Amateur Radio

CQ

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SEPTEMBER 1996

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Tips for Improving Your CW Skills

Antenna Farm of Matt Strelow, KC1XX, Mason, NH

RADIO AMATEUR'S JOURNAL

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Specifications are subject to change without notice or obligation. Performance specifications only apply to amateur bands. Permits required for MARS/CAP use.

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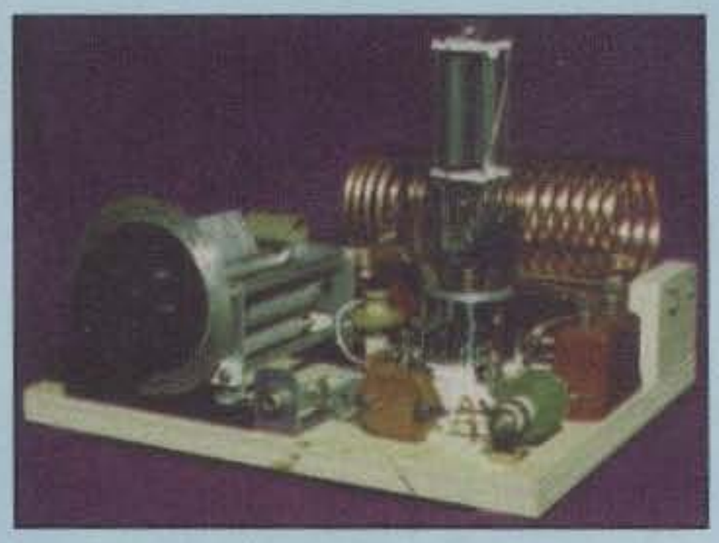

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Features

Departments

ON THE COVER: Few have the energy and enthusiasm for amateur radio and contesting that Matt Strelow, KC1XX, has. His recently constructed New Hampshire "monster" station is evidence of that. The first of what will be multiple (yes, multiple!) 200 ft. towers is featured on our cover this month. Check out the 20 meter, 4-stack array (four 4-el Yagis) along with the stacked 40 meter beams, all by Cushcraft. His recently completed second 200 footer supports eight 4-el, 15 meter Yagis! With all that hardware in the air, it may be dangerous to place your receiver near Matt's frequency when he's operating!

When Matt's not building his own towers/antennas, he's doing it professionally for others, including recent trips to China and Gabon. Matt's wife, Christine, and their two young girls, Sabrina and Cassandra, share life together from their impressive Mason, NH mountaintop. (Photo by Larry Mulvehill, WB2ZPI)

Best Dual-Banders on Wheels

144MHz/440MHz Dual-Band Operation

Kenwood's TM-733A is a versatile FM dual-bander with the sophistication and power (144MHz: 50W & 440MHz: 35W) for high-performance mobile communications. As well as receiving simultaneously on VHF and UHF bands, it can receive two frequencies on the same band.

Six-In-One Programmable Memory

Six entire operating profiles — including everything from frequency range to dimmer level — can be stored in programmable memory for recall at the press of a button. It's like having six transceivers in one. Each operator or family member can set up their own profile.

Data Connector for 1200/9600 bps Packet

Using the 6-pin mini DIN connector on the front panel, you can easily hook up a TNC to the TM-733A for either 1200 or 9600 bps packet communications.

Theft-Deterrent Features

As an anti-theft measure you can remove the front panel whenever the car is left unattended. If the optional quick-release kit is used, the panel can be mounted virtually anywhere in the vehicle because the microphone cable connects directly to the main unit.

New Microphone with Backlit Keys

A new, large backlit keypad offers extra convenience for frequency entry and autopatch telephone operation.

Other Features

- 72 multi-function memory channels
- AIP (Advanced Intercept Point)
- Built-in DTSS with page
- Cross-band repeater
- Wireless clone function
- Wireless remote function
- Auto simplex checker
- Built-in CTCSS encoder & optional TSU-8 decoder
- Key function display
- Modifiable for MARS/CAP*

*Permits required for MARS and CAP use. Specifications guaranteed for Amateur bands only.

TM-733A
FM DUAL BANDER

NEW ! Backlit Microphone and Duplexer Model Now Available

144MHz/440MHz & 144MHz/220MHz Operation

The TM-742A (144MHz: 50W & 440MHz: 35W) and TM-642A (144MHz: 50W & 220MHz: 25W) dual-band mobile transceivers can be converted into tri-banders with the addition of an optional FM band unit: 28MHz (50W), 50MHz (50W), 220MHz (25W; TM-742A only), 440MHz (35W; TM-642A only), or 1200MHz (10W). The transceiver can display and even receive three bands simultaneously.

TM-742A

101 Memory Channels

For each band, there are 100 memory channels plus 1 call channel. Each channel can store transmit and receive frequencies independently for odd split repeaters.

Separate Control & Display Units

The display and controls can be mounted separately — on either side of the steering wheel, for example — using the optional DFK-3 kit.

TM-642A

New Microphone with Backlit Keys

The supplied microphone has backlit keys for added convenience during autopatch operation or frequency entry.

TM-742A/642A
FM DUAL BANDER

Other Features

- Built-in DTSS selective calling with page
- Independent SQL & VOL controls for each band
- Built-in CTCSS encoder & optional TSU-7 decoder
- Wireless remote control function
- High-visibility illuminated panel keys
- Wide-band VHF/UHF receive coverage (including Air Band)
- Date & time display, stopwatch, alarm, on/of timer
- Cross-band repeater function
- Modifiable for MARS/CAP*

* Permits required for MARS and CAP use. Specifications guaranteed for Amateur bands only. Kenwood follows a policy of continuous advancement in development. For this reason specifications may be changed without notice.

NEW ! Backlit Microphone Model Now Available

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ZERO BIAS

AN EDITORIAL

Every so often I receive a letter from a reader who would like to voice his epiphany about amateur radio. This revelation usually concerns a cabal or conspiracy involving those in the amateur radio industry. The purpose of these sinister groups is to do away with not only CW, but most—if not all—of the requirements for an amateur radio license. This would fill our ranks with the most undeserving wretches, while at the same time reward this nefarious group with tons of money. This, of course, presumes that the rest of us who are here are truly deserving of being here, and somehow by our very nature we keep the industry in check.

There's an old saying: "Sometimes even paranoids are right!" I guess you easily could prove the case for the amateur radio industry being profit centered. Most of us who earn our living at this have gotten pretty used to eating on a regular basis and plan to keep up the practice. Beyond that, and some of the other obvious reasons for making a living, there aren't too many (if any) large fortunes being amassed in this industry.

What we have is a basic cultural conflict between what was and what's about to happen. We have the element of tradition and what that exactly means. We have the never-never land of what amateur radio should be and never was. We have a fixed point in time when everything was wonderful and the rest of the world didn't matter. Of course, each of these things is different for each one of us.

In the long run, it really doesn't matter if you like CW or you hate CW. It will be gone as a requirement. It's simply that technology has changed. It also doesn't mean that there will be no CW activity. I'm sure the practice of CW will continue for a long time as a viable alternative mode. Yes, I know it is a tradition, but we also had traditions with spark and AM. I also know that some of us look fondly and wistfully at the equipment of yore and the memories they evoke. Still, for the most part, we wouldn't want to depend on that gear, not would we expect and insist that everyone still use it.

Recently, we all have been treated to the harsh reality of little Leo, band sharing, and the concept of everything on the table. The world is changing, technology is changing, and whether we like it or not, amateur radio is changing. If you've been around for a while, you can remember the great fiasco involving 220 MHz. We lost it. We saved it. We lost it again. We share it. UPS went away, but others took their place. Most of us would rather buy than build our station. The use of the word "rather" is just to be kind. Most of us simply cannot build, test, or service the likes of a modern transceiver. That part of our hobby has changed dramatically over the last 25 years or so. That tradition, the one of the master builder, is basically gone. Some of us still design, still build, and still exchange the fruits of technological curiosity. Some of us like to do these things, some just like to read about them, and some could care less.

Our tests no longer measure what we need to know. Therefore, at some point tests will be changed to reflect what it is we need to measure in the way of ability to be a good amateur. Will our bands then fill up with undeserving wretches? Somehow, I doubt that there are hoards of people panting at the opportunity. Yes, our ranks will grow, just as they will grow during peaks in the sunspot cycle. However, in truth they basically will be no different from the rest of us, except probably younger. Let's face it. Most of us are not of the MTV generation.

Is all of this a giant conspiracy by the industry to make tons of money? If it were, most of us would have failed miserably by now. When I was a kid with a brand-new Novice license, I could go downtown in Manhattan and find at least 40 stores selling parts, surplus, and the latest in finished equipment. Those were the glorious days of Radio Row and Canal Street. Today, with probably three times the number of amateurs around, there are only two or three stores in this area. How many stores are there in your area? How many were there at one time?

Yes, I guess in some ways there is a conspiracy. I don't think it's an overt, organized effort to either dominate or subjugate anything. It's more subtle than that and certainly not organized. It's basically a feeling that we must do everything to keep amateur radio alive well into the next century. It's a realization on most people's part that if you look closely, you'll see everything changing. If you are of a mind set that says, "If only we return to the good old days, things will be perfect," then you're lost and eventually left out. Most governments by now have realized that our spectrum space is very valuable in terms of generating revenue, and so everything can be looked at closely and weighed in terms of money and greater good. If anything, our generalized conspiracy concludes that if we have greater numbers, we present less of a target.

For a while there was more interest in how the system was evolving when the 220 MHz debacle took place. Business and government couldn't do that to us. After all, we were licensed radio operators. Well, history has changed and Goliath won. If you're old enough to remember, the big guy also won 27 MHz a number of years earlier. That's not to say we're going to lose anything outright, but is to remind us that nothing is carved in stone. Everything is up for grabs.

So if you're worried that all of this change is just an amateur radio industry conspiracy to make more money off the backs of simple folks, then reflect on one simple fact. If you took all the money generated within the amateur radio industry in one year (even in good times), it probably wouldn't be enough to run our government for one hour. In the overall scheme of things, even though some of the products are expensive, we don't collectively generate that much money. This is not an apologist's view, but is simply to show our position of importance in valuing spectrum.

Now, if you're still paranoid, step back and ask yourself a few simple questions. If there is so much money to be made in amateur radio, why aren't there more major manufacturers? Why aren't there more stores opening to sell our products? If our major manufacturers didn't have commercial and military contracts, would they still be in the amateur radio business? If there was no amateur radio industry, would—or could—700,000 amateurs build their own equipment from scratch? If there was no amateur radio industry, would there even be amateur radio?

Let's look at what's really important these days. Yes, we need to increase our numbers. Yes, we have another opportunity to learn about and use the system. No one is going to do this for you except by accident. It has nothing to do with CW. It has nothing to do with vanity callsigns. It has nothing to do with pretty much everything except staying alive. We need to make friends and not enemies in high places. We each took up a hobby which at some level would take us away from reality and cares of the day. Listen and you can hear the cares of the day and reality knocking at your door.

At *CQ*, about 25 years ago, we used to joke about starting a National Radio Relay League and having annual World Series events. No, we're not starting anything like that, nor are we planning to, but perhaps these days what we all should be musing about is either a National or American Radio Relay League and Spotted Owl Society. The Spotted Owl probably has more friends and political clout than we do, even without a Spotted Owl industry.

Awards Column

Norm Van Raay, WA3RTY, our Awards Editor, has been under the weather the last month or so. He is home now recuperating. Although there was no column last month or this month, Norm is feeling better and wants to let everyone know that his column will be back next month.

73, Alan, K2EEK

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PC PakRatt for Windows 2.0™

AEA's premier Windows-based terminal control program is now included in every DSP-2232, PK-900, and DSP-232 multi-mode data controller sold.

Within the packaging of each of the above mentioned data controllers you receive one 3.5" 1.44 MB program disk and one operating manual. PC PakRatt for Windows 2.0 works with Windows 3.1 or Windows '95.

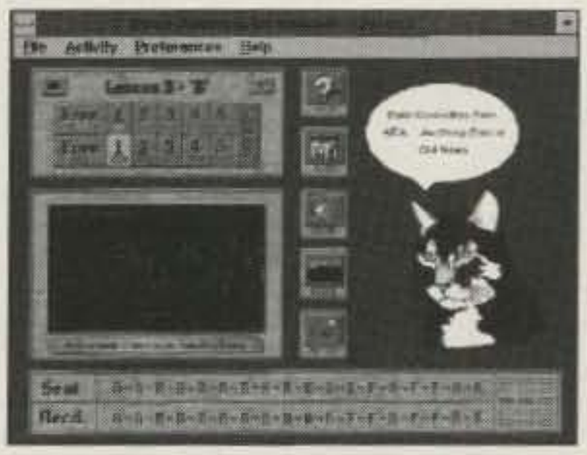
Log Windows 3.0

Amateur Net Price: $49.00

AEA has reduced the price of Log Windows 3.0 to only $49.00. Log Windows is arguably the best logging, award tracking, rotor control, DX Cluster monitor, rig control software made. Log Windows 3.0 requires an IBM compatible computer running Windows 3.1 or better, 4 MB of RAM or better, and 4 MB of free hard disk space.

Morse University II™

Amateur Net: $39.00



Morse University II is a Windows multimedia product that makes learning Morse code fun. You start with Lessons to learn characters and numbers. Then you can move on to the Exercise feature where you copy real world QSO's. There is also a great game included! Pentode™ allows you to test your skills. Includes theory question sample tests for all license levels. Morse University II runs on PC computers with Windows 3.1 or '95.

AEA HALO-6™

Amateur Net: $69.00

The Halo-6 is AEA's new highly efficient single piece loop antenna designed for 6 meters (covers 50-54 MHz). The Halo-6 is omni-directional and has a low angle of radiation which makes it excellent for spotting band openings and for DX. The Halo-6 is simple to assemble, mount, and tune. The Halo-6 gives new technician code-free licensees the experience of working real ionospheric skip DX on six meters. It also allows long-time Radio Amateurs (who have never sampled this mysterious band) the opportunity to use his new multi-band transceiver (like the IC-706) on six meters at the lowest cost possible.The Halo-6 can take 750 watts, stack two for maximum legal power and 3 db omni-directional gain. Ten Meter version coming soon.

CableMate™

Amateur Net: ~~$995.00~~ $499.00

AEA's new CableMate is a Time Domain Reflectometer which allows you to detect and locate faults in a length of cable. CableMate will find damage to cables and tell you how many feet down the line the damage is. No more guessing where your cable is damaged. You can interface the CableMate to your PC-compatible computer with optional software.

IDR-96™ 440MHz

Amateur Net: $499.00 Special order: $535.00

Is it a radio? Is it a 9600 bps Packet TNC? It is both! AEA's new IDR-96 (Integrated Data Radio) 440MHz makes 9600 bps Packet truly plug-and-play! Comes with 441.1 MHz crystal installed. Special order units with any frequency between 430 & 450 MHz - see dealer or call AEA.

The Radio: The integrated radio is a 9600 bps compatible radio—crystal controlled for operation on 440MHz.

The TNC: The TNC is based on the PK-96 design and has all the features of the PK-96 except for 1200 bps packet. The IDR-96 comes with PC PakRatt Lite™, the DOS Packet-only terminal control software.

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ANNOUNCEMENTS

•**AACS Roundup**—Amateurs who served in the Army Airways Communications System (and subsequent name changes to July 1961) are encouraged to participate in this CW/phone event. The AACS is a friendly get-together using SSB and CW. The event will be held Sept. 9 from 1400 to 2200 UTC on 7230–7240 and 14280–14290 SSB and 7050–7060 and 14050–14060 CW. Send results or comments to W5LK via e-mail <TMFS06A@prodigy.com>.

•**FISTS CW Club Straight Key Week –** In celebration of the founding of the FISTS CW Club in September 1987, the club is holding their ninth annual Straight Key Week, 0001Z Sept. 1 to 2359Z Sept. 7. Rag-chewing contacts are encouraged using any CW sending device. Stations may be worked once per day/per band. Call CQ FISTS particularly in the Novice and General portions of the CW band. Certificates and awards are available. Send logs, including callsigns and QSO starting and ending time/date of contact to Pete Kozup, K8OUA, 5115 N. Park Ave., Warren, OH 44481.

•**Bletchley Park Grand Reunion** will be held on Sept. 1, during The Milton Keynes ARS Rally, Car Boot Sale and Fair at Bletchley Park. If you were ever involved with Bletchley Park during WWII or more recently, join in the grand reunion to be held in the Bletchley Park Club, alongside the mansion, at 1330. Leave your name and phone number by the bar and look up old friends who may be there as well.

•**The following Special Events are slated for Sept.:**

WB1U, from Marconi Station, Cape Cod, Massachusetts; to commemorate Marconi station's 95th anniversary; 1400Z Sept. 28 through 2100Z Sept. 29; in the General portions of 15, 20, and 40 meters and the Novice portions of 10 and 80 meters (CW and SSB). For certificate send SASE to Ray Hilson, 6 Sherman Place, Norwalk, CT 06851.

K2BR, from the Miss American Pageant, Atlantic City, New Jersey; SCARA; Sept. 9–14; operation on phone, 25 kHz inside lower General class bands; CW, 65 kHz inside lower General bands; and Novice, 28.100–28.500 kHz. Send QSL and no. 10 SASE via SCARA, P.O. Box 121, Linwood, NJ 08221.

KB2YCT and other stations around the country; to honor the working men and women of the US on Labor Day weekend; Robert D. Grant United Labor Amateur Radio Association; operation on the General portion of 40, 20, 15, and 10 meters in the Novice phone band. For certificate, send SASE to the contact station or RDGUL ARA, P.O. Box 716, Nutley, NJ 07110-0716.

KC3HP, WC3A, N3IRN, & N3LQS, from Liberty-Valley Elementary School, Danville, Pennsylvania; Sept. 16 from 1300–1900Z; operation in the General portion of the 15, 20, 40, and 75 meter bands. For certificate, send QSL to N3POB, D. Miguelez, Liberty-Valley School, 175 Liberty-Valley Rd., Danville, PA 17821.

K3C, Washington, D.C.; to celebrate the 25th anniversary of the John F. Kennedy Center for the Performing Arts;The North Shenandoah DX Association; 1300Z Sept. 7 through 0100Z Sept. 9; operation on 7.240, 3.840, 14.240, and 147.92 MHz. For QSL, send name, address, and QSL to John C. Kanode, N4MM, RFD 1, Box 73A, Boyce, VA 22620.

K4OGB, from The Best of Badin Festival, Badin, North Carolina; Stanly County ARC; 1300–2100Z Sept. 21; lower General 40–15 meters and 28.365 all phone. For certificate send 9 × 12 SASE to K4OGB, P.O. Box 581, Badin, NC 28009.

4-land, from re-enactment of the 1862 Civil War Battle of Munfordville, Munfordville, Kentucky; Sept. 7–8; on 20 and 40 meters phone and CW. For certificate send QSL and business-size SASE to AD4EI, Box 23, Summer Shade, KY 42166.

4-land, from Olde Salem Days, Salem, Virginia; Roanoke Valley ARC *(no calls given—ed.)*; 1400–2100Z Sept. 14; on 7.250, 14.250, 50.150, 146.985 repeater. For QSL write to RVARC, P.O. Box 2002, Roanoke, VA 24009.

AC5GH, from Lake Belton, Texas; to commemorate the 14th annual Texas Train Festival; Lake Belton DX Klub; Sept. 21; on SSB 40 and 20 meters and 145.59 packet. For QSL, send QSL and SASE to "TRAINS," 4511 West Dr., Belton, TX 76513.

N5DVI, from the offshore rig Mr. Charley; Louisiana; Bayouland Emergency Amateur Radio Service (BEARS); for alumni reunion; 1300–2300Z Sept. 1; in the General portion of 75, 40, and 20 meters and the Novice portion of 80 and 40 meters. For QSL, send QSL to Huey Ohmer, Box 874, Amelia, LA 70340.

W7F, from Leavenworth National Fish Hatchery, Leavenworth, Washington; to celebrate Salmon Festival '96; Sept. 19–20 for area school amateur stations and Sept. 21–22 for all amateurs; operation on 20, 40, and 75 meters. Certificates will be issued to stations contacted. Mail QSL card to FISH, General Delivery, Leavenworth, WA 98826. All entries must be postmarked before Oct. 1 to be eligible for prize drawings.

KA9WAR, Peshtigo, Wisconsin; from the 125th anniversary of the Peshtigo Fire, America's most disastrous forest fire; The Marinette/Menominee ARC; 1500–2100Z Sept. 21; on 7.271, 14.271, 21.371, and 28.371 MHz SSB and CW. For certificate, send QSL and SASE to Arden Nelson, KA9WAR, 329 Brown Ave., Peshtigo, WI 54157.

KB9KGS, Thomson, Illinois; to celebrate Thomson Melon Days; The Palisades ARC and 90 West DX Association; 1700–2100Z Sept. 1; lower portion of the General 40 and 20 meter bands. For certificate, send QSL and 9 × 12 SASE to Bob Plumley, K9IEG, 1123 W. Main St., Thomson, IL 61285.

K9UXZ, Effingham County, Effingham, Illinois; from the Annual Transportation Festival; The National Trail ARC; Sept. 14, 1 PM to 8 PM CDT; in the lower General and Novice 10 meters. For certificate and/or QSL send SASE to K9UXZ, National Trail ARC, P.O. Box 903, Effingham, IL 62401.

CH3Y, from 25th anniversary of the formation of York Regional Police, Newmarket, Ontario, Canada; 1200–2100Z Sept. 21; phone 7240, 14240, 21345 kHz; CW 7040, 14040, 21040 kHz; VHF 146.580 MHz. For QSL send direct with SAE and 1 IRC (for certificate send 9 × 12 SASE, or SAE and 2 IRCs) to CH3Y, c/o M. Kassay, 90 Herrell Ave., Barrie, ON L4N 6T9 Canada. Buro cards okay via VE3MKX. For more info: ax.25: <VE3MKX@VE3FJB.#CON.ON.CAN.NOAM> (Mike, VE3MKX); internet: <amitchell@sympatico.ca> (Andy, VA3CW).

VE3MIS, from Halton County Radial Railway, Mississauga, Ontario, Canada; Mississauga ARC; 1430–2000Z Sept. 28–29; on SSB 3.930, 7.230, 14.240, 18.130, 21.330, 24.940, 28.340 MHz ±QRM, plus 145.430 MHz MARC repeater and 446.100 MHz simplex. For QSL send QSL and SASE to MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Crescent, Mississauga, ON L5N 1X6 Canada. (Note: US stamps cannot be used to send mail from Canada to the US.)

August Issue "Math's Notes" Addition

In "Math's Notes" in August we left out Table I, a comparison of rechargeable batteries. All parameters listed are approximate and will vary with manufacturer and actual cell condition.

Parameter	Lead-Acid	Nickel Cadmium	Nickel Metal Hydride	Lithium Ion	Lithium Metal
Volts/cell	2.0	1.2	1.25	3.6	3.0
Watts/pound	16	20	25	45	64
Cost ratio	.38	1.0	1.75	3.0	2.2
Memory	No	Yes	No	No	No
Operating Temp.	0/50	–10/50	–10/50	–10/50	–30/55
Environmental	Yes	Yes	No	No	No

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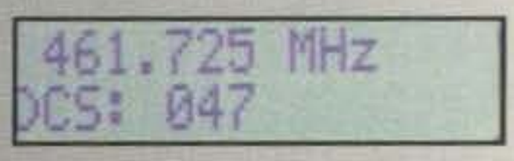

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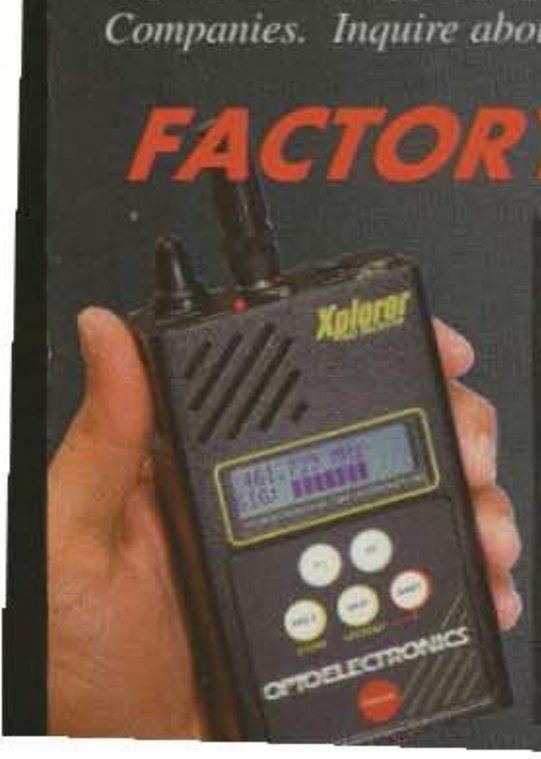

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• The following hamfests, etc., are slated for Sept. and late Aug.:

Aug. 25, **Tri-County Radio Group Hamfest & Computer Show**, McHenry County Fairgrounds, Woodstock, Illinois. Call Robert, N9KXG, 847-658-1678.

Aug. 30–31, **New Orleans International DX Convention**, Royal Sonesta Hotel, New Orleans, Louisiana. Contact Michael Mayer, W5ZPA, 5836 Marcia Ave., New Orleans, LA 70124 (phone 504-283-4143 daytime only; fax 504-524-2129).

Sept. 7, **44th Annual W9DXCC DX Convention & Banquet**, Holiday Inn Rolling Meadows, Illinois. Contact NIDXA or Phil Camera, KB9CRY, Chairman, telephone 708-343-1696; fax 708-343-4394; e-mail <lphil@aol.com>.

Sept. 7, **Erie Hamfest '96**, Franklin Township Firehall, Erie, Pennsylvania. Contact Chris Robson, KB3A, 5560 Bear Creek Road, Fairview, PA 16415; phone/fax 814-474-1211; e-mail <crobson@moose.erie.net>. (Handicapped accessible; exams.)

Sept. 7, **Summit City Hamfest**, Allen County Fairgrounds, Fort Wayne, Indiana. Contact FWRC Hamfest, 4801 Honey Oak Run, Fort Wayne, IN 46845 (phone 219-471-5657; e-mail <westock@concentric.net>). (Exams.)

Sept. 7, **Uniontown, PA Gabfest**, club grounds, Old Pittsburgh Road, Uniontown, Pennsylvania. Contact Carl (WA3HQK) or Joyce (KA3CUT) Chuprinko, Rt. 6 Box 231-CC, Morgantown, WV 26505 (304-594-3779).

Sept. 7–8, **The Greater Louisville Hamfest/ ARRL Kentucky State Convention**, Kentucky Fair & Exposition Center, Louisville, Kentucky. Write to The Greater Louisville Hamfest Assn., P.O. Box 34444-Q, Louisville, NY 40232-4444.

Sept. 8, **SEMARA Fleamarket**, southeastern Massachusetts ARA Clubhouse, South Dartmouth, Massachusetts. Contact Bill Miller, K1IBR, 508-996-2969.

Sept. 8, **Butler Co. ARA Hamfest & Computer Show**, Butler Farm Show Grounds, Butler, Pennsylvania. Contact K3LL, 1080 N. Boundry Rd. #C, Cranberry Twp, PA 16066, or call 412-538-9491, or e-mail <cliff@nauticom.net>.

Sept. 8, **1996 Hamfest, Radiofest & Computer Expo**, Dubuque County Fairgrounds, Dubuque, Iowa. For more information, contact Loren Heber, NØYHZ, at 319-556-5755; Jerry Lange, KBØVIK, at 319-556-3050 or Jerry Ehlers, NØNLU, at 319-583-1016; internet <http://galaxy.mwci.net/grarc/top.htm>; or e-mail <sheber@mwci.net>. (Exams.)

Sept. 14, **AARC Annual Gonzales Hamfest**, Gourmet Catering Building, Prairieville, Louisiana. Contact AARC, c/o Shane Dugas, KK5LC, 37150 Swamp Rd., Prairieville, LA 70769 (504-673-8369). (Exams.)

Sept. 14–15, **31st Annual Melbourne, FL Hamfest**, Melbourne Auditorium, Melbourne, Florida. Contact Larry Sexton, KF4EJB, 7005 Dogwood Dr., Cocoa, FL 32927 (407-636-8826) or Al Hudson, N4PTM, e-mail <ahudson@iu.net>.

Sept. 15, **"CARA" Western Connecticut Hamfest**, Newtown, Connecticut. Call 203-744-7646, 203-790-7041, or 203-438-6782, or Internet <http://www.danbury.lib.ct.us/org/cara/>. (Handicapped accessible.)

Sept. 15, **TSRAC Wheeling Hamfest/Computer Show**, Wheeling Park, Wheeling, West Virginia. Contact TSRAC, Box 240, RR 1, Adena, OH 43901 (phone/fax 614-546-3930).

Sept. 15, **Delaware Valley RA Fallfest '96**, Tall Cedars of Lebanon picnic grove, Sawmill Rd., Hamilton Twp, New Jersey. Call 609-882-2240.

Sept. 21, **Sonoma County Annual Swapmeet, Auction & Exam Session**, Holy Ghost Hall, Sebastopol, California. Contact Rick Reiner, K6ZWB, 2120 Slater St., Santa Rosa, CA 95404 (707-575-4455); or write c/o Sonoma County Radio Amateurs, Inc., P.O. Box 116, Santa Rosa, CA 95402. (Exams.)

Sept. 21, **The AARC Silver Anniversary Hamfest**, Kincaid Park Outdoor Center, Anchorage, Alaska. Contact Anchorage ARC, Inc., P.O. Box 101987, Anchorage, AK 99510-1987. (Exams.)

Sept. 21, **Southern Kentucky Hamfest**, Cave City Convention Center, Cave City, Kentucky. Contact Larry Brumett, KN4IV, 108 Withers Dr., Glasgow, KY 42141 (502-651-2363). (Exams.)

Sept. 21, **Central Vermont ARC 8th Annual Fall Foliage Hamfest**, Judd Gymnasium, Vermont Technical College, Randolph, Vermont. Contact Barry Driscoll, KE1BV, RR 1 Box 3165, Barre, VT 05641 (telephone 802-479-1408; e-mail <driscoll@planning.aot.state.vt.us>. (Exams 12:30 PM.)

Sept. 22, **St. Peters ARC Swapfest**, St. Charles County Community College Campus, Cottleville, Missouri. Contact Jay Underdown, WØOGS, 58 Judy Dr., St. Charles, MO 63301 (314-723-4200). (Exams.)

Sept. 22, **AARC Hamfest & Computer Show**, Lenawee County Fairgrounds, Adrian, Michigan. Contact Brian Sarkisian, KG8CO, 139 N. Main St., Adrian, MI 49221; phone 517-265-1537, or <gbishop@tc3net.com>. (Exams.)

Sept. 28, **21st Annual Elmira, NY International Hamfest-Computerfest**, Chemung County Fairgrounds, Horseheads, New York. Contact Dave Lewis, 465 CR 13, Van Etten, NY 14889 (607-589-7495). (Exams.)

Sept. 27–29, **Walla Walla ARC 50th Annual Hamfest**, Walla Walla National Guard Armory, Walla Walla, Washington. Contact David L. Pence, KB7WRT, Hamfest Chairman, W7DP, P.O. Box 321, Walla Walla, WA 99362 (509-525-2529).

Sept. 28, **21st Annual Elmira International Hamfest-Computerfest**, Chemung County Fairgrounds, Horseheads, New York. Contact Elmira Hamfest, c/o dave Lewis, 465 CR 13, Van Etten, NY 14889 (SASE), phone 607-589-7495. (Exams 0900.)

Sept. 28–29, **Louisville Computer Fair**, Kentucky Fair and Expo Center, Louisville, Kentucky, exit 11 off I-264. Contact Trade Show Productions, c/o Mark hanslip, 143 Schloss lane, Dayton, OH 45418.

Sept. 29, **Metro 70 cm Network Giant Electronic Flea Market**, Lincoln High School, Yonkers, New York. Contact Otto Supliski, WB2SLQ, 914-969-1053. (Exams.)

Sept. 29, **Framingham ARA Fall Flea Market**, Framingham High School, Framingham, Massachusetts. Contact Martin Bayes, AA1ON (508-435-0564); to register for exams send check for $6.05, payable to ARRL/VEC to Dick Marshall, WA1KUG, 37 Lyman Rd., Framingham, MA 01701. (Exams.)

OUR READERS SAY

A Chance For Everyone

Editor, *CQ*:

Please find enclosed an SASE for log sheets for the CQ VHF Contest. This will be my first real effort at contesting, and I am looking forward to trying it. Being new to contesting, maybe the "propagation gods" will look upon this newbee and let me do well enough to submit something that resembles a log.

Many thanks for offering a contest that gives the small guys a chance against the big guns and is easy on us newcomers. Also, I will be sending in a subscription for *CQ VHF* magazine. I have purchased as many editions as possible from the local newsstands, but they are not always available and are about two weeks late. Thanks again for an outstanding magazine and for coming up with a contest for the newcomer and small gun.

Barry Sampson, KE4PZT
Louisville, KY

CQ More Readable

Editor, *CQ*:

Just wanted to let you know that this morning as I was reading your editorial in the July issue, I was thinking about letting my subscription expire until I noted that you have been convinced to make the print a little heavier so we can read it! The fine print on the glossy paper is difficult for some of us. I'm looking forward to the new style. *(It's here!—ed.)*

And by the way, whatever happened to the photo of my friend Fred Lass's (K2TR) shack and beautiful antenna farm in Altamont, New York? I guess it was last year when I was up there to visit and a *CQ* photographer was suppoed to show up the next day. *(See the cover of our August issue of* CQ.*—ed.)*

Nice that you mentioned Joe Fairlough [of WB2JKJ Junior High School 22 fame]. I am one of his supporters. I was born in the Bronx, but when I got out of the Army (Sig C) I went to work at the Pentagon (31 years with the Sig C). However, I still love the small town in the Catskills where I grew up as a teenager and where my high school teacher got me into ham radio.

It's also nice that you mentioned Bob Cox, K3EST, a fellow PVRCer (I am a charter member of the PVRC).

Hope you can make our hamfest here in Flagstaff some July. (*CQ's Lew McCoy, W1ICP, represents* CQ *at that one—ed.)* It's hot as Hades in Phoenix, but always cool up here in the mountains at 7000 ft!

Bill Schuchman, W7YS
Flagstaff, AZ

Fourth Solar Maximum

Editor, *CQ*:

I enjoyed your editorial in the June 1996 issue of *CQ*, particularly the references to solar cycles and antennas. I was first licensed 31 July 1956, so this will be my fourth solar maximum. My most vivid memory is hearing LU9MA, Mendoza, Argentina on 6 meter AM phone in 1957. I was in Fort Wayne, Indiana at the time.

Antenna-wise, consider reprinting "A Shortened ZL Special Beam," pages 42–43 of the July 1959 issue of *CQ*. It's a winner.

Tom Leu, W8BWC
Westlake, Ohio

Looking For A "Sea of Sparks"

Editor, *CQ*:

About a year ago I heard a radio program about a book called, I believe, *Sea of Sparks* about a female CW operator on board a ship in WW II. I have not been able to track down this book and wonder if anyone at *CQ* could be of help! I have even called the Library of Congress, but they couldn't help.

I am a British citizen currently in Haiti (with the UN). Due to regular black-outs (electricity shortages) I operate a Yaesu FT-80 barefoot to a dipole off a set of car batteries, and use a candle to illuminate my log. Nonetheless, working CW on 20 meters is a pleasure, as is moving to some of the SSB nets for DX contacts. I am usually quite busy, as there aren't many HH callsigns out there actively working.

Hope you can give me some guidance on this book. I'd really appreciate it.

David Meadows, HH2MED
P.O. Box 1095
Port-Au-Prince, Haiti, W.I.

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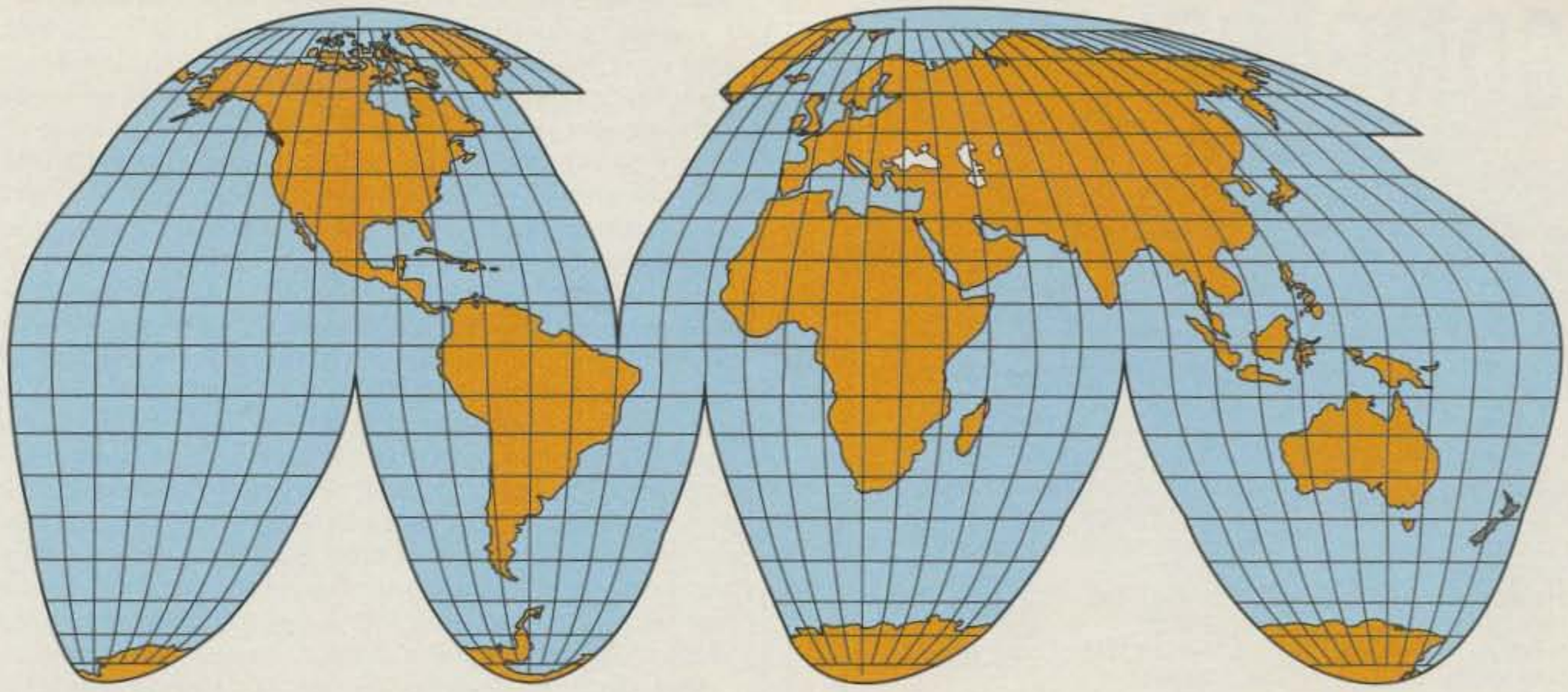

"Hello World, DE Cycle 23"

The sun will shine and the birds will sing. The best of all possible worlds (as far as amateur radio goes, that is) is just ahead. How far ahead and just how soon may be nearer than you think.

BY DR. THEODORE J. COHEN*, N4XX

To listen to most amateurs on the high-frequency (HF) bands today (and to those DXers currently not active), you'd think that the world had come to an end! There is no end to their complaints, and for good reason. The 2800 MHz solar flux is bumping along in the mid-60s on most days (the lowest solar flux recorded since 1947 was 62.6 units back in November 1954); the slightest geomagnetic activity can wipe out the high-latitude propagation paths; the daytime DX bands tend to open late and close early on many paths (e.g., over the pole into Asia); little F_2-layer DX is heard above 18 MHz on most days (though seasonal sporadic-*E* openings are a wonder to behold and "work"!); and signal levels are nothing to write home about. The impact of all this, of course, is reflected throughout our ranks and within the amateur radio industry. For example, attendance at the 1996 Dayton Hamvention® was down by 6% over last year, and there is a lack of new, major HF products coming to market. Even the DXCC program is feeling the pinch, with applications down by about a third according to DXCC Manager Bill Kennamer, K5FUV.

Will the new solar cycle *ever* begin? And when it does, how long will

*8603 Conover Place, Alexandria, VA 22308

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Jan.		18	58	142	151	148	124	71	37	24	10*	6**
Feb.		20	65	145	151	148	116	69	35	23	9*	8**
Mar.		22	71	150	152	147	108	67	34	22	8*	10**
Apr.		24	78	154	149	146	103	64	34	21	7*	12**
May		26	84	157	147	146	100	60	33	19	7*	14**
June		28	94	158	144	145	97	56	31	18	7*	16**
July		31	104	159#	141	146	91	55	29	17	6*	18**
Aug.		35	114	158	141	147	84	52	27	16	6*	20**
Sept.	12	39	121	157	142	145	80	49	27	13	6*	23**
Oct.	13	44	125	157	142	142	76	45	27	12	5*	26**
Nov.	15	47	130	158	142	138	74	41	26	12*	5*	28**
Dec.	16	51	138	154	144	132	73	39	26	11*	5**	31**

Table I– Progress of sunspot Cycle 22 and predictions for 1995–1997. Predicted values for the remainder of Cycle 22 are shown with a single asterisk (*). Predictions for Cycle 23 are shown with a double asterisk (**). (Reprinted from "Propagation" column, Aug. 1996 CQ.)

it take for the HF bands to sound like they did in the late 1980s and early '90s? These are some of the questions answered below.

There's no question that we now are at, or near, the bottom of the solar cycle. You don't need to track the solar flux or sunspot numbers to see that; just listen to the bands! And while there was hope last year that three spots characterized by magnetic fields opposite in polarity to current-cycle spots might herald the start of new-cycle activity, these hopes recently were dashed when scientists confirmed that they really were associated with the old cycle. *Regardless, be assured we are getting close to the start of the new cycle, the 23rd since the recording of sunspot numbers was begun by the Swiss Federal Observatory in 1749.*

As discussed in *The NEW Shortwave Propagation Handbook*[1], the minimum for the current cycle is expected sometime later this year or early next year. Because the state of the sunspot cycle is defined by the so-called "12-month smooth sunspot number" (or simply the SSN, for short), we won't know in what month the absolute minimum occurred until six months later. However, because the spots associated with the old and new cycles can overlap for two years or more, the minimum also can be defined as that time when the number of sunspots associated with the old cycle is equal in number to the sunspots associated with the new cycle (averaged, say, over a one-month period). Before this can happen, obviously, we have to see some new cycle activity.

Well, we finally have the official announcement that activity associated with sunspot Cycle 23 has begun! According to scientists at the NOAA's Space Environment Center in Boulder, Colorado[2], two sunspot regions—Region 7965 at South 38 degrees latitude, and Region 7967 at North 35 degrees latitude—were observed between 22 and 29 May, and between 1 and 9 June 1996, respectively. Because of their high-latitude positions, there is no question whatsoever that these regions are associated with the new cycle. And because the activity of a new cycle will accelerate faster than the old cycle declines, we probably are safe in assuming that the true beginning of the new sunspot cycle (as measured by the 12-month SSN) is three to six months away from the time that this was written (early June).

What does this mean to DXers and the amateur radio industry alike? A lot of things. For operators, it means that solar activity will climb rapidly from the minimum, with the maximum reached in a period of about four years. This places the next solar maximum around the year 2001. But you won't have to wait that long for good propagation conditions to return. As was noted in George Jacob's "Propagation" column last month, predicted 12-month SSNs between 20 and 31 should be observed in the period between August and December 1997. The last time the count was as high as 31 was in July 1994, when openings on the high HF bands were still regularly observed. By the way, a 12-month SSN of 31 corresponds roughly to a solar flux in the mid-80s, something that today brings tears to the eyes of even the most grizzled DXer! Further, solar flux values of 100 and more will soon follow, with the 15, 12, and 10 meter bands once again providing spectacular openings.

As for the amateur radio industry, it, too, will experience a resurgence in activity. We can expect to see major new developments in applications of digital technology, while antenna manufacturers will wonder what everyone is doing with all the copper wire and aluminum they are shipping. Not to put too fine a spin on it, the good times will roll again.

In the meantime, there is plenty of DX to work out there. Sure, you have to dig a bit deeper in the noise to hear it, and the openings are a bit short, but it's there, to be sure. In one 20 meter opening one evening last June, I heard SSB signals from 4S7, 9N1, AP, UN, and VU, all within 30 minutes.

While Cycle 22 still will hold forth for three to six months, now is the time to begin preparing your station and antenna farm for the conditions that lie ahead. After all, if all goes well, this time next year will see both the HF community and those who provide the equipment we use beginning to enjoy the great conditions produced by sunspot Cycle 23.

References

1. Jacobs, G., W3ASK, T. Cohen, N4XX, and R. Rose, K6GKU, *The NEW Shortwave Propagation Handbook*, CQ Communications, Inc., Hicksville, NY, 1995.

2. *Preliminary Report and Forecast of Solar Geophysical Data*, Space Environment Center, NOAA, U.S. Department of Commerce, 4 and 11 June 1996. ■

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. . . ***LED indicators*** -- On-Air, receive preamp and power -- gives you confidence

. . . ***Pushbuttons*** -- select FM/SSB, receive preamp on/off and power on/off

. . . ***Free mobile mounting bracket***

. . . ***Full one year MIRAGE warranty***

. . . ***Legendary MIRAGE ruggedness***

35 watts, FM only . . . $79

NEW

B-34, $79. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

MIRAGE RUGGED!

BD-35
$199
Suggested Retail

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

- ***45 Watts on 2 Meter/35 W on 440 MHz***
- ***Automatic Band Selection***
- ***Single Connector for dual band radios and antennas***
- ***Full Duplex Operatrion*** • ***5x1¾x5 inches***
- ***Reverse polarity protection***
- ***Includes mobile bracket*** • ***"On-Air" LEDs***
- ***Works with all FM handhelds up to 7 watts***
- ***One year Mirage Warranty***

Add this Mirage *dual band* amp and boost your handheld to a *powerful* mobile or base -- 45 watts on 2 Meters or 35 watts on 440 MHz!

Mirage's exclusive *FullDuplexAmp*™ lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation!* (Requires compatible HT)

160 Watts on 2 Meters!

-5016-G
299
gested Retail

MIRAGE RUGGED!

ower Curve -- typical Mirage B-5016-G output power									
Watts Out	130	135	140	145	150	155	160	165	170
Watts In	20	25	30	35	40	45	50	55	60

MIRAGE's *most popular* amplifier gives you 160 watts of brute power for 50 watts input!

The B-5016-G is ideal for your 20 to 60 watt 2 Meter mobile or base station. *Power Curve* chart shows typical output power for your input.

You'll talk further, longer and clearer on all modes -- FM, SSB or CW -- and hear weak signals better than you've ever heard before!

Low noise GaAsFET preamp gives you excellent 0.6 dB noise figure for pulling out weak signals. Select 20 dB or 15 dB gain to minimize receiver overload and intermod.

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

Your B-5016-G is *fully protected* with features found only in pricey commercial amps.

The Mirage B-5016-G prevents damage from high SWR or excessive input power by bypassing the power amplifier. LED warns you.

Your expensive power transistors are protected from overheating by MIRAGE's *Therm-O-Guard*™.

The B-5016-G *knows* when you're transmitting and kicks in 160 watts of power. Adjustable time delay gives you smooth transmit/receive switching. Also has remote external keying.

Extra heavy-duty heatsink spans entire length of cabinet. Draws 17 to 22 amps from 13.8 VDC. 12x3x5½ inches.

Place your B-5016-G out of the way. RC-1 Remote Control turns On/Off, pre-amp On/Off, selects SSB/FM. RC-1, $45, with 18-foot cable.

More 160 Watt, 2 Meter Amplifiers . . .

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

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

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3.5 W in. For 0.25 to 5 watt handhelds.

6 Meter Amplifiers (50-54 MHz)

Bust through 6 Meters with 150 watts of brute power and work exotic DX! The **A-1015-G**, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. For 1 to 15 watt transceivers. 150 watts out for 10 in. **A-1035-G**, $659, 350 watts out for 10 in. Both are a compact 12x3x5½ inches.

70 cm Amplifiers (420-450 MHz)

MIRAGE's *most popular 70 cm amp* -- the **D-3010N**, $365 -- gives 100 watts out for 30 in. For 5 to 45 watt *mobile/base*. **D-1010-N**, $395, 100 watts out for 10 in. *Dual purpose* - for handhelds *or* mobile/base. **D-26-N**, $269, 60 watts out for 2 in, for *handhelds*.

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

Amateur TV Amps

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

Call your dealer for your best price!

Nearest dealer/Free catalog: 800-647-1800

MIRAGE has *the world's most rugged* VHF /UHF amplifiers -- and the largest line -- 51 models . . . 6 Meters through 70 cm, all modes FM/SSB/CW, continuous duty repeater, Amateur TV, even commercial.

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

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

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

Results of the 1995 CQ World-Wide DX SSB Contest

BY BOB COX*, K3EST

The sunspot cycle was near its minimum, the year was 1995, and *CQ* expected a drop off in log submissions for the CQ WW SSB. It was a normal cycle that followed the 11-year journey of our sun. You can imagine our delight, when all the logs were tallied to find that 1995 was the third highest year of log entries—3167 for SSB. Even though 10 meters was truly visiting another planet, the rest of the bands were great. And the low bands were outstanding! From around the world reports speaking of remarkable openings on 40 through 160 meters filtered into *CQ* HQ.

Single Operator High Power

The competitors for the coveted top award were a very diverse group. From all over the world, they included two Europeans and one USA station. The number one position went to Pekka, OH1RY, operating EA8AH. Pekka, as you know, is no stranger to the SSB top ten (remember YJØR?). He was CQing from the Canary Island dream QTH described in detail in the January issue of *CQ Contest* magazine.

Following in second place was Carlos, TI2CF, operating from his country QTH as TI1C. Carlos did a terrific job from North America. His finish is the highest non-3 pointer in years. In third place was a very welcome entrant, 3V8BB. The club station, which is manned by enthusiastic Tunisian amateurs for most of the year, welcomed the guest operation of YT1AD. All of us applaud the efforts of the Tunisian amateurs to promote good will.

Over in the USA, the top slot was gathered in by John, K1AR. Not content to sit on his laurels as the reigning US champion, John jumped on a ferry and ended up in Massachusetts at K1EA's QTH. In second place was another MA operator, Randy, K5ZD/1. Both Randy and John are very intense and serve as excellent role models for beginners and intermediate contesters.

The battle in Europe was very close. After the log-checking dust settled, Tine, S5ØA, had bested GIØKOW by just a few QSOs. Both are improving their stations for the upcoming season. It is a great achievement for both of them to have gained entrance into the world top 10.

Single Operator Low Power

The single operator world leader was WP4U operated by Andy, AA3BG. He traveled to KP4 to make a dream come true—operating in the CQ WW from the Caribbean. Andy's old call was RC2AR. He was followed by US1E, who did an outstanding job with multipliers. In Europe second place went to last year's winner, EA7CEZ. This fine operator has certainly proven that low power is *not* a handicap to being competitive.

In the single operator low power category for the USA, it was Doug, KR2Q, taking the prize with over 1.1 meg. The last time KR2Q did an all band entry in the CQ WW, he set the existing USA record in the QRP category. This year Doug was more than 40% ahead of second-place finisher KQ3V. KR2Q wishes to express his thanks to Tony, K2SG, for *not* entering this year. Also noteworthy are NY3Y (4th place) and WA6IET (8th place). NY3Y, despite KR2Q's 33% lead in number of QSOs, was only four country mults behind Doug. And WA6IET had 108 zones, more than any other entry in this category. Third place went to AC1O/4, and fifth place was taken by WA7BNM/6, giving the West Coast a spot in the Top Five. This category continues to grow and is well represented with entries from across the entire country.

3V8BB operated by YT1AD puts a needed multiplier in everyone's log.

QRP

The peanut category was well represented this year with LY35BA taking the top spot. His location in Europe sure helped with the multipliers, but was a deterrent with points. Following in second place was EA1GT. Located in a totally different propagational zone, he managed to get quite a few USA QSOs in his log. Over in the USA, AA2U, the perennial QRP winner, actually had his score go *up* after the CQ WW log-checking procedure!

Assisted

The top world score was turned in by AA2DU. Always an intense contester, AA2DU finally put it all together to take away the trophy.

He was followed very closely by EA8AFJ over on the Canary Islands. Being tied back to EA packet clusters allowed access to all those juicy multipliers.

Multi-Single

Sitting on a mountaintop near Marconi's QTH is the club of IQ4A. These dedicated contesters have built up a formidable station that overlooks the plain near Bologna. With a multiplier which would make others envious, IQ4A took top honors in the world.

Second place went to 9A1A. Located in beautiful Croatia, this club has put their skills to work to teach electronics to students at a school located on a mountain. In exchange they get a club room in which to operate.

In the USA, KC1XX took full advantage of his NE USA location to finish first. Matt is in the process of rebuilding his station, so look out in the future. As a matter of fact, many people have taken advantage of the sunspot minimum to rebuild. A little farther west, K2TR put their talented crew to work to get within shouting distance of KC1XX.

Multi-Multi

Leading the pack in the Sumo category was PJ9B. Using their new callsign was difficult for the boys from Bonaire after so many years of PJ1B. However, they managed to say it right enough times to win. Since PJ9B has operated from the same QTH with more or less the same antennas and rigs for the last 10 years, you can look at their scores as a gauge of propagation. The big drop-off was on 10 meters, where the band barely opened to the States.

*1816 Poplar Lane, Davis, CA 95616

TROPHY WINNERS AND DONORS

SINGLE OPERATOR
World All Band
EA8AH
(Opr. Pekka Kolehmainen, OH1RY)
Donor: Dave Rosen, K2GM
WA2RAU Memorial

World Low Power
WP4U (Opr. Andrei Stchislenok, AA3BG)
Donor: Slovenian Contest Club

World Assisted
J. P. Kleinhaus, AA2DU
Donor: Snake River Contest Club

World QRP
LY35BA
(Opr. Gediminas Lucinskas, LY3BA)
Donor: Doc Sayre, N7AVK

U.S.A
John Dorr, K1AR
Donor: Potomac Valley Radio Club
KC8C Memorial

U.S.A Low Power
Doug Zwiebel, KR2Q
Donor: North Coast Contesters

U.S.A. Zone 3
Lewis Sayre, N7AVK
Donor: Bill Fisher, KM9P

U.S.A. Zone 4
Steve London, N2IC/Ø
Donor: Dennis O'Connor, K8DO

Canada
John Sluymer, XM3EJ
Donor: Niagara Frontier Int'l DX Assn.
VE3WT Memorial

Caribbean/C.A.
TI1C (Opr. Carlos Fonseca, TI2CF)
Donor: Alex M. Kasevich, VP2MM

Europe
Tine Brajnik, S5ØA
Donor: Potomac Valley Radio Club
W4BVV Memorial

Europe Low Power
US1E (Opr. UR5EAT)
Donor: WR3G & K3LR

Africa
3V8BB (Opr. Milosevic Hrane, YT1AD)
Donor: Gordon Marshall, W6RR

Asia
JH5FXP
Donor: Japan CQ Publishing Company Ltd.

Japan
Akira Asai, JA8RWU
Donor: Japan Crazy Contesters Club

Oceania
Al Crespo, KH6/WR6R
Donor: Northern California DX Club

South America
8R1K (Opr. Marko Myllymaki, AB6NJ)
Donor: Yankee Clipper Contest Club

SINGLE OPERATOR, SINGLE BAND
World—28 MHz
Arturo J. Gargarella, LU6ETB
Donor: Joel Chalmers, KG6DX

World—21 MHz
ZW5B (Opr. Atilano de Oms, PY5EG)
Donor: French 21170 DX Net/LNDX
FY5AN Memorial

World—14 MHz
ZD8Z (Opr. Jim Neiger, N6TJ)
Donor: North Jersey DX Assn.
K2HLB Memorial

World—7 MHz
IG9A (Opr. Fabio Grisafi, IT9GSF)
Donor: Fred Laun, K3ZO
K7ZZ Memorial

World—3.8 MHz
IG9T (Opr. Alberto Annesi, IV3TAN)
Donor: Fred Capossela, K6SSS

World—1.8 MHz
IG9W (Opr. Francesco Spina, IV3SHF)
Donor: Robert Wruble, AI7B

USA—28 MHz
Charles Dietz, KE5FI
Donor: Donald Thomas, N6DT

USA—21 MHz
Stephen Sacco, Jr., KC2X/4
Donor: Bill Gioia, K2EK

USA—14 MHz
KM1H (Opr. Robert Shohet, KQ2M)
Donor: Southern California DX Club

USA—7 MHz
Steven Kelly, KC7EM
Donor: Stanley Cohen, WD8QDQ

USA—3.8 MHz
John Rodgers, WE3C
Donor: Arnold Tamchin, W2HCW

USA—1.8 MHz
Jeffrey Briggs, K1ZM
Donor: J. Bruce Siff, W2GBX

Carib./C.A.
VP2E (Opr. Robert Wood, WB5CRG)
Donor: Snake River Contest Club

Europe—28 MHz
Arpad Berke, S51AY
Donor: Chod Harris, VP2ML

Europe—21 MHz
IY1LEC
Donor: OH6JW Memorial

Europe—14 MHz
Jiri Sanda, OK1RI
Donor: A.G. Anderson, GM3BCL

Europe—7 MHz
S5ØC (Opr. S55OO)
Donor: Roger Burt, N4ZC

Europe—1.8 MHz
Jon Ingolvur Dam, OY9JD
Donor: Robert Kasca, S53R

Japan—28 MHz
T. Akase, JH6AUS
Donor: Take Yokoyama, JL1BLW

Japan—21 MHz
S. Hatakenaka, JA5FDJ
Donor: DX Family Foundation

MULTI-OPERATOR
SINGLE TRANSMITTER
World
IQ4A (Ops.: I4VEQ, I4IND, I4LCK, I4TJE, I4IKW, I4EAT, I4AVG, IK4DCT, IK4QJH, IK4EWK, IK4CZF, IK4XQH, IK4MGP)
Donor: Southern California DX Club
W6AM Memorial

U.S.A.
KC1XX
(Ops.: KC1XX, KC1F, AD1C, K1EA)
Donor: Carolina DX Association

Europe
LZ9A (Ops.: LZ1JY, LZ1NG, LZ1RB, LZ1ZX, LZ1JK, LZ2BE, LZ2CC, LZ2DF, LZ2HE, LZ2HM, LZ2II, LZ2JE, LZ2PO, LZ2PS, LZ2TT, LZ2UU, LZ2WF, LZ2WM, LZ2XA, LZ3DX, LZ3SM, LZ4UU, LZ5JE)
Donor: Bob Cox, K3EST

Carib./C.A.
6D2X (Ops.: K5NU, K5TSQ, N5RZ, WB5VZL, XE2YNS, XE2XDX)
Donor: Eric Scace, K3NA

Oceania
KH6RS
Donor: Junichi Tanaka, JH4RHF

South America
PT7CB (Ops. PT7BL, PT7BZ, PT7NK, PT7WA, PT7WB)
Donor: Jerry Boyd, KG6LF

Asia
VS6WO (Ops. VS6WO, 9V1YC, VR2GO, VR2NR)
Donor: Edward L. Campbell, AH2BE

MULTI-OPERATOR
MULTI-TRANSMITTER
World
PJ1B (Ops.: WA3LRO, N3ED, K1DG, K3EST, WN4KKN, K2SB, W3UM)
Donor: W6QHS and KK6QM

U.S.A.
N2RM (Ops.: N2RM, N2NT, WM2H, KZ2S, K2TW, N2AA, K3UA, W2RQ, N2BCC, KE2PF, W2GMA)
Donor: Paul Hellenberg, KS9K

Europe
GØKPW (Ops.: G4BAH, G3VHB, G4BUO, G4PIQ, G4BWP, G4VMM, G3NLY, G3LNS, K1XX, G3NKC, GØWCW, G7ABQ, G4CBQ, GØKRL, GØAFH, GØHSS, G4BBU, G4SWX, G4WFR, S5ØK)
Donor: Finnish Amateur Radio League

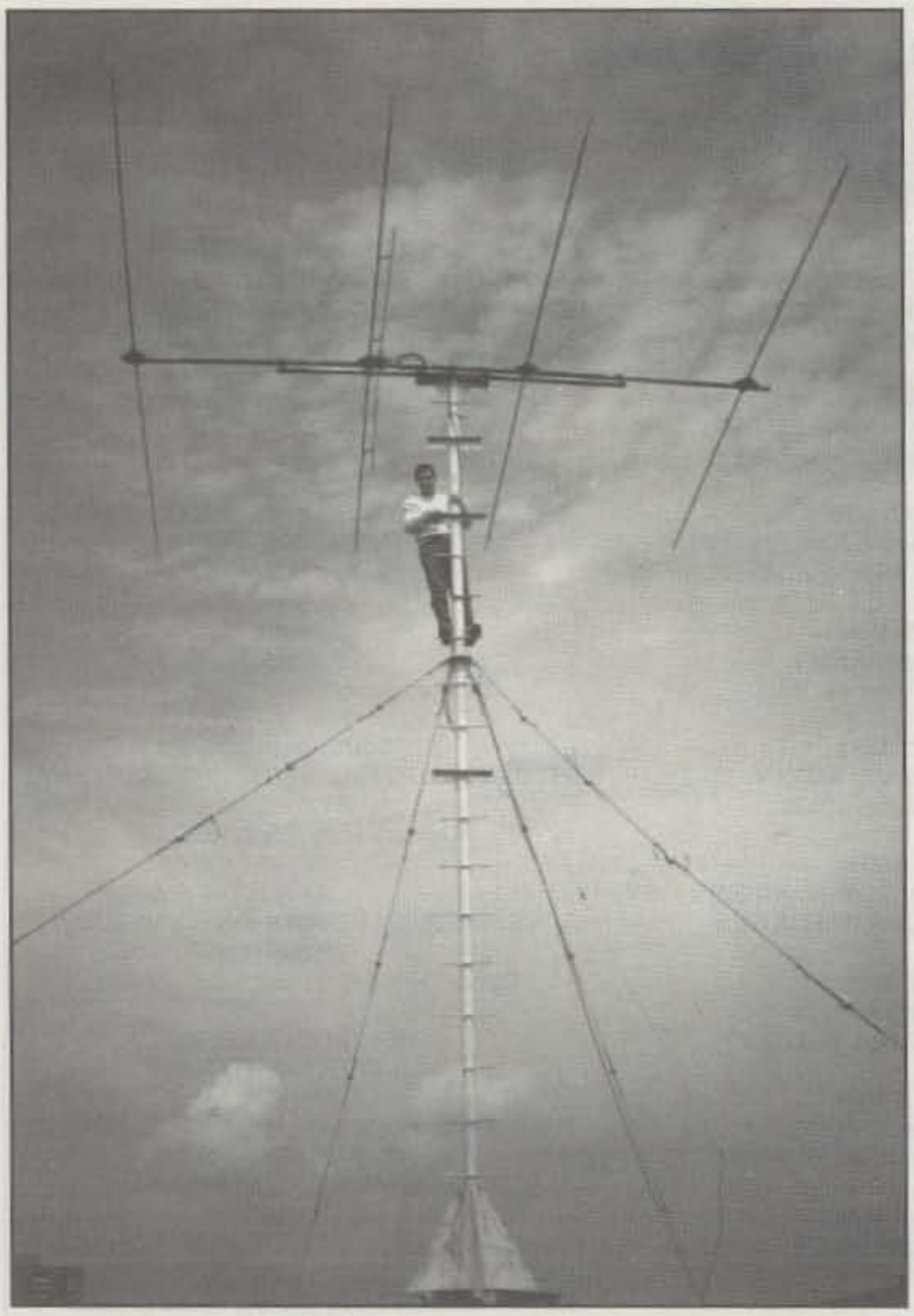
Japan
JA3ZOH (Ops.: JH3DPB, JH3PRR, JG3JEW, JG3KIV, JG3MRT, JI3OPA, JM3XKG, JH4IFF, JH4NMT, JF4FUF, K6UMB)
Donor: Ryozo Goto, JH3JYS

CONTEST EXPEDITIONS
World Single Operator
3V8BB (Opr. Milosevic Hrane, YT1AD)
Donor: Stuart Meyer, W2GHK

WORLD MULTI-OPERATOR
JT1Z (Ops: JT1BL, JT1CS, K6MC, N6AA, N6TW, N6ZZ, W6MKB, W6XD)
Donor: The German CDXG & SDXG
DJ3NG & DJ4EI Memorial

SPECIAL SINGLE OPERATOR AWARD
World—All Band Under 21 years old
Miguel Angel Devora Jimenez, EA1BOI
Donor: Gene Zimmerman, W3ZZ

World—All Band High YL
Mieko Enoue, JAØQWO
Donor: Yutaka Tanaka, JH3DPB



Jerry, UT4UZ, climbs to get a better view of conditions for 15 meters.

TOP SCORES IN VERY ACTIVE ZONES

Zone 3

N7AVK	1,612,052
NN7L	1,437,594
W6REC	1,311,856
KC7V	1,325,676
WK6V	1,188,600
VE7IN	804,573
WA7BNM/6	767,848
VE7KD	732,000
WA6IET	675,146
K6GX	660,570

Zone 4

XM3EJ	6,698,968
N2IC/Ø	3,000,556
W9RE	2,968,368
KØRF	2,378,322
N3BB/5	2,001,222
KØKX	1,559,124
NXØI	1,451,151
KØEJ/4	1,039,669
KB8TI	970,224
WBØO	845,856

Zone 5

K1AR	6,147,537
K5ZD/1	5,480,608
KM3T	3,906,468
N6BV/1	3,673,944
AA1K/3	3,335,400
W2SC/1	3,199,089
N2LT	2,985,423
K3ZO	2,834,030
VO1MP	2,824,963
W3BGN	2,757,456

Zone 14

GIØKOW	5,995,220
GW4BLE	4,444,749
DJ4PT	4,288,176
TM7XX	3,487,771
EA6URP	3,320,224
EA3CCN	3,182,314
G3NAS	3,026,034
F6HLC	2,608,815
F2EE	2,505,222
DJ6QT	2,159,976

Zone 15

S5ØA	6,047,415
YT6A	5,508,048
YU7AV	4,818,352
S53EA	4,670,838
S58AB	4,332,346
OHØMM	3,912,902
YT1AD	3,222,752
S59ZA	3,162,232
ZA1AJ	2,326,240
OM8A	2,126,020

Zone 25

JH5FXP	3,449,322
JA8RWU	2,482,830
JH1AEP	2,265,894
JA7BEW	779,382
JA1IDY	725,088
JF1KFV	585,150
JR1GSE	584,200
JF3NLQ	562,650
JAØUMV	553,644
JAØQWO	470,988

You still, however, could work Europe a little in the mornings.

Following in second place was the dedicated group on V26B. Their results sure indicate that they had some very serious ops at the microphones. The results from V26B show them beating or matching PJ9B on several bands, but their proximity to the US hurt them on 10 meters.

Over in Europe the group at GØKPW was setting up their field day site on the farm in western England. After much effort and pub drinking, they finished in the winner's circle and won the European crown. Not far behind were the dedicated and enthusiastic men at 9A1A. The two European winners had such different propagation and yet less than a million points separated them. The bronze metal goes to the guys in the middle, OT5T.

The race in the US was an interesting one. The crew at hotel New Jersey took away top

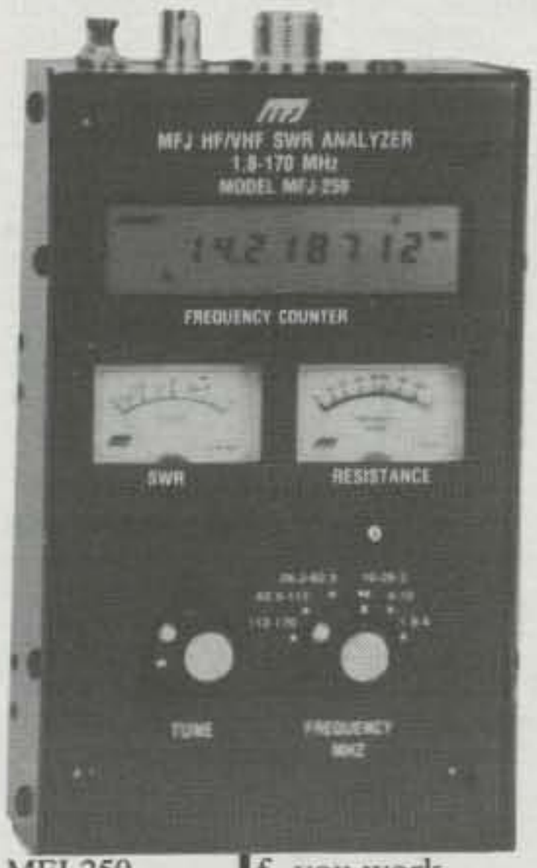
ZONE LEADERS SINGLE OPERATOR

Zone	Call	Score	Zone	Call	Score
1	WL7CLK	245,195	21	HZ1HZ	787,697
2	VE2QRZ	2,424,489	22	No Entry	
3	N7AVK	1,612,052	23	JT1BV	31,058
4	XM3EJ	6,590,384	24	VR2KF	562,324
5	K1AR	6,147,537	25	JH5FXP	3,449,322
6	XE1L	553,815	26	3W5FM	66,608
7	TI1C	7,898,252	27	DU9RG	2,815,955
8	WP4U	3,547,934	28	V85HG	3,432,184
9	8R1K	7,394,750	29	No Entry	
10	HC1OT	1,155,505	30	VK5GN	2,150,224
11	ZW5B	2,157,610	31	KH6/WR6R	3,926,533
12	XR1X	3,393,689	32	FO5IW	571,300
13	L37N	1,609,578	33	EA8AH	10,999,592
14	GIØKOW	5,911,024	34	SU2MT	6,805,372
15	S5ØA	6,012,303	35	5NØT	3,591,837
16	US1E	3,186,888	36	9J2FR	1,664,080
17	RK9CWY	687,188	37	5X4F	1,926,114
18	RZ9UA	876,856	38	ZS6CAX	111,566
19	RAØFU	1,584,410	39	3B8/F5PXQ	1,076,285
20	SV5/IN3QBR	2,941,329	40	JW8GV	141,752

The multi-single crew at ZP5WYV. Clockwise from bottom: ZP5CGL, ZP5DX, ZP5YW, ZP5ALI, ZP5RDX, ZP5YOE, and ZP5WYV.

MFJ *HF/VHF* SWR Analyzer™ with RF Resistance Meter

Read your antenna SWR from 1.8-170 MHz . . . 10-digit LCD frequency counter . . . RF Resistance Meter™ . . . smooth reduction-drive tuning . . . simple-to-use . . .



MFJ-259
$239.95

If you work with antennas, MFJ's revolutionary new *SWR Analyzer™* is the best investment you'll ever make! Now you can diagnose a wide range of antenna problems instantly with one easy-to-use instrument.

What the MFJ-259 Does

The MFJ-259 gives you a complete picture of your antenna's performance anywhere between 1.8 and 170 MHz -- you can even check SWR outside the ham bands without violating FCC rules. Set the bandswitch and tune the dial--just like your transceiver. SWR is displayed instantly!

RF Resistance Meter™

Does 2:1 SWR mean 25 ohms or 100 ohms? *The new MFJ-259 tells you at a glance!*

Now you can measure RF resistance up to 500 ohms at minimum SWR -- instantly -- on MFJ's *exclusive* side-by-side RF Resistance and SWR Meters!

Take the guesswork out of building matching networks and baluns for your antennas.

Watch the effects of spacing on radiation resistance as you adjust your antenna.

Here's What You Can Do . . .

Find your antenna's true resonant frequency from the shack.

Tune the antennas on your tower and watch SWR change instantly as you make each adjustment. You'll know exactly what to do by simply watching the display.

Tune critical HF mobile antennas in seconds -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on a single band, or analyze multiband performance over the entire spectrum from1.8 to 170 MHz!

Measure inductance, capacitance, resonant frequency of tuned circuits, transmission line velocity factor/impedance/loss.Test RF chokes, transformers, baluns.

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

And this is only the beginning! The MFJ-259 is really *four* test instruments in one: an accurate RF signal generator, a high resolution 170 MHz frequency counter, *RF Resistance Meter™* and an *SWR Analyzer™*.

Free Manual

MFJ comprehensive 18 page instruction manual is packed with useful applications -- all explained in simple language you can understand!

For free manual write or call MFJ.

Take It Anywhere

The MFJ-259 is fully portable, powered internally by 8 AA batteries or 110 VAC with MFJ-1312B, $12.95. It's in a rugged all metal cabinet that's a compact 4x2½x6¾ inches. Take it to remote sites, up towers, on DX-peditions -- anywhere your antennas are located.

For rough service, pick up a convenient **MFJ-29B**, $24.95, padded carrying pouch to keep your MFJ-259 close at hand and looking like new.

How Good is the MFJ-259?

MFJ SWR Analyzers™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Professional installers and technicians use them worldwide.

Get More by Paying Less

With the MFJ-259, you get full 1.8 to 170 MHz coverage, simple operation, instantaneous readings, a high accuracy frequency counter and MFJ's exclusive *RF Resistance Meter™*-- all for a low $239.95.

1.8-170 MHz *SWR Analyzers™*

MFJ-249
$219.95

MFJ-249 *HF/VHF SWR Analyzer™* has all the features of MFJ-259 but less RF resistance meter. Includes 1.8-170 MHz *continuous* coverage, 10-digit LCD frequency counter and smooth vernier tuning.

MFJ-209
$109.95

MFJ-209 *HF/VHF SWR Analyzer™* is same as MFJ-259 without LCD frequency counter and RF resistance meter. Has jack for external frequency counter. MFJ-249/MFJ-209 are 4x2½x6¾ inches and uses 8 AA cells or 110 VAC with MFJ-1312B, $12.95.

Carrying Pouch with Window

MFJ-29B
$24.95

Tote your MFJ-259/249/209 *SWR Analyzer™* anywhere with this custom Carrying Pouch.

Made with a special foam-filled fabric, it cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Clear protective frequency display window and cutouts for knobs let you use it without taking it out of pouch. Fully-adjustable webbed fabric carrying strap has snap hooks on both ends. Wear around waist or over shoulder.

Keep your analyzer safe and looking new!

MFJ-29, $19.95, no window or cutouts.

Dip Meter Adapter

MFJ-66
$19.95

Plug a dip meter coupling coil into your *MFJ SWR Analyzer™* and turn it into a sensitive and accurate bandswitched dip meter.

With a dip meter you'll save time and take the guesswork out of winding coils, measuring inductance and capacitance, measuring velocity factor and electrical lengths of coax. Determine resonant frequency of tuned circuits and measure Q of coils. Set of two coils cover 1.8-170 MHz depending on your *MFJ SWR Analyzer™*.

Free MFJ Catalog

Write or call . . . 800-647-1800

10-160M *SWR Analyzer™*

MFJ-207
$79.95

If you're an HF man, this compact MFJ-207 *HF SWR Analyzer™* will help you build 10-160 Meters antennas that'll make working DX almost routine.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. 7½x2½x2¼ inches.

Bandswitch Dip Meter™

MFJ-203
$99.95

The MFJ-203 is a sensitive *Bandswitched Dip Meter™* that covers all ham bands from 160-10 Meters. There are no plug-in tuning coils to keep up with or break.

Has detachable coupling coil, dual FET oscillator, op-amp meter amplifier and jack for external frequency counter. 7½x2½x2¼ in.

2 Meter *SWR Analyzer™*

MFJ-208
$79.95

MFJ-208 2 Meter *VHF SWR Analyzer™* finds the SWR of any antenna from 138-156 MHz. Jack for external frequency counter. 7½x2½x2¼ inches.

For Commercial VHF Radio

Same as MFJ-208 but for commercial VHF. **MFJ-217**, $79.95, covers 30-50 MHz and **MFJ-218**, $79.95, covers 150-170 MHz.

MFJ Antenna Bridge

MFJ-204B
$79.95

Great for determining feedpoint resistance of antennas and for designing impedance matching networks. Measure RF resistance up to 500 ohm. Covers all ham bands 160-10 Meters. Built-in resistance bridge, null meter, tunable oscillator-driver, frequency counter jack. 7½x2½x2¼ inches. Use 9 volt battery or 110 VAC with MFJ-1312, $12.95.

440 MHz *SWR Analyzer™*

MFJ-219
$99.95

Read SWR of any antenna 420 to 450 MHz -- just plug coax of your antenna into SO-239 connector, set frequency and read SWR. Uses microwave integrated circuits and microstrip technology. Jack for external frequency counter. 7½x2½x2¼ in.

MFJ-219N, $99.95, sames as MFJ-219 but with "N" connector.

MFJ-219/218/217/208/207/203 uses 9 volt battery or 110 VAC with MFJ-1312B, $12.95.

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH(8324)

• 1 year **unconditional** guarantee •30 day money back guarantee (less s/h) on orders from MFJ • **FREE** catalog

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(601) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (601) 323-6551; **Add s/h**

MFJ . . . making quality affordable

CIRCLE 160 ON READER SERVICE CARD

TOP SCORES

WORLD

SINGLE OPERATOR HIGH POWER

All Band

EA8AH 10,999,592
TI1C 7,898,252
3V8BB 7,508,820
8R1K 7,394,750
SU2MT 6,805,372
XM3EJ.....6,590,384
K1AR 6,147,537
S5ØA 6,012,303
GIØKOW.....5,911,024
YT6A 5,508,048

28 MHz

LU6ETB.....638,388
EA8ZS.....449,460
ZP5MAL 442,981
ZV5A 431,232
LU1MA 364,060
LU2DW/A 338,663

21 MHz

ZW5B 2,157,610
PQØMM.....1,642,575
ZS6EZ.....1,552,250
9R1A 1,135,818
JA5FDJ 1,045,128
IY1LEC.....1,040,910

14 MHz

ZD8Z 2,356,065
IG9R.....2,076,068
4X6TT 1,557,951
OK1RI 1,359,640
CE3F.....1,325,016
VP2E.....1,315,327

7 MHz

IG9A.....1,168,855
9M8R.....1,091,835
PYØFM 862,368
S5ØC.....729,520
9Y4VU.....635,328
LZ5W.....586,656

3.7 MHz

IG9T 816,959
HC8A.....441,084
I8UDB.....233,562
S57AW.....219,535
DL8OH.....209,469
LX1NO 194,775

1.8 MHz

IG9W 137,020
EA8EA.....105,786
OY9JD.....98,824
EKØW.....75,806
SV8CS 60,258
IR4T 58,764

LOW POWER

All Band

WP4U.....3,547,934
US1E.....3,186,888
OD5NJ 2,691,360
5X4F.....1,926,114
EA7CEZ 1,777,656
L37N.....1,609,578
RAØFU 1,584,410
ON5GQ 1,442,708
TR8IG.....1,162,620
KR2Q 1,158,288

28 MHz

ZY3Z 575,246
LU8HSO.....341,857
LU3HIP.....244,055
LU3HWE 222,040
EA8IN.....209,326
LU3HYS 182,868

21 MHz

HC1OT 1,155,505
UA4LCQ.....703,812
GI4SNA.....415,359
CX6VM.....328,654
II6I 316,798
YU7CF 312,602

14 MHz

IR4XX.....658,615
Z3ØM.....646,218
LU5FCI.....528,504
JR4PMX/1 321,222
VA3JK 300,105
S52UT 266,328

7 MHz

RVØAR.....456,284
YV5AMH 200,871
IR4R.....180,006
YV5NCK.....78,912
SV2AEL.....71,246
RA3WA 68,801

3.7 MHz

T99W.....99,528
DL4FMA.....82,616
S57J.....75,225
PAØRCT.....66,082
S51IX 63,771
OK2PJW 62,790

1.8 MHz

S53X 39,960
HA8EK 37,128
OZ3SK 30,177
IT9ZGY.....27,750
S57DX.....21,840
DL9SXX 17,877

QRP

All Band

LY35BA.....421,201
EA1GT 377,568
AA2U.....370,804
WØKEA 323,190
JA6GCE 283,284
N1AFC 281,112
UA4SKW.....258,531
UT1WA.....239,313
JA6UBK.....227,916
EA3FHT 204,228

ASSISTED

All Band

AA2DU 3,145,262
EA8AFJ.....3,089,350
DJ2YA.....2,669,139
DL6ET.....2,619,378
IR8A.....2,584,581
N3RR 2,522,730
N3AD.....2,497,105
K3WW.....2,330,389
DK9DA 2,293,248
PY2EX.....2,275,232

MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A.....11,986,918
ED9EA 9,707,190
6D2X.....9,689,400
LZ9A.....9,327,936
8P9Z.....9,213,928
FG5BG 9,147,840

MULTI-OPERATOR MULTI-TRANSMITTER

PJ9B.....33,279,744
V26B 22,384,428
GØKPW.....17,257,440
9A1A 16,362,936
OT5A.....15,120,045
HG73DX.....14,997,749

EUROPE

SINGLE OPERATOR HIGH POWER

All Band

S5ØA 6,012,303
GIØKOW.....5,911,024
YT6A 5,508,048
S53EA.....4,587,600
YU7AV 4,395,660
GW4BLE 4,335,168
DJ4PT 4,076,328
OHØMM.....3,843,576
S58AB 3,538,522
TM7XX 3,344,568

28 MHz

S51AY 161,190
IK4GRO.....128,588
EA7BA.....116,772
F5NBX.....101,022
GØAEV 71,136
DF9XV.....54,035

21 MHz

IY1LEC.....1,040,910
CQ5BOP 989,860
HAØDU.....967,500
S59WA.....696,808
OH5NQ 677,875
UT4UZ.....599,585

14 MHz

OK1RI 1,359,640
S59A 1,207,553
US5WE 1,081,294
IT9BLB 1,078,020
GM4FDM.....1,026,840
GIØUJG 990,090

7 MHz

S5ØC.....729,520
LZ5W.....586,656
S57AL 573,448
PA3CWM 528,000
YT7A 464,594
HA9BVK.....436,640

3.7 MHz

I8UDB.....233,562
S57AW.....219,535
DL8OH.....209,469
LX1NO 194,775
ON9CJM 185,544
DL3LAB.....171,021

1.8 MHz

OY9JD.....98,824
SV8CS 60,258
IR4T 58,764
9A4D 56,564
S54DL 54,264
SP5INQ.....47,232

LOW POWER

All Band

US1E.....3,186,888
EA7CEZ 1,777,656
ON5GQ 1,442,708
LX1KC.....1,059,597
DL2OBF 852,432
S54A 830,144
DL1NCT 779,100
G4KIV.....774,836
EA3BKI.....743,285
DL1MGB 687,040

28 MHz

OM5FA.....107,502
S52CD.....71,610
Z31JA.....57,720
CT1ESO.....47,472
EA7FUN.....46,872
T99T.....46,046

21 MHz

UA4LCQ.....703,812
GI4SNA.....415,359
II6I 316,798
YU7CF 312,602
OK1ARI 260,032
EA7FTR 195,576

14 MHz

IR4XX.....658,615
Z3ØM.....646,218
S52UT 266,328
S58WW.....248,200
US4LAD 246,645
SP6KEP 228,780

7 MHz

IR4R.....180,006
SV2AEL.....71,246
RA3WA 68,801
UX2VZ.....61,610
S52KD.....60,000
S51QZ.....51,912

3.7 MHz

T99W.....99,528
DL4FMA.....82,616
S57J.....75,225
PAØRCT.....66,082
S51IX 63,771
OK2PJW 62,790

1.8 MHz

S53X 39,960
HA8EK 37,128
OZ3SK 30,177
IT9ZGY.....27,750
S57DX.....21,840
DL9SXX 17,877

MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A.....11,986,918
LZ9A.....9,327,936
TM2Y.....9,130,602
TM1C 9,060,660
EN5J 8,003,660
OT5T 7,975,077

MULTI-OPERATOR MULTI-TRANSMITTER

GØKPW.....17,257,440
9A1A 16,362,936
OT5A.....15,120,045
HG73DX.....14,997,749
TK2C.....13,886,544
EM2I.....12,241,254

USA

SINGLE OPERATOR HIGH POWER

All Band

K1AR.....6,147,537
K5ZD/1 5,480,608
KM3T/1.....3,906,468
N6BV/1 3,673,944
AA1K/3.....3,335,400
W2SC/1 3,199,089
N2IC/Ø.....3,000,556
N2LT 2,985,423
W9RE.....2,968,368
W3BGN.....2,865,030
K3ZO.....2,834,496

28 MHz

KE5FI 42,084
W4YV 25,811
W6KFV.....20,631
WA7KLK.....13,158
KF7E/5 9,087
W6ISQ.....2,457

21 MHz

KC2X/4.....688,144
KM9P/4 441,298
K7RI 371,754
N4BP 305,885
N4CT.....304,258
W6KP.....291,612

14 MHz

KM1H 1,093,932
K2SS/1 952,408
NI8L.....928,884
KK9A.....772,310
KS1L 732,685
K3ZJ/8.....568,516

7 MHz

KC7EM.....409,446
N7DD 280,872
KVØQ 247,020
WB9Z 175,540
W3GH 125,902
W9LT/8.....61,946

3.7 MHz

WE3C.....162,212
KO1F.....135,892
AD1G 81,270
AB6ZV/7 53,448
K8OQL 50,721
K9HMB.....49,969

1.8 MHz

K1ZM.....55,420
W2VO.....10,962
KØCS.....3,780
AA4MM 3,663
WØCM 2,268
KN6DV 360

LOW POWER

All Band

KR2Q 1,158,288
KQ3V.....820,386
AC1O/4 815,480
NY3Y.....787,200
WA7BNM/6 767,848
WD5K.....733,249
WT3W 693,216
WA6IET.....675,146
K2AZ.....600,626
WS1A.....592,353
KØRNZ/4 148,720
K2MFY 142,621
KB8IBS.....139,876
KD1YN 104,170

28 MHz

KC3PZ.....15,226
WA7NIY 12,726
WB2BZR/3 12,650
KC5HFI 10,220
KC4UCK.....6,480
KF4CRD.....3,844

21 MHz

WA2QNW.....258,100
KJ6HO.....253,260
NI5M.....154,234
KF8UM.....152,460
NY5B.....127,612
KB1KM.....124,540

14 MHz

WI9H 184,518
N4MO.....154,155

7 MHz

WB8VPA 27,492
WW3S.....16,896
AD8J 8,112
AA9IA.....4,028
WA6WPG.....4,000
W1WMH.....884

3.7 MHz

WA4SVO.....35,690
W1MK 8,112
WA2ASQ.....3,672

1.8 MHz

KA2CDJ 1,104
NOØY 684

MULTI-OPERATOR SINGLE TRANSMITTER

KC1XX 6,214,992
K2TR.....5,766,831
N2NU 5,350,544
KF2ET 4,868,640
W1FJ.....4,843,104
K1NG 4,677,669
K4ISV 4,653,720
KS9K.....4,589,184
K8AZ 3,984,120
NF2L 3,466,368

MULTI-OPERATOR MULTI-TRANSMITTER

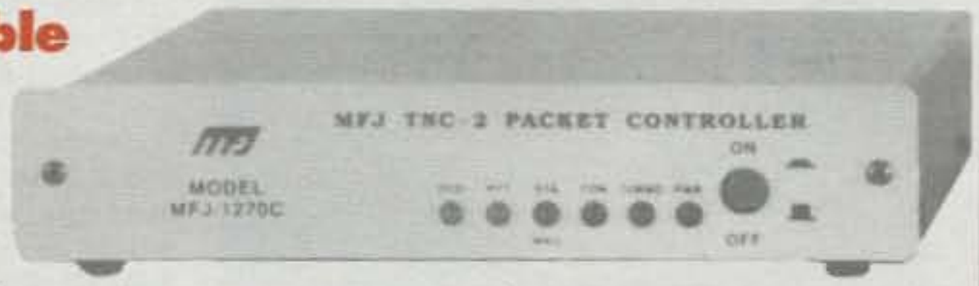
N2RM 12,199,016
K3LR 11,370,057
W3LPL 9,638,216
K1KI 8,887,262
KY1H.....8,643,627
N3RS.....6,453,540
N4ZC.....6,048,323

MFJ TNCs for VHF/HF Packet

MFJ-1270C super TAPR TNC clone has a world wide reputation as the most reliable packet TNC in the world! Thousands used as digipeaters, nodes, BBS and in all kinds of commerical applications working 24 hours a day -- many work for years without a single failure . . .

Now GPS Compatible

- *ROM expands to 512K*
- *External accessible reset*
- *Built-in monitor amplifier*
- *Front panel ON/OFF switch*
- *Enhanced DCD circuit for HF*
- *Supports 19,200 baud terminals*
- *Memory Expands to 64K, 128K or 512K*



MFJ-1270C **$119.95**

The MFJ-1270C *super* TAPR TNC clone has a world wide reputation as *the most reliable TNC in the world!*

Thousands are dedicated as digipeaters, nodes, BBS and used in all kinds of commercial applications working 24 hours a day -- many work for years without a single failure.

The Most for Your Money

The most reliable TNC in the world gives you the most for your money. See for yourself . . .

Fully TAPR TNC-2 Compatible

You get full TAPR TNC-2 compatibility -- *all* software and hardware designed for the TAPR TNC-2 standard works without modification. You get NETROM, theNET, X1J and Rose Switch compatibility that turns your MFJ-1270C into a Layer Three and Four networking node.

VHF *and* HF operation.

You get high performance VHF *and* HF modems as standard equipment -- for double fun.

You get a true DCD circuit that dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

FREE AC Power Supply

You get a *free* 110 VAC power suppy at no extra cost. With other brands, the AC power supply could cost you an extra $20.95.

New *enhanced* Personal Mailbox

The *enhanced* Easy Mail™ personal mailbox lets you use a dedicated call-sign for your mailbox. Your mailbox can stay on while you operate packet. It will also auto forward or reverse forward mail to and from other BBSs. A *check mail* LED blinks when you have mail. More features: remote sysop access, sysop paging, mailbox C-text, chat mode and many other features not available in other TNCs. The mailbox memory is expandable to 32K, 128K and 512K.

WeFAX gives you Weather Maps

You get a WeFAX mode that lets you print full fledged weather maps from your HF radio to screen or printer or save to disk using an MFJ Starter Pack.

Plug-in Modem - - 2400 or 9600 Baud

You can add MFJ's optional *internal* 2400 baud or 9600 baud modem just by *plugging it in* and making a few simple connections.

KISS interface and MFJ Host Mode

You get a KISS interface that lets you run TCP/IP and MYSYS and MFJ's Host Mode that makes it easy to write efficient application programs.

MFJ *Anti-Collision*™ Technology

You get MFJ's *Anti-Collision*™ technology that prevents packet collisions and improves performance on busy channels.

Plus more . . .

You also get 32K RAM, IC sockets for easy service, 256K ROM, speaker jack, lithium battery backup, RS-232 *and* TTL serial ports, radio cable (you have to add a connector for *your* radio), Fast-Start™ Manual plus much more. Use 12 VDC or 110 VAC. 9½x1½x7½ in.

One Year *Unconditional* Guarantee

You get MFJ's famous *No Matter What*™ one year *unconditional* guarantee.

Enjoy Packet for a long, long time

If you want a TNC that'll work 24 hours a day without failure -- *one that has more features than any other* -- get the ultra reliable MFJ-1270C today and enjoy packet for a long, long time.

2400 Baud *Turbo*™ TNC

MFJ-1270CT, $209.95. Has all the features of the MFJ-1270C plus built-in fast 2400 baud modem. Operate 300, 1200 and 2400 baud packet with the MFJ-1270CT. Radio modification is *not* necessary when operating 2400 baud packet.

MFJ 9600 Baud *TurboPlus*™ TNC

MFJ-1270CQ **$229.95**

Has all the features of the MFJ-1270C, *the most reliable TNC in the world,* plus built-in 9600 baud G3RUH compatible modem. Operate 300, 1200 and 9600 baud.

TNC ACCESSORIES

MFJ Starter Packs

An MFJ Starter Pack, $24.95, gets you on the air instantly. You get interface cable, software on disk and instructions -- just plug it all in and start enjoying packet. Order **MFJ-1284** for IBM or compatibles, **MFJ-1282** for Commodore 64/128, **MFJ-1287** for Macintosh or **MFJ-1290** for Amiga.

2400 and 9600 Baud Modems

MFJ-2400, $89.95, operates 300, 1200 and 2400 baud packet and works with any radio. **MFJ-9600B,** $109.95, G3RUH compatible 9600 baud modem. Not all radios compatible with 9600 baud. Both plug into MFJ TNCs for easy installation.

Mailbox Memory

For MFJ-1270C/1276. Plugs into RAM socket for extra *mailbox* memory. **MFJ-45A** (32K), $14.95, **MFJ-45B**(128K), $29.95, **MFJ-45C** (512K), $159.95.

Real Time Clock

MFJ-43, $29.95, ends re-setting TNC clock everytime you turn it on. Maintains correct time even when TNC is off. Plugs into RAM socket. Works with MFJ TNCs and TAPR TNC clones.

FM Deviation Meter

MFJ-52, $29.95, plug this board into your TNC configured as TheNet X-1J Node and users can check their transceiver packet FM deviation. Requires X-1J or later nodeware. See *CQ Magazine*, Nov. 1993 .

Firmware Upgrade

For older MFJ TNCs. **MFJ-40C**, $19.95, gives you enhanced mailbox and supports mailbox up to 512K. ***And now you also get GPS compatibility.***

Mailbox Memory Expansion Board

For older MFJ TNCs. **MFJ-47A**, $49.95, 32K RAM; **MFJ-47B**, $69.95, 128K RAM; **MFJ-47C**, $239.95, 512K RAM. Complete with firmware.

MFJ's new TNC/Mic Switch

Switch between your TNC or Mic by pushing a button!

Switch between your microphone and TNC by pushing a button!

MFJ-1272B/M **$39.95**

You won't have to unplug your microphone and plug in your TNC *everytime* you want to work packet or other digital modes.

Just plug these pre-wired cables into your rig's microphone connector and into your TNC and you're ready to go -- no more hard-to-find connectors and wiring up cables.

Works with HF, VHF and UHF radios with 8 pin mic connectors -- including Kenwood, ICOM, Yaesu, Alinco and others. *For radios with 8-pin RJ-45 modular telephone jack, select the new "M" models.*

Plug-in jumpers let you quickly set-up for virtually any radio. Factory set for Kenwood and Alinco. Includes easy-to-follow instructions. Has audio-in and speaker jacks. 3¼x1¼x4 inches.

MFJ-1272B/1272M, $39.95, for MFJ TNC/multimodes,TAPR TNC-2 clones.
MFJ-1272BX/1272MX, $39.95, for PK-232.
MFJ-1272BYV/1272MYV, $39.95, for KAM VHF/KPC3.
MFJ-1272BYH/1272MYH, $39.95, for KAM HF Port.

Pre-wired Radio-to-TNC cables . . . $14.95

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
6. YV for KP9612 1200 baud port
7. YH models for KPC9612 9600 baud port

PACKET *plus* PACTOR TNC

You get all the features of the MFJ-1270C HF/VHF TNC plus . . . PACTOR . . . precision HF tuning indicator . . . extra 32K mailbox memory . . .

PACTOR combines the best of Packet and AMTOR for HF. You get excellent weak signal operation, error correction, faster baud rate, data compression and full 8-bit word transmissions.

MFJ-1276 **$159.95**

A 20 LED bargraph makes HF tuning easy. Just tune your radio to center a single LED and you're precisely tuned in to within 10 Hz -- and it shows you which way to tune!

You also get an extra 32K of memory for your enhanced *Easy Mail*™ packet mailbox.

MFJ-1276T, $249.95, same as MFJ-1276 but includes fast 2400 baud modem. Lets you operate 300, 1200, and 2400 baud packet.

FREE MFJ Catalog

Write or call . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH(8324)

• 1 year *unconditional* guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • FREE catalog

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(601) 323-5869; 8-4:30 CST, Mon.- Fri.
FAX: (601) 323-6551; **Add s/h**

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CIRCLE 3 ON READER SERVICE CARD

honors. Operating at the weekend cottage of N2RM, they talked their way to the top. In second place was K3LR. Tim's crew caught his enthusiasm and took K3LR to new heights. They took full advantage of their proximity to VE to work our Canadian neighbors in great numbers.

Team Contesting

The leader of the team pack was the YCCC team captains. They put their locations to good use and edged out the first Team Yugoslavia effort. The Yugoslavian contest team made all contesters happy with their DXpeditions to VP2 and 3V8. They hope to repeat their efforts again this year.

The Notepad

Please make a note of several housekeeping chores that you can perform to make life easier for the CQ WW Committee. Please send us your disk no matter how many QSOs you make. A disk is REQUIRED from all potential high-scoring stations regardless of category.

You can send a disk plus a paper summary sheet. It bears saying again that the disk label should contain your CALLSIGN, MODE, and CATEGORY. On the disk should be the proper file. If you use CT, send the .BIN file named with your call. For example, when ZS6EZ sends in a disk, the file should be named ZS6EZ.BIN. If you use TR, send in the .DAT file; NA the .QDF file. Please avoid DBF files. There are too many variations for use to easily read each one. If you have a non-common program—i.e., other than CT, TR, or NA—please make sure that you give files that consist of a single column of calls in the order that you worked them on the band. For example, if you were all band, you should send six different files, each file having the name of your call.160, your call.80, etc.

If we received disks from all participants, we could have the results out much earlier. In 1995 over 1000 disks were received for SSB. Of these, about 900 were readable. The rest were damaged or had DBF files that were too difficult to read. On those disks were 1.1 million log entries representing 85,000 different callsigns. Of these 85,000 calls, 47,000 were worked by only one person in the database. If you send in a disk and wish to see your unique list send an e-mail to <K3EST@netcom.com>.

The level of operating skill has dramatically increased over the last few years. Operators are really trying to get the calls of the stations that they work correct.

Coverage Expansion

Due to space limitations, some aspects of these results cannot appear in *CQ*. Now, however, we are pleased to be able to present a more detailed analysis in *CQ Contest* magazine (also published by CQ Communications). The band-by-band breakdown for Europe and for most active zones will be in the October issue of *CQ Contest*.

Thanks

Thanks to all the faithful log checkers who validated the winners. The hard-working crew includes: K1DG, KZ2S, KR2J, N3ED, W2RQ, W3ZZ, N2AA, WR3G, WA8YVR, W9RE, KR0Y, K3ZO, N6ZZ, W7EJ, N8BJQ, K6NA, and K3UA. Our DX advisors were very useful in sorting out potential problems; they are JE1CKA, OH2KI, OH2MM, S50A, OK2FD, I2UIY, EA3DU, G3SXW, PY5EG, CT1BOH, ON6TT, DL6RAI, VE3EJ, and UA9BA.

A special thanks to Dick, N6AA, who spent countless hours to make the CQ WW database the best in contesting. We at CQ WW use the software developed by N6TR. Tree improved the depth of checking this year, and we want to thank him for his long, hard work.

Congratulations to all the winners. Make sure that you are a participant this year. To participate is what it's all about! From all of us on the CQ WW, 73 and CU in '96!

Bob, K3EST

PY5CC relaxing at the controls of PYØFM.

USA QRM

Most DX stations do not listen above 7225 (the General portion) . . . *W1WMH*. Wish the Europeans would listen for West Coast stations . . . *KJ6ZH*. Best we've ever done from N4ZC. Bad QRN from lightning and antenna rain noise for first 3 hours . . . *N4ZC*. I love packet. I hate packet! It's addicting, but it sure makes it difficult to call CQ for any length of time. Too many "fun" distractions . . . *WZ6Z*. After all these years, I still enjoy this contest for all the DX it brings out in a weekend . . . *N6HK*. My second contact was my first overseas contact—thrilling!! . . . *KB2THF*. Third year in a row to finish behind K1AR! Will try again next year . . . *K5ZD/1*. Greatest African openings I've seen in 36 years of operating . . . *KC7DB*.

Single op is the best! I have a lot to learn about doing it right, though . . . *KM3T (at K1MNS)*. First time QRP in a contest. Can't believe I worked RAØFU and ZD8Z with 5 watts and a vertical . . . *N7XCZ*. We set it up, we learned how to use it, we didn't spill any beer on it, and we had LOADS of fun using it. Now that we are getting it figured out, WATCH OUT for us next year! Many thanks to Don, K5AAD, for providing us with the opportunity . . . *W5UW gang*. I worked 22 new countries on 40M. My goal was 20, so I'm happy . . . *WA2CNV*. In 2 months back on the air after 29 years off, I worked 2 stns on 15. Sunday in CQ WW on 15 was therefore a particular thrill . . . *WAØKIR/2*. Calculating the QSO points is always a highlight . . . *N2AUK*.

Worked the contest between calls at the firehouse! . . . *WB3ECU*. Worked zones 23, 34, and 2 in zone 26! Unheard of! . . . *K6YRA*. 1995 was my 40th year in amateur radio. Always a pleasure to meet old friends . . . *W9GXR*. We went on a surf fishing trip. So we thought why not take a rig and antenna and operate in the BIG DX contest? We didn't make much of a score, but we had a lot of fun. (We didn't catch any fish either!) . . . *W4TMN*. First time at new QTH—with new daughter! I was not on for long, but it is nice to be back! . . . *KRØU*. With 3 minutes left in the test, I found XZ1A working split. I gave a call and what a thrill hearing him come right back to me! . . . *KK9A*. Boy, I hate restrictive communities!. Thanks for the excellent conditions . . . *K3YDX*.

Most enjoyable was working KL7Y for a new country and state on 160 . . . *KC4YM*. This was my first contest. I had a ball and will do it again . . . *KD4TWP*. This was my first contest ever! I'm sure it won't be my last. Very exciting . . . *KBØSDB*. Checked 10 meter band and it was dead. Checked it again and found it wide open! Made 41 QSOs in about an hour . . . *N6IBP*. Biggest thrill was breaking through on the RAØFU pile-up with my tribander at 53 feet and low power . . . *N9VVV*. This was my first CQ WW, but it won't be my last. SSB was more fun than I thought it would be, with 50 watts and a 2-el X-beam pointed south . . . *N3UMA*. My first concentrated effort in the CQ WW. I had a fabulous time . . . *K8IKW*. If this is bad conditions, good conditions must be fantastic . . . *KV1W*.

Getting KL7Y on 160. Now only need ME for WAS . . . *WK5K*. It pays to go to church! After early mass, I came home to find the band wide open! . . . *WT8P*. Great contest! Best in years. Everybody moved around bands instead of staying on the highest band. My body can't take too many more of these marathons, but it's better to burn out than to fade away . . . *WK6V*. After almost 40 years in this contest, meeting old friends who know your name and QTH before you give it . . . *K7ABV*. Biggest thrill was getting SU2MT and HC8A in pile-ups with my mobile . . . *W8ILC*. Fastest fingers on the VFO: WH6R after working him on 40 meters split after a change in listening frequency . . . *N2PEB*.

Murphy visited on Friday—cold, wind, fog, rain. Whose idea was it to operate portable from the mountains? See you next year . . . *W4NC*. Broke my personal best rate. I saw 139/hr at 17Z on Saturday . . . *K2WK*. Operated from a cabin at 3500 feet. Antenna was a vertical at 10 feet. Sleet Saturday morning and battery powered for all QSOs. Thanks for great contest . . . *KC4UCK*. Used a balloon vertical for 160 . . . *NOØY*. My first contest since the Novice Roundup. I have been licensed less than a year. Wish 10 would have opened more . . . *N9ZPE*. I especially love contesting when the band is about ready to fold. The local QRM goes away and the band seems to open up before you, and you are able to hear and work very weak stations . . . *KC2X/4*.

TEAM CONTESTING

1. YCCC Team Captains: 22,507.646. By K1AR, K5ZD, KM3T, N6BV, W2SC.
2. Yugoslavian Contest Team: 18,673,653. By VP2ENR (Opr. YU1NR), 3V8BB (Opr. YT1AD), YT6A, YU7AV, YT1AD (Opr. YU1DX).
3. Team 444 DXers: 4,504,107. By VE2QRZ (Opr. WB2K), AA2U, K2AZ, KR2Q.
4. Equipo Litoral Argentino: 2,081,588. By LR3F (Opr. LU6FAZ), L5F (Opr. LU1FNH), L7F (Opr. LU7FEU).
5. Lithuanian DX Group #1: 2,047,028. By LY1DS, LY2LA.
6. Lithuanian DX Group #2:1,707,458. By LY2DX, LY35FW, LY5W.
7. Kiev Contesting Team: 869,840. By UT4UZ, UT5UGR, UX1UA.
8. Team Afrah: 740,973. By F6BVB, F6IIV, F5HWB, FB1OWN.
9. Number Thirteen: 616,988. By EA1MK, EA1OT, EA1YB.
10. Elettra Marconi: 231,415. By IYØTCI, I5NXD, ISØPFD, IK5MEQ, IK2CQF.
11. Sake, Lager & Milk: 225,682. By WV3U, N4YKD, N4KWX.

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
EA8AH	87/11/49	500/22/75	1073/26/94	1507/34/104	2109/29/96	584/20/71
TI1C	46/9/16	660/22/66	954/25/85	1637/26/95	2644/31/107	124/16/26
3V8BB	244/10/50	267/12/55	576/23/73	1027/37/118	1399/35/110	594/21/76
8R1K	42/8/17	300/18/54	802/24/80	1108/32/105	1980/27/98	404/22/65
SU2MT	60/7/32	192/16/59	858/21/80	928/33/106	1630/33/110	334/18/63
XM3EJ	303/11/20	521/14/59	651/27/90	1374/37/114	1626/29/115	86/12/26
S5ØA	78/6/49	164/10/57	610/27/96	1411/35/114	1387/36/111	138/25/61
GIØKOW	230/8/51	435/11/59	874/25/92	2026/33/114	818/30/104	109/15/51
YT6A	291/22/69	312/25/74	910/27/87	832/32/105	1345/34/111	340/22/68
P4ØE	23/7/17	295/18/45	782/23/67	803/27/79	1642/26/84	357/16/31

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K1AR	26/8/21	334/17/70	254/25/78	1401/39/139	1446/32/132	62/13/25
K5ZD/1	71/12/38	322/16/71	199/21/79	1451/36/124	1169/28/110	96/9/25
KM3T/1	12/5/7	307/13/60	162/16/67	1096/32/109	1132/29/107	76/13/28
N6BV/1	34/8/23	263/12/61	110/18/59	1029/31/113	1281/29/107	8/2/3
AA1K/3	44/11/28	91/14/53	133/19/63	1135/36/119	846/26/107	74/12/22
W2SC/1	29/9/20	232/14/67	196/22/78	679/31/100	1094/28/107	28/8/15
N2IC/Ø	40/11/20	79/17/38	394/30/70	807/35/115	756/30/93	91/11/24
N2LT	23/10/22	153/14/53	109/21/60	621/30/103	1180/28/112	62/10/20
W9RE	36/10/23	112/17/52	183/27/74	656/37/121	889/28/112	93/10/25
K3ZO	13/7/10	140/15/52	183/20/65	1114/32/120	753/25/95	17/3/4

WORLD MULTI-OPERATOR SINGLE TRANSMITTER

IQ4A	62/12/62	271/30/106	1010/37/122	1531/40/145	2348/38/157	188/31/107
ED9EA	37/6/26	416/19/76	1581/23/87	1492/35/127	1938/33/125	752/21/89
6D2X	65/10/15	285/24/62	1478/34/108	1376/36/119	2999/31/119	249/18/40
LZ9A	174/20/71	365/34/100	916/39/137	1122/40/150	1660/38/135	571/34/114
8P9Z	149/8/25	304/18/60	1164/26/92	1619/37/123	2165/35/118	494/21/69
FG5BG	204/10/44	464/16/70	1403/26/94	1394/31/107	2039/33/110	427/21/62

USA MULTI-OPERATOR SINGLE TRANSMITTER

KC1XX	30/10/38	319/21/85	173/28/88	1418/40/155	1082/30/140	53/17/46
K2TR	41/12/42	375/21/89	170/29/95	1379/39/152	811/31/139	52/16/52
N2NU	55/12/51	354/19/78	131/28/85	1140/38/146	1006/31/142	57/17/45
KF2ET	24/12/28	253/19/79	210/31/92	1144/37/146	865/30/138	42/17/44
W1FJ	39/10/43	430/19/85	189/27/92	775/39/131	1048/29/137	45/18/42
K1NG	49/13/43	164/19/79	156/27/92	1082/39/151	799/31/146	90/20/51

WORLD MULTI-OPERATOR MULTI-TRANSMITTER

PJ9B	255/14/38	1186/27/101	2011/30/115	4088/37/151	4893/33/147	1481/25/98
V26B	431/13/40	916/21/87	2046/29/106	4028/37/144	3573/34/142	936/23/83
GØKPW	877/13/76	1557/25/101	1804/36/127	2542/39/155	2067/38/174	706/27/105
9A1A	584/11/59	1480/28/106	2332/37/139	2831/40/159	2482/37/118	464/22/72
OT5A	809/12/61	1123/22/83	1960/35/122	2894/40/155	1716/39/149	622/23/90
HG73DX	584/11/68	1257/20/89	1973/37/141	2235/38/143	2209/39/149	667/31/105

USA MULTI-OPERATOR MULTI-TRANSMITTER

N2RM	194/15/63	757/22/98	666/31/110	2033/39/159	1715/32/154	277/19/52
K3LR	147/12/40	904/24/91	499/34/100	2254/40/182	1406/33/153	189/20/44
W3LPL	170/13/52	695/22/93	527/29/104	1734/40/161	1398/32/151	245/18/49
K1KI	125/14/59	449/20/84	327/28/94	1664/38/153	1719/28/148	129/19/49
KY1H	134/14/47	604/19/83	393/31/94	2138/40/149	1210/31/138	279/18/47
N4ZC	50/14/35	256/21/81	400/31/97	1365/40/155	922/29/138	182/16/34

DX QRM

First time on 40 meters single band. Too much QRM. Big signal from 9M8R since 3 hours before my sunset. No zone 30?? . . . *PYØFM (Opr. PY5CC).* Great conditions. This activity from this new one gave me the emotion of my first contest . . . *IG9R (Opr. I4UFH).* I wanted to try 15 meters, but rotor died before the contest, so I was trying on this band full of "jam," and I am happy with the result . . . *OK1RI.* Conditions were very good most of the weekend for us. Our score was well up over last year's. Ten meters yielded some very nice multipliers, but no rate. We could hear the EA's running on Sunday, but could not hear what they were working. Highlight was working 9M8R when the whole of Europe seemed to be calling him . . . *EI7M.*

Missed JT1Z and FR5DX; both were worked locally. In part made up by catching XZ1A before most UK was even out of bed. KHØAM and FK boys also helped . . . *G3LZQ.* Many stations worked under 7040 kHz. Forty meters is short, but it is not a very good ham spirit to work like this . . . *F5PHW.* What a thrill to work Far East on top band with low power . . . *ON4AUC.* Poor propagation, low power, a vertical antenna, wind, rain, power-line static—but it was FUN! . . . *PY2EMT.* I know a lot of people called me, but the noise in North Africa is very high even with three Rx antennas! Thank you for calling . . . *IG9W (Opr. IV3SHF).* Very good propagation JA to world wide, but weary of QRM. QRP is hard! . . . *JA2JSF.* Unexpected conditions on 15 meters! My best score for this band ever . . . *UT4UZ.*

Surprised when I got HC8A on a CQ . . . *LY35FW.* We warmed the ionosphere, Hi! From my side the queen of the bands was 15 with good openings. Incredible knowing that we are the bottom of the well . . . *EA3EJI.* My vacation: sun, sea, and WW DX! . . . *SV5/IN3QBR.* This was a fun blend of newer and experienced contest operators. We operated from the QTH of N6VI. Ten and 15 meters were pleasant surprises; low bands were disappointing. Many Europeans would have zone 31 on lower bands if they had heard us through the closer-in QRM. We heard them very well . . . *WH6R.* Big typhoon attacked my new antenna system and crashed them down. But I could still enjoy 10 meters as usual . . . *JH6SQI.* Ten meters was better than expected. Another fun-making contest! . . . *DL1BFZ.*

First time running low power in the contest. I enjoy it . . . *V44NK.* This is the first time our club reached a million points. We set a new T9 record for the SSB part and will try to do better on CW. We like to play with keyers more than sing into a microphone . . . *T99MT.* This was my first contest—beautiful and fantastic! . . . *IK2YSA.* I was very surprised that TY1IJ called me on a CQ! . . . *JR9OPJ.* This was my first time in this contest and I enjoyed participating immensely . . . *VK4KSB.* This was my first contest . . . *LZ5QZ (age 13).* More fun than human beings should be allowed to have! . . . *WL7CMK.* CQ WW—four magic letters! . . . *YU5ØBO.* Contest was the best as always, but band was closed down more than 10 hours. Hope I gave a good chance operators to work VP2E . . . *VP2ENR (Opr. YU1NR).*

The going on 40 was very tough this year. I observed many stations operating very low in the band. This caused a great deal of friction on the air and after the contest. I think the time for everyone to cooperate is now if we do not want the situation to aggravate . . . *PAØMIR.* It's an adventure every year! The new callsign was lots of fun. Not being heard on the low bands wasn't! . . . *VE2QRZ (Opr. WB2K).* Came home from gall bladder operation one week before the contest! Decided to go single band 20 . . . *S59A.* This was my first WW contest. I tried to work most of the contest, but I lost my voice for about one week . . . *DL1RNH.* I hope everyone interested in working the IG9 mult on 40 meters. I will be on Lampedusa again next year. It's a good place for swimming, YL's, fishing, and working on antennas for CQ WW! . . . *IG9A (Opr. IT9GSF).*

First time all band in CQ WW. Awake for 48 hours. Amazingly, I didn't feel tired. All keyed up, I guess . . . *VE9ST.* Highpoint was breaking through the pile-up on VK6APZ as the sun came up—Zone 29 and my longest haul QSO! . . . *XE1/AA6RX.* My age is 25. I don't have to get married. I am "married" to CQ WW DX contest . . . *JHØFWV.* My favorite contest. Always great fun and pleasure to QRV. I was so surprised to be heard in pile-ups with 100 watts and my 5-el log-periodic homebrew antenna! Some strange propagation allowed a QSO with XZ1A over the South Pole, currently a very difficult path . . . *CE2EZE.* Monday morning at 7 AM my wife said, "Wake up, Vangelis." I replied, "CQ Contest!" . . . *SV2BFN.*

Had a great time, but my neighbors won't talk to me anymore! All my wire antennas were mysteriously torn down the next day! . . . *XM7GFS.* Have been on for 35 hours, and enjoyed every minute of it! . . . *PAØRCT.* Worked the contest from a hut without electricity. I used a 12 volt car battery. My rotator broke, so I had to turn the antenna by hand. The toilet didn't work; I had to use buckets to flush it! The temperature was 8C so had to heat by using gas, which ran out in a few hours. As a light I used candles to save energy for the transmitter . . . *DL4RCE.* It was very nice to QSO with XY1HT and XZ1A on SSB. I worked XZ1TH way back in 1961 on 14 MHz CW only, so this time I got XZ on several bands . . . *HL5AP.* I cannot recall hearing so many strong stations on 20 for the last 30 years. Incredible! . . . *OZ5KG.*

My first CQ WW test. Conditions were quite good, but where was Oceania? Thanks to all who pulled me out of the QRM. It was worse than a war! No clear fre-

quency from 14110 to 14350! . . . *VA3JK*. Seventy-nine years old and new to computers . . . *G6QQ (Always a pleasure to hear you on, Dave . . . ed.)*. Calling CQ on an apparently dead 28 MHz band and ending up with a mini-pile-up. Unfortunately, I had to leave it to catch my train to take the "chunnel" to London! . . . *F5NYK*. My first SSB contest. Bad propagation on 7 MHz here in North Russia. Never heard U.S. guys at all . . . *UA1OMS*. Almost everything was broken during the contest, but the most important thing: our team spirit! . . . *OT5L*. The hospitality of the HI hams was incredible! . . . *HI3/WA2VUY*.

Have now reached 85.5 years and have difficulties in a full contest. However, it is still fun . . . *DL3ME*. At first I only had the intention to test my new antenna system and work zones. It went well and finally I decided to do the contest. And it was fun again! . . . *DL8AAE*. The mini-expedition was discussed for several months and actually organized two days before the contest! We operated from the island of Anagada . . . *VP2VE*. How surprising it is to find always so much interest from operators after more than 20 years of participating in CQ WW SSB from HB9H . . . *HB9H*. I couldn't believe to create such a large pile-up on 160 meters with only 80 watts! . . . *VE2UMS*. I managed to be in the shack for 4.5 hours. And when someone said, "What a nice signal you have in Mississippi," I am quite happy about that remark . . . *PA3GKE*. Each year is more striking this contest, a sweet drug! . . . *EA5YG*. Have you ever heard a whole pile-up laughing? My station was asked, "What is your call?" My spontaneous answer was, "My wife calls me Mousy, but I do not what she will call me after the contest!" . . . *HP1XVH*. The evening after the contest, I found myself waking up out of a sound sleep yelling, "QRZ this is nine-kilowatt-two-yankee-yankee" . . . *9K2YY*. My second contest. Fun—a great way to work new countries . . . *LA2MJA*. My station is a little pistol, but it does not stop me from getting the same adrenaline flow as when I operated a world class MM at GB3MCG. Eighty meters rules! . . . *G3WGN*. Thirteen hours is a long time in a 10 foot car! But worth it! . . . *G3TVU/m*.

I am QRV from a small condominium. I built a fishing-rod antenna in my balcony. Please U.S.A. stations call CQ out of JA SSB band. Too much QRM. QSX 3747-3754 . . . *JE1SPY*. Selective propagation at times. Only by 20 JA's in log . . . *GW4BLE*. This is my first entry in CQ WW, and didn't expect making more than 100 QSOs. Finally it came to 400! Really enjoyed this contest . . . *JRØWZR*. Only Europe on 15 meters was to EA. Always fun to work the test from KH6 wearing shorts and shoes . . . *WR6R/KH6*. Power amp damaged on Friday by a lizard which was hunting mosquitoes in a dangerous zone . . . *3B8/F5PXQ*. Many tks to LU8AQE for the use of his station (/A means I was in Buenos Aires) . . . *LU2DW/A*. Nice snowstorm and temp at –20C. Many vodkas gave a special contest feeling . . . *EX2M*.

I never before used a linear amp, but it was a must, under present condx . . . *EA3ALV*. Seemed to be a lot of diodes in the paths, as many S9+ signals from Europe couldn't hear me . . . *HP3XUG*. I am very old! . . . *OH3NM (Always nice to hear you, Jouko . . . ed.)*. Tnx for the best contest in the world . . . *YC6PUP*. There is contest life in Africa, with plenty of juicy mults to work! Turn those 6/6 beams OUR way for a change and discover! . . . *9R1A (Opr. PA3DZN)*. In Denmark on 160 the General license allows you to work SSB in the segment 1810-1850 with only 10 watts. From 1996 full power can now be used . . . *OZ1AXG*. My first attempt to really work 80 meters. Had a great time, but it is not funny to chase cows to prevent antenna damage during a contest! . . . *LX1NO*.

STATION OPERATORS
Multi-Op Single Transmitter

4B9CQ: XE2CQ, XE1O. **4N7Z:** 4N7TA, Struhar, Lomen. **4UØITU:** OK1DF, OK1DIX, OK1FIA, OK1MM, OK1TN. **6D2X:** K5NU, K5TSQ, N5RZ, WB5VZL, XE2YNS, XE2XDX. **7S3GK:** SM3SGP, SM3OSM, SM3KOR. **8P9Z:** K3KG, K4FJ. **9A1CEI:** 9A4SD, 9A4DO, 9A6TCA, 9A4GR, Pernic, Grkovic. **9A6V:** 9A2YD, 9A3EO, 9A4DC, 9A6W. **9A7A:** 9A7V, 9A8A, 9A2ME, 9A3OS, 9A3TR, 9A4IC, 9A4PA, 9A4RX. **9K2HN &** IK2NCJ. **AA2FB &** K2QMF. **AA8U &** AA8AV, AA8FE, KA8AEE, K8MJZ, KD8B, KF8QE, KT8X, WA8VHQ, WB8ALP, WX3M. **AB4RU &** N9HZQ, AA4GA, AE6E. **AB5K &** AKØA, KCØEI, KØJN, KBØISS, AA2OX. **AB5YG:** KC5I, KA5GJU. **AB7BS &** KC7BNH. **AB7GM &** WØMHS/7. **AEØM &** NØBBS. **AK3Z &** K2PH. **BY4BHP:** BZ4DDI, BZ4DBY, BZ4DLI, BG4FJ, BZ4DCH, BG4ER. **C6AHU:** W7FKF, WJ8C. **CE8SFG &** XQ8ABF, CE8DGQ. **CG2CLM:** VE2CJZ, VE2GPS, VA2RO, VE2ZDR. **CG2KCB:** Club. **CK7U:** VE7WNA/YU4NW, VE7TTQ, VE7WRA/YU4RW, VE7CNV. **CT3BX &** DK1BT, DK7YY, DL1DSF, DL3DXX, DL7UTM. **CT8T:** CT1AOZ, CT1DVV, CT1ESV. **CT9M:** CT3BD, CT3BM, CT3DL, CT3IA.

DFØAT: SF6QN, DF6QV, DJ8CR, DL9NC. **DFØHQ:** DL1AUZ, DL3OI, DL5ANT, DL5AOM, DL5AXX, DL5LYM, DL5MX. **DFØRG:** DJ9XT, DE1ARW, DE1FRW. **DF3CB &** DL1SDN, DL5MFF. **DKØEE:** DL1MFL, DL4MCF, DL4MDO, DL4MEH. **DKØPR:** DL4XP, DL5XF, DL5XT. **DKØUB:** DJØMW, DL1EFD, DL1EFO, DL1EKA. **DLØARN:** DL6AXI, DGØODQ. **DLØBI:** DK1QH, DL5YEQ, DL8YFC, DL9YED. **DLØCE:** Mohamed, Martin, Daniel. **DL5XAT &** DL1XAQ. **DLØMBG:** DL8AYI, DL1AOB, DL8AKA. **DLØTD:** DG2FEF, DL1FDV, DL2ZBN, DL3NEK, DL8AAU. **DL4RDJ &** DL2NBU, DL6RAI. **EA1ACP &** EA1BFZ, EA1FEL. **EA1COZ &** EA1EAG. **EA1CW:** EA1FDO, EA1FEQ, EA1JP, EA1AAB, EA1CB, EA1DAX, EC1AMQ, EA1US. **EA1EEY &** EA1CS, EA1ALI, EA1CUB, EA1DZW, EC1ANF. **EA1FDG &** EA1FBU, EC1DIH. **EA3CWK &** EA3GFA, EA3AJW, EA3GEP, EA3GGO, EA3DJL, EA3BW, EC3DEG. **EA3RKG:** EA3BOW, EA3BOX, EA3DGQ, EA3EIO. **EA5BY &** EA5BXT, EA5CZ, EA5DG, EA5GJW, EA5GRV, EA5KW, EA5RS. **EA5HQ:** EA5KY, EA5ZI, EA5ABE, EA5AFH, EC5CPL, EC5AEB. **EA5SJ &** EA5WX, EA5EVC, EA5FYT. **EA5URD:** EA5DCL, EA5FCW, EA5FDA, EA5GMB, EA5VN, EB5IUF. **EA8RG &** DF8AE, DF8XC, DK3DM, DK5QN, DL1YDI, DL1YAW.

ED1WW: EA1WW, EA1EB, EA1BD, EA1YO, EA1EK,EA1ABT, EC1AIL. **ED2URP:** EA2ATU, EA2CIR, EA2CNH. **ED3TR:** EA3CT, EA3ANY, EA3KG, EA3GJH, EC3CVD, EC3CTR, EC3CIL. **ED8CLU:** EA2CLU, EA2BP. **ED9EA:** EA9AI, EA9AJ, EA9KB, EA9UG, EA7HDO, EA7TL, EA4BB, EA4FW, EA4KR, EA1AK. **EI7M:** EI7DNB, EI4HQ, EI8GS, EI9HC, EI5HB, EI6BT, EI3DP. **EN5J:** UU1JA, UU2JQ, UU2JX, UU2JZ, UU3JD, UU5JR, UUØJM, UUØJX, UB7-067-2. **ET3AA:** ET3A, ET3MW, ET3SID, ET3KV. **EU5ØUN:** EU1AZ, EU1TU, EW8MW, EU1UC, EW1WG, EU1DX. **EW4XA:** EU4EU, EU4ØØ1. **EX2M:** DK7ZT, DL8OBQ, DL4MFM. **F5BZB &** F5BSB. **F5PSG &** F2YT, F5TTI. **F6IFR &** F6HMQ. **F6KBF:** F5RAV, F5RRX, F5RWM, F6IBS, F1EZG, F1STV. **F6KCS:** F5JCB, F5PRH. **F6KLO:** F5SHG, F5RBB, FB1IPH, F1MCO, F1OKZ. **F6KUQ:** Club. **F8KCF:** F6BGC, F5DJL, F5BMI, F5IQA, F1UAM, F6BNH, F6FNL, F1BGO, F1AXB. **FG5BG &** JA9SSY, JF2DQJ, JH7PKU. **FK5DX:** FK8GM, FK8HC.

GØ/AA4V & N4SF. **GØNKL:** GØOFD, GØMPJ. **GØWAT/P &** GØDYW, GØNSH, GØSAH, G1LLW, G1GJK, G6PWS, G7PUE, G8AWO, G8LCO. **G3FJE:** G1JKF, G4LOO, GØBVW, G4VXT, G8EIK, GØWII, G7MTR, G4YRF, G3EUS, G4OXD, G8ATD. **G3OZF &** 5B4WN, G4DQW, GØHSD, G3XTT, G4JVG. **G4WPD &** G4TSH. **G4WWG &** G1SJD. **GB2AA:** G3GAF, G3UHU, G4PWA, G4TNB. **GB6AR:** G4XKR, VE6WQ. **GB8WW:** GØLUJ, G4ZVJ, GØUDT. **GU3HFN:** GU4WRP, GU4SXM, GU6EFB, GU3NHL, GU4EON. **GW3CSA:** GØKXL, GØIEQ, GØPZO, GØSTU, G1AOF, G3RTU, G4WSE. **GW8GT:** GW3NWS, GW3KYA, GW4JBQ, GW5NF, GW6ZUQ, GWØMAW, GWØPUH. **GXØWMR:** GØUZF, GØLRE, G7SSJ, G1AHM, G4WJR, GØUCS, G7NER, G7NPG, G7VOQ. **HBØ/HB9AON &** DF1JC, DL1EIJ, DL8DAW, DL8EAQ, HB9CRV, DJ2YE. **HB9AJ:** HB9IR, HB9JH, HB9OL, HB9SQ, HB9AQF, HB9BIR, HB9BWN, HB9CCT, HB9CJR, HB9COB, HB9COC, HB9CTU, HB9CZI, HB9KAM, HB9KAQ. **HB9H:** HB9CIP, HB9CXZ, HB9CAT, HB9BLQ, HB9DDO, HB9FAP, HB9DBH, HB9STL. **HB9OK:** HB9FAQ, HB9FBG, HB9AGC, HB9FBS, HB9CHN, HB9RNC, HB9OCR, HB9AJB, HB9MEC, HB9ALM, HB9AJM, HB9OAB, HB9ODD, HE9GYG.

HG5A: HA5IW, HA5OM, HA5MK, HA5ML, HA5WE, HA5FM, HA5UA, HA5AWH, HA5CQA, HG5CNC, HG5CCC. **HG5C:** HA1AG, HA5MA, HA5MO, HA5OG. **HG5M:** HA5MY, HA5WA, HA5EH, HA5BVD, HA5AWP, HA5BBC, HA5OF, HA1DRJ. **HG6Y:** HA6DX, HA6NG, HA6OB, HA6KNV, HA5BSW, HA6OI. **HP1XVH &** DL8RBR. **HS5ØA:** HS1CHB, HS2JFW/1, HS1JQP, HS1YRY, HS4DOR/1, E21CJN, E21HJZ. **HZ1AB:** K3DTU, N4LB, G7SLP. **II2K:** I2KHM, IK2UCK, IK2SGC, IK2SFZ, IK2GWH, IK2PFL, IK2ZJJ, I2GXS. **II2Z:** I2ZZZ, I2ACC, I2MWZ, I2PHN, IK2OWX, IK2PTR, IK2UEC, IK2VOS, IK2XZD, IK4MED, IK2PIH, IK2WBN, IK2YFR, IW2DOF, IW4BVH, IW4CTG. **IK2VOV &** others. **IK3STG &** IK3RIT, IK3NLK, IK3XNQ, IK3ZBQ, IK2IQR, IK2VTJ. **IO2L:** I2OKW, IK2IQD, IK2ULM, IK2MLV, IK2QEI, IK2YXM, IK2YXP, IK2YYE, IW2HAJ, IW2HPI, IW2INY, Diego. **IO5A:** I5OYY, I5NSR, I5JHW, IK5JAN, IK5NAW, IK5EKB, IK5PWC, IK5LWE, IK5CRH.

IQ2X: IK2GZU, IK2GSN, I2CZQ, IK2SAU, IK2EAD, IK2WAD, IK2FYH, IW2LLH. **IQ4A:** I4VEQ, I4IND, I4LCK, I4TJE, I4IKW, I4EAT, I4AVG, IK4DCT, IK4QJH, IK4EWK, IK4CZF, IK4XQH, IK4MGP. **IQ4T:** IK4HVR, I4IFL, I4MNY. **IQ7A:** IK7XIV, IK7JWX, IK7IMO. **IR1I:** IK1RGL, IK1XHU. **IR2W:** I2EOW, IK2EGL, IK2OHG, IK2PZC, IK4MTF, I2VXJ. **IR4J:** I4JEE + others. **IR5T:** IK5ORP, IK5SRF, IK5UIS, IK5ATM, IK5VYY, IK5WGK. **IT9EWG:** IT9KWF, IW9EKK. **IU4U:** I4AUM, I4FYF, I4GAD, I4GAS, I4VOS. **J3A:** J3K, J3X, J37K, J37L, J3I, V44KAO. **JAØYAK:** JHØUSD, JRØHYT, JK2PVL, JEØETP, Kozawa, 7M2UKR, JI7TDR, JM7SGO, JF1USQ. **JA1YAI:** JA1KFX, JJ1GHO, Arai, Makino, Nagashima, Takahashi, Tamai, Hishiyama, Kodama, Namiki. **JA1YKX:** JH4OWG, JQ1VNM, 7J1AQH, JO1VVT, JQ1PCT. **JA2YAF:** JA2JAO, JE2VWY, JF2RDM, JI2RFS, JL2VZJ, JM2MOW, JO2CKU, JO2HIV, JH3MUV, JM7JGI, JR9SVQ, JGØTOO. **JA2YKA:** JP2QNB, JS2ERL, JI4RDO, JL7JRO, KHØAZ. **JA2ZJR:** JA2SZQ, JH2CMI, JH2RRD, JL2ICO, JS2OYQ.

JA3YBF: JG3JHI, JF3HXJ, JL1PEI, JJ3BDG, JA9TOZ, JO3LDN. **JA7YFB:** JM1HBO, JL2OGZ, JF5LOE, JL7IQM, JM7DOV, Nobutaka. **JA7YRR:** JA7FDY, JA7JUD, JA7LBY, JA7OZW, JH7VHZ, JR7LVA, JJ1XGF. **JA8YBY:** JO1DFG, JR8GOU, JP1OQY, JI8UCI, JJ8HNJ. **JA9YAA:** 7N1RVN, JG2KKG, JI2KQJ, JN2QCV, JG5KTD, JL7LNE, JH9KVF. **JE6ZIH:** JR6GKT, JF1DHS, JF6DEA, JG4KEZ, JI6BRB. **JG2ZQZ:** JA2BY, JA2AXB, JA2BIV, JH2MYN, JI2KAR, JM2CCL, JO2BBC. **JH2ZUN:** JG2QMV, JI2KGI, JM2CQN, JE8KKX. **JR7YCM:** JH7NPF, JR7WFC. **K1NG &** KI1G, KD1NG, WF1B, WA1G, WA1IML. **K1RX &** KF1V. **K2AA:** WA2CVJ, KD2KS, KF2YX. **K2IBW &** W4YDD. **K2IGW &** KB5TZJ. **K2JD:** AA2FO, AA2XP, K1JUL, KF2XC, KB4VL, N2KKB, N2TUK. **K2OWE &** others. **K2TE &** K1HI. **K2TR &** K2XA, K5NA, NJ1F, NQ2D, YU1AO/W2. **K3CP &** KU3X, KU3K, K3YD. **K3DI &** W2EOS, KW4T, WD4IEH. **K3II &** N3BDA. **K3JLK &** N3UHZ. **K3MD &** N3NAV, N3PUR, N3NWN, KD3SF, AD8J, W9XR, W3GH.

K3MD & N3PUR, N3NAV, N3NWN, AD8J, W3GH, W9XR, KD3SF. **K3ZNV &** WD3A, KE3HO. **K4ISV &** WA4QQV, K9VV, K4UVH, N1GL, KB4DMI, WB4FLB, KB4HU. **K5LIB:** KJ5BX, KB5KYJ, KC5KQF, KC5OBX, KC5QKV, KC5QVM, KC5MVZ. **K6XQ/7 &** KI7WX. **K8JP/9 &** KS9O. **KA1DWX &** WA1TTE, G3IZQ/W1. **KB1H &** AA1CE, KZ1M, K1EBY, N1OPZ, NX1Q, WA1HYN, N1LYA. **KB4FAI &** KS4YT. **K8AZ &** K8BL, K8NZ, WT8C, W8KIC, N8LXS. **KB6HRB &** KC6UCN. **KC1XX &** KC1F, AD1C, K1EA. **KC4ZV &** KU4J, KA9EKJ. **KD1VQ &** KE1CN, N1UJV, KA1ZAK, N1TDM. **KE2JR &** KU2C, NU2W, KF5FK, N2UYV, KB2HZ. **KE6WEH &** N6WZR, KE6GHX, KD6QWU, N6XAC, KD6ZHC, KD6OKN, KA6QXX, Kimberly. **KF2ET &** KE2NL, KD2TT, KW2P, WB2DVK, KD2RD. **KG4ZE &** KG4CM, KG4MN, KG4SH. **KH6RS:** Club.

KG8CY & AA8UG. **KH6RS:** KI6CG, K6GSS. **KQ4HC &** KO4EW. **KQ4HC &** KO4EW. **KS9K &** WE9V, KA9FOX, WB9TIY, NB9C, K9PW, W9RN. **L3HP:** Club. **L3HP:** LU4HFE, LU7HTJ, LU5HCI, LU2HJA, LU7HXP, LU9HWC. **LA5M:** LA6MJA, LA7AJA, LA7CL, LA9VDA. **LP4H:** LU1HOO, LU9HIG, LU3HJJ, LU2HQI, LU6HVA, LU2HAM, LU9HPN, LU3HAK. **LR3H:** LU6HLH, LU9HUP, LU3HR, LU5HCM, LU7HWR. **LU1FZR &** LU2FBW, LU6FWN, AZ8FAG. **LU1HLH &** LU9HVR, LU6HPH. **LU1NF:** LU1NDC, LU8NAR, LU7NAO, LU7NN, LU4NAD. **LU1UM:** LU3UAT, LU7UAV, LU8UAR, LU8UAS. **LU1YY:** LU1YU, LU1YFC, LU2YAX, LU3YBI, LU3YAQ, LU6YAR, LU6YBK, LU7YAP, LU7YBM, LU8YAP, LU9YAQ, LU9VI. **LU8DZE:** LU6DTS, LU3DJD, LW4DYU, LW9ETY, LW7EIC, LW1DQK, LU5DU, LU6VOQ. **LV1V:** LU1VV, LU1VK, LU2VD, LU3VMS, LU4VZ, LU5VC, LU6DH, LU7DID, LU8VCC, LU9VY. **LX/DF1VH &** DL4VBS. **LY1DQ &** LY1DT, LY38HY, **LY3MR:** LY1FF, LY2BKF, LY3NFW.

LZ7G: LZ1NK, LZ3ND, LZ3GA. **LZ9A:** LZ1JY, LZ1NG, LZ1RB, LZ1ZX, LZ1JK, LZ2BE, LZ2CC, LZ2DF, LZ2HE, LZ2HM, LZ2II, LZ2JE, LZ2PO, LZ2PS, LZ2TT, LZ2UU, LZ2WF, LZ2WM, LZ2XA, LZ3DX, LZ3SM, LZ4UU, LZ5JE. **NØZA &** KØUK, KØCL. **N1KWF &** KD1GJ, WA1ZYX. **N1RDJ &** N1REK, N1STT. **N2MM &** WB2R, WN3K, W6TER. **N2NU &** WW2Y, K2WI, NZ4K, KU8E. **N2SS &** K3GYS. **N5HRG &** K9MK. **N7DF/KL7 &** WL7VT. **N7IXG &** N7VTB. **N7QQ &** N6NU, N6UEN. **N8ZSG &** Others. **N9LCR &** N9RUC. **NCØP &** KFØH, WRØG, WOØV, KZØC, WDØGVY, WAØETC, WAØFLS. **NF2L &** K2BU. **NIØS &** KGØWQ, NØTMY, KDØAY, KCØDQ. **NIØS &** KGØWQ, NØTMY, KDØAY, KCØZW. **NM3K &** N3IBH, WV3F. **NS2K &** WU3A, W2GD, KF2BH.

OE2S: OE1ETA, OE2CRM, OE2DYL, OE2EJN, OE2GEN, OE2LCM, OE2MON, OE2MRN, OE2SCM, OE2VEL. **OE3V:** OE3GBB, OE1NBW. **OE5T:** OE3GEA, OE5VVL, OE5VBL, OE5MKM, OE5OHO. **OE6Z:** OE6CLD, OE6MBG, OE6MMD, OE8KDK, OE8SKQ. **OH2HE &** OH2BVI, OH2IW, OH2JA, OH2JNX, OH2KDY, OH2KVH, OH2KXK, OH6DD, OH6KK, OH7BX, OH7JT, OH7MA. **OH3YLE:** OH1BV, OH2BLV, OH2OA, OH2VB, OH3UU. **OH7M:** OH6LNI, OH7KIR, OH7LTK, OH7MHL, OH7MS, OH7WV. **OH9AR &** OH9RJ. **OK1KZD:** OK1TO, OK1HWB, OK1VCB, OK1UQS, OK1UDN. **OK2KOD:** OK2BDI, OK2BGR, OK2BHM, OK2PID, OK2WAZ. **OK5W:** OK1AEZ, OK1WT, OK1WF, OK1CF, OK1TA, OK1JKT, OK1AOZ. **OL2A:** CLUB. **OL3A:** OK1AY, OK1CM, OK1DX, OK1MR. **OL5T:** OK1DNR, OK1MUJ, OK1AMM, OK1MKI, OK1NR, OK1TC. **OL6M:** OK2BJR, OK2PBV, OK2BMV, OK2BOB. **OM3A:** OM3DX, OM3GI, OM7RU, OM7ZZ, OM8AM, OM8AM, OM8DM, OM8FM, OMØWR. **OM3KHU:** OM3JS, OM3-ØØØ1. **OM3RDP:** OM6ACM, OM3-28173, OM3-Ø05Ø. **OM7M:** OM2KW, OM3PA, OM3PC, OM3EY, OM3TPV, OM3TPF, OM3TQM, OM5RW, OM5ZW, OM5NU, OM6KW, OK2BFN.

ON6AH & ON4LZ, ON4GO, ON5PV, ON6MH, ON6QR, ON6VL, ON7ZV. **ON6BR:** ON4AYL, ON4BCN, ON5RA, ON6OU, ON6JN, ON6ZR, ON7XN. **ON6RM:** ON4CN, ON4KFM, ON4KHG, ON5SV, ON6XN, ON6YV. **OT5K:** ON5SY, ON9CGB, ON4FE, ON4AVT, ON4AVA, ON5DI, ON4ON, ON4AFO, ON6IJ, ON8LW, ON4ADZ, ON6CX, ON4BDR, ONL4531, ON1DI, ON1CJB, ONL3908, ONL225Ø. **OT5L:** ON1AFN, ON4AEK, ON4AHF, ON4AKL, ON4BR, ON6JZ, ON6MP, ON6NL, ON6ZX, PAØMPM, ZD8GW, ONL-JAN. **OT5T:** ON4AFZ, ON5UK, ON4AAM, ON7LX, ON4UN, ON1CIK, ON1BEJ, ON4JO, ON1ACV, ON4JO, ON4EJ, ON4JV, ON4ZG, ON4ATV, ON4TJ, ON6SV, ON6JV, ON1BFJ, ON1CMN, ON1ACV, ON1AIL, ON1ARQ, ONL1860Ø5. **OT5V:** ON4AYM, ON4ALL, ON4BCP, KB2RRV, ON6KZ. **OZ5EDR:** OZ1ETA, OZ1IVA, OZ5ABD, OZ5LH, OZ6VG, OZ7AAQ. **OZ5W:** OZ1FTE, OZ1FTU, OZ1KRF.

PA3DWD & PA3AAV, PA3DCO, PAØCOR, PAØJMH, PE1LAU. **PA3FNE &** PA3FQK, PAØERA. **PI4CC:** PAØVHA, PA3ALK, PA3BAG, PA3BSQ, PA3ELV, PA3EPD, PA3FVW. **PI4ZLD:** PA3EOB, PA3GCU, NL8884. **PI5ØTUE:** PA3GFE, PA3GBU, PA3GBV, PE1OZG, PE1PCP, PE1PEB, PE1PRG. **PJ9T:** NADXC Club. **PT7CB:** PT7BL, PT7BZ, PT7NK, PT7WA, PT7WB. **PX9Z:** PY1NEZ, PY1NEW, PY1MN, PY1WCS. **R9MWS:** UA9MI, UA9MA, UA9MR. **RA3AWO:** UA3AB, RX3DCX, UN8IM, KF2QX, UA3AGW, Smirnov. **RKØAYZ:** UA4WAN, UAØACU. **RK3QWM:** RX3QAM, UA3-121-31Ø2, RW3QFP. **RK3RYY:** RX3RZ, RU3RQ, UA3-157-554. **RK9AWN:** RA9AA, RA9AX, RA9AEW, RA9ANR, UA9AU, UA9AR. **RK9YXI:** UA9YVM, RW9YW, UA9-Ø99-792. **RN4W:** RU4WJ, UA4WGU. **RU3A:** RA2AUM, RK3DT, RW3AH, RX3ACS, RZ3GE, UA6XGL, RV6HY. **RU4L:** UA4LL, RA4CVR/4, UA4-164-435, UA4-164-459, UA4-164-5Ø1. **RU6LWZ:** UA6LV, UA6NP, UR5IBG, RV6AJJ, RV6LMG, RV6LOB. **RW9OWW:** UA9OO, UA9-145-59Ø, UA9-145-592. **RZ1AWO:** UA1-169-14ØØ, UA1-169-1333, UA1-169-9ØØ. **RZ3Q:** RW3QC, RW3QO, UA3QDM. **RZ4AYT:** UA4AIY, UA4ALI, RA4AI, UA9COD. **RK2FWA:** UA2FB, UA2FBA, UA2FF, UA2FX, UA2FZ, RA2FA. **RZ6AXO:** RA6AX, RN6MM, RX6BA, RA6YY, UA6YN, **S57NW &** S56A. **SI3GM:** SM3CER, SM3DMP. **SK2KW:** SM2HWG, SM2ODB, SM2VHD, SM2NOG, SM2LIY. **SK7BQ:** SM7BHM, SM7FTG. **SMØBGM &** SMØATN. **SM4AIO &** SM4/YO9FVU. **SM5FQQ &** SM5CSS, SM5PPS, SM5IMO, SM5ACQ, SM5FUG. **SN6F:** SP6AZT, SP6DNS, SP6DLO, SP6ECA, SP6IXF. **SP3PLD:** SP3IBM, SP3HBF. **SP5YFC:** M. Osuch, SP5BNB. **SP6YFU:** SP6NVK, SP6OPE. **SP9KRT:** SP9DH, SP9ADU, SP9ZW, SP9HNB. **SP9ZKN:** SP9MQB, SQ98EB. **T99MT:** T9/OH6XY, T94EU, T94NE, T94NF, T94TF, T94TU, T95LIG, T95LUH, T95MBO, T95MJB. **TM1C:** F5LND, F6FVY, F6EPY, F5MZN, F5HRY, F6CTT, F5OQJ. **TM2F:** F5OHW, F5TCN. **TM2T:** F5PXT, F5SIH, F5ROP, F5PFP, F6JJX, F1SAA. **TM2Y:** F6BEE, F6ARC, F6FGZ, F5SNJ, GØJFX, F9IE. **TM8A:** F5SSG, F2VX, F5OZF, F5RXL, F6FYD, F6EXV. **TM8P:** F5PYI, F5NOD, F5UFX. **TO5M:** K9GS, N9AU, ND9O, W9OP. **UR4LWC:** UR4LSB, UR4LQA, UR4LTX, UR4LUG, UR4LRG, UR4LRQ, UR5LCV, US4LCL. **UR7IYU:** Club. **UT4UWC:** Mitsay, Bazilevich, Suk, Nakoakin, Bashinskiy, Rabcev, Gromovoy. **UT4UWL:** July Tereschenko, V. Melekestsev, V. Polyakov.

V31DX: N6YRU, AB6WM, KI6IM, WA9L. **V59T &** V51CM, V51BO. **VA3SK &** VA3MW, VA3WTO, VA3PC, VE3EKP, VA3RTW. **VE2CMH &** team. **VE2CUA:** VE2DUB, VE2HKI, VE2JNK, VE2ARW, VE2KXD. **VE2UMS:** VE2FAB, VE2WJW. **VE3RM &** VE3WRL. **VE3RRH &** VE3FNY. **VE5CB &** VE5TQ. **VE5TP &** VE5CPU, VE5SF, VE5DX, VE5RC, VE5ZG,

ASTRON CORPORATION
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Irvine, CA 92718
(714) 458-7277 • FAX (714) 458-0826

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

NEW

SWITCHING POWER SUPPLIES

	CONT.	ICS	WT. (LBS)
SS-25	20	25	4.2
SS-30	25	30	5.0

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)

SL SERIES

• LOW PROFILE POWER SUPPLY

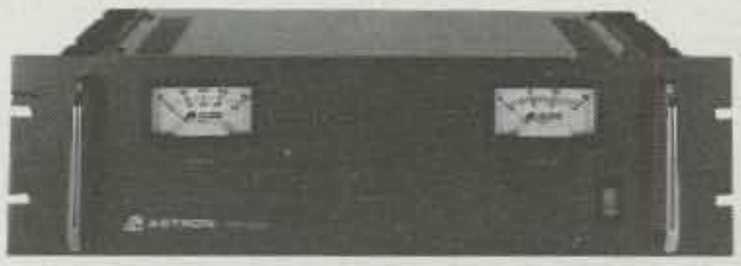
MODEL	Colors Gray	Colors Black	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H × W × D	Shipping Wt. [lbs]
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11R-MC		•	7	11	5¾ × 7¼ × 9¾	13
SL-11R-GE	•		7	11	5¾ × 7 × 9¾	13
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13
SL-11R-EFJ		•	7	11	5⅛ × 7¼ × 9¾	13
SL-11MG		•	7	11	5⅛ × 7 1/18 × 9¾	13
SL-15R	•	•	12	15	2⅝ × 7 × 9¾	13
SL-15R-GE	•		12	15	5⅛ × 7⅝ × 9¾	14
SL-15R-RA		•	12	15	4¾ × 7¼ × 9¾	14
SL-15R-EFJ		•	12	15	5⅛ × 7 1/18 × 9¾	14

RS-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

RM 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

RS-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-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

RS-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 × 1	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

VS-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
VS-70M	57	34	16	70	6 × 13¾ × 12½	48
• 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

*ICS - Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

VE5SJA. **VE6AO:** VE6AMR, VE6RTL, VE6NJK, VE6CIZ, VE6KLO, VE6RVW, VE6KC, VE6FXR, VE6TFM, VE6BIR, VE6RAJ, VE6HFW. **VE6JY &** VE5MX, VE6FR, VE6LDX, VE6BF, VE6BMR. **VE6SV &** VE6NAP, VO1CV. **VE6ZC &** VE6MSN. **VE7ZZZ:** VE7JMN, VE7SK, VE7RBL, VE7DBS, VE7TCP, VE7PTT, VE7VX, VE7EME, VE6PDQ. **VK1DX:** Canberra DX Club. **VK4MZ &** VK4EMM. **VO2WL:** AH9B, NØAFW, KDØXK, WAØPUJ. **VP2VE &** VE2CJX/VP2V, WP2O/VP2V, NP2L/VP2V. **VP5S:** KC4FWS, N4KE, NU4Y, W3ZNB, WB4EYX, WB4KSP, WB4MAI, WR4K. **VP5WW:** AB4OM, KB4QKP, KF4WW, KY4Q, KØLUZ, N4WW, NX4N. **VS6WO &** 9V1YC, VR2GO, VR2NR. **WØOF &** NØLNO, KØVM, AAØWO, N6WLY, NØUFZ.

W1FJ & K1JKS, W1KM, K1XM, NB1B. **W1FY:** N1LOO, W1EQW, KA1USL, N1ECI, N1DCT, WA1KUG, KA1JIR, N1UWJ, KA1ALT, N1SKS, N1MQG, KC1YR, K1AZE, N1TYF, WA1R, KA1HIA, KD1BF, KE6DPL, WR1P, AA1IZ, W1NXC, KE1BG, N1VYL, K1LOG, N1SHF, KA1HGL, N1TIM, N1JFO, N1VYF, AA1KY, N1UVA. **W2AX/1 &** VE1XT, VE1AL, N2FF, K2LE, NA2M, N2UN, K2SX. **W2CRS/Ø &** NØLRJ. **W2RR:** KB2NMV, N2QLT, W2KKZ, W2WVC, WA2AOG, WB2ABD. **W3GNO &** WA3WJD, WR3Z, AA6DC, W3GOH. **W4NC:** KG5LH, NØKTY, WB4KQN, KD4VED, KC4VIY, KD4RGB, N4VHK. **W4PRO &** WDØCNQ, KO4MR. **W4TMN &** W3WFF, KA3VGF. **W5HTK &** N5HEL, N5FF, KA7GLA, N5LWT, KAØRNY, KB5QXJ. **W5UW:** K5AAD, N5UOC, KG5OW, WA5POK. **W6EEN &** K6XC, KA6SAR. **W6YRA:** KC6LDO, KD6IKE, KE6RCR, WA6AYI, KU6T. **W9JZ:** K9IMM, N9CHN, WB9NOV, KE9ET, KE9AF, KE9XN, K9KVA, NO9M. **W9UI &** N9AG. **W9YB:** AD4OS, KE4USA.

WA2C & N2GMA, K2TZF. **WA6TKV &** KD6KKP. **WA7IIM &** W7TWL, WA7OEM. **WB2UFO &** KB9BAL, KC7EUP. **WS7E &** UAØSJ. **WT3Q &** KC3NE, NC3C, NU3Y, KA3PLS. **WV1M &** WS1Y. **XL2MCZ &** VE2QK, VE2LJP. **XL2MCZ:** VE2MCZ, VE2QK, VE2LJP. **XM7GFS:** VE7GFC, VE7GFS, Palmer, Langeler. **XY1HT:** 9M2BZ, JA8RUZ, LA7JO, G3NOM. **YT9N:** YU7BW, 4N7ZZ, YU7LM, YU7CM. **YU1AAV:** Nenad, Zoky, Zika, Sasa, Slavko. **YU7AL:** Ivan, Goram, Al. **ZC4DX:** GØBQV, GØMRF, GØOHW, GØONA, GØPZA, GØRHB, ZC4AB, ZC4OS, ZC4ZLB. **ZF2DX:** K1KNQ, KJ4WC, K7LXC. **ZM2K:** ZL2BHS, ZL2AGY, ZL2BSJ, ZL2IR, ZL2DX. **ZPØR:** ZP5XF, ZP5AZL, ZP5XYE. **ZP5WYV &** ZP5ALI, ZP5CGL, ZP5DX, ZP5YW. **ZS4K &** ZS4Q, ZS6BRZ. **ZS5NK:** Pogieter, Hubbard. **ZS6SA &** ZS6YA.

STATION OPERATORS
Multi-Op Multi-Transmitter

9A1A: 9A2B, 9A2R, 9A2DQ, 9A2EU, 9A3GW, 9A3NR, 9A5W, 9A6D, 9A7R, 9A9AA, 9A9A, S58KW. **9A5D:** 9A2FK, 9A2TL, 9A3AM, 9A3DU, 9A3ID, 9A3VM, 9A4CB, 9A4CJ, 9A6TBA, 9A6TBB, 9A6TBC, Duro, M Tomi. **AA2Z &** K1ZZ. **DF3QG &** DJ1FC. **DK5EZ &** DK4TP, DL9JT, DL3EBX, DL6EAQ, DL4EBA. **EA2AU &** EA2AM, EA2AW, EA2BSJ, EA2CGA, EA2AFY. **ED4RCT:** EA4ABB, Munoz, Ruiz, Vargas, Gala, EC4DFP, Fernandez, EA4ELS, FE5OCE, Rivera, EC4DFP, EA1DOF, Rathmann. **ED6IB:** EA3AAY, EA3BKS, EA3CKX, EA3CUQ, EA3EZD, EA3UJ, EA6AAX, EA6ADT, EA6FB, EA6FO, EA6PZ, EA6QB, EA6SE, EC6PJ. **ED7ESH:** EA7ESH, EA7BJV, EA7AIM, EC7ADD. **EM2I:** UT2IA, UT2ID, UT2II, UT2IJ, UT2IM, UT2IN, UT2IO, UT2IS, UT2IV, UT2IW, UT2IY, UT2IZ, US2IR, US8IM, UR3IPP. **EM7Q:** UY5ZZ, UR5QN, UR9QQ, US5QRW, UT2QT, UR3QT.

GØKPW: G4BAH, G3VHB, G4BUO, G4PIQ, G4BWP, G4VMM, G3NLY, G3LNS, K1XX, G3NKC, GØWCW, G7ABQ, G4CBQ, GØKRL, GØAFH, GØHSS, G4BBU, G4SWX, G4WFR, S5ØK. **GM4DMZ:** GM3WOJ, GM4AFF, GM4BAP, GM4TXX, GM4YXI. **HG73DX:** HA1AH, HA1AR, HA1AV, HA1DAC, HA1DAE, HA1TJ, HA2RX, HA2VR, HA6ND, HA6NF, HA6NL, HA6NY, HA6OQ. **HI3/WA2VUY &** NO2R. **HKØ/KH8AL &** W7TSQ, JH1NBN, JI3ERV. **JA1YDU:** JHØNZN, JF7TFK, JRØJFM, JK3GAD, JJ2QEH, 7L1DGK, JL2IUW. **JA3YKC:** JP2BZE, JH3RHQ, JO3UGI, JM3FVL, JP3PZD, JG4LSR, JL4CVB, JE5DTS, JL6BMJ, JP6RBN, JE9GMX, Fukuda. **JA3ZOH:** JH3DPB, JH3PRR, JG3JEW, JG3KIV, JG3MRT, JI3OPA, JM3XKG, JH4IFF, JH4NMT, JF4FUF, K6UMB. **JH5ZJS:** JA5BJC, JA5JCC, JH5RXS, JR5VHU, JR5PDX. **JK1ZHH:** JR1BTG, JE1HXZ, 7K2LMR, 7M2MKP, JA7SYG.

JR1ZTT: JN1MSO, JR1LWQ, 7M3ERJ, 7K4LBD, JK2FGD, JG3AXP, JJ3PKB, JG5JYL, JA9VDA, JEØBKI, JFØMQX, JRØUUU, JRØXHL, Akiko, Megumi, Matsumoto, Nakamoto. **JT1Z:** JT1BL, JT1CS, K6MC, N6AA, N6TW, N6ZZ, W6MKB, W6XD. **K1KI &** K1CC, K1RM, K1TO, KB1GW, KC1SJ, KF2FB, W1OD, W1RM. **K1SSN:** WB7Q, K1LL, KG8NX. **K3ANS &** WF3H, N2BIM, N3RCA, N2KJM, AA3JU, N3JGX, N2TTP, I1RBJ. **K3LR &** N3BJ, KG8GO, NØBSH, WA8YVR, WD8IXE, WX9E, K8CX, WR3G, ND8L, WR3D. **K5VI &** W6CCP, W6UQF, KD6AZK. **K7FR &** K7PK, W7WMO, N7AUV, KA7EKL, WB7UPU. **K7FR &** W7WMO, K7PK, KA7EKL, WB7UPU, N7AUV. **KBØWY &** others. **SP2PIK:** SP2WKB, SP2UKT, SQ2CFH, SP2RIU. **KG8CW &** KB8ECG, KG8CO, KB8YFT, K8AQM, KG8EF, NU8Z. **KHØAM:** JE1CKA, AHØK, KHØBA, JA1WSX, JF1MIA, JR1EFG, JH1GTV, JE2JCV, JE2PCY, JA6VZB. **KO6IG &** others. **KY1H &** KB2HUN, WR1X, N1NQD, KA1NCN, AA1ND, KM1P, WR2I, K1MBO, KB2UCV, WM1K, WK1O, RX3QA, KA2WEI, WB2KDD, WA1ZAM, NT2X.

L3HL: AZ3HAE, LU3HL. **LA1R:** LA4EU, LA3EDA, LA5ZJA, LA3SJA, LA4GIA. **LU4FM:** LU1FMS, LU1FOW, LW1EYW, LU2FYU, LU4FPZ, LU5FAO, LU5FYV, LU6FHL, LU6FVK, LU7DP, LU7DW, LU8FFU, LU8FVS, LU9FDG, LU9FIM, LU9FIO, AZ8FAD. **LX/DL4OCL &** DL3OBU, DL6OBX, DL8OBC. **LY35ZO:** LY1EE, LY1DF, LY2AO, LY2BMX, LY2BUE, LY2KZ, LY2NK, LY2UF, LY3BLF, LY3DA, LY3DQ, LY4AA, LYR346, Toleikis. **LZ7M:** Drago, LZ3FN, LZ4AX, LZ5VK, RVØAM. **NØUEI &** KEØMF, KBØNUY. **N2RM &** N2NT, WM2H, KZ2S, K2TW, N2AA, K3UA, W2RQ, N2BCC, KE2PF, W2GMA. **N3RS &** KY2T, WN3K, KE3GA, N3RD. **N4ZC &** K2SD, KB2LH, WZ3Q, AA4SQ, AA4ZZ, K4MQG, KE4EW, KI4HN, KU4V, WA4UNZ, WD4BTF, WB5M, W5VWN, AAØME. **N6AW &** W6BA, NF6H, W6HT, KJ6GC, KC6CNV, K7JYE. **NE3F &** KS3F, NT3V, K3ATO, N3JLL, AA3AO. **NK7U &** KG6LF, WA6QQF, KE6HKP, W7ZRC.

OH3NE: OH1HS, OH1KAG, OH2AWX, OH3FM, OH3KCB, OH3LQK, OH3MFP, OH3MMH, OH3NHF. **OK1KIR:** OK1PG, OK1PN, OK1AKF, OK1AWH, OK1IMC, OK1IPN, OK1FJB. **OK1OKE:** OK1DUT, OK1FUT, OK1VBA. **OT5A:** DJ4AX, DL3EBM, OM3TJW, ON1ACN, ON1AEI, ON1AFF, ON1APN, ON1ARZ, ON1AWB, ON1CIM, ON1CKE, ON1GL, ON2AIC, ON2AIM, ON4ACA, ON4AID, ON4AJW, ON4AKH, ON4AME, ON4AML, ON4AMX, ON4ASB, ON4AUC, ON4AVM, ON4AWH, ON4AWU, ON4AWV, ON4BAG, ON4BBF, ON4BBL, ON4BCB, ON4BI, ON4CAS, ON4DB, ON4MA, ON4MV, ON5CD, ON5DH, ON5GO, ON5OT, ON5UM, ON5WL, ON5YI, ON6HP, ON6HZ, ON6ML, ON6MR, ON6OW, ON6PU, ON7DU, ON7HU, ON7NB, ON7TK, ON7YZ, ON9CFB, ON9CGR, ONL2309, ONL4335, ONL6975, ONL9536, PA3EBT, PA3EZL, PA3GEO, PA3GOJ, PE1AYX, SWL NL-Johan.

PA6V: Club. **PI4COM:** PA3ALP, PA3BBP, PA3CAL, PA3DMH, PA3ERC, PA3EWP, PA3FDO, PA3FQA, PA3GBQ, PBØAIC, PBØAOE, IK4SXJ. **PJ9B:** WA3LRO, N3ED, K1DG, K3EST, WN4KKN, K2SB, W3UM. **S56M &** S57NLV. **TK2C:** TK5EP, TK5MH, TK5NN, DF4RD, DF7RX, DK2OY, DK6WL. **V26B:** WT3Q, N3BNA, AB2E, KA2AEV, K3MQH, KF3P, N3ADL, WA2UDT, KR2J, WB2P. **VA9DH &** AG9A, K2NJ, NR2H, VE2ZP, VE9BM, VE9DX, VE9GJ, VE9MY, VE9WH, W9NGA, WX3N. **VE5RI:** VE5FF, VE5FN, VE5HWK, VE5SDD, VE5WI, VE6BBP, VE6BDP, VE6EZ. **VG6FI:** VE6LB, VE6NA, VE6BIC, VE6AQ, VE6ARA, VE6GL. **VP5T:** N2VW, WB2YOF, KE2OP. **VY2CR:** VY2GJ, VY2RB, VY2SA, VY2GWM, VY2JG, VY2ROB. **WØAIH/9 &** KØFVF, NØAXL, AAØVQ, AIØY, AA9D, AA9OC, K9MA, WB9EEA, G3NAQ.

W3LPL & K1RZ, WR3E, KC3EK, ND3F, KZ3H, N3KTV, N3ORY, K3RA, K3RV, W3ZZ, W4DR, N5OKR, WA6GVC. **W3MM &** W3FV, KF3B. **W4IY:** KA4RRU, N4DXS, KJ4VG, WD4KXB, WB4RDV, KC4ZHQ, WB4NFS, WB4RMJ, KO4FM, KT4AD, K7SV, KQ4VN, KQ4XJ, AC4XT, KE4SJR, K8MLM, AA3KX, Martha, Debbie. **W4MYA &** WA4DAI, KD4JXY, AD4TS, AD4TU, KS4RX, KC4AUF, WU4G, WK4Y, AC4OB, KB4DI, AD4KE, KI4GM, Vicky. **WH6R &** AH6IO, KH6HKL, KH6IFN, KL7BV, N6DLU, N6IC, N6VI, NH6XO, NH6YK, NY6Y, WB6OKK. **WH6R &** AH6IO, KH6HKL, KH6IFN, KL7BV, N6DLU, N6IC, N6VI, NH6XO, NH6YK, NY6Y, WB6OKK. **XE2DV &** XE2DU, AI7B, N7WEW, KN6DW. **XZ1A:** JA1BK, K5FUV, N7NG, OH2BH. **YT9W:** YU1ZZ, YU1JW, YU1YV, YU1RA, YT1WA, YU1AC, YT1MA, YT1PZ, YU1FX, YU1EW, YU1CL, YU6AR, Vel, YT1BB, YU1EA, YU1QW, YU4AV, YZ1AU, YZ1KW, YT1EA, YZ1EB. **YV3AJ:** YV3CFE, YV3EHD, YV3FIX, YV3BXH, YV5MMA/3, YV3EDO, YV3BKC. **YZ6G:** YU6DD, YU6ORK, YU6ZIM, YU6GAS.

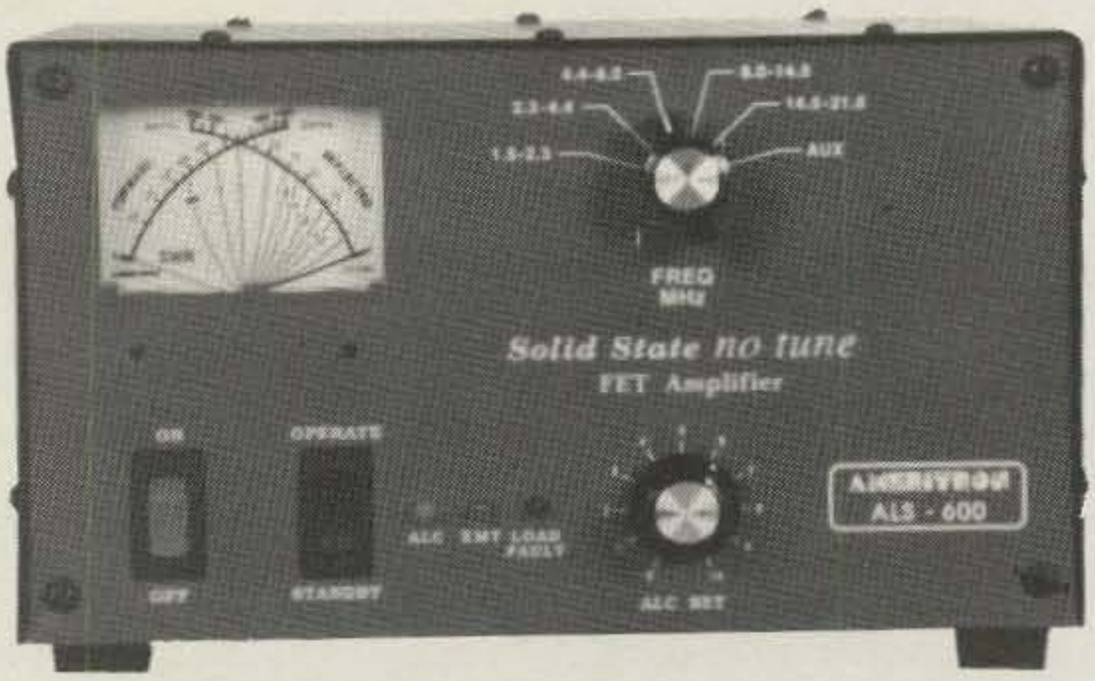
Ameritron *no tune* Solid State FET Amplifier

No tuning, no fuss, no worries -- just turn on and operate . . . Incredibly low $1299 includes AC power supply, 600 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no warm up, no tubes to baby, fully SWR protected, extremely quiet, very compact

- **Ameritron's** *revolutionary* ALS-600 is amateur radio's *only* linear amplifier that uses four rugged TMOS RF power FETs -- gives unequaled *no tune* solid state performance
- **$1299 includes** Ameritron's *no tune* FET Amplifier *and* a 120/220 VAC, 50/60 Hz AC power supply for home operation

ALS-600
$1299
Suggested Retail
(*Includes* AC Power Supply)

- **Instant bandswitching, no tuning, no warm up** -- just turn on and operate
- **Output Power** -- 600 Watts PEP, 500 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **SWR Protection** -- prevents amplifier damage if you switch to wrong band, use wrong antenna or have high SWR
- **Over Power Protection** -- if output forward power or reflected power exceeds safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to exciter
- **Extremely quiet** -- low speed, low volume fan is so quiet you'll hardly know it's there, unlike noisy blowers used in other amps
- **Very Compact** -- 6 x 9½x12 inch amplifier takes up less desktop space than your transceiver and weighs about the same -- only 12½ pounds
- **Illuminated Cross-Needle SWR/Wattmeter** -- lets you read SWR, forward and reflected *peak* power simultaneously
- **Operate/Standby Switch** -- lets you run "barefoot", but you can instantly switch to full power if you need it
- **Front Panel ALC Control** -- *exclusive* Ameritron feature -- convenient front panel control lets you adjust your output power
- **Transmit, ALC, SWR LED indicators** -- keeps you informed
- **12 VDC output jack** -- lets you power low current accessories
- **Separate** ALS-600PS power supply (included) can be placed conveniently out of the way and plugged into your nearest 120 VAC outlet -- no special wiring needed
- **Made in USA**
- **Enjoy** 600 Watts of *no tune* solid state power. Call your favorite dealer for your best price and order your ALS-600 with power supply today



ALS-600PS Heavy Duty Power Supply

ALS-600PS power supply included with ALS-600 amplifier

- **Massive choke input filter** greatly improves voltage regulation and reduces peak AC line current
- **Ameritron's** exclusive *Multi-Voltage Power Transformer* lets you compensate for stressful high line voltage and performance robbing low line voltage
- ***Step-Start Inrush Protection***™ stops damaging inrush currents and extends life of power supply components
- **Illuminated** Cross-Needle Meter monitors voltage and current of 50 VDC line
- **Extremely** quiet fan
- **Very compact** 6 x 9 ½ x12 inches -- can be placed conveniently out-of-way
- **Wired for 120 VAC,** supplies 50 VDC at 25 amps to ALS-600 amplifier
- **Also** use on 100-130 VAC and 220-250 VAC, 50/60 Hz
- **Draws** less than 12 amps at 100 VAC and less than 6 amps at 230 VAC
- **Includes prewired cable** to plug into ALS-600 amplifier
- **Made in USA**

Ameritron Mobile *no tune* Solid State Amplifier

Ideal mobile amplifier -- ***uses 13.8 VDC mobile electrical system, very compact 3½x9x15 inches, extremely quiet, 500 Watts output, continuous 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, SWR protected***

ALS-500M
$799
Suggested Retail

- **Mobile *no tune* Solid State Amplifer** -- uses four rugged 2SC2879 high power linear RF power transistors
- **Instant bandswitching, no tuning, no warm up --** just turn on and operate -- makes mobile QSOs safer
- **Very Compact** -- just 3½x9x15 inches -- fits in nearly any mobile installation; weighs only 7 pounds, that's less than some mobile HF transceivers
- **Extremely quiet** --quiet low speed, low volume fan stays off and silent until temperature rises
- **Output Power** -- 500 Watts PEP, 400 Watts CW
- **Continuous Coverage** -- 1.5 to 22 MHz; 10/12 Meters with easy-to-install optional kit, $29.95 plus s/h
- **Load Fault Protection** -- disables and bypasses amplifier if antenna has excessively high reflected power or if bandswitch is set lower than exciter frequency -- virtually eliminates damage because of operating error; has Load Fault LED indicator
- **Thermal Overload Protection** -- disables and bypasses amplifier if temperature is excessively high; automatically resets when temperature drops to safe level; has Thermal Overload LED indicator
- **Excellent harmonic suppression** -- multiple section output network and push-pull output circuit gives excellent harmonic suppression
- **DC current meter** lets you monitor collector current
- **ON/OFF Switch**-- bypasses amplifier for "barefoot" operation without having to disconnect high current power supply cables
- **Remote ON/OFF Control** -- lets you remotely control ON/OFF function for out-of-the-way mounting of amplifier
- **Exciter Drive** -- less than 100 watts input gives full output
- **Power Supply Requirements** -- requires 13.8 VDC at 80 amperes peak current for PA transistors and separate line for 12-15 VDC at 4 amperes for control and bias circuits
- **Made in USA**
- **Call you favorite dealer** for your best price and order your ALS-500M today

Exact power output of amplifiers may vary on each band.

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CIRCLE 142 ON READER SERVICE CARD

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. An asterisk (*) before a call indicates low power. Certificate winners are listed in boldface. (All country terminology reflects the DXCC list at the time of the 1995 contest.)

SSB RESULTS
SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K1AR	**A**	**6,147,537**	**3523**	**134**	**465**
K5ZD/1	**"**	**5,480,608**	**3308**	**122**	**447**
KM3T/1	**"**	**3,906,468**	**2785**	**100**	**378**
N6BV/1	**"**	**3,673,944**	**2725**	**100**	**366**
W2SC/1	**"**	**3,199,089**	**2258**	**112**	**387**
AA1ON	"	1,320,660	1360	88	260
W1WEF	"	1,007,112	1051	88	260
AK1N	"	855,376	786	88	298
KV1W	"	724,449	817	82	237
W1KRS	"	591,888	684	73	231
K1EFI	"	486,624	631	61	213
N1OEK	"	347,300	551	53	177
K1YDG	"	300,440	426	70	189
W1OP	"	270,840	398	67	177
			(Opr. K1PLX)		
K1BV	"	237,636	504	36	128
K1DS	"	102,560	244	48	112
K1TN	"	64,192	172	39	97
K1VV	"	45,810	179	25	65
K1CLN	"	38,480	133	27	77
AA1LU	"	28,686	146	17	54
KQ1F	"	7,224	52	23	33
K1DX	"	2,553	29	16	21
KA1GTR	**21**	**130,268**	**394**	**25**	**91**
KM1H	**14**	**1,093,932**	**2008**	**40**	**149**
			(Opr. KQ2M)		
K2SS/1	**"**	**952,408**	**2020**	**34**	**129**
KS1L	"	732,685	1534	36	127
W1ZK	"	219,888	537	33	111
K1DWQ	"	138,852	382	30	96
N1VAP	"	6,096	42	11	37
AE1D	"	1,188	22	2	16
KO1F	**3.7**	**135,892**	**478**	**23**	**83**
AD1G	**"**	**81,270**	**307**	**21**	**83**
N1AC	"	29,970	151	17	57
K1ZM	**1.8**	**55,420**	**215**	**15**	**70**
***WS1A**	**A**	**592,353**	**728**	**74**	**237**
***KD1TM**	**"**	**337,930**	**528**	**61**	**174**
*KG1D	"	310,503	449	67	182
*K8JLF/1	"	220,176	402	54	144
*AA1EY	"	218,380	350	64	180
*KD1SG	"	148,512	343	42	114
*NM1W	"	99,840	227	42	114
*NM1O	"	14,950	81	17	48
*N1LJA	"	14,469	149	28	67
*KA1ALT	"	12,688	76	20	41
*N1OFO	"	810	18	8	7
***KB1KM**	**21**	**124,540**	**339**	**25**	**105**
***K1VSJ**	**"**	**117,294**	**368**	**25**	**88**
*WØMHK/1	"	96,142	319	22	84
*WB1HBB	"	88,192	241	26	102
*K2MN/1	"	3,360	40	5	23
***KD1YN**	**14**	**104,170**	**340**	**27**	**83**
*W1WMH	7	88	4	4	4
***W1MK**	**3.7**	**8,112**	**74**	**13**	**35**
N2LT	**A**	**2,985,423**	**2148**	**113**	**370**
W6XR/2	**"**	**2,065,944**	**1591**	**113**	**359**
KE2C	**"**	**1,761,858**	**1316**	**121**	**353**
			(Opr. N2AU)		
K2DM	"	1,694,540	1381	99	340
WA2ASM	"	680,385	754	83	252
N2MR	"	656,013	735	73	250
K4KFH/2	"	548,856	130	21	72
KB2SE	"	473,214	631	69	197
K2MP	"	400,780	503	78	212
AJ3K/2	"	295,864	440	71	177
WB2ZTH	"	256,522	367	71	180
N2AUK	"	256,444	385	57	187
K3JGJ/2	"	246,980	418	56	156
AA2VZ	"	182,928	332	59	147
WR2V	"	178,772	350	52	135
AA2IX	"	153,657	299	52	137
WA2ABN	"	124,763	253	49	130
K2FL	"	112,395	302	33	94
WB2AYQ	"	75,696	199	46	106
WB2YQH	"	73,970	200	33	97
KX2A/3	"	61,300	220	24	76
W2OMV	"	52,644	194	27	80
W2PAU	"	42,812	114	42	112
AA2VN	"	34,428	123	40	74
AE2T	"	32,307	129	27	62
WJ2O	"	22,989	103	23	56
AA2UA	"	20,381	90	27	62
N2VPN	"	19,505	87	22	61
K2GKM	"	14,910	76	22	49
KA2KFO	"	8,840	50	20	45
KF2YP	"	8,568	71	20	36
KA2YKN	"	5,207	69	12	29
W2EZ	"	1,820	27	10	16
N2KA	"	700	13	8	12
K2PS	28	1,008	21	10	14
KE2VB	**21**	**207,757**	**601**	**23**	**98**
KF2YX	"	1,040	19	5	15
N2PP	**14**	**528,825**	**1133**	**37**	**128**
K2MGA	**"**	**116,235**	**340**	**30**	**92**
W2HG	"	38,592	146	23	73
NI2C	**7**	**44,700**	**164**	**24**	**76**
KZ2I	"	19,182	103	15	54
AA2LC	**3.7**	**29,082**	**171**	**14**	**60**
AA7QZ/2	"	7,248	63	11	37
W2VO	**1.8**	**10,962**	**76**	**14**	**49**
***KR2Q**	**A**	**1,158,288**	**1034**	**101**	**308**
***K2AZ**	**"**	**600,626**	**651**	**84**	**254**
*N2INN	"	369,852	514	69	190
*NA2Q	"	309,620	498	61	165
*N2PEB	"	300,184	456	70	169
*NA2A	"	243,072	405	53	158
*KB2QWO	"	235,004	414	47	149
*K2UF	"	227,164	345	72	172
*W2KHQ	"	195,408	379	45	132
*KG2BN	"	189,024	377	46	133
*N2PKN	"	157,149	327	40	131
*AA2SZ	"	152,325	260	59	166
*NY2Z	"	123,012	256	64	137
*AA2GS	"	94,357	226	45	112
*K3FNW/2	"	80,642	474	61	125
*AA2TB	"	77,701	215	37	102
*N2LSK	"	75,755	203	38	101
*KM2L	"	65,879	206	30	83
*N2LEB	"	62,928	153	47	97
*WA2RZJ	"	62,832	223	27	75
*N2RMZ	"	41,088	145	30	77
*AA2TM	"	24,750	125	19	47
*W2FGY	"	22,869	94	32	67
*KB4VL/2	"	22,320	111	18	54
*N2NYR	"	17,264	80	32	51
*N2LQQ	"	16,080	82	28	52
*N2LDV	"	14,896	90	17	39
*K2HPJ	"	11,385	80	24	45
*WB2JFP	"	9,520	65	18	38
*KF2YP	"	8,568	71	20	36
*KF2C	"	8,460	141	19	41
*N2YXC	"	8,080	65	15	37
*W2LRO	"	4,185	58	19	26
*KG2CS	"	4,122	111	21	28
*KF2ZW	"	3,354	34	16	23
*K2SWZ	"	3,154	37	14	24
*WA2CNV	"	3,120	30	15	25
*K2DB	"	3,024	38	14	22
*KB2THF	"	2,100	27	11	17
*WA2YBI	"	1,174	30	15	19
*N2QWR	28	2,938	42	10	16
*N2DEM	"	1,026	20	6	13
***WA2QNW**	**21**	**258,100**	**659**	**26**	**119**
*WAØKIR/2	"	3,990	40	12	26
***K2MFY**	**14**	**142,621**	**419**	**19**	**100**
*K2BOW	"	65,472	350	23	70
*KB2RAS	"	45,069	192	22	61
*WA2FVL	"	20,723	142	23	50
***WA2ASQ**	**3.7**	**3,572**	**46**	**10**	**26**
***KA2CDJ**	**1.8**	**1,104**	**22**	**8**	**15**
AA1K/3	**A**	**3,335,400**	**2323**	**118**	**392**
K3ZO	**"**	**2,834,496**	**2220**	**102**	**346**
W3BGN	**"**	**2,757,456**	**1983**	**119**	**372**
K3TEJ	"	914,148	868	87	292
KC3MR	"	558,764	600	56	180
K3OO	"	504,450	765	50	175
N3MLV	"	494,125	632	80	215
K3IXD	"	374,070	419	85	252
K3JT	"	367,794	475	89	205
N3JCL	"	328,929	479	67	182
WK3H	"	252,225	409	60	165
AI3Q	"	217,864	348	64	162
K3ATO	"	202,176	318	71	163
AD3Z	"	200,521	300	60	179
WA3NNA	"	196,872	239	78	234
KL7HIR/3	"	192,576	351	61	143
WW3V	"	192,102	333	47	155
N3ARK	"	181,450	336	48	143
N3KR	"	165,852	312	56	148
NI3I	"	157,341	320	36	90
K4JLD/3	"	149,480	279	69	133
WA3DMH	"	133,984	300	50	108
KE3RR	"	131,775	275	49	126
W3AZ	"	125,918	269	47	120
W3EVW	"	107,308	280	42	97
W3QIR	"	97,038	225	47	115
W3NX	"	95,700	203	56	118
KM3D	"	48,285	435	30	81
N3HTZ	"	37,440	132	31	73
W6AXX/3	"	25,784	124	31	57
N3GWR	"	3,157	30	16	25
WB3ICL	**21**	**140,466**	**400**	**26**	**97**
KB3AGZ	**14**	**63,848**	**247**	**21**	**71**
WY3T	"	46,752	180	23	73
KA3JFI	"	26,752	123	21	55
W3FQE	"	456	15	5	7
W3GH	**7**	**125,902**	**418**	**29**	**90**
WE3C	**3.7**	**162,212**	**682**	**23**	**84**
AA3JU	"	35,948	227	15	61
***KQ3V**	**A**	**820,386**	**862**	**88**	**269**
***NY3Y**	**"**	**787,200**	**773**	**95**	**304**
***WT3W**	**"**	**693,216**	**787**	**88**	**260**
*W3UJ	"	435,102	606	59	195
*N3RW	"	242,755	377	64	171
*NZ3I	"	228,620	382	68	162
*KB3XJ	"	197,010	349	50	149
*N3UN	"	148,503	297	46	131
*NY3C	"	76,986	216	33	93
*K3YDX	"	59,160	157	42	103
*AA3FY	"	49,400	181	19	81
*K3LA	"	20,992	112	28	54
*WJ3N	"	15,504	85	27	49
*N3QVD	"	8,296	56	26	35
*N3MTU	"	6,042	48	24	29
*WV3U	"	3,840	31	19	29
*WD3Q	"	1,638	23	10	16
***KC3PZ**	**28**	**15,226**	**122**	**15**	**31**
***WB2BZR/3**	**"**	**12,650**	**113**	**15**	**31**
*W3CPB	21	13,847	81	16	45
*WB3ECU	14	18,034	100	20	51
*N3UMA	"	2,574	43	11	22
*WW3S	7	16,896	109	18	46
WZ4F	**A**	**2,099,856**	**1724**	**114**	**337**
NQ4I	**"**	**2,005,408**	**1611**	**118**	**346**
N6AR/4	**"**	**1,747,092**	**1281**	**122**	**370**
KØEJ/4	"	1,039,669	978	101	290
K4XU	"	950,852	877	103	303
N4UH	"	671,944	724	85	253
K4LTA	"	590,538	640	91	248
W3VT/4	"	571,550	594	93	257
W4FDA	"	489,880	593	84	212
WA4TII	"	485,760	550	84	246
N4TO	"	326,341	397	87	220
KE4CLE	"	262,314	407	72	162
W4NTI	"	245,729	363	61	190
K4RZ	"	212,652	387	50	148
KX3Q/4	"	197,890	272	75	182
KC4DWT	"	197,472	371	53	134
K4CSB	"	194,480	322	63	158
W4LMJ	"	156,005	279	55	150
W1ENZ/4	"	89,700	240	41	89
N4XSE	"	80,055	220	42	93
KB4TUW	"	77,490	217	31	95
KC4ELO	"	72,048	184	51	101
KT4DQ	"	71,262	214	45	66
W1IHN/4	"	42,328	109	39	104
N4MM	"	34,650	132	38	61
W4VC	"	28,724	120	25	61
K4ZTL	"	21,420	91	21	63
KR4KL	"	21,168	100	26	58
WB4YEY	"	20,010	100	20	53
W4YV	**28**	**25,811**	**199**	**15**	**38**
KC2X/4	**21**	**688,144**	**1460**	**31**	**133**
KM9P/4	**"**	**441,298**	**1068**	**28**	**115**
N4BP	**"**	**305,885**	**827**	**29**	**102**
N4CT	"	304,258	718	28	121
N4IJ	**14**	**292,292**	**726**	**29**	**114**
KV4P	"	184,023	529	29	98
K4HWG	"	10,904	77	16	42
N4HOH	**7**	**51,039**	**176**	**29**	**78**
KC4YM	"	38,537	158	23	66
AE4MJ	"	27,018	140	20	59
KC2KU/4	"	7,152	58	15	33
KI4DC	"	5,290	50	12	34
AA4MM	1.8	3,663	54	11	26
W4PSJ	"	80	9	5	3
***AC1O/4**	**A**	**815,480**	**789**	**97**	**283**
***WA4ZXA**	**"**	**587,590**	**714**	**90**	**245**
*WA6KUI/4	"	467,748	611	76	208
*KR4QI	"	311,304	477	67	171
*KO4MM	"	304,395	493	56	167
*KS4LP	"	150,829	275	72	131
*WA4JUK	"	149,283	317	49	122
*WB4VIM	"	128,640	285	42	118
*KQ4KK	"	120,420	257	49	131
*N4YKD	"	117,000	250	48	132
*K4UVT	"	113,457	237	45	132
*KD4HYT	"	108,962	235	56	125
*N4KWX	"	104,842	221	53	125
*KD4LHA	"	104,646	239	44	119
*AB4KL	"	88,425	260	37	94
*WB4FHI	"	84,626	50	17	38
*K4PHE	"	84,480	241	42	90
*KB4RME	"	77,409	202	40	101
*W3FTG/4	"	72,631	186	47	104
*KC4GIA	"	58,212	168	32	94
*KA4IKH	"	38,064	131	31	73
*KI4KR	"	29,160	107	36	72
*AA4KD	"	19,352	99	28	54
*W4OGG	"	11,291	100	30	61
*KR4NY	"	8,228	50	27	41
*KS4LS	"	7,844	61	19	34
*KC4URW	"	7,800	57	18	34
*KE4YQR	"	5,247	49	20	33
***KC4UCK**	**28**	**6,480**	**80**	**9**	**21**
*KF4CRD	"	3,844	100	12	19
*KE4CAV	"	495	15	4	7
***WA4LBJ**	**21**	**115,440**	**339**	**24**	**96**
*W2RPZ/4	"	21,883	105	23	56
***N4MO**	**14**	**154,155**	**450**	**29**	**100**
***KØRNZ/4**	**"**	**148,720**	**466**	**31**	**99**
*N4YGY	"	103,960	326	25	88
*KD4TWP	"	3,543	94	17	41
***WA4SVO**	**3.7**	**35,690**	**162**	**18**	**68**
N3BB/5	**A**	**2,001,222**	**1731**	**122**	**316**
			(Opr. AA5RB)		
W5/AL7CQ	**"**	**667,890**	**710**	**102**	**267**
K5YAA	**"**	**650,628**	**747**	**86**	**232**
K5UA	"	549,744	625	84	228
W5GN	"	357,926	513	65	186
W5CWQ	"	343,684	439	92	200
N5QDE	"	335,358	446	77	202
WD5IQA	"	212,568	380	61	143
K5RX	"	127,953	249	61	128
W5GAI	"	54,210	145	46	93
WA5SOG	"	35,991	138	26	67
WA6OTU/5	"	2,394	28	18	20
KE5FI	**28**	**42,084**	**265**	**19**	**44**
KF7E/5	"	9,087	84	15	24
N8RR/5	**21**	**218,880**	**509**	**33**	**119**
K5DX	**"**	**201,207**	**506**	**32**	**109**
N5NMX	"	177,429	438	33	114
K5OC	**14**	**134,810**	**372**	**30**	**100**
KN5S	**7**	**29,760**	**144**	**24**	**56**
W5KFT	**3.7**	**25,120**	**122**	**22**	**58**
K5GN	"	3,344	35	9	29
***WD5K**	**A**	**733,249**	**777**	**100**	**249**
***N5OZB**	**"**	**498,256**	**597**	**87**	**217**
*W5VGX	"	364,952	505	83	183
*AB5SE	"	311,740	452	75	185
*NM5M	"	162,540	314	59	130
*N5RXF	"	162,351	336	62	127
*NN5T	"	157,800	292	69	131
*NT5D	"	157,066	316	58	124
*KV5F	"	102,414	225	50	119
*WK5K	"	69,840	201	53	91
*KG5NE	"	60,970	189	45	89
*KN5Y	"	37,842	180	33	69
*W4RTE/5	"	36,000	144	32	64
*W5XD	"	14,162	73	24	49
*W5EIJ	"	8,195	59	19	36
*KC5WA	"	2,635	39	9	22
***KC5HFI**	**28**	**10,220**	**117**	**11**	**24**
*KC5NRA	"	1,122	25	8	9
***NI5M**	**21**	**154,234**	**410**	**30**	**104**
*NY5B	"	127,612	373	29	93
*WT5U	"	110,500	312	38	92
*W5TZN	"	38,220	164	21	63
W6REC	**A**	**1,354,654**	**1479**	**114**	**208**
WK6V	**"**	**1,188,600**	**1250**	**111**	**239**
K6GX	"	660,570	810	95	196
W6QHS	"	648,400	592	128	272
KG6AR	"	311,395	395	96	191
KJ6ZH	"	249,306	431	82	140
W6OUL	"	230,892	396	79	134
WA6TKT	"	221,595	384	72	115
W6RCL	"	217,047	385	80	133
KG6AO	"	191,800	359	73	127
AB6YL	"	178,791	384	69	114
W6HAL	"	162,338	373	57	100
N6GC	"	142,968	319	53	108
W6QEU	"	134,540	357	44	96
N6AZR	"	106,272	242	63	101
N6HK	"	88,660	251	40	84
W6BIP	"	78,432	178	68	104
N6HR	"	70,656	200	44	84
WA5VGI/6	"	64,493	190	42	79
WZ9J/6	"	62,810	210	51	59
W6RFF	"	61,360	175	43	87
WA6UFY	"	38,220	148	36	62
KE6QNJ	"	32,982	168	25	44
N6AN	"	24,900	124	25	50
KJ6DL	"	16,077	95	32	37
KO6IS	"	15,060	89	24	36
K6OXU	"	7,380	44	27	33
K6LRN	"	1,479	21	14	15
N6TCZ	"	1,170	35	13	12
KE6CCV	"	1,058	15	11	12
W6KFV	**28**	**20,631**	**191**	**17**	**22**
W6ISQ	"	2,457	41	9	12
W6KP	**21**	**291,612**	**897**	**32**	**82**
W6BSY	"	162,060	539	28	83
W6EUF	"	54,900	175	29	61
WA6VNR	"	10,120	84	15	31
K6HNZ	**14**	**350,325**	**1012**	**34**	**101**
KC6X	"	220,372	616	35	113
W6OK	"	70,516	262	26	71
K5KT/6	**7**	**45,668**	**191**	**32**	**66**
K6YRA	"	32,450	100	34	84
W7CB/6	"	23,187	139	22	37
KN6DV	1.8	360	11	7	8
***WA7BNM/6**	**A**	**767,848**	**922**	**98**	**210**
***WA6IET**	**"**	**675,146**	**756**	**108**	**218**
*WB6NFO	"	131,352	297	59	97
*N6IBP	"	125,164	286	62	104
*AA6EW	"	117,600	295	58	92
*N6NF	"	71,463	209	47	76
*KK6RG	"	49,187	191	45	56
*KE6UP	"	42,669	167	41	58
*N6GL	"	26,605	121	36	49
*W6ESJ	"	17,018	55	32	35
*AA6EE	"	12,992	80	29	35
*KD6QK	"	9,280	69	26	32
*WA6FIT	"	6,751	60	21	22
*KI6PG	"	6,042	44	26	27
*N2ALE/6	"	3,626	42	19	18
*K6MA	"	560	13	7	9
***KJ6HO**	**21**	**253,260**	**674**	**32**	**102**
*NP4IW/W6	"	70,528	397	24	52
*WB6MBF	"	55,242	245	24	57
*AE9F/6	"	47,596	250	22	51
*KU6T	"	34,237	172	24	49
*WA6FGV	"	10,416	83	18	30
*KC6ZFM	"	1,066	34	13	18
***KN6MV**	**14**	**76,440**	**267**	**29**	**75**
*K6CEO	"	3,395	40	16	19
*WA6WPG	7	4,000	50	13	19
N7AVK	**A**	**1,612,052**	**1620**	**120**	**257**
NN7L	**"**	**1,437,594**	**1506**	**113**	**241**
KC7V	**"**	**1,311,856**	**1374**	**114**	**250**
N7RO	"	311,520	615	51	126
W8AEF/7	"	295,412	439	86	161
K7ABV	"	248,811	454	58	139
W7LGG	"	248,170	381	74	156
W7EYE	"	161,540	293	69	128
KC7UP	"	138,317	330	57	100
KI7M	"	130,400	301	50	110
W7HS	"	91,107	232	63	96
W7LXR	"	79,728	240	53	79
W7MB	"	79,552	164	58	118
N7QNO	"	54,378	172	41	73
KA7PNH	"	49,396	187	40	66
NF7E	"	48,789	168	46	71
WA7VNI	"	46,550	170	41	57
AA7FL	"	41,471	142	47	66
KW1K/7	"	25,290	119	40	50
N7PNK	"	18,894	90	40	54
KI6WJ/7	"	14,640	128	29	59
WA7KLK	**28**	**13,158**	**109**	**14**	**29**
AA7VY	"	1,309	29	7	10
K7RI	**21**	**371,754**	**1201**	**29**	**85**
			(Opr. AA7FT)		
K7OX	**"**	**231,267**	**651**	**30**	**97**
WA7KPH	"	124,800	343	31	97
W7UPF	"	114,319	377	28	83
W7AYY	"	54,296	217	24	64
KX7J	"	18,459	114	18	45
K9JF/7	**14**	**558,738**	**1226**	**39**	**123**
W7FP	"	162,492	441	31	101
KC7EM	**7**	**409,446**	**1083**	**34**	**95**
N7DD	**"**	**280,872**	**691**	**37**	**104**
N5CT/7	"	2,730	36	13	17
AB6ZV/7	**3.7**	**53,448**	**518**	**26**	**42**
***WN7J**	**A**	**358,422**	**525**	**82**	**164**
***W7YAQ**	**"**	**243,532**	**410**	**77**	**137**
***WQ7R**	**"**	**233,478**	**406**	**73**	**145**
*W7QN	"	163,805	333	64	117
*N7WWQ	"	151,029	329	63	110
*KJ7OZ	"	87,720	254	46	90
*WS7O	"	81,454	224	56	83
*WJ7R	"	55,671	254	32	45
*W7YS	"	43,966	175	35	54
*KJ7CU	"	29,892	223	38	56
*KJ7KX	"	29,568	127	34	54
*AA7UC	"	22,272	95	32	55
*WA2OCG/7	"	3,456	72	18	30
*K2RUW/7	"	2,600	26	17	23
*KA7UND	"	2,232	27	16	20
*AA7AJ	"	1,755	31	12	15
*W7GUR	"	1,430	18	13	15
***WA7NIY**	**28**	**12,726**	**130**	**14**	**28**
*N7SDI	"	6	1	1	1
***WJ7S**	**21**	**115,752**	**392**	**27**	**77**
KB8TI	**A**	**970,224**	**865**	**107**	**301**
W8FN	**"**	**414,495**	**489**	**81**	**224**
KE8KG	**"**	**386,912**	**650**	**53**	**161**
AA8PA	"	307,125	518	78	195
WA8SAE	"	233,810	400	62	144
KU8U	"	199,184	333	58	153
K8TMK	"	173,130	355	46	128
WD8LTM	"	146,529	269	61	140
KG8AS	"	139,500	273	52	134
AC8W	"	91,008	217	51	107
N8KSO	"	70,602	210	36	87
WA8RSA	"	44,850	141	35	80
W8UPH	"	36,855	139	33	72
K8IKW	"	34,040	175	18	56
N8QVP	"	33,984	137	35	61
WB8BUQ	"	31,428	115	33	64
K8PYD	"	30,415	135	36	43
KB8OWE	"	25,207	100	29	62
ND8L	"	24,464	111	33	55
N8CQA	"	15,075	78	28	47
N8LIQ	21	22,311	144	19	48
WA8YLZ	"	156	7	6	6
NI8L	**14**	**928,884**	**1716**	**39**	**147**
K3ZJ/8	**"**	**568,516**	**1236**	**38**	**131**
W8TWA	"	247,842	603	34	113
W8UD	"	150,285	412	32	97
W8SJU	"	87,264	313	24	77
KI8O	"	3,564	41	10	23
W9LT/8	**7**	**61,946**	**246**	**23**	**71**
K8OQL	**3.7**	**50,721**	**298**	**18**	**69**
K8SJ	"	1,875	36	7	18
***KC8FS**	**A**	**556,664**	**670**	**67**	**231**
***N8FEH**	**"**	**253,188**	**411**	**72**	**162**
*KA8ZPE	"	114,868	222	56	132
*KB8FLY	"	92,204	226	42	106
*N8GZE	"	79,560	244	37	83
*KA8OUT	"	68,640	205	31	89
*W8ILC/M	"	51,300	144	39	96
*N8WOZ	"	33,615	143	22	59
*KB8PK	"	22,825	99	22	61
*N8QWI	"	7,449	128	26	55
***KF8UM**	**21**	**152,460**	**409**	**25**	**107**
*WZ8T	"	97,440	327	25	80
*WT8P	"	34,720	180	18	52
***KB8IBS**	**14**	**139,876**	**421**	**27**	**94**
***WB8VPA**	**7**	**27,492**	**127**	**22**	**65**
*AD8J	"	8,112	63	11	26

(Continued on page 104)

Patcomm introduces the PC-16000 HF Transceiver for $1395.00

Featuring Built-In Keyboard/Digital Mode Interface & Digital Signal Processor

Patcomm Corporation™ introduces the PC-16000™, a full featured HF Transceiver with a built-in keyboard interface. Plug a standard IBM-AT* compatible keyboard into a PC-16000™ and instantly enjoy keyboard CW, RTTY (BAUDOT) and ASCII data communications. Incoming morse and RTTY data is decoded and displayed on the built-in LCD display. Data is also sent to an RS-232 serial port for display on a "dumb terminal" or equivalent. The PC-16000™ offers the following features:

- Built-in AT keyboard interface (keyboard optional)
- General coverage receiver (1.5–29.9 MHz)
- Dual up conversion design
- USB/LSB/CW/FSK/AM & optional FM modes
- 160 thru 10m ham band coverage on transmit (CAP & MARS available)
- 100W output power
- DDS driven PLL synthesizer—1 Hz minimum step size
- Selectable variable speed/fixed 10Hz step VFO tuning

- **Basic display lets you know exactly where you are.**

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14.03510-T   0930
14.03510-R   M000
```

- **Standard Display shows RX/TX VFO freq's, time and current memory**

- **Send & Receive in: CW / RTTY(BAUDOT) / ASCII**

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← **Incoming data**

← **Outgoing data appears here**

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- Auto notch filter removes multiple hetrodynes on SSB signals automatically
- De-noisier reduces background noise

- Manual notch for CW operation
- Built-in digital power/SWR meter
- 24 hour clock
- Built-in 5–75 WPM IAMBIC keyer
- Select 1 of 3 antennas from the front panel
- Slow/fast AGC
- IF shift

Patent Pending

(Keyboard Optional)

Specifications are subject to change without notice.

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The 1996 World Radiosport Team Championship

A Crowning Achievement For Amateur Radio Operating!

BY JOHN DORR*, K1AR

With the memories of the 1996 Summer Olympics still fresh in our minds, K1AR reports his personal experiences during one of the most memorable operating events in the history of our hobby!

It all began in 1990. Danny Eskanazi, K7SS, had a long-time dream of assembling the best operators in the world in one geographic location. Using similar stations and antennas, his idea was to provide a level playing field whereby amateur radio's leading contesters could compete head-to-head in an attempt to crown a champion based purely on operating ability. To Danny's credit, along with a very long list of able-bodied volunteers, he achieved his goal. WRTC-90 revealed the diversity within the world's amateur population. More important, however, it furthered international goodwill at a time when the world desperately needed it. That was and is the essence of what has become known as the World Radiosport Team Championship.

In 1990, competitors arrived by the dozens from geographic locations as diverse as Indiana and Chelyabinsk, Russia. There were Hungarians and Japanese, Brazilians and Italians. It was truly a collection of amateur radio's best operators—perhaps contesting's finest hour. Held in conjunction with the 1990 Goodwill Games, the idea of an amateur radio olympics became a reality. While the on-air operating event was clearly the highlight of 1990's version, everyone concurred that the camaraderie we experienced would be a memory that will stay with us forever. For the first time, a simple list of winning callsigns in the contest results from around the world became live, breathing individuals standing right before our very eyes.

As you might imagine, even as the events of 1990 were winding down, talk began about planning the next one. Some of the initial thoughts included the idea of conducting the "next one" in the Soviet Union in 1994, but political changes ultimately made that impossible. It wasn't until the Potomac Valley Radio Club, based in Washington, D.C., initiated the process and ultimately the Northern California Contest Club took the baton that it became clear that another WRTC was actually going to take place.

One of the advantages NCCC had in planning the 1996 affair was that they could leverage the experiences of 1990. As Fred Laun, K3ZO, so aptly said, "You just don't find a geographic area where you can combine the industry-insider knowledge and fund-raising acumen of a W6RJ and W6QHS, the drive and energy of a W6OAT and K3EST, and the organizational talents of an AI6V, AA6KX, AA6MC, and W6RGG in one place."

The winners of WRTC-96: (left to right) KRØY, K1TO, N2IC, K6LL, and K4BAI.

WRTC-96 began its legacy by increasing the size of the playing field from that of its 1990 predecessor. In total, 54 competing teams from over 30 countries were ultimately invited, representing 108 of the best operators in the world! Teams were selected mostly by their respective local radio societies and contest clubs. There was not a poor operator to be found in the lot, a credit to the selection process.

A new concept of the WRTC process was the creation of on-site judges for each team. Every judge was a world-class competitor in his own right, and the list included members such as K3ZO, G3SXW, N2AA, S50A, OH2MM, UA9BA, and many others. Their job was to be the big brother, watching over the operating teams and adding to the desired goal of equitable operating among all competitors.

Perhaps the most imposing task that the San Francisco organizers had to face, aside from the logistics of transporting people to the plethora of WRTC events, was the acquisition of 54 comparable stations, all within a 40 mile radius. For the most part, this goal was achieved, as was confirmed by various on-air reports after the contest. Words simply cannot describe the amount of work that went into selecting each of these stations and ensuring that equipment, antennas, and host availability were in place.

Beginning with a Bang WRTC-96 Day 1

Some of the WRTC-96 attendees began arriving in San Francisco up to a week before the scheduled activities were to begin. There was a rumor that some of them had never left the U.S. and simply hung out in Seattle for 6 years! I, along with my teammate, Doug Grant, K1DG, had the unique opportunity to participate in WRTC-96 as defending champions. Naturally, our level of excitement was high, both from the standpoint of our 1990 Seattle experience and what was to ensue in California. It seemed that we had only been off the airplane for less than an hour when we, along with everyone else, were whisked via bus to the first social event—the WRTC-96 welcoming picnic. This event was where the sheer magnitude of WRTC-96 first hit me. I arrived at the picnic site to witness a crowd of contesters the world has never seen in one place. It was a consummate example of sensory overload! Whom do I talk to first? Where do I begin the conversation? It was a real-time pileup! With well over 300 people present—including competitors, judges, station

New Hampshire makes a big splash in South Africa and Fernando de Noronha (ZS6NW, left, and PYØFF).

c/o CQ magazine

hosts, locals, and other guests—I began a six-day experience that confirmed, yet again, why amateur radio is the greatest hobby on Earth!

After five hours of picnicking, one thing became very clear: Unlike Seattle, I was going to be lucky if I had a chance simply to shake the hand of every participant, much less have a meaningful conversation with so many people. However, after 200 pounds each of beef and chicken were served, along with Russian skewered lamb and an infinite supply of beer, it was obvious that the real contest of six days of no sleep and camaraderie had begun.

One aspect that the WRTC-96 committee had arranged was accommodations at a local Motel 6 for all the participants. This turned out to be a welcome retreat for everyone involved, with the exception of the dozen or so unfortunate non-amateurs who thought they had a deal in staying at a cheap motel that weekend. Fortunately, our band-changing skills were tested in advance of the upcoming competition by virtue our on-site beer blasts being moved about the various motel venues in response to noise complaints.

Day 2 Arrives

As the sun rose on Day 2 of our adventure, we had the choice of a private tour of either San Francisco or Silicon Valley. Choosing the latter, I was treated to tours of Ham Radio Outlet, Force 12, and Fry's—one of the largest computer store outlets on the planet. If you can imagine an entire retail aisle being devoted to fuse inventory, you can perhaps begin to picture what this store has to offer. While shopping, I had one of the Chinese team members ask me my opinion of a backup disk storage unit. I told him that it was an excellent product and had the added advantage of a $50 rebate. I'm not sure that he got the point about the rebate.

After a long day of touring, we started the evening with a rather long journey to the employee clubhouse of Shell Oil in Martinez, California. Although the length of the trip made some of us think that we were on our way to Heard Island, it gave me the chance to jabber with G3SXW and hear, among other things, about his old-time adventures in Afghanistan and Iran. Aside from being a good friend and one of the best CW operators around, Roger is also a fascinating person.

Dinner at the clubhouse was catered by one of the local Mexican restaurants. Imagine the look on the faces of the Latvian team when they saw a 2-inch pile of guacamole on their plates. Negotiating through a pile of indescribable dishes must have been an experience for some of the foreign teams.

Down to Business

Although the festivities of the previous night continued building the spirit of camaraderie that was to be with us the entire week, it was clear that tension was building as the competition drew nearer. Friday morning was the first real sign of this. An early morning judges' meeting was called to work out the final kinks prior to the scheduled competitors' gathering. While the smiling faces and story-telling continued, there was an edge to the air that told you this was not just an average group of people waiting for a meeting to start. This was rather a group of intensely serious competitors about to "duke it out" in a way never done before.

The teams' meeting room filled quickly that

FINAL SCORES WRTC-96

Call	Op#1	Op#2	Judge	QTH	Score	QSOs	Mults
W6X	KRØY	K1TO	UA6HZ	WA6AHF	761,829	2457	183
K6T	K4BAI	KM9P	W6UM	NQ6X	678,132	2511	162
W6R	K6LL	N2IC	WR3G	AF6S	655,720	2424	169
K6P	VE3EJ	VE3IY	OH2KI	N6UUG	647,112	2343	177
K6C	K4UEE	N6IG	BA1FP	WB6PCJ	644,059	2355	169
W6T	K5ZD	WX3N	K6SSS	AB6CW	616,308	2170	174
W6D	K1KI	K3UA	AA7FT	K6YT	606,550	2145	175
W6Q	9A3A	S53R	W7NI	WA6GFY	598,272	2233	164
W6V	KF3P	KR2J	N6RA	WB6YRN	577,575	2352	151
W6P	K8CC	K5GO	K7LXC	WB6WSL	568,435	2370	149
K6V	W2GD	WØUA	S59AA	KE6HUA	568,378	2465	146
K6W	N6TV	K7SS	N6KT	AB6DI	556,928	2261	152
W6I	K1AR	K1DG	S50R	KK6WP	547,404	2204	156
W6Y	DL1IAO	DK3GI	NB6G	AD6E	545,756	1993	167
K6D	DL5XX	DL1VJ	KJ4VH	NF6S	532,728	2183	147
K6R	LZ1SA	LZ2PO	OK2FD	N6BT	531,552	2256	147
K6G	NP4Z	WC4E	K5MM	K6MA	527,592	2238	152
W6A	K3LR	WA8YVR	AB6NJ	KEØT	523,672	2478	134
K6X	UA3DPX	RZ9UA	AI7B	WB6UTY	518,666	1960	163
K6Z	JH4NMT	JE3MAS	WØUN	W6YX	512,535	2318	141
W6S	LY2IJ	LY1DS	S50A	AA6YQ	508,760	1956	158
W6B	S59A	S56A	I2UIY	AEØM	507,318	2257	141
K6Y	OK1CF	OK2PAY	W7RM	W6DU	499,796	2143	148
W6H	RW1AC	RV1AW	PY5EG	AI6V	497,965	1841	163
K6I	JH7PKU	JO1BMV	CT1BOH	KN6VO	488,940	2296	145
K6S	ON4UN	ON9CIB	W3ZZ	N6WFK	480,326	2120	154
W6U	EA1AK	EA4KR	NØAX	W6JD	470,744	1918	152
W6G	JE1JKL	JH7WKQ	OH2MM	N6OM	470,237	1984	139
K6U	SM3DMP	SM3CER	N7NG	AJ6V	465,075	2165	135
W6O	ZS6EZ	ZS6NW	VE7SV	KV6S	461,553	2093	137
K6O	N6TR	WN4KKN	WA7NIN	KW6C	454,476	2331	121
W6E	EA7TL	EA9KB	N2AA	K6XV	445,356	1871	139
K6N	YT1AD	YU1RL	K3ZO	WB6AFJ	440,358	2228	140
W6W	LU6ETB	LU/OHØXX	IØJBL	W6OPO	437,016	2319	131
K6J	N2NT	KZ2S	S57AL	KK6EK	426,656	1902	134
W6K	F6FGZ	F5MUX	K5RC	W6VG	418,375	2276	125
K6A	JH4RHF	JA8RWU	9A5W	K6SMH	412,388	1981	131
K6H	DJ6QT	DJ2YA	RW9UP	N6DA	411,376	2353	112
K6K	UT5UGR	UT4UZ	S59L	KG6FR	398,399	1863	127
K6B	9A9A	9A3GW	G3SXW	AB6YL	383,166	1886	126
K6Q	VE7NTT	VE7CC	KØKR	WM6R	362,440	1546	130
K6E	HAØMM	HAØDU	AA6XZ	KK6PH	357,885	1759	135
K6M	GIØNWG	G3OZF	K4XU	WB6JJJ	357,094	1884	132
W6Z	VK5GN	VK2AYD	RU1AA	W6NA	343,604	1822	124
K6F	IT9BLB	IT9VDQ	UA9BA	KM6OH	337,152	2000	128
W6J	SP6AZT	SP9FKQ	K6NA	K6LM	330,876	2023	117
W6L	UN4L	UN2L	W7YAQ	KM6AV	309,518	1796	121
K6L	SP9HWN	SP9IJU	JA7RHJ	W6ISO	298,178	2149	97
W6N	I4UFH	I2VXJ	KC7V	KE6KXO	269,028	1728	106
W6M	PYØFF	PY5CC	S56M	AB6CJ	231,066	1580	99
W6C	IN3QBR	IT9TQH	K8AZ	AA6LY	185,070	1615	93
W6F	OH2IW	OH1JT	KT3Y	AG6D	530,000*	2100	155
AH3C	YL2KL	YL3DW	WZ6Z	WZ6Z	**	1591	140
AH3D	BA1OK	BA4RC	OH2BH	W6JZU	**	1913	120

**approximate score—damaged computer log file*
***demonstration teams*

morning, as we all anxiously awaited more details of the upcoming operating event. One of the major coups the WRTC-96 organizers had arranged was the one-time assignment of 1×1 callsigns (K6A–Z and W6A–Z) to the teams. To ensure fairness, no one was to know his randomly assigned callsign until 15 minutes before the competition began. However, the team meeting was where the callsign, host station, and judge were to be selected for each team via a random drawing. K1DG and I were the first to dip our hands into the box, and we received the station owned by Steve Sturges, KK6WP, with a very capable judge, Leo, S50R. As it turned out, our operating QTH was located up in the hills of Berkeley, California. Our antennas included a 2-el Gem quad along with the requisite 40 meter dipole that was installed at every competing station. This turned out to be another logistical nightmare that the WRTC-96 organizers overcame, as 54 dipoles were built, tested, and installed across the Bay area in advance of the contest.

As you might imagine, the competitors asked a long list of questions, such as "Can I pass a needed station to another band?" or "What do we do if the other station doesn't know their ITU zone?" Log checkers and judges led by Dick Norton, N6AA, and Chief Judge Lew Gordon, K4VX, patiently answered each question to our satisfaction. Shortly thereafter we "hit the road" with judge in tow on our way to KK6WP.

Almost immediately upon arriving at Steve's shack, we began disassembling everything and installing the five cartons of radios and accessories we had brought with us. In a little over 3 hours, we built a functional, 100 watt, 2-position multi-single contest setup complete with bandpass filtering (thanks to the generosity of I.C.E.) and flexible antenna switching between

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Here's the operating setup at W6I (KK6WP)—K1AR (left) and K1DG.

stations. It wasn't pretty, but it did the job. The next few hours were preoccupied mostly with running the station through its paces on all the bands, with a brief interrupt at a local HS (CQ Zone 26) restaurant. We opted for the rare DX food with the hope that it would help our multiplier totals.

The WRTC contest was to be held in conjunction with the regularly scheduled July IARU HF Championship. For that reason, we had to be prepared to begin operating at 1200Z, or 5 AM. Although my alarm was set for 4 AM, I was wide awake at 3:30, knowing that the hour was about to come. Doug and I decided that like Seattle, we would alternate operating positions every hour. Because the rules required us to operate in a true multi-single environment, this meant that one operator would use the transmitting "run" station with the other tuning for needed QSOs and multipliers on the second receiver. After a coin toss, it was determined that I would start the contest on the run radio. All that was left at this point was Leo revealing our assigned callsign. We had hopes for a goody such as "W6A" or "K6R" but at 1145Z we learned that our fate gave us "W6I." As it is with life in general, you deal with what you are given, and off we went, making the final programming changes to our computers and keyers.

At precisely 1200Z an explosion erupted on the bands. In addition to the usual group of participants, a new crowd of 1×1 callsigns hit the bands. Most of us started on 40 meter CW, so you can imagine what the low end of 40 sounded like in those opening minutes. With only 100 watts and a dipole/tribander at our disposal, we weren't overly confident that the pace was going to be too frenetic at any point during the contest. However, much to our delight, we experienced 18 hours of pileups calling us (for the most part)! The first hour was nothing short of complete euphoria as our log became filled with over 150 QSOs from the U.S., Japan, Guam, Hong Kong, South Cook, and others.

Clearly one of the objectives of the WRTC-96 organizing committee had been achieved—getting the interest and attention of the IARU HF Championship general participants in working the "boys in San Francisco." I'm told that many of the DX Packetcluster systems were backed up by 30+ minutes due to the number of 1×1 callsign spots. Our station, for example, was spotted over 40 times during our 18 hours of operation.

In post-contest discussions, it was humorous to hear the various descriptions of the WRTC-96 competitors. Reports told us that we were not especially loud anywhere. We were most often characterized, however, as 54 buzzing mosquitoes running up and down the bands. However, as we buzzed away on CW and SSB, the sheer enjoyment of being in the hunt for the gold was indescribable. And having an occasional minute during the contest where 9 QSOs were logged didn't put a damper on the outing either!

Aside from our 1×1 callsign status, the competition itself was not unlike most other con-

It's a JA pileup in Napa Valley!

tests. The usual strategies and operating tactics applied in San Francisco as well. At the end of it all, we managed to log 2230 QSOs.

Winners and Winners

After all the dust settled, it was clear that one team had to be the winner. Unfortunately, from our perspective, it wasn't us. However, WRTC-96 was won by one of the most competent operating teams around: KRØY and K1TO. It just doesn't get much better than Jeff and Dan. While the operators decompressed on Sunday together with a scheduled noon poolside party, the log checkers and judges were busily (and I mean through the night!!) verifying the logs to determine the final scores and placings. In the final analysis, however, it was clear that while three teams won metals, everyone was a winner. How could you be part of the WRTC-96 experience and consider it a loss?

The awards banquet was held at Stanford University on Sunday evening. It was everything that we had expected and more. As had become the tradition of WRTC-96, a first-class event was orchestrated, including moving speeches of recognition for everyone who had made this event possible. The crowning moment, however, was when the final awards were presented. Although the U.S. dominated the rankings in this one, special note should be made of the achievements made by the Canadian team and S53R/9A3A, both of whom made the Top 10.

And Finally . . .

Would WRTC-96 ever end? For sure, most of us didn't want its inevitable conclusion to occur. Monday was spent on a memorable trip to some of Napa Valley's finer wineries, with a catered picnic lunch and ferry boat ride thrown in for good measure. It was an appropriate conclusion to a momentous event.

Witness the Chinese demonstration team. BA1OK was sending 40 wpm on a hand-key for the entire contest!

What does one say at this point? It has to begin with an inadequate thank you to all of the organizers of WRTC-96. There simply are not enough words to describe the physical and mental toll placed on those folks. However, in championship style, they pulled it off, making the organizers of the next WRTC shake in their boots! To my fellow competitors: you're the best. WRTC-96 proved again that there is so much more to the world of contest operating that the clinical exchange of numbers. Finally, to all of you who worked us, a hearty thank you must go out. I hope in a small way you were able to catch the fever that we experienced in those six days in San Francisco. Amateur radio is further along because of WRTC-96. There's no one debating that! ■

DSP Software

DSP Blaster™ 1.0 replaces hardware DSP boxes. It uses your PC and sound card to provide high- and low-pass SSB filters, CW/DATA/SSTV bandpass filters, CW peaking filters, adaptive noise reduction, automatic notch filtering, and AGC. *DSP Blaster* displays the signal waveform and spectrum to provide insight about the signals you're hearing. It's fascinating to correlate the sound of a voice with its spectrum. A system block diagram makes the program simple to use. Pass your mouse over a filter block to display its properties. Click to alter them or to activate the filter. *DSP Blaster* can run in the background. Mouse required.

RITTY 1.0 is a high-performance software modem that uses a limiterless front-end, optimal matched filters, ATC, numerical flywheel, and other advanced techniques to recover RTTY signals other modems can't. *RITTY* has an FFT spectral tuning indicator, variable mark/space frequencies, precision AFSK, FSK & PTT outputs, and supports WF1B's RTTY contest-logging program.

386/40+387, VGA, and Sound Blaster 16, Vibra 16, or AWE32 required (no "compatibles"). One program, $100; both, $170.

Antenna Software

AO 6.5 automatically optimizes antenna designs for best gain, pattern, impedance, SWR, and resonance. *AO* uses an enhanced, corrected MININEC for improved accuracy. *AO* features 3-D radiation patterns, 3-D geometry and wire-current displays, 2-D polar and rectangular plots with overlays, automatic wire segmentation, automatic frequency sweep, skin-effect modeling, symbolic dimensions, symbolic expressions, current sources, polarization analysis, near-field analysis, and pop-up menus.

NEC/Wires 2.0 accurately models true earth losses, surface waves, and huge arrays with the Numerical Electromagnetics Code. Best for elevated radials, Beverages, wire beams, giant quads, delta loops, LPDAs, local noise.

YO 6.5 automatically optimizes monoband Yagi designs for maximum forward gain, best pattern, minimum SWR, and adequate impedance. *YO* models stacked Yagis, dual driven elements, tapered elements, mounting brackets, matching networks, skin effect, ground reflection, and construction tolerances. *YO* optimizes Yagis with up to 50 elements and does it hundreds of times faster than NEC or MININEC.

NEC/Yagis 2.5 provides reference-accuracy modeling of individual Yagis and large arrays. Use *NEC/Yagis* to model big EME arrays.

TA 1.0 plots elevation patterns for HF antennas over irregular terrain. *TA* accounts for hills, valleys, slopes, diffraction, shadowing, focusing, compound ground reflection, and finite ground constants. Use *TA* to optimize antenna height and siting for your particular QTH.

One antenna program, $70; three, $120; five, $200. 386+387 and VGA required. Visa, MasterCard, Discover, U.S. check, cash, or money order. Add $5 overseas.

Brian Beezley, K6STI • 3532 Linda Vista
San Marcos, CA 92069 • (619) 599-4962
k6sti@n2.net

PROLOG from Datamatrix

PROLOG is a QSL route database and logging program for PCs. It supports up to 36 logbooks, each with its own award tracking. It includes automatic award tracking for DXCC, IOTA, WAC, WAS, EAZ, WPX, Counties, plus 16 user-selectable awards. Also provided are callbook database support, rig control, PacketCluster™ (to alert you to "new ones"), QSL and address labels, award status report generator with dupe/new status display, and more. PROLOG will run in a DOS only or Windows™/Windows95™ environment and requires 350K of conventional memory and a color or monochrome display. The QSL route database requires 10 megabytes of disk space. A logbook with 5000 contacts and award files will occupy two more megabytes of disk space.

The QSL route database includes over 54,000 entries and is priced at $23. The logging program is $49.95. Both integrated is $64.95. (International add $3.) An optional IOTA database for logger is an additional $12. For QSL route database updates (6) add $36 (international add $48). For more information, contact Datamatrix, 5560 Jackson Loop NE, Rio Rancho, NM 87124 (info/tech support 505-892-5669; orders only 1-800-373-6564). E-mail <prolog@rt66.com>; or web page <http://www.4w.com/ham/prolog>. Or circle number 100 on the reader service card.

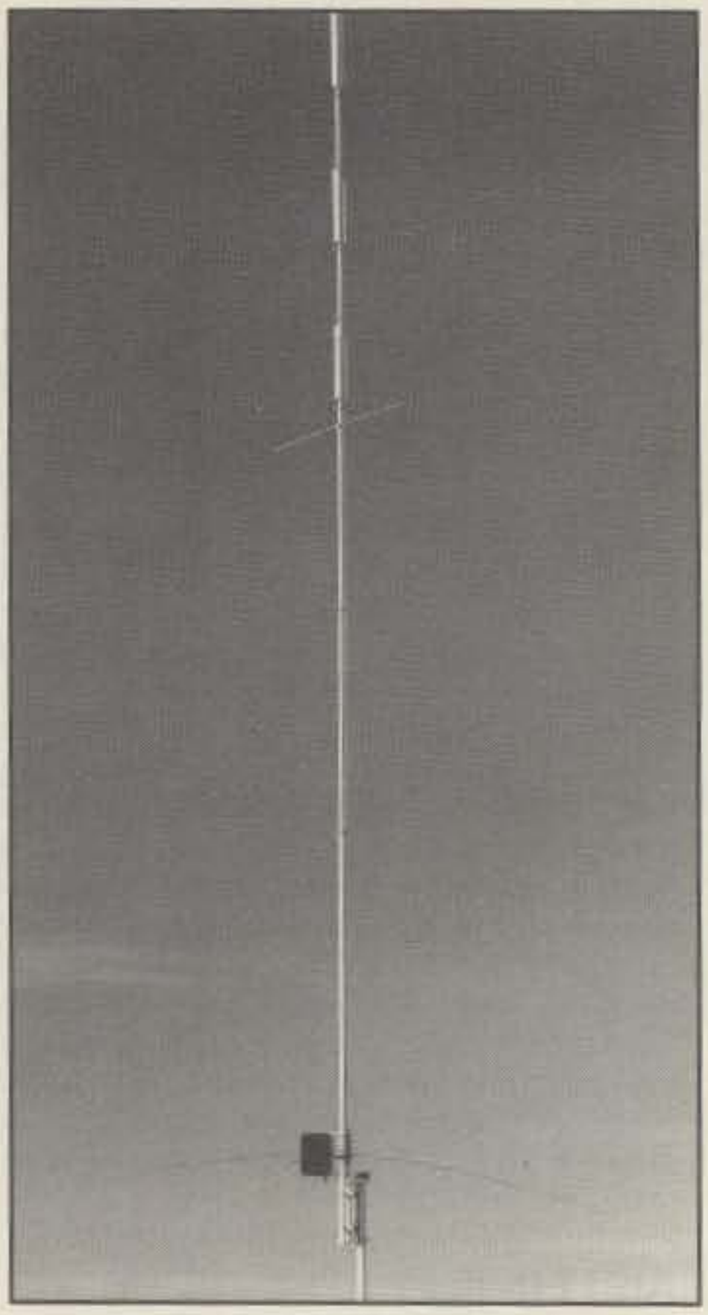
Timewave Technology DSP-599zx Noise Filter & Test Instrument

The DSP-599zx is an all-mode noise filter and test instrument incorporating the newest high-speed CPU. The unit is a field-upgradable design with the following features: LCD display for Visible Memory™ and Calibrated Filters™; wideband filter for AM and FM (VHF and UHF); continuous filter tuning up to 5 kHz using optical encoders; voice lowpass, highpass from 200–5.0 kHz; CW and Data 10 Hz to 600 Hz wide; audio test generator, voltmeter, and tone decoder; manual notch Heterodyne Eliminator™; and more. Data filters supported in this filter are RTTY, AMTOR, PACTOR, G-TOR™, HF packet, SSTV, WEFAX, SITOR, and CLOVER. The test instrument mode is designed to provide the audio test instruments necessary for normal maintenance and setup of audio circuits in radio equipment installations.

For more information, including a technical data and comparison sheet, contact Timewave Technology, Inc., 2401 Pilot Knob Rd., St. Paul, MN 55120 (phone 612-452-5939; fax 612-452-4571; e-mail <http://www.timewave.com>), or circle number 113 on the reader service card.

Cushcraft R7000 Vertical Antenna

The R7000 is a no-ground radials vertical antenna for use on 10–40 meters. This antenna can be upgraded from its standard configuration of 10–40 meters to include 80 meter operation. The R7000 features stable traps and



rugged base and mount, and offers easy installation. It can be used for portable operation such as camping and DXpeditions.

For specific details of the R7000 design and its installation, check out the Cushcraft web page at http://www.cushcraft.com. For more information, contact your amateur radio equipment dealer or contact Cushcraft Corporation at P.O. Box 4680, Manchester, NH 03108 (888-599-7373 (603-627-7877); or circle 102 on the reader service card.

Limelight Books Easy Calculator Math For Electronics

Limelight Books, a Division of Tiare Publications, has a new study guide that teaches you how to make quick work of math problems involving electronics. Electronics instructor Larry R. Luchi takes the reader through each required step in over 30 formulas used in electronics, from Ohm's Law to phase angles to component values for resonance to transistor characteristics. *Easy Calculator Math for Electronics* also includes terminology and theory explanations and diagrams to aid in understanding the material. Luchi begins with sections on "Using the Scientific Calculator in Electronics," and explains the "Algebraic Operating System," display formats, the keyboard and display, and coordinate systems. The book can be used in conjunction with Luchi's *Amateur Radio License Guide* series, also available from LimeLight Books, to further explain the theories in those books.

Easy Calculator Math for Electronics is available for $17.95 plus $3 shipping/handling from LimeLight Books, div. Tiare Publications. For more information, contact Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 (phone 414-248-4845), or circle number 107 on the reader service card.

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CIRCLE 117 ON READER SERVICE CARD

BY BILL WELSH, W6DDB

BILL'S BASICS

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Operating Tips

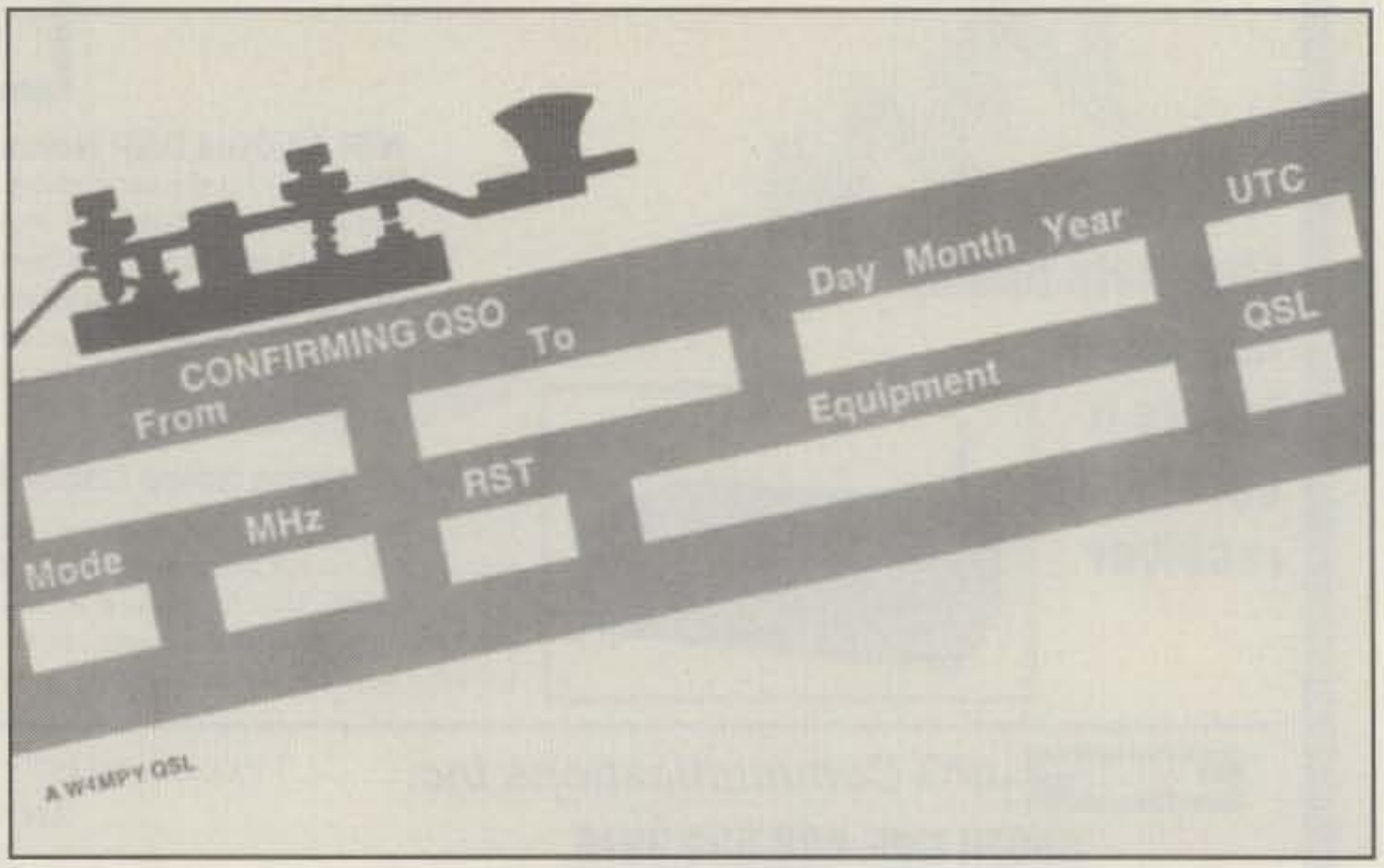
I have been working the Novice code bands since they were established in 1951. Mistakes have always been the same among new amateurs using these bands. This article covers several of the most common errors. If you are a relatively new amateur, you will benefit from reading this article and considering whether or not any part of it applies to you. It would be surprising if none of these tips applied to any new amateur. The comments in this article usually apply to code operation, since that is the stumbling block most new amateurs must overcome to upgrade to higher class licenses. However, some of these tips also apply to voice and other modes of operation. This article primarily is intended to help Novice and Technician-Plus amateurs using their code segments. Subjects are not covered in a sequence of importance, since there is no way to know which items are most important to every reader.

Get the best equipment and accessories you can afford to buy. Used items can serve you very well; it is not essential to buy new things. However, do not purchase junk. An experienced operator can achieve remarkably good communication results using mediocre to poor gear, but a new operator should not handicap herself/himself by using junk. New and used gear is advertised in all of the monthly amateur radio publications. As they are sold, most transceivers do not have sufficiently narrow code filters; they usually just have a single sideband (SSB) filter that is about 3000 Hz wide. When operating a well-designed radiotelegraph (code) transmitter, the width of the output signal is about five times the keying speed. As an example, at a sending rate of 10 words per minute, the width of the transmitted signal is about 50 Hz. When operating code, there is no advantage to be gained from listening to more of the band spectrum (width) than one needs to hear when receiving a signal. The supplied 3000 Hz SSB filter subjects the listener to about 6 to 12 times as much QRM (man-made interference) and QRN (atmospheric noise) as one would hear when using a narrow code filter. It is advisable to install a 250 or 500 Hz filter in your transceiver if you intend to use code, with the 250 Hz filter being the preferred one. It is not wise to use a filter narrower than 250 Hz, since most of them tend to ring. Using a narrow passband code filter can make the difference between misery and pleasure when operating on a crowded and/or noisy band. An excellent source of filters is International Radio and Computer, Inc., 3804 South U.S. 1, Fort Pierce, FL 34982.

Operate from a room that has air-conditioning and heating. We sit quite still for long periods of time while we are operating. Setting up a station in a garage or cellar can be an uncomfortable arrangement which can result in medical problems.

Before answering a CQ call, either set the RIT (receiver incremental tuning) control to its mid-point zero position, or turn off the RIT. Failure to do this will result in the two stations transmitting on different frequencies, which can result in unintentional interference (QRM). This occurs while you are listening to the other station's transmit frequency and your own transmit frequency is not in use. Some other station can find the frequency that is not in use, assume it is not busy, and transmit on it.

Most transceivers have automatic offset designed into them. As an example, if the digital readout is 21121.7 kHz, the transmit frequency automatically shifts down about 700 Hz to 21121.0 each time the rig is keyed. The built-in offset frequency may be more or less than



A sample fill-in-the-blanks QSL card.

Here is Joseph Pinter, Jr., KC7LVN, who lives in Tucson, Arizona. He picked up a Yaesu FT-900 just in time to use it in the Novice Roundup contest that was sponsored by FISTS this year. I was lucky enough to be his fourth contact ever and his first contact with his new rig. His station also includes an MFJ-949E antenna tuner, an Astron RS-20A power supply, Bencher key, Hy-Gain 18AVT vertical antenna, and a RadioShack HTX-212 two meter transceiver.

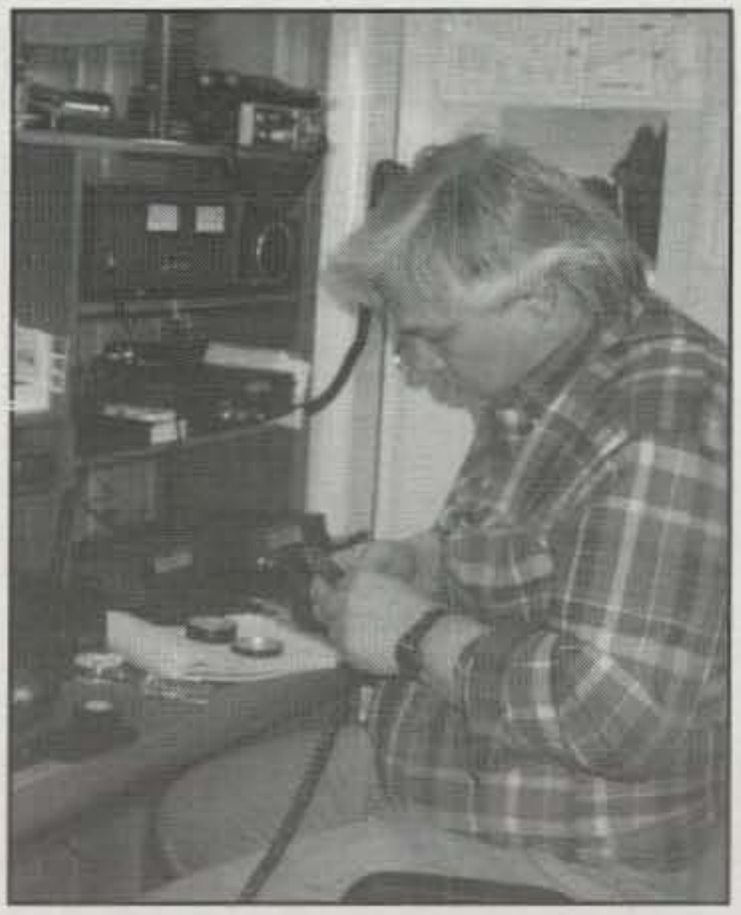
45527 Third Street East, Lancaster, CA 93535-1802

700 Hz, but it will be close to this desirable audio tone. Do not make the mistake of adding an unnecessary and unwanted additional frequency offset. Some well-meaning amateurs make this mistake in regard to the offset frequency. When operating SSB voice mode on the 10 meter band, the automatic offset is about 2700 Hz. Incidentally, upper sideband (USB) normally is used on the upper frequency bands (10–20 meters), whereas lower sideband (LSB) voice normally is used on the lower frequency bands (40–160 meters). However, there is no regulation which prohibits using the sideband opposite to the customary one.

Until higher speed code requirements are eliminated from license upgrade tests, it is obvious that you must improve your code proficiency to move up to higher grade licenses, which provide increased operating privileges. Set up your station promptly and operate regularly. Work at least seven code contacts per week, or a total of at least three hours of contact time per week. There are contests on the air almost every weekend, with some contest activity during the middle of the week. Check the amateur radio publications to determine which contests extend into the Novice bands and join in on the activity. Submit your contest logs to be used to check the submittals of other contest participants. Your contest score is not likely to challenge the scores of serious contesters, but you will benefit from such activity. The single most important benefit you will realize from contest operation is an increase in your code proficiency. Also, you probably will contact several counties, states, and countries which can help you qualify for several of the hundreds of operating awards available to you. Contest activity is likely to prompt you to improve your station setup as well as your operating proficiency. Do not be afraid to participate in contests, because your contacts are appreciated by even the most experienced amateurs.

Take care not to send code at a rate that is faster than the other operator can copy. Some amateurs who have been licensed many years let their code proficiencies decline to the point where it is helpful for them to get code practice in the Novice bands. If you hear an "older" callsign identifying a station, do not automatically assume that the operator has good code proficiency. Many beginners have better code speed capabilities than the old timers they meet on the air. Newer amateurs are not too bashful to ask other operators to send more slowly (QRS), whereas an old timer may hesitate to request a slower code speed. One-way communications are not what amateurs want; use a mutually satisfactory code speed. You do not have to erect a tower and a highly directive antenna to experience satisfactory communications on the high-frequency (3 to 30 MHz) bands. The highly directional antennas (Delta loop, quad, rhombic, Yagi-Uda, etc.) many amateurs use enable them to hear your relatively weaker transmissions and to work you on the air. Highly directional antennas are an important part of a good amateur radio station. However, you can postpone the costs of installing a tower and directional antenna a long time, but still enjoy very good results on the air. Simply stated, an amateur with a less expensive antenna can do well when in contact with other amateurs using expensive antenna systems.

It is advisable to get at least 250 to 500 QSL cards when you are getting started on the air.



Here is Randy Teall, KB8URZ, who lives in Ishpeming, Michigan, in the upper peninsula of Michigan. His station includes an ICOM 729 transceiver and a Cushcraft R-7 vertical antenna. I recently enjoyed a 40 meter code contact with Randy. He is also active on VHF and has his own repeater in operation.

QSL printers are advertised in the amateur radio publications (see *CQ*'s display ads and classified section). QSL prices vary between cheap and expensive. I do not think expensive cards bring a better response ratio than cheap ones. Like most amateurs, I send a card to

every amateur who requests one during a contact or who sends her/his card (or a letter) to confirm the contact. Several companies sell fill-in-the-blanks QSL cards which can be used to meet small-quantity card requirements. Such outfits are advertised in amateur radio publications. As a temporary measure, you can purchase a supply of picture postcards showing local scenes of interest. Self-adhering report forms can be purchased and attached to local postcards, or you can write the contact data in the message portion of the cards. In any case, you should send cards if you want to get them.

Do not hesitate to send your name and address if the other amateur expresses her/his desire to send a card to you. It helps to provide your last name to the other operator, since your amateur radio station is not likely to be as well known to local Post Office personnel as commercial AM, FM, and TV stations.

Almost all foreign (DX) cards are received via the ARRL Incoming DX QSL Bureau. As soon as you start contacting foreign countries, you should send at least one self-addressed, stamped envelope (SASE) to your local sorting group, which is listed in *QST*. It is expensive and time-consuming for DX amateurs to address and mail cards directly. No matter what is promised on the air during a contact, there is very little chance you will receive a card via direct mail from a foreign amateur. You do not have to be an ARRL member to receive DX cards through the ARRL Incoming DX QSL Bureau, but you must be an ARRL member to send cards to foreign amateurs via the ARRL Outgoing DX QSL Bureau. If you want additional data regarding the ARRL DX QSL Bureaus, you can request it by writing to 225 Main Street, Newington, CT 06111-9965.

Do not assume that every amateur has an up-to-date callbook or other access to your correct address. Most amateurs let a few years pass before buying a new callbook.

If you want a good explanation concerning the design and use of QSL cards, buy a copy of the *PSE QSL* book that is published by Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. That book provides a wealth of information about QSL cards, bureaus, styles, print sizes, managers, and report forms.

It is sometimes necessary to conduct on-the-air tests, such as when you are checking out an antenna system. If you are going to run tests on a busy band, take care to select a frequency that is not in use. It is even better if you use a band while it is dead.

Using a headset makes your station operation much more acceptable to others in the immediate area around your equipment. A good pair of communication headphones can also improve your ability to hear weak signals.

Do not use a junk handkey, since a poor one can make it more difficult for you to send good code. Shift to a paddle with an electronic keyer when you want to send code at a faster rate. A semi-automatic key (bug) is harder to master than a keyer and does not provide the many additional features of a keyer with a paddle.

Have good lighting in your station and set up your station on a large desk/table with plenty of room for your arms to rest on the operating surface. Use good writing instruments.

It is advisable to join the American Radio Relay League, your local amateur radio club, and any on-the-air groups which promote your operating interests. It is also helpful to subscribe to amateur radio publications such as *CQ*, *CQ VHF*, and *QST*. Many groups promote specific operating modes and activities; you may decide to join one or more such groups to enjoy their activities.

Summary

I hope that one or more of the preceding tips helps you improve your communications capabilities. If you know of other points you think should be covered in any future similar article, I would be glad to receive your comments. I hope to contact you on the air.

Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be send to anyone who requests it and sends a business-size (#10) self-addressed and stamped envelope to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

73, Bill, W6DDB

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MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

A Vital Note on Electrical Safety

This installment of "Math's Notes" is the result of recent events that concern me a great deal. Let me tell you why.

Several months ago while reading another amateur radio publication, I came across an interesting article that described an experimental medical device with potentially amazing curative properties. The article was the culmination of a series of editorials by the publisher on the yet-to-be-discovered beneficial results of externally applied electrical currents to the human body. Why this was published in a magazine devoted to amateur radio is not exactly clear, but that's another story.

The device was very carefully described with a companion schematic diagram and complete construction details. What concerned me was that the device was specifically intended to connect directly to, and pass current through, a human being. In fact, it was even suggested in the article that the current level be adjusted to the point where "a comfortable tingle" could be felt. The exact method of making the connection to the body was also described, as well as the suggestion to experiment with different current levels, polarity reversal intervals, etc.

I do not know how many *CQ* readers read that article, but I simply must voice my concern over the publication of such information in a magazine aimed at anyone other than medically competent personnel. If you have any common sense whatsoever, you should **never, never willingly connect anything to your body (or anyone else's for that matter) that will result in any current flow exceeding 20 microamperes for any reason whatsoever!** If you do, there is a very real chance of your heart going into fibrillation **and failure** shortly thereafter. Numerous studies done in the 1960s and '70s have clearly indicated that current levels of this magnitude, passing directly through the heart, can be very dangerous, and as a result, any experimentation along these lines should only be done with the direct assistance, cooperation, and supervision of properly trained medical personnel. Otherwise you simply are asking for trouble.

At this point some of you may say, "Hey, we all have gotten shocks on occasion, and most of us have lived to tell the tale. If 20 microamperes through the heart can be fatal, how come we don't have more problems, especially in a hobby that deals with electricity all the time?" That's the obvious question, and as a reply let's look at some facts.

1. Fig. 1 is a representation of the possible paths electrical current can take through portions of the body, including the heart. From the diagram it is apparent that the circuit between both hands or arms definitely includes the heart. The circuit from head to foot can include the heart. The circuit between the two feet does not directly include the heart nor does the circuit between fingers or toes.

c/o CQ magazine

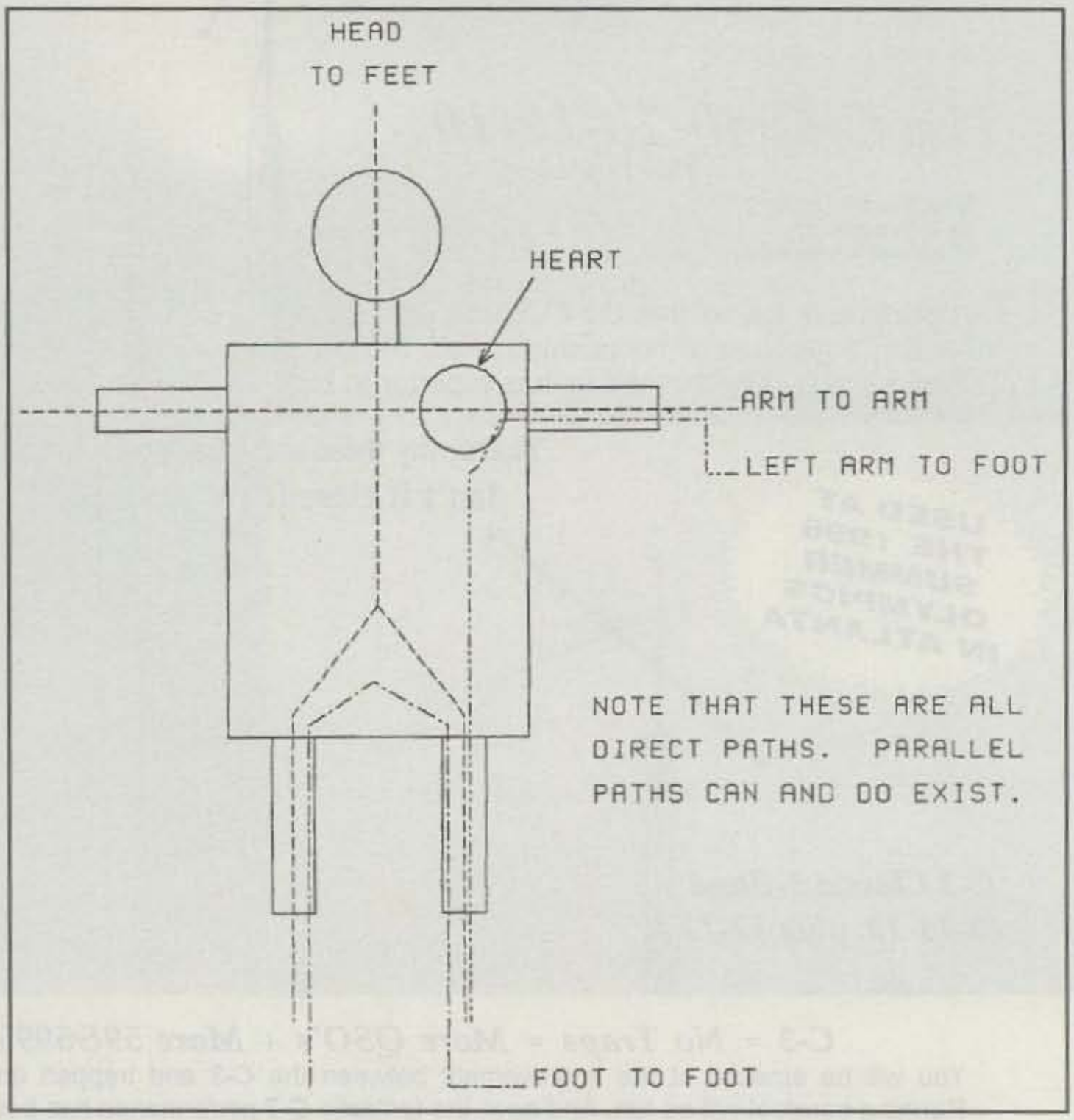


Fig. 1– Possible current paths through the body.

2. In order for dangerous levels of current to flow, enough voltage has to be present to force the electrons to overcome the resistance of the body. Dry skin has high resistance and requires high voltages to pass current. Wet skin has low resistance and does not need as much voltage to pose a threat.

3. Human internal organs are immersed in fluids containing saline (salt water) and hence are conductive. Once current goes past the high-resistance skin "barrier," the rest of the internal path doesn't offer much more resistance.

4. Since the internal organs are enclosed in an outer layer of skin, the current that flows between any two points divides between the internal path and the shunting external path. Fig. 2 shows this in schematic form.

Statement 1 is the reason for the old electrician's rule which states that persons working around high voltages should always keep one hand in a pocket. It is also the reason why people standing on wet ground should never reach out to touch any "live" electrical wire or stand up in a lightning storm.

Statement 2 is the reason why a 1.5 volt D-cell is not normally dangerous, but why several 9 volt transistor radio batteries in series, the AC power line, and the B+ supply in your kilowatt final can be.

Statement 3 is the reason why doctors use conductive paste and mild abrasives when connecting devices such as EEG machines to a patient to measure the voltages generated by internal processes. It is also the reason why even a lowly D-cell should never be "connected" to an open wound for any reason.

Statement 4 is the reason why most of the time we only suffer a shock, not a catastrophic failure. Statement 4, however, also refers to a fact of which we should always be aware: **No matter how the current flows through our bodies, since all parts are in contact with each other, it is always possible that there will still be some current flow through the heart.** Exactly how much current is only a matter of resistances and voltages. Think about fig. 2 again. As my freshman EE-101 college instructor used to say, "Electrons are very dumb

and single-minded. They do not know where they are supposed to go, since they cannot even read a schematic diagram. If there is any path for them at all, no matter where, they will blindly follow it!" For these reasons I have to repeat and emphasize my earlier statement: **Never, never willingly connect anything to your body (or anyone else's, for that matter) that will result in any current flow exceeding 20 microamperes for any reason whatsoever.**

Now that I have made my speech, I wish to state that I am the last one in the world to criticize any person or group who feels that a particular technique utilizing electrical current flow through the human body, no matter how strange it may appear at first, may have beneficial results to mankind. A number of such procedures already exist or are in various stages of development, and I am certain there will be others. I simply feel that when dealing with any device or procedure designed to pass current through the human body, for all of the reasons given above:

1. Extreme caution must be exercised.
2. Experienced personnel must be involved in any and all such experiments.
3. Appropriate warnings in large, bold type must be printed at the beginning, middle, and end of all construction articles on such subjects.
4. Detailed information on such equipment should only be presented in publications oriented toward personnel who have enough experince and maturity to know exactly what they are doing.

None of us have an internal fuse that can be replaced or a circuit breaker that can be reset.

73, Irwin, WA2NDM

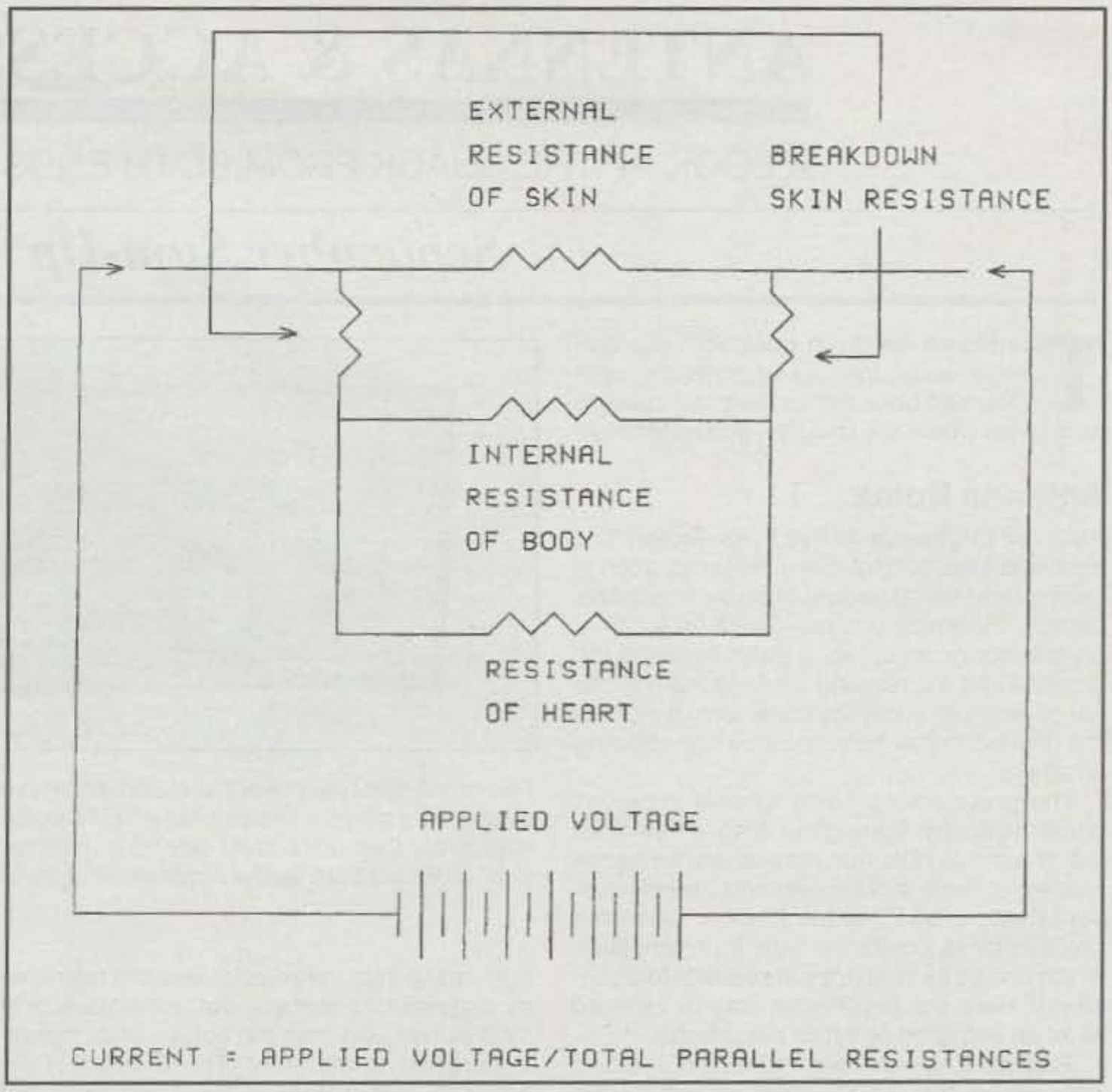


Fig. 2– Simplified model of body resistances.

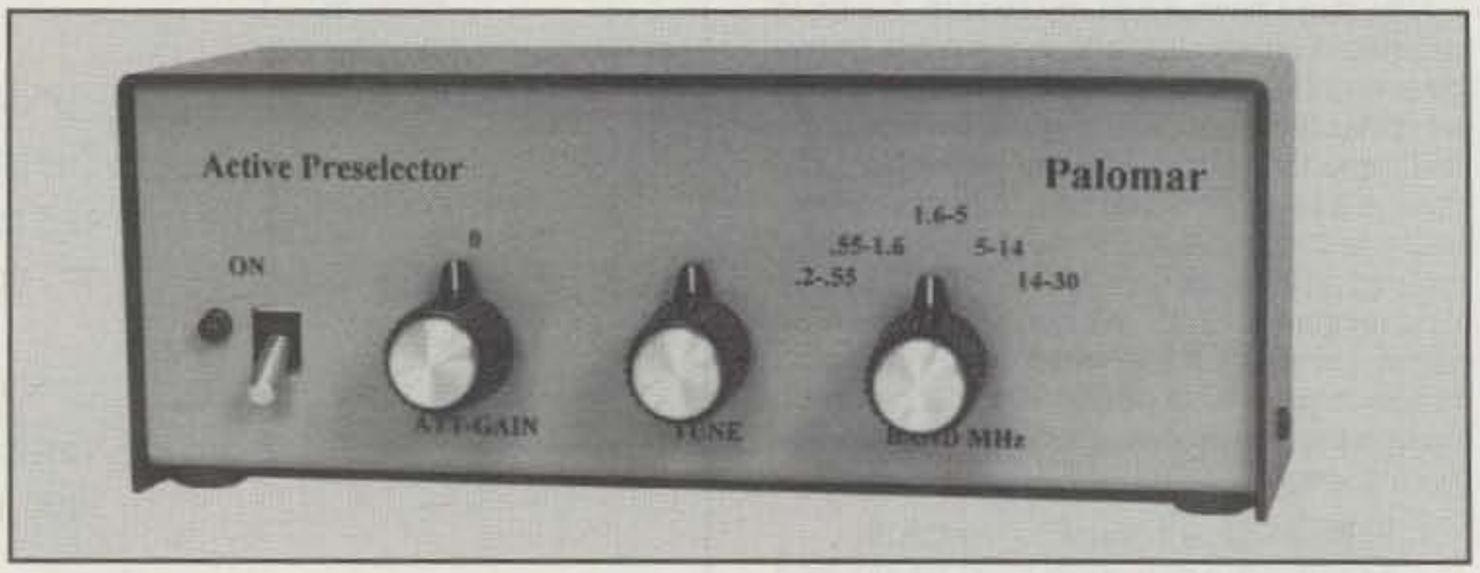
BY KARL T. THURBER, JR., W8FX

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

September Sum-Up

This month we're on track with our column's usual formula of antenna, software, and book notes. As is our custom, we'll begin where we should—with antennas.



Palomar Engineers offers the P-508 active preselector, which covers 200 kHz to 30 MHz in five overlapping ranges. The unit has a FET-bipolar amplifier to tolerate high signal levels without overload better than units using older dual-gate technology. The unit also provides 20 dB signal gain for receivers that need a boost when signals are weak. (Photo courtesy Palomar Engineers)

Antenna Notes

Palomar Engineers Active Preselector. The front-end selectivity of many receivers often is minimal and represents an obstacle to good reception. However, you can insert an external preselector or an antenna tuner between the antenna and the receiver antenna input terminal to achieve some improvement. It passes the desired signal frequencies while rejecting all others.

The preselector's being tunable improves performance by filtering out images and other out-of-band signals that may otherwise cause problems; these include overload, receiver desensitization, and intermodulation. Often the preselector is combined with a preamplifier, which boosts performance in sets with low sensitivity. Here, the preselector may be referred to as an amplified or active preselector.

Palomar Engineers has introduced an active preselector, the P-508, which covers a wide range of frequencies, from 200 kHz to 30 MHz, in five overlapping ranges (see photo). The unit has a FET-bipolar amplifier, circuitry which tolerates higher signal levels without overload than units using older dual-gate technology, to operate better in today's high-signal density environment. The $99.95 unit provides 20 dB signal gain for receivers that need a boost when signals are weak.

For more information on the P-508, or a free catalog, contact Palomar Engineers, P.O. Box 462222, Escondido, CA 92046 (619-747-3343; Internet <75353.2175@compuserve.com>.

Ultimate Indoor Antenna from R F Electronics. R F Electronics has announced several VHF/UHF indoor antennas and accessories. They call their main product the "Ultimate Indoor Antenna"; it's a compact, 5-element quad for 2 meters priced at $49.99. Also offered is an omnidirectional, dual-band antenna for 2 meters and 70 cm at $36. Third in the product series is a ceiling-mounted, indoor antenna rotator, one featuring high-claimed accuracy and sporting a precision stepping motor. The $54 package includes the rotator, controller, and power supply.

For more details, contact R F Electronics, 14604 Vintage Lane, Dallas, TX 75244.

Genesys G-1 Dual-Band Base Station Antenna. Genesys Products Group, Ltd. offers a variety of amateur VHF/UHF base station, mobile, and HT antennas, along with several mounts and accessories. Recently the firm announced their smallest dual-band base antenna, the G-1 Dual-Band Base Station Antenna, for 2 meters and 70 cm.

The G-1 is designed for amateurs who have tight space requirements or who are restricted by antenna ordinances—the antenna is only 42.5 inches long from the bottom of its mounting bracket to the apex. The G-1 is factory-tuned to the centers of the two bands and comes with a mounting sleeve which protects the UHF SO-239 connector, two U-joint brackets, and three ground radials. The antenna is priced at $99.95.

For more information contact Genesys Products Group, Ltd., 10815 Gulfdale, San Antonio, TX 78216 (1-800-847-4745; Internet <genesys @connecti.com>.

Harbach Electronics Antenna Parts. Al Harbach, WA4DRU, offers a variety of precision, anti-corrosion parts and assemblies for the amateur beam-builder. His firm sells hardware for a wide choice of elements and boom diameters. Among items offered are a selection of stainless-steel element saddle clamps, aluminum-alloy element-to-boom and boom-to-mast plates, and stainless element clamps.

For a flyer, contact Allen B. Harbach at Harbach Electronics, 2318 S. Country Club Road, Melbourne, FL 32901-5809 (407-723-7145).

Quick Talk Antenna Raiser. A rather unusual antenna raising and lowering device is available from Quick Talk. It can be mounted on motor homes, trailers, mobile homes, semi-trailers, boats, trucks, and other vehicles.

The heart of the Quick Talk Antenna Raiser is its steel base. The device isn't bolted down, but rather lies flat and is held in place on your motor home or trailer roof by a strong silicon adhesive under the base. A remote-controlled, 12 VDC motor controls the unit and causes the antenna or mast to pivot.

Two models are available. One handles antennas and couplings with a combined weight of 6 lbs.; the other raises antennas up to 30 lbs. Available accessories include an up-down switch, an 18 ft. antenna for 10 to 17 meter use, and aluminum extensions for the antenna. An illustrated flyer is available.

For more info, contact Quick Talk, Box 574, Winter Haven, CA 92283 (520-783-1101).

Antenna Network Lab, Inc. (ANLI) Products. ANLI offers a variety of antennas imported from Taiwan, mostly for VHF and UHF. These are designed for several markets, including land mobile, cellular telephone, and amateur radio communications. Mobile, portable, base, and marine antennas are described in their 12-page catalog, which is free of charge.

A variety of accessories also is offered, including antenna mounts and parts, cables, connectors, and battery chargers. The available antennas cover amateur frequencies in the ranges 47–55, 144–148, 220–225, and 430–450 MHz, among others. The ANLI antennas come with a one-year limited warranty.

For a free catalog, contact Antenna Network Lab, Inc., 11627 Clark Street #102, Arcadia, CA 91006 (1-800-487-1110).

Larsen Dual-Band Mobile Antennas. Larsen Electronics is known for its high-quality antennas, especially dual-band 2 meter and 70 cm mobile and portable models. Recently Larsen introduced a short-whip (17 inch) dual-band antenna, the NMO 2/70 SH, which is 16 inches shorter than the firm's standard NMO 2/70 model.

The NMO series uses brass for conductivity with nickel-tin plated steel for strength and corrosion resistance; the enclosed coil construction reduces wind noise, and the heavy-duty spring base adds durability. The antenna covers 144–148 and 440–444 MHz and handles 100 watts. It comes with Larsen's three-year "no-nonsense" warranty.

Larsen offers an illustrated catalog of its extensive line of mobile, portable, and base-station antennas and accessories. For details, contact Larsen Electronics, Inc., P.O. Box 1799, Vancouver, WA 98668-1799 (1-800-426-1656).

Specialized Antennas and Downconverters from Cellular Security Group. In the March 1991 column we noted the popular MAX

289 Poplar Drive, Millbrook, AL 36054

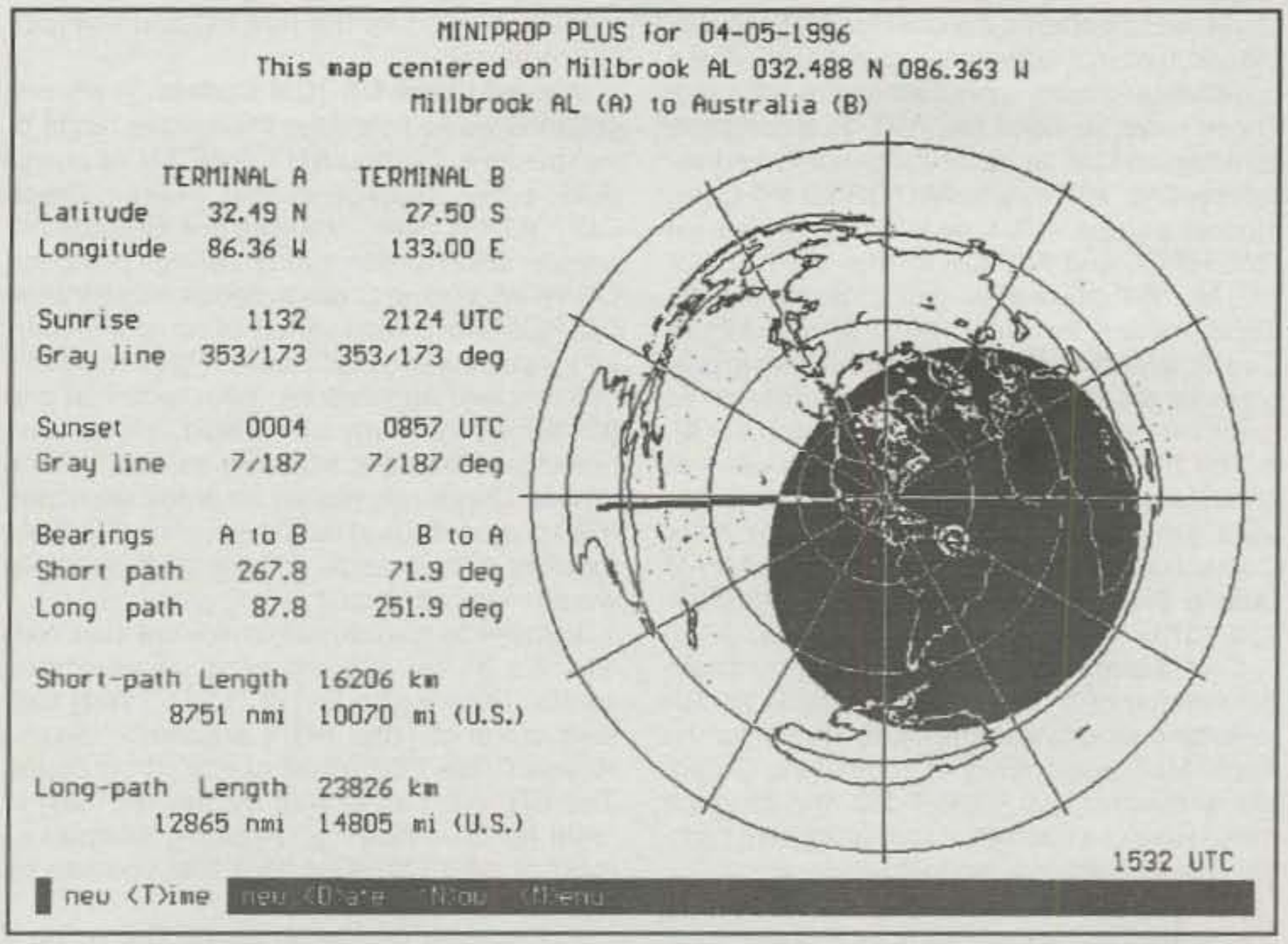


Fig. 1– Using a hamshack computer, you can produce predictions of HF skywave conditions between any two points on the globe, along with a great deal more useful information. Shown here is W6EL's DOS-based MINIPROP PLUS 2.5 great circle (azimuthal equidistant projection) display centered on W8FX's QTH and depicting path and other data to Australia.

series of amateur VHF/UHF groundplane vertical antennas offered by Cellular Security Group for 146, 220, and 440 MHz. As we noted, the idea behind the MAX antennas was to capitalize on the advantages of the groundplane in terms of efficiency, low angle of radiation, good SWR characteristics, and easy-to-handle 50 ohm feedpoint impedance.

A recent flyer from the firm notes several new antennas, including handheld, scanner base, and "Loopyagi" directional antennas for the 800–900 MHz band. Also described in the flyer are several interesting full-size, resonant indoor antennas for enhanced listening to cordless telephones in the 46–49 MHz band. A 10 ft. wire dipole ($49.95) and a 15 ft. portable end-fed, halfwave antenna ($29.95) are offered.

As the owner of a new Bearcat BC-9000 scanner, I'm amazed at the number of "odd-ball," nonamateur VHF and UHF frequencies that have activity in my area. Among the most active of these is the 46–49 MHz cordless telephone band, which incidentally also includes so-called "baby monitor" RF devices.

As a sidebar, although the legal issues involved are murky, if you want to be able to receive the blocked 869–894 MHz cellular telephone frequencies on your scanner, the firm offers an 800 MHz "virtual downconverter" for most scanners. The device reportedly overrides the scanner's CPU control by manually "swapping" the internal circuitry to a downconversion configuration. The firm installs the unit in your scanner for $99.

For more information and a flyer, contact Cellular Security Group, 4 Gerring Rd., Gloucester, MA 01930 (508-281-8892).

Software Notes

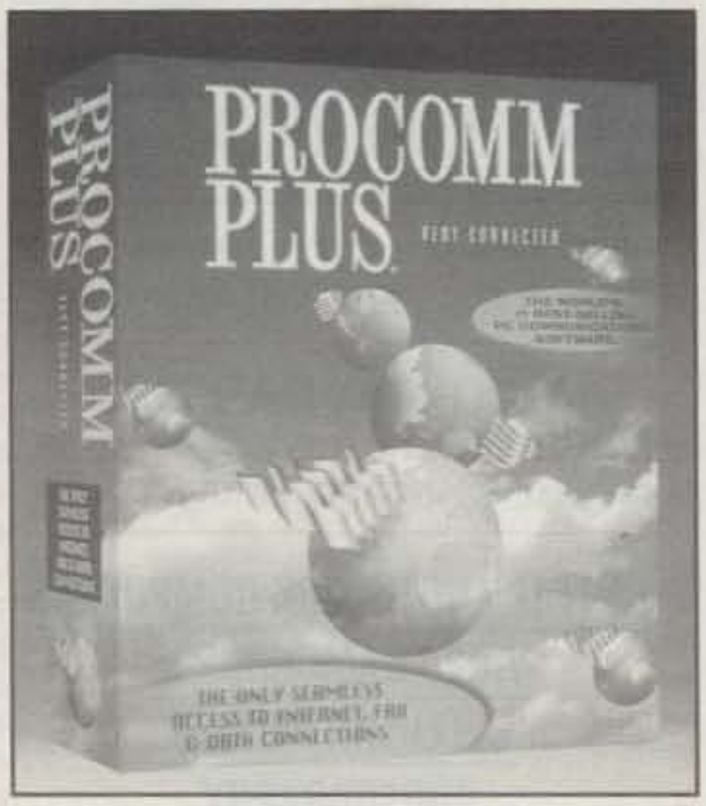
MINIPROP PLUS Version 2.5. To predict whether or not radio propagation conditions are likely to be good enough to "work" various areas of the world is important to the DXer. Using a computer, and with minimum input data, you can produce timely predictions of HF skywave conditions between any two points, along with a variety of other useful information, such as path, sunrise/sunset, grayline, and other communication details.

Since 1987 we've observed the steady progress of the DOS-based MINIPROP and later MINIPROP PLUS. These are comprehensive propagation prediction programs by Sheldon Shallon, W6EL. We examined Version 2.0 in July 1994, and recently Shel sent us his latest update, Version 2.5.

On any path you specify, and for any date, the program predicts the received signal levels for every half hour of the day on each of seven frequencies you specify between 3 and 30 MHz. Maximum Usable Frequencies (MUFs), radiation angles, beam headings, path lengths, sunrise and sunset times, and other useful information are reported. An important new feature of MINIPROP 2.5 is the calculation and display of predicted signal-to-noise ratio (S/NR) in addition to signal levels, as calculated in previous versions of the program.

Another new feature is a great-circle map display centered on your QTH, besides the rectangular world map display (fig. 1). Both maps show the great-circle path between any two stations and the location of the solar terminator (grayline) at any time of day. The resolution of the program's frequency map has been increased to show the frequency suggested for use between any QTH and each of the 877 areas of the world the program considers, at any time and date.

The program also prints a great-circle map centered on any location for use as a station operating aid. Still another impressive feature is that the MUF graph now is drawn in true



PROCOMM PLUS 3.0 is the latest incarnation of Datastorm Technologies' highly intuitive communications software. It claims to be the first PC communications software to seamlessly integrate Internet, FAX, and data communications. The program works under Windows or under Windows 95. (Photo courtesy Datastorm Technologies, Inc.)

graphics. Another graphics display shows predicted signal levels and S/NR for all your prediction frequencies at once.

MINIPROP PLUS 2.5 for the IBM PC is $60.00 postpaid in the U.S. and Canada, and $65 U.S. elsewhere. It's from W6EL Software, 11058 Queensland Street, Los Angeles, CA 90034-3029.

A Closeout on Commodore CW/RTTY/AMTOR Adapters. Does this closeout signal the real end of the Commodore computing era? For a number of years G and G Electronics of Maryland has offered the communications cartridges, terminal/interface systems, and Morse code tutors formerly manufactured by Microlog. These have included the ART-1, a complete communications terminal for sending and receiving CW, RTTY, and AMTOR for the Commodore 64/128; AIR-1, an interface system for CW, RTTY, and AMTOR for the Vic-20 or C-64/128; SWL, a receive-only cartridge for the same modes for the C-64/128; and Morse Coach, a Morse code teaching and testing program for the C-64/128. RTTY capability on all terminal units includes both Baudot and ASCII.

The firm is closing out the product line at attractive prices. According to their flyer, quantities are limited and subject to prior sale. Contact G and G Electronics of Maryland, 8524 Dakota Drive, Gaithersburg, MD 20877 (301-258-7373).

C.W. Tutorsoft©. Mac mavens should note the release of a new version of the C.W. Tutorsoft© Interactive Morse Code Trainer for the Apple Macintosh family of computers. Originally written for the Apple II PC, the program makes use of a number of sophisticated psychological instructional techniques.

The publisher's president, John D. Gosselink, notes that the program is a variable speed, variable pitch, randomized interactive Morse program that teaches character, word, callsign, and QSO phrase recognition. This is accomplished through a series of passive and active exercises. All exercises offer immediate feedback plus an overall score for drill sessions, making it easy for students to record progress.

The program requires 2 MB RAM and may be used with the Mac's internal speaker, or it can drive an external amplifier through the Apple Macintosh Sound Manager© program, which is included on the diskette. C. W. Tutorsoft is $30 postpaid from Wind & Fire Development, 509 E. First St., Pella, IA 50219-1821 (515-628-1487). The company promises a future version for the IBM PC and compatible computers.

Walnut Creek CDROM Update. In several columns we've noted the impressive range of inexpensive, high-quality CD-ROMs of practically every description that Walnut Creek CDROM has been cranking out. Besides the popular QRZ! amateur radio callsign database CD-ROM, Walnut Creek includes in its libraries CD-ROMs for a wide variety of computer operating systems and platforms, programming languages, and applications (both technical and nontechnical). Many multimedia, image, and text-laden disks are available as well. In fact, Walnut Creek has placed so many gigabytes (GB) of program and data material on CD-ROM that they almost can be considered to be a software reference library!

If you're on the Internet, check out their Web site. It's at the address <http://www.cdrom.com/>. There's also AA7BQ's QRZ! Web callsign server at <http://www.qrz.com/> and the Walnut Creek FTP server at <ftp.cdrom.com>. The FTP site has tens of megabytes (MB) of "stuff for downloading," including samples of most of their CD-ROM titles that you can try before buying.

For an ever-thickening catalog depicting a variety of disks, contact Walnut Creek CDROM, 4041 Pike Lane, Suite D, Concord, CA 94520 (1-800-786-9907). (They also sell through distributors, many of which offer their disks at substantial discounts.)

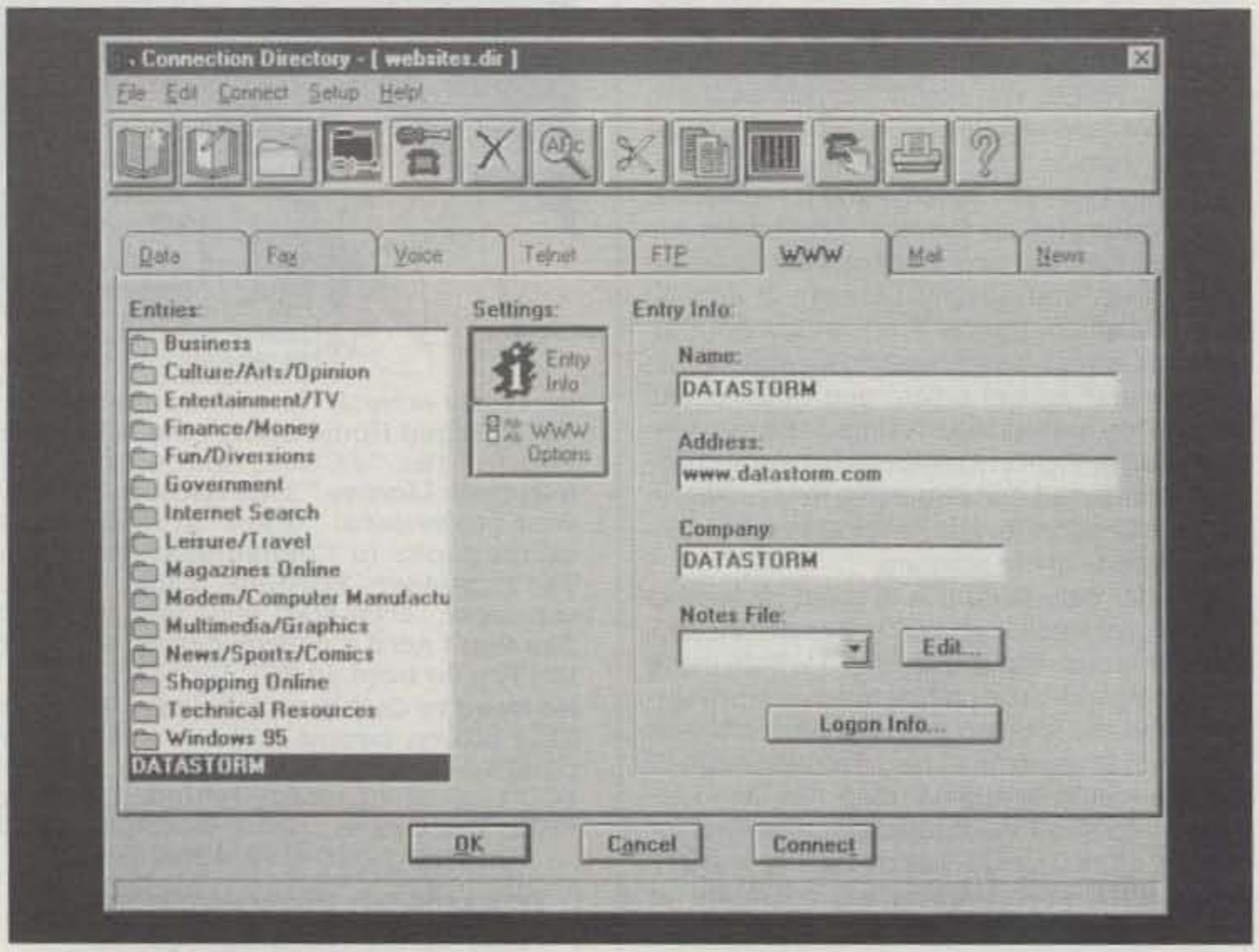
PROCOMM PLUS 3.0. Since its beginnings as shareware software in the early days of the IBM PC, PROCOMM and PROCOMM PLUS have long been the communications programs of choice for many amateurs' ham-shack PCs. We're no stranger to these programs, having reviewed various versions in the column. Most recently, we reviewed the Windows Version 2.11 in the September 1995 column.

Now Datastorm® Technologies has updated the program to V3.0, mainly to add a complete suite of Internet-access programs to the mix (see photo). The company asserts that it's now the first PC communications software to seamlessly integrate Internet, FAX, and data communications in a single package. While the whole product has been "spiffed up," the main enhancements are to the connection (dialing) directory and FAX capabilities, plus the suite of new Internet tools and Web browser, which they colorfully call Web Zeppelin™.

In my view, the biggest enhancement is to the connection directory, which lets you move from one communications activity to the next easily. You don't have to maintain separate dialing directories or learn different programs to access a BBS, log on the Internet, browse a Web page, send or receive a FAX, or transfer a file. All of the communications tools are displayed in a convenient format for easy, point-and-click access.

The program also includes a variety of FAX enhancements, including the ability to scan incoming FAXes using the built-in Optical Character Recognition (OCR) capability, to convert them into character-based data. You even can annotate FAXes or insert text or graphics into them, clean up crooked ones, and even "scrub" FAXes with speck marks or scan lines.

Version 3.0 comes with various Internet client programs, including newsreader, mail, FTP, Telnet, and Web browser modules. All the modules are connected with one another and with the data terminal and FAX modules so you can move data around easily.



At the heart of PROCOMM PLUS 3.0 is the connection directory, the single source for your data, FAX, and voice telephone numbers, and your e-mail, Web, Telnet, FTP, and news entries. Click on a directory entry and the program adjusts your system's settings and makes the connection. (Photo courtesy Datastorm Technologies, Inc.)

Digital Satellite TV?

Should I own or not?

What does it really cost?

Can I get my local stations?

Will it work on my set?

Can I use it with two TVs?

Do I still need an antenna?

What else do I need?

Can I block channels?

What if I need help?

What does the red button do?

What about surround sound?

Should I disconnect my cable?

How big is it?

Any *more* questions?

If you're a little fuzzy about digital satellite TV, we can clear things up. Whether you choose to own the equipment or lease, we're the only nationwide retailer that offers RCA®-brand DSS, with DIRECTV® and USSB™ programming—or PRIMESTAR® service and programming—all under one roof. We've got the systems, we've got the accessories, we've got the answers. For a store near you, call 1-800-THE-SHACK℠.

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CIRCLE 154 ON READER SERVICE CARD

RadioShack.℠

You've got questions.
We've got answers.®

What did I think of the program? There's a great deal of value in PROCOMM PLUS 3.0, with its multi-communications capabilities—including several that resourceful amateurs will undoubtedly find useful in the hamshack. I was impressed with the new, all-in-one connection directory and the improved FAX capabilities; I found that sending a quick "memo FAX" to someone now is just as simple and easy as sending e-mail.

On the other hand, this is Datastorm's first real foray onto the Internet. The Net's client programs, including the browser, are not necessarily the most powerful programs around. Too, a full installation takes a whopping 35 MB of hard disk space and is very demanding of Windows 3.1 resources. In my own case, I had some trouble getting a PPP (Internet) connection to CompuServe, and when I logged on I found the mail program wasn't fully compatible with CompuServe's mail protocols. Thus, I couldn't use the full capabilities of the program's Internet suite.

PROCOMM PLUS 3.0 is $179, although it's available widely "on the street" for much less, and upgrades are reasonably priced at $79.95. For more information, contact Datastorm Technologies, Inc., 2401 Lemone Blvd., P.O. Box 1471, Columbia, MO 65205 (1-800-474-1548; Internet <http://www.datastorm.com>).

Books For The Hamshack

Digital Duo. If you're just getting your feet wet in packet radio and other forms of digital communications, here are two resource books you'll surely want to get your hands on.

The first is *Practical Packet Radio,* by Stan Horzepa, WA1LOU. It's the successor to Stan's classic *Your Gateway to Packet Radio* primer which we reviewed in the July 1988 column. The new 219-page book covers almost everything you need to select, install, and operate a packet station, from initially setting up the station to exploring BBSes and much more. A series of appendices includes sources of packet-related hardware, a glossary, and technical details. It's $15.95.

The second is *Your HF Digital Companion,* by Steve Ford, WB8IMY. It's what's needed to explore HF digital communication with a multimode controller. The 197-page book gathers in one convenient place information on both new and old HF digital modes, including RTTY, AMTOR, HF packet, PacTOR, G-TOR, and CLOVER. Each mode is discussed in terms of what's needed for you to set up a station and communicate using that mode. It's $10.

Both books are available from the American Radio Relay League, 225 Main St., Newington, CT 06111 (860-594-0200; Internet <ltardette@arrl.org> or <http://www.arrl.org/>.

The Underground Guide to Windows™ 95. I've almost had my fill of computer books with "cutesy" titles and oddball approaches. Many of the approaches taken are just *too* cute and annoyingly fluffy to be very palatable after the first few pages.

A possible exception is Addison-Wesley's "Underground Guide" series. The books tackle the tough questions head-on and still manage to keep a sense of humor and perspective, *without* becoming too cute in the process. The first book in the series that I've had the opportunity to evaluate is Scot Finnie's 427-page *The Underground Guide to Windows 95,* which purports to offer some very good but "slightly askew advice from a Windows Wizard."

Indeed, the book is humorous and its straightforward, practical approach is just right, covering Win95 setup, the interface and file system, Internet connections, the mobile computing environment, tuning and troubleshooting, customization, and more. The $22.95 book is well-illustrated.

For more information, check out your local bookstore or contact Addison-Wesley Publishing Company, 1 Jacob Way, Reading, MA 01867 (1-800-227-1936; Internet <http://www.aw.com/devpress/>. A free catalog is available from the publisher.

young@heart: Computing for Seniors. I instinctively dislike reading anything aimed at seniors; doing so reminds me of my current status as a middle-ager not that far from senior status. As a result, I turned the 368 pages of *young@heart: Computing for Seniors,* by Mary Furlong and Stefan B. Lipson, with trepidation. However, I was pleasantly surprised by the contents of this Osborne/McGraw-Hill book.

The book's main theme is that computer proficiency shouldn't be limited to baby boomers and "generation Xers," and that people 55 and over are eager to participate in the computer revolution. More than just an ordinary how-to book, it's designed to inspire this age group to learn about computer technology. It deftly explores the basics of computers as they relate to a senior's life and targets the special interests that older adults have.

The book is $22.95 and is available in book-

stores, or contact Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710 (1-800-822-8158; Internet <http://www.osborne.com>).

Short Bursts

Antique Radio Service Data. It's difficult to repair and maintain electronic equipment without operating or service manuals and schematic diagrams. Unfortunately, many manufacturers of older equipment now are defunct, or the manuals are out-of-print. Nevertheless, documentation probably still exists somewhere for almost any gear you're likely to encounter.

Many third-party manual-supply resources can furnish reproductions, or in some cases originals. Hamfest fleamarkets and swap meets can be good sources as well. For a difficult case try a classified ad in *CQ* or one of the other amateur radio publications. A classified ad in a publication that specializes in the type of equipment (amateur, surplus, antique/vintage, etc.) you're interested in may be effective in rounding up needed documentation.

I was surprised to learn recently that one of the several specialized sources of documentation for antique and vintage radios turns out to be one of my old college chums. Gary Micanek, who owns over 1000 such radios, can supply a wide variety of documentation—some of which is much more detailed than that contained in standard sources such as Riders and Sams manuals.

Gary has photocopies of original manufacturers' radio service data from RCA, Philco, Spartan, GE, Zenith, Majestic, Crosley, Grunow, Atwater-Kent, Motorola, and other radio manufacturers. He also has data on early TV sets, record changers, and car radios, as well as some car radio parts, technical data, and sales catalogs. Also available are Western Electric data, tube catalogs, test equipment manuals (Heath, EICO, Hickok, etc.), early hi-fi equipment data, and the like.

Call or write to Gary at 226 Henry Avenue, Manchester, MO 63011 (314-227-7046, preferably 7–9 AM Monday through Friday).

Legends of Amateur Radio Videotape. *CQ*'s Managing Editor, Gail Schieber, forwarded to me a videotape she received from Harvey S. Laidman, N6HL. The video is "Legends of Amateur Radio," subtitled "Tall Tales and Big Antennas," which was produced by The Southern California DX Club (SCDXC). It's a sort of "oral history" project the club undertook to interview and highlight three of their older longtime members who have lived almost the entire history of amateur radio.

Those interviewed on the tape include Ted Gillett, W6HX; Art Enockson, W6EA; and Gene Real, K6OJ. SCDXC was, I should mention, the "home" of some great amateur radio DXers such as the late Don Wallace, W6AM, and John Knight, W6YY. The club, of course, is saddened when history is lost in its members' untimely passing.

I found the video entertaining and enlightening. It's $10 plus $3 shipping from Harvey Laidman, N6HL, 4923 Encino Terrace, Encino, CA 91316 (818-784-9501).

We Get Letters

Once more we're just about out of space. Before closing, we'd like to acknowledge just a few of the folks who have written, FAXed, e-mailed, phoned, or otherwise corresponded with your columnist over the past several months. A tip of the hat goes to Paul Elliott, N3GPU; Stan Horzepa, WA1LOU; Mark Hoersten, N8VEA; and George Murphy, VE3ERP. Thanks for corresponding, and keep up with those cards and letters, gang.

Looking Back Five

Five Years Ago in Antennas and Accessories. Okay, so now you know what the column is like for September 1996. But what was hot in September 1991? This column took a deep scoop into the W8FX mailbag and was appropriately entitled "Special Delivery."

All the letters in the column were on antenna topics. L. B. Cebik, W4RNL, enlightened us further on the boomless X-beam; Dan Umberger, W8ZCQ, cleared up some of the confusion on Zepp antenna terminology; George Brennert, W2CUA, summarized his experiences with various types of end-fed antennas; and Larry V. East, W1HUE/7, offered some cautions on using attic antennas. In addition, Mike Zane, K6URI, discussed the benefits of centerfed multiband HF antennas; Jerry L. Bartachek, KDØCA, sent us information on the Australian Black C.T.W. (Continuous Traveling Wave) HF antennas; and E. Grant Kundert, Jr., KBØHRG, asked for pointers on identifying and using CB beams on 10 meters.

In the same column we updated the ION-SOUND ionospheric prediction program; discussed HB9DBC's CwDrill code practice program; gave details on SCORPIO (Shortwave Computer Operated Radio Plus I/O), an integrated monitor package for SWLs from Ashton ITC; described PROCOMM PLUS, an intuitive, DOS-based predecessor of the current Windows version (discussed this month in the column); and updated a previous review of the CheckIt® diagnostic program from TouchStone Software. We relayed some observations on the benefits of a computer user group, noted the *CQ 1991 Antenna Buyer's Guide*, and offered suggestions to shareware authors in forwarding us their products for review.

Wrap-Up

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

Overheard: Most of the time, the best and most creative ideas come *not* from the experts, but from beginners.

73, Karl, W8FX

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

A Potpourri of Heartwarming Topics

Unofficial reports and on-the-air observations indicate some of our friends are feeling almost as low as present sunspot counts, so this month's column is an enthusiasm builder with something for everyone. We have a variety of good news subjects lined up for discussion.

Sunspot Cycle 23 is barely starting, true, but it already is generating waves of renewed excitement, and they are rippling into all areas from QRP and working the WARCs to OSCAR satellites and rediscovering the romance of classic rigs. Hang on to your hats, friends. The next half dozen or more years promise to be terrific! With so many areas beginning to flourish at the same time, you could start enjoying a few of them now and still not get everything in by the year 2000. Drag your feet and you will be putting up new antennas, learning how to use a new rig (or relearning your old rig), and brushing up on your DXing techniques while everyone else is having a ball. The wait for the "good times" is over. They are here!

That's enough soapboxing for this time. Let's jump into the views behind those statements.

HF Bands Getting Better Daily

The sunspot count was down to near zero during December '95 and January '96, and the bands above 40 meters were undeniably flat. The count went up slightly in February and March '96, the MUF (Maximum Usable Frequency) went up, and even 10 meters boasted some occasional DX openings. As most amateurs who have gone through a couple of sunspot cycles agree, this upward climb has always been more exponential than linear (a quick jump start rather than a slow crawl). The previously mentioned sunspot variations could have been bottom-of-cycle fluctuations, but they also could have been the first good winks from Cycle 23. Think optimistically!

Looking back over propagation reports from *CQ*'s famed George Jacobs, W3ASK, I noticed past sunspot peaks occurred in 1957, 1968, 1979, and 1990. I also noticed the count fell to 10 in 1986, jumped to 71 in March 1988, continued on to 120 in the fall of 1988, and reached 138 in January 1989. Applying a similar logic to sunspot Cycle 22, we can estimate a count of 35 around November '96 and 70 by fall of '97—and possibly (probably!) sooner. Will the improvement be noticeable? You bet!

Like many of our readers, I made very few upper HF band DX contacts during this past December and January. The sunspot count was up to 5 by May '96, and I started working all kinds of DX such as Reunion Island, Malta, the Canary Islands, Ireland, and more. Here's the clincher: My rig ran only 5 watts to a 30 meter test dipole 12 feet above ground (photo 1). I hid half the antenna in our sun deck and still reached out to the other side of the world. (My results are only one example, too. Other QRPers around the country did equally well.) Remember the Miniprop Plus computer program from W6EL Software (11058 Queensland St., Los Angeles, CA 90034) I featured in last December's column? I entered propagation data for May '96 into it, and Miniprop Plus accurately predicted the good DX openings I experienced (photo 2). It also confirmed the hopeless conditions experienced in December and January. Yes, friends, the upper HF bands are getting better every day—and there's more.

A month later (June '96), the sunspot count was up to 7 and 20 meters started its improvement. While running 5 watts and a simple vertical antenna, on 20 meters I worked Asiatic Russia, Tunesia, Croatia, Japan, and more. If all that evolved when sunspots only went to 5 or 7, imagine how hot the bands will be when the count reaches 35—or more!

What is the sunspot count right now? Here is a quick way to answer that question yourself. Check the solar flux number announced by WWV on 5.0, 10.0, or 15.0 MHz at 18 minutes after each hour. A flux of 66 equals an approximate sunspot count of 5, a flux of 72 equals an approximate count of 14, a flux of 88 equals approximately 35, and a flux of 120 equals a

4941 Scenic View Dr., Birmingham, AL 35210

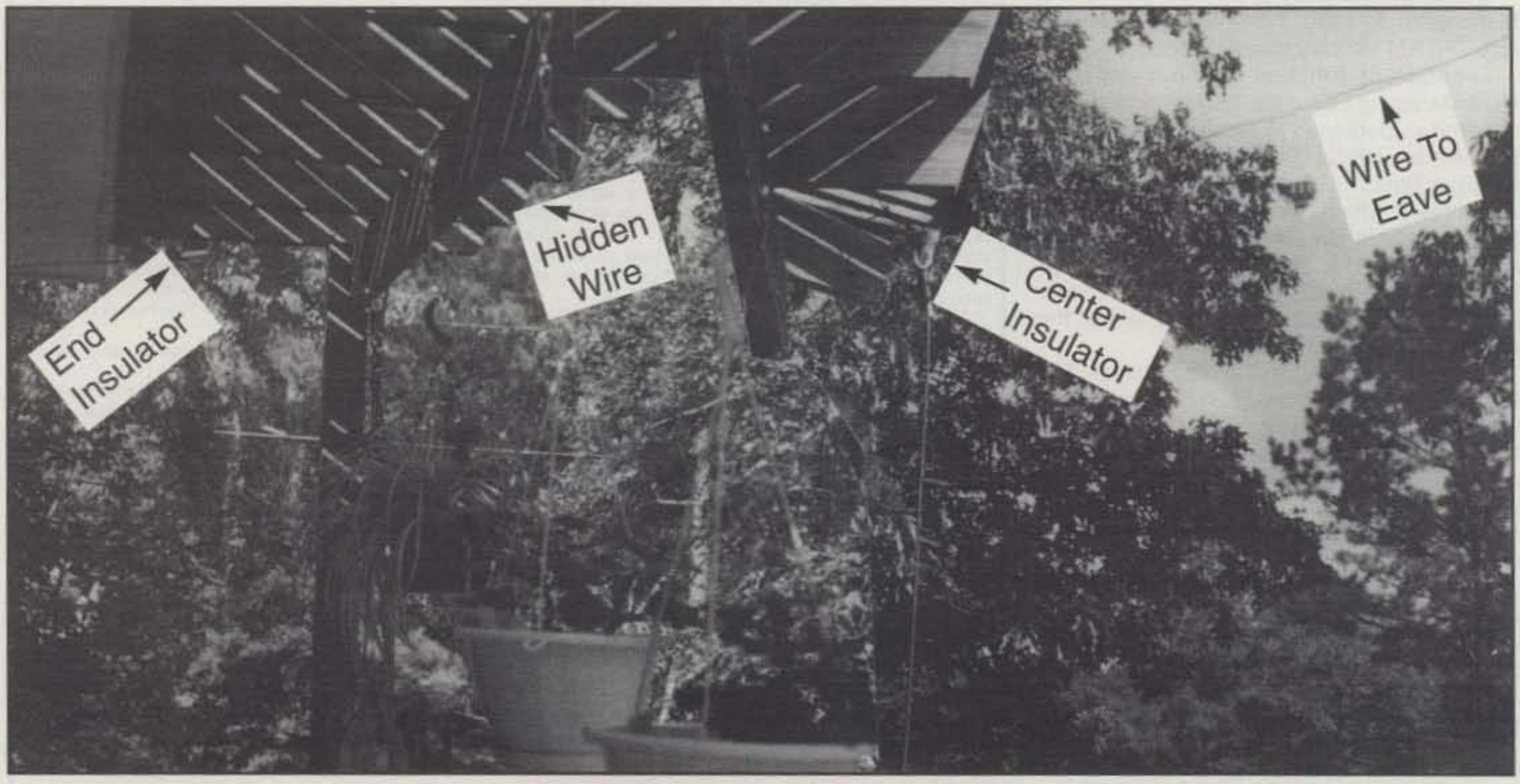

Photo 1– Problems with antenna restrictions? These butted-together photos show my 12'-above-ground test dipole hidden along the edge of our sun deck and extending to a nearby eave. Although blocked by foliage and 5 or 6 dB below my reference Delta Loop at 50 feet, it has been used for many great DX QSOs. (Discussion in text.)

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Bob Penneys, WN3K
Ham Radio Outlet
Delaware

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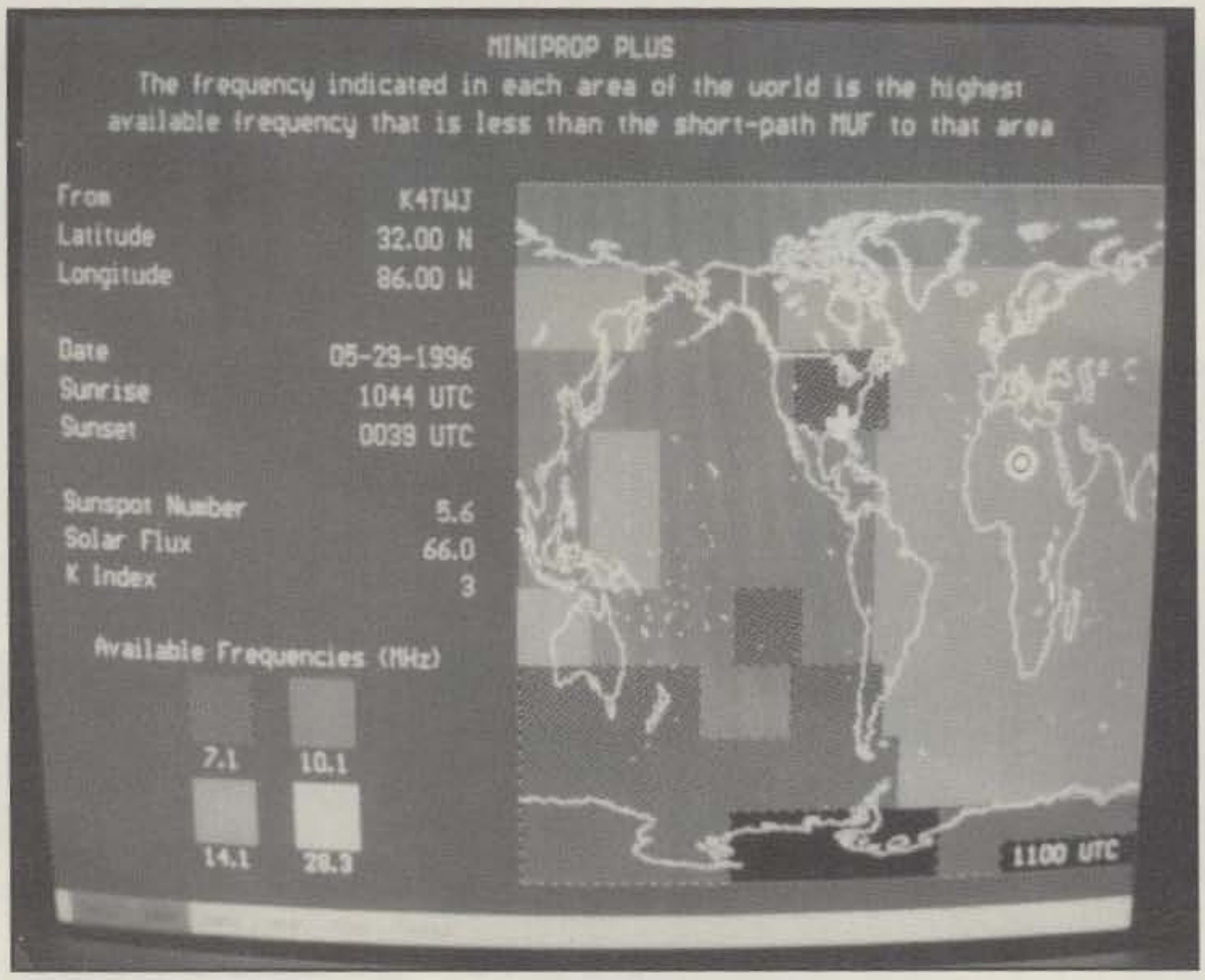

Photo 2– This off-the-monitor photo of the MiniProp Plus program shows 30 meters (medium shaded areas) open to the South Pacific, Australia, the Far East, and much of the Indian Ocean. My QTH (on the edge of the shaded area) is marked with an "X." Note date, time, solar flux (66), and sunspot count (5.6). MiniProp Plus programs are available from W6EL Software (see text).

count around 71 (all assuming a K index of 1 to 4). A higher flux number means you should be operating the bands and working DX rather than listening to WWV. All of my previously mentioned "better sunspot" DX QSOs were on CW, incidentally, but that just brings another uplifting topic into focus.

CW Alive and Thriving

With the majority of amateurs today using voice modes, CW band segments are being left pleasantly open for great DXing—especially if you are running low power. Start brushing up on your Morse code copying skills, gang. It's the best QSO-per-dollar investment you can make in amateur radio enjoyment. How? One of the most convenient and productive ways I have seen is using the new MFJ-414 shown in photo 3. Not only does it send QSO-type code like that received on the air or used in license exams, it has a two-line readout that displays its text as it is sent. You can, of course, select any desired speed from 5 to 60 WPM, normal spacing or Farnsworth spacing, change the tone to fit your preference, and more. The MFJ-414 is also small enough to carry anywhere (3.75"H × 2.5"W × 1"D). Use it for a few minutes a day, every day, and you will become prolific in CW in the shortest possible time.

In today's world of highly specialized digital communications, it may seem easy to visualize Morse code as becoming a mite outdated. However, take a closer look at the facts. Today there are more companies and master craftsmen making exquisite hand keys and paddles than ever before. If amateurs in the U.S. are not buying and using those keys, who is? DX?

There is more encouraging news for CW lovers. The office of continuing education in Human Sciences at the University of Wisconsin and the John Hopkins Institute Center for Technology in Education recently formed the Morse 2000 Worldwide Outreach Program. The combined-resource program is supporting research in use of Morse code for rehabilitation and education, and results thus far have been quite impressive—especially among severely handicapped people. They have found, for example, a person who can move only one limb or produce eye or tongue movement can communicate by Morse code. They also have found use of Morse can be relatively quiet and unobtrusive, more portable than any computer setup, and inexpensive to implement. Further, a Morse code speed of 20 or 25 words per minute

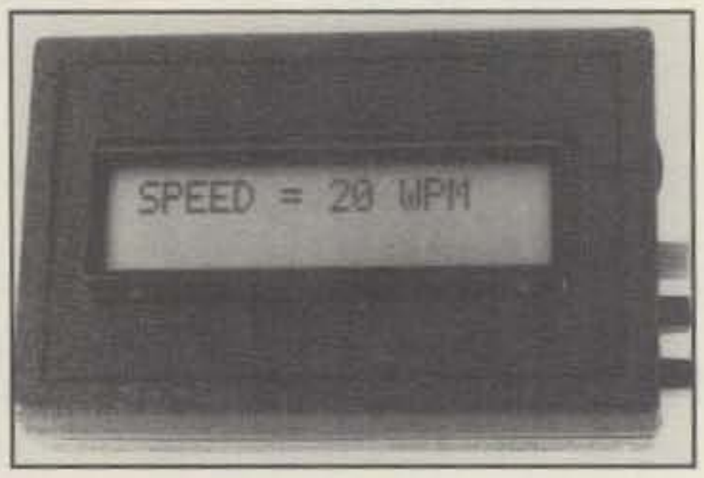

Photo 3– CW rusty? Need to improve your Morse copying ability or upgrade your license? Check out the new MFJ-414. It generates QSO-type code for practice, displays text on its built-in readout, and slips into your pocket for impromptu use anywhere, anytime.

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The introduction of the all new AOR AR7030 shortwave receiver is offered to the discerning and dedicated listener. No matter how many new features are offered, ultimately a receiver will be; judged on how well it receives! The AR7030 is the result of a combined project between AOR and a UK designer. The AR7030 represents the very latest and best design, featuring exceptionally strong signal handling and bristling with enhanced features. The AR7030 has been targeted to handle strong signals that are of prime concern of European listener. It offers greater than +35dBM IP3 (InterceptPoint 3) and greater than 100dBm dynamic range. The DMOS FET QUAD first mixer with NCO drive DDS offers the ultimate performance. All this and great sensitivity better than 0.5µV for 10dB S/N in AM mode and better than 0.3µV for 10dB S/N in SSB. Selectivity too is razor sharp offering greater than 90dB @ 10kHz SSB and greater than 100dB @ 20kHz. No other receiver "in the class" nor indeed at considerably higher price can match the sheer performance excellence of the AR7030.

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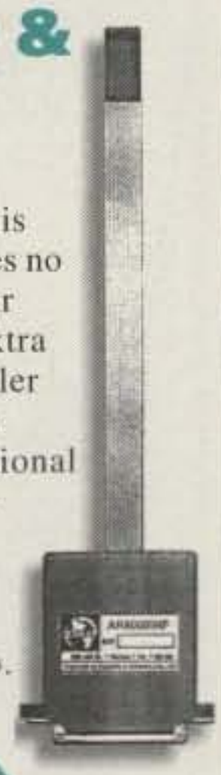
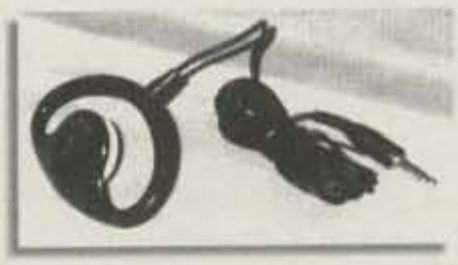


Unlike some of the European devices sold today, this unit is smaller, lighter, and makes no power demands on your receiver. With the extra shielding and smaller size there is less chance of additional interference leaking into your radio.

• Memory banks include 100 channels per bank with frequency, description and mode.• Search ranges include frequency, step, mode and description. New database search by service codes.• Data logging to the file includes date and time stamp, signal strength, tone and number of hits, location (requires PerCon Database) • Spectra analysis uses search ranges or displays logged data • NEW High Speed CTCSS & DCS controlled scanning with the RS-2005/6, RS-2035 and OptoScan with 456/535. • CTCSS & DCS controlled scanning on R7000/7100 & AOR 3000/3000A AOR 8000 with optional RC-125 Tone Interface Box



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NorCal QRP Club Forty-9er

A 40M Direct Conversion Transceiver with 9V

Manual by Doug Hendricks, KI6DS

Thank you for purchasing the 49er kit from NorCal QRP Club. As you will read in the following article, this rig was designed as a building project that was to be simple, yet provide a very usable transceiver when you were finished with it.

We first provided only a circuit board and a source for the crystal, but our members immediately deluged us with requests for a kit. Many of our members do not live near, nor d[illegible]ty have access to, a reasonable supply of parts. Thus they [illegible]st resort to order[illegible] our mail order companies. Most [illegible]e parts can be ob[illegible] Mouser and D[illegible]ken the problem is that when [illegible]der from these c[illegible] you have [illegible]ng minimu[illegible] Thus [illegible]her for order more p[illegible]. [illegible] $25 which [illegible] the parts very u[illegible]g.

NorCal has the ad[illegible]ntage in being able to pur[illegible] la[illegible] quantities and [illegible] add $5 sh[illegible]

We f[illegible] all of those [illegible]e in that categ[illegible]ows how to so[illegible] and have the [illegible] enced kit [illegible]h a fine tip. Th[illegible]hat you buy Ke[illegible]will also work. [illegible] and cleans up easier. Get the solder in the .031 diameter. It is much easier to work with. No matter what solder you purchase, make sure the solder you use has a resin core and is designed

Get a piece of 8 ½" x 11" white plain paper. Place the paper on a table and c[illegible]pour out the parts on it. Separate the parts into simi[illegible] that look the same). Use the parts identificatio[illegible]d identify all of the parts. You may need[illegible]arly read the markings.

Writ[illegible]er (i.e. C7) on the paper and [illegible] Do it in order so you wi[illegible]for in the instruc-

[illegible]ne to start build-
[illegible]s or bridges. I do
[illegible]one for a direct short.
[illegible] not shorted across the
[illegible] shooting much easier later on.
[illegible]at the board has no shorts, it is time
[illegible] iron and start "stuffing parts"

[illegible] the schematic as I build. Most of the guys [illegible]ful builders do the same thing. If you have [illegible]s will [illegible]d training. If you have built [illegible]e u[illegible]ing [illegible]e schematic as you go, and [illegible]ou will learn more as you build.

Wh[illegible]n to build by the schematic? I make a [illegible]w copy o[illegible]chematic and lay it next to my work area. [illegible] install parts I check them off the schematic by drawing a circle around them with a red ink pen. This keeps me from leaving out parts, or installing them in the wrong place. I check the board to make sure that the part I am installing goes where the schematic says it should BEFORE I solder.

First solder the NE602AN into the space marked U1 on the board. Make sure that you have the notched end oriented the same as the outline on the silkscreen. This will insure that

Photo 4– If you like weekend homebrewing and/or QRP (who doesn't!), you'll go bonkers over NorCal's neat little "Forty-9er." As shown here, the kit is supplied with all parts, including a crystal for 7.040 MHz.

rivals or surpasses "hunt and peck" keyboarding for non-typists. Makes sense. I surely am not the only person who can send code faster than I can find letters on a keyboard.

QRP Hotter Than Ever

Say you have built that super dream station and reached DXCC Honor Roll status or decided the pursuit is a mite strenuous for the old back and budget? Looking for something more lightweight and affordable, or need a good amateur radio solution to apartment living? Heads up, friends. QRP is the lighthearted answer, and it is the hottest trend in HF activities today. The world of QRP is bubbling over with easy-to-build, fun projects, reasonably priced commercial gear, contests, and enthusiastic clubs galore. I have not seen folks excited like this since the heydays of Slow Scan TV. It's amazing!

The 1996 Dayton Hamvention was a prime example of the previously mentioned state-

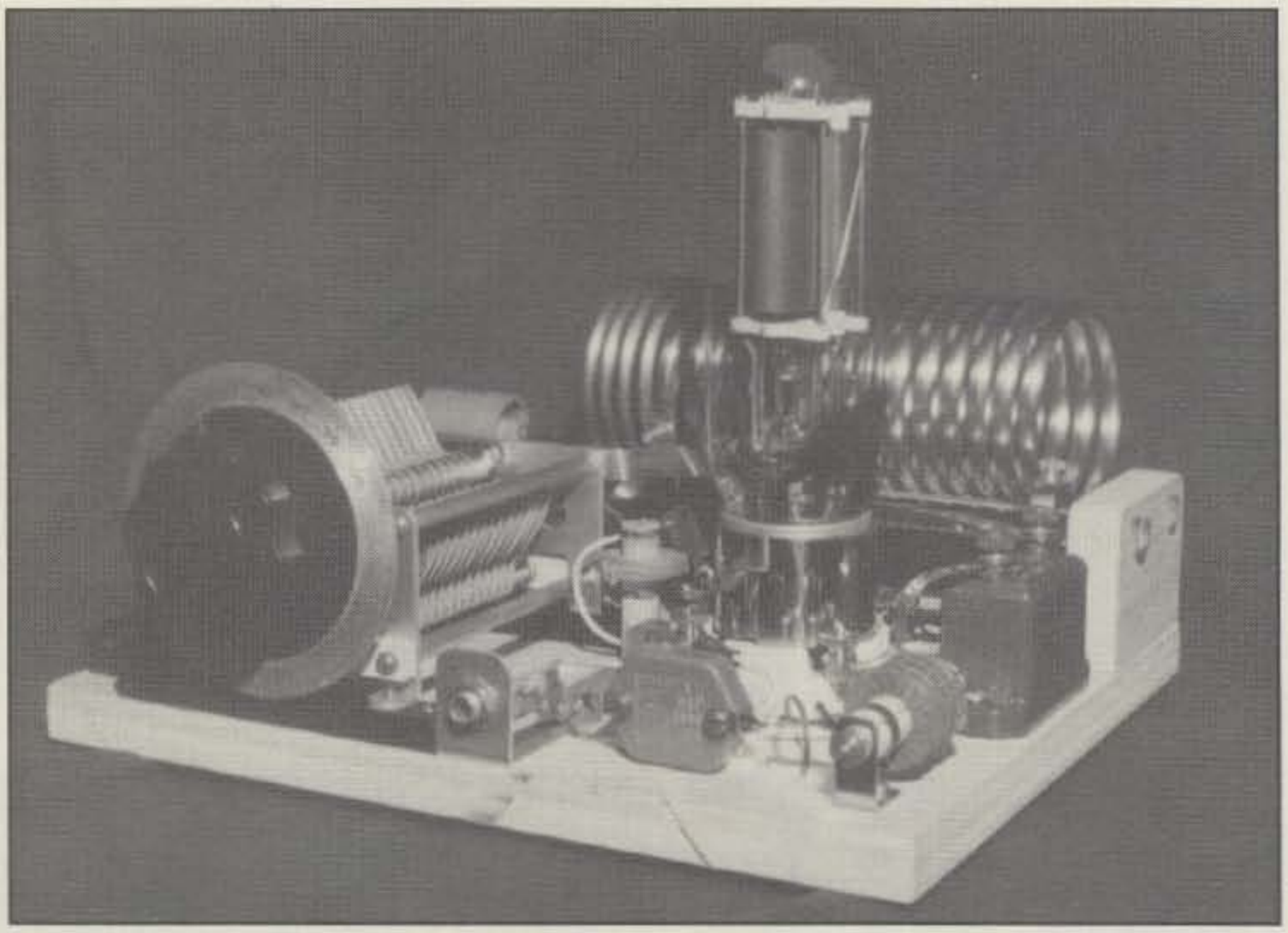

Photo 5– Unquestionably the most breathtaking classic we have seen is this 50 watt Hartley transmitter built by Charles, K4LJH. It's dazzling!

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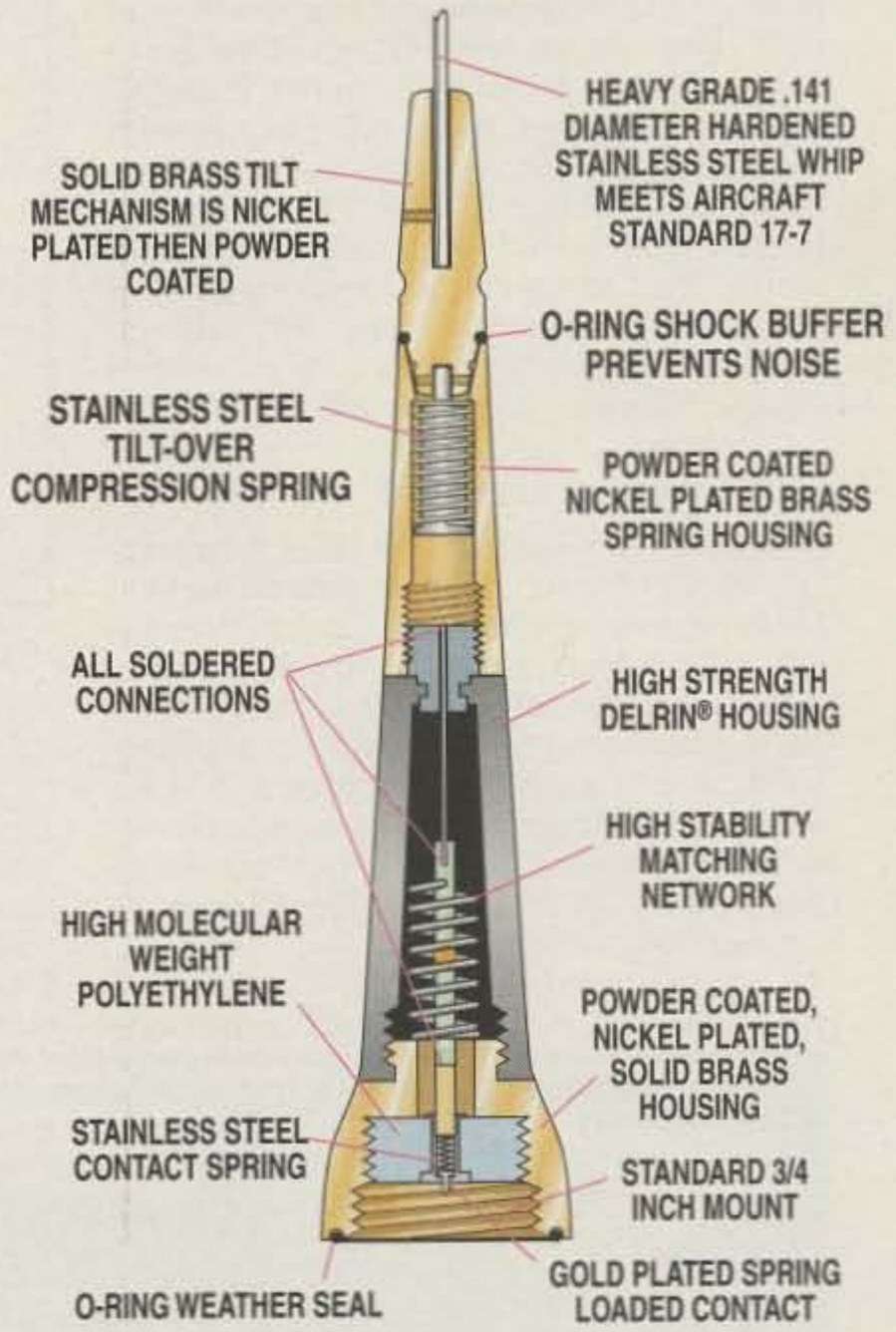

If you'd like to know more about PROJECT GOLD antennas, check them out at http://www.cushcraft.com or see your dealer. You may get information via E-mail at hamsales@cushcraft.com or by contacting our ham sales department.

MODELS

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ments. QRP activities went solid for four days. All the goodies and parts brought in sold quickly, circuits and ideas were exchanged like crazy, and the hospitality suite turned into a building spree that continued until into the late night hours. Pinpointing a single "most popular" item is almost impossible. I would say, however, Index Lab's QRP Plus transceiver reigned supreme in the commercially built rig category, and NorCal's (The North California QRP Club) "Forty-9er" kit (photo 4) was the homebrewer's favorite. This little 40 meter transceiver is beautifully laid out, runs off a regular 9 volt battery, squeezes into an Altoids mint tin, and sells for only $25 plus $3 shipping. I will be shooting photos while I assemble my "Forty-9er" and will tell you all about it in a future column. Meanwhile, you can direct-order your own kit from Jim Cates, WA6GER, 3241 Eastwood Road, Sacramento, CA 95821.

While on a roll, incidentally, may I also suggest you go full-bore and join a couple of great QRP clubs. Membership in NorCal QRP is $10 annually (to WA6GER at the above address); their quarterly newsletter (a mini-magazine!) is packed with great projects. Second is the Northwest QRP Club, P.O. Box 354, Bay Center, WA 98527 (also $10 annually for U.S. amateurs). Their newsletter includes a variety of good "what's happening" notes. Why settle for being just another fish in the big HF pond when you can be a kingfish in the QRP pond!

Captivating Classic

I usually feature views and details of classic rigs in a related "World of Ideas" column, but the photo recently received from Charles Preston, K4LJH, in Hamilton, Virginia demands immediate recognition (photo 5). This 1929-version Hartley transmitter uses a genuine 211 "50 watter" tube. It is a real show stopper and works great! In fact, Charles used the gem on 80 meters during a recent Antique Wireless Association "1929 QSO party." Now that's what we call hamming in high style!

Charles's golden-age delight is authentic to the finest detail, including its glass curtain rods supporting steel-wool-polished coils and birchwood base. In fact, every component in this masterpiece is a collector's pride rather than a hamfest "fleamarket special." Watch for more views and full "build it" details of this admirable classic in a future column. Meanwhile, start searching for a good 211 or 203 tube and four-pin breadboard socket, a National or Cardwell 250 pFd tuning condenser, and some .02, .002, .0002 mFd acorn condensers to build your own copy of this treat.

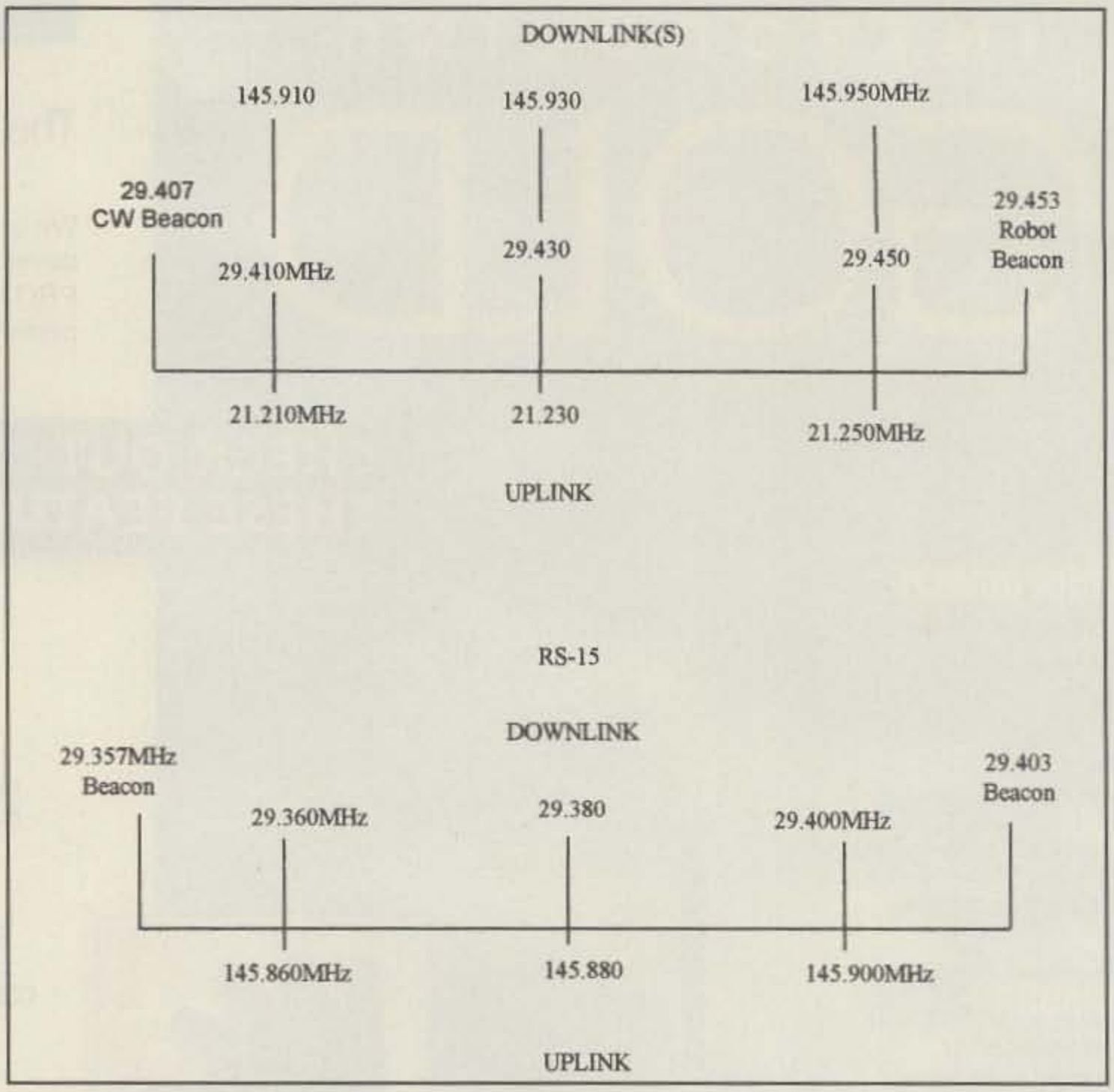

Fig. 1– Ready-to-use frequency relation charts for RS-12 and RS-15 satellites. (Note: Uplink/downlink frequencies are approximate and will vary ±4 kHz according to Doppler shift.)

Finale

We have almost overflowed available space, so let's wrap up with some good news in OSCAR satellites. First, Russia's low-orbiting and easy-to-use RS-12 is presently operating in mode KT (you uplink/transmit to it on 15 meters and downlink/receive from it on 10 meters or 2 meters as shown in fig. 1), and it's doing great. I have been having a ball working through RS-12 using a basic transceiver with its VFO's "split," an output of 20 watts, and a simple vertical antenna. Try it. You'll love it! Ditto Russia's new 2 meter uplink/10 meter downlink RS-15. Technician licensees take note! This satellite is in a slightly higher orbit, has more range (up to 6000 miles), and requires slightly more uplink power (50–100 watts ERP typical). Ahhh . . . but you can work foreign amateurs through it.

Amateur radio's most elaborate and multiband satellite yet, Phase IIID, is now scheduled for launch during the next couple of months. This one will "outdo" OSCAR 10 and OSCAR 13 combined. South Africa's Sunsat, which will carry a 2 meter FM simplex/parrot repeater in orbit, is also scheduled for launch within the next few months. Tune in the AMSAT net (14.282 MHz Sundays at 1730 GMT) for more details and Keplerian data for tracking programs. Enjoy! 73, Dave, K4TWJ

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DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

VHF Transmatch Design

Why would anyone want to build an antenna tuner for VHF? After all, commercial verticals and beam antennas are designed to provide a 50 ohm feed impedance, which means they should be suitable for use with 50 ohm coaxial cable, sans a tuner. Indeed, this is the situation, so why a tuner? Those who experiment with VHF antennas often use low-loss open-wire line for feeding these antennas. This requires an LC network that provides a match between 50 ohms (unbalanced) and 300 or 450 ohm balanced feed lines. Some amateurs still may prefer open-wire balanced feeders in the interest of reducing transmission-line loss, especially when long runs of feed line are necessary.

Another advantage realized when using a tuner or Transmatch is the additional harmonic attenuation that is provided by the usually high-Q, parallel-resonant LC circuit. RFI and TVI can be minimized substantially by using a quality tuner at 6 or 2 meters. Those who use high power at VHF are especially prone to experiencing problems because of harmonic energy. A typical parallel-resonant tuner can add 25 dB or greater harmonic attenuation if the circuit Q_L (loaded Q) is 15 or higher.

Unbalanced VHF matching networks have also been used with coaxial feeders to ensure an SWR of 1 across an entire VHF band. Modern VHF transceivers have built-in protection circuits that limit the output power when the SWR rises above a specified level (typically above 2:1). A tuner will enable the transmitter to deliver full output power if there should be an SWR problem. This article describes various LC matching networks that you can adopt or experiment with.

Some Basic Circuits

Three examples of VHF matching networks are provided in fig. 1. Circuits A and B have been used for decades at HF and MF for antenna matching. Regardless of the LC configuration adopted, these circuits have many names. Terms such as Transmatch, antenna coupler, antenna tuner, and ATU (antenna tuning unit) are common today. The fundamental purpose of a tuner is to cancel existing X_L (inductive reactance) or X_C (capacitive reactance) that may be present at the transmitter end of the feed line. These and other networks have been used at the antenna feed point, especially at VHF and UHF, over the years to minimize feedline losses caused by SWR. In this example alone we have a true "antenna tuner," although in some situations (depending upon the antenna system used) a tuner at the transmitter end of the line can also be considered an antenna tuner. A discussion about that application is beyond the intent of this article.

Circuit A in fig. 1 shows a matching network for balanced feeders. The feed line is tapped toward the center of L2 to ensure that adjustment of C1 and C2 results in an SWR of 1. The classical E. F. Johnson Matchboxes contained this type of circuit.

Example B in fig. 1 illustrates an unbalanced matching network for use in coaxial transmission lines. It is suitable also for matching the transmitter to an end-fed wire antenna. It may be used at the base of a 1/4-wavelength vertical antenna to ensure a match to 50 or 75 ohm coaxial line. The tap on L2 is chosen experimentally to arrive at the best point for matching a wide range of impedances.

Circuit C in fig. 1 may be employed at VHF and UHF to avoid the complications that can accompany the use of a lumped inductance for the tuner coil. L1 can be a flat strip line or a tubular conductor. Taps are placed near the grounded end of the inductor to ensure a wide matching range. This circuit is preferable for high-power operation because it allows the use of conductors with greater surface area (skin effect), and hence less heating and loss will occur. C1 (15 pF for 144 MHz) would be a large, adjustable two-plate disc capacitor. This would provide sufficiently wide plate spacing for high power. C2 can be a conventional tuning capacitor with moderate plate spacing, since at 1000 watts there would be a maximum of 224 RMS volts developed across a 50 ohm load. C1 and L1 of fig. 1(C) should be housed in a rectangular nonferrous metal box with 2 1/2 inch sides if L1 is a 5/8" × 9" copper tube for 2 meter operation. A wide strip line would require a larger box.

Circuits A and B in fig. 1 should have large conductors for the L2 coils in order to maintain a high Q and minimize heating and losses. No. 12 copper wire or 1/8 inch copper tubing is suitable for VHF powers up to 100 watts. Silver plating of L2 will aid conductivity and increase the Q; likewise for L1 in fig. 1(C).

Circuits B and C of fig. 1 may have additional functions as matching networks between VHF transmitters and linear amplifiers. These impedance matchers will ensure an SWR of 1, while attenuating harmonics before they reach the amplifier. In all of the fig. 1 examples it is essential to use a VHF SWR meter between the transmitter and the feed line to monitor the matching adjustments.

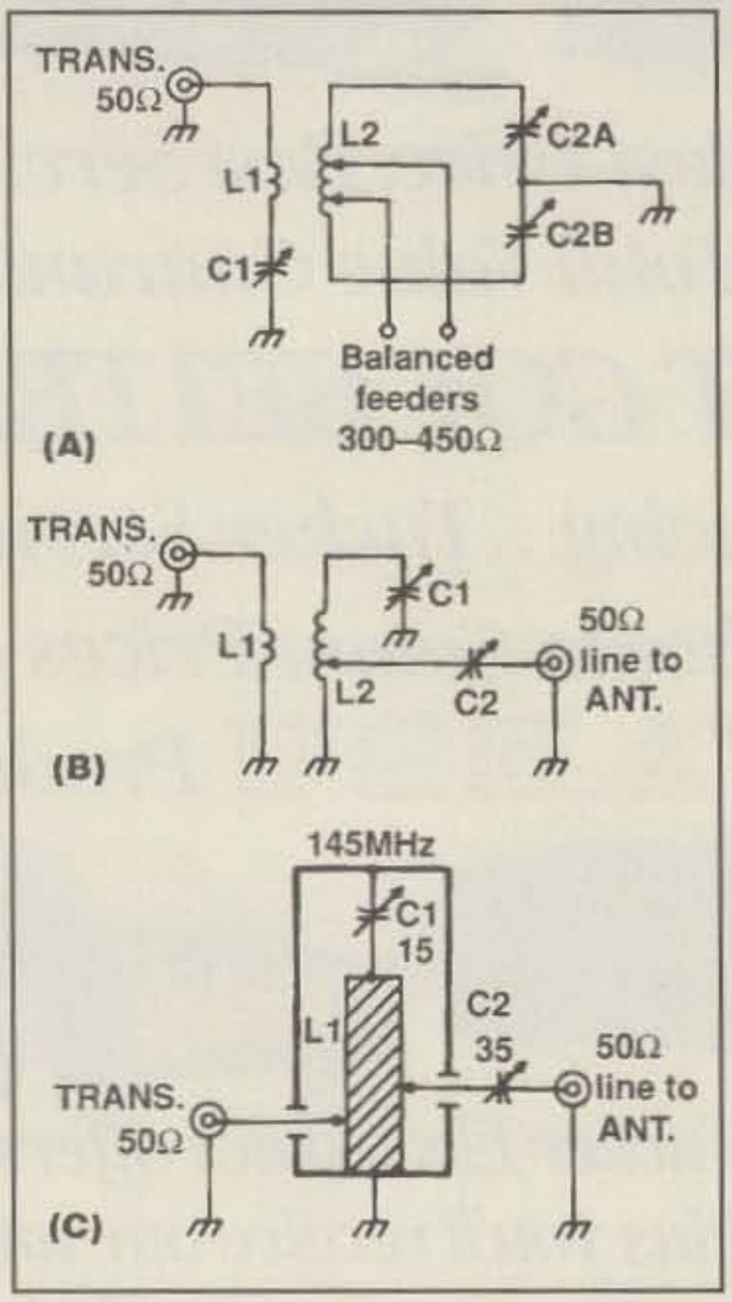

Fig. 1– Examples of matching networks that are suitable for use at VHF. Circuit A is for use with balanced feeders such as open-wire line. The arrangement at B may be used with coaxial feed lines, or between an exciter and a linear amplifier. A strip-line type of unbalanced tuner is shown at C. For 144 MHz use L1, which is a 9 inch length of 5/8-inch OD copper tubing (see text). The input and output taps on L1 are chosen experimentally to provide a wide matching range. C1 may be a small variable capacitor for low-power operation. A two-plate adjustable disc type of capacitor would be more suitable for high-power operation.

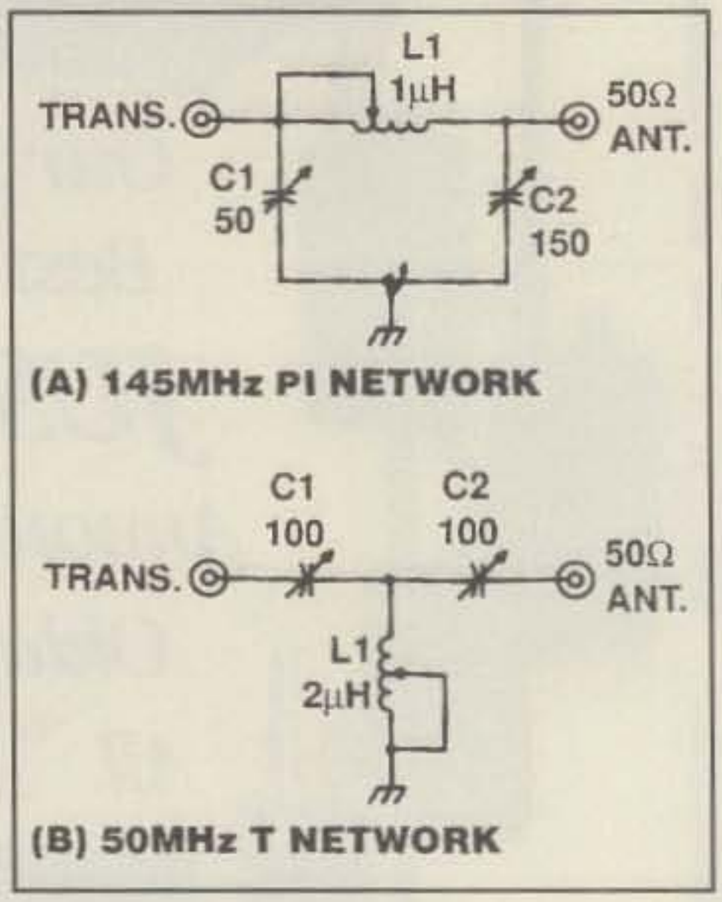

Fig. 2– Examples of pi and T matching networks (see text). Use L2 and L4 dimensions from fig. 3. Add or subtract turns as needed.

Pi and T Networks at VHF

Unbalanced matching networks for VHF can be fashioned along the lines of the familiar pi and T

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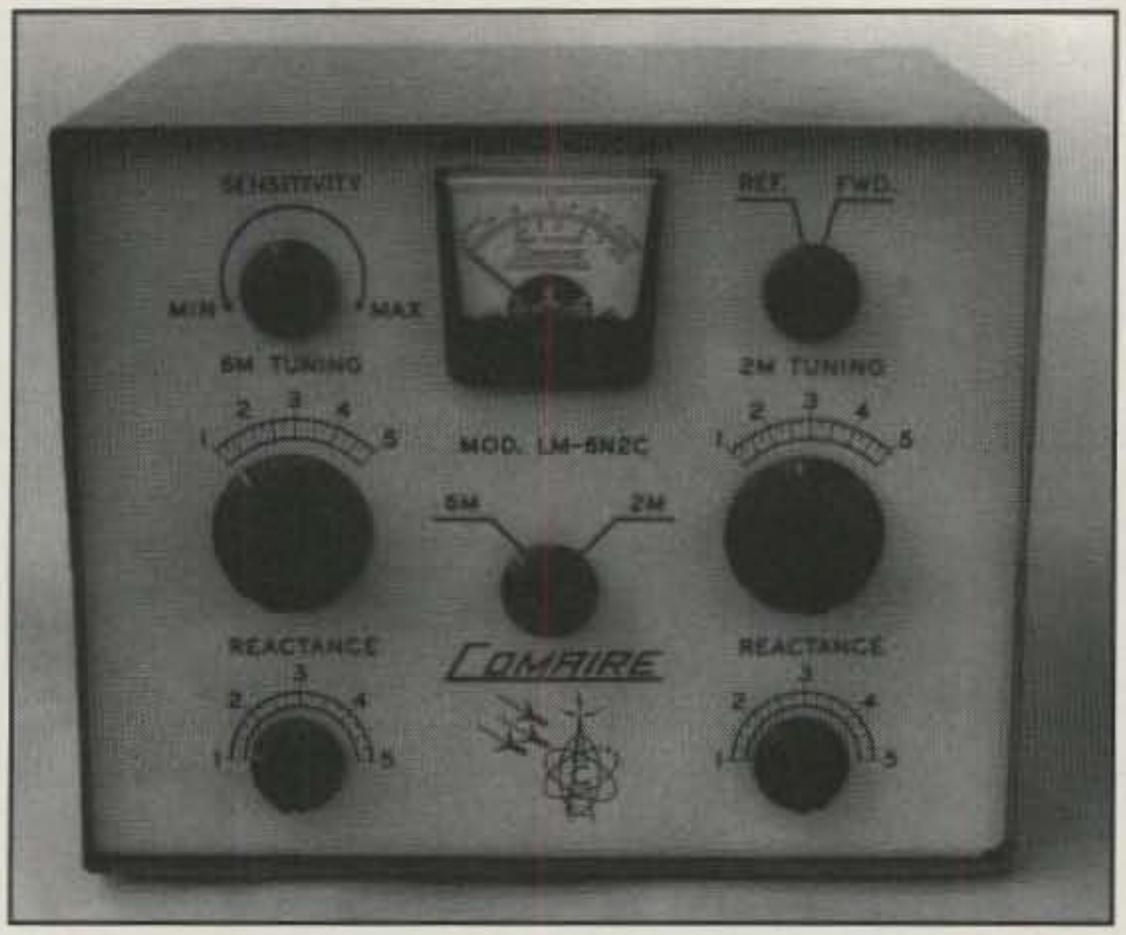

Photo A– The Comaire Electronics commercial 6 and 2 meter tuner designed and built by W1FB in the early 1960s. The line was discotinued in 1965. (See text for details.)

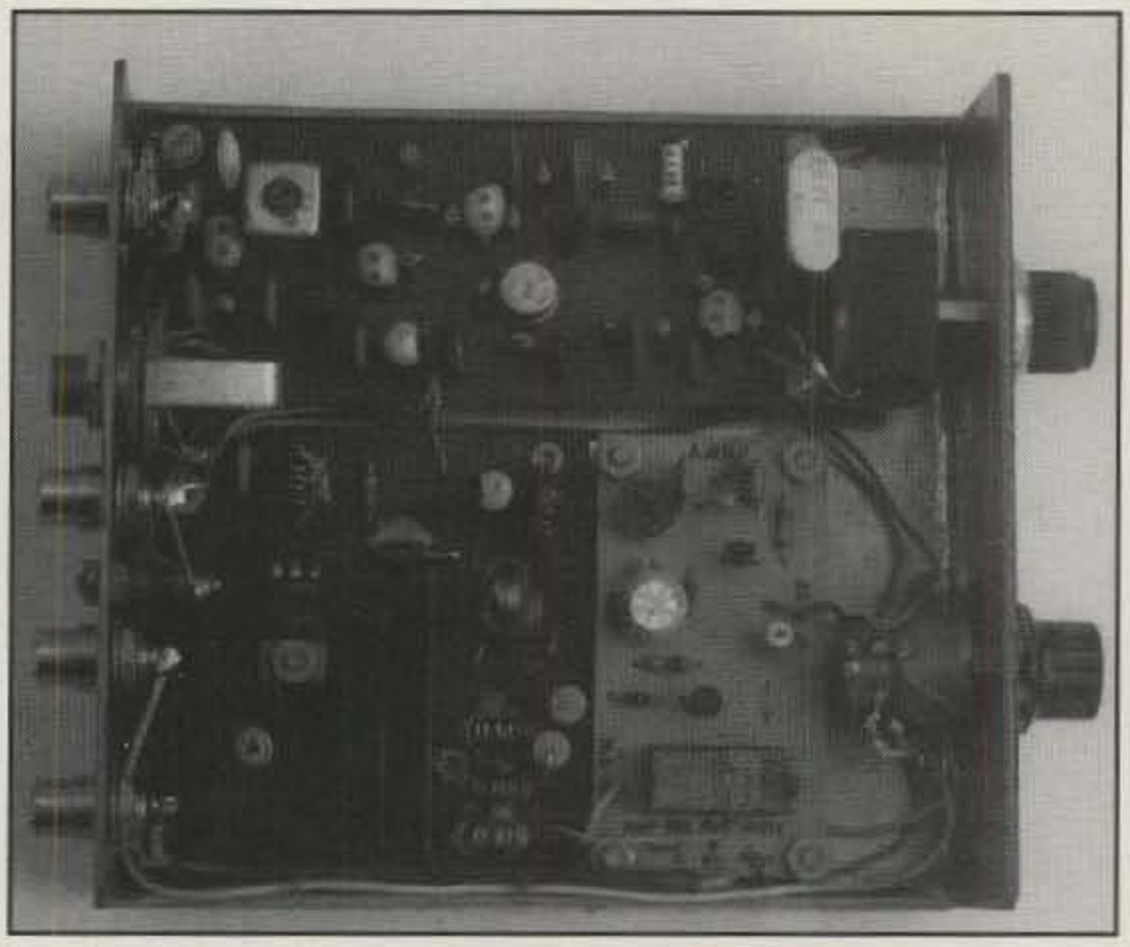

Photo B– Interior view of the discontinued commercial Comaire 6 and 2 meter tuner.

networks used at HF and MF. They are more tricky to adjust than the circuits in fig. 1, because things happen fast when the capacitors are rotated! Also, the builder must keep stray inductance (connecting leads) at a minimum so that it does not become part of the coil and spoil the Q and/or increase the overall circuit inductance.

Examples of pi and T networks are given in fig. 2. Circuit A is a pi network with a limited matching range. Since it is a low-pass filter in principle, it will help to attenuate harmonic currents from the transmitter. The pi-network tuner is well suited for use between an exciter and a linear amplifier.

Fig. 2(B) is a T network of the type used in most commercially made tuners. It is an adaptation of the Ultimate Transmatch described by W1ICP some years ago in *QST*. L1 is a fixed-value coil that is tapped to select the inductance required for providing an SWR of 1 when adjusting C1 and C2.

A Practical Tuner For 6 and 2 Meters

Photos A and B show a commercial 6 and 2 meter tuner I designed and sold (Comaire Elec-

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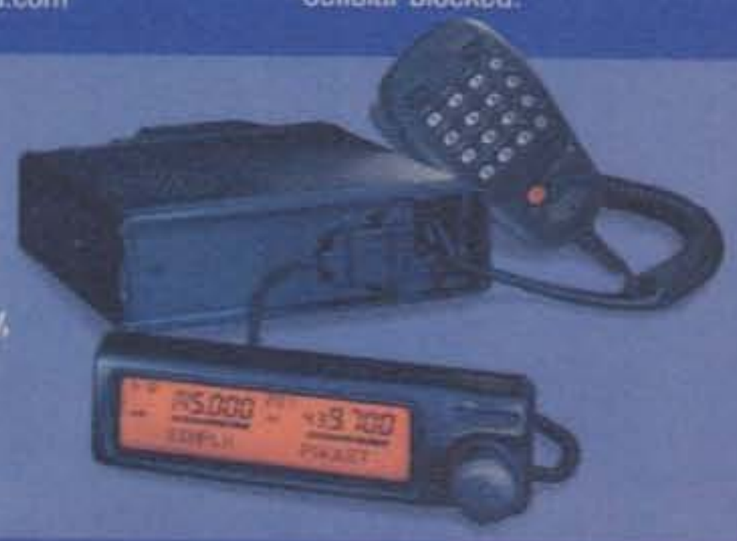

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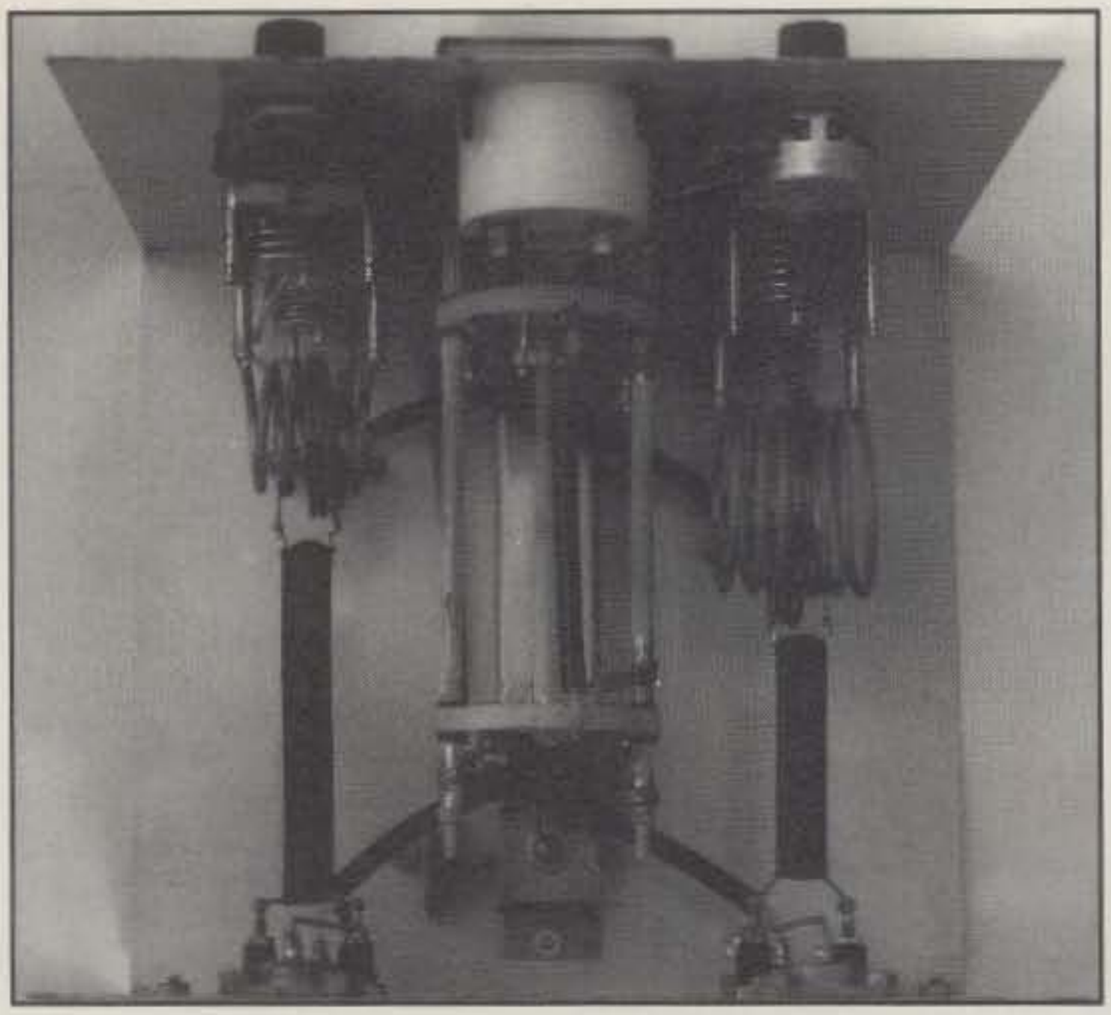

Photo C– Interior view of the assembled 6 and 2 meter tuner of fig. 3. The SWR sampling circuit is enclosed in the channel at the lower center of the picture. Tubular 300 ohm TV ribbon is used for leads in the balanced circuitry. RG-58 is used for all 50 ohm lines.

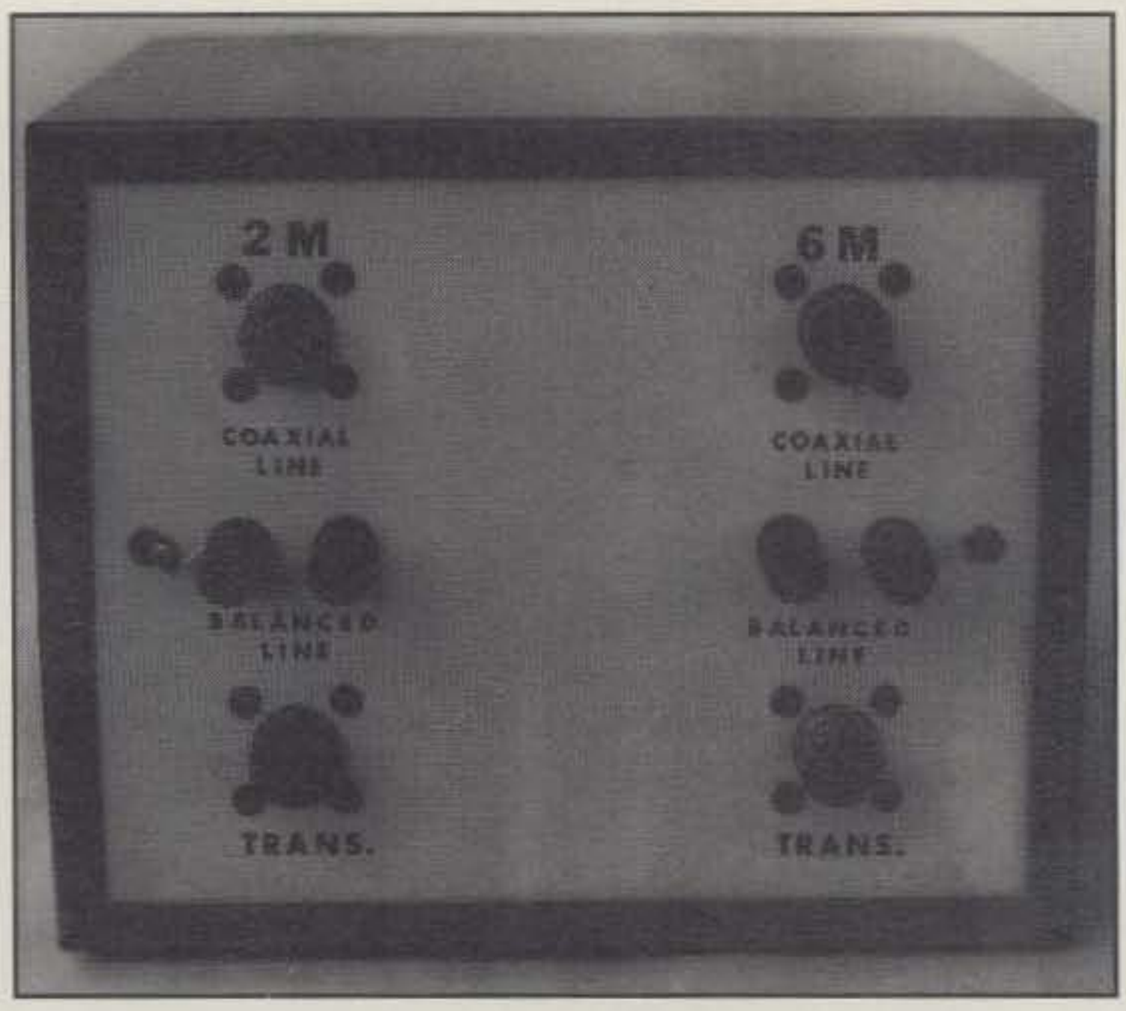

Photo D– Rear view of the assembled tuner. Solder lugs are adjacent the outer binding posts to permit grounding them when the tuner is used with coaxial lines.

tronics) in the early 1960s. The product line was discontinued in 1965. The tuner accommodates coaxial and balanced feed lines. It will handle up to 100 watts of power. It contains an SWR indicator that was featured in a NASA *Tech Brief* in the 1950s. The circuit was popularized in February 1957 *QST* by W1ICP. Lew McCoy dubbed it "The Monomatch." Modern VHF SWR bridges are worth considering for use in the fig. 3 circuit. Those wishing to duplicate this tuner may opt to omit the SWR indicator and use a store-bought unit externally.

C2 and C4 in fig. 3 (see photo C) are butterfly variable capacitors. They were used in the interest of good circuit balance and overall symmetry. It is unlikely that such devices can be found on the market today. A conventional dual-section variable capacitor can be used at C2 and C4. As an alternative, the builder may use a single-section variable and ground the center turns of L2 and L4. This would necessi-

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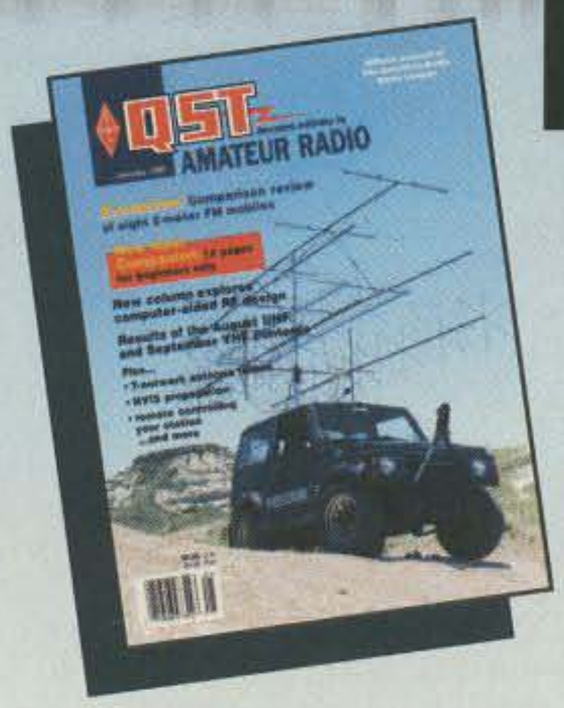

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CIRCLE 162 ON READER SERVICE CARD

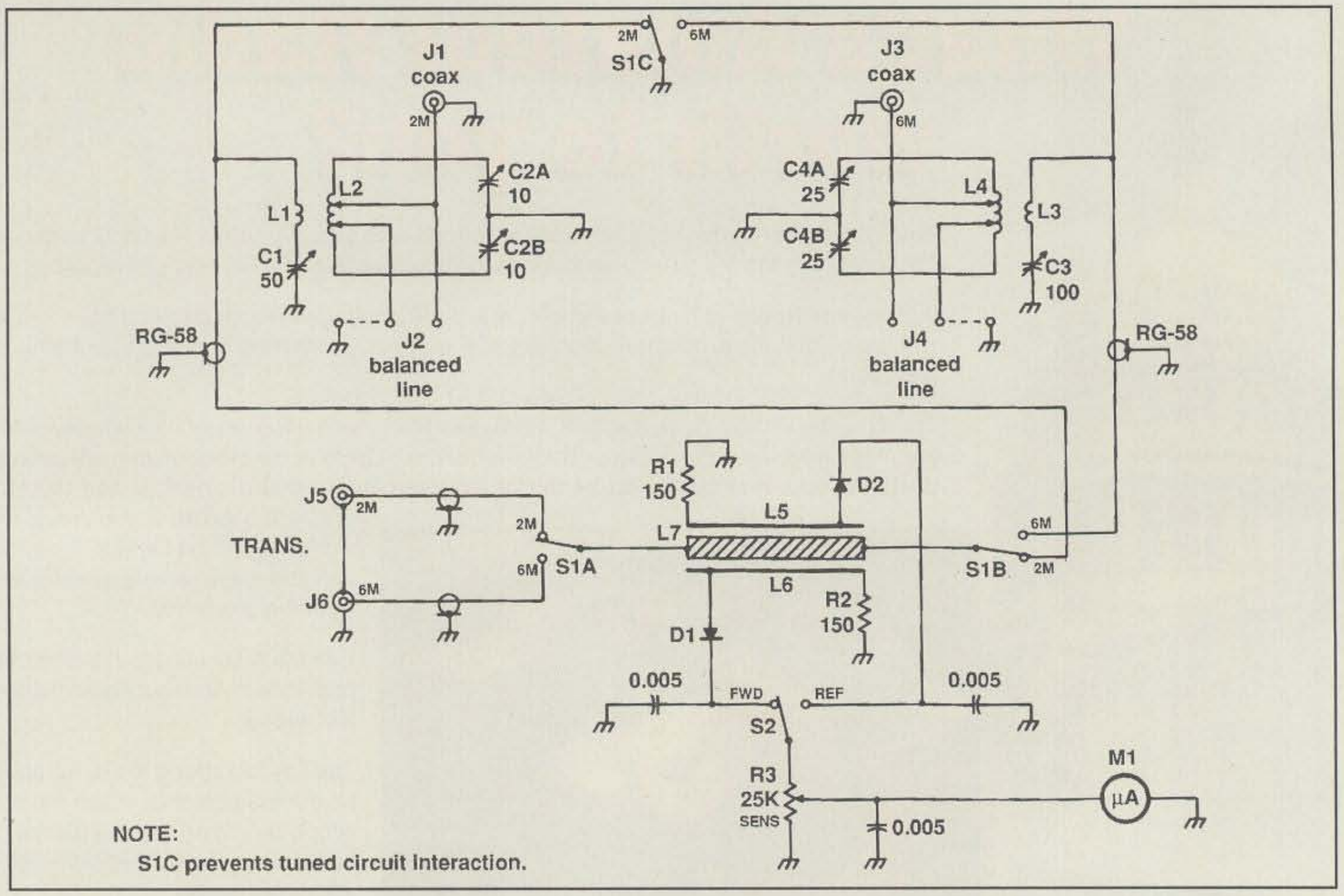

Fig. 3– A practical circuit for a 6 and 2 meter antenna tuner with a built-in SWR indicator. This circuit is rated for 100 watts maximum.

PARTS LIST

C1—Miniature 50 pF air variable.
C2—Dual-section 10 pF variable (see text).
C3—Miniature 100 pF air variable.
C4—Dual-section 25 pF variable (see text).
D1, D2—Silicon diode, type 1N914 or equiv.
J1, J3, J5, J6—SO-239 or type N chassis connector.
J2, J4—Two 5-way binding posts at each site.
L1—Two turns of No. 14 enam. wire, 1 3/8 inch ID, over center of L2 winding.
L2—5 turns of No. 12 copper wire, 7/8" ID × 1 1/4" long. Tap 1 1/2 turns in from each end.
L3—2 turns of No. 14 enam. wire, 2 inch ID, over center of L4.
L4—7 turns of No. 12 copper wire, 1 3/8" ID × 1 1/4" long. Tap 1 1/2 turns in from each end.
L5, L6—3 3/8 inches of No. 14 wire. Space 1/8 inch away from L7.
L7—4 1/2 inch length of 1/4 inch copper tubing. Center in a 5 inch U-shaped aluminum or copper channel with 5/8 inch sides. Use plastic spacers to support L5, L6, and L7.
M1—100 microampere DC meter.
R1, R2—150 ohm, 1/2 watt carbon resistor.
R3—25K ohm, linear-taper potentiometer.
S1—3-pole, double-throw rotary wafer switch.
S2—SPDT toggle or slide switch.

tate insulating C2 and C4 from ground and using an insulated shaft coupler or an insulated tuning shaft to the front panel.

L2 and L4 are wound from No. 12 solid copper house wiring from which the insulation is stripped. I silver-plated the coils, but plating is not essential for good operation. Four insulated five-way binding posts (J2 and J4) are located on the rear panel (photo D) for attaching balanced feeders. One of these terminals for each band of operation is shorted to ground when the tuner is used with coaxial feed line. The coaxial feeder is then attached at J1 or J3.

Adjustment of the tuner is accomplished while observing the reflected power via M1 and adjusting the two variable capacitors, alternately, until the SWR is 1. Adjustment should be done at low power in order to prevent arcing at S1, or between the plates of C2 or C4. The SWR indicator diodes and terminating resistors may also be damaged at high power levels before the SWR is reduced.

Practical Considerations

Open-wire, balanced feeders are less lossy than coaxial cable. Therefore, it is not the product of archaic or eccentric thinking to use balanced feeders of this kind. Furthermore, open-wire line is less costly than quality coax. It is not difficult to make this type of feed line from No. 14 antenna wire and spacers that consist of sections cut from inexpensive plastic coat hangers. The latter items are available at low cost in most variety stores, such as WalMart or K-Mart. Information concerning how to make open-wire feed line is provided in *W1FB's Antenna Notebook* and in *The ARRL Antenna Book*. Low-loss 300 ohm UHF TV ribbon can be used for VHF balanced feeders in lieu of open-wire line, but the losses will be greater. This type of feed line is affected by rain and ice, thereby requiring readjustment of the antenna tuner when moisture is present.

Feed-line loss should be a concern at VHF, depending upon the type of transmission line used. A 100 foot length of open-wire line has a loss of 0.25 dB at 150 MHz. An identical length of 300 ohm tubular TV ribbon exhibits a 1.25 dB loss at 150 MHz. If foam-filled RG-8 coax is used, there will a 2 dB loss for 100 feet of line at 150 MHz. RG-58 causes a loss of 6 dB per 100 feet at 150 MHz. It is important to realize that a 3 dB signal loss is equivalent to reducing the transmitter power by 50 percent. The same losses affect the received signal. It is for this reason that some VHF operators prefer open-wire feeders. If, for example, the operator uses 100 feet of RG-58 to feed a 2 meter antenna with 200 watts of RF power, only 50 watts of energy will reach the antenna. If there is SWR on the line, additional power will be lost because of the mismatch.

In Conclusion

It is not my intention to imply that VHF operators should scrap their existing feed lines and switch to open-wire line. Rather, the tuners described in this article will be useful to those who are experiencing SWR problems. Low-loss hardline coax is a viable alternative to open-wire line with respect to minimizing losses, but the former product, along with suitable hardline connectors, is a costly approach to antenna system efficiency.

73, Doug, W1FB

JRC

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2 MOSFET POWER AMPLIFIER • Final PA utilizes RF MOSFETs to achieve low distortion and high durability. Rated output is 10 to 150 watts on all bands including 6 meters.

3 AUTOMATIC ANTENNA TUNER • Auto tuner included as standard equipment. Tuner settings are automatically stored in memory for fast QSY.

4 MULTIPLE ANTENNA SELECTION • Three antenna connections are user selectable from front panel. Antenna selection can be stored in memory.

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7 QRM SUPPRESSION • Other interference rejection features include Passband Shift (PBS), dual noise blanker, 3-step RF attenuation, IF notch filter, selectable AGC and all-mode squelch.

8 NOTCH TRACKING • Once tuned, the IF notch filter will track the offending heterodyne (±10 Khz) if the VFO frequency is changed.

9 DDS PHASE LOCK LOOP SYSTEM • A single-crystal Direct Digital Synthesis system is utilized for very low phase noise.

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14 ERGONOMIC LAYOUT • Front panel features easy to read color LCD display and thoughtful placement of controls for ease of operation.

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CIRCLE 151 ON READER SERVICE CARD

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Bash'n The Bauds

Have you ever wished you could come up with another transceiver to put on the air at home so you wouldn't have to pull the YL's radio out of her car to use for packet? As the next step, there is the new need to have some source of 9600 baud access in the packet operator's hamshack. In either case, the picture is the same. Here then is a solution to the above situations.

For the system node operator (SNO), for the BBS operator who wants to add that 9600 baud port, and for the packeteer who needs a low-cost packet-only transceiver, we've found the "rock crushing" MFJ-8621 Packet Only™ transceiver to be just the ticket.

The MFJ-8621 Packet Only™ transceiver was designed specifically for packet-only operation.

Simplified Technical Notes

The MFJ-8621 Packet Only™ transceiver was designed specifically for packet-only operation. MFJ has eliminated costly circuitry you don't need—things such as squelch, repeater offsets, PL tones, DTMF pad, PLL synthesis, memory, the speaker-amplifier, and the speaker itself. At the same time they've engineered in essential packet circuits such as true-FM direct modulation, unsquelched AFSK, pin-diode switching, data-passband IF filtering, and a tailored 0 Vu DC-coupled line driver to ensure maximum performance. Best of all, the MFJ-8621 works with most popular TNCs.

I have three of these data radios operating at locations on mountaintops in central Virginia. One of them I use here in my lab at Evington, Virginia. They are little, but effective. All four of these units are operating on 145.770 MHz. The power output to the antenna is between 4.5 and 6 watts.

Don't let the small size of these Packet Only™ data transceivers fool you. They have a hot receiver section (0.25 uV for 12 dB SINAD) with image rejection that is better than –45 dB.

The transmitter is built around a rugged MRF237 low-power RF amplifier. One caution, though: The transmitter is not VSWR protected, so be sure to have an antenna (or 50 ohm dummy load) connected when transmitting.

The MFJ-8621 is crystal controlled and comes supplied with 145.010 MHz installed. There is also an APRS version of the Packet Only™ transceiver. The MFJ-8621**X1** model is priced at $139.95, including crystals. The APRS version is already tuned and adjusted for operation on the APRS frequency of 145.790 MHz. Other frequencies (crystals) are available off the shelf from MFJ at $24.95 a set (transmit and receive).

Sending and Receiving 9600 Baud Data

Although 9600 baud packet is almost four times faster than 1200 baud packet, it is a little less forgiving over marginal signal paths. For one thing, you'll probably need between 3 and 6 dB additional signal strength to overcome wide-band noise generated in the receiver's unusually broad IF and audio passbands. Also, 9600 baud signals are extremely vulnerable to phase shift, which means multipath reflections between stations must be held to a minimum. Finally, your transmitter and receiver must be accurately adjusted to frequency, and the transmit deviation set for the correct shift (3 kHz).

Once you've experienced 9600 baud, you'll find it hard to return to the slow pace of 1200 baud. At 9600 baud the packets are shorter, and the time it takes for 9600 baud packets to go through is much better than the time it takes for a comparable length packet at 1200 baud to make it through. I'm seeing 9600 baud stations operating on the same frequencies as the 1200 baud stations with little or no problem in the shared environment.

In some of my connects over the long paths through the 9600 baud backbones I can issue a connect request from one of the 9600 baud nodes to a distant node about 300 miles away and get the familiar "connected to ART" on my screen in under 5 seconds. Try that with 1200 baud and you will have the time to read another page of this month's *CQ*. I rest my case!

Documentation

The manual for the MFJ-8621 is well written and defines many of the pitfalls that often are overlooked when making the transition to the higher baud rates. There is a section in the manual that gives the new packeteer a quick look at what to check in case of difficulty.

When setting up point-to-point 9600 baud links, a carefully aimed Yagi will deliver better quieting and less multipath than most omni-directional antennas. If you are selecting a remote site, remember the MFJ-8621 is a $120 amateur radio product and not a bullet-proof $5000 commercial unit. Avoid sites that have high levels of intermod, or be prepared to provide additional filtering to reduce the effects of intermod and desensing from nearby transmitters. Finally, make certain your transmitter is not interfering with commercial services sharing the site.

At one of my sites I tried to use the MFJ-8621 with a 500 watt paging transmitter next door—*not a chance.* I therefore decided to use a commercial-version transceiver. Phooie! Even the expensive commercial rig was no match for the *paging parasitic generator.* I needed the site, so I wound up installing a cavity that notched out most of the interfering signal.

Setting up a node for 9600 baud takes a little more care, but once you are "up and running," you can sit back and watch massive files pump through in a matter of seconds at 9600 baud rather than the ancient 1200 baud.

Pin Diode Switching is Fast!

The question many are asking at this point is what about the TXDelay. I'm having little or no retries with the X-1J4 node set to a TXD of 7 (70 milliseconds). To make sure I have a clean link and tries are minimum, I set the TXDelay to 8 or 9. I have had good results with the MFJ-8621 and the node set below 50 milliseconds (TXD 5). However, this was across a short path using the MFJ-1270CQ with the Dave Roberts, G8KBB, X-1J4 TheNET node EPROM installed.

All the 9600 baud nodes I use with the MFJ-8621 transceiver are built around the MFJ-1270CQ Turbo TNCs. The new MFJ-1270CQ/T REV 11, equipped with the "gated transmit & receive" 9600 baud modem, has more than adequate drive for almost all 9600 baud transceivers. In addition, the MFJ-1270CQ/T responds to even the low-level audio outputs from other transceivers I've used.

The MFJ-8621 Operates At 1200 Baud, Too

The MFJ-8621 receiver features a special noise-reduction filter to enhance 1200 baud operation. When running at 1200 baud, this filter improves weak-signal performance. To activate the 1200 baud noise-reduction filter, install a shorting plug at **JMP-1** as shown in fig. 1 (this plug must be removed when you are operating at 9600 baud).

The MFJ-8621 has two FM modulators. One is a sensitive reactance modulator designed for microphone-level 1200 baud **AFSK** signals. The other is a "*true*-FM" varactor modulator designed for line-level 9600 baud **FSK.** For 1200 baud AFSK operation, set **JMP-2** and **JMP-3** in

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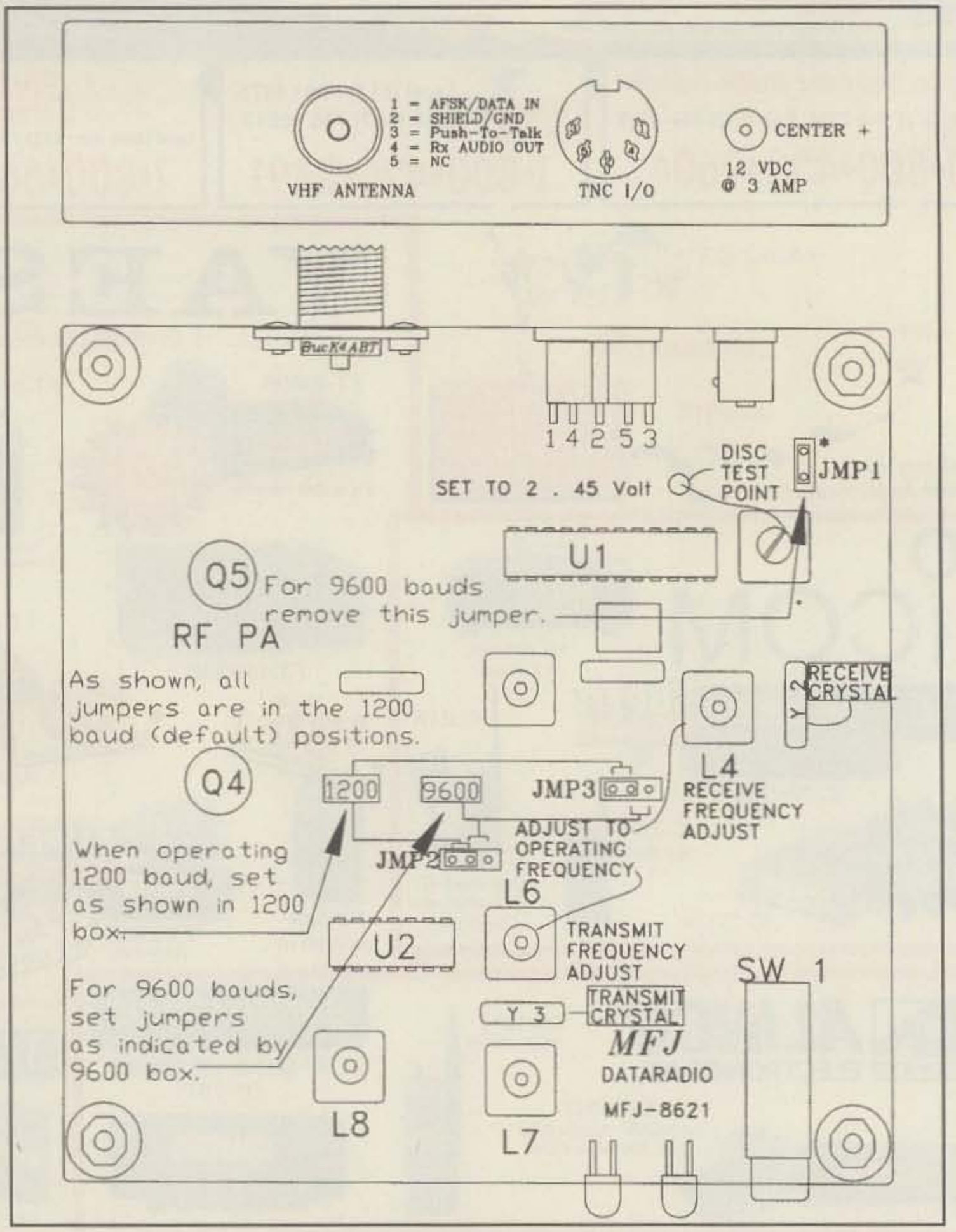

Fig. 1– Overview of the MFJ-8621 Packet Only™ transceiver. The modulator select jumpers at JMP-2 and JMP-3 are used to select 1200 or 9600 baud operation. The jumper at JMP-1 should be installed when operating 1200 baud. When operating 9600 baud, be sure it is removed. Crystals for other frequencies are available from MFJ. The receive crystal is Y2, and the transmit crystal is Y3. These crystals are ordered in simplex pairs.

the reactance modulator positions (jumper plugs go on the left-hand and center pins of each header; see fig. 1). For 9600-baud operation, set **JMP-2** and **JMP-3** in the varactor modulator positions (jumper plugs go on the center and right-hand pins of the headers; see the notes in fig. 1). If your TNC has a high-level output setting for 1200 baud TX-AFSK (usually set via a jumper inside the TNC), you may use the varactor modulator at both data rates.

The "Sound and The Fury" of 9600 Baud FSK Packet Signals

In the tests I've conducted on these MFJ-8621 Packet Only™ transceivers, I've had good results at both 1200 and 9600 baud. In a previous article about 9600 baud we discussed the difference between the sound of 1200 and 9600 baud. Since then I, along with most other users of 9600 baud, assume that everyone is familiar with the sound of 9600 baud as compared to the sound of 1200 baud.

It is my mistake for *assuming* that everyone knows the sound of 9600 baud. Unlike 1200 baud Audio Frequency Shift Keying packet, 9600 baud signals are transmitted by binary FSK. To understand how this works, suppose you set your radio at 145.000 MHz with the modem adjusted for 3 kHz deviation. Any time the TNC sends a 1, the transmitter should flip 1.5 kHz high in frequency to generate a carrier at 145.0015 MHz. When the TNC sends 0, the transmitter should flop 1.5 kHz low to generate a carrier at 144.9985 MHz. This is called FSK-FM (frequency-shift-keyed FM), and there are no analog tones involved—only a rapid switching back and forth between binary states. In fact, 9600 baud signals sound more like white noise rather than tones when monitored on a conventional FM receiver.

Data signals of this particular type require

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Message Tracker Information:

- DOS Program (Does not run under Windows)
- Requires Minimum of 386 Computer,
  3.5 HD Disk Drive, RS-232 Serial Port
- Auto polarity and baud rate detection
- Output to file with Time Stamp
- Decodes Golay and multispeed POCSAG (2400, 1200, & 512) modes on same Frequency
- Includes Clear Screen(s), Clear buffer(s), and multiple Cap code lists capabilities
- Frequency requirement for your Scanner
- 150-170, 450-512, 928-932 MHz (check your local pager system for your exact frequency)
- Use with Receiver earphone jack or discriminator input source (Software Selectable)
- Tested on AOR (must be used in WFM mode or with an internal connection on AR3000A), Bearcat, Radio Shack, and Regency Scanners
- Select the model that meets your specific system requirements:

Message Tracker Product:

- One 3.5 HD Disk with Message Tracker software program
- 25 Pin Serial Interface Audio Adapter (SIA-100)
- User's Guide

Computer to Receiver Interface:

- Uses the Serial Interface (SIA-100)
- DB-25 Connector to 1/8" (3.5 mm) audio plug
- No external power Required

MONITORING ACARS with the new LOWE "AIRMASTER"

The monitoring of air band communications is a hobby that has become more and more popular over the last 10 years. In common with the rest of the communications field, there are far reaching changes in process in this area to cater to the requirements of air traffic control in the next century. ACARS is a very specialized data mode, and only decoders that have been specially designed for it will function. Until now, the only decoders that will work have been fairly expensive devices, as they use dedicated hardware to handle the decoding.

The new Lowe Electronics Airmaster uses a small demodulator that plugs into the Com port on the back of a PC and takes its power from it. All the decoding of the data stream is handled by software running on the PC, which also enables some analysis of the messages to take place before they are displayed on the screen. Items such as the registration number of the aircraft, its flight number and the type of message are shown separately from the message text. Because the decoding requires a considerable amount of processing power, you will need at least a 386 PC to enable Airmaster to operate.

What messages will I hear?

With aircraft operating at 35000 feet and above, you will expect to hear them up to around 400 miles away. ACARS messages are sent immediately after aircraft departure, during high altitude flight, and during approach to land. While not all commercial aircraft are ACARS equipped, it is now standard equipment on all new Boeing and Air bus deliveries, and is rapidly becoming a standard feature with all major airlines. Adding ACARS monitoring capability to your receiving station will open the door to a whole new world of digital aircraft communications.

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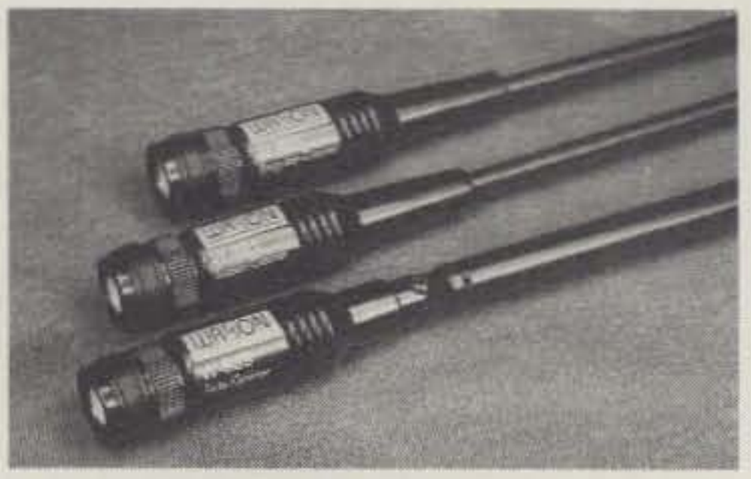

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W-881 41cms Super-Gainer is the one to choose for really long distance reception

W-889 - 41cms Tele-Gainer gives you the advantage of adjustable length with swivel knuckle joint

W3HM - Universal mobile mount for hatchbacks. Adapts to any angle, thumbwheel rachet adjustment. Low profile design.

W3CK - Mobile Aerial Cable Kit.
For use with W3HM. Comes with 16 feet of cable and has SO239 & PL259 connectors.

W-30 - 2M/70 cm Base antenna, fibre glass, 3/6dB, 150W.

W-285 - 144MHz, 5/8 Wave, 200W, 3.4dB, PL259, fold over.

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SSE PSU101

Adjustable Desk Charger/ Power Supply 12VDC Version

This quality, custom-designed combination desk charger and regulated power supply unit is perfect for convenient 'Base Station' use of your handheld scanner at home or office!!

• Securely holds scanner in proper position • Charges radio's internal NiCad w/out overcharging • Powers radio from standard 117VAC house current. (220VAC Version Available)

For: FIARMATE HP1000E/200E/HP2000
AOR AR1000XLT/AR1500/AR2000
YUPITERU MVT7000/MVT7100
UNIDEN BEARCAT BC50XL/BC55XLT/
BC70XLT/BC100XLT/
BC200XLT/BC205XLT
ALINCO DJX1
ICOM ICR1 Handheld
REALISTIC-TANDY-RADIO SHACK
PRO35/PRO38/PRO41

SSE

SSE PSU101T

Desk Charger/Power Supply 9VDC Version

• 9 volt version for popular REALISTIC (RADIO SHACK) handheld scanners and others that require a 9 volt DC supply

• All the same quality & features of the PSU101 12 volt version above!

For: REALISTIC- TANDY- RADIO SHACK PRO34/PRO37/PRO43 and others.

Adjustable SSE BHA3 (C)

Universal base stand for handheld scanners and transceivers

• Heavy chrome base for extra stability, even with heavy handhelds.

• Adjustable front support stop which adjusts to fit all popular handheld scanners and transceivers.

• Convenient rear panel BNC connector for external antenna attachment - Use a short jumper to your radio and remove stress of large external antenna cable from your handheld's connector.

• Deluxe felt-lined radio tray that won't hurt your handheld's finish. BHA3 C comes with cable.

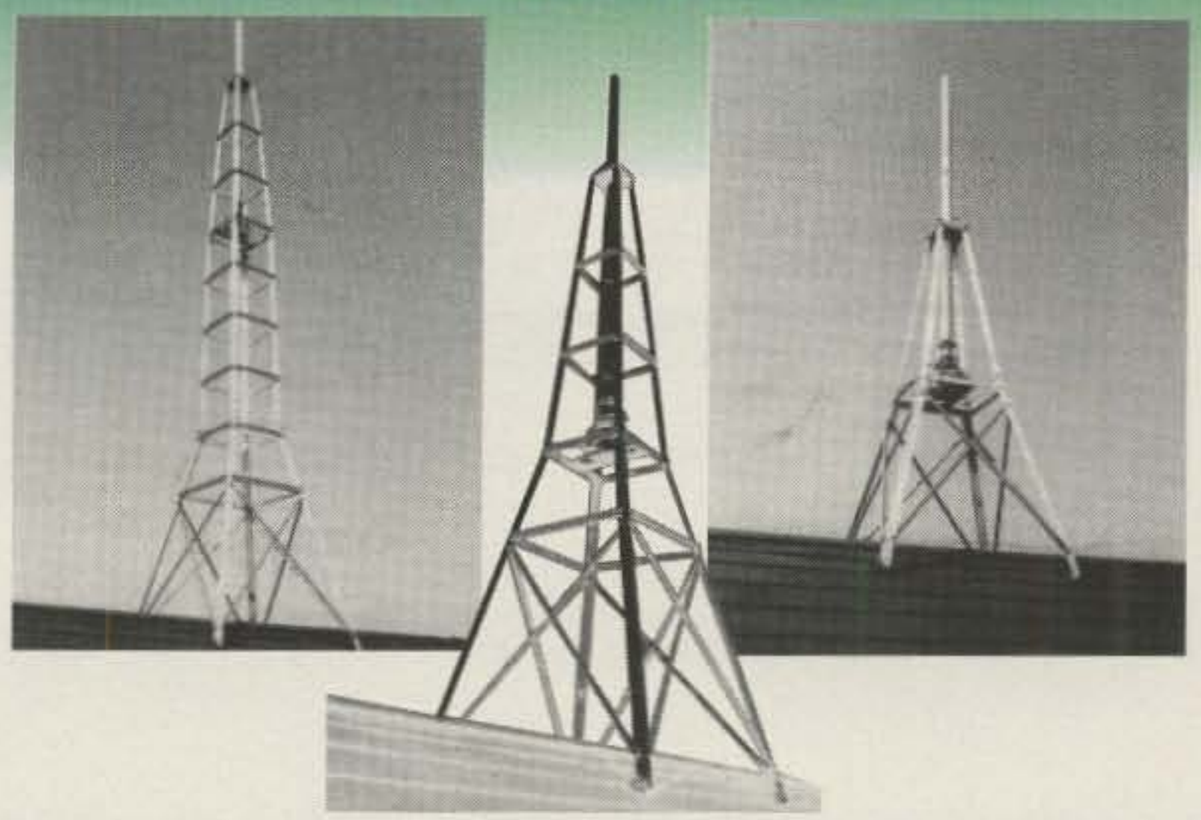
SCANMASTER 1500

The 1500 offers super high quality, attractive all white fiberglass and stainless steel construction that withstands the very worst of weather, even salt spray along the coast. Custom engineered 500kHz to 1500MHz super wide band reception, low VSWR dual band 2m/70 cm gain type transmitting antenna rated at 35 watts, all rolled into one! The perfect low cost, heavy duty alternative to flimsy, wide band scanner antennas. Built to provide peak performance year after year.

Frequency:
500kHz - 1500MHz
Impedance: 50 Ohm
Material: Fiber Glass
Length: 43.3 inches
Connector: Low Loss "N" type
Mounting:
Mast mounting

NEVADA

CREATE ROOF TOWERS



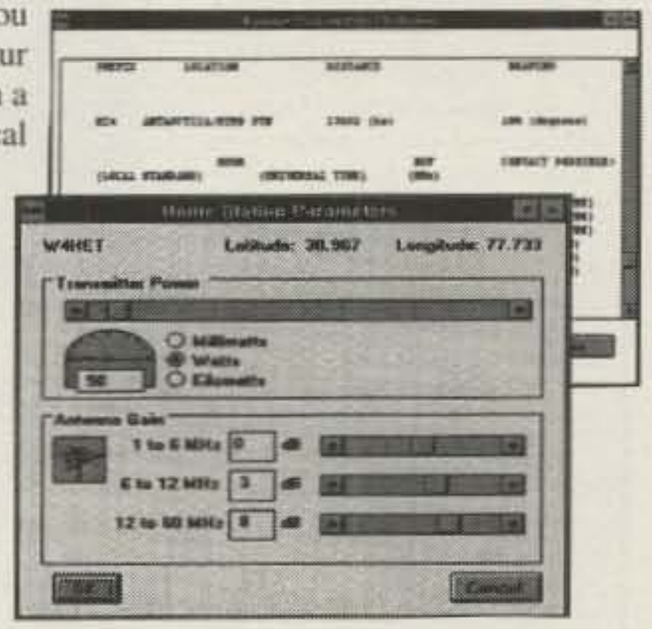
Create Roof Towers are constructed of high quality aluminum with galvanized steel bracing for additional support and stability. Available in three sizes, these towers will easily accommodate your antenna requirements, and will support VHF antennas, HF tri-banders, and Oscar systems. Rotators mount securely inside the tower on a furnished rotor shelf. While figures listed below are for Create Roof Towers in a properly installed, un-guyed condition, we do recommend guying for safety reasons.

Model	Height	Base Width	Max Wind Load Sq FT	Max Vert Load LBS	Weight
CR18	5'10"	31.3"	21 @ 90 mph	440	18
CR30	9'10"	39"	27 @ 90 mph	1,322	33
CR45	14'9"	39"	23 @ 90 mph	881	57

SKYCOM

Skywave Propagation Prediction Software for Windows 3.1/Windows 95

Tell SKYCOM where you are, your transmitter power and antenna gain. Enter the current Sunspot Number or Solar Flux measurement. SKYCOM's windows simplify data entry. Pick a location from SKYCOM's database of over 400 call sign prefixes, using SKYCOM's database search tools or map. You can tailor the SKYCOM database to your own needs by adding additional locations. Instantly obtain prediction reports that tell you the best time and frequency for your transmission. You can also obtain a detailed report that lists the vertical critical frequency, frequency of Optimum Transmission, Signal to Noise ratio, and other data. SKYCOM 2.0 includes an on-line beam heading reference to the direct and long path bearing and distances (in miles and kilometers) from your home station to all locations in the SKYCOM database.



CONTACT YOUR FAVORITE DEALER TODAY

CIRCLE 173 ON READER SERVICE CARD

DAIWA SSE LOWE AOR®

The MFJ-1270CQ Turbo is 9600 baud ready.

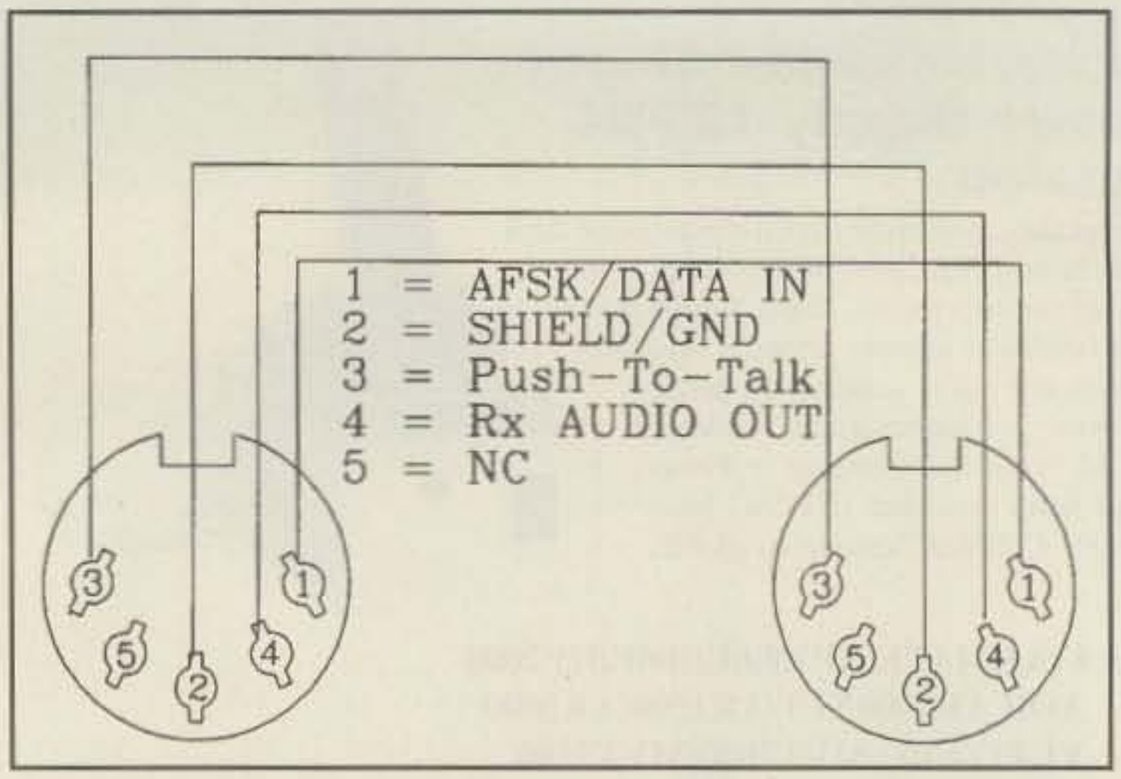


Fig. 2– Interfacing the MFJ-1270CQ Turbo to the MFJ-8621 is a piece of cake. Use 5-pin DIN male connectors and shielded wire cable. Connect wires end to end and pin to pin. No pins are rolled. →

more bandwidth than normal speech. Extended low-frequency response is needed to sustain prolonged strings of 1s or 0s, and extended high-frequency response is needed to provide a fast rise time when the signal changes state. This is why 9600 baud receivers typically use wider IF filters and special RX-FSK output circuits, and why transmitters often use "direct-FM" modulators which are especially adapted for FSK.

To make it easy to understand, 9600 baud has the sound of air escaping (in short bursts) from an automobile tire with an audible leak.

Setting Deviation To The 8621

The MFJ-8621 has no internal deviation control. Deviation is adjusted via the FSK output level control on your TNC 9600 baud modem. In the MFJ-1270CQ/T the control is located on the 9600 baud modem (consult your TNC manual for specifics of other 9600 baud modems). If you don't have access to an FM deviation meter, you can set deviation by measuring the peak-to-peak FSK signal output from your TNC. With jumpers in the reactance modulator (1200 baud) jumper positions, a 150 mV p-p sine wave should produce approximately 3 kHz deviation. With jumpers in the varactor modulator (9600 baud) jumper positions, an 800 mV p-p sine wave should produce about 3 kHz deviation.

Summary

To make this month's topic complete, the only other item you'll need is the interface cable between the MFJ-8621 and the TNC. In my application I am using the MFJ-1270CQ TNC (9600 baud ready TNC) with the MFJ-8621 Packet Only™ transceiver. The cable may be ordered from MFJ ready to plug and play for $14.95. If you prefer to roll your own, then refer to fig. 2. The MFJ interface cable is wired for use with most current manufacturers' TNCs that have the standard 5-pin DIN connector transmit and receive I/O. Another reason why I use the MFJ interface cable is that it provides shielding of both the transmit and receive data AFSK and FSK lines.

The price of the MFJ-8621 is $119.95. It is available from MFJ Enterprises or your local MFJ dealer. An APRS version of the data radio

Technical Specifications

Receiver

Frequency Coverage	144–148 MHz
Sensitivity	0.25 uV for 12 dB SINAD
Image Rejection	–45 dB or better
1st IF	10.7 MHz
2nd IF	455 kHz
1st LO	Crystal, 3rd overtone
2nd LO	10.245 MHz
Selectivity	–6 dB at 20 kHz (data-passband filter)
AFSK Output	unsquelched, 0 dBm @ 3.0 kHz deviation
Current Drain	25 mA

Transmitter

Frequency Control	crystal, 18 MHz × 8
FSK/AFSK Input level	150 mV p-p or 0.8 V (selectable)
Deviation	0–5 kHz, adjustable at TNC
RF Power Output	4.5–5.0 watts into 50 ohms
VSWR Tolerance	3:1 maximum
Current Drain	1.0 amp @ 13.8 volts

Table I– Specifications of the MFJ-8621 Packet Only™ transceiver.

Features of the MFJ-8621 Packet Only™ Data Radio

Here are some of the features of the new MFJ-8621 Packet Only™ data radio.

Packet Only™ Performance: The MFJ-8621 was designed—from the ground up—for packet, with performance on both AFSK and FSK at a price much less than that for a converted voice radio.

Cool Running: The MFJ-8621 draws 25 mA on receive and less than 1 amp on transmit.

Sensitive: IC-based receiver circuitry recovers data from weak signals for better throughput and fewer collisions.

Made-for-Data Filters: Optimized (selectable) receiver filters for wide (9600 baud FSK) signals or narrow (1200 baud) AFSK signals. Not usually found in other radios.

Clean Unsquelched Data Output: The MFJ-8621 uses a wide-response DC-coupled line driver rather than a speaker amp for clean data recovery.

Lightning-Fast TXD: Set TXD low. PIN-diode switching, a continuous-running receiver, and crystal control deliver ultra-fast switching.

Dual-Mode Modulators: Choose the varactor-modulator for true-FM FSK or the sensitive reactance modulator for microphone-level AFSK at 1200 baud.

Easy To Rechannel: Use supplied 145.01 MHz crystals, or you can purchase extra frequencies of your choice. Step-by-step instructions show you how to recrystal using only a counter or HF receiver.

The Right Tool for the Job: The MFJ-8621 is a true data radio, designed and tested for accurate packet operation, whether you use it to work your local network, BBS, or DX spotter.

is the MFJ-8621**X1,** and it is priced at $139.95, including crystals. The APRS version is already tuned and adjusted for operation on the APRS frequency of 145.790 MHz.

The MFJ-4110 is a special regulated power supply for the 8621 data radio (both models), and it is priced at $39.95.

For more information, contact MFJ Enterprises Inc. at P.O. Box 494, Mississippi State, MS 39762. The MFJ order line telephone number is 1-800-647-1800; fax 601-323-6551.

Happy (9600) baud packeting! And be sure to visit the packet radio SEDAN home pages at http://www.inmind.com/sedan.

buck4abt@inmind.com

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

More on "The Threat"

Last month in this column I reported that it appeared that the 70 cm band had been removed from the "threat." Now comes word from ARRL Executive VP Dave Sumner, K1ZZ, via the ARRL home page, that the 70 cm band remains on more than one of the lists floating around the world. Quoting Dave:

"You may see references to 420–450 MHz having been withdrawn from consideration for little LEOs. It's not quite that simple. Here's the scoop. Little LEO industry representatives presented a list of candidate bands at the May 7, 1996 meeting of IWG-2A. That list included 144–146, 146–148, and 420–450 MHz.

"There are two other, later lists of candidate bands floating around. One was contained in a State Department cable to embassies and missions overseas, seeking information on utilization of various bands in those countries. This version of the list includes 144–146 and 146–148 [MHz], but not 420–450 MHz. The last band was not included in recognition of Department of Defense concerns, and not because of our concerns.

"The third list is contained in a document that was submitted at the May 30 meeting of IWG-2A, numbered IWG-2A/#39. It is a joint document submitted by the little LEO companies E-Sat, Final Analysis, Inc., Leo One, ORBCOMM, and STARSYS. It lists 144–146 and 146–148 MHz as possible earth-to-space MSS allocations, notes the current primary allocations, and notes 'Sharing analyses needed' with respect to the Amateur and Amateur-Satellite Services. The 420–450 MHz band is not included in this document. However, the document contains the following note: 'Note 3. Depending on the results of sharing studies, additional frequency allocations for NVNG MSS may be feasible in the bands 410–430 and 440–470 MHz.' [NVNG is an abbreviation for 'non-voice non-geostationary.' MSS stands for 'mobile-satellite service.']

"So, the answer to the question 'Is 420-450 MHz out of danger?' is 'No.'"

You will note from Dave's report that the 2 meter band is split into two segments—144–146 MHz and 146–148 MHz. The following is a bit of speculation on the part of your editor. Worldwide, the 2 meter band is exclusive only between 144–146 MHz. It is only here, in Region II, that the 2 meter band allocation extends to 148 MHz. It is this writer's opinion that eventually 144–146 MHz will be dropped from consideration because this is the segment that is used worldwide for amateur satellite, SAREX, and EME communications. You will note the phrase "sharing analysis needed," that Dave quotes from the little Leo industry. It is my belief that when the analysis comes in, it will have determined that there is too much risk posed to the little LEO satellites for them to operate within a band segment that has high-power RF aimed potentially in their direction from many different parts of the world.

On the other hand, the other two megaHertz are not so easily removed from their lists. As I stated above, this portion of the band is in the Amateur Service only in this region. And then it is only used with any intensity here in the U.S. and Canada. Not all other countries in Region II use, or are even allocated, the top two megaHertz. Cuba, whose system was modeled after the European system because of the former Soviet influence, does not presently authorize its amateurs operation in this portion of the 2 meter band. However, my friends there tell me that because of the growing number of amateurs on 2 meters, there is mounting pressure on the government to open this portion of the band for repeater operations.

Additionally, as you will see below, the currently licensed little LEO companies use spectrum between 148–149.9 MHz. Therefore, it would seem logical to them to try to acquire more frequency spectrum adjacent to spectrum which is already allocated to them.

Because all of the communications in this portion of the band is terrestrial, there is a logical assumption that such terrestrial communications would not interfere with low earth orbiting satellites operating in this portion of the band. Therefore, it could be "shared" with the amateurs, particularly with a clause that the little LEOs must accept harmful interference. Considering that the types of signals to be received by the little LEOs are narrow, digital, as compared to the broad FM signals emitted by repeaters and other users of this band segment, the front end of the satellite could fairly easily be designed to exclude the FM signals.

What about 70 cm? Again, only a small portion of this band is exclusively amateur on a worldwide basis. Therefore, much of it is open for grabs. The least likely area would be between 430–440 MHz. In this portion are both EME and satellite communications, again on a worldwide basis. The potential interference to little LEOs from our repeater band between 440–450 MHz would be similar to what I cited above for the top half of 2 meters.

Again, because little LEOs already used spectrum between 455–456 MHz, they would be interested in adjacent frequency allocations. However, there are complications. First, wind profilers are also looking at the same spectrum and have already pegged 449–450 MHz as one of the frequency allocations most desirable. By nature, wind profilers are skyward-pointing with their high-power RF. Therefore, they could be a challenge for the little LEOs operating nearby.

Second, we are a shared user with the military on this band (in a secondary position). The military has had long-standing first-position precedence to parts of this portion of the UHF spectrum. Furthermore, the military is very possessive of its allocations and does not part with them very easily, if at all. This objection is the reason why the 70 cm band doesn't appear on all of the lists, as cited by Dave Sumner. Nevertheless, as I pointed out above, the 70 cm band is not entirely threat-free.

What I am writing about is not to say that we should give up the fight. Far from it! However, when one of the e-mail messages on the VHF reflector stated that a loss of some of our spectrum was a foregone conclusion, I started reasoning why. And what you have read are my speculative conclusions.

Nevertheless, we should not give up the fight, particularly as it applies to future growth of the Amateur Service. And, any threat to any one of our bands is a threat to all of our bands. We should make all of the noise possible to let the commercial interests know that we are a force to reckon with.

Furthermore, despite the prognosticators' feelings that a loss of spectrum is a foregone conclusion, the fight is far from over. Basically, what is being prepared at this time is what the U.S. will be presenting at the WARC-97 con-

VHF PLUS CALENDAR

Sept. 1	Moderate EME conditions.
Sept. 1–2	α *Aurigids* meteor shower predicted peak.
Sept. 4	Last quarter Moon.
Sept. 6	Highest Moon declination.
Sept. 8	Poor EME conditions. *Piscids* meteor shower predicted peak.
Sept. 10	Moon apogee.
Sept. 12	New Moon.
Sept. 14–16	ARRL VHF QSO Party. *(See text for details.)*
Sept. 15	Moderate EME conditions.
Sept. 20	First quarter Moon.
Sept. 20–21	Second weekend of ARRL 10 GHz and Above Contest. Pacific NW VHF/UHF Conference. *(See text for details.)*
Sept. 21	*Piscids* meteor shower predicted second peak.
Sept. 22	Very Poor EME conditions.
Sept. 25	Moon perigee.
Sept. 26–27	Full Moon (27th, UTC).
Sept. 28–29	Western States Weak Signal Society meeting. *(See text for details.)*
Sept. 29	Moderate EME conditions.

P.O. Box 73, Oklahoma City, OK 73101
(phone 405-528-6626; fax 405-528-0746)
Internet jlynch@post.cis.smu.edu
Compuserve 72124.2734@compuserv.com

ference. Nevertheless, the U.S. has but *one* vote. All of the other nations also have one vote. Should a majority of other governments be opposed to these proposed little LEO allocations, they will not became part of the international rules governing frequency spectrum allocation.

Finally, it appears that we are fighting. As of late June the FCC had received several thousand correspondences pertaining to the little LEO threat. If you are reading this in mid-August, there is still time to send your correspondence to the FCC.

Who Are The Players?

The following is a list of the little LEO companies who are currently licensed. This is courtesy the ARRL home page.

"Orbcomm (Orbital Communications Corp.) is a joint venture between Orbital Sciences Corporation of Dulles, VA and Teleglobe Canada. They have two satellites in orbit (launched April 3, 1995) with plans to launch the remaining constellation, for a total of 36 satellites, beginning around the end of this year. Satellites are being built by Orbital Sciences in Germantown, MD (a former Fairchild facility) and launched on Pegasus XL launchers. Uplinks are 2400 bps FSK in the 148–149.9 MHz band, user downlinks are 4800 bps FSK in the 137– 138 MHz band, with beaconing in the 400–401 MHz band. Their two satellites are the only little LEOs actually in orbit. Orbcomm has an informative Web site at <http://www.orbcomm. net/>.

"Starsys (Starsys Global Positioning, Inc.) of Lanham, MD is now owned (80%) by GE American Communications. They were previously owned by NACLS (the US subsidiary of a French company that operates System Argos). They will most likely begin launching their constellation in early 1998. The satellites are being built by Alcatel (Toulouse, France). Launch services have not been announced, but likely candidates are Cosmos or Roket (Russia), Pegasus, LLV (Lockheed Martin), or Delta. They plan to use the same frequencies as Orbcomm, using spread-spectrum technology.

"VITA is a non-profit development organization based in Arlington, VA. They were teamed with CTA Incorporated, but suffered a launch failure in August 1995 (the first LLV-1 launch). The VITA-CTA agreement ended and VITA is now partnered with Final Analysis, Inc. of Greenbelt, MD for the ownership of a single transponder on the FAISAT-2v satellite. This satellite is a hybrid US-Russian effort, and should be launched in the September time frame on a Cosmos from Plesetsk, Russia. VITA's uplinks are the same as Orbcomm and Starsys, with the downlinks in the 400–401 MHz band. VITA's uplinks are not from mobile terminals, but rather are from a few fixed gateway stations. VITA has an informative Web site at <http://vita.org/>. Final Analysis has an experimental license for the remainder of the satellite that allows for a limited number of user terminals to uplink at data rates from 1200–19200 bps GMSK in the 455–456 and 459–460 MHz band. Downlinks are in the 400–401 MHz band, ranging from 1200–38400 bps GMSK. Final Analysis has a Web site at <http://www.uscom.ch/companies/it/facs/facs.html>."

Ariane 501 Flight Fails

The following is from an AMSAT press release dated June 6, 1996.

"Several news accounts have reported that the first flight test of the Ariane 5 launch vehicle was destroyed by ground-based command 40 seconds into the flight at an altitude of about 12,000 feet (4,000 meters) as it appeared that the rocket was veering off course. The launch was initiated at 1233 Universal Time June 4 from the European Space Agency's Kourou launch facility in French Guiana, South America. Ariane 501 carried a group of four scientific satellites known as 'Cluster,' which were, of course, destroyed as well. No amateur radio satellites were aboard.

"The AMSAT Phase 3D spacecraft, currently under construction, is manifested on the second flight test of the Ariane 5 series (Ariane 502), which, according to ESA's latest schedule, is to be launched in October of this year. AMSAT officials believe that it is too early to know what effect the Ariane 501 failure will have on the 502 schedule, or on the possible Phase 3D launch date, or the vehicle on which it will ride. However, a schedule stretch out beyond the re-entry of AO-13 cannot be ruled out.

"AMSAT-DL President Karl Mcinzer, DJ4ZC, and AMSAT-NA President Bill Tynan, W3XO, expressed their sadness on hearing the news. In a joint statement they said, 'We, at AMSAT, have enjoyed a mutually beneficial relationship with ESA for over fifteen years and we are, quite naturally, distressed to hear of this unfortunate occurrence.' They further noted that except for the RS and Fuji satellites, all successful amateur satellite launches since the early 1980s have been on Ariane vehicles. On behalf of the amateur radio satellite community, they extend sincere condolences to ESA, ArianeSpace, CNES, and the Cluster Project. Both expressed confidence, however, that the ESA team will overcome this setback and develop a most successful launch vehicle. DJ4ZC and W3XO said that they are together in anticipating a successful launch of Phase 3D on a forthcoming Ariane mission.

"AMSAT is a worldwide, nonprofit, 501(c)(3) educational and scientific organization chartered in Washington, DC. Its objectives include promoting space research and communication by building, launching, and controlling amateur radio spacecraft. Since its founding, over 25 years ago, AMSAT has used predominantly volunteer labor and donated resources to design, construct, and, with the added assistance of government and commercial space agencies, successfully launch over two dozen amateur radio communications satellites into Earth orbit.

"The Phase 3D satellite, now under construction by AMSAT, will be the largest, most complex, and most expensive amateur radio satellite ever built."

As indicated above, the loss of the Ariane 501 flight has clouded the launch of the Phase 3D satellite. I had a brief conversation with Bill Tynan at HamCom. He told me that they were not sure when they would launch, but that it would most likely be early next year.

In his "Amateur Satellites" column in July *QST*, Steve Ford, WB8IMY, speculates that because of the failure of both the Chinese "Long March" rocket and the Ariane, there is a chance that Phase 3D will launch as early as October because Intelsat, which lost a satellite on the Chinese rocket and was scheduled for an early launch on the Ariane rocket, is suddenly getting "gun shy" about unproven rockets. Therefore, it would give up its place on the Ariane rocket, thereby moving AMSAT into its place.

Because there is no launch insurance available on this unproven rocket, I doubt that AMSAT is willing to take the risk of launching with it. Therefore, it is my speculation that the earliest launch of Phase 3D will be sometime next year, and then probably on an older, more proven Ariane rocket.

I will have more coverage of the features of the Phase 3D satellite in a future column.

No Propagation For CQ VHF Contest

Early Internet reports are that many operators across the country reported no propagation. The exceptions seem to be along the U.S.-Canadian border. Operators in the upper U.S. reported working several Canadians. Additionally, a couple of Canadian operators in the Maritimes reported working several Europeans during the opening.

Many ops who have reported low scores are also saying that they probably will not submit their scores. This leads to a snowball effect. If you don't submit your log, the contest results reflect it. The next year less people participate, leaving less to submit logs. Pretty soon no one participates and no one submits logs. Let's reverse this trend by submitting your log no matter how low your score. Next year, who knows; propagation may be the best ever.

CYØAA Report

The following summary of the CYØAA operation was provided by Mike Smith, VE9AA, via the Internet.

After the completion of the CYØAA Expedition the breakdown of the band/mode counts are as follows: 6 meters, 926 QSOs; and 2 meters, 30 QSOs, including two on EME.

The 2 and 6 meter QSLs go to Mike's new address: Michael E. Smith, 271 Smith Road (Geary), Waterville, Sunbury Co., N.B. Canada E2V 3V6.

Current Contests

ARRL September VHF QSO Party: This contest is scheduled between 1800 UTC Saturday, September 14 and 0300 UTC Monday, September 15. Complete rules can be found on page 102 of the August issue of *QST*.

ARRL 10 GHz and Above Contest: The second weekend of this modified contest is 21–22 September, from 8 AM to 8 PM local time. More information on the rules changes can be found in last month's column and June *QST*.

Canadian Sprints: *The Canadian Amateur*'s VHF column editor ("6 Metres and Down"), Dana Shtun, VE3DSS, informs me that there will be no Canadian Sprints this year.

VE3ONT's (non) Schedule

The following regarding the Algonquin dish is from Peter Shilton, VE3AX.

"I am very sorry to report that VE3ONT will *not* have access to the 46 metre dish in Algonquin Park this year. Fortunately for the future of the site, a contract has finally been reached, and they will be doing major revisions of the drive/control gear. I am not privy to any details at this time. The Toronto VHF Society, the group responsible for bringing you the VE3ONT EME activity, will hopefully be able to work out an acceptable timetable of events in 1997. I suppose if we could come up with the $1000 per hour charge out rate (before improvements) we could be a little more demanding about access!

"In all seriousness, the site's managers have been extremely cooperative in allowing us access and the full run of the site. Despite disappointing results in 1994 and 1995 due to events beyond our control, we cannot forget the very satisfying results achieved in 1993 (144/432/1296—approximately 600 QSOs and 6.5 million points!). Let's hope the dish will be available to amateurs again in the future!—73, Peter Shilton, VE3AX."

Current Meteor Showers

Two minor showers, the α *Aurigids* (1–2 September) and the *Piscids* (two peaks, 8 and 21 September) can be seen this month. However, their activity has not been much above what is considered sporadic activity.

Current Conferences

Pacific NW VHF/UHF Conference: The annual Pacific NW VHF/UHF Conference will be held Saturday, September 21, 1996 in Oregon City, Oregon. Friday night hospitality room; Saturday breakfast (location yet to be determined); coffee and snacks at the convention room; speakers W7PUA, W7ZOI, KK7B; lunch break; program; eyeball QSO, etc.; dinner (location yet to be determined). Group rate discount at Value Inn. For more info call or write: Jim Christiansen, K7ND, 206-549-4062 (P.O. Box 147, Fox Island, WA 98333; e-mail <kd7ts@mail. prostar.com>).

West Coast Weak Signal Society Meeting: Officers of the Western States Weak Signal Society have scheduled a meeting for September 28–29, 10 AM to 8 PM Saturday and 8 AM to 2 PM Sunday at the Lockwood Valley Ranch of Ron Hammel, KC6WLC. Ron's QTH is 15 miles west of the Frazier Park Exit off the Interstate 5 Freeway; near Gorman; 75 miles north of Los Angeles; and 45 miles south of Bakersfield.

You are invited to stay at the Flying J Inn at the Frazier Park Exit (phone 805-248-2700, ask for Elizabeth Leithardt, and mention WSWSS). Lecturers include K6MYC, N6NB, NC7K, and WA6BFH. Antenna range and preamp noise-figure measurement contests are scheduled. Talk-in is on 144.240 USB and 146.550 FM. Admission is $15 each non-members; $5 each members and family. For more info contact Erik Dean, NI6G, e-mail <ni6g@pdsw.com>, or call David, KI6FF, secretary, at 714-891-0208 for messages and fax requests.

Notes on Publications

E-mail Address For West Coast VHFer: The following is from John Kitchens, NS6X.

"I am willing to be a relay for any e-mail you want to send to Bob Cerasuolo, WA6IJZ, the editor/publisher of the 'West Coast VHFer.' He has no Internet access yet. I can accept e-mail, and fax him your information. If you would like to see a free copy of the 'VHFer,' send a #10 SASE to P.O. Box 685, Holbrook, AZ 86025. My e-mail address is <kitchens@earthlink.net>."

New GPS RX with Grids

Earlier this year Garmin introduced their model 38 GPS receiver in stores such as WalMart. The price was around $200. This GPS receiver has software which will allow for readout in six-digit grid locators. The drawback to this

model is that it does not have provision for an external antenna.

Now comes word that Garmin is shipping their new model 45XL. This is a model 38 in a 45 case, which does have provision for an external antenna. As of my writing this info, the price is unavailable. According to the Garmin people, the old model 45 cannot be upgraded to the 45XL.

And Finally . . .

Each One Get One Epilog: Last month in this area I bragged about my boss at SMU and her husband's interest in getting into the hobby. Well, Tom Hampton is now sporting his father's call, W5ADU. Tom is an electronic engineer who spends much of his time in the south Pacific working on government projects. After reading those license manuals he picked up at HamCom, he passed the Technician test with flying colors. After about ten days, every day Janelle would check the Internet for her husband's call. When she spotted it, we located a Form 610 V and Tom sent off for his dad"s call.

Well, I don't want to brag too much, but I did get my "one" into the hobby. Now I have to work on encouraging Janelle. After all, when he is away in the south Pacific, what better way for them to keep in touch with each other.

If you have recruited your friend into the hobby and want to brag about it, too, or if you have something else that you want to brag about, then please let me hear from you. My addresses are on the first page of this column.

Until next month . . .

73, Joe, N6CL

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

On Being A DX Lid

SSB-only DXers are the ones most affected by sunspot minimums. At such times the only place suited to SSB DXing is the top half of 20 meters. DXers proficient in CW as well as SSB operation have 40 and 30 meters to fall back on. However, 30 meters is a CW-only band essentially around the world, and powerful broadcast stations along with the US subband allocation make SSB DXing on 40 meters all but impossible. Most 40 meter SSB DXing occurs during contests and DXpeditions when the DX stations make a special effort to listen up in the US phone subband. For the most part, the higher bands are not open to DXing.

This suggests that all the SSB-only DXers sit on 20 meters during periods of low solar activity. The net result, unfortunately, is a huge collection of DX lids in every pile-up. (For those new to the term "lid," it refers to an obviously inexperienced operator.)

This is not an exaggeration. Tune across any 20 meter SSB pile-up and you'll hear dozens of DX lids doing all the wrong things—and not working the DX station. Since being a DX lid appears to be the goal of every fledgling DXer, let's review the qualifications for being a true 20 meter SSB DX lid.

First, the lid is seriously uninformed. The DX lid avoids all DX newsletters, bulletins, and electronic sources of DX information such as PacketCluster™ and computer bulletin boards. The DX lid has only one source of DX information: asking ignorant questions on the DX station's transmitting frequency. Questions include: What's your call? What country is that? Where's he listening? What's your QSL route? When are you going to be on 40 meter SSB?

Such questions have an escalating effect on the DX station's transmitting frequency. First, the more experienced DX lids answer the questions, completely obliterating the weaker DX signal. Meanwhile, the self-appointed "DX policeman" form of DX lid angrily denounces the initial questioner, creating more QRM.

This continues for some time, completely drowning out the DX signal. Finally, all the various grades and types of DX lids have had their say, and a few of the more experienced DXers actually make a few contacts. The DX lids were too busy transmitting on the DX station's frequency to listen up in the pile-up. Thus, they don't know exactly where in the announced receiving range the DX station is really listening. Not knowing this vital piece of information, the DX lid calls blindly and ineffectually.

The DX lid is totally ignorant of amateur radio propagation. This is why the DX-lid problem is so much worse at sunspot minimums. During periods of high solar activity, the DX lid is probably on the wrong band to work DX. Since the DX lids are spread more thinly about the bands, it lessens the burden on 20 meters. However, everyone "knows" that 20 meters is the only place to work DX at the bottom of the sunspot cycle, so all the DX lids flock to that band.

P.O. Box 50, Fulton, CA 95439

Z32KV operating from RZ4FWA club station.

The DX lid is rude and easily angered. The DX lid will fly off the handle at the slightest provocation, punching the "transmit" key and venting his outburst on the DX station's transmitting frequency, to maximize his audience.

The DX lid never sends his entire callsign. He sits on his chosen frequency in the pile-up, sending but two letters of his callsign. Since he doesn't know where the DX station is listening, his chances of actually working the DX are minimal. Sending but two letters of his callsign drives the DX lid's odds of actually working the DX station to hundreds-to-one. Why would a DX station take the time to make the double contact necessary to copy the rest of the DX lid's callsign when the DX station can work someone sending his complete call? In fact, the DX station can probably work two real DXers in the time it takes to work someone sending the "last two" (letters).

Another distinguishing characteristic of the DX lid is a 10:1 ratio of transmitting to listening. The DX lid figures that the DX station can't hear him unless he is transmitting, so he transmits continuously. This makes him a good reference place in the pile-up, but further increases the odds against him ever making a contact. Since the DX station is only transmitting one third to one quarter of the time, the chances that the DX lid's short listening time coincides with the DX station's transmission are slim. Even if the DX station came back with the last two letters, the DX lid would be too busy transmitting to hear the call. Again, no contact.

The DX lid is either deaf or can't tell one letter of the alphabet from another. When the DX station asks the WB2C-something to go ahead, the DX lid immediately calls, even if his callsign is KA7M-something. Why the DX lid thinks the DX station is so stupid as to come back to the wrong callsign is a mystery to those who are not yet DX lids. (Such an action by the DX station immediately turns the pile-up into a free-for-all, eliminating any chance for contacts.)

The DX lid is also geographically challenged. He doesn't know in which direction to point his antenna for a given DX contact. Thus, he is always dishwater weak on the DX end of the path, requiring multiple guesses as to callsign and report. The DX lid even calls when the DX station is clearly working some other part of the world. In fact, the DX lid waits until the DX station asks for "outside North America" before calling from the US.

Finally, the DX lid has a terrible sense of timing. Timing is central to successful DXing. A real DXer listens to the DX station enough to find the rhythm of the contacts. Good DXers and contesters quickly determine the rhythm of the contacts and adjust their transmissions accordingly. Ideally, the DXer wants to transmit as soon as the DX station begins to listen, and continue to transmit until just before the DX station comes back with a callsign. The DX station might work the first callsign he hears, or he may linger a while waiting for the pile-up to diminish and then pick up a call. The successful DXer discerns exactly how soon after the DX station asks "QRZ" the DXer should send his callsign. The DX lid overcomes this handicap by transmitting all the time.

Actually, I don't mind that so many of the so-

LET THE FUN BEGIN!

2 BIG DAYS

BOXBORO '96

The New England ARRL Convention at Boxboro, Massachusetts

Take the Mass. Pike to Rte I-495. The convention is at exit 28.

OCTOBER 5 & 6



• Make DEALS at the Dealers! •See the Newest Gear! •Giant Flea Market
•FCC Exams - All Levels •WIN the Contests! •Wouff Hong Initiation
•Alternative Programs •DX Meetings & QSL Checking •ARRL & FCC Forums
•Big Banquet, Dance & Show Saturday Night •Free Sessions for Youngsters 6-16

Early Bird Registration $7

$8 at the door

For Tickets Write: Mel Cole WZ1Q, P.O. Box 8, Prides Crossing, MA 01965

All-you-can-eat banquet, show & dance $23.95 per person including tax and tip.

E-Mail Tony Penta, WA1MWN for more information - tony@shore.net

The WPX Program

SSB

2598.....HL5FXP 2600.....EA5VG
2599.....EA5GRC

CW

2916.....KB2FD 2918.....EA3AHQ
2917.....EY8VV 2919.....EA3FBO

Mixed

1746.....EA5GRC

Mixed: 650 IK5ATM. 700 IK5ATM. 750 IK5ATM. 800 IK5ATM. 850 IK5ATM, AA1KS, VE6FR. 900 IK5ATM, AA1KS, VE6FR. 950 IK5ATM VE6FR. 1000 IK5ATM, VE6FR. 1050 IK5ATM. 2550 IK2ILH. 3450 JM3EVR. 3600 N4NO. 3650 N4NO. 3900 W2FXA.

SSB: 350 EA5VG. 400 EA5VG. 450 EA5VG. 500 EA5VG. 550 EA5VG, EA2ABM. 600 EA5VG, EA2ABM. 650 EA5VG, EA2ABM. 700 EA5VG. 750 EA5VG. 800 EA5VG. 850 EA5VG. 900 EA5VG. 950 EA5VG. 1000 EA5VG. 2750 N4NO.

CW: 450 DL4NVB, KB2FD. 400 KB2FD. 450 KB2FD. 500 KB2FD. 550 KB2FD. 600 KB2FD. 650 KB2FD. 700 NS2H, KB2FD. 1200 EA6AA, JG2LGM. 1250 KA2CLV. 1300 KA2CLV. 1950 KS3F. 3100 N4NO. 3150 N4NO. 3900 WA2HZR. 3950 WA2HZR.

20 Meters: AA1KS
40 Meters: WN5MBS

Asia: EA5AT
Africa: EA5AT
No. Amer.: EA5AT
So. Amer.: I1-21171, EA5AT
Europe: EA5AT
Oceania: JR6SVM, EA5AT, EA3CWK

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, S50A, AA6WJ, W3AP, W9IL, OE1EMN, IK1GPTG, KØDEQ, DL5ARS.

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, AA6WJ, W3AP, KØDEQ.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

called DXers on 20 meter SSB are lids. They are essentially out of the competition for a contact with the DX station, thanks to their ill-considered actions. DX lids make life easier for real DXers, at least when they aren't transmitting on the DX station's frequency.

So how can a new DXer avoid turning into a DX lid? It's easier than you might think. Let's review the ways to elude DX "liddom" by turning each DX-lid characteristic around.

The real DXer keeps up to date on DX activities and operations. The real DXer subscribes

From left: Anatoly, UA2AO, Sak, LY2BO, and Dima, RA2FA, at the RW2F club station.

The WAZ Program

Single Band WAZ

15 Meter SSB

496 ..... JE8IGW

20 Meter SSB

987 ..... VE3VET

20 Meter CW

466 ..... N1QY
467 ..... DL7VOG
468 ..... EA6BD

160 Meter WAZ

12	WØCD	37 Zone	Endorsement
36	W8UVZ	37 Zone	Endorsement
91	N4SU	38 Zones	New
92	WB4DBB	30 Zones	New
93	JA3AAW	31 Zones	New
94	K8GG	34 Zones	New
95	WB2P	32 Zones	New

All Band WAZ SSB

4332 ..... OD5NH
4333 ..... VE3VET
4334 ..... BV5CM
4335 ..... EA1OT
4336 ..... EA5GRC
4337 ..... JK1IRY

CW/Phone

7683 ..... JH4CBM
7684 ..... JA7NUZ (CW)
7685 ..... EA3CB
7686 ..... EA3AJI
7687 ..... EA4AU
7688 ..... JF7QUE (CW)
7689 ..... JG1INC

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.

to at least one of the many available DX newsletters; this means the real DXer already knows who's on what frequency. The real DXer knows about propagation shifts and is on the right band at the right time.

The DXer knows the answers to questions such as callsign, QSL route, etc., or at least knows how to find this information *without* transmitting, much less on the DX station's frequency. The real DXer *never* transmits on that frequency. The only possible exception might be to inform a DX lid that the DX station is listening up. However, this advice must be carefully timed so as not to interfere with the DX station's transmission. Of course, the real DXer has a fine sense of timing and is able to give this gentle reminder without interference.

The real DXer keeps cool while the pile-up and DX lid/cops battle it out. The real DXer knows that maintaining personal control is very important in serious DXing.

The real DXer *always* sends his complete callsign. The real DX *never* sends just two letters of his callsign. There is simply no reason to *ever* send other than a complete callsign. In fact, so-called DXers who send only two letters of their callsign may be violating amateur radio regulations. The rules require that you identify with your complete callsign at least once every ten minutes. Sending but two letters doesn't meet this requirement. Since you have to send

5 Band WAZ

As of May 31, 1996, 441 stations have attained the 200 Zone level.

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

DL3ZA

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

N4WW, 199 (26)	HA8IB, 199 (2 on 15)
AA4KT, 199 (26)	DK1FW, 199 (31)
K7UR, 199 (34)	US1IDX, 199 (37)
NAØY, 199 (26)	YU1AB, 199 (1)
WØPGI, 199 (26)	OH2DW, 199 (1)
W2YY, 199 (26)	IK1AOD, 199 (1)
W9WAQ, 199 (26)	UA3AGW, 198 (1, 12)
W1JR, 199 (23)	VO1FB, 198 (19, 27)
VE7AHA, 199 (34)	EA5BCK, 198 (27, 39)
W1FZ, 199 (26)	KZ4V, 198 (22, 26)
IK2GNW, 199 (1)	K4PI, 198 (23, 26)
W9CH, 199 (26)	G3KDB, 198 (1, 12)
ACØM, 199 (34)	DK2GZ, 198 (1, 24)
IK8BQE, 199 (31)	KG9N, 198 (18, 22)
JA2IVK,199 (34,40m)	KM2P, 198 (22, 26)
K1ST, 199 (26)	GM3YOR, 198 (12, 31)
ABØP, 199 (23)	DKØEE, 198 (19,31)
KL7Y, 199 (34)	KØSR, 198 (22, 23)
UY5XE, 199 (27)	YO3APJ, 198 (29, 35)
NN7X, 199 (34)	K3NW, 198 (23, 26)
DL3ZA, 199 (31)	WB6OKK, 198 (22, 37)
OE6MKG, 199 (31)	

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

EA3EQT, 153 Zones	Z32KV, 158 Zones
YZ7AA, 179 Zones	DF9ZW, 188 Zones

Endorsements:

WB4DBB, 197 Zones	DL3ZA, 200 Zones
K6FG, 186 Zones	OH2DW, 199 Zones
KG6LF, 160 Zones	GM3YTS, 195 Zones
W6BCQ, 190 Zones	IK1AOD, 199 Zones
YU1AB, 199 Zones	

1008 Stations have attained the 150 Zone level as of May 31, 1996.

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your entire callsign sometime in the next ten minutes, why not do it *all* the time? The last-two-letters problem is a serious one in DXing today. The number of contacts a DX station or DXpedition makes is significantly reduced by the kind of double exchange necessary because of the lack of the complete call.

The real DXer listens, listens, and then listens some more. The real DXer *never* transmits a signal that doesn't have a high probability of being heard by the DX station. That means the real DXer has determined that propagation will permit a contact, based on whom the DX station is working. The real DXer has discerned the rhythm of the contacts and has practiced such timing *without* putting a signal on the band. The real DXer has found the exact frequency on which the DX station is listening *now*. The real DXer did this by zero-beating the frequency of the last contact. With the antenna pointed in the right direction, the real DXer, with near-perfect timing, sends his complete callsign once or twice, depending on the DX station's preference. If the DX station comes back

ZP5ALI visits amateurs in Lebanon.

CQ DX Awards Program

SSB

2195	YZ7AA	2197	KI7CM
2196	YT7TY	2198	EA3AJI

CW

943	YT7TY	945	EA3AJI
944	OH7MKR	946	EA3CB

SSB Endorsements

320	VE7DX/328	310	DL3DXX/314
320	AA6BB/328	310	KQ4GC/310
320	EA4DO/328	310	KF7RU/310
320	ZL3NS/328	310	YZ7AA/311
320	WB3CQN/327	300	EA3CB/308
320	KB8DB/327	300	EA3CWK/303
320	VE3MR/327	300	YT7TY/300
320	VE3MRS/327	275	KG6LF/296
320	KB7VD/326	275	KQ4WD/283
320	K4JLD/324	200	EA3AJI/208

CW Endorsements

320	WØIZ/328	300	K4JLD/309
320	KB8DB/327	275	IKØADY/290
320	WØHZ/326	275	9A2AJ/289
320	W8XD/325	250	YT7TY/254
320	DJ2PJ/323	200	EA3CB/230
320	K2JLA/322	150	EA3AJI/171
310	VE7DX/318		

RTTY Endorsements

275	K3UA/281	250	KB8DB/255

Total number of active countries is 328. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

to another callsign, the real DXer refrains from coming back. Not until the DX station is clearly calling the DX will the real DXer transmit, and then only an acknowledgement of the report, correction, or completion of the callsign, and a signal report. Since DX lids outnumber real DXers by about a factor of ten, most of the stations in the pile-up are either on the wrong frequency or have poor timing, so the real DXer has minimum competition and the contact is soon in the log.

Meanwhile, the DX lid continues his ineffectual actions, perhaps believing that if his electricity bill is high enough, the DX station will take pity on him and work him. Since the DX lid is on the wrong frequency, is sending but two letters of his call, and has poor timing, it's unlikely.

The new DXer has a true choice: mastering DX skills and working rare stations through substantial pile-ups on a couple of calls, or choosing the path of the DX lid and settling for a mere handful of DX contacts.

DX Conventions

The 1996 New Orleans International DX Convention is August 30–31 at the Royal Sonesta Hotel on Bourbon Street in the historic French Quarter of New Orleans. Additional information is available from Wondy, K5KR, at 504-837-1485. This is an excellent, high-class gathering in a wife-approved location. Plan to attend this year. Your DX editor will be hosting the Hospitality Room at the Royal Sonesta on both Friday and Saturday evenings.

The Northern Illinois DX Association hosts the 44th Annual W9DXCC DX Convention and Banquet on Saturday, September 7 at the Holiday Inn, Rolling Meadows, Illinois. There will be interesting programs, guest DX speakers, industry representatives, contests, exhibits, QSL checking, hospitality suites, banquet activities, and more. For information contact: Chairman Phil Camera, KB9CRY, at 708-343-1696, fax 708-343-4394 or his e-mail address: <lphil@aol.com>.

The 1996 SEANET Convention is November 22-24 in Madras, India. For more information,

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 326 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K2TQC 328	K2OWE 326	YU1HA 326	K8LJG 324	K2JLA 322	N4AH 315	WB6OKK 310	WG5G/QRPp 301	LA7JO 289
K1MEM 328	K4CEB 326	I5XIM 326	IT9QDS 324	AA5NK 321	IK2ILH 315	K4CXY 309	W6YQ 301	9A2AJ 289
K2FL 328	I4EAT 326	IT9TQH 326	W6DN 324	ON4QX 321	K2JF 314	VE7DX 309	YU1TR 300	G4MVA 289
K9BWQ 328	K6LEB 326	WA4IUM 326	G4BWP 324	K9QVB 321	AA2X 314	K4JLD 309	YU2TW 299	YU1AB 288
K2ENT 328	KD8V 326	WA8DXA 326	WØJLC 324	HA5DA 321	4N7ZZ 314	VE9RJ 309	YV5ANT 299	DJ1YH 288
DL8CM 328	9A2AA 326	N5FW 326	W7CNL 324	WB5MTV 321	W5OG 313	I1EEW 307	N4OT 299	YU7FW 286
N7RO 328	N4KG 326	EA2IA 326	W7ULC 323	IT9ZGY 320	KA7T 313	N1HN 307	CT1YH 298	F6HMJ 284
WØIZ 328	OK1MP 326	W7OM 326	WA4JTI 323	K1HDO 320	K9DDO 312	N3DQN 306	HB9DDZ 297	KF5PE 282
K3UA 327	PAØXPQ 326	WØHZ 326	W4OEL 323	KB4HU 320	K1VHS 311	N5HB 306	W7IIT 296	I2EOW 278
K6JG 327	W2FXA 326	N6AR 325	KUØS 323	N5FG 319	G3KMQ 311	I4LCK 305	KØHQW 296	HB9AFI 278
N7MC 327	SM6CST 326	K8NA 325	DJ2PJ 323	N6AV 318	WA8YTM 311	OZ5UR 304	KH6CF 294	W4UW 277
KB8DB 327	N4JF 326	KZ4V 325	AG9S 322	VE7DX 318	N6AW 311	G2FFO 303	K7EHI 293	KB8O 276
W9DWQ 326	W2UE 326	I1JQJ 325	K4IQJ 322	VE7CNE 317	WB4DBB 311	K7JYE 302	KE5PO 293	WG7A 276
N4MM 326	W9WAQ 326	IT9VDQ 325	NC9T 322	N6CW 316	WB4UBD 310	WA4DAN 301	K8JJC 290	LU3DSI 275
DL1PM 326	AA4KT 326	W8XD 325	DL3DXX 322	KA5TQF 316	OH3NM 310	HA5NK 301	IKØADY 290	
K9MM 326	K9IW 326	F3TH 324	W1WAI 322	W3BBL 315				

SSB

K4MZU 328	N4MM 326	IT9TGO 326	VE2PJ 325	KC5P 323	I4SAT 320	KV2S 315	EA3CB 308	N6ITW 291
K2TQC 328	YS1GMV 326	ZL1HY 326	I8LEL 325	WDØGML 323	I8LEL 320	WA9RCQ 315	AB4IQ 307	YB1RED 291
K2FL 328	K9MM 326	XE1L 326	K7LAY 325	WW1N 323	K4JLD 320	IØSGF 315	W9IL 307	DJ2UU 291
DJ9ZB 328	4Z4DX 326	YU1HA 326	PY4OY 325	K4SBH 323	WE2L 320	N3ARK 315	N6AV 306	WA3KKO 290
EA2IA 328	ZL1AGO 326	W4NKI 326	IT9ZGY 325	WB2JZK 323	EA3EQT 320	KA4RAW 315	TI2TEB 306	N5QDE 290
K2ENT 328	KF7SH 326	KZ4V 326	IT9TQH 325	CE7ZK 323	WS9V 320	K2AJY 315	VE3DLR 306	OE7KWT 290
OZ5EV 328	ZS6LW 326	VE3GMT 326	K6LEB 325	K2ARO 323	KU9I 320	K7TCL 315	W3YEY 306	4X6DK 290
VE1YX 328	VK4LC 326	OZ3SK 326	K8CSG 325	LU7HJM 323	KE3A 320	NØAMI 314	KF8UN 306	IK2PZG 289
W6EUF 328	YV1AIP 326	W4EEE 326	I2EOW 325	KA9I 323	KD8IW 320	OE6CLD 314	XE1MDX 305	KF7VC 288
K2JLA 328	K9IW 326	KE4VU 326	IK1GPG 325	4N7ZZ 323	AB7AU 320	W5RUK 314	W6SHY 305	OK1AWZ 287
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K6YRA 328	YV1AJ 326	WA4WTG 326	K1UO 325	WN5IJZ 322	ON5KL 319	OH5KL 313	EA5OL 305	W5OXA 287
W6BCQ 328	YV1KZ 326	WD8PUG 326	VE7WJ 325	YV5IVB 322	WA4DAN 319	WDØDMN 313	G4NXG/M 304	IK8BMW 286
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AA6BB 328	DL6KG 326	IT9TGO 326	IK8BQE 324	ZS6AOO 322	KB1JU 319	OA4QV 313	EA3CWK 303	EA1AYN 285
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K9BWQ 327	N4KG 326	K9HDZ 326	YV1CLM 324	TI2HP 321	KB5FU 318	N6RJY 312	XE2DU 301	YC3OSE 282
WØYDB 327	OK1MP 326	WA3HUP 326	YV5CWO 324	I8XTX 321	AA4AH 318	ZS6BBY 311	AB4NS 301	VE7HAM 281
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WB3CQN 327	I2QMU 326	YV1CLM 326	I8KCI 324	K4POV 321	W6NLG 318	IN3ANE 311	YU2TW 300	YU1TR 280
KB8DB 327	PAØXPQ 326	N6AW 326	I1POR 324	KS2I 321	IK8GCS 318	F1OZF 311	AB4UF 300	KK4TR 280
VE3MR 327	N4JF 326	ZP5JCY 326	VE4AT 324	OA4OS 321	W6MFC 318	EI6FR 311	WB4UHN 300	KN4RI 280
VE3MRS 327	KB4HU 326	K5TVC 326	DU9RG 324	W7ULC 321	KF5AR 318	WA2FKF 311	KB8NTY 300	WØIKD 279
W9DWQ 326	KC4MJ 326	KB7VD 326	KD5ZM 324	W3AZD 321	I8IYW 318	YZ7AA 311	YT7TY 300	WZ3E 279
W9SS 326	OE2EGL 326	WB3DNA 325	KØHQW 324	WØULU 321	NI5D 318	KD5ZD 310	WB6GFJ 299	EA3CWT 278
WA4IUM 326	SV1ADG 326	I8ACB 325	W7FP 324	KB8O 321	WA8YTM 318	KA5RNH 310	VE3CKP 299	WN5MBS 277
WB1DQC 326	CX2CB 326	N6AR 325	KA5TTC 324	OE7SEL 321	W6SHY 318	I2MQP 310	EA5GKE 298	VE2DRN 277
XE1AE 326	W4UNP 326	WD8MGQ 325	KE5PO 324	VE2GHZ 321	VE4ACY 318	HA6NF 310	KJ9N 298	GØLRX 277
KA3HXO 326	TI2CC 326	K8LJG 325	KB7VD 324	LU1JDL 320	WB6PSY 317	KQ4GC 310	KG6LF 296	KC6AWX 276
CX4HS 326	WA4ECA 326	K8NA 325	WB4DBB 324	KF8VW 320	9H4G 317	KF7RU 310	KB5WQ 294	OA4EI 276
F9RM 326	IØZV 326	IK8CNT 325	K4JLD 324	IØAMU 320	WA6DTG 317	EA5RJ 309	IT9VDQ 293	NC3C 275
I4EAT 326	I4LCK 326	AI8M 325	K8YVI 323	K4CXY 320	W8AXI 317	XE1MD 308	KJ5LJ 293	F5NBX 275
VE3XN 326	K7EHI 326	W4UW 325	NC9T 323	G4ADD 320	XE1XM 317	CT1AHU 308	TI2LTA 292	VE2AJT 275
YU1AB 326	IKØIOL 326	WB6OKK 325	K9HQM 323	I4WZK 320	N5HSF 316	K4JDJ 308	K2EEK 291	IS1IDX 275

RTTY

K2ENT 321	WB4UBD 300	NI4H 288	K3UA 281	I1JQJ 273	KE5PO 263	KB8DB 288	W4EEU 250	G4BWP 222

contact Gaja, VU2GJR, P.O. Box 1127, Madras, India 600010 or e-mail to <seanet96@indiagate.com>.

Club Officers

The Long Island DX Association has elected the following officers for the 1996–98 term: president, Frank Fallon, N2FF; vice-president, Marty Miller, NN2C; secretary, Ed Whitman, K2MFY; treasurer, Russ Lusterman, AA2LC; and directors Art Albert, K2ENT, Marv Frickas, W2FGD, and John Reiser, KB2CB.

Special-Event Station

The Southern Counties Amateur Radio Association of New Jersey will operate **K2BR** September 9–14 from the Miss America Pageant in Atlantic City, NJ. Atlantic City is on Absecon Island, (NA-111) for the Islands On The Air program. Try 25 kHz up from the bottom of the General-Class subbands on phone and 65 kHz up on CW. QSL with a business-sized (#10) SASE via SCARA, P.O. Box 121, Linwood, NJ 08221.

QSL Notes

For airmail postage from Germany, DXers should include US$2 or two IRCs; one IRC or US$1 is not enough for airmail return postage.

QSL **T98BBF** to OH2CI and **T98TFA** to LA5TFA.

QSL **XR1X, 3G1X,** and **XQ1IDM** via Nicolas Herrera G., P.O. Box 345, Antofagasta, Chile. This is a new address for Nick.

QSL **HI7/DL5PV** via operator's home address: Frank Eichstaedt, Mussbecherstr. 7, D-67067 Ludwigsshafen, Germany.

QSL active IOTAer **K2OLG** via his new address: 1290 Yesica Ann #103, Naples, FL 34110.

QSL **4K2MAL** direct to Chepur E.V., UR5MAL, P.O. Box 23, Krasnodon 349349, Ukraine.

QSL **3A/IK1QBT** to Tony Gallo, Via Capo S. Spirito 1/16, I-17020 Borghetto S. Spirito, Italy.

QSL **3A/IK1HLG** via Frank Imbesi, P.O. Box 155, I-17025 Loano, Italy.

QSL **3A/IK1CJO** via Mauro Ferrua, P.O. Box 41, I-17031 Albenga, Italy.

QSL **J45DZX** from the WPX CW contest via operate Goran Lundell, SMØCMH, Elgovagen 11, S-133 36 Saltsjobaden, Sweden, direct or via the Swedish bureau.

QSL **V26B** via WT3Q.

QSL **TM1MA** to Eric Heidrich, F5TKA, La

CQ Books

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This is truly a 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 for anyone! **Order No. MCCOY.....$15.95**

Building and Using Baluns and Ununs, by Jerry Sevick, W2FMI
This volume is the definitive source for the latest information and designs on transmission line transformer theory. Discover new applications for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples.
Order No. BALUN.....$19.95

The NEW Shortwave Propagation Handbook, by W3ASK, N4XX & K6GKU
The most comprehensive source of information on HF propagation is available from CQ! Read about propagation principles, sunspots, ionospheric predictions with photography, charts and tables galore—it's all in this unique reference volume!
Order No. SWP....$19.95

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ARRL Operating Manual (New Ed.)	ARRLOM	$22
ARRL Repeater Directory ('95-'96)	ARRLRD	$7
ARRL Antenna Compendium Vol. 1	ARRANT1	$10
ARRL Antenna Compendium Vol. 2	ARRANT2	$12
ARRL Antenna Compendium Vol. 3	ARRANT3	$14
ARRL Antenna Compendium Vol. 4	ARRANT4	$20
ARRL Weather Satellite Handbook	ARSAT	$20
ARRL FCC Rule Book (new)	ARFCC	$12
ARRL World Map	ARMAP	$12
ON4UN Antennas and Techniques for Low Band DXing	LOWDX	$20
1996 NA Callbook	NACB	$35
1996 Int'l Callbook	INTCB	$35
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Gordon West No-Code Technician Plus License Manual	GWTM	$10

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The Quad Antenna, by Bob Haviland, W4MB
This is the authoritative book on the design, construction, characteristics and applications of quad antennas.
Order No. QUAD..... $15.95

Keys, Keys, Keys, by Dave Ingram, K4TWJ
Enjoy nostalgia with this visual celebration of amateur radio's favorite accessory.
Order No. KEYS.....$9.95

The VHF"How-To" Book, by Joe Lynch, N6CL
This book is the perfect operating guide for the new and experienced VHF enthusiast.
Order No. BVHF.....$15.95

The Vertical Antenna Handbook, by Paul Lee
Learn basic theory and practice of the vertical antenna. Discover easy-to-build construction projects for anyone!
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This is an excellent video introduction to ham radio. CQ's experts show how to select equipment and antennas, which bands to use, how to use repeater stations, the importance of grounding and the basics of soldering.
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For the newcomer to contesting or experienced veteran, this video is for you! You'll get advice and operating tips from contesting's most successful competitors, including Ken Wolff, K1EA, and CQ's own contest columnist, John Dorr, K1AR. **Order No. VCON $19.95**

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Learn how veteran operators set up their satellite stations. Locate and track ham satellites with ease. Watch operators access current satellites and make contacts around the world. **Order No. VSAT..... $19.95**

Getting Started in DXing
Top DXers share their experience with equipment, antennas, operating skills, and QSLing. You'll see hams work rare DX. If you're new to DXing, this video is for you! **Order No. VDX..... $19.95**

Getting Started in VHF
This is the ideal introduction to VHF. See demonstrations of the latest radios. Also, learn about repeater usage, packet, satellites as well as the more exotic VHF operating modes. **Order No. VVHF....$19.95**

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Discover all aspects of ham radio ranging from what it takes to get started to how to get your ham license. Ideal for public events or as an opening to your club's licensing courses! **Order No. VHOR.....$19.95**

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Silvano, KB5GL, executive vice-president of the New Orleans International DX Convention (right), greets Victor, UN8EA, and his family. W5BWA is at the left.

Ferme du Temple, Baliment K2, 91130 Ris Orangis, France.

QSL **9J2CQ** via op Rob Shapiro, ND3A, P.O. Box 3675, Merrifield, VA 22116-3675.

QSL special-event stations **YM21HCS** (Europe) and **YM22HCS** (Asia) via TA2BK.

QSL **A61AF** for the period June 5–12 **only** to operator Dave, AA6DC. All other A61AF cards go to manager N1QMM.

QSL **OD5PN** via Norbert Oberweis, LX1NO, 5, Cite Oricher-Hoehl, L-8036 Strassen, Luxembourg.

73, Chod, VP2ML

QSL INFORMATION

3C1DX to EA6BH
3D2RW to ZL1AMO
3DAØMA to DK8FS
3Z0WAW to SP5PBE
4J3M to UD6DJ
4K8F to UA9AB
4L1DX to OZ1HPS
4N4L to 9A2AA
4U1SCO to F5SNJ
4U1UN to WB8LFO
5U7AA to HH2HM
5WØAN to DF8AN
5X4F to KB4EKY
6W6/N3RUS to K3IPK
7Q7EH to W1EH
8P9IR to DJ1TO
8R1ZG to W4FRU
9H3WK to DK9IP
9K2MU to WA4JTK
9K5HN to 9K2HN
9K5HR to 9K2HR
9L1PG to NW8F
9M2JJ to SMØOEK
9M8HIM to 9M8DB
9N1RHM to KV5V
9Q5MRC to G3MRC
9Q5TR to 4Z5DP
9U/EA1FH to EA1FFC
A61AD to WB2DND
A92GD to K1SE
AHØAV/KH2 to JH6RTO
BV4MU to KA6SPQ
BV4OQ to W3HCW
BV5DR to W3HCW
C56CW to DL7DF
CN2LN to DJØQJ
CN8GB to CN8BA
CU3YY to CT1GG
CX9AU to KA5TUF
EA8BYR to WA1ECA
ED9SSC to EA9AO
EM5DIG to UY5AA
EO7J to UT5JAJ
ER1M to SP9HWN
ER1OO to I8YGZ
EU5F to EW6WF
EW1WZ to DL1OY
EX8DX to IK2QPR
FG5FR to F6FNU
FG5GZ to F6CLK
FG5HR to F6BUM
FM5WE to W4FRU
FOØMOD to AE6C
FT5WE to F5GTW
FY5FJ to IK2HTW
H99I to HP2CTM
HC5EA to K8LJG
HC6CR to NE8Z
HP1XBH to AD4WU
HP2DZL to WP4NAC
J3K to WB8GEX
J52AK to IV3TIQ
J56CK to I4LCK
J56DY to IK4SDY
JW5HE to OZ8RO
JX7DFA to LA7DFA
KB1AGK/KH2 to JA6PJS
LZØA to LZ1KDP
LZ7ØBFR to LZ1BJ
OD5JY to OE6EEG
PJ2MI to K2PEQ
PJ5AA to W1AF
R1FJL to DF7RX
R1FJZ to DF7RX
RPØAKO to RKØAZZ
SØ7NY to EA4URE
SØA to EA2JG
SØRASD to EA2JG
S79MAD to GW4WVO
SPØCW to SP2FAP
T3ØBH to ZL1AMO
T92A to S57MX
T99W to DL1QQ
TU2DP to K4MQL
TU2XR to AK1E
UAØAP to AA2SZ
UR4WWT to WR3L
USØHZ to W3HNK
UX2MM to DL3BQA
V21CW to KA2DIV
V44KJ to WB2TSL
V73GT to WF5T
V73NN to W3HVN
V73W to WW1V
VI75RAAF to VK4LV
VK1CW to JA6EGL
VK1FF to WB2FFY
VK2IGT to JH2BCN
VK2IMD to VK2KAA
VK9XM to JA1BK
VP2EFF to JH4IFF
VP8BPZ to DA4RG
VQ9DX to AA5DX
VQ9LV to KY3V
XX9AS to KU9C
YS1ZRB to K8ZAA
YS1ZV to KB5IPQ
ZD7VJ to G4ZVJ
ZD7WRG to WA2JUN
ZD8Z to VE3HO
ZF2DR to K5RQ
ZK1FAN to DF8AN
ZK1XB to HB9DKX
ZL3FAN to DF8AN
A61AN to N. Fekri, P.O. Box 53650, Dubai, U.A.E.
HP2CTM to Ricardo Lee, P.O. Box 152, Colon, Republic of Panama
JX9ZP to Amateur Radio Station JX9ZP, N-8099 Jan Mayen, Norway
OHØXX to Suite 599, 1313 So. Military Trail, Deerfield Beach, FL 33442, U.S.A.
VK2BEX to Atsu Asahina, P.O. Box 195, Killara, NSW 2071, Australia
VP8CKN to Tim, P.O. Box 478, Port Stanley, Falkland Islands
VR2KF to Kazuhuko Fujita, P.O. Box 4724, Hong Kong
VR6DR to Dennis Christian, P.O. Box 2, Pitcairn Island
VR6MW to Meralda Warren, P.O. Box 27, Pitcairn Island
VU2PAI to P.O. Box 730, 575003 Mangalore, India
ZL2TT to R. Wills, 163 Mark Ave, Grenada Village, Wellington 6004, New Zealand

Announcing:

The 1996 CQ WW DX Contest

Phone: October 26–27 CW: November 23–24
Starts 0000 GMT Saturday Ends 2400 GMT Sunday

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.

II. BANDS: All bands, 1.8 through 28 MHz, except for WARC bands.

III. TYPE OF COMPETITION (choose only one):

For all categories, transmitters and receivers must be located within a 500 meter diameter circle or within the property limits of the station licensee's address, whichever is greater. All antennas used by the entrant must be physically connected by wires to the transmitters and receivers used by the entrant. Only the entrant's callsign can be used to aid the entrant's score.

A. **Single Operator Categories:** Single band or all band; only one signal allowed at any one time; the operator can change bands at any time.

1. Single Operator High: Those stations at which one person performs all of the operating, logging, and spotting functions. The use of DX alerting assistance of any kind places the station in the Single Operator Assisted category.

2. Single Operator Low: Same as III A 1 except that the output power shall not exceed 100 watts (see rule XI. 11).

3. QRPp: Same as III A 1, except that the power output must not exceed 5 watts (see rule XI.11).

4. Single Operator Assisted: Same as III A 1 except the passive (self-spotting not allowed) use of DX spotting nets is allowed.

B. **Multi-Operator** (all band operation only):

1. Single Transmitter: Only one transmitter and one band permitted during any 10-minute period, defined as starting with the first logged QSO on a band. Exception: One—and only one—other band may be used during any 10-minute period if—and only if—the station worked is a new multiplier. Logs found in violation of the 10-minute rule will be automatically reclassified as multi-multi.

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

C. **Team Contesting:** A team consists of any five radio amateurs operating in the single operator category. A person can be on only one team per mode. Competing on a team will not prevent any team member from submitting his personal score for a radio club. A team score will be the sum of all the team member scores. SSB and CW teams are totally separate. That is, a member of an SSB team can be on a totally different CW team. A list of a team's members must be received at *CQ* Headquarters by the time the contest begins. Mail or FAX the list to *CQ*, Att: Team Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A.; FAX 516-681-2926. Awards will be given to the top teams on each mode.

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e., 5705). CW: RST report plus zone (i.e., 57905).

V. MULTIPLIER: Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The *CQ* Zone Map, DXCC country list, WAE country list, and WAC boundaries are standards. Maritime mobile stations count only for a zone multiplier.

VI. POINTS: 1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multiplier.

Example: 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

VIII. AWARDS: First-place certificates will be awarded in each category listed under Sec.III in every participating country and in each call area of the United States, Canada, European Russia, and Japan.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award *only*. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates and plaques will be issued to the licensee of the station used.

IX. TROPHIES & PLAQUES (Donors)

PHONE

Single Operator, All Band
World—Dave Rosen, K2GM (WA2RAU Memorial)
World—Low Power—Slovenia Contest Club
World—QRPp—Doc Sayre, N7AVK
World—Single Operator Assisted—Snake River Contest Club
U.S.A.—Potomac Valley R.C. (KC8C Memorial)
U.S.A.—Low Power—North Coast Contesters
U.S.A.—Zone 4—Dennis O'Connor, K8DO
U.S.A.—Zone 3—Bill Fisher, KM9P
Canada—Niagara Frontier Int'l DX Association (VE3WT Memorial)
Carib./C.A.—Alex M. Kasevich, VP2MM/W4
Europe—Potomac Valley R.C.—W4BVV Memorial
Europe—Low Power—Scott Jones, WR3G & Tim Duffy, K3LR
Africa—Gordon Marshall, W6RR
Asia—2 AM Dayton Pizza Gang
Japan—Japan Crazy Contesters Club
Oceania—Northern California DX Club
South America—Yankee Clipper Contest Club

Single Operator, Single Band
World—28 MHz—Joel Chalmers, KG6DX
World—21 MHz—*CQ* Magazine
World—14 MHz—North Jersey DX Assn. (K2HLB Memorial)
World—7 MHz—Fred Laun, K3ZO (K7ZZ Memorial)
World—3.8 MHz—Fred Capossela, K6SSS
World—1.8 MHz—Bob Wruble, AI7B
U.S.A.—28 MHz—Donald Thomas, N6DT
U.S.A.—21 MHz—David Hueben, KBØISS
U.S.A.—14 MHz—Southern California DX Club
U.S.A.—7 MHz—Stanley Cohen, WD8QDQ
U.S.A.—3.8 MHz—Arnold Tamchin, W2HCW
U.S.A.—1.8 MHz—*CQ* Magazine
Carib./C.A.—Snake River Contest Club
Europe—28 MHz—Chod Harris, VP2ML
Europe—21 MHz—Tine Brajnik, S5ØA
Europe—14 MHz—A.G. Anderson, GM3BCL
Europe—7 MHz—Roger Burt, N4ZC
Europe—3.8 MHz—*CQ* Magazine
Europe—1.8 MHz—Robert Kasca, S53R
Japan—21 MHz—DX Family Foundation
Japan—14 MHz—Take Yokoyama, JL1BLW

Multi-Operator, Single Transmitter
World—Southern California DX Club (W6AM Memorial)
U.S.A.—Carolina DX Association
Europe—Bob Cox, K3EST
Carib./C.A.—Eric Scace, K3NA
Oceania—Junichi Tanaka, JH4RHF
Africa—*CQ* Magazine
South America—Gerry Boyd, KG6LF
Asia—*CQ* Magazine

Multi-Operator, Multi-Transmitter
World—Dave & Barbara Leeson, W6QHS & KK6QM
U.S.A.—Paul Hellenberg, KS9K
Europe—Finnish Amateur Radio League
Japan—Ryozo Goto, JH3JYS

Contest Expeditions
World—Single Opr.—National Capitol DX Association (Stuart Meyer, W2GHK Memorial)
World—Multi-Opr.—The German CDXG & SDXG (DJ3NG & DJ4EI Memorial)

Special—Single Operator Award
World—All Band Under 21 years old—Gene Zimmerman, W3ZZ
World—All Band High YL—Yutaka Tanaka, JH3DPB (KA6V Memorial)

CW

Single Operator, All Band
World—Albert Kahn, K4FW (W9IOP Memorial)
World—Single Operator Assisted—Snake River Contest Club
World—Low Power—Slovenia Contest Club
World—QRPp—Gene Walsh, N2AA
U.S.A.—Frankford Radio Club
U.S.A.—Low Power—North Coast Contesters
U.S.A.—Zone 4—Dennis O'Connor, K8DO
U.S.A.—Zone 3—Bill Fisher, KM9P
Canada—Canadian DX Association
Carib./C.A.—Chuck Shinn, W7MAP
Europe—Edward Bissell, W3AU
Europe—Low Power—Scott Jones, WR3G & Tim Duffy, K3LR
Africa—Gordon Marshall, W6RR
Asia—Chuck Shinn, W7MAP
Japan—Japan Crazy Contesters Club
Oceania—Peahi Contest Club
South America—Venezuela DX Club

Single Operator, Single Band
World—28 MHz—Joel Chalmers, KG6DX
World—21 MHz—Don Busick, K5AAD (N5JJ Memorial)
World—14 MHz—North Jersey DX Assn. (W2JT Memorial)
World—7 MHz—Alex M. Kasevich, VP2MM/W4
World—3.5 MHz—Fred Capossela, K6SSS
World—1.8 MHz—Kenneth Byers, Jr., K4TEA
U.S.A.—28 MHz—*CQ* Magazine
U.S.A.—21 MHz—Wayne Carroll, W4MPY
U.S.A.—14 MHz—Northern Illinois DX Association
U.S.A.—7 MHz—Jan Perkins, N6AW (W6AM Memorial)
U.S.A.—3.5 MHz—Bill Feidt, NG3K
U.S.A.—1.8 MHz—Peter Hutter, WW2Y
Canada—Radio Amateurs of Canada
Carib./C.A.—Snake River Contest Club
Europe—28 MHz—John Pryor, K4OGG
Europe—21 MHz—Robert Naumann, KR2J
Europe—14 MHz—Maud Slater (G3FXB Memorial)
Europe—7 MHz—Ivo Pezer, 5B4ADA/T93A
Europe—3.5 MHz—Frankford Radio Club (K3VW Memorial)
Europe—1.8 MHz—Pat Barkey, WA8YVR & Terry Zivney, N4TZ
Japan—21 MHz—DX Family Foundation

Multi-Operator, Single Transmitter
World—Anthony Susen, W3AOH
U.S.A.—Douglas Zwiebel, KR2Q
Canada—Eastern Canadian DX Assn.
Carib./C.A.—North Nevada DX Contest Club
Europe—Friends of K3AO (K3AO Memorial)
Africa—*CQ* Magazine
Oceania—Junichi Tanaka, JH4RHF
South America—Tyler Stewart, KF3P
Asia—Steve Merchant, N4TQO

Multi-Operator, Multi-Transmitter
World—Douglas Zwiebel, KR2Q (K2GL Memorial)
World—SSB/CW Combined—Ehrhorn Technological Operations
U.S.A.—Bob Ferrero, W6RJ (N6RJ Memorial)
Europe—Finnish Amateur Radio League
Japan—Ryozo Goto, JH3JYS

Contest Expeditions
World—Single-Opr.—Yankee Clipper Contest Club
World—Multi-Opr.—Bill Schneider, K2TT

Special—Single Operator Award
World—All Band—Under 21 years old—Chuck Shinn, W7MAP

Club
World—SSB/CW—*CQ* Magazine (W1WY Memorial)
Non-USA—SSB/CW—No. Calif. Contest Club (N6AUV Memorial)

A station winning a World Trophy will not be considered for a sub-area award. That trophy will be awarded to the runner-up of that area.

X. CLUB COMPETITION:

1. The club must be a local group and not a national organization.
2. Participation is limited to members operating within a local geographic area defined as within a 275 km radius from center of club area (except for DXpeditions especially organized for operation in the contest; club contributions of DXpedition scores are percentaged to the number of club members on the DXpedition).
3. To be listed, a minimum of 3 logs must be received from a club and an officer of the club must submit a list of participating members and their scores, both on phone and CW.

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.
2. All sent and received exchanges are to be logged.
3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

4. Logs must be checked for duplicate contacts, correct QSO points and multipliers. Submitted logs must have duplicate contacts clearly shown.

5. DISKS: We want your computer disk. IBM, MS-DOS compatible disks are required. The format we prefer is your CT.Bin, TR.Dat, or NA.QDF file. Name your file correctly—for example, HSØAC.Bin. If you use a different program than mentioned above, the generic format we want is a separate file, for each band, containing a vertical single column of calls in chronological order. The committee **REQUIRES** a disk for any possible high score. The outside of the disk should be labeled clearly with the call of the entrant, the files included, the mode (SSB or CW), and the category. **A disk containing your files may be submitted in lieu of a paper log.** Disks **MUST** be accompanied by a paper summary sheet.

6. Use a separate sheet for each band.

7. Each entry must be accompanied by a summary sheet showing all scoring information, category of competition, contestant's name and address in BLOCK LETTERS, and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

8. Sample log and summary sheets and zone maps are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request. If official forms are not available, make up your own 80 contacts to the page on 8 1/2" × 11" paper.

9. All entrants are required to submit cross-check sheets (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made. All other entrants are encouraged to submit cross-check sheets.

10. Duplicate contacts and broken calls penalty: up to 3%, three (3) additional contacts removed; over 3% is grounds for possible disqualification.

11. QRPp and low power stations must indicate same on their summary sheets and state the actual maximum power output used, with a signed declaration.

XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest; unsportsmanlike conduct; taking credit for excessive duplicate contacts; unverifiable QSOs; or unverifiable multipliers will be deemed sufficient cause for disqualification. Incorrectly logged calls will be counted as unverifiable contacts.

An entrant whose log is deemed by the Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within 5 years, he will be ineligible for any *CQ* contest awards for 3 years.

The use of non-amateur means such as telephones, telegrams, etc., to elicit contacts or multipliers **during** a contest is unsportsmanlike and the entry is subject to disqualification. Action and decisions of the *CQ* Contest Committee are official and final.

XIII. DEADLINE:

1. All entries must be postmarked NO LATER than December 1, 1996 for the Phone section and January 15, 1997 for the CW section. **Indicate phone or CW on the envelope.**

2. An extension of up to one month may be given if requested by letter or other means. The granted extension must be confirmed by letter sent to the contest director, must state a legitimate reason, and the request must be received before the log mailing deadline. Logs postmarked after the extension deadline may be listed in the results but will be declared ineligible for an award.

Both Phone and CW logs should be sent to *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801.

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Tips For Improving Your CW Contesting Skills

September Contest Tip of the Month

Okay, not everyone has the circumstances that allow for three towers with stacked Yagis on all bands at his or her station. There are more reasonable things that any contest station owner can do that don't require megabucks. And with the contest season rapidly approaching, now is the time to implement! Consider your station from an antenna switching, external noise filtering, band changing perspective. Pay attention to some of the construction/configuration ideas being promoted in sources such as *CQ Contest*, the *NCJ*, or the *Contest Reflector*. There are literally dozens of low-cost improvements you can make to your station that will improve your scores. Be aggressive; check 'em out!

Calendar of Events

Aug.	24-25	Utah Centennial QSO Party
Aug.	25	Summer QRP QSO Party
Sept.	1	Panama XXV Anniversary Contest
Sept.	2-3	Labor Day QRP CW Sprint
Sept.	7-8	All Asian SSB DX Contest
Sept.	7-8	LZ DX Contest
Sept.	8	North American CW Sprint
Sept.	11-13	YLRL Howdy Days
Sept.	14-15	Worked All Europe SSB Contest
Sept.	14-16	ARRL VHF QSO Party
Sept.	15	North American SSB Sprint
Sept.	21-22	Scandinavian CW Activity Contest
Sept.	21-22	Washington State Salmon Run
Sept.	**28-29**	**CQ WW RTTY Contest**
Sept.	28-29	Scandinavian SSB Activity Contest
Sept.	29-30	Tennessee QSO Party
Oct.	5-6	California QSO Party
Oct.	5-6	VK/ZL SSB Contest
Oct.	6	RSGB 21/28 MHz SSB Contest
Oct.	9-11	YLRL CW Anniversary Party
Oct.	12-13	Pennsylvania QSO Party
Oct.	12-13	VK/ZL CW Contest
Oct.	20	RSGB 21/28 MHz CW Contest
Oct.	20-21	Illinois QSO Party
Oct.	23-25	YLRL SSB Anniversary Party
Oct.	**26-27**	**CQ WW DX SSB Contest**
Nov.	2-4	ARRL CW Sweepstakes
Nov.	8-10	Japan Int'l DX SSB Contest
Nov.	9-10	Worked All Europe RTTY Contest
Nov.	16-18	ARRL SSB Sweepstakes
Nov.	**23-24**	**CQ WW DX CW Contest**

My experience over the years has taught me that there is a basic truth in amateur radio: Some operators excel at CW operating and others need some work. There's at least a million theories why this is the case. Many feel that it's "just in your genes." Others believe that it's a question of like or dislike. Additional theories include ideas such as inherent musical ability, age at which Morse Code is learned, motivation, equipment, etc. The list goes on.

My experience is that CW always came easy to me. Like many of my contesting peers, I entered the ranks of amateur radio at a relatively young age—13. Unlike the training tools of today, I had to learn the code the old-fashioned way. Maybe you remember that old, red-covered ARRL Morse Code training book? I lived on Long Island at the time (NY QTH version 1) and was in relatively close proximity to the ARRL's W1AW transmitting station. It was ideal for copying their Morse Code practice sessions. What provided further challenge to my learning curve, however, was the fact that the shortwave receiver I was using did not have a BFO. Imagine the demands of copying CW as pulsating bursts of "white noise" through a 3 inch speaker! I'm convinced that these early trials were the precursor of the contesting spirit I have today—a desire we all have of pushing the operating envelope to new heights.

There's serious debate going on in our hobby today about the merits of Morse Code, especially from a license-requirement standpoint. I feel confident in predicting that while CW will eventually disappear as a licensing criteria, it will always exist as a form of communication used by amateur radio operators. And, as you might expect, this will be the case particularly with contesters. Can you imagine only one CQ WW each year? What then would we do on Thanksgiving weekends? Watch tediously boring football games? Sort through our QSL card collections now only generated from SSB contacts? (Hmmm . . . half the QSL load. Maybe this idea of one mode has some merit!)

Well, enough of the history lesson. Several weeks ago I had the pleasure of reading a practical commentary on improving your Morse Code skills as written by Jim Reid, AH6NB. While there are probably scores of other ideas you can think of on improving your CW, Jim captured the essence of the issue. What follows is his commentary.

c/o CQ magazine
Internet: K1AR@contesting.com (new!)
Compuserve ID: 71301,424

Improving Your CW Contesting Skills

By Jim Reid, AH6NB

You can become a high-peed CW operator! How? Practice. What kind of practice? Read on, only if you really *want* to become a good QRQ CW operator—that is, one who is comfortable working DX at 30 to 40 wpm and want to try to compete in contests with the real ops who whistle along at 40 to 50 wpm, and sometimes even faster. It is said that during contests Nose, KH6IJ, could accurately read calls sent above 75 wpm. (By the way, his daughter, Frances, has just picked up his call via the new Vanity Call program. She is living in Honolulu, as did Nose in his later years, after having been a teacher here on Kauai for many years.)

So back to the topic: What is the best, most efficient way to achieve these sorts of operating speeds? How best should you use your available practice time?

First, let's assume you are at least around 13 wpm now, and licensed as either General or Advanced. Both classes of license have access to the same CW bands in all nine of our HF bands. The Extras have some 25 kHz more spectrum on down to the lower end of "only" four of these nine bands: 15, 20, 40, and 80. Pretty good incentive for upgrading, should DXing and contesting be of motivating interest to you.

So, here is how and how much to practice.

Practice Methods

1. *Experience on the Air—Making QSOs.* Lots of CW QSOing outside of contest times works wonders and is the best place to start. Put the microphone away for several weeks and eliminate SSB, SSTV, digital-mode operation, or whatever else from your mind for the same time period. This is to be a time of pure CW skill improvement.

Contesters use computer logging programs which do most of the transmitting for them, as well as the log tasks and duplicate checking; some programs do even more! But to use them efficiently in a contest, you had better be a pretty good keyboard operator as well, and also know the use of the function keys, without using crib notes or key overlay guides during the 'test.

2. *QRQ Receiving Practice.* While waiting to acquire and set up some of the practice programs, start your adventure by engaging in on-the-air receiving practice. Find QSOs in progress at a speed you can comfortably copy with a pencil/pen. Now put the pen/pencil down, and just start listening. Yes, try to recognize the letters as they come along, and group them into words on your mind's "blackboard." Not easy to do, but well worth trying anyway. It is going to take some time, maybe even three or four weeks, before you can follow these high-speed QSOs in your head without writing everything down! Jot down the call, the op's name, QTH and report, while just listening to the rest.

While doing this, if you can find a willing friend, there is a way to augment this sort of practice completely away from CW. Have your friend/spouse/relevant-other spell words from a story or newspaper article to you! He or she is to read the story to you, but not the word sounds, only by spelling the words to you out-loud. This is what is going on when one is "reading CW in one's head": words are being spelled to you "out-loud," and you must form these spelled words into meaningful thoughts. Start at one letter/word space every second sounded by your helper. Have a letter spoken every tick of the clock. This is a speed of 12 wpm (at the Paris standard of 100 letters/workspaces per minute equaling 20 wpm CW speed). Tune in WWV to get exact beats every second.

When you have no trouble forming the

thoughts of the story/article in your mind as the words are spelled to you at this rather slow pace, have your friend double the rhythm—that is, two letters/word spaces per second spoken two per tick. This, of course, doubles your word reading rate to 24 wpm—a big jump for CW, but not for learning to read words spelled out to you in clear, plain English! When you know the story comfortably at this rate, your actual in-the-head CW reading speed should be close behind, and you may be well on your way to QRQ operation.

When using high-speed CW, you'll be receiving letters/word spaces at 3 per second at a 36 wpm CW rate or greater. Maybe your friend can get the rhythm going at 3 letters/spaces per clock tick, and you will know exactly what 36 wpm CW sounds like. This is a typical QRQ DX and contest operation speed. Of course, using a musician's metronome would allow you to exactly set the number of beats per minute, 20 wpm being 100 beats, 36 wpm being 180 per minute, 50 wpm 250 letters/spaces, and so on. My mechanical metronome has a highest beat rate of 208 per minute, or a bit over 41 wpm.

Computer-generated CW such as that from the popular RUFZ program produce top scores that originate from over 450 letters/numbers/spaces per minute! Of course, only callsigns are being sent, and these guys already know all the prefix CW sounds!

Computer-aided CW training programs are also available. They will send code groups, random words, text, and typical QSOs. They are advertised, nearly monthly, in the ham magazines. Morse Academy and Code Master V are two good examples of these products. Their "canned" CW doesn't last long at high speeds, but is very helpful for in-the-head CW reading practice. Using Code Master V, for example, you can also input via the keyboard, or text (.txt) file input, kilobytes of text for very long high-speed CW listening practice runs. I have taken lots of long text files directly from various Internet sites, and copied it directly into a text file for this sort of high-speed practice. In my case, I remove unusual punctuation marks from the text, as I don't want to learn or know the code for quotation signs, semicolons, etc.!

3. *Using the Computer for Practice.* If you have CM V or MA, or another, here is how to use it to become QRQ qualified. Remember that we're focusing on methods to read CW mentally, not writing down or typing anything as you receive it. That comes later.

With lots of CW text stored in your computer program, you are ready to begin. Once you have determined your present 100% comfortable hand-copying speed using pencil or pen, set your computer program to send clear text at about 5 wpm faster than your hand copying speed. Begin sending text at this speed, sit back, and just listen for 30 minutes, twice per day. First you will only be catching a letter every now and then. While this happens, you will miss the next several letters! But keep at it. Soon you will get all the letters of a single word. Again, congratulations as you say the word to yourself, and again a lot of letters/words go on by unrecognized! But you are making progress. In a couple of weeks or so, especially if you were able to get a friend to spell the words of stories/text to you, you will be understanding the text being sent. As soon as you do, up the speed another 5 wpm. Keep it up, and in 3 or 4 months you may be up to 40 or more wpm! Try it. It works, and you'll be amazed.

At some point, you must add in the typing and contest program practice. The RUFZ program already mentioned will send the call signs of the world to you at ever increasing speed. Your assignment is to enter them correctly via the keyboard to score. Another program called PED is a pileup simulation training program. Both the TR and NA contest logging programs have simulator programs built in for training in the use of the program. These programs may be downloaded at no cost from various Internet sites such as those linked via the KA9FOX or VE7TCP web sites. PED411.zip is available at the FTP site <oak.oakland.edu> in the SimTel\msdos\hamradio directory.

4. *CW Sending Practice Helps Loads.* Don't practice sending using the keyboard for these practice ideas! Use a bug, or preferably an electronic iambic keyer and paddle setup. The electronic keyer sends "perfect" CW characters, spacing and rhythm, a big help in your mental training activity.

Adjust the paddle to very light action. You don't want to be slapping the key all about the tabletop! Good paddle keys are heavy for this reason. Put it on a mouse pad also to help keep it put.

Now begin practice by attempting to send fast. This sending practice also works wonders as you begin your progress to becoming a QRQ operator. Why? Because now you must form words to express ideas in your mind, while simultaneously sending the thoughts as CW. This inverts what has been going on in your mental processes to receive CW. As you increase your speed ability, you will not even be thinking "letter to CW" translation, but will mentally and automatically be sending CW as if it were another language with which you have become quite comfortable.

Your mind will be training on CW in such a way that when it can send fast, it will use the same subconscious patterns to also receive fast. KE7V has told me he raised his QRQ speed to 55+ wpm (275 letters/word spaces per minute) using this specific practice method!

There is more to encourage you to practice. Once you are able to mentally send at QRQ speeds and type accurately into a contest logging program, you may also want to practice clear text copying to the keyboard, and copying behind many, many words. Your QRQ mental rate will increase even more, and you're well on your way to being a competent, competitive CW contest op!

By having fun, practicing daily, and engaging in frequent CW QSOs, you will get there. I am still working on it, but I am probably older than 90% or more of you reading this! *(end quote)*

And Finally . . .

CW is hardly a dead mode. As amazing as it sounds, a large number within our midst actually prefer it. Some, such as my long-time friend K1GQ, design their stations exclusively for CW. Bill may own a microphone, but I doubt he knows where it is off the top of his head! I firmly believe that contesters and DXers together will be the group that ultimately drives the preservation of CW in our hobby. Only time will tell.

Closing Comments

As I write this, I'm on an airplane heading for the WRTC '96 festivities. By pure chance, my good friend Randy Thompson, K5ZD, will be connecting with me in Chicago, and together we'll be arriving in San Francisco in 5 short hours from now. Once we land in beautiful W6-land, we'll be enjoying the company and camaraderie of over 100 of the best contesters in the world. Collectively we're awaiting the biggest show of operating talent the contest world has ever seen from one geographic location. As the familiar line goes, "It just doesn't get any better than this!" Check out my report of this incredible event elsewhere in this issue.

As always, please remember that the deadline for the December issue is October 1st.

73, John, K1AR

Panama Anniversary Contest

0001–2359Z Sunday, Sept. 1

The Panama Radio Club invites all radio amateurs of the world to participate in the XXV Anniversary Contest.

Class: Single Operator, All Band, SSB-only, 40, 20, and 15 meters.

Exchange: RS and serial number (e.g., 59001).

Scoring: HP club members are 2 points; all other stations are 1 point. The multiplier is the total number of DXCC countries worked on all bands. Final score is total QSO points times multiplier.

Awards: Certificate of participation will be sent to all amateurs who work 10 or more HP stations. HP stations must operate for at least 6 hours to be eligible for awards. A plaque will be awarded to the station with the high score from each continent.

Logs must be postmarked by November 30th and sent to: Radio Club Panama, Anniversary Contest, P.O. Box 10745, Panama 4, Panama.

Bulgarian DX Contest

0000Z Sat. to 2400Z Sun., Sept. 7–8

The Bulgarian Federation of Radio Amateur holds this activity the first Sunday in September each year. It's on CW only, all five bands, 10–80 meters, using the IARU Region 1 band plan.

Classes: A—single operator, all band; B—single operator, single band; C—multi-operator, all band, single transmitter; D—SWL.

Exchange: RST and ITU Zone.

Points: QSOs with LZ stations, 6 points. With other stations in the same continent, 1 point. In other continents, 3 points. SWLs must show calls of both stations heard. Score 3 points if both exchange numbers are copied; 1 point if only one is copied.

Multiplier: Total ITU Zones worked on each band.

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Classes A and C—cups and medals to the three top world scorers and medals to the three continental leaders in each continent. Class B—medals to the top three scorers on each band in the world. Class D—medals to the top three.

Logs: Use a separate sheet for each band, a summary sheet showing the scoring, and the usual signed declaration.

Mailing deadline is 30 days after the end of the contest: Central Radio Club, P.O. Box 830, 1000 Sofia, Bulgaria. Logs may also include applications for the many BFRA awards: NRB, W-100-LZ, 5 Bands LZ, W-28-Z, Black Sea, and Sofia awards.

Labor Day QRP CW Sprint

2300Z Mon. to 0300Z Tues., Sept. 2–3

Sponsored by the Michigan QRP Club, this is a fun event to add to your Labor Day weekend activities.

Classes: A—250 milliwatts or less output. B—250 milliwatts to 1 watt. C—1 watt to 5 watts. D—over 5 watts output.

Exchange: RST, QTH (state/province/country), and MI-QRP membership number (non-members send power output).

Scoring: Stations may be worked once per band for QSO points. All member QSOs are 5 points. Non-member contacts in W/VE are 2 points. Non-member QSOs outside of W/VE are 4 points. Multiply total QSO points on all bands by the number of states/provinces/countries worked on all bands. USA and Canada do not count as countries. Total points may be multiplied by 1.25 for homebrew/commercial RX/TX combinations. Completely homebrew stations multiply their score by 1.5.

Awards: Certificates will be awarded by class for each QTH multiplier.

Logs must be received by October 30th and should be sent (including equipment description and power output per band) to L. T. Switzer, N8CQA, 654 Georgia Ave., Marysville, MI 48040-1243. Logs and entry sheets are available by sending an SASE to N8CQA.

YLRL Howdy Days Contest

1400Z Wed. Sept. 11 to 0200Z Fri. Sept. 13

This annual event is sponsored by the Young Ladies Radio League (YLRL) and is open to all licensed women operators around the world. All amateur bands may be used. Any type of emission may be used (SSB, CW, etc.). A station may be worked only once on each band for contact points. No crossband, net, or repeater contacts allowed. Maximum allowable output power is 750 watts on CW and 1500 watts PEP on SSB.

Exchange: YLRL member or non-YLRL member. Be sure to show time breaks in your log.

Frequencies: CW—80 meters 3.540–3.725 MHz; 40 meters 7.040–7.070 MHz; 20 meters 14.040–14.070 MHz; 15 meters 21.120–21.150 MHz; 10 meters 28.150–28.200 MHz. SSB—80 meters 3.940–3.970 MHz; 40 meters 7.240–7.270 MHz; 20 meters 14.250–14.280 MHz; 15 meters 21.380–21.410 MHz; 10 meters 28.300–28.610 MHz.

Scoring: Score two points for each YLRL member contacted. Score one point for each non-YLRL member contacted. For each duplicate contact that is removed by the YLRL vice-president a penalty of three additional and equal contacts will be exacted. There are no multipliers.

Awards: The top-scoring YLRL member will receive her choice of YLRL pin, charm, or stationery. In addition, the top-scoring non-YLRL member will receive a one-year YLRL membership certificate.

All log entries should be sent to: Carol Hugentober, K8DHK, 4441 Andreas Ave., Cincinnati, OH 45211. Logs must be postmarked no later than 30 days after the end of the contest.

ARRL VHF QSO Party

1800Z Sat., to 0300Z Mon., Sept. 14–16

All bands 50 MHz and up can be used for this one. The August issue of *QST* should have all the details. It is recommended that you send

for official summary and log sheets. A large SASE will get you a supply. Address your request to the ARRL VHF Party, 225 Main St., Newington, CT 06111.

North American "Sprint"

CW: Sept. 8 SSB: Sept. 15
0000–0359Z Sun. (Sat. night)

This is the fall edition of the Sprint run by the *National Contest Journal*. As the name implies, it's a shorty, only four hours long.

North Americans will be contacting other North American stations as well as stations in other countries, single operator only. North American boundaries are as defined by the rules used in the CQ WW DX Contest. As a reminder about recent rule changes: (1) Simultaneous transmission on more than one band is no longer permitted; (2) automatic reception methods may *not* be used; (3) you can no longer standby on a frequency and work the station who answers the CQ of the station you just worked (e.g., round-robin QSOs).

Exchange: Call, QSO no., name, and QTH (state, Canadian area, or country).

Scoring: Multiply total QSOs by the sum of states, Canadian areas, and other North American countries worked for your final score. (U.S. and VE are not countries; KH6 is not considered a state.) There are eight Canadian multipliers: VE1/VO1/VO2, VE2–VE7, VY1/VE8. Non-North America countries do not count as a multiplier.

Frequencies: Three bands only: 80, 40, and 20 meters. CW—3540, 7040, 14040. SSB—3850, 7225, 14250. (Plus or minus QRM.)

Awards: A trophy to the highest scoring entrant. Certificates to the top scorer in each U.S. call area, Canada, and other North American country. Also to the ten top scorers, each member of the winning team, and the highest scoring entrant on each team.

Team competition is limited to a maximum of 10 operators as a single unit. Pre-contest registration is required for each team before the start of the contest with N6TR for CW and K7GM for SSB.

There are other detailed rules, a special QSY rule, disqualifying penalties, etc. I suggest you write to N6TR or K7GM if you do not have a copy of the *NCJ*.

Entries must be received no later than 30 days after the end of each Sprint. CW logs go to: Larry Tyree, N6TR, 15125 S.E. Bartell Rd., Boring, OR 97009. SSB logs go to: Rick Niswander, K7GM, P.O. Box 3778, Greenville, NC 27386-1778.

Scandinavian Activity Contest

CW: Sept. 21–22 Phone: Sept. 28–29
1500Z Saturday to 1800Z Sunday

It's the world working in this 38th Scandinavian Activity Contest (SAC). The same station may be worked on each band for QSO and multiplier credit. The prefixes used in Scandinavia are LA, LB, LG, LJ (Norway); JW (Svalbard & Bear Is); JX (Jan Mayen); OF, OG, OH, OI (Finland); OFØ, OGØ, OHØ (Aland Is.); OJØ (Market Reef); OX (Greenland); OY (Faroe Is.); OZ (Denmark); SJ, SK, SL, SM, 7S, 8S (Sweden); and TF (Iceland).

Bands: 3.5, 7, 14, 21, 28 MHz according to IARU band plans; 3560–3600, 3650–3700, 14060–14125, and 14300–14350 kHz should be kept free of contest activity.

Classes: Single operator and multi-operator single transmitter, all band only. Multi-operator must remain on the same band for at least 10 minutes. (Exception: A station may be worked on another band if it is a new multiplier, only.) Also, QRP single operator (maximum of 10 watts output) and SWL (only SAC stations may be logged).

Exchange: RS(T) plus a QSO number starting with 001.

Scoring: European stations score 1 point for each SAC contact. Non-European score 1 point on 14, 21, and 28 MHz, and 3 points on 3.5 and 7 MHz.

Multiplier: Each call area in the above list of SAC countries worked on each band (call areas, not prefixes).

Final Score: The sum of QSO points from all bands times the sum of the multiplier from each band. Scoring for SWLs same as above.

Awards: Certificates to the winning station in each class, both CW and phone, in each country and each U.S.A. call area. QRP stations will be listed in one common list. The non-SAC SWL winner will also receive an award. Plaques will be awarded to the top-scoring station in each continent.

The usual disqualification criteria will be observed. Include a summary sheet and a dupe sheet for logs with more than 200 QSOs, and a signed declaration. Logs may also be submitted on MS-DOS diskettes in either ASCII format or the accepted ARRL contest log standard. Mailing deadline for all logs is no later than October 31st. Send all entries to: SSA Contest Manager, Jan-Eric Rehn, SM3CER, P.O. Box 54, S-863 22 Sundsbruk, Sweden.

CQ WW RTTY Contest

0000Z Sat. to 2400Z Sun., Sept. 28–29

This is the tenth running of the CQ WW RTTY Contest organized by *CQ* magazine, and from the response to last year's contest, it has become one of the major RTTY competitions.

Bands: All five bands, 10 through 80 meters.

Classes: Single operator, single and all band, and single-op assisted all band only. Multi-operator, single transmitter, all band only.

Keep in mind that competitors in all categories may operate the entire 48-hour contest period.

Exchange: RST, state or VE area, and *CQ* Zone for stations within the 48 continental U.S.

states and 13 Canadian areas. All others send RST and *CQ* Zone.

Points: One point for contacts within own country. Two points for contacts outside own country but same continent. Three points for contacts outside own continent.

Multiplier: One for each state (48) and VE area (13). One for each DX country (ARRL and WAE list). One for each *CQ* Zone (40). All of the above on each band.

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Plaques to the first-place winners in each operator class. Certificates to the second and third place, and certificates to the first-place finisher in each DX country.

Complete, detailed rules were published in the August issue of *CQ* and should be reviewed for more detailed information. The standard *CQ* log and summary sheets are recommended. Sample forms are available from *CQ*. Include an SASE (or IRC) with your request. All entries must be postmarked no later than December 1st. An extension may be given upon a written request. Logs go to: CQ RTTY Contest, Roy Gould, KT1N, P.O. Box DX, Stow, MA 01775 USA. Requests for log forms go to: *CQ* magazine, 76 N. Broadway, Hicksville, NY 11801.

Washington State Salmon Run

1200Z Sat., to 0700Z Sun., Sept. 21–22
1200Z to 2400Z Sun., Sept. 22

This popular state QSO party is sponsored by the Western Washington DX Club and is open to amateurs worldwide on SSB and CW.

Classes: Single or multi-operator, single transmitter. Also, entrants may operate QRP, low power (200 watts or less), or in the open category on SSB, CW, or mixed modes. There will be a special competition among Washington state clubs in the multi-single category.

Exchange: RS(T) and QTH (state/province/DXCC country, or Washington state county).

Scoring: Count 2 points for SSB and 3 points for CW contacts. QSOs with CW Novice/Technicians are worth 6 points. The multipliers are Washington counties (maximum 39) or state/province/DXCC countries for Washington state stations. Credit multipliers only once per mode on multiple bands. Final score is total QSO points times multiplier. Low-power stations multiply score by 2 and QRP by 3.

Frequencies: CW—1805, 3530, 7030, 14030, 21030, and 28030. SSB—1815, 3925, 7260, 14280, 21380, and 28380. Novice—3700, 7125, 21150, and 28160.

Awards: The highest scorers in each DX country and US call area will receive a package of Pacific Northwest smoked salmon. Certificates will be available for other category winners. A participation certificate will be awarded for each log submitted (50 QSOs [US], 25 QSOs [DX], 100 QSOs [Washington state] minimum). A special award will be awarded to the highest Washington club score.

The mailing deadline for logs is October 31st. Logs can be sent to: Bob Preston, W7TSQ, 809 Cary Road, Edmonds, WA 98020.

Tennessee QSO Party

1800Z Sat. to 0100Z Sun., Sept. 29–30

After last year's success, the Tennessee QSO Party is returning. 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. Also, participation awards will be sent to any station making more than 50 QSOs in the contest.

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 also be accepted. Send a #10 SASE for contest results.

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

FCC Getting Ready to Open Gate 2 of Vanity Call Sign System

No other amateur radio program has been as eagerly awaited by the amateur operator community as the one which will allow you to select a call sign of your choice. Obtaining preferred station call signs seems to be as important to amateur radio operators as obtaining more radio frequencies!

The Vanity Call Sign System is being implemented by a series of starting gates. The first two of the five gates (Gates 1 and 1A) are already open. These permit former holders, close relatives, and amateur radio clubs to reclaim previously held call signs and the call signs of deceased family and club members. A few thousand already have been assigned.

Gates 2, 3, and 4, however, are the ones the amateur community is waiting for! These gates provide the opportunity for Extra Class, Advanced, and all other license classes to obtain a completely new "vanity" call sign.

We expect Gate 2 to open any day now. Gate 2 permits any of 75,000 Extra Class amateurs to select an available call sign. Most will want the preferential 1-by-2 and 2-by-1 format call signs, and there are only about 40,000 available—not enough to go around.

Our mailbox has been overflowing with questions about the vanity call sign program. We thought that we would cover some of the more general-interest questions this month. It might help you to obtain the call sign you want!

Why is the program being phased in rather than being available to everyone at the same time?

In a nutshell, because that is the way the amateur community wanted it. The system of "starting gates" for various amateur groups was suggested by the ARRL. It also permits the FCC to get the "bugs" out of the system before opening up vanity call signs to everyone. Since no additional application processing manpower is being used, a phase-in period also prevents severe overload. As each succeeding gate opens, it will admit applications from a new group as well as any group allowed by a previous gate.

When can I submit my application for a preferred call sign?

It depends on which "gate" you qualify for. Gate 1 (which opened May 31) allows former holders and close family relatives to reclaim call signs. Gate 1A, which opened July 22, allows a club trustee to obtain a station call sign of a deceased member—that is, providing the trustee's call sign is of a "call sign group" that is equal to, or higher than, the deceased amateur. As a general rule, Gate 2 allows Extra Class amateurs to select any call sign available to the sequential system. However, there is some "fine print" you need to be aware of.

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

Gate 3 permits Advanced Class amateurs to select most 2-by-2 (Group B), 1-by-3 (Group C), and 2-by-3 (Group D) call signs. Gate 4 throws it open to all licensed amateurs. You must already hold an FCC issued "sequential" call sign before you can apply for a preferred call sign.

Can I submit my application by overnight courier so that it arrives the morning the gate opens?

Yes. But do *not* send it to the address shown in the FCC Public Notice. Federal Express, UPS-Red Label, Airborne, and other overnight delivery services can not deliver to a post office box. Send your application package to: Federal Communications Commission, c/o Mellon Bank, 525 William Penn Way, 27th Floor, Room 153-2713, Pittsburgh, PA 15259, "Attention: Wholesale Lockbox Shift Supervisor." Do not try to call them, since this office has no telephone and their customer service department is totally unable to answer any questions about the Vanity Call Sign System. We have already talked to the bank, and they have absolutely no idea how the program works. All they do is receive feeable applications, deposit the check to the U.S. treasury, date stamp, and forward the Form 610-V applications to the FCC in Gettysburg, Pennsylvania for handling.

In the future, you—or a service that represents you—may be able to electronically submit your FCC Form 610-V application for a vanity call sign directly to the FCC with payment by credit card. They are already looking into ways this might be accomplished.

Can I hand-deliver my vanity call sign application?

Yes. The bank's feeable applications department is open 24 hours a day, 7 days a week. Form 610-V applications are not accepted prior to the opening of the appropriate gate. Be aware that any applications received or delivered early are returned to the sender without action.

Why must I wait two years after expiration to obtain a specific call sign?

A person whose license has expired has a two-year grace period in which to apply for renewal without losing his/her call sign. Three exceptions "to the two-year rule" involve deceased amateurs. Close family relatives and amateur radio clubs may apply for the call sign of a deceased member without waiting two years after death. The call sign of a deceased amateur is available to the Vanity Call Sign System two years after death and not necessarily two years after license expiration.

My friend just changed his call sign. Can I get his old one?

No. A call sign is "vacated" (canceled) when its previous owner has been assigned a vanity call sign. Initially, the FCC proposed that a vacated call would immediately be available for reassignment. The ARRL, however, felt that immediate reassignment of vacated call signs would be confusing and could result in "trafficking in call signs."

A vacated call sign is therefore not assignable for a two-year waiting period. The two-year interval also makes the handling of vacated call signs consistent with the assignability of a deceased person's station call sign or a licensee's expired station call sign.

What about preferred call signs for amateur radio clubs?

There are basically four different types of club "vanity" call signs:

1. The first is for clubs that want to reclaim a previously held club call sign. This can be accomplished under Gate 1, which opened May 31st. You do not have to wait two years and the trustee does not have to hold a class of operator license required for the Group (A, B, C, or D) for the call sign requested.

2. Family members have first choice of a silent key's call sign under Gate 1. Should no family member desire the call, the deceased amateur's amateur club gets next choice under Gate 1A, which opened July 22. Club station trustees do not have to wait two years following death of a club member, but they must have the written consent of a close family relative. This letter is retained by the club and not sent to the FCC unless requested. The club must have held a club call sign on March 25, 1995 to be eligible under Gate 1A. Clubs must ensure that the deceased club member's call has been canceled from the FCC amateur database before applying. A call sign still in the FCC's amateur database cannot be reassigned.

3. Gate 2 allows clubs wishing to obtain the call sign of a silent key member without written consent of a relative, providing the trustee of the club station is an Extra Class licensee. Advanced Class trustees may apply under Gate 3; all other classes under Gate 4. The deceased member's call sign is not available for two years following death or license expiration, whichever is sooner. This policy allows relatives and amateur radio clubs with family permission the first opportunity to obtain the call sign. And again, the deceased member's call sign must be canceled before applying.

4. Preferred call signs for existing clubs licensed after March 25, 1995 may be obtained by the trustee according to his/her call sign group. Extra Class trustees may apply under Gate 2, Advanced Class trustees under Gate 3, and all others under Gate 4. RACES and military recreation stations are not eligible for a vanity call sign under any circumstances.

May I form a radio club to obtain a preferred call sign?

Yes. New radio clubs may be formed by any

two or more licensed amateurs—even members of the same family. This may change, however, since the ARRL wants the number of members constituting a club to be raised to four " . . . to ensure legitimacy and to prevent fraud." The FCC has not yet taken action on this request. The current rule Sec. 97.5(b)(2) requires clubs " . . . to be composed of at least two persons, . . . have a name, a document of organization, management, and a primary purpose devoted to amateur service activities . . . " New clubs may apply for a preferred call sign under Gate 2, 3, or 4, depending on the call sign group of the trustee.

An initial club call sign must be assigned under the Sequential Call Sign System before a vanity call sign may be requested. According to the rules, initial call signs for amateur radio club stations may only be assigned Group "D" (2-by-3) formats. This is true even if the trustee is an Extra Class licensee.

What station call signs are not available to the Vanity Call Sign System?

You do not have to reside or have a mailing address in a specific call sign area in order to select a call sign from that region. However, there is one exception. Due to limited availability, amateurs with mailing addresses in the 48 continental United States may not apply for call sign prefixes allocated to Hawaii, the U.S. South Pacific islands, Alaska, Puerto Rico, U.S. Virgin Islands, or other Caribbean possessions. These excluded prefixes are AH, AL, KH, KL, KP, NH, NL, NP, WH, WL, and WP. This limitation does not apply to applicants seeking the call sign of a deceased relative.

Certain "Q-signal" and other suffixes (such as W5QST and W5SOS) are not issued. Letter combinations normally considered in poor taste may be issued. The FCC Rules (contained in Sec. 2.302) preclude 1-by-1 and 2-by-3 format amateur call signs being assigned with the letter "X" following the numeral. These are assigned to non-amateur experimental stations.

Can I obtain the call sign AA1AAA?

No. The FCC rules (Sec. 97.19(c)) specify that only call signs allocated under the Sequential Call Sign System are available to the Vanity Call Sign System. The Sequential Call Sign System initially was spelled out on March 24, 1978 and later released to the public in the form of Fact Sheets. The most recent is PR-5000, No. 206, February 1995. While AA-AL-by-1 and AA-AL-by-2 are part of the Sequential Call Sign System, AA-AL-by-3 formats are not. Strangely, however, AA-AL-by-3 format has been allocated by the FCC (see Sec. 2.302) to the Amateur Service but never made part of the sequential system, so there are an additional two million amateur call signs held in reserve!

When will Gates 2, 3, and 4 open?

We don't know. However, our best guess is around September 1st for Gate 2, when it is anticipated that thousands of vanity call sign applications will be submitted. Most will go through the system automatically. Hundreds, though, will not, and applications from amateurs who do not follow instructions will hit the WIPs (Work-in-Progress) error list. These rejected Form 610-V's must be handled manually. And since the FCC has not been authorized an increase in personnel to handle the vanity call sign program, it is anybody's guess as to when they will be able to get to them.

The bottom line is that a rejected application essentially means that you go to the end of the line. Gate 3 will not open until the majority of Gate 2 applications have been handled. There is no telling when that will be. Our best guess? October or November, with Gate 4 by year end. Again, this is merely a guess on our part.

Legibility is also very important. If the information on your application is not readable, you could experience a delay in processing, lose the opportunity to obtain a requested call sign, or even obtain a call sign different from what you want.

Where can I get the FCC Vanity Call Sign Application Form 610-V?

The application is widely available from several sources, including the FCC via the Internet at <http://www.fcc.gov/Forms/Form610V> or <ftp://ftp.fcc.gov/pub/Forms/Form610V/>, or by fax at 202-418-0177. Ask for Form 006108. You can also order it from the FCC Forms Distribution Center at 800-418-3676. The W5YI Group (P.O. Box 565101, Dallas, TX 75356, phone 817-461-6443) and the ARRL (225 Main St., Newington, CT 06111, phone 860-594-0300) also have Form 610-V available at no

cost. Include a large SASE. Photocopies and FAX copies are also acceptable.

Can I obtain the call sign of an amateur who died but whose call sign is still listed as active?

A call sign *must* be deleted from the active licensee database *prior* to submitting a request. This is because the vanity call sign software at the FCC will *not* select a call sign that is still shown in the active amateur service database. It will go on to the next one on your list even if you attach evidence to the FCC Form 610-V that the licensee is deceased. Canceling a specific call sign and applying for that same call are two separate FCC processing operations which can*not* be handled at the same time.

How can I get a deceased amateur's call sign out of the FCC's active amateur database?

This is usually accomplished by a relative of the deceased sending a *Request for Cancellation of License* letter to the FCC (1270 Fairfield Road, Gettysburg, PA 17325) accompanied by a copy of a newspaper obituary or a death certificate. There is no special form for this purpose; an informal letter will do. This may also be handled by an individual who is not a relative. Notifications in amateur radio club newsletters or amateur radio magazines (such as *QST*'s "Silent Keys" column) will *not* suffice. The notification *must* be a copy of the death certificate or an obituary from a newspaper. No other way is acceptable. The call sign is canceled and becomes available about two weeks after receipt of the letter and documentation.

I am a No-Code Technician. How can I obtain my deceased father's Extra Class call sign?

You will have to upgrade to Extra Class if your father has a Group "A" call sign and hope that another amateur does not obtain the call sign first. Originally, the FCC Order adopted December 23, 1994 provided that close family relatives and club station license trustees would not have to conform to the rule that requires vanity call signs to be selected from a group coinciding with the license class of the requestor. However, a Petition for Reconsideration was filed and the FCC changed their position. Now all " . . . vanity call signs requested by an applicant must be selected from the group of call signs corresponding to the same or lower class of operator license held by the applicant as designated in the sequential call sign system" (Sec. 97.19(d)). A No-Code Technician qualifies only for a Group C (1-by-3 format) or Group D (2-by-3) call sign, but not for a Group "A" or "B" call sign.

Why does it cost $30.00 for a Vanity Call Sign? Can I pay by credit card?

The fee initially set by Congress was $7.00 per year collected for the length of grant of license (10 years), or $70. The FCC changed it to $30.00 to be in line with their actual costs based on anticipated call sign request projections. This fee will be adjusted later if the projections prove inaccurate. The ARRL wanted a one-time $150 administrative processing fee rather than a recurring processing expense. The League felt the one-time fee concept would also greatly reduce the Commission's fee collection workload, since they would not have to deal with additional fee collection at license renewal time.

The $30.00 check (payable to the FCC) must be stapled to the front of the FCC Form 610-V. It need not be a money order or cashier's check. A personal check will do. You may pay by credit card (VISA or MasterCard only), in which case you must include an FCC Form 159 *Remittance Advice* along with your Form 610-V.

What happens if I choose all 1-by-2 call signs and none are available?

The rules provide for choosing a list of up to 25 call signs in order of preference. However, you do not have to select 25. You can choose only one if you wish. The first assignable call sign from the applicant's list will be shown on the license grant. If none of those call signs are assignable, the applicant will retain his/her previous call sign and you will eventually get your $30.00 fee back. However, we predict it will take a while! Government refunds from the U.S. treasury are certain to be slow in arriving.

Can I retire my call sign so no one else can obtain it after I pass on?

There is no provision in the rules for "retiring" a call sign, but a family member could become licensed and obtain your call sign, never use it, and renew it continually. Your amateur radio club could also obtain the call

sign *in memoriam* and then "retire" it. There is nothing in the rules to prevent amateur clubs from obtaining multiple club call signs in memory of deceased members. Sec. 97.19(c)(3) requires that a close relative authorize the transfer to the club in writing.

We believe that an amateur radio club in existence before March 25, 1995 could have as one of its projects the retiring of amateur radio call signs with perpetual upkeep (continual renewal). Neither close relatives or clubs have to wait the two-year period, at which time the call sign would become available to the general amateur community.

How can I find out which call signs are still available?

We have carefully studied the Sequential and Vanity Call Sign System and believe we are the nation's foremost expert on *exactly* how they work! There is more to them than first meets the eye! It is not just a case of having a list of the active amateur call signs and picking one not assigned. There are many variables to deal with, such as excluded (unassignable) call signs and those in the two-year "unavailable" time period. In addition, call signs are continually being assigned, old call signs reclaimed, and previous call signs transferred to the "vacated" list.

Amateurs who upgrade and change their call sign will not have their previous call sign available for reassignment for two years. This "unavailable call sign list" includes call signs that have been surrendered, revoked, set aside, canceled, voided, and vacated.

There are currently over 700,000 U.S. amateurs with station call signs. However, there are far more call signs "outstanding" (for one reason or another) than that! More than half of all currently assigned station call signs are from the Group "D" (2-by-3) format type.

When the FCC began thinking about implementing the Vanity Call Sign System, we began developing software that could accurately determine which call signs are available for assignment. The result is a custom-made computer disk that lists every available "preferred" station call sign available to a specific call sign "group" in a specific call sign region. Basically, our software subtracts the "unavailable" station call signs from the "available" ones. The "unavailable" include current (active) station call signs and those in the two-year "moratorium." The "available" are basically those included in the Sequential Call Sign System less any that can't be assigned for one reason or another.

The "unavailable" list is updated daily right from the FCC's Amateur Service databases. This is necessary, since the FCC is assigning and withdrawing call signs daily. The resulting custom-made computer disk lists every possible four- and five-character station call sign available to a specific license class in a certain geographic area.

We have determined that four-character (1-by-2 and 2-by-1 format) and five-character (1-by-3 and 2-by-2) call signs comprise what most amateurs consider to be a preferred call sign. There are approximately 1.2 million of them, more than enough for every U.S. licensed amateur radio operator. (There are more than 13 million 2-by-3 format call signs, such as KA1AAA.)

You'll find an advertisement for these custom-ade Vanity Call Sign disks elsewhere in this publication. See you next month.

73, Fred, W5YI

W9RE	**A**	**2,968,368**	**1969**	**129**	**407**
W9BCV	**"**	**186,984**	**339**	**66**	**146**
W9RN	"	156,716	315	64	129
N9TCF	"	142,725	295	48	125
W9GXR	"	76,005	200	40	95
K9MDO	"	74,503	206	47	96
WD9HTC	"	47,824	156	45	77
W9BZP	"	15,152	94	19	43
WB9KOY	"	6,536	61	14	24
KO9Y	**21**	**261,372**	**664**	**28**	**110**
KC9LA	**"**	**235,585**	**686**	**27**	**100**
KF9YT	"	167,232	503	29	105
W9GIL	"	98,595	326	25	80
K9UQN	"	9,476	72	13	33
KK9A	**14**	**772,310**	**1508**	**38**	**149**
K9UWA	**"**	**548,184**	**1059**	**39**	**143**
W9OF	"	181,872	445	34	110
K9CAN	"	169,020	441	33	102
WA9TPQ	"	148,463	417	31	96
K9QVB	"	115,994	348	26	92
KR9V	"	105,996	283	30	102
K9YNF	"	104,864	329	29	84
W9RZW	"	53,088	200	25	71
W9TYT	"	35,316	161	20	61
WD9FEN	"	26,832	113	21	65
WB9Z	**7**	**175,540**	**473**	**35**	**99**
KR9G	"	17,733	96	21	48
K9CJ	"	16,006	93	5	18
N9QX	"	15,939	95	17	46
K9HMB	**3.7**	**49,969**	**179**	**27**	**80**
K9DX	"	23,785	142	21	50
***N9VVV**	**A**	**228,464**	**398**	**65**	**153**
***KJ9C**	**"**	**99,900**	**226**	**59**	**121**
*KD9MS	"	47,244	132	46	81
*W9ILY	"	47,232	153	36	87
*WB0OLA/9	"	34,505	135	32	71
*WB9ZPK	"	17,358	118	32	34
*AA9IV	"	16,906	90	28	51
*WD9GGY	"	12,040	71	27	43
*N9XDS	28	442	26	7	10
*N9ZPE	"	336	12	6	6
*KF9VJ	21	8,771	79	16	33
***WI9H**	**14**	**184,518**	**437**	**37**	**116**
*W9JOO	"	76,475	242	28	87
*W9LNQ	"	14,400	71	17	58
*K9JPS	"	1,554	19	4	14
*N9GBB	"	1,127	20	10	13
*AA9IA	7	4,028	45	17	21
N2IC/0	**A**	**3,000,556**	**2167**	**134**	**360**
K0RF	**"**	**2,378,322**	**1830**	**130**	**347**
					(Opr. W0UA)
K0KX	**"**	**1,559,124**	**1174**	**127**	**356**
NX0I	"	1,451,151	1189	122	349
WB0O	"	845,856	783	116	280
K0TPF	"	527,956	597	85	201
KF0DJ	"	453,968	618	89	183
KB0C	"	416,392	515	84	208
W3GRW/0	"	404,041	585	80	173
K9MWM/0	"	297,168	471	81	165
K0IFL	"	204,672	380	57	135
W0RSR	"	202,989	340	65	148
KE0UI	"	153,451	334	54	119
K9WIE/0	"	139,590	305	45	120
WA0CLR	"	111,186	251	53	121
W0VBD	"	83,062	254	35	84
K0AP	"	65,532	185	40	89
W0ML	"	63,784	166	49	87
WT0Y	"	42,240	137	53	75
W0PPF	"	39,678	153	34	68
K0JPL	"	29,526	108	40	71
AA0GG	"	28,140	220	38	96
WW0O	"	7,840	55	27	29
W0RXL	"	2,296	24	19	22
K0RWL	**14**	**190,944**	**431**	**38**	**118**
W0YA	"	88,660	229	39	104
N0MSX	"	64,876	260	25	73
KV0Q	**7**	**247,020**	**743**	**28**	**87**
K0GT	"	36,000	139	27	69
K0CS	**1.8**	**3,780**	**61**	**11**	**25**
W0CM	"	2,268	38	10	18
***AC0W**	**A**	**517,890**	**643**	**88**	**217**
***AA0SQ**	**"**	**329,728**	**541**	**62**	**162**
*AA0MQ	"	188,400	370	62	138
*K0GAS	"	149,698	316	61	117
*WA0DCB	"	99,519	258	46	101
*WB0IEL	"	67,734	177	47	95
*WA0BNX	"	43,442	153	31	76
*N0JHX	"	32,635	121	41	66
*AA0SY	"	11,016	81	19	35
*WB0B	"	6,120	47	22	29
*N0GOS	"	3,220	37	17	18
*WB0GFV	28	1,800	36	6	12
*KB0SOB	"	552	23	3	5
***NW7Q/0**	**21**	**71,262**	**243**	**26**	**81**
*N00Y	1.8	684	20	9	10

ALASKA

WL7CMK	**A**	**135,730**	**604**	**36**	**62**
WL7CLK	**14**	**245,195**	**1153**	**30**	**65**
					(Opr. UN7DA)
WL7MA	**7**	**80,988**	**551**	**23**	**45**
***NL7DU**	**A**	**50,592**	**357**	**32**	**30**
*KL7FAP	"	25,140	162	30	30
KL7/KG5EG		18,768	100	27	42

AMERICAN VIRGIN ISLANDS

KP2/K3SKE	**A**	**106,515**	**347**	**51**	**84**

ANGUILLA

VP2E	**14**	**1,315,327**	**3026**	**35**	**134**
					(Opr. WB5CRG)
VP2ENR	**"**	**1,261,125**	**3183**	**37**	**140**
					(Opr. YU1NR)

BARBADOS

***8P6DU**	**A**	**169,904**	**466**	**52**	**112**
*8P6CV	14	35,112	230	21	45

BELIZE

***V31MX**	**A**	**133,152**	**670**	**36**	**60**

BERMUDA

VP9DX	**A**	**2,259,900**	**3016**	**87**	**237**
					(Opr. N2MZH)

CANADA

VO1MP	**A**	**2,824,963**	**2629**	**89**	**320**
VE9ST	**"**	**2,622,627**	**2648**	**92**	**307**
VE9ZL	"	116,724	353	38	104
VE9AA	**1.8**	**24,288**	**301**	**11**	**33**
***VE1/W6IXP**	**A**	**178,536**	**411**	**46**	**126**
***VE9KM**	**"**	**170,145**	**995**	**48**	**123**
*VO1LT	21	10,432	150	8	24
VE2QRZ	**A**	**2,424,489**	**2769**	**92**	**255**
					(Opr. WB2K)
XJ3ZC/2	**"**	**1,802,398**	**2040**	**89**	**273**
					(Opr. VA3ZC)
VE2AYU	"	652,400	875	67	213
VY2LI	"	648,312	1050	59	179
VE2CQ	"	138,168	340	38	114
					(Opr. VE2MPZ)
VE2GWL	"	14,129	78	25	46
***VE2AWR**	**A**	**129,200**	**339**	**39**	**113**
***CG2GSX**	**28**	**4,266**	**59**	**9**	**18**
***VE2XAR**	**14**	**27,450**	**144**	**16**	**59**
					(Opr. T92X)
XM3EJ	**A**	**6,590,384**	**4561**	**130**	**424**
XM3KUK	**"**	**608,565**	**1678**	**34**	**111**
VE3XL	"	243,807	503	43	138
VE3ZD	"	132,927	303	54	123
VE3ZTH	"	63,080	155	53	113
VE3FW	"	13,440	160	18	66
VE3DNR	21	16	2	2	2
XJ3MG	**14**	**1,058,126**	**2535**	**32**	**126**
					(Opr. VA3MG)
XJ3MM	**"**	**1,049,256**	**2271**	**37**	**134**
VE3OTL	"	178,542	717	28	81
VE3OBU	7	1,976	28	8	18
VE3PN	**1.8**	**27,888**	**354**	**12**	**30**
***VA3TA**	**A**	**247,025**	**466**	**55**	**150**
*VE3ST	"	42,362	132	37	81
*VE3STT	"	21,175	118	27	50
*VA3SWG	"	20,133	321	33	70
*VA3DXR	"	5,868	89	16	20
*VE3SKX	"	2,108	37	11	23
***VE3HX**	**28**	**2,508**	**40**	**8**	**22**
***VA3KA**	**21**	**86,920**	**291**	**22**	**84**
***VA3JK**	**14**	**300,105**	**813**	**31**	**104**
VE4RP	A	32,562	152	29	52
***VE4COZ**	**14**	**98,208**	**420**	**25**	**74**
VF5FX	**A**	**471,360**	**1085**	**61**	**121**
VE6KRR	**A**	**77,054**	**281**	**52**	**66**
VE6NWG	"	27,594	270	21	42
***VE6BMX**	**21**	**34,279**	**245**	**19**	**40**
***VE6SF**	**14**	**69,300**	**250**	**27**	**72**
VE7IN	**A**	**804,573**	**1450**	**84**	**159**
VE7KD	**"**	**732,000**	**1650**	**68**	**132**
VE7XO	"	121,044	315	48	83
VA7A	**14**	**831,150**	**2404**	**35**	**115**
					(Opr. VE7XR)
XM7NTT	**7**	**430,540**	**1752**	**32**	**78**
***XM7CFD**	**A**	**325,052**	**1202**	**49**	**84**
*VE7TLK	"	181,884	995	40	52
***VE7ABC**	**14**	**86,797**	**513**	**21**	**52**

CAYMAN ISLANDS

ZF2DR	**14**	**550,134**	**2191**	**27**	**90**
					(Opr. K5RQ)

COSTA RICA

TI1C	**A**	**7,898,252**	**6065**	**129**	**395**
					(Opr. TI2CF)

EL SALVADOR

YS1ZV	**A**	**1,042,093**	**1777**	**70**	**177**

GUADELOUPE

***FG/EA2KL**	**A**	**130,680**	**507**	**36**	**72**
***FG/ EA3ELM**	**21**	**68,018**	**385**	**19**	**52**

HONDURAS

***HR1ERL**	**A**	**292,334**	**1003**	**44**	**89**

JAMAICA

6Y5DA	**A**	**567,824**	**1612**	**41**	**143**

MEXICO

XE1L	**14**	**553,815**	**1698**	**40**	**115**
XE1/ AA6RX	**3.7**	**57,460**	**413**	**20**	**48**
XE2/ WA7UQV	**1.8**	**25,696**	**401**	**10**	**22**
***XE2CWW**	**A**	**390,974**	**731**	**90**	**143**
***4A1C**	**"**	**143,616**	**761**	**40**	**56**
*XE2MX	"	139,425	313	54	115
*XE3JCT	"	81,740	296	51	71
*XE3LMV	21	7,375	110	14	11
*XE2AC	"	4,522	55	14	20

PANAMA

HP1XVH	**A**	**2,244,850**	**2962**	**89**	**234**
					(Opr. DL8RBR)
***HP3XUG**	**A**	**96,524**	**333**	**39**	**79**
					(Opr. KG6UH)
*HP1XZQ	"	31,098	284	26	47
***HP1DGX**	**21**	**35,343**	**513**	**19**	**32**
***HP1BYS**	**14**	**86,071**	**450**	**21**	**62**

PUERTO RICO

***WP4U**	**A**	**3,547,934**	**3284**	**109**	**336**
					(Opr. AA3BG)
*KP4F	"	67,041	212	35	82
***WP4LNY**	**28**	**16,800**	**204**	**14**	**21**
***KP4FP**	**21**	**49,896**	**238**	**23**	**54**

SAN ANDREAS

***HK0TCN**	**14**	**30,525**	**164**	**22**	**53**

ST. KITTS

V47KP	**A**	**3,515,130**	**3660**	**109**	**314**
					(Opr. K2DOX)
V47NS	**14**	**671,024**	**1849**	**28**	**108**
					(Opr. W9NSZ)
***V44NK**	**A**	**127,566**	**857**	**33**	**81**

AFRICA

AFRICAN ITALY

IG9I	**21**	**924,165**	**1925**	**35**	**130**
IG9R	**14**	**2,076,068**	**3447**	**40**	**166**
					(Opr. I4UFH)
IG9A	**7**	**1,168,855**	**2486**	**35**	**120**
					(Opr. IT9GSF)
IG9T	**3.7**	**816,959**	**1938**	**33**	**110**
					(Opr. IV3TAN)
IG9W	**1.8**	**137,020**	**560**	**14**	**71**
					(Opr. IV3SHF)

ASCENSION ISLAND

ZD8Z	**14**	**2,356,065**	**3925**	**38**	**167**
					(Opr. N6TJ)

CANARY ISLANDS

EA8AH	**A**	**10,999,592**	**5860**	**142**	**489**
					(Opr. OH1RY)
EA8CAL	"	1,004,360	1422	58	180
EA8ZS	**28**	**449,460**	**1185**	**28**	**104**
EA8AGG	**21**	**241,902**	**909**	**18**	**71**
EA8BWW	**14**	**1,116,828**	**2324**	**34**	**128**
EA8EA	**1.8**	**105,786**	**473**	**16**	**65**
					(Opr. OH1MA)
EA8AN	"	4,380	55	7	23
***EA8LS**	**A**	**1,088,717**	**1236**	**77**	**225**
*EA8BGO	"	47,430	200	26	59
***EA8IN**	**28**	**209,326**	**806**	**17**	**66**

CEUTA & MELILLA

EC9AX	21	25,272	113	23	55
***EA9AR**	**A**	**715,392**	**1003**	**54**	**189**
***EA9IB**	**21**	**261,495**	**656**	**31**	**104**

DJIBOUTI

***J28ML**	**21**	**173,271**	**526**	**27**	**84**

EGYPT

SU2MT	**A**	**6,805,372**	**4002**	**128**	**450**
					(Opr. K6NA)

GABON

TR8SF	**A**	**750,336**	**998**	**69**	**187**
***TR8IG**	**A**	**1,162,620**	**1468**	**74**	**196**

IVORY COAST

TU2XZ	**14**	**285,957**	**820**	**28**	**91**

KENYA

5Z4SS	**A**	**467,343**	**931**	**48**	**123**
***5Z4BJ**	**A**	**177,330**	**440**	**44**	**94**

MADEIRA ISLANDS

CT3FF	**7**	**208,552**	**548**	**31**	**100**

MALAGASY REPUBLIC

5R8DS	**A**	**603,980**	**815**	**67**	**193**

MAURITIUS

***3B8/ F5PXQ**	**A**	**1,076,285**	**1521**	**56**	**189**
*3B8DB	"	203,504	434	54	107

MOROCCO

CN8TM	**A**	**1,358,720**	**2346**	**136**	**57**
					(Opr. JR2ITB)
***CN8NK**	**21**	**287,114**	**1080**	**22**	**67**

NIGERIA

5N0T	**A**	**3,591,837**	**2717**	**110**	**343**
5N0MVE	**"**	**2,476,119**	**2227**	**101**	**280**

RWANDA

***9X/ON4WW**	**A**	**342,090**	**669**	**59**	**122**

SIERRA LEONE

***9L1PG**	**14**	**147,552**	**570**	**24**	**63**

SOUTH AFRICA

ZS1ESC	**A**	**111,476**	**899**	**39**	**85**
					(Opr. ZS1ACH)
ZS6EZ	**21**	**1,552,250**	**3026**	**34**	**141**
ZS6H	14	30,150	150	24	51
***ZS6CAX**	**A**	**111,566**	**231**	**59**	**123**
*ZS4BS	"	3,840	36	16	24

TUNISIA

3V8BB	**A**	**7,508,820**	**4107**	**138**	**482**
					(Opr. YT1AD)

UGANDA

***5X4F**	**A**	**1,926,114**	**1878**	**93**	**261**

ZAIRE

9R1A	**21**	**1,135,818**	**2252**	**35**	**143**
					(Opr. PA3DZN)

ZAMBIA

9J2FR	**A**	**1,664,080**	**1700**	**91**	**250**

ASIA

ARMENIA

EK0W	**1.8**	**75,806**	**496**	**10**	**48**

ASIATIC RUSSIA

RK9CWY	**A**	**687,188**	**844**	**77**	**221**
					(Opr. RX9CAZ)
RV9XF	**"**	**377,034**	**700**	**38**	**153**
UA9XL	"	285,675	525	38	157
UA9XMG	"	257,600	534	40	144
RZ9UA	**14**	**876,856**	**1894**	**40**	**132**
RA9DX	"	401,820	1048	37	111
UA9CE	"	88,704	425	26	62
RU9CK	**3.7**	**147,060**	**570**	**20**	**70**
UA9OC	"	16,740	117	14	40
***UA9CVQ**	**A**	**525,995**	**327**	**44**	**136**
*RA9AE	"	86,433	234	41	100
*RW9RF	"	51,330	172	32	86
***RW9QA**	**21**	**42,965**	**238**	**13**	**52**
***RW9AB**	**14**	**266,112**	**697**	**34**	**110**
*UA9ORH	"	38,780	224	19	51
***UA9QQA**	**3.7**	**15,463**	**144**	**14**	**33**
RZ0CQ	**A**	**153,624**	**371**	**57**	**116**
UA0SMF	**21**	**85,981**	**810**	**21**	**50**
UA0WY	**14**	**379,951**	**1103**	**40**	**103**
UA0ZBK/0	"	81,567	481	27	54
UA0SR	**7**	**19,200**	**161**	**21**	**43**
UA0FDX	**3.7**	**14,454**	**159**	**16**	**17**
***RA0FU**	**A**	**1,584,410**	**2313**	**110**	**200**
*RA8T	"	642,058	1295	77	174
***UA0YAY**	**14**	**78,012**	**352**	**27**	**72**
***RV0AR**	**7**	**445,332**	**1230**	**37**	**111**
*RA0FF	"	29,520	402	18	30

CHINA

***BG4TBD**	**21**	**35,328**	**350**	**19**	**45**

CYPRUS

***5B4/ DL2SEK**	**A**	**85,824**	**306**	**26**	**70**

HONG KONG

VR2KF	**A**	**562,324**	**1026**	**90**	**176**
VR2RX	"	111,244	570	48	89
					(Opr. JR1JCB)
VR2EZ	**14**	**70,964**	**466**	**27**	**67**
					(Opr. G4DEZ)
*VR2/ WA6RAY	A	580	20	14	15

ISRAEL

4X6TT	**14**	**1,557,951**	**2877**	**40**	**161**
***4X1VF**	**28**	**87,309**	**331**	**20**	**69**
***4X6RA**	**21**	**47,691**	**257**	**17**	**46**
*4Z5FW	14	3,758	61	7	14

JAPAN

JH1AEP	**A**	**2,265,894**	**2041**	**125**	**269**
JR1GSE	**"**	**584,200**	**831**	**91**	**163**
7K3OWM	"	325,725	540	77	138
JA1XEM	14	2,268	28	12	16
***JA1IDY**	**A**	**697,200**	**750**	**115**	**217**
***JF1KFV**	**"**	**585,150**	**765**	**95**	**187**
***JE1LFX**	**"**	**314,167**	**450**	**91**	**168**
*JA1BUI	"	282,375	440	96	155
*JJ1VRO	"	251,312	415	82	144
*JS1OYN	"	244,770	472	77	122
*JA1GYO	"	207,192	406	72	122
*JE1BDC	"	145,010	316	64	106
*JG1TVK	"	123,025	253	67	118
*JA1BRL	"	118,116	289	55	98
*JR1MRG	"	99,811	261	62	88
*JE1UFF	"	94,462	241	56	90
*JA1QN	"	83,750	233	51	83
*JA1CPS	"	57,096	174	45	77
*7J1ABD	"	45,018	150	50	72
					(Opr. WA6URY)
*JA1STY	"	31,501	120	40	69
*7J1AFP	"	30,870	137	38	60
*JL1MWI	"	25,157	251	35	62
*JJ1NUI	"	21,672	93	36	50
*7N2UQC	"	21,360	100	37	52
*JF1SQC	"	16,188	77	34	42
*JH1RMH	"	13,419	77	26	37
*JI1RCB	"	8,236	60	25	33
*JR1GGB	"	6,232	56	18	23
*JH1TYU	"	5,040	43	18	18
*JH1JGZ	"	2,255	26	19	22
*JL1UMX	"	1,860	24	14	17
*JQ1AHZ	"	288	9	6	6
*JJ3OLZ/1	"	180	6	5	5
***JA1MYW**	**28**	**4,118**	**55**	**12**	**17**
*JA1AAT	"	570	14	8	7
***JF1LLT**	**21**	**276,948**	**701**	**37**	**110**
***JA1KVT**	**"**	**168,462**	**496**	**35**	**91**
***JQ1BNL**	**"**	**93,810**	**326**	**34**	**72**
*JA0BMS/1	"	85,358	331	29	69
*JE1XCZ	"	63,360	227	31	57
*7M2CAG	"	49,302	220	25	58
*JS1KQQ	"	47,840	226	25	55
*JF1UVJ	"	43,700	178	30	65
*JA1NFD	"	24,013	143	20	39
*JA1JLP	"	11,700	75	17	35
*JA1XPU	"	4,114	49	13	21
*7K1EQG	"	4,056	45	16	23
*JE1HXZ	"	3,300	47	12	13
*JR1VNX	"	780	13	10	10
*7M2MIK	"	703	19	7	12
*JH1NXU	"	180	8	4	6
*JM1YEV	"	130	7	5	5
***JR4PMX/1**	**14**	**317,454**	**725**	**37**	**120**
*7N1WIY	"	65,875	284	27	58
*JH1UUT	"	65,250	266	28	62
*JE1GZB	"	28,032	138	26	47
*JG1GCO	"	2,584	32	14	20
*JI1CYX	"	1,166	19	10	12
*JA1POS	"	936	20	9	15
***JS1UMQ**	**7**	**8,000**	**64**	**21**	**29**
*JK1AFI	"	3,290	36	16	19
*JE1SPY	3.7	1,254	25	11	11
*JM1NKT	"	390	13	8	7
JA2ADH	**A**	**465,796**	**690**	**79**	**165**
JE2HCJ	**"**	**231,125**	**400**	**79**	**136/**
JA2QVP	"	8,313	55	25	26
JI2UNR	**21**	**585,046**	**1341**	**37**	**117**
JA2IVY	**"**	**451,503**	**1070**	**36**	**117**
JA2ESR	7	135	9	3	2
***JN2AMD/2**	**A**	**227,328**	**455**	**68**	**124**
*JA2GHP	"	27,540	136	30	51
*JA2BEY	"	26,162	114	42	61
*JQ2BBC	"	25,256	127	30	47
*JH2WHS	"	10,384	72	24	35
*JK2VOC	"	7,095	65	23	32
***JA2JNA**	**28**	**4,590**	**54**	**13**	**17**
*JA2DLM	"	1,870	34	10	12
*JA2IZA	21	21,417	137	22	37
*JQ2LGS	"	8,970	71	19	27
***JA2ANA**	**14**	**80,496**	**230**	**37**	**92**
*JF2WXS	"	30,378	130	28	55
*JH2CYU	"	12,036	70	22	37
***JA2NNF**	**7**	**16,128**	**105**	**22**	**42**
***JR7OMD/2**	**"**	**12,017**	**83**	**22**	**39**
JE3HVL	**A**	**236,170**	**423**	**67**	**142**
JE3BMU	"	26,885	113	34	61
JA3CE	"	16,368	89	18	44
JH3FBS	**21**	**653,014**	**1444**	**36**	**122**
JL3IVX	"	1,570	30	13	15
JR3NZC	**14**	**285,090**	**768**	**34**	**96**
JN3SAC	"	74,984	269	32	72
***JF3NLQ**	**A**	**562,650**	**636**	**114**	**216**
*JH3CUL	"	179,724	366	74	130
*JF3IUC	"	144,480	331	70	102
*JA3UWB	"	43,466	173	42	61
*JI3MVO	"	29,484	141	34	50
*JA3TBT	"	8,756	107	29	56
*JA4AQR/3	"	1,092	16	11	15
***JR3RIY**	**21**	**223,846**	**681**	**33**	**85**
***JN3DRB/3**	**"**	**208,560**	**568**	**35**	**97**
*JA3LEZ	"	48,057	215	27	56
*JE9KHV/3	"	32,100	150	28	47
*JN3DSH	"	22,743	146	24	39
*JA3BBG	"	22,444	132	23	39
*JR3CVJ	"	15,343	89	22	45
*JQ3JUG	"	11,344	30	16	23
*JA3FZI	"	2,241	30	12	15
*JR3KAH	"	1,296	26	9	15
***JI3BFC**	**14**	**103,854**	**346**	**33**	**81**
***JH3FTZ**	**"**	**63,588**	**283**	**26**	**58**
*JA3AYX	"	14,820	101	24	33
*JA3IVU	"	1,008	16	9	12
*JG3WCZ	"	612	12	5	12
JA4HIX	A	27,000	100	43	57
JA4RTX	"	11,388	52	37	41
JA4DHN	"	6,136	45	19	33
***JA4ENY**	**A**	**71,022**	**208**	**53**	**80**
*JL4CMT	"	65,201	224	43	70
*JA4XRN	"	37,373	107	53	80

*JH4WBY	*	714	14	10	11
*JA4ETH	28	2,175	30	10	19
*JI4HKA	*	1,144	18	13	13
***JR4GPA**	**21**	**95,344**	**351**	**32**	**69**
*JL4BSE	*	2,407	31	12	17
*JH4LPY	*	840	15	11	10
***JH4JNG**	**14**	**139,707**	**404**	**36**	**93**
***JA1XCZ/4**	**7**	**34,443**	**152**	**28**	**61**
*JH4YOX	*	3	1	1	1
			(Opr. JA4HIX)		
JH5FXP	**A**	**3,449,322**	**2832**	**126**	**300**
JA5IP	*	102,200	268	56	90
JA5FDJ	**21**	**1,045,128**	**2207**	**37**	**131**
JA5AF	*	4,680	46	14	26
JA5EXW	**14**	**850,916**	**1806**	**40**	**126**
JE5MCV	*	287,628	785	37	95
*JF5FGY	28	2,211	26	14	19
***JA5EO**	**21**	**44,793**	**209**	**24**	**57**
*JA5PEE	7	3,638	22	11	13
*JA5PDS	*	924	18	10	12
JA6WW	**A**	**221,598**	**357**	**86**	**148**
JA6AKV	*	22,578	126	25	46
JH6EJG	**7**	**51,512**	**206**	**26**	**68**
***JA6SRB**	**A**	**202,164**	**370**	**64**	**140**
*JA6WFM	*	15,540	82	32	42
***JH6AUS**	**28**	**77,572**	**349**	**27**	**59**
***JH6SQI**	**"**	**64,650**	**316**	**25**	**50**
*JE6IBJ	*	646	17	9	8
***JA6BIF**	**21**	**69,460**	**279**	**29**	**63**
*JH6FHJ	*	41,344	207	21	55
*JM6EBU	*	13,776	88	19	37
*JA6QDU	*	2,912	36	8	20
***JA6CM**	**14**	**41,366**	**176**	**28**	**58**
***JH6TYD**	**7**	**5,676**	**53**	**17**	**27**
*JF6QJX	3.7	900	18	7	11
JA7BEW	**A**	**779,382**	**1011**	**95**	**188**
JH7BMZ	*	101,244	234	58	98
JA7FMZ	*	76,504	224	47	84
JH7DNO	**21**	**814,200**	**1641**	**38**	**139**
JA7JI	*	34,093	120	32	71
JA7FTR	**14**	**604,344**	**1366**	**39**	**117**
JA7BO	*	57,376	230	32	56
JA7RXU	*	34,190	185	25	40
JA7AXP	*	1,159	21	9	10
***JA7UAP**	**A**	**186,318**	**360**	**66**	**132**
*JL7BRH	*	79,442	200	63	94
*JG7AMD	*	40,748	144	51	71
*JA7JH	*	20,900	93	35	41
*JH7FUJ	*	20,777	102	34	45
*JJ7HAC	*	14,430	77	32	42
***JA7OWD**	**28**	**18,600**	**121**	**22**	**38**
*JR7CDL	*	2,475	41	11	14
***JA7MSQ**	**21**	**224,109**	**740**	**31**	**80**
***JR7WAB**	**"**	**152,813**	**559**	**32**	**69**
*JR7LVK	*	33,048	183	26	48
*JH7OHN	*	4,838	44	19	22
*JR7RJZ	14	15,219	107	24	33
***JA7HQK**	**7**	**10,455**	**86**	**18**	**33**
*JA7FFN	*	2,160	34	11	13
JA8RWU	**A**	**2,482,830**	**2018**	**136**	**305**
*JA8TEZ	A	2,106	32	13	13
***JH8UQJ**	**28**	**4,935**	**54**	**15**	**20**
***JA8WY**	**21**	**46,593**	**190**	**31**	**62**
*JH8DHV	*	39,123	219	25	44
*JH8OOS	*	1,458	21	12	15
***JH8CFZ**	**7**	**2,926**	**53**	**21**	**28**
JA9JFO	**A**	**416,604**	**524**	**107**	**191**
JA9CCG	21	34,944	157	26	52
***JE9LLO**	**A**	**88,324**	**240**	**53**	**89**
*JAØTEA/9	*	26,880	97	48	57
*JA9DDF	*	17,889	85	37	52
*JA9GHC	*	15,826	67	35	47
***JH9VSF/9**	**28**	**40,365**	**232**	**26**	**43**
***JR9NVB**	**21**	**109,326**	**360**	**32**	**82**
*JE9HVF	*	17,226	114	21	37
*JA1ALX/9	*	15,871	102	21	38
*JE9REN	*	1,624	23	11	18
*JE9PFD	*	374	9	9	8
***JR9OPJ**	**14**	**101,205**	**318**	**32**	**85**
*JA9KUG	*	44,160	211	28	52
***JA9XBW**	**7**	**15,675**	**102**	**20**	**37**
JAØUMV	**A**	**553,644**	**722**	**90**	**183**
JAØQWO	**"**	**470,988**	**659**	**88**	**179**
JRØWZR	*	240,384	444	65	127
JRØWZR	*	2,924	32	16	18
JAØJHA	**7**	**421,248**	**1163**	**34**	**94**
JAØQNJ	**21**	**767,394**	**1660**	**37**	**125**
***JHØHON**	**A**	**205,668**	**326**	**77**	**184**
***JHØEPI**	**21**	**64,586**	**277**	**29**	**57**
***JHØFWV**	**14**	**65,540**	**199**	**34**	**82**
*JFØSGW	*	42,360	220	24	46

KAZAKHSTAN

UN7LZ	**14**	**389,090**	**1087**	**30**	**100**
UN2O	**1.8**	**14,478**	**137**	**7**	**31**
***UN5OP**	**21**	**245,259**	**858**	**28**	**91**
			(Opr. UN5PR)		
*UN7FDM	*	71,495	426	20	59

KIRGHIZIA

EX/RU1AO	7	11,572	83	13	31

KOREA

HL9FC	**14**	**112,029**	**443**	**32**	**75**
***HL5AP**	**A**	**44,625**	**154**	**32**	**93**
*HL5YI	*	12,921	80	29	44

KUWAIT

9K2YY	**14**	**233,919**	**667**	**33**	**108**

LEBANON

***OD5NJ**	**A**	**2,691,360**	**2706**	**79**	**257**

MACAU

XX9AL	A	1,134	22	11	16
*XX9KC	A	6,850	138	13	37

MONGOLIA

JT1BV	**21**	**31,058**	**404**	**14**	**39**
***JT1BY**	**28**	**17,760**	**387**	**14**	**23**

PAKISTAN

***AP2N**	**A**	**253,712**	**736**	**49**	**108**

SAUDI ARABIA

HZ1HZ	**A**	**787,697**	**964**	**88**	**235**

TAIWAN

BV2FI	**A**	**345,420**	**762**	**68**	**122**
BV3BW	**7**	**18,750**	**165**	**13**	**37**

TURKMEN

EZ8AI	A	7,614	51	15	39
*EZ8CW	14	2,262	32	9	20

UNITED ARAB EMIRATES

***A61AF**	**A**	**779,820**	**1139**	**66**	**180**
			(Opr. K7SP)		

UZBEKISTAN

***UK8IG**	**21**	**73,112**	**413**	**20**	**54**

VIETNAM

3W5FM	**A**	**66,608**	**501**	**38**	**54**
			(Opr. UAØFM)		

WESTERN MALAYSIA

***9M2TO**	**A**	**160,678**	**664**	**59**	**102**

EUROPE

AALAND ISLANDS

OHØMM	**A**	**3,843,576**	**3641**	**131**	**421**
			(Opr. OH2MM)		

ALBANIA

ZA1AJ	**A**	**2,326,240**	**3101**	**98**	**371**
			(Opr. OK2ZV)		
ZA1AB	7	240	14	5	10

AUSTRIA

OE1JNB/3	**14**	**347,600**	**1050**	**37**	**121**
OE1WWL	7	3,010	53	10	33
***OE8CIQ**	**A**	**61,663**	**301**	**41**	**120**
*OE1GOA	7	6,063	122	7	40

AZORES ISLANDS

CU2AF	1.8	1,240	35	4	16

BALEARIC ISLANDS

EA6URP	**A**	**3,252,768**	**3369**	**114**	**382**
			(Opr. EA3NY)		
***EA6LP**	**A**	**92,050**	**208**	**63**	**200**
*EA6WL	*	4,150	73	9	41
*EA6WY	21	1,900	38	9	29
***EA6PE**	**14**	**18,966**	**276**	**13**	**45**
*EA6JN	*	1,106	28	6	8

BELGIUM

ON4BW	**7**	**70,519**	**585**	**19**	**78**
ON9CJM	**3.7**	**185,544**	**1454**	**23**	**85**
			(Opr. WQ2M)		
***ON5GQ**	**A**	**1,442,708**	**1577**	**102**	**361**
***ON4APU**	**"**	**460,184**	**816**	**67**	**261**
*ON9CCQ	*	173,958	482	50	187
*ON6CR	*	165,612	432	42	180
*ON5LF	*	79,424	283	37	109
*ON5CZ	*	31,262	146	23	75
*ON4AFO	*	7,740	74	16	29
***ON4TO**	**21**	**159,570**	**501**	**30**	**105**
*ON5AZ	*	40,139	170	27	62
***ON4XG**	**14**	**51,772**	**345**	**18**	**68**
***ON4AUC**	**1.8**	**16,896**	**392**	**4**	**40**

BELARUS

EW4MM	**A**	**596,410**	**1070**	**88**	**277**
EU8MA	**"**	**425,148**	**1086**	**61**	**223**
EW3DU	*	19,200	80	29	51
EW8OS	14	8,624	88	6	25
EW6TU	**3.7**	**19,494**	**326**	**9**	**48**
***EW6BL**	**1.8**	**6,006**	**145**	**6**	**33**

BOSNIA-HERZEGOVINA

T93M	**21**	**278,124**	**1104**	**32**	**97**
***T99T**	**28**	**46,046**	**439**	**19**	**58**
***T99W**	**3.7**	**99,176**	**847**	**18**	**70**

BULGARIA

LZ1BJ	**A**	**429,375**	**1133**	**53**	**176**
LZ3CW	*	735	13	9	12
LZ6A	**21**	**52,893**	**337**	**22**	**59**
			(Opr. LZ2EG)		
LZ5W	**7**	**586,656**	**1695**	**37**	**131**
LZ2FQ	*	12,139	168	9	52
***LZ3YY**	**A**	**275,420**	**956**	**49**	**186**
*LZ1DM	*	39,624	197	30	97
*LZ4BU	*	38,016	200	32	112
*LZ5GB	*	28,408	217	26	80
***LZ2GS**	**28**	**12,218**	**97**	**16**	**56**
*LZ3DB	21	20,370	162	20	50
***LZ1CW**	**14**	**52,243**	**388**	**20**	**69**
*LZ5QZ	*	41,025	392	14	61
***LZ2ZY**	**7**	**6,318**	**148**	**8**	**31**
*LZ2FM	*	5,148	110	7	37
***LZ4BC**	**3.7**	**8,680**	**208**	**10**	**30**

CROATIA

9A9R	**A**	**789,264**	**1188**	**87**	**249**
9A1CRJ	**7**	**247,808**	**1147**	**30**	**98**
			(Opr. 9A4LA)		
9A4D	**1.8**	**56,564**	**654**	**12**	**67**
9A1KDE	**"**	**44,030**	**563**	**11**	**59**
			(Opr. 9A2VR)		
***9A2AJ**	**A**	**463,680**	**1046**	**60**	**255**
*9A4RU	*	56,520	360	101	169
***9A2TX**	**21**	**6,528**	**192**	**23**	**92**
*9A1CDH	14	10,530	130	12	42
			(Opr. 9A4RV)		
***9A3QK**	**3.7**	**30,360**	**395**	**10**	**56**

CZECH REPUBLIC

OK1EP	**A**	**500,778**	**642**	**87**	**300**
OK1AXB	**"**	**313,034**	**801**	**65**	**216**
OK1MP	**28**	**23,205**	**124**	**21**	**70**
OK1LL	**21**	**115,440**	**437**	**28**	**92**
OK1RI	**14**	**1,359,640**	**2909**	**40**	**150**
OK1DT	*	73,036	308	32	92
OK1FPS	*	70,513	376	25	82
OK1TD	**3.7**	**47,925**	**544**	**12**	**63**
OL3Z	**1.8**	**14,224**	**237**	**8**	**48**
			(Opr. OK2HI)		
OK2SG	*	6,480	132	6	42
***OL6R**	**A**	**346,380**	**1003**	**55**	**196**
***OK2QX**	**"**	**285,560**	**589**	**72**	**223**
*OK1BA	*	187,902	548	46	173
*OK1DXW	*	138,460	416	50	165
*OK1FF	*	123,191	435	43	148
*OK1IR	*	110,802	350	42	135
*OK1MD	*	104,718	458	41	145
*OK1BMW	*	90,324	284	50	184
*OK2SWD	*	21,239	150	21	46
*OK1RV	*	10,017	155	15	48
*OK2PBG	*	7,011	96	16	41
*OK2PSA	*	5,100	78	14	36
*OK2EC	*	1,364	45	5	26
***OK1ARI**	**21**	**260,032**	**778**	**37**	**99**
*OK2LE	*	25,915	186	17	54
*OK2EQ	*	24,003	158	20	43
*OK2SFO	*	21,714	164	21	45
***OK2BEE**	**14**	**63,244**	**387**	**24**	**73**
***OK2TBC**	**"**	**45,153**	**400**	**22**	**65**
*OK2PLK	*	33,417	267	18	61
*OK1DMS	*	27,375	272	18	57
*OK1DSA	*	26,220	265	16	60
*OK1DWD	*	19,293	198	16	43
***OK2ABU**	**7**	**11,160**	**167**	**10**	**50**
***OK2PJW**	**3.7**	**62,010**	**929**	**10**	**55**
*OK1KZ	*	19,544	327	9	47
*OK2PPM	*	7,050	148	6	41
***OK1TP**	**1.8**	**14,758**	**300**	**7**	**40**

DENMARK

OZ5EV	**A**	**560,197**	**667**	**99**	**302**
OZ1AXG	*	85,478	434	31	127
OZ5KF	**14**	**786,000**	**2121**	**37**	**113**
OZ1INN	*	132,480	770	18	62
OZ5KG	*	45,210	152	33	77
OZ1IZB	7	1,080	22	8	19
***OZ1ACB**	**A**	**155,420**	**470**	**44**	**146**
*OZ5WQ	*	82,824	266	48	126
*OZ1JSH	*	81,396	322	38	115
*OZ8T	*	40,828	182	34	84
*OZ4FF	*	8,662	68	26	35
*OZ4NA	*	7,752	60	20	37
*OZ1DAE	14	6,721	113	10	37
***OZ3SK**	**1.8**	**30,177**	**465**	**9**	**54**
*OZ7AX	*	6,705	148	5	40

DODECANESE ISLANDS

SV5/ IN3QBR	**A**	**2,941,329**	**3903**	**98**	**355**

ENGLAND

G3NAS	**A**	**2,682,629**	**2294**	**123**	**398**
G3TTJ	**"**	**682,650**	**986**	**84**	**249**
GØVSN	*	469,244	797	72	220
GØAEV	**28**	**71,136**	**509**	**22**	**74**
GØSDX	**21**	**305,672**	**894**	**36**	**116**
G3LZQ	**"**	**281,260**	**802**	**33**	**107**
G4WTD	*	210,256	649	36	100
GØLRX	*	149,060	582	27	89
GØDBE	**14**	**364,500**	**1138**	**35**	**115**
G3TVU/M	*	15,900	111	17	43
G3WGN	**3.7**	**54,852**	**521**	**15**	**69**
G3SNN	**1.8**	**13,496**	**186**	**6**	**48**
G4IFB	*	4,074	104	6	36
***G4KIV**	**A**	**774,836**	**1289**	**85**	**303**
*G3VAO	*	76,704	341	39	102
*G6QQ	*	50,439	241	30	99
*G4NXG/M	*	23,861	114	34	73
*GØNIF	*	7,980	76	5	38
*G4OTY	*	224	16	5	9
*G3YOG	21	8,342	108	11	32

ESTONIA

ES7RE	**3.7**	**64,902**	**555**	**18**	**69**
***ES4NG**	**A**	**147,496**	**519**	**49**	**157**
*ES5RGJ	21	7,857	75	11	70
***ES5RGJ**	**3.7**	**6,314**	**78**	**6**	**71**
*ES6MO	*	826	21	6	8
***ES5DE**	**1.8**	**6,468**	**143**	**5**	**39**

EUROPEAN RUSSIA

RU3QW	**A**	**807,729**	**1194**	**96**	**321**
RZ1ZZ	**"**	**632,448**	**1454**	**68**	**220**
UA6LU	*	290,130	524	78	207
RU6BV	*	32,079	143	36	75
RZ6FZ	*	16,490	140	19	66
RV6ASY	*	16,401	77	31	46
RA3THN	*	13,736	136	19	49
UA6EE	**21**	**155,827**	**711**	**30**	**83**
RA3DNC	*	74,300	506	30	70
UA6NZ	*	48,924	239	32	76
RA3XO	*	43,044	264	25	77
RW1ZA	**14**	**549,648**	**1875**	**35**	**109**
RU4AA	**"**	**472,878**	**1456**	**38**	**124**
UA6LQ	*	439,126	1369	38	140
R3/WA2NZA	*	218,008	1022	34	102
RA1ANO	*	147,072	715	34	94
RA1AW	*	129,800	623	26	84
RA4CHT	*	105,004	662	27	89
UA3PP	*	85,232	491	31	81
UA3D	**7**	**53,928**	**362**	**24**	**83**
			(Opr. UA3DPX)		
UA1OMS	*	35,280	316	19	65
***RW1CW**	**A**	**205,932**	**540**	**65**	**197**
***UA3ACV**	**"**	**112,236**	**415**	**50**	**138**
*UA4WEI	*	83,772	328	44	112
*UA6ART	*	48,816	180	45	99
*RA6AEL	*	36,312	148	39	97
*RW4AO	*	27,972	200	25	86
*R3/N9NC	*	21,100	177	17	83
*UA1JA	*	2,992	24	11	23
***UA4LCQ**	**21**	**703,812**	**2056**	**40**	**138**
*RA3RCL	*	95,832	527	29	92
*RZ6HX	*	45,603	424	19	62
*RV6APN	*	6,890	93	13	40
***RU3D**	**14**	**129,402**	**612**	**31**	**95**
			(Opr. RU3HD)		
*RN9XA	*	86,020	338	20	72
*UA6LAK	*	64,746	351	29	80
*UA4LY	*	54,570	298	26	76
*UA1ZZ	*	19,206	215	14	52
***RA3WA**	**7**	**68,801**	**417**	**24**	**83**
*UA1OZ	*	3,675	51	13	36
***RV1CC**	**1.8**	**13,250**	**247**	**7**	**46**
*RA3RAQ	*	4,560	114	6	34

EUROPEAN TURKEY

***TA1FA**	**A**	**106,790**	**530**	**50**	**131**

FAROE ISLANDS

OY1G	A	10,354	163	13	49
OY9JD	**1.8**	**98,824**	**984**	**15**	**73**

FINLAND

OH5NBJ	**A**	**463,749**	**960**	**73**	**226**
OH5VT	**"**	**294,800**	**479**	**85**	**250**
OH6KZP	*	248,148	720	54	172
OH6NEV	*	169,386	447	47	175
OH2VZ	*	148,074	667	59	163
OH2KQ	*	93,051	211	56	155
OH2FS	*	45,872	155	38	84
OH5NG	*	42,471	169	36	81
OH2RL	*	176	11	5	6
OH5NQ	**21**	**677,875**	**1579**	**38**	**149**
			(Opr. OH1WZ/2)		
OH6MFN	**"**	**453,952**	**1214**	**37**	**127**
OH2BCD	*	64,700	331	29	71
OH6NIO	**14**	**680,822**	**1986**	**38**	**120**
OH3XA	**7**	**59,064**	**365**	**24**	**83**
OH3BZY	**3.7**	**136,800**	**950**	**26**	**88**
OH1MLB	**1.8**	**38,478**	**531**	**9**	**57**
OH8LAE	*	24,576	355	10	54
OH2LU	*	4,368	105	6	36
***OH6SU**	**A**	**114,771**	**287**	**52**	**149**
*OH2UBF	*	81,012	358	38	134
			(Opr. OH2LP)		
*OH6QP	*	79,704	304	39	125
*OH1NPT	*	52,126	343	28	106
*OH2MO	*	45,466	223	33	94
*OH7NW	*	35,750	224	29	101
*OH5KIZ	*	13,277	119	51	20
*OH5TE	*	10,703	83	14	53
*OH3JCB	*	6,800	83	16	52
***OH8MIZ**	**21**	**70,875**	**709**	**22**	**59**
*OH3LZU	*	37,620	193	22	77
*OH6KTD	*	28,880	145	26	69
*OH6RC	*	14,430	108	18	56
*OH3NLP	*	11,390	104	17	50
***OH8BQT**	**14**	**73,062**	**397**	**25**	**74**
*OH3MC	*	17,030	130	18	47
*OH3NM	*	6,500	80	12	40
*OH2LNH	7	1,620	55	4	26

FRANCE

TM7XX	**A**	**3,344,568**	**2716**	**124**	**428**
			(Opr. F5MUX)		
F6HLC	**"**	**2,608,815**	**2421**	**102**	**387**
F2EE	**"**	**2,505,222**	**2706**	**108**	**351**
TM3U	*	1,824,988	2042	100	307
			(Opr. F6DZU)		
F6IIV	*	509,530	781	74	216
F8WE	*	325,780	910	62	198
F2AR	*	303,324	700	59	217
F5JKK	*	268,755	661	60	225
F5RAB	*	177,120	478	53	187
F6IPS	*	142,101	395	51	120
F6HNX	*	117,150	349	40	125
F/ON5OF	*	27,714	149	29	64
F5PXF	*	2,478	50	11	31
F5NBX	**28**	**101,022**	**552**	**24**	**89**
F5PRR	21	21,070	138	21	49
F8PTT	**14**	**328,640**	**1161**	**28**	**102**
			(Opr. F5TGR)		
F2NH	*	49,816	250	28	76
F6CQU	*	5,480	59	14	26
F5NBU	**3.7**	**102,339**	**1026**	**14**	**69**
F2BF	*	55,115	643	13	60
F6CWA	1.8	1,410	39	5	25
***F5PCX**	**A**	**207,708**	**514**	**48**	**180**
***F6DZD**	**"**	**163,008**	**499**	**40**	**152**
***F5OYU**	**"**	**161,102**	**300**	**113**	**170**
***F6IJG**	**"**	**160,974**	**435**	**9**	**23**
*F5YJ	*	132,795	429	48	179
*F5TMZ	*	112,112	510	40	114
*F2RO	*	108,480	336	42	118
*F5PHW	*	104,064	342	41	151
*F3VX	*	100,792	380	39	133
*F5HWB	*	87,101	331	35	126
*F6JHL	*	76,608	362	38	130
*F5GEG	*	50,250	229	34	116
*F9XA	*	47,495	227	26	89
*F6FNA	*	43,000	258	23	102
*F5SDA	*	34,804	201	31	82
*F5JOT	*	30,303	214	23	88
*F6API	*	29,795	192	26	75
*F5JBF	*	28,853	391	15	43
*F5PSA	*	27,714	141	30	63
*F6CYT	*	14,022	101	21	61
*F8IN	*	9,063	81	21	36
*F5RPB	*	7,574	125	3	3
*F6EEM	*	3,956	52	15	31
*F5MVU	*	2,774	45	14	32
*F5NYK	*	2,636	127	20	46
*F5IJH	*	2,106	27	16	23
***F5TDK**	**28**	**23,798**	**170**	**16**	**57**
*FB1OMN	*	240	10	5	10
***F6BVB**	**21**	**144,102**	**453**	**32**	**109**
***F5IYQ**	**14**	**79,000**	**474**	**25**	**75**
*F6FUN	*	48,504	238	25	69
*F9DK	*	27,083	272	13	60
*F5JOU	*	12,376	97	15	41
*F5ORE	*	9,100	129	11	41
***F5BEG**	**3.7**	**44,100**	**529**	**11**	**59**

GERMANY

DJ4PT	**A**	**4,076,328**	**2850**	**141**	**441**
DJ6QT	**"**	**2,159,976**	**1933**	**115**	**401**
DL8PC	**"**	**1,900,596**	**1758**	**110**	**382**
DL2OBO	*	1,006,056	1521	75	239
DL8UCC	*	975,024	1101	101	331
DL2DXX	*	850,746	1041	82	256
DL7IO	*	720,720	1000	93	219
DK1II	*	631,400	942	76	274
DF2RG	*	598,425	800	91	304
DK2XX	*	427,424	558	101	260
DJ8UV/P	*	366,660	817	62	208
DL5ZBA	*	365,976	697	74	225
DL6NCY	*	271,058	413	85	228
DL2FDK	*	240,192	438	68	220
DJØIF	*	218,025	356	85	170
DK4IO	*	191,730	431	55	176
DF9RD	*	176,436	460	62	199
DL8YR	*	169,404	404	56	172
DL8AAE	*	165,085	327	77	164
DJ6DO	*	164,565	400	50	157
DL2QT	*	161,568	420	53	151
DL8HCO	*	149,910	461	47	143
DL1TC	*	140,128	255	69	163
DK5PD	*	130,398	393	56	150
DF3IS	*	116,440	340	41	123
DL1BFZ	*	102,600	344	48	142
DL6KVB/P	*	85,184	301	48	128
DF1QQ	*	74,368	448	33	133
DJ3HJ	*	72,726	277	46	140
DL6LE	*	67,562	200	37	129
DK8EY	*	62,307	213	46	115
DF5NF	*	60,885	275	32	103
DL4DCC	*	52,392	240	38	110
DF3TE	*	50,370	375	31	88
DK3YD	*	28,269	139	31	50
DJ6GK	*	19,610	107	35	71
DL4YBP	*	17,017	70	35	56
DL6SEV	*	15,408	114	25	47
DL1VTL	*	14,678	123	21	61
DL7MAE	*	13,674	91	33	53
DL7VPO	*	6,262	100	18	44
DL9XW	*	6,237	85	15	48
DF9XV	**28**	**54,035**	**323**	**26**	**81**
DK7AN	*	7,668	90	14	40

DL2JDS	*	1,595	40	7	22
DL1AZZ	**21**	**392,616**	**933**	**37**	**127**
DF7YU	**14**	**494,262**	**1289**	**35**	**126**
DL4YAO	*	133,000	537	33	100
DL9ZBG	*	86,912	346	32	96
DL4DXF	*	44,330	142	34	109
DJ9MH	*	11,020	90	16	42
DL5AWI	**7**	**256,608**	**1163**	**31**	**113**
DJ5LA	**"**	**184,592**	**944**	**32**	**107**
DK5WO	*	44,462	383	18	76
DL5AUJ	*	306	12	5	12
DL8OH	**3.7**	**209,469**	**1305**	**30**	**93**
DL3LAB	**"**	**171,021**	**1141**	**27**	**82**
DL1MDY	*	3,192	80	7	31
DK2FR/P	*	72	9	2	7
***DL2OBF**	**A**	**852,432**	**1110**	**90**	**323**
***DL1NCT**	**"**	**779,100**	**913**	**104**	**316**
***DL1MGB**	**"**	**687,040**	**946**	**83**	**297**
*DL1JBQ	*	463,736	782	74	264
*DK8FS	*	410,564	728	77	264
*DK7ZH	*	407,664	685	70	234
*DL9YAJ	*	346,408	628	79	265
*DJ1OJ	*	341,600	675	74	231
*DJ4JF	*	243,180	459	57	195
*DL1JPL	*	240,434	548	59	180
*DL8SDC	*	236,470	566	50	164
*DL7BO	*	195,050	403	66	169
*DL6KY	*	187,782	440	59	179
*DLØDWD	*	174,216	604	44	160
*DL1DTC	*	161,460	414	53	154
*DK7LA	*	141,600	600	49	151
*DL5XB	*	139,055	397	49	154
*DL1BGN	*	135,648	340	55	161
*DFØEK	*	126,688	398	51	163
*DL5KBC	*	119,480	422	44	162
*DL2DCO	*	108,855	357	44	161
*DL5PW	*	106,622	300	48	130
*DJ7IK	*	95,583	283	54	149
*DL6MRM	*	81,567	328	42	129
*DL1RNH	*	60,150	307	30	120
*DL8DBW	*	50,616	264	35	117
*DL4GBA	*	50,325	209	43	122
*DL2DBH	*	50,127	194	46	101
*DL3DBY	*	47,376	239	110	336
*DF5AN	*	43,344	222	32	112
*DL1EMH	*	41,529	155	42	85
*DL2YAK	*	41,400	226	27	93
*DL3DRN	*	40,745	185	45	100
*DL1DWT	*	36,942	118	31	100
*DL1HSR	*	30,000	202	26	99
*DL1GBQ	*	28,438	156	35	83
*DL5IAB	*	27,195	178	31	80
*DL5JJF	*	23,751	145	33	58
*DA1HA	*	22,454	182	22	80
*DL2TG	*	21,168	86	48	50
*DL3HWW	*	20,367	140	27	63
*DL1DCJ	*	19,558	117	26	51
*DL4FDT	*	15,444	131	22	56
*DL1YFF	*	14,904	125	26	66
*DLØFFP	*	12,844	106	22	54
			(Opr. DL1MFP)		
*DF9RC	*	10,064	112	28	40
*DL3DCY	*	10,008	81	22	50
*DL8UAD	*	6,380	61	20	38
*DL6MTG	*	5,880	55	14	46
*DL3WB	*	5,280	92	35	9
*DL3YDY	*	4,982	86	13	40
*DL3NBL	*	2,128	36	11	17
***DH1LAD**	**28**	**11,233**	**163**	**11**	**36**
*DH5SBW	*	5,700	70	14	36
*DH4JU	*	399	20	6	13
***DL3BRA**	**21**	**92,476**	**332**	**30**	**92**
***DJ9ZB**	**"**	**90,364**	**318**	**30**	**86**
*DL2SBY	*	34,486	182	24	62
*DL4SKF	*	7,130	59	17	29
*DL9FV	*	7,038	116	14	37
*DL3AG	*	4,312	36	17	27
***DL3ABL**	**14**	**132,436**	**402**	**55**	**171**
*DL3ME	*	12,844	57	9	67
*DL6FCB	*	11,554	132	10	43
*DL8DZL	*	11,400	80	16	41
*DL6AG	*	6,500	61	16	36
*DJ5MN	7	1,845	35	7	34
*DJØBX	*	24	6	1	3
***DL4FMA**	**3.7**	**81,512**	**823**	**17**	**75**
*DH4JQ	*	5,805	133	8	37
*DHØDK	*	4,715	112	6	35
***DL9SXX**	**1.8**	**17,877**	**326**	**8**	**51**
***DJ9LJ**	**"**	**15,080**	**210**	**10**	**55**
*DK3GG	*	10,229	192	6	47
*DL5MHB	*	3,280	87	5	35

GREECE

SV2BFN	**A**	**1,195,480**	**2010**	**93**	**347**
SV8CS	**1.8**	**60,258**	**640**	**11**	**72**
***SV2CWY**	**A**	**292,100**	**716**	**64**	**190**
*SV2YC	*	102,044	342	52	142
*SV2CLS	*	6,832	57	23	38
*SV2BOH	*	2,709	27	19	24
*SV2DFI	*	900	18	12	18
***SV2AEL**	**7**	**71,245**	**600**	**20**	**78**
*SVØAN	*	4,524	53	6	23

HUNGARY

HA/DL1MAJ	**A**	**538,612**	**741**	**89**	**272**
HA8ZO	**"**	**234,710**	**454**	**73**	**172**
HA3OU	*	100,746	298	50	124
HA4XG	*	91,932	360	43	120
HA8DU	**21**	**967,500**	**1889**	**39**	**176**
HA8IE	**14**	**865,419**	**1988**	**40**	**173**
HA9BVK	**7**	**436,540**	**1724**	**37**	**123**
			(Opr. HA9CU)		
HA8IB	**3.7**	**123,057**	**844**	**23**	**90**
***HA8AT**	**A**	**109,947**	**381**	**44**	**157**
*HA/DK5KJ	*	1,200	40	8	22
***HG8QB**	**28**	**28,756**	**205**	**23**	**56**
*HA3FT	*	18,788	205	15	46
*HG8LVS	*	18,252	256	15	39
*HG9MDP	*	5,934	107	11	32
***HA3MO**	**21**	**142,992**	**460**	**31**	**113**
*HA4YV	*	10,396	105	15	31
*HA4GDO	*	8,282	89	15	26
***HA4FB**	**14**	**76,800**	**501**	**25**	**71**
*HA5COX	7	2,485	69	5	30
***HA4FV**	**3.7**	**21,603**	**359**	**9**	**48**
***HA8EK**	**1.8**	**36,846**	**484**	**10**	**59**
*HA8BE	*	3,663	87	7	30

IRELAND

EI4DW	**A**	**480,249**	**1089**	**57**	**240**

ISLE OF MAN

***GD4GWO**	**14**	**31,453**	**316**	**16**	**55**

ITALY

IU2E	**A**	**2,008,078**	**2137**	**108**	**370**
			(Opr. IK2VUE)		
I6FLD	**"**	**1,682,694**	**1609**	**115**	**327**
IN3ZNR	**"**	**1,554,840**	**1603**	**90**	**330**
IK8CHL	*	394,525	704	86	281
I4WTC	*	392,314	697	88	294
IK2VFW	*	270,568	555	63	185
IYØTCI	*	210,634	543	52	189
I4CSP	*	103,834	400	46	147
IK6GPZ	*	28,350	160	24	46
IK4GRO	**28**	**128,588**	**469**	**32**	**92**
IY1LEC	**21**	**1,040,910**	**2484**	**37**	**133**
IR4B	**"**	**573,434**	**1436**	**36**	**127**
			(Opr. IK4AUY)		
IK6WDY	*	313,885	1037	33	110
IRØC	*	277,426	737	37	126
IKØAPR	*	116,008	379	33	103
IV3HYD	**14**	**93,330**	**409**	**26**	**96**
IV3BMV	*	87,688	516	24	73
IKØNGI	*	24,090	265	16	50
IK5QGO	**7**	**335,617**	**1132**	**37**	**126**
IV3YYK	**"**	**285,868**	**1116**	**34**	**112**
I8UDB	**3.7**	**233,562**	**1068**	**28**	**106**
IN3KTT	*	4,056	111	5	34
IR4T	**1.8**	**58,764**	**609**	**13**	**70**
			(Opr. I4JMY)		
***IV3UHL**	**A**	**627,150**	**1010**	**84**	**286**
***IK4ADE**	**"**	**373,824**	**773**	**59**	**177**
***IKØYUT**	**"**	**299,720**	**609**	**70**	**225**
*IK3OII	*	206,438	442	64	169
*IV3ORB	*	189,152	471	68	189
*IK5MEQ	*	180,975	323	69	216
*IK3OYY	*	178,047	426	58	161
*IK7RVY	*	165,660	508	50	170
*IK4QIE	*	110,622	342	47	132
*IK2RPE	*	110,019	313	57	160
*IK7WUE	*	107,579	369	51	128
*IK3SCB	*	104,652	341	37	125
*IK3XZX	*	80,432	265	40	136
*IØYQV	*	79,212	241	50	111
*IK4QJM	*	75,400	325	35	95
*IK2ZEL	*	69,212	263	36	107
*IK1VGG	*	67,528	254	46	138
*IK8XVE	*	53,949	200	40	107
*IK1TTD	*	53,742	291	32	127
*IKØWRB	*	50,796	278	33	120
*IK1TKS	*	43,000	157	39	86
*IK2XRW	*	41,328	149	42	122
*IK7WPD	*	38,934	208	34	92
*IN3IKF	*	36,725	205	31	82
*IK4RQI	*	27,060	139	36	87
*IK8VMV	*	24,415	128	31	64
*IK5WWF	*	22,504	105	36	80
*IK7UYB	*	17,015	118	26	57
*IKØSMM	*	12,460	110	22	67
*IK2YSJ	*	11,919	89	30	57
*IK4CBM	*	5,369	77	15	44
*IK2REA	*	4,200	63	13	40
*I5NXD	*	3,577	64	15	34
*IK7TAL	*	2,064	38	12	12
*IV3PCF	*	1,836	35	9	27
*IK2XZB	*	713	13	11	12
*IK4RSK	*	414	18	9	14
***IK2YSA**	**28**	**37,947**	**204**	**23**	**68**
*IK6XGS	*	8,650	109	12	38
***II6I**	**21**	**316,798**	**1052**	**34**	**117**
			(Opr. IK6GZM)		
*IK2OLJ	*	33,300	205	20	55
*IK5YJK	*	22,080	176	16	48
***IR4XX**	**14**	**654,847**	**1903**	**37**	**120**
			(Opr. IK4OLP)		
*IV3ZCS	*	60,858	236	30	96
*I4PZP	*	52,633	235	24	79
*IK8WEL	*	23,064	200	15	54
*I1GXV	*	12,567	124	14	45
*IK2YYS	*	7,975	110	10	45
***IR4R**	**7**	**175,902**	**943**	**26**	**88**
			(Opr. IK4ALM)		
***I0SQ**	**3.7**	**40,936**	**368**	**14**	**72**
			(Opr. I5VXG)		
*IK0XBX	*	17,688	223	11	55
*IK2ULV	*	14,040	195	11	49
*IK5PWN	*	12,291	219	9	49
***IK4LZH**	**1.8**	**14,460**	**228**	**7**	**53**

JAN MAYEN

*JX4CJA	A	1,944	52	7	29
*JX3EX	*	1,440	41	6	26

JERSEY

***GJ3XZE**	**14**	**27,650**	**201**	**16**	**63**

KALININGRAD

***UA2FEA**	**A**	**61,005**	**310**	**34**	**113**

LATVIA

YL2SW	**A**	**63,366**	**477**	**23**	**95**
YL2GN	**7**	**114,243**	**849**	**24**	**89**
***YL2KO**	**A**	**188,778**	**524**	**55**	**164**
*YL3FW	*	105,648	447	38	148
*YL1ZD	*	44,508	622	37	130
*YL2EC	*	38,360	173	39	98

LITHUANIA

LY1DS	**A**	**1,778,999**	**2075**	**111**	**350**
LY35BM	**"**	**1,010,187**	**1680**	**79**	**242**
LY5W	**"**	**973,198**	**1502**	**103**	**328**
LY35OU	*	820,446	1202	98	303
LY35FW	*	533,010	1189	73	254
LY2LA	*	268,029	774	56	187
LY2BN	*	247,648	497	74	210
LY2DX	*	201,250	609	57	193
LY2CX	*	50,094	329	30	108
LY3MV	*	24,442	205	28	73
			(Opr. LY2QT)		
LY5ØUN	*	23,793	241	25	78
			(Opr. LY2BG)		
LY2IC	*	15,276	123	23	53
LY3BH	**21**	**461,376**	**1174**	**37**	**125**
LY2ZZ	**1.8**	**44,091**	**587**	**10**	**61**
			(Opr. LY3MM)		
***LY2FN**	**A**	**315,060**	**760**	**64**	**231**
*LY35BY	*	101,386	463	36	127
*LY35KB	*	92,364	421	36	143
*LY35TZ	*	73,458	362	31	123
			(Opr. LY2TZ)		
*LY35HK	*	8,064	112	11	45
*LY3CL	*	1,170	35	11	19
*LY2BR	28	1,403	48	4	19
*LY35CW	*	88	9	3	5
			(Opr. LY3CW)		
***LY2AE**	**14**	**38,212**	**299**	**19**	**63**
*LY2PAQ	*	10,920	135	12	40
***LY3BX**	**7**	**155,890**	**1129**	**23**	**96**
*LY2BUU	*	31,084	344	16	60
***LY6K**	**3.7**	**55,360**	**616**	**19**	**61**
			(Opr. LY3BS)		

LUXEMBOURG

LX1EP	**A**	**283,210**	**1073**	**45**	**178**
LX9SW	**14**	**147,545**	**573**	**27**	**88**
			(Opr. LX1RQ)		
LX1NO	**3.7**	**194,775**	**1567**	**20**	**85**
***LX1KC**	**A**	**1,059,597**	**1361**	**88**	**329**
***LX2SM**	**21**	**81,585**	**350**	**27**	**84**

MACEDONIA

Z32BU	**21**	**179,949**	**752**	**33**	**90**
*Z32KV	A	12,348	91	27	57
***Z31JA**	**28**	**57,720**	**593**	**18**	**60**
***Z3ØM**	**14**	**640,386**	**2381**	**36**	**126**
			(Opr. Z31GX)		
***Z31GB**	**7**	**36,982**	**380**	**16**	**66**

MALTA

***9H1DE**	**A**	**176,400**	**500**	**47**	**163**
*9H3UX	*	5,686	62	18	36
			(Opr. DL2DN)		

MOLDOVA

***ER3DX**	**A**	**346,250**	**903**	**64**	**190**
***ER3MM**	**21**	**66,847**	**362**	**27**	**76**

MONACO

***3A2MD**	**A**	**146,331**	**511**	**48**	**165**
*3A2PWX	*	7,913	119	10	31
			(Opr. 3A2HN)		

NETHERLANDS

PAØAGA	**A**	**931,068**	**1552**	**72**	**261**
PAØIJM	**"**	**256,480**	**1078**	**27**	**85**
PAØKDM	*	33,264	192	26	86
PA3GKE	*	12,261	103	23	38
PAØQX	21	11,349	108	18	22
PA3CWM	**7**	**528,000**	**1762**	**39**	**137**
***PAØKHS**	**A**	**372,000**	**815**	**60**	**240**
***PA3EMN**	**"**	**240,813**	**726**	**100**	**143**
*PA2SWL	*	131,880	529	36	174
*PA3ELD	*	58,756	184	39	109
*PA3GKT	*	58,266	242	33	84
*PA3GAB	*	46,116	198	34	92
*PA3GAU	*	10,725	79	23	32
*PAØYN	*	8,372	78	22	40
*PA3AEB	*	3,444	57	8	23
*PAØJNH	28	1,350	32	6	19
*PAØDOM	21	588	28	7	10
***PAØCYW**	**7**	**18,865**	**181**	**16**	**61**
*PAØMIR	*	7,847	106	10	49
***PAØRCT**	**3.7**	**64,898**	**745**	**12**	**62**

NORTHERN IRELAND

GIØKOW	**A**	**5,911,824**	**4492**	**122**	**471**
GIØUJG	**14**	**990,090**	**2387**	**40**	**150**
***GIØSAP**	**A**	**657,570**	**1215**	**53**	**177**
*GIØOUM	*	54,483	277	30	97
***GI4SNA**	**21**	**415,359**	**1433**	**33**	**138**

NORWAY

LA9DFA	**A**	**816,577**	**1536**	**73**	**258**
LA1LIA	**"**	**393,250**	**744**	**65**	**221**
LA2WHA	*	314,394	840	42	141
LA6IHA	*	203,632	650	40	168
LA9JDA	*	163,718	445	50	168
LA6BBA	*	112,179	386	53	130
LA2JR	*	68,440	260	40	105
LA8RIA	*	32,132	260	28	88
LA2IR	**14**	**41,791**	**242**	**20**	**59**
LA9GX	**7**	**105,444**	**762**	**25**	**91**
***LA4MHA**	**A**	**157,644**	**601**	**42**	**132**
***LA8LA**	**"**	**93,808**	**305**	**46**	**130**
*LA2EIA	*	52,390	283	28	102
*LA6VIA	*	43,355	211	38	107
*LA1PHA	*	26,563	157	29	72
*LA6FJA	*	23,760	156	10	98
*LA2AD	*	19,000	145	19	66
*LA2MV	*	15,738	140	19	67
*LA9IHA	*	13,137	129	21	66
*LA7CL	*	8,550	62	22	35
*LA7MJA	*	7,140	73	16	52
*LA5YV	*	5,544	67	22	41
*LA3TR	*	4,189	63	26	92
*LA5RIA	*	4,032	104	8	28
*LA1KQ	*	3,170	61	18	20
*LA5LJA	28	4,300	60	12	31
***LA2MJA**	**14**	**51,418**	**180**	**24**	**70**
*LA8WG	*	21,392	259	15	41

POLAND

SP8NR	**A**	**1,160,176**	**1265**	**115**	**357**
3Z6CZ	**"**	**456,168**	**1091**	**75**	**257**
SP9HZF	*	149,425	509	53	162
SP7VCK	*	94,990	243	50	111
SP9QMP	*	92,736	334	47	145
3Z4GAP	*	53,950	374	31	99
SP6CPF	*	53,793	230	35	94
SP2UUU	*	53,560	253	28	76
SP2JMR	*	34,560	111	48	87
SP6HAO	*	13,940	123	26	56
SP9LDI	*	13,200	256	19	21
SP5BYY	*	12,450	115	19	56
SP9DGO/P	*	7,035	42	30	37
SP9LAS	*	6,272	42	24	32
SP2FWC	*	1,248	32	9	48
SP5DDJ	**28**	**32,226**	**283**	**20**	**62**
SP5GRM	**21**	**526,435**	**1301**	**35**	**134**
SP5CEQ	*	5,808	68	13	31
SP3GEM/2	**14**	**884,802**	**2067**	**40**	**146**
SP7DZA	*	24,912	258	17	55
SP3SFN	*	22,365	176	19	52
SP7GIQ	**7**	**430,287**	**1672**	**31**	**112**
SP6CDK	*	67,080	351	27	103
SP8MU	*	2,888	75	19	35
SQ5O	**3.7**	**53,874**	**649**	**12**	**61**
			(Opr. SP5IUK)		
SP5INQ	**1.8**	**47,232**	**600**	**10**	**62**
***SP2QCH**	**A**	**523,908**	**966**	**88**	**220**
***SP6NIC**	**"**	**493,038**	**1054**	**63**	**238**
***SP3SLA**	**"**	**355,965**	**756**	**65**	**220**
*SP6DVP	*	238,680	491	83	187
*SP6MLX	*	177,246	378	67	162
*SP5BB	*	151,536	523	50	181
*SP1AEN	*	126,725	339	45	140
*3Z4DCR	*	108,471	532	60	113
*SP2AHD	*	96,096	394	39	129
*SP5XMM	*	70,082	409	30	104
*SP2LNY	*	63,928	358	33	98
*SP1MHV	*	52,311	167	47	94
*SP3MGP	*	49,484	252	35	104
*SP7FQI	*	45,694	211	42	92
*SP9RQH/P	*	43,500	166	36	64
*3Z6CXH	*	31,913	203	27	70
*SP6SOX	*	27,485	170	29	86
*SP8UFY/P	*	25,853	127	43	60
*SP9LDP	*	17,670	84	36	57
*SP6FJ	*	17,248	115	27	50
*SP8OOB	*	16,434	175	21	62
*SP4MPH	*	13,892	125	26	66
*3Z4GHL	*	8,716	177	27	74
			(Opr. SP4GHL)		
*SP5ZIC	*	4,558	88	8	35
*SP1EOI	*	4,147	84	21	52
*SP7LHX	*	3,796	60	17	35
*3Z9IEK	*	2,850	37	12	18
			(Opr. SP9IEK)		
*SP7GAQ	*	1,008	20	10	18
*SP3ZJA	*	108	7	5	7
			(Opr. SP3RNP)		
*SP3DAH	28	3,400	71	8	26
***SP6OJJ**	**21**	**180,366**	**535**	**34**	**104**
*SP8EEX	*	45,580	201	20	77
*SP9RPW	*	43,110	203	24	66
*SP7SEG	*	11,130	80	23	30
*SP4BPH/P	*	7,056	57	18	24
*SP5WAL	*	6,364	50	15	28
*SP3CMA	*	4,002	41	15	31
***SP6KEP**	**14**	**228,780**	**927**	**30**	**94**
***SP5CPR**	**"**	**105,408**	**576**	**24**	**84**
*SP2GNB	*	43,032	304	20	68
*SP9HOF	*	40,040	281	27	50
*SP9XLV	*	38,720	320	18	62
*SP9RCL	*	33,930	274	18	60
*SP8HXN	*	32,132	384	16	42
*SP5ICS	*	19,008	218	14	50
*SP4SHD	*	15,618	164	17	40
*SP9VEJ	*	13,230	120	17	46
*SP9DNO	*	8,680	101	11	45
*SP9EH	*	5,896	96	10	34
*SP6DHH	*	5,207	101	7	34
*3Z8LZC	*	5,031	78	9	30
*SP9OJQ	*	5,000	72	10	40
*SP9HQC	*	3,108	46	9	37
***SN6O**	**7**	**20,640**	**164**	**21**	**65**
			(Opr. SP6IHE)		
*SP9OYK/9	*	4,551	100	5	36
*SQ1BVG	*	3,990	101	5	33
*SP7QJN	*	416	22	4	15
***SP6LUV**	**3.7**	**53,865**	**504**	**18**	**63**
*SP9EMQ	*	8,000	151	7	43
*SP9IKN	*	1,350	47	3	24
*SP9MDY	*	450	23	4	18
***SP5CJQ**	**1.8**	**14,554**	**235**	**9**	**53**
***SO3QL**	**"**	**11,567**	**273**	**5**	**39**
*SP6OJG	*	6,027	144	5	36

PORTUGAL

CT1CJJ	**A**	**640,320**	**1070**	**81**	**287**
CT1BWU	**"**	**540,960**	**1046**	**56**	**168**
CT1EOD	**"**	**496,860**	**936**	**68**	**205**
CT1BWW	*	441,336	679	75	209
CT1AUO	*	229,890	466	59	178
CT1AGS	*	50,600	192	36	79
CS6AUW	**28**	**19,404**	**251**	**15**	**51**
			(Opr. CT1AUW)		
CQ5BOP	**21**	**989,860**	**2592**	**38**	**134**
CT1UO	*	23,550	165	19	56
CT1BNW	**14**	**44,540**	**238**	**21**	**64**
CQ7DIZ	**3.7**	**161,929**	**809**	**22**	**91**
***CT1EAT**	**A**	**632,225**	**858**	**78**	**197**
***CT1ELP**	**"**	**598,934**	**1073**	**81**	**277**
*CT1EIF	*	214,656	489	48	124
*CT1FLD	*	7,893	73	22	45
*CT1ESS	*	7,618	202	49	106
***CT1ESO**	**28**	**47,472**	**270**	**19**	**73**
***CT1ETE**	**21**	**118,565**	**492**	**24**	**91**
*CT1AZS	*	12,000	78	23	52
*CT1ELF	*	8,085	92	14	41
*CT1QF	*	6,972	88	9	33
***CT1EDJ**	**14**	**20,064**	**162**	**16**	**60**
*CT4NC	*	13,794	164	14	43

ROMANIA

YO4NF	**14**	**820,599**	**2746**	**38**	**121**
***YO8FR**	**A**	**142,884**	**563**	**41**	**155**
*YO9XC	*	115,368	253	43	109
*YO5CTY	*	42,811	273	53	136
*YO2LIF	*	12,772	179	20	44
*YO2LII	*	3,608	86	12	28
*YO8RAA	*	3,538	44	11	18
***YO3JF**	**28**	**11,977**	**135**	**13**	**46**
*YO3FF	*	1,092	21	8	18
***YO7DAA**	**21**	**28,105**	**219**	**22**	**55**
*YO3AIL	*	14,170	92	24	41
***YO4ATW**	**14**	**15,042**	**122**	**17**	**52**
***YO2DFA**	**3.7**	**19,551**	**326**	**8**	**49**
*YO8BPY	*	13,833	255	6	47

SARDINIA

***ISØNHT**	**A**	**678,216**	**1223**	**77**	**231**
***ISØWBT**	**"**	**131,445**	**507**	**47**	**160**
*ISØLLJ	*	42,441	207	34	95
*ISØGSR	*	36,270	186	36	81
*ISØPFD	*	17,204	127	22	70

SCOTLAND

GMØEGI	**A**	**548,494**	**1093**	**65**	**213**
GM3BCL	**"**	**509,340**	**865**	**64**	**196**
GM4FDM	**14**	**1,026,840**	**2512**	**40**	**132**
***GMØFET**	**A**	**314,496**	**745**	**64**	**170**
***GMØIIO**	**14**	**30,885**	**292**	**16**	**55**

SICILY

IT9BLB	**14**	**1,078,020**	**2957**	**40**	**140**
IT9PZM	**7**	**146,718**	**843**	**23**	**91**
***IT9THD**	**A**	**481,692**	**961**	**74**	**219**
*IT9NVA	28	2,937	40	20	30
***IT9RYJ**	**21**	**126,040**	**619**	**30**	**85**
*IT9STG	*	84,911	476	25	84
***IT9GKQ**	**14**	**87,690**	**540**	**26**	**85**
*IT9LTA	3.7	4,958	125	5	32
***IT9ZGY**	**1.8**	**27,750**	**336**	**11**	**63**

SLOVAK REPUBLIC

OM8A	**A**	**2,126,020**	**2050**	**112**	**369**
OM3PC	*	130	5	5	5
OM3TA	**3.7**	**21,228**	**282**	**11**	**47**
***OM6MO**	**A**	**200,236**	**610**	**50**	**176**
***OM3YK**	**"**	**161,398**	**522**	**62**	**140**
*OM3CDZ	*	17,935	184	19	66
*OM6TY	*	12,441	111	20	67

*OM9AZ	*	9,724	135	17	27	
			(Opr. OM8CA)			
***OM5FA**	**28**	**107,502**	**943**	**29**	**85**	
***OM7V**	**3.7**	**22,990**	**412**	**7**	**48**	
*OM5KM	*	7,770	185	5	37	
*OM6ACW	*	2,871	87	6	27	

SLOVENIA

S50A	**A**	**6,012,303**	**3788**	**139**	**488**
S53EA	**"**	**4,587,600**	**3481**	**149**	**451**
S58AB	**"**	**3,538,522**	**2856**	**133**	**418**
S59ZA	**"**	**3,162,232**	**2617**	**125**	**429**
S59L	*	1,703,042	2012	94	295
S50R	*	1,182,816	1388	113	319
S51AY	**28**	**161,190**	**735**	**31**	**104**
S59WA	**21**	**696,808**	**1544**	**38**	**146**
S59A	**14**	**1,207,553**	**2453**	**40**	**171**
S51DX	*	401,695	1289	37	124
S50C	**7**	**729,520**	**2316**	**36**	**140**
			(Opr. S550O)		
S57AL	**"**	**573,448**	**1905**	**35**	**137**
S53M	*	293,232	1230	32	117
S54ZZ	*	205,326	1093	23	99
S57AW	**3.7**	**219,535**	**1481**	**26**	**89**
S57O	**"**	**155,788**	**951**	**24**	**92**
S51WV	*	103,599	1081	15	66
S54DL	**1.8**	**54,264**	**660**	**13**	**63**
S59KW	*	27,612	451	8	51
***S54A**	**A**	**830,144**	**938**	**113**	**363**
***S51FA**	**"**	**528,192**	**900**	**77**	**259**
*S53BM	*	54,292	247	27	71
*S53DX	*	47,005	257	26	93
*S57KM	*	37,406	222	32	86
*S51VG	*	7,614	111	11	43
*S58MU	*	7,410	108	14	51
***S52CD**	**28**	**71,610**	**379**	**26**	**79**
*S52SK	*	20,130	150	20	46
***S52UT**	**14**	**266,328**	**952**	**28**	**109**
***S58WW**	**"**	**248,200**	**890**	**34**	**112**
*S57U	*	146,000	691	27	98
*S51NM	*	4,680	46	15	37
***S52KD**	**7**	**60,000**	**535**	**18**	**78**
***S51QZ**	**"**	**51,912**	**410**	**22**	**81**
***S57J**	**3.7**	**75,140**	**732**	**16**	**69**
***S51IX**	**"**	**63,423**	**636**	**17**	**70**
***S53X**	**1.8**	**39,664**	**500**	**11**	**63**
*S57DX	*	21,840	389	8	48

SPAIN

EA3CCN	**A**	**2,721,645**	**2786**	**99**	**366**
EA4KD	**"**	**1,695,813**	**1738**	**106**	**377**
ED5OL	**"**	**1,352,768**	**1700**	**90**	**297**
			(Opr. EA5OL)		
EA1UX	**"**	**1,225,280**	**2163**	**61**	**219**
EA3GHQ	*	861,540	1071	85	330
EA2IA	*	816,408	1035	97	294
EA1JO	*	442,288	766	76	232
EA3AET	*	400,050	759	75	240
EA3GBU	*	351,120	800	70	210
EA5GRB	*	326,748	647	70	222
EA5GSA	*	308,750	643	71	179
EA3CZM	*	205,309	407	69	152
EA3CWT	*	137,313	300	62	157
EA7AKK	*	125,832	345	56	140
EA7DHP	*	100,320	356	39	121
EA1CZF	*	79,975	313	39	136
EA1BLA	*	43,625	170	35	91
EA1EVN	*	37,395	211	38	97
EA7CWA	*	35,014	134	33	95
EA1FGJ	*	31,164	154	33	73
EA3GJU	*	25,620	129	40	82
EA5GQZ	*	21,200	158	22	41
EA5ADC	*	17,892	102	26	58
EA7AFM	*	12,324	101	22	56
EA7BR	*	11,524	68	20	60
EC5AFK	*	5,088	62	15	33
EA7BA	**28**	**116,772**	**655**	**26**	**85**
EA1KW	**21**	**490,970**	**1384**	**32**	**113**
EA7AGW	*	166,800	560	30	109
EA7HDN	*	9,352	105	14	42
EA1BNW	**7**	**90,540**	**657**	**20**	**70**
EA3FQV	**3.7**	**49,218**	**505**	**11**	**67**
EA3ALV	**"**	**37,772**	**361**	**12**	**64**
EA3AFR	*	22,120	262	10	46
EA3AML	*	16,968	244	9	47
EA3ALD	1.8	6,837	118	8	45
***EA7CEZ**	**A**	**1,777,656**	**2077**	**98**	**310**
***EA3BKI**	**"**	**743,285**	**1270**	**69**	**236**
***EA3FHN**	**"**	**675,392**	**1210**	**83**	**263**
***EA7HBP**	**"**	**650,560**	**1232**	**72**	**248**
*EA1FAD	*	457,002	857	68	211
*EA4BAS	*	402,112	823	52	154
*EA1MK	*	346,528	807	56	152
*EA7RU	*	317,016	627	58	164
*EA1EYG	*	295,260	617	49	141
*EA1BMA	*	220,560	563	51	189
*EA3ELZ	*	217,800	409	70	172
*EA1BOI	*	213,900	588	41	147
*EA5YJ	*	205,779	535	51	188
*EA1AW	*	199,794	463	51	162
*EA1YB	*	178,770	415	48	154
*EA5GPX	*	144,400	586	41	111
*EA2ASB	*	130,143	383	49	164
*EA5AEN	*	123,654	297	60	162
*EA5EOC	*	119,808	306	49	107
*EA2BNU	*	117,564	322	53	141
*EA3CA	*	117,030	417	40	126
*EA5JC	*	105,357	354	40	133
*EA1JJ	*	96,102	337	45	126
*EA5AAN	*	91,933	336	39	110
*EA1OT	*	91,690	372	44	129
*EA1IF	*	87,647	488	28	105
*EA5FWW	*	79,450	251	40	135
*EA4ENQ	*	73,095	234	49	116
*EA7GBG	*	72,369	240	42	87
*EA7BHO	*	71,300	226	53	102
*EA1BPO	*	66,816	230	34	110
*EA7GGP	*	63,870	46	23	35
*EA2CCG	*	58,386	254	33	78
*EA4DAT	*	57,681	309	31	86
*EA4KN	*	56,718	203	36	101
*EA1DFP	*	51,727	172	50	120
*EA5CHT	*	51,612	205	38	94
*EA5CGU	*	45,708	153	48	108
*EA5XN	*	43,660	170	41	107
*EA7EWX	*	42,160	174	36	88
*EA1APS	*	41,064	185	30	88
*EC5CWA	*	40,680	195	29	84
*EA1ET	*	38,599	192	32	89
*EA3AM	*	34,410	189	24	69
*EA3GHC	*	34,224	140	41	83
*EA1FCR	*	33,354	194	28	81
*EA3ANE	*	32,966	187	27	79
*EA1BMY	*	32,500	146	38	87
*EA3NA	*	29,925	109	41	92
*EA4AV	*	29,637	133	36	75
*EA4ALX	*	26,784	140	34	74
*EA1BAW	*	26,362	175	25	73
*EA3ESJ	*	21,608	130	20	54
*EA7CWV	*	21,528	112	29	43
*EA4AUO	*	21,420	131	23	82
*EA7TG	*	15,738	71	31	55
*EA3EVR	*	15,548	101	23	29
*EC2BAZ	*	15,264	137	20	52
*EA5AAJ	*	14,472	83	25	47
*EC4CRW	*	14,400	130	21	59
*EA7AK	*	11,680	76	20	53
*EA1EXY	*	11,270	84	24	46
*EA4EIS	*	11,039	68	29	54
*EA1SP	*	9,688	105	12	44
*EC5AAK	*	9,306	112	16	50
*EA1ASC	*	8,804	81	19	52
*EA5FXS	*	8,142	89	16	43
*EA1BLF	*	8,030	60	15	40
*EC4AIZ	*	7,722	78	15	39
*EA1DLN	*	7,473	56	15	38
*EA7GVW	*	7,350	78	13	37
*EC4DHD	*	7,192	78	19	39
*EC1AMR	*	6,562	73	15	39
***EA7FUN**	**28**	**46,872**	**284**	**21**	**72**
***EA3CD**	**"**	**38,394**	**256**	**20**	**61**
*EA7IA	*	19,924	136	17	51
*EA7AKB	*	13,936	110	17	35
***EA7FTR**	**21**	**195,576**	**824**	**30**	**86**
***EA1KI**	**"**	**190,332**	**506**	**35**	**118**
***EA1DLU**	**"**	**178,654**	**760**	**23**	**75**
*EA1AKP	*	171,000	633	25	89
*EA5AEK	*	104,236	498	30	73
*EA3ANM	*	80,476	381	31	87
*EC3ABU	*	73,868	366	30	88
*EA2AKP	*	68,794	311	30	76
*EC7AFO	*	39,990	295	22	71
*EC3AGW	*	39,235	250	24	71
*EC1AFK	*	25,665	139	25	62
*EC3ADM	*	25,650	154	22	68
*EA1CKL	*	18,000	120	20	52
*EA4EJR	*	17,864	134	21	37
*EC3AFG	*	17,176	139	19	57
*EA7EBL	*	17,111	107	19	52
*EA1BCK	*	13,696	112	19	45
*EC5AFX	*	9,462	95	17	40
*EC1DMO	*	9,204	80	17	42
*EC4DJY	*	9,114	84	17	45
*EC1AKM	*	7,672	79	16	40
*EC3CMT	*	5,022	50	15	39
*EC4AIU	*	4,212	55	15	37
*EA7AFD	*	3,552	51	10	22
*EC7AEQ	*	2,698	38	14	24
*EC1BXI	*	1,107	37	5	22
*EC2AEQ	*	990	24	8	22
*EA7HCZ	*	378	9	7	7
***EA3BD**	**14**	**179,130**	**917**	**22**	**83**
*EA3GHZ	*	103,510	454	24	86
*EA1DAX	*	39,420	231	19	71
*EA1FFC	*	38,799	284	15	66
*EA1FAU	*	11,450	161	10	40
*EA4CFY	*	8,639	113	11	42
*EA2ARD	7	3,330	83	4	33
*EA3DNC	*	2,925	73	6	33
***EA1DVY**	**1.8**	**6,063**	**117**	**5**	**42**

SVALBARD

JW8GV	**A**	**141,752**	**341**	**62**	**126**

SWEDEN

SM5AOE	**A**	**1,669,662**	**1824**	**100**	**314**
SM3PZG	**"**	**910,440**	**1656**	**69**	**255**
SM3BIZ	*	478,130	758	88	261
SM7DXQ	*	212,750	456	57	173
SM5ALJ	*	88,704	330	41	127
SM7ATL	*	75,600	313	41	62
SM5OK	*	16,864	104	21	47
SKØMG	**21**	**214,188**	**630**	**37**	**119**
			(Opr. SMØKV)		
SM5AAY	*	5,875	63	13	34
SM5LPO	**14**	**210,015**	**1020**	**32**	**85**
SM6FJY	*	23,940	253	18	52
SM6DOI	**1.8**	**42,228**	**552**	**11**	**57**
***SM2DMU**	**A**	**165,756**	**424**	**57**	**171**
***SMØBDS**	**"**	**135,632**	**383**	**51**	**145**
*SM2IEO	*	57,246	215	35	106
*SM4RIK	*	55,308	224	39	93
*SM4TIY	*	20,615	139	26	69
*SM7BZV	*	19,764	127	23	58
*SMØFM	*	5,328	123	27	70
*SM3MHD	*	2,006	31	13	21
*SM3CVM	*	1,197	21	11	10
*SM6AHU	14	10,660	205	14	38
*SMØMC	*	6,165	78	10	35
*SM7HSP	*	100	8	4	6
***SMØDZH**	**3.7**	**5,985**	**115**	**6**	**39**
*SK4UW	*	3,724	97	5	33
			(Opr. SM4JHK)		

SWITZERLAND

HB9AAA	**A**	**103,525**	**261**	**60**	**145**
HB9DX	**21**	**39,960**	**117**	**34**	**114**
***HB9NN**	**A**	**66,420**	**252**	**30**	**78**
***HB9HLO**	**"**	**65,946**	**262**	**42**	**132**
			(Opr. OH2PM)		
*HB9AYZ	*	7,169	77	21	46
*HB9QA	*	1,680	24	15	25

UKRAINE

UTØD	**A**	**2,899,700**	**2755**	**130**	**405**
			(Opr. UT7DX)		
UR7E	**"**	**1,626,645**	**2093**	**127**	**370**
			(Opr. UR5EDU)		
UX5UO	*	474,582	856	91	271
US3WO	*	246,228	647	59	225
UY5TE	*	80,256	448	31	121
UR5IAE	*	42,300	207	39	111
UT8IM	*	37,044	190	33	75
UY3QW	*	22,400	136	32	98
UX7I	**28**	**17,248**	**105**	**28**	**49**
UT4UZ	**21**	**599,585**	**1496**	**38**	**147**
US5QRW	*	6,302	80	14	38
US5WE	**14**	**1,081,294**	**2359**	**40**	**141**
UTØU	**"**	**414,699**	**1614**	**34**	**103**
			(Opr. UT5UDX)		
UXØKN	*	343,945	1334	38	117
UUØJZ	*	163,380	1002	25	80
UT7Q	**7**	**356,744**	**1386**	**34**	**118**
			(Opr. UT7QF)		
EMØF	*	136,500	780	30	95
			(Opr. UXØFF)		

UT5UGR	**3.7**	**147,085**	**1037**	**25**	**90**	
UY5ZZ	**"**	**128,622**	**1036**	**20**	**82**	
***US1E**	**A**	**3,186,888**	**2889**	**143**	**441**	
						(Opr. UR5EAT)
*UX1LA	"	230,780	643	60	160	
*UX1UA	"	123,170	437	51	167	
*UT3HD	"	107,400	444	39	140	
*UR3MP	"	83,053	427	29	128	
*UT1ZZ	"	81,215	410	37	148	
*UX5EF	"	54,683	271	34	115	
*UR5WHT	"	31,806	197	30	84	
*UT3LL	"	16,906	151	24	55	
***UX1HW**	**28**	**7,975**	**84**	**16**	**39**	
***UT5URW**	**21**	**116,592**	**308**	**35**	**133**	
***US4LAD**	**14**	**246,645**	**1107**	**34**	**111**	
***UX2VZ**	**7**	**61,610**	**482**	**21**	**80**	
*UT1WW	"	37,444	333	18	74	
*UX3MO	"	35,866	350	16	63	
***US5ZZ**	**3.7**	**7,866**	**160**	**6**	**40**	
***UR7CA**	**1.8**	**7,750**	**57**	**5**	**25**	
*UT5UOC	"	2,555	69	7	28	

WALES

GW4BLE	**A**	**4,335,168**	**3243**	**119**	**417**	

YUGOSLAVIA

YT6A	**A**	**5,508,048**	**4030**	**162**	**514**	
YU7AV	**"**	**4,395,660**	**3276**	**145**	**465**	
YT1AD	**"**	**2,229,528**	**2449**	**112**	**371**	
						(Opr. YU1DX)
YU7LS	"	66,172	188	52	90	
YU7SF	"	19,796	147	29	69	
4N4L	**14**	**686,194**	**2204**	**38**	**120**	
YT7A	**7**	**464,594**	**1767**	**35**	**132**	
						(Opr. YZ7UN)
*YU50BO	A	27,104	184	26	95	
***YU7CF**	**21**	**312,602**	**917**	**36**	**113**	
***4N1N**	**14**	**82,752**	**574**	**21**	**75**	
						(Opr. YZ1EA)
***4N7CC**	**7**	**27,784**	**225**	**20**	**72**	
***YZ7ED**	**3.7**	**14,202**	**251**	**8**	**46**	
*YU7KM	"	12,150	140	6	44	
*YU1FX	"	1,972	66	5	24	
*YU1RA	"	100	8	3	7	
*YU1UA	"	100	8	3	7	
***YZ1MB**	**1.8**	**13,804**	**219**	**8**	**50**	

OCEANIA

AMERICAN SAMOA

AH8A	**21**	**901,900**	**2695**	**31**	**85**	

AUSTRALIA

VK5GN	**A**	**2,150,224**	**2021**	**110**	**258**	
VK3TZ	**"**	**1,380,392**	**1142**	**111**	**338**	
VK2ARJ	"	676,400	1180	74	126	
VK3PU	"	151,008	320	59	117	
VK2APK	**21**	**244,836**	**787**	**28**	**80**	
VK3DXI	**14**	**240,096**	**678**	**33**	**90**	
VK4UA	"	183,159	500	34	107	
VK5OE	"	6,000	44	21	30	
***VK5APK**	**A**	**41,172**	**165**	**42**	**52**	
***VK4KSB**	**21**	**41,820**	**230**	**20**	**48**	
*VK3SM	14	2,923	33	13	24	

BELAU

KC6MW	**A**	**844,496**	**1556**	**71**	**117**	

BRUNEI

V85HG	**A**	**3,432,184**	**3523**	**101**	**233**	
						(Opr. JO1RUR)

EASTERN MALAYSIA

9M8R	**7**	**1,091,835**	**2354**	**37**	**122**	
						(Opr. W7EJ)

FRENCH POLYNESIA

FO5IW	**A**	**571,300**	**1360**	**57**	**88**	

GUAM

***KH2/WS7V**	**14**	**33,201**	**191**	**25**	**38**	

HAWAII

KH6/WR6R	**A**	**3,926,533**	**3633**	**130**	**237**	
KH6BZF	21	159,030	930	21	36	
WH6CQH	**14**	**467,055**	**1500**	**34**	**73**	
KH6FKG	**"**	**439,005**	**1334**	**31**	**82**	
KH6CC	**1.8**	**18,218**	**260**	**11**	**13**	

INDONESIA

YBØASI	**A**	**484,386**	**658**	**87**	**179**	
						(Opr. ND3A)
YC3MIG	21	15,774	85	25	41	
***YC3SPS**	**A**	**70,317**	**213**	**40**	**77**	
*YB1JX	"	49,276	160	51	76	
***YC9COD**	**21**	**137,145**	**400**	**30**	**93**	
						(Opr. DL7AV)
*YC3BC	"	15,317	104	19	34	
*YC6PUP	"	13,695	90	17	38	
*YB7XTJ	"	6,944	42	14	42	
*YB1JZF	"	6,685	65	13	22	
*YB2KK	"	4,751	115	14	33	
***YB2CPO**	**14**	**135,362**	**456**	**32**	**74**	

NEW CALEDONIA

*TX8FU	7	15,196	111	24	34	
						(Opr. FK8FU)

NEW ZEALAND

ZL4NF	**A**	**352,334**	**558**	**77**	**149**	
ZL1HY	**3.7**	**46,360**	**200**	**27**	**49**	

NORTHERN MARIANAS

***KH8CG**	**14**	**28,736**	**180**	**26**	**38**	

PHILIPPINES

DU9RG	**A**	**2,815,955**	**2498**	**125**	**270**	
DX1EA	"	434,976	800	57	127	
						(Opr. OHØXX)
DU1SAN	**14**	**320,538**	**904**	**35**	**88**	
4F3GDX	**7**	**85,848**	**415**	**26**	**47**	
***DU7CC**	**A**	**100,340**	**219**	**62**	**111**	
						(Opr. SM6CNS)
*DU3/ W4NXE	"	69,708	218	39	72	
***DU1WHO**	**21**	**89,190**	**362**	**31**	**59**	
***DU1COO**	**14**	**100,486**	**375**	**27**	**67**	

SOUTH AMERICA

ARGENTINA

LR3F	**A**	**1,538,592**	**1482**	**104**	**268**	
						(Opr. LU6FAZ)
LU8ADX	**"**	**1,158,606**	**1219**	**94**	**243**	
LU8FDZ	"	600,596	985	70	142	
LU2BAR	"	406,945	607	75	170	
LU6ETB	**28**	**638,388**	**1648**	**26**	**112**	
LU1MA	**"**	**364,060**	**1197**	**24**	**85**	
LU2DW/A	**"**	**338,663**	**1109**	**23**	**86**	
LU9MBY	**"**	**264,528**	**951**	**24**	**75**	
LU3FZW	"	244,750	959	21	68	
LU3MAM	"	188,910	735	21	69	
LU2HAO	**21**	**127,796**	**511**	**25**	**61**	
LU6LAZ	**14**	**224,128**	**585**	**33**	**103**	
AY1I	**7**	**436,280**	**1202**	**36**	**94**	
LT1F	"	303,126	929	33	81	
						(Opr. LU1FKR)
LU1CQ	"	125,550	498	28	62	
LW1ECO	"	2,816	60	13	19	
LU8EEM	3.7	4,095	53	14	21	
***L37N**	**A**	**1,609,578**	**1521**	**102**	**267**	
						(Opr. LU2NI)
***LU6AMD**	**A**	**524,654**	**833**	**67**	**154**	
*LU8HLI	"	499,140	756	72	164	
*L7F	"	454,672	905	61	120	
						(Opr. LU7FEU)
*LU5CAB	"	120,120	154	15	52	
*LU2FDN	"	95,325	361	38	55	
***LU8HSO**	**28**	**341,857**	**1158**	**23**	**80**	
***LU3HIP**	**"**	**244,055**	**891**	**23**	**72**	
***LU3HWE**	**"**	**222,040**	**849**	**24**	**67**	
***LU3HYS**	**"**	**182,868**	**757**	**22**	**62**	
*LU8FOZ	"	172,490	660	23	71	
*LU5E	"	153,792	563	24	72	
						(Opr. LU5EWO)
*LU9HZS	"	151,536	609	24	64	
*LU4FCZ	"	138,605	536	23	72	
*LW6EQG	"	137,596	586	20	62	
*L5F	"	88,314	382	21	61	
						(Opr. LU1FNH)
*LU3FMR	"	54,408	850	19	49	
*LW2DBM	"	41,875	221	18	49	
*LWØD	"	9,717	94	13	28	
*CE3DPV/ LU	21	192,351	690	20	77	
*LU2FJY	"	183,911	707	22	69	
						(Opr. LU3FSP)
*LU1HTF	"	127,652	480	24	70	
*LW2EOC	"	81,648	448	19	44	
*LU3OJZ	"	54,897	225	25	62	
*LU4HKL	"	35,990	211	21	40	
***LU5FCI**	**14**	**521,208**	**1188**	**36**	**116**	
*LU4DFH	"	143,623	455	32	81	
*LU5EVK	"	21,352	129	20	48	
*LU1AEE	7	5,805	70	15	30	
*LU5ONX	3.7	2,108	44	14	20	
*AZ3HAE	"	54	21	2	3	

ARUBA

P4ØE	**A**	**5,067,480**	**3902**	**117**	**323**	
						(Opr. CT1BOH)
P49I	**1.8**	**58,653**	**353**	**14**	**43**	
						(Opr. K4PI)

BOLIVIA

CP1OZ	**A**	**41,008**	**217**	**38**	**50**	
						(Opr. JE6OXU)

BRASIL

PQ1CZ	**A**	**867,955**	**1455**	**61**	**154**	
						(Opr. PP1CZ)
PS2S	"	417,984	800	69	123	
						(Opr. PY2KP)
PY3LP	"	66,000	515	51	81	
ZV5A	**28**	**431,232**	**1324**	**26**	**102**	
						(Opr. PY5GU)
ZW5B	**21**	**2,157,610**	**4333**	**34**	**148**	
						(Opr. PY5EG)
PQØMM	**"**	**1,642,575**	**3189**	**36**	**145**	
						(Opr. PP5JR)
PY4OY	"	816,910	1854	31	120	
PP5UA	"	750,522	1978	30	99	
ZX2A	"	63,648	290	19	59	
						(Opr. PT2BW)
PY3BD	"	43,364	399	16	21	
PP5AM	**14**	**51,948**	**182**	**29**	**79**	
PY1LI	"	37,728	194	24	48	
***PW2N**	**A**	**388,815**	**630**	**72**	**173**	
*PY2OZF	"	37,800	164	40	65	
*PT2NP	"	9,240	60	24	42	
*PY1ZT	"	7,719	95	27	32	
*ZX5LL	"	7,500	226	15	34	
						(Opr. PP5LL)
*PY2XW	"	4,823	38	22	31	
*ZW2T	"	4,725	42	19	24	
						(Opr. PY2TI)
***ZY3Z**	**28**	**575,246**	**1665**	**24**	**95**	
						(Opr. PY3OC)
*PU2SIX	"	56,903	301	23	54	
*PP5WN	"	40,432	196	21	55	
*PY2RIK	"	27,945	302	13	32	
*PU2RKM	"	18,081	133	21	42	
*PY2AWD	"	15,400	286	23	54	
*PU2TDU	"	6,344	47	17	35	
*PY3FBI	"	5,600	56	12	22	
*PY2DUN	"	5,084	62	17	24	
*PT7SD	"	8,788	63	15	37	
*PY2GT	"	5,032	60	15	19	
***PT2AW**	**14**	**46,480**	**238**	**24**	**56**	
*PP5DU	"	43,968	196	25	71	
*PY2EMT	"	22,952	120	26	50	
*PP5AP	"	42	3	3	3	
*PU2VJJ	3.7	144	19	4	5	

CHILE

XR1X	**A**	**3,393,689**	**2586**	**126**	**341**	
						(Opr. XQ1IDM)
CE6EZ	**"**	**2,418,416**	**2770**	**84**	**218**	
CE6DFY	**21**	**129,137**	**725**	**17**	**44**	
CE3F	**14**	**1,325,016**	**2702**	**39**	**129**	
						(Opr. CE3FIP)
XR8E	**3.7**	**49,896**	**252**	**25**	**56**	
						(Opr. CE8EIO)
***CE4P**	**A**	**624,162**	**1163**	**66**	**127**	
						(Opr. CE4PBB)
*XR4M	"	4,730	37	27	32	
						(Opr. CE4MLN)
***CE2EZE**	**14**	**155,526**	**406**	**33**	**105**	
*CE4USW	7	252	31	4	5	

COLOMBIA

HK6HFY	**A**	**312,650**	**669**	**48**	**121**	
HK4DWY	"	147,445	329	52	133	
HK5MQZ	"	2,080	29	15	25	
HK3JJH	**14**	**329,763**	**1013**	**27**	**96**	
*HK6IUI	A	11,690	111	25	34	

ECUADOR

HD2RG	**A**	**373,692**	**664**	**69**	**140**	
HC1NCN	**7**	**25,520**	**200**	**13**	**31**	
HC2HM	**14**	**220,745**	**661**	**27**	**92**	
HC1JQ	**"**	**219,700**	**601**	**32**	**98**	
***HC1AK**	**A**	**255,500**	**645**	**44**	**102**	
***HC1OT**	**21**	**1,155,505**	**2702**	**32**	**113**	

FERNANDO DE NORONHA

PYØFM	**7**	**862,368**	**1932**	**35**	**121**	
						(Opr. PY5CC)
*PYØFF	A	2,478	34	19	23	

GALAPAGOS ISLANDS

HC8KU	**14**	**224,088**	**854**	**24**	**93**	
HC8A	**3.7**	**441,084**	**1359**	**28**	**90**	
						(Opr. N6KT)

GUYANA

8R1K	**A**	**7,394,750**	**4636**	**131**	**419**	
						(Opr. AB6NJ)

PARAGUAY

ZP5MAL	**28**	**442,981**	**1372**	**29**	**92**	
ZP6CC	**21**	**406,884**	**1160**	**29**	**94**	

PERU

OA4EI	**A**	**675,792**	**1031**	**75**	**172**	
OA4QV	"	347,615	693	55	130	
***OA4CPI**	**A**	**100,016**	**361**	**46**	**66**	

TRINIDAD & TOBAGO

9Y4NZ	**14**	**1,066,400**	**2335**	**33**	**127**	
9Y4VU	**7**	**635,328**	**1515**	**29**	**115**	

URUGUAY

CX3C	**28**	**268,463**	**856**	**25**	**82**	
						(Opr. CX2BAF)
CX7ACH	"	227,700	876	23	69	
CX1JM	21	24,282	152	20	37	
CX4SS	1.8	110	6	5	6	
***CX6VM**	**21**	**328,654**	**1111**	**23**	**78**	

VENEZUELA

YV4FRS	**14**	**39,360**	**195**	**22**	**60**	
YW5P	**3.7**	**164,892**	**660**	**20**	**71**	
						(Opr. YV5FGL)
YV4FZM	"	126,375	574	13	62	
YV1DRK	**1.8**	**18,755**	**209**	**7**	**24**	
***YV1CR**	**A**	**345,240**	**731**	**55**	**113**	
*4M4T	"	59,356	245	49	93	
						(Opr. YV4EYA)
***YV4GAC**	**21**	**199,818**	**680**	**28**	**74**	
*YV5NWG	"	49,708	226	23	63	
*YV2FEO	"	23,146	150	20	45	
***YV5AMH**	**7**	**200,871**	**685**	**21**	**76**	
*YV5NCK	"	78,912	374	17	55	

QRP WORLD

LY35BA	**A**	**421,201**	**933**	**70**	**235**	
EA1GT	**"**	**377,568**	**1311**	**59**	**229**	
AA2U	**"**	**370,804**	**510**	**72**	**194**	
WØKEA	**"**	**323,190**	**489**	**92**	**178**	
EA3FHT	**"**	**302,455**	**708**	**56**	**195**	
JA6GCE	**"**	**283,284**	**432**	**89**	**169**	
N1AFC	**"**	**281,112**	**524**	**50**	**154**	
UA4SKW	**"**	**258,531**	**655**	**62**	**211**	
UT1WA	**"**	**239,313**	**596**	**53**	**188**	
JA6UBK	**"**	**227,916**	**382**	**87**	**147**	
KB3TS	**"**	**195,736**	**402**	**41**	**131**	
YU5ØKN	**"**	**179,883**	**650**	**40**	**167**	
						(Opr. YU1KN)
JH1HRJ	"	155,660	327	68	113	
YU1LM	"	139,200	602	39	161	
KP4DDB	**"**	**126,898**	**445**	**46**	**88**	
OK1DKS	**"**	**115,740**	**473**	**45**	**135**	
LX2PA	**"**	**114,741**	**300**	**52**	**157**	
UA9SG	**"**	**110,670**	**296**	**46**	**109**	
KV8S	**"**	**105,417**	**240**	**41**	**118**	
UA4YJ	"	102,935	441	36	137	
KA1CZF	"	102,340	233	56	116	
W8QZA/6	**"**	**77,613**	**240**	**53**	**70**	
OH5NHI	**"**	**66,776**	**301**	**38**	**98**	
KIØG	"	63,000	209	56	64	
ER1FW	**"**	**60,882**	**364**	**26**	**113**	
SP7LZD	**"**	**59,985**	**247**	**46**	**109**	
WB6JMS	"	51,870	177	51	63	
IK1TWC	"	42,980	186	38	102	
N7RWH	**"**	**42,824**	**154**	**40**	**61**	
WB6ITM	"	41,536	142	51	67	
N7JXS	"	39,990	162	38	55	
GØKRL	"	30,080	194	30	98	
RA1QEA	**"**	**29,337**	**138**	**28**	**99**	
UX8IX	**"**	**27,216**	**120**	**40**	**72**	
CT1DSJ	**"**	**26,257**	**144**	**33**	**88**	
W9CGI	**"**	**20,254**	**102**	**26**	**56**	
NM1K	"	17,840	100	31	49	
EA6SK	**"**	**16,072**	**126**	**26**	**72**	
KE4LJM	**"**	**16,043**	**122**	**43**	**61**	
F6HHR	**"**	**13,188**	**105**	**23**	**61**	
CT1EXT	"	10,374	85	23	55	
N8AXA	"	6,793	83	37	66	
DL5JBN	"	4,212	74	18	34	
N7XCZ	"	2,288	65	8	8	
EA1BEZ	"	1,924	32	11	26	
IG9/IV3TRK	"	858	16	11	15	
LW2DFH	**28**	**49,920**	**225**	**22**	**58**	
PU2LCD	**"**	**49,320**	**234**	**24**	**66**	
IT9NAN	**"**	**8,732**	**80**	**16**	**43**	
JF3EIU	**"**	**7,488**	**78**	**17**	**22**	
FB1IPH	**"**	**2,624**	**65**	**8**	**24**	
EA7AIG	**"**	**2,544**	**44**	**8**	**16**	
SP3LWP	"	1,638	38	6	20	
JIØPJE/1	"	1,632	29	10	14	
HG5COK	"	1,200	42	8	17	
EA3GIW	"	945	20	6	15	
KA8NRC	"	810	21	6	9	
SO5TW	"	616	28	5	17	
WBØIWG/3	"	36	3	2	2	
NO9Z	**21**	**69,870**	**247**	**25**	**77**	
OM7DX	**"**	**52,920**	**225**	**27**	**81**	
YU8FFG	**"**	**27,054**	**170**	**24**	**57**	
JA2LRD	**"**	**18,850**	**136**	**20**	**38**	
JL3SBE	**"**	**16,038**	**112**	**19**	**35**	
SP5YQ	**"**	**14,976**	**83**	**22**	**56**	
EC1AIS	**"**	**14,472**	**114**	**17**	**50**	
RU3RR	**"**	**7,520**	**120**	**12**	**35**	
JH8FAJ/7	**"**	**7,335**	**78**	**18**	**27**	
EC2AAO	"	5,439	82	12	37	
JN6XCZ	"	1,320	19	16	14	
YC2KTK	"	592	13	7	9	
JA2JSF	**14**	**52,726**	**244**	**25**	**57**	
EA2ANG	**"**	**38,304**	**305**	**15**	**57**	
W6CN	**"**	**32,311**	**153**	**28**	**51**	
DL4RCK	**"**	**15,288**	**173**	**14**	**42**	
EA2BTO	**"**	**14,427**	**142**	**11**	**52**	
SP9EWO	**"**	**11,935**	**171**	**10**	**45**	
RV3DLK	**"**	**11,424**	**152**	**9**	**56**	
F5LMJ	**"**	**10,266**	**140**	**10**	**48**	
VF5AEO	**"**	**9,288**	**120**	**16**	**20**	
JK1OXU	"	3,864	50	22	34	
HAØGK	"	2,464	65	25	77	
UR4UKT	**7**	**7,802**	**144**	**8**	**39**	
VE6SH	**"**	**1,500**	**23**	**13**	**17**	
JG1JQJ	"	336	12	7	5	
SP4GFG	**3.7**	**9,630**	**205**	**7**	**38**	
HA4XN	**"**	**8,832**	**181**	**6**	**42**	
OK1FJD	**"**	**5,540**	**147**	**6**	**34**	
SP2FAP	"	1,590	51	4	26	
UR5FFQ	**1.8**	**7,298**	**179**	**7**	**34**	
RV3ABR	**"**	**6,020**	**124**	**7**	**36**	
YL3GHD	**"**	**693**	**33**	**3**	**18**	
SP5NOG	"	210	16	2	12	

ASSISTED

NORTH AMERICA

UNITED STATES

K1KP	**A**	**1,583,552**	**1398**	**91**	**291**	
K1IU	**"**	**1,421,692**	**912**	**120**	**436**	
KS9Z/1	**"**	**1,361,458**	**1111**	**103**	**331**	
N8RA/1	"	1,141,862	1014	98	300	
W1NG	"	921,600	747	105	345	
WB2DND/1	"	708,730	673	94	280	
K1HMO	"	569,184	608	83	253	
N6RFM/1	"	551,036	587	83	264	
WA3TXR/1	"	428,722	575	70	201	
WA2CJT/1	"	301,910	472	56	171	
WA1G	"	226,709	347	62	171	
KA1FMR	"	154,504	312	52	126	
NO1J	"	143,785	275	55	138	
N1OPZ	"	132,187	240	50	147	
K1TR	"	132,112	263	55	129	
N4XR/1	"	70,472	142	52	132	
KB2R/1	"	27,000	103	39	69	
N1TZW	"	24,990	106	23	62	
N1KWJ	"	17,302	87	30	52	
K1JKS	"	3,915	34	17	28	
W1BIH	**14**	**148,104**	**346**	**35**	**118**	
K1YXV	3.7	11,825	81	11	44	
K1GW	"	8,400	70	13	35	
AA2DU	**A**	**3,145,262**	**2005**	**125**	**441**	
K2WK	**"**	**1,515,930**	**1066**	**117**	**390**	
W1GD/2	**"**	**1,358,444**	**1032**	**109**	**370**	
KF2U	"	1,288,056	940	114	378	
N1CC/2	"	964,843	926	90	277	
KF2O	"	760,864	596	117	355	
WA2TIF	"	684,775	742	78	247	
K2ONP	"	631,240	619	82	285	
N2AIF	"	566,209	614	89	240	
WB2RAJ	"	339,240	470	62	202	
KC2Q	"	282,816	376	78	210	
WB2MWW	"	264,172	450	53	158	
WA2ZGO	"	225,131	296	73	216	
WA2WYR	"	168,740	272	68	168	
W2XN	"	107,185	179	67	154	
K2PF	"	74,520	173	49	113	
NG2P	"	45,493	165	25	72	
KA2CKJ	"	37,485	121	43	76	
N3RR	**A**	**2,522,730**	**1549**	**131**	**455**	
N3AD	**"**	**2,497,105**	**1651**	**120**	**413**	
K3WW	**"**	**2,330,389**	**1404**	**129**	**468**	
K3NZ	**"**	**1,614,240**	**1091**	**130**	**401**	
NN3Q	"	1,484,538	1051	112	386	
AA3B	"	1,291,745	1011	96	359	
NW3Y	"	1,237,720	1013	100	340	
N3MKZ	"	1,194,400	1140	90	280	
K3ND	"	1,025,965	828	108	341	
AA3HA	"	919,602	785	96	327	
N3II	"	720,421	709	89	278	
W3AP	"	700,700	710	94	270	
WA3WJD	"	669,180	640	96	284	
K3KNH	"	590,304	616	80	264	
WB3CIW	"	534,800	685	65	215	
KC3RN	"	523,572	589	82	240	
NK3U	"	491,392	523	87	262	
K1HTV/3	"	404,319	492	84	223	
AA3HM	"	398,370	504	75	219	
WT3P	"	367,392	521	64	194	
K3SW	"	357,848	404	89	239	
KB3X	"	321,488	411	84	200	
W3HVQ	"	320,790	408	80	209	
K3BHX	"	302,706	436	66	185	
K3SA	"	271,184	360	71	201	
W2UP/3	"	260,928	333	77	211	
K3KO	"	235,664	402	51	157	
W3OV	"	218,640	330	62	178	
W8FJ/3	"	169,323	280	67	164	
K3TLP	"	143,936	249	59	149	
W3FG	"	54,210	148	40	99	
N3KQY	"	17,182	90	21	50	
K3YGU	"	3,948	37	16	26	
WR3L	**21**	**85,854**	**246**	**25**	**98**	
KG4W	**A**	**1,721,610**	**1245**	**113**	**379**	
WB2NQT/4	**"**	**1,431,360**	**1079**	**112**	**368**	
K4CEF	"	510,497	529	96	271	
KQ4QM	"	479,682	533	84	245	
ND4Y	"	378,190	490	78	217	
N4XM	"	343,952	436	81	215	
WB8BMV/4	"	288,660	370	73	210	
K4UTE	"	212,280	266	75	215	
N4BNO	"	211,116	350	62	98	
AE4FY	"	178,704	313	58	146	
KN4ZT	"	172,010	310	58	148	
WA4QDM	"	142,848	267	51	141	
N4SLR	"	136,620	226	60	160	
WA4RYO	"	106,785	340	22	83	
W4RX	"	91,980	186	57	123	
NF4L	"	52,855	125	50	105	
N4DW	"	39,040	120	47	81	
N4ZR	"	35,948	148	28	58	
N4TG	"	23,540	80	40	70	
N4XMX	"	10,360	55	29	45	
W5HVV/4	**28**	**13,020**	**112**	**12**	**30**	
KR4DL	**21**	**172,956**	**431**	**30**	**112**	
KR4UJ	"	158,838	417	28	110	
W4JVN	**14**	**205,200**	**508**	**32**	**112**	

KQ4GC	*	97,376	263	34	102
K5LP	**A**	**917,280**	**798**	**118**	**302**
NA4M/5	**"**	**562,432**	**673**	**96**	**242**
W5ASP	**"**	**412,230**	**800**	**48**	**134**
KD5IA	*	263,150	362	88	189
ND5S	*	243,200	300	76	180
K5EC	*	94,341	194	58	119
KF5YZ	*	71,736	184	62	106
N5NMY	**28**	**31,093**	**204**	**19**	**40**
WB5UDX	**21**	**166,160**	**435**	**31**	**103**
WZ6Z	**A**	**958,820**	**907**	**122**	**260**
NI6T	**"**	**493,245**	**621**	**100**	**191**
N6CCL	*	473,026	525	98	228
AA6MC	*	408,216	525	94	198
W6GO	*	364,026	407	108	230
K6SG	*	352,656	451	94	185
AB6WD	*	198,132	869	77	151
W6MFC	*	110,715	253	60	105
KT6V	*	84,460	189	51	113
AJ6V	*	64,656	167	54	90
NF6R	*	52,272	179	42	66
W6TKF	*	49,023	154	47	70
KM6XX	*	40,320	166	35	55
W6OAT	*	19,788	78	46	51
K6PU	21	21,080	123	20	42
K6LEB	**14**	**46,632**	**348**	**36**	**98**
KA7ZUM	**A**	**358,110**	**608**	**76**	**154**
W7OM	**"**	**324,535**	**509**	**75**	**160**
KC7DB	*	198,186	364	66	135
AA7WP	*	69,000	180	57	93
KD4HXT/7	*	31,025	136	36	49
AAØCY/7	*	27,360	104	34	62
WAØRJY/7	**21**	**98,576**	**346**	**26**	**75**
N8BJQ	**A**	**658,471**	**707**	**88**	**253**
NC8V	**"**	**472,860**	**606**	**75**	**209**
KD8FS	*	264,966	399	61	176
KD8KX	*	261,080	388	67	177
K8CV	*	159,327	305	55	134
NT8V	*	156,090	272	62	153
NG8D	*	134,483	264	50	131
N8XTO	*	126,385	280	44	117
KG8AL	*	67,497	169	49	102
W8UVZ	**3.7**	**73,245**	**348**	**23**	**72**
WO9Z	**A**	**978,737**	**858**	**110**	**299**
NE9U	**"**	**631,557**	**684**	**86**	**253**
KB9BUM	*	216,920	363	57	163
WD9GIG	*	206,800	319	67	168
N9XBM	*	154,700	355	45	125
WE9A	*	78,016	157	65	119
KS9U	**21**	**276,974**	**649**	**32**	**126**
K9OSH	*	18,915	107	18	47
N9AW	**14**	**179,690**	**428**	**35**	**116**
NØAT	**A**	**507,744**	**505**	**102**	**267**
KMØL	**"**	**468,963**	**592**	**86**	**211**

ALASKA

KL7Y	**A**	**931,216**	**1453**	**115**	**171**

CANADA

VE7NKI	**A**	**607,956**	**1675**	**53**	**121**
VA2AM	**"**	**214,130**	**342**	**68**	**177**
XM7SBO	**21**	**345,038**	**1193**	**28**	**79**

AFRICA

CANARY ISLANDS

EA8AFJ	**A**	**3,089,350**	**2316**	**116**	**335**

ASIA

HONG KONG

VS6BG	**A**	**1,344,350**	**2078**	**111**	**211**

JAPAN

JQ1BVI	**A**	**616,148**	**823**	**99**	**190**
JR4QZH	**"**	**296,400**	**414**	**77**	**170**
JGØVCM	**"**	**274,744**	**451**	**84**	**160**
JA4CUU	*	101,061	219	72	99
JAØHYU	*	75,429	180	61	92
JA7LMZ	**28**	**3,016**	**45**	**11**	**15**
JQ1NGT	21	120	4	4	4
JA7KBR/1	**14**	**75,447**	**290**	**31**	**70**
JA1YXP	**7**	**139,095**	**512**	**29**	**70**
				(Opr. JM1UWB)	

KOREA

HL9DX	**A**	**445,408**	**747**	**82**	**166**

EUROPE

BELGIUM

ON4BAL	**14**	**175,032**	**700**	**30**	**106**

CROATIA

9A3ZG	**A**	**309,228**	**645**	**68**	**224**

CZECH REPUBLIC

OK1DIG	**A**	**1,936,484**	**2016**	**111**	**373**
OK2BMT	*	261,792	496	75	213

ENGLAND

G4OJH	**A**	**1,427,830**	**1533**	**101**	**353**

ESTONIA

ES5Q	**A**	**1,096,414**	**1890**	**94**	**324**
				(Opr. ES5RY)	

FINLAND

OH1NSJ	**A**	**775,260**	**1046**	**92**	**273**
OH2MPO	*	13,668	93	26	41
OH1BOI	*	13,330	73	30	56

FRANCE

F6JSZ	**A**	**50,250**	**208**	**34**	**100**

GERMANY

DJ2YA	**A**	**2,669,139**	**1871**	**142**	**485**
DL6ET	**"**	**2,619,378**	**1954**	**138**	**528**
DK9DA	**"**	**2,293,248**	**2049**	**120**	**392**
DL2ARD/P	**"**	**1,932,593**	**1391**	**135**	**476**
DL3KDV	**"**	**1,712,976**	**1475**	**133**	**429**
DK4QT	*	718,641	1013	88	269
DL5IC	*	511,000	714	88	262
DF1IC	*	496,264	734	87	241
DL2ZAE	*	448,568	583	92	284
DL4NN	*	407,046	716	79	279
DL8AAM	*	334,828	791	57	217
DJ9IE	*	331,483	773	70	219
DK3GI	*	251,126	357	76	231
DL9DRA	*	234,416	450	70	229
DLØIMS	*	199,122	423	54	177
DL4LAM	*	28,527	126	32	79
DAØUN	**7**	**293,393**	**1274**	**35**	**116**
				(Opr. DL4NAC)	
DJ6TK	*	15,540	168	15	59

HUNGARY

HAØHW	**A**	**350,350**	**612**	**83**	**242**

ITALY

IR8A	**A**	**2,584,581**	**2580**	**119**	**418**
				(Opr. I8QLS)	
IO4A	**"**	**1,136,016**	**1274**	**97**	**317**
				(Opr. IK4PVR)	
I2CMA	*	1,022,469	903	126	417
IK2HKT	*	677,680	1021	87	307
IQ3R	*	275,825	555	64	211
				(Opr. IK3RIZ)	
IK6VXO	*	182,584	441	59	173
I6NOA	*	154,330	334	70	183
IK2RXV	*	133,509	282	63	170
IK3UMT	*	132,594	307	68	178
IK2WBA	*	61,104	206	47	105
IK4WMG	*	56,350	161	53	108
IC8WIC	**7**	**68,310**	**548**	**23**	**87**
IN3ASW	**3.7**	**86,739**	**850**	**15**	**72**

NORWAY

LA9GY	A	10,500	91	24	51

POLAND

SP6CIK	A	55,610	167	46	120

SICILY

IT9ORA	**A**	**52,597**	**241**	**40**	**109**
IT9VDQ	14	3,741	32	15	28

SLOVAK REPUBLIC

OM5A	**A**	**926,541**	**1124**	**109**	**332**
				(Opr. OM3LA)	

SLOVENIA

S5ØD	**A**	**1,608,689**	**1617**	**126**	**403**
				(Opr. S57AD)	
S59AA	*	559,650	703	98	312

SPAIN

EA5GRC	**A**	**1,332,608**	**1675**	**107**	**357**
EA3AOK	**"**	**1,061,265**	**1396**	**101**	**316**
EA3EJI	*	539,250	729	92	283
EA3CB	*	425,565	654	76	239
EA4AUF	*	38,988	169	33	81
EA5WI	*	23,808	96	38	58
EA7AKM	*	12,008	100	24	55
EA3FEJ	*	6,604	55	19	33
EA7DPU	21	103,008	515	29	82

WALES

GWØARK	**14**	**402,248**	**1302**	**35**	**119**

OCEANIA

AUSTRALIA

VK2VM	**A**	**118,792**	**344**	**49**	**75**

SOUTH AMERICA

BRASIL

PY2EX	**A**	**2,275,232**	**2058**	**110**	**278**
PU2LSR	**28**	**162,122**	**596**	**25**	**78**
ZY2HT	**14**	**173,831**	**509**	**35**	**98**
				(Opr. PY2PAH)	

VENEZUELA

YV6DBX	**14**	**213,679**	**710**	**25**	**82**

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

UNITED STATES

KC1XX	**6,214,992**	**3075**	**146**	**552**
W1FJ	**4,843,104**	**2526**	**142**	**530**
K1NG	**4,677,669**	**2340**	**149**	**562**
W2AX/1	3,116,036	1931	136	468
KB1H	2,981,232	1959	120	416
K1RX	2,020,360	1358	119	411
WV1MS	833,272	821	89	285
KA1DWX	574,431	655	71	238
W1FY	506,736	599	73	233
N1KWF	481,452	546	81	237
KD1VQ	372,564	567	58	179
N1RDJ	237,573	450	47	142
N1SOH	135,424	287	52	132
K2TR	**5,766,831**	**2828**	**148**	**569**
N2NU	**5,350,544**	**2743**	**145**	**547**
KF2ET	**4,868,640**	**2538**	**146**	**526**
NF2L	**3,466,368**	**1995**	**132**	**480**
N2MM	2,027,175	1346	118	419
NS2K	1,763,965	1256	116	389
KE2JR	1,736,192	1236	117	395
K2OWE	1,585,376	1184	110	371
K2TE	1,299,650	1088	96	329
N2SS	1,212,288	976	104	347
WA2C	951,357	915	103	278
W2RR	928,805	801	104	327
K2IBW	920,202	1068	85	224
AA2FB	813,624	709	94	312
K2IGW	317,724	473	82	167
K2JD	203,580	392	53	142
WB2UFO	37,728	161	40	56
K2AA	40	77	2	2
W3GNQ	**1,891,695**	**1282**	**127**	**418**
K3MD	**1,500,804**	**1272**	**100**	**323**
K3II	1,286,560	859	119	425
K3DI	1,207,605	944	108	357
K3CP	976,327	901	92	299
WT3Q	880,256	767	94	322
AK3Z	639,610	615	94	289
NM3K	568,192	595	90	278
K3ZNV	542,080	584	91	261
K3JLK	69,920	173	45	115
K4ISV	**4,653,720**	**2485**	**160**	**535**

AB4RU	**2,976,000**	**1724**	**135**	**485**
W4PRO	1,194,060	1026	101	319
KQ4HC	1,061,616	992	100	308
KC4ZV	766,314	712	107	307
W4NC	503,617	619	78	235
KB4FAS	286,412	931	66	146
W4TMN	16,875	87	21	54
N5HRG	**1,047,832**	**849**	**126**	**328**
AB5YG	**1,009,558**	**916**	**107**	**314**
AB5K	901,269	812	110	309
W5UW	486,189	614	91	206
K5LIB	277,240	516	75	157
W5HTK	196,301	361	62	141
W6EEN	**2,950,740**	**2173**	**140**	**345**
WA6TKV	540,710	712	92	186
AE0M/6	262,752	488	74	130
KB6HRB	140,970	291	76	109
W6YRA	12,768	99	25	31
KE6WEH	5,426	63	25	18
W7SE	**950,520**	**1243**	**115**	**241**
N7QQ	**636,840**	**659**	**114**	**246**
AB7BS	609,280	1018	88	184
K6XO/7	388,046	567	82	169
WA7IIS	327,420	570	68	136
N7IXG	86,310	256	45	81
AB7GM	24,220	143	30	40
K8AZ	**3,984,120**	**2280**	**142**	**488**
AA8U	**3,062,499**	**1959**	**136**	**447**
W9UI/8	914,208	782	104	324
KG8CY	438,064	566	86	218
N8ZSG	22,448	108	33	59
KS9K	**4,589,184**	**2581**	**149**	**497**
K8JP/9	907,707	757	118	325
W9JZ	897,127	813	112	315
N9LCR	64,350	173	53	97
W9YB	61,061	169	47	96
NCØP	**2,611,008**	**1769**	**140**	**436**
WØCP	**1,933,312**	**1625**	**131**	**341**
W2CRS/Ø	1,034,840	942	124	286
WØOF	415,233	563	81	192
NIØS	308,210	461	75	170
NØZA	1,019,817	1051	110	243

ALASKA

KL7/N7DF	**379,518**	**1284**	**45**	**84**

BAHAMAS

C6AHU	**653,271**	**1397**	**69**	**144**

BARBADOS

8P9Z	**9,213,928**	**5895**	**145**	**487**

BELIZE

V31DX	**6,130,330**	**6110**	**124**	**334**

BRITISH VIRGIN ISLANDS

VP2VE	**918,281**	**656**	**57**	**101**

CANADA

VE6JY	**3,296,430**	**3165**	**117**	**318**
VO2WL	**3,224,394**	**3316**	**102**	**324**
VE3RM	**2,591,913**	**2159**	**114**	**357**
VE6SV	**2,371,808**	**3203**	**104**	**228**
VA3SK	**2,336,424**	**2486**	**100**	**302**
VE7ZZZ	**2,011,492**	**2447**	**109**	**252**
XM7GFS	1,811,808	2746	100	188
CG2KCB	1,585,348	2137	76	231
CK7U	1,251,656	2515	73	144
XL2MCZ	1,201,078	2101	57	166
VE5TP	859,848	1501	78	186
VE5CB	558,486	1329	68	139
VE6AO	505,701	1137	72	135
VE2CMH	258,456	618	47	131
VE3RRH	229,448	380	62	170
VE2CUA	217,175	568	51	124
VE2UMS	127,776	497	38	83
CG2CLM	108,678	431	37	81
VE6ZC	30,600	203	35	40

CAYMAN ISLANDS

ZF2DX	**2,308,054**	**3627**	**85**	**202**

GAUDELOUPE

FG5BG	**9,147,840**	**5931**	**137**	**487**

GRENADA

J3A	**279,081**	**1218**	**19**	**80**

GUANTANAMO BAY

KG4ZE	**2,655,010**	**3109**	**96**	**269**

MEXICO

6D2X	**9,689,400**	**6445**	**153**	**477**
4B9CQ	2,570,400	3284	104	232

ST. PIERRE ET MIQUELEON

TO5M	**4,217,920**	**3648**	**97**	**351**

TURKS AND CAICOS ISLANDS

VP5WW	**7,916,608**	**5580**	**136**	**438**
VP5S	**7,770,228**	**5904**	**135**	**436**

AFRICA

CANARY ISLANDS

EA8RG	**5,701,934**	**3326**	**124**	**457**
ED8CLU	841,425	1445	53	142

CEUTA & MELILLA

ED9EA	**9,707,190**	**5216**	**139**	**530**

ETHIOPIA

ET3AA	**1,076,490**	**1497**	**83**	**160**

MADEIRA ISLANDS

CT3BX	**9,043,258**	**5009**	**127**	**495**
CT9M	**6,019,698**	**4201**	**113**	**369**

NAMIBIA

V59X	**3,764,284**	**3244**	**99**	**299**

SOUTH AFRICA

ZS5NK	**2,973,776**	**2288**	**121**	**321**
ZS6SA	**2,843,910**	**2407**	**109**	**296**
ZS4K	1,946,252	1854	98	258

ASIA

ASIATIC RUSSIA

R9MWS	**1,683,408**	**1677**	**102**	**306**
RK9AWN	**1,067,220**	**1248**	**81**	**249**
RK9YXI	500,192	916	61	163
RW9OWW	266,063	513	58	141
RKØAYZ	**189,688**	**479**	**53**	**128**

BRITISH SOVEREIGN BASES

ZC4DX	**4,257,110**	**3231**	**102**	**356**

CHINA

BY4BHP	**189,051**	**730**	**61**	**98**

HONG KONG

VS6WO	**4,941,597**	**4538**	**133**	**366**

JAPAN

JE6ZIH	**2,730,984**	**2134**	**131**	**325**
JAØYAK	**1,803,930**	**1673**	**119**	**264**
JG2ZOZ	**1,747,284**	**1689**	**112**	**250**
JA1YKX	**1,550,928**	**1365**	**127**	**282**
JA8YBY	**1,497,392**	**1489**	**118**	**250**
JA9YAA	**1,325,583**	**1228**	**127**	**270**
JA3YBF	**815,626**	**781**	**123**	**268**
JR7YCM	**409,107**	**654**	**84**	**165**
JA7YFB	385,764	709	71	133
JA2YKA	308,571	529	79	140
JA2ZJR	253,470	398	89	149
JH2ZUN	234,876	408	80	142
JA2YAF	3,312	34	21	25
JA1YAI	2,294	30	14	17

KIRGHIZIA

EX2M	**2,770,271**	**3008**	**90**	**283**

KUWAIT

9K2HN	**2,323,683**	**2629**	**75**	**232**

MYANMAR

XY1HT	**1,043,205**	**2604**	**80**	**175**

SAUDI ARABIA

HZ1AB	**19,944**	**93**	**29**	**43**

THAILAND

HS5ØA	**267,257**	**747**	**61**	**138**

EUROPE

AUSTRIA

OE6Z	**6,960,000**	**4293**	**147**	**568**
OE2S	**5,949,348**	**3794**	**150**	**568**
OE3V	1,241,070	1500	97	313
OE5T	793,848	1312	78	294

BELGIUM

OT5T	**7,975,077**	**4355**	**161**	**570**
OT5L	**4,007,068**	**3095**	**130**	**456**
OT5V	3,224,624	3098	112	369
ON6AH	3,145,259	2956	110	371
ON6BR	1,917,520	2231	98	342
OT5K	1,495,431	1892	105	336
ON6RM	200,895	577	51	176

BELARUS

EU5ØUN	**1,100,860**	**1716**	**91**	**289**
EW4XA	107,358	341	46	128

BOSNIA-HERZEGOVINA

T99MT	**1,041,210**	**1865**	**88**	**326**

BULGARIA

LZ9A	**9,327,936**	**4808**	**205**	**707**
LZ7G	1,740,585	2972	93	292

CZECH REPUBLIC

OK5W	**6,243,090**	**3694**	**157**	**578**
OL3A	**3,018,764**	**3064**	**118**	**406**
OL2A	958,107	1581	92	297
OK2KOD	874,280	1132	105	335
OL5T	566,784	1174	68	260
OL6M	542,520	984	75	199
OK1KZD	247,749	662	61	208

DENMARK

OZ5W	**4,336,408**	**3344**	**131**	**476**
OZ5EDR	228,704	638	57	167

CROATIA

9A7A	**3,238,380**	**3080**	**123**	**417**
9A6V	1,140,099	1418	99	320
9A1CEI	220,220	608	49	171

ENGLAND

G3OZF	**4,053,033**	**3071**	**134**	**523**
GB2AA	**3,908,797**	**3026**	**136**	**507**
GB6AR	2,434,425	2254	110	415
GØVAA4V	1,019,746	1675	75	263
GB8WW	772,564	1339	82	276
G4WPD	729,200	992	100	300
G3FJE	487,838	702	86	291
GXØWMR	307,326	728	58	204
G4WWG	193,459	464	52	151
GØWAT/P	171,954	527	54	179
GØNKL	114,924	396	47	110

EUROPEAN RUSSIA

RU3A	**5,722,440**	**4810**	**153**	**492**
RU6LWZ	**4,593,600**	**3226**	**173**	**547**
RN4W	2,995,785	3129	128	441
RA3AWO	2,518,896	2557	139	443
RZ6AXO	1,959,573	2150	137	424
RZ3Q	1,618,301	2086	121	366
RU4L	880,000	1597	79	273
RZ4AYT	451,248	1002	78	238
RK3QWM	145,928	159	48	100
RK3RYY	145,692	440	53	160
RZ1AWO	9,928	119	16	57

FINLAND

OH2HE	**7,867,025**	**4446**	**170**	**605**
OH7M	**4,639,286**	**3536**	**141**	**485**
OH3YLE	1,334,991	1587	111	342
OH9AR	733,120	1322	73	217

FRANCE

TM2Y	**9,130,602**	**5182**	**158**	**583**
TM1C	**9,060,660**	**5412**	**148**	**566**
TM2T	3,635,580	3331	129	461
F5PSG	2,815,360	2672	116	414
TM8A	2,612,656	2902	125	441
F6IFR	2,242,644	2498	94	350
F8KCF	1,877,085	1795	103	402
TM2F	1,222,445	1502	87	284
F6KBF	997,513	1533	78	241
TM8P	993,858	1413	99	327
F6KCS	618,144	939	83	293
F5BZB	530,120	1073	72	218
F6KLO	414,770	820	69	226
F6KUQ	53,620	230	37	103

GERMANY

DL4RDJ	**6,863,852**	**3848**	**163**	**609**
DFØHQ	**5,842,232**	**3339**	**170**	**618**
DKØEE	**3,506,330**	**2924**	**138**	**535**
DFØAT	2,545,380	2140	118	419
DLØBI	1,367,040	1402	103	377
DLØMBG	1,224,366	1482	97	332
DF3CB	1,186,797	1171	124	319
DKØUB	1,184,967	1453	95	346
DLØTD	968,121	1276	96	285
DKØPR	435,974	800	66	200
DL5XAT	173,680	464	49	159
DLØCE	119,196	401	47	125
DLØARN	98,106	298	40	126
DFØRG	4,608	70	13	35

GREECE

SV1AFA	**200,146**	**628**	**76**	**153**

GUERNSEY

GU3HFN	**1,163,134**	**1669**	**73**	**258**

HUNGARY

HG5A	**5,895,129**	**4117**	**144**	**489**
HG6Y	**3,736,260**	**3398**	**127**	**383**
HG5M	3,494,427	3521	121	398
HG5C	927,146	1353	92	282

IRELAND

EI7M	**5,744,370**	**4450**	**130**	**480**

ITALY

IQ4A	**11,986,918**	**5424**	**188**	**699**
IR2W	**6,198,270**	**3742**	**151**	**539**
IO5A	**4,319,410**	**3413**	**134**	**476**
IU4U	4,075,677	3041	138	465
IQ2X	4,038,606	2864	147	555
II2K	3,968,972	3015	137	507
II2Z	2,299,968	2005	124	404
IQ4T	2,134,726	2323	102	316
IR5T	1,376,402	1362	102	204
IO2L	1,085,700	1508	94	326
IQ7A	1,040,270	1557	94	291
IR1I	466,866	867	81	252
IK2VOV	317,715	558	77	218
IR4J	37,206	235	28	89

KALININGRAD

RK2FWA	**5,380,067**	**4356**	**150**	**503**

LITHUANIA

LY1DQ	**1,672,836**	**2410**	**97**	**340**
LY3MR	**1,412,964**	**1686**	**114**	**420**

LUXEMBOURG

LX/DF1VH	38,634	150	36	101

NETHERLANDS

PA3DWD	**4,044,324**	**3055**	**130**	**506**
PI4CC	**1,952,187**	**2211**	**109**	**412**
PI4ZLD	1,612,160	1890	104	336
PI50TUE	398,174	814	61	177
PA3FNE	143,925	1176	17	78

NORWAY

LA5M	**133,406**	**506**	**46**	**136**

POLAND

SN6F	**3,108,026**	**3010**	**130**	**408**
SP3PLD	375,925	863	69	206
SP9KRT	261,240	681	80	200
SP9ZKN	189,450	713	44	181
SP6YFU	124,341	402	42	149
SP5YFC	55,476	352	29	105

PORTUGAL

CT8T	**5,421,372**	**4318**	**139**	**474**

SICILY

IT9EWG	**479,196**	**1082**	**60**	**201**

SLOVAK REPUBLIC

OM7M	**6,716,160**	**4202**	**157**	**611**
OM3A	**6,051,150**	**4002**	**158**	**556**
OM3KHU	165,444	626	37	167
OM3RDP	26,536	222	23	84

SLOVENIA

S57NW	**1,175,306**	**1376**	**103**	**348**

SPAIN

EA5HQ	**3,000,296**	**3138**	**109**	**333**
EA3CWK	**2,947,252**	**2818**	**122**	**417**
ED3TR	**2,293,806**	**2483**	**105**	**333**
EA5BY	2,248,544	2549	103	361
EA1FDG	2,127,375	2323	95	280
EA3RKG	1,301,376	1852	93	291
ED1WW	1,105,300	1641	89	261
EA1EEY	1,025,962	1232	90	271
EA1CW	668,334	1155	79	255
EA1ACP	613,847	956	76	223
EA5SJ	437,100	779	68	214
EA1COZ	363,300	638	72	228
EA5URD	192,256	476	60	196
ED2URP	97,820	368	39	107

SWEDEN

SM5FQQ	**2,728,160**	**2571**	**117**	**427**
7S3GK	**1,374,240**	**1871**	**313**	**96**
SK2KW	913,409	1393	81	262
SI3GM	818,254	1424	71	282
SMØBGM	140,114	500	56	165
SM4AIO	128,148	523	37	140
SK7BQ	103,602	412	38	148

SWITZERLAND

HB9H	**5,113,216**	**3384**	**152**	**536**
HB9OK	877,084	1134	90	314
HB9AJ	792,693	1503	63	234

UKRAINE

EN5J	**8,003,660**	**4059**	**194**	**786**
UR4LWC	1,091,984	1268	120	371
UT4UWC	136,682	544	50	132
UR7IYU	127,618	1013	100	198
UT4UWL	103,170	405	45	136

UN-GENEVA

4UØITU	**2,430,480**	**2435**	**115**	**405**

WALES

GW8GT	**4,657,804**	**3608**	**130**	**484**
GW3CSA	713,804	1246	81	290

YUGOSLAVIA

YT9N	**2,306,048**	**3008**	**106**	**406**
YU7AL	744,444	1155	90	276
YU1AAV	148,500	600	60	138
4N7Z	112,128	400	57	135

OCEANIA

AUSTRALIA

VK4MZ	2,009,322	2094	108	225
VK1DX	1,257,982	1647	92	179

HAWAII

KH6RS	2,875,660	3349	108	187

NEW CALEDONIA

FK5DX	1,924,932	2471	97	185

NEW ZEALAND

ZM2K	2,244,757	2297	98	239

SOUTH AMERICA

ARGENTINA

LV1V	4,977,910	3548	126	364
LP4H	**3,453,840**	**3247**	**120**	**249**
LU1FZR	3,169,374	3055	109	249
LU1HLH	2,424,076	2421	97	249
LU1YY	1,404,683	1877	73	190
L3HP	1,177,290	1610	73	181
LU8DZE	1,143,408	1607	78	168
LU1UM	707,184	1156	77	139
LU1NF	350,176	576	82	166

BRASIL

PT7CB	**8,281,900**	**5053**	**129**	**421**
PX9Z	475,200	1054	53	107

CHILE

CE8SFG	**2,886,728**	**3096**	**82**	**246**

ECUADOR

HC2GT	**562,496**	**1058**	**63**	**125**

NETHERLANDS ANTILLES

PJ9T	**3,977,361**	**3749**	**98**	**261**

PARAGUAY

ZPØR	**2,955,316**	**3435**	**94**	**205**
ZP5WYV	1,408,755	1770	73	212

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

UNITED STATES

N2RM	**12,199,016**	**5642**	**159**	**635**
K3LR	**11,370,057**	**5399**	**163**	**610**
W3LPL	**9,638,216**	**4769**	**154**	**609**
K1KI	**8,887,262**	**4413**	**147**	**587**
KY1H	**8,643,627**	**4758**	**153**	**558**
N3RS	**6,453,540**	**3360**	**142**	**561**
N4ZC	**6,048,323**	**3175**	**151**	**540**
W4MYA	5,294,014	3093	147	515
AA2Z	4,015,942	2336	127	475
N6AW	**3,676,904**	**2509**	**151**	**366**
K3ANS	3,361,864	2176	129	475
W4IY	3,062,273	2096	131	440
K6VI	2,672,631	2031	139	338
WØAIH/9	2,630,474	1913	134	417
W3MM	2,289,887	1403	128	459
NK7U	2,264,580	2154	124	290
K1SSN	1,908,736	1323	122	390
NE3F	1,755,635	1319	109	378
KBØWY	757,520	821	95	245
KG8CW	745,710	746	100	271
K7FR	648,540	885	81	189
NØUEI	223,080	399	74	146
KO6IG	42,432	176	38	58

ANTIGUA

V26B	**22,384428**	**11930**	**157**	**602**

CANADA

VA9DH	**12,229,445**	**7394**	**138**	**529**
VG6FI	**2,119,776**	**3221**	**100**	**211**
VE5RI	988,812	1873	82	160
VY2CR	186,124	506	45	113

DOMINICANA

HI3/ WA2VUY	**3,108,399**	**3995**	**84**	**273**

MEXICO

XE2DV	**5,571,104**	**5890**	**129**	**289**

SAN ANDREAS

HKØ/ KH8AL	**5,443,092**	**6090**	**109**	**295**

TURKS AND CAICOS ISLANDS

VP5T	**5,771,952**	**5741**	**111**	**321**

ASIA

JAPAN

JA3ZOH	**11,104,712**	**5426**	**175**	**549**
JH5ZJS	**10,294,470**	**5666**	**165**	**477**
JA1YDU	**5,333,672**	**3346**	**158**	**426**
JA7YRR	**3,557,076**	**2701**	**146**	**315**
JR1ZTT	3,500,640	2705	138	330
JA3YKC	1,152,939	1260	116	223
JK1ZHH	230,050	420	80	134

MONGOLIA

JT1Z	**4,447,872**	**5435**	**298**	**118**

MYANMAR

XZ1A	**2,594,507**	**3792**	**109**	**252**

EUROPE

BALEARIC ISLANDS

ED6IB	**5,157,353**	**5548**	**115**	**426**

BELGIUM

OT5A	**15,120,045**	**9124**	**171**	**660**

BULGARIA

LZ7M	**1,372,512**	**1911**	**106**	**358**

CZECH REPUBLIC

OK1OKE	**598,535**	**1104**	**69**	**280**
OK1KIR	463,060	910	258	80

CORSICA

TK2C	**13,886,544**	**10329**	**152**	**625**

CROATIA

9A1A	**16,362,936**	**10173**	**175**	**653**
9A5D	2,677,500	3872	109	367

ENGLAND

GØKPW	**17,257,440**	**9553**	**178**	**738**

FINLAND

OH3NE	**2,429,130**	**3059**	**113**	**397**

GERMANY

DK5EZ	**3,461,017**	**3005**	**124**	**457**
DF3QG	703,392	895	102	329

HUNGARY

HG73DX	**14,997,749**	**8925**	**176**	**695**

ITALY

IK3STG	**1,105,584**	**1626**	**84**	**388**

LIECHTENSTEIN

HBØ/ HB9AON	**3,066,216**	**3753**	**109**	**401**

LITHUANIA

LY35ZO	**3,261,951**	**4055**	**128**	**439**

LUXEMBOURG

LX/DL4OCL	**501,795**	**1174**	**58**	**237**

NETHERLANDS

PI4COM	**8,413,164**	**6272**	**149**	**559**
PA6V	665,305	1582	60	211

NORWAY

LA1R	70,716	303	33	109

POLAND

SP2PIK	**570,064**	**1100**	**77**	**239**

SCOTLAND

GM4DMZ	**4,615,497**	**4330**	**128**	**511**

SLOVENIA

S56M	52,809	553	17	70

SPAIN

ED4RCT	**3,400,533**	**3419**	**110**	**367**
EA2AU	**2,460,648**	**2807**	**109**	**380**
ED7ESH	318,450	715	65	210

UKRAINE

EM2I	**12,241,254**	**8686**	**176**	**651**
EM7Q	3,033,012	3379	130	461

YUGOSLAVIA

YT9W	**11,491,270**	**8102**	**188**	**647**
YZ6G	1,581,372	2288	94	309

OCEANIA

HAWAII

WH6R	**10,569,456**	**7942**	**155**	**309**

NORTHERN MARIANAS

KHØAM	**12,743,948**	**7694**	**162**	**412**

SOUTH AMERICA

ARGENTINA

LU4FM	**9,563,859**	**6091**	**133**	**410**
LR3H	404,814	887	56	103
L3HL	175,440	488	50	79

NETHERLANDS ANTILLES

PJ9B	**33,279,744**	**13914**	**166**	**650**

VENEZUELA

YV3AJ	**2,195,695**	**2453**	**82**	**223**

CHECK LOGS

Our thanks to the following stations who sent in check logs:

4X4NJ, 7J6AAO/1, 9X/SM5DIC, C31LU, CX3TI, DL1ASF, DL1HSH, DL1JEI, DL3AG, DL4RCE, DL5DWW, DL5JRA, DL5YSM, EA1ASB, EA1ATL, EA1AUT, EA1AXY, EA1BXG, EA1CO, EA1EBJ, EA1OB, EA2ABM, EA2ARW, EA2JZ, EA2XR, EA3ADM, EA3AFW, EA3BLC, EA3DUW, EA3FYD, EA3GDX, EA3JD, EA3KB, EA4AFI, EA5AFH, EA5AHP, EA5AT, EA5BX, EA5BZS, EA5GCX, EA6ACF, EA6ACX, EA7AFP, EA7AIG, EA7BVI, EA7EFE, EA7GR, EA7GW, EA7HAE, EA7JB, EA7VE, EA8AHB, EA8BXQ, EA8TH, EA9IE, EC3AFG, EC5CXI, EC7AFB, EW8CM, EW8DA, F6CLM, HA2MV, HA7PW, HA9PB, HC1NWW, HK6KKK, JA4AQA, KG9AC, KRØU , KS4NC, KS4XG, LA2GCA, LA2HFA, LA4OGA, LA8CD, LA8DY, LA8XM, LA9NM, LA9VGA, LU3HBO, LZ2UZ, LZ3BS, LZ4UU, NØXCF, NQ9M , OH1NAD, OH1PN, OH1PY, OH2FQ, OH3BI, OH3TY, OH3WR, OH5NCG, OH5WL, OH6TV, OK1AD, OK1DUB, OK2BMI, OK2OED, OM2SM, ON7YP, OZ1CID, PAØASN, PAØZH, PU5YIP, PY7AHJ, RØ/UR8LV, RA3GCC, RA9FF, RK9AWQ, RS4498A, RX9UTB, SI2GM, SMØBXT, SMØCSX, SM2KAL, SM4AWC, SM4BNK, SM4TYF, SM6CDN, SM6HRR, SM6LIF, SP1DPA, SP1GZT, SP1RKM, SP2IU, SP2LUK, SP3PFR, SP4AS, SP4CMW, SP4EEZ, SP5DIQ, SP5GKN, SP5JTM, SP5NHI, SP5SSB, SP6AEG, SP6AUI, SP6CES, SP6JZB, SP6LK, SP7NMW, SP8BJH, SP8CSL, SP8FHM, SP8JMA, SP8KO, SP8WJD, SP9AVZ, SP9CLO, SP9DAE, SP9DTH, SP9LLA, SP9WZJ, SPL-2ØØ189, UAØCW, UA2EC, UA3DEA, UA3DFV, UA3NAI, UA3XGM, UA4FLB, UA9OSV, UT5UAG, UU9JN, VE3BR, VE7YJ, VF5GC, W9VSO, YB2ARW, YB3TAF, YB6INU, YL2IP, YL3BZ, YO3CDN, YO3FRI, YO4SI, YO5CUU, YO7BA, YO8AII, YV5JBI, Z31JA, ZL4AS.

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle Update: Cycle 23 May Have Begun!

The Royal Observatory of Belgium reports a mean monthly sunspot number of 5.6 for May 1996. The sun's surface was completely spotless on 16 days during the month. The mean sunspot number for May results in a 12-month running smoothed sunspot number (upon which the sunspot cycle is based) of 11 centered on November 1995.

As expected, there was a corresponding decrease in 10.7 solar flux levels during May. According to daily observations made at Penticton, B.C. by the Dominion Radio Astrophysical Observatory, the mean monthly level of 10.7 cm solar flux was 71. This results in a smoothed level of 73 centered on November 1995.

The good news to report is that an increasing number of "new" cycle spots are appearing on the sun's face. Scientists can identify these, since they appear at high solar latitudes and are reversed magnetic polarity from "old" cycle spots. When the number of old and new spots is equal, the end of Cycle 22 and the beginning of Cycle 23 will be declared!

There is a good probability that Cycle 23 began earlier this summer, but it still will be several months before we know for sure. There is a good possibility, therefore, that the new cycle will result in a small increase in sunspot activity during September. A smoothed sunspot number of 8 is predicted, with an accompanying 10.7 cm smoothed solar flux level of approximately 72.

September Propagation

This month's DX Propagation Charts cover the equinoctial period between September 15 and October 15, rather than the usual two-month span. A Short-Skip Propagation Chart for September and October is also included in this month's column.

Mid-September through mid-October marks the fall equinoctial period. A similar period occurs in the spring, between mid-March and mid-April.

The fall equinoctial period marks the time when the sun crosses the equator on its apparent travel into southern skies. During this period the hours of daylight and darkness are just about equal in length throughout the world. Sunrise should take place at approximately 6 AM local time (7 AM daylight) and sunset at about 6 PM local time (7 PM daylight).

This results in an ionosphere of almost equal characteristics over large areas of the world, and is usually the best time of the year for long DX openings between the temperate regions of the northern and southern hemispheres, on all HF bands. Look for more frequent openings between the USA and South America, South Pacific, South Asia, and southern Africa especially on 20 meters for a few hours after sunrise and again during the early evening hours.

Long-path propagation also is usually optimum during the equinoctial period. In western states look for long-path openings from Europe and Africa on 20 meters shortly after sunrise and again during the evening. Stations in eastern states can expect some long-path openings to the South Pacific during the late afternoon and early evening, and to parts of eastern Africa and Asia just after sunrise. Long-path openings may also be possible on 30 and 40 meters during the sunrise and sunset periods.

In general, during September expect 20 meters to continue to be the best band for DX propagation. It should open in almost all directions for a few hours after sunrise, and remain open to several different areas of the world throughout most of the day and into the early evening. Signals should be a bit stronger than they were during July and August, but the band will close an hour or two earlier because of the shorter period of daylight.

A seasonal improvement is expected for DX conditions on 15 and 17 meters, but solar activity is so low that considerably fewer openings are expected compared to the past several years. The best time to check for DX openings is from a few hours before noon through the afternoon hours. The best bet is for fairly good openings towards South America, but openings to Africa, the South Pacific, and Europe could occur from time to time.

Solar activity is much too low for any real 10 or 12 meter DX openings, but some may be possible towards South America and other southern areas during the afternoon hours.

Improved nighttime DX propagation conditions are expected on 30, 40, 80, and 160 meters as a result of increasing hours of darkness and a seasonal decrease in static levels. Forty should provide the best chance for DX from sunset through the sunrise period. Check 80 and 160 meters during the same time span, and especially an hour or so before sunrise.

For readers interested in short-skip conditions, for openings less than 250 miles try 80 meters during most of the day and 160 meters during the hours of darkness. Between 250 and 750 miles, 40 meters should be best from about 9 AM to 5 PM local daylight time, and 80 meters at other times. For openings between 750 and 1300 miles, try 20 meters during most of the daylight hours, 30 and 40 meters from sundown to about midnight, and 80 meters from midnight to sunrise. For openings beyond 1300 miles, 17 and 20 meters should be best during most of the daylight hours, with 30 and 40 meters optimum during most of the hours of darkness.

VHF Ionospheric Openings

Auroral activity usually increases during the equinoctial periods. Look for some good 6 and 2 meter auroral-type openings when conditions on the HF bands are Below Normal or Disturbed. Check the Last-Minute Forecast at the beginning of this column for those days likely to be in these categories during September.

Although summertime sporadic-*E* ionization should fall off considerably during September, and occasional 6 meter short-HF opening may still be possible over distances ranging from 1000 to 1300 miles. The best time to check is before noon and during the early evening, but don't expect too much.

No major meteor showers are expected during September, so few, if any, meteor-scatter-type openings are likely to occur on the VHF bands.

Conditions for trans-equatorial (or TE) scatter propagation also usually peak during equinoctial periods. However, in the present period of low solar activity, TE openings are likely to be considerably less numerous than in previous years. Some 10, 12, and perhaps a rare 6 meter opening may be possible by this propagation mode between the southern tier states and deep South America. The best time to check for TE openings is between 8 and 11 PM local time. Openings are usually of fairly short duration, and signals can vary between very weak and watery to fairly strong, with some degree of flutter fading almost always present.

CQ WW DX Contest Special '96

The 1996 contest weekends will mark the 46th consecutive CQ WW DX Contest for which this

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for September 1996

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1, 16, 18, 26	A	A	B	C
High Normal: 2, 6, 10-11, 14, 17, 24-25, 27-28	A	B	C	C-D
Low Normal: 3, 5, 9, 15, 19-21, 29-30	B	C	D	D-E
Below Normal: 4, 8, 13, 22-23	C	C-D	D-E	E
Disturbed: 7, 12	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading 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.

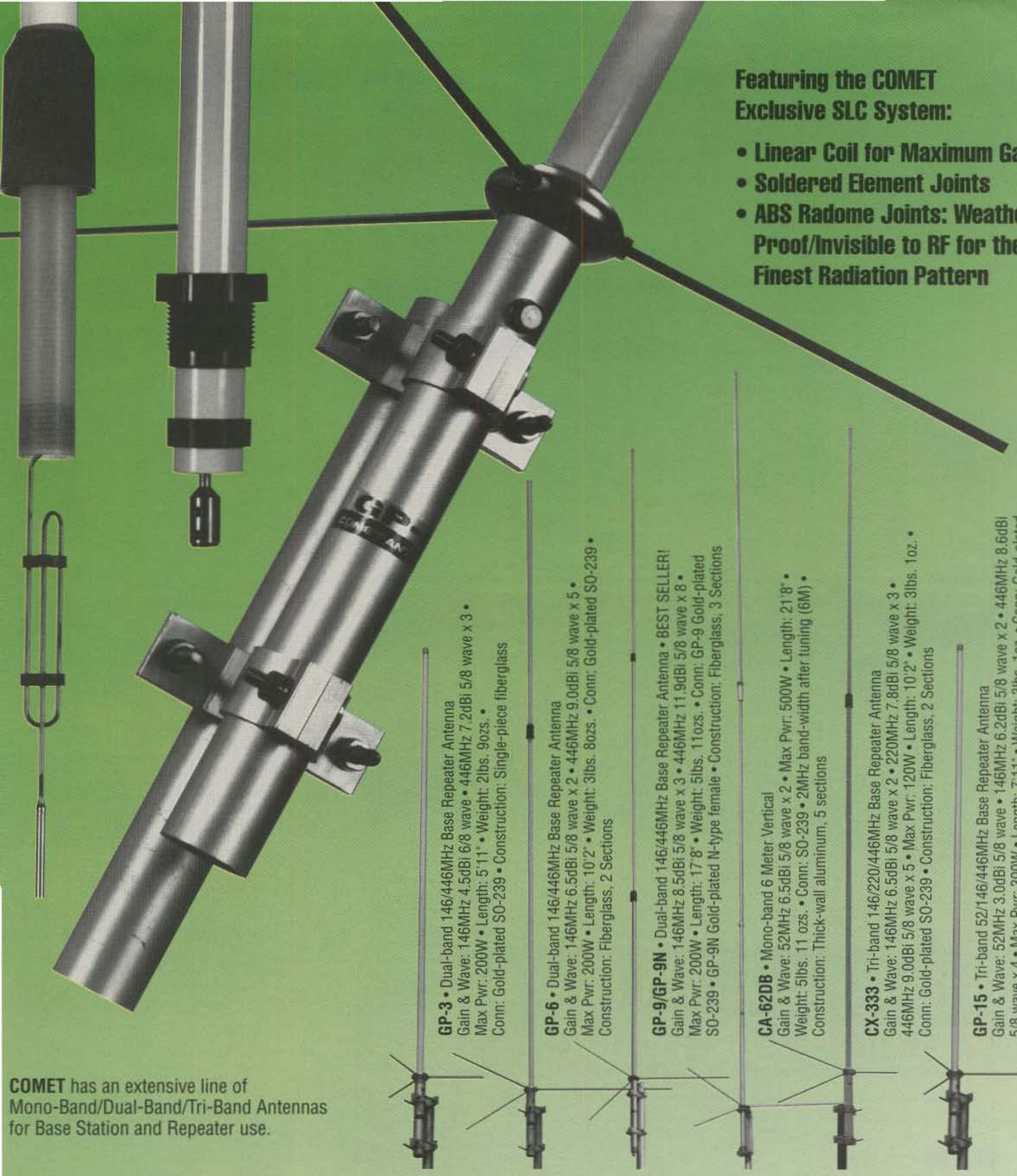
E—No opening expected.

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 excellent (A) on Sept. 1st, good (B) on the 2nd, fair (C) on the 3rd, fair-to-poor (C-D) on the 4th, fair (C) on the 5th, etc.

11307 Clara Street, Silver Spring, MD 20902 (g.jacobs@ieee.org)



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GP-3 • Dual-band 146/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 •
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 17 ON READER SERVICE CARD

CQ Short-Skip Propagation Chart
September & October 1996
Local Daylight Savings Time
At Path Mid-Point

Band (m)	Distance Between Stations (miles)			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	Nil	10-20 (0-1)	10-20 (1)	10-20 (1-0)
15	Nil	10-20 (0-1)	08-10 (0-1) 10-17 (1-2) 17-22 (1)	08-10 (1) 10-17 (2) 17-19 (1) 19-22 (1-0)
20	Nil	08-10 (0-1) 10-12 (0-2) 12-15 (0-3) 15-17 (0-2) 17-22 (0-1)	08-10 (1-2) 10-12 (2-4) 12-15 (3-4) 15-17 (2-4) 17-20 (1-3) 20-22 (1-2) 22-08 (0-1)	08-09 (2-1) 09-10 (2) 10-14 (4-2) 14-16 (4-3) 16-17 (4) 17-18 (3-4) 18-20 (3) 20-22 (2) 22-00 (1) 00-06 (0-1) 06-08 (1)
40	08-10 (0-2) 10-12 (1-3) 12-16 (2-4) 16-18 (2-3) 18-20 (1-2) 20-22 (0-1)	08-10 (2-3) 10-12 (3) 12-16 (4-2) 16-18 (3) 18-20 (2-4) 20-22 (1-4) 22-00 (0-3) 00-03 (0-2) 03-06 (0-1) 06-08 (0-2)	08-10 (3-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-20 (4-3) 20-22 (4) 22-00 (3-4) 00-03 (2) 03-06 (1-2) 06-08 (2-3)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-00 (4-3) 00-06 (2-3) 06-08 (3-2)
80	07-09 (3-4) 09-12 (4) 12-19 (4-3) 19-22 (4) 22-04 (3-4) 04-07 (2-3)	07-09 (4-2) 09-12 (4-1) 12-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-04 (4) 04-06 (3-4) 06-07 (3)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-04 (4) 04-06 (4-2) 06-07 (3-2)	07-09 (1) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (3-2) 22-04 (4-3) 04-06 (2) 06-07 (2-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (1-0)

ALASKA
September & October 1996
Opening Given in GMT

To	*15 meters*	*20 meters*	*40 meters*	*80 meters*
Eastern States	21-23 (1)	18-21 (1) 21-23 (2) 23-01 (1)	08-12 (1)	Nil
Central States	21-00 (1)	19-22 (1) 22-00 (2) 23-01 (1)	08-13 (1)	09-12 (1)
Western States	20-21 (1) 21-23 (2) 23-01 (1)	17-18 (1) 18-21 (2) 21-01 (3) 01-02 (2) 02-04 (1)	08-11 (1) 11-14 (2) 14-16 (1)	11-14 (1)

HAWAII
September & October 1996
Openings Given In
Hawaiian Standard Time

To	*15 m*	*20 m*	*40 m*	*80 m*
Eastern States	11-14 (1)	05-06 (1) 06-08 (2) 08-13 (1) 13-16 (2) 16-18 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1)	19-20 (1) 20-23 (2) 23-02 (1)
Central States	08-12 (1) 12-15 (2) 15-16 (1)	05-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	17-19 (1) 19-21 (2) 21-02 (3) 02-04 (2) 04-05 (1)	19-20 (1) 20-01 (2)* 01-03 (1)
Western States	08-10 (1) 10-12 (2) 12-14 (3)** 14-15 (2) 15-17 (1)	06-07 (1) 07-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	17-18 (1) 18-19 (2) 19-00 (4) 00-03 (3) 03-06 (2) 06-07 (1)	18-20 (1) 20-22 (2)* 22-03 (3)* 03-04 (2)* 04-06 (1)

 # See "How To Use Short-Skip Charts" in box at the beginning of this column.
Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.
** Indicates best time for 160 meter openings.*
*** Indicates best time for 10 meter openings.*

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates possible 10 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last-Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *daylight* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 PM in Los Angeles; 18 or 6 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *sdaylight* time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

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 (10 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.

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 *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 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.

September 15 to October 15, 1996
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	10-15 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (3) 16-17 (2) 17-18 (1)	18-19 (1) 19-20 (2) 20-02 (3) 02-04 (2) 04-05 (1)	20-22 (1) 22-01 (2)* 01-04 (1)
Northern Europe & European CIS	10-13 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-16 (2) 16-17 (1)	18-20 (1) 20-04 (2) 04-05 (1)	21-04 (1)
Eastern Mediter-ranean & Middle East	10-14 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-16 (2) 16-17 (1)	19-21 (1) 21-00 (2) 00-01 (1)	22-00 (1)
Western Africa	09-11 (1) 11-13 (2)** 13-14 (3)** 14-15 (2) 15-16 (1)	08-10 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	20-23 (1) 23-02 (2) 02-04 (1)	22-03 (1)
Eastern & Central Africa	11-13 (1) 13-15 (2) 15-16 (1)	13-15 (1) 15-18 (2) 18-19 (1)	21-02 (1)	22-01 (1)
Southern Africa	09-11 (1) 11-14 (2)** 14-15 (1)	08-10 (1) 13-15 (1) 15-18 (2) 18-20 (1) 23-01 (1)	19-22 (1) 22-00 (2) 00-02 (1)	23-01 (1)
Central & South Asia	Nil	07-08 (1) 08-10 (2) 10-12 (1) 19-22 (1)	05-07 (1) 20-23 (1)	Nil
Southeast Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 16-18 (1) 20-22 (1)	06-08 (1)	Nil
Far East	17-19 (1)	08-09 (1) 09-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1)	Nil
South Pacific & New Zealand	14-16 (1) 16-18 (2)** 18-19 (1)	07-08 (1) 08-11 (2) 11-14 (1) 16-20 (1) 20-23 (2) 23-01 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	03-05 (1) 05-07 (2)* 07-08 (1)
Australia	17-19 (1)**	07-08 (1) 08-10 (2) 10-12 (1) 14-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (1)	02-04 (1) 04-06 (2) 06-07 (3) 07-08 (2) 08-09 (1)	04-05 (1) 05-06 (2)* 06-07 (1)
Caribbean, Central America & Northern Countries of South America	09-10 (1) 10-13 (2)** 13-16 (3)** 16-17 (2) 17-18 (1)	07-08 (1) 08-09 (3) 09-10 (4) 10-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	19-20 (1) 20-21 (2) 21-04 (4) 04-06 (3) 06-07 (2) 07-08 (1)	21-23 (1) 23-04 (2)* 04-07 (1)
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-10 (1) 10-11 (2) 11-14 (1) 14-17 (2)** 17-18 (1)	07-08 (1) 08-10 (2) 10-11 (1) 14-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-23 (1)	21-23 (1) 23-01 (2) 01-03 (1) 03-06 (2) 06-07 (1)	02-06 (1)*
McMurdo Sound, Antarctica	15-17 (1)	07-09 (1) 18-20 (1) 20-22 (2) 22-00 (1)	00-03 (1) 03-05 (2) 05-07 (1)	04-06 (1)

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	10-14 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	21-23 (1) 23-01 (2)* 01-02 (1)
Northern Europe & European CIS	10-13 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-15 (2) 15-16 (1)	20-23 (1) 23-01 (2) 01-02 (1)	22-01 (1)
Eastern Mediter-ranean & Middle East	10-13 (1)	07-08 (1) 08-09 (2) 09-15 (1) 15-16 (2) 16-17 (1)	20-23 (1)	21-23 (1)
Western Africa	09-12 (1) 12-14 (2)** 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	20-23 (1) 23-01 (2) 01-02 (1)	23-01 (1)
Eastern & Central Africa	12-15 (1)	07-09 (1) 13-16 (1) 16-18 (2) 18-19 (1)	21-00 (1)	22-23 (1)
Southern Africa	09-11 (1) 11-14 (2)** 14-15 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1)	21-23 (1)
Central & South Asia	Nil	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1)	06-08 (1) 19-21 (1)	Nil
Southeast Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-21 (1)	05-08 (1)	Nil

Far East	16-18 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	03-05 (1) 05-07 (2)	06-08 (1)
South Pacific & New Zealand	12-15 (1) 15-18 (2)** 18-19 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	00-01 (1) 01-07 (3) 07-08 (2) 08-09 (1)	02-04 (1) 04-07 (2)* 07-08 (1)
Australia	16-18 (1)**	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (2) 11-17 (1) 17-18 (2) 18-20 (1) 20-22 (2) 22-00 (1)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1)	05-06 (1) 06-07 (2)* 07-08 (1)
Caribbean, Central America & Northern Countries of South America	09-10 (1) 10-11 (2)** 11-13 (3)** 13-15 (4)** 15-16 (3)** 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	19-20 (1) 20-21 (2) 21-01 (3) 01-05 (4) 05-06 (3) 06-07 (2) 07-08 (1)	20-23 (1) 23-06 (2)* 06-07 (1)
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	09-10 (1) 10-11 (2) 11-13 (1) 13-17 (2)** 17-18 (1)	07-08 (1) 08-09 (2) 09-11 (1) 13-16 (1) 16-17 (2) 17-20 (3) 20-21 (2) 21-23 (1)	21-23 (1) 23-02 (2) 02-04 (1) 04-06 (2) 06-07 (1)	23-02 (1) 02-04 (2)* 04-05 (1)
McMurdo Sound, Antarctica	15-17 (1)	17-20 (1) 20-22 (2) 22-00 (1) 08-10 (1)	00-03 (1) 03-05 (2) 05-07 (1)	04-06 (1)

September 15 to October 15, 1996
Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Southern Europe & North Africa	10-12 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Central & Northern Europe & European CIS	10-12 (1)	08-09 (1) 09-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 22-00 (1)	20-00 (1)	21-23 (1)
Eastern Mediter-ranean & Middle East	Nil	08-12 (1) 12-14 (2) 14-16 (1) 20-22 (1)	20-23 (1)	21-22 (1)
Western Africa	11-14 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-17 (2) 17-18 (1)	21-00 (1)	22-23 (1)
Eastern & Central Africa	11-14 (1)	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1) 21-23 (1)	20-22 (1)	Nil
Southern Africa	10-14 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1) 22-00 (1)	19-20 (1) 20-22 (2) 22-23 (1)	20-22 (1)
Central & South Asia	17-19 (1)	08-09 (1) 09-11 (2) 11-13 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 19-21 (1)	Nil
Southeast Asia	16-19 (1)	07-08 (1) 08-10 (2) 10-11 (2) 11-12 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-08 (1)	03-06 (1)
Far East	16-19 (1)	07-08 (1) 08-10 (3) 10-13 (2) 13-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	01-02 (1) 02-06 (2) 06-07 (3) 07-08 (2) 08-09 (1)	02-05 (1) 05-07 (2)* 07-08 (1)
South Pacific & New Zealand	12-15 (1) 15-16 (2)** 16-18 (3)** 18-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-14 (1) 14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-00 (3) 00-05 (4) 05-07 (3) 07-08 (2) 08-09 (1)	23-02 (1) 02-07 (2)* 07-08 (1)
Australia	13-16 (1) 16-19 (2)** 19-21 (1)	01-07 (1) 07-08 (1) 08-10 (3) 10-12 (2) 12-13 (1) 17-19 (1) 19-20 (2) 20-23 (3) 23-01 (2)	00-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	02-04 (1) 04-07 (2)* 07-08 (1)
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-11 (2) 11-13 (3)** 13-15 (4)** 15-16 (3)** 16-17 (2) 17-18 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-23 (1)	18-21 (1) 21-22 (3) 22-02 (4) 02-04 (3) 04-06 (2) 06-08 (1)	20-22 (1) 22-02 (2) 02-04 (3)* 04-05 (2)* 05-06 (1)
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-10 (1) 10-11 (2) 11-13 (1) 13-17 (2)** 17-18 (1)	08-10 (1) 13-15 (1) 15-17 (2) 17-20 (3) 20-21 (2) 21-23 (1)	20-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-06 (1)	22-00 (1) 00-04 (2)* 04-05 (1)
McMurdo Sound, Antarctica	16-18 (1)	08-10 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	01-03 (1) 03-05 (2) 05-07 (1)	03-06 (1)

***Indicates best times for 10 meter openings.*
**Indicates best times for 160 meter openings.*
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.

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	PS120M	PS140II	RS300	PS400T	PS50TM
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Current (ICS)	12	14	30	40	5.2
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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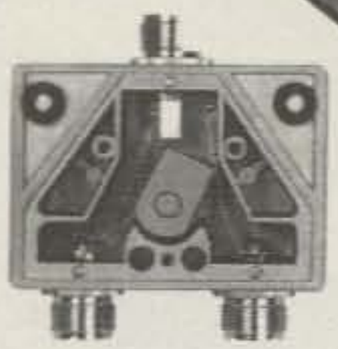
Isolation	60 dB 600MHz	50dB 1 GHz	60dB 300 MHz
Conn.	SO239	N	N



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CIRCLE 171 ON READER SERVICE CARD

column has contained special propagation forecasts. This year's contest weekends are:

October 26–27—SSB Section
November 23–24—CW Section

In the tradition of the past 45 years, there will appear in the next month's "Propagation" column a special, comprehensive forecast that will focus on both sections of the contest. Besides the latest updated propagation predictions to all areas of the world, it will also contain pointers for scoring as many points as possible.

Moon Reflected Ionizing Radiation (MRIR Effect)

In the June column we reported correspondence from Chuck Bolland, KA4PRF, relating his findings of a possible association between the moon and the ionosphere. From the response that Chuck has received, it appears that there is quite an interest in this subject among radio amateurs. Following are excerpts from e-mail we received from Denny, K8DO (e-mail <k8do@aol.com>). To Denny also goes the credit for creating the name **Moon Reflected Ionizing Radiation (MRIR) Effect.**

" . . . I found your June *CQ* Propagation column relating the findings of Chuck Bolland, KA4PRF, to be most interesting. I had the immediate reaction 'Why didn't I think of that?' as I found his hypothesis that reflected solar radiation from the moon can affect the level of ionization in the ionosphere on the night side as being plausible and likely.

"I would like to discuss the term 'unscientific' used by both Chuck and you to describe the work to date. I have to disagree with that assessment. While his system of measuring the signal quality can be markedly improved and made less subjective, I find Chuck's work to date to be in the tradition of field research in science. Galileo, DaVinci, Mendel, Darwin, Marconi, Feynman, and many others would immediately recognize his methodology. New scientific findings are frequently the result of a chance observation or hunch, and the initial field data, which helps to convince an observer (and others) that the topic is worth following in a more rigorous fashion can often be quite subjective . . . So, the 'unscientific' method is not necessarily bad . . .

"I find the possibility of the MRIR Effect to be an exciting addition to (amateur radio) and I am interested in participating in this research. Chuck's observations need basic gathering for confirmation. Several questions come to mind. Does the MRIR Effect affect propagation only on the night side, or does the effect also affect/enhance propagation on the sun side? How many days/hours each side of full moon has perceptible effects? Which layers of the ionosphere are more/less affected as compared to full sun exposure? i.e., I expect that the ionizing radiation reflected from the moon will have an altered spectrum as compared to sun side radiation, in addition to the obvious intensity difference. What effect does seasonal variation have, in addition to the known seasonal variations in sun side propagation? What latitude variations occur?

"Finding something new in science is just fascinating. I hope that this topic will be of interest to the radio amateur community and that data gathering and central collection of that data for analysis can be organized. Perhaps some of the universities can be interested. I wonder if W8JK/Ohio State might be recruited.—Cheers, Denny, K8DO"

Readers interested in participating in the MRIR project can contact Chuck Bolland, KA4PRF, either by e-mail at <chuck@mail.filnet.com> or by the Postal Service at P.O. Box 18402, West Palm Beach, FL 33416.

Internet Space Weather And Propagation Course

In my May column I discussed the Web page published by the Solar Terrestrial Dispatch (STD) experts located in Alberta, Canada. I understand that an increasing number of radio amateurs are now using the STD Web page to obtain a volume of updated ionospheric, solar, geomagnetic, and other atmospheric data.

Cary Oler, one of the resident experts at the STD, has informed me that they are planning to open again to the public their popular Internet Space Weather and Propagation Course. The course is entirely electronic, mainly downloaded from ftp and the World Wide Web, and with direct one-to-one assistance and correspondence via e-mail. It is broken down into two sections. Course A is an in-depth look at the Sun's influence on our environment and natural phenomena such as the ionosphere, geomagnetism, auroral displays, solar winds, sunspots, solar flares and storms, etc., and the latest methods for forecasting events that are produced by such phenomena and which have an effect upon terrestrial and spatial communications. Course B is of a more operational nature, covering all aspects of radio propagation forecasting.

Cary Oler points out that the purpose of the course is to teach how to accurately predict radio propagation conditions and to provide an understanding of the natural phenomena that are involved. The course is conducted with a large assortment of visual and graphic computer programs and databases developed by STD. This makes it possible for participants to work at their own pace, and there are no time restrictions. STD help is always available by e-mail. Cary Oler emphasizes that they want the course to be a good, comfortable learning experience and not a taxing one.

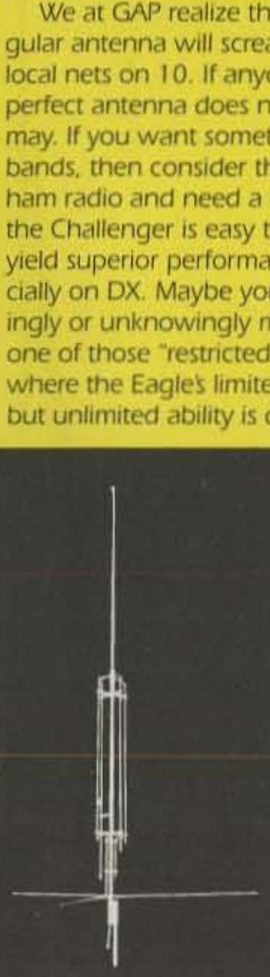
There is a nominal fee for the courses mainly to cover the large amount of computerized material that is supplied. The STD will extend a $100 discount to readers of *CQ*.

The next courses are planned to begin September 23 and October 21. For more detailed information and pricing, check the STD Web page at <http://solar.uleth.ca/solar/www /course.html> or through the STD Web page at <http://solar.uleth.ca/solar>. A course schedule and detailed info can also be obtained by telefaxing 403-756-3008 or 403-756-2380.

73, George, W3ASK

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."

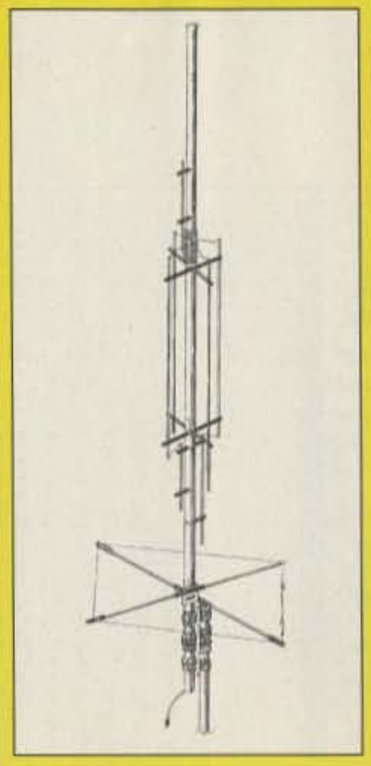
73–"This is a real DX antenna, much quieter than other verticals."

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

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Advertiser's Index

(continued on page 123)

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