ICD 08241

Amateur Radio

CQ

SERVING AMATEUR RADIO SINCE 1945

FEBRUARY 1995

1945 CQ 1995

50th Anniversary

This Issue

U.S. $4.95 CANADA

02 >

0 74851 08241 6

On the cover: Ted, WA4VCC, and Itice, KB4CSE, Ft. Mill, SC.

THE RADIO AMATEUR'S JOURNAL

Explore New Frontiers!

Advanced technology moves Kenwood's HF rigs to the top.

WINTER CASH BACK OFFER!
On Selected Radios
See Kenwood Dealer For Details

TS-450SAT/S • TS-690S

- 160m to 10m amateur band operation, 500kHz to 30MHz general coverage receiver • 6m amateur band and 50–54MHz general coverage receive (TS-690S)
- DDS (Direct Digital Synthesizer) & digital PLL system
- AIP (Advanced Intercept Point) system
- Automatic antenna tuner (built-in or optional)
- IF shift function tuning • AF notch filter
- Heavy duty cycle design • 100 memory channels

TS-850SAT/S

- 160m to 10m amateur band operation, 100kHz to 30MHz general coverage receiver • DDS (Direct Digital Synthesizer) & digital PLL system • AIP (Advanced Intercept Point) system
- Automatic antenna tuner (built-in or optional)
- IF slope tuning • IF notch filter
- Electronic message keyer circuit with weighting control
- 100 memory channels • Digital recording system (optional)

TS-950SDX

- 160m to 10m amateur band operation, 100kHz to 30MHz general coverage receiver
- Built-in DSP (Digital Signal Processor)
- MOS-type FET final section • Dual frequency receive
- 150W PEP output (SSB/CW/FSK/FM)
- DDS (Direct Digital Synthesizer) • Menu system
- AIP (Advanced Intercept Point) system
- Automatic antenna tuner • IF slope tuning • IF notch filter
- 100 memory channels • Built-in AC power supply

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
•Customer Support/Brochures (310) 639-5300
•Repair Locations/Parts (800) KENWOOD •Bulletin Board Service (BBS) (310) 761-8284
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

KENWOOD

94ARD-1084

Kenwood's TM-733A -

Faster and Faster!

WINTER CASH BACK OFFER!
On Selected Radios
See Kenwood Dealer For Details

TM-733A
FM DUAL BANDER

1200/9600bps packet compatible

Theft Deterrent Faceplate

Features

- Max. 50W output (144MHz), 35W (440MHz)
- "6-in-1" programmable memory
- 72 memory channels
- Time-Operated & Carrier-Operated scan stop modes
- Dual receive on same band (VHF+VHF or UHF+UHF)
- Built-in DTSS selective calling with page
- ASC (Auto Simplex Checker)
- Built-in CTCSS encoder & optional TSU-8 decoder
- Key function display ■ Automatic band change
- AIP (Advanced Intercept Point) ■ Cross-band repeater
- Selectable frequency step (5, 10, 12.5, 15, 20 or 25kHz)
- Wireless clone function ■ Incremental MHz key
- S-meter squelch
- Tone alert system with elapsed time indicator
- Separate speaker terminals for each band (switchable)
- Auto repeater offset (144MHz)
- Repeater reverse switch & offset switch
- 3-position RF output power control
- Dimmer control ■ Auto power-off

*An optional accessory kit is required to mount the front panel separately from the main unit.

Kenwood's new FM dual bander, the TM-733A (144MHz/440MHz), is specially tailored for hassle-free mobile communications with a unique "6-in-1" programmable memory. Six entire operating profiles—including everything from frequency range to dimmer level—can be stored, ready for instant recall. So there's virtually no need to adjust your settings. The detachable front panel has a high-visibility LCD with key function display to make on-the-move operation even easier. Of course, this compact transceiver has a full complement of sophisticated features, including 72 memory channels, DTSS selective calling and page functions, ASC (checks whether you can switch from a repeater to simplex communications), AIP (Kenwood's exclusive circuit for enhancing RX performance), and a jack for 1200/9600bps packet use. And as well as receiving simultaneously on VHF and UHF bands, the TM-733A can receive two frequencies on the same band (VHF+VHF or UHF+UHF). There's even an optional quick-release kit as an added anti-theft measure. So check out the TM-733A-a sensation bred from inspiration.

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario L5T 1S8

KENWOOD

94ARD-1087

Introducing another "gotta-have" breakthrough from **hy-gain** by Telex

THE DCU-1 PATHFINDER DIGITAL CONTROL SYSTEM

Doesn't the DCU-1 Pathfinder look great? Digital and analog displays. Fantastic. And those six convenient presets. Bet you can't wait to give one a push. It's an *all-in-one* computer-interface unit, too. Now that should have you jumping right out of your chair. Ready for more? The DCU-1 Pathfinder also features:

- automatic brake delay and motor slowdown
- automatic calibration
- programmable center of rotation
- RS-232 control with pass-through

The DCU-1 Pathfinder is a digital control system and is paired with your choice of rotators—the T²X Tailtwister™ or HAM IV.

It's time. Hustle to your nearest amateur dealer, *but be forewarned*, you won't be coming home empty-handed.

hy-gain by Telex

Telex Communications®, Inc.
8601 East Cornhusker Highway
Lincoln, NE 68505 USA
Telephone: 402-467-5321
Facsimile: 402-467-3279

MASTHEAD

EDITORIAL STAFF
Alan M. Dorhoffer, K2EEK, Editor
Gail M. Schieber, Managing Editor
Nancy Barry, Editorial Assistant
Lew McCoy, W1ICP, Technical Representative
Richard S. Moseson, NW2L, On-Line Coordinator

CONTRIBUTING STAFF
Doug DeMaw, W1FB, Doug's Desk
John Dorr, K1AR, Contest Calendar
Chod Harris, VP2ML, DX
Dave Ingram, K4TWJ, Special Interests
George Jacobs, W3ASK, Propagation
Joe Lynch, N6CL, VHF
Frederick O. Maia, W5YI, FCC Correspondent
Irwin Math, WA2NDM, Math's Notes
Bill Orr, W6SAI, Radio Fundamentals
Buck Rogers, K4ABT, Packet Radio Editor
Karl T. Thurber, Jr., W8FX, Antennas & Software
Norm Van Raay, WA3RTY, Awards & USA-CA
Bill Welsh, W6DDB, Novice

AWARD MANAGEMENT
Jim Dionne, K1MEM, WAZ Award
Norman Koch, K6ZDL, WPX Award
Norm Van Raay, WA3RTY, USA-CA Award
Billy Williams, N4UF, CQ DX Award

CONTEST MANAGEMENT
Steve Bolia, N8BJQ, WPX Contest Director
Robert Cox, K3EST, WW DX Contest Director
Roy Gould, KT1N, RTTY Contest Director
David L. Thompson, K4JRB, 160M Contest Director

BUSINESS STAFF
Richard A. Ross, K2MGA, Publisher
John Dorr, K1AR, General Manager
Arnie Sposato, N2IQO, Advertising Manager
Tracy A. Parbst, Sales Assistant
Frank V. Fuzia, Controller
John Dorr, K1AR, Director of Marketing

CIRCULATION STAFF
Simon Schatzman, Circulation Director
Catherine Ross, Circulation Manager
Melissa Nitschke, Operations Manager
Carol Licata, Data Processing
Denise Pyne, Customer Service

PRODUCTION STAFF
Elizabeth Ryan, Art Director
Barbara Terzo, Associate Art Director
Susan Reale, Assistant Art Director
Edmond Pesonen, Electronic Composition Manager
Dorothy Kehrwieder, Production Manager
Tracy A. Parbst, Production
Emily Kreutz, Production
Pat Le Blanc, Phototypographer
Hal Keith, Illustrator
Larry Mulvehill, WB2ZPI, Staff Photographer
Joe Veras, N4QB, Special Projects Photographer

A publication of

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

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

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

CQ The Radio Amateur's Journal

ON THE COVER: That's Ted Goldthorpe, WA4VCC, and his wife Itice, KB4CSE, making Ham Radio a family affair down in Fort Mill, South Carolina. Ted does a bit of DXing from time to time, and both are very active VHFers. (Photo by Larry Mulvehill, WB2ZPI)

FEBRUARY 1995 **VOL. 51 NO. 2**

FEATURES

DEPARTMENTS

ZERO BIAS

EDITORIAL

One good thing, or perhaps opportunity is a better word, that occurs during a sunspot low is the chance to hone our operating skills. Most of us are forced to listen long and hard for any and all elusive signals. A lot of us start looking at the clock, not so much to find out what time it is, but to automatically add or subtract hours to see what parts of the world are awake or asleep. On one level we know that it's only a matter of time before things perk up to near bedlam, but it's getting from here to there that induces stress in some people.

Now we know that during lulls the folks who hate contests, DXpeditions, and probably nets are happy with amateur radio being "what it should be." This is their "real" state. The rest get kind of edgy almost waiting for something to happen. Even though it's a cycle, it may be a long wait for some. If anything should get depressed over this it should be your frequency not your psyche. As you descend the depths of frequency, there's more and more out there to work. In fact, there should be a noticeable increase in participation in our CQ 160 meter contests this year.

Some of us, however, just might fixate and spend hours tuning across bands simply hearing "shhhhhhhhhhhhhhh" and perhaps pausing at what could either be a barely perceptible human voice or a heterodyne. Well, we can surmise that these folks will have a very finely developed sense of hearing after a while and be able to pick out a signal from apparent nothingness. While we may sympathize and tsk tsk at the actions of our fellow amateur, he/she is not really wasting time burning out brain cells, but is in training for the next big one down the road. I guess that a very small percentage would consider themselves in training and that the vast majority of them are fixated, but all it takes is a busy contest weekend or a wee bit of propagation to make believers of us all.

Now reality dictates that after a short while the new cycle starts and the vast wastelands have readable signals once again. In the meantime, our indominable spirit keeps us moving towards new modes, new gear, and new anything that will allow us to communicate. Whether we're preparing for the next cycle, trying to get through the remnants of this one, or simply trying to figure out what happened to everyone, we hold strong to the idea "They're out there, somewhere, and I'm going to find them." The pleasant surprise comes when we do try something different and new and there is a positive response to our efforts.

I've got my graph paper out and I've started sketching and making drawings of things I'm going to do in the shack and things to improve my antenna installation. I figure that I should have time this year to make several improvements before the new cycle starts. I know I say the same basic thing every year, but something always seems to distract me. This year I'm going to get my hamfest wish list in order and find some perfect widgets to finish my station.

Miami

If it's February, it means the Miami Hamfest. It may not mean to much to you who live in the warmer climates, but to those of us who probably have experienced cold and snow by now, it means a few days of fun, amateur radio, and some warm weather. This year the Miami Hamfest is followed quickly by the one in Orlando (two weeks later), and it is a tempting thought just to linger on in Florida.

It's been a few months since our last hamfest, and it's time to get out the suitcases, make up a new 1995 list of flea-market stuff to look for, and head on out in the search of the penultimate grease-dog. This past holiday season I leaned towards the practical in the way of gifts, so it's time to nurture the ethereal side. There's nothing like the feeling you get from finding the perfect whatever at a hamfest fleamarket, especially at a bargain price. No, you may not have an immediate use for it, but someday you will, or it's the one thing you need to finish some project or another. Whatever it is, it lights that little LED in your brain, and you've got to have it to make your life complete. Of course the light dims and goes out by the time you get home. Most of the great stuff you see (and buy or sell) will turn up later at another fleamarket, sometimes thousands of miles away. The secret really is that there is only a certain finite amount of good stuff around, and it's like the famous holiday fruitcake (only eight ever made). People get them, look at them, take them home, and at some future point pass them along.

W1ICP Modified

Recently, our own living legend, Lew McCoy, W1ICP, underwent open-heart surgery, and I'm glad to report that the mods were quite successful and the new and improved (if that's possible) W1ICP is well underway to complete recovery. Lew says his doctor said that the mods were guaranteed for at least 20 years. I think that goes with the provision that he stays away from hamfest food. When I was able to speak to him a few days after surgery, the first thing he wanted to talk about was not how he felt, but about whether or not his book had arrived here in time to be shipped out for the holidays. He also wanted to know when was he going to get a batch to autograph and send out. Yes, his new-book, *Lew McCoy On Antennas,* arrived in plenty of time to be shipped out as holiday gifts, and Lew is making plans to be at several hamfests this year to autograph copies. Typically, his inquisitive mind was taking in all of the technology involved with his operation and the addition of a pacemaker to his everyday life. He asked if we had ever covered the technology, and I said yes, in 1978. I can only guess (it's probably certain) that we will be receiving an update on how the technology has changed and how it all works. I know he'd like to be at the Miami show this month, but it depends on how he feels at the time. In the meantime, if you get a chance, drop a card to him.

1995

As we enter our 51st year, things are moving along at a fast pace. I've gotten some great construction articles and expect a few more. I know that a lot of people say we don't build anymore, but judging from what I see in letters and at hamfests, I know that people will build something if it's presented right. While I don't think that the major equipment manufacturers have anything to fear from homebrewers, I believe that the intrinsic value of the experience to someone who builds some gear is far greater than what it is or what it may be compared to. It's not a competition to outdo something. We also have new books in the works and new things guaranteed to put more fun in your amateur radio life.

In the January issue we were more interested in the historical perspective of *CQ* and the hobby than to once again tackle New Year's resolutions. Resolutions are those things which we are going to make an effort to avoid, or rid ourselves of something negative. A positive resolution is probably more in order and hopefully easier to keep. Why not think about the things in the hobby that you'd like to try or give greater attention to, including having more fun? Amateur radio is really not that serious although it can be at times. For the most part it can be and is fun to do and be part of. Resolve to have more fun and enjoy more of whatever part of the hobby you like in '95.

Ooops

One of the people we inadvertently forgot to thank in the January issue was Jon Kummer, WA2OJK. Jon very kindly let us use the photographs, periodicals and tubes shown on the cover, and went out of his way to facilitate their use. Many thanks for the help, Jon. The National Receiver (which still works great, by the way) is from Dick's collection.

73, Alan, K2EEK

Can your multi-mode adapt to the changing world?

Ours can.

It seems good hardware is becoming an endangered species in multi-modes. Not so with AEA's PK-900. It is the hardware that allows the PK-900 to evolve, to grow as you do. We've given the PK-900 three dedicated processors and an innovative circuit design for power and flexibility.

Switch between radio ports with a keystroke using the dual simultaneous ports. Gateway from packet to AMTOR, packet to PACTOR, and packet to packet. Bounce packets off satellites using the optional 9600 bps modem.

The PK-900 has the same eight-pole Chebyshev bandpass filter as the acclaimed PK-232MBX for superior HF performance. It has hardware-memory ARQ for reduced errors. The easy-to-read LCD panel keeps you informed of all activity at all times.

You want modems? The PK-900 offers twenty software selectable modems and there are optimized modems for AMTOR, PACTOR, 45 baud RTTY, and packet. There is even a TAPR disconnect header so you can plug in other modems.

Call AEA's Literature Request Line at (800) 432-8873 for more information, or call us direct at (206) 774-5554. See your favorite ham radio dealer for best prices.

The PK-900 is the natural selection.

Connect with us

ANNOUNCEMENTS

•Amateur of the Year Nominees Sought – Nominations are now being sought for the 1995 award plaques to be presented at the ARRL Atlantic Division Convention held in association with the Rochester, NY Hamfest, May 19–21. "Amateur of the Year" should be outstanding, all-around amateurs from the Atlantic Division with a strong record of service to the amateur community. An award for lifetime service to amateur radio, the "Grand Ole Ham," is open to Atlantic Division OMs and YLs who have been licensed for at least 30 years or are at least 50 years of age. The Atlantic Division "Technical Achievement" award may be presented to an individual or group. Complete information on the awards and nomination procedures is available from the Rochester Hamfest, 300 White Spruce Blvd., Rochester, NY 14623 (business hours 800-724-8515 or 716-424-7184). The deadline for nominations is April 1, 1995.

•VI5ØPEACE – The Hervey Bay ARC has been allocated the call VI5ØPEACE for the period August 1 through October 31, 1995. The Special Event is an attempt to bring together in international unity as many amateurs as possible. The call is in commemoration of the men, women, and children of all nations who lost their lives during the conflict. The Hervey Bay ARC would like to hear from clubs and/or countries who would be interested in activating a special call along these lines to thus gain a greater combined image. Contact The Hervey Bay ARC, P.O. Box 829, Hervey Bay 4655, Queensland, Australia; phone (071) 25 1332.

•The following Special Events will take place during February:

N4BV, from George Washington's birthday, Mount Vernon estate, Virginia; Mount Vernon Amateur Radio Club; 1600–2000Z February 18 and 19; lower General 80–15 meters phone and CW subbands, Novice 10 meters phone subband, and 2 meter packet @ WA3TAI.MD.USA.NOAM. For certificate send QSL and 9 × 12 SASE to Steve Schneider, WB4EEA, 8602 Cushman Place, Alexandria, VA 22308.

K6AA, from 50th anniversary of the WW II Angels Gate tug boat, Los Angeles Maritime Museum, San Pedro, California; United Radio Amateur Club; 10 AM to 8 PM Friday February 3, 7 AM to 8 PM Saturday February 4, 8 AM to 5 PM Sunday February 5; 10 meter phone and 15, 40, 40 meters CW and phone. Contact the United Radio Amateur Club, Los Angeles Maritime Museum, Berth 84, Foot of Sixth Street, San Pedro, CA 90731.

6-land, from Chinese Bok Kai Festival, Marysville, California; Yuba Sutter ARC; 0000Z February 28 through 2400Z March 5; 80–10 meters phone and CW. For special QSL send QSL and #10 SASE to Callbook address of participating YSARC station.

WB7TJD, from Lost Dutchman Days, Apache Junction, Arizona; Superstition ARC; 1300–2400Z February 18 and 19; General portion of 10, 15, 20, 40 meters. For certificate send QSL and 6 × 9 SASE to SARC, P.O. Box 1551, Apache Junction, AZ 85217.

N9US, from observance of end of flight operations at Glenview Naval Air Station, Glenview, Illinois; Lake County (IL) R.A.C.E.S./ARES Group; 1500Z February 25 to 2100Z February 26; CW 3.580, 7.035, 14.030, 21.140; phone 3.880, 7.280, 14.280, 21.320, 28.430; OSCAR 10/13 satellite 145.910; packet 145.03. For certificate send QSL and 9×12 SASE to Lake County R.A.C.E.S./ARES, 1303 North Milwaukee Avenue, Libertyville, IL 60048.

•The following hamfests, etc., are slated for late January and February:

Jan. 29, **28th Villa Park, Illinois Mid Winter Hamfest**, The Odeum Exposition Center, Villa Park, Illinois. Amateur radio and electronic fleamarket, commercial booths, prize drawings, YL programs. Talk-in 144.790/145.390 MHz, 222.540/ 224.140 MHz. For more information call 708-545-9950. Sponsored by the Wheaton Community Radio Amateurs. (VE exams.)

Feb. 4, **Kerbela Hamfest**, Kerbela Shrine Temple, Knoxville, Tennessee. Dealer tables, tailgating; talk-in 146.34/94. For information contact Paul baird, KY4A, 1500 Coulter Shoals Circle, Lenoir City, TN 37771 (615-986-9562). (Exams by WCARS-VEC. Registration until 9:30 AM. Mail completed form 610 with check for $5.90 payable to WCARS-VEC Ray Adams, N4BAQ, 5833 Clinton Hwy., Suite 203, Knoxville, TN 37912-2545, phone 615-688-7771.)

Feb. 4, **Niagara Peninsula ARC Fleamarket**, C.A.W. Hall, St Catharines, ON, Canada. Talk-in on 147.24/.84. For further information contact NPARC, P.O. Box 20036, Grantham Postal Outlet, St. Catharines, Ontario, Canada L2M 7W7; or call Marg Sewell, VE3HOX, 905-680-1211.

Feb. 5, **Chestnut Ridge ARC Winterfest**, Latrobe American Legion, Latrobe, Pennsylvania. Door prizes; tables available; talk-in on 145.150 (-600). For information contact Tim Bartlow, KA3BXA, 213 South Washington Ave., Greensburg, PA 15601 (412-834-6517).

Feb. 6, **West Valley ARC Radio Equipment Auction**, St. Clement of Rome Catholic Church Social Hall, Sun City, Arizona. Talk-in on 147.30+. For more information contact WVARC, P.O. Box 1573, Sun City, AZ 85372 (602-546-2119).

Feb. 11, **22nd Annual Charleston, South Carolina Hamfest & Computer Show**, Charlestowne Landing State Park under the dome, Charleston, South Carolina. Prizes, YL activities. Talk-in freqs.: downtown 146.79-; north of Charleston 145.25-; other area repeaters 147.18+, 146.835-, 147.27+, 146.76-, 147.30+, 443.8+, 444.3+. For more information contact Jenny Myers, WA4NGV, 2630 Dellwood Avenue, Charleston, SC 29405-6814. (VE exams at St. Andrews High School on Wappo Rd. Bring original and copy of licenseany CSCE's, two IDs, one with photo. Walk-in basis only; begins 12 noon. For info call Ed, KC4OOZ, 803-871-4368, or gary, AC4PL, 803-766-3440.)

Feb. 11, **OCARC Hamfest**, Goshen, New York. For more information call Bruce Sparrow, N2KTV, 914-496-9091.

Feb. 11, **14th Annual Midwinter Madness**, National Sports Center, Blaine, Minnesota. Computers, software, hardware, components, peripherals, amateur radio equipment. Over 30 commercial vendors, over 250 hobby market tables of used equipment. For more information contact RARC, P.O. Box 22613, Robbinsdale, MN 55422 (612-537-1722).

Feb. 12, **Mansfield, Ohio Mid-Winter Hamfest & Computer Show**, Richland County Fairgrounds, Mansfield, Ohio. Prizes; over 400-table fleamarket. Talk-in call W8WE on 146.34/94. For more information contact Pat

(Continued on p. 8)

Imagine this much power unleashed by a 9-volt battery. That's the KPC-3.

Kantronics KPC-3

It's one of the smallest TNCs you can buy. One of the least expensive. It uses the least power. And it's extremely user-friendly. Yet it offers enough performance to satisfy even advanced users. The KPC-3 has more than 20K in personal mailbox space that is inexpensively expandable to 100K; it runs on a 9-volt battery, so it's portable; and it's very affordable. So if you've been wondering why packet beginners and veterans alike choose the KPC-3, now you know. Maybe you should catch the same wave.

Kantronics

For more information, contact your authorized Kantronics dealer or Kantronics at 1202 E. 23rd St., Lawrence, KS 66046-5006 913-842-7745 FAX 913-842-2021.

DEMAND THE BEST

DJ-582T *Superior Performance*

The Right Features. The new Alinco DJ-582T offers you a distinct alternative to the many radios on the market today that inconvenience the user with unnecessarily difficult operation. Alinco's DJ-582T gives you everything you want in a handheld with the kind of user-friendly design even the most advanced amateur radio enthusiasts will appreciate. Improvement on previous models include an accelerated scan speed up to 2 times faster, a separate low power PTT switch, and a highly durable keypad.

Sophistication. Providing cross-band repeat, full duplex operation, a backlit keypad, 8 scanning modes, CTCSS encode and decode, DSQ private paging, and an exceptional receive capacity of 130-174 MHz, 420-474 MHz, and AM 108-136 MHz.

Power. The DJ-582T delivers a full 5 watts of power with the optional EBP-22N 12V battery, and our EMS-8Z Remote Speaker Microphone offers remote command of memory channels, plus scanning features.

130.000 – 173.995 MHz FM (RX)
144.000 – 147.995 MHz FM (TX)
108.000 – 136.000 MHz AM (RX)
420.000 – 470.000 MHz FM (RX)
438.000 – 449.995 MHz FM (TX)

- Cross Band Repeat
- Super Low Battery Consumption Function
- Full Duplex and Dual Watch Capability
- CTCSS Encode and Decode Standard
- 8 Scanning Modes
- Odd Splits on All Memory Channels
- Illuminated Key Pad
- Auto Power Off
- Channel Display Mode

DJ-G1T (2M HT)

The ALINCO DJ-G1T offers a rare combination found in today's HT's:

Compact Construction and a User Friendly Control Design. The Ham operator has easy access to both the dial controls and DTMF keypad, and the Large LCD display adds to the convenience giving you a clear readout of the operating frequency.

Bonus Feature!! CHANNEL SCOPE

Alinco's Channel Scope technology allows you to visually monitor activity on your favorite frequencies as you simultaneously tune into your local repeater. The DJ-G1T displays signal strengths of 7 memory channels at a time to ensure that you don't miss out on the action. The DJ-G1T is the first of its kind to offer this incredible feature, easily accessible with just a couple of keystrokes.

108.000 – 173.995 MHz RX
440.000 – 449.995 MHz RX
144.000 – 147.995 MHz TX

- Extra Large LCD Display
- 80 Memory Channels
- Auto Dial Pause
- 5 Auto Dialer Memories
- DSQ Paging Feature
- Cross-Band Semi Duplex
- 6 scan modes
- Odd Splits on All Memory Channels
- Low Battery Voltage indicator
- Auto Power Off
- CTCSS Encode standard

Better Products, Better Service.
See for yourself why people are coming to ALINCO.

ALINCO ELECTRONICS INC.
438 Amapola Ave., #130,
Torrance, CA 90501
Phone: (310) 618-8616
Fax: (310) 618-8758

Other Great Products from ALINCO

DR-130T

DR-M06T

DR-600T/B

DR-150T

FULL ACCESS MOVES YOU AHEAD

Engineered for Satisfaction. Alinco's DR-150T sets a new industry standard for 2 meter mobiles, featuring up-to-the-minute technology and a full-powered 50 watts.
So advanced and yet so simple to use, the DR-150T will more than satisfy the needs of beginners and Ham veterans alike.

Channel Scope Sweep Scan

Enjoy visual scanning capability of multiple frequencies along with simultaneous receive audio!!!

While in the channel scope mode, activate the scan function and quickly access only those frequencies that show a strong signal indication. The DR-150T's "S-meter" squelch control has 8 adjustable settings for custom operation. With the DR-150's built-in band scan, program scan and memory scan modes, the radio may be set to stop on either a busy or a vacant channel. Also, the DR-150T gives you a visual display confirming the direction of the scan, a feature which adds to the overall user friendly construction that this rig has to offer.

New Safety Dialer

Alinco has specially designed the DR-150T for mobile-safe operation. The new Safety Dialer feature enables the operator with complete control of auto dial transmissions simply with the equipped remote mic. Depressing the PTT in conjunction with either the up/down buttons gives you simple and direct access preventing any distraction while driving.

Features

- ✻ Frequency Range
- ✻ Receive: 108.000 – 173.995 MHz (AM, FM)
  440.000 – 449.995 MHz (AM, FM)
  Transmit: 144.000 – 147.995 MHz (FM)
- ✻ Power Output
  High: 50 W, Medium: 25 W, Low: 10W
- ✻ Remote Control by Microphone
- ✔ Channel Scope (Visual Search)
- ✻ Various Scan Modes
- ✻ 100 Memory Channels plus 1 Call Channel Memory, 1 Program Scan frequency Memory
- ✔ LITZ Function Capability (The US First Emergency Alert Monitoring Feature)
- ✻ S meter Squelch Function
- ✻ Tone Burst Function
- ✻ Built in RF attenuator
- ✻ Built in 9600 bps/Phone Patch Interface
- ✻ Built in Tone Encoder (50 Tones)
- ✔ Safty Dialer (5 memory channels)
- ✻ DSQ Function
- ✻ Direct Frequency Entry from the DTMF microphone
- ✻ DTMF tone decoder
- ✻ 2 VFO's (A&B)
- ✻ TOT (Time Out Timer)
- ✻ Channel Display
- ✻ Tone Scan Function
- ✻ Air Clone
- ✻ Cable Clone

✔ NEW INNOVATIVE FEATURES

NEW

(FCC approval pending)

Size: 5-1/2" W x 1-9/16 H" x 6" D

ALINCO ELECTRONICS INC.
438 Amapola Ave., #130, Torrance, CA 90501
Phone: (310) 618-8616 / Fax: (310) 618-8758

Better Products, Better Service. See for yourself why people are coming to ALINCO.

> 12 STORE BUYING POWER! <

HAM RADIO OUTLET®

WORLDWIDE DISTRIBUTION

YAESU Coupons Good Thru March 31st

Phone Hours:
9:30 AM to 5:30 PM
Store Walk-In Hours:
10:00 AM - 5:30 PM • Closed Sundays

CALL TOLL FREE:

West	1-800-854-6046
Mountain	1-800-444-9476
Southeast	1-800-444-7927
Mid-Atlantic	1-800-444-4799
Northeast	1-800-644-4476
New England	1-800-444-0047

Toll free, incl. Hawaii, Alaska, Canada; call routed to nearest store; ***all HRO 800-lines can assist you, if the first line you call is busy, you may call another.***

Call/Write for your HRO Catalog!

ANAHEIM, CA 92801
933 N. Euclid St.
(714) 533-7373
(800) 854-6046
Janet, WA7WMB, Mgr.
Near Disneyland

OAKLAND, CA 94606
2210 Livingston St.
(510) 534-5757
(800) 854-6046
Mach, K6KAP, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 &
Claremont Mesa

SUNNYVALE, CA 94086
510 Lawrence Expwy. #102
(408) 736-9496
(800) 854-6046
Bill, K6YDQ, Mgr.
Lawrence Expwy.
So. from Hwy. 101

VAN NUYS, CA 91411
6265 Sepulveda Blvd.
(818) 988-2212
(800) 854-6046
Jon, KB6ZBI, Mgr.
San Diego Fwy.
at Victory Blvd.

NEW CASTLE, DE 19720
1509 N. Dupont Hwy.
(302) 322-7092
(800) 644-4476
John, N1IFL, Mgr.
RT.13 1/4 mi., So. I-295

PORTLAND, OR 97223
11705 S.W. Pacific Hwy.
(503) 598-0555
(800) 854-6046
Earl, KE7OA, Mgr.
Tigard-99W exit
from Hwy. 5 & 217

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

PHOENIX, AZ 85015
1702 W. Camelback Rd.
(602) 242-3515
(800) 444-9476
Gary, WB7SLY, Mgr.
East of Highway 17

ATLANTA, GA 30340
6071 Buford Highway
(404) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi.
no. of I-285

WOODBRIDGE, VA 22191
Washington D.C. area
14803 Build America Dr.
(703) 643-1063
(800) 444-4799
Jerry, WA2VGV, Mgr.
Exit 161, I-95, So. to US 1

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

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

YAESU

FT-900

NEW!

Compact HF Trans., 100W, optional built-in auto tuner
Remotable front panel, optional kit required.
QSK, 100 Mem. Gen Cov. Rx, OMNI-Glow display
Call Now For Intro. Special!

FT-840

NEW!

$25. off

100W • 12V DC • DDS • Gen. Cov. Rx, 100 mem.
Optional Ext. Auto • Tuners Available
CALL NOW FOR OUR LOW PRICING!

FT-736R

The Ultimate Oscar Machine

VHF/UHF All Mode Transceiver
25W, Built-In Pwr Supply

FT-5100/FT-5200

2M/440 Mobile

NEW!

$30. off

Ultra compact 50W/35W
94 Memories • Non-remotable
Dual in-band receive
Built-in DTMF paging/Coded Sql.
CTCSS Encode built-in
Backlit DTMF mic included

2M/440 Mobile

Ultra Compact
50w/35w 2m/440
32 memories
Built-in duplexer
Backlit DTMF
MIC included

CALL NOW FOR OUR LOW PRICING!

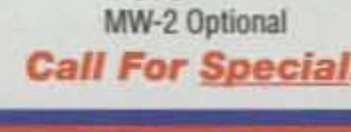
FT-1000

200W, DUAL RX,
GEN COV RX, QSK, TCXO
CALL NOW FOR OUR LOW PRICING!

FT-2200H

2 Mtr.

NEW!



$20. off

2M 50W Mobile
50 Mem. CTCSS Encode +
Paging Built-In.
MW-2 Optional
Call For Special!

HANDHELDS

NEW!

FT-11R/41R
2M 440mHz
$20. off FT-11R only

150 Mem. Channels
1.5W standard
5W option
Alpha-numeric display
Compact & back lit keypad

DUAL-BAND HANDHELDS

NEW!

FT-51R
2M/440mHz HT

2W standard
5W Optional
Alpha Numeric
120 Memories
Spectrascope
DTMF Paging
Coded SQL
Built-in
Call For Introductory Pricing!

NEW!

FT-530
2M/440mHz
$50. off FT-530 only

2W standard, 5W opt.
82 Mems
Dual in-band Rx
DTMF paging
+ coded Sql. std.
Built-in VOX & CTCSS
Auto tone search
Built-in clock
Backlit keyboard

Environmental concerns affect everyone equally. Here's one that may be doing double duty by raising additional havoc with our antennas.

Acid Rain and Your Antenna

BY RICHARD A. GENAILLE*, W4UW

Rain can be a pain in the antenna, to put it politely, and many amateurs have had their antenna systems affected by it whether they realize it or not. What is even worse is that some, or maybe many, of us have had antenna problems made worse due to acid rain! If you have ever experienced the detuning of your antenna during rainy weather, whether it be a beam or a wire type of antenna, then perhaps the following information will help you to understand what is happening and what you might be able to do to alleviate the situation.

Antenna Problems

My basic antenna system, which has been up for over 20 years, consists of a steel flagpole, turnover mast upon which is mounted a TH6DXX beam. The mast itself is configured as a vertical folded unipole and is used on both the 160 meter and 80 meter bands. A wire, two half waves in phase, horizontal antenna was used for 40 meters for many years until the opening of the WARC bands, at which time experiments were made with wire multiple dipoles to cover 40 meters and the WARC bands.[1]

After experiencing severe detuning problems with the multiple dipoles because of rain, I installed a delta loop, which I now use on 40 meters and the WARC bands and which does not appear to detune as significantly as the dipoles. I attribute this to precautions used in the construction of the delta loop which can be applied to other wire antennas and which I will describe later. These precautions may be useful in solving problems of antenna detuning due to icing, which some pundits see as changes in the antenna's dielectric constant.[2] I might mention that the resonant frequencies of my TH6DXX beam appear to lower during periods of rain, but detuning of the vertical mast on 160 and 80 meters is negligible.

I endured my rain-induced problems with my multiple-dipole antenna system until I got curious as to what could be done to alleviate the situation. When my multiple-dipole system was first installed, the maximum SWR at the target frequencies of 7.1, 10.125, 18.08, and 24.89 MHz was no higher than 1.1! The amount of shift occurring during heavy rain lowered the dipole frequencies by about 56, 129, 418, and 234 kHz, respectively, for the aforementioned band frequencies. You don't have to do much arithmetic to realize that these changes might cause your antenna to resonate at other than the frequency of choice. I think that most operators using wire antennas will find that their antenna tuner settings will change from what they had logged in dry weather as opposed to a rainy day. I can just imagine the problems encountered by those amateurs who live near a salt-water environment.

If you are someone who grew up think-

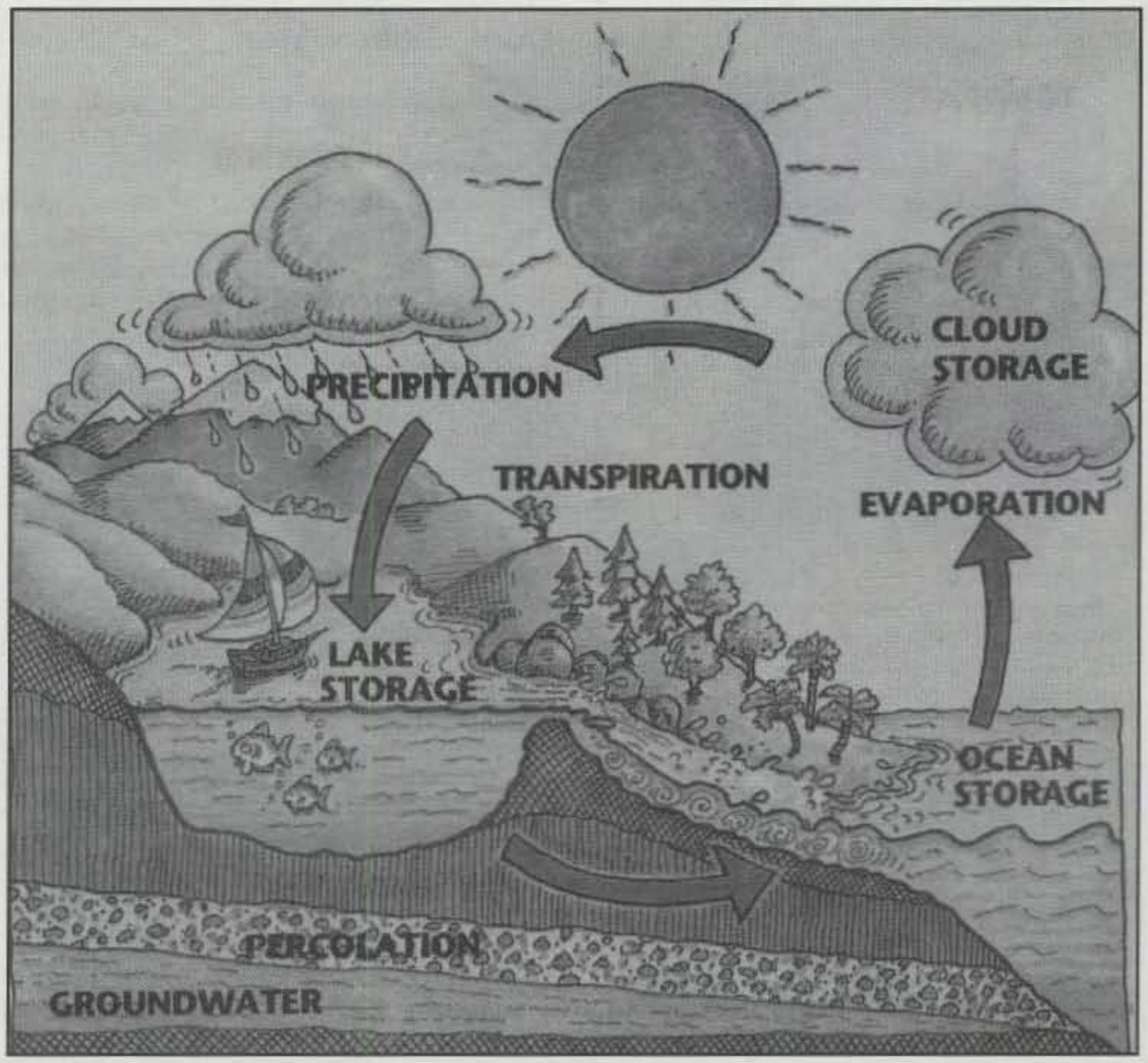


Fig. 1– The hydrologic cycle. Water evaporates. It travels into the air and becomes part of a cloud. It falls down to earth as precipitation. Then it evaporates again. This repeats over and over again in a never-ending cycle. This hydrologic cycle never stops. Water keeps moving and changing from a solid to a liquid to a gas, over and over again. Precipitation creates runoff that travels over the ground surface and helps to fill lakes and rivers. It also percolates or moves downward through openings in the soil to replenish aquifers under the ground. Some places receive more precipitation than others. These areas are usually close to oceans or large bodies of water that allow more water to evaporate and form clouds. Other areas receive less. Often these areas are far from water or near mountains. As clouds move up and over mountains, the water vapor condenses to form precipitation and freezes. Snow falls on the peaks. (Reprinted with permission from "The Story of Drinking Water," American Water Works Association, copyright 1990.)

*719 Quarterstaff Rd., Winston-Salem, NC 27104

ing of rain as being clean and pure, that you could catch it and drink it "raw," you should think again. And snow cones? Forget it! I have lost my naivete in recent years, and am beginning to look at rain water in a different light. I hope that some of what follows will make many amateurs curious about their own situations, do some basic investigation, and get some local help to determine whether or not they have a problem with acid rain, and with suggestions offered in this article, reduce or eliminate "wet antenna syndrome"!

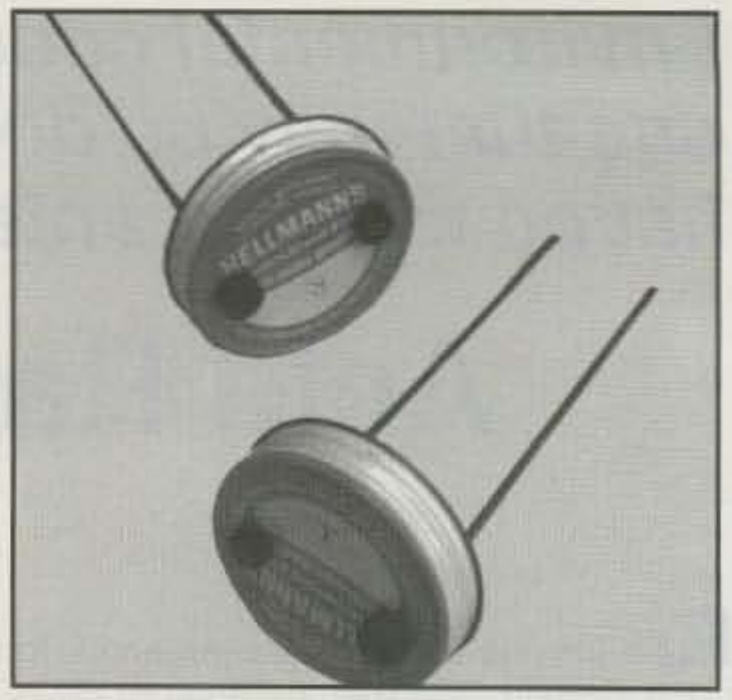


Photo 1– Simple test probes for home water analysis.

Cool, Clear Water!

Some years ago several articles that grabbed my attention appeared in my local newspaper. One of these, in September 1991, was by-lined "Forsyth May Have Most Acid Rain." Another, in November 1992, was actually a question posed by a local resident to the newspaper's answer man. It asked, "How do you get acid rain off the exterior of a car?" In both cases an explanation was given regarding what could be called acid rain. I should mention that Forsyth is a county in North Carolina, and the article dealt specifically with this state. Other states may have their own problems. I learned that acidity is measured on a pH scale, with 7.0 being neutral. Water is alkaline above that mark and acidic below it. For a definition of pH I would suggest that you consult your dictionary, which when all is said, tells you the same thing. It was said in the newspaper article that rainfall acidity in various areas in the county ranged from 3.4 (lemon juice is about 2.0) to 5.23, with a mean of 4.21 among six monitoring stations. It seems that winds from the south and west blow pollutants from as far away as Birmingham, Alabama and Tampa, Florida, as well from other areas, to this area. This means that wherever you are located there is a good possibility that pollutants are coming to you from places other than your own area, and your rain may not be as pure as you think.

How do these pollutants get mixed in with your rain? Take a look at fig. 1, which shows the hydro-logic cycle. If you study this sketch and then look at your local weather channel on TV and see the movement of various fronts and moisture, it isn't difficult to determine that if the moisture passed over Chicago or Los Angeles, or most any other major industrial area, on its way to you, you could get a good dose of rain loaded with pollutants. The pollutants will more than likely be sulfur dioxide and nitrous oxides, which undergo chemical reactions in the atmosphere that turn them into nitric and sulphuric acids which then fall back to earth with rain. Your chances aren't very good anymore that you will have rain that is clean and pure fall on you. So much for the childhood myth of good, clean rain!

Out of curiosity, I collected some rain

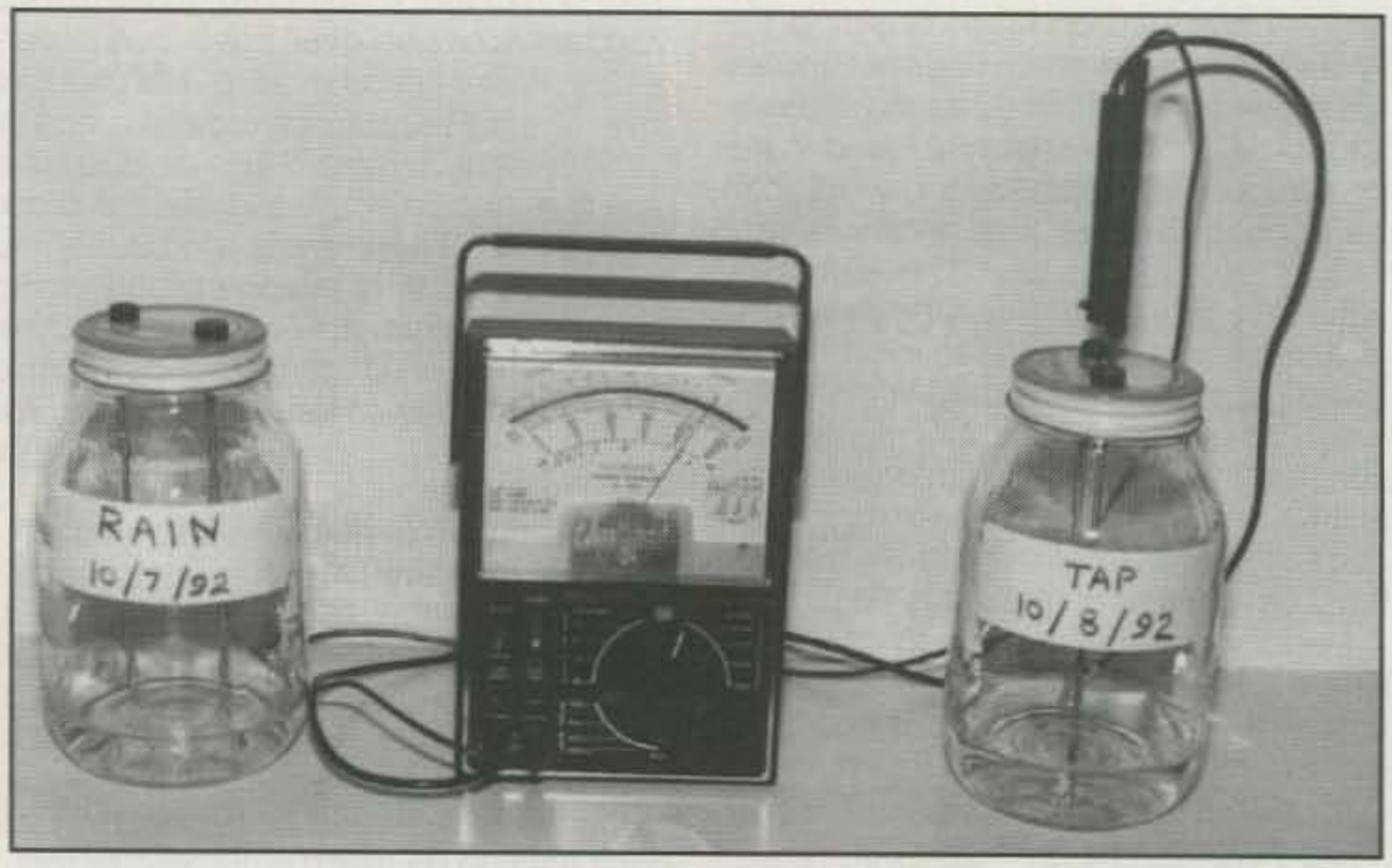


Photo 2– Testing rain and tap water at W4UW.

> 12 STORE BUYING POWER! <

HAM RADIO OUTLET

WORLDWIDE DISTRIBUTION

HURRY!!! ALINCO Coupons Expire Feb 15th

DR-1200T

1200 Baud

NEW!

2M Packet/FM Transceiver, 25W
REG. $399.
SPECIAL $279.95
(DR-1200T)

DR-1200TH2 9600 Baud CALL FOR PRICE

ALINCO

DR-M06T

6M 10W Mobile

50 - 54 Mhz FM
4 scanning modes
100 Mem. Channels
Built-in encoder
DTMF mic standard

DJ-G1T

2M/HT

$40. Mfr. Coupon

NEW!

2M HT w/440 RX
Aircraft RX
80 Memories
Encode built in
Channel-scope built in
CALL FOR LOW INTRODUCTORY PRICE!

DJ-F1T/DJ-F1T-HP

NEW!

2w 2 meter compact HT
8 scan modes
40 memories
Now 5W Version Available, Too!
CALL NOW FOR SPECIAL PRICE!

DR-600TB

2M/440 FM Transceiver

NEW!

$10. Mfr. Coupon

45W/35W + Airband RX
Detachable/Remotable Head
Keyboard freq. entry from microphone!
CALL NOW FOR SPECIAL PRICE!

DJ-180T/DJ-180T-HP

NEW!

2M 2W HT
10 Mem. Standard
upgradable to 200 Mem.
PL Encode/Decode built in
DTMF Pad Included
no keyboard entry of frequency Scanning
DJ-180T-HP 5W version now available
CALL NOW FOR SPECIAL PRICING!

DJ-580T

2M/440
Dual Band

$25. Mfr. Coupon

40 Mem Channels
DSQ, Dual Display
CTCSS Enc/Dec Built-in
Cross Band Full Duplex

CALL FOR OUR SPECIAL LOW PRICE!

DR-130T

2M Mobile

$15. Mfr. Coupon

NEW!

2M, 50W compact TCVR, Runs cool,
20 Memories, expandable to 100 Mems
with optional EJ-19U, CTCSS encode built in,
Tone SQL optional (EJ-20U)
Call Now For Special Low Price!

FREE SHIPMENT
UPS - Most items over $100

RAPID DELIVERIES FROM THE STORE NEAREST TO YOU!

ANAHEIM, CA 92801
933 N. Euclid St.
(714) 533-7373
(800) 854-6046
Janet, WA7WMB, Mgr.
Near Disneyland

OAKLAND, CA 94606
2210 Livingston St.
(510) 534-5757
(800) 854-6046
Mach, K6KAP, Mgr.
I-880 at 23rd Ave. ramp

SAN DIEGO, CA 92123
5375 Kearny Villa Rd.
(619) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA 94086
510 Lawrence Expwy. #102
(408) 736-9496
(800) 854-6046
Bill, K6YDQ, Mgr.
Lawrence Expwy. So. from Hwy. 101

VAN NUYS, CA 91411
6265 Sepulveda Blvd.
(818) 988-2212
(800) 854-6046
Jon, KB6ZBI, Mgr.
San Diego Fwy. at Victory Blvd.

NEW CASTLE, DE 19720
1509 N. Dupont Hwy.
(302) 322-7092
(800) 644-4476
John, N1IFL, Mgr.
RT.13 1/4 mi., So. I-295

PORTLAND, OR 97223
11705 S.W. Pacific Hwy.
(503) 598-0555
(800) 854-6046
Earl, KE7OA, Mgr.
Tigard-99W exit from Hwy. 5 & 217

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

PHOENIX, AZ 85015
1702 W. Camelback Rd.
(602) 242-3515
(800) 444-9476
Gary, WB7SLY, Mgr.
East of Highway 17

ATLANTA, GA 30340
6071 Buford Highway
(404) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285

WOODBRIDGE, VA 22191
Washington D.C. area
14803 Build America Dr.
(703) 643-1063
(800) 444-4799
Jerry, WA2VGV, Mgr.
Exit 161, I-95, So. to US 1

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

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

Another bright idea from

OPTOELECTRONICS

But don't just take our word for it...

"I purchased the Scout... WHAT A UNIT! VERY IMPRESSED!!!"
Allen Wilde - Littleton, MA

"I take my Scout with me everywhere - it's very effective in mobile use, either in the car or on foot. I recommend a Scout over another scanner when adding to your collection... the most effective device so far from Opto for the Scannist."
Steve Dawkins - Pensacola, FL

"This is a breakthrough product in everyway... KUDOS!"
Robert Caron - DesMoines, IA

"The Scout is AWESOME-the folks at OPTO keep coming up with winners, and this is their best yet!"
Gordon West
Gordon West Radio School

"Scantastic"
Brad Schroeder - Omaha, NE

- 400 Frequency Memory with 250 Hit Counter
- Sleep Mode to prevent data loss when battery dies
- Reaction Tune - will tune a recie with CI-V port in .01 seconds
- Beeper and Vibrator Signal indicator
- Digital Filter and Auto Capture
- CI-V Serial Data Port
- Software for uploading Frequencies to a PC included
- 16 Segment Signal Level Bargra
- 10MHz to 2.8GHz Frequency Ran
- 7 Hour Battery Operation
- Maximized Sensitivity for maxmu antenna pick-up

SCOUT.....$449.00

OPTIONS: Option 1: Mini DB32 Ant....$29.00 Option 2: AC100 Rapid Charger....$39.00 Option 3: Spectrum-CD ROM....$39.0

Scout SPECTRUM-CD ROM

The SCOUT

Scout Reaction-Tune

ORDER LINE: 800-327-5912

TEL: (305) 771-2050 FAX: (305) 771-2052
5821 NE 14TH AVE, FORT LAUDERDALE, FL, 33334
VISA,MC,C.O.D.,CASH OR MONEY ORDER-SHIPPING ADDT'L
ALL SPECIFICATIONS & PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

BASIC ANALYSIS OF LOCAL WATER

	Hardness	Alkalinity	Turbidity	pH	Date Collected
Rain	0	0	0.47	4.55	21 Feb. 1993
Tap	30	16	0.32	7.28	23 Feb. 1993
Snow	0	0	0.33	4.35	25 Feb. 1993

(Note: pH of 7 is neutral.)

ELEMENTS IN PPM
(parts per million)

	Rain	Snow	Tap
Na (Sodium)	<2.0	<2.0	7.83
K (Potassium)	<1.0	<1.0	1.66
Ca (Calcium)	<1.0	<1.0	4.91
Mg (Magnesium)	<0.5	<0.5	1.37
Ni (Nickel)	<0.05	<0.05	<0.05
Fe (Iron)	<0.10	<0.10	<0.01
Cu (Copper)	<0.05	<0.05	0.06
Zn (Zinc)	<0.10	<0.10	0.259
Mn (Manganese)	<0.01	<0.10	<0.01
Pb (Lead)	0.012	<0.0025	<0.0025

(< = less than.)

Table I– pH and elements found in local water.

water in a clean, empty mayonnaise jar and tap water in another jar. I fabricated two sets of probes from the jar tops and some insulated jacks which then had lengths of tinned copper wire soldered to them as shown in photo 1. The probe assemblies were screwed onto the jars as shown in the test setup shown in photo 2. What I was trying to do was see if I could read some resistance between the probes due to the tap water or the rain water. If you look at the meter pointer you will see that there is an indication of resistance, which is also indicative of current flow in the ohmmeter. This unscientific test rather surprised me, since I was not expecting to get a reading using tap water. The local water department allayed my fears by telling me that the tap water was slightly alkaline and therefore would pass a small current. What was interesting was that the rain water passed more current due to its acidity. Not to worry, the water department said, "The tap water is fit to drink!" Try this test for yourself and worry, too!

With my curiosity whetted (no pun intended) I decided to have the Winston-Salem Public Works Department, Utilities Division do a check on my tap water, rain water, and water melted from collected snow. One of the chemists at one of the water treatment plants in Winston-Salem not only analyzed my three samples of water, she also provided me with a copy of "The Story of Drinking Water" published by the American Water Works Association. This publication, while not a college textbook, should be required reading for anyone who has ever taken a drink of water. The results of the water analysis should be of interest to everyone. You should be able to obtain such information from your Utilities Division at no charge.

The figures in Table I show how my tap

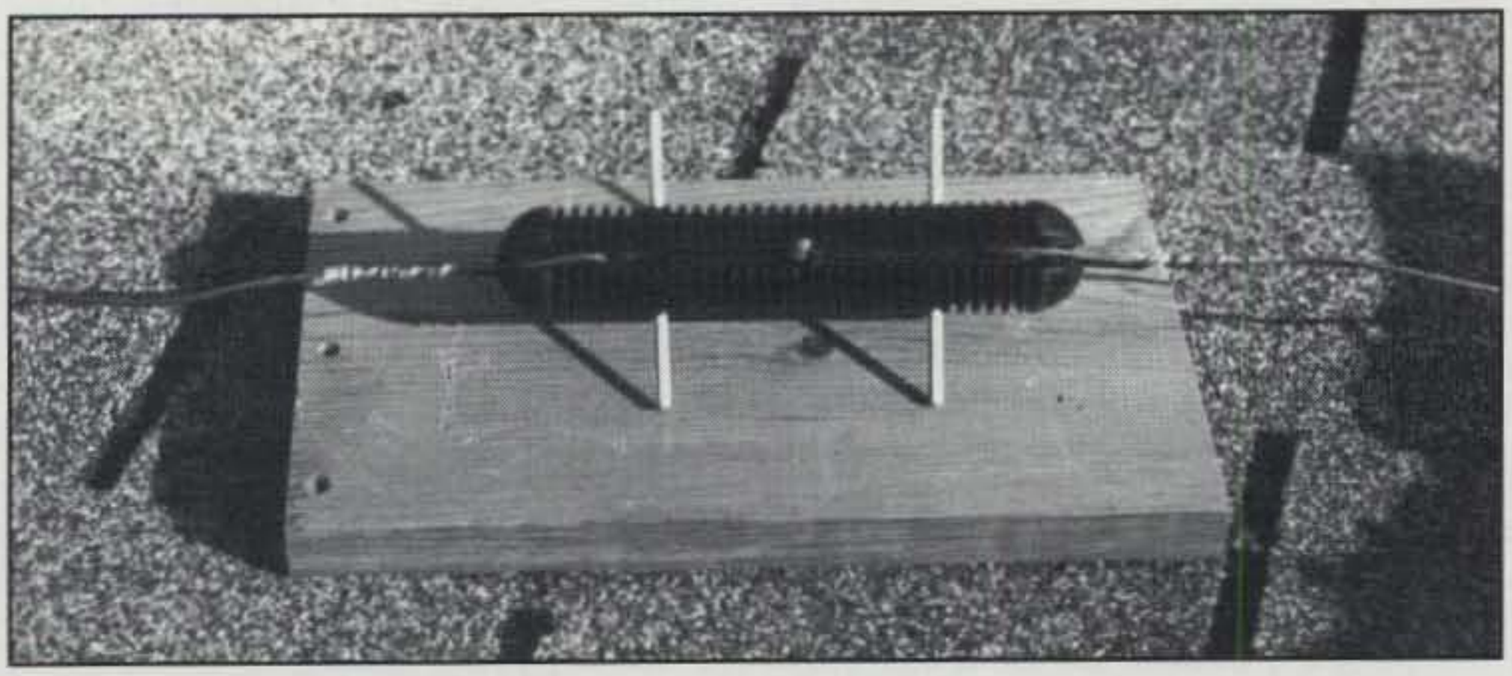


Photo 3– Modification with dowel centering pins.

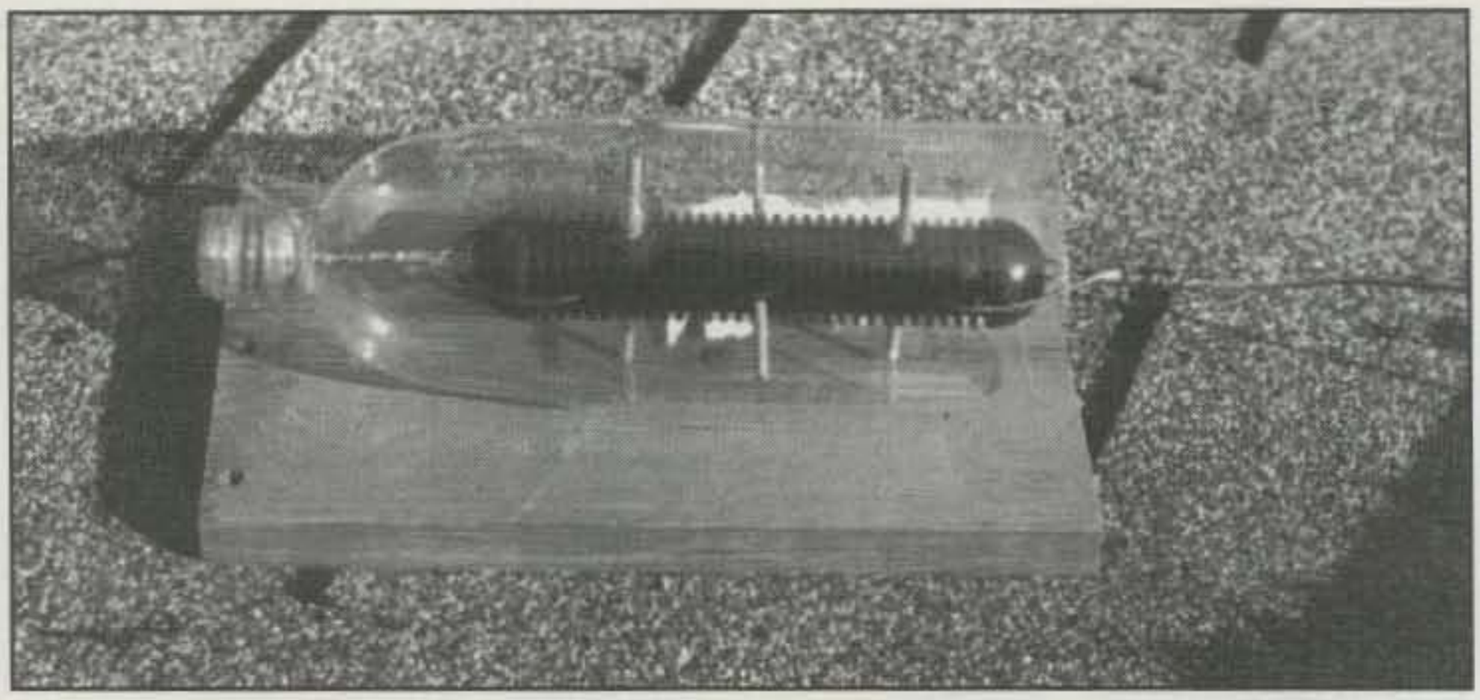


Photo 4– Modified insulator with "bootie" raincoat.

water, rain water, and snow water compared in regard to pH. One can see that the rain water and snow water are definitely acidic, while the tap water, which is river or reservoir water treated at the water treatment facility, is almost neutral. Table I also shows the makeup of each of the water samples in terms of the various elements. Note the level of lead in the rain water! You may think that the rain in your area is non-acidic, but your friendly water department chemists may have news for you! By the way, you will probably need to supply whoever tests your water comprehensively with at least 1½ pints of each liquid for them to work with, but check it out with them first.

Searching For Answers

Some time ago in a question-and-answer column in another publication a question was asked regarding the SWR increasing greatly and the operation suffering when ice accumulated on a wire antenna. The response was that when ice coats an antenna, the antenna's dielectric constant changes because of the thickness of the ice on the antenna, and so does the resonant frequency. I believe that the response told only part of the story and that the antenna should have been considered as a system complete with insulators and supporting medium. I also believe that rain or snow, acidic in nature, might have more effect on the shift in resonant frequency due to the effective lengthening of the overall antenna because of wet or iced-over insulators rather than the coating of ice on the antenna wire. Remember that in the case of a half-wave dipole antenna, the impedance at each end of the dipole is theoretically infinite. What this means is that if you have an insulator between the ends of the dipole wires and the supporting rope or wire, you had better be darn sure you use high-quality insulators—ones with a high dielectric constant and a low dissipation factor and a long path.

The supporting catenary for my multiple-dipole antenna was the 40 meter dipole which utilized a popular, black plastic insulator at each end. I believed that the weak spot on my antenna system might be the insulators, since I could not bring myself to believe that rain, even acid rain, could cause as much shift in the resonant frequency of my multiple dipoles by the wire just being wet! As an aside I should mention that with a multiple-dipole system adjustments are usually made on the lowest frequency dipole first, since these adjustments have a considerable effect upon the higher frequency dipoles. Consequently, any changes to the lower frequency dipole due to ice or rain would detune the other dipoles without even considering the effect of the ice and rain on the other dipoles.

To prove what I suspected, I decided to provide some protection for my end insulators on the 40 meter antenna. I did this by covering them with empty, plastic soft-drink bottles of the liter size to keep them dry. As shown in photos 3 and 4, ⅛ inch holes were drilled at three points on the plastic insulator, and short pieces of ⅛ inch dowel, treated with water seal, were pushed through the holes such that each end sticking out of the insulator was the same and sufficient in length to position the insulator in the center of the plastic bottle. A cork was fitted into the neck of the bottle, and the support wire end of the antenna was fed through a hole in the cork. A bead of solder was placed on the wire coming out of the cork to keep the protective cover from sliding off the insulator. Silicone sealer could also be used around the cork. The antenna was reinstalled and I patiently waited for it to rain. It did. In fact, it rained many times and eureka! The change in resonances of the multiple-dipole system was negligible. There were no large changes as mentioned earlier in this article. Photos 5 and 6 show typical installations using the "bootie" covered end insulators.

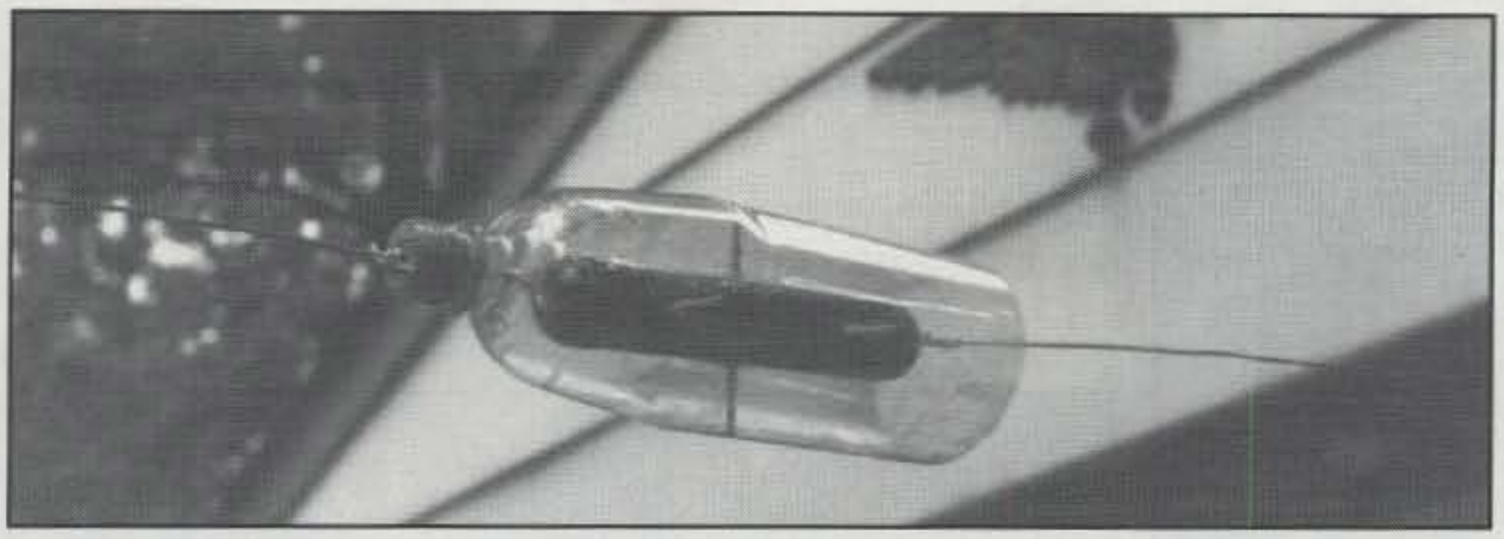


Photo 5– "Bootie" protected end insulator used for horizontal antenna.

A practical solution for horizontal dipoles—which virtually eliminates resonance changes caused by rain, snow, or ice—is to fold over each end of the dipole. As long as the center portion is not shorter than a quarter wavelength, the dipole will perform satisfactorily. To retain normal characteristics each end should be folded down the same amount and no more than 1/8 wavelength. An insulator covered with a "bootie" is used at the bend point on each end of the dipole to connect to the supporting rope or wire. The idea is to place the insulator at a point on the antenna where the impedance is much lower than at the very end.

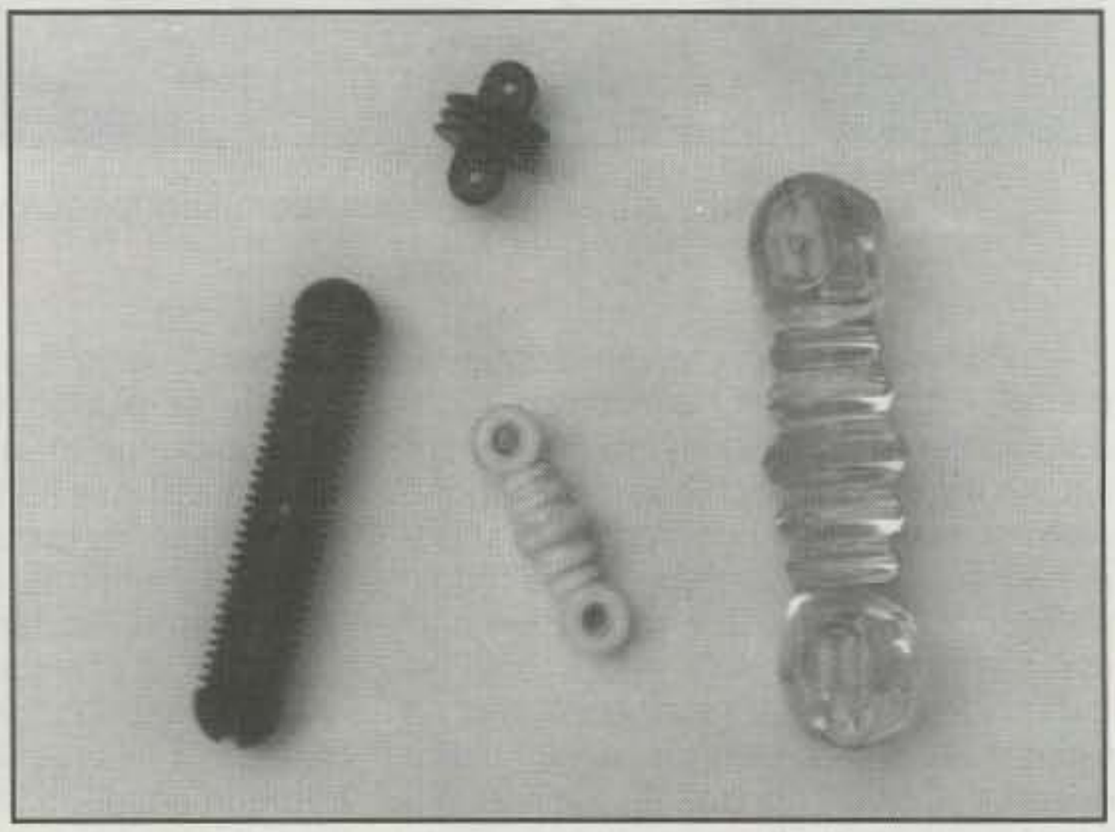
While I am not overly fond of plastic insulators, putting a "bootie" over them seems to solve the problem. In looking closely at plastic insulators that have been exposed to weather, I find them all to have had their surfaces affected, which probably helps to make them not look like insulators when acid rain covers them, but just an extension of the antenna wire.

I have not attempted to find the cause of shift of resonance of the beam during periods of heavy rain, but I suspect that trap end covers on the elements may be the culprits allowing water to leak into the traps.

Let me digress for a moment to mention that poor insulators can also cause problems in dry weather as I found out the hard way many years ago. When I first erected the turnover mast for my beam, I thoughtfully decided to use the mast as a radiator for the 80 and 160 meter bands. I accomplished this by configuring the mast into a folded unipole by fastening RG8 coax cable, with the inner conductor joined to the shield, to a bracket that extended out about 3 inches from the mast at the uppermost point of the mast (below the rotating mast supporting the beam). The line was run down to ground level parallel to the mast and spaced 3 inches from the mast with insulators at about 4 foot intervals. The bottom end of this coax was also shorted at the bottom end to form a flexible conductor and was fed into a remotely operated tuner at the base of the mast. The feedpoint impedance was relatively high on both bands. When doing the initial load tests on the vertical, I found that the SWR crept up slowly during full power application. I found this hard to believe until I thought about the insulators that I had used to space the coax line away from the mast. I had used a number of 3 inch long round steatite insulators from the top down and ran out near the bottom. I dug out some old nondescript insulators from the junk box and used them in the last two bottom positions. Those bottom insulators were very warm to the touch after a minute or two of full power to the antenna. Apparently, the dielectric factor was poor enough, at radio frequencies, to permit

Photo 6– "Bootie" protected end insulator used at bottom end of sloper or suspended vertical.

Photo 7– Some typical insulators. (The big Pyrex one may be hard to come by. Length is 7¼ inches.)



current flow and dielectric heating. After replacing the problem insulators with several made of quality material, the problem went away. You probably would never notice RF heating at the lower power levels of transceivers. The loss is there nonetheless, reducing useful radiated power.

Insulators

There are many new amateurs who may not pay attention to what they are using for insulating material. A local chap, relatively new to amateur radio, asked me to take a look at a KW antenna tuner that he had constructed from handbook diagrams and photos. He was having some trouble with it. I connected it up in my installation and tuned up into one of my antennas at low power. Everything seemed to work okay until I raised the power level. Then sparks flew and smoke rose. Disaster! In examining the unit I found "insulating" material used for keeping the variable tuning capacitors isolated from ground. The material looked as if it had been cooked somewhat, so I removed it. On one piece I found the word "Havoline." He had used the plastic from an empty motor oil container for his project. I suspect the dielectric quality of this material was not suitable for RF work. How would he have known? Nothing was said in the article describing the tuner that high RF voltages might be present most of the time, making it necessary to use quality insulating material. I have looked at a number of popular handbooks and found little, if anything, about insulators and their use in antennas systems. That's a pity, because with widespread acid rain more and more amateurs will be having trouble with their wire antennas.

Photo 7 shows several types of insulators which are available. The venerable glass insulator made by Pyrex does not seem to be readily available any longer except at fleamarkets, but certainly it is one of the finer ones. The white porcelain insulators, which I believe are available from number of sources, would be my next choice for moderate-size antennas. The plastic insulators would be my last choice, unless some sort of protective boot is installed over them. At low-impedance points, such as at the center of a dipole, the short insulator would probably be satisfactory as is. Some examples of good insulators are ceramics consisting of porcelain and steatite, iron-sealing glasses, and glass bonded mica or ruby mica, polyethylene, and teflon. Not all of these materials can be made into antenna insulators, of course. These materials have high dielectric constants and low dissipation factors at most amateur band frequencies. The dissipation factor of an insulating material is defined as the ratio of energy dissipated to the energy stored in the dielectric. Forget about PVC pipe, plastics, and wooden dowels (even those soaked in paraffin like in the old days). These materials weather poorly, and eventually the surfaces get pitted to the point where various contaminants in the air will adhere to the damaged surfaces and ruin the insulation effectiveness of the material. Even the popular 450 ohm ladder line should be replaced after some years of use.

Summary

While I am certain that the information regarding acid rain and the suggestions that I have provided for combatting the effects of acid rain on your antennas are far from complete, I cannot remember ever seeing this subject treated, probably because not many amateur operators have given it much thought. Now that it is on the table, perhaps additional information will be forthcoming from others based on their experiences with wet antennas. I sincerely hope so. Good luck!

And Finally . . .

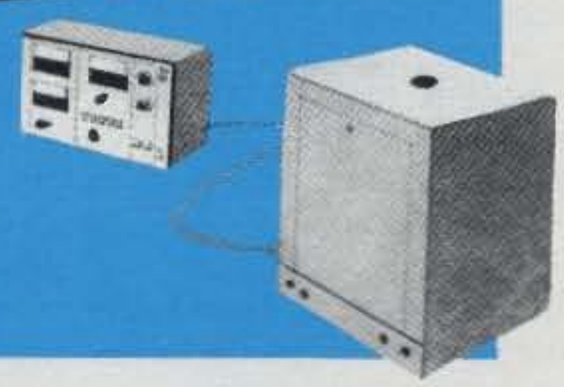
My thanks to Kelly Stoltz, Chemist for the Winston-Salem, NC Public Works Department, Utilities Division for her help in understanding more about our drinking water and for providing the analysis of my rain, snow, and tap water.

Thanks also to the American Water Works Association for their permission to reprint the illustration of the Hydrologic Cycle From "The Story of Drinking Water."

Footnotes

1. Genaille, Richard A., "40 Plus WARC," *CQ*, October 1992, p. 42.
2. ARRL, "The Doctor Is In," *QST*, May 1994, p. 72. ■

A new standard of performance for amateur amplifiers



...the 3K-ULTRA

We are satisfied that this is the finest HF linear amplifier we have ever offered. The 3K Ultra represents a vision and a resolve taken years ago to provide amateurs with the finest amplifier that we could possibly build. It is every amateur's dream.

- ★ General coverage all frequencies 1.8 to 24 MHz (Export models to 30 MHz). Ask about our 8K Ultra.
- ★ Remote control
- ★ All modes. . .SSB, CW, AM, FM, Amtor
- ★ Full legal power
- ★ Unique, high reliability design
- ★ **Export, commercial and military (including MARS) communicators note that our higher power 8K ULTRA is also available for prompt delivery.**

It is rugged, reliable, remotely tuned and offers full power and efficiency on all bands between 1.8 and 24 MHz. Frequencies above 24 MHz are available on export models. The amplifier offers 6 memory channels for automatic tuning on your choice of frequencies. A small, light-weight, remote control cabinet sits at the operating position, while the amplifier itself can be across the room, in a closet, or in the next room. We manufacture many other HF, VHF, and UHF amplifiers, all still available as before. All domestic and foreign inquiries are invited. Write for full specifications on the 3K Ultra or for our complete amplifier information packet. Don't wait any longer to own the amplifier you have always wanted.

Henry Radio

2050 S. BUNDY DR. LOS ANGELES, CA 90025 (310) 820-1234

Toll free order number: (800) 877-7979 FAX (310) 826-7790

CIRCLE 116 ON READER SERVICE CARD

CQ REVIEWS:

The Azden AZ-21A 2 Meter Handheld

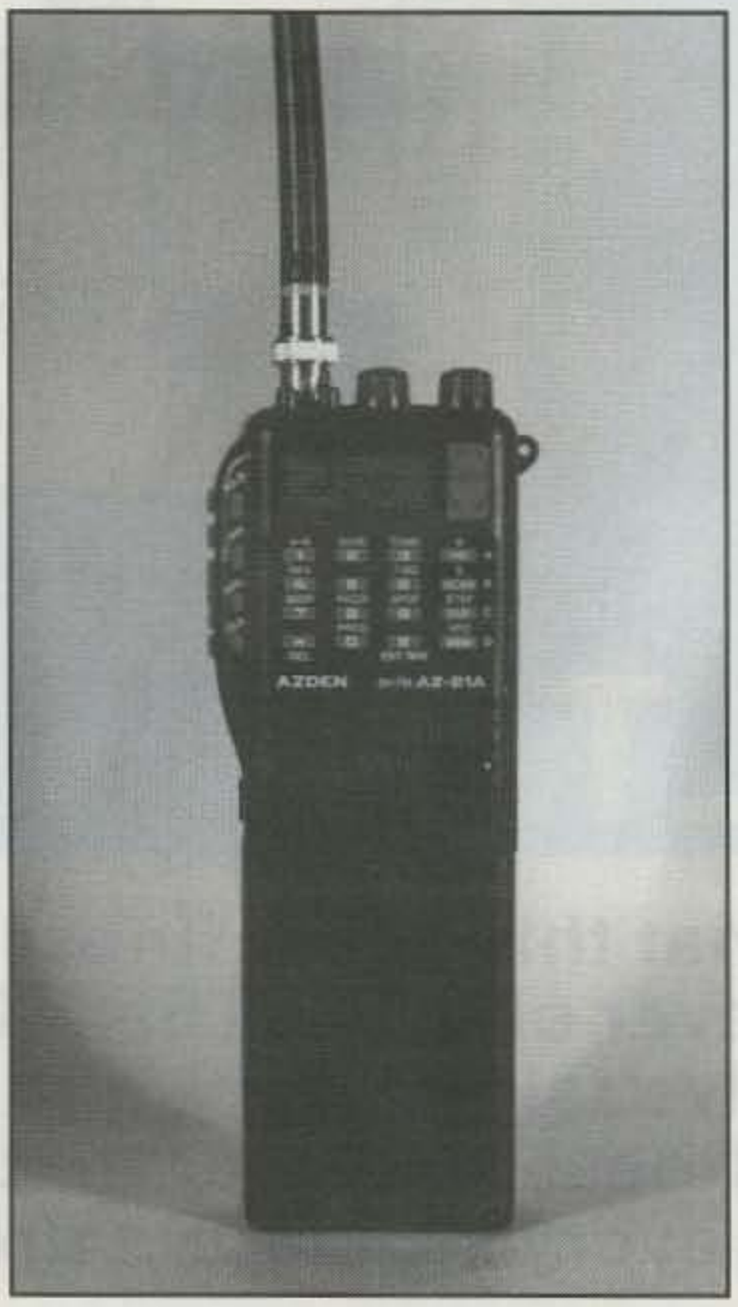
BY LEW McCOY*, W1ICP

For some time now I've been testing and using the Azden AZ-21A 2 meter handheld. It has been an extensive testing procedure, because I asked an amateur who is involved with search and rescue to also use the rig to get his opinion. Before getting into a description of the unit, let me tell you a little about the terrain here in New Mexico.

We have a great deal of wilderness land consisting of high mountains and deep valleys. We get many hikers and campers, and sometimes one of them becomes lost. In the Silver City area we have a repeater that is located very high up, some 9000 feet, and that covers a very large area. I say "covers," because due to the deep valleys there is always the problem of being heard and of hearing others. That brings us to the Azden AZ-21A 2 meter handheld.

Regardless of the manufacturer, most handhelds using rubber ducky antennas will be on a par with each other when it comes to transmitting. On receiving, however, it can be a different story, and that is where the Azden unit shines. The reception of weak signals was outstanding with this unit. Frankly, I was impressed with the unit's performance with regard to weak-signal reception, even though the antenna is the typical rubber ducky. It is certainly one of the best I have ever heard. And that brings me to a point that really has nothing to do with the product review. However, it is important information, and it is simply the following:

How many times have you listened to or worked with a repeater when your handheld was very marginal at "making the repeater"? I have heard that so many times in emergency situations that I have lost count. There is an extremely simple and inexpensive answer to the problem. It is very easy to make, or inexpensive to buy, an end-fed, half-wave 2 meter antenna that can be coiled up and put in your pocket. When you get in a situation that is marginal, simply uncoil the antenna; hang it from a bush, tree, post, or whatever; and your signal will become simply outstanding. At the least, your signal will improve at least ten times both receiving and transmitting. Now that I've gotten that off my mind, let's get on with the review.



Front view of the Azden AZ-21A 2 meter handheld. Functions of some of the buttons are explained in the text.

The dimensions of the AZ-21A are 2.6 inches wide, 6.8 inches high, and 1.3 inches deep with the supplied BP-11 battery pack. There are two power outputs: 5 watts (1 ampere draw) and 500 milliwatts (500 ma draw). The RF sensitivity is better than 0.16 uV for 12 dB SINAD. (As I stated above, the sensitivity of this unit is very good.) The selectivity is rated at ±6 kHz at –6 dB, and ±15 kHz at –60 dB.

The frequency coverage of the unit is 118 to 136 MHz (amplitude modulation) and 136 to 174 MHz for FM. These are both receiver ratings. For transmit, the FM range is 144 to 148 MHz. The receiver is a double conversion superheterodyne unit with intermediate frequencies at 16.9 MHz and 455 kHz.

On top of the unit is the rubber ducky antenna, a DC charging jack, a mic, and speaker connector if the optional mic/speaker is used. Also on top is the hi/lo power switch and the squelch and volume control.

On the face of the handheld are the 16 buttons of the touch-tone pad, and the display panel for the various readouts. There is a multitude of various functions available, and if I had any problem, it was with the manual. The instruction manual is 36 pages long and contains a hodge podge of information. For example, I am

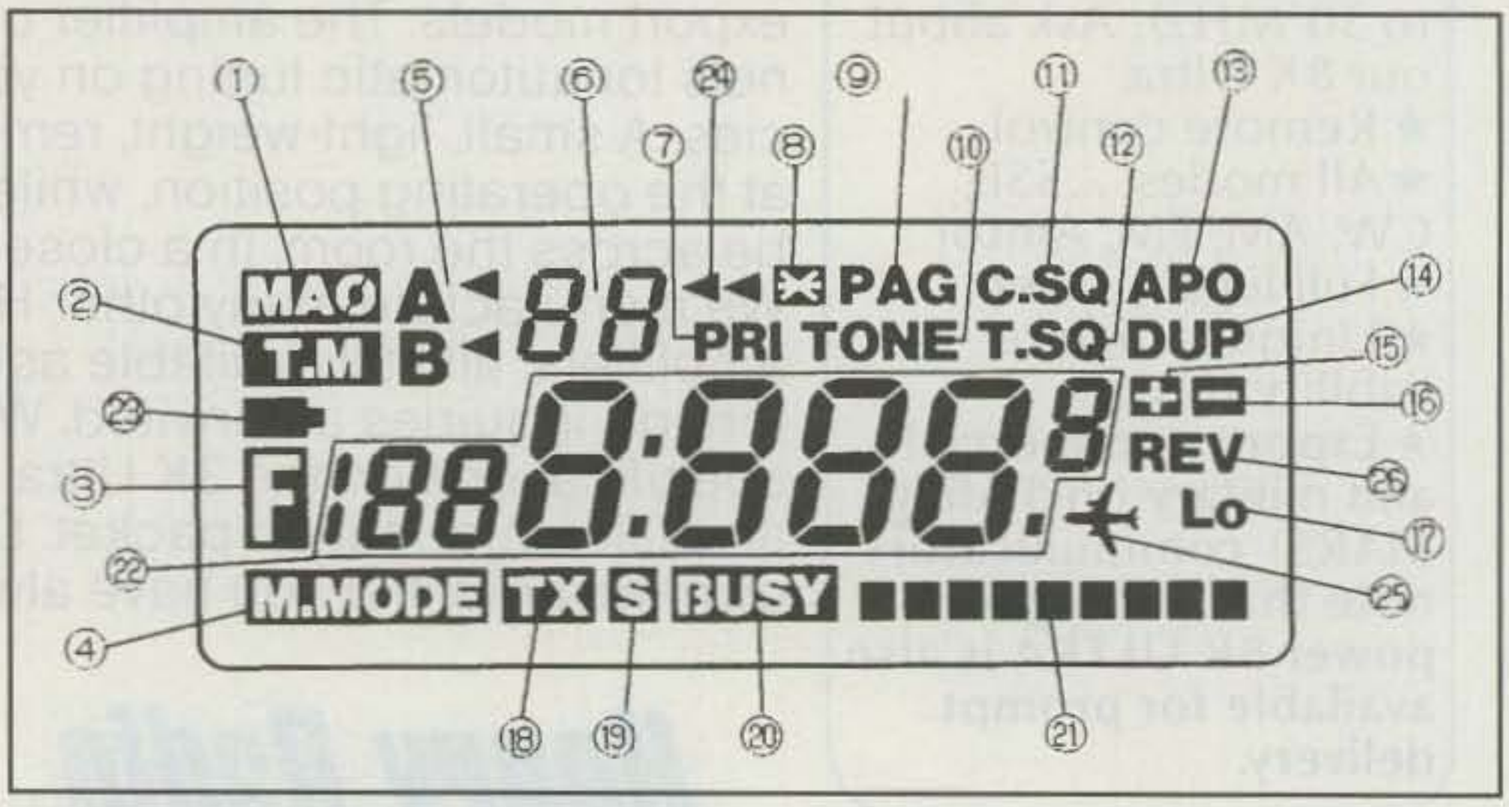


Fig. 1– This is the liquid-crystal display panel (from the instruction manual).

**Technical Editor, CQ, 1500 W. Idaho St., Silver Cty, NM 88061*

not sure exactly how many memories are available. I believe there are 40 memories in total, but I couldn't find specific information in the manual.

The front panel of the unit has a total of 14 keys that are dual function. In addition, at the front side are four keys. The first is the MA0 key, which recalls the memory channel A0 and controls some of the scanning functions. Below that key is the TM/WR key, which serves to temporarily store the frequency in use. The next lower key turns on and off the AUTO-DIAL function (16 digits and a 7-channel memory). Below that is the CLR key, which clears the stored frequency, code squelch, input and code squelch, tone and tone squelch, and errors.

The liquid-crystal display is shown in an accompanying drawing. Most of the functions on the display need no explanation. The A–B indicates the memory mode display or the C mode when in programmable scanning. I might add that the display is easy to read in fairly bright light.

From a performance standpoint, aside from the excellent sensitivity I mentioned earlier, I would give the AZ-21A a very high rating. Also, with the soaring prices in the market, the unit lists for $299, which I would consider a very good buy.

The Azden AZ-21A is manufactured by the Japan Piezo Co. of Japan and is marketed in the U.S. by Azden Corporation, 117 New Hyde Park Rd., Franklin Square, NY 11010. ■

Once the thrill of the hunt gets in your blood, it doesn't make too much difference what the quarry is. The hunt is everything. Sometimes it's countries and other times it's counties. They're all out there, just waiting.

Counties Can Be Like DX

BY ROBERT A. LEHNING *, WA2YSJ

Early one evening this past January, while the entire country was mired in one of the worst winters in recent memory, I had a very pleasant contact on 160 meter CW with a fellow down in central Pennsylvania. We were commiserating with each other about the lousy band conditions and general lack of DX. Towards the end of our QSO he asked me for my county and to please confirm our contact. As I was filling out his QSL after we had signed, I got to thinking that county hunting may be a pastime worth pursuing during the upcoming sunspot minimum. I had no way of knowing what a momentous decision I had just made, and what life was going to be like in the upcoming months.

Once I decided to chase counties, I obtained a *USA-CA Record Book* from *CQ* and started asking for confirmations for contacts during my evenings and weekends of casual operating. As the cards came in, I filled in the appropriate lines in the book and filed the cards in the new tray I had made for this purpose. I found myself looking forward to getting on the air in the evening to see what new county I could come across, just as I did many years ago when I first started chasing DX. A lot of old habits came back to life, such as penciling in on the household calendar weekends when there were state QSO parties as well as DX contests. This was to ensure that nothing else was planned for that particular weekend.

My wife, who is not very fond of the term "XYL," noticed the increase in incoming and outgoing mail. She also noticed that a lot of chores were not getting done and that we were getting behind on some of the projects around the house. But when one month on the calendar had every weekend penciled in with a QSO party or contest, she felt it was time we came to an understanding. I could operate part of the weekend that had an activity of some sort, but I also had to participate in family things such as chores, picnics, and visiting my brother-in-law.

Life went on, and we settled into a new and easy-living style that provided all an active amateur could want. Antennas were fixed, the garden was eventually planted, counties were worked, and the firewood was cut and stacked. There were no questions asked when it came time to order another 1000 QSL cards. Life was good.

Counties can be like DX. Some are rare, some are common, and some can be difficult to work because of a small amateur population. As I spend most of my time on CW, I naturally pursue counties on CW. I discovered that there are not as many county hunters operating on CW as there are on phone, and some of the contests and QSO parties are rather sparse in activity.

Cattaraugus County in New York falls into the category of difficult to work because of its small amateur population. Our family owns an old farm in central Cattaraugus County. All of this contributed to an idea that came to me in a blinding flash one evening early in May. The County Hunters CW weekend was coming up. Why couldn't I operate from our farm as a portable station and make a family outing of it?

All the logistics were in place. I had operated portable there several times in the past for field day or just for the sake of it. My wife seemed to think it was a good idea, if only for Saturday, because we had plans for Sunday, which was Mother's Day. We would make it a day-long trip with a picnic included. A quick call to my parents determined that they would like to go, and we could haul the big generator in their van. I could also operate Saturday evening when we returned home from our excursion. Unfortunately, my step-son works part-time on weekends and would not be able to go with us.

I immediately started making a list, noting all the things I felt were needed and I should not forget—log book, extension cord, my trusty Vibroplex, and so forth. By the time I finished, Jamie remarked that it looked like I was planning a major DX-pedition, or whatever it is they call it. I *had* to remember to get that gas can filled. There were visions (or delusions) of large pile-ups, and my handing out Cattaraugus County to any and all who needed it.

I wanted everything to be ready to go on Friday evening of the weekend of the contest, so I spent several evenings prior to Friday checking my dipoles, cables, rope, and other sundry items. This, of course, was done only after my various and assorted chores were completed. Everything was packed and ready to go. I had even remembered to fill the gas can. There was some free time Friday evening to operate, but there did not seem to be much activity. I figured they all were waiting for 20 meters to open up on Saturday morning.

The big day finally arrived, and I was up at dawn with the birds, peering out at a gray and leaden sky. I could not believe that the weather had turned against our "county expedition." In fact, Jamie had chided me the evening before for verbally abusing the weatherman on the television. It was cold, and it sure looked like it was going to rain. Conditions on the bands sounded, and indeed were, horrible—no signals on 20 meters and nothing but static on 40 meters, the two bands I was planning to operate on. As we were having our breakfast, however, the sun burst through the clouds, and it looked like that TV weatherman was wrong.

So it was with a happy heart that I packed up the Blazer for our trip and made sure that my step-son was up and ready to go to work. We stocked our picnic basket and filled the coffee thermos, met my mother and dad, and headed up into the lovely hills of western New York and Cattaraugus County. I must have

* *1295 Wisconsin Rd., Derby, NY 14077*

babbled all the way up to the farm, about a 40 minute drive. It was our first trip up there this year, and I was anticipating the beauty of the hills in early spring, as well as the excitement of getting on the air. Our Amish neighbors were all out plowing their fields, and my parents stopped at one farm to inquire about some maple syrup.

It was only a matter of a few minutes to get the lawnmower and generator off the van and to get my antenna strung up between two maple saplings behind the cabin. I quickly discovered that I had not brought enough rope to raise both antennas—oversight number one. A couple of minutes later it became apparent that I had brought the 50 foot extension cord and not the 100 foot cord. I did have my earphones, however, so I could eliminate most of the noise from the generator.

While my mother and dad were getting the mower going, Jamie and I set up the transceiver on the table in the cabin and got the generator leveled, gassed up, and running. Everything was falling right into place. The sun was still shining, but there was a cold, northeast breeze blowing across the hills.

Connecting the antenna and plugging in the "bug," I was ready to go. Jamie settled down to log for me as I was getting ready to start knocking off those contacts. What greeted our ears on 40 meters was an S7 static level and considerable ignition noise from the lawnmower, with only one or two readable signals across the whole band. A bit of a sympathetic glance was cast my way as I, feeling a little disheartened, settled on the contest frequency for the county hunters and started calling CQ.

Forty-five minutes and two contacts later she came back into the cabin and asked me if I wanted a cup of coffee. I decided that it was time to switch to 20 meters. We let down the 40 meter dipole and hoisted the antenna for 20 meters up in its place. After a bit of lunch, we fired up the generator again and switched on the transceiver, to be greeted by a multitude of strong and melodious CW signals. I quickly found some county hunters, and we were off and running. This was really neat! I envisioned DX repeaters and packet clusters all across the country coming up, letting everyone know that Cattaraugus County, New York was on the air, and knocking them off left and right.

In twenty minutes we had logged ten contacts and my wife was duly impressed. I was merrily keying along and we were steadily filling another page in the logbook, when suddenly I heard this ominous "click." I looked at the meter on the transceiver and it revealed that I was now running at slightly less than half power. "@#*&!" I exclaimed loudly. "What!?" "QRZ?" was the plaintive CW I heard on frequency. I could not believe it!

"Your mother is out on the porch!" was what I heard next as I was frantically retuning the transceiver. My heart sank as I watched the output power quickly drop to less than 25%. I readjusted the drive and finals and sent "de WA2YSJ/2 CH K." Nothing. The meter was not even moving now. Jamie was looking at me with that expression that told me I had better have a good explanation for what was going on. I heard the generator sputter and quit just as my father called out that it was raining and to get everything under cover. I could feel our "county expedition" crumbling down around my ears.

Some time later, in the afternoon, the rain stopped and we were able to get everything taken down and packed up again for the interminable trip home. We had a rather cheerless picnic dinner before we left.

As we were driving home, I explained to my wife what I thought had happened to a tube or tubes in the transceiver, and that I had spares to fix it. We started discussing the callsigns we had logged in our brief operating period. Jamie asked me why we had worked the same station three different times. I explained to her that this fellow was a mobile station driving from one county to another within that particular state. I pointed out that we could get one of those new, miniaturized HF rigs for the Blazer, beef up the battery and alternator, install an antenna, and we too could be mobile on weekends and during contests. She muttered something about the hinges on the gates of Hades that was muffled by the noise of the tires as we went over an old wooden bridge.

Later that evening I had some time to operate from home, but my heart just was not in it. The next day was Mother's Day, and we had a house full of company. For some reason or another I did not have much time for operating until the following Thursday evening. My daughter from Annapolis called that evening, and in the course of the conversation I told her about the trip up to the farm. After she had rung off, my wife quietly expressed her hope that I had gotten over the misfortune of our "county expedition." She also said she felt we really did not need a portable HF rig for the Blazer. I had already fixed the transceiver, and it was completely back to normal. She asked me to please try to control my emotions in the future and not become so involved in a hobby. I suggested that we plan a camping weekend at the farm, possibly the last weekend in July or the second weekend in August, and she agreed. I had already penciled in those weekends on the calendar as "The Connecticut QSO Party" and "The Empire State QSO Party." Yes, life is good.

While most of us try to get more power out of our rigs, AH2AR/5 reminds us about keeping power out of our rigs—EMF power, that is.

How To Protect Your Gear From Lightning Strikes

BY DAVID K. PELAEZ*, AH2AR/5

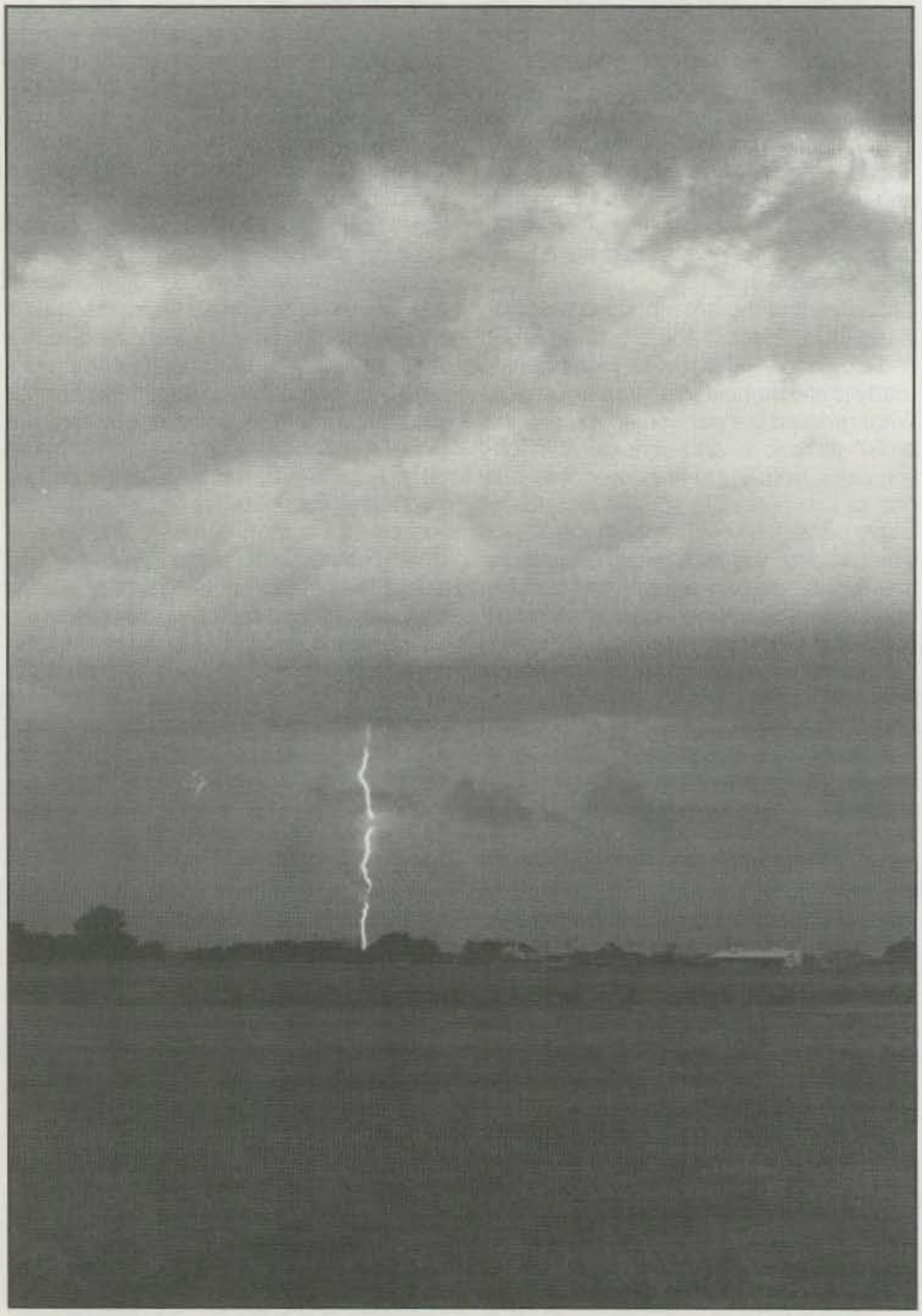
After the appearance of discrete components in the electronics marketplace, we had to rethink some of the earlier "tried and true" methods of lightning protection. Spark gaps made from shaped copper plate and spark plugs serving duty as makeshift lightning arrestors could no longer be depended upon to prevent gear from going to EMF heaven. Given time, no matter where you live in the U.S., chances are your installation will eventually receive a lightning strike or an induced high-voltage surge from a nearby hit. (Kind of like winning the lottery in reverse!)

Several "philosophies" exist regarding protecting antennas and equipment from lightning discharges. Some are based on lab-verified fact, and other philosophies are based on people's personal experience. In fact, many installations are "protected" by nothing more than a ground system. In my *ARRL Antenna Handbook* there are only three small paragraphs that address lightning protection; the subject doesn't even appear in the *Amateur Radio Handbook*. In this "high stakes" area, it would seem that this concern should merit just a little bit more attention.

A Look At The Inevitable

One of the paradoxical problems with lightning is that it always seems to be extremely unpredictable. Old Thor is a fickle kinda guy, and there appear to be many examples to validate this statement. Example number one involves an experience I had in Orlando, Florida (you would have to travel to Borneo to experience more thunderstorms). A 100 foot run of copper wire strung at a height of 20 feet was hit dead center (at the 50 foot mark) even though it had all of the textbook protection and was surrounded by tall buildings and large trees. Another more recent example involved a local amateur who experienced a strike to the antenna tower that knocked down his antenna and ex-

* 7309 Centenary Dr., Rowlett, TX 75088



The kind of DX contact that nobody needs. While it's fascinating and awesome to watch, it's better kept at a distance.

Attention Timewave DSP9+ and DSP59+ Owners!

New DSP-9+ & DSP59+ Upgrades Available!

Timewave will have upgrade EPROMS available January 1, 1995 for the DSP-59+ and the DSP-9+. In keeping with the Timewave policy of providing the best possible products for our customers (and because it's impossible to keep our engineers from constantly coming up with great new ideas), we are upgrading two products which are less than one year old. We've added new features, revised other features, moved control modes to the front panel, and tweaked some filters. Many of these features are a result of our engineers and sales staff listening to our customers, while others are a result of our continuing research and development program.

For a detailed description of the new features, call, write or FAX Timewave. Don't worry, the cost of this upgrade is not high - only $10.00 will cover the cost of a new program EPROM delivered post-paid in the United States. FREE upgrade EPROMS will be available for DSP59+ or DSP9+ purchased after September 1, 1994. Upgrade EPROM kits, as well as DSP-9+ and DSP-59+ units with the new EPROM installed will be shipped from Timewave on January 1, 1995.

TIMEWAVE TECHNOLOGY INC.

2401 Pilot Knob Road
St. Paul, MN 55120 USA
Phone: 612-452-5939 Fax: 612-452-4571

Noise Killers+

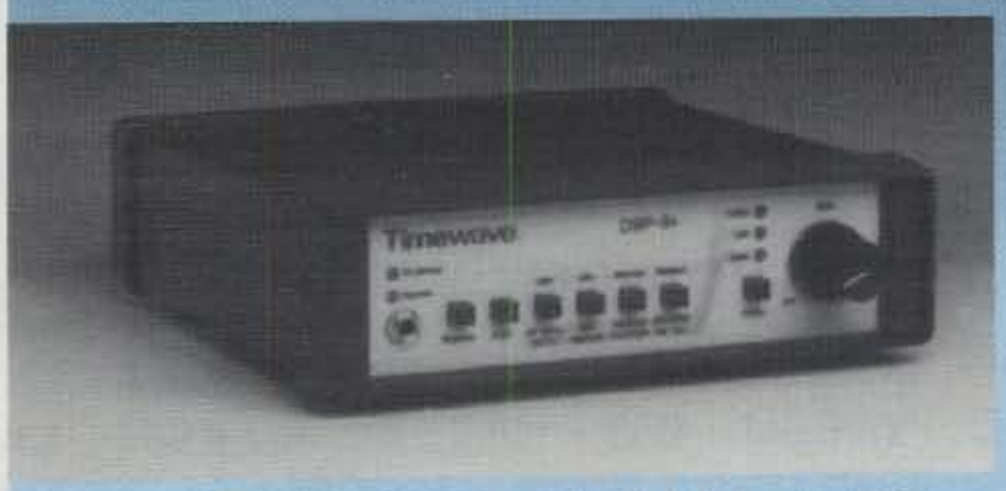
Advanced DSP Noise Filters

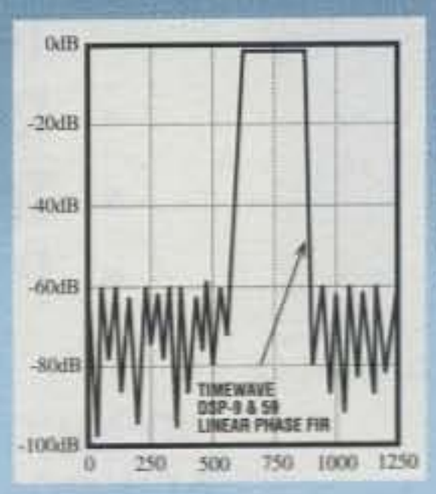
For Voice, CW, and Data Modes

The TW DSP-9+ and DSP-59+ improve reception by simultaneously reducing random noise up to 20dB and heterodynes up to 50dB. TW DSP filters feature third generation 16 bit processing, providing razor sharp audio for SSB, CW and Data modes. Both have AGC for wider dynamic range and signal boosting/peaking, relay bypass and self test modes. A station requirement for weak signal, noisy band operation during the *LOW SUN SPOT CYCLE!*

NEW! DSP-59+ Multi-Mode Filter

Now hundreds of CW and Bandpass filters allow the operator to select almost any filter combination. The easy turning filter knobs allow continuous coverage. Includes all data filters in the DSP-9+ plus G-TOR®, SSTV, EME and WEFAX. Voice filters cover 200Hz to 3.4kHZ. 13 CW center frequencies, CW bandwidths from 25Hz to 600Hz and a CW marker to spot the center of narrow filters.





DSP-59+ & DSP-9+ give steep-skirt filtering!

NEW! DSP-9+ Multi-Mode Filter

Push button selectable bandpass and automatic notch filters. SSB filters 1.6, 2.0, 2.4kHz, CW 100, 200 and 500 Hz. Programmable CW center frequencies 400/500/600/800Hz. HF data filters, HF Packet, PACTOR, G-TOR®, AMTOR, AM and RTTY with programmable center frequencies for North America and Europe.

G-TOR® is the registered Trademark of Kantronics.

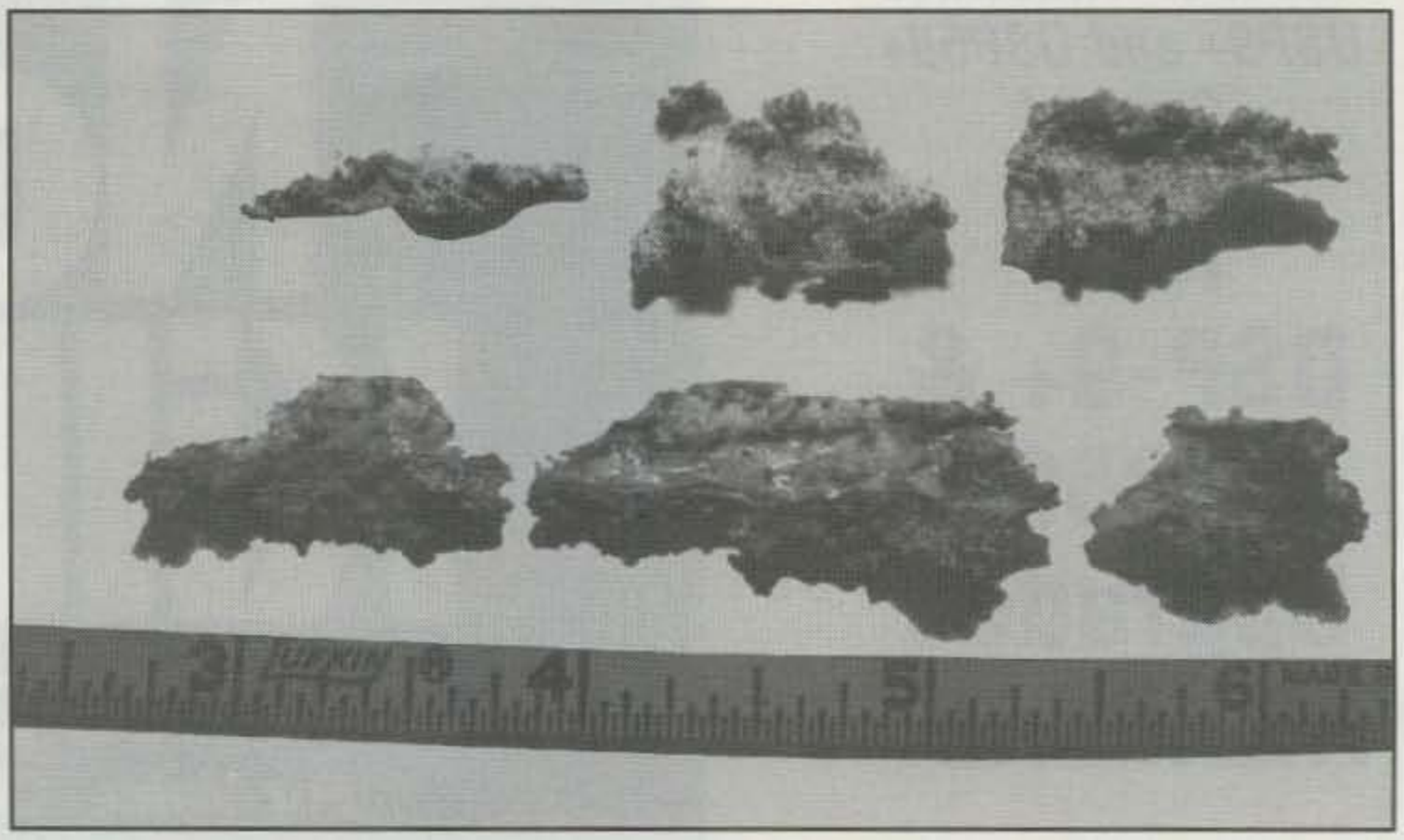
TIMEWAVE TECHNOLOGY INC.

2401 Pilot Knob Road • St. Paul, MN 55120 USA
Phone: 612-452-5939 Fax: 612-452-4571

tensively damaged equipment within the operating position. Perched on top of the tower, however, was a very vulnerable GaAsFET preamp that went unscathed. Due to the relatively helter-skelter manner in which Thor operates, you can almost be assured of eventually experiencing a similar encounter. What would be the best course of action to take to protect your amateur station?

Choosing A Practical Course of Action

Sometimes necessity or convenience may require keeping systems on-line during bad weather. This decision is usually determined by many factors. Uninterrupted repeater, packet, or remote base operation may require that these systems stay on-line. Some may also choose to leave SWL gear on line as a matter of convenience, knowing well that the risk is simply a game of celestial dice. This choice justifies having good insurance as the only real means of protection by replacement. The inconvenience of chasing down cost and replacement estimates, adjuster's delays, and deductible expenses become an additional bureaucratic lightning strike. The following five steps may be considered overkill when employed in unison. However, if these protective steps are used together, they become highly synergistic. Practical application, convenience, and willingness to accept a reasonable degree of risk obviously have to be weighed to determine whether you want to apply all of these steps to your installation.



Never underestimate the energy release from a lightning strike. Pictured above is fused (melted) sand from a lightning strike recovered from a field in central Florida. The fused sand formed tubes of fragile glass, a common occurrence, yet rarely recovered.

Step 1. Invest some time in developing a good earth ground system. There appears to be some truth in the claim that an extremely good earth ground system may actually attract a lightning discharge. However, you have to keep this theory in perspective, because the proverbial oak tree and house chimney don't appear to be efficient ground paths, but often become Thor's favorite target. If the system is going to take a hit, it's best that there is a solid ground path to earth so

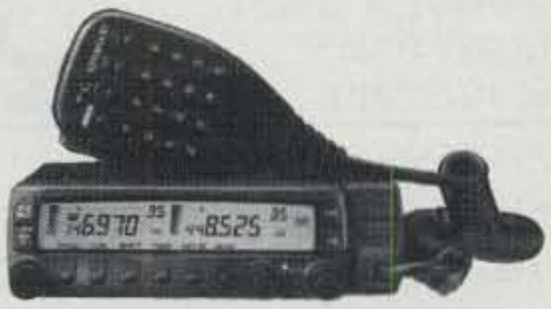
TS-850S
9 Band HF Transceiver With
General Coverage Receiver

TS-450S
Compact, 100 Watt,
HF Transceiver

TS-50S
Super Compact, 100 Watt,
HF Transceiver

KENWOOD

TH-79A(D)
2M/440MHz, FM Dualband
With Added Features



TM-733A
2M/440MHz Transceiver
With 50/35 Watts

TH-22AT
Compact, 2 Meter
Handheld

CALL US FOR GREAT PRICES & GREAT SERVICE

1-800-344-3144

THE HAM STORE

KCOMM, INC. SAN ANTONIO, TEXAS

5730 MOBUD SAN ANTONIO, TEXAS 78238 TEL (210) 680-6110 FAX (210) 647-8007

FACTORY AUTHORIZED DEALER & SERVICE FOR ALL MAJOR LINES

most of this directed energy will be dissipated by terra firma. Lightning will then take alternate routes to ground, and it usually seems to display a high level of creativity in seeking earth ground when conductive paths are unavailable. It will usually arc over and continue to seek ground through house wiring. In most amateur shacks between the house wiring and the antenna sits the new rig still under warranty. Murphy always seems to show up at the most inopportune times!

Step 2. Take advantage of the available wide selection of lightning arrestors and antenna switches with fast-acting gas discharge tubes. Although they will give you some level of protection, none of these systems will necessarily protect equipment from a direct hit. On the other hand, this added measure of protection may minimize or negate damage in some situations.

Step 3. Hold on to your capacitive hats, folks, because this is where most mistakes are made. If you want to ensure maximum protection for your system, you need to be sure that the radio gear is taken out of line. Some common mistakes are made in this step, and you might think that you have taken the appropriate precaution, but find out otherwise after the smoke clears. Disconnect transmission lines, rotor lines, phone patch connections and power from *all* the gear. There are many quick-disconnect wiring methods available for rotor cables and telephone patch installations. A degree of imagination will be needed to come up with some convenient ways to quickly disconnect the tangle of wire, but it can be done. Unfortunately, phone patches and rotor cabling are left in-line at most installations, and if your aim is to protect the system, then a means must be established to disconnect this potential high-voltage path. When disconnecting power, **do not** simply turn off a power strip switch from a multiple line power strip. It may be "surged protected," but it's not protected from the high-voltage transients present from a lightning discharge. These types of transients can easily jump the one-quarter inch gap afforded by the rocker switch. It is best to simply unplug the power strip cord from the wall outlet. **Do not** make the mistake of leaving disconnected antenna transmission lines draped over the equipment table. The thin insulation on the outer jacket is virtually invisible to high-voltage discharge, and damage to radio gear has occurred because of this overlooked phenomenon. Most new rigs can't survive the EMFpresent from "Thor" arc-welding a PL-259 to the top of the transceiver chassis! A ground termination for these disconnected lines is highly desirable (sans the telephone line). Don't depend solely on grounded antenna switches switched to an empty SO-239 to protect your rig. Ensure that grounded antenna switches are used with the technique of physically distancing gear from the conductive path.

To get yourself in the habit of disconnecting lines can be somewhat difficult, especially if you have lots of gear within the shack. Once you have a routine down, the process will take less time. **Do not—I repeat—do not** wait until you hear thunder to start disconnecting the equipment. Consider yourself fortunate indeed if you survive a potential 10,000-plus amp discharge while holding onto the transmission line. (Ben Franklin made this look easy!)

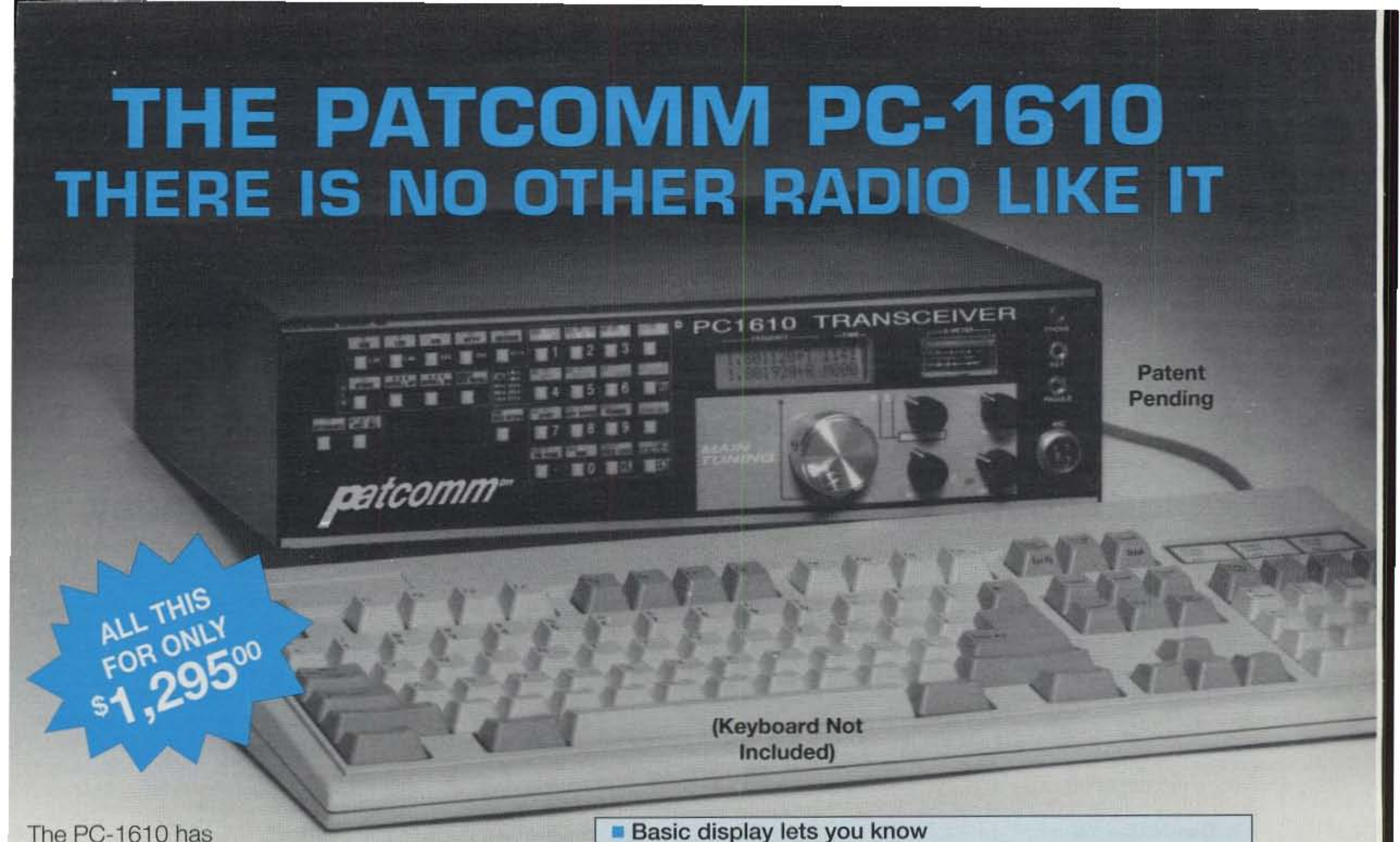
Step 4. Spend five to ten dollars on a smoke detector for the shack. With the many cable terminations penetrating the wall or the window, when the inevitable happens, this added touch is a common-sense insurance measure. It's essential that the occupants be aware of the presence of smoke. The earlier you are notified, the better the chances for you or others to be able to minimize further damage. This may be a good time to be sure you have the fire department's number posted near your telephones.

Step 5. Take a look at your present insurance policy and talk it over with your agent to determine if your coverage is adequate for your situation. You might find out too late that your coverage is inadequate or non-existent.

What? Me Worry?

During thunderstorms late at night there is really no need to hide under the covers with your dual-band multi-mode rig hiding from the "lightning boogeyman." The basis for this article is not to make you become paranoid about lightning protection, but it is to get you to examine your current installation to determine if some adjustments might be in order. The various levels of protection for your shack are in your hands. It might be just a matter of time before Thor knocks on your door!■

THE PATCOMM PC-1610
THERE IS NO OTHER RADIO LIKE IT



Patent Pending

ALL THIS FOR ONLY $1,295.00

(Keyboard Not Included)

The PC-1610 has begun to revolutionize CW & RTTY/ASCII operation on the HF bands. The "Plug-in & Operate" concept is making digital operation a snap, with only a standard IBM* type AT keyboard required for RTTY/ASCII operation. Received data is displayed on the built in LCD display or an external RS-232 serial device such as a "Dumb Terminal." The PC-1610 offers the following features:

- Built-in AT keyboard interface (keyboard optional)
- 160-10M ham band coverage
- USB/LSB/CW/FSK modes
- 75W output power
- Built in digital power/SWR meter
- DDS VFO with 1Hz step size
- Selectable variable speed/fixed 10Hz step VFO tuning
- Built-in 24hr clock
- 90 tunable memories
- 1 scratchpad memory
- 9 (256 character) keyboard data buffers
- Built-in 5-75 wpm IAMBIC keyer
- Built-in 2.4KHz, 1.8KHz, 500Hz, 200 Hz & RTTY filters
- Notch filter
- Select 1 of 3 antennas from front panel

Specifications are subject to change without notice.
* IBM AT is a registered trademark of the IBM Corporation.

- Basic display lets you know exactly where you are.

```
14.03510-T    0930
14.03510-R    M000
```

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

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

```
TNX FER QSO. 73
■
```

← Incoming data

← Outgoing data appears here

- Store up to nine 256 character messages.

```
14.03510-T    0930
3>CANNED      MSG■
```

- Messages can be: edited, sent & appended to out-going message

← Format & Edit stored MSG's here

PC-1610 = HF XCVR + PC + DATA CNTLR +

- The PC-1610 Performs the functions of an HF Transceiver, Computer, Data Controller and Control Software all in one package.

The PC-1610 has too many features to adequately describe in one ad... call or write for a detailed brochure—Major Credit Cards Accepted.

patcomm corporation

Designed and manufactured in the U.S.A.
Phone: (516) 862-6512 ■ Fax: (516) 862-6529
7 Flowerfield, St. James NY 11780

CIRCLE 156 ON READER SERVICE CARD

Announcing:

The 38th Annual CQ World-Wide WPX Contest

SSB: March 25–26, 1995
CW: May 27–28, 1995

Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday

I. Contest Period: Only 36 hours of the 48 hour contest period permitted for Single Operator stations. **Off periods must be a minimum of 60 minutes in length and clearly marked in the log.** Multi-operator stations may operate the full 48 hours.

II. Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 1.8, 3.5, 7, 14, 21, and 28 MHz bands may be used. No WARC bands.

IV. Type of Competition:

1. Single Operator (Single Band and All Band)

(a) Single operator stations are those at which one person performs all of the operating, logging, and spotting functions. **Only one signal is allowed at any one time. The use of DX spotting nets or any other form of DX alerting assistance places the station in the multi-single category.**

(b) **Low Power:** Same as 1(a) except that **output power shall not exceed 100 watts.** Stations in this category will compete with other low-power stations only.

(c) **QRP/p:** Same as 1(a) except that **output power shall not exceed 5 watts.** Stations in this category will compete with other QRP/p stations only.

(d) **Assisted:** Same as 1(a) except **the use of DX spotting nets or other forms of DX alerting is permitted.** Stations in this category will compete with other Assisted stations only.

2. Multi-Operator (All Band operation only)

(a) **Single Transmitter:** Only one transmitter and one band permitted during the same time period (defined as 10 minutes).

(b) **Multi-Transmitter:** No limit to transmitters, but only one signal and running station allowed per band. *Note:* All transmitters and receivers must be located within a 500 meter diameter or within property limits of the station licensee's address, whichever is greater. **All operation shall be from the same operating site.** All antennas must be physically connected by wires to the transmitters and receivers.

V. Exchange: RS(T) report plus a progressive three-digit contact number starting with 001 for the first contact. (Continue to four digits if past 1000.) Multi-transmitter stations use separate numbers for each band.

VI. Points:

A. Contacts between stations on different continents are worth three (3) points on 28, 21, and 14 MHz and six (6) points on 7, 3, 5, and 1.8 MHz.

B. Contacts between stations on the same continent but different countries are worth one (1) point on 28, 21, and 14 MHz, and two (2) points on 7, 3, 5, and 1.8 MHz. **Exception: For North American stations only—contacts between stations within the North American boundaries count as two (2) points on 28, 21, and 14 MHz and four (4) points on 7, 3.5, and 1.8 MHz.**

C. Contacts between stations in the same country are permitted for multiplier credit but have zero (0) point value.

VII. Multiplier: The multiplier is the number of different "**valid**" prefixes worked. A "PREFIX" is counted only once regardless of the number of times the same prefix is worked.

A. The letter/numeral combinations which form the first part of the amateur call will be considered the prefix. Examples: N8, W8, Y22, Y23, WD8, HG1, HG19, WB2, WB200, KC2, KC200, OE2, OE25, U3, GB75, ZS66, NG84, etc. Any difference in the numbering, lettering, or order of same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country or call area of operation. In cases of portable operation, the portable designator would then become the prefix. Example: N8BJQ operating from Wake Is. would sign N8BJQ/KH9 or KH9/N8BJQ, and KH6XXX operating from Ohio would not sign /KH8 which is normally assigned to American Samoa, but could sign /W8, /N8, /K8, etc., or any other prefix authorized for use in the US 8th district. Portable designators without numbers will be assigned a zero (Ø) after the second letter of the designator to form the prefix. Example: N8BJQ/PA would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as RAØ, etc. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

B. Special event, commemorative, and other unique prefix stations are encouraged to participate.

VIII. Scoring:

1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixes worked. (b) Single Band score. QSO points on the band multiplied by number of different Prefixes worked. (See VII.)

2. Multi-Operator stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A station may be worked once on each band for QSO point credit. However, **prefix credit can be taken only once** regardless of the number of different bands on which the same station and/or prefix has been worked during the entire contest.

IX. QRPp Section: (Single Operator only). Output power must not exceed 5 watts. **You must denote QRPp on the summary sheet and state the actual maximum output power used for all claimed contacts.** Results will be listed in a separate QRPp section and certificates will be awarded to each top-scoring QRPp station in the order indicated in Section XI. These certificates will be marked QRPp and will show your power output. QRPp stations will be competing only with other QRPp stations for awards. All other information contained in these rules is applicable to this section.

X. Low Power Section (Single Operator only). Output power must not exceed 100 watts. **You must indicate low power on the summary sheet and state the actual maximum output power used for all claimed contacts.**

XI. Awards: Certificates will be awarded to the highest scoring station in each category listed under Section IV.

1. In every participating country.
2. In each call area of the United States,

MFJ *super* DSP *filter*

. . . Tunable "brick wall" bandpass, lowpass, highpass, notch, SSB, CW filters . . . programmable pre-set filters . . . automatic multiple notch filter eliminates heterodynes . . . adaptive noise reduction reduces noise and QRN . . . for Voice, CW, Data . . .

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

MFJ-784
$219.95

MFJ's *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 -- nearly any mode you'll ever encounter.

You get MFJ's *tunable* FIR linear phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 60 dB attenuation just 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* 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!**

You get MFJ's *automatic notch filter* that 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 a local FM repeater.

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

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

Automatic notch filter

MFJ's *automatic* notch filter searches for and eliminates *multiple* heterodynes. It's *milli*-second fast -- interfering CW and RTTY signals are also eliminated.

Voice signals aren't degraded because the notch is *extremely* narrow.

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes, miss fewer calls and be less exhausted.

Leave the *automatic* notch filter on during a phone contest and you'll never hear unwanted heterodynes of tuner-uppers.

You can *selectively* remove tones. Say, you're on CW and a couple of annoying CW stations appear nearby. You can use the *two* manually *tunable* notch filters -- *an MFJ exclusive* -- to completely knock them out.

Adaptive noise reduction

Turning on *noise reduction* silences background noise. Noisy SSB, FM, AM, CW and Data signals become readable.

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

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

Reducing random noise reduces fatigue, especially when the band is noisy.

Tunable highpass/lowpass filters

For Voice and Data, nothing beats MFJ's exclusive *tunable* highpass/lowpass FIR linear phase "brick wall" filters.

You can *tune* the lower cutoff frequency 200 to 2200 HZ and the upper cutoff frequency 1400 to 3400 Hz.

Signals *just 75 Hz* away literally disappear -- they are reduced a *thousand* times, 60 dB!

Unlike other filters, speech clarity is not reduced by envelope distortion caused by unequal time delay.

By adjusting the highpass and lowpass filters you can create *custom* filters for Voice, Data and other modes.

When signals are weak, you can improve copy by removing high and low speech frequencies. They contain little information but are full of noise that reduce readability.

On crowded HF bands, overlapping SSB signals make copying difficult. You can improve copy by slicing off some overlap with razor sharp "brick wall" responses.

You can also highpass filter out hum, pulses, rasp and other irritating low frequency noise.

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in an MFJ *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.

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 50 dB.

You can use *narrower* bandwidths to fight tough QRM because these linear phase filters don't distort signals with unequal time delays.

Even with the narrowest 30 Hz bandwidth, you'll never have a problem with ringing.

One position gives you *two* tunable filters you can use together on one signal. For example, on RTTY, tune one filter to mark, the other to space and set the bandwidth tight for an incredibly sharp RTTY filter.

15 *pre-set* filters -- use factory set or program your own

You can select from *fifteen* convenient *pre-set* filters. Use them for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode you can think of.

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 and noise reduction --all filter settings-- in 10 *programmable* filters.

Only MFJ gives you the best of both worlds -- *tunable* filters to eliminate nearly any QRM and fast convenient *pre-set* filters customized for any mode.

Plus more . . .

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

Built-in two watt amplifier. Has volume control, input level control, speaker jack, headphone jack, accessory jack, PTT line and PTT sense and line level output. 9x2½x6 in.

It plugs between your transceiver or receiver and external speaker or headphones. Use 12 VDC or 110 VAC with MFJ-1315, $14.95.

No Matter What™ guarantee

You get MFJ's famous one year No Matter What™ *unconditional* guarantee. That means we will repair or replace (at our option) your MFJ-784 *no matter what* for a full year.

Call your dealer for your *best* price

Automatically eliminate heterodynes, reduce noise and QRM on Voice, CW and Data. Call your favorite dealer for your *best* price and order your MFJ *super* DSP filter today!

Free MFJ Catalog
Write or call toll-free . . . 800-647-1800

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

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

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

MFJ . . . making quality affordable

CIRCLE 153 ON READER SERVICE CARD

Canada, Australia, and Asiatic Russia.

All scores will be published. However, to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single award **only.** If a log contains more than one band, it will be judged as an all band entry, unless specified otherwise. However, a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, second- and third-place awards will be made.

XII. Trophies, Plaques, and Donors:

SSB

Single Operator, All Band

WORLD – Stanley Cohen, WD8QDQ
U.S.A. – Atilano de Oms, PY5EG
EUROPE – Jim Hoffman, N5FA
SO. AMERICA – Ron Moorefield, W8ILC
OCEANIA – Phillip Fraizer, K6ZM Memorial
AFRICA – Peter Sprengel, PY5CC
*JAPAN – The DX Family Foundation
WORLD QRPp – Dayton ARA
USA QRPp – Doug Zwiebel, KR2Q

Single Operator, Single Band

WORLD – John N. Reichert, N4RV
WORLD 7 MHz – William D. Johnson, KVØQ
EUROPE – Myron E. Crofoot, WB4VQO
OCEANIA – D. Craig Boyer, AH9B
U.S.A. 3.7 MHz – Lance Johnson Engineering
U.S.A. 21 MHz – Bernie Welch, W8IMZ Memorial
U.S.A. 28 MHz – Novice/Tech. only – Jon Engelhardt, KAØZFX

Multi-Operator, Single Xmtr.

U.S.A. – Oklahoma Comm Center

Multi-Operator, Multi-Xmtr.

WORLD – Prince Georges Zulu Radio Club
NORTH AMERICA – James Dixon, NL7HI (Burt Curwen, KL7IRT Memorial)
U.S.A. – Glenn Tracey, KC3EK

Contest Expedition

WORLD – Kansas City DX Club

***

CW

Single Operator, All Band

WORLD – Steve Bolia, N8BJQ
U.S.A. – Steve Bolia, N8BJQ
OCEANIA – Tom Morton, KT6V
CANADA – Radio Amateurs of Canada (RAC)
* JAPAN – The DX Family Foundation
U.S.A. QRPp – Richard Arland, K7YHA

Single Operator, Single Band

WORLD – Pedro Piza, Jr., NP4A (Pedro Piza, Sr., KP4ES Memorial)
WORLD 7 MHz – William D. Johnson, KVØQ
WORLD 3.5 MHz – Lance Johnson Eng.
OCEANIA – D. Craig Boyer, AH9B
U.S.A. – Kansas City DX Club
U.S.A. 28 MHz – Walt Smith, K1DWQ (Bernie Welch, W8IMZ Memorial)
U.S.A. 21 MHz – Wayne Carroll, W4MPY

Multi-Operator, Single Xmtr.

WORLD – Ron Blake, N4KE
U.S.A. – Austin Regal, N4WW

Contest Expedition

WORLD – Ed Roller, K4IA

***

Combined SSB/CW

WORLD – SINGLE OP, ALL BAND – Al Slater, G3FXB Memorial
EUROPE – SINGLE OP, ALL BAND – Les Nouvelles DX Group
U.S.A. – SINGLE OP, ALL BAND – Oklahoma Comm Center

Club (SSB & CW)

WORLD – *CQ* Magazine
U.S.A. – Oklahoma DX Assn.

**Donor is responsible for this trophy.*

A station winning a World Trophy will not be considered for a sub-area award. That trophy will be awarded to the runner-up for that area if the returns justify the award.

XIII. Club Competition: A trophy will be awarded each year to the club or group that has the highest aggregate score from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area. **(Exception: DXpeditions especially organized for operation in the contest and manned by members.)** Indicate your club affiliation. To be eligible for an award, a minimum of three logs must be received from a club.

XIV. Log Instructions: 1. All times must be in GMT. All breaks must be clearly marked. Single operator and multi-single logs must be submitted in chronological order. Multi-multi logs must be submitted chronologically by band.

2. Prefix multipliers should be entered only the FIRST TIME they are contacted.

3. Logs must be checked for duplicate contacts, correct points, and prefix multipliers. Duplicate contacts must be clearly shown. Computerized logs must be checked for typing accuracy. Original logs may be requested if further cross-checking is required.

4. **An alpha/numeric check list of claimed PREFIX multipliers must be submitted with your log.**

5. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the contestant's name and mailing address in BLOCK LETTERS.

Also submit a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant have been observed.

6. Official log and sample summary sheets are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available, you can make your own.

7. Disk submission of logs is encouraged. Logs submitted on disk must contain all required information (Time, Band, Call, RST & Serial NR Sent & Rcvd, Multiplier, and QSO Points). The desired log formats are K1EA's *.bin file, N6TR's LOG.DAT file, K8CC's *.QDF file, or a .dbf file. Also, a plain ASCII file containing all required information is accceptable. Disk files must be in chronological order for single operator and multi-single entries and chronologically by band for multi-multi entries. Only MS-DOS compatible disks can be processed (either 5¼ or 3½ inch). A written summary sheet must accompany each disk submission showing all required scoring information, category of competition, off times, and the normal signed declaration, as well as your name, address, and a phone/FAX number where you can be reached. If required by the committee, the original log may be requested.

Logs may be submitted via the Internet to SDB@AG9V.AMPR.ORG. Internet submissions must be in ASCII format and contain all required information. Logs received via E-mail will be confirmed via E-mail upon receipt. A summary sheet and multiplier sheet must accompany all E-mail submissions. Please do not attempt to send binary files.

XV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. (Incorrectly logged calls will be counted as unverifiable contacts.) An entrant whose log is deemed by the WPX Contest Committee to contain a large number of errors may be disqualified as a participant operator or station for a period of one year. If within a 5 year period the operator is disqualified a second time, he will be declared ineligible for any *CQ* contest awards for a 3 year period. The use of non-amateur means to solicit contacts during the contest period is considered unsportsmanlike and will result in disqualification of the entry. Actions and decisions of the CQ WPX Contest Committe are official and final.

XVI. Deadline: All entries must be postmarked no later than **May 10, 1995** for the SSB section and **July 10, 1995** for the CW section. **Indicate SSB or CW on the envelope. One extension of up to 30 days, for legitimate reasons, may be granted if requested from the contest director. Logs postmarked after the deadline or extension deadline, if granted, may be listed in the results, but will be ineligible for any awards.**

All logs go to: CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, NY 11801 U.S.A. Questions pertaining to the WPX Contest can be sent to WPX Contest Director, Steve Bolia, N8BJQ, 4121 Gardenview Dr., Beavercreek, OH 45431 U.S.A., or via Internet to SDB@AG9V.AMPR.ORG.

Please remember to send in early for the WPX Contest Logs and Summary Sheets.

MFJ TUNERS

MFJ's world famous 3 KW Antenna Tuner

If you won't settle for less . . . here is the finest 3 KW tuner money can buy!

The MFJ-989C is not for everyone.

However, if you make the investment, you'll get the finest 3 KW antenna tuner money can buy.

Here's why . . .

Massive Transmitting Capacitors

You get two *massive* 250 pf transmitting variable capacitors with detailed logging scales. They can handle *amps* of RF current and withstand 6000 RF volts because the plates are smoothed and polished and have extra wide spacing.

Precision Roller Inductor

A precision roller inductor, 3 digit turns counter and spinner knob gives you *exact* inductance control for absolute minimum SWR.

Ball bearings on steel shafts give you a velvet smooth vernier feel and long term durability.

You won't have arcing problems with this roller inductor. Firm springs put high pressure on a plated contact wheel for excellent electrical contact.

Wide, low inductance straps are used for high currents and a new core minimizes RF loss.

$349.95 MFJ-989C

Cross-Needle Meter

You get a lighted *peak* and average reading Cross-Needle SWR/Wattmeter with 200 and 2000 watt ranges. Its new directional coupler gives you accurate readings from 1.8 to 30 MHz.

Super Heavy Duty Balun

You get a super heavy duty current balun for balanced lines. It has two giant 2½ inch powder iron toroid cores and is wound with *Teflon*® wire connected to high voltage ceramic feedthru insulators. It lets you operate high power into balanced feedlines without core saturation or voltage breakdown.

Ceramic Antenna Switch

A two wafer 6 position *ceramic* antenna switch with extra large contacts gives you trouble free switching.

Plus much, much more

You also get a 300 watt dummy load, full one year *unconditional* guarantee, flip stand, all aluminum cabinet, tough baked on paint, locking compound on all nuts and bolts. 3 KW PEP. 10¾x4½x15 in.

Don't settle for less, get yours today!

More hams use MFJ tuners than all other tuners in the world! Why settle for an imitation when you can have the real thing?

MFJ's *deluxe* 300 Watt Tuner

MFJ-949E **$139.95**

More hams use the MFJ-949E than any other antenna tuner in the world!

Why? Because you get proven reliability, the ability to match just about anything and a one year *unconditional* guarantee.

You get a lighted *peak* and average reading Cross-Needle SWR/wattmeter, antenna switch, 4:1 balun for balanced lines, 1.8-30 MHz coverage and a *full size* dummy load that easily handles 300 watts of abusive tune-up power.

New 8 position antenna switch lets you pre-tune into dummy load to minimize QRM.

The inductor switch is designed for high RF voltages and currents--it's not a *plastic* switch made for small signals and wired with *tiny* gauge wire.

Each MFJ-949E cabinet is chemically treated and has a new tough scratch-proof *vinyl* cladding -- not paint that can scratch or chip off. You won't find a tougher, longer lasting finish anywhere.

MFJ's *versatile* 1.5 KW Tuner

MFJ-962C **$229.95**

Use your barefoot rig now and have the capacity to add a 1.5 KW PEP amplifier later! Lighted Cross-Needle SWR/Wattmeter. 6 position antenna switch, *Teflon*® wound balun, ceramic feedthru insulators for balanced lines. 1.8-30 MHz. 10¾x4½x14⅞ in.

MFJ's *portable/QRP* Tuner

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/*300 or 6 watt QRP* ranges. 6x6½x2½ in.

MFJ-971 **$89.95**

MFJ's *super value* Tuner

MFJ-941E **$109.95**

The new MFJ-941E gives you a 300 watt PEP tuner with *lighted* Cross-Needle Meter that covers everything from 1.8-30 MHz for an incredible $109.95.

Antenna switch selects 2 coax lines (direct or thru tuner), random wire, balanced line or external dummy load. 4:1 balun. 1000 volt capacitors.

2 Knob *Differential-T*™ Tuner

MFJ-986 **$289.95**

The MFJ-986 Differential-T™ 2 knob tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one best setting. 3 KW PEP. 1.8-30 MHz.

Roller inductor makes tuning smooth and easy. Turns counter lets you quickly re-tune to frequency.

Lighted Cross-Needle Meter reads SWR/forward/reflected/*peak*/average power in 2 ranges. Current balun reduces feedline radiation and forces equal currents into unbalanced antennas.

MFJ's *mobile* Tuner

MFJ-945D **$89.95**

Don't leave home without this mobile tuner! Let the MFJ-945D extend your antenna bandwidth so you don't have to stop, go outside and adjust your mobile whip.

Small 8x2x6 inches uses little room. Lighted Cross-Needle SWR/Wattmeter makes tuning easy while in motion. Has lamp switch. 1.8-30 MHz. 300 watts PEP. **Mobile mount**, MFJ-20, $4.95.

MFJ's *smallest* Versa Tuner

The MFJ-901B is our smallest --5x2x6 inches --(and most affordable) 200 watt PEP tuner -- when both your space and your budget is limited. Great for matching solid state rigs to linear amps.

MFJ-901B **$59.95**

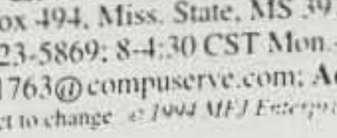
MFJ's *random* wire Tuner

Operate all bands anywhere with any transceiver with the MFJ-16010. It lets you turn a random wire into a transmitting antenna. 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 inches.

MFJ-16010 **$39.95**

MFJ's *VHF or UHF* Tuners

MFJ-921 or MFJ-924 **$69.95**



MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 in. Simple 2-knob tuning for mobile or base.

MFJ's *artificial* RF Ground

Creates artificial RF ground. Eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

MFJ-931 **$79.95**

Free MFJ Catalog

Write or call toll-free . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
24 Hour FAX: (601) 323-6551
Technical Help: 800-647-TECH (8324)

MFJ ENTERPRISES, INC.
P. O. Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST Mon.-Fri.
76206.1763@compuserve.com; **Add s/h**

MFJ . . . making quality affordable

CIRCLE 7 ON READER SERVICE CARD

WB2AQC takes us on a peripatetic journey through Alaska, where he introduces us to a number of amateur radio families whose lives are greatly intertwined with amateur radio and public service.

Amateur Radio Families In Alaska

BY GEORGE PATAKI*, WB2AQC

In my family there are four amateur radio operators: my wife Eva, WA2BAV; my daughter Diane, KB2KLV; my son Tommy, KB2KRV; and myself, WB2AQC. Amateur radio has some effect on every one of us. My spouse is very busy with her job, and the children are busy with their studies. Being retired and having plenty of free time, I am the most active amateur in my house, followed by my son, who prefers talking on the radio to homework. My wife does most of her talking on the telephone, and my daughter is away at college.

When I travel and visit radio operators, I often find families with two or more members sharing the same hobby. Recently I toured Alaska, and in 29 days I went to 15 localities and met more than 90 active radio amateurs. I will mention only those families with more than one operator.

In Anchorage, where half of Alaska's half-million people reside, I met Lil Marvin, NL7DL, the vice-president of the Polar Amateur Radio Club of Alaska, a YL club. Lil's husband Rick, KL7YF, is also very active. Both have Extra class licenses.

In the same city I visited Harley Steward, KL7IZZ, a retired carpenter, and his wife Arlene, KL7HO, a retired teacher. Both are doing community service, such as providing radio communications for the famous Iditarod Sled Dog Race that runs every year in March from Anchorage to Nome, a distance of 1049 miles. In recent years several of these races were won by women mushers.

Bill Reiter, KL7ITI, is the trustee of KL7AA, the Anchorage Amateur Radio Club; his daughter Carol is KL7IZF, but presently she is not active. Also in Anchorage is Chuck Sappah, KL7PJ, licensed in 1948, and his wife Marge, KL7YG, licensed a year later. Chuck was one of the six amateurs who operated in 1983 from Pribilof Island, a very rare and difficult spot.

The youngest amateur I found in Anchorage is Jana Erickson, NL7WV, a high-school student licensed in 1990. Her father is Fred, KL7VC, and her mother is Joan, WL7IB. The entire family is involved in ARES emergency drills and other public-service radio communications.

Wrangell, Alaska: Kandy, KL7HMG, and Jack, KL7GOG, Knale.

The largest amateur radio family I saw in Anchorage was Simon Carraway, NL7VR, a chiropractor; his wife Connie, WL7KZ, his office manager; and their two college sons, Bill, WL7MC, and Alan, WL7LA. Simon is the most active; he is a DXer and operates on Oscar 13 satellite.

In Eagle River, a bedroom community

Petersburg: Ed, KL7DYS, and Mildred, WL7ALG, Fuglvog. Their son Arne is also an amateur (WL7CFT).

**84-47 Kendrick Pl., Jamaica, NY 11432*

MFJ Dual Band Mobile Antenna

For an incredible $14.95, you get a dual band 2 Meter/440 MHz mobile antenna with strong magnet mount, stainless steel radiator, 15 feet of coax and BNC adapter for your handheld -- It's the fastest selling mobile antenna in ham radio!

MFJ-1724B **$14.95**

For an incredibly low $14.95, you get an MFJ dual band 2 Meter /440 MHz mobile antenna!

It's the fastest selling mobile antenna in ham radio!

You get excellent gain for solid, noise-free QSOs. On 440 MHz, it's a high gain ½ wave over ¼ wave radiator. On 2 Meters, it's a *full size* ¼ wave radiator.

Its tough *stainless steel* radiator is only 19 inches tall -- won't knock off when parking in your garage.

An extra powerful magnet holds it steady -- even at highway speeds.

You get 15 feet of coax with a standard PL-259 coax connector for your mobile rig.

You get a BNC adapter so you can also use it with your handheld!

Your MFJ-1724B is protected by MFJ's famous one year *No Matter What*™ unconditional guarantee.

DualBand144/440 MHz Ground Plane

MFJ-1754 **$24.95** *New!*

Dual band ground plane antenna for 2 Meters and 440 MHz gives you extra long range on 440 MHz with a high gain halfwave over quarter wave radiator. On 2 Meters you get solid quarter wave performance. Mounts on 1 to 1½ inch mast with single U-bolt. Easy-to-tune.

1/4 Wave Ground Plane

MFJ-1740 **$12.95**

The MFJ-1740 brings up 2 Meter repeaters as well as any ¼ wave ground plane made!

You get easy tuning, low loss ceramic antenna insulator and strong lightweight aluminum construction.

Single U-bolt mounting for 1 to 1½ inch mast. Cutting chart included for 220/440 MHz. Made in USA.

MFJ Pocket Roll-Up™

2 Meter halfwave J-pole antenna

MFJ-1730 **$14.95**

Roll up this *halfwave* 2M J-pole antenna and stick it in your pocket! It's the perfect *gain* antenna for traveling.

Get home station performance on the go. Just hang your *MFJ Pocket Roll-Up*™ in the clear and plug the BNC connector into your handheld.

It's omni-directional and has significant gain over a ¼ wave. It does not need a cumbersome ground plane so it's convenient for indoors and works great with handhelds. Made in USA

Dual Band *flexible* Ducks

144/440 MHz flexible ducks for HTs

A. *High Gain FlexiDuck*™. **MFJ-1717, $19.95**. Enjoy dependable QSOs when other rubber ducks give you noise. High gain ½ wave on 440 MHz, full size ¼ wave on 2M. Won't jab you -- bends, twists, flexes with you. 15¾ inches.

B. *FlexiDuck*™, **MFJ-1716, $16.95.** Similar to MFJ-1717. Full ¼ wave on 440 MHz, efficient loaded ¼ wave on 2 Meters. 8¾ inches.

A. B.

Shorty Duck™ for HTs

MFJ-1718 **$12.95**

Add this *short*, 4¼ inch *ShortyDuck*™ to your 2M handheld for a Q-5 signal! Impedance matched for maximum gain. High-Q helical wound radiator.

5/8 Wave 2 Meter Mobile Antenna

MFJ-1728/B **$24.95**

For *maximum range* while mobile, use MFJ's ***Maximum Gain***™ 5/8 Wave 2 Meter Mobile Antenna. You'll get the maximum possible gain of any single element mobile antenna!

Competitive 5/8 wave mobile antennas can't work any better -- no matter how much more they cost.

You get low SWR so your rig can safely deliver maximum power into your antenna. It's rated at 300 watts PEP so you can use any mobile rig plus a mobile amplifier.

You get a heavy-duty magnet mount that holds your antenna tight at highway speeds and a black magnet base that'll look good for years.

You get a stainless steel radiator that'll endure years of harsh mobile use and 12 feet of coax cable.

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

Order MFJ-1728 with standard PL-259 coax connector or MFJ-1728B that also includes a BNC adapter for your handheld.

Stacked 5/8 Wave for 2 Meters

gives twice the omni-directional gain of a single 5/8 wave

MFJ-1764 **$34.95**

MFJ's stacked 5/8 wave radiators give you *more than twice* the *omni-directional* gain of a single 5/8 wave radiator!

Wide 10 MHz 2:1 SWR bandwidth . . . excellent ferrite choke balun feedline decoupling . . . shunt choke for bleeding off unwanted static . . . strong lightweight aluminum.

Fully assembled -- simply attach radiators -- no tuning required. Mounts vertically for FM/Packet or horizontally for SSB. Installs with single U-bolt on 1 to 1½ inch mast or tower leg. 1½ lbs., two 47 inch radiators, 23 inch boom. Made in USA.

Also works as excellent *6 Meter* full halfwave centerfed antenna.

MFJ-1766, $89.95, gives you *four times* the gain of single 5/8 wave. Includes 2 MFJ-1764, phasing cables. Doubles gain on 6 Meters.

MFJ-1765, $29.95, phasing cables for 2 MFJ-1764s, other 2M ant.

MFJ dual band 144/440 MHz Yagi

5 elements on 440 MHz . . . 4 elements on 2 Meters . . .$49.95

MFJ-1768 **$49.95** *New!*

Get two Yagis for the price of one . . . enjoy two Yagis in the space of one with single coax feed!

MFJ's *exclusive* dual band balanced feed with *FerriteChoke*™ decoupling prevents pattern skewing and gives you low SWR.

The MFJ-1768 is based on the *National Bureau of Standards* design that's optimized for maximum forward gain with high front-to-back ratio and a clean symmetrical pattern.

Mounts vertically for FM/Packet or horizontally for SSB with single included U-bolt on 1 to 1½ inch mast or tower leg.

High strength 6061-T6 aluminum 5 foot, 1⅛ inch diameter boom. 2 pounds. Elements are electrically isolated from boom. Made in USA.

Portable 3 element Yagi for 2 M

MFJ-1763 **$39.95**

You can set up or take down MFJ's *portable* 3 elements 2 Meter Yagi in seconds! Elements simply screw into the boom.

You can take it with you wherever you go and have the "oomph" and directivity of a beam.

It's easy to store and sturdy enough to use as your home station antenna.

Mounts vertically for FM/packet or horizontally for SSB. *Center* or *end* mounts with single U-bolt. Great for packet/PacketCluster™.

It's compact 2¾ foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.

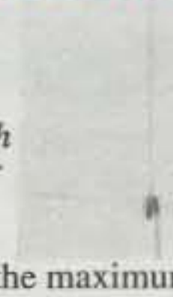
Extra thick elements maintain high gain and directivity over entire 2 Meter band. MFJ's *FerriteChoke*™ decouples feedline.

Elements and boom are made from strong lightweight aluminum and protected by MFJ's *Permanent Molecular Bonding Technology*™.

Weighs just 2 pounds. Boom is 30½ inches. Made in USA.

5/8 Wave Ground Plane

MFJ-1750 **$19.95**



For a low, low $19.95, you get a *high performance* 2 Meter 5/8 wave ground plane home station antenna -- you'll get the maximum gain of any single element antenna.

More expensive 5/8 wave ground planes can't work any better -- no matter how much they cost.

You get . . . shunt fed matching that bleeds off unwanted static and gives you low SWR . . . strong lightweight aluminum construction . . . low loss ceramic antenna insulator . . . MFJ's *RapidTune*™ radiator . . . MFJ's one year *No Matter What*™ guarantee. It mounts on 1 to 1½ inch mast with single U-bolt and is Made in USA.

MFJ-1752, $19.95, for 220 MHz .

HT Range Extenders

Telescoping antennas for handhelds

A. *Long Ranger*™ 2 Meter Halfwave, **MFJ-1714**, $16.95. For really long range this MFJ endfed halfwave is hard to beat. It outperforms a ⅝ wave on a handheld because the ⅝ wave needs a ground plane. The MFJ halfwave doesn't. It's shorter, lighter, has more gain and places less stress on your antenna connector than a ⅝ wave antenna. When collapsed, it performs like a rubber duck. 40" extended, 10½" collapsed.

B. *Dual Bander*™ for 2 Meters and 440 MHz, **MFJ-1712**, $14.95. Got a new dual band handheld or separate units? One antenna fits all. It's a ¼ wave for 2 Meters and a ⅝ wave with gain for 440 MHz. 7¼" collapsed, 19" extended.

C. *Pocket Linear*™ ⅜ Wave, 2 Meters, **MFJ-1710,** $9.95. Carry this pen size antenna in your pocket like a ballpoint pen. When you're using your rubber duck, on the fringe and noisy, put on the *Pocket Linear*™, extend it to 24½" and carry on your QSO. Has pocket clip. 5¼" collapsed.

A. B. C.

144/440 MHz Duplexer

MFJ-916 **$29.95**

Lets you use dual band 144/440 MHz antenna with separate transceivers *or* separate 144/440 MHz antennas with dual band transceiver.

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

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

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

MFJ . . . making quality affordable

CIRCLE 152 ON READER SERVICE CARD

The largest amateur radio family visited in Anchorage: the Carraways—Simon, NL7VR; Connie, WL7KZ; Alan, WL7LA; and Bill, WL7MC (not pictured).

Anchorage: Harley, KL7IZZ, and Arlene, KL7HO, Steward.

near Anchorage, I visited Lynne Duncan, KL7IO, the president of the Polar Amateur Radio Club. This club runs the KL7ION open repeater on 147.30+. Lynne works mostly on CW and maintains skeds with her father, Conrad, KL7JKE, and mother, Lucy, KL7LH, now residing in the state of Montana.

Also in Eagle River I found Hannelore Kelliher, NL7EA, born in Germany and licensed in 1984. She participates in ARES drills and provides radio communications for Iditarod and Walk for Hope, a charity fund-raising event for Hope Cottage, a home for handicapped children. With her husband Mark, KL7TQ, Hannelore flies their private plane to their cabin, 90 miles northwest of Anchorage. There they operate a rig powered with batteries, charged when needed with a generator or solar panels.

In the Pioneers Home in Anchorage there is a club station, presently with three operators: Allen Turner, KL7GU, a very active DXer; Grace Dillon, KL7DLA, born in 1905; and Mary Olendorff, KL7BJD, ten years younger than Grace. They are not related, but live under the same roof and have the same hobby. They are almost like a family.

Don Fanning, WL7NF, in Anchorage, married into a family of hams. His father-in-law is Bob, KL7GIC, and his brother-in-law is Chris, KL7BHM. His wife Robynn is studying for her ticket.

In Fairbanks I was a guest for a night of Bob Hisamoto, KL7AM, a retired scientist, and his wife Luisa, WL7BNX. Both are active organizers of the Worldwide World Peace Net.

Near Fairbanks is the city of North Pole, not to be confused with the real North Pole, which is way up on the top of the world. In this alternate North Pole I visited Eric Nichols, KL7AJ, president of the local radio club. Eric is a missionary and broadcast engineer for a religious radio station. His 16-year-old son David is WL7NK. Also in North Pole I saw the station and the antennas on the top of two big towers belonging to a family of five hams: Ed Hunstein, KL7XD; his wife Sandy, WL7PQ; their daughter Danielle, WL7QW; their #1 son Bill, KL7TC; and #2

← *Anchorage: Chuck, KL7PJ, and Marge, KL7YG, Sappah.*

Juneau: Frederick, WA6AXO/KL7, and Terry, AL7AE, Hoskinson. ↓

MFJ ACCESSORIES

Compact Speaker/Mics

Here's a Compact *Speaker/Mic that fits comfortably in your hand and has a* full *size speaker for crystal clear audio.*

No need to remove your handheld from your belt to talk or monitor calls. Clip it near your ears so you can easily hear every call with the volume turned down.

First-rate electret mic element and full size speaker gives superb audio on transmit *and* recieve. Earphone jack, PTT, light-weight retractable cord. Gray. 1¼x2x3 in.

MFJ-284 fits Icom and Yaesu.
MFJ-286 fits Kenwood.

MFJ-284 or MFJ-286
$24.95

Mini Speaker/Mics

These tiny *MFJ Speaker/Mics are so small and so lightweight you'll forget they're there -- until you get a call.*

Excellent audio from electret mic element and speaker. Has swiveling lapel /pocket clip, PTT button with transmit LED, earphone jack, lightweight retractable cord. Available with L or regular connector. *Tiny* 2x1¼x¼ in.

Order MFJ-285/MFJ-285L for ICOM, Yaesu, Alinco; **MFJ-287/MFJ- 287L** for Kenwood; **MFJ-283** for split plug Alinco; **MFJ-285W** for IC-W2A.

MFJ-283, MFJ-285, MFJ-285L, MFJ-285W, MFJ-287 or MFJ-287L
$24.95

L Connector also available - order L model.

MFJ Artificial RF Ground

MFJ-931
$79.95

Creates artifical RF ground that eliminates or reduces RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding.

Greatly improves your signal if you're using a random wire or longwire antenna with an ineffective ground.

Electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire.

20 Meter CW Transceiver

MFJ-9020
$179.95

Throw this tiny MFJ 20 Meter CW Transceiver in a corner of your briefcase and enjoy DXing and nagchewing wherever you go. You get high performance superhet receiver, crystal filter, RIT, AGC, vernier tuning, adetone, speaker, up to 5 watts output, semi/full break-in, much more. *Free* manual. See *free* MFJ catalog for 40, 30, 17, 15 Meter versions, keyer, audio filter, power pack, tuner, antennas.

Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to- operate active antenna...quiet...excellent dynamic range...good gain... low noise...broad frequency coverage... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz - 30 MHz.

Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Switch two receivers and aux. or active antenna. 6x3x5 in. Remote has 54 inch whip, 50 ft. coax. 3x2x4 in. 12 VDC or 110 VAC with MFJ-1312, $12.95.

$129.95 MFJ-1024

Cross-Needle SWR Meter

MFJ-815B
$69.95

Peak/ average Cross-Needle SWR/ Wattmeter. Shows SWR, forward/ reflected power in 2000/500 & 200/50 watt ranges. 1.8-60 MHz.

Mechanical zero. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

"Teflon® is a registered trademark of Dupont"

MFJ Coax Antenna Switches

$34.95 MFJ-1701

$21.95 MFJ-1702B

$59.95 MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. One year *unconditional* guarantee.

MFJ-1701, $34.95. 6 position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. 10x3x1½ in. DC-60 MHz.

MFJ-1702B, $21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. *MFJ-1702BN, $31.95, N connectors, DC-1.1 GHz.*

MFJ-1704, $59.95. 4 position cavity switch with lightning/surge protection. Center ground. 2.5 KW PEP, 1 KW CW. 50 dB isolation at 500 MHz. 50 ohm. 6¼x4¼x1¼ in. *MFJ-1704N, $69.95, N connectors.*

Dry Dummy Loads for HF/VHF/UHF

MFJ has a full line of dummy loads to suit your needs. Use for tuning to reduce needless (and illegal) QRM and save your finals.

$29.95 MFJ-260B **$59.95** MFJ-264

MFJ-260B, $29.95. VHF/ HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. 300 Watts for 30 seconds, derating curve. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2½x2½x7 in. *MFJ-260BN, $34.95, N connectors.*

MFJ-264, $59.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. 100 watts/10 minutes, 1500 watts/10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 in. *MFJ-264N, $69.95, N connector. MFJ-5803, $4.95, 3 ft. coax/ PL-259.*

MFJ Low Pass Filter

MFJ-704
$39.95

Suppress TVI, RFI, telephone and other interference by reducing unwanted harmonics going to your antenna. 9 poles, MFJ's exclusive *Teflon® Dielectric Technology™* capacitors, hi-Q inductors, ground plane shielding, RF tight cabinet gives excellent TVI/ RFI protection. Full legal power 1.8-30 MHz. Mounting tabs.

Full Color FAX

MFJ-1214PC
$149.95

Use your computer and transceiver to receive, display and transmit *brilliant full color* news photos and incredible WeFAX weather maps with all 16 gray levels. Also receive/transmit RTTY, ASCII and CW.

Animate weather maps. Display 10 global pictures simultaneously. Zoom any part of picture or map. Manager lists over 900 FAX stations. Automatic picture capture and save.

MFJ Iambic Paddles

MFJ-564
$49.95

MFJ Deluxe Iambic Paddles feature a full range of adjustments in tension and contact spacing, self-adjusting nylon and steel needle bearings, contact points that almost never need cleaning, precision machined frame and non-skid feet on heavy chrome base. For all electronic CW keyers.

MFJ/Bencher Keyer

MFJ-422B
$134.95

The best of all CW worlds --a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

Iambic keying, speed (8-50 wpm), weight, tone, volume controls. Automatic keyer or semi-automatic ("bug")/tune mode. RF proof. 4⅛x2⅝x5½ in.

MFJ-422BX, $79.95, keyer only for mounting on your Bencher paddle.

12/24 Hour LCD Clocks

$19.95 MFJ-108B

$24.95 MFJ-112

MFJ-108B dual clock has separate UTC and local time displays. Huge 5/8 inch LCD digits are easy-to -see. Brushed aluminum frame.

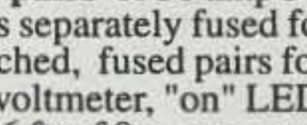
MFJ-112 shows hour/minute/ second, day, month, date, year at any QTH on *world map*. 12 or 24 hour display. Daylight saving time feature.

VHF SWR/Wattmeter

MFJ-812B
$29.95

Covers 2 Meters and 220 MHz. 30 and 300 Watt scales. Relative field strength 1-250 MHz, SWR above 14 MHz. 4½x2¼x3 in.

Code Practice Oscillator



MFJ-557
$24.95

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable. 9-volt battery or 110 VAC with MFJ-1305, $12.95.

Earphone jack for private practice, tone and volume controls for a wide range of sound. Speaker. Adjustable key. Can be hooked to transmitter. Sturdy. 8½x2¼x3¾ in.

MFJ Multiple DC Outlet

MFJ-1118
$64.95

Use your rig's 12 VDC power supply to power two HF/VHF rigs and six or more accessories with this MFJ *high current* multiple DC outlet.

2 pairs of 30 amp 5-way binding posts separately fused for rigs. 6 switched, fused pairs for accessories. DC voltmeter, "on" LED, RF bypassed, 6 ft. of 8 guage power cable. See *free* MFJ catalog for more DC outlets.

Write or call . . . 800-647-1800
Free MFJ Catalog

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)
• **1 year *unconditional* guarantee** • 30 day money back guarantee (less s/h) on orders from MFJ • **Free catalog**

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri.
FAX: (601)323-6551; **Add $6 s/h**

MFJ . . . making quality affordable

CIRCLE 10 ON READER SERVICE CARD

Fairbanks: Bob, KL7AM, and Luisa, WL7BNX, Hisamoto.

Petersburg: Bernie, NL7TQ, and Caroline,WL7EX,Engebretson, Bernie is president of the Petersburg ARC.

son Mike, KL7YY. The father and his #1 son are very active DXers.

At the US Coast Guard station in Kodiak I found a family of three amateurs: Dean Willis, WL7RK, a helicopter pilot; his wife Alesia, WL4RL; and their young son Brian, WL7RJ. All three have dune buggies and HTs and they travel in a group a couple of yards from each other, maintaining radio communications.

In Juneau, the state capital, I visited Frederick Hoskinson, WA6AXO/KL7, originally from California, and his wife Terry, AL7AE. They own and operate a video equipment service and a low-power commercial TV station. In the same city I went to see Rick Kaplan, N6IV/KL7, who rents an apartment with the use of a beam from Herb Holeman, WL7BIL, and his wife Cynthia, KL7IZE. Rick is a kind of adopted radio-son, if there is such a thing.

In Sitka, the former capital of Russian-America, Paul Arvin, KL7FBU, inherited the passion for amateur radio from his father, who was WA6EDX in California.

In Petersburg, founded by the Norwegian settler Peter Buschmann, there is a family of three amateurs: Ed Fuglvog, KL7DYS, a commercial fisherman; his wife Mildred, WL7ALG; and their son Arne, WL7CFT, also a fisherman. The president of the Petersburg Amateur Radio Club is Bernie Engebretson, NL7TQ, a maintenance mechanic working at the airport for the FAA. His wife Caroline, WL7EX, is therefore the "first lady" of amateur radio, at least for this town.

In Wrangell there is an active amateur named Bob Kurtti, KL7JCZ. His daughter Kathy was licensed in the state of Oregon, but now she is married and lives in Japan, and her name is Sekioka. Also in Wrangell I found Doug Smith, WL7LR, a Customs Inspector. His son Duane, KI7UF, lives in the state of Washington.

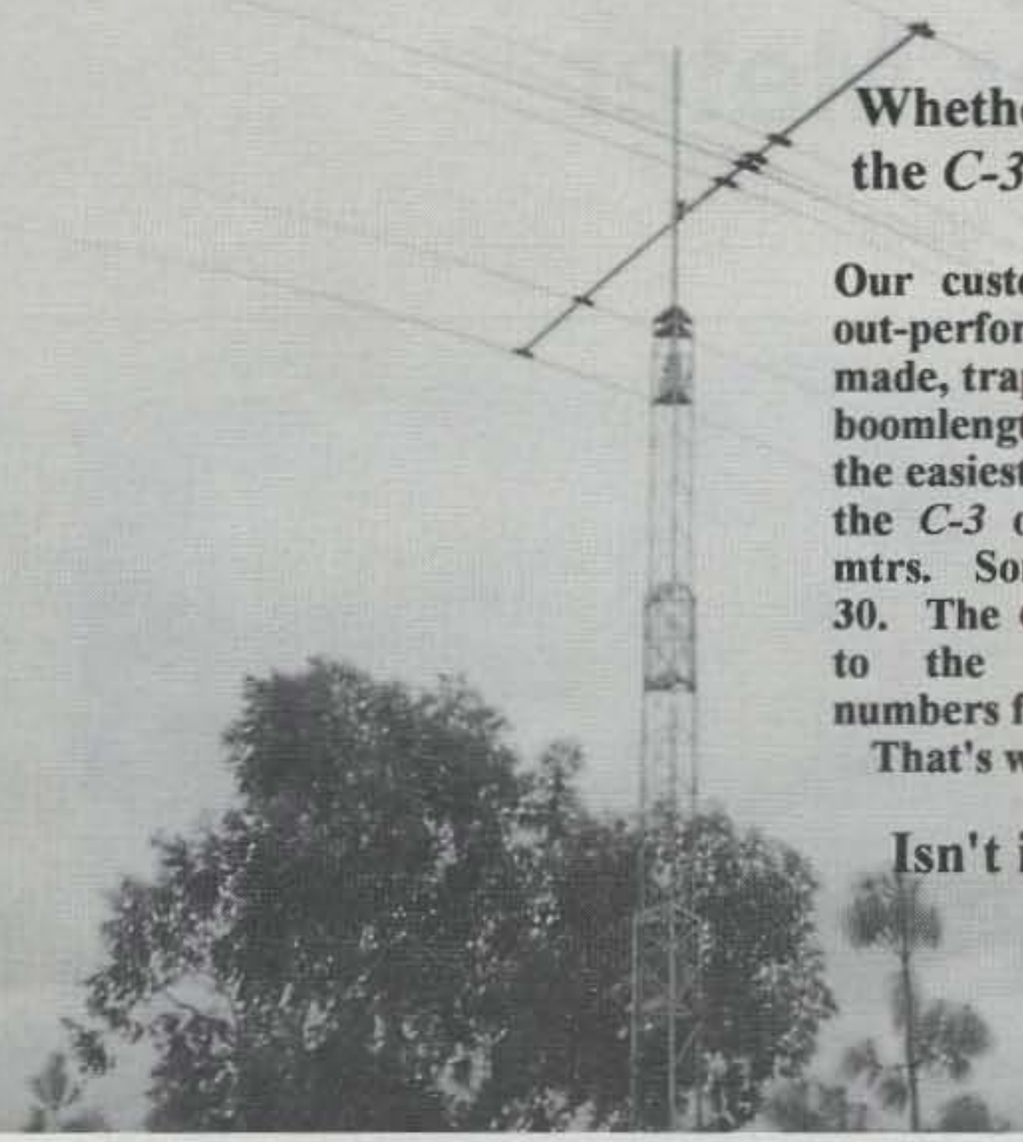
In the same town resides Jack Kvale, KL7GOG, a heavy-equipment operator, and his wife Kandy, KL7HMG, a hospital employee. They used to work in logging camps and ran hundreds of phone patches for loggers and fisherman. I saw them the day they returned from a trip piloting their own private plane.

Finally in Ketchikan I met Lew Williams, Jr., WL7AZM, the retired publisher of the *Ketchikan Daily News*. Now the paper is run by his son Lew III, WL7AZO.

Without a doubt, amateur radio brings people together. Through amateur radio friendly relations can be established and maintained among people living far apart geographically, having different political and religious beliefs and far-ranging financial status. Amateur radio has the power to bridge differences. It is a magnet that attracts humans having the same passion. If this can be done on a large scale, as among members of a club, or a national or international organization, it certainly can have strong effects in family settings.

A common hobby strengthens family relations. A supportive spouse can get involved in his or her spouse's hobby, first assisting in and later becoming part of it. A parent passes to his/her children the knowledge of electronics and skills in radio communications. In our world there are so many factors that tend to break up families. It is nice to find that amateur radio can strengthen those ties. ■

C-3 beam for 20-15 & 10 mtrs without traps!



Whether you use one or six... the *C-3* is the simply the best.

Our customers tell us that the *C-3* out-performs every commercially made, trapped tribander, regardless of boomlength. Not only that, the *C-3* is the easiest to assemble and put up, plus the *C-3* offers coverage of 17 & 12 mtrs. Some also use it effectively on 30. The *C-3* forward gain is superior to the high claimed marketing numbers from other trapped antennas. That's why the *C-3* really "works."

Isn't it time for a change?!!

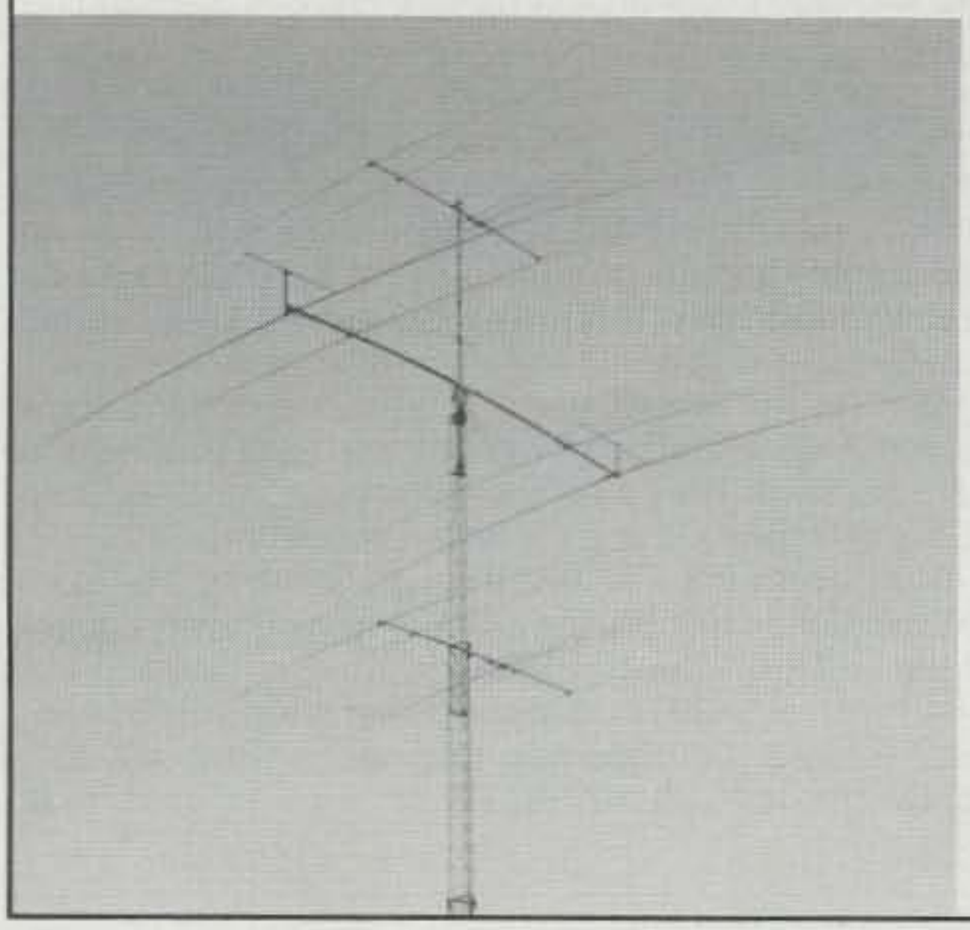
N7ML, Mike Lamb
Six C-3's at
180',150',120',90',60',30'
on 190' Rotating 55G

The ***C-3*** has 7 elements that are strong and tapered, for a pleasing look. Utilizing Force 12's forward stagger and NOMAD designs, all 7 elements function on all the bands to enhance the performance. The ***C-3*** has deep side nulls and a fine pattern; F/B 14-18 dB. As one customer said, "You have to aim this one!" The ***C-3*** has an 18' boom and is fed with a single 50 ohm coax. Its light 32 pounds, 19.8' turning radius and exclusive Easy-On™ mounting make the ***C-3*** easy to put up anywhere. It can be temporarily assembled for field use and assembles with standard wrenches and a hand riveter. The element-to-boom brackets are pre-aligned on the boom, so every element is straight and will not move. Small rotators are fine.

Force 12 has more than 50 HF antennas. They run from 3 element 80 mtr yagis, an 80 mtr rotary dipole that enables you to hear and transmit efficiently, 40 mtr dipoles and great 2 and 3 element 40 mtr yagis, interlaced 20/40's, 20/30/40, 30 and 17 mtr yagis, to multibanders such as the 5BA for 20-10 and the 4BA for 17-10. We wonder who will be the first to imitate designs like the 4BA: no traps, covering 17-15-12-10, which enables you to put up virtually any 20, 20/40, or 20/30/40 on the same mast. Our rotatable 8 bands on a single mast are a first - all with no traps. Take a look at the 36' boom MAGNUM 2/2 below: 2 on 80/75 (using the new EF-180B 66' elements) and 2 on 40. It is placed between a pair of ***C-3***'s. This set-up provides gain on all bands 80-10.

Force 12 also offers a pair of 50 ohm 1:1 baluns; fully tested and vacuum impregnated for reliability. The B-1 is rated at 3KW and the B-1/C commercial version with N-connector, rated at 25KW.

The C-3 is available at all 12 HAM RADIO OUTLET stores and TEXAS TOWERS. List is $449.95. Buy it now & have fun!



John Crovelli, W2GD / P40W, 1st place '93 CQWW Phone, 2nd place, '93 CQWW CW, "Force 12 antennas make all the difference. Say whatever you would like in the ad! Force 12 antennas are like turning on an amplifier."

Force 12
Antennas and Systems

For full brochure: **(408) 720-9073, (800) 248-1985**, FAX **(408) 720-9055**.

Why imagine the ultimate when you can have it?

FORCE 12, part of BUY U.S.A., Inc.
3015-B Copper Road, Santa Clara, CA 95051

CIRCLE 41 ON READER SERVICE CARD

CQ REVIEWS:

The Palomar Engineers M-840 SWR/Power Meter

BY LEW McCOY*, W1ICP

Jack Althouse, K6NY, owner of Palomar Engineers, has always been a genius at coming up with devices that amateurs really want—and need. His latest endeavor is the M-840, an SWR and power output indicator. The 840 is a rather big improvement on his already extremely efficient model M-835, and it replaces it and the model M-827.

The M-840 display unit measures 4½"W × 4¼"H × 2½"D. As you can see from the photo, there are two LED light bars—one for SWR and the other for power—each consisting of 30 LED segments. There are also three power levels available—20 watts, 200 watts, and 2000 watts. On the standing wave ratio side the scale goes to an SWR of slightly over 10 to 1.

Another small unit is used as a sensor to detect the RF passing through your transmission line to the antenna or Transmatch. This unit can be mounted remotely, as much as 6 feet from the display unit.

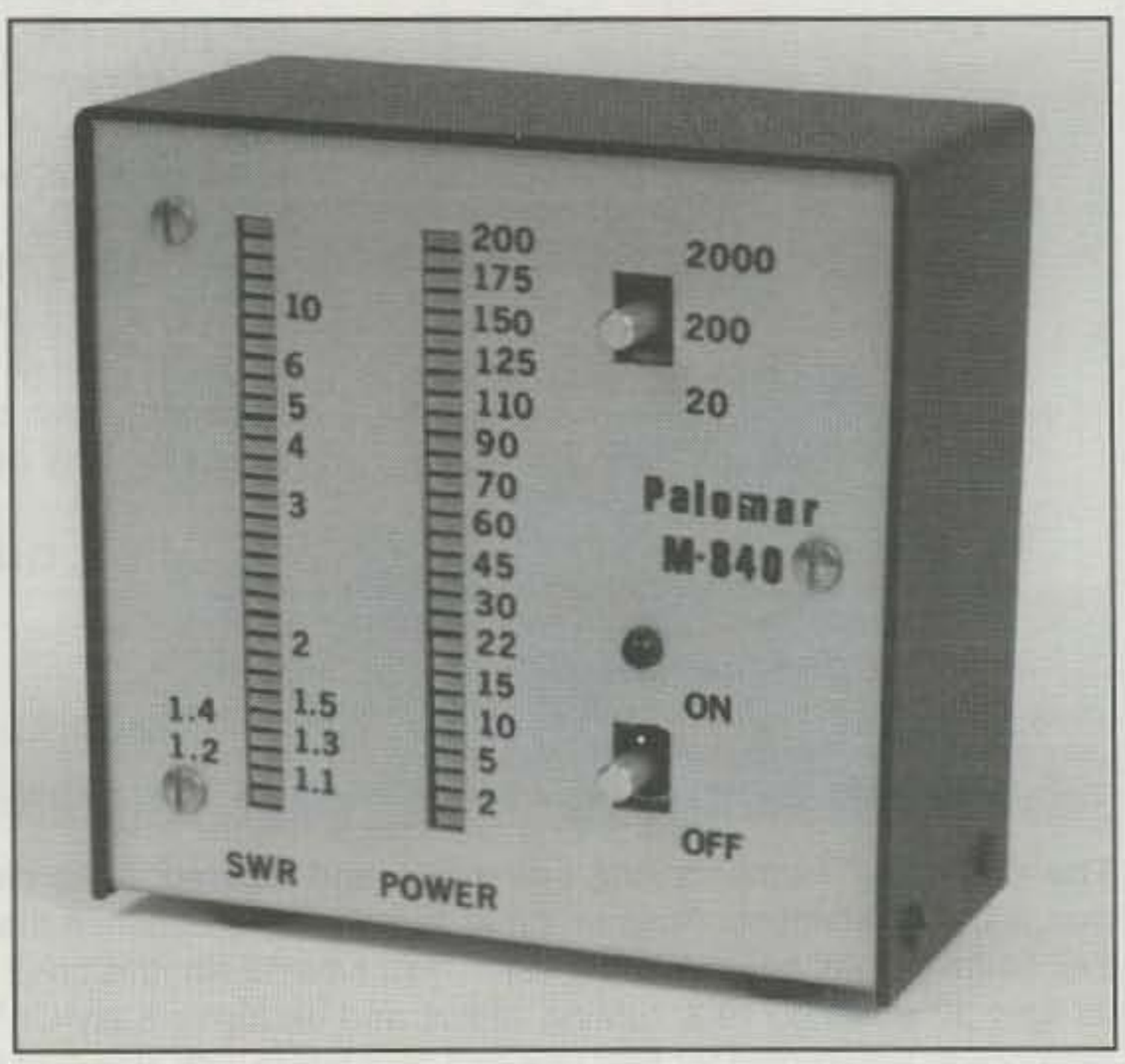
Simplicity is the word that best describes operation of this excellent bridge. Simply turn on the power switch and the LED bars lights up. Set the desired power scale—200 watts for most transceivers. Let's assume you want to tune up a Transmatch/antenna tuner for a 1 to 1 SWR antenna load. You'll find that initially both the SWR readings will be high and the power output readings low. As you adjust the Transmatch near the matching point, you will see the LED SWR bars drop towards 1 to 1 and the power bars go up.

Anyone who knows me well also knows that I have some very exotic test equipment when it comes to antennas, Transmatches, and SWR bridges. I put the M-840 completely through its paces, checking power levels and SWR. My test equipment for power will check to within plus or minus 5 percent. (Normally, manufacturers of SWR and power bridges rate their units at ±10 percent.) I found that the Palomar M-840 equaled my test equipment in accuracy, which is pretty doggone good by any standard.

Palomar uses extensive circuitry in the M-840 to ensure accuracy. The power output readings are practically instantaneous. In other words, when you speak into your microphone, you will observe peak envelope power (PEP output). The unit will also follow fast keying.

I cannot help but sort of step aside here and explain something that has bothered me for years and about which many amateurs have made mistakes. Years ago, back in the 1950s, I came up with an SWR bridge called the Monimatch. It was a good unit for showing matches, and several manufacturers picked up on the circuit and made units for sale. However, they decided to calibrate the meter they used for forward and *reflected* power. Instantly, amateurs started to think they had huge amounts of reflected power flowing back down their lines from their antennas. (There always is some reflected power loss from the inherent losses in cable. This is usually miniscule, however.)

What all bridges actually measure are *reflected voltage ratios.* I suppose manufacturers in those days figured it was simpler to use the term "reflected power." Reflected power is really a misnomer, and I will try to explain, in simple language, what happens. Bear with me, as this relates to the M-840. Transmission line experts please bear with me in this oversimplified explanation.



This is the Palomar model M-840. The SWR scale is on the left and the power scale is to the right. Power switching is at the upper right corner.

The instant you turn on your rig or speak into the microphone, an RF signal or pulse shoots up the feed line, looks at the antenna load, shoots back down the line, and has a conversation with the final RF amplifier stage in your rig as follows: "I just went up and looked things over and we have a condition where you cannot get full power into the antenna—too much reactance. Please transmit only 80 watts of your 100 watt capability." That is oversimplifying by a great deal, but essentially it is correct. Keep in mind that the reactance in the antenna impedance will show up as an SWR of some amount greater than 1 to 1. This in turn sets up a voltage ratio (SWR) that some people have shown as "power."

Getting back to the M-840, what Palomar has done is show the actual, real, true, bonafide power coming out of your rig and going to the antenna. They also show you your standing wave ratio. And for my money, that's the way it should be.

The M-840 covers from 1 MHz through 30 MHz. The connectors on the pickup unit are the SO-239 type. Power requirements for the unit are 12 volts at 800 ma.

The M-840 lists for $199.95, and the power supply for $14.95. It is manufactured by Palomar Engineers, Box 462222, Econdido, CA 92046 (619-747-3343). ■

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

PRICE SHOPPING?

CALL US LAST!

1-800-765-4267

YAESU

FREE SHIPPING

Oklahoma Comm Center

Orders & Quotes
800-765-4267

FAX 405-748-3077

Local & Info
405-748-3066

Oklahoma Comm Center
13424 Railway Drive
Oklahoma City, OK 73114

MasterCard VISA DISCOVER COD

Oklahoma owned and operated.
Not affiliated with any other store.

DOUG'S DESK

BY DOUG DeMAW, W1FB

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

HF-Band Preamps—Pros and Cons

Misgivings exist about the advantages of using a preamplifier ahead of the station receiver. Homemade or manufactured receiver preamplifiers can greatly enhance reception in some instances. However, no matter how well designed a preamp may be, it can cause significant impairment of receiver performance under a variety of circumstances. This article provides some guidelines that may assist you in deciding whether or not a preamp is something you need for your amateur station.

Preamp Advantages

Older receivers that have marginal front-end gain or a poor noise figure can be perked up considerably with the addition of a low-noise, medium-gain preamp. Generally, the weakness found in vintage and war-surplus receivers is the most pronounced at frequencies above 14 MHz. In some instances these receivers also need some pepping up at 1.8 MHz, depending on the design. Certainly, a preamp has merit in the foregoing situations.

A preamp gain of 10 to 20 dB is sufficient to resolve most of the problems that can be related to low overall receiver gain. The tip-off comes when you need to set the receiver audio gain at nearly maximum volume in order to copy a weak signal. This assumes that the receiver front-end noise figure is acceptable, and that the desired signal is at or above the noise threshold. A poorly designed receiver front end may have excessive noise generated within the RF amplifier stage, or the RF stage gain may be so low that the signals can't override the noise that originates in the mixer. A low-noise preamp can resolve this noise-figure problem when you install it between the antenna and the first stage of your receiver. The higher the operating frequency (14 MHz and above), the more significant the noise figure becomes, owing to the fact that receiver noise may exceed that of the man-made and atmospheric noise more prevalent below 14 MHz. In other words, a very low receiver noise figure is seldom of benefit at frequencies from 1.8 to 14 MHz.

P.O. Box 250, Luther, MI 49656

Preamp Disadvantages

Don't be fooled by the generous S-meter readings that accompany the addition of a preamp. I recall visiting an amateur friend who purchased a commercially made HF-band preamp. He was anxious to show me how "hot" his state-of-the-art receiver was when the preamp was operating. First he tuned in an S-9 signal on 20 meters. Next he turned on his preamp and the S-meter reading jumped to 20 dB over S-9! "What do you think of that?" he beamed. I suggested that he turn off the preamp and get a reading on the band noise by tuning to an unoccupied frequency, which he did. The S meter read S-4. I then asked him to turn on his preamp. When he did, the noise level also increased by 20 dB. This showed the effective signal-to-noise performance of the receiver had not improved because of the preamp. In essence, all that resulted was his need to turn down the audio gain by some 20 dB, with respect to the previous audio-gain level without the preamp.

The foregoing situation is not all that we need to consider when placing a preamp ahead of an already good receiver. The added front-end gain from the preamp can degrade the dynamic range (ability to accommodate strong signals without generating intermodulation distortion, or IMD). Poor dynamic range (apart from poor design) is caused by too great a signal level being applied to the receiver RF amplifier and mixer stages. Evidence of poor dynamic range can be observed when one or more strong signals within the band appear in two or more places across the tuning range. These spurious responses make it appear that the "offending" station has a dirty signal, too

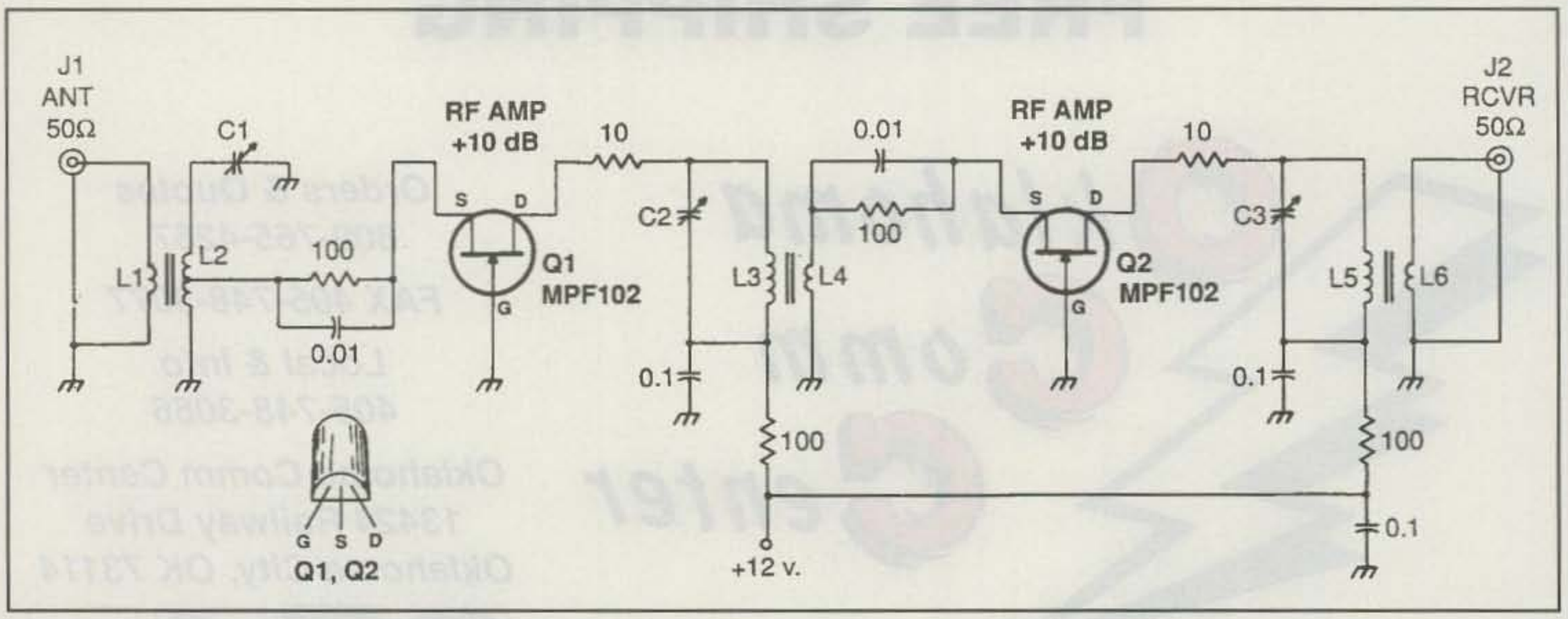


Fig. 1– Schematic diagram of a practical two-stage, 20-dB, low-noise preamp. C1, C2, and C3 are mica or ceramic trimmers (see text). Fixed value capacitors are in µF. Resistors are ¼ watt carbon film or composition types. Q1 and Q2 are MPF102 or equivalent JFETs (see text).

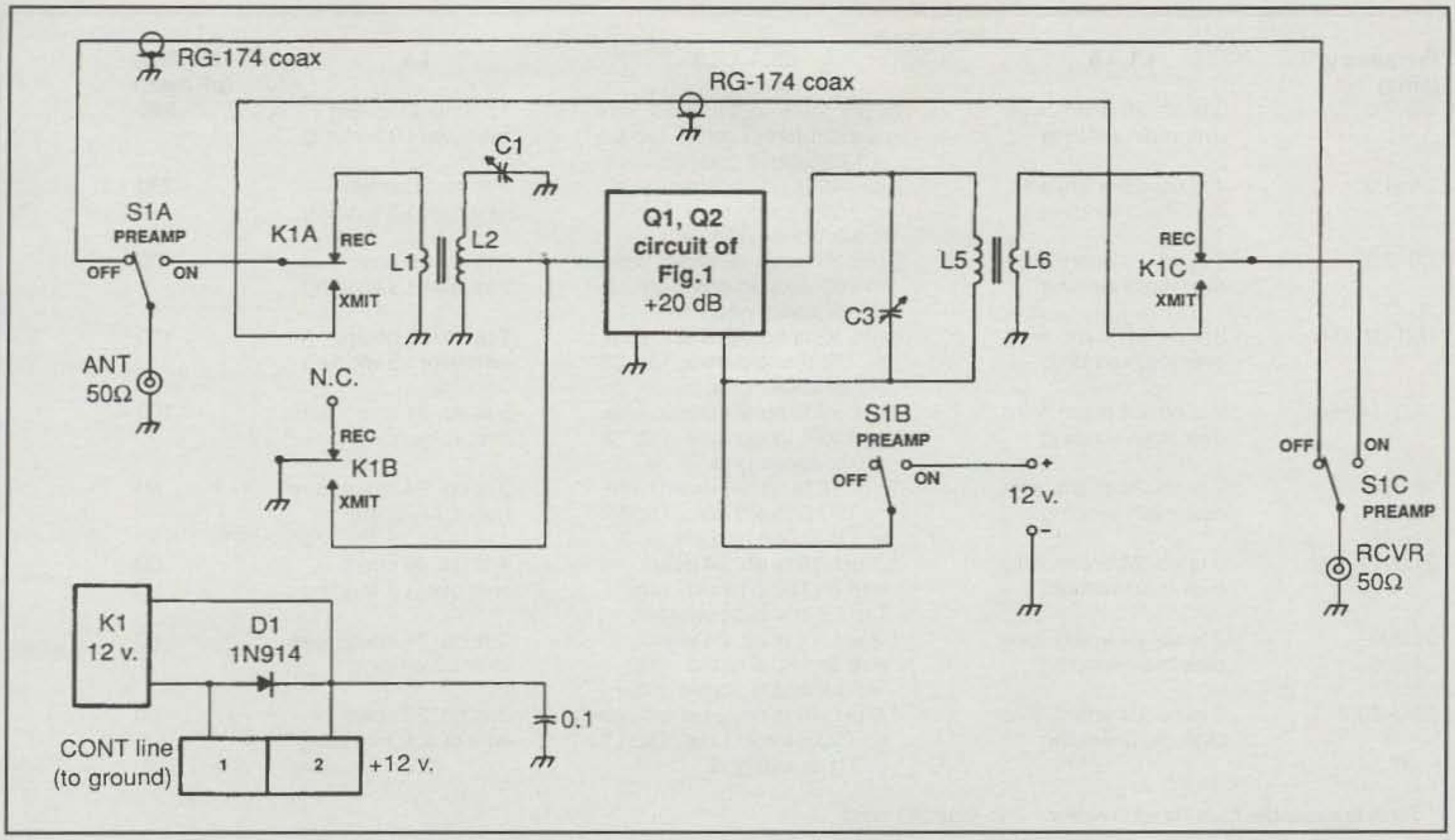


Fig. 2– Method for adding a relay and a switch to permit bypassing the preamp when transmitting. K1 accomplishes this (see text for relay ratings), and S1 is used for turning off the preamp when it is not needed. K1 is a three-pole, double-throw 12 VDC relay. A four-pole relay may be substituted, or two double-pole, double-throw units can be employed. In either situation, one relay section will be available for shorting out L6 during transmit, if desired. K1 can be actuated from the transceiver-to-ground control line. S1 is a three-pole, double-throw wafer switch. It requires the same ratings as K1.

much mic gain, or excessive speech processing. In effect, mixer IMD products can make it appear that the band is filled with QRM, when in fact it is not. Receiver noise blankers create a similar effect in the presence of strong signals, and this is also a result of impaired receiver dynamic range. The above possibilities clearly suggest that a preamp should not be used when it is not needed.

Other Preamp Uses

MF- and HF-band preamplifiers come into their own when we are using small receiving loops, short wire antennas, or Beverage antennas. Preamplifier gains from 10 to as great as 40 dB are not uncommon, depending upon the efficiency of the small receiving antenna. The greater gain magnitudes are usually associated with very small receiving loops. In any of these situations I recommend that the preamp gain be set to provide unity signal strength with that which is obtained while listening to a given signal with the transmitting antenna. For example, if you use a full-size vertical antenna or dipole for transmitting, and the signal of interest on receive is 10 dB over S-9 with that bigger antenna, adjust the loop antenna preamp gain to also provide a 10 dB over S-9 meter reading. Gain levels that are substantially greater than unity could impair the receiver dynamic range. If the preamplifier has no built-in RF gain control, you may insert a step attenuator between the preamp and the receiver input jack to control the gain in that manner. Once unity signal strength is established, you can build a T- or pi-type of three-resistor attenuator for permanent use with the preamp. Details for these simple attenuators are provided in the ARRL Electronics Data Book, by W1FB.

A Practical 20 dB Preamp

Low noise, moderate gain, and good dynamic range are characteristics of the circuit in fig. 1. I have used this design with 160 meter small loop and Beverage antennas a number of times. Since Q1 and Q2 operate as common-gate (grounded gate) amplifiers, instability is not likely to occur, even when the input and output ports are open. Self-oscillation in a preamp can be observed when phantom unmodulated carriers appear in the tuning range of the receiver. Self-oscillation may also appear as a loud hash noise in the receiver. VHF self-oscillations are suppressed in the fig. 1 circuit by means of the 10 ohm resistors at the drains of Q1 and Q2.

Although MPF102 JFETs are satisfactory at Q1 and Q2, somewhat better performance can be expected when 2N4416s are employed. The latter type has a better pinch-off characteristic and a slightly lower noise figure than is available from the somewhat generic MPF-102s on today's market. Dual-gate MOSFETs, such as the 3N211 or 40673, may be substituted for Q1 and Q2 by tying gates no. 1 and 2 together and treating the devices as JFETs. Other than the tuned circuits, there are no critical components in this preamp. Table I contains the tuned-circuit values for operation from 160 through 10 meters.

Switch-Around Method

If the fig. 1 preamp is used with a transceiver, it will be necessary to add a relay to permit transmitting around the preamp. A method for doing this is illustrated in fig. 2. K1 allows the user to bypass the circuit during transmit and S1 turns off the preamp and bypasses it when it is not being used. One set of the K1 contacts ground the input of Q1 during transmit periods, thereby protecting the junction of Q1. K1 should be a relay that has low capacitance between its contacts. It should also have low capacitance between its three

Frequency (MHz)	L1, L6	L2, L3, L5	L4	C1-C3 (MHz) (pF max.)
1.8–2.0	5 ts no. 28 enam. wire over main winding	28 µH. 52 ts no. 28 enam. wire on t50-1 toroid core.† Tap L2 at 13 ts above gnd.	13 ts no. 28 enam. wire over L3 winding	280
3.5–4.0	4 ts no. 26 enam wire over main winding	9 µH. 42 ts no. 26 enam. wire on T50-2 toroid core. Tap L2 at 9 ts above gnd.	9 ts no. 26 enam. wire over L3 winding	280
7.0–7.3	3 ts no. 26 enam. wire over main winding	6 µH. 35 ts no. 26 enam. wire on T50-2 toroid core. Tap L2 at 8 ts above gnd.	8 ts no. 26 enam. wire over L3 winding	100
10.1–10.150	3 ts no. 26 enam wire over main winding	4 µH. 32 ts no. 26 enam. wire on T50-6 toroid core. Tap L2 at 7 ts above gnd.	7 ts no. 26 enam. wire over L3 winding	100
14.0–14.350	2 ts no. 24 enam. wire over main winding	2 µH. 22 ts no. 24 enam. wire on T50-6 toroid core. Tap L2 at 5 ts above gnd.	5 ts no. 24 enam. wire over L3 winding	100
18.068–18.168	2 ts no. 24 enam. wire over main winding	1 µH. 16 ts no. 24 enam. wire on T50-6 toroid core. Tap L2 at 3 ts above gnd.	3 ts no. 24 enam. wire over L3 winding	60
21.0–21.450	2 ts no. 24 enam. wire over main winding	1.5 µH. 19 ts no. 24 enam. wire on T50-6 toroid core. Tap L2 at 4 ts above gnd.	4 ts no. 24 enam. wire over L3 winding	60
24.890–24.990	2 ts no. 24 enam. wire over main winding	1.2 µH. 17 ts no. 24 enam. wire on T50-6 toroid core. Tap L2 at 3 ts above gnd.	3 ts no. 24 enam. wire over L3 winding	60
28.0–29.7	2 ts no. 24 enam. wire over main winding	1.0 µH. 16 ts no. 24 enam. wire on T50-6 toroid core. Tap L2 at 3 ts above gnd.	3 ts no. 24 enam wire over L3 winding	60

** Toroids available from Amidon Assoc., Inc. (see CQ ads).*

Table I– Figure 1, L and C data.

sections. This will minimize unwanted RF energy transfer to the preamp transistors during transmit. The K1 contacts must also be able to handle the RF current from a 100 watt transceiver. Since 100 watts at 50 ohms results in a current flow of 1.41 A, the relay contacts should be rated at 5 A or greater to allow a reasonable safety factor if high SWR should occur. In a like manner, the voltage-breakdown rating of K1 should be 250 or greater, even though the peak RF voltage at 100 watts into a 50 ohm load is only 100. High SWR can cause much higher peak voltages to develop. S1 should have similar ratings.

Construction

I built this preamplifier "ugly style," a-la W7ZOI (tacked together on a piece of PC board) and therefore cannot offer a PC-board pattern or parts placement template. I used 1/4 watt, 100K ohm resistors as standoff posts for the circuit tie points. All of the wiring should be short and direct in order to discourage instability and unwanted degeneration (gain-loss). Install the Q1 and Q2 circuitry in line rather than side by side. This helps to minimize unwanted stray coupling that could cause self-oscillation.

C1, C2, and C3 in fig. 1 are mica compression trimmers. They could be replaced by a three-section variable capacitor to permit simultaneous peaking of the three tuned circuits from the front panel of the preamp. This would be a useful feature at 160 and 75 meters, owing to the relatively narrow bandwidth at those frequencies. When individual trimmers are used, they allow peak performance over a fairly narrow segment of each of those bands, owing to the high Q of the three resonators. The effective bandwidth doubles with each octave of frequency increase, assuming that the circuit Q is the same for each band. Therefore, the trimmer settings (peaked at mid band) are suitable for all of each band from 40 through 10 meters, give or take a few dB.

You may wish to replace the tuned circuits with fixed-tuned bandpass filters (filter design information can be found in The ARRL Handbook). If this is done, it will be necessary to use broadband matching transformers at each affected point in the circuit. Also, the preamp gain will decline because of the insertion loss of the filters and matching transformers.

Some Final Comments

You can use one half of the fig. 1 circuit (J1 through L4) if 10 dB of gain is sufficient for your application. If this is done, L4 should have the same number of turns specified for L6. No other changes are needed. Conversely, if you need more than 20 dB of gain, simply add one more JFET and tuned circuit to the preamp.

STORE HOURS
MON-FRI
10AM-6PM
SAT 10AM-3PM

R & L ELECTRONICS
HAMILTON, OHIO

CALL OR WRITE FOR FREE CATALOG (FREE IN US ONLY)

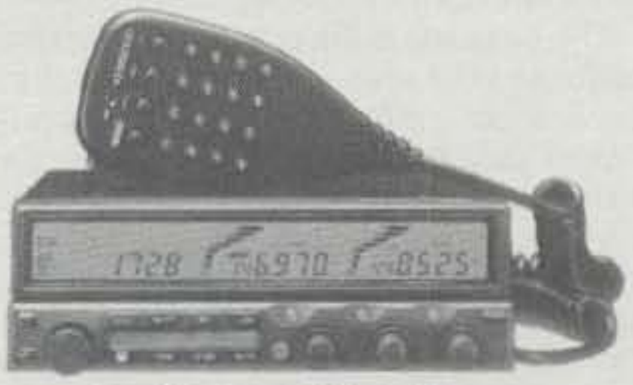
1315 MAPLE AVE
HAMILTON, OH 45011
(800)221-7735
[(513)868-6399 TECH/LOCAL] [(513)868-6574 FAX]

8524 E WASHINGTON ST
INDIANAPOLIS, IN 46219
(800)524-4889
[(317)897-7362 TECH/LOCAL] [(317)898-3027 FAX]

WE STOCK MOST ALL AMATEUR RADIO PRODUCTS. CALL US FOR ANY OF YOUR AMATEUR NEEDS.

KENWOOD

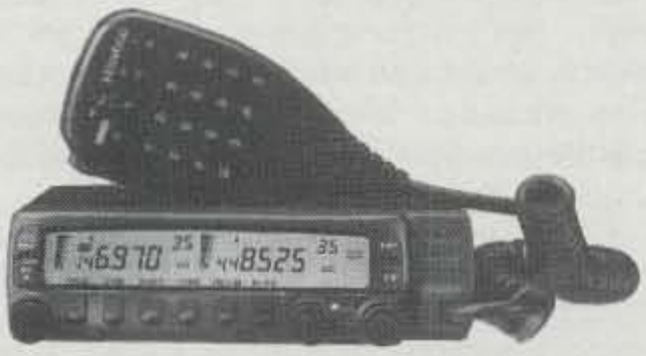
TS-950SDX



TM-742A

TS-850S

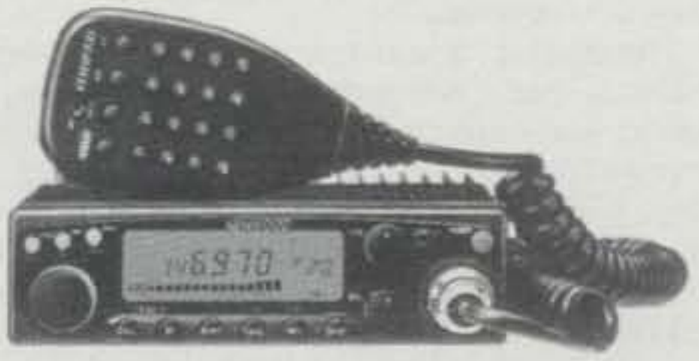
TH-79A



TM-733A

TS-450S

TH-28A



TM-241A

TS-50S

TM-255A

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Update '95

This time we'll revisit and update many of the Antennas and Accessories topics we covered in earlier columns, and we'll also break some new ground. Let's get started.

Antenna Update

Coax-Seal®. Do you take the few simple steps required to safeguard your outdoor coaxial cable connectors and coax joints? Have you ever found your SWR climbing during the first rainstorm, even after wrapping all your coax connectors with electrical tape? How much time have you wasted untaping the leaking connectors to dry them out? And to what extent has the water-wicking action contaminated your coax under such circumstances?

The coax line is the conduit from your transceiver to your antenna system, and it also is the weakest link in the system. Simply put, you should seal the "weak points" against water entry to ensure the integrity and performance of your station.

You can use silicone sealers, but the stuff uses a curing agent that can corrode both your cable and its connectors. One good answer to the connector sealing problem is Coax-Seal®. It's billed as "the original connector sealant," and it has been around for quite some time. It's one unassuming product that I have used regularly, but I never gave much thought as to exactly what it was, who made it, or what it cost. That was until Tom Harrington of Universal Electronics sent me some interesting background information on the product.

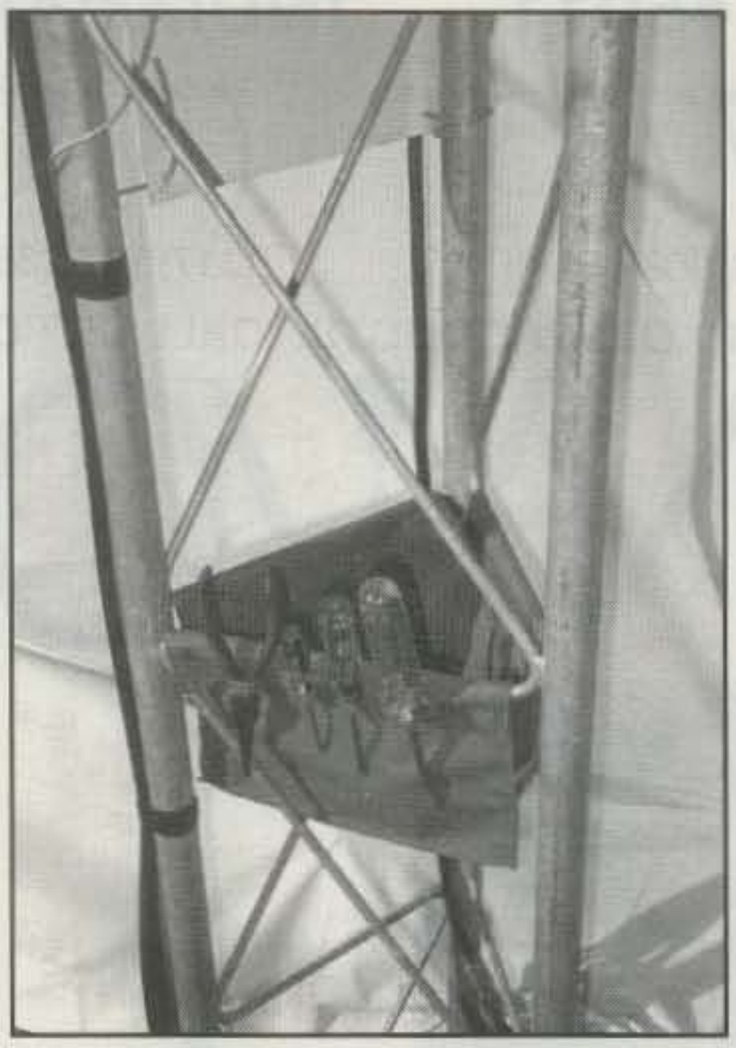
Coax-Seal® is a hand-moldable, plastic mastic (a resin) suitable for sealing a wide variety of materials, including metals, plastics, and vinyls. The product produces a tenacious and waterproof long-lasting seal for coaxial cable, cable fittings, CATV hardware, marine electronic equipment, antennas, feedlines, and microwave hardware.

The product is a black, tacky, self-healing material that's nonconductive, noncontaminating, and waterproof. It's nonhardening and nonoxidizing at ambient temperatures, and it stays flexible for a ten-year life over a temperature range of plus/minus 35 degrees Fahrenheit. It can be used anywhere a permanent, flexible seal is required.

Coax-Seal® is easy to apply. You just remove about 6 in. of material, then wrap to cover the fitting. After wrapping, you mold the material to form a smooth surface and force out any air. You can bury Coax-Seal® with no effect on the material, or you can apply vinyl electrical tape over the seal to afford mechanical protection if needed. Best of all, the product is nonflammable and does not present any significant health effects.

The 3/32 in. thick Coax-Seal® is available in two widths—1/2 in. and 1 in. Both types are furnished on rolls having a peel-away backing paper. The retail pack is 1/2 in. wide and is sold for $2.49 in 60 in. long rolls. Industrial packages are available for volume users in both widths in 12 ft. rolls.

289 Poplar Drive, Millbrook, AL 36054



The Tower-Mate™ Accessory Pouch, also known as the "Big Pocket," features Velcro fasteners that attach to the inside of the tower. This creates a handy place for loose bolts, tools, and other parts. (AA6WJ photo)

For a spec sheet, contact Universal Electronics, Inc., 4555 Groves Road, Columbus, OH 43232 (614-866-4605). A trial packet for four connectors is $1 postpaid.

Tower-Mate™ Accessory Pouch. Do you never seem to have enough pockets when working on a tower project? Well, there's an answer to the problem of creating a place for all those bolts, tools, and other parts that you may find yourself angrily crawling down the tower and into the ham shack to retrieve.

The answer is the Tower-Mate Accessory Pouch, also known as the "Big Pocket." It features Velcro fasteners that attach the pocket to the inside of the tower, creating a handy place for those tools, bolts, and other parts we mentioned.

The "Big Pocket" comes in two sizes. One is the Tower-Mate 25, designed to fit a Rohn 25 or similar tower; the TM25 is $15.95. A second model, the Tower-Mate 45, fits Rohn 45/55 or similar towers; the TM45 is $19.95. Both require $3 shipping and handling.

For details on the "Big Pocket," contact Randy Wagaman, AA6WJ, at Tower-Mate, P.O. Box 601616, Sacramento, CA 95860-1616 (FAX 916-481-5381).

Turnbuckle Tip de WAØKKC. Frequent correspondent Richard Mollentine, WAØKKC, regularly FAXes us antenna and tower-related tips. Many of these we find appropriate to share with readers. This time Richard offers a simple but useful guying suggestion. He notes that when using a turnbuckle on tower guy wires, you should be sure to use a safety wire through the turnbuckle itself and attach this safety wire with substantial guy-wire connectors at both ends. Doing so serves two purposes. First, it prevents the turnbuckle from slowly unwinding. Second, it also joins the ends if the turnbuckle breaks. Thanks, Richard!

A.S.A. Fold-Over Adapter. A.S.A. has announced the Model FO-1 "Fold Over" three-position adapter for 3/8" × 24 thread mobile antennas; the adapter fits any mount. The adapter eliminates having to take your antenna off your vehicle when approaching your own garage, a bank teller window, a parking garage, or any low-hanging structure. With the adapter in place, all you need to do is depress the side button on the adapter and fold it over to lower the antenna to either 45 or 90 degrees. The unit is made of chrome-plated brass and has a stainless-steel center pivot ball. The adapter is $7 plus $5 shipping and handling.

For more information, contact A.S.A., P.O. Box 3461, Myrtle Beach, SC 29578 (1-800-722-2681).

ACTIVE KITS Electronics Projects. Why build a kit in this day and age? Well, electronic kits represent a rewarding way of setting up at least a portion of your shack or workbench. You learn building and troubleshooting and become familiar with your equipment. You also learn something about tools, component color codes, schematics, and test equipment.

Kits overcome many construction obstacles. Usually, printed circuit (PC) boards and components are furnished, holes are predrilled, assembly and alignment instructions are provided, and only simple tools are required. A kit you assemble yourself usually costs less than a comparable assembled unit.

A busy Canadian-based kit company is ACTIVE KITS, which offers electronics enthusiasts a variety of projects ranging from instrumentation to fun and games. At last count, more than 34 kits are offered. These include a color light organ, 1 MHz function generator, electronic siren, battery-level monitor, remote infrared switch, stepper motor controller, TTL logic probe, FM transmitter, resistor switch box, and more. Several kits presently are in development.

To determine whether your skill level is commensurate with that required to build a project, difficulty level values (beginner, intermediate, or advanced) are added to each project description. Each kit includes single- or double-sided, drilled and etched glass epoxy PC boards; component placement illustration on the boards; IC sockets for any projects involv-

ing ICs; and detailed, step-by-step assembly instructions.

For a free catalog, contact ACTIVE KITS, 345 Queen St. W., Toronto, Ontario, Canada M5V 2A4 (1-800-465-5487).

Garantennas Update. We featured the Canadian-made Garantenna line of balun and coax-fed Windom antennas for HF use in two previous columns, May 1989 and December 1991. It's now time to update the details on their products.

The all-band, no-traps Garrantennas are good general-purpose HF skyhooks, being based on the classic 1928 off-center-fed (an approximate one-third to two-thirds leg length ratio) dipole design by Loren Windom, W8GZ. His antenna allowed the user to work several HF bands with a single flattop. Windom used an openwire feedline, but the Garantenna Windoms are fed with 52 ohm coax rather than with openwire line. The change in feedline is preferred by the manufacturer to reduce feedline radiation and to minimize the danger of electric shocks to passersby.

In this modified Windom design, a balun is inserted at the appropriate point of the flattop to permit the feeding of what is basically a high-impedance dipole antenna fed with a low-impedance feedline. Six different designs enable you to work up to nine different HF bands from 160 to 10 meters (including the 17, 15, and 12 meter bands). Each Windom design is available in 500 W PEP and 2 KW PEP models; there is no difference, other than the balun, between the two basic models.

You need a 67, 137, or 255 foot straightaway for the flattop, depending on the model, although you can install the antennas as inverted-Vees in somewhat smaller spaces. Three of the antennas (the GD-5, GD-8, and GD-9) are a combination of both types—that is, a horizontal dipole with an inverted-Vee below it, connected to a common balun. The antennas range in price from $99 to $225 (Canadian), depending on flattop length and balun model. All antennas come with a three-year limited warranty.

The 500 W PEP balun is a rather conventional toroidal balun. However, the 2 KW PEP "duplex balun" is rather different. It uses a two-step approach: the added upper part of the balun acts like a choke or current balun to reduce the amount of unnecessary radiation from the feedline or coax.

These antenna systems are designed not to require an antenna tuner, having an SWR profile that is usually better than 1.5:1. However, as can be the case with multiband antennas, especially when you can't achieve an optimum installation, a tuner may be required in your station setup.

For more details, contact L. M. (Skip) Wright, VE3BBS, at Garantennas, RR #14, Mapleward Road, Thunder Bay, Ontario, Canada P7B 5E5 (807-768-8164).

EUR-AM Antennas Update. As we noted in our September 1993 column, EUR-AM (owned by J. J. Lauer, N6PMM) is an importer that specializes in the distribution of high-quality, European-made amateur antennas and accessories. Most of their antennas, mounts, and connectors are interchangeable, a unique feature of EUR-AM's "modular antenna system" design.

The most recent catalog shows a variety of VHF/UHF antennas covering 70 MHz and up, special connectors and adapters, and mounts and brackets. Also offered are VHF/UHF base-station verticals and Discones; rubber duckies; and several apartment-style antennas, including a "Window Quad" loop for 144–440 MHz. The antennas are supplied with a cutting chart for convenience in setting them to the desired frequency.

The many mobile antennas offered come in two basic versions: the modular type and the DV27 (ball joint) type. All of the M6 thread modular antennas and mounts are interchangeable. The mounts are equipped with a special "nipple connector" that lets you change connectors and/or add cables in seconds, without soldering (see the Sept. '93 column for details on the Swedish-made nipple connector).

The DV27 (ball joint) antennas have a toggle joint which has a wing screw so that you can adjust your antenna angle over a 180-degree range. This type of mount fits anywhere on a car roof, fender, or any other vehicle contour. Adapters are available so that you can convert the 3/8" × 24 ball mount to accept a DV27 style antenna, or vice-versa.

For a catalog, contact EUR-AM, P.O. Box 990, Meredith, NH 03253-0990 (603-279-1393).

Sinclabs Update. We highlighted the Canadian firm Sinclair Radio Laboratories (Sinclabs) in December. We sited their current amateur radio products, noting their flyer and data sheets on several antennas, passband filters, and duplexers.

Recently we received their new full-color catalog, and at 122 pages it's impressive. We were surprised by the range of products for business users as well as amateurs offered in the catalog—products covering the spectrum from 25 to 1800 MHz.

Among the antennas offered are ground planes, dipoles, dipole arrays, collinears, Yagis, corner reflectors, and diversity antennas. A variety of transmitter combiners, receiver multicouplers, duplexers, cavity filters, coaxial cable, clamps, mounting hardware, and other antenna accessories are featured.

One of the more interesting Sinclabs VHF antennas is the SRL-250, a medium gain, extremely broadband Yagi antenna for 138-174 MHz. The six-element design boasts a nominal gain of only 7 dBd, but the bandwidth is a full 36 MHz at the 2.0:1 SWR points. A similar antenna, the SRL-350, covers 406–512 MHz.

Another unusual design is the SRL-227, a broadband 7 dBd gain corner reflector for 138–174 MHz; bandwidth at the 1.5:1 SWR points is claimed to be 15% of the design frequency. A similar but larger corner reflector, the SRL-228, offers 10 dBd gain and has comparable bandwidth characteristics.

For a catalog, Canadians should contact Sinclabs Radio Laboratories Limited, 85 Mary St., Aurora, Ontario, Canada L4G 3G9 (1-800-263-3275). U.S. amateurs may place orders through Sinclair Radio Laboratories, Inc., 675 Ensminger Road, Tonawanda, NY 14150 (1-800-288-2763).

Software Update

RF Design Software Update. In April 1993 we took note of a very specialized software distributor, the RF Design Software Service. It offered IBM PC-compatible RF engineering programs that appear in *RF Design* magazine. The purpose of the service was to distribute the programs from articles published in the

magazine to promote the exchange of ideas among engineers.

Now the fulfillment of *RF Design* software is being performed in Atlanta by Argus Direct Marketing, which continues to offer monthly discs, yearly subscriptions, and prior editions. Generally, the program disks are $25 postpaid. Annual program subscriptions are $170. Past-year collections are available back to 1989 for $120 a year. The complete index of *RF Design* articles (1978–1993) is available on disk for $25, for the IBM PC or Macintosh. Argus Direct also offers a small electronic engineering library of technical books, directories, buyers' guides, and conference proceedings.

For a flyer and catalog of available software, contact Argus Direct Marketing, 6151 Powers Ferry Road N.W., Atlanta, GA 30339-2941 (404-618-0219).

Book Notes

Lathrop Electronics Study Publications. Larry Lathrop, AA3BD, offers self- or classroom-study educational materials for those serious about attaining a solid working knowledge in electronics. Nine different books are offered in the series.

Although the nine books are comprehensive, they present complex concepts and principles of electronics in simple, step-by-step terms, detailing and illustrating each point. The books include texts on matter, energy, and DC; AC and transformers; solid-state devices and power supplies; amplifiers; wave-generation circuits; propagation, transmission lines, and antennas; amplitude and phase modulation; and microwave. In the interest of being complete, there's even a book on electronic tubes and tube theory, a subject rarely covered elsewhere today.

The books, which are offered with a 30-day money-back guarantee, are priced at $12.50 each plus $0.75 shipping and handling for each book. They're from Lathrop Publications, P.O. Box 207, Upper Marlboro, MD 20773-0207 (1-800-300-3294, ext. 6137).

***Satellite Times* Makes Its Debut.** Bob Grove, WA4PYQ, publisher of *Monitoring Times*, recently introduced a sister publication, *Satellite Times*. Launched by Bob as a satellite-oriented parallel to its sister publication and edited by Larry Van Horn, N5FPW, the new publication offers several features. These include hints for more productive satellite listening, equipment tips, frequencies and identifications of all types of orbital satellites, and equipment and publication reviews. Regular departments include amateur satellites, domestic and international TVRO topics, weather satellites, personal communications satellites, computer applications, NASA news, launch reports, technical forums, and more.

A one-year domestic subscription is $16.95 from Satellite Times, P.O. Box 98, Brasstown, NC 28902 (1-800-438-8155).

New Frequency Directory Edition. In March 1992 we took note of a new HF monitoring resource, *The Worldwide Aeronautical Communications Frequency Directory*, by noted aero author Robert E. Evans. The 5½" × 8½", 42-page book initially was designed simply to update and augment the frequency listings published in Robert's 1989 book, *Aeronautical Communications Handbook—HF Edition*, which we covered in April 1990.

The *Directory* has grown considerably to become a comprehensive sourcebook for novice and experienced aero monitors alike. The second edition contains complete major world, regional, and domestic air route information for 137 countries; company operations for 116 airlines; VOLMET broadcasts from 70 cities; and full military coverage for 30 nations' air forces.

While the book is primarily a frequency directory covering some 2350 discrete frequency entries, it also includes an introduction to aeronautical monitoring. The book includes discussion of the "what, when, where, and how" of this specialized type of listening and a comprehensive glossary of terms, abbreviations, and on-the-air acronyms. Appendices include internationally recognized codes, designators, and waypoint data not readily available to the hobbyist monitor.

The book is $19.95 from Universal Radio, Inc., 6830 Americana Pkwy., Reynoldsburg, OH 43068 (1-800-431-3939).

Digital Digest-RTTY Digital Journal Merger. We have reported on *Digital Digest*, edited by Tom Arvo, WA8DXD, several times. Indeed, over the past several years it's been a valuable resource to radio amateurs interested in all aspects of digital communications. *DD* served the growing interest in digital techniques by providing practical information on digital communications, software, and associated technologies. Packet radio, RTTY, AMTOR, PACTOR, CW, FAX, slow and fast scan TV, PCs, computer interfacing, and other modes were covered in some detail.

In a very significant change, *Digital Digest* has merged into the *RTTY Digital Journal* (*RDJ*). *RDJ* is the successor to the *RTTY Jour-*

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

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

MODEL VS-50M

SPECIAL FEATURES

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

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

SL SERIES

• LOW PROFILE POWER SUPPLY

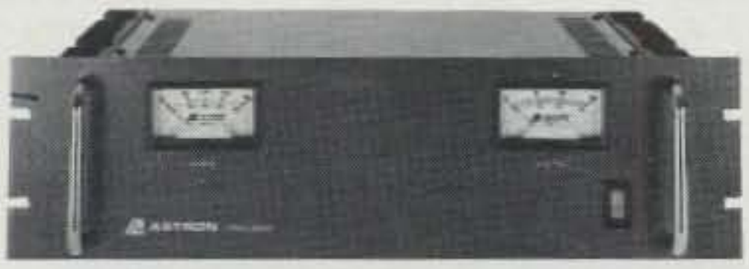
MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

RS-L SERIES

• POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

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

RM SERIES



MODEL RM-35M

• 19" RACK MOUNT POWER SUPPLIES

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

RS-A SERIES

MODEL RS-7A

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

RS-M SERIES

MODEL RS-35M

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

VS-M AND VRM-M SERIES

MODEL VS-35M

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

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

RS-S SERIES

MODEL RS-12S

• Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

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

nal, which was purchased by the American Digital Radio Society (ADRS) in late 1993. According to Tom, *DD* subscribers now receive *RDJ* to fulfill the balance of their subscriptions. Along with the subscription to *RDJ*, readers gain membership in ADRS, a not-for-profit organization dedicated to voicing and promoting the interest of amateurs who enjoy digital modes and their associated technologies.

New subscriptions to *RDJ* are $20 per year (11 issues). For further information, contact *RTTY Digital Journal*, American Digital Radio Society, Box 2465, New York, NY 10185 (914-762-4168).

Short Bursts

Geochron® World Time Indicators. Most of us can't afford them, certainly not as last-minute stocking stuffers, and must in fact limit ourselves to viewing them in the lobbies of luxury hotels, the offices of policymakers such as George Shultz and Henry Kissinger, and on the sets of movies such as *The Hunt for Red October*. So what are they, and how much do they cost?

What we're talking about is the Geochron World Time Indicator. The Geochron is a colorful, strategic Mercator projection world map and clock that charts the time and daylight hours in all the world's time zones. You can think of the Geochron as a wall-size physical incarnation of the "terminator" or sunrise/sunset propagation programs many of us load on our PCs. Unlike conventional timepieces that indicate the time at one point only, the Geochron indicates the correct time everywhere.

The principal objective of the Geochron is to provide a device capable of pictorializing, on a flat surface, global solar time and its modifications, as well as related natural phenomena. The indicator also shows the days of the week and dates of the month that prevail at any given instant.

Perhaps the most fascinating thing about the Geochron is that it very vividly shows the exact portions of the earth that are in daylight, and those in darkness. The brightly illuminated pattern in the map's center delineates those areas in daylight. The left edge of this pattern is the line of sunrise at it sweeps across the earth, and the right edge is the line of sunset.

Because the length of the day changes daily as the earth progresses through its seasons, the light pattern on Geochron also changes, almost imperceptibly, from day to day. Thus, you can read the time of sunrise and sunset, and the relative length of day and night, for any latitude. This illuminated pattern shows the progress of the seasons during the year.

As we have hinted, the only bad news is the cost, which may mean that Geochron may be suited best as a deluxe gift for those amateurs who seem to have everything else. Geochron is available in four models (standard, original, executive, and boardroom) ranging in price from $1295 to $2465. They are available from Geochron Enterprises, Inc., 899 Arguello St., Redwood City, CA 94063 (415-361-1771).

Looking Back Five

Five Years Ago in Antennas and Accessories. As we pointed out last month in *CQ*'s special golden anniversary issue, your editor took over the "Antennas" column in March 1980, when longtime "Antennas" editor Bill Orr, W6SAI, left for editorial duties at *Ham Radio* magazine. I've been muddling through, writing the column ever since, although Bill now is back in *CQ* with his popular and far-ranging monthly "Radio Fundamentals" column.

We changed the name of the column from "Antennas" to "Antennas and Accessories" in May 1985 to encompass more editorial material of interest to all of *CQ*'s readers. In other words, we began to look at the hamshack from *both ends* of the coax. Now your columnist appears on the masthead as *CQ*'s Antennas and Software editor to better reflect the duality of our interests and writing emphasis.

This month we'll experiment with a new feature in the column, "Looking Back Five." We'll briefly review the key items found in the column exactly five years ago, with the view toward seeing the progress in antennas and software since then, and also to perhaps whet your interest in subjects we covered back then. If you find a topic to be of interest, please try to obtain the back issue directly from *CQ*'s New York headquarters, rather than requesting the article from us. Most back issues are available for $3.50 postpaid. (*CQ* also offers various "back issues specials" to help you complete your *CQ* collection. Check their ad, or call 1-800-853-9797 to order back issues.)

That being said, what did the column look like in February 1990? It was an interesting month. Some of the topics we discussed included traveling "suitcase station antennas," the Com-Rad compact DDRR (directional-discontinuity ring-radiator) "Untennas"™ for VHF/UHF mobile, 10 meter Extended Double Zepps, a 17/12 meter rotary dipole from Contest Radio, the Urban Antennas limited space HF outdoor and apartment antennas, and the Ham 10™ mobile antenna from American Antenna Corp.

In the same column we also noted the Pauldon Associates catalog of preamps and switchboxes, the RadioKit catalog of radio and antenna parts and supplies, new MFJ SWR/wattmeters, G and G Products communications terminal and interfacing systems, the QSO Tutor Morse code program, and the K2LAF MULTIFAX weather facsimile software. We also asked how many PCs there were worldwide, basing our discussion on worldwide PC stats gathered by International Data Corp. (IDC).

All things considered, February 1990 was a very interesting month in the "Antennas and Accessories" column. Were you there in *CQ* with us?

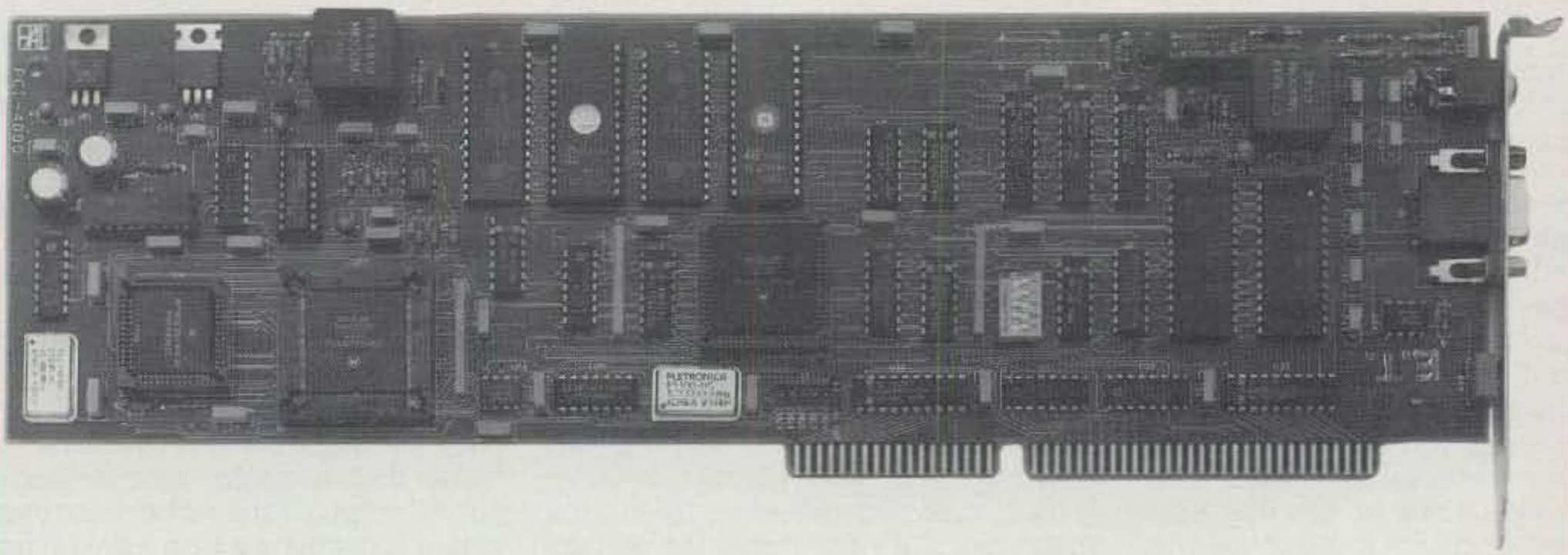
Wrap-Up

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

Overheard: One of the most important laws of computer programming has it that the value of any program is directly proportional to the weight of its output. 73, Karl, W8FX

Work Weak and Fading Signals with the PCI-4000 from HAL

HAVE MORE FUN ON HF



You can have *more* fun with HF data even under poor band conditions using the ***PCI-4000***. Whether you run RTTY, AMTOR, PACTOR, or CLOVER, you'll have a ball with the ***PCI-4000***. The ***HAL PCI-4000*** will come through when other modems fall short.

Check out these features:

- CLOVER, PACTOR, AMTOR, BAUDOT & ASCII RTTY
- Plug-in card for 386 or 486 personal computer
- Programmable tones for AMTOR, PACTOR, and RTTY
- Highest data speed on HF (CLOVER)
- High-performance Digital Signal Processing (DSP)
- User-friendly terminal software
- Wide variety of third-party software support
- HAL design and manufacturing - ***QUALITY YOU CAN TRUST***

Order your PCI-4000 today and have MORE FUN on HF

Now Only $795.

Those "do-everything" boxes work fine when signals are 20 over 9,
But let the band drop, And they tend to flop,

You'd better get HAL on the line!

HAL Communications Corp.
P.O. Box 365
Urbana, IL 61801-0365
Phone (217) 367-7373/FAX (217) 367-1701

VISA MasterCard

CIRCLE 165 ON READER SERVICE CARD

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

A Variable Frequency Power Supply

While writing my January column and reminiscing about "Radio Row" in lower Manhattan (New York City), I thought about the many projects I had built using World War II surplus electronic equipment. One of the main problems in using this equipment, I remembered, was finding the 400 Hz AC power source for aircraft equipment, or the 50 Hz source for some of the European devices that I occasionally came across. In those days you simply had to make do with unwieldy "dynamotors" or the existing 60 Hz power line. After playing various tricks and extensive rewiring, you were lucky if you could get some of this equipment to operate at all, and usually at less than optimum performance. For those of you who still have such gear, or for those of you who have miraculously picked up a piece of this sort of surplus equipment at a hamfest, the AC power supply I am about to describe is for you.

Fig. 1 is a schematic diagram of a simple power supply that will convert a DC input to an AC output at any desired frequency in the common AC operating power range. By using standard 60 Hz transformers, good performance at 50 Hz through 400 Hz is achievable at moderate efficiencies. By examining the schematic, you will see that the power supply is nothing more than a 555 oscillator (operating at the desired frequency), an inverting stage, and a power amplifier consisting of two transistors driving the secondary of a transformer. The primary of the transformer provides the stepped-up AC. Values are given for 50 Hz, 400 Hz, and even 60 Hz for those who want to power 60 Hz appliances in their cars.

In operation the 555 produces an almost 50% duty-cycle square wave at the desired operating frequency. The output of the 555 drives one of the power transistors and a simple inverter. The output of the inverter drives the other power transistor. As a result, during one half of the cycle, one transistor conducts and allows current to flow through one half of the transformer secondary winding. During the other half cycle, the process reverses, and current flows through the other half of the secondary winding but in the opposite direction. The result is an AC current in the secondary which the transformer then steps up to the desired 115 volt AC output. It should be noted that the output is not quite a sine wave (in fact, it is more like a rounded square wave), but the wave shape is certainly adequate to operate most AC equipment properly.

The key to all of this is of course the

* *c/o CQ magazine*

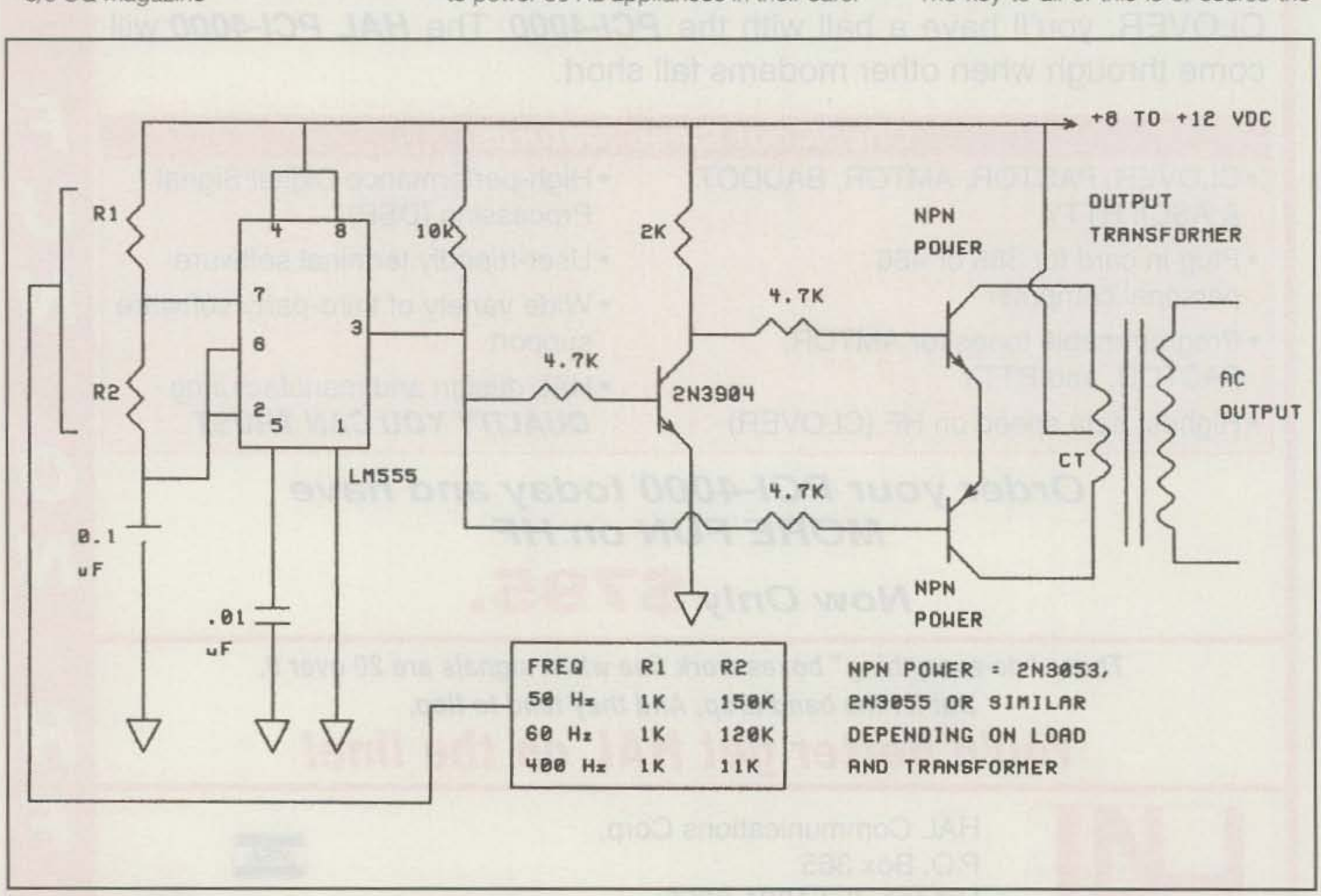


Fig. 1– Schematic of variable frequency power supply.

transformer. For best results it should be a high-quality unit and must have a center tap. Each half of the secondary should be rated at the B+ available. For example, a 24 volt AC CT transformer is ideal for a 12 volt DC source, while a 12 volt AC CT transformer would be used with a 6 volt DC source. Transformers rated for 60 Hz will also operate at 50 Hz if the load is de-rated, and most kinds will also operate with reasonable efficiency at 400 Hz. If you need a 400 Hz output, and can get a 400 Hz transformer, so much the better. In the past these transformers were available for next to nothing, as they would not operate at 60 Hz. If you have an old 400 Hz unit kicking around, here is the ideal way to use it. Although there is no real way to determine just how well a transformer will operate without trying it, don't be afraid to do so. That is what experimenting is all about. Since the circuit operates in a brute force mode, it will probably drive almost anything you have. Finally, the secondary current rating of the transformer will be the approximate load current the circuit will draw from the DC source, so be certain that the power transistors are adequately rated and are properly heat sinked.

For those who do not have the privilege of working with military surplus gear, keep in mind that if you choose an operating frequency of 60 Hz, and a 115/24 volt CT transformer, you can build a convenient AC power source for use in your car.

Please let me know the results of your experiments.

As a postscript to my reminiscing, and totally outside the normal subject matter of this column, I would like to offer the following recommendation. If you do plan to take a trip to lower Manhattan to either revisit old haunts or are looking for a place for a truly unusual and excellent meal, I would strongly suggest that you visit a restaurant called *Clair*. Located on Seventh Avenue between 19th and 20th Streets (telephone 212-255-1955), *Clair* is truly a landmark with the theater crowd (designers, actors, actresses, and attendees) as well as many of the locals. Owner Marvin Page has effectively transported Key West to New York City, and the conch chowder and key-lime pie are undeniably the very best available in the continental United States. What will be interesting to my readers (in addition to the excellent fare) will be the decor, designed by Tony Award winning Robin Wagner ("Chorus Line," "Dream Girls"), the huge snake-skin bar (yes, it's real) and the friendly atmosphere. For years *Clair* has been a real "in place" with the New York crowd, and the service and cuisine are way beyond what one usually finds in a typical restaurant. I think you will truly enjoy the experience.

73, Irwin, WA2NDM

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

The Users and The Movers

With so much happening and so many innovations occurring in the world of packet radio, it is no wonder that I sometimes find myself in a quandary as to which topic to write about. There are new network nodes, trunks, backbones, and stacking techniques occurring almost on a daily basis, not to mention the latest features being incorporated into the terminal node controllers. We can add to this the attention being given to our need for real data-ready transceivers.

Several manufacturers have heard our call for help, and now we are beginning to see transceivers that support our need for the higher speeds. Some of these data-ready radios are being supplied by the large transceiver builders.

211 Luenburg Drive, Evington, VA 24550

Hold It Just One Minute!

Did I hear someone ask what about spectrum on which to operate these data-radios and nodeware to support the backbones, trunks, and networks?

In the 12 to 14 years that packet has been a part of our hobby, only a few SYSOPs and even fewer users have given a moment's thought to the conservation of packet spectrum.

In 1988 I proposed a nationwide band plan at the Dayton HamVention. It was hohummed and given a "We'll think about it later." In 1990 I ran a copy of the band plan in this column, and the only interest it received was from a few ATVers who felt that a couple of the frequencies were a bit close to the UHF ATV frequencies.

I've included an example of that proposed band plan in Table I.

Virtual Reality

We have come face to face with the real question: What are we to do now? First of all, there is a distinct possibility that we may soon have ten 100 kHz channels in the 219 to 220 MHz band that could give us some relief. That remains to be seen, but then these frequencies will be set aside for a backbone- and trunk-only nationwide system.

This nationwide network will be coordinated by the ARRL or an appointed *re-*

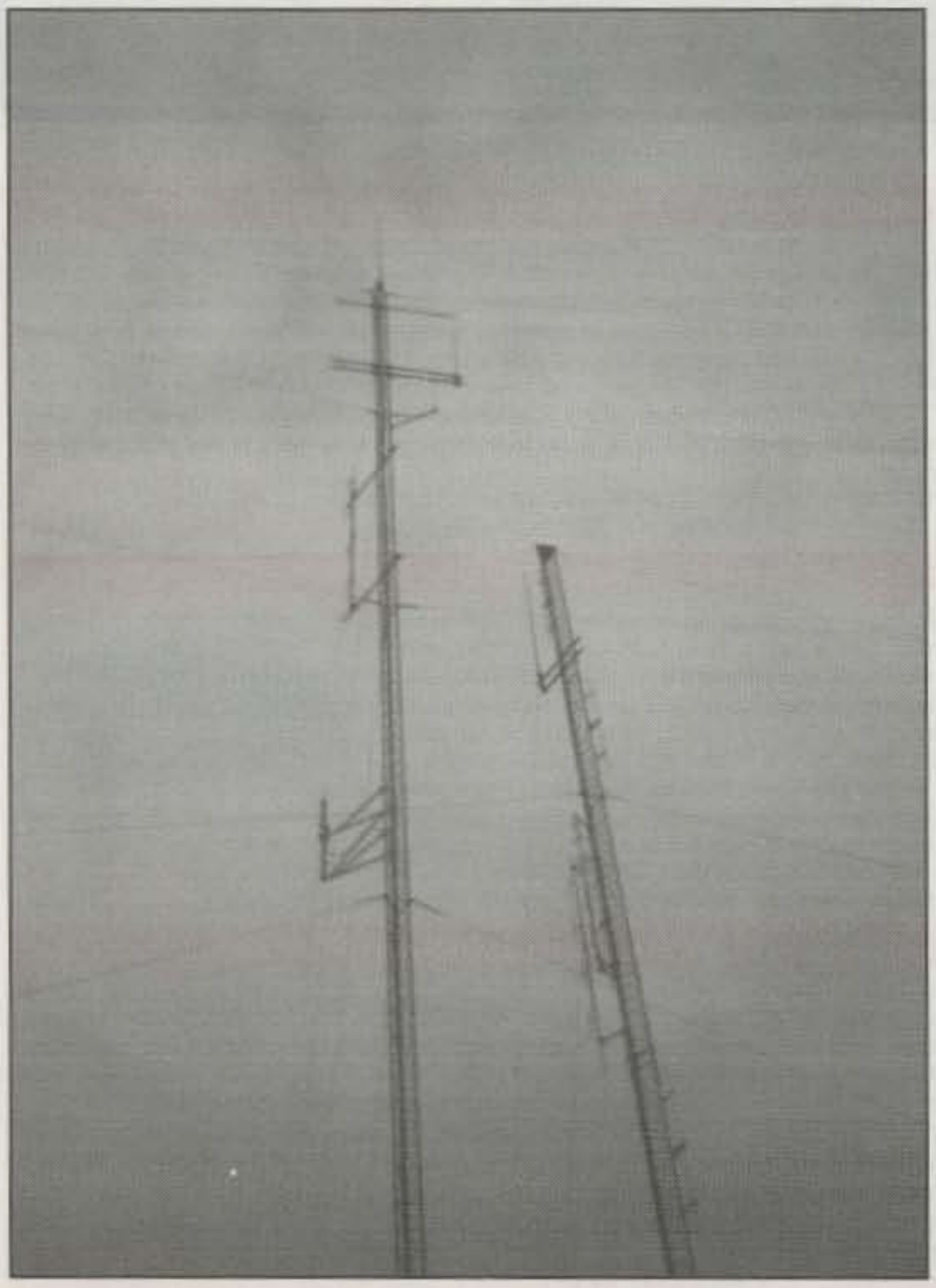


Photo A– The antenna installation at the Watson township site. Note the third antenna from the top on the tower at the left. It's the one used for packet.

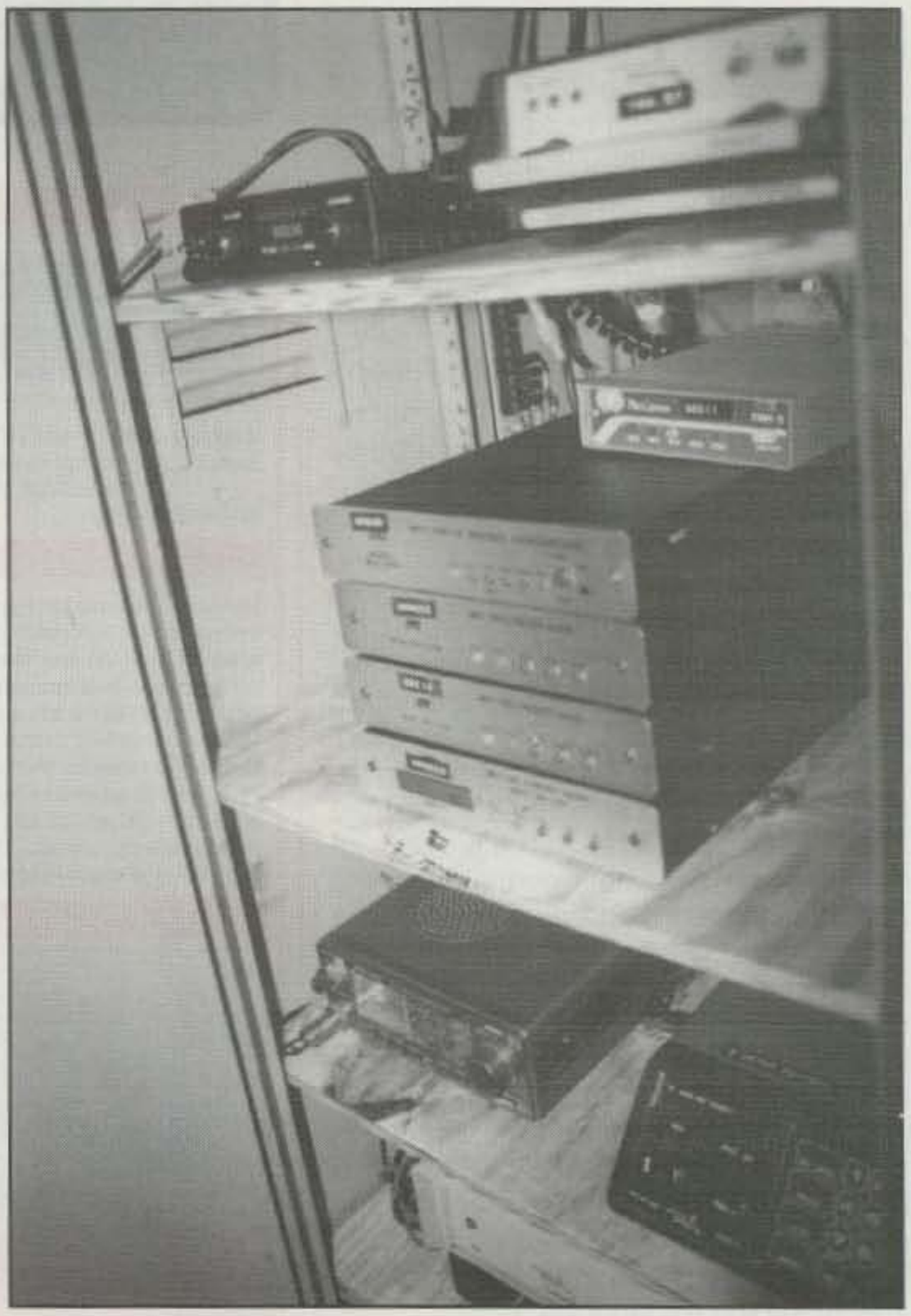


Photo B– Nodes WRNCO2, WRNCO4, and CROWD.

PROPOSED BAND PLAN FOR PACKET RADIO 1988

50 MHz

51.12	Neighbor Backbone
51.14	Experimental
51.16	Keyboard to Keyboard
51.18	Experimental

144 MHz

144.91	Keyboard to Keyboard
144.93	LAN
144.95	DX Spotting Network
144.97	9600 baud
144.99	LAN
145.01	BBS Forwarding
145.03	Keyboard to Keyboard
145.05	BBS Forwarding
145.07	LAN
145.09	DX Spotting
145.51	DX Spotting
145.53	DX Spotting
145.55	LAN
145.57	Keyboard to Keyboard
145.59	LAN
145.61	LAN
145.63	9600 bps
145.65	LAN
145.67	TCP/IP
145.69	LAN
145.71	LAN
145.73	LAN
145.75	DX Spotting Network
145.77	Kbd to Kbd & Emergency
145.79	APRS & LAN

220 MHz

223.54	Node Backbone
223.56	Node Backbone
223.58	DX Spotting Network
223.60	Node Backbone
223.62	Node Backbone
223.64	Keyboard to Keyboard
223.66	Keyboard to Keyboard
223.68	LAN
223.70	9600 bps
223.72	TCP/IP

440 MHz

433.05	TCP/IP Backbone (100 kHz)
433.25	DX Spotting (100 kHz)
433.31	Experimental
433.35	Node BackBone (100 kHz)
433.41	BBS INTERLINK (Forwarding)
433.39	DX Spotting (backbone)
433.43	9600 bps
433.45	BBS INTERLINK (Forwarding)
433.47	Node Keyboard to Keyboard
433.49	TCP/IP
441.50	All
446.50	BBS Interlink (Forwarding)

PACKET FREQUENCY—USE & DEFINITIONS

LAN—Local Area Network. Anything except TCP/IP and DX Spotters is tolerated. Please avoid placing high-level switches, digipeaters, or nodes on these frequencies, since they are designated for local use. Low-level switches are permitted for access to high-level backbones.

EXPERIMENTAL—All packet modes, such as SWITCHES, NODES, GATEWAYS, etc., except full-service BBSes or other 24 hour service. A frequency for testing new equipment, protocols, programs, etc.

KEYBOARD TO KEYBOARD—Primarily chat channels, no full-service BBSes, TCP/IP, or DX Spotting. These frequencies are also set aside for primary emergency operations.

BACKBONE—NO uncoordinated stations! These channels are for specific purposes, such as BBS, SWITCH, NODE, DX NETS, and UPLINKS. The usage of these frequencies is defined and specified within each station's coordination. Users are requested to use the normal entry points on the 144 and 220 MHz bands.

TCP/IP—Stations using TCP/IP protocol supported atop AX.25. Only AX.25 stations using persistence access method allowed, and for communications with TCP/IP stations.

DX Spotter—DX Spotting Network, no other packet activity is allowed.

9600 bps—Only stations using 9600 bps with direct FSK.

Table I– A proposed packet band plan.

gional packet radio coordinating body. Also, these precious few channels will be allocated for use by nodes that run data rates above 38,400 baud. There will be *no* user access to these trunked nodes!

The Movers and Shakers

To understand which data speed we should consider for this system, we must first look at what has happened to our packet system in the last decade—lots of users and not much else!

There are a handful of movers and shakers who went to work developing networks and systems that would help move some of the data. For the most part, however, little has happened to provide some relief to the now congested networks.

A large majority of the users are just that—*users*. Often I get calls (sometimes at three o'clock in the morning!) from users who complain they are unable to get through from point "A" to point "B." Some ask why it takes so long for them to get through. The answer is simple, yet it has a complex overtone. Get your heads out of the sand and look around! Yes, there are now over half a million packet users across this country.

Another surprise: This *moral* majority of users won't raise a hand to help build a node. In many cases, when asked to help a SYSOP install a node, they always have

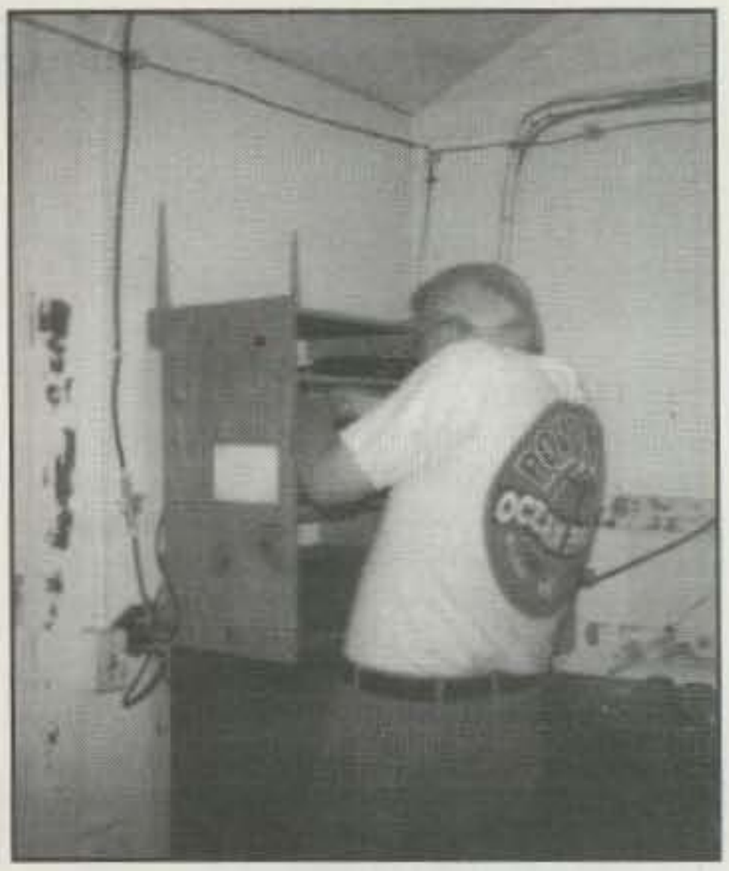


Photo C– Gerald, WB3IWY, shown here at the node site.

other things to do. However, when the new node finally does get airborne, guess who is the first call seen accessing the new node!

Somehow we must have support from the users, whether it be physical or financial. The load that is now sustained by the network and node SYSOPs must be considered. The old cliché "If you're gonna dance, you must pay the fiddler" has become more true than anyone could have imagined.

Someone Must Provide The Music

The node SYSOPs are now under the gun to move from the decade-old and sometimes worn-out 1200 baud nodes to a more highly evolved level of node. Even if it is adding a port at 9600 baud, the 9600 baud TNC is near the $200 price tag, and that's only a third of the expense. The transceivers (VHF) that are 9600-baud capable are twice that price ($400).

Who picks up the tab for this outlay of funds? Not the government, not the users. Yes, back again to the purse of the node SYSOP. Sure, old money-bags can handle it. But no one knows better than I that over 85% of the packet node SYSOPs can hardly bare the expense of their own radio and TNC, much less adding more nodes and 9600 baud ports to their system. *But they do!*

Esprit de Corps

I don't care if the packet node SYSOP does have an "attitude" or an ego. I don't even care if he or she is a bit squeamish at times. The SYSOPs have a right to be indifferent. They've paid their dues!

Wow! I must have fallen asleep. Anyway, you get my drift. Regardless of the

amount of support you give the node SYSOP, you always find that in the end you are welcome to use their nodes and networks.

Among node SYSOPs there exists a camaraderie. There has to be, because each SYSOP is an individual who works together with the neighbor SYSOP to make their nodes function in concert and deliver your data and traffic across their networks.

Here's To Those Who Pay The Dues

As can be seen in the accompanying photos, there are some who do assist the SYSOP. Case in point is Gerald Ingman, WB3IWY, who explains that without the physical labor and contributions from local amateurs the WRNCO node stack might not be possible.

Photo A is a look at the antenna installation at the Watson township site. Photo B is a look at nodes WRNCO2, WRNCO4, and CROWD.

Gerald's better side is viewed in photo C. Words such as "Gotcha, you lil varmint" were probably being muttered. Must have been a mouse, eh Gerry?

Talk About A "Rocky Mountain High"!

Look up there1. It's a SYSOP! No, it's NØMOR of Carbondale, Colorado! In photo D John Radloff, NØMOR, the president of the Ski Country ARC, is on the catwalk atop the tower. Photo E shows a view across a 4 mile valley towards Grand Mesa; the original, which is in color, is a glorious view of the Aspens in full Sep-

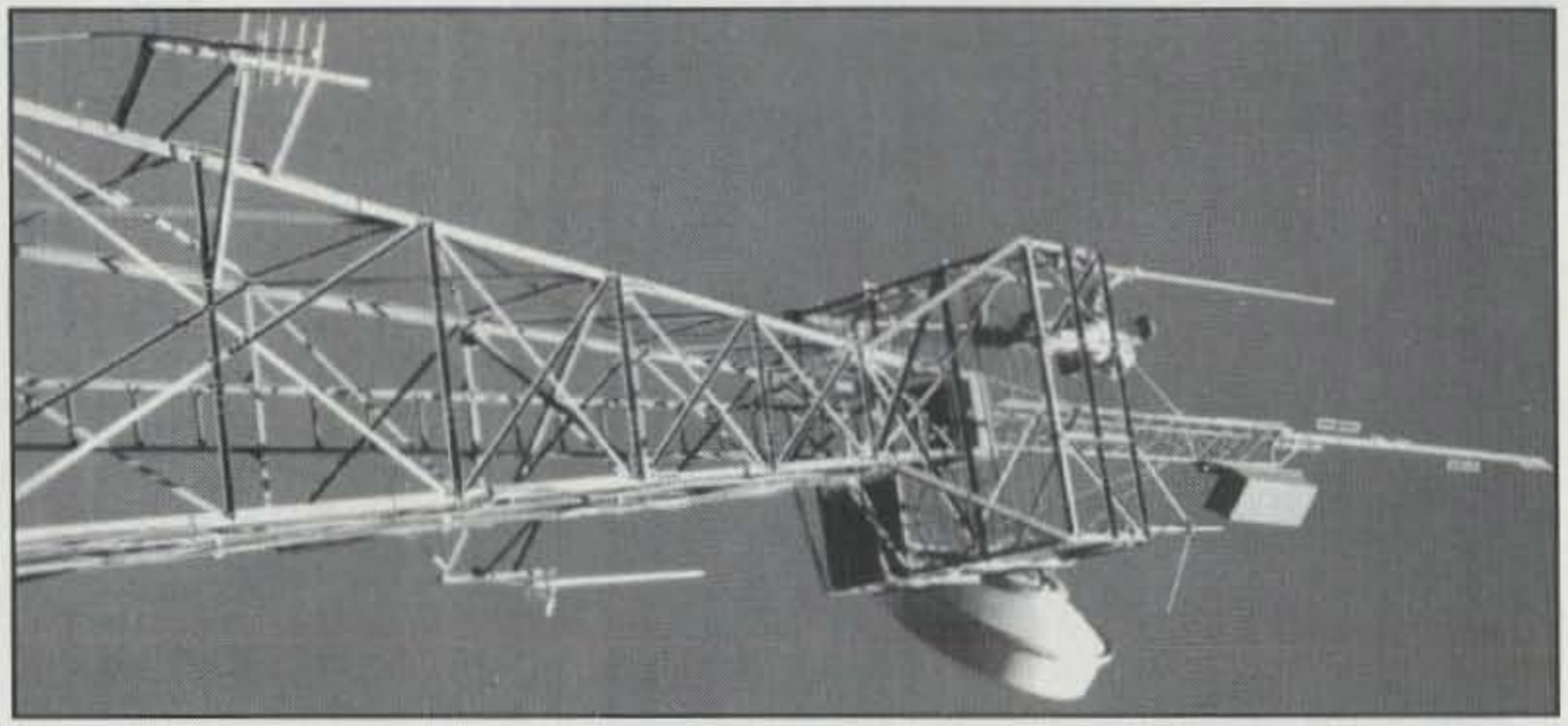


Photo D– John Radloff, NØMOR, of Carbondale, Colorado, is president of the Ski Country ARC and is shown here on the catwalk atop the tower. It is a 75 foot tower, and NØMOR is working on the 447.1 antenna.

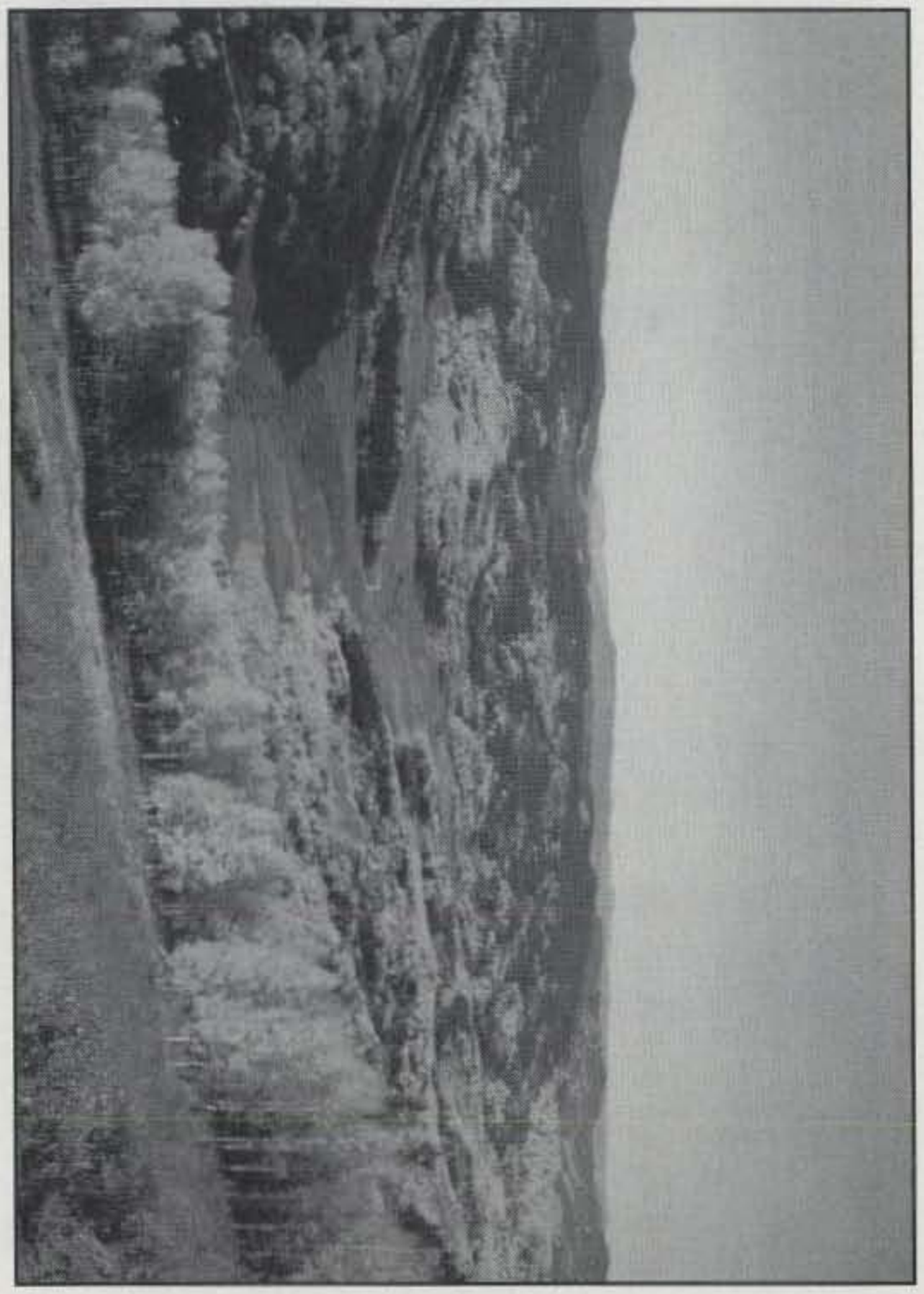


Photo E– This is a view across the 4 mile valley towards Grand Mesa.

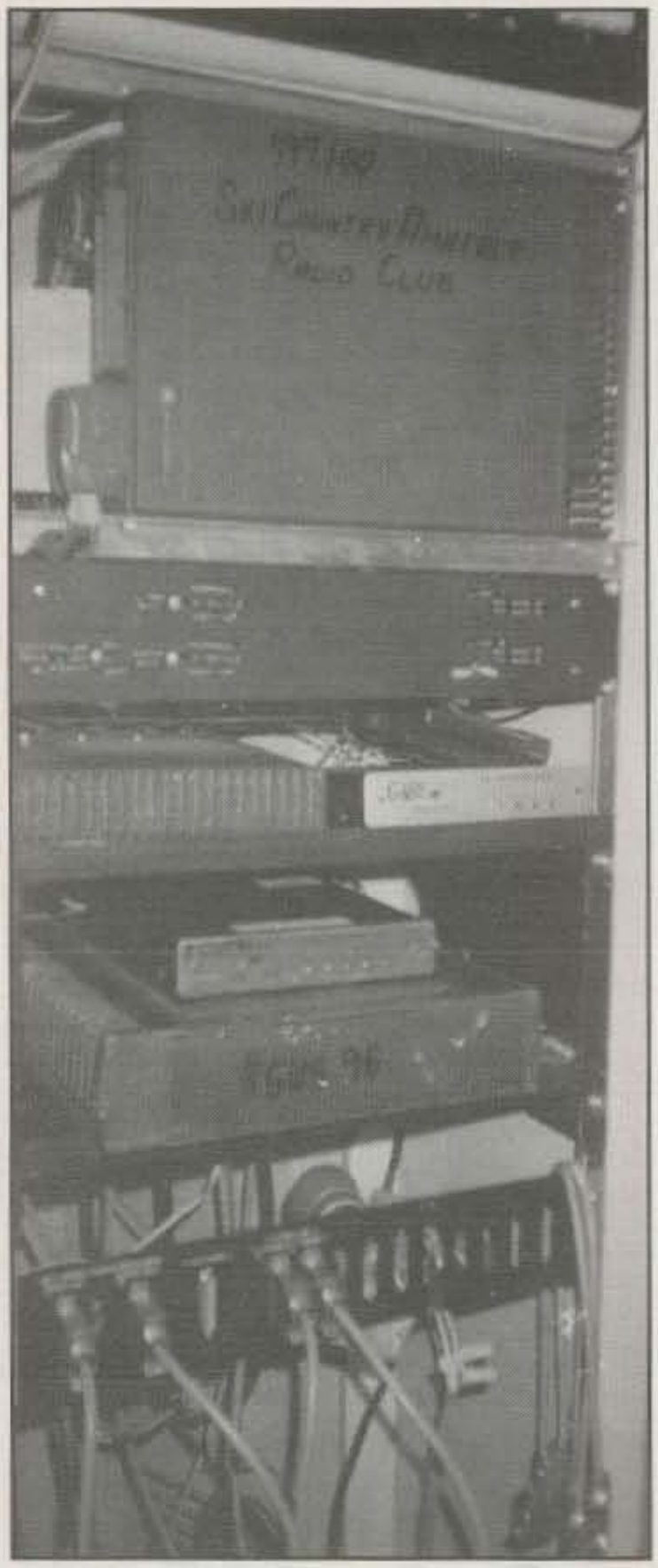


Photo F– NØMOR's installation includes a 447.1 repeater, 447.1 controller, KØGUZ-1 1200 baud port at 145.010 MHz, KØGUZ-2 441.050 backbone 9600 baud, and diode matrix for other nodes in the stack.

tember radiance. Photo F shows an installation of which John can be proud. From top to bottom: the 447.1 repeater; 447.1 controller; KØGUZ-1 (GWS) Glenwood Springs 1200 baud port @ 145.010 MHz; KØGUZ-2 (#GWS96) 441.050 backbone 9600 baud; and diode matrix for other nodes in the stack.

Close To Home

One of the SouthEastern Digital Association Network's (SEDAN) node SYSOPs is Kirk Hall, KD4RWH. In photo G Kirk displays one of his many nodes on the SEDAN. This is the KNC node at Kinston, North Carolina. Photo H is a close look at Kirk's installation. Note the power disconnect breaker close by at the right side of the enclosure. Caution is the watch-word, as always. Photo I shows off the KNC four-bay antenna atop the water tank.

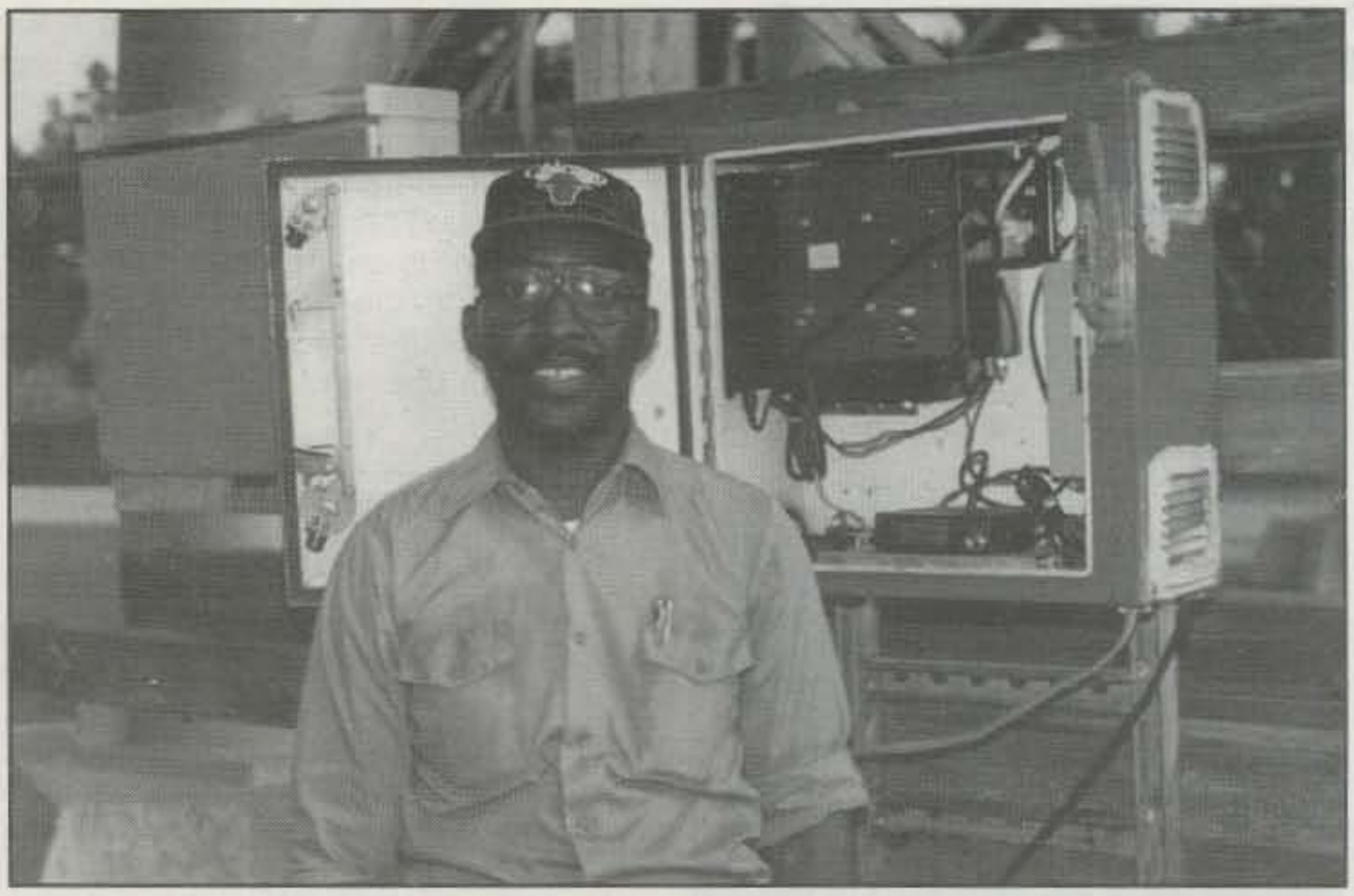


Photo G– Kirk, KD4RWH, displays one of his many nodes on the SEDAN. This is the KNC node at Kinston, North Carolina.

Kirk is a true mover and shaker of the SEDAN, since he supports SEDAN nodes KD4RWH-7 (KNC) at Kinston, NC; KD4RWH-8 (NBNC) at New Bern, NC; and KD4RWH-6 (RLNC) at Richland, NC.

Quite A Stack!

Joel Huntley, WA1ZYX of Surry, NH sent us a set of photos (J and K) that depict quite a node site, which got started about six years ago. Although he tossed a few anti-packet blurbs at me for not displaying the backbone nodes of the SEDAN, I still like his open-systems environment, which he chose to share with us here. Joel is SYSOP of the SWNH/SWNHU/NHDX node complex.

FYI, Joel, the SEDAN does support 9600 baud point-to-point trunks. However, the system that you saw has only been active for just over a year and has over 100 network nodes with five 9600 baud point-to-point trunks now active. Given a little more time, we may soon interconnect with your network somewhere along the backbone path. It would really be great to have contiguous connectivity from New Hampshire to Miami!

In photo J, Joel displays the local node for the South-West New Hampshire (SWNH) area on 145.790. The node lives on the New Hampshire Public Television tower site (see photo K) just north of

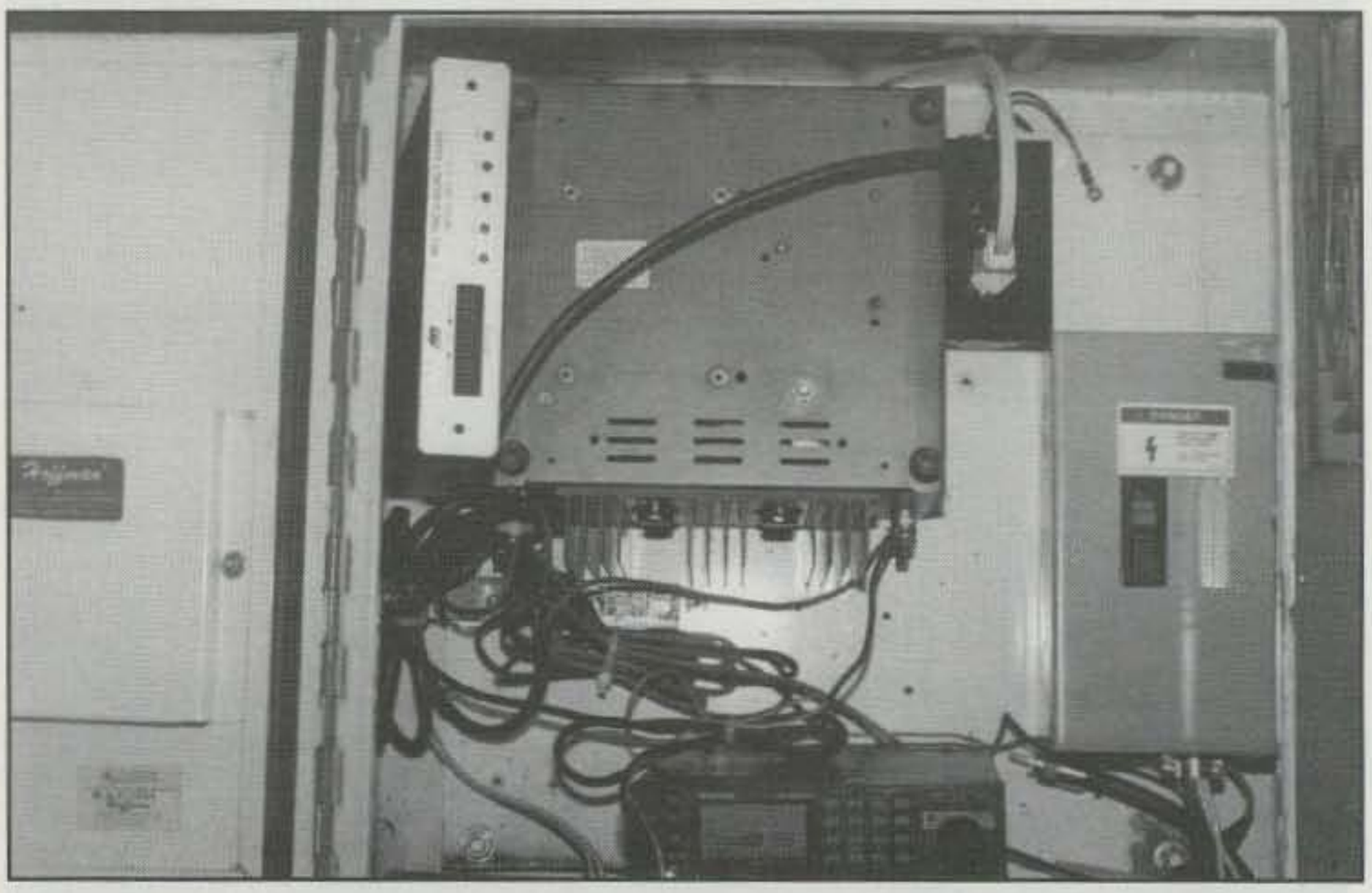


Photo H– A closer look at KD4RWH's installation. Note the power disconnect breaker close by at the right side of the enclosure. Caution is always the watch-word.

VECTRONICS

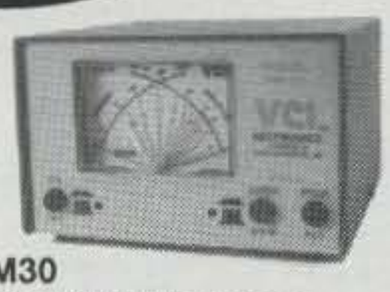
A Division of VALOR ENTERPRISES, INC.
1711 Commerce Dr., Piqua, Ohio 45356 PH:(513) 778-0074

WORLD CLASS QUALITY!

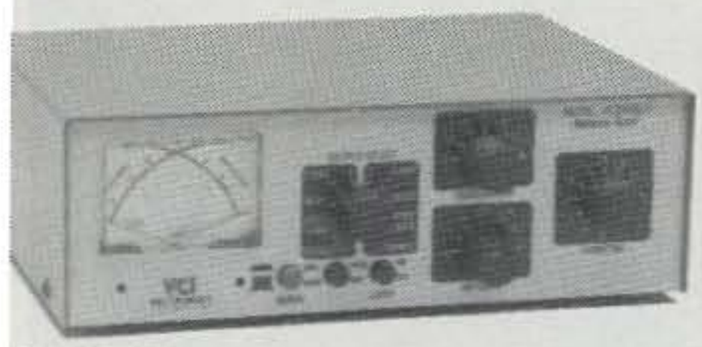
VC300M
300W Mobile Tuner

LP2500
2500W Low Pass TVI Filter

MADE IN THE USA!



PM30
300W/3kW Wattmeter



VC300DLP
300W Antenna Tuner

DL300M
300W Dummy Load

PM30UV
30W/300W Wattmeter

VC300D
300W Digital Antenna Tuner

DL650M
1500W
Dummy
Load

PS30VM
13.8Vdc 30A Linear
Power Supply

HFT1500
2000W PEP Antenna Tuner

DL2500
2500W Dummy Load

PS50F
13.8Vdc 50A Linear
Power Supply

PS400C
13.8Vdc Switching
Power Supply

HF600QSK
1 kW HF RF Amplifier w/QSK

AT100
Active Antenna/Tuner.
Tunes from 300 kHz
to 30 MHz, covering AM
broadcast, all shortwave,
and all amateur radio bands.
Gain: -3dB to +10dB selectable.

NEW!

HPF1
High Pass TV Filter

LP30
1500W Low Pass TVI Filter

IN THE USA:

AMATEUR ELECTRONIC SUPPLY
CLEARWATER, FL (813) 461-4267 (PH) (813) 443-7893 (FAX)
MILWAUKEE, WI (414) 358-0333 (414) 358-3337 **(800) 558-0411**

LAS VEGAS, NV (702) 647-3114 (PH) (702) 647-3412 (FAX) **(800) 634-6227**
ORLANDO, FL (407) 894-3238 (407) 894-7553 **(800) 327-1917**

WICKLIFFE, OH
PH:(216)585-7388 FAX:(216)585-1024
(800) 321-3594

A-1 TELECOM
NILES, MI (616) 683-0937 (FAX) **(800) 238-1786**
GIRARD, OH (216) 759-8370 **(800) 835-6445**

FOR HAMS ONLY, INC.
MONROEVILLE, PA
PH:(412)374-9744 FAX:(412)374-9745
ORDERS:**(800) 854-0815**

HAM RADIO OUTLET
PHOENIX, AZ (602) 242-3515 **(800) 444-9476**
DENVER, CO (303) 745-7373 **(800) 444-9476**
ANAHEIM, CA (714) 533-7373 **(800) 854-6046**
NEW CASTLE, DE (302) 322-7092 **(800) 644-4476**
OAKLAND, CA (510) 534-5757 **(800) 854-6046**
ATLANTA, GA (404) 263-0700 **(800) 444-7927**
SAN DIEGO, CA (619) 560-4900 **(800) 854-6046**
SALEM, NH (603) 898-3750 **(800) 444-0047**
SUNNYVALE, CA (408) 736-9497 **(800) 854-6046**
PORTLAND, OR (503) 598-0555 **(800) 854-6046**
VAN NUYS, CA (818) 988-2212 **(800) 854-6046**
WOODBRIDGE, VA (703) 643-1063 **(800) 444-4799**

NATIONAL TOWER COMPANY
SHAWNEE MISSION, KS
(913) 888-8864 **(800) 762-5049**

N & G ELECTRONICS
MIAMI, FL
PH:(305)592-9685 FAX:(305)592-3561

QRV ELECTRONICS
CRAWFORD, GA
(706) 743-3344

R & L ELECTRONICS
HAMILTON, OH (513) 868-6399 **(800) 221-7735** (513) 868-6574 (FAX)
INDIANAPOLIS, IN (317) 897-7362 **(800) 524-4889** (317) 898-3027

TRANSEL TECHNOLOGIES
HARVEYSBURG, OH
PH:(800)829-8321 FAX:(513)897-0738

UNIVERSAL RADIO, INC.
REYNOLDSBURG, OH
PH:(614)866-4267 FAX:(614)866-2339
ORDERS: **(800)431-3939**

IN CANADA:

TEXPRO SALES, INC.
BURLINGTON, ONTARIO
PH:(905)332-5944 FAX:(905)332-5946

IN EUROPE:

NEVADA COMMUNICATIONS
PORTSMOUTH, UK
44-0705-698-113 (PH)
44-0705-690-626 (FAX)

I. L. ELETTRONICA
FORNOLA, ITALY
0187-520-600(PH) (FAX)0187-529-058

SWEDISH RADIO SUPPLY
SWEDEN
011-46-54-85-03-40 (PH)
011-46-54-85-08-51 (FAX)

CIRCLE 179 ON READER SERVICE CARD

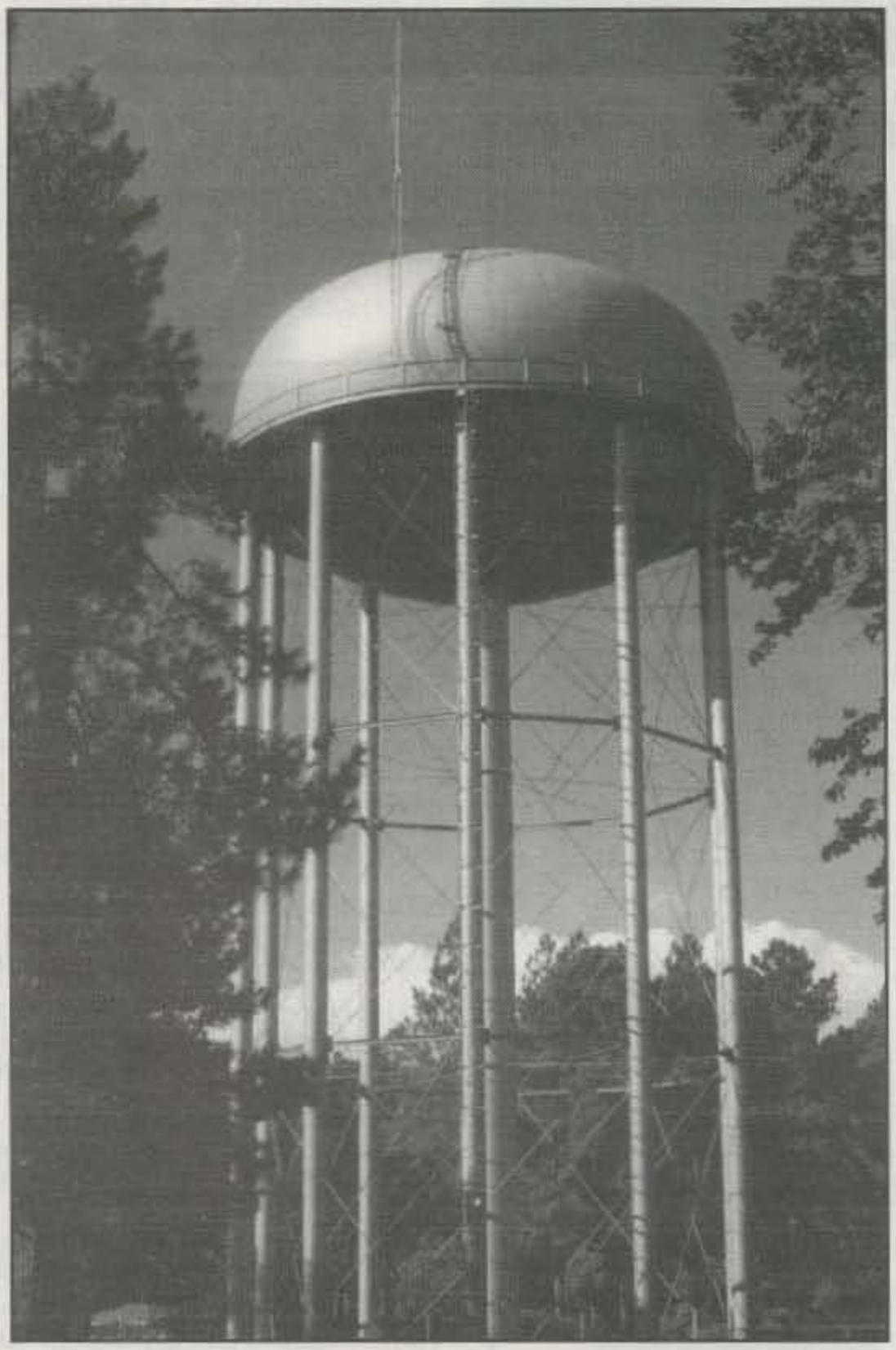


Photo I– The KNC four-bay antenna atop the water tank.

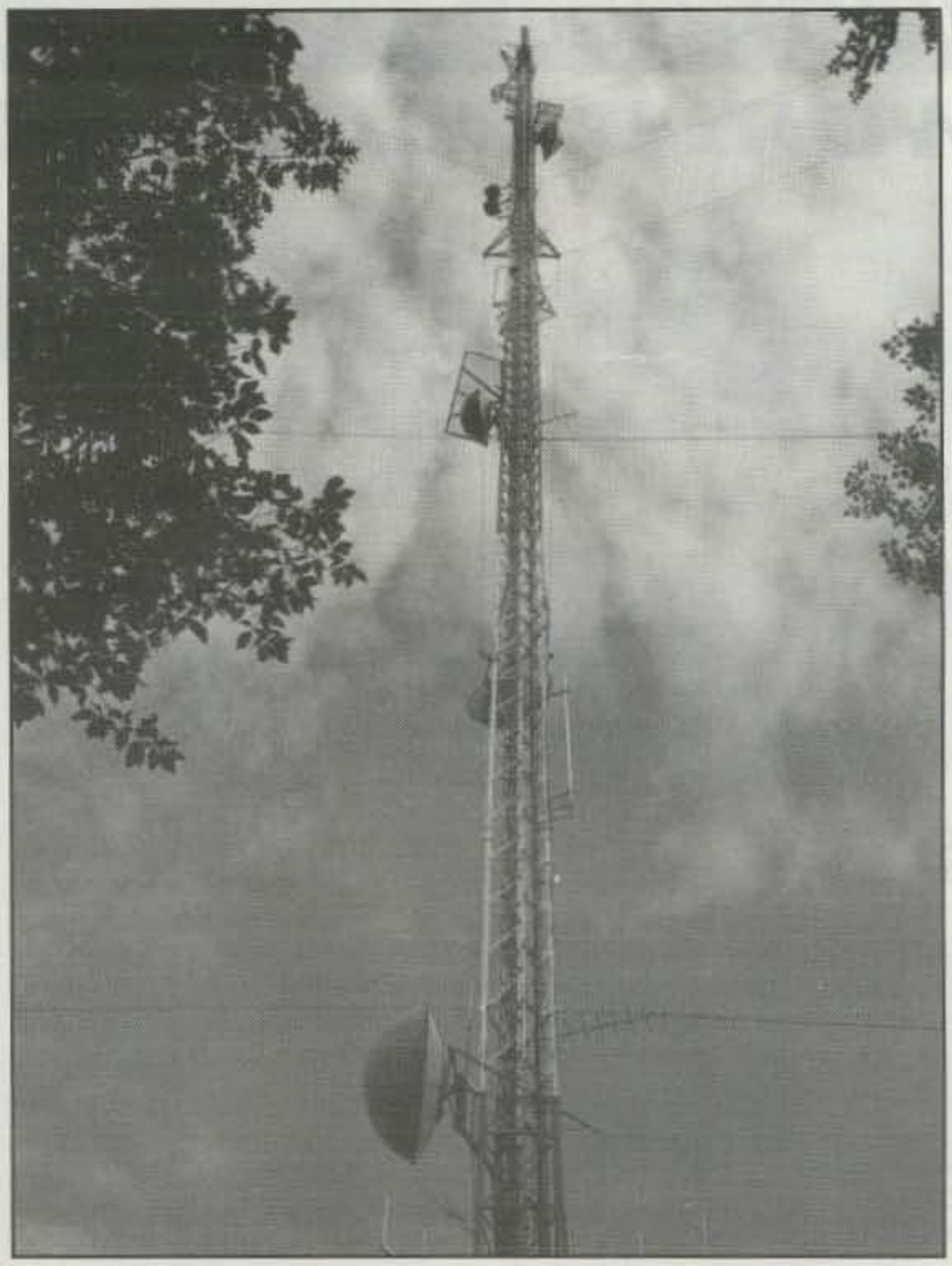


Photo K– The node shown in photo J resides on the New Hampshire Public Television tower site just north of Keene, New Hampshire. The elevation to the tip of the user port antenna is approximately 1820 feet AMSL.

Photo J– Joel, WA1ZYX, displays the local node for the South-West New Hampshire (SWNH) area on 145.790.

Keene, NH. The elevation to the tip of the user port antenna is approximately 1820 feet AMSL.

This node stack currently has nine PacComm Tiny-2's and a 386 X 25 computer for the local BBS (WA1YTW.NH aka BBSYTW) tied together at the node site. There is a 2 meter user port on 145.79, and a UHF User/Server port. Added to this are five point-to-point links going off in various directions using 220 MHz, 430 MHz, and 440 MHz, as well as baud rates of up to 9600 over the radios.

There are very few nodes on the same frequency that are close enough to one another to talk back and forth on the user port frequencies. Each of the nodes is interconnected via backbone links on different frequencies and/or bands.

Joel, you have good taste in radios. I, too, use several of the General Electric MVP's and Phoenix transceivers in some of the stacks here. Thanks for a great display of your system.

Happy Packeting! Until next month . . .

73 de BucK4ABT @ KQ4OK.VA.NA

Weather Stations/Scanners/CB

COMMUNICATIONS ELECTRONICS INC.
Emergency Operations Center

New Weather Products Available

Now readers of *CQ Amateur Radio* magazine may purchase weather forecasting and communications equipment directly from the Weather Bureau, a division of CEI. Order today and save.

Weather Stations

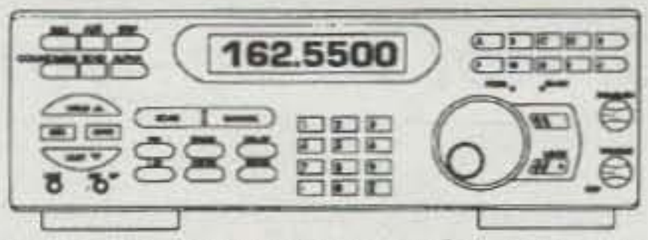
Now you can be your own weather reporter with the Davis Weather Monitor II. Our top-of-the-line weather station combines the most advanced weather monitoring technologies available into one incredible package. Glance at the display, and see wind direction and wind speed on the compass rose. Check the barometric trend arrow to see if the pressure is rising or falling. Push a button, and read indoor and outdoor temperature, wind chill, humidity and barometric pressure. Our package deal includes the new ultra high resolution 1/100 inch rain collector part **#7852-K**, and the external temperature/humidity sensor, part **#7859-K**. The package deal is order **#DAV1-K** for $479.95 plus $15.00 shipping. If you have a personal computer, when you order the optional Weatherlink computer software for $139.95, you'll have a powerful computerized weather station at an incredible price. For the IBM PC or equivalent order part **#7862-K**. Apple Mac Plus or higher including PowerBook, order part number **7866-K.**

The Weather Monitor II (7440-K) comes complete with anemometer with 40 feet of cable, external temperature sensor with 25 feet of cable, junction box with 8 feet of cable, AC-power adapter, detailed instruction booklet and one year limited factory warranty.

Davis Weather Monitor II 7440-K	$334.95
Davis Weather Wizard III 7425-K	$154.95
Davis Remote Display Unit 7815-K	$84.95
Davis Rain Collector II 0.01" 7852-K	$59.95
Davis Rain Collector II 0.2 mm 7852M-K	$59.95
External Temperature/Humidity Sensor 7859-K	$99.95
Davis Anemometer Mast Mount 7890-K	$15.95
Weatherlink Software for IBM PC-Version 3.0 7862-K	$139.95
Weatherlink Software for Apple-Version 3.0 7866-K	$139.95
4-Conductor 40' (12.2 m) extension cable 7876-K	$17.95
6-Conductor 40' (12.2 m) extension cable 7878-K	$21.95
8-Conductor 25' (7.6 m) junction box cable 7880-K	$14.95
8-Conductor 50' (15.2 m) junction box cable 7881-K	$24.95
8-Conductor 100' (30.5 m) junction box cable 7882-K	$44.95
Modem Adaptor 25-pin for communications port 7870-K	$9.95
Car/Boat/RV Lighter Cord 7873-K	$9.95
2400 baud modem for Weatherlink MEXT-K	$39.95
Talking weather station - Call 313-994-9000 for demo ITPRO2-K	$3,999.95
Weatherlink language disks: Française, Deutsche, Italiana, Española 7863-K	$24.95
Barometer, Indoor Hygrometer & Thermometer, Clock/Calendar BA888-K	$99.95
Indoor-Outdoor Thermometer/Barometer & Hygrometer by OSI BA213-K	$79.95
Thermometer with transparent calender & clock display by OSI TC188-K	$19.95
Thermometer with AM/FM clock radio by Oregon Scientific CR388-K	$39.95
Indoor/Outdoor Thermometer with Jumbo Display by OSI JB880EX-K	$24.95

Bearcat Scanners

Bearcat 8500XLT-K base/mobile	$368.95
NEW Bearcat 3000XLT-K handheld	$379.95
Bearcat 890XLT-K base/mobile	$228.95
Bearcat 860XLT-K base	$168.95
Bearcat 760XLT-K base/mobile	$198.95
Bearcat 700A-K info mobile	$148.95
Bearcat 560XLA-K base/mobile	$83.95
Bearcat 220XLT-K handheld	$228.95
Bearcat 200XLT-K handheld	$198.95
Bearcat 178XLT-K base/WX alert	$133.95
Bearcat 148XLT-K base/WX alert	$88.95
Bearcat 80XLT-K handheld	$168.95
Bearcat 60XLT-K handheld	$88.95
Bearcat BCT7-K info mobile	$168.95
Bearcat BCT2-K info mobile	$138.95



Bearcat® 890XLT-K Radio Scanner

Mfg. suggested list price $399.95/CE price $228.95

200 Channels · 10 banks · Weather Alert Feature
Turbo Scan · VFO Control · Priority channels
Auto Store · Auto Recording · Reception counter
Frequency step resolution 5, 12.5 & 25 KHz.
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High

Frequency Coverage:
29.000 - 54.000 MHz. (NFM), 108.000 - 136.995 MHz. (AM) 137.000 - 173.995 MHz. (NFM), 216.000 - 224.995 MHz. (NFM), 225.000 - 399.995 MHz. (AM) 400.000 - 512.000 MHz. (NFM), 806.000 - 823.9875 MHz (NFM), 849.0125 - 868.9875 MHz (NFM) 894.0125 - 956.000 MHz. (NFM).

The new Bearcat 890XLT gives you pure scanning satisfaction with amazing features like Turbo Scan to scan and search up to 100 channels per second. This base and moble scanner is ideal for weather watchers because it has a built-in tone activated ***Weather Alert Feature***. Other features include ***Auto Store*** - Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** - This feature lets you record channel activity from the scanner onto a tape recorder. You can even get an optional ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **BC002** CTCSS Tone Board $54.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC890XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited warranty from Uniden.

CB/GMRS Radios

Cobra 40 CHANNEL
25LTD WX CLASSIC CB RADIO

A National Weather Service (NWS) receiver with automatic emergency broadcast activation has been added to the legendary Cobra 29 CB radio. The integrated NWS receiver in the Cobra 29LTDWX will *automatically* activate to receive emergency announcements about severe weather and travel conditions. A special tone-alert signal broadcast by the NWS activates the weather receiver and overrides any CB radio reception for monitoring the warning message.

Cobra 29LTDWX-K CB/Weather Alert	$129.95
Cobra 25LTDWX-K CB/Weather Alert	$109.95
Cobra HH40-K CB 40 ch. Handheld	$99.95
Ranger RCI2970-K 100 watt 10 meter.	$369.95
Ranger RCI2950-K 25 watt 10 meter	$244.95
Uniden GMR100-K GMRS Handheld	$159.95
Uniden WASHINGTON-K SSB CB Base	$189.95
Uniden GRANTXL-K SSB CB Mobile	$139.95
Uniden PRO538W-K CB & Weather	$59.95

Cobra 40 CHANNEL
29LTD WX CLASSIC CB RADIO

Talking Weather

Now your weather station can talk to callers. Call 313-994-9000 for a demonstration. The Talking Weather Station (TWS) from Innovative Tech Works, lets anyone phone your Davis Weather Monitor II and *hear* the weather. Here's how it works. You setup the TWS with most IBM PC 80286 or faster compatible computers with a 40 MB hard disk. Requires MS-DOS version 5.0 or later with 1 MB of RAM. Add phone lines and your own personal messages or promotional advertising. Callers are automatically greeted with your voice giving them the weather and your messages. Several times a minute, the TWS software will poll the Weatherlink and will update the voice library files to make your spoken report. A single line card, order # IT1-K is only $489.95. A two line card is order #IT2-K for $939.95. A complete turnkey system for commercial use is available, order #ITPRO2-K starting at $3,999.95.

VHF Transceiver

RELM® WHS150-K Transceiver

Mfg. suggested list price $481.67/CE price $339.95

Severe weather spotters depend on the RELM WHS150 transceiver for direct two-way communications with their police or fire department, civil defense agency or ham radio repeater. The WHS150 is our most popular programmable five watt, 16 channel handheld transceiver that has built-in CTCSS, which may be programmed for any 39 standard EIA tones. Frequency range 148.000 to 174.000 MHz. Will also work 144.000-148.000 with slightly reduced performance. The full function, DTMF compatible keypad also allows for DTMF Encode/Decode and programmable ANI. Weighing only 15.5 oz., it features dealer programmable synthesized frequencies either simplex or half duplex in both 5.0 and 6.25 KHz. increments. Other features include scan list, priority channel, selectable scan delay, selectable 5 watt/1 watt power levels, liquid crystal display, time-out timer and much more. When you order the WHS150 from the Weather Bureau, you'll get a complete package deal including antenna, battery, belt clip and user operating instructions. Other accessories are available. A leather carrying case with swivel belt loop part #LCWHS is $49.95; rapid charge battery charger, part #BCWHS is $69.95; speaker/microphone, part #SMWHS is $54.95; extra ni-cad battery pack, part #BP007 is $59.95. The radio technician maintaining your radio system must order programming instructions part #PI150 for $18.00 to activate this radio. FCC license required for United States operation.

Other neat stuff

Grundig Satellit 700-K portable shortwave receiver with 512 memory & AC adapter	$389.95
Grundig Yacht Boy 400-K digital portable shortwave receiver - 40 memory presets	$199.95
Grundig Yacht Boy 230-K portable shortwave receiver	$139.95
Sangean ATS800-K portable 20 memory shortwave receiver	$69.95
Sangean ATS803A-K portable shortwave receiver w/AC adapter - 9 memory presets	$148.95
Sangean ATS808-K portable 45 memory shortwave receiver	$159.95
Sangean ATS818CS-K portable shortwave receiver with cassette recorder	$209.95
Uniden EXP9200-K 900 MHz. 2 line cordless phone	$289.95
Uniden EXP9100-K 900 MHz. 1 line cordless phone	$269.95
Cobra CP912-K 900 MHz. spread spectrum cordless phone	$249.95
Bogen FR2000-K Digital two-line advanced voice mail system & answering machine	$279.95
Bogen FR0018-K memory expansion module, doubles recording time to 36 minutes	$79.95
FANS P161P-K 60 name/number caller ID, unwanted call blocker, automatic paging	$149.95
SNI ID200-K Bouncer name/number caller ID, call reject, forward to machine	$89.95
ICOM GP22-K handheld global positioning system (GPS)	$599.95
WR200-K weather radio with National Weather Service storm alert	$59.95
RELM WHS150-K VHF handheld 5 watt, 16 channel transceiver	$339.95
RELM RH256NB-K VHF 25 watt, 16 channel synthesized transceiver	$289.95
Ranger RCI2950-K 25 watt 10 meter ham radio transceiver	$239.95
Ranger RCI2970-K 100 watt 10 meter ham radio transceiver	$369.95
Uniden LRD9100SW-K Super Wideband Laser/Radar Detector	$139.95
ME2-K Map Expert CD Rom for IBM PC by DeLorme Mapping	$299.95
HCPC-K HamCall CD Rom for IBM PC by Buckmaster Publishing	$39.95
ANTK-K VHF scanner/VHF transmitting antenna PL259 connector	$29.95
ANTMMBNC-K magnet mount scanner antenna w/ BNC connector	$29.95
ANTMMMOT-K magnet mount scan antenna w/Motorola plug	$29.95
ANTMMPL-K magnet mount scan antenna with PL259 connector	$29.95
ANTSGBNC-K glass mount scanner antenna with BNC connector	$29.95
ANTSGMOT-K glass mount scanner antenna with Motorola jack	$29.95

Buy with confidence

It's easy to order from us. **Mail orders to**: Communications Electronics Inc., Emergency Operations Center, P.O. Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add $15.00 per radio or telephone product for U.P.S. ground shipping and handling in the continental U.S.A unless otherwise stated. Add $10.00 shipping for all accessories and publications. Add $10.00 shipping per antenna. For Canada, Puerto Rico, Hawaii, Alaska, P.O. Box, or APO/FPO delivery, shipping charges are two times continental U.S. rates. Michigan residents add state sales tax. No COD's. No returns or exchanges after 31 days. 10% surcharge for net 10 billing to qualified accounts. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. We welcome your Discover, Visa, American Express or MasterCard. Call 1-800-WX-BUREAU to order toll-free. Call 313-996-8888 if outside the U.S.A. FAX anytime, dial 313-663-8888. **For technical assistance to solve your communications problem, call the Communications Electronics technical support hotline for $2.00 per minute at 1-900-555-SCAN.**

For credit card orders call

1-800-WX-BUREAU

Weather Bureau

P.O. Box 1045, Ann Arbor, Michigan 48106-1045 U.S.A.
For information call 313-996-8888 or FAX 313-663-8888

BILL'S BASICS

BY BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

To Be Or Not To Be—An Amateur

If you know someone who has expressed an interest in becoming an amateur radio operator, but has yet to take any action to achieve that goal, please give her/him a chance to read this article.

Age. There is no age restriction related to holding an amateur radio operator's license.

Clubs. There are many organizations which specialize in specific modes of operation. Such groups can be helpful after one becomes licensed and acquires operating experience. However, these mode-specialized organizations seldom have much to offer to aspiring amateurs. Most local radio clubs are not specialized, but prospective amateurs are unlikely to be offered much help in most of these general-interest clubs. However, some of the general-interest clubs offer licensing courses at little (or no) cost. Local electronics stores (Radio Shack, etc.) personnel often know about available licensing courses. The American Radio Relay League is another good source of information about these courses. The ARRL's address is Clubs and Training Department, 225 Main Street, Newington, CT 06111. It helps to list the postal ZIP numbers of the areas where you are willing to attend classes. A licensing course conducted by an active amateur is more effective than any textbook. Personal practical experiences are also extremely important.

Code. Morse Code often appears to be a formidable obstacle to prospective amateurs, but this does not have to be the true situation. It is easy to acquire good code proficiency if one follows a sensible routine. Frequent short practice sessions are more effective than irregular long ones. Code is not visual; it is a language of sounds. Do not rely solely on visual devices such as flash cards or blinker lights as code training aids. It is best to use a manual (hand) key at first to develop desired spacing between characters, words, and sentences. A paddle and associated electronic keyer enable even the most inexperienced operator to send perfect dits and dahs, and I advise students to change from a handkey to an electronic keyer when they achieve a proficiency of about ten words per minute. Operators who fail to acquire proper spacing by using a handkey run things together when they use an electronic keyer. Perfect dits and dahs just form garbage without proper spacing. I use a semi-automatic key (bug) most of the time, because I became used to bugs long before electronic keyers became available. However, I do not advise students to use bugs, because electronic keyers are much easier to master, and they provide many features which do not exist when using bugs. Keyboards can be used to activate computer-generated code symbols.

There are several code training aids. The most common ones are tape recordings, computer programs, and records. I (W6DDB) have a set of tapes that have been used successfully by several thousand ex-students. If you want a data sheet about these tapes, send your request with an SASE to the California address shown on the first page of this article.

When the Farnsworth System is used, code characters are sent rapidly and the extra (saved) time is used as longer spaces between adjacent code symbols. Many people believe this system is preferable, since students become accustomed to copying fast code characters. It is my opinion that using the Farnsworth System is a certain way to make many students quit trying to master the Morse Code. It is more effective to use a system in which code symbols are transmitted at a slower rate with less spacing between symbols. Newcomers have enough trouble trying to learn the Morse Code when the symbols are being sent at a slow rate; their chance of success is reduced by having the code symbols sent at a faster rate. Good Morse Code operators know that the dah is not always three times the length of the dit. It can be about a 7:1 ratio at extremely slow speeds, and it reduces to about 1.5:1 at very high speeds. However, any code practice is better than none at all.

When using code, all of the output power is packed into a narrow emission spectrum. This factor allows a low-power code transmission to provide the same degree of communications capability as is available from using a much higher power voice emission. In addition to higher transmission effectiveness, code offers the advantage of narrow bandwidth reception. Simply stated, one does not have to listen to a wide received signal, which means that the code operator does not have to listen to atmospherics (QRN) and man-made interference (QRM) above and below the received code signal.

Eight-year-old Chris Busch, KB3BEJ, lives in Allentown, Pennsylvania. Chris operates primarily in the Novice 40 and 80 meter code segments. His station includes a Kenwood TS-180S transceiver and a dipole antenna. His uncle is George Busch, WA3MOJ, who helped Chris prepare for the Novice and Technician-Plus examinations. Chris intends to demonstrate amateur radio to the other students in his third-grade class.

Until (and unless) the licensing requirements change, one must pass Morse Code tests to gain high-frequency (3–30 MHz) operating privileges and to upgrade to higher classes of licenses. Failure to pass required code tests severely limits one's operating privileges.

The fastest and easiest way to increase code receiving proficiency, once you have received Novice or Technician-Plus operating privileges, is to get on the air and operate a lot. You have to copy what other amateurs send if you are going to hold meaningful two-way conversations.

It helps to copy code in a manner that is quick to write and is easy to read. If you want a copy of such a printing system, it is available to you at no cost; simply send your SASE and request to W6DDB at the Lancaster address.

Equipment and Accessories. The value of items now being sold for use in amateur radio stations is terrific. Do not make the mistake of thinking that the prices of modern transceivers are high, because

45527 Third Street East, Lancaster, CA 93535-1802

With ICOM's New IC-281H . . It's Not Just 2 M Anymore!

(2 M mobile transceiver *with* 440 MHz receive!)

"Everyone complimented... on it's ease of use" (the IC-821H) drew accolades for its ample audio." —QST, Jan '95

SAVE $25.00 when you buy the IC-281H during 2/25/95. See your ICOM dealer for details

New Exciting Features!

Bonus Receive Band – The 430 (440) MHz bonus band is available for receive. Enables full duplex, crossband operation between the 2 M and 70 cm bands. Crossband repeat from 440 MHz to 2 M.

Scratch Pad Memories – 10 scratch pad memories automatically store your 10 previously transmitted frequencies (5 simplex and 5 duplex) for instant recall. No fumbling around trying to write down, or store into regular memories, frequencies which you want to use temporarily.

Memory Allocation Function – 60 regular memory channels can be divided between the main and bonus band. You can organize your memories for maximum efficiency and listening preference.

Automatic Memory Channel Advance – After a memory channel is programmed, the channel indicator automatically advances, speeding up the programming process.

Tone Scan* – Scans, detects *and sets* the subaudible tone. Permits access to a repeater when you don't know the tone frequency.

* Optional UT-85 required.

Voice Synthesizer* – The IC-281H announces the operating frequency, enabling quick confirmation without taking your eyes off the road. Very helpful for visually impaired operators, too.

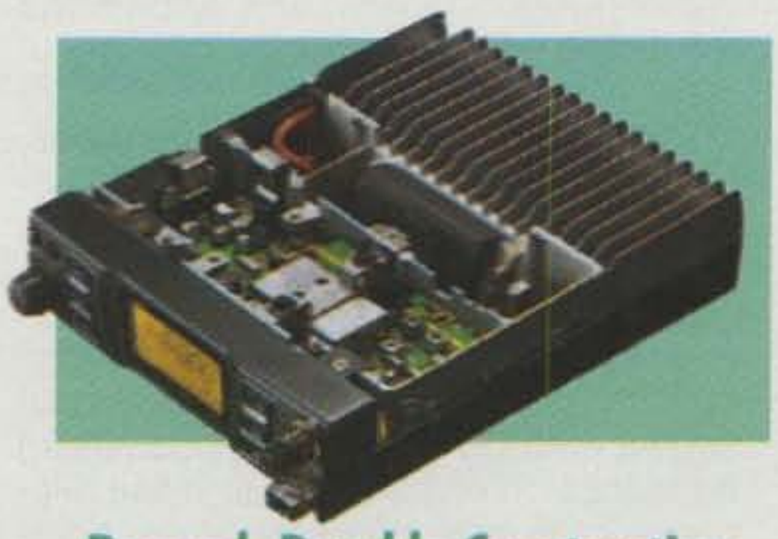
* Optional UT-66 required.

Packet "Plug and Play" Operation

Data Jack – Connects a TNC directly to the modulation circuit for packet convenience.

9600 BPS Capability – No modifications necessary. Provides higher performance packet operations.

Modulation Circuit – Newly designed, prevents over modulation even during high data throughput.



Rugged, Durable Construction

Die Cast Aluminum Frame Construction – Meets the highest standards to provide reliability and long life. Will enhance your trade-in value years later.

Large Heat Sink – Dissipates the heat to maintain power output and stability characteristics.

Simple Operation

Remote Control Microphone – Puts the operation of several functions at your fingertips.

Auto Dialing Capability – Programs 14 telephone numbers for autodial via repeater autopatch.

"One Push" Action Switches – Eliminates the need for "two step" function switch operation. Simplifies mobile operations for convenience and safety.

Large Display – Easy to see and logically organized for easy interpretation.

Auto Power Off – Shuts the transceiver down (when programmed). Great for bedside use.

Compatible Accessories – For easy mounting and operation.

And More!

- Built-in Pager and Code Squelch
- Optional Tone Squelch and Pocket Beep
- Scanning

IC-281H 144 MHz FM Transceiver

ICOM America, Inc. Corporate Headquarters:
2380-116th Ave. N.E., Bellevue, WA 98004
All stated specifications subject to change without notice or obligations.
All ICOM radios significantly exceed FCC regulations limiting spurious emissions. The ICOM logo is a registered trademark of ICOM, Inc. 2811294Y

Call our Brochure Hotline for FREE literature on ICOM radios: (206) 450-6088.

Experience the Quality™

ICOM®

CIRCLE 173 ON READER SERVICE CARD

the actually are very reasonable. Remember that both the transmitter and the receiver are included in a transceiver. Equivalently capable aeronautical and marine transceivers are being sold at three to ten times the price of an amateur transceiver. We are fortunate to have such superb equipment made available to us at reasonable cost.

If you can afford to do so, purchase very good new gear. Experienced amateurs can accomplish remarkable operating results with relatively poor gear, but inexperienced amateurs need the help good equipment provides. If you cannot afford to buy top-quality new gear, you should investigate the possibility of purchasing some of the high-quality used equipment that is readily available. Many of these older rigs are being sold at very low prices.

Building (including kits) is at a low for a few reasons. For one thing, very few kits are currently on the market for people who would like to construct top-quality gear. Second, some modern components are difficult to work with and special tools may be required. A third consideration is that homemade (called homebrew) equipment, including items built from kits, has relatively low resale value.

Amateurs commonly build antennas and accessories to be used in their stations. Many amateurs make minor repairs and modifications to their equipment, whereas major work is commonly performed by equipment manufacturers.

Exposure to Amateur Radio. People are often introduced to our Amateur Radio Service by relatives or friends who are amateurs. In some cases newspaper articles or radio/TV coverage provides motivation to become a licensed amateur. Radio control of model vehicles has led some folks into amateur radio. Shortwave listening provides an excellent entry into our service. Many Citizens Band operators have broadened their horizons by becoming amateurs.

Interests and Benefits. One achieves a good knowledge of basic electricity and electronics while preparing to pass licensing examinations. This knowledge remains useful to amateurs throughout their lives. Licensing studies also increase one's knowledge of mathematics, physics, and science. It is natural to acquire increased interest in geography, history, languages, and stamps as one contacts foreign (DX) amateurs. When one contacts foreign amateurs living at an unusual location, it is fun to read about such a place in an encyclopedia. Using an autopatch enables one to place telephone calls from anywhere. Voice operation increases one's confidence in public speaking. As a new operator becomes proficient on the air, she/he is likely to become interested in contacting foreign (DX) amateurs. An interest in DX operation usually leads to participation in on-the-air contests and the collection of some of the hundreds of available operating awards. There is contest activity almost every weekend. The majority of active amateurs get involved in handling public-service communications during parades, walk-a-thons, marathons, bike-a-thons, car rallies, and other similar events. Last but not least, there is always the possibility that one will be presented with opportunities to handle real emergency communications.

Modes of Emission. As a Novice or Technician-Plus licensee, one is allowed to operate facsimile, Morse Code, packet radio, radioteletype, television (slow scan and regular), and voice (amplitude modulation, frequency modulation, and single sideband) in specified segments of the high-frequency (3–30 MHz), very-high-frequency (30–300 MHz), and ultra-high-frequency (300–3000 MHz) amateur bands.

Needs. Amateur radio has a lot to offer to young people, and our service needs to acquire many of these young folks. The majority of our existing American amateur radio population is very mature. Older amateurs seemed to resent the emergence of the No-Code Technician License. Fortunately, it seems that resentment towards no-code licensees has eased, and it has been replaced by efforts to upgrade these licensees. Many

2m / 70cm Dual Banders

NEW A270-10S

Increase your range on 2 meters and 70 cm with this new Cushcraft dual band Yagi. Make more solid contacts on FM and eliminate many disconnects and retries on packet by focusing your transmit and receive power. The latest computer-aided design and long-life stainless steel hardware make this antenna the right choice for improving your station's performance.

A DUAL BAND FOR ANY APPLICATION

Cushcraft's full line of American made dual band antennas offers a solution for every need. The ARX-270 fiberglass is an excellent choice for those demanding requirements for long-range communications or repeater applications. Now you can run your 2 meter and 70 cm repeaters into the same antenna. AR-270B is designed for high performance at a moderate price and all in a package that is less than 8 feet tall. The AR-270 for compact spaces provides excellent coverage and easily fits every budget. Cushcraft AR-270 and AR-270B feature all aluminum construction. All models have stainless steel hardware and are guaranteed to withstand winds up to 80 mph. Our CS-270M is a sophisticated dual band mobile which is designed for high performance and all weather durability.

MODEL	A270-10S	
Frequency, MHz	144-148	430-450
Forward Gain, dBd	10	10
No. Elements	5	5
Front to Back Ratio, dB	20	18
SWR 1.2:1 Typical		
2:1 Bandwidth, MHz	≥4	≥10
Power Rating, Watts PEP	350	350
3dB Beamwidth, Degrees		
E Plane	52	52
H Plane	60	60
Boom Length, ft (m)	6.17 (1.9)	
Longest Element, in (cm)	40.3 (102.4)	
Turning Radius, ft (m)	6 (1.8)	
Mast Size Range, in (cm)	1.25-2 (3.2-5.1)	
Wind Load, ft^2 (m^2)	.725 (.07)	
Weight, lb (kg)	1.8 (.81)	

MODEL	AR-270		AR-270B		ARX-270U/N	
Frequency, MHz	144-148 / 430-450		144-148 / 430-450		144-148 / 430-450	
Gain, dB	3.7	5.5	5.5	7.5	9	12
SWR 1.2:1 Typical						
2:1 Bandwidth, MHz	>4	>15	>4	>15	>4	>20
Power, Watts FM	250	250	250	250	200	200
Horizontal Radiation Pattern, Degrees	360	360	360	360	360	360
Height, ft, (m)	3.75 (1.13)		7.7 (2.3)		16.5 (5)	
Mast Size Range, in	1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)		1.25-2 (3.2-5.1)	
Radial Length, in (cm)	6.75 (17.1)		20 (51)		20.5 (52.1)	
Wind Load, ft2 (m2)	0.27 (0.03)		0.47 (0.044)		0.95 (0.088)	
Weight, lb (kg)	2 (0.9)		2.4 (1.09)		5 (2.3)	
Construction style	High strength aluminum		High strength aluminum		Fiberglass enclosure	

AVAILABLE THROUGH DEALERS WORLDWIDE

cushcraft

48 PERIMETER ROAD, MANCHESTER, NH 03103 USA
TELEPHONE: 603-627-7877 • FAX: 603-627-1764

Amateur Electronic Supply®

Toll Free!...

OVER 38 YEARS IN AMATEUR RADIO!

5 Fully Stocked Locations

HEADQUARTERS – MILWAUKEE, WI
5710 W. Good Hope Road • Milwaukee, WI 53223
800-558-0411 • 414-358-0333 • Fax 414-358-3337
24-hour BBS 414-358-3472

WICKLIFFE, OH
28940 Euclid Ave.
Wickliffe, OH 44092
800-321-3594 • 216-585-7388
Fax 216-585-1024

ORLANDO, FL
621 Commonwealth Ave.
Orlando, FL 32803
800-327-1917 • 407-894-3238
Fax 407-894-7553

CLEARWATER, FL
1898 Drew St.
Clearwater, FL 34625
800-557-4237 • 813-461-4267
Fax 813-443-7893
(800-line In-State, only)

LAS VEGAS, NV
1072 N. Rancho Dr.
Las Vegas, NV 89106
800-634-6227 • 702-647-3114
Fax 702-647-3412

4 Hi-tech Service Facilities

HOURS • Mon–Fri 9-5:30; Sat 9-3:00

HF EQUIPMENT • SHORTWAVE • VHF & UHF • HANDHELDS

YAESU

FT-1000 HF Transceiver • **tx:** 160–10m Amateur Bands • **rx:** 100kHz to 30MHz • 100 memories • cross-band dual receive • 200w • built-in antenna tuner w/memories • built-in AC power supply • 6"h x 16"w x 15"d, 58 lbs.
FT-1000D *Deluxe* • dual bandpass filter • temp. compensated xtal osc. • 2.4kHz & 2KHz SSB filters, 500Hz CW crystal filter.

FT-990 HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 90 memory channels • SCAF • FSP • DDS • high speed antenna tuner w/memories • AC power supply. 12¾"w x 4½"h x 11½"d, 30 lbs
FT-990DC • DC version w/o built-in AC ps.

FT-840 HF Transceiver • **rx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 100 memories (independent tx/rx per memory) • Twin band stacking VFOs • optional FM • automatic 10M repeater offset with selectable CTCSS encode • 100W • 13.5V @ 20A • 9⅝"w x 3⅛" x 9½"d,18 lbs.

CLOSEOUT

FT-890/AT HF Transceiver with tuner **$1249.00**
Prices includes ***$150.00 Coupon***
Limited Quantity

FT-900/AT HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 100W • 100 memories • built-in antenna tuner • front sub-panel optionally mounts separately from the main body • CTCSS encode with repeater offset • twin stacking VFOS.
FT-900 • does not have built-in antenna tuner.

FT-736R Multi-Mode U/V Full Duplex Base
2 meters: 144-148MHz; **70cm:** 430-450MHz • opt. modules for 50, 220MHz and 1.2 GHz • 100 memories • full duplex crossband with inverted tracking • 25w (144, 220 & 440MHz) 10w (50 & 1.2GHz) • built-in AC supply or 13.5 VDC • 5¼"h x 14½"w x 11½"d, 19.8 lbs.

OPEN HOUSE **YAESU DAYS**

AES® Clearwater, FL
1898 Drew Street
Friday Jan. 20 • 4PM to 8PM
Saturday Jan. 21 • 9AM to 3PM

AES® Las Vegas, NV
1072 N. Rancho Drive
Friday Mar. 31 • 4PM to 8PM
Saturday Apr. 1 • 9AM to 3PM

Factory Reps • Prizes • Special Prices
Can't attend!...
Call for Special Pricing available on YAESU Day only at all AES® Stores.

FT-5200/6200 Dual Band Mobiles
32 memories • CTCSS encode • dual receive • built-in duplexer • cross band repeat • remote capability • 5½"w x 1⅝"h x 6"d, 2 lbs.
FT-5200 • 2M/440MHz (50/35w).
FT-6200 • 440MHz/1.2GHz (35/10w)
FT-5100 • Like FT-5200 w/o remote capability.

FT-2200/7200 Mobiles
50 memories • DTMF page/coded squelch • backlit DTMF mic • 5½"w x 1½"h x 6¼"d, 2.8 lbs.
FT-2200 • 2m with 110-180MHz rx (50w).
FT-7200 • 440MHz (35w)

FT-7400H Mobile (left) • 440MHz (35w) • 31 memories • alpha display • track tuning • CTCSS encode • backlit DTMF microphone • 6¼"w x 1⅞"h x 7"d, 3.3 lbs.
FT-2500M 2m Mobile (top) • 50w • 31 memories • CTCSS encode • scan • backlit DTMF mic • 6"w x 1⅞"h x 7"d,1½ lbs.
FT-912RH Mobile (right) • 1.2GHz

FRG-100B Communications Receiver • 50kHz to 30MHz • AM, SSB, CW; FM opt.

VHF/UHF Multi-Purpose Mobiles/Portables
FM/SSB/CW • 2w with 12V @ 1.1A, or optional battery case • DTMF mic w/up-down tune • dual VFOs • 10 memories • scan • LCD display • strap • 2¼"h 6¼"w x 7½"d, 2.6 lbs.
FT- 290RMkII 2m (25w) • **FT-690RMkII** 6m (10w) **FT-790RMkII** • 430-450MHz (25w)

New! **FT-51R** • 2w 2m/440 FM HT
FT-51R/HP • 5w 2m/440 FM HT
FT-411E • 2.5w 2 meter FM HT
FT-911 • 1w, 1.2GHz HT **CLOSEOUT**
FT-811 440 HT/TTP c/o .. **(w/$25 Coupon) $234.95**
FT-815 440 HT/batt/chgr ..... **CLOSEOUT $299.95**
FT-816 • 440 MHz HT/batt/chgr, black HT
FT-33R • 5w 220 MHz FM HT
FT-530 • 2m/440 FM HT w/TTP
FT-11R • 1.5w 2 meter FM HT
FT-11R/HP • 5w 2 meter FM HT
FT-41R • 440MHz FM HT

YAESU Coupon Promotions until 3/31/95

HF Radios
$150 Off FT890/AT (until gone)
$25 Off FT840

Mobile Radios
$30 Off FT5100 • FT5200
$20 Off FT2500M • FT2200

Handhelds
$50 Off FT530 (until 2/28/95)
$20 Off FT11R • FT11R/HP

Rotor
$50 Off G2700SDX (until gone)
(Net $838.95 with Coupon) CLOSEOUT

The Ham Radio Superstore ... your Source for over 4000 items!

Largest Ham Inventory • Competitive Pricing • Fast/Low Cost Shipping

More Buying Power with the ...

AES® Credit Card

18.9% APR

NO PAYMENT FOR 90 DAYS

INTEREST ACCRUES

No Minimum Purchase
No Down Payment
No Annual Fees

Call for Application Today!

Knowledgeable Staff • Top Trades • Quality Used Gear • Credit Card

Extended Phone Hours • Same Day Shipment on Most items

VHF & UHF MOBILE UNITS • HANDHELD UNITS

ALINCO

DR-130T 2-Meter Mobile 50/5W output • 140-174MHz receive • 20 memories (100 optional) • CTCSS encode built-in • 5½"w x 1½"h x 6"d, 2½ lbs. • Model **DR-430T** is 440MHz.

DR-600TB 2m/440MHz Twin Band Mobile 45W (2m)/35W 440 MHz • receives 118-174 (including AM and 410-470 MHz • 40 memories • scan • full duplex cross band operation • remotes from any DTMF capable 2m or 70cm unit • separate VHF/UHF outputs • separate controls for each band • CTCSS and DTMF encode • 5⅞"w x 2"h x 7"d, 3¾ lbs.

ALINCO CLOSEOUT

DR-119T
50W 2m FM Mobile
$339.95

Order Toll Free and use your Credit Card for

Same Day Shipment

***New!* DR-M06T 6 Meter FM Mobile Transceiver** Find exciting communications on the 50MHz band! • 50 to 54MHz •100 memory channels •10 or 1 watt output • Programmable offset, built-in • 50 tone encoder with decoder optional • DTMF microphone • 5½"w x1½"h x 4½"d.

DR-1200T 2m Data Radio • Optimum Packet • 25W • 1200/2400 baud • 14 programmable memories • 4 scan modes • programmable CTCSS encode/decode • voice transmission with optional microphone • 5½"w x 2"h x 6¾"d, 2.2 lbs.

DR-1200TH2 • The 9600 baud version.

LATEST HANDHELDS

The New **DJ-582T** VHF/UHF FM Handheld Transceiver has the same standard features as the popular DJ-580T, plus: Bigger bold keypad buttons; Easier to grasp control knobs: Faster scan speed; Channels Display; TX LED.

The New **DJ-480T** UHF FM HT features similar design, and offers simple program as found in the DJ-180T.

DJ-180T DJ-580T DJ-F1T DJ-G1T

DJ-180T 2m HT • E-Z to operate! • receives 130-174 MHz • 2.0W, 5W with optional battery. Illuminated LCD display • 16 digit DTMF • 10 memories • 5½"h x 2⅜"w x 1⅜"d.

DJ-180TH • Same as DJ-180T, 5W standard.

DJ-580T 2m/440MHz Twin Band HT • 2.5W • receives 130-174 & 410-470MHz. Modifies for MARS/CAP tx, + 118-136MHz+ • 40 memories • CTCSS encode/decode • DTMF encode • DSQ. • full duplex cross band repeat • scan • autodialer • back-lit keypad • simult. rx on both bands-separate controls • 6½"h x 2¼"w x 1¼"d, 0.97 lbs.

DJ-F1T 2m Mini HT • 2.5W • receives 130-174MHz and 118-136MHz • scanning • autodialer • back lit keypad, 40 memories • call channel • CTCSS • DTMF encode • DSQ paging • 4⅜"h x 2⅛"w x 1½"d, 14 oz.

DJ-F1T/HP • Same as DJ-1FT but 5W • 12V 600mah nicad battery standard.

DJ-G1T 2m HT • 2m tx/rx + 440MHz and AM aircraft receive • Channel Scope spectrum analyzer • 80 memories -5 for autodialer • Crossband semi-duplex operation • DSQ paging • Scan • 4½"h x1⅛"w x 1½"d, 12.6 oz.

ALINCO COUPONS

Good on the radios listed until Feb. 15th, 1995. The coupon amount shown is applied at the time of sale ... there is nothing for you to send in!

Until 2/15/95 ...

$10 Off DR-600TB
$15 Off DR-130T
$25 Off DJ-580T
$40 Off DJ-G1T

NEW EXPORT SERVICES from AES® ORLANDO

Toll Free 1-800-327-1917 **fax** 1-407-894-7553
International 1-407-898-1166

Natán, KN4BJ
Jaime, N4LIO
Eddie KD4RAZ
Carlos

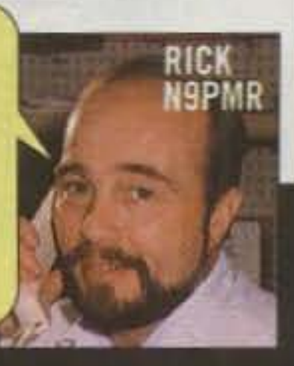
Se Habla Español

Call 1-800-558-0411 for your AES® Catalog

AMATEUR ELECTRONIC SUPPLY®

New! **Extended Phone Hours!**

Monday thru Friday... talk to **AES®** as early as 6:00AM PACIFIC or as late as 8:30PM EASTERN by calling...
1-800-558-0411



We Service what we Sell ... on all Major lines!

newer licensees operate very little or not at all. Such licensees need to get on the air to improve their operating capabilities.

On-The-Air Discussions. Each contact usually starts with an exchange of names and locations, plus signal-reception reports. Then equipment, antenna, and weather information are commonly exchanged, followed by a good two-way exchange of data regarding jobs, education, school activities, families, other pursuits, ages, and subjects of mutual interests.

Operating Expenses. Once the station has been set up, it costs money to operate it. Electricity is one cost, of course, but it is a lot more expensive to run a refrigerator than it is to run a station. Most amateurs like to exchange QSL cards, which provides written proof of completed two-way contacts. Cards used to cost about the same amount as the one-cent postage stamp required to mail them. Now the postage costs about four times as much as the cards. Fortunately, there are bureaus, such as the ARRL Membership Outgoing Foreign QSL Bureau, which handle QSL cards at low cost. Despite relatively high postage costs, many new amateurs want cards and are quite willing to bear the expense.

Parents. Young people may have to face concerns of their parents. It has been my experience that most parents are very willing to pay all expenses related to establishing and operating an amateur station. Parents may remember television interference problems that were common in the early 1950s, but TVI is no longer a major concern. The appearance and safety of station antennas are questionable factors which need to be resolved to keep peace in the family.

Testing. FCC amateur radio license examinations are now only conducted by Volunteer Examination groups. The written tests are relatively easy to pass. In fact, Novice and Technician amateur tests do not even contain questions related to some of the modes of operation these licensees are allowed to use. Despite the relative simplicity of the current tests, it is necessary for prospective amateurs to study and prepare themselves to pass FCC tests.

If you want a set of the Novice/Technician licensing course data which was recently printed in several issues of *CQ*, it is available to you at $3, which includes reproduction and mailing costs. Prospective amateurs are welcome to progress through a series of ten Novice tests and ten Technician tests at just the costs of reproduction and postage. Send a large, self-addressed, stamped envelope to my (W6DDB) California address to get started using these examinations.

Time. It is wise to devote three to six hours per week to studying the material associated with the written test one is preparing to pass. When learning the Morse Code, one should use frequent short practice sessions. A recommended practice schedule is 20 to 30 minutes per day 4 to 7 days each week. The amount of time one spends on the air is up to each individual amateur, but one should operate at least 3 to 6 hours per week when trying to increase one's code proficiency.

Printed Aids

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

73, Bill, W6DDB

WE'RE STANDARD AND WE'VE GOT YOUR STYLE!

Superior Intermod Rejection!

STANDARD PIONEERS ANOTHER FIRST!! THE C5718DA & C1208DA IS PACKET READY!
Designed with packet in mind. Out-of-the-box high-speed, 9600 baud, interface.
Just connect your TNC to the radio and you're on the high speed packet network.
Also, operates at 1200 and 2400 baud equally well.

C5718DA

C1208DA

C5718DA TWIN-BAND MOBILE
50 Watts of power totally controlled from the microphone! Remote this radio anywhere!

Unsurpassed intermod rejection.
Built in Antenna Duplexer.
Dual frequency receive; two VHF, two UHF, or VHF/UHF.
Frequency range:
Receives 110-199.995 MHz (including AM aircraft) and 250-499.995 MHz.
50 Watts 2M, 40 Watts 70cm
(3W Low, 10W Medium selectable)
Memories: 40 (20 per band); stores frequency, offsets and CTCSS tones.
200 memory channel option, CMU182.
CTCSS Encode /Decode standard.
Frequency steps, 5, 10, 12.5, 15, 20, 25, 50 and 100 Khz.
Full Duplex cross band operation with CTCSS tones.
Paging/Coded squelch.
DTMF autopatch dialing, 6 memories, 15 digits.
Eight kinds of scan, including priority and CTCSS.
Memory scan lock-out.
Back-lit Keypad and Display
Auto mute opposite band, three settings (-6, -12 and -18dB).
Cooling fan built- in.
Size: 5.51"W 1.57"H 5.31"D Weight 2.2 lbs..
Mobile bracket and power cord (2M) included.

STANDARD HAS EVERYTHING IN THE SPEAKER-MIC WHILE DELIVERING UP TO 50 WATTS!

C1208DA TWIN-BAND MOBILE
The smallest, lowest price 2 meter mobile radio that delivers all the features. Mount it under a seat or even in the trunk using the optional extension cable (CAW561 or CAW562).

Frequency range:
Receives 110-199.995 MHz (including AM aircraft) and 250-519.995 MHz.
50 Watts, 10W and 3W selectable
Built in Antenna Duplexer for 450 MHz receive
Memories: 100; stores frequency, offsets and CTCSS tones.
CTCSS Encode/Decode standard.
Frequency steps, 5, 10, 12.5, 15, 20, 25, 50 and 100 Khz.
Paging/Coded squelch.
DTMF autopatch dialing, 10 memories, 15 digits.
Six kinds of scan, including priority and CTCSS.
Back-lit Keypad and Display
Auto mute: four settings (-10, -20, -30 and off)
Semi Duplex cross-band operation with CTCSS tones
Cooling fan built-in
Size: 5.51"W 1.18"H 5.79"D Weight 1.65 lbs..
Mobile bracket and power cord (3M) included.

MARS and CAP modification available (permit required).

Specifications, features and price are subject to change without obligation or notice

STANDARD Amateur Radio, Products, Inc.
P.O. Box 48480, Niles, Illinois 60714

CIRCLE 170 ON READER SERVICE CARD

SR STANDARD®

Announcing the Latest in New Products

Only $9.95

They're Back . . .And Better Than Ever!

CQ 1995-96 Calendars CQ

CQ has done it again with our new 1995 calendar series. You'll refer to your CQ calendar time after time as you search for the schedules of upcoming ham events and conventions. Public holidays and valuable astronomical information will be right by your side, too!

With CQ's 1995 calendars, you actually receive *15 months* of use (January '95 - March '96) with all-new photography you won't see anywhere else. At only $9.95 each, you can't afford to be without them!

1995 Amateur Radio Calendar

There's no better addition to your shack or office!

Imagine professional color photographs of some of the biggest stations in the world! You'll see everything from aerial photos of 80M yagis to ham shacks that are beyond belief! No ham should be without one.

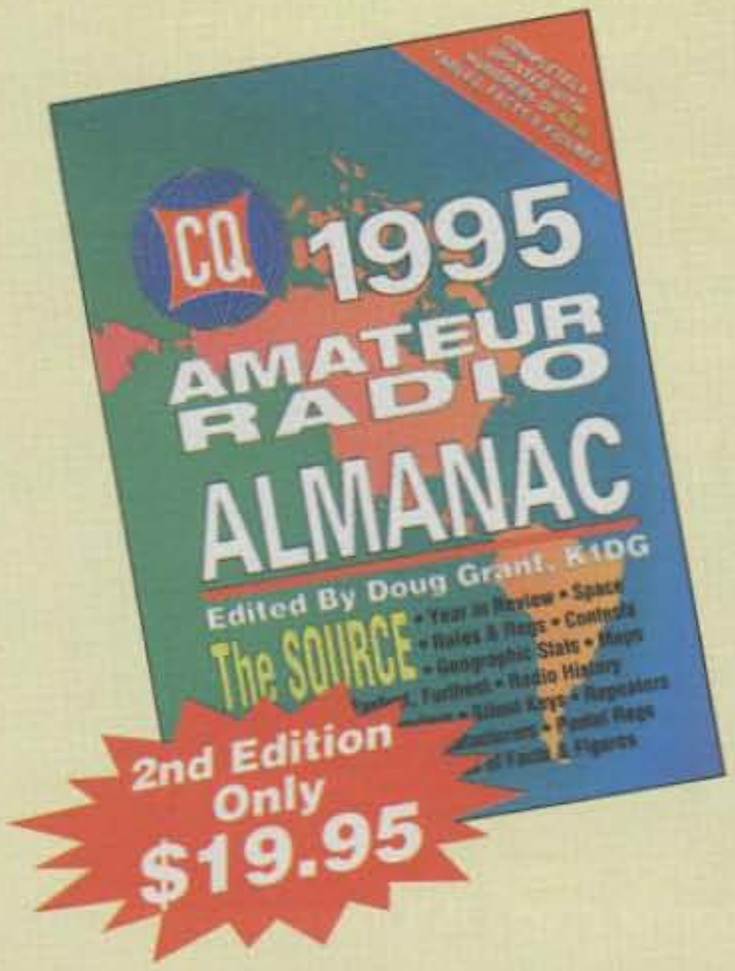
1995 Radio Classics Calendar

If you enjoy the old days of radio you'll love CQ's latest look into the past. Each month you'll explore radio history with dazzling photography of antique radios, rare morse keys, tubes and more.

CQ's 1995 Radio Classics Calendar—a must for every radio nostalgia buff!

CQ's 1995 Amateur Radio Almanac, 2nd Edition

If you're looking for information about ham radio, it's in the **1995 Amateur Radio Almanac**! This Sourcebook is filled with over 500 pages of facts, figures and information.



Here's just a sample of what's new in this year's edition:

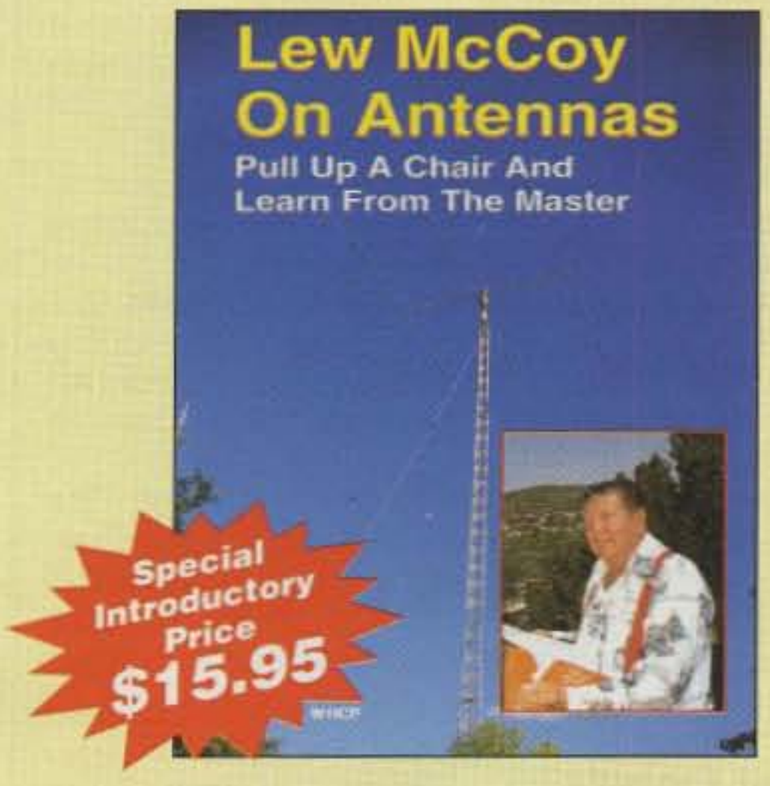
- Amateur Radio Around the World
- Propagation Predictions for 1995
- Latest Part 97 Rules and Regulations
- FCC Survey Listings of RFI-proof Telephones
- Comprehensive Index of Equipment Reviews
- Expanded Coverage of Internet Computer Services for Hams
- FCC General Class Question Pool
- Updated Records for all Major Contests
- Proposed Vanity Callsign Rules
- Revised U.S. Ham Census
- All-new Color Photography
- U.S. Radio Clubs by State & City
- IOTA Program Rules... the list goes on!

Plus, this year's Almanac is even easier-to-use with larger type and a simplified format.

CQ's 1995 Amateur Radio Almanac is a resource you'll refer to over and over again. If it's ham radio, it's in The Source!

from CQ . . . and Just in Time for the Holidays!

Here's the book you've all been waiting for!



Lew McCoy on Antennas

by Lew McCoy, W1ICP

It's not every day you get to meet a living legend, but CQ brings you one of the greatest! CQ magazine author and renowned authority on antenna theory and design, Lew McCoy, W1ICP, has written a truly unique antenna book that's a must for every amateur. Unlike many technical publications, Lew presents his invaluable information in a casual, non-intimidating way.

Reading Lew McCoy is like having a conversation with him right in your shack!

Here's just a few of the topics you'll read about:

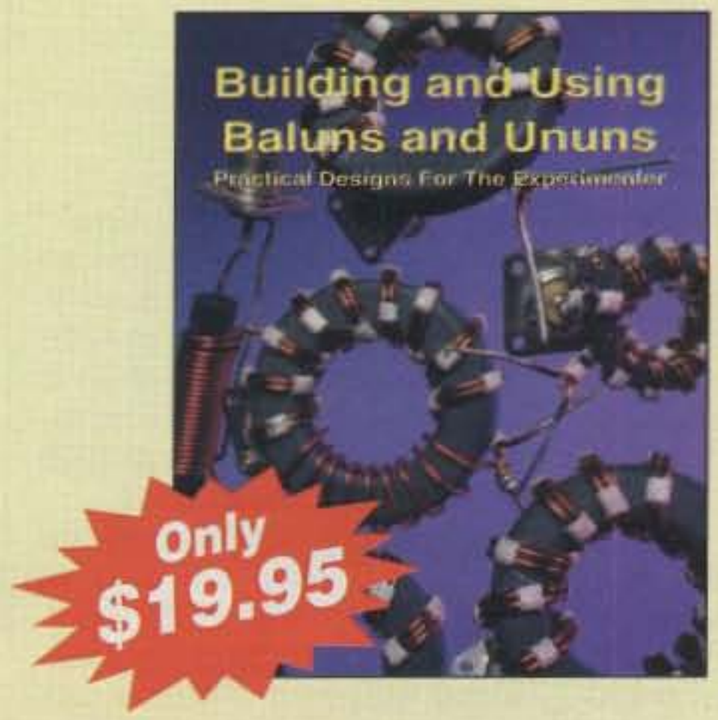
- Basic facts about antennas
- Antenna Matching & Standing Wave Ratio
- Understanding Decibels
- Transmatches & Antenna Tuning
- Feedline Radiation Problems
- Simple Wire antennas
- Rotary Dipoles
- Multi-band Rotary Beams & Quads
- VHF Antennas
- Multiband Mobile Antennas

You'll also get countless examples and illustrations. **Lew McCoy on Antennas**—It's not just an antenna handbook, but a wealth of practical antenna advice for the ham!

Pull up a chair and learn from the master. Lew McCoy, W1ICP, an amateur for nearly 50 years, is an expert in his field. For decades, Lew has written and lectured on the subject of antennas to audiences around the world. Now ***you*** can take advantage of all his experience and knowledge. Don't miss out—order your copy of **Lew McCoy on Antennas** today!!

Building and Using Baluns and Ununs

Practical Designs for the Experimenter
by Jerry Sevick, W2FMI



Without question, Jerry Sevick, W2FMI, is *the* authority on transmission line transformer theory. **Building and Using Baluns and Ununs** is the definitive source for his latest practical information and designs.

This book provides a unique opportunity to learn about the application of baluns and ununs for dipoles, yagis, log periodics, beverages, antenna tuners, and countless other examples.

Much has been published about the theory of transmission line matching circuits. Jerry Sevick has unraveled the technological mysteries with designs that are simple and work. Be sure to order your copy of **Building and Using Baluns and Ununs** right away!

Order Toll Free 800-853-9797

Please mail your orders to: CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801
516-681-2922 FAX 516-681-2926
Please add $2 shipping and handling for orders under $20.
For orders $20 to $50, add $4 S/H. FREE shipping for orders over $50.
Also available at your local dealer

CQ SHOWCASE

Electromorse CW Program From Electrosoft

Electromorse is a program that combines a Morse code tutor with a CW keyboard. One program can be used to learn Morse code and to communicate on the air. Electromorse runs immediately on any IBM compatible computer, including laptops, with no setup required.

The tutor helps you learn code by sending random characters, buffers, or conversations. Random letters and numbers are sent in five character groups and may either include or exclude punctuation marks. Custom practice drills are made by randomly selecting from ten separate user-defined buffers. Practice for VE exams is done by randomly selecting millions of unique conversations from a pool of common phrases. The Farnsworth method is used for code speeds below 13 words per minute.

Electromorse sends and receives CW from 5 to 100 wpm. The dot/dash ratio can be adjusted from 21 to 45 percent. An automatic serial number is available for contesters. The program is available for $30 without interface, and for $50 with interface. For more information, contact Electrosoft, P.O. Box 1462, Loveland, CO 80539, or circle number 107 on the reader service card.

MFJ-8621 "Packet Only" VHF Data Radio

The MFJ-8621 Data Radio monitors "packet only" on a packet channel for continuous 24 hour a day duty. The MFJ-8621 is a 2-meter FM data receiver built exclusively for, and dedicated to, monitoring packet. The unit runs all data rates through 9600 without modification. It operates on 145.01 MHz with crystals pre-installed, but plug-in crystals can

be ordered for the packet channel of choice. Other features include PIN diode switching providing instant changeover between transmit and receive; a dual conversion receiver, 0.25 µV low noise preamp, and a double-tuned front end; a narrow 10.7 MHz IF filter; and unsquelched audio that feeds directly to the TNC.

For more information, contact an MFJ dealer or MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (601-323-5869; FAX 601-323-6551), or circle number 108 on the reader service card.

AEA PK-96 Part of TheNet Network at 9600 bps

Advanced Electronic Applications, Inc. now offers a special version of TheNet for the PK-96 at 1200 and 9600 bps. Network builders can add a 9600 bps port to an existing mountain-top network quickly. Benefits associated with using a network have been available at 1200 bps for a while, but are now available at 9600 bps. Once a PK-96 is installed in a network, 9600 bps users can find users to communicate with in one forum. The PK-96 utilizes HDLC hardware, operates at 1200 and 9600 bps, comes with 32K RAM, and is upgradable to 128K.

There are two ways network operators can acquire TheNet software for the PK-96. One, AEA will send you an initialization disk and an EPROM, you fill in the parameters and burn your own EPROM ($10). Two, AEA will send you an initialization disk to fill out (listing the parameters you wish to have set on your PK-96); you then send the disk back to AEA. AEA will take this information and burn a chip for you and send you the EPROM in the mail ($30 plus $5.50 s&h).

For further information about the PK-96 TheNet EPROM, contact Advanced Electronic Applications, Inc., P.O. Box C2160, Lynnwood, WA 98036 (206-774-5554; FAX 206-775-2340), or circle number 109 on the reader service card.

(Continued on p. 122)

DAIWA

Rugged Reliability for Today's Amateur!





Daiwa's Accessories offer exceptional quality and at very competitive prices!

Power Supplies

Rugged, reliable, crossbar protection, offering easy access connectors, cig plug and meters on most models!!

HIGH QUALITY POWER SUPPLIES

	PS120M	PS140II	RS300	RS40X	PS50TM
Voltage(VDC)	3-15	13.8	1-15	1-15	13.8
Current(ICS)	12	14	30	40	5.2
Current(cont.)	9.2	12	24	32	4.2
Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
Weight (ilbs.)	11	11	18	22	6
Meter	YES	NO	YES	YES	YES
EEB Price	$87.95	$69.95	$144.95	$187.95	$42.95

Daiwa Switching Power Supply

SS404 - Compact, 40amp supply Auto Switching - 100-117V or 220-240V Input 70 - 132V or 140-264V; crossbar protection. Additional models are available, CALL.

APS300 - Sophisticated Automatic Voltage Regulator, battery charger, with UPS functions. **Input:** 160-260V AC **Output** - 1-15 DC variable Output current Max. 30A Rated 24Amps continuous UPS current 12 A,6A.

SWR/PWR METERS

FAMOUS CROSS NEEDLE METERS

MOBILE

CN410M -mobile 3.5-150 MHz ✦ CN460M -mobile 140-450 MHz CN465M -mobile 140-450 MHz

BASE

CN101 1.8-150 MHz ✦ CN103M 140-525 MHz W/UHF Conn ✦ CN103N 140-525 MHz w/N Conn

DAIWA IV300

DC-AC Inverter

Input: DC 12V
Output: AC 220V - 117V max. 300W
Rated 240W

ANTENNA TUNERS...

High quality construction, unique cross needle meter, convenient reading of SSB, one of the most accurate on the market.

CNW 320 3.5-54MHz 150CW
CNW 420 1.8-30MHz, 11 Bands 200 W CW 3.5- 30MHz
CNW 520 3.5-30MHz, 8 Bands. 1KW CW 50% duty
CNW727N 140-150 (200W) & 430-450MHz (150W);
The only VHF/UHF tuner available.

DC - DC CONVERTERS...

Run your 13.8VDC accessories on any 24VDC system! High performance and superior commercial construction.

SD-405IIB 5 Amp ✦ **SD-412II** 12 Amps
SD-416II 16 Amps ✦ **SD-303FII** 30 Amps

Contact Your Favorite Dealer Today!

DAIWA

Switches, Meters, Power Supplies, Linear Amps, Accessories and more!

DAIWA

Electronic Distributors
325 Mill St. Vienna, Va. 22180
703-938-8105 • FAX 703-938-4525

EXCLUSIVE DISTRIBUTOR THROUGHOUT THE U.S., CANADA, AND SOUTH AMERICA. CALL EDCO FOR YOUR NEAREST DEALER.

CIRCLE 161 ON READER SERVICE CARD

VHF PLUS

BY JOE LYNCH, N6CL

ALL ABOUT THE WORLD ABOVE HF

New Evidence That Lightning and Sporadic-E Are Related?

We are still scratching our heads over reports of the past two summers of upward lightning. These reports appeared in *Aviation Week and Space Technology* (see the "VHF Plus" column in the October 1994 issue of *CQ* for a discussion of the works of physicists Drs. Davis Sentman and Eugene Wescott, who studied and photographed high-altitude lightning flashes during the summers of 1993 and 1994). Now comes a press release from NASA forwarded by Dave Phillips, W7GZ, outlining the observation of gamma-ray radiation from thunderstorms.

The following press release (No. 94-204) is from Steve Roy, Marshall Space Flight Center, Huntsville, Alabama:

"Gamma Ray Flashes in Atmosphere More Common than Thought: Scientists at NASA's Marshall Space Flight Center in Huntsville, Alabama, are observing rare gamma ray flashes above thunderstorms at a rate six times that of previous observations.

"The observations are being made by the Burst and Transient Source Experiment aboard NASA's Compton Gamma Ray Observatory which was recently modified by ground commands to be more sensitive to the events.

"'The high rate of occurrence of these gamma ray events suggests the presence of a little understood, but significant phenomena that will have impact in many scientific fields,' explained Dr. Steve Goodman of Marshall's Space Sciences Laboratory. 'We're especially looking forward to the opportunity to bring together investigators from the fields of space and atmospheric physics to study these newly discovered events.'

"Scientists previously observed gamma ray flashes above thunderstorm activity about once every six weeks. Now, they are observing such gamma ray events weekly. The first indications of gamma ray flashes above thunderstorms were detected by the Burst and Transient Source Experiment earlier this year.

"It is suspected the gamma ray flashes come from a rare type of powerful electrical discharge, similar to lightning, above large thunderstorm regions. The observed flashes are very brief, lasting only a few thousandths of a second. In the past two months most of the observed gamma ray flashes have occurred near the equator, primarily over regions of South America and the East Indies known to have high thunderstorm activity.

"These recent observations have been confirmed by other instruments on the Compton Observatory. The gamma ray observations from the Earth's atmosphere and their association with thunderstorms is a complete surprise to scientific investigators. It is suspected the gamma ray events may be related to faint, but visible electrical discharges observed and reported recently high in the stratosphere above thunderstorms.

"The new observations were presented at a meeting of the American Geophysical Union in San Francisco today [7 December 1994] by Dr. Steve Goodman. The Compton Gamma Ray Observatory is managed by NASA's Goddard Space Flight Center in Greenbelt, Maryland, and the Burst and Transient Source Experiment is managed by Marshall."

If that press release is not enough to pique your curiosity, then read the article "Chorus, Sferics, Tweaks, and Whistlers" by Steve McGreevy, N6NKS, in the January 1995 issue of our sister publication *Popular Communications*. In that article Steve observes the effects of lightning storms and auroras in VLF frequencies. Steve states that we can hear sounds associated with lightning storms that are hundreds, even thousands of miles away.

One such type of sound which Steve calls a "whistler" is observed to travel from a lightning storm via the Earth's magnetic field to distant points around the globe.

According to Steve there is energy created by the lightning that passes through the E-layer, is caught in the earth's magnetic field, and comes out at a distant point on the globe. From his article, fig. 1 depicts the energy that is emanating from the lightning stroke. One wonders if this energy might not be the gamma ray flashes observed by the Burst and Transient Source Experiment cited by the above NASA press release!

VHF PLUS CALENDAR

January 29	Very poor EME conditions.
February 5	Moderate EME conditions.
February 8	Apogee and first quarter Moon.
February 11	Aurora 95 VHF conference. See text for details
February 12	Poor EME conditions.
February 15	Full moon.
February 19	Moderate EME conditions.
February 21	Last quarter moon.
February 22	Perigee.
February 26	Poor EME conditions.
February 28	New moon.

(Moon date courtesy W5LUU.)

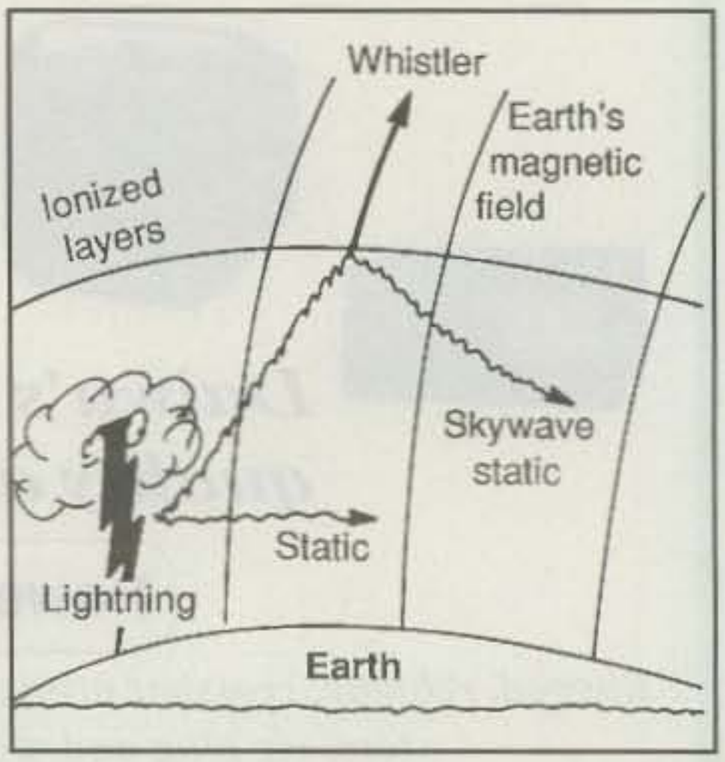


Fig. 1– The path of a whistler follows our planet's magnetic field as it loops out of our atmosphere, then returns to the surface at a distant point. (Figure courtesy N6NKS and Popular Communications *magazine.)*

Algonquin Park—Pretty Successful Despite . . .

The following, by Dana Shtun, VE3DSS, who is with the Toronto VHF Society Amateur Radio Club, reports on the success of the VE3ONT November EME operation:

"Once again this year, members of the Toronto VHF Society ARC, Canada's preeminent VHF/UHF contest group, sallied forth to participate in the annual ARRL EME (Earth-Moon-Earth) competition. The contest, spread over two weekends in the fall, allows moonbouncers from around the world an opportunity to pit their systems and operating skills against each other. Given the fact that a signal generated by such a station must traverse a path of over 600,000 km (364,000 miles), pass through the earth's magnetic field twice, and reflect off the lunar surface as well, means that the level of signal returned to earth after a two plus second round trip at the speed of light must be detected and copied properly—no easy feat, but well within the capabilities of *all* radio amateurs, as evidenced by the participation from a diversity of countries within the first, second, and third worlds.

"The operation by VE3ONT, from the Algonquin Space Complex, using the 46 metre (150 foot) diameter Algonquin Radio Telescope represents perhaps the ultimate in EME operation. By combining the superior gain of the telescope (33 dBi at 144 MHz), with current 'state of the art' power amplifiers, ultra low noise receivers and careful engineering systems design techniques, the Toronto VHF Society members planned to continue their efforts to make 'moonbounce' a reality for more and more 'satellite capable' Radio Amateurs around the globe.

Members VE3VD (President and 1994 Project Manager), VE3ASO (1993 Project Manger and Mentor), VE3KDH (6 metre project coordinator), VE3DSS (founding member of the Society), W9IP/VE3 (communications coordinator), VE3BFM (feed antenna project coordinator), and recent new members Larry, VA3LK, and Mike, VA3MW, spent most of the winter of 1993-1994 mapping out a strategy for the 1994 ARRL contest.

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

Catch the winning spirit.

From the forge of world-wide competition comes the new Hustler *Spirit* series of vertical antennas.

Designed to win the race to provide the highest performance and durability possible, at a price that leaves others in the dust.

If you are driven to achieve a superior signal; if you need an antenna which is virtually impervious to wind and weather; if you want the best the world has to offer, catch our new *Spirit*-and win today.

Model Shown: HS9-42555 for 425 to 455 MHz. operation.
Also Available: Models for 136 MHz. to 2 GHz. at Unity, 3, 6, 9 and 10 db gain versions.

HUSTLER®

Beyond your Expectations

One Newtronics Place
Mineral Wells, Texas 76067
1-800-949-9490
(817) 325-1386

CIRCLE 35 ON READER SERVICE CARD

YES, I'm interested in the new *Spirit*.
Please send me your latest Amateur catalog.

Name _____

Address _____

City _____ *State* ____ *Zip* _____

Larry Stoskopf, NØUU, reports that despite the tornadic winds in Kansas that bent the mast of his satellite dish, his home and Toto's dog house did stay put (apparently so did the dog dish!). He reports, however, that neither he nor Auntie Em have seen Toto or heard from Dorothy in some time. (Photo courtesy NØUU via WA5VJB)

"Plans were made to operate 50 MHz, 432 MHz, 1296 MHz, and 10 GHz during the first weekend of the contest in October. However, the operation was scrubbed due to the need to utilize the Radio Telescope for another worldwide event. That event was the observation of the gas cloud associated with a massive supernova that occurred (relatively speaking, of course, a few years ago). We were all disappointed, but thankful for any opportunity to use the 'Big Ear.'

"The second weekend of the ARRL EME Contest was November 25–26, 1994, and plans had been made to operate exclusively on 144 MHz that weekend, to maximize our potential to reach new amateurs worldwide. With the expectation that we could work a station running 50 watts with a single Yagi aimed at the moon, we anticipated a busy weekend.

"In fact, the weekend was very busy, despite some visits from old man Murphy, in the form of a nonfunctional 'cherry picker' forcing Peter, Larry and Mike to climb up the support legs of the feed cabin to install and remove the equipment. In addition, there were a few computer glitches that caused us to lose our bead on the moon more than once, and to top it off, prior to the contest I had received information from Energy Mines and Resources that there was a strong likelihood of auroral activity that weekend.

"However, despite these problems, very strong fading and loss of signals due to the auroral activity, VE3ONT managed to move into the top 10 for EME scores in the ARRL Contest.

"Given we also lost one hour at moonrise and set due to our inability to track the moon below 9° elevation, the team, operating in shifts during moon access, amassed a score of 299 individual stations worked in 52 countries/regions worldwide during the approximately 20 hours of operating time, for a claimed score of 15,548,000 points. Not only was the operation a success in this area, it also gave everyone an opportunity to get away from the routines of life, to do something totally different and to challenge their abilities.

"The Toronto VHF Society is already planning for the next foray into Algonquin Park (Grid FN05xw) during the Spring of 1995. Testing of new feed antennas will be done but the primary focus will be to again bring EME opportunities to non EMEers worldwide, and to test and evaluate equipment and techniques on the 50 MHz and 10 GHz bands. More news and a complete analysis of activity will appear at a later date. For further information, watch for announcements in *CQ* and *QST*.—73 de The Toronto VHF Society ARC and see you off the moon!"

Another EME Contest Report

The following is from Dave Smith, WA6YDI:

"I missed operating the first weekend but operated the second half from Fresno, California (DM06).

"Moonrise at my location (Friday night, 2345 PST, 0745 UTC) brought several strong stations that I worked rapidly the first 45 minutes. It was a real struggle as conditions, after that, deteriorated. Conditions got so bad that I could only hear the five stations I had already worked: VE3ONT, W5UN, K5GW, I2FAK, and DL8DAT. I don't know if Faraday rotation had caused the return signal from the moon to be in the wrong polarity or if some other anomaly was the culprit, but conditions were terrible! I worked only the biggest guns that could be heard and that could hear me Saturday morning.

"By moonrise the next evening conditions had changed dramatically. There's nothing like hearing wall-to-wall signals across the 2 meter band . . . most of them weak. (So *that's* why they call it weak signal work!) Sunday morning was spent trying to copy and work stations from all over the American and European continents. Adding to the challenge were two fellow local EMEers—Mike, K6MYC, and Eric, NI6G. Both were doing an admirable job meeting the task at hand with their stations.

"By the time the Asian window opened Sunday morning, the band was in and out again . . . mostly out! I managed to work two Japanese stations before the moon sank below the horizon and my EME contesting was done.

"After the battle was over, I counted 14 QSOs with 12 multipliers for a total score of 16,800 points. Moral of the story . . . don't miss operating either contest weekend!—73 de Dave, WA6YDI."

JWØBY Schedule

The following is from Stefan Heck, JWØBY:

"The planned activity times for JWØBY in the first six months of 1995. The operating frequency is always 144.155 MHz with standard sequencing. Skeds proposals can be forwarded via VE7BQH or directly via E-mail to

YOU GET AMATEUR, SHORTWAVE, MARS, CAP AND MORE.

Versatility, performance and quality.

The Paragon II performs superbly on ham bands, shortwave, MARS, CAP and other commercial/government services. It has proven synthesizer performance, "intuitive" digital features, built-in AM transmit and unequaled Ten-Tec construction.

One-touch bandwidth selection.

Change bandwidth in any mode by hitting one button. 6 KHz AM and 2.4 KHz SSB filters are standard, and 1.8 KHz, 500 Hz and 250 Hz filters are available as options. So you get -- and pay for -- just what you need.

Jump between frequencies.

Bandstacking registers originally developed for the top-of-the-line OMNI VI let you jump between two frequencies on the same band, and give you single button band change.

Full power in any mode.

Only the Paragon II lets you run full power in any mode. Ten-Tec's virtually indestructible final's 100% duty cycle design is so rugged it doesn't require SWR foldback as other rigs do -- a big advantage for PACTOR and AMTOR digital modes.

Unequaled QSK.

The Paragon II has Ten-Tec's smooth, lightning-fast QSK that's earned reviews like "...the best you'll find in any radio" from QST and "excellent" from CQ. There's simply nothing better for the serious CW operator.

SPORT PC interface.

One of the most important advances in the Paragon II is Ten-Tec's exclusive SPORT (Serial Port Operation of Receive and Transmit) PC interface. It's the only one that lets you choose between RS-232 or 2-line operation, and it's compatible with most logging and contest software.

Ten-Tec's Paragon II is a high-performance HF transceiver and shortwave communications receiver.

We make it here. We're here when you need us.

Like all Ten-Tecs, the Paragon II is made right here in America. So you're keeping money -- and jobs-- here instead of exporting them to Japan. It also means we're right here with expert factory advice and legendary Ten-Tec service when you need us.

Just $2125 factory direct (plus shipping and handling).

With the Paragon II you get more radio for your money because Ten-Tec only sells factory direct. So you aren't paying extra for middlemen. And we're always ready to take your present Ten-Tec equipment in trade. We accept Visa, MasterCard and Discover, and are under GSA contract.

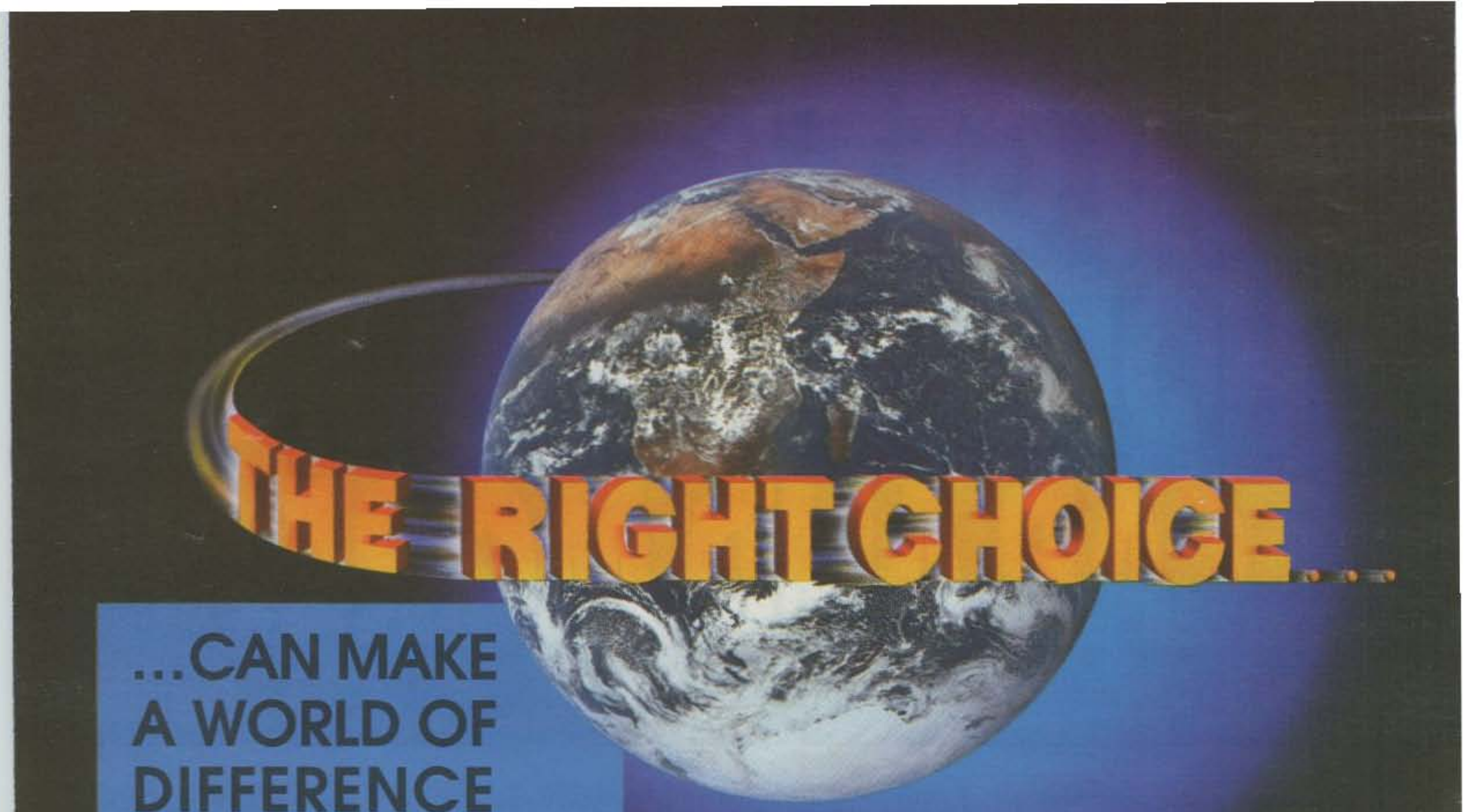
No-risk, 30-day money-back guarantee.

The Paragon II is protected by Ten-Tec's no-risk 30-day money-back guarantee. If you're not satisfied for any reason just return your rig in original condition for a full refund. All you pay is shipping and handling.

Call today: 1-800-833-7373.

Call Ten-Tec from 9:00 AM to 5:30 PM Eastern time, Monday through Friday for more information or to order. You can reach our repair department at 615-428-0364 from 8:00 AM to 4:00 PM Eastern time Monday through Friday. You can also fax us at 615-428-4483 or write us at 1185 Dolly Parton Parkway, Sevierville, TN 37862.

TEN-TEC



THE RIGHT CHOICE...

...CAN MAKE A WORLD OF DIFFERENCE

When you chose Amateur Radio, you made a commitment to a learning experience that lasts a lifetime. When you got on the air, you began to realize the astonishing feats you could accomplish. Amateur Radio has been challenging and rewarding. It's changed your world for the better and was the right choice for you.

Another choice can make your experiences even more fulfilling–membership in the American Radio Relay League. As a member, you'll receive benefits that will make a real difference:

- at-home delivery of our monthly membership journal, *QST*. Stay up-to-date on the latest Amateur Radio technology, sharpen your skills and discover aspects of our hobby you never knew existed.
- access to the ARRL "All-Risk" Ham Radio Equipment Insurance Program. Save money AND receive broader coverage than similar plans.
- sit back, relax and let the ARRL handle your overseas QSLing chores AND save money.
- participate in ARRL "Members Only" operating awards and Field Organization programs.

and MUCH MORE!

Name _____ Call _____

Street _____

City _____ State _____ Zip _____

Dues are $30 in US/$42 elsewhere (US funds). An Amateur Radio operator's license is not a membership requirement. The only qualification needed is an interest in Amateur Radio. Individuals who are age 65 or over, upon submitting one-time proof of age, may request the dues rate of $24 in the US, $36 elsewhere (US funds). Immediate relatives of a member who receives QST and reside at the same address may request family membership at $4 per year. Blind individuals may join without QST for $4 per year. If you are 21 or younger, a special rate may apply. Write to ARRL for details.

Payment Enclosed ❐

Charge to MC, VISA, AMEX, Discover No. _____

Expiration Date _____

Cardholder Name _____

Cardholder Signature _____

CIRCLE 151 ON READER SERVICE CARD

The American Radio Relay League

225 Main Street Newington, CT 06111 (203) 666-1541 CQ2

MAKE THE ARRL YOUR MEMBERSHIP ORGANIZATION. **IT'S THE RIGHT CHOICE.** JOIN TODAY.

HF for only $549

HOW IT ALL STARTED

We wanted to offer the most affordable HF rig in the industry and still provide real performance for even the most experienced ham. In recent years, many hams requested a "back to basics" transceiver that was simple to use. We reviewed all the latest design techniques, selected the best concepts from the 20 rigs we designed over these 25 years and asked 500 hams across the country for their ideas.

WE CALL IT THE SCOUT

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.

HERE'S HOW IT'S USED

MOBILE

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.

PORTABLE

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

NEW HAMS

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.

OLD TIMERS

Operators with years of experience and a shack full of expensive HF gear also buy the SCOUT. It's refreshing to many who say "It takes 5 minutes to learn and without all the complicated features, there is only one thing to do with a SCOUT, work someone!" Experienced hams call us constantly to report "I can't believe this receiver, it outperforms my $1400 synthesized rig".

CALL TODAY:
1-800-833-7373
(U.S. & Canada)

Call Ten-Tec from 9:00 AM to 5:30 PM Eastern time, Monday through Friday for more information or to order. You can reach our repair department at 615-428-0364 from 8:00 AM to 4:00 PM. You can also FAX at 615-428-4483 or write us at 1185 Dolly Parton Parkway, Sevierville, TN 37862.

ATTENTION QRP ENTHUSIASTS

The SCOUT has a little brother, the ARGO 556. It is identical to the SCOUT without the 50 watt final. adjustable 1-5 watts output. TX-2 Amps, RX-.6 Amps.
Only $489*

- "SYNCHRO-LOCK" software keeps VFO virtually drift free regardless of temperature variation.
- SSB and CW 50 Watts Output Adjustable To 5 Watts
- Runs Off 12-14 VDC, TX -10 Amps, RX -.6 Amps
- Receive Offset Tuning
- Built-in Iambic Keyer with Legendary QSK. Speed adjustable on front and shown in display.

$549* Includes one band module of your choice

$29* Each additional band module

SCOUT ACCESSORIES:

MODEL		PRICE*
296	Mobile Bracket	$15.00
297	Noise Blanker	$19.50
937	11 Amp Power Supply	$79.00
938	Tiny Switching Supply (Only 3 lbs.!)	$95.00
700C	Hand Mike	$39.95
607	Weighed Key Paddle	$39.00
291	Antenna Tuner	$89.00

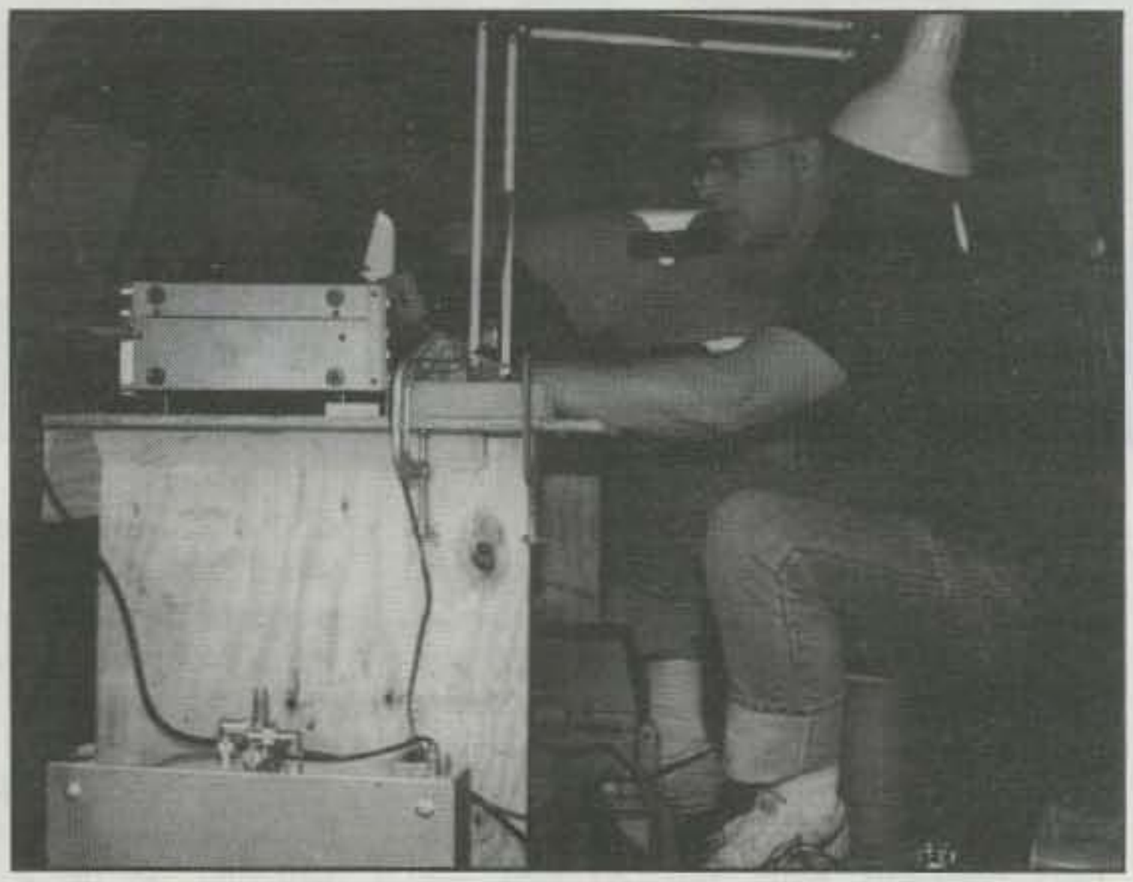
VISA, MC, DISCOVER
*Plus shipping and handling; call toll-free for charges.

TEN-TEC

MADE IN USA

Introducing TKits
A new division of Ten-Tec
Call 615-453-7172
to request your kit catalog

The EN15 crew: Front row—Leland Helgerson, WBØMLL; Mr. Harold Torness, originator of the Nicollet Memorial Tower project; Rich Westerberg, NØHJZ; and Bruce Richardson, KE9QT. Back row—Donn Baker, WA2VOI; John Palmer, WAØNTT; Ron Bergantzel, KAØRYT; and Phil Jorgerson, NØNOG. (Photo courtesy WA2VOI)



John Palmer, WAØNTT, works on 1296 MHz from the parking lot. (Photo courtesy WA2VOI)

The Nicollet Memorial Tower ready for operation during the 1994 Perseids meteor shower. From the left, 222 MHz, 2 and 6 meters, 20 meter rotatable dipole, and satellite antennas. The 80 meter dipole is strung from the top of the tower to the fence line to the extreme left of the photo. The 2304 MHz station was operated from the top of the tower. The 432 MHz and 1296 MHz stations were operated from the minivan in the parking lot to the right. (Photo courtesy WA2VOI)

stefan@eiscat.no. For the weekends certain periods have been reserved for random CQ on 144.155 MHz.

Jan. 17, 0400–0700 UTC (US only) + 1600–2400 UTC; Jan. 18, 0430–0700 UTC (US only) + 1600–2400 UTC; Jan. 19, 0530–0700 UTC (US only) + 1800–2400 UTC; Jan.. 20, 0000–0330 UTC; Jan. 21, 0130–0430 UTC, random CQ 0300–0400 UTC; Jan. 22, 0230–0500 UTC, random CQ 0300–0400 UTC.

Feb. 3, 1300–1600 UTC; Feb. 4, 0700–1630 UTC + 1930–2200 UTC, random CQ 1300–1600 UTC; Feb. 5, 0700–1730 UTC + 2000–2400 UTC (US only), random CQ 1500–1700 UTC; Feb. 12, 0100–2300 UTC, random CQ 0200–0400 UTC + 2000–2300 UTC; Feb. 13, 0200–0700 UTC + 1600–2400 UTC; Feb. 14, 0230–0700 UTC + 1600–2400 UTC; Feb. 15, 0330–0700 UTC + 1600–2400 UTC; Feb. 16, 0000–0100 UTC + 0400–0700 UTC.

Apr. 9, 0000–2000 UTC, random CQ 1700–2000 UTC; Apr. 10, 1500–2100 UTC; Apr. 11, 0000–0200 UTC + 1500–2200 UTC; May 6, 0000–1800 UTC, random CQ 1500–1800 UTC; May 7, 0000–1900 UTC + 2200–2400 UTC, random CQ 1600–1900 UTC; June 3, 0000–1700 UTC + 1930–2400 UTC, random CQ 1400–1700 UTC + 2000–2200 UTC; June 4, 0700–1800 UTC + 2030–2400 UTC, random CQ 1600–1800 UTC + 2100–2300 UTC; June 5, 1500–1900 UT.

"Please note that there might be a high noise level for low elevations from AZ 280–320 degrees. For the second quarter of 1995 mainly weekends are listed. Those who would like to work JWØBY are advised to try as soon as possible. You never know how long the antennas will survive in the harsh arctic weather. QSL only direct to Stefan Heck, Floyvegen 25, N-9020 Tromsdalen, Norway. Good luck!—73 de Stefan, JWØBY."

Stefan can also be reached at phone +47-77692171; FAX +47-77692360.

5760 MHz DX Record—The Rest of The Story

Arriving after last month's column was sent in was this description of what happened on the Texas end the evening that Al Ward, WB5LUA, and Ron Stefanskie, W9ZIH, made their record-breaking 5.7 GHz QSO.

"My wife and I returned home late Friday night, Nov. 11, to a message from Ron, W9ZIH, saying that the bands were open from Illinois to the Gulf Coast. I got on 432.1 around 11 PM local to find W9ZIH coming in 59 on 432. Having already worked Ron on all bands through 3456 MHz in the past, it was decided to go directly to 5760 MHz for a stab at the record.

"Several attempts were made, but luck was not going to be had until the following morning. We tried up until 2:30 in the morning and then called it quits. The following morning we tried it again, but again no luck.

"Then Ron said, 'Let me call Roger, WB9OJR, and let him know the band is open.' I had already called AA5C and Greg was ready to go. Roger is closer to Texas, as he is in EN51.

"Between AA5C and myself, we must have spent a couple of hours sending dashes and

calls up towards Illinois, when all of a sudden some signals appeared at WB9OJR. Roger was hearing WB5LUA's 90 watt TWTA! Roger knew he was hearing me, as I had previously told Roger that my TWT did have some hum on the signal. Roger proceeded to copy calls from me and I responded with calls and reports. My 'R's to Roger took longer, as Roger was having difficulty copying my signal due to the hum when it was close to the noise. Finally at 1350 UTC on Nov. 12 WB9OJR and WB5LUA made a contact on 5760.1 MHz, establishing a new 5760 MHz record at 633 miles. After we completed, AA5C and WB9OJR heard each other and made contact at 1645 UTC for a distance of 630 miles.

"WB5LUA runs 90 watts to a 5 ft dish at 65 feet fed with about 80 feet of elliptical waveguide. AA5C runs 25 watts to a 30 inch dish at 55 feet. After completion with WB90JR, Greg and I decided that we were bound and determined to work W9ZIH. Both Greg and I began sending series of dashes within a few kHz of 5760.1 MHz in hopes that Ron could hear us. Ron had already had partial copy from AA5C when Greg was working Roger, so we were very optimistic.

"After Roger had difficulty copying my high-power TWT with the hum, I decided to fire up an old standby Siemens TWT which ran a mighty 18 watts output into the waveguide. Both Greg and I were anxiously waiting for Ron to identify one of our signals once again. We waited on 432.1 MHz for a reply. Then it came; Ron said he was hearing WB5LUA. I went back with calls and then stood by. There he was!

"Talk about exciting. This was! We completed a contact at 1652 UTC for a new DX record of 738 miles. At this point, AA5C was copying W9ZIH, so with some sequencing they were able complete a contact at 1706 UTC at a distance of 730 miles. All QSOs were made on two-way CW. Other stations were active that day. N9IYV tried several times with AA5C,, but no luck was had. I had a 6 PM flight to Florida, so I was busy getting ready for that. This was a very exciting day for Greg, Ron, Roger, and me. In addition, I worked WB9OJR for a new grid on 3456 MHz and we had a repeat QSO on 2304 MHz. We missed working on the last band opening because I had a relay problem.

"It is really nice to catch the band open and to know that there are people active on the microwave bands who are ready to go. It is also comforting to know that our equipment, which has only worked out to 250 miles under normal conditions, can actually work when the band opens up! And finally it is pretty obvious that in order to make the contacts, both stations must be willing to ride the up and down band conditions. Having one station always transmitting in order to catch the peak is very important. Peaks may be 10 to 30 minutes apart. Note that the first 5760 QSO was made at 1410 UTC after several hours of trying, and the last QSO was made at 1706 UTC!—73 de Al Ward, WB5LUA."

Nicollet Memorial Tower Grid Expedition

Perhaps one of the most successful grid expeditions of last year was the 1994 *Perseids* Meteor Shower EN15 Grid Expedition to Nicollet Memorial Tower, Sisseton, South Dakota. The following was written by Donn Baker, WA2VOI:

"The Nicollet Memorial Tower, approximately 5 miles west of Sisseton, South Dakota, is dedicated to Joseph Nicollet, a French astronomer and map-maker. In 1837 the U.S. Government commissioned him to map the area between the Mississippi and Missouri rivers. In an expedition that lasted two years, Nicollet made the astronomical and barometric observations necessary for mapping. Nicollet's map was unequaled in accuracy until the 20th century, and remains today the only record of many original place names used by the Native American peoples of the area.

"The Tower site includes the 75 foot observation tower and an Interpretive Center located on three acres approximately two-thirds of the way up the eastern side of the Coteau Des Prairies in northeastern South Dakota. Its altitude of 1675 feet places it 600 feet above average terrain to east and southeast. The visual horizon is approximately 35 miles away when looking from the NNW through E to SSE. The final rise of the Coteau to the west raises the horizon line by some 15 to 20 degrees from the SSE through W to the NNW. The Tower is located close to the center of EN15 (45° 39' N; 97° 08' W, EN15kp).

"We had received permission to use a portion of a small room used for presentation of videos, the top platform of the Tower, the parking lot, which looks east, and power.

"Our caravan—Rich Westerberg, NØHJZ; John Palmer, WAØNTT; Ron Bergantzel, KAØRYT; Phil Jorgensen, NØNOG; Leland Helgerson, WBØMLL; and Donn Baker, WA2VOI—arrived at Sisseton about noon on Wednesday, 10 August to cool temperatures and a light drizzle. As we climbed the several hundred feet up the Coteau Des Prairies to the Nicollet Tower site, we met the ceiling and drove the last mile or so in light fog. (Bruce Richardson, KE9QT, had not been able to leave Milwaukee until 1000, and had at least six hours additional driving to make it to the site. He *said* it was due to his schedule, but he *did* miss all the setup work. Hi.)

"As we checked in with the people at the site, we received our only setback of the expedition. Percy Aadland, WBØBZD, who was to have been our guide and interlace to the site was not there and wouldn't be . . . he was hospitalized for a heart attack suffered the day before. (I'm happy to report that he is doing well, and returned home to recuperate on the 14th.) Mr. Torness was very apologetic, and assured us that if there any thing we wanted or needed, we should call him.

"By the time we actually began setup, the rain had stopped, and the fog had lifted above our altitude, but it was still cool and overcast. We decided to place 6 meters and 2 meters, along with the HF and satellite stations, inside the Interpretive Center. We very quickly overflowed the "corner of the room" we had been given.

"'Oh, that's OK,' the Tower staff said. 'We'll just move the video out here to the main room. That way we won't bother you.' The cooperation and helpful attitude of the Center Staff was quite remarkable, and our operation would not have been as successful without it.

"With extra space available, we moved 222 MHz inside also. Because of interaction and overload, 432 MHz and 1296 MHz were placed in WA2VOI's rover mini-van in the parking lot, and AC power run from the building.

"Our station lineups were: 50 MHz, Kenwood TS-60, running 90 watts into Cushcraft 5-element Yagi at about 20 feet; 144 MHz, Kenwood TR-751A with a TE Systems 350 watt brick and preamp to a modified Cushcraft 4218XL long-boom Yagi at 25 feet; 222 MHz, Yaesu FT-736R with a Mirage 120 watt brick to 16-element K1FO-design Yagi at 15 feet; 432 MHz, ICOM-451A w/ARR GaAs preamp and TE Systems 175 watt brick feeding a pair of Cushcraft 424Bs with K1FO modifications; the antennas were centered at 20 feet; 903 MHz, Down East Microwave no-tune transverter driving a 100 watt homebrew amplifier and a DEM 33-element loop Yagi at 10 feet, all loaned to us by WA9O; 1296 MHz, Yaesu FT-736R (10 watts) to a homebrew W1JR-design 45-element loop Yagi at 10 feet; 2304 MHz, Down East Microwave no-tune transverter, with a 5 watt homebrew amplifier, feeding a DEM 45 element loop Yagi; the station was installed at the top of the Nicollet Tower (75 feet); and Satellite, Yaesu FT-736R with a Mirage 120w brick, feeding KLM antennas (435-40CX & 2M-22C) at about 12 feet. All antennas except the HF dipoles were fed with 1/2 inch hardline. The HF liaison station was a Yaesu FT-767 into dipoles on both 80 and 20 meters.

"By late afternoon, all stations except 903 MHz were up and running. (KE9QT was bringing 903 MHz, and wouldn't arrive until later in the evening.) To our great pleasure, 6 meters was open into the southeastern US. Activity was so good that it took two to operate . . . one working stations and one just logging. A little less than one half of our total QSOs were on 6 meters between 2350Z August 10th and 0222Z August 11th. One hundred and seventy QSOs in two hours and 30 minutes!

"Our first scheduled tropo window" was 8 to 10 PM CDT on the 10th. Conditions were OK, but nothing special for this period, other than the opening on 6 meters. We were able to work a number of Upper Midwest stations, and a few Central States stations who were looking for us on 6 meters through 432 MHz, and 1296 MHz. Our 903 MHz gear had not arrived yet, and plans were for 2304 MHz into EN17 (NTØW) and EN34/EN35 (WAØBWE and KØFQA) were for morning or Friday evening. A few meteor scatter skeds were run during the early morning of 11 August, with fair success.

"KELO-TV, from Watertown, SD sent a news crew to the site on Thursday afternoon. They spent more than an hour interviewing Bruce, KE9QT, and getting an explanation what we were doing, and why. KELO is one of several related stations that serve eastern South Dakota, and the couple of minutes of story we received on the evening news was good publicity for both us and the Nicollet Tower.

"Friday, *The Sisseton Courier* sent a reporter out. Again, we explained what and why, but it wasn't until we showed her some video we had shot of one of the better 'burns' the previous night . . . close to two minutes long . . . that she 'understood' why we were there. We ended up with a very nice story and two pictures on the front page of the *Courier*.

"Thursday evening was our busiest time. Bruce, KE9QT, and Rich, NØHJZ, mounted a combined Rover operation to EN05/EN06, located about a 90-minute drive to the north and west. Using NØHJZ, the guys operated on 2m, 222 MHz, 432 MHz, 903 MHz, and 1296 MHz to activate those two 'rare grids' for a number of stations in the upper midwest. Conditions were just so so, but still good enough to log 87 QSOs from the two grids. The best DX for the

At OZ1UM's portable QTH OZ2LLP adjusts the 47 GHz dish and OZ8AO exlains the operation to a couple of visitors to the Danish Microwave Activity Week operation while OZ1UM junior is relaxing. (Photo courtesy OZ1UM)

OZ9ZI's portable QTH with crew and lighthouse in the background as seen over 10 GHz ATV at OZ1UM. (Photo courtesy OZ1UM)

Rovers was about 400 miles to the east (WA9LWJ in EN54) and 300 miles to the west (W7XU/7 in DN74).

"Starting with the evening tropo window at 0100Z (8PM CDT) until the end of the morning tropo window at 1300Z (8AM CDT, the group at the Tower had all stations operating. All of the available 1/2 hour schedules for 2 meters were occupied, with a heavy schedule for 222 MHz. A half dozen or so schedules for 6 meters and 432 MHz filled out the night.

"Generally, conditions did not appear to be all that great. Two meter schedules were not that easy to complete, although some were almost effortless. Most of the 222 MHz schedules were not completed, and none of the 432 MHz schedules were able to be completed. (During the day on Friday, the keyer for the high-speed 432 MHz schedules died. There were still two schedules for 432 MHz that evening which we were not able to make.)

"While in general completions were difficult, there were several that were spectacular. At least three burns on 2 meters exceeded one minute, with one lasting close to three full minutes. During these long burns, schedules were easily completed, and as were 'randoms' on the same burn. The record was four completions on a single burn. After schedules were completed, we picked up a number of 'randoms' from the net on 3.818 MHz, and had about the same level of success with these as with the pre-arranged tries. On 222 MHz, the longest burn noted was about 18 seconds, in the 24th minute of a schedule with WB4DBB in FM07. We completed easily with 10 over 9 signals at our end. Interestingly, only one long burn was noted on 2 meters and 222 MHz at the same time. Overall, our schedule completion rate was 51%; it was best on 2 meters, lower on 222 MHz.

"The Friday evening tropo window was a little piece of 'tropo-heaven.' We were located near the western end of a strong cold front sagging down over the Great Lakes. This weather gave us both a brilliant lightning show to the NNE and excellent propagation conditions as far east as Michigan, Indiana, and western Ohio. Signal reports of '20-over' were the rule up through 432 MHz both to and from stations in these areas. One QSO on 222 MHz FM into the Minneapolis-St. Paul area was made with KAØPQW using a 1 1/2 watt hand-held and a 'rubber-ducky' antenna at his end. Signals were full quieting both ways!

"It was during this tropo window that the first (?) South Dakota 2304 MHz contacts were made with WAØBWE (EN34), KØFQA (EN35), and NTØV (EN17), with two of the three QSOs being in the 200-mile (320 km) range.

"After the tropo-window, we went back to our meteor skeds. The number of burns was very noticeably less than the night before, and completions were difficult. By about 0630 UTC, the thunderstorms were getting close to the site, and we felt it was necessary to start shutting down operations. Most of the antennas were outside of the area that would be protected by the Nicollet Tower itself, and we simply didn't want to take the risk of a lightning strike. We disconnected all the feed lines and rotor control cables, and had moved the ends outside by about 0700. We secured the site, and got the first real sleep we'd had since arriving on Wednesday.

"By 1300 we had 6 and 2 meters on the air again, but conditions were very poor. By 1500, we realized that it was over, and decided to pack up and head for home. We had accomplished what we had started out to do, plus a little more, and had enjoyed ourselves in the process. For 52-plus hours of continuous operation, we made over 400 QSOs on all seven VHF/UHF bands, and completed 64 meteor-scatter QSOs (completing 51% of pre-arranged skeds). Not bad, but it does give us something to shoot for the next time."

Danish Microwave Activity Week 1994

The following report on last year's Danish Microwave Activity Week is from Steen Gruby, OZ9ZI:

"The Danish Microwave Activity Week 1994

is now over, so here is a report. As indicated in the report from 1993, our aim was to manufacture a number of transverters for 47 GHz.

"The name for the project had already been given to us last year by Radio Communication Microwave's column editor Mike Dixon, G3PFR —i.e., JIT 1-47, in which JIT stands for Just In Time, which was the perfect name for it as we worked like mad right up to the last minute to be ready for the Microwave Activity Week. In particular we had underestimated the task of gluing the mixer diodes, and only the purchase of Russian stereo-microscopes solved the problems.

"Furthermore, last year we had had to ascertain that our waveguide relays for the 24 GHz transverter LMT 1-24 had too poor cross-talk attenuation, as a result of which there was yet another task to be performed before this year's Activity Week.

"A number of relays (25) were manufactured and built into LMT 1-24. The new relays are made of brass, and the real improvement is that 1/4-wavelength notches have been cut in the rotor so that they are located between the active ports. In the new relay the rotor is suspended on ball bearings, and the drive for the servo has been designed with a notched belt, which has resulted in fantastic precision in the relay.

"The cross-talk attenuation in the new relay is on the other side of 50 dB. After the modification all LMT 1-24s were measured to ensure that everything was in order for the Activity Week.

"Before the Activity Week we succeeded in completing the construction of 20 JIT 1-47s so that all in the group are now QRV, also on 47 GHz.

"The transverter consists of DB6NT's 12 GHz injection chain, DB6NT's doubler/amplifier 12–24 GHz and DB6NT's subharmonic mixer with two antiparallel diodes. The aerials are 25 cm PROCOM dishes with a subreflector feed system. The output from the transverter is approximately 100 microwatt, and the noise figure of the receiver is around 10–15 dB.

"During the Danish Microwave Activity Week we were thus to be QRV on 10, 24, and 47 GHz in general and on 76 and 145 GHz with a limited number of stations.

"In this connection it should be mentioned that in the course of the winter OZ1UM manufactured two SSB transverters for 76 GHz with approximately –3 and –6 dBm output, respectively, and a noise figure of approximately 5.5–6 dB as well as two transverters for 145 GHz with –7 and –9 dBm output, and a noise figure of 13 dB, also designed for SSB.

"The diodes used for 76 and 145 GHz are Russian diodes of the 3A643E-3 type made by the Salut plants. The diodes have the following data: ft = 2500 GHz, ct = 0. 04 pF and Pdis = 100 mW.

"DB6NT, DF9LN, and DCØDA also brought stations for the highest bands.

"How did it go?

"Before the Danish GHz Activity Week all those who participated in the JIT 1-47 project were out to test the production of the winter. On this occasion all participants established a QSO on 47 GHz over a distance of 31 km (19.25 miles), which is not so bad for the first QSO on this band.

"On the same occasion a number of the participants had serious problems finding the direction when the output was low and the apex angle of the aerial quite small. I honestly be-

lieve that some of the participants were given quite a challenge.

"OZ1UM's ATV equipment was tested over the same distance with excellent results and much amusement when the co-amateurs were to act as TV stars. *(Editor's note: the ATV report appears below.)*

"The Clerk of the Weather was definitely not with us as we had almost the worst conditions to work under at a Danish Microwave Activity Week so far. In particular a very high wind made it almost impossible to set the dishes just somewhat correctly. In addition, the wind cost us a number of dishes when the stations suddenly fell over.

"Implementing a QSO on 10 GHz over water is not difficult, so as usual most participants achieved connection here.

"The results were more depressing with 24 GHz on which only the nearest achieved a QSO. ODX on 24 GHz were OZ/ON6UG and OZ1UM at 90 km (56 miles).

"The 47 GHz operation was nearly chaotic, as in addition to the poor weather, there was also a very low output and a very small apex angle on the dish. The fact that the dish has a good gain is another matter. Gradually, as the participants got used to the conditions on 47 GHz, they started to achieve connections.

"ODX on 47 GHz was 38 km (23.6 miles) between OZ/PAØEHG (JO57FJ) and OZ9ZI (JO57HR).

"On 76 GHz OZ1UM and DB6NT SSB achieved QSO over a distance of 11 km (6.8 miles). The connection was achieved on Friday 17.06.1994 with the reports 5-2 and 5-6. The connection is an improvement of the Danish record from 8.8 km to 11 km (5.5 to 6.8 miles).

"On 145 GHz on the same day OZ1UM and DB6NT implemented an SSB QSO over a distance of 1.1 km (0.7 miles), the reports were 5-6 both ways. As far as we know, the connection is the first SSB QSO on 145 GHz.

"Because of the bad weather the team in Skagen decided to move to Ebeltoft, where we measured dishes and equipment together with ON6UG. There is a difference of 1 dB in the measurements of a PROCOM 25 cm dish for 47 GHz with a feed system as a 'crook' and a feed system with a sub-reflector—in the latter's favor. The difference may be due to many factors, and, in principle, the two feed systems must be regarded as equally good. Some measurements with solar noise were also made in the few periods in which we could see the sun.

"LMT 1-24 indicates 1 dB solar noise. Compared with DF9LN's new 24 GHz transverter in which much work has gone into the receiver, Uwe's transverter can indicate 3 dB solar noise.

"Our old 10 GHz Solectra transceiver indicates approximately 3 dB solar noise, which is quite good.

"The solar noise measurements also gave us the opportunity to optimize the feed point of the 24 GHz dishes. In fairness, it should be mentioned that only minor improvements could be achieved.

"On Friday 17 June 1994 we all met in Ebeltoft for a conclusion, which, as usual, was very pleasant and lasted into the early hours of the morning.

"We would like to thank all participants, in particular those from DL, ON, and PA who had come all the way to Denmark. In all 26 Danes, three Germans, two Dutch, and one Belgium amateurs participated in the tests. We look forward to seeing you again next year, when we will try to achieve something special, as it will be the 10th anniversary of the activities which led to the Danish Microwave Activity Week. And let us see whether we can upgrade the whole group to 76 GHz.

"It is good to have a target! On behalf of the GHz North Zealand Work Group and PROCOM's Amateur Radio Club, 73 de Steen Gruby, OZ9ZI."

10 GHz ATV—Danish Style

The following report from Steen Gruby, OZ9ZI, reports on 10 GHz ATV activity during their Microwave Activity week held during the week of 4 July 1994:

"During the Danish Microwave Activity Week in July 1994 we made some of the first Danish tests with ATV on 10 GHz. As previously described, this resulted in a QSO over a distance of 90 km (56 miles) from Spodsbjerg to Trehoje near Ebeltoft.

"Prior to this, attempts had been made to establish connection from Skagen to Spodsbjerg, but in vain.

"On 4 July 1994 OZ1UM and the undersigned made a new attempt at establishing connection from Skagen to Spodsbjerg, this time with considerably better luck.

"As 'talk back' we used 10 GHz SSB where the team at Spodsbjerg had to work without a dish—i.e., with an open waveguide as OZ1UM had left the dish at home. Nevertheless, the SSB connection was 5-6 both ways, so there was nothing wrong with the conditions.

"Connection with ATV was first established from Spodsbjerg to Skagen at approximately 2030 local time. To begin with there was much QSB on the signals, but in the course of half an hour conditions became more stable. At approximately 2100 we changed directions and transmitted pictures from Skagen to Spodsbjerg. The reports were 5-7-5 (?) both ways.

"The following equipment was used for the tests. Transmitter: frequency-modulated DSO directly on the frequency (10.400 GHz), followed by 0.5 watt PA. Picture/sound separation: 5.5 MHz. Bandwidth: 16 MHz. Receiver: Standard satellite down-converter adapted to our purpose, NF approx 1 dB. Aerial: PROCOM 50-cm dish, gain approx. 29 dB.

"Sitting in the dunes at Skagen watching OZ1UM, OZ3VC, OZ5DI, and OZ1JLA appear on ATV with Spodsbjerg lighthouse in the background was a very fascinating experience—and in colour too.

"Unfortunately, my photographs of the pictures from Spodsbjerg suffer from the very bright light in Skagen and the lack of something with which to cover the monitor, but it is possible to use the photographs as 'valid proof.'—73 de Steen Gruby, OZ9ZI."

Current Conference

Aurora '95: The 12th annual winter VHF gathering, Aurora '95, will be held on Saturday, 11 February 1995. As it was last year, it will again be in conjunction with the Midwinter Madness hamfest. Full details of Aurora '95 were to have been announced in a mailing in early January.

For those of you who have not previously attended, the conference starts a formal program at 3 PM, consisting of several short talks on an assortment of VHF/UHF/microwave topics. After a break for dinner, they will have a

small flea market, another talk or slide show, and lots of ragchewing.

It will be a great opportunity to meet others who are active on VHF SSB/CW. There will also be door prizes, and hopefully VUCC award checking.

For more information, contact Paul Husby, WØUC, 1462 Midway Parkway, St. Paul, MN 55108, or call 612-642-1559.

Coming Conferences

Listed under September last month was the announcement of the Microwave Update conference. The dates have now been set and they are 27–29 October at the La Quinta Inn in Arlington, Texas. For more information, contact Kent Britain, WA5VJB, at 214-660-2810.

Are You On Packet?

Steve Morgan, WA8QNR, is compiling a list of weak-signal operators who also are on packet. He would like for you to send him a message with the following information: Name, call, grid locator, bands operated, and packet address. He states that he will send a completed list to all who respond.

And Finally . . .

February is the month for lovers. It got that reputation because of Valentine's Day. Checking the calendar, I notice that there are no VHF Plus events scheduled for that day, nor for the following weekend.

It is my suggestion that you make time for the special person in your life, that person who puts up with you while you play on the radio. Spend the evening with that "significant other" in your life.

You say that you don't have one of those special people? Well, your job is to go to a senior citizens' center or a children's hospital and find something worthwhile to do on the evening of that special day. I guarantee that you will find that activity very rewarding, maybe even more rewarding than completing your WAS on a VHF band.

You don't think I know what I'm talking about? Well, this is being written in mid-December and your editor spent the evening last night in a red suit and white beard. Let me tell you, it was *very* rewarding.

Now go out and find your reward!

Thanks again for your wonderful support of this column. I have been barely able to scratch the surface of all the material you sent me this past month. Just because you didn't see yours in this column, please don't fret. It may just show up when you least expect it. So keep yours coming. You can send it to the address at the beginning of the column, via my FAX 405-528-0746, or the Internet 72124.2734@compuserve.com. You can even call me at 405-528-6625 and tell me about it.

One more thing: Thanks again to all of you who continue to tell me that my brother, Bill, is in your thoughts and prayers. We Lynches are together in battling the cancer, and knowing that you care makes a tremendous difference to us.

Until next month . . .

73, Joe, N6CL

WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Bugged by QRM and QRN? Try DSP!

As briefly mentioned in last month's column, a relatively new interference-reducing concept known as Digital Signal Processing has become quite popular during recent months. My previous discussion did not get into specific details of DSP, however, so this month's column takes a closer look at this rapidly growing technology. Understand I am presenting a plain-language explanation of what DSP is and how it can be useful to you; this is not a model versus model comparison (I found all of them delightful). Also understand this discussion will highlight only "add-on" units. I use the term "add-on" because various forms, adaptations, and applications of DSP are found today in everything from high-end audio systems to deluxe top-of-the-line transceivers. In the latter case, "internal DSP" (like AF Slope Tuning in Kenwood's TS-950) is quite good, but it is only one of several features included in "add-on" units. Some examples of additional features are automatic tone-seeking notch filters, reduction of band and power line noise, and compensation for reduced volume when using ultra-narrow CW bandwidths.

Although DSP handles signals at their audio level rather than at a transceiver's IF level, it works remarkably well. In fact, it often provides that extra edge needed to copy stations buried in noise and/or QRM. There is a trade-off of reduced audio quality when using its ultra-narrow bandwidths on SSB, but that's expected.

DSP: What It Is and How It Works

One initially might assume Digital Signal Processing uses tunable digital audio filters to remove adjacent-frequency QRM, but such is not the case. In fact, traditional filtering is not even used. Everything is converted to numbers, and all functions are handled as mathematical computations. Signals and noise are measured according to correlations, and correlations falling outside of operator-selected parameters are simply discarded from computations. Far out, eh?

Martin F. Jue, K5FLU, and I recently discussed Digital Signal Processing, and his viewpoint warrants quoting at this point: "The way DSP works is so different from the way we normally think of filters working that it is difficult to visualize. DSP filters work by taking samples of the audio input at given instants of time and converting those samples into digital numbers. The DSP's processor then computes the output in near real time from the filter's input/output transfer function (the mathematical description of the filter's action). The digital output is then converted back to audio."

4941 Scenic View Drive, Birmingham, AL 35210

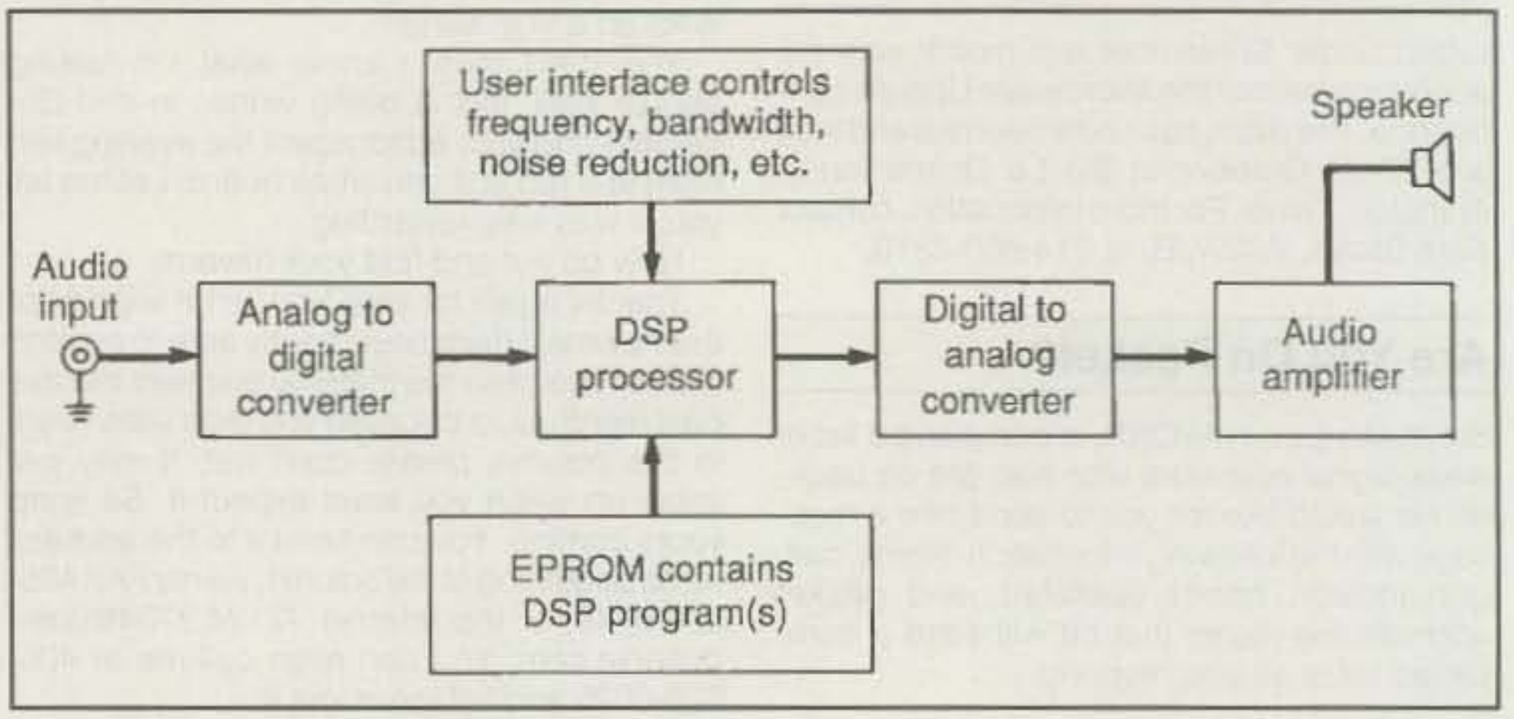


Fig. 1– Generic block diagram of a DSP unit. (Diagram courtesy Martin Jue, K5FLU)

In other words, a DSP unit is like a miniature yet powerful computer with a specially-made CPU chip. Its input comes from your rig's speaker socket rather than from a keyboard, its operating programs are on EPROM rather than on disk, and its output goes to a speaker (or earphones) rather than a video monitor or printer. The results are super-steep skirted passbands (there are no capacitor-resistor lags), no ringing, the ability to subtract band noises, and in the case of MFJ's model 784, the ability to even memorize favorite "filter" selections.

As further clarification, the block diagram of a generic DSP unit is shown in fig. 1. Incoming audio is first converted to an endless string of numbers. Computations then are performed by the DSP processor using various algorithms for bandwidth, center frequency, noise reduction, etc. These algorithms are contained in the DSP's program/software (EPROM) and selected by the user. The final mathematical tallies are then converted back to analog (sound), amplified, and output to a speaker or earphones.

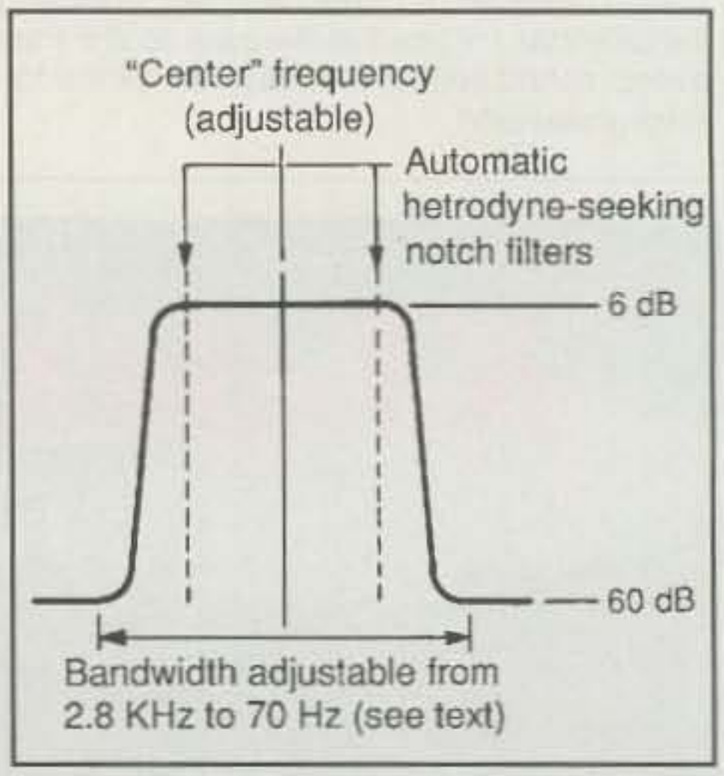


Fig. 2– Typical audio response curve of a DSP unit. Note ultra-steep skirts that can drop off-frequency signals as if they hit a brick wall. Center frequency is also adjustable, plus automatic heterodyne-seeking notch filters can remove "tuner-uppers."

Since DSP units employ numbers and high-speed computing rather than tuned circuits, bandpass curves become exceptionally steep skirted and very selective (see fig. 2). A bandpass width and its center (or off-center) frequency are also adjustable. Indeed, CW signals only 70 or 80 Hz apart can be separated as if each were sitting on a frequency by itself.

Additionally, several DSP units include a couple of heterodyne-seeking and needle-sharp notches that can be unleashed on a bandpass of 1 kHz or wider for removing QRM in a DX pile-up. What happens when such "tune up interference" is within a transceiver's IF bandwidth and causes the rig's AGC to fluctuate? Audio level AGC in (most) DSPs compensates and holds the output volume within tolerable limits. Finally, and probably most significant, is the ability to remove band and power-line noises. This feature is worth the cost of a DSP unit in itself, but it may not be available in all models. Study ads and specs very closely, and then select a model best suited to your needs.

DSP Versus Narrow CW Or SSB Filters

In light of the previous discussion, you might ask whether investing in a transceiver's optional IF filter(s) or an add-on DSP unit is the best bet. Since each can help the other, I say go first class and get both! Most of us are limited in budget, however, so here are some prime points worthy of consideration.

Optional filters fit inside your transceiver and do not require any adjustments. Just punch them up as desired. Having everything in one cabinet also makes moving and setting up a rig easy. Conversely, narrow SSB filters are not available for all transceivers, and finding one sharper than 2.1 kHz can be as challenging as installing it. Narrow CW filters tend to introduce "ringing," plus they usually produce a noticeable drop in signal level. Many times band noises mask out weak signals when narrow filters are called into use.

DSP units can be moved between transceivers, and they are easily connected to a new transceiver when upgrading your station. An SSB bandwidth of 2.1, 1.8, 1.5, or even 1.0 kHz can be selected with DSP. Audio may sound muffled or mushy, but at least you can hear weak DX in pile-ups! You will also need to tweak DSP controls rather than just pressing it "on" like an IF filter, however. DSP really shines on CW, as it can achieve ultra-narrow bandwidths without ringing, and the DSP's built-in audio amplifier can even raise a signal's volume level when bandwidth is narrowed. Finally, DSP's extra benefits of noise reduction and automatic heterodyne nulling are functions you cannot get in a rig's optional IF filter. And yes, DSP works well with all rigs, from Kenwood's TS-50 to Yaesu's FT-1000 (and every transceiver in between).

On the flip side of the coin, operators using a narrow filter or a DSP unit should remember that not everyone is equally equipped. Do not slide within 200 Hz of an ongoing QSO, assume they cannot

Fig. 3– The JPS Communications Model NIR–10 DSP. Unit has switch selection of three bandwidths, noise reduction, and hetrodyne notching.

Fig. 4– The JPS Communications Model NRF–7 includes switch selection of numerous bandwidths, giving the operator vast flexibility.

hear you because you cannot hear them, and start calling CQ. Switch that DSP unit or narrow CW filter out-of-line and listen first! Modern technology is no substitute for old-fashioned consideration!

The DSP Market

To the best of my knowledge, four companies are making DSP units at the present time. Some information and general facts on each follow.

The first company to produce a DSP unit for amateur radio was JPS Communications, Inc. (Box 97757, Raleigh, NC 27624-7757, telephone 919-7901-1011). Their initial unit (the NIR-10 shown in fig. 3) features three selectable bandwidths, random noise reduction, and auto heterodyne notching on some modes. Additional JPS units include the NRF-7 shown in fig. 4 (similar to the NIR-10, but more bandwidth selections), NF-60 (auto heterodyne notching), the NRT-1 (random noise and tone removal), and the SSTV-1 (sync and video filter for SSTV). The NRF-7 and NIR-10, incidentally, were reviewed by columnist Paul Carr, N4PC, in the July 1994 issue of *CQ*.

Another DSP unit many amateurs like is made by J-Com (793 Canning Parkway, Victor, NY 14564, telephone 716-924-4560). The J-Com model W9GR-DSPII has ten selectable filters: four for SSB, four for CW, one for RTTY, and one for HF packet. Random noise reduction and auto notching are not included, but this unit is still a gem.

Next up are three popular units from Timewave Technology, Inc. (2401 Pilot Knob Road, St. Paul, MN 55120, telephone 612-452-5939). They are the DSP-9, DSP-9+, and the DSP-59+. The DSP-9 has three selectable SSB bandwidths, three narrow CW bandwidths, random noise reduction, and auto heterodyne notching on SSB. The DSP-9+ is similar to the DSP-9, but includes AGC, four data filters, and selection of many different bandwidths for SSB and CW. Timewave's top-of-the-line "killer unit" is the DSP-59+ shown in fig. 5. It has a vast number of filter configurations and bandwidths (high pass, low pass, adjustable center fre-

Fig. 5– Timewave Technology's "do everything" model DSP-59+. Front-panel switches let the operator select numerous filter configurations, bandwidths, and center frequencies.

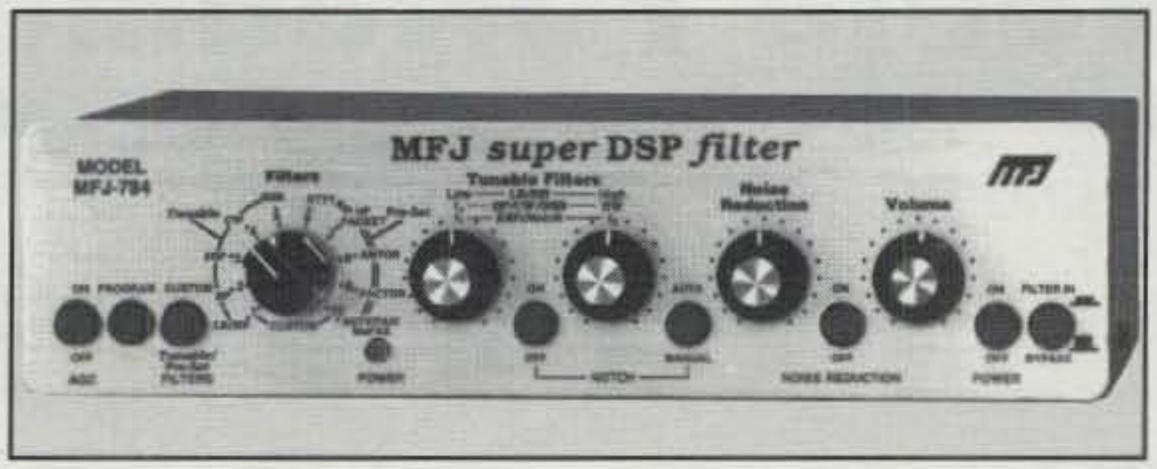


Fig. 6– The MFJ-784 Super DSP features selection of many filter types, continuously adjustable bandwidths, filter memories, plus heterodyne and noise reduction.

quencies, CW filters, SSB filters, etc.), plus auto tone notching on SSB and random noise reduction. Front-panel pushbuttons and frequency-calibrated switches make the DSP-59+ quite easy to use.

The newest unit on today's DSP market comes from MFJ Enterprises (P.O. Box 494, Mississippi State, MS 39762, telephone 1-800-647-1800). This is their model 784 shown in fig. 6, and it is also a feature-packed "killer unit." The MFJ-784 has filters for high pass, low pass, bandpass, CW, and SSB, and each is continuously adjustable to any desired bandwidth and center frequency. The MFJ 784 also has preset filters for RTTY, AMTOR, packet, PACTOR, FAX, and SSTV, plus auto tone notching on SSB, manual notching on CW, random noise reduction, AGC, and a hefty output amplifier. Additionally, several memories that let you store favorite filter settings for instant pushbutton recall when needed are included—a real asset when contesting or DXing. The MFJ 784 is easy to understand, easy to use, and a real workhorse.

If you have additional questions on any of the previously mentioned units, I heartily suggest contacting their manufacturers directly (that is why I included addresses and telephone numbers). All features on some DSP units do not work simultaneously, for example, and such unrealized limitations may not be apparent in ads. No one knows a unit's capabilities better than the folks who make it.

On The Air With DSP

Is Digital Signal Processing really as effective as it seems? I strived to answer that question in an unbiased manner by using two units (the Timewave DSP-59+ and MFJ-784) while writing this month's column, and my conclusion is a favorable "yes!" I should also say learning how and when to use various DSP functions will take a couple of days to master, however. In other words, the more you understand and operate a DSP unit, the better the results!

Since I usually operate CW using only that gray matter between my ears for both copying and blocking out QRM, my first night's use of DSP was rather blah. The narrowband filters were incredibly selective, but I was continuously changing bandwidths when tuning and working stations and thus paying more attention to the DSP than the QSOs. I loaned one DSP unit to a friend who works mainly SSB, but reserved opinions/comments until later. He returned a couple of days later with a similar opinion. We reread the manuals, visualized how each function worked, and began using the units on the air again. This time every feature, including random noise reduction (which did not work previously because the input level was too low and no AGC action was taking place), worked more effectively. I also discovered the advantage of setting up filters to bandwidths of my choice and storing them in the MFJ-784's memories so I could call them up instantly. Neat!

My friend borrowed a DSP unit a second time, and agreed it worked better for him, too. In my case, working DX through pile-ups proved much easier on the eardrums. In fact, I could even switch over to a speaker without filling the house with QRM and tune-up carrier tones. Might DSP become the latest rage? Judging by all the seemingly daft QRM on the bands, I would say yes—or maybe it is already the craze and everyone but me is using it.

Conclusion

At the risk of beating the subject to bits (no computer pun intended), I strived to answer everyone's questions on DSP. If you have additional questions (which will surely relate to specific model units), contacting the manufacturer is your best bet. If you prefer writing to me, however, please do not ask for a "which one is best" opinion. Also remember to include an SASE and be patient for a reply. This month will be a very busy time for me, but I still plan on catching a couple of minutes on 30 meters CW weeknights and on 20 meters SSB Sunday afternoons.

Stay tuned: Our most unbelievable keys column yet should be coming up next, and it's a killer!

73, Dave, K4TWJ

Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

The Open Sleeve Dipole

The "Open Sleeve Dipole" has been around for a long time, but it is not a household word in amateur radio. This simple antenna is composed of two or more adjacent dipoles—only one fed—and each is resonant at a different frequency (see fig. 1). I first ran across this design about 1946 when it was incorporated in a television antenna for the lower VHF channels. The antenna was invented either at Stanford Research Institute (now SRI, Inc.) or at the U.S. Naval Postgraduate School (Monterey, California), or maybe somebody else invented it. A cursory search of the records reveals no less than six separate patents on the scheme, all issued between 1946 and 1950. The earliest patent covers three monopoles for use on a jet aircraft. Although not specified, the range covered was probably 100 to 156 MHz.

The bone of contention was the use of the sleeve dipole in broadband TV antennas for home use. The concept was modified and improved for harmonic operation, the goal being to preserve the bidirectional pattern over a 3-to-1 frequency range, suitable for low-band TV.

No doubt the lawyers grew rich as the squabble over patents dragged on. The matter was finally resolved about 1953. I am indebted to George Kearse, W5AWU, who was head of the Antenna Laboratory at Amphenol, Inc. for copies of the early patents and a summary of the litigation.

While useful in TV antennas and in certain log-periodic designs, as far as amateur radio is concerned, the primary use of the sleeve dipole is in multiple-band HF operation.

The 17th edition of *The ARRL Antenna Book* has a good write-up on this antenna (section 7-4) and provides insight into the design of various "multiband" open-sleeve dipoles. And finally, it should be noted that the open-sleeve design is used in the radiator portion of the Hy-Gain Explorer 14 triband Yagi beam.

A Practical Three-Band Sleeve Dipole

The November 1994 issue of *RF Design* magazine[1] has an article by Gary Breed, K9AY, covering the theory of the sleeve antenna in detail, calling it a "Closely-coupled Resonator." Ah, well. A rose by any other name would smell as sweet.

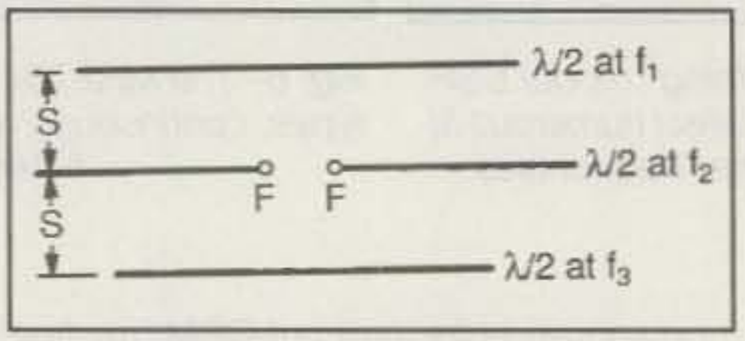


Fig. 1– The three frequency system is composed of a fed dipole plus closely spaced conductors resonant at higher frequencies. Spacing S is small compared to element lengths. The feed point is F-F.

Gary's article is of great interest to amateurs, as it provides know-how to build a multiband dipole antenna, including the technique of controlling the feedpoint resistance and reactance on each band.

In brief, Gary's multiple resonant antenna consists of a driven dipole, resonant on the lowest band of choice, with additional conductors around it placed at appropriate distances. These are resonant on higher bands. When properly built, the antenna provides a near unity match at the resonant frequency on each of the chosen bands. The result is a triband dipole having no traps, decoupling networks, or tuned stubs.

An Open-Sleeve Dipole For 10, 18, and 24 MHz

The K9AY dipole provides operation on the three WARC bands of 10.1, 18.1, and 24.9 MHz without traps, coils, or switching. The assembly is shown in fig. 2. The driven dipole is resonant on the lowest frequency band, and the additional wire resonators are tuned to 18.1 and 24.9 MHz. There is no direct connection between the driven dipole and parasitic resonators.

The antenna is made of #12 AWG enameled wire. Spacing between the wires is two inches. The overall antenna length is 46.7 feet. The antenna wires are held in position by insulated spacers placed every couple of feet along the antenna. The insulators can be made of 3/8 inch square material such as Lexan or polystyrene. Any good RF-insulating material will do the job.

The best way to build the antenna is to stretch the wires between two fixed points, about shoulder high. With the wires under tension, the insulators can be fixed in position and the end bridles aligned to place equal tension on all wires.

The feedpoint demands attention. Gary fed his antenna directly with coax. I would prefer the use of a 1-to-1 current balun at this point. This helps to keep RF current off the outside shield of the transmission line. However, the weight of the balun causes the center dipole wire to sag, unless additional spacers are used at the center point to keep everything shipshape and in Bristol fashion.

The radiation on all bands is the familiar figure-8 pattern. Gary recommends the antenna be placed about 45 feet above ground for best results.

The SWR response is a function of wire lengths, spacing, and wire diameter. The K9AY article provides equations for those who wish to experiment with this design.

Use the antenna as an inverted-V? That may be a little tricky unless you can arrange the mechanical layout to keep all wires taut. It might be worth a try.

The G3EAY Antenna Farm

My good friend Doug DeMaw, W1FB,

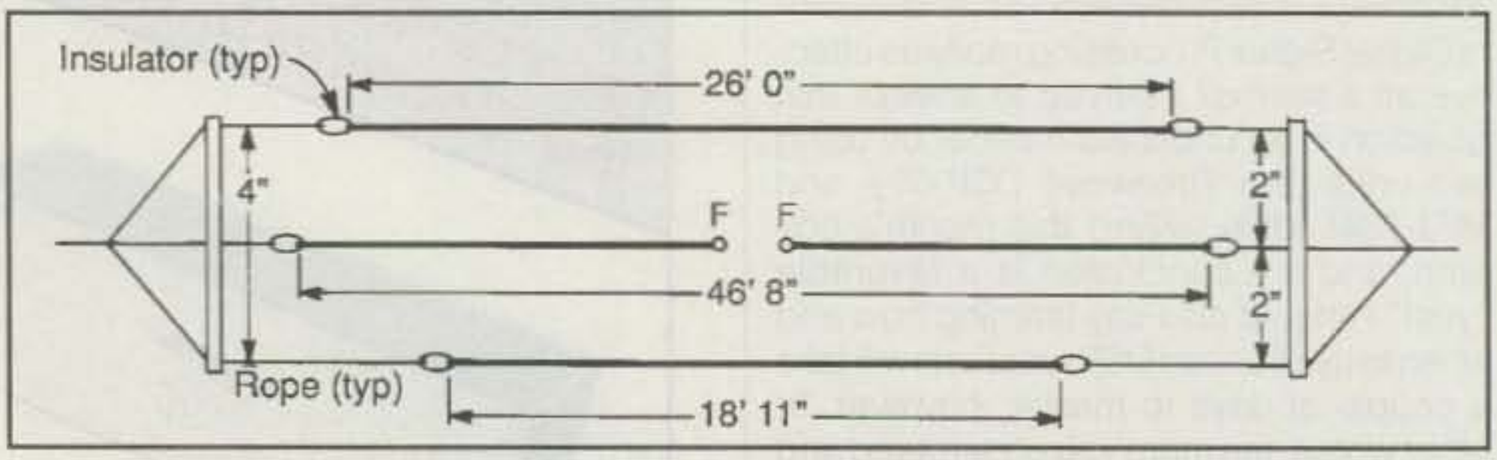


Fig. 2– The open-sleeve dipole for the 10, 18, and 24.9 MHz bands. The antenna is made of No. 12 AWG. The design height used for computer analysis is 45 feet. Insulated spacers keep wires in alignment.

[1] 48 Campbell Lane, Menlo Park, CA 94025

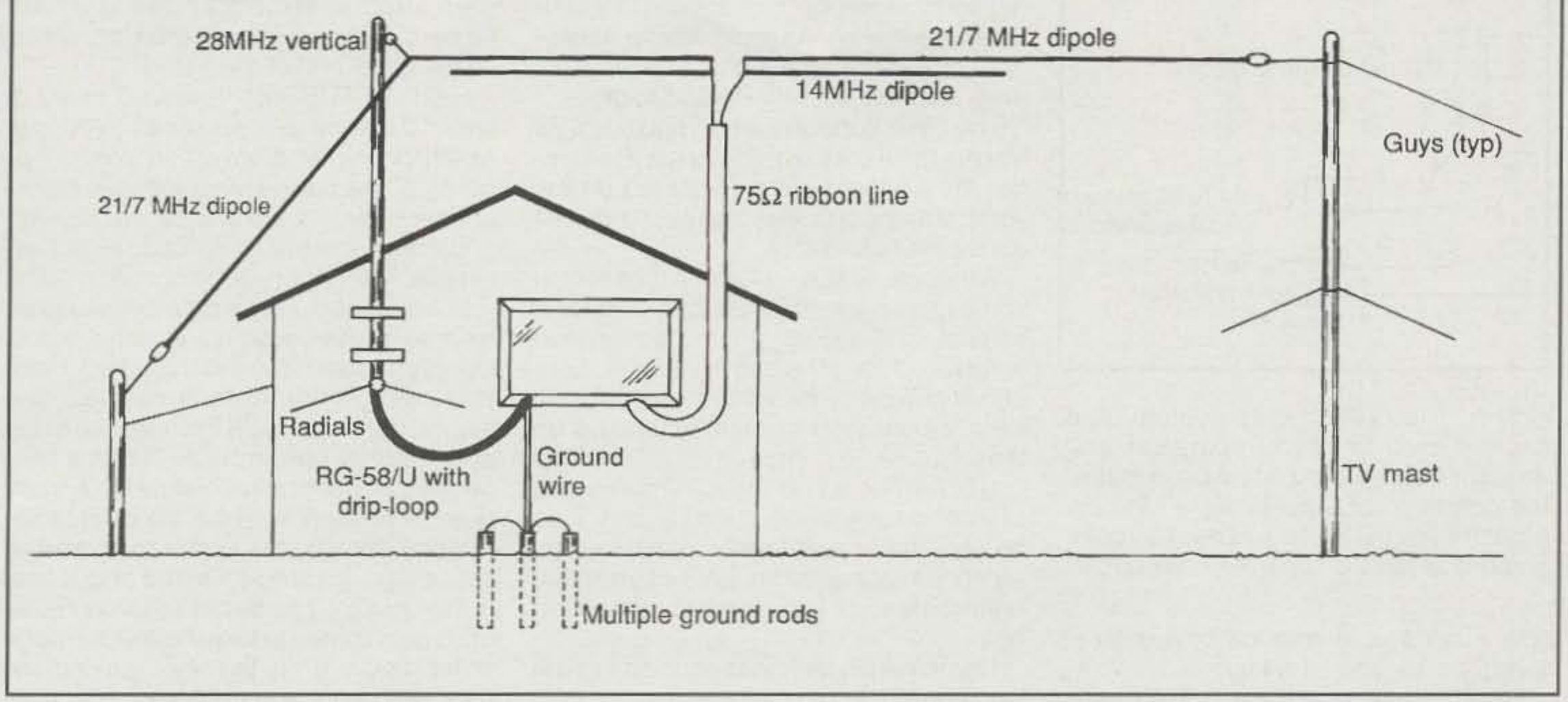


Fig. 3– G3EAY's solution to 5-band operation on a small lot. An old CB vertical is cut for 10 meters and also serves as support for 40 and 15 meter dipoles. The 40 meter antenna works as a Marconi on 80 meters using antenna tuners.

sent me a copy of an article in the British *Practical Wireless* magazine (November 1994). The article is "Five Band Antenna—No ATU," by Dennis Wood, G3EAY.

The problem facing G3EAY was to obtain 5-band operation on a very small lot without covering the property with a maze of wires and masts. His solution is shown in fig. 3. The principal antenna is a 7/14 MHz dipole which is also near-resonant at the third harmonic, 21 MHz.

The dipole is made of 300 ohm ribbon line. One wire of the line is cut for 7 MHz, and the other wire is cut for 14 MHz. The lines are tied in parallel at the center feed-

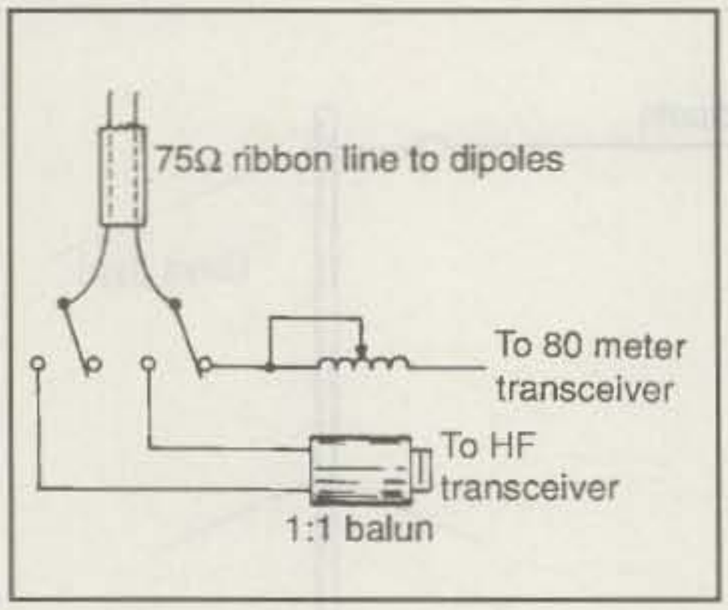


Fig. 4– The G3EAY feed system. The balun is used for normal operation, and an adjustable loading coil is used to permit operation of dipoles as a Marconi antenna for 80 meters. The 10 meter antenna is fed via separate coax cable.

point. This simple antenna covers three bands (7, 14, and 21 MHz).

For 80 meter operation G3EAY uses half of the 7 MHz dipole as an end-fed Marconi. To achieve resonance, a simple loading coil is included in the feeder arrangement (fig. 4).

G3EAY uses 75 ohm twin-lead feeder for the multiband dipole and a 1-to-1 balun at the shack. A double-pole, double-throw switch makes the changeover for 80 meter operation.

The support mast at the far end of the dipole is made up of sections of scrap steel water pipe. An inexpensive substitute for this material is the aluminum TV mast sections sold by Radio Shack.

The other support for the dipole is a 28 MHz vertical cut from a defunct CB antenna. An insulated pulley mounted on the vertical supports the multiband dipole above the house roof.

Although G3EAY doesn't mention it, some radials are required for the 28 MHz vertical, and a good ground connection is required for 80 meter operation. Four or five ground rods, about three feet long each, connected in parallel, should do the job.

G3EAY has found the maximum value of SWR on any band is less than 1.5, so he uses no antenna tuner. Trimming the antennas for minimum SWR at your favorite operating frequency should be a big help.

Combination antennas such as this are very handy for cramped spaces. The user may not be the biggest signal on the band, but general operation on a number of bands is very satisfying, regardless of signal strength!

Voodoo Telephone Calls

Well, it looks as if one culprit who initiates "voodoo" telephone calls has been found. These are the annoying calls that often arrive when you are eating dinner. When the phone is answered, no one is on the other end of the line!

Reid, W6MTF, has received many of these calls on his personal FAX line, which he never answers in voice. Apparently, the calling machine tries several times over a period of a few weeks. After a certain number of unsuccessful attempts, it abandons the number.

Scott, N6NXI, had a different situation. He had a device on his line that would identify a mysterious caller. He had a voodoo call, got the caller's number, and suprised the pants off the speaker at the other end by calling back. It was a telephone call solicitation company. A computer was used to make the calls in sequence. When the party answered, it connected the solicitor to the phone line. If the solicitor ran behind the computer and wasn't ready to take the call, the computer would drop the line, leaving the recipient angry and confused.

Scott found out the outfit that purchased the services of the call solicitation company was the legal defense fund of a large California environmental group! They were out to raise money. I won't embarass the environmental group by mentioning their name, but they aren't making any friends by this annoying scheme.

So that's where the situation is at this moment. Just another invasive attempt on individual privacy that is annoying and a real pest. I hope wiser heads will prevail and stop this operation.

Great Moments in Amateur Radio History

How did you like the 50th anniversary issue of *CQ*? Pretty impressive, wasn't it?

My modest contribution to this issue was an overview of amateur radio during the period 1945–1975. My sources included files of *QST* and *CQ* magazines, plus articles from other publications.

It was a fascinating undertaking, following the natural flow of events that made amateur radio what it is today. Certain very important milestones stand out during this voyage of discovery. Among the most important are:

•The post-war boom in television. The enthusiastic acceptance of TV in the home with the resulting avalanche of TVI problems forced a re-examination of transmitter design, circuitry, and construction. The problems of harmonic emission, TV receiver overload, and cross-modulation were tackled. Concurrently, the transition of single sideband from the laboratory to on-the-air amateur radio provided the means of generating a powerful signal without the use of harmonic-producing class-C amplifiers.

With a great deal of effort the TVI problem was reduced from a catastrophy to a crisis, and eventually to a nuisance. If this problem had not been solved, in the main, it is doubtful amateur radio could have survived the complaints and political influence of a myriad of irate TV viewers.

•The rise of single sideband. It is interesting to note the resistance to SSB that many amateurs displayed. Equipment was rendered obsolete and had to be replaced at the amateur's expense. Many amateurs did not understand SSB and resented its presence on the bands.

Aside from the improvement in the TVI problem, the elimination of carrier heterodynes in the phone bands eventually made true believers out of many doubters. Even so, it took over a decade for SSB to emerge as a primary means of HF amateur communication.

•VHF FM and repeaters. After the war VHF phone activity was principally AM, fueled by the surplus SCR-522 radio and the Gonset Communicator. During the war the military had used FM circuits and repeaters in the North African campaign to great success. Eventually, wide-band surplus FM equipment became available and started to show up on the amateur bands. As commercial use of VHF FM grew and additional FM channels were authorized, a large amount of narrow-band commercial FM gear became available to amateurs.

Taking a clue from the military, 2 meter repeaters started cropping up in urban centers, making the VHF bands even more useful than before.

•Project Oscar. A small group of California amateurs working in the aerospace industry conceived the idea of launching an amateur space satellite. As Hiram Percy Maxim once said in regard to a seemingly impossible project, "It was an idea without a handle on it." The difficulties were enormous. The project required the cooperation of the amateur community, the FCC, and the launching facility (US Air Force). Much time was expended by the Oscar group convincing these reluctant entities that amateur radio deserved its place in space. Eventually a meeting of minds was reached and Oscar I was launched. It was a great success and brought amateur radio into the space age. The insurmountable problems were overcome, international approval of amateur radio space activities was eventually gained, and now space satellites are accepted internationally as a part of amateur radio.

•The WARC bands. Amateur radio lived in fear of extinction during the early days. One has only to read the story of the 1927 International Radio Conference to understand what a narrow escape amateur radio had from extinction! Much of the opposition was because of ignorance of the true nature of the radio amateur, and a fear for the safety of many countries' monopoly on communications.

After a harrowing experience bordering on extinction, amateur radio survived, and amateurs and their frequency assignments were recognized internationally.

The uneasy relationship between amateurs and the rest of the communication world was gradually eased over succeeding conferences. Amateur achievements were recognized, and close cooperation between the AARL, the FCC, and the State Department, and between amateur societies via the International Amateur Radio Union (IARU) achieved a place in the sun for amateurs. The spadework eventually paid off in later years when amateur radio actually achieved an expansion in HF frequency assignments in the newly created 10, 18, and 24 MHz bands. No doubt difficulties lie ahead (particularly in the UHF region), but amateur radio seems well equipped to protect itself to the utmost limit of its ability. The lessons of history are well learned.

•Diversity. In 1945 the main modes of amateur radio communication were AM phone and CW, with minimal interest in FM. Amateur radio has expanded over the decades to include diverse activities such as RTTY, AMTOR, slow-scan TV, FAX, AM, packet, satellite, FM repeaters, radio control, and other modes. Today amateur radio is a hobby encompassing many other hobbies. If you don't like one aspect, choose another.

•The home computer. The computer in amateur radio today is just the tip of the iceberg. Tomorrow, like it or not, the computer will assume the commanding position on the operating desk.

What are your views on amateur radio during the next decade? Will it prosper and change, or remain static and slowly wither on the vine? Your views are good (and probably better than mine). Your comments would be appreciated.

And Thanks To . . .

I appreciate the comments and suggestions from the following amateurs who took the time and trouble to write to me. Many thanks to: W6PUO, WB2YVY, GØIXC, N1QVQ, G/OZ7SM, W6AD, N2ZOA, KI1JX, K1JZZ, PY2SFI, NV7K, N7ISX, G4ZU, and WB4HFL.

Footnote

1. *RF Design*, published by Argus, Inc., editorial office 6300 S. Syracuse Way, Suite 650, Englewood, CO 80111.

73, Bill, W6SAI

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

The Kingdom of Mustang

Late last year two DXers petitioned the DX Advisory Committee to make the Kingdom of Mustang a separate DXCC country. Jay Kobelin, WA2FIJ, and Peter Meyer, NØAFW, argue that this tiny Asian kingdom is an independent entity that justifies separate DXCC status by reason of government. Let's look at the Kingdom of Mustang and explore possible separate DXCC status.

The Kingdom of Mustang encompasses an area of about 500 square miles on the northern border of Nepal. It is the highest kingdom in the world, with an average height above sea level of nearly 15,000 feet. Total population is a few thousand, with about 500 living in the capital, Lo Mustang. DXers can locate Mustang on a map of the region by looking northwest of Nepal's capital of Kathmandu for a protrusion into Tibet.

The kingdom is completely surrounded by mountain ranges of the Himalayas, with the lowest pass into the high plateau more than 13,000 feet high. These mountains have isolated Mustang from Nepal and Tibet over the centuries to the point where the first Westerner to set foot in Mustang did so in 1952!

In that year Toni Hagen, a Swiss geologist, briefly visited the Kingdom. He reported that "it is so remote as to be virtually independent." Mustang remained off limits to most visitors following his visit, as China annexed the surrounding territory of Tibet. Tibetans fleeing from the Chinese soldiers and waging guerrilla warfare against them retreated to Mustang and nearby regions of Nepal.

The first extended survey of Mustang by a westerner was in 1964, when French-born explorer Michel Peissel trekked into the kingdom. (Peissel's book, *Mustang, the Forbidden Kingdom*, is one of the very few references aboout Mustang, and is the basis for much of this discussion.)

The Kingdom of Mustang dates back to the 14th century. Ame Pal, a descendent of the king of Tibet, and his sons conquered several independent castles in the vicinity and consolidated the territory into the Kingdom of Mustang. They built several forts in the late 14th and early 15th centuries, forts the remains of which still dot the plateau.

P.O. Box 50, Fulton, CA 95439

Members of the Limbiate ARI Club in Milan, Italy, operated from Monaco 3A in early October.

In the early 15th century Lama Ngorchen Kunga founded several Buddhist monasteries in Mustang, and the kingdom became a major religious center. Contemporary writers compared Mustang to the major religious center Lhasa.

The threat of invasion from the powerful Kingdom of Jamla to the south led Ame Pal to build a great walled city. Thus, Lo Mustang came into being in 1440. The city was little changed when Peissel visited it more than 500 years later! The dispute between Mustang and Jamla continued for more than 300 years, with power and control over forts and territory ebbing and flowing under different kings. Jamla finally conquered Mustang around 1760.

Jamla was in turn conquered in the early 19th century by Gurkha kings, who controlled most of western Nepal. The Gurkha never fought nor entered Mustang. The King of Lo agreed to pay an annual tribute to the Gurkha. Peissel then says, "From then on, the King of Mustang accepted the loose supervision of the Gurkha kings, who had little to do with Mustang, apart from accepting annual presents." The present (at least in 1964) king of Mustang is the direct descendent of the line of kings dating back to the 14th century. He is the only government in Mustang and is arbitrator of all disputes.

In 1961 a treaty between China and Nepal placed Mustang in Nepal. (The Chinese earlier had annexed Tibet, which surrounds Mustang on three sides.)

As of Peissel's visit in 1964, the Kingdom of Mustang is still stuck in the 15th century. The only way into the kingdom is on foot or horseback; there are no roads through the mountain passes. The kingdom lacks all modern conveniences, such as running water, sewer system, any form of mechanization, electricity, etc. It is isolated in time as well as in space.

Determining possible separate DXCC status for the Kingdom of Mustang presents certain difficulties. As we have discussed in past columns, the usual means of determining whether an entity is "sovereign" enough to qualify as a separate DXCC country is to refer to Point 1 of the DXCC Countries List Criteria. Point 1 lists the criteria to be considered in determining sovereignty. However, few of these criteria have any meaning in the case of Mustang.

Mustang is clearly not a member of the United Nations. It is not formally recognized as an independent state by any nation, and rates no mention in standard references such as the *CIA Factbook*. However, Mustang *does* appear to meet

The WPX Program

SSB

2477	KB5OGM	2484	DK2NZ
2482	HA7RC	2485	IKØIRF
2483	ND9O	2486	WZ1R

CW

2849	ND9O	2853	IK1QQU
2850	WT3W	2854	LU5EW
2851	DL3HRJ	2855	WZ1R
2852	BV7GC		

MIXED

1691	BV3BW	1694	VE3FSV
1692	HB9JAP	1695	WZ1R
1693	ND9O		

Mixed: 450 BV3BW, HB9JAP, ND9O, UA9-154-101, WZ1R. 500 BV3BW, ND9O, UA9-154-101, WZ1R. 550 BV3BW, ND9O, UA9-154-101, WZ1R. 600 BV3BW, ND9O, UA9-154-101, WZ1R. 650 ND9O, WZ1R, UA9-154-101. 700 UA9-154-101, WZ1R. 750 UA9-154-101, WZ1R. 800 UA9-154-101, WZ1R. 850 WM2U, WZ1R. 900 WM2U, WZ1R. 950 WM2U, JE1RRK, WZ1R. 1000 IN3PER, WM2U, JE1RRK, WZ1R. 1050 WM2U, WZ1R. 1100 VO1SF, WZ1R. 1150 VO1SF, WZ1R. 1200 VO1SF, WZ1R. 1250 WZ1R. 1300 WZ1R. 1350 WZ1R. 1400 WZ1R. 1450 WZ1R. 1500 WZ1R. 1650 JA1-20784, K9UQN. 1700 JA1-20784. 1750 JA1-20784, KS3F. 1850 W3KH. 1900 W3KH, W9IL. 1950 W9IL. 2100 KS4S. 2150 KS4S. 2500 WB2YQH. 2750 N2AC, I8RFO. 2800 N2AC. 3450 N9AF.

SSB: 350 DK2NZ, IKØIRF, WZ1R. 400 N6ONO, WZ1R. 450 WZ1R. 500 WZ1R. 550 JJ1SBO, IK2QPR, WZ1R. 600 JJ1SBO, IK2QPR, WZ1R. 650 JJ1SBO, IK2QPR, WZ1R. 700 HL5BUV, JJ1SBO, N3DRO, IK2QPR, WZ1R. 750 HL5BUV, IK2QPR, WZ1R. 800 WZ1R. 850 WZ1R. 900 WZ1R. 950 WZ1R. 1000 WZ1R. 1050 WZ1R. 1250 I3UBL. 1450 IK2DUU. 1500 IK2DUU, KS3F, KS4S. 1550 KS4S. 1800 KF7RU. 2350 I8RFD. 2700 NJØC.

CW: 350 WT3W, BV7GC. 400 WT3W, BV7GC. 450 WT3W, VE2ABO, BV7GC. 500 WT3W, BV7GC. 900 G3JTO, KS3F. 1100 W4TYU, K2PK. 1150 W4TYU, K2PK. 1200 W4TYU. 1400 KS4S. 1450 KS4S. 1550 I8RFD. 2100 W8IQ. 3450 N6JV. 3700 WA2HZR. 3750 WA2HZR.

10 Meters:	IK4GNH, N5QDE, WZ1R
15 Meters:	IK4GNH, K2LUQ, DJ9SZ, N5QDE, WZ1R
20 Meters:	IK4GNH, DJ9SZ, N5QDE, WZ1R
40 Meters:	W4TYU, SZ1R
80 Meters:	N5QDE, WZ1R
160 Meters:	I2EOW

Asia:	IK4GNH, IK2MRZ, N5QDE, WZ1R
Africa:	IK4GNH, IK2MRZ, WZ1R
No. Amer.:	IK4GNH, IK2MRZ, N5QDE, N6ONO, WZ1R
So. Amer.	IK4GNH, IK2MRZ, WZ1R
Europe:	IK4GNH, JJ1SBO, DJ9SZ, IK2MRZ, N5QDE, WZ1R
Oceania:	G4MVA, IK4GNH, IK2MRZ, KS4S, N5QDE, WZ1R

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

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

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.

The WAZ Program

Single Band WAZ

20 Meter SSB

958	JA5OP	959	N5QDE

20 Meter CW

452 ON4ACG

30 Meter CW

12 G4BWP

40 Meter CW

176 LU2BRG

80 Meter CW

42 DK5AD

All Phone

622 W1HIC

All CW

61 JA6NQT

SSB

4227	N8KOL	4232	KR4DA
4228	N8KUS	4233	IK3LGC
4229	KB7M	4234	KG6KW
4230	OZ3FS	4235	W1WTG
4231	W1HIC		

CW/Phone

7508	JH4MIF (CW)	7513	5B4ES
7509	YU1ZD (CW)	7514	W1HIC
7510	HA6NF	7515	IT9JPS
7511	AA5AU (CW)	7516	SV8ZC
7512	WK7Z (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.

the overall definition of sovereignty, as given in the DXCC country criteria. This reads: "a body politic or society united together, occupying a definite territory and having a definite population, politically organized and controlled under one exclusive regime, and engaging in foreign relations—including the capacity to carry out obligations of international law and applicable international agreements."

Mustang is clearly its own society, separate from that of Nepal, with its own population and well-defined territory, politically organized and controlled under one exclusive regime—the King of Mustang. Mustang has left to Nepal many of the ordinary foreign-relations questions that we usually consider in new DXCC countries, such as diplomatic relations. However, this does not automatically exclude separate DXCC status. The DXCC country criteria specifically provide for such delegation: "An entity may delegate to another country . . . a measure of its authority . . . without surrendering its sovereign status."

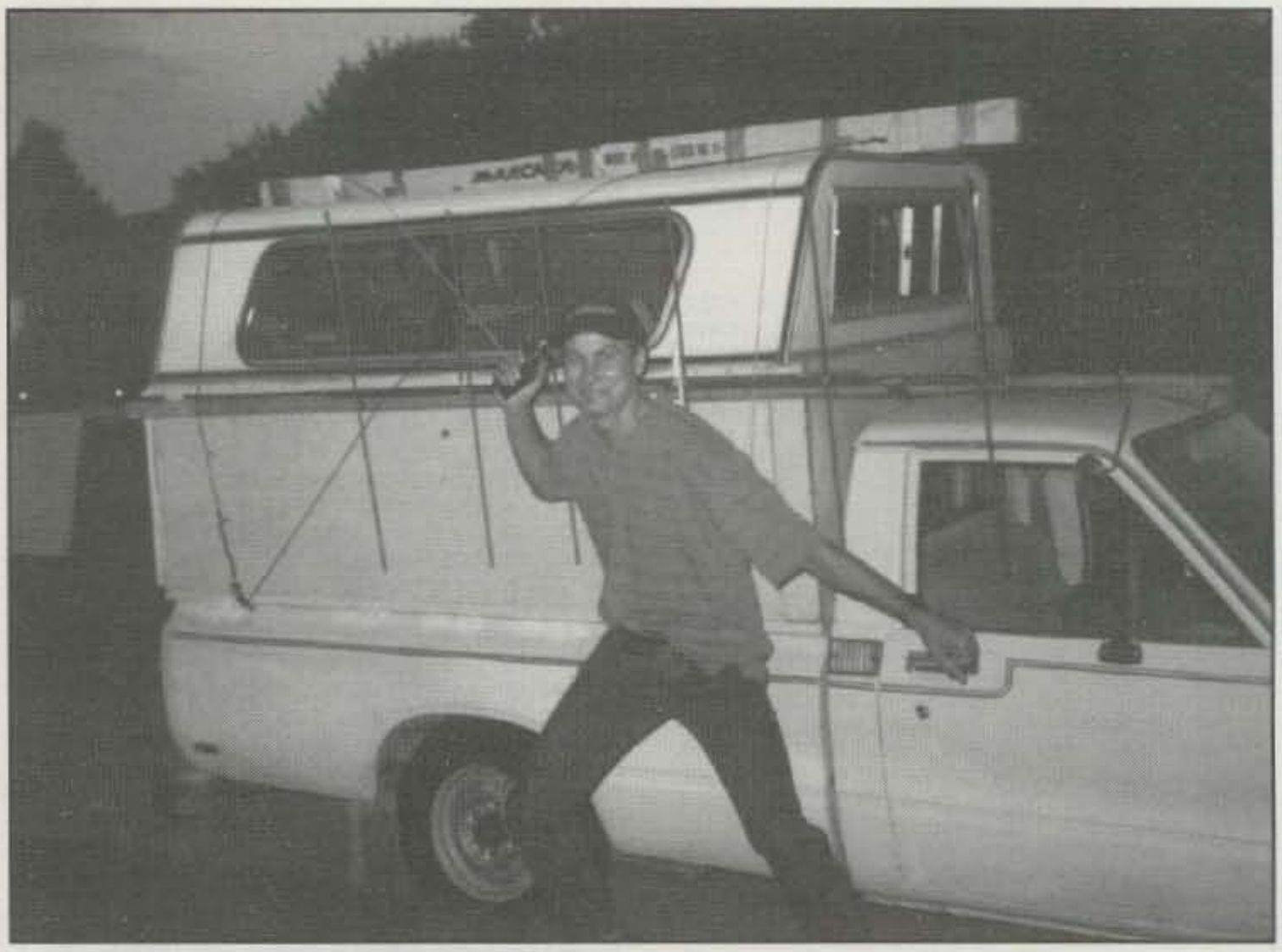
Here's where the analysis becomes difficult. Most of the characteristics listed in the DXCC rules for determining sovereignty have no meaning in connection with Mustang. Mustang is not a member of any of the specialized agencies of the United Nations, such as the ITU. Why would a Kingdom without electricity care about the ITU? Neither does it have its own ITU-assigned callsign prefix, for the same reason—no radio. It has delegated its diplomatic relations to Nepal, as mentioned above. The only item left is the regulation of foreign trade and commerce, customs, immigration and licensing, and the issuance of currency and stamps.

Again, Mustang's backward nature and isolation make many of these items meaningless. It has no postal service, and hence no stamps. It relies on silver for currency, for what little external commerce in which it engages. It issues no licenses, but it has no need to; everything in the kingdom is under the control of the King.

Mustang does regulate its own "foreign" trade, as it deals directly with traders from Tibet, across the Chinese border. These goods are not subject to duty or regulation from Nepal. The Kingdom of Mustang handles these matters on its own. (In fact, the Nepalese view Mustang with some suspicion for its dealings with Tibetans. Peissel says: "The monarch . . . was too friendly with the Chinese, as he directed the destiny of his country with a certain disregard for formal East-West alliances, running his land, as in the past, by steering a course between Tibet and Nepal in order to preserve his autonomy.") Further, the King certainly regulates immigration, as no one can even visit the kingdom without the permission of the King.

Since we can't use most of the usual criteria to examine the possible sovereignty of Mustang, perhaps we can look at it from the other side: How much control does Nepal have over the kingdom?

The government of Nepal controls access to the Kingdom of Mustang, and no one may trek there without permission



David Stutz, NH6MG/TG5, operates 17 and 10 meter SSB. He says he can't use IRCs in Guatemala. His QSL address is APDO #79, Huehuetenango, Guatemala.

from Nepal *(Peissel, p. 19)*. However, this is not the same as controlling immigration. Clearly, the final say on who may visit Mustang rests with the King of Mustang.

Nepal maintains a small garrison outside the walls of Mustang, supposedly a border guard. However, Peissel says that they are "technically under the direction of the king . . . The soldiers' presence in Mustang was no more than symbolic . . . With this small outpost Nepalese control and influence over this land began and ended. All authority in other matters . . . rested with the king and his feudal administration."

What about the "tribute" that Mustang annually remits to Nepal? Is this an indication that Mustang falls under the influence of the Nepalese taxation authorities? Not according to Peissel. He states that the tribute is the token of submission to the Gurkha crown, and must be understood in a medieval rather than a modern sense. Nepal has accepted the obligation to protect Mustang. Mustang in turn recognizes Nepal as a greater power, and pays a token amount for that protection, without surrendering independence. The total amount is less than US$50, so it really is a token. Further, the King of Mustang retains the right to collect taxes from his subjects, and spend the money as he pleases, without accounting to Nepal. Neither does Mustang pay a land tax to Nepal, as other areas of Nepal must.

Another example of the unique status of Mustang is that Mustang was specifically exempted from the Raja Abolition Act of 1962, which curtailed the control over taxation and administration of justice of the then-powerful rajas.

Mustang has a unique status within Nepal. It is an independent principality with control over its own destiny. Is this independence sufficient proof of sovereignty to qualify as a separate DXCC country? That decision rests with the DX Advisory Committee.

Even if the DXAC votes in favor of separate DXCC status for Mustang, and the Awards Committee concurs, it may never become a current DXCC country. To do so requires an accredited operation from the country. (North Korea rests in this limbo of "pending DXCC country," since the P5RS7 operation was not accepted.) Getting permission to operate from Mustang may be even more difficult than the 25 mile trek over the Himalayas to get to the remote kingdom from the nearest airstrip.

Besides the logistical problems of hauling radio gear, antennas, generators, fuel, and living supplies through the highest mountains of the world, over passes 2½ miles high, we have to add the problem of getting the king's permission for the radio operation. The United States government failed in its repeated attempts to erect a listening post in the kingdom. (Mustang's strategic location jutting into Tibet and high attitude made it an attractive monitoring site in the 1960s.)

DXAC News

In November the DX Advisory Committee voted *against* separate DXCC status for three entities: the Marquesas and Austral

5 Band WAZ

As of October 31, 1994, 402 stations have attained the 200 Zone level.

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

K5CTG
NX7K
UZ9CWA
OH3TY

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

N4WW, 199 (26)
K6YRA, 199 (34)
AA4KT, 199 (26)
K7UR, 199 (34)
NAØY, 199 (26)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
IK2GNW, 199 (1)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199(34,40m)
KM5W, 199 (26)
K1ST, 199 (26)
I1POR, 199 (1)
ABØP, 199 (23)
VE1AST, 199 (18)
SM6AHS, 198 (12, 31)
UA3AGW, 198 (1, 12)
KL7Y, 198 (34, 36)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (23, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
UY5XE, 198 (24, 27)
N5FG,198 (22,34 on 40)
KG9N, 198 (18, 22)
W2UE/7,198 (18,18on40)
K2ENT, 198 (28,40 on20)

The following have qualifiedfor the basic 5 Band WAZ Award:

K5CTG, 200 Zones
K2ENT, 198 Zones
NX7K, 200 Zones
UZ9CWA, 200 Zones
KG6LF, 154 Zones
LW2DFM, 157 Zones

Endorsements:

OH3TY, 200 Zones
LU2BRG, 187 Zones

930 Stations have attained the 150 Zone level as of October 31, 1994.

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.

island groups of French Polynesia, and Balleny Island. In a previous column I discussed the issues in the French Polynesia islands. Essentially, the petition for separate DXCC status was based on proving that French Polynesia was a "Point 1" country, and not an overseas territory of France. My analysis suggested that this would be a very difficult case to prove, and the members of the DXAC agreed. They overwhelmingly rejected this interpretation, by a much more lopsided vote than the earlier vote turning down these island groups. (The earlier vote was 10 to 6 against; the more recent vote was 14 to 2 against separate DXCC status.) Apparently, the DXAC is taking a conservative approach to what constitutes a country by reason of government. This attitude could make the case for separate DXCC status for Mustang more difficult.

The Balleny Islands are located just off the coast of Antarctica. They are part of

The WPX Honor Roll

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

MIXED

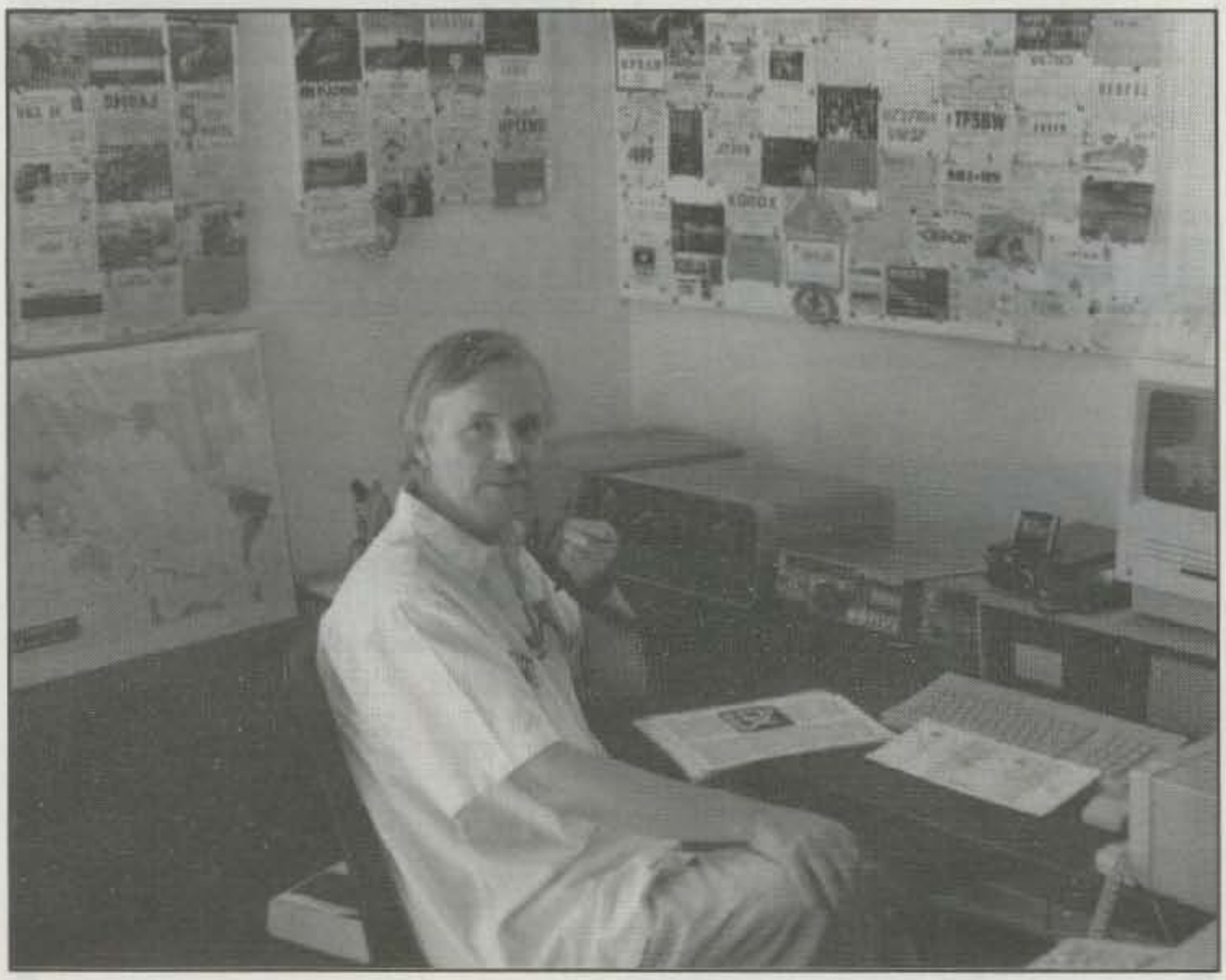
4604	9A2AA	3125	I2PJA	2711	HAØDU	2329	WB2YQH	1994	K2OLG	1719	S58MU	1359	ND3A	1174	WØJIE	889	VE3OMM
4589	F9RM	3115	SM3EVR	2676	K9BG	2321	K2POF	1959	WB4RUA	1674	VE9RJ	1359	KØIFL	1167	OZ1ACB	883	WU1F
4259	K2VV	3106	W1BWS	2650	SM7TV	2309	S53EO	1957	S51NU	1650	CT1QF	1323	W9IAL	1145	HA8QC	824	JR3TOE
3616	EA2IA	3050	YU1AB	2634	N2AC	2308	HAØIT	1940	KBØG	1598	CT1YH	1285	KSØZ	1093	AB5C	796	OZ-2044
3527	IT9TQH	3047	N4MM	2582	KF2O	2285	K8LJG	1928	WE2L	1555	WB3DNA	1285	WØIZV	1090	WT3W	761	EA2BNU
3417	VE3XN	3020	I1EEW	2548	IT9QDS	2216	K5UR	1907	NV9S	1540	LU8DY	1280	WK3Z	1082	IK2DUW	655	W2EZ
3415	K6JG	2989	KA5W	2488	HAØHW	2138	KL7AF	1893	W9IL	1537	YBØTK	1251	K9XR	1057	HB9DDZ	638	KD1CJ
3387	W2FXA	2942	N4UU	2441	I2MQP	2137	W4UW	1870	SM6CST	1516	HA9PP	1249	I1ZQD	1018	N4PYD	605	VE6JAV
3342	N4NO	2929	WA8YTM	2410	K9AGB	2125	DK5AD	1859	IK2ILH	1502	WZ1R	1242	NH6T	1014	IT9JPK		
3306	N6JV	2920	W9DWQ	2396	SM6DHU	2047	N2AIF	1858	W3KH	1471	OE6CLD	1212	HP2CWB	1008	CT1EEB		
3226	N9AF	2857	YU7SF	2392	4N7ZZ	2037	W6OUL	1853	G4OBK	1433	I2EAY	1207	WA3HUP	977	WB2PCF		
3144	I2UIY	2752	YU7BCD	2350	I2EOW	2018	HA5NK	1848	WB2ABD	1376	KC6X	1186	JN3SAC	943	VE6BMX		

SSB

4524	F9RM	2651	OZ5EV	2250	EA3AQC	1957	4X6DK	1650	WA6SLO	1388	WN5MBS	1176	HA5NK	1014	N4PYD	818	EA8BWW
4026	IØZV	2644	I6ZJC	2243	LU8ESU	1952	W4UW	1618	LU8DY	1386	EA5OL	1161	NG9L	1011	CT1EEB	799	EA3EQT
3633	K2VV	2623	NJØC	2207	KF2O	1916	EA2AOM	1614	YU7SF	1362	K3IXD	1148	F6FNA	1008	ND3A	796	EA8BGY
3529	VE1YX	2601	N4NO	2193	WA4QMQ	1889	N4UU	1608	N6FX	1339	IKØEIM	1127	EA3KB	985	NH6T	778	JR3TOE
3521	IT9TQH	2598	I1EEW	2183	WF4V	1876	K5UR	1563	IK2DUU	1327	DK5WQ	1107	WA2FKF	977	K9XR	774	EA1KN
3512	ZL3NS	2582	EA8AKN	2168	CT4UW	1863	IN3QCI	1560	K8LJG	1308	KBØC	1105	KBØG	954	KØIFL	711	SM6CST
3179	F6DZU	2572	F2VX	2163	I8KCI	1860	CT1BY	1514	KS4S	1296	I2-21171	1101	EA1KK	934	WT3W	680	N3DRO
3175	K6JG	2561	I4CSP	2147	W9DWQ	1811	CX6BZ	1492	N2AIF	1277	HP6AYV	1100	HP2CWB	886	DF7HX	674	KE4BM
3137	WD8MGQ	2504	PAØSNG	2145	YU7BCD	1802	WE2L	1465	OE6CLD	1272	W5ILR	1089	WB6SRK	878	SV3AQR	672	IØUVP
3116	I2PJA	2499	KA5W	2122	PY4OY	1800	KF7RU	1459	CT1DIZ	1262	I3ZSX	1086	KC6X	866	EA1AX	651	S51NU
2892	CT4NH	2472	I4ZSQ	2089	I2EOW	1783	SM6DHU	1446	K2EEK	1253	G4OBK	1071	WZ1R	865	T3ØJH	650	VE9RJ
2726	N4MM	2397	I5ZJK	2052	CT1AHU	1695	K2POF	1408	N2AC	1235	OE2EGL	1059	G4SDJ	845	CT1YH	620	UA1ZO
2703	I2UIY	2332	I2MQP	1984	K5RPC	1673	HAØIT	1408	CT1BWW	1234	K8MDU	1027	VE3MS	843	WU1F	611	IK4HPU
2671	EA2IA	2298	WA8YTM	1980	EA5AT	1673	KL7AF	1404	W6OUL	1196	IK2AEQ	1020	EA2IF	841	I6KYL	601	HB9DDZ

CW

3640	K2VV	2560	YU7SF	2018	W8IQ	1757	KF2O	1652	HA5NK	1434	G4OBK	1186	KA1CLV	965	4X6DK	749	AA6WJ
3584	WA2HZR	2361	N2AC	1946	S51NR	1756	HAØIT	1650	OK1CZ	1423	IK3GER	1094	EA7TG	925	ND3A	715	EA2BNU
3520	IT9TQH	2343	W9DWQ	1924	KA7T	1746	SM6CST	1650	KL7AF	1418	SM5DAC	1081	WZ1R	915	KC6X	676	HL5AP
3291	N6JV	2296	LZ1XL	1887	EA7AZA	1739	K2POF	1625	N2AIF	1395	KS4S	1072	JN3SAC	898	WØJIE	658	HB9CSM
2998	VE7CNE	2227	WA8YTM	1861	G3VQO	1719	K8LJG	1615	KBØG	1386	DJ1YH	1051	EA6AA	836	KL7UR	640	KØIFL
2886	N4NO	2204	KA5W	1829	TI4SU	1703	N6FX	1612	I7PXV	1351	VE3MS	1022	HI8LC	830	PY4WS	622	VE6BMX
2729	YU7LS	2202	YU7BCD	1803	JA9CWJ	1698	G4SSH	1595	VE9RJ	1345	G4MVA	1035	AC5K	787	VE3OMM	603	I2EOW
2650	EA2IA	2155	G4UOL	1795	S51NU	1678	OZ5UR	1526	W6OUL	1284	EA6BD	1007	W9IAL	787	NH6T		
2629	K6JG	2109	I2UIY	1782	SM6DHU	1666	ZS6EZ	1498	I1EEW	1263	LU2YA	983	W4UW	786	K9XR		
2581	N4UU	2069	N4MM	1768	K5UR	1653	W1WAI	1497	S58MU	1200	IK2ECP	966	EA2CIN	768	JA3ARM		



Ulrich, ZS6IR, operates 20 meters SSB. He keeps well-informed on DX news with "The DX Bulletin." (KDØL photo)

the Ross Dependency, which is administered by New Zealand. Separate DXCC status for the Balleny islands depended on whether New Zealand's claim on the Ross Dependency survived the Antarctic Treaty. This 1961 treaty froze all territorial claims to Antarctic and the surrounding waters. Although the Treaty did not affect the prior claims of territorial sovereignty, including the Ross Dependency, the United States has never recognized any of these territorial claims. The DXAC voted 13 to 1 against adding Balleny to the DXCC list, primarily because the DXAC members felt Balleny is a part of Antarctica.

The DXAC also voted 14 to 2 against recommending the establishment of a DXCC award for contacts made while operating mobile. Members of the committee noted the impossibility of verifying that the contacts were indeed made while operating mobile.

DX News

Father Edward Schmidt, W9SI/OA4SS, will operate from the Vatican's **HV3SJ** station until March 25. He has to squeeze his operating around his work as an inter-

BATTERIES

BUY DIRECT FROM US, THE MANUFACTURER!

YAESU

FNB-2	10.8v @	600 MAH
FNB-4	12v @	750 MAH
FNB-4A	12v @	1000 MAH
*FNB-10(S)	7.2v @	1200 MAH
FNB-12(S)	12v @	600 MAH
FNB-17	7.2v @	600 MAH
FNB-25	7.2v @	600 MAH
FNB-26	7.2v @	1200 MAH
**FNB-26(S)	7.2v @	1500 MAH
FNB27	12v @	600 MAH
**FNB-27(S)	12v @	800 MAH
**1/4" longer than FNB27		
FNB-31	4.8v @	600 MAH
FNB-33(S)	4.8v @	1500 MAH
FNB-35(S)	7.2v @	600 MAH
*FNB-35(S)(S)	7.2v @	1500 MAH
FNB-38	9.8v @	600 MAH

*1 1/3" longer than FNB38 case

BATTERY ELIMINATORS AVAILABLE

SPECIAL
FOR THE
MONTH OF FEBRUARY

10% OFF

ON ALL
YAESU FT-11R/41R/51R
REPLACEMENT BATTERIES

Look for March's Special of the Month

Monthly Discounts Applicable to End-User's ONLY

REPLACEMENT BATTERIES FOR YAESU FT-11R/41R/51R

YAESU PART #	YAESU SPECS	W&W SPECS
FNB31	4.8v @ 600mAh	4.8v @ 600mAh
FNB33	4.8v @ 1200mAh	4.8v @ 1500mAh
*FNB35(S)	———	7.2v @ 600mAh
**FNB35(S)(S)	———	7.2v @ 1500mAh
FNB38	9.6v @ 600mAh	9.6v @ 600mAh

* Same size case as FNB38 — Battery Eliminator Available
** Battery is 1.3" longer than FNB38

Prices and Specifications subject to change without notice

DISCOVER VISA MasterCard

NYS residents add 8 1/2% sales tax. Add $4.00 for postage and handling.

W & W ASSOCIATES

800 South Broadway, Hicksville, N.Y. 11801

WORLD WIDE DISTRIBUTORSHIPS AVAILABLE. PLEASE INQUIRE.

MADE IN THE U.S.A.
SEND FOR FREE CATALOG AND PRICE LIST

In U.S. & Canada Call Toll Free (800) 221-0732 • In NYS (516) 942-0011 • FAX (516) 942-1944

CIRCLE 134 ON READER SERVICE CARD

ATLAS RADIO *Introduces . . .*

"THE LITTLE GIANT"

Model 400-X HF Transceiver With a Superior Analog Tuning System and AFL (Automatic Frequency Lock)

Big Signal · Super Receiver · Small Package · Affordable

- Velvet smooth frequency control.
- Covers all 9 HF bands, plus MARS. SSB, CW, Packet.
- 150 watts PEP output, 120 watts CW.
- Single conversion design results in superior performance, low noise and high dynamic range.
- 9 in. wide, 3.4 in. high, 9 in. deep.

Limited Introductory Price Only **$699**

Now Shipping

Factory Direct

To order or for information/brochure on Atlas radio equipment

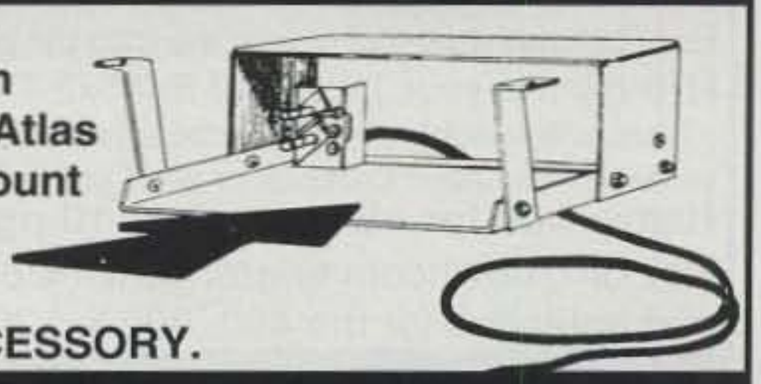
CALL-FAX-WRITE

PHONE (619) 259-7321 FAX (619) 259-7392

PLUS

Plug in Desktop Atlas Power Supply **$199**

Plug in Traveling Atlas Mobile Mount **$79**



Ask us about our plug in EXTENDED FREQUENCY COVERAGE ACCESSORY.

MasterCard Made in USA.

ATLAS RADIO CO.

Made in USA. VISA

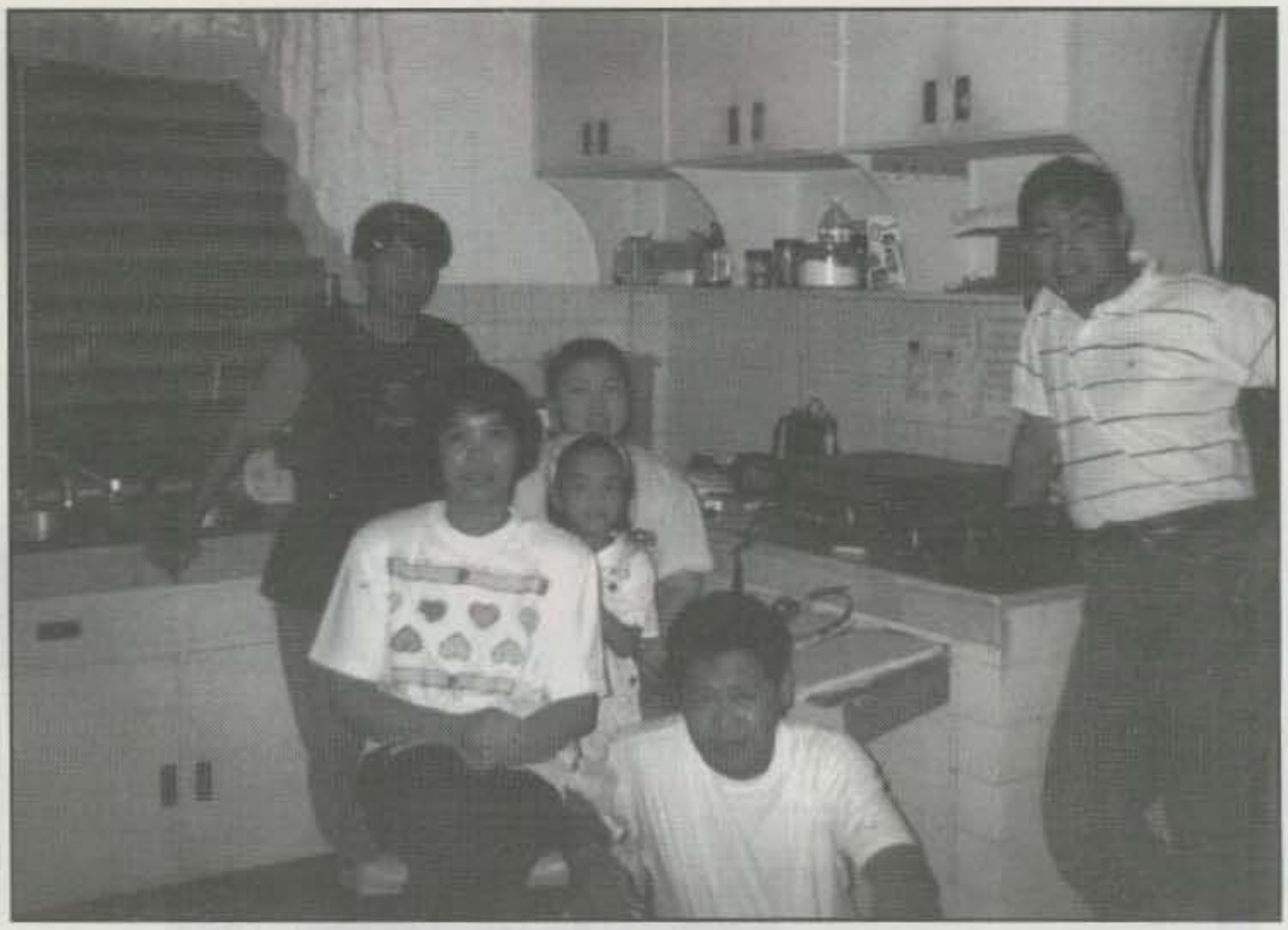
722-G Genevieve St., Solana Beach, CA 92075

preter, but look for him 1400–1530Z and 1930–2300Z weekdays, 1400–1830Z Saturdays, and 0800–1130Z, 1430–1830Z, and 1930–2230Z Sundays. QSLs go to IØDUD with one IRC for surface-mail return and two IRCs for airmail. The HV3SJ station has been upgraded with Yaesu FT-1000 transceiver and FT-7000 amplifier, and an FT-650 for 12, 10, and 6 meters. A Mosley TA-53-M five-band beam has also been installed. Father Ed operates both CW and SSB.

Islands On The Air News

RSGB IOTA-Yaesu UK Ltd Agreement: The Islands On The Air Committee of the Radio Society of Great Britain (RSGB) announced that they have entered into a sponsorship agreement by which Yaesu becomes the principal sponsor of the RSGB IOTA Programme. The agreement is a worldwide agreement and runs for three years from 1 October 1994.

Under this agreement Yaesu will inject funds into the IOTA Programme which will be used by the IOTA Committee to finance its costs in running the programme. Yaesu will secure advertising without charge in the IOTA Directory and in the IOTA Anniversary Booklet. Both parties agree to make their best efforts to publicise the agreement.



Gilbert, 4K2KWT, and his family in Cagayan, Philippines. The Cagayan Amateur Group uses the callsigns DU2ABS and DU2ABT on HF.

Yaesu will be making available on loan a portable station for the use of IOTA DXpedition together with QSL cards. Under the agreement minor sponsors are encouraged to join.

Islands On The Air Publications: The 1995 IOTA Directory is now available to North American DXers for US$10, including postage, from Dewitt Jones, W4BAA, P.O. Box 379, Glen Arbor, MI 49636. The

CQ DX Awards Program

SSB

2108	AA2TB	2111	N5QDE
2109	EA2BP	2112	WA2DQI
2110	KB5OGM		

CW

913	W4UW	915	WA2DQI
914	ZL2GEO		

SSB Endorsements

320	I4LCK/327	310	N5HSF/310
320	WB3DNA/326	275	N5QDE/279
320	AA5NK/325	250	N6CFQ/272
320	VE4AT/324	250	OA4EI/272
310	EA3EQT/319	150	KB5OGM/163
310	EA2AOM/311	3.5/7 MHz	N5QDE

CW Endorsements

320	EA2IA/326	300	OZ5UR/304
320	W1WAI/322	250	W4UW/266
320	AA5NK/322	1.8 MHz	W4UW
300	G3KMQ/309		

Total number of active countries is 327. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. 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.

1995 edition is a 56-page, glossy publication which has been updated to include the major decisions about the future of the programme announced in October 1994. It includes new island groups and the amended procedures for applying for an award or updating. Also available from W4BAA for US$10 is the 56-page "IOTA 30th Anniversary Booklet." This includes stories about the programme and island operations, IOTA certificate listings, the IOTA Most Wanted island listings, 1994 Honor Roll, and much more. Price of both publications together is $18.

Three New Amateurs in United Arab Emirates

Don Greenbaum, WB2DND, reports that he just returned from a business trip to A6, where he made about 1700 contacts in four evenings. Conditions to the US were fair, given this part of the sunspot cycle. His QSOs were mostly on 17 and 80 meters, 950 phone, 700 CW, and a few RTTY. The bulk of his contacts were with Europe, 15% with North America, and another 10% with Japan and the Pacific.

Don further reported that the PTT of the UAE approved three more licenses. The calls **A61AH** and **A61AN** were issued in November and approval was given for **A61AI**, which is expected to be issued as

QSL Information

1B/KUØJ to KUØJ
1Z9B to AA6BB
3D2CA to I4ALU
3D2QB to SM3CER
3ZØCON to SP2TQW
3ZØUN to SP8KEA
4J3M to UD6DJ
4K2BY to KF2KT
4K8F to UA9AB
4LØG to RF6FM
4L1AA to CT1CJJ
4L5O to CT1CJJ
4N6F to YU6FPO
4N7ØAL to YU7AL
4N7ØAT to DC3SZ
4N7DW to YU7BJ
4U49UN to W8CZN
5H3JA to AAØOB
5H3JB to NK2T
5H3JD to DK9MA
5NØ/DL9GMM to DL9GMM
5NØGC to F2YT
5N1DMA to W4DVJ
5N3ALE to DJ2VZ
5R8DL to JH8YZB
5U7Y to JG3UPM
5V7DB to DJ6SI
5WØBL to JH2ABL
5WØBY to JA2FBY
5WØJA to JF2RZJ
5X1F to WB1DQC
7Q7JL to GØIAS
7Q7LA to GØIAS
7Q7RM to GØIAS
9G1BJ to G4XTA
9I3ØZIN to 9J-Bureau
9J2BO to W6ORD
9J2SZ to SP8DIP
9K2MU to WA4JTK
9K2YAZ to N2YAZ
9K2ZC to KC4ELO
9M8BT to N5FTR
9Q5AGD to SMØAGD
9Q5RP/9X to F5DN
9V1YC to AA5BT
9X5HG to DK2SC
9Y4SF to WA4JTK
A22EX to N4CID
A35VI to K8VIR
A35XC to JE1DXC
BØØM to BV2KI
BZ1QL to BY1QH
C53HG to W3HCW
CP4BT to DL9OT
CP4CR to IK2UVU
CP8XA to CP8AL
CR9WAG to DL8KWS
CS8EGW to CT1EGW
CU9CNE to CU1AC
D2SA to F6FNU
D68TA to JA1IDY
EA8BYR to WA1ECA
EO5ØJS to LY1DS
ER1AM to SP9HWN
ET3YU to YU1FW
EU7SA to RC2SA
EW3LB to W3HNK
EXØA to DF8WS
EXØV to DF8WS
EX8F to DL8FCU
EY8WW to DL8WN
EZ5AA to DF7RX
FG5GZ to F6CLK
FK8FI to F6GZA
FK8GJ to F6CXJ
FK8GT to F6GZA
FP/KA1NCN to AA1AS
FR5ZU/T to VE2NW
FS5PL to FG5BG
GB3Ø1OTA to G3PMR
GP5KN to G4TTX
HBØ/DL1RNW to DL1RNW
HBØ/HB9NL to HB9NL
HC8JG to WA6ZEF
HH2LQ to KM6ON
HK/GØSHN to F6AJA
HL9BS to N2BSA
HL9DC to N7RO
HP1XBH to W4YC
HP1XXD to N4NFM(94CB)
HSØZBJ to W8GIO
HV4NAC to IKØFVC
HZ1AB to K8PYD
I1A/ØSG1 to I1RBJ
I1A/1PØ to I1RBJ
IQØJ to IKØREH
IS1A/ØS1A to I1RBJ
IS1A/1P to I1RBJ
IUØYL to IKØPXD
IY4FGM to I4IKW
IZ6ARI to I6LKB
J68AC to WA2USA
J68BT to W8KTQ
J88CW to WA6AHL
JWØGB to LA8PF
JWØH to LA5NM
JWØI to SP3ASN
KC6OK to N5OK
KC6WP to JA1WPX
KG4JO to WI2T
KG4ML to WB6VGI
KH2DD/KHØ to JA1SGU
KS2V/TI2 to KB5IPQ
LA1Z/P to LA6LHA
LX9DX to SP5SS
LX9UN to LX1NJ
LY4ØMR to LY1BZB
OD5/SP7LSE to SP7LSE
OHØ/OZ5IPA to OZ5AAH
OHØBDA to OH2BDA
OH1NOA/OD5 to OH1MRR
OM5XX to OK3CQR
OM9SIAD to OK3CTA
OQ5ØUSA to ON4RAT
OS5GK to ON5GK
OS7YY to ON7YY
P29VH to VK4CRR
P4ØMX to JR4PMX
P4ØYL to JH4RHF
P49T to W3BTX
PA3EVJ to VE3MR
PJ7/OH2LVG to KE7LZ
PJ8X to KE7LZ
PJ9U to OH1VR
PPØF to PP1CZ
PYØFF to W9VA
RØ/G3MHV to G3MHV
RØ/KA6ZYF to KA6ZYF
R3/G3MHV to G3MHV
R3/KA6ZYF to KA6ZYF
R9/G3MHV to G3MHV
R9/KA6ZYF to KA6ZYF
RAØA/K4EWG to K4EWG
RKØQXY to UAØKCL
RK4WWQ to AA4NU
RK9XWH to UZ9XWH
SØ1MZ to EA2JG
SØRASD to EA2JG
S21ZG to W4FRU
S61YC to AA5BT
SNØPR to SP6FER
SNØUN to SP8KHT
SV/WY3V to WB2RQW
T3ØBH to ZL1AMO
T3ØRT to VK4CRR
T318A to DL2ZAD
T31BB to DF6FK
T32Z to N7YL
T77BL to T7ØA
T91DNO to DL1DAZ
T92A to S57MX
T92X to KA9WON
T99W to DL1QQ
TA1/K4UEE to K4UEE
TA2DS to WA3HUP
TA2ZI to WB6EQX
TJ1AG to F5RUQ
TL8NG to WA1ECA
TM2H to F5JCG
TM4C to F6KAR
TM5IPA to F5LGQ
TM9RAT to F6KED
TNØCW to DK7PE
TT8/F5IXR to F5MXH
TU2ZR to SM3DMP
U5WF/UR9P to SP5IUL
UAØKAH to G4AYO
UAØQBA to UC2WP
UAØQJG/Ø to UA1AGC
UE9WML to KA6ZYF
UE9WML/Ø to KA6ZYF
UE9WML/9 to KA6ZYF
UE9WTL to G3MHV
UE9WTL/Ø to G3MHV
UE9WTL/9 to G3MHV
UK7R to UA9AB
UK8AX to UA9AB
UK8BA to ON7GB
UK8FF to W3HNK
UK8QU to K9FD
UN7R to UL7RE
US5WE/US8P to SP5IUL
V2/G4DIY to G4DIY
V26Y to W2KKZ
V31CK to XE1CI
V31JY to KV5E
V31ML to N5FTR
V31MP to W5ZPA
V31RD to G4SMC
V31YK to W5JYK
V47KEP to DL8WAA
V5/NØAFW to WA2FIJ
V73GT to WF5T
V858G to G3JKX
V85KX to G3JKX
VE3MJQ/9X5 to VE2PR
VK1FF to WB2FFY
VK6DX to AB4ZD
VP2EP to DL8WAA
VP2EST to KT8Y
VP2VE to WA2NHA
VP2VI to AB1U
VP5/AB5MF to AB5MF
VP5/W4BRE to W4BRE
VP5JM to W3HNK
VP8GAV to GMØLVI
VP9MZ to WB2YQH
VQ9QM to W4QM
VQ9TP to N5TP
VS6WV to KØTLM
XR6T to CE6TC
XU7VK to HAØHW
XX9AS to KU9C
XX9TSX to G3SXW
YI1DZ to WA4JTK
YJØAAY to W6YA
YS1DRF to W2PD
YS1XS to WD4PDZ
YW171LM to WS4E
Z21BA to N5FTR
Z31GX to YU5GBC
Z31PK to YU5XVD
Z32DJ to YU5FK
Z37GBC to YU5GBC
ZA/KA6ZYF to KA6ZYF
ZA/Z32KV to YU5FCA
ZA1AJ to OK2PSZ
ZA1B to HB9BGN
ZA1J to I2MQP
ZD8KJ to GØFXQ
ZD8OK to N8ABW
ZD8Z to VE3HO
ZF1CQ to W8BLA
ZF2AH to WA6VNR
ZF2GT to NØTG
ZF2SY to K2UFT
ZL3KG to WB6EQX
ZP7AA to ZP5AA
ZP9XB to PY5BI
ZZ7DX to PP5LL
ZZ8SA to PW8NG

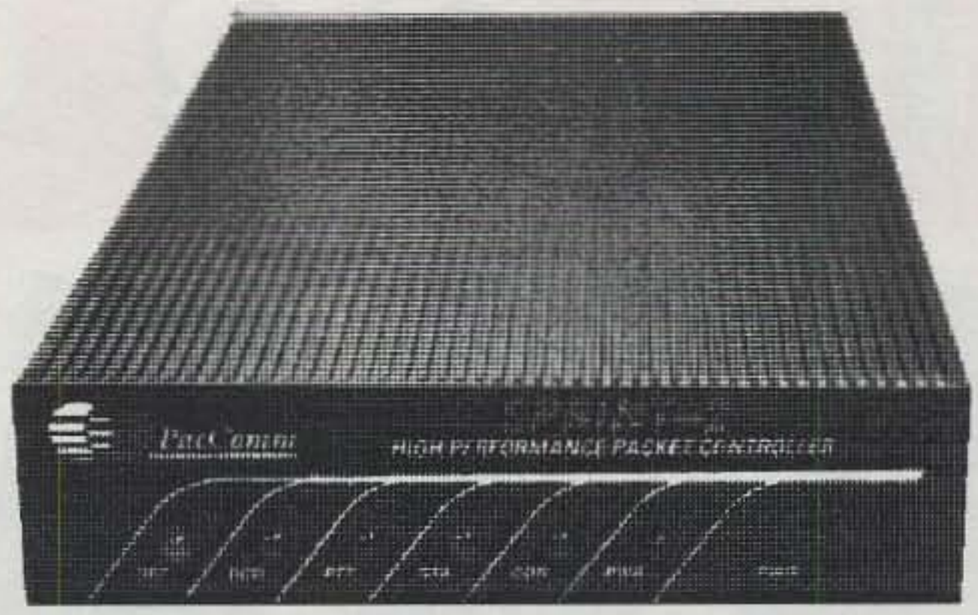
soon as the applicant appears to pick up his license. Both new licensees are "graduates"of the club station at the Dubia Men's Technical College. They are the first licenses to be issued in about a year.

A61AH is Al Mur Al Mohiri, a pilot. He has a TS-850 and DX88 vertical. His address is P.O. Box 4800, Dubia. He has been operating for the past year on 11 meters while waiting for his license and has also been active at the new club station, **A61AF**. On November 14th he made his first contacts on 75 meters. Al Mur is very comfortable on the air and should provide many contacts for the Deserving for some time to come. He is printing QSL cards locally and should be able to QSL in just a few weeks.

A61AN is Nasr Fekri. Nasr is in his early 20s and works in the New Dubia Hospital. He is an experienced operator, having operated previously from the club station. His equipment consists of a TS-850, TL-922 amp, and a monobander for 10 meters and wire antennas for 15-80 meters. QSL to P.O. Box 53656, Dubia, UAE.

73, Chod, VP2ML

SPRINT-2 High Performance Packet Controller



The newest 9600 baud TNC from the oldest 9600 baud manufacturer. PacComm has built more 9600 baud modems than all other US amateur manufacturers combined! What does this unequalled experience mean to you?

Performance, Reliability, Expandability, Economy.

- A genuine G3RUH modem (not a 'compatible' version) supports 9.6kbps and 19.2-57.6 kbps.
- Both modem and terminal baud rates up to 57,600 bps for future networking and satellite service.
- 10 MHz CPU clock speed (20 MHz optional), 128k RAM standard, 64k EPROM.
- Comprehensive support for Global Positioning System receivers and Automatic Packet Reporting System.
- Personal Message System with 96k message storage space and many advanced features.
- Deviation and signal strength of received signals, voltage and temperature measurements using the optional AD-4 Analog to Digital Accessory board ($39/$49).
- Extensive EMI and power spike filtering, quiet four-layer circuit board, NMOS RS-232 interface.
- Ideal for network use - TheNet, ROSE, or Texnet. Built in CoaxLAN avoids complex diode matrices.
- Satellite model can uplink at 9.6kbps and downlink at 38.4kbps, full duplex or 9.6kbps both links.
- Priced at $225 including power supply and cables. (Satellite model $235, 20 MHz Backbone model $260).

PacComm Packet Radio Systems, Inc.
4413 N. Hesperides St., Tampa, FL 33614-7618
+(813) 874-2980 Facsimile: +(813) 872-8696 BBS: +(813) 874-3078
CompuServe: 76576,2003 Orders: (800) 486-7388

Best Fit—
Best Protection—
ONLY From
Ham Equipment
DEALERS.

A Protective Carrying-Case
Made Of Neoprene & Nylon

The Pouch
Information Only
1-800-72POUCH

CIRCLE 84 ON READER SERVICE CARD

EARTALK
Combination of an invisible mic and earphone into one compact earpiece. For motorbiking, paintball, gas mask & any discreet communications $38.99

THROAT MIC
Throat activated microphone with earphone unit, high isolating capability. For construction areas, airport ground crew, machine shop, lawn mowing, etc. $59.99

SOLDERING IRON KIT
Cordless, butane gas powered. Use as soldering iron, blow torch, heat blower or hot knife. 60 min of continuous use. $39.99
Additional tips $5.00 each

EARPHONE/LAPEL MIC
Yaesu MH19A2B. Earphone w/cable mounted condenser lapel mic. For all types of HT except Kenwood & ICOM W2A
$24.99

MINI SPEAKER MIC
A non-directional electret condenser type handheld mic w/a high quality speaker that withstands maximum volume without breaking up.
$19.99

ANTENNA MOUNT
K-4001 M Hatchback door/trunk lid mount antenna bracket. It comes complete with 16.4 ft. coaxial cable.
Coaxial cable: RG188A/U-5DSFA
Connector: PL-259 $54.99

ANTENNA MOUNT
K-7041M Variable angle 5" magnet mount. It comes complete w/coaxial cable.
Coaxial cable: 3.5DQFV 4M
Connector: PL-259 $52.99

ANTENNA MOUNT
K-6001M Variable angle trunk lid mount bracket. It comes complete w/coaxial cable.
Coaxial cable: RG 188A/U-5DFV
Connector: PL-259 $53.99

ROBOCHARGER®
A universal charger with conditioner. It discharges and charges and once it's full it goes into trickle to "top off" the few remaining energy. Specify HT upon ordering. $79.99

GRIPMATIC HT CRADLE
Holds HT in place while mobile. Convenient w/ speaker mic. Adjustable firm grip soft pads & quick button released jaws. No force needed.PC-3 $15.99

MAGIC SUCTION W/Z-MOUNT
Use w/Gripmatic HT cradle. Mount on windshield, dashboard. Can be easily moved from car to car without leaving sticky residues from adhesives. M-2A $17.99

GRIPMATIC MOUNTING HARDWARE
15" flexible gooseneck w/ tilt swivel mounting plate. Comes w/regular and no drill mounting base.
M-3AB $19.99

To order: MC, VISA, AMEX (please include card # and expiration date). Check, Money Order payable to Intelex, Inc. Add $5 S&H for the first item and $1 for every additional item. PA residents add sales tax. Orders outside U.S. Call for details. For free catalog send SASE. Prices and specifications subject to change without notice. RoboCharger is a registered trademark of Intelex, Inc.

Intelex, Inc.
144 West Eagle Road, Ste 122, Havertown, PA 19083
Tel: (215) 879-9419, FAX (215) 879-0137

CIRCLE 60 ON READER SERVICE CARD

Save on ALL Radio Shack® Scanners & Radios

WITH MANUFACTURERS WARRANTY IN U.S. (copy available on req.)

3 WAYS TO SAVE

1 **FREE**
SHIPPING & HANDLING
48 STATES

2 **BIG**
PRICE REDUCTION

3 **NO TAX**
COLLECTED
49 STATES

PRO 43 $298 WITH BATT'S

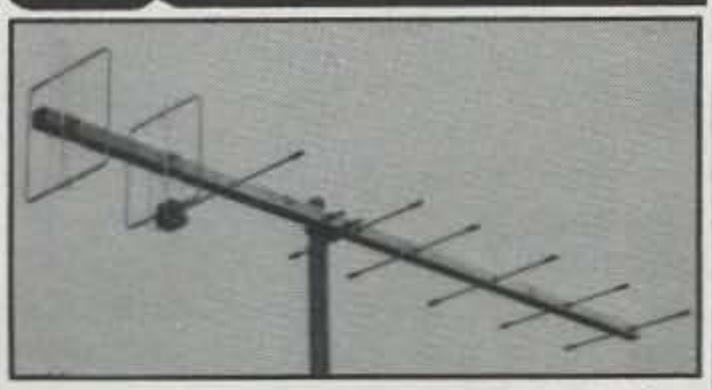
CALL FREE: **1-800-433-SAVE** 9-5 Central Mon.-Fri.
Since 1961

The Difference Is The Price

USRADIO®

USRadio 377 Plaza, Granbury, TX. 76048

QVHF QUAGIS



Q144-8	$109.95	**SENTECH, INC.**
Q222-8	$84.95	P.O. BOX 2136
Q432-8	$69.95	RIVERVIEW, FL 33569

PHONE 813-677-4410 FAX 813-671-4122

CIRCLE 126 ON READER SERVICE CARD

CQ BOOK &

Keys, Keys, Keys

Enjoy nostalgia with this visual celebration of amateur radio's favorite accessory. Written by the well-known author and CQ columnist Dave Ingram, this book is full of pictures and historical insight that only K4TWJ can provide. If you've ever wondered about the old days of Morse, this book's for you. **Order No. KEYS..... $9.95**

The VHF "How To" Book

This book is the perfect operating guide for both the new and experienced VHF enthusiast. Developed by CQ VHF Columnist, Joe Lynch, N6CL, this book is the ideal reference tool for all phases of VHF operating. Learn more about packet, EME, satellite, ATV, and repeater operation. You'll also find a complete tutorial on exotic propagation modes as well as pages of data and sources for additional information. **Order No. BVHF $15.95**

The Quad Antenna

Hams love antenna books and this book is no exception. Written by world renowned author Bob Haviland, W4MB, The Quad Antenna is the authoritative technical book on the design, construction, characteristics and applications of Quad Antennas. Discover how to easily build a quad antenna for your station that will help you fill your logbook with rare DX that you have only dreamed about before. **Order No. QUAD..... $15.95**

The Packet Radio Operator's Manual

This book is written by CQ columnist and Amateur Radio Packet authority Buck Rogers, K4ABT. An all new introduction and guide to packet operation, it is the perfect single source, whether you're an advanced user or just starting out. Learn about packet radio without all the technical jargon. Also included are detailed hookups for dozens of radio/packet controller/ computer combinations, making this book the definitive resource for the active packet user. **Order No. PROM..... $15.95**

Ham Radio Horizons: The Book

Written by Peter O'Dell, WB2D, this is a book about ham radio that every beginner can enjoy! If you want to get in on the fun and excitement of Amateur Radio, Ham Radio Horizons is the perfect way to get started. HRH is full of tips from expert hams in: DXing, Contesting, Serving the Public, Ham Radio in Space, Experimenting, Digital Communications — you name it! This exciting book is an excellent gift to a prospective ham or for use in your club's licensing classes and library. **Order No. BHOR..... $12.95**

The Vertical Antenna Handbook

Take advantage of the 20 years of research and practical experience of naval communications engineer Capt. Paul H. Lee, USN(ret), N6PL. Learn the basic theory, design, and practice of the vertical antenna. Discover easy construction projects such as a four-band DX vertical or a broadband array for 80 meters. Ever wonder how to build a functional directive vertical system? Paul Lee can get you started today! **Order No. VAH..... $9.95**

Also available at your local dealer

Now Available Direct From CQ!

Title	Order No.	Price
ARRL Antenna Book (17th Edition)	ARRLAB	$30
ARRL Handbook (New Edition)	ARRLHB	$30
ARRL Operating Manual	ARRLOM	$18
ARRL Repeater Directory	ARRLRD	$6
ARRL Antenna Compendium Vol. 1	ARRANT1	$10
ARRL Antenna Compendium Vol. 2	ARRANT2	$12
ARRL Antenna Compendium Vol. 3	ARRANT3	$14
ARRL Weather Satellite Handbook	ARSAT	$20
ARRL FCC Rule Book	ARFCC	$9
Your RTTY/AMTOR Companion	ARRTTY	$8
ARRL World Map	ARMAP	$12

Title	Order No.	Price
ON4UN Antennas and Techniques for Low Band DXing	LOWDX	$20
1995 NA Callbook	NACB	$35
1995 Int'l Callbook	INTCB	$35
1995 Callbook Pair	NAICB	$65
Gordon West No-Code Technician Plus License Manual	GWTM	$10
Gordon West General License Manual	GWGM	$10
Gordon West Advanced License Manual	GWAM	$10
Gordon West Extra License Manual	GWEM	$10

VIDEO LIBRARY

Getting Started in Ham Radio

This is a fast-paced video introduction to the fascinating world of ham radio. CQ's experts show how to select equipment and antennas; which bands to use; how to use repeater stations for improved VHF coverage; the importance of grounding and the basics of soldering. How to get the most out of your station, whether it's home-based, mobile or hand-held. **Order No. VHR $19.95**

Getting Started in Packet Radio

This video will help de-mystify the exciting but sometimes confusing world of packet radio. Learn how to get started using your computer on the radio. Included are step-by-step instructions on making packet contacts and using packet bulletin boards, networks and satellites. **Order No. VPAC.. $19.95**

Getting Started in Contesting

For the newcomer to contesting or an experienced veteran, this video is for you! You'll get advice and operating tips from some of contesting's most successful competitors, including Ken Wolff, K1EA, Dick Newell, AK1A, and CQ's own contest columnist, John Dorr, K1AR. Here's just a sample of what you'll see: what contesting's all about, explaining contest jargon, tips for beginners, how to compete from a small station, operating secrets from the "pros", live QSOs from world class stations, VHF/UHF contesting.

Order No. VCON $19.95

Getting Started in Amateur Satellites

Learn with this video how veteran operators set up their satellite stations. Find out how to locate and track ham satellites with ease. Watch as operators access current satellites and contact far ranging countries around the world. This video is filled with easy to understand advice and tips that can't be found anywhere else . **Order No. VSAT..... $19.95**

Getting Started in DXing

Top DXers share their experience with equipment, antennas, operating skills, and QSLing. You'll see hams work rare DX around the world. If you're new to DXing, this video is for you! All this valuable information may well give you the competitive edge you need to master the exciting world of DXing. **Order No. VDX..... $19.95**

Getting Started in VHF

This is the ideal introduction to the world of VHF. See demonstrations of the latest radios. Also, learn about repeater usage as well as the more exotic VHF operating modes. Whether you are interested in packet radio, satellite operation, or simply using your local repeater, this is your video! **Order No. VVHF....$19.95**

Ham Radio Horizons: The Video

This introduction to Amateur Radio is an excellent complement to the Ham Radio Horizons book. Enjoy seeing all aspects of ham radio ranging from what it takes (and costs) to get started to how you can get your ham license. Designed for the general public, HRH is ideal for public events, presentations to community groups and as an opening to your club's licensing courses! There's no better way to introduce someone to ham radio. **Order No. VHOR.....$19.95**

Order Toll-Free 1-800-853-9797

YES! I want to learn from the experts. Rush me my book(s)/video(s) right away!

Please add $4 shipping & handling. FREE shipping & handling for orders $50 and over.
Please make your check or money order payable to: CQ Communications, Inc.

Qty	Item #	Description	Price	Total Price
			Shipping/Handling	
			Total	

Name _____ Callsign _____

Address _____

City _____ State _____ Zip _____

MC/VISA/AMEX/Discover # _____ Expires _____

Form of payment: ☐ MC ☐ VISA ☐ AMEX ☐ Discover ☐ Check ☐ Money Order

Please mail your orders to: CQ Communications, Inc., 76 North Broadway, Hicksville, New York 11801-9962 FAX 516-681-2926

AWARDS

BY NORM VAN RAAY, WA3RTY

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we salute a young lady (YL) shortwave listener:

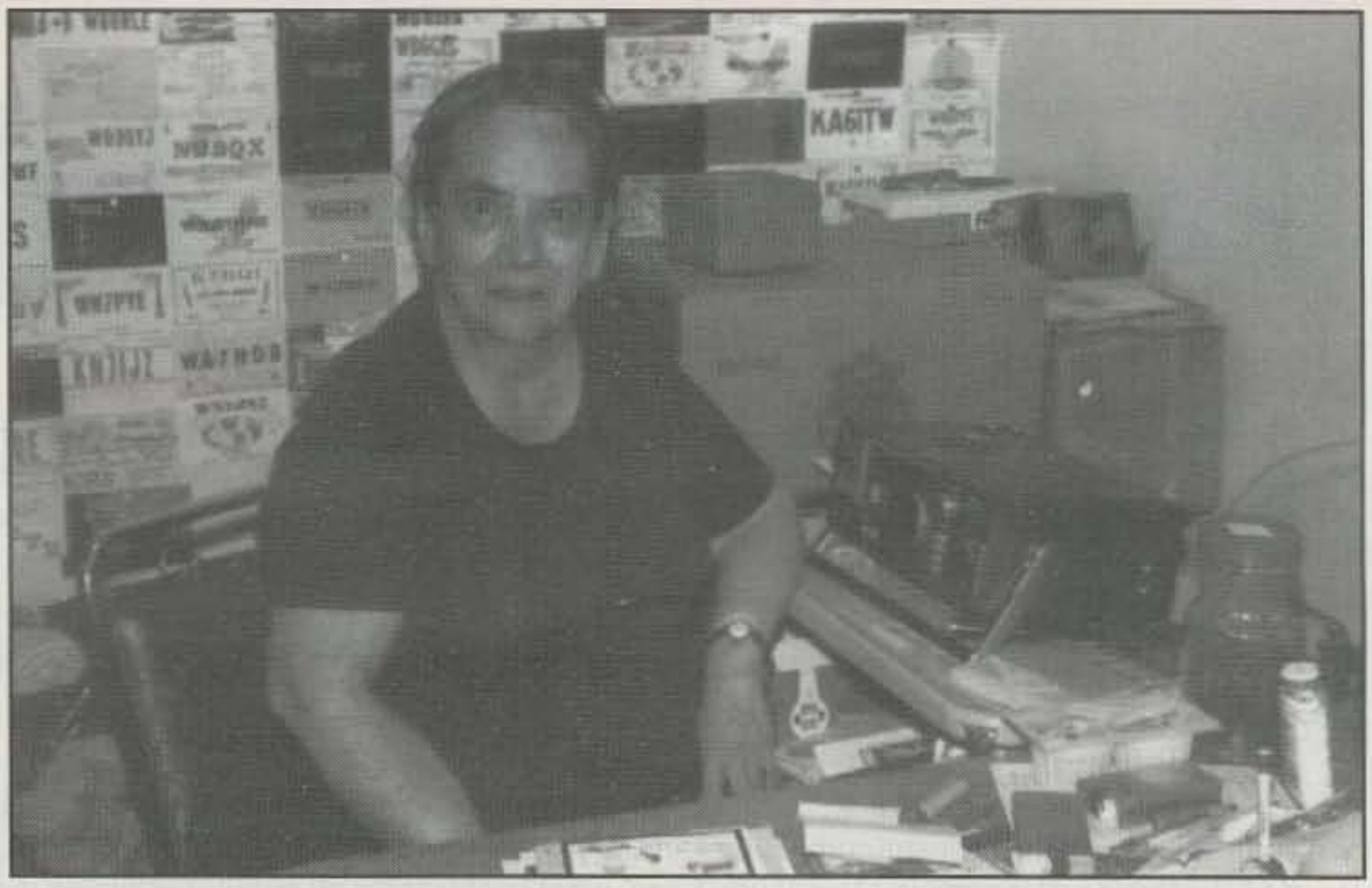
Betty Pearl Cruz, WPE6YL
USA-CA #635, 9-2-89

Betty is 69 years old and is recovering from a stroke. Shortwave listening is a very important activity for her. She has been an active SWL since 1941 and began exchanging cards in 1946. Her first rig was a ten-tube all-band Zenith and an underground antenna.

In 1985 Betty heard an emergency piece of traffic on the West CARS Net for an OM and XYL. They were driving from Anchorage, Alaska, and the last time the XYL's mother, KL7LA, had heard them on the air, they were headed south on the ALCAN highway. Their callsigns were WA4BQY (XYL) and WB4OMB (OM). She was worried sick. Betty got all the information and called Pete Gray, KC4IF, USA-CA #478. She knew he could check into many nets and get the word out. As it turned out the Hulls, WA4BQY and WB4OMB, had lost their antennas and were fine.

Pete told Betty that should she ever hear anything like that again, she should call him right away and he would get it out on the County Hunter's Net. Her ears perked up, since she had about 326 counties confirmed. That's how Betty started on her quest for USA-CA All Counties. It soon became a habit, and she has started on her second time around.

Betty's equipment is a Kenwood R1000 with an indoor antenna. She loves CW and can copy 30 WPM solid. Congratulations on your fine achievement, Betty!



Shortwave listener Betty Pearl Cruz, WPE6YL, USA-CA #635, has been an active shortwave listener since 1941.

Awards Issued

The present solar cycle must have affected county hunters this month, as there were no applications for USA-CA Awards.

The DO-AZ Award

At the Fourth Annual Pacific District Mini Convention in Phoenix, Arizona on October 1, 1994 a new award was announced. Available as of that date, the "DO-AZ" award is available for working Arizona counties in various ways. It is available in four categories:

1. Awarded for working All Arizona Counties with full-time Arizona residents. (Note: Full time as evidenced by the address per FCC records.)

2. Making two or more contacts from all Arizona counties on one or more of the HF bands.

3. Working 25 or more holders of the DO-AZ award while they are in Arizona.

4. Working all Arizona counties with one DO-AZ holder of record.

All county hunters/SWLs are eligible to work towards the DO-AZ award. Use the official application form and submit with any required fee to obtain the DO-AZ award certificate.

Rules: Start making contacts towards the DO-AZ award now. Any and all contacts made on or after October 1, 1994 may count towards this award. List your contacts on the official application form and submit with the fee.

Category One. Contacts with any Arizona resident (full time) can be used to qualify for the Category One award. A full-time resident is defined as one who has an FCC address in Arizona. All contacts for Category One must be with a resident of that county. All contacts must be on any HF band below 30 MHz. Only contacts made on or after October 1, 1994 are eligible.

Category Two. To qualify for the Category Two award, you must make two or more HF contacts from each Arizona county. No other restrictions apply. Your contacts may be any mode or band. Same vehicle contacts are not allowed. Use contacts on or after October 1, 1994.

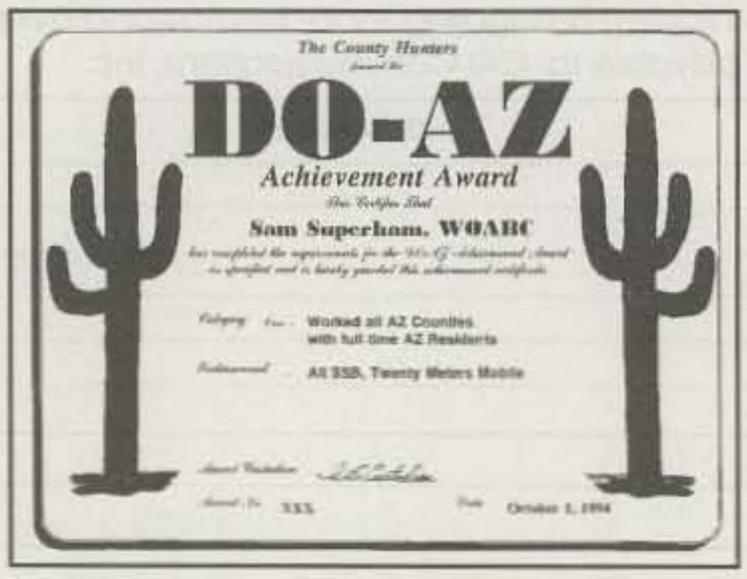
Category Three. Contacts for the Category Three award are valid only if made with the station after the date of their DO-AZ award. Make contact with 25 different DO-AZ holders. All contacts must be recorded in your log.

Category Four. All Category Four contacts with a single operator must be made after the date of that operator's obtaining the DO-AZ award (any category).

Contacts must be with a 2 × 2 or better signal report exchange.

The list of Arizona counties in the Log and Tracking book is the official list. Any new counties added to the state will be required for contacts beginning on the date of creation of the new county. The Log and Tracking book is available from The B&B Shop.

Any endorsement can be accommodated, but will not be numbered. Work the contacts any way you wish. Each category will be separately numbered. There



The DO-AZ Award is available for working Arizona counties.

Box 76, Pleasant Mount, PA 18453-0076

are no upgrades, nor any plaques.

There is a single fee of $1.00 made at the time of application for the award. The award is a certificate suitable for framing and is 8½" × 11".

The rules and application form for this award are available for an SASE to The B & B Shop, 12312 N. 37th Ave., Phoenix, AZ 85029. The application form must be used. Submit the application along with your list of contacts showing each county alphabetically within the state. Each contact must list the date, time, station worked, band, mode, and signal report received. The list of contacts does not have to have the band entered if for all one band, or does not have to have the mode entered if for all one mode. Use the application form to list your data.

Arizona Gold. Amateur operators qualifying for and earning all four categories of the DO-AZ award will be issued the Arizona Gold award at no cost. The Arizona Gold award is a special certificate honoring the person obtaining this very distinctive operating level.

Summary

That's it for this month. Please remember to send information on new awards to me at my address listed at the beginning of this column.

73, Norm, WA3RTY

CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

"Play-by-Play" Contesting—One Operator's Perspective

Based on the number of inquiries I receive every month, I'm led to believe that many of you truly wonder about operating strategy and operation from an East Coast USA contest station. Lately on Internet many folks have been providing their perspective on last fall's CQ WW DX Contests. So with that in mind, here's my shot.

What follows is a blow-by-blow summary of my Single Operator effort in the 1994 CQ WW DX SSB Contest. A few of you may have noticed that conditions have taken a marked downturn, and that weekend was absolute proof to most of us. Only 12 months earlier top scores were nearly double the final results of the 1994 weekends. Nevertheless, the analysis should prove to be interesting. Take the time to compare this commentary to your log. I'd love to hear your observations about similarities and differences in operating strategy and conditions.

The Beginning

As the clock approached 0000Z on Friday night, I was going through the usual gyrations of determining the best band to start on. When operating from K1EA's station, there are perhaps more options than other ops possess—stacked beams on 10/15/20, a full-size 40 meter Yagi, and a 4 square on 80 meters. With 20 meters wide open to Asia, I made my decision and found a spot, 14155, and waited for the "games to begin." The first 30 minutes of the contest were nothing short of exhilarating. In just the first 10 minutes I logged 28 stations. Fantastic multipliers such as HS, VS6, J28, 5Z, 5N, HL9, and others called in. My thinking was "Sunspot minimum—what minimum?" In fact, I was so busy that the second radio sat idle for nearly 45 minutes. It wasn't until 0050Z that things finally slowed down and I logged my first 80 meter QSO on the second radio. Well, as far as I was concerned, this was going to be a great contest weekend for sure!

As 0100Z approached, 20 meters was starting to die out, so I headed for 40 meters. Feeling good about my first hour (93 QSOs), I knew from past experience that 40 meter SSB had become a good East Coast run band. So, fired up and ready to go, I called CQ. Did anyone call? No! It became obvious 40 meters wasn't going to be the 40 meters of the past. Nevertheless, conditions weren't that bad, and I settled into the mode of working stations on both radios across 80, 40, and 20 meters. As 80 meters picked up, I began to call CQ, which really made use of the second radio productive. Operating with the second radio works best when your rate is slow and steady on the main station. Perfection is when things are slow enough that you can effectively tune with the second radio and still work guys at a decent rate on the main station. Effectively, it allows you to call CQ more often without feeling guilty about the rate being too slow, because you are also working guys on other bands at the same time. This was my mode of operation for most of Friday night. By 0400Z I had worked 281 stations, with nearly 30 of them on the second radio.

Although 80 meters wasn't great, it was a reasonable opening by K1EA standards. The rate was steady at about 50 to 60 per hour with a few terrific multipliers such as SU2MT, HZ1AB, Z32JA, and others calling in. Meanwhile, the second radio was logging TU2, 3DAØ, FR5, etc. One of my operating tricks is not only to work another station on the second radio, but to pass as many of those guys as possible to the main station. My view is that all activity on the second radio is incremental to the primary station. If it takes 5 minutes to successfully pass a double multiplier to 40 meters, that probably will be a double multiplier I would not work any other way. By 0400Z I had successfully passed 5 mults to 40 meters, while CQing away on 80. As the Russian comedian says, "What a country!"

One of the operating decisions I always struggle with is when to go to 160 meters. Most often I get so caught up in the 80-40-20 loop that I sometimes forget about the 1.8 MHz band! This year I hit 160 for the first time at 0423Z with not a European to be found. However, 12 multipliers (zones and countries) in 8 minutes made the trip worthwhile, and from there160 was more consciously added to the second radio portfolio.

Eighty meters continued to perform into the evening, although it was noticeably slower than usual. Was this a sign of things to come later in the weekend? As CT's F1 "CQ" button was pushed, I worked through my usual list of predictable openings on the second radio. My favorite is the 0600Z path to Africa on 20 meters. Sure enough, there they were with booming signals. In the course of 15 minutes I logged Z28, ZS, V5, C5, and others. Meanwhile, 80 meters continued to cook at 40–50 hour. By 0700Z I was up to 400 QSOs and feeling pretty good about things. In fact, much to my amazement, I was actually 20 QSOs ahead of my total from two years ago!

By 0800Z the usual doldrums began to arrive. Operating was now a game of rapidly moving among 20, 40, 80,and 160 meters. I tend to view band changing at this point as looking at one big band, not as a conscious move from one band to another. The goal is always put more QSOs in the log—wherever you can find them!

Saturday Morning—Where Is Everybody?

As 1000Z approached, the thought "Why isn't 20 meters open to Europe?" began to cross my mind. After all, conditions began with a

Internet: p00259@psilink.com
Compuserve ID: 71301,424

Calendar of Events

Jan.	**27-29**	**CQ WW 160 M CW Contest**
Jan.	28-29	U.B.A. SSB Contest
Jan.	28–Feb.5	ARRL Novice Roundup
Feb.	4	North American CW Sprint
Feb.	4-5	New England (Combined) QSO Party
Feb.	5-6	1995 Classic Radio Exchange
Feb.	11	North American SSB Sprint
Feb.	11-12	Dutch PACC Contest
Feb.	11-13	YLRL YL-OM SSB Contest
Feb.	18-19	ARRL CW DX Contest
Feb.	18-19	YL-ISSB SSB QSO Party
Feb.	19	Colorado QRP Club Winter QSO Party
Feb.	**24-26**	**CQ WW 160 Meter SSB Contest**
Feb.	25-26	U.B.A. SSB Contest
Feb.	25-27	YLRL YL-OM CW Contest
Mar.	4-5	ARRL SSB DX Contest
Mar.	11-12	DIG QSO Party
Mar.	12-13	Wisconsin QSO Party
Mar.	14-15	CLARA & Family HF Contest
Mar.	18-19	Bermuda Contest
Mar.	**25-26**	**CQ WW SSB WPX Contest**
Apr.	1-2	EA RTTY Contest
Apr.	22-23	Friendship Contest
Apr.	29-30	Helvetia (HB9) Contest
May	6-7	ARI International DX Contest
May	**27-28**	**CQ WW CW WPX Contest**

February's Contest Tip

When does one QSY from a run frequency? This is one of the hardest operating strategies to learn in contesting. I tend not to overreact by moving too quickly. Think of it like the stock market: How many stocks have you sold at $20 per share in panic that eventually closed at $45 just 3 short months later? An extra 5 to 10 minutes of patience on a run frequency will often pay off in the long run.

More CQ WW Errata

The operators of K4VX in the 1993 CQ WW DX Contest should have been listed as WX9E on SSB and WX3N on CW. These were both fine operating efforts and recognition is due to both Paul and Dave.

C31LJ (AB6WM operator) was erroneously omitted from the 1993 SSB results. Peter's final score was 362,570 points.

4O7AV should have been listed as #5 Europe in the European Top Ten Box in the 1993 SSB results.

4N1T should have been listed as #7 Europe in the European Top Ten Box in the 1993 SSB results.

Ameritron *doubles* average SSB power . . .

NEW AL-80B kilowatt output desktop linear can double your average SSB power output with high-level RF processing . . . it also runs cooler because its Eimac 3-500Z tube completely turns off between words . . .

Ameritron's all NEW AL-80B kilowatt *output* desktop linear can *double* your average SSB power output with high-level RF processing using Ameritron's exclusive *Dynamic ALC™*.

You get cooler operation because the AL-80B's exclusive *Instantaneous RF Bias™* completely turns off the Eimac 3-500Z tube between words. It saves hundreds of watts wasted as heat.

You get a full kilowatt PEP *output* from a whisper quiet desktop linear. It's a compact 8½"H x14"D x15¼" W and plugs into your nearest 120 VAC wall outlet. Covers all bands 160-15 Meters, including WARC and MARS bands (user modified for 10/12 Meters with license).

You get 1000 watts *output* on SSB, 850 watts *output* on CW, 500 watts *output* on RTTY, an extra heavy duty power supply, genuine Eimac 3-500Z tube, nearly 70% efficiency, tuned input, Pi/Pi-L output, inrush current protection, multi-voltage transformer, dual Cross-Needle meters, QSK compatibility, Two-Year Warranty, Made in USA, plus much more for only $1195.

Dynamic ALC™ doubles average SSB power

The AL-80B's exclusive *Dynamic ALC™* gives you high-level low-distortion RF processing. When activated, it can more than double your *average* SSB power and produce up to 6 dB improvement in intelligibilty. It maximizes your talk power without distortion and splatter.

A convenient front panel control lets you adjust your output power level.

Instantaneous RF Bias™ eliminates heat

The AL-80B's exclusive *Instantaneous RF Bias™* completely turns off the Eimac 3-500Z tube (except filaments) between words and dots and dashes. It eliminates hundreds of watts wasted as heat to give you cooler operation and longer component life.

Gutsy Heavy-Duty Power Supply

The guts of the AL-80B is its heavy ***heavy*** duty power supply. A 26 pound transformer using a high silicone steel core, computer grade capacitors, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give you a stiff 2700 volts fully loaded. Many amplifiers using *two* 3-500Zs use such small power supplies they don't deliver much more power output than the AL-80B.

NEW! $1195 Ameritron AL-80B Suggested Retail

Genuine Eimac® 3-500Z Tube

The AL-80B uses a *genuine* Eimac® 3-500Z tube warranted by Eimac® -- not cheaper, less reliable 3-500Zs used by some competitors.

600 WATTS OUT . . . $649

A tough low cost linear with REAL transmitting tubes!

Ameritron's new AL-811 linear amplifier gives you plenty of power to bust thru QRM. You get a quiet desk top linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet.

You get three tough vertically mounted 811A transmitting tubes, extra heavy duty power supply, all HF band coverage, pressurized ventilation, tuned input, dual illuminated meters, adjustable ALC, standby switch, transmit LED, UPS shippable and much more.

Select the 3 tube 600 watt out AL-811, $649 -- or the new 4 tube 800 watt out AL-811H, $795.

70% efficiency

The AL-80B is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep RF from leaking out. This keeps RFI and TVI to a minimum.

Superb RF design and layout, Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. Your power goes into your antenna instead of heating up your amplifier.

A whisper quiet internal fan draws in cool air over power supply components and pressurizes the 3-500Z tube compartment to remove heat for longest life.

Tuned Input lets your rig deliver full output

A 50 ohm broadband Pi-Network *tuned input* is used.

Pi/Pi-L Output Network

A carefully designed Pi/Pi-L output network using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide matching range, full band coverage and peak performance at all power levels.

Has ball bearing vernier reduction drives with logging scales on plate and load controls.

Step-Start Inrush Protection™

Step-Start Inrush Protection™ stops damaging inrush current with a start up sequence that's *easy* on your tube and power supply components.

Multi-Voltage Power Transformer

Ameritron's exclusive *Multi-Voltage Power Transformer* lets you optimize for different line voltage. You can select from 14 different *primary* voltages from 90 to 140 VAC and 205 to 250 VAC.

Dual Illuminated Cross-Needle Meters

Ameritron's dual illuminated cross-needle meters give you *four separate meters* to monitor your operating conditions -- you can tell right away if something is wrong.

QSK Compatible

The fast *custom* T/R (transmit/receive) relay in the AL-80B switches nearly as fast as some vacuum relay QSK T/R switches.

For *lightning fast* QSK operation use the optional external Ameritron *electronic PIN diode* QSK-5 T/R switch or the internal QSK-5PC. Please contact Ameritron for details.

Plus more . . .

An *Standby* switch lets you run barefoot, but you can instantly switch to full power if you need it.

Has transmit LED; 12 VDC, 200 mA jack; 12 VDC keying relay for solid state and tube rigs; tough, nearly indestructible Lexan-over-aluminum front panel. Two year limited warranty.

AMERITRON offers the best selection of legal limit linears!

These 3 rugged linears all use a super heavy duty hypersil® power supply capable of 2500 watts!

Ameritron's most powerful amplifier

AL-1500 **$2695.00** Suggested Retail

Ameritron super power amplifier uses the herculean Eimac® 8877 ceramic tube.

It's so powerful that 65 watts drive gives you full legal output—and it's just loafing because the power supply is capable of 2500 watts PEP.

Ameritron's Dual 3-500Z linear

AL-82 **$2095.00** Suggested Retail

This linear gives you full legal output using a pair of Eimac® 3-500Zs. Some competing linears using dual 3-500Zs don't give you 1500 watts because their lightweight power supplies can't use the tubes to their full potential.

Ameritron's 3CX1200A7 linear

AL-1200 **$2195.00** Suggested Retail

Get ham radio's toughest tube with the Ameritron AL-1200—the Eimac 3CX1200A7. It has a 50 watt control grid dissipation—12 times tougher than the 4 watt rating of the 3CX800A7—yet you get the same full legal output as you get from a *pair* of 3CX800A7s.

AMERITRON brings you the finest high power accessories!

Legal limit antenna tuner

ATR-15 **$399** Suggested Retail

Ameritron — *the high power specialist* — brings you the ATR-15 antenna tuner that's designed for legal limit amplifiers. Heavy duty silver plated bandswitch virtually eliminates switch failure. High power transmitting capacitors. 1.8-30 MHz. Peak reading SWR/wattmeter. 6 position antenna switch. Selectable 1:1 or 4:1 balun. 5¼ x 13¼ x 13½ inches. Meter lamps uses 12 VDC.

Legal Limit Dummy Load

Oil cooled 50 ohm dummy load. Handle 1500 W for 5 min. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz. 7½" H x 6 5/8" D. **ADL-1500X** without oil, $39.95. **ADL-1500** with oil, $59.95

ADL-1500X **$39.50** Suggested Retail

Remote Coax Switches

RCS-8V **$149** Suggested Retail

RCS-8V, DC-UHF 5 KW Coax Switch. Replace 5 coax feedlines with one with this Remote Coax switch. Weatherproof box mounts outdoors on your tower or mast. Attractive control unit sits on your operating desk. Low SWR to 250 MHz. Usable to 450 MHz. Low loss. Rated at 5 KW to 30 MHz, 1 KW at 150 MHz. **RCS-8VN, $159.00** with "N" connectors.

RCS-4, $134.00, 4 position HF switch. Similar to RCS-8V. No control cable needed. Handles 1500 watts continuous.

RCS-4 **$134.50** Suggested Retail

QSK-5 Pin Diode T/R Switch

$349 QSK-5 Suggested Retail

Self-contained, connects externally to most HF amplifiers. Handles 2.5 KW PEP, 2 KW CW. Six time faster then vacuum relay. 6x4x9½ inches.

Step-Start Inrush Current Protector

Stops power up inrush current and absorbs momentary high voltage spikes to your amplifier. ICP-120 for 110-120V or ICP-240 for 220-240 VAC.

ICP120/240 **$79** Suggested Retail

AMERITRON

. . . the high power specialist

921 Louisville Rd. • Starkville, MS 39759

(601) 323-8211 • **FAX:** (601) 323-6551

Free Catalog/Nearest Dealer: **800-647-1800**

8 a.m. - 4:30 p.m. CST, Monday - Friday

Prices and specifications subject to change. © *1992 Ameritron*

CIRCLE 5 ON READER SERVICE CARD

bang at the start of the contest. As 1000Z came and went I managed a 20 meter QSO with VA3MM at 1017Z, followed by my first European contact with 9A7A at 1051Z! There was something very wrong here. Europeans were reasonably loud, but more than half of them called CQ in my face. Had Ken's tower fallen down? Maybe I had inadvertently been using his 160 meter dipole. What really happened was a major solar flare at 1013Z! At this point, it was certain that no USA all-band records would be broken this weekend. Twenty meters was so hopelessly disturbed that by 1200Z I was still working guys on 40 meters (usually things are so busy that the second radio takes a back seat at this point), and I had only worked 30 Europeans on 20! The 12Z hour wasn't much better, with only a paultry 45 QSOs. These were some of the most miserable conditions I had ever experienced. In the timespan of 1257Z to 1317Z, I only logged 3 QSOs. Finally, at 1325Z things began to work better on 20 meters and an actual "run" developed. As 20 meters ran, more or less, I continued to comb 15 and 10 meters (yeah, right!), thinking about the old days of running Europe on those bands. My throat still hurts from screaming and eventually working F6BEE for my first European on 15 meters at 1354Z! This is in stark contrast to the days of running 10 meter Europeans at 1100Z just a few short years ago.

It was pretty clear at this point that the 1994 CQ WW SSB Contest was going to be a 20 meter affair. So run on 20 I did, as the second radio again became invaluable to snare 15 meter multipliers and even pass a few of them to my 20 meter run frequency. By 1700Z on Day 1, I had less than fifty 15 meter QSOs in the log and only a couple of Europeans. Amazingly, my very first 10 meter QSO was not made until 1736Z.

There was one brief glimmer of hope as 15 meters opened briefly to Europe around 1730Z. During a 45 minute period I managed to work about 35 Europeans with the assumption that it would not be possible on Sunday at all. In retrospect, Sunday turned out to be much better, but it was still the right thing to do. As 1800Z came along two things were happening to me in the contest. On 20 meters I was finally having a great run to Europe (70 QSOs in 30 minutes). Remember, essentially I had not worked anyone yet, so it was bound finally to be productive. The other activity was my participation in what seemed to be the "LU QSO Party" on 10 meters. Where have all the LU operators come from in recent years? It was just terrific as I combed the band for over 30 of them in a 2½ hour period.

QSO Number 1000

It wasn't until 1914Z that I finally worked my 1000th QSO. This is in sharp contrast to 1992, when I had 1000 QSOs at 1255Z and 1881 QSOs at 1914Z! It probably comes as no surprise to you that 20 meters closed early to Europe. By 2000Z I was basically done running stations, which made for a "fascinating" next 16 hours of running around calling guys for the most part. There was some excitement, however, at around 2300Z on 40 meters. A quick CQ yielded a pretty good pile-up of Europeans that resulted in a brief run of 45 stations in 37 minutes, including a 5X, H20, and GU calling in.

Moving Into Day 2

As Day 1 ended, I crossed the 1165 QSO mark. It sure seemed like a lot of work to make those contacts when compared to previous years. Day 2 could only be better, I thought, and it did start with some interest. As I ran stations on 40 meters, I was able to catch some real good ones on 20 meters over the North Pole, including JT, BY, and a few JAs. But it was clear that this was going to be a long night. In fact, I took my first of several off times at 0115Z for 2½ hours—much more than I usually do—only to find conditions to be terrible on 80 meters. Amazingly, I did not work a single European on 80 meters the second night until 0627Z! My only QSO on that band for the entire evening previously was KY1H. Wow! Another off time was taken between 0445Z and 0600Z, followed by yet another at 0800Z and even another at 0945Z. It seemed as if Sunday morning was going to be another repeat of Saturday, as I didn't work my first 20 meter European until 1139Z.

Unlike Saturday, though, 20 meters perked up rapidly when it finally did open. I completely avoided the screaming and yelling on the bottom of the band and found a nice clear spot near 14295 where the running was just fine. After working three or four 15 meter Europeans on the second radio, I was resigned to the fact that there would be little Europe this weekend on that band. In what was probably the biggest surprise of the weekend, the propagation gods turned on the big 15 meter switch at 1500Z, and low and behold, I was able to run Europe. Finally, contesting East Coast style ensued. After working 80 QSOs in the first half hour, the second radio had again become dormant. Another 80 contacts were logged between 1530Z and 1600Z. They just kept on calling until approximately 1700Z when the sun realized that this was an obvious bug in its propagation program and boom! The Europeans vanished as fast as they had arrived. At least now I was only 1300 QSOs behind my 1992 totals!

The runs on 20 meters were much better on Sunday as well, mirroring the results achieved on 15. At 1805Z I ran into an interesting situation, as someone had obviously spotted me on the Athens, Greece PacketCluster system. Six SV2 stations (with obvious differences in audio and signal strength) called in. It was probably my first and only SV pileup ever. Maybe I should go split next time?

The Final Push

With the contest now winding down, I was feverishly looking for "easy" multipliers such as KH6 and ZL on 15 meters, and a XE on 10. As it turned out I found most of them and also managed to snag some other goodies such as 5W, ZK2, and V7. Did the contest end with me running JAs on 15 meters? Hardly. Rather, I worked about 20 Canadians on 80 meters and ended with a double call to YU7AV on 3783 kHz. Just think of the advantages of no JAs at the end, though. It's easy to QSY to 3830 to report your score. And there's no need to strain your tired ears trying to keep your JA unique rate under 40%. There is some good news with bad conditions.

Some people have accused stations such as K1EA and others to be in a different galaxy when it comes to signal strength and station capability. Maybe the experiences I've shared here will confirm that for you. No matter what, things can only look up. The bottom of the cycle has arrived, in my book.

Final Comments

Although I indicated that we would run the results of the 1994 *CQ* Contest Survey this month, there were a large number of late responses arriving at press time. You'll be sure to see it next month instead.

Remember to send your contest announcements to me no later than March 1st to be included in the May edition of *CQ*. As I've said in the past, soft copy or E-Mail versions of your announcements are preferable to hard copy whenever possible.

73, John, K1AR

Vermont QSO Party

0000Z Sat. to 0700Z Sun., Feb. 4–5

This is the 37th annual Vermont QSO Party sponsored by the Central Vermont Amateur Radio Club. This is a great opportunity to work one of the rarest states on several bands. Participation is open to all licensed radio amateurs worldwide on 160–2 meters.

Classes: Single or multi-operator all bands, club, QRP, mobile.

Exchange: Vermont stations send RS(T), county (14 total), and state. Others send RS(T) and state/province/DXCC country.

Frequencies: Phone—first 25 kHz up from the beginning of the General band and Novice 10 meter band. CW—40 kHz up from the bottom edge of the bands and 20 kHz up from the bottom of Novice portions. VHF—50.200, 144.20, and 146.69 MHz. Other modes can be used. Repeater contacts do not count.

Scoring: Credit 5 points per phone QSO and 2 points for CW, digital-mode QSOs. Non-Vermont stations multiply total QSO points by the number of VT counties and special-event QSOs with W1BD, WA1ABI, WB1CAF, WB1FPT, WB1GQR, W1KOO, WA1LCH, WA1LYR, WA1PCX, or WA1WLM. Vermont stations follow similar format with the addition of states/provinces/DXCC country multipliers. Stations may be worked up to four times per band (SSB, CW, RTTY, etc.).

Awards: Vermont stations submitting a log will receive a Vermont QSO Party certificate. Plaques will be awarded to the three highest scoring Vermont stations. Special certificates will also be awarded for the highest scoring station in each state, province, and DXCC country.

Send your postmarked entries no later than March 1, 1995 to: Central Vermont Amateur Radio Club, Vermont QSO Party, P.O. Box 674, Montpelier, VT 05602. Be sure to include an SASE for final results.

New Hampshire QSO Party

1300Z Sat. to 0700Z Sun., Feb. 4–5

This year's party is again sponsored by the NH Amateur Radio Association. It is New Hampshire stations working all others. As with

most QSO parties, the same station may be worked once on each band mode.

Classes: Single or multi-operator all bands, club, QRP, mobile.

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

Scoring: All stations credit 1 point/SSB QSO and 2 points digital QSO (RTTY, CW, packet). NH stations multiply QSO points by number of NH counties, states, provinces, and DXCC countries. Others simply use counties. Count 5 points for phone and 10 points for CW when working the bonus stations: W1ET, WB1CAG, W1WQM, W1WA, KA1FYB, N1KLP, KC1XG, WB1HBB, AA1EX, W1GUA, WB1ASL, K1BKE, and W1OC.

Final Score: Final score is calculated by multiplying QSO points times total multiplier and adding bonus points.

Frequencies: CW—1810, 3535, 7035, 14035, 21035, 28035. SSB—1875, 3935, 7235, 14280, 21380, 28320, 50115, 144205. Repeater QSOs do not count.

Awards: New Hampshire stations submitting a log will receive a New Hampshire QSO Party certificate. Plaques will be awarded to the three highest scoring New Hampshire stations. Special certificates will also be awarded for the highest scoring station in each state, province, and DXCC country.

Logs must be received no later than 30 days after the contest. Be sure to include an SASE for final results. Send logs and comments to: G.E.A.R.S., Conrad Ekstrom, WB1GXM, P.O. Box 1076, Claremont, NH 03746-1076.

Maine QSO Party

1300Z Sat. to 0700Z Sun., Feb. 4–5

This one is sponsored by the Portland Amateur Wireless Association. This is a great opportunity to work a rare state and/or counties on several bands.

Classes: Single (high and low power) or multi-operator all bands, club, QRP, mobile. The use of spotting nets is prohibited.

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

Scoring: All stations credit 1 point/SSB QSO and 2 points digital QSO (RTTY, CW, packet). ME stations multiply QSO points by number of ME counties, states, provinces, and DXCC countries. Others simply use counties. Count 5 points for phone and 10 points for CW when working the bonus stations: WA1URS, K1JB, W1TLC, N1JBD, NS1Z, K1CUP, K1BUG, K1YXV, KD1HH, KC1DG, and WA1WPR. The same station may be worked once on each band mode.

Final Score: Final score is calculated by multiplying QSO points times total multiplier and adding bonus points.

Frequencies: CW—1810, 3535, 7035, 14035, 21035, 28035. SSB—1875, 3935, 7235, 14280, 21380, 28320, 50115, 144205. Repeater QSOs do not count.

Awards: Maine stations submitting a log will receive a Maine QSO Party certificate. Plaques will be awarded to the highest scoring Maine stations in each category and the overall high score outside Maine. Certificates will also be awarded for the highest scoring station in each state, province, and DXCC country.

Logs must be received no later than March 31, 1995. Be sure to include an SASE for final results. Send logs and comments to: Portland Amateur Wireless Association, P.O. Box 1605, Portland, ME 04104.

1995 Classic Radio Exchange

1900Z Sat. to 0400Z Sun., Feb. 5–6

The Classic Radio Exchange, "CX," is a celebration of the older commercial and homebrew equipment that was the pride of our ham shacks a few decades ago. Exchange your name, RST, QTH, receiver and transmitter type, and other interesting conversation.

Frequencies: CW—60 kHz up from lower band edge. Phone—3880, 7290, 14280, 21380, 28320 kHz. Novice/Technician operate 20 kHz up from lower band edge.

Scoring: Multiply total QSOs by the sum of the total number of states, provinces, and DX countries plus the total number of different receivers and transmitters worked on each band/mode and numbers of states/provinces/countries worked per band/mode. Your final score is calculated by multiplying this total times the sum age of all the equipment used during the event.

Send logs, comments, anecdotes, and pictures to: Jim Hanlon, W8KGI/5, P.O. Box 581, Sandia Park, NM 87047. Include an SASE for a copy of the club's next newsletter.

North American "Sprint"

CW: Feb. 4 SSB: Feb. 11
Sunday 0000Z to 0400Z (Sat. night)

This is the spring edition of the "Sprint" run by the *National Contest Journal*. As the name implies, it's a shorty, only four hours long.

North Americans will be contacting other North American stations as well as stations in other countries, single operator only. North American boundaries are as defined by the rules used in the CQ WW DX Contest. Refer to the *NCJ* for additional information.

YLRL YL-OM Contest

SSB: 1400Z Sat. to 1400Z Mon., Feb. 11–13
CW: 1400Z Sat. to 1400Z Mon., Feb. 25–27

Sponsored by the Young Ladies Radio League, this annual event is open to all licensed men and women operators around the world.

Exchange: Callsign, QSO number, RS(T), ARRL section/VE province/country.

Scoring: Phone and CW are considered separate contests. Score 1 point for each station worked. YLs only work OMs and OMs only work YLs. Credit a special multiplier of 1.5 if you are using 100 watts or less on CW and 200 watts PEP on SSB. Final score is the total QSO points times the sum of ARRL sections, provinces, and countries worked per band.

Frequencies: CW—3540–3725, 7040–70, 14040–070, 21120–150, and 28150–200 kHz. SSB—3940–70, 7240–70, 14175–280, 21380–410, 28300–610 KHz.

Awards: Special cups will be awarded to the winning phone and CW YL and OM. Certificates will be sent to the high scorers in each US call area, VE province, and DX country, provided there are at least ten valid QSOs in the log.

All logs must postmarked no later than 30 days after the contest and should be sent to: Carla Watson, WO6X, 473 Palo Verde Dr., Sunnyvale, CA 94086.

Dutch "PACC" Contest

1200Z Sat. to 1200Z Sun., Feb. 11–12

It's the world working The Netherlands on all six bands, 1.8 through 29.7 MHz, in the band sections recommended for contest operation by the IARU. The same station may be worked on each band, but on one mode only, phone or CW, for QSO and multiplier credit. Note that SSB QSOs are not allowed on 160 meters.

Categories: Single operator, multi-operator, and SWL.

Exchange: RS(T) plus a QSO number starting with 001. Dutch stations will add two letters to identify their province. There are 12 provinces: DR, FR, GD, GR, LB, NB, NH, OV, UT, FL, ZH, and ZL.

Scoring: Each QSO with a PA/PB/PI station counts one point. DX stations determine their multiplier by the number of provinces worked on each band (maximum of 72).

Final Score: Total number of QSOs times the number of provinces worked on each band.

Awards: Certificate to the top-scoring station in each category in each country and call areas of JA, LU, PY, UA9/Ø, VE/VO, VK, W/K, ZL, and ZS. Also second- and third-place awards if returns justify.

SWLs must log the call of the Dutch station as well as the station being worked and both serial numbers. Scoring same as above. Indicate the multiplier in a separate column in your log only the first time it is worked on each band. Include a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration.

Mailing deadline is March 31st to: PACC Contest, Att: F. Th. Oosthoek, PAØINA, P.O. Box 499, 4600 AL Bergen op Zoom, The Netherlands.

YL ISSB QSO Party

0001Z Sat. to 2359Z Sun., Feb. 18–19

This party is open to all, but the emphasis is on membership participation. Rules and logging format are much too lengthy and complicated to list here. Send a large SASE to KØETA for more details.

Categories: Single operator, DX-US Partners, and YL-OM Teams.

Exchange: Call, name, QTH (state, province, territory, district, or country), name, ISSB number, YL-OM teammate, DX-US partner.

Points: One point for non-member contacts, 3 points for member contacts on the same continent, and 6 points if in a different continent.

Multiplier: Only contacts with member stations count as a multiplier. In addition, credit one multiplier for working both DX-W/K partners, each YL/OM team, US state, VE province, DXCC country, and each VK, ZL call area. Use a multiplier of 5 for low power (less than 200 watts).

Frequencies: The General portions of the CW and phone bands, 10 through 80 meters. Avoid 14332 used by ISSB Net. Check 40 and 80 hourly.

Awards: Category and QTH area winners.

Special certificate to the top combined CW and phone score.

Logs: Should be set up as outlined in the exchange and should indicate at least two 6-hour rest periods. A summary sheet showing the scoring and other essential information would be helpful.

The mailing deadline for all entries is April 30th and should be sent to: Rhonda Livingston, N4KNF, 2160 Ivy Street, Port Charlotte, FL 33952.

ARRL International DX Contest

CW: Feb. 18–19 Phone: Mar. 4–5
0000Z Saturday to 2400Z Sunday

This is a great DX contest that you should not miss. Study the announcement in the December issue of *QST* for more details. Also send a large SASE (2 IRCs for DX) for sample log and entry forms.

All bands may be used, 1.8 through 28 MHz, but not 10, 18, or 24 MHz. Aeronautical or maritime mobile stations cannot be worked for contest credit. Following is a brief outline.

Categories: Single operator, both single and all band, and single operator assisted. Multi-operator, one transmitter and two transmitters. Also multi-operator, multi-transmitter. And QRP, all band only (5 watts or less output). Multi-transmitter stations must remain on a band at least 10 minutes once a contact is made.

Exchange: RS(T) and state or province for W/VE; RS(T) and power input for DX stations (three-digit number).

QSO points: W/VE stations earn three points for each W/VE contact.

Multiplier: Each DXCC country worked on each band for W/VEs. DX stations use US states (48), District of Columbia (DC), and VE provinces (13) for their multiplier. (Maximum multiplier of 63 per band.)

Final Score: Total QSO points times the sum of the multiplier from each band. Entries with 500 or more QSOs must include a QSO check sheet.

Awards: Certificates given in each category, in each country, and in each ARRL section, plus a wide selection of plaques. Also certificates to DX stations making over 500 QSOs.

Log entries are accepted on 5¼ inch MS-DOS formatted diskettes. Submit an ASCII file along with a signed summary sheet. No paper logs are required with this method.

Disqualification regulations will be strictly enforced and are listed in the official rules. Mailing deadline for all entries is April 5th, and they go to: ARRL DX Contest, 225 Main Street, Newington, CT 06111.

CQ WW 160 Meter SSB Contest

2200Z Fri. to 1600Z Sun., Feb. 24–26

Just a reminder that the SSB section of *CQ*'s 160 Meter Contest will be coming up the last full weekend of this month. Extensive coverage has been given to this event, with complete rules in the November issue.

Mailing deadline for your entry in last month's CW contest is February 28th, and March 31st for this month's SSB section.

They should be sent directly to the 160 Contest Director, David L. Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092. (Please indicate CW or SSB on the envelope.)

CQ SHOWCASE *(from p. 76)*

Contact East Catalog

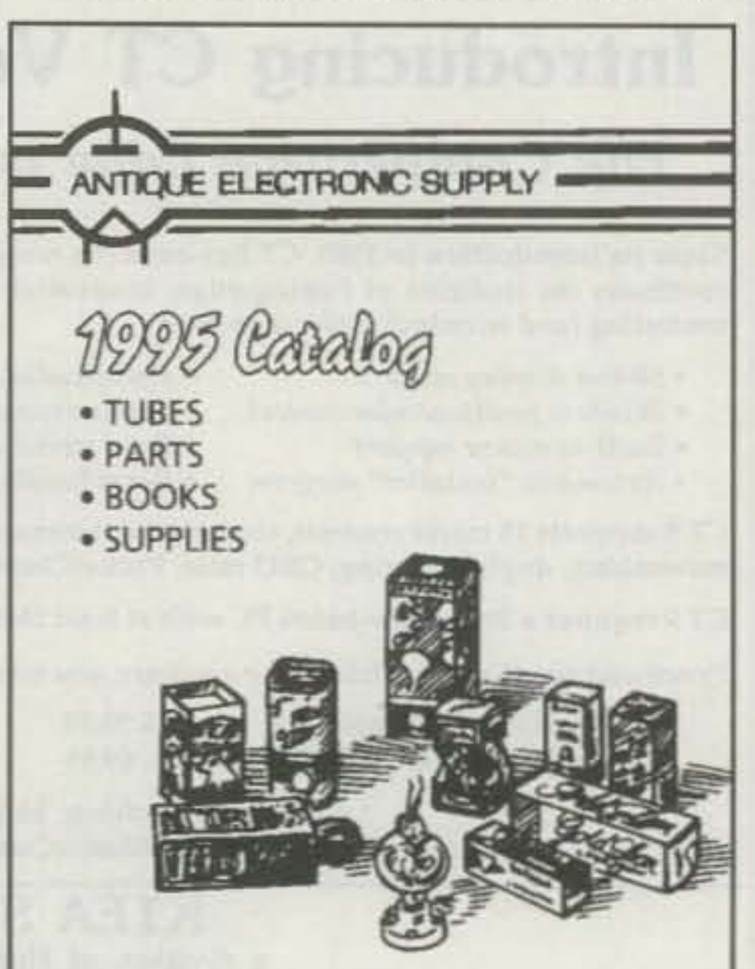
Contact East's 48-page catalog features hundreds of test instruments and tools for engineers, managers, technicians, and hobbyists. Included are products for testing, repairing, and assembling electronic equipment, such as DMMs and accessories, soldering tools, custom tool kits, EPROM programmers, power supplies, reference books, adhesives, cases, and more.

To receive a free copy of the catalog write to Contact East, 335 Willow St., No. Andover, MA 01845 (508-682-2000; FAX 508-688-7829), or circle number 101 on the reader service card.

AES Catalog

The 1995 Antique Electronic Supply catalog features over 3000 types of receiving, audio, transmitting, and industrial tubes, plus an extensive line of capacitors and other items needed for repair or construction of tube-type electronic equipment. Also in the catalog are over 75 book titles covering collecting, restoration, and related subjects.

For a copy of the catalog, contact Antique Electronic Supply, 6221 South Maple Ave., Tempe, AZ 85283 (602-820-5411; FAX 800-706-6789), or circle number 102 on the reader service card.



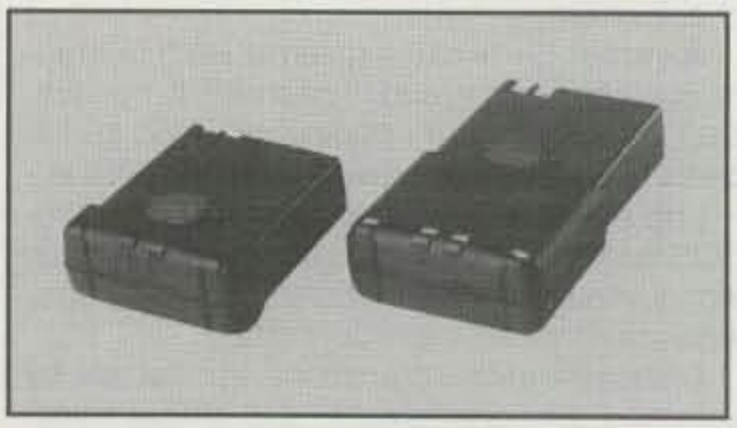
The Tool Resource Hex-Wik Desoldering Braid

The Tool Resource has available a Hex-Wik desoldering braid. The Hex-Wik desoldering braid works quickly while safely desoldering components from PC boards and terminals.

The braid removes the solder so that the desoldering joint is left clean and ready for resoldering. For more information, contact The Tool Resource, P.O. Box 1106, West Dundee, IL 60118 (phone/FAX 708-468-0849), or circle number 103 on the reader service card.

W & W Replacement Batteries And Battery Eliminators

Replacement batteries for the Kenwood TH22AT, TH42AT, and TH79A transceivers are now available from W & W Associates. Battery capacities are 6 V @ 600 MAH, 6 V @ 1200 MAH, and 9.6 V @ 600 MAH.



Replacement batteries are also available for the Yaesu FT11R/ 41R, 51R. In addition to replacement batteries for the FNB31, FNB33, and FNB38, W & W has added two higher capacity versions—4.8 V @ 1500 MAH and 7.2 V @ 1500 MAH.

Battery eliminators are available for Alinco, E.F. Johnson, G.E., ICOM, Kenwood, Kyodo West, Maxon, Midland, Motorola, Radio Shack, Standard, and Yaesu. For further infor-

mation contact W & W Associates, 800 South Broadway, Hicksville, NY 11801-5017 (in U.S. and Canada 800-221-0732; in NY state 516-942-0011), or circle number 104 on the reader service card.

Azden PCS-9600D Packet Radio

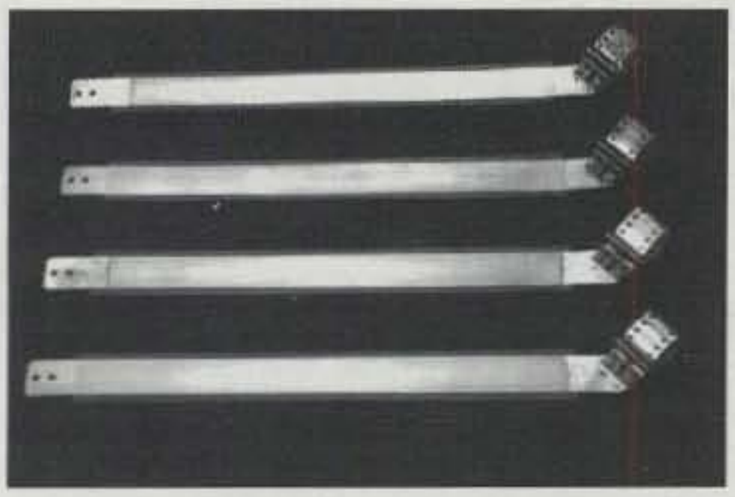
Azden Corporation has announced their newest 35 watt, digital packet radio, the PCS-9600D. The transceiver incorporates 35 watts of high-power output, 20 kHz wideband IF,

wide frequency range from 430–450 MHz, and solid-state diode TX/RX switching. A full touch-tone microphone is included for voice operation when needed. The unit is priced at $649.

For further information, contact Communications Division, Azden Corp., 147 New Hyde Park Road, Franklin Square, NY 11010; phone: 516-328-7501; fax: 516-328-7506, or circle number 105 on the reader service card.

PolyPhaser Corp. Cable Grounding Kits

PolyPhaser® Uni-Kit 2 Cable Grounding Kits are available in four combinations to address specific grounding needs and applications such as aluminum or copper coaxial lines to galvanized tower legs. In such applications, the ground connection end of the strap is specially coated to minimize dissimilar metal problems when bonding. The integration of weather protected copper strap as a conductor for the grounding kit provides an improved surface area connection to the cable that reduces



the inductance. The strap also reduces the resistance path to ground. Kit variations include copper to copper, copper to tin, tin to tin, and tin to copper. The design fits cables from 1/4 inch to 2 inch diameter and elliptical waveguides up to EW28. Standard weatherizing materials are included to seal the connection. To secure the attachment, two (NEMA spaced) 1/4 inch holes and 3/4 inch 18-8 stainless steel hardware is provided.

For more information concerning the Uni-Kit 2 as well as other lightning/EMP and grounding solutions contact: PolyPhaser Corporation, Customer Service/Sales Dept., P.O. Box 9000, Minden, NV 89423-9000 (800-325-7170; 702-782-2511), or circle number 106 on the reader service card.

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Amateur and Commercial Radio Operator Exams Frequently Asked Questions

Amateur radio license testing was privatized about ten years ago. Up until that point the FCC's Field Operations Bureau administered all amateur radio operator examinations at their district offices and in various other cities around the country.

The privatization of radio license testing began on September 13, 1982 when President Ronald Reagan signed legislation into Public Law 97-259. The new law permitted the FCC to utilize the services of amateur radio operators to prepare and administer amateur radio license examinations.

The W5YI Group was the first to apply to become a National Volunteer Examiner Coordinator, and the first VEC to offer amateur radio testing on a nationwide basis. We believed that if amateurs would volunteer their time to administer the Novice test (which they had for decades), then they would also be willing to administer them all. We were right!

In total, about two dozen organizations eventually applied to coordinate amateur radio operator license testing. Today, ten years later, eighteen of these groups are still in business. Only two of these coordinators, however (the American Radio Relay League and the W5YI Group), account for nearly 90% of all test sessions administered.

Amateur radio self-testing proved to be very successful. The examinations were kept more current, they were more widely available, and the cost to the taxpayer was less—a win-win situation for all!

A couple of years after turning amateur radio testing over to the amateur community, the FCC issued a Notice of Inquiry asking whether commercial radio operator testing should also be privatized. The answer came back "Yes!" However, the law did not yet provide for privately administered commercial radio exams.

In 1990 the FCC asked for, and received, statutory authority to delegate the preparation and administration of commercial operator examinations to one or more private organizations.

Change came slowly, however. It took another three years to go through the required law-making process. Privatized commercial radio exams began in the fall of 1993. The FCC selected nine Commercial Operator License Examination Managers—or COLEMs as they are known—to administer the program. The Part 13 Commercial Radio Operator rules were also completely re-written.

The FCC's field offices are now completely out of radio operator license testing and no longer administer examinations of any kind. W5YI Group, Inc. is the only organization that was selected by the Commission to be both a VEC and a COLEM. Its amateur testing branch is known as the W5YI-VEC. Commercial radio operator testing is handled through its National Radio Examiners division.

The W5YI Group has a separate department which distributes both amateur and commercial radio operator license preparation materials to the public. Amateur and commercial radio operator education and exams are our only business.

All VECs and COLEMs operate under a Memorandum of Agreement with the FCC to prepare and administer all examinations and to process the license application paperwork. Last year our organization administered some 50,000 amateur

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

AMATEUR RADIO OPERATOR QUESTION POOLS

Examination Element & Description		Questions in Pool	Questions in Exam	Questions Correct to Pass
2	Novice	346	30	22
3A	Technician	295	25	19
3B	General	290	25	19
4A	Advanced	497	50	40
4B	Amateur Extra	432	40	30
Total Amateur Questions:		**1,860**		

COMMERCIAL RADIO OPERATOR QUESTION POOLS

Examination Element & Description		Questions in Pool	Questions in Exam	Questions Correct to Pass
1	Radio Law	169	24	18
3	Electronics	720	76	57
5	Basic Radiotelegraph	286	50	38
6	Advanced Radiotelegraph	616	100	75
7	GMDSS Radio Operator	446	76	57
8	Ship Radar	293	50	38
9	GMDSS Radio Maintainer	257	50	38
Total Commercial Questions:		**2,787**		

AMATEUR RADIO OPERATOR MORSE CODE REQUIREMENTS

Examination Element & Description		How the Examination is Scored
1A	5 wpm PL telegraphy	Various scoring methods to pass
1B	13 wpm PL telegraphy	Various scoring methods to pass
1C	20 wpm PL telegraphy	Various scoring methods to pass

COMMERCIAL RADIO OPERATOR MORSE CODE REQUIREMENTS

1	16 wpm CG telegraphy	One minute solid copy (80 characters) required
2	20 wpm PL telegraphy	One minute solid copy (100 characters) required
3	20 wpm CG telegraphy	One minute solid copy (100 characters) required
4	25 wpm PL telegraphy	One minute solid copy (125 characters) required

Note: PL = Plain Language (Text). CG = Code Groups (Random).

Table I– Amateur radio and commercial exam question pools and Morse code requirements.

WE SHIP WORLDWIDE

Barry Electronics Corp.

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

For the best buys in town call:
212-925-7000
Los Precios Mas Bajos en Nueva York
WE SHIP WORLDWIDE!
Export orders expedited.

KITTY SAYS: WE ARE OPEN 7 DAYS A WEEK
Sat. 10-5 Sun 11-4 M-F 9-6 Come to Barry's for the best buys in town

MOTOROLA
SP10, SP50, P110, GP3000, M120, GM300, GR300 repeaters.
Domestic, exports and gov't. orders.

Yaesu Vertex Portables
FTH-2070 dual band VHF/UHF 5 watts VX500, FTH 2008/7008/VTR 5000 repeater

CONTACT US FOR THE LATEST IN BUSINESS AND HAM RADIOS, SHORTWAVE RECEIVERS & SCANNERS. MOTOROLA, YAESU, ICOM, KENWOOD, ALINCO, STANDARD, MAXON, RELM, BENDIS, KING, SONY, SANGEAN, GRUNDIG

ICOM
281-H, 481-H, 2340-H, 2700-H, IC-D100, GP-22A
ICOM Business Radios
New F30LT/F40LT, H16, U16, V100, and repeaters

Wherever I go, I take my radio.
Specialist in RADIOS;
Business marine aviation, ham radios and scanners.

"YAESU Ham & Vertex Business Radios"
FT-890, FRG-100B, FT-1000D, FT-530, FT-5200, FT-530-FT411E, FT-840,FT-900AT, FRG-100B, FT-2400, FT-23R, FL-7000 Linear.
New VXR-5000 synthesized repeater 25 watts, VHF or UHF.

KENWOOD

ANTENNAS
A-S, AES, Cushcraft, Hy-Gain, Hustler, KLM, METZ, Urban, MODUBLOX, TONNA, Butternut, Multi-Band

YAESU	ICOM
FT-23R/26/76	IC2/3/4SAT
FT411E-811-911	IC02AT/2SRA
FTH-2008/7008	IC2/4GAT/24AT
	IC-A21/U16

Landmobile HT's
ICOM: U16, H16, V100, U400
MAXON, MOTOROLA,
YAESU: FTH 2008/7008
UNIDEN, REGENCY, KING,
MARINE ICOM: M7, M56, M700
AVIATION ICOM: A21 A200 H.T., TAD

"TS-50S", TS450S/AT, R-5000, TS-850S, TM 241/A/441A, TR-751A, Kenwood Service Repair, TS140S, TS690S, RZ-1, TS-790A, TS950SD, TH-78A, TH28/48A, TM-941A, TM-741A, TM-732A, TM-641A, TM-742A.

SCANNERS
AOR: 900, 1000, 1500, 2500, 2800, 3000A
ICOM: R-1, R100, R71A, R72A, R7000, R7100, R9000
Bearcat

ICOM HANDHELDS
2GXAT, 4GXAT, T21A, W21AT, V21AT, X21AT.

ICOM Repeaters VHF or UHF Synthesized

W2IAT
2GXAT

IC-H16/U16
IC2IA

MOTOROLA RADIUS COMMERCIAL RADIOS

TH-79A Kenwood

FT-530 Yaesu

Telephone Autopatch
Patches telephone calls from your radio to phone line, Great for making and receiving phone calls where there are no phone lines. Simple to use. Write or fax for inquires.

TCS- Ultralite
Ultimate, transportable telephone communication terminal. Make and receive phone calls, fax, telex anywhere in the world where there are no phone lines. Small, compact with 1.2 meter dish. Fits in suitcase. Mil. Std. 810 specs. Write or call.

Save money on batteries. Ask for Special Prices.

MARINE RADIOS
ICOM M7, M11, M56, M700TY, M800
AVIATION PORTABLE ICOM A-21
MOTOROLA MARINE KING KX 99

Surveillance Devices Available

Linear Amplifier
Ameritron, Icom, Kenwood, Yaesu

Barry's supplies all MFJ products Call us direct.

Covercraft/Coaxseal Stocked

Shortwave Receivers
• SONY • GRUNDIG
• SANGEAN • ICOM
Call 2212-925-7000
Satellite telephone in suitcase for worldwide use. CALL

Computer Interfaces Stocked: MFJ-1270B, MFJ-1274, MFJ-1224, AEA PK-88, MFJ-1278T, PK-900, PK-232 MBX W/FAX, DRSI PRODUCTS DSP 2232

Antenna Tuners:
MFJ, AEA AT-300, ICOM, KENWOOD, YAESU, VERTEX

COMMERCIAL & HAM REPEATERS STOCKED. WRITE FOR QUOTES

Kantronics
KAM PLUS, KPC 2/3/4, KPC2400, SUPER FAX II, KPC IV, Data Engine, D4-10, etc.

SHORTWAVE RECEIVERS STOCKED

CB Radios Stocked
148 GT2, Warington, Ranger 2950-70, Wilson 1000, 10/11 Meter Antennas, Antron, Shakespeare, etc, Astatic power mics, Silver Eagle w/beep, etc.

Wide selection of SW & Amateur Publications

MOTOROLA AUTHORIZED DEALER
KACHINA COMMUNICATIONS DEALER
AUTHORIZED DEALER
SONY
Shortwave Radios Stocked
DIGITAL FREQUENCY COUNTERS
OPTOELECTRONICS model 1300 H/A, 0-1300MHz
2300, 2210 H, 0-2200 MHz, 2600H, UTC-3000, 2810

AMPLIFIERS STOCKED:
RF Concepts
Mirage
TE Systems

Radios for Business, Government. Stocked & Serviced Call for Great Prices!

ALINCO DJ-580T, DJ-582T, DJ-F1T, DJ-F1TH, DR-130/430T, DJ-180T/TH

Privacy scramblers for radios and phones. CALL

BIRD Wattmeters & Elements In Stock

COMET ANTENNAS STOCKED

ANTENNAS: AEA, AlphaDelta, ANLI, Antenna Specialist, Barker & Williamson, Comet, Cushcraft, Diamond, GAP, Hy-Gain, Hustler, Larsen, Etc.

(144, 220, 440 MHz), Isoloop.

EIMAC
3-500Z
572B, 6JS6C
12BY7A &
6146B

BIRD Wattmeters & Elements In Stock

Long-range Wireless telephone for overseas. CALL

BENCHER PADDLES
BALUNS, LOW PASS FILTERS
IN STOCK

MIRAGE/RFC Amplifiers
ASTRON POWER SUPPLES
Belden Wire & Cable, Int'l Wire
OPTOELECTRONICS STOCKED

Shortwave Radios
JRC, ICOM, KENWOOD, YAESU, SONY and GRUNDIG

Hy-Gain Towers will be shipped direct to you FREE of shipping cost.

Amplifiers, HF/VHF/UHF AMERITRON, etc.

BARRY ELECTRONICS CORP., 540 BROADWAY, NY, NY 10012 (Five blocks N. of Canal St., between Spring & Prince St.) **FAX 212-925-7001 Phone 212-925-7000**

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqul Se Habla Espanol"
BARRY INTERNATIONAL
FAX 212-925-7001 Phone 212-925-7000
For Orders Call 1-800-990-2929
Monday-Friday 9 A.M to 6:00 P.M.
Saturday 10- 5pm /Sunday 11- 2pm

Subways: #6 Spring St. stop, N. train to Prince St., F train to Houston St.
Bus: Broadway bus to Prince St., Path 9th St./6th Ave.

COMMERCIAL RADIOS STOCKED: ICOM, Motorola, MAXON, Standard, Yaesu. We serve municipalities, businesses, Civil Defense, etc. Portables, mobiles, bases, repeaters...

ALL SALES FINAL

We stock: AEA, Alinco, Ameco, Ameritron, Antenna Specialist, ARRL, Astatic, Astron, B&K, Belden, Bencher, Bird, Bitternut, CES, Cushcraft, Condan, Daiwa, Elmac, Henry Heil, Hustler, Hy-Gain, Icom, KLM, Kantronics, Kenwood, Larsen, Maxon, MFJ, Mirage, Motorola, Nye, Palomar, RF Products, Shure, Standard, TUBES & Tube Cartons Uniden, Yaesu, Vibroflex, Duplexers, Repeaters, Scanners Radio Publications.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED
COMMERCIAL RADIOS stocked & serviced on premises.
Amateur Radio Courses Given On Our Premises, Call
Export Orders Shipped Immediately.

Technical help offered upon purchase

FAX: 212-925-7001

AMATEUR AND COMMERCIAL RADIO OPERATOR LICENSE EXAMINATION REQUIREMENTS

Amateur Radio License Class	Written Exam Elements	Morse Code Exam Elements
Novice	Element 2	Element 1(A) 5 words per minute
Technician	Element 2 & 3(A)	None
Technician Plus	Element 2 & 3(A)	Element 1(A) 5 words per minute
General	Element 2, 3(A) & 3(B)	Element 1(B) 13 words per minute
Advanced	Element 2, 3(A), 3(B) & 4(A)	Element 1(B) 13 words per minute
Amateur Extra	Element 2, 3(A), 3(B), 4(A) & 4(B)	Element 1(C) 20 words per minute

Commercial Radio License Class	Written Exam Elements	Morse Code Exam Elements
Restricted Radiotelephone Operator Permit	None	None
Restricted Radiotelephone Operator Permit—Limited Use	None	None
Marine Radio Operator Permit (MROP)	Element 1	None
General Radiotelephone Operator License (GROL)	Element 1 & 3	None
GMDSS Radio Operator's License	Element 1 & 7	None
GMDSS Radio Maintainer's License	Element 1, 3 & 9	None
Ship Radar Endorsement	Element 8	None
First Class Radiotelegraph Operator's Certificate (T-1)	Element 1, 5 & 6	Element 3 & 4 (20 wpm CG and 25 wpm PL)
Second Class Radiotelegraph Operator's Certificate (T-2)	Element 1, 5 & 6	Element 1 & 2 (16 wpm CG and 20 wpm PL)
Third Class Radiotelegraph Operator's Certificate (T-3)	Element 1 & 5	Element 1 & 2 (16 wpm CG and 20 wpm PL)

Notes: GMDSS, the Global Maritime Distress and Safety System, is an automated ship-to-shore distress alerting system using satellite and advanced terrestrial communications. GMDSS will replace ship-to-ship Morse code distress communications at sea, which will be phased out by 1999.
CG = Code Groups (Random); PL = Plain Language (Text). The Ship Radar Endorsement may be placed on the First or Second Radiotelegraph Operator's Certificate, General Radiotelephone Operator's License, or GMDSS Radio Maintainer's License.

Table II– Amateur and commercial radio operator license examination requirements.

radio and 5,000 commercial radio operator examinations to more than 30,000 examinees. That is nearly 200 exam elements a day!

Actually, the W5YI Group itself does not administer any tests at all. Instead, the test sessions are conducted by more than a thousand authorized independent amateur and commercial radio examination crews located in every major city around the country. Each testing team is made up of FCC licensed radio operators holding senior-level licenses. While we provide the testing materials, the exam team determines which written or telegraphy tests will be used. The examiners may even generate their own random exams using computer software we provide.

As you might imagine, we get loads of questions on the FCC's radio operator testing program. Following are some that we have been saving up.

Where do the questions come from for the various radio operator examinations?—*C.M., Maynard, KY*

Although there are many different testing organizations, each of them is required by the FCC to follow certain procedures. All amateur and commercial written examinations are prepared from known sets of multiple-choice questions (see Table I). There are five amateur and seven commercial radio question pools. All together they amount to nearly 5,000 questions.

Each examination is constructed by selecting a specified number—about 10 percent—of questions in a question pool. You pass if you answer 75 percent correctly. Each question, which has four possible answers, is about the rules, equipment, and the activities and privileges associated with the license. A specified number of questions must be asked on certain topics if the question pool is broken down into sub-elements or different subjects.

The questions are developed through the cooperation of the FCC, the public, and the examination coordinators. All amateur and commercial questions are revised according to a specified review cycle. Each amateur radio question pool contains questions on nine subjects and is revised by an internal VEC panel called the Question Pool Committee (QPC). Your author, Fred Maia, is Vice-Chairman of this committee. The various COLE Managers assist in the development and revision of all commercial radio operator test questions. These questions must be approved by the FCC.

Newly revised amateur radio question pools, complete with their multiple choices and answers, are released to the public by the QPC. Commercial radio pools are released by the FCC. The W5YI Group also has these pools available through their license preparation materials division (telephone 1-800-669-9594). Many book stores sell study manuals for the various amateur and commercial radio operator examinations, complete with answer explanations. It is important to obtain the most recent question pool release, since all are periodically revised. Taking and passing an amateur or commercial radio operator exam has never been easier.

Why are amateur and commercial radio telegraphy examinations scored differently?—*R.H., Lafayette, IN*

Why does a commercial radio Morse code test contain random groups, but the amateur does not?

—*S.K., Mt. Vernon, NY*

The short answer to both questions is: "Because the FCC says so." Only the Part 13 commercial radio rules specify an answer format. Section §13.209(d)(1) requires that telegraphy exam messages be received correctly by ear for a period of one minute without error.

The Part §97.503(a) amateur rules only require that "A telegraphy examination must be sufficient to prove that the examinee has the ability to receive correctly by ear texts in the international Morse code at not less than the prescribed speed." No answer format is specified.

The VECs, however, have adopted a telegraphy scoring standard among themselves. It requires VEs to use one of three answer formats when scoring an amateur Morse code test. These are: (1) transcribing one minute solid copy, (2) answering seven out of ten questions about the transmitted text, or (3) multiple-choice questions. It is up to the Volunteer Examiner to determine which answer format is used. Some will give you two chances to pass the test. They will admin-

ister the questions if you fail to copy the exam message for one minute.

The random code groups (CG) are also required by the Part 13 commercial radio operator rules (see Part §13.203[7][b]). The amateur rules do not state telegraphy exam message content, but most take the form of a typical Morse code exchange between operators.

An interesting side note is that amateur radio examinees get examination credit toward all amateur Morse code tests if they hold a commercial radiotelegraph license. Conversely, commercial radio examinees get credit for the telegraphy portion of the Third or Second Class Radiotelegraph licenses if they hold an Amateur Extra Class ticket. No reciprocal examination credit is allowed for the written examinations.

Who needs a commercial radio operator license? What can you do with it?—*T.N., Charlotte, NC*

In 1984 the FCC made major changes to its commercial radio operator licensing program. The First and Second Class Radiotelephone Operator license was discontinued and was replaced with a lifetime General Radiotelephone Operator License.

The government also abolished the requirement that a commercial radio operator license was needed to install, maintain, repair, or operate domestic business or personal radio equipment. The key word is "domestic." Operation of any amateur radio equipment, of course, requires an amateur radio ticket.

The fact remains, however, that many employers still require a commercial radio operator license, especially the General Radiotelephone Operator License, as a condition of employment. Although there are nine commercial radio licenses and endorsements, more than 80% of all licenses issued by the FCC are for the GROL. Out of more than 12,000 commercial radio operator licenses issued by the FCC in 1994, nearly 10,000 were for the GROL. It is by far the most desirable commercial radio license. It is anticipated that the GMDSS licenses will become more popular in the coming years, since the maritime community is converting to satellite-based distress communications.

Commercial radio licenses are still required by international law, however, for radio operators:

1. Aboard certain vessels navigating the Great Lakes, tidewaters, or in the open sea,
2. If the vessel carries passengers for hire,
3. If the vessel or aircraft operates on frequencies under 30 MHz,
4. If the ship is larger than 300 gross tons,
5. Operating coast (land) stations with more than 1500 watts output power, and
6. Operating AM, FM, or TV broadcast stations.

The Restricted Radio Operator Permit is all that is legally needed to operate broadcast equipment. Most broadcasters, however, require their technicians and engineers to hold a General Radiotelephone Operator License. A Restricted Permit is also required when operating radio equipment on certain private aircraft or pleasure boats.

You also need a commercial radio operator license to repair and maintain radio and radar equipment (including handheld radios) used on ships, aircraft, and at coast radio stations.

Commercial radiotelegraph licenses are needed to operate, repair, and maintain ship and coast radiotelegraph stations in the maritime services. A Third Class license authorizes radiotelegraph operation only at a coast station.

The Second Class license conveys all radiotelegraph privileges except serving as a chief radio operator on a U.S. passenger ship. You also must be 21 years old and have at least one year of commercial radiotelegraph experience to qualify for the First Class Radiotelegraph Operator's Certificate.

I am confused. Can you explain all of the costs associated with amateur and commercial radio operator testing and licenses?—*F.P., Van Nuys, CA*

Being a non-commercial service, amateur radio is exempt from all fees except a single examination fee which is used to reimburse expenses. This fee started off in 1984 at $4.00 and has been increased about 20 cents annually since then. The increases are based on inflation as determined by the government's Consumer Price Index (CPI). The fee to take all the amateur radio examinations needed for a license is now at a maximum of $5.90. It only increased $1.90 in the past ten years.

Commercial radio license fees are a lot more complicated, since there are three different costs associated with them. No one pays more than two of them, though.

First, there is a testing fee which is paid to the examiners. Unlike amateur radio, the maximum testing fees of which are determined by the FCC, the examination fee for a commercial radio operator license can be anywhere from $25.00 per exam element to $120.00 per license.

There are nine different COLE Managers, and each sets his own fees, which are approved by the FCC. Our National Radio Examiners division charges $35.00 per commercial radio license or endorsement regardless of the number of exam elements administered, making it the lowest cost of any COLEM.

The other two fees are called a Regulatory fee and an Application fee. These fees are paid by separate checks made out to the FCC. The Regulatory fee is a Congressionally mandated charge which allows the Commission to recover the cost of commercial radio regulation and enforcement. In other words, the applicant must pay his share of the massive FCC budget.

This fee was set by Congress at $7.00 per year. Since all licenses (except the lifetime Restricted Permit and the General Radiotelephone Operator License) are for a five-year term, this fee is $35.00. A separate check in this amount payable to the FCC must be attached to your application.

Interestingly, the lifetime licenses do not have a Regulatory fee attached to them, since Congress simply forgot to provide for a lifetime fee! We understand that this fee will be $105.00 once Congress agrees that a lifetime represents 15 years (15 times $7.00 is $105.00). A word to the wise! Pass your GROL as soon as you can, or it will cost you an additional 105 bucks!

The Application fee is only paid on commercial radio licenses that do not require an examination, or when you request a replacement or renewal license. This $45 paperwork processing fee applies to all Restricted Permits, when you need a duplicate or replacement license, or when you renew your Marine Radio Operator Permit, GMDSS, or radiotelegraph ticket.

To make matters even more confusing, there are different addresses to which you send your application to the FCC. Any application that has a Regulatory or Application fee check attached must be sent to a certain post office box located at the Mellon Bank in Pittsburgh, PA. Different types of applications go to different P.O. boxes. All other applications go to the FCC's licensing facility in Gettysburg, PA. The Mellon Bank strips the attached fee checks and deposits them in the U.S. treasury.

The FCC has set up a special Public Services phone number (202-418-0220) to assist applicants with filing fees and application submittal information. Commercial radio operator application blanks (FCC Form 753 or 756) may be obtained at no charge by calling 202-418-3676.

There could be another fee attached to commercial radio operator licenses in the future. The FCC shortly will be embarking on a program of electronic application filing. There was a discussion at the recent COLEM Conference held at the FCC in Washington about the possibility of allowing COLEMs to charge an additional fee for this service.

73, Fred, W5YI

PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle Progress

The Royal Observatory of Belgium reports a mean sunspot number of 44 for October 1994. The mean value results in a 12-month running smoothed sunspot number of 34 centered on April 1994. This is the same level as that recorded for March 1994.

The National Geophysical Data Center in Boulder predicts a smoothed sunspot number of 23 for February 1995, as the present cycle is expected to continue its slow decline.

Canada's Dominion Radio Astrophysical Observatory in Penticton, British Columbia reports a 10.7 cm solar flux level of 88 for October 1994. This results in a smoothed value of 89 centered on April 1994. A smoothed 10.7 cm solar flux level of approximately 80 is predicted for February 1995.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for February 1995

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2, 6, 12	**A**	**A**	**B**	**C**
High Normal: 1, 3, 5, 7, 13, 24, 27-28	**A**	**B**	**C**	**C-D**
Low Normal: 4, 10-11, 14, 17-20, 23, 25-26	**B**	**C**	**D**	**D-E**
Below Normal: 8-9, 16, 21	**C**	**C-D**	**D-E**	**E**
Disturbed: 15, 22	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on Feb. 1, excellent (A) on the 2nd, good again (B) on the 3rd, fair (C) on the 4th, good (B) on the 5th, etc.

FLASH!

HF propagation conditions have a tendency to recur in a 27-day cycle. When DX contests, such as the CQ World-Wide DX Contest, are held in sessions four weeks, or 28 days, apart, there is a good chance that the conditions noted during the SSB weekend will repeat during portions of the CW weekend. This is fine when conditions are Normal or better during the SSB weekend, but in the 1994 SSB period a major radio storm developed which marred the contest weekend. Well, nature was true to form, and 27 days later, which coincided with November 26, the first day of the CW weekend, the storm hit again. This time it was not as intense as the SSB weekend storm, but it did cause Below Normal to Disturbed conditions for several hours, particularly for openings in higher latitudes. Conditions slowly returned to more or less Normal on the 27th, but high-latitude openings remained Below Normal for a good part of the day. The solar flux level was 83 on the 26th and 80 on the 27th. The 24-hour worldwide geomagnetic A-index was 39 on the 26th and dropped to 25 on the 27th. There will be a more complete critique of conditions during the 1994 CQ World-Wide DX Contest in next month's column.

February Conditions

Low solar activity coupled with normal seasonal changes in HF propagation conditions is expected to result in very few 10 and 12 meter DX openings during February. The bands may occasionally open towards southern and tropical areas during the daytime when conditions are High Normal or better. There's a somewhat better chance for 15 and 17 meter DX openings to many parts of the world during daylight hours, especially when conditions are High Normal or better.

Twenty meters should continue to be the best band for DX propagation during February. Look for a DX window of an hour or two duration, beginning just after sunrise, during which the band should open to most areas of the world. DX should be possible throughout the day, with another peak in conditions expected during early afternoon. When conditions are High Normal or better, 20 meters should stay open to some areas of the world well into the hours of darkness, and possibly as late as midnight.

Good nighttime DX propagation conditions are expected on 40 meters during February. Bands should open towards Europe and the east an hour or so before sundown, peaking during the early evening. South America should be within range from about 7 PM and until sunrise. Look for openings towards the South Pacific, Asia, and the Far East from about an hour or two before to about an hour after local sunrise. Good 80 meter openings are also forecast to most areas of the world during the hours of darkness. Be sure to also check 160 meters between sundown and sunrise for fairly good DX openings to many areas of the world.

A seasonal increase in static levels may begin to be noticeable on the HF bands during February.

11307 Clara Street, Silver Spring, MD 20902

Short-Skip Conditions

On 160 meters no significant skip is expected during the daylight hours, but up to 1300 miles and beyond should be possible on a regular basis during most of the hours of darkness. On 80 meters expect openings up to about 250 miles during most of the daylight hours, with the skip lengthening to between 400 and 1300 miles just after sundown, and between 800 and 2300 miles by midnight. On 30 and 40 meters daytime skip should be possible between approximately 250 and 750 miles, extending to between 750 and 2300 miles during the early evening. During the hours of darkness expect to work 30 and 40 meter stations within a range of 1500 to 2300 miles. Daytime skip on 20 meters should range between 750 and 2300 miles through the late afternoon. During the late afternoon and until just after sundown it should lengthen to between 1500 and 2300 miles, with the band out for short-skip by 8 PM on most nights. On 17 and 15 meters skip should range between 1300 and 2300 miles during most of the daylight hours, with the bands going dead for short-skip about an hour or so after local sundown. Occasional short-skip openings may also be possible on 10 and 12 meters.

VHF Ionospheric Openings

Best chances for unusual ionospheric openings should be during periods of radio storminess on the HF bands. Check the Last Minute Forecast at the beginning of this column for days during February expected to be Below Normal or Disturbed. Check the VHF bands on these days for auroral-type and sporadic-*E* short-skip openings.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates best time to check for 10 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *standard* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

February 15 – April 15, 1995
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	10-12 (1)** 08-10 (1) 10-12 (2) 12-13 (1)	06-08 (1) 08-11 (2) 11-12 (3) 12-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	16-17 (1) 17-19 (2) 19-20 (3) 20-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-20 (1) 20-21 (2) 21-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)* 22-01 (2)* 01-02 (1)*
Northern Europe & European USSR	09-12 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-14 (2) 14-16 (1)	17-19 (1) 19-02 (2) 02-03 (1)	20-22 (1) 22-00 (2) 00-02 (1) 20-00 (1)*
Eastern Mediter-anean & Middle East	09-11 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-13 (2) 13-14 (3) 14-15 (2) 15-17 (1)	18-20 (1) 20-23 (2) 23-01 (1)	19-23 (1) 20-22 (1)*
Western Africa	10-13 (1)** 09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-19 (1)	18-19 (1) 19-00 (2) 00-02 (1)	19-21 (1) 21-23 (2) 23-01 (1) 21-01 (1)*
Eastern & Central Africa	11-13 (1)** 09-11 (1) 11-14 (2) 14-15 (1)	13-15 (1) 15-18 (2) 18-19 (1)	19-22 (1) 22-00 (2) 00-01 (1)	20-00 (1)
Southern Africa	10-13 (1)** 09-10 (1) 10-12 (2) 12-13 (3) 13-14 (2) 14-15 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-20 (1)	18-20 (1) 20-22 (2) 22-00 (1)	21-23 (1) 21-23 (1)*
Central & South Asia	09-11 (1) 16-18 (1)	06-07 (1) 07-09 (2) 09-11 (1) 18-21 (1)	04-07 (1) 17-21 (1)	04-07 (1) 18-20 (1)
Southeast Asia	17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-21 (1)	05-08 (1) 19-21 (1)	06-07 (1) 19-21 (1)
Far East	16-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-20 (1)	05-08 (1) 17-19 (1)	06-07 (1) 17-18 (1) 06-07 (1)*
South Pacific & New Zealand	14-16 (1) 12-15 (1) 15-18 (2) 18-19 (1)	15-19 (1) 19-22 (2) 22-07 (1) 07-09 (2) 09-11 (1)	00-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1)	02-03 (1) 03-06 (2) 06-07 (1) 02-07 (1)*
Australasia	15-17 (1)** 09-11 (1) 22-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (1) 18-20 (2) 20-22 (1)	03-05 (1) 05-07 (2) 07-08 (1)	04-05 (1) 05-06 (2) 06-07 (1) 04-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-16 (1)** 07-08 (1) 08-09 (2) 09-11 (4) 11-13 (2) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-09 (4) 09-10 (3) 10-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	18-19 (1) 19-20 (2) 20-03 (3) 03-05 (2) 05-07 (1)	19-21 (1) 21-04 (2) 04-06 (1) 20-02 (1)* 02-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-15 (1)** 08-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (2) 20-22 (1) 22-23 (2) 23-00 (1)	19-21 (1) 21-04 (2) 04-07 (1)	21-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	15-17 (1)	17-19 (1) 19-22 (2) 22-00 (1) 07-09 (1)	22-00 (1) 00-04 (2) 04-06 (1)	00-04 (1)

February 15 – April 15, 1995
Time Zones: CST & MST
(24-Hour Time)
Central USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Southern Europe & North Africa	08-09 (1) 09-12 (2) 12-13 (1)	06-08 (1) 08-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	16-18 (1) 18-21 (2) 21-00 (1) 00-02 (2) 02-03 (1)	18-20 (1) 20-00 (2) 00-01 (1) 20-00 (1)*
Northern & Central Europe & European USSR	08-11 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-13 (2) 13-15 (1)	19-22 (1) 22-00 (2) 00-02 (1)	20-01 (1) 21-01 (1)*
Eastern Mediterranean & Middle East	08-11 (1)	07-11 (1) 11-14 (2) 14-16 (1) 22-00 (1)	19-20 (1) 20-22 (2) 22-23 (1)	20-22 (1)
Western Africa	09-12 (1)** 08-10 (1) 10-13 (2) 13-15 (1)	07-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	18-20 (1) 20-22 (2) 22-01 (1)	21-00 (1) 21-23 (1)*
Eastern & Central Africa	08-11 (1) 11-13 (2) 13-14 (1)	07-12 (1) 12-14 (2) 14-15 (3) 15-16 (2) 16-18 (1)	19-23 (1)	19-22 (1)
Southern Africa	10-12 (1)** 08-10 (1) 10-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	07-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-19 (1) 22-00 (1)	18-20 (1) 20-23 (2) 23-00 (1)	19-22 (1) 20-22 (1)*
Central & South Asia	09-11 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-21 (1)	04-08 (1) 17-21 (1)	05-07 (1) 17-19 (1)
Southeast Asia	10-13 (1) 17-19 (1)	06-07 (1) 07-10 (2) 10-12 (1) 17-21 (1)	04-08 (1) 17-19 (1)	05-07 (1) 17-18 (1)
Far East	16-18 (1)** 16-17 (1) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	02-04 (1) 04-07 (2) 07-08 (1)	04-07 (1) 05-07 (1)*

South Pacific & New Zealand	14-17 (1)** 11-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-10 (2) 10-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	22-00 (1) 00-01 (2) 01-06 (3) 06-07 (2) 07-08 (1)	00-02 (1) 02-06 (2) 06-07 (1) 03-07 (1)*
Austral-asia	14-17 (1)** 12-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-00 (1)	01-04 (1) 04-06 (3) 06-07 (2) 07-08 (1)	04-05 (1) 05-06 (2) 06-07 (1) 05-07 (1)*
Carib-bean, Central America & North-ern Coun-tries of South America	11-15 (1)** 07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-09 (4) 09-10 (3) 10-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	18-19 (1) 19-20 (2) 20-02 (3) 02-05 (2) 05-07 (1)	19-21 (1) 21-04 (2) 04-06 (1) 20-02 (1)* 02-04 (2)* 04-05 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	12-14 (1)** 07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	05-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-01 (1)	19-20 (1) 20-04 (2) 04-06 (1)	21-05 (1) 01-04 (1)*
McMurdo Sound, Antarc-tica	15-17 (1)	16-19 (1) 19-22 (2) 22-00 (1) 07-10 (1)	22-01 (1) 01-04 (2) 04-06 (1)	01-04 (1)

February 15 – April 15, 1995
Time Zone: PST
(24-Hour Time)
WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & South-ern Eu-rope & North Africa	08-11 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-14 (1) 22-00 (1)	19-22 (1) 22-00 (2) 00-01 (1)	19-22 (1) 20-22 (1)*
Northern & Central Europe & European USSR	08-10 (1)	06-07 (1) 07-09 (2) 09-11 (1) 11-12 (2) 12-13 (1) 22-00 (1)	19-21 (1) 21-22 (2) 22-23 (1)	19-22 (1) 20-22 (1)*
Eastern Mediter-anean & Middle East	08-10 (1)	07-10 (1) 10-11 (2) 11-13 (1) 22-00 (1)	18-21 (1)	18-20 (1)
Western Africa	09-10 (1)** 08-09 (1) 09-12 (2) 12-14 (1)	05-07 (1) 07-08 (2) 08-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	18-22 (1)	19-21 (1) 19-21 (1)*
Eastern & Central Africa	09-11 (1)	06-08 (1) 11-13 (1) 13-15 (2) 15-16 (1)	18-21 (1)	18-20 (1)
Southern Africa	09-11 (1)** 08-10 (1) 10-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-13 (1) 13-17 (2) 17-18 (1) 23-01 (1)	18-22 (1)	19-21 (1) 19-21 (1)*
Central & South Asia	08-10 (1) 18-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 17-19 (1)	05-07 (1) 17-18 (1)
South-east Asia	16-18 (1)** 08-10 (1) 16-17 (1) 17-18 (2) 18-19 (1)	02-07 (1) 07-09 (2) 09-11 (1) 16-17 (1) 17-19 (2) 19-20 (1)	02-04 (1) 04-06 (2) 06-08 (1)	05-07 (1)
Far East	14-16 (1) 16-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	02-03 (1) 03-06 (2) 06-07 (1) 03-06 (1)*
South Pacific & New Zealand	15-17 (1)** 11-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	06-09 (1) 09-11 (2) 11-16 (1) 16-18 (2) 18-19 (3) 19-21 (4) 21-22 (3) 22-00 (2) 00-04 (1)	21-22 (1) 22-06 (3) 06-08 (2) 08-09 (1)	22-00 (1) 00-06 (2) 06-07 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Austral-asia	15-17 (1)* 14-16 (1) 16-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-23 (1)	00-02 (1) 02-03 (2) 03-06 (3) 06-07 (2) 07-08 (1)	02-03 (1) 03-06 (2) 06-07 (1) 03-06 (1)*
Carib-bean, Central America & North-ern Coun-tries of South America	10-14 (1)** 07-08 (1) 08-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	05-06 (1) 06-07 (2) 07-09 (4) 09-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-02 (1)	18-19 (1) 19-20 (2) 20-01 (3) 01-04 (2) 04-06 (1)	19-20 (1) 20-03 (2) 03-04 (1) 20-01 (1)* 01-03 (2)* 03-04 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	10-15 (1)** 07-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	18-20 (1) 20-03 (2) 03-05 (1)	21-04 (1) 22-03 (1)*
McMurdo Sound, Antarc-tica	13-15 (1) 15-17 (2) 17-18 (1)	16-19 (1) 19-22 (2) 22-02 (1) 06-07 (1) 07-09 (2) 09-11 (1)	22-02 (1) 02-05 (2) 05-06 (1)	02-05 (1)

**Indicates best time for 160 meter openings.*
***Indicates best time for 10 meter openings.*
For 12 metrer 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.

No significant meteor showers are expected during February.

There is a slight change in the format of the DX Propagation Charts appearing in this month's column. For the duration of the low period of solar activity, the band headings will be for 15, 20, 40, and 80 meters, with 10 meter openings shown in the 15 meter column with a double asterisk (**) and 160 meter openings in the 80 meter column by a single asterisk (*). Short-Skip Charts for February—valid for distances between approximately 50 and 2400 miles and between Alaska, Hawaii, and the mainland—appeared in January's column.

73, George, W3ASK

TWO POWERFUL

HAM RADIO VIDEO COURSES FROM ARRL

Everything you need to pass your Novice, Codeless Technician and General Class Amateur Radio license tests—plus Morse code. Guaranteed!

These breakthrough courses are fast, easy and fun!

Get the Best, When You Need the Best!

- Only the **American Radio Relay League** (**ARRL**), the national organization of Amateur Radio Operators, has more than 75 years experience in helping people—just like you—become hams. With our expert help, **you'll be on the air in no time!**
- ARRL Video Courses demonstrate **every** important concept on video. You succeed because you completely understand the material, not because of rote memorization.
- Only the ARRL has the resources to make sure you have the latest, most accurate information on video. With the ARRL, you **know** your course is fully updated for the current FCC exams.
- Your course is produced in assocation with King Schools, whose award-winning "Monster Graphics" let you see your instructor and "the action" at the same time.
- With the ARRL, expert help is only a phone call away. Call us any business day, **toll-free**, to have your questions about ARRL Video Courses or your FCC exam answered personally.

KING SCHOOLS

Here's What You Get—

Expert Information That's Easy to Understand!

TECHNICIAN CLASS COURSE (No Morse Code Required)

Your complete ARRL Technician Class Home Study Video Course Includes:

- Three exciting video tapes—five hours of invaluable instruction—covering everything you need to pass your Novice and Technician Class written exams.
- A 164-page Course Book with detailed notes.
- Every exam question—with correct answers and detailed explanations.
- Six practice exams to "tune you up" for the real thing. On the big day, you'll be more than ready!

GENERAL CLASS COURSE

Your complete ARRL General Class Home Study Video Course Includes:

- Three exciting video tapes—four hours of invaluable instruction—covering everything you need to pass your General Class written and Morse code exams.
- A 96-page Course Book with detailed notes.
- Every exam question—with correct answers and detailed explanations.
- Three practice exams to "tune you up" for the real thing. On the big day, you'll be more than ready!
- *Morse Academy* software—so you'll learn Morse code the right way, the Farnsworth way.

With our ironclad guarantee, you risk nothing!

We're so sure you're going to pass your Amateur Radio license tests with the ARRL Technician and General Class Video Courses that we make this exceptional guarantee:

1. Examine either course for 20 days. If it's not what you expected, simply return it for a full refund—no questions asked.
2. You will pass your FCC codeless Technician-class *written* exam within one year, or you can return your course for a full refund—every penny. Or, you will pass your FCC General-class *written* and *Morse code* exams within one year, or you can return your course materials for a full refund. **You pass, or you don't pay!** (Include a dated proof of purchase and the date and location of your VEC-administered exam session when you return your course.) **And...**
3. In addition, the veteran hams at ARRL Headquarters are available to answer your questions and provide expert advise and information. **We're only a phone call away—and we won't let you fail!**

Choose from 4 Great Deals:

1. Your ARRL Technician Class Video Course, only **$99**

2. Your ARRL Technician Class Video Course, Plus The Technician Class Computerized Exam Review Software (a $49 value), all only **$119**

3. Your ARRL General Class Video Course, including *Morse Academy* Morse code training software, only **$99**

4. Your ARRL General Class Video Course, *Morse Academy* software Plus The General Class Computerized, Exam Review Software (a $49 value) all only **$119**

To Order, Call 1-800-32-NEW HAM or Tear Out And Mail Today

OK! I want to start enjoying the World of Amateur Radio. Rush me:

- ❑ Complete Technician Class Video Course $99
- ❑ Complete General Class Video Course $99
- ❑ Extra Course Book ❑Tech. ❑Gen. (with course purchase only) $19
- ❑ Complete Course And Computerized Exam Review Software ❑Tech. ❑ Gen. All only $119

Exam Review Software

❑ Macintosh ❑ IBM Compatible (512k, hard drive)

Specify ❑ 3½" ❑ 5¼" Disks

Order now and get in on the fun of Amateur Radio!

Ship To:

Name _____

Address _____

_____

City _____

State, ZIP _____

Tel (____) _____

VHS Format

Charge To:

❑ MC ❑ VISA ❑ AMEX ❑ Discover

Card No. _____

EXP _____

❑ Check or Money Order Enclosed

TOTAL PURCHASE $ _____

Shipping and Handling _____

❑ UPS Surface, $5

❑ FEDEX 2-Day Delivery, $15

❑ In CT add 6% Tax _____

❑ In CA add 7.5% Tax _____

TOTAL AMOUNT $ _____

The American Radio Relay League
Helping Hams Get Started Since 1914
•
225 Main St, Newington, CT 06111
203-666-1541 • Fax 203-665-7531

CQ **ALSO AVAILABLE FROM YOUR LOCAL AMATEUR RADIO DEALER**

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 20 cents per word including abbreviations and addresses. Commercial and organization ads are $1.00 per word. Boldface words are $1.50 each (specify which words). Minimum charge $2.00. No ad will be printed unless accompanied by full remittance. All ads must be typewritten double-spaced.

Closing Date: The 10th day in the third month preceding date of publication (example: Jan. 10th for the March issue). Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of *CQ* cannot vouch for the merchandise listed therein. The publisher reserves the right to reject any advertisement. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

ELECTRON TUBES: All types buy and sell. Daily Electronics, 10914 NE 35th St., #B-6, Vancouver, WA 98682. Call 800-346-6667 or 206-896-8856, or FAX 206-896-5476.

CB-TO-10M CONVERSIONS: FM kits, frequency modification hardware, books, plans, high-performance CB accessories. Catalog $3. CBCI, Box 31500CQ, Phoenix, AZ 85046.

Low Power Communications: All about QRP operating—contesting, field day, digital, computers, DX, solar, milliwatting. Volume 1 – Basic QRP, $14.95. Volume 2 – Advanced QRP, with chapters by some of the world's best QRP operators, $19.95 from Tiare Publications, P.O. Box 493, Lake Geneva WI 53147 $2 s/h first book ($3 foreign), $1 for second book. Visa/Mastercard welcome.

The Outer Space Frequency Directory, by A.R. "Tony" Curtis. The radio monitor's guide to eavesdropping on satellites, space shuttles, space stations, interplanetary space probes, and non-human signals arriving from deep space. $17.95 + $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/Mastercard welcome. US $ only.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned, weekday net, 14.280 MHz, 1:00-3:00 PM Eastern. Sr. Noreen Perelli, KE2LT, 2755 Woodhull Ave., Bronx, NY 10469.

THERMOGRAPHED CARDS! Raised-print QSLs at flat printing prices. Samples: Phone 817-461-6443 or write: W5YI Group, Box 565101, Dallas, TX 75356.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $19.50 annually to new subscribers! Money-back guarantee! FREE sample for S.A.S.E. (two stamps). W5YI, P.O. Box 565101, Dallas, Texas 75356.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

WANTED: Older model bugs, unusual bugs, and miniature hand keys. State price, condition. Dave Ingram, K4TWJ, 4941 Scenic View Drive, Birmingham, AL 35210.

CHASSIS, CABINET KITS. SASE K3IWK, 5120 Harmony Grove Road, Dover, PA 17315.

PSE QSL! An Expert's Guide to Amateur Radio QSL'ing. By CQ's Bill Welsh, W6DDB. Every imaginable facet from designing to ordering to filling them out to filing them. Card sources, postage usage, bureaus, much much more. $9.95 + $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/Mastercard welcome. US $ only.

FREE Ham Gospel Tracts. SASE. N3FTT, 5133 Gramercy, Clifton Heights, PA 19018.

FOREIGN AIRMAIL POSTAGE for successful QSLing! Many countries, monthly bargains, plus **EUROPEAN AIRMAIL ENVELOPES!** Samples, prices: William Plum, 12 Glenn Road, Flemington, NJ 08822. FAX 908-782-2612.

FOR SALE: New, Unused, in original cartons: Radio Shack DMP 130A dot matrix printer, PTC-64, C-64 printer controller. $160.00. K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

HAVE AM CAPABILITY? Join SPAM (Society for the Promotion of AM). For information and membership, send $1 and SASE to SPAM, WB6TRQ, Box 62, Potrero, CA 92063.

RCI-2950 OWNERS: New modification manual including Power increase, Clarifier modification, Modulation increase, Operating hints, and more. Parts Included. Only $20.00 ppd in U.S. (Missouri residents add $1.15 tax).Scott, P.O Box 510408, St.. Louis, MO 63151-0408 (314-846-0252). Money Orders or C.O.D.

WEATHER RADIO—The Complete Guide to Receiving NOAA, Volmet, Weatherfax, Weather Satellite and Other Weather Information Sources, by A.R "Tony" Curtis, K3RXK. Everything from TIS stations to Russian fishing fleet and ham emergency weather nets. $14.95 plus $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 US $ only. Visa/Mastercard.

RTTY JOURNAL published ten times per year for those interested in the Digital modes. Timely information on RTTY, AMTOR, PACKET, PACTOR, CLOVER, MSOs, Contesting, Hardware/Software for the digital modes, plus technical articles. This is a Digital operators magazine. $16 per year (foreign higher). RTTY JOURNAL, 1904 Carolton Ln., Fallbrook, CA 92028-4614.

The Code Book—Amateur Radio CW Operating, by Robert J. Halprin. A practical guide for those who want to make CW a bigger part of their amateur radio hobby. Mastering the code, operating techniques, tools of the trade, files and audio tape, contests, DXing, traffis, QRP, and more. $17.95 + $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/Mastercard welcome.

The HamSat Handbook, by A.R. "Tony" Curtis. A complete history, frequency guide and specs for every amateur satellite, current and past, how they work and much more. $19.95 plus $2 s/h ($3 foreign) from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147. Visa/ Mastercard welcome.

FOR SALE: CQ/Ham Radio/QST/73 magazines and binders. SASE brings data sheet. W6DDB, 45527 Third Street East, Lancaster, CA 93535-1802.

DX QSL's. THE "GO LIST." We make getting the QSL cards as much fun as the QSO itself. Over 20,000 QSL routes. Updated and published monthly on 3.5 inch diskette (5.25 inch available). One copy $12/USA, Quarterly $32/USA, Monthly $62/USA. "GO LIST," P.O. Box 2306, Paducah, KY 42002-2306. N4FFO/KB4RGW, 502-898-8863.

PacketCluster for DXers and Contesters! Multi-user, multi-node networking software features real-time messaging, announcements, DX alerts, e/mail, linking, and much more. Up to 64 users can connect to your node using a radio,TNC, and PC or terminal. Hardware also available. Pavillion Software, 5 Mt. Royal Ave., Marlborough, MA 01752 (508-779-5054, or FAX 508-460-6211).

DXers say **THE DX BULLETIN** is the most accurate, timely, and complete source of DX news available. $42 for 50 weekly issues. MasterCard/Visa or check to Box 50C, Fulton, CA 95439-0050 (707-523-1001). Samples free.

THE DX MAGAZINE is your bi-monthly ticket to the exciting world of DX: DXpeditions, Reviews, Awards, QSL Information, News, and Opinions. 64 well-illustrated glossy pages. Only $15/year. Sample $2. Box 50C, Fulton, CA 95439-0050 (707-523-1001).

DACRON ROPE; WHY RISK FAILURES with aerial supports? Strong, high UV resistant, non-stretch Military type black DOUBLE (unlike our competitors' single) braided Dacron. 3/32 inch ($.06/ft.), 3/16 inch 770 lb. test ($.11/ft.), 5/16 inch ($.16/ft.). **DAVIS RF CO.**, 24-HOUR ORDERS 1-800-328-4773.

Radio City inc.

$5.95* For 2 Day Delivery
*Up to 12 lbs. in Continental USA

Call For Catalog
Ask For Ext. 22

1•800 426•2891

FAX (612) 786•6513

Call Today!
Phone Hours
M-F 9am-8pm
Sat. 10am-5pm
CST

MasterCard VISA DISCOVER

ALINCO ELECTRONICS INC.

Alinco Coupons Extended to 2•95

DJ-580T — SAVE $25

This tiny HT is a feature packed dual bander. Ergonomic design combined with CTCSS & DTMF paging. Excellent sensitivity and great audio makes for a great radio companion. **Limited**

$389.95 -$25.00

WITH COUPONS... **$364.95**

DR-130T — SAVE $15

This 2 meter mobile sports all the features you need in this class transceiver. Power out is 50 watts with DTMF mic, CTCSS encode, bracket, hardware and power cord gets you set to go into a tight space. **Limited**

$314.95 -$15.00

WITH COUPONS... **$299.95**

DR-600T — SAVE $10

This easy to use dual bander is jam packed with special features like simultaneous dual band receive, detachable front panel, remote operation and much, much, more.

$589.95 -$10.00

WITH COUPONS... **$579.95**

IC-2700H — FREE MIC OFFER

This new 2 meter/ 70cm dual band mobile will wow you with all its new features. It sports a removable front panel, separate controls for tuning-volume and squelch. Remote control mike.

$769.95

Icom Coupons Expire 2•28•95

ICOM

IC-281H — SAVE $25

This 50 watt 2 meter mobile is equipped with a data port, 440 MHz receive, 60 memories, auto dialer, auto off, direct frequency entry, and cross band duplex operation. Easy one touch operation.

$379.95 -$25.00

WITH COUPONS... **$354.95**

IC-2GXAT — SAVE $10

High power & compact design set a new performance pace. This new HT offers 40 memories, Die cast case, CTCSS. It's fresh and exciting from Icom.

$277.75 -$10.00

WITH COUPONS... **$267.75**

KENWOOD

Radio City 1¢ Sale

TM-742A

New VHF/ UHF tri-bander with third band optional includes many enhancements such as, direct frequency entry, CTCSS encode, DTMF remote control and much, much more. Also available in a tri-band model TM-942A.

$759.95

TH-79A(D) — NOW WITH SKIP SCAN

This slim line dual bander sports a dot-matrix LCD (for a perfect Alpha numeric display), 82 memories, non-volatile memory with ID, DTSS, DTMF & CTCSS V/V & U/U receive & "FET" power make this a winner.

$489.95

1¢ BONUS SALE

- Yaesu Hat
- Icom Hat
- Kenwood HT Case
- Radio City Cup
- Radio Angel Book
- Yaesu Log Book
- RCI Log Book Cover
- 1995 Calendar
- World Map
- Kenwood Log Book
- ARRL Hat
- Kenwood Hat
- Operating an Amateur Radio Station Book

Just **ONE** per Order.

IC-738

Icom does it again with a new radio worth the word "Great" utilizing DDS technology. 1 Hz of tuning resolution is displayed with VOX, RF gain, 100 watt, 101 memories, quick split auto antenna tuning, dual CW ports and more stack up to a feature packed HF rig.

$1549.95

IC-736

Here's the H.F. rig you've been holding out for! It features a full 100 watts output from 160 meters through 6 meters with a built in antenna tuner and power supply, VOX, PBT, RF Gain, 101 memories and more provides you with the latest features and fun.

$1979.95

IC-T21A — SAVE $30

Dual receivers with single band transmit makes this HT truly versatile. The 6 watt output, lit keypad, fast scan, DSQ, clock, 114 memories and a compact design add up to a great new product.

$359.95 -$30.00

WITH COUPONS... **$329.95**

YAESU

Yaesu Coupons Extended to 2•95

FT-990

The new FT-990 combines the basic technical features of that top-of-the-line model with several new advances in both transmitter and receiver circuitry. Digital filter, 90 memories, wide dynamic range and much more!

- **FT-990DC** $1819.95

$2099.95

FT-900/AT

The FT-900/AT is a revolutionary HF transceiver which answers the call for a truly practical mobile radio. Its unique remote-head construction allows installation where no other transceiver can be mounted. 100 watts, 100 memories, dual VFO's, IF Notch and many more features.

- **FT-900** $1189.95

$1349.95

FT-840 — SAVE $25 MORE

This new transceiver delivers the fun and performance you're looking for while staying on a budget! It has 100 watt output, 100 memories, DDS, IF Shift FET front end and a general coverage receiver.

$855.40

FT-11R — SAVE $20 MORE

This new HT packs the features you want in a small size. It features a new alphanumeric display, super small profile, new square "D" battery design, lit keypad, AM air craft receive, DSQ & CTCSS encode.

$299.95

FT-51R/31 — NEW

This new H.T. is the world's smallest dual bander. FET output, back lit keypad, V+V, U+U and U+V operating modes plus-menu guide, *Spectrascope™*, CTCSS encode, DTMF paging, 120 memories, cloning, SLS (ask) and so much more you have to hold and try it!

- **FT-51/38** $509.95

$489.95

FT-290R/II

Portable or mobile, this 2 meter all-mode transceiver delivers fun and function. The 25 watt linear amplifier clips on in place of an optional battery case to extend your operating horizon.

- **FT-690** 6m Txcr $689.95
- **FT-790** 70 cm Txcr $679.95

$579.95

FT-736R

Satellite and all-mode 2m/ 70cm work gets exciting with this full-feature transceiver. Linked tuning, 12 unlink memories, 100 memories, and 2 optional modules offers band extensions for 6m, 220MHz, or 1.2 GHz operation.

$1829.95

FT-5100 — SAVE $30 MORE

This dual band mobile features 100 memories, cross band repeat, lighted keypad, built-in duplexer and a small footprint. Dual watch capability rounds out this 50/35 watt VHF/UHF transceiver. Packet ready.

$619.95

FT-2500M — SAVE $20 MORE

This new 2 meter mobile borrows its ruggedness from the FT-2400H while adding great new features such as advance track tuning, time out timer, A.P.O., 9600 bps option, 31 memories, the new "omni-glow" LCD display and more!

$359.95

FT-530 — COUPON EXTENDED SAVE $50

The newest member of the dual band family. This handheld sports auto tone search, 82 memory channels, automatic power off, built-in VOX, dual in-band receive feature, built-in cross band repeat function and much more.

- **Limited supply**

$449.95 -$50.00

WITH COUPONS... **$399.95**

Authorized Factory Warranty Center

We offer factory authorized warranty service for Icom, Kenwood and Yaesu. We service all makes and models. Our customers may send any product requiring service to us, and we will handle it for them. This is a one-stop service that keeps our customers having more fun than hassle in this hobby. If you need a custom cable for packet and don't have time to make it, let us do it for you. C.A.P. & M.A.R.S. mods are also available at reasonable rates to authorized hams only.

2663 County Road I, Mounds View, MN 55112
Metro: (612)786-4475 • Nat'l Watts: 1-800-426-2891 • FAX: (612)768-6513
Store Hours: M-F, 10:00 am-8:00 pm, Sat.: 10:00 am-5:00 pm
Phone Hours: M-F, 9:00 am-8:00 pm, Sat.: 10:00 am-5:00 pm

Not Responsible For Typographical Errors.

Call For Catalog Ask For Ext. 22

Expires February 1995

Radio City

Prices Subject To Change Without Notice.

CIRCLE 175 ON READER SERVICE CARD

FALL SALE: DSP AUDIO FILTERS, FINALLY HEAR WEAK signals. NIR-10 $309.95; NRF-7 $199.95; NTR-1 $149.95; NF-60 $135.00; SSTV-1 $134.00. FREE SHIPPING 48 states. TWO WEEK FULL SATISFACTION OR FULL REFUND. Do not accept JPS clones. 24 HOUR ORDERS. Authorized JPS dealer: **DAVIS RF Co.** ORDERS ONLY 1-800-328-4773; Tech Info. 508-369-1738.

40M KLOUD KOUPLER: Want more gain than a dipole? The KLOUD KOUPLER inverted V is the answer. Better coupling ability than other antennas. Introductory price $89.95 + $5 S&H. Phased Array add-on available. Order today! MSL Antennas, P.O. Box 363, Ashland, PA 17921-036.

INEXPENSIVE HAM EQUIPMENT: Send stamp for list. WA4DSO, 3037 Audrey Dr., Gastonia, NC 28054.

QSLs/RUBBER STAMPS—Top Quality! Send 52¢ stamp to: Free Ebbert QSLPAK, D-2, P.O. Box 24280, Columbus, Ohio 43224.

ELECTRIC RADIO MAGAZINE in our sixth year. Articles on vintage, ham and military gear, repairs/restoration, history and AM operation. Large classified section. $3.00 for a sample copy. Electric Radio, Box 57, Hesperus, CO 81326.

UNIQUE ITEMS SALE. Packet, QRP, 2M, rare Commodore and Model 100 computer stuff, SSTV, surveillance, etc. Large SASE for list. Randy Barthel, KF8TV, 4003 Beverly Drive, Toledo, OH 43614.

MODIFICATION REPORTS: HR2510, RCI2950, Ranger 3300/3500-frequency, RF power modulation, RIT, etc., $10 ea. or $25 for all three. Four-hour video on VCR repair $19.95. Send to Jack Fisher, P.O. Box 612, Oceano, CA 93445.

RADIO RUBBER STAMPS free brochure. Reid Associates, 6680 Mellow Wood, West Bloomfield, MI 48322.

HF AMPLIFIER KITS, 2SC2879, 1.8–30 MHz, 14 VDC, 600 W $215, 1200 W $420. SASE KD4YBC, 197 Chickasaw Lane, Myrtle Beach, SC 29577.

HOME AUTOMATION. Become a dealer in this fast-growing field. Free information. 800-838-4051.

MILITARY: TCS, TBX, Navy & WWII ground mobile. VINTAGE: Johnson, National, Gonset, Meissner. Tubes, magazines. Buy/sell/trade. Two-stamp LSASE. Don, N3RHT, 47 Hazel Drive, Pittsburgh, PA 15228.

WANTED FOR MUSEUM: Apple-1 and other pre-1980 microcomputers. Also early microcomputer journals, newsletters, and advertising literature. KK4WW, 703-231-6478/763-2321.

LOTS OF COMMODORE 64 Software and related miscellaneous items must go! For complete information and sample 50 programs send $10. Lots of Commodore Amiga 500 software must go! For complete information and 5 sample programs send $5. Post office issued money orders only. William Bacheler, 3250 Trinity St., Eureka, CA 95501.

WANTED: Gear train from R4-C receiver or junker R4-C; clean Hammarlund HQ-215 RX; inexpensive transverters for 144 and 435 MHz for Sat. work; VFO adjustment tool for 75A-3; 50S and 60S film (converted to VHS video) of ham radio operations—Field Day, contests, etc., especially if participants can be identified. Dave Heil, A22MN, Gaborone/Dept. of State, Wash., D.C. 20521-2170. State lowest acceptable price first letter.

WANTED: Squire-Sanders SS-1BS receiver, SS-1V bandscan, SS-1RS speaker. Need schematic manual for LTC G276A VLF receiver converter. Weber, 4845 West 107th St., Oak Lawn, IL 60453-5252.

TRANSCEIVERS: Kenwood TS430S $600, TS520S $375, TS830S $600. ICOM IC730 $500. K1BW, 508-537-7195.

NATIVE UKRAINIAN wants to be your Tech Rep in Ukraine or Eastern Europe. Fluent in four languages, BSE degree, highly skilled in IBM/DOS hardware/software/networking. LF to UHF communications, antenna and transceiver design. Training or temporary work in USA to learn your products okay. KC1VF/US5WE, 703-231-6478, P.O. Box 2490, Christainsburg, VA 24068.

BUDGET QSL CARDS: $1 for samples (refundable with order). Busy Bee, 170 North Wilson Road, #132, Columbus, OH 43228-1263.

PHASED ARRAY NETWORKS by **COMTEK SYSTEMS** deliver gain and front to back. Call 704-542-4808; FAX 704-542-9652, write COMTEK SYSTEMS, P.O. Box 470565, Charlotte, NC 28247.

MILITARY KEYS, telegraph stuff, etcetera. 15-page illustrated list, $2.00 (refundable) plus 2 stamps. Dr. Jacobs, 60 Seaview Terrace, Northport, NY 11768.

WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear—new, old, in any condition—to the Radio Club of Junior High School 22, the Nation's only full time non-profit organization working to get Ham Radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 15th year of service. It is always easier to donate and usually more financially rewarding, plus your gift will mean a whole new world of educational opportunity for children nationwide. Radios you can write off; kids you can't. Start 1995 by helping a child and yourself. Write, phone, or FAX the WB2JKJ "22 Crew" today. The RC of JHS 22, P.O. Box 1052, New York, NY 10002. Twenty-four hours call 516-674-4072 or FAX 516-674-9600. Meet us on the WB2JKJ Classroom Net, 7.238 MHz, 1200–1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC.

WANTED: Nostalgic ham would like to restore and operate your vintage receivers, transmitters, or transceivers from the 1950 to 1975 era. All makes and models considered. Please write WB4IJN, 601 Black Oak Blvd., Summerville, SC 29485. All inquiries will be answered.

DX DESKTOP for Windows™, DX station management, $99. Logging with DXCC, WAS, and WAZ. SAM and Buckmaster interface. DX Cluster interface with automatic radio QSY. Optional coordinated rotator control. Put Windows™ to work in your station with **DX DESKTOP** from DEBCO ELECTRONICS, INC., 3931 Edwards Road, Cincinnati, Ohio 45209 (1-800-423-4499).

WANTED: SWAN SPHERICAL TVRO Antenna construction plans for 16 feet. I will gladly pay copy and postage charges. DU7LA, P.O. Box 901, Cebu 6000, Philippines.

BUILD A 35' FREE-STANDING TILT-OVER ANTENNA TOWER. Plan book $8.95. Build a universal coil winding machine. Plan book $8.95. Include $1.00 s&h with each order. Other books available. Dave Gingery Publishing, P.O. Box 75, Fordland, MO 65652-0075.

W7FG VINTAGE MANUALS. Most manuals in stock. SASE for Catalog. VISA/MASTERCARD accepted. 3300 Wayside Drive, Bartlesville, OK 74006 (1-800-807-6146).

QSL CARDS: Standard and custom. Your ideas or ours. Excellent quality. Foil stamping available. Many designs and type styles. Catalog and samples $1, refundable. Wilkins, Dept. B, Box 787, Atascadero, CA 93423.

ANY OLD TRAINS IN YOUR ATTIC?? I have new/usedHam equipment or test equipment to trade for Lionel, American Flyer, Marklin, or LGB Trains. Get the Ham Rig you want with minimal cash outlay. Call Jim Tucker, WM5G, at 800-527-4642 today.

VACUUM VARIABLES and vacuum relays. Lowest prices. SASE for list. Allen Bond, 221 Greencrest, Marietta, GA 30068-3825.

PHASED ARRAY NETWORKS by **COMTEK SYSTEMS** deliver gain and front to back. Call 704-542-4808, FAX 704-542-9652, write COMTEK SYSTEMS, P.O. BOX 470565, CHARLOTTE, NC 28247.

Statement of Ownership, Management and Circulation, October 24, 1994. CQ Amateur Radio, 76 North Broadway, Hicksville, NY 11801. Publication #0007893. Issued monthly, subscription price $24.50 per year (12 issues). Publisher: Richard A. Ross; Editor: Alan M. Dorhoffer; owned by CQ Communications, Inc. Stockholders: Richard A. Ross, Alan M. Dorhoffer, Thomas Kneitel, Arthur S. Salsberg. Circulation (Average of Preceding 12 Months): Net Press Run 108,935, Sales Through Dealers and News Agents 36,111, Mail Subscriptions 42,335, Total Paid 78,446, Free Distribution 1,900, Total Distribution 80,346, Copies Not Distributed 1,500, Returns from News Agents 27,089, Total 108,935. Circulation (single issue nearest filing date): Net Press Run 108,898, Sales Through Dealers and News Agents 37,196, Mail Subscriptions 40,600, Total Paid 77,796, Free Distribution 1,900, Total Distribution 79,696, Copies Not Distributed 1,500, Returns from News Agents 27,702, Total 108,898 /s/ Richard A. Ross, Publisher.

CABLE TV DESCRAMBLERS/CONVERTERS. Why rent? Lower your bill, SAVE $. Wholesale prices. Money back guarantee. Free 30-day trial. **RP ELECTRONICS, 1-800-304-3604.**

KB4QGJ is looking for a Leica camera or an old antique fountain pen and will swap my unbuilt Heathkit GD 1703 or other ham items. Rose, 524 North Quaker, Alexandria, VA 22304-1827-07 (703-370-1880).

ICOM 761: Perfect! Includes CT-17 computer interface, SP-20 speaker, SM-8 desk microphone, additional SSB and CW filters. New price $2782 in 1989, now $1400. Mark, N7MMQ, 503-628-0315.

THE HI-PERFORMANCE ANTENNA YOU'LL DEPEND ON!
DUAL & MONO BAND HI-GAIN MOBILE WHIP ANTENNAS

Unsurpassed SIRIO Antennas, known throughout Europe as the finest communication antennas available anywhere in the world, make their way to your favorite hamstore! SIRIO offers a unique combination of fine, old world craftsmanship and state-of-the-art engineering. SIRIO uses only the highest quality materials available, making other antennas pale by comparison!

SIRIO
SIRIO

•High quality materials - Gold plated RF connectors & solid brass castings, 17/7 PH stainless steel, anti-corodal aluminum, teflon insulators, & even stainless steel hardware. •Custom VSWR & bandwidth charts - with every model, actual antenna test range results, not theoretical printouts. •Factory pre-tuned - while fully tunable, they are shipped pre-tuned for North American bands, with custom tuning available. •Best DC ground potential for maximum static & lightning protection

HP 2070 2M/70CM DUAL BAND

Type:	VHF 1/4 Lambda UHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144-148MHz UHF 440-450MHz
Polarization:	Vertical
VSWR:	at freq. res.<1.2:1
Max. Power:	VHF 75 Watts, UHF 50 Watts
Bandwidth:at VSWR 1.5:1	VHF/UHF 10MHz
Gain:	VHF 0 dBd - 2.15 dBi UHF 3.8 dBd - 5.95 dBi
Connection:	UHF Female with gold plates center conductor and PTFE (TEFLON) insulator
Length:	approx. 18.5 inch.
Weight:	approx. 8.8 oz.

HP 2000 2m Mono Band

Type:	VHF 3/4 Lambda
Impedemce:	50 OHms
Frequency Range:	144 - 148MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwidth: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch.
Weight:	approx. 11.8 oz.

HP 2000 C 2m Mono Band

Type:	VHF 3/4 Lambda
Impedence:	50 Ohms
Frequency Range:	144 - 148 MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	150 Watts
Bandwith: at VSWR 1.5:1	4MHz
Gain:	4 dBd - 6.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 60.6 inch
Weght:	approx. 11.8 oz.

SIRIO
SIRIO

HP 7000 70cm Mono Band

Type:	UHF 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1. 5:1	10MHz
Gain:	3.2 dBd - 5.35 dBi
Connection:	UHF Femal with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 18.5
Weight:	approx: 8.8oz.

HP 7000 C 70cm Mono Band

Type:	UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	440-450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	75 Watts
Bandwidth: at VSWR 1.5:1	10MHz
Gain:	6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) Insulator
Length:	approx. 34.6 inch.
Weight:	approx. 10.9 oz.

HP 2070 H 2m/70cm Dual Band

Type:	VHF 1/2 Lambda UHF 2 x 5/8 Lambda
Impedence:	50 Ohms
Frequency Range:	VHF 144 - 148MHz UHF 440 - 450MHz
Polarization:	Vertical
VSWR: at freq. res.	<1.2:1
Max. Power:	VHF 150 Watts, UHF 100 Watts
Bandwidth: at VSWR 1.5:1	VHF 4 MHz UHF 6 MHz
Gain:	VHF 3 dBd - 5.15 dBi UHF 6 dBd - 8.15 dBi
Connection:	UHF Female with gold plated center conductor and PTFE (TEFLON) insulator
Length:	approx. 41.3 inch.
Weight:	approx. 11.6 oz.

These super High Performance antennas, as well as the complete SIRIO antenna line for Amateur, Commercial, Marine and Cellular are now available. Contact your favorite dealer or call EDCO for the dealer nearest you. SIRIO offers High performance antennas at unbeatable prices!

EDCO

Electronic Distributors
325 Mill St.
Vienna, Va. 22180
PH 703-938-8105

Exclusive Distributors for North & So. America

CIRCLE 162 ON READER SERVICE CARD

ISLAND HUNTERS read the Island News. Sample #10 SASE to P.O. Box 701, Fernandina Bch, FL 32035-0701.

SB-200 OWNERS: New Fan Motor and Fan Blade, Soft Key interface, Power Supply board with new Caps and Rectifiers plus Soft Start. Write HARBACH ELECTRONICS-WA4DRU, 2318 S. Country Club Road, Melbourne, FL 32901.

AT LAST: Organize and store resistors, diodes, etc., in the Sofpack. Roll up or hang on wall, holds hundreds of components. U.S. Patent 5,273,158. Introductory offer, buy one get one free. Send $7.95 + $2.00 s/h. Fathom Technologies, P.O. Box 1155, Naples, FL 33939-1155.

OFF ROAD HAMMING AT ITS BEST! 1990 Jeep Cherokee Loredo 4wd. Custom installed FT-900AT with Hustler whips. Car has 43k miles,white w/grey interior, auto, air, AM/FM stereo cassette, compass and exterior air temp. $17,950. Contact Dick Yocom, KK6ZV, 714-723-0923.

FIBERGLASS: Solid rod, round tube, square tube, quad spreaders, (UHF–40 meters!) masts, crossbooms. SASE for list. Max-Gain Systems, 221 Greencrest, Marietta, GA 30068-3825.

WANTED: COLLINS REPAIR TECHNICIAN to repair final stage of KWM2. WA5BJM, P.O. Box 14115, San Antonio, TX 78214 (FAX 210-927-4554).

WANTED FOR MUSEUM: Apple-1 and other pre-1980 microcomputers. Also early microcomputer journals, newsletters, and advertising literature. KK4WW, 703-231-6478/763-2321.

ROSS'$$$$ USED February SPECIALS: KENWOOD TV-506 $240.00, VFO-120 $130.00, TS-530S/YK88C $550.00, BC-11 $69.90. ICOM 2SAT/UT-50 $295.00, 4SAT/UT-50 $300.00, IC-701PS $99.90, R-1 $490.00. YAESU FT-690RII $600.00, FV-101 $130.00, FT-726R 2M, 70CM, SU $900.00, FT-221R $350.00, FT-209RH $150.00, YO-901P $420.00. COLLINS 32S-3, 75S-3B, 516F-2, 312B-4, ALL ROUND $1250.00, CC-2 $90.00, AC-3805 HB $60.00. DRAKE PS-75 $65.00, PS-7 $140.00. TEN-TEC 225 $75.00, 252-MO $80.00, 961 $130.00, 251-M $70.00. Looking for something not listed? Call or send 2 stamps. We have over 120 USED ITEMS in stock. MENTION AD. Prices cash, FOB Preston. Hours Tuesday–Friday 9:00 to 6:00, 9:00–2:00 P.M. Mondays. Closed Saturday & Sunday. ROSS DISTRIBUTING COMPANY, 78 South State, Preston, Idaho 83263 (208-852-0830).

1995 CALLBOOKS. North American, $24.95; International, $24.95. Both, $48.95. 1994 Callbooks, $12.95/ea. **Buckmaster** HamCall CD-ROM, $36.95. QRZ! HamRadio CDROM, $12.95. **ARRL Books:** 1995 Handbook, $25.95; Antenna Book (17th edition), $25.95. Add $3/order S/H. CA orders: add 7%. AA6EE—Callbook Distributor, 16832 Whirlwind/C2, Ramona, CA 92065 (619-789-3674).

NOW ON 80 METERS! NEW, KNOB TUNED w/DIGITAL DISPLAY, SYNTHESIZED QRP Transceiver. Complete kit only **$199.95.** S&H $6.50 (Continental US). GUARANTEED TO WORK. For info send **SASE**; Call/write to order: S & S Engineering, 14102 Brown Road, Smithsburg, MD 21783 (301-416-0661).

REPAIRS AND **MODIFICATIONS** for your receivers, scanners, and amateur equipment now available from certified, licensed technicians at Grove Enterprises. Fast turn-around, reasonable rates and 90 day warranty on repaired or modified equipment. Authorized ICOM repair center, but other brands serviced. Call **704-837-7081** for more information and to receive a service order number.

OLD QST 1972 to date; CQ 1977 to date; POPULAR ELECTRONICS, ELECTRONICS ILLUSTRATED, 1960s and 1970s. Call 810-673-8697.

YAESU FT-990 SIDEBAND/CW FILTERS NOW AVAILABLE! Also 8-pole & 10-pole Crystal Filters for Kenwood, ICOM, and Yaesu. Fox-Tango Filters available. Kits & Upgrades. Authorized Kenwood warranty service center. Send for our free catalog. INTERNATIONAL RADIO & COMPUTER, INC., 3804 S. US #1, Ft. Pierce, FL 34982 (1-407-489-0956). Look for us at Dayton in Booth #443.

WANTED: WE-300B, 2A3's Mono Plate, Mullard 5AR4's, AR-1 Speakers, TV/7 Tester. SELL: SW-3 Batt. RCVR. Robert 310-928-3889.

CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Road, Howell, MI 48843.

WANTED: ICOM IC-SP2 Speaker, Yaesu FT-225RD w/memory, and C-30/C-43 ARC-5 Control Units. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

FOR SALE: Periphex Battery and Wall Charger for ICOM 02-03 series, 8V. 1200mah, $50.00. Cushcraft A 147-11, 2 meter 11-element beam $45.00. Gary Hultman, N6BJF, 300 Limpy Creek Rd., Grants Pass, OR 97527 (503-474-6466).

About 2 1/2 miles from LAX-North on I-405

Out of State 1-800-882-1343

310-390-8003 FAX 310-390-4393

HOURS M-F 9:00 - 5:30 SAT 9:00 - 5:00 ESPANOL • KOREAN

5563 SEPULVEDA BLVD., CULVER CITY, CA 90230

JUN'S ELECTRONICS

ICOM

HF Equipment	List	Jun's
IC-781 Super Deluxe HF Rig	$8835.00	Call $
IC-736 New HF Xcvr w/6 Meters	2385.00	Call $
IC-707 New HF	1032.00	Call $
IC-765 All-Mode HF	4125.00	Call $
IC-738 All-Mode, 100w Tuner	1935.00	Call $
IC-728 New, All-Band HF	1325.00	Call $
IC-729 All-Band HF Plus 6 Meters	1492.00	Call $
IC-2KL 500w, Amp	2710.00	Call $
IC-4KL 1 kW Amp	9000.00	Call $
Receiver		
IC-R1 100 khz - 1300 MHz	567.00	Call $
IC-R72 30 kHz - 30 MHz Rcvr	1145.00	Call $
IC-R100 100kHz - 1.85GHz, AM, FM	850.00	Call $
IC-R9000 100kHz - 1.99 GHz w/Scope	6825.00	Call $
GP-22 Ground Pos. Unit	656.00	Call $
VHF		
IC-2GXAT Up To 7W Output, HT	359.95	Call $
IC-T21A 2M HT, Rec 440MHz	455.00	Call $
IC-2GAT 7W HT	425.95	Call $
IC-281H 2M Mobile, Rec. 440MHz	488.00	Call $
UHF		
IC-T41 New, 440MHz HT	472.95	Call $
DUALBANDERS		
IC-V21AT 2M/220MHz HT	783.95	Call $
IC-W21AT 2M/440MHz HT	625.95	Call $
IC-Δ1A 2M/440/1.2GHz, HT	987.00	Call $
IC-X2A 440MHz/1.2GHz HT	772.95	Call $
IC-X21AT 440MHz/1.2GHz FM	960.00	Call $
IC-2330 2M/220MHz Mobile	865.95	Call $
IC-2340H 2M/440MHz Mobile	749.95	Call $
IC-2700H 2M/440MHz Mobile Detch Panel	959.95	Call $
IC-820H 2M/440MHz All-Mode	1999.95	Call $
IC-970H All-Mode, 45w	3964.00	Call $
IC-Δ100H 2M/440MHz/1.2GHz Mobile	1570.00	Call $
220 MHz		
IC-3SAT, 2.5W, 220 HT	399.00	Call $

YAESU

HF Equipment	List	Jun's
FT-1000 Transceiver w/PS/Tuner	$4099.00	Call $
FT-1000D Top Performer	$5199.00	Call $
FT-990 Transceiver w/PS/Tuner	$2699.00	Call $
FT-990DC All Mode	2299.00	Call $
FT-890/AT HF Base	1699.00	Call $
FT-840 New Compact HF	1099.00	Call $
FT-900 Mobile Or Base, Remv. Frt. Panel	1499.00	Call $
FT-900AT New HF Mobile	1699.00	Call $
FT-650 100w On 6m, 10m, 12m	1899.00	Call $
FL-7000 15m-160m Solid State Amp	2459.00	Call $
Receivers		
FRG-100B Mini Receiver	699.00	Call $
VHF		
FT-11R, Worlds Smallest 2M HT	369.00	Call $
FT-11RH 5 Watt Version of FT-11R	389.00	Call $
FT-23 R/17 Mini HT	309/329	Call $
FT-2200 50w, 2m Mobile	479.00	Call $
FT-2500M Rugged 2M Mobile	449.00	Call $
FT-290R/690R 6M, All Mode Portable	729/859	Call $
UHF		
FT-41R, Worlds Smallest 440MHz HT	429.00	Call $
FT-7200 35w, 440MHz Mobile	599.00	Call $
FT-7400H New, Rugged 440MHz Mobile	589.00	Call $
FT-790 R/II 70cm/25w Mobile	839.00	Call $
VHF/UHF Full Duplex		
FT-736R, All Mode, 2m/70cm	2299.00	Call $
Dual Bander		
FT-51R 2m/70cm HT w/ "Windows"	609.00	Call $
FT-530 2m/70cm HT	589.00	Call $
FT-5100 Compact 2m/440 Mob.	779.00	Call $
FT-5200 Compact 2m/440 Mob.	819.00	Call $
FT-6200 Cpt 440/1.2 GHz Mob.	899.00	Call $
1.2 GHz		
FT-911 Compact HT	549.00	Call $
FT-912 10w Mobile	729.00	Call $
Rotators		
G-800SDX med./hvy. Duty	439.00	Call $
G-1000SDX Heavy Duty.	539.00	Call $
G-2700SDX Heavy Duty.	1099.00	Call $
G-5400 Az-El Med/Heavy Duty.	589.00	Call $

STANDARD

HandHelds

	List	Jun's
C108A Mini 2 Meter	$269	Call$
C168A Mini 2 Meter	469	Call$
C188A Mini 2 Meter Dlx	489	Call $
C288A 220MHz, HT	499	Call $
C468A Mini 440 MHz	480	Call $
C158A Affordable 2M	339	Call $
C178 Mini 2 Meter	459	Call $
C228A 2M/220MHz	695	Call $
C558A 2M/440MHz	689	Call $
C628A 440MHz/1.2 GHz	727	Call $
C528A 2M/440MHz Twinbander	495	Call $

C108A Super Mini 2M, HT

CCR-708A Communications Test Receiver With Spectral Display Scope List $750 Call $

Mobile

C1208DA 2M/440 Receive List $529 Call $
C5718DA 2M/440 List $849 Call $

ALINCO ELECTRONICS INC.

COUPON DISCOUNTS

NEW

DR-MO6T	6 Meter	List $459
DJ-582	2M/440MHz HT	List $486
DJ-480	440MHz HT	List $349

$40 OFF

DJ-G1T New, 2m, HT List $409

$10 OFF

DJ-180T 2m, HT List $279

$25 OFF

DJ-580T 2m,70cm HT List $499

$10 OFF

DJ-F1T 2M Handheld List $339

DR-130T 2 Meter Mobile List $399
DR-430T 440MHz Mobile List $479

$15 OFF

$10 OFF

DR-600TB 2M/440MHz Mobile, List $759
DR-1200T 2M Data Radio, List $339

New Items from COMET

Dual-Band 2M/70cm Mobile

SB-5/SB-5NMO SB-7/SB-7NMO

- Gold Plated Connector
- Fold-Over Element
- Superior Quality
- Choose PL-259 or NMO type

Miracle Baby HT Antenna

CH-32

- Dual-Band 2M/70cm
- Surprising Performance
- Only 1.75 Inches Tall
- BNC Connector

JUN'S BARGAIN BOX

ICOM

$349.95

IC-X2A 440MHz 1.2GHz HT List $772.95

$349.95

IC-W21A 2M/440HT List $572.00

$199.95

IC-2iA 2 Meter HT List $389.95

IC-901A $599.95

Detachable Front Dual Band Mobile List $1119.00

LIMITED QUANTITIES ONLY WHILE THEY LAST

CIRCLE 63 ON READER SERVICE CARD

5 BAND QUAD

$289 2 Element Complete

Complete Kits, Parts and Custom Building For Quads From 40m to 440MHz. Remember Your Ideas Can Become Reality. UPS Shippable

Lightning Bolt Antennas
RD#2, RT 19, Volant, PA 16156
412-530-7396

VECTOR FINDER

Handheld 2-mtr/220 MHz phase sense direction finder. Used with any FM xcvr. Oil compass. Type VF-142, $139.95, $3.50 S&H. Call/write for info. CA add tax.

RADIO ENGINEERS, 7969 Engineer Rd. #102
San Diego, CA 92111 619-565-1319

U.S. AMATEUR RADIO MAIL LISTS
Labels, floppy disks, CD-ROM, mag tape.

- Newly licensed hams
- All upgrades
- Updated each week

BUCKMASTER Publishing
Route 4, Box 1630
Mineral, Virginia 23117
703:894-5777
800:282-5628
Fax 703:894-9141
Internet: info@buck.com

VISA MasterCard

TRADE: Realistic Model MD-1000 Multi-Media Laser Disc Player, mint condition with five discs for your 2 meter rig of equal value. Gary, KC3ZW, 412-667-1166.

FOR SALE: Collins Parts—one each main osc. coil, used. IF cans new—one each x 003 and one each x 002, 5 each x 004. Make offer to T. Balk, P.O. Box 180, Clayville 1665, Rep. South Africa.

KRAFT HIGH SPEED GAME CARD for IBM compatible, $5.00. Walt Grosch, KZ9F, 1735 Stoneway Ct., Richfield, WI 53076 (414-628-1558).

WANTED: Sadelco, Jerrold, C/M UHF-VHF television field strength meter. T.N. Colbert, WA8MLV, General Delivery, Burton, OH 44021.

WANTED: YAESU FT-625RD Memory Option Upgrade. Charles T. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

COMPOSITE COLOR MONITOR with service manual wanted. West Alabama or East Mississippi Area preferred. L.K. Tucker, KC4IAI, 12511 Frog Ridge Road, Buhl, AL 35446-9747.

FOR SALE: AM'ers try the Taylor Super-Mod. or Ultra-Modulation finals for super-results. Circuit, instructions $3 each, both $5. W4CJL, 202 Baker Dr., Florence, AL 35630.

ANYONE WITH EXPERIENCE using Kenwood TV-506 6M transverter with other makes please call (615-949-KC8M. (No collect, pse.).

HEATH HW12A 32A $149 ea., SB101 $225, SB400 $200, SWAN 250, 350 $225 ea., SW175 $125. DRAKE R4 $200, exc. w/ps, man. List $1 & SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

MFJ-9017 17M CW QRP XCVR $125; BAYPAC BP-1 Packet Modem, extra cords, 9 to 25 pin adapter, $45; YAESU FT-301SD HF XCVR $250; ICOM IC-230 2M FM XCVR (needs repair) $20. Charles Bright, 4115 Buckley Ridge Ct., St. Louis, MO 63125 (314-544-5584).

WANTED: Schematics Knight R55A rcvr. Heath TS-3, Precision E200C, Ballantine 300H, RCA WV-97A, WV77C, WV-49B. Jack, WA4CSM, 8109 N.W. 58 Ct., Tamarac, FL 33321.

VARIABLE CAPS, rotary coils, freq. counter, textbooks, radio, physics, much more. SASE for lists. Bill Tucker, W4FXE, 1965 A-1-A, Apt. 15-G, Hallandale, FL 33009 (305-456-1349).

WANTED: Crystals and manual for ICOM IC-22A. K4FQF, Mike Thomason, 1301 Malibu Pl., Birmingham, AL 35216.

WANTED: ICOM IC-9000, IC-781, IC-4KL, IC-970A/H, JRC JRL-2000F. Alan Emerald, K6GA, 8956 Swallow Ave., Fountain Vly, CA 92708 (714-964-3912).

WANTED: ICOM IC-SP2 Speaker and R-2174A/URR Rycom Voltmeter. CharlesT. Huth, 229 Melmore St., Tiffin, OH 44883 (419-448-0007).

WANTED: SWAN 250 MANUAL/COPY. CALL WB7DEJ, 504-641-2779, or 1434 Ridgecrest Dr., Slidell, LA 70458.

CRYSTALS: SASE for my list. K8LJQ, 2023 Lannen Rd., Howell, MI 48843.

FOR SALE: QST/HR/73 & misc. publications, SASE. KA1VY, Ernie Guimares, P.O. Box 1262, Lakeville, MA 02347-7262.

WANTED: Heathkit HD-8999. T.N. Colbert, General Delivery, Burton, OH 44021.

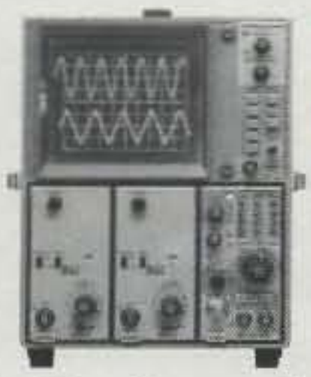
COLLECTORS: Hamilton "Lever-Set" Railroad pocket watch. 21 jewels, inside is gold-plated. GOOD condition. Make offer by letter ONLY. Bill, K8TBW.

FOR SALE: DJ-160 2 meter handie-talkie comes with manual and three batteries. Reason for selling: now have the dual band and don't need this unit. Price $150.00 and no personal checks. Also brand new, bought only couple of months ago, the Ten-Tec Paragon II Model 586. I can't use this unit where I am and paid over $2600. Will sell for $1500, and I don't have the boxes it came in. For more info on the above gear send SASE to P.O. Box 518, Whitehouse, FL 32220.

COLLINS RF VARIABLE INDUCTOR assembly, 41uH, 1KW+, motorized, 12-28 VDC, $49. Collins Variable Vacuum Capacitor assembly, UCSL-1000-3KV, motorized, 12-28 VDC $69. Collins RF Inductor, Variable, 19uH, 1.5KW+, new $39. Bird 5000H, new $83. Alan, K6GA, 8956 Swallow Ave., Fountain Valley, CA 92708 (714-964-3912).

FOR SALE: National HRO Radio Model M. Complete, working cond., with manual, speaker, PWR supply and full set of coils. $200.00 plus shipping. Charles E. Miller, 11937 Glenarm Rd., Glenarm, MD 21057.

FULL PERFORMANCE...EXCEPTIONAL VALUE...GUARANTEED.



Tektronix 7603N Complete Oscilloscope System (7603N/7A15AN/7A15AN/7B53AN Option 11S)

Thousands Off of the Original Tektronix Price!

Mention This Ad When You Order and We'll Send You Two FREE PROBES!*

While They Last! Only..... **$495**

10% DISCOUNT ON ANY PLUG-IN FOR THIS MAINFRAME!

There has never been a better time to purchase an Oscilloscope System than now! For a limited time we're able to offer you this exceptionally low price on a familiar industry workhorse- the Tektronix 7603N 11S Complete Oscilloscope System! A system that provides what other scopes simply can not deliver...continued peak performance, comprehensive capabilities, and reliability that won't quit. Comprised of a 7603N Dual-Trace Mainframe, two 7A15N Vertical Amplifiers, and a 7B53AN Time Base, this system was designed to meet strict military physical and electrical specifications so you know it will out perform others in everyday use. With the ability to utilize a wide range of available plug-ins ranging from Differential Amplifiers to Spectrum Analyzers and Sampling units, this system is truly a comprehensive "one handle" solution to your instrument requirements.

The Mainframe provides a straight forward approach by housing a multiple array of plug-ins while providing a bright, crisp display of signals in question. Although the military bandwidth specification of this system is 65 MHz, the viewing and triggering of 100 MHz signals are easily displayed.

Your system will be delivered with two 7A15N Amplifiers providing vertical sensitivities from 5 mV to 10 V/division with continuously variable attenuation between all ranges. Front-panel polarity, X1/X10 MAG, and gain adjustment makes it easy to view signals in the way that's best for your specific needs.

The 7B53AN has multiple triggering modes, sweeps, and trigger source capabilities from 5 nS to 5 S/div, making even the most elusive signals easily triggerable. Those hard-to-see signal portions are a thing of the past with built-in delay and delayed triggering functions.

We've gone one step further on this already exceptional system value by including two FREE X1/X10 switchable probes!*

Explore the possibilities, discover what the 7603N 11S System can do for you. Order yours today!

Protective front covers available for only $25!

* 2 each Universal P600S X1/X10 Switchable Probes

AEA · ALINCO · AMIDON · ANLI Antenna · ASTRON CORPORATION · Bencher · COMET · CREATE · Cushcraft · DAIWA · DIAMOND ANTENNA · DRSI · EDCO · EMOTO · HEIL SOUND · hOFi · ICE · pro-am · OPTOELECTRONICS · MFJ · LAKEVIEW · KENWOOD · Kantronics · JPS · Jim · ICOM · rfc · hy-gain · HUSTLER · RAMSEY · ROHN TOWERS · valor

CALL TOLL FREE 800-527-4642 FOR OUR FREE CATALOG TODAY!

CALL FOR COUPON SPECIALS ON KENWOOD, ICOM AND ALINCO

AVAILABLE ON ALL

30 DAY NO RISK GUARANTEE

PREOWNED EQUIPMENT

FREE FedEx. Federal Express *Economy Service on this item.*

Tucker T-1000 *The Best 300 W Tuner* $139.95

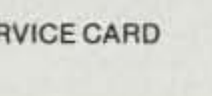
Tucker SatisfactionPlus 30-Days - No Questions Asked Guarantee

The Tucker T-1000 has been designed to give you more than any other tuner currently available for 300 W and its construction will let you appreciate its many features for years to come. Covers the entire frequency range up to 300 W PEP. Utilizes continuous rotation capacitors to provide superior transmitter/antenna tuning. Inductance is setup using a 12-position switched inductor. Antenna Selector: six positions: COAX 1 tuned and DIRECT, COAX 2 tuned and DIRECT, bypass and balanced antenna. Power Switch: high and low (300 W/30 W). Comes complete with a 1 year warranty and our risk-free Tucker SatisfactionPlus guarantee.

Made in the U.S.A.! Get the best, order your T-1000 today!

"Very well made. Can't build it for that price!" R. N., Anchorage AK

TEST EQUIPMENT WANTED



YOUR USED EQUIPMENT IS VALUABLE.

CALL FOR AN INSTANT TRADE QUOTE.

ALL NEW RADIO EQUIPMENT AVAILABLE

We Gladly Accept These Major Credit Cards: VISA · MasterCard · Discover

TUCKER ELECTRONICS

CALL TOLL FREE 800-527-4642

• RADIO & COMPUTER HOTLINE: 800-559-7388 •

1717 Reserve Street • Garland, TX 75042

P.O. Box 551419 • Dallas, TX 75355-1419 • Phone in Dallas: 214-348-8800

24 Hour Fax in English, en Español, und auf Deutsch: 214-348-0367

CIRCLE 174 ON READER SERVICE CARD

WANTED: Ten-Tec Scout 555. Local deal preferred. Glenn, AA8NT, P.O. Box 603, Dearborn Hts., MI 48127-0603.

DRAKE SW4 $199, RV4 $129, RV4C $149, MS4 $55, R4B/T4XB $429, R4/T4X $399, TR4 $249, W/PS. Parts, manual copies. Exc. List $1 & SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

WANTED: COLLINS Radios, mechanical filters, and accessories. Military HF radio for submarine restortion project. Older semi-automatic key. Brian, K9VKY, 3068 Evergreen, Pittsburgh, PA 15237 (412-931-4646).

FOR SALE: KENWOOD TS-940S with antenna tuner, mint, with YK-88C1 and YG-455C1 (500 Hz CW filters) and VS-1 voice synthesizer; box and operating manual; $1500 plus shipping; original owner: Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

THREE SWAN TRANSCEIVERS For Sale. 500CX with AC power supply and VOX, $225. 500 CX with 117-14 mobile supply, $225. 240 with homebrew PS $150. All sets working when stored. Look good with instruction books for each. Send cashiers check or MO and will check out, pack properly, and ship immediately UPS collect. Telephone 803-773-2437. Ernest Jenkinson, W4WXK, 102 Lesesne Drive, Sumter, SC 29150.

FOR SALE DRAKE TR-7 TRANSCEIVER: Late model TR-7 with 3 filters, heavy-duty power supply and service manual, all for $550. You may FAX me a reply at 404-396-0276 or write KD4AJ @ 1968 Huntington Hall Court, Atlanta, Georgia 30338. I will respond to every inquiry.

WANT: Sadelco, JFD, Channel Master UHF-VHF Signal Strength Meter. T.N. Colbert, 13609 Colony Lane, Burton, OH 44021.

5-1/4 inch 360K XT floppy drive, $5.00. Walt Grosch, KZ9F, 1735 Stoneway Ct., Richfield, WI 53076 (414-628-1558).

FOR SALE OR TRADE: National SW-3 RCVR, 6 sets of coils in original boxes. Mint condition, original papers from National, much literature and articles on SW-3. Antique Trimm earphones. HBPS. All excellent, works great, trade for Nikon cameras, lenses, accessories, or best offer. Jim Leathem, K7BTB, Box 50355, Parks, AZ 86018 (1-602-635-2117).

FOR SALE: Kenwood TS-830S, 500 Hz 1st/2nd IF filters, VFO-240, Shure 526T mike, $685. Nye MB5A tuner, $535. All excellent, original owner, low hours. Jeff, K2OD, 908-788-5663 before 9 PM EST.

ALUMINUM TOP-MOUNT thrust-bearing plate for Universal or Heights towers, pre-drilled for SC-4, $5.00. Walt Grosch, KZ9F, 1735 Stoneway Ct., Richfield, WI 53076 (414-628-1558).

GET THE MOST from your general-coverage receiver: 24-hour shortwave station list of international English broadcasts audible in North America, $6. JS, Box 50264, St. Louis, MO 63105.

FOR SALE: Kenwood VFO-240 (analog); very good, with manual and carton; $110, I ship. Al Christman, KB8I, 1101 W. Main St., Grove City, PA 16127 (412-458-0761).

WILL TRADE my new 4-400-C new in sealed carton, value $150, for ur NC-270. Socket chimney included. W4CJL, 202 Baker Drive, Florence, AL 35630.

HAM ITEMS, parts, textbooks, radio, physics. Giant-size Buck Rogers complete works. SASE lists. Bill Tucker, W4FXE, 1965 A-1-A Apt. 15-G, Hallandale, FL 33009 (305-456-1349).

SONY CCDV801 HI8 HANDYCAM, stereo, 10X zoom, RC time code. In excellent condition with original box and all accessories, $1500. Brand new Sony ICF2010 SW RX $450. VE7BFX, #51-10771 Auburn Drive, Richmond, B.C., V7A-4X7, Canada (604-272-1825).

FOR SALE: ARRL Handbooks: 1949, 56, 61, 62, 65, 66, 68, 69, 70, 72, 76, 77 ed. $20 ea. postpaid, certified check or money order. Joe Moraine, N5UX, 3700 Cliffwood Drive, Bedford, TX 76021 (817-281-1128).

WANTED: Tempo One. Manual with schematics. Ralph, KD6BYI, 190 Nob Hill Ln., Ventura, CA 93003 (805-642-2024).

HV POWER SUPPLY Plate Transformer, 3KV-1A, Hipersil, taps $150. Capacitors, 2100MFD-400V, New $6. Filament transformer, 7.5V-75A, taps $100. Alan, K6GA, 714-964-3912.

KRAFT HIGH SPEED GAME CARD for IBM compatible, $5.00. Walt Grosch, KZ9F, 1735 Stoneway Ct., Richfield, WI 53076 (414-628-1558).

HEATH HW12A 32A $149 ea., SB101 $225, SB400 $200, SWAN 250, 350 $225 ea., SW175 $125. DRAKE R4 $200, exc. w/ps, man. List $1 & SASE. Joe Bedlovies, P.O. Box 139, Stratford, CT 06497.

Advertiser's Index

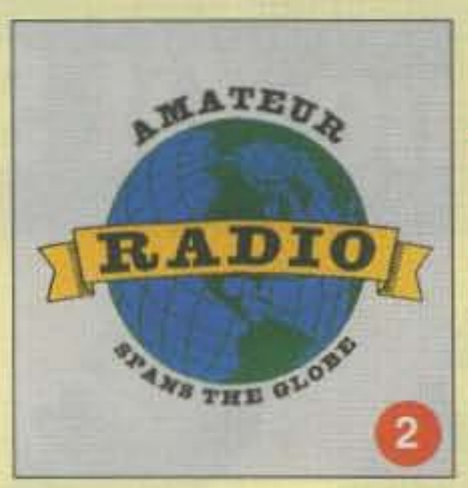
(continued on page 147)

CQ Radio T-Shirts

High-Quality T-Shirts, made in U.S.A., pre-shrunk 100% cotton.

$17.95 per shirt plus shipping & handling

1



2

3

4

Item # 13

5

6

7

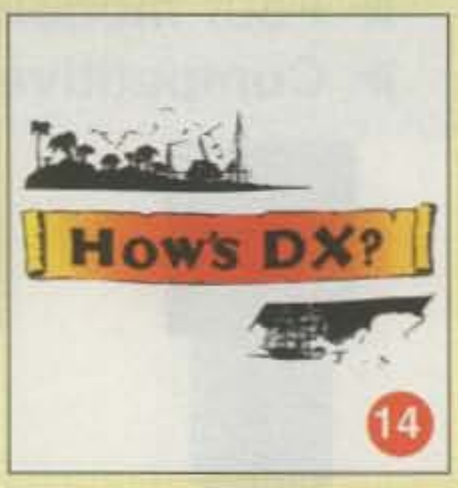
8

9

10

11

12



14

15

16

RADIO SWEATSHIRTS ARE NOW AVAILABLE!

NEW! Radio Sweatshirts only $27.95 plus $2 s/h

Now you can order your favorite CQ shirt design in a high-quality sweatshirt!

All sizes and designs are available.

To order simply add an "S" to the item number (i.e., 6S is a CQ sweatshirt)

Order your Radio Sweatshirt today!

Yes! Rush my CQ T-Shirt(s) to me right away! Here's my order below

Available sizes: L, XL, XXL (add $2)
Please add $2 s/h per item. Order 4 or more for free shipping. Make check or money order payable to:
CQ Communications, Inc., 76 North Broadway, Hicksville, New York 11801

Qty	Item #	Size	Price	S & H	Total
				Grand Total	

Please charge my:

MC/VISA/AMEX/Discover # _____ Expires _____

Signature _____

Name _____ Callsign _____

Address _____

City _____ State _____ Zip _____

To Order Toll Free Call (800) 853-9797 or FAX (516) 681-2926

Advertiser's Index *(cont'd)*

Only the best companies advertise in CQ. Learn how easy it is to enjoy the benefits the great CQ audience has to offer. Call Arnie Sposato, N2IQO, at (516)681-2922 or FAX (516)681-2926.

RADIO CENTER USA

1-800-821-7323 East/Midwest

1-800-345-5686 West

SPRING ACCESSORY SALE!

Save 15% - 50% On Kenwood, ICOM, And Yaesu Accessories

YAESU

FT-1000D
Premium HF Transceiver In A Class By Itself

YAESU

FT-840
New, Compact HF Transceiver With 100kHz-30MHz Receive

YAESU

FT-2500M
Heavy Duty, 2 Meter Mobile 50 Watts, Large LCD Display

YAESU

FT-5100
Compact 2M/70cm Mobile. Built-In Antenna Duplexer

YAESU

NEW

FT-51R
Dualband Handheld
Easy-To-Use
Scrolling Instruction
Menu-Cloning
Memories

FT-990
100 Watt HF Transceiver w/General Cov. Receiver

FT-736R
Multi-Mode VHF/UHF Full Duplex Base, Optional Modules For Extra Bands

FT-2200
2 Meter Mobile. Compact Size With 3 Power Levels

FT-5200
Dual Band Mobile With Snap-Off Front Panel

FT-530
2M/440MHz
Handheld With
Multiple Power
Levels, 82 Mem.
And Aircraft
Receive

FT-900
New Compact HF Transceiver

- Snap-Off Front Remote Control Panel
- 100 Watts
- Built-In Antenna Tuner

FT-290MKII
True Field Operation For Fun Or Emergency. All Mode, 2 Meter, 25 Watts

ROTATORS
G-500
G-800S
G-800SDX
G-1000SDX
G-5400B

LOWEST PRICES

FRG-100B
50kHz-30MHz Receiver With 50 Memories and New Broadcast Band Mode

FT-11R
2 Meter, FM
Handheld. World's
Smallest Size HT
With Full Sized
Keyboard

STANDARD

C558A
VHF/UHF FM HT
Super Compact Size, Cross-Band Operation, Twin Band Scanning, Receive AM

C188A
Ultra Thin 2 Meter FM HT,
200 Memory Channels,
Keyboard Under A Slide-Cover Plus Wakeup Feature

cushcraft

A3S	$329.95
A4S	$389.95
R5	$259.95
R7	$343.00
13B2	$ 94.95
17B2	$159.95
124WB	$ 49.95
ARX2B	$ 49.95
AR270	$ 59.95
AR270B	$ 84.95
ARX270	$184.95
A148-3	$ 34.95
A148-10	$ 57.95
A449-11	$ 59.95
A50-5	$124.95

ASTRON CORPORATION

SL11A	$ 69
RS12A	$ 72
RS20A	$ 89
RS35A	$143
RS50A	$215
RS12M	$ 85
RS20M	$109
RS35M	$161
RS50M	$233
RS70M	$265
VS20M	$127
VS35M	$177
VS50M	$244

MFJ

MFJ-989C

MFJ-1270C

MFJ-493

1214PC	$135	411	$ 69
1270C	$109	422B	$119
1276	$139	452X	$ 73
1278B	$257	462	$129
1289	$ 55	490	$147
1701	$ 32	492	$ 88
1702B	$ 19	493	$119
1704	$ 54	498	$159
1763	$ 37	784	$198
1768	$ 45	815B	$ 59
1786	$249	817	$ 69
1796	$165	8621	$108
1798	$229	9020	$144
209	$ 94	9420	$179
249	$165	934	$144
259	$188	949E	$119
283, 284, 285, 286	$ 22	962C	$195
346	$169	986	$242
407	$ 63	989C	$292

C5718DA
2 M, 440MHz
Mobile
Packet
Ready

9600 Baud Packet Ready From The Box. 50W On 2M, 40W On 440MHz

OUTBACKER

8 HF Bands On 1 Whip No Coils To Change, No Tuner HF Mobiling Fun, Plug And Play
NEW LOW PRICES

uniden

SCANNERS IN STOCK

Call For Low, Low Prices

ALINCO	DIAMOND	LARSEN	OUTBACKER
ASTRON	HUSTLER	MFJ	UNIDEN
BENCHER	ICOM	MIDLAND	VAN GORDEN
COMET	KANTRONICS/RFC	MIRAGE	YAESU
CUSHCRAFT	KENWOOD	M²	

No surcharge for credit cards.

630 NW Englewood Road
Kansas City, MO 64118
(816) 459-8832

M-F 9-5 pm CST & PST
Sat 9-2pm

7075 Pecos
Denver, CO 88221
(303) 426-7226

Lowest Prices On MFJ From Radio Center, USA

Call for FREE MFJ catalog with a complete listing of all MFJ items

IC-738 THE NEXT GENERATIO

Don't let your contest results depend on "previous generation" technology. Get the Dxer's advantage with the "Next Generation" IC-738.

FEATURES

- ☐ New DDS Technology
- ☐ 100W (SSB, CW, FM) 40W AM Standard
- ☐ AT-170 High Speed Automatic Antenna Tuner (160-10 Meters)
- ☐ Two Antenna Connectors (Front Panel Switchable)
- ☐ 4 Function Meter (SWR/ALC/PO/S)
- ☐ VOX
- ☐ RF Gain
- ☐ Pass Band Tuning
- ☐ Notch Filter
- ☐ 10 Electronic Scratch Pad Memories
- ☐ 101 Memory Channels (10 split, 2 scan edge)
- ☐ RIT/ΔTx Functions
- ☐ Quick Split w/Simultaneous Display
- ☐ Speech Compressor
- ☐ Attenuator (20 db)
- ☐ Pre Amplifier (20 db)
- ☐ Double Band Stacking Registers
- ☐ Set Mode Menu to Customize Operation
- ☐ Menu Selectable CW Filters
- ☐ Noise Blanker
- ☐ Fast/Slow AGC
- ☐ High Dynamic Range/Low Distortion
- ☐ Built-in Electronic Keyer
- ☐ Direct Keyboard Entry
- ☐ Hand Microphone Included (HM-36)
- ☐ Computer Control Port (CI-V)

NEXT GENERATION TECHNOLOGY

Next Generation Circuitry	**DDS (Direct Digital Synthesis)** ICOM's unique DDS IC is used for the LPL Circuit. High tech and compact, the PLL unit improves frequency resolution to 1 Hz step. You'll experience an analog feeling of the tuning, faster PLL lockup times, improved phase noise blocking and high dynamic range.
Next Generation Tuner	**AT-170 Advanced Tuner** Preset memories, in 100kHz steps, provide very high speed tuning. "Automatic re-tune" turns the AT-170 on, and tunes, when SWR exceeds 1.5:1 "Through inhibit" permits tuning at SWR conditions up to 3:1 (when your antenna can't be tuned to 1.5:1). "Sensitive/Normal" gives you the choice of minimum possible SWR or 1.5:1. This eliminates tuning each time you transmit, unless desired.
Next Generation Duty Cycle	**100% Full Duty** The final power amplifier outputs a stable 100 W in SSB, CW and FM modes. The aluminum die cast frame, large heatsink and innovative twin cooling fan system stabilize the PA circuit to ensure 100% duty cycle operation.
Next Generation Frequency Management	**Quick Split Operation** Pre-programmable offsets, simultaneous display of Tx and Rx frequencies and XFC (Transmit Frequency Change) give you a competitive edge when calling Dx stations operating split frequencies. "Split Lock" permits changes in your transmit frequency while protecting your receive freqeuency against accidental changes.
Next Generation CW Operation	**CW Contest Package** Our built-in electronic keyer with separate key jack, full break-in (QSK) and separate jacks for an extended CW key or memory keyer, make a competitive package for CW contesting. For example, use a memory keyer (or TNC with CW capability) to make contacts easily, then use your paddle for normal operation.

ICOM America, Inc. Corporate Headquarters 2380-116th Ave. N.E., Bellevue, WA 98004

Call our Brochure Hotline for FREE Literature on ICOM Radios: (206) 450-6088

CIRCLE 178 ON READER SERVICE CARD

Experience the Quality®

ICOM

NEW HF

Compact HF Transceiver FT-900AT

Introducing an HF that's going places.

"With the small snap-off remote front panel design, it's an HF mobile."

"It's a great base, too. Direct keypad entry, built-in antenna tuner, CW keyer with adjustable speed, 100 Watts, Omni-Glow display... Wow!"

"Yaesu did it again!"

DX-CARIBE CRUISE '95
for details call or write Yaesu USA Today!
1995

Uncompromising HF quality that will change your lifestyle. It's the first transceiver with true HF technology to go mobile in any vehicle or stay at home as a compact base station.

With its revolutionary, small, snap-off remote panel, the controls of the FT-900AT can install almost anyplace in your car, truck or camper. Since the 100 Watt RF deck can be installed under a seat or in your car trunk, it's away from critical automotive electronic wizardry. And, for ultimate convenience, the built-in antenna tuner simplifies in-car operation.

As a base station, the compact full function FT-900AT includes direct keypad entry for pinpoint accuracy during quick band/frequency changes. Other features you'll like include CW keyer with front panel speed adjustment, speech processor, twin stacking VFOs, and IF Shift and Notch. No competitor offers this! Bonuses, such as signal strength, power output, SWR and ALC digital meters, add value to the FT-900AT, and the proven duct-flow cooling system provides excellent long-term transmit power output reliability and frequency stability. For ease of use, Yaesu's exclusive Omni-Glow display enhances viewing in any light condition. And, since the high speed antenna tuner is built-in, it means less clutter in your shack.

The FT-900AT controls mount almost anywhere in your car, truck or camper. 100 Watt RF deck can mount in trunk, or under seat.

Remote front panel control head measures only 2-1/4"H x 9-1/8"W x 1-1/4" D.

For sheer high-performance, anywhere, the incomparable FT-900AT ranks with the FT-1000 to further establish Yaesu as the choice of the world's top DX'ers.

Trust Yaesu to know what you want. True HF you can take with you or leave at home! Available now at your Yaesu dealer.

Specifications

- Remote Front Panel Design
- Built-In Auto Antenna Tuner
- Direct Keypad Entry when used as a Base Station
- Large, Bright Omni-Glow™ LCD Display
- 100W on SSB, CW, FM modes; 25W on AM
- IF Shift and 30db Notch Filter
- Digital S/RF, SWR & ALC Meters
- Programmable CTCSS Encode w/Repeater Offset
- Direct Digital Synthesis (DDS)
- 100 Memory Channels
- Frequency Range
  RX: 100 kHz-30 MHz
  TX: 160-10 meters
- CW Full Break-in Keying w/ Adjustable Speed
- Fast/Slow AGC Circuit
- Intercept Point Optimization
- Duct Flow Cooling System
- Twin Band Stacking VFOs
- Built-in Noise Blanker
- Built-in Adjustable Speech Processor

ACCESSORIES:
YSK-900 Remote Mount Kit
MMB-62 Controller Bracket
MMB-20 Mobile Mtg. Bracket
SP-7 Mobile External Spkr.
SP-6 Base Station External Spkr.
DVS-2 Digital Voice Recorder
FP-800 20A HD Power Supply
YH-77ST Headphone

YAESU

Choice of the World's top DX'ers

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

NEW
Dual Band HT

Dual Band Handheld FT-51R

DX-CARIBE CRUISE '95
for details call or write
Yaesu USA Today!
1995

Only one Dial/Volume knob required for easier use.

The First Dual Band HT with WINDOW

Three dual receive configurations VHF/VHF, UHF/UHF, or VHF /UHF with main band frequency on right or left side. Flexible programming allows transmit on main or sub band.

An 8 character alpha-numeric user help menu scrolls operation instructions in the bottom of the large, backlit display.

Digital battery voltage readout displays condition of battery in use. Scan skip function allows individual memory channel lock-out during scanning mode.

Spectrascope™ displays active adjacent frequencies in real time with relative signal strength.

MH-29A2B
LCD Display Mic with Remote Functions.
(Optional)

FT-51R
2¼"W x 4¾"H x 1⅛"D
(2 Watt version shown.)

The new FT-51R Dual Band HT is state-of-the-art, and easy to use! So easy, you won't need an operating manual. Its exclusive, scrolling instruction menu located in the large, backlit display "window", guides you through total operation while simultaneously viewing the main display window.

You'll like some of the other new, exclusive features, too. Like Spectrascope.™ This unique feature displays real time, continuous scanning of activity on adjacent frequencies in VFO mode or 8 of your favorite memories. A cloning feature duplicates favorite channels to another FT-51R.

A digital battery voltage display, five power output levels, the largest backlit dual band HT keypad made, Smart Mute,™ two VFOs on both VHF and UHF, as well as available 2 Watt and 5 Watt versions, round out the exciting FT-51R. Plus, the optional MH-29A2B Display Microphone allows you to control volume and also access Memory, VFO, Call Channel, Band Selection and scanning functions. All of this in world's smallest dual band HT radio!

See the FT-51R with "windows" at your Yaesu dealer today!

"I can see two frequencies and alpha-numeric all at the same time."

"Scrolling instructions tell me what to do next!"

"I use the Spectrascope to find new contacts faster."

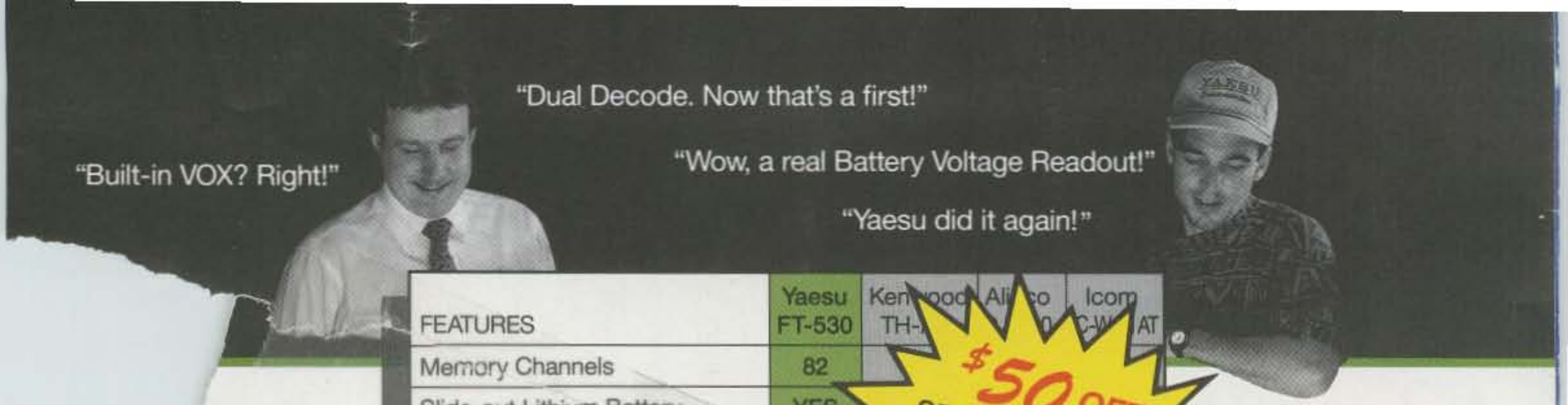
"Yaesu did it again!"

Specifications

- Frequency Coverage
  VHF RX: 110-180 MHz
  TX: 144-148 MHz
  UHF RX: 420-470 MHz
  TX: 430-450 MHz
- Spectrascope™ Display
- Scrolling User Help Menu
- Alpha-Numeric 8 Character Display
- Up/Down Volume/Squelch Controls & Display
- Selectable Sub-Band TX Mute
- Automatic Tone Search (ATS)
- Digital Battery Voltage Display
- AM Aircraft Receive
- Scanning Light System (SLS)
- 120 Memory Channels (80 w/Alpha-Numeric)
- Large Backlit Keypad & Display
- Automatic Repeater Shift (ARS)
- Multiple Scanning Modes
- 3 Selectable Scan Stop Modes with Scan Skip
- Selectable 6-way Lock Functions
- Automatic Power Off (APO)
- TX/RX Battery Savers Built-in
- Handy Cloning Feature
- 5 Selectable Power Output Levels
- 5 Watt and 2 Watt versions
- Selectable RX Smart Mute™
- Cross-Band & One-Way Repeat Functions
- DTMF Paging/Coded Squelch Built-in

Accessories
Consult your local dealer.

YAESU
Performance without compromise.℠



FEATURES	Yaesu FT-530	Kenwood TH-[illegible]	Alinco [illegible]	Icom [illegible]AT
Memory Channels	82			
Slide-out Lithium Battery	YES			
Dual CTCSS Decoder	YES			
Battery Voltage Readout	YES			
Automatic CTCSS Tone Search	YES	NO		
Transmit Battery Saver (Repeater & Simplex Operation)	YES	NO	NO	NO
Built-In Vox	YES	NO	NO	NO
One Touch Reverse Button	YES	NO	NO	NO
Dual In-Band Receive (V+V, U+U)	YES	YES	NO	YES
Programmable External Speaker Audio	YES	NO	NO	YES
Optional Digital Display Mic with "S" Meter	YES	NO	NO	NO
AM Aircraft Receive	YES	YES	YES	YES

$50.OFF SEE YOUR DEALER FOR DETAILS LIMITED TIME OFFER.

CRUISE '95
[illegible] call or write
[illegible] USA Today!
1995

The Best vs. "the rest".

FT-530
Dual Band Handheld

- **Frequency Coverage:**
  2-Meter 130-174 MHz RX
  144-148 MHz TX
  70 cm 430-450 MHz RX/TX
- 4 TX Power levels:
  w/FNB-25: 2.0, 1.5, 1.0, 0.5W
  w/FNB-27: 5.0, 3.0, 1.5, 0.5W
- DTMF Paging and Coded Squelch
- AOT – Auto On-Timer with built-in clock and alarm functions
- IBS – Intelligent Band Select (provides automatic TX band select on scan stop)
- Backlit keypad and display with time delay
- Built-in cross-band repeat function
- APO – Automatic Power Off
- 5 Watts output w/ FNB-27 battery or 12 VDC
- 2 VFO's for each band
- **Accessories:**
  NC-42 1-Hour Desk Charger
  FNB-25 600 mAh Battery (2 watt)
  FNB-26 1000 mAh Battery (2 watt)
  FNB-27 600 mAh Battery (5 watt)
  FBA-12 6 AA Cell Holder
  CSC-56 Vinyl Case w/ FNB-25
  CSC-58 Vinyl Case w/ FNB-26/27
  E-DC-5B 12 VDC Adaptor
  YH-2 Headset for VOX
  MH-12A2B Speaker Mic
  MH-18A2B Lapel Speaker Mic
  MH-19A2B Mini Earpiece Mic
  MH-29A2B LCD Display Mic with Remote Functions
  MMB-54 Mobile Mounting Hanger

No other dual band handheld beats the FT-530 on features for performance and ease of use. With the largest backlit keypad available, 82 memories, exclusive Dual CTCSS Decode and AM Aircraft Receive, the FT-530 is simply the best value there is.

Compare for yourself, then forget "the rest." See your dealer for the best dual band handheld you can buy. The FT-530.

YAESU

Performance without compromise.℠