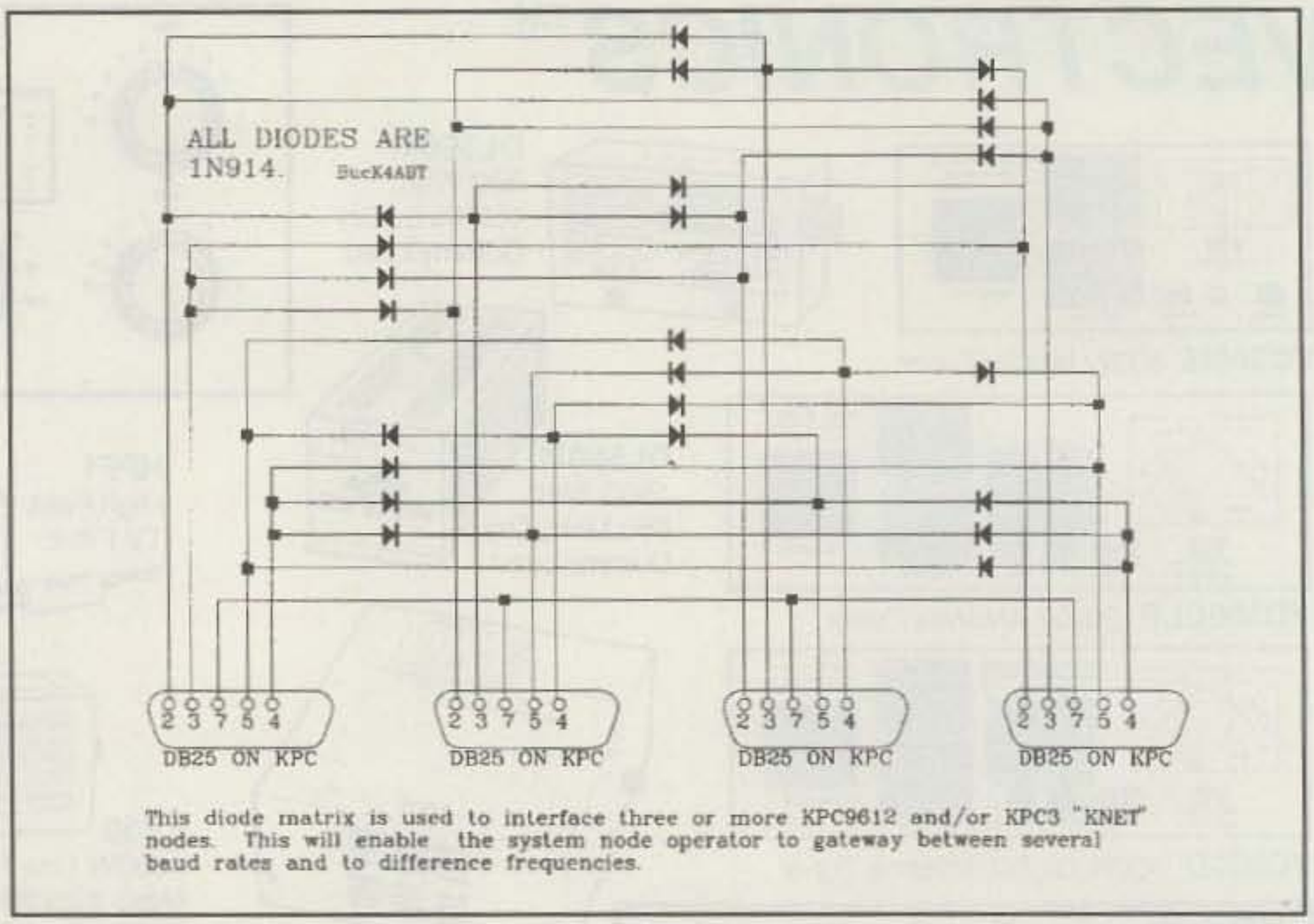


Fig. 5– When more than two nodes are included in the node stack, use an interface similar to the one shown above. All diodes used in this diode matrix can be 1N914 or 1N4148. Remember that it is important to set the INT command to NET when two or more KPC K-NET's are implemented in a node stack.

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

A Micro-Miniature B&W Camera Module

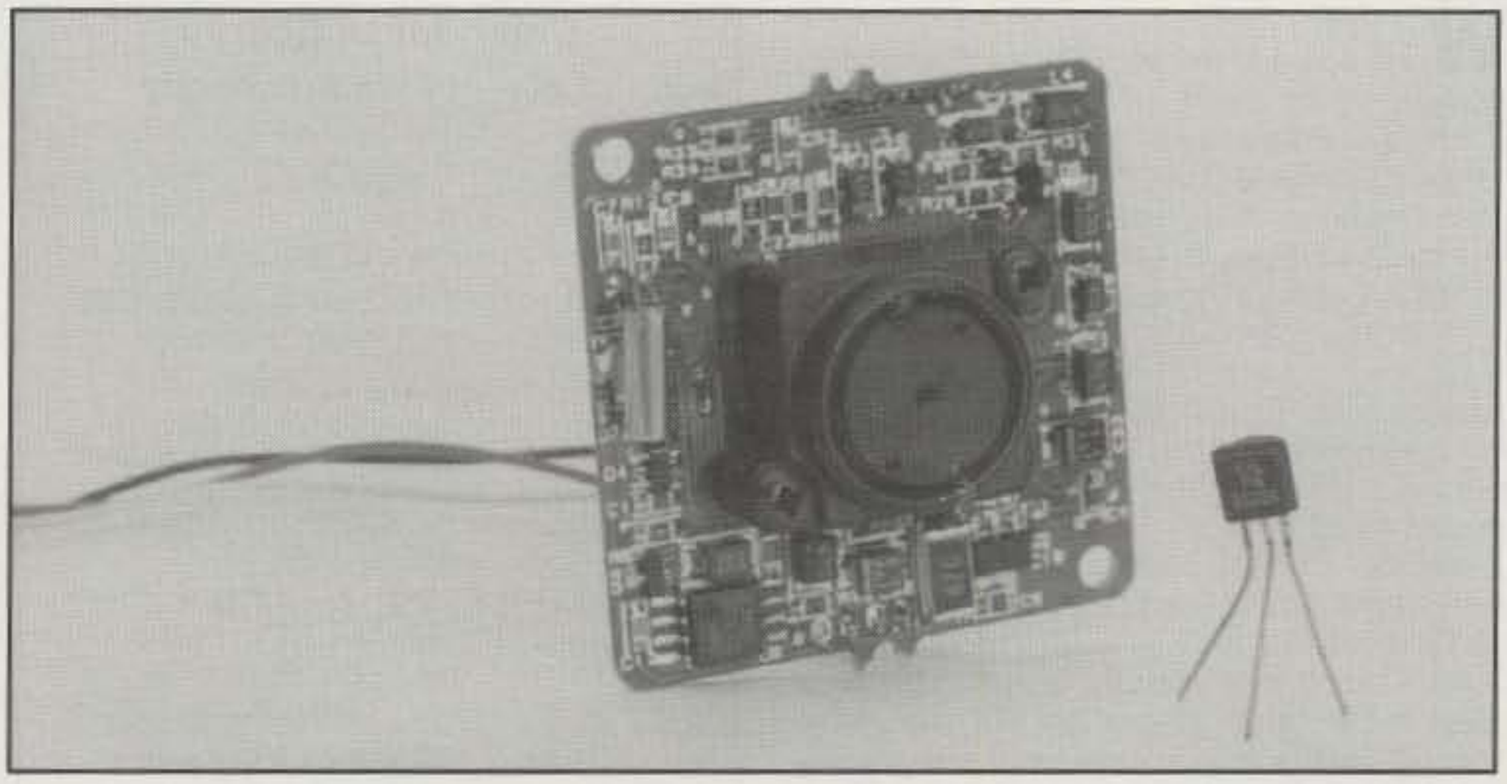
This month I would like to highlight a new product I have become aware of that is an excellent item for those of you who have been "itching" to get involved with video. The device is a micro-miniature solid-state B&W TV camera that is available at low cost and is ready to build into your particular project.

The unit is capable of producing a baseband NTSC video signal that is compatible with all standard monitors, VCRs, and other video equipment using baseband video inputs. The unit measures 1.25" wide by 1.25" long by 1.25" thick, weighs 0.7 ounces, and comes with a built-in lens. The lens is in focus from 1 foot to infinity and has an angle of view of 80 degrees. It can be focused as close as ½" by adjusting several set-screws if desired. Operating power is 8 to 14 volts DC, and the camera will operate for about 8 hours from a 9 volt lithium-type transistor radio battery.

The miniature camera uses a ⅓ inch CCD- type pickup and produces a 1 volt pp composite video output into a 75 ohm load. The signal-to-noise ratio is better than 45 dB, which results in an essentially noise-free picture. The camera offers 2:1 interlace scanning and a resolution of better than 380 lines, thereby producing a high-quality picture. An electronic automatic iris control is provided, allowing operation from 0.5 to 80 Lux (indoor lighting to sunlight), and a usable picture will be produced with light levels as low as 0.04 foot candles. The camera's form factor is a printed circuit board, with mounting holes, making it ready to mount into any enclosure suitable for your needs. A mounted camera, 1.5" × 1.5" × 0.57", with a pin-hole lens instead of the standard glass lens, is also available. This camera can be mounted behind a wall, ceiling tile, picture, or any other similar item and requires a "see-through" hole of only 1/16".

Typical application for such a camera would be surveillance systems, backyard monitors, RV "electronic rear-view mirrors," and hidden-camera applications of all kinds.

The camera is available from Marshall Electronics, P.O. Box 2027, Culver City, CA 90231 as their model number V-1207. Cost is approximately $100—quite a bargain for any CCTV camera, especially one so tiny.

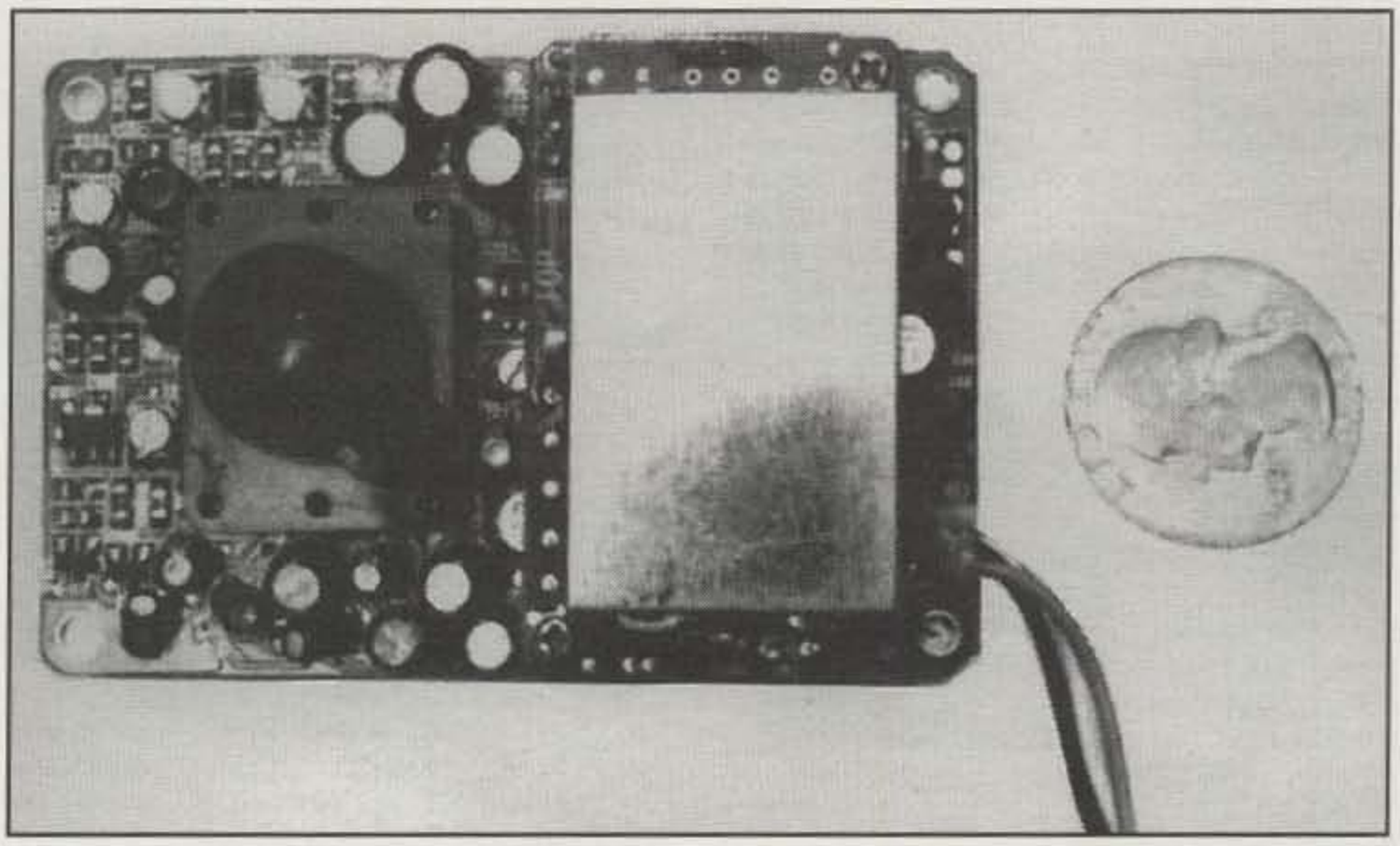


The Marshall V-1207 camera.

By the time you read this Marshall may still have a limited number of an older design, the V-1206, still available .It measures 1.8" × 2.7" × 0.81" (roughly the size of a "thick" credit card). This camera is designed for 12 volt DC operation (at 140 ma), is usable to 0.05 foot candles, and also is equipped with an auto-iris. The V-1206 comes with a 74-degree field-of-view set screw adjustable lens, but can be equipped with a standard C-mount CCTV lens by means of an optional adaptor. This camera is also available for less than $100. A photograph of this camera is also shown.

If any of these are of interest to you, request a data sheet from Marshall or call them at 1-310-390-6608 (internet E-mail: Lmarsgo@ix.netcom.com).

73, Irwin, WA2NDM



The Marshall V-1206 camera (now discontinued).

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

What's Your Favorite Contest?

When you ask fellow contesters what they consider to be their favorite contests, you get a incredibly wide range of responses. In part, I think it's because we operate contests for so many reasons. And, I suspect it's also due to the large number of operating events sponsored throughout the year (more on that later).

When it comes right down to it, most of us have one favorite contest that stands out above all the others. It could be based on our station's limitation or strengths, or simply just the first one we ever operated, offering some level of nostalgic value.

Without a doubt—and having nothing to do with where you're reading this (honest!)—my favorite event is the CQ World-Wide DX Contest. In fact, I suppose that I have to concede that DX contest, in general are where my interests lie. This is, for the most part, a very widely held feeling on the East Coast of the U.S. As with any geographical area, the contests that afford the best results are usually the most popular. If you pose the same question to someone in Texas or Nevada, he'd probably tell you about the benefits of operating in domestic contests such as the ARRL Sweepstakes.

As I mentioned earlier, there is a nostalgic part of this equation, too. Like many of you, my first "contest" was the ARRL Field Day. It was my first exposure to amateur radio as well. For that reason Field Day has always had a special spot in my contesting interest curve—so much so that I've never missed operating one (albeit from home many times) in 26 years of hamming. I'm sure there are scores of you who can relate a similar story from the recently discontinued ARRL Novice Roundup. When I look back at the 20+ hours of operating I did to make 230 QSOs in the 1969 NR, it's amazing that I ever operated another contest. But to tell you the truth, it was one of the best times I ever had in a contest!

From an international perspective, DX contests are hugely popular—and not just the CQ WW and ARRL DX. There are literally dozens of national contests, some permitting international participation and others limited to domestic QSOs. Maybe some of you can recall an experience such as listening to a buzzsaw of weak JA stations on 80 meters working each other at high QSO rates, wondering what it would be like to work them yourself.

The Punch Line

The preceding discussion cannot be concluded without some comments on the number of contests currently being sponsored throughout the year. One of the most common complaints I receive from non-contesting amateurs is that there are too many darn contests. When you look at the contest calendar (or even better, the annual list in *CQ*'s *Almanac*), it's easy to see that point of view. There are weekends in which four or five operating events are underway at various times.

Hopefully, most contests have some goal in mind. Some are trying to stir up activity from rare states. Others are attempting to increase activity on certain modes or bands. Still others are designed to encourage newcomers or those with small stations to join in on the fun. My question for the contest community to consider is, if there's no significant goal you're trying to achieve by sponsoring a contest, or the organizational support for the event is minimal at best, then why conduct the contest in the first place? The concept is something like the banking system. What the world does not need is another generic credit card with a great interest rate.

We all have heard the arguments, however. So many of these contests have little or no activity, so what's the big deal?! Well, my view is that this is precisely the point. If a contest has little or no activity, then why sponsor the it at all? It sure seems like common sense to me.

The contest and non-contest community will never completely see eye-to-eye on the virtues of contest operating. It's no different than the conflicts SSTV-ers and non-SSTV-ers suffer from on 20 meter SSB. Or net operators and non-net operators, and 2 meter packet operators and non-packet operators for that matter. The list just goes on and on. Fortunately for the hobby, our self-policing approach works very well—for the most part. What are your thoughts on this subject? The 1995 CQ Contest Survey asks about your favorite contest(s). If you can, take a few minutes and send us your response.

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Calendar of Events

Sept.	**23-24**	**CQ WW RTTY Contest**
Sept.	23-24	Scandinavian Activity SSB Contest
Sept.	23-24	Washington State Salmon Run
Sept.	23-24	American\Canadian Island Contest
Oct.	7-8	California QSO Party
Oct.	7-8	XVIII Concurso Iberoamericano
Oct.	7-8	1995 F9AA Cup Contest
Oct.	7-8	VK-ZL SSB Contest
Oct.	8-9	Tennessee QSO Party
Oct.	11-13	YLRL Anniversary CW Party
Oct.	14-15	Pennsylvania QSO Party
Oct.	14-15	QRP ARCI FAll QSO Party
Oct.	14-15	VK-ZL CW Contest
Oct.	21-22	Texas QSO Party
Oct.	22-23	Illinois QSO Party
Oct.	25-27	YLRL Anniversary SSB Party
Oct.	**28-29**	**CQ WW DX SSB Contest**
Nov.	4-6	ARRL CW Sweepstakes
Nov.	11-12	Worked All Europe RTTY Contest
Nov.	18-20	ARRL SSB Sweepstakes
Nov.	**25-26**	**CQ WW DX CW Contest**
Dec.	1-3	ARRL 160 Meter Contest
Dec.	9-10	ARRL 10 Meter Contest
Dec.	31	RAC Canada Winter Contest

October's Contest Tip

Contest rules are always changing. Although we make our best effort to report them accurately, even we get them wrong sometimes. Although you may think you know the rules of a contest that you've operated for years, the fact is that rules change all the time. Make the effort to "re-read" the rules for any contest you attempt to operate and you may be surprised how a little knowledge can improve your score!

Want to make the top ten in the next contest? Get out your cable-cutter and head for the guy wires on this tower! Top to bottom: KC1XX, K1EA, NX1H, K5ZD, K1DG, K1TR, WZ1R, KM3T, K1AR, and KC1F.

Final Comments

The 1995 CQ WW DX Contest is upon us. Maybe some of you have already left on airplanes to operate from Zone 23 or BV-land. Even in the doledrums of 1995 propagation, the CQ WW is still the world's most popular contest if you measure that by participation levels. Don't miss out on the fun!

As always, please remember that the deadline for the January issue is November 1st.

73, John, K1AR

California QSO Party

1600Z Sat. to 2200Z Sun. Oct. 7–8

This year's party is again sponsored by the

Northern California Contest Club. Effort is being made to activate all CA countries and make 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). Off-times must be at least 15 minutes and clearly indicated in the log.

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

Classes: Single Operator, Multi-Single, Multi-Multi, California County Expedition, Mobile, and Novice/Technician.

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). VO/VE1–7 and VY1/VE8. Out-of-state entries use CA counties (maximum 58).

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

Frequencies: 160–2 meters, except WARC bands. CW—1805 and 40 kHz up from band edge. Phone—1850, 3850, 7230, 14250, 21300, 28450. Novices work 10 kHz up from edge of Novice bands and 28450.

Try CW on the half hour; 147.54 at 2000, 0000, 0400Z; 160 at 0500Z, and 80 at 0300 and 0700Z.

Awards: The CQP has more award opportunities than almost any other contest. Certificates to the highest scoring single operator in each state, province, and country; also each CA county and stations scoring 100 or more QSOs. There are also trophies galore, including single operator, top three out-of-state, and CA top three. Also, CA county expedition, and a special award for stations making most CW QSOs, multi-single and multi-multi winners in CA, and county expedition. The CA mobile team making the most QSOs, and the top scorer outside the United States and Canada, high- scoring low-power entry (less than 200 watts) will also receive a winner's trophy. A special award of a personalized bottle of California wine goes to the top 20 single operators in CA and out of state. Additional awards are available in a variety of categories such as the most CW QSOs, Phone QSOs, low power entries, etc. Finally, a CQP T-shirt will be available for $8 to any entrant making at least 100 QSOs in the contest.

Include a summary sheet showing the scoring, etc., and a dupesheet if you make more than 200 QSOs, with a large SASE for a copy of the results. Entries may be submitted in CT Ver. 8 or 9 format with a signed hardcopy summary sheet.

The mailing deadline is November 15th and entries go to: NCCC, c/o Ken Anderson, K6PU, Box 853, Pine Grove, CA 95665. Logs may also be submitted electronically by e-mail in ASCII format to: "cqp-1995@kb.org". A $1.00 donation to help defray the costs of printing and postage is encouraged.

A contest paperwork packet containing log, summary sheet, contest records, county abbreviations, and Special Awards List is available by sending a large SASE to K6PU.

F9AA Cup 1995 Contest

1200Z Sat. to 1200Z Sun., Oct. 7–8

This contest was created in 1986 to celebrate the memory of Fernand Raoult, F9AA, who was the founder of the French Clubs Group. The URC was designed to benefit amateur radio by facilitating friendships between different club organizations.

Classes: Single operator private stations or multi-op club stations.

Bands: All HF bands according to IARU rules.

Exchange: Club stations—59(9) plus serial number and club name; others eliminate the club designation.

Modes: First 12 hours are CW with the remainder of the contest on SSB. QSOs can be credited per band and mode.

Scoring: Club stations—5 points same continent, 10 points different continent. Individual stations—1 point same continent, 3 points different continents. Fifty bonus points/QSO for working F8URC. Multipliers are DXCC countries and different radio clubs.

Awards: The first place club station and SWL outside of France will receive the special F9AA Cup Award. A special cup is valid for AMTOR and RTTY entries. The top ten individual stations receive other awards. All foreign club entries will be notified of the final results.

The log deadline for this one is November 8th and logs should be mailed to: Union Des Radio Clubs, Coupe Fernand Raoult, 11 Rue de Bordeaux, F-94700 Maisons Alfort, France.

XVII Iberoamericano Contest

2000Z Sat. to 2000Z Sun. Oct. 7–8

Organized by "Unio Radioaficionats del Valles Oriental" and by "CQ Radio Amateur de

Boixareu Editores," this contest will be sponsored every year the week before October 12th to commemorate the anniversary of the discovery of America. This a phone-only contest with the emphasis on Latin-American areas.

Classes: Single operator and multi-operator, single transmitter; both Latin-American and non Latin-American. Single operator EC (EA novice), QRP, less than 5 watts output, and SWL.

Exchange: RS plus a progressive QSO number (001, etc.).

Bands: All six bands, 1.8 through 28 MHz, SSB only.

Points: Latin-American stations score one point per QSO. Non-Latin-Americans, 3 points per QSO with Latin-Americans, 1 point with other non-Latin-Americans.

Multiplier: Latin-Americans use the DXCC list. Non-Latin-Americans use the following country list: CE, CO, CP, CR, CT, CX, C3, C9, DU, EA, HC, HI, HK, HP, HR, HT, KP4, LU, OA, PY, TG, TI, XE, XX9, YS, YV, ZP, 3C, and DXCC dependencies.

Final Score: Total QSO points from all bands times the sum of the multipliers from all bands.

SWL: Same rules apply to SWL entries. The same station cannot be logged more than 15% of the total logged. And the same station can only be logged again after 5 other entries.

Penalties: Taking credit for excessive duplicate contacts, and violation of rules and amateur radio regulations could result in disqualification.

Awards: Certificates will be issued to the highest scores in each DXCC country. Participating certificates will go to non-Latin-American stations making 50 or more QSOs. There are plaques for overall winning scores showing at least 4 hours of operation and 100 more QSOs.

Mailing deadline for entries is November 30th to: Concurso Iberoamericano, c/ Concepcion Arenal 5, 08027 Barcelona, Spain.

Tennessee QSO Party

1800Z Sat. to 0100Z Sun., Oct. 8–9

The Tennessee Contest Group has announced the return of the Tennessee QSO Party. Out-of-state participation is encouraged!

Classes: Single Operator fixed, Mobile, Outside Tennessee, Multi-Operator fixed, Novice/Technician.

Exchange: RS(T) and Tennessee county or state/province/DXCC country.

Scoring: Credit one point per QSO on phone; two points on CW and/or digital modes. Multipliers are Tennessee counties (95 maximum). For Tennessee stations only, add U.S. states, Canadian provinces, and DXCC countries. An extra multiplier may be claimed for every five additional QSOs made with the same Tennessee county. Tennessee mobile operators may claim 500 bonus points for each Tennessee country in which they make at least 15 QSOs.

Frequencies: CW—40 kHz up from bottom band edge. SSB—3900, 7240, 14280, 21390, 28390 kHz. Novice/Tech.—3700, 7130, 21140, 28140, 28390, 146550 kHz.

Awards: Certificates will be awarded to the five high-scoring Tennessee in each operating category. Certificates will also be issued to the high scorer in each U.S. state, Canadian province, and DXCC country.

Logs must be postmarked no later than November 12th and sent to: Tennessee QSO Party, Douglas Smith, 1385 Old Clarksville Pike, Pleasant View, TN 37146-8098. Computer logs in ASCII format will be accepted as well. Send an #10 SASE for contest results.

YLRL Anniversary Party

CW: Oct. 11–13 SSB: Oct. 25–27
1400–0200Z, Wed.–Fri.

This is the 56th annual party run by the YL Radio League. It is open to all YLs around the world. Activity will be found on all bands, 10 through 80 meters, and will be between YLs only. CW and SSB are separate contests and require separate logs. A station may be worked once on each band for contest credit.

Exchange: QSO no., RS(T), and QTH; U.S. state, VE province, or DX country.

Scoring: One point per QSO between stations within the U.S. and Canada (including Alaska and Hawaii). Two points for contacts with stations in other areas. DX YLs score 2 points for QSOs with the U.S. and Canada and with other continents, but 1 point with stations in own continent.

Final Score: Multiply total QSO points from all bands by the sum of states, provinces, and DX countries worked. There is a low-power bonus multiplier of 1.5 for stations using 100 watts or less on CW and 200 watts PEP on SSB. For each duplicate contact removed from your log there is a penalty of 3 additional and equal contacts removed from your log.

Frequencies: CW—3555, 7055, 14055, 21135, 28195. SSB—3955, 7255, 14265, 21395, 28395 (plus or minus 15 kHz). Look in DX portions of band on 40 and 80 meters.

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Current (cont.)	9.2	12	24	32	4.2
Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
Weight (lbs.)	11	11	18	22	6
Meter	YES	NO	YES	YES	YES

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CIRCLE 35 ON READER SERVICE CARD

Awards: Certificates to winning scores in each district, province, and DX country, and first-, second-, and third-place overall winners. There are cups and plaques for YLRL members in North America and DX countries.

Include a summary sheet with your entry showing the scoring and other essential information. Logs must be in their original form, no carbon copies. Your entry must be received by November 30th, and this year logs go to: L. Carla Watson, YLRL Contest Logs, 473 Palo Verde Drive, Sunnyvale, CA 94086.

Pennsylvania QSO Party

1600 to 0500Z Sat.–Sun., Oct. 14–15
1300–2200Z Sun., Oct. 15

This one is sponsored again by the Nittany ARC of State College, Pennsylvania. 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; Multi-Single, Multi-Multi, Portable, Novice/Technician, and Mobile.

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 150. 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. 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. Final score is total QSO points times multipliers.

Frequencies: CW—1810 kHz and 40 kHz up from bottom of each band. SSB—1850, 3980, 7280, 14280, 21380, 28310 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.

Logs need to be postmarked no later than November 15th and should be sent to: Douglas Maddox, W3HDH, Nittany Amateur Radio Club, RD #1, Box 760, Petersburg, PA 16669. An information package is available for the contest by sending $1 to help defray printing and postage costs to the sponsor's address.

Texas QSO Party

1400Z Sat. to 2200Z Sun., Oct. 21–22

This is one of the more popular QSO parties and is sponsored by the Texas DX Society. Stations work as many Texas QSOs as possible (Texas works everyone). Operators may work no more than 24 hours and off-times must be at least 30 minutes.

Classes: Single Operator, fixed/mobile; Multi-Single, fixed.

Exchange: Non-Texas name and state/province; VE/DX stations send name only. Texas stations send name and county.

Frequencies: CW—50 kHz up from bottom of bands; SSB—3850, 7230, 14250, 21350, 28450; Novice—3710, 7110, 21110, 28110, 28450 kHz.

Scoring: Score one point/QSO on SSB and 2 points/QSO on CW. Non-Texas stations score 5 points for Texas mobiles on SSB and 7 points on CW.

Multipliers: Texas stations use Texas counties, stations, VE call areas, and DXCC countries. All others use Texas counties. Final score is total QSO points times total multiplier.

Awards are available to the winners of each category. Send summary sheet, logs, multiplier and dupe sheets, and signed statement by November 30th to TXDS, Box 540291, Houston, TX 77254-0291.

Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 22–23

This is the 33rd 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.

Stations may be worked once per band and mode, and IL stations can contact other in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for IL stations; state, VE province, or DX country for others.

Scoring: One point for phone contacts, 2 points on CW. Illinois stations multiply total QSO points by (state + provinces + IL counties + maximum of 5 countries) worked. Additional DX QSOs count for points but not multiplier. Others use IL counties for their multiplier (maximum of 102). Illinois mobiles add 200 points to final score for each county from which 10 or more QSOs were made.

Frequencies: CW—3550, 7050, 14050, and 30 kHz above bottom edge of Novice subbands for CW and 28390 for phone. SSB—3890, 7290, 14290. Other bands may also be used, excluding the WARC frequencies.

Awards: Certificates will be sent to the top 10 scoring IL fixed stations, 5 IL mobiles, winners in each state, province, county, and the highest club/team aggregate score. A plaque goes to the top-scoring Illinois station (fixed and mobile).

Logs: Indicate band and mode, circle each new multiplier, and IL mobiles must indicate each county change. Stations with over 100 QSOs must submit a dupe sheet.

A summary sheet showing the scoring and the usual signed declaration is also requested. Mailing deadline for logs is November 20th to: RAMS, c/o John Matz, KB9II, 7079 West Ave., Hanover Park, IL 60103. Enclose an SASE for contest results.

CQ World-Wide DX Contest

Phone: Oct. 28–29 CW: Nov. 25–26
0000Z Saturday to 2400Z Sunday

Complete rules were published in the September issue. With the growing number of entry categories, be sure to list your entry category 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 from previous years. The detailed trophy list can be found in the rules announcement.

All entries must be postmarked no later than December 1, 1995 for the phone section, and January 15, 1996 for CW.

All logs must be sent directly to: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801. *Be sure to indicate Phone or CW on the envelope.* ■

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- All units available in 220 VAC input voltage (except for SL-11A)

SERIES

- LOW PROFILE POWER SUPPLY

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅞ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅞ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

-L SERIES

- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

M SERIES

MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

-M AND VRM-M SERIES

MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅞ x 9¾	12

BILL'S BASICS

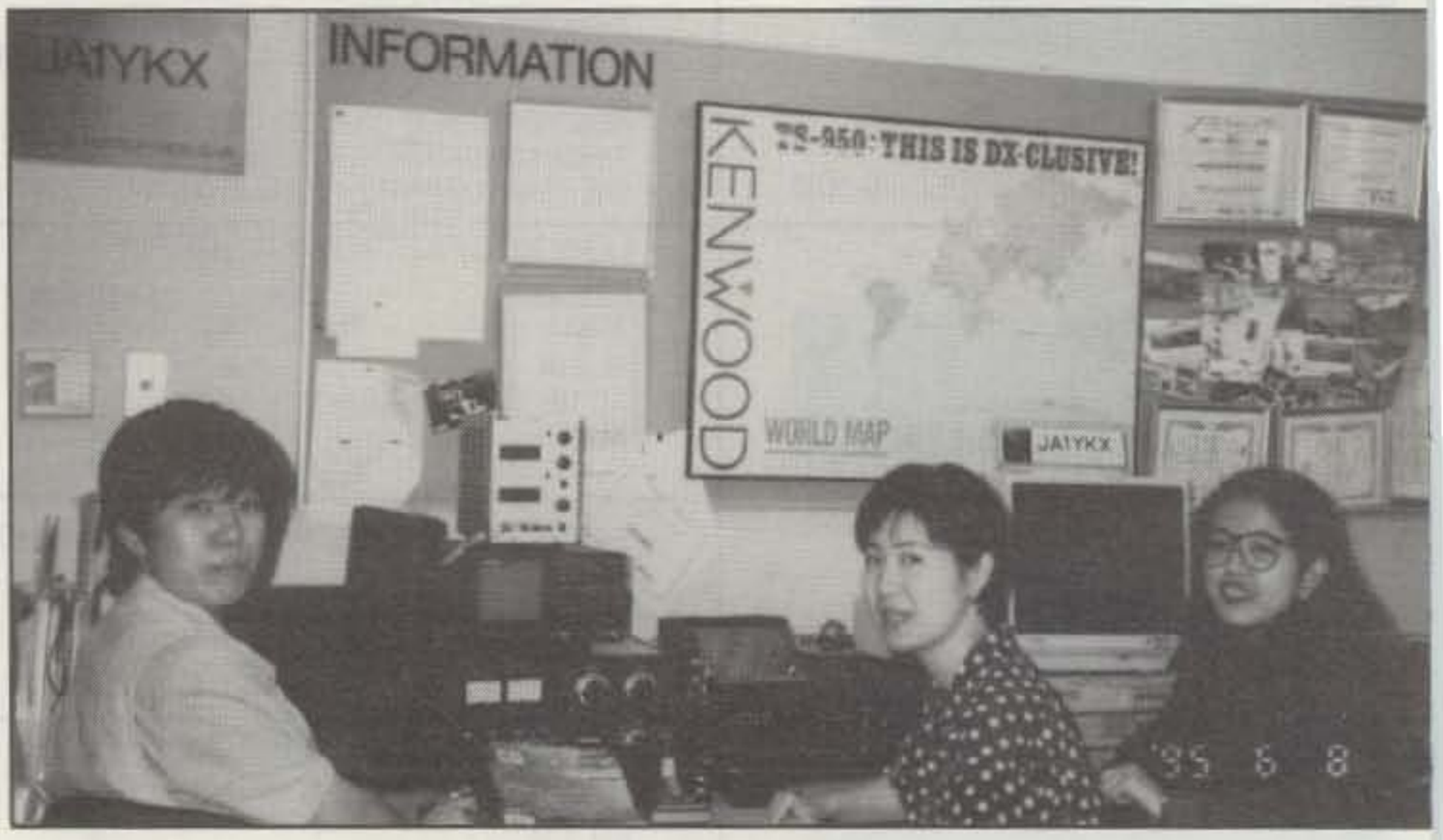
BY BILL WELSH, W6DD

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Man-Made Interference To The Ionosphere

This article provides an introduction to a military project which involves pumping more than three million watts of radio frequency energy into our ionosphere layers. The details herein were taken from the *Earth Island Journal* and a project fact sheet issued by the Office of Naval Research and Phillips Laboratory. As amateurs, we are vitally interested in everything that concerns our ionosphere layers; therefore, this project merits our attention.

The daytime ionosphere layers extend about 35 to 500 miles above Earth. The atmosphere close to Earth consists of neutral atoms and molecules; the ionosphere layers are composed of positively and negatively charged particles called ions and electrons. Ionized gasses may absorb, distort, or refract radio signals, influencing communication, navigation, surveillance, and remote sensing systems.



From left to right, here are Mariko Sai, Naoka Suginome, and Noriko Ismigochi seated at the high-frequency operating position of JA1YKX, at Kenwood. There are several stations scattered throughout Kenwood's Yokohama, Japan plant and they provide communications from 160 meters through 2400 MHz. Six Yagi-Uda antennas are installed on the roof of the Kenwood building. These ladies have lived and worked in North America. They are licensed and they are active on the air.

The Project

The name of this combined U.S. Navy and U.S. Air Force project is the High Frequency Active Auroral Research Project (HAARP). The site where this project is being constructed is Gakona, Alaska. Gakona was an over-the-horizon (B) radar site.

Similar (but lower power) DoD projects include Charge IV, Excede, and Red Air. Low-power ionospheric research is also conducted at Arecibo, Puerto Rico; Apatity, Russia (C.I.S.); Dushanbe, Tadzhikistan (C.I.S.); Fairbanks, Alaska; Jicamarca, Peru; Kharkov, Ukraine (C.I.S.); Moscow, Russia (C.I.S.); Niznhy, Novgorod, Russia (C.I.S.); and Tromso, Norway. *Note:* These installations do not have the frequency capability and beam steering agility needed to complete projected HAARP experiments.

Purposes

The HAARP Fact Sheet states that this project will be used to study fundamental physical principles which govern our ionosphere layers. Plasma processes will be stimulated and controlled in a highly localized region of the ionosphere. Project results could significantly affect the planning and economics of space systems. Radio frequency energy will be used to burn holes in the atmosphere to create an artificial lens that will enable high-power bursts of electromagnetic energy to be focused at higher altitudes. DoD involvement advises that "Although HAARP is being managed by the Air Force and Navy, it is purely a scientific research facility which poses no threat to potential adversaries and has no value as a military target." The *Earth Island Journal* reports that one objective of HAARP is to find ways to disrupt global communication capabilities without disrupting American military communications. Another stated objective is to determine whether or not HAARP could be used to bounce signals to deeply submerged submarines by heating the ionosphere enough to trigger bursts of extremely low frequency energy. The DoD is stated to also be interested in using HAARP to detect aircraft and missiles.

45527 Third Street East, Lancaster, CA 93535-1802

HAARP Team

The organizations running this project are the Office of Naval Research (Arlington, VA), Naval Research Laboratory (Washington, DC), and Phillips Laboratory Air Force Material Command (Hanscom Air Force Base, MA). ONR handles procurement of the primary contract to design and construct the high-power high-frequency transmitters. NRL monitors technical aspects of contracts and interfaces with other government agencies. Phillips oversees environmental processes, site acquisition, and the implementation of scientific instruments associated with the HAARP facility.

Anticipated Users

HAARP facility users are expected to include the Advanced Research Programs Agency, civilian universities, National Science Foundation, U.S. Air Force, and U.S. Navy.

Operating Schedule

HAARP operation will not be continuous. Four or five campaigns will be scheduled each year. Each one will typically involve 10 to 15 visiting scientists conducting experiments during two-week periods. Ten days of preparation and four days of shutdown are also involved. The anticipated life of HAARP is 20 years.

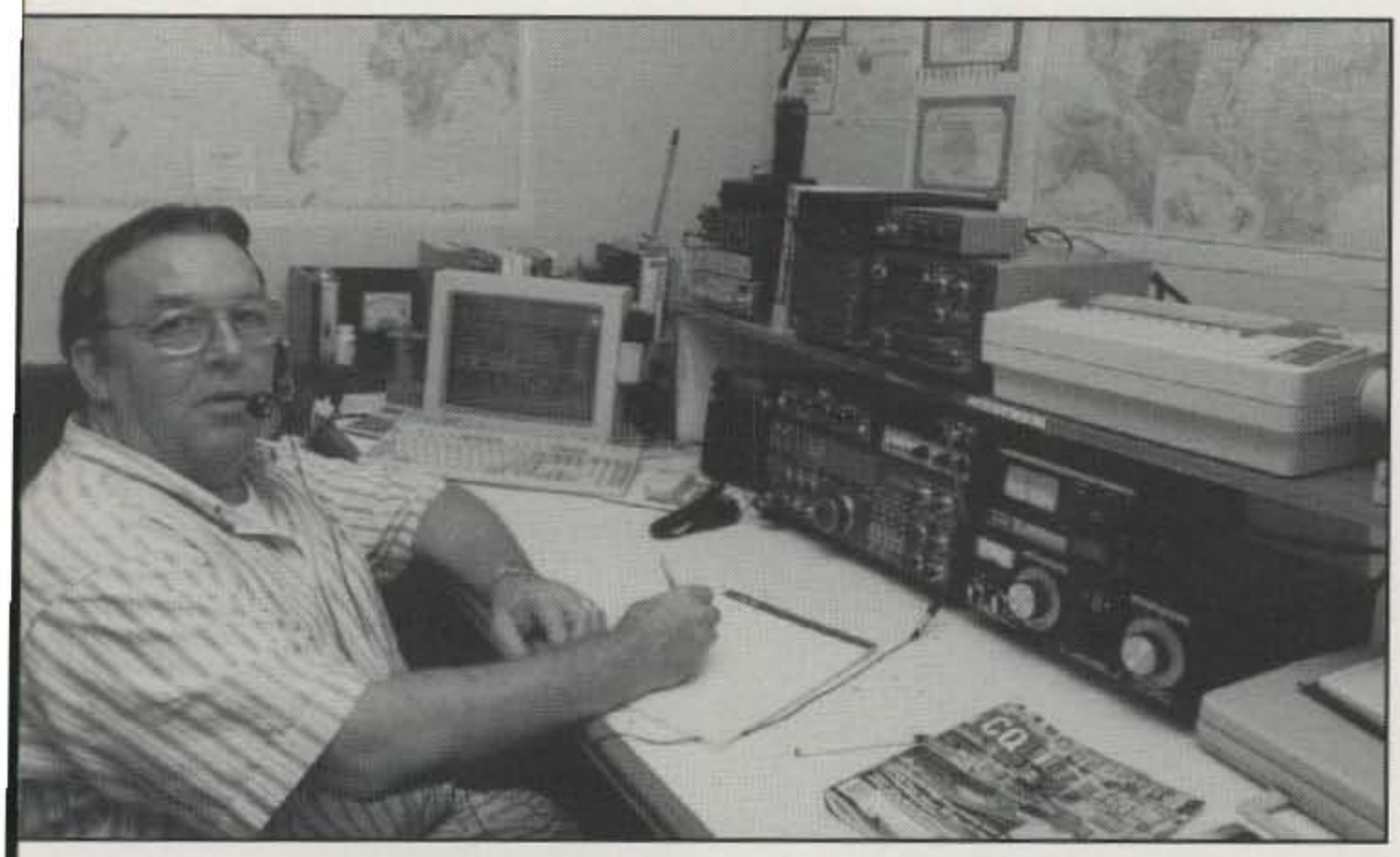
Radio Frequency

Up to 3600 kilowatts of 2.8 to 10 MHz energy will be focused upward in a beam that is a few degrees wide. The width of the beam is calculated to be a few miles in diameter at lower ionosphere layers and several tens of miles in diameter at higher ionosphere layers. Beam intensity will be a few milliwatts per square meter. The HAARP Fact Sheet states that this intensity level is hundreds of times less than the intensity levels created by ultraviolet radiation from the Sun.

Antenna Array

This array will consist of 360 horizontal dipoles, with each dipole driven by a separate 10 kilowatt transmitter. A 12 by 15 (180) group of antenna masts will be mounted on thermopiles in a gravel pad measuring 1000 by 1200 feet. Each mast will support two horizontally crossed dipoles stacked one above the other. The maximum height of the masts is to be 72 feet, and they will be guyed.

The radio frequency energy is focused upward. The amount of ground-level radio frequency is calculated not to exceed radio frequency radiation standards potentially haz-



Bruce Richards, WD4NGB, lives in Clarksville, Tennessee. Despite the existing poor operating conditions on the 10 meter band, Bruce has 306 countries confirmed on that band and he continues to work them. His station includes a Kenwood TS-940S transceiver and a 7-element 10 meter Yagi-Uda up 90 feet.

ardous to humans and large mammals. An exclusion fence will provide protection against ground-level energy.

Electric Power

Primary power will be provided by six 2500 kilowatt electric generators driven by separate 3600 horsepower diesel engines. This on-site electric power will be supplemented by locally available commercial power. The total electrical power requirement of the HAARP facility will be approximately 12 megawatts.

Environmental Impacts

In accordance with the National Environment Policy Act (NEPA), the Air Force (with Navy cooperation) prepared an Environmental Impact Statement (EIS) which evaluated the consequences related to constructing and operating the HAARP research facility in Alaska. This statement covers impacts on electromagnetic and radio frequency interference, air quality, cultural resources, vegetation, wetlands, wildlife, and other considerations. An EIS meeting was held in Glennallen, Alaska during August 1992. The EIS draft was distributed to cognizant organizations and the public on March 12, 1993. The 45-day EIS review period ended on April 25, 1993, and public hearings were held at Glennallen and Anderson, Alaska. The final EIS was released on July 15, 1993. The HAARP Fact Sheet states that the Navy and Air Force are complying with all state and federal regulations which apply to the HAARP facility.

Radio Frequency Interference

State-of-the-art transmitters (with stringent requirements for minimizing out-of-band spurious emissions), proper orientation of the Ionospheric Research Instrument (IRI) antenna array, and the use of operating procedures (including beam steering) to minimize array sidelobes pointed towards Anchorage and Fairbanks, employing special techniques (such as waveform shaping, filtering, and antenna null placement), and working with any affected joint spectrum users to achieve mutually satisfactory resolutions of interference problems should combine to minimize RFI difficulties. Joint spectrum users include aircraft communication/navigation, Alaskan AM/FM/TV stations, amateur radio, animal tracking

receivers, cellular telephones, pipeline communications, and satellite communications.

Construction Status

The Office of Naval Research awarded a contract on September 25, 1992 to ARCO Power Technologies Incorporated for design and construction of the Ionospheric Research Instrument. Construction of a demonstration prototype began on November 17, 1993. About 14 acres have been cleared and filled with gravel. A 3 foot thick gravel pad (817 by 680 feet) was accomplished and the installation of 80 thermopiles was completed on February 18, 1994. The installation of antenna masts started during July 1994. The demonstration prototype was finished about November 1994. Ionospheric Research Instrument construction is expected to begin during the summer of 1995 and to be completed during the latter part of 1997.

Demonstration Prototype

The demonstration prototype consists of 36 ten kilowatt transmitters driving 36 separate horizontal dipoles, providing 360 kilowatts of output power in the same frequency range. Use of this lower power prototype should enable HAARP personnel to identify and correct problems before the full power facility is completed.

Diagnostic Instruments

Most of the diagnostics instruments will be located at the site of the primary HAARP facility. Due to geometrical considerations, some instruments will be installed remote from the primary HAARP facility site.

A primary on-site diagnostics system is an Incoherent Scatter Radar (ISR) transmitting 430–450 MHz energy. A 120 foot diameter ISR dish will be mounted 35 feet up with a 25 foot thick concrete base.

Cost

HAARP cost estimates vary between 25 and 90 million dollars, depending on which of several reports is used.

Concerns and Controversy

The *Earth Island Journal* coverage expresses several concerns about HAARP. Documents they received under the Freedom of Information Act reveal that the goal of HAARP is to "perturb" the ionosphere with extremely powerful beams of radio frequency energy, and to subsequently study "how it responds to the disturbance and how it ultimately recovers. . . ." Their coverage also advises that a February 1990 Air Force/Navy document lists only military experiments to be conducted with HAARP.

Reprints

A copy of the six-page December 1, 1994 HAARP Fact Sheet is available for $1.00 from the author of this column. Mailing costs are included in the stated cost. Please use the California address shown on the first page of this article. A reprint copy of the four-page *Earth Island Journal* HAARP coverage is also available from the same source for $1.00, thanks to Gar Smith, the editor of the *Earth Island Journal*. These reprint offers are only valid during 1995.

Additional Data Sources

The reprints offered in this article provide a lot more information about HAARP. This article only highlights the main points.

Another source of HAARP data is Mr. John Heckscher, Phillips Laboratory/GPIA, 29 Randolph Road, Hanscom Air Force Base, MA 01731-3010.

Jim Roderick is associated with a group which is seeking further investigation of HAARP and its possible harm to the ionosphere and the area around the HAARP site. Queries can be addressed to him at P.O. Box 916, Homer, AK 99603.

Summary

Clare Zickuhr is a radio operator in Anchorage, Alaska. Clare is a former ARCO employee and the founder of the NO HAARP campaign. The ionosphere layers are an asset deserving of our concern. After you have read the offered reprints, you may decide to contact your federal senators and representatives to request a review of the HAARP Environmental Impact Statement by a suitable unassociated organization.

73, Bill, W6DDB

DOUG'S DESK

BY DOUG DeMAW, W1

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Answers To Some Common Questions

As an author I have found it useful to keep a notebook that lists the most common questions I receive from readers of my columns in *CQ* and *Monitoring Times*. The same questions are asked over and over by each new crop of licensed amateurs and experimenters. This month I will list some of those questions and provide answers for them.

Question: I want to bury the coaxial feed line that runs between the shack and my tower. I need to know what the best type of cable is for in-ground use.

Answer: The longevity of buried coax is dependent in large measure on the makeup of the soil in a given region. High acidity or alkalinity will contaminate the cable quickly if there is considerable soil moisture. Almost any type of standard coaxial cable can be buried in desert areas without the poisoning that soil chemicals produce. Contaminants destroy the dielectric and make the coax lossy. The solution is to bury self-healing, impregnated coax such as Times Wire & Cable Impervon, or Decibel Products VB-8 cable. Both are 50 ohm lines the size of RG-8. Standard coaxial cable should be buried in PVC tubing that has well-sealed joints and is protected from moisture that could enter the tubing.

Question: How many radials do I need for my ground-mounted vertical antenna?

Answer: Although the theoretical maximum useful number of on-ground or buried radials was suggested as 120 in the classical Brown, Lewis, and Epstein paper in the IRE Proceedings many years ago, as few as 15 or 20 quarter-wave radials have been used successfully by myself and others. The wire diameter is not critical, since the radials carry only milliamperes of RF current. The wire can be bare or insulated. Shortened, loaded verticals do not require 1/4-wave-long radials to be effective. The radial length can be the same as the physical height of the vertical. This is because the primary field of the antenna does not extend substantially beyond a distance that equals the antenna height. Although cutting all radials for the same length is recommended, good results can be obtained if some are shorter than the target length. Short radials are better than no radials at all!

Question: Are several ground rods okay if I can't have radials?

Answer: No, they are not suitable if you are using them as a ground screen for an antenna. Rods driven into the soil provide a DC ground for your station, but they do not serve as an RF ground screen. At best, they provide a ground reference for the coaxial cable that feeds your antenna.

P.O. Box 250, Luther, MI 49656

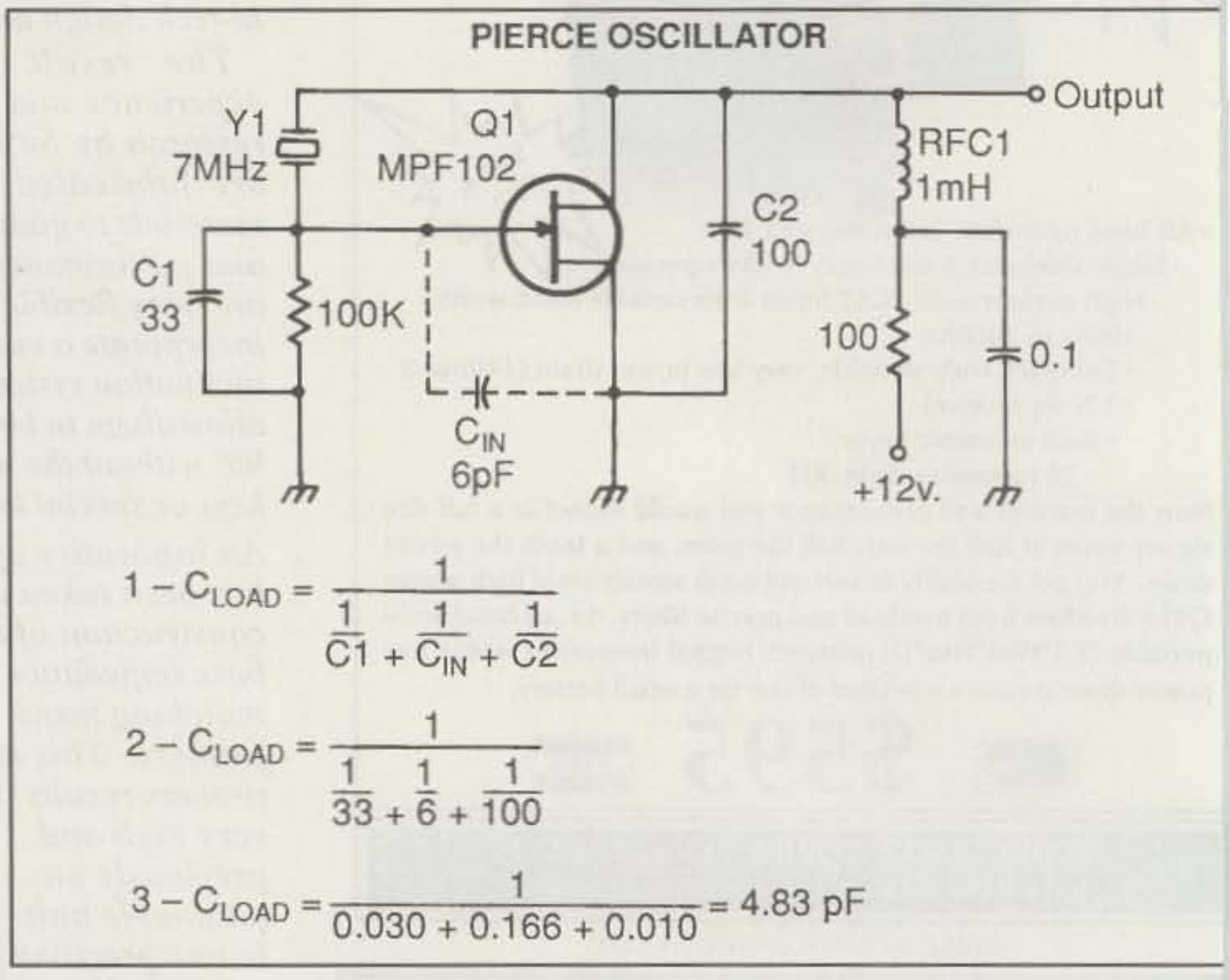


Fig. 1– Circuit for a Pierce crystal oscillator with the equation for determining the crystal load capacitance. C_{in} is the characteristic input capacitance of JFET Q1. C1 and C2 are the feedback capacitors.

Question: My ham shack is on the second floor of my house and the ground system isn't working. I get RF burns when I touch my rig. How can I cure this problem?

Answer: Your ground wire is so long that it is inductive and is acting like an RF choke, thereby preventing the RF currents from flowing to your ground rods and/or radials. Increasing the conductor size to 1 inch wide copper strap will decrease the inductance and may solve the problem. Your best bet is to use a low-power antenna tuner between your station gear and the ground lead in the shack. Tune it for zero reactance (like an SWR of 1 with an antenna) for each frequency on which you operate. A simple diode RF voltmeter connected to the ground lead will permit you to adjust the tuner for zero reactance (minimum RF voltage).

Question: No matter what I have done to cure the problem, RF energy is messing up the audio of my SSB transceiver. What methods are there for resolving this annoyance?

Answer: There is no single solution for this complex problem. Step No. 1 is to make certain your earth ground is truly acting as a ground (see the foregoing question). Step No. 2: If you are using an amplified microphone, such as an MC-80, add an internal 0.01 µF bypass capacitor to the PTT line (and other control lines) and place a 0.002 µF capacito between the audio lead of the microphon amplifier output port and the ground bus of th microphone assembly. Step No. 3: Bond you transceiver to the tuner and the linear amplifi er chassis with copper straps or the shiel braid from RG-8 coax (keep the leads short) Step No. 4: Use a 50 ohm line isolator, such a the Radio Works 4KV-L1, between the trans ceiver and the linear amplifier, or between th transceiver and the antenna tuner or coaxia feed line. The line isolator will prevent RF cur rents from flowing back into the transceive along the outer conductor of the coaxial cable

Question: I can only get my SWR down t 1.5:1. Will this make my signal weak?

Answer: The on-the-air difference betwee a 1:1 and a 1.5:1 SWR is not discernible at th other end of the circuit. Most commercial trans ceivers can tolerate an SWR as great as 2: before the internal transmitter-protection circu starts to reduce the output power. Generall speaking, any SWR less than 2:1 is entirel acceptable, although an SWR of 1 should b your goal. Years ago we amateurs had no SWI indicators. We simply tuned our antennas fo maximum RF current in the feed line.

Question: Why is the 2:1 SWR bandwidt of my 75 meter dipole only 100 kHz, when th

2:1 SWR bandwidth of my 40 meter dipole is 200 kHz? I need more bandwidth on 75 meters.

Answer: This is normal, assuming that the Q of the antennas is the same or very close to being the same. The bandwidth versus Q doubles with each higher octave of operating frequency (i.e., 3.5 to 7.0 MHz, or 7.0 MHz to 14.0 MHz). Various methods exist for increasing the bandwidth of a given antenna or tuned circuit, but the tradeoff for increased bandwidth is reduced system gain.

Question: I am building a homemade antenna tuner. How well must I shield it to prevent TVI?

Answer: Antenna tuners, Transmatches, and line matchers do not need to be enclosed in a metal cabinet. They cannot cause TVI unless they have a bad solder joint or other poor RF connection that can act as a rectifier diode and generate harmonic energy. TVI-causing harmonic currents are created in the transmitter and can actually be attenuated several dB by the antenna tuner, depending upon the type of LC network used in the tuner. Wooden chassis and cabinets are entirely suitable for housing tuners.

Question: Why does my linear amplifier deliver maximum output power when the plate current is not at the bottom of the dip?

Answer: This condition indicates instability (regeneration) in the amplifier. Instability is a self-oscillation at or near the operating frequency. It is caused by a lack of complete neutralization, defective bypass capacitors at the tube socket, or excessive RF-lead inductance near the tube. In a worst-case instability situation the strong self-oscillations can destroy the tube and/or related components. A completely "tame" narrow-band RF amplifier delivers maximum output power when the dip in plate current is at the "valley" minimum.

Question: Many of your articles list X_C and X_L values instead of actual parts values. How can I convert X to understandable numbers?

Answer: Simple algebra is all that is required to learn the value of capacitance or inductance when X_C (capacitive reactance) or X_L (inductive reactance) is expressed in ohms. This is clearly explained in *The ARRL Handbook* and in the *ARRL Electronics Data Book*. This equation is used for obtaining the capacitance in µF:

$$\text{Eq. 1} \qquad C(\mu F) = \frac{1}{6.28 \times X_C \times f_{MHz}}$$

In the case of inductive reactance you will find the inductance in microHenries from:

$$\text{Eq. 2} \qquad L(\mu H) = \frac{X_L}{6.26 \times f_{MHz}}$$

Question: Whenever I order a quartz crystal I am asked to specify the load capacitance. What is the load capacitance and how can I find out what to specify?

Answer: The load capacitance is the cumulative circuit capacitance at the point in the circuit where the crystal is connected. C_{load} varies with the circuit used. In most noncritical circuits it is safe to order your crystal for a load capacitance of 25 or 30 pF. Fig. 1 shows a typical crystal oscillator for which the load capacitance is calculated. Once again, simple algebra can be used to solve the problem.

Question: Why do I get different SWR readings when I move my SWR bridge to a different part of the 50 ohm feed line?

Answer: This happens only under two common conditions. (1) If the antenna is not matched to the feed line (at the antenna feed point), there will RF voltage on the outer conductor of the line and this can disrupt the accuracy of the readings. A flat line should yield the same SWR reading no matter where the instrument is inserted along the line. (2) When two SWR bridges are used in one feed line, and the SWR doesn't read the same on both meters, chances are (assuming that the antenna is matched correctly) that one or both of the meters is not balanced for 50 ohms. It might be balanced for, say, 60 ohms or 40 ohms, owing to poor design.

Some Closing Comments

The answer to nearly any question concerning amateur radio circuits and design can be found in *The ARRL Handbook* or Bill Orr's *Radio Handbook* (Howard Sams, Inc.). Other ARRL books such as *W1FB's Design Notebook*, *W1FB's QRP Notebook*, and *The ARRL Electronics Data Book* provide many straightforward answers for common questions. For antenna problems I recommend that you consult *The ARRL Antenna Book* and *W1FB's Antenna Notebook*. 73, Doug,W1FB

DX

BY CHOD HARRIS, VP2MI

NEWS OF COMMUNICATION AROUND THE WORLD

DXCC Ruckus

Mid-summer proved to be very hot on the DXCC scene this year, despite a near-total lack of sunspots. A series of controversial votes, decisions, and actions generated hundreds of comments and opinions at DX gatherings and on PacketClusters™ and the Internet DX reflector. The fallout from this series of controversies will most likely leave permanent marks on the face of the DX Century Club program. While it is far too early to even guess at the extent of the eventual changes (abolishing the DXCC program is one idea being tossed about!), we can at least keep current on the events in the program.

The primary fuss began as a result of a negative DX Advisory Committee (DXAC) vote on possible DXCC country status for Scarborough Reef BS7H. (For more about the background of Scarborough Reef, see the July '94, *CQ* DX column.) In early July of this year the DXAC released the following:

" . . . The DXAC voted 9 to 7 against recommending the addition of Scarborough Reef to the DXCC countries list.

"Those who voted against the recommendation cited membership opinion within their respective divisions. Some went on to state an opinion that the rocks that comprise the reef do not constitute islands, and for that reason no operation from the reef can be 'land based.'

"Those who voted in favor felt that Scarborough Reef meets the criteria that were in effect at the time the petition was received. Several cited membership opinion in their divisions.

"In membership correspondence to the entire DXAC, 157 persons (72%) were against adding Scarborough and 61 were in support of new country status.

"DXAC Chair Garth Hamilton, VE3HO, stated 'The Minimum-Size Rule was not applied to this petition. DXAC members made a judgment in accordance with the DX communities they represent.'"

The supporters of adding Scarborough Reef to the DXCC Countries List immediately cried foul. They pointed out that several of the DXAC members voted no because the land area of the Reef is too small, in essence using a minimum-size rule, even though no such rule was in effect when the Scarborough Reef petition was submitted. (In April, ARRL Executive Vice-President Dave Sumner, K1ZZ, directed the DXAC *not* to use the recently passed minimum-size rule in the Scarborough Reef deliberations.)

Some DXAC members said the reason for their no votes was that no operation from the Reef could be "land based" (as required by DXCC rule 8), again despite the fact that the DXCC desk had ruled, prior to the vote on Scarborough Reef, that the second BS7H operation in April was indeed "land based." (Determinations of accreditation, including whether a given operation was in accordance with DXCC rules, is the province of the DXCC desk, and *not* the DXAC.)

P.O. Box 50, Fulton, CA 95439

A61AH at his Dubai shack. (WB2DND photo.)

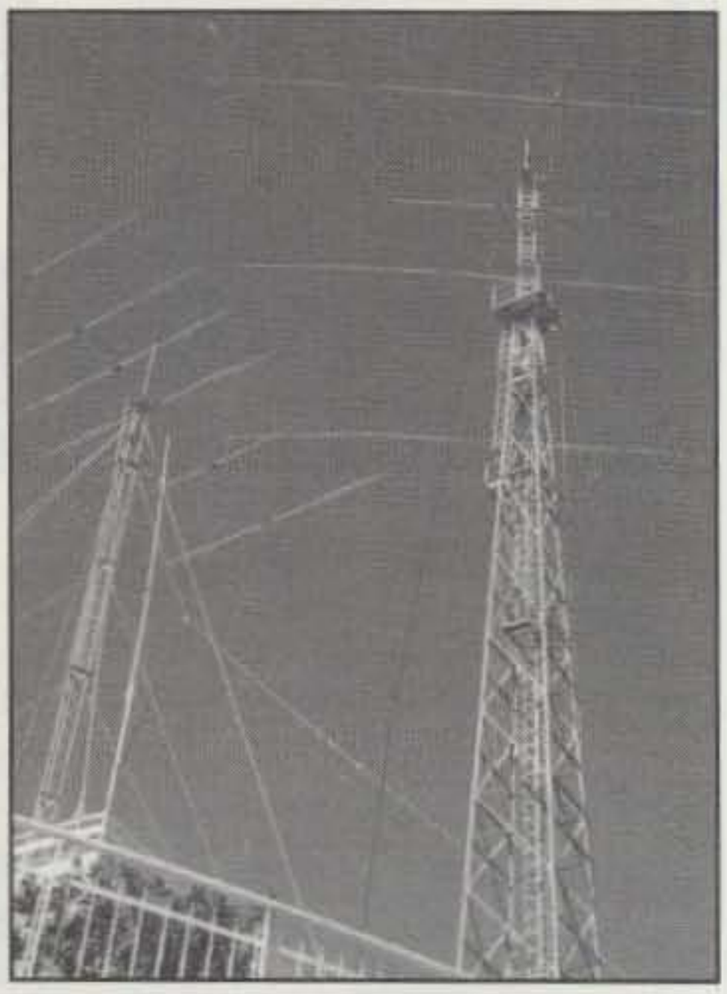
Cutting through the clutter of conflicting opinions on this decision is very difficult, as many correspondents have a vague or incorrect understanding of the DXCC decision-making process and the roles of the DXAC, DXCC desk, and the ARRL Board of Directors. Some very vocal supporters of the outcome of the vote undermined their arguments by errors in simple addition. It was ugly.

However, the difference of opinion can be narrowed to one's perception of the role and purpose of the DXAC versus the DXCC rules. Those DXAC members who voted against country status for Scarborough Reef almost all cited the opinions of DXers in their division for their negative vote.

There is nothing in the DXCC country criteria, however, about determining the opinions of DXers, nor about applying such opinions in individual petitions for separate DXCC country status. Should such decisions be based on a popularity contest among those DXers willing to share their opinions with their DXAC representative, or should the DXAC members simply apply the published DXCC country criteria as written to a given petition?

There is the same geographic split on this question as there is on the question of minimum country size. DXers on the West Coast are heavily in favor of believing that the DXAC must go by the published rules in effect at the time of application, rather than by DXers' opinions. DXers on the East Coast appear to be more willing to go around the printed rules to eliminate what they feel is a non-country.

The DXAC votes against DXCC country status for both Scarborough Reef and Pratas earlier this year pointed out an anomaly in the relationship between the DXAC and the Awards Committee, which is comprised of HF-active amateurs employed at ARRL Headquarters. Positive DXAC decisions—decisions to *do* something, such as change a rule or add or delete a DXCC country—are subsequently reviewed by, and voted for or against, the Awards Committee. Usually the Awards Committee endorses the DXAC decision, and the change is implemented. In the relatively rare cases of disagreement between the two committees, the chairmen of the committees attempt to resolve their differences, and find a solution acceptable to both committees. Recent examples of such a procedure were



This is why I8UDB is so loud! (KDØJL photo.)

the start date for Eritrea and the minimum-size rule. In both cases the DXAC and the Awards Committee chairmen reached a mutually acceptable agreement.

However, in cases in which the DXAC votes *against* doing something, such as a vote against adding a country to the DXCC list, the Awards Committee does not review the decision. The petition for separate country status dies at that point, without further review. (The petitioners can resubmit their petition after a two-year cooling-off period, instituted by former DXAC Chairman Bob Locher, W9KNI, to staunch the near-continuous flow of Pribolof Island petitions in the early 1980s.)

What this Standard Operating Procedure meant for both Pratas and Scarborough Reef was that their DXCC country status would not be reviewed until 1997, at the earliest.

Several prominent DXers felt that the combination of DXAC members voting "around" the published DXCC country criteria, and this veto power of the DXAC, was unfair to the petitioners, who are both sister International Amateur Radio Union (IARU) member societies—the Chinese Radio Sports Association in the case of Scarborough Reef and the Chinese Taipei Amateur Radio League for Pratas.

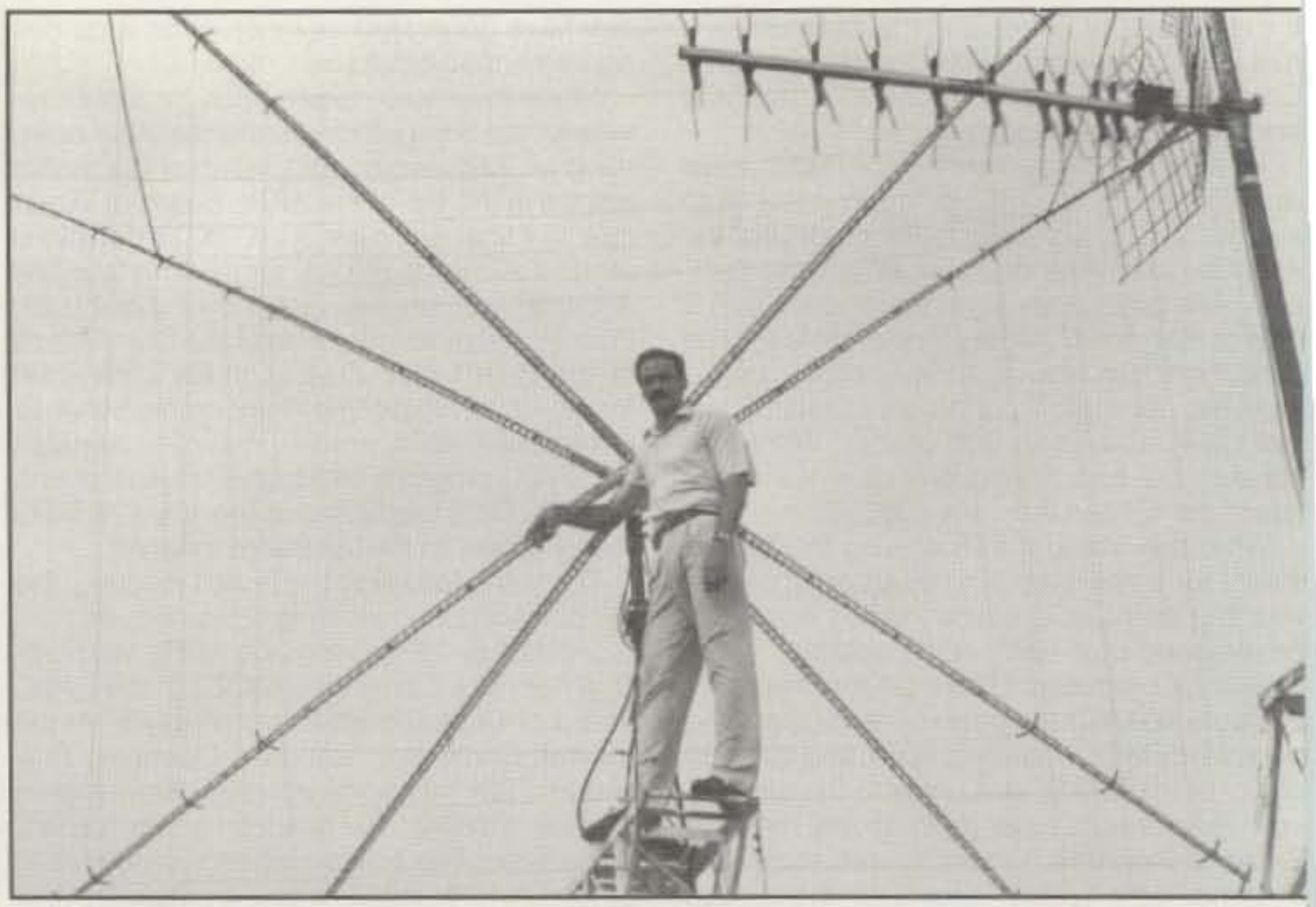
A four-page editorial by Martti Laine OH2BH, published in *The DX Bulletin*, added fuel to the fires of controversy. The editorial made the above points, and several more in support of reconsideration of the DXCC country criteria for both Pratas and Scarborough Reef. Many DXers were outraged at the attitudes of some DXAC members toward the published DXCC rules. About an equal number of DXers said they disagreed with OH2BH's editorial and supported keeping the two entities off the DXCC list. Few DX topics in recent history have generated as much or as wide disagreement as this issue.

Since there was no provision for further review of the two petitions under existing operating procedures, consideration of the matter landed in the lap of the ARRL Board of Directors, the final arbitrator of all DXCC decisions (and all ARRL decisions, for that matter). The ARRL Board met the weekend of July 21–23. Prior to that meeting, some of the Committees of the Board met. One of those committee members was that of the Membership Services Committee (MSC), whose jurisdiction includes the DXCC program. In a highly unusual event, all ARRL Directors attended the July 19th MSC meeting prior to the full Board meeting.

The week following the Board meeting, the ARRL issued the following news release:

"At its July 19 meeting, the ARRL Membership Services Committee (MSC) of the ARRL Board of Directors voted to remove from the Awards Committee Standard Operating Procedure (SOP) an administrative interpretation of a Board motion. The deleted text said in part, "Thus it requires a favorable recommendation by the DXAC to initiate a country status review by the Awards Committee." All ARRL Directors were present at the meeting, and it was the sense of the meeting that the Awards Committee should review negative as well as positive country status recommendations of the DXAC.

"On July 25, the ARRL Awards Committee voted unanimously that Scarborough Shoal (Huang Yan Dao) should be added to the DXCC List under Point 2(a) of the Countries List Criteria. Committee members all felt that Scarborough meets the rules that were in place when the petition for new country status was received. Further, they concluded that it meets the definition of an island under the UN Law of



XX9AS is the most active station in Macao.

The WPX Program

SSB

2525	EA3EAN	2528	EA5OGU
2526	EA7FHR	2529	EA8PP
2527	EA4CRU		

CW

2882	BV7FF	2885	EA1APA
2883	WWØE	2886	ZS1AFZ
2884	DL4NBV		

MIXED

1711	UB3EA	1713	HA7UW
1712	EA4AD		

Mixed: 450 UB3EA, HA7UW. 500 UB3EA, HA7UW. 550 UB3EA, KB2R, HA7UW. 600 UB3EA, KB2R, HA7UW. 650 UB3EA, HA7UW. 700 UB3EA, HA7UW. 750 UB3EA, HA7UW. 800 UB3EA, HA7UW. 850 UB3EA. 900 UB3EA. 950 UB3EA. 1000 UB3EA. 1050 UB3EA. 1200 DF7GK. 1250 DF7GK. 1300 DG7GK. 1350 DF7GK. 1400 DF7GK. 1450 DF7GK. 1500 DF7GK. 1550 DF7GK. 1600 DF7GK. 1650 DF7GK. 1700 DF7GK. 1750 LU8DY. 2050 KS3F. 2100 N6JM. 2150 N6JM, KS4S. 2200 N6JM. 2250 IK2ILH. 2300 IK2ILH. 3200 I1EEW. 3500 N4NO. 3550 N4NO. 3700 W2FXA.

SSB: 350 EA3EAN, EA7FHR, EA5CGU, EA8PP, EA7CRL, VK4ARB. 400 EA3EAN, EA5CGU, EA8PP, EA7CRL, VK4ARB. 450 EA5CGU, EA8PP, EA7CRL, VK4ARB. 500 EA5CGU, EA8PP, EA7CRL, VK4ARB. 550 JA6SVM, EA5CGU, EA8PP, EA7CRL. 600 JA6SVM, EA5CGU, EA8PP, EA7CRL. 650 EA5CGU, EA8PP, EA7CRL. 700 EA5CGU, EA8PP, EA7CRL. 750 EA5CGU, EA8PP, EA7CRL, N3DRO. 800 EA5CGU, EA8PP, EA7CRL. 850 EA5CGU, EA8PP. 900 EA5CGU, EA8PP. 950 EA5CGU, EA8PP. 1000 EA5CGU, EA8PP. 1050 EA5CGU, EA8PP. 1100 EA5CGU. 1150 EA5CGU. 1200 EA5CGU. 1250 EA5CGU. 1300 EA5CGU. 1350 EA5CGU. 1400 EA5CGU. 1450 EA5CGU, KS4S. 1500 EA5CGU. 1700 LU8DY. 1750 LU8DY, KS3F. 2700 I1EEW, N4NO. 3850 ZL3NS.

CW: 350 ZS1AFZ. 400 ZS1AFZ, F5TFS. 450 9A3UF, ZF1AFZ, F5TFS. 500 9A3UF, ZS1AFZ, F5TFS. 550 ZS1AFZ. 600 ZS1AFZ. 1150 KS3F. 1450 IK3GER. 1550 KS4S. 1600 I1EEW, ZS6EZ. 3000 N4NO. 3050 N4NO.

10 Meters:	EA7FHR, EA7CRL
15 Meters:	JA6SVM, EA7CRL, HB9BHY
20 Meters:	KB2R, EA7CRL, HB9BHY
80 Meters:	UB3EA

Asia:	UB3EA, JA6SVM, EA5CGU, EA7CRL, LY3BY
Africa:	EA5CGU, EA7CRL
No. Amer.:	UB3EA, EA5CGU, EA7CRL
So. Amer.:	JA7FFN, EA5CGU
Europe:	UB3EA, JA6SVM, EA7FHR, EA5CGU, EA7CRL, LY3BY
Oceania:	EA5CGU

Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, I5ZJK, JAØSU, S51NU, K9XR, WØULU, HB9DDZ, F6HMJ, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, IN3NJB, WT3W, IN3NJB, S50A, UT5-186-2.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV, I2MQP, IØRIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HMJ, HB9DDZ, K9XR, KØJN, ZS6EZ, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, K9LJN, WT3W, IN3NJB, S50A, UT5-186-2.

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.

5 Band WAZ

As of June 30, 1995, 423 stations have attained the 200 Zone level.

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

N5FG
G3NLY

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

N4WW, 199 (26)	KL7Y, 199 (34)
AA4KT, 199 (26)	RA3AUU, 199 (1)
K7UR, 199 (34)	SM6AHS, 198 (12, 31)
NAØY, 199 (26)	UA3AGW, 198 (1, 12)
WØPGI, 199 (26)	VO1FB, 198 (19, 27)
W2YY, 199 (26)	EA5BCK, 198 (27, 39)
W9WAQ, 199 (26)	KZ4V, 198 (22, 26)
W1JR, 199 (23)	K4PI, 198 (23, 26)
VE7AHA, 199 (34)	G3KDB, 198 (1, 12)
W1FZ, 199 (26)	DK2GZ, 198 (1, 24)
IK2GNW, 199 (1)	UY5XE, 198 (24, 27)
W9CH, 199 (26)	KG9N, 198 (18, 22)
ACØM, 199 (34)	KM2P, 198 (22, 26)
IK8BQE, 199 (31)	I1ZXT, 198 (1, 1 on 40)
JA2IVK,199(34,40m)	GM3YOR, 198 (12, 31)
KA5W, 199 (26)	OE6MKG, 198 (12, 31)
K1ST, 199 (26)	NN7X, 198 (17, 34)
ABØP, 199 (23)	DKØEE, 198 (19,31)

The following have qualified for the basic 5 Band WAZ Award:

G3NLY, 200 Zones	TI5RLI, 190 Zones
N2VW, 164 Zones	

Endorsements:

KØVZR, 194 Zones	NN7X, 198 Zones
K6FG, 182 Zones	DKØEE, 198 Zones
N5FG, 200 Zones	

972 Stations have attained the 150 Zone level as of June 30, 1995.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

The WAZ Program

Single Band WAZ

15 Meter SSB

481	JF1UVJ	484	JA8XDM
482	JI6URU	485	JF5APX
483	JRØAMD		

160 Meters

16 WØZV —Endorsement, 39 Zones

All CW

75	AD1E	77	N5FG
76	KB5OHT	78	JL3SBE

All Band WAZ

SSB

4285	JR6SVM	4287	KI6BN
4286	LU3HBO	4288	WO1P

CW/Phone

7598	W7SE	7602	W1JA
7599	AA8CH	7603	JI1DHY (CW)
7600	DL7UGU	7604	WA4QDM
7601	KA5GMN (CW)	7605	JH1BAM (CW)

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

he Sea Conventions. China claims Scarborough, and there is an absence of other territorial claims. Finally, it is more than 225 miles from the nearest part (island) of China.

"Awards Committee Chair Chuck Hutchinson K8CH shared the results with DXAC Chair, Garth Hamilton, VE3HO, immediately after the vote. As announced in a June 30, 1995 news release, the DXAC voted 9 to 7 against recommending the addition of Scarborough to the DXCC Countries List.

"Under procedures established by the ARRL Board, and because the Chairs are unable to effect a compromise, there is an automatic appeal. In the next step, the two committees will report the reasons for their votes to the MSC for recommendation to the full Board, which ultimately will decide the matter."

This news release makes two important points. First, the change in the Standard Operations Procedures eliminates the "veto" power of the DXAC on potential new DXCC countries. Now even negative DXAC votes will be routinely reviewed by the Awards Committee.

Second, the entire ARRL Board was at the MSC meeting, and concurred with the decision. This strongly suggests that the Board will vote in favor of adding Scarborough Reef to the DXCC countries list when it next considers the question. (As the news release points out, when the DXAC and Awards Committee cannot reach agreement, the two committees outline their reasoning for the MSC, and then the entire ARRL Board for a final decision.) While the next Board meeting isn't until January 1996, the Board may make a decision prior to the next meeting, voting by mail, phone, or e-mail. In any case, it appears that Scarborough Reef will be added to the DXCC countries list in the near future.

There was another decision made at the MSC meeting. Second-hand reports say that the Membership Services Committee of the ARRL Board of Directors will ask Garth Hamilton, VE3HO, Chairman of the DX Advisory Committee, (DXAC) to waive the DXAC's internal two-year limit on re-voting petitions in the case of Pratas BV9. This would allow an immediate re-vote. Earlier this year, the DXAC voted 8 to 7 against adding Pratas to the DXCC Countries List, based on now-discounted reports of intervening rocks. Should VE3HO go along with this request, Pratas will most likely get at least nine "yes" votes, and subsequently be added to the DXCC countries list.

The Pratas/Scarborough Reef controversy was not the only mid-summer DXCC ruckus. In another decision that stirred up numerous comments, the DXCC desk announced on July 6 that documentation for P5/OH2AM has been approved. In accordance with a news release

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 CQ Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4642 9A2AA	3177 SM3EVR	2825 YU7BCD	2452 SM6DHU	2122 N6JM	1846 G4OBK	1498 WZ1R	1315 WA3HUP	1020 WU1F
4323 K2VV	3153 N4MM	2761 IT9QDS	2445 4N7ZZ	2069 W8UMR	1844 W3KH	1484 I2EAY	1305 CT1EEB	1003 WB2PCF
3703 EA2IA	3136 YU1AB	2741 HA8XX	2440 S50A	2063 W9IL	1796 KA5TQF	1445 AE5B	1295 I1-50156	993 VE6BMX
3535 W2FXA	3121 N4UU	2721 K9BG	2418 WB2YQH	2041 N2AIF	1794 HA8QC	1437 KØIFL	1286 HP2CWB	785 W2EZ
3467 K6JG	3079 I1EEW	2689 SM7TV	2390 S53EO	2034 W6OUL	1773 WB8ZRL	1392 EA3CWK	1272 K9BQL	883 WU1F
3462 N4NO	3076 KA5W	2676 N2AC	2375 K8LJG	2013 KS4S	1729 VE9RJ	1373 KC6X	1235 AA7FL	759 EA2BNU
3417 VE3XN	3007 WA8YTM	2675 K9AGB	2230 K5UR	1986 KBØG	1668 PY2DBU	1361 JN3SAC	1127 G4SDJ	739 VE6JAV
3341 N6JV	2999 9A2NA	2613 KF2O	2199 HA5NK	1946 WB2ABD	1663 LU8DY	1352 ND3A	1123 WT3W	670 KB5OHT
3326 W1BWS	2890 PAØSNG	2535 HAØHW	2162 S51NU	1901 NV9S	1655 WB3DNA	1321 W9IAL	1068 IK2DUW	
3213 N9AF	2876 YU7SF	2478 I2EOW	2147 W4UW	1865 SM6CST	1617 HA9PP	1317 KSØZ	1066 IT9JPK	
3200 I2PJA	2855 HAØDU	2470 K2POF	2122 IK2ILH	1855 S58MU	1604 IØAOF	1316 NH6T	1038 N4PYD	

SSB

4053 IØZV	2691 N4NO	2238 KF2O	1933 CX6BZ	1526 KS4S	1338 OE2EGL	1124 EA1KK	1020 KØIFL	831 W6RQQ
3658 K2VV	2684 F2VX	2228 EA3AQC	1907 IN3QCI	1521 KA5TQF	1306 CT1EEB	1111 EA3KB	1006 ND3A	827 EA5DCL
3568 VE1YX	2659 I1EEW	2206 YU7BCD	1902 K5UR	1520 CT1DIZ	1293 IK2AEQ	1103 KBØG	1000 IT9JPK	799 HA9PP
3555 ZL3NS	2612 NJØC	2174 I2EOW	1847 CT1BY	1445 K2EEK	1267 HA5NK	1074 EA1IF	974 EA8BGY	798 EA7CRL
3361 F6DZU	2605 I4CSP	2160 CT4UW	1811 SM6DHU	1445 N2AC	1250 NG9L	1069 WZ1R	931 WU1F	796 EA3EQT
3228 K6JG	2572 KA5W	2108 EA5AT	1801 K2POF	1411 KBØC	1249 K8MDU	1054 EA8PP	930 WT3W	782 CE5FSB
3198 I2PJA	2554 PAØSNG	2087 CT1AHU	1749 LU8DY	1403 CT1BWW	1242 G4OBK	1047 KB4HU	917 DF7HX	729 N3DRO
3114 WD8MGQ	2491 HA8XX	2026 4X6DK	1643 N6FX	1403 W6OUL	1223 T30JH	1042 WA2FKF	911 EA1AX	710 KE4BM
2951 CT4NH	2466 I4ZSQ	2015 N4UU	1630 W5AWT	1390 AE5B	1158 HP2CWB	1033 N4PYD	890 SV3AQR	706 IK4HPU
2804 N4MM	2376 9A2NA	1983 K5RPC	1608 K8LJG	1383 WB8ZRL	1151 EA5GKE	1028 AA6BB	867 I6KYL	658 VE9RJ
2755 EA2IA	2375 I2MQP	1967 EA2AOM	1604 YU7SF	1375 EA5OL	1143 K9BQL	1027 NH6T	839 S51NU	601 KJ8F
2722 OZ5EV	2353 WA8YTM	1957 W4UW	1578 LU7HJM	1360 DK5WQ				
2702 EA8AKN	2257 LU8ESU	1945 KF7RU	1558 IK2DUU	1360 K3IXD				

CW

3755 K2VV	2408 N2AC	1959 KA7T	1788 HA8XX	1609 I7PXV	1406 SM5DAC	1156 EA6AA	964 KA5TQF	703 IK2EOW
3630 WA2HZR	2397 K9QVB	1932 S51NU	1787 K5UR	1599 S58MU	1389 EA6BD	1122 WB8ZRL	923 ND3A	676 HL5AP
3314 N6JV	2286 WA8YTM	1902 JA9CWJ	1748 N6FX	1538 I1EEW	1355 LU2YA	1098 9A3SM	871 I2MQP	663 KØIFL
3056 VE7CNE	2253 YU7BCD	1866 K2POF	1739 SM6CST	1523 W6OUL	1326 I2EAY	1080 WZ1R	855 PY4WS	656 VE6BMX
2979 N4NO	2250 KA5W	1851 G3VQO	1734 OZ5UR	1467 IK3GER	1289 HI8LC	1067 9A2HF	848 NH6T	650 KF7JF
2825 YU7LS	2245 G4UOL	1842 SM6DHU	1728 W1WAI	1443 KS4S	1259 KA1CLV	1053 W9IAL	836 KL7UR	647 ZS1AFZ
2751 N4UU	2164 N4MM	1823 TI4SU	1726 ZS6EZ	1435 DJ1YH	1253 EA7TG	1038 4X6DK	803 IK5TSS	602 WT3T
2729 EA2IA	2057 W8IQ	1822 K8LJG	1690 VR2UW	1432 G4OBK	1233 EA7AAW	1030 AC5K	801 K2LUQ	602 KB5OHT
2687 K6JG	2026 S51NR	1817 W5AWT	1670 KBØG	1431 G4MVA	1225 JN3SAC	1008 W4UW	714 EA2BNU	
2591 YU7SF	2017 9A2NA	1788 KF2O	1652 VE9RJ					

dated July 16, 1991, North Korea (Democratic People's Republic of Korea) will now be added to the DXCC Countries List.

The DXCC Desk will accept QSL cards for this new country starting October 1, 1995. QSL cards received at the DXCC Desk before October 1, 1995 will be returned without action.

Since P5/OH2AM worked only 16 different stations, this action will dramatically change the DXCC Honor Roll, unless there is another, more extensive operation from North Korea before the next Honor Roll deadline. The 2,000 Top Of The Honor Rollers will drop back to the #2 position, and 400 will drop off the Honor Roll. Martti Laine, OH2BH, has stated that the next North Korea operation will be prior to the Beijing DX Convention in mid-October.

The P5/OH2BH demonstration of amateur radio was based on pre-arranged schedules with certain Asian amateurs. Although this was certainly not Martti's intent, should this result in a dramatic rearrangement of the DXCC Honor Roll, the ghost of Don Miller, W9WNV, will haunt the DXCC program. Miller single-handedly altered the DXCC Honor Roll during his DXpedition career by selectively working stations, apparently not hearing certain high-ranking Honor Rollers who failed to contribute to or who questioned his operations.

DXers anxiously await final resolution on all three of these issues: Pratas, Scarborough Reef, and a real opportunity to work North Korea. It was an interesting summer for DXers, but not on the air. Stay tuned for further developments on all three issues.

Meanwhile, in a far less controversial vein, "The ARRL DX Advisory Committee (DXAC) voted 15 to 1 to suspend further study of the status on Aruba until the Netherlands and Aruba have announced a change in the current move towards (sic) independence for Aruba originally slated for 1996."

Aruba was added to the DXCC countries list based on its starting on a ten-year path toward complete independence from the Netherlands. Aruba has since had cold feet about completing the process, putting the original decision for separate DXCC status in doubt. The DXAC decision to table any change in DXCC status for Aruba puts any possible deletion well into the future.

Up-Coming Events And Activities

The ARI DX and IOTA Convention is Oct. 13–15, in Bologna, Italy. The program includes G3KMA and G3ZAY on Islands On The Air; VK9NS, SM6CAS on the Conway Reef operation; Rudi Klos, DK7PE, technical programs; and much more. Information is available from ARI, Via Scarietti 31, 20124 Milano, Italy.

The New England ARRL DX Convention and Dinner is Saturday, October 7, at the Student Center of Worchester State College, Worchester, Massachusetts. The program includes DXpedition reports, DX Quiz, pile-up contest, QSL card checking, YCCC's Contest University, and much more. DXAC representatives and DXCC desk personnel will also be on hand. Dinner speaker is Wayne Mills, N7NG. Admission, including dinner, is $25 payable to Gary Young, K2AJY, P.O. Box 211, Swampscott, MA 01907-0211, fax or phone to 617-592-6934.

The fifth annual **W5 DX Bash** is Oct. 14–15 at W5KFT's ranch on Lake Buchanan, northwest of Austin, Texas. The program includes PacketCluster®, contest stations towers, antennas, and DX. Les Bannon, WF5E, W5 QSL bureau manager, will be on hand. Registration is $20 via Bryan Edwards, W5KFT, 3801 68th St., Lubbock, TX 79413. For more information contact W5KFT at 806-745-3692 (work) or 806-799-5783 (home).

Among the special events on the HF bands this month is the Tall Stacks celebration around Cincinnati, Oct. 11–15. Listen for stations signing **/TS** after their calls, especially W8DZ, K8SCH, and W8VND. Special QSLs featuring the historic steam paddle boats will be available from N8FU, direct with SASE or via the bureau.

YW6AF is a special operation Oct. 21–22 from the top of the world's highest waterfall, Angel Falls, in Venezuela. The stations will operate on 80, 40, 20, and 10 meters. QSL via YV6AG.

Jose, TI2JJP, plans another visit to Cocos Island Oct. 10–25, and he expects to be active at that time as **TI9JJP**. QSL to him at P.O. Box 330-1000, San Jose, Costa Rica.

There will be many contest DXpeditions for the CQ WW SSB contest Oct. 28–29. Non-contesters can often catch the operators before the contest, while they test their stations, and sometimes after the fest as well. Among those operations already committed are a major multi-op DXpedition to Grenada, where the contest call with be J3A; QSL to WA8LOW with SASE, please. The operators will be on the

QSL INFORMATION

1CØZZ to UU6JF/RB4JF
1PØP to DK8KW
3A1ØØGM to 3A2LF
3A2RPR to 3A2LZ
3D2EK to N6EK
3D2LF to AA6BB
3F3C to HP2CWB
4L5O to TA7A
4L7Z to UU6JF/RB4JF
4S7DA to W3HNK
4U/KCØPA to VE9RHS
4X1VF to K1FJ
5H3MZ to 5Z4YQ
5R8FA to JE8BKW
5T6E to F6FNU
5WØXC to JE1DXC
5X1F to WA1ECA
6V1A to 6W6JX
7J4ACF to DF1CZ
8P9GU to DL7VOG
8Q7AI to DL1IAI
9A4A to 9A4AA
9H3UD to DL8OBC
9H5ØVE to 9H1ARC
9K2MU to WA4JTK
9N1MWU to JA8MWU
9Q5JM to EA2URD
9X1A to ON5NT
AH8N to KH8BB
AP2JZB to K2EWB
AX2ITU to VK2PS
AY1A to LU4AA
BS7H to JA1BK
BV2BI to W3HNK
C6AFP to N4JQO
CN5I to I5JHW
CS4PV to CT1EIF
D2SA to F6FNU
DSØDX/2 to HL1XP
DU97RG to DU9RG
ED1SLG to EA1CA
ED8OR to OHØXX/DU1
EK4JJ to GW3CDP
EO5ØBA to RB5BA
EO5ØII to RB4IWM
ER1M to SP9HWN
EW2CR to NF2K
EX8MD to IØWDX
EX8MF to IK2QPR
EX8W to DL8FCU
FK/JE1SPY to JE1SPY
FM/F5PHW to F5PHW
FO5OU to F6GQK
FR5HG/E to F6FNU
FS5PL/FG to FG5BG
FW/JA1WPX to JA1WPX
H33C to HP2CWB
HL9AK to N3BZA
HO3C to HP2CWB
HP9I to HP2CWB
II4ARI to IK4QIB
IR8A to I8ACB
J2ØSF to F5LBM
J28ML to F5LBM
JT1M to JT1BG
KG4MN to WB2YQH
KP2A to W3HNK
KP4TQ to NP4QH
LN1V to LA4LN
LX9UN to LX1NJ
N7QXQ/HR6 to NA7X
P29SC to WB1GWB
PA3EVJ to VE3MR
PI5ØTUE to PI4TUE
PJ7/AI5P to AI5P
PJ8AA to N4XO
PJ9T to AB4JI
PXØUP to PY1UP
R1FJC to RW6HS
R1FJV to RW3GW
R1FJZ to DF7RX
SØ7URE to EA4URE
S21YE to GØEHX
SVØHS/SV9 to DJ8MT
SV5/G4JVG to G3OZF
SV5/SM7DAY to SM7DAY
SV9/HAØET to HAØHW
SV9/HAØET/P to HAØHW
SV9/HAØHV to HAØHW
SV9/HAØHV/P to HAØHW
SV9/HAØHW to HAØHW
SV9/HAØHW/P to HAØHW
SV9/HGØD to HAØHW
SV9/HGØD/P to HAØHW
T2ØXC to JE1DXC
T94NF to N2AUK
TL8CN to see notes
TMØPR to F5JOT
TM5RE to F5JPA
TO5ORC to FM5CW
UN7FW to KD7H
UP5ØP to UN5PR
UR1ØØIM to RB4IRO
UT1ØØCW to UB5CDX
UT1ØØWL to UT1WL
UU1ØØJWA to LY1DS
UW1ØØGA to AA4US
UX1ØØHX to UX3HX
UX5UO to PA3BUD
UY1ØØBA to RB5BA
UZ1ØØXE to UY5XE
V21CW to KA2DIV
V31DX to AA6BB
V31MD to K2MDM
V31RD to G4SMC
V47KJI to W2BJI
V63XB to JL1HCL
VIØANT to VK4EET
VK6DX to AB4ZD
VP2E/AI5P to AI5P
VP2V/WA6URY to WA6URY
VP2VI to AB1U
VP5/JA7XBG to JA7XBG
VP5/JH7MQD to JA7XBG
VP9DX to WB2YQH
VP9RND to WB2YQH
WP4Q to KP4CKY
YS1ZV to KB5IPQ
YT5ØBB to YU1NUF
Z31RB to DJØLZ
ZA1AB to OH1MKT
ZA1AJ to OK2PSZ/OK2ZV
ZF2NE to W5ASP
ZK1AR to WB6HGH
ZK1DXP to DL7UVO
ZK3RW to ZL1AMO
ZL8/G4MFW to KA1JC
ZV5LL to PP5LL
ZX3T/1 to PY3TD

island Oct. 25–31, and will operate with individual J3 callsign before and after the contest.

Meanwhile, the Frankford Radio Club will operate from Antigua as V26B. QSL to WT3Q. Again, members of the team will operate with individual V26 callsigns before and after the contest.

Mario, DL4MFM, and other German amateurs plan a major DXpedition to the Kirghiz Republic Oct. 25 to Nov. 1. DL4MFM is the QSL manager for EX2M.

Speaking of the CQ WW contest, there is a new country for the contest. The Italian islands in Zone 33, between Sicily and Tunisia (prefixes IG and IH) will be a new country for the contest, starting in 1995. The country's name

Paul, I1RBJ, has been operating from the Principality of Seborga under various callsigns. No applications for separate DXCC country status has been submitted for consideration.

CQ DX Awards Program

SSB

2150 ..... CT1ESO 2151 ..... IK2PZG

CW

924 ..... GØTYV 926 ..... IK2PZG
925 ..... YU1AB

SSB Endorsements

320 ..... WB4DBB/322
310 ..... ZL1BOQ/312
275 ..... IK2PZG/289
200 ..... CT1ESO/206
3.5/7 MHz CT1ESO

CW Endorsements

310 ..... IK2ILH/315
310 ..... KA7T/313
300 ..... N1HN/307
300 ..... WB4DBB/304
275 ..... K7JYE/298
275 ..... YU1AB/288
275 ..... W4UW/277
150 ..... IK2PZG/176

RTTY Endorsements

310 ..... K2ENT/317

Total number of active countries is 326. 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.

is African Italy. An Italian group is already planning to operate both modes in the 1995 'tests.

In other Islands On The Air news, F5JWW will operate from some of the islands in French Polynesia FO Oct. 28 to Nov. 7. The Mid-Lanark ARS will be active as GB5SI from the Shetland Islands Oct. 28 to Nov. 7. This is also a separate multiplier in the contest. QSL via the bureau to GB5SI. Finally, CO7KR hopes to operate from Los Colorados Archipelago sometime this month. Good hunting!

QSL Information

QSL **SJ9WL** and **LG5LG**, the callsigns of the Morokulien Radio Club on the Sweden/Norway border, via John Hallenberg, SMØDJZ, Siriusgatan 106, S-195 55 Mersta, Sweden. (Former manager SMØHUK is a Silent Key.)

To QSL the Key West (NA-062) IOTA DXpeditions of **WB8YJF**, include a business-sized SASE, as the photo QSL does not fit in a regular envelope. Jon Severt, 5586 Babbitt Road, New Albany, OH 43054.

Bob Schenck, N2OO, offers to take responsibility for any logs for Silent Keys or logs to be "closed," as well as acting as QSL manager for DX stations or DXpeditions. Contact Bob at P.O. Box 345, Tuckerton, NJ 08087-0345.

Tom Polak, 9A2AJ, is QSL manager for **HH2AW, T93A/4U, 5B4ADA/HH2, T91CFG, T91EGR, T94TG, T94YS, T93T, C47A, C48A, H20A, H21A, 5B0A**. His address is P.O. Box 613, 10 000 Zagred, Republic of Croatia.

Romeo Stepanenko, 3W3RR, says the QSL routes for his operations remain unchanged. Do not use the address given in the August issue; use the previously published routes.

73, Chod, VP2ML

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	UG7GWO('87).....255,852	1,327	12	57
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	ZD8Z('94).....3,481,925	5,535	36	179
	(Opr. N6TJ)			
28	ZV5A('91).....2,984,166	5,154	37	156
	AFRICA			
1.8	IH9/IV3PRK('89).....81,344	447	9	53
3.5	CT3BZ('79).....235,113	772	22	87
7.0	EA8RCT('87).....859,362	1,959	32	115
	(Opr. OH2MM)			
14	CT3DL('94).....1,894,165	3,644	36	145
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	RFØFWW('87).....1,447,128	2,894	40	147
	(Opr. UF6FFF)			
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	CQ4A('90).....1,757,780	3,912	38	141
	(Opr. CT1BOP)			
28	YU3ZV('88).....1,541,603	3,219	39	134
	NORTH AMERICA			
1.8	VE3BMV('86).....52,240	662	14	26
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('94).....1,077,440	2,329	38	122
	(Opr.W7EJ)			
14	ZM1BIL('83).....1,334,232	2,635	38	136
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	YV2IF('92).....18,700	191	9	25
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	ZW5B('93).....2,834,228	4,524	39	173
	(Opr. N5FA)			
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.	TJ1GG('92).....5,925,760	5,052	96	298
	(Opr. I2VXJ			
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	YM5KA('90).....15,056,664	7,609	164	548
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	4X4NJ('94)	184,896	698	19	77
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	C41A('93) (Opr. T93A)	1,307,944	2,972	34	133
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZPØY('93) (Opr. K4UEE)	1,869,978	3,627	35	139
28	CXØCW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

AFRICA

1.8	EA8AK('82)	75,768	385	15	51
3.5	EA8XS('88) (Opr. OH5XT)	516,390	1,649	24	81
7.0	EA9EO('94) (Opr. EA7TL)	1,122,506	2,503	34	120
14	ED9ED('90)	1,444,436	3,063	37	121
21	CR3W('92) (Opr. DF5UL)	1,652,170	3,092	38	141
28	ZS6BCR('91)	1,397,658	3,209	34	112

ASIA

1.8	4X4NJ('94)	184,896	698	19	77
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	7L1GVE('92)	1,181,937	2,255	40	139
21	4Z4T('91) (Opr. 4Z4UT)	939,900	2,240	36	120
28	4Z5DX('90)	826,759	2,003	39	120

EUROPE

1.8	GW3YDX('93)	154,376	1,030	19	73
3.5	ON4UN('93)	630,568	2,119	35	114
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	VO1NA('93)	148,050	661	20	70
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('93)	68,250	547	18	24
3.5	VR3AH('76)	178,560	956	24	40
7.0	ZL3GQ('94)	672,612	1,732	36	102
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	P4ØR('86) (Opr. K4UEE)	576,725	1,682	25	90
7.0	PJ9U('92)	1,171,864	2,655	30	118
14	P4ØV('91) (Opr. N7NG)	1,883,700	3,521	38	142
21	ZPØY('93) (Opr. K4UEE)	1,869,978	3,627	35	139
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	P4ØF('94) (Opr. KRØY)	12,393,150	6,557	150	488
QRP	HI8A('91) (Opr. JA5DQH)	3,316,768	3,320	117	325
Low Pwr. Asst.	9X5EE('94) (Opr. PA3DZN)	4,014,270	3,201	110	315
	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	J6DX('93)	11,691,029	7,180	159	532
O	KH2S('92)	7,249,952	4,306	169	399
SA	4M5I('93)	11,222,746	6,051	147	475

WORLD RECORD

Station	Band	QSOs	Zones	Countries
TA5KA (1990) 13,915,044	1.8	181	10	49
	3.5	962	23	69
	7.0	2,037	31	84
	14.0	1,231	38	96
	21.0	1,518	36	112
	28.0	1,272	37	112
	Total	7,201	175	527

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

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	WB9HAD('87)	27,181	157	23	54
3.5	K1ZM('92)	223,971	742	28	93
7.0	W7XR('92) (Opr. W7WA)	363,900	834	34	116
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	W1BYH('93)	48,552	279	15	53
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
N4RJ (Opr. KM9P) (1992) 5,851,152	1.8	34	13	27
	3.5	170	21	65
	7.0	687	34	104
	14.0	696	37	114
	21.0	709	35	107
	28.0	670	32	92
	Total	2,966	172	509

QRP

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

Low Power

N8II('92)	2,008,982	1,419	135	368

Assisted

K3WW('93)	5,056,464	2,499	160	547

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—Southern California Contest Club #1 ('92) 53,779,847

CW—Southern California Contest Club #1 ('93) 45,194,836

(2)

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

A "Rocky Mountain High" Balloon Launch

VHF PLUS CALENDAR

Oct. 1	Very Poor EME conditions.
Oct. 7–8	ARRL EME Contest. *(See text for details.)*
Oct. 8	Full moon. Moderate EME conditions.
Oct. 14	Moon Apogee and highest declination.
Oct. 15	Poor EME conditions.
Oct. 18	*Orionids* meteor shower predicted peak, 1650 UTC. *(See text for details.)*
Oct. 22	Moderate EME conditions.
Oct. 24	New moon.
Oct. 26	Moon perigee.
Oct. 26–29	Microwave Update Conference, Arlington, Texas. *(See text for details.)*
Oct. 27	Lowest moon declination.
Oct. 29	Poor EME conditions.

EME conditions courtesy W5LUU.

As part of the 29th annual Central States VHF Society Conference, the Edge of Space Sciences, Inc. organization planned to launch its 24th balloon, EOSS 24, at 9:00 AM on the Sunday morning of the conference.

Founded in 1990, EOSS, the Colorado-based organization, now has around 75 members who have enthusiastically launched and chased balloons across parts of Colorado, Wyoming, Nebraska, Kansas, and Oklahoma. Most of the launches are designed to get people interested in amateur radio. Often the launches take place on public-school grounds and involve the faculty and students in on-board experiments. However, a few of the launches were made with the cooperation of the Air Force Academy.

Because of funding cuts, the academy has had to restrict some of the cadet-based experiments that would have been flown on board aircraft. Having the training from EOSS and the balloons as an alternative has enabled the cadets to continue to fly their experiments.

It was about 8 AM local time in Monument, Colorado on that Sunday, when your editor arrived at the launch site. The sky was partly cloudy and a very slight breeze was blowing—conditions just right for a balloon launch. Members of the launch team had been at the site since before dawn. Now, less than an hour before launch, these team members were busy scurrying around making last-minute preparations for the launch.

Launch Director Nathan Roskop, NØWPG, was busily checking every aspect of the launch, making sure everything was ready for it. Barely 20 years old, Nathan has been licensed as an amateur for just over two years. He has been a part of five other balloon missions. Having volunteered to be launch director (the prime consideration) and having been determined by his peers as qualified for the responsibilities of the position, Nathan was appointed to direct this, his first launch.

On board, or rather attached to, EOSS 24 would be a 70 cm in, 2 meter out 300 mw repeater, an ATV (amateur television) transmitter (operating on 426.25 MHz), and a 1 watt packet station to retransmit GPS (global positioning system) coordinates received by the on-board GPS receiver and other telemetry. Additional equipment on board would be a 35 mm still camera set to shoot a picture every five minutes, and an experiment. The experiment was designed to see if a quick cut-down of the payload from the balloon could be achieved by sending a signal to an on-board receiver. All of this equipment would weigh in at just less than 6 pounds in order to qualify for the FAA (Federal Aviation Administration) exemption from regulatory control.

The balloon would travel to a maximum altitude of approximately 100,000 feet, where its expansion would cause it to burst, thereby causing its descent. The descent would be slowed by the parachute attached just below the balloon and above the payload.

With excellent weather conditions, and the FAA and the control towers at Colorado Springs, Denver International, and the Air Force Academy airports notified of the balloon launch, everything was set for its takeoff.

The balloon was slowly inflated with helium to its proper lift weight. Again Nathan checked every aspect to make sure that the balloon was ready. The last items checked were the on-board transmitters and repeater, and that was done by on-air confirmation that the equipment was indeed working.

Finally, at 08:58:16 Nathan gave the word to release the balloon. As the balloon went soaring into the sky, the transmitters on board continued their missions of repeating signals, and providing telemetry and visual indications. A net control was set up to operate through the on-board repeater. As stations started checking in, the net control station operator started coordinating these check-ins, giving priority to stations that were at some distance from the balloon. In addition to the balloon repeater, a 2 meter 70 cm repeater was linked to the balloon repeater input frequency so those who did not have access to 70 cm would still be able to work through the balloon repeater.

About 15 minutes into the launch the ATV signal was lost. It would remain to the recovery of the payload to solve the mystery of why it was lost.

At the same time operators who were tracking the balloon began chasing it northward on a crisscross pattern that generally stayed close to Interstate 25. Your editor was with Jerome and Bobette Doerrie (K5IS and N5UDJ, respectively) and their two daughters, Jennifer, KA5WMJ, and Elena, KB5DAK. We decided to follow Jack Crabtree, AAØP, who was tracking the balloon's progress by using its GPS data along with data from a GPS receiver in the car and his laptop computer. Also with

At the control center several stations are set up to monitor the balloon's progress.

P.O. Box 73, Oklahoma City, OK 73101

Just before launch several people are needed to make the airborne transition smooth.

us in their own car were Charlie and Wanda Chennault (WA5YOU and WB5NIF) and their son and daughter, Nathan and Jamie.

As one of the founders (along with Dave Clingerman, W6OAL) of the EOSS organization, Jack had been on most of the 23 other balloon launches. Before we started, he pointed out to us that to this point they had a 100 percent payload recovery after each launch. He wasn't about to let this one get away and spoil the record. So off we went to help Jack and EOSS preserve it!

Beginning our trek up I-25, we followed the zig-zagged route of the balloon. Along the way we each made contacts through its repeater, I with fellow section manager, Joe Knight, W5PDY, who was in Albuquerque, New Mexico. Because of the extended altitude, so extensive was the range of the repeater that stations from New Mexico to Wyoming were now checking in and making contact with each other.

At one point we stopped to see if we had a visual contact with the balloon as it reached its maximum altitude. Now nearly 40 feet in diameter, it was barely visible to the naked eye at its height of over 97,000 feet. Shortly after this visual contact, the balloon burst and the payload began its descent.

Knowing that the descent would be much quicker than the ascent, our pace quickened. Stops became more frequent as we determined our location in reference to the rapidly falling payload. From burst to landing, we had about 15 minutes to predict its touchdown point and to get to it.

Arriving southeast of Castlerock, we spotted the bright-red parachute against the clouds in the sky. After we moved closer to where Jack had predicted touchdown, we stopped the cars, jumped out, and ran in the direction of where we spotted the parachute. Wanda set up her tripod with her very powerful long-range lens in order to take pictures of the parachute's descent, and I ran up a road to watch the descent. Spotting a grove of trees about two miles in front of me, I watched as the parachute finally disappeared behind the grove. I made a mental note of approximately where in the grove I had last seen the parachute.

Nearly four hours later, at approximately 11:55 AM, the payload was on the ground. After following a crisscrossed path northward, it landed approximately 23 miles from its launch site. Because the packet transmitter was still functioning, we could still get a fix on the position of the payload based on the GPS coordinates the packet station was retransmitting.

Back in the cars we drove south along a small hill range. Finally getting in close proximity to the balloon's position, we found that we

Moments after launch the entire length of the balloon and payload can be seen floating upward.

Jack Crabtree, AAØP (left), and Mike Musick, NØQBF, examine the repeater payload at the landing site.

would have to hike in to the landing location. And, hike we did, over two hills!

About the time we arrived at our location Mike Musick, NØQBF, from Missouri, also arrived. Parking a bit farther south from us, Mike began his hike. Using his handheld receiver, he began to use direction-finding techniques to locate the signal still coming from the repeater. While I took off for my grove of trees, Jack spotted Mike and joined up with him.

After going over the two hills, I spied the trees. Using Boy Scout survival techniques I learned 35 years before ("Where am I and how do I get out of here?"), I positioned myself south and to the west of the trees as I had seen them before on their north side. I began walking away from the grove all the while keeping my position relative to the grove.

I found myself walking up a valley toward a "V" in the terrain with the last hill that I had traversed continuing to be on my right (west) and another hill beginning on my left (east). About three-quarters of a mile in from the grove I spotted Mike and Jack on top of the west hill. They pointed down the hill toward a smaller grove of trees, indicating to me that they had spotted the parachute.

Trees in front of me obscured my view, but taking their cue, I continued to walk south, in the same direction that I had been going. Coming across a dirt road, I followed it right to the rope connecting the parachute to the payload at about the same time that Mike and Jack arrived from the west side.

Mike won the prize for having first spotted the downed payload. However, I was a bit pleased with myself for having used only dead reckoning to walk in on its location, thereby proving at least to myself, that, with a little luck, it is possible to recover the payload without a radio signal, if it's necessary.

Knowing that a film crew from the Grove, Oklahoma Channel 43, UHF TV station was behind us, we left everything intact. Finally, Tony Bickel, K5PJR, and his cameraman, Jean Bohannan, arrived and shot their footage, which they had planned to make available for public televisions across the country.

Upon inspection of the ATV payload, we discovered why we had lost the ATV signal. The antenna was gone! Also gone was the coax connecting it to the ATV transmitter. Jack sur-

Your editor got the job of carrying out the parachute from the landing site.

mised that the extreme cold of the altitude (–50° C) destroyed the connector or the antenna mounts, causing the antenna to fall off.

We also discovered that the cut-down experiment failed to work properly. When the signal was received, it would cause a circuit to be complete causing a voltage to be placed across a wire coiled around the rope connecting the balloon to the parachute. When the wire heated, it would burn the rope, thereby cutting it and releasing the parachute and the payload from the balloon.

While there was some burn discoloration of the rope where the wire was coiled around it, the rope was still intact. Initial conclusion of the probable cause of the failure was low battery voltage. Battery voltage in most batteries can drop to zero if exposed to the extreme cold of the altitude. It would remain until the payload was examined by the team several days after the launch to determine the exact cause of the failure of the experiment.

Finally, after everyone had taken all the required pictures, we disconnected the payload from the parachute, secured everything, and began our trek back to our cars. Arriving to what had now become a mini hamfest, we determined that we would have a postmortem lunch at a nearby restaurant, amateurs' usual perfect end to a fun outing.

What does it take to launch a balloon? Upwards of 10 to 15 people are necessary at the launch site. It takes four to six people to get the balloon inflated. Additionally, it takes a couple of others to keep the payload in line as the balloon is alighting. Depending on how many radios are on board, it takes an operator to man each of the ground-based receivers.

Chase teams can be as many as are practical to follow this airborne fox hunt. For this EOSS launch approximately ten chase teams took off looking for the balloon. Accompanying several of the teams were spectators who were from the conference and wanted to see results of the launch.

If your organization is interested in ballooning, how would you go about putting together the necessary information to find the resources? Jerome and Bobette Doerrie have written an excellent introductory article, "Ballooning 101," which was published in the *Proceedings of the ARRL 1995 National Educational Workshop*, which was held July 28, 1995 at the Manchester, New Hampshire hamfest. Copies of the *Proceedings* may be purchased from the League for $12 plus shipping (to 225 Main Street, Newington, CT 06111).

My thanks go to the Jack Crabtree and Jerome and Bobette Doerrie for their assistance in preparing this topic in this month's column. For more information on Jerome and Bobette's article, contact them at Rt. 2 Box 72, Booker, TX 79005, or call them at 806-659-2264. For more info on EOSS, contact Jack Crabtree at 4327 W. Bellewood Dr., Littleton, CO 80123, or call him at 303-795-7736.

Central States VHF Society Conference

As mentioned above, the 29th annual Central States VHF Society Conference was held the last weekend in July in Colorado Springs, Colorado. Hosted by President Lauren Libby, KXØO, it featured two special guests from Cuba—Oscar Morales, CO2OJ, and Arnie Coro, CO2KK. Oscar presented a report on the new Cuban VHF beacon station and Arnie was the banquet speaker.

Boasting the third largest attendance, the conference featured the usually great speakers and the usual antenna range and pre-amp competitions. Among the speakers and topics were: Paul Shuch, N6TX, who spoke on the search for extra terrestrial intelligence; Bill Wageman, K5MAT, transverter design; Chuck MacCluer, W8MQW, filters for EME work; Doug Allen, W2CRS, predicting VHF and UHF openings; Randy Simons, NØLRJ, portable antennas and masts; and your editor and Charlie Calhoun, KB5ZUD, amateur radio involvement in the Oklahoma City bombing disaster.

Additional speakers and their topics were: Pat Rose, W5OZI, the future of SMIRK; Kent Britain, WA5VJB, the future VHF operator; Russ Miller, N7ART, amplifiers and tubes; Chuck Clark, AF8Z, easily constructed local oscillators; Emil Pocock, W3EP, field aligned irregularities; Dave Clingerman, W6OAL, the "little wheel" antenna; Tom Clark, W3IWI, signal processing for weak-signal operations; Ray Rector, WA4NJP, large dish antenna mounts; and Bob Carpenter, W3OTC, software pertaining to weak-signal VHF work.

A new feature this year was a young people's program that attempted to demonstrate live contacts using exotic modes familiar to the weak signal VHFer. Jimmy Treybig, W6JKV, with assistance from Mike Staal, K6MYC, and Dave Blaschke, W5UN, attempted to demonstrate EME and meteor scatter contacts. Randy Simons, NØLRJ, demonstrated portable antennas and rover operations. Luca Martini, VE2WKR, demonstrated mobile satellite operations. Additional youth forums were held at the hotel. These included a contest forum conducted by W$ETT, WØKEA, N5JHV, NØLL, W2CRS, and NØLRJ. Dave, N5JHV, conducted a forum on 6 meter European openings he had experienced. Finally, Jack Crabtree, AAØP, conducted a forum on previous Edge of Space Sciences balloon launches and how they featured amateur radio payloads.

Another first for the society was a talk-in station. Coordinated by Ken, NØYGM, the station was set up with an IC-736 and an IC-820, equipment loaned by ICOM specifically for the society's conference station.

The winner of the John T. Chambers Award for Technical excellence went to Zack Lau, KH6CP/1, for his many years of technical contributions. According to an ARRL special bulletin, "he [Zack] was cited not only for his investigative work on the VHF and UHF bands, but also for his help, as an ARRL staff member, in fielding questions from other amateurs. KH6CP/1 is a mainstay in VHF and UHF contests as well, often appearing from New England hilltops. Zack Lau also is widely known for his low-power HF accomplishments, including a number of ARRL Sweepstakes awards in the under-5-watt category."

The recipient of the Melvin S. Wilson Award for service to the society or VHF/UHF in general was Charles Chennault, WA5YOU. Charlie has served for the past several years as treasurer of the society. Additionally, he has served many more years on the board and has performed many hours of behind-the-scenes work for the society.

A big bouquet goes to Lauren and June for hosting an excellent conference this year. Next year society members are looking forward to going to the Twin Cities of Minnesota, where they will be hosted by Paul Husby, WØUC. The conference is set for the last weekend in July.

Current Conferences

The following was furnished by Al Ward, WB5LUA. **Microwave Update '95 Conference:** The conference will be held at the LaQuinta in Arlington, Texas on October 26–29. For hotel registration call the hotel directly at 817-640-4142, request the reservations department, and mention the Microwave Update. A toll-free reservations number is 1-800-453-7909 (9-5 Dallas time). You may also fax your reservation information to 817-649-7864. The hotel rate is $60.00 per night plus tax and the cut-off date for room registration is October 12. The address for the hotel is: The LaQuinta Inn, 825 N. Watson Rd., Arlington, TX 76011.

The technical program for Microwave Update '95 consists of many well known technical microwave enthusiasts from across the nation and even Japan and England. There will be a wide range of topics that cover from 902 MHz to 24 GHz. The customary noise-figure measuring workshop will be held Friday evening along with the flea market. Test-equipment demonstrations are planned by Hewlett Packard and Tektronix. There are plans to have a network analyzer available for tuning filters, etc., so you can bring your LOs.

Kent Britain, WA5VJB, will help out again with the customary equipment auction, which helps offset conference expenses. All donations are always welcomed!

Prize drawings will be held in between the technical papers and again all donations are very much appreciated. Contact Al Ward, WB5LUA, if you have anything to offer.

There will be a poster board session and slide show session Friday evening, so if atten-

dees wish to take a few snapshots or slides of their station and/or equipment, do so. In order to best plan time, Al Ward would appreciate hearing from you if you plan to do either.

On Saturday evening, there will be a trip to WB5LUA's shack for a barbeque dinner catered by Texas famous Dickey's barbecue, and there will also be an exhibition of microwave EME.

There is no formal planned spouse program for the conference but information on local attractions will be available at the conference. (Indicate if your spouse will be attending so that they can compile a list for all those to see at the conference.) Register for the conference as soon as possible. Conference preregistration costs $40 and is due by October 2. Preregistration also entitles you to be eligible for special preregistration prize drawings. Regular registration fee at the door and after October 2 is $45. Make out checks to the North Texas Microwave Society. The following is the schedule of events:

Thursday, Oct. 26: 8 AM, Dallas Surplus Tour #1 begins at hotel. Two PM Ft. Worth Surplus Tour #2 begins at hotel. Seven-nine PM registration and informal bull/swap session in meeting room.

Friday, Oct. 27: 7:30–9 AM, registration; 8 AM, welcome; 8:00–8:45, KK7B, The Next Generation of No-Tune Transverters; 8:45–9:30, N1BWT, More Dish Antennas for 5.7 and 10.3 GHz; 9:30–9:45, break; 9:45–10:30, N6CA, Local Oscillator and Filter Design for the Microwave Bands; 10:30–11:00, WB5LUA, New LNAs for the Microwave Bands; 11:00–11:30, WD5AGO, The Art of Stable LNA Design; 11:30–1:00 PM, lunch (on your own); 1:00–4:00, Test Equipment demonstration/workshop, John Duffield, W5VYE, of Hewlett-Packard and Kent Britain, WA5VJB, of Tektronix; 1:00–1:45, N6TX, SETI, Searching for Life Among the Stars; 1:45–2:30, W51U, Operating the new Phase III D Satellite; 2:30–3:00, prize drawing/break N5OSG; 3:00–3:45, WG31, 24 GHz SSB, European Style; 3:45–4:30, JE1AAH, the art of building 24 GHz equipment that works; 4:30–5:15 EME forum, WA5VJB, WB5LUA, VE4MA, WA7CJO, G3WDG, and others; 5:15–7:00, dinner (on your own); 7–8:30, poster board and slide

In one of the few relaxing moments for them, June and Lauren, KXØO, Libby, Chairman of the Woman's and Kids Programs and CSVHF President, take in the western band and barbecue show at the Flying W Ranch the night before the conference. Behind them are Oscar Morales, CO2OJ, and Arnie Coro, CO2KK.

Oscar Morales, CO2OJ, and Arnie Coro, CO2KK, were guests of honor at the 29th annual Central States VHF Conference held in Colorado Springs the last weekend of July.

show session; 8:30–midnight, Noise Figure test/workshop, WB5LUA, WA8WZG, WA5VJB; and flea market and informal bull session.

Saturday, Oct. 28: 7:45–9 AM, registration; 8:00–8:45, WA8WZG, Microwave Operation—Midwest Style; 8:45–9:30, G4DDK, Local Oscillators—European Style; 9:30–10:30, break/prizes/auction; 10:30-12 noon, N6TX, Smith Chart Workshop—Amplifier Design using Public Domain Software; 12–1:30 PM, lunch; 1:30-2.15, G3WDG, Successful equipment design for 10 and 24 GHz; 2:15–3:00, N2CEI, Neatness Counts: techniques and construction tips for homebrew microwave enthusiasts; 3:00-3:15, prize drawing/break; 3:15–4:00, AA5C, +28 dBm Power Amplifier for 1296 MHz No-Tune Transverters; 4:00–4:45, K5SXK, Waveguide Tutorial, The How's and Why's; 5 PM, gather for journey to WB5LUA's QTH for a barbeque dinner. Moon is up and near Perigee. Plan a microwave EME demonstration on 3456, 5760, or 10368. Return to hotel around 10 PM for an informal bull session. Sunday, Oct. 29, 8–9 AM, next year's plans.

Current Contest

The first weekend of the ARRL annual EME contest is scheduled for 7–8 October. 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*.

VE3ONT is scheduled to be on the air on 2 meters on 7 October and on 6 meters and 23 cm simultaneously on 8 October.

Current Meteor Shower

According to the OH5IY meteor shower prediction software, the *Orionids* is predicted to peak around 18 October at approximately 1650 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.

Fred Fish, W5FF Works Them All

Fred Fish, W5FF, has worked all the grid locators in the continental U.S. on 6 meters. Lacking just three of the locators, Fred started his quest in earnest this past June. Completing a contact with Ted, WA4VCC, on 15 June, his total was reduced to two.

Having a QSO on 18 June with Kevin Higgins, K1GAO, Fred advised him of his goal. Kevin agreed to drive to FN67. In the 25 minutes it took for Kevin to make the drive the band all but died out. Fortunately, they were able to make the QSO; which left one locator to be worked.

The next day the band opened again to New England. Lee, K5FF, phoned Peter Stackpole, N1MLE, who fortunately was home. A short while later Peter was in their logs, thereby completing a personal goal of working every grid locator in the continental U.S.

Later this summer, thanks to John Walker, WZ8D, who was grid mobiling through Canada, Fred worked his 849th and 850th grid to complete that endorsement of the award.

Repeater Trustee, Two Other Amateurs Shot to Death

Anthony Gain, W6KFN, the trustee for the Los Angeles City Amateur Radio Volunteers ARC repeater, was one of three hams shot to death

on 19 July allegedly by a disgruntled City of Los Angeles radio repairman. Also killed were Marty Wakefield, N6BZ, Neil Carpenter, KA6QIB, and a non-ham, James Walson. All four men were supervisors at the city's Piper Tech Center.

Phase 3-D Launch Schedule Changed

Owing to slippage of launch dates of other Ariane series rockets, the launch of the Ariane 502 mission, the one which Phase 3-D is manifested, is now set for 29 May 1996. A future column will devote extensive coverage to the satellite that has been dubbed the one for all amateurs.

New 3456 Tropo Land Record Set

As announced in a sidebar last month, Al Ward, WB5LUA (EM13qc), and Gary Mohrlant, WAØBWE (EN34lx), have set a new 3456 MHz land tropo record of 841 miles (1386 km). Al noticed a tropo opening taking place between Oklahoma and Arkansas in the south and Minnesota in the north on the evening of 11 July. Staying alert to the condition, he noticed that the path spread to his location the next morning. After working a few stations on 432 MHz, Al attempted a contact with Rich Westerberg, NØHJZ, on 2304 MHz, but with no success. Rich then advised Al that because of a thunderstorm in the area he had to QRT. However, before leaving the shack he placed a call to Gary.

Gary got on the air and quickly worked Al on 432 MHz at 1206 UTC on 12 July. They then moved to 2304 MHz and completed six minutes later, thereby making the first MN to TX QSO on that band. Moving on to 3456 MHz, they completed fairly quickly with decent signals both ways. An attempt was made on 902 MHz, but Al discovered that his equipment was not working, thus no completion.

And Finally . . .

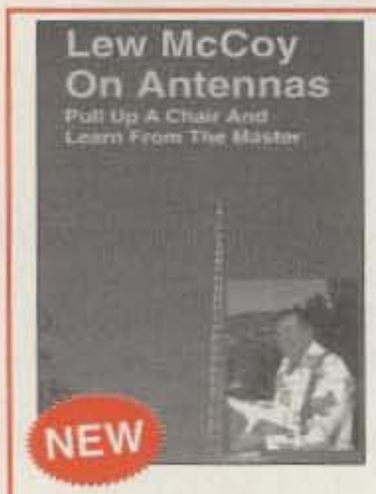
I want to thank all of you who sent me e-mail, cards, and letters of condolences over the loss of my brother. I have received correspondence from as far away as New Zealand (Father Phil Keane, ZL2ANQ). Moving to me were the special notes you sent. One said that upon reading my column, he called his brother just to be in touch with him.

I also appreciate your kind words concerning my writing about my involvement with the Salvation Army following the Oklahoma City bombing. You readers truly are family to me and I really appreciate and feel your support.

If you have something special to share with the rest of this wonderful family of the VHF+ world, please let me hear from you. You can e-mail me at 72124.2734@compuserve.com or JoeN6CL@AOL.COM. You can fax me at 405-529-0746. You can also call me at 405-528-6625. I'm looking forward to hearing from you in the near future. Until next month . . .

73, Joe, N6CL

CQ BOOK &



McCoy on Antennas

CQ magazine author and acclaimed authority on antenna theory and design, Lew McCoy, W1ICP, has written a truly unique antenna book that's a must for every amateur. Unlike many technical publications, Lew presents his invaluable information in a casual, non-intimidating way. **Lew McCoy on Antennas**—It's not just an antenna handbook, but a wealth of practical antenna advice for the ham!

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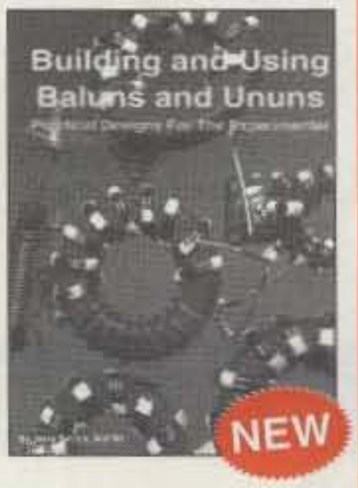
Building and Using Baluns and Ununs



Written by world-renowned expert Jerry Sevick, W2FMI, this volume is the definitive source for his latest practical information and designs on transmission line transformer theory. W2FMI has unraveled the technological mysteries with designs that are simple and work. Discover new applications for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples. **Order No. BALUN.....$19.95**

1995 Amateur Radio Almanac, 2nd Edition

If you're looking for information about ham radio, it's in the **1995 Amateur Radio Almanac**! Compiled by Doug Grant, K1DG, this volume is filled with over 500 pages of facts, figures and information. CQ's almanac is a resource you'll refer to over and over again. If it's ham radio, it's in The Source!

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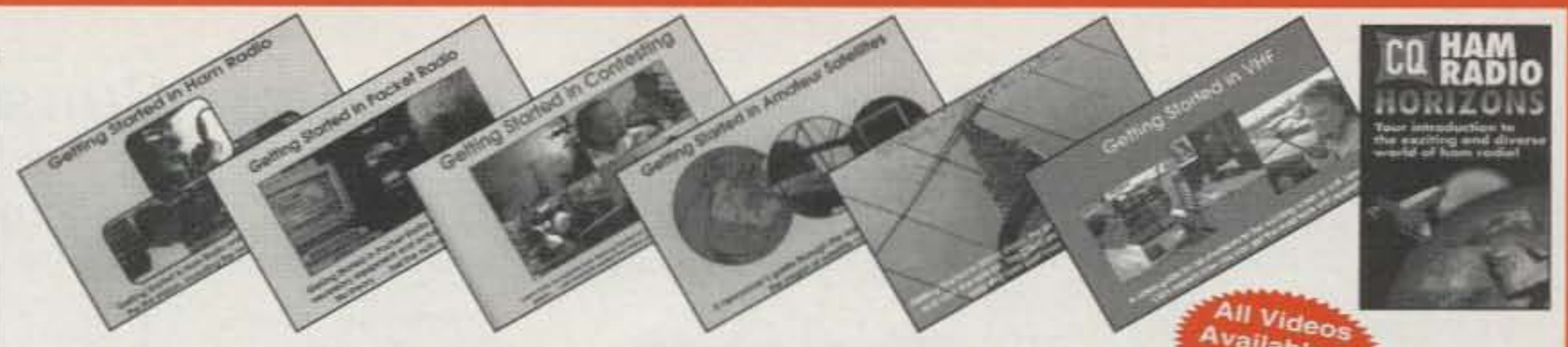

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PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

1995 Contest During Period of Low-Sunspot Activity

Sunspot activity has now declined to a point where Cycle 22 is well into its low phase. A smoothed sunspot count of approximately 20 is expected during the 1995 contest period. This would be seven points lower than the count during last year's contest, and it would be the lowest count during any CQ World-Wide DX Contest held since 1986.

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 of at least Low Normal propagation conditions on October 28, the first day of the SSB contest weekend. There is an increased possibility that a radio storm might occur on October 29th, with generally Low Normal conditions to many areas of the world, but Below Normal conditions to some areas. 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.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for October 1995

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 5, 16, 19, 24-25	**A**	**A**	**B**	**C**
High Normal: 7-8, 13, 20-21, 23, 26-27	**A**	**B**	**C**	**C-D**
Low Normal: 1, 4, 6, 9, 14-15, 17-18, 22, 28, 31	**B**	**C**	**D**	**D-E**
Below Normal: 2-3, 10, 12, 29-30	**C**	**C-D**	**D-E**	**E**
Disturbed: 11	**C**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from 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 band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair (C) on October 1, fair-to-poor (C-D) on the 2nd and 3rd, fair (C) on the 4th, excellent (A) on the 5th, etc. Fair (C) is forecast for October 28 during the 1995 World-Wide DX SSB Contest, and fair-to-poor (C-D) on the 29th.

DX CONTEST SPECIAL

The 1995 CQ World-Wide DX Contest will be held on the following dates:

SSB: 0000 UTC Saturday, Oct. 28 to 2400 UTC Sunday, Oct. 29

CW: 0000 UTC Saturday, Nov. 25 to 2400 UTC Sunday, Nov. 26

For the 45th consecutive year this month's propagation column is devoted to special forecasts and information applicable to both the SSB and CW contest weekends. The accuracy of the forecasts for the previous 44 contests is greater than 90%!

Sunspot Cycle Activity

The Royal Observatory of Belgium reports a monthly mean count of 16 for June 1995. This results in a smoothed sunspot number of 26 centered on December 1994. The cycle has remained relatively constant between a count of 26 and 27 for five consecutive months.

Corresponding values of 10.7 cm solar flux were 76 for June 1995 and a smoothed level of 81 for December 1994. The solar flux levels are those reported by the Dominion Radio Astrophysical Observatory at Penticton, B.C.

Solar Count for 1995 CQ WW DX Contest

The present plateau that Cycle 22 has reached has slowed down its decline. As mentioned previously, a smoothed sunspot number on the order of 20 is now expected during the 1995 World-Wide Contest weekends. A corresponding smoothed 10.7 cm solar flux level of approximately 75 is forecast. By comparison, in 1989, when the present cycle was enjoying peak activity, the level during the Contest period approached 159! Table I shows the level of solar activity recorded during past *CQ* World-Wide DX Contest periods since 1983, as well as predicted solar activity through 1996.

Table II demonstrates how solar activity can influence scores during the World-Wide DX Contest. A comparison is made for the average of the top three scores in the US single operator category, for all bands, and for each individual band, for the 1989 SSB Contest when the sunspot count was near a peak of 157 and for the 1994 SSB Contest when a smoothed sunspot number of 27 was recorded. Note the considerable reduction in All Band scores, and the drastic reduction in 28 and 21 MHz scores with low sunspot activity. On the other hand, the reduction in scores for 14 MHz is relatively small, and there is a drastic *increase* in scores for 7, 3.8, and 1.8 MHz.

Mother Nature did not cooperate during the 1994 contest weekends. Radio storms of up to moderate intensity took place during both the SSB and CW weekends, dropping propagation conditions to Low and Below Normal to most areas of the world, and at times conditions were Disturbed for paths crossing the auroral zones.

While a sunspot count of approximately seven points less is expected for the 1995 contest, the difference between the 27 recorded for last year's SSB weekend and the 20 expected this year is not great enough to significantly change overall propagation conditions. In fact, if Mother Nature cooperates this year and there are no radio storms during the 1995 contest periods, conditions this year can even be somewhat better than last year. If such will be the case, expect contest scores to be quite similar to last year's scores; 14 MHz should continue to be the band in which the highest scores should be possible, and there is a good possibility that higher than last year's scores will be possible on all bands this year, particularly for the 7, 3.8, and 1.8 MHz bands.

If you plan to participate in the 1995 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, despite the present period of low sunspot activity.

General Conditions, Band By Band

The following is a band-by-band summary of DX propagation conditions normally expected from mid-October through mid-December, and centered on the contest periods.

10 Meters: With the bottom of the present sunspot cycle slowly approaching, very few DX openings are expected on this band. During High or Above Normal conditions look for

Year	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96
Oct.	68	29	17	13	44	125	158	142	138	74	41	27	20*	9*
Nov.	67	24	17	15	47	130	157	142	142	76	45	26	20*	9*

*Table I– Smoothed sunspot levels recorded during CQ World-Wide DX Contest periods since 1983. An * indicates predicted values.*

11307 Clara Street, Silver Spring, MD 20902

Year (SSB)	1989	1994	Change
Smoothed Sunspot #	157	27	(%)
	Single US Operator Scores*		
All Bands	4,702,960	3,187,480	–32
28 MHz	892,861	83,569	–91
21 MHz	682,630	260,285	–62
14 MHz	615,666	526,420	–14
7 MHz	74,978	194,208	+260
3.8 MHz	26,796	143,475	+536
1.8 MHz	3,365	9,850	+29

**Average of top three claimed scores.*

Table II– Comparison of single US operator scores for CQ World-Wide DX SSB Contest weekends during high sunspot activity (1989) and low solar activity (1994).

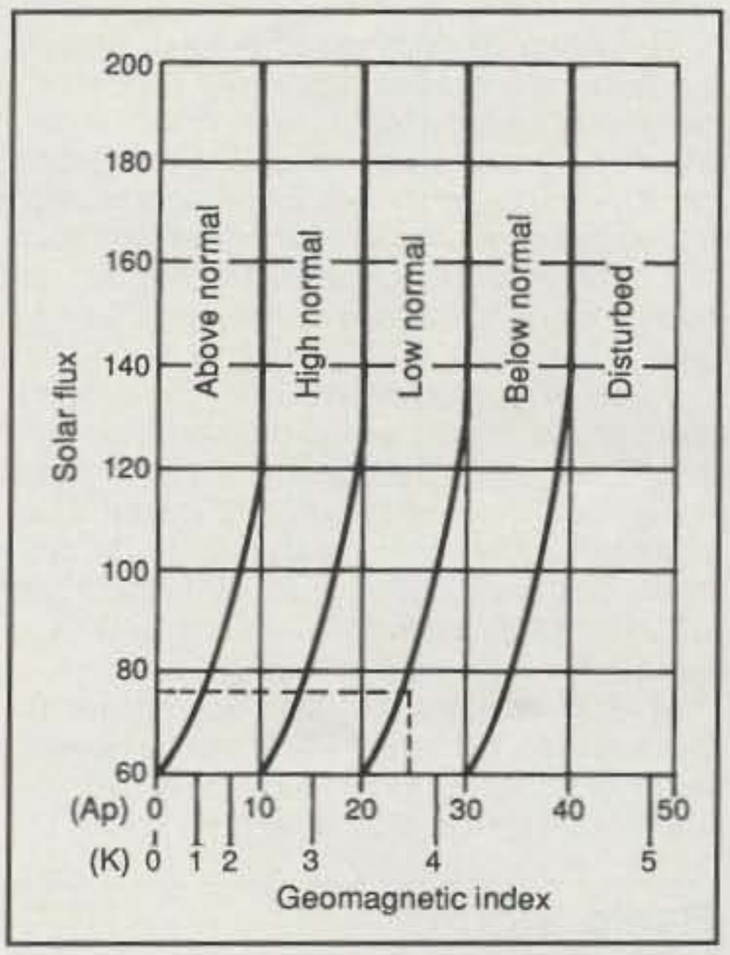

Fig. 1- Intersection of given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: Solar flux is 75 and Ap is 25: therefore, expect Below Normal conditions.)

some openings towards Africa and Europe before noon, towards Central and South America from a few hours before until a few hours afternoon, and towards the South Pacific during the afternoon.

15 Meters: Fifteen meters should be a fairly good band during most of daylight hours. When conditions are Normal, the band should open to many areas of the world from shortly after sunrise through the late afternoon. Signals from Europe and Africa should peak an hour or two before noon, while signals from Central and South America, the Far East, and the South Pacific should peak during the late afternoon. During Below Normal or Disturbed conditions, 15 meter openings will be spotty and of very short duration, if possible at all.

20 Meters: This is again expected to be the "backbone" band during the contest. During Normal conditions good DX openings are expected to almost every corner of the world sometime between sunrise and the early evening hours. Conditions should peak for a few hours after sunrise and again during the late afternoon and early evening. During these peak periods, 20 meters should be the optimum band for DX, with openings usually characterized by strong signal levels. When conditions are Below Normal, 20 meter openings should be fewer in number, of shorter duration, and with weaker signal levels. In general, however, the band should hold up for some DX openings during all but Disturbed conditions.

40 Meters: The band is expected to open during the late afternoon hours, and remain open for DX to one area of the world or another until shortly after sunrise. Look for openings to Europe and Africa from an hour or so before sundown to about midnight in the MST and PST time zones, and to at least 2 AM in the CST and EST zones. Good openings towards Central and South America should be possible throughout most of the hours of darkness. Openings towards the South Pacific and the Far East are expected to peak during a two-hour period before sunrise. During most of the hours of darkness, 40 meters should be the optimum band for DX propagation. When conditions are Below Normal or Disturbed, openings will be spotty and considerably fewer in number.

80 Meters: DX propagation conditions are generally at their best on this band during periods of low solar activity. Some fairly good 80 meter DX openings are expected to several areas of the world during the hours of darkness and the sunrise period. When propagation conditions are Normal, signal levels should be strong on many openings. Even during Below

Normal or Disturbed periods there is a fairly good chance that some DX openings may be possible during the hours of darkness. Expect conditions normally to peak around midnight for openings towards Europe and Africa, after midnight and before sunrise for openings towards Central and South America, and just before sunrise for openings towards the South Pacific and the Far East.

160 Meters: With longer hours of darkness, DX conditions on this band should improve. While DX conditions may not be as good on 40 and 80 meters, look for openings to many areas of the world during the hours of darkness and the sunrise period. Because of power limitations in force on this band in many areas of the world, signals are likely to be weak and noisy, especially on phone. The best time for 160 meter DX is when a path is in complete darkness. Within this period conditions often peak just as the sun begins to rise at the easterly point on the path. The best forecaster for 160 meter DX (and 40 and 80 meters, as well) is a set of sunrise and sunset tables. For example, if the sun is expected to rise at 0700 GMT in western Europe, then this would be the best time to look for 160 meter openings between western Europe and the USA, plus or minus a half hour. Conditions on 80 meters can often also serve as an indicator for 160 meter openings. The band will often open at the same time 80 meters seems to peak on a particular path. With these tips and some patience, it should be possible to work many DX areas of the world on 160 meters during the contest.

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 this 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.

Contest Work Plans

The DX Propagation Charts on the following pages show the times when each amateur band from 10 through 160 meters is expected to open for DX from the United States to the major areas of the world. Instructions for the proper use of these charts are given elsewhere in this column.

This information contained in the charts can easily be reorganized into more convenient types of operational work plans, or schedules, which can serve as valuable propagation guides during the contest. Experience gained during previous contests has shown that such plans can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table III is an example of one of several types of plans that can be devised. For each three-hour period throughout the day it shows the areas of the world to which 20 meter propagation conditions are expected to be optimum. Only those openings shown in the charts with a propagation index of (2) or higher were used in compiling this plan.

A western USA QTH has been chosen for this example, but similar plans can be devised for other locations, for other bands or for multiband operation, and for other time spans.

Radio Storms

The forecasts discussed in this column are based on *normal* propagation conditions expected with a sunspot level in the mid-20s. 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 open-

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Step-Start Inrush Protection™ stops damaging inrush current with a start up sequence that's *easy* on your tube and power supply components.

Multi-Voltage Power Transformer

Ameritron's exclusive *Multi-Voltage Power Transformer* lets you optimize for different line voltage. You can select from 14 different *primary* voltages from 90 to 140 VAC and 205 to 250 VAC.

Dual Illuminated Cross-Needle Meters

Ameritron's dual illuminated cross-needle meters give you *four separate meters* to monitor your operating conditions -- you can tell right away if something is wrong.

QSK Compatible

The fast *custom* T/R (transmit/receive) relay in the AL-80B switches nearly as fast as some vacuum relay QSK T/R switches.

For *lightning fast* QSK operation use the optional external Ameritron *electronic PIN diode* QSK-5 T/R switch or the internal QSK-5PC. Please contact Ameritron for details.

Plus more . . .

An *Standby* switch lets you run barefoot, but you can instantly switch to full power if you need it.

Has transmit LED; 12 VDC, 200 mA jack; 12 VDC keying relay for solid state and tube rigs; tough, nearly indestructible Lexan-over-aluminum front panel. Two year limited warranty.

AMERITRON offers the best selection of legal limit linears!

These 3 rugged linears all use a super heavy duty hypersil® power supply capable of 2500 watts!

Ameritron's most powerful amplifier

AL-1500
$2695.00
Suggested Retail

Ameritron super power amplifier uses the herculean Eimac® 8877 ceramic tube.

It's so powerful that 65 watts drive gives you full legal output—and it's just loafing because the power supply is capable of 2500 watts PEP.

Ameritron's Dual 3-500Z linear

AL-82
$2095.00
Suggested Retail

This linear gives you full legal output using a pair of Eimac® 3-500Zs. Some competing linears using dual 3-500Zs don't give you 1500 watts because their lightweight power supplies can't use the tubes to their full potential.

Ameritron's 3CX1200A7 linear

AL-1200
$2195.00
Suggested Retail

Get ham radio's toughest tube with the Ameritron AL-1200—the Eimac 3CX1200A7. It has a 50 watt control grid dissipation—12 times tougher than the 4 watt rating of the 3CX800A7—yet you get the same full legal output as you get from a *pair* of 3CX800A7s.

AMERITRON brings you the finest high power accessories!

Legal limit antenna tuner

ATR-15
$399
Suggested Retail

Ameritron — *the high power specialist* — brings you the ATR-15 antenna tuner that's designed for legal limit amplifiers. Heavy duty silver plated bandswitch virtually eliminates switch failure. High power transmitting capacitors. 1.8-30 MHz. Peak reading SWR/wattmeter. 6 position antenna switch. Selectable 1:1 or 4:1 balun. 5¼ x 13¼ x 13½ inches. Meter lamps uses 12 VDC.

Legal Limit Dummy Load

Oil cooled 50 ohm dummy load. Handle 1500 W for 5 min. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz. 7½" H x 6 5/8" D. **ADL-1500X** without oil, $39.95. **ADL-1500** with oil, $59.95

ADL-1500X
$39.50
Suggested Retail

Remote Coax Switches

RCS-8V
$149
Suggested Retail

RCS-8V, DC-UHF 5 KW Coax Switch. Replace 5 coax feedlines with one with this Remote Coax switch. Weatherproof box mounts outdoors on your tower or mast. Attractive control unit sits on your operating desk. Low SWR to 250 MHz. Usable to 450 MHz. Low loss. Rated at 5 KW to 30 MHz, 1 KW at 150 MHz. **RCS-8VN, $159.00** with "N" connectors.

RCS-4, $134.00, 4 position HF switch. Similar to RCS-8V. No control cable needed. Handles 1500 watts continuous.

RCS-4
$134.50
Suggested Retail

QSK-5 Pin Diode T/R Switch

$349 QSK-5 Suggested Retail

Self-contained, connects externally to most HF amplifiers. Handles 2.5 KW PEP, 2 KW CW. Six time faster then vacuum relay. 6x4x9½ inches.

Step-Start Inrush Current Protector

Stops power up inrush current and absorbs momentary high voltage spikes to your amplifier. ICP-120 for 110-120V or ICP-240 for 220-240 VAC.

ICP120/240
$79
Suggested Retail

AMERITRON

. . . the high power specialist

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CIRCLE 5 ON READER SERVICE CARD

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates best time to check for 10 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

October 15–December 15, 1995
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	09-11 (1)	08-09 (1) 09-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-09 (4) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-02 (2) 02-03 (3) 03-04 (2) 04-05 (1) 19-21 (1)* 21-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & CIS**	09-11 (1)	08-09 (1) 09-10 (2) 10-11 (1)	06-07 (1) 07-10 (3) 10-13 (2) 13-15 (1)	17-19 (1) 19-22 (2) 22-01 (1) 01-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*
Eastern Mediterranean & Middle East	08-10 (1)	08-09 (1) 09-11 (2) 11-12 (1)	06-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	18-20 (1) 20-00 (2) 00-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Western Africa	11-14 (1)	08-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	18-20 (1) 20-02 (2) 02-03 (1) 20-22 (1)* 22-01 (3)* 01-02 (1)*
Eastern & Central Africa	10-13 (1)	08-12 (1) 12-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-01 (1) 22-00 (1)*
Southern Africa	10-12 (1)	08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	*Nil*	09-11 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-21 (1)	05-07 (1) 18-21 (1) 05-07 (1)* 18-20 (1)*
Southeast Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	05-07 (1) 18-20 (1) 05-07 (1)*
Far East	*Nil*	16-17 (1) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 16-19 (1) 19-21 (2) 21-22 (1)	04-08 (1) 17-19 (1) 05-07 (1)* 17-18 (1)*
South Pacific & New Zealand	12-16 (1)	12-14 (1) 14-15 (2) 15-16 (3) 16-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-01 (1)	23-00 (1) 00-02 (2) 02-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	14-16 (1)	10-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-01 (1)	02-05 (1) 05-07 (2) 07-08 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 19-21 (1)* 21-01 (2)* 01-04 (3)* 04-05 (2)* 05-06 (1)*

Time PST	Areas to which openings should be optimum
00-03	No openings expected with a propagation index of (2) or higher. Some (1) openings should be possible to South America, South Pacific, New Zealand, and Australasia, but this means condtions should be High Normal or better. This is a good time to catch up on some sleep.
03-06	About the same as the previous block.
06-09	Should open in just about every direction: Europe, North Africa, Eastern Mediterranean and Middle East,most of Asia and the Far East, Pacific Islands, New Zealand, Australasia, the Caribbean, Central America, and most of South America. This is the period in which to rack up points.
09-12	About the same as previous period, but signals getting weaker and openings falling off.
12-15	Western and southern Europe, most of Africa, most of the Caribbean, Central America, and the northern countries of South America.
15-18	All of the Caribbean, Central America and South America, most of Africa, the Pacific Islands and New Zealand, the Far East.
18-21	Another peak period, and a good time in which to increase scores. Most of Asia including the Far East; the Pacific Islands, New Zealand, and Australasia; Caribbean,Central and South America, but falling off; Antarctica.
21-00	South Pacific, New Zealand and Australasia, much of South America, Antarctica. A propagation index (1) opening to Europe and Africa.

Table III– Sample 20 meter operating schedule for a western USA QTH.

ings to some areas of the world during the hours of darkness.

Do-It-Yourself Forecasting

If you have a modem-equipped personal computer, you can obtain a wealth of updated daily summaries of solar and geophysical activity and a daily HF propagation summary and forecast (updated every six hours) directly from the NOAA Space Environmental Services Center (SESC) bulletin board in Boulder, Colorado. Information about a variety of other useful SESC services and products is also posted on the board.

The SESC bulletin board has been upgraded and is in operation 24 hours a day. Modem-equipped PCs can access the system at 303-497-5042. 300 through 9600 baud can be used. Protocol is the standard 8-bit data word with one stop bit and no parity. There is no charge for the data that can be obtained from the SESC bulletin board, but the telephone call is not toll-free. The program is very user friendly and menu driven. A wealth of propagation data is available, including propagation and solar reports, solar and geomagnetic data, and MUF predictions.

Fig. 1 can be used with the updated values of geomagnetic activity (Ap or K figures) and the latest reading of solar flux available from SESC to determine real-time day-to-day conditions in terms of Disturbed, Below Normal, Low Normal, High Normal, or Above Normal. If you do not have a modem-equipped computer, the latest geomagnetic and solar flux levels can be obtained from National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts are transmitted simultaneously on 2.5, 5, 10, 15, and 20 MHz. They contain the latest available geomagnetic Ap and K figures, as well as the 10.7 cm solar flux level and short-term forecast of expected conditions. The same information can be obtained at any time by calling 303-497-3235 (collect calls will not be accepted).

WWVH, located on the island of Kauai, Hawaii, broadcasts geophysical alerts at 45 minutes past each hour on frequencies of 2.5, 5, 10, and 15 MHz, with its signal audible throughout the Pacific Oceania area and farther into other parts of the world, depending upon radio propagation conditions. These augment the same alert broadcasts from WWV, which can be heard throughout the Western Hemisphere and other parts of the world as well.

Both the WWV and WWVH solar alert broadcasts are updated every three hours beginning at 0000 UTC, and they contain the latest information concerning geomagnetic and solar conditions, as well as radio-storm warning data. Alert data is also available at any time by calling the "on-duty forecaster" at SESC at 303-497-3171.

A comprehensive world-wide propagation analysis and forecast is given every day on the INTERNET computer E-mail network. Information for accessing this can be obtained from the following E-mail address: oler@Rho.Uleth.CA, or coler@Solar.Stanford.Edu.

Updated solar, geomagnetic, and ionospheric data is also available on the INTER-

Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	10-15 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-02 (1)	20-22 (1) 22-04 (2) 04-06 (1) 21-23 (1)* 23-03 (2)* 03-04 (1)*
McMurdo Sound, Antarctica	*Nil*	08-10 (1) 13-15 (1) 15-16 (2) 16-17 (1)	16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 06-08 (1)	03-06 (1)

Time Zones: CST & MST (24-Hour Time) CENTRAL USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	08-09 (1) 09-12 (2) 12-13 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	17-18 (1) 18-20 (3) 20-22 (2) 22-00 (1) 00-02 (2) 02-03 (1) 18-20 (1)* 20-00 (2)* 00-02 (1)*
Northern Europe & CIS**	08-10 (1)	08-11 (1)	06-07 (1) 07-12 (2) 12-14 (1)	18-19 (1) 19-21 (2) 21-23 (1) 23-00 (2) 00-01 (1) 19-00 (1)*
Eastern Mediter-ranean & Middle East	08-10 (1)	09-11 (1)	06-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	18-20 (1) 20-23 (2) 23-00 (1) 20-23 (1)*
Western Africa	10-13 (1)	07-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-23 (2) 23-00 (1) 19-23 (1)*
Eastern & Central Africa	09-12 (1)	08-11 (1) 11-13 (2) 13-14 (1)	07-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	20-00 (1) 21-23 (1)*
Southern Africa	09-12 (1)	07-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	21-23 (1) 07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-22 (2) 22-23 (1) 19-22 (1)*
Central & South Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 18-20 (1) 05-07 (1)* 18-20 (1)*
Southeast Asia	*Nil*	14-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (2) 10-14 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-07 (1) 17-19 (1) 05-07 (1)*
Far East	16-18 (1)	15-16 (1) 16-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 16-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1) 02-03 (1)* 03-05 (2)* 05-07 (1)*
South Pacific & New Zealand	12-17 (1)	10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-00 (1)	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	14-17 (1)	10-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	05-07 (1) 07-08 (2) 08-10 (2) 10-11 (2) 11-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	02-04 (1) 04-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-14 (2) 14-16 (1)	07-08 (1) 08-09 (2) 09-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	00-06 (1) 06-07 (2) 07-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-21 (3) 21-03 (4) 03-05 (3) 05-07 (2) 07-08 (1) 19-21 (1)* 21-00 (2)* 00-03 (3)* 03-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-15 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (3) 15-16 (4) 16-17 (2) 17-18 (1)	00-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-05 (2) 05-06 (1) 21-23 (1)* 23-01 (2)* 01-03 (1)*
McMurdo Sound, Antarctica	*Nil*	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1)	06-08 (1) 15-17 (1) 17-19 (2) 19-22 (3) 22-00 (2) 00-01 (1)	03-06 (1)

Time Zone: PST (24-Hour Time) WESTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	08-10 (1)	07-08 (1) 08-10 (2) 10-12 (1)	06-07 (1) 07-09 (2) 09-10 (1) 10-14 (2) 14-16 (1) 23-01 (1)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Northern Europe & CIS**	*Nil*	07-10 (1)	06-07 (1) 07-11 (2) 11-13 (1) 23-01 (1)	21-00 (1) 21-23 (1)*
Eastern Mediter-ranean & Middle East	*Nil*	07-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-15 (1) 21-23 (1)	18-22 (1) 06-08 (1)
Western Africa	09-11 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-13 (2) 13-14 (1)	07-10 (1) 10-14 (2) 14-16 (3) 16-17 (2) 17-18 (1) 22-00 (1)	18-23 (1) 19-22 (1)*
Eastern & Central Africa	*Nil*	09-12 (1)	06-09 (1) 11-13 (1) 13-16 (2) 16-18 (1) 21-23 (1)	18-21 (1) 06-08 (1)
Southern Africa	08-12 (1)	08-10 (1) 10-13 (2) 13-14 (1)	07-09 (1) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 23-01 (1)	18-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-20 (1)*
Central & South Asia	*Nil*	17-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (1)	04-06 (1) 06-08 (2) 08-09 (1) 05-07 (1)*
Southeast Asia	15-17 (1)	14-15 (1) 15-17 (2) 17-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-22 (1)	02-03 (1) 03-06 (2) 06-08 (1) 03-07 (1)*
Far East	14-16 (1)	13-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	22-00 (1) 00-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 23-01 (1)* 01-05 (2)* 05-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-17 (1)	09-12 (1) 12-15 (2) 15-17 (4) 17-18 (2) 18-19 (1)	04-07 (1) 07-09 (3) 09-12 (2) 12-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (2) 22-02 (1) 02-04 (2)	21-22 (1) 22-05 (3) 05-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	15-17 (1)	11-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	12-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-03 (1) 03-05 (2) 05-07 (1) 07-10 (3) 10-12 (2)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-10 (1) 10-14 (2) 14-15 (1)	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (4) 15-16 (2) 16-17 (1)	00-05 (1) 05-06 (2) 06-08 (3) 08-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-22 (1) 22-00 (2)	18-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-22 (1)* 22-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	09-14 (1)	07-08 (1) 08-09 (2) 09-13 (1) 13-14 (2) 14-15 (4) 15-16 (3) 16-17 (1)	01-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-01 (2)	19-21 (1) 21-03 (2) 03-05 (1) 20-23 (1)* 23-01 (2)* 01-02 (1)*
McMurdo Sound, Antarctica	Nil	08-10 (1) 13-15 (1) 15-16 (2) 16-18 (1)	07-09 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	23-02 (1) 02-05 (2) 05-06 (1) 02-05 (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 meter openings.
** Former European USSR.

NET from the National Geophysical Data Center (NGDC), Boulder, Colorado. To access on-line data use the following addresses:
FTP: ftp.ngdc.noaa.gov
Gopher: gopher.ngdc.noaa.gov
World Wide Web: http:/www/ngdc.noaa.gov
For more information, call NGDC at 303-497-6132 or e-mail at: info@ngdc.noaa.gov

VHF Ionospheric Openings

While the CQ WW DX Contest does not include the VHF bands, some interesting ionospheric activity is likely to occur on these bands during October.

Some fairly good meteor-scatter-type openings should be possible on the VHF bands around October 20th, when the two-day *Orionids* meteor shower is expected to begin. This should be a major shower, with a maximum hourly rate of at least 25 meteors.

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TS-950SDX
Digital Signal Processing

The ***NEW KENWOOD TS-950SDX (DX-CLUSIVE)*** is the talk of the new generation HF transceivers. Continuous research, development, engineering, and production of superior products make Kenwood the recognized leader in Amateur Radio. Utilizing the most advanced technology available, our products offer the highest level of quality and reliability. The ***KENWOOD TS-950SDX*** includes ***advanced digital signal processing (DSP)*** while remaining user-oriented. It also includes digital AF VBT, IF notch filter, Dual-Mode Noise Blanker, IF VBT, SSB IF SLOPE tuning, selectable IF filter with Memory, Switchable AGC, All-Mode Squelch, High Stability TCXO, QSK or Semi break-in, built-in keyer, 100 memories, cw pitch control, adjustable scanning speed, 150 watts of power output, built-in speech processor, built-in Computer interface, programmable tone encoder for FM mode, and ***DUAL RECEIVE*** in a single band making it the ultimate for DX. Also available is the ***NEW SM-230 Monitor Scope ($1019.00).*** It also functions as a band scope, tone generator, and monitor for supporting and calibrating radio stations.

TS-850S/AT
Direct digital Synthesis HF Transceiver

The ***Kenwood TS-850S*** features 160-10 amateur band operation with 100kHZ to 30 MHZ General Coverage Receiver. Its superior receiver dynamic range ***(utilizes Direct Digital Synthesizer)*** with the Kenwood **NEW AIP SYSTEM (Advanced Intercept Point)** provides excellent intermodulation performance and suppresses unnecessary radiation. Two selective RF amplifiers, one with large gain (12DB), are used to enhance sensitivity and another with a small gain (ØDB/source floor circuit) which improves intermodulation characteristics. It also features a IF notch filter, IF slope tuning, CW variable pitch control & CW reverse mode. It also has a dual-mode noise blanker, 4 step RF attenuator, Switchable AGC, All-Mode squelch, microprocessorcontrolled automatic antenna tuner (160-10), QSK, 100 memories, and adjustable power. Options include ***DRU-2 Digital Recording Unit, VS-2 voice synthesizer, SO-2 TCXO high stability oscillator, and the DSP-100 (Digital Signal Processor).*** **DSP-100 $599.95**

TS-450S/AT
Compact Mobile

Kenwood's goal is to always offer our customers the most sophisticated achievements in technology. So, when it came time to enhance our best selling TS-440S transceiver we didn't hesitate. The Kenwood TS-450S includes **Advanced Intercept Point (AIP)** which greatly improves the receiver's dynamic range to an incredible 108db. An optional **Digital Signal Processor (DSP-100)** offers even further sound clarity by tailoring the incoming and outgoing audio passband signals. ***Other refinements include convenient split frequency operation, advanced filter functions, optional automatic antenna tuner, and 100 memory channels with flexible scanning selections.*** It provides 100 watts of continuous power and **DDS (Direct Digital Synthesis)** for optimum operation. An optional **TCXO (SO-2)** provides the utmost in stability.

TS-50S
Compact Mobile HF TRANSCEIVER

HF is going places – thanks to Kenwood's new TS-50S, the smallest transceiver of its kind in the world. Providing high-performance communications with go-anywhere convenience, the TS-50S is your passport to freedom. And whether used for mobile operations and DX-peditions, or in a fixed installation, this rig packs a powerful punch. Maximum output is 100W, and there's a full range of advanced features — including 100 memory channels, DDS with innovative "fuzzy" control, and AIP for superior dynamic range IF shift and CW reverse mode help reduce interference, while a noise blanker improves clarity. For user-friendly operation on the move, there's a multi-function microphone and powerful menu system. And the TS-50S is fully equipped for split frequency operation.

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CIRCLE 159 ON READER SERVICE CARD

Auroral activity usually increases during October, and some corresponding auroral-scatter-type and sporadic-*E* VHF openings can be expected during periods of such activity. The best days to check are those which are expected to be either Below Normal or Disturbed on the HF bands. See the Last-Minute Forecast at the beginning of this column for the days in October that are forecast to be in these categories.

Computer Programs

There are several good computer programs available for supplementing band-opening predictions contained in the CQ DX Propagation Charts appearing on the following pages. Many of these have been reviewed on a regular basis by my *CQ* colleague Karl Thurber, W8FX, in his excellent monthly column "Antennas & Accessories."

The following is a listing of the more popular programs. All of them contain band opening data. Most of them also contain grayline data, sunset/sunrise times, distance, great-circle bearings, and other useful information. All of the listed programs are well prepared, menu-driven, relatively easy to use, and well documented.

Super DX Edge™—Computerized version in color for IBM compatibles. Also available in a large plastic slide rule version. Reviewed by Karl Thurber on page 60 in his August 1995 column. For a free flyer, contact Xantek, P.O. Box 834, Madison Square Station, New York, NY 10159. Tel: 212-566-8240

Ham Companion™—For IBM compatibles. Version 3.0 updated and revised. New color graphics for EGA and VGA. Calculates band openings for all locations; shows sunrise and sunset times, grayline moving around the world and displays great-circle paths, showing azimuth and distance, and more. Predictions and forecasts can be updated with WWV sunspot numbers and solar flux levels. See W8FX's review on page 83 of May 1994 *CQ*. For more information contact Brinson Microware Corp., 114 S.E. 4th Street, Mooreland, OK 73852, or call 1-800-874-0771.

MINIPROP Plus™—Version V2.0 is the latest upward revised version of a very popular HF propagation program for IBM compatibles. Predicts received signal levels and all other propagation parameters for any location. Maps display great-circle path and grayline in full color. Also contains comprehensive world atlas with coordinates, and lists beam headings from given QTH. Reviewed in "Antennas & Accessories" column on page 80, July 1994 *CQ*. For more details contact Sheldon C. Shallon, W6EL, 11058 Queensland Street, Los Angeles, CA 90034-3029.

IONSOUND PRO™—This is an updated version of the very popular IONSOUND™ propagation program developed by Jake Handwerker, W1FM. It is a sophisticated ionospheric prediction program for IBM PCs and compatibles. It is well documented, and user friendly menu driven. It produces tabular or graphic frequency opening times and data between any two locations, as well as great-circle distance and bearing data. The program permits comparing data for up to twelve smoothed sunspot numbers or solar flux levels. The program has been reviewed by W8FX on page 66 of the March 1994 issue of *CQ*. Additional information can be obtained for IONSOUND.PRO and several other propagation programs from Skywave Technologies, 17 Pine Knoll Road, Lexington, MA 02173.

Three propagation programs are now available for radio amateur use of IBM PCs and compatibles that were formerly only available for professional use. They are CAPMAN™, ASAPS™, and PROPMAN™.

CAPMAN™—Stands for Computer Assisted Prediction Manager. The program utilizes the sophisticated model of the ionosphere used in the IONCAP program. IONCAP is one of the world's standards used by professional engineers and scientists for propagation predictions and analyses. CAPMAN was developed by Don Lucas, WØOMI, one of the original developers of ONCAP, and Jim Tabor, KU5S, to overcome the shortcomings of IONCAP, for PC use by radio amateurs. While the IONCAP program for PC use was made available to the general public by the U.S. Government, it was difficult to learn, had very little documentation, and was cumbersome to use. CAPMAN, on the other hand, is well documented, user friendly menu driven, and gives very accurate results. The choices of output include maximum usable frequency (MUF), frequency of optimum transmission (FOT), signal-to-noise (S/N) ratio, circuit reliability, service probability, angles of takeoff and arrival, field strength, modes of propagation, great-circle distance and bearing, and more. The 32-bit program requires an 80386 or higher microprocessor, and a math co-processor is recommended to speed up results. The program also contains a large assortment of antenna data that can be used in the calculations. Karl Thurber reviewed CAPMAN on page 83 in the May 1994 issue of *CQ*. Additional information is available from Don Lucas, 2900 Valmont Road, Suite H, Boulder, CO 80301, or telephone 303-494-4647.

ASAPS™—This is another world-wide standard propagation prediction and analyses program used by professionals, and recently made available for general PC use. The program stands for Advanced Stand Alone Pre-

diction System, and was developed by the IPS Radio and Space Services of the Australian government. This program uses a different but equally sophisticated model of the ionosphere than does CAPMAN, but the results from both programs are similar. While CAPMAN provides a great deal more data, ASAPS is a much faster program to use, but a 80386 microprocessor and a math coprocessor are still highly recommended. CAPMAN is presently available at approximately one-third the price of ASAPS. For more information see W8FX's review on page 60 in the April, 1994 issue of *CQ*, or write directly to Jacques d'Avignon, VE3VIA, 965 Lincoln Drive, Kingston, ON, Canada K7M 4Z3, or call him at (613) 634-1519.

PROPMAN™—This program has been newly released by Rockwell/Collins as the *Collins HF Propagation Software*. It claims to be an easy-to-use frequency propagation and management tool, supported by the Collins heritage of quality HF development. It utilizes the IONCAP propagation program, and offers customization of station parameters, displays current best frequency and propagating frequency as well as 24 hour plots. Data can be updated with SESC or WWV geomagnetic and solar data. Requires 286 or higher, math coprocessor, DOS 3.2 or higher, and color EGA or VGA monitor and graphics card. Additional information can be obtained from Rockwell, 350 Collins Rd. NE, Cedar Rapids, IA 52498-0120 (800-321-2223).

The listing of the above products does not necessarily indicate an endorsement by the editor of this column. Additional information and prices should be obtained directly from the program producers.

The newly released *The New Shortwave Propgation Handbook* can make an excellent companion during the 1995 World-Wide DX Contest. It contains a considerable amount of additional information concerning propagation, radio storms, do-it-yourself forecasting, and computer propagation programs. The useful information it contains for more effectively using the shortwave or high-frequency spectrum could add considerably to your final score. Copies can be obtained directly from *CQ* by calling toll free 1-800-853-9797, or from your local book dealer. The price is $19.95, plus $4 s/h and taxes where applicable.

CW Contest Forecast

This month's DX Propagation Charts are valid for both the SSB and CW sections of the CQ WW DX 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.

Experience from the past 44 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 1995 contest and the accuracy of these forecasts and predictions would be apreciated, and should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20915. Good luck in the contest!

73, George, W3ASK

TOP SCORES

WORLD

SINGLE OPERATOR HIGH POWER

All Band

EA8EA	12,805,040
P4ØF	12,393,150
PYØFF	10,778,990
HC8N	10,181,750
PZ5JR	8,301,917
H2ØA	7,467,174
HC1OT	7,041,712
A71CW	6,514,340
VS6WO	5,983,476
HC8KU	5,595,600

28 MHz

ZS6NW	298,906
LU6ETB	290,184
KG6DX	209,056
EA6ZY	159,962
S53EA	143,172
EA7EZ	142,664

21 MHz

ZPØY	1,584,523
9Y4VU	722,787
CR3U	720,090
EA9EU	625,053
TU2MA	465,875
EA7KW	397,432

14 MHz

P4ØJ	1,697,400
KP2A	1,332,460
CR3P	1,317,084
OHØBH	1,003,353
9M6NA	971,397
TGØAA	968,250

7 MHz

EA9EO	1,122,506
PJ9U	1,056,817
9K2ZZ	891,902
TI1C	849,288
S5ØA	738,650
S5ØC	691,298

3.5 MHz

ZB2X	464,444
SN3A	418,325
UN2L	408,894
CT3FN	371,478
4N1A	327,474
OM5M	307,956

1.8 MHz

4X4NJ	184,896
OM7A	132,664
SP5GRM	114,886
I3JSS	109,388
F6EZV	107,624
DL1IAO	105,644

LOW POWER

All Band

9X5EE	4,014,270
EA7CEZ	3,469,004
J8ØC	2,537,808
ZF8BS	1,831,200
S59AA	1,645,226
EA5WU	1,548,365
XE1/AA6RX	1,331,323
W2UP/3	1,298,650
TA3D	1,197,914
W1PH	1,182,216

28 MHz

EA8/EA1AK	409,500
YV3AJ	297,142
LW4DYI	261,063
PJ2/PAØVDV	146,642
YU1HA	59,169
VK4XA	55,275

21 MHz

KP4TQ	413,640
VK2AYD	292,940
YZ1AU	279,524
WP4/AA3BG	261,660
S57J	235,008
9A3ER	232,140

14 MHz

PT7CB	1,157,475
LU1ICX	401,196
OL7Z	357,046
SP9YDX	334,126
OH3LIM	300,875
OH6LBW	266,805

7 MHz

YM2DS	558,129
YT7AR	531,180
UR5QSK	450,447
KP4VA	225,704
S54A	209,151
EA8CN	199,980

3.5 MHz

S52OP	89,628
OM3ZBU	85,814
LY2BZ	80,898
UA3WU	64,724
UA9YNC	63,332
LY3ID	60,352

1.8 MHz

9A2OB	45,150
YU1RA	42,984
GIØKOW	41,580
RX9ST	31,388
IV3KTY	20,406
OM2XW	20,022

QRP

All Band

TA4ZM	1,734,238
AA2U	486,200
LY3BA	449,757
KP4DDB	296,172
IK2LEY	248,939
UX8IX	241,962
DL3KVR	218,476
I1BAY	217,460
JA2IVK	176,512
N7IR	152,800

ASSISTED

All Band

P4ØW	10,288,950
K1ZM/2	3,319,620
OM3NA	2,974,634
K3WW	2,923,641
K1IU	2,439,160
K2WK	2,372,676
AA2DU/1	2,167,869
N3AD	2,153,200
DJ2YA	1,892,485
K1DG	1,861,175

MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A	8,844,052
NP4Z	7,629,219
OT4T	7,583,400
LZ9A	6,953,600
HZ1AB	6,896,136
OH2M	6,723,750

MULTI-OPERATOR MULTI-TRANSMITTER

9G5AA	22,946,634
VP5VW	21,823,275
KHØAM	17,076,598
HG73DX	16,114,625
9A1A	14,506,569
YKØA	11,474,172

EUROPE

SINGLE OPERATOR HIGH POWER

All Band

S59A	3,311,655
DL6RAI	3,169,792
S53A	3,097,360
G4BUO	3,032,424
YU7AV	3,014,010
F6FGZ	2,952,349
TM7XX	2,800,584
OH6WZ	2,681,184
UT2QT	2,531,613
EMØF	2,452,989

28 MHz

EA6ZY	159,962
S53EA	143,172
EA7EZ	142,664
HGØD	137,241
S51AY	102,492
S57AL	32,334

21 MHz

EA7KW	397,432
S5ØK	390,456
OH1AF	334,059
GB4RF	324,960
YT9C	316,992
LZ5Z	242,957
OHØBH	1,003,353
LZ5W	781,696
IO9T	767,428
OH2PM	766,263
OH6NIO	728,550
S53M	710,430

14 MHz

7 MHz

S5ØA	738,650
S5ØC	691,298
OM8A	665,525
YT7A	641,538
9A3IQ	546,426
S52RD	499,961

3.5 MHz

ZB2X	464,444
SN3A	418,325
4N1A	327,474
OM5M	307,956
S58A	291,584
EA3KU	267,546

1.8 MHz

OM7A	132,664
SP5GRM	114,886
I3JSS	109,388
F6EZV	107,624
DL1IAO	105,644
IT9ZGY	88,466

LOW POWER

All Band

EA7CEZ	3,469,004
S59AA	1,645,226
EA5WU	1,548,365
F6DDR	1,021,760
9A2AJ	999,242
GD4UOL	970,557
SP9XCN	965,157
S51FA	912,695
SP9WZJ	902,484
YL2GN	878,700

28 MHz

YU1HA	59,169
LZ2GS	34,727
G4OBK	19,513
OK1AES	19,295
F6EQV	11,180
DL3HRA	9,548

21 MHz

YZ1AU	279,524
S57J	235,008
9A3ER	232,140
ON4RU	203,987
4N1N	183,520
T91ENS	178,560

14 MHz

OL7Z	357,046
SP9YDX	334,126
OH3LIM	300,875
OH6LBW	266,805
S57U	208,575
UU9JCF	197,478

7 MHz

YT7AR	531,180
UR5QSK	450,447
S54A	209,151
UR3IEW	184,352
PA3AAV	159,432
IQ9AF	157,665

3.5 MHz

S52OP	89,628
OM3ZBU	85,814
LY2BZ	80,898
UA3WU	64,724
LY3ID	60,352
OK1RR	60,344

1.8 MHz

9A2OB	45,150
YU1RA	42,984
GIØKOW	41,580
IV3KTY	20,406
OM2XW	20,022
OK2PWJ	16,698

QRP

All Band

LY3BA	497,511
UX8IX	420,783
I1BAY	401,793
DL3KVR	269,040
IK2LEY	248,939
OH1LUZ	162,792
EA7AAW	146,355
9A3GU	118,695
Z32DR	115,020
PAØADT	94,675
DJ3XK	40,152

ASSISTED

All Band

OM3NA	2,974,634
DJ2YA	1,892,485
DL2ZAE	1,348,214
DL2HBX	1,280,250
F5NBX	1,141,904
JWØI	1,054,596
DJ9MH	781,335
DL7AV	668,161
SMØHTO	624,012
F6IRA	617,050

MULTI-OPERATOR SINGLE TRANSITTER

IQ4A	8,844,052
OT4T	7,583,400
LZ9A	6,953,600
OH2M	6,723,750
TM9C	6,337,206
DFØHQ	6,295,100

MULTI-OPERATOR MULTI-TRANSMITTER

HG73DX	16,114,625
9A1A	14,506,569
EM2I	10,436,607
UU5J	9,390,039
OL7O	8,166,164
RU1A	7,581,104

USA

SINGLE OPERATOR HIGH POWER

All Band

K5ZD/1	4,037,408
KM1H	3,905,136
W1KM	3,443,040
N2NT	3,320,772
N4RJ	3,177,636
N2LT	3,014,190
N6BV/1	2,793,570
K3ZO	2,752,000
W2SC/1	2,436,954
N6AR/4	2,317,344

28 MHz

KE3Q	44,100
W4YV	29,797
N4BP	27,864
W6ISQ	2,070
WA7KLK	2,000

21 MHz

KC2X/4	226,980
W6YA	213,614
K4ISV	208,488
N4CT	205,610
K4JPD	166,522
W4PZV	162,540

14 MHz

K3EST/6	458,060
K2SX/1	442,550
K8GL	427,356
NQØI	395,100
KØKE	378,896
W6QHS	192,786

7 MHz

KC7EM	409,676
N6AW	335,069
W3GH	184,350
NX7K	168,064
KØOD	124,712
WB4MAI	107,316

3.5 MHz

W1MK	202,420
K4PI	108,642
WZ3Q	106,624
WA4CTA	100,796
W9LT/8	85,845
W8JGU	77,112

1.8 MHz

WB9Z	23,100
K4TEA	21,128
KVØQ	14,030
AA8U	11,966
KX4R	8,791
W2VO	8,357

LOW POWER

All Band

W2UP/3	1,298,650
W1PH	1,182,216
K7GM/4	1,149,528
K2SG	1,017,620
K7SV/4	870,916
K2TE/1	709,920
W6JTI	693,548
K6XV	655,109
K2QMF	645,759
KM1X	639,184

28 MHz

KQ1V	6,440
K2YJL/M4	1,464

21 MHz

WB4TDH	119,000
KO9Y	93,170
WA2C	87,138
K2MFY	56,826
WA6FGV	13,572
W6JTA	10,927

14 MHz

N4MO	186,320
W5FO	170,170
N7RO	160,398
WAØRJY/7	135,642
WA6KUI/4	128,570
W8UMR	75,376

7 MHz

W9CH	77,880
AB4RX	54,827
WR4K	41,106
K9MMS	34,692
K4LDR	33,582
KW8J	27,804

3.5 MHz

AA9AX	12,449
K7WA	736

1.8 MHz

W2FCR	10,203

QRP

All Band

AA2U	535,572
N1AFC	228,501
K4LTA	191,352
N7IR	164,016
KA1CZF	126,336
N4IJ	122,194
KRØB	74,888
KV8S	27,984
NM1K	25,984
AB4KL	16,351
N9LMU	14,536
AB5OU	11,139

ASSISTED

All Band

K1ZM/2	3,319,620
K3WW	2,923,641
K1IU	2,439,160
K2WK	2,372,676
AA2DU/1	2,167,869
N3AD	2,153,200
K1DG	1,861,175
K2BU	1,788,123
K5NA/2	1,774,220
K2LE	1,572,516

MULTI-OPERATOR SINGLE TRANSMITTER

K1AR	6,660,108
N2NU	5,511,740
KC1XX	5,431,836
N3RS	5,304,804
K1TR	4,616,046
K8AZ	4,514,277

MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	9,699,844
N2RM	8,979,876
K1KI	8,158,280
K3LR	7,360,036
KY1H	5,245,622
KY3N	4,869,634

Timewave Drives Today's Technology To the Limit!

Timewave doesn't just meet the challenge, we create it!

Today's technology is moving fast and Timewave is right in there driving it. Our full-time in-house engineering staff focuses on a continuing program of product innovation and improvement.

Innovative new features enhance the already popular DSP-9+ and the DSP-59+.

DSP-9+ Noise Filter new features include:

- *Remodulator for RTTY with optimum DSP detector and filter*
- *New improved Voice Noise Reduction software*

DSP-59+ Noise Filter new features include:

- *Remodulator for RTTY with optimum DSP detector and filter*
- *New improved Voice Noise Reduction software*
- *Variable Noise Reduction from the front panel*
- *SSTV and WEFAX Filters*

Timewave has sold more DSP units through its worldwide distribution network than any other manufacturer in amateur radio. And we listen to the satisfied customers who own Timewave's proven products. Their suggestions and ideas to our customer service and support help us keep Timewave ahead in its quest for the best in DSP!

Call Timewave for information on $10 updates for older DSP-9+ and DSP-59+ Noise Filters.

TIMEWAVE TECHNOLOGY INC.

2401 Pilot Knob Road
St. Paul, MN 55120 USA
Phone: 612-452-5939 Fax: 612-452-4571

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Noise Killers+

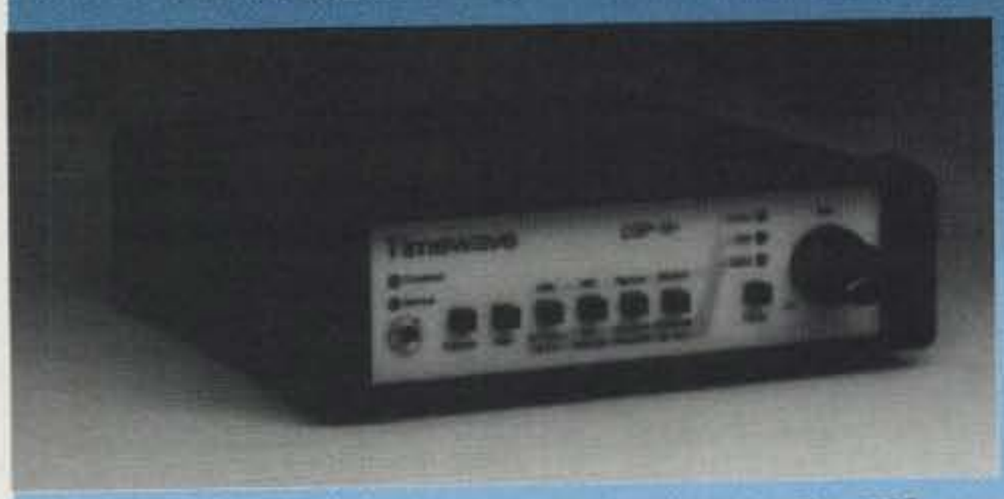
Advanced DSP Noise Filters

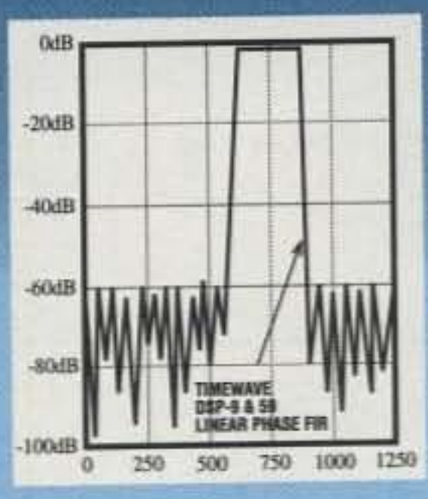
For Voice, CW, and Data Modes

The TW DSP-9+ and DSP-59+ improve reception by simultaneously reducing random noise up to 20dB and heterodynes up to 50dB. TW DSP filters feature third generation 16 bit processing, providing razor sharp audio for SSB, CW and Data modes. Both have AGC for wider dynamic range and signal boosting/peaking, relay bypass and self test modes. A station requirement for weak signal, noisy band operation during the *LOW SUN SPOT CYCLE!*

NEW! DSP-59+ Multi-Mode Filter

Now hundreds of CW and Bandpass filters allow the operator to select almost any filter combination. The easy turning filter knobs allow continuous coverage. Includes all data filters in the DSP-9+ plus G-TOR®, SSTV, EME and WEFAX. Voice filters cover 200Hz to 3.4kHZ. 13 CW center frequencies, CW bandwidths from 25Hz to 600Hz and a CW marker to spot the center of narrow filters.





DSP-59+ & DSP-9+ give steep-skirt filtering!

NEW! DSP-9+ Multi-Mode Filter

Push button selectable bandpass and automatic notch filters. SSB filters 1.6, 2.0, 2.4kHz, CW 100, 200 and 500 Hz. Programmable CW center frequencies 400/500/600/800Hz. HF data filters, HF Packet, PACTOR, G-TOR®, AMTOR, AM and RTTY with programmable center frequencies for North America and Europe.

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TIMEWAVE TECHNOLOGY INC.

2401 Pilot Knob Road • St. Paul, MN 55120 USA
Phone: 612-452-5939 Fax: 612-452-4571

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

K6NA	1,611,610
AB6FO	1,348,032
N6TU	1,122,329
W2VJN/7	862,967
AI6V	859,732
*W6JTI	693,548
*K6XV	655,109
*K6OY	502,737
W7CB/6	500,647
K6XO/7	382,525

Zone 4

K5MR	2,021,940
KØRF	1,932,678
W9RE	1,864,160
N5RZ	1,824,268
KØEU	1,496,940
KØKX	953,856
N7ML	880,581
K9MA	836,600
W5UDA	617,440
WN9O	607,095

Zone 5

K5ZD/1	4,037,408
KM1H	3,905,136
W1KM	3,443,040
N2NT	3,320,772
N4RJ	3,177,636
N2LT	3,014,190
N6BV/1	2,793,570
K3ZO	2,752,000
W2SC/1	2,436,954
N6AR/4	2,317,344

Zone 14

*EA7CEZ	3,469,004
DL6RAI	3,169,792
G4BUO	3,032,424
F6FGZ	2,952,349
TM7XX	2,800,584
DL2NBU	2,377,822
EA2IA	2,362,192
GØIVZ	2,308,068
OZ1LO	2,144,740
EA4KA	1,987,741

Zone 15

S59A	3,311,655
S53A	3,097,360
YU7AV	3,014,010
OH6WZ	2,681,184
YT1AD	2,285,496
OH1AA	2,181,408
OH6KIT	1,939,086
*S59AA	1,645,226
OH6YF	1,638,609
LY2IJ	1,452,731

Zone 25

JH5FXP	2,389,920
JA8RWU	1,952,817
JH1AEP	1,906,416
JE4VVM	1,897,608
JH7XGN	1,538,585
JA6GCE	1,387,071
*JHØKHR	1,031,493
JA1IDY	656,362
JA9JFO	644,742
JA2EU	578,760

hope to even have more and faster checking procedures. I found very interesting the fact that about 55-60% of the different calls in the data base are almost certainly mis-copied calls—i.e., errors! Almost every real call generates a whole string of look alikes. I thought I worked JT7AS on 20 meters, but he had it as K3ES in his log at the exact right time. K3ES, K3EV are just some combinations. You get the idea. The only call with no variations was 4U1ITU.

If you submit a computer log, you should submit a disk containing your files. File name examples are (use your call): CT send CT1BOH.BIN; N6TR send DL6RAI.DAT; NA send S5ØA.QDF. If you use another program, send a file per band of calls in chronological order in ASCII. If you are lucky enough to be a potential top score, you must submit a disk as per the rules. If you do not, you will not be eligible for

ZONE LEADERS SINGLE OPERATOR

Zone	Call	Score	Zone	Call	Score
1	NL7DU	39,975	21	A71CW	6,514,340
2	No Entry		22	VU2PTT	934,032
3	K6NA	1,611,610	23	JT7FAA	281,853
4	K5MR	2,021,940	24	VS6WO	5,983,476
5	K5ZD/1	4,037,408	25	JH5FXP	2,389,920
6	XE1/AA6RX	1,331,323	26	HSØZBI	1,218,114
7	TI5NW	949,390	27	DX1EA	3,766,896
8	KP2/WJ2O	3,776,500	28	9M8X	5,390,300
9	P4ØF	12,393,150	29	VK8TM	3,475,170
10	HC8N	10,181,750	30	VK1FF	774,750
11	PYØFF	10,778,990	31	KH6/N6HR	1,711,975
12	3G1X	4,139,394	32	ZL3GQ	672,612
13	LU1EWL	530,612	33	EA8EA	12,805,040
14	EA7CEZ	3,469,004	34	No Entry	
15	S59A	3,311,655	35	5U7Y	1,121,236
16	UT2QT	2,531,613	36	9X5EE	4,014,270
17	EY8MM	1,184,622	37	5X1XT	1,461,761
18	RWØAB	843,483	38	ZS6EZ	5,322,790
19	UAØFZ	807,128	39	3B8/F6HWU	959,101
20	H20A	7,467,174	40	JWØI	1,054,596

awards. We had to type into the computer many logs this year. We do not like to do this at all. It wastes our time and introduces our typos. So give us your disks. Thanks!

Remember that IG/IH count as a new multiplier as of this October's contest. There are also some rule changes pertaining to the use of two calls at one QTH. In a nut shell, the new rule says that another call other than the entrant's can be used to aid any submitted score. You can still check into packet, etc., using your call. That's no problem. This rule applies most germanely to the multi categories.

There are two reflectors on internet which you might find of interest. The Youth reflector is set up under the CQ WW as a reflector for young contesters age 25 and under. Some discussions have been very interesting. The Club reflector is open to any radio club in the world. Just send a message to K3EST@netcom.com to find out more about both of them.

Thanks To The Committee

This was an especially strenuous year for log checkers. Computers do not make for less work. They create more. So let's take our hats off to the guys who helped certify the results published herein: K6NA, W7EJ, KRØY, W9RE, WA8YVR, WR3G, K3UA, W3ZZ, K1DG, N3ED, W2RQ, N6ZZ, N2AA, KR2Q, KR2J, KZ2S, and CT1BOH. Thanks to all our DX advisors who in several cases helped resolve very difficult problems: I2UIY, S5ØA, G3SXW, OH2KI, OH2MM, JE1CKA, ON6TT, VE3EJ, CT1BOH, and DL6RAI. Thanks to our special advisor K3ZO, WN4KKN for making our life easier via internet, and N8BJQ who provides WPX advice. A big bow to N6TR for keeping up with our ever-changing computer software demands. Thanks to K1AR for the trophy and certificate mailings.

A hero of the republic medal goes to N6AA, who spent countless hours pouring over the data and on the phone with K3EST to make the data as perfect as we could make it.

Congratulations to all the winners and participants! See you in October and November 1995.

73, Bob, K3EST

DX QRM

Always a great pleasure to QRV in CQ WW! . . . *UA3AGW*. Thanks for two new ones on 80 meters . . . *UAØSR*. Hope to join you agn next year. Age here 78 . . . *PA3BEJ*. No propagation, heavy power line noise, no time for contesting, but I love the CQ WW! . . . *LU7DW*. Lots of fun! Pile-ups with low power were tremendous on 15 meters . . . *OD5/OH1NOA*. Thanks for making the 100W category. One doesn't have to compete with the kilowatts . . . *OK1CZ*. Sri dear N6T. QRM was too big on 3.5. Try agn next year . . . *YL2SM*. My arch rival VE6BMX on computer—I on all manual took him to the cleaners . . . *VG6BF*. I had a great time! Doubled my score from last year and finally broke the 1000 QSO mark for a single contest. My next goal is 1500+ QSOs! . . . *VK1FF*.

Learning more about contesting each time I enter. With regard to multipiers I keep this simple philosophy in life: The important thing is to keep the important thing . . . *VK4ICU*. My apologies to all for my fumbling attempt at CW. I have been phone contesting since 1970, but this was my first CW contest. Unfortunately it was fun, so I have another addiction to feed, Hi! . . . *VK5GN*. Thanks to flight changes, vacation limitations, and no meaningful planning, I am pleased to offer my entry of one QSO. A new record for me, but one for which there is only one direction for the future! . . . *VK8/N3JT*. Pre-contest preparation on Friday consisted of a couple of hours at the beach, wondering if we should ever go back to the shack. We ran on adrenaline all weekend. Had a blast and wouldn't hesitate doing it again . . . *VP2EZA*.

Worked a few on 10 meters at last, but missed the low bands. Wish the contest would last a week! . . . *VU2PTT*. My first serious contest. Wow! 686 QSO with 5W into a R7 is not bad, isn't true? . . . *IK2LEY*. Many thanks for my first contest. It was very very good to me . . . *IT9ORA*. As usual only had time to pick some plums out of the pudding. But what a delicious pudding . . . *SM6BZE*. First time in a contest. There is much to do to become better next year, but it was a real pleasure . . . *DK8NX*. Condx were much better than predicted. Some nice 5 band QSOs. YKØ was a fish in a barrel. Got called by R1FJL on 160 . . . *DL2HBX*. It's getting tougher every year with my small setup, but it was FUN as usual! Congrats to some US ops; they must be able to hear the grass grow! . . . *DL2OBF*.

Great cndx on 10 for a sunspot minimum . . . *4X1IF*. It was great fun. Hope everyone enjoyed contacting zone 36 and 9X . . . *9X5EE (Opr PA3DZN)*. 28 MHz had been dead all week. It was open from sunrise to after sunset while the contest was on. It takes the CQ WW to bring it to life . . . *EA6ZY*. I never had such good personal results. Things very fine, good propagation, good DXers . . . *ER5GB*. I was so surprised to be heard in the pile-ups with ny vertical antenna that I forgot my call. Hi Hi . . . *F5JOT*. Low power contesting is more and more challenging. But I like it (and so do my neighbors) . . . *F6DSV*. With my age (88 years) I still participate. First QSO April 1925 . . . *F8TM*. Hope that Loyalties Island are now in all the logs . . . *FKØP (Opr F6AUS)*.

My first CW contest. Very exciting! Will be there next year . . . *FK8FU*. On Sunday a patch of ionosphere seemed to move across the globe allowing me to make the most of the contest by bouncing sigs off it. It was great to really wrk hard with the 100W. 73

Travelling Ham Show Takes Amateur Radio on the Road

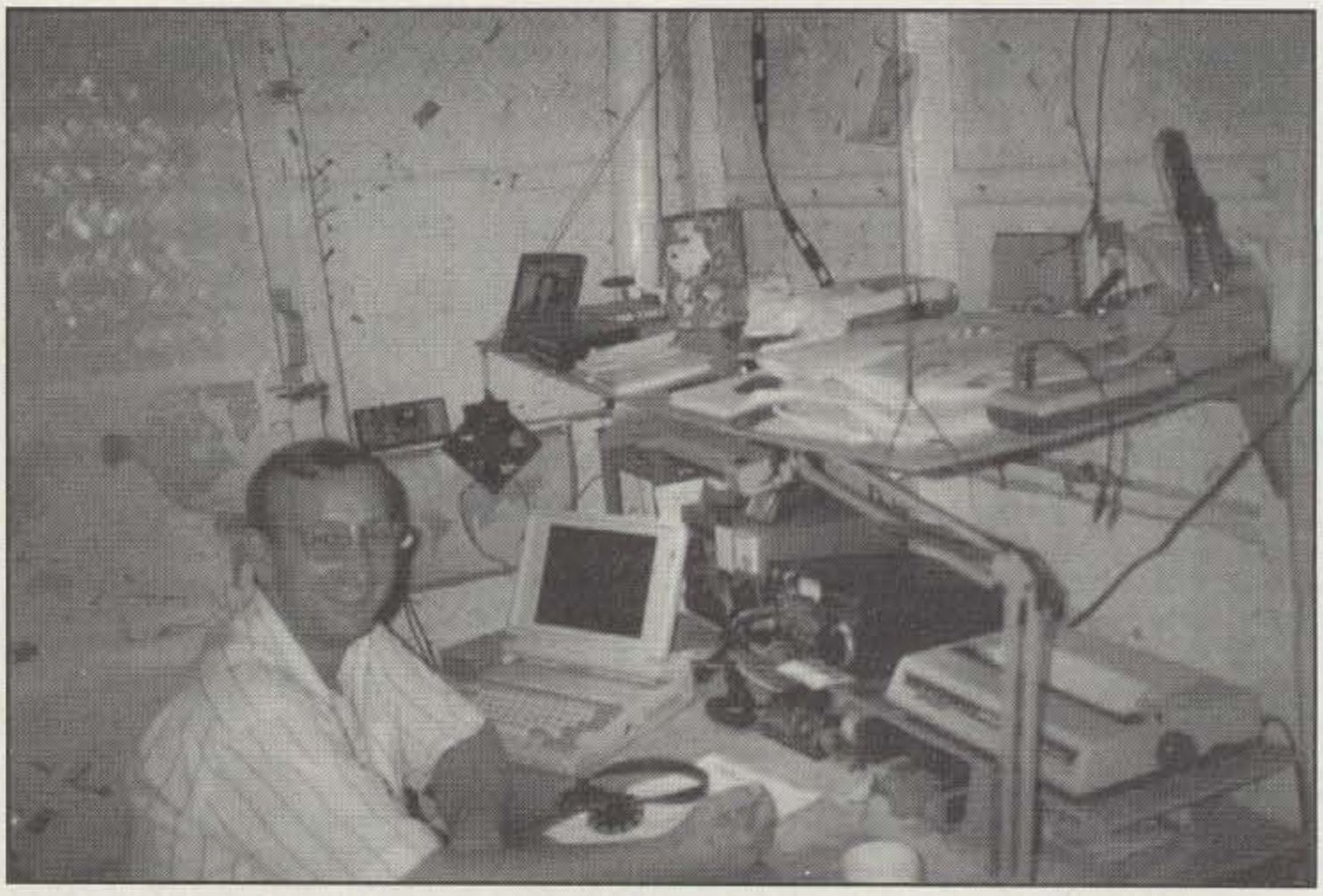
Ed Hammond, WN1I, is doing what so many of us have only dreamed of doing. He's hitting the road with Amateur Radio to spread the word that this is a great hobby. Beginning in September, Ed will visit fourteen cities presenting seminars and demonstrations of Amateur Radio. In cooperation with Ham dealers at each stop, Ed will demo how it all works, and tell what it takes to join the ranks of licensed Hams. The entire expense for the tour is being borne by Ed.

Formerly the North American Sales Manager Amateur Products for Cushcraft Corp., Ed is an accomplished professional public speaker who has had an unabashed love affair with Amateur Radio for 25 years. He is also the author of a new book on the hobby, "Ham Radio—Your Ticket To Worldwide Adventure." While the tour is aimed at spreading the word to folks who know nothing about Ham Radio, this might be the chance you've been looking for to get a non-Ham spouse or acquaintance in your hobby. Contact the dealer in your location for exact seminar sites and times. Here's the tour schedule:

Ed Hammond, WN1I (center), talks to some future Hams at a warm-up seminar session.

Tour Schedule

Tues. Sept. 19	Baltimore, MD	Maryland Radio Center	301-725-1212
Thurs. Sept. 21	Washington, DC	Electronic Equipment Bank	703-938-3350
Tues. Sept. 26	Cleveland, OH	Amateur Electronic Supply	216-585-7388
Wed. Sept. 27	Grand Rapids, MI	H.R. Electronics	816-722-2246
Tues. Oct. 3	Evansville, IN	The Ham Station	812-422-0231
Wed. Oct. 4	Cincinnatti, OH	R & L Electronics	513-868-6399
Thurs. Oct. 5	Indianapolis, IN	R & L Electronics	317-897-7362
Tues. Oct. 10	Minn./St. Paul, MN	Radio City	612-786-4475
			1-800-426-2891
Thurs. Oct. 12	Kansas City, MO	Radio Center USA	816-459-8832
Tues. Oct. 17	Dallas, TX	Texas Towers	214-422-7306
Thurs. Oct. 19	Austin, TX	Austin Amateur Radio Supply	512-454-2994
Mon. Oct. 23	Memphis, TN	Memphis Amateur Electronics	800-238-6168
Tues. Oct. 24	Huntsville, AL	RT Systems Amateur Radio Supply	205-882-9292
Thurs. Oct. 26	Wilmington, NC	Communications H.Q.	919-791-8885



Tom put SMØCNS/DU7 in lots of logs.

and tks for the best test of the year . . . *G4OBK*. 88's to XYL for letting me put in the time so close to SSB test . . . *GM4BVJ*.

USA QRM

My favorite contest. Always fun, even from W5 during sunspot minimum . . . *K5MR*. VK8TM on 14070 kHz with 10 minutes to go was a good zone 29 catch! . . . *K7ABV*. Trailer parked about 100 yards from shack loaded with dynamite and blasting caps! . . . *K8OQL*. VS6WO and KHØAM on 160 meters—Wow! . . . *KØCS*. Forty meters sounds more and more like 20! Was open to Europe or Asia 20 hours a day . . . *W1FEA/6*. Operating time 20 hours. Operator's endurance = 1 hour! . . . *W2PAU*. While mowing lawn forgot the 80 meter wire was in the grass! Riding mower cut it into multiple 2 meter antennas, so didn't get to operate 80 . . . *W4PLL*. Wow! Fine conditions considering low sun spots. Was able to work a surprising number of JA's on 20 and 15! Good thing it was cold out, as my shack had electric heater working (3-500z's) . . . *K1JKS*.

You should have a contest just for the little pistols—too much competition against the "big pistols" . . . *K2JF*. Kids home for Thanksgiving, but got some time in anyway . . . *K2NV*. Passing kidney stone half way through contest—that's all she wrote! . . . *K2SWZ*. This was the best I have ever done in a DX contest. I usually get in to just wrk a few stations, but this year I set a goal of 50 stations. I run only 5 watts with a 6Y6 final tube. I'm glad that you do not use serial numbers in your contest. That way I don't get discouraged when I hear those high power guys . . . *K3WWP*. Was surprised to have VK9NS answer my CQ . . . *K4RZ*. 100 watts to a vertical makes this a challenging contest . . . *K4XG*. Low dipoles stink. Still trying to get zoning ordinance changed . . . *K6LRN*.

Had a great time. Conditions seemed fair and good activity . . . *K6SG*. Great low-band conditions before the coronal hole arrived Saturday . . . *K9MA*. Achieved goal of at least 25 QSO's per band except 160 for first CW contest from my rural QTH . . . *KA2CDJ*. In the face of low solar activity, I worked more stations, zones, and countries with only 4 watts! . . . *KA6SGT*. It was fun as usual and provided some new band countries. Missed SU2MT on 80 again for one of the last needed zones . . . *KB4GID*. Had a great time in this contest. My age is only 11, but I have my General. I will be in the contest again next year with a higher score due to a new 70 foot tower . . . *KB8SUZ*. In a pinch used 40 meter beam on 15. Better than nothing . . . *KG4W*.

Best signal on the bands: VP5VW. A very classy operation. Best DX worked was 9G5AA. Best DX missed ZA on 20 which would have been an all time new one . . . *KI4HN*. I am 17 years old and this is my first time in the contest. Worked RUØLL on 40. I had never worked DX on 40 before that QSO . . . *KJ7EJ*. It's always great to hear so many familar calls and operators . . . *KK4SM*. Had a blast, discovered some strange propagation quirks, surpassed my goal. What more can anyone ask? Thanks to the faithful JA crowd for some really FUN runs! . . . *KN6EL*. Five watts from "black hole" of northern Minnesota = last in pileups . . . *KRØB (AF9T)*. Poor conditions. No Europe Saturday. Wind and rain static Sunday. Amazed to score what I did. Then there is always next year . . . *KV8Q*.

My first time in CQ WW contest. Spent more time on report than operating . . . *W2LRO*. First time tried computer logging . . . *W2TZ*. Conditions were so bad on Saturday evening that I took time out to listen to the Lawrence Welk program on PBS . . . *W3VT/4*. The DX opening on 40 was very nice. The patience of some DX operators was remarkable . . . *W4PBG*. I really enjoyed low power, as there was a sense of accomplishment to work overseas stations . . . *W4YN*. Greatest thrill was adding 5 new countries to my 80 meter total . . . *W5CWQ*. Had more contacts than I expected with predicted poor conditions . . . *W6BIP*. Due to Thanksgiving company, only spent 15 hours in the contest.

Hope to do better next year without the company . . . *W6KFV*. 9G5AA on 80 meters! . . . *W6MVW*. I was surprised at the level of activity considering the conditions of late. Turned out to be a FB contest . . . *W6NKR*. Was able to squeeze in only a few minutes of operating this year. Oh well! . . . *W6ZH*. Pet peeve: DX stations that don't identify for several minutes . . . *W7IIT*. First CQ WW ever. Great fun despite poor conditions. Twelve new countries for me. K7NPN made me do it! . . . *W7JHS*. Forty meter QRP is tough, but after a few no QSO's in the first 7 hours, a complete check revealed that the RIT was on. That's frustration! . . . *W8QZA/6*. Having my grandson, N9RIT, post a better score than me. Hi . . . *W9LNQ*.

STATION OPERATORS
Multi-Op Single Transmitter

4U1ITU: UW3QG, S56A, DL7UTA, DL3DXX. **4U1VIC:** DL6RDR, DL6NCY, DL2MEH, DL1GGT, DHØRAK. **6D2X:** K5TSQ, W5VX, WB5VZL, WD5N. **9A5D:** 9A2FK, 9A2TL, 9A3VM, 9A3AM, 9A3DU, 9A4SG, 9A4DU, 9A4CB, 9A7AFL, Gogo. **AA1K/3 &** K3WJV. **AA6MC** & NI6T, AEØM. **AB2E &** WT3Q, NU3Y, KC3NE. **AG6D &** N4TQO, K2MM, N6YK. **C6AHX:** WM2C, WS4E, NF6S, KE7X,

YAESU

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Multimode
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Dual Band HT
FT-51RH
5 Watt Model

$50 OFF

FT-530
Dual Band
Handheld

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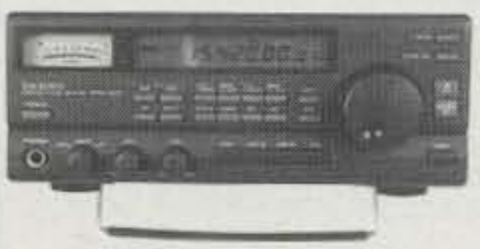
FT-11R/41R
2M/70cm HTs
FT-11RH
5 Watt Model

RECEIVER



FRG-100
Receiver

ROTATORS

***Rotator size mounted together*

Model		Applications	Mast Size	Rotator Size	Pre-sets	Wind Load
G-450XL		Light/Medium-duty	1¼-2 inches	12½"H x 7½" Dia.	No	10 Sq. Ft.
G-800S	*$25 OFF*	Medium-duty	1½-2½ inches	12½"H x 7½" Dia.	No	17 Sq. Ft.
G-800SDX	*$25 OFF*	Medium-duty	1½-2½ inches	12½"H x 7½" Dia.	Yes	17 Sq. Ft.
G-1000SDX	*$25 OFF*	Heavy-duty	1½-2½ inches	12½"H x 7½" Dia.	Yes	23 Sq. Ft.
G-2800SDX	*$25 OFF*	Extra Heavy-duty	1⅞-2½ inches	13⅝"H x 8" Dia.	Yes	34 Sq. Ft.
G-5400B	*$25 OFF*	Azimuth-Elevation Rotator combination	1½-2½ inches (Boom Dia. 1¼-1⅝ in.)	Mounted together 12½"H x 7½" Dia.**	No	11 Sq. Ft.
G-500A	*$25 OFF*	Elevation Only	1½-2½ inches (Boom Dia. 1¼-1⅝ in.)	10½"H x 7½" Dia.	No	12 Sq. Ft.

KØPP, N7HKW. **DFØHQ:** DL1AUZ, DL3OI, DL4NAC, DL5ANT, DL5ATD, DL5AXX. **DF2RG &** DJ1US. **DKØEE:** DF3CB, DL1MFL, DL2MDU, DL4MCF, DL4MDO, DL4MEH. **DKØFFE:** DL2BWM, DL2BUM, DL2BKE. **DKØMM:** DJØIF, DJ7IK, DJ8WL, DJ9CB, DL5XAT, DL8OBC, T94DX. **DKØTZ:** DL1SBF, DF5EN. **DKØUB:** DL1EFD, DL1EFO, DK7FP, DL9XY, DL1EKA, DJ2QV. **DK6WL &** DF7RX, DK2OY, UA2FJ, UA2FM. **DK9DA &** DK2YI. **DLØRH:** DF1HF, DK5XG. **DLØTUD:** DL6MUG, DL6DVU.

DL5XU & DK9FE, DL1ASA, DL1AWI, DL3APO, DL5AWI, DL9AWI. **DL8HWA &** DL2HTO, DL6UST, DL8UWG. **EA1AU &** EA1DD, EA1NK. **EA3CW:** EA3ACE, EA3AIR, EA2ALV, EA3CWK, EA3GAS, EA3GFA. **EA5EU &** EA5FID, EA5SM, EA5YN. **EA5VN &** EA5DCL. **EI7M:** EI4BZ, EI3DP, EI6BT, EI5HB, EI9HC, EI6GF. **F6KCS:** F5JCB, F5PRH. **G3LNS &** G3NKC, G3SJJ, G3VHB, G4JGV. **GB5DX:** G4DJX, G3JKS, VE5ZX, NW1Z, G3RTE, G3NOH, G4XRV, G4JKS, G3OUF. **GB5WW:** GØLII, G3LZQ, G3PSM, G4BYG, G4DRS, G4MVA. **GM4TMS:** GM4DGT, GMØTTY, GM4UYE, GMØKWL, GMØAZC, GMØBWR. **GU3HFN:** GU3MBS, GU4SXM, GU4WRP. **GW8GT:** GW3KYA, GWØMAW, GW3NWS, GW6ZUQ, G4IFB, G4VXE, G3SUH, G3OAY, GW4LXO. **GXØAAA:** G3MXJ, G3TXF, G3WVG. **HB4FE:** HB9ADD, HB9CJG. **HSØAC:** HSØ/G3NOM, DK3GI, JA3KWJ, JM1RFT, LA7JO, YU7AU, YU7EF. **HS7AS:** HS1AAM, HS1CDX, HS1GOS, HS1EUD, HS7CDI, HS1KMZ/7, HS7ECI.

HZ1AB: N4KT, SMØCXU, SM5CCT. **IK2UCK &** IK2BUF, IK2MPV, Fabio, Carlo. **IK4UOP &** IK4CFV, IK4COH, IK4WNI, IK4UNZ. **IO2L:** IK2JUB, IK2PFL, IK2QEI, IK2MLV, IK2NVU, I2OKW, IW2HPI. **IQ4A:** I4EAT, I4IKW, I4IND, I4LCK, I4LEC, I4PVP, I4TJE, I4VEQ, IK4CZF, IK4DCT, IK4DKO, IK4EWK, IK4QJH, IK2NCJ. **IQ4T:** IK4HVR, I4YTE, IK4SXJ, I4CZS, I4IFL. **IR2W:** IK2EGL, IK4MED, UA3DPX, I2VXJ. **IR5R:** I5ESR, IK5QQE, I5JHW, I5IIG. **IU2X:** IK2GSN, IK2GZU, IK2WAD, IK2SGO, IK2SAU, IK2FYH, IK2GXK, I2CZQ, IK2WAH. **J28EN:** J28FA, J28BS. **JA1YXP:** JL1SIF, 7K1EWD, 7M1WGZ, 7N1WIY. **JA1ZLO:** JF1KML, JJ1MED, JK1BSX, 7M1QPG. **JA2YKA:** JG2LYJ, JO2SUO, JS2ERL, KHØAZ, Masami. **JA6YCL:** JF4CZL, JE6UWK, JI6MYW. **JA8YBY:** JO1DFG, JH8PNE, JI8UCI. **JA9YAV:** JH9ETC, JRØELG, JA9-3Ø1D.

JE6ZIH: JR6GKT, JF6DEA, JI6BRB, JG4KEZ. **JH2ZUN:** JI2KGI, JE8KKX. **JH8YCT:** JJ7FBQ, JJ8NHY, JG1UHA, JH8WAH. **JJ3YBB:** JA3FHL, JA3LHL, JA3PJL, JE3TXA, JF3EIG, JH1ORL, JH3FBS, JH3FQF, JI3ERV, JR3RIU, JJ60AA. **JR1ZTT:** JN1MSO, JEØIUZ, JRØXHL, JRØUUU, JEØBKI, JR1LWQ, 7L1XCM, JL6MPR, JFØMQX. **JT1T:** JT1CD, JT1BL. **K1AR &** K1EA, K1GQ. **K1KP &** WA1S, NB1B, KM1D. **K1TR &** K1RX, NX1H, N1HFE, K1MNS, K1BG. **K3DI &** WD4IEH. **K8AZ &** K8NZ, WT8C, NX8R, NI8L, W8CAR, W8KIC, KQ8M, N8ARD. **K8LX &** N8EA, WA8ZDT. **K9UWA &** KC9LA, KR9U, KR9V, KA9A, N9NO. **KB1H &** KZ1M, K1DW, K1EBY, WA1HYN, AA1CE, NX1Q. **KB3TS &** N3KEG. **KC1XX &** AD1C, KM3T, K1XX, KA1XN, N1RFE. **KF2KT &** KB2RVD, N2ZAK, RA9USU. **KO4EA &** WB4PJW, W4XD, WF3L. **KS9K &** KA9FOX, NB9C, NØBSH, WE9V, WX9E.

LU4FM: LU6UO, LU4FD, LU1WFA, LU8EHW, LU5FIL. **LX/DFØBK:** DL8SGG, DL4SDX, DL5SEJ, DL4SDW. **LY1BXB:** LY1DQ, LY2BOS, LY3BHY, LY-R-1289. **LZ7N:** LZ1HI, LZ1JZ, LZ1NG, LZ1YQ, LZ1ZP. **LZ9A:** LZ1JY, LZ1UK, LZ2CC, LZ2DF, LZ2HE, LZ2II, LZ2JE, LZ2PL, LZ2PO, LZ2PS, LZ2TT, LZ2UU, LZ2WF, LZ2XA, LZ3DJ, LZ3SM, LZ5JW, LZ2-F-319, Vasko. **SP3KPN:** SP3GXU, SP3RXO. **N1AU &** WC1D, WA1TTV. **N2IC/Ø &** KØKR. **N2NU &** W2REH, WW2Y, KZWI. **N3BNA &** NM2Y. **N3RS &** N3ED, KY2T, N3RD. **N5HRG &** K9MK, WB5VIH. **N5OK &** N5CG, WA6OTU, AA5WQ. **N6CQ &** WF3T, K3MQH, KQ3F, K3SWZ, NE3H, KV3J, WD3U. **NCØP &** WDØV, KFØH, WRØG, WAØFLS, WDØGVY, NØSM. **NM3K &** WE3E. **NO2R &** KU2C, KB2HZ. **NP4Z &** WC4E, KP4EJ. **NS2K &** WU3A. **NXØI &** KMØL, KØRWL, KBØU, NØBIW, KJØD, KØVBU, KBØISS, KCØEI.

OE2S: Club. **OH2M:** OH1JT, OH2BVI, OH2IW, OH2JA, OH2KVH, OH7JR. **OH4N:** OH4EA, OH4JFN, OH4KEC, OH4KZM, OH4MFA, OH4MDY, OH4NEW, OH4YR. **OH5LAQ &** OH5MLH. **OH7X:** OH4LTK, OH4LYX, OH6LNI, OH7MHL, OH7MS, OF7WV. **OH8MDG &** OH8MIZ. **OI6AY:** OH2LYW, OH2KHX, OH5MPZ. **OK2KDS:** OK2VWB, OK2HIJ, OK2-22266. **OK2KJU:** Club. **OK2KOD:** OK2BDI, OK2BGR, OK2BNX, OK2PID. **OL1CW:** OK1DUT, OK1FUT, OK1DXW. **OL3A:** OK1AY, OK1CM, OK1MR. **OM3A:** OM3CGN, OM3DX, OM3LU, OM7LU, OM8AM, OM8AW, OM8FM, OMØWR. **OM3RJB:** OM5CW, OM5FA, OM5NA, OM5EA, OM3CPG, OM5CD. **OM7M:** OK2BFN, OM3TZW, OM3PA, OM3TPV, OM3EY, OM7DX, OM3PC, OM5NU, OM3TWO, OM5AW, OM3TZQ, OM3TQM. **ON6AH &** ON5AV, ON4GO, ON6MH, ON6QR, ON9CMB, ON6VL, ON7ZV. **OT4A:** ON4AID, ON4AWU, ON4BI, ON4DB, ON5DH, ON5SH, ON5OT, ON6EV, ON6ML, ON6MR, ON7SF, ON7VU.

OT4T: ON4WW, DL1SBR, DJ4AX, DL1VJ, DK7PE, RA3AUU, ON6TT, ON4UN, ON6WU, ON5NT, ON4AAC, ON6KD, ON6HE, ON7UF, ON5UK, ON4AFZ, ON1BEJ, ON4TJ, ON4EJ, ON1ACV, ON1CIK, ON7GB, ON4ANT, Frida, Marlene, Stefan. **PA3FHA/P** & PA3GKW. **PI4ALK:** PAØXAW, PA3DLA, PA3CVY, PA3FPA. **PI4CC:** PA3ALK, PA3BSQ, PA3EPD, PBØAIU. **PI4DEC:** PAØMRG, PAØTUK, PA3AAM, PA3AWW, PA3ERA, PA3FUE. **PI4TUE:** PA3GFE, PA3GLZ. **RKØQ:** UAØQDL, UAØQN, UAØQAU, UAØQAS. **RK1OWZ:** UA1OZ, UA1OSS, UA1OMZ, UA1OMX, UA1ODN. **RK9AWN:** RA9AA, UA9AR, RA9ALC, RA9ATW, RA9ATU, RA9AX, UA9AU, RA9ANR, RA9AEW. **RS3A:** RA3DUU, RX3AEV, RX3AQL, RX3DAZ, RV3DDZ, RW3DD, ER2CQ, RW3AI, RK3AXX, UR4VJA, UA3-17Ø-79. **RW1Q:** UA1QM, UA1QV, RA1QDO, RA1QFE, Sivolap, ex-UA9WAL. **RW2F:** RA2FA, RAØFA, UA2FB, UA2FF, UA2FX, UA2FZ, UA2AO, UA2CY, UA2FBR, UA2FBS, UA2FFX, UA2-125-767.

RZ4AYT: UA4-156-1Ø57, UA4AJ, UA4AIY, UA4ALI, RA4AI. **RZ4PZL:** Khmyz, Blinov, Carpenko. **RZ6LZL:** UA6LP, RA6LFO, RA6LBX. **SK1PW:** SM1ALH, SM1OII, SM1TDE. **SK4AO:** SM4PEL, SM4OTI, SM4HFI, SM4KRL, SM4KSM. **SK6AW:** SM6CAS, SM6CDG, SM6CVE, SM6DER, SM6EHY, SM6GBM, SM6IQD, SM6LFJ, SM6MGZ, SM6UQJ, SM6VAO. **SK6EI:** SM6LPF, SM6REA, SM6CMR, SM6OEF, SM6LPG, SM6GOR, SM6TOL. **SK6WU:** SM6ASB, SM6KHN. **SLØCB:** SMØMXO, SMØNSJ, SMØTXT. **SPØPKQ:** SP6EJH, SP6FER, SP6HAO. **SP9KRT:** SP9HNB, SP9ADU, SP9-1753. **TM8A:** F5SSG, F5OZF, F5NTV. **TM9C:** F5IN, F5QF, F5LGE, F6ARC, F6DZS, F6FVY. **TU5EV &** TU2XZ. **UN5G:** UN8GO, UN8GJ, UN7GF. **UT7W:** UR5WCW, UT7WA, UT7WZ, UT7WW. **UU4JWI:** Retser, Nechitailov, Cherkasov. **VE3EJ &** VA3DX, VA3EU, VA3NA, VA3RU, VE3CDX. **VE6AO:** VE6AAV, VE6CIZ, VE6JO, VE6RCI, VE6AMR, VE6EX, VE6KC.

VE7U: VE7WRA, VE7WNA, N2PNG, VE2QBI. **VK4MZ &** VK4EMM. **VP2MDE:** W5ASP, K5GN, VP2MEG, VP2MFH. **WØCP &** K9AY, N3SL, KCØD. **W1CW &** W1YL, K1ZX, G4BKI, WB4BBH, K1KNQ. **W1XS &** WS1K, NU1H. **W3GG &** WD3I. **W4PRO &** WB4DNL, W4DHZ, K4IX. **W6GO &** AA6WJ, KV6H, N6IG, NB6G, N6IYS, WG6H. **W6REC &** RAØFC. **W9KDX &** K9RN, K9BG, KS9W, AA9LX, KF9LB. **WA6IET &** W2KVA, KO6GA. **WE1B:** N1KKY, AA1FN, N1JAC, WF1L, KA1EUX. **WH6R &** N6VI/KH6, AH6MZ. **WT1T &** WO1N, WB1ELA, K1MBO, K1TWF, WA1TET, KT1O, WN1V. **WXØB/5 &** NA5O, AL7CQ, KN5E, AB5QY. **YU1AAV:** Sasalic, Bozic, Stojilijkovic, Bozic, Aleksic. **ZF1A:** WA6VNR, W6OSP, K4UVT, K9LA.

Picture QSL card of RUØLL from Vladivostok.

STATION OPERATORS
Multi-Op Multi-Transmitter

6E2T: N6AZE, N6KI, W6UQF, K9VV, KM6SN. **9A1A:** 9A2DQ, 9A2HO, 9A2LJ, 9A2MP, 9A2OG, 9A2RA, 9A3GW, 9A3NR, 9A4WW, 9A6ABX, F2CW, Vjeko. **9G5AA:** G3SXW, GM3YTS, KC7V, K7GE, N7BG. **DLØKF:** DK7XS, DL3LBX, DJ3UL, DJ6TN, DL2ZT, DF4PA, DK5TI, DK8LV, DJ4FZ, DL8KUA, DK7LN, DF3LZ, DJ9MT, DF6LI, DJ2BV. **EM2I:** UR3IKY, US1ITU, UT2IA, UT2IB, UT2ID, UT2II, UT2IJ, UT2IM, UT2IO, UT2IZ. **F6KJX:** F5ROX, F5MLJ, F5MFL. **HG73DX:** HA1AH, HA1DAC, HA1DAE, HA1TJ, HA2RV, HA2RX, HA5AWH, HA5CCC, HA5FM, HA5GF, HA5IW, HA5ML, HA5OM, HA5TI, HA5WE, HA6NF, HA6ND, HA6NL, HA6NQ, HA6NY, HA6ON, HA6PX, HA6WX, HA7RY, HA7VB. **IK2VUE &** IK2XNW. **IR5R:** I5ESR, IK5QQE, I5JHW, I5IIG. **IU2D:** IK2ILH, IK2MMF, IK2IKT, IK2OHG, IK2MRZ, IK2OFR, IK2FEO, IK2EKY, IK2GAU, IK2RJK, IK2VJF.

J45T: SV5TH, SV5VR, SV5BYR, SV5BYT, SV5BYV, SVØ/KB4PMS. **J77J:** K1XM, KQ1F, AC1O, G4WJS, G4WVX, K4BAI. **JA1YDU:** JHØNZN, JHØLFE, JA9VDA, JF7TFK, JRØJFM, JI2UYK, 7L1DGK, JM1UWB, JJ1CFQ, JQ1QOW, JS1INN, JL7MYL, 7L1ETO, JP1CWU, JJ1DYR, JL2LCE. **JA3YKC:** JL3MCM, JM3FVL, JG4LSR, JL4CVB, JP3PZD. **JA3ZOH:** JH3DPB, JH3PRR, JE3MAS, JG3JEW, JG3KIV, JG3MRT, JG3WDN, JI3OPA, JM3XKG, JH4IFF, JH4NMT, JH4RHF, JR4ISF, JF4FUF, JK4KSD. **JA7YAA:** JE1AMC, JF1CKX, JF1SXL, JJ1CVH, JM1QPR, 7M1JAS, JK7RZN, JL7LYM, JL7MXK, JRØSPG. **JH5ZJS:** JA5BJC, JA5FDJ, JA5JCC, JA5THU, JR5PDX, JR5VHU. **K1KI &** K1TO, K1CC, K1ZZ, W1OD, AA2Z, K5FUV. **K3ANS &** N2BIM, WF3H, JH7PKU, N2EA, K3YD, NC3C, N3JGX, N3IYX. **K3LR &** WR3G, W3YQ, K8CX, NA8V, K3KO, WD8IXE. **K4VX &** K4XU, N4CC, K5GO, AA9D, K9BGL, KD9Q, KIØW, N9JF, NSØZ.

KHØAM: JE1CKA, AHØK, JA1WSX, JF1MIA, JO1RUR, JP1OGL, 7L1GVE, JH1GTV, JF1SQC, JE2JCV, JK3GAD, JE7BIZ, JR7OMD, JA9SSY. **KY1H &** NT2X, WZ1R, KB1W, KM1P, AA1AS, NY1L, WM1K, NJ1F, WT2Q, W1NG, RA3AKR. **KY3N &** WB3FIZ, W8FJ, WU3M, WN3K, WB3LFZ. **LY7A:** LY1DF, LY3DA, LY2BDW, LY3BBC, LY2BMX, LY2FN, LY2NK, LYR346, LYR728, LYR1751. **N2MM &** WB2R, AA2NS, KE3GA, K2TD, WK2G. **N2RM &** K3UA, W2RQ, N2AA, KZ2S, KA2AEV, N2BCC, WM2H, KE2PF, W2GMA, K2TW, KR2J. **N6DX &** AD6C, N6IC, N6VR, N6RZ, N6RVZ, N8SR, KC6X, WA6CDR, WB6SHD. **NE3F &** NT3F, K3ATO, KS3F. **NL7G &** KL7Y, KL7PJ, KØMVL, KL7U, NL7VJ, KL7AF, KL7DM. **OH1AJ:** OH1JM, OH1LD, OH1WR. **OL7O:** OK1AWZ, OK1CF, OK1FKD, OK1JKT, OK1WF, OK1WT, OK1TN, OK2RZ, OK2ZW, OM3TPG. **OZ4HAM:** OZ2JZ, OZ8PER. **OZ5WQ &** OZ1BIZ, OZ3PE, OZ3ZW.

PI4COM: PA3ALP, PA3BBP, PA3BWD, PA3CAL, PA3DMH, PA3ERC, PA3FVW, PA3GBQ, PAØCLN. **RU1A:** RU1AA, RV1AW, RW1AC, UA1ANC, UA1ARL, RV1AO, UA1-2574. **RW9C:** RA9CBS, RA9CMO, RA9DK, RA9DZ, RU9CK, RU9CZ, RW9CF, RZ9CN, RZ9CO, UA9CDC, UA9CDT, UA9CDV, UA9CIR, UA9CGA, UA9DD, UA9FQY, UW9CO, UN7-26-577. **UU5J:** LZ3DB, UB5-67-1Ø25, UB7-67-2, UT7CR, UU1JA, UU2JQ, UU2JX, UU2JZ, UU3JD, UU3JW, UU4JDF, UU4JFJ, UU4JKC, UU5JR, UU8JJ, UUØJM, UUØJX, UUØJZ, UX7CQ. **VP2EZA:** ND3A, ND3F, WR3Z. **VP5VW:** K8MFO, WT8N, WØCG, W6RGG, WA4DRU, WD8LLD, WD8AUB. **WØAIH/9 &** KØFVF, NØAXL, AAØOD, KØEA, WAØRBW, W4ETO, AIØY, WØUC, ND9O. **W3LPL &** WR3E, W3EKT, AI3M, KE3Q, KF3P, K3RA, N3RR, W4BQF, KO7V, KE9A, KP4XS. **W4MYA &** WA4QDM, K4BAM, WA4PGM, KX4S, Vicky.

W7RM & AA7NX, N6TR, WA6BXH, WJ7R, AA7VB, NV7F. **YKØA:** WA2TMP, K3NA, K6ANP, W6OAT, W6OTC, NW6P, N6TV, WØYK. **YU7ØL:** YU1OO, YU1ML, YU1JU, YZ1GD, YZ1ZI. **Z3ØM:** Z31GX, Z31GB, Z31FK, Z31ET, Z31VP, Z31CN, Z32XX, Z32JA, Z32XA, Z32KO, Z31WW, Z32KV, Boby san, Tone. **ZM2K:** ZL2AGY, ZL1AIZ, ZL4SS, ZL2IN, ZL2DX, ZL2BSJ, ZL2AHC, ZL2IR, ZL2AL.

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.)

SINGLE OPERATOR

NORTH AMERICA

UNITED STATES

K5ZD/1	**A**	**4,037,408**	**2471**	**132**	**430**
KM1H	**"**	**3,905,136**	**2460**	**131**	**433**
					(Opr. KQ2M)
W1KM	**"**	**3,443,040**	**2198**	**126**	**414**
N6BV/1	**"**	**2,793,570**	**2036**	**116**	**378**
W2SC/1	"	2,436,954	1831	121	350
W1WEF	"	1,962,326	1507	116	350
WA3ECT/1	*	795,166	933	78	224
K5MA/1	*	522,937	573	94	229
K1EFI	*	331,540	435	74	200
KG1D	*	300,909	407	78	189
WE6G/1	*	256,450	406	66	164
W1CNU	*	81,125	188	35	86
AA1KY	*	80,032	184	54	110
W1YN	*	56,724	169	36	80
N2LTK/1	*	31,930	114	35	68
AE1D	*	2,542	30	13	18
K2SX/1	**14**	**442,550**	**939**	**38**	**129**
W1ZK	*	164,880	398	36	108
KD1SG	*	39,000	177	21	57
KT1T	*	442	26	8	13
NU2L/1	7	62,060	219	28	79
AK1N	*	42,183	145	29	80
W1MK	**3.5**	**202,420**	**621**	**24**	**92**
***W1PH**	**A**	**1,182,216**	**1007**	**100**	**334**
***K2TE/1**	**"**	**709,920**	**728**	**89**	**271**
***KM1X**	**"**	**639,184**	**680**	**98**	**266**
*WS1E	*	461,472	514	98	260
*WA1LNP	*	392,504	565	88	238
*K8JLF/1	*	179,961	298	66	157
*WZ1K	*	171,450	295	74	151
*KB1KM	*	164,220	252	76	179
*W1AX	*	118,146	226	59	135
*K2MN/1	*	23,850	93	25	65
*K1VSJ	*	13,020	70	28	42
*KD1ON	*	9,453	57	25	44
*KQ1V	28	6,440	55	14	32
*WV1C	14	18,936	100	22	50
*WØMHK/1	7	6,630	55	16	35
*W1WMH	*	1,160	26	12	17
N2NT	**A**	**3,320,772**	**2154**	**132**	**414**
N2LT	**"**	**3,014,190**	**1967**	**131**	**404**
N2BA	**"**	**1,911,306**	**1475**	**112**	**349**
WA2ASM	*	567,504	629	91	245
WA2VYA	*	528,522	553	95	259
KA2HMJ	*	519,100	636	72	218
K2NV	*	389,136	507	79	189
N2MR	*	245,024	368	74	174
WB2YQH	*	240,560	360	71	177
KW2J	*	197,138	324	74	167
W2PAU	*	192,015	276	69	186
WB2RAJ	*	188,368	298	68	176
AA2GQ	*	157,113	282	66	141
N2PLE	*	109,028	217	59	135
N2LSK	*	77,550	185	50	115
N2EA	*	60,720	166	41	97
WA2UDT	*	56,631	160	44	42
N1CC/2	*	36,223	150	27	62
N2VPI	*	31,900	127	35	65
W2FXA	*	28,231	96	37	72
KE2OP	*	26,304	100	36	60
K2MP	*	26,208	100	28	68
WA2ABN	*	10,998	61	32	46
N2FY	*	9,240	55	17	39
WØVU/2	*	8,050	43	30	40
AE2T	*	6,750	46	20	34
K2DM	*	5,328	42	18	30
KB2HK	*	3,432	30	18	26
W5KI/2	*	3,420	31	17	28
WB2ABD	**14**	**169,188**	**434**	**34**	**104**
K2AW	*	102,124	395	33	88
K2SIG	**7**	**47,726**	**180**	**27**	**71**
W2XL	*	10,354	63	19	43
W2VO	**1.8**	**8,357**	**56**	**16**	**43**
N2KA	*	1,800	24	8	22
***K2SG**	**A**	**1,017,620**	**934**	**103**	**307**
***K2QMF**	**"**	**645,759**	**565**	**110**	**340**
*WAØQOA/2	"	488,431	617	78	215
*K2SHL	*	401,294	508	79	204
*AA2SZ	*	337,272	406	84	228
*W2KHQ	*	217,424	362	57	157
*N2PEB	*	148,995	269	62	153
*KA2CDJ	*	104,804	211	62	135
*K2JF	*	80,496	184	57	115
*NA2Q	*	76,797	185	56	105
*W2TZ	*	71,288	207	48	85
*WA2YSJ	*	53,654	147	47	92
*W2OMV	*	52,374	156	41	88
*WB2JFP	*	46,000	141	43	82
*K2SWZ	*	22,984	94	36	68
*AA2Y	*	18,423	79	30	59
*WB2DVU	*	15,747	72	32	55
*K3GYS/2	*	11,826	65	25	48
*W2LRO	*	10,998	82	33	45
*WA2LCC	*	10,731	60	28	45
*KF5FK/2	*	224	7	7	7
***WA2C**	**21**	**87,138**	**298**	**22**	**81**
***K2MFY**	**"**	**56,826**	**207**	**23**	**76**
*AE2N	14	2,132	50	10	16
*N2MBM	*	1,574	44	6	10
*K2DW	7	10,680	73	17	43
*WA2VQV	*	260	10	3	10
***W2FCR**	**1.8**	**10,203**	**71**	**14**	**43**
K3ZO	**A**	**2,752,000**	**1896**	**131**	**381**
W3BGN	**"**	**2,289,804**	**1625**	**119**	**379**
K3TEJ	*	835,110	755	109	296
W3FV	*	783,591	637	110	337
K3TUP	*	655,920	652	105	255
W3AZ	*	497,519	527	94	247
W3GK	*	451,605	478	99	246
W3GN	*	443,980	535	98	218
K2DOX/3	*	300,960	394	88	200
W3NX	*	217,750	333	85	165
K3OX	*	216,744	305	78	186
KL7HIR/3	*	209,125	385	71	168
AD8J/3	*	93,195	202	42	80
W3QIR	*	86,907	190	57	120
N3FDL	*	44,688	110	49	103
NI3I	*	28,017	102	31	37
N3KR	*	18,174	92	25	53
K3NL	*	3,276	30	17	25
KE3Q	**28**	**44,100**	**243**	**21**	**69**
AK3Z	14	2,208	26	15	17
W3GH	**7**	**184,350**	**447**	**34**	**116**
WZ3Q	**3.5**	**106,624**	**324**	**29**	**90**
WE3C	**"**	**77,080**	**302**	**21**	**73**
K4JLD/3	*	15,686	99	15	47
***W2UP/3**	**A**	**1,298,650**	**1044**	**114**	**361**
*W3UJ	*	373,277	475	74	209
*K2PH/3	*	360,598	439	88	213
*WT3W	*	261,738	375	74	188
*AA3HM	*	255,518	378	71	180
*W3CPB	*	64,218	174	43	96
*N3RW	*	51,987	154	38	91
*NV3V	*	9,112	52	26	41
***N2WCQ/3**	**14**	**68,508**	**258**	**28**	**71**
					(Opr. UT4UZ)
*WA3DMH	*	10,600	73	15	38
***WW3S**	**7**	**17,640**	**102**	**19**	**51**
N4RJ	**A**	**3,177,636**	**2109**	**141**	**391**
					(Opr. KM9P)
N6AR/4	**"**	**2,317,344**	**1390**	**154**	**452**
W4RX	**"**	**2,285,758**	**1562**	**134**	**380**
KT3Y/4	**"**	**2,171,334**	**1558**	**124**	**377**
WZ4F	*	1,186,702	1048	118	300
W3VT/4	*	1,032,444	770	127	355
KA4RRU	*	767,900	813	99	251
AD4KE	*	612,417	579	93	290
N4XM	*	538,891	579	103	244
AA4S	*	537,115	560	102	253
AC1O/4	"	511,014	578	85	237
					(Opr. WD8RIN)
W4AI	*	448,468	425	117	265
W1IHN/4	*	397,656	541	78	185
W4PLL	*	271,566	352	84	198
N4MM	*	226,005	323	71	176
N4UH	*	128,450	257	50	125
WB4RDV	*	100,016	207	62	126
N4KE	*	97,948	192	64	124
AC4ZO	*	91,176	214	57	117
K5OTI/4	*	62,720	139	52	108
W4LMJ	*	56,440	150	39	97
AB4UF	*	43,070	114	47	99
AC4PQ	*	38,468	123	41	77
W8CNL/4	*	36,855	114	37	80
KC4ELO	*	35,250	125	47	78
W4IF	*	30,906	107	31	71
WA4ORG	*	26,215	93	33	74
K4EZ	*	22,010	117	19	71
WA4MCZ	*	20,534	164	47	89
NF4L	*	15,500	64	42	58
W4KYW	*	10,877	65	30	43
W4OGG	*	7,731	83	31	56
AD4ZE	*	6,944	48	25	37
KA4HMV	*	4,720	49	28	31
W4YV	**28**	**29,797**	**176**	**22**	**61**
N4BP	**"**	**27,864**	**174**	**22**	**59**
KC2X/4	**21**	**226,980**	**615**	**31**	**99**
K4ISV	**"**	**208,488**	**648**	**34**	**102**
					(Opr. NI4M)
N4CT	**"**	**205,610**	**513**	**34**	**111**
K4JPD	**"**	**166,522**	**440**	**33**	**106**
W4PZV	**"**	**162,540**	**483**	**30**	**96**
					(Opr. WA4SVO)
K4RZ	**14**	**91,988**	**282**	**29**	**87**
W4NTI	**"**	**53,088**	**206**	**23**	**73**
N3AHI/4	*	2,436	30	9	19
WB4MAI	**7**	**107,316**	**285**	**32**	**100**
AD4MQ	**"**	**87,252**	**238**	**34**	**98**
K4PI	**3.5**	**108,642**	**350**	**25**	**89**
WA4CTA	**"**	**100,796**	**327**	**27**	**86**
NU4Y	*	51,183	214	27	72
K4TEA	**1.8**	**21,128**	**108**	**20**	**56**
KX4R	**"**	**8,791**	**61**	**16**	**43**
K4YYL	*	3,135	38	9	24
***K7GM/4**	**A**	**1,149,528**	**967**	**114**	**340**
***K7SV/4**	**"**	**870,916**	**745**	**131**	**347**
*N4YDU	*	447,744	602	87	231
*KK4SM	*	276,774	376	84	199
*AA4GA	*	272,157	399	72	177
*N8LM/4	*	255,368	405	66	167
*AD4IL	*	221,136	315	78	194
*K4XG	*	216,752	341	84	164
*N4GAK	*	190,226	290	71	156
*W4DEC	*	153,595	271	73	148
*K4UTE	*	148,785	200	89	184
*N4DW	*	141,381	262	63	144
*KN4Y	*	110,229	249	58	123
*WA4ZXA	*	109,686	239	56	125
*K4FPF	*	105,378	200	57	136
*KR4DL	*	65,493	150	61	110
*KI4HN	*	57,984	160	51	100
*WB4VKW	*	37,788	111	54	80
*KR4NY	*	26,159	96	34	67
*AA4KD	*	26,028	101	39	69
*W4PBG	*	23,828	97	34	58
*AB4KL	*	22,862	235	19	52
*W4YN	*	9,458	90	37	60
*K2YJL/M4	28	1,464	16	8	16
***WB4TDH**	**21**	**119,000**	**349**	**33**	**86**
***N4MO**	**14**	**186,320**	**489**	**36**	**100**
***WA6KUI/4**	**"**	**128,570**	**369**	**33**	**97**
***AB4RX**	**7**	**54,827**	**181**	**31**	**78**
***WR4K**	**"**	**41,106**	**150**	**27**	**75**
***K4LDR**	**"**	**33,582**	**142**	**23**	**64**
K5MR	**A**	**2,021,940**	**1539**	**148**	**330**
N5RZ	**"**	**1,824,268**	**1323**	**145**	**357**
W5UDA	*	617,440	665	100	240
KD5M	*	470,906	524	102	244
AB5YG	*	359,856	485	93	201
NJ1V/5	*	248,000	500	68	132
KM5G	*	203,975	362	32	102
AB5I	*	54,365	153	49	82
AH9B/W5	*	8,588	48	36	40
WM4Z/5	**14**	**188,430**	**638**	**31**	**78**
WA5OYU	*	118,521	396	33	84
W5CWQ	**3.5**	**15,360**	**91**	**20**	**44**
WF5E	*	12,033	74	22	41
K5WXZ	**1.8**	**4,500**	**44**	**15**	**30**
N5NMX	*	3,040	36	14	24
***K5KLA**	**A**	**598,950**	**616**	**108**	**255**
***WD5K**	**"**	**420,600**	**509**	**102**	**198**
*W5VGX	*	323,136	410	107	190
*NN5T	*	262,870	352	95	176
*K5BDX	*	139,499	260	69	130
*KJ5YM	*	76,050	190	61	108
*NZ5O	*	58,797	164	49	90
*KB2HV/5	*	31,610	113	42	67
*AJ4F/5	*	18,130	91	41	57
*WØVX/5	*	10,488	56	30	39
*W5GAI	*	8,990	52	23	39
***W5FO**	**14**	**170,170**	**422**	**38**	**105**
K6NA	**A**	**1,611,610**	**1266**	**150**	**305**
AB6FO	**"**	**1,348,032**	**1486**	**115**	**221**
N6TU	**"**	**1,122,329**	**1065**	**129**	**248**
AI6V	"	859,732	966	117	197
W7CB/6	"	500,647	701	92	167
W6OUL	"	328,104	472	96	152
K6VX	"	317,440	456	100	156
WA5VGI/6	*	293,045	494	79	136
W6FSJ	*	292,040	430	88	157
W6MVW	*	206,248	332	84	148
K6FO	*	169,506	297	83	136
W6WB	*	117,467	251	60	113
AB6YL	*	103,230	260	64	91
N6IBP	*	100,408	238	65	98
K6DR	*	90,675	219	66	89
W6RFF	*	69,376	196	53	75
K6LRN	*	43,318	140	54	67
W6RO	*	28,160	129	37	43
					(Opr. N6MI)
W6ISQ	**28**	**2,070**	**30**	**13**	**17**
W6YA	**21**	**213,614**	**594**	**33**	**94**
W6BSY	*	55,440	242	27	61
NW6S	*	41,712	189	23	56
K3EST/6	**14**	**458,060**	**1083**	**39**	**109**
W6QHS	**"**	**192,786**	**527**	**36**	**91**
W6NKR	*	59,762	213	31	65
W6KFV	*	30,186	130	26	60
W6OVO	"	3,181	56	18	31
N6AW	**7**	**335,069**	**762**	**40**	**111**
W1FEA/6	**"**	**104,081**	**390**	**29**	**68**
K6MO	1.8	297	12	6	5
***W6JTI**	**A**	**693,548**	**780**	**116**	**216**
***K6XV**	**"**	**655,109**	**855**	**107**	**192**
*K6OY	*	502,737	539	108	231
*N6NF	*	300,312	438	97	161
*N6JM	*	105,377	231	68	99
*N6GL	*	99,060	245	62	94
*W6PYX	*	88,053	226	64	83
*N6NG	*	78,900	198	61	98
*AA6EE	*	51,330	172	52	66
*WD6DXH	*	39,785	142	50	59
*N6AZR	*	39,063	176	41	46
*AE9F/6	*	33,320	165	21	47
*W6NNV	*	26,394	95	47	59
*KK6RG	*	1,131	16	15	14
*WA6FGV	21	13,572	98	18	34
*W6JTA	*	10,927	80	21	28
*KU6T	14	16,530	104	23	35
*N2ALE/6	*	25	3	2	3
*W8QZA/6	7	5,363	70	12	19
*KJ6DL	*	1,920	28	15	15
*WA6WPG	*	882	24	6	8
N7ML	**A**	**880,581**	**952**	**114**	**223**
W2VJN/7	**"**	**862,967**	**941**	**120**	**209**
K6XQ/7	*	382,525	504	100	175
W7SE	*	347,490	443	104	182
K7ABV	*	303,644	425	93	175
KA7T	*	205,408	340	82	142
W7LR	*	204,352	301	91	157
AA7FL	*	193,620	345	78	132
WG7A	*	184,576	323	80	126
W7LGG	*	172,659	297	72	129
NT7E	*	171,864	336	66	120
N7AGP	*	164,350	375	67	106
W7IIT	*	149,234	324	64	102
N7JXS	*	117,280	278	66	94
W7QDM	*	114,840	256	71	103
K9JF/7	*	88,695	153	82	137
NN7F	*	71,603	147	77	116
W8AEF/7	*	59,280	185	45	75
KX7J	*	30,789	111	40	59
KJ7EJ	*	22,862	147	36	35
N7IXG	*	17,420	103	34	31
KU7K	*	6,417	70	11	20
WA7KLK	**28**	**2,000**	**29**	**10**	**15**
N7IRR	**14**	**126,000**	**393**	**30**	**82**
W7AYY	*	30,044	145	25	49
KC7EM	**7**	**409,676**	**960**	**36**	**110**
NX7K	**"**	**168,064**	**473**	**36**	**92**
***K7NPN**	**A**	**138,278**	**325**	**69**	**97**
***W7QN**	**"**	**129,675**	**278**	**69**	**106**
***N7EPD**	**"**	**127,263**	**260**	**72**	**105**
*W7YS	*	97,744	238	56	93
*W7JHS	*	28,470	126	39	39
*NN7A	*	23,463	91	44	55
*W7TSQ	*	14,600	77	35	38
***N7RO**	**14**	**160,398**	**501**	**32**	**82**
*WAØRJY/7	*	135,642	443	31	80
*W7HS	*	72,267	232	31	78
*K6OMB/7	7	12,932	90	20	33
*K7WA	3.5	736	19	9	7
K3JT/8	**A**	**636,000**	**642**	**114**	**261**
W8ILC	*	305,162	386	79	207
W8KTQ	*	216,200	374	80	155
WA8SAE	*	183,456	301	81	153
K8MR	*	150,870	238	78	157
W8UPH	*	118,272	267	54	114
K8JM	*	65,258	181	42	92
K8UC	*	53,424	164	44	82
NT8V	*	36,162	107	36	90
K4FW/8	*	1,053	83	21	55
K8OQL	**21**	**118,900**	**382**	**32**	**84**
KV8Q	*	47,846	187	26	68
K8GL	**14**	**427,356**	**913**	**37**	**125**
WB8VPA	*	94,512	257	34	98
W8IQ	*	52,500	181	32	73
N8LXS	*	52,359	208	28	65
W8PN	7	814	14	10	12
W9LT/8	**3.5**	**85,845**	**332**	**20**	**77**
W8JGU	**"**	**77,112**	**259**	**25**	**83**
AA8U	**1.8**	**11,966**	**141**	**18**	**44**
W8QID	**"**	**3,784**	**36**	**14**	**30**
***KF8TM**	**A**	**237,771**	**339**	**80**	**181**
*WB8BMV	*	102,084	210	63	125
*KA8ZPE	*	72,090	156	61	117
*N8KSO	*	58,695	172	45	84
*W8IDM	*	17,711	86	34	55
*WB8ORV	*	9,760	61	23	38
*KI8O	*	1,551	54	15	18
***W8UMR**	**14**	**75,376**	**236**	**29**	**83**
*KB8NTY	*	16,947	118	21	42
***KW8J**	**7**	**27,804**	**129**	**24**	**60**
W9RE	**A**	**1,864,160**	**1359**	**133**	**355**
K9MA	**"**	**836,600**	**827**	**113**	**263**
WN9O	*	607,095	557	126	279
WB9IIQ	*	602,316	644	95	243
WB9HRO	*	406,326	549	91	190
AA9JY	*	174,838	334	76	70
WO9S	*	137,588	242	66	146
K9QYC	*	56,889	140	51	96
W9RN	*	53,392	144	48	94
K9OM	**21**	**63,700**	**228**	**28**	**72**
W9GIL	**"**	**48,312**	**196**	**25**	**63**
WA9BOW	*	30,498	142	25	53
W9OF	**14**	**170,955**	**415**	**37**	**108**
KA6A/9	**"**	**166,784**	**473**	**34**	**94**
K9CAN	*	160,992	440	34	95
WA9TPQ	7	18,375	97	22	53
N9NC	**3.5**	**33,553**	**153**	**22**	**67**
WB9Z	**1.8**	**23,100**	**121**	**19**	**56**
***K9LJN**	**A**	**476,705**	**526**	**103**	**232**
***NA1R/9**	**"**	**309,551**	**439**	**86**	**177**
*K9OSH	*	47,704	137	48	86
*WB9ZPK	*	10,595	53	33	32
*W9LNQ	*	1,108	44	38	40
***KO9Y**	**21**	**93,170**	**280**	**30**	**91**
***W9CH**	**7**	**77,880**	**231**	**33**	**87**
*K9MMS	*	34,692	162	22	62
*K9GS	*	16,575	93	23	52
***AA9AX**	**3.5**	**12,449**	**90**	**16**	**43**
KØRF	**A**	**1,932,678**	**1569**	**137**	**317**
KØEU	**"**	**1,496,940**	**1308**	**134**	**275**
KØKX	**"**	**953,856**	**823**	**122**	**292**
NSØB	*	369,222	455	97	201
WBØO	*	323,646	377	108	215
KEØUI	*	170,138	338	69	125
WØML	*	151,512	302	58	119
WØHW	*	124,380	257	62	118
WØRSR	*	83,655	210	54	89
WXØS	*	41,866	143	49	72
WØRT	*	18,540	75	39	51
WAØCLR	*	15,480	69	31	55
KIØE	*	6,821	49	20	29
NQØI	**14**	**395,100**	**982**	**37**	**113**
KØKE	**"**	**378,896**	**966**	**34**	**102**
					(Opr. KTØF)
WIØR	*	44,100	175	28	62
KØOD	**7**	**124,712**	**342**	**34**	**97**
WCØY	**3.5**	**22,100**	**123**	**17**	**51**
KCØEI	*	9,126	67	15	39
KVØQ	**1.8**	**14,030**	**99**	**20**	**41**
WØRXL	*	1,764	30	11	17
***AAØSQ**	**A**	**125,994**	**279**	**58**	**108**
*KØGSV	*	51,308	146	46	81
*K9BQL/Ø	*	28,914	128	30	49
*WAØBNX	*	21,883	100	24	55
*AAØPB	*	18,228	84	36	48
*WDØAVV	*	5,751	40	21	50
*WAØOZP	*	4,914	44	18	24

ALASKA

NL7DU	A	39,975	200	29	46
AL7MX	**1.8**	**7,353**	**197**	**9**	**10**

ANTIGUA & BARBUDA

V29J	**14**	**423,021**	**1660**	**28**	**75**
					(Opr. N6TJ)
***V2/G6QQ**	**A**	**385,284**	**898**	**59**	**135**

BAHAMAS

***C6A /N4RP**	**A**	**490,915**	**944**	**76**	**159**
***C6A /AA6EW**	**"**	**86,005**	**411**	**32**	**71**

BERMUDA

***VP9MZ**	**A**	**101,500**	**361**	**47**	**78**

CANADA

VO1MP	**A**	**1,225,095**	**1522**	**83**	**252**
VE1AI	**"**	**844,830**	**1090**	**86**	**229**
VG1HA	*	687,165	948	85	220
VE9ST	**14**	**654,885**	**1860**	**35**	**112**
***VE1AZN**	**A**	**607,600**	**1024**	**64**	**181**
***XO9SF**	**"**	**596,936**	**1080**	**59**	**173**
*VG9HF	14	36,060	288	19	41
*VE9AA	1.8	9,591	202	6	17
VE2AYU	**A**	**599,844**	**986**	**70**	**189**
VE2FFE	*	34,200	145	30	65
VE2DC	14	33,696	42	13	26
VG2ZP	3.5	24,120	293	11	29
***VG2AWR**	**A**	**76,111**	**241**	**40**	**91**
*VE2JDR	14	3,937	56	11	20
VE3ST	**A**	**372,887**	**492**	**61**	**220**
VA3SK	*	149,465	342	55	124
VE3HX	28	4,602	49	12	27
VE3RM	**21**	**39,620**	**241**	**19**	**51**
VE3DO	**1.8**	**10,488**	**108**	**15**	**31**
VE3PN	*	8,865	162	8	19
***VE3OTL**	**A**	**233,800**	**614**	**63**	**112**
*VE3DZZ	*	189,924	383	63	141
*VA3NR	*	161,318	463	55	103
*VE3ZTH	*	66,560	167	51	109
*VE3DSN	*	61,122	215	41	81
***VA3MM**	**14**	**107,494**	**275**	**36**	**106**
*VA3KA	*	68,000	268	25	75
VE4JB	**A**	**124,575**	**343**	**51**	**100**
***VG4VV**	**A**	**548,207**	**1242**	**71**	**138**
***VE5SF**	**"**	**187,264**	**535**	**58**	**96**
*VE5GD	14	11,385	113	17	28
VE6BMX	**A**	**198,468**	**599**	**57**	**91**
VE6KRR	*	33,522	226	36	38
VE6JY	**14**	**483,204**	**1485**	**34**	**100**
					(Opr. VE6WQ)
***VG6BF**	**A**	**324,597**	**703**	**73**	**130**
*VE6HPT	*	158,220	550	57	78
*VE6EZ	*	118,900	464	47	69
VE7QO	**A**	**245,112**	**603**	**69**	**99**
VE7IN	**"**	**242,490**	**586**	**72**	**105**
VE7VR	*	200,816	501	70	93
VD7C	**14**	**460,629**	**1506**	**33**	**94**
					(Opr. VE7XR)
VG7SZ	**7**	**487,440**	**1755**	**34**	**86**
					(Opr. VE7NTT)
VE7RBL	*	71,280	633	22	32
VE7CC	**3.5**	**103,836**	**677**	**26**	**42**
***VE7UF**	**A**	**232,547**	**646**	**64**	**75**
*VE7FYO	14	34,161	233	23	36
XN9JA	**A**	**95,188**	**376**	**38**	**70**

CAYMAN ISLANDS

*ZF8BS	A	1,831,200	2812	95	205	(Opr. AA6KX)

COSTA RICA

TI1C	7	849,288	2817	29	103	(Opr. TI2CF)
*TI5NW	A	949,390	2153	70	136	(Opr. WB3LUI)

CUBA

*CO2VG	3.5	42,790	376	16	39

DOMINICANA

*HI8LC	21	29,832	180	21	45

GREENLAND

*OX3KV	A	49,980	323	23	61

GUATEMALA

TGØAA	14	968,250	2938	37	113	(Opr. NL7GP)

JAMAICA

*6Y5X	A	616,448	884	96	205	(Opr. DJ6QT)

MARTINIQUE

*FM5CW	A	334,750	1025	61	145

MEXICO

XE2MX	A	230,201	456	80	131
*XE1 /AA6RX	A	1,331,323	2021	105	196
*XF3 /K7DBV	"	430,920	1150	52	119

PANAMA

*HP3 /KG6UH	A	240,406	779	44	98

PUERTO RICO

WP4IIW	A	1,924,740	2522	94	239
*KP4TQ	21	380,808	1475	24	84
*WP4 /AA3BG	"	261,660	1138	25	73
*KP4VA	7	225,704	1190	22	67 (Opr. KP4TK)

ST. MAARTEN & SABA

*PJ5JP	A	302,480	676	57	142
*PJ8NA	21	50,740	393	17	42 (Opr. K1NA)

ST. VINCENT

*J8ØC	A	2,537,808	3164	85	251	(Opr. DL3KDV)

U.S. VIRGIN ISLANDS

KP2 /WJ2O	A	3,776,500	4296	90	274
KP2A	14	1,332,460	3115	38	132 (Opr. KW8N)

ZONE 1

K5LZO/MM	A	2,451	44	9	10

AFRICA

BOTSWANA

A22MN	7	613,470	1622	33	97	(Opr. K8MN)

CANARY ISLANDS

EA8EA	A	12,805,040	6404	162	508	(Opr. OH2MM)
*EA8 /OK2BOB	A	6,705	51	13	32	
*EA8AF	"	648	14	11	13	
*EA8 /EA1AK	L28	409,500	1106	25	100	
*EA8ADJ	28	16,264	107	2	36	
*EA8EY	21	6,474	59	11	28	
*EA8CN	7	199,980	664	21	80	

CEUTA & MEILLA

EA9GK	28	87,500	458	16	54
EA9EU	21	625,053	1562	32	111
EA9EO	7	1,122,506	2503	34	120 (Opr. EA7TL)

CHAGOS

VQ9SS	1.8	16,092	101	18	36	(Opr. N6SS)

DJIBOUTI

*J28FX	A	88,176	230	32	100

IVORY COAST

TU2MA	21	465,875	1574	31	94

MADAGASCAR

*5R8DS	A	205,380	370	45	135

MADEIRA ISLANDS

CR3U	21	720,090	2074	27	99	(Opr. DL2HYH)
CS3T	"	335,946	994	27	91	(Opr. CT3FT)
CR3P	14	1,317,084	2770	38	126	(Opr. DF4SA)
CT3FN	3.5	371,478	1286	22	79	(Opr. HB9CRV)
*CT3 /DF5AN	14	10,444	126	13	15	

MAURITANIA

5T5JC	A	1,034,620	1205	78	211

MAURITIUS

*3B8 /F6HWU	A	959,101	1309	61	186

NIGER

*5U7Y	A	1,121,236	1597	61	175

NIGERIA

5NØMVE	3.5	4,836	54	9	22

REPUBLIC OF SOUTH AFRICA

ZS6EZ	A	5,322,790	3398	148	382
ZS6NW	28	298,906	985	24	79
*ZS6AJS	A	472,611	622	83	180

RWANDA

*9X5EE	A	4,014,270	3201	110	315 Opr. PA3DZN)

UGANDA

5X1XT	A	1,461,761	1367	104	263 (Opr. WF5T)

ZAIRE

*9Q5EXV	A	402,447	834	49	114

ZONE 33

*EA1FBJ /MM	A	280,896	416	52	179

ASIA

ASIATIC RUSSIA

UAØJB	A	1,252,713	1779	130	233	
RWØAB	"	843,483	1420	57	180	
RUØLL	"	609,801	1244	101	148	
UAØLCZ	"	65,076	288	49	67	
UAØDC	14	49,138	274	28	51	
RWØA	7	304,780	2177	35	105	(Opr. RVØAM)
UAØSR	3.5	34,650	255	16	50	
*UAØFZ	A	807,128	1259	103	181	
*RAØFU	"	439,131	809	102	129	
*UAØSBQ	"	9,880	191	26	49	
*UAØAGI	28	54,080	308	22	58	
*UAØSMF	"	7,263	210	12	15	
*UAØCIL	7	14,940	146	21	39	
*UAØSMM	3.5	50,838	222	28	72	
UA9XS	A	322,400	542	54	154	
UA9MX	21	178,776	619	31	86	
RZ9UA	14	627,238	1674	35	111	
UA9LBQ	"	286,488	786	35	103	
RW9SW	"	279,180	760	34	98	
UA9XC	7	71,601	309	22	65	
RW9DX	3.5	224,540	831	22	81	
UA9OA	"	196,317	802	23	76	
UA9AT	1.8	48,888	268	15	57	
UA9CR	"	46,800	233	14	64	
*UA9SCX	21	96,444	350	27	81	
*RK9CYA	14	29,884	173	15	47	
*UA9XW	"	25,124	194	12	32	
*UA9YNC	3.5	63,332	353	16	55	
*RX9ST	1.8	31,388	190	11	48	

AZERBAIJAN

4K9W	A	67,080	176	46	110

CHINA

*BY4SZ	A	243,360	940	62	94 (Opr. BZ4SCT)

CYPRUS

H2ØA	A	7,467,174	4391	136	458 (Opr. 5B4ADA)

HONG KONG

VS6WO	A	5,983,476	4556	166	398	(Opr. WX3N)
VR2GO	7	330,716	1520	33	83	(Opr. 9V1YC)

INDIA

*VU2PTT	A	934,032	1024	100	248

ISRAEL

4X/OK1JR	28	86,464	460	15	49
4X4NJ	1.8	184,896	698	19	77
*4X1VF	A	358,550	523	52	150

JAPAN

JH1AEP	A	1,906,416	1593	148	284	
JF1KFV	"	548,750	787	91	159	
JA1QOW	"	252,442	424	85	141	
JA1JKG	"	248,949	302	83	116	
JR1GRF	"	193,781	299	84	133	
JG1BPS	"	110,722	272	72	94	
JA1BNW	"	56,244	133	71	101	
JA1GTF	"	47,928	226	79	133	
JA1WYQ	"	40,560	114	54	76	
JA1IT	"	40,260	145	38	72	
JO1QZI	"	31,240	136	38	50	
JE1PMQ	"	28,756	120	37	54	
JA1WHG	"	25,382	99	49	49	
JA1IVL	"	24,738	90	44	49	
JA1BRL	"	18,821	132	18	59	
JA1QML	"	13,266	78	30	37	
JE1LFX	14	19,176	103	26	42	
JA1NUT	7	200,013	589	34	87	
JA1XEM	"	1,350	30	8	7	
7L3SQL	3.5	9,468	129	15	21 (Opr. JH3LCU)	
*JA1IDY	A	656,362	713	132	214	
*JS1OYN	"	338,462	568	82	147	
*7M3FMT	"	272,843	446	95	138	
*JS1UMQ	"	218,790	409	87	134	
*JK1LSE	"	180,830	323	84	130	
*JA1TRP	"	94,084	224	69	103	
*JA1QN	"	85,392	230	54	90	
*JA2FNY/1	"	70,686	181	57	96	
*JR4PMX/1	"	67,235	202	51	68	
*JA7KBR/1	"	65,296	175	67	87	
*JE1CTM	"	58,904	160	64	84	
*JA1BUI	"	52,986	174	50	66	
*JQ1NGT	"	48,440	172	47	64	
*JA1KI	"	46,728	172	52	80	
*JH1BCS	"	43,734	154	48	63	
*JA1OQJ	"	38,988	133	47	67	
*JL7PVR/1	"	31,155	125	42	51	
*7N2TCF	"	26,705	93	46	63	
*JL1MWI	"	26,681	255	38	57	
*7M2JTT	"	25,990	103	49	66	
*JI1RCB	"	24,360	110	37	47	
*JA1AB	"	19,596	102	30	41	
*JR1UMO	"	18,460	94	30	41	
*JR1VNX	"	11,418	77	32	34	
*JG1TVK	"	9,996	59	31	37	
*JH1PXY	"	8,568	53	31	41	
*JA1JNR	"	6,667	47	30	29	
*JA1BLT	"	5,586	52	18	20	
*7J1ABD	"	5,080	49	21	19 (Opr. WA6URY)	
*JK1BJX	"	3,965	65	21	40	
*JH1UES	"	2,565	40	17	28	
*JA1NLX	28	6,075	55	20	25	
*JO1CRA	"	4,452	45	18	24	
*JA1AAT	"	1,134	20	9	12	
*JA1VVH	"	1,020	20	9	11	
*JP1BDU	"	612	14	8	9	
*JJ1LRD	"	322	10	6	8	
*JE1VTZ	21	102,300	344	35	75	
*JE1BDC	"	92,828	374	28	64	
*JAØBMS/1	L21	59,004	221	30	69	
*JS1KQQ	"	27,468	135	25	59	
*JO1WIZ	"	21,980	126	23	47	
*JM1KNI	"	13,674	106	21	32	
*JR1NKN/1	"	7,866	77	16	30	
*7K1EQG	"	3,850	51	14	21	
*JA1XPU	"	2,490	32	13	17	
*JR2BNF/1	14	177,156	509	38	88	
*JA1KFX	"	115,858	393	37	69	
*JH1BDS	"	92,640	342	32	64	
*JA1JQY	"	87,048	305	34	70	
*JA1VBW	"	52,512	195	35	61	
*JA1PCM	"	48,880	169	37	67	
*JH1DYV	"	48,690	203	31	59	
*JK1NSR	"	7,503	67	17	24	
*JM1AQU	"	4,240	46	18	22	
*7N2DXF	"	3,959	51	16	21	
*JA1POS	"	132	6	5	6	
*JK1AFI	7	14,906	87	25	33	
*JI3FAD/1	"	14,790	110	21	30	
*JR1LEV	"	14,616	104	25	33	
*JA1JGP	"	3,038	38	14	17	
*JA1BFN	"	552	24	8	15	
*JH1NXU	"	288	8	6	6	
*JE1KDM	"	114	7	3	3	
*JA1LZR	3.5	4,212	65	14	13	
*JE1SPY	1.8	576	19	8	8	
JA2EU	A	578,760	774	96	169	
JA2QVP	"	39,412	132	51	67	
JA2SWF	"	16,536	80	32	46	
JN2QYN/2	"	16,247	101	37	40	
JH2ECB	21	77,044	287	31	72	
JE2HYS	"	62,900	273	25	60	
JR2XFS	14	206,112	651	36	77	
*JA2IU	A	394,224	594	91	167	
*JN2AMD/2	"	254,130	464	84	131	
*JA2PSV	"	77,054	245	48	70	
*JA2AXB	"	48,300	174	41	64	
*JH2NWP	"	28,490	141	30	44	
*JL2ICO	"	24,940	108	34	52	
*JE2KSP	"	5,928	44	27	30	
*JA2MZ	"	3,293	37	17	20	
*JQ2XON	28	104	5	3	5	
*JI2UNR	21	163,680	532	33	77	
*JH2CYU	"	2,040	26	13	17	
*JL2LPX	14	59,082	256	29	57	
*JA2HO	"	41,940	177	35	55	
*JQ2LGS	"	28,566	144	25	44	
*JA2KPV	"	11,780	78	24	38	
*JA2QJ	"	6,816	85	15	17	
*JA2NNF	7	34,188	156	29	55	
*JA2GTW	"	16,815	113	23	36	
*JG2YIV	"	11,856	98	20	28 (Opr. JF2WEQ)	
*JF2WXS	"	2,244	31	14	19	
*JE2PCY/2	3.5	2,581	48	13	16	
*JH2QMT	1.8	86	10	3	2	
*JL2PQV	"	6	1	1	1	
JR3NZC	A	446,332	666	100	141	
JA3ARM	"	258,298	456	82	132	
JH3AIU	"	176,400	312	83	127	
JL3SBE	"	94,692	241	62	94	
JG1EIQ/3	28	560	16	7	9	
JO3TKX	14	238,000	126	20	35	
JA3EEM	"	22,951	145	22	37	
JA3XOG	3.5	10,127	110	14	27	
JA3BCT	"	768	16	10	14	
*JF3IUC	A	275,631	463	89	148	
*JF3NLQ	"	238,641	416	78	133	
*JH3CUL	"	175,545	306	89	146	
*JE3UHV	"	78,890	204	63	98	
*JG3CQJ	"	63,468	192	57	72	
*JA3JOT	"	59,813	202	40	67	
*JA3VOV	"	50,578	177	53	68	
*JA3TBT	"	11,886	134	38	68	
*JG3EHD	"	5,166	44	16	25	
*JE3KGT	"	1,380	18	14	16	
*JH3FTZ	28	464	13	7	9	
*JQ3UDL	21	73,332	283	29	68	
*JA3AVO	"	3,872	38	16	28	
*JF3AGI	"	2,412	31	14	22	
*JF3PEY	"	16	2	2	2	
*JI3BFC	14	104,190	340	34	81	
*JN3DSH	"	39,688	182	28	54	
*JA5UBW/3	"	13,747	100	23	36	
*JE3CYH	"	7,990	68	20	27	
*JA3GN	7	53,064	207	31	68	
JE4VVM	A	1,897,608	1669	137	271	
JA4ESR	"	203,904	359	93	123	
JH4CPC	3.5	4,480	61	15	25	
JA4LKB	1.8	2,336	34	14	18	
*JL4CMT	A	229,460	411	83	137	
*JA4CZM	"	144,720	266	92	124	
*JA4BAA	"	49,236	147	52	80	
*JA4HIX	"	44,958	150	54	73	
*JA4ETH	28	1,932	30	12	16	
*JE4SDB	21	4,514	48	15	22	
*JA4AQR	"	2,680	29	13	17	
*JH4JNG	14	182,640	542	38	82	
*JR4GPA	"	54,115	251	28	51	
JH5FXP	A	2,389,920	2179	127	263	
JA5IP	"	199,554	337	97	140	
JA5AF	"	14,529	72	37	50	
JA5EXW	14	472,896	1153	37	107	
JA5CKD	"	102,786	340	34	77	
JA5APU	"	98,000	424	24	56	
JA5JGV	3.5	4,060	55	14	21	
*JA5PDS	7	16,878	118	23	35	
JA6GCE	A	1,387,071	1398	122	247	
JS6GIM	"	193,764	307	86	155	
JR6LLN	"	54,488	153	55	84	
JA6WW	"	4,590	49	17	17	
JH6NBW	21	104,310	400	31	64	
JF6OJX	3.5	5,092	58	19	19	
*JA6SRB	A	127,426	283	65	104	
*JJ6TWQ	"	106,546	245	69	98	
*JA6HJP	"	36,352	110	52	76	
*JA6BWH	"	31,047	100	51	80	
*JA6QDU	28	1,914	26	13	16	
*JK6ISK	21	13,260	87	22	30	
*JF1VXB/6	"	2,310	32	15	18	
*JH6WHN	14	190,043	579	37	82	
*JH6SQI	"	31,278	150	28	50	
*JA6WFM	7	17,280	115	21	39	
*JJ6DGP	"	9,408	70	19	30	
JH7XGN	A	1,538,585	1397	139	252	
JA7BO	"	122,636	265	66	106	
JA7GAX	"	27,018	91	48	66	
JA7JW	"	16,280	80	28	46	
JH7DNO	21	349,440	903	36	104	
JA7FTR	"	237,952	671	35	93	
JA7MSQ	"	121,505	467	27	68	
JA7AXP	14	5,977	55	19	24	
JE7RJS	7	94,044	329	35	67	
JA7JI	"	43,225	178	30	61	
*JH7QXJ	A	316,089	562	71	136	
*JH7FUJ	"	13,192	80	29	39	
*JA7BVA	"	5,715	46	19	26	
*JH7CJM	"	576	14	12	12	
*JA7ERJ	28	897	17	10	13	
*JA7AMK	21	71,775	336	29	58	
*JA7VEI	"	14,805	87	23	40	
*JF7GDF	"	2,926	37	14	24	
*JA7SSB	14	236,785	720	35	80	
*JA7JND	"	26,520	149	25	43	
*JH7JVJ	7	77,121	276	33	66	
*JA7QQK	"	8,256	66	19	29	
*JA7FFN	"	7,876	71	19	25	
*JE7JRD	"	2,295	34	14	13	
*JA7CQB	3.5	1,173	30	10	13	
JA8RWU	A	1,952,817	1782	142	251	
*JE8KGH	A	168,586	324	77	117	
*JA8JDQ	"	82,750	243	44	81	
*JA8AJE	"	77,490	235	48	78	
*JR8OGB	21	51,611	257	23	50	
*JA8UBV	7	40,400	155	33	67	
JA9JFO	A	644,742	787	109	197	
JA9CCG	"	7,245	52	31	32	
*JA9XBW	A	509,622	642	117	197	
*JR9NVB	"	114,208	261	67	105	
*JA9DDF	"	83,776	194	77	99	
*JE9LLO	"	31,185	124	40	65	
*JH9WSX	"	19,491	91	36	53	
*JH9KVF	21	143,444	477	32	77	
*JE9HVF	"	2,964	33	18	21	
*JA9XAT	"	418	11	9	10	
*JR9OPJ	14	79,182	275	36	70	
*JA9ANF	"	1,314	38	11	18	
*JA9KUG	7	35	4	3	4	
JHØFUW	7	113,088	436	31	65	
*JHØKHR	A	1,031,493	1060	129	242	
*JAØUMV	"	365,307	530	101	162	
*JAØQWO	"	149,532	303	81	123	
*JAØHC	"	120,130	256	85	120	
*JHØEPI	21	56,781	261	28	53	
*JHØBLI	"	4,635	44	16	29	
*JAØCJK	"	308	10	7	7	
*JFØSGW	14	94,347	348	33	66	
*JAØGZ	"	840	14	8	12	
*JHØESK	7	2,378	36	13	16	
*JAØAOQ	3.5	2,210	40	13	13	

KAMPUCHEA

XU7VK	A	822,564	1330	101	212	(Opr. HA7VK)

KAZAKHSTAN

UN6T	A	43,143	568	23	50	
UN8LW	14	575,421	1663	35	106	
UN9LY	"	569,572	1378	35	116	
UN9LX	"	292,371	805	33	90	
UN2L	3.5	408,894	1233	34	105	(Opr. UA9BA)
UN5J	"	170,700	776	25	75	
UN2O	1.8	37,464	259	9	47	

KIRGHIZIA

*EX2A	7	20,724	120	17	49
*EXØM	1.8	10,282	122	14	39

KOREA

HL9DC	A	744,226	1398	76	162	(Opr. W8KJP)
*HL5AP	A	110,313	320	49	104	

KUWAIT

9K2ZZ	7	891,902	2472	32	110

LEBANON

OD5PL	A	39,984	149	33	65
*OD5 /OH1NOA	A	581,830	1198	35	131

MACAO

XX9X	A	2,369,864	2892	124	280	(Opr. AB6NJ)

MONGOLIA

*JT7FAA	A	281,853	712	66	153	(Opr. UTØYW)

NEPAL

*9N1AP	A	65,280	248	33	69	(Opr. HB9APJ)

QATAR

A71CW	A	6,514,340	3775	152	468	(Opr. SP5EXA)

SAUDI ARABIA

7Z5OO	A	2,838,693	2543	104	325	(Opr. K3UOC)
HZ1HZ	A	1,143,714	950	105	324	

TADZHIKISTAN

EY8MM	A	1,184,622	1201	98	260

TAIWAN

BV2A	A	28,232	285	68	117

THAILAND

HSØZBI	A	1,218,114	1735	108	246

NOT SURE WHICH RADIO TO BUY? HERE'S WHAT THE EXPERTS HAVE TO SAY ABOUT AZDEN.

PCS-7000H 2-METER MOBILE

(QST 1/95) ..."With its ample heat sink, the PCS-7000H ran cool, even during long-winded conversations at the 50W level. The Azden is the only radio in this group to offer a two-year warranty... This radio receives as well as it transmits."

PCS-7500H 6-METER MOBILE

(73 8/94) ..."its handheld PTT microphone has a solid feel and produces solid transmit audio. Its receive audio is full, loud and undistorted, and sounds better than many mobile rigs. And the rig is beautiful... maybe the only game in town for a moderately priced 6-meter FM rig." ***(Radio Fun 10/94)*** ..."The Azden PCS 7500H exceeds my performance expectations! It's a real bargain in today's ham equipment marketplace and every 7500H owner I've talked to agrees with me!"

PCS-7200 220MHz MOBILE

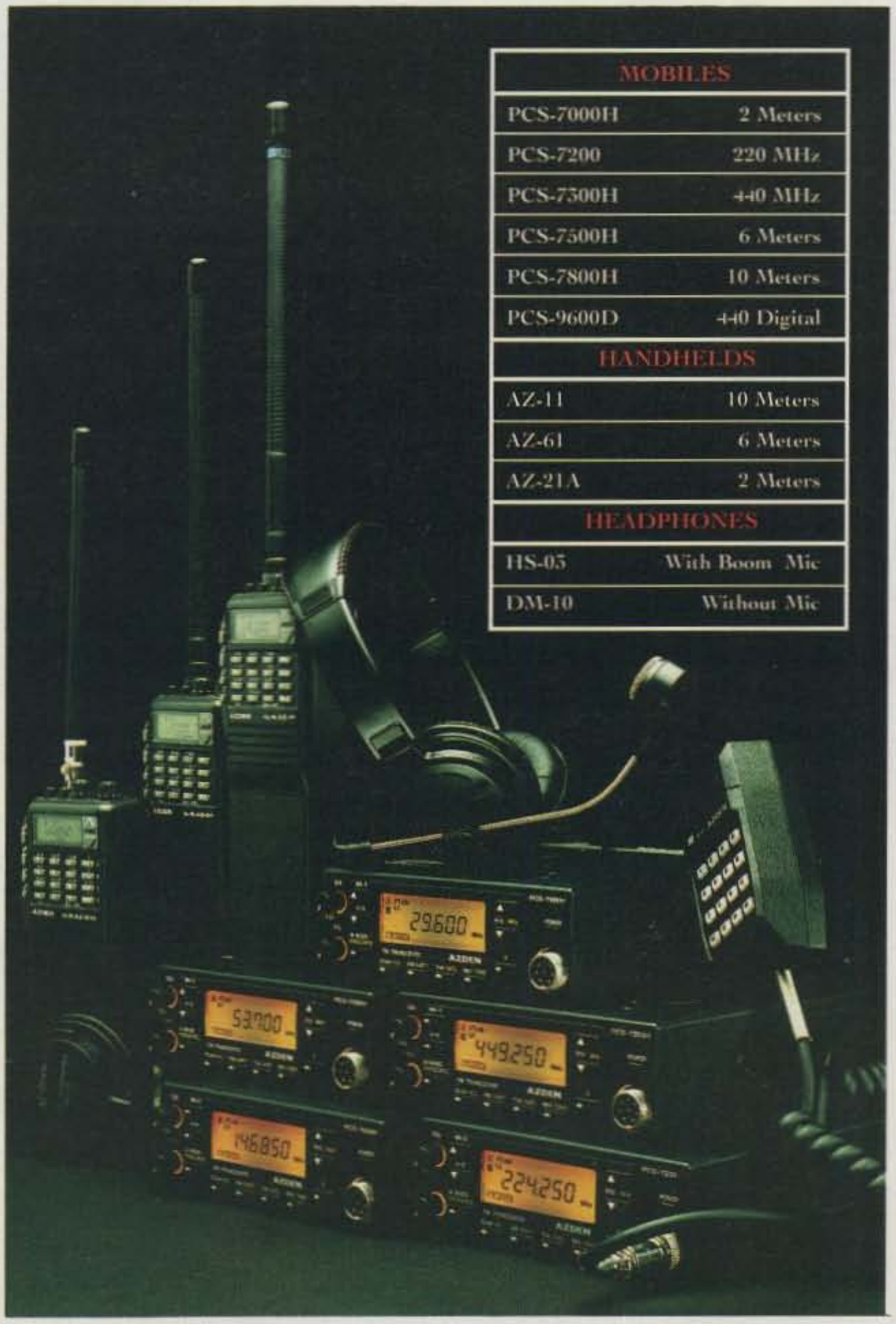
(73 3/95) ..."An excellent entry-level radio for newcomers and oldtimers alike. With 25 watts output power and sensitive, selective receiver, it's a 'workhorse' radio that will serve a variety of needs."

AZ-61 6-METER HANDHELD

(QST 3/95) ..."With the AZ-61, Azden brings the convenience of an H-T to the 6-meter FM World... The design is rugged and Azden backs the durability with a two-year warranty (unique in the amateur equipment market)... The AZ-61 was a pleasure to use. The radio performed well in all applications: mobile, portable, and home." ***(CQ 1/94)*** ..."I was pleasantly surprised to hear just how good it sounds, both on receive and to the other operator on transmit. The ability to program so many different aspects of the radio also makes it quite attractive... Did I say that I enjoy using the radio? I certainly do! You will also enjoy owning one of them." ***(73 11/93)*** ..."This IS an advanced-featured handheld...I like it. I like the Azden AZ-61 6-meter a lot."

AZ-21A 2-METER HANDHELD

(CQ 2/95) ..."The reception of weak signals was outstanding with this unit... It is certainly one of the best I have ever heard... From a performance standpoint, I would give the AZ-21A a very high rating."



PCS-9600D VOICE/DATA TRANSCEIVER

(QST 5/95)..."Putting it simply, the PCS-9600D is an outstanding transceiver. In fact, it is the only single-mode base/mobile rig that we've tested that is truly 9600-bit/s ready... The Azden PCS-9600D offers the best of both worlds. It's a capable 440-MHz voice rig and a true "9600-baud ready" packet transceiver."

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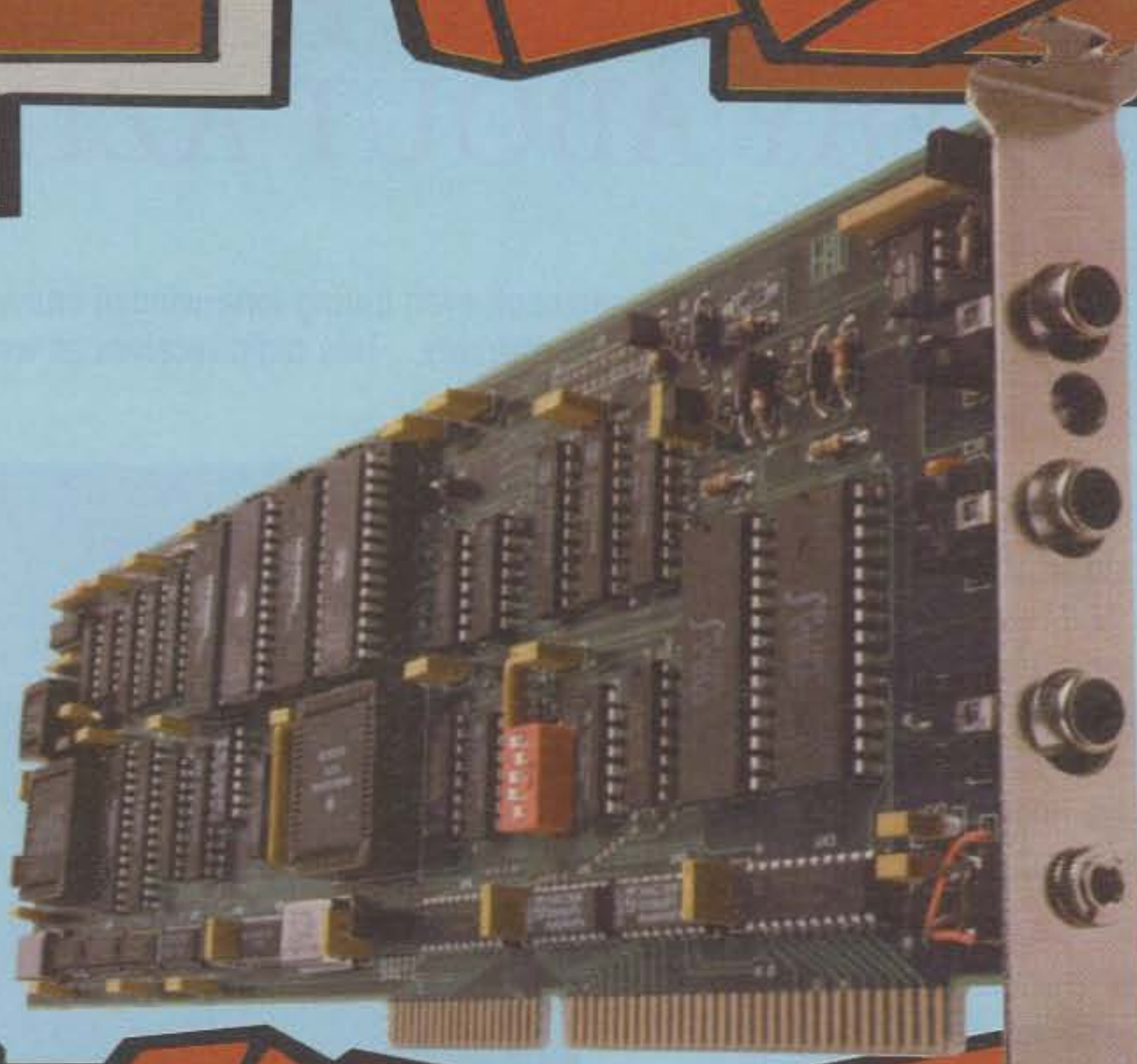

P38

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nateur Bands • **rx:** 100kHz- 30MHz • 100
emories • cross-band dual receive • 200w
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power supply • 6"h x 16"w x 15"d, 58 lbs.
-1000D *Deluxe* • dual bandpass filter •
np. compensated xtal osc. • 2.4kHz &
Hz SSB filters, 500Hz CW crystal filter.
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nateur Bands • **rx:** 100kHz to 30MHz • 90
emory channels • SCAF • FSP • DDS •
h speed antenna tuner w/memories • AC
wer supply •12¾"w x 4½"h x 11½"d, 30 lbs
-990DC • DC version w/o built-in AC ps.

-840 HF Transceiver • **rx:** 160-10m Ham
nds • **rx:** 100kHz-30MHz • 100 memories
dependent tx/rx per memory) • Twin band
cking VFOs • optional FM • automatic
M repeater offset with selectable CTCSS
code • 100W • 9⅝"w x 3⅛" x 9½"d,18 lbs.

-8500 Dual Band Mobile • Compact with
w Spectra-Analyzer and Smart Controller
c. 50/35W, 5½"w x 1⅝" x 6¼"d, 2.4 lbs.

Coupon! See List

FREE YSK-900 Remote Kit! w/FT-900/AT & FT-900 Limited Time

FT-900/AT HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 100W • 100 memories • built-in antenna tuner • front sub-panel optionally mounts separately from the main body • CTCSS encode with repeater offset • twin stacking VFOS. **FT-900** • does not have built-in antenna tuner.

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2 meters: 144-148MHz; **70cm:** 430-450MHz • opt. modules for 50, 220MHz and 1.2 GHz • 100 memories • full duplex crossband with inverted tracking • 25w (144, 220 & 440MHz) 10w (50 & 1.2GHz) • built-in AC supply or 13.5 VDC • 5⅛"h x 14½"w x 11½"d, 19.8 lbs.

5100/5200 Coupon!

FT-5200/6200 Dual Band Mobiles
32 memories • CTCSS encode • dual receive • built-in duplexer • cross band repeat • remote capability • 5½"w x 1⅝"h x 6"d, 2 lbs.
FT-5200 • 2M/440MHz (50/35w).
FT-6200 • 440MHz/1.2GHz (35/10w)
FT-5100 • Like FT-5200 w/o remote capability.

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FT-2200/7200 Mobiles
50 memories • DTMF page/coded squelch • backlit DTMF mic • 5½"w x 1½"h x 6¼"d, 2.8 lbs.
FT-2200 • 2m with 110-180MHz rx (50w).
FT-7200 • 440MHz (35w)

FT-2500M Coupon!

FT-7400H Mobile (left) • 440MHz (35w) • 31 memories • alpha display • track tuning • CTCSS encode • backlit DTMF microphone • 6¼"w x 1⅞"h x 7"d, 3.3 lbs.
FT-2500M 2m Mobile (top) • 50w • 31 memories • CTCSS encode • scan • backlit DTMF mic • 6"w x 1¾"h x 7"d,1½ lbs.
FT-912RH Mobile (right) • 1.2GHz

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FM/SSB/CW • 2w with 12V @ 1.1A, or optional battery case • DTMF mic w/up-down tune • dual VFOs • 10 memories • scan •. LCD display • strap • 2⅛"h 6¼"w x 7½"d, 2.6 lbs.
FT- 290RMkII 2m (25w) • **FT-690RMkII** 6m (10w) **FT-790RMkII** • 430-450MHz (25w)

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FT-411E • 2.5w 2 meter FM HT
FT-911 • 1w, 1.2GHz HT
FT-33R • 5w 220 MHz FM HT
FT-530 • 2m/440 FM HT w/TTP **$50 Coupon**
FT-11R • 1.5w 2M HT **$30 Coupon**
FT-11R/HP • 5w 2M HT **$30 Coupon**
FT-41R • 440MHz FM HT

FT-811 440 HT **CLOSE-OUT $199.95**

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FT-840	**$50 Off**
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FT-5200	**$40 Off**
FT-5100	**$30 Off**
FT-2500M, FT-2200..	**$30 Off**
Handhelds	
FT-11R, FT-11R/HP..	**$30 Off**
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All Except G-450XL...	**$25 Off**

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TURKEY (ASIA)

***TA3D**	**A**	**1,197,914**	**1336**	**74**	**233**	
*TA2ZO	"	133,209	300	28	95	
***YM2DS**	**7**	**558,129**	**1343**	**32**	**111**	
						(Opr. Z32ZM)
***TA2BD**	**"**	**45,456**	**324**	**7**	**41**	

UZBEKISTAN

UK8FF	1.8	3,696	65	8	20

WESTERN MALAYSIA

*9M2XC	21	15,423	201	20	33

ZONE 24

UAØZDA /MM	A	43,776	324	24	48

ZONE 25

YL3IZ/MM	14	9,922	242	19	22

EUROPE

ALAND ISLANDS

OHØBH	**14**	**1,003,353**	**2957**	**39**	**130**	
						(Opr. OH2MAM)

ALBANIA

ZA1AJ	**14**	**591,201**	**2065**	**37**	**126**	
***ZA /PAØGAM**	**A**	**104,232**	**411**	**47**	**125**	

ANDORRA

***C31NA**	**14**	**22,684**	**350**	**11**	**42**

AUSTRIA

OE5SPW	**A**	**116,842**	**517**	**55**	**171**	
OE6CLD	"	104,611	351	43	126	
OE9SLH	"	94,536	281	53	149	
OE3DSA	**14**	**135,516**	**523**	**36**	**102**	
OE5BWN	**3.5**	**48,975**	**584**	**13**	**62**	
*OE1TKW	A	25,199	126	36	77	
*OE/DF4TD	"	23,010	129	31	87	

BELEARIC ISLANDS

EA6GP	**A**	**185,592**	**564**	**54**	**155**	
EA6ZY	**28**	**159,962**	**811**	**27**	**94**	
EA6ACC	**3.5**	**144,540**	**1259**	**18**	**72**	
***EA6ZS**	**A**	**46,736**	**231**	**36**	**91**	
*EA6ABK	"	31,753	147	33	80	

BELGIUM

ON5LL	**14**	**317,603**	**1101**	**35**	**108**	
ON4NL	7	17,174	215	13	49	
***ON4APU**	**A**	**219,792**	**611**	**55**	**186**	
*ON6LO	"	13,328	134	28	40	
***ON4RU**	**21**	**203,987**	**610**	**37**	**124**	
*ON4ARJ	"	5,632	84	12	32	
***ON6CW**	**14**	**112,322**	**554**	**31**	**82**	
*ON4XG	"	70,620	379	24	83	

BELARUS

EU1MM	**A**	**279,807**	**883**	**46**	**137**	
EW2AA	"	122,180	369	65	140	
EU2AW	"	39,198	114	45	94	
EW6TU	**14**	**105,561**	**698**	**27**	**84**	
EU1DX	**7**	**135,493**	**556**	**33**	**104**	
EW8OS	"	17,024	219	12	52	
EU7SD	**3.5**	**25,585**	**238**	**19**	**66**	
EU4AA	"	14,839	159	14	57	
EU6EU	"	1,161	31	3	6	
***EW3CW**	**A**	**159,858**	**376**	**49**	**200**	
*EV1F	"	85,484	373	44	128	
*EU6AA	"	83,550	474	30	120	
*EW6BL	"	68,365	458	26	95	
*EW1TZ	"	4,356	56	25	42	
***EU1EU**	**1.8**	**16,038**	**274**	**6**	**48**	
*EU1AA	"	6,477	113	6	45	

BOSNIA-HERZEGOVINIA

T93D	**3.5**	**190,848**	**1270**	**24**	**88**
T94DD	**1.8**	**61,983**	**780**	**11**	**60**
***T99W**	**A**	**176,988**	**683**	**42**	**130**
***T91ENS**	**21**	**178,560**	**755**	**32**	**96**
					(Opr. T94TF)
*T92X	"	3,720	55	12	12
***T92A**	**7**	**117,554**	**776**	**24**	**82**
*T94NE	3.5	3,968	108	6	25

BULGARIA

LZ1BJ	**A**	**534,779**	**1125**	**75**	**242**	
LZ5Z	**21**	**242,957**	**873**	**35**	**108**	
						(Opr. LZ1UQ)
LZ5W	**14**	**781,696**	**1966**	**39**	**158**	
						(Opr. LZ1MC)
LZ7G	**7**	**453,840**	**1712**	**35**	**120**	
						(Opr. LZ1NK)
LZ1V	"	205,620	951	32	106	
						(Opr. LZ3NY)
LZ1AP	**3.5**	**37,730**	**649**	**12**	**43**	
LZ1WR	**1.8**	**15,512**	**239**	**8**	**48**	
***LZ1AG**	**A**	**118,296**	**252**	**68**	**180**	
*LZ1IA	"	22,680	110	35	70	
***LZ2GS**	**28**	**34,727**	**156**	**29**	**92**	
***LZ1CW**	**14**	**60,420**	**428**	**23**	**72**	
*LZ3UP	"	41,160	330	22	62	
***LZ1CF**	**3.5**	**27,600**	**326**	**12**	**57**	
***LZ2WA**	**1.8**	**12,740**	**255**	**5**	**44**	

CROATIA

9A6P	**A**	**200,961**	**515**	**60**	**183**	
						(Opr. 9A3ZO)
9A2WJ	"	40,616	149	45	97	
9A7A	**14**	**617,520**	**1849**	**39**	**116**	
						(Opr. 9A2ME)
9A3IQ	**7**	**546,426**	**1495**	**37**	**125**	
9A4WY	"	185,125	851	28	97	
9A4D	**1.8**	**78,876**	**771**	**16**	**68**	
						(Opr. 9A2LH)
***9A2AJ**	**A**	**999,242**	**1305**	**117**	**370**	
*9A3SM	"	129,950	300	73	157	
***9A3ER**	**21**	**232,140**	**758**	**35**	**111**	
*9A9D	"	30,600	282	19	53	
						(Opr. 9A4KK)
***9A1HBC**	**7**	**35,108**	**370**	**14**	**53**	
***9A2OB**	**1.8**	**45,150**	**547**	**12**	**63**	
*9A2NO	"	12,474	234	6	48	

CZECH REPUBLIC

OK1DIG	**A**	**842,391**	**1277**	**91**	**290**	
OL4M	"	339,864	899	58	180	
OK1FPG	"	37,440	103	66	90	
OK1TW	28	10,112	75	22	42	
OK1RF	**14**	**622,104**	**1705**	**37**	**124**	
OK1DT	"	246,740	858	34	112	
OK1XJ	**7**	**64,792**	**385**	**24**	**80**	
OK1JST	"	20,579	194	13	48	
OK1DTP	**3.5**	**88,506**	**679**	**21**	**78**	
OK1FF	"	57,267	551	15	66	
OK1JDX	**1.8**	**39,024**	**460**	**16**	**56**	
OK1DRU	**"**	**27,235**	**390**	**8**	**57**	
***OK1KT**	**A**	**748,932**	**1017**	**107**	**342**	
***OK1DCF**	**"**	**610,902**	**886**	**93**	**326**	
*OK1FPS	"	585,086	1153	80	266	
*OK1BA	"	413,721	825	65	232	
*OK2EC	"	378,173	790	74	230	
*OK2QX	"	371,280	604	95	262	
*OK1DG	"	350,755	807	67	228	
*OK2PCF	"	311,740	804	61	286	
*OK2DB	"	298,936	455	89	255	
*OK1AXB	"	257,508	597	58	218	
*OK1MKI	"	253,890	661	63	210	
*OK1BMW	"	243,756	417	79	254	
*OK1KZ	"	203,510	553	57	178	
*OK2BPY	"	158,949	504	47	142	
*OK2TBC	"	136,768	461	79	223	
*OL3Z	"	130,968	490	45	159	
						(Opr. OK2HI)
*OK2BXR	"	104,325	400	44	151	
*OK1AOU	"	77,436	364	37	125	
*OK1DKR	"	76,973	221	56	135	
*OK2BBQ	"	64,152	283	36	126	
*OK1DMS	"	62,622	296	30	112	
*OK2PPM	"	47,804	279	35	112	
*OK2FEI	"	29,304	94	49	83	
*OK2BND	"	28,024	211	24	100	
*OK2SWD	"	23,725	150	20	45	
*OK2BHE	"	6,250	47	22	28	
*OK1JDJ	"	3,900	124	40	60	
***OK1AES**	**28**	**19,295**	**108**	**23**	**62**	
***OK1ABP**	**21**	**126,567**	**334**	**36**	**111**	
*OK1LL	"	112,962	419	36	98	
*OK2SAT	"	77,748	296	29	85	
*OL6R	"	77,740	304	29	86	
						(Opr. OK2PHH)
*OK1FHI	"	60,416	218	34	84	
***OL7Z**	**14**	**357,046**	**1093**	**35**	**132**	
						(Opr. OK2PAY)
*OK1VD	"	151,604	549	38	113	
*OK1XW	"	135,063	609	34	95	
*OK2ON	"	92,225	421	22	97	
*OK1DIL	"	86,591	310	32	99	
***OK1CZ**	**7**	**96,990**	**564**	**26**	**96**	
***OK1EE**	**"**	**92,684**	**520**	**25**	**91**	
*OK1IR	"	74,592	469	22	89	
*OK1IE	"	23,409	150	20	61	
***OK1RR**	**3.5**	**60,344**	**709**	**13**	**63**	
*OK1FOG	"	25,500	305	12	56	
*OK2PJW	"	15,196	240	10	48	
*OK1MGW	"	10,974	140	9	50	
***OK2PWJ**	**1.8**	**16,698**	**215**	**11**	**58**	
*OK2PKJ	"	3,444	76	6	36	
*OK1FFH	"	1,595	57	4	25	

DENMARK

OZ1LO	**A**	**2,144,740**	**2317**	**132**	**433**	
OZ1FTU	"	135,807	347	61	142	
OZ8NJ	"	93,939	430	39	134	
OZ1AXG	"	87,360	193	75	165	
OZ5DX	"	37,692	227	27	81	
OZ7YL	"	15,225	100	24	63	
OZ4OC	"	14,210	83	27	71	
OZ2RH	"	5,886	40	25	29	
OZ8RO	**7**	**185,000**	**788**	**34**	**114**	
OZ1FTE	**"**	**149,796**	**612**	**37**	**109**	
OZ1ING	**1.8**	**85,184**	**814**	**17**	**71**	
***OZ8AE**	**A**	**816,871**	**1083**	**112**	**361**	
*OZ5MJ	"	485,576	704	95	311	
*OZ1JRF	"	398,812	815	79	279	
*OZ5IPA	"	93,795	406	41	144	
*OZ5ABD	"	71,200	301	45	133	
*OZ4FF	"	42,746	114	46	88	
*OZ7NB	"	28,800	205	30	90	
*OZ8QW	"	16,520	108	33	85	
*OZ7JQ	"	2,415	61	21	43	
***OZ1BMA**	**21**	**19,592**	**153**	**12**	**62**	
*OZ1KRF	14	2,993	52	11	30	
*OZ1IZB	7	2,044	69	6	22	
*OZ1JLX	3.5	7,808	106	12	49	
*OZ1APA	1.8	544	18	2	16	

DODECANESE

***SV5 /SMØCMH**	**A**	**162,180**	**658**	**51**	**153**	

ENGLAND

G4BUO	**A**	**3,032,424**	**2390**	**145**	**461**	
GØIVZ	**"**	**2,308,068**	**2732**	**111**	**386**	
G3UFY	"	752,978	1027	88	295	
GØLZL	"	180,810	436	45	200	
GØAEV	**28**	**26,829**	**144**	**22**	**77**	
G84RF	**21**	**324,960**	**939**	**35**	**125**	
						(Opr. GØSLY)
G3KDB	**14**	**519,715**	**1487**	**38**	**117**	
G4CNY	"	332,225	1110	34	103	
G4ODV	"	192,717	944	35	98	
G3PJT	**7**	**222,575**	**988**	**34**	**111**	
G3WRR	"	10,945	140	12	43	
G3XTT	**1.8**	**68,388**	**658**	**14**	**68**	
***G3NKS**	**A**	**469,778**	**754**	**76**	**261**	
***GØDEZ**	**"**	**280,302**	**758**	**56**	**218**	
*G4ZFE	"	273,828	724	58	170	
*G3ESF	"	265,038	616	62	209	
*G3RSD	"	124,410	437	44	130	
*G5MY	"	105,924	306	45	137	
*G3KKQ	"	90,873	281	50	157	
*GØMRH	"	17,484	160	33	60	
***G4OBK**	**28**	**19,513**	**153**	**18**	**61**	
***G3RXP**	**14**	**113,460**	**570**	**33**	**60**	
*G4WYG	"	73,062	402	22	77	
*G3YMC	1.8	5,016	132	3	35	

ESTONIA

ES5MC	**1.8**	**70,980**	**753**	**15**	**69**
***ES6PZ**	**A**	**362,595**	**747**	**77**	**268**
***ES1CW**	**3.5**	**23,826**	**314**	**10**	**56**

EUROPEAN RUSSIA

UA4AGP	**A**	**260,026**	**693**	**63**	**211**	
RU4AA	**"**	**252,234**	**684**	**57**	**184**	
RZ1AZ	"	55,552	232	28	100	
UA1ACG	"	50,440	226	35	95	
RX3RT	"	24,910	124	24	70	
RW6HA	**28**	**31,152**	**266**	**22**	**66**	
RA6LW	"	25,935	191	25	66	
UA6LAK	**21**	**23,157**	**249**	**25**	**68**	
RW1ZA	**14**	**380,375**	**1417**	**32**	**93**	
RA6AX	**7**	**350,320**	**1255**	**35**	**116**	
RW4WR	**"**	**311,645**	**1070**	**38**	**119**	
RW1ZZ	"	120,078	466	32	94	
RW6HZ	**3.5**	**144,232**	**844**	**29**	**92**	
RA3XO	"	81,328	610	23	81	
RW6FF	"	52,440	585	16	58	
RX3QX	**1.8**	**18,660**	**253**	**10**	**50**	
RA4UDW	"	11,752	168	8	44	
***UA3ABJ**	**A**	**283,128**	**777**	**69**	**182**	
***RU4WE**	**"**	**242,433**	**1107**	**50**	**169**	
*UA1ANA	"	199,104	572	50	194	
*UA3RLZ	"	166,934	570	46	145	
*UA4YG	"	84,258	400	43	143	
*UA3LIZ	"	70,384	305	32	134	
*UA6LDF	"	6,213	71	16	41	
***RA4HRL**	**21**	**99,800**	**566**	**25**	**75**	
***RA4PQC**	**"**	**92,114**	**556**	**28**	**78**	
*RV6APN	"	8,520	96	12	48	
***RW3WM**	**14**	**64,320**	**285**	**33**	**87**	
*RA3VY	"	9,625	176	12	43	
***UA1OMS**	**7**	**73,514**	**410**	**31**	**87**	
*RV3LA	"	41,106	338	24	69	
*UA3MIF	"	37,064	322	21	61	
*RV6LA	"	29,148	224	21	63	
***UA3WU**	**3.5**	**64,724**	**594**	**14**	**66**	
***RW1AN**	**"**	**55,335**	**518**	**17**	**68**	
*UA3AGW	"	46,209	532	14	59	
*RA1AAO	"	27,531	370	10	53	
*RA6XJ	"	11,123	189	6	43	

FAROE ISLANDS

OY1CT	**A**	**1,718,212**	**2975**	**85**	**319**
*OY4M	A	19,110	98	20	45

FINLAND

OH6WZ	**A**	**2,681,184**	**2338**	**124**	**404**	
OH1AA	**"**	**2,181,408**	**2475**	**125**	**371**	
						(Opr. OH1MYA)
OH6KIT	**"**	**1,939,086**	**1932**	**115**	**367**	
OH6YF	"	1,638,609	1665	113	358	
OH6NEX	"	1,354,966	1859	90	304	
OH3MMH	"	539,585	837	88	259	
OH3NM	"	209,062	371	74	200	
OH1EB	"	179,172	499	53	136	
OH2BUQ	"	89,698	282	47	102	
OH2BGD	"	51,303	124	65	82	
OH1BOI	"	27,965	93	44	75	
OH2RL	"	27,772	170	32	68	
OH1VL	"	26,069	137	35	96	
OH6KUL	"	14,705	113	24	61	
OH1PY	"	2,016	25	12	20	
OH1AF	**21**	**334,059**	**1056**	**37**	**122**	
						(Opr. OH1MDR)
OH5PA	"	14,516	82	24	52	
OH2PM	**14**	**766,263**	**1985**	**38**	**125**	
OH6NIO	**"**	**728,550**	**2092**	**36**	**114**	
OH8LQ	**"**	**666,900**	**2062**	**39**	**111**	
OH1NSJ	"	635,537	1742	40	123	
OH7NVU	"	186,618	829	26	88	
OH2BCD	"	10,442	78	18	36	
OH3BZY	**3.5**	**131,495**	**752**	**28**	**91**	
OH1AD	**"**	**95,551**	**636**	**24**	**83**	
						(Opr. OH1WZ)
OH9BVM	"	74,675	575	23	80	
OH1TN	"	54,560	504	19	69	
OH3WS	"	24,882	303	13	53	
OH2BSQ	"	23,180	336	12	49	
***OH2VF**	**A**	**239,632**	**455**	**74**	**198**	
*OH2LNH	"	77,430	295	47	127	
*OH7NW	"	65,505	274	37	128	
*OH1LEG	"	62,264	183	53	119	
*OH3MFP	"	38,936	251	30	94	
*OH1XT	"	27,390	174	28	82	
*OH9AB	"	5,280	53	20	40	
***OH3MFT**	**21**	**78,775**	**339**	**33**	**104**	
*OH6RC	"	35,880	174	26	78	
*OH6MBQ	"	19,314	151	15	43	
*OH6UP	"	2,077	36	11	20	
***OH3LIM**	**14**	**300,875**	**1014**	**35**	**110**	
***OH6LBW**	**"**	**266,805**	**1084**	**28**	**93**	
*OH3MC	"	41,296	212	27	62	
*OH3KSS	"	38,640	333	17	52	
*OH8LC	"	15,225	139	18	57	
*OH2BRH	"	1,350	36	7	11	
***OH3NLP**	**3.5**	**50,220**	**519**	**14**	**67**	
*OH3TY	"	36,300	362	15	60	
*OH4TY	"	17,751	235	10	51	
*OH4MCV	"	6,072	113	8	36	

FRANCE

F6FGZ	**A**	**2,952,349**	**2612**	**129**	**400**	
TM7XX	**"**	**2,800,584**	**2644**	**132**	**450**	
						(Opr. F5MUX)
F6CEL	"	1,005,327	1675	84	249	
F5TNI	"	811,133	912	109	334	
F6OIE	"	755,083	1118	88	313	
F6HNX	"	334,339	618	75	202	
F6KEQ	"	314,001	637	67	184	
F6HLC	"	45,752	187	39	94	
F6BEE	**14**	**555,504**	**1535**	**38**	**125**	
F6DKV	**"**	**325,038**	**1163**	**35**	**107**	
F6EZV	**1.8**	**107,624**	**836**	**17**	**71**	
F6CWA	"	30,284	312	13	54	
***F6DDR**	**A**	**1,021,760**	**705**	**134**	**381**	
***F6DSV**	**"**	**677,794**	**936**	**92**	**306**	
*F6IIE	"	638,928	896	98	310	
*F6BQY	"	575,904	904	82	254	
*F5NQL	"	289,172	710	67	201	
*F6FTB	"	280,665	572	62	181	
*F6FII	"	279,531	641	64	197	
*F5RBG	"	248,321	608	60	179	
*F5MOY	"	176,328	419	62	175	
*F6GYU	"	171,200	745	38	162	
*F5JLV	"	149,084	401	42	146	
*F5OEV	"	142,216	300	67	165	
*F5NKX	"	115,786	360	46	119	
*F5RAB	"	79,530	277	41	124	
*F5JDG	"	79,060	384	31	103	
*F6DZD	"	49,000	197	39	101	
*F5LET	"	36,156	162	42	89	
*F5JOT	"	27,030	148	33	69	
*F5OIU	"	25,916	105	43	81	
*F2FX	"	25,844	135	33	76	
*F5AM	"	11,397	66	29	58	
*F8TM	"	6,072	86	12	57	
*F6EQV	28	11,180	78	19	46	
***F9DK**	**14**	**43,086**	**320**	**19**	**67**	
*F6ICM	"	9,180	103	16	44	

GERMANY

DL6RAI	**A**	**3,169,792**	**2584**	**144**	**460**	
DL2NBU	**"**	**2,377,822**	**2167**	**132**	**430**	
DF3KD	**"**	**1,072,242**	**1391**	**105**	**321**	
DL4YBM	"	856,350	1111	104	346	
DJ9MH	"	781,335	939	113	372	
DJ8CR	"	601,139	920	90	317	
DK4RM	"	528,341	594	124	349	
DL6YR	"	485,392	782	88	280	
DJ1YH	"	452,400	566	99	291	
DL7BQ	"	432,564	852	83	265	
DL2DXX	"	432,372	687	76	198	
DL8KAW	"	420,282	694	82	280	
DL1JF	"	396,440	708	85	255	
DL8JMN	"	353,094	553	82	212	
DL1DTL	"	348,950	599	80	270	
DF3OL	"	344,964	605	85	271	
DK3YD	"	295,074	603	67	224	
DF2UU	"	285,450	438	88	258	
DF3QG	"	261,405	446	95	238	
DL2DN	"	140,967	344	62	164	
DL4JTN	"	130,800	399	52	166	
DK7ZT	"	125,400	300	63	157	
DL1LOD	"	114,114	355	50	159	
DL1ARJ	"	77,212	144	39	80	
DL3BQD	"	66,660	249	44	121	
DL3ZI	"	50,887	190	49	102	
DK8NX	"	49,449	119	64	95	
DJ6DO	"	45,864	285	35	112	
DL4DCC	"	44,148	201	39	117	
DL2DSA	"	39,274	200	46	100	
DL8UI	"	36,328	132	52	100	
DJ2UU	"	31,812	211	27	105	
DL5AMF	"	17,613	71	41	62	
DL5XAT	"	16,128	80	16	48	
DL3DRN	"	10,298	60	20	36	
DL8UDD	"	2,728	50	14	30	
DL8UED	"	2,585	46	10	37	
DK2PH	**28**	**30,294**	**170**	**23**	**76**	
DJ7PT	"	16,350	111	21	54	
DL8DZV	21	13,090	85	27	50	
DLØIU	**14**	**247,752**	**835**	**34**	**114**	
						(Opr. DL4AAE)
DJ7AA	**7**	**427,734**	**1430**	**37**	**141**	
DL8CTG	"	49,392	309	27	85	
DF1JC	"	45,954	227	25	86	
DKØBC	**3.5**	**151,250**	**1004**	**25**	**85**	
						(Opr. DL2SDN)
DK3DM	**"**	**134,514**	**873**	**20**	**86**	
DL9SCU	"	125,504	819	21	85	
DL7MAE	"	114,696	794	23	85	
DLØLW	"	5,080	135	7	33	
						(Opr. DL2SAX)
DL1IAO	**1.8**	**105,644**	**810**	**19**	**79**	
DL8NBE	"	17,820	266	10	56	
***DL1YAW**	**A**	**691,600**	**783**	**121**	**373**	
***DL7AV**	**"**	**668,161**	**618**	**126**	**373**	
***DK8FD**	**"**	**625,646**	**679**	**120**	**349**	
***DL1NCT**	**"**	**577,896**	**927**	**92**	**306**	
*DL2OBF	"	574,355	1565	74	293	
*DL7URH	"	556,800	901	90	310	
*DJ5GG	"	508,772	840	82	259	
*DF4ZL	"	489,204	780	93	288	
*DK5MV	"	465,520	795	84	284	
*DL6KVA	"	452,584	631	95	312	
*DL7QU	"	439,668	726	75	279	
*DL4JYT	"	430,848	742	84	268	
*DL4BQE	"	380,400	862	60	317	
*DL7VBM	"	374,904	703	78	250	
*DL7VOG	"	302,626	543	88	249	
*DL7CF	"	294,140	511	73	235	
*DL1JBQ	"	255,190	538	76	226	
*DK7ZH	"	230,510	447	67	192	
*DK4TB	"	184,260	442	59	163	
*DF6QC	"	171,534	553	47	179	
*DL1TH	"	144,144	432	60	171	
*DL6JRA	"	139,298	414	55	186	
*DL2HWB	"	134,719	371	57	184	
*DL4RDJ	"	105,094	374	48	139	
*DL2GBB	"	105,014	290	45	137	
*DL2RUG	"	102,168	347	48	168	
*DL2DBS	"	101,069	305	54	157	
*DL1ZQ	"	100,626	376	49	137	
*DL4VBP	"	93,834	233	68	166	
*DL4XU	"	83,681	358	38	119	
*DL3DBY	"	72,540	360	35	121	
*DL8WCM	"	68,517	183	55	151	
*DLØPDM	"	54,165	292	45	112	
						(Opr. DL2RYL)
*DL8ZWG/P	"	52,206	206	43	111	
*DL5SVB	"	51,072	263	32	120	
*DF4TD/M	"	44,080	148	51	94	
*DL2V	"	43,245	224	42	113	
*DL2FAG	"	42,700	144	50	90	
*DL5ZBA	"	41,890	200	42	100	
*DL1DWT	"	38,178	125	51	138	
*DL8UVG	"	37,118	171	37	97	
*DL3AWJ	"	29,952	130	41	87	
*DL6AXI	"	27,876	136	32	69	
*DL9DBZ	"	25,935	159	28	67	
*DL3YEI	"	25,312	198	25	87	
*DJ4PT	"	18,810	116	65	209	
*DJØSH	"	15,906	118	13	53	
*DL4FDM	"	15,478	120	31	78	
*DF3QN	"	14,758	117	26	68	
*DL8UAT	"	10,795	55	32	53	
*DL3DCY	"	7,910	96	19	51	
*DL2HEB	"	7,315	94	16	61	
*DL2JRM	"	5,650	54	17	33	
*DL2DWA	"	3,600	30	19	21	
*DL3JRA	"	2,852	54	13	33	
*DL3KWF	"	2,590	42	12	23	
*DL5AUJ	"	1,200	25	11	23	
*DL3HRA	28	9,548	75	18	44	
*DF5WN	"	4,400	65	14	26	
***DL5JRA**	**21**	**67,984**	**284**	**32**	**90**	
*DL6RDE	"	31,234	183	29	68	
*DL2AXM	"	6,322	70	24	34	
*DL2JDS	"	5,724	55	16	20	
*DL2YAK	"	5,544	88	14	30	
***DL8WN**	**14**	**98,423**	**505**	**26**	**87**	
*DF7TU	"	42,018	150	22	72	
*DL3KWR	"	7,344	88	15	39	
***DL3DTH**	**7**	**41,013**	**311**	**17**	**76**	
*DL2DXA	"	28,101	230	18	69	
*DL2RON	"	17,712	187	14	58	
*DJ2YE	"	13,585	160	13	52	
*DL3ARM	"	6,550	129	7	43	
*DL8MKW/P	"	4,212	82	10	31	

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*DL1EMH	"	12,430	162	10	45
*DH8BQA	"	9,506	181	6	43
*DK2GZ	1.8	3,825	90	4	41
*DJ5MN	"	2,318	62	4	34

GIBRALTAR

ZB2					
/K8UNP	**21**	**20,882**	**302**	**12**	**41**
ZB2X	**3.5**	**464,444**	**2217**	**29**	**105**
			(Opr. OH2KI)		

GREECE

SV1JA	**A**	**290,777**	**490**	**84**	**229**
***SV2AVP**	**21**	**18,690**	**121**	**20**	**50**
*SV2BOH	3.5	18,530	195	13	21

HUNGARY

HA					
/DL1MAJ	**A**	**348,318**	**519**	**84**	**249**
HGØD	**28**	**137,241**	**566**	**32**	**121**
			(Opr. HAØNAR)		
HA7JJS	**3.5**	**49,434**	**669**	**14**	**52**
***HA8JV**	**A**	**642,916**	**1141**	**95**	**293**
*HAØHW	"	528,820	830	90	296
*HA5NK	"	340,710	804	73	204
***HA8FK**	**21**	**133,728**	**573**	**32**	**80**

ISLE OF MAN

***GD4UOL**	**A**	**970,557**	**1538**	**87**	**322**

ITALY

I3EVK	**A**	**1,305,810**	**1297**	**127**	**368**
IØZUT	"	556,662	861	80	281
IK8CHL	"	524,560	827	103	292
I2MQP	"	31,602	101	49	89
IV3DXW	**7**	**309,831**	**1177**	**33**	**106**
IR7A	**3.5**	**159,936**	**1119**	**28**	**84**
			(Opr. I7ALE)		
I3VHO	"	115,878	944	22	71
I3JSS	**1.8**	**109,388**	**915**	**17**	**75**
***IK4WMG**	**A**	**550,434**	**817**	**86**	**312**
***IKØADY**	**"**	**479,888**	**749**	**93**	**263**
*IK4EWX	"	381,234	808	77	236
*IKØCNA	"	311,328	766	66	222
*IK2AHB	"	300,204	707	60	209
*IK8SMZ	"	212,898	463	65	209
*I2RLX	"	199,408	428	58	184
*IK4SDS	"	155,622	422	49	173
*IK3HHY	"	73,101	238	55	122
*IK2AIT	"	71,978	267	45	101
*I4JEE	"	58,056	192	48	129
*I1VTX	"	42,120	250	31	104
*IK2TQG	"	35,090	180	33	88
*IK7FVF	"	17,940	102	34	81
*IK5RLS	"	13,818	78	34	60
*I5UNA	"	9,288	71	27	45
*IK6HWX	"	7,380	63	24	36
*IK8TPJ	"	6,480	85	17	55
*IK6HWX	"	4,408	54	16	28
*IK4SXM	"	3,078	44	18	36
***I1XPQ**	**21**	**146,462**	**519**	**34**	**100**
*IR4R	"	50,648	223	29	75
			(Opr. IK4ALM)		
*IK5TBK	"	36,627	206	24	63
***I3JTE**	**14**	**168,554**	**641**	**33**	**109**
*I5OQV	"	21,888	181	16	60
***I2IFT**	**7**	**55,581**	**422**	**18**	**79**
*IK3HUG	"	25,090	291	14	51
***I5NQK**	**3.5**	**7,809**	**111**	**11**	**46**
***IV3KTY**	**1.8**	**20,406**	**350**	**8**	**49**
*I4JEE	"	5,252	43	3	23

LATVIA

YL2KO	**A**	**817,833**	**1330**	**93**	**300**
YL2PJ	"	40,278	183	45	102
YLØA	**7**	**371,424**	**1332**	**37**	**122**
			(Opr. YL2KL)		
YL2GD	**3.5**	**134,860**	**939**	**27**	**83**
YL2SM	"	83,300	689	24	76
YL2IP	"	36,540	320	19	68
YL2PQ	**1.8**	**59,803**	**696**	**14**	**65**
***YL2GN**	**A**	**878,700**	**1376**	**96**	**339**
*YL2GVW	"	228,599	512	88	201
*YL2EC	"	87,890	376	38	149
*YL2GQT	"	13,860	279	23	36
***YL2UZ**	**14**	**44,712**	**352**	**20**	**72**

LIECHTENSTEIN

***HBØ**					
/DJØIP	**A**	**454,740**	**1206**	**70**	**248**

LITHUANIA

LY2IJ	**A**	**1,452,731**	**1476**	**129**	**424**
LY3BX	**"**	**930,529**	**1284**	**106**	**325**
LY2OU	"	634,816	1041	94	322
LY1CF	"	517,390	1120	72	238
LY1CX	"	318,585	655	80	237
LY2LA	"	200,405	542	63	206
LY2DX	"	191,422	620	51	191
LY1CN	"	143,500	620	36	169
LY2OX	"	112,464	393	55	158
LY2BN	**14**	**124,355**	**594**	**32**	**101**
LY2KM	"	70,551	385	28	89
LY2BB	"	9,243	83	17	62
LY6M	**7**	**361,845**	**1562**	**36**	**117**
			(Opr. LY1DS)		
LY2BKT	"	64,792	586	21	68
LY1DR	**3.5**	**234,168**	**1285**	**30**	**102**
LY6K	**"**	**185,913**	**1131**	**28**	**89**
LY1BZB	"	75,150	795	18	72
			(Opr. LY1FF)		
LY2OQ	"	68,886	646	19	67
LY3BU	**1.8**	**55,825**	**641**	**12**	**65**
*LY3BQ	A	36,084	241	28	96
*LY1DD	"	16,965	165	17	70
*LY3BY	"	7,168	103	14	50
*LY3KB	"	4,524	82	12	46
***LY2TX**	**21**	**21,420**	**128**	**22**	**62**
*LY2IC	"	10,458	68	21	42
***LY2HN**	**14**	**82,375**	**380**	**31**	**94**
***LY2GV**	**7**	**53,326**	**480**	**18**	**73**
*LY1CY	"	6,762	110	11	35
***LY2BZ**	**3.5**	**80,898**	**678**	**21**	**76**
*LY3ID	"	60,352	510	21	71
*LY2PAQ	"	23,499	316	13	50
*LY1DI	"	10,752	200	6	42

LUXEMBOURG

LX4B	**7**	**430,940**	**1907**	**31**	**114**
			(Opr. OH2PQ)		

MACEDONIA

*Z32KV	A	7,855	132	35	73

MOLDOVA

ER1AM	**A**	**1,173,020**	**1495**	**117**	**328**
ER1CW	**"**	**501,684**	**1374**	**65**	**226**
ER1OA	"	238,965	657	63	204
ER5Z	**21**	**88,515**	**484**	**25**	**80**
ER5GB	**7**	**79,827**	**414**	**29**	**94**
ER1AA	**3.5**	**15,246**	**336**	**6**	**36**
ER3MM	1.8	7,503	156	6	6
***ER3DX**	**7**	**63,124**	**499**	**22**	**64**
***ER1LW**	**1.8**	**16,692**	**275**	**7**	**45**

NETHERLANDS

PAØLOU	**A**	**559,284**	**1338**	**104**	**314**
PA3DUA	"	22,066	137	33	85
PAØCOR	"	9,394	86	21	56
PA2CHM	"	8,184	153	19	47
PA3EWP	7	14,544	133	17	55
PA3BUD	**3.5**	**71,889**	**600**	**19**	**74**
PAØCYW	"	50,730	406	16	73
PA3DWD	**1.8**	**8,970**	**86**	**11**	**58**
***PA3ELD**	**A**	**377,568**	**639**	**80**	**262**
*PA3GNO	"	177,270	376	81	204
*PA3ECJ	"	61,962	235	138	449
*PAØSKP	"	35,242	147	45	89
*PA3EUS	"	13,774	105	30	67
*PAØYN	"	11,766	110	20	54
*PAØJED	"	11,692	144	19	55
*PA3BEJ	"	3,888	61	11	43
***PA3AAV**	**7**	**159,432**	**709**	**33**	**113**
***PAØRCT**	**3.5**	**35,945**	**477**	**9**	**56**
*PA2REH	1.8	99	9	2	9

NORTHERN IRELAND

***GIØKOW**	**1.8**	**41,580**	**592**	**9**	**51**

NORWAY

LA7AFA	**A**	**505,660**	**900**	**90**	**296**
LA6IHA	"	259,205	732	53	182
LAØEW	"	76,104	309	47	121
LA4LN	**1.8**	**25,856**	**321**	**12**	**52**
***LA2O**	**A**	**276,816**	**712**	**50**	**169**
***LA7DHA**	**"**	**276,172**	**773**	**51**	**175**
*LA1YE	14	18,900	211	13	47
***LA7AK**	**3.5**	**22,446**	**387**	**8**	**50**
*LA8WG	1.8	2,262	81	4	29

POLAND

SP8NR	**A**	**1,211,548**	**1130**	**139**	**459**
SP2IU	"	113,7043	262	60	173
SP2FWC	"	396,324	924	74	253
SP2IW	"	172,480	364	75	205
SP4EAK	"	122,640	370	53	166
SP2HHX	"	79,800	345	41	134
SP3EQE	"	74,710	266	38	117
SP3FAR	"	30,375	85	54	81
SP3DIK	"	26,950	124	33	77
SP4AVG	"	21,840	160	29	83
SP5DDJ	**28**	**22,386**	**124**	**27**	**64**
SP6EQZ	21	13,454	100	19	43
SP5CEQ	"	7,007	59	16	33
SP6YAS	**14**	**539,672**	**1479**	**37**	**124**
			(Opr. SP3RBR)		
SP8UFO	"	160,962	645	35	104
SP8IOD/p	"	126,477	495	32	85
SP7FUH	"	49,104	326	24	75
SP5CJQ	**7**	**196,236**	**814**	**35**	**104**
SP6YAQ	**"**	**123,708**	**659**	**29**	**93**
SP7CLB	"	82,399	384	30	101
SP4GHL	"	12,663	154	12	51
SP9RPY	"	24	2	2	2
SN3A	**3.5**	**418,325**	**1716**	**34**	**111**
SP7GIQ	**"**	**254,487**	**1293**	**29**	**94**
SP6FVF	"	81,360	746	18	72
SP2FWC	"	5,934	129	6	37
SP9RRW	"	10	3	2	3
SP5GRM	**1.8**	**114,886**	**770**	**20**	**89**
SP5INQ	"	51,175	494	17	72
SP5ZIM	**"**	**37,843**	**516**	**10**	**61**
			(Opr. SP5GKN)		
SP5GH	"	6,790	73	9	61
***SP9XCN**	**A**	**965,157**	**1316**	**97**	**336**
***SP9WZJ**	**"**	**902,484**	**1019**	**113**	**364**
***SN7L**	**"**	**679,995**	**1162**	**95**	**310**
			(Opr. SP7NJX)		
*SP6NIC	"	514,776	930	82	274
*SP5TT	"	459,298	692	103	268
*SP2UKB	"	296,415	530	79	236
*SP9VEG	"	232,580	390	75	215
*SP4EEZ	"	221,550	337	93	257
*SP7ELQ	"	220,119	489	65	174
*SP2CBS	"	216,106	747	44	198
*SP6CIK	"	200,842	377	80	194
*SP1AEN	"	173,610	407	68	202
*SP5JCL	"	154,178	350	71	183
*SP1MHV	"	145,860	254	75	180
*SP5ASY	"	139,556	419	63	186
*SP7VCA	"	100,245	333	52	153
*SP8GEY	"	88,044	316	54	120
*SP9RTI	"	72,228	361	46	110
*SP2DVH	"	65,173	161	48	111
*SP8FHJ	"	44,400	224	38	112
*SP9DGO/A	"	41,363	123	46	87
*SP6NIF	"	41,031	155	44	97
*SP6CXH	"	37,022	160	36	71
*SP6STS	"	35,550	227	25	65
*SP9AGS	"	34,020	243	23	85
*SP9GKM	"	32,000	209	37	88
*SP5CBA	"	29,213	176	34	97
*SP6NIG	"	24,970	87	47	63
*SP2QVE	"	14,784	98	25	87
*SP2IHG	"	7,300	143	22	76
*SP3CQP	"	4,371	64	22	47
*SP9QLK	"	3,481	100	5	19
*SP5RDX	"	3,312	30	18	28
*SP2QVS	"	2,264	93	12	49
*SP9XLX	"	825	28	10	15
*SP2QCH	28	7,560	63	20	36
*SP2BEA	"	7,296	60	21	43
*SP3AOT	"	1,612	28	13	13
***SP3HRN**	**21**	**165,271**	**555**	**35**	**104**
*SP8LZC	"	116,446	413	34	100
*SP8FHK	"	63,048	250	35	76
*SP3GTS	"	24,092	148	22	54
*SP3FPF	"	8,710	54	21	46
*SP5CGN	"	7,424	63	20	38
*SP5MBA	"	5,247	39	18	35
*SP8KEA	"	1,170	16	10	16
***SP9YDX**	**14**	**334,126**	**1115**	**37**	**105**
			(Opr. SP9EIJ)		
*SP2QG	"	37,410	306	20	66
*SP9KZ	"	32,373	145	31	78
*SP3KFI	"	31,816	170	27	70
			(Opr. SP3OEQ)		
*SP5XMM	"	13,860	135	14	56
*SP9EML	"	7,796	81	17	35
*SP6PAX	"	3,220	76	7	28
			(Opr. SP6DHH)		
*SP9EMV	"	192	8	2	6
***SP2LNW**	**7**	**63,504**	**408**	**27**	**81**
***SP6CTC**	**"**	**52,690**	**309**	**25**	**85**
*SP5CNA	"	40,586	310	21	70
*SP6CDP	"	27,768	222	17	61
*SP9LAS	"	24,528	216	17	56
*SP3ZAH	"	8,145	144	9	36
			(Opr. SP3VKO)		
***SP2WDW**	**3.5**	**59,120**	**618**	**16**	**64**
*SP5DIR	"	35,568	413	14	58
*SP4DCR	"	28,035	413	9	54
*SP2AHD	"	8,815	200	6	37
*SP9HOF	"	8,140	158	7	37
*SP9DH	"	6,345	125	7	40
***SP3WYI**	**1.8**	**13,536**	**271**	**6**	**42**
*SP9YBS	"	3,344	90	5	33
*SP3MY	"	1,078	50	3	19

PORTUGAL

*CT1BNW	14	3,360	46	12	28
***CT4DX**	**7**	**45,108**	**256**	**20**	**64**
*CT1BQH	"	19,278	187	14	40
***CT1YH**	**3.5**	**12,810**	**148**	**10**	**51**

ROMANIA

YO8KOS	**7**	**93,732**	**563**	**27**	**80**
YO3AC	**1.8**	**12,528**	**194**	**6**	**52**
***YQØDFA**	**A**	**346,518**	**1000**	**64**	**215**
			(Opr. YO2DFA)		
*YO4SI	"	168,200	570	48	184
*YO2ARV	"	62,920	339	36	107
***YO3RK**	**21**	**33,746**	**177**	**26**	**68**
*YO2AQB	"	13,860	90	20	46
*YO4DIJ	7	832	80	2	6
*YO8BDQ	3.5	5,907	180	5	28
***YO6OBH**	**1.8**	**12,190**	**245**	**5**	**41**

SARDINIA

***ISØGSR**	**A**	**268,056**	**717**	**47**	**169**
***ISØOMH**	**"**	**255,918**	**845**	**53**	**168**
*ISØLDT	"	38,357	190	35	86
***ISØMKU**	**14**	**113,619**	**571**	**30**	**91**
*ISØUWX	"	22,575	187	20	55

SCOTLAND

GM3WOJ	**14**	**270,432**	**1000**	**37**	**107**
GM3ITN	**1.8**	**36,812**	**137**	**6**	**46**
***GM4HQF**	**A**	**37,760**	**260**	**38**	**80**
***GM3CFS**	**14**	**33,408**	**259**	**20**	**67**

SICILY

IO9T	**14**	**767,428**	**2300**	**38**	**135**
			(Opr. IT9TQH)		
IT9ZGY	**1.8**	**88,466**	**838**	**16**	**73**
***IT9ORA**	**A**	**135,548**	**508**	**51**	**155**
*IT9DEC	"	35,904	210	26	76
*IT9AJP	"	15,980	82	30	64
*IT9VDQ	14	9,248	78	17	51
***IQ9AF**	**7**	**157,665**	**847**	**28**	**87**
			(Opr. IT9AF)		

SLOVAK REPUBLIC

OM3OM	**14**	**189,336**	**742**	**32**	**106**
OM8A	**7**	**665,525**	**2004**	**36**	**139**
OM5M	**3.5**	**307,956**	**1494**	**30**	**102**
			(Opr. OM3TCW)		
OM3TRJ	"	66,729	590	17	70
OM7A	**1.8**	**132,664**	**1046**	**18**	**85**
***OM3TEW**	**A**	**478,400**	**1010**	**70**	**255**
***OM8ON**	**"**	**453,550**	**537**	**98**	**288**
*OM3PQ	"	360,357	546	85	254
*OM3CCC	"	271,920	642	59	205
*OM3CDZ	"	159,176	628	62	140
*OM3MB	"	48,461	136	59	102
*OM3IF	"	35,777	115	50	83
*OM7AT	"	32,032	206	23	57
*OM3TB	"	21,105	121	26	41
*OM3TY	"	16,377	196	40	97
*OM3BA	"	15,563	111	26	53
*OM3CVN	"	6,039	39	26	35
*OM8ZZ	28	966	23	7	14
*OM3GB	21	16,182	96	24	38
*OM3CAB	14	17,670	244	14	43
*OM7AM	"	14,384	170	16	46
*OM6RM	7	17,829	214	23	40
***OM3ZBU**	**3.5**	**85,814**	**630**	**95**	**107**
*OM5KM	"	29,760	396	9	55
*OM3CDN	"	14,364	239	8	46
*OM2SM	"	9,936	192	6	42
***OM2XW**	**1.8**	**20,022**	**243**	**11**	**58**

SLOVENIA

S59A	**A**	**3,311,655**	**2436**	**166**	**501**
S53A	**"**	**3,097,360**	**2501**	**139**	**421**
S53EA	**28**	**143,172**	**656**	**30**	**93**
S51AY	"	102,492	522	28	89
S57AL	"	32,334	164	27	75
S5ØK	**21**	**390,456**	**1188**	**37**	**116**
S5ØR	"	173,901	577	36	111
S53M	**14**	**710,430**	**1846**	**39**	**131**
			(Opr. S52ZW)		
S57DX	**"**	**586,684**	**1700**	**37**	**124**
S59L	"	304,896	1167	32	96
S5ØA	**7**	**738,650**	**2192**	**37**	**133**
S5ØC	**"**	**691,298**	**2055**	**39**	**140**
			(Opr. S53CC)		
S52RD	**"**	**499,961**	**1798**	**33**	**118**
S58A	**3.5**	**291,584**	**1217**	**34**	**102**
S53DCM	**"**	**252,160**	**1307**	**30**	**98**
S53O	"	213,125	1029	30	95
S59KW	"	212,004	1280	23	85
			(Opr. S53WW)		
S51W	**1.8**	**58,181**	**695**	**13**	**60**
***S59AA**	**A**	**1,645,226**	**1515**	**137**	**446**
*S51FA	"	912,695	1210	109	336
***S57J**	**21**	**235,008**	**667**	**36**	**117**
*S58WW	"	162,135	588	35	100
*S52CW	"	46,002	228	26	76
***S57U**	**14**	**208,575**	**831**	**33**	**102**
*S52UT	"	153,317	569	34	105
*S57X	"	144,400	461	36	116
*S57W	"	70,596	373	28	78
***S54A**	**7**	**209,151**	**903**	**35**	**118**
*S51QZ	"	121,625	650	31	94
***S52OP**	**3.5**	**89,628**	**903**	**17**	**67**
*S51EA	"	41,262	501	12	57
*S53X	"	23,040	358	10	50

SPAIN

EA2IA	**A**	**2,362,192**	**2498**	**126**	**398**
EA4KA	**"**	**1,987,741**	**2228**	**109**	**334**
EA1JO	"	453,662	680	94	280
EA7GHB	"	153,036	376	56	162
EA5GOT	"	84,898	200	70	157
EA7CA	"	72,316	221	48	131
EA1KN	"	63,945	202	45	100
EA4EMC	"	39,886	137	46	108
EA5AIK	"	18,483	88	37	64
EA2CNH	"	17,765	138	27	68
EA7EZ	**28**	**142,664**	**656**	**31**	**105**
			(Opr. OH2BAZ)		
EA7KW	**21**	**397,432**	**1349**	**35**	**116**
EA7DPU	"	48,484	412	24	68
EA5CZ	**7**	**62,647**	**550**	**18**	**61**
EA3KU	**3.5**	**267,546**	**1318**	**27**	**95**
***EA7CEZ**	**A**	**3,469,004**	**3217**	**125**	**414**
***EA5WU**	**"**	**1,548,365**	**1946**	**108**	**347**
*EA5FV	"	772,440	1431	67	247
*EA7HAT	"	751,184	1033	83	270
*EA5FV	"	749,080	1431	71	236
*EA3AEQ	"	608,400	1109	90	248
*EA7TG	"	487,249	973	76	253
*EA7IL	"	483,460	963	56	174
*EA5ACF	"	300,900	580	75	225
*EA7HDO	"	253,460	504	70	220
*EA4AMC	"	252,756	804	57	179
*EA3BOW	"	188,466	468	52	150
*EA7HAB	"	159,152	453	47	156
*EA7FZ	"	110,950	365	67	108
*EA7AAC	"	100,848	353	45	131
*EA3AJW	"	100,224	520	42	102
*EA4AV	"	98,358	245	56	138
*EA5LA	"	96,068	265	40	141
*EA5FX	"	33,258	101	47	91
*EA3DVJ	"	25,480	164	33	71
*EA1OJ	"	24,990	78	47	72
*EA5EYJ	"	24,910	125	32	62
*EA5GJI	"	8,526	59	21	37
*EA5CEC	"	7,884	55	25	29
*EA4MS	"	6,003	54	27	42
*EA3GIS	"	4,896	38	19	32
*EA1XN	"	2,173	29	14	27
*EA5WX	28	1,440	22	12	18
*EA5AAJ	"	1,056	26	9	15
*EA3GIJ	21	3,240	80	6	30
***EA1FEQ**	**14**	**63,612**	**321**	**24**	**84**
***EA3DKR**	**"**	**53,100**	**289**	**21**	**79**
*EA1AKB	"	16,200	154	10	35
*EA5GKE	"	3,784	30	15	29
***EA2BNU**	**7**	**25,976**	**243**	**12**	**56**
***EA5BU**	**"**	**24,492**	**214**	**18**	**60**
***EA1AUI**	**1.8**	**13,481**	**206**	**9**	**52**

SWEDEN

SM7PKK	**A**	**917,225**	**1233**	**113**	**362**
SM5AOE	**"**	**585,728**	**896**	**97**	**255**
SM6BJI	"	416,250	568	93	282
SM3DMP	"	177,120	388	64	206
SM5CLE	"	52,572	173	45	111
SM3AF	"	41,481	250	25	74
SM6CDG	"	2,120	47	10	30
SKØHB	**14**	**234,864**	**950**	**39**	**105**
			(Opr. SMØTHN)		
SM6NJK	"	172,190	742	32	102
SM2JEB	"	110,610	570	24	66
SM4TLZ	"	76,480	483	21	59
SMØTGG	"	28,560	181	18	62
SM6JY	"	13,392	161	15	47
SM3SGP	**7**	**300,682**	**1189**	**37**	**112**
SMØJHF	**"**	**241,650**	**900**	**36**	**114**
SM5IMO	"	182,172	815	34	107
SM7CQY	"	15,052	230	11	42
SM6DYK	**3.5**	**155,628**	**1077**	**25**	**83**
SMØIHR/5	"	65,680	690	15	65
SM6DOI	"	57,154	550	18	64
SMØNJO	"	25,756	143	56	81
SM6CPY	**1.8**	**53,581**	**454**	**13**	**60**
SM5HJZ	"	35,904	499	10	56
SM6LWH	"	5,588	111	8	36
***SM4SX**	**A**	**78,603**	**310**	**39**	**94**
*SM5RE	"	49,068	276	19	36
*SM7BZV	"	45,016	247	35	101
*SM3CVM	"	25,578	126	39	87
*SM2CFZ	"	19,503	119	32	67
*SM6GOR	"	12,969	75	33	66
*SM3PGN	"	11,635	126	16	49
*SMØTHU	"	11,039	109	17	66
*SM7ATL	"	8,832	82	26	41
*SMØCOP	"	925	15	12	13
***SM6SHF**	**21**	**23,870**	**207**	**19**	**58**
*SM3DXC	"	16,644	154	18	55
***SM7**					
/T94BO	**14**	**83,300**	**453**	**25**	**94**
*SM2CDF	14	75,346	211	14	188
*SM7GCZ	"	26,691	155	21	72
***SM7VIK**	**3.5**	**22,597**	**343**	**11**	**48**

SWITZERLAND

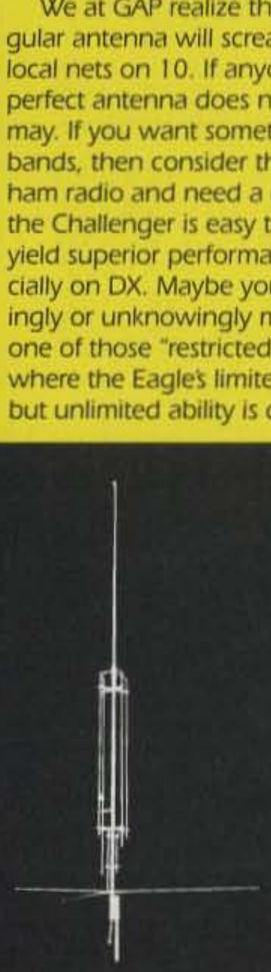
HB9AGA	**A**	**1,069,121**	**1484**	**98**	**299**
HB9CVO	"	206,164	424	72	187
HB9KC	"	50,518	167	46	88
HB9DX	**21**	**39,664**	**115**	**35**	**113**
***HB9ARF**	**A**	**295,358**	**664**	**71**	**218**
***HB9FAP**	**"**	**257,670**	**712**	**55**	**155**
*HB9IBA	"	230,384	701	56	186
					(Opr. W7LPF)
*HB9HLE	"	75,753	301	51	120
*HB9AYZ	"	27,798	153	40	83
*HB9QA	3.5	195	13	2	13

UKRAINE

UT2QT	**A**	**2,531,613**	**2816**	**146**	**463**
EMØF	**"**	**2,452,989**	**3098**	**133**	**406**
			(Opr. UXØFF)		
UR5QN	"	1,425,028	1566	131	425
UT7LA	"	1,032,080	1320	119	366
UU9JH	"	831,312	1400	104	310
UT8IM	"	327,810	682	69	225
UT4EK	"	183,513	545	55	194
UT1WZ	"	182,320	479	61	204
UTØH	**21**	**183,982**	**803**	**33**	**101**

GAP: THE PERFECT ANTENNA

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Eagle DX

Challenger DX

Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

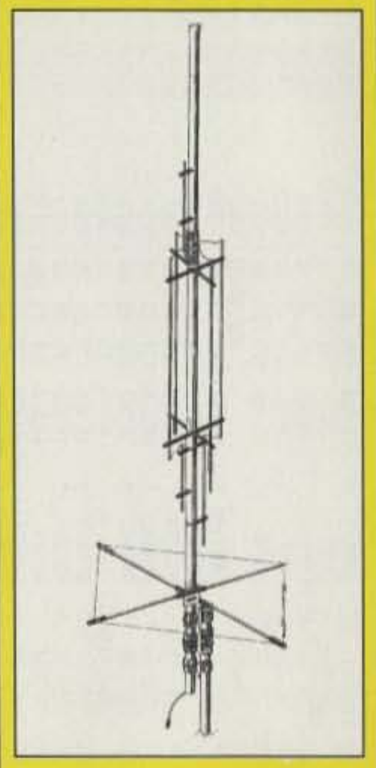
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

New 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 (Just Released)			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$289
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

GAP ANTENNA PRODUCTS INC.
6010 N. Old Dixie Hwy.
Vero Beach, FL 32967

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(407) 778-3728

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UU7JF	"	**176,611**	**804**	**28**	**81**
UU7JS	"	21,204	127	24	53
US5WE	**14**	**469,152**	**1456**	**38**	**124**
URØI	**"**	**368,880**	**1181**	**39**	**120**
UY6I	"	264,368	902	38	126
UX5NQ	"	198,856	907	33	101
UXØHA	"	60,325	399	23	72
UX5VK	"	40,188	236	21	81
UT7ND	**7**	**103,490**	**545**	**29**	**102**
US7IW	**"**	**102,358**	**576**	**29**	**93**
UT1PD	"	79,992	572	21	78
UX3ZBG	"	50,193	329	24	75
UX3MO	"	21,318	241	16	50
UR7VA	**3.5**	**135,997**	**964**	**25**	**82**
UR5LCV	"	93,534	668	26	76
UY5ZZ	"	53,828	513	17	67
UY5BA	**1.8**	**51,030**	**515**	**15**	**71**
URØIX	"	14,094	189	12	46
UX1VT	"	13,000	220	8	44
UYØZG	"	10,300	164	8	42
UR5FA	"	5,700	136	5	33
***UR5EAT**	**A**	**633,280**	**1039**	**97**	**274**
***UT3UZ**	**"**	**288,304**	**707**	**68**	**228**
*UY5TE	"	262,544	733	54	215
*UX5EF	"	254,624	680	62	230
*UT7ZT	"	212,589	403	74	225
*UR3MP	"	204,120	738	46	170
*UT5UJY	"	155,280	461	52	188
*UT3EM	"	119,340	332	47	213
*UR5IAE	"	83,126	308	44	134
*UR5EIT	"	25,326	144	40	86
*UU2JA	28	9,222	110	15	43
***US7IGF**	**21**	**67,620**	**367**	**26**	**79**
*UT1PO	"	38,016	200	26	62
*UR5IPD	"	27,473	186	21	62
***UU9JCF**	**14**	**197,478**	**960**	**36**	**102**
***UT3QW**	**"**	**183,219**	**658**	**36**	**121**
*UT3IQ	"	144,200	669	34	106
*UX1LA	"	91,131	500	28	83
*UR5EKG	"	51,243	361	25	68
*US5QVV	"	33,360	321	17	63
***UR5QSK**	**7**	**450,447**	**1541**	**35**	**124**
***UR3IEW**	**"**	**184,352**	**474**	**29**	**83**
*US7IIB	"	69,229	431	28	79
*UT1QR	"	65,044	425	23	78
*UY2ZZ	"	34,000	304	16	64
*UT1WW	"	25,564	232	17	66
*UR7QM	"	9,990	147	12	42
*UR5QU	"	3,999	63	10	33
***UT5UIA**	**3.5**	**45,760**	**491**	**15**	**65**
*US5ELM	"	27,600	333	12	57
*UX3IA	"	8,216	134	7	45

WALES

***GW3JI**	**A**	**356,070**	**814**	**62**	**224**
*GW4BVJ	"	14,884	145	14	47

YUGOSLAVIA

YU7AV	**A**	**3,014,010**	**2649**	**151**	**459**
YT1AD	**"**	**2,285,496**	**2152**	**149**	**499**
YU7KM	"	149,568	445	58	170
YT9C	**21**	**316,992**	**994**	**37**	**119**
					(Opr. YU1IG)
4N7ØBB	**14**	**497,850**	**1848**	**37**	**113**
					(Opr. YT1BB)
YT7A	**7**	**641,538**	**1962**	**37**	**137**
					(Opr. 4N7DW)
YT1R	"	359,165	1524	33	112
					(Opr. YU1ZZ)
4O4D	"	344,208	1497	31	111
					(Opr. YU4FA)
4N1A	**3.5**	**327,474**	**1595**	**30**	**96**
					(Opr. 4N1DXX)
YU7LS	"	92,064	882	16	68
YZ1MB	"	56,826	557	15	67
***4N7ØAL**	**A**	**230,472**	**419**	**83**	**208**
					(Opr. YU7AL)
*YU7SF	"	64,500	203	56	116
***YU1HA**	**28**	**59,169**	**257**	**26**	**95**
***YZ1AU**	**21**	**279,524**	**862**	**34**	**115**
***4N1N**	**"**	**183,520**	**613**	**34**	**114**
*YU7CF	"	148,944	642	31	85
*YV7QP	"	95,979	469	17	52
***YT7AR**	**7**	**531,180**	**1770**	**35**	**121**
***YU1RA**	**1.8**	**42,984**	**538**	**9**	**63**

OCEANIA

AUSTRALIA

VK8TM	**A**	**3,475,170**	**2830**	**135**	**287**
					(Opr. N6AA)
VK5GN	"	143,820	281	70	110
VK6LW	"	57,036	203	42	55
VK5GZ	"	22,910	106	32	47
VK3APN	**7**	**65,892**	**292**	**26**	**50**
***VK1FF**	**A**	**774,750**	**1075**	**97**	**163**
					(Opr. WB2FFY)
*VK3DXI	"	390,164	658	76	130
*VK2BQQ	"	130,296	368	51	71
*VK2VM	"	117,072	370	44	64
*VK4XW	"	39,804	147	18	89
*VK5GZ	"	7,906	106	32	47
***VK4XA**	**28**	**55,275**	**348**	**22**	**33**
*VK6AJ	"	28,080	184	16	36
***VK2AYD**	**21**	**292,940**	**1025**	**26**	**71**
*VK4ICU	"	136,620	520	29	61
*VK4OD	"	4,294	38	13	25
*VK8BE	14	1,216	24	8	11
*VK8/N3JT	"	6	1	1	1

EASTERN KIRIBATI

T32BE	**A**	**585,275**	**997**	**90**	**115**
					(Opr. WC5P)

EASTERN MALAYSIA

9M8X	**A**	**5,390,300**	**3852**	**143**	**332**
					(Opr. OH2BH)
9M6NA	**14**	**971,397**	**2195**	**37**	**116**
					(Opr. JE1JKL)

FIJI ISLANDS

***3D2MQ**	**A**	**223,236**	**660**	**53**	**64**

FRENCH POLYNESIA

*FOØTJ	A	62,123	330	37	36
					(Opr. K1VWL)

GUAM

KG6DX	**28**	**209,056**	**764**	**31**	**63**

HAWAII

KH6					
/N6HR	**A**	**1,711,975**	**2122**	**107**	**168**
KH6CC	**1.8**	**42,588**	**401**	**18**	**18**

INDONESIA

YBØASI	**A**	**1,069,025**	**1202**	**105**	**200**
					(Opr. AA4U)
YB6INU	**"**	**883,040**	**1057**	**93**	**174**
YB2UDH	**7**	**59,976**	**211**	**27**	**98**
***YB3FFB**	**21**	**224,128**	**736**	**29**	**74**

NEW CALEDONIA

***FKØP**	**21**	**176,418**	**635**	**33**	**66**
					(Opr. F6AUS)
***FK8FU**	**7**	**31,508**	**455**	**24**	**44**

NEW ZEALAND

ZL3GQ	**7**	**672,612**	**1732**	**36**	**102**
*ZL4NF	A	27,744	108	38	58

PAPUA-NEW GUINEA

***P29KH**	**A**	**625,828**	**1059**	**82**	**124**

PHILIPPINES

DX1EA	**A**	**3,766,896**	**3163**	**125**	**279**
					(Opr. OHØXX)
DU1KK	**"**	**1,209,747**	**1789**	**93**	**138**
					(Opr. WN7S)
***SMØCNS**					
/DU7	**A**	**664,003**	**820**	**103**	**178**
*DU3					
/W4NXE	"	235,912	549	55	93

WESTERN SAMOA

5W1MM	1.8	42	4	3	4
					(Opr. JR6FIP)

SOUTH AMERICA

ARGENTINA

LTØA	A	6,100	86	14	11
					(Opr. LU1ARL)
LU6ETB	**28**	**290,184**	**1054**	**25**	**88**
					(Opr. LU2CW)
***LU1EWL**	**A**	**530,612**	**842**	**76**	**142**
*LW2EUE	"	239,008	411	58	136
*LU4HKN	"	7,884	82	18	18
***LW4DYI**	**28**	**261,063**	**903**	**22**	**77**
*LU7DW	"	49,358	300	19	39
*LU4FAK	"	1,752	27	11	13
***LU5FDQ**	**21**	**203,632**	**788**	**22**	**62**
*LU2DPW	"	57,510	247	21	60
*LU7EAR	"	56,015	405	23	62
*LU1ELY	"	12,936	69	15	22
***LU1ICX**	**14**	**401,196**	**1018**	**36**	**98**
*LU1BW	"	49,106	201	25	61
*LU6EF	"	42,427	194	23	54
*LU9EDY	"	22,632	182	23	46
*LU1AEE	7	18,460	124	18	34
*LU2BRG	3.5	4,669	62	12	17

ARUBA

P4ØF	**A**	**12,393,150**	**6557**	**150**	**488**
					(Opr. KRØY)
P4ØJ	**14**	**1,697,400**	**3307**	**39**	**141**
					(Opr. WX4G)

BRAZIL

PY2XB	**A**	**654,132**	**752**	**85**	**217**
PP1RR	"	251,945	435	64	141
ZY2TI	"	191,488	493	43	93
					(Opr. PY2TI)
PY2KP	"	32,132	109	48	68
PY3LHB	"	24,822	130	28	35
PY4WS	"	23,489	102	28	55
PW8EM	**21**	**87,960**	**508**	**19**	**41**
***PW2N**	**A**	**804,320**	**1269**	**72**	**148**
					(Opr. PY2NY)
*PY2OW	"	382,679	625	63	146
*PY2OU	"	188,700	310	81	141
*PY2FUS	"	91,352	229	51	101
*PP7CI	"	39,330	131	51	64
*PU2MHB	"	39,006	209	26	40
*PY2APQ	"	36,340	146	34	58
*PY2SP	"	16,005	66	42	55
*PR7FB	"	5,400	39	25	35
*ZV2NP	"	4,329	39	16	23
*PU2RCM	"	2,920	29	16	24
*PY2AE	"	2,776	41	20	26
*PY2DUN	28	5,207	51	16	25
***PY2ZVV**	**21**	**148,512**	**507**	**26**	**76**
					(Opr. XE1VV)
*PU2KER	"	43,687	199	22	57
*PY3CJI	"	12,528	79	19	39
*PY1DL	"	8,949	57	12	45
*PY2NZR	"	5,740	120	21	49
*PY2OZF	"	3,776	44	14	18
*PY2HA	"	2,025	29	7	18
***PT7CB**	**14**	**1,157,475**	**2366**	**37**	**128**
					(Opr. YU1RL)
*PY5BLG	"	51,253	270	18	49
*PY4LH	"	31,863	205	21	36
*PT2AW	"	16,271	114	20	33
***PW2A**	**7**	**61,232**	**243**	**24**	**65**
					(Opr. PT2BW)

CHILE

3G1X	**A**	**4,139,394**	**3018**	**120**	**349**
					(Opr. CE1IDM)
XR3A	**28**	**86,190**	**481**	**19**	**49**
CE8FGC	**14**	**197,540**	**816**	**24**	**59**

COLOMBIA

HK1HHX	**14**	**683,571**	**2026**	**31**	**98**

ECUADOR

HC1OT	**A**	**7,041,712**	**4786**	**126**	**370**
					(Opr. S53R)
HC7SK	**3.5**	**191,172**	**748**	**21**	**68**
					(Opr. SM7BUA)

FERNANDO DE NORONHA

PYØFF	**A**	**10,778,990**	**5894**	**143**	**474**
					(Opr. CT1BOH)

GALAPAGOS ISLANDS

HC8N	**A**	**10,181,750**	**5861**	**149**	**437**
					(Opr. WN4KKN/6)
HC8KU	**"**	**5,595,600**	**4721**	**113**	**287**
					(Opr. DL5XX)

NETHERLAND ANTILLES

PJ9U	**7**	**1,056,817**	**2676**	**29**	**110**
					(Opr. OH1VR)
***PJ2**					
/PAØVDV	**28**	**146,642**	**646**	**23**	**56**

PARAGUAY

ZPØY	**21**	**1,584,523**	**3728**	**36**	**130**
					(Opr. LW9EUJ)
***ZP5XYE**	**21**	**83,844**	**431**	**18**	**50**

SURINAME

PZ5JR	**A**	**8,301,917**	**5110**	**131**	**420**
					(Opr. N6ZZ)

TRINIDAD & TOBAGO

9Y4VU	**21**	**722,787**	**1930**	**28**	**101**

URUGUAY

CX4SS	7	48	4	2	4
***CX6VM**	**7**	**58,186**	**222**	**29**	**65**

VENEZUELA

YV1OB	**1.8**	**38,352**	**357**	**13**	**34**
***YV3AJ**	**28**	**297,142**	**1000**	**26**	**75**
					(Opr YV6AZC)
*4M7A	3.5	23,920	203	11	29

QRP

TA4ZM	**A**	**1,734,238**	**1615**	**82**	**292**
					(Opr DK5WL)
AA2U	**"**	**486,200**	**565**	**94**	**246**
LY3BA	**"**	**449,757**	**886**	**82**	**281**
KP4DDB	**"**	**296,172**	**835**	**54**	**117**
UX8IX	**"**	**241,962**	**973**	**57**	**237**
IK2LEY	**"**	**248,939**	**686**	**69**	**214**
DL3KVR	**"**	**218,476**	**629**	**59**	**224**
I1BAY	**"**	**217,460**	**558**	**77**	**255**
JA2IVK	**"**	**176,512**	**292**	**90**	**134**
N7IR	**"**	**152,800**	**302**	**77**	**123**
N1AFC	**"**	**149,917**	**348**	**51**	**146**
EA7AAW	**"**	**146,355**	**458**	**43**	**122**
KA1CZF	"	126,336	258	55	137
K4LTA	**"**	**125,208**	**286**	**72**	**150**
UA9SG	**"**	**122,265**	**311**	**49**	**116**
N4IJ	"	122,194	225	66	148
9A3GU	**"**	**118,695**	**434**	**45**	**160**
Z32DR	**"**	**115,020**	**441**	**44**	**136**
PAØADT	**"**	**94,675**	**386**	**29**	**136**
JJ1VRO	**"**	**94,085**	**231**	**66**	**89**
OH1LUZ	**"**	**84,420**	**451**	**45**	**156**
KRØB	**"**	**74,888**	**201**	**51**	**97**
					(Opr AF9T)
DJ3XK	**"**	**40,152**	**171**	**34**	**134**
KV8S	**"**	**27,984**	**109**	**41**	**65**
OH2YL	"	26,460	142	32	73
EA3FER	"	26,265	115	35	50
NM1K	"	25,984	103	47	69
G4FRE	**"**	**25,452**	**172**	**31**	**95**
					(Opr WG3I)
OM3TUM	**"**	**20,833**	**242**	**23**	**60**
SP2FAP	**"**	**20,819**	**129**	**36**	**73**
OK2PBG	**"**	**20,497**	**164**	**21**	**82**
SM5DQ	**"**	**20,280**	**171**	**26**	**78**
UAØKCL	**"**	**18,500**	**136**	**30**	**44**
AB4KL	"	16,351	85	31	52
VE2ABO	**"**	**15,500**	**123**	**24**	**38**
N9LMU	**"**	**14,536**	**73**	**30**	**49**
HB9XY	**"**	**14,534**	**153**	**18**	**68**
SP2UUU	"	11,160	82	26	67
AB5OU	**"**	**11,139**	**94**	**37**	**42**
DL4OBJ	"	9,971	128	12	47
DJ5QK	"	7,566	35	16	62
SM7CZC	"	6,424	66	20	53
K3WWP	**"**	**5,564**	**53**	**18**	**34**
DL6ZLG	"	5,049	39	12	39
OZ7ADP	**"**	**4,960**	**52**	**23**	**39**
DL4MFM	"	4,800	56	19	41
F5KTL	**"**	**4,361**	**70**	**11**	**38**
					(Opr. FB1IPH)
YQØATW	**"**	**3,552**	**45**	**9**	**39**
ON5EU	"	3,318	60	11	31
VE5AEO	"	3,069	50	18	15
GØOXT	"	2,280	41	11	29
W8HNI	"	2,166	25	18	20
VE6GK	"	1,786	49	8	11
W6ZH	"	920	15	11	12
DL2PY	"	825	58	4	7
VE7EKS	"	768	25	8	8
4X1IF	**28**	**28,713**	**197**	**13**	**38**
L5F	**"**	**18,684**	**176**	**13**	**23**
					(Opr LU1FNH)
DL9LAI	**"**	**7,182**	**67**	**15**	**39**
OM7PY	**"**	**3,999**	**45**	**17**	**26**
RV9CE	**"**	**2,688**	**45**	**6**	**15**
UT7FO	**"**	**1,856**	**32**	**13**	**19**
US4EX	**21**	**96,096**	**454**	**30**	**102**
GØTDX	**"**	**51,612**	**300**	**24**	**68**
LU8HSO	**"**	**32,928**	**233**	**15**	**33**
S51RW	**"**	**19,099**	**133**	**21**	**50**
EA1BV	**"**	**6,486**	**97**	**13**	**34**
SP5SDA	**14**	**65,637**	**334**	**30**	**87**
G3LHJ	**"**	**50,232**	**333**	**19**	**65**
WB6JMS	**"**	**20,803**	**110**	**29**	**42**
SP9NLI	**"**	**16,836**	**168**	**16**	**53**
HB9CBR	**"**	**13,166**	**160**	**16**	**42**
JA6UBK	**"**	**9,010**	**72**	**20**	**33**
K4GEL	**"**	**5,206**	**56**	**13**	**25**
KMØL	**"**	**4,738**	**40**	**18**	**28**
OK1KAI	"	2,079	66	5	22
KA6SGT	"	1,323	42	13	10
IK4MFP	"	980	23	7	21
HB9LDO	"	418	17	6	13
KM6SE	"	266	16	7	7
I5AZX	"	80	10	2	6
OS6TJ	**7**	**13,452**	**167**	**12**	**47**
UT7QF	**"**	**12,312**	**119**	**14**	**58**
VE6SH	**"**	**8,280**	**111**	**16**	**20**
I8SAT	**"**	**2,145**	**33**	**10**	**23**
SMØHPL	**"**	**1,014**	**42**	**5**	**21**
UA9CBM	**3.5**	**72,051**	**344**	**15**	**58**
SP4GFG	**"**	**30,294**	**416**	**10**	**56**
LZ1FW	**"**	**7,470**	**144**	**10**	**35**
SP8UFY	**"**	**6,864**	**138**	**9**	**39**
SO5TW	**"**	**3,400**	**105**	**5**	**29**
					(Opr K3TW)
G3DYY	**"**	**2,088**	**44**	**21**	**72**
WA2ASQ	**"**	**1,650**	**26**	**8**	**17**
2EØACY	**"**	**912**	**24**	**3**	**15**
US8ICZ	**1.8**	**8,736**	**142**	**7**	**41**
KIØG	**"**	**2,232**	**32**	**13**	**18**
YO4FRF	**"**	**1,196**	**50**	**4**	**19**
SP5NOG	"	216	15	3	12
IØKHP	"	54	7	3	6

ASSISTED

NORTH AMERICA

UNITED STATES

K1IU	**A**	**2,439,160**	**1484**	**141**	**437**
AA2DU/1	**"**	**2,167,869**	**1452**	**125**	**412**
K1DG	**"**	**1,861,175**	**1231**	**137**	**408**
N4XR/1	"	1,116,644	773	132	392
K1JKS	"	982,488	873	107	295
KC1F	"	774,048	775	95	257
W1FJ	"	415,808	437	100	256
K1FWF	"	302,510	325	93	245
WB2DND/1	"	137,488	241	62	146
WA1KSY	"	119,515	222	58	147
NO1J	"	57,918	152	49	98
KA1CLV	"	53,439	140	37	104
WA1G	21	19,278	91	25	56
K1ZM/2	**A**	**3,319,620**	**1895**	**147**	**463**
K2WK	**"**	**2,372,676**	**1422**	**141**	**452**
K2BU	**"**	**1,788,123**	**1100**	**136**	**441**
K5NA/2	**"**	**1,774,220**	**1109**	**136**	**444**
K2LE	"	1,572,516	1164	128	356
K2PS	"	1,136,200	873	120	340
AA2FB	"	798,490	745	99	286
W1GD/2	"	663,806	573	108	314
N2UN	"	586,099	588	98	269
K3JGJ/2	"	576,300	603	92	248
K2AZ	"	460,752	491	96	252
K2NJ	"	402,696	446	90	239
KD2NT	"	374,088	429	90	237
AA2PZ	"	327,172	383	81	130
K2SB	"	307,344	373	88	216
W2HG	"	289,120	379	81	197
W2XN	"	214,500	274	82	204
NA2M	"	203,820	298	80	178
N2AIF	"	170,403	272	68	169
K2TD	"	149,695	243	71	164
W9NGA/2	"	125,930	192	74	171
N2CQ	"	101,548	175	59	153
WJ2W	"	44,225	118	53	92
KB2SE	"	31,842	98	42	80
N2VW	"	10,988	54	32	50
KF2O	**7**	**63,318**	**187**	**30**	**92**
K3WW	**A**	**2,923,641**	**1596**	**154**	**497**
N3AD	**"**	**2,153,200**	**1367**	**136**	**424**
AA3B	**"**	**1,314,672**	**967**	**118**	**370**
NN3Q	"	1,258,650	995	105	345
W3MM	"	1,030,808	705	142	396
N3NA	"	950,475	723	116	359
K3NZ	"	898,576	660	119	378
K3ND	"	832,831	657	128	371
NW3Y	"	798,940	690	113	317
K3II	"	701,520	544	123	351
W3OV	"	634,865	603	103	282
K3BHX	"	400,860	427	87	253
W3HVQ	"	354,654	410	98	225
K3SA	"	339,885	391	88	227
W3KV	"	272,796	393	73	181
WT3P	"	242,326	341	75	191
NK3U	"	199,648	272	78	194
N3AM	"	188,552	277	82	177
K3ATO	"	125,868	230	57	147
K3TLX	"	109,180	213	72	140
NY3C	"	61,758	169	46	95
KE3GA	"	50,856	123	49	107
W3EVW	"	33,304	220	58	128
WR3L	**21**	**53,955**	**175**	**28**	**81**
AA4NC	**A**	**1,517,233**	**1046**	**133**	**394**
N4KG	**"**	**896,512**	**649**	**146**	**366**
KB4GID	"	809,217	660	128	331
K4CEF	"	797,400	665	125	318
KG4W	"	513,264	480	109	299
AB4RU	"	387,612	427	96	237
W5HUQ/4	"	125,580	213	70	160
N4XX	"	93,080	130	58	131
AC4ZD	"	63,434	160	56	105
W4JVN	"	10,001	60	25	48
W3FTG/4	"	3,024	29	16	26
N4SLR	"	522	11	8	10
KØLUZ/4	**14**	**141,484**	**423**	**32**	**92**
AC4HB	**7**	**350,592**	**784**	**36**	**130**
NJ4F	**"**	**112,185**	**300**	**32**	**103**
KA5W	**A**	**958,512**	**764**	**136**	**320**
K5LP	**"**	**772,710**	**646**	**128**	**302**
N3BB/5	"	577,536	582	119	257
N5AW	"	407,370	429	121	246
KD5IA	"	184,534	260	97	172
WB5CRG	"	64,484	136	70	118
K5HDU	"	30,030	104	44	66
K5EC	"	23,205	83	41	64
KI3L/5	"	22,800	87	35	60
WT5U	**21**	**41,225**	**160**	**27**	**70**
K6XT	**A**	**977,077**	**812**	**135**	**296**
WZ6Z	**"**	**878,384**	**768**	**134**	**278**
WS6X	"	514,096	511	119	249
K6SG	"	462,735	528	105	210
W6BIP	"	245,376	321	101	183
K6MA	"	188,650	281	89	156
WA6TLA	"	135,468	240	72	141
KJ6HO	"	135,464	220	94	142
N6RFM	"	117,700	210	63	151
W4RIM/6	"	113,277	231	76	107
NC6U	"	108,324	253	61	92
WW6D	"	89,739	188	66	103
KT6V	"	61,560	132	60	111
WA8LLY/6	"	56,250	139	63	87
N6DLU	"	38,645	108	48	83
NF6R	"	28,033	107	38	59
AA6JJ	"	15,792	61	38	56
NF6H	**14**	**328,324**	**724**	**39**	**119**
KN6EL	"	149,760	450	32	88
K6UO	7	13,752	72	24	48
AA7CQ	**A**	**517,324**	**678**	**102**	**181**
NØAX/7	**"**	**342,952**	**504**	**95**	**168**
NY7T	"	194,256	314	84	144
N7ENU	"	102,950	257	54	91
KE7GH	"	78,498	186	71	107
KF8LY	**A**	**739,830**	**684**	**109**	**281**
W8FN	**"**	**496,800**	**496**	**101**	**267**
K8JJC	"	484,956	532	95	247
KE8M	"	295,380	409	81	189
KB3X/8	"	148,155	226	87	168

KC8EG	"	107,400	216	57	122
K8CV	"	71,736	180	47	100
KB8PK	"	8,064	51	27	36
KB8SUZ	"	7,788	50	28	38
NW8F	3.5	1,250	18	9	16
W8UVZ	**1.8**	**16,434**	**101**	**17**	**49**
KK9V	**A**	**852,852**	**746**	**125**	**301**
W9OP	"	416,640	493	96	214
K3GGN/9	"	59,100	149	53	97
W9ILY	"	31,080	100	41	79
N9AU	**7**	**73,396**	**231**	**30**	**88**
NK9G	"	51,584	190	28	76
NØAT	A	95,931	187	62	125
KØCS	**1.8**	**4,128**	**42**	**16**	**27**

CANADA

VE1RAA	**A**	**144,225**	**232**	**60**	**165**
VE6LB	1.8	2,743	107	7	6

AFRICA

CANARY ISLANDS

EA8NQ	**14**	**113,580**	**426**	**21**	**69**

ASIA

ASIATIC RUSSIA

RKØSXF	**3.5**	**59,120**	**368**	**20**	**60**

(Opr RUØSN)

HONG KONG

VS6BG	**A**	**1,474,200**	**2159**	**118**	**233**

JAPAN

JF1SEK	**A**	**976,966**	**918**	**135**	**251**
JH8KYU/1	"	174,838	330	90	124
JA1SJV	**14**	**34,853**	**147**	**31**	**60**
JE1HXZ	"	960	18	10	14
JK1GKG	3.5	4,446	59	18	20
JK2VOC	**A**	**285,525**	**606**	**87**	**148**
JF3LGC	**"**	**265,848**	**438**	**78**	**150**
JN3SAC	"	227,601	408	77	132
JE6IBJ	7	23,779	113	27	52
JA7SUR	**A**	**274,920**	**453**	**95**	**142**
JA9CWJ	**"**	**492,407**	**660**	**101**	**170**

EUROPE

ALAND ISLANDS

OHØBCI	**1.8**	**81,528**	**846**	**17**	**69**

(Opr OH2BCI)

CZECH REPUBLIC

OK2FD	**A**	**306,908**	**343**	**116**	**272**

ENGLAND

G5LP	**A**	**428,340**	**665**	**94**	**269**
G4PDQ	"	160,284	478	66	156

FINLAND

OH2VZ	**A**	**152,766**	**315**	**67**	**179**
OH2MPO	**21**	**79,992**	**358**	**32**	**100**
OH3NE	**3.5**	**28,877**	**401**	**10**	**57**

(Opr OH3LQK)

OH1MLB	**1.8**	**45,288**	**568**	**11**	**61**

FRANCE

F5NBX	**A**	**1,141,904**	**1273**	**120**	**346**
F6IRA	"	617,050	1051	84	266
F5NLY	"	305,520	417	79	225
F5TFS	"	164,944	412	66	178

GERMANY

DJ2YA	**A**	**1,892,485**	**1408**	**161**	**534**
DL2ZAE	**"**	**1,348,214**	**1464**	**128**	**425**
DL2HBX	**"**	**1,280,250**	**1207**	**135**	**434**
DF8WS	**"**	**1,049,784**	**1055**	**110**	**388**
DK1RP	"	386,922	587	89	265
DL9NCR	"	336,675	601	88	247
DL5ABI	"	197,960	402	75	205
DL3KUD	"	190,176	312	86	197
DL8KJ	"	165,240	330	75	195
DJ5AV	"	139,780	425	73	168
DL5DXF	"	113,500	246	57	193
DL4KMK	"	62,205	233	44	145
DF3CB	"	12,780	83	24	36
DJ9RR	**7**	**78,120**	**409**	**32**	**94**
DJ4SO	**1.8**	**25,915**	**311**	**12**	**61**
DJ4LK	**"**	**18,699**	**261**	**9**	**60**

ITALY

IKØHBN	**A**	**566,672**	**715**	**106**	**322**
IK3QAR	**"**	**440,230**	**710**	**87**	**244**
IQ2A	"	290,440	729	75	190

(Opr I2UIY)

IKØPXD	"	208,492	632	55	133
IK3SCB	"	93,396	300	53	119
IK1TZO	"	87,590	287	55	135
IK2NVE	"	52,622	172	52	114
IK1VGK	"	31,626	187	33	93
IK2IKW	"	21,296	101	39	82
IK5TSS	**21**	**111,186**	**369**	**32**	**110**
I2HVE	**14**	**305,897**	**928**	**37**	**112**
II8W	**7**	**331,045**	**1434**	**32**	**111**

(Opr IK8JSV)

IN3NJB	**3.5**	**155,040**	**1128**	**19**	**83**

NETHERLANDS

PA3EBT	**3.5**	**255,612**	**1313**	**26**	**93**

NORWAY

LA4PHA	**A**	**231,768**	**463**	**72**	**189**
LA2KD	"	179,196	376	71	203

SICILY

IT9XUC	**14**	**339,795**	**1304**	**32**	**103**

SLOVAK REPUBLIC

OM3NA	**A**	**2,974,634**	**2501**	**143**	**456**

SPAIN

EA3BT	**A**	**351,540**	**540**	**84**	**240**

SVALBARD

JWØI	**A**	**1,054,596**	**1834**	**73**	**203**

SWEDEN

SMØHTO	**A**	**624,012**	**684**	**124**	**195**
SM7WT	"	104,218	278	56	158
SM6LPF	"	5,734	82	16	31
SM5CZK	"	3,588	29	23	29

SWITZERLAND

HB9CPS	21	29,568	153	22	62

VATICAN CITY

HV4NAC	A	6,976	43	31	33

(Opr IKØFVC)

WALES

GW3JXN	**3.5**	**62,524**	**558**	**17**	**60**

SOUTH AMERICA

ARUBA

P4ØW	**A**	**10,288,950**	**5541**	**155**	**460**

(Opr W2GD)

CHILE

CE3BFZ	A	26,280	150	24	36

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

K1AR	**6,660,108**	**3124**	**155**	**586**
KC1XX	**5,431,836**	**2773**	**152**	**546**
K1TR	**4,616,046**	**2432**	**148**	**518**
K1KP	1,942,590	1358	119	391
KB1H	1,868,730	1338	122	379
WT1T	1,580,652	1146	120	378
W1XS	734,977	701	99	284
WE1B	466,236	542	80	244
N1AU	226,570	300	82	196
N2NU	**5,511,740**	**2587**	**168**	**586**
NO2R	1,481,760	1051	124	380
AB2E	1,369,650	864	139	436
NS2K	1,073,950	831	113	357
KF2KT	209,440	355	69	151
N3RS	**5,304,804**	**2583**	**159**	**573**
AA1K/3	**2,303,712**	**1357**	**143**	**465**
W3GG	1,338,466	985	119	372
N3BNA	904,960	807	98	306
K3DI	847,168	725	103	324
NM3K	513,857	586	86	231
KB3TS	138,852	256	58	145
W1CW/4	**2,564,892**	**1599**	**151**	**443**
W4PRO	558,448	508	114	304
KO4EA	288,025	400	82	199
WXØB/5	**1,988,806**	**1555**	**145**	**381**
N5OK	967,664	987	115	279
N5HRG	195,910	262	99	187
W6GO	**3,397,914**	**2420**	**150**	**357**
N6CQ	**2,545,040**	**1605**	**142**	**438**
AG6D	**2,087,652**	**1884**	**137**	**269**
W6REC	1,628,354	1480	126	263
AA6MC	1,597,925	1472	127	270
WA6IET	927,520	962	116	236
K8AZ	**4,514,277**	**2322**	**162**	**525**
K8LX	1,003,440	810	119	325
KS9K	**3,273,984**	**2015**	**153**	**456**
K9UWA	**2,024,308**	**1326**	**150**	**422**
W9KDX	1,618,130	1135	136	379
N2IC/Ø	**2,931,732**	**1907**	**155**	**403**
NCØP	**2,250,056**	**1620**	**145**	**379**
NXØI	**1,915,740**	**1438**	**150**	**372**
WØCP	1,488,704	1244	139	309

BAHAMAS

C6AHX	**5,760,495**	**4162**	**140**	**445**

CANADA

VE3EJ	**6,446,946**	**3739**	**164**	**518**
VE7U	1,367,204	2055	102	176
VE6AO	318,462	968	59	95

CAYMAN ISLANDS

ZF1A	**4,675,628**	**3997**	**131**	**371**

MEXICO

6D2X	**6,544,224**	**4863**	**157**	**401**

MONTSERRAT

VP2MDE	**4,078,800**	**3605**	**107**	**333**

PUERTO RICO

NP4Z	**7,629,219**	**5217**	**141**	**450**

AFRICA

DJIBOUTI

J28EN	**4,790,019**	**3502**	**117**	**350**

IVORY COAST

TU5EV	**1,408,959**	**1778**	**70**	**197**

ASIA

ASIATIC RUSSIA

RK9AWN	**2,629,578**	**2143**	**115**	**342**
RKØQ	**871,200**	**1765**	**83**	**159**

JAPAN

JJ3YBB	**3,522,400**	**2314**	**166**	**378**
JA8YBY	**2,887,680**	**2183**	**151**	**319**
JE6ZIH	**2,041,392**	**1727**	**139**	**287**
JR1ZTT	**1,822,699**	**1547**	**151**	**280**
JA6YCL	1,637,160	1431	139	281
JA1ZLO	1,282,284	1267	131	241
JA9YAV	732,484	917	114	184
JA1YXP	519,414	777	91	158
JA2YKA	302,574	537	85	126
JH8YCT	204,852	437	66	106
JH2ZUN	51,728	172	48	74

KAZAKHSTAN

UN5G	**3,354,654**	**2304**	**139**	**404**

MONGOLIA

JT1T	**426,624**	**1435**	**75**	**127**

SAUDI ARABIA

HZ1AB	**6,896,136**	**4078**	**146**	**452**

THAILAND

HSØAC	**2,594,388**	**2745**	**131**	**316**
HS7AS	**1,126,856**	**2150**	**100**	**216**

EUROPE

4U-ITU

4U1ITU	**4,420,560**	**4068**	**151**	**527**

4U-VIC

4U1VIC	**4,458,090**	**3923**	**170**	**540**

AUSTRIA

OE2S	**3,113,131**	**2713**	**152**	**471**

BELGIUM

OT4T	**7,583,400**	**4053**	**192**	**708**
ON6AH	1,902,432	2299	122	334
OT4A	1,882,226	1968	116	387

BULGARIA

LZ9A	**6,953,600**	**4312**	**189**	**659**
LZ7N	1,676,760	2005	121	350

CROATIA

9A5D	**1,493,457**	**2373**	**83**	**278**

CZECH REPUBLIC

OL3A	**2,059,960**	**2494**	**118**	**372**
OK2KOD	**1,178,853**	**1438**	**116**	**385**
OK2KJU	434,928	813	79	249
OL1CW	433,807	812	83	266
OK2KDS	118,160	311	59	152

ENGLAND

GXØAAA	**6,279,640**	**4205**	**165**	**575**
G3LNS	**5,162,808**	**3475**	**166**	**612**
GB5DX	**4,697,360**	**3471**	**151**	**559**
GB5WW	2,534,592	2453	139	475

EUROPEAN RUSSIA

RS3A	**4,413,688**	**3902**	**168**	**544**
RZ6LZL	**1,131,031**	**1733**	**103**	**346**
RZ4AYT	685,785	1412	83	266
RK1OWZ	548,226	1025	90	252
RW1Q	528,105	1116	73	250
RZ4PZL	36,287	220	37	94

FINLAND

OH2M	**6,723,750**	**3896**	**180**	**570**
OH7X	**4,940,904**	**3262**	**164**	**532**
OH4N	2,105,732	2209	126	412
OH5LAQ	1,820,246	2156	106	343
OH8MDG	845,480	1880	65	165
OI6AY	97,088	520	50	114

FRANCE

TM9C	**6,337,206**	**4423**	**165**	**573**
TM8A	1,405,070	2099	103	307
F6KCS	966,810	1403	95	295

GERMANY

DFØHQ	**6,295,100**	**3762**	**183**	**599**
DK6WL	**4,325,708**	**2760**	**172**	**601**
DL5XU	**2,704,380**	**2127**	**164**	**494**
DKØMM	2,369,458	1941	150	508
DKØEE	2,365,272	2060	159	525
DL8HWA	1,974,565	1892	132	425
DKØUB	1,521,450	1840	112	371
DLØRH	651,960	900	70	290
DF2RG	561,699	796	99	318
DKØTZ	303,369	561	82	237
DLØTUD	205,200	411	76	194
DK9DA	148,719	251	77	190
DKØFFO	83,367	303	41	136

GUERNSEY

GU3HFN	**1,654,380**	**3018**	**77**	**287**

IRELAND

EI7M	**3,657,600**	**3293**	**131**	**469**

ITALY

IQ4A	**8,844,052**	**4501**	**194**	**674**
IR2W	**5,132,160**	**3425**	**167**	**562**
IU2X	3,848,574	2824	158	529
IU2D	3,058,560	2704	135	441
IO2L	2,222,550	2186	128	422
IK2UCK	1,273,688	1653	114	367
IQ4T	1,117,840	1254	116	329
IK4UOP	306,375	626	77	208

KALININGRAD

RW2F	**4,629,768**	**3625**	**171**	**570**

LITHUANIA

LY1BXB	**952,070**	**1628**	**93**	**313**

LUXEMBOURG

LX /DFØBK	**1,157,013**	**2032**	**106**	**323**

NETHERLANDS

PI4CC	**1,582,490**	**2100**	**107**	**374**
PI4DEC	**1,051,596**	**1795**	**98**	**266**
PA3FHA/P	591,981	1180	88	265
PI4TUE	217,560	593	56	166
PI4ALK	46,508	242	41	110

POLAND

SP9KRT	360,552	662	84	248
SPØPKQ	104,040	303	52	152
SP3KPN	4,002	61	16	42

SCOTLAND

GM4TMS	**457,660**	**1516**	**55**	**190**

SLOVAK REPUBLIC

OM3A	**4,802,520**	**3377**	**168**	**576**
OM7M	**4,657,375**	**3486**	**166**	**537**
OM3RJB	1,358,215	1377	130	421

SPAIN

EA3CW	**2,038,971**	**2603**	**104**	**347**
EA1AU	**1,964,016**	**2573**	**104**	**310**
EA5EU	446,454	868	75	231
EA5VN	143,451	440	56	151

SWEDEN

SK1PW	**2,038,509**	**2482**	**122**	**409**
SLØCB	**1,653,300**	**2115**	**122**	**373**
SK4AO	1,210,203	1533	108	315
SK6AW	806,650	1262	99	326
SK6EI	157,500	402	57	153
SK6WU	61,835	232	44	105

SWITZERLAND

HB4FE	**1,330,830**	**1300**	**127**	**403**

UKRAINE

UT7W	**2,084,506**	**1755**	**151**	**478**
UU4JWI	393,617	759	92	185

WALES

GW8GT	**5,183,882**	**3966**	**147**	**544**

YUGOSLAVIA

YU1AAV	240,768	1056	50	178

OCEANIA

AUSTRALIA

VK4MZ	**1,409,906**	**1709**	**101**	**182**

HAWAII

WH6R	**2,624,622**	**2770**	**119**	**203**

SOUTH AMERICA

ARGENTINA

LU4FM	**4,024,078**	**3022**	**137**	**310**

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

W3LPL	**9,699,844**	**4196**	**181**	**666**
N2RM	**8,979,876**	**4070**	**174**	**630**
K1KI	**8,158,280**	**3861**	**160**	**594**
K3LR	**7,360,036**	**3546**	**166**	**580**
KY1H	**5,245,622**	**2846**	**153**	**544**
KY3N	**4,869,634**	**2444**	**164**	**557**
N6DX	**4,415,920**	**2980**	**164**	**414**
K4VX/Ø	**4,330,932**	**2606**	**159**	**483**
K3ANS	2,679,600	1614	147	462
W7RM	**2,669,632**	**2223**	**141**	**307**
N2MM	2,223,870	1371	140	446
WØAIH/9	**2,158,456**	**1568**	**143**	**395**
W4MYA	**1,283,427**	**892**	**147**	**384**
NE3F	610,134	578	109	289

ALASKA

NL7G	**4,416,880**	**4378**	**125**	**278**

ANGUILLA

VP2EZA	**8,280,048**	**6479**	**121**	**411**

DOMINICA

J77J	**8,599,387**	**6496**	**123**	**424**

MEXICO

6E2T	**1,953,351**	**2945**	**108**	**181**

TURKS & CAICOS

VP5VW	**21,823,275**	**11740**	**169**	**586**

AFRICA

GHANA

9G5AA	**22,946,634**	**11063**	**154**	**543**

ASIA

ASIATIC RUSSIA

RW9C	**10,279,614**	**5477**	**173**	**550**

JAPAN

JA3ZOH	**6,512,896**	**3876**	**177**	**431**
JH5ZJS	**5,731,698**	**3628**	**168**	**403**
JA1YDU	**4,488,876**	**2996**	**173**	**391**
JA7YAA	**2,654,338**	**2227**	**143**	**294**
JA3YKC	2,367,651	2007	140	289

SYRIA

YKØA	**11,474,172**	**7351**	**132**	**424**

EUROPE

CROATIA

9A1A	**14,506,569**	**9052**	**187**	**660**

CZECH REPUBLIC

OL7O	**8,166,164**	**5589**	**184**	**612**

DENMARK

OZ5WQ	**1,931,215**	**2859**	**105**	**376**
OZ4HAM	72,352	396	31	121

DODECANESE

J45T	**1,549,278**	**3646**	**74**	**292**

EUROPEAN RUSSIA

RU1A	**7,581,104**	**5247**	**184**	**612**

FINLAND

OH1AJ	**1,317,528**	**1283**	**120**	**402**

FRANCE

F6KJX	146,305	733	31	114

GERMANY

DLØKF	**3,704,239**	**3566**	**146**	**513**

HUNGARY

HG73DX	**16,114,625**	**8968**	**198**	**743**

ITALY

IR5R	**335,342**	**941**	**55**	**183**
IK2VUE	14,136	138	19	57

LITHUANIA

LY7A	**3,700,800**	**4184**	**136**	**464**

MACEDONIA

Z3ØA	**6,477,834**	**6287**	**150**	**521**

NETHERLANDS

PI4COM	**5,671,848**	**4676**	**156**	**530**

UKRAINE

EM2I	**10,436,607**	**7946**	**174**	**609**
UU5J	**9,390,039**	**6718**	**196**	**681**

YUGOSLAVIA

YU7ØL	**252,984**	**804**	**61**	**188**

OCEANIA

NEW ZEALAND

ZM2K	**6,214,602**	**4636**	**143**	**315**

NORTHERN MARIANAS

KHØAM	**17,076,598**	**8438**	**193**	**493**

CHECK LOGS

Our thanks to the following stations who sent in check logs:

9A2EU, AA9AX, DK5OS, DL1AKL, DL1JEI, DL2AKK, DL2HWI, DL3ARX, DL3NEO, DL4HWI, DL4LVM, DL5AVJ, DL5DWW, DL5LRA, DL5LZM, DL5YWM, DL6CGT, DL6CHG, DL6CIA, DL7VAF, DL8UFO, EA1ATL, EA1EDS, EA1FAE, EA1FGJ, EA2AGB, EA3AEI, EA3FBO, EA3GFB, EA4FW, EA4UL, EA5ABH, EA5GRC, EA5OI, EA7BB, EA7BJ, EA7GVW, EA7HDW, EA7KN, EA7XC, EA8QJ, EU3EU, EW3LB, G3HCT, G4ZME, HA5AEX, HA5AF, HK3DDD, HK3YH, IT9GXE, K6FM, KL7UR, KQ3E, KRØI, LA4BN, LA4JHA, LA4KF, LA4NE, LA4OGA, LA5AP, LA5LT, LA5QC, LA6BG, LA7IJ, LA7SI, LA8CA, LA8CE, LA8HGA, LA8NHA, LA8XM, LA9FFA, LA9GY, LA9HF, LA9PHA, LA9VGA, LB2UE, LR2Z (Opr LU1XSI), LR3Z (Opr LU3XQ), LZ1CY, LZ1HX, LZ1KH, LZ1VQ, LZ2FM, N3CZB, NM1Q, OH1LFF, OH2BO, OH2KQ, OH3WR, OH4LBX, OH5PT, OK1AD, OK1FKW, OK2AG, OK2BCJ, OK2PO, OZ1EUO, OZ2JI, OZ5PA, OZ5UR, OZ7QB, PAØUV, PA3DCS, PV8ZDC, PY7OJ, RU9CXP, RZ4PXJ, RZ6HW, SMØBNK, SMØCSX, SM4CTI, SM4DDE, SM4GI, SM5BEU, SM5BFJ, SM5BUH, SM5LI, SM5MLE, SM5WC, SM6BZE, SM6PVB, SM7UYS, SP2DX, SP2FZT, SP2GUC, SP3ESV, SP3FZN, SP3JUN, SP4DZT, SP4HKB, SP4JYA, SP4TBM, SP4TKK, SP5AHZ, SP6AEG, SP6ALE, SP6AUI, SP6BGZ, SP6CPF, SP6FER, SP6JOE, SP7EJS, SP7FAH, SP8FHM, SP8JMA, SP9CTT, SP9DAE, SP9DSM/am, SP9MDY, TF3DX, UAØZAM, UA3DFV, UA3FO, UA3GR, UA3IKP, UA4ZA, UA6HPQ/EKØ, UA9XK, UN9LX, UR3IFD, UT2XX, UX4IJ, VE1ACU, VE3BR, VE3KLM, VK3KS, VK3XB, VK4IV, VO1CA, W6QHS, W8LYT, WB4RUA, WX9U, YO4CAH, YO8RL, ZB2EO.

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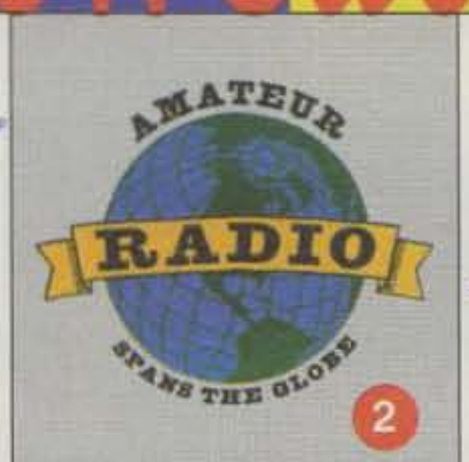

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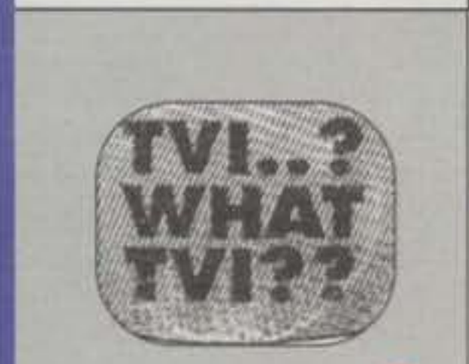

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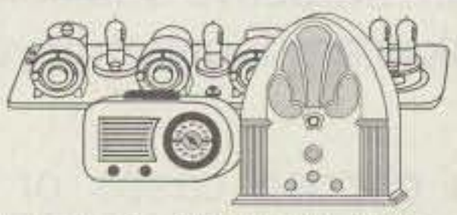

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(continued on page 147)

Announcements *(from page 8)*

Oct. 15, **MIT Flea Market,** Cambridge, Massachusetts. Call 617-253-3776.

Oct. 21, **9th Annual Sumter Hamfest & Computer Fair**, Sumter County Exhibition Center, Sumter, South Carolina. Call Mike Dunlap, KC4HUT, 803-481-4611. (Exams.)

Oct. 21, **Octoberfest,** Grandview East Junior High School, Grandview, Missouri. Contact: KGØUP, P.O. Box 1142, Grandview, MO 64030. (Exams.)

Oct. 21, **Holland ARC Hamfest**, Holland Christian High School, Holland, Michigan. Contact Barbara Siebelink, N8NXA, 6418 Otis Rd., Saugatuck, MI 49453 (616-857-1343; fax 616-857-1463). (Exams.)

Oct. 21, **Polk County Fairgrounds**, Rickreal, Oregon. Contact Evan Burroughs, N7IFJ, at 503-585-5924; for exam info, contact Sandy Berry, N7TQQ, at 503-588-7685 (must preregister). (Exams.)

Oct. 21, **Rogue Valley ARC Swapmeet**, The Medford Armory, Medford, Oregon. Contact W5HVK at 503-770-5631. (Exams.)

Oct. 21, **Ham Radio Auction & Flea Market**, Christian Life Building, Seneca, Pennsylvania. Call Mary Housholder, N3QCR, at 814-437-2036; e-mail address: MAHOUSHOLD@AOL.COM; or write to Fort Venango Mike & Key Club, R.D. #1, P.O. Box 591, Cranberry, PA 16319.

Oct. 21–22, **Palm Beach County Hamfest**, South Florida Fairgrounds, West Palm Beach, Florida. Call Vi Kiekenapp, KC4LCF, at 407-585-9074. (Exams.)

Oct. 21–22, **Louisville Computer Fair**, Kentucky Fair and Expo Center, Louisville, Kentucky. Call 513-263-3378.

Oct. 22, **RH Hill ARC Hamfest**, Sellersville Fire House, Sellersville, Pennsylvania. Call the Hamfest Hotline: Linda Erdman 215-679-5764; or write to P.O. Box 29, Colmar, PA 18915. (Exams.)

Oct. 22, **USECA Swap**, Our Lady of Redemption Conference Center, Warren, Michigan. Call Kevin Everett, N8QVX, at 810-772-8082; or write to Kevin at 21947 Birchwood, Eastpoint, MI 48021. For VE test registration, call Bill, N8CVC, 810-468-8345. (Exams.)

Oct. 22, **1995 RMRL Hamfest and ARRL Colorado State Convention**, Jefferson County Fairgounds, Golden, Colorado. Call Joe Dickinson, WTØC, at 303-771-9577. (Exams.)

Oct. 28, **Franklin Fest '95**, Franklin, Kentucky. Call Ed Schwab, KA4REF, at 502-843-4389; or write to him at P.O. Box 9656, Bowling Green, KY 42102.

Oct. 28, **Tri-City ARC Annual Fall Auction**, Senior Citizens Center, Waterford Municipal Complex, Waterford, Connecticut. Contact Bob Dargel, KA1BB, 8 Willow Lane, East Lyme, CT 06333-1526; or call 203-739-8016. (Handicapped accessible.) (Auction only.)

Oct. 28, **The Mayflower ARC Amateur Radio Flea Market**, Plymouth Memorial Hall Building, Plymouth, Massachusetts. Call Jon, WS1K, 508-746-0162; or Jim, NM1F, 508-747-2224. (Handicapped accessible.)

Oct. 28, **Port St. Lucie ARA Hamfest '95**, Port St. Lucie Yacht Club, Port St. Lucie, Florida. Call Bill Perciasepe at 407-879-4020; or Roy Cox at 407-340-4319.

Oct. 28, **Halloween Hamfest**, West County Tech., 8 miles west of St. Louis, Missouri. Contact Dennis, AAØA, 5022-Lansdowne Ave., St. Louis, MO 63109.

Oct. 28, **Hamfest Minnesota & Computer Expo**, St. Paul Civic Center, St. Paul, Minnesota. Write to P.O. Box 5598, Hopkins, MN 55343; or call Hamfest Minnesota information line at 612-535-0637. (Exams.)

Oct. 29, **Long Island Hamfest-Computer Show**, Knights of Columbus Hall, Lindenhurst, New York. For additional information from 7 pm to 10 pm only call Andy Feldman, WB2FXN, at 516-928-3868; or Walt Wenzel, KA2RGI, at 516-957-0218.

Oct. 29, **Lebanon Hamfest/Flea Market**, Boone County 4-H Fairgrounds, Lebanon, Indiana. Contact Michael Ottinger, NX9Q, at 317-482-1866; or write to him at 809 E. Walnut Street, Lebanon, IN 46052.

Oct. 29, **21st Annual HamFiesta and Computer Show**, Marion County Fairgrounds Coliseum, Marion, Ohio. Contact either Karen Eckard, N8JDH, 6583 South Street, Meeker (Marion), OH 43302 (614-499-3565); or Betty Krist, N8UDT, 132 N. Seffner Ave., Marion, OH 43302 (614-387-3533 after 5 PM).

Oct. 29, **Hamfest Iowa '95**, 4H Building, Iowa State Fairgrounds, Des Moines, Iowa. Contact Randal Lees, NØLMS, 1575 Northwest 78th Street, Clive, IA 50325-1255 (515-279-4241). (Exams.)

Oct. 29, **Hampden County Radio Association Annual Hamfest and Electronics Show**, Southwick Recreational Center, Southwick, Massachusetts. Contact Barry Mason, N1IJK, 413-747-7010 (before 10 PM); or John Walker, N1QXV, 413-572-4592 (before 9 PM); or write Hamfest Committee, 36 Kenwood Terrace, Springfield, MA 01108-1716. (Pre-registration required for exams; contact Yorke Phillips, K1BXE, 413-566-3010.)

Oct. 29, **Mason-Dixon Computer & Hamfest**, Carroll County Ag Center, Westminster, Maryland. Contact Larry Martin, N3DGK, 410-374-4544. (VE exam pre-registration: Bill Wolfgang, NZ3J, 717-359-7095.)

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Introducing the new CUB pocket sized frequency counter. The CUB is ideal for communications, surveillance, and recreational monitoring applications. From 10MHz-2.8GHz, the CUB has maximized sensitivity for detecting RF in the near field and displaying the frequency detected. The CUB features a 9 digit LCD display for best visibility and longer battery life, 8 selectable gate times with a high speed .0001 second gate, Digital Filter that reduces false counts and Random Noise, Digital Auto Capture that acts like an intelligent hold button, allowing any frequency captured to remain displayed as long as needed. Simplicity, sophistication and accuracy. Make the CUB your choice for a frequency counter.

The Handi-Counter Accessory Package: CC30 Case, Telescoping WhipAntenna, and Belt Clip.....$25.00

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MADE IN U.S.A

ADMS-1 COMPUTER PROGRAMMABLE

Ultra Compact Handhelds FT-10/40R

ARTS
Tracks range of 2 identically programmed HTs.

TOP NOTCH™
Multi-function knob controls programming and volume.

PTT THUMB SWITCH
Ergonomically designed, conveniently located, insures maximum comfort.

ALPHANUMERIC DISPLAY
Allows 4-character labelling of important frequencies.

SUPER LOUD AUDIO
State of art miniaturization givest greatest RX volume and clarity.

RUBBER GASKETS
Protects against corrosion from dust, rain or spray.

12 V DC JACK
Use optional E-DC-5B power adapter in your car for 5 W PWR O/P.

"This HT is the first amateur radio with built-in Digital Coded Squelch (DCS) for RX and TX."

"For a radio this small and rugged, the audio is genuinely LOUD!"

"I used ADMS-1 to program my FT-10 when we went camping, and the new ARTS system to keep track of my kids on the trails!"

"Yaesu did it again!"

Military spec commercial grade HTs loaded with new features and a choice of keypad, too.

FTT-10/A16S
16-Key, CTCSS Enc/Dec, DCS Enc/Dec, Digital Voice Recorder 99 Channels

FTT-10/A16
16-Key, CTCSS Enc, DCS Enc/Dec, 30 Channels

FTT-10/A06
6-Key, CTCSS Enc, DCS Enc/Dec, 30 Channels

FTT-10/A16D
16-Key, CTCSS Enc/Dec, DCS Enc/Dec, 99 Channels

Specifications

- Frequency Coverage
  FT-10R
  2m: RX: 140-174 MHz
  TX: 144-148 MHz
  FT-40R
  70cm: RX: 420-470 MHz
  TX: 430-450 MHz
- Choice of 4 keypad options (6, 16 or Deluxe and DVRS16 Keypads)
- Auto Range Transpond System™ (ARTS™)
- MIL-STD 810
- High Audio Output
- 12 V DC Direct Input
- Alphanumeric Display
- RX/TX Battery Savers
- Digital Coded Squelch (DCS)
- Digital Voice Recording System (DVRS) w/FTT-10/A16S
- True FM for better voice clarity
- High Speed Scanning System
- 2.5 and 5 W available
- Full line of accessories

The FT-10/40R is a totally new HT concept! Built to rugged, tough military spec, commercial radio standards inside and out, it's small, powerful, feature-packed and ready to roll out in four versions!!

Four different keypads – count 'em, FOUR! First true user-choice customized HT on the market, offers a 6, and three 16 keypad selections plus 2.5 and 5 W battery choices, too! Easy for Yaesu, the electronics are in the keypad. Easy for you, they're already installed. Just pick the one that suits your HT "style"!

New technology high-efficiency speaker design provides super-loud audio. No small surprise – after all it is Yaesu!

First ever amateur HT rated MIL-STD 810! What else could you hope for? This, maybe. Dual Watch – see two frequencies displayed simultaneously in the display. No other single band HT has this feature. Another Yaesu exclusive, the Auto Range Transpond System™ (ARTS™) alerts you visually and audibly when a companion HT is out of simplex range. Most radio functions, are controlled of the Top Notch™, the neatly placed knob on the HT. This minimizes complex key sequences. Only Yaesu has this. Digital Coded Squelch (DCS) – for convenient semi-private operation. Digital Voice Recording System (DVRS) – records voice messages for playback, and received messages. And, of course Omni-Glow™ display, because you won't be able to put this one down!

The FT-10/40R is a military-tough, commercial-quality force in a small package. Exactly what you've come to expect from Yaesu! Better get one now, before the dealer sells out!

FT-51R
Dual Band with Windows Spectrum Scope™, Alphanumeric, Scrolling Menu, Battery Voltage Display. 2 or 5 W. World's smallest dual band HT!

FT-11/41R
Slim, trim and powerful! Alphanumeric, Compact Battery Design, Up/Down Thumb Control, RX/TX Battery Savers. 2 or 5 W Available.

YAESU
Performance without compromise.℠

NEW DUAL BAND

Dual Band Mobile FT-8500

Never before has Yaesu technology changed an industry so dramatically.

"With the Smart Controller Mic, all the radio functions are in your hand."

"And, look, the digital voltage display monitors my car battery voltage!"

"Spectra-Analyzer lets me check out channel activity in UHF, VHF, and keep track of my favorite repeaters, too."

"Yaesu did it again!"

Rear-panel data jack for packet with 6-pin connections for Data Input, PTT, 9600 bps and 1200 bps Receive Data, Squelch Status, Ground.

ACTUAL SIZE
140x40x160mm (5.6"x1.6"x6.4")

Rotary Dial Selector Knob
Select memories and other settings according to the current mode functions.

Omni-Glow™ LCD Dual-Band Display

VHF&VHF, UHF&UHF, VHF&UHF
Select three dual band configurations. Menu loop contains 13 headings and 53 transceiver settings. Shown with custom 6-character alpha-numeric code.

Spectra-Analyzer™ displays station activity above and below the current operating channel. In Memory Recall, display signal strength of programmed channels.

Built-in digital voltage display monitors automobile battery voltage. Menu-Selectable Packet Baud Rate. Choose 1200 or 9600 bps.

Specifications

- **Frequency Coverage:**
  2m RX: 110-174 MHz
  TX: 144-148 MHz
  70 cm RX: 420-500 MHz
  TX: 430-450 MHz
- Spectra-Analyzer™ w/adjustable signal width, spacing & span markers
- 6-Character Alpha-Numeric Display
- 110 Memories (in 5 memory banks)
- Omni-Glow™ Display
- Digital voltage display
- Selectable 1200/9600 baud
- 3-Level Auto-Mute w/Mute Timer
- V+V, U+U, V+U Dual Receive
- 3 Power Output Levels
  2 m 50/10/5 Watt
  70 cm 35/10/5 Watt
- Built-in Auto Power Off (APO) and Time-out Timer (TOT)
- MIL-STD 810/C Rating
- 9 Memory DTMF Autodialer
- Handy Cloning Feature
- 3 Scanning Modes w/ Clear Scan
- Adjustable LCD Contrast/ Brightness Control
- **Accessories:**
  Consult your local Yaesu dealer.

The FT-8500 and Smart Controller™ Microphone demonstrates Yaesu's world leadership position in 2-way radio communication again! With just four simple flicks of the Smart Controller™ Microphone "joystick"-type lever, you command over 50 separate functions from the palm of your hand! The FT-8500 defines "high-tech" in mobile radio engineering.

The Smart Controller™ Microphone isn't the only engineering advancement. Watch the unique Spectra-Analyzer™ exhibit station activity above and below your current operating channel, and the digital voltage readout monitor your car battery voltage big and bold in the Omni-Glow™ display. In V+V, U+U or V+U view frequencies and custom alpha-numeric messages at the same time. Other features include handy cloning, selectable 1200/9600 baud, and a rear-panel data jack for packet! All of this and more in the deluxe, compact FT-8500.

The extraordinary FT-8500 Dual Band Mobile is at your Yaesu dealer now. Find out how this dramatic change will affect mobile technology for you from this day forward.

YAESU

Performance without compromise.℠

EDSP RX/TX

All-Mode HF Transceiver FT-1000MP

The year was 1956. Electronic communication throughout the world was on the threshold of significant and remarkable change. Intrigued by the development of single-sideband radio theory, a young engineer and amateur radio experimenter painstakingly assembled an SSB transmitter. Word of his successful efforts spread quickly among his friends, and soon radio amateurs from all over the country were requesting transmitters just like it. Thus was born the first invention of JA1MP, founder of Yaesu. Though his key is now silent, in tribute to his leadership and exceptional contributions to the radio art, the FT-1000MP carries the memory of his call sign.

An HF Masterpiece, Combining the Best of Digital and RF design technology. The FT-1000MP.

Specifications

- EDSP (Enhanced Digital Signal Processing)
- Shuttle-jog Rapid Tuning Enhancement
- Directional Tuning Scale for CW/Digital mode and clarifier offset display
- Dual In-Band Receive w/ Separate S-Meters
- Selectable Antenna Jacks
- Collins SSB Mechanical Filter built-in, 500 Hz CW Collins filter plug-in, optional
- Selectable Cascaded Crystal and Mechanical IF Filtering (2nd and 3rd IF Filters)
- User-programmable Tuning Steps w/0.625 Hz High Resolution Low-Noise DDS Circuit
- Custom Feature Set-up via New Menu System
- Adjustable TX Output Power: 5-100W (5-25W AM)
- True Base Station: Both 100-117 or 200-234± VAC 10%, 50/60 Hz and 13.5 VDC Power Inputs

Blending digital and RF technology, the FT-1000MP features a Yaesu exclusive: Enhanced Digital Signal Processing (EDSP). Beginning on the receive side with Yaesu's industry-standard high-intercept front end design, the RF signal is then fed to the IF stages, where an impressive array of 8.2 MHz and 455 kHz IF filters (including a built-in Collins SSB Mechanical Filter) establish the tight shape factor so important in obtaining high dynamic range and low noise figure. Finally, the EDSP system provides specially-designed filter selections and response contours for maximum intelligence recovery.

Only with this combination of EDSP, independently selectable 8.2 MHz and 455 kHz IF filters, and a low-noise DDS local oscillator system can receiver performance without compromise be obtained. You can customize your FT-1000MP by choosing from 2.0 kHz, 500 Hz, and 250 Hz optional, cascaded IF filters, then zero in on weak signals using Yaesu's exclusive Shuttle-jog Rapid Tuning Enhancement and high-resolution (0.625 Hz) DDS VFO. Without question, the FT-1000MP is the most technologically advanced HF rig today.

EDSP operates in both transmit *and* receive modes. On receive, the EDSP produces enhanced signal-to-noise ratio and significantly improved intelligence recovery during difficult situations involving noise and/or interference. The result of hundreds of hours of laboratory and real-world experimentation, EDSP's 4 preset random noise reduction protocols and 4 digital filtering selections are controlled by easy-to-use concentric controls on the front panel of the transceiver. High, low, and mid-range cuts for voice work are teamed with razor-sharp CW bandpass filters and an automatic notch filter which identifies and attenuates undesired carriers or heterodynes. Also operational in the transmit mode, EDSP provides 4 performance-enhancement pattern selections for different operating circumstances, ensuring best readability of *your* signal on the other end of the path.

Once again, Yaesu's engineers have reaffirmed the vision and dedication of JA1MP which began nearly 40 years ago. See the incomparable FT-1000MP today.

YAESU

Choice of the World's top DX'ers

FT-1000/D

Legendary 200W
All Mode HF Transceiver
"The Dream Station"

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17210 Edwards Road, Cerritos, CA 90703
(310) 404-2700

ICOM

706

HF all band + 50 MHz + 144 MHz !

- Powerful 100 W from HF to 50 MHz and 10 W for 144 MHz
- 101 memory channels with dotmatrix display
- All mode including SSB, CW, RTTY, AM and FM.

The front panel photo is **Actual size.**

Detachable front panel mounts any where.

Super compact at 6 9/16 (W) × 2 1/4 (H) × 7 7/8 (D) in

Full functions to compete with big rigs

CIRCLE 6 ON READER SERVICE CARD

HF/50/144 MHz ALL MODE TRANSCEIVER

IC-706

This device has not been approved by the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased until the approval of the FCC has been obtained.

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