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Amateur Radio

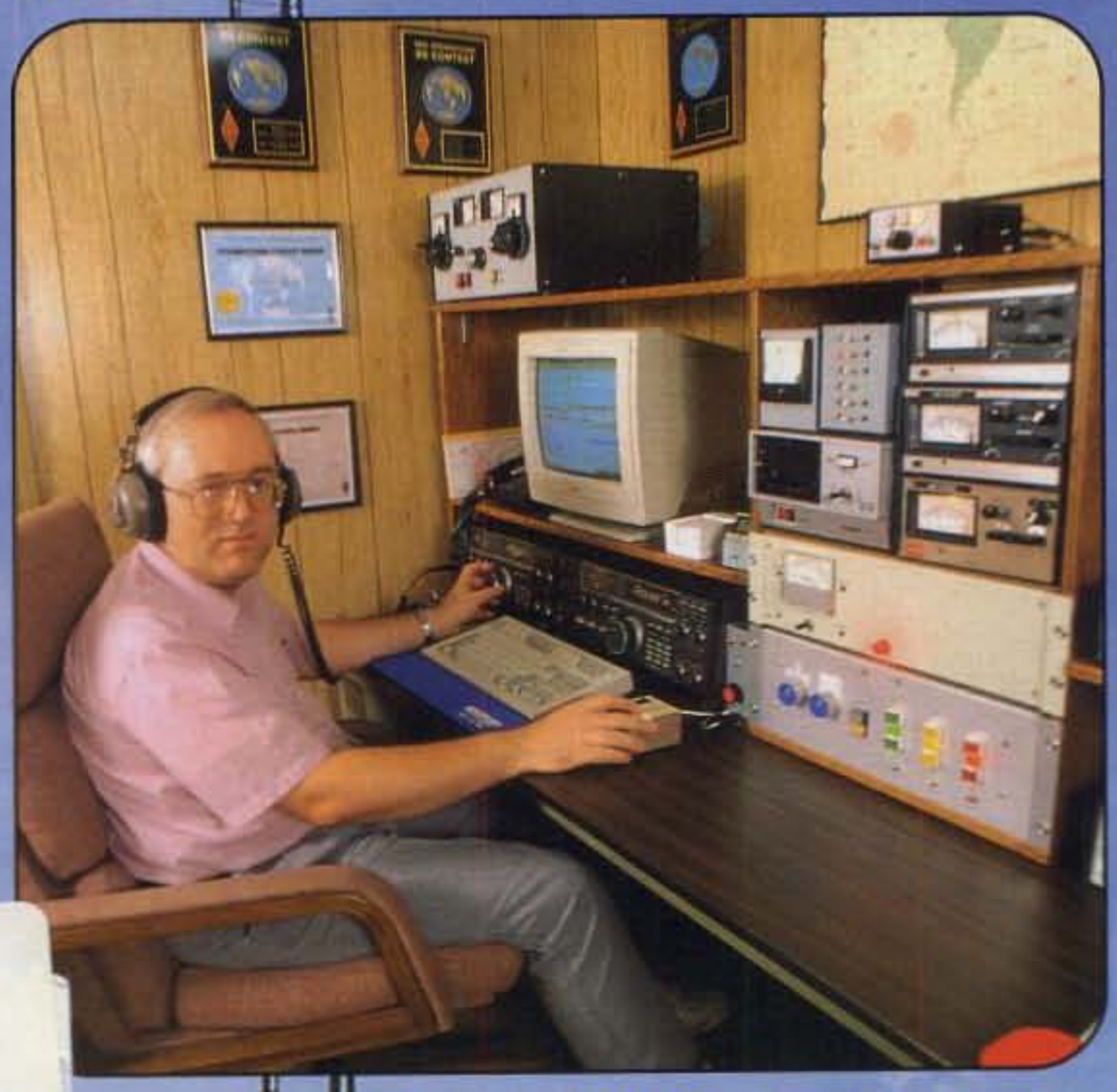
CQ

SERVING AMATEUR RADIO SINCE 1945

AUGUST 1997

In This Issue:

- **XZ1N—A DXpedition to the Union of Myanmar (page 9)**
- **CQ Reviews: The Ameritron AL-800H HF Linear Amplifier (page 30) The Alpha Delta Communications Variable Response Console (page 36)**
- **A Limited Space Antenna For 160 Meters (page 85)**
- **What It Takes To Solar Power Your Station And Then Some (page 74)**
- **Results of The 1996 CQ WW RTTY DX Contest (page 18)**
- **Meteor-Scatter Communications—What It Is And How To Do It (page 66)**



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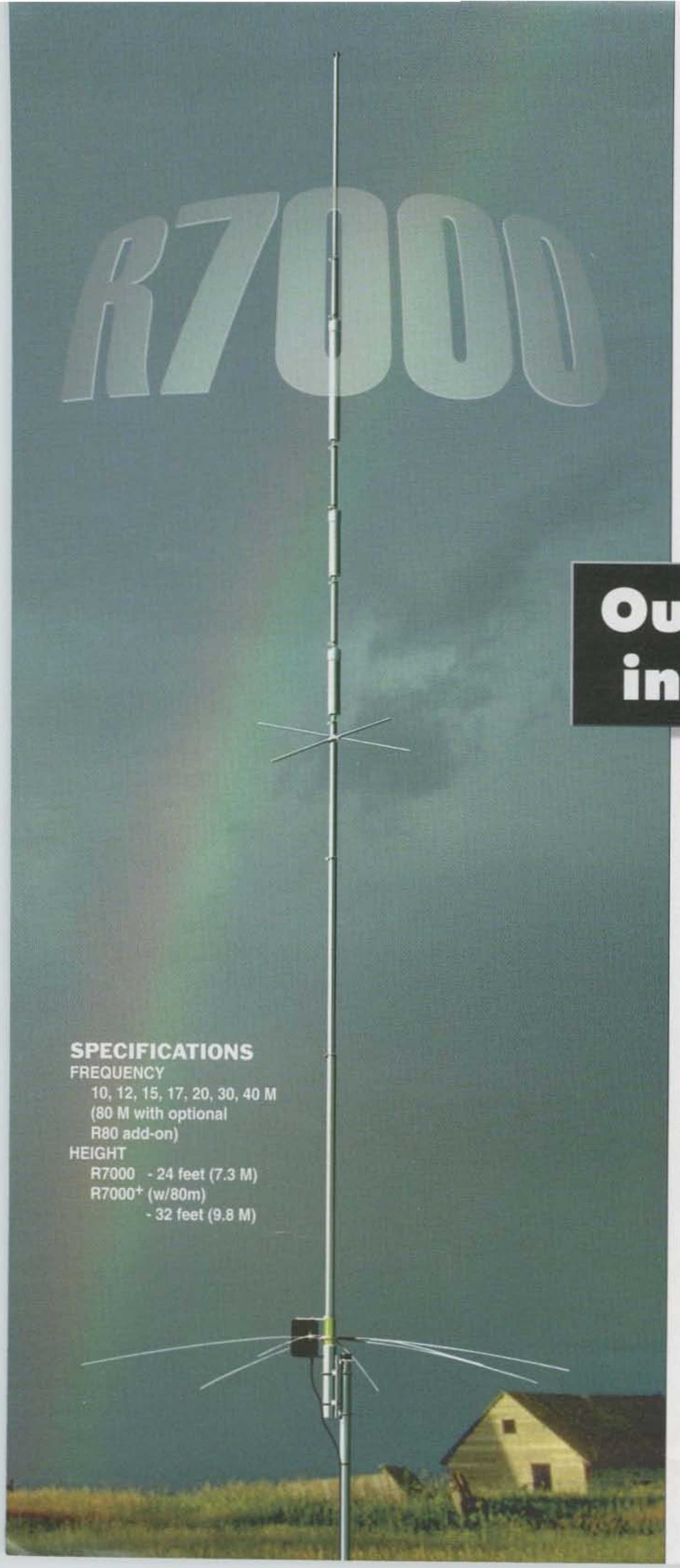
THE RADIO AMATEUR'S JOURNAL



SPECIFICATIONS

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

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

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

Outstanding Performance, Reliability, and Looks

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

Our customers say it best!

Great Performer

"Making great DX contacts to South America and Europe - in poor propagation conditions. My God what will it be like when conditions improve? . . . can hardly wait . . . will add 80 meters soon. Thank you for an excellent product." N1XAE

Reliable

"The R7000 withstood several New England ice/snow storms with no damage." KA1WIU

Outstanding in its field!

Slim Silhouette

"I have antenna restrictions, but no complaints from neighbors!" KS4VN

Easy Installation and Tuning

"The use of similar size hardware is appreciated as this minimizes the number of tools I have to carry up the ladder . . . After following the R7000 printed instructions the antenna worked the first time. It has been a pleasant experience to put up a vertical antenna which performs to the manufacturer's specifications." K1NB

Automatic Band Changing

"Seven bands right out of the box with no tuning is impressive." WV0H

So, if you want an R7000 in your field…or yard… on the roof, or even on the RV for Field Day, contact your dealer today!

Visit our web site (**http://www.cushcraft.com**) for the latest R7000 news and details of our other fine products. You can review the manual and learn how the R7000 and R7000+ work.

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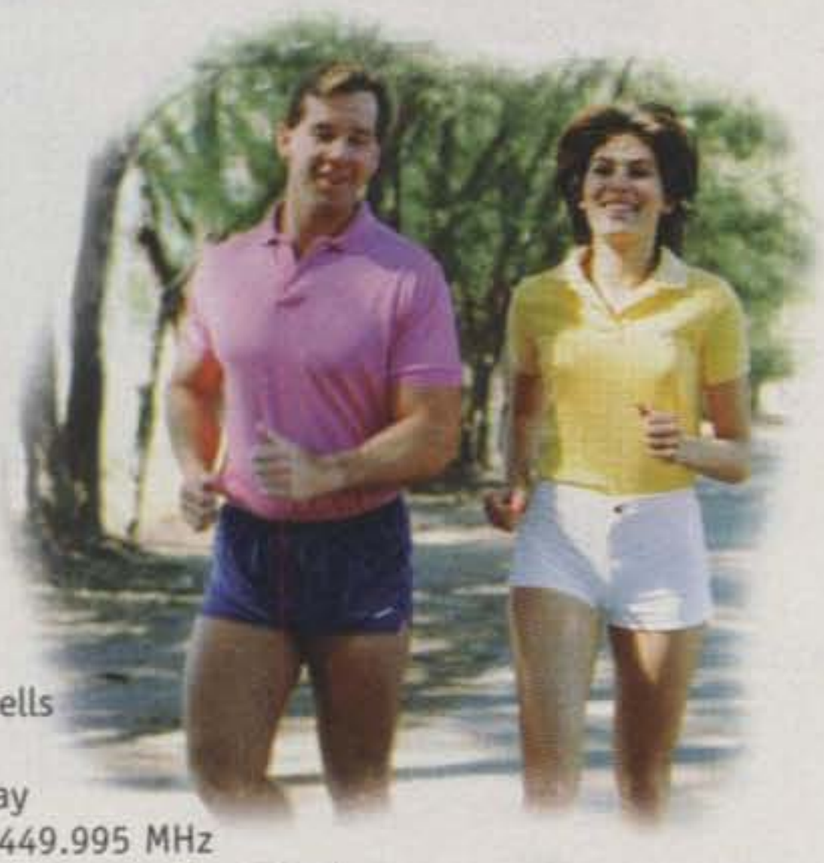
Freedom from High Prices!

New Alinco DJ-S41T UHF "pocket radio" A great radio for under $150!

The fun new radio everyone's talking about!



- Fits in pocket or purse, uses 3 AA cells
- 21 memories
- Large backlit display
- TX+RX range: 425~449.995 MHz
- CTCSS encode PLUS European tone burst
- "Swing Away" flex antenna resists loss and breakage
- Easy to program, easy to operate–one page operating manual!
- Use with speaker mic, headset, vox mic
- Big audio from a little radio
- Great for repeater, simplex or use through cross-band units!
- A great gift for the other hams in your life!

New DR-140T 2 meter mobile/base with alphanumeric display–under $289!

A full-featured FM mobile with many "extras"

- 51 memory channels
- Alphanumeric display up to 7 characters per memory
- Aircraft (AM) receive and extended FM receive
- MARS/CAP capability
- Scanning functions
- Cable cloning features
- CTCSS encode PLUS European Tone Bursts

Alinco has introduced three new radios that allow you to own great equipment with advanced features at very "down-to-earth" prices. Before buying ANY new radio, you owe it to yourself to check out these value leaders from Alinco.

DR-605T full 2 meter/70 cm FM dual-band capabilities at a "super-low" price

The reviews are in and the DR-605T is a hit!

- Get more UHF–TX 430 MHz~449.995 MHz
- Can be used for FM satellite contacts!
- 102 memory channels (51 for each band)
- Cross band repeat feature
- MARS/CAP capability
- Extended receive on both bands
- Internal duplexer saves even more money!
- CTCSS encode PLUS European Tone Bursts
- Cloning capability
- 9600 bps packet ready
- Scanning functions

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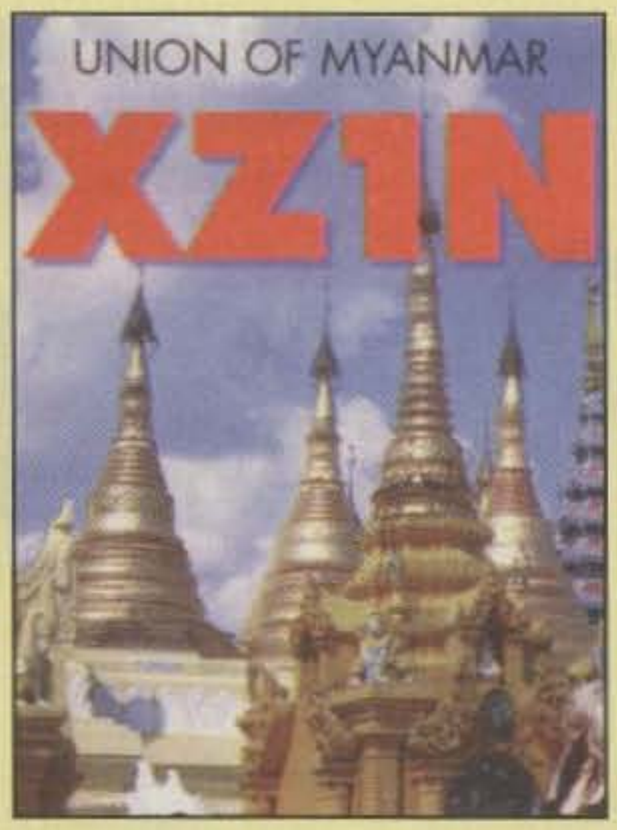
CQ Amateur Radio

AUGUST 1997 VOL. 53, NO. 8

FEATURES

page 58

page 18



page 9

DEPARTMENTS

Best Performance... Best Size...Best Price!

NEW!
Sky Command Operating System
(See your dealer for details)

Kenwood makes Digital Signal Processing technology available to everyone with the all-new TS-570D and TS-570S. Imagine a DSP radio that you can operate in the shack, the car, or on a remote DX island. These are the first DSP rigs that meet the needs of today's HF operator within a budget. From the first moment that you hear the incredibly clear and powerful audio and operate the new, common-sense ergonomic design, you will realize the TS-570D or TS-570S is the HF rig built for you.

The TS-570D and TS-570S offer the world's first CW AUTO TUNE feature which enables automatic zero-beating for CW operation. Advanced Kenwood design and features coupled with traditional Kenwood HF performance make the TS-570D/570S a masterpiece that you can proudly operate. If you have been waiting for a new DSP HF radio with performance at an affordable price, wait no more.

- **The RCP-2 Radio Control Program also allows the HF operator to design and program multiple radios with custom settings while conveniently saving them to a PC file for future use.**
- **Kenwood's Sky Command System option allows you to operate your TS-570D, TS-570S or TS-870S remotely with special version Kenwood TH-79ADH handhelds.**

Large LCD display features a 4-stage dimmer while the **7-digit alphanumeric sub-display** provides menu mode guidance, split frequency display and digital filter selection options. Easy-to-read **S/PWR/COMP/SWR/ALC** meters and an operating guidance feature help to greatly simplify operation.

16-bit DSP technology delivers superb audio quality on both transmit and receive. **Noise reduction** (line enhancer method and SPAC), **audio equalization** (voice/transmit equalizer and speech processor), **slope tuning** and **automatic IF filter bandwidth selections** can be operated with a touch of a button.

Power output can be set between 5 ~ 100 watts in 5 watt increments. 5 watt setting is ideal for QRP operation.

Preset auto antenna tuner with 22 sub-bands from 1.8 MHz - 30 MHz including 6M and memory for both antenna ports.

10-key direct frequency entry

World's first CW Auto Tune enables automatic zero-beating for CW operation.

Quick memory provides five channels for on-the-fly frequency control: **M.IN** stores data, **MR** recalls it.

Electronic keyer provides speed settings of between 0 and 100 wpm and dual key inputs on the back – one for the paddle and one for the key.

Menu system offers 46 types of functions to assist novice thru extra class operators.

A wealth of scanning capabilities enhance operability. Scan speed is variable and can be set for time-based or carrier-based resume. Scanning can work across channels, groups of 10 channels, all except locked out channels, or it can be programmed to scan a frequency range between two channels.

• Mobile/fixed station size (10-5/8 x 3-3/4 x 10-11/16 in) • Heavy-duty design • CW message memories
• CW reverse mode • Full break-in and semi break-in • High-speed 57600 bps PC control • Dedicated packet port

TS-570D / TS-570S

HF Transceiver **HF + 6M Transceiver**

With a half century of engineering and design experience to draw upon, Kenwood is changing the future of HF communications technology. High quality TX-RX audio reproduction with extremely effective DSP interference reduction delivers pleasing performance to your ear and over the air. You will also enjoy the large, easy-to-read LCD display with a built-in on-screen operator guidance system for simple operation. Features like 10-key direct frequency entry with new "soft-touch" keys, auto-antenna tuner, 100 to 5 watt for QRP operation, variable scanning speed, built-in CW keyer, ANT 1-ANT 2 ports, IF shift control, RS-232C com-port, 100 memory channels, CW reverse, optional VS-3 voice synthesizer and DRU-3A digital recording unit make the TS-570D or TS-570S the radio for you.

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ISO 9001
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6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

ZERO BIAS

AN EDITORIAL

One of the hardest things to explain to a non-amateur is just what amateur radio is all about. No, I don't need reminders of global concepts, catch phrases, or geo-political altruism. With over 700,000 licensed amateurs in this country it is difficult to pick out universals of behavior and activity. We all seem to like a lot of different things. About the only thing that can get our collective hackles up is a discussion of the merits of CW and whether or not CW should be a requirement. Then it's easy to have far more people talking about CW rather than actually using it as a mode. The conversation quickly goes from mode status to filter status, whereby the mode is used to keep undesirables and low-motivators out of our gene pool. Therefore, there's at least one universal abstraction or concept that can get a response from most amateurs, pro or con.

This is not about CW, pro or con, but about something that started as an idea last month when I wrote about Dayton and the lack of young people. It dawned on me that I was lumping together a category of people ("young") by nothing other than age. That's the same as saying all amateurs are alike and do the same thing simply by virtue of their license. Yes, there is a fine thread that binds us together under the heading of "amateur," but certainly we all don't chase DX, operate contests, design equipment, collect vintage gear, strive for achievement awards, and participate in the hundreds of other subinterests that we have. In fact, there's virtually no likelihood of all of us showing up on 20 meters at the same time tonight.

It follows then that a general appeal or reaching out to young people for the purpose of interesting them in amateur radio probably would be as successful as finding that clique of amateurs who enjoy the exact same aspect of the hobby as you do. We may think that there's a universal appeal to the whole hobby, but generally we extol or sell the aspect that we as individuals enjoy the most and assume that the next person will have an immediate attraction to the same thing. Well, without any great scientific research to back me up, I'd venture a guess that young people as a group are about as varied in their interests as "old" people. It is also probably safe to say that young people's interests do not include affirming older people's beliefs or validating what they hold dear. They've got enough on their plates at the moment dealing with their own reality.

Then I thought about possible stumbling blocks or impediments that make acquiring an amateur radio license really unattractive. It's not simply having to take a test. Young people take tests all the time. They are conditioned to memorize, learn by rote, and amass large amounts of data that seem to have little or no practical value at the time. They may balk at requirements, but they do them. It's not a lack of perceived role models. We hold up as exemplars astronauts, entertainers, politicians, world leaders, and most certainly parents and family members who happen to be amateurs. While I'm impressed at the panoply of notable amateurs, apparently young people in significant numbers aren't awed enough to want to emulate them with regard to the amateur radio part of their lives. While none of these are impediments, they're not universal turn-ons for young people or anyone else who knows nothing about amateur radio or has limited exposure to it.

While other hobbies and pastimes suffer from the same malaise, I feel that we certainly have a lot more to offer. I therefore began to look for universals—or something that could be added to our requirements or even exchanged for something outmoded—that would lend appeal to amateur radio and tug at the sensitivity of the average young person. The ARRL this year is making a big push for public service (and rightly so), and so I thought about the possibility of exchanging a portion of our examination in favor of a demonstration of altruism. Out there on all bands there are numerous groups and nets that handle traffic for emergencies, medical concerns, various disaster relief, *et al.* I thought about some arbitrary amounts of time (say 25 hours per year) devoted to helping one of these groups, or something similar. Everyone has seen the TV coverage of the recent floods and tornadoes and the initial communications demand for the flight 800 disaster over Long Island. Unfortunate as the circumstances are, throughout the world there is plenty of emergency activity that definitely could benefit from reliable and efficient communications. You could add communications for public events, safety, etc. I guess everyone, no matter what age, can understand and appreciate that need and have some natural willingness to participate.

While I was ruminating over this idea and how to implement it, I tried to think of the negatives. It didn't take too long for one to pop up in the form of a newspaper article. It seems in the community of Lynbrook, here on Long Island, the local schools implemented a similar program for public service credits in order to graduate and receive a diploma. There currently is a flap brewing over several students who have refused to participate and therefore have been denied their diplomas. The "forced" volunteerism is looked on as punishment or as an alternative sentence in the same manner as community service sentences handed out by courts. There is also a bit of wrangling over insurance liabilities. Obviously, the great majority of students took part in the program and in all likelihood got more out of it in terms of real-life experience than the amount of time and effort they put in. It still sounds like a good program.

With regard to amateur radio, there is a core group that always refers to amateur radio as a service, not a hobby. I do feel that for the most part the term "service" has a small "s," and if pressed, they too would react as those few students in Lynbrook did. Service literally means doing something for others, not simply amusing yourself without obligation. Most of us, however, see amateur radio as a hobby, a means of enjoying our free time by doing various singular activities. We do what we do basically by ourselves. Yes, at times we interact via radio with other people who also by and large are by themselves. We don't do too many group activities other than perhaps multi-operator contest stations, DXpeditions, and Field Day. Maybe a bit of public service activity will improve our social skills and help the well being of the community.

I think that we all take pride in and congratulate those selfless amateurs who do see the large "S" in service and who do participate in emergency preparedness activities. I think that feeling extends to those in our respective communities who volunteer for our fire departments, police departments, search and rescue units, etc. They truly are positive role models for our young (and "old") people. While we all appreciate what they do, in some instances we take that effort for granted. However, these services only happen because people volunteer to make them happen.

Maybe as a means of attracting new young or "old" people to amateur radio we need a bit of the spirit that helped to build the Peace Corps and Vista. Maybe what we as amateurs presently do, and those we consider "real hams," are not particularly good turn-ons, except to us. These days there are any number of singular activities whereby a person can "communicate" with another person or group of individuals without a license, exam, or filtering process, and still be totally accepted as "real." What we have to consider is that when we describe amateur radio to a newcomer, *we* are the perceived role model—not the astronaut, entertainer, or world leader. Does that person want to be like us and do what we do? For a lot of young people the answer to that question is no.

Maybe what we have to think about is not specifically adding more filters, changing filters, or even dropping filters to obtaining a license. Maybe what we need to focus on is adding relevance and value to what we already have. Maybe a bit of volunteerism is just the ticket to bring amateur radio in line with the real world and its needs. It's something everyone can relate to and see value in.

73, Alan, K2EEK

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The all New DC442 CTCSS, DCS, and DTMF tone decoder!

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- Decodes 52 CTCSS tones, 106 DCS codes, and 16 DTMF digits
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ANNOUNCEMENTS

• **IRCC Bison Stampede** – This Indiana QSO party is to celebrate the 50th anniversary of the Indiana Radio Club Council. The goal is to get all of the Indiana counties on the air during the party which will be from 1800Z Aug. 2 to 0200Z Aug. 3 on all amateur bands, 1.8 to 446 MHz, excluding 30, 17, and 12 meters. Indiana stations exchange call and county; others exchange call and state/province/DXCC country. Count 1 pt/QSO on phone, 2 pts/QSO on CW. Indiana stations multiply QSO total by sum of Indiana counties, states, VE provinces, plus a max of 5 DXCC countries worked. Count additional DX for QSO points, but not multipliers. Indiana mobiles may add 100 points for each county from which they operated that at least 5 QSOs were made. All others multiply QSOs by Indiana counties. For certificate, submit an entry with 25 QSOs with Indiana stations and 9 × 12 SASE to IRCC Bison Stampede, P.O. Box 18495, Indianapolis, IN 46218.

• **Australian ARS** – To all radio amateurs and interested SWLs who have a professional Naval or Marine background, A.N.A.R.S. offers the opportunity to enjoy amateur radio activities with like-minded individuals. Join one of the Navy nets, QSO/QSL with the crew and/or DX. Weekly nets: Monday on 3532 kHz, 0930Z, CW; Wednesday on 3620 kHz, 0930Z, SSB. Daily nets: 7075 kHz, 0400Z (net control VK2SEA); and 14175 kHz, 0430Z "The Seven Seas Net" (net control VK7SEA). For more info write to Secretary A.N.A.R.S., 13 Brothers Rd., Dundas, N.S.W. 2117, Australia; or phone 02.96383569; or e-mail <fayem@sydney.dialix.oz.au>, or join one of the nets.

• **The following Special Events are scheduled for August:**

AC2P/200, Montauk Point Lighthouse, Montauk, Long Island, New York; Long Island DX Association, to celebrate the bi-centennial; 1400Z Aug. 2 to 1900Z Aug. 3; on standard IOTA frequencies; CW as announced. A special commemorative QSL will be available with SASE from the CBA of AC2P.

W2CM, from the New York State Fair; New York; Liverpool Amateur Repeater Club; 1500–0300Z, Aug. 21 through Sept. 1; operation on 7250, 14250, 21350, and 28400. Send QSL info to Liverpool Amateur Repeater Club, P.O. Box 103, North Syracuse, NY 13212-0103.

N2OB, from "Old Barney" Barnegat Lighthouse, Barnegat Light, New Jersey (Long Beach Island IOTA NA-111); Old Barney ARC; to celebrate National Lighthouse Day; Aug. 9–10, from 1300–2300Z each day; the lower 25 kHz of the General phone bands, 40, 20, 15, also 28.400 SSB, 146.52 simplex, 146.835 repeater and other local repeaters. For special QSL, send regular SASE. For certificate and QSL, send 9 × 12 SASE with 2 units of postage to Old Barney ARC, N2OB, P.O. Box 345, Tuckerton, NJ 08087-0345.

KB2YCT, from Nutley, New Jersey; the Robert D. Grant United Labor ARA; "CQ Labor Day"; 1200Z Aug. 30 to 2400Z Sept. 1; on 14.303, 21.350, 28.420, and 52.525. For certificate, send name, address, and QSL to R.D.G.U.L.A.R.A, P.O. Box 716, Nutley, NJ 07110-0716.

KB3BOD, from Mt. Davis, the highest point in Pennsylvania; Somerset, Pennsylvania; Somerset Co. ARC; 1700Z Aug. 9 to 2000Z Aug. 10; operation on 14.075, 14.275, 21.075, and 21.350. For certificate send name, address and QSL to KB3BODSCARC, Box 1453, Gray, PA 15544.

N4HID, Bowling Green, Kentucky; Western Kentucky DX Association; in recognition of the contribution of animals to mankind; 0100Z Aug. 30 to 2400Z Aug. 31; on 7330, 14280, 21380, and 28580. For certificate send name, address, and QSL to Ed Gann, N4HID, 445 Elrod Road, Bowling Green, KY 42104.

W8MAI, from Heath Company, Benton Harbor, Michigan;Blossomland ARA; to celebrate the 50th anniversary of The Heath Company; Aug. 9–10 and Sept. 13–14. During Aug. 9–10 eight stations will operate on all HF bands and possibly 6 and 2 meters. The Sept. 13–14 event will feature an all Heath station operating primarily on 20 and 40 meters. Send all QSL requests to N8SHZ at the *Callbook* address and include a#10 SASE. QSL will be similar to those sent by Heath employees.

W9DK, from the WWII submarine the *USS Cobia*, Manitowoc, Wisconsin; Mancorad Radio Club; to commemorate the 51st anniversary of the submarine's decommissioning; 1400–2200Z Aug. 16; on SSB 7250 and 14250 kHz. For QSL, send QSL and #10 SASE to Fred Neuenfeldt, W6BSF, 4932 S. 10th St., Manitowoc, WI 54220-9121.

W9ZL, from "Pioneer Airport" adjacent to the EAA Aviation Museum, the Experimental Aircraft Association Fly-In and Convention; Oshkosh, Wisconsin; members of the Fox Cities ARC; Aug. 1–3; operation on the General phone portions of the HF bands, plus RTTY and CW as conditions permit. For special 8 ×10 certificate, send QSL and SASE to Wayne Pennings, WD9FLJ, 913 N. Mason St., Appleton, WI 54914.

W9BPT, from Thomson, Illinois; Palisades ARC and 90 West DX Association; to celebrate Thomson Melon Days; 1700–2100Z Aug. 31; the lower portion of the General 40 and 20 meter bands. For certificate, send QSL and 9 × 12 SASE to Bob Plumley, K9IEG, 1123 West Main St., Thomson, IL 61285.

WDØGAT, from Iowa; The Tama ARS; to celebrate the 100th anniversary of Lennox Manufacturing; 1500–2300Z Aug. 16; General 80–15 meter phone, Novice 10 meter phone, and 2 meters. For certificate, send QSL and 9 × 12 SASE to TARS/WDØGAT, P.O. Box 94, Montour, IA 50173.

WAßCJU/9ALD, from Waseca High School, Waseca, Minnesota; second annual Edgar F. Johnson Memorial special event station; 1300–0200Z both days Aug. 16–17; AM 3885, 7290, 14286, 21400, 29000; SSB 3900, 7260, 14250, 21350, 28400; and CW 3700, 7125, 14050, 21150, 28050 kHz. Qualified licensed amateurs may operate vintage Johnson rigs and receive operator certificates; special QSLs returned for verified contacts. Contact Ed Wirtz, KØBKA, 507-835-3665.

CH3CSO & **CG3CSO**, from Ontario Special Olympics Summer Games, Chatham-Kent, Ontario, Canada; the Chatham-Kent ARC; to commemorate the Ontario Special Olympics Summer Games; Aug. 7–10; operation on SSB and CW 10, 15, 20, 40, and 80 meters. For a certificate, send QSL to CH3CSO/CG3CSO, c/o Chatham-Kent ARC, Inc., P.O. Box 284, Chatham, Ontario, Canada N7M 5K4.

• **These hamfests, etc., are slated for August:**

Aug. 2, **Auburn Hamfest '97**, Weedsport Speedway and Fairgrounds; Weedsport, New York. Contact Dick Bardin, KA2EGA, 14006 Martville Rd., Martville, NY 13111 (315-564-6570).

Aug. 2, **1997 Upper Peninsula Amateur Radio Convention**, Dee Stadium, Houghton, Michigan. Contact Roland Burgan, KB8XI (phone 1-906-482-2403; e-mail <rburgan@up.net>; packet <KB8XI@W8YY.#upmi.mi.us.na>.

Aug. 2, **9th Annual HPARC Lomer L. McMahan Memorial Hamfest**, High Point National Guard Armory, High Point, North Carolina. Contact Judy Walker, P.O. Box 1163, Jamestown, NC 27282 (910-887-3281).

Aug. 2, **Western Illinois ARC Annual Hamfest**, Eagles Alps, Quincy, Illinois. Contact N9JF at 217-336-4191. For exam info contact NA9Q at 217-224-8526. (Exams.)

Aug. 2, **Athens Hamfest and Computer Expo**, Oconee County Civic Center, Athens, Georgia. Con-

tact George Kelley at 706-543-9590; e-mail <wb4vnt @athens.net>; or write Athens Radio Club, P.O. Box 6337, Athens, GA 30604. (Exams.)

Aug. 2, **Mt. Shasta ARC Swapmeet & Luncheon**, Mt. Shasta County Park, Mt. Shasta, California. Contact Rich Zanni, KJ6RA, P.O. Box 601, Mt. Shasta, CA 96067 (916-926-1237).

Aug. 3, **Swap '97**, St. Clair County Community College, Port Huron, Michigan. Contact Bob Herbert, KB8WMW, P.O. Box 611230, Port Huron, MI 48061-1230; or e-mail <kb8wmw@juno.com>.

Aug. 3, **47th Annual Winchester Hamfest and Computer Show**, Clarke County Fairgrounds, Berryville, Virginia. Call Irv Barb at 540-955-1745; or e-mail <http://www.w3ic.com/inet/svarc/hamfest>; or write to Irv at Route 3, Box 5385, Berryville, VA 22611. (Exams.)

Aug. 3, **Annual Land of Lakes Angola Hamfest**, Steuben County 4-H Fairgrounds, Crooked Lake, Angola, Indiana. Contact Land of Lakes Angola Hamfest, Sharon Brown, WD9DSP, 905 W. Parkway Dr., Pleasant Lake, IN 46779 (219-475-5897). (Exams.)

Aug. 3, **ARRL National Convention**, Jacksonville Convention Hall, Jacksonville, Florida. Orange Park ARC VE Team will be conducting VE Exams. Pre-registration requested but not required.

Aug. 3, **6th Annual Marshfield Area ARS Picnic**, Wildwood Park, Marshfield, Wisconsin. Contact Guy A. Boucher, KF9XX, 107 West Third St., Marshfield, WI 54449 (phone 715-384-4323; e-mail <guyboucher @tznet.com>; packet <KF9XX@ W9IHW.WI.USA.NA>.

Aug. 3, **Portage Hamfair '97**, Portage County Fairgrounds, Randolph, Ohio. Call Joanne Solak, KJ3O, 330-274-8240.

Aug. 3, **Skyview Radio Society Hamfest** Washington Township Firehall, North Washington, Pennsylvania. Call Bob Reihms, N3NOS, 412-727-2194 (after 6 PM EST).

Aug. 3–4, **Greater Jacksonville Amateur Radio & Computer Show**, Jacksonville, Florida. Call Larry Filzen, WB4CGD, at 904-272-0726; fax 904-272-3250; or write to P.O. Box 27033, Jacksonville, FL 32205.

Aug. 9, **1st Annual Circus City Swapfest**, Sauk County Fairgrounds, Baraboo, Wisconsin. Contact Yellow Thunder ARC, 1120 City View Rd., Baraboo, WI 53913; or via the Web <http://www.thelorax.com/~sschulze/hamfest.htm>.

Aug. 9, **T.A.R.A. Hamfest & Computer Show '97**, Veteran's Memorial Field House, Huntington, West Virginia. Call Georgia Overby, KA8QME, 304-522-1811.

Aug. 9, **Tacoma Electronics Fleamarket**, Charles Wright Academy, Tacoma, Washington. Call Alan at 206-840-4947; Bill at 206-584-1086; or Al at 206-474-9023.

Aug. 9, **St. Cloud Radio Club Hamfest**, Whitney Senior Center, St. Cloud, Minnesota. Call 320-251-8008. (Exams.)

Aug. 9, **Juniata Valley ARC Hamfest**, Decatur FC grounds on Pennsylvania Route 522, 8 miles east of Lewistown, Pennsylvania. Call 717-242-1882.

Aug. 10, **DuPage ARC Hamfest and Computer Show**, Hawthorne Race Course, Stickney, Illinois. Call 708-985-9256; or conact them on the Web at <http://homepage.interaccess.com/~geirh>. (Handicapped accessible.)

Aug. 10, **Central Kentucky ARRL Hamfest**, Western Hills High School, Frankfort, Kentucky. Contact Bill DeVore, NF4X, 112 Brigadoon Pkwy., Lexington, KY 40517; phone 606-257-3343 or 606-273-8345; <devore@engr.uky.edu>. (Exams.)

Aug. 10, **Central Oregon DX Club Ham Radio & Computer Swapfest**, Deschutes County Fairgrounds, Redmond, Oregon. Contact Bill Sawders, K7ZM, 19821 Ponderosa St., Bend, OR 97702 (541-389-6258).

Aug. 16, **6th Annual Ham Radio, Computer & Electronic Equipment Swap Meet**, Cowlitz County Fairgrounds, LOngview, Washington. Contact Bob Morehouse, KB7ADO, 360-425-6076 evenings, otr write to LCARC Swap Meet, P.O. Box 906, Longview, WA 98632 (e-mail<KB7ADO@aol.c om>).

Aug. 16, **Roanoke Valley ARC Hamfest & Computer Show**, Roanoke Civic Center, Roanoke, Virginia. For more information, contact Terry, AE4EW, 540-890-6782; e-mail <ae4ew@ix.netcom.com>. (Exams.)

Aug. 16, **Brantford ARC Flea Market**, Burford Fairgrounds, Burford, Ontario. Contact Richard La Rose, VE3RLX, 153 Dunsdon Street, Brantford, ON Canada N3R 6N3; phone 519-752-2437; e-mail <rlarose@bfree.on.ca>; or via packet <VE3RLX@ VA3SME>.

Aug. 16, **Tailgate Hamfest & Open House**, Kosciusko Co. Amateur Radio Center, Warsaw, Indiana. Call Loren Melton, WB9OST, 219-858-9374 (eves.). (Exams.)

Aug. 17, **MIT/Harvard Fleamarket**, Albany and Main St., Cambridge, MA. Call 617-253-3776.

Aug. 17, **7th Annual Paulding County Hamfest**, Paulding County Fairgrounds, Paulding, Ohio. Contact Jerry, KB8MAF, PCARG, Inc., 10392 SR 500, Paulding, OH 45879; phone 1-419-399-4507, or e-mail <jlrhod@bright.net>.

Aug. 17, **Santa Barbara ARC Hamfest '97**, the Elk's Grove, Santa Barbara, California. Call 805-569-5900. (Exams.)

Aug. 17, **DELMARVA Hamfest**, Delaware Technical and Community College, Georgetown, Delaware. Contact the Delmarva Hamfest, Route 6, Box 64A, Georgetown, DE 19947.

Aug. 17, **40th Annual Warren Hamfest**, Trumbull Branch Campus of Kent State University, Warren, Ohio. Contact Warren ARA, P.O. Box 809, Warren, OH 44482; or call Hamfest Chairman, Al Van Slyke at 330-889-3378. (Exams.)

Aug. 22–23, **New Orleans International DX Convention**, Royal Sonesta Hotel, New Orleans, Louisiana. Contact the New Orleans International DX Convention, c/o Michael Mayer, W5ZPA, 5836 Marcia Ave., New Orleans, LA 70124 (phone 504-837-1485, fax 504-524-2129).

Aug. 23, **SCARS Hamfest**, Somerset County 4-H Center, Bridgewater, New Jersey. Contact Pat, N2CQM, at 908-873-3394; or write to SCARS, P.O. Box 742, Manville, NJ 08835.

Aug. 23, **5th Annual Mohawk ARC Hamfest**, Mohawk Drive-In Theater, Gardner, Massachusetts. Contact John, WF1L, at 508-249-5905 (4–9 PM); or Tom, N1KKY, at 508-249-4814 (6–9PM); or Paul, N1IPG, at 508-632-9432 (6–10 PM).

Aug. 23, **Northwoods Hamfest**, Sugar Camp Town Hall, Sugar Camp, Wisconsin. Contact Mary Berger, NS9Q, 367 Lois Street, Rhinelander, WI 54501 (715-362-9296). (Exams.)

Aug. 23–24, **16th Annual MARC Campfest-Swapfest**, Coloradio Lions Camp, North of Woodland Park, Colorado. Write to MARC, P.O. Box 1012, Woodland Park, CO 80866-1012; or call Don, AAØNW, at 719-687-3692.

Aug. 24, **Yonkers ARC Hamfest/ Computerfest**, Yonkers Municipal Parking Garage, Yonkers, New York. Contact YARC, P.O. Box 378 Centuck Station, Yonkers, NY 10710-0378; or phone Jim at 914-969-5182; or Dan at 914-667-0587.

Aug. 24, **NoBARC Annual Flea Market**, Adams Agricultural Fairgrounds, Adams, Massachusetts. Contact Joel Miller, N1WCF, at 413-442-2609; or e-mail <n1wcf@cbcc.bcwan.net>.

Aug. 24, **The VHF/UHF Conference Swap 'n Sell Fleamarket**, Harley Hotel Parking Lot, Enfield, Connecticut. Contact Mark Casey, N1LZC, 303 Main St., Hampden, MA 01036; phone 413-566-2445 (8 AM to 9 PM EST); or e-mail <N1LZC@juno.com>.

Aug. 31, **Hamfest/Radiofest/Computer Expo**, Dubuque County Fairgrounds, Dubuque, Iowa. Contact Loren Heber, NØYHZ, at 319-556-5755; or Jerry Lange, KBØVIK, at 319-556-3050; or Jerry Ehlers, NØNLU, at 319-583-1016; or write to GRARC, P.O. Box 546, Dubuque, IA 52004-0546. (Exams.)

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As K7WX points out, rare DX is rare for a reason. While the reasons may vary, it doesn't get any more exciting than this—the chance to go on a DXpedition and to re-open a country to amateur radio at the same time.

XZ1N

The Re-opening of The Door to Amateur Radio In The Union of Myanmar

BY WARREN HILL*, K7WX

The chance to operate from The Union of Myanmar came unexpectedly. In December 1995 the XV7DX group of the Central Arizona DX Association was in the final stages of negotiations with the Hanoi government for the first American operation from Vietnam since the end of the war. A month before our planned departure we received a call from Martti Laine, OH2BH. Martti wanted to know if we would be interested in following the XZ1A Myanmar DXpedition with an operation from the capital city of Yangon. It took only a minute to make the decision to change our plans.

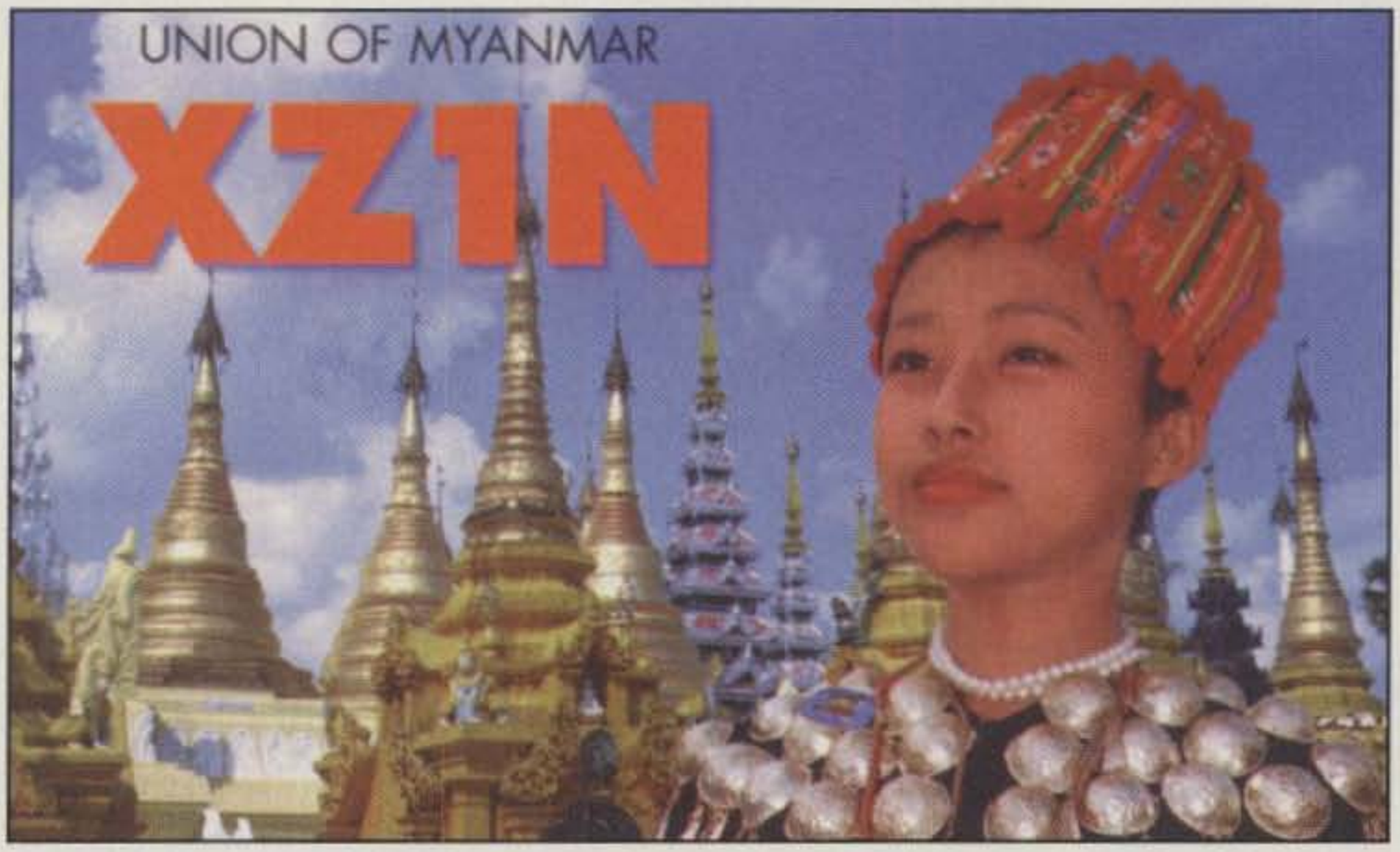
With the overwhelming success of XZ1A in the fall of 1995 still fresh in our minds, enthusiasm was high to run a well-equipped, large-scale operation from Myanmar. It was our collective hope that another successful demonstration of amateur radio would bring things one step closer to the establishment of a permanent amateur radio service in a country that has been mostly silent for more than three decades.

With our trip to Vietnam now placed on hold, tentative plans were made to travel to the Union of Myanmar in April 1996. However, the unexpected events of the next eleven months would take us on an emotional roller coaster ride through the surprise of a sudden cancellation to the exhilaration of running massive pile-ups from one of the rarest of the rare.

Reinstatement of A Ban On Amateur Radio

As we were to soon discover, rare DX is usually rare for a reason. Our first clue that amateur radio was not yet on a solid footing was that two months before our planned departure, permission for the Finnish XZ1R operation would unexpectedly be withdrawn. Unknown to any of us, the hotel from which the XZ1A operation had taken place was discovered by the Myanmar government to have an "illegal" paging system. The events that followed quickly overtook us. After months of preparations, a call already assigned, and airline reservations confirmed, our April activities would be canceled by the Yangon government. Even though

*7525 E. Broadway Road, Mesa, AZ 85208
e-mail: k7wx@getnet.com



The QSL card of XZ1N.

The XZ1N team. K5VT had left for Togo, West Africa and OH2BH had left for Nauru Island at the time this picture was taken. Top row, left to right: John Arthurs, K7WP; Rich Chatelian, K7ZV; Dan Brown, NA7DB; and Tom Schiller, N6BT. Bottom row, left to right: Jack Reed, WA7LNW; Robin Critchell, WA6CDR; Sally martinez, KM5EP; Warren Hill, K7WX; Jessica Brown, N7ZRD; and Millie Thompson, WY7K.

Warren, K7WX, leader of the XZ1N Myanmar DXpedition team, presents honorary membership in the Central Arizona DX Association to His Excellency Lt. General Khin Nyunt, Secretary-1 of the State Law and Order Restoration Council on November 18, 1996.

the hotel's pager problems had nothing to do with our team, or the members of the XZ1A operation, a general ban on any form of radio activity was reinstated, and the equipment left behind by OH2BH, JA1BK, and N7NG was confiscated. In spite of faxes, telephone calls, and letters, it looked as though the door to amateur radio in the Union of Myanmar had been closed shut one again.

Meetings With The Myanmar Government

Six months after this new ban on amateur radio activity went into effect, it was decided that a face-to-face dialog with Myanmar government officials was the only way to get our operation back on track. Martti Laine, OH2BH, Kan Mizoguchi, JA1BK, and myself, K7WX, agreed to gather in Yangon on August 25, 1996. We were to meet several days later with His Excellency Lt. General Kyaw Ba, Minister for Hotels and Tourism and a Senior Member of the State Law and Order Restoration Council, who previously had represented the interests of amateur radio to the Myanmar government. The XY1HT, XZ1X, XZ1A, XZ2BH, and XY1U operations all were allowed to proceed due to his personal support.

On the way to Yangon, I stopped in Thailand for two days to decompress after a long flight from Arizona. I was met in Bangkok by Thida Denpruektham, HS1ASC, editor of the Thai amateur radio journal *100 Watts* and Kittipong Ongvarrasopone, HS1ASN, who graciously hosted me. Thida even took me to an ancient Buddhist temple in Bangkok to offer prayers on my behalf for a successful meeting in Yangon.

I was impressed by all the Thai radio amateurs I met, who are always looking for ways to improve the hobby and to involve others at every level. In fact, even the King of Thailand, His Majesty King Bhumibol Adulyadej, has the call sign HS1A. My Thai hosts were especially proud of this fact and that my visit coincided with the 50th anniversary of his accession to the throne. On August 25th I left Bangkok for Yangon with Buddha's prediction for success and the good wishes of the Radio Amateur Society of Thailand.

At the Yangon airport I was graciously met by U Hla Myint of the Ministry of Hotels and Tourism and Daw Khin Hnin Nwe of the Nokia Corporation. The next day I hooked up with Martti Laine and Kan Mizoguchi at the same hotel where the XZ1A operation had taken place ten months earlier. In the two days before our meeting with government officials I had the opportunity to meet U Htay Aung, the Director of the Ministry of Hotels and Tourism, and U Nay Tun of the Nokia Corporation, who had made our preliminary arrangements. Word came to us from the Ministry of Hotels and Tourism that our meeting was set for Wednesday morning, August 28th. Happily, we were informed by the hotel staff that the Burmese astrological calendar showed this to be a particularly auspicious date. All concerned felt that we could now proceeded with confidence.

XZ1N Approved

Due mainly to OH2BH's persuasive powers, our meeting with His Excellency Lt. General Kyaw Ba went very well. Martti skillfully outlined the accomplishments of prior operations and the many possibilities for the future. Following a demonstration of the XZ1N world-wide web site, permission was given to operate as XZ1N for the next 48 hours. Later that day Lt. Col. Khin Maung Latt, Director General of the Ministry of Hotels and Tourism, gave us the good news that approval had also been given by His Excellency Lt. General Khin Nyunt, Secretary-1 of the State Law and Order Restoration Council, for a much larger operation in mid-November. This second operation was timed to coincide with the opening ceremony of "Visit Myanmar Year 1996."

For two days XZ1N was intermittently active from Yangon on CW and SSB. U Tin Win, the Chief Engineer of the Summit Parkview Hotel, helped and JA1BK erected a dipole on the roof of the Ministry of Hotels and Tourism using bamboo poles lashed together. When we were finished, it was a beautiful sight to see an antenna high above the city center and next to the flag of the Union of Myanmar! Unfortunately, we were restricted to only 100 watts and between meetings had little free time for operating. These limitations, and downtown Yangon's high level of local electrical noise, prevented us from making many contacts. Approximately 300 stations were worked in Europe and Japan. Propagation to the Americas was not available during the brief periods when we were QRV.

After the first night of operating I hurriedly sent a FAX to our QSL manager, W1XT, asking him to post the exciting news to the Internet

The XZ1N DXpedition operating site, the New World Inya Lake Hotel as seen from the north. With most antennas at a height well above 90 feet, and their Fresnel zone over water, this was a DXer's dream location.

Jack Reed, WA7LNW, and Captain Ko Ko Oo, Foreign Liaison Officer of the Ministry of Defense on the roof of the XZ1N operating site, the New World Inya Lake Hotel in Yangon.

Myanmar—A Brief Overview

Myanmar: Southeast Asia, CQ Zone 26. Size: 261,217 square miles (676,577 square km) and is approximately the size of the United Kingdom and France combined. Population: 45 million. Often referred to as "The Golden Land" because of its many gold-covered Buddhist pagodas. The country is divided into 14 administrative zones made up of 7 divisions and 7 states, all under the central control of the State Law and Order Restoration Council in Yangon.

Principal Cities: Yangon 16°58'N, 96°17'E. Mandalay 21°57'N, 96°04'E.

Local Time: GMT +6.5 hours. Nine PM Sunday in Los Angeles is 11:30 AM Monday in Yangon.

Languages: Myanma (Burmese) is the official language. Aside from Myanma, Karen, Shan, Mon, Jingpo, Mon-Khmer, and Parauk are a few of the major languages spoken by members of more than 100 distinct ethnic groups found throughout this country. Members of isolated tribes along the border with China do not speak Myanma. English is becoming more widespread in the capital of Yangon.

Location: The Union of Myanmar occupies the eastern portion of the Bay of Bengal and the Andaman Sea. It is situated between Thailand, Laos, China, India, and Bangladesh. It is approximately 8300 air miles from Los Angeles.

Climate: Tropical monsoon. The rainy season is generally from May through October. Average precipitation in July is more than 20 inches. Average temperature in April is between 95°F and 100°F. The "cool" season is in November, with an average temperature of 85°F.

Currency: The Myanmar Kyat. Approximately 168 Kt = US$1. At the Yangon Airport there is a compulsory exchange of US$300 for another monetary unit known as Myanmar Foreign Exchange Currency (FEC); 1 FEC = US$1. Foreign currency is accepted mainly in hotels and other operations run jointly with the Myanmar government. Some shop owners will accept dollars and some government owned operations will only accept FECs.

Power: 220 volts/50 cycles. In the capital city of Yangon outages are surprisingly uncommon.

Visa: Embassy of the Union of Myanmar, 2300 "S" Street NW, Washington, DC 20008. Valid passport and travel itinerary are presently required for all foreign nationals. Single entry visa is US$10 with a one to two week turnaround. Telephone: (202) 861-0737; fax: (202) 323-9046. In North America visa application forms may be requested by fax.

Diseases: Current immunity to hepatitis and typhoid are recommended. Malaria prophylaxis is begun one to two weeks before leaving and is continued for four to six weeks after returning. Consult your physician or the CDC in Atlanta for current recommendations.

License: An official policy regarding licensure of foreign nationals has not yet been fully developed. License requests are considered only on an individual basis and must be approved by the State Law and Order Restoration Council. Contact the author directly for more information.

DX reflector that the door to amateur radio in the Union of Myanmar had once again been reopened! A call from NA7DB to the rest of the XZ1N team started everyone planning in ernest to arrive in Yangon in less than three months. The November XZ1N operation was on its way!

The November XZ1N team

This was a very diverse group ranging from two of the most dedicated and experienced operators in the world (OH2BH and K5VT) to a 15 year-old YL op (N7ZRD) who two years before had already completed a DXpedition to the South Cook Islands. Our plan was to divide the responsibilities in the following manner: Robin Critchell, WA6CDR, was to dedicate himself to maintaining our equipment and the unenviable task of manning 160 meter CW until local sunrise each day. Tom Schiller, N6BT, would focus on our antennas and the constantly changing vagaries of 80 meter CW. Rich Chatelain, K7ZV, would concentrate on the difficult task of 80 meter SSB. Vince Thompson, K5VT, John Arthurs, K7WP, Jack Reed, WA7LNW, and myself, K7WX, would handle 40, 30, and 20 meter CW. Martti Laine, OH2BH, Sally Brown-Martinez, KM5EP, Dan Brown, NA7DB, Jessica Brown, N7ZRD and Millie Thompson, WY7K, would take care of HF SSB. WA7LNW would hand out RTTY contacts, as operating time allowed, and also run LF and HF CW. We had also received permission for an entry in the 1996 CQ World-Wide DX CW Contest during our final days in Yangon. This overall plan was to prove highly successful and resulted in some pleasant and unexpected surprises.

Arrival and Setup

The team arrived in Yangon on November 15, 1996. At the airport we were met by representatives from the Ministry of Hotels and Tourism and the Ministry of Defense, and true to their word, every detail concerned with our arrival had been taken care of well in advance. In spite of 42 boxes and bags, we went straight through airport customs and directly on to our operating site the New World Inya Lake Hotel. On the outskirts of town, this location would be free of local electrical noise.

The New World Inya Lake hotel was built more than 30 years ago by the Russians. It has since undergone a major renovation, and by the fall of 1996 was nothing short of spectacular. The hotel staff was very cooperative. Manfred Keiler, General Manager, even instructed his engineering staff to install extra 220 volt lines to the rooms with radios and amplifiers.

We arranged for two operating rooms to be located at opposite ends of a hallway that was more than 500 feet long, with another room half way in between for storing boxes and equipment. The plan was to be able to have two stations on the same band at the same time, separated by enough distance to stay out of each other's receiver.

Antennas and Equipment

Having the head of Force-12 antennas, Tom Schiller, N6BT, with us was no mistake. A number of recent DXpeditions have discovered that these wonderful trapless antennas not only go together quickly, but perform even better. And we were not to be disappointed! N6BT, K5VT, K7ZV, and K7WP all worked hard in the hot Southeast Asian sun assembling and positioning a total of nine Force-12 antennas.

At a height of 90 feet, the hotel roof was a massive platform measuring approximately 600 by 70 feet. The longest dimension ran east-west and allowed for a very useful separation of antennas, which were all facing north. N6BT and K7ZV had planned for a series of 160 meter antennas on the roof and on the ground: an EF-180B 80 meter rotatable dipole, EF-240 two-element 40 meter and EF-230 two-element 30 meter monobanders, two phased EF-230 three-element 20 meter monobanders, and two five-band C-3 trapless Yagis. With the Americas, Europe, and Japan in the same general direction from our location, this worked very well. Only working Africa, Australia, and Oceania would require significant changes in antenna direction.

XZ1N QSOs By Continent

CW

	160	80	40	30	20	17	15	12	10	Total	%
Europe	875	1354	1943	971	535	308	779	5	0	**6770**	30
N. Amer.	24	204	891	533	302	34	1	0	0	**1989**	9
Asia	298	780	950	535	729	93	95	13	4	**3497**	15
Africa	7	7	19	16	7	1	6	0	0	**63**	0.3
S Amer.	0	10	29	18	37	1	0	0	0	**95**	0.4
Oceania	17	22	44	40	51	6	16	1	0	**197**	0.9
Total	**1221**	**2377**	**3876**	**2113**	**1661**	**443**	**897**	**19**	**4**	**12,611**	**56**

SSB

	160	80	40	30	20	17	15	12	10	Total	%
Europe	0	191	128	0	792	312	2467	0	0	**3890**	17
N. Amer.	0	156	93	0	971	18	8	0	0	**1246**	5.5
Asia	0	170	163	0	1274	338	1748	102	212	**4007**	18
Africa	0	4	1	0	27	5	55	0	0	**92**	0.4
S Amer.	0	0	0	0	158	5	33	0	0	**196**	0.9
Oceania	0	38	16	0	204	21	220	1	5	**505**	2
Total	**0**	**559**	**401**	**0**	**3426**	**699**	**4531**	**103**	**217**	**9936**	**44**

With the two 20 meter phased monobanders at one end of the roof and several C-3 multiband Yagis at the other, it was actually possible to run both CW and SSB on 20 meters at the same time, effectively doubling our QSO rate during the two brief periods each day that North America was open to us.

For each operating position we used a Yaesu FT-1000MP and an Alpha 76. The one exception was the Alpha 89 that had originally been confiscated in February by the Ministry of Defense. His Excellency Lt. General Kyaw Ba arranged for this to be returned to us the day after our arrival, and WA6CDR quickly got it back into top working condition. Its 2500 watt output was to prove particularly effective on 160.

OH2BH's 50th Birthday Celebration

By Saturday, November 16th station setup was well underway and a few preliminary QSOs were beginning to be made. WA7LNW made the first contact with 9V1ZV on 20 meter CW. That evening the team took a break to host a surprise birthday party for Martti Laine, who was to turn 50 in several days. As Martti's wife Leena, OH2BE, was with him on this trip, it was a special occasion indeed. A lovely dinner arranged by WY7K, a speech by K5VT, and a champagne toast by K7WX would kick off Martti's celebration a few days before his C21BH 1996 CQ World-Wide CW DX Contest operation from Nauru Island *(look for an article on this in an upcoming issue of CQ—ed.)*.

That evening Martti was presented with a very unique and most appropriate "WAC birthday card" in the form of letters of congratulation from the presidents of a number of amateur radio societies: the Radio Society of Great Britain, the American Radio Relay League, the Japan Amateur Radio League, the Finnish Amateur Radio League, The Wireless Institute of Australia, The Radio Amateurs of Canada, The Radio Amateur Society of Thailand, The Radio Club of Argentina and The Ghana Amateur Radio Society.

This was indeed a very special evening for everyone. Here we were, having just been given permission to conduct the largest unrestricted operation in the history of a location that could only have been imagined a few years before. Members of the Central Arizona DX Association were hosting the 50th birthday of possibly the best known DXpeditioner ever to handle a pile-up. And most important, we were only a few days away from realizing the cherished dream of OH2BH and JA1BK of establishing a permanent amateur radio service in a country where six months before amateur radio had been a banned activity. It doesn't get any better than that!

For the entire XZ1N team this evening was a time of great anticipation and many deep emotions. For everyone seated together at this special dinner it all would begin the next day with our participation in the opening ceremony of "Visit Myanmar Year 1996" as the special-event station.

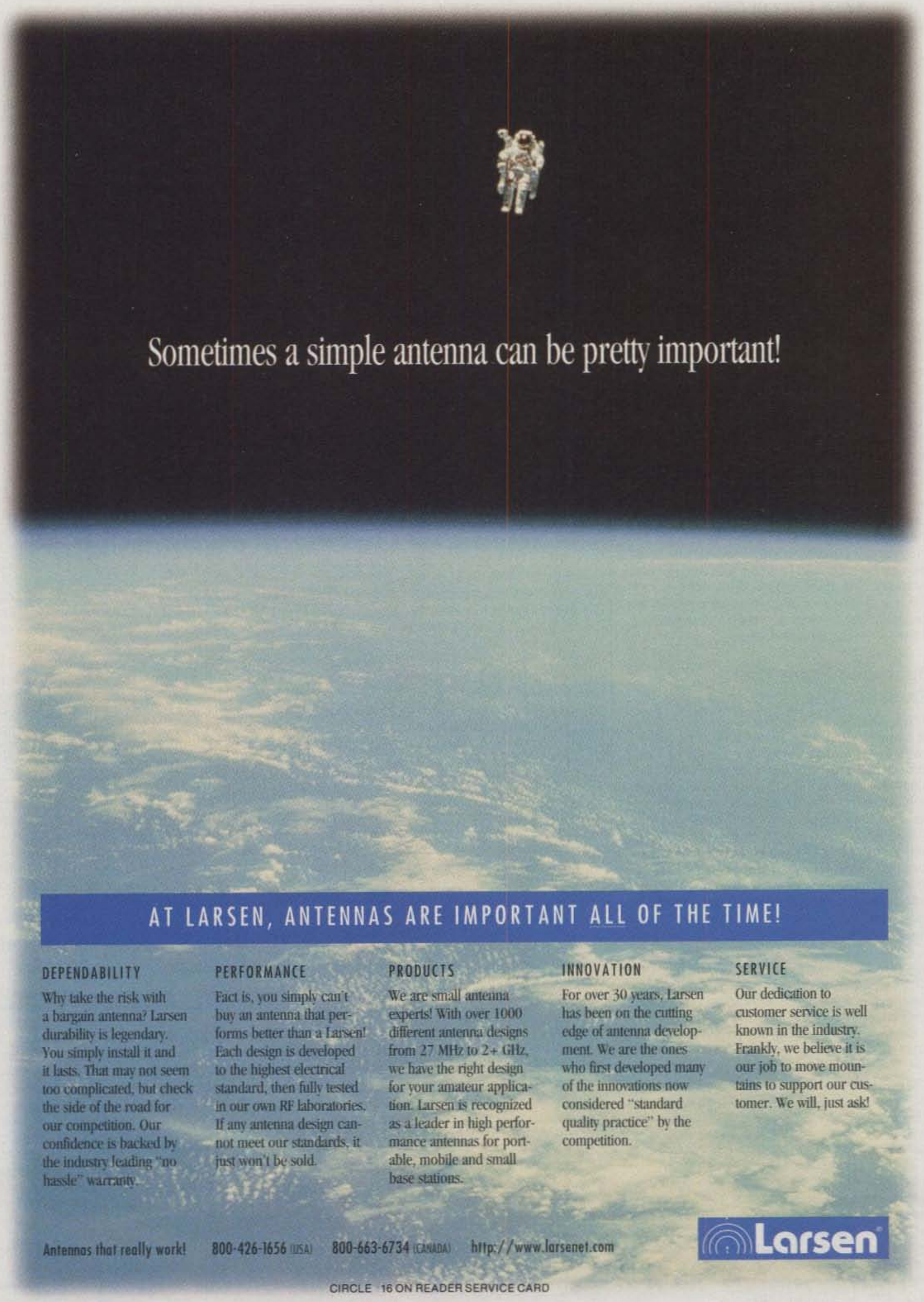
Opening Ceremony For Visit Myanmar Year 1996

The year before the State Law and Order Restoration Council embarked on an ambitious campaign to open the country to tourism. This took the form of a promotional effort entitled "Visit Myanmar Year 1996." Although well into the year, it had been decided that the opening ceremony would take place on Monday, November 18, 1996. During our August visit it was requested that XZ1N serve as the special event station. Having arrived on a Friday, it was a scramble to have enough antennas and operating positions up and running at our hotel by Monday morning to be on the air in some meaningful way. In order for this to work, half of the team went to the Youth Training Center of Thuwunnato to witness the opening ceremony, while the other half stayed behind to finish the antennas and begin handing out contacts.

We could hardly have been prepared for what we were about to see. The opening ceremony for "Visit Myanmar Year 1996" was a well-organized, large-scale production, not unlike the opening ceremony of the recent Olympic Games in Atlanta, Georgia, with seemingly endless parades of representatives from every Myanmar state and region, all dressed in native costume. There were also demonstrations by colorful sky divers, karate students, and lovely dancers moving to a catchy theme song sung to an enthusiastic crowd. I found myself humming this song well into the next day. A speech by Secretary-1 of the State Law and Order Restoration Council welcomed all who came. Guests included the entire diplomatic community, hundreds of foreign dignitaries, and the XZ1N team.

Something that took us completely by surprise was our own celebrity. Years of international isolation had made foreigners something of a novelty to those living outside the capital. After the opening ceremony we were quickly surrounded by many ethnic groups asking to have their picture taken with us. NA7DB, N7ZRD, WA7LNW, and WY7K spent more than an hour signing autographs and posing for photographs with Kachin, Shan, Kayin, and Mon women. My 50 business cards were gone in less than a minute! The front of the XZ1N QSL card bears the photo of a lovely Kachin women

The author, Warren Hill, K7WP, demonstrates the XZ1N World-Wide Web site to His Excellency Lt. General Kyaw Ba during his August visit to Yangon. This meeting led to the lifting of the 1996 ban on amateur radio and resulted in the approval of the August and November XZ1N operations from Yangon.



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XZ1N Overall QSOs

Band	CW	SSB	RTTY	Total
160	1221	0	0	1221
80	2377	559	7	2943
40	3876	401	11	4288
30	2113	0	0	2113
20	1661	3426	304	5391
17	443	699	0	1142
15	897	4531	317	5745
12	19	103	0	122
10	4	217	0	221
Total	**12,611**	**9936**	**639**	**23,186**

EU 47% **Asia 32%** **NA 15%**

The Union Myanmar—Rare For A Reason

With its name changed from Burma in 1989, the Union of Myanmar remains a modern patchwork of 135 ethnic groups with a complicated past and a difficult future. Since the assassination in 1947 of this country's beloved independence leader, General Aung San, there has been a succession of different forms of government, ethnic insurgencies, and student rebellions. For several periods during the last four decades there has been intermittently a background level of violence hard to imagine by Western standards. Some ethnic groups have been in a continuous struggle with the central government since the occupation by the Japanese during World War II.

It is in these many ethnic groups, and the tattered history of this country, that an understanding of the Union of Myanmar begins to emerge. Left to itself, without a popular figure, or a strong central governing body, the social fabric of the country begins to unwind. With the assassination of General Aung San, the possibility of popular rule following independence from Britain was lost. With the continued assertion of separatist claims by ethnic minorities, this trend may continue for the indefinite future.

In August 1988 a series of bloody clashes between students and the army led to the collapse of the Burmese Socialist Programme Party of General Ne Win, who had seized power years before in a *coup d'etat*. Shortly thereafter, a group of senior military officials took control of the country, forming the State Law and Order Restoration Council, now known to all by the acronym "SLORC." Presently headed by Secretary-1, His Excellency Lt. General Khin Nyunt, the State Law and Order Restoration Council has remained the central governing body.

That the SLORC has exerted tight controls at almost every social level is something of an understatement. The justification offered is that with many differing factions vying for either control, or independence, this is the only system that can keep the country together. There is some truth in this, although popular rule continues to be viewed by the world community as the preferable path. The fact that amateur radio has not been permitted is hardly a surprise to anyone even vaguely familiar with the post-war history of this country.

That any amateur radio activity has come out of the Union of Myanmar borders on the miraculous. The 1991 XYØRR operation has since been dismissed by many due to serious questions regarding the entry and exit paperwork of this team. Other activity, sanctioned by non-central authorities, could not be accredited. Later, in 1994, the very limited XY1HT demonstration took the DX community tantalizingly close to the hope of something meaningful. It wasn't until 1995—when the XZ1X, XY1HT, and XZ1A operations went on the air—that we all began to hope that the door to amateur radio in the Union of Myanmar finally had been opened wide to the rest of the world. A brief ban on amateur radio in early 1996 was then followed by the largest amateur radio operation in the history of the Union of Myanmar—XZ1N.

By winning the support of His Excellency Lt. General Kyaw Ba, a senior member of the State Law and Order Restoration Council, and Minister for Hotels and Tourism, it became possible for amateur radio to begin again. Kan Mizoguchi, Martti Laine, Ray Gerrard, and Yoshi Hayashi have much to be proud of for this accomplishment. And His Excellency Lt. General Kyaw Ba will long be remembered by radio amateurs everywhere as the first advocate for this activity from so improbable a location. With the successful completion of XZ1N, a firm foundation has now been laid for the establishment of an amateur radio service. A proposal for rules and regulations governing amateur radio in the Union of Myanmar is presently being written. Only the future can tell us how far this will be allowed to develop.

our team met on this memorable afternoon.

That evening at the Gala Dinner in honor of these opening ceremonies the XZ1N team made a short presentation to Secretary-1 of the State Law and Order Restoration Council. In front of Myanmar television cameras His Excellency Lt. General Khin Nyunt was made an Honorary Member of the Central Arizona DX Association. With all that was taking place, we all had to keep reminding ourselves that several years before, any form of amateur radio activity from Yangon would have been impossible to imagine. Now the top official in the Myanmar government was a member of an American DX association! Things were certainly changing at a rapid pace.

By Monday evening the hard-working crew back at the hotel had finished with most of the antennas and operating positions. By the end of the gala dinner all the rest of us could think about was soon being able to operate from one of the rarest locations anywhere.

Operating From The Rarest of The Rare

With the stated goal of this operation to work as many North American stations as possible, it was a happy coincidence that sunset at Yangon occurred just before sunrise at the east coast of North America. Our sunrise in Yangon took place just after sunset in zone 5. Working the terminator paths twice daily gave us the only reliable openings to this area. The 20 meter short path to Zone 5 was at times outstanding. The 40 meter sunrise opening to Zone 3 was often open for hours at a time. Unfortunately, zones 4, 8, and 9 were very difficult, with only a handful of stations being worked. Zones 14 through 19, 22, 25, 29, and 30 were available to us almost 24 hours a day. For zone 11 we were unable to identify no particular pattern of propagation. A number of unexpected long- path openings presented themselves to us on 80 meters.

Several weeks before our arrival the multinational XY1U operation was active from Yangon. It was decided between our two groups that XY1U would concentrate on Europe and Japan and that XZ1N would make a special effort to work the Americas. A pattern soon developed twice daily with all of our attention being focused on the two terminator openings to Zone 3, 4, and 5.

Working from Zone 26 seemed to generate pileups with three distinct layers. The first background layer was a collection of unintelligible calls, sounding almost like pink noise. These were mostly average stations with modest power and a dipole, or something similar. The next recognizable layer consisted of stations that may have been only 1 dB stronger, or less. It was felt that these stations stood out due to a combination of favorable location, more power, or perhaps a better antenna. With some effort, these calls were workable and made up the overwhelming majority of our contacts. I quickly learned that the ability to work weak signals just above the noise is the single most important skill needed on a large-scale DXpedition. The third layer heard was many dB louder and undoubtedly was due to a more efficient antenna system. On the low bands W6RJ was by far and away the very best example of this group, although there were others.

160 Meters

Originally an afterthought, top band proved to be one of the most exciting aspects of the entire operation. WA6CDR dedicated himself to this task with a devotion I have seen in few others. Using 1.8255 MHz as the transmit frequency, Europe and JA were workable every evening.

A major problem for us was the fact that every few minutes an S9 carrier would appear like clockwork and cover the entire 160 meter band. Stations had to be worked in between this cycle of recurring interference. In spite of these limitations, 1221 contacts in 70 countries were made on top band, one of the highest 160 meter totals ever achieved by a DXpedition from a rare location.

Top Band and Non-Reciprocal Propagation

A few days into operating many of us began to notice a curious phenomenon. In spite of five outstanding antennas for 160 meters (600 and 200 foot beverages, a sloper at 120 feet, and a linear loaded vertical and dipole at 90 feet), we were still unable to hear much of North America calling us. For most days propagation in our direction allowed us to hear the west coast of North America for less than ten minutes at a time! From our end it appeared as though a propagation searchlight was moving from south to north, illuminating only narrow strips of North America. Once daily we would hear several stations around Los Angeles, then a few stations around San Francisco, and then nothing more for the next 24 hours.

Hearing signals in the other direction (the

The opening ceremonies of "Visit Myanmar Year 1996."

path from Zone 26) was an entirely different matter. On several nights, while operating 40 and 80 meters, we were told many times that our 160 meter signal was quite strong into large portions of Zone 3 for an hour, or even longer. However, during this time we simply could not hear anyone calling us. To a lesser degree, on 80 meters we had a similar experience.

In the weeks following our return many theories were offered to us regarding this observation. The most intriguing is that during over-the-pole propagation, polarization of the 160 meter wave front undergoes rotation. It has been speculated that at our location a weak low-angle, horizontally polarized wave simply would not have been strong enough to be effectively collected by most of our antennas. Only when the polarization and pattern angles matched one or more of the characteristics of our receiving antennas could enough signal be collected to allow us to hear stations calling us.

For years it has been accepted that propagation is basically reciprocal, that the path characteristics between two stations must be the same. After comparing notes each morning, N6BT, WA6CDR, K7ZV, WA7LNW, and I came to the conclusion that at least from Zone 26, certain aspects of propagation in each direction actually can be quite different. Whether this is due to a rotation in polarization, high levels of propagated background noise near the equator, or some other unexplained phenomenon, I am unable to say. With multiple state-of-the-art antennas and high-performance radios, all run by experienced operators, we are still unable to offer a satisfactory explanation of our experience.

North America

From the beginning we tried to work as many North American stations as possible. In spite of large efforts towards this purpose, North American accounted for only 15% of the total contacts. K7ZV and N6BT dedicated themselves to 80 meters and took advantage of every opportunity. As expected, short-path propagation to the west coast of North America followed terminator openings and at times was outstanding. By far and away 30 and 40 meters had the best openings, and K7WP, NA7DB, KM5EP, WY7K, and WA7LNW used these as our utility bands. Although difficult from Southeast Asia, we were able to dedicate two Zone 3 openings to 40 meter SSB. Short-path openings to Zone 5 on 20 meters were our best option for the east coast. Usually these openings would only last a matter of minutes, although one evening WY7K was able to run stations for almost two hours. It was curious for us to learn that just when we felt as though we had worked every last Zone 5 station possible, our signal would actually peak to W1–W4. This generated many comments to us afterwards.

Europe and Asia

From Yangon, Europe was no problem and comprised about 46% of the total number of QSOs. It was difficult to ignore the fact that 10% of all our contacts were with Finnish stations. Anyone who has ever done a DXpedition is well aware of the keen interest in DXing by operators in the "northern villages." OH stations were often loud on every band, especially on 160 meters. For Europe in general, sunset terminator openings on 40 and 80 meters proved the most useful. Just how much power some Italian stations may have actually been running was a frequent topic of speculation.

Japanese, Soviet Asian, and Indian stations comprised the great majority of our Asian contacts. It was startling to hear a VU calling me at 20 dB/S9! Fifteen and 10 meter contacts were mainly with Japan.

1996 CQ WW DX CW Contest From Myanmar

Because the demand for SSB was so high, a late decision was made to participate in the 1996 CQ World-Wide CW DX Contest in the form of four single-band, single-operator entries. This would free up the remainder of the group to continue their efforts on SSB. CQ WW CW Contest entries were made for 160, 80, 40, and 20 meters.

During the 48 hours of the contest WA6CDR continued his efforts on 160 meters, N6BT fought endless static crashes on 80 meters, K7WP slept during the day and operated 40 meters after sunset, and WA7LNW made an outstanding effort on 20 meters in between RTTY contacts. Although not yet confirmed, at the time of this writing it looks as though the final scores for several of these single band entries may be new world records for Zone 26. On 40 meters K7WP worked 86 countries and 32 zones!

1996 CQ WW DX CW Contest Totals
XZ1N Single Band, Single Operator

Band	QSOs	Zones	Countries	Points	Operator
160	347	20	53	64,167	WA6CDR
80	1046	29	79	264,168	N6BT
40	1013	32	86	278,834	K7WP
20	428	29	61	83,880	WA7LNW

XZ1N and Monitoring By The Myanmar Government

As our sponsor, the staff of the Ministry of Hotels and Tourism saw to our every need, providing transportation, guides, and translators. Even though our activities easily could be viewed as highly unusual by the average Myanmar national, every official, or unofficial, visitor to the operating rooms quickly saw what we were doing as something positive for their country. We all were very impressed by a general openness to new ideas on the part of every Myanmar national we met.

Unlike XY1HT and XZ1A, for the most part Myanmar government officials basically left us alone during the entire operation. There would be the occasional visit from a member of the Myanmar military, but we felt that it was more out of curiosity than anything else. It's not every day in Yangon that a civilian building is seen bristling with HF antennas! The only request of the Myanmar government was that we be prepared to tape record both sides of every contact. For this purpose K7ZV brought four special slow-speed tape recorders which ran day and night from November 17th through the 24th.

One afternoon, Captain Ko Ko Oo, Foreign Liaison Officer of the Ministry of Defense, came by while WA7LNW and I were operating RTTY and CW. We spent the better part of an hour demonstrating to him how contacts were made. We then showed him each of the four operating positions and even took him up to the roof to see our many antennas. This was as close as anything we had in the way of an official visit.

After our return the team put together a detailed report and translated into Word Perfect a complete set of our CT logs—all 23,186 contacts on 453 pages!. These items, along with copies of the XZ1N QSL card, were later delivered to Myanmar government officials as the final detail of our DXpedition.

Returning Home

The day after the CQ WW CW we began the process of disassembling the stations and antennas. It was difficult to imagine that our flight back to North America would be leaving the next day. After such intense activity we all felt our time in "The Golden Land" was over far too soon. Traveling through Bangkok and Seoul, we arrived back in Los Angeles filled with fond memories from a once-in-a-lifetime experience.

The Future of Amateur Radio In Myanmar

In the Union of Myanmar the belief in astrology is deeply rooted. Many hold to the concept of *yedaya chay*, the ancient theory that fate can be outwitted by prompt individual action. Perhaps the future actions of dedicated DXers will undo the past fate of continued isolation from the world amateur radio community. With the recent establishment of an amateur radio service, contacts with "The Golden Land" may soon be possible for us all on a regular basis.

The Internet and DXpeditioning

Beginning with the 1995 XRØY Easter Island operation, the Internet became an important part of any large-scale DXpedition. Six months before our departure an extensive web site outlined our plans. For the present, access to the Internet is still heavily restricted in Myanmar, and for this reason daily updates from our team had to be sent via fax. During the time we were in Yangon, N7RK kept our web site current and posted daily news items to the DX Reflector. Upon our return, there were over 2500 e-mail messages waiting for me! With the recent VKØIR operation allowing real-time log checking via satellite up-link, it is difficult to imagine what our next indispensable tool will be !

Not long ago there was speculation that the advent of the Internet would lead to a decline in amateur radio, especially for CW. In fact, just the opposite has occurred. Various specialty reflectors, comprehensive web pages, real-time world-wide DX posting and e-mail—lots of e-mail—have added to our enjoyment of this hobby in ways that never before could have been imagined. Think back to what working DX was like before the appearance of area Packet-clusters and the DX Reflector. Working DX has only become more interesting as a result of use of the Internet.

Special Thanks

The XZ1N team wishes to express their sincere appreciation to His Excellency Lt. General Khin Nyunt, Secretary-1 of the State Law and Order Restoration Council, for permission to conduct this operation. We are also deeply indebted to His Excellency Lt. General Kyaw Ba, Minister for Hotels and Tourism, who had the vision to see the value of amateur radio in the Union of Myanmar and graciously acted as our advocate. Lt. Col. Khin Maung Latt, Director General of the Ministry of Hotels and Tourism, and U Htay Aung, Director of the Ministry of Hotels and Tourism, gave their unhesitating support during every phase of planning. The staff of Thai Airways generously transported all equipment from Los Angeles to Yangon. Our special friends U Nay Tun and Daw Khin Hnin Nwe of the Nokia Corporation solved countless logistical problems. Mr. Manfred Keiler, General Manager of the New World Inya Lake Hotel, saw to our every need. Mr. Tom Schiller of Force-12 provided all the antennas for this operation. Yaesu Musen Company, Ltd. supplied XZ1N with five FT-1000MP transceivers. Robert Myers, W1XT, our patient and devoted QSL manager continues to sort through Internet and direct requests for cards. To those on "the other side" who gave us more than 23,000 contacts, we remain profoundly grateful for your patience and interest. ■

(Left to right) U Nay Tin of the Nokia Corporation; Warren Hill, K7WX; His Excellency Lt. General Kyaw Ba; Martti Laine, OH2BH; and Lt. Col. Khin Maung Latt, Director General of the Ministry of Hotels and Tourism, at the meeting in August 1996.

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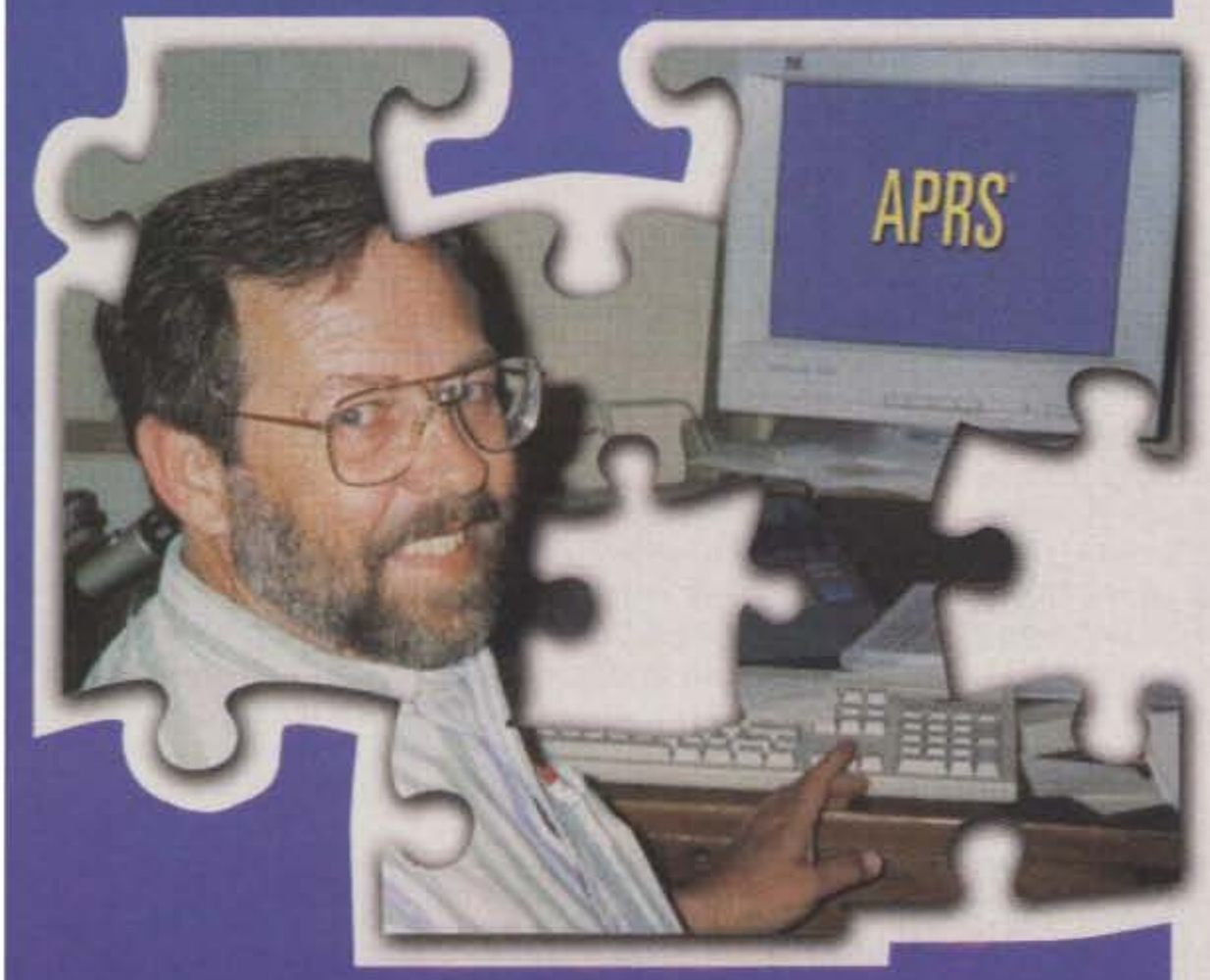

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Results of the 1996 CQ WW RTTY DX Contest

BY ROY GOULD*, K1RY, AND RON STAILEY**, K5DJ

Entries were up again this year by another 15 percent. It was also another record-breaking year with 529 logs and 91 countries sending in logs. The level of activity grew substantially from all parts of the globe. There were four new world records, three new world single band records, and a total of seven new continental records set (in different categories). Not bad, seeing as how we are at the low end of the cycle.

This year we have a new design for our plaques. We wanted something that would really make the winners feel proud to have a *CQ* contest plaque hanging on their wall. We feel this has been accomplished. I don't know of a single contest in any mode that can claim they have a more beautiful plaque than we do, as Ron was told at the Dayton Hamvention when we presented some of them to the winners. The largest RTTY contest in the world should have something very special, and now we have it.

Single Operator

In this year's Single Operator High Power (SOH) category Fr. Hern, CT3BX, flexed his muscles a bit, breaking his own world record of last year with a score of 2,005,944 points. The two million point barrier for SOH is now history. CT3BX now has two (back to back) world record plaques hanging on his wall. Congratulations on a job well done.

In second place, Marijan, S56A, moved up a notch from last year's third place, also setting a new European record with a score of 1,554,969 points. In third place was TM7XX (Opr. F5MUX) with 982,125 points. ZW2A (Opr. PT2BW) took the South America plaque, scoring 805,562 points. Romeo, UN5PR, had 648,088 points, picking up the Asia plaque. Dave, N2DL, was close behind with 621,520 points, taking the North America plaque. Jim, WA4ZXA, walked away with the USA plaque with a score of 469,224 points.

In the Single Operator High Power Assisted (SOA) category there was a real shootout for first place between IK2QEI and K1NG. It was close enough that RST reports were checked to see it there were any mistakes at all. At the end of this battle Stefano, IK2QEI, took the honors with a score of 1,434,716, also setting a new world record in the SOA category. K1NG (Opr. Rick, KI1G) finished second with a score of 1,350,875 points, taking the North America plaque and setting a new North American record. In third place was DF3CB, also making a nice showing with a score of 1,117,551 points. Sam, W4PK, picked up the USA plaque, scoring 408,434 points.

In the Single Operator Low Power (SOL) category Roland, DK3GI, operating as DLØWW, took top honors with the World Single Op Low Power plaque with a score of 929,493 points, setting a new European record in low power. About 70,000 points behind came YL8M operated by Girt, YL2KL, whose final score of 860,370 points took the Europe plaque. Jody, VP5JM, added another plaque to her shack wall, winning the North America plaque with a score of 833,499 points, a new North American record. Jody received her plaque at the RTTY dinner at Dayton. Pasquale, YV5KAJ, operating as 4M5RY, won the South America plaque with a score of 717,320 points, also adding another plaque to his wall. The winner of the United States plaque was Don, AA5AU, who held on to a commanding lead over the USA operators in low power. Don came up with 637,855 points. The Asia plaque went to Mustafa, TA3B, with a score of 423,128 points.

Single Band

On 28 MHz again this year with the 12 hour limit for plaques no one was eligible to win one. However, we did have two logs sent in. LU6AUM took first place with a score of 4,325 points, and S52SK took second, scoring 1,775 points. Needless to say, 28 MHz just isn't here as yet (Hi).

On 21 MHz Argentina made a showing, taking first and second place in this event. Eduardo, LU8EKC, became king of the hill, winning the 21 MHz plaque with a score of 267,820 points. Ernesto, LU6BEG, held second place with a score of 192,010 points. 5X1T (Opr. Peter, ON6TT, of VKØIR fame) finished third with a score of 170,582 points. Peter also helped out many of us by sending in a check log for other bands he worked during the time

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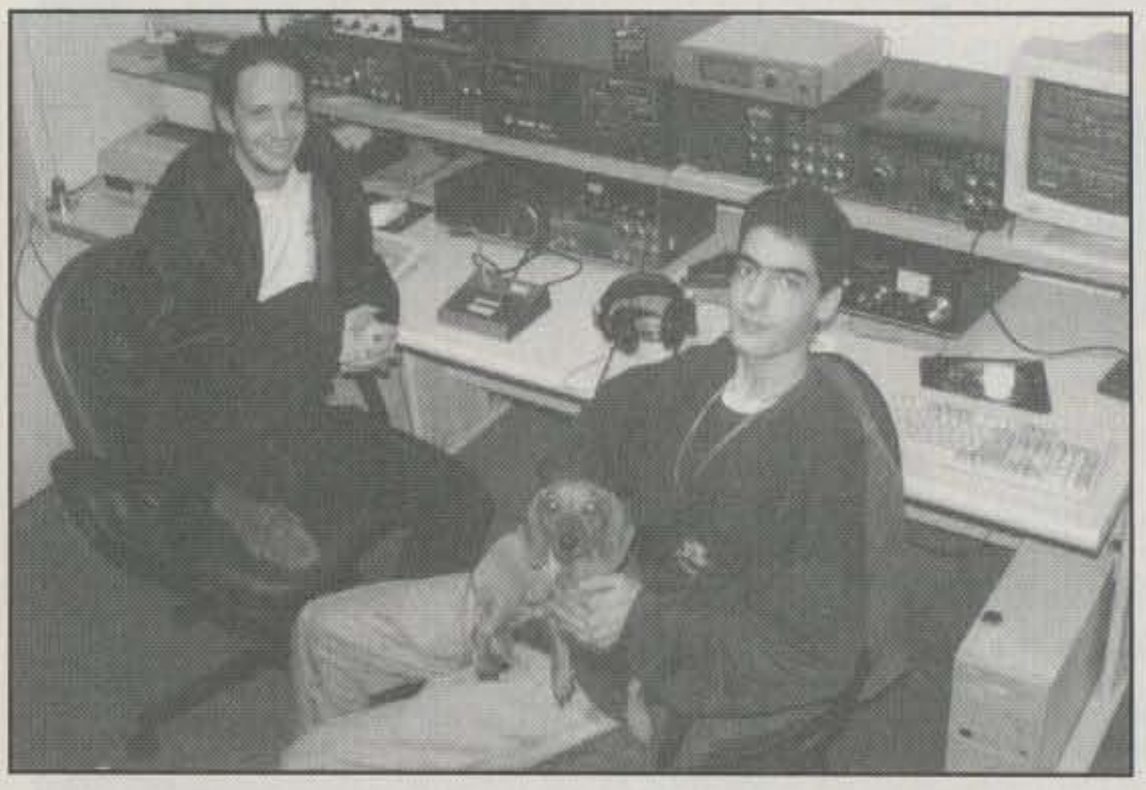
The ops at IK1GPG, Multi-Multi, third place world with 1,725,900 points.



"PY2DOG" the DX hound being held by Rod, PY2KC, with Art, PY2KJ, on the left relaxing after a close battle for MOL top honors. They operated ZY2HT to fifth place world.

PLAQUE WINNERS

World Single Operator, High Power: Station CT3BX, Fr. Hermani M. F. Curreia. Sponsored by Dunestar Systems.
World Single Operator, High Power Assisted: Station IK2QEI, Stefano Brioschi. Sponsored by CQ Magazine.
World Single Operator, Low Power: Station DLØWW (DK3GI), Roland Mensch. Sponsored by Amateur Radio Trader
World Multi-Op Single Transmitter, High Power: Station TY1RY (Ops: GØAZT, W6OTC, WF1B, TY1PS, KE6FV). Sponsored by Amateur Radio Trader.
World Multi-Op Single Transmitter, Low Power: Station YV5NFL (Ops: YV5NFL, YV1DIG). Sponsored by Hal Communications Corp.
World Multi-Op Multi-Transmitter: Station W3LPL (Ops: K3MM, K3TZV, N3UN, ND3F, NO2T, NE3H, N3OC, K4GMH). Sponsored by CQ Magazine.
North America Single Operator, High Power: Station N2DL, Dave Lamm. Sponsored by TG9VT Memorial (by Roy Gould, K1RY & Jules Freundlich, W2JGR).
North America Single Operator, High Power Assisted: Station K1NG (Opr: Rick Davenport, KI1G). Sponsored by Jeff Bouvier, K1AM.
North America Single Operator, Low Power: Station VP5JM, Jody Millspaugh. Sponsored by Dick Stevens, N1RCT
North America Multi-Op Single Transmitter, High Power: Station W5KFT, (Ops: W5KFT, K5DJ, WS7I, NA4M, K5TR). Sponsored by Eddie Schneider, GØAZT.
North America Multi-Op Single Transmitter, Low Power: Station NP2E, (Ops: NP2E, KP2N , KE5BK). Sponsored by Don Hill, AA5AU & Eddie Schneider, GØAZT.
United States Single Operator, High Power: Station WA4ZXA, Jim Floyd Sponsored by Johan Devoldere, ON4UN.
United States Single Operator, High Power Assisted: Station W4PK, Sam Lesley Sponsored by RTTY by WF1B.
United States Single Operator, Low Power: Station AA5AU, Don Hill. Sponsored by Phil Duff, NA4M.
United States Multi-Op Single Transmitter, High Power: Station AA4FC, (Ops: AA4FC, AD4TG, AF4Z, AB4GI, W3ZNB, KC4HW, KT4DI, WB4NPL) .Sponsored by TR Logging Software (by George Fremin, K5TR).
United States Multi-Op Single Transmitter, Low Power: Station KE1FO, (Ops: KE1FO, KY1H, WM1K. Sponsored by Platinum Coast Amateur Radio Society.
South America Single Operator, High Power: Station ZW2A, (Opr: Ariosto Rodriquez de Souza, PT2BW). Sponsored by Neal Sulmeyer, AE6E.
Europe Single Operator, High Power: Station S56A, Marijan Miletic. Sponsored by Hal Communications Corp.
Europe Single Operator, Low Power: Station YL8M, (Opr: Girts Budis, YL2KL) Sponsored by Don Hill, AA5AU.
Europe Multi-Op Single Transmitter, High Power: Station DL6RAI (Ops: DL6RAI, DL7RX, DL2NBU) Sponsored by Ron Stailey, K5DJ & Wayne Matlock, K7WM.
Asia Single Operator, High Power: Station UN5PR, Romeo Loparev. Sponsored by David Busick, N5JJ Memorial (by Don Busick, K5AAD).
Asia Single Operator, Low Power: Station TA3B, Mustafa Tandogan. Sponsored by Bruce D. Lee, KD6WW.
World 21 MHz: Station LU8EKC, Edualdo Danial Cosso. Sponsored by Denis Catalano, WD4KXB & Mike Trowbridge, KA4RRU.
World 14 MHz: Station GIØKOW, Bob Cummings. Sponsored by Kunihiko Fujii, JH1QDB.
World 7 MHz: Station ZS6EZ, Chris Burger. Sponsored by Tri-County DX Assoc.
World 3.5 MHz: Station I8UDB, Domenico Grande. Sponsored by Neal Campbell, K3NC, ON9CNC.

15 meters was closed. Thanks a bunch, Peter. We appreciated the mults very much. Nikola, 9A5W, finished fourth with a score of 119,540 points.

On 14 MHz we had a good race with three ops (GIØKOW, 9A2DQ, and IT9ZGY) not wanting to give up until time ran out. Let the record show that all three ops were above the old 20 meter single band record. At the end of the contest Bob, GIØKOW, was the last man standing holding the biggest stick, taking the 20 meter Single Band plaque and setting a new 20 meter single band record. His score was 443,520 points, a real nice job, Bob. Last year's winner, Zelimir, 9A2DQ, held his own, scoring 403,206 points, and IT9ZGY, right on his heels, scored 402,660 points. Next was Jeff, K1IU (now K1AM), with a score of 373,240 points. On 7 MHz topping old world records seemed to be the thing to do. Chris, ZS6EZ, did just that, taking the 40 meter plaque and setting a new world record with 205,720 points. Our congratulations to you also, Chris, for very nice job indeed. In second place was LZ5W operated by Slavi, LZ1MC, with 189,675 points. Third place went to Jose, PJ2MI, with a score of 174,885. Fourth was Jim, WU3V, scoring 141,488 points. Next was 9A1A with Soric, 9A7R, at the controls with a score of 140,530. Then came probably the most popular 40 meter operator in the world, Barry, W2UP. He only had enough time for a parttime effort and still made a decent score of 137,598 points.

On 3.5 MHz world records are just as important as they are on any other band. Domenico, I8UDB, set the pace and held it all the way to the finish, winning the 80 meter plaque and setting a new world record. His score was 72,265

Bob, PA3ERC, in the foreground, and Dick, PA3FQA, multi-op low power, giving out multipliers as J77C.

points. Our congratulations on a very nice score. In second place was 9A9A (Opr. Emil, 9A2RA) with a score of 60,900 points. Finishing third was Slavko, S57DX, with a score of 48,741 points. Fourth place went to Greg, N4CC, with 30,972 points. Next was YTØT (Opr. YT1MA) scoring 25,956 points.

Multi-Operator

This year in the Multi-Operator High Power (MOH) category there were 13 stations scoring at least a million points. We don't recall this ever happening before. We had a nice battle between TY1RY and IG9/I2EOW for top honors in the Multi-Single category. Both have nice contest locations. In the end TY1RY took the Multi-Single World plaque and set a new African record. Their score was 2,732,506 points. IG9/I2EOW finished second, by no means being blown out of the water, with a very competitive score of 2,241,506 points. In third place from way back in Texas was W5KFT with a score of 1,833,800 points. They held on to third place and took the North America plaque, setting a new USA record and only missing a new North America record by a few QSOs. In fourth place turning in a nice score was XR8S with 1,675,350 points. In fifth place and the first time from a DX location was KG4GC on Guantanamo Bay. They turned in a score of 1,403,150 points. (We can expect more from these guys in years to come.) DL6RAI made a nice showing with a score of 1,390,259 points, taking the Europe plaque. AA4FC picked up the USA plaque with 868,428 points.

In the Multi-Operator Single Transmitter Low Power (MOL) category Ricardo, YV5NFL, teamed up with Paolo, YV1DIG, to take the World plaque with a score of 1,214,336 points. They had fewer QSOs than their competition, but they had more multipliers. The North America plaque went to NP2E assisted by KE5BK and KP2N. They were close behind with a score of 1,010,344 points. KE1FO along with KY1H and WM1K took the United States plaque with a score of 445,851 points. Other great scores were turned in by Z30M at 961,860, RQ4L with 947,121, and ZY2HT with 827,200.

TOP SCORES

SINGLE OP, HIGH POWER ALL BAND

CT3BX	2,005,944
S56A	1,554,969
TM7XX (F5MUX)	982,125
UTØI (UT2IZ)	952,280
EA3NY	884,250
DJ6QT	826,340
ZW2A	805,562
SM5FUG	669,944
UN5PR	648,088
N2DL	621,520

SINGLE OP, LOW POWER ALL BAND

DLØWW (DK3GI)	929,493
YL8M (YL2KL)	860,370
VP5JM	833,499
4M5RY (YV5KAJ)	717,320
AA5AU	637,855
GB5RY	512,244
WS1E	488,650
KA4RRU	455,400
TA3B	423,128
ZL3GQ	384,714

SINGLE OP ASSISTED

IK2QEI	1,434,716
K1NG (KI1G)	1,350,875
DF3CB	1,117,551
HAØDU	558,670
W4PK	408,434

MULTI-OP, SINGLE TRANSMITTER HIGH POWER

TY1RY	2,732,506
IG9/I2EOW	2,241,525
W5KFT	1,833,300
XR8S	1,675,350
KG4GC	1,403,150

LOW POWER

YV5NFL	1,214,336
NP2E	1,010,344
Z30M	961,860
RQ4L	947,121
ZY2HT	827,200

MULTI-OP MULTI-TRANSMITTER

W3LPL	2,487,347
ON4UN	2,188,461
IK1GPG	1,725,900
RW6AWT	1,303,248

SINGLE OP, SINGLE BAND 3.5 MHz

I8UDB	72,265
9A9A (9A2RA)	60,900
S57DX	48,741

7.0 MHz

ZS6EZ	205,720
LZ5W (LZ1MC)	189,675
PJ2MI	174,885
WU3V	141,488
9A1A (9A7R)	140,530

14 MHz

GIØKOW	443,520
9A2DQ	403,206
IT9ZGY	402,660
K1IU	373,240
IT9GSF (IT9STG)	338,220

21 MHz

LU8EKC	267,820
LU6BEG	192,010
5X1T (ON6TT)	170,582
9A5W	119,540
IK6WDY	70,488

Rusty, KG4AU (left), and Jan, KG4QD, can't believe what they are seeing on the screen! They were two of the ops at MOH station KG4GC, which took fifth place world.

Multi-Multi

Things picked up a bit in the Multi-Multi (MOM) category. It has been a very tough to get many RTTY stations to participate in this category. This year we had an all-time high of seven logs sent in. Maybe things are starting to pick up as more and more contesters start giving RTTY a try. There was definitely more than one serious station making a run for the World plaque this year. W3LPL and ON4UN had great scores. W3LPL once again was champ of the Multi-Multi category, scoring 2,487,347 points. Second place ON4UN finished with a score of 2,188,461. Third place went to IK1GPG, who amassed 1,725,900 points. Following them were RW6AWT (1,303,248 points), LY1BZB (885,573), OI3LQK (748,800), and K9TSM (190,236).

Summary

Our thanks to all the participants and plaque sponsors. Thanks to the donors and Ron, K5DJ's efforts we have attractive plaques to award to the winners. Why not sponsor one? There are still sponsorships available. Contact K5DJ if you are interested.

Our thanks also to Jim, W1EWN, and Jerry, N1DGC, for helping with the certificates. Also, special thanks to Gail at *CQ*. See you the last full weekend in September, the 27–28th!

73, Roy, K1RY, and Ron, K5DJ

Comments From Around The World

AA2GS: Did not get KT34a up until 1700Z Sunday. Will do better next year. *AC4PY:* Been working RTTY less then a year and really enjoy RTTY contesting. Gotta try RTTY by WF1B next year, though. *AE4RG:* First RTTY contest. Had a blast! *DF3CB:* Great fun! First time I could break the million-wall. Worked two new RTTY countries. *DJ2BW*: Fine contest again. More multipliers but poor condx to W/VE. *DJ6QT:* Conditions were not so good. Where was DX on 80 meters? *DL4MCF:* Smaller an-

Hermann, DJ2BW, was a 40 meter entrant with 437 QSOs and 80 countries.

tenna, TVI, and a broken linear made it not possible to beat my last year's score, but I had fun. *DU1SAN:* Giving out a multiplier generates more interest. *EA3FQV:* Next time more QSOs. Only worked a few hours. *EA8AW:* My first CQ WW contest. I will return next year. *EO6F:* Sorry abt bad log. Still need a good RTTY logging program.

GM3UTQ: Found 40 meter dipole was intermittent after the test, hence low 40 meter score. Best data contest of the year, Tnx. *GW0ANA:* Great to be back in the thick of it again. *GW4KHQ:* Enjoyed the contest, My best score yet, but so tired. *K1IU:* Great contest! If you don't think every QSO is important, think again. I missed the 20 meter S/B World record by four QSOs or one multiplier! *K1NG (Opr. KI1G):* Nice to see so much activity. Can't wait until the bands are open! *K2PS:* Lost the tribander so decided on an 80 meter entry. Condx lousy! *KA2CYN:* My personal best. Plenty of activity. Europe opened nicely on 80 after midnight here in NY. Tnx for working me.

KB5VRF/6Y5: Full typing was a real pain. Hi! Thanks to everyone who worked me (Op. JR4PMX). *KP2BH:* All the antennas down due to hurricanes; just wires. *LU6BEG:* Lost linear second day. *N1AFC:* QRP 5 watts out. *N1JAC:* What a great contest agn. *N2QCA:* Almost a Multi-Op, as I had a lot of help from Mr. Murphy. *N3BDA:* It was great to work two new ones, TY and 5X. *N8FEH:* Bright spot—worked TY1RY on three bands. *ND5S:* My main rig went out on me three days before the contest. Really gave my ICOM 706 a workout! *ON4UN:* We were set up for M/S but went M/M so all could operate. Had two stations, one running only 500 watts. *ON7KK:* Nice contest, lot of stations.

S56A: It was a pleasure to work almost all the VE's except NS and NB. *SM4CMG:* Able to operate just the last 8 1/2 hours due to health, but improving now. My favorite contest. Antennas need work and busy checking SARTG logs. *(Get better Bo and great job on SARTG.—ed.) SP1JRF:* This was my first RTTY contest. Very poor conditions, but made a few new countries. I'll see you again next year. *SP9LKS:* Very 73 to all members of contest committee from Poland. *UR6QA:* Pse program for RTTY contests. *(Many out there. Look in CQ ads.—ed.) WA1FCN:* Wow! VS96BG on RTTY. This was fun. *WF5T:* Not much of an effort, busy weekend with the family, next year.

WS1E: Moved to 28 MHz for a sked and found YV5NFL. You never know. *YB1AQS:* My duties in the office gave me only 6 hours to participate in my first RTTY contest ever. CU in '97 for sure. *YO3JF:* My first RTTY contest and at the bottom of the cycle, it was tremendous! *YT0E:* With experience better score, same equipment. TU for award from last year; it's up on the wall. *YZ7ED:* Good conditions and good activity. I heard A71CW, J77C, YV5NFL, and CO3ZD on 40 meter RTTY, but no contact. My first CQ WW RTTY contest. QSL cards okay via bureau or via YU7AL. *ZL2AMI:* Very poor condx, but I am glad my antenna is back up after blowing down during BARTG. *ZL3GQ:* Great event, thanks. *ZS6EZ:* For a change no malfunctions. I was amazed to work 75 countries on 40.

Station Operators, Multi

3Z0ZIM: SP5VYI & SP5GRU. **4U1ITU:** OM1AM & F6HYE. **9A1D:** 9A2FK, 9A3DU, 9A3GA, 9A3NY, 9A3VM, 9A2DU, 9A4SG, 9A4VN, Haris, Mate, Mato, Nick, Pero. **AA7NO:** WA7LNW, AA7WP, N7PNK. **DL4OCL** & DL8OBC. **DL7URH:** DL3RUM, DL7IO, DL7UBA, DL7URH, DL7VRO. **G0UNO** & G0TEC. **GI4GTY** & GI4SNA. **GW5NF** & GW4JBQ. **HB9CC** & ?. **HB9LF:** HB9CRV, HB9EAZ, HB9EBB. **IG9/I2EOW:** I2EOW, IK2CFH, IK2NCJ, IK2MPV, IK2OYD. **IK1GPG:** IK1QFM, I1JQJ, IK1TZO, IK1HSR, IK1VDM, IK1HXN, IK1TAY.

IK2BUF: I2KHM, IK2SGF, I2GXS. **K0LIR:** WB0IUN, N0IS, N0LIK, WD0CHW, W0KOC, KB0WUQ, KB0KK. **J77C:** PA3BBP, PA3ERC, PA3EWP, PA3FQA. **K9TSM:** K9ZBM, WZ9M, KB9AV0, KB9HKF, WB9ZEZ, KA9SYE, N9DUE, WD9AKG, W9JOE, N9ZZW, KB9ATR, KA1LGX, N9OKD, KB9NTY, AA9DG, N9GVD, KB9BBI. **KB5WBL:** KK5NA, KK5QA, N3BUO, N5YAK. **KE1FO:** KY1H & WM1K. **KG4GC:** KQ5GC, WA4VQD, KG4AU. **KK5CA:** N5LYG, WA5UZB. **KM9P:** AE6E, KE4ZQD, NX9O. **KQ4QM:** KF4KL, KE4QRR, N4EGK.

LA1K: LA3JJA, LA5GIA, LA5NJA, LA8UGA, LA8VJA. **LU5VC:** LU4VZ, LU9VET. **LU6DTS:** LW2EMZ, LW4DYU, LW6DWQ, LW7EIC, LW9ETY. **LY1BZB:** LY2BKF, LY2BIL, LY2FF, LY1FR, LY3NFW. **N4XWC** & KA5GET. **N9NCX:** KS9W, K9RN. **NP2E:** KE5BK, KP2N. **OH2GI:** & ? **ON4UN:** AB4MJ, WN4KKN, ON4AFZ, ON4MA, ON5NT, ON7TK, ON4JO. **PI4COM:** PA3ACA, PA3ALP, PA3BWD, PA3DMH, PA3GBQ, PA3GXF, PB0AIC. **RQ4L:** UA4LCQ, UA4LU, RW4LQ, UA4LL, RA4LM, RA4LFM, RA4LFG, RA4LF, RA4LFQ. **RW6AWT:** RN6BN, UA6NP, RA6AX, UA6ADC, UA6ATC, RU6AB. **S50C:** S53CC, S52OR, S53BB, S53MM, S57C, S55OO. **SN6U:** SP6NVK & SP6OPE.

T91EZC: T95MXH, T94KM, T94KT, T94KW, T94MNR. **TY1RY:** WF1B, G0AZT, W6OTC, KE6FV. **VE3EJ:** & G4VXE. **VE5RI:** VE5CMA, VE5FF, VE5FN, VE5SWR, VE5WI, VE5EZ. **VE6RAJ:** VE6PC, VE6NJX. **VK6GOM:** & VK6APW. **W3LPL:** K3MM, K3TZV, N3UN, ND3F, NE3H, N3OC, K4GMH, NO2T. **W5KFT:** K5DJ, WS7I, NA4M, K5TR. **WA0VQR:** N0BG, W0LSD. **WB8YTZ:** WB8YJF, NM8O. **Z30M:** Z31GX, Z31JA, Z31MM, Z32XX, Z32XA, Tone, Danco, Goran, Zoke & Boby. **ZY2HT:** PY2KC & PY2KJ.

Hern, CT3BX, on his way to setting a new world record SOH with 2,005,944 points.

The neat station of World plaque winner, MOL category, YV5NFL.

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RTTY RESULTS

Alpha/numeric groups after call letters denote the following: Classification (SOH = Single Operator High Power All Band; SOL = Single Operator Low Power All Band; SOA = Single Operator Assisted All Band; MOH = Multi-Operator High Power All Band; MOL = Multi-Operator Low Power All Band; MOM = Multi-Operator Multi-Transmitters or Single Band Entry by Frequency); Final Score, QSOs, QSO Points, Zones, Countries, States/VE. Winners are listed in boldface.

AFRICA

BENIN

TY1RY	MOH	2,732,506	1936	5498	94	272	131

CANARY ISLANDS

EA8PP	SOL	95,744	186	544	46	106	24
EA8AW	21	9,504	66	198	14	30	4

CEUTA & MELILLA

EA9BF	SOL	130,410	321	945	33	105	0
EA9AZ	14	76,727	264	791	28	49	20

DJIBOUTI

J28JY	7.0	76,834	319	937	21	59	2

(Op. F5JY)

LAMPEDUSA ISLAND

IG9/I2EOW	MOH	2,241,525	1,617	4,719	88	281	106

MADEIRA ISLAND

CT3BX	SOH	2,005,944	1,475	4,399	79	255	122

MARION ISLAND

ZS8IR	SOH	61,285	206	595	29	73	1

REP. OF SOUTH AFRICA

ZS6EZ	7.0	205,720	471	1390	28	75	45

RWANDA

9X4WW	SOL	6,426	44	126	19	31	1

UGANDA

5X1T	21	170,582	429	1273	25	81	28

(Op. ON6TT)

ASIA

ASIATIC RUSSIA

RA9FF	14	6,512	69	176	12	9	16

BAHRAIN

A92GD	SOL	234,669	453	1311	53	125	1

CYPRUS

5B4/SMØTGG	SOL	180,268	453	964	43	139	5

HONG KONG

VS96BG	SOA	216,476	486	1196	56	92	33

ISRAEL

4ZØZ	14	244,010	648	1877	28	82	20

(Op. 4X6ZK)

JAPAN

JA5EXW	SOH	345,818	504	1429	68	123	51
JA2IVY	SOH	278,936	438	1172	64	134	40
JE2UFF	SOL	147,225	272	755	59	107	29
JH4IFF	SOL	127,269	262	711	53	94	32
JR6EZE	SOA	123,369	240	697	55	100	22
JL6HKJ	14	57,912	176	508	28	66	20
JA2BY	SOL	54,912	147	429	40	60	28
JR6LDE	14	35,280	138	392	23	47	20
7L4IOU	SOL	34,720	109	310	37	52	23
JR2BNF/1	14	34,650	124	350	23	52	24
JH7QXJ	SOL	33,077	120	341	31	49	17
JH8UQJ	SOH	31,376	105	296	35	42	29
JH6ETS	14	29,250	112	325	25	60	5
JF1UVJ	SOL	22,594	101	286	31	35	13
JH4CES	SOA	14,850	60	165	35	43	12
JF2BNG	7.0	14,697	79	213	21	43	5
JK1ATT	SOL	11,988	64	162	29	37	8
JK1AFI	14	11,682	67	198	19	40	0
JA4CZM	14	8,305	53	151	17	29	9
JA2NNF	7.0	6,943	52	131	19	31	3
JR1BAS	14	6,909	48	141	34	15	0
JA1BNW	SOL	6,084	41	117	22	30	0
JA2MOG	14	5,805	43	129	11	21	13
JH7AJD/1	SOA	5,292	40	98	23	24	7
JE2LUN	14	4,355	67	67	30	29	6
JR6LLN	14	3,800	34	100	13	19	6
JE1UFF	SOL	2,760	27	69	18	22	0
JA1SJV	21	1,800	23	60	11	19	0
JRØGFM	SOL	903	15	43	11	10	0
JI6JSD	21	176	6	16	5	6	0

KAZAKHSTAN

UN5PR	SOH	648,088	710	1988	77	222	27

KUWAIT

9K2HN	SOH	67,611	248	727	19	68	6

LEBANON

OD5PL	SOL	14,104	115	344	9	32	0

MALAYSIA

9M2TO	SOH	269,108	504	1373	60	129	7

QATAR

A71CW	SOL	48,730	150	443	29	74	7

Tajikistan

EY8MM	SOH	232,906	457	1153	58	142	2

TURKEY

TA3B	SOL	423,128	622	1816	61	154	18
TA2II	14	210,600	668	1950	30	50	28
TA3D	14	30,660	176	511	16	44	0
TA3BO	SOL	1,472	23	64	8	15	0

UZBEKISTAN

UK7F	SOL	31,815	113	315	29	71	1

BALAERIC ISLANDS

EA6NB	14	56,430	266	627	13	42	35
EA6ZS	SOL	4,416	74	92	11	33	4

EUROPE

BELGIUM

ON4UN	MOM	2,188,461	1708	4233	101	294	122
ON7KK	SOL	178,227	405	861	50	135	22
ON6AM	SOL	99,385	325	695	36	80	27
ON2CCB	SOL	2,280	24	60	13	15	10
ON6NL	7.0	2,232	46	62	7	25	4

BOSNIA & HERZEGOVINA

T91EZC	MOL	104,208	315	668	30	107	19

BULGARIA

LZ5Z	MOS	1,293,846	1224	2901	90	275	81
LZ5W	7.0	189,675	591	1405	25	76	34

(Op. LZ1MC)

LZ1KPP	SOL	157,195	335	745	52	136	23

(Op. LZ3RR)

LZ1BJ	SOH	143,444	638	763	44	124	20
LZ1MP	14	78,690	277	645	24	68	30
LZ4BU	SOL	14,670	70	163	30	52	8
LZ2UF	21	10,758	110	163	19	47	0

CROATIA

9A1D	MOL	629,506	845	1931	65	190	71
9A2DQ	14	403,206	893	2278	33	92	52
9A1A	7.0	140,530	500	1081	26	78	26

(Op. 9A7R)

9A5W	21	119,540	371	860	28	87	24
9A9A	3.5	60,900	350	725	13	55	16

(Op. 9A2RA)

9A2WJ	7.0	8,624	119	154	14	42	0
9A3SM	SOL	4,830	76	115	8	34	0

CZECH REPUBLIC

OK2DB	SOL	211,456	341	826	60	145	51
OK2SG	SOH	148,720	298	676	49	144	27
OK2EQ	SOL	126,973	306	679	41	121	25
OK2PAD	SOL	69,678	218	474	36	99	12
OK2XTE	7.0	13,566	128	266	10	40	1
OK2PHI	3.5	3,052	56	109	5	23	0

ENGLAND

GB5RY	SOL	512,244	739	1581	68	216	40
GØUNO	MOL	82,194	282	618	44	72	17
MXØADU	14	13,728	155	312	10	34	0

(Op. GØLII)

ESTONIA

ES7FQ	14	240,534	587	1449	28	63	75

EUROPEAN RUSSIA

RW6AWT	MOM	1,303,248	1257	2858	105	296	55
RQ4L	MOL	947,121	1048	2499	83	238	58
UA6LP	SOL	250,146	502	1069	52	168	14
UA3AFS	SOL	198,660	410	924	57	145	13
RU3AT	SOH	153,882	415	927	37	112	17
UA6LU	21	17,082	97	234	22	51	0
RA3BT	21	6,992	60	152	17	28	1

FINLAND

OI3LQK	MOM	748,800	1031	2304	73	216	36
OH2GI	SOH	455,535	575	1719	63	157	45
OH2BP	SOH	263,586	512	1182	49	141	33
OH2LU	SOA	179,955	372	837	45	135	35
OI3MMF	14	76,572	309	709	22	64	22

FRANCE

TM7XX	SOH	982,125	1076	2619	70	218	87

(Op. F5MUX)

F5TEU	SOL	78,952	253	556	27	92	23
F2AR	SOH	66,007	200	443	36	98	15
F6JSZ	SOA	20,532	105	236	18	52	17
TMØZK	7.0	18,096	238	312	12	46	0

(Op. F5OZK)

F5PHW	SOL	13,272	81	168	21	54	4

GERMANY

DL6RAI	MOH	1,390,259	1219	2977	97	277	93
DF3CB	SOA	1,117,551	973	2467	95	270	88
DK3GI	SOL	929,493	934	2229	89	252	76
DJ6QT	SOH	826,340	859	2092	82	228	85
DL7URH	MOH	552,594	663	1561	76	220	58
DL4MCF	SOA	403,920	530	1188	73	226	41
DJ6JC	SOH	381,120	509	1191	75	186	59
DF8QB	SOH	329,896	505	1096	68	195	38
DL7VOG	SOL	263,406	411	921	65	182	39
DL4RCK	SOH	160,704	330	744	49	132	35
DJ2BW	7.0	130,650	437	975	27	80	27
DJ9XB	SOL	102,185	241	535	41	126	24
DJ5FT	SOL	99,484	233	532	44	124	19
DL5PW	SOL	98,362	229	526	41	115	31
DL1FPL	SOH	76,293	186	441	40	107	26
DL8SDC	SOL	75,504	225	484	32	107	17
DF5BX	SOL	64,437	221	457	29	94	18
DJ3IW	21	51,290	190	446	23	77	15
DJ5JK	21	45,344	188	416	23	81	5
DF3UB	14	34,347	127	321	21	66	20
DK7FP	SOL	25,544	108	248	29	58	16
DL9MBZ	14	25,156	153	331	14	48	14
DL5BCQ	SOH	18,032	88	196	25	61	6
YZ7ED	7.0	16,836	132	276	12	44	5
DL1ET	7.0	11,526	115	226	9	40	2
DJ2YE	7.0	10,017	92	189	9	40	4
DL4OCL	MOL	9,126	66	117	27	51	0
DH7ACI	3.5	8,569	110	209	7	33	1

GREECE

SV2BFN	SOL	181,650	402	865	45	139	26
SV1CER	SOL	117,986	310	682	42	104	27
SV1NA	21	2,484	27	69	14	21	1

HUNGARY

HG9N	MOH	1,326,748	1250	3043	90	265	81
HAØDU	SOA	558,670	666	1610	78	221	48
HAM5BSH	14	124,236	424	986	22	69	35
HA3OU	SOH	26,450	98	230	24	53	38
HA5EA	14	493	14	29	6	11	0

ITALY

IK1GPG	MOM	1,725,900	1369	3138	107	328	115
IK2QEI	SOA	1,434,716	1149	2858	95	289	118
IK2BUF	MOH	1,247,714	1058	2594	276	90	115
I1COB	SOH	525,959	673	1589	68	196	67
IK2HKT	SOL	378,056	551	1204	65	199	50
I2HWI	SOL	207,460	395	902	44	134	52
I2UIY	SOL	124,050	324	827	29	80	41
IK2UVR	SOL	83,838	252	534	30	104	23
IK8VRN	SOL	79,926	205	462	40	114	19
IK2OPW	SOL	72,468	254	594	36	83	3
I8UDB	3.5	72,265	355	745	16	60	21
IK6WDY	21	70,488	223	534	27	83	22
IV3FSG	7.0	64,741	316	641	20	64	17
IK8CNT	21	57,065	213	505	25	71	17
IV3UHL	14	51,253	195	479	21	62	24
IV3ORB	SOL	32,248	135	278	26	83	7
IK4BWC	SOL	29,469	100	209	79	51	11
IK7XCW	14	27,594	188	378	15	48	10
IK2REA	SOL	25,270	121	266	17	62	16
IKØCNA	SOL	21,945	110	209	28	63	14
IK2DDP	14	19,152	123	266	14	46	12
I7ICU	SOL	16,849	100	203	23	54	6
I8BVW	SOL	15,352	91	202	16	50	10
IK7YUA	7.0	14,280	125	255	14	42	0
IK3SCB	SOL	418	10	22	9	10	0

ITU GENEVA

4U1ITU	MOL	97,760	323	752	24	71	35

KALININGRAD

RW2F	MOH	1,193,956	1167	2836	85	264	72

LATVIA

YL8M	SOL	860,370	1041	2410	75	230	52

(Op. YL2KL)

LIECHENSTEIN

HBØ/HB9NL	SOH	12,410	61	146	24	47	14

LITHUANIA

LY1BZB	MOM	885,573	1048	2349	83	259	35
LY1DC	MOH	484,220	780	1705	62	187	35

MFJ *tunable* super DSP filter

Only MFJ gives you tunable and programmable "brick wall" DSP filters

MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.

You get MFJ's *tunable* FIR linear phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57dB attenuation 75 Hz away.

***Only* MFJ gives you 5 *tunable* DSP filters. You can *tune* each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* the bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like FM.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fade.**

U.S. Patent D374,010

MFJ-784B

$249.95

NEW!

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

You can use two tunable filters together. For example, tune one to mark, one to space and set bandwidth tight for a super sharp RTTY filter.

Tunable highpass/lowpass filters

You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create *custom* filters for Voice, Data and other modes.

Signals just 75 Hz away literally disappear -- they are reduced 57 dB!

Automatic notch filter

MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milli-seconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

You can *selectively* remove unwanted tones using the two *manually tunable* notch filters --an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

15 *pre-set* filters -- factory set or you custom program

You can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- *an MFJ exclusive!* Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 *programmable* filters.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

2½ watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. Use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

New Features

MFJ's exclusive tunable *Spotting Tone*™ -- accurately tunes even the narrowest CW filter.

MFJ's exclusive *Adaptive Tuning*™ -- tuning rate automatically becomes finer as you narrow bandwidth -- makes narrow filters easy-to-use.

MFJ's exclusive *FilterTalk*™ -- sends precise filter settings in Morse code.

Has automatic notch with *variable* aggressiveness, new quieter 2½ watt audio amplifier, new speaker switch keeps phones always active.

Manual and automatic notch can be used together. Noise reduction, automatic notch and tunable manual notch can be used when a custom filter you saved in memory is selected.

You get an accurate easy-to-use input level indicator, improved manual notch in the CW mode, adjustable line level output, more Mark-Space frequencies and baud rates for data filters and auto- matic bypass during transmit for monitoring CW sidetone, voice or data by sensing the PTT line.

Firmware Upgrade

For MFJ-784, order **MFJ-55, $29.95.** Gives you most features of the MFJ-784B.

NEW! 60 dB Null *wipes out* noise and interference

MFJ-1026

$139.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise-- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequencies from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $12.95. 6½x1½x6¼ inches.

MFJ-1025, $119.95. Like MFJ-1026 less built-in active antenna, use external antenna.

dd DSP to *any* Multimode

FJ-781
29.95

Add "brick wall" DSP filtering to *any* TNC or multi-mode data controller.

Copy signals buried in noise and QRM.

Under severe QRM, DSP greatly improves copy of Packet, AMTOR, PACTOR, OR, Clover, RTTY, SSTV, WeFAX, FAX, V -- nearly any digital mode. Automatic gain trol, ON/OFF/Bypass switch. Plugs between nsceiver and multi-mode. Uses 10-16 VDC or) VAC with MFJ-1312B, $12.95. 4½x2½x5in.

DSP for your MFJ-1278/B

MFJ-780
$99.95

Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B *automatically* selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW.

Plug in a MFJ-780 and copy signals that other multi-modes can't. Some soldering needed.

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LUXEMBOURG

LX1TO	**SOL**	**224,561**	**410**	**1007**	**45**	**133**	**45**

MACEDONIA

Z30M	**MOL**	**961,860**	**1175**	**2788**	**67**	**206**	**72**

NORTHERN IRELAND

GIØKOW	**14**	**443,520**	**979**	**2520**	**29**	**91**	**56**
GI4GTY	**MOL**	**229,056**	**495**	**1193**	**38**	**107**	**47**

NORWAY

LA9AJ	**SOH**	**223,330**	**431**	**971**	**48**	**146**	**36**
LA1K	**MOH**	**114,866**	**353**	**727**	**31**	**122**	**5**
LA2IJ	**SOA**	**77,976**	**202**	**456**	**43**	**109**	**19**
LA2KD	**SOL**	**29,832**	**116**	**264**	**32**	**79**	**2**
LA1IO	SOL	26,460	145	294	20	70	0
LA5TFA	SOL	16,498	105	226	16	43	14
LA8GK	14	1,326	28	51	6	20	0

POLAND

SP9UNX	**SOL**	**92,253**	**260**	**573**	**35**	**112**	**14**
SP9LKS	SOL	78,971	222	503	35	95	27
SP2UUU	**SOA**	**70,512**	**216**	**452**	**36**	**111**	**9**
SP2EWQ	SOL	52,700	154	340	50	104	1
SP3RBT	SOL	52,578	173	381	33	93	12
SP7NMW	**SOH**	**51,544**	**170**	**379**	**38**	**92**	**6**
SP1JRF	**14**	**49,755**	**199**	**465**	**82**	**25**	**0**
SP2EIW	SOL	41,301	162	353	28	79	10
SN6U	**MOL**	**33,633**	**140**	**303**	**28**	**74**	**9**
SP2HPD	SOL	32,373	142	297	28	77	4
3Z6AEF	14	30,976	155	352	18	55	15
SP2FAV	SOH	24,297	128	273	37	44	8
SP2FN	14	15,015	105	231	13	50	2
3ZOZIM	MOL	14,040	132	195	17	55	0
SO5TW	7.0	10,638	91	197	10	34	10
SP9RTF	SOL	9,163	95	187	16	33	0
SP2GWZ	14	4,600	112	115	10	29	1
SP6OPE	SOL	912	16	38	9	14	1

PORTUGAL

CT1AOZ	**14**	**263,345**	**702**	**1699**	**27**	**76**	**52**
CE1ETE	**21**	**23,478**	**172**	**273**	**17**	**59**	**10**

ROMANIA

YO3APJ	**SOH**	**300,672**	**601**	**1044**	**74**	**180**	**34**
YO3JF	**SOL**	**189,144**	**532**	**888**	**54**	**135**	**24**
YO5AY	SOL	19,260	153	321	11	49	0
YO3FRI	**14**	**12,446**	**132**	**254**	**13**	**36**	**0**
YO5TE	SOL	9,880	72	152	17	45	3
YO4FRF	14	1,260	30	60	7	14	0

SARDINIA

ISØWBT	**SOL**	**244,770**	**480**	**995**	**51**	**162**	**33**

SCOTLAND

GM3UTQ	**SOL**	**127,263**	**330**	**719**	**34**	**118**	**25**
GMØEGI	SOL	836	17	38	8	14	0

SICILY

IT9ZGY	**14**	**402,660**	**897**	**2237**	**32**	**92**	**56**
IT9GSF	14	338,220	900	1879	34	90	56
					(Op. IT9STG)		
IT9STX	14	242,088	653	1572	27	75	52
IT9ORA	SOL	6,510	76	105	18	44	0

SLOVAK REPUBLIC

OM5XX	**7.0**	**81,620**	**431**	**742**	**24**	**77**	**9**
OM3PR	21	1,890	27	63	11	19	0

SLOVENIA

S56A	**SOH**	**1,554,969**	**1222**	**3067**	**105**	**273**	**129**
S50C	**MOH**	**1,089,621**	**1083**	**2613**	**84**	**248**	**85**
S57W	SOH	315,280	479	1126	60	165	55
S53MJ	**14**	**269,600**	**670**	**1685**	**28**	**81**	**51**
S51DX	14	235,467	596	1539	38	64	51
S50A	SOH	142,008	309	776	35	91	57
S57J	SOL	115,560	215	535	56	134	26
S52CO	**3.5**	**73,266**	**100**	**198**	**6**	**31**	**0**
S57DX	3.5	48,741	312	633	12	51	14
S59L	SOL	14,898	87	191	18	44	16
S57C	SOL	14,058	100	198	15	50	6
S52SK	28	1,775	36	71	8	11	6

SPAIN

EA3NY	**SOH**	**884,250**	**976**	**2250**	**80**	**230**	**83**
EA3FQV	**SOL**	**192,360**	**390**	**916**	**38**	**119**	**53**
EA5EYJ	SOL	144,318	304	718	45	127	29
EA7GXD	SOL	108,445	224	529	46	128	31
EA3GJH	SOL	104,873	339	527	44	119	36
EA7AFM	**21**	**51,887**	**265**	**583**	**20**	**56**	**13**
EA2ASB	SOL	50,400	182	336	38	91	21
EA1AHA	SOL	45,738	176	378	24	80	17
EA2BNU	SOL	34,336	137	296	21	67	28
EA4BNQ	SOL	3,700	50	100	10	27	0
EA4CKC	SOL	2,128	37	76	6	22	0
EA1BLF	21	1,464	27	61	10	10	4

SWEDEN

SM5FUG	**SOH**	**669,944**	**874**	**2024**	**71**	**210**	**50**
SM3KOR	SOH	583,110	862	2046	60	173	52
SM5EIT	SOH	124,532	329	764	31	97	35
SK7BQ	**MOL**	**110,528**	**295**	**628**	**40**	**132**	**4**
SM4GVR	SOH	102,204	302	668	31	97	25
SM4CMG	**SOL**	**46,560**	**187**	**388**	**28**	**91**	**1**
SM4DHF	**14**	**43,656**	**172**	**408**	**24**	**61**	**22**
SM3BYJ	14	38,808	164	392	21	57	21
SM5AAY	SOL	15,879	109	237	16	42	9
SM4RGD	SOL	8,932	79	154	11	47	0
SM3LGO	SOL	3,825	40	85	10	31	4

SWITZERLAND

HB9HK	**SOH**	**455,064**	**660**	**1608**	**48**	**166**	**69**
					(Op. HB9CAL)		
HB9CC	**MOH**	**172,405**	**482**	**1189**	**26**	**79**	**40**
HB9LF	**MOL**	**57,252**	**162**	**367**	**42**	**104**	**10**
HB9HFD	SOL	12,558	73	161	19	50	9

THE NETHERLANDS

PI4COM	**MOH**	**1,180,116**	**1087**	**2676**	**90**	**261**	**90**
PAØVHA	**SOH**	**169,155**	**400**	**895**	**44**	**115**	**30**
PA3GKT	**SOL**	**124,218**	**259**	**618**	**45**	**112**	**44**
PA3DHR	**14**	**84,298**	**312**	**746**	**18**	**62**	**33**
PA3AQL	**SOA**	**44,268**	**181**	**372**	**24**	**85**	**10**

UKRAINE

UTØI	**SOH**	**952,280**	**1099**	**2506**	**83**	**244**	**53**
					(Op. UT2IZ)		
EO6F	**14**	**264,201**	**715**	**1641**	**31**	**89**	**41**
UR5IBG	**SOL**	**152,934**	**333**	**718**	**49**	**149**	**15**
UT2UD	SOL	128,400	283	642	52	137	11
UR7E	**7.0**	**121,726**	**427**	**1006**	**26**	**76**	**19**
UTØZZ	14	108,252	385	873	25	73	26
UR6QA	7.0	90,972	438	722	28	78	20
UR7TA	7.0	10,044	87	186	14	38	2
UYØYU	SOL	4,389	57	77	20	37	0
UR4FWI	7.0	1,232	28	56	6	16	0

WALES

GW5NF	**MOH**	**816,855**	**1030**	**2301**	**72**	**226**	**57**
GWØANA	**SOL**	**215,000**	**478**	**1000**	**39**	**150**	**26**
GW4KHQ	SOL	182,709	417	909	38	127	36

YUGOSLAVIA

YU1NR	**14**	**291,040**	**741**	**1819**	**30**	**85**	**45**
YU7AG	**SOH**	**268,270**	**422**	**965**	**63**	**179**	**36**
YTØE	**SOL**	**152,991**	**378**	**801**	**38**	**134**	**19**
					(Op. YU1BO)		
YU7AM	SOL	131,950	344	754	40	127	8
YU7AE	SOL	112,800	330	705	30	115	15
YT9T	**3.5**	**25,956**	**192**	**412**	**8**	**43**	**12**
					(Op. YT1MA)		
YZ7ED	**7.0**	**16,836**	**132**	**276**	**12**	**44**	**5**
YU7BJ	SOL	8,910	66	135	15	48	3
YU4WU	7.0	4,664	132	106	10	30	4

NORTH AMERICA

ALASKA

KL7/KG5EG	**14**	**29,941**	**147**	**379**	**17**	**32**	**30**
KJ7SB/KL7	SOL	1,050	20	42	9	6	10

CANADA

VE3EJ	**MOH**	**1,024,194**	**990**	**2427**	**87**	**181**	**154**
VE6KRR	**SOL**	**300,042**	**592**	**1266**	**46**	**75**	**116**
VA3MM	**14**	**261,800**	**650**	**1700**	**28**	**81**	**45**
VE3FJB	MOH	240,352	441	1036	51	100	81
VE6RAJ	**MOL**	**233,709**	**530**	**1077**	**38**	**59**	**120**
VE5RI	MOH	227,344	516	1093	42	68	98
VE2AXO	SOL	170,833	333	773	39	89	93
VO1HP	SOH	141,600	276	708	43	98	59
VE6JO	**14**	**128,616**	**416**	**932**	**25**	**63**	**50**
VE2BOB	SOL	104,859	246	573	39	70	74
VE3IAY	SOL	97,018	243	542	27	59	93
VE4COZ	14	83,220	333	730	23	52	39
VE7BTO	SOH	74,328	211	489	36	49	67
VE7OR	**SOA**	**53,710**	**198**	**410**	**27**	**28**	**76**
VE7IRA	SOA	51,220	195	394	24	31	75
VE6JY	SOA	20,500	78	205	34	49	17
VE5SF	SOH	19,838	94	218	22	26	43
VE8NC	14	19,825	117	305	15	26	24
VE2FFE	SOH	8,624	65	154	12	22	22
VE6ZX	3.5	7,831	103	191	3	2	36
VE5CPU	14	1,175	25	47	4	3	18
VE3UR	MOL	78,336	227	544	34	62	48

CUBA

CO3ZD	**7.0**	**64,236**	**274**	**606**	**20**	**38**	**48**
CO2KG	**14**	**34,100**	**252**	**550**	**17**	**45**	**0**

DOMINICA

J77C	**MOL**	**471,240**	**717**	**1386**	**67**	**136**	**137**

GUANTANAMO BAY

KG4GC	**MOH**	**1,403,150**	**1471**	**3325**	**76**	**163**	**183**

JAMAICA

KB5VRF/6Y5	**14**	**88,515**	**875**	**843**	**16**	**41**	**48**
8P6SA	**SOL**	**42,840**	**141**	**357**	**31**	**52**	**37**

MEXICO

XE2DV	**SOL**	**87,024**	**277**	**592**	**29**	**27**	**91**

PANAMA

HP1KZ	**SOL**	**81,653**	**268**	**571**	**21**	**38**	**84**
HP1DGX	**21**	**27,150**	**177**	**362**	**15**	**18**	**42**
HP1AC	SOL	10,521	79	167	14	10	39
HP3XUG	SOL	9,240	56	132	25	25	20

TURKS & CAICOS

VP5JM	**SOL**	**833,499**	**1063**	**2503**	**55**	**125**	**153**

US VIRGIN ISLANDS

NP2E	**MOL**	**1,010,344**	**1145**	**2584**	**64**	**142**	**185**
KP2BH	**SOL**	**150,516**	**306**	**666**	**142**	**72**	**12**

UNITED STATES

W3LPL	**MOM**	**2,487,347**	**2128**	**4223**	**110**	**270**	**209**
W5KFT	**MOH**	**1,833,300**	**1713**	**3150**	**110**	**263**	**209**
K1NG	**SOA**	**1,350,875**	**1,252**	**2675**	**98**	**235**	**172**
						(Op. KI1G)	
AA4FC	MOH	868,428	1182	2193	73	174	149
KM9P	MOH	736,062	856	1831	85	181	136
N9NCX	MOH	663,390	933	1755	73	150	155
AA5AU	**SOL**	**637,855**	**897**	**1537**	**83**	**172**	**160**
N2DL	**SOH**	**621,520**	**764**	**1828**	**67**	**161**	**112**
AA7NO	MOH	556,480	935	1504	76	125	169
WS1E	**SOL**	**488,650**	**709**	**1450**	**58**	**148**	**131**
WA4ZXA	**SOH**	**469,224**	**641**	**1372**	**71**	**147**	**124**
N1RCT	**SOH**	**464,508**	**792**	**1518**	**54**	**127**	**125**
KA4RRU	SOL	455,400	639	1265	75	154	131
KE1FO	**MOL**	**445,851**	**637**	**1323**	**69**	**153**	**115**
W4PK	**SOA**	**408,434**	**575**	**1366**	**65**	**145**	**89**
WA7FOE	SOH	403,920	813	1360	52	90	155
WA7FAB	SOA	402,213	740	1253	57	106	158
K1IU	**14**	**373,240**	**957**	**2170**	**51**	**90**	**31**
WA6VZI	SOH	361,075	724	1111	61	104	160
WAØVQR	MOL	351,855	729	1117	60	99	156
N6GG	SOH	351,333	603	1137	67	112	130
KB4GIB	SOH	321,051	570	1039	68	124	117
NA2K	SOL	320,051	519	1181	56	126	89
N9CKC	SOA	309,848	587	1006	58	116	134
WB8YTZ	MOH	309,100	513	1124	59	118	98
KQ4QM	MOL	303,072	529	924	64	130	134
KE7GH	SOH	269,103	679	993	48	71	152
W7LZP	SOH	255,960	555	948	53	91	126
N1JAC	SOL	212,095	473	845	44	93	114
ND5S	SOH	205,343	390	799	56	103	98
WA1FCN	SOL	197,396	350	809	52	108	84
KA2CYN	SOL	194,928	365	744	54	108	100
K9TSM	MOM	190,236	452	764	51	90	108
KD2YG	SOL	184,950	320	685	69	122	79
WB5B	SOH	182,118	405	717	54	103	97
WA2WYR	SOH	178,035	333	715	56	114	79
KJ7TH	SOH	162,494	417	719	47	79	100
N4XWC	MOL	160,608	365	672	48	90	101
KA3HFI	14	152,460	492	1089	25	70	45
KBØJUS	MOH	148,685	419	655	42	74	111
W7RSJ	SOH	145,860	430	715	39	69	96
K5ED	MOL	143,920	324	560	53	84	120
WU3V	**7.0**	**141,488**	**574**	**956**	**27**	**69**	**52**
W2UP	7.0	137,598	521	969	26	66	50
WW1Y	SOL	135,420	317	610	46	88	88
N8FEH	SOL	134,328	285	579	56	95	81
W3FV	14	131,657	406	961	26	69	42
AA7UN	14	129,444	469	938	27	62	49
KB5BOB	SOH	125,460	448	738	35	68	67
N8NHP	SOL	121,958	307	578	45	82	84
N5XUS	SOL	114,185	370	557	42	63	100
WB2HMF	SOL	113,850	272	575	39	90	69
NI4H	SOH	105,070	230	553	43	99	48
WF5T	SOA	102,816	253	476	44	81	91
N1AFC	SOL	99,302	236	574	37	79	57
W8FDV	SOL	98,044	262	508	40	77	76
KG8DM	SOH	94,965	267	487	40	73	82
KR4DA	SOL	93,070	230	454	51	81	73
K8PYD	SOH	86,673	187	519	53	108	6
WØML	SOH	86,490	206	465	47	82	57
NA2M	SOH	83,569	237	433	45	78	70
W5UFI	14	75,576	276	536	31	67	43
KØBX	SOL	74,448	228	396	44	97	47
K4FPF	SOL	73,530	182	430	39	87	45
N2QCA	SOL	72,375	213	375	39	70	84
KF2OG	SOL	72,240	218	430	38	72	58
W4IF	SOH	70,839	185	463	37	84	32
W2JGR/Ø	SOH	68,376	270	407	39	54	75
N7UJJ	SOL	67,887	298	397	36	41	94
N0AEV	SOL	66,980	251	394	29	51	90
KI4MI	SOL	66,240	186	368	40	73	67
AKØA	SOL	65,604	281	426	32	54	68
KN6WV	SOH	64,960	226	406	35	39	86
WB4M	SOL	64,874	213	398	35	65	63
WA3TXR	SOL	59,986	191	337	38	67	73
K8CV	SOH	58,745	189	379	37	62	56

Three members of the North America Multi-Single, High Power winning team. From left to right are Ron, K5DJ, Bryan, W5KFT, and Jay, WS7I. (Phil, NA4M, and George, K5TR, are not shown.) This photo was taken at Dayton this year and shows them holding the newly designed RTTY Contest plaque. By the way, there are plaques available for sponsorship for the 1997 contest. Contact Ron, K5DJ, if you are interested (his address is shown on the first page of the results).

KD6TO	SOA	56,991	176	363	43	63	51
AA7CP	SOL	56,406	261	357	27	36	95
W4PSJ	SOH	52,704	153	366	38	75	31
WA4GKM	SOL	51,561	202	337	31	52	70
KR4U	SOL	51,034	209	323	36	55	67
N1MEO	SOA	50,995	189	329	32	61	62
AC4PY	SOL	49,440	168	309	40	59	61
K9OSH	SOH	46,357	166	307	37	54	60
KN6DV	7.0	45,885	303	483	21	25	49
W6JOX	SOL	45,705	159	277	37	51	77
NY2Y	SOH	43,885	217	335	26	41	64
KC9UU	SOL	42,164	146	332	26	58	43
KØJPL	SOH	38,448	154	267	37	44	63
N3BDA	SOL	37,990	132	290	37	56	38
NN5T	SOL	36,841	153	277	33	46	54
K3JT/8	SOH	36,636	159	258	32	41	69
AC5DK	SOL	35,186	170	241	27	28	91
AC6DR	SOL	34,018	167	233	29	32	85
W6CN	14	32,832	146	304	23	47	38
K6HGF	SOL	31,744	178	248	28	30	70
N4CC	**3.5**	**30,972**	**269**	**348**	**12**	**24**	**53**
KC4UH	SOH	27,336	102	268	31	57	14
AE4MJ	SOL	26,555	134	235	22	43	48
W8IDM	SOL	25,415	110	221	30	46	39
K5HDU	SOL	24,624	153	216	22	29	63
W8CNL	SOL	23,751	109	273	24	46	17
KØLIR	MOL	22,230	145	247	20	28	42
KB9KWL	SOL	22,200	126	185	22	29	69
W4JLS	SOL	22,154	131	209	20	31	55
WB3AAL	SOL	21,736	100	209	26	44	34
WW3S	SOL	21,060	94	195	27	50	31
KK5CA	MOL	18,920	120	172	23	23	64
W7QDM	SOL	17,649	97	159	27	31	53
AE4RG	SOL	17,646	99	173	30	33	39
K2PS	3.5	17,537	175	247	8	21	42
WB3D	SOL	15,857	90	157	24	38	39
AB5SE	SOL	15,553	116	151	18	16	69
N5RXF	SOL	14,625	166	195	12	14	49
AA2GS	SOL	14,175	83	175	23	33	25
NZ3I	SOL	14,058	86	142	27	32	40
KA2DFO	SOL	12,936	70	196	19	44	3
KG5IT	SOL	11,954	84	139	21	28	37
W5TZN	3.5	11,774	187	203	5	6	47
WA9AQE	SOL	10,800	67	150	21	29	22
KC4B	SOH	10,024	65	179	18	35	3
AA8VK	14	9,240	78	165	13	28	15
N2CQ	SOL	9,159	60	129	21	31	19
K1HMO	SOL	8,192	54	128	19	32	13
KR4NY	SOL	7,960	82	199	15	20	5
N4PYD	SOL	7,770	50	111	24	34	12
W3CPB	SOL	3,976	38	71	18	18	20
K7EX	SOL	3,933	45	69	18	17	22
AB7NV	SOL	2,809	39	53	16	11	26
KK5XI	7.0	1,221	35	37	5	4	24
WB8ORV	14	882	29	42	12	9	0
W5KI	SOL	729	16	27	9	10	8
KI7AO	14	315	15	15	5	5	11
N2ALE/6	7.0	28	4	4	2	1	4
WB8JBR	SOL	13,350	139	178	28	47	0

OCEANIA

AUSTRALIA

VK6GOM	**MOH**	**307,800**	**466**	**1350**	**63**	**132**	**33**
VK2KM	**SOL**	**130,626**	**254**	**738**	**46**	**87**	**44**
VK3EBP	**14**	**11,310**	**72**	**195**	**19**	**33**	**6**

HAWAII

AH6JF	**SOH**	**130,677**	**346**	**1013**	**33**	**33**	**63**
NH6XM	SOH	110,893	218	641	44	43	86

INDONESIA

YB5QZ	**SOL**	**96,615**	**290**	**855**	**34**	**74**	**5**
YB1AQS	**SOH**	**19,296**	**99**	**288**	**28**	**35**	**4**

NEW CALEDONIA

FK8GM	**SOL**	**119,280**	**399**	**1136**	**44**	**61**	**0**

NEW ZEALAND

ZL3GQ	**SOL**	**384,714**	**510**	**1474**	**58**	**110**	**93**
ZL2JON	SOL	71,630	173	494	45	60	40
ZL2AMI	SOH	56,625	159	453	38	54	33

PHILIPPINES

DU1SAN	**SOH**	**66,616**	**258**	**757**	**29**	**51**	**8**
4F3GDX	**21**	**10,224**	**99**	**284**	**16**	**20**	**0**
DU7AFT	14	578	12	34	8	8	1

SOUTH AMERICA

ARGENTINA

LU5VC	**MOL**	**468,270**	**626**	**1815**	**55**	**103**	**100**
LU8FDZ	**SOL**	**310,500**	**434**	**1242**	**56**	**110**	**84**
LU8EKC	**21**	**267,820**	**651**	**1913**	**24**	**65**	**51**
LU6BEG	21	192,010	500	1477	21	59	50
LU6DTS	MOL	170,775	284	825	98	55	54
LU1ARL	SOL	113,778	290	774	62	85	0
LR3F	SOL	61,686	163	447	38	58	42
						(Op. LU6FAZ)	
LU6AUM	28	4,325	60	173	11	14	0

BRAZIL

ZY2HT	**MOL**	**827,200**	**814**	**2350**	**67**	**161**	**124**
ZW2A	**SOH**	**805,562**	**850**	**2494**	**61**	**154**	**108**
PU2RKM	SOL	96	6	12	4	4	0

CHILE

XR8S	**MOH**	**1,675,350**	**1309**	**3825**	**82**	**210**	**146**

COLOMBIA

HK3SGP	**SOL**	**207,200**	**359**	**1036**	**35**	**61**	**104**
HK1LAQ	SOL	104,390	327	949	35	66	9

ECUADOR

HC1JQ	**14**	**138,187**	**352**	**1039**	**24**	**64**	**45**

NETHERLANDS ANTILLES

PJ2MI	**7.0**	**174,885**	**452**	**1335**	**21**	**60**	**50**

PARAGUAY

ZP6CC	**SOH**	**165,186**	**428**	**1197**	**34**	**75**	**29**
ZP6VI	**21**	**41,168**	**232**	**664**	**20**	**42**	**0**
ZP5MAL	21	34,833	235	683	17	34	0

URUGUAY

CX8DX	**7.0**	**32,637**	**174**	**473**	**20**	**36**	**13**

VENEZUELA

YV5NFL	**MOL**	**1,214,336**	**977**	**2864**	**78**	**189**	**157**
4M5RY	**SOL**	**717,320**	**646**	**1816**	**79**	**162**	**154**
						(Op. YV5KAJ)	
YW1A	**7.0**	**84,482**	**273**	**797**	**19**	**45**	**42**
						(Op. YV1AVO)	
YV4GLD	21	861	15	41	7	5	9

CHECK LOGS

ZS1AAZ, S57DX,IK3UMU, SP3FAR, N4AN, LY2C, SP2LNY, K3SWZ, OK2BMA, WS2E, DL9GGA, OK-2-21478, 5X1T, AD1B, YU6UO, SK6LK, SM6BSK, LA2TD, F5YJ, SP6NVU.

CQ REVIEWS

The Ameritron AL-800H Linear Amplifier

BY DOUG DeMAW*, W1FB

When a new linear amplifier appears on the market, it is easy to dismiss it as just another piece of fancy new hardware. This is not uncommon if the amateur already has a quality amplifier on his or her operating desk. This was my situation when Ameritron announced the availability of the AL-800H. At first glance it looked similar to the Ameritron AL-80A that I have been using for many trouble-free years. But when I scanned the specs in the ad, I realized that there were vast differences in the two products. The AL-800H is a husky RF powerhouse compared to the AL-80A with its single 3-500Z tube. Let's examine the AL-800H in greater depth.

Front view of the Ameritron AL-800H linear amplifier.

Protection Circuits and Power Levels

Power tubes are beautiful things to behold. But until you hold a 3CX800A7 silver-plated external anode tube in your hands, you haven't had the ultimate experience. The AL-800H uses two Eimac 3CX800A7s in a parallel class AB2 circuit to produce up to 1.5 KW peak output. Actually, these tubes are capable of producing more than 1.5 KW, but that would be in violation of the regulations. However, knowing that the tubes are not being taxed to the limit offers the assurance of long life and low distortion RF power output.

It is a joy to be able to drive the amplifier to maximum legal power with only 50 watts of SSB exciter power. Although the manual states that full ratings are reached at approximately 70 watts of driving power, 50 watts from my TS-570D provides a peak SSB power output of 1.5 KW. For the most part, I use 25 watts of drive to produce 1 KW of peak output power. The lower driving power helps to ensure that the exciter is operating well within its minimal distortion range and is not supplying IMD products to the AL-800H for further amplification.

Tube damage (excessive grid current) from too much driving power is prevented by means of a fast-acting grid protection circuit. This circuit is preset from the front panel by adjusting the ALC SET control for a meter reading of 10 volts. This causes the grid protection sensor to trip at a combined grid current (two tubes) of approximately 50 mA. When the protection circuit engages, the amplifier ALC circuit reduces the transceiver output by applying a negative voltage to keep the grid current below 50 mA. There is also a grid-trip circuit that will place the amplifier in the standby mode if the 3CX800A7s draw more than the rated grid current. This protects the tubes when the ALC feature is not used. When the grid-protection circuit trips, the operator must cycle the **Operate/Standby** switch to put the amplifier back in service.

Another sensing circuit disables the amplifier transmit function if the power transformer should reach an unsafe operating temperature. The thermal sensing circuit will reset after several minutes of nontransmitting standby time.

Perhaps of equal or greater importance in the area of amplifier protection is the step-start system that engages when the amplifier is first turned on. This circuit ensures that the tube cathodes are fully heated before RF driving power can be applied. The cathodes are fully operational after filament voltage is applied and the three-minute step-start cycle is completed. I found the start-up delay somewhat frustrating at first, having never used an amplifier of this type previously. However, I grew used to this minor annoyance after two or three days of operation. Now, if I have a schedule at a particular time, I make sure I turn on the amplifier at least three minutes prior to the sked! Certainly, tubes that cost some $350 each deserve the best protection possible.

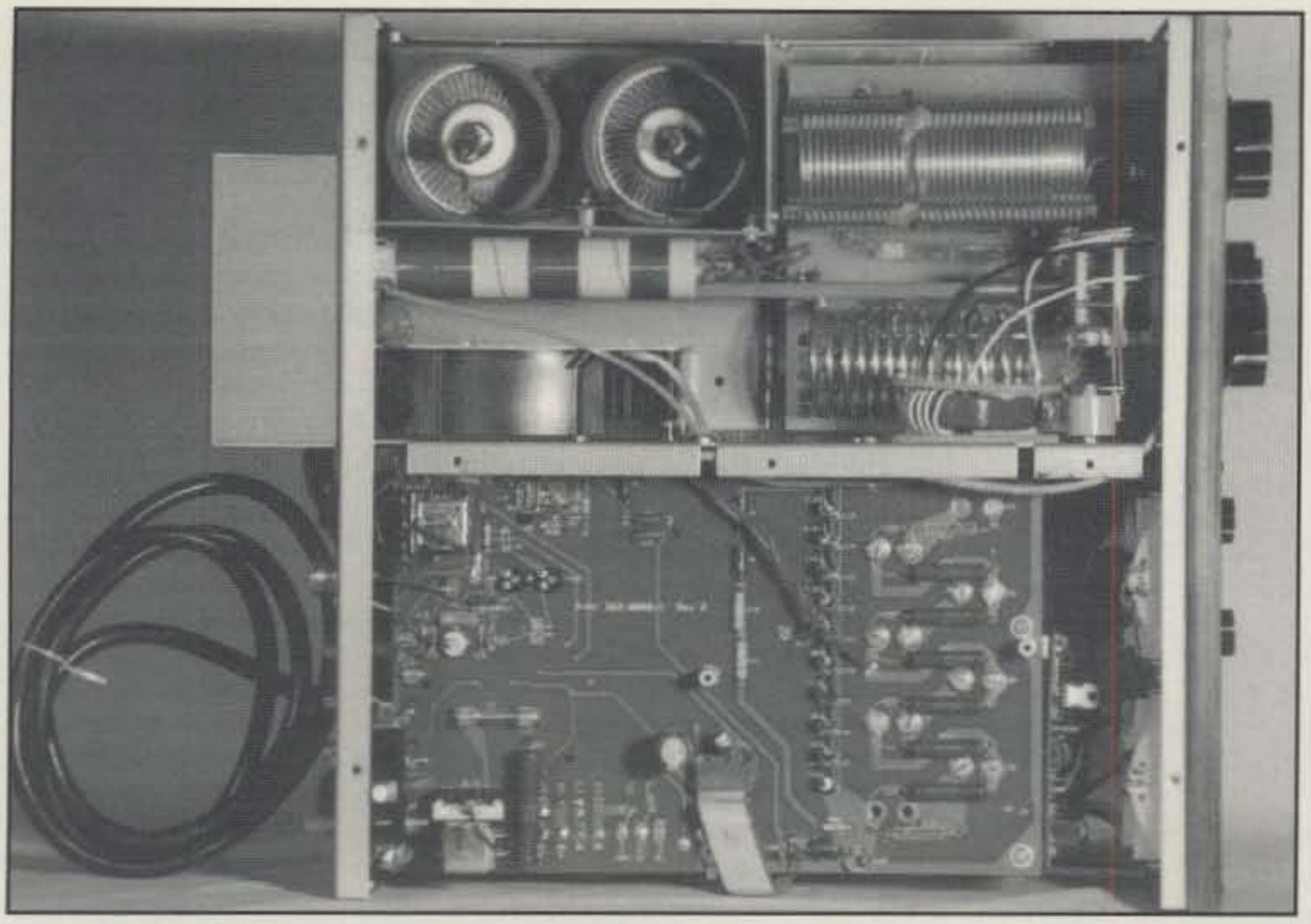
Specifications

The AL-800H operates from 1.8 to 21 MHz, inclusive of the 17 and 30 meter bands. An export model includes the 10 and 12 meter bands.

Individual band-switched pi-network matching circuits are used at the amplifier input to ensure an input SWR of 1.3:1 or less. The adjustable slug-tuned coils are available to the user at the rear of the amplifier. There is no need to remove any covers to have access to these coils.

Pi and Pi-L tank circuits are used at the output of the grounded-grid amplifier, depending upon the band of operation. Amplifier efficiency is rated at 65% for both CW and SSB.

*P.O. Box 250, Luther, MI 49656



Internal view of the AL-800H. The two tubes and their chimneys may be seen at the upper left of the photo.

A plate voltage of 2600 is standard (no load). The full load (1.2 amp) plate voltage sags to 2250 volts when operating from a quality 240 VAC line, resulting in a regulation percentage of 15. Line current at 1.5 KW peak output is 9 amps at 240 volts.

Third-order IMD is –35 dB or greater at full rated output power. All other spurious products are 40 dB or greater below peak output power.

Other Features of Interest

Two cross-needle meters are located at the upper left corner of the panel. The left-hand meter continuously monitors grid and plate current. The right-hand meter reads peak output power and reflected power (SWR) when the multimeter switch on the front panel is set to **REF**. Other metering selections are available for reading **HV, ALC,** and **ALC Set.**

A jack on the rear panel of the amplifier provides +12 volts at 200 mA for operating accessory devices, such as the ATR-15 antenna tuner.

The **ALC Set** control is adjusted for SSB operation by means of a single tone or carrier. It is adjusted so that the grid current of the amplifier cannot exceed 40 mA. This is the setting that ensures the best linearity. For CW operation the **ALC Set** control is adjusted for a maximum of 50 grid mA under any tuning or drive condition.

Best amplifier performance versus low grid current is achieved by slightly overcoupling the amplifier to the antenna. In other words, increase the **Load** control setting until there is a slight drop in RF output power. This coincides with a decrease in grid current. This represents only a small tradeoff in output power, but it is well worth it. Extremely light output coupling will lead to frequent tripping of the grid-protection circuit, even when less than rated output power is being delivered.

I was delighted to find that 6:1 vernier reduction drives are used on the **Plate** and **Load** controls. This makes amplifier adjustment much easier than when using direct-drive control shafts.

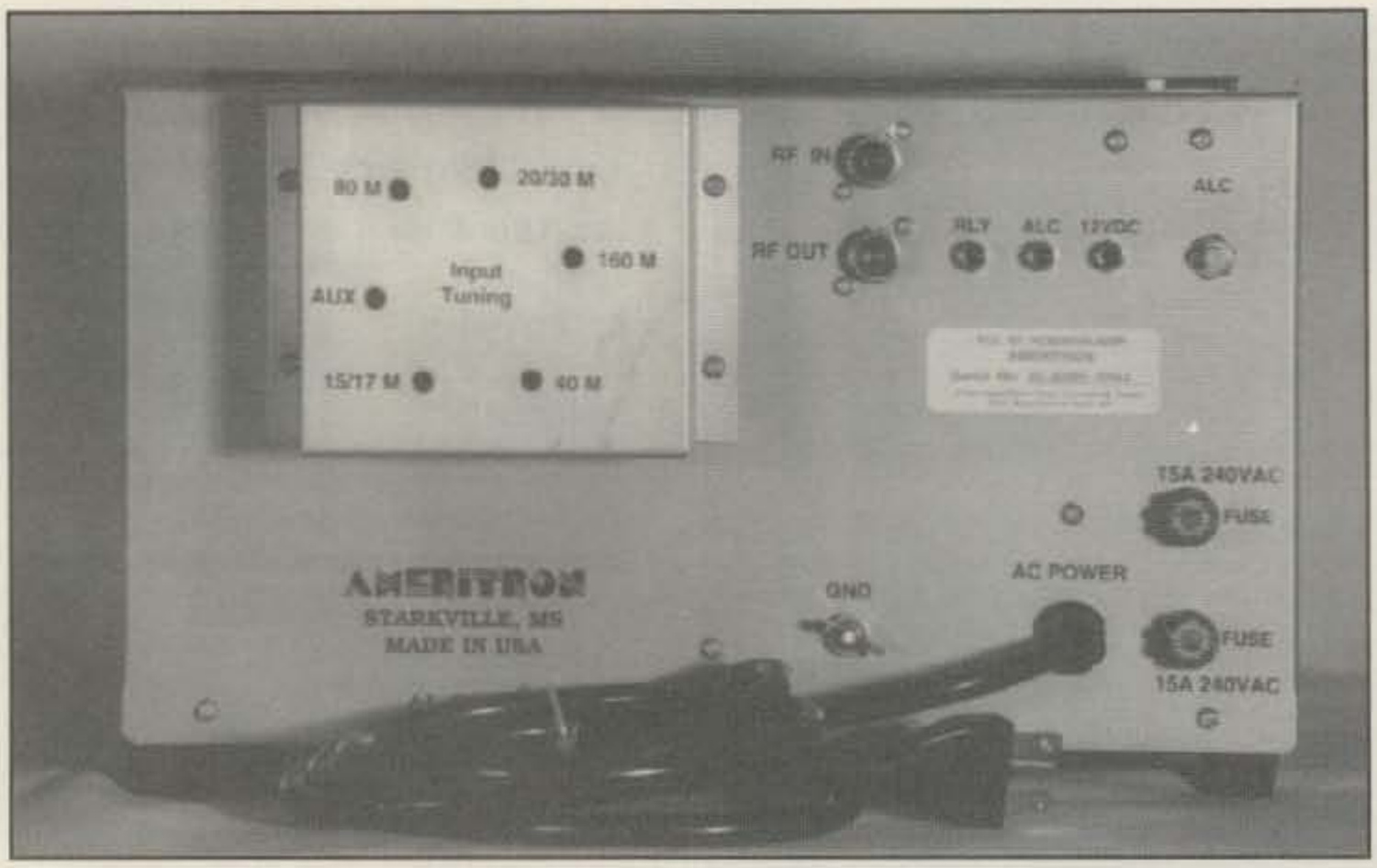
What About QSK?

The AL-800H is not a full QSK amplifier. The manufacturer does not recommend that a vacuum relay be substituted for the existing T-R relay, which requires 15 milliseconds to change states. Ameritron encourages the use of its external QSK-5 switch for those who desire full QSK operation. The QSK-5 also will work with other types of amplifiers. An internal QSK board (QSK-5PC) is available, too. Ameritron recommends that it be factory installed.

Operating The AL-800H

The 3CX800A7 tubes are shipped in a separate package. The amplifier must be opened to allow the installation of the tubes and their chimneys before testing can commence. Also, a small package of hardware must be removed from inside the amplifier before proceeding with the installation.

The amplifier is shipped with the transformer primary taps set for 240 volt operation. This is the time to alter the taps for other primary voltages if that is the user's desire. The manual explains which taps to select for other than 240 volt operation.



Rear panel of the AL-800H. The input tuning adjustments are accessible at the upper left through the holes in the matching network external cover. All rear-panel jacks are clearly labeled.

I was especially impressed with the orderly arrangement of the amplifier components while having the interior exposed. Quality components and solid electrical connections prevail throughout the system. The AL-800H is a fine example of modern-day American craftsmanship.

I do not use ALC with any of my amplifiers, so all that was needed to put the AL-800H on line was the coaxial cable from the exciter, another coaxial cable to the antenna tuner, and the relay control cable to the TS-570D. After the required three-minute step-start delay cycle was completed, I was generating full rated amplifier power within five minutes. I first had to adjust the **ALC Set** to limit the grid current to 40 mA.

I am impressed with the relative quiet of the amplifier cooling fan. It is the least noisy of the many fans I have heard in most commercial and homemade amplifiers.

Regardless of the 1.5 KW peak power level of the amplifier, I have yet to hear an internal arc while operating the system, even on those days when the humidity level is high. It is apparent that the vane spacing of the **Plate** and **Load** capacitors is well within the amplifier power rating. Furthermore, very little heat is vented from the amplifier compared to other units I have had on my operating desk. The shack will stay cooler on summer days!

The manual is clearly written and complete. Beginners and seasoned amateurs should have no difficulty following the instructions for installation and operation of the AL-800H. Those who have the necessary skills to service the AL-800H will find a complete line-up of circuit diagrams at the rear of the manual. There are also parts lists that identify the values of all of the components.

Amateurs who are disposed to AM operation should be aware that maximum carrier power must not exceed 300 watts. At this power level the peak envelope power can rise to 1200 watts with 100% symmetrical modulation.

The estimated tube life for 3CX800A7s is 8000 hours under ICAS conditions. Pushing them beyond the recommended power limits set forth in the manual will shorten the tube life or cause immediate failure in a worst-case situation. It is always best to operate any amplifier a tad on the conservative side of the ratings. The difference in signal strength will be less than 1 dB if this practice is adopted.

Physical Characteristics

The AL-800H measures 8½"H × 14½"W × 17¼"D. Weight is 52 pounds, and color is dark gray. The knobs are black with chrome inserts. The suggested retail price is $2295. The AL-800H is manufactured by Ameritron, 116 Willow Road, Starkville, MS 39759. Phone 1-800-647-1800 for a catalog or additional information. ■

BACK TO BASICS

HOW IT ALL STARTED

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Every feature can be mastered in minutes. No modern rig is as easy to use. It only takes a second to change bands. Plug-in modules are available for 160-10 meters including WARC. Single conversion and crystal mixing are the foundation of this 90 dB dynamic range receiver. That's the strong signal performance of rigs costing 3 times as much! It's sensitive and receive audio is sparkling clean with less than 2% distortion. The ideal selectivity for every band condition is at the touch of a knob. This patented "Jones" filter provides variable I-F bandwidth from 500 Hz to 2.5 KHz.

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Hams complain about today's cars having precious little space for gear. The SCOUT is the smallest HF rig in the industry (excluding QRP) measuring only 2.5" x 7.25" x 9.75" and runs directly off the 12 VDC car battery. If the SCOUT won't fit your car, nothing will. The optional noise blanker reduces ignition noise from both your car and the one that just drove by.

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Business travelers and vacationing hams typically set up a briefcase or small travel bag to include the 5 lb SCOUT, wire or whip antenna and lightweight power supply. It is surprising how many hikers and cyclists take along their SCOUT using some clever battery arrangement.

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The SCOUT is the most economical way to get started in ham radio. Consider the choice a new ham must make just to test his interest in HF: (1) Spend nearly $1000 or more on a new rig, (2) buy a used radio and take a chance on its condition, or (3) invest in a SCOUT at $549 with a one year factory warranty and our legendary TEN-TEC support.

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CW

Call	M	Score	QSOs
EA8EA	S	1,245,084	1009
P4ØWA	S	1,036,966	875
P49I	S	970,680	814
OT7T	S	934,500	1119
WW2Y	M	807,040	1363
VE3EJ	S	781,911	1150
GM3YOR	S	742,176	988
W2GD	M	696,000	1391
EA3KU	S	678,720	900
9A1A	M	669,073	984
RW2F	M	660,033	976
UA2FJ	S	650,624	1050
OH2HE	M	621,161	927
I4JMY	M	604,173	884
DK1NO	M	601,620	892
OZ7YY	S	598,208	943
OM7A	M	559,104	899
N1BB	M	555,960	1080
FM5BH	S	553,088	765
OK5W	M	526,932	820
W3LPL	S	513,798	1182
GØIVG	S	508,434	812
LY2ZZ	S	506,979	856
SN5W	S	497,490	808
OM7M	M	496,288	771
EK6GC	S	494,073	657
OH1NOR	S	490,800	839
HG1S	M	474,222	830
SP7GIQ	S	467,500	792
8P9DX	S	465,405	673
SL3ZV	M	464,530	774
S58MC	S	462,264	747
DF9ZP	S	459,472	721
VE9AA	S	455,712	784
LA9VDA	S	452,476	865
G4BYG	S	451,878	677
K8CC	S	450,993	1118
SM5HJZ	M	446,046	758
4X4NJ	S	442,595	562
SM4HCM	S	435,108	720
OK1DX	S	430,777	802
SK1BL	M	418,992	889
HG5A	M	410,424	743
K3WW	M	406,336	1045
N5JA	S	402,042	1052
9A2VR	S	396,398	677
AA1K	S	390,276	1034
GU3HFN	M	386,116	849
DK6WL	S	384,810	707
OM5DX	S	382,695	692
W3BGN	S	378,620	838
OK1RAK	M	377,952	738
NU8Z	M	371,742	1055
N2NT	S	369,304	1011
K3CR	M	366,660	1090
N3OC	M	360,140	991
OHØAM	M	359,640	913
9A7V	S	357,425	722
OK5TOP	M	356,190	683
K3UA	S	355,533	740
CT8T	S	354,936	588
ES5MC	S	354,312	750
S5ØA	S	348,087	733
9A2TW	S	346,775	597
LY3BS	M	345,738	698
YU7BJ	S	331,296	703
VE3KP	S	321,987	701
W4WA	M	321,860	936
OE5X	M	318,249	712
S53R	S	317,610	614
DKØSU	M	315,270	647
V47KP	S	312,825	524
PI4COM	M	304,024	591
KP4/K4UJ	M	298,015	512
WØCD	M	297,648	930
F5GHP	M	292,240	603
LA9SDA	M	285,120	648
W9RE	S	280,908	902
S57M	S	280,584	630
DKØEE	M	274,565	624
P4ØV	S	378,572	450
WR8C	M	355,212	1408
N5JA	S	332,352	1333
IK4IEE	M	326,610	653
K3CR	S	325,948	1319
N8TR	M	325,898	1442
UA2FJ	S	319,813	809
OT7A	M	308,240	694
LX9UN	M	302,649	706
RW2F	M	289,612	784
NXØI	S	280,160	1378
WØSD	M	272,320	1422
OZ9KY	M	260,250	641
XE1RCS	M	258,570	584
CU2CE	S	252,720	410
OT7T	S	245,836	516
W3GH	S	245,820	1210
VE3DC	M	244,370	722
NN5Z	M	225,280	1206
AA4S	M	224,814	1047
EA8ZS	M	223,686	263
K4JYO	S	221,937	1045
LY3BS	S	213,136	721
NØNI	M	207,150	1213
KG8CW	S	198,480	1025
NE3F	M	195,054	926
KH6CC	S	190,568	396
N3HBX	S	189,672	943
VP5JP	S	188,160	451
W4IZ	M	188,056	883
WA4ZXA	S	187,840	1017
W3RE	S	187,352	872
F5GTR	M	186,900	443
SP2FAX	S	181,805	527
K1VW	S	181,016	812
NX5M	M	178,350	905
K8LN	S	177,947	1006
HB9CXZ	M	170,380	459
WBØZLV	M	168,412	1034
AA4NU	S	167,536	987
K1OW	M	166,496	714
S57M	S	165,550	457
W3TS	S	164,410	826
AA2MF	M	162,180	704
GWØGEI	S	159,253	397
WØAIH	S	158,838	994
K1PX	S	158,004	911
K3ANS	M	157,818	703
WA1LNP	S	157,014	866
N4EHJ	M	153,769	858
K7ZO	M	151,656	897
N3MKZ	S	151,060	744
4N7ZZ	S	150,742	496
W7GG	M	150,290	877
5B4MF	S	150,124	298
N9ITX	S	146,454	977
TA2DS	S	145,900	306
S54E	S	138,474	422
OL5Q	M	135,818	469
RA4NW	S	135,289	524
AA4MM	S	132,848	502
OK1CM	S	131,936	411
W9LT	M	131,720	771
K2YR	M	131,250	747
AA1BU	S	129,796	746
WY3T	M	129,137	764
N5IA	S	128,180	822
DJ6QT	S	127,530	405
VE3XN	S	126,801	351
UY1HY	S	124,344	353

SSB

Call	M	Score	QSOs
VE3EJ	S	725,948	1502
GIØUJG	S	520,485	815
V47KP	S	509,450	732
EK6GC	S	480,738	949
W2GD	M	458,480	1541
WB9Z	S	405,270	1730
UA9MA	S	400,176	1181
W4WA	S	391,440	1423
XE2/ WA7UQV	M	389,205	945
VE1PZ	M	386,426	685

1997 HIGH-CLAIMED CLUB SCORES

Club	Score
Frankfort Radio Club	8,702,168
Southeastern DX Club	4,447,234
Contest Club Finland	3,707,055
Slovenian Contest Club	3,596,062
Society of MidWest Contesters	3,519,145

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The Alpha Delta Communications Variable Response Console

BY PAUL CARR*, N4PC

One of the most often overlooked parts of the amateur station is the audio reproduction system. The manufacturers state that the audio response from their equipment is "communications quality." Often there is very little that you can do to provide customized audio, short of electronic surgery on your high-dollar transceiver. You take what you can get!

The Alpha Delta Model VRC Variable Response Console.

Alpha Delta Communications may have just what you have been looking for—a tuned port speaker as a part of their Model VRC Variable Response Console. This unit will allow you to tailor the audio response of your station to suit your taste.

Aesthetically, the console is very pleasing. It measures 8.25"H × 8.25"W × 6"D and has a black matte finish. When you lift the console from its box, the 8.17 pound weight lets you know that you have a very solid piece of equipment in your hands.

The front panel of the unit is fairly evenly divided between the speaker grill at the top and the controls at the bottom. At the extreme left of the bottom panel is an OFF/ON pushbutton which controls power either from the wall-mounted power

*97 West Point Road, Jacksonville, AL 36265

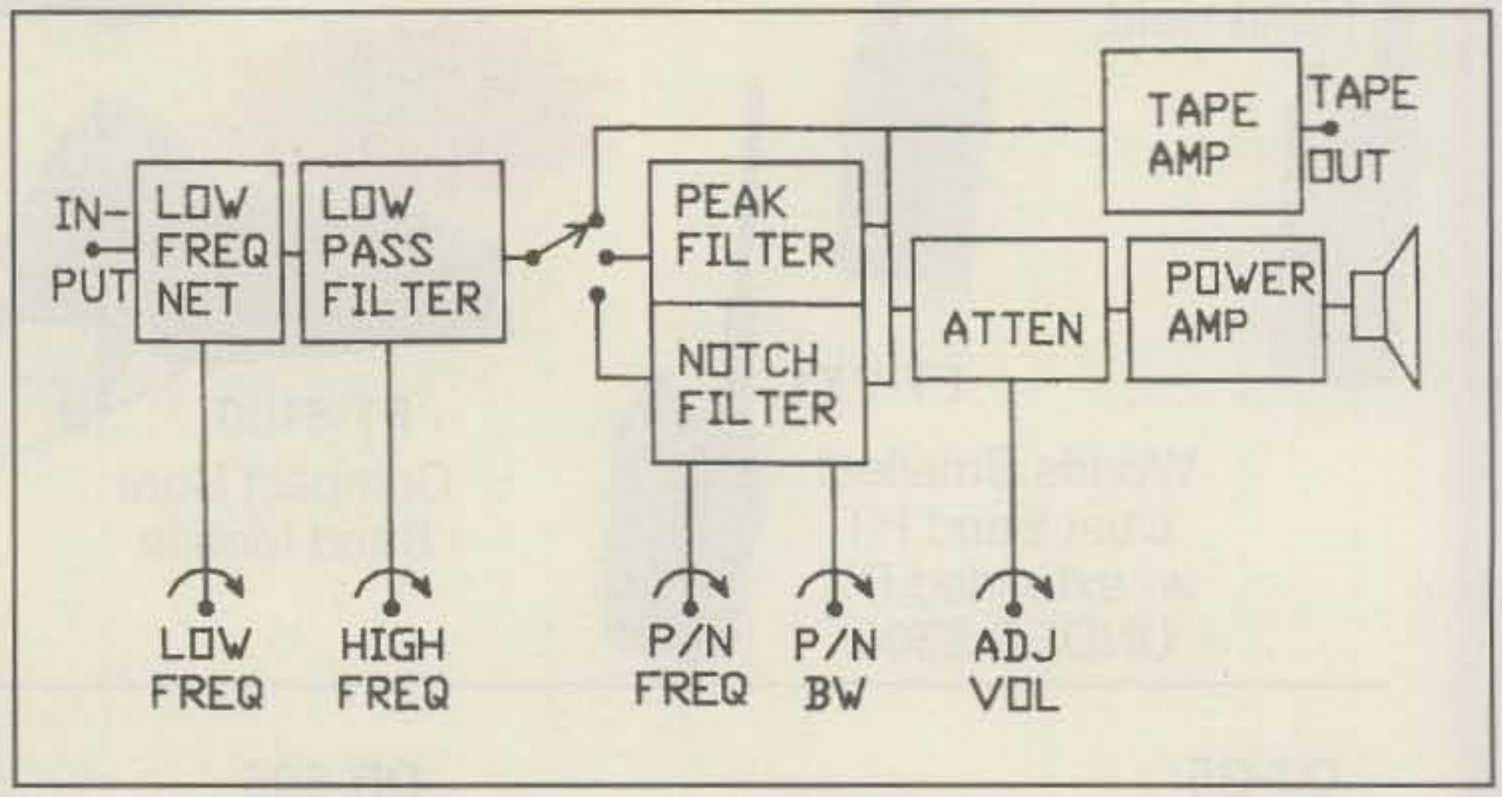


Fig. 1– The block diagram of the Alpha Delta Variable Response Console.

cube or an auxiliary 12 volt DC source. To the right there are two rows of green LEDs. The vertical row indicates the amount of low-frequency boost or cut, and the scale is calibrated in dB. The horizontal row of LEDs indicates the high-frequency cut-off (indicated in kHz). Underneath the LED graph are located two potentiometers which control the frequency response.

To the right there are several additional controls. There is a "set and forget" volume control (ADJ VOL) that allows you to

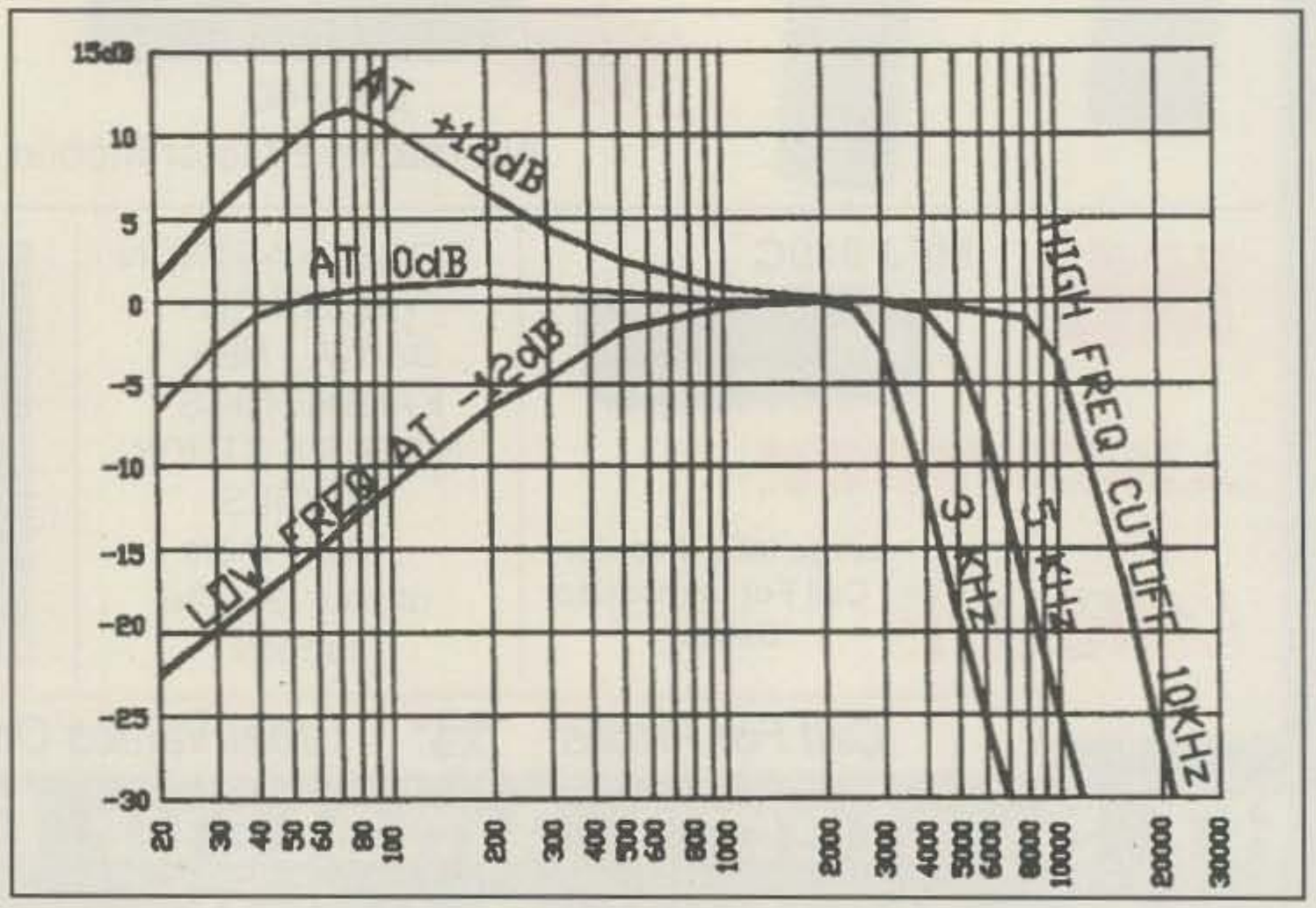


Fig. 2– Low- and high-frequency audio response.

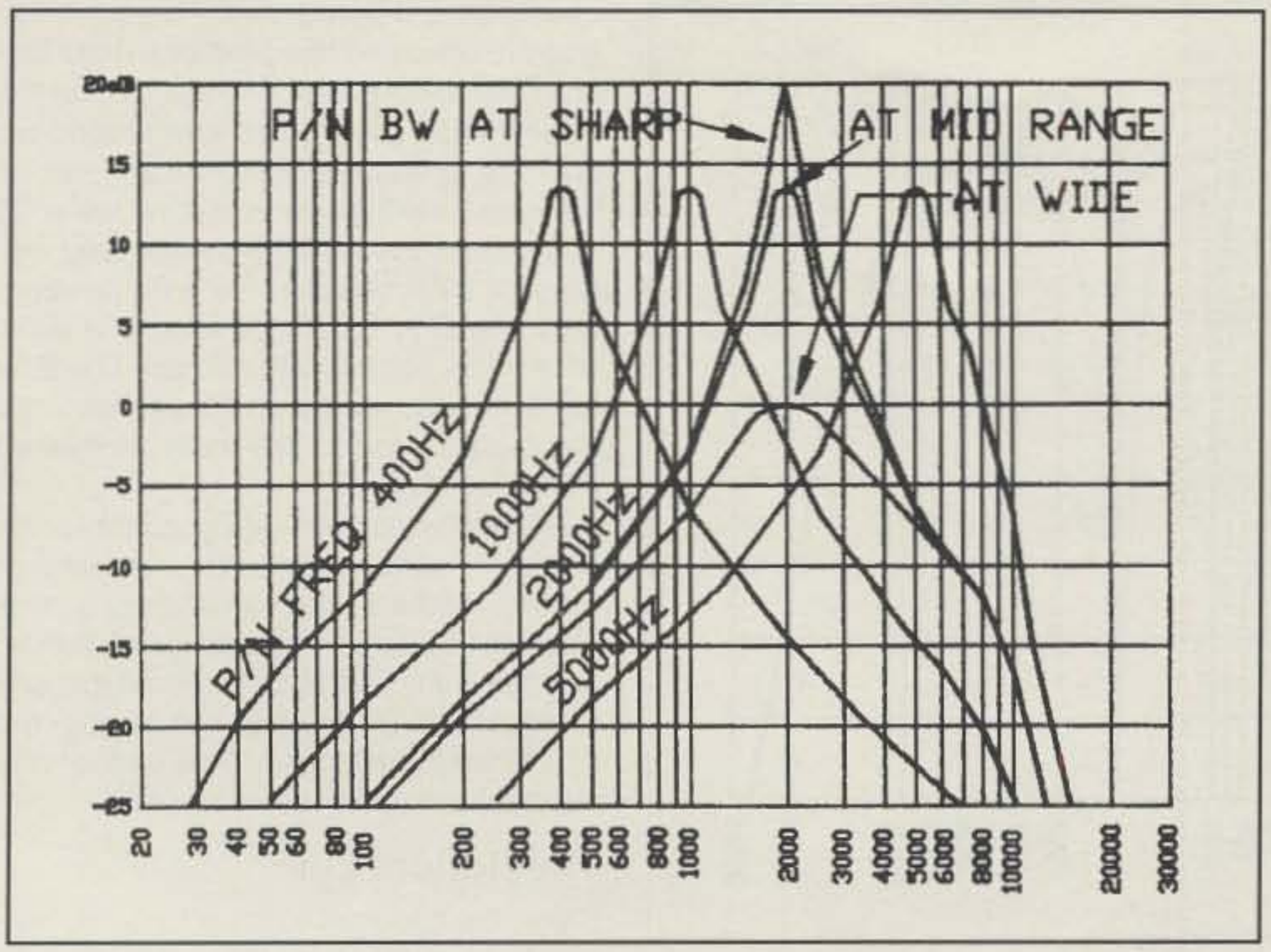


Fig. 3– Effect of controls on peak response.

equalize the audio level between what you hear in the transceiver's headphone jack and what comes from the speaker. The manufacturer recommends that the audio level be controlled by using the audio gain control on the transceiver. Below this control there are three push-button switches labeled NORM, PEAK, and NOTCH. If the PEAK control is activated, additional SCAF filters are placed in line. The peak response and bandwidth are controlled by potentiometers under these switches. To return to the normal mode of operation simply press the NORM switch. An adjustable notch is available by pressing the NOTCH switch. The width and depth of the notch is controlled by the potentiometers beneath these switches. At the bottom center of the front panel is a 1/4 inch stereo headphone jack.

On the rear panel of the unit there are three connectors. The audio input is via an RCA-type phono connector. There is a gain independent output for those who desire to connect a tape recorder. Power connection is provided through a barrel connector (center pin is negative).

Let's turn our attention to a block diagram of the Variable Response Console. As seen in fig. 1, there is always a low-pass filter in the circuit. The low-frequency, high-frequency responses are set by two potentiometers. These two settings determine the overall bandpass response. As seen in fig. 2, the overall patterns that are attainable are very impressive, and this is the way that I operate the unit under normal band conditions.

When the signals are weak and there

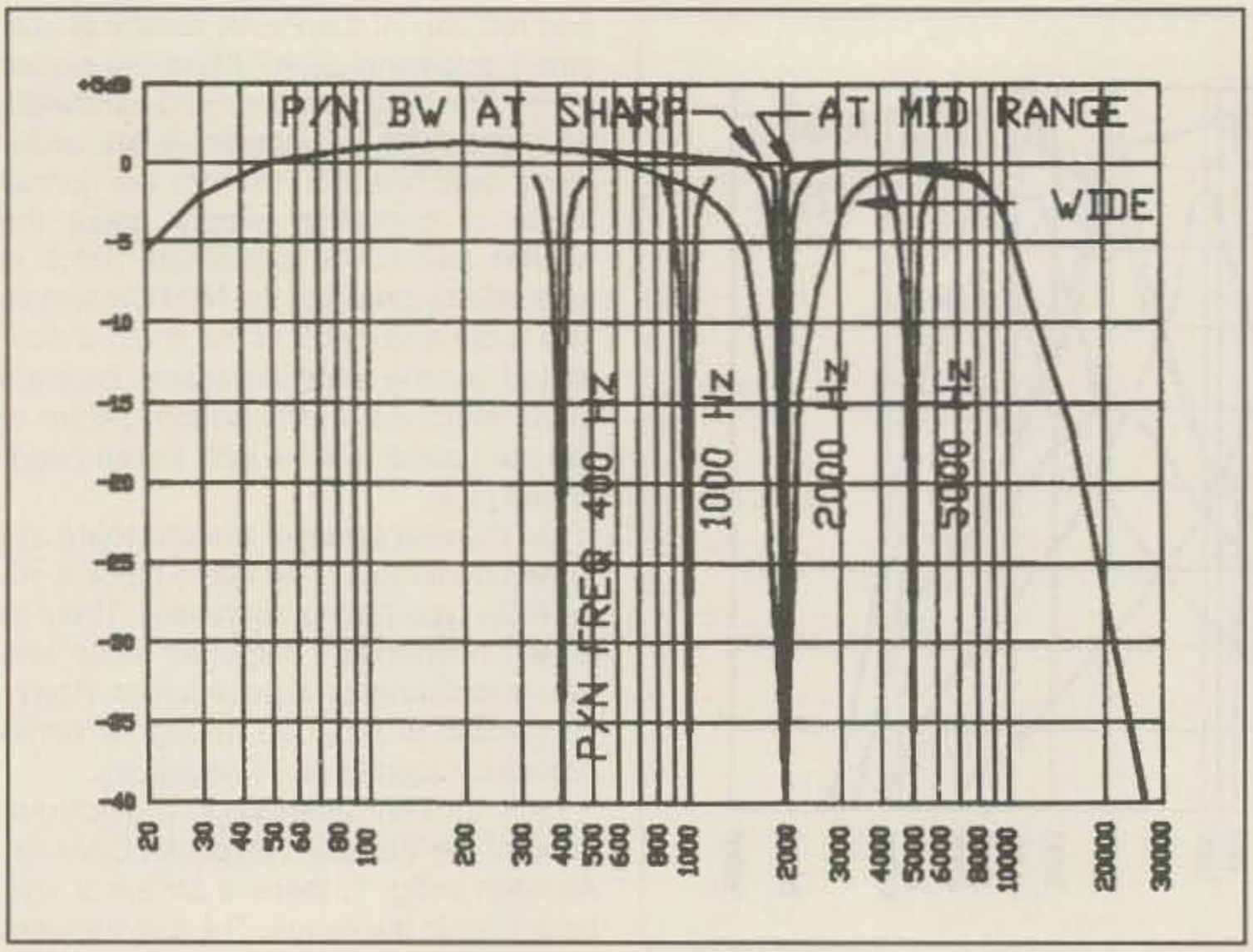


Fig. 4– Effect of controls on notch response.

is a high amount of noise on the band, the first step is to cut the low-frequency response and lower the high-frequency cutoff. If the response still seems to be too wide, press the peak switch to add additional filtering. Adjust the P/N BW knob to wide and adjust the P/N FREQ for best intelligence. This procedure can greatly enhance the receive intelligibility.

Another problem that plagues our daily operation is heterodynes. There are two ways of attacking this problem. If the heterodyne is very high pitched, adjust the HIGH FREQ control for a lower response until the unwanted signal disappears. If the unwanted heterodyne is lower in pitch, press the NOTCH switch, and with the P/N BW control in the wide position, tune the P/N FREQ control to a point where the signal is attenuated. The B/W knob can be adjusted to sharpen the notch and provide the best recovered audio (see fig. 4).

By carefully combining the control of the audio responses you can eliminate or greatly reduce the interference that plagues the receive signals on the bands. Another thing that is great about this unit is there is no RF feedback to hamper the interference reduction. The unit is very "clean" from an RF point of view.

The Bottom Line

If you are currently looking for a "no surgery" way of improving the audio from your present rig, this may be the answer. The VRC has a 90-day limited warranty against defects in parts and workmanship, and it has a suggested retail price of $249.95. The unit is made by Alpha Delta Communications Inc., P.O. Box 620, Manchester, KY 40962 (606-598-2029). ■

CQ SHOWCASE

Yaesu VX-1R VHF/UHF Handheld Transceiver

The new VX-1R VHF/UHF handheld transceiver is an ultra-compact dual-band transceiver with wideband coverage. The features include: 500 mW power output (1 watt w/ external power adapter); wide VHF/UHF multi-band receive; 290 memory channels in 9 groups; 6 character alpha-numeric display; built-in CTCSS/DCS encode/decode; built-in CTCSS/DCS tone search feature; smart search function; dual watch feature; one touch ARTS (automatic range transponding system) feature; priority channel alarm feature; and AM air-band receive. The VX-1R measures 81 × 47 × 25 mm (HWD) and weighs 125 g with antenna and lithium ion battery.

For more information, contact Yaesu USA, 17210 Edwards Road, Cerritos, CA 90703 (phone 562-404-2700).

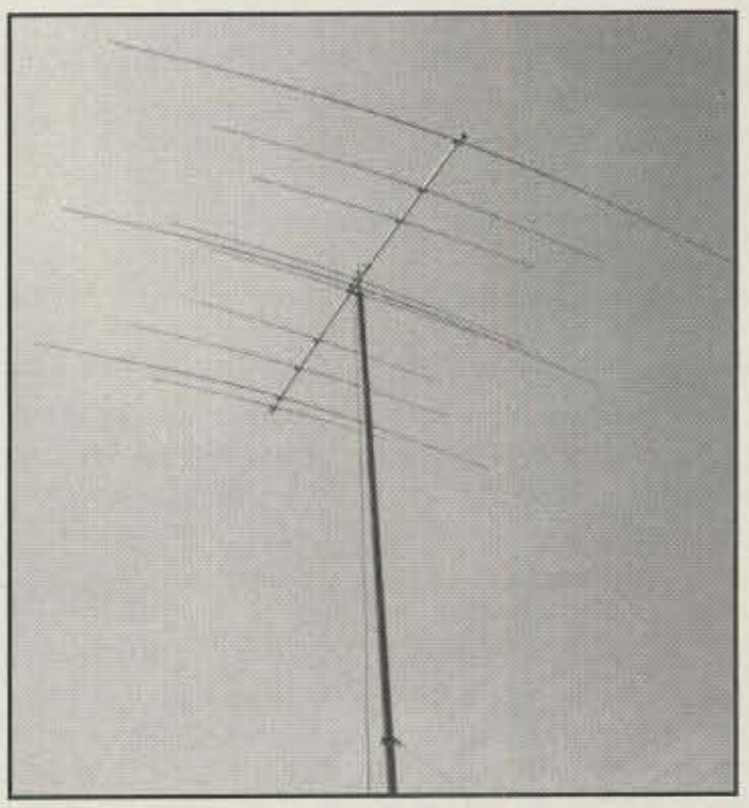
Drake TR270 FM Transceiver

The R.L. Drake Company has re-entered the amateur radio market with the TR270 FM transceiver. The TR270 is the only desktop FM transceiver on the market dedicated to 2 meter operation, maker says. The unit works as two radios; the first permits full 2 meter transceiver capability (142–150 MHz), while the second permits independent dual-band reception (136–174 and 420–470 MHz). The range of the TR270 allows the user to listen in on public service, marine, weather, and amateur bands.

The TR270 utilizes internal card slots for integrating 1200/9600 bps packet radio, satellite, weather fax, and data reception. The optional TNC270 Terminal Node Controller and DEMOD270 Demodulator plug-in cards fit inside the TR270, eliminating extra cabling.

The unit offers 60 user defined parameters and can be set up to meet individual needs. Parameters such as selecting filters or antennas, setting memory scan modes, or customizing channel lists for receiver and transmitter can be selected with setup menus and front-panel input. All operating parameters and repeater offsets are factory installed. The TR270 offers 400 channel memories and can remember frequencies in voice, satellite,or data modes.

The TR270 employs a built-in 140 watt, 115/230 VAC switching power supply. Other features include a dynamic microphone, an external DC input for mobile or emergency power operation, DTMF and CTCSS tone encoding and decoding for 2 meter and wideband receivers, external audio-in jack for copying shortwave fax/data transmissions, external speaker jack, headphone jack and transmit time-out timer. For additional information, contact the R.L. Drake Company, 230 Industrial Drive, Franklin, OH 45005 (phone 513-746-4556, fax 513-743-4510, or <http://www.rldrake.com>), or circle number 100 on the reader service card.



Trap-Free Triband Yagi From Bencher

Bencher, Inc. has created a new design trap-free triband Yagi. The Skyhawk features 10 elements on a 23 foot boom, and is the equivalent of three full-sized Yagis sharing a common feedline and a common boom. The design offers three elements on 20 meters, three on 15, and four on 10 meters. The Skyhawk provides wide bandwidth and excellent gain over the entire design range of frequencies. Created by WA3FET, K3LR,and W9KNI, there are no traps to rob dBs and narrow the bandwidth. Some of the features of the Bencher Skyhawk antenna include good bandwidth and F/B ratios, low weight, zero mast torque, and 85 mph wind survival.

For more information, contact Bencher, Inc., 831 N. Central Street, Wood Dale, IL 60191 (phone 708-238-1183; fax 708-238-1186), or circle number 102 on the reader service card.

No, this is not about which one is better, but rather the unique construction considerations each offers and the relative ease of replicating results by home-brewers.

Narrowing The Debate

A Brief Look At Replication Requirements For Building Yagi and Quad Antennas

BY WILLIAM THOMAS*, K1XT

The intention of this article is not to settle the long-standing debate between the virtues of HF quad and Yagi antennas. Rather, I have chosen to narrow the focus of discussion to overlooked characteristics of the two different designs and constructs and to show how these characteristics ultimately affect consistent performance from one builder to the next.

Anyone who has used the various Yagi design programs now available for the home PC knows that designing a Yagi antenna can be a complicated procedure. The conversion from computer-generated electrical to real-world mechanical dimensions must be closely adhered to. For those not familiar with the process, let me explain that the computer primarily models the antenna as though it were a single wire or cylinder. For those who build wire Yagi antennas, that's fine. However, most builders construct their antennas using various sizes of available aluminum tubing that change in diameter as they connect to form each element.

Once the builder decides upon the size and number of tubing sections for a given antenna design, the length and diameter of each section is run through a taper program which converts the electrical design length to real-world physical dimensions. This is an essential step of the process that must be closely adhered to because connecting several sections of different diameters and lengths affects the *overall* finished length.

For example: In the files of one of the programs used in researching this article I came across a design for a three-element 15 meter beam with a 12 foot boom (see Table I). The overall cylindrical length given for the reflector is 280 inches. By using Lew Gordon's program, Taper801, I converted the cylindrical dimension to a physical dimension. I told the program that the tubing I was using tapered from .875 to .625 inches in two sections for each element half. I also told it that the first section from the boom would be 75 inches long. The program then calculated the remaining .625 tubing section to be 67.84 inches in length. Thus, the overall physical dimension is 285.68 inches.

File: 315-12
Equiv. Cylindrical Reflector Length = 280
Equiv. Cylindrical Element Diameter = .54

Section #1	Length (in.)	Diameter (in.)
1	75.0	.875
2	67.84	.625

Total tapered element length end to end = 285.68
(Source: Taper801 by K4VX)

Table I– Using Taper801 with a design for a three-element 15 meter beam with a 12 foot boom. Taper801 is by Lew Gordon, K4VX.

Another consideration is the method of element to boom attachment. Does the element go through the boom? Does it attach by means of a plate, or is the element insulated from the boom? Each method has a different effect on the overall length. If the element is insulated from the boom, no compensation is necessary. But if a plate rather than an insulator is used, its length, width, and thickness must be entered into the program as a separate section of the element. If the element passes through the boom, proper compensation must be made with regard to the thickness of the boom.

Some Yagi designs are less tolerant of dimensional errors than others, especially modern designs with close-spaced elements. In the three-element design mentioned earlier, the elements are unevenly spaced with the driven element just 48 inches from the reflector. Table II shows the calculated gain and front to back ratio of this antenna when run through Yagimax.

Notice the decrease in gain from 7.43 dBi to 7.29 dBi when the reflector is lengthened 2.8 inches overall. This is an insignificant difference. However, the decrease in front to back is 8 dB, a much more noticeable difference.

Thus, it is easy to see that in order to convert the Yagi design to the real world, it is essential that all mechanical aspects just covered be closely monitored and adhered to. These variables apply to both computer and range designed Yagis. Regardless of the design, compensation must be made in order to duplicate the performance from one Yagi to the next if in fact the tubing sizes' element to boom attachments are different than the original antenna.

Armed with the Yagi information we now have, let's turn our attention to the quad antenna. The simplicity of the quad antenna is its strong point when it comes to design and replication. Because a single wire loop of a given gauge obviously will be continuous throughout its circumference, no mechanical tapering need be considered. In addition, there are no boom or element to plate dimensions to consider, as the elements of a quad normally are suspended on non-conductive fiberglass spreaders. Thus, only minor adjustments need to be done when applying the electrical dimensions to the physical construction. Far fewer variables to deal with when designing and constructing quad antennas results in a higher probability of matched results from one constructor to the next. In other words, the repeatability of design from one constructor to the next is more consistent and predictable.

In contrast, the repeatability of the quad design is far easier to copy. Without the need for computer modeling to compensate for construction variables, overall performance results can be much the same from one builder to the next. Simply put, the quad is a much more forgiving antenna, assuming the builder follows conventional quad construction. (Most quad constructors use number 12 and 14 wire and non-conductive fiberglass spreaders.)

There is yet one more aspect to consider. The Yagi antenna is designed on a half-wave principle, whereas the quad is based on a full wave. Therefore, a simple one inch error in measurement during construction may ad-

*810 Selma, St. Louis, MO 63119

Dimension	Gain (dbi)	F/B (dB)
280.00	7.43	32.34
282.80	7.29	24.26

(Source: Yagimax 3.23 by K4VX)

Table II– Figures for gain and f/b at 21.000.

versely affect the Yagi more than the quad. (A two inch error in the overall dimension of a 20 meter half wave is one half of one percent of the overall length. A two inch error in a full-wave loop is half that much, or one quarter of one percent.) This seemingly small error can lead to decreased performance in close-spaced Yagis as previously shown in Table II.

Not so many years ago when there were no personal computers and affordable antenna programs to go with them, average Yagi antenna builders were at the mercy of NBS design dimensions and those passed on to them by fellow amateurs. Many times, the result of their antenna projects was far less than hoped for if they failed to consider the mechanical variables present. Only if they used the exact same tubing lengths and dimensions, boom width, and element to boom attachment would the performance of their antennas usually match that of their friends or that of the NBS predictions. If any one of the mentioned variables was ignored or altered, the results often fell far short of their hopes.

During the 1950s, '60s, and most of the '70s the average amateur had no access to computer modeling. Unless he was well versed in mathematics, he was unable to accurately compensate for the variables introduced in the construction of Yagis. The probability factor of the performance of a copied quad design versus a Yagi was therefore much higher, and the results more consistent. The advent of the PC has helped to reduce the inherent errors in Yagi design and construction, thus narrowing the debate between the Yagi and quad.

Without going into the electrical performance of each antenna, I have tried to show why the home-brew antenna builder may sometimes find the quad antenna to be a better performer than a Yagi, especially in those years prior to the home PC.

It is important that the builder recognize that the quad and Yagi are two different antennas, the Yagi demanding special treatment. The debate here is not that one is better than the other, but that more care must be taken in the design and construction of the Yagi as opposed to the quad.

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American Radio Relay League. *The ARRL Radio Handbook for Amateurs*. 72nd ed. Newington: American Radio Relay League, 1994.

YA 1.00 by Brian Beezley, K6STI. Software from the 1995 *ARRL Antenna Handbook*. Newington: ARRL, 1995.

Source for Tables I and II: Yagimax 3.23 and Taper801, software program by Lew Gordon, K4VX.

BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

Electrostatic Discharge

Last month we looked at a neat way to generate high voltages with a piezo-electric gas igniter. As mentioned, this technique was originally developed to test for ESD susceptibility of electronic components. After reading the column you might have thought, "How does this really affect me? I don't have a static problem." Well, although we are still in the "heat and humidity" of summer, think back to those cold days of winter for a moment. Remember walking on that nice wooly carpet on your way to your amateur rig or computer, reaching out and touching the power switch, and suddenly being greeted with a spark and a mild jolt? If you do, then you have a potential electro-static discharge (ESD) problem.

It is an accepted rule-of-thumb that it takes 10,000 volts to produce a 1/4 inch spark in dry air, which is quite prevalent during winter. This same 10,000 volts, although only producing a few microamperes of current, easily can damage a CMOS device or a delicate FET. If you

c/o CQ magazine

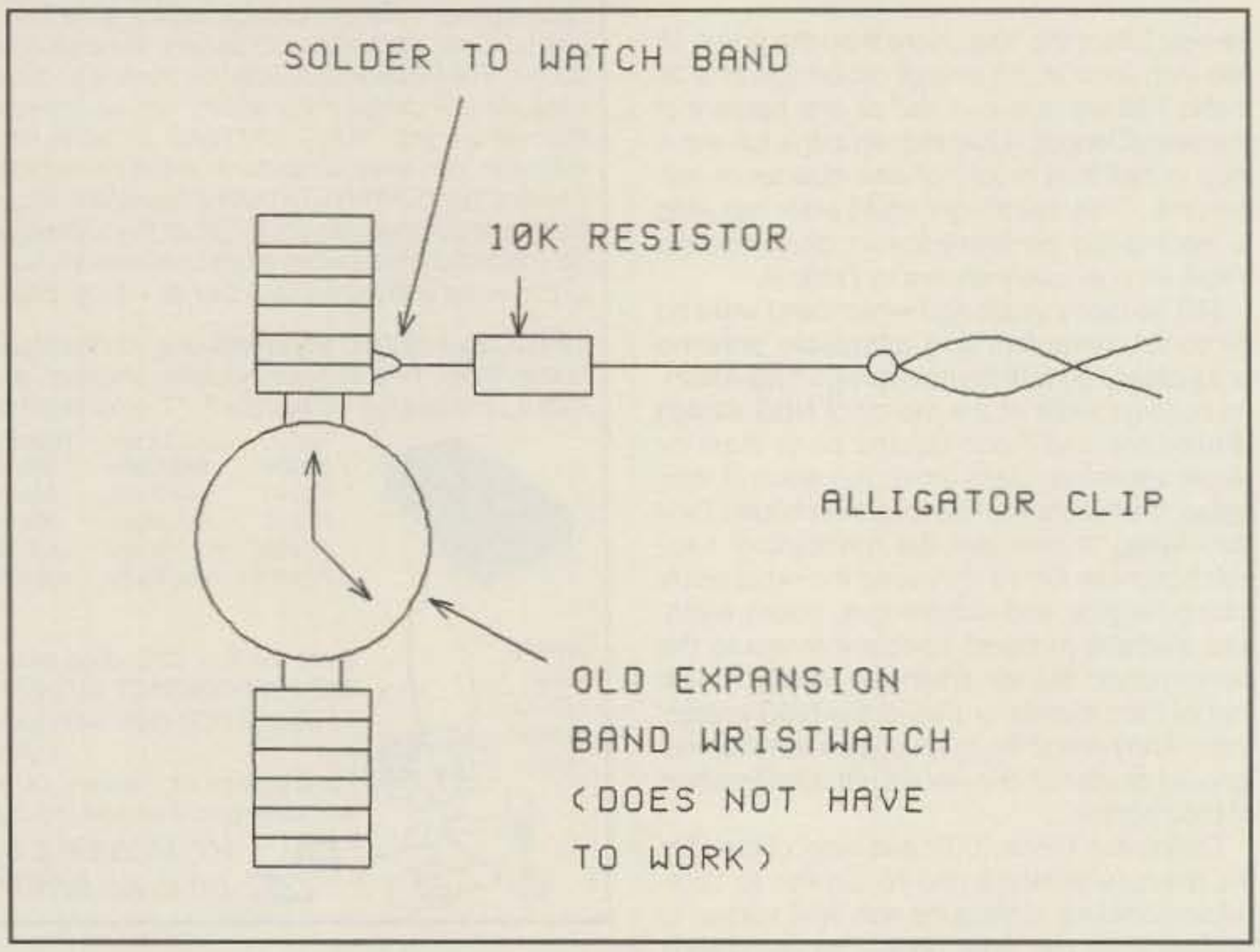

Fig. 1– A simple ground strap made from an old watch.

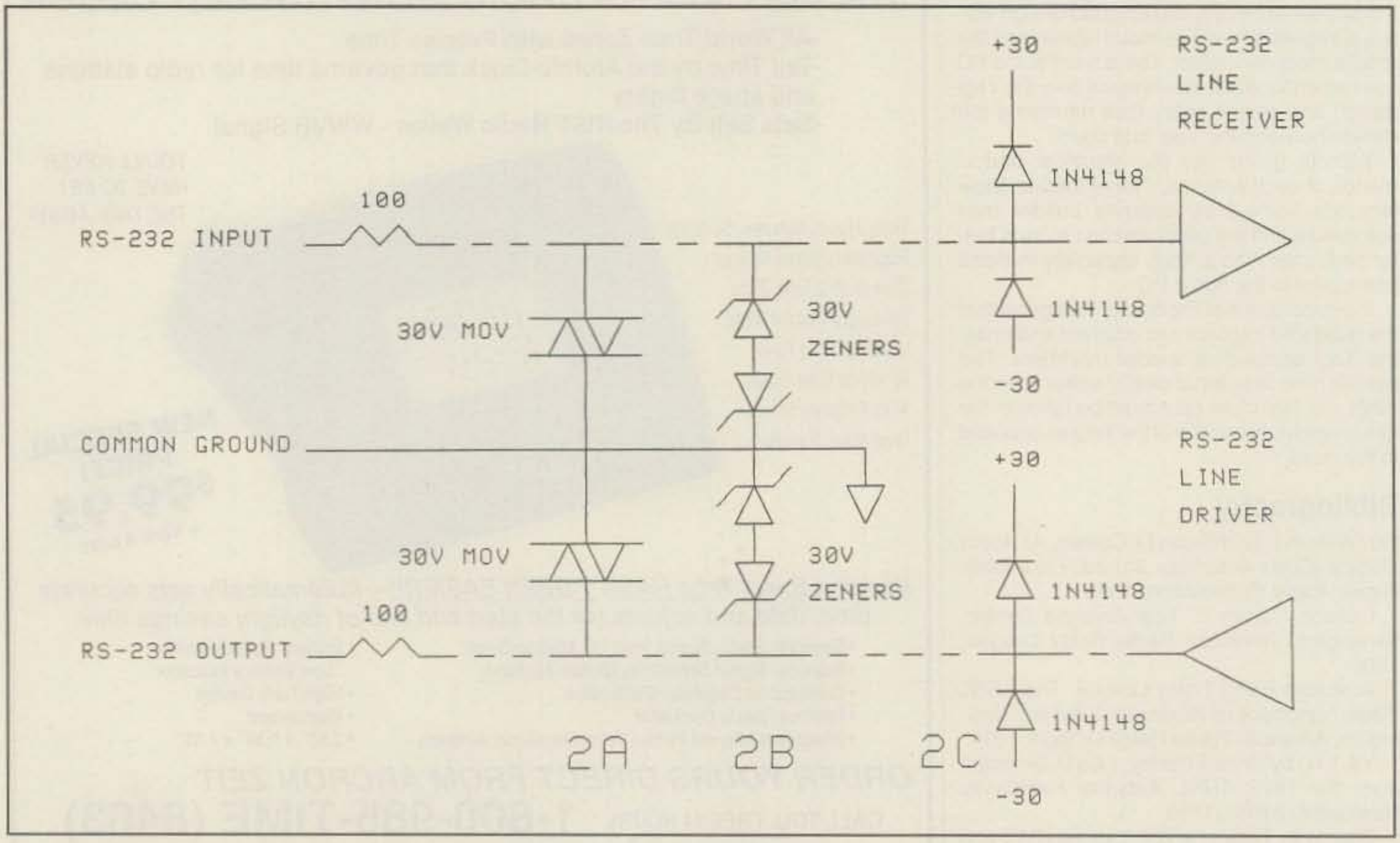

Fig. 2– Various ways to prevent ESD damage.

immediately blow out such a device, you can replace it and resume operation. What is worse, however, is that a static discharge also can partially deteriorate such a device to the point where it continues to work at first, but then leakage currents gradually increase, noise figure gradually degrades, and the entire device eventually fails a few days, months, or even a year after being zapped. In this case you are not aware that anything has happened, since everything does continue to work. It just gets progressively worse and worse. If you have ever experienced such a situation, ESD easily could have been the cause. What do we do to prevent this?

As the medical profession likes to say, the best cure is to prevent the situation at the outset. This can easily be accomplished by first converting your work station or work bench so that it is ESD free. A conductive bench mat made for the purpose is an ideal start, but if you cannot afford or locate one, a grounded metal-topped work surface will suffice for the area on which you assemble circuitry. Obviously, you should not try to test things on such a surface, since you easily could short something; for assembly, however, it's fine.

An inexpensive grounded wrist strap is a good second choice. This also can be purchased or made from an old metal expansion- band wristwatch connected in series with a 10K resistor and ground such as shown in fig. 1. For a convenient place to ground the mat and/or wrist strap, you might try the cover restraining screw on a close-by electrical outlet.

Finally, all test equipment (including soldering irons) should be fitted with three-prong grounded power cords, and the green ground wire from the power cord connected to any exposed metal surface of such equipment. Finally, all equipment should only be plugged into working, grounded electrical outlets. If you do all of this, and store all ESD-susceptible components in the conductive packages they came in while not actually using them, you will go a long way toward minimizing ESD problems. Now let's look at ways to prevent ESD problems in equipment after we build it.

Fig. 2 is a circuit of an RS-232 input and output port (such as might be found on a PC) that has been ESD protected in a few different ways. You will notice that the actual chip doing the interfacing is a typical RS-232 to TTL converter. Since RS-232 signal levels rarely exceed ±15 volts, that is all the chip is expected to handle. A 5 to 10 KV ESD pulse is obviously out of this range. As a result, in fig. 2A, a 30 volt varistor (or MOV, as they are often called) has been added across the lines to limit voltage spikes to a safe level. Another way of accomplishing the same thing is shown in fig. 2B. Here a couple of 30 volt zener diodes connected back to back have been added to accomplish the same end result. Fig. 2C shows still another approach—that of using reverse-biased diodes which conduct when any voltage in excess of the V_{cc} or V_{ee} lines is applied. In some instances capacitors could be used for the same purpose, but whatever you choose, the idea is the same: Reduce the high-voltage spike to something the component can handle.

Finally we come to the handling of electronic circuitry. Anyone who has purchased a computer accessory is familiar with the "static bag" it comes in. This is not done for fun nor as a sales measure. It is an attempt to eliminate potential ESD damage to a finished product. If you have bought ICs recently, you might also have noticed the black foam into which they were stuck. You should handle and store your circuit boards and chips the same way. This does not mean that any old plastic bag or foam sponge will work. If you take your ohmmeter and check the resistance of the foam or static bag in which the component came, you will notice that both conduct—in some cases quite well. Ordinary foam and plastic bags do not, and can even contribute to static buildup.

In conclusion, do not underestimate the potential for ESD damage. It can and really does occur and can "bite you" when you least expect it. By following the tips given above, you can easily reduce your risk. A word to the wise should be sufficient.

73, Irwin, WA2NDM

BY DOUG DeMAW, W1FB

DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Low-Power Thrills For Less Than Ten Bucks

Now and then we authors receive letters which reinforce our faith that some amateurs still tinker and build. Also, despite the growing belief that CW is passé and should be phased out of amateur radio, many experimenters, ragchewers, and contesters still prefer the CW operating mode. A letter from Al Ayling, F6IDU/W6LFM, contained proof that he built the single-stage QRP transmitter I described in *CQ* in the December 1994 issue. Al added some frills to the circuit. He has been loaning his little rig to other OMs in France in an effort to encourage them toward QRP operating.

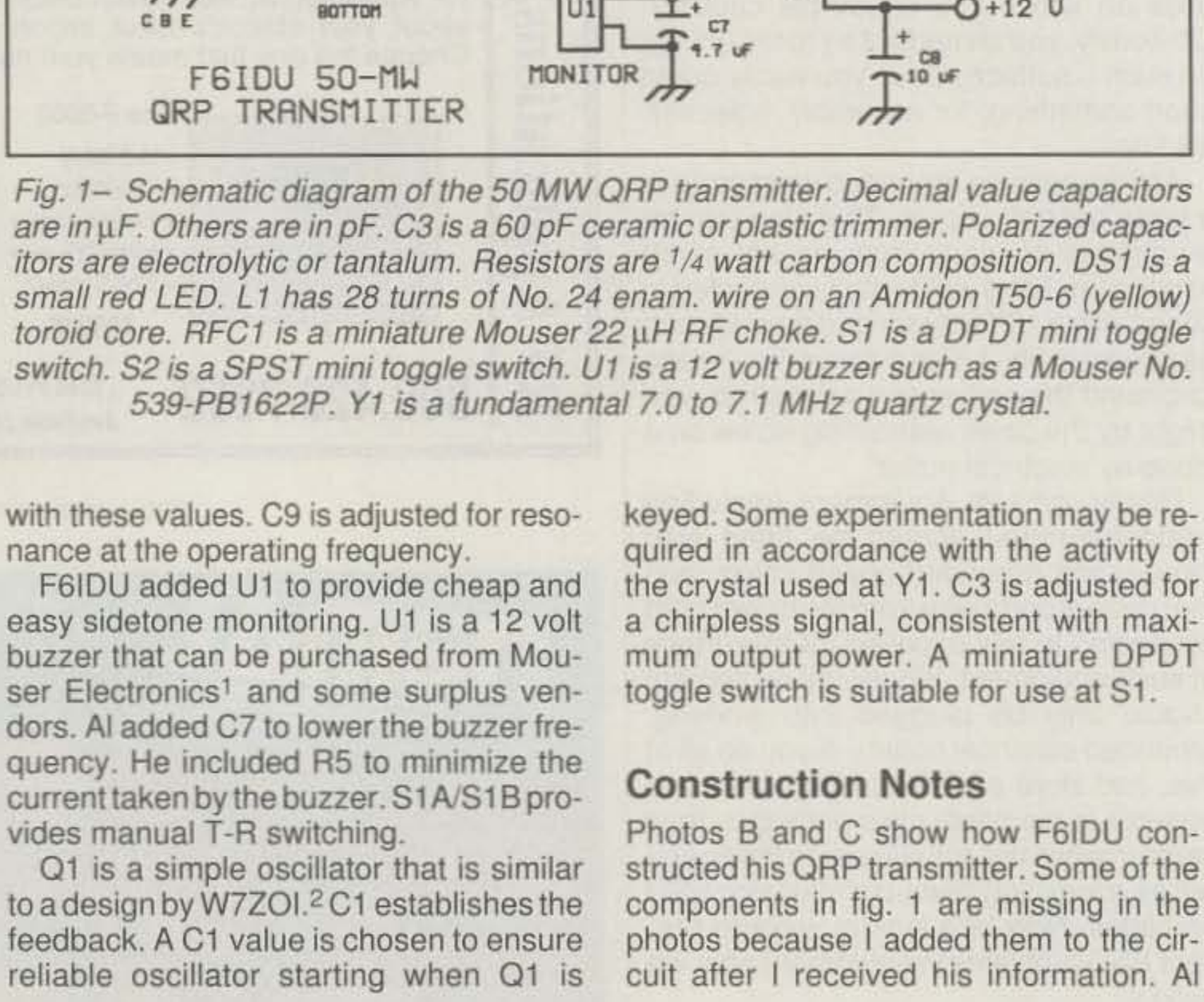

Fig. 1– Schematic diagram of the 50 MW QRP transmitter. Decimal value capacitors are in µF. Others are in pF. C3 is a 60 pF ceramic or plastic trimmer. Polarized capacitors are electrolytic or tantalum. Resistors are 1/4 watt carbon composition. DS1 is a small red LED. L1 has 28 turns of No. 24 enam. wire on an Amidon T50-6 (yellow) toroid core. RFC1 is a miniature Mouser 22 µH RF choke. S1 is a DPDT mini toggle switch. S2 is a SPST mini toggle switch. U1 is a 12 volt buzzer such as a Mouser No. 539-PB1622P. Y1 is a fundamental 7.0 to 7.1 MHz quartz crystal.

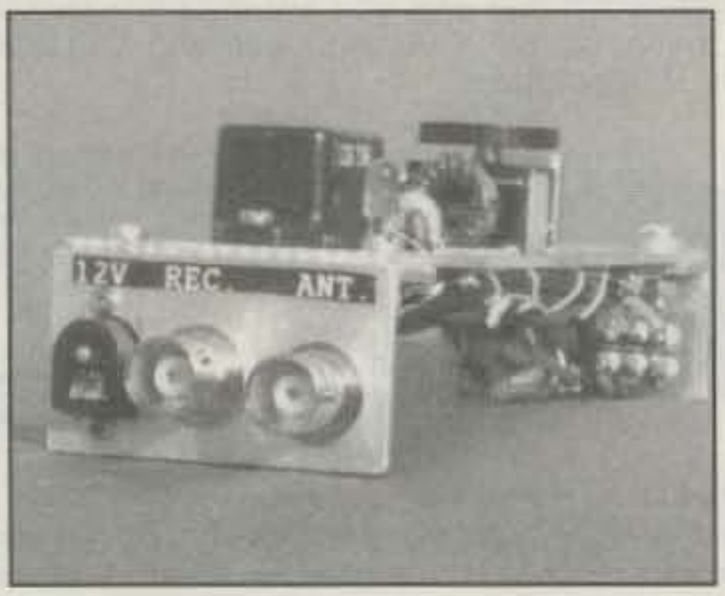

Photo A– The F6IDU QRP transmitter is a modified version of the one described in "Doug's Desk" of December 1994.

This month we will examine the F6IDU version of the W1FB QRP transmitter. Perhaps you will be inspired to duplicate the circuit and try your hand on 40 meters with only 50 MW of RF energy. Surprising distances can be spanned with that level of power if a quality antenna is used.

Circuit Details

Fig. 1 shows the F6IDU transmitter circuit. I had added S2 to permit removal of DS2 during transmit. Although it consumes only 5 MW of RF power, no power should be sacrificed when the maximum power is only 50 MW. I changed the C and L values in the Q1 collector circuit. The original *CQ* circuit used a low-pass filter with a Q of 1. The new values (C2, C3, C4, and L1) are designed to match the Q1 1400 ohm collector impedance to 50 ohms as a tunable pi network with a Q of 8. Efficiency and harmonic suppression have been improved with these values. C9 is adjusted for resonance at the operating frequency.

F6IDU added U1 to provide cheap and easy sidetone monitoring. U1 is a 12 volt buzzer that can be purchased from Mouser Electronics[1] and some surplus vendors. Al added C7 to lower the buzzer frequency. He included R5 to minimize the current taken by the buzzer. S1A/S1B provides manual T-R switching.

Q1 is a simple oscillator that is similar to a design by W7ZOI.[2] C1 establishes the feedback. A C1 value is chosen to ensure reliable oscillator starting when Q1 is keyed. Some experimentation may be required in accordance with the activity of the crystal used at Y1. C3 is adjusted for a chirpless signal, consistent with maximum output power. A miniature DPDT toggle switch is suitable for use at S1.

Construction Notes

Photos B and C show how F6IDU constructed his QRP transmitter. Some of the components in fig. 1 are missing in the photos because I added them to the circuit after I received his information. Al

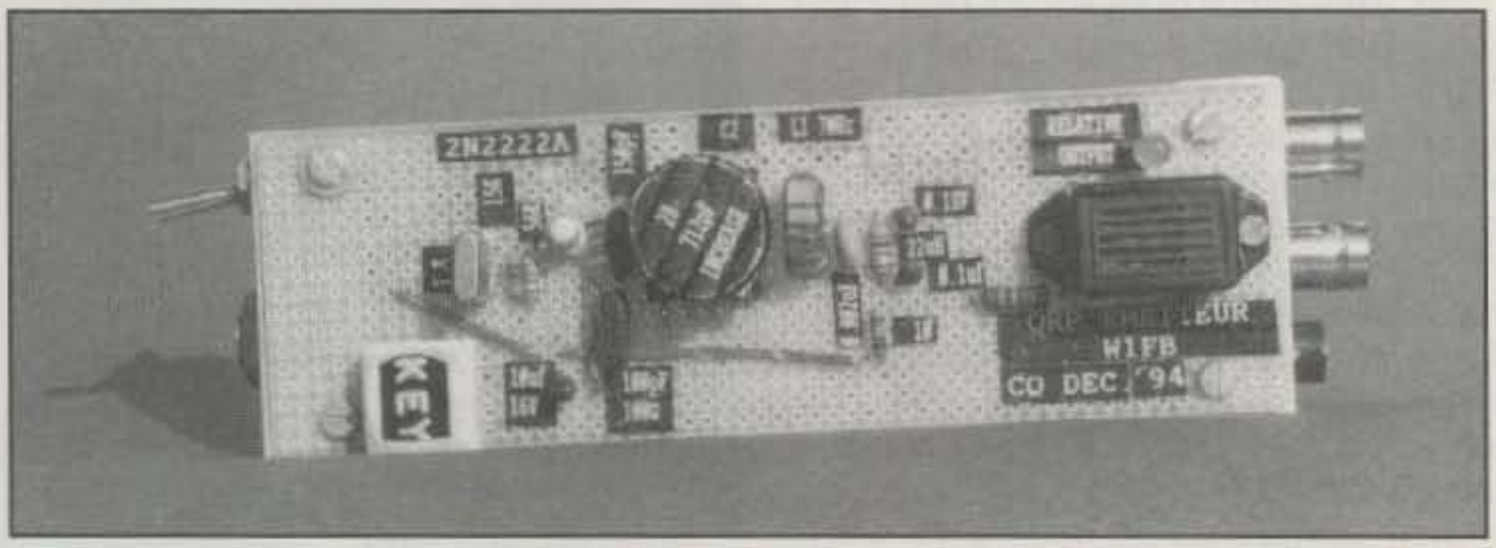

Photo B– Top view of the F6IDU QRP transmitter built on perf board.

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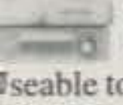

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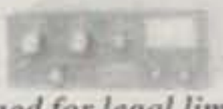

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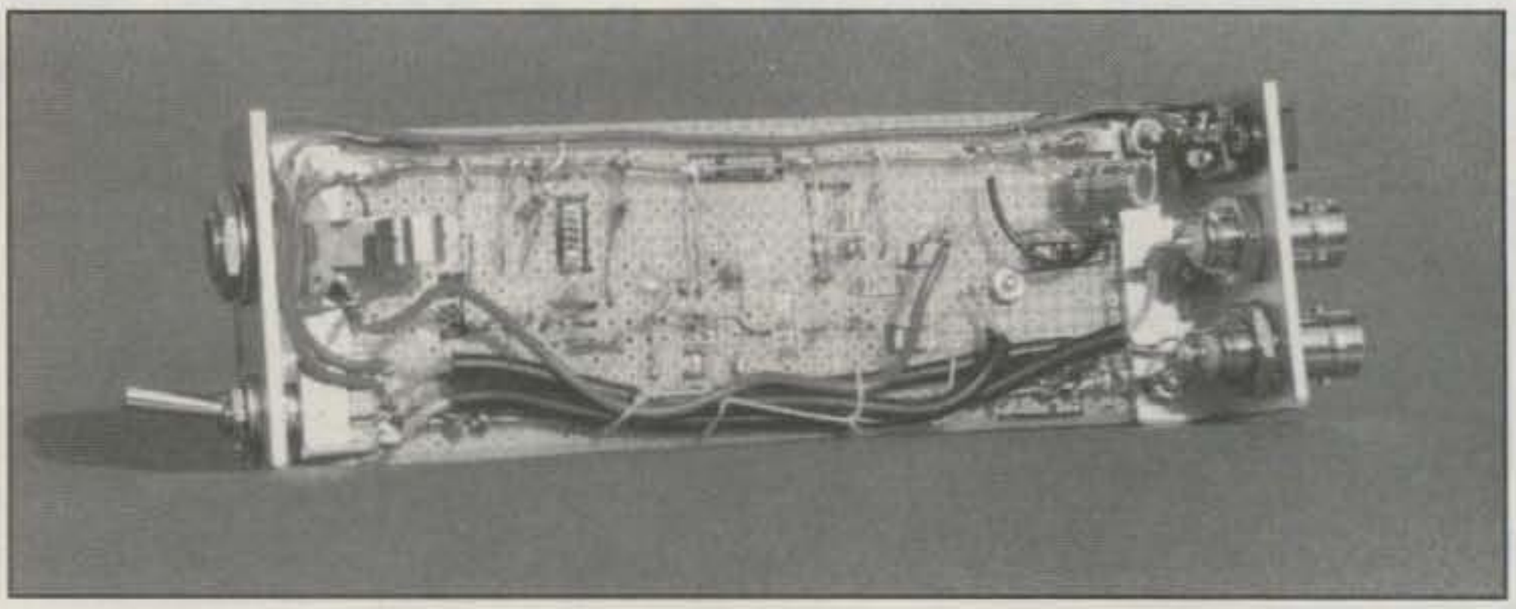


Photo C– Underside view of the F6IDU transmitter.

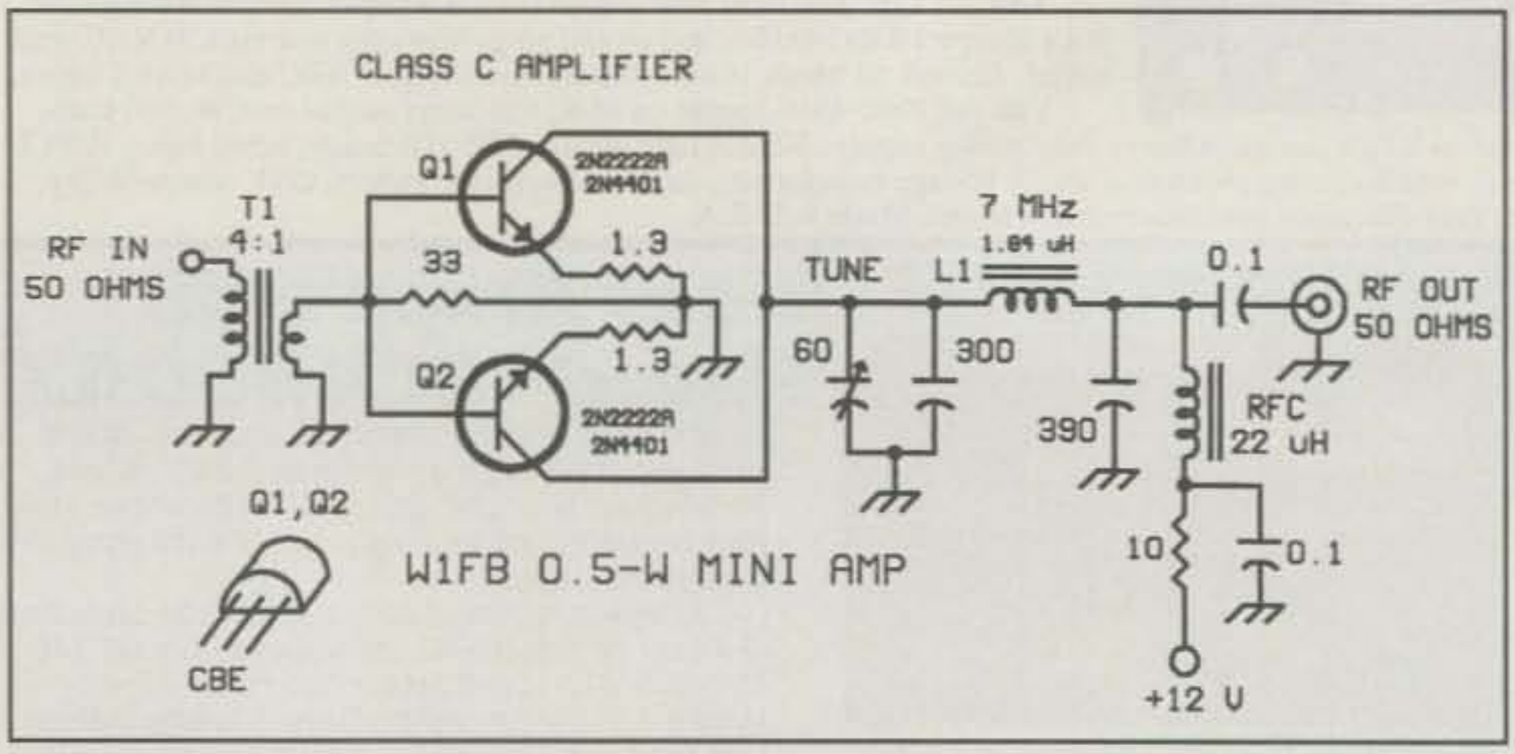


Fig. 2– Schematic diagram of an add-on amplifier that produces up to 500 MW of RF output power when driven by the fig. 1 circuit. Decimal-value capacitors are disc ceramic and are in µF. Others are in pF. The tuning capacitor is a 60 or 100 pF plastic or ceramic trimmer. The 300 and 390 pF capacitors are silver mica or polystyrene. Resistors are 1/4 watt carbon composition. L1 has 21 turns of No. 26 enam. wire on an Amidon T50-6 toroid. RFC is a miniature RF choke. T1 has 16 turns of No. 26 enam. wire on an Amidon FT-37-43 ferrite toroid. The secondary has 8 turns of No. 26 wire.

used perf-board construction. Aluminum end plates serve as panels. Dymo tape labels identify the components. All signal leads should be as short and direct as practicable.

Tune-up and Operation

The antenna should present a 50 ohm load for the transmitter. A Transmatch may be used to ensure an SWR of 1:1. QRP antenna tuners and SWR indicators are described in *W1FB's QRP Notebook*, 2nd edition.[3] Nary a milliwatt should be wasted when using this low a power!

With the antenna connected and S1 in the transmit position, close S2 and observe the LED on key closure. Adjust C3 for maximum LED brilliancy. Turn off S2 and proceed to call CQ or reply to someone else's CQ.

Any receiver may be used with the fig. 1 transmitter. Connect the receiver antenna jack to the antenna jack on the QRP transmitter. S1 of fig. 1 may be changed to a three-pole, two-position wafer or slide switch to permit muting the receiver. A speaker lead may be opened for this purpose if the receiver audio output stage has an 8 ohm resistive load for a termination when the speaker is disconnected.

Build a 7 dB Add-On Amplifier

Impatient QRP operators may find the 50 MW challenge too much to accept in terms of stations worked per a given number of CQs. Another 7 dB of signal strength can be gained by adding the fig. 2 amplifier after the fig. 1 circuit. It uses two 2N4401 or 2N2222A transistors in parallel. The 1.3 ohm emitter resistors serve as ballasting devices to prevent either of the transistors from hogging the current if they are not matched pairs. The little amplifier operates in class C to provide up to 0.5 watts of output power. This equates to a 7 dB signal increase—slightly more than one S unit. If DS1 of fig. 1 is used as a tuning indicator, it will require a resistor between it and the output port of the add-on amplifier. Otherwise the LED may burn out. Use

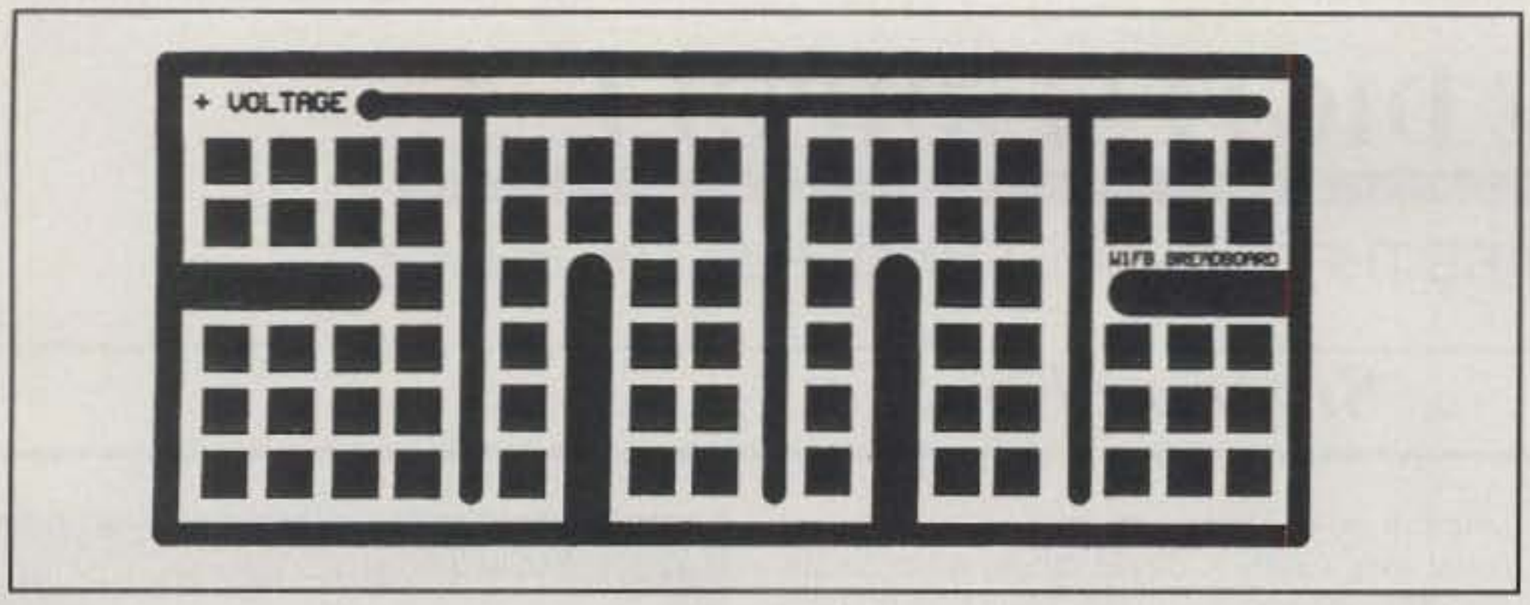


Fig. 3– Scale etching pattern for the general-purpose PC breadboard.

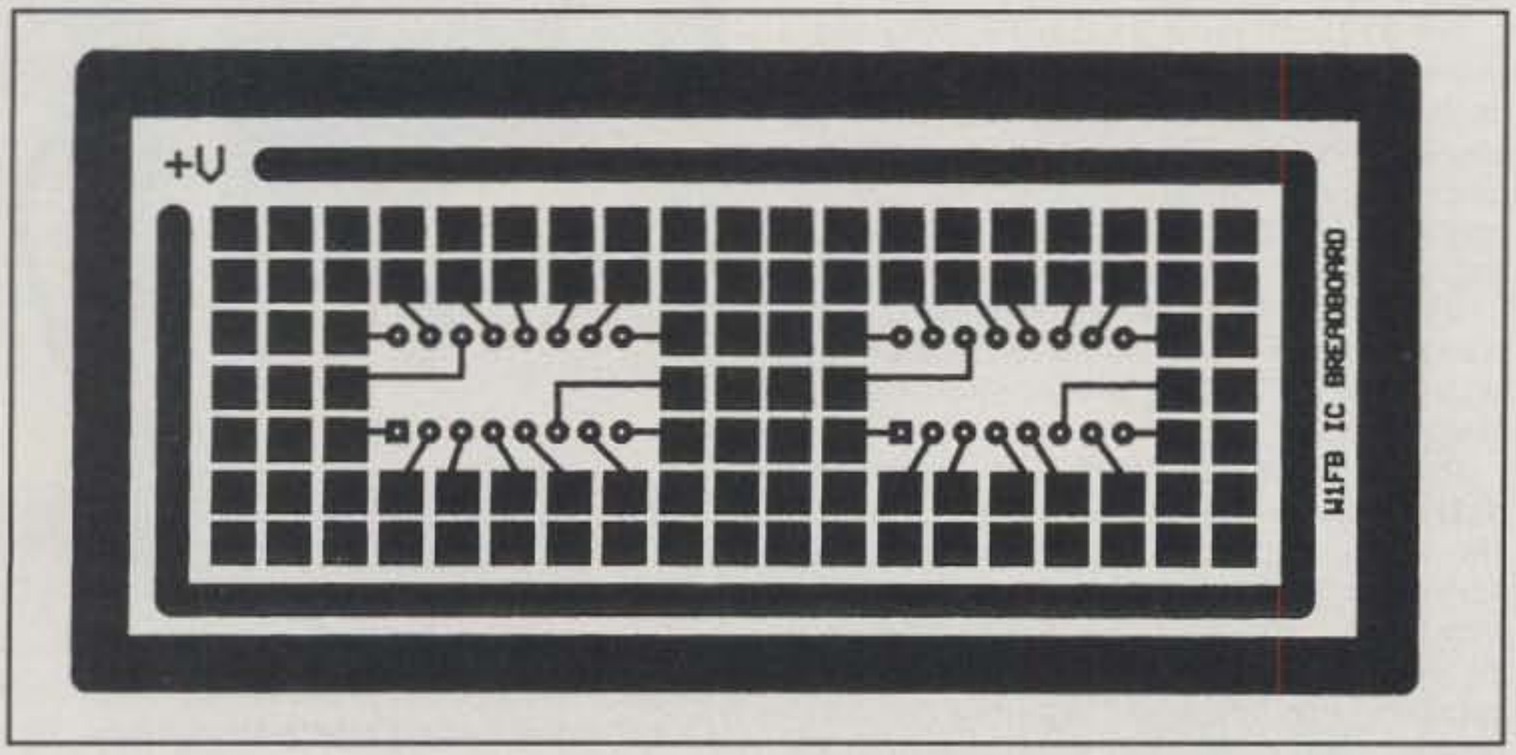


Fig. 4– Scale etching pattern for a breadboard that has two 16-pin DIP IC sites.

a resistor value that barely allows the LED to illuminate when the key is closed. Typical values range from 100 to 330 ohms. Adjust pi-network trimmer C3 for maximum output power. A QRP SWR bridge may be used as a more sensitive output tuning indicator in lieu of the LED.

Keep all leads short and direct. The 1.3 ohm resistors should be mounted as close to the Q1 and Q2 emitters as possible.

An Alternative Construction Method

Although perf board is fine for constructing projects of this type, some builders prefer to use PC boards. I designed two PC breadboards that are excellent for all manner of prototype and finished circuits. Figs. 3 and 4 contain scale artwork for both breadboards. The fig. 3 board is for general construction when ICs are not used. Two 16-pin IC sites are found on the fig. 4 breadboard pattern. Any DIP IC from 8 to 16 pins may be mounted on this board. There are ample isolated pads for mounting other components as well. The user may opt for a single- or double-sided PC board format, depending upon his or her requirements. The double-sided board provides a ground plane for enhancement of circuit stability. Double-sided boards are not recommended for VFO or RF filter circuits, due to the capacitors that are formed between the conductors on one side of the board and the ground plane on the opposite side of the board. Etched and plated breadboards, as seen in figs. 3 and 4, are available.[4]

Summary

I hope this article inspires you toward heating your soldering iron, building a simple, inexpensive rig, and trying your hand at QRP operation. Only a modicum of patience and operating technique are required for making contacts at the 50 or 500 MW power levels. More important, if you build these circuits you will experience a sense of accomplishment when that first station answers your CQ.

Footnotes

1. Mouser Electronics, 2401 Hwy. 287 North, Mansfield, TX 76063-4827 (800-346-6873).

2. W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur*. The ARRL, Inc., Newington, CT 06111.

3. D. DeMaw, *W1FB's QRP Notebook*. The ARRL, Inc., Newington, CT 06111.

4. FAR Circuits, 18N640 Field Court, Dundee, IL 60118 (847-836-9148).

73, Doug, W1FB

BY KARL T. THURBER, JR., W8FX

THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

Summer Fun!

Last time I mentioned that a column was "fun," it was February in the dead of winter. The seasons have changed now. It's August, traditionally a "fun month" that includes lots of tower climbing and other antenna-related activities. In any event, we'll have fun this month with our regular column happenings, and to kick off the fun we'll first turn our attention to antennas.

Antenna Notes

Palomar Engineers Field Strength Meter (FSM). FSMs are fairly simple devices that measure relative signal strength, although some of them measure field strength accurately and so can be used in directional antenna pattern study. Amateurs also use untuned FSMs as monitors to check the output of hand-held and mobile radios and to confirm their signal actually is "on the air."

Palomar Engineers' Model PFS-1 Field Strength Meter has several precision features needed for serious antenna work. These include a detector that's linear over nearly a 30 dB range, an accurate step attenuator with a 30 dB range, a 35 dB gain RF amplifier, high-Q tuned circuits, and a panel meter readable to 0.1 dB. A little more than the usual uncalibrated FSM, it covers 1.8 to 150 MHz and is powered by 9 or 12 volt batteries. Antenna connection is by an SO-239 jack. (Photo courtesy Palomar Engineers)

More expensive and sensitive FSMs use a small, tunable RF amplifier circuit. Sensitive tuned units are useful for low power (QRP) work, tracking down transmitter harmonics and spurious oscillations, and confirming on which band you're actually transmitting. The more sensitive devices can be placed far from the antenna and can be used to plot antenna radiation patterns. Other uses include checking RF levels in the hamshack and on ground leads and counterpoises, plus tracking down radio frequency interference (RFI) sources. Calibrated FSMs with step attenuators can be used to make antenna gain measurements.

Palomar Engineers' Jack Althouse, K6NY, has announced a new FSM, the Model PFS-1. It has several features needed for serious antenna work. These include a detector that is linear over nearly a 30 dB range, an accurate step attenuator with a 30 dB range, a 35 dB gain RF amplifier, high-Q tuned circuits, and a panel meter readable to 0.1 dB—a little more than the usual uncalibrated FSM, to say the least.

The $195 unit covers 1.8 to 150 MHz and is powered by 9 or 12 volt batteries. Antenna connection is by a SO-239 jack on the rear of the aluminum cabinet. For more information, contact Palomar Engineers, P.O. Box 462222, Escondido, CA 92046 (phone 619-747-3343; e-mail <75353.2175@compuserve.com>).

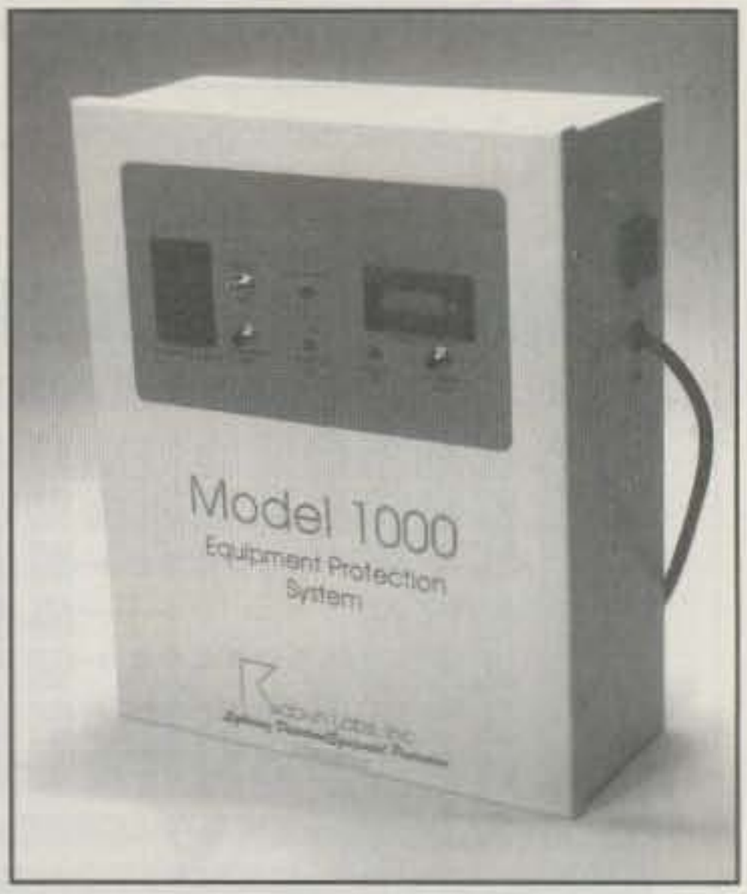
(Postscript: *Worldradio* published a highly complimentary review in the December 1996 issue, a copy of which is available from Palomar Engineers.)

Rabun Labs Intelligent Line Disconnect (ILD). There are several solutions to the problem of effecting automatic equipment protection from lightning. For those interested in what may be the ultimate in equipment safeguarding, Rabun Labs offers several home and office versions of its "intelligent" lightning protection devices. They're definitely worth a second look.

The firm's products can provide an automatic solution to the equipment protection problem that goes beyond the assurance offered by ordinary surge protectors. With conventional surge suppressors and protectors your equipment remains connected to the power source and coax and telephone wiring even when your equipment is turned off or not in use.

For the typical home and hamshack Rabun Labs offers a popularly-priced protection solution called the Intelligent Line Disconnect™, or ILD™. The ILD is an active and automatic equipment protection system that has the same effect as when you physically pull AC plugs from wall outlets and disconnect coax and telephone lines from your electronic equipment (amateur rig, PC, entertainment system, satellite receiver, etc.) when it's not in use and turned off. This means not only are your equipment inputs and outputs (I/Os) disconnected from external wiring, which is the path surge voltages usually take to damage equipment, but the I/Os also are connected or shunted together and to a common ground.

The Rabun Labs ILD™ is an active and automatic equipment protection system that has the same effect as when you pull AC plugs from wall outlets and disconnect coax and telephone lines from your electronic equipment. When you turn off your equipment, the ILD automatically disconnects and grounds everything that's plugged into it. When you turn your equipment back on, all connections are restored automatically. The simple "plug and play" unit, shown here, offers solid-state indicators, one-pushbutton operation, a "goof-proof" auto-disconnect timer, and filtering for power-line noise. (Photo courtesy Rabun Labs, Inc.)



Rabun Labs also offers the Whole House and Office Equipment Protection System. This state-of-the-art package, which consists primarily of the Model 1000 Central Control Unit (shown here) and the Model ACP-6 AC Power Switching and Control Unit, interfaces with all of your equipment and provides the proper protection each requires. The sophisticated system reacts to the threat of equipment damage by detecting lightning when it is a safe distance away. (Photo courtesy Rabun Labs, Inc.)

Thus, the ILD automatically does the disconnecting for you. When you turn off your equipment, the ILD automatically disconnects and grounds everything that's plugged into it. When you turn your equipment back on, all connections are restored automatically. The ILD is priced at $99 plus $9.95 s/h.

For the larger home or office Rabun Labs offers the Whole House and Office Equipment Protection System. This state-of-the-art package consists of the Model 1000 Central Control Unit, Model ACP-6 AC Power Switching and Control Unit, and several other accessories. The sophisticated system interfaces with all of your household or office equipment and provides the proper protection each requires. It

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THE VECTRONICS VC-300DLP . . .
300 WATT ANTENNA TUNER

- *Multi48™ Inductor*
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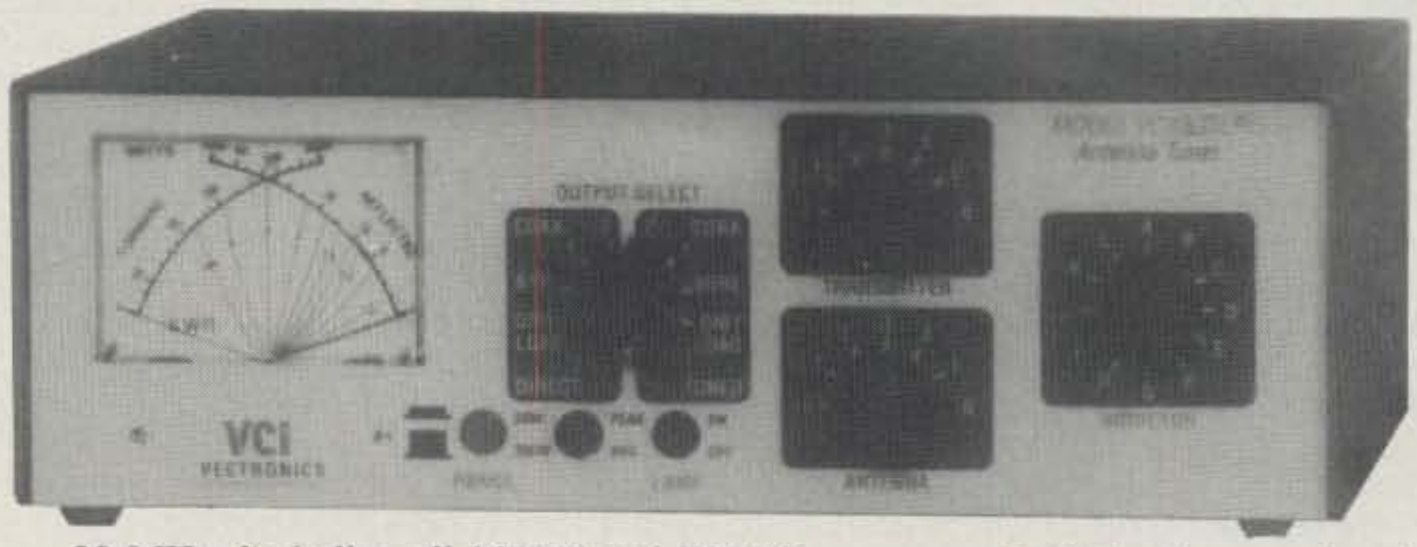
- *Built-in Dummy Load*
- *1.8 to 30 MHz Coverage*

VC-300DLP
$159.95



The VECTRONICS VC-300DLP is the world's most versatile 300 Watt antenna tuner!

You'll get everything you've ever wanted . . . precise inductance control that rivals roller inductors . . . the ability to match any real antenna . . . full 1.8-30 MHz coverage . . . peak reading backlit Cross-Needle Meter . . . 8 position antenna switch . . . built-in 50 Ohm dummy load . . . finest components available and world class quality.

Precise Inductance Control

VECTRONICS' exclusive *Multi48™* inductor gives you *forty-eight* inductance values -- you'll get precision tuning that rivals the most expensive roller inductors.

Tune any antenna 1.8-30 MHz

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

Has 4:1 balun for balanced line antennas.

Handles up to 300 Watts SSB PEP, 200 watts continuous (150 Watts on 1.8 MHz).

Peak Reading Cross-Needle Meter

The VC-300DLP backlit Cross-Needle meter displays SWR, forward and reflected power simultaneously. Reads both peak and average power on 30/300 watt scales. Meter lamp has front panel switch and uses 12 VDC or 110 VAC with AC-12 adaptor, $12.95.

Versatile Antenna Switch

The VC-300DLP eight position antenna switch lets you select two coax fed antennas, random wire/balanced line or built-in dummy load for use through your tuner or direct to your transceiver. Bypass position bypasses your tuner but keeps your SWR Power meter in line.

Built-in Dummy Load

A built-in 50 Ohm dummy load makes tuning up your rig easy! Use it for testing and repairing your rig, setting power level, adjusting your mic gain and more.

World Class Quality

The finest components available and the highest quality construction gives you the *best* 300 Watt antenna tuner that you can buy.

A chemically treated aluminum case with durable baked-on paint and scratch-proof multi-color Lexan front panel looks great for years of dependable service.

Try any product for 30 days

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

2 kW Antenna Tuner

HFT-1500
$459.95

You can tune any real antenna from 1.8 to 30 MHz for absolute minimum SWR.

The HFT-1500 is crafted of the finest components available . . . two *heavy duty* 4.5 kV transmitting variable capacitors and a *high current* roller inductor with a precision 5 digit *gear* driven turns counter. Gives you arc-free operation up to 2 kW PEP SSB.

Has backlit, peak-reading Cross-Needle SWR/Power meter, *SSB✻Analyzer Bargraph™*, 6 position *ceramic* antenna switch, 4:1 Ruthroff balun for balanced line. Scratch-proof Lexan front panel. 5.5x12.5x12 inches.

300 Watt *Mobile* Tuner

VC-300M
$109.95

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

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

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

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

SWR/Power Meters

PM-30
$79.95
PM-30UV
$89.95

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

For 144/220/440 MHz, 30/300 Watt ranges. PM-30UV, $89.95, has SO-239 connectors. PM-30UVN, $89.95, has N connectors. PM-30UVB, $89.95, has BNC connectors.

1500 Watt *dry* Dummy Load

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

Low Pass TVI Filter

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

High Pass TVI Filter

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

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even reacts to the threat of equipment damage by automatically detecting lightning when it is a safe distance away to effect the desired equipment disconnects.

The $3800 Whole House system continually monitors the atmosphere and detects the presence of lightning when an electrical storm is several miles away. When the lightning reaches an intensity that's likely to cause equipment damage, it protects equipment by selectively and automatically "unplugging" (disconnecting) sensitive equipment from AC power sources, coaxial RF cables, and telephone lines.

The system automatically restores power and other connections after the storm has moved a away or the lightning has subsided. This system can handle intelligently a variety of protected circuits, including circuits for wells, irrigation systems, air conditioning, freezers, and swimming pool and spa pumps, in addition to more common home and office circuits.

For more information, contact Rabun Labs, Inc., P.O. Box 818, Plant City, FL 33564 (1-800-788-1824), or check out the firm's Web page at <http://www.rabunlabs.com>.

CTSVR Vertical Revisited. We described the Capacitance Terminated Short Vertical Radiator (CTSVR) in January 1995. It's now time to revisit the antenna, since some of the design specs have changed. To recall, the CTSVR is a compact, 31 ft., 1 in. tall 4-band vertical antenna system covering 160, 80, 40, and 17 meters. The system features heavy-duty construction, stainless hardware, and a single coax feedline.

The patent-pending CTSVR requires an area 25 ft. × 25 ft. to achieve full 4-band operation. It needs a ground system consisting of one 8 ft. ground rod at the base of the antenna with a minimum of 6 radials, each 34 ft. long.

Excellent bandwidth is claimed with a proprietary matching system. Retuning the antenna's center operating frequency is accomplished from the ground on all bands. The antenna has a low radiation angle (10–12 degrees) originating from the "RF launch point," which coincides with the maximum current point, some 30 ft. off the ground at the top hat. The antenna is claimed to be a somewhat quieter antenna on receiving than conventional vertical designs, even those verticals with elevated feedpoints.

The CTSVR handles 1.5 KW CW or 2.5 KW SSB. It has a feedpoint impedance of about 50 ohms with a claimed SWR at resonance of 1.5:1 or better. The 2:1 bandwidth points range from 47 kHz on 160 meters to 500 kHz on 17 meters. The 47 lb. antenna's footprint, with guy wires, is 625 sq. ft., and the wind surface area is 9 sq. ft. The price still is $499 plus shipping.

For more information, contact Uni-Hat Corporation, 3816 Royal Lane, Suite 100, Dallas, TX 75229 (214-352-4623).

New Larsen Amateur Antenna Catalog. Larsen Electronics has released its 36-page Amateur Antennas Catalog, which includes the firm's full range of amateur mobile, portable, and base-station antennas, coax and connectors, and accessories. Specialized antennas over the range 27–1300 MHz are included.

The catalog also has a short section that describes the "high performance heritage" of the company, which dates to 1965, beginning with the commitment to "golden rule service" spelled out by company founder Jim Larsen (K7GE, W7DZL). Provided in the catalog are technical details that describe the company's trademarked whips, bases and shells, and coaxial cable sets. A short technical guide and a description of the various antenna series designations are included.

Also spelled out in the catalog is Larsen's liberal "no nonsense" three-year warranty on its antennas, under which it will repair or replace, without charge, any Larsen antenna that fails within that period. The catalog is available from Larsen Electronics, Inc., P.O. Box 1799, Vancouver, WA (1-800-426-1656).

Radio Works Update. For nearly a dozen years now we have noted the growth of Jim Thompson, W4THU's firm, The Radio Works. In fact, I recall the first Radio Works catalog, which was all of four pages; now the General Catalog is just under 100 pages.

Jim is a committed wire-antenna specialist who sells a variety of antennas and antenna accessories, including ready-made antennas, baluns, line insulators, support line, connectors, wire, cable, and more. Some new products offered include the SuperLoop 40™ antenna; military ground strap kits; a line of 10, 6, and 2 meter baluns and line isolators; and several high-performance 6 meter wire antennas.

What previously was known as the Reference Catalog (which has been discontinued in its present format) may reappear in book form. In the meantime, the Radio Works Web site has a "Jim's Notebook" section, based on the Reference Catalog, which he is developing into a complete, practical online antenna library.

The General Catalog is free via bulk mail (or send $2 if you want it faster) from The Radio Works, P.O. Box 6159, Portsmouth, VA 23703 (phone 1-800-280-8327; Internet <jim@RadioWorks.com>; Web <http://www.RadioWorks.com> (the Web site has an online catalog).

Soft Stuff

Yagi Designer for Windows 95. Amateur antennas used to be designed largely by the seat of the pants or by using a stubby pencil and calculator. Either way, final performance characteristics were hard to predict. Now you can do your stubby pencil figuring on your PC. With antenna modeling programs it's fairly simple to calculate the correct dimensions and wire sizes for all sorts of antennas, including dipoles, quads, Yagis, and verticals.

Such programs offer the professional, experimenter, and casual user alike some nice "what if" possibilities as well as confidence in results as design parameters are manipulated. You also can take into account "real world" variables that can affect results. Most such programs are specialized, with certain ones "doing" Yagis and others handling wire antennas.

A recently introduced specialized program of the Yagi genre is Yagi Designer for Windows 95. The new program, which sports a friendly, graphical user interface, calculates antenna characteristics such as gain, front-to-back (F/B) ratio, and feedpoint impedance. It also displays antenna radiation patterns on polar graphs in units of dB.

The program was developed by Mark A. Goforth, Ph.D., a physicist, on a DEC-Vax 3100 computer and was written in Fortran. Yagi Designer since has been converted into a 32-bit program with lightning-fast speed, compiled in the C language. According to the author, the equations the program uses are derived from the "first principle of physics," which is to make things as accurate as one can.

Yagi Designer Version 1 is shareware with a $10 registration fee. It's available on America Online and CompuServe, as well on the Web at <http://www.shareware.com>. Version 1 has a limit of 20 elements, and it doesn't include

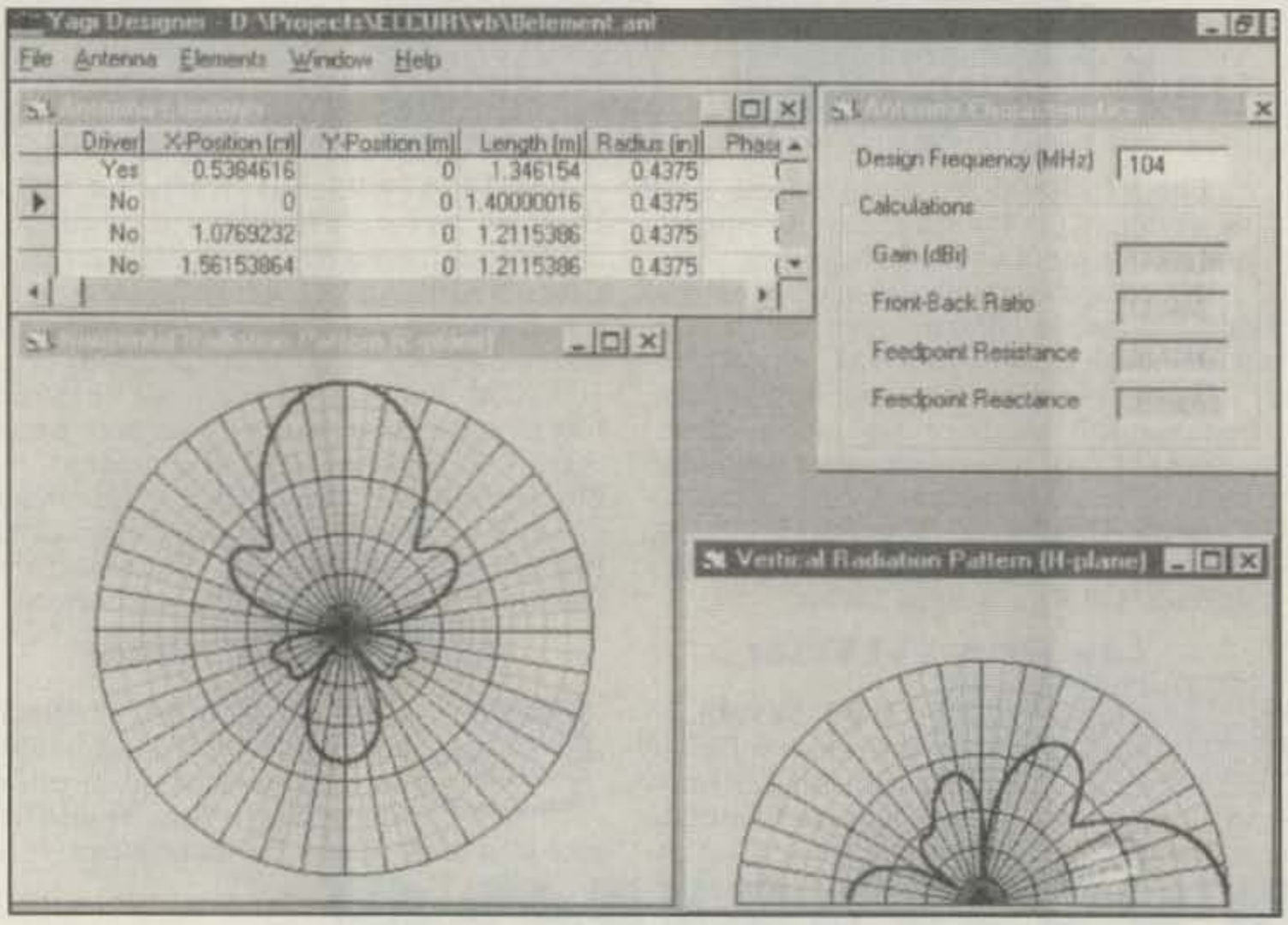
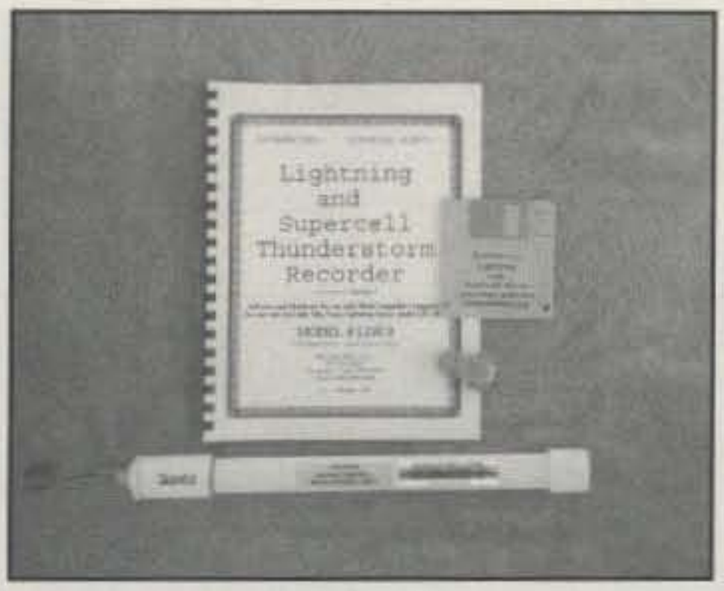


Fig. 1– Yagi Designer for Windows 95, with a friendly graphical user interface, calculates antenna characteristics such as gain, front-to-back (F/B) ratio, and feedpoint impedance. It also displays the antenna radiation pattern on polar graphs in units of dB. Version 1 is shareware and is available on America Online and CompuServe, and at <http://www.shareware.com>. The shareware version has a limit of 20 elements, and it doesn't include effects due to antenna structure, tapered elements, or ground.



Now you can graph severe thunderstorms, including especially dangerous "supercells," with your PC. The Stormwise Lightning and Supercell Thunderstorm Detector and Recorder includes a LSU-2001 Lightning Sensor Unit to detect the ELF/VLF emissions associated with approaching thunderstorms. Its output is optically coupled to your PC's serial port, where the associated software lets you plot, graph, and analyze electrical activity on your screen. (Photo courtesy McCallie Mfg. Corp.)

effects due to antenna structure, tapered elements, or ground. A non-shareware Version 2 also is available; the commercial version includes the effects noted. Version 2 also lets you rescale dimensions, overlay antenna graphs, print, and more.

For more information, contact Mark A. Goforth, Ph.D., at Goforth Laboratories, 3301 Rosemere Ct., Herndon, VA 20171 (phone 703-435-2999; e-mail <MARK.A.GOFORTH @cpmx.saic.com>).

Antennas CD-ROM. As we've pointed out previously, Walnut Creek CDROM offers a rapidly growing library of CD-ROM discs of all descriptions. A title of special interest to radio amateurs, shortwave listeners (SWLs), and other radio hobbyists is the new Antennas CD-ROM. The disk was developed for Walnut Creek by antenna expert Bob Haviland, W4MB.

According to Bob's README file on the disc, he has attempted to prepare a self-contained, easy-to-use source for the major programs and data needed by workers in radio. Another goal has been to make the material on the disc available for a wide range of computer setups. Bob also has created extensive but simple indices to the programs and data, which are provided on the disc. You can view the indices with the included viewer programs, or you can use your own Web browser to view them if you prefer.

The individual programs on the disc are intended for the design of antennas of nearly 50 types, covering the HF to SHF range. They may be used for preliminary design, with the results checked by one of the three antenna analysis programs (MiniNEC, NEC, and ThinWire) that are included on the disc.

Besides the individual W4MB antenna designs and the three antenna analysis programs, the disc contains a wide variety of information for antenna experimenters. There are a number of Bob's antenna articles, information on finite element analysis, historical antenna information and designs, math aids, propagation data, extensive reference data, miscellaneous antenna design and related programs, source code, and much more.

The disc is $29.95 and offers 2000+ program and data files. It's from Walnut Creek CDROM, 4041 Pike Lane, Suite D-906, Concord, CA 94520-9909 (phone 1-800-786-9907; e-mail <info@cdrom.com>). Also check out the Walnut Creek Web site for both product information and technical support at <http://www.cdrom.com>. There's also their nifty FTP site which has tens of megabytes (MB) of "stuff for downloading"; it's at <ftp://ftp.cdrom.com>.

Stormwise Lightning and Supercell Thunderstorm Detector and Recorder. Several firms, including McCallie Mfg. Corp., make storm lightning sensors to warn of approaching thunderstorms, some claiming up to several hours' warning that thunderstorms, with the possibility of dangerous lightning strikes, are approaching. The warning they provide gives you ample time to shut down and/or disconnect equipment and take other precautions.

We have profiled several of McCallie's Stormwise® LSU-series lightning detector sensors in previous columns. These outdoor, battery-operated and optically coupled alarms use an ELF/VLF impulse detection sensor. When storms are far away, the sensor sounds a buzzer briefly. As storm activity and lightning draw closer, the buzzer sounds longer, up to several seconds or more for each discharge. If approaching storms are severe, the alarm sounds almost continually until the activity dissipates. The device draws no battery power unless light-

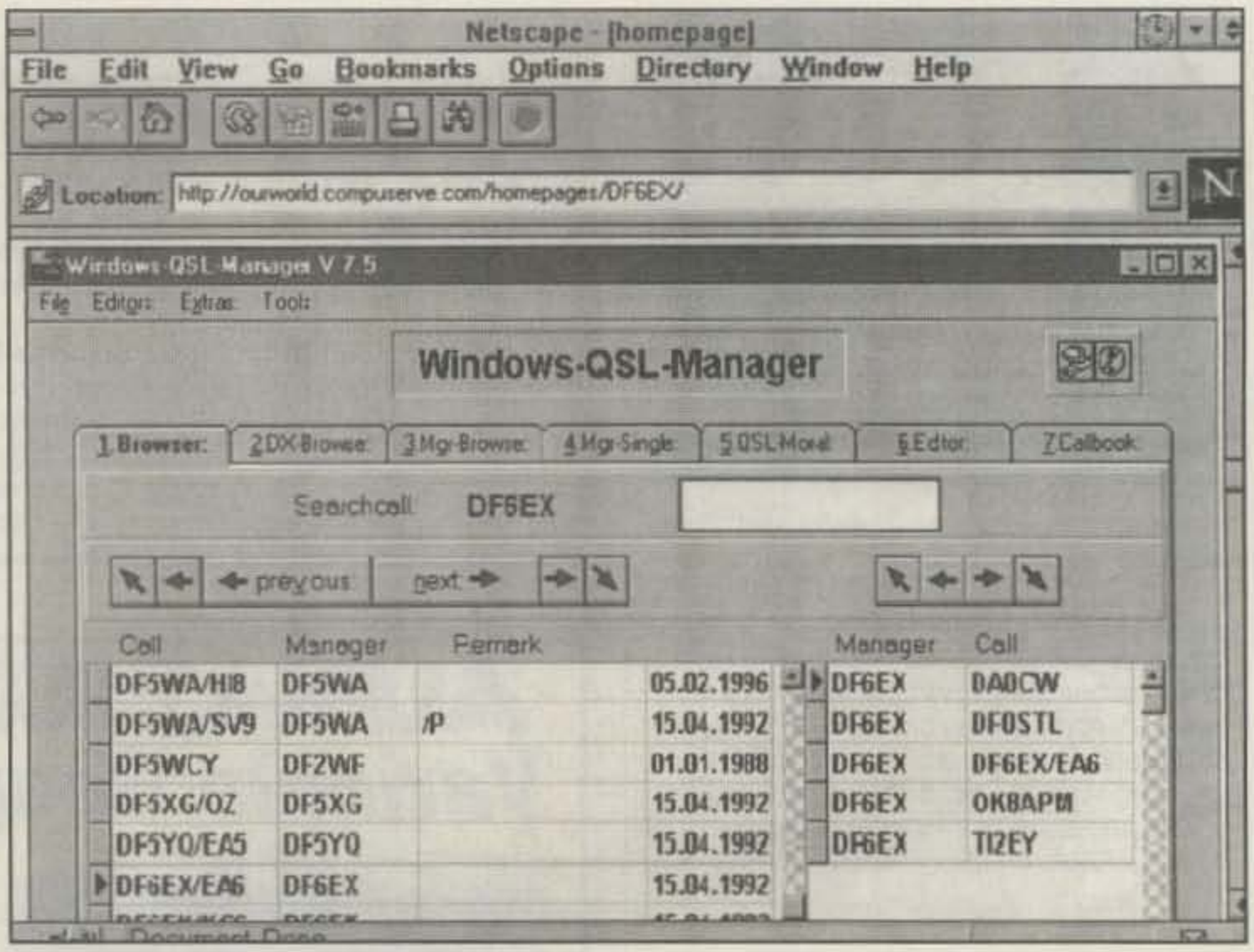


Fig. 2– Manfred Meier, DF6EX, operates the Windows-QSL-Manager Web page to service his popular QSL management program. The page features screen shots from the program (one of which is displayed here); price and licensing information; links to other amateur radio Internet sites; technical support; and a download area for registered users to obtain updates. The DF6EX Web page is at <http://ourworld.compuserve.com/homepages/DF6EX>. (See the text of this month's columns for more details.)

ning is detected; a 9 volt battery can provide 2 to 3 years of around-the-clock use.

The firm recently began offering a software/hardware system that lets you graph thunderstorms on your PC. The system is known as the Stormwise® Lightning Alert® Lightning and Supercell Thunderstorm Detector and Recorder. The detection package is adept at dealing with the really dangerous "supercell" type of thunderstorm. The package includes a LSU-2001 lightning sensor, PC serial port optical interface, and associated DOS-based Lightning and Supercell Storm Detection Software.

Some of the main features of the detection package include automatic lightning proximity alarm and recording to warn of approaching storms and their relative intensity, display of lightning detections per minute as a graph on your monitor screen, a severe storm alarm, an automatic weather log, an ability to record on diskette lightning activity and storm intensity, color display and logging of supercell storms, and more. The hardware/software detection package is $49 plus $5 s/h.

For more product info, contact McCallie Mfg. Corp., P.O. Box 8631, Greenville, TX 75404-8631 (903-883-3684).

Windows-QSL-Manager. Most of us know what a QSL manager is. The QSL manager is a rare breed of individual, a DXer who volunteers his or her services to a DX station for a variety of reasons. These may include helping a DX station that doesn't have the time or inclination to send or receive vast quantities of QSLs, or who lacks the financial resources to do so. Several of the more popular logging, contesting, and callbook programs include, or have links to, QSL management software that facilitates keeping track of QSL managers by the DXer. One of the better-known QSL management programs is called Windows-QSL-Manager.

This highly capable program is by Manfred Meier, DF6EX, who supplies the QSL manager list for the Radio Amateur Callbook CD-ROM, and who now wishes to make his standalone program available in the U.S. The program, now up to Volume 7, is written in Pascal; it's very fast and is easy to install and use. It offers several possibilities to search for DX calls and managers, addresses of managers, and even hints as to the QSL policies of some stations. The Windows-based program is $29 in U.S. funds, postpaid. Database updates are available every two months; each update is $7. A yearly sub to all six updates is $40.

Manfred is in the process of setting up an Internet support Web site. The Web page features screen shots from the program, price and licensing information, links to other amateur radio sites, technical support, and a download area for registered users to obtain updates. It is at <http://ourworld.compuserve.com/homepages/DF6EX>.

For further information, contact Manfred Meier, DF6EX, P.O. Box 1269, D-95645 Waldsassen, Germany (e-mail <DF6EX@compuserve.com> or <DF6EX@t-online.de>).

Procomm® RapidRemote for Windows 95. For many "road warriors" the ability to efficiently and effectively remotely access and control applications and data from a home or office PC, or a network, located anywhere in the world, can be a real lifesaver. Over the years many competing products have been designed to do these things, but many such programs are not all that reliable or easy to use by non-experts in communications.

One of the newest entries into the "remote control derby," so to speak, is Procomm®

MIRAGE...100 Watts...$199

Boost your 2 Meter handheld or multimode (like ICOM 706) to a super powerful 100 watts . . . All modes: FM, SSB, CW . . . 15 dB GaAsFET receive preamp . . . Reverse polarity protection . . . Silent cooling fan . . . Free HT-to-amp coax and mobile bracket

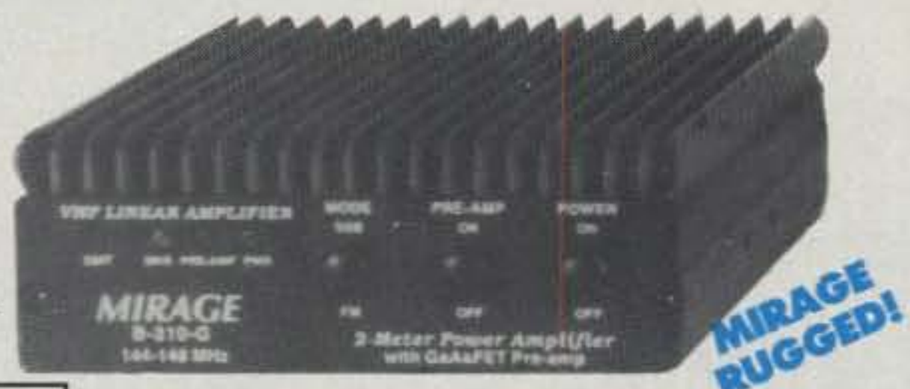
In Stock at ham dealers everywhere!

Call your dealer for your best price

$199

B-310-G Suggested Retail

NEW!



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

For an incredibly low $199, you can boost your 2 Meter handheld to a super powerful 100 watt mobile or base!

Turn "You're breaking up . . . Can't copy" into "Solid Copy . . . Go ahead."

Talk further . . . Reach distant repeaters . . . Log onto faraway packet bulletin boards.

This rugged Mirage B-310-G amplifier operates *all modes*: FM, SSB and CW. It's perfect for *all* handhelds up to 8 watts *and* multi-mode SSB/CW/FM 2 Meter rigs.

***It's** great for the ICOM IC-706 -- you'll get 100 blockbuster watts on 2 Meters!*

Low noise GaAsFET pre-amp

A built-in *low noise* GaAsFET receive pre-amp gives you 15 dB gain -- lets you dig out weak signals.

Fully Protected

***SWR** Protection* prevents damage from antennas whipping in the wind. *Reverse Polarity Protection* can save your amp if you connect power backwards.

Compact but Powerful

Mirage's integrated *HeatsinkCabinet™* and whisper quiet fan gets heat out fast!

The results? An *ultra-compact* 4¾x1¾x7¾ inch 2½ pound amplifier that delivers a *super powerful* 100 watts.

Free Accessories

Free 3 foot handheld to B-310-G coax cable -- just plug and play! ***Free*** mobile bracket! ***Free*** rubber mounting feet for home use!

Plus more . . .

Automatic RF sense Transmit/Receive switch. Remote keying jack. LEDs monitor "On Air", high SWR, pre-amp, power. Push buttons select SSB/FM, pre-amp, power. Draws 15 amps at 12-15 VDC.

Full one year MIRAGE warranty

With Mirage's legendary ruggedness, you may never need our superb warranty.

Dual Band 144/440 MHz Amp

$159.95 BD-35 Suggested Retail

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

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

Works with all FM handhelds up to 7 watts. Power Curve chart shows typical output power.

Full Duplex Operation

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)

Mirage is the Best! Here's why . . .

- ***Automatic frequency band selection*** --you'll never forget to switch bands
- ***Single input connector and single output connector for both bands*** -- easy to use with dual band radios and antennas
- ***First-class strip-line techniques*** -- superb RF performance and reliability
- ***Custom wrap-around heatsink*** -- runs cool
- ***Reverse Polarity Protection*** -- saves your amp if you connect power backward
- ***Automatic RF sense Transmit/Receive switch*** -- makes operation easy
- ***Low input SWR*** -- keeps your handheld safe from overheating
- ***"On Air" LEDs*** -- for each band
- ***Free mobile mounting bracket***
- ***Free 3 foot handheld-to-BD-35 coax cable***
- ***Small size:*** just 5x1¾x5 inches
- ***Full one year MIRAGE warranty***
- ***Legendary MIRAGE ruggedness***

Call your dealer today for your best price!

35 Watts for 2 Meter HTs

B-34-G

$89.95

Suggested Retail

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

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

MIRAGE RUGGED!

35 watts, FM only . . . $69.95

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

160 Watts on 2 Meters!

B-5016-G

$299

Suggested Retail

MIRAGE RUGGED!

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

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

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

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

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

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

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

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

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

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

More 160 Watt, 2 Meter Amplifiers . . .

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

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

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

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http://www.mirageamp.com

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

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Starkville, MS 39759, USA

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

"The quick-release remote front panel gives you so many installation options ."

"And with dual receive you can talk on one band, and listen on another!"

"Plus, the high-tech Enhanced Smart Search™ is great for finding repeaters --and you can watch it all on the dual display."

"Looks like Yaesu did it again!"

FT-8100R

Compact Dual Band Mobile

Now a dual-bander that remotes and is easy-to-use, without sacrificing the features you want!

With its quick-release, remote front panel system, the FT-8100R combines high-performance dual-band features in a simple-to-operate rugged mobile built to the endurance standards of commercial radios. The result is installation flexibility and industry-first, "must-have" advantages!

Use dual receive (V+V, U+U or V+U), or talk on one band while listening on another. Watch Yaesu's exclusive Enhanced Smart Search™ automatically seek out and load active frequencies--great for finding new repeaters while traveling.

Get wide receive coverage--from 110 to 550 MHz and 750 to 1300 MHz* for public safety, marine, aircraft, and weather channels. Enjoy up to 50 Watts of VHF power output (35 Watts on UHF) with High/Medium/Low choice on each band, and "plug and play" 1200 or 9600 bps packet. Utilize 208 memory channels--the greatest available on any remote mobile--to store repeater offset, CTCSS tone, packet baud rate, and power level.

Yaesu's popular Omni-Glow™ display provides a wide field of view, and includes a DC voltage meter. Quickly program, or clone frequency memories with optional Windows™ PC programmable ADMS-2D.

"User-friendly" describes the streamlined front panel layout. Eight clearly-marked keys, and separate Volume/Squelch controls for each band, make operation easy. And the backlit DTMF microphone includes 3 user-programmable keys...but no awkward keypad cover!

Don't sacrifice high-performance features in your dual-band mobile installation Get the easy-to-use FT-8100R at your Yaesu dealer now!

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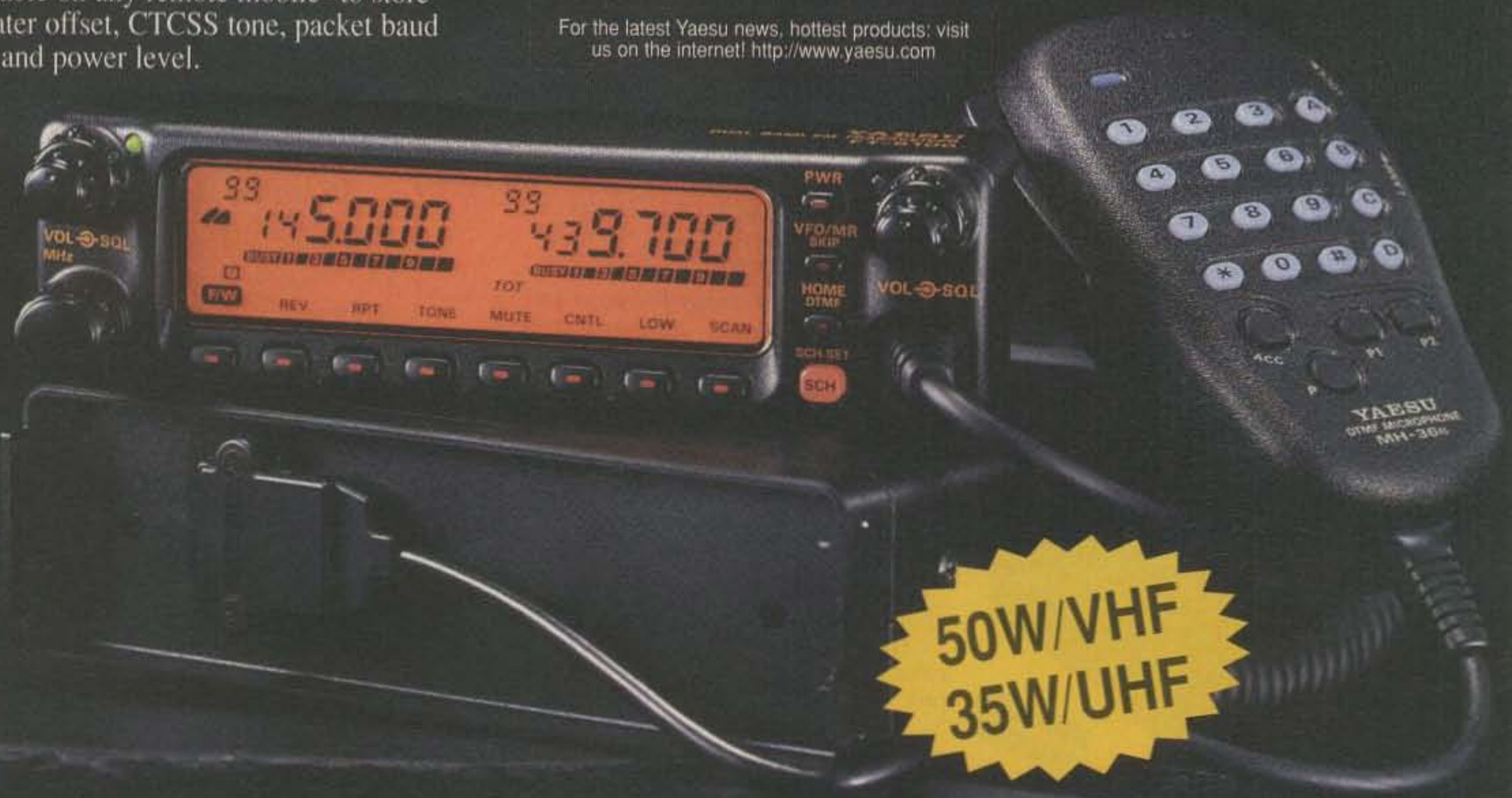
...leading the way.℠

For the latest Yaesu news, hottest products: visit us on the internet! http://www.yaesu.com

Features

- Frequency Coverage
  - RX: 110~550 MHz
  - 750~1300 MHz*
  - TX: 144~148 MHz
  - 430~450 MHz
- Detachable Front Panel (remotable w/optional YSK-8100)
- 3 Power Output Levels
  - 2m 50/20/5 Watt
  - 70cm 35/20/5 Watt
- 208 Memory Channels
- Enhanced Smart Search™
- CTCSS Encode
- Built-in Duplexer
- S-Meter Squelch
- Dual Receive (V+V,U+U,V+U)
- Crossband Repeat (bidirectional or one-way)
- PC Programmable w/optional ADMS-2D
- Digital Battery Voltage Display
- Auto Power Off (APO)
- Omni-Glow™ Display
- 1200/9600 bps Packet Compatible
- Alternating-Band Memory Selection (ABMS)
- DTMF Autodialer (6 Memories)
- Time Out Timer (TOT)
- Accessories: Consult your local Yaesu dealer.

*Cellular & 900 MHz Cordless Phone frequencies blocked.



50W/VHF
35W/UHF

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

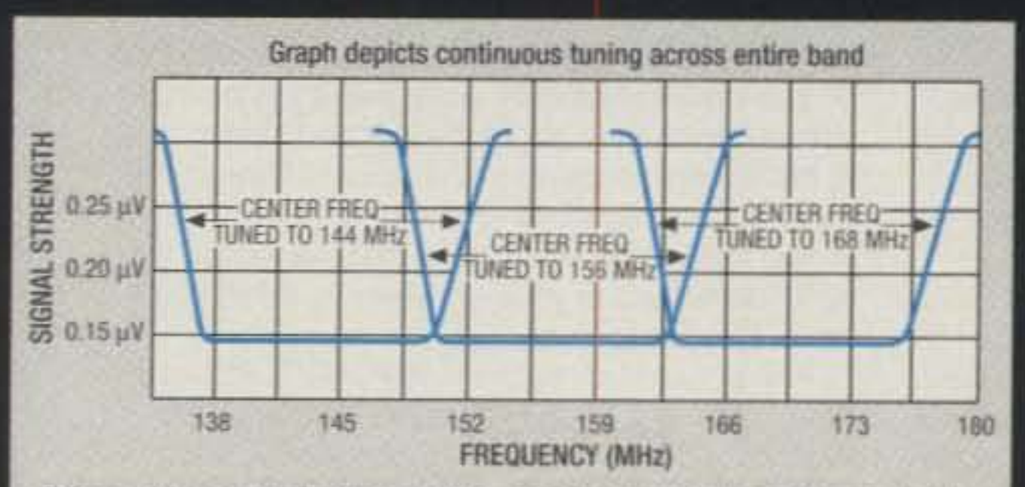
Advanced Track Tuning, Mil Spec, true FM. All in one radio!

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

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

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

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



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

Specifications

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

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

*FT-2500M

YAESU

Performance without compromise.℠

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

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

"This Advanced Track Tuning practically eliminates intermod!"

"Yaesu did it again."

US MILITARY APPROVED MIL-SPEC 810

FT-3000M

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

RapidRemote for Windows 95. The program is billed by Quarterdeck as "remote control for the rest of us"; anything you can do sitting in front of your PC, you can now do by phone from anywhere in the world, and do it fast.

The new program is designed to give users affordable, fast, and easy access to the information on their PC, whether from the office, home, or on the road. The program includes fast, 32-bit multitasking capability; good security features; and smart wizards that guide you through the process of connecting and controlling a remote PC. Some of the program's key features include fast screen updates and repainting, ease of configuration and use, turbo file transfer, a secure computing environment, bitmap caching (to reduce handling of graphical data), data compression, video synchronization between the two PCs, and a Windows 95 Explorer-style file transfer window.

The program's estimated street price is $69. It's from Quarterdeck Corporation, 13160 Mindanao Way, Marina Del Rey, CA 90292-9705 (phone 310-309-3700; Internet <INFO@QUARTERDECK.COM>; web <http://www.quarterdeck.com>).

From The Bookshelf

New Electronics Titles from PROMPT Publications. A letter from Candace Drake Hall, PROMPT Publications Managing Editor, promises at least 30 new 1997 titles on a variety of the "hottest topics in the electronics industry." These include books on computer, monitor, camcorder, and VCR troubleshooting and repair; optoelectronics; computer hardware; robotics; digital electronic servicing and troubleshooting; and home security.

One new title Candace sent for our perusal was *Internet Guide to the Electronics Industry,* by John Adams. The 242-page book is a specialized tool to help you find and access the electronics data you need from the Internet. The new book is designed to help the electronics professional or hobbyist who needs a fast way to find the electronics information he or she needs. Not only does the book provide useful information about the Net and how to use it, but it also contains a directory of Net-based electronics resources and instructions on how to find them. If you're convinced the Net is the right tool to add to your workbench, this $16.95 book may be for you.

For a catalog, contact PROMPT Publications, Howard W. Sams and Company, 2647 Waterfront Parkway E. Dr., Suite 100, Indianapolis, IN 46214-2041 (1-800-255-6989).

We Get Letters

Once more we're just about out of space. Before wrapping it up, however, we'd like to acknowledge just a few of the folks who have written, faxed, e-mailed, phoned, or otherwise corresponded with your columnist. A tip of the hat goes to Tony Lacy, G4AUD; Norb Ostrye, W4LUM; William C. Greeley; Kevin Carey; John Keller, AAØLG; and Steve Morris, K7LXC. Thanks, gang!

Looking Back Five

Five Years Ago in Antennas and Accessories. Now you know what the column is like for August 1997. But what was "hot" five years ago, in August 1992?

We began by holding "mail call." Some interesting reader-reported topics included a description of 40 meter dipole experiments by Earle Grandison, K6WS; experiences with the GAP Challenger DX "center launch technology" vertical antennas, reported by Bill Drummond, WN6J; a tower hint from Richard Mollentine, WAØKKC; and a description of the problem of getting a good RF ground in an apartment hamshack, from Ken Gilcrest, KA8FFL/7. Other comments were received from Harold J. Tucker, K4HXW, and Dennis G. Eksten, W9SS.

We also profiled several H. Stewart Designs antennas; described the WB5TYD Texas Bugcatcher HF mobile antennas; and noted a new W9INN antenna, the "Hideaway" MDX-5C Space-Saver Dipole. We also noted several general-interest and utility programs, including BOOTCON for boot-up configuration control, from Modular Software Systems; INFO SELECT 2.0, a versatile personal information manager (PIM) from Micro Logic Corporation; and The Norton AntiVirus 2.0 utility from Symantec.

Food For Thought. Incidentally, in that column, we referenced a previous column (January 1992) in which Robert A. Wanderer, AAØCY, presented some installation problems he had with a new GAP vertical, problems solved only after technical consultation with the factory. GAP's Richard Henf saw our remarks in print and wrote us to further stress the need to obtain technical consultation when a product doesn't seem to work right. The significance of his comments bears repeating once again:

"What I particularly liked about your editorial was the reference to Robert [AAØCY] calling the factory, because something did not appear correct. I am amazed at how many people buy something, put it together, check their results, find they are higher or worse than specified, and accept this as the norm or the best they can achieve. The reason I am surprised is because it tells me people are getting used to accepting less than that which has been advertised. . . . Probably the one item we stress most is, if you have any questions or something does not appear correct, call us."

This, indeed, is a very good point. And what Richard says applies not only to antennas, amateur gear, or software, but to just about *anything* you buy: don't meekly accept substandard results. Get with tech support or customer service, and try to make things right. Doing so usually is worth your trouble.

Wrap-Up

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

Overheard: One thing I've learned is that nothing is really work, unless you'd rather be doing something else.

73, Karl, W8FX

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SWITCHING POWER SUPPLIES ....

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SPECIFICATIONS:

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

OUTPUT VOLTAGE: 13.8 VDC

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

- *with separate volt & amp meters
- All SS power supplies are available in a RACK MOUNT VERSION (3.5 x 19 x 9 3/8)
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CIRCLE 163 ON READER SERVICE CARD

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Mobile, CW, and QRP: Fun for All!

I originally planned to spotlight more views of mobile setups in this month's column, but everyone motored off to Dayton and left me sitting on the side of the road (the old red tail lights in the sunset syndrome). Every cloud (of dust) has a silver lining, however. I was sitting on a big bag of goodies and thought-whetting notes on mobiling, CW, and QRP to share with the multitude. Gotcha! To all of our friends who assumed that statement related to a single topic rather than a blowout triple feature, we humbly dedicate the first photo in this month's column. Can you spot the hidden rig and key?

Can you spot the hidden rig and key in this photo?

Mobile and CW

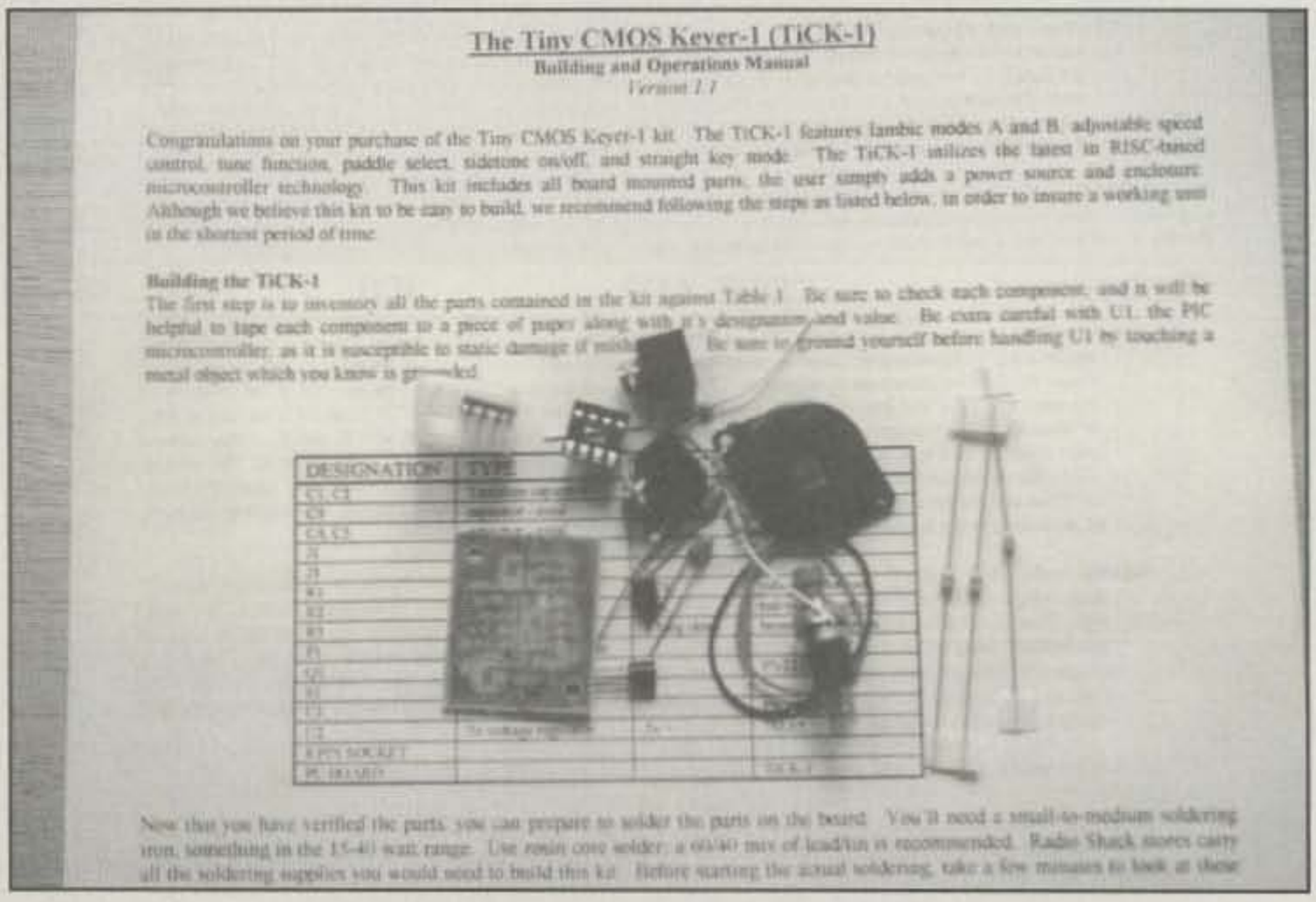
Near the end of last month's column I briefly mentioned a terrific product for mobiling (and more!) TICK-1 keyer kit available from Embedded Research, P.O. Box 92492, Rochester, NY 14692. This month I have more details on this amazing little treat (see photos).

The keyer kit comes complete with all parts, including a 1" × 1" PC board. It costs only $16 postpaid and goes together in less than an hour. If desired, you can also purchase the custom chip alone for only $5, and it makes a most impressive keyer.

All of the TICK-1's features and functions are accessed by a single pushbutton (which, incidentally, can be mounted right on your paddle for remote operation). Tap the pushbutton once, and the keyer's piezo buzzer emits an "S." Press your paddle's right/dash lever to increase speed, or the left/dot lever to reduce speed. Output for keying a transceiver is disabled during speed adjustment and automatically reactivated after speed is set. You must experience this pushbutton action to appreciate its no-fumbles convenience, especially when mobiling.

Holding the pushbutton depressed sequentially accesses the TICK-1's other features, such as T/tune (keys rig until you tap paddle), P/paddle (tap lever desired for dit paddle/right- or left-hand use), and A/audio (activates/deactivates sidetone). Continue depressing the pushbutton and you can select SK/straight key mode (either paddle level can be used manually or as a "sideswiper"), M/mode (iambic A or B operation), K (keyer returns to normal operation), or S (back to speed select). In each case, keyed output is disabled during selections (but letters for selections are emitted from the piezo buzzer) and automatically restored after selection.

The TICK-1 will operate from a regulated 3 to 5 volt DC source (such as a lithium battery), a regular 9 volt battery, or a 12 volt DC supply. During use the keyer draws about one milliamp of current.


The Tiny CMOS Keyer-1 (TiCK-1)

Building and Operations Manual

Version 1.1

Congratulations on your purchase of the Tiny CMOS Keyer-1 kit. The TiCK-1 features Iambic modes A and B, adjustable speed control, tune function, paddle select, sidetone on/off, and straight key mode. The TiCK-1 utilizes the latest in RISC-based microcontroller technology. This kit includes all board mounted parts, the user simply adds a power source and enclosure. Although we believe this kit to be easy to build, we recommend following the steps as listed below, in order to insure a working unit in the shortest period of time.

Building the TiCK-1

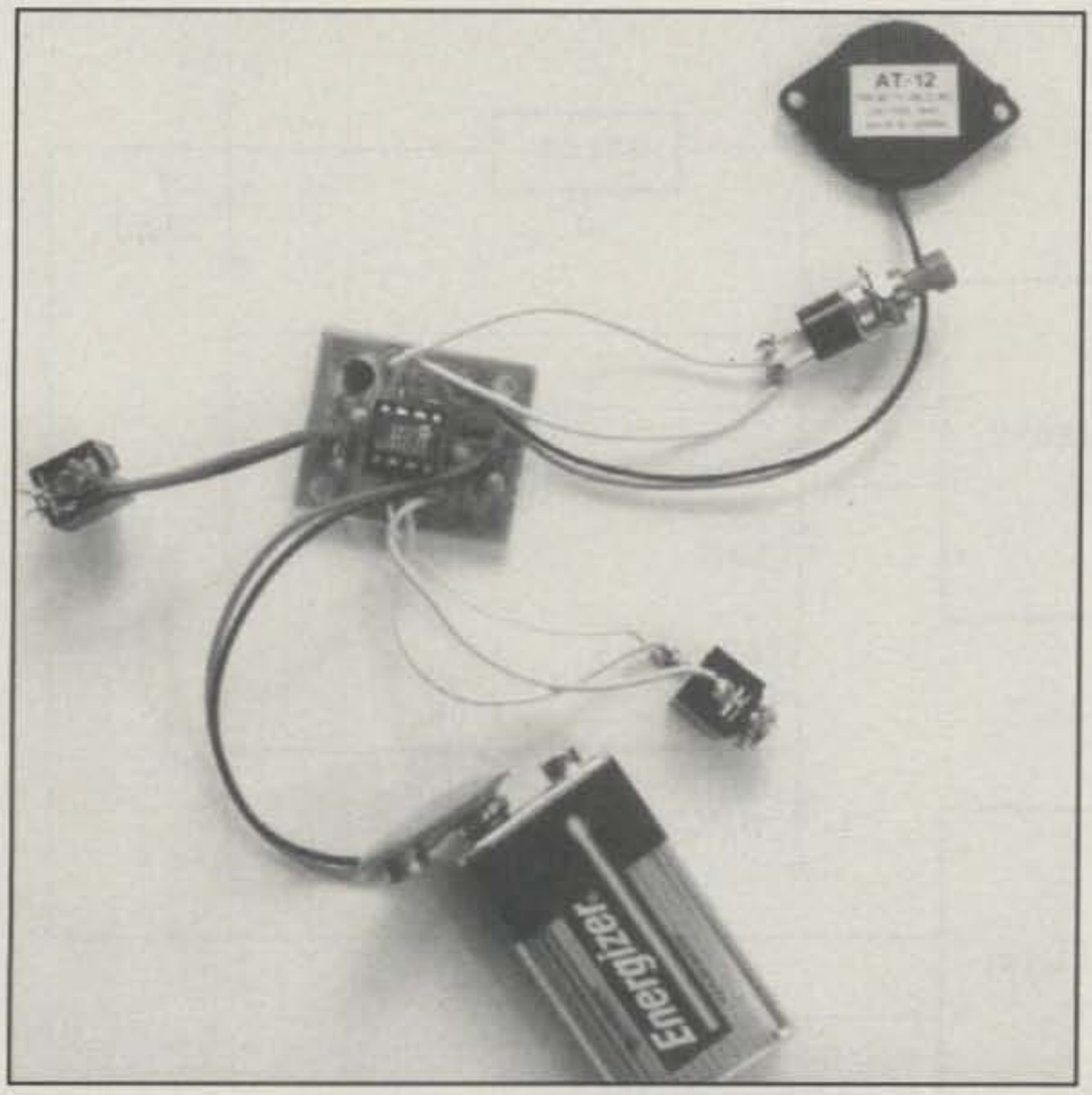
The first step is to inventory all the parts contained in the kit against Table 1. Be sure to check each component, and it will be helpful to tape each component to a piece of paper along with it's designation and value. Be extra careful with U1, the PIC microcontroller, as it is susceptible to static damage if mishandled. Be sure to ground yourself before handling U1 by touching a metal object which you know is grounded.

DESIGNATION	TYPE
C1, C2	
C3	
C4, C5	
J1	
J2	
R1	
R2	
R3	
R4	
R5	
U1	
U2	
Y1	
8 PIN SOCKET	
PC BOARD	TiCK-1

Now that you have verified the parts, you can prepare to solder the parts on the board. You'll need a small-to-medium soldering iron, something in the 15-40 watt range. Use rosin core solder; a 60/40 mix of lead/tin is recommended. Radio Shack stores carry all the soldering supplies you would need to build this kit. Before starting the actual soldering, take a few minutes to look at these

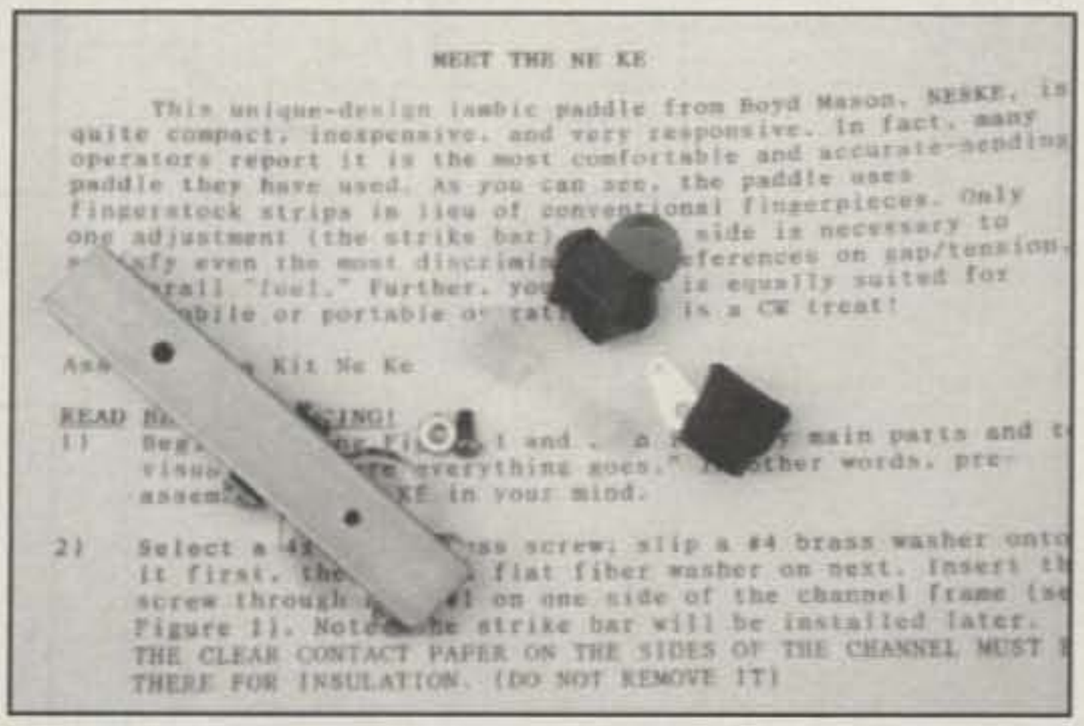
Shown here is the TICK-1 custom keyer kit as received from Embedded Research. Note the inclusion of a socket for IC, piezo sounder for sidetone, and well-designed PC board. This has to be the hottest little keyer kit yet!

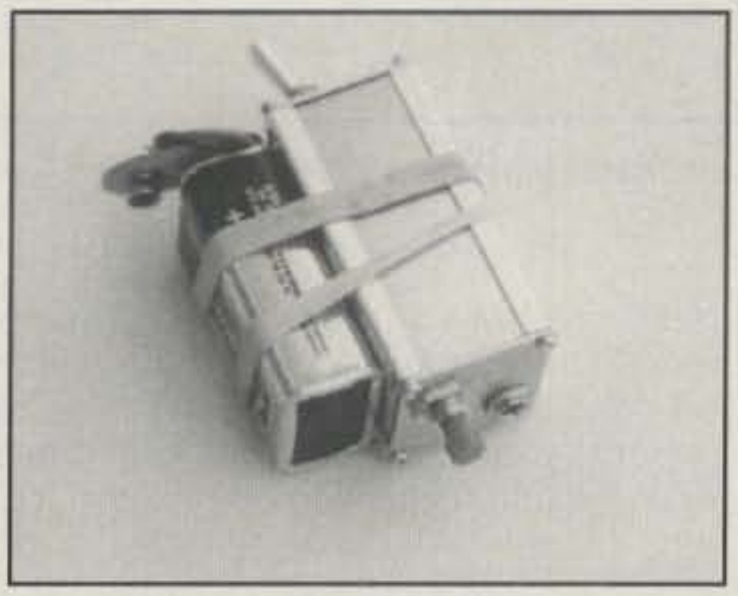
4941 Scenic View Dr., Birmingham, AL 35210



In less than an hour the TICK keyer was assembled and ready to mount in a rig or squeeze into a tiny enclosure. The PC board is one inch square. The item marked "AT-12" at the top right is a piezo sounder for sidetone and CW-announcing functions selected by pushbutton.

Need an inexpensive paddle for mobiling? Check out Boyd Mason's new kit Ne Ke. It looks a mite funky, but it handles very well.





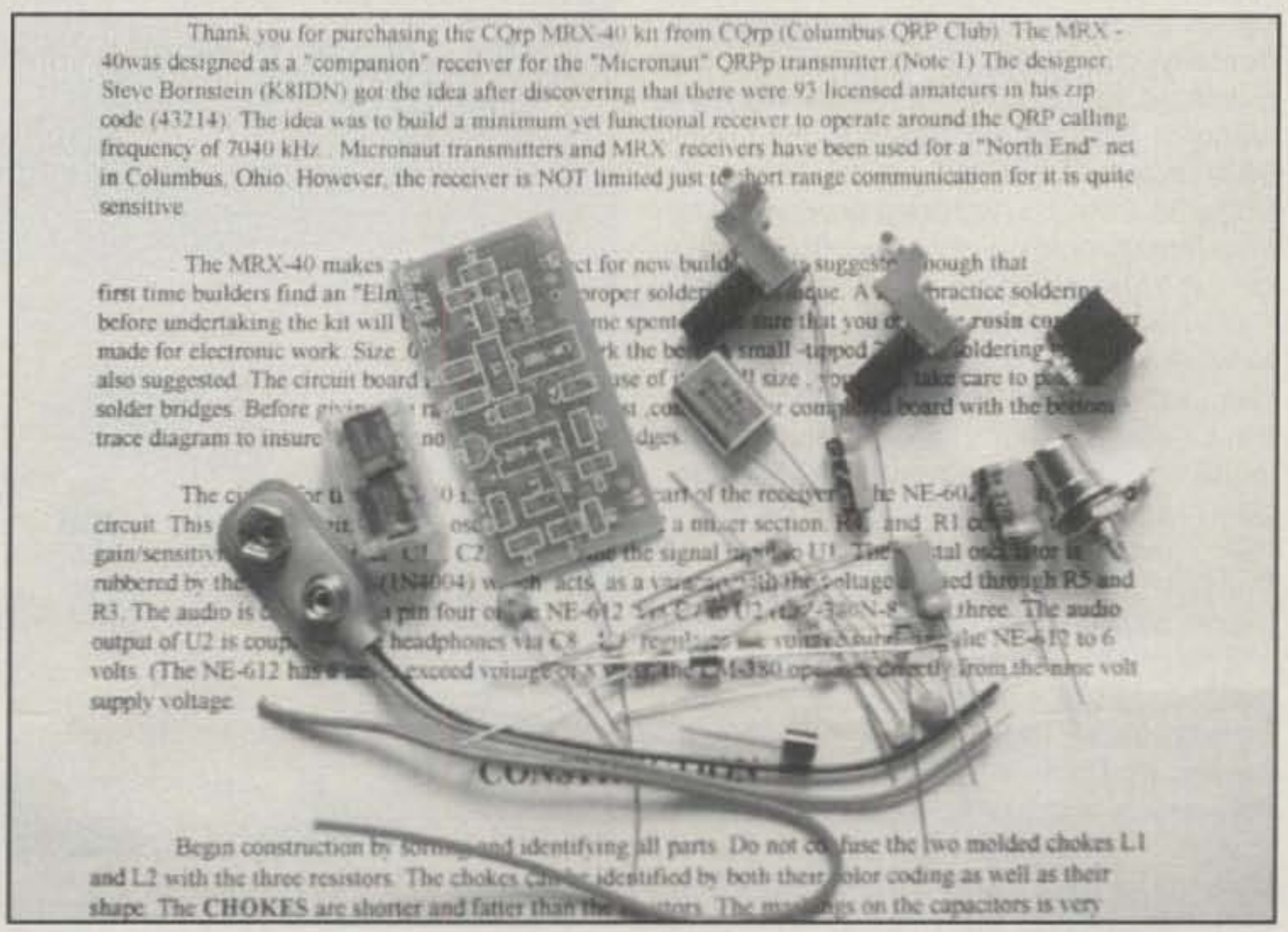
We buttered the TICK board and piezo sounder's hips and squeezed them diagonally into a 1" × 1" × 2" Sescom box and made a super-featured pocket-size keyer. All functions, including speed adjustment, are accessed by that single front pushbutton.

When not in actual operation, however, it immediately goes into sleep mode and draws only one microamp of current. A regular 9 volt battery delivers 90 ma of current, which equates to 90 hours of constant paddling or several months (!) of normal use. The TICK-1's small size and low cost make it very attractive for mounting ("embedding") inside a mobile transceiver, but I squeezed mine (literally!) into a 1" × 1" × 2" Sescom box for strap-on-side operation with different rigs.

I started using it with a leg-strapped Ne Ke, but then Boyd Mason (8297 Cleveland W., Coopersville, MI 49404) announced a new Ne Ke paddle kit for low-cost mobile and portable operating (see photo). I quickly assembled one, fitted a 3.5 mm plug into its back end, plugged it into the TICK keyer, and emerged with a handheld keyer/paddle combo to use while XYL WB4OEE pilots our vehicle. Ne Kes, TICKs, a snazzy auto, a terrific XYL, and a killer Stealth antenna—now that's mobiling in style!

QRP Delights

Our little Micronaut transmitter kit described in the March 1997 column kindled widespread interest in quick-brew QRPp. Many folks anxiously asked if and when a mating receiver might be announced. Well, friends, that "companion" receiver kit is now available from Steve Bornstein, K8IDN (475 East North Broadway, Columbus, OH 43214), and the introductory price is only $18 postpaid. The receiver is a basic "two chipper." It goes together in less than an hour, and it's a gem (quick-brew projects and summer are a perfect match!). To illustrate those points, some



The MRX-40 receiver kit from K8IDN comes complete with chips, a crystal for 7040 kHz, and a beautifully screened 1" × 2" PC board. The easy-to-follow instructions simplify assembly.

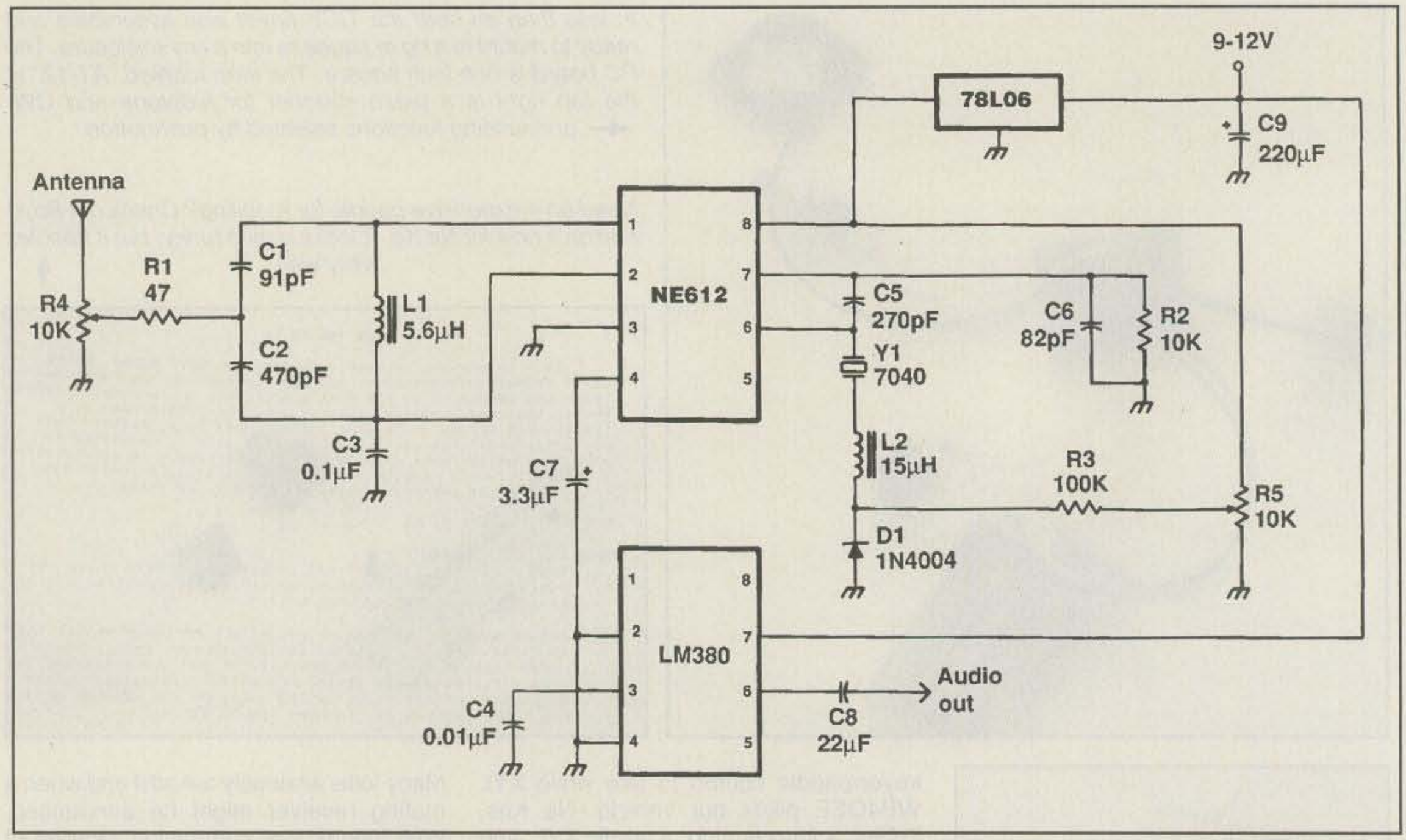


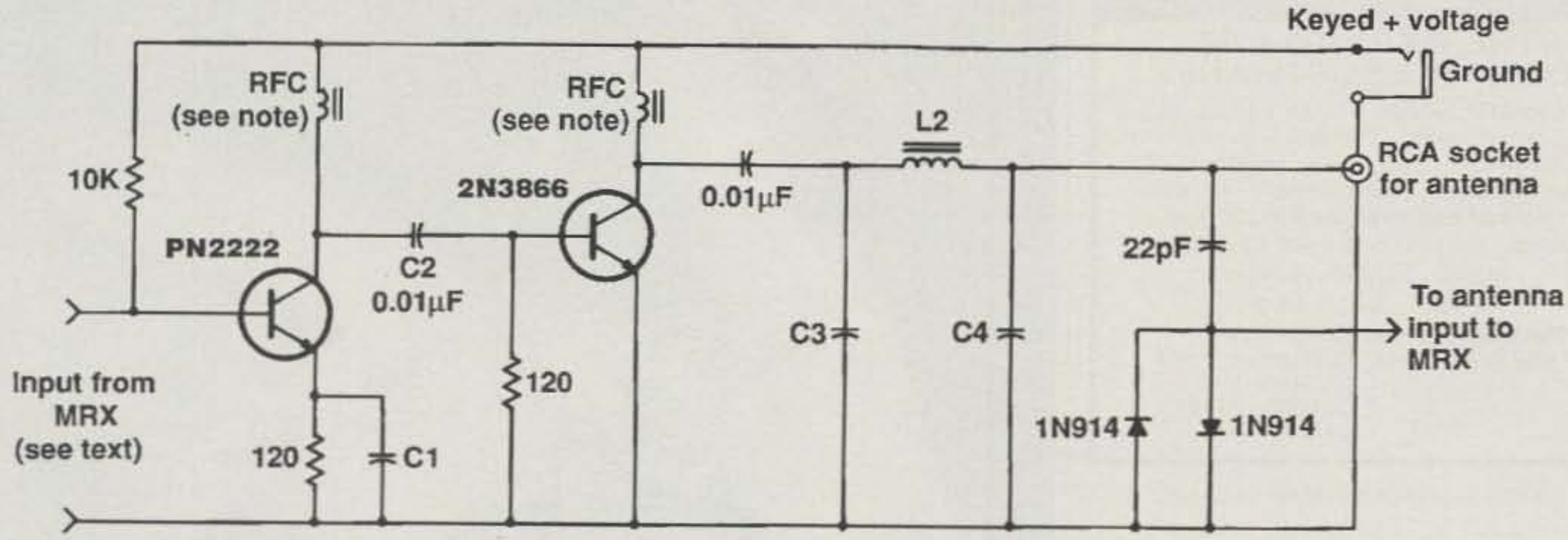
Fig. 1– Circuit diagram of K8IDN's MRX receiver—minimum number of components and maximum performance!

over-the-shoulder photos of a kit being assembled are shown here.

Separating out the parts and spotting their points of installation on the well-marked PC board took only minutes. Then I used magnifying goggles, a fine-tip iron, and ultra-thin silver bearing solder as assembly aids. The goggles, incidentally, are called "MagEyes" and are available for around $25 from Nancy's Notions, 331 Beichl Avenue, P.O. Box 683, Beaver Dam, WI 53916 (phone 1-800-833-0690). They are a sewing aid for fine needlepoint work, and they really make PC boarding a cinch. Since Steve's "MRX" kit was designed for (and proven to work well on) 40 meters, I decided to change three front-end components and the crystal for 30 meter operation during initial assembly. The result is a favorite-band receiver small enough to be a key fob. (Now you know what rig is used with the QRP mobile in the first photo in this month's column.)

The MRX receiver's circuit diagram is beautifully basic, yet quite surprising in performance (fig. 1). An NE-612 IC serves as both an oscillator and mixer, converting incoming signals from 40 meters (or in my case, 30 meters) directly to audio (pin 1 and 2 input, pin 4 output). An LM-380 then boosts the audio level for driving an earphone (pin 3 input, pin 6 output). The oscillator's frequency is established by crystal Y1 (7,0404 kHz supplied with kit). In turn, the crystal's frequency can be warped a few kHz by D1 acting as a varicap. Potentiometer R5 controls voltage applied to the varicap for tuning, and pot R4 controls overall gain/sensitivity of the receiver. Capacitors C1 and C2 and coil L1 match selected band signals to the NE-612. For 30 meters I changed them from 91 pFd and 470 pFd and 5.6 µHy to 68 pFd and 330

The MRX receiver is shown here midway through assembly. Magnifying goggles are great for turning fine work into relaxing enjoyment. A sharp-tipped iron and ultra-thin solder ensure accurate soldering without PC run "bridges."



NOTE:

RFC = 2 0r 3 turns #30 or 32 on tiny bead.

Coil and Capacitor Data for The Micronaut

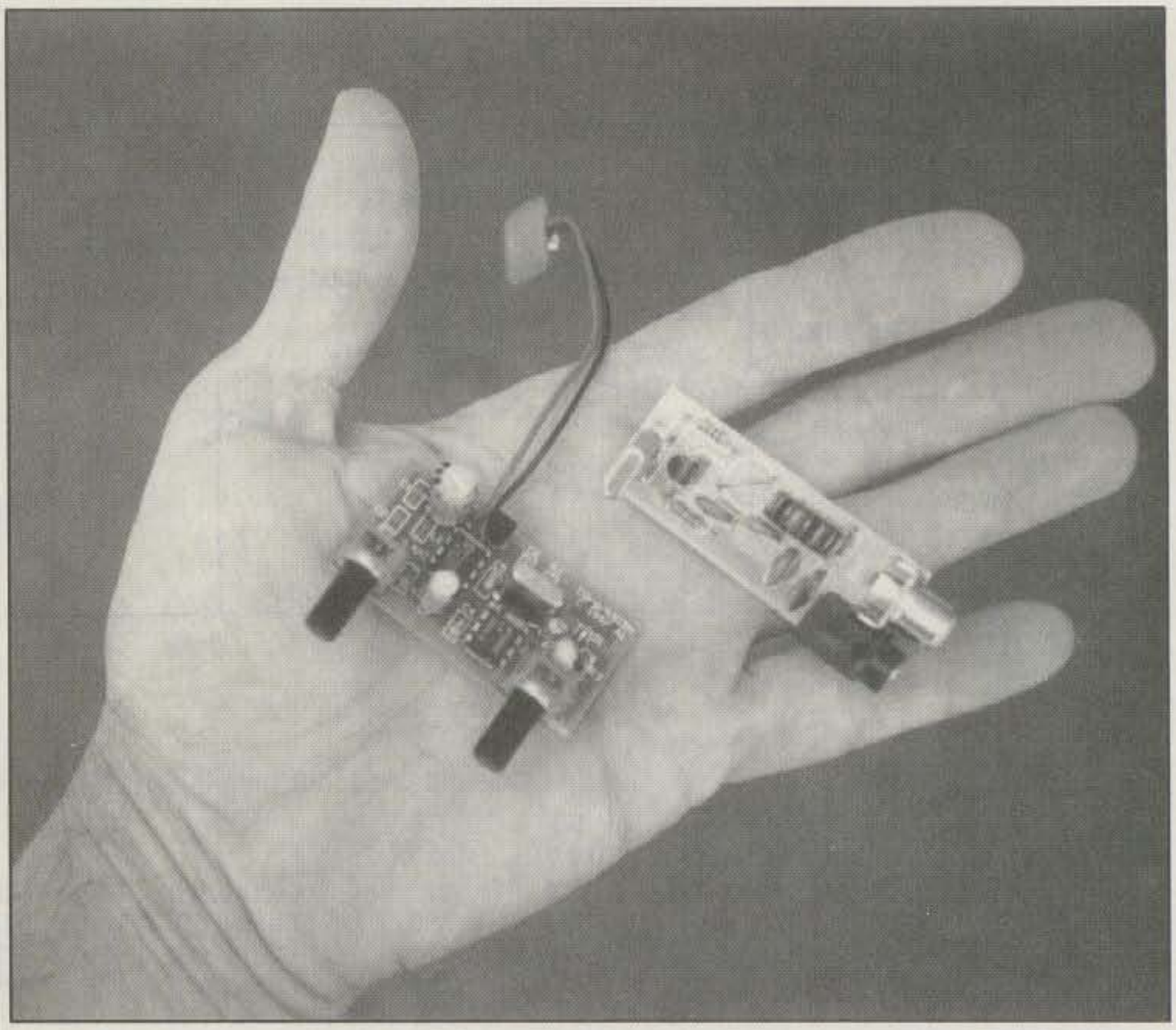
Band (m)	C1 (pFd)	C3 (pFd)	C4 (pFd)	L2	Inductance (uHy)
20	270	270	270	12 turns #28 or #30 on T-50-2 core	.720
30	330	330	330	13 turns #28 or #30 on T-50-2 core	.980
40	470	470	470	16 turns #28 or #30 on T-50-2 core	1.280
80	750	750	750	34 turns #30 or #32 on T-50-2 core	5.780

Fig. 2– Circuit diagram of my Micronaut transmitter illustrating possible areas of expansion for transceive operation with K8IDN's MRX receiver (see text).

pFd and 4.7 µHy. These quickly selected values are probably not optimum, but they work well.

Overall performance of K8IDN's MRX is very good, even when using a random wire for on-the-spot monitoring. It's a fun project you will enjoy using and a neat traveling companion. Congratulations, Steve. You produced a winner!

Several QRPers have stated K8IDN's MRX-40 and my Micronaut seem like miniature equivalents of those dear little two-stage receivers and one-tube transmitters they started out with in years past. The analogy is indeed striking. However, saying such probably will kindle questions such as "Can the Micronaut be modified for more output?" and "Can the two units be interconnected for single knob tuning?" Available time for investigating those possibilities has been very limited, but here are my notes thus far (refer to fig. 2). Operating/collector voltage for the Micronaut can be increased to 9 or 12 volts, and the emitter resistor can be reduced to between 120 and 70 ohms. These steps will raise output into the 100 to 350 milliwatt range (ideal for QRPp on 30 meters!). Directly wiring a second PN2222 in parallel with the Micronaut's existing PN2222 then will help avoid overheating (reminds you of the way we used to "push" those metal 6AG7 and 6L6 tubes, doesn't it?). Interconnecting the MRX and Micronaut for transceiver operation is a bit more chal-



An HF station in the palm of your hand! The lower unit is K8IDN's MRX receiver, while the upper unit is my Micronaut transmitter. Both are readily available in quick-brew kit form. (Details in text.) Using this handheld combo parallel connected to a 9 volt battery and a Delta Loop for transmitting, plus a dipole for receiving, I worked a station in Virginia and one in the Caribbean. A little QRP goes a long way!

lenging. A frequency injection signal for the transmitter can be tapped off the junction of R2, C6, and pin 7 of the receiver's NE-612, but its level is extremely low and needs a boost. The transmitter's crystal and 4700 ohm resistor can be removed, and the NE-612's injection signal fed through a 50 pFd capacitor to the PN2222's base for buffering. Output from the collector then could be fed through the (existing) .01 mFd capacitor to the base of an amplifying transistor such as a 2N3866 or 2N3553 wired "ugly construction style" on the Micronaut's board (fig. 2). Finally, a 22 pFd capacitor and two "back to back"-connected IN914 diodes should provide good T/R switching with full break-in operation. Note that I said "should" in the previous statement. I have successfully used that capacitor and diode scheme with several QRP projects, but have not yet tried it with an NE-612. Be sure you have an extra NE-612 on hand in the unlikely event it gets RFed. You asked for more homebrew and small projects, so dive in and have fun!

At this point, some folks are probably wondering if a "transceiver-version Micronaut kit" might become reality in the near future. Maybe, maybe not. Steve and I mentioned it once very briefly, but we are still pondering the idea. What's your opinion? I originally devised the Micronaut as a hot-sauce or grapefruit powered fun project, and encouraged everyone ordering a kit to be creative in trying other power sources. One Microwatter said that he planned to couple a tiny DC motor to the rotating shaft in his hamster's running wheel to make a pet-driven generator for the transmitter. Another chap planned to use a miniature steam engine that was heated by candles and turned a slot car motor to power the transmitter. That's the idea, gang!

Yes, I still have Micronaut kits available. They are $15 plus shipping ($2 regular, $3 priority mail). I include a crystal for 80 meters/3.58 MHz; you supply a crystal on your preferred frequency for 40 or 30 meters. My address is 4941 Scenic View Dr., Birmingham, AL 35210.

In answer to that elusive question of what will future Micronauts be like, I can only say that like the original version, they will be unique. In the corner of my mind I visualize a MARK III version two-transistor transceiver and a MARK IV version transceive adapter to slip into a car's tape deck. Stay tuned! The QRP fun is only just beginning!

73, Dave, K4TWJ

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AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

The USA-CA rules pertaining to National Parks and Independent Cities were amended several years ago. National Parks cover wide geographical areas and are not really part of any county's territory. Therefore, a mobile transitting in a National Park is not in any definable county.

Independent Cities were created when the voters of a particular geographical area decided to politically separate themselves from a particular county. This took place in Virginia when 42 independent cities were created, and in Nevada when Carson City became an independent city. Many years ago it was determined that if a fixed station located in, or a mobile station passing through, one of these independent cities was contacted, the station contacting that station could **choose** an assigned county to claim for credit toward *CQ*'s USA-CA Awards. However, once the station **chose** a county, it could not subsequently claim another county. For example, mobile station K1ABC/M is passing through the independent city of Alexandria, VA. W2XYZ (fixed station) in New York completes a valid contact. The fixed station (W2XYZ) has a choice of claiming Arlington or Fairfax County. He chooses Arlington. W2XYZ may not subsequently contact another station in Alexandria and choose Fairfax County.

It was impossible for those checking the USA-CA Record Book to ensure that the applicant had not violated this rule. Therefore, several years ago it was decided to amend the rules and not allow any contacts from an Independent City. This had the unintended consequence of disenfranchising amateurs who happened to live within the Independent City.

In reviewing what can be done to correct this situation, four options are being considered. Each has advantages and disadvantages. They are as follows:

1. Revert to the old rule and permit contacts to count for one of the counties.
2. Leave the revised rule in effect.
3. Assign each Independent City to a county.
4. Make each Independent City a county.

There has been a spirited debate on the County Hunters World Wide Web Page maintained by K3IMC and W4GP at <http://www.delve.com/ch> (for those who have access to the Web).

We are soliciting comments from amateurs and will make a decision by the end of the year.

Box 76, Pleasant Mount, PA 18453
e-mail wa3rty@epix.net

SPECIAL HONOR ROLL

Roger Purdy, W2NWL
USA-CA # 924
May 11, 1997

Robert J. Cyr, N1HHW
USA-CA # 925
May 15, 1997

Awards Issued

USA-CA 500: Roger Purdy, W2NWL; Mauro Pregliasco, I1JQJ; Roland Raystal, SM6OLL; Brian E. Bayus, N1KC.

USA-CA 1000: Roger Purdy, W2NWL; Robert J. Cyr, N1HHW.

USA-CA 1500: Roger Purdy, W2NWL; Robert J. Cyr, N1HHW.

USA-CA 2000: Roger Purdy, W2NWL; Robert J. Cyr, N1HHW.

USA-CA 2500: Roger Purdy, W2NWL; Robert J. Cyr, N1HHW.

USA-CA 3000: Roger Purdy, W2NWL; Robert J. Cyr, N1HHW.

Awards Available

The ZS4BFN Award. The Bloemfontein ARC of South Africa offers this award to both amateur radio operators and SWLs. Applicants must show proof of six two-way contacts with the Bloemfontein ARC (5 contacts with members and 1 contact with the club station, ZS4BFN). Contacts on all bands and modes after 1 July 1996 are valid.

Send a list of contacts made, certified by two other amateurs or SWLs, plus 2 IRCs to the club address: Bloemfontein Amateur Radio Club, P.O. Box 6673, Bloemfontein 9300, Republic of South Africa.

Transmitting members are: ZR4DLR, ZR4MS, ZR4N, ZR4TR, ZR4VR, 7P8RP, ZS4AAD, ZS4AJ, ZS4AZ, ZS4BS, ZS4CW, ZS4DG, ZS4DR, ZS4HG, ZS4IQ, ZS4JBC, ZS4JM, ZS4KN, ZS4KV, ZS4LS, ZS4MB, ZS4NIC, ZS4PE, ZS4RP, ZS4TB, ZS4TV, and ZS4XG.

The ZS4BFN Award is offered by the Bloemfontein ARC of South Africa.

HONOR ROLL

500
W2NWL.....2969
I1JQJ.....2970
SM6OLL.....2971
N1KC.....2972

1000
W2NWL.....1440
N1HHW.....1441

1500
W2NWL.....1201
N1HHW.....1202

2000
W2NWL.....1105
N1HHW.....1106

2500
W2NWL.....1033
N1HHW 1034

3000
W2NWL.....940
N1HHW.....941

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.50. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

CQ European YL Award. *CQ Radioamateur*, the French-language edition of *CQ*, offers an award for confirmed contacts with Young Lady (YL) stations in Europe and France. The program is open to radio amateurs and shortwave listeners worldwide. All contacts must be made after May 15, 1995. Contacts must be made from the same country. There is no band or mode restriction. To obtain the award, the applicant must have confirmation of contacts with at least 20 YL stations throughout Europe; at least one contact must be established with a YL station transmitting from France. A joker contact may be included for a European YL station operating outside of Europe during a DXpedition. The operation must be temporary in this particular case.

There are four classes: CW, SSB, RTTY, and Mixed modes. Contacts using terrestrial relays are not admitted.

Award submission should contain a list of contacts made, certified by two licensed amateurs or by a national awards representative, and include date, time, band, mode, callsign and name of the YLs contacted. The processing fee for the award is 20 FF or $4 for subscribers to the US, Spanish, or French editions of *CQ* (please

The EU-YL Award is sponsored by CQ Radioamateur, *the French-language edition of CQ magazine.*

enclose your most recent *CQ* mailing label or a copy); and 50 FF or $10 for nonsubscribers. All applications should be sent to CQ Radioamateur, P.O. Box 76, 19002 Tulle Cedex, France.

The Worked All New England (WANE) Award. Sponsored by the Port City ARC, this award is open to all amateurs. Applicant must show proof of having consucted two-way communications with another amateur station in at least 50 counties comprising New England. Phone, CW or a combination of both modes on any frequency are acceptable. Contacts with mobile stations are *not* valid. Stations must be permanent or portable. Repeater contacts are *not* valid. US contacts must be made from the same county. Contacts from outside the US must be made from the same country. All six New England states must be represented.

QSL cards or a GRC list signed by two other amateurs in good standing will be accepted as evidence of this achievement. Stickers to be attached to the certificate will be awarded for contacts with 62 and 67 counties.

There is no charge for the certificate. However, return postage for QSLs submitted by the applicant must accompany the QSLs. Also, include one of your QSLs for the club files.

Applications should be sent to WANE Award Manager Stella Lapanne, KC1MX, 460 Sherburne Road, Portsmouth, NH 03801.

Polish Tatras – Zakopane Award. This award is sponsored by the Zakopane Radio Club of Poland. The aim of the award is to promote the Tatra Mountain region and the town of Zakopane, Poland. To obtain the award you must obtain 5 points in some combination of the following: stations SP9KGG, SPØKGG, or 3Z9PT 5 points; a member of the Zakopane Radio Club 2 points; remaining stations in Zakopane 1 point; and expeditions to the mountains 3 points. Contacts after 1 January 1995 will be recognized.

Cost of the award is US$5 or 7 IRCs. Applications should be sent to Zakopane Radio Club, SP9KGG, P.O. Box 88, 34-500 Zakopane, Poland.

73, Norm, WA3RTY

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Meteor-Scatter Communications

August tends to signal the beginning of the meteor-scatter season. The last embers of summer sporadic-*E* communication are making their appearance. After we weak-signal VHF+ enthusiasts have whetted our appetites for exotic communications on the lower VHF+ bands, we are now looking for something else to pursue. The *Perseids* meteor shower provides that something to keep us going for yet another month.

The Sky is Falling!

What is it about meteor showers that provides that interest? Well, meteor scatter is probably one of the most exotic forms of propagation on the VHF+ frequencies. Most people's interest in meteors follows this example:

John and Myrtle are in the backyard on a hot summer night. They are sucking on their ice teas and looking at the sky. Suddenly Myrtle sees a meteor and exclaims, "Look, John! A shooting star!" John responds in a bored tone, quoting Chicken Little's line from the children's story, "Yeah, the sky's falling." The trouble is that like often-quoted *Bible* verses, Chicken Little's line is out of context. What happened to her was that something fell out of a tree and hit her on the head and she wasn't the same throughout the rest of the story. Plus, all this took place in the daytime! I'm getting away from the subject, though.

The word *meteor* is from the Greek *meteoron*, meaning "phenomenon in the sky." After John and Myrtle finish their ice teas, they go inside and flip on the 11 o'clock news. Halfway through the newscast the weather person, or meteorologist, tells the viewers that they might see some "shooting stars" tonight. Hmm, there's that word *meteor* again; the *meteorologist* is so named because of his or her study of the "things in the sky." The meteorologist reports that these shooting stars are appearing as part of the *Perseids* meteor shower, which occurs annually about this time of the year. That piques John and Myrtle's interest and they run outside again. Sure enough, they see a few more meteors.

Well, that about does it for bored John. He goes back inside and flips on the *Tonight* show and falls asleep. Myrtle, on the other hand, is a bit more interested. The next day she goes to the grocery store. As she peruses the magazine rack, looking for the latest edition of *Soap Opera Digest*, her eyes happen upon the lone remaining *Sky and Telescope*. She sees the cover filled with a picture of—you guessed it—meteors. She passes up the soap opera magazine in favor of *S&T*, telling herself that she might just learn something new for a change.

The next thing Myrtle knows is that she's on the Internet looking up meteors on home pages. She discovers the International Meteor Organization's excellent home page at <www.imo.net>. Then she discovers links to meteor organizations all over the world—and even to amateur radio special-interest groups. Soon she discovers the wonderful world of amateur radio, gets her license, and makes her first meteor-scatter QSO. Meanwhile, John continues his life of boredom and reruns of *Married With Children*.

Well, I admit that the latter half of my fictional account is a bit far-fetched. Even so, if Myrtle had gone on in her pursuit of her new-found interest in meteors, she would have discovered what makes up a meteor, where it is in the sky, and why it glows. She also would have discovered the meanings to the following words: *meteoroid, meteorite,* and *perihelion*.

Let's start at the beginning of Myrtle's discovery. Meteor showers are principally caused by debris discharged from comets as they make their way around their orbit. Most of the debris, consisting of sand and small pebbles, is expelled when the comet grows a tail as it moves to its closest point to the sun. That is called the *perihelion*. This debris tends to travel in orbit both ahead of and behind the comet. When the Earth travels close to the orbit of a comet, it can run into or cross through this debris, thereby creating a meteor shower as the debris enters the Earth's atmosphere. A meteoroid is that grain of sand that hasn't yet made its spectacular entrance into the Earth's atmosphere. When it does, at around 60-70 miles (96–112 km), it is speeding into it at around 160,000 mph (260,000 km ph). All that speed strips away electrons both from the grain of sand and the ionosphere. The result is ionization. And, depending upon what makes up the grain of sand, the ionization takes on a particular color. For example, silicon appears red, magnesium appears blue-green, calcium appears violet, iron appears yellow, and sodium appears orange-yellow.

In their wake, an ionization trail appears, like a cloud. This ionization is either overdense or underdense, with the overdense area being in the central part of the cloud. And it is frequency sensitive. As the ionization decays, the underdense area expands at the expense of the overdense area. During this ionization, signals hitting the underdense area pass through it. However, signals are refracted off the overdense areas. Depending on the denseness of this area, higher and higher frequency signals are refracted. Yet as this overdense area is disappearing, the maximum usable frequency (MUF) of the ionized cloud is falling. Eventually, the MUF falls out altogether as the ionosphere returns to its pre-ionized state. And because of the recombination of the electrons with atoms, the ionization disappears. It's during this brief moment of ionization that we get our adrenaline rush while we complete the previously impossible QSO.

It is important to note that the denseness is frequency sensitive. What may be "underdense" at one frequency, may also be "overdense" at a lower frequency.

Meteors are usually harmless—unless they are large enough to make it to the surface of the Earth. Then they become known as meteorites. Every once in a while there is a news report of a meteorite which crashes through someone's roof. However, most of the time meteorites are harmless grains of sand which hit the Earth's surface without notice.

Sometimes a meteor can explode. When it does, it can appear to be a fireball. (This is probably what the Pakistani airline pilot observed one evening off the coast of New York after the TWA Flight 800 crash.) This can happen as a normal course of it flying through the ionosphere and breaking apart, or it can happen if an upward bolt of lightning strikes it. The propagation caused by that phenomenon is usually much longer and more intense.

Some (namely Gordon West, WB6NOA, and *CQ VHF* columnist Tim Marek, K7XC) have reported to me of "hearing" the meteors. What they report is a hissing sound. If a meteor explodes, they report the sound of its explosion. Some say that the hissing sound has to do with low-frequency radiation intermingling with the atmosphere, causing a sort of audio

VHF PLUS CALENDAR

August	2–3	ARRL UHF Contest. *(See text for details.)*
August	3	New Moon. Poor to moderate EME conditions if you can find the moon.
August	7	Moon Apogee.
August	10	Very poor EME conditions.
August	11	First quarter Moon.
August	12	Predicted peak, *Perseids* meteor shower peak.
August	14	Lowest Moon declination.
August	16–17	First weekend of ARRL 10 GHz and above contest. *(See text for details.)*
August	17	Poor EME conditions.
August	18	Full Moon.
August	20	Moon perigee.
August	24	Last quarter Moon. Moderate EME conditions.
August	27	Highest Moon declination.
August	31	Moderate to good EME conditions.

P.O. Box 73, Oklahoma City, OK 73101
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rectification of the signal. In the case of the fireball, it may sound like rumbling, like thunder. If you are hearing that sound, it's because the shock wave has penetrated all the way through the atmosphere to within your hearing range.

Background of the *Perseids* Meteor Shower

For a long time it was thought that the *Swift-Tuttle Comet* was the originator of the debris that makes up the *Perseids* meteor shower. However, because the comet's orbit is so long (around 129+ years), no one knew for sure.

An astronomer, Dr. Brian G. Marsden, who works at Harvard University's observatory, wrote an article entitled "The next return of the comet of the *Perseids* meteors" which appeared in the September 1973 issue of *The Astronomical Journal*. This article examined historical sightings of comets and tied them to a prediction of the return of the *Swift-Tuttle Comet*. In the article Marsden actually made two predictions in one when he stated: "The point is, of course, that if the comet has not been found before late 1983, it would certainly be desirable to start thinking about searching . . . in 1992 . . . "

What happened was that during his research, Dr. Marsden tried to make a comet sighting in 1748 "fit" with the comet sighting of 1862. Finding that there were flaws in this assumption, he went back to a comet sighting in 1737 (the *Kegler Comet*). In order to predict the 1992 sighting, he assumed that since the 1737 sighting was 11 years earlier, the next sighting would be 11 years later than a possible 1981 date. Yet, he left the door open for discussion by saying: "Our procedure for forcing the linkage of the 1737 and 1862 observations is certainly open to question, and these resulting 1992 predicted elements are consequently somewhat uncertain." This "hedging his bet" caused Marsden to be somewhat indifferent about the September sighting until he remembered the tremendous activity reported by amateur radio operators, and in particular Shelby Ennis, W8WN, who sent reports to *Sky and Telescope* following the 1991 *Perseids* meteor shower.

In an article that appeared in the January 1993 issue of *S&T,* Marsden discussed the possibility of the comet hitting the Earth in the year 2126. Such speculation has given rise to recent films and a PBS television special on asteroids hitting the earth. But that's another subject.

Within that article Marsden reviews his reservations about his own prediction, but upon examination of Ennis' reports, he remarked: "Maybe the comet really was coming!" Another astronomer—an amateur, Joe Rao, who has observed the *Perseids* since 1966—also took notice of the amateur radio operators' reports. Following my article in August 1992 *S&T* (on "listening to" the *Perseids*) Rao contacted me to find out more about the way meteors affect propagation on the VHF+ frequencies. Being assured that there was a tie-in between the increase in visual observation and the increase in radio wave propagation, Rao set about to see what were the implications for shower activity should the comet actually be sighted.

Following the September sighting of the comet, Rao examined Marsden's orbital data which appeared in the *Astronomical Journal* article and calculated that the orbits of the comet and Earth may come within 100,000 miles of each other. With clumps of debris being contained in knots as big as 100,000 miles in diameter, Rao concluded that we might graze one of these knots. However, not being totally satisfied with his own calculations, he took his findings to Marsden. Marsden calculated that the orbits might be as close as 93,000 miles.

Rao then took his findings to another astronomer, Dr. Donald K. Yeomans, who, as an employee of the NASA's Jet Propulsion Laboratory, is interested in meteors from an outer space survey standpoint. Yeomans, in turn, calculated that the rendezvous may be as close as 87,400 miles, thereby putting us well within the realm of a close encounter with the knots of debris.

Because the comet has been recovered (a comet is "recovered" when, after being lost for a period of time, it is again sighted), Rao concluded that the visual increases in *Perseids* activity since 1988 (and the radio wave propagation increases since 1991) can be attributed to debris expelled ahead of the comet. As the comet has proceeded through its orbit, the debris ahead of it also has proceeded through the same orbit. Now that the comet has gone beyond the Earth's orbit, Rao concluded, "It is quite possible to expect that, in view of the very small distance between the Earth's and comet's orbit, we may very well encounter dust that was released as recently as 1737, and 'maybe' even 1862!"

In 1993 Rao predicted that that year's *Perseids* would be a storm. In order to reach that conclusion, Rao examined the *Perseids* dis-

plays for the years surrounding the previous return in 1862. He found that the Far East reports showed increases in *Perseids* displays for the years 1861 and 1862. He then examined a report made by William F. Denning, a devoted meteor observer. Rao found that Denning had observed that the 1863 display produced a rate of three to four times the normal maximal *Perseids* rates. Rao then examined the work of S. Herschel, another noted meteor observer. He found that Herschel, commenting on the *Andromedid* meteor storm of 1872, compared it favorably to the *Leonids* storm of November 1866 and the marked maximum of the *Perseids* shower of 1863.

Using the regularity of meteor storms (every 33 or so years) associated with the *Leonids* shower as a model and the fact that this regularity closely follows the periodicity of the *Temple-Tuttle Comet,* the parent of the *Leonids* shower, most astronomers theorize that there is a knot (or knots) of debris in close proximity to the comet. Incidentally, the *Temple-Tuttle Comet* was recovered earlier this year. Perihelion is predicted early next year with a storm predicted for the annual reappearance of the shower in November. More coverage on this shower will be in the November column.

Applying this theory to the *Swift-Tuttle Comet*, relating the intense increase in radio propagation activity of the *Perseids* during the 1991 and 1992 showers, and noting that the comet's passage by the Earth's orbit has occurred only 224 days before for these orbits nearly intersecting, as compared to 332 days for the 1862 orbits, Rao concluded that there existed a high probability for a storm for that year's *Perseids* display.

In analyzing the probability of a storm, one other aspect Rao considered was the ability of the comet to continue to produce debris. An excellent measure of its ability is its brilliance. Rao's research led him to discover that contemporary comet expert John E. Bortle has noted that the *Swift-Tuttle Comet* is ". . . 4 to 10 times brighter than the average long-period comet."

So what happened to the predicted storm? Well, it was not "storm" levels. To be considered a storm the ZHR rate should be in excess of 1000. However, a good show did occur, but in the high latitude, and then mostly over Europe. Rao, who had booked passage on a cruise ship which was in the Mediterranean, witnessed quite a visual display.

The consensus of those amateurs who played in the *Perseids* meteor shower was that it did not live up to its advanced billing—not in the least. Nevertheless, it was a good shower. Several stations reported completed contacts, and that is the importance of a shower—being able to complete contacts.

What was notable, and also pleasantly surprising, was the number of operators on the air during the days surrounding the shower. Reports from all over the country indicate that new and old operators alike were looking for contacts via the meteors. Perhaps this is an indication of the potential for populating the VHF+ frequencies. We who operate on them regularly can only hope so.

What is the prognosis for this year's *Perseids* meteor shower? The IMO makes this observation on their home page:

"The *Perseids* have become the single most exciting and dynamic meteor shower in recent times, with outbursts producing EZHRs [estimated zenith hourly rates; the amounts of meteors falling during the peak, based upon an hour's time] of 400+ in 1991 and 1992, around 300 in 1993, 220 in 1994, and around 160 in 1995 at the shower's primary maximum, which this year is expected to fall around 0600 UTC on August 12. The peak may be encountered up to four hours before this time, however, judging by past variations in the densest stream core. The return of the *Perseids'* parent comet *Swift-Tuttle* in late 1992 was almost certainly responsible for producing these recent outbursts, although the material was probably laid down at the comet's previous perihelion passage, in 1862. Whether the moon-free 1996 *Perseid* peak will continue the decreasing trend in the primary maximum's rates remains to be seen as this is written, but conditions are reasonable for trying to cover the 1997 event, as the waxing gibbous [first quarter] Moon will set soon after midnight for most northern hemisphere observers on August 12, by when the shower radiant will be at a very healthy elevation. Europe or the eastern seaboards of North America should be the places to be, if the shower's primary peak keeps to time. The 'traditional' maximum is expected around 1800 UT on August 12, well-placed for sites in the Far East and eastern Asia particularly.

"Visual and photographic observers should need little encouragement to cover this stream, but telescopic watching near the main peak would be valuable in confirming or clarifying the possibly multiple nature of the *Perseid* radiant, something not detectable visually. Video observations would be very helpful in this respect, too. Radio data would naturally enable early confirmation, or detection, of a perhaps otherwise unobserved outburst if the timing proves unsuitable for land-based sites. The only negative aspect of the shower is the impossibility of covering it from the bulk of the southern hemisphere."

Making Contacts Via Meteor Scatter

While earlier illustrations indicate that contacts made during previous storms were "nearly normal" in that the operators were able to copy each other for periods of 2 to 3 minutes at a time, contacts attempted via meteor scatter are much different in structure.

During a meteor shower, random contacts are often possible. One station will call a very brief CQ and listen for a response. A station hearing the first station will call that station, give his callsign and either his grid locator or a signal report. The first station then announces the calling station's callsign and gives the responding grid locator or signal report. The second station responds by saying "Roger" several times. The contact is considered complete if both parties have all they need for the QSO. The entire contact may take as little as 10 seconds to complete, if that.

For most meteor contacts, however, a structured schedule is set between two stations who wish to talk to each other. If you set such a schedule, you'll probably run for half an hour. You'll transmit for 15 seconds and listen for 15 seconds. The westward station transmits first. Some operators break at the end of 7 seconds and listen briefly for the other station. Be sure to clarify operating procedures with the other station before beginning your sked. The initial exchange includes the other station's callsign

and your callsign, without either of you saying "this is."

For example, if I, in Oklahoma, grid locator EM15, were running with Ken Ramirez, N4UK, in EM84, I'd start by saying "N4UK N6CL" over and over again for 15 seconds. I would then listen for Ken to repeat "N6CL N4UK" over and over again during his 15 seconds of transmission time.

After one of us has heard "complete callsigns," the receiving station starts transmitting a signal report. So when I've heard both my call and Ken's call (in no particular order), I start repeating "S-2" during my 15 second segment, interspersing our callsigns—just in case Ken has yet to hear complete callsigns.

The signal report of "S-2," rather than the traditional "59," is a way of telling the listener the length of the burns being heard. The letter "S" stands for the word "signal" and the number 1, 2, or 3, stands for the length of the burn. Number 1 stands for "pings," number 2 stands for burns long enough to make a contact, and number 3 stands for very long burns at least 15 to 30 seconds in length. Therefore, a signal report of "S-2" means that the sending station is hearing the receiving station on burns long enough to make a contact. As a matter of convenience most operators stick with "S-2" much like HF operators stick with "59."

Assuming Ken has heard both calls and the signal report "S-2," he'll start saying "Roger, S-2," over and over again during his 15 seconds. Once I have heard "Roger, S-2," I reply with "Roger," over and over again. Once Ken has heard my "Rogers," the QSO is considered complete. As an option, Ken can come back and say "Roger, 73," repeatedly during his sequence. However, it's not necessary to complete the contact.

Occasionally, the sequence can be broken. For example, when I ran with Ted Goldthorpe, WA4VCC (now W4VHF), during the 1992 *Perseids,* I heard him give callsigns during the last 3 to 4 seconds of his 15 second segment. I immediately said, "WA4VCC N6CL. WA4VCC N6CL. S-2, S-2, break." Hearing me, Ted came back and said, "Roger, S-2. Roger, S-2, break." Continuing to hear him, I replied, "Roger, roger, roger, break." Hearing my "Rogers," Ted responded, "Roger, 73. Roger, 73. Break." I then replied "73, 73." At that point we both considered the contact more than complete just three minutes into the half-hour schedule.

Band Conditions

What band conditions can you expect during meteor showers? Unfortunately, it's not entirely possible to predict band conditions with certainty, especially considering what propagation modes may be present at that time (sporadic-*E*, tropo, etc.). However, some generalizations can be made based on past experiences. On 12 meters it will seem like the band is open everywhere (on short skip) during the hour or so long peak. On 10 meters conditions will be much the same. If the storm is very intense, the same conditions that exist on 10 meters may also be present on 6 meters. On 2 meters stations may have propagation over a given path for up to a minute or so. On 135 cm propagation may exist for up to 5 seconds or more. Propagation on 70 cm may exist for a fraction of a second to a couple of seconds.

Books on Meteors

Meteors, by Neil Bone, is an excellent book released by Sky Publishing Corporation as part of their Sky and Telescope Observer's Guides series. For the radio amateur this book provides a great deal of insight into what a meteor is, and how the meteor and Earth collide to create the visual (and in our case, the electronic) observations we experience. The book gives a brief history of meteor studies and contains a season-by-season calendar of annual meteor showers and their characteristics. A few paragraphs are devoted to the amateur radio operator's interest in meteor-scatter propagation.

The International Meteor Organization's Handbook for Visual Meteor Observations, edited by Paul Roggemans and also published by Sky Publishing Corporation, covers meteor showers extensively. Included are historical anecdotes of both major and minor showers. I use this book almost every month when preparing my column for *CQ.*

For a copy of *Meteors,* send $18.95, plus $2 shipping and handling, to Sky Publishing Corporation, P.O. Box 9111, Belmont, Massachusetts 02178-9918. For a copy of the *Handbook,* send $18.95, plus $2 shipping and handling, to the above address. For your convenience, charge-card orders are accepted via the company's toll-free number, 800-253-0245, from 9 AM to 4:30 PM Eastern time, Mon.–Fri.

Top Ten List

It seems that everyone has a top ten list. Arliss, W7XU, is no exception when it comes to why you aren't making the meteor QSOs. Below is

his list, courtesy of the World Wide Web:

Top Ten List of ways to know this year's shower isn't up to par:

10. You've only made 1 of 30 schedules and it's already the 12th of August.

9. Your preamp really isn't blown; it just sounds like it.

8. You run the first half of a sked on the wrong frequency, but it doesn't make any difference.

7. You've just run six skeds without even a ping, and begin to wonder if your noise figure really does exceed your IQ.

6. Guys are calling you on the telephone to make tropo skeds.

5. Your best DX of the shower is a tropo contact on 144.200 MHz.

4. You go outside not to look for meteors, but to see if your antennas are still up.

3. You find yourself considering working the FMers on 144.138 MHz.

2. You start reminiscing about how the *Leonids* used to be a major shower, too.

1. You find yourself making top ten lists instead of working randoms.

Current Contests

The annual ARRL UHF Contest is scheduled for 2–3 August. The contest period is for 24 hours beginning 1800 UTC Saturday. There are several categories for entry. Scoring: Count 3 points for 222 or 432 MHz contacts, 6 points for 902 and 1296 MHz contacts, and 12 points for contacts on 2.3 GHz and above. Exchange is your four-digit grid square. Pins again are availabile this year. The minimum number of contacts necessary for a pin is five. Submit your log by 3 September to the League to be eligible for awards. What is new this year is that the Rover scoring is like the Rover scoring for all other ARRL VHF contests. For complete rules, see July *QST*.

The dates for the first weekend of the eighth annual ARRL 10 GHz cumulative contest are 16–17 August (the second weekend is 20–21 September). The operating times are 8 AM to 8 PM, *local* time each day. The exchange is the *six-digit Maidenhead grid locator. Scoring is addin*g the sum of the distances in *kilometers* of each station worked to the sum of each unique callsign worked multiplied by 100. For example, if you work four unique stations (two of which operated from two separate locations) that are 97, 107, 154, 205, 157, and 147 km apart (for a total of 867 km), then your final score would be 1267 (867 + 400). To be eligible for contest awards, submit your log by 21 October. Remember, the contest includes all bands, from 10 GHz and above. Plus there are two entry categories from which to choose: 10 GHz only and 10 GHz and up. For complete rules, see June *QST*.

Note: When submitting your logs to the ARRL, you may do so either in writing or by several electronic methods. Consult their rules for instructions on how to do so.

Remember, 31 August is the deadline for submitting your logs for the CQ WW VHF Contest. Please send the completed logs to me by that date in order to be eligible for scoring awards. If you need logs and/or entry sheets, send an SASE to *CQ* magazine headquarters right away. Do not sent your request to me, as I do not have them!

Rick Robinson, K1JRW, Silent Key

Ron Klimas, WZ1V, wrote the following obituary for Rick: "I was deeply saddened to learn that Rick Robinson, K1JRW, passed away June 14. Rick was 78 and had been undergoing cancer treatments for the past several months. Rick was one of the first VHFers to confirm 100 countries on 6 meters, earning DXCC Award #12. I'll best remember Rick for his friendly and helpful manner on the 'gentleman's band.' He was a vigilant watcher who was always glad to alert others to band conditions and share news of interest. This upcoming cycle won't be quite the same without Rick. The wake was June 17. Sympathy cards can be sent to his daughter, Ellen McKay, West Pelham Rd., Shutesbury, MA 01072.

Dave Batcho, N5JHV, adds the following: "I too will miss Rick. He was a stalwart 6 meter watcher and, in my mind, was kinda the east coast net control on 28.885 MHz [calling frequency] during the last cycle. He was always great about giving us westerners a heads-up and alerting Europe when we were hearing the video or other indicators. I'll really miss him on 28.885 MHz this coming cycle."

VHF-UHF DXpedition To Tunisia, 3V8BB

The following is from Maik Reckeweg, DJ2QV:

"From July 6 to July 18, 1996 the only licensed station in Tunisia, 3V8BB, was activated especially on VHF and UHF by Frank (DL8YHR), Maik (DJ2QV), and Heiko (DK3DM). The station 3V8BB is located in the small town of Bir el Bey, about 15 km southeast of Tunis (QTH locator JM56eq). In the first days we only worked with a 10-ele Yagi on 2 meters due to some problems with the customs in Tunis, but we put up 4×17 ele F9FT for 2 meters and a single 21 ele for 70 cm with a superb take-off from northwest to northeast after some days.

"Via tTropo it was no problem to work into whole Italy, the east coast of Spain, and Malta. The best DX on tropo was a QSO with IV3CER in JN66lc over 1066 km. Also HB9CQA in JN45mu was worked over a distance of 1021 km, and on his QSL he writes that he was just using 5 watts into a 5-element antenna.

"Via meteor scatter we made 131 QSOs using high-speed CW keying by a laptop with OH5IY Software and a DTR for recording. Reflections were usually quite good during the night hours and early morning. The ODX was a QSO with OZ1FDJ in JO65FR covering a distance of 2120 km.

"There was also the possibility to make a few QSOs via ionoscater. On July 7 we worked five stations from south of Germany (JN58) with a quite good signal over a distance of around 1250 km. Unfortunately there was no sporadic-*E* during our expedition, but we had two good FAI openings, one of them via the scatter point above Geneva, where we worked stations from I1, I2 , I5, and EA3, and another weak opening via Budapest scatter to LZ (KN32, KN33). As EA3ADW told me (5/97) he was beaming to Rome JN61 during our FAI QSO, so the scatter point was possibly somewhere over northern Sardinia or eventually some scattering at

Corsican Mountains took place. The signals from EA3 were much weaker than from Italy during this FAI opening.

"We are very sorry for all stations who didn't manage to work us via EME. Due to some problems with our elevation rotator, we could only be QRV on moonrise and moonset, with a lot of QRM picked up from local sources. This is the reason why we only worked 10 QSOs off the moon during the whole expedition. In the end a total of 590 QSOs on 2 meters and 70 cm were logged, working 95 different locator squares in 24 different countries. We were also very active on shortwave, where approximately 7500 QSOs were logged, 90% of those in CW. In the end, we think that we gave really a lot of people the chance to work a new country and a new square.

"Further activities from 3V8 are planned by Frank, DL8YHR, especially for EME. The QSL information for VHF-UHF is via DJ2QV, while the shortwave cards are managed via DK3DM. We also wish to thank the German *Funkamateur* magazine for financially supporting the QSL cards.

"All QSLs which have been received directly have been answered the same way. The rest of the cards were sent out via the bureau at the end of 1996.

"News update (5/97): I got the information that the 4x17 element array which we left at 3V8BB was destroyed by a storm recently.

"The Tunisian PTT is planning to install more club stations in other big cities of Tunisia, so there is a chance to activate other locators in the future. So when do *you* go there? (I still need 3V8 as a new DXCC, hi !)"

Triple States Net

The following is from Ralph McDonouh, K8AN: The Triple States Radio Amateur Club (TSRAC) based near Wheeling, West Virginia has a goal to become the largest all-mode 6 meter contact net by the end of 1997. They meet at 9 PM EDT on 50.150 MHz for SSB, AM, and CW check-ins, and 51.150 MHz for FM. The net manager is John Ellison, KA8TSR. If you hear them, check into their net.

And Finally . . .

It's official. I'm now Reverend Joe Lynch. I was ordained a United Methodist minister on May 29. My friend Chip Margelli, K7JA, asked me if I lost my ability to be irreverent if the occasion warranted it, and I assured him that I could if I needed to be.

Don't worry about me becoming preachy and using this column as a pulpit, because as some of you have already figured out, I have been doing that for a long time now. I have tried to stand for what is right and true in our hobby. I have tried to encourage us toward fair play and respect for each other. And now that I'm officially a "reverend," I will continue to stand up for what I think is best for us as amateur radio operators and I will continue to "preach" appropriate messages from this "pulpit." Below is another one of my "sermons."

The Internet: Fire, Aim, Ready: There is something to be said about the good old snail mail (U.S. Postal Service) that cannot be said about the Internet. Generally, it forces one to take time between composing correspondence and sending it. Here's what I mean.

When you write a letter to someone, you have to take the trouble to either type it or write it. Then you have to find an envelope, look up the person's address, find some postage, and mail it. All of this takes time. Now why is this good? It gives you an opportunity to think about what you are writing and whether or not you want to send the letter after all.

With e-mail on the Internet, you compose, often on line, and when you are through writing what you are going to say, you hit the "enter" key and your mail is on its way. Pretty simple, right? Too simple.

Have you ever regretted hitting that "enter" key. I know I have. I have seen something that I didn't like on the VHF reflector and commented on it ("flamed" is the euphonium). Sometimes my comments have been directed at an individual. I have thought of how clever I was in my composition, only to regret it after I sent it out. There is something about the Internet that I discovered a while back: Once I hit that "enter" key, I cannot "unhit" it. It's too late.

I have a suggestion. I thought of this idea after reading a story about one of our presidents (I think it was Lincoln) who composed a scathing letter to one of his generals. The letter was discovered in his desk after he died. It had never been sent. Here is my suggestion. If you really think that you must compose something to someone, go ahead and do so. Then save it overnight before hitting that "enter" key. The next day take another look at it, and if you really think that you should go ahead and send it, then you can hit the "enter" key.

See there. That sermon wasn't too bad, now was it? Until next month . . . 73, Joe, N6CL

BY BILL WELSH, W6DDB

BILL'S BASICS

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Onward and Upward—Part III

The first two parts of this article provide useful information regarding code, learning code, and keys. Readers are urged to read all four parts to obtain maximum benefit from this series.

Station Considerations

Location. Set up your station in an area with good heating, cooling, and lighting. Do not operate in a cold or damp area.

Desk or table. Once you have selected the best location for your station, obtain a large, sturdy table (or desk) to hold your equipment. The table can be metal or wood. If it is metal, ground it to the station ground point at the transmitter's ground stud. The top surface must be large enough to leave plenty of operating room after the equipment is positioned for use. The only way you can send correct code with a handkey is to have your elbow rest comfortably on the surface of the operating table. It sometimes helps to move a table a few inches away from a wall to let the major equipment overhang the back end of the table.

Lighting. Fluorescent lights can produce enough noise to drown out weak received signals. If you experience fluorescent lighting noise, it is advisable to conduct a light-by-light check to determine which ones create the most noise. If it is possible to do so, have the most troublesome lights in your home turned off while you operate. Most fluorescent lighting noise can be eliminated by using shielded (better grade) transformers. The newer RF energized fluorescent tubes can be an even worse source of interference than the standard ones.

Clock. It is handy to have a large, four-digit clock within easy view of the operating position or on the operating table. Clocks are built into some equipment. It is good to set the clock to Coordinated Universal Time (UTC), which is common to amateur radio operations throughout the world. Amateurs who work a lot of long-distance (DX) contacts commonly use only UTC on the air and in their records.

Headphones. It is extremely important to minimize any possibility that operation of your amateur radio station will disturb others in your home. One major step towards making your station operation acceptable is to use headphones instead of a loudspeaker. The station you are listening to or working on the air may sound great to you, but it is just noise to non-amateurs in your home. Code can have a very piercing quality that penetrates walls, floors, and ceilings. The use of headphones provides the added advantage that of greatly improving an operator's ability to hear weak stations. There is also much less chance that an operator will be distracted from the signal being copied if he/she uses headphones to provide isolation from household and street noises.

45527 Third St. East, Lancaster, CA 93535-1802

Twelve-year-old Greg Koprowski, KF6BTR, lives in Northridge, California. This photograph was taken while he was operating one of the 1996 Field Day positions of the San Fernando Valley Amateur Radio Club (W6SD). Greg has a General license and he has passed the 20 words-per-minute Extra class code test. He is an "A" student in school, where he plays in two bands and an orchestra. Greg is also very active in church activities. This picture was taken and submitted by Greg's proud grandfather, who is F.O. (Matt) Mathews, K6MK.

It is best to get a very good set of communication headphones in the beginning, because it is one thing you most likely won't change, no matter how long you are an amateur. Good communication headphones have a limited (narrow) frequency range, are very sensitive to small input signals, have extremely effective ear muffs, and can easily be adjusted to minimize operator discomfort.

Equipment. Purchase the best equipment you can afford to buy. Experienced operators can achieve remarkable results even while using junk gear. However, newer amateurs have enough trouble achieving good results even when they are using excellent equipment. Good gear helps new amateurs realize good operating results, which keeps them interested in amateur activity.

Filters. If you intend to operate A1A code, use a 250 or 500 Hz filter. There is nothing to be gained from listening to a lot of QRM and QRN you do not need to hear. Narrow-band code filters are readily available, and easy to install. Using a good filter goes a long way toward making code operation much more pleasant.

Antennas. If you can do so, put up a good directional antenna such as a delta loop, quad, or Yagi-Uda. Do not convince yourself that you must erect an expensive directional antenna. There are many wire antennas (Windom, dipole, G5RV, etc.) and vertical antennas which can enable you to work stations all around the world. *CQ* contains many advertisements for amateur accessories and equipment. Simply stated, amateurs using antennas that are less than optimum can experience extremely good operating results when working amateurs who have very good directional antennas.

Coaxial Cable. Do not use poor coaxial cable. You can easily lose much of your transmitter's output power in heating of a lossy cable. Of more importance, a lossy cable can cause a weak received signal to be unreadable at your receiver. Thinner cables are easier to install, but they are lossier than larger diameter cables with the same characteristic impedance. If you have an excess length of coax, do not coil or leave it in your shack for possible future use. Just leave enough slack in each coax line to reach your gear with no strain and cut off the rest of the coax. Every inch of transmission line causes loss, and it is sensible to cut off unnecessary extra coax. When an extra-long coax transmission line is coiled, it has an inductive characteristic which can contribute to interference and antenna loading problems. If you want a detailed breakdown of coaxial cables, it is available from me for $2.00 plus a self-addressed, large envelope.

Writing Instruments. I advise you to get a good writing instrument to use when copying code. If you use a pencil, use a sharpened one with a number two (or softer) lead. If you use a mechanical pencil, computer lead should be used for copying ease. Computer lead is called "electrographic mark sensing lead," and it is available from major computer outfits. Copying code with a pencil or pen is called copying by stick. If you use a ballpoint pen when copying code, it should not be retractable, because that type of pen has some tip movement each time it is applied to (or removed from) the paper. This motion will slow you down, and it can reduce your code receiving speed. I believe the best code-practice writing instrument is the series of fine-line, felt-tip marking pens. Regardless of which kind of writing instrument you use, it should provide a dark (readable) mark with very little pressure required.

Mill/Typewriter. If you are serious about becoming an extremely proficient code operator, you should shift to using a typewriter at about the point where you change to a bug or keyer. There are special typewriters intended for use by code operators; these machines are called telegraph mills. It has been my experience that used typewriter shops sometimes have mills for

sale, and their price is usually quite low, since few people want them or know what they are.

Operating

Bands and Times. Fundamentally, the 10 and 15 meter bands are optimum bands during the day, even though both of them are not particularly good at this point in the sunspot cycle. Despite their present decreased usefulness, it remains advisable to try these bands during the day. The 40 and 80 meter bands are the optimum for long-range contacts at night, with minimum contact distances existing about noontime. Unfortunately, during the evening hours high-power foreign broadcast stations cause serious interference to 40 meter Novice band communications. Broadcast interference (BCI) can be avoided by using a narrow code filter (250 or 500 Hz) and selecting frequencies ending in 2.5 or 7.5, such as 7112.5 and 7127.5. The BCI occurs every 5 kHz—7105, 7110, etc.

Listening. It is important to check a band before you operate on it. Listen to find out which areas you are hearing. Make certain there is no station using the frequency you intend to use.

Tuning. After making a CQ call, tune about 2 kHz above and below your transmit frequency. If no reply is heard, repeat the CQ calling sequence. Do not hesitate to make CQ calls. It is more productive to make CQ calls than it is to answer them. Several amateurs may answer your CQ call, whereas you may be one of many amateurs answering another amateur's CQ call. If you make calls, you will get results.

Short CQ Calls. Do not use long CQ calls, because they reduce your chances of getting a reply. A series of brief CQ calls is more effective than a single long one. It is aggravating when the listener has to wait a long time for an amateur to finish his/her CQ call. The standard CQ calling sequence is CQ sent three times, followed by DE (from) sent once, and the sender's callsign sent three times. This 3 by 3 sequence is repeated three times and the invitation to transmit (K) is sent at the end of the third repetition of this sequence. Another popular sequence involves sending CQ five times, DE once, and the callsign once; then reduce the number of CQs by one and increase the callsign by one, sending CQ (4), DE (1), and the callsign (2). The third (last) call is CQ (3), DE (1), and the callsign (3), followed by the invitation to transmit (K). This sequence initially emphasizes that you are sending a CQ call, and it ends emphasizing the callsign. When a band is active, a single three by three call is usually all that is needed.

Same Frequency Use. If you are going to answer another amateur's general call to all stations (CQ), you should zero your receiver incremental tuning (RIT) control or turn off your RIT before you answer the CQ call. This should be done to make sure you will be on (or close to) the same frequency as the station calling CQ. If both stations are not on the same frequency, inadvertent interference (QRM) may occur when other amateurs find one of the two frequencies not in use while that amateur is listening and not transmitting. Your RIT may be identified as offset tuning (OT) clarifier, or some other similar name. Failure to have both stations operate on the same frequency is the major reason why man-made interference (QRM) occurs in a crowded band. If you do not zero this offset control, you are transmitting on a frequency different from the frequency of the station calling CQ. I commonly have stations answer my calls one or two kHtz off the frequency I am using.

Interim Summary. This completes the third part of this series. The next part completes this article and covers speed, accuracy, handkey use, RST reports, time, Phillips Code, Q Signals, multiple identifications, punctuation marks, contact data, work/ending signs, contests, names, practices, bad practices, QSL cards, QRZ? use, QRL? use, logs, and goals.

Photographs Wanted

Photographs of new members in their shacks provide introductions to a few of the newer licensees. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color or black-and-white pictures can be used. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

73, Bill, W6DDB

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

Solar Power and More!

So much to say and not enough space to say it in. We have several topics to cover in this month's "Packet User's Notebook," so I won't keep you waiting. The warm glow of the sun here in Virginia has given me a good topic this month. It's one which we've not discussed in a long time—solar power.

Before we get into the meat of the subject, however, there are a few other issues that we must first address. Several years ago—to be more accurate, about 12—I made it a point to keep the subject of this column centered around digital communications, and specifically packet radio. Since then some of my ideals have undergone change. Lately there are some self-appointed American packet radio "wanna-be authors" who feel that it is more interesting, however, to condemn, berate, and belittle our American ingenuity by ballyhooing about how great some packet system on the other side of this planet is.

Without giving any credit to these "wanna-be's" and Johnny-come-latelies, let it be known that we here in the USA are just as advanced as other countries in our state-of-the-art networking strategies. In truth, we have packet networks in this country that rival packet "systems" elsewhere on this globe. Note I said "systems." They are not true packet radio networks when they use landlines and non-amateur-related "worm holes" to complete a path. Most of our networks are real amateur-radio-based networks. I know first hand that some of our domestic packet radio networks are truly RF based and do not use landlines and other non-amateur-related "worm-holes" to complete paths and links.

Day In and Day Out, Night and Day

Our packet radio network here in the southeast (eleven states) is no different from many others across our country. On the SEDAN we enjoy 1000 mile contacts with our friends, on a regular basis, night and day. We've heard a lot about networks that run 19,200 up to 56 kilobaud, but have you experienced 9600 baud yet? Let me assure you, 9600 baud packet is not to be scoffed at. It will kick bootie any day—or night.

It is not only on the SEDAN. There are other networks that support long-haul 9600 baud backbones. It is no wonder that some "wanna-be" writers sing the praises of some network across the world. They're too busy reading some propaganda page on the Internet instead of getting on the air and operating real packet radio. Even worse, they've never taken the time to sit at the lab work-table and develop mods that make radios perform in a real-world 9600 baud "packet radio" environment. I'm not talking about a one or two watt tinker's plaything. I'm talking about a real kick-butt, 50 or 70 watt transceiver. Once these "wanna-be's" remove their heads from the sand and try *real* packet radio, in a *real* RF medium, they'll find there is a wonderful packet radio networking experience to be had right here in the United States.

211 Luenburg Drive, Evington, VA 24550
e-mail: buck4abt@inmind.com

The MFJ-1026 Noise Canceling Signal Enhancer.

Now For The "Good Stuff"

MFJ has just announced a new product that will turn your antenna into a directional receiving phased array featuring a 60 dB null which wipes out interference and noise. When you plug your station antenna into the MFJ-1026 Noise Canceling Signal Enhancer, your antenna system turns into a directional receiving array. You can place a null up to 60 dB deep on any type of noise and interference arriving from any direction and wave angle. The unit works on all modes (SSB, AM, CW, FM) and frequencies from VLF to VHF. You can change from null to peaking a signal at the push of a button and improve weak-signal reception.

The MFJ-1026 will wipe out all kinds of interference, including lightning from distant thunderstorms, power-line noise from arcing transformers and insulators, lamp dimmers, touch-controlled lamps, electric drills, motors, industrial processes, TV birdies, etc. You can also eliminate unwanted signals and expose hidden stations.

The MFJ-1026 is far more effective than a noise blanker. A noise blanker can't completely remove much stronger interference than your desired signal. It can't prevent overload by canceling noise before it gets to your sensitive receiver, and it can't peak or null signals.

The MFJ-1026 is better than a phased antenna. Your antenna and a MFJ-1026 in line can electrically "rotate the array" while the antennas remain physically stationary. You can adjust both direction and wave angle of null or peak.

It can be used as an adjustable phasing network. You can combine two antennas to give you various directional patterns and improve receiving signal levels.

The MFJ-1026 is very easy to use. It simply plugs between your transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push the reverse button. Use built-in active antenna or an external one. It has constant amplitude phase control. An RF sense T/R switch bypasses your transceiver when you transmit. It features adjustable delay time and uses 12 VDC or 110 VAC with the MFJ-1312B ($12.95). The unit is 6 1/2" × 1 1/2" × 6 1/4" and is priced at $139.95. The MFJ-1026/1025 noise-canceling devices come with MFJ's famous "no matter what" one-year unconditional warranty. MFJ will repair or replace the unit (at their option) for one complete year. For your nearest dealer or to order, call toll-free 800-647-1800, or fax 601-323-6551.

And Now . . . Solar Power

In my book *The Packet Radio Operator's Manual* (available from *CQ*) I cover in depth solar power and many other topics related to the application of alternative power sources. Solar power is truly a power source that we amateurs can use, and it is affordable.

Solar power is one means of alternative power that we can use to run our remote packet nodes, and even better, our home stations. Either way, we conserve energy by utilizing a power source that is there for the taking. Free electricity is another means of working Field Day on that remote mountaintop when you don't have a 10,000 watt, $3000 generator.

After the initial investment for the photo-voltaic panels, batteries, and regulators, you have arrived. Many times I've heard repeater operators complaining because they lost utility power or they've used the excuse "There is no power available at the site."

If the site is at a good elevation and there is ample sunlight, then by all means, there is available *power!* There is one task we must first perform, and that is the conversion of that energy

into a usable form of power. Power comes in different types and from many sources. The easy part is converting it into power that we can harness and use.

Although there are many kinds of energy sources—such as water, wind, organic, sunlight, etc.—for our discussion I will concentrate on the source that is most available to us on a daily basis. Converting the sun's energy is easy enough, and in the long run it is the most economical power source. If we go about the task of harnessing and storing this energy, we soon discover another benefit that we had not considered before.

Maintenance

In the day to day operation of my station(s) the solar system powers two HF (all-band, 100 watt each) transceivers, two VHF transceivers, and a UHF transceiver, plus five terminal node controllers (TNCs). So what's new? Well, here is the best part of all. The 800 amp, 14 volt battery bank and the four 4 × 4 foot solar panels have supplied these transceivers and TNCs with power for more than four years with no maintenance. Well, maybe I did go out to the solar-panel stand and wipe the snow or residue from the solar panels a couple of times. Also, it is important to make minor adjustments to the angle of the panels from summer to winter. And in the spring I readjust the panels upward from the southern angle I had set earlier for the winter solstice.

Many amateurs who visit my QTH ask if I have ever had to supplement the solar panels with a battery charger in order to have enough power to take me through overcast days. The answer is absolutely not! In fact, I have enough reserve power in the system to allow the use of the VHF transceivers 24 hours a day. The system has operated the transceivers and TNCs for up to six days without sunlight (overcast), and the system has stayed alive and run well.

Here atop a mountain in central Virginia we have an X1J4 node that has been running for almost five years. The only maintenance to the node has been to upgrade the EPROM in the TNC from X-1J2 to X-1J4 firmware.

What About Field Day?

Think about this for a moment: Solar power is not reserved for "fixed" use only. Field Day activity is one of the ways in which you can put this kind of energy to work and make extra contest points while doing so.

Building a solar-powered station, packet node, or even a voice repeater can become a useful, beneficial project. Try it for yourself, your club, or for the Local Area Network (LAN) and discover how easy it is to put this limitless source of "free" energy to work for you. This is one time you will feel the "rush" of great pride and accomplishment.

System Considerations

As my solar project here at this QTH gathered momentum, I discovered some unseen design drivers I had to consider. There are a number of components that go into the formula. Although there are not many items that make up the solar power system, there are items that are to be attached to your power supply.

Here is the first consideration the packeteer should look at when buying a power supply at the amateur radio store or at a hamfest. What size power supply (current and voltage) do I need to handle my transceiver, TNC, etc.?

Then there is always the contingent of add-ons that come later, so include some overhead for that requirement. In this case the new packeteer adds the demands of the transceiver, TNC, and an extra five amps for later expansion, etc.

If the transceiver is a 45 watt output unit, and the TNC is an ALL MODE device, the following numbers might apply.

Transceiver power requirements: 13 volts DC @ 9 amps.

All-mode TNC power requirements: 13 volts DC @ 1 amp.

Total power for both units: 13 volts DC @ 10 amps.

With the add-on power requirement(s) the current demand can go to 15 amps. If the user should add a 150 watt power amplifier, that power demand suddenly jumps by another 25 amps. We don't have to be rocket scientists to do the arithmetic that tells us we have approached a load requirement of 50 amps.

This same rationale is to be used when designing the solar energy system for a home station or a mountaintop packet node. When designing this system give yourself some "head room" so that you are not pushing the (solar) power supply to its limits. This could become

LED	Purpose/Status
PV Ready	Illuminates when the solar panel is emitting sufficient energy to charge the battery.
Analyzing	Illuminates when the controller has temporarily suspended the charging current to the battery. This is to allow proper chemical (action) mixing inside the battery, which in turn prevents cell damage. In 30 to 60 seconds the charging LED will re-engage.
Charging	Illuminates when full charging current is flowing to the battery.
Finishing	Begins a slow flash rate as the battery reaches full charge. As the battery voltage rises, the flash rate of the LED will increase. This can be used as an indicator to determine battery charge/voltage swing condition.

Table I– The definition and purpose of the four LED status indicators on the SUN charge controller.

the point where you suddenly find a need for more than just casual or routine maintenance.

Choosing The Solar Panels

There are absolute maximums that can be derived from solar panels of a given size. Keep the batteries away from the operating position and in a well-ventilated space. Do not set the batteries on a concrete floor or on earth/soil. A wood pallet or a support frame made from metal angles will suffice.

Use wire that is large enough and that has heavy insulation so current loss in the wire does not become a problem. If the batteries are located outside, it's a good idea to place them into some kind of ventilated enclosure to reduce terminal oxidation and for heat dissipation.

Another consideration is the type of battery being used. I selected the GEL-type Johnson Controls (Dynasty) lead-acid batteries mainly because this minimizes the degree of battery maintenance required. I found a source of large-capacity sealed batteries at VolTex Batteries Inc. in Doraville, Georgia. Chuck Beckham, N4XZV, ships batteries to many parts of the world, so the shipment to my Virginia QTH was not a problem.

Setting The Limits Of The Station Needs

There is a limit that must not—I repeat, "must not"—be exceeded. It is the sum of the power output from the solar panels, the amount of expected daylight, and the amount of "daylight" that is useful as direct sunlight. This is the power that charges the batteries. And just remember: You can never out-guess the weather—*never.* I've seen the system go for five days at a time without sunlight. Reserve power over extended periods is the driver to keep the system operating with little or no sunlight, up to seven days if possible. That number might make some folks cringe, but when it is possible to have a week without sunlight, the user soon learns (the hard way) that it is necessary to have as many days of reserve as possible in the (solar) power plant.

Putting It All Together

Tying this system together is not difficult. However, it is not something you undertake in one evening. There are some precautions which must be considered and applied before proceeding. A good resource and booklet of detailed illustrations for building your solar power plant is available from Fowler Solar Electric, Inc., 13 Bashan Hill Road, P.O. Box 435, Worthington, Massachusetts 01098 (413-238-5974). Not only is their catalog an illustrated order book, it is also a good starter or beginner's manual for solar power-plant design.

When using photo-voltaic (solar panel) devices that are designed to supply charging voltage for a large battery bank, remember this step first: 14-16 volt solar panels can sometimes generate voltages in excess of 20 volts direct current. This alone could cause damage to expensive electrical device(s).

The "Charge Controller"

The "charge controller" is usually the second item after the solar (photo-voltaic [PV]) panels and follows the first disconnect panel. This device can be the C30A charge controller by "TRACE," or the M8 by "SUN." In the following text I'll provide a simple description of the M8.

If the M8 is used, connect the "brown" wire to the battery negative (–) post and the "orange" wire to the positive (+) post. The manufacturer recommends using a 15 amp in-line fuse in the orange wire. The "red" wire is attached to the positive terminal of the solar panel, and the "white" wire is attached to the solar panel negative (–) lead.

If the Sun Selector M16 is used, it is recommended that a **25** amp fuse be used in the orange wire. The M16 is to be used when the charging currents are above 8 or 10 amps. The maximum charging current should not be 20% more than the rated device current-handling capability. There are four LED status indicators on the SUN charge controller. Table I defines them and describes their purpose.

We learned that the best precaution is to never connect a solar panel directly to the battery without a "governor" (charge controller) to maintain a prescribed level of voltage and current. Now that we have covered the battery considerations, it's time to look at the "load" application. Before the battery we inserted the "charge controller," which in reality protects the down-stream load (equipment).

"Load Disconnect" Equals Added Protection

In the system we've assembled here I added a second disconnect panel. Included in this panel are the fuses that are the watch-dog for other down-stream equipment. After the battery bank I've added another fuse and disconnect panel as further insurance for the system and to allow maintenance protection. Let's call the second disconnect the "load disconnect," as it will remove the load from the batteries while they are being charged to full capacity.

When the load is reconnected to the system it will be at optimum performance. Our load disconnect can also be used to provide protection for the battery(s) and other energy-conserving devices up-stream by preventing deep discharge that could cause permanent damage to the batteries.

Final DC distribution is achieved through the use of a multiple output Deluxe DC Distribution Panel (MFJ-1116, $44.95). Another reason I use this particular DC distribution panel is because it incorporates a 0-25 volt meter. This enables me to monitor the DC voltage at the operating position.

So without great fanfare we have built a digital store-and-forward station on a remote mountaintop where no manmade electrical power existed. *One final precaution:* When working with lead-acid or any other storage cells, it is a good idea to allow plenty of ventilation and vent harmful gases during periods of high charge rates. This is one reason why I use the sealed type (Johnson-Controls/Dynasty) batteries. These batteries have little or no gas emissions.

Equipment Sources

Sources for equipment referenced in this column are as follows.

Solar panels and devices: Fowler Solar Electric, Inc., 13 Bashan Hill Road, P.O. Box 435, Worthington, Massachusetts 01098 (413-238-5974).

DC Distribution Panel (MFJ-1116): MFJ Enterprises, Inc., 921 Louisville Road, Starkville, Mississippi 39759 (800-647-1800).

Batteries and accessories: VolTex dba/VBI Marketing, 14 Steve Drive, Doraville, Georgia 30340 (770-448-6021).

Glossary of Packet Terms

Once again we continue from where we left off last month with our glossary of terms.

SAREX (Shuttle Amateur Radio EXperiment): An educational program in which U.S. Shuttle astronauts communicate with classroom students using voice and packet.

Saturation: When related to packet radio, this definition refers to the absolute limit of traffic handling that a network of nodes will accept or handle. (Sometimes called "GridLock.")

Scattering: Diffusion of an electromagnetic signal as it passes through a transmission medium; the ultimate cause of signal loss with distance in fiber-optic lightpipes.

Serial Port: The part of a computer responsible for sending binary data in a serial fashion. Normally computers talk internally with parallel data signals—that is, all of the important bits for a block of information are sent at once. Serial communications uses only one wire which is toggled many times for a single block of information. Thus, a letter "A" might be sent in parallel all at once when it must be sent as a string of ones and zeroes in sequence in serial. The serial port usually consists of a single chip called a UART, a RS-232 driver chip, and a connector.

Signal-to-Noise Ratio: Ratio of the signal power to the noise power in a specified bandwidth, usually expressed in decibels. The smaller the ratio, the poorer the channel. Generally speaking, a ratio of 20 dB or more is a channel

subjectively "excellent" for voice, while broadcast television video requires 30 dB or more, but 1200 bps can function with only 12 dB, requiring greater S/N as the baud rate increases.

Simplex Digipeater: A digital store-and-forward node or digipeater is a regenerative digital repeater that receives a packet, verifies that it was received correctly, and if the packet is correct, retransmits it on the same frequency on which it was received. The node retransmits the signal only after confirming that the frequency or channel is clear.

Single Sideband (SSB): A form of amplitude modulation of a radio signal in which only one of the two sidebands is transmitted. Either of the two sidebands may be transmitted, while the carrier may be reduced or suppressed.

Slime Trail: In Net/ROM and TheNET nodes, transmitted node tables will sometimes show distant nodes that connect through it. The temporary node will be listed at the beginning of the nodes list and will show callsigns only, no aliases. This node list entry is called a "slime trail," because you can trace back to see the origin and route of the displayed node.

Slottime: In the persistence method of collision avoidance, slottime is the time delay before repeating the random number persistence calculation.

Space: The communications signal state corresponding to binary zero; represented as no current, no hole in paper tape, (usually) positive voltage. *(See also Mark.)*

Spread Spectrum: Fundamental to telecommunications, a method of transmitting radio signals as a very wide-band but low-powered signal that appears almost like noise. At the receiver all components of the desired signal are filtered from the noise and summed to recover a usable signal.

SSID (Secondary Station IDentification): The SSID is the specific number applied to the callsign of a digipeater or second, third, etc., packet station. It is most often used with nodes of the TheNET variety. In packet radio a callsign is normally used as an address. In applications where an amateur requires more than one address on the air at a time, the callsign may be used with an SSID. There are 16 different possible SSIDs, 0 through 15. An SSID is used when applied to a personal mailbox or PBBS by adding the dash-one suffix to the call. Most personal mailbox calls use -1 as the SSID—i.e., the packet mailbox of K4ABT is K4ABT-1. Examples of a few callsigns and SSIDs of K4ABT in central Virginia are:

K4ABT, user call of my home packet station.

K4ABT-1, mailbox call/SSID at home QTH.

K4ABT-2, (223.700 MHz) 9600 baud node at Big Island Mountain, Virginia.

K4ABT-3, (223.700 MHz >< 145.770 MHz) Gateway/Port SML mountain, Virginia.

K4ABT-6, (145.770 MHz >< 223.700 MHz) Gateway/Port SML mountain, Virginia.

K4ABT-7, (145.770 MHz) 1200 baud node at Big Island Mountain, Virginia.

K4ABT-9, (440 MHz) 9600 baud backbone node.

STA (Special Temporary Authorization): A special permit granted by the FCC to operate using a special application for experimental or test purposes. STA's also are issued to stations for use in applications that are not normally permitted or allowed.

Station: Any user location on a packet radio network capable of sending or receiving packet AX.25 transmissions.

Store-and-Forward: The process employed in nodes and digipeaters where a packet is received, processed, and retransmitted to the next node, digipeater, or destination station.

Stream: AX25 allows many connections to be made from several stations at the same time. Each connection is called a "stream." To test one's sanity, open more than one stream and allow two or more connections, and then carry on separate QSOs with each separately connected station.

Switch: Mechanical, electromechanical, or electronic devices for making, breaking, or changing connections in circuits.

Synchronization: Relating to packet radio, the function of terminal node controllers to reach equal clocking of data and recognized frames.

Synchronous: Having a regular time relationship between successive bits, characters, blocks, frames, messages, or other elements. Even so-called "asynchronous" data reaches synchronization during the reception of information bits for each character. A serial communications mode in which the data bits are sent in a continuous stream without character start and stop bits. The data stream is embedded with clocking bits for synchronization at the receive end of the circuit. AX.25 packet communications use synchronous data transmissions.

SYSOP, or BBS SYSOP: The person(s) responsible for the smooth operation of a BBS, including maintaining forwarding routes, redirecting misaddressed messages, and checking for illegal or improper messages. SNOs are not sysops. *(See System Node Operator.)*

System Node Operator (SNO): This is the person or persons who have software control responsibility for node (and digipeater) operations over specific node site(s).

Summary

Visit the SEDAN Packet Radio Networking Home Pages at <www.sedan.org>. And you can reach me at <BucK4ABT@inmind.com> or <K4ABT@SEDAN.ORG>.

Happy Packeting de BucK4ABT

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Being Competitive—Is It Strategy or Skill?

August's Contest Tip of the Month

Preventative maintenance is not in the vocabulary of most amateurs, but it is a critical success factor to contesters. Our sport doesn't allow the clock to stand waiting during a contest while we solder a gamma match connection that really needed attention during the summer. Don't waste an opportunity to solve problems before they happen. With summer temperatures at their peak, take the initiative to put that climbing belt on and ensure your scores are maximized this fall!

One of the most common questions asked of successful contest operators is "What is your secret?" There's a myth afloat that somehow an elite group of winners have found and wear the secret contest decoder ring and have *the knowledge of winning*. Fortunately, most experienced contesters have discovered that there really are no secrets. It may seem like an old adage, but success in any facet of life comes from hard work, dedication, and passion for what you do. However, my guess is that whether you're a world-class chess player or successful businessman, the same question is asked: "What is your secret?"

I know that my claim of *no secrets* is not acceptable to many of you, so if you must press, I'm happy to report this month on what I consider to be the perceived secrets to success in contest operating. They are secrets that have been stored away in the minds of a limited few since the days of Samuel Morse. You may want to take a break before you read on, because when you receive this enlightenment, it may overwhelm you. Never in the history of contest reporting have *the secrets* been revealed.

Are you ready? The secrets to competitive contesting are: Strategy and Skill! Can you believe it? For decades, contesters have focused on many complicated theories that describe contest success. You've probably heard most of them at one time or another—secret band openings, location, proprietary radio technology, and even cheating!

Now that the ice has been broken, let's use the balance of this month's comments to focus on these two points: strategy and skill. The subject I would like to consider in particular is identifying which of these critical success factors plays a more dominant role in contest success.

Let's Take A Look at Skill

How do you measure operating skill? There are a myriad of factors, but they generally fall into the classifications of speed and accuracy. In my opinion, the operators who can "run guys at incredible rates" are a dime a dozen. While many feel that running speed is something that you either have or don't have, it's not an especially rare skill. If you doubt this claim, just think about the number of guys you run into during a contest who make your hair blow back as a result of their blinding operating speed. Running stations at high rates in contests essentially uses the same skill set as someone who copies your personal information when you place a catalog order over the phone. Doesn't it just drive you nuts to give someone your phone number, only to have the individual repeat it back to you while you're talking? Using this example, the world truly needs more skilled contest operators.

While there are seemingly endless numbers of "fast runners" on the bands during contests, the real skill is not only working guys quickly, but copying the callsign and exchange correctly as well. That, in my mind, is what separates the men from the boys in contesting. And frankly, that's what contesting is all about. Otherwise, why would we bother to keep logs? A simple tally of QSO totals and multipliers scratched on a scrap of paper would probably suffice.

Then There's Strategy

Running stations at lightning speed is one thing. Outsmarting your competition through strategic decision-making is quite another. The prerequisites to sound contest strategy are experience and good old-fashioned common sense. The good news is that you're potentially born with common sense; experience only comes with time.

While I haven't done the empirical analysis, my intuition tells me that operators who consistently win contests treat strategy as a core element of the contesting process. It's like antennas, transceivers, and propagation studies. A poorly thought out contest strategy is like that noisy potentiometer in your old tube rig: you can get by, but it will impede your performance all weekend.

Those who exploit a well-defined contest strategy the most, think about it incessantly while they are operating. Throughout the weekend they ask questions of themselves such as: "Am I maximizing my effort at this very moment?" "What tactic can I deploy that others aren't thinking about?" "Is now the best time to be running, or should I be searching and pouncing?" The list literally can be endless. Knowing what questions to ask is the first part of developing this skill. The harder part is gaining experience to respond with the correct answers.

And The Winner Is . . .

So what's more important to contest success, skill or strategy? There's no clear-cut answer, but I've never been one to hold back an opinion, so here goes. In the evolution of the contester, the mechanics of knowing when to push buttons and copy callsigns and proper CQing techniques are usually the first operating characteristics to emerge. For many it comes naturally; for others it takes work, but it does develop over time.

Contest strategy work is quite another thing. Successful contest competitors seem to have a sixth sense when it comes to operating strategy. They magically know when to go to bands, when to pass multipliers, and when to search for new multipliers. They seem inherently to land on the right band just as the propagation path begins.

Operating skill is the great equalizer in contest operating. Experience has shown, however, that winners are the operators who combine their operating skill with a passion for strategy that few share. If I were placing my bets on a winning operator, I'd give a little on the speed they enter calls into the log for a heavy dose of intuition based on years of experience. The clear winner in my book is the expert strategist. Just as in real life, there is nothing that beats experience and good decision-making. It's a formula for success!

1997 CQ Contest Hall of Fame

The process of inducting new contesters into *CQ*'s Contest Hall of Fame has become an annual tradition in recent years. As 300+ contesters gather for a fun-filled evening of laughs and new insight delivered by thought-provoking speeches at the Dayton Hamvention Contest Banquet, the venue exists for a memorable

CALENDAR OF EVENTS

July	26-27	Venezuela CW DX Contest
Aug.	2-3	Summer Ten-Ten SSB Contest
Aug.	2-3	YO DX Contest
Aug.	2-3	ARRL UHF Contest
Aug.	2-3	North American CW QSO Party
Aug.	9-10	Worked All Europe CW Contest
Aug.	9-10	Maryland-DC QSO Party
Aug.	16-17	North American SSB QSO Party
Aug.	16-17	KCJ CW Contest
Aug.	16-18	New Jersey QSO Party
Aug.	23-24	TOEC CW WW Grid Contest
Sept.	6-7	LZ DX Contest
Sept.	6-7	All Asian SSB DX Contest
Sept.	13-14	Worked All Europe SSB Contest
Sept.	13-15	ARRL VHF QSO Party
Sept.	18-20	YLRL Howdy Days
Sept.	**27-28**	**CQ WW RTTY DX Contest**
Oct.	4-5	California QSO Party
Oct.	10	Ten-Ten October Sprint
Oct.	11-12	Pennsylvania QSO Party
Oct.	25-26	Ten-Ten Fall CW QSO Party
Oct.	**25-26**	**CQ WW DX SSB Contest**
Nov.	1-3	ARRL CW Sweepstakes
Nov.	7-9	Japan Int'l SSB DX Contest
Nov.	8-9	Worked All Europe RTTY Contest
Nov.	15-17	ARRL SSB Sweepstakes
Nov.	**29-30**	**CQ WW DX CW Contest**

8 Anchor Lane, Mt. Sinai, NY 11766-1200
e-mail K1AR@contesting.com
Compuserve ID: 71301,424

experience for new inductees into the Hall. This year was no exception, as the honored candidates were:

John Devoldere, ON4UN
Jorge Bozzo, LU8DQ (sk)
Gordon Marshall, W6RR
Carl Cook, AI6V
John Dorr, K1AR

John Devoldere, ON4UN

John Devoldere, ON4UN, is a radio icon. His accomplishments in operating, station building, and facilitating the growth of Europe's contesting ranks make him a worthy candidate for the Contest Hall of Fame. Whether your desire in contesting is to develop operating skill or technical excellence, or to bring newcomers into the fold, John should be your model.

In recent years John has built a multi-op station and operating team that is the envy of nearly everyone around the world. Whether the crew is digging out a KH6 on 160 meters or working USA stations at 300+/hour, John is the reason for it all. He has discovered the ability to maximize his station and develop camaraderie with his team. John is an example for us all to emulate.

Jorge Bozzo, LU8DQ (sk)

Although Jorge Bozzo, LU8DQ, is no longer with us physically, his impact is still felt in contest circles. Jorge was the quintessential CW operator. When it comes to naming the standard for operating efficiency, LU8DQ is the obvious example. To this day, I marvel at how well Jorge accurately responded to my calls in contests, regardless of speed or sending accuracy. He was simply amazing—and all without the aid of computer logging.

Jorge was a champion. His contest wins truly form a list for budding contesters to admire. At the Contest Banquet nearly every hand rose in the room when asked if they had ever had a QSO with LU8DQ. There were few operators who stayed on the contest radar screen the way Jorge did.

Jorge Bozzo is why the Contest Hall of Fame was invented. He fits the model by having been one of the world's finest operators, one who shared his enthusiasm for the sport with everyone he met.

Gordon Marshall, W6RR

In my book, Gordon Marshall, W6RR, is one of contesting's old-time contributors, and a joy to welcome into the *CQ* Contest Hall of Fame. Gordon was defining contesting before most of us were a gleam in our parents' eyes. It's a joy to know that not only are contesting and Gordon Marshall one and the same, but Gordon's interest and desire are still there today. Although you won't find Gordon at the top of today's contest listings very often, you'd be foolish to underestimate the influence he still maintains in his own quiet way.

Gordon Marshall has always been a winner. He's been professionally successful, has enjoyed world-class contest results in the past, and most important has affected the sport of contesting for the common good. There are very few of us who can make these claims, and for that reason it is an honor to call W6RR one of our own.

Carl Cook, AI6V

When you think of Carl Cook, what comes to mind is an immediate image of a crazed contester saying the words "Papa Forty Victor." That has been Carl's legacy in recent years and only a small reason why he is so worthy of entering the *CQ* Contest Hall of Fame. Carl is both a champion and a coach. He not only has won numerous contests personally, but has been directly responsible for encouraging others to join the sport. His quiet contributions to WRTC '96 could only be measured by his absence. Carl's enthusiasm for contesting is enough to wear you out, yet you can't wait for the chance to meet with him again. Carl is a contester who truly is loved and admired!

Carl is an ambassador for contesting. He's what makes us proud to wear our contest badges. Congratulations on a well-deserved and long overdue honor, Carl.

John Dorr, K1AR

For obvious reasons, I want to address my induction by giving you some of my personal thoughts. As you may have heard, I was a very surprised contester while standing in front of my peers. Complete disbelief only begins to describe how I felt. As the surreal induction process began, I thought, "That can't be my name being spoken by Bob Cox, K3EST, and Doug Grant, K1DG." Just when I thought I had experienced "contest heaven" with the experiences of WRTC '90 and '96, a new and even more memorable curve ball was thrown at me.

One of this year's five recipients of the CQ Contest Hall of Fame award was John Dorr, K1AR. (See text for the other honorees.) The awards were presented by Bob Cox, K3EST, at this year's Dayton Hamvention at the Contest Banquet on Saturday. As John himself is quoted as saying, "For the first time in my life I'm speechless!" (Photo courtesy K8CX)

As I've said many times, contesting is in my blood. My very first QSO as an amateur was a contest QSO. There's really little to add beyond that. I love contest operating as much as any avocation in life. Competition is what drives my interest to succeed—whether it's in contesting, business, or pleasure. I'm in awe of the honor bestowed upon me and forever grateful for those who made it possible. I just hope that as time goes by, I'll be able to hold a candle next to the likes of those who preceded my induction.

Final Comments

The past twelve months have been an amazing ride in the contest world for me personally. I truly want to thank all of you for your support, and more important for the concern you show towards furthering amateur radio and contesting. There are a lot of Hall of Famers out there. You know who you are and deserve every accolade possible.

That's it for this month. As always, the deadline for Contest Calendar submissions for the November issue is September 1st.

73, John, K1AR

ARRL UHF Contest

1800Z Sat. to 1800Z Sun., Aug. 2–3

Activity on this one starts at 220 MHz and goes all the way up to 2.3 GHz and higher.

Exchange: Grid square locator.

Points: Take three points for 220 or 432 MHz contacts, six for 902 or 1296 MHz. Credit 12 points for 2.3 GHz or higher.

Multiplier: Total number of different grid squares worked on each band. Final score is the total QSO points from all bands times the sum of the grid-square multiplier from each band.

An award pin program is available for this contest for making 5 QSOs. Details including the full rules were published in the July issue of *QST*. Send a large SASE to the ARRL for official log and summary sheets.

Send logs to ARRL UHF Contest, 225 Main Street, Newington, CT 06111.

YO DX Contest

2000Z to 1600Z Sun., Aug. 2–3

This is the annual YO DX Contest sponsored by the Romanian Amateur Radio Federation. This is a worldwide contest with everyone working each other on SSB and CW.

Classes: Single Operator All Bands/Single Band and Multi-Operator/Single Transmitter.

Frequencies: CW—3510–60, 7010–40, 14010–60, 21010–60, 28010–60 kHz. SSB—3700–75, 7040–90, 14150–250, 21200–300, 28400–600 kHz.

Exchange: RS(T) plus ITU Zone. YO stations will substitute their two-letter country abbreviation for their zone.

Scoring: 8 points for YO QSOs, 4 points for QSOs outside your continent, and 2 points for QSOs within your continent. QSOs within your own country are valid for multiplier credit only. Final score is computed by multiplying your total QSO points times the sum of YO counties and ITU zones worked on each band.

Deadline for logs is September 3rd and they should be mailed to: RARF, P.O. Box 05-50, R-76100 Bucuresti, Romania.

North American QSO Party

CW: 1800Z Sat., Aug. 2 to 0600Z Sun., Aug. 3
SSB: 1800Z Sat., Aug. 16 to 0600Z Sun., Aug. 17

This is a short but fun QSO party that can have a fast rate at times. Any licensed radio amateur may enter, with the object being to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period.

Classes: Single operator and multi-operator, two transmitters. Multi-operator stations must keep a separate log for each transmitter and must have at least 10 minutes between band changes. Single operator entrants may

only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Single operator stations may operate 10 out of 12 hours (multis may use the full 12 hour period). Off-times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in Phone parties.

Bands: 160, 80, 40, 20, 15, and 10 meters only. You may work a station once per band. Suggested frequencies are: 1815, 3535, 7035, 14035, 21035, and 28035 (35 kHz up from band edge for Novice) on CW; and 1865, 3850, 7225, 14250, 21300, and 28600 (28450 for Novices) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of the number of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian provinces/territories, and other North American countries (do not count USA, Canada, KH6, or KL7 as countries). Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations as a single entry unit. Groups having more than five members may submit more than one team entry. To qualify as a team entry, the name and callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g., W6EEN op by KA6SAR), must be registered with W9NQ on CW and N4TQO on SSB. The team registration information must be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

Awards: A total of five plaques will be awarded for the high score for the Single Operator CW, Single Operator Phone, Multi-Operator CW, Multi-Operator Phone, and Single Operator Combined score categories. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each state, province, and North American country.

CW contest logs must be sent to Bob Selbrede, W9NQ, 6200 Natoma Ave., Mojave, CA 93013. SSB logs go to: Steve Merchant, N4TQO, 1795 Cravens Lane, Carpenteria, CA 93501. Entries must be postmarked not later than 30 days after the party to be eligible for trophies and awards. Logs may be submitted by K8CC's NA program or MS-DOS ASCII files if generated from another logging program.

European DX Contest

CW: Aug. 9–10 SSB: Sept. 13–14
0000Z Saturday to 2400Z Sunday

This is the 44th annual contest sponsored by the DARC. Activity will be between European countries and the rest of the world on all five bands, 3.5–28 MHz (IARU Region I regulation of frequencies for contest operation). Also, remember that the WAEDC has returned to a 36-hour limit for single operator entries. In addition, there is no longer a multi-multi category.

Classes: (a) Single operator, all band. (b) Multi-operator, single transmitter. Only one signal on any band at the same time. (c) SWL.

Note: DX packet cluster spotting is allowed for all classes.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Points: One point per QSO and one point for each QTC reported.

Multiplier: The multiplier for non-Europeans is determined by the number of European countries worked in each band (see WAE country list). Europeans will use the ARRL DXCC list of non-European countries.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 by 3, and on 10/15/20 by 2.

Final Score: Total QSO points plus QTC points times the sum total multiplier from all bands.

SWL: Only the single operator, all-band class may be used. The same callsign, European or non-European, may only be logged once per band. The log must contain both callsigns and at least one of the control numbers. Each QSO logged counts one point, each complete QTC one point (maximum of 10 per station). Multiplier is determined by the DXCC and WAE country lists.

QTC Traffic: Additional point credit may be earned by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent by a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional one point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (e.g., 1300/DL2DN/134, which means that at 1300Z you worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; 3/7 indicates that this is the third series of QTCs sent and that 7 are being reported. If more than 100 QTCs are claimed, a check list must show that the maximum quota of 10 per station is not exceeded.

Club Competition: This rule requires the club to be a local group and not a national organization. Eligible club members must operate within a 500 km diameter. To be listed, a minimum of three logs must be received from a club. Entrants must clearly indicate their club name on the summary sheet. A special trophy will be awarded by the DARC to the winning clubs from Europe and non-Europe.

Awards: Certificates will be awarded to the top scorers in each class in each country. Each participant with at least half the score of the continental leader will also receive a certificate. Plaques will go to continental winners in the single- and multi-operator classes and the winning EU and non-EU clubs.

Logs: It is suggested that you use the official DARC or equivalent log form. Use 40 contacts to the page and a separate sheet for each band. Submit a dupe sheet for each band with 200 or more contacts. A summary sheet showing the score and a signed declaration are also required (sample log forms are available with an SASE and/or IRCs). Logs may also be sent via the Internet to <100712.2226@compuserve.com>.

WAE Country List: C31, CT1, CU, EA, EA6, EI, F, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB, HBØ, HV, I, IS,IT, JW Bear, JW Spitsbergen, JX, LA, LX, LZ, OE, OH, OHØ, OJØ, OK, OM, ON, OY, OZ, PA, S5, SM, SP, SV, SV5 Rhodes, SV9 Crete, SY Athos, T7, T9, TA1, TF, TK, UA1346, other EU-CIS republics, YU1267, ZA, ZB2, 1A0, 3A, 4J1M–V, 4U1 Vienna, 9A, and 9H1.

Mailing deadline is September 15th for CW entries and October 15th for SSB to: WAEDC Contest Committee, Durerring 7, P.O. Box 1126, D-74370 Sersheim, Germany.

Maryland DC QSO Party

1600Z Sat. to 0400Z Sun. Aug. 9–10
1600Z to 2400Z Sun. Aug. 10

The Maryland/DC QSO Party is sponsored by the Antietam Radio Association. Non-Maryland stations work Maryland/DC operators. Maryland/DC station may work anyone. Stations may be worked once per band/mode and mobiles/portables that change counties may be worked again for QSO credit.

Exchange: QTH (county for MD stations; state/province/DXCC country for others) and operating category (Club, QRP, Mobile, Novice/Technician, and Standard).

Frequencies: SSB—3920, 7230, 14260, 21370, 28380, 50150, and 146550 kHz. CW—3643, 3701, 7035, 7126, 14040, 21115, 28040, and 28115 kHz.

Scoring: Each Maryland county, Baltimore city, and D.C. are multipliers. Score 10 points for club station QSOs, 5 points for mobiles, 4 points for QRP/Novice and Technician QSOs, 3 points for a CW contact, and 1 point for any other valid contact. QSO points are cumulative (i.e., mobile MD stations count 5 points). Final score is total QSO points times multiplier (25 maximum).

Awards: Plaques are available to the high-scoring MD-DC, non-MD-DC, and MD-DC club. Certificates will be awarded to the high scorer from each state and Canadian province. In addition, there will be awards to the high score from a MD mobile, top 10 MD logs, Novice, Technician, DX station, and MD YL. *(Note: Certificates will be issued to all entrants making at least 50 or more QSO points.)*

Logs are to be postmarked by September 10th and sent to: Antietam Radio Association, P.O. Box 52, Hagerstown, MD 21741. Be sure to indicate your operating class on the summary sheet. If you want the final results, include an SASE with your entry.

New Jersey QSO Party

2000Z Sat. to 0700Z Sun., Aug. 16–17
1300Z Sun. to 0200Z Mon., Aug. 17–18

This is the 38th annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest. The same station may be worked on each band and mode, and NJ stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO number, RS(T), and QTH; county for NJ, state/province or country for others.

Scoring: All stations credit 3 points for each contact. Multiply total QSO points by multiplier to compute final score. Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400 kHz, and 50–50.5 and 144–146 MHz. Suggest phone on even hours, 15/10 meters on odd hours, and 160 at 0500Z.

Awards: Certificates to the top scorers in each NJ county, ARRL section, and DX country. Second-place awards if four or more logs are received from that section. Also Novice/Tech and mobile awards. There are four plaques donated by the section managers for NNJ and SNJ to the winning stations in those sections.

Use UTC time and indicate the multiplier only the first time it is worked. Be sure to include a QSO check sheet and a summary sheet showing scoring, etc. Send a large SASE if you wish a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage in all counties may be planned.

Logs must be received no later than Sept. 14th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528.

BY BILL ORR, W6SAI

RADIO FUNdamentals

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

The S92SS Limited Space Antenna for 160 Meters

Remember the robust signal from S92SS in Sao Tome e Principe during the last 160 meter DX season? When I heard him coming through, it made my socks roll up and down!

Charles, S92SS, quickly discovered that even with an exotic call, if he wasn't putting a signal into the air, it did him little good. After a lot of experimentation (limited by the size of his property) Charles finally derived a folded-T flat-top. It was designed to reduce high-angle atmospheric QRN and produce low-angle radiation for 160 meter DX work. Charles suggests this limited space antenna might be of use to others who have given up trying 160 meter DX after reading about the big antennas and extensive buried ground radial systems required to work DX on "top band."

S92SS wanted to try top band, and he examined his location to see how much antenna he could get in the air and how extensive a ground radial system could be. He tackled the radial problem first.

The Radials at S92SS. The installation of an extensive buried radial system was impossible at S92SS because the yard is small and much of it is under a concrete deck. Elevated radials therefore had to be used, although they couldn't be made much longer than 55 feet, and even at that none of them would run in a straight line. Four radials were tied together and connected to the shield of the coax feedline via a variable loading inductor.

Charles wanted to break the ground return path to the transmitter via the coax shield, so he wound as many turns as practical of the RG-58 feedline on a ferrite toroid salvaged from a TV set flyback transformer. This made an inexpensive and effective RF choke for common-mode current.

The Antenna at S92SS. The antenna at S92SS was an electrical quarter-wave on 160 and initially consisted of a variation of an inverted-L (more like a face-down C) with a vertical run of less than 40 feet (fig. 1). A variable shunt inductor was used at the base to bring the system to resonance (the antenna itself was a little short of resonance). By adjusting the shunt inductor and the radiator length, the SWR could be brought down to near-unity at the design frequency.

Charles then discovered that even with only 100 watts input the coax toroid was getting quite warm. He ran a loop of wire with a #47 lamp attached around the down-lead of a radial and found it would light very brightly when he applied power. He then noted that by adjusting the ground-plane loading coil he could null the RF current on the coax shield that was indicated by the lamp, and then the toroid ran cool. A check with a field intensity meter indicated this condition also yielded the best field strength. By alternately adjusting the radiator length, the radial loading coil, and the shunt inductor he was able to make the SWR null coincide with the null in the current in the toroid. A field intensity meter indicated that this condition also provided the best field strength.

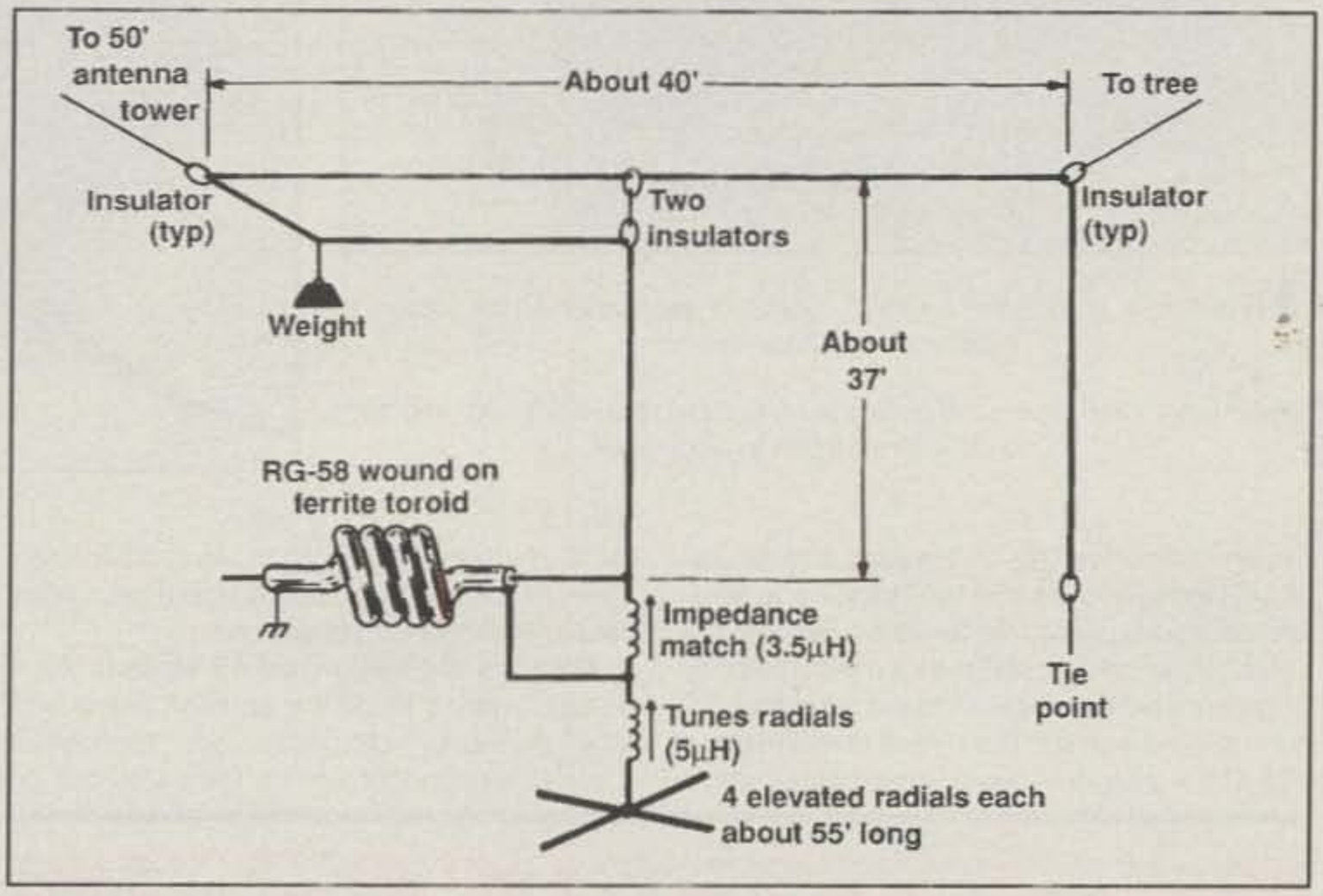


Fig. 1– The 160 DX antenna at S92SS. Inductance values are approximate.

A Practical RF Indicator. During his experiments Charles developed a variation of the loop and bulb gadget to check for RF in the antenna

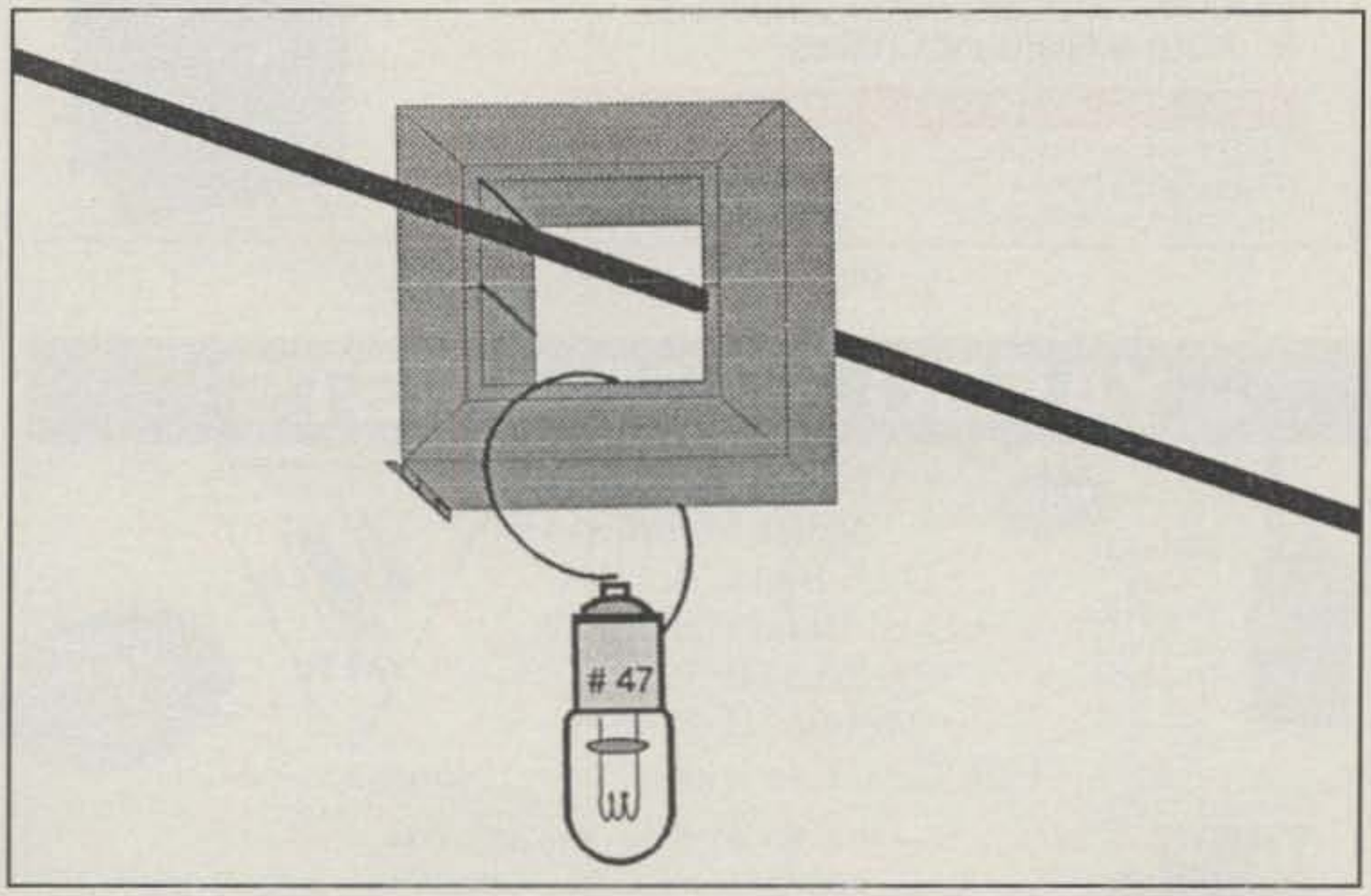
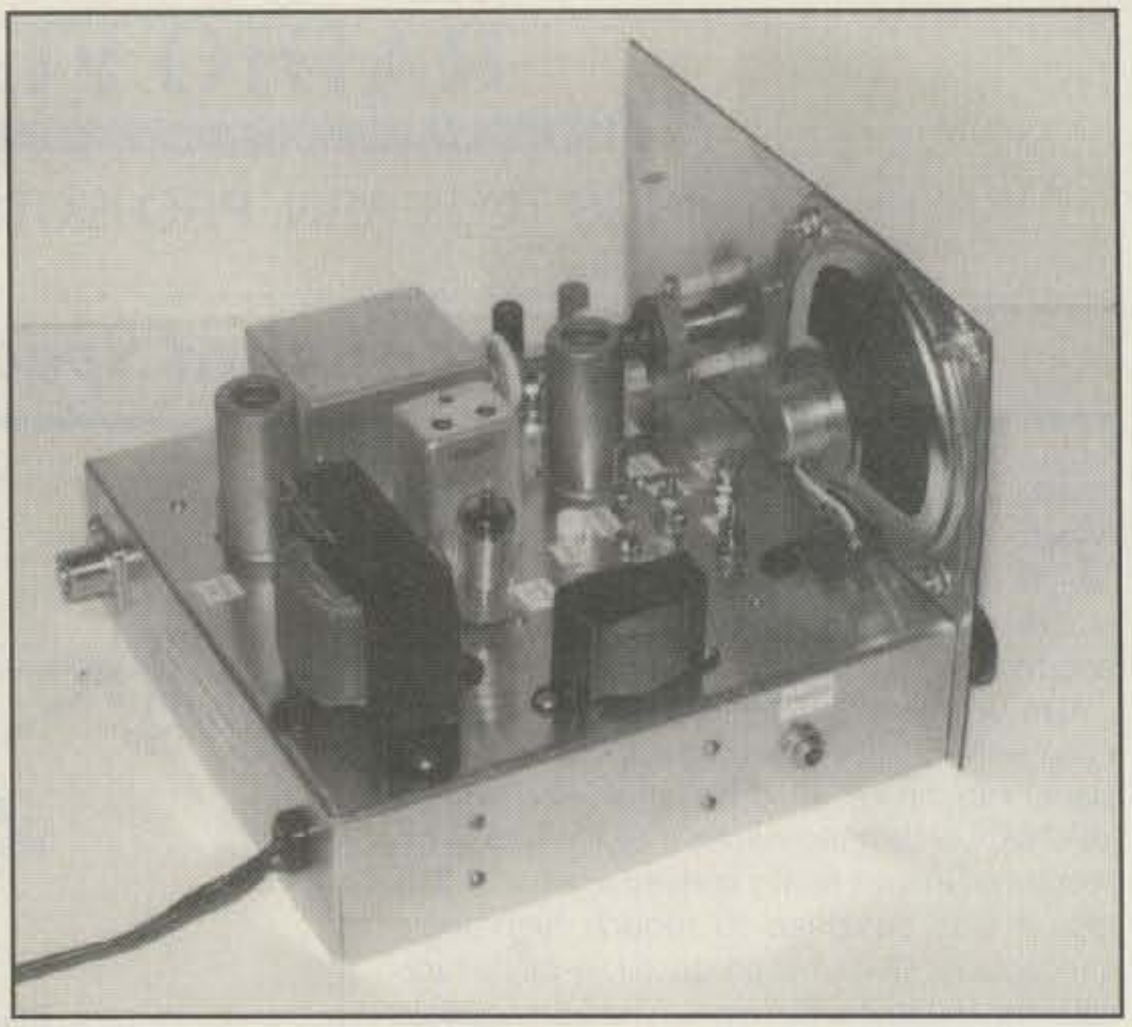


Fig. 2– An inexpensive and simple RF current detector. Avoid using too much power to prevent burning out the bulb.

48 Campbell Lane, Menlo Park, CA 94025

Front view of W2HBE's slightly updated version of Frank Jones's 1936 superhet receiver.



The interior view shows the quality workmanship that went into this "old time" reproduction project. →

system conductors (fig. 2). He used a rectangular split toroid such as sold by RadioShack, MFJ, and others. He clipped the toroid around both the conductor under test and the loop with the bulb. This permitted the observer to judge relative RF currents. A check with this device revealed there was a heavy current flowing in the radiator which divided fairly evenly among the four radial wires. It was interesting to actually observe the current division with this simple device.

Antenna Operation on 40 Meters. As a bonus, Charles found the antenna works well on 40 meters by voltage feeding it. He hooked a variable capacitor across the same coil he uses for a shunt on 160 meters, and the combination resonates at 7 MHz with the radiator wire attached to the hot end of the coil. The transmission line is tapped about one turn up from the grounded end of the coil. By varying the tap point and the LC ratio at resonance a perfect match is achieved.

Finally, the series inductor to the radials is tuned for a null in the current circulating in the transmission-line choke, but it is necessary to add a series capacitor in the circuit.

On 40 meters the antenna apparently looks a bit like an upside-down quarter-wave ground-plane antenna with current maximum point on the vertical wire, well up in the air. The performance is outstanding!

Results. Charles was pleasantly surprised with the 160 meter DX worked with this antenna, including Japan, which is a long way from West Africa! The DXers who have heard his signal can attest to the efficiency of the antenna! Unfortunately, by the time this is in print S92SS will be QRT, as his job will require moving to a new QTH. Where next? Greece? Stay tuned.

The New *ARRL Antenna Book*

Dean Straw, N6BV, the editor of the new *ARRL Antenna Book* is very proud of it. Just ask him. He has good reason to be. It is a beautifully produced work. The cover art is outstanding, and the revised and updated contents make this work a must-read for every antenna enthusiast.

Quite a bit of the original artwork has been redone to make the book more unified. A new section on marine antennas has been added, and the list of antenna products and suppliers has been updated. Of course, there are plenty of new antenna designs for you to contemplate (and perhaps build).

A PC diskette is enclosed; it includes a program to analyze the effects of local terrain on your antenna, antenna tuner evaluation, elevation angles for DX work, and other goodies. It almost takes the fun out of working DX. You know what I mean?

When I was a kid I had a DX evaluation pro-

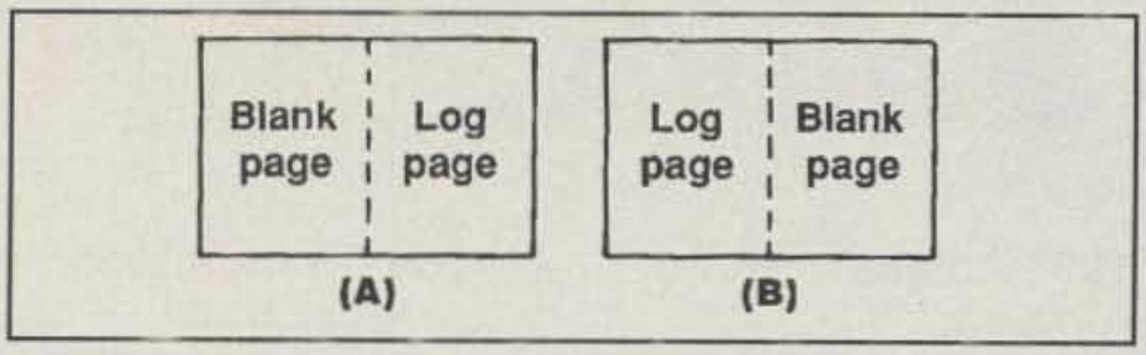


Fig. 3– (A) A conventional logbook. (B) The W6SAI log is reversed, with the blank page for notes on the right. Try it!

gram for the fall months that always worked. I went outside and looked up. If it was a clear, starry night with no wind, it was a good night for DX, especially if I could smell the leaves burning. No computer program needed! Time marches on, however. The antenna designs, the propagation data, and all the other goodies will make this book a best buy.

I have one complaint about the new *ARRL Antenna Book*. The chapter on propagation has a section on propagation data sources. It lists material available by computer/modem from W1AW bulletins, NOAA, and others, and provides a bibliography of articles and books on propagation. Nowhere does it list the most obvious and popular source, the monthly columns in *CQ* written by George Jacobs, W3ASK, nor does it mention his best-selling book *The New Shortwave Propagation Handbook* (available from *CQ*). However, it does list an obscure and outdated propagation book published in London in 1990 and a book on rhombic antenna design (1941), both of which, no doubt, readers of this column are anxious to read. I look forward to a correction of this massive oversight in the next edition of the *ARRL Antenna Book*.

The W6SAI Logbook

I've filled up my share of logbooks over the years. True, the log is no longer an FCC requirement, but it is a valuable record of my time on the air. From time to time I enjoy looking back through the old logs, especially at the notes I wrote about various signals I heard, DX I missed, and info on the amateur radio operator at the other end of the QSO.

The logbooks came from different sources: the ARRL, *Ham Radio* magazine, a special log from a local contest club, and so on. None of them really did the job, however. Some were unwieldy to use, opening at the top rather than the side, for example, and all of them had the log page on the right and a blank page on the left (fig. 3[A]).

I finally created a logbook of my own which seems to fill the bill for me. The log page is on the left, and the blank page is on the right (fig. 3[B]). This seems more convenient for a right-handed operator. I find it so.

My logging columns are date, time, station, frequency, report received, report sent, time of end of QSO, and remarks (for the QTH and/or name of the operator I QSO).

My daughter Cathy ran off 20 log pages using her spreadsheet program, and I punched the pages to fit in a flat "Abaca" pressboard binder, LC-1188, obtained at the local stationery store. I placed a press-on label on the front of the binder, giving my call and opening date of use.

So far it works out well. Why don't you examine your operating habits and make up your own personal log? I'm sure that a contester, a DXCC chaser, and a rag-chewer each would have an individualized log to fit his or her needs. How about you?

The W2HBE Receiver

In my February 1997 column I described a compact receiver designed in 1936 by Frank Jones, W6AJF. It used three or four tubes, depending upon the whim of the builder.

Bob Dennison, W2HBE, decided to build a 1997 version of the receiver using three more modern tubes than were incorporated in the Jones design (see photos). This receiver features bandswitching for the 80, 40, and 20 meter bands, direct dial calibration, and other goodies. The tubes are a 6U8A as a mixer/oscillator, a second 6U8A as a regenerative oscillator and first audio stage, and a 6AK6 output, driving a small speaker.

Bob plans to write up the receiver for the old-timer magazine *Electric Radio*, so keep an eye out for it. Good show, Bob!

73, Bill, W6SAI

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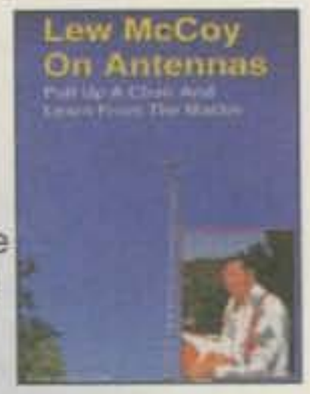

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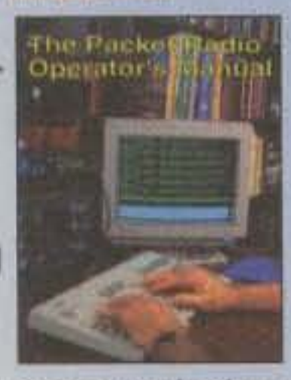

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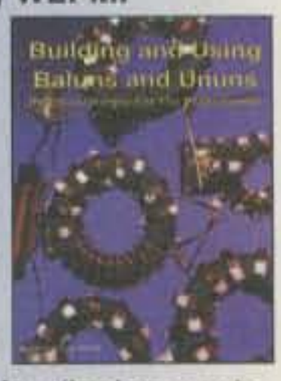

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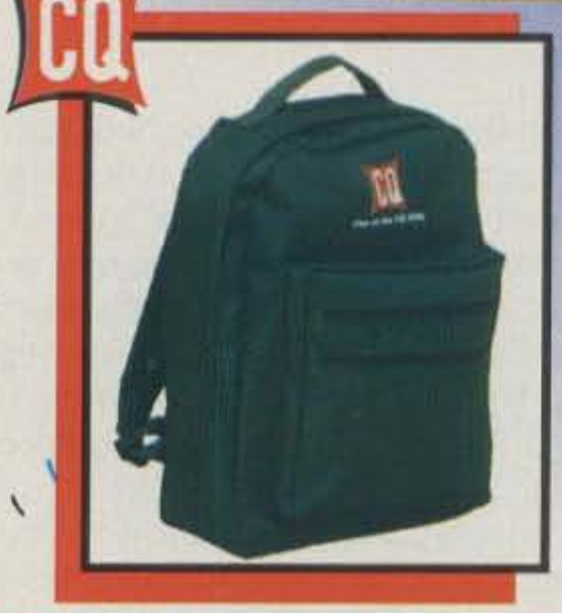

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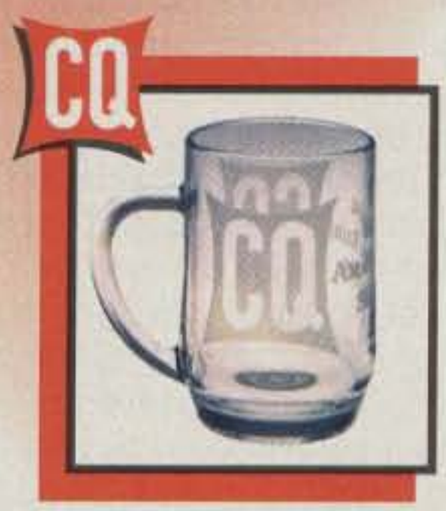

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DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Focus on CQ's 5-Band Worked All Zones

As sunspot Cycle 23 picks up, many DXers will be looking for a new challenge. With about 70% of those DXers making a QSL card submission to the DXCC desk in the last two years already on the Honor Roll, it appears that the majority of DXers have few countries (other than North Korea) left to work. For those DXers facing this situation, there are several options.

One possibility is to turn one's sights toward one of the open-ended DX programs, such as *CQ*'s Worked All Prefixes (WPX) or the RSGB's Islands On The Air award programs. There will always be more prefixes to work, as countries issue unusual callsigns for contests and special events. Of course, there are thousands of prefixes that have already been aired, and the QSL collection process for serious WPX chasers is formidable.

The IOTA program provides at least seasonal interest, but many serious DXers don't like the idea that most island DXpeditions simply show up on 14260 kHz and work off lists. Then there's the *CQ* USA-CA counties award program, but again, serious DXers feel there is little challenge (and lots of paperwork) in working counties in nearby states. (This award can be *very* interesting to foreign DXers.)

The ARRL's 5-Band DXCC award presents a significant challenge, especially to west-coast DXers who don't have the luxury of working 40 to 50 countries in Europe to provide the bulk of the low-band contacts. Some enterprising DXers have self-imposed some additional constraints on the 5BDXCC award. One east-coast DXer was attempting to work 5BDXCC with exactly 100 different stations! Contest DXpeditions, multi-band DXpeditions, and a few well-equipped stations make this goal obtainable, but the ARRL won't endorse the award for this achievement.

No, for those serious DXers who are looking for a *real* DX challenge, in a well-known program with a fixed end in sight, the answer is *CQ*'s 5-Band Worked All Zones (WAZ) award.

Fewer than 500 DXers have worked all 40 *CQ* zones on each of the five traditional bands—80, 40, 20, 15, and 10 meters. (Individual WAZ awards are available for the newer bands.) That's about 10% of the number of DXers on the DXCC Honor Roll. Thus, 5-Band WAZ identifies the very top DXers. Further, 5-Band WAZ requires both CW and SSB skills (as 90% of DX on 40 meters is worked on CW). The real difficulty in 5-Band WAZ, however, is working far-away zones on 80.

The listing of 5-Band WAZ contenders in this column clearly demonstrates how demanding this task of low-band skills is. Several dozen skilled DXers are only one or two countries on 80 meters from wrapping up their 5-Band WAZ quest. Let's have a closer look at these top contenders to see why 5-Band WAZ is DX's ultimate closed-end goal.

Many of those DXers needing only one or two 80 meter zones to reach the 200 level lack QSOs with Zone 26 or 34. Those on the east coast find Zone 26 the most difficult, while DXers farther west are often stumped by Zone 34. Zone 26 consists of Thailand, Vietnam, Cambodia, Laos, Burma, the Andaman Islands, and Spratly.

There is no legal amateur radio on the Andamans, with the result that these islands rank as one of the Most Wanted countries in the world. Radio activity from Vietnam, Cambodia, and Laos is very rare, and low-band contacts still fewer. The reason for this is that 80 meters is used for other purposes in this region, both legally and illegally. Several of the countries in southeast Asia allocate parts of the 80 meter band to fixed and mobile services, often at the exclusion of amateurs. Even in the cases where amateurs may use 80 meters, strong signals from commercial and military users of the band make weak-signal work nearly impossible.

Thailand, for example, regularly grants 48-hour operating permission on 80 meters during major contests. However, once the Thailand station has worked a station or two in each zone, the operator will turn to more productive bands and regions. Further, in some countries such as Vietnam an amateur must pay a separate license fee (often more than US $100) for each frequency—that's right, for each spot frequency, not band. Paying the extra fee, finding enough copper wire to erect a decent 80 meter antenna, and giving up sleep to work the US in the middle of the night combine to make working Vietnam on 80 meters one of DX's most difficult tasks.

Of course, there is always the Spratlies. This DXpedition-only location now sports a luxury resort, and a dedicated crew could probably make a small dent in the demand for Zone 26 eighty meter QSOs, propagation permitting. However, with the Spratlies nearly antipodal to the eastern US, low-band contacts are very difficult.

Jan Robbins, NØJR, shares the shack with Bearlioz.

DXers on the west coast dream of low-band contacts with Zone 34. The only countries in this Zone are Egypt, Sudan, Southern Sudan, and Libya. There is almost zero amateur radio activity from Libya, making it one of the Most Wanted countries. Radio is also very rare from Sudan and the non-country of Southern Sudan. With a very high demand for these countries on *any* band, those who do manage to operate seldom spend much time trying to work the difficult path to the west coast of the US on 80 meters.

Egypt offers the one reasonable chance for west-coast DXers to complete 5-Band WAZ. A couple of Egyptian stations operate regularly in contests and may have functional 80 meter antennas. Getting these stations to spend contest minutes trying to pull very weak signals out of the crowded 80 meter band is another story.

DXers in Europe face other challenges in their 5-Band WAZ quest. Zones 1 and 31 are the tough ones from Europe. Zone 1 is heavily populated by amateurs (at least relative to Zones 26 and 34). However, the path from Alaska to Europe goes through the northern polar regions, a usually impenetrable RF curtain. (More below about working Zone 1 from Europe.)

US DXers may find the need for Zone 31 strange. After all, Hawaii is crowded with amateurs, and 80 meter QSOs are a

P.O. Box 50, Fulton, CA 95439

The WPX Program

SSB

2636 ..... CP2DL
2637 ..... K8NIA
2638 ..... W4SMG
2639 ..... N3LTY
2640 ..... 9K2RA

CW

2952 ..... NG9L
2953 ..... K8NIA
2954 ..... IK2VUE
2955 ..... JA9IFF

Mixed

1782 ..... K8NIA
1783 ..... NG9L

CW: 350 NG9L, IK2BUE, JA9IFF. 400 NG9L, IK2VUE, JA9IFF. 450 NG9L, JA9IFF. 500 JA9IFF. 550 JA9IFF. 600 KUØA, JA9IFF. 650 IK4TVQ, JA9IFF. 700 IK4TVQ, JA9IFF. 750 IK4TVQ, JA9IFF. 800 JA9IFF. 850 JA9IFF. 900 JA1XCZ, JA9IFF. 950 JA1XCZ, JA9IFF. 1000 JA1XCZ, JA9IFF. 1050 JA1XCZ. 1100 JA1XCZ. 1150 JA1XCZ. 1200 JA1XCZ. 1250 JA1XCZ. 2000 KS3F. 4050 WA2HZR.
SSB: 350 DU1SAN, CP2DL, W4SMG. 400 DU1SAN, CP2DL, W4SMG. 450 DU1SAN, W4SMG, CP2DL. 500 DU1SAN, CP2DL. 550 DU1SAN, CP2DL. 600 DU1SAN, CP2DL. 650 DU1SAN. 700 DU1SAN. 750 DU1SAN. 800 DU1SAN. 1450 I3ZSX. 1500 I3ZSX. 2600 LU8ESU.
Mixed: 450 NG9L. 500 NG9L. 550 NG9L. 600 NG9L. 650 NG9L. 700 NG9L. 750 NG9L. 800 NG9L. 850 NG9L. 900 NG9L. 1000 NG9L. 1050 NG9L. 1100 NG9L. 1150 NG9L. 1200 NG9L. 1250 NG9L. 1300 NG9L. 1350 NG9L. 1400 NG9L. 2400 N4UH. 3500 SM3EVR. 3550 SM3EVR.

20 meters: DU1SAN, JA9IFF
40 meters: JA9IFF
80 meters: IK4TVQ, IK2VUE
Asia: DU1SAN, JA9IFF
Africa: JA9IFF
No. America: K8NIA, JA1XCZ, JA9IFF
So. America: JA9IFF
Europe: K8NIA, JA9IFF
Oceania: JA1XCZ, JA9IFF

Award of Excellence: KUØA
Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, YU2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, S57J, EA8BM, DL1EY.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, K9BG, W1BWS, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY.

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.

snap, especially during contests. While the largely east-west path between Hawaii and the mainland US is a easy one, the long, north-south path to Europe again passes right through the northern polar regions. Even those dedicated DXpeditions with European operators find working Europe on 80 meters from the middle of the Pacific difficult and frustrating.

So what does it take to earn 5-Band WAZ? It takes a well-equipped station on all bands, as even 10, 15, and 20 meter contacts to the far side of the world are not easy. It takes good CW skills to work the distant zones on 40. And most important, it takes a top-notch 80 meter station and lots and lots of time and patience. Let's look at some real-life stories of the quest for that elusive 200th zone.

Jan Robbins, NØJR

Jan waited until he had all 200 QSLs in hand before applying for his 5-Band WAZ. Here are some of Jan's comments:

"The task took 15 years, dating from August 1981, when I became active from my current QTH [in Cedar Rapids, Iowa]. 5-Band WAZ is *undoubtedly* one of the two most difficult things I've ever done. The other one was to get a Ph.D., but that was for a career, not a hobby, and anyway it took only five years after the B.A.

"The difficulty is perhaps measured by these comparisons: (1) It took me 3.5 years to complete 5BDXCC with nothing but a tribander at 50 feet and a 60 foot vertical for 40 and 80 meters; (2) Using similar antennas, it took me four years to confirm 300 countries QRP (5 watts).

"From the northern midwest, everyone expects Zones 23 and 26 to be the toughest. They weren't easy by any means, but thanks to a number of Hungarian DXpeditions with *great* operators they weren't too bad for me. I found the toughest Zones were 22 and 34 on 80 and 22 on 40. Had S2/HA5BUS, another of those Hungarians DXpeditions with terrific operators, or my good friend Eric, S21ZG, been on at different times in the sunspot cycle and more convenient times for me, 22 would have been taken care of a lot earlier. Zone 34 would have been easy, too, if there simply was more activity from that part of the world. (Would that I could have worked Eric on 80 and 40 when he was /ST4!) Zone 34 is a good place for a low-band DXpedition.

"I will never be able adequately to thank all the hams who helped make this 5-Band

The WAZ Program

Single Band WAZ

20 Meter SSB

1005 .....BV5GQ 1006 .....C21DJ ....

20 Meter CW

473 .....W9GXR

All CW

100 .....N7MCA

Satellite

15 .....JA1BLC

160 Meter WAZ

112 .....DL3KDV, 36 Zones New
79 .....DJ7RD, 35 Zones Endorsement
87 .....SV8JE, 37 Zones Endorsement

All Band WAZ

SSB

4384 .....IK2VUE 4387 .....IK8HVJ
4385 .....KGØEJ 4388 .....IKØIXQ
4386 .....9K2RA 4389 .....HS1NGR

CW/Phone

7741 .....9K2RA 7743 .....LA1PBA (CW)
7742 .....DF9LB 7744 .....EA7BB (CW) ....

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

WAZ possible. Some, such as GW3CDP and W4FRU, helped arrange skeds with someone like Eric, ST4/WZ6C, so I could finish Zone 34 on 10, or something like that. (At least I was able to return the favor for Eric: When he needed teaching materials for his 'New Hams' class for the Bangladesh ARS, I was able to send him lots of *CQ* books at no cost to him.) Some, especially on the two coasts, heard me in the pileups and—knowing how difficult Asia is from the northern midwest—asked a rare one to 'listen for the zero,' and now and again the Asian would pull me through, even at odd times. Then there were the numerous hams in rare and strange places who were willing to indulge the Yankee Zone hunter by agreeing to listen for him on some other band at some outlandish time. And finally there were the dozens of QSL managers—the truly unsung heroes, for whom my admiration never ceases—who made sure some, at least, of the rare cards got back quickly.

"I can't say I didn't curse *CQ* and the award a time or two over the years, but I can't thank you folks enough for keeping me interested by holding out a prize worth having. It is precisely because 5-Band WAZ is so hard that I found it worth pursuing for 15 of my 40 years as a ham."

Incidently, Jan enjoys designing and building antennas. During his 5-Band WAZ quest he used no fewer than 17 different antennas, from tribanders for the higher bands to a four-square array of vertical dipoles over an elevated system of 60 one-wavelength radials on 80 meters!

Slavko Celarc, S57DX

"I've been in amateur radio since 1973 and have 333 DXCC countries worked and confirmed. 5-Band WAZ was my project for the past 15 years. The only problem was Zone 1 on 80 meters. In 1996, I finally worked KL7HF on 80 meter CW. My first radio love was contesting, and I have been active for the past 20 years. For the past five years I've operated under my own call of S57DX; before that I usually operated contests from the YT3T contest station, mostly multi-single."

Slavko Celarc, S57DX, contests from this station when he is not looking for rare band/zones.

5 Band WAZ

As of April 30, 1997, 458 stations have attained the 200 Zone level.

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

NAØY UU1JA

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

N4WW, 199 (26)
AA4KT, 199 (26)
K7UR, 199 (34)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199 (34,40m)
K1ST, 199 (26)
ABØP, 199 (23)
KL7Y, 199 (34)
UY5XE, 199 (27)
NN7X, 199 (34)
DL3ZA, 199 (31)
OE6MKG, 199 (31)
HA8IB, 199 (2 on 15)
DK1FW, 199 (31)
OH2DW, 199 (1)
IK1AOD, 199 (1)
DF3CB, 199 (1)
F6CPO, 199 (1)
W6SR, 199 (37)
S57J, 199 (2)
W3UR, 199 (23)
KC7V, 199 (34)
UA3AGW, 198 (1, 12)
VO1FB, 198 (1, 12)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (22, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
KG9N, 198 (18, 22)
KM2P, 198 (22, 26)
GM3YOR, 198 (12, 31)
DKØEE, 198 (19,31)
KØSR, 198 (22, 23)
K3NW, 198 (23, 26)
UA4PO, 198 (1, 2)
K5RT, 198 (22, 23)
JA1DM, 198 (1, 31)
OE1ZL, 198 (1,31)

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

WB2AQC, 190 Zones
NØFW, 191 Zones
EA2CLU, 155 Zones
N5AHS, 150 Zones

Endorsements:

K6FG, 187 Zones
GM3WIL, 189 Zones
W3RU, 199 Zones
KC7V, 195 Zones
OK1FPG, 170 Zones
NAØY, 200 Zones
UU1JA, 200 Zones

1041 Stations have attained the 150 Zone level as of April 30, 1997.

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.

Eric Mills, VE1AST, used modest equipment and a superb location to complete 5-Band WAZ.

Slavko's high-band antennas include three 5-element monobanders, with the 15 meter antenna at 100 feet.

Eric Mills, VE1AST

"5-Band WAZ has been a long-held ambition. In terms of completion of the award, I finished the roster of zones with Zone 23, RB5RLK/JT, on 10 meters, during the last full year of good 10 meter conditions following the peak of the last solar cycle. My big problem was getting a valid confirmation of Zone 18 on 80 meters; my QSL requests coincided with the breakup of the Soviet Union and the postal chaos that followed. It took until May 1995 for a card to appear, thanks to the magic of Joe Arcure, W3HNK, in getting cards from Russia.

"Some of the highlights are the following: The thrill of working a JT on 75 meters one spring morning after waiting nearly a year for conditions allowing me to hear him. The magic of working Ken, KE3A/ DU3, on 80 meter CW on Christmas Eve, when no one else on the east coast seemed to know that he was there. Ken later provided me with both the Zone and a new country on 40 meter CW; he called me, knowing that I was desperately looking for a DU. The mystery of openings to Zone 18 on 80 meters from Atlantic Canada; my four QSOs with Zone 18 stations all have been within a month centered around Christmas in various years. And then there was the excitement and fun of getting to know the DX potential on 10 and 40 meters, bands that I had ignored for too many years.

THE WPX HONOR ROLL

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

MIXED

4705 9A2AA	3311 SM3EVR	2912 YU7BCD	2498 K8LJG	2113 W8UMR	1705 EA5BM	1449 I1-21171	1197 IT9JPK	838 EA5BHK
4194 IT9TQH	3299 I2UIY	2832 IT9QDS	2486 K2EOW	2105 K2XF	1699 CT1QF	1436 VE4ACY	1122 IV4PYD	636 9A2AJ
3828 W2FXA	3296 I2ØJA	2825 K9BG	2377 KØDEQ	2105 KS4S	1623 I2EAY	1401 F6HMJ	1112 VE6BMX	
3769 EA2IA	3295 N9AF	2745 KF2O	2375 HA5NK	2094 9A4RU	1589 JN3SAC	1368 NG9L	1013 WB2PCF	
3728 UA3FT	3290 N4UU	2697 N2AC	2349 IK2ILH	2001 G4OBK	15II KØIFL	1362 YU1ZD	1003 KB5OHT	
3636 W1CU	3063 KA5W	2688 K9AGB	2303 S51NU	1958 YU7JDE	1587 AE5B	1329 KSØZ	967 JR3TOE	
3573 K6JG	3023 WA8YTM	2661 I2MQP	2200 K5UR	1776 W7OM	1586 W7CB	1317 Z32KV	953 S52QM	
3447 N6JV	3003 9A2NA	2610 4N7ZZ	2183 N6JM	1752 HA9PP	1570 KC6X	1317 N3ED	938 VE7CBH	
3415 VE3XN	2967 PAØSNG	2589 WB2YQH	2141 WA1JMP	1717 K5IID	1560 OZ1ACB	1289 WØIZV	931 W2EZ	
3337 N4MM	2935 YU7SF	2538 S53EO	2131 W6OUL	1717 IØAOF	1500 CT1EEB	1212 WT3W	850 US1IDX	

SSB

4186 IT9TQH	2834 I2UIY	2371 9A2NA	2084 KD9OT	1669 K8LJG	1454 K3IXD	1261 I3OBL	1054 S51NU	852 N1RT
4127 IØZV	2798 F2VX	2365 WA8YTM	2077 N4UU	1606 KS4S	1418 I3ZSX	1225 KC6X	1006 WT3W	846 JR3TOE
3706 VE1YX	2715 I4CSP	2330 KF2O	2044 K5RPC	1601 KBØC	1415 HA5NK	1158 KØIFL	971 DJ4GJ	845 EA3EQT
3641 ZL3NS	2595 KA5W	2290 4X6DK	2035 EA1JG	1567 EA5CGU	1401 W7OM	1138 EA8AG	966 KI7AO	832 I6KYL
3345 F6DZU	2584 PAØSNG	2290 YU7BCD	2022 CX6BZ	1553 LU7HJM	1361 IK2AEO	1132 WA2FKF	959 EA1AX	828 I2EAY
3312 K6JG	2530 I5ZJK	2216 WF4V	1906 IN3QCI	1503 CT1EEB	1353 DK5WQ	1115 DF7HX	930 EA1MK	772 LW2DBM
2957 CT4NH	2428 LU8ESW	2212 I2EOW	1903 K5UR	1501 AE5B	1349 K5IID	1107 SV3AQR	918 LU3HBO	759 N3DRO
2930 N4MM	2419 EA3AQC	2207 CT1AHU	1723 OE2EGL	1501 CT1BWW	1332 G4OBK	1101 KB4HU	879 N3ED	748 JN3SAC
2867 EA2IA	2410 I2MQP	2206 PY4OY	1685 N6FX	1489 W6OUL	1327 W5ILR	1068 N4PYD	873 HA9PP	644 VE6BMX
2862 OZ5EV	2372 UA3FT	2158 KF7RU	1674 YU7SF	1464 K8MDU	1282 NG9L	1055 IT9JPK	860 IK4HPU	

CW

4109 IT9TQH	2640 YU7SF	2250 I2UIY	1910 KF2O	1608 G4OBK	1408 I2EAY	1238 EA6AA	993 I2MQP	863 KB5OHT
3782 WA2HZR	2627 K9QVB	2167 W8IQ	1875 TI4SU	1606 W6OUL	1357 9A2HF	1219 IK5TSS	925 LW2EUE	731 VE6BMX
3428 N6JV	2430 N2AC	2111 S51NU	1823 N6FX	1559 DJ1YH	1356 IK2ECP	1183 K5IID	919 HA9PP	712 KØIFL
3038 VE3CNE	2353 G4UOL	2076 JA9CWJ	1796 OZ5UR	1557 IK3GER	1355 EA7AAW	1139 EA2CIN	903 DF6SW	697 K3WWP
3034 YU7LS	2339 YU7BCD	2035 9A2NA	1767 K5UR	1555 KS4S	1326 N1IA	1130 AC5K	902 9A3UF	691 WT3W
2914 N4UU	2319 N4MM	2001 KA7T	1722 VR2UW	1519 LU26A	1297 ZB2EO	1079 N3ED	899 K2LUQ	630 LY3BY
2819 EA2IA	2314 WA8YTM	1959 K8LJG	1708 17PXV	1500 EA6BD	1278 W7OM	1051 4X6DK	891 I2EOW	602 LU6VCD
2808 K6JG	2280 KA5W	1954 HA5NK	1649 N2AIF	1457 JH3SAC	1275 DJ4GJ	1023 LU3DS	863 PY4WS	

"Some personal and equipment notes: I am a university professor specializing in oceanography and the history of science. I have been DXing seriously since about 1968, but was interrupted by a lot of professional travel and by lengthy periods living in England, Scotland, Germany, and France, when I did no operating.

"Throughout my 5-Band WAZ activities I mostly used a Ten-Tec Omni-C (since replaced by an Omni-VI) and an SB-200 linear (replaced near the end of the 5-Band WAZ search by a Ten-Tec Titan linear). On 10–20 meters I used a trusty TH7-DX, and on 80 and 40 meters the superb KLM SSV-80-40-15 vertical which performed miracles with its feet in the Atlantic Ocean. By North American standards I have had a modest setup. I can't overstress the value of a good QTH and of haunting the bands with foreknowledge of when they are likely to open to any target area. And then there's luck!"

Ready for a *real* DX challenge? Start collecting band-Zones!

FØCAA (CX3CE), FØALE (CX3AN), and FØREB (CX4CR) operated from the Hotel Hibiscus on Moorea in French Polynesia.

DX News and Events

The 1997 New Orleans International DX Convention is August 22–23 at the Royal Sonesta Hotel in the French Quarter of New Orleans. This is a very well-run event with top-notch speakers and a superb Saturday banquet. DXers should seriously consider attending this convention; it's even wife-approved!

This news is probably a little late, but the 1997 Pacific Northwest DX Convention is July 25-27 at the Richmond Inn near Vancouver, British Columbia. It is being sponsored by the BC DX Club and the Fraser Valley DX Club. For more information, contact Ken Thompson, VE7BXG, at P.O. Box 3048, Blaine, WA 98231.

There is a new DX newsletter available on the Internet. Bernie McClenny, W3UR, publishes "The Daily DX" five days a week. For more information, contact him at <bernie.mcclenny@mail.wdn.com> or by mail to him at 3025 Hobbs Road, Glenwood, MD 21738. Daily DX news can be somewhat overwhelming, but the

QSL INFORMATION

3A/DJ7RJ to DJ7RJ
3B8GA to 3B8DB
3CØDX to EA4URE
3DA/AA3JA to JH7FQK
3DA5A to AA3JA
3ZØAPA to SP5ZDH
4B1AC to XE1BEF
4F1JUX to 4F1JUX
4K6FT to UA9AB
4M1X to W4SO
4NØS to YU7JDE
4X44JU to 4X4JU
5N7T to F2YT
5W1FR to K5TR
5Z4EE to K1RH
6YØA to K3DI
7J1AAP to KH6BZF
7P8ZZ to W4DR
8P6EQ to KC3AE
8R1ZB to JH1NBN
9G5CW to DL2RUM
9H3XI to DL5CE
9K2EC to 9K2HN
9M2OM to GØCMM
9M6TCR to KQ1F
9R1A to PA3DMH
9X/RW3AH to RW3AH
9X5EE to PA3DMH
9Z4BM to 9Y4NZ
A22QR to ZS6EW
A35EM to JA1OEM
A61AS to YO3FRI
AH7X/AHØ to JP1NWZ
AY9H to LU3HL
BA4TB to 9A2AJ
C31IL to K1RH
C56CW to DL7DF
C6AJR to DL3ABL
CO6CD to W3HNK
D25L to PA3DMH
D2M to OH3LQK
EA6NB to EA6NB
EL2/ND3A to ND3A
EL2RR to NØJT
EM1KA to JA2JPA
EN5US to UR4UZA
ER5WU to W3HNK
EY8RR to N7RR
FØZR to K1RH
FK5M to F6AJA
FK8HC to VK4FW
FP1DX ***not to*** W2AWA
FR5KH/J to F6FNU
FS5YL to W3HNK
HB5CC to HB9BCK
HP1XBI/1 to F6AJA
HQ1JPT to HR1JPT
HR3KLB to K4ZLE
HS1RU to JG3AVS
IIØS to IKØAZG
IR7S to IK7RWE
J52DW to LX2DW
J83ZB to JH1NBN
JW7QIA to LA7QIA
KG4US to W4WSZ
KH6XX to W3HNK
KH7R to KH6HH
L4ØH to LU4HH
LP5H to LU1HOO
LR3Y to LU1YY
LT5V to LU8VCC
LY5A to LY2ZZ
LZ7N to LZ1NG
M7A to G4ZFE
M7T to G3XTT
MW7Z to G5LP
OE2ZBM to WAØROI
OJØ/KF7PO to AHØW
OT7P to ON6AH
OY3H to W3HNK
OY5NS to W3HNK
P4ØZ to K7BV
PJ8LF to PY2VA
PJ9C to K1CPJ
PS1ZZ to PY1NEZ
R1ANT to UA1GO
RA1PM to RK1PWA
RK9AWT to UA9AB
RM3T to RW3TJ
RZ9A to UA9AB
SØ1A to EA2JG
S21YD to SM6CST
S5ØO to S59VM
S52A to S56MM
S79HP to JA1OEM
SM7CRW to W3HNK
SO7TN to OK1TN
SU1EE to K1RH
SV5DZZ to IZ2AEQ
SV9/I2YYO to IK2MYX
SX2T to SV2TSL
TØØCW to DL3OCH
T22MS to DL2GAC
T3ØA to KU9C
T4ØRFC to CO2KG
T5EC to DLØMAR
T88CK to HB9BCK
T88X to JE6DND
T94DD to K2PF
TE1C to W3HNK
TG4VT to W3HNK
TG9AWS to W3HNK
TI2GSC to TI2GSC
TI3CF to W3HNK
TI9X to JH1NBN
TJ1GS to EA4AHK
TM5DX to F5EJC
TU2AA to W6OML
TU4CC to IK2NNI
UAØYAY to RW6HS
UA9BA to UA9AB
UL9PC to W3HNK
UR6F to OE5EIN
V26SR to N2SR
V63AQ to JH1NBN
V63KW to AC4G
V73AT to K2CL
V73CT to AC4G
V85NM to DF8AN
VC5ØØJC to VE1CR
VK6FOC to DJ8FW
VP2END to JA4DND
VP2MHY to KM9D
VP5A to WE3C
VR97SS to VR2SS
VU4ØZAP to W3HNK
WH2J to JA3NEP
WP4C to W3HNK
XU3FLT to JN3FLT
Y38I to DL1AWI
YB2BRW to N2UE
YB9BV to K7BV
YI1AU to WB3CQN
YI9HW to HAØHW
YLØA to YL2GM
YM3ATA to TA3J
YN1KDM/9 to KD4ZNB
YN3CC to W3HNK
YO6JN ***not to*** KU9C
YP4A to YO4KCA
YS9YS to KK8K
Z21EV to W3HNK
ZF2LA to K9LA
ZK2HP to JA1OEM
ZL4WA to ZL4WA
ZL9DX to K8VIR
ZP5ØN to ZP1BO
ZS45TWR to ZS4Y
ZV5M to PY5AA
ZW1B to PY1OB

Internet delivery eliminates the significant time delay of printing and mailing a conventional paper DX newsletter.

QSL Notes

QSL **L5V** and **L5ØV** via operator Raul Suarez, LU5VC, P.O. Box 151, 8400 Bariloche, R.N., Argentina.

QSL the new Ethiopian station of **ET3FB** via IK6FHG at Via A. Toscanini 10, 61100 Pesaro, Italy.

QSL **3A/DJ7RJ** via the operator's home address: Manfred Przygode, DJ7RJ, Hoisdorfer Ldstr. 50, D-22927 Grosshansdorf, Germany.

QSL the April Sao Sebastiao Island operation of **ZY2IB** via PY2AE.

Active DXpeditioner Rudi Klos, DK7PE, has a new address: Im Kirschgarten 17, 55263 Wackernheim, Germany.

QSL **MUØASP** from the island of Guernsey via the operator's home address: Nathieu Roche, F5SHQ, 4 Cours de la Liberation, F-33000 Bordeaux, France.

Joe Schroeder, W9JUV, given as the QSL manager for Arnie, **CO2KK**, says he can't confirm any of the QSL requests as he has not received any log information from Arnie in a couple of years. He has cards dating back to 1990, but cannot answer them without log information.

Finally, those DXpeditioners and managers with new vanity callsigns should remember to include their old call when giving out QSL information. The new calls won't be available to most amateurs until the 1998 *Callbook* comes out.

The table of QSL managers in this column is courtesy of John Shelton, K1XN, editor of The GOLIST, P.O. Box 3071, Paris, TN 38242 (phone 901-641-0109; e-mail <golist@iswt.com>).

73, Chod, VP2ML

CQ DX Awards Program

SSB

2225 .....CP2DL 2226 .....NØFW

CW

962.....K9CC/M

SSB Endorsements

320.....LA7JO/327
320.....W9OKL/326
320.....N5FG/325
320.....VE2GHZ/323
320.....OA4QV/321
320.....OE6CLD/321
310.....I4CSP/315
250.....CP2DL/254
28 MHz.....NØFW
3.5/7 MHz.....NØFW

CW Endorsements

320.....G4BWP/328
320.....N5FG/324
310.....LA7JO/310

RTTY Endorsement

250.....G4BWP/267

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.

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

History of the Morse Code Requirement in the Amateur Service

Amateur radio began with a few experimenters in the early 1900s. It has grown to over 750,000 licensed operators in the United States. There are more 2.5 million licensed amateurs worldwide.

In the United States the Federal Communications Commission (FCC), the Communications Act of 1934 (the document that created this independent governmental agency), and the Code Federal Regulations (CFR) provide the guidelines under which the Amateur Radio Service is regulated. The Code of Federal Regulations is organized into various titles, parts, subparts, and sections. Title 47 applies to Telecommunications, and Part 97 to the Amateur Radio Service. Subpart F details how the public may qualify by examination for an Amateur Service license.

Sections 97.501 and 503 (47 CFR 97.501, 503) require that five of the six amateur operator classes pass examinations in telegraphy. These same five license classes (Novice, Technician Plus, General, Advanced, and Amateur Extra Class) have access to frequencies below 30 MHz.

On the surface it would appear the FCC is the primary regulatory agency that requires Morse code knowledge as a prerequisite for high-frequency amateur band operation. Such is not the case, however. Since radio does not respect international borders, domestic communications policy cannot be developed without regard to international implications. The Commission is required to regulate wire and radio communications within the guidelines of international telecommunication agreements of which the United States is a part.

The Early Days Of Communications

Binary signaling is the earliest form of communication. It is defined simply as the presence or absence of a single element that when used in prearranged combinations conveys intelligence. Signal fires, reflected sunlight, smoke signals, flag waving, and jungle drums are the earliest examples of binary signaling. The earliest versions were, of course, audible or visual systems, since electrical transmission had yet to be invented.

Electric signaling arrived in 1835, when Samuel Morse employed a chemical battery and a lever to send currents through a wire circuit. The original Morse machine printed code on tape. The word "telegraph" was coined to mean a device that could print patterns at a distance. It was derived from the Greek "tele" (far) and "graphein" (to write). The discovery of the "ground return" circuit meant that only one wire would be needed.

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

Samuel Morse ushered in the age of electrical communications by sending his first public "What hath God wrought?" message on May 24, 1844 over an experimental telegraph line between Washington and Baltimore. He developed a key and sounder for this demonstration, since he discovered that the code could better be received by ear, eliminating the printer.

Within ten years the tentacles of the electric telegraph had spread to England and Europe. In 1851 countries in Europe adopted a new version of the "American" Morse code which they called the "continental" or "international" Morse code. The new code eliminated the characters which used close-spaced dots and replaced them with "dahs" which required longer key closure. Nations everywhere began establishing telegraphic networks within their boundaries.

Wireline telegraphy, however, did not cross national borders, and technical and operating standards varied widely from country to country. Some countries even had their own telegraph code to safeguard the secrecy of military and government messages. It was not unusual for messages to be transcribed at national borders and handed over to telegraph operators for retransmission over a neighboring telegraph network.

International Agreements

The International Telegraph Union (ITU) was formed in Paris on May 17, 1865, when 20 European nations met to work out an international agreement to facilitate telegraphic communications. The ITU thus became the world's first international coordinating body. The second (convened on September 15, 1874) was the Universal Postal Union. Each had similar obstacles, since the mail and telegraph lines both had to cross national borders.

The International Telegraph Union decided on standardized equipment and operating rules to guarantee interconnection to the European telegraph network, and they decided to use the "international" version of the Morse alphabet. It was also agreed that the organization would serve as a meeting place for future amendments. This marked the birth of the ITU. Today, more than 130 years later, the factors that led to the formation of the Union still apply, and the fundamental goals of the ITU are basically the same.

In 1889 Guglielmo Marconi, a young Italian inventor, proved that communication by radio was possible. He had read how Heinrich Hertz created and radiated electromagnetic waves using a battery-operated induction coil connected to a spark gap. Marconi reasoned, "Why not use the waves for signaling?"

In 1899 Marconi successfully sent wireless communications across the English Channel. Until then all telegraph networks stopped at the edge of the great seas. On December 12, 1901 Marconi spanned the Atlantic Ocean with his wireless telegraph by transmitting the letter "S" from southern England to St. Johns, Newfoundland. The era of the amateur radio experimenter had begun.

In the early years wireless telegraphy remained confined to the sea. The U.S. Navy was among the first to use it. At the request of Germany, a conference was convened in 1903 to establish international radio cooperation. The new technique, called the radiotelegraph, held great promise for maritime communications.

An agreement governing wireless telegraphy was signed at the International Radiotelegraph Conference held in 1906, and another communications organization was formed—the International Radiotelegraph Union (IRU). The Conference also agreed to require ships to be equipped with wireless transmitters and receivers.

The first wireless distress frequency for ships to use to call for help was set at 500 kHz. In 1909 "SOS" was adopted as the international radiotelegraph distress call. It replaced "CQD," which meant "Anyone answer (CQ), I am in (D)istress." SOS does not mean "Save our Souls" any more than CQD means "Come Quick, Danger."

The first U.S. legislation dealing with marine radio was approved by Congress in 1910. Known as the Wireless Ship Act, it required installation of wireless apparatus and operators on large sea-going passenger vessels. Only a few ships staffed their radio equipment around the clock.

That all changed after April 15, 1912, when the *Titanic*, ripped open by an iceberg, sank three hours later in the North Atlantic. The *Titanic*'s radio operator frantically called for help over the wireless. However, the wireless operator on the nearest ship had gone to bed with no one to take his place. A ship that was 58 miles away responded and managed to rescue 700 survivors.

As a result of the 1912 sinking of the *Titanic*, the IRU convened an international conference in London. It was agreed to establish a system which still governs spectrum use today. The radio spectrum was divided into bands, the use of which would be reserved for specific purposes.

Each nation committed to avoid interference to existing wireless stations and to register their own use of radio frequencies. Regulations were enacted to require at least two radio operators on ships and a constant watch, with emergency backup power supplies.

Amateur stations were banished to the experimental frequencies above 200 meters. The lawmakers had come up with a regulation that finally would keep the amateur radio operator off the lower frequencies, which were being used more and more for commercial, maritime, and government use. The regulation was signed into law by President Taft on August 12, 1912.

To carry out its obligations under the treaty, the United States enacted the Radio Act of

1912. This was the first U.S. law for domestic control of radio communications. The Radio Act regulated the character of emissions, regulated transmission of distress calls, set aside certain frequencies for Government use, and placed licensing of wireless stations and operators (including amateurs) under the Commerce Department. Radio station and operator licensing began that year, making access to the electromagnetic spectrum a privilege granted only by Government approval. At the time, unlicensed amateur stations accounted for 80 percent of all stations on the air!

The International Frequency Registration Board (IFRB) was set up to manage the frequency spectrum, which was becoming increasingly congested. The first Table of Frequency Allocations became mandatory in 1912. These first regulations since have been amended and revised by numerous radio conferences and are now known as the international Radio Regulations (RR).

The Radio Regulations are part of a treaty between nations and do not of themselves impose obligations on amateurs. Instead they provide guidelines to the various countries on how they are to regulate their Amateur Service.

Amateurs pioneered sound broadcasting in 1920. At their 1927 (Washington) conference the Telegraph Union allocated frequency bands to the various radio services existing at the time (fixed, maritime and aeronautical mobile, broadcasting, amateur, and experimental). Operating guidelines for each of these stations and operator qualifications were established. It was deemed important that amateurs prove an ability to transmit and receive in Morse signals.

In the last 50 years, however, the ITU has reviewed and modified the amateur Morse requirement at every international conference capable of changing it! In 1947 (Atlantic City) the ITU agreed that Morse proficiency should only be required when the operation took place on frequencies below 1000 MHz (1 GHz). At WARC-59 (the 1959 World Administrative Radio Conference) this level was dropped to 144 MHz. A further reduction was made at WARC-79 to its present 30 MHz.

At a joint meeting of the two organizations at the 1932 Madrid Conference the (1865) International (wireline) Telegraph and Telephone Union (ITTU) and the (1906) International Radiotelegraph Union (IRU) were combined. The goal was to form an international organization that would apply to all fields of wire and electromagnetic communications. The name change to the International Telecommunication Union (ITU) took effect on January 1, 1934. Eighty countries, 62 private companies, and other bodies were the initial members.

The next 15 years (1932–1947) were not productive ones for the ITU. Propaganda broadcasting, revolution, and World War II were accompanied by much jamming, interference, and non-cooperation among nations of the world. That all changed in 1947, however. With World War II over, it was decided at the Atlantic City Conference to make the ITU a specialized government agency of the United Nations and to move its headquarters from Bern, Switzerland to Geneva the following year. The most important change, however, was that membership became open only to sovereign nations, each of which would have one vote. This substantially increased the influence of small or developing countries in a manner totally unrelated to industrial wealth or telecommunications usage. (This will be very important when the Morse issue is considered at WARC-99!)

The ITU is basically an organization of governments from countries around the world. Each government cooperates with the private sector to develop communications. By agreement among the participating members, the ITU adopts broad international regulations concerning the use of the radio frequency spectrum. These accords have the force of international treaty once ratified at the national level.

A key feature of the ITU is that its regulations tend to be very general in scope, thus providing a certain amount of national flexibility and application. The role of the ITU's Radiocommunication Sector is to ensure the rational, equitable, efficient, and economical use of the radio frequency spectrum by all radio services.

Periodically the ITU schedules world conferences to review and revise the international Radio Regulations. Major World Administrative Radio Conferences (WARCs) used to be held about every ten years. Agreements reached establish the general guidelines for various international radio services and set rules which apply to member nations and individual operators. In recent years, however, the ITU has convened smaller, more specialized World Radiocommunication Conferences every two years. WRCs have specific agreed upon agendas and have the power to revise the Radio Regulations, which have the force and effect of a treaty. WRC-99 is the one which will consider changes in the Amateur Service.

At present the ITU is made up of 185 voting member nations and 363 private sector members. These members are scientific and indus-

trial companies, public and private operators, broadcasters, and various regional/international organizations.

Morse Code QRTs On The High Seas

The London-based International Maritime Organization (IMO) was formed in 1959. One of its goals is to enhance safety of large ships at sea through improved radio communication technology. IMO membership consists of representatives from the various countries that control nearly all of the world's ocean-going vessels. The current maritime law requires that all passenger and cargo ships of more than 1600 gross tonnage be equipped with radiotelegraph equipment and qualified operators.

In 1972 the IMO began a study of satellite communications. The 1979 SAR Convention (International Convention on Maritime Search and Rescue) invited the IMO to develop a global maritime distress and safety system (GMDSS) including high-technology communications. Working with other worldwide organizations, IMO developed and tested various GMDSS equipment and procedures. The 1983, 1987, and 1992 World Radiocommunication Conferences approved amendments to the ITU Radio Regulations which provided frequencies and operating procedures for the GMDSS.

On November 9, 1988, at the conclusion of a two-week London conference, the IMO notified the world that GMDSS had been given the go-ahead by world shipping leaders. It would eventually spell the end of Morse code at sea. A statement issued called the decision "... one of the biggest advances in maritime communications since the introduction of radio."

Radio officers with Morse code knowledge will still be needed on older vessels until February 1, 1999. Radio Officers are already no longer required on ships that were constructed after February 1, 1995, since they must comply with all GMDSS requirements. Licensed GMDSS operators will be required on all large ships, but they need not have Morse knowledge. After 1999 manual telegraphy goes the way of the horse and buggy on the high seas.

After 70 years of continuous monitoring, the U.S. Coast Guard has now discontinued watch on 500 kHz, long considered the primary frequency for distress alerting. They transmitted their last message on July 31, 1993 and stopped monitoring 500 kHz completely in 1995. Even if a ship's radiotelegraph operator tapped out an "SOS," the Coast Guard would not receive it!

The advent of satellite and digital technology have made Morse code totally obsolete at sea. In essence, the U.S. Coast Guard has said manual telegraphy is no longer important to the safety of life on ocean-going vessels. There simply are better communications methods.

The international radio rules, however, continue to require amateur operators to be knowledgeable in Morse code when their operation takes place in the medium- and high-frequency bands. Strangely, the reason given was that it was believed HF radiotelegraphy knowledge would be beneficial in emergency situations.

Now that manual telegraphy is being phased out in the commercial radio sector, the question is "Should Morse code knowledge remain a requirement for amateur radio?"

The International Amateur Radio Regulations

The current international Radio Regulations that deal specifically with the Amateur and Amateur-Satellite Services are contained in Article 32 of the 1994 and earlier editions of the Radio Regulations; it was renumbered Article S25 at WRC-95. We are including both numbers. Following is an extract from the Radio Regulations:

ARTICLE 32/S25
Amateur Service and Amateur-Satellite Service
Section I. Amateur Service

2731/S25.1 – Radiocommunications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.

2732/S25.2 – When transmissions between amateur stations of different countries are permitted, they shall be made in plain language and shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified.

2733/S25.3 – It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

2734/S25.4 – The preceding provisions may be modified by special arrangements between the administrations of the countries concerned.

2735/S25.5 – Any person seeking a licence to operate the apparatus of an amateur station shall prove that he is able to send correctly by

hand and to receive correctly by ear, texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz.

2736/S25.6–Administrations shall take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station.

2737/S25.7 – The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the technical qualifications of the operators and to the conditions under which these stations are to operate.

2738/S25.8 – All the general rules of the Convention and of these Regulations shall apply to amateur stations. In particular, the emitted frequency shall be as stable and as free from spurious emissions as the state of technical development for such stations permits.

2739/S25.9 – During the course of their transmissions, amateur stations shall transmit their callsign at short intervals.

Section II. Amateur-Satellite Service

2740/S25.10 – The provisions of Section I of this Article shall apply equally, as appropriate, to the amateur-satellite service.

2741/S25.11 – Space stations in the amateur-satellite service operating in bands shared with other services shall be fitted with appropriate devices for controlling emissions in the event that harmful interference is reported in accordance with the procedure laid down in Article 22/S15. Administrations authorizing such space stations shall inform the IFRB and shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference which might be reported can be terminated by the authorizing administration.

The IARU

The International Amateur Radio Union (IARU) was formed in Paris in 1925 to represent the interests of amateur radio to the International Telecommunications Union. It is made up of national amateur radio societies throughout the world and is recognized as the official voice of the Amateur Service.

It is administered by one of its members, the American Radio Relay League (ARRL), which also provides the president of IARU. The IARU attends the ITU Conferences and has "observer" status recognition.

The IARU Constitution, last amended in 1989, organizes the Union into three regional organizations that correspond to the three administrative regions of the ITU. Current IARU membership is 144 national societies.

WRC-95, WRC-99, And Morse Code

At WARC-79 the United States delegation suggested that the RR 2735 (amateur telegraphy requirement) be changed " . . . to permit administrations to develop their own licensing requirements." The U.S. proposal reduced the requirement to the status of a recommendation, which in effect was the same as deleting the regulation. This proposal was made even though the ARRL had surveyed its membership and received an overwhelming response requesting "no change." The U.S. proposal, however, was not successful. Instead it was agreed to modify the code waiver frequency to 30 MHz.

The 1995 World Radio Conference (WRC-95) was held in Geneva between October 23 and November 17, 1995. The New Zealand government proposed at this conference to abolish international Radio Regulation 2735 in favor of RR2736. RR2735 requires Morse code knowledge (no speed is specified) when the amateur communication takes place below 30 MHz. RR2736 leaves amateur operator requirements up to the various national administrations. The proposal became very controversial. Some administrations (including the United Kingdom) favored the change, while others opposed it or said the time was not right and the issue needed further study within the amateur community. The ultimate action was to delay further consideration until 1999, although an initial proposal looked toward resolving the issue at WRC-97.

WARC-92 agreed that the general scope of future conferences should be established four years in advance. Accordingly, before WRC-95 adjourned, Resolution 720, "A Preliminary Agenda for the 1999 World Radiocommunication Conference," was adopted. Item 2.2 of this agenda is "Consideration of Article S25 concerning the Amateur Service and the Amateur-satellite Service."

The International Amateur Radio Union and the American Radio Relay League have now formed ad hoc committees whose task is to develop a position on Morse code testing and "Amateur Radio in the 21st Century."

73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Count Increasing Slowly

The Royal Observatory of Belgium reports a mean sunspot number of 16 for April 1996. A high of 37 was reported on April 3, with a low of zero spots on the 20, 21, and 30. The mean value for April results in a 12-month running smoothed sunspot number of 9 centered on October 1996. It is expected that the new cycle, Cycle 23, will begin to rise at a faster rate during the coming months. How fast this will be continues to be a point of contention among the world's experts. For example, the Solar-Terrestrial Physics Division of the National Physical Data Center in Boulder, Colorado is predicting a smoothed sunspot number of 12 for August 1997. Down the street in Boulder, the Space Environment Center of NOAA is calling for a level of 30. The prestigious Australian IPS Radio & Space Services recently released its predictions for the early years of Cycle 23, and they estimate a smoothed count of 27 for August 1997.

A corresponding increase was reported in the 10.7 cm solar flux level. Canada's Dominion Radio Astrophysical Observatory in Penticton, B.C. reports a monthly mean of 75 for April 1997. This results in a smoothed value of 72.4 centered on October 1996. A smoothed level in the upper 70s is forecast for August 1997.

Cycle 22/23 Progress

Table I is a listing of smoothed sunspot numbers observed for the entire Cycle 22 and the initial months of Cycle 23, as well as *CQ*'s predictions for the remainder of 1997.

The HF propagation doldrums of the past three years or so are just about over. Conditions are expected to improve steadily as the cycle increases. Take this as a guarantee from someone who has operated on the HF bands through five sunspot cycles!

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LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for August 1997

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 10-11, 15, 25-26	A	A	B	C
High Normal: 2-3, 9, 12, 23-24 30-31	A	B	C	C-D
Low Normal: 1, 4, 7-8, 13-14, 16-17, 20-22, 27-29	B	C-B	C-D	D-E
Below Normal: 5, 19	C	C-D	D-E	E
Disturbed: 6, 18	C-D	D	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be fair to good (C-B) on August 1st, good (B) on the 2nd and 3rd, fair-to-good (C-B) on the 4th, fair-to-poor (C-D) on the 5th, poor (D) on the 6th, etc.

August Propagation

A noticeable improvement in HF propagation conditions is expected this August and through mid-September when compared to last year as a result of increasing solar activity.

During August a few 10 and 12 meter DX openings should be possible to southern and tropical areas. Best bet is during the afternoon when conditions are expected to be High Normal or better. Frequent short-skip openings between distances of about 500 and 1400 miles can also be expected. Conditions should improve considerably during September.

Look for more than an occasional 15 meter DX opening towards Europe and the east before noon, but chances should be much better during the afternoon hours, particularly towards Africa, South America, the South Pacific, and Oceania. Expect frequent short-skip openings between distances of about 400 to 1400 miles.

The propagation pattern in 17 meters should be similar to 15 meters. With increasing solar activity and summertime propagation conditions in the northern hemisphere, the somewhat lower frequency range of this band may well prove to be a propagation asset. On many days when conditions will not permit 15 meters to open, check this band for openings. When 15 meters does open, expect the same opening on 17 meters, but the band should remain active up to an hour after 15 meters closes.

During August, 20 meters should continue to be the best band for DX propagation. Openings are forecast to most areas of the world between sunrise and midnight, when conditions are at least Low Normal. Peak conditions should occur, with strongest signals, during a two to three hour window just after local sunrise, and again during the late afternoon and evening. When conditions are High Normal or better, 20 meters may remain open through much of the period of darkness, particularly towards southern and tropical areas. Excellent short-skip openings are also expected to continue on 20 meters from shortly after sunrise to almost midnight. These should range from a few hundred miles out to the one-hop limit of about 2300 miles.

Thirty meters can be another propagation asset during the summer months. Peak openings are expected during the nighttime hours, much like 40 meters, but often with higher sig-

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
January		18	58	142	151	148	124	71	37	24	10	13**
February		20	65	145	151	148	116	69	35	23	10	14**
March		22	71	150	152	147	108	67	34	22	10	15**
April		24	78	154	149	146	103	64	34	21	8.6	16**
May		26	84	157	147	146	100	60	33	19	8.1##	18**
June		28	94	158	144	145	97	56	31	18	8.6*	22**
July		31	104	159#	141	146	91	55	29	17	8.5*	24**
August		35	114	158	141	147	84	52	27	16	8.5*	27**
September	12	39	121	157	142	145	80	49	27	13	8.6*	30**
October	13	44	125	157	142	142	76	45	27	12	10*	33**
November	15	47	130	158	142	138	74	41	26	11	11*	36**
December	16	51	138	154	144	132	73	39	26	11	12**	38**

Table I– Smoothed sunspot numbers for the entire Cycle 22 and the initial months of Cycle 23, and predictions for the remainder of 1997. The peak of Cycle 22 occurred July 1989 (#), and the cycle is generally believed to have ended during May 1996 (##). Observed values for the Cycle 23 to date are shown with a single asterisk (*); predicted values through 1997 are shown with a double asterisk (**).

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.

August 15–September 15, 1997
Time Zone: EDT (24 Hour Time)
EASTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	*Nil*	09-11 (1) 14-16 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	19-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-04 (1) 21-23 (1)* 23-01 (2)* 01-03 (1)*
Northern Europe & CIS (former European USSR)	*Nil*	09-11(1)	06-07 (1) 07-10 (2) 10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	20-22 (1) 22-00 (2) 00-03 (1) 22-02 (1)*
Eastern Mediterranean & Middle East	*Nil*	11-13 (1) 13-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1) 22-00 (1)*
West Africa	14-16 (1)	09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1) 23-02 (2) 02-04 (1) 22-02 (1)*
Central & East Africa	*Nil*	11-14 (1) 14-16 (2) 16-17 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	21-01 (1)
South Africa	12-14 (1)	08-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-20 (1) 23-01 (1)	21-23 (1) 23-01 (2) 01-03 (1) 23-02 (1)*
Central & South Asia	*Nil*	17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 20-23 (1)	05-07 (1) 18-21 (1)
Southeast Asia	*Nil*	18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-22 (1)	*Nil*
Far East	*Nil*	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1)
South Pacific & New Zealand	16-19 (1)	13-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-02 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 04-08 (1)*
Australasia	17-19 (1)	16-17 (1) 17-19 (2) 19-20 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	03-04 (1) 04-07 (2) 07-08 (1) 05-07 (1)*
Northern South America	13-15 (1) 15-17 (2) 17-18 (1)	08-12 (1) 12-14 (2) 14-16 (4) 16-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-02 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-08 (1) 22-02 (1)* 02-04 (2)* 04-07 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-16 (1) 16-17 (2) 17-18 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1)	06-08 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-00 (2) 00-02 (1)	21-23 (1) 23-01 (2) 01-03 (1) 03-06 (2) 06-07 (1) 04-06 (1)*
McMurdo Sound, Antarctica	*Nil*	15-18 (1)	07-09 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-01 (1)	01-06 (1)

Time Zones: CDT & MDT
(24 Hour Time)
CENTRAL USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	*Nil*	09-11 (1) 13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	20-22 (1) 22-01 (2) 01-04 (1) 22-02 (1)*
Northern Europe & CIS (former European USSR)	*Nil*	10-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-14 (3) 14-16 (2) 16-17 (1) 21-23 (1)	20-02 (1) 22-01 (1)*
Eastern Mediterranean & Middle East	*Nil*	10-15 (1)	07-14 (1) 14-16 (2) 16-18 (1) 21-23(1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23(1)*

CIRCLE 95 ON READER SERVICE CARD

CIRCLE 60 ON READER SERVICE CARD

West Africa	12-14 (1)	09-11 (1) 11-14 (2) 14-16 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	20-22 (1) 22-01 (2) 01-02 (1) 23-01 (1)*
Central & East Africa	*Nil*	12-15 (1)	13-17 (1) 17-19 (2) 19-21 (1) 07-09 (1)	21-00 (1)
South Africa	11-14 (1)	08-10 (1) 10-14 (2) 14-15 (1)	07-09 (1) 12-15 (1) 15-18 (2) 18-20 (1) 22-01 (1)	20-21 (1) 21-23 (2) 23-01 (1) 22-00 (1)*
Central & South Asia	*Nil*	18-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-21 (1)	06-08 (1) 19-21 (1)
Southeast Asia	*Nil*	17-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	06-08 (1)
Far East	*Nil*	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-13 (1) 17-19 (1) 19-22 (1) 22-01 (1)	03-06 (1) 06-07 (2) 07-08 (1) 06-07 (1)*
South Pacific & New Zealand	16-19 (1)	12-15 (1) 15-19 (2) 19-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-21 (2) 21-23 (3) 23-02 (2) 02-07 (1)	00-01 (1) 01-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	16-19 (1)	14-16 (1) 16-19 (2) 19-21 (1)	00-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-16 (1) 16-18 (2) 18-20 (1) 20-00 (2)	02-04 (1) 04-07 (2) 07-09 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Northern & Central South America	12-15 (1) 15-17 (2) 17-18 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-17 (4) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-02 (1)	19-21 (1) 21-23 (2) 23-03 (3) 03-06 (2) 06-07 (1) 21-00 (1)* 00-03 (2)* 03-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-18 (4) 18-19 (2) 19-20 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 22-01 (2) 01-03 (1)	21-23 (1) 23-01 (2) 01-03 (1) 03-05 (2) 05-07 (1) 02-06 (1)*
McMurdo Sound, Antarctica	Nil	15-18 (1)	15-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 08-10 (1)	01-06 (1)

Time Zone: PDT (24 Hour Time)
WESTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	*Nil*	11-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1) 22-23 (1)*
Central & Northern Europe & CIS (former European USSR)	*Nil*	10-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (1) 21-23 (1)	19-00 (1)
Eastern Mediter-ranean & Middle East	*Nil*	09-12 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 20-22 (1)	20-23 (1)
Western & Central Africa	*Nil*	12-15 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	21-01 (1)
East Africa	*Nil*	*Nil*	12-15 (1) 15-17 (2) 17-19 (1)	20-22 (1)
South Africa	*Nil*	10-12 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	*Nil*	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-21 (1)	06-08 (1)
Southeast Asia	*Nil*	16-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-01 (1)	02-05 (1) 05-07 (2) 07-08 (1) 06-07 (1)*
Far East	*Nil*	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-20 (2) 20-22 (3) 22-23 (3) 23-01 (1)	01-02 (1) 02-06 (2) 06-07 (3) 07-08 (1) 03-07 (1)*
South Pacific & New Zealand	16-18 (1)	12-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1) 14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-01 (2)	22-23 (1) 23-00 (2) 00-06 (3) 06-07 (2) 07-08 (1) 23-02 (1)* 02-05 (2)* 05-07 (1)*
Australasia	15-18 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	12-19 (1) 19-20 (2) 20-01 (3) 01-04 (2) 04-07 (1) 07-08 (2) 08-10 (3) 10-12 (2)	00-02 (1) 02-03 (2) 03-06 (3) 06-08 2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Northern & Central South America	12-14 (1) 14-17 (2) 17-18 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-02 (1)	18-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-07 (1) 20-22 (1)* 22-02 (2)* 02-05 (1)
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-17 (4) 17-19 (2) 19-20 (1)	04-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-22 (2) 22-00 (1)	20-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	*Nil*	13-16 (1) 16-18 (2) 18-20 (1)	08-10 (1) 16-19 (1) 19-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	01-06 (1)

**Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*
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.

The late Natan Sterental, N4/OA4OS (right), shown in Florida with George Jacobs, W3ASK.

an average count of 50 meteors an hour. Ionization produced by theses meteors as they enter the Earth's atmosphere should make possible numerous meteor-scatter-type openings on the 6 and 2 meter bands. The range of such openings could be up to several hundred miles and at times somewhat greater.

August is not usually a good month for auroral-type propagation on the VHF bands, but some could occur during times when the ionosphere is disturbed. Check the Last-Minute Forecast at the beginning of this column for those days that are expected to be Below Normal or Disturbed. These are the days when chances are best for auroral-type openings on the VHF bands.

Auroral-scatter openings can range from a few hundred up to about a thousand miles, and are usually characterized by very rapid flutter fading and Doppler shift on SSB signals.

Natan Sterental, N4/OA4OS Silent Key

It is with deep personal sadness that I report the death of Natan Sterental, N4/OA4OS, on January 11, 1997 at age 67. Natan was among the world's most known voices on the HF amateur bands. He was first licensed as OA4OS in his home town of Lima, Peru almost 40 years ago. For the past five years he had operated as N4/OA4OS from his new home in Miami, Florida.

OA4OS was a true Olympian in amateur radio. He was holder of almost every major DX and special award. More important, however, Natan was the life and spirit of amateur radio itself. He was always available to assist in an emergency, to give a helping hand with a phone patch, to alert other amateurs to the presence of a rare DX station, to ragchew, and to bring new blood into amateur radio.

Natan was a part of an amateur radio family. His wife Becky is OA4AJ, his son Benny is OA4OS, his daughter Esther is OA4CS, and his late daughter Lilli was OA4ES. The Sterental home in Lima was always open to visiting radio amateurs, and the list of visitors would fill a small callbook!

I first worked Natan in 1962. This contact grew over the years into a family relationship. He was my "Peruvian Brother," and we were one family. We shared happy and sad family occasions over the past 35 years. He will be sadly missed as a radio amateur, as a good friend, and as a brother.

Natan's key may now be silent, but his accomplishments will live on in the annals of amateur radio.

73 Natan de George, W3ASK es SK

nal levels and somewhat lower noise levels.

Some fairly good 40 meter DX openings are forecast for the early evening hours towards the east and south. Conditions should improve towards the west and south after midnight, with the band remaining open for DX until sunrise. Look for excellent short-skip openings between about 250 and 750 miles during the daylight hours and between 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should also be possible on 80 meters during the hours of darkness. Conditions should peak just as the sun begins to rise on the "light" side of the path. Try 80 meters for short-skip openings up to about 250 miles during the daylight hours and between 250 and 2300 miles at night.

It's still too early for 160 meter DX openings. However, an occasional one may be possible during the hours of darkness and the sunrise period. Short-skip on 160 looks good during the hours of darkness for distances up to at least 1300 miles.

Since the summer propagation season usually ends by mid-September, this month's DX Propagation Charts cover only a one-month period rather than the usual two months. Short-Skip Charts for August appeared last month.

VHF Ionospheric Openings

Although sporadic-*E* ionization is expected to decrease during August, some 6 meter short-skip openings still should be possible. These openings should normally extend between approximately 750 and 1300 miles, but during periods of widespread sporadic-*E* ionization 6 meter "two-hop" openings may be possible up to as great as 2500 miles. During periods of intense sporadic-*E* ionization also check for possible short-skip openings on 2 meters over a range of about 1100 to 1300 miles.

What is likely to be the year's most prolonged and intensive meteor shower should take place between August 10 and 14. Called the *Perseids*, it's expected to peak on August 12 with

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(continued on page 107)

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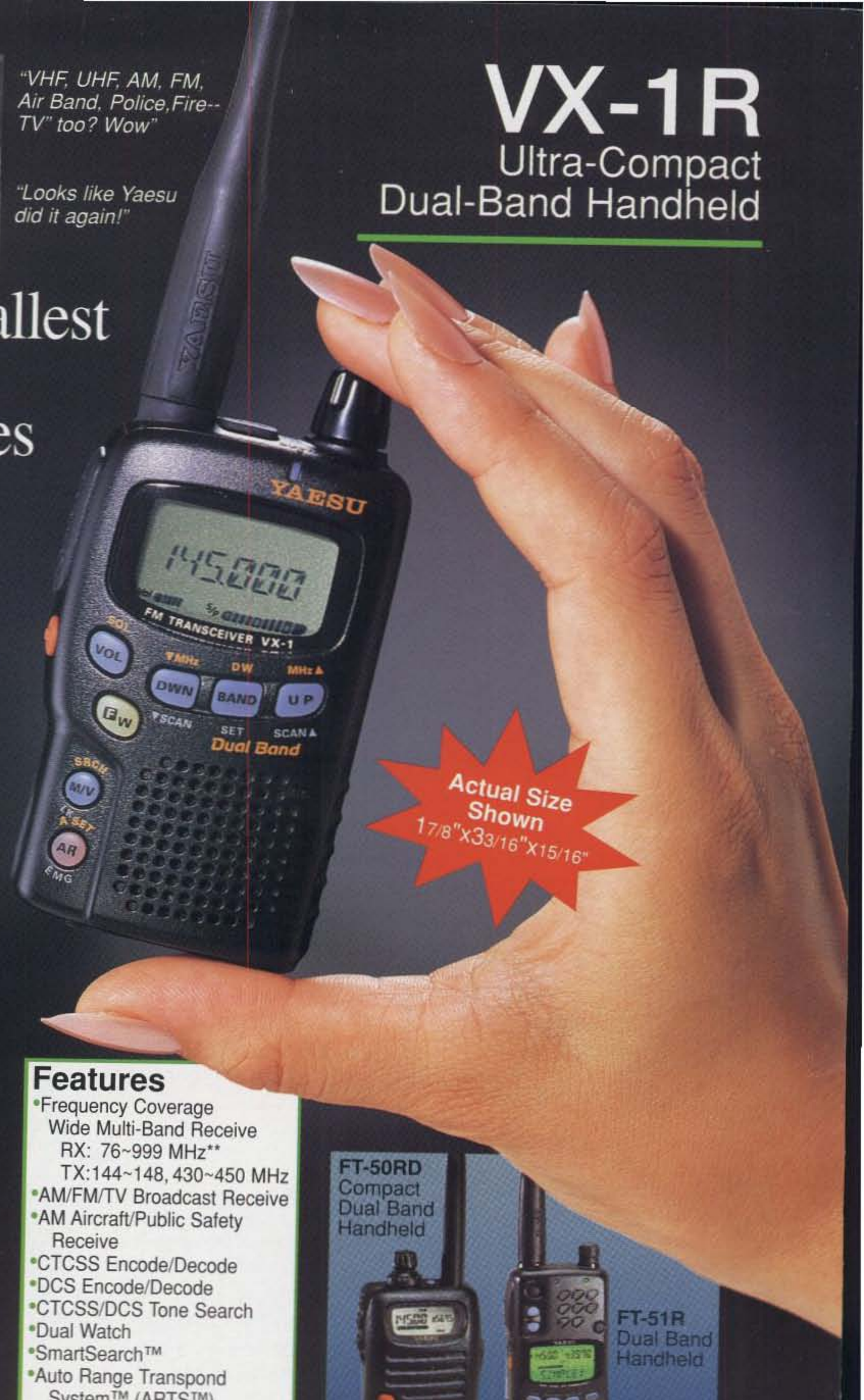

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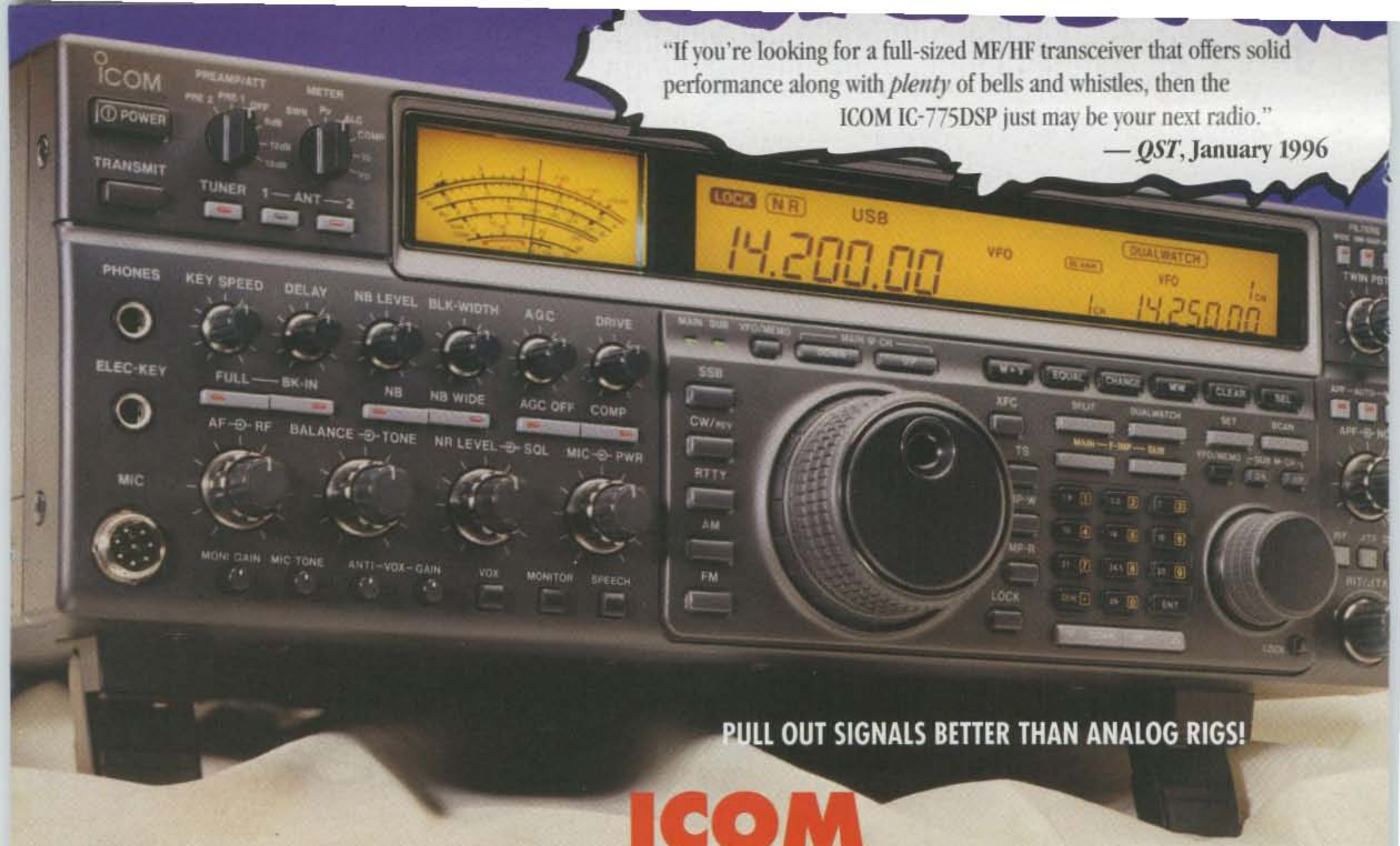

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