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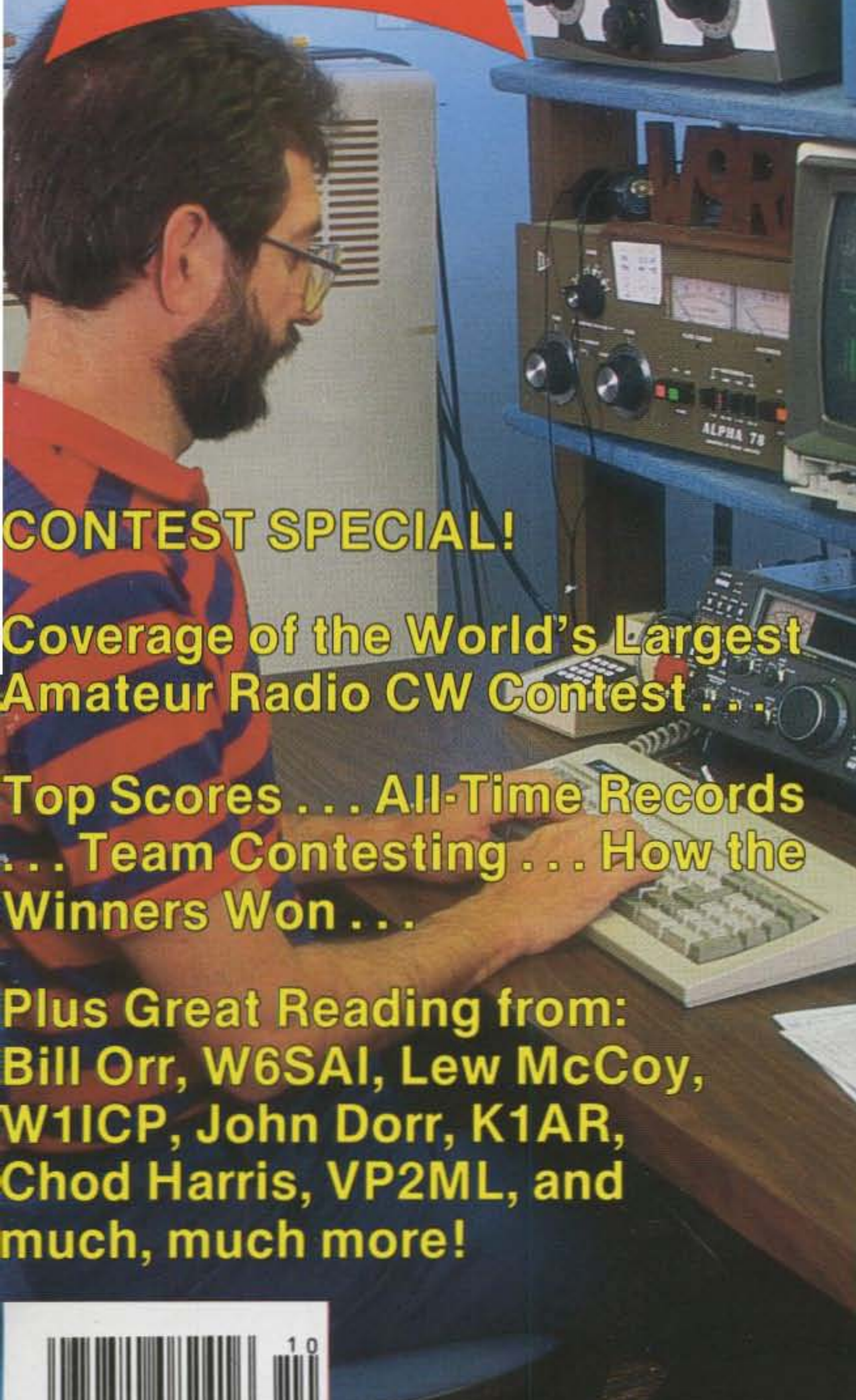
Amateur Radio

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CQ



On The Cover: W9RE, Indianapolis, IN

CONTEST SPECIAL!

**Coverage of the World's Largest
Amateur Radio CW Contest ...**

**Top Scores ... All-Time Records
... Team Contesting ... How the
Winners Won ...**

**Plus Great Reading from:
Bill Orr, W6SAI, Lew McCoy,
W1ICP, John Dorr, K1AR,
Chod Harris, VP2ML, and
much, much more!**



THE RADIO AMATEUR'S JOURNAL

KENWOOD

Mobile Companion!

TM-241A

TM-441A/TM-541A

Compact FM Mobile transceivers



Here are your new mobile companions — at your service whenever you're on the road! Their compact size makes installation a snap, and the remote control options allow you to customize your installation for that "professional" look!

- **Wide band receiver coverage.** The TM-241A receives from 118–173.995 MHz. Transmit range is 144–148 MHz. (Modifiable for MARS and CAP operation, permits required.)
- **TM-441A** covers 438–449.995 MHz, and the **TM-531A** covers 1240–1299.995 MHz.
- **CTCSS encode built-in, selectable from the front panel.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-241A provides 50 W. TM-441A 35 W, and TM-541A 10 W.** Three power positions, 5, 10, and full. The TM-541A has two power positions, 1 and 10 watts.
- **20 full-function memory channels** store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2m is automatically selected.** There are four channels for "odd split" operation.
- **Tone Alert System with Elapsed Time indicator.**
- **Auto-power off function, and time-out timer.**



RC-20 Remote Control Unit

As supplied, one RC-20 will control one transceiver. **Most often-used front panel functions** are controllable from the RC-20. The RC-20 and IF-20 combine to allow control of up to four radios.

- **Selective calling and pager option.** The DTU-2 option enables the Dual Tone Squelch System (DTSS), allowing selective calling and paging using standard DTMF tones.
- **Digital recording system option.** Used in conjunction with the tone alert system, the DRU-1 allows message storage of up to 32 seconds.
- **Multiple scanning functions.** Band and memory scan, with selectable scan stops and memory channel lock-out.
- **Large LCD display with four-step dimmer control.**
- **Automatic Lock Tuning (ALT) for the TM-541A.** Compensates for drift.

- **Supplied accessories.** Mounting bracket, DC cable, fuses, MC-44DM multi-function DTMF mic.

Optional accessories

- **DRU-1** Digital Recording Unit
- **DTU-2** DTSS unit
- **IF-20** Interface unit, used with the RC-20, allows more than two transceivers to be remotely controlled
- **MA-700** 2m/70cm dual band antenna with duplexer (mount not supplied)
- **MB-201** Extra mounting bracket
- **MC-44** Multi-function hand microphone
- **MC-55** (8-pin) Mobile mic. with time-out timer
- **MC-60A, MC-80, MC-85** Base station mics.
- **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter
- **PG-4G** Extra control cable
- **PG-4H** Interface connecting cable
- **PG-4J** Extension cable kit
- **PS-50/PS-430** DC power supplies
- **RC-10** Handset remote controller
- **RC-20** Remote control head
- **SP-41** Compact mobile speaker
- **SP-50B** Mobile speaker
- **TSU-6** Programmable CTCSS decoder

KENWOOD U.S.A. CORPORATION
COMMUNICATIONS & TEST EQUIPMENT GROUP
P.O. BOX 22745, 2201 E. Dominguez Street
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Our new TS-850S just made the competition obsolete

No competition class transceiver is even in the same ballpark as the TS-850S.

You'll find a superior intermodulation dynamic range of 108 dB throughout the entire 100 kHz to 30 MHz range.

Kenwood's optional DSP-100 Digital Signal Processor (DSP) converts audio signals to digital information, where it is shaped and processed by a microprocessor. For SSB work, this means a cleaner signal, and for CW, it allows adjustment of the rise and fall times for optimum waveshape. The DSP-100 also works at the

receiver detector level for audio shaping, in all modes.

Other advanced technology in the TS-850S includes 10 Hz step dual VFOs, multi-mode scanning, full and semi break-in CW, superior interference reduction, keyer, dual noise blanker, and RIT/XIT. 100 memory channels store, transmit, and receive frequencies independently. High boost for SSB signal "punch." Microphone supplied.

The Kenwood TS-850S. All band. All mode. One year warranty. In a class by itself!

Key options.
DSP-100 Digital Signal Processor.

AT-300 160 - 10 m external antenna tuner.
AT-850 160 - 10 m internal antenna tuner.
DRU-2 Internal digital recording unit.
IF-232C Computer interface. **PG-2X** DC cable. **PS-52** Power supply. **SO-2** TCXO. **SP-31** Matching external speaker.
VS-2 Voice synthesizer. **YG-455C-1** 500 Hz CW filter for 455 kHz IF. **YG-455CN-1** 250 Hz CW filter for 455 kHz IF. **YK-88C-1** 500 Hz CW filter for 8.83 MHz IF. **YK-88CN-1** 270 Hz CW filter for 8.83 MHz IF. **YK-88SN-1** 1.8 kHz SSB filter for 8.83 MHz IF.

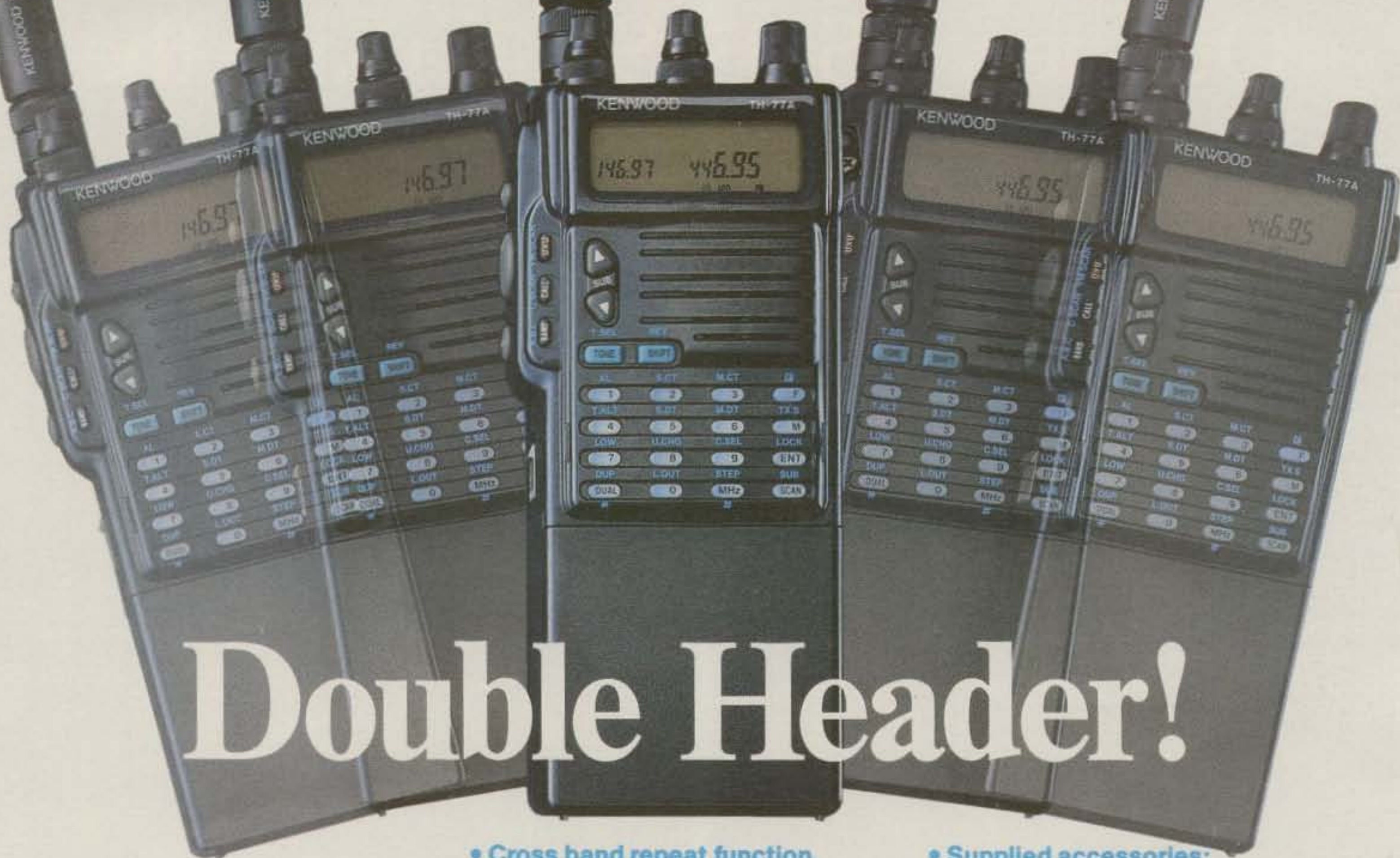
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KENWOOD
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Kenwood meets or exceeds all specifications. Contact your dealer for a complete listing of specifications and accessories. Specifications are subject to change without notice. Complete service manuals are available for all Kenwood transceivers and most accessories. *One year warranty in the U.S.A. only.

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Double Header!

TH-77A

Compact 2m/70cm Dual Band HT

Here's a radio that deserves a double-take! The TH-77A is a feature-packed dual band radio compressed into an HT package. The accessories are compatible with our TH-75, TH-25, and TH-26 Series radios. Repeater and remote base users will appreciate the DTMF memory that can store *all* of the DTMF characters (*, #, A, B, C, and D) that are usually required for repeater functions!

- **Wide band receiver coverage.** 136-165 (118-165 [AM mode 118-136] MHz after modification) and 438-449.995 MHz. TX on Amateur bands only. (Two meter section is modifiable for MARS/CAP. Permits required.)
- **Dual receive/dual LCD display.** Separate volume and squelch controls for each band. Audio output can be mixed or separated by using an external speaker.

- **Cross band repeat function.**
- **Dual Tone Squelch System (DTSS).** Uses standard DTMF to open squelch.
- **CTCSS encode/decode built-in.**
- **Forty-two memory channels.** All channels odd split capable.
- **DTMF memory/autodialer.** Ten 15-digit codes can be stored.
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **Multi-function, dual scanning.** Time or carrier operated channel or band scanning.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Two watts (1.5 W on UHF) with supplied battery pack.** Five watts output with PB-8 battery pack or 13.8 volts. Low power is 500 mW.
- **DC direct-in operation** from 6.3-16 VDC with the PG-2W.
- **T-Alert with elapsed time indicator.**
- **Automatic repeater offset on 2 m.**
- **Battery-saving features.** Auto battery saver, auto power off function, and economy power mode.

• Supplied accessories:

Flex antenna, PB-6 battery pack (7.2 V, 600 mAh), wall charger, belt hook, wrist strap, keyboard cover.

Optional accessories:

• **BC-10:** Compact charger • **BC-11:** Rapid charger • **BH-6:** Swivel mount • **BT-6:** AAA battery case • **DC-1/PG-2V:** DC adapter • **DC-4:** Mobile charger for PB-10 • **DC-5:** Mobile charger for PB-6, 7, 9 • **PB-5:** 7.2 V, 200 mAh NiCd pack for 2.5 W output • **PB-6:** 7.2 V, 600 mAh NiCd pack • **PB-7:** 7.2 V, 1100 mAh NiCd pack • **PB-8:** 12 V, 600 mAh NiCd for 5 W output • **PB-9:** 7.2 V, 600 mAh NiCd with built-in charger • **PB-11:** 12 V, 600 mAh OR 6 V, 1200 mAh, for 5 W OR 2 W • **HMC-2:** Headset with VOX and PTT • **PG-2W:** DC cable w/fuse • **PG-3F:** DC cable with filter and cigarette lighter plug • **SC-28, 29:** Soft case • **SMC-30/31:** Speaker mics. • **SMC-33:** Speaker mic. w/remote control • **WR-1:** Water resistant bag.

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A publication of

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

Offices: 76 North Broadway, Hicksville, NY 11801.
 Telephone: 516 681-2922. FAX (516) 681-2926. CQ
 (ISSN 0007-893X) is published monthly by CQ Com-
 munications Inc. Second Class postage paid at
 Hicksville, NY and additional offices. Subscription
 prices: Domestic—one year \$22.95, two years \$43.00,
 three years \$63.00; Canada/Mexico—one year \$25.00,
 two years \$47.00, three years \$69.00; Foreign—one
 year \$27.00, two years \$51.00, three years \$75.00; For-
 eign Air Mail—one year \$80.00, two years \$157.00,
 three years \$234.00.

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 cations Inc. 1991. CQ does not assume responsibility
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 change of address. Printed in the United States of
 America.

Postmaster: Please send change of address to CQ
 Magazine, 76 North Broadway, Hicksville, NY 11801.



**The Radio
 Amateur's Journal**

ON THE COVER: Indianapolis, Indiana is famous for travel trail-
 ers, brass musical instruments and contester Mike Wetzel, W9RE. Mike's shack is
 built for efficiency in contest operation, and feeds an impressive assortment of alumi-
 num in the back yard. (Photos by Larry Mulvehill, WB2ZPI)



OCTOBER 1991

VOL. 47, NO. 10

FEATURES

RESULTS OF THE 1990 CQ WORLD-WIDE DX CW CONTEST

Larry Brockman, N6AR/4 and Bob Cox, K3EST/6	13
CW TROPHY WINNERS AND DONORS.....	14
TOP SCORES.....	16
BAND-BY-BAND BREAKDOWN—TOP ALL-BAND SCORES	17
CLUB SCORES.....	18
WORLD TOP 10 QRPP.....	24
TEAM CONTESTING.....	24
ZONE LEADERS, SINGLE OPERATOR.....	25
TOP 10 SINGLE OPERATOR ASSISTED.....	26

ATTITUDE ADJUSTMENT FOR YOUR BUG	
Larry Lisle, K9ZKT	34

LET'S TALK ANTENNAS, PART II.....	Lew McCoy, W1ICP	36
-----------------------------------	------------------	----

CQ WORLD-WIDE DX CONTEST ALL-TIME RECORDS

Frederick Capossela, K6SSS	
ALL-TIME PHONE RECORDS.....	42
ALL-TIME CW RECORDS.....	43
ALL-TIME USA RECORDS.....	44

RADIO FUNDAMENTALS: THE GREAT ECLIPSE	
Bill Orr, W6SAI	48

CQ SHOWCASE: NEW AMATEUR PRODUCTS.....	56
--	----

VHF PLUS: ALL ABOUT THE WORLD ABOVE HF	
Joe Lynch, N6CL	62

BILL'S BASICS: GOODIES, PART I.....	Bill Welsh, W6DDB	72
-------------------------------------	-------------------	----

ANTENNAS & ACCESSORIES: BOOKS FOR THE HAMSHACK	
Karl T. Thurber, Jr., W8FX	83

WASHINGTON READOUT: TESTING APPLICANTS FOR AMATEUR RADIO LICENSES!.....	Frederick O. Maia, W5YI	88
--	-------------------------	----

PACKET USER'S NOTEBOOK: MORE (SOLAR) POWER TO YOU, PART I.....	Buck Rogers, K4ABT	92
---	--------------------	----

DEPARTMENTS

AWARDS: STORY OF THE MONTH—ALVIN P. SLIGH, W5RJH	
Dorothy Johnson, WB9RCY	58

CONTEST CALENDAR: DO YOU NEED MULTIPLIERS TO WIN?, CONTESTS FOR OCT. AND EARLY NOV.....	John Dorr, K1AR	98
--	-----------------	----

DX: SUNSPOT REGION 6659 AND WHAT TO DO WHEN THE BANDS GO DEAD.....	Chod Harris, VP2ML	110
---	--------------------	-----

PROPAGATION: DX CONTEST SPECIAL , DX CHARTS FOR OCT. 15 THROUGH DEC. 15.....	George Jacobs, W3ASK	122
--	----------------------	-----

ZERO BIAS.....	4	HAM SHOP.....	130
ANNOUNCEMENTS.....	8		

The mystery is solved! My secret antenna shown in the August editorial has been identified by a reader who had first-hand knowledge of its use. The antenna was developed for an effort called "Project Igloo White" and is the top half of an **Air Delivered Siesmic Intrusion Detector (ADSID)**. From the material sent in by our reader, the bottom half looks like a rocket or missile which imbeds itself in the earth. This unit is a channelized FM transmitter with a frequency range from 163 to 174 MHz with 64 separate IDs available for each channel. It had a life expectancy of 100 days and was booby-trapped to self-destruct upon tampering. I was also assured that in the right context it did blend in with the area quite well. Now I have to check with W1DL on how he got it apart without getting hurt.

Another Gift

Recently Jan Perkins, N6AW, sent me a copy of his book on the legendary Don Wallace, W6AM. I had met Don a few times during his later years and only knew him in the casual social settings of hamfests. Until reading the book my sense of Don was more anecdotal, coming from what I had picked up over the years from various people who knew him. To actually read about and see the list of the man's accomplishments is indeed a treat. Jan has written articles for *CQ* in the past and was closely associated with Don and Don's legendary station (let alone the real estate).

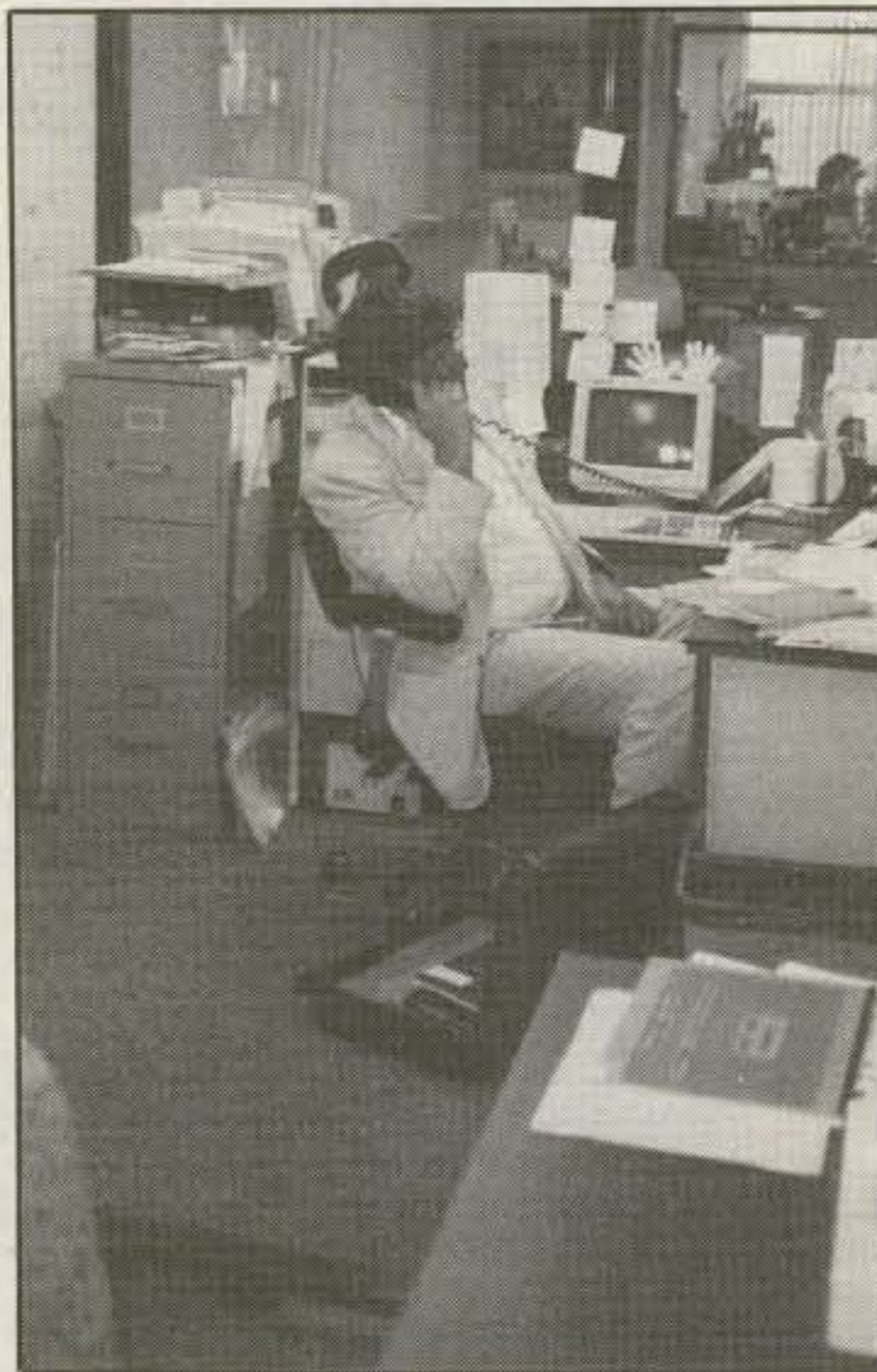
The book is also a chronicle of our hobby and of communications in general, spanning Don's lifetime involvement with it. It is still amazing to think of all the changes, milestones, and pure technological innovations that took place during his lifetime. The book is certainly worthwhile reading, and Jan has done a remarkable job in bringing Don's story to all of us. The book is hardbound, large format (8½" x 11¼"), and contains 320 pages with over 200 photographs, some in color. It would make a great holiday gift for someone and a guaranteed pleasure to receive.

The giants among us, those with their particular and singular visions, are leaving us, as indicated each month in *Silent Keys*. Most will not be heralded or chronicled, and their legacy, however rich, will go unnoticed. Some may simply be remembered for eccentricities rather than for the sum of their dreams, but that's what sets us apart. This time we're fortunate to have history preserved. Thanks, Jan.

The book is called *Don C. Wallace, W6AM: Amateur Radio's Pioneer*, and it sells for \$29.95. For more information contact Wallace & Wallace, 11823 E. Slauson Ave., Suite 38, Santa Fe Springs, CA 90670.

Speaking of Books

In early August Martti Laine, OH2BH, visited the *CQ* offices where we had a chance to finish a conversation started at the Dayton Hamvention. Martti, as many of you know, is the author of *Where Do We Go Next?*, a great book on DX and DXpeditioning culled from Martti's own experiences as well as from other famous



Here's Martti Laine, OH2BH, at the *CQ* offices working some DX via the land-line.

DXpeditioners. At Dayton we talked with Martti about publishing subsequent editions of the book, and while he was here we worked out all the last-minute details. The price of the book will remain the same, \$22.95, and it should be available through the *CQ* Bookshop shortly.

More August

August was certainly a busy month. It started out with Arnie and me doing the Atlanta Hamfest, where we were joined by Buck Rogers, K4ABT, and Karl Thurber, W8FX. The week we returned, Martti visited the office, as did Bill Pasternak, WA6ITF, of the *Westlink Report*. We had a chance to see the tape Bill brought showing the hams in space and school kids interacting with them via amateur radio.

That Saturday I left for Seattle, Washington and the Seafair Hydroplane Races on Lake Washington courtesy of an invitation received from the folks at ICOM. First let me tell you it's a bit disconcerting for me to arrive in a city where I don't have to set up a booth and stand all day. That is what some people would call sort of a mini-vacation. ICOM had set up a hospitality area and was sponsoring one of the aerobatic teams, Team America, who was appearing along with military air groups. The annual event draws several hundred thousand people, and ICOM took advantage of the crowd by having a working display of amateur radio and helping to co-sponsor a Military MARS station. They also put out a lot of literature on amateur radio, explaining what the visitors were seeing and how to get involved.

At the hospitality area I had the chance to meet the members of Team America and also several of the Navy's Blue Angels prior to their



Four members of Navy's Blue Angels flew over the pit area where the hydroplanes were continually serviced between the races. The large cranes were used to take the boats in and out of the water after each event.



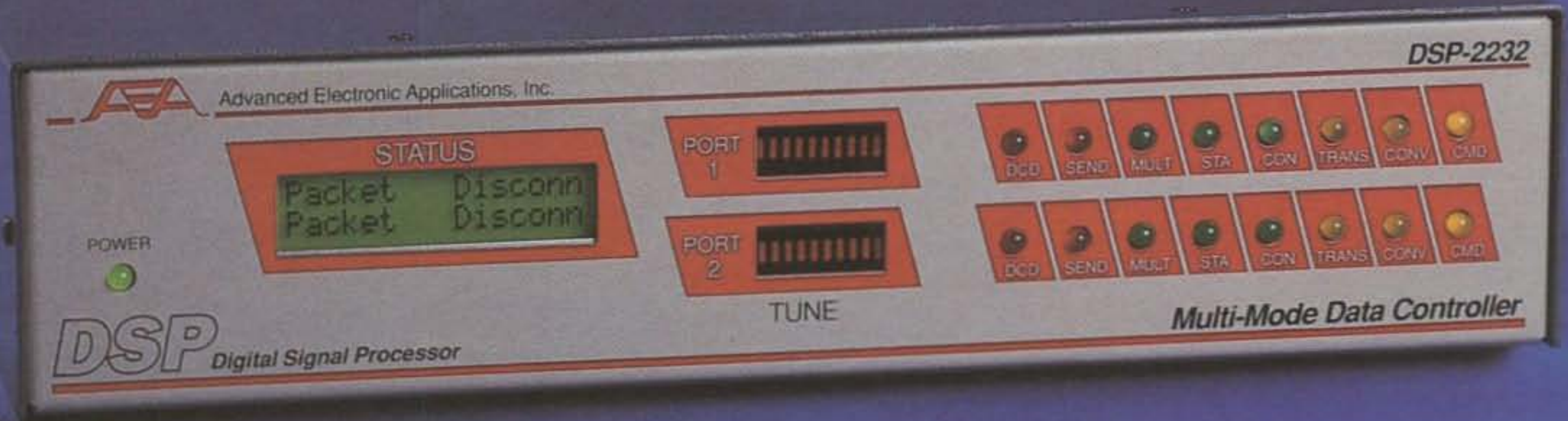
WEFAX proved an interesting draw to the amateur radio display at Seafair.

exhibition. Like your average gawking tourist, I stood in line to meet them and get an autographed picture. It was exciting, and the morning after I returned home the picture was out being framed.

The following evening I was scheduled to have dinner in downtown Seattle with Gordon West, WB6NOA, and his wife, plus Allan and Sharon York of Amateur Radio Supply. We were to meet at the store in the late afternoon. Arriving early, I noticed the store next door was (for all you catalog junkies) a Woodcrafters Supply Corp. store with everything on display. A quick tour through there will show up next month on my VISA bill, as I left with two English brass-backed saws that somehow I had to have. Being a tourist in a sense can be a lot of fun, plus you don't have to get up quite as early.

73, Alan, K2EEK

AEA is...



Packet...plus!

If you want the best Packet or multi-mode equipment available, look no further. These data controllers have no equal when it comes to features, performance and value.

The versatile DSP-2232 (above) is simply the most powerful multi-mode controller available to amateurs. It features Digital Signal Processing modems, dual simultaneous ports, all known amateur digital modes, Packet and AMTOR mailboxes, and much more.

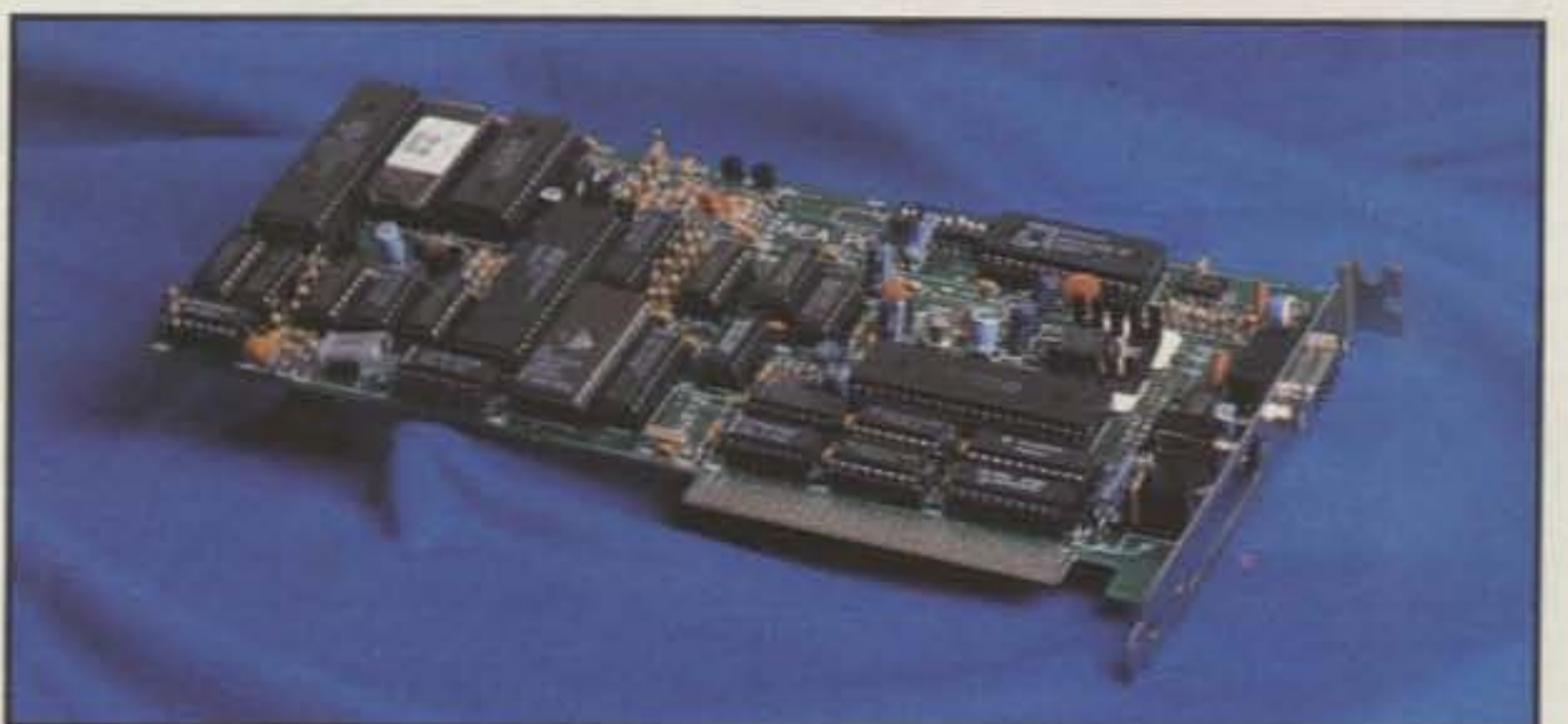
The legendary PK-232MBX (top right) has long been the most popular data controller ever, and is still going strong. Includes: Chebyshev filter design, Host Mode, Signal Identification mode and more. With features like these, no wonder it's number 1.

For Packet only, the PK-88 (center) and its PC-compatible plug-in counterpart, the PCB-88 (bottom right) offer AEA's famous Host Mode, Packet maildrop, KISS mode, lithium battery-backed RAM...the list goes on and on.

When hams think of Packet, they think of AEA.

AEA is Packet...plus!

For complete information on these or any other AEA products, call the toll-free Lit Line at (800) 432-8873.



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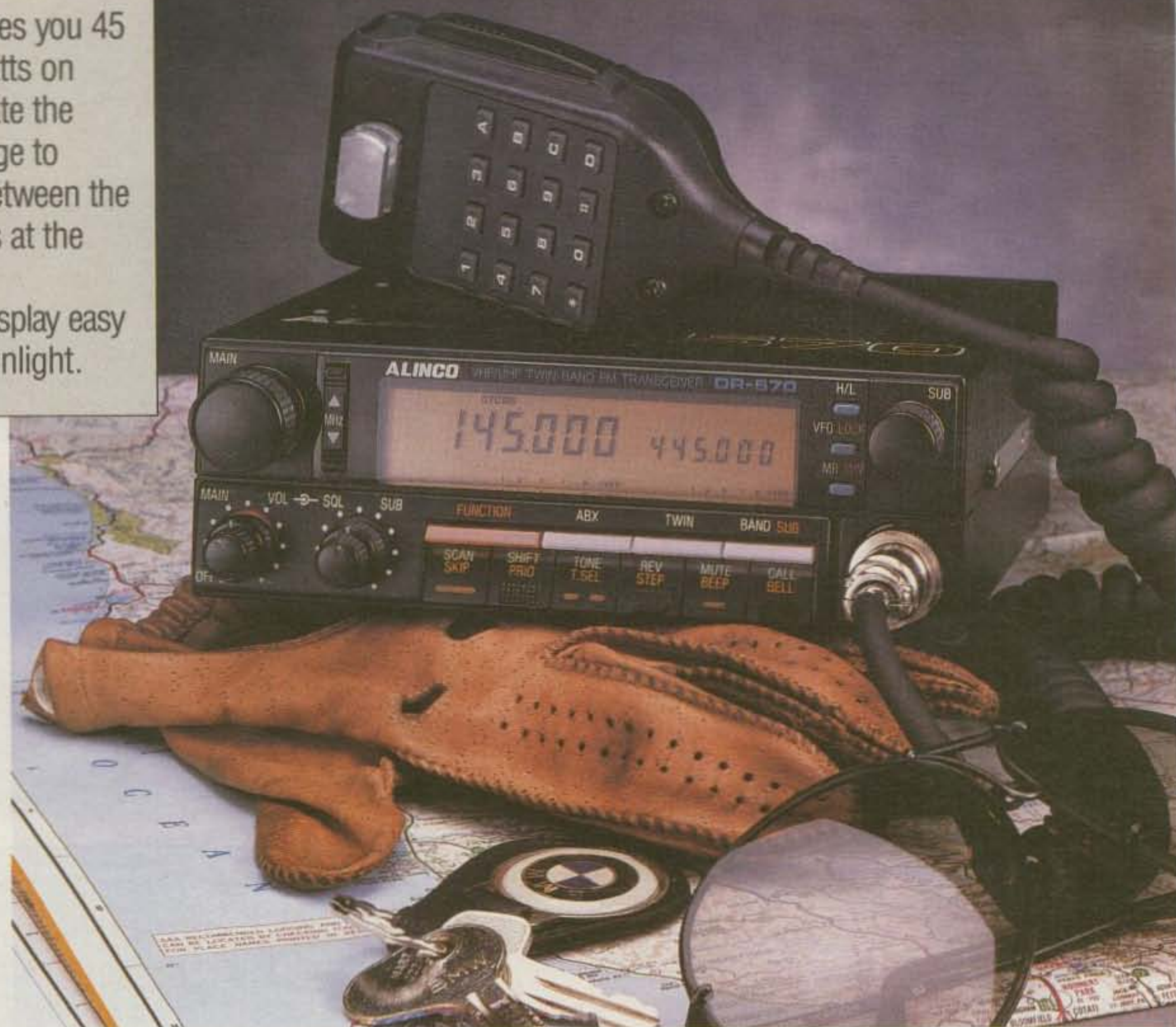
Model DR-570T

Cross Band Full Duplex, Twin Band Transceiver

The DR-570T allows full duplex operation and 20 memory channels with 4 scan modes. It also functions as a twin band receiver, with independently adjustable squelch and volume controls for each band.

A powerful output gives you 45 watts on VHF and 35 watts on UHF, plus you can activate the Automatic Band Exchange to switch back and forth between the "sub" and "main" bands at the touch of a button.

The LCD makes the display easy to read even in bright sunlight.



Ask to see ALINCO products at your dealer and become familiar with our quality line and accessories. We've always been here, and now we're ready to go wherever you do.

...IN THE HAND.

New

Model DJ-162TD

A Complete Receiving And Sending Station In Your Hand

This 2M handy combines the best features from the most advanced handhelds available today. Built-in DTMF squelch is standard, as is a wildcard function to help you access any group code that you have programmed without recalling the exact numbers.

There are power saving features such as auto shut-off and timed LCD lighting, timed to turn itself off after 5 seconds of non-use. The display is conveniently located on top of the unit for reading when the transceiver is being carried in your pocket or in a bag. There is even a key lock mode to prevent accidental changing of frequencies, should the buttons be hit while the unit is being handled.



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ELECTRONICS INC.

CIRCLE 180 ON READER SERVICE CARD

ALINCO ELECTRONICS INC.
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Torrance, CA 90501
Tel. (213) 618-8616 Fax (213) 618-8758

Two Year Limited Warranty.

Specifications and features are subject to change without notice or obligation.

ANNOUNCEMENTS

• **Amateur Television Transmission of Video Astronomy** - On Friday, October 11 the Orange County, California Astronomers will utilize the facilities of the Amateur Television Network to bring video astronomy from the Orange County Club's 22 inch telescope. The video link was established in 1985 using the previously constructed Santiago Peak Video Repeater. This is a public demonstration. For more information, contact the Orange County Astronomers' Starline at 714-666-2718, or the OCA Bulletin Board System at 714-738-4331, with 8 N 1 configuration at 300, 1200, and 2400 baud.

• **The following Special Events will take place during October:**

WB1U, from 90th anniversary of Marconi Wireless Station, South Wellfleet, Cape Cod, Massachusetts; starting at 1400Z October 5-6; General portions of 15, 20, 40 meters (lower 25 kHz), and Novice portion of 10 and 80 meters. For certificate send QSL and 9 x 12 SASE to Ray Hilson, 6 Sherman Place, Norwalk, CT 06851.

WB2JKJ, from 11th anniversary of "22 Crew," Radio Club of Junior High School 22, New York, New York; on 7.238 from 1200-1330Z and then on 21.395 until 2000Z, Oct. 23-25. For a special QSL and "surprise package" write to RC of JHS 22, P.O. Box 1052, New York, NY 10002, or FAX them at 516-674-9600.

3-land, from Brunswick Railroad Days, Brunswick, Maryland; Brunswick Radio Amateur Groups; Sept. 30 to Oct. 6 signing with location on phone and "IBSWK" on CW from home QTHs and festival grounds; days 28.300-28.325 MHz SSB; evenings 14.250-14.265 MHz SSB, 7.100-7.115 MHz CW, and 3.675-3.700 MHz CW, plus local VHF and UHF. For QSL send QSL to BRAGS, P.O. Box 143, Brunswick, MD 21716.

W3XX, from *USS Requin SS481*, Carnegie Science Center, Pittsburgh, Pennsylvania; Breezeshooters ARC; Oct. 5-6, 1400-2200Z; on 28.495, 21.365, 14.245. For QSL send SASE to WB3LHD, 326 Sunset Drive, Bethel Park, PA 15102.

K4CO, from Salt Festival, Big Bone Lick State Park, Union, KY; Northern Kentucky ARC; 1400-2100Z Oct. 18-20; 40, 20, 10 meters and 147.375 + repeater. For certificate send 4 x 9 SASE and contact number to NKARC, P.O. Box 1062, Covington, KY 41091.

WA4BKF, from "Tree That Owns Itself," Athens, Georgia; Athens Radio Club; Oct. 19-20; General portions of 80-15 and Novice 10 meters. For QSL send QSL and #10 SASE to Bill Strickland, WA4FVT, 355 Segrest Cir., Athens, GA 30605.

KN4IE, from Museum of Aviation, Robins AFB, Georgia; Middle Georgia Radio Assn.; 1200-2000Z Oct. 12-13; SSB 3944, 7244, 14244, 21344, 28344; CW 3644, 7144, 14144, 21144, 28244. For QSL and/or certificate send SASE and QSL to Dave Shiplett, WL7ACY, P.O. Box 1076, Warner Robins, GA 31099.

W4EHV, from Devil's Courthouse Halloween celebration, Transylvania County, North Carolina; 2100Z Oct. 31 to 0200Z Nov. 1; 3.860, 14.295, 21.365, 28.335, 50.150, 144.25, all SSB and 146.52 FM simplex, VHF packet KN4GC V NCAVL2.NC. For certificate send legal-size or 9 x 12 SASE to W4EHV, Erik Hansen, P.O. Box 10, Sapphire, NC 28774.

N5QZK, from 54th Annual East Texas Yamboree, Gilmer, Texas; Hams of Upshur County; Oct. 18-19; General portion of 40 and 20 meter phone subbands and Novice 10 meter phone subband. For certificate send QSL and 9 x 12 SASE to KB5PAD, Rt. 2 Box 114, Diana, TX 75640.

5-land, from rare counties in New Mexico, Albuquerque DX Assn.; Oct. 5-6; CW 1810, 3555, 7055, 14055, 21055, 28055 kHz; SSB 1880, 3945, 7280, 14280, 21380, 28480. Contact N5IRC.

KE5TC, Columbus Day celebration aboard *USS Battfish* submarine, Muskogee, Oklahoma; Eastern Oklahoma Area Hams; 1400-2200Z Oct. 12-13; General portion of 10-80 meters. For QSL send SASE and QSL to KE5TC, P.O. Box 436, Keota, OK 74941.

K5PXP, from 1991 Globalfest, Russellville, Arkansas; ARVARF; 1400-2200Z Oct. 11-12; SSB 14.290 or 21.290 MHz (depending on conditions), Novice SSB 28.390 MHz. DX stations encouraged to participate. For certificate send SASE and QSL to ARVARF Inc., K5PXP, P.O. Box 582, Russellville, AR 72801.

WD5FDO, from Potlatch Festival, Carthage, Texas; Carthage ARS; 1400-2230Z Oct. 19; lower 25 kHz of General bands and Novice 10 meters. For certificate send QSL, contact number, and #10 SASE to

WD5FDO, 1408 Crescent St., Carthage, TX 75633-2152.

W6AK, from Alcatraz Island, Sacramento, California; Sacramento ARC; 1700-2300Z Oct. 19; 7.240, 14.280, 21.350, 28.350 MHz. QSL and SASE to SARC, P.O. Box 161903, Sacramento, CA 95816.

KC6LUC, from "General Patton's Desert Training Center at Camp Clipper," Essex, California; Order of E Clampus Vitus Billy Holcomb Chapter ARC; 1700-0400Z Oct. 11-12; General 40, 20, 15, Novice portion of 10 meters. For certificate send QSL and SASE to ECV ARC, 1458 Albright Ave., Upland, CA 91786.

W7AW, from "Quilcene Slug and Oyster DX Festival," Quilcene, Washington; West Seattle ARC; 1600-0400Z Oct. 12 and 1600-1900Z Oct. 13; 7.225, 14.225, 21.125. For certificate send QSL and SASE to B. Todd, N7MFB, 3719 59th Ave. SW, Seattle, WA 98116.

W8TO, from Columbus Day Special Event, Columbus, Ohio; Columbus ARA; 0000Z Oct. 12 to 2400Z Oct. 13; 7.240, 14.340, 21.375, 10 meters Novice phone. QSL for confirmed contact. Certificate for those who contact at least 10 Columbus area amateurs (W8TO counts for 6 contacts). (Contacts with the same station on different bands count separately.) Exchange name, QTH, and signal report. Send QSLs and logs to Roger Dzwonczyk, WB2EIG, 283 East Longview Ave., Columbus, OH 43202.

W9YB, from Homecoming Weekend, Purdue University, West Lafayette, Indiana; Purdue ARC; 1400-2200Z Oct. 19; on 7.280, 14.280, 21.380, 28.480 MHz (plus or minus 20 kHz). Contact Purdue ARC, W9YB, Box 507, Purdue Memorial Union, Purdue University, West Lafayette, IN 47907.

W9REG, from Feast of the Hunters Moon, Lafayette, Indiana; Tippecanoe County ARC; Oct. 5-6; CW and SSB 80-10 meters, SSB 3.935, 7.235, 14.235, 21.335, 28.535; CW 35 kHz up from band edge. Commemorative QSL for each QSO, and for working 5-band, any mode, a certificate. QSL with SASE to N9GKE, Bruce Stewart, 315 Hamilton St., West Lafayette, IN 47906.

N9WB, from Raintree County Jamboree, New Castle, Indiana; Henry County ARC; 1700Z Oct. 12 to 2359Z Oct. 13; SSB on bottom 25 kHz of General bands, 10 meters 28.435. For certificate send 9 x 12 SASE to (Care of Civil Defense), Box 607, New Castle, IN 47362.

• **The following hamfests, etc., are slated for October:**

Sept. 29, **Southeast Iowa Hamfest**, West Liberty, Iowa Fairgrounds. Contact Tom Kramer, KE0Y, 905 Leroy St., Muscatine, IA (319-264-3259). (VE exams walk-ins as materials available. Contact Richard Bingham, WW0Q, 319-351-4098.)

Oct. 5, **Radio Amateurs of Greater Syracuse Hamfest**, Tri-County Convention Center, Baldwinsville, NY. Call 315-469-0590. (Wheelchair accessible; preregister for VE exams.)

Oct. 5-6, **Rock Hill, South Carolina Hamfest & Computerfair**, Charlotte Knights Baseball Stadium, Rock Hill, SC. Contact York County ARC, 2129 Squire Rd., Rock Hill, SC 29730 (SASE). (VE exams Saturday 10 AM, registration required.)

Oct. 5-6, **ARRL Mississippi State Convention & Ham/Swapfest**, Joppa Shrine Temple, Biloxi, MS. Contact Charlie Kunz, AA5QJ, 601-377-6495 days, 601-875-9516 evenings. (VE exams Sat. and Sun., preregister.)

Oct. 6, **Hamarama 91**, Garden State Park, Cherry Hill, NJ. Contact Al Boblitt, K3EOD, 8389 Langdon St., Philadelphia, PA 19152 (215-742-3312).

Oct. 6, **Huntington County ARS Hamfest**, PAL Club, Huntington, IN. Contact Jim Covey, KC9GX, 1752 Kocher St., Huntington, IN 46750 (219-356-3269). (VE exams.)

Oct. 6, **Springfield Independent Radio Assn. Hamfest**, Clark County Fairgrounds, Springfield, OH. Contact Ralph Pamer, WA8KSS, 513-325-1456.

Oct. 6, **Yonkers ARC Ham Fair**, Yonkers Municipal Parking Garage, Yonkers, NY. Contact Yonkers ARC, P.O. Box 378, Centuck Station, Yonkers, NY 10710. (VE exams 12-3 PM at First Precinct Police Station, E. Grassy Sprain Rd.)

Oct. 6, **Springfield, Ohio Hamfest**, Clark County Fairgrounds, Springfield, OH. Call 513-325-1456.

Oct. 12, **SIERA Hamfest/Computer Fair**, Carson Valley Inn, Minden, NV. Contact Ed Rogers, W6FFT, 702-266-3661.

(continued on p. 10)

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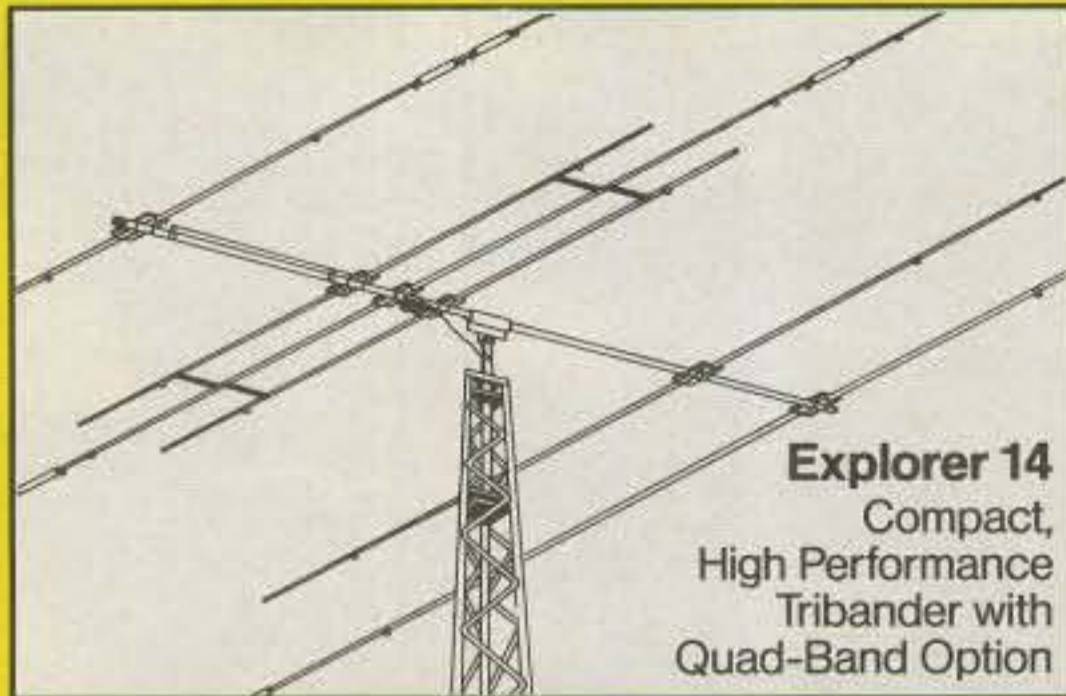
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- 4) I understand that violation of the FCC Rules or willful noncompliance with the VEC will result in the loss of my VE accreditation, and could result in loss of my Amateur Radio operator and/or station licenses, or both.
- 5) I understand that even though I may be accredited as a VE, if I am not able or competent to perform certain VE functions required for any particular examination, I should not administer that examination (Section 97.525[a] [3]).

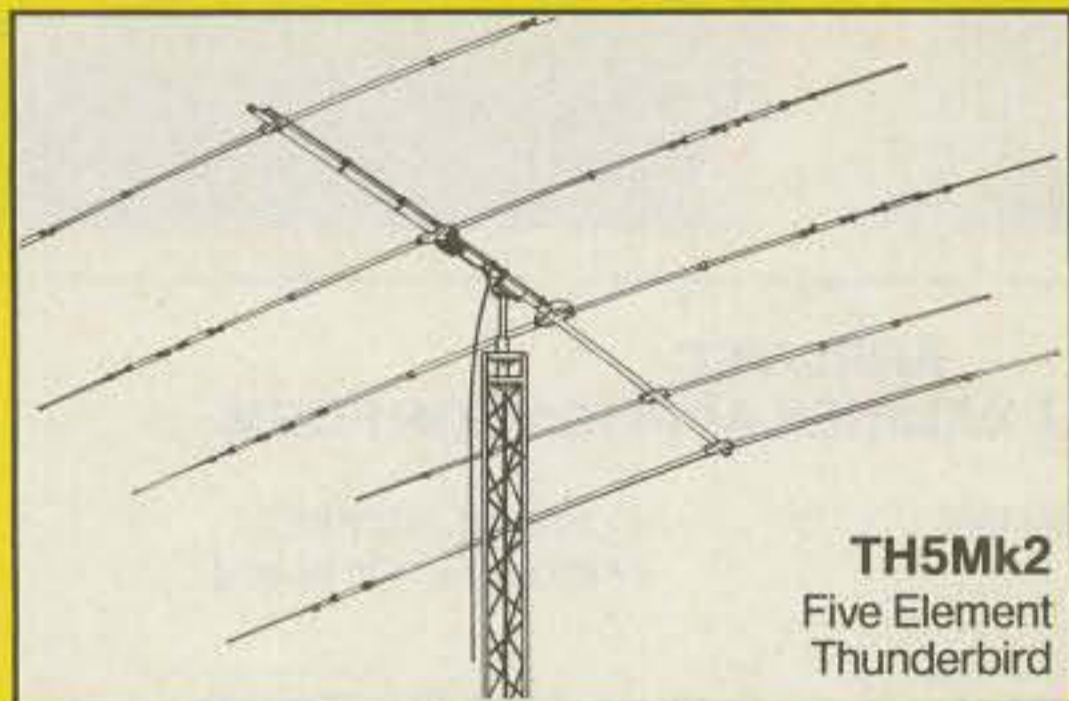
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[Please attach a photocopy of your Amateur Radio license, and if applicable a photocopy of any other VEC accreditation held, to this application.]

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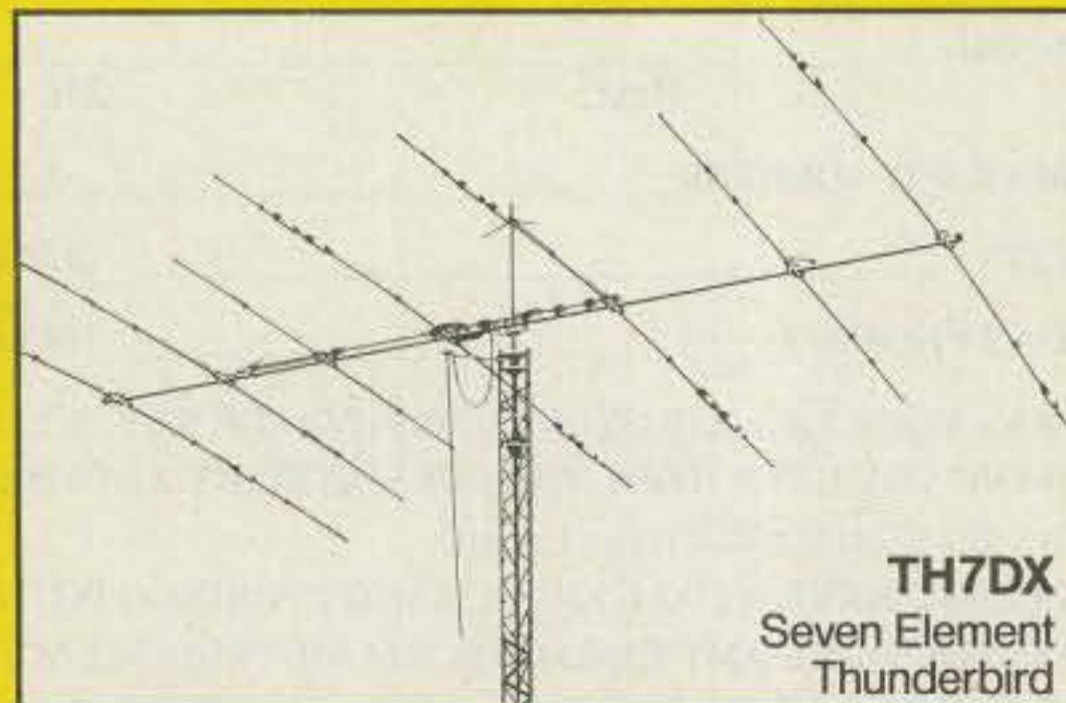
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ANNOUNCEMENTS

(from p. 8)

Oct. 12, **Bergen ARA Hamfest**, Fairleigh Dickinson University, Teaneck, NJ. Contact Jim Joyce, K2ZO, 286 Ridgewood Blvd. No., Westwood, NJ 07675 (201-664-6725). (VE testing contact Pete Adely, K2MHP, 13-30 Edward St., Fairlawn, NJ 07410, phone 201-796-6622 before 10 PM.)

Oct. 12, **Hamfest Minnesota & Computer Expo**, Hennepin Technical College, Brooklyn Park, MN. Contact Hamfest Minnesota, P.O. Box 5598, Hopkins, MN 55343 (612-535-0637). (VE exams.)

Oct. 12-13, **Memfest 91**, Mid-South Fairgrounds in Pipkin Building, Memphis, TN. Contact Nita Wofford, N4DON, 2966 Cordell, Memphis, TN 38118 (901-363-4971). (VE exams.)

Oct. 13, **Shore Area Ham & Computerfest**, Alaire Airport, Monmouth County, NJ. Contact Al Jackson, NK2O, 908-922-8121. (VE exams.)

Oct. 13, **CARA Computer Show, Electronic Exposition & Amateur Radio Convention**, Howard County Fairgrounds, West Friendship, MD. Contact CARA Hamfest Committee, P.O. Box 911, Columbia, MD 21044 (301-531-2933).

Oct. 13, **Kettle Moraine RAC Ham & Computer Swapfest**, Waukesha County Exposition Center, Waukesha, WI. Contact KMRA Swapfest, P.O. Box 276, Waukesha, WI 53187-0276. (VE exams.)

Oct. 13, **Northwest Ohio ARC Hamfest**, Allen County Fairgrounds, Lima, OH. Contact NOARC, P.O. Box 211, Lima, OH 45801. (VE exams, registration via W8TY, 1370 Stevick Rd. Lima, OH 45807, phone 419-336-1336.)

Oct. 19, **Augusta Hamfest & Computer Fair**, Augusta-Richmond County Civic Center, Augusta, GA. Contact Jim Abercrombie, N4JA, P.O. Box 5943, Augusta, GA 30906 (404-790-7802). (VE exams 10 AM.)

Oct. 19, **TCRA Hamfest/Fleamarket**, St. Anne's School, Garwood, NJ. Contact Dick Franklin, W2EUF, 23 Shawnee Rd., Cranford, NJ 07016 (908-276-6522). (VE exams 9:30 AM.)

Oct. 19, **Tri-Cities Hamfest**, Appalachian Fair Grounds, Gray, TN. Contact Tri-Cities Hamfest, P.O. Box 3682 CRS, Johnson City, TN 37602.

Oct. 19, **Lewis-Clark Hamfest**, Clarkston Center Campus, Walla Walla Community College, Clarkston, WA. Contact Kenneth Anderson, KB7IAW, 305 Weisgerber Building, Lewiston, ID 83501.

Oct. 19-20, **International Hamfiesta**, El Maida Shrine Temple Convention hall, El Paso, TX. Contact Chris Hines, N5LZB, P.O. Box 31628, El Paso, TX 79931 (915-584-3824).

Oct. 20, **Rocky Mountain Radio League Hamfest & ARRL Section Convention**, Jefferson County Fairgrounds, Golden, CO. Contact Jim Ungry, W0LGF, 2662 S. Newark Ct., Aurora, CO 80014 (303-751-7795). (VE exams.)

Oct. 20, **Kalamazoo Hamfest**, Kalamazoo Central High School, Kalamazoo, MI. Contact Gary Hazelton, KB8PL, 67332 32nd St., Lawton, MI 49065.

Oct. 20, **Cumberland County ARC Hamfest**, Carlisle Fairgrounds, Carlisle, PA. Contact CCARS, P.O. Box 448, New Kingstown, PA 17072 (SASE).

Oct. 20, **Centralia Wireless Assn. Hamfest**, Kaskaskia College Gymnasium, 3 miles northwest of Centralia, IL. Contact Bud King, WA9U, 618-532-6606.

Oct. 20, **Tucson Hamfest**, DeAnza Drive-in, Tucson, AZ. Contact A.J. Pawlowski, KB7KZ, 3418 W. Green Trees Dr., Tucson, AZ 85741.

Oct. 20, **Penn Wireless Assn. Tradefest 91**, Yezzi Athletic Field, Rt. 513, 1 mile south of Rt. 132. Call Steve, 215-752-1202. (VE exams.)

Oct. 26, **Tri-City ARC Auction**, Senior Citizens Center, Waterford Municipal Complex (Rt. 85, south of exit 77 of I-395), CT. Call WA2RYV, 203-464-6555. (Wheelchair accessible.)

Oct. 26, **Amateur Radio Club Bradford Area Hamfest**, Dixieland Music Park, north of Waldo, FL. Contact Terry Parrish, N4TWX, 904-496-2655.

Oct. 26-27, **Hamfest Chattanooga & ARRL Delta Div. Convention**, South Hall, Chattanooga-Hamilton County Convention and Trade Center, Chattanooga, TN. Contact Hamfest Chattanooga, P.O. Box 3377, Chattanooga, TN 37404. (VE exams.)

Oct. 26-27, **Palm Beach County Hamfest**, Fairground, West Palm Beach, FL. Contact PBRA Hamfest, P.O. Box 461, Lake Worth, FL 33460 (407-585-9074). (VE exams.)

Oct. 27, **Heart of Ohio Hamfest & Computer Show**, Marion County Fairgrounds Coliseum, Marion, OH. Contact Dan Burns, N8JMF, 844 Robinson, Marion, OH 43302 (614-382-2384). (No exams.)

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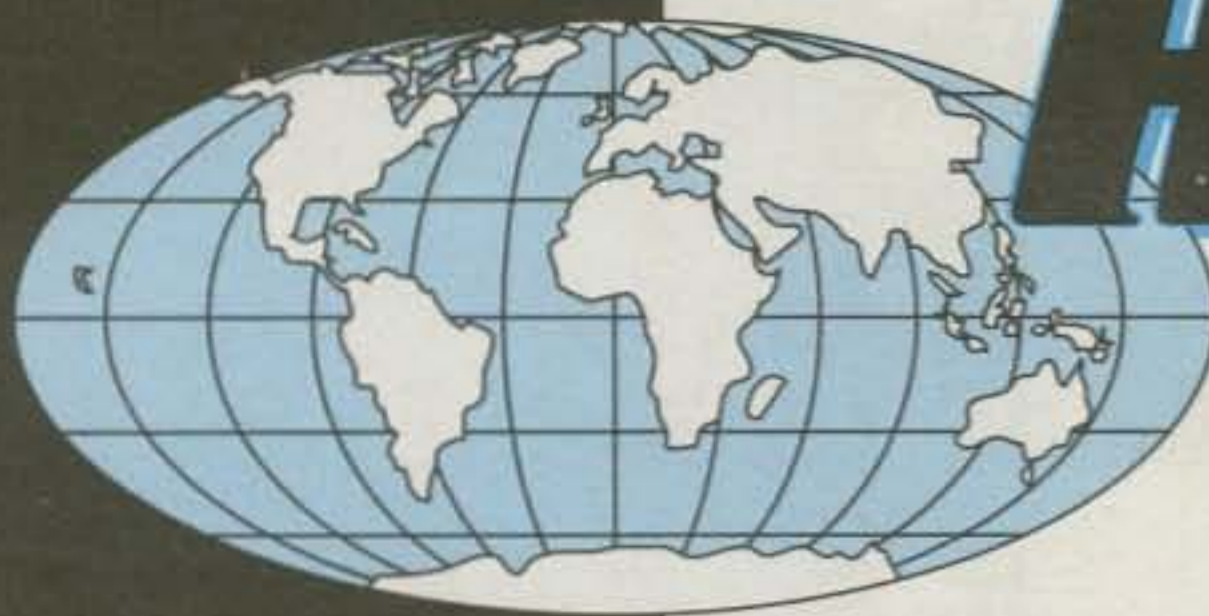
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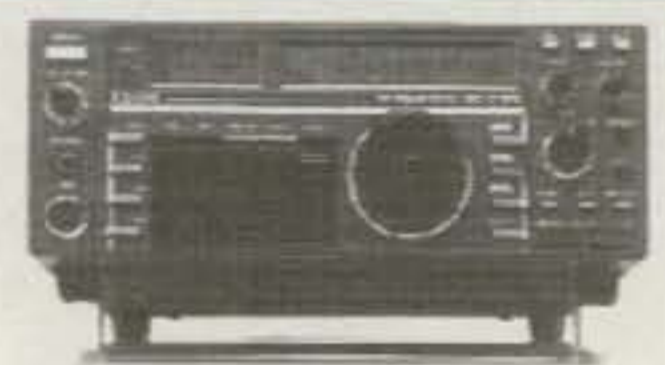
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Results of the 1990 CQ World-Wide DX CW Contest

BY LARRY BROCKMAN*, N6AR/4, AND BOB COX**, K3EST/6

As the contest creeps into the second day, our hero, Homer, is gloating over his fantastic performance. And that new computer logging program—what a great tool that has been! With 22 hours left to go, Homer peers over the computer-generated score on the side of the screen. Wow! DXCC on 10, 15, and 20 meters already, and a cool 3.1M—already 130 zones, too.

Well, he'll show them this time. Those W1's, 2's, and 3's have still got a thing or two to learn. This is going to be Homer's year. He can just feel it. A victory for the suffering 6's in the U.S. at last in the CQ WW Contest. When the JA openings are over on 40 tonight, Homer will be in the uncontested lead! The way 10 and 15 have been, and with the second day coming up, why just think of all those European contacts tomorrow, too. It's always easier the second day with Europe. Then Homer will clean up on the African multipliers in the afternoon as the contest wanes. The perfect strategy for the perfect operator.

Yet even as he daydreams the sweetness of the victory, with all those awards and accolades he's going to receive, slumber begins to take its toll on Homer. The lids droop ever so much as he logs that next JA on 20. "Was that a JA7 or a JE7? Oh, well. Can't stop to ask that question. It would spoil the rate," muses Homer. "Gotta keep going."

An hour later Homer makes the key strategy decision of the contest. Just two hours of sleep, and he'll be fresh as a daisy. Yep, that's the thing to do. An hour or two of sleep, and the rest of his strategy will prevail. Homer will have that clear, sharp, fresh intensity that is the hallmark of an "Olympic" class operator. So Homer does it. He saves his log, pulls the switch, sets all three alarm clocks, and goes to sleep. At first visions of 599 dance through his head. Why a few 59923's even race through his brain. But at last, sleep...

All of a sudden the rude awakening of a chorus of ugly buzzes permeates Homer's mind. What the heck is that? Of course. It's time to get up and finish the test! From the first moment of consciousness the adrenaline flows into Homer as the "perfect strategy" and the success of the first day's operation dawn on him. In a flash, the rig and computer are switched on for the main course. Already the tubes are glowing and the rig is ready to go. He'll just enter the name of the file, and away he'll go.

What was the name of that file anyway? Never mind, he'll just check the directory. What's this? No such file? "What do you mean, no such file? Certainly there is a file by that



John Crovelli, W2GD (left), who placed second worldwide from P40GD in the Single Op category, visits with Ville, OH2MM, of the winning PJ9A Multi-Multi crew just after the contest.

name." Homer looks again. And again. Maybe it's on the floppy. So Homer checks the floppy. Again, the impersonal but brilliant computer tells Homer there's no such file. Can it be that the file is gone?

We shall leave Homer at this point. Our hero has discovered that the file is indeed gone. Yes, the whole contest has vanished! Gone forever are DXCC on 10, 15, and 20 in just over 24 hours. The 130 zones are gone. Gone is the 3.1M. Gone is the sweet victory of the West Coast. Gone are the dreams of awards and accolades. Gone is the perfect strategy. Gone is the "Olympic" operator. Wiped out in a magnetic anomaly that surely only happens once in a million: *the file is gone!* All those hard-earned contacts have migrated away into the ether from whence they came, never to be recovered. Not even "Norton" can help our hero. There remains only the sad lesson of history. Homer has learned that no job is complete until the paperwork is done!

Speaking of paperwork, those who kept a paper copy of their logs and sent them to CQ will be glad to know their contacts have not vanished into the ether. We are delighted to report on the winners and losers in the best-ever CW contest.

The All Band Results

The big story this year was the fantastic worldwide conditions that fostered new world records in the Single Operator and Multi-Single categories. First and foremost, CT3M, ably manned by Juha, OH7JT, blew away the 1988 record of 9.6M by FY5YE with a fantastic 10.3M, followed closely by John Crovelli, W2GD, operating P40GD, with a fine 10.2M. Both entries were extremely well balanced in QSOs and multipliers, but Juha's 20 meter and 10 meter QSOs were apparently the difference.

Rounding out the top three was Glenn Rattmann, 9Y4H, with 8.3M. The great propagation



Rich, K1CC, topped all the Stateside boys in the Single Operator category.

aided John Laney, K4BAI, to better his North American record set last year from 8P9HT with a 7.5M mark from the same station, while Pete, AH3C's 6.8M eradicated the old Oceania standard set by KC6CS in 1988.

The Southern California Contest Club actually placed six entries in the worldwide top ten, as they competed among themselves with two of their own teams for the Team Championship. Our congratulations to number three 9Y4H (K6NA), number four ZD8Z (N6TJ), number five EA9IE (N6TR), number seven ZP0Y (WN4KKN/6), number eight AH3C (KN0E), and number nine HC5Z (N6ZZ) for such outstanding efforts. By the way, it was SCCC Team 1 (VP2VCW, 9Y4H, FR5DX, EA9IE, and ZP0Y) that came out on top in the Team Championship, but the matter was settled by just a little under 1M points out of 33M total. SCCC Team 2 consisted of AH3C, HC5Z, ZD8Z, D44BC, and HC8U. That's 65 million points from just 10 operators!

The best part is that this West Coast contingent also provided all of us other contesters such wonderful multipliers! Keep up the good work, guys.

The Stateside honors went to Rich, K1CC, with a cool 5.3M, not enough to topple the USA record, but enough to edge second-place finisher Andy, N2NT. A few extra multipliers, especially on 20 meters, and a slight edge in 15 meter QSOs were the margin of victory for Rich. The 1's, 2's, and 3's once again dominated the top 10 with 9 of the 10 top spots. Only Pat, WA8YVR, operating W9RE, managed to penetrate the East Coast block with a fine 4.8M fourth-place finish.

The Yugoslavians marched away with the European honors this year, with 4N9UN (4.6M), YT7A (4.4M), and YT90A (3.8M) taking first, second, and third place. OZ1LO and GJ6UW finished in a near dead heat for fourth place with less than 2000 points separating them.

Other all band winners included K3WW in

*12041 Walker Pond Road, Winter Garden, FL 34787

**1816 Poplar Lane, Davis, CA 95616

the Assisted category with 4.9M, followed by OK1ALW. In the QRP world it was Aki (JA5DQH), operating HI8A, who captured the new world record with 2.5M, over twice the old mark of 1.2M by YU3BC in 1988. YU3BC finished second at 1.1M, just ahead of the top USA contender, AA2U. One has to sympathize

with the QRP crowd, a tough task on any band. Yet we just can't believe the devotion some guys have to QRP on 1.8 MHz. As we screened the Russian and East European logs, we couldn't help but notice so many 5 and 10 watt entries on 1.8 MHz from there. Good show, fellows!

The High Band Results

Once again 10 meters dominated the single band categories with phenomenal propagation and even more phenomenal participation. CX0CW—with Jorge Camboni, CX8BBH, at

TROPHY WINNERS AND DONORS

SINGLE OPERATOR, ALL BAND World

CT3M (Opr. Juha Tuovinen, OH7JT)
Donor: Albert Kahn, K4FW
W2AB Memorial

World—Single Operator Assisted
Charles D. Fulp, Jr., K3WW
Donor: Pavillion Software

World—QRP
HI8A (Opr. Akito Nagi, JA5DQH)
Donor: Gene Walsh, N2AA

U.S.A.

Richard J. Assarabowski, K1CC
Donor: Frankford Radio Club

Canada

Jim Roberts, VE3IY
Donor: Canadian DX Association

Caribbean/Central America

8P9HT (Opr. John T. Laney III, K4BAI)
Donor: CQ Magazine

Europe

4N9UN (Opr. Boris Germadnik, YU3EW)
Donor: Edward Bissell, W3AU

Africa

ZD8Z (Opr. Jim Neiger, N6TJ)
Donor: Gordon Marshall, W6RR

Asia

Michael Klokov, RZ9UA
Donor: Japan CQ Publishing Company Ltd.

Japan

Tatsuya Sasaki, JH7WKQ
Donor: Japan Crazy Contesters Club

Oceania

Pete Grillo, AH3C
Donor: Maui Amateur Radio Club

South America

P40GD (Opr. John Crovelli, W2GD)
Donor: Venezuela DX Club

SINGLE OPERATOR, SINGLE BAND

World—28 MHz

CX0CW (Opr. Jorge Camboni, CX8BBH)
Donor: Joel Chalmers, KG6DX

World—21 MHz

C56/OH7XM (Opr. Arno Martin, OH7XM)
Donor: Don Busick, K5AAD
N5JJ Memorial

World—14 MHz

ED9ED (Opr. Juan M. Chazarra, EA5BRA)
Donor: North Jersey DX Assn.
W2JT Memorial

World—7 MHz

P40J (Opr. Robert W. Brockman, WX4G)
Donor: Alex M. Kasevich, VP2MM

World—3.5 MHz

Jose C. Dominguez, EA9EU
Donor: Fred Capossela, K6SSS

U.S.A.—14 MHz

Paul L. Reiter, WY7I
Donor: Northern Illinois DX Assn.

U.S.A.—7 MHz

Jeffrey T. Briggs, K1ZM
Donor: Jan Perkins, N6AW
W6AM Memorial

Canada (21 MHz)

Kent D. Chown, VE2LJ
Donor: Canadian Amateur Radio Fed.

Europe—21 MHz

OM7DX (Opr. Michal Janitor, OK3DX)
Donor: Southern New England DX Club

Europe—14 MHz

OH2BH (Opr. Pasi L. Aho, OH6UM)
Donor: Al Slater, G3FXB

Japan—21 MHz

Yohtaro Hoshiyama, JA2JW
Donor: DX Family Foundation

MULTI-OPERATOR, SINGLE TRANSMITTER

World

TA5KA (Oprs. TA5C, TA5B, HA0NNN, HA0LC,
HA0MM, HA5PP)
Donor: Anthony Susen, W3AOH

U.S.A.

N3RS (Oprs. N3RS, N3RD, WA3LRO, NW3B)
Donor: Douglas Zwiebel, KR2Q

Canada

VE3EJ (Oprs. VE3EJ, VE3CDX, VE3CPU,
VE3DDL, VE3ICR, VE3KZ)
Donor: Eastern Canadian DX Assn.

Europe

LZ9A (Oprs. UA1ALZ, UV1AA, LZ2PO, LZ2CC,
LZ2DF, LZ2HE, LZ2UU, LZ2PS, LZ2WF,
LZ2BE, LZ2XA, LZ2TT, LZ2II, LZ2WM, LZ2UA,
Krasí)
Donor: Friends of K3AO
K3AO Memorial

MULTI-OPERATOR, MULTI-TRANSMITTER World

PJ9A (Oprs. OH6DO, OH1LD, OH2JA,
DL3HAH, YV5ANT, OH6XY, OH2MM, OH6LI,
DL5XX, OH6NU, OH2KI, OH6MW)
Donor: Hazard Reeves, K2GL Memorial

World—SSB/CW Combined

PJ9W/PJ9A (87,131,800)
Donor: Ehrhorn Technological Operations

U.S.A.

N2RM (Oprs. N2RM, WM2H, KA2AEV, KZ2S,
N2ME, N4HY, K2TW, KQ2M, KR2Q, KR2J,
W2RQ, N2AA)
Donor: Jim Rafferty, N6RJ

Europe

PA6DX (Oprs. PA0CLN, PA0COR, PA0CYW,
PA0ERA, PA0JMH, PA0LVB, PA0SKP,
PA0SOL, PA0VAJ, PA3AAV, PA3ABA,
PA3BAS, PA3BFM, PA3CEF, PA3CTM,
PA3DCO, PA3DQW, PA3DWD, PA3EQV,
PA3FML, PA3FLS, PA3BZC, PA0ORH,
PA0ONZ)
Donor: Finnish Amateur Radio League

Japan

JE2YRD (Oprs. JH1ORL, JA2EZD, JF2XJE,
JA2KVD, JR2SCI, JI3ERV, JK3GAD, JR7OMD,
JA9SSY, JA9-10148, JF2EOC)
Donor: Nippon Television Network Corp.

CONTEST EXPEDITIONS

World—Single Operator

9Y4H (Opr. Glenn Rattmann, K6NA)
Donor: Yankee Clipper Contest Club

World—Multi-Operator

CN5N (Oprs. F2CW, F5CW, F6ATQ, F6DOW,
F6EMT, F6IMS, F6EEM, F6IMS, F9LX,
G3SXW, HB9CUY, K5VT, K7GE, KC7V, N6VI,
N7BG, NZ7E, W6OUL, W7CB, YU1RL)
Donor: Bill Schneider, K2TT

SPECIAL SINGLE OPERATOR AWARDS

World—Single Band SSB/CW

CX8BBH/CX0CW
(Opr. Jorge Camboni, CX8BBH)
28 MHz (3,557,247)
Donor: CQ Magazine

World—All Band, Most QSOs

CT3M (5970 QSOs) (Opr. Juha Tuovinen, OH7JT)
Donor: From the 14270 kHz Group
KV4AA Memorial

CLUB

World—SSB/CW

Frankford Radio Club (352,816,404)
Donor: CQ Magazine
Non-USA—SSB/CW
Bavarian Contest Club (59,752,459)
Donor: Northern California Contest Club
N6AUV Memorial



The Delta II... Compact Power.

These transceivers are identical except for the die cast heat sink that houses the 100 watt amplifier on the Delta II. General coverage receive on AM, FM, LSB, USB, CW and the digital modes from 100 KHz to 29.999 MHz. Transmit from 1.8 to 29.999 MHz. on FM, LSB, USB, CW and the digital modes using externally generated AFSK.

The top priority in this engineering effort was receiver performance. The result is impressive. Excellent sensitivity and dynamic range. Selectivity is dramatically enhanced by our unique Jones Filter (patent pending) which is an eight pole crystal ladder I-F filter. The band-width is continuously variable from 2.4 KHz to 500 Hz. This, in combination with our digitally controlled pass-band tuning and switched capacitor audio notch filter, provides QRM fighting weapons that are most uncommon in rigs in this price range.

The CW system is our best yet. QSK (of course) and a keyed waveform that will embarrass some competitive transceivers that are substantially more expensive. Whether you prefer a calibrated tone or zero beat for matching another station's frequency is academic. Both methods are provided. The programmed offset is 700 Hz. By using receive offset (RXO), you can set up for whatever operating audio frequency you prefer. Just to top it all off, a preset audio filter is switched in when the CW mode is selected.

Excellent SSB performance with built-in speech processor. Other standard features include a noise blanker, SWR bridge, 20 dB attenuator and multi-speed AGC and QSK. Dual VFO's plus memory



The Argonaut II... QRP With Class.

scratchpad, independent receiver offset tuning with offset display and a momentary REVERSE button to check the transmit frequency. Forty-eight memories, 15 with duplex capability. The "set and forget" controls for VOX gain, delay and anti VOX, plus CW sidetone level, are all front panel programmed using our unique soft-touch system. There are no rear panel controls. All of this plus a two wire serial interface for remote control.

The liquid crystal display holds contrast even in direct sunlight. The electro-luminescent back lighting can be turned on/off. The display includes the multi-meter and shows mode, VFO status, clock or receive offset and frequency to 10 Hz.

Like all Ten-Tec designs, the Argonaut II and Delta II are designed to be field serviceable to the board level. The upper chassis deck is hinged for easy access to all three board mounting surfaces.



If you are a serious QRP operator, the Argonaut II was designed for you. If you are interested in an affordable 100 watt rig that loves to travel but has all the of the "big rig" functions and features, the Delta II is for you.

ACCESSORIES



Model 936. A 20 A, 13.7 Vdc, power supply for the Delta II. Primary power is 115/230 Vac, 50/60 Hz.



Model 290. Step attenuator. Reduces Argonaut II output power from 5 watts to 10 mw in six calibrated steps.



Model 935. A 43 watt, 13.7 Vdc, switching power supply for the Argonaut II. Primary power 90-270 vac @ 47-63 Hz.



Model 700C. Hand Mic
Model 705 Desk Mic.
Both models are electret microphones and may be used with any Ten-Tec transceiver with a 4 pin mic connector.



Model 291. 300 watt antenna coupler. For single wire or coax fed antennas. Uses SWR bridge in the transceiver.



Model 606. Electronic keyer. Energy efficient for battery operation.

Model 293. Mobile mount. For under-dash or floor installation.

Model 303. Fan kit for use on the Delta II. Recommended for extended full power operation in "key down" modes.

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Cross Needle SWR/Power Meters for All Bands



Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-101	1.8-150 mHz	15/150 W/1.5kW	SO-239
CN-103	140-525 mHz	20/200 W	SO-239 or N
NS-660A/PA	1.8-150 mHz	30/300 W/3kW	SO-239
NS-663BM/BN	140-525 mHz	30/300 W	SO-239 or N type

Digital SWR/Power Meters for All Bands



Model	Freq. Range Int. Sensor	Forward Power	Connectors
DP-810	1.8-525 mHz	0-1.5 kW/0-15W	SO-239 or N type
DP-830	1.8-150 mHz	0-1.5 kW	SO-239
DP-820	140-525 mHz	0-150 W	SO-239 or N type

Mobile/Base Cross Needle SWR/Power Meters



Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-520	1.8-60 mHz	200/2000W	SO-239
CN-410M	3.5-150 mHz	15/150 W	SO-239
CN-460M	140-450 mHz	15/150 W	SO-239
CN-465M	140-450 mHz	15/75 W	SO-239

Coaxial Switches

	CS-201	CS-201GII	CS-401	CS-401G	
Frequency:	500mHz	1.3 GHz	800 mHz	800 mHz	CS-201
Connectors:	SO-239	N type	SO-239	N type	
Isolation:	+60 dB	+60 dB	+50 dB	+50 dB	
Power Rating:	2.5 kW PEP 1 kW CW	2.5kW PEP 1 kW CW	2.5 kW PEP 1kW CW	2.5 kW PEP 1 kW CW	CS-401

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Daiwa power supplies use the latest hi-tech circuitry and components providing reliable, regulated DC Power. Short circuit protection protects the power supply in the event of accidental shorting. Crowbar protection protects your rig in the unlikely event of power supply failure. All Daiwa Power Supplies are 120V 50/60 Hz. Also available 220V 50/60 Hz.

Model	PS120M	PS140II	PS304	RS3080	RS40X
Voltage	3-15	13.8	1-15	1-15	1-15
Current(ICS)	12A	14A	30A	33A	40A
Current(Cont.)	9.2A	12A	24A	30A	32A
Ripple(Max)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	1%
Cooling Fan	NO	NO	NO	YES	YES
Size(inches)	5x4x9	5x4x9	7x6x9	7x6x9.5	11x5.5x9
Weight(lbs.)	11	11	16	21	22

NEVADA



Height: 5'6"
Weight: 2.2 lbs.
Connector: "N" Type

The ultimate wide-band omnidirectional antenna. Not only excellent, on receive it will handle up to 200 watts, 50-1300 mHz. All stainless steel for years of reliable service. Great Scanner antenna indoors.

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CLP5130-1
50-1300 mHz

This high gain, wide-band VHF/UHF antenna is excellent for DXing, amateur radio, FM broadcast, scanners, VHF/UHF television, government, cellular and business band use. The forward gain is 10-12 dB, front to back ratio 15 dB, 23 elements, transmit power to 500 watts. Boom length 5.8ft., VSWR 2.0:1 or less, max. Longest element 9.8ft., weight 11 lbs. wind survival 90 mph. CLP5130-2, 105-1300 mHz also available. 19 Element Boom 4.6 ft. Element 4.6 ft.

CREATE

High grade aluminum Roof Towers for your antenna requirements. Guying is recommended to insure safety.



Model	Height	Base Width	Max. Wind Load Ft ²	Max. Vert. Load Lbs.	Weight
CR18	5'10"	31 1/2"	21 @ 90 mph	440	18
CR30	9'10"	39"	27 @ 90 mph	1,322	33
CR45	14'9"	39"	23 @ 90 mph	881	57



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TOP SCORES

WORLD Single Operator All Band		USA Single Operator All Band		EUROPE Single Operator All Band	
CT3M	10,370,646	K1CC	5,283,486	4N9UN	4,592,406
P40GD	10,211,103	N2NT	5,132,415	YT7A	4,366,230
9Y4H	8,300,853	W1KM	4,777,389	YT90A	3,806,346
ZD8Z	7,772,001	W9RE	4,755,206	OZ1LO	3,323,370
EA9IE	7,733,924	K1TO	4,582,905	GJ6UW	3,321,874
3P9HT	7,478,808	K3TUP	4,448,178	GW4BLE	3,178,194
ZP0Y	7,192,146	K3ZO	4,296,600	LY3BA	2,798,585
AH3C	6,798,363	AA1K	4,199,616	OH6YF	2,514,996
HC5Z	6,749,244	K3OO	4,138,337	OH2PM	2,461,580
CT3T	6,120,420	N2LT	4,052,075	DK8ZB	2,223,554
28 MHz		28 MHz		28 MHz	
CX0CW	1,890,607	W0ZV	506,989	LZ5Z	785,178
ZP5Y	1,643,050	K8CX	489,010	9H1EL	734,880
LU2DJY	1,031,814	N8CXX	449,065	OH0BBF	562,060
EA9EA	873,923	N4ZZ	405,520	OH1HD	556,402
4Z5DX	826,759	W6YA	390,450	DK5PD	469,560
KH2D	799,026	K3UA	379,175	EA6/OH1XM	454,710
21 MHz		21 MHz		21 MHz	
C56/OH7XM	1,183,325	KE3Q	753,660	OM7DX	613,236
EA8BPW	1,138,014	W1RM	698,257	I3JSS	542,864
V29W	1,110,512	AA4NC	614,376	OY3QN	478,875
9Y4VU	1,046,920	K6LL	531,000	DK4JN	475,134
CX5AO	999,488	W5WMU	467,754	G4CNY	456,820
EA9EO	950,649	W5VX	431,298	DL0IU	425,140
14 MHz		14 MHz		14 MHz	
ED9ED	1,444,436	WY7I	637,208	OH2BH	915,136
YW1A	1,369,368	KC9T	573,501	OH4NRC	750,120
OH2BH	915,136	N5CR	524,244	UA1DZ	736,968
OH4NRC	750,120	N6GG	276,360	OH7MA	715,658
UA1DZ	736,968	K1XA	229,248	JX7DFA	523,204
OH7MA	720,594	W1YN	224,451	UA4WA	511,286
7 MHz		7 MHz		7 MHz	
P40J	1,022,076	K1ZM	839,520	Y42MK	716,976
K1ZM	839,520	K5GO	542,108	G3FXB	557,151
Y42MK	716,976	W7XR	519,578	LA1EE	494,769
FM5BH	596,883	K4CG	461,005	HA8IE	489,920
G3FXB	557,151	K8PO/1	444,416	YU4CC	465,367
K5GO	542,108	K1ZZI	417,620	IG8R	460,554
3.5 MHz		3.5 MHz		3.5 MHz	
EA9EU	325,170	W1FV	260,406	G3KDB	213,944
W1FV	260,406	W1MK	244,088	OH1WZ	213,642
RL7A	246,312	K7EG	122,943	4N1A	195,664
W1MK	244,088	N2KK/6	106,399	ES5MC	191,160
G3KDB	213,944	KZ3H	101,736	EA6/OH2BCI	168,768
OH1WZ	213,642	WR4K	59,670	SM6MCW	157,885
1.8 MHz		1.8 MHz		1.8 MHz	
UG6GAW	164,430	K5UR	22,824	ON4UN	118,776
ON4UN	118,766	W8LRL	20,000	OK5TOP	54,291
KH6CC	60,352	W8UVZ	12,852	OK3TPV	34,845
OK5TOP	54,291	K4TEA	12,033	SM0AJU	32,612
V73AZ	49,872	N8EA	10,850	YL2PQ	31,447
EA9GK	39,270	AB4RU	7,830	RA3DOX	24,614
Multi-Operator Single Transmitter		Multi-Operator Single Transmitter		Multi-Operator Single Transmitter	
TA5KA	13,915,044	N3RS	8,024,079	LZ9A	9,308,354
EA8AGD	12,341,047	K5NA/2	7,431,445	IQ4A	9,201,024
RL0L	9,324,916	N4RJ	6,651,957	HG5A	8,963,658
LZ9A	9,308,354	K8AZ	5,880,834	OL8A	8,942,010
IQ4A	9,201,024	K1VR	5,529,447	LY2ZO	8,469,160
HG5A	8,963,058	K1YR	5,447,540	FQ0M	7,948,707
Multi-Operator Multi-Transmitter		Multi-Operator Multi-Transmitter		Multi-Operator Multi-Transmitter	
PJ9A	34,930,548	N2RM	17,282,262	PA6DX	13,363,945
CN5N	33,659,256	K1AR	17,276,544	DA0BV	10,933,510
J6DX	19,361,664	W3LPL	17,108,280	DL0KF	10,241,900
N2RM	17,282,262	K1ST	12,367,632	R6L	8,730,070
K1AR	17,276,544	KY1H	11,424,240	4N2N	5,289,592
W3LPL	17,108,280	K4VX/0	10,924,267	PI4COM	4,789,424

the key—bested ZP5Y's op, arch rival LU8DQ, for the top score 1.9M to 1.6M, and toppled ZP0Y's year-old world and South American 1.7M record while he was at it. He was followed by a third South American, LU2DJY, at 1M; Africa's top entry, EA9EA, at 873K; and new Asian record holder Dov at 4Z5DX with 826K. This is Dov's third single band Asian record! KH2D rounded out the top 6.

Bill, W0ZV, nabbed the top slot Stateside at 506K, followed by a cluster of five close scores from K8CX (489K), N8CXX (449K), N4ZZ (405K), W6YA (390K), and K3UA (382K). LZ5Z ran away with the European top notch at 785K, followed by 9H1EL and OH0BBF. Lots of fine scores were submitted in this popular category, many at or above the 100 country milestone. Let's hope the sun blesses us with propagation like that in 1991!

On 15 meters C56/OH7XM's 1.183M just managed to best Tom Warren's 1989 5H3TW African record to claim world high on that band this year. Yet it was a four horse race with EA8BPW just behind him at 1.138M, and V29W (1.110M) and 9Y4VU (1.031M) a close third and fourth. A new Asian continental mark of 875K was posted by 7L1GVE (operated by JA0JCJ), wiping out Aki, JA5DQH's old pace. KE3Q headed up the USA leaders with 753K, followed by W1RM (698K), AA4NC (614K), K6LL (531K), and W5WMU (468K). OM7DX led the Europeans with 613K, with I3JSS (543K) and OY3QN (479K) just behind him.

Usually reliable 20 meters almost seemed dead at times in the middle of the day, but was open well enough for ED9ED's great 1.44M world high score, setting a new African standard. He was trailed closely by YW1A (1.37M) for second place. Guest operator OH6UM took the reins of Martti Laine, OH2BH's superstation to capture a fine third-place finish, setting a new all-time European record at 915K.



That yearly big noise from 8P9HT on Barbados comes to us courtesy of this gent, John Laney, K4BAI.



Here's the welcome visiting Hungarian crew who gave us all TA5KA multipliers this year. From left to right are HA0LC, HA0MM, HA5PP, and HA0NNN. Congratulations on winning Multi-Single worldwide!

OH4NRC was next at 750K, followed closely by George, UA1DZ, with 737K. Sadly, George became a silent key soon after the contest, and we will all miss him. Stateside, WY7I ended up at 637K, a comfortable 100K ahead of nearest rivals KC9T and N5CR in the mid 500's.

The Low Band Results

As the QRM section of this article demonstrates, it was 40 meters that raised all the eyebrows this year with unbelievable propagation—more like 20 meters than 20 meters. It is with great pride that your Director announces that his little brother, Bob Brockman, WX4G, ran away with worldwide honors on that band with a new pace setting World record of 1.02M from P40J! Incredibly, the second high spot goes to the USA's Jeff Briggs, K1ZM, with 840K, good enough for new North American

and USA all-time highs. Y42MK finished third at 717K, wiping out the European standard set by YU3ZV in 1987.

The boys at EA9 manned competitive efforts in all single band categories this year, with a high-placing score on all bands and each single band category. Yet it was the 80 meter band that yielded the only first-place finish, as EA9EU's 325K topped the heap. W1FV mustered a QSO career high on that band, finishing second and high for the States, but fell shy of his previous best. G3KDB and OH1WZ battled it out for Europe, with only hundreds of points separating them. Eighty meters was open for hours between North America and Europe, even out to the West Coast, a welcome change of pace.

The top band provided unusually quiet conditions for the faithful, allowing UG6GAW to whisk away the world record from TA2BK with a fine 164K. Meanwhile, world-reknown ON4UN finished above HB9AMO's old Euro-

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
CT3M	246/16/50	577/19/60	1016/26/73	1283/30/79	1122/35/95	1726/29/81
P40GD	242/14/38	688/22/73	1003/26/83	1019/37/91	1210/31/89	1563/26/79
9Y4H	220/12/35	564/21/79	872/29/84	833/34/91	870/33/87	1123/31/91
ZD8Z	29/11/21	278/19/51	375/24/63	1033/31/75	1245/33/86	1922/31/92
EA9IE	76/10/35	516/20/60	987/24/70	691/29/80	824/27/87	1653/27/79
8P9HT	255/12/26	620/19/60	796/21/64	1336/31/89	957/28/76	1322/28/82
ZP0Y	14/8/12	47/13/20	440/24/67	1197/32/84	1212/32/90	2020/28/84
AH3C	107/14/17	543/26/38	823/32/61	856/33/75	899/33/70	1311/34/74
HC5Z	27/10/14	368/15/49	596/25/69	828/35/90	890/35/96	1349/29/96
CT3T	28/5/19	371/18/56	685/19/63	882/26/77	1130/30/82	1037/24/79

USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
K1CC	33/13/29	237/17/62	602/25/77	809/34/100	774/31/96	571/28/91
N2NT	28/11/24	183/16/61	770/25/74	801/30/94	677/30/93	628/27/92
W1KM	28/10/24	330/17/58	698/28/75	742/31/88	448/31/88	710/30/81
W9RE	31/12/23	107/19/56	542/29/71	512/33/91	803/34/92	814/28/90
K1TO	22/7/17	273/15/57	427/24/81	948/30/93	782/31/92	401/25/73
K3TUP	30/11/22	100/19/53	552/31/97	618/34/99	667/30/98	569/32/86
K3ZO	24/10/18	239/22/65	631/28/82	510/28/85	516/31/86	751/25/78
AA1K	48/15/37	182/17/61	610/24/69	616/30/87	448/30/91	608/29/86
K300	31/11/26	154/17/53	274/24/73	686/32/89	774/32/95	582/29/88
N2LT	17/7/14	108/14/54	478/29/80	543/33/87	722/32/83	657/29/83

WORLD TOP MULTI-OPERATOR, SINGLE TRANSMITTER

TA5KA	181/10/49	962/23/69	2037/31/84	1231/38/96	1518/36/112	1272/37/112
EA8AGD	58/9/36	312/17/65	1146/26/90	1742/31/102	1589/34/104	1677/32/107
LZ9A	184/17/65	337/22/79	1866/37/121	979/37/129	912/38/110	945/40/114
IQ4A	73/14/56	107/21/77	1590/34/108	988/38/125	1143/39/125	1046/36/115
HG5A	242/10/51	787/22/79	1127/35/114	1035/36/120	1285/37/114	803/37/106
OL8A	61/9/48	644/26/83	1610/31/105	757/34/114	780/39/116	1174/39/126

USA MULTI-OPERATOR, SINGLE TRANSMITTER

N3RS	24/12/22	244/22/83	729/34/110	967/39/135	854/35/129	714/33/123
K5NA/2	46/17/43	180/25/82	709/35/119	1121/39/132	684/35/118	490/31/115
N4RJ	42/16/41	77/24/74	860/34/108	650/37/108	660/33/118	803/31/117
K8AZ	38/13/34	130/18/65	516/33/105	682/38/125	918/33/113	560/33/107
K1VR	35/11/34	254/20/68	733/32/102	539/35/116	651/33/115	509/30/111
K1YR	19/6/18	139/14/62	678/27/98	630/36/112	707/35/113	630/30/117

WORLD TOP MULTI-OPERATOR, MULTI-TRANSMITTER

PJ9A	506/13/45	1873/27/99	2588/35/122	3903/38/139	3689/35/128	2703/36/126
CN5N	453/11/51	1551/23/81	2383/31/104	3936/38/149	3163/39/142	2693/36/122
J6DX	630/14/49	1086/22/79	1658/29/85	2235/33/96	3403/37/113	2456/31/93
N2RM	96/17/51	622/24/88	1511/34/120	2085/39/149	1495/38/130	1209/37/130
K1AR	91/16/50	712/24/89	1325/34/122	2109/37/149	1543/36/141	1150/34/132
W3LPL	147/17/58	605/28/93	1680/33/120	1696/39/139	1563/37/133	1167/34/137

USA MULTI-OPERATOR, MULTI-TRANSMITTER

N2RM	96/17/51	622/24/88	1511/34/120	2085/39/149	1495/38/130	1209/37/130
K1AR	91/16/50	712/24/89	1325/34/122	2109/37/149	1543/36/141	1150/34/132
W3LPL	147/17/58	605/28/93	1680/33/120	1696/39/139	1563/37/133	1167/34/137
K1ST	110/14/37	387/18/77	1342/33/109	1631/37/133	1339/37/118	807/31/120
KY1H	79/14/37	380/20/75	1052/32/104	1451/38/143	1263/36/124	979/33/118
K4VX/0	252/17/39	217/22/70	1353/35/112	1347/38/125	1119/35/116	983/32/114

USA CLUB SCORES

Frankford Radio Club	352,816,404
Yankee Clipper Contest Club	270,289,267
Southern California Contest Club	136,203,194
Northern California Contest Club	117,766,300
Potomac Valley Radio Club	109,051,757
Mad River Radio Club	44,100,623
North Coast Contesters	38,083,760
North Texas Contest Club	28,343,093
Dixie DXers	28,196,626
Western Washington DX Club	24,713,845
Southwest Ohio DX Association	21,857,498
Rochester DX Association	19,467,804
Minnesota Wireless Association	18,506,346
Texas DX Society	15,110,106
Southeastern DX Club	14,757,917
Mile Hi DX Association	14,180,240
Society of Midwestern Contesters	12,890,669
Tri City Amateur Radio Club	12,802,053
Hoosier Contesters	12,188,296
Mississippi Valley DX & Contest Club	10,598,029
Southern California DX Club	9,548,441
Central Florida DX Association	8,085,546
Eastern Iowa DX Association	7,339,927
San Diego DX Club	7,074,880
Carolina DX Association	7,073,573
Order of Boiled Owls	7,025,216
Murphy's Marauders	6,975,395
Williamette Valley DX Club	5,131,574
Arrowhead Amateur Radio Club	4,782,835
Central Arizona DX Association	4,314,771
Albany Amateur Radio Association	4,260,450
Grand Mesa Contesters	4,045,316
Northern California DX Club	4,012,599
Kansas City DX Club	3,956,185
Falmouth Amateur Radio Association	3,291,446
Salt City DX Association	3,180,664
Lone Star DX Association	2,586,034
Lincoln Amateur Radio Club	2,551,384
South Florida DX Association	2,521,294
Rubber Circle Contest Club	2,330,336
Four Lakes Amateur Radio Club	2,255,601
Woodbridge Wireless Association	1,823,198
Redwood Empire DX Association	1,616,674
Utah Contest Club	1,522,942
Nodot DXers	1,451,001

North Jersey DX Association	1,420,390
Amarillo DX Society	1,306,160
North Florida DX Association	1,047,973
Western New York DX Association	1,014,873
Alamo DX Amigos	958,454
Metro DX Club	945,142
Livingston Amateur Radio Klub	618,299
Panhandle Radio Club	575,532
WISACO	546,715
Northern Illinois DX Association	516,571
West Park Radio Ops	249,307
Bartlesville Amateur Radio Club	219,860
Hamfesters Radio Club	105,105

DX CLUB SCORES

Rhein Ruhr DX Association	67,205,523
Bavarian Contest Club	59,752,459
French DX Foundation	58,264,748
Kaunas Polytechnik Radio Club	37,440,088
Chiltern DX Club	27,585,546
Troyan Contest Club	23,036,938
YU DX Club	21,724,886
Alaska DX Association	19,072,994
Kiel Channel Activity Group	12,067,836
Eastern Canada DX Association	10,288,735
SP DX Club	9,532,717
Araucaria DX Club	9,062,421
Ukrainian Contest Club	8,805,788
Fraser Valley DX Club	6,621,980
LNDX	4,874,379
Northern Lithuania DX Group	4,789,405
Uruguay DX Club	3,725,611
Icelander Radio Association	3,441,444
South German DX Group	2,666,091
Sexy Alligators Contest Club	1,781,184
Arctic Circle Contest Club	1,709,481
YV DXperts	1,598,125
PZK	1,382,316
Winnipeg DX Club	1,354,402
Maui Amateur Radio Club	920,258
Gaucha Argentina CW	782,059
Moscow DX Club	769,378
Guyancourt Team	38,227

pean mark with 119K for second; and a determined KH6CC, finishing third with 60.3K, recaptured the all-time Oceania mark. A second Oceania station finished in the top six—V73AZ, a fine new one for lots of us on 160.

Multi-Operator Results

The great all band propagation permitted both TA5KA (14M) and EA8AGD (12M), finishing first and second in Multi-Single, to wipe out old world and continental records this year. The Hungarian crew that visited TA-land is shown relaxing after the test on a little sightseeing tour (see photo), but they were all business during the test. The USA high went to N3RS's gang, a reuniting of the old W3WJD crew of the 1980s. Their 8M score set the pace just above K5NA/2's 7.4M. The European competition saw a very densely packed group of four stations fight it out for first place, but it was LZ9A, IQ4A, HG5A, and OL8A, in that order, with the winner up around 9.3M.

The perennial war of the worlds for Multi-Multi World Record was waged this year by the visiting Finnish team at PJ9A, who finished just

under 35M and under the record. A multinational group of F and US hams, sponsored by the French DX Foundation, sojourned to CN5N, with a fine 33.7M second-place finish to their credit, enough for a new African record. PA6DX took top European honors with 13M, some 3M above DA0BV and DL0KF, in that order. And in the States, it was a three-way battle, with N2RM on top at 17.3M, followed closely by K1AR (17.2M), and W3LPL (17.1M). To put these scores in perspective, we're talking 7000 QSOs for the winning USA station, and 15,000 for the worldwide high! I'm sure glad I don't have that much QSLing to do.

Club Results and Special Awards

Once again the Frankford Radio Club did it, amassing a mind-boggling 352M USA club total, 50M above their old mark, and over 80M above the nearest club, the Yankee Clipper Contest Club. With all those great visiting single operator DX scores, the SCCC and NCCC fought it out for third and fourth place, respectively. In the DX club arena, the Bavarian Con-

test Club, with almost 60M, squeaked by the French DX Foundation's 58.3M, with their yearly rival Rhein-Ruhr Club close behind with 57M. It's good to see the level of interest in the club categories.

Our congratulations to George Camboni, CX8BBH, the winner of this year's special trophy for the highest combined SSB/CW single band score with a fantastic 3.5M points. Likewise, our hats off to Juha, OH7JT, who not only won for the world from CT3M, but also managed to make the most QSOs of any single operator entry with just under 6000 QSOs.

Noted With Interest

This year we observed a number of interesting developments. First, DL8YR, operating mobile, submitted three separate entries for the contest, one from each of three different European countries, each in a different zone. As he drove to his job duties from Germany through Austria and into Romania, our hero faithfully gave out contacts in all three countries and zones, a first to our knowledge. This sounds like a better solution than one of our QRM con-



HF Equipment Regular **SALE**
IC-781 Xcvt/ps/tuner/scope • *Special* \$6149.00 **5099**



IC-765 Xcvt/ps/keyer/tuner..... \$2692.00 **2399**



IC-751A 9-band xcvt/1-30 MHz rx... \$1699.00 **1219**

- PS-35 Internal power supply..... 219.00 **209⁹⁵**
- FL-63A 250 Hz CW filter (1st IF) 59.00
- FL-52A 500 Hz CW filter (2nd IF) 115.00
- FL-53A 250 Hz CW filter (2nd IF) 115.00
- FL-70 2.8 kHz wide SSB filter 59.00

- IC-735** HF xcvt/SW rcvt/mic..... 1149.00 **899⁹⁵**
- PS-55 External power supply 219.00 **209⁹⁵**
- AT-150 Automatic antenna tuner 445.00 **399⁹⁵**
- FL-32A 500 Hz CW filter..... 69.00
- EX-243 Electronic keyer unit 64.50
- UT-30 Tone encoder..... 18.50



- IC-725** HF xcvt/SW rcvt..... \$949.00 **759⁹⁵**
- AH-3 Automatic antenna tuner 489.00 **449⁹⁵**
- IC-726** 10-band xcvt w/6m..... 1299.00 **1089**

- HF Accessories:** Regular **SALE**
- IC-2KL** HF solid state amp w/ps \$1999.00 **1719**
 - IC-4KL** HF 1 kw amp w/ps • *Special*.. 6995.00 **5899**
 - EX-627 Auto antenna selector 315.00 **279⁹⁵**
 - PS-15 20A external power supply 175.00 **169⁹⁵**
 - PS-30 Systems p/s w/cord, 6 pin plug 349.00 **329⁹⁵**
 - SP-3 External speaker..... 65.00
 - SP-7 Small external speaker..... 51.99
 - CR-64 High stab. ref. xtal; 751A, etc 79.00
 - SM-6 Desk microphone 47.95
 - SM-8 Desk mic; two cables, scan 89.00
 - AT-500 500w 9 band auto ant tuner 589.00 **539⁹⁵**
 - AH-2 8-band tuner w/mount & whip..... 758.00 **689⁹⁵**

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 - IC-475H** 100w 440 FM/SSB/CW 1599.00 **1399**
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 - IC-575H** 25w 100w 6/10m xcvt 699.00 **1329**
 - IC-1275A** 10w 1.2GHz FM/SSB/CW 1849.00 **1619**



- VHF/UHF FM Transceivers** Regular **SALE**
- IC-229A** 25w 2m FM/TTP mic \$423.00 **369⁹⁵**
 - IC-229H** 50w 2m FM/TTP mic 462.00 **379⁹⁵**
 - IC-448A** 25w 440 FM/TTP • *Closeout* 599.00 **379⁹⁵**
 - IC-449A** 35w 440FM xcvt/TTP 563.00 **399⁹⁵**
 - IC-1201** 10W 1.2GHz FM xcvt..... 799.00 **719⁹⁵**

- Dual band FM Transceivers** Regular **SALE**
- IC-3220A** 25w 2m/440 FM/TTP mic \$659.00 **579⁹⁵**
 - IC-3220H** 45w 2m/35w 440 FM/TTP 699.00 **609⁹⁵**
 - IC-2500A** 440/1.2GHz FM..... 999.00 **869⁹⁵**

- Multi-band FM Transceivers** Regular **SALE**
- IC-901** 50w 2m/35w 440MHz FM xcvt .. \$999.00 **869⁹⁵**
 - UX-R91A** Broad band receiver unit 389.00 **359⁹⁵**
 - UX-19A** 10w 10m unit..... 299.00 **279⁹⁵**
 - UX-59A** 10w 6m unit..... 349.00 **329⁹⁵**
 - UX-S92A** 2m SSB/CW module..... 599.00 **549⁹⁵**
 - UX-39A** 25w 220MHz unit 349.00 **329⁹⁵**
 - UX-S94A** 430MHz SSB/CW module..... TBA
 - UX-129A** 10w 1.2GHz unit..... 549.00 **509⁹⁵**

- IC-970A** 25w 2m/430MHz transceiver .. 2895.00 **2029**
- IC-970H** 45w 2m/430 MHz transceiver . 3149.00 **2729**
- UX-R96** 50-905 MHz receive unit 389.00 **349⁹⁵**
- UX-97** 1.2GHz band unit 999.00 **869⁹⁵**

- VHF/UHF Mobile Antenna** Regular **SALE**
- AH-32** 2m/440 Dual Band mobile ant..... \$39.00
 - AHB-32** Trunk lip mount..... 35.00
 - Larsen PO-K** Roof mount 23.00
 - Larsen PO-TLM** Trunk-lip mount..... 24.70
 - Larsen PO-MM** Magnetic mount..... 28.75

- VHF/UHF Repeaters** Regular **SALE**
- RP-1510** 2m 25w repeater..... \$1849.00 **1649**
 - RP-2210** 220MHz 25w repeater 1649.00 **1449**
 - RP-4020** 440MHz 25w repeater. 2299.00 **2009**
 - RP-1220** 1.2GHz 10w repeater 2599.00 **2269**



- Handhelds** Regular **SALE**
- IC-02AT/High Power** 2m... \$409.00 **289⁹⁵**
 - IC-2SA** 2m HT 419.00 **289⁹⁵**
 - IC-2SAT** 2m/TTP 439.00 **319⁹⁵**
 - IC-3SAT** 220MHz HT/TTP 449.00 **299⁹⁵**
 - IC-4SAT** 440MHz HT/TTP 449.00 **299⁹⁵**
 - IC-2GAT** 2m HT/TTP..... 429.00 **319⁹⁵**
 - IC-4GAT** 440MHz/TTP 449.00 **319⁹⁵**
 - IC-12GAT** 1.2GHz/TTP 529.00 **329⁹⁵**
 - IC-W2A** 2m/440 HT 629.00 **529⁹⁵**

- Handhelds for Aircraft band** Regular **SALE**
- A-2** 5W PEP synth aircraft HT 525.00 **479⁹⁵**
 - A-20** aircraft HT w/VOR • *Closeout*..... 625.00 **499⁹⁵**
 - A-21** Navicom Plus Aircraft HT 660.00 **599⁹⁵**

Call for information and Prices on
 accessories for Handhelds listed above.



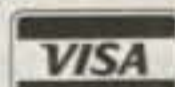
- Shortwave Receivers** Regular **SALE**
- R-7000** 25MHz-2GHz receiver..... \$1199.00 **1029**
 - RC-12** Infrared remote controller..... 70.99
 - EX-310** Voice synthesizer 59.00
 - TV-R7000** ATV unit..... 139.00 **134⁹⁵**
 - R-71A** 100kHz-30MHz rcvt..... 999.00 **869⁹⁵**
 - RC-11** Infrared remote controller..... 70.99
 - FL-32A** 500 Hz CW filter..... 59.00
 - FL-63A** 250 Hz CW filter (1st IF) 59.00
 - FL-44A** SSB filter (2nd IF)..... 178.00 **169⁹⁵**
 - EX-257** FM unit..... 49.00
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 - CR-64** High stability oscillator xtal..... 79.00
 - SP-3** External speaker 65.00
 - CK-70** (EX-299) 12V DC option..... 12.99
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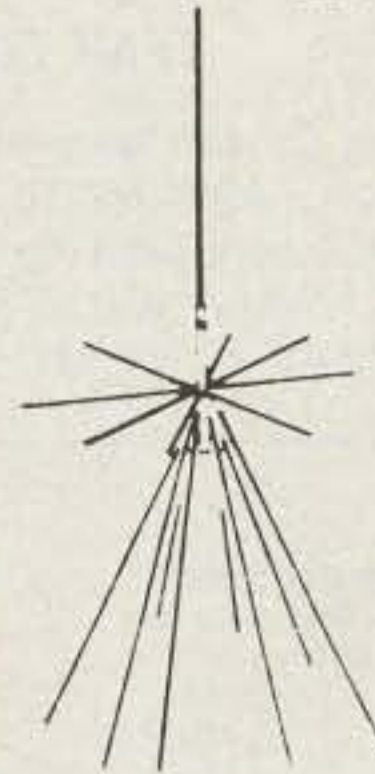
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Model	Sq. Ft.	Roto TQ.	Brake TQ.
105TSX	10.9	37ft.#	215 ft.#
747SRX	21.8	50	502
1105MSX	27.3	57	717
1105MSAX	27.3	57	717
1200FXX	27.3	143	1290
1300MSAX	32.7	215	1792
1800FSX	38.2	287	2150



WB1300

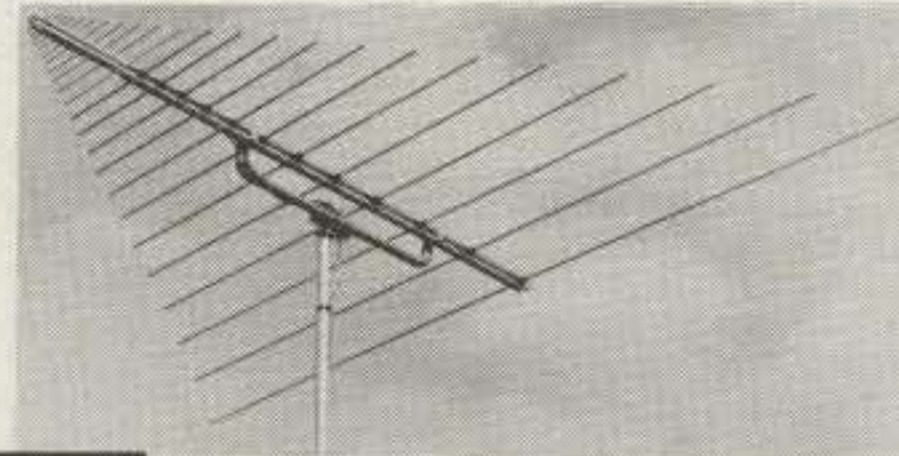
The ultimate wide-band omnidirectional antenna. Not only excellent, on receive it will handle up to 200 watts, 50-1300 MHz. All stainless steel for years of reliable service. Great Scanner Antenna indoors.



Max.Pwr.: 200W,
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Height: 5'6"
Weight: 2.2lbs.
Connector: "N" Type

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Create Roof Tower constructed of high grade aluminum with galvanized steel bracing for added stability and strength. Will easily accommodate your antenna requirements. Three sizes of Roof Towers will support VHF antennas, HF Tri-Banders, and Oscar systems. Rotators easily mount inside the tower. An optional thrust bearing (CK46) is recommended. CK-46 Thrust Bearing for CR-18, CR-30, and CR-45



CLP 5130-1
50-1300MHz



- Mast Diameter 2 1/2"
- For safety's sake all towers should be guyed.

Model	Height	Max. Antenna Wind Load in FT.2	Base Width	Max. Vert. load lbs.	Tower Weight in lbs.
CR-18	5'10"	21 @ 90mph	31 1/3"	440	18
CR-30	9'10"	27 @ 90mph	39"	1322	33
CR-45	14'9"	23 @ 90mph	39"	881	57
CK-46	Thrust Bearing for Cr-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2 1/2"				

This high gain, wide-band VHF/UHF antenna is excellent for DX'ing, amateur radio, FM broadcast, scanners, VHF/UHF television, government, cellular and business band use. The forward gain is 10-12 dB, front to back ratio 15 dB, 23 elements, transmit power to 500 watts. Boom length 5.8", VSWR 2.0:1 or less, max. Longest element 9.8", weight 11 lbs. wind survival 90 mph. CLP5130-2, 105-1200 MHz also available. 19 Element Boom 4.6' Element 4.6'

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A449-6 FM yagi
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A3S TriBand 3 el
A4S TriBand 4 el
AP8 HF Vert
R5 HF Vert
R7 HF Vert **New**
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Isopole 144 2M
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NLA150 2M, Mobile
NLA220 + NLA450
LM150 2M, Mobile
LM220 + LM450
NMO2/70 Dual
NMOMM Mag. Mt.
NLAMM Mag. Mt.
LMMM Mag. Mt.
NMOK Perm. Kit
NLAK Perm. Kit
KD4270 Dual Duck
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BM-1 bumper mt.
SSM-2 stainless ball mt.
SSM-3 spring
QD2 quick disconnect
FX2 2mt. 5/8 mag. mt.
HOT trunk mt. w/swivel ball
MO3 mobile mast MO4

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20G 10' sect.
20AG top sect. 9'
25G 10' sect.
25AG2 top sect. 9'
45G 10' sect.
45G2 top sect. 9'
AS25G access shelf
AS45G access shelf
TB-3 thrust bearing
M200 10' mast
SB25G short base
EF254G gin pole
VAN GORDEN
PD8010 Dipole
PD8040 Dipole
PD4010 Dipole
D10 10M Dipole
D40 40M Dipole
D80 80M Dipole
Allbander
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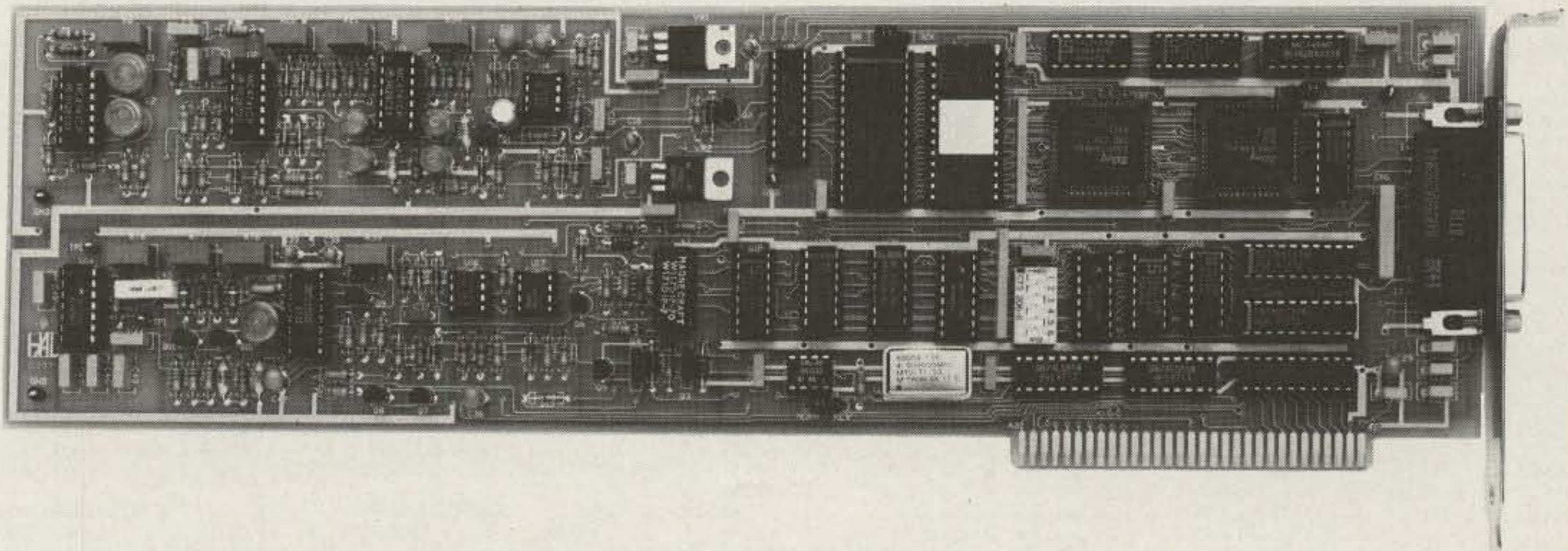
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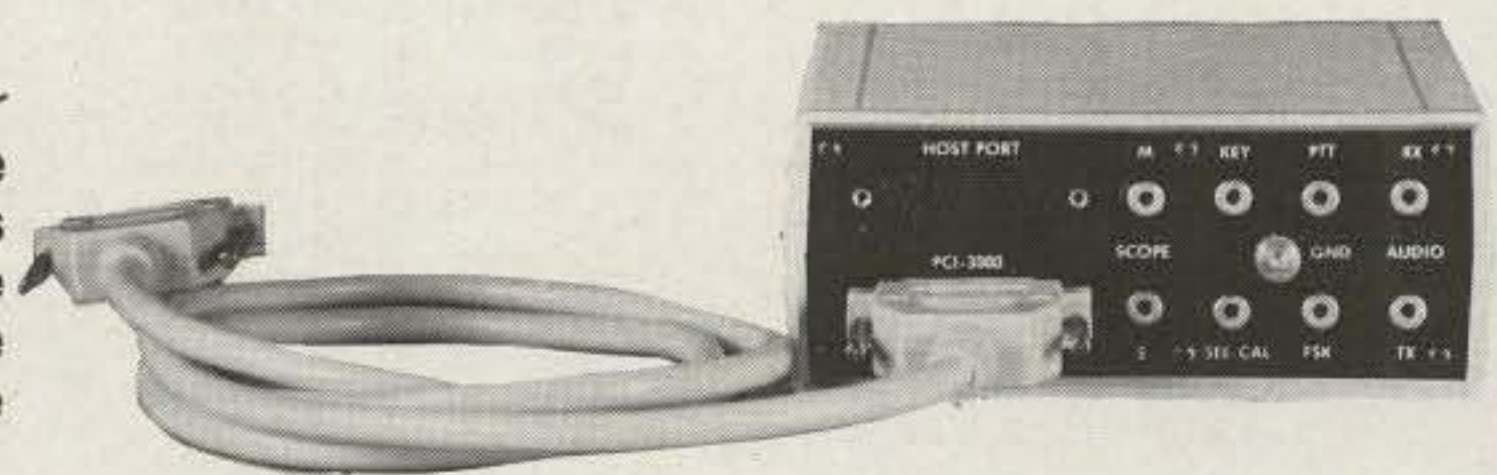
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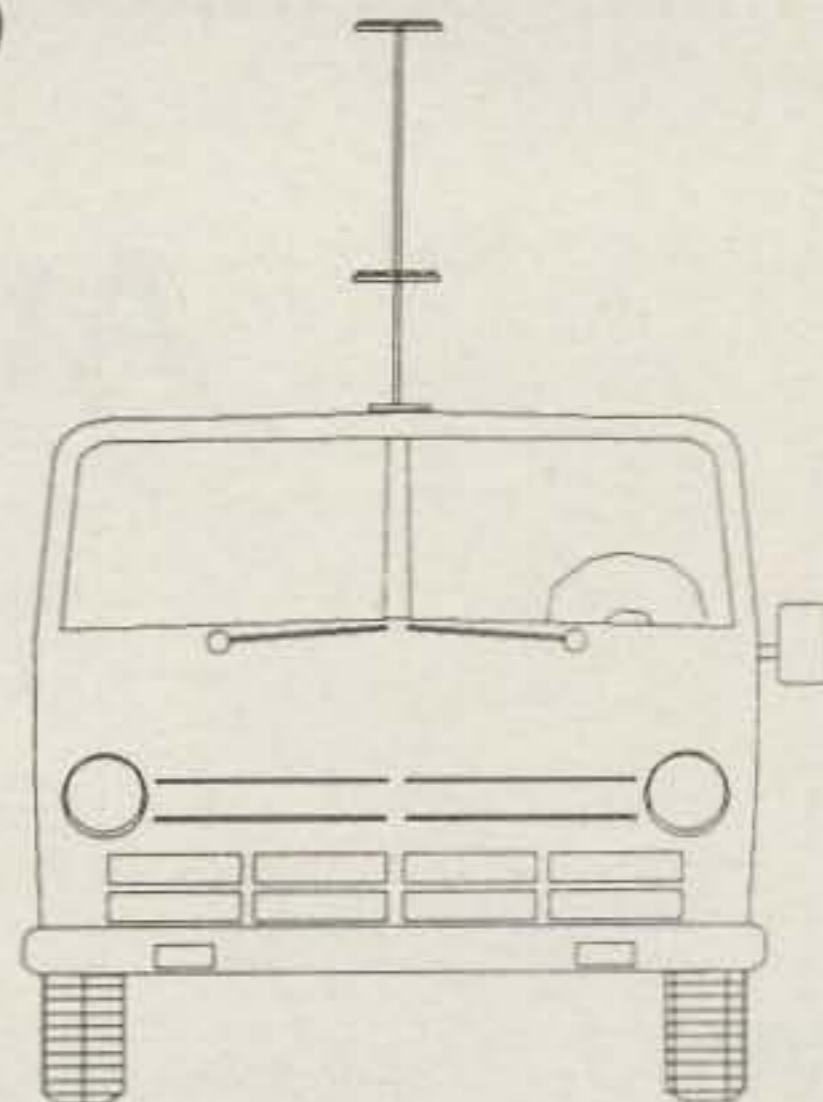
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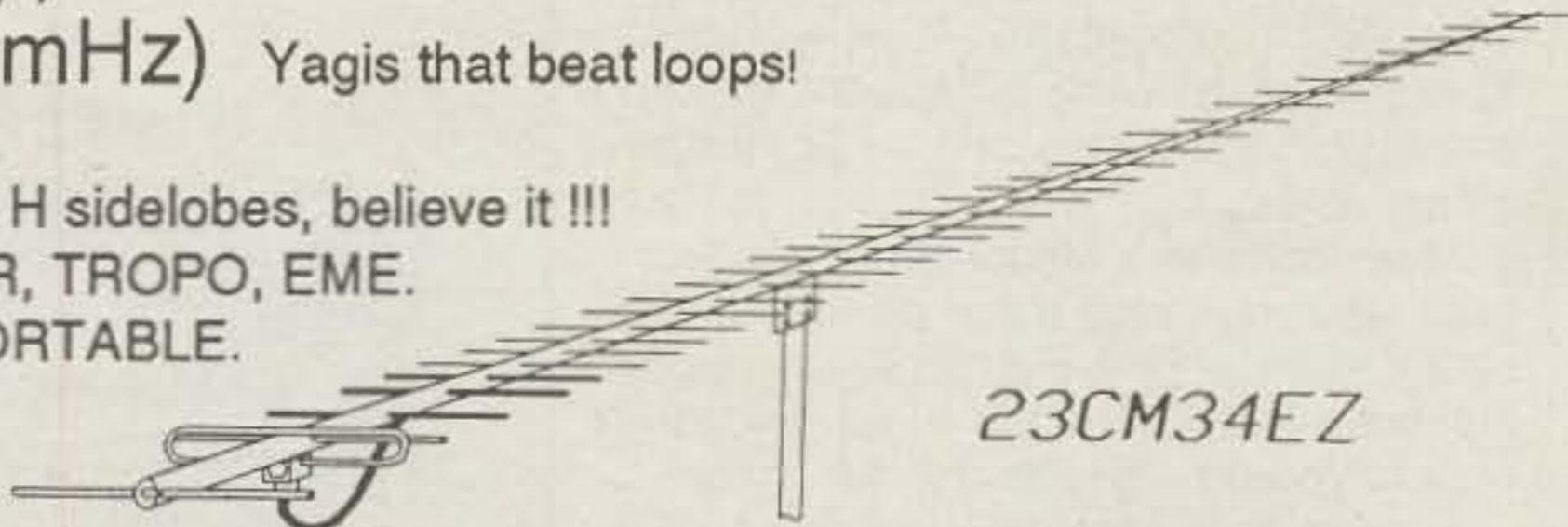
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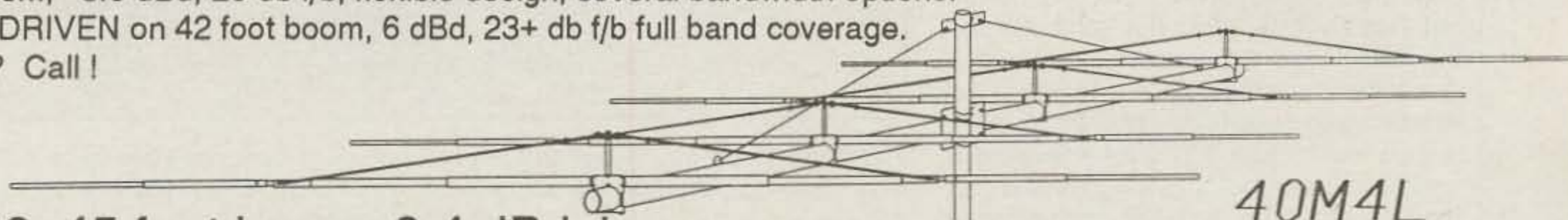
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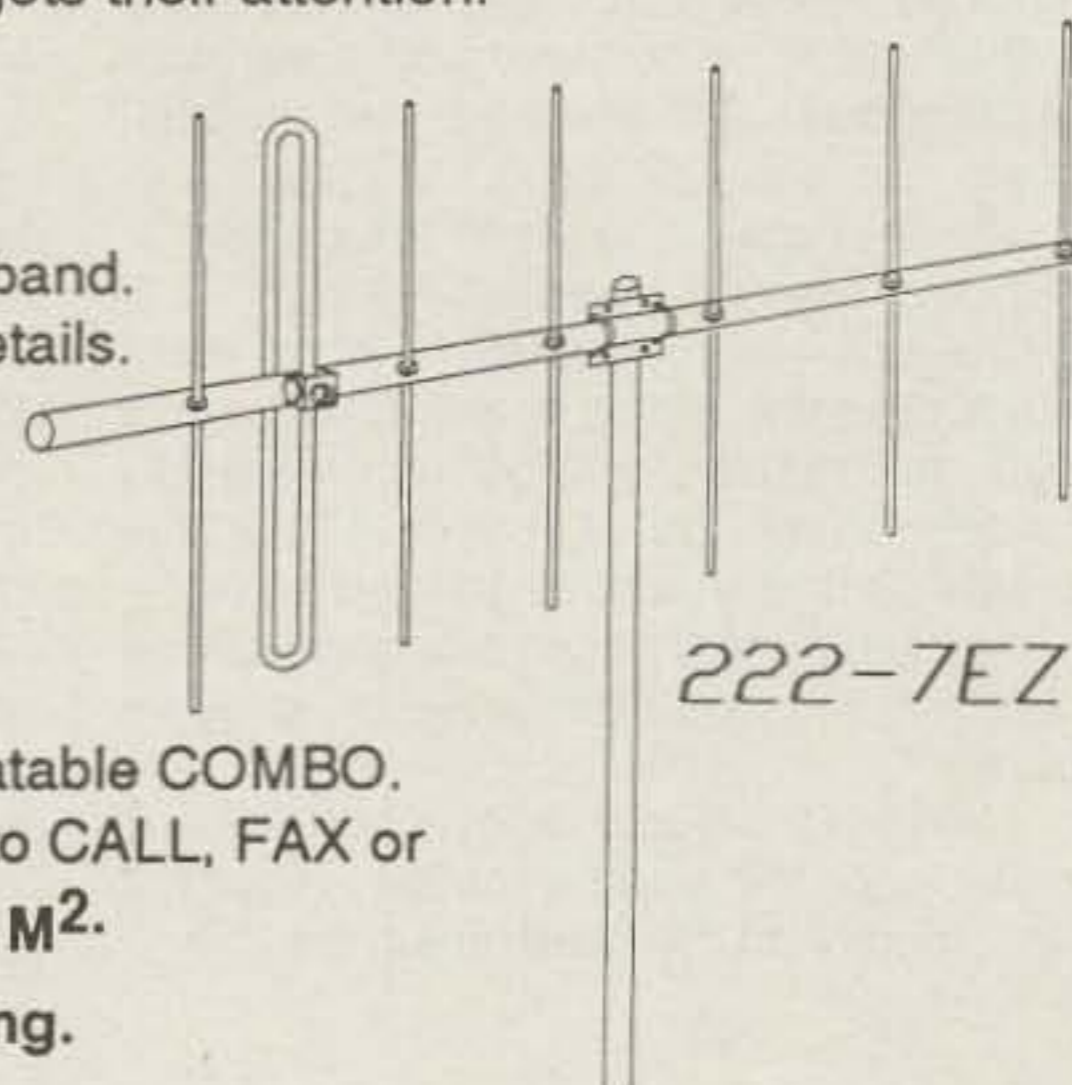
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CIRCLE 13 ON READER SERVICE CARD

With the CQ WW DX CW Contest coming up, it's time to dust off "Old Reliable" and perhaps tweek it a bit. If you're about to use one of these gems for the first time, here's how to get it up and running.

Attitude Adjustment For Your Bug

BY LARRY LISLE**, K9KZT

When a piece of electronic equipment designed over 100 years ago starts increasing in popularity, that's news! That's exactly what's happening with semi-automatic telegraph keys, better known as bugs.

More and more amateurs are collecting them and using them on the air because a bug lets you put more personality into your sending than an electronic keyer or keyboard. They're also fun to use.

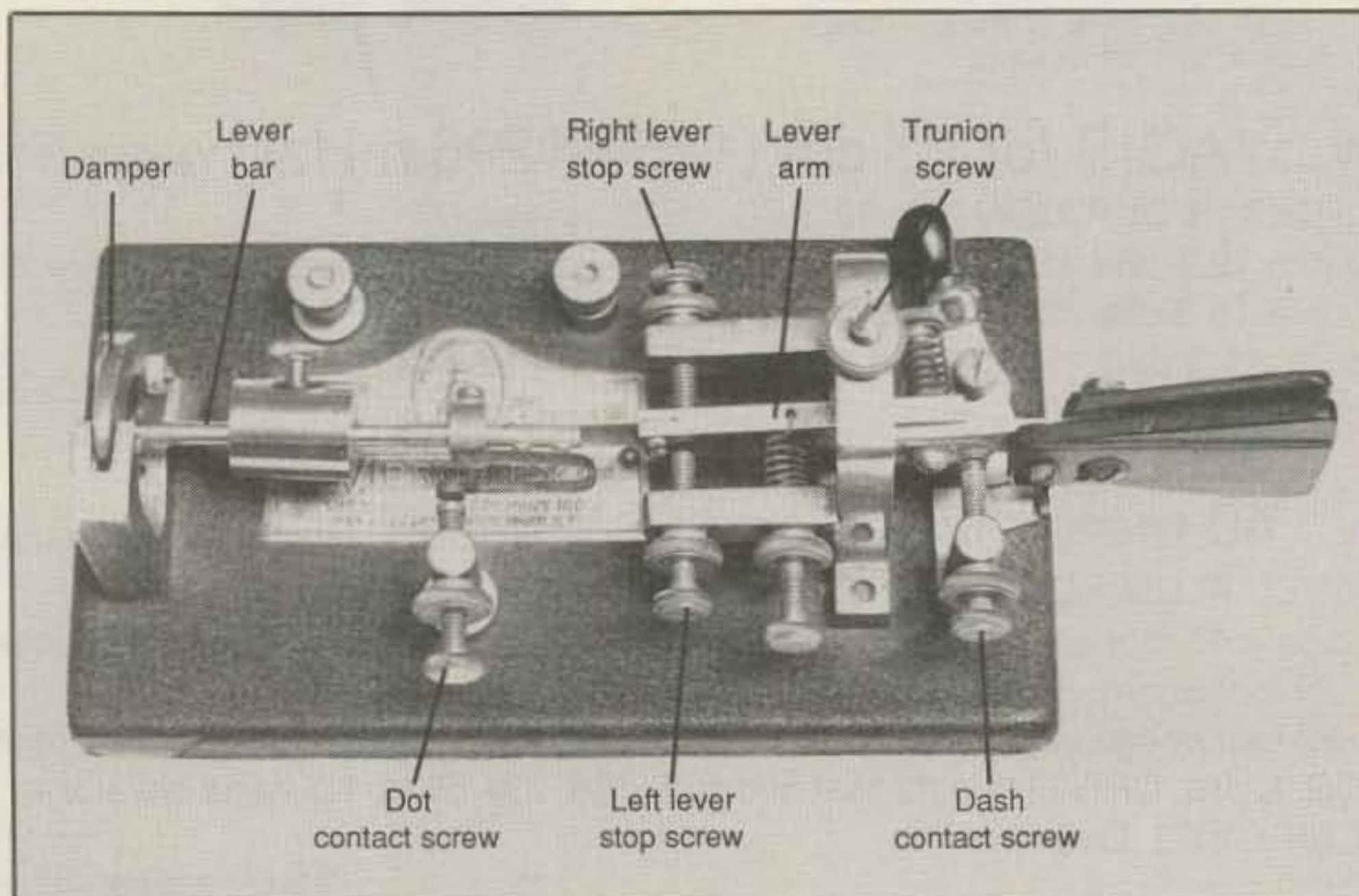
Even more amateurs might pull an old relic off the shelf and give it a try if they knew how to adjust all those screws and springs and weights. Actually, it's very easy and in this article I'll tell you how.

There have been hundreds of different bugs made, either in factories or at home, but they all work about the same. I'll use the names on the Vibroplex parts diagram, but you should be able to figure out what I mean if yours is a little different.

You can adjust a bug by ear using a code oscillator, but a moving needle (not digital) ohmmeter makes it easier. If you don't have one, you can series connect a milliammeter, a battery, and a variable resistor that will make the meter read full scale instead.

The first step is to clean the contacts. Rubbing a piece of paper—a dollar bill works fine—across them is good for a quick cleaning. If the contacts are really dirty, an ordinary soft pencil eraser will usually do the job. If your bug is an ancient one that's been neglected for half a century, try silver polish or a contact burnishing tool. *Don't use a file or abrasive paper.*

Next put the bug on a level surface and make sure the paddle moves easily but not sloppily on the **trunion screw**.



The semi-automatic telegraph key, or bug, is a hundred-year-old electronic gadget that's getting more popular all the time. This article will tell you how to adjust bugs and put them on the air.

Now adjust the **right lever stop screw** until the **lever bar** lightly touches the damper and will come to rest without bouncing.

Next adjust the **left lever stop screw** until it clears the **lever arm** by about 1/32 inch. Some operators prefer a closer spacing of .015 inch or even less, but I think bugs give cleaner sounding dots with a wide spacing. Try it both ways and see what you think.

The next step is the one that really determines how your bug sounds. Connect the ohmmeter to the binding posts and pull the paddle to the right, or dot side. Stop the vibrations of the **lever bar** and adjust the **dot contact screw** until it just makes solid contact as indicated by the meter. Tighten the lock nut and send

short strings of dots. The ohmmeter should read mid-scale if the dots and the spaces between them are equal, as they should be. If the meter reads low, the **dot contact screw** is in too far, the dots are longer than the spaces between them, and the sending will sound "mushy." Hook the bug to a code oscillator and you'll see what I mean. On the other hand, if the **dot contact screw** is too far from the **lever bar**, the meter will read high and the dots will sound scratchy.

Some operators believe that a bug should make 40 dots or more before the vibrating **lever bar** comes to rest. I've found this usually makes the dots scratchy. In the wire telegraph days a string of eleven dots was considered just about right. Since the longest string of dots in

*3030 Rutgers Place, Rockford, IL 61109


Morse Code is eight for "error," I think the old timers had the right slant on things.

Next adjust the **dash contact screw** so that about the same paddle movement is required for dashes as for dots. A common error in using a bug is to send dots at 30 words a minute and dashes at 10. A good rule to remember is that two dots and the space between them should sound as long as one dash. You can practice this by sending the letter **U** (.. —) or **D** (— ..).

The speed of the bug is controlled by the amount of weight on the **lever bar** and where it's located. Weights that can be used separately or in combination to give almost any speed you want are available, but you easily can make your own. An old trick is to slip a metal nut over the screw in the speed weight to slow down the **lever bar**. A few turns of solder wire through the nut will make it fit snugly but allow it to be removed easily when you want to go fast.

Finally, adjust the dot and dash springs to suit yourself and you're done.

These suggestions are just a guide. Don't be afraid to change things and listen to what happens on a practice oscillator.

The perfect code generated by keyers and keyboards is easy to copy, but after a while it all sounds the same. A bug will make your signal stand out from the crowd, and give you something to talk about when you make the contact. 



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In Part I of this series W1ICP discussed some basics, including antenna patterns and gain. In Part II he starts off with multiband beams and goes on to wire antennas and more.

Let's Talk Antennas—Part II

BY LEW McCOY*, W1ICP

In 1953 an amateur named Buchanan, W3DZZ, produced a single antenna that was fed with a single feed line but would work on many bands and present a *reasonable* load to the transmitter—in other words, a single beam or dipole that would cover more than one band. By inserting electrical traps in the Yagi elements, the antenna could be made to appear to be a 50 ohm antenna, plus be resonant on many bands. However, it should be made very clear to the uninitiated that these multiband beams or trap dipoles are always a compromise and can never approach a monoband beam in performance.

A monoband beam is designed to be optimized for maximum gain or maximum front-to-back, or a combination of both. The spacing of the elements, and their lengths, is critical to obtain maximum performance. With multiband trap or linear loaded beams, it is almost impossible to have optimum spacing of elements simply because what holds true for one band will not hold true for another. Also, there is the problem of trap losses. Any tuned circuit will introduce some losses, and the quality of the traps is very important in order to maintain gain.

One last point about purchasing a beam antenna, either monoband or multiband, and that has to do with quality. A beam is exposed to the weather and must stand rigorous conditions. It may cost more, but in the long run it is well worth the difference in cost to be sure the manufacturer provides all quality parts.

Antenna Supports

For any antenna to perform at its best, it should be mounted as high as possible and in the clear. There are all kinds and types of towers, from roof-mounted to

*Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

Frequency	Overall Length
3.7 MHz	324 ft.
7.0 MHz	172 ft.
14.0 MHz	90 ft.
21.0 MHz	60 ft.
28.0 MHz	44 ft.

Table 1—Lengths for extended double Zepp antennas.

self-supporting unguyed towers. I urge the reader to write to the various tower manufacturers to obtain their literature. This information will tell you what kind of loads the various towers will support, both as to load bearing and wind loading. Antenna manufacturers always provide complete specifications regarding wind loading, surface area, weight, and other critical details.

How high? The question most frequently asked is "How tall a tower should I buy?" That is not an easy question to answer because many variables are involved. It seems every amateur wants to have the loudest signal on the band. Assuming money is no object, it is possible to build a system that will help make you a top performer.

The average height is easy to find out simply by asking a lot of amateurs what they use. This appears to be a tower of 50 to 60 feet high. The big guns—those with the very strong signals—usually have towers in the 80 to 120 foot range. There is a good reason for this. The angles of radiation for 20 meters from the average beam don't tend to become low enough to be useful for long-haul DX until you reach something over 80 feet. If you are not concerned with becoming a "top gun," then 50 to 60 feet is a good compromise for multiband beams. I would be remiss if I didn't mention the fact that a Delta Loop beam rises from the boom with the apex of the triangle at the boom height. A major part of the radiating portion of this

antenna is at the very top of the antenna. In the case of 20 meters, and utilizing a 60 foot high tower, some of the antenna will actually be working (radiating) above 80 feet.

If you live in an area subjected to high winds, then you must consider a guyed tower. Again, we suggest you write to tower manufacturers and get literature on their products. This will assist you in determining exactly what you need for your location and situation.

Roof-mounted towers are excellent for lightweight beams, even some small or lightweight tribanders. Again, manufacturers' specifications are the thing to look for here. Anchoring a tower to a roof must be done according to good engineering techniques, and steps must be taken to dampen antenna elements and wires to prevent vibration, which will be transmitted to the tower and then through the roof to the dwelling. (Your family will quickly take a dim view of such noise. I know, as it happened to me.)

Vertical Antennas

Many amateurs who have space limitations will want to choose vertical antennas simply because they don't require much in the way of real estate. Again, there are many excellent trap-type multiband verticals and one non-trap that I know of. However, bandwidths can be rather limited on 80 and 40 meters simply because on these bands the antennas are shortened physically. A quarter-wavelength-long vertical on 80 meters is on the order of 65 feet high. The normal feedpoint impedance of this antenna is on the order of 30 ohms or so, and as such, without a matching device, 50 ohm cable will be mismatched and the bandwidth narrowed. When the 80 meter antenna is shortened physically, its impedance drops considerably and the bandwidth is narrowed even more. Trap verti-

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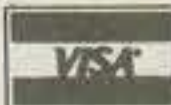

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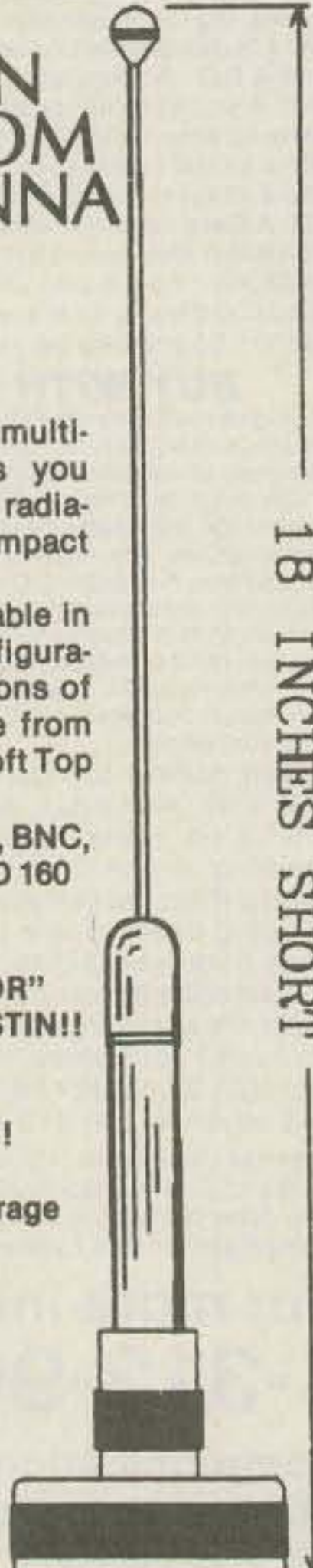
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calcs are usually adjusted to fit the user's desired operating frequency on 80 meters. On 40 and higher, this is not as much a problem.

Ground-mounted verticals will operate with a single ground rod installed near the base of the antenna. However, performance is improved immeasurably when radial wires are installed.

Radials

Installing a radial ground plane beneath a vertical is not really a difficult project. In the case of a multiband vertical, including 80 meters, the ideal ground plane would be at least 30 wires, at a minimum length of 0.2 wavelengths long. The 0.2 wavelengths would mean about 50 feet long to cover 80 meters and the higher bands. This may sound as if it is an impossible project, but it is not difficult at all. Ideally, the wires would all be connected together to a ground plate at the base of the antenna and the wires would radiate out in a perfect circle. However, this would be impractical on a small city lot. The wires do not have to run straight. Also, they can be separated by only inches. Suppose the vertical is mounted alongside a house. The wires can run along the house and fan out to the fence line and then along the fence to the desired length. Naturally, you would want to bury them—but only do so just below the surface. Of course, if 40 meters is the lowest band, then 25 foot wires would be adequate. Also, any kind of wire can be used, insulated or uninsulated.

I like to give credit where it is due, and Jerry Sevick, W2FMI, made many extensive tests to determine the required number of radials. His primary reasoning was that a vertical has a theoretical impedance of about 30 ohms. He kept adding radials until he established this impedance. My statement above of 30 radials is not quite the required number (50 being needed), but I am sure that Jerry will forgive me for making the job a little easier with only a slight addition in ground losses. Sevick's work was recounted in a series of articles some years ago in *QST*.

Many amateurs choose to mount verticals above ground. In this case, you should use as many radials as possible, but at least four should be used in order to establish some semblance of a ground plane beneath the vertical.

Wire Antennas

The discussion on antennas up to this point has been about multiband beams and verticals. However, many amateurs start out with simple dipoles, either single band or multiband. First, though, it should be pointed out that there are trap dipoles

available that cover 80 through 10 meters. These are all coax fed, using 50 ohm line. None of these, however, are truly broadband on 80 or 160 meters, and some type of tuning device must be used with such antennas in order for the transceiver to operate.

You will find ads in this magazine for dealers who primarily sell wire and feed lines. In order to make a good-performing antenna, very little knowledge is required. As I stated earlier, a half-wavelength dipole is the most efficient antenna there is. This dipole consists of two equal lengths of wire or tubing separated at the center by an insulator and supported at the ends with insulators. The antenna can be fed with 50 ohm coaxial line and it will provide a match that will be close enough for all practical purposes. The formula for calculating a half-wave dipole is very simple. Divide 468 by the desired frequency in megaHertz and the answer will be in feet. Let's suppose we want to make a dipole antenna for 3800 kHz (3.8 MHz). We divide 468 by 3.8 and come up with 123 feet. The antenna can be used in an inverted-V configuration or simply as a horizontal dipole. It will work well either way. How will it work if we feed it with coax directly, no balancing device used? Believe it or not, it will work the same either way. You can install a balun if you want, but more than likely it will not improve the performance.

What many amateurs do not realize when they make a dipole such as this is that they have actually created a multiband antenna, one that will work on all bands and all frequencies. There are a couple of things we have to do, but they are not complicated. First, we do not feed the dipole with coax. We use either open wire line or the more popular transmitting-type twin lead. Why open wire line? The answer is simple. Coax cannot tolerate high standing-wave ratios without increasing losses. On the other hand, the transmitting twin lead can have an extremely high SWR without the losses. So our choice is clear cut.

As you can gather from reading all of the preceding parts of this article, we must provide a 50 ohm load for our very fussy transceiver. And, our multiband antenna with its feed line is going to present some pretty crazy loads. I know some of our readers will realize I have said a lot of this in previous articles, but it always bears repeating. We can install a Transmatch, sometimes called antenna tuner, directly at the transceiver and then proceed to adjust the Transmatch so that the transceiver always sees a 50 ohm load. In this case we take the unknown load presented at the end of the feed line and transform that load to 50 ohms by way of the Transmatch. This is a very simple procedure and makes any dipole, regardless of its overall length, into a multiband antenna.

Of course, you could take an end-fed wire, connect the far end as high as possible, connect the other end to the Transmatch, and make the same adjustments. In this case you never have to worry about feed lines. However, the idea of using a balanced line is more appealing.

The amateur will come across a whole family of antennas that are supposed to work as a 50 ohm load on all bands and frequencies, but none will really do so without a Transmatch. These include the G5RV, multiple half-wavelength dipoles with a common feed point, off-center-fed antennas, and coaxial dipoles (most of these are usually referred to as broadband dipoles).

Maybe you might even want to use a "McCoy" antenna. It is extremely simple to make and will work like a bomb—on all bands, and always present an SWR of 1 to 1 to your rig. All you need do is to measure the distance between your two support points. Suppose the distance is 100 feet. Take a wire that long—any kind of wire (#18 or larger enamel-covered wire is preferred but not necessary)—and cut the wire into two equal lengths. Put an insulator on each end and one in the center. Oh, yes. You can use short lengths of PVC tubing with holes drilled in them to make the insulators or buy some insulators at Radio Shack.


The feed line is going to be open-wire line, either the commercial TV twinlead or preferably the 450 ohm type available from advertisers in this magazine (Nemal Electronics or Certified Communications, for example). You make the feed line long enough to reach from the antenna center insulator to the Transmatch in your shack. The insulated twin-lead or open-wire type can be brought directly under a window or through the wall to the shack. It is perfectly safe and a simple way to bring in the line. You then simply adjust the Transmatch for a match and go to work on the bands. For some reason (which I don't understand) many amateurs are reluctant to bring open-wire-type line into the shack. The insulated type line is perfectly safe. However, if it improves your peace of mind, you can run two adjacent lengths of coax from the tuner to the outside wall and then connect the two inner conductors to the open-wire line conductors. I would emphasize that a good-quality coax be used; the RG-8/U types would be preferred. Also, ground the shields at the Transmatch and at the other, or wall, end. Don't be concerned with the differences in line impedance. Two adjacent 50 ohm coax lines would be 100 ohms attached to a 450 ohm line. Keep in mind that you are always matching a "system" load. In other words, the unknown impedance with reactance at the Transmatch.


How long or short can the McCoy antenna be? As long as you can make it. How short can it be? That is a little tough-

er, but I have used this antenna as short as 40 feet (center fed) for 80 meters and higher and it produced creditable results. I might add that you can make it 102 feet and then you'll have a bonafide G5RV antenna. Or, if you have the room, an extended double Zepp is an excellent antenna for all bands. It is a dipole that is 0.64 wavelength long on each side of center. An antenna this long produces major lobes that have at least 3 dB gain. When this antenna, 1.28 wavelength long overall, is used on the higher bands, the number of lobes increases and the antenna has even more gain. It should be noted that the overall length for a 20 meter extended double Zepp is 45 feet long, and such an antenna with open-wire line and a Transmatch will work on 80 and 40, even though the antenna is short. Table I

provides the EDZ lengths for all the bands.

Even if you don't have the space for the EDZ, the McCoy antenna is still the one which should be made long enough to fit between your farthest supports. It is foolish, for example, to make an 80 meter dipole a half-wavelength long if you can make it longer, as long as a tuned system (open-wire feeders and Transmatch) is used. Remember what I said earlier: Bigger is better, and in this case I mean longer. I have mentioned this before, but it bears repeating. By Goodman, W1DX, the famous antenna man, once told me, "An amateur should always make his antenna as big as possible and put it as high as possible. If it stays up, it isn't big enough or high enough!"

In Part III, I'll discuss other pertinent information about antennas. 



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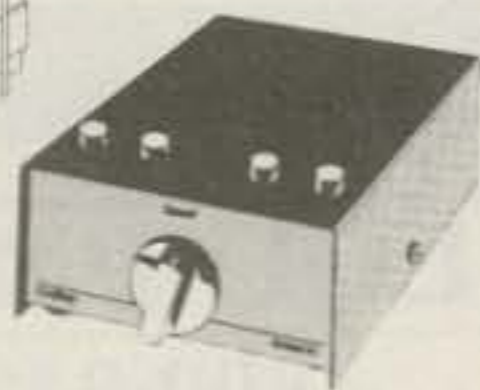
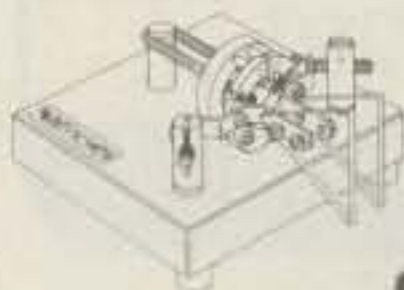
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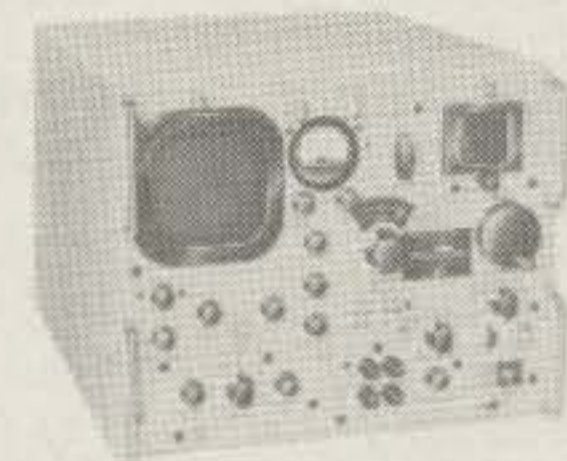
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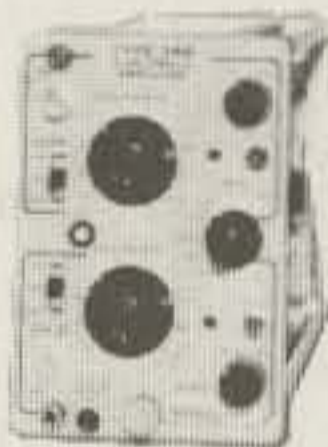
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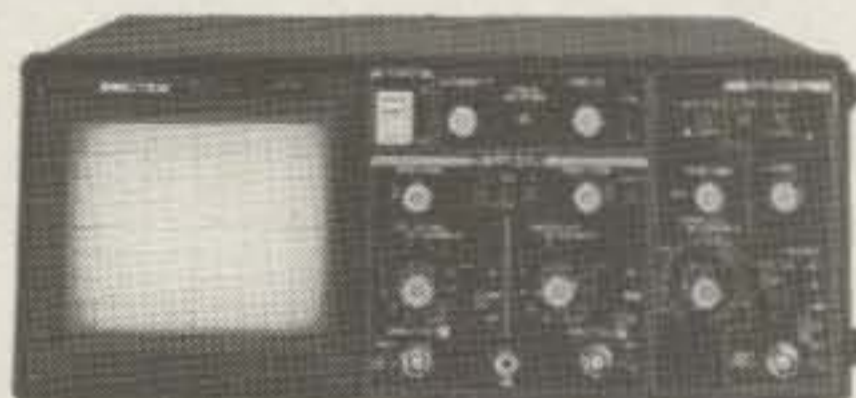
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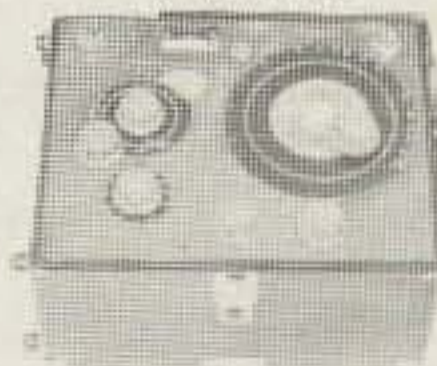
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HP 353A PATCH PANEL \$59.00

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- Output impedance is 600 Ω
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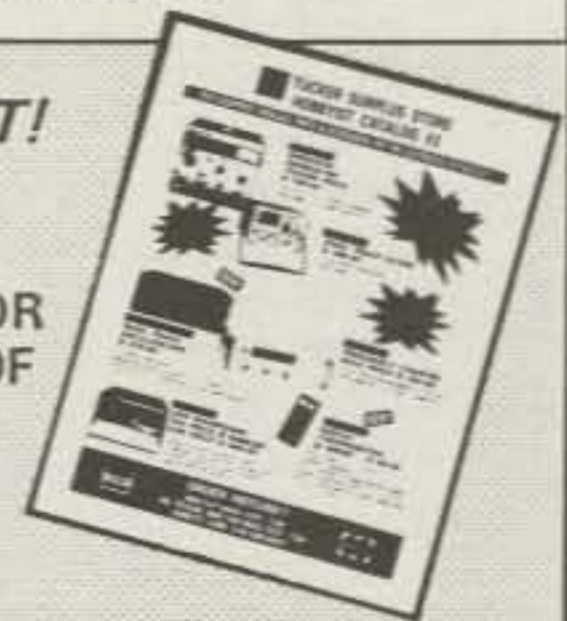
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CQ World-Wide DX Contest All-Time Phone Records

BY FREDERICK CAPOSSELA, K6SSS

Number groups after calls are: year of operation, total score, contacts, zones, and countries. All-band and Multi-Operator records include a band-by-band breakdown of the world leader in each category.

Single Operator/Single Band WORLD RECORD HOLDERS

1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	P40R('87) (Opr. K4UEE)	552,786	1,628	23	91
7.0	ZF2JR('90) (Opr. N6RJ)	870,480	2,253	33	123
14	VP2KAA('81)	2,011,185	4,186	37	150
21	P40R('90) (Opr. K4UEE)	2,719,336	4,972	37	147
28	ZP0Y('90) (Opr. ZP5JCY)	2,961,295	5,409	36	149

AFRICA

1.8	IH9/IV3PRK('89)	81,344	447	9	53
3.5	CT3BZ('79)	235,113	772	22	87
7.0	EA8RCT('87) (Opr. OH2MM)	859,362	1,959	32	115
14	EA9LZ('90)	1,244,340	2,685	32	123
21	EL2CX('89)	2,242,968	4,445	34	135
28	5H3TW('89)	2,052,900	3,855	38	142

ASIA

1.8	UG7GWO('87)	255,852	1,327	12	57
3.5	UW9AF('83)	222,192	554	19	53
7.0	JA8IXM('90)	469,012	1,304	38	110
14	RF0FWW('87) (Opr. UF6FFF)	1,447,128	2,894	40	147
21	7L1GVV/8('90)	1,188,352	2,351	38	139
28	JH1AJT('88)	1,421,070	2,409	38	163

EUROPE

1.8	LZ2CJ('84)	107,818	1,319	13	61
3.5	HA8IE('90)	361,343	1,455	35	116
7.0	IK5BAF('90)	687,040	1,809	37	123
14	TF3CW('88)	1,791,840	4,107	34	126
21	CQ4A('90) (Opr. CT1BOP)	1,757,780	3,912	38	141
28	YU3ZV('88)	1,541,603	3,219	39	134

NORTH AMERICA

1.8	VE3BMV('86)	52,240	662	14	26
3.5	VE3BMV('85)	383,040	1,629	25	89
7.0	ZF2JR('90) (Opr. N6RJ)	870,480	2,253	33	123
14	VP2KAA('81)	2,011,185	4,186	37	150
21	V22A('86) (Opr. WB7RFA)	1,789,470	4,075	37	140
28	VP2ET('88) (Opr. K5RX)	2,423,880	5,137	37	143

OCEANIA

1.8	KH6CC('85)	45,984	484	13	19
3.5	T32AF('85)	222,768	1,064	23	49
7.0	T32AF('84) (Opr. KH6UR)	677,844	2,045	34	80
14	ZM1BIL('83)	1,334,232	2,635	38	136
21	AH0AB('82) (Opr. JA3DOC)	1,923,840	4,509	36	108
28	KD7P/NH2('88)	2,309,304	4,885	38	123

SOUTH AMERICA

1.8	YV2IF('84)	18,291	172	14	25
3.5	P40R('87) (Opr. K4UEE)	552,786	1,628	23	91
7.0	9Y4VU('84)	700,488	1,718	28	110
14	P40SS('87) (Opr. K2SS)	1,792,056	3,570	35	133
21	P40R('90) (Opr. K4UEE)	2,719,336	4,972	37	147
28	ZP0Y('90) (Opr. ZP5JCY)	2,961,295	5,409	36	149

Single Operator/All Band

AF	CT3BH('90) (Opr. OH2BH)	14,892,102	7,177	166	531
AS	EX6F('84)	6,362,000	4,648	113	387
EU	YT9OA('90) (Opr. YT3AA)	7,120,204	4,243	154	477
NA	FG5R('90) (Opr. W7EJ)	12,192,368	7,006	154	510
O	YJ1A('90) (Opr. OH1RY)	9,516,731	6,429	160	381
SA	9Y4TT('88) (Opr. NQ4I)	12,340,132	7,150	151	436
QRP	PJ2FR('87) (Opr. K7SS)	3,171,166	3,212	100	234
Asst.	YT3AA('89)	5,756,932	3,580	154	482

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	136	11	43
CT3BH	3.5	371	20	64
(1990)	7.0	686	29	82
14,892,102	14.0	1,877	38	115
	21.0	2,212	35	118
	28.0	1,895	33	109
Total		7,177	166	531

Multi-Operator/Single Xmtr.

AF	EA8AGD('88)	17,172,672	8,203	157	547
AS	YM5KA('90)	15,056,664	7,609	164	548
EU	IQ4A('90)	17,255,700	7,253	183	717
NA	8P9X('90)	15,388,604	7,726	165	583
O	AH0B('88)	8,608,600	6,163	143	330
SA	P40V('89)	18,520,488	9,128	143	542

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	39	9	21
P40V	3.5	227	13	48
(1989)	7.0	668	23	83
18,520,488	14.0	2,738	35	138
	21.0	1,996	32	129
	28.0	3,460	31	123
Total		9,128	143	542

Multi-Operator/Multi-Xmtr.

AF	EA8CR('77)	21,351,898	10,290	153	544
AS	EW6V('82)	18,746,136	10,100	142	544
EU	LX7A('89)	26,578,978	14,947	175	751
NA	VP2KC('79)	37,770,012	17,767	175	677
O	KH0AM('90)	35,730,600	16,309	179	565
SA	PJ1B('90)	57,610,400	19,655	189	803

WORLD RECORD

Station	Band	QSOs	Zones	Countries
	1.8	531	19	50
PJ1B	3.5	1,335	24	99
(1990)	7.0	2,104	31	117
57,610,400	14.0	4,860	38	179
	21.0	5,395	38	176
	28.0	5,430	39	182
Total		19,655	189	803

CQ World-Wide DX Contest All-Time CW Records

Single Operator/Single Band WORLD RECORD HOLDERS

1.8	UG6GAW('90)	164,430	851	15	55
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	P40J('90) (Opr. WX4G)	1,022,076	2,598	32	100
14	P40N('86) (Opr. N4PN)	1,477,905	3,138	37	122
21	CW8B('88) (Opr. CX8BBH)	1,496,556	3,112	40	122
28	CX0CW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

AFRICA

1.8	EA8AK('82)	75,768	385	15	51
3.5	EA8XS('88) (Opr. OH5XT)	516,390	1,649	24	81
7.0	OH7JT/CT9('88)	904,038	2,195	35	103
14	ED9ED('90)	1,444,436	3,063	37	121
21	C56/OH7XM('90)	1,183,325	3,033	33	110
28	FR0MM('79)	978,012	2,590	36	90

ASIA

1.8	UG6GAW('90)	164,430	851	15	55
3.5	ZC4DX('87) (Opr. 4Z4DX)	430,560	1,318	29	88
7.0	4Z4DX('88)	859,392	2,129	36	108
14	4Z8DX('89) (Opr. 4Z4DX)	1,156,148	2,621	38	119
21	4Z5U('90)	778,180	2,075	36	94
28	4Z5DX('90)	826,759	2,003	39	120

EUROPE

1.8	ON4UN('90)	118,776	936	16	68
3.5	UA2FGA('87)	403,686	1,918	30	93
7.0	Y42MK('90)	716,976	2,051	36	108
14	OH2BH('90) (Opr. OH6UM)	915,136	2,454	36	122
21	OH6MCW('89)	775,620	2,208	37	102
28	LZ5Z('90) (Opr. LZ1AX)	785,178	1,726	39	142

NORTH AMERICA

1.8	K5UR('85)	47,005	219	25	60
3.5	NP4A('88) (Opr. K1ZM)	808,640	2,243	31	102
7.0	VP2KAA('83) (Opr. N4PN)	837,366	2,461	30	104
14	VP2KAA('80) (Opr. N4PN)	1,244,782	3,111	37	117
21	V29W('90) (Opr. KD6WW)	1,110,512	2,829	37	115
28	J79DX('89) (Opr. AA5DX)	859,360	2,661	33	98

OCEANIA

1.8	KH6CC('90)	60,352	494	17	24
3.5	VR3AH('76)	178,560	956	24	40
7.0	KH6XX('84)	427,230	1,424	33	68
14	NY6M/KH2('88)	765,872	1,717	38	113
21	N7DF/NH2('89)	1,205,776	2,977	37	99
28	KD7P/NH2('88)	1,037,608	2,456	38	105

SOUTH AMERICA

1.8	YV3AGT('85)	147,588	591	21	63
3.5	P40R('86) (Opr. K4UEE)	576,725	1,682	25	90
7.0	P40J('90) (Opr. WX4G)	1,022,076	2,598	32	100
14	P40N('86) (Opr. N4PN)	1,477,905	3,138	37	122
21	CW8B('88) (Opr. CX8BBH)	1,496,556	3,112	40	122
28	CX0CW('90) (Opr. CX8BBH)	1,890,607	3,795	39	128

Single Operator/All Band

AF	CT3M('90) (Opr. OH7JT)	10,370,646	5,970	155	439
AS	5B4TI('87) (Opr. N6ZZ)	5,816,907	3,949	126	387
EU	ZB2X('89) (Opr. OH2KI)	5,450,761	4,402	146	529
NA	8P9HT('90) (Opr. K4BAI)	7,478,808	5,286	139	397
O	AH3C('90)	6,798,363	4,539	172	335
SA	P40GD('90) (Opr. W2GD)	10,211,103	5,725	156	453
QRP	H18A('90) (Opr. JA5DQH)	2,549,592	2,698	116	292
Asst.	K1DG('89)	5,048,802	2,904	155	438

WORLD RECORD

Station	Band	QSOs	Zones	Countries
CT3M (1990) 10,370,646	1.8	246	16	50
	3.5	577	19	60
	7.0	1,016	23	73
	14.0	1,283	30	79
	21.0	1,122	35	95
	28.0	1,726	29	81
Total		5,970	155	439

Multi-Operator/Single Xmtr.

AF	EA8AGD('90)	12,341,047	6,518	159	504
AS	TA5KA('90)	13,915,044	7,201	175	527
EU	LZ9A('89)	9,962,386	5,342	200	626
NA	NP4A('82)	11,648,565	6,881	168	515
O	KC6AA('89)	5,002,664	3,917	136	300
SA	PJ2X('88)	8,948,660	5,257	152	422

WORLD RECORD

Station	Band	QSOs	Zones	Countries
TA5KA (1990) 13,915,044	1.8	181	10	49
	3.5	962	23	69
	7.0	2,037	31	84
	14.0	1,231	38	96
	21.0	1,518	36	112
	28.0	1,272	37	112
Total		7,201	175	527

Multi-Operator/Multi-Xmtr.

AF	CN5N('90)	33,659,256	14,179	178	644
AS	EW6V('82)	14,702,688	8,001	159	504
EU	LX7A('89)	20,497,632	12,735	189	705
NA	KP2A('88)	32,325,150	15,198	191	631
O	AH0C('83)	6,877,750	5,164	149	302
SA	PJ1B('88)	38,415,760	14,921	194	672

WORLD RECORD

Station	Band	QSOs	Zones	Countries
PJ1B (1988) 38,415,760	1.8	717	17	65
	3.5	1,447	24	83
	7.0	3,119	37	133
	14.0	3,791	40	140
	21.0	2,997	39	134
	28.0	2,850	37	117
Total		14,921	194	672

CQ World-Wide DX Contest All-Time U.S.A. Records

BY FREDERICK CAPOSSELA, K6SSS

Tabulated below are the record-high scores achieved by U.S. Contesters in the CQ World-Wide DX Contest. Number groups following calls and bands are: year of operation, total score, contacts, zones, and countries.

PHONE

Single Operator/Single Band

1.8	WB9HAD('87)	27,181	157	23	54
3.5	K7SS('86)	217,038	828	31	91
7.0	W7RM('85) (Opr. W7WA)	243,270	813	31	71
14	K1OX('85) (Opr. KC1F)	1,131,328	2,176	36	140
21	K3RV/4('88)	1,270,478	2,298	39	148
28	W0ZV('88)	1,145,368	2,158	39	142

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	16	7	10
KC1F (1988) 6,429,808	3.5	225	18	58
	7.0	102	18	58
	14.0	968	36	125
	21.0	723	33	102
	28.0	1,527	34	117
Total		3,561	146	470

Assisted

K1ZM/2('90)	4,405,350	2,246	165	518
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Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1990) 11,193,606	1.8	32	12	30
	3.5	197	18	76
	7.0	154	26	95
	14.0	1,370	39	167
	21.0	1,167	38	165
28.0	1,517	37	170	
Total		4,437	170	703

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
N2RM (1990) 18,146,246	1.8	80	13	26
	3.5	531	19	82
	7.0	466	24	95
	14.0	2,216	40	170
	21.0	2,082	39	172
28.0	1,946	36	171	
Total		7,321	171	716

CW

Single Operator/Single Band

1.8	K5UR('85)	47,005	219	25	60
3.5	W1FV('87)	270,692	790	28	90
7.0	K1ZM/2('90)	839,520	1,783	34	125
14	K2EK('89)	903,200	1,902	38	112
21	W7WA('89)	772,146	1,647	39	119
28	K1ZM('89)	732,564	1,447	37	134

Single Operator/All Band

Station	Band	QSOs	Zones	Countries
	1.8	14	5	9
K3TUP (Op. K5ZD) (1989) 5,575,913	3.5	61	15	46
	7.0	622	31	85
	14.0	759	36	98
	21.0	864	35	99
	28.0	894	33	95
Total		3,214	155	432

Assisted

K1DG('89)	5,048,802	2,904	155	438
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Multi-Operator/Single Xmtr.

Station	Band	QSOs	Zones	Countries
K1AR (1989) 9,383,459	1.8	36	16	33
	3.5	313	26	75
	7.0	920	35	100
	14.0	1,139	37	128
	21.0	773	39	123
28.0	920	37	129	
Total		4,101	150	588

Multi-Operator/Multi-Xmtr.

Station	Band	QSOs	Zones	Countries
N2RM (1990) 17,282,262	1.8	96	17	51
	3.5	622	24	88
	7.0	1,511	34	120
	14.0	2,085	39	149
	21.0	1,495	38	130
28.0	1,209	37	130	
Total		7,018	189	668

Club record: Frankford Radio Club ('90) 352,816,404

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The Great Eclipse

Mauai, Hawaii: Dawn, July 11, 1991. At 6:30 AM the show began. Slowly the shadow crept across the face of the sun. While others watched the eclipse with awe, the Maui Ionospheric Observatory, under the direction of Steve Barnes, KH6SB, was watching the ionosphere by means of radio pulses. This experiment was to determine the effect of the coming eclipse on radio communication.

The process was straightforward and had been proven over the years. A 10 kilowatt pulsed transmitter was slowly swept across the HF spectrum from about 2 to 12 MHz. The transmitting antenna was a broadbanded affair, with the maximum lobe pointed directly upwards at the overhead ionosphere. The reflected pulses, coming down from the ionosphere, were picked up by a sensitive receiver which tracked the frequency of the transmitter. One of the receiver outputs was attached to a chart recorder, advancing in unison with the transmitter frequency. The operator could also observe the reflected signal on an oscilloscope. Any amateur operator familiar with early World War II radar transmitters would have felt completely at home with the ionospheric sweeper.

At the start of the eclipse the pulser indicated the F1-layer reflected vertical incident signal as high as 5 MHz. (A rule-of-thumb states that the maximum usable frequency [MUF] is about three times as high as the maximum overhead reflected frequency.) This meant that the 20 meter band was probably open at sunrise in Maui.

As the solar eclipse progressed, night seemed to fall. The sky grew darker as other observers tended their instruments atop Hawaii's Mauna Kea and Maui's Haleakala. As Steve watched the chart recorder, the maximum frequency of reflection dropped rapidly (fig. 1). By the time of total eclipse (7:30 AM) the sun was more than 99 percent obscured at Maui. In the passing hour the maximum frequency of vertical reflection had dropped to 2.3 MHz. As the eclipse ended and the shadow of the moon sped across the Pacific towards Mexico, the reflection frequency rose as rapidly as it had fallen, and quickly resumed its upward climb to normal levels.

48 Campbell Lane, Menlo Park, CA 94025

Far to the southeast Steve's son, XE1/KG6TA, Steve, Jr., was running a similar ionospheric sounder near Mexico City. The results of that investigation were successful, after a lot of last-minute equipment repair was completed.

No doubt there will be information in the various amateur radio magazines on the effects of the eclipse on HF and VHF operation. Meanwhile, the graph in fig. 1 shows what happened to the ionosphere over Maui on that historic occasion.

Unclear on the Concept (Part I)

At the turn of the century (1906) Dr. J. A. Fleming of London discovered that electron emission from a heated filament could be attracted to a positive anode when both were placed in a vacuum. Furthermore, he noted that current passing through this device (known today as a diode tube) was unidirectional, the electrons moving from the filament to the anode, or plate. He called his invention an "Oscillation Valve" because it could detect wireless signals. So far, so good.

The concept quickly became unclear because as everyone knew, electricity flowed from positive pole to negative pole. The puzzle was how could the flow of electrons from negative filament to positive plate be reconciled with the flow of electricity from positive to negative? A puzzlement. (See fig. 2.)

Some very bright people never seemed to grasp the concept. In 1918 Alfred Goldsmith, a Fellow of the IRE and Professor at City College of New York, stated that electrons flowed from filament to plate and electricity (battery current) flowed from plate to filament.¹ Elmer Bucher, a well-known engineer at R.C.A., voiced the same opinion.²

The popular thought was that two currents were passing each other in the diode tube—the flow of electrons and the flow of "battery current"!

The controversy was finally laid to rest by H. J. Van Der Bijl, a research physicist at A.T.&T.³ In 1920 he proved beyond the shadow of a doubt that electrons flow from filament to plate, and he disproved the notion of a so-called battery current flowing in the opposite direction. Other scientists at R.C.A. and General Electric Co. also published works describing electron action in a diode tube. Old ideas die

hard, however, and some books still carried the discredited theory of battery current as late as 1923.

Unclear on the Concept (Part II)

About the time the diode controversy started, another hot argument over the existence of sidebands on a modulated signal was taking place. Do sidebands actually exist, or are they mathematical fiction? In most cases, the presence of upper and lower sidebands was reluctantly assumed on faith by some radio engineers, but the concept was hard to grasp. It was finally conceded that sidebands existed, and that one sideband was all that was required to reproduce the original signal. This came about in 1915. It was then, at the Naval Radio Station in Arlington, Virginia, that a low-frequency antenna was tuned to pass one sideband of a voice signal, while the other sideband was attenuated.

The controversy over the existence of sidebands still continued in the technical press until 1923, when the first trans-Atlantic radiotelephone circuit was demonstrated. It employed an SSB signal because of the limited power capacity of the equipment and the narrow resonance band of an efficient antenna at the low frequency (57 kHz) used.

By 1927 trans-Atlantic SSB telephone service was established and SSB was here to stay. But it took nearly 30 years for SSB to be exploited fully, as developments in filters, frequency stability, and low-distortion linear amplifiers were slow to evolve. It was a long, hard road to today's reliable, easily operated HF and VHF SSB transceivers!

The W8JK Beam Revisited

Before World War II, when DX chasing was young, a popular antenna for 20 and 10 meters was the W8JK beam (fig. 3A). This compact array provided about 3.5 dBd gain on its fundamental frequency and about 5.5 dB on its second harmonic. A balanced, open-wire line fed by an antenna tuner was used with the beam.

With the advent of the all-metal Yagi, the W8JK beam faded into obscurity, and little is heard of it in today's world of amateur radio. However, the advent of the 18

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MFJ's innovative new SWR Analyzer gives you a *complete picture of your antenna SWR over an entire band — without a transmitter, SWR meter or any other equipment!*

All you do is plug your antenna into the coax connector, set your SWR Analyzer to the frequency you want and read your SWR.

Setting up and trimming your antenna:
Super simple and super accurate

You can instantly find your antenna's true resonant frequency right at your feedline -- that's something a noise bridge just can't do.

You can monitor SWR changes as you adjust your beam or vertical — you'll know right away which way to adjust it.

You can shorten or lengthen your dipole and see the effect immediately.

The MFJ SWR Analyzer is battery operated and handheld size so you can take it right to your antenna. It makes it soooooo easy to work on your antenna until it's just the way you want it.

Create your perfect multi-band antenna

You can instantly check multi-band dipoles and trap verticals to see if the low SWR points are where you want them and adjust your antenna until they're right.

Mobile Antennas made easy

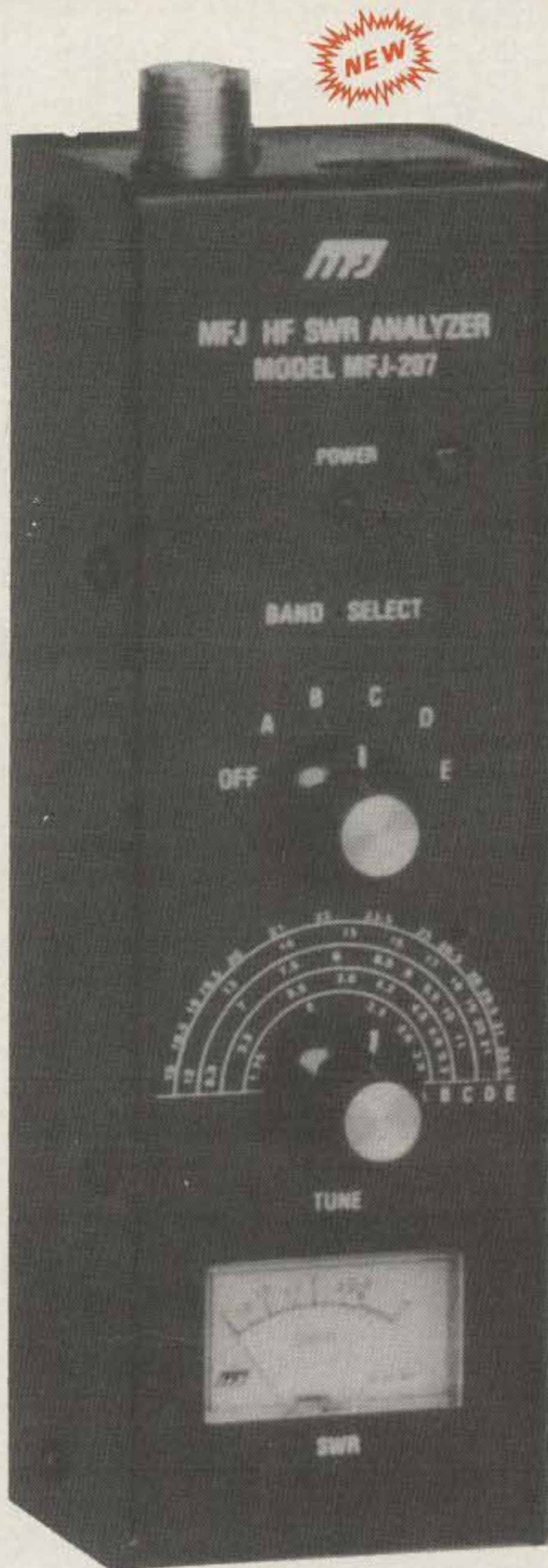
You'll find the perfect adjustment for your mobile whip in seconds by actually seeing the SWR as you pull the whip in and out without transmitting

You can easily find the ideal place on the car for your mobile antenna by checking different spots with the SWR Analyzer.

All kinds of uses

You can see how the SWR varies over your entire band and quickly find your usable 2:1 SWR bandwidth.

You can see your SWR change as you drive under an overpass and see how mobile



MFJ-207

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whip flutter affects SWR.

You can see what happens as you swing your beam toward the power line or away from your tower.

You can see how rain or snow affects your beam.

You can tune up your antenna tuner without transmitting.

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You'll find all kinds of uses for this totally self-contained handheld unit that'll revolutionize how SWR is measured.

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You get a super value because several instruments are combined into a single portable handheld unit.

It has a low distortion RF generator that covers 10-160 meters, an SWR bridge that gives forward and reflected components and a computing circuit that automatically computes the SWR and displays it on the meter.

Everything is automatic. All you do is set the frequency and read SWR. It also has a frequency counter output so you can connect a frequency counter for precise digital readout.

Use 9 volt battery or 110 VAC with MFJ-1312, \$12.95. 7½" x 2½" x 2¼".

The best way ever to measure SWR

Here's the best way ever to measure SWR . . . so get yours today!

MFJ VHF SWR Analyzer

MFJ-208

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If you operate 2 meters this new MFJ-208 VHF SWR Analyzer helps get your antennas in tip-top shape. Just plug in the coax to find the SWR of any antenna from 142-156 MHz. Use 9 volt battery (not included) or 110 VAC with MFJ-1312, \$12.95.



MFJ Low Pass Filter



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Now you can eliminate or minimize TVI problems caused by harmonics with this new MFJ Low Pass Filter that connects between your transceiver and antenna. It's the best way to ensure that your transceiver does not cause harmonic interference to your neighbors' TVs -- you can operate in peace while your TV watching neighbors completely miss out on the fun of ham radio.

Handles full legal power from 0 to 30 MHz. SWR below 1.15:1 to 30 MHz. High harmonic attenuation. Low insertion loss. One year unconditional guarantee.

W9INN Balun Box



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With an adequate tuner will permit feeding any balanced transmission line this way.

Retains flexibility and efficiency of the ladder line feed without bringing the ladder line into the shack. One year unconditional guarantee.

DC-650 MHz Dummy Load

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One dummy load that covers 160 Meters through 650 MHz and QRP through 1500 watts! SWR is below 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. Run 1500 watts for 10 seconds, 100 watts for 10 minutes. 3" x 3" x 7". Guarantee.

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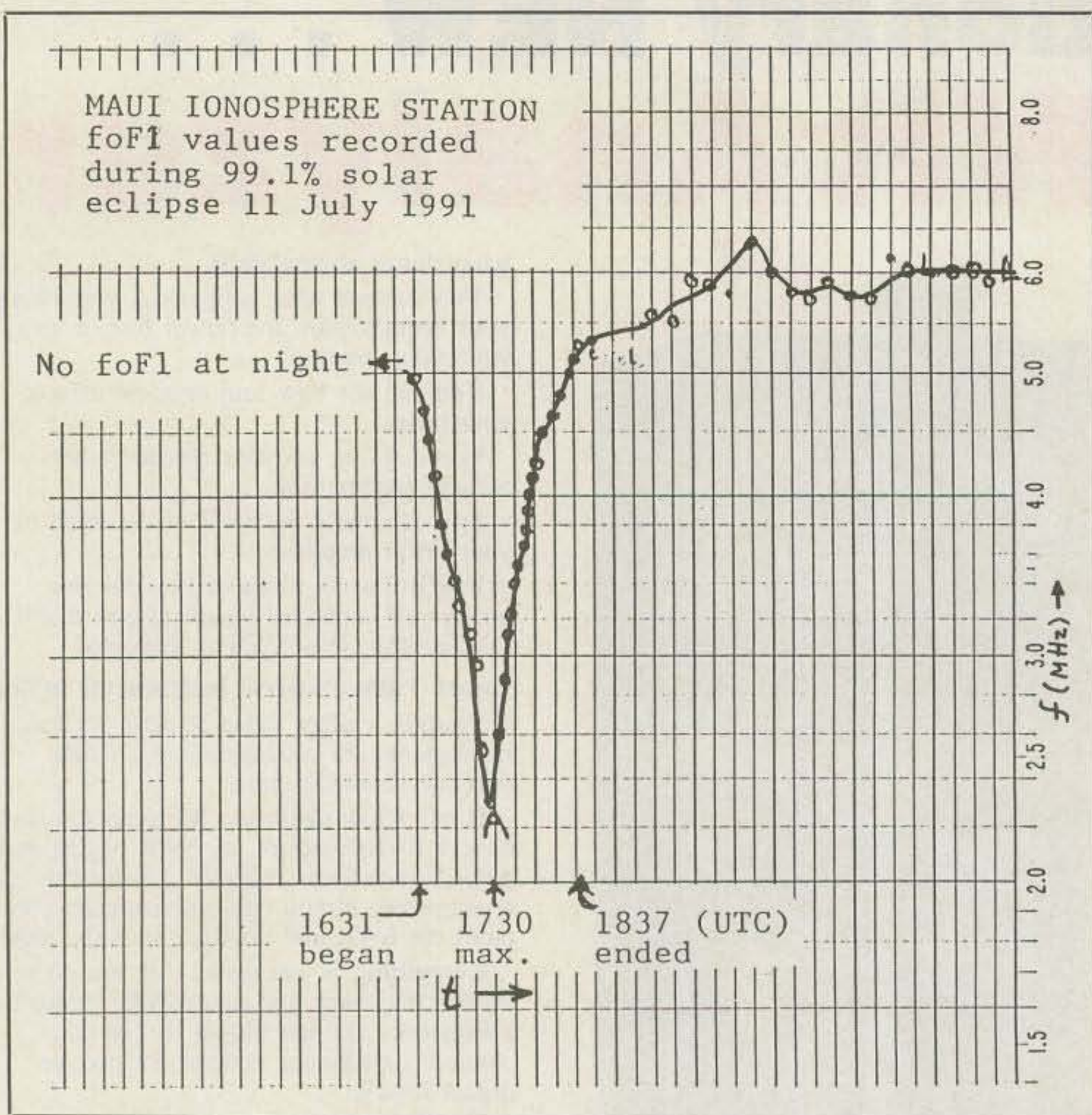


Fig. 1—F-1 layer of ionosphere disappeared during eclipse period. Maximum frequency of vertical sounding dropped from about 5 MHz down to 2.3 MHz (point A) at eclipse maximum.

and 24 MHz bands has brought this antenna back into the spotlight. With the proper tuner, it could be made to function on the 14, 21, 24, and 28 MHz bands. The antenna is part of a tuned system; therefore, the length of the elements does not have to be some exact fraction of the operating wavelength. In addition, no traps or tricky bandswitching techniques are required at the antenna. I can think of no other antenna of such simplicity that will do this job with reasonable gain.

A sticky fact of life is that both elements of the W8JK had to be insulated from a metal boom. This complicated both the design and assembly of the array. Recently, Pierre Villamagne, F9HJ, has given this old favorite a new lease on life (fig. 3B).

The F9HJ design consists of two tapered aluminum elements each 24 feet 7 inches overall, spaced 8 feet 3 inches apart. The elements are fed directly with a cross-connected transmission line, having the feedpoint at the center. The elements are grounded to the boom.

On 14 MHz the elements are shorter than a half-wavelength, resulting in a very low feedpoint resistance and narrow operating bandwidth. This is the price to

pay for such a compact, multiband antenna. Using transmitting-type 300 ohm twin-lead, the SWR exceeds 20 to 1. The SWR is much less on the higher bands.

Nevertheless, the beam operates well on 20 meters. Adjustments of the antenna tuner are quite critical, and it must be adjusted for major changes in frequency. This is not a problem on the higher bands.

The array works and shows directivity on 10 MHz, but SWR is excessive and transmission line losses are high. Those operators more interested in 10 MHz than 28 MHz can increase element length and spacing accordingly for better performance.

Because of low feedpoint resistance, #10 wire, or 3/8 inch copper tubing is used for the crossover line. Care must be taken that all connections and joints in the assembly have low resistance. The insulating plate that supports the center of the phasing line and feedline is attached to an extension of the supporting mast. A wide-impedance-range, balanced antenna tuner similar to "The Link-coupled Matching Network" shown in the 15th edition of *The ARRL Antenna Book* is recommended for use with this antenna.

(This antenna is described in the July

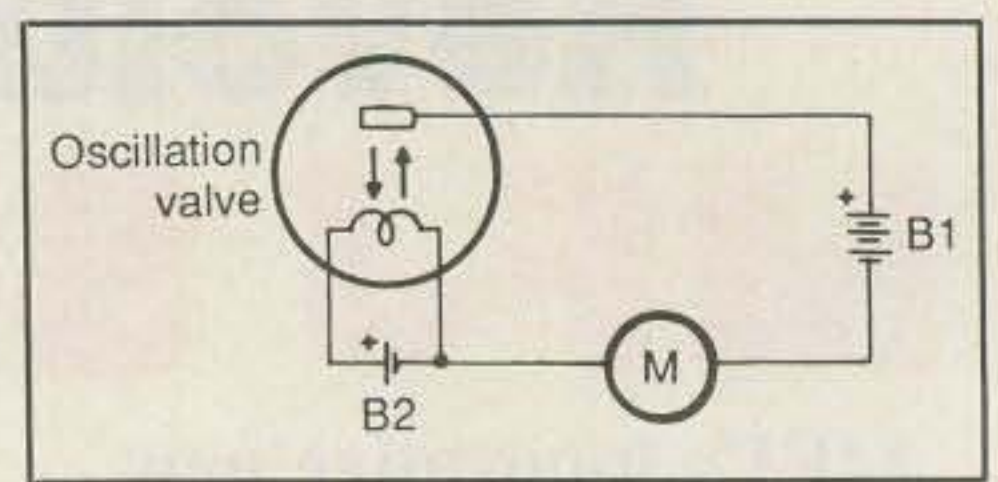


Fig. 2—Unclear on the concept. Old timers were befuddled by current flow in a vacuum diode. Electrons flowed from filament to plate and "battery current" flowed from plate to filament—or did it?

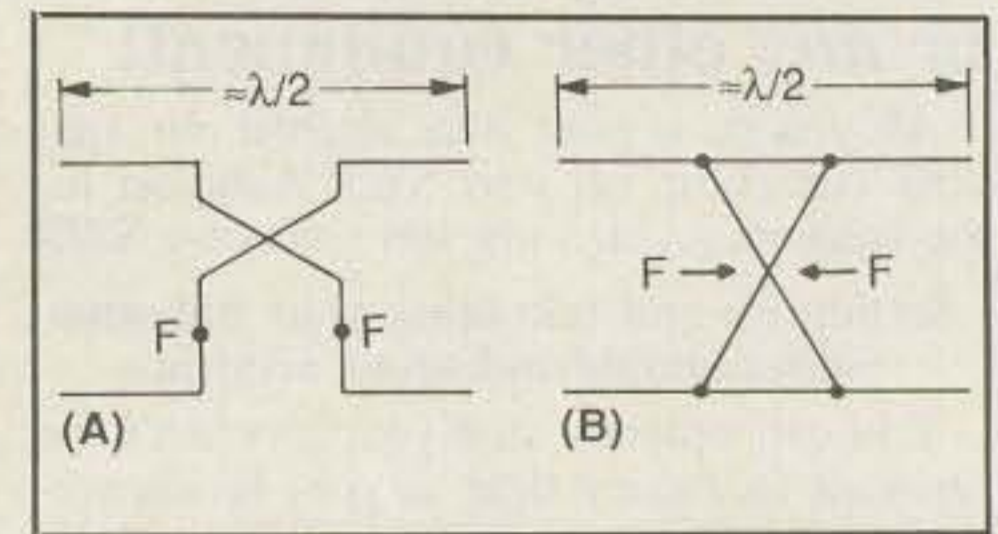


Fig. 3—(A) W8JK beam consisted of two elements cross-connected and fed at F-F with two-wire transmission line. (B) F9HJ modification of W8JK beam used delta-feed system. Elements are not broken and feedline is tapped on elements by cross-connected wires. Elements may be grounded to boom. (Courtesy RSGB)

1991 issue of *Radio Communication*, a publication of the Radio Society of Great Britain.)

A Version of the End-fed Wire Antenna

Using an end-fed antenna is an open invitation to TVI, as it brings the antenna end right into the residence. George, W2CUA, found this out the hard way, even when running low power. Something had to be done to get the RF out of the shack!

George's solution was simple. He ran about 30 feet of coax from his tuner to the end of his long wire. The shield was connected to a ground stake and to various radials cut for the bands between 40 and 10 meters, one radial for each band (fig. 4).

The results? No TVI, except a little on 10 meters. The antenna provides plenty of DX on all bands, and George is extremely happy with the results.

Purists may frown on the idea of feeding an antenna of varying input impedance directly from a low-impedance transmission line, as the SWR on the line may be quite high at certain frequencies. No matter. As long as the line is able to handle the transmitter power, and the transmitter will load to the antenna, all is well. This leads to the suggestion that the impedance at the end of a random-length wire is not as high as many people suspect. George uses a

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You get a ceramic antenna insulator for low RF loss. The result? Maximum radiated power.

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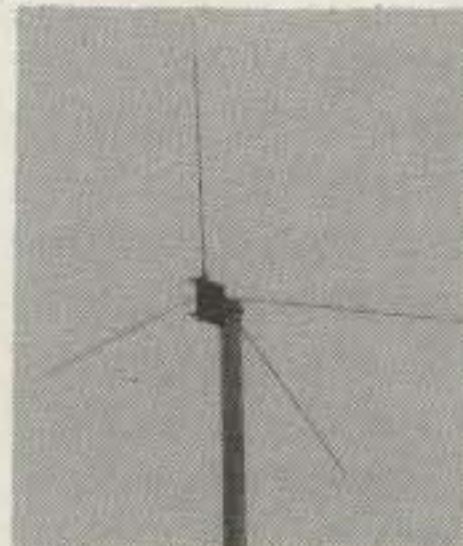
The radial angle is raised from the conventional 45 degrees to 28 degrees to reduce inductive coupling. Then, the radiator is shortened and the radials are lengthened to move the feedpoint from the voltage node so capacitive coupling cancels the remaining inductive coupling. This minimizes feedline radiation.

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Elements simply screw into the boom.

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You can center mount it and use it vertically on FM or horizontally for SSB. By rotating it you can minimize QRM. Unique design also lets you end mount it vertically or horizontally on the leg of a tower . . . great for packet and PacketCluster™.

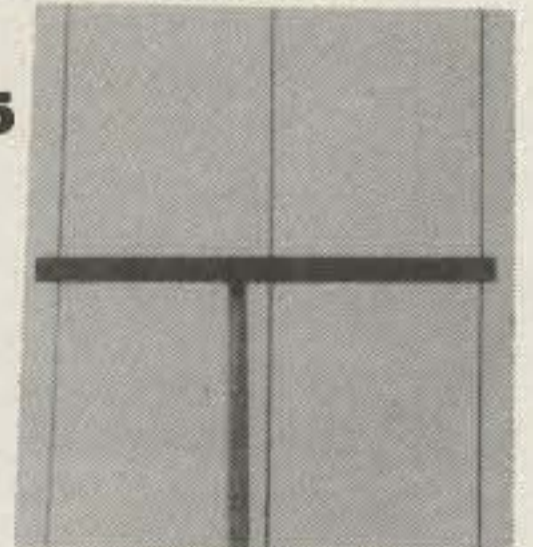
Its compact 2¾ foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.

Extra thick elements maintain high gain and directivity over virtually the whole 2 Meter band. A ferrite choke balun gives you excellent feedline decoupling. Coax coupling is further reduced by mounting the SO-239 connector behind the reflector.

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Weights just 2 pounds. Boom is 30½" x 1¾" x 1¼". Mounts easily to mast or leg of a tower with single included U-bolt. Mast not included. Made in USA.

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It's omni-directional and has significant gain over a 1/4 wave. It doesn't need a cumbersome ground plane so it's convenient for indoors and works great with handhelds.



HT Range Extenders

Telescoping antennas for handhelds

The Long Ranger™ 2 Meter Halfwave. MFJ-1714, \$16.95. For really long range this MFJ endfed halfwave is hard to beat. It outperforms a 5/8 wave on a handheld because the 5/8 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 5/8 wave antenna. When collapsed it performs like a rubber duck. 40" extended, 10½" collapsed.

The 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 1/4 wave for 2 Meters and a 5/8 wave with gain for 440 MHz. 7¼" collapsed, 19" extended.

The Pocket Linear™ 3/8 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 ducky, on the fringe and noisy, put on The Pocket Linear™, extend it to 24½" and carry on your QSO. Has pocket clip. 5¼" collapsed.



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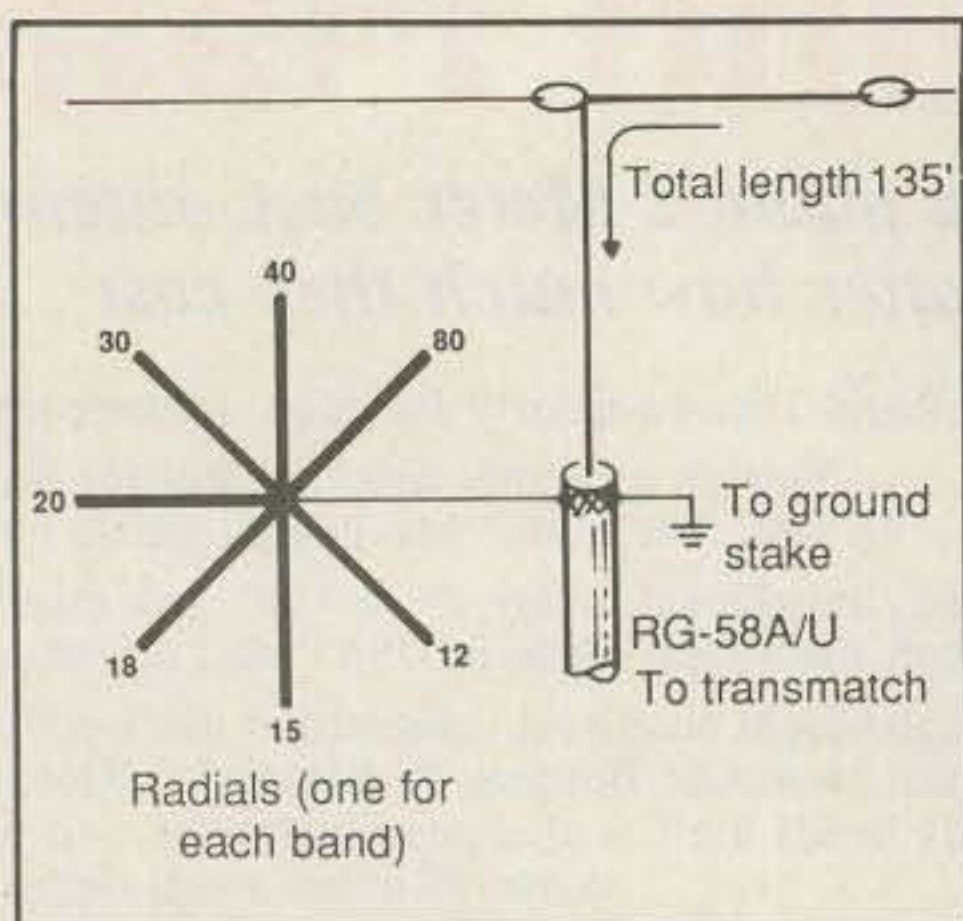


Fig. 4—W2CUA feeds end wire directly with coax line and Transmatch to get rid of TVI. Quarter-wave radials are used, as well as a ground stake.

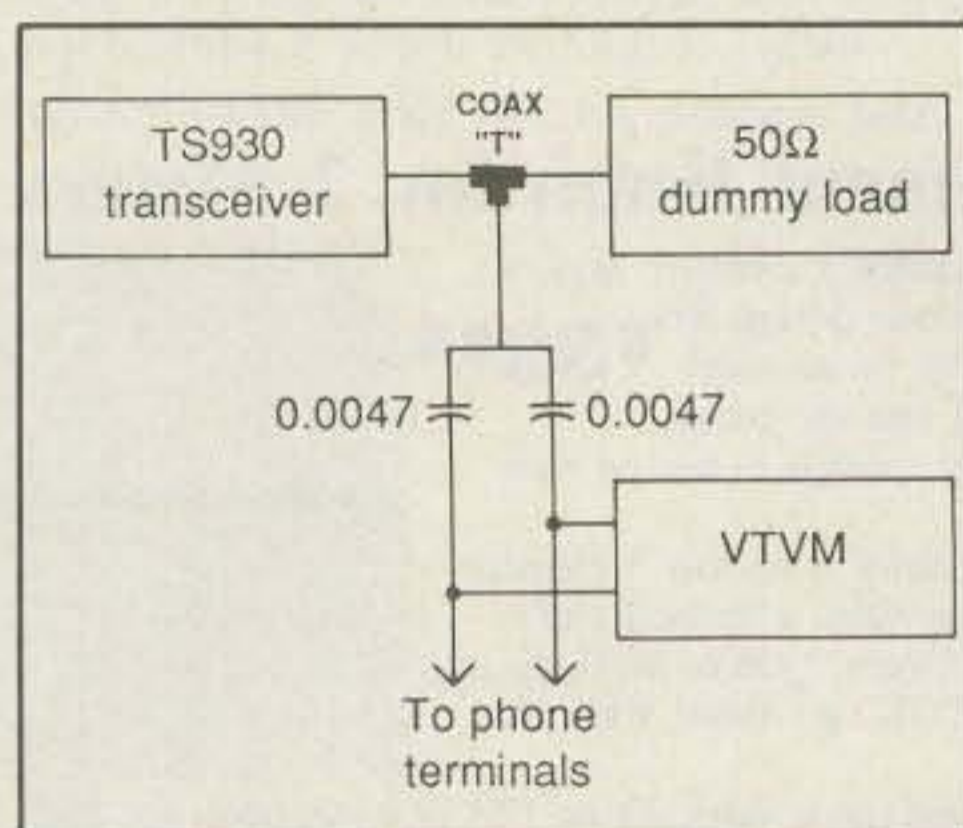


Fig. 5—W1VY uses his transceiver to test telephone for RFI. Running low power into a dummy load, he taps off signal and injects it into telephone under test. RF voltmeter (VTVM) monitors level, which should not exceed 3 volts.

Ten-Tec Corsair 2 and 30 feet of RG-58/U coax and reports no ill effects. A number of his friends are using this simple antenna to evade local TVI with the same good results.

Telephone Interference Revisited

"Eddie," VE3CUI, follows up my April column on this important subject with some interesting observations on interference. He refers to extraneous RF pickup by the handset cord of a telephone. He experienced this problem with a nearby neighbor who had a Bell "Innova II" two-line telephone. Eddie says this unit is little more than an expensive crystal radio set that tunes the 10 meter band very effectively! The main point of entry of VE3CUI's signal was the telephone's DC, wall-type power supply used to light the status LEDs on the unit. By simply pulling the power supply out of the line, most of the

RFI disappeared (but then the status lights remained off).

He wound the power lead to the telephone around a toroid, and the RFI apparently went away. But as soon as the handset cord was extended to its full length, the RFI returned, as bad as ever!

Eddie wound the handset cord around another toroid as close to the base of the phone as possible. Now he had three toroids on the instrument—one on the main phone line, one on the DC power line, and one on the handset line. This minimized the problem, but his signal was still readable when the handset cord was extended. Eddie came to the reluctant conclusion that the only RFI solution for the Innova II phone was to place LC filters (such as described in my article) inside the phone itself—one each for the line, the power line, and the handset line (a discouraging proposition because the phone could not be opened without damaging the case!).

Eddie's solution was very simple. He moved out to the country and left the vexing telephone behind him!

In closing, VE3CUI says that in Canada the Bell "Symphony" and "Harmony" telephones are recognized by the phone department as being RFI-prone, depending upon the serial number of the particular unit. Bell Canada will replace such units, at no cost, according to a Bell Canada field investigator who talked to VE3CUI. So there is some hope—at least in Canada. What happens in the U.S. with these particular phone models is unknown.

Filter Measurements at Home

An interesting letter from Al, W1VY, outlines the method he used to test telephone filters. He determined that 3 volts RMS of RF signal, or less, was sufficient to test filters. His test setup was his TS-930 used as a signal generator, working into a 50 ohm dummy load (a "Cantenna"). He placed a coax "T" in the line to the Cantenna. Off the T, he coupled into a telephone pair via two .0047 uF capacitors, one in each lead (fig. 5). Using an RF probe and a VTVM, he was able to measure the RF level at the test phone terminals. He could vary the RF output of the TS-930 from 0 to 3 volts while listening in the phone. He made a bunch of filter attenuation measurements as follows.

Test 1: The best Z-100A filter on hand—26 dB attenuation.

Test 2: Two Amidon FT50A-J toroid cores with 22 turns of #26 wire, one core in each line with .0047 uF across phone side of line—30 dB.

Test 3: Two section (4 cores), as above—40dB.

Test 4: Radio Shack split core, with 10 turns of phone line wrapped on it—18 dB.

Test 5: Amidon FT-1407 toroid with 10

turns of line wrapped around it—18 dB.

Test 6: Ferrite beads on telephone line—less than 5 dB.

W1VY reports that it took the number 3 filter (40 dB) to quiet his neighbor's phone and also his own phone located very near the base of his tower. All tests were run on 20 meters.

Al ran checks on several other electronic phones—General Electric, Cobra, Radio Shack models—and found out that all of these types required at least 40 dB of isolation when operated within 100 feet of his tower. An old, reliable Western Electric dial-type phone was quieted with a Z-100A filter which provided 26 dB of isolation.

W1VY concluded that you can't turn to the telephone company for help. But he also thinks that most phones can be cured if you can bring the phone into your shack and run quantitative tests on it.

Al's test setup is simple, requiring equipment in most amateurs' shacks: an RF signal source of about 3 volts, a dummy load, a VTVM operable up to 30 MHz, and a supply of filters for test purposes.

Generally speaking, I have found that inductor-capacitor filters (simple, pi-network configuration) provide more isolation than do choke-type filters wound on toroids. This is not to say the choke-type filters won't do the job, but measurements show that the single-section Butterworth-style filter provides more attenuation than does a similar-size toroid-style filter.

Some telephone engineers frown upon the idea of placing capacitance across the phone line. Perhaps a lot of capacitance can effect telephone system balance or audio/control signals. In these cases the toroid-type filter is the only answer. However, I've found that one or two L-C filters used on my home phones don't seem to cause any problems at all. Stay tuned for late-breaking developments.

Shop Talk

From time to time I will bring up topics of general interest concerning construction practices. This is a broad, general topic, so anything goes!

A few months ago I asked how to remove masking tape that had solidified on metal without damaging the paint. This nasty process is hastened by exposing the tape to sunlight, whereupon it turns into a rock-solid strip that defies all attempts to remove it! However, some readers have found a solution to the problem. I received a blizzard of suggestions, and here they are.

VE7GWO: Old-fashioned lighter fluid works great. Let it soak, two or three times, then remove tape with a rag.

WA6VZI: Try Johnson's Baby Oil! It works great.

N1DWA: Olive or cooking oil on the tape. Wait overnight and clean off. Repeat if necessary.

W2HCA: Try "Lift Off," a spray by Loc-tite Corp. found in auto supply stores.

K3VLQ: Cigarette lighter fluid on a soft cloth. Then follow up with wax or "Armor-all."

W2FZ: Start with alcohol. If no luck, use a wax and grease remover used in body shops. Sometimes gasoline will work.

K4AVU: "Tech-spray" 1723, a Gold Kleen solvent, works.

KQ3S: The newspaper column "Tips from Heloise" suggests peanut butter left on for several days. It works like a charm, and you can let your dog lick it off!

WB2VRX: Apply Proctor & Gamble liquid laundry detergent "ERA-plus." Remove with clear water and sponge after 24 hours.

WB2CHP: Use naphtha. Let it soak through the tape. Eventually you can wipe away the tape with a soft cloth.

W2OFB: Soak cotton ball in gasoline covered by plastic wrap to retard evaporation. Tape comes off in minutes.

WA6LFJ: Try soaking tape with WD-40. Remove with your fingers after a few hours.

W3EKT: Try anything with lemon oil in it. "Pledge" and other furniture polishes work, too. A friend told me to try Avon "Skin So Soft," a bath oil spray!

W5PEK: Use a petroleum-based laundry spray such as "Spray-N-Wash." Lighter fluid cleans up residue. As a last resort, cook the tape with a hair dryer after it has soaked for a while.

N7QCQ: "Motsenbicker's Liftoff."

K4NJ: 3M General Purpose Adhesive Cleaner #08984.

VE3AEW: Contact Cement Thinner.

W3EKT: Lemon oil.

W0WTP: Kerosene.

KN3C: Avon "Skin-So-Soft."

KA8EUN/6: Alcohol will do it.

WF8H: Use a hair dryer.

And the following also suggested WD-40: VE7FLA, WD0DAN, K2QFR, K1NIT, and KA3UUC.

So there you are! Take your pick!

Thanks to the following who responded to the quizzes on the old-time movies *Key Largo* and *The Third Man*: WB6SYN, W7HPI, W8WOJ, LA9CQ, N3AB, VE3MAL, K1CT/MM, Dick Sweinhart, WN5C, W2GBX, VK3DWZ, W4FCJ, W5IPC, WQ0H, N2LBI, N4VBG, K1XA, K7FC, N5IZY, K6BMA, W7IV, W6EOA, K4CD, W5VCM, WB5MTV (tks for list), WB6DAC, K6MA, W9ILY, WB6IYM, NN0M, KB5NBS, W1MN, N3JJK, KG6F, WA5EID, KA6V/7, K4JBY, N2GHX, WN2SQC, AA6AY, KA1EAP, AA6ZJ, K2JFE, K5PC, VE3GNF, KC0XB, VE3ACB, N8KAM, WD6HDF, KA0URN, KA3VXA, KC4VKG, KB8KUV, AD0V, Abe Magni Jr., KB0INJ, WA6ARA, KF4CR, N4SPR, WF5T, W8WOJ, KG7DK, K2BRY, KA7OBU.

KC0YE, KA3DBG, K1HRV, VE3IUU, K3VRS, K6URI, KA2UWA, N2AUD, W6GBA, WA1DFL, W9WOC, and WA6ITF.

I'll wrap this up with a suggestion from VE7FLA. He suggests an easy way to weatherproof a coaxial fitting is to use non-contaminating heat-shrink tubing. Says it is not as messy as coax tape and he's used this idea for over 15 years.

And to end it all, here's a Dead Band Quiz from Bill Crowley, K1NIT. (I couldn't pass up this one!) *Question:* Who was the only man to play for the Boston Red Sox, the Boston Bruins, and the Boston Celtics during a championship season?

Give up? The answer is John Kiley, the Fenway Park and Boston Garden organizer. Ho, Ho.

See you on the low end!

73, Bill, W6SAI

Footnotes

1. Goldsmith, Alfred N.: *Radio Telephony*, Wireless Press, NY, 1918.

2. Bucher, Elmer: *Vacuum Tubes in Wireless Communication*, Wireless Press, NY, 1919.

3. Van Der Bijl, H. J.: *The Thermionic Vacuum Tube*, McGraw-Hill Book Co., NY 1920.

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- 45 Watts Output
- Compact Size
- Multi Scanning Modes

YAESU FT-5200



Hi-Power, Dual Band Mobile

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- Power Output 2M-50/5 W 70cm-35/5 W
- Removable Front Panel
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TM-741A
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- 2M/70cm Operation With Optional Expansion To Triple Band
- 50 Watts Output

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IC-W2A
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- Simultaneous Receive on Both Bands
- Up to 5 Watts

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- Dual VFO's with DDS
- Superior SCF Filter
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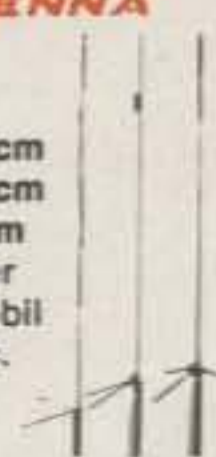


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Includes theory textbook, 2 stereo code tapes, and a marine radio facsimile broadcast schedule book.

GW0003 Novice Code Short Course \$14.95
Includes 2 stereo cassettes and preparation for the Novice code test at 5 wpm.

GW0001 Complete Novice \$59.95
Includes 2 theory tapes, 2 textbooks, FCC Rule Book, 4 code tapes, code oscillator set, examiner test packet, and over \$50 in radio discount coupons.

GW0002 Novice Code Course \$29.95
Includes 6 cassette tapes that make it easy to learn the code from scratch.

GW001 2-Week Tech \$19.95
This Technician course includes 2 theory tapes and 1 illustrated textbook.

GW0007 Complete General \$59.95
Includes 6 code tapes, 4 theory tapes, and 2 textbooks. Ideal for upgrade from Novice to General.

GW0008 Gen. Code Course \$29.95
This General course includes 6 tapes for speed building from 5 to 13 wpm.

GW0013 Complete Advanced \$59.95
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GW0016 Complete Extra \$59.95
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The IC-2410A is priced at \$855, while the IC-2410H is \$899. For more information, contact ICOM America, Inc., 2380 116th Ave. NE, Bellevue, WA 98004 (206-454-8155), or circle number 107 on the reader service card.

Realistic HTX-202 2 Meter Handheld



The Model HTX-202 is Radio Shack's entry into VHF communications. It features a multi-function scanning system, large-capacity nickel-cadmium battery pack/charger, Touch-Tone (DTMF) memory dialer, and DTMF squelch built in. For packet operation the HTX-202 features true FM output. In addition, there are 12 independently programmable memory channels plus one calling and three priority channels. It may be operated directly from 12 volts with 5 watts minimum output.

The HTX-202 is priced at \$259.95. For more information, check the Radio Shack catalog, visit a Radio Shack store, or circle number 102 on the reader service card.



Optoelectronics 2810 Frequency Counter

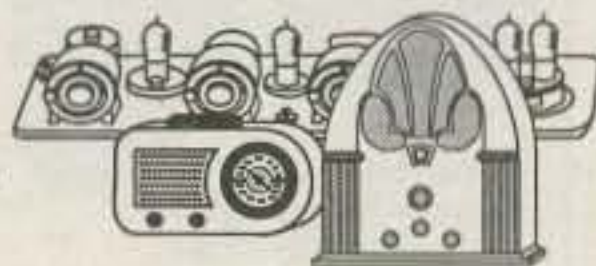
The Optoelectronics Model 2810 handheld frequency counter features full-range operation, 1 mV sensitivity, and resolution to display 10 Hz in 3 GHz. The unit detects frequencies up to 200 MHz and resolves them to 1 Hz in 1 second. Frequencies up to 900 MHz are resolved to 10 Hz and displayed in 4 seconds, and frequencies up to 3 GHz are resolved to 10 Hz and displayed in 1.6 seconds. Four different gate times are available by means of a front-panel selector switch. Sensitivity is specified at better than 1 mv for signals up to 200 MHz, and better than 10 mv for signals up to 2400 MHz. The unit is operable up to and beyond 3000 MHz.

The unit is designed for traditional laboratory settings as well as for field-service applications. The Model 2810 is priced at \$259. The optional battery pack is \$24; optional LCD backlight \$45; plus/minus 2 PPM TCXO \$100. For more information contact Optoelectronics Inc., 5821 NE 14th Ave., Fort Lauderdale, FL 33334 (305-771-2050), or circle number 104 on the reader service card.

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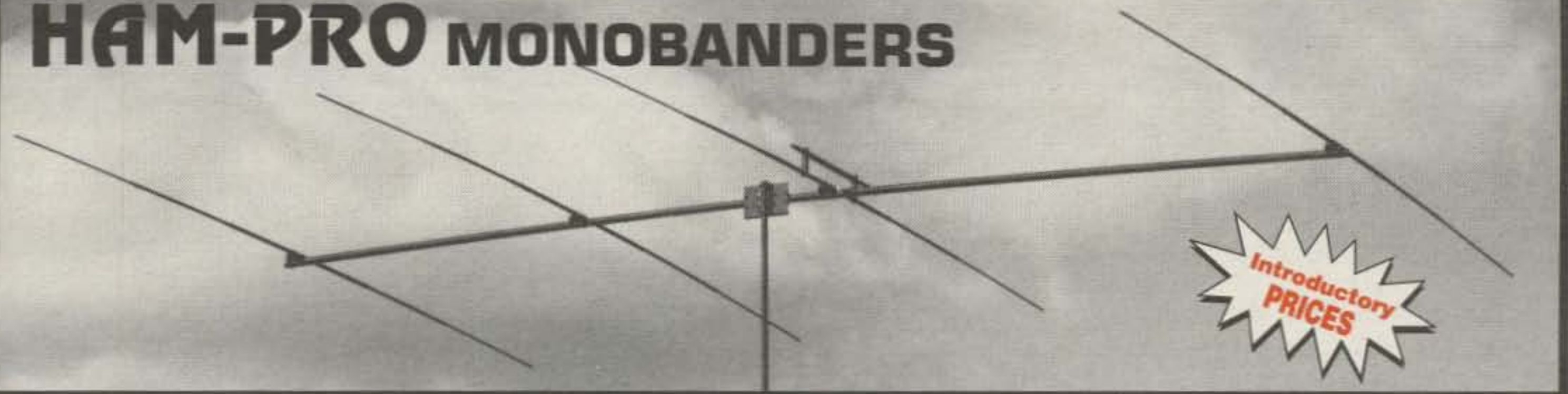
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Model & Elements	Band	MEASURED		
		Gain dB/d	Max VSWR in band	Price
H20-4	20 m	9.23	1.61	\$530
H15-4	15 m	8.80	1.65	\$340
H10-3	10 m	6.46	1.79	\$190
H6-6	6 m	9.41	1.91	\$200
H144-5	2 m	9.10	1.70	\$ 50
H144-15	2 m	13.73	1.68	\$145
H220-5	1.25 m	9.10	1.70	\$ 50
H220-17	1.25 m	13.53	1.29	\$150
H432-24	70 cm	16.14	1.76	\$145

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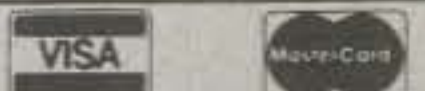
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NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for October is:

**Alvin P. Sligh, W5RJH
USA-CA All Counties #645
Mixed, 12-9-89**

"A purchase of a gift for my mother was my introduction to amateur radio. The gift was a 1937 Zenith radio with a butterfly dial for switching bands. The serviceman from the appliance store in Big Spring, Howard County, Texas, while demonstrating the use of the band switch, tuned in to the ham band frequencies and explained amateur radio. He then introduced himself as W5AWT, Mel Boatman (now USA-CA All Counties #169).

"I began listening a great deal and was interested but did not have the chance to follow up until the late 1940s. Both Mel and I were then working for the Texas and Pacific Railroad. He helped me rig up a code oscillator, and from there I went on to get my Conditional Class license. By that time army surplus equipment was on the market. Again with the help of Mel, I built a power supply for one of the BC458 command sets for 40 meter CW, and purchased a converted BC348 receiver and was off and operating.

"My first certificate was for WAS on 40 meter CW. From there I started working DX and continued until 1963, when a number of problems caused me to shut down for several years. I managed to operate enough to keep my license current, so when I retired in 1984, I immediately went to a hamfest, purchased a rig, and was off and running again.

"My first contact as a County Hunter was with W5AWT in Bernalillo County, New Mexico. With the help of many, many hams, some of them going out of their way to help me, I made it down to my last two: Campbell County, South Dakota, and Borden County, Texas. I thought I would really have a long wait for Campbell, but low and behold, one morning I was listening on frequency when Ralph, WB4FFV, called in for a mobile contact from Campbell, South Dakota. I got so excited I could hardly talk, but managed to make the contact. For my last one, Borden County, Texas, W5AWT, his wife, and my lovely bride, Pat, KA5VWD, made the 110 mile trip so Pat could give me the last county.

"It is a great feeling to have my number



Alvin P. "Slick" Sligh, W5RJH, USA-CA All Counties #645, at his neat operating position.

645, and an honor to know so many great people. It is impossible to thank each of you individually, but to all the mobiles and net controls I say, 'Thank You Very Much!'

"My next project was to help my wife earn her number. Pat now holds USA-CA All Counties #718, 6-20-91.

"Good hunting, everyone. By the way, thanks, Mel!—73, 'Slick,' W5RJH."

Awards Issued

Charles W. "Bill" Peale, W5MW, collected his final 2500-plus county confirmations and claimed USA-CA All Counties #712, USA-CA 3000 #741, USA-CA 2500 #823, USA-CA 2000 #896, USA-CA 1500 #988, and USA-CA 1000 #1182, Mixed, dated 5-30-91.

Ronald B. Rosenwald, KA3DRO, filed his complete record of confirmed county contacts and received USA-CA All Counties #713, USA-CA 3000 #742, USA-CA 2500 #824, USA-CA 2000 #898, USA-CA 1500 #989, USA-CA 1000 #2528, Mixed, dated 6-4-91.

Larry Thornsbury, NZ8Q, submitted his application and received USA-CA All Counties #714, USA-CA 3000 #743, USA-CA 2500 #825, USA-CA 2000 #899, USA-CA 1500 #990, USA-CA 1000 #1184, and USA-CA 500 #2529, Mixed, dated 6-4-91.

Bob Margolin, K1BM, completed his good record and received USA-CA All Counties #715, and USA-CA 3000 #744, Mixed, dated 6-7-91.

C. David Conder, KD9OT, filed a completely filled Record Book and qualified for USA-CA All Counties #716, USA-CA 3000 #745, USA-CA 2500 #826, USA-CA 2000 #901, USA-CA 1500 #991, USA-CA

1000 #1185, and USA-CA 500 #2530, Mixed, dated 6-10-91.

Charles T. Wooten, WA4IMC, filed his completed and certified record and received USA-CA All Counties #717, USA-CA 3000 #747, USA-CA 2500 #828, USA-CA 2000 #902, USA-CA 1500 #992, USA-CA 1000 #1187, and USA-CA 500 #2531, Mixed, dated 6-17-91.

Pat Sligh, KA5VWD, completed all of her paperwork and claimed USA-CA All Counties #718, USA-CA 3000 #749, USA-CA 2500 #829, USA-CA 2000 #903, USA-CA 1500 #993, and USA-CA 1000 #1188, Mixed, dated 6-20-91.

Violet M. Hoyt, W5UGD, is another who did it all in one step, claiming USA-CA All Counties #719, USA-CA 3000 #750, USA-CA 2500 #830, USA-CA 2000 #906, USA-CA 1500 #995, USA-CA 1000 #1189, and USA-CA 500 #2532, All SSB, dated 6-27-91.

D. H. Allerston, G5PQ, enhanced his good record by claiming USA-CA 3000 #746, Mixed, dated 6-17-91.

Frank A. "Bob" Swanlund, W0WYX, took the penultimate step in his march to a completely endorsed certificate and received USA-CA 3000 #748, Mixed, dated 6-20-91.

USA-CA Special Honor Roll

Charles W. "Bill" Peale, W5MW
USA-CA All Counties #712
Mixed, 5-30-91

Ronald B. Rosenwald, KA3DRO
USA-CA All Counties #713
Mixed, 6-4-91

Larry Thornsbury, NZ8Q
USA-CA All Counties #714
Mixed, 6-4-91

Bob Margolin, K1BM
USA-CA All Counties #715
Mixed, 6-7-91

C. David Conder, KD9OT
USA-CA All Counties #716
Mixed, 6-10-91

Charles T. Wooten, WA4IMC
USA-CA All Counties #717
Mixed, 6-17-91

Pat Sligh, KA5VWD
USA-CA All Counties #718
Mixed, 6-20-91

Violet M. Hoyt, W5UGD
USA-CA All Counties #719
All SSB, 6-27-91

333 South Lincoln Avenue, Mundelein, IL
60060

USA-CA Honor Roll

3000		1500	
W5MW	741	KB0FQC	905
KA3DRO	742	W5UGD	906
NZ8Q	743		
K1BM	744		
KD9OT	745	W5MW	988
G5PQ	746	KA3DRO	989
WA4IMC	747	NZ8Q	990
W0WYX	748	KD9OT	991
KA5VWD	749	WA4IMC	992
W5UGD	750	KA5VWD	993
		KA1CRP	994
		W5UGD	995
2500		1000	
W5MW	823	W5MW	1182
KA3DRO	824	KA3DRO	1183
NZ8Q	825	NZ8Q	1184
KD9OT	826	KD9OT	1185
K6PQA	827	YU2WJ	1186
WA4IMC	828	WA4IMC	1187
KA5VWD	829	KA5VWD	1188
W5UGD	830	W5UGD	1189
2000		500	
W5MW	896	YC3OSE	2526
KA2ELH	897	NQ7Q	2527
KA3DRO	898	KA3DRO	2528
NZ8Q	899	NZ8Q	2529
WB4QZD	900	KD9OT	2530
KD9OT	901	WA4IMC	2531
WA4IMC	902	W5UGD	2532
KA5VWD	903		
KW0U	904		

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is \$4.00. For nonsubscribers it is \$10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801 USA for \$1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060 USA. DX stations must include extra postage for airmail reply.

Robert P. Banner, K6PQA, filed his good application for USA-CA 2500 #827, Mixed, dated 6-10-91.

Thomas W. Condren, KA2ELH, received USA-CA 2000 #897, Mixed, dated 6-3-91.

J. Archie Hampton, WB4QZD, received USA-CA 2000 #900, Mixed, dated 6-7-91.

Richard H. Weil, KW0U, received USA-CA 2000 #904, All 20M SSB, dated 6-21-91.

Jack W. Crutchfield, KB0FQC, received USA-CA 2000 #905, Mixed, dated 6-21-91.

David Landry, KA1CRP, upgraded his record and received USA-CA 1500 #994, Mixed, dated 6-25-91.

Milan Drlic-Daki, YU2WJ, received USA-CA 1000 #1186, All CW, dated 6-14-91.

USA-CA 500 certificates went to:

Achmad Salim Kuddah, YC3OSE, USA-CA 500 #2526, All SSB, 5-30-91.

Wayne M. Sutherland, NQ7Q, USA-CA 500 #2527, Mixed, 6-4-91.

Ronald B. Rosenwald, KA3DRO, USA-CA 500 #2528, Mixed, 6-4-91.

Larry Thornsbury, NZ8Q, USA-CA 500 #2529, Mixed, 6-4-91.

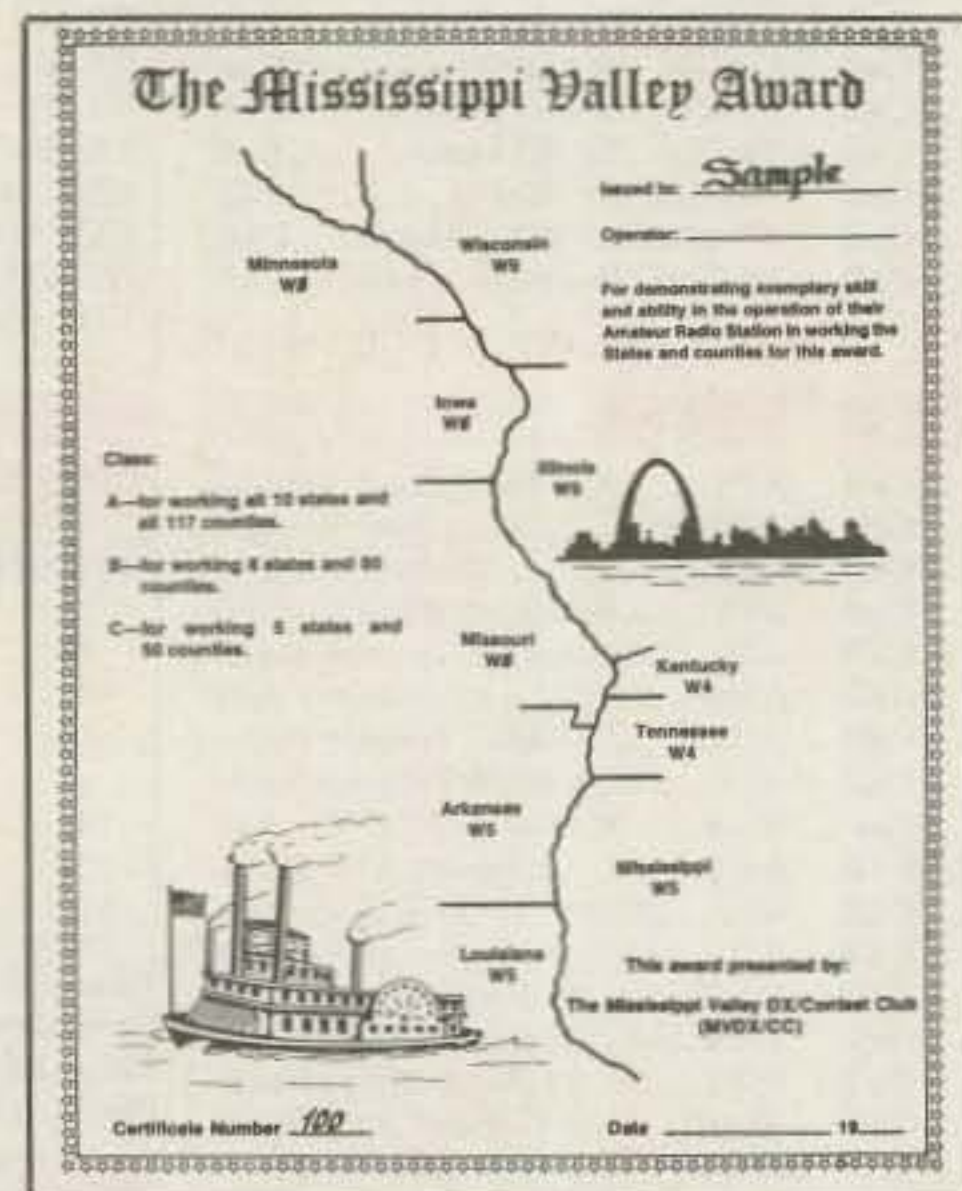
C. David Conder, KD9OT, USA-CA 500 #2530, Mixed, 6-10-91.

Charles T. Wooten, WA4IMC, USA-CA 500 #2531, Mixed, 6-17-91.

Violet M. Hoyt, W5UGD, USA-CA 500 #2532, All SSB, 6-27-91.

Awards Available

Mississippi Valley Award. The Mississippi Valley Award is presented by The Mississippi Valley DX/Contest Club. The Award Custodian is Jim Glasscock,



The Mississippi Valley Award, which is presented by the Mississippi Valley DX/Contest Club.

W0FF, 3416 Manhattan Avenue, St. Louis, MO 63143-3523.

The Mississippi Valley Award is offered for working the states and counties of the United States that lie along the Mississippi river. There are 10 states and 117 counties possible.

Rules: Contacts after January 1, 1990 count toward this award. There are no band or mode endorsements, and the award will be for the class applied for, with provisions for upgrading to a higher class. The cost is \$2.00 U.S. currency or 5 IRCs. Upgrades are \$1.00. GCR rules for applications are applicable.

Classes for the award are: Class C—for working 5 states and 50 counties; Class B—for working 8 states and 80 counties; Class A—for working all 10 states and 117 counties. Counties and states are as follows.

Minnesota: Aitkin, Crow Wing, Itasca, Morrison, Cass, Benton, Sherburne, Stearns, Wright, Anoka, Hennepin, Ramsey, Dakota, Washington, Goodhue, Wabash, Houston, Winona.

Missouri: Clark, Lewis, Marion, Ralls, Pike, Lincoln, St. Charles, St. Louis, St. Louis City, Jefferson, Ste. Genevieve, Perry, Cape Girardeau, Scott, Mississippi, New Madrid, Pemiscot.

Wisconsin: Pierce, Pepin, Buffalo, Trempealeau, La Crosse, Vernon, Crawford, Grant.

Kentucky: Ballard, Carlisle, Hickman, Fulton.

Arkansas: Mississippi, Crittenden, Lee, Phillips, Desha, Chicot.

Iowa: Allamakee, Clayton, Dubuque, Jackson, Clinton, Scott, Muscatine, Louisa, Des Moines, Lee.

Tennessee: Lake, Dyer, Lauderdale, Tipton, Shelby.

Mississippi: De Soto, Tunica, Coahoma, Bolivar, Washington, Issaquena, Warren, Claiborne, Jefferson, Adams, Wilkinson.

Illinois: Jo Daviess, Carroll, Whiteside, Rock Island, Mercer, Henderson, Hancock, Adams, Pike, Calhoun, Jersey, Madison, St. Clair, Monroe, Randolph, Jackson, Union, Alexander.

Louisiana: East Carroll, Madison, Tensas, Concordia, E. Feliciana, W. Feliciana, Pointe Coupee, E. Baton Rouge, W. Baton Rouge, Iberville, Ascension, Assumption, Orleans, Jefferson, St. John The Baptist, St. Bernard, St. James, St. Charles, Plaquemines, Livingston.

Veterans for Peace on Earth Award. The "Veterans for Peace on Earth" is a certificate awarded to amateur radio stations and SWLs for contacts (SWL reports) with Soviet amateurs who are veterans of World War II (prefixes with one letter and one number—e.g., U1AA, R3DX, etc.).

Europeans must have six QSOs; DX stations must have two. When working on low bands (1.8, 3.5, 7 MHz) Europeans need three QSOs, DX stations need one. Dupes—on different bands.



"Veterans for Peace on Earth" certificate, awarded for contacts with Soviet veterans of World War II.

Send log abstract and 10 IRCs, by registered mail only, to the Awards Manager, U3HB, Box 301, Moscow 125190, USSR.

100 Years of Russian Matryoshka. This award commemorates the 100th anniversary of the creation of the popular toy Matryoshka. The doll, Matryoshka, appeared quite by accident. A shop owner, Mrs. Mamantova, wife of a known manufacturer, Savva Mamontova, commissioned the studio of Abramtsevo near Moscow to create Matryoshka. Matryoshka was unique in that it was made up of a series of wooden dolls, each fitting inside the next larger in the series.



The Matryoshka Award which is offered by the Radio Amateur Federation of Maa-keevka, USSR.

Mass production of these brightly painted dolls began in 1890, and they rapidly gained favor in Russia and abroad. In 1900 Matryoshka received a Gold Medal in an exhibition in Paris. In these 1990/1991 jubilee years, this unique Russian doll is celebrating its 100th birthday.

The Matryoshka Award is available to radio amateurs and SWLs worldwide. To qualify, log 100 contacts with any USSR stations in the period 1 January 1990 to 31 December 1991. All HF bands may be used, any mode. Contacts may be logged with the same station on different bands, modes. Confirmations are not required. The fee is \$5 or 10 IRCs. Send log extract (GCR rules apply) and fee to either of the Award Managers: Y42DA, Axel Schernikau, PSF-2, Kuhlungsborn 0-2565, West Germany; or I8YRK, Gennaro Casaburi, Via XXXI Maggio - 11, I-80027, Frattamaggiore (NA), Italy.

73, Dorothy, WB9RCY

The USA-CA Award The Story of County Hunting, Pt. III

By Arnie Bachmann, K9DCJ

In the mid 1980s county hunters experienced the sunspot cycle minimum, the bugaboo of all hams. In 1985, the acknowledged low, there were only eleven persons who reached the goal of all counties. In spite of the preceding statement, in the 1980s there were approximately 970 applications to be processed for the 500 county basic award. (Many do not apply for the various levels until they have worked all counties.) During the 1980s, 23 DX amateurs receive All County numbers.

In the '80s many worked counties on CW only. The latest information I have is as of December 31, 1989. Twenty-three had them all worked on CW. This information was received from N0CKC. Thanks, Buster.

YLs have played an important role in County Hunting, being mobile, net con-

trol, QSL managers, etc. During the 1980s, 33 YLs reached the All Counties goal.

Novices were active also. Six applied for the Basic Award. None had All Counties as a Novice, but some upgraded and two went on to collect all counties.

It is interesting to scan the CQ and ARRL DXCC Honor Rolls and to find that a large number of those members are County Hunters, and that many have earned the USA-CA All Counties Award.

Last but not least are the Shortwave Listeners. Through June of 1991, 33 SWLs had the Basic Award, 500 counties. Five had all 3076 counties confirmed and had their All Counties number.

Shortwave listening goes back many years, as long ago as Broadcast Listeners (BCL) on regular AM radios, the goal being to collect verification cards, the same as collecting MRCs from the mobile stations.

A quick check of the holders of the basic USA-CA Award shows 84 countries represented.

An overall view of County Hunting shows that in the 1960s, 16 worked all counties; in the 1970s 246 received the award; and in the 1980s, 387 collected counties for the coveted USA-CA num-

ber. That shows a continuing healthy growth.

In June 1981, a portion of Valencia County, New Mexico was made into Cibola County and was required for the program as of January 1, 1982.

In January 1983, part of Yuma County, Arizona became La Paz County, and on the same date, multi-county points (3 and 4) became no longer acceptable. Only two adjoining counties can be used, provided they are not separated by water and the vehicle is on or touching both counties being claimed. The three mile limit prevails when the mobile station is on water.

The June 1983 issue of CQ magazine carried the last Awards column by the retiring Ed Hopper, W2GT, and the following month (July) was the first Awards column by Dorothy Johnson, WB9RCY, who is also the USA-CA Custodian. On a sad note, Ed Hopper, W2GT, became a Silent Key on February 25, 1988.

This is the final installment. Hopefully, on the last day of 1999, someone will prepare a summary of the USA-CA happenings during the 1990s.

Thanks to Dorothy Johnson and CQ for allowing me to present this history—73, Arnie, K9DCJ.

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ALL ABOUT THE WORLD ABOVE HF

I start this month by saying a big thank you to all of you who have sent me well wishes on the success of this column and to those of you who have sent material or ideas for use in the column. As I stated in the first column, this is *your* column. I want to report about what you do on those higher frequencies.

Another Record Set

Last month I reported on the record-breaking laser shot between KY7B and WA7LYI. Well, at about the same time a group in southern California was setting another laser record at the other end of the light spectrum. Steve Noll, WA6EJO, assisted by Dick George, WA6JOX, operated grid mobile during the ARRL June VHF QSO Party. On June 8 they set up a HeNe (helium-neon, visible red) laser operating on 474 kGHz (or teraHertz). Their location was the town of Bissell, which is intersected by grid squares DM04, DM05, DM14, and DM15.

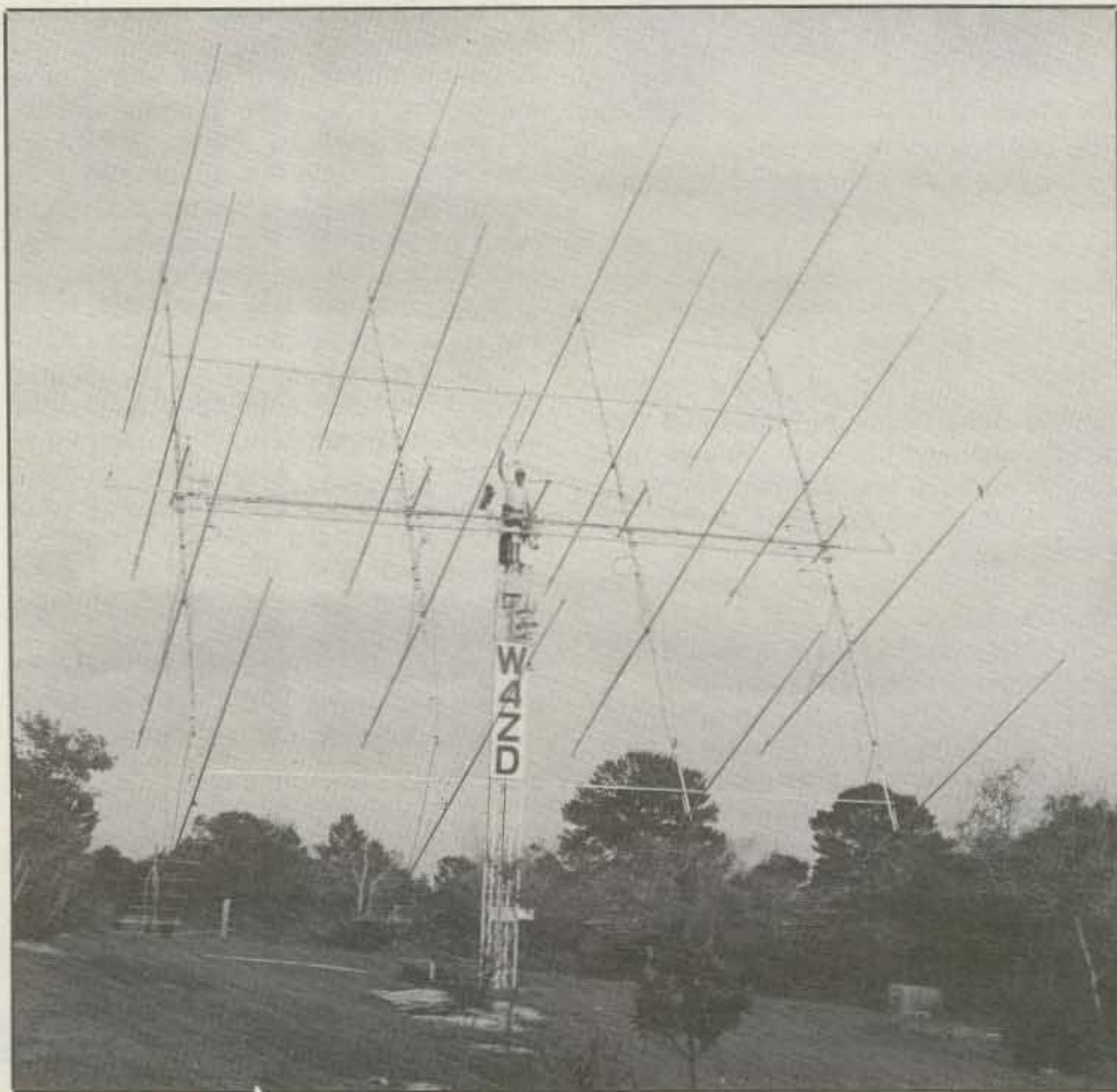
Beginning at 0412 UTC they established contact with their club station, K6MEP (Venture County Amateur Club), from grid square DM04. Their club station was operating from Mount Frazier, at an elevation of 8013 feet, also in grid square DM04. During the next 45 minutes Steve moved his station and established three more contacts with K6MEP, in each of the three other grid squares. The farthest point between the two stations was 57.7 miles, for a new IR laser world record. The following six operators upheld the K6MEP end: Jim Sharlow, WB2ODH; Pat Coker, N6RMJ; Ed O'Donnell, WA6DJS; Gary Jue, N6QOA; Don Wingo, N6LHZ; and John Kitchens, NS6X.

Steve said that they used 450 MHz as a liaison frequency, and it took about two hours to initially establish contact. The mode used was modulated CW. Steve reported that although there was a 5000 foot difference in elevation between the ends of the path, there was very little atmospheric-induced light-beam fluctuation. Steve also indicated that plans are being made to break this record. When they do, you will read about it here!

Two Meter EME Communication

During this month there is an annual renewal of interest in moonbounce, or EME

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



While it doesn't take a backyard full of antennas such as this to hit the moon, it certainly doesn't hurt. Bev Cavender, W4ZD, has worked over 500 stations via EME using this array. You can get "on the moon" with much less. See the "VHF Plus" column to find out how to do it. (Photo courtesy Bev Cavender, W4ZD)

(earth-moon-earth) communication. Although EME communication has been around since WW II, successful amateur communication is relatively new. The first successful amateur two-way communications did not occur until 1960, and it wasn't until the influence of the U.S. higher power limit of 1500 watts output and GaAsFET preamps in the 1980s that EME communication became more popular.

Among the VHF/UHF bands, the most popular for EME communication is 144 MHz. Although EME communication has been successful on 50 MHz, the size of the antenna arrays and background sky noise restrictions remain barriers for all but the most serious operator on that band. The higher the frequency, the higher the path loss. Therefore, more elaborate arrays and close to the maximum legal power is required for successful EME

work above 144 MHz. Accordingly, most operators start on 144 MHz and, if they find EME a mode to pursue, try the higher frequencies later.

To help us get up to speed in this aspect of VHF DXing, I called on five 144 MHz EME communication experts to explain how it works: Lance Collister, WA1JXN; Bev Cavender, W4ZD; San Hutson, K5YY; John Carter, K0IFL; and the dean of 2 meter EME, Dave Blaschke, W5UN. What follows is a compilation of their ideas about EME communication on 2 meters.

Several factors affect EME communication. Some of these are libration fading, the tremendous path loss, noise (both sun and background sky), Faraday rotation, and spatial polarization.

Since the earth and the moon are wobbling along in their orbits, the signals emitted from the earth stations are hitting



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Spanish Amateurs To Get Six Meter Permits

Ted Collins, G4UPS, advised Harry Schools, KA3B, that Joe, EA4CGN, has informed him that Spanish amateurs holding class A licenses have been allowed to apply for 6 meter permits. The permits will be good for one year and will be renewable. The permit will allow the operator CW and SSB privileges on the frequency range of 50.000-50.200 MHz. The maximum power will be 30 watts ERP. Operation on the 6 meter band will be on a secondary/non-interference basis. No antenna restrictions seemed to have been imposed.

While no beacons will be allowed, it is Joe's opinion that EA3VHF will be given tacit approval to continue to operate. Joe expects the first operation to begin sometime in November or December.

an area of a target on the moon, rather than a bull's eye. Also, since the moon's surface is very irregular, the reflected signal takes on that irregular shape. What your radio hears is kind of like what you see looking at yourself reflected in a fun-house mirror at a carnival as you bob up and down. These combined effects cause fading and a certain amount of Doppler shift between the two stations attempting communications and is re-

ferred to as libration fading. The effects on 2 meter operation will be longer term peaks and valleys, where portions of a call sign will be clearly heard followed by very weak signals. While these effects are not nearly as pronounced on 144 MHz, the effect on 1296 MHz may be as high as 20 dB fading and 10 Hz frequency shift.

The moon is located over 221,000 miles at perigee (the closest point to earth) and over 252,000 miles at apogee (the farthest point from earth). Due to the shape of the moon, only about 7 percent of the signal striking it is reflected. The remaining 93 percent is absorbed and thus lost for communication. The path loss is directly proportional to the frequency of operation. That is, the higher the frequency, the higher the path loss. Therefore, the path loss is around 252 dB at perigee and 254 dB at apogee on 144 MHz. For the low-power station, the 2 dB difference between perigee and apogee may be just enough for that successful QSO.

Noise, caused by the sun and by the background sky, affects your ability to receive the weak signal. Generally, communications are not favorable the day of a new moon (since if you are relying on naked-eye observation, you cannot see the moon, except in an eclipse) and when the moon is farther south in the sky, for us in the northern hemisphere. The latter is due to the higher background sky noise

due to constellations in the southern sky (and Dave says, somewhat from convention, since the higher latitude European stations see less moon when it is farther south. Hence, they just don't get on the air). The ideal time of the month for northern hemisphere stations has been found to be when the moon is through its most northerly declination and is moving southward in the sky.

Faraday rotation is the polarization rotation of the signal, due to the influence of the earth's ionosphere on the signal. Some say that this is due to the effect of the earth's magnetic field on the signal as it passes through the earth's ionosphere. (Dave, W5UN, has noticed some correlation between what is happening with Faraday rotation and what is happening on HF propagation. It remains one of the mysteries of EME communication that deserves further study.) Faraday rotation affects the signal by causing the signal to go through a deep cyclical fade. This cycle changes in period, from shorter to longer, as the frequency is increased. It is estimated to have a period of approximately 20 minutes on 144 MHz. Dave says that some days the cycle is more pronounced than on other days. To accommodate that period, schedules are set up for the QSOs. These schedules last typically for one-half hour to one hour on 144 MHz, with one hour for casual schedules and one-half hour for contest sched-



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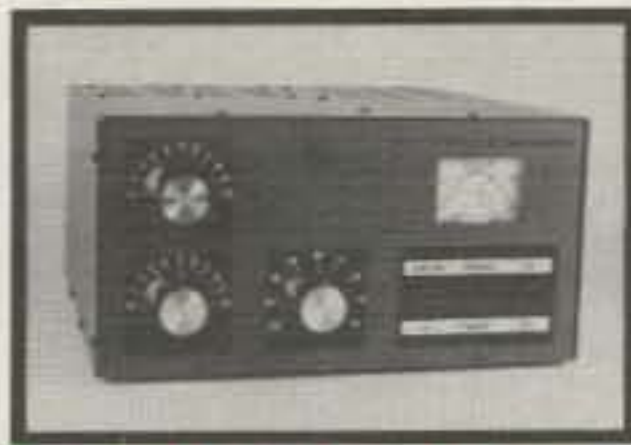
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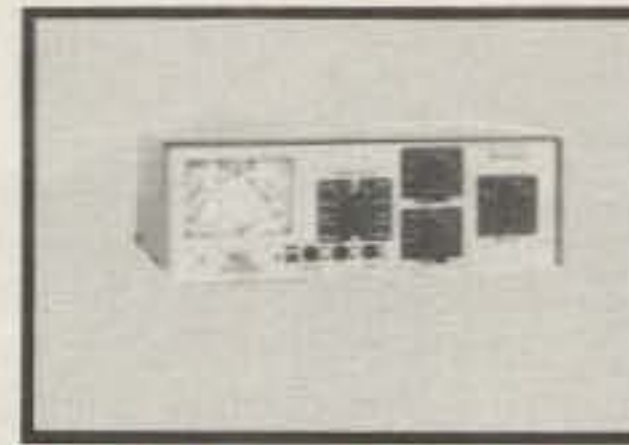
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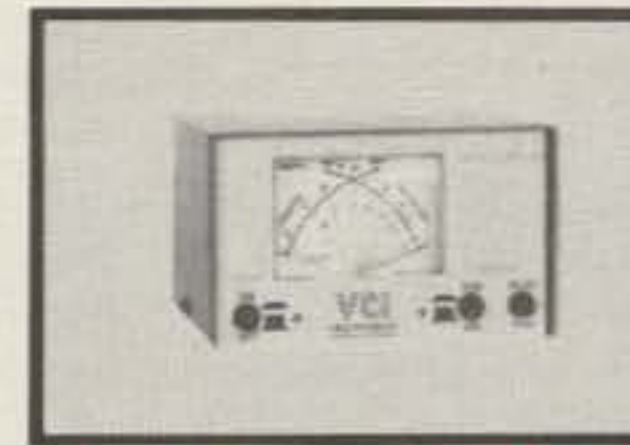
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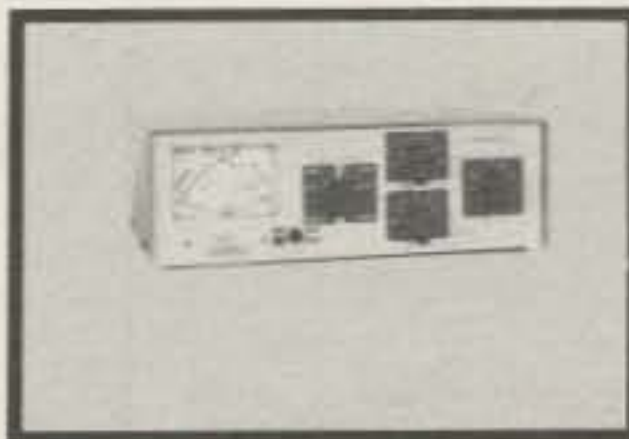
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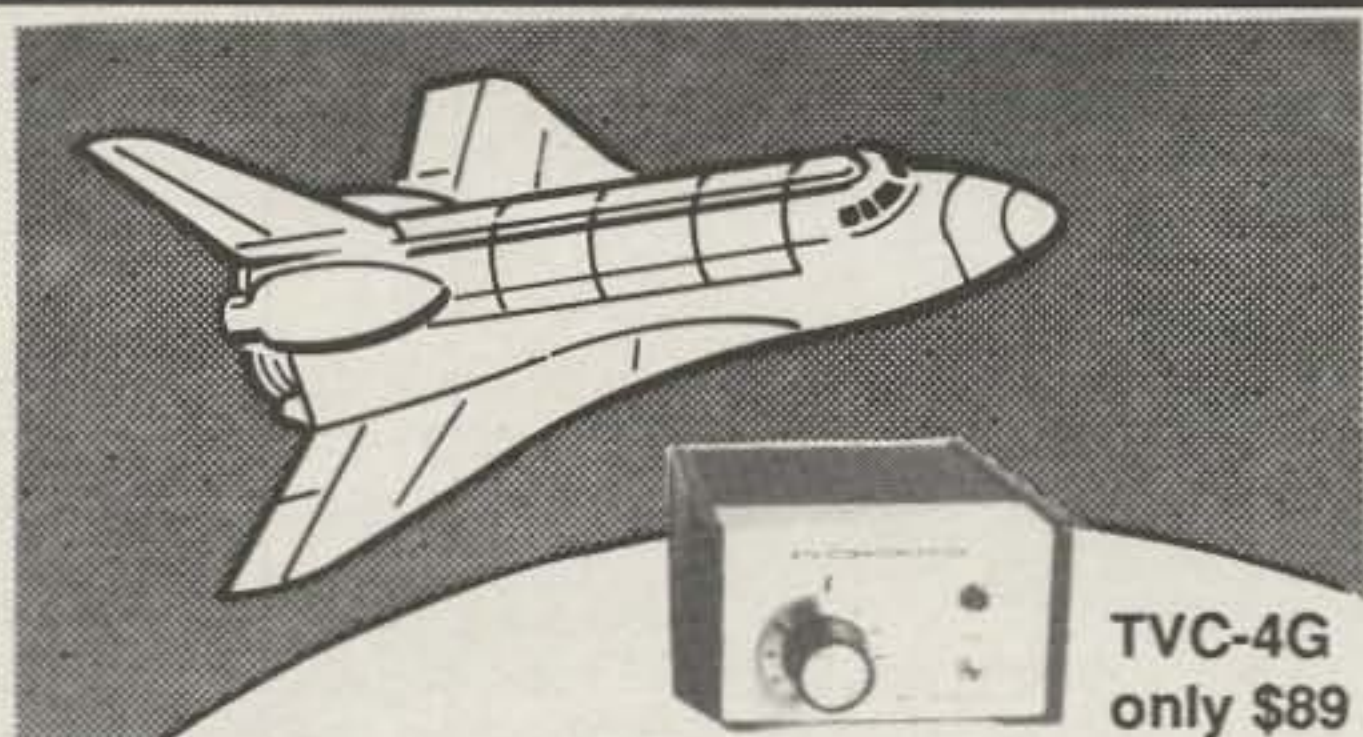
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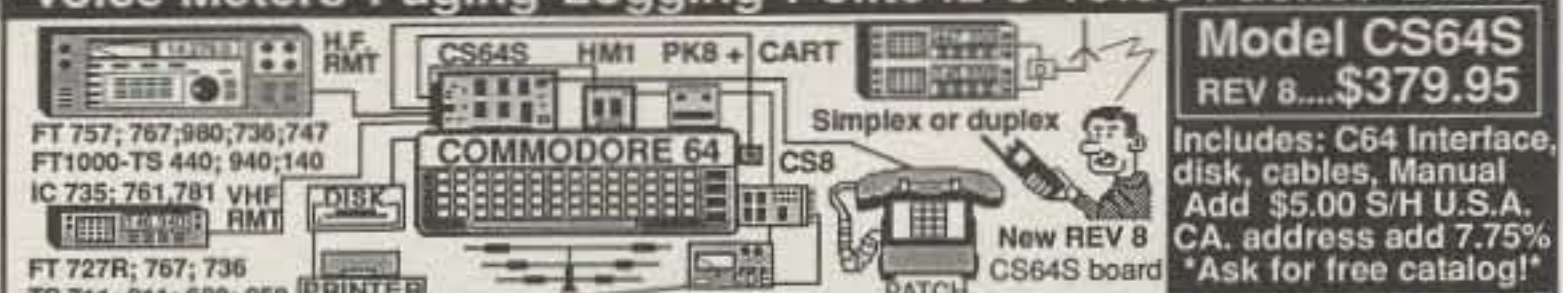
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ules. Although some contest QSOs are schedules (particularly the low-power stations wanting to work the high-power stations), most contest QSOs are random.

Spatial polarization is simply the fact that two stations on different positions on the earth are aiming their antennas that are fixed in the (horizontal or vertical) plane at the moon. Using the mirror analogy again, if you were to look at something at an angle with a mirror, depending on how your head is tilted, that object may appear right side up, at an angle, or upside down. If one of the stations has the ability to rotate the antennas through the plane between horizontal and vertical, some of the effects of spatial polarization can be overcome. However, being able to rotate several antennas through this plane simultaneously, while maintaining phasing relationships between each antenna, becomes a bit of a mechanical nightmare. Therefore, spatial rotation is often overcome by brute force. That is, adding more and more elements to an antenna array helps reduce the effects by increasing the dB gain of the array. Also, Dave states that Faraday rotation has a tendency to overcome spatial polarization during at least part of the scheduled period for a QSO on 2 meters.

There are two other little tidbits concerning EME communication to keep in mind: (1) On moonrise, you will experience Doppler shift of between 300 and 500 Hz above your frequency. On moonset, the Doppler shift will be 300 to 500 Hz below your frequency. When the moon is overhead, there is no Doppler shift. Those of you who have worked the satellites are familiar with the effects of Doppler shift and your hand on the tuning knob. (2) If you are able to hear your echoes, be prepared for a 2.3 to 2.7 second delay. That moon is a long way off, and it takes a little time for your signal to get there and back.

The preferred mode of communication is CW, since it has been found to be the most reliable mode because of the weakness of the signal. The transmission is at a rate between 10 and 15 WPM. With fading and fluttering, slower CW can become broken up, and letters tend to disappear on faster CW.

EME communication is similar to meteor scatter in one sense; both are dealing with weak and irregular signals. Therefore, as with meteor scatter, EME communication has a protocol. However, due to the nature of the EME signal, the procedure is very different from the protocol used for meteor scatter.

The preferred frequency of operation for schedules is above 144.030. The preferred frequency of operation for random QSOs is between 144.000 and 144.030 MHz. If signals are loud enough to sustain SSB QSOs, the preferred frequency is around 144.150 and up.

There is one net that handles 144 MHz

ARRL Votes 222 MHz Band Plan

Recognizing the need to present some sort of band plan as soon as possible near the date of the loss of the bottom two Mega-Hertz of 220, at their July Board meeting the League voted to adopt an interim band plan. The band plan appears below. Considering all of the controversy surrounding use of the band by different groups in different geographic areas, the Board made the following stipulations to the plan.

1. The term "local option" will be replaced with the term "local coordinator's option."

2. The plan is really a guideline. The League recognizes that in certain areas the plan is very sensitive and suggests that local plans that deviate from this one be respected in the affected geographic area.

3. The League recognizes that the plan is probably subject to change. Hence, the plan was adopted as an interim plan.

4. The League recommended that where repeaters cannot be moved to a higher frequency, the operators of the repeaters be urged to use CTCSS inputs and possible time-sharing of the frequency. The League urged that "courtesy and mutual respect must guide our operating practices."

A tremendous amount of hard work was done by the VUAC, particularly its chairman, Lauren Libby, KX0O. If you have comments, write to Lauren and let him know at his Callbook address. You might also want to just drop him a note of thanks for being willing to do the volunteer work.

VUAC 222 MHz Band Plan Proposal

222.000-222.150	Weak signal modes
222.000-222.025	EME
222.050-222.060	Propagation beacons
222.100	SSB & CW calling frequency
222.100-222.150	Weak signal CW & SSB
222.150-222.250	Local option
	Weak signal/ACSB/repeater inputs/control
222.250-223.380	FM repeater inputs only
223.400-223.520	FM simplex
223.500	FM simplex calling frequency
223.520-223.640	Digital, packet
223.640-223.700	Links, control
223.710-223.850	Local option
	FM simplex, packet, repeater outputs
223.850-224.980	Repeater outputs only

EME communication coordination. It is hosted by VE7BQH and meets every Saturday and Sunday on 14.345 MHz at 1700 UTC, or as soon as the 432 MHz net is finished. Also, every Monday at 0230 UTC (Sunday evening local time) at 3.818 MHz (plus or minus QRM) a VHF/UHF clearinghouse net meets for exchange of information and setting skeds. In addition, at 0130 UTC Tuesday (Monday evening local time) another VHF/UHF clearinghouse net meets on 3.843 MHz for the same purpose.

Now, let's consider an example of a QSO. A sked is set between DL8DAT in Germany and N6CW in San Diego. The QSO is scheduled to last an hour and will start at 0000 UTC. The eastern station (relative to the position on earth) transmits first. In this case DL8DAT will transmit first. The transmission will last for two minutes. DL8DAT will send the receiving station's call followed by his, one time each, as follows: N6CW de DL8DAT N6CW de DL8DAT, etc. At 0002 UTC N6CW begins an identical routine, sending DL8DAT de N6CW DL8DAT de

N6CW, etc. This back and forth transmission every two minutes goes on until one station hears the other sending complete callsigns.

Once complete callsigns have been copied by the receiving station, that station will start the next phase of the sequence, that being sending callsigns, as above, for the first 90 seconds of the 2 minute sequence. During the last 30 seconds a signal report is sent. The signal report is the letter "O."

It used to be that the signal report was either a "T," an "M," or an "O." A "T" means that the callsigns are just barely detectable. An "M" means that portions of a call are copied. An "O" means that complete callsigns have been received. However, since the receiving station is looking for complete callsigns, any other report would be a waste of time in completion of the QSO. Therefore, the signal-report convention has evolved into simply using the letter "O."

Let's assume that N6CW was successful in copying the callsigns and has initiated the second phase of the proto-

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col. It is now up to DL8DAT to hear the signal-report portion of the QSO (assuming he has already heard the complete call-sign exchange). Once he hears the signal report, he sends "RO" throughout his entire two minute time frame. This tells N6CW that he has heard the signal report (the "R") and is sending a signal report of his own (the "O"). If his country requires him to sign his call-sign at the end of every transmission, then he sends N6CW de DL8DAT one time at the end of the two

minutes. Otherwise, no call-signs are sent. When N6CW finally hears "RO," during his next two minute transmission he sends only the letter "R." When DL8DAT finally hears the "R," during his next two minute session he sends "73" or "73/SK" followed by complete call-signs at the end of the transmission (to comply with government rules pertaining to station identification). The QSO is considered complete when DL8DAT hears the "R" sent by N6CW. The honor system comes into

effect here, since you are the only one who knows what you heard.

What does it take to get "on the moon"? W5UN reports that there are around 300 active stations. However, Dave has logged over 1500 "initial" contacts, many of which have made only one EME QSO. Dave reports that W2RS, running only 150 watts and a single Cushcraft long boom beam, has made over 20 contacts. Dave also said that many low-power stations take advantage of ground gain. By pointing the beam at the moon when it is close to the horizon, if the terrain is relatively flat ahead of your beam, you can realize as much as six db of gain. Bev, W4ZD, reports that many European stations, running low power (150 watts) and two antennas, have made a success of EME communication. San, K5YY, was able to complete his WAS, work 32 countries, and add to his grid-square total by spending just \$200 more than his initial outlay for his 2 meter station. He has an excellent write-up in the 1990 Central States VHF Society "Proceedings," (available from the ARRL for \$12.00 plus shipping). Bev, W4ZD, has a paper he has prepared that he will send out for an SASE with two units of first-class postage. His address is: Bev Cavender, W4ZD, P.O. Box 88, Lake Placid, FL 33852-0088. John, KØIFL, has an excellent 2 meter EME newsletter. You can obtain a subscription by sending \$12.00 for a year to: John Carter, KØIFL, P.O. Box 554, Union, MO 63084.

Current Contests

The Canadian Radio Relay League is sponsoring their Fall VHF/UHF Sprints. The contest is spread out over several weekends during this month. See John Dorr's Contest Calendar column for details. Do you want to try out your newfound EME skills? You will have a chance this month as the first of the two weekend ARRL International EME Competition occurs this month. Again, check with John, send to the ARRL for the logs and entry sheets, and good luck. I know that Dave, W5UN, will be looking for you.

On The Air

I received a nice letter from John Godwin, KB5IUA, concerning the W5OZI DXpedition to DL88. It is said that half the fun of getting there is just getting there. Well, John reports that they had a lot of fun getting to DL88. The USA and the state of Texas (or should I say Republic of Texas) just barely extends into DL88. It is just enough to whet the appetite of the sojourning DXer, since traveling there to put a rare grid square on the air would still leave one in the United States. Hence, no special licensing arrangements need be made for operating from there.



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Base/Repeater Antenna

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POWER: 200 watts

LENGTH: 15'11"

CONNECTOR: N

CA-2x4FX

Base/Repeater Antenna

GAIN: 146MHz 4.5dB 446MHz 7.2dB

POWER: 200 watts

LENGTH: 5'11"

CONNECTOR: UHF type

CA-2x4MB

Mobile Antenna w/Fold-over feature

GAIN: 146MHz 4.5dB 446MHz 7.0dB

POWER: 150 watts

LENGTH: 5'

CONNECTOR: UHF type

CA-2x4SR

Mobile Antenna w/Fold-over feature

GAIN: 146MHz 3.8dB 446MHz 6.2dB

POWER: 150 watts FM

LENGTH: 3'4"

CONNECTOR: UHF type

CF-416

Duplexer w/Coax

POWER: 146MHz 800 watts

446MHz 500 watts

CONNECTOR OUTPUT: N-type

146MHz INPUT: UHF

446MHz INPUT: N-type



CF-41601 CF-4160K

Duplexer w/o Coax

POWER: Same as CF-416

CONNECTOR OUTPUT: UHF

146MHz INPUT: UHF

I MODEL 446 INPUT: N-type

K MODEL 446 INPUT: UHF



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John reports that to get to their location, they had to travel over 30 miles of unimproved rock, sand, and gravel road. He stated that it took them three hours to travel approximately 26 1/2 miles. They ended up in a washed out gully and still in DL89 when they ran out of daylight. Quite a bit discouraged, they pitched camp, hoping to get a good start on the last 3 1/2 miles in the morning.

After a breakfast of tacos cooked over the charcoal grill (yum!) and the required coffee, they started out. They figured that with the shovel, some rock moving, and lots of good luck, they would make it the rest of the way with at least one of their trucks. Their destination was a dot on the road called Pettit's Place, a spot that is 100 yards north of and 100 feet above the Rio Grande. With shovel in hand, off they went. All the bouncing around caused the HF rig to QRT for the rest of the trip (but who needs DL88 on the low bands, anyway?). The total travel time for the last 3 1/2 miles was around 2 hours. John reported that they only got stuck a total of four more times (he didn't say how many times previously) while getting both trucks through.

John stated that Desert Storm didn't have much on them. They operated in temperatures of 110 degrees, with sand blowing almost continuously. He reported that their tarp almost blew into the Rio Grande, and that they consumed 30 gal-

lons of water, two cases of soda, and three to four gallons of fruit juices and thirst quenchers. They endured three days (28, 29, and 30 June) before packing it in and returning home.

John was astonished to learn about the diligence of our government. This was brought home to him when he was asked at the Border Patrol checkpoint 75 miles from their campsite if "Ya'll were part of that group of hams that had operated from down on the river?" How did the Border Patrol know?

For their trip they made a grand total of 447 QSOs as follows: DM90—8; DM80—3; DL79—12; DL89—34; and DL88—390, all on 6 meters. They had a few QSOs on 2 meters, using a combination of tropo and meteor scatter to make them. John stated that they did work 131 grids from DL88, and if the required QSLs come in, they will apply for VUCC from that grid square.

The gang included John, KB5IUA; Pat, W5OZI; Jeff, N5ECP; John Rose; and 10-year-old Andy Smith. QSLs go to W5OZI at his Callbook address.

I received a nice note from Andy Blackburn, WD4AFY, stating that he had a 23 minute sporadic-E opening on 2 meters between 0005 UTC and 0028 UTC on July 20. He reports working 31 stations, with 4 of them being in new grid squares. He states that his WAS total now stands at 40. He is using a Kenwood TS-790, driving a 170 watt RF Concepts brick w/pre-amp, into a Cushcraft 215WB up just 45 feet. Not bad totals for that setup, Andy!

As you know by now, Harry Schools, KA3B, has turned over his 6 meter newsletter to Shel Remington, NI6E. Harry cites increased job responsibility plus caring for his father who is in poor health the reasons for having to give up the pen and quill. I really appreciated the very kind words Harry had for me in one of his last newsletters. When I met Eric, T12NA, in San Jose, Costa Rica this past July, it meant a lot to hear him say that he had already heard of me by reading about me in Harry's newsletter. Harry has contributed so very much to the encouragement of operating on 6 meters, and he will be missed very much. Thanks, Harry!

Shel will be assisted by Bob Cooper, ZL0AAA/VP5D/K6EDX. Subscriptions will continue as before with no interruptions. For subscription information, contact Shel Remington, NI6E/KH6, P.O. Box 1222, Keaau, HI 96749.

Well, I have learned one thing during my first three months at this column. Never say what you plan to write about the next month. Due to the length of the piece on EME, I ran out of room. The survey and the interview with Eric will be put off until "a future column," hi. Please keep the correspondence coming, as I really appreciate hearing how you are enjoying the higher frequencies.

73, Joe, N6CL

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CIRCLE 6 ON READER SERVICE CARD


First In Communications

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Goodies—Part I of II

This article contains information about amateur radio specialty items such as badges, caps, cups, jackets, patches, pins, and T-shirts. I have included a wide variety of items which amateurs can wear and use. Equipment and accessories directly related to signal reception and/or transmission are not covered in this article. Where prices are stated, they are only included to provide some idea of costs; exact current costs should be determined by requesting that information from the seller. State sales taxes are not included in this article, but they frequently apply. Also, prepaid charges only apply to U.S.A. addresses.

If you know about similar items which are not mentioned in this article, please send such information to my California address. Also, if an outfit has gone out of business, I want to receive that information.

It is hoped that this article will make amateur radio a bit more interesting to many new amateurs. I believe in advertising amateur radio. Everyone who knows me is aware that I am an amateur radio operator. I have my callsign on just about everything that can be marked to show my amateur radio affiliation. Almost every day someone asks me what W6DDB means, which gives me a chance to tell a little bit about our amateur radio service. Many of those brief introductions have resulted in additional amateurs.

The ARRL

The American Radio Relay League (ARRL) has a nice assortment of items. Most of the League items are only available to members. These items are listed in this article for the benefit of ARRL members.

Amateur Radio Emergency Service (ARES) items are available as follows: (a) black and gold stickers (2 per package) at 50¢; (b) red, white, and blue stickers (2 per package) 50¢; (c) black and gold decals or red, white, and blue decals \$1 each; (d) plus black and gold patches, or red, white, and blue patches, \$3 each. The 5 inch member (diamond) decals \$1. Life-member decals (5 per package) \$1. ARRL flag license plate \$5. Cloth ARRL

flag patch \$5, and 4 inch ARRL diamond patch \$2, life-member 4 inch diamond patch \$1.25. ARRL flag pin \$5, membership pin \$3, and life-membership (replacement) pin \$3. Life membership plaque \$25. Set of 50 ARRL member letterhead stationery sheets with 50 matching business-size (#10) envelopes \$8. Fifty pieces of stationery \$4, or 50 envelopes (separately) \$5. Spark to Space items are available as follows: (a) bumper sticker \$2; hats \$7, and patches \$3. Exact details can be requested from ARRL Membership Services, 225 Main Street, Newington, CT 06111.

Bail/Tilt Stand

Budwig sells a bail (tilt stand) that is 2½ inches tall. It can be added to equipment to lift the front panel to a better viewing angle. It is steel finished in black epoxy. The bail can be folded flat against the bottom side of equipment. Mounting centers of 5½, 7, 10, 12, and 15½ inches are available to match almost all amateur equipment. Each bail costs \$7.50, prepaid. The address is Budwig Manufacturing Company, P.O. Box 829, Ramona, CA 92065-0829.

Belt Buckles

Award Design Medals, Inc. offers a unique amateur radio belt buckle. It shows an amateur operating his station. A tower and beam antenna are included in the background. The stated prices include buckle, shipping, handling, callsign engraving, and any tax that might apply. DX amateurs should include an additional \$5 to cover delivery to non-U.S.A. addresses. Payment should be made by check or money order. The all-brass buckle is priced at \$25.95. The two-tone 24K gold and sterling-silver plated buckle is priced at \$54.95. The sterling-silver plated buckle costs \$29.95. Allow 4 to 6 weeks delivery time. Orders may be sent to Pat Guillory, 9487 Dartry Court, Elk Grove, CA 95758. The telephone number is 916-684-1730. These are the most unusual amateur radio belt buckles I have seen.

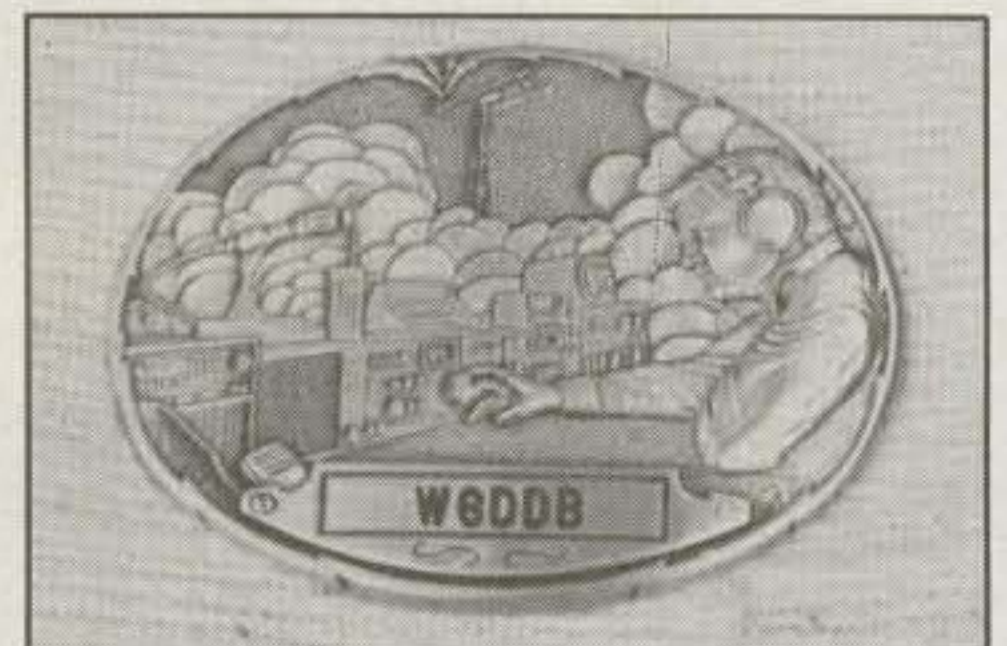
Henry Hornsby, N6MRG, manufactures a very good solid-brass belt buckle of his own design. Each buckle is machine-engraved and hand-finished. He custom engraves anything a purchaser requests

on his buckles. The price is \$11.99 per engraved buckle (callsign only) plus \$2 shipping and handling charges. Add \$1 if you order a second engraved line (name). A nice drawstring-type denim pouch is available at \$1.00 more. His address is 3205 Cook Peak Road, Lake Isabella, CA 93240 (telephone 619-379-4749; he can be called evenings and weekends).

Saul Slonim, W2PD, sells solid-brass belt buckles. One-line (name or callsign) buckle price is \$16 prepaid. Two-line (name and callsign) buckle price is \$18 prepaid. As many as ten digits may be used on each line. The address is 320 Rose Street, Massapequa Park, NY 11762 (516-797-1128).

Bumper Stickers

Star Ridge Communications sells bumper stickers at \$1.75 each and five for \$5, prepaid. One reads "Pray For My Wife. I'm A Ham Operator," and the other message is "Pray For Me. My Husband Is A



Belt buckle available from Award Design Medals is available in brass, sterling-silver plate, and gold and sterling-silver plate.



Henry Hornsby, N6MRG's brass belt buckle can be engraved with anything the purchaser requests.

45527 Third Street East, Lancaster, CA 93535-1802

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

Straight A's Plus!

A3WS

(12, 17 Meters)
30 meter add-on available

A4S

(10, 15, 20 Meters)
40 meter add-on available

A3S

(10, 15, 20 Meters)
40 meter add-on available

If you enjoy contesting, rag chewing or DX-peditions the Cushcraft tri-banders will make amateur radio more interesting. These antennas are used by more hams because they offer more performance and reliability with easy-to-use computer enhanced designs. They feature the highest quality materials with precision machined components and all stainless steel hardware.

A3WS, our newest model gives you uncompromised performance on 12 and 17 meters. With its light weight and clean profile it can easily be mounted with your existing tribander.

Easy-to-use kits will add 30/40 meters to the A3S and A4S and 30 meters to the A3WS.

Heavy duty, high power trap coils.



MODEL	A3S	A4S	A3WS
Frequency, MHz	28, 21, 14	28, 21, 14	24, 18
Forward Gain, dBd	8	8.9	8.0
Front to Back Ratio, dB	25	25	25
2:1 Bandwidth, KHz	>500	>500	300
Power Rating, Watts PEP	2000	2000	2000
Boom Length, ft (m)	14 (4.3)	18 (5.5)	14 (4.3)
Longest Element, ft (m)	27.7 (8.4)	32 (9.7)	25.1 (7.7)
Turning Radius, ft (m)	15.5 (4.7)	18.4 (5.5)	14.4 (4.4)
Mast Size Range, in	1.25-2.0	1.25-2.0	1.25-2.0
Wind Load, ft ² (m ²)	4.4 (0.47)	5.5 (0.51)	4.1 (0.38)
Weight, lb (kg)	27 (12.9)	37 (16.8)	22.5 (10.2)
ADD-ON KITS			
Model	A743	A744	A103
Frequency, MHz	7 or 10	7 or 10	10

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A Few Expert Opinions...

"...The most important performance aspects of any transceiver are ease of use and basic receiver performance. The FT-1000 excels at both...The FT-1000...has a very strong receiver; it has the best overall performance and the highest third order input intercept of any commercial radio ever tested in the ARRL lab...The FT-1000 needs little for me to consider it the ultimate contesting and DXing machine available today..."

—QST Magazine

"The FT-1000 is an excellent top flight transceiver in all respects. It has all the features one would expect in a radio of this class...Of all the top of the range models..., the FT-1000 is the friendliest to use. The ergonomics has been well thought out with simple and obvious control of all functions..."

—Radio Communications (U.K.)

"The FT-1000 is indeed a fascinating new generation of HF transceiver... The receiver side is very impressive. The sensitivity, dynamic range, and selectivity figures are more than adequate for today's needs..."

—CQ Magazine

"Until now a RF output power of 100 watts applied as the norm for semiconductor component shortwave transceivers; some newer high class units offered 150 watts. The FT-1000 is set for a maximum RF output of 200 watts. During normal SSB and CW use the power transformer remains hand warm — an improvement over the past when a transformer would occasionally 'burn up'..."

—cq DL (Germany)

"The biggest attraction of the FT-1000 is the very quiet receiver. In a side-by-side comparison between the FT-1000, the ICOM IC-781, the ICOM IC-765, and the Kenwood TS-950, the FT-1000 came out the winner by a long shot... when comparing its receiver to those found in current equipment of the like monetary value from other manufacturers, the FT-1000 beats all."

—73 Magazine

FT-1000



Direct Digital Synthesis (DDS), two ten-bit DDS plus three 8-bit DDS for fast lock-up time and lower noise than other traditional PLL systems.

High RF Power Output, continuously adjustable output from 20 to a full 200 watts for that extra edge in pileups.

Dual Receive, allows simultaneous reception of two different frequencies utilizing two tuning knobs for easy spotting. And with optional BPF-1 module allows crossband dual receive.

100 Memories, a detented rotary selector can be independently tuned or mode of IF filter selection can be changed directly, like a VFO.

Digital Voice Storage (DVS-2), option provides instant playback of 16-second receive memory, plus two 8-second "CQ Contest" messages on transmit.

Automatic Antenna Tuner, built-in quick-response antenna tuner matches SWRs up to 3:1 on the amateur bands and includes 39 tuner-setting memories for quick band changes.

CW Spot, provides audible tone for aligning transmit signal precisely on incoming signals without transmitting.

CW Audio Peaking Filter, provides additional selecting on CW for weak-signal work. On/Off status is held in memory.

High Dynamic Range, features four high-IDSS JFET up-conversion first mixer for receiver strong signal handling.

Multimode Selection on Packet/RTTY, for maximum flexibility packet mode toggles LSB/FM while RTTY toggles LSB/USB.

IF Shift and Variable Bandwidth Controls provide intermediate bandwidths with adjustable center frequency for no-compromise interference rejection.

Front Panel RX Antenna Selector allows quick switching to your Beverage or loop receiving antenna.

Dual Mode Noise Blanker for automobile ignition noise or Woodpecker suppression.

All-Mode Squelch for silent monitoring between contacts.

Wide Variety of Cascaded Filter Selections, SSB/CW filter selections from 2.4 kHz to 250 Hz in both 2nd and 3rd IF sections.

Stereo Dual Receive, operator may select either mixed or stereo dual receive (one channel in each ear). Stereo headphones required.

BPF-1 Module (optional on std. model), don't be restricted to inband spotting only!

RF Speech Processor for extra punch in the big pile-ups.

Flywheel-Effect Main and Sub-VFO Tuning Dials, main dial includes finger hole for easy tuning.

Temperature-Compensated Crystal Oscillator factory installed in model FT-1000D, for extremely high stability in critical applications.

YAESU
Performance without compromise.SM



MFJ's world map clock shows time and date at each worldwide location and lets you see where your contact is located.

Ham Operator." The address is P.O. Box 141, Newton, CT 28658.

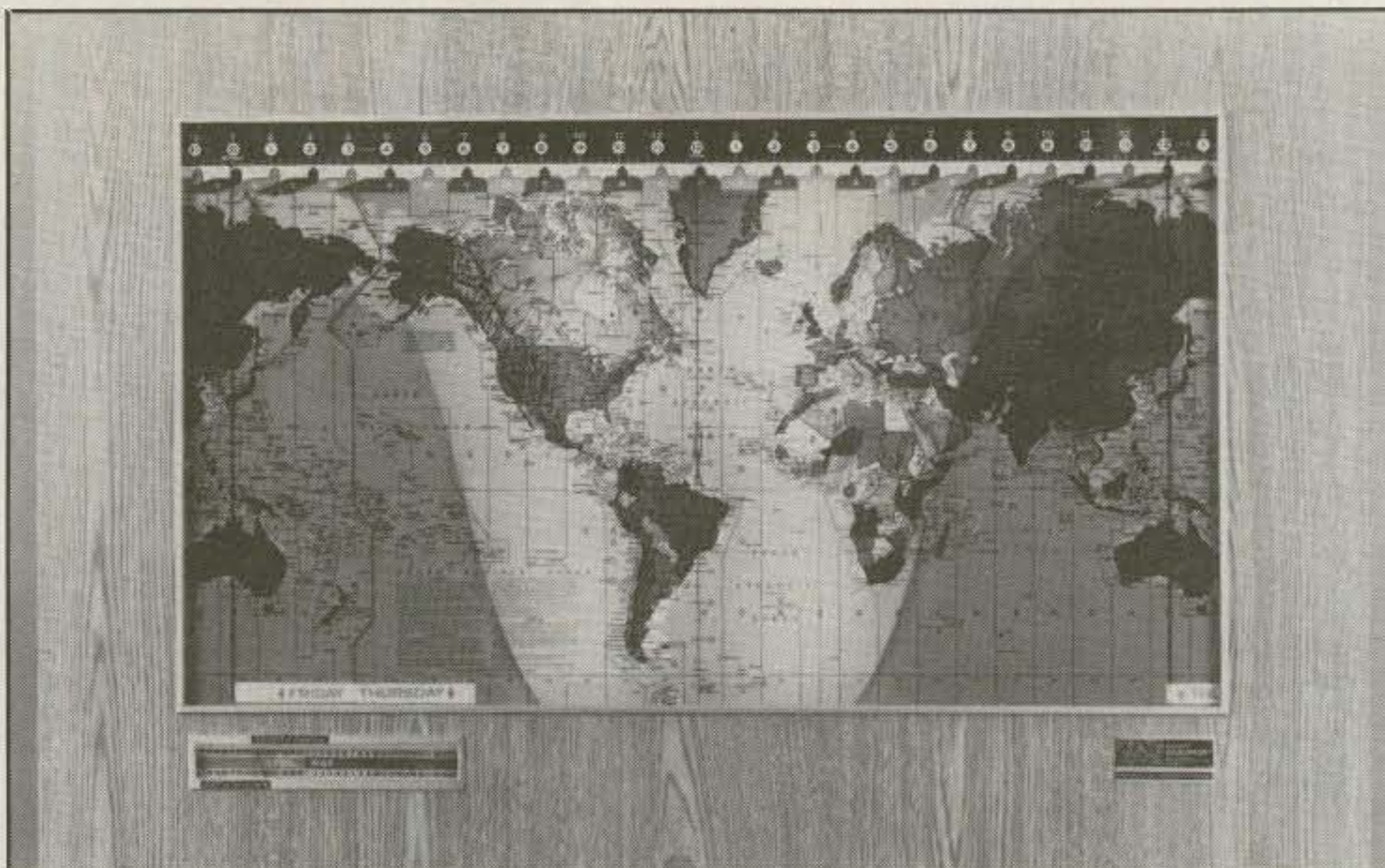
CQ Bookstore

The CQ Bookstore has a few items which may be of interest to you. Their baseball-type caps are available in blue, gold, kelly green, and red. The callsign and name are added to the front of the cap, with a maximum of six digits to each line. The price is \$7.95 each. Plastic-laminated identification badges are sold at \$3.50 each. The badge/lettering color combinations are blue/white, green/white, metallic gold/black, metallic silver/black, red/white, white/black, white/red, woodgrain/white, and yellow/blue. Add \$4.00 to cover shipping and handling costs of a U.S. order. The address is Main Street, Greenville, NH 03048 (orders only 800-457-7373).

Clocks

World Map Clock. MFJ offers a 5 1/4" x 3 1/4" world map clock at \$24.95, plus shipping and handling. Their MFJ-110 shows the time and date at each worldwide location, and it lets you see where your contact is located. The clock also shows the month, date, and year, plus the day of the week. Pushbuttons allow you to easily move the display to any QTH in every time zone. It is a tan map on a gold background with a black border. An additional feature of this clock is an alarm. The address is MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762.

World Time Indicators. Geochron Enterprises offers four models of their world time indicator. Each model displays daylight and darkness, sunrise and sunset, correct time in each zone, day of the week, and date of the month. Prices range between \$1265 and \$2465, plus shipping charges and costs of any desired accessories. Each model is 40" x 28" x 10". Their address is 899 Arguello Street, Redwood City, CA 94063. Their toll-free telephone number is 800-342-1661 and their FAX number is 415-361-1780.



The world time indicator from Geochron Enterprises displays daylight and darkness, sunrise and sunset, correct time in each zone, day of the week, and date.

World Timer/Digital Thermometer.

Beam Solar and Electronics sells a combination world timer and digital thermometer which converts degrees Fahrenheit (F) to degrees Celsius (C). A data sheet can be obtained by sending a request and SASE to 6205 11th Avenue, Brooklyn, NY 11219.

Clothing

Caps. The Embroidery Warehouse sells summer (mesh) and winter (corduroy) caps at \$10.70 and \$12.00 each ppd, respectively. The embroidered name, callsign, and town/city can have a maximum of 14, 6, and 14 letters, including spaces, respectively. Summer caps are red or royal-blue mesh and bill, with a white foam front. Embroidery matches the cap color. Full corduroy (winter) caps are red or navy blue with gold embroidery. The address is P.O. Box 1476, Severna Park, MD 21146.

Caps and Decals.

Caps Unlimited sells a 2" x 3" embroidered Skywarn patch with heat-seal adhesive backing. It shows a black tornado inside a fluorescent orange eye, and it has the word "Skywatch" below the eye. This patch is also available on a black baseball-type summer cap. They sell the same kind of cap (one size fits all) with the words "Amateur Radio Communications" centered between a pair of lightning bolts in day-glo bright chartreuse. RACES decals are sold to RACES members. They are self-adhesive on the front side for attachment inside vehicle windows and windshields. The address is P.O. Box 460118, Garland, TX 75046-0118 (214-276-0413). They also sell identification badges and embroidered patches. As usual, your SASE would be appreciated if you request data.

Caps, Emblems, and Jackets. A. T. Patch Company sells patches (emblems), jackets, and caps in a wide variety of styles, colors, and prices. Emblems sell



Caps Unlimited sells SKYWARN patches, RACES decals, and various caps.

...The Perfect Solution

If you're living in an area with antenna restrictions, if you're tired of hassling with huge multi element yagis or if you're just looking for a compact, rugged, easy-to-use portable antenna that really *works*, the 150 watt IsoLoop 10-30 (MHz) HF Antenna is the Perfect Solution to your antenna problems.

The IsoLoop 10-30 has been redesigned to provide greater durability, lower SWR and extended frequency coverage. Because the loop is isolated from the feedline, your radiated power goes into the antenna, not into the shack. Efficiency is maximized because the new design has no mechanical joints and no assembly is required. **No ground plane or antenna tuner needed!**

The IsoLoop comes fully assembled complete with LC-2 Loop Controller (including signal strength LEDs) and 50 feet of control cable in a UPS shippable package.

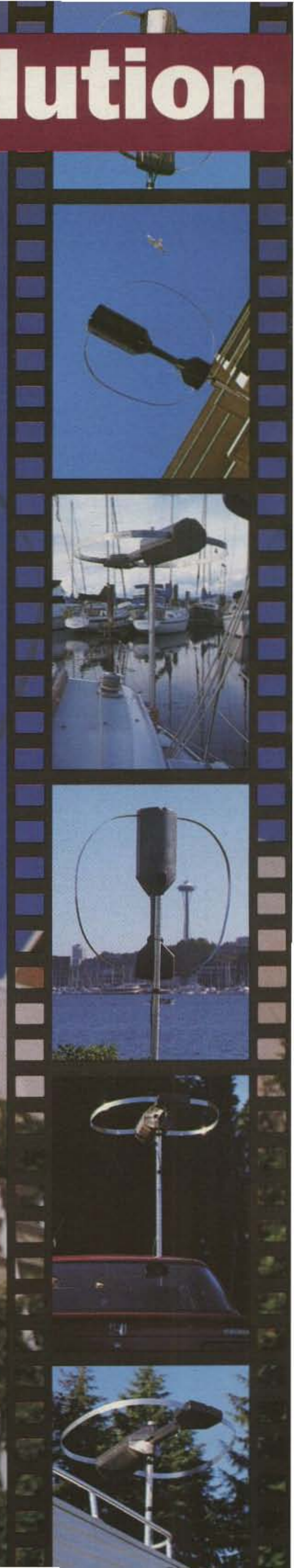
This HF antenna goes where few others have gone before!

See the IsoLoop 10-30 today at your favorite AEA dealer.

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LC-2
Loop Controller.



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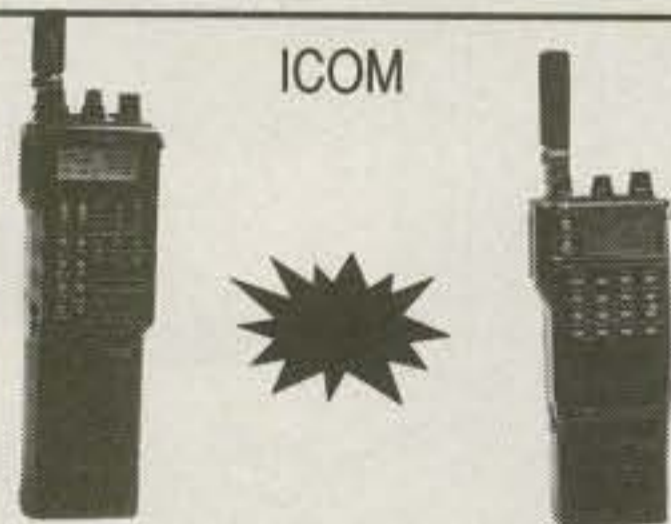
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CIRCLE 136 ON READER SERVICE CARD



Here is eight-year-old Avraham (Avi) Broges, KB2JFU, of Flushing, New York. Avi is a third grader and the son of Aaron Broges, WC2C. His equipment is eight times older than he is, and it weighs twice as much as Avi. He is active in the Novice code bands. Lloyd Mills, WB2ZIT, provided the photograph.

in a basic range of 70¢ to \$5.20 each. Up to six colors can be used in an emblem without extra charge. Each additional color adds 7¢ to the price of every emblem. If metallic thread is ordered, it adds 30% to the base price. Similarly, solid embroidery increases the price 30%, and a felt background costs 20% more. If heat-seal backing is ordered (to avoid sewing), that raises the price 15%. There is an initial \$10 pattern setup charge, and patterns are retained for possible use in filling future orders. These emblems can be added to caps and jackets. Caps cost \$3.00 to \$4.50 (depending on quantity ordered). Obviously, these items should be purchased by groups (such as amateur radio clubs) in large quantities to obtain low prices. The required form is dated and it is sent with a catalog in response to a request. The address is P.O. Box 682, Littleton, NH 03561 (603-444-3423).

Caps, Golf Shirts, and T-Shirts. Anne Wright, N6BOP, sells a very good assortment of T-shirts, golf shirts, and caps. T-shirts and golf shirts are available in beige (tan), light blue, light yellow, or white. They can be printed both sides. A red ARRL logo is available in sizes of 2¼" × 5" or 1¾" × 3". Lettering style can be ivy open or sportswear using black, brown, green, maroon, orange, red, or royal-blue ink. T-shirts cost \$13.75 each ppd, printed both sides. Golf shirts cost \$17.25 each (printed one side), or \$18.25 each (printed both sides). Her caps have a foam front, mesh back, and a strap to adjust the size. Caps sell at \$8.25 each, ppd. Print styles and colors for caps are as stated for shirts. The address is 2272 Kellogg Park Drive, Pomona, CA 91768.

Caps, Jackets, and T-Shirts. Rod Williams offers an interesting variety of jackets, T-shirts, and caps. Each item can be customized to include name, callsign, and other information. His address Box



A. T. Patch Company sells patches, jackets, and caps in a variety of styles and colors.

AMATEUR RADIO W6DDB

Rod Williams' T-shirts, jackets, and caps can be customized with the buyer's name, callsign, etc.

7486, Toledo, OH 43615. His telephone numbers are 419-829-6254 and 419-843-2014. Rod gives clubs a 10% discount when they place multiple item orders. If you want details about Rod's products, you should request information from him. My wife (Marie, W6JEP) and I are two of his satisfied customers.

Club T-Shirts. Mike Klein, KC3NE, specializes in club T-shirts. No order is too small. His address is Box 306, Cheltenham, PA 19012 (215-742-5321).

Paul Washa, W0TOK, sells T-shirts and sweatshirts featuring an enlarged reproduction of the 1964-1965 5¢ amateur radio stamp. T-shirts sell in all sizes (S, M, L, XL, XXL) at \$10 each ppd. High-quality white sweatshirts sell at \$23 each in sizes S through XL, and at \$26 each for XXL, delivered. The desired size must be specified, of course. The address is 4916 Three Points Boulevard, Mound, MN 55364-1245.

Sweatshirts and T-Shirts. These sweatshirts are marked "I LOVE CW" and they sell at \$16.95 each, prepaid. The T-shirts are also marked "I LOVE CW" and they sell at \$10.95 each, prepaid. Both are available in blue, white, or yellow. Orders can be sent to R. Daniel, P.O.

Now, You Can Eavesdrop On The World. Introducing the new Drake R8 Communications Receiver. It's world class, world band radio, made in the U.S.A. From Perth to the Persian Gulf, Moscow to Mozambique, local or global, you hear events *as they happen* with amazing clarity. Since 1943, Drake



has been setting the standards in electronic communications... and then raising them. Today, there's no better shortwave receiver than the Drake R8. **Out-Of-This-World Performance.** The new Drake R8 has more standard features than other shortwave radios. You get wide frequency range (100 KHz to 30,000 KHz), coverage of all world and local bands, and excellent dynamic range. But you also get important features you won't find on receivers costing hundreds of dollars more. A multi-voltage power supply. Pre-amp and attenuator. Five filter bandwidths and synchronous detector. Dual mode noise blanker and passband offset. Non-volatile 100 channel memory. All designed to give you the best reception with the least distortion. **Down-To-Earth Design.** The ergonomic design of the R8 gives you real ease of operation. You have convenient keypad entry, with large, legible controls. The face is bold. Uncluttered. And the liquid crystal display (LCD) is backlit for easy reading. **Try The R8...** **At Our Risk.** If you're not impressed by Drake's quality, performance and ease of operation, return the R8 Receiver within 15 days and we'll refund your money in full, less our original shipping charge. For more information, or to order, call **TOLL-FREE, 1-800-937-2530**. Telephone orders may be placed on a major credit card. \$979.00 (Shipping and handling \$10 in continental U.S. Ohio residents add 6½% tax.) Call **TOLL-FREE, 1-800-937-2530** today. You can't lose.

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| TA100S: | Telescoping Whip Antenna..... | \$ 12. |
| CC30 | Vinyl Carry Case..... | \$ 14. |
| BL10: | LED Backlight..... | \$ 15. |
| BL28: | EI Backlight for use in roomlight and low light..... | \$ 45. |
| BG28: | Bargraph Signal Level Indicator..... | \$100. |
| TCXO 30: | Precision ± 0.2 ppm 20 to 40°C temp. compensated time base..... | \$100. |

Universal Handi-Counter™ Model 3000, \$375. and Bench Model 8030, \$579. Both offer frequency, period, ratio and time interval.



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An enlarged reproduction of the 1964-65 amateur radio stamp is found on T-shirts and sweatshirts available from Paul Washa, W0TOK.



Glass and ceramic mugs with name and callsign are available from Todd W. Skogen, KA9OBH.

Box 670, Williamsbridge Station, NY 10467-0670.

Leslie Shirk can put an enlarged version (about 8" x 10") of your QSL card (or photo) on white sweatshirts or T-shirts. Except for neon, all colors can be reproduced. The QSL card (or photo) is returned undamaged, and orders are filled within a couple of days. Each sweatshirt (cotton/poly) and T-shirt (cotton) sells at \$25 and \$20, respectively, prepaid. Orders can be mailed to Laurelwood Designs, 2728 SE Laurelwood Drive, Milwaukee, OR 97267.

T-Shirts. Shure Brothers, Inc. offers a promotional T-shirt at \$7.25 each ppd. The stock number is PR-73, which is appropriate. As usual, these T-shirts are available in S, M, L, and XL sizes. The Shure logo and slogan (Sound of The Professionals . . . Worldwide) appears on the front. T-shirt color changes from time to time. The present ones are athletic gray with red lettering. Orders may be mailed

to Shure Brothers, Inc., Customer Service Department, 222 Hartrey Avenue, Evanston, IL 60202-3696. Be sure to include the stock number. Their telephone number is 1-800-257-4873.

Cups and Mugs

Todd W. Skogen, KA9OBH, sells 5 ounce etched glass mugs and 11 ounce ceramic coffee cups at \$12.90 each ppd. First name and callsign are etched on the large glass mug. The first name and callsign are etched in white on one side of the black or blue (state choice) ceramic coffee cup. If at least 36 cups are included in a single order, a 10% discount applies. The address is Todd W. Skogen, P.O. Box 3025, Fox Valley Station, Aurora, IL 60504 (312-805-5972).

Pottery Mugs. J.C. Cramer sells 16 ounce size handcrafted pottery mugs with name and callsign imprinted into the clay. Buyer must state choice of cinnamon brown or seacrest blue. ARRL logo is available at no extra charge, if it is requested. The price is \$16.95 each ppd, with three weeks delivery allowance. The address is Pottery by J.C., 650 Cascade, Shelton, WA 98584 (206-426-7559).

Summary, Part I

This completes the first segment of this two-part article. The second segment covers engraved replicas, eyeball QSL cards, identification tags, jewelry/patches, license plates, lights, maps, pencils, QSL displays, rubber stamps, signs, and Vibroplex, Kenwood, Yaesu, and ICOM items. If you want to buy specialty items for holiday gifts for your relatives and/or friends, now is the time to place your orders.

73, Bill, W6DDB



These handcrafted pottery mugs have the operator's name and callsign imprinted into the clay. They can be ordered from Pottery by J. C.

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Continuing over a 70 year tradition, we bring you two new Callbooks for 1992 with more features than ever before.

The 1992 North American Callbook lists the calls, names, and addresses for more than 500,000 licensed amateurs in all countries of North America from Panama through Canada, including Greenland, Bermuda, and the Caribbean islands, plus Hawaii and the U.S. possessions. 1,592 pages. Item # 087123. (paper) \$29.95

The 1992 International Callbook lists more than 500,000 licensed amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions). 1,720 pages. Item # 087115. (paper) \$29.95

Every active amateur needs the Callbook! Fully updated and loaded with extra features, the 1992 Callbooks will be published in December 1991. Order now from your dealer or send in the coupon below.

Please send me _____ copy(ies) of **The 1992 North American Callbook** (Item # 087123, \$29.95) and _____ copy(ies) of **The 1992 International Callbook** (Item # 087115, \$29.95).

I have enclosed my check/money order for \$_____. (Please add sales tax in CA, DC, IL, MA, NJ, NY & TN, and \$3.00 per book for postage and handling for U.S. shipments and \$7.00 for all shipments outside the U.S.) Or call and charge on your credit card. MasterCard, VISA and American Express cards accepted.

Please be sure to include shipping instructions. Prepayment required and must be in U.S. funds. DRZI 0991

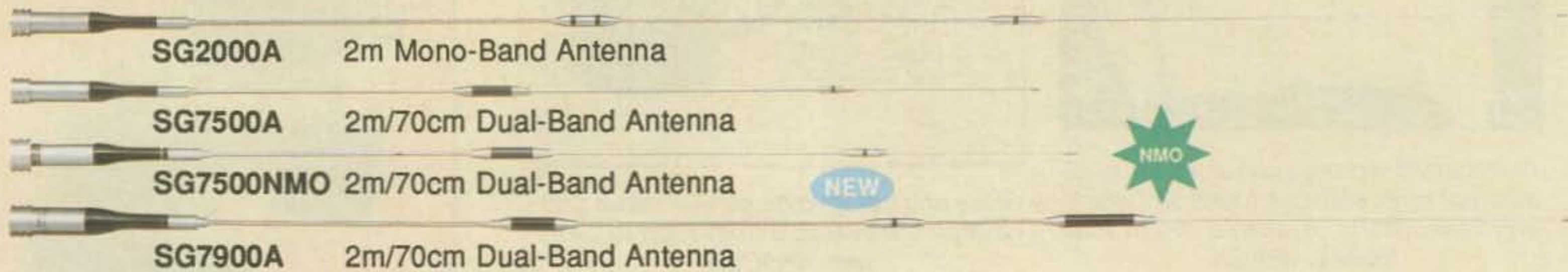
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1-908-905-2961 (Phone) 1-908-363-0338 (Fax)

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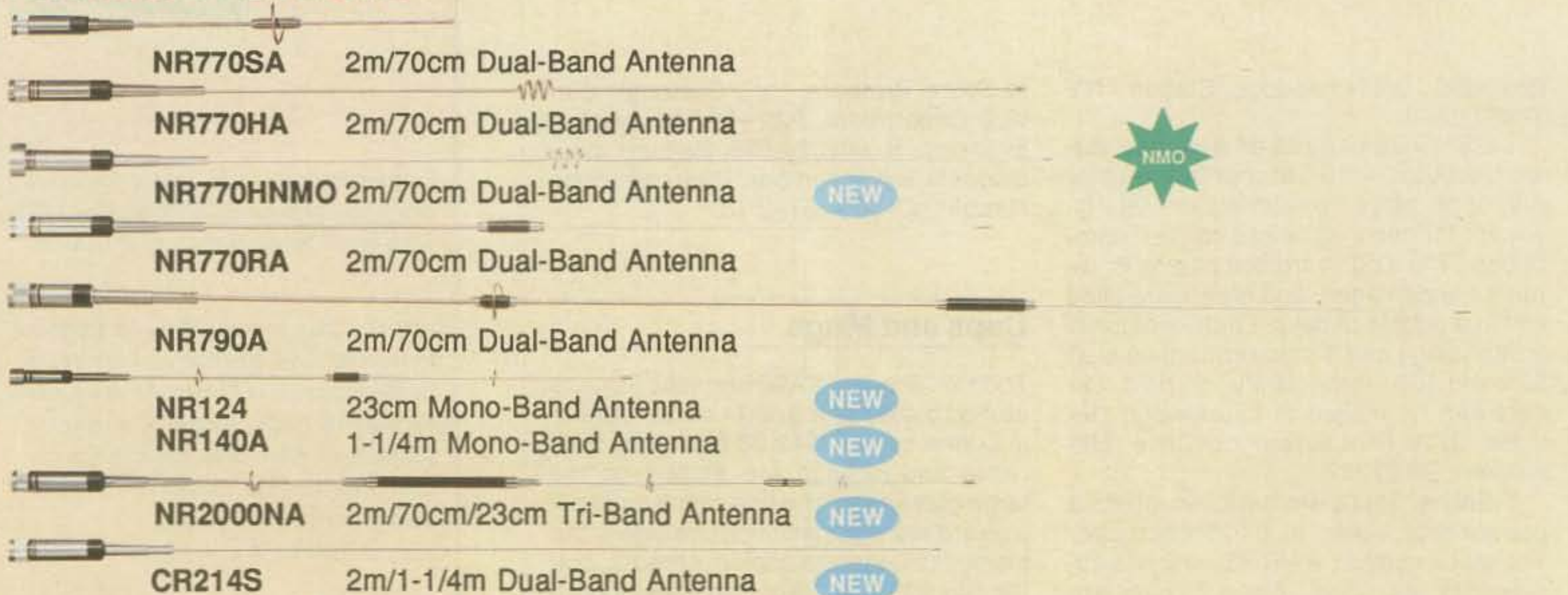
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SG7500A	2m/70cm	3.5/6.0	150	UHF	41	2m:1/2λ,70cm:5/8λ
SG7500NMO	2m/70cm	3.5/6.0	150	NMO	42	2m:1/2λ,70cm:5/8λ
SG7900A	2m/70cm	5.0/7.6	150	UHF	62	2m:1-1/2λ+1-3/8λ, 70cm:3-5/8λ
NR770SA	2m/70cm	-/2.15	100	UHF	17	2m:1/4λ,70cm:1/2λ
NR770HA	2m/70cm	3.0/5.5	200	UHF	40	2m:1/2λ,70cm:2-5/8λ
NR770HNMO	2m/70cm	3.0/5.5	200	NMO	41	2m:1/2λ,70cm:2-5/8λ
NR770RA	2m/70cm	3.0/5.5	200	UHF	39	2m:1/2λ,70cm:2-5/8λ
NR790A	2m/70cm	4.5/7.2	120	UHF	58	2m:3/4λ, 70cm:3-5/8λ
NR124	23cm	8.4	100	N	25	4-5/8λ
NR140A	1-1/4m	4.0	150	UHF	37	5/8λ
NR2000NA	2m/70cm/23cm	3.15/6.3/9.7	100	N	39	2m:1/2λ,70cm:2-5/8λ, 23cm:5-5/8λ
CR214S	2m/1-1/4m	2.1/3.4	120	UHF	37	2m:1/2λ,1-1/4m:5/8λ

- SPECIAL FEATURES:** - Superior Quality for long life - Factory Pre-tuned/no adjustment required
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 - Fold-Over feature with spring loaded hinge(not available in NR770SA)
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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Books for the Hamshack

This month we turn to stocking the well-read radio amateur's bookshelf. Let's get started.

From the Bookshelf

Communications Formulas & Algorithms. There's a new one-volume reference book now available that focuses on the most used formulas, algorithms, and design data used in communications. The 254-page, illustrated hardcover is *Communications Formulas & Algorithms* by C. Briton Rorabaugh.

The book is a comprehensive guide intended to speed up the design process. It includes some of the most helpful techniques to analyze, simulate, design, and test communications systems. Practical information and a clear definition are included for each algorithm, procedure, and method covered. Some of the topics include noise; simulation; signal processing; probability distributions; the use of function plots, graphs, and diagrams; and reception and transmission.

The \$39.95 book is published by McGraw-Hill Publishing Company, 11 West 19th St., New York, NY 10011.

Passport to World Band Radio. This one, by Larry Magne, is a "must" for shortwave listeners (SWLs), as it is a comprehensive, quick-access annual guide to shortwave broadcasting in the 2.3 to 26 MHz international broadcasting range; stations are displayed by frequency. Outlets in over 150 countries are presented in grid-chart format showing station name and location, power, beginning and ending times of transmission, languages used, and target areas. The book also features a buyer's guide that includes Larry's hard-hitting but respected receiver reviews.

The 384-page annual is published by IBS and is priced at \$16.95. It is available from many communications stores and mail-order dealers, including Tiare Publications, Electronic Equipment Bank (EEB), Universal Radio, Gilfer, and others.

The Shortwave Listening Guidebook. This is a new book from Harry L. Helms, AA6FW, that checks in at 316 pages in a 6" x 9" format; it contains eleven chapters and six appendices that are chock full of useful information. The book tells the reader when, where, and how to hear the world via shortwave radio, presented in highly readable, nontechnical language. Included is information on receiver selection, propagation, proper receiver operation, obtaining program schedules from overseas stations, profiles of major international broadcasters, and popular broadcast and utility frequencies. There are chapters on antennas and accessories; FM, TV, and broadcast

band DXing; amateur radio; and even "unusual, illegal, and mysterious radio stations," including clandestine and pirate broadcasters.

The new book is priced at \$16.95 plus \$3.00 shipping from the publisher, HighText Publications, Inc., 7128 Miramar Road, Suite 15, San Diego, CA 92121. It also is available at many communications stores and mail-order houses.

Another recently released and intriguing Helms book from the same publisher is *The Underground Frequency Guide*, second edition. This book provides detailed information on strange, unusual, and mysterious shortwave radio stations. The guide catalogs over 500 frequencies and times when "strange radio signals" have been heard in the past year. The 86-page, 8½" x 11" book is \$10.95.

Scanner Modification Handbook, Volume 2. In the August 1990 column we took note of Volume 1 of this handbook. In it author Bill Cheek showed how the nontechnical scanner hobbyist could make some relatively simple equipment modifications and changes to emerge with a much-enhanced scanner. Special focus was on adding memory channels.

In the recently released Volume 2, "modification master" Cheek describes in detail 18 more enhancements for several Radio Shack and Uniden Bearcat scanners. Many of these modifications are quite simple and are adaptable to other scanners. Included are approaches to adding signal strength and center tuning meters, varying the scan delay time, decoding CTCSS tones, adding channels, speeding up the search/scan rate, adding an event counter, restoring locked-out bands, and more.

Volume 2 includes a very useful listing of all known VHF/UHF scanning radios to date, alignment instructions, guidelines on purchasing used scanners, and using a VCR to record scanner output. There's also a review and update of the 23 modifications that were presented in Volume 1.

The new 220-page volume is available from CRB Research Books, Inc., P.O. Box 56, Com-mack, NY 11725. It's \$17.95 plus \$3.50 shipping. CRB Research also offers a very interesting catalog of unusual SWL, scanner, and other radio and related publications for \$1.00.

Two from Osborne/McGraw Hill. I must admit that I've been impressed with most of the computer book/disk packages that these folks have issued over the past few years. One of the latest ones to hit the bookstores is *Dvorak's Guide to DOS and PC Performance*, another massive (950-page) but neatly packaged and organized *magnum opus* by John C. Dvorak and Nick Anis.

By the same two authors who wrote *Dvorak's Guide to PC Telecommunications* (reviewed in the August 1990 column), Dvorak and Anis give users the context, examples, and specific instructions they need to obtain peak PC performance. Included is in-depth coverage of Microsoft DOS 5.0 and Digital Research DR-DOS 5.0; text editors; DOS batch

files and extenders; menu programs; DOS shells; data protection and recovery; multi-tasking, task switching, and memory management; disk backup and security; Microsoft Windows and DESQView; DOS vs. OS/2 and UNIX; and computer networks. Also covered are diagnostics; benchmarks; disk caching and defragmenting; upgrading hardware; BASIC; and many other topics.

A nice bonus is the inclusion of two disks that are packed with more than 1 MB of compressed software. The disk package includes more than 70 shareware selections and special versions of popular commercial programs including XTree, DeskConnect, Mace Utilities, and others. The book/disk combo is \$49.95.

If you're in need of a good computer dictionary, the same publisher offers the 352-page *Computer Professional's Dictionary*, a handy reference to the latest in computer terminology. Over 3000 terms are included from "abbreviated addressing" up front to "Zmodem" bringing up the rear; common words are included as are arcane terminology, buzzwords, and computer jargon. About all that's not included are the trade names of computer companies and application software products, such as "Apple" and "MacWrite." The new reference by Allen L. Wyatt is \$19.95.

Both books are widely distributed in bookstores, or contact Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710.

The Radio Works Catalog. A while back Jim Thompson, W4THU, sent me a copy of the latest Radio Works catalog No. 911, which focuses on HF wire-antenna systems, high-power baluns, and components. I was surprised at how the catalog has grown over the past five or six years: it's now up to 80 pages, and as such is probably the biggest wire antenna catalog around (*and in need of a table of contents or index—hint, Jim!—ed.*). Just about everything you might need to build, install, accessorize, or update an antenna system is found in the catalog. There's also a good deal of tutorial and reference information between the covers, making the catalog an excellent resource for the beginner.

New with this edition are expanded wire, coax, and connector sections; also, bulk prices are included for many items. Of special interest are the new 40 and 80 meter "C-Cube" (for **C**urrent-fed, **C**arolina Windom, **C**urtain-type) Beams and the new multiband "G5RV Ultra." The mobile HF and VHF antenna section offers a wide variety of mobile and base-station antennas and mounts and also includes the new "Carolina Bug Catcher" mobile antenna. Too, the balun section includes two new "line isolators." One of the new isolators is designed specifically for verticals, while the second is an addition to an already installed antenna, including a beam; Jim suggests the latter as a good replacement for "coiled-coax" style baluns.

The catalog is available by writing The Radio

317 Poplar Drive, Millbrook, AL 36054

ELNEC ver. 2.03N
(c) 1991 by Roy Lewallen, W7EL

TI TITLE:	W8JK with 0.1 - wavelength sp.		
FR FREQUENCY:	21.2 MHz. (wavelength = 14.14116 m.)		
WI WIRES:	2 Wires	WL WIRE LOSS:	Zero
SO SOURCES:	2 Sources	UN UNITS:	Wavelengths
LO LOADS:	0 Loads		
GT GROUND TYPE:	Real	LAST FILE SVD/RCLD:	
GD GND DESCRIPTION:	1 Medium, 0 Radials	LAST.EN	
PT PLOT TYPE:	Elevation	AR ANAL RES:	1 Deg.
PA AZIMUTH ANGLE:	0 Deg.	RF REFERENCE:	0 dBi
PR PLOT/TABLE RANGE:	0 - 180 Deg. (full)		
SS STEP SIZE:	5 Deg.		
OR OUTER RING OF PLOT:	Automatic scaling		
FI FIELD(S) TO PLOT:	Total field only		
(DE)lete, (RE)call, (SA)ve description <RET> = Plot (AN)alyze (CU)rrents (Load D)ata (OP)tions (Print D)esc (Src D)ata (TA)ble (View A)ntenna (EX)it prog without saving desc (QU)it			

Fig. 1—Shown here is the ELNEC Main Menu as it is set up to analyze a W8JK multi-element directive array with 0.1 wavelength spacing at 21 MHz. ELNEC is an antenna modeling and analysis program that is intended to simplify sophisticated antenna analysis. It is written by Roy Lewallen, W7EL.

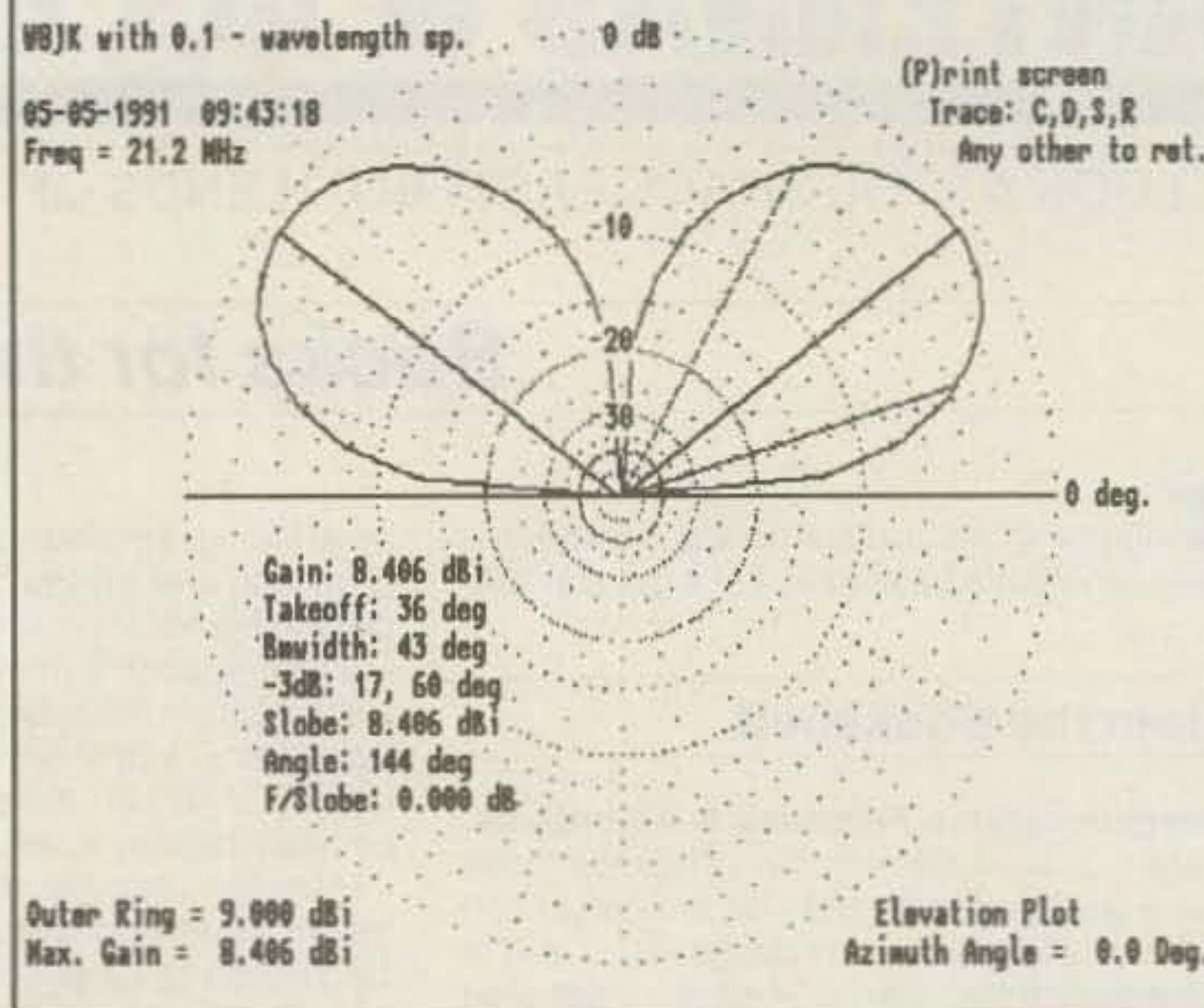


Fig. 2—Here's a screen dump of what you typically see when subjecting an antenna to ELNEC modeling, and after analysis and annotation of the plot—in this case, that of a 21 MHz W8JK beam with 0.1 wavelength spacing. The program allows azimuth and elevation plotting on Epson-compatible 8/9-pin or 24-pin dot matrix printers or HP LaserJet or DeskJet printers. An especially nice feature is that multiple antenna patterns can be superimposed on a single graph for comparison.

Works, Box 6159, Portsmouth, VA 23703.

AntennasWest Data Packet. Jim Stevens, KK7C, of AntennasWest, offers a large packet of spec sheets that cover the HF antennas he sells. Jim's very reasonable philosophy is that if you take care in choosing an antenna, you can consistently work DX without a tower and without running high power.

Some of the latest AntennasWest offerings include the TNT, a ready-to-use, "no-tune" HF Windom; G5RV all-band "QuickKits"™; QRV ("I am ready") emergency antenna packs; the single-band, two-element DX HalfSquare; a "Slinky" indoor antenna; the QRV-QL Quick-Launch antenna installation kit; the Omni-Loop™ for 160–10 meters; TigerTail™ snap-on range extenders for handheld radios; and several other antennas. AntennasWest also offers solar-power supply products and fast turn-around two-color QSLs.

For a free information packet, contact AntennasWest, Box 50062, Provo, UT 84605.

Bird Catalog. This 60-page illustrated catalog describes Bird's extensive professional-quality line of directional couplers, RF wattmeters, attenuators, coax filters and switches, load resistors, and other antenna accessories. The Bird power measurement instruments catalog is available from Bird Electronic Corp., 30303 Aurora Rd., Cleveland, OH 44139.

Great Radio Reads Catalog. Gerry L. Dexter, a fellow columnist who writes for sister publication *Popular Communications*, operates Tiare Publications. Gerry offers a good selection of books on SWling, scanner and utility monitoring, amateur radio, broadcasting, and the like. Both Tiare-published books (about 30) and the books and products from other publishers and manufacturers (around 50) are covered. I note in the latest (5th edition), 20-page "Great Radio Reads" catalog (up from 8 pages early last year) that he also has added a good selection of SWL and scanner oriented software for the IBM PC.

Copies of the catalog are available for \$1.00 from Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147.

Universal Radio Communications Catalog. Fred Osterman, N8EKU, sent me a copy of Universal's recently released communications catalog which now blends the previously separately issued catalogs for the amateur radio operator and shortwave and scanner listening hobbyists. The new combined Catalog 91-02 is 92 pages long in 8½" × 11" format and is of typeset quality. It features a rather impressive selection of antennas, headphones, books, and accessories. The catalog includes tutorial information for the beginner as well as a list of seven free informational pamphlets that are available for an SASE.

The new catalog is available free on request by fourth-class mail, or for \$1.00 by first-class mail. Contact Universal Radio, 1280 Aida Drive, Reynoldsburg, OH 43068.

Gilfer Catalog. Of special interest to our SWL readers is an excellent source of shortwave receivers, antennas, books, cables, connectors, and sundry accessories. That source is Gilfer Shortwave, 52 Park Avenue, Park Ridge, NJ 07656. The most recent catalog I perused had 24 pages and included several unique receiving antennas and a good selection of amateur radio and shortwave oriented publications. Their catalog is free of charge.

Artsci Catalog. A new catalog of a small but intriguing selection of amateur radio, SWL, and scanner publications is offered by Bill Smith, N6MQS, of Artsci, Inc., P.O. Box 1848, Burbank, CA 91507. Artsci offers publications such as the *Amateur HamBook*, a collection of useful graphs, tables, charts, and construction plans, focusing on antennas; the *U.S. Repeater Mapbook*, a VHF/UHF repeater guide with state maps showing popular repeaters; *Radio/Tech Modifications*, which includes easy-to-follow instructions and diagrams of practical modifications for popular amateur radio, CB,

and scanner radios; and *Federal Assignments, Volume 1*, said to contain the complete federal government frequency assignment file. Artsci also offers several QSL card designs.

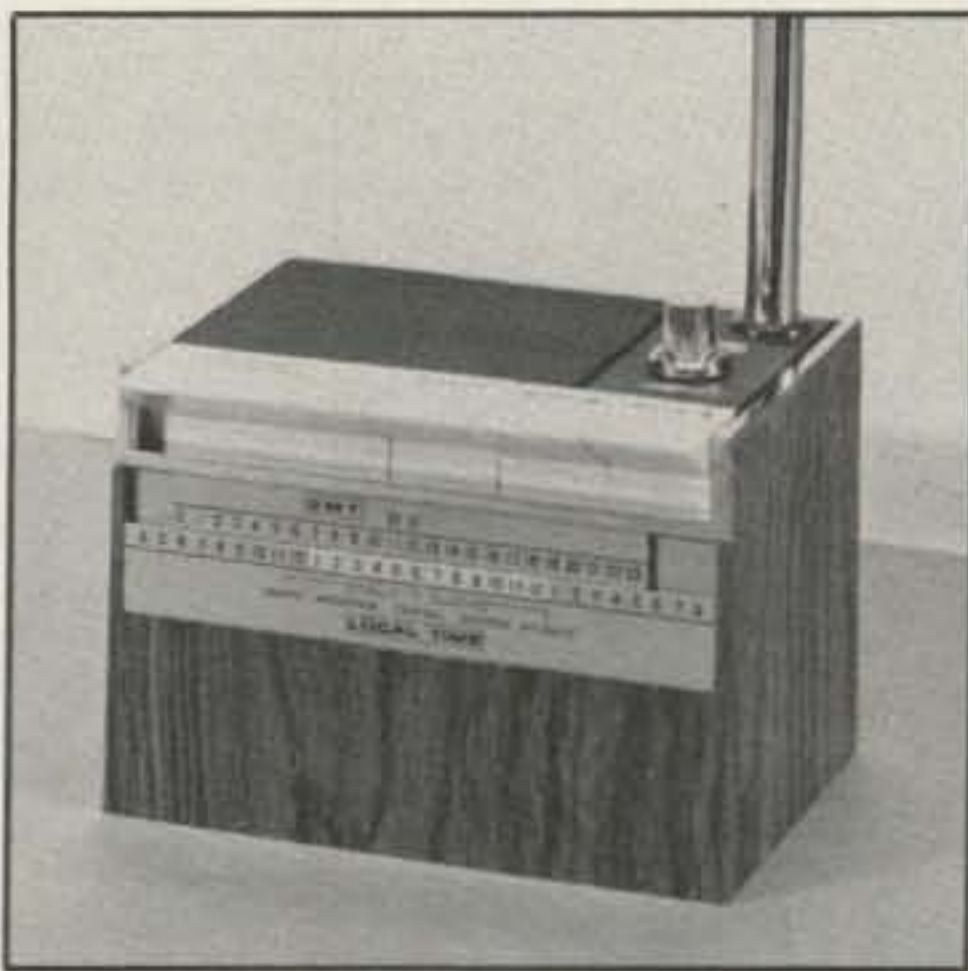
EEB Shortwave Catalog. The Electronic Equipment Bank (EEB) is in its 20th year and refers to itself as "your full service communications supplier." In 1990 they opened a large showroom in Vienna, Virginia (a Washington suburb), but they still do a thriving mail-order business, especially among SWLs. Their thick catalog features a variety of portable and fixed-station communications receivers, RF and audio accessories, and books of interest to the SWL and beginning amateur.

I was fascinated by the range of HF receiving antennas and antenna accessories (coax switches, lightning protectors, cables, etc.) that EEB offers in its catalog. They provide a variety of sloper and trap-dipole antennas by AlphaDelta and Antenna Supermarket. They also sell a number of active outdoor antennas by Sony, Datong, and MFJ, as well as several wideband 25–1300 MHz receiving Discones that also have limited transmit capabilities. EEB also sells two VHF/UHF log periodic (LP) beam antennas, one a 23-element unit covering 50–1300 MHz and the other a 19-element model spanning 108–1300 MHz.

For a catalog, contact the Electronic Equipment Bank, 323 Mill St. N.E., Vienna, VA 22180.

The Radio Collection Catalog. A new catalog of radio books, software, and assorted "RF miscellany" is available from The Radio Collection, P.O. Box 149, Briarcliff Manor, NY 10510.

The Radio Collection catalog is devoted mostly to publications of interest to the serious SWL and includes several unusual items I haven't seen elsewhere. Some of the more exotic publications it features include *The Traveler's Guide to World Radio*; *QTC*, the *Seagoing Radio Officer's Scrapbook*; *Coast Guard Ra-*



Here's one of the older Radio Shack Timekube® receivers that receives WWV and WWVH time signals on three preset frequencies—5, 10, and 15 MHz. The unit also has a sliding scale that converts universal time to local time. Obtained secondhand at a hamfest for about \$10, we've found it useful in obtaining WWV time information and propagation forecasts without tying up a hamshack receiver or transceiver. The 1991 Radio Shack catalog shows a much more stylish combination Weatheradio/Timekube (No. 12-148) that also receives VHF weather broadcasts. (Photo courtesy Radio Shack)

dio; Pirate Radio Stations; The Pirate Radio Directory; Vintage Aircraft Nose Art, a pictorial collection of World War II and Korea military aircraft nose art paintings; Radio 101, an information series for the shortwave beginner; a variety of computer book titles, including *The Hacker's Handbook*; and various "cloak and dagger" publications and bric-a-brac.

The same catalog also lists a variety of PC applications software for radio buffs, which includes both their own titles and several from other authors. Some of the titles offered include Bandview, a monitoring and receiver control program for the Japan Radio NRD-525 receiver (IBM PC); the Communications Intelligence Analysis Program, for logging of utility station intercepts (IBM PC); and DBASE.SWL, an international broadcasting database manager (C-64).

Fair Radio Sales Surplus Catalog. There isn't much left of "the good old radio surplus days" in which the pages of the amateur radio and electronics magazines were chock full of ads from radio surplus houses touting their postwar bargains. There's even less left of the fabled "Radio Rows" that sprouted up in major cities and provided countless amateurs and prospective amateurs many Saturday parts-collecting excursions.

One of the mail-order "survivors" is Fair Radio Sales, which offers a free 36-page catalog of reasonably priced government and commercial electronic surplus goodies; perusing it is almost like revisiting the Radio Row many remember fondly. The catalog is stuffed with classic goodies, such as power inverters, transceivers, receivers, meters, microphones, headsets, handsets, keyboards, knobs, transformers, test equipment, antennas, and much more.

For a free catalog, contact Fair Radio Sales Co., Inc., 1016 E. Eureka St., P.O. Box 1105, Lima, OH 45802.

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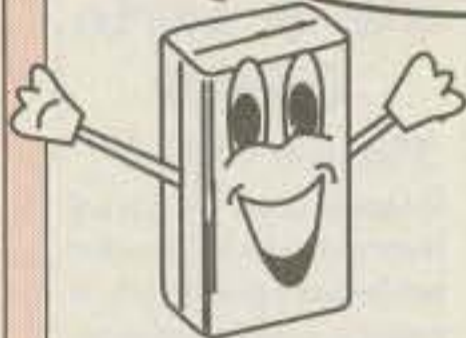
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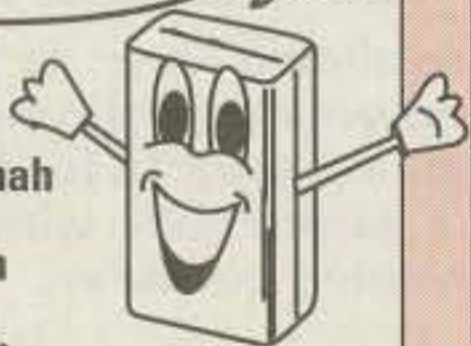
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CQ's New Sibling. Most of you know that CQ's parent company, CQ Communications, Inc., publishes several magazines in addition to CQ. These include *Popular Communications*, *Communications Quarterly*, and *Electronic Servicing and Technology*, the latter a monthly magazine for consumer electronics servicing professionals. Last March the final issue of *Modern Electronics* was published and in its place emerged *ComputerCraft*. The new magazine bills itself as "the practical magazine for personal computers and microcontrollers." As Art Salsberg, editor of both, put it in the first issue last April, "the change reflects the growing dominance of microprocessors in electronic equipment, and the large role that personal computers and microcontrollers play in the electronics field."

The new computer magazine focuses on hardware, though software is also covered to a limited extent. The magazine caters to computer craftsmen—readers who want to sharpen their skills in improving and expanding the performance of their equipment. Hands-on computer-oriented articles run the gamut from how to replace and upgrade a PC's ROM BIOS to modifying a circuit to achieve better performance. While consumer electronics coverage is gone from the new magazine, many of the familiar columnists are still there, including Joe Desposito, Ted Needleman, Pete O'Dell, WB2D, and Forrest Mims III. While I'm sad to see *ME* disappear, the new magazine looks like a winner to me.

Subs to the new magazine are \$18.97 for a year and are available from CQ Communications, Inc., 76 North Broadway, Hicksville, NY 11801.

While we're plugging CQ's literary offerings, I should mention that CQ Communications took over the old Ham Radio bookstore in Greenville, New Hampshire when it acquired the magazine last year. Now the CQ Bookstore, it offers an excellent mail-order selection of amateur publications, including a number of antenna books, plus a good assortment of hamshack software.

One of the more interesting software products carried is Lynn Gerig, WA9GFR's Communications Engineering software package used to predict communications ranges based upon your station's operational capabilities. Another is MicroSmith, a Smith Chart utility program by Wes Hayward, W7ZOI, that has been optimized for impedance-matching applications. The Bookstore also sells the two CQ buyer's guides, the *1991 Antenna Buyer's Guide* and the *1991 Equipment Buyer's Guide*. The Bookstore is on Main Street, Greenville, NH 03048, and their order line is 1-800-457-7373.

Antenna Potpourri

Surplus Stuff de KA2TYT. N.E. Litsche, KA2TYT, wrote to tell us of some of the products he sells. These include a variety of military surplus antennas and accessories, among them the BC-939/TN-339 antenna couplers. Interestingly, a number of the coupler units in his stock were intentionally damaged by the government and probably will never see service again. However, the roller inductors within them, which come in three sizes—1.6, 15, and 96 mH (milliHenries)—typically are in good condition. He sells the inductors for \$15 each, noting that the largest inductor

comes without the frame. Included are the roller, bearings, sliding contact, and the hardware for the glass rod that the sliding contact rides on, as the glass itself is usually among the casualties.

Also offered is a stock of unused FR-4 epoxy glass boards, with copper cladding, that can be worked into a good frame for a transmatch. These sheets are 1/4 inch thick and about 36 inches square. They are priced at \$25 per sheet. He has sold a number of these boards to builders of large transmitters and antenna couplers for the broadcast industry.

For more information, contact N. E. Litsche, KA2TYT, at Air Navigation Industries, Inc., 39A Phoenix St., P.O. Box 191, Canandaigua, NY 14424-0191.

Tower Mounting Hardware de K3IWK. Charles Byers, K3IWK, has for about nine years manufactured a variety of chassis and cabinets both in kit form and assembled. He also makes several tower-mounting box kits that are also available weatherproofed. Charles offers a wide assortment of sizes in his tower-mounted box kits, which include U-bolts. The enclosures come in sizes from 6" x 10" x 6" up to 10" x 20" x 30".

For a flyer that lists at least 27 different styles and types of chassis and enclosures, contact Byers Chassis Kits, 5120 Harmony Grove Rd., Dover, PA 17315.

Soft Topix

Elneq Update de W7EL. In the September 1990 column we described ELNEC Version 1, which has proved to be a very popular antenna design and analysis program. Roy Lewallen, W7EL, advised us that Version 2 now is available. Roy says that he's notified current ELNEC customers of its availability and is filling orders at a high rate.

To briefly review, ELNEC is a very capable but easy-to-use program for modeling and analyzing practically any type of antenna in its actual environment. Its menu-driven structure, spreadsheet-like entry format, graphic antenna display, and shortcut features make it very user friendly. Some of the things the program does include: plotting azimuth and elevation patterns; telling you gain, feedpoint impedance, SWR, and current distribution; and finding and reporting beamwidth, angles of the 3 dB pattern points, front-to-back (F/B) ratio, major sidelobe level, front-to-sidelobe level, and sidelobe angle. All information, including patterns, can be displayed on-screen or printed out.

The V2 upgrade includes a host of new features that make analysis simpler than before but do not complicate the user-friendly interface. Some of the major program enhancements include graphical antenna representation, in which a three-view thumbnail representation of what the antenna looks like can be viewed or printed; the ability to save "solved arrays," thus allowing you to save to disk all the arrays the program has calculated so you can restart the program and return to where you left off without requiring recalculation; and the ability to save and recall traces (far-field patterns), with the capability to superimpose multiple traces on the current pattern for comparison.

Also included in V2 are a trace view feature, in which you can start the program in this special mode if you want to look at, compare, analyze, or print saved traces without calculating

a new pattern; an automated segment tapering for enhanced accuracy, described in Roy's February 1991 QST article, "MININEC: The Other Edge of the Sword"; and an expanded user's manual that runs more than 70 pages and includes an expanded "test drive" feature.

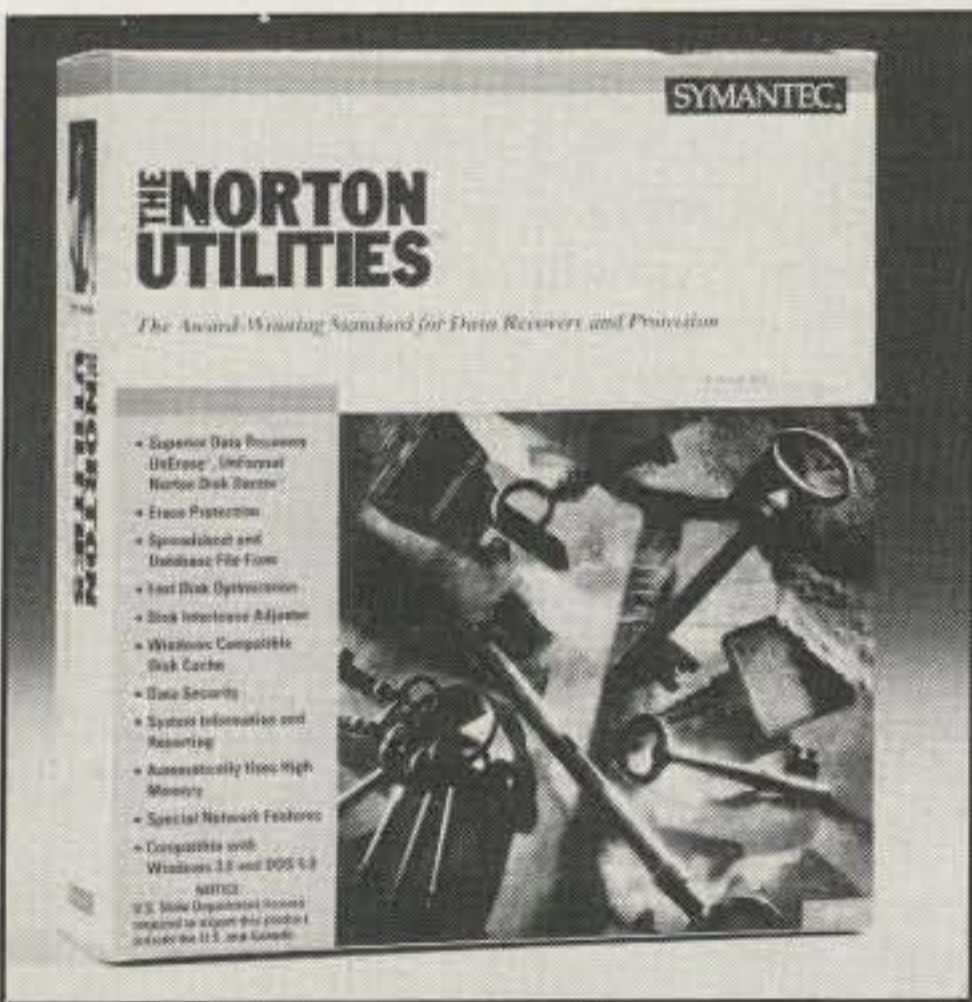
As we noted in the earlier column, two types of ELNEC are available: Standard, for use with a math coprocessor, and "N" type, a non-coprocessor version for use with non-coprocessor equipped PCs. The basic IBM PC requirement is for 512K RAM, at least one disk drive, and CGA, EGA, VGA, Hercules, or a compatible graphics adapter. The non-copy-protected programs are available either on 5.25 or 3.5 inch diskettes. Either version is \$49 postpaid in the USA and Canada. For more information, contact Roy Lewallen, W7EL, P.O. Box 6658, Beaverton, OR 97007.

Fig. 1 shows the ELNEC main menu, while fig. 2 is a dump of a typical ELNEC screen after analysis and annotation of the plot.

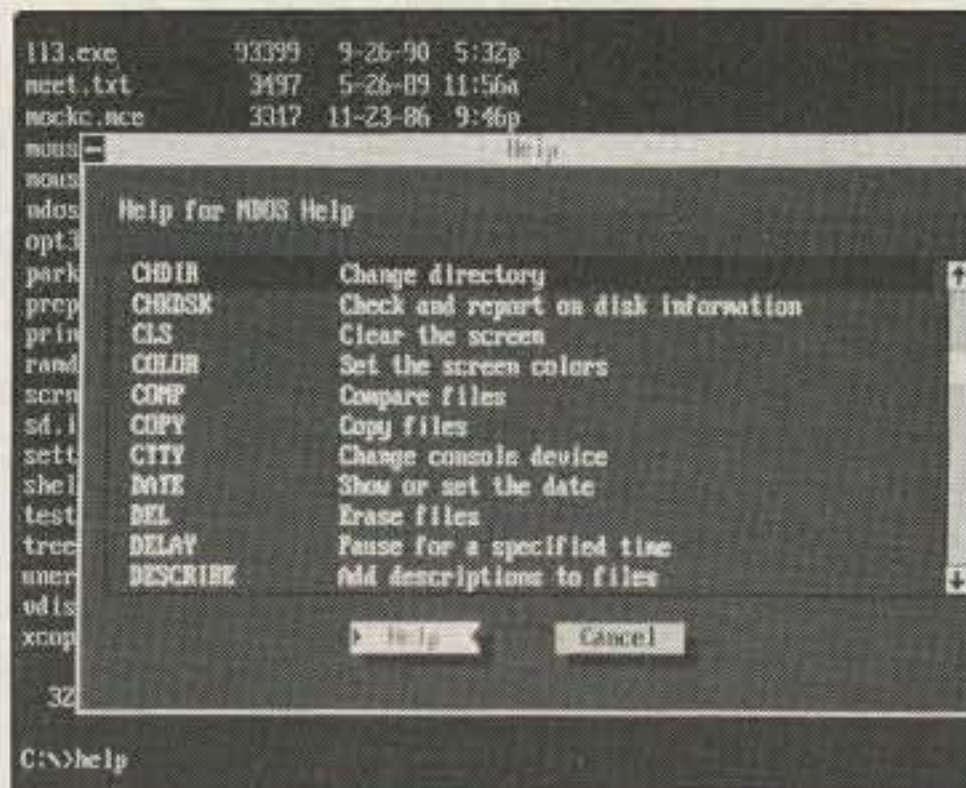
Short Bursts

Time on a Timekub. An accurate check on the correct time is important in any hamshack. One gadget we've found useful to have around is the little Radio Shack Timekub[®] receiver which receives WWV or WWVH time signals on 5, 10, and 15 MHz. Obtained several years ago at a hamfest for about \$10, we've found the Timekub useful in obtaining WWV time information and propagation forecasts without tying up the main or auxiliary communications receiver or transceiver. I've also found it useful to have one close to the household PC for use in checking and accurately resetting the PC's clock. The 1991 Radio Shack catalog shows a much more stylish combination Weatheradio/Timekub (No. 12-148) than the older one I have that is shown in the accompanying photo. The new unit is \$39.95 and also receives VHF weather broadcasts.

Photos Wanted. Antennas are difficult criters to photograph well, and so we're usually scrounging for good photos to dress up the col-



Don't miss next month's column. In it we'll review *The Norton Utilities Version 6*, the latest and greatest successor to Peter Norton's original PC utility package. This newest edition contains many new or improved utilities for data recovery, disk repair, disk performance enhancement, and data security. V6.0 is a winner! (Photo courtesy Symantec Corp.)



The Norton Utilities, to be covered next month, now include a spiffy DOS enhancer, NDOS, that works with the new DOS 5.0 and earlier versions of DOS. NDOS even offers immediate pop-up help for DOS commands that takes no additional memory. (Photo courtesy Symantec.)

umn each month. We're looking for pictures of impressive antenna installations, unusual antenna configurations, homebrew accessories and antenna modifications, and the like. If you send us a photo for possible use in the column, please include a short caption that explains the photo. The size of the photo isn't terribly important, but good contrast, definition, and subject matter are important. Color slides, color prints, or black-and-white prints can all be used. Send us a photo you can spare, since we can't guarantee its return.

Untranslatable Technospeak. As a technical writer, poorly written or incomprehensible

user's manuals for amateur radio equipment and computer hardware drive me up the proverbial wall. Let me share with you one of the worst cases of poorly translated technical instructions I've seen or read. This one is from a multisync color monitor's manual, the manufacturer of which I'll save from further embarrassment by not mentioning any names.

1. If there is a little horizontal video flowing in the first operating, make sure if the signal (*sic*) cable of monitor connect the computer.

2. If the signal (*sic*) cable of monitor did not connect the computer, turn off the power switch of computer.

3. After you connect the signal cable of monitor with the computer, turn on the power switch of computer again.

4. If you meet the horizontal video flowing again, consult the dealer.

Oh, yes . . . to wrap things up, "This monitor may not be perfectly compatible, if you do not use IBM standerd (*sic*) board."

Thank heaven those instructions weren't for an amateur transceiver, but they very well *could* have been written for a piece of amateur radio gear found in your hamshack or mine!

Wrapping It Up

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

Overheard: If two wires can be connected in two different ways, the first way is *always* the one that blows a fuse or trips a circuit breaker.

73, Karl, W8FX

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REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

Testing Applicants For Amateur Radio Licenses!

Last month we covered general information about the Amateur Radio Service and how to become an amateur radio operator. This month let's focus in on the nuts and bolts of amateur radio testing. Unlike CB radio, amateur radio operators must be licensed to communicate on the ham bands.

Amateurs have enormous privileges when compared to CB radio. In fact, there is really no comparison! Hams are authorized to communicate worldwide on bands of frequencies scattered throughout the radio spectrum with up to 1500 watts output using every mode imaginable: voice, code, radioteletype, television, ground and satellite repeater stations, computer data exchange, moonbounce . . . and more!

Needless to say, an operator could get into heaps of trouble if he didn't know what he was doing! A twist of the radio dial and you could be on commercial aviation bands instead of amateur frequencies. International law requires that amateur radio operators of every nation prove to their governments that they are qualified to operate their equipment before they may be licensed. Simply stated, there are certain things you can and cannot do, and you must know what they are.

Article 32 of the International Radio Regulations contains the guidelines for the amateur service of every nation. It specifies that "Administrations shall take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station." It also stipulates that only amateurs with telegraphy skills may communicate on frequencies below 30 MHz.

Up until recently, entering amateur radio meant passing a Morse code test, since the beginning Novice Class authorized shortwave communications privileges below 30 MHz. As of this year, however, there are now two different routes you can take to become a ham operator—the Novice and (Codeless) Technician. The Technician Class only authorizes frequency privileges above 30 megaHertz, so there is no need for Morse code requirement.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101

License Class	Morse Code	Written Element	Questions in Pool	Questions in Test	Pass Mark
Novice	5 wpm	2	369	30	22
Technician	None	2 & 3(A)	369	30	22
General	13 wpm	3(B)*	325	25	19
Advanced	13 wpm	4(A)*	286	25	19
Extra	20 wpm	4(B)	507	50	37
			440	40	30

*Note: Written examinations must be passed in order. For example, applicants must pass the Technician requirements before they may be licensed as General Class. Applicant may begin at either the Novice or Technician level.

Table 1—Examination requirements for each amateur license class.

The United States—and most other countries of the world—determine operator eligibility by requiring applicants to pass written and Morse code examinations. The system is pretty much like passing a test to get an automobile driver's license. You learn the correct procedures by studying material related to your privileges and then answering questions.

The testing parameters to obtain an amateur operator license are spelled out by the Federal Communications Commission in a section of the Communications Act called Sub-Part "F" of Part 97, Title 47 CFR. (Code of Federal Regulations). Title 47 is the law applying to all Telecommunications, while Section 97 zeroes in on only the regulations applying to the Amateur Service.

The Part 97 Rule Book is constantly revised to keep up with current regulations and technology. For obvious reasons, the FCC wants every licensed amateur to have a current copy of Part 97 in his possession. We have just published a newly revised Part 97 Rule Book that contains all updated regulations, including the new rules associated with re-allocating a section of the 1.25 meter (220–222 MHz) to narrow-band Land Mobile use. Cost is \$2.95 if you need a new Rule Book.

Rules Applying To Amateur Testing

There are really not very many government regulations relating to amateur radio testing. In fact, as of 1989 there are less than ever! That is the year the FCC completely rewrote (and reduced the size

of) the amateur radio rules. There are five different amateur license classes in the U.S: Novice, Technician, General, Advanced, and the top-of-the-line Amateur Extra Class. Applicants must pass five different written and three progressively higher speed Morse Code tests to obtain all amateur operating privileges. The Novice entry level only requires passing a five words-per-minute code test and answering 22 out of 30 multiple-choice questions.

The Technician Class, now also an entry level, requires passing the Novice 30-question written test and another 25-question multiple-choice examination relating to VHF operation. There is no code requirement to become a Technician Class operator. You need only pass the two short multiple-choice examinations. And you have a year to retake a failed test should you only pass one of the two test elements. You can, however, retake a failed test immediately (even the same day if you want to) since there is no longer a 30-day waiting period.

The Written Exam

Each of the other classes has a separate set of questions that apply to the privileges afforded by that class of license. The questions are selected from question pools which are known and widely published. All questions are administered in multiple-choice format. Even these—and the correct answers—are published. The system is certainly much different from the amateur exams of ten years ago when none of the questions were known, and you even had to draw schematic diagrams. As a general rule, there are about

Sub-Element	Topic	Element				
		2	3(A)	3(B)	4(A)	4(B)
(A)	FCC rules for Amateur Service	10	5	4	6	8
(B)	Amateur station operating procedures	2	3	3	1	4
(C)	Radio wave propagation characteristics	1	3	3	2	2
(D)	Amateur radio practices	4	4	5	4	4
(E)	Electrical principles, station equipment	4	2	2	10	6
(F)	Station equipment circuit components	2	2	1	6	4
(G)	Practical circuits in station equipment	2	1	1	10	4
(H)	Signals and emissions transmitted by stations	2	2	2	6	4
(I)	Amateur station antennas and feed lines	3	3	4	5	4
Total questions in license class		30	25	25	50	40

Table II— Topics and number of questions in each amateur written test element.

ten times as many questions in each pool as will be asked on any one examination (see Table I). You can order a complete copy of all of the current question pools, multiple choices, and answers by ordering the *Radio Amateurs Licensing Handbook* from W5YI at (toll free) 1-800-669-9594. All (nearly 2,000) questions asked in all written examinations are contained in this manual.

Each written test relates to the privileges of a specific license class, and questions are on nine different subjects. Examinees who pass one test element, but not enough to upgrade to the next higher class, are issued credit in the form of a certificate.

The Telegraphy Exam

The answer format of the telegraphy examination is not as standard as that of the written test. The examiners may require one minute solid copy out of five, seven out of ten correct answers to questions about the telegraphy transmission . . . even multiple choice, fill-in-the-blanks, or true/false answer formats are permitted. It is up to the examiners. The primary point is that the examiners must be convinced that you can correctly copy text in the international Morse Code. You probably will not be given a code hand-sending test, since the FCC has taken the position that passing a receiving examination is adequate proof of an examinee's ability to both send and receive telegraphy.

A telegraphy examination consists of a message sent in the international Morse Code at a specific speed for a minimum of five minutes. You will be tested on all 43 different characters. The rules require that code tests contain every letter (A-Z), numeral (0-9), and certain operating pro-signs and punctuation.

Telegraphy Element 1(A) is transmitted at 5 words-per-minute, 1(B) at 13 wpm, and 1(C) at 20 wpm. It is customary, especially at the slower speeds, to send the characters faster with longer spaces between the characters. This is called the Farnsworth method and usually contributes to higher pass rates since the characters can be more readily interpreted

ed by ear. Applicants who hold a commercial radiotelegraphy license are given credit for passing 20 words-per-minute without examination.

Doctor certified handicapped applicants can be given an exemption of the higher (13 and 20 wpm) speeds if, due to their handicap, they are unable to pass these speeds. Exemptions cannot be given, however, for the 5 words-per-minute Element 1(A) examination. This is because of the international code proficiency requirement when the communications take on the high-frequency amateur bands. The special handicap exemption form is available from the examiners, or you can request one from W5YI.

Where warranted, however, the examiners will accommodate disabled applicants even at the 5 words-per-minute level. This may be accomplished by requiring a sending instead of a receiving test, or by pausing the telegraphy test message after each sentence, phrase, word, or character and waiting for a response from the examinee. The use of special devices such as blinking lights, braille typewriters, and vibrating surfaces is also authorized where necessary and must be provided by the disabled applicant.

The Volunteer Examiner

Your examination will be conducted under one of two testing programs. The

Novice program is less formal and allows two (General Class or higher rank) amateurs to administer the Element 2 (Novice theory) and 1(A) (5 wpm code) requirements, usually at their home station. All other examinations—including the new entry-level Codeless Technician—must be administered under the newer three-examiner VEC System.

The VEC System is a name given to the testing program under which examiners must be approved for testing by various FCC-authorized coordinators. The coordinators, called VECs (for Volunteer Examiner Coordinators), have entered into an agreement with the FCC to provide amateur radio operator testing assistance to the examination team. A VEC provides his examining teams with the necessary testing information and processes the applications of successful applications returned by the testing team. The VEC then authorizes the upgraded operator license to be issued by the FCC.


Except for oversight activity, the FCC no longer prepares or administers any amateur radio examinations of any kind, and has not since 1984. The test questions appearing in all examinations are developed and periodically revised by an internal VEC panel called the Question Pool Committee (QPC). This committee consists of three VECs who are elected at the annual VEC Conference. Your author, Fred Maia, is one of the three QPC members charged with maintaining all examination questions.

There are 18 different VEC organizations, but most (about 80%) of all examinations are administered by only two—the ARRL and W5YI-VEC. Your author heads up the W5YI-VEC examination group. At present we have about 10,000 volunteer examiners and 600 testing teams who conduct examinations all over the world on a regular basis.

How To Conduct Exams

Volunteer examiners for the Novice Class need not be accredited by a VEC. It is the VECs, however, who provide the

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Novice testing material, since all test questions (including Element 2) are developed by the QPC. General Class (or higher level) licensed amateurs who meet the statutory qualifications may purchase the questions in the publishing marketplace and then systematically select the appropriate questions from each sub-element.

Volunteer examiners cannot be in a business directly related to amateur radio and must have a clean enforcement record. VEs are not permitted to administer amateur examinations to relatives. There is no charge to applicants who are administered Novice examinations. There is a test fee (currently \$5.25) to examinees who apply to be administered examinations above the Novice level. Some VECs (including the ARRL and W5YI-VEC) share expense reimburse-

ment with their VE teams.

The W5YI-VEC (P.O. Box 565101, Dallas, TX 75356) has a booklet available entitled "How to Administer the Novice Examinations" which is available at no cost except for postage (two stamps). We also have a Novice Test Kit available (for \$4.95) which contains all instructions, application forms, several different written tests, and a properly constructed 5 wpm code test tape with transcription.

Volunteer examiners must be accredited by a VEC to administer any examination above the Novice level. To become an accredited VE, Advanced and Extra Class amateurs simply complete an application form available from any VEC. There is no charge to become a VE. (You can write to us if you wish to become a W5YI examiner.) Accredited Advanced Class VEs may certify Element 2 and 3(A),

the requirements for the new Codeless Technician Class, as well as Novice Element 1(A), the 5 wpm code test.

Once the requirements for the Codeless Technician are passed, an applicant is required to pass the 5 wpm telegraphy examination under the VEC System if he/she wishes to upgrade to Tech Plus. The applicant may not go back and have this examination administered under the two-examiner Novice testing program. This is because a Technician who passes 5 wpm becomes a Tech Plus, or Technician plus code, and is considered to have upgraded. Tech Plus operators not only have access to all amateur spectrum above 30 MHz, but also the Novice spectrum below 30 MHz, including 10 meter voice privileges.

Special Codeless Tech Test Teams

The W5YI-VEC has a special testing program available to approved Advanced (or Extra) Class amateurs who wish to conduct Codeless Technician examinations on a regular (at least once a quarter) basis. You must have an IBM (or compatible) personal computer to participate in this program. Again, this special program is only to conduct examinations for the Codeless Technician Class.

Here is how it works! Both test elements required for the Codeless Technician (that is Element 2 and 3[A]) are imbedded in computer software. The software automatically generates properly constructed examinations, and every one is completely different! An answer sheet is also generated for the applicant to fill in if you print out the test for the applicant. If the test is administered at the computer keyboard, the PC will eject a completely scored answer sheet! Answer keys are generated by the computer for VE use if you decide to use printed tests rather than examine at the keyboard.

Advanced and Extra Class amateurs may start the ball rolling by requesting a VE application. Once received, we will send you the testing software at no cost, which permits you to conduct examinations right at your PC, or you can print out up to ten different written examinations at one time. Also forwarded are complete instructions and the necessary forms. Keep in mind that you need two other accredited VEs to assist you who also must be Advanced or Extra Class level since it takes three examiners under the VEC System. Write to us at W5YI-VEC (P.O. Box 565101, Dallas, Texas) if you are interested in participating. Or you may call us during regular VEC business hours at 817-860-3800, or 817-461-6443 evenings and weekends.

73, Fred, W5YI

Heterodyne Headache #14.226.5

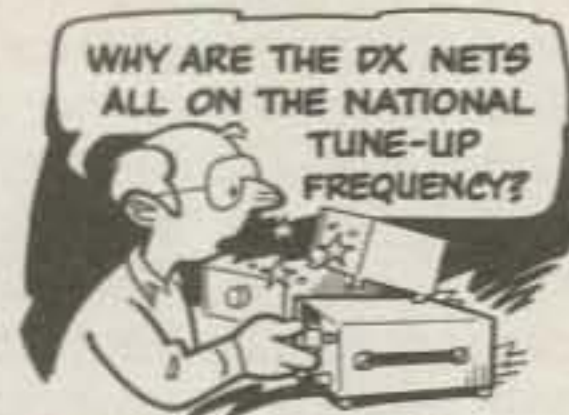
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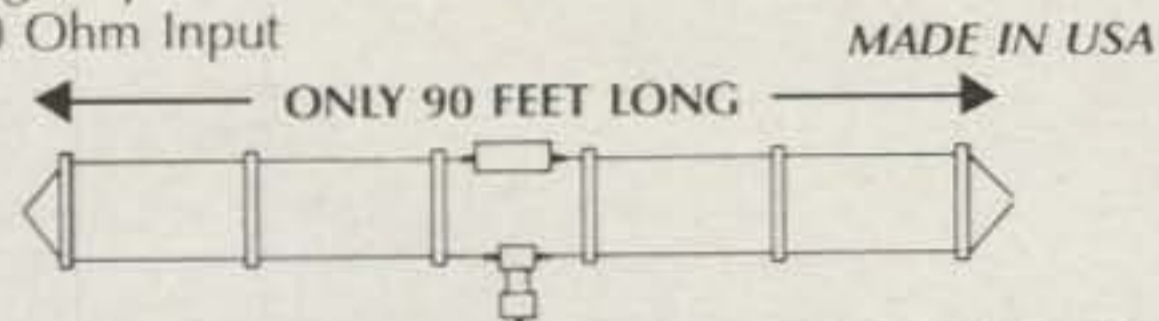
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More (Solar) Power To You—Part I

Until recently my QTH was in the friendly area of Atlanta, Georgia. I decided to put into motion an idea I had toyed with for over a year. The notion had been goading me long enough, and the time was right for the implementation of a well-designed, solar-powered, remote-located packet switch.

I mentioned the idea to Chuck Beckham, N4XZV. Chuck had worked with me to install the first ROSE switch in the Atlanta area. While working on another project that involved the building of another ROSE switch in north Atlanta, Chuck told a couple of friends about the idea, and this kindled even more interest in the notion.

Professionalism Makes Perfection

Enlisting the support of Neal Johnson, KC4LU, of Professional Technical Services, Chuck had given the idea some momentum. He told me the idea had stirred so much interest that I should begin putting the plan into action.

Now to talk about these guys is one thing, but to know them is another. Chuck and Neal are more than just "talkers"; they are "doers."

I told Chuck the first order of consideration was to find a site for the project. It took all of a week for him to talk with the property owners and secure the location for our solar switch. Seemed I had come face to face with some real "movers and shakers" who were off and running.

The mountain that looms skyward in Photo 1 is the location that was chosen. The look angle favors the southwest (see Photo 2) and provides coverage to other switches well into South Carolina, East Tennessee, and Central Georgia. Photo 3 provides us with a rabbit's view of the "crows nest" where the solar panel will receive most exposure from the sun.

My Turn To Do Some "Moving and Shaking"

The burden was on me to find a radio or transceiver that would deliver the most output power for the least amount of current drain. The same rule applied to the

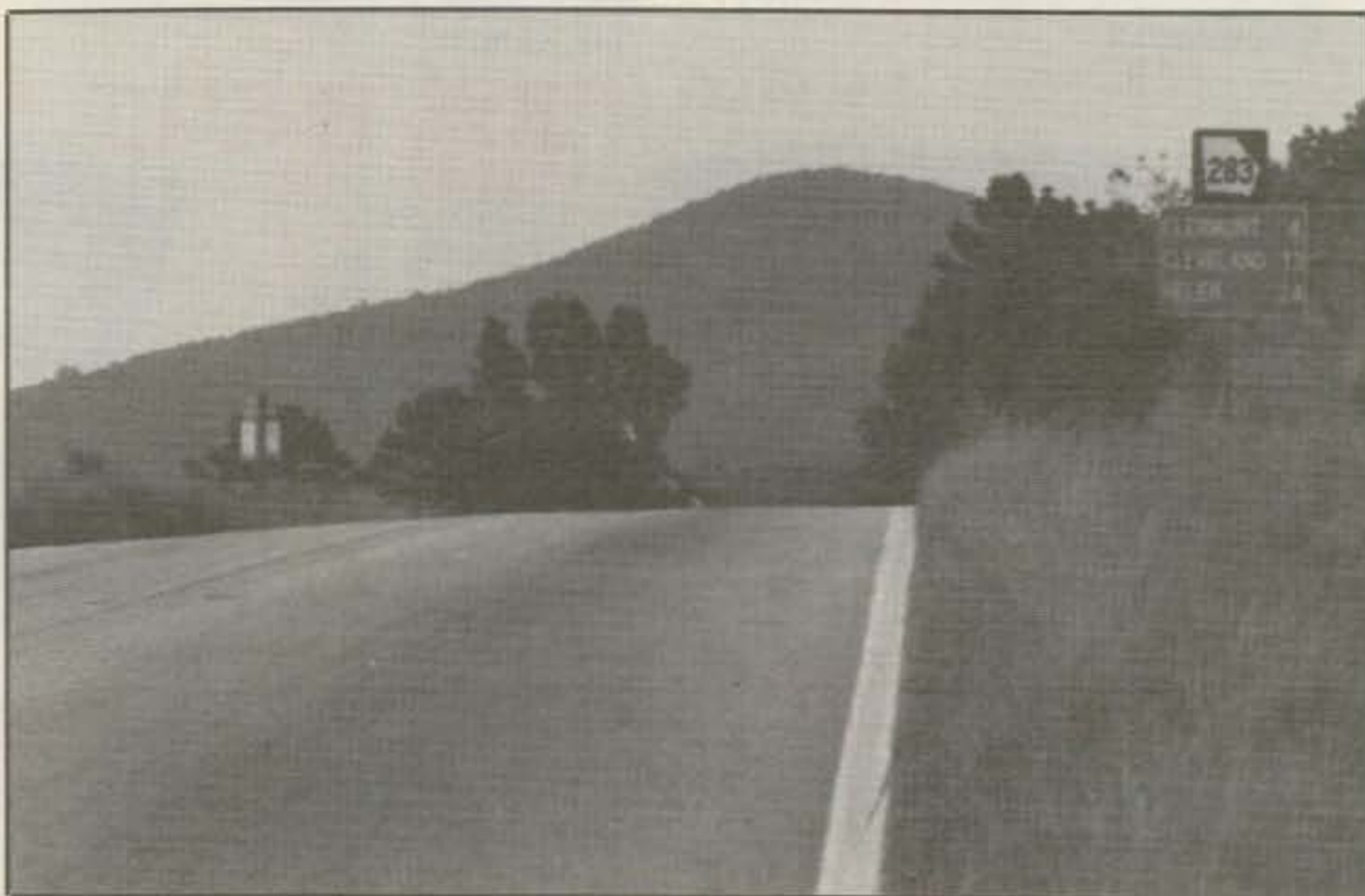


Photo 1—From about 5 miles south it's uphill to the top of Skitt Mountain, where you are almost 2000 feet above sea level. For Georgia that's a tidbit more than a "pop-up."

requirements for a TNC. And there were other decisions to be made, including the subject of how much total energy would be needed. This was indeed the drive behind all this effort. Again Neal came to my aid; sources of power panels and the sup-

port equipment associated with the project were the catalyst.

Neal produced several books and catalogs on the subject of solar energy. One book was entitled *Real Goods Alternative Energy Source Book*. It took three days



Photo 2—At the crest of Skitt Mountain looking southwest from the site toward Atlanta, 75 miles away.

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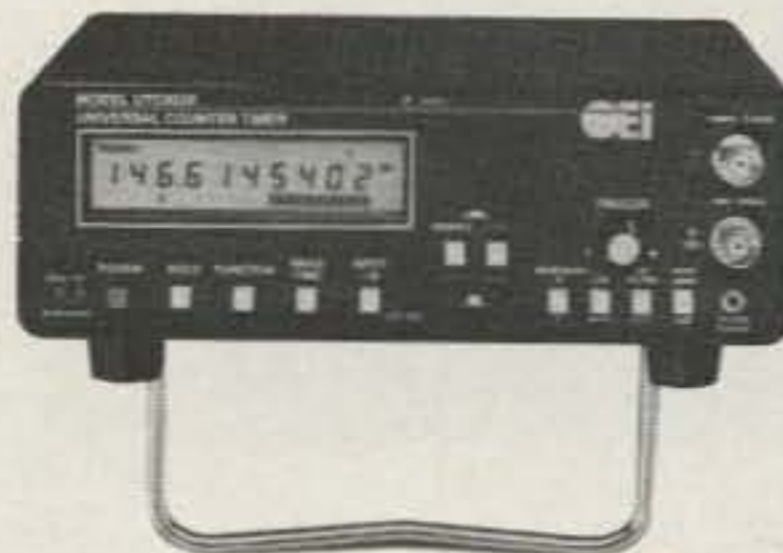


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Photo 3- The solar panels mounted so they will receive optimum sunlight.

for me to scan (notice I didn't say "read," as that would have taken three months) this magnificent piece of literature. It may represent a catalog to some, but to me it was a virtual storehouse of information about alternative energy. *Real Goods* is



Photo 4- No, this is not a movie set from "Thunder Road" (see text).

written in plain language that a beginner who is searching for an alternative energy source can understand. I was a beginner, and after reading this powerhouse of information, I was well on my way to becoming an informed alternative energy source advocate.

So that I don't run into a ton of mail letting me know that I forgot to include the address of the supplier of this document, I should include the information for obtaining the *Real Goods* book. The catalog is 320 pages and contains many articles by users and those who have built and engineered systems similar to the one which we are covering in this series of articles. If you ever need to "jump-start" a nuclear plant, regardless of the energy source, you may find just the ticket in this source book. To receive a copy of this informative catalog, they require \$10.00, which is refunded when you place an order. Send to: Real Goods, 966 E. Mazzoni Street, Ukiah, CA 95482.

Drivers That Must Be Considered

As the project gathered momentum, we began to discover more fully that the design was driven by the demand of the solar panels. Neal gave me the absolute maximums that could be derived from panels of a given size. Chuck, being the authority on battery types and sizes, had arrived at numbers and sizes of the batteries. With the kind of enclosure being employed, the Dynasty gel type lead-acid batteries were selected (see Photo 9). This minimizes the amount of required battery maintenance.

The Beast of Burden: Choosing The Transceiver

We decided to build the system around the Alinco Data Radio (DR-1200) because it could be modified to draw less current by removing the panel indicator lamps.

In our case we used one of the first of the Data Radio series. Photo 7 shows the manner in which the MICROPOWER-2 and the Alinco Data Radio are mounted. The transceiver heat sink was doped and attached to the heavy-gauge aluminum bracket (see Photo 6). Notice how the bracket is attached to the round disk. This disk was later attached to the inside top of the drum.

The enclosure of the DR-1200 may look familiar, but that's as far as it goes. Inside the case are several changes which make it different. Certain components were added, and others were changed to tailor the audio for both transmit and receive data and pulse wave-shaping. These changes are now a part of the current production models of the Alinco DR-1200 Data Radio.



Photo 5- Chuck Beckham, N4XZV (left), and Neal Johnson, KC4LU, preparing the newly fabricated bracket for the Pac-Comm MICROPOWER-2 and the Alinco Data Radio.

The DR-1200 at this location is the radio that was built as one of the first prototypes of the DR-1200. Neal became an expert on how to disassemble the face from the transceiver and remove the "current sopping" panel lamps. Yes, I hear those questions. . . . "How can we tell what frequency we are on?" Who cares? The transceiver recovers to the frequency to which it was tuned when power was removed and later restored. Add to this the fact that the transceiver, batteries, regulator, MICROPOWER-2, and interconnect cabling are all sealed inside a waterproof drum and buried in terra-firma.

Heat Dissipation Is Another Consideration

Heat dissipation is another consideration, because all the above-mentioned equipment is housed inside a sealed drum and placed into the cool earth—well, cool for the summer months and warm in the north Georgia winters. Notice in Photo 5 how Neal and Chuck fabricated the bracket, attaching it solidly to the round disk which was then attached and sealed to the drum cover (see Photo 8). The disk then serves as a transition surface for the heat to be dissipated from the aluminum to the soil (earth above) that comes in contact with the disk.

The sealant used to attach the disk to the drum cover is "LOCTITE Superflex" Ultra-Blue Silicone 587. It was chosen be-

cause this glue and sealant is noncorrosive to aluminum, withstands temperatures to 500 degrees Fahrenheit, and is stronger than other types of silicone glues and sealants.

Protocol Is Not A Concern

In this series of articles I may mention the ROSE switch, but that is only because this particular station contained the ROSE code. This could just as easily have been TheNet, COZY, TexNet, G3RUH 9600 bps, K9NG 9600 bps switch, KANODE, or one of the several new protocols that are being introduced into the rapidly expanding packet network system.

I burned a version 901111 ROSE switch EPROM into the CMOS 27C256 and plugged it into a TNC-2 clone. I proudly handed it to Chuck, so he and Neal could connect the system together for a test drive on the bench. We were beginning to get that bubbly feeling because we were happy that things were shaping up.

So much for the pride bit! Neal called a couple of days later to inform me that the TNC was socking the batteries for over 300 milliamps. What could a measly 300 ma do to us?!

Neal provided the answer. Neal had taken the numbers that I had given them for the use and demand of the switch, and using this data, he and Mr Voltex batteries plugged the numbers into their arithmetic crunchers (Neal's pencil and paper).

There is a limit that must not—I repeat **must not**—be exceeded. It is the sum of the power output from the ARCO solar panels, the amount of expected daylight, and the amount of "daylight" that is useful as sunlight that will build the power to charge the batteries.

As a bit of information for the prospective solar switch builder, you can never outguess the weather—*never*. There was one week recently when we never saw sunshine (or moonshine—and no, the barrel in Photo 4 is not what it appears to be) in Georgia for six days and nights. Don't touch that "Georgia moonshine" phrase with a forklift.

When we get into Part II of this article, the "how it goes together" portion, we will learn how and why the solar-panel output has to be regulated. Anyway, back to the way we solved the reduction in current drain.

We asked Alinco to modify the radio so as to provide maximum output at the frequency we were using for this switch. Sort of follows the old "maximum power out for minimum current flow." Alinco obliged.

Chuck and Neal put the system on the air in a test bed. Still too much load for the reserve time we were trying for. Oh, yes

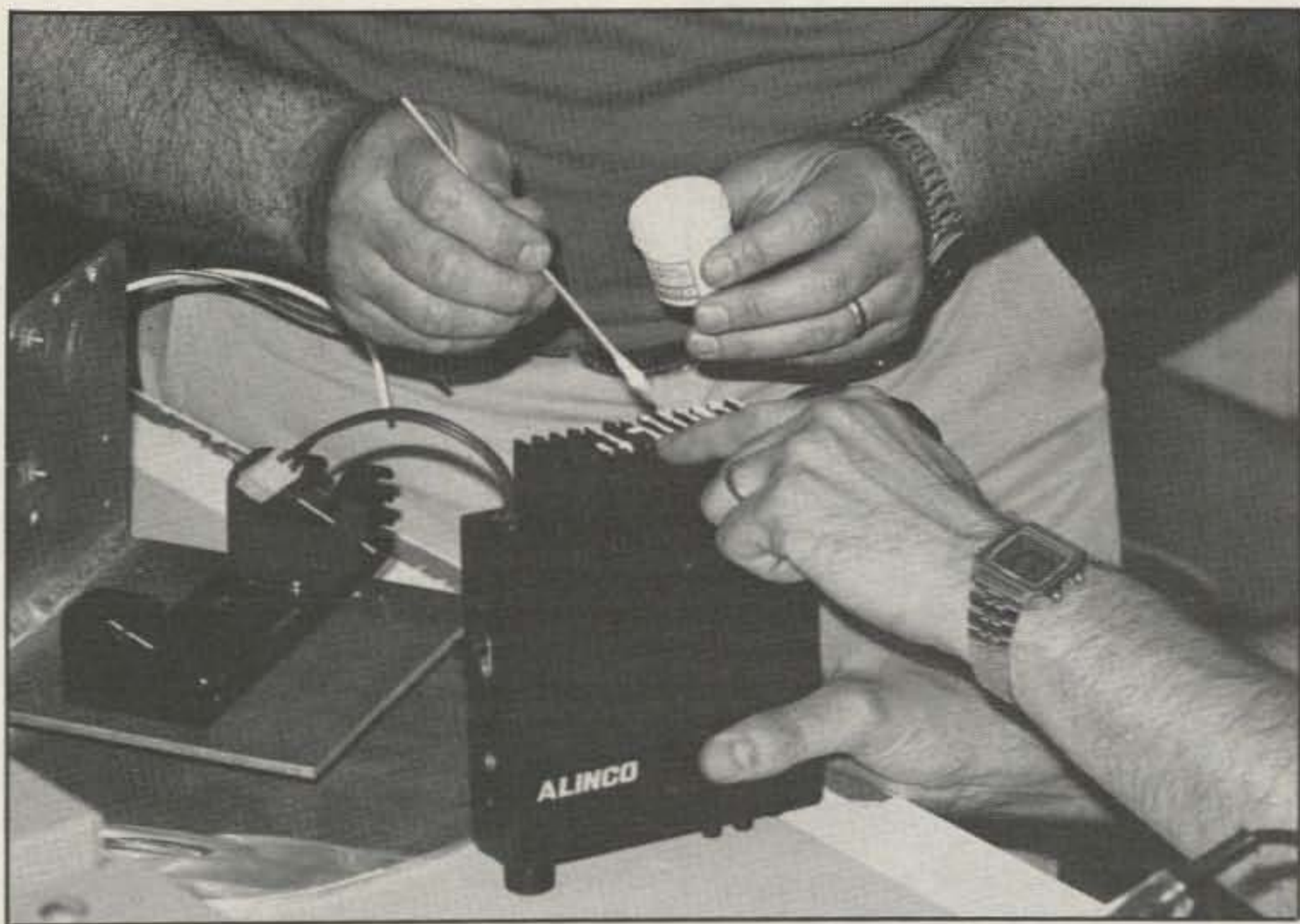


Photo 6—Coating the DR-1200 heat sink with "Wakefield Compound" to aid in the transfer of heat from the Data Radio onto the mounting bracket and transition disk (see text for more details).

—reserve power over extended periods was the driver to keep the system operating with little or no sunlight. That number might make some folks cringe, but to these professionals it had become an obsession to have as close to seven days of reserve power in this plant as possible.

(Note: Now two months later I just spoke with Chuck yesterday. The mountain on which this switch is operating has had rain and clouds for five consecutive days, and the batteries are continuing to

supply power to the system sufficient to keep the transmit signal constant, 75 miles away.)

The Final Straw

It took a short time and some head-scratching to come up with the solution. I don't know who thought of it first.

It was Neal who called me the following morning. Shortly thereafter Chuck

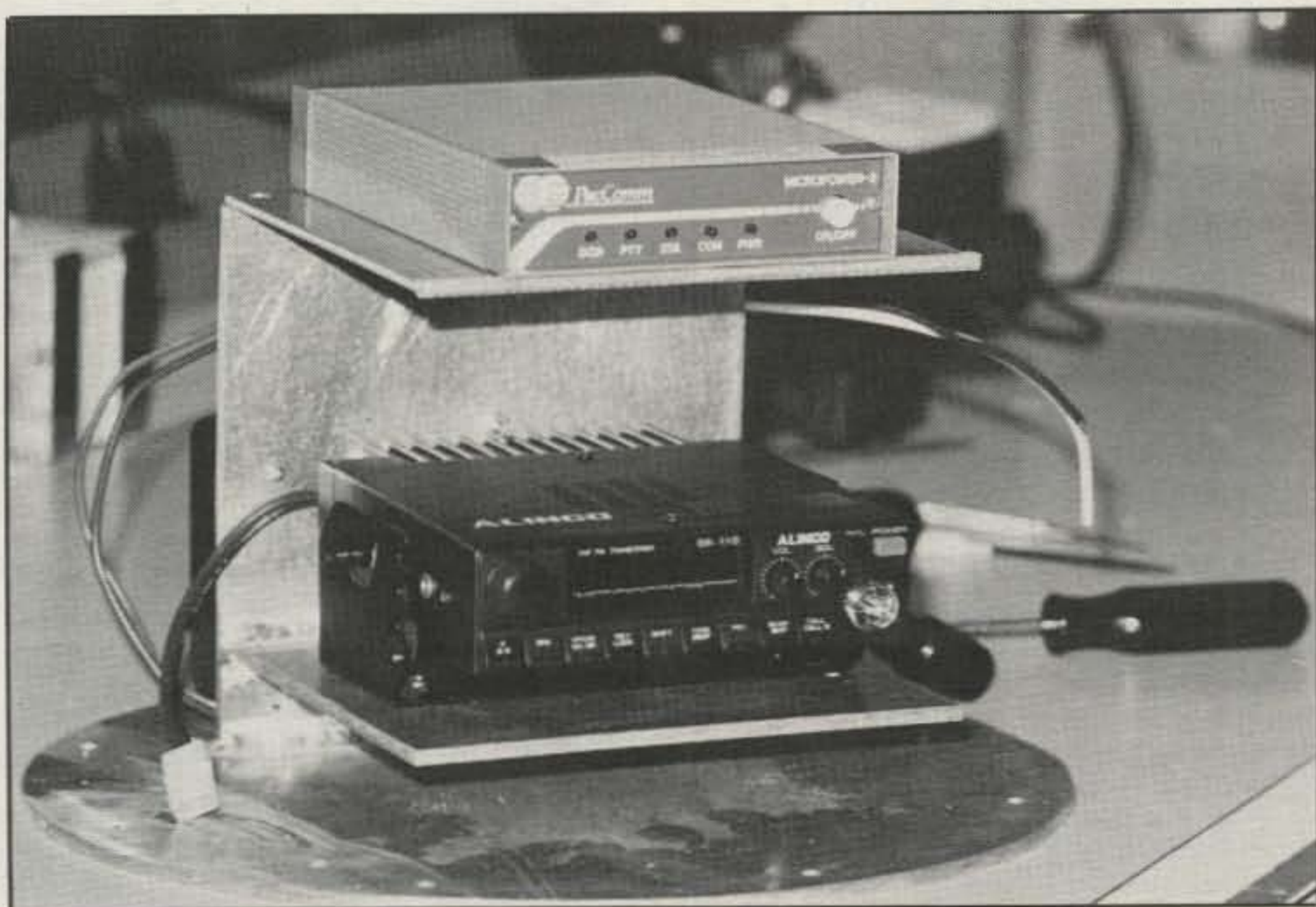


Photo 7—These are not only two pretty faces, they are the "beasts of burden" that are to provide communications for the packeteers of the surrounding region.

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called. The answer was clear and distinct. Neal's arithmetic had again indicated that we must come up with a way to drop 200 milliamps to maintain the needed reliability factor.

Seems everyone had heard of the CMOS version of the PacComm TINY-2. Sure, even the ROSE overlay for the EPROM was the same. The TNC was no big problem, we all concurred. The PacComm MICROPOWER-2 (CMOS version of the TINY-2) met, or better yet it exceeded, the power reduction that was needed. However, we had now reached a point where each moment was a premium.

I was on the phone to PacComm. "Hello, Linda? Gwyn. Help! Uh... we need the low-current, CMOS version of the TINY-2 (MICROPOWER-2) TNC *yesterday!*"

I expected to hear the familiar "You need it *when?*" Instead I heard, "Okay (*pause*) what else can we do for you?" It arrived via Federal Express the following morning.

This PacComm MICROPOWER-2 TNC at maximum current drain needs only 40 milliamperes of current. That sure beats the current demand of the earlier TNC-2 clone, which pulled nearly 300 milliamperes. The PacComm MICROPOWER-2 was fitted with the EPROM for W4IXN-5,404869, then attached to the vacant shelf of the bracket (see Photo 7) in preparation for "its final resting place"! Cables were attached, levels set, and off to the mountains to make packet with energy from the heavens.

In a project of this kind there are many players. I would be remiss if I failed to mention those who played a part in making this operation a success. In no special order I would like to thank the follow-

ing for their relentless contributions: Chuck Beckham, N4XZV; Mark Forrest, WB4HJG; Steve Idler, KA9UIE; Neal Johnson, KC4LU; and Richard Barnes, W4IXN. With great fanfare, we wish to extend special thanks to Ron Wiley for the use of his mountaintop.

Next month we will continue with Part II, the construction of the project, including more photos and a step-by-step progression. As this issue goes to press, I will be completing the drawings of the TNC, transceiver, solar panels, regulators, batteries, antenna, and protection circuit interfacing. The diagrams are being drawn in Generic CADD5, which may also be used with or transferred into AutoCAD.

As part of this feature I plan to make these drawings available on disk to those who wish to use them to build or implement similar systems. There is no charge for the data I provide. However, the user who wishes the disk, must provide me with a formatted MS/DOS disk, a self-addressed disk mailer, and sufficient postage attached for return mail. The drawings are not to be used in any commercial or "for profit" publication without prior written approval of CQ Communications.

The balance of this series of solar articles will be as detailed as possible. I have now become a real believer in the use of this truly abundant source of energy.

KNAT-BYTES

A few months back I began including letters from our readers. These letters covered a multitude of obstacles which had been experienced by readers, including problems with the TNC, computer, transceiver, and terminal software.

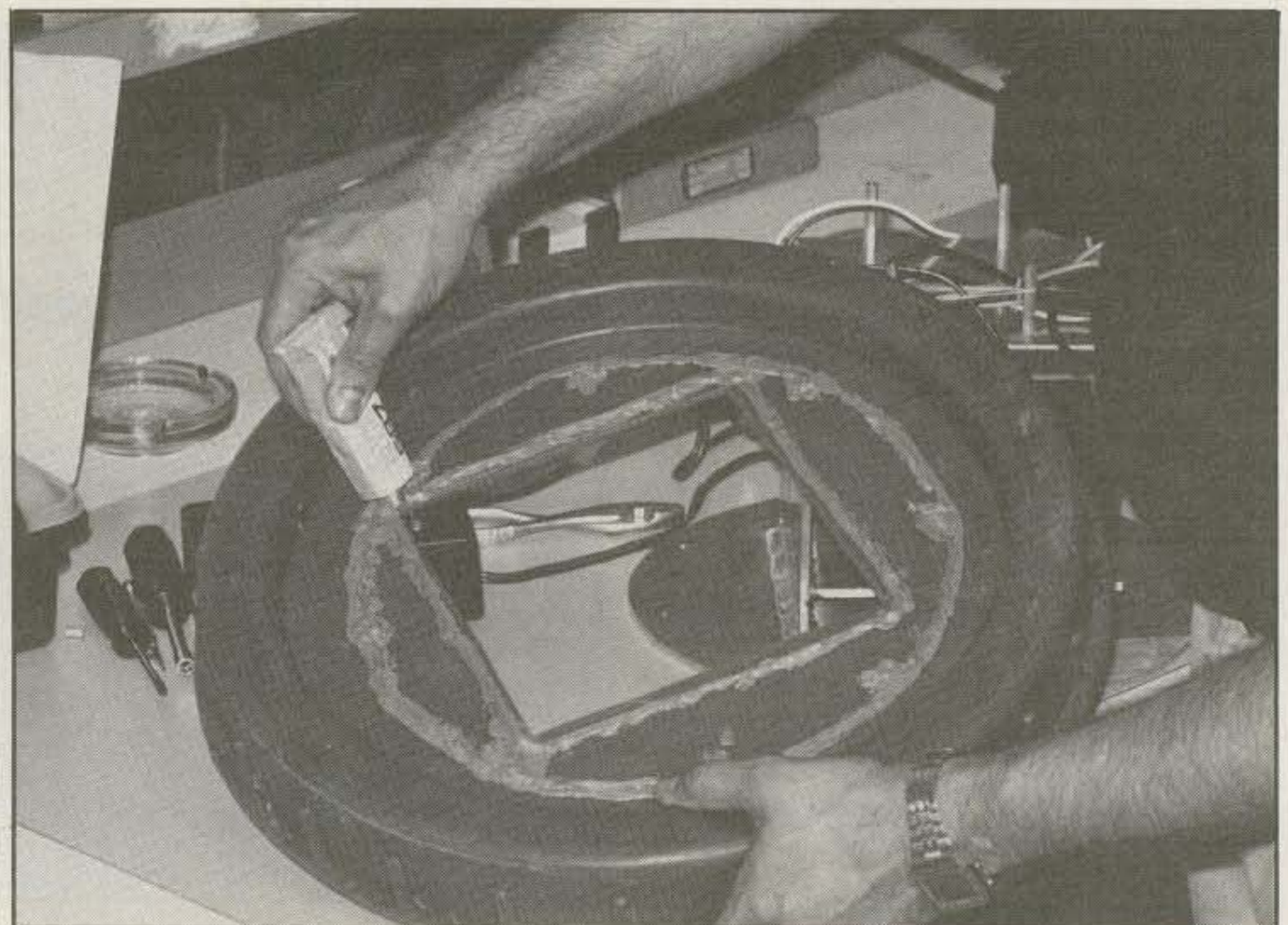


Photo 8- Applying the "LOCTITE" glue/sealer to the cover (see text).

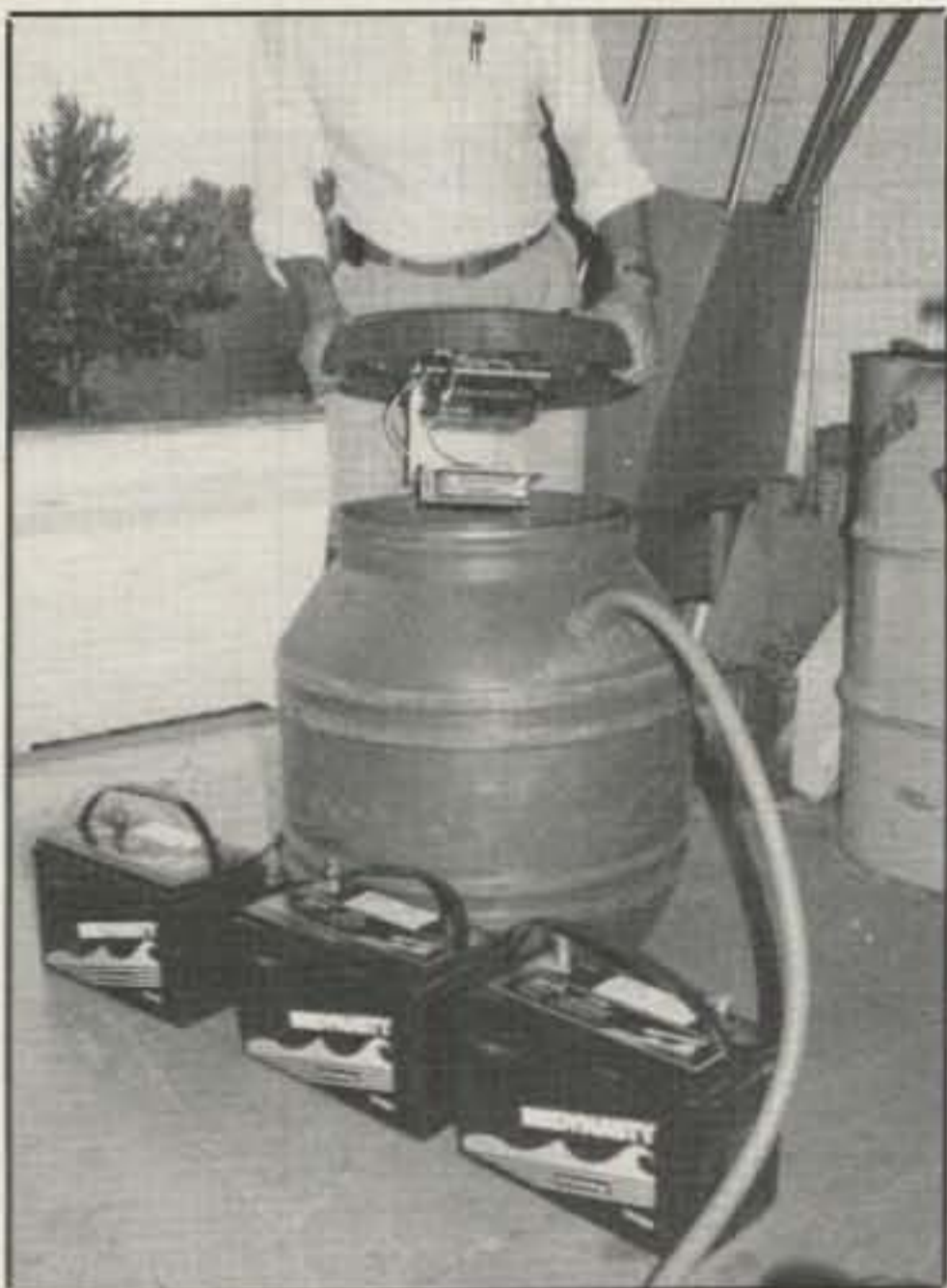


Photo 9- The Dynasty lead-acid gel batteries are used for reserve power and minimum maintenance.

Because there were so many letters requesting that I continue with this practice, I'm going to make this feature a part of this column each month. There is no doubt that each of us has encountered one of these "KNAT-BYTES" at some point along the way in our packet environment. If you have a solution to a problem that can be of help or interest to other packeteers, please forward it to me so we can share the corrective findings with others who may be experiencing the same kind of dilemma. Mail to: Buck Rogers, K4ABT, P.O. Box 158673, Nashville, TN 37215. Each month we will include the problem and solution from the letters received. They will be featured in this column under the heading "KNAT-BYTES."

This month's KNAT-BYTE cause and cure comes from John Smenner, KJ4LE. John sends two problems/solutions, one which concerns the implementing of an update to his KAM, and one which covers an easily overlooked self-inflicted wound.

KNAT-BYTE #1. After installing Kantronics version 4.0 in my KAM and initializing it, I booted their new HOST II software, which I read about in your column a couple of months ago.

I noticed the **Connect** and **Status** LEDs no longer functioned. I changed back to my PACPRO software and the LEDs functioned normally. After reading the documentation supplied with the HOST II program and finding *no* information about the "malfunctioning" LEDs, I called Kantronics. They informed me that the lamps were disabled when using the HOST II software.

KNAT-BYTE #2. After giving my ICOM IC-271A a good cleaning, I put it back on packet. I experienced a lot of trouble with it, on the order of many retries and time-

outs. After much head-scratching I discovered that I had moved the **Tone** control from the bass to the treble position.

I turned the **Tone** control back to the bass position and my packet station again operated normally. It is important to note that the treble position tends to distort the audio enough to make it unreadable to the KAM.

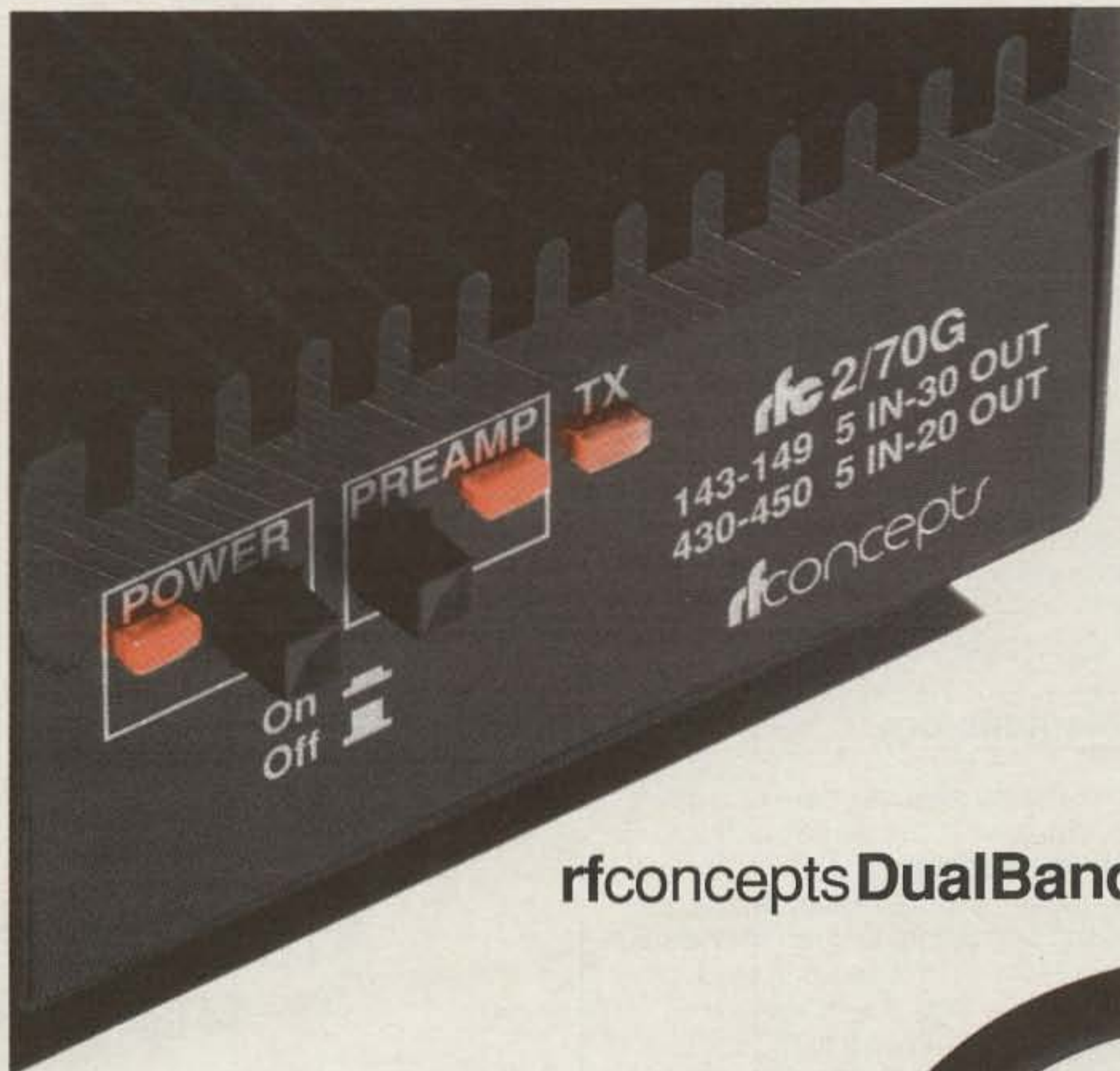
That's our KNAT-BYTE for this month. Look for another problem/solution next month.

We are having fun digitally!—73 de Buck4ABT.

K4ABT @ W4HHY.TN.USA.NA

Chattanooga Hamfest Packet Forums

On October 26-27 I will be conducting packet forums on beginners packet, networking, protocols, and more at the Chattanooga Hamfest, Chattanooga Hamilton County Convention & Trade Center, Chattanooga, Tennessee. For more info contact Art Parry, WB4BGX, Hamfest Forum Director, or Ben Timmerman, AC4HG, Hamfest Chairman (615-886-1631), at the Chattanooga ARC, Inc., P. O. Box 23121, Chattanooga, TN 37422.



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NEWS/VIEWS OF ON-THE-AIR COMPETITION

Do You Need Multipliers to Win?

Finding multipliers is one of contesting's art forms. There are some operators who seem to have a magnetic attraction to a new zone or country appearing on the bands. As I sit at my keyboard this month, the following thought keeps passing through my mind: How important are multipliers to the winners?

While there is some element of luck in finding good multipliers, it truly is an acquired skill. High multiplier totals come from a good operator's ability to discern the need to change from running stations to searching and pouncing. This ability comes from experience, which tells an operator that *now* is a good time to pass a needed zone to another band while in the middle of a good European run.

Rather than focusing on techniques for multiplier chasing this month (subject for a future column!), I thought it would be fun to take another look at the past and see how multipliers contributed to the winning scores of CQ WW participants.

The Methodology

When analyzing 40-plus years of contest results, you have to put some parameters on the effort. For purposes of this discussion, I chose two operating categories: USA and World Single Operator winners. Each were viewed exclusive of each other in the reporting. In other words, I looked independently at high multiplier totals by category (e.g., the evaluation of the USA winner did not consider whether or not a non-USA participant had a higher multiplier). This was intentionally done to even the playing field within categories.

The analysis is divided into separate modes and reported by year and decade. Just as SSB and CW require completely different consideration, so do operations in the 1980s when compared to those of the 1950s.

Finally, I also took into consideration the relative levels of high multiplier totals when identifying the winner. The results would probably be less significant if a high percentage of winning multiplier tallies were close to the second- and third-place totals. Surprisingly, in most cases a high multiplier total for a given contest far exceeded the second highest total (of

Calendar of Events

Sep.	27-29	Europe for QRP Weekend
Sep.	28-29	CQ WW RTTY Contest
Sep.	28-29	Idaho State QSO Party
Oct.	5-6	VK/ZL/Oceania CW DX Contest
Oct.	5-6	California QSO Party
Oct.	5-6	F9AA Cup 1991 Contest
Oct.	5-13	Wyoming QSO Roundup
Oct.	12-13	VK/ZL/Oceania SSB DX Contest
Oct.	12-13	Discovery of The New World Contest
Oct.	13	RSGB 21/28 MHz SSB
Oct.	13-14	Illinois QSO Party
Oct.	16-17	YLRL CW Anniversary Party
Oct.	19-20	Worked All Germany Contest
Oct.	20	RSGB 21 MHz CW Contest
Oct.	26-27	CQ WW SSB DX Contest
Oct.	30-31	YLRL SSB Anniversary Contest
Nov.	2-4	ARRL CW Sweepstakes
Nov.	8-10	Japan Int'l SSB DX Contest
Nov.	9-10	WAEDC RTTY DX Contest
Nov.	16-18	ARRL SSB Sweepstakes
Nov.	23-24	CQ WW CW DX Contest
Dec.	6-8	ARRL 160 Meter Contest
Dec.	14-15	ARRL 10 Meter Contest

course, there were some exceptions). So let's get on to the analysis.

The Results

If you haven't already done so, I suggest you begin by studying the tables and figures in this month's column. As you can see, there are numerous differences between SSB and CW. For example, 1956 was the first year that a CW USA participant worked 250-plus countries while on SSB (actually AM at the time). The same result wasn't achieved until ten years later.

Another interesting observation was that the USA group consistently exceeded the multiplier totals of World winners on CW. This was not the case on SSB.

As you might expect, multiplier totals track sunspot activity. However, it seems as if there is no end to the continuing increase in winners' multiplier totals. A winning USA Phone score in 1948 only needed 31 zones and 69 countries compared to the efforts of W1ZM (K1ZM operator) in 1982 and N2NT in 1989 (600-plus multipli-

Winners' Multiplier Totals CQ World-Wide SSB Contest

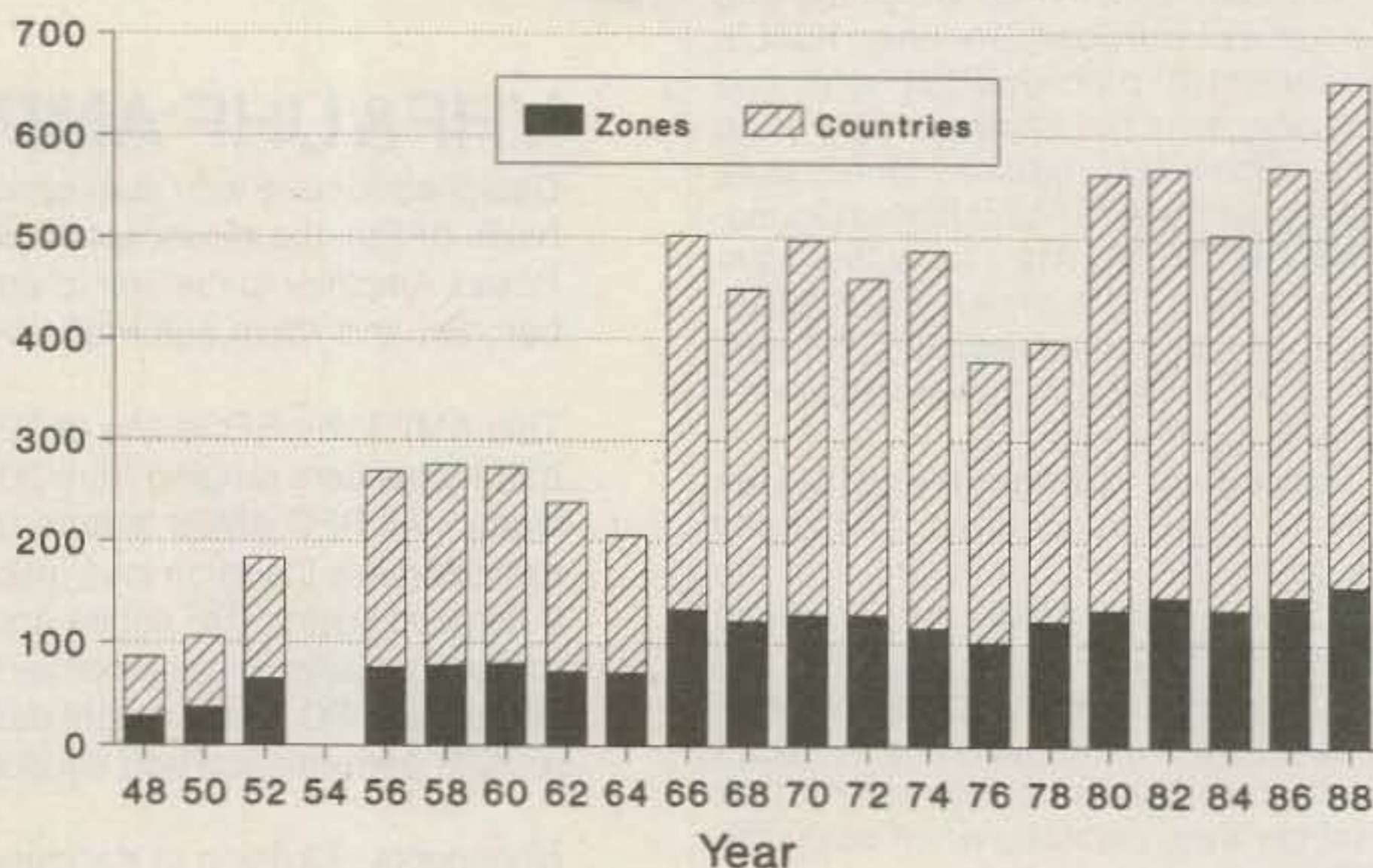


Fig. 1- Winners' multiplier totals for the CQ WW DX SSB Contest from 1948 to 1988, World Single Op All Band category.

2 Baldwin Street, Windham, NH 03087

Year	Callsign	Zones	Countries	Highest Multiplier/Class
1948	W8KML	31	69	Yes
1949	W1ATE	50	94	Yes
1950	W1ATE	39	89	Yes
1951	W4ESK	50	109	No
1952	W1ATE	50	117	Yes
1953	W1ATE	69	133	Yes
1954	W1ATE	*		
1955	W6YY	92	136	Yes
1956	K2AAA	100	200	Yes
1957	W6YY	110	161	Yes
1958	W9EWC	76	138	Yes
1959	W1ONK	61	127	No
1960	W6GHM	69	103	No
1961	K5MDX	70	143	No
1962	K5MDX	81	150	Yes
1963	K2HLB	79	177	Yes
1964	W3MSK	96	234	Yes
1965	WA2SFP	94	242	No
1966	WA2SFP	111	262	Yes
1967	W4AXE	127	286	Yes
1968	W2PV	114	305	Yes
1969	K1KTH	138	328	Yes
1970	W6RR	130	285	No
1971	W2PV	116	314	Yes
1972	W6RR	134	315	No
1973	K6AHV	125	244	No
1974	W6RR	108	260	No
1975	W7RM	115	250	No
1976	W1ZM	106	344	No
1977	W3WJD	128	357	Yes
1978	W4DR	127	386	Yes
1979	N7DD	147	346	No
1980	K7RI	127	256	No
1981	K1AR	140	420	Yes
1982	W1ZM	150	470	Yes
1983	AI6V	136	296	No
1984	K1AR	124	365	No
1985	K1AR	129	427	Yes
1986	K2TR	125	366	No
1987	KC1F	132	395	No
1988	KC1F	146	470	No
1989	N2NT	137	477	Yes

*Not Reported

Year	Callsign	Zones	Countries	Highest Multiplier/Class
1948	PY2AC	28	58	Yes
1949	PY2CK	58	133	No
1950	HC2JR	37	69	No
1951	PY2CK	55	141	Yes
1952	CE3CZ	65	118	Yes
1953	CT1FT	82	216	Yes
1954	CN8MM	*		
1955	CX2CO	73	149	No
1956	4X4DK	76	193	No
1957	F8CH	*		
1958	F8PI	78	198	No
1959	4X4GB	84	209	No
1960	VQ4DT	80	193	Yes
1961	CX2CO	88	198	Yes
1962	XT2Z	72	166	Yes
1963	5A1TW	68	189	Yes
1964	YV5BIG	71	135	No
1965	CX2CO	106	238	No
1966	VQ9AA/D	133	369	Yes
1967	VK2ADY/9	153	384	Yes
1968	ZD8Z	122	327	No
1969	9Y4AA	130	355	Yes
1970	KV4FZ	128	369	Yes
1971	6D1AA	111	296	No
1972	4M4UA	128	331	No
1973	ZD3Z	113	305	Yes
1974	ZD3X	115	372	No
1975	FY7AK	126	372	Yes
1976	PJ9CG	101	277	No
1977	PJ9CG	121	339	Yes
1978	9Y4VT	122	275	No
1979	9Y4VT	118	332	No
1980	EA8AK	133	430	Yes
1981	9Y4VT	128	329	No
1982	9Y4VT	146	422	No
1983	PJ2FR	131	388	No
1984	PJ2FR	134	369	No
1985	PJ2FR	124	393	No
1986	8R1X	147	423	Yes
1987	9Y4TT	136	417	No
1988	CT9BZ	157	497	Yes
1989	EA8RCT	117	432	No

*Not Reported

Table I- Multiplier totals for USA CQ WW SSB winners.

Table II- Multiplier totals for World CQ WW SSB winners.

ers each!). There have been other amazing accomplishments as well. The 500 multiplier barrier has only been broken four times by a World CW winner (86-89) and now seems to exist as a standard for comparison. K3TUP (K5ZD operator) set a new standard for winners by nearly breaking 600 multipliers in the '89 CW event. Compare that accomplishment to Vic Clark, W4KFC, in the early days of the CQ WW where 200 multipliers were more than enough to win.

The most interesting data I was able to gather from my piles of paper and printouts was the importance of high multiplier totals to actually winning the contest. For years we have found ourselves in pile-ups trying to build up our country and zone totals. For most participants, focusing on your multiplier total is probably not a bad strategy. This is especially true from a small station that often lacks the horsepower to run stations for long peri-

ods of time. The winners present a totally different picture. For starters, I was surprised to discover that USA winners only claim the highest multiplier total about half the time. When breaking the data into decades, the percentages become even smaller in the 1980s, ranging from 30 to 40%. Equally amazing were the DX entrants. In the 1980s only 20% of the winning World CW scores also had the highest multiplier and only 7 of 30 going back to the 1960s! Can you say "RUN, RUN, RUN"?

Some Conclusions

Far be it for me to suggest that the importance of multipliers to a winning score has diminished. Even though multiplier totals continue to rise, the need to have the highest one seems to be less and less a factor. As growth in contest activity advances, DX contesting is becoming more

of a running event rather than requiring the countless hours of multiplier chasing of years past. It's going to be interesting as we approach another sunspot minimum to see how that operating strategy may change. Will the volumes of participants resulting in long runs prevail or will contest operators need to place a drop of oil on their VFOs and return to the days of tuning? Only time will tell.

Closing Comments

If you haven't yet, please take a few minutes and fill out the contest survey in last month's contest column. I'd encourage you to bring a copy to your local contest club meeting and spread it around. Remember to send your responses directly to my QTH and not to CQ magazine.

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

73s, John, K1AR

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FREE DATA REPORT

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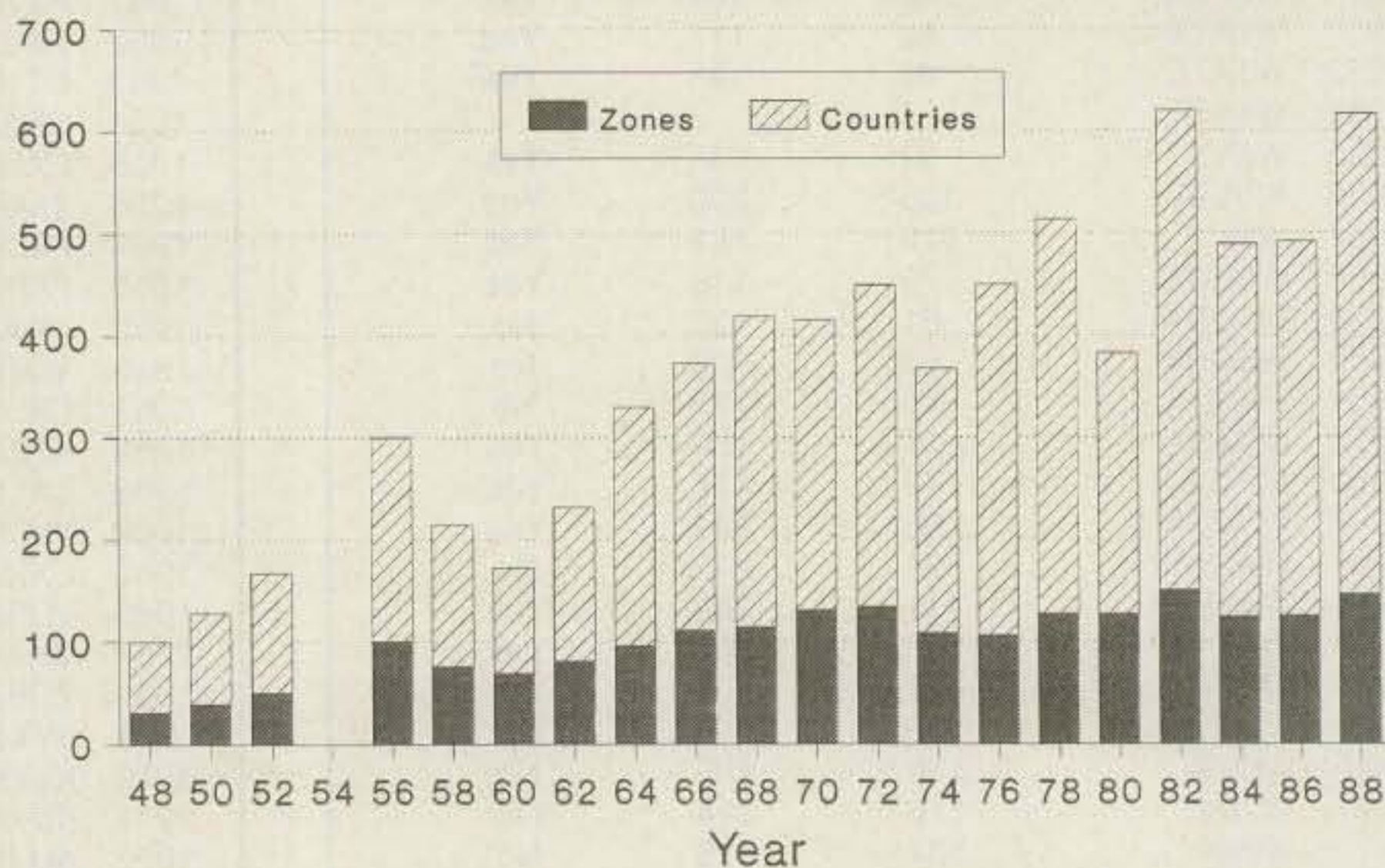
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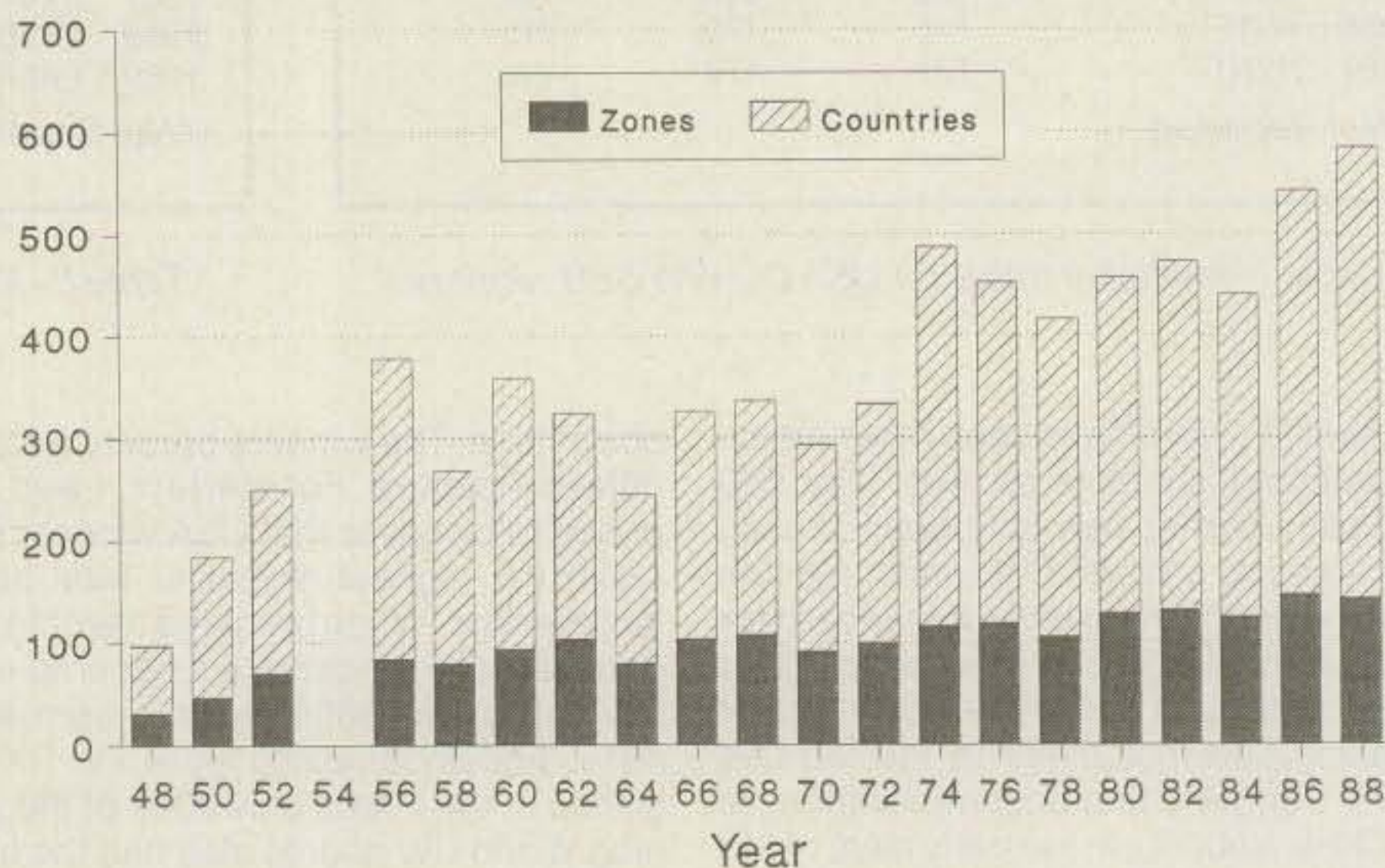
Winners' Multiplier Totals CQ World-Wide SSB Contest



USA Single Op/All Bands

Fig. 2- Winners' multiplier totals for the CQ WW DX SSB Contest from 1948 to 1988, USA Single Op All Band category.

Winners' Multiplier Totals CQ World-Wide CW Contest



World Single Op/All Bands

Fig. 3- Winners' multiplier totals for the CQ WW DX CW Contest from 1948 to 1988, World Single Op All Band category.

Iberoamericano Contest

2000Z Sat. to 2000Z Sun., Oct. 5-6

Organized by "Seccion Territorial de URE del Valles Oriental" and by "CQ Ra-

dio Amateur de Boixareu Editores," this contest will be sponsored every year the weekend before October 12th to commemorate the anniversary of the discovery of America. This is a phone-only con-

Year	Callsign	Zones	Countries	Highest Multiplier/Class
1948	W4KFC	31	75	Yes
1949	W4KFC	74	158	No
1950	W4KFC	60	127	No
1951	W4KFC	76	143	Yes
1952	W8JIN	86	154	Yes
1953	W4KFC	88	173	Yes
1954	W4KFC	*		
1955	W2HJR	97	201	No
1956	W4KVX	135	253	Yes
1957	W4KFC	124	269	No
1958	W8JIN	99	218	No
1959	W3GRF	106	216	Yes
1960	W4YHD	124	236	No
1961	W4KFC	121	252	Yes
1962	W3GRF	95	197	No
1963	W3GRF	107	233	Yes
1964	W3GRF	96	213	No
1965	W4KFC	97	254	Yes
1966	W3GRF	113	266	Yes
1967	K1DIR	124	282	Yes
1968	W3GRF	111	264	No
1969	W4YHD	127	278	Yes
1970	K1KTH	142	314	Yes
1971	W1FBY	119	286	No
1972	W3WJD	134	336	Yes
1973	W3LPL	117	278	Yes
1974	W1BGD/2	125	304	No
1975	W3LPL	112	303	Yes
1976	W3LPL	117	351	Yes
1977	W3LPL	128	323	Yes
1978	W3RJ	137	356	Yes
1979	K1AR	130	323	No
1980	K1AR	139	351	No
1981	K1GQ	138	390	No
1982	K1AR	127	354	No
1983	W1KM	130	376	Yes
1984	N2LT	119	325	No
1985	K1AR	120	363	Yes
1986	W1KM	131	376	No
1987	K1EA	144	378	No
1988	W1KM	156	421	No
1989	K3TUP	155	431	Yes

*Not Reported

Year	Callsign	Zones	Countries	Highest Multiplier/Class
1948	GI6TK	31	66	Yes
1949	PA0UN	65	133	Yes
1950	4X4RE	47	138	No
1951	4X4BX	57	166	Yes
1952	4X4RE	70	180	Yes
1953	4X4RE	68	179	Yes
1954	4X4DX	*		
1955	W2HJR	97	201	No
1956	4X4BX	84	294	Yes
1957	W4KFC	124	269	No
1958	CN8JX	79	189	No
1959	CN8JX	94	214	No
1960	UA9DN	93	266	Yes
1961	7G1A	79	182	No
1962	HL9KH	103	221	No
1963	5A1TW	75	175	No
1964	PY4OD	79	166	No
1965	VR2EW	126	268	Yes
1966	ZD8J	103	223	No
1967	ZD8J	107	240	No
1968	KV4FZ	107	229	No
1969	9Y4AA	123	279	No
1970	ZS3AW	91	202	No
1971	KH6RS	118	162	No
1972	ZD3Z	99	234	No
1973	ZD3X	96	251	No
1974	KH6RS	115	372	No
1975	EA8CR	102	287	Yes
1976	KP4AST	118	334	Yes
1977	9Y4VT	122	275	Yes
1978	CT3BZ	105	311	No
1979	EA8AK	95	255	No
1980	9Y4VT	128	329	No
1981	9Y4VT	111	294	No
1982	9Y4VT	131	342	No
1983	9Y4VT	127	359	No
1984	9Y4VT	124	316	No
1985	EA9IE	113	339	No
1986	9Y4VT	146	396	Yes
1987	FY5YE	142	381	No
1988	FY5YE	142	442	Yes
1989	P40GD	146	416	No

*Not Reported

Table III- Multiplier totals for USA CQ WW CW winners.

Table IV- Multiplier totals for World CQ WW CW winners.

test with the emphasis on Latin-American areas.

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

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

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

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

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

Final Score: Total QSO points from all

Decade	Winners with Highest Mults	% of Total
1940	2	100
1950	7	78
1960	7	70
1970	3	30
1980	4	40
Total	23	55

Table V- High multiplier analysis USA CQ WW SSB winners.

Decade	Winners with Highest Mults	% of Total
1940	1	50
1950	3	38
1960	7	70
1970	4	40
1980	3	30
Total	18	45

Table VI- High multiplier analysis World CQ WW SSB winners.

bands times the sum of multipliers from all bands.

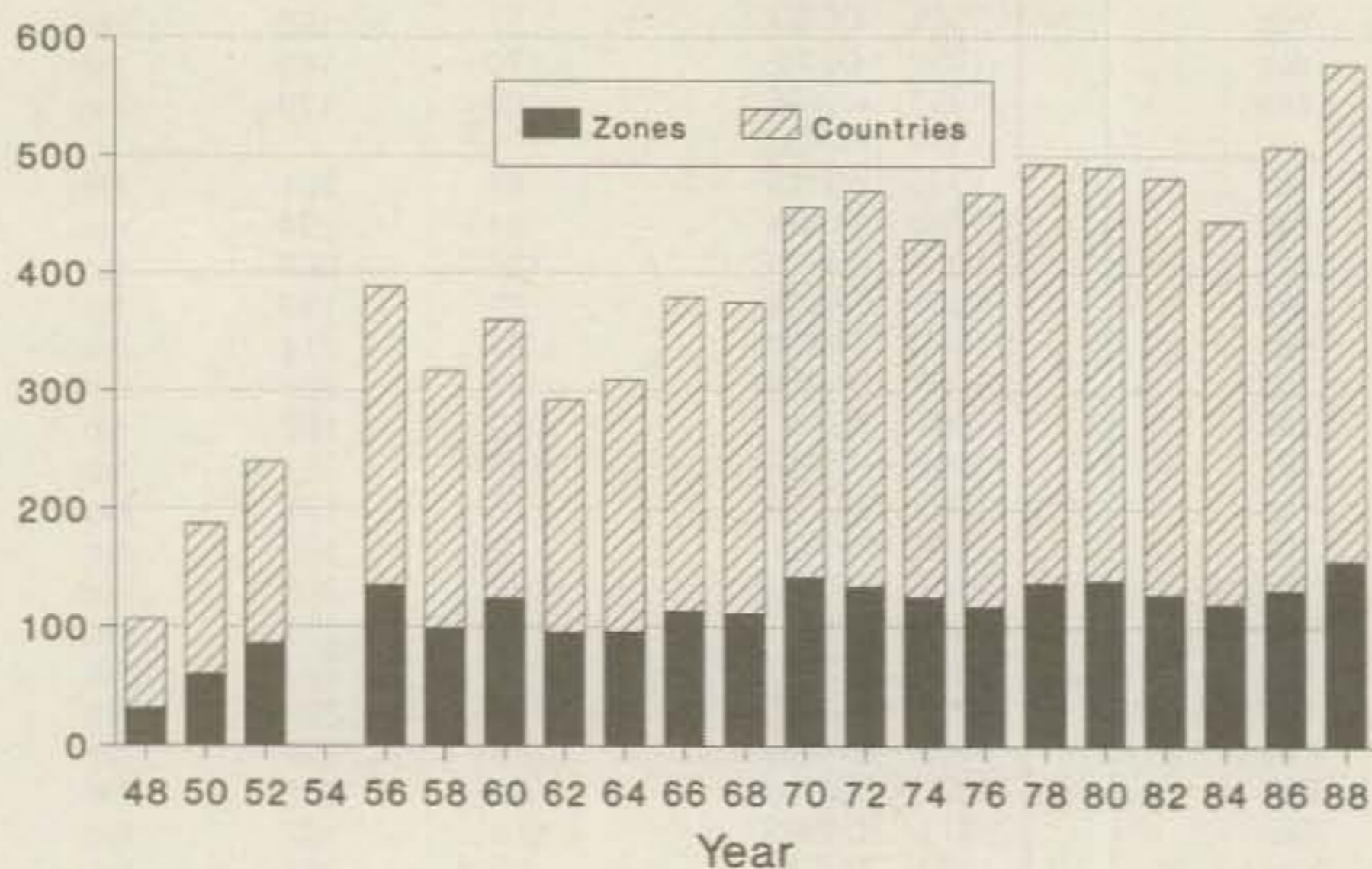
SWL: Same rules apply to SWL entries. The same station cannot be logged more than 15% of the total logged. And the same station can only be logged again after 5 other entries.

Penalties: Taking credit for excessive

duplicate contacts, and violation of rules and amateur radio regulations could result in disqualification.

Awards: Certificates will be issued to the highest scores in each DXCC country. Participating certificates will go to non-Latin-American stations making 50 or more QSOs. There are plaques for

Winners' Multiplier Totals CQ World-Wide CW Contest



USA Single Op/All Bands

Fig. 4- Winners' multiplier totals for the CQ WW DX CW Contest from 1948 to 1988, USA Single Op All Band category.

Decade	Winners with Highest Mults	% of Total
1940	1	50
1950	5	56
1960	6	60
1970	7	70
1980	3	30
Total	22	52

Table VII- High multiplier analysis USA CQ WW CW winners.

Decade	Winners with Highest Mults	% of Total
1940	2	100
1950	4	45
1960	2	20
1970	3	30
1980	2	20
Total	13	32

Table VIII- High multiplier analysis World CQ WW CW winners.

overall winning scores showing at least 4 hours of operation and 100 or more QSOs.

Mailing deadline for entries is November 30th to: X-Concurso Iberoamericano, Gran Via de les Corts Catalanes, 594, 08007 Barcelona, Spain.

F9AA Cup 1991 Contest

1200Z Sat. to 1200Z Sun., Oct. 5-6

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

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

Bands: All HF bands according to IARU rules.

Exchange: Club stations—59(9) plus

serial number and club name. Others eliminate the club designation.

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

Scoring: Club stations—5 points same continent, 10 points different continent. Individual stations—1 point same continent, 3 points different continents. Fifty bonus points/QSO for working FF8URC. Multipliers are DXCC countries and different radio clubs.

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

The log deadline for this one is November 7th and they should be mailed to: Union Des Radio Club, Coupe Fernand Raoul, 11 Rue de Bordeaux, 94700 Maisons Alfort, France.

VK/ZL/Oceania DX Contest

SSB: Oct. 5-6 CW: Oct. 12-13
1000Z Saturday to 1000Z Sunday

This is the 56th year of the VK/ZL contest. Use all bands, 1.8-28 MHz, except WARC bands.

Oceania stations can work anyone. The rest of the world can work VK, ZL, and Oceania stations only. The same station may be worked on each band for QSO and multiplier credit.

Exchange: RS(T) plus a three-figure QSO number starting with 001.

Points: Two points per QSO.

Multiplier: Each VK/ZL/O prefix worked on each band.

Final Score: Total QSO points from all bands times the sum of the prefix multiplier from each band.

Awards: Special large, color certificates to top scorers in each country and to each continental winner. A participation certificate to all on request (3 IRCs, please).

There is an SWL section. Only VK/ZL/O stations are logged. Call of station being worked and RS(T) being sent must be reported. Scoring same as above but both SSB and CW scores are combined for final score (maximum total of 24 hours).

Use a separate log sheet for each band and underline each new VK/ZL/O prefix as it is worked on each band. Include a summary sheet showing the scoring and other essential information, and the usual signed declaration that all rules and regulations have been observed.

This year logs go to the Contest Manager, Frank Beech, VK7BC, 37 Nobelius Drive, Legana, Australia 7277, and they must be received no later than January 25, 1992.

Wyoming QSO Roundup

0000-2359Z Sat.-Sun., Oct. 5-13

One of the attractive aspects of QSO parties is the opportunity they provide for you to work rare U.S. states. This year's Wyoming QSO Roundup is being sponsored by the University of Wyoming Amateur Radio Club and is no exception. The contest is unusual this year as it is a week-long event. Wyoming stations can work each other and stations outside of the state.

Exchange: Non-Wyoming stations send RS(T) and State/Province. DX send RS(T) and serial number. Wyoming stations send RS(T) and County.

Scoring: A station may only be worked once per band/mode category for QSO credit (e.g., 20 meter QSOs with the same station on CW, SSB, and RTTY count as three valid contacts). Non-Wyoming stations use band/mode counties as multipliers. Wyoming stations use the same plus states, provinces, and DXCC countries.

Scoring is computed by total valid QSOs times multiplier.

Bands: All bands are encouraged (excluding WARC frequencies) with CW lower band edge plus 50 kHz, SSB upper band edge minus 50 kHz. Novice CW sub-band edge plus 25 kHz, and Novice SSB on 28390 kHz.

Awards: All awards will be determined by a committee of the UWARC and will include certificates for top scorers in a variety of categories. Certificates of participation will be awarded to all entries submitting a large SASE.

Logs and entry forms should be post-marked by November 15, 1991 and sent to Bill Wright, KF7AP, 1304 Sheridan St., Laramie, WY 82070.

Discovery of the New World Contest

0000Z Sat., Oct. 12 to 0000Z Sun., Oct. 13

This worldwide contest has been organized to celebrate the 500th anniversary of the discovery of the New World, and it is open to amateurs around the world.

Classes: Single Operator and Single Operator/Single Band only on SSB.

Exchange: Signal Report (RS) and serial number (59001). Keep separate serial numbers for each band of operation.

Scoring: Contacts between stations in the Americas are worth 2 points. QSOs between the Americas and outside are worth 3 points, and contacts between countries not in the Americas are worth 1 point. Double your QSO point credit for all but the latter (one-pointers) for 40 and 80 meters. Contacts within the same country are only allowed for multiplier credit. Multipliers are countries of the Americas (per DXCC list), the nine HI call areas, and UDRA stations (e.g., HI1UD to HI9UD and HI500UD). Final score is total QSO points times multiplier.

Frequencies: All amateur bands 80-10 (excluding WARC bands).

Awards: A prepaid round-trip to Santo Domingo, Dominican Republic will be awarded to the overall winning score, including accommodations for three days/nights (departure points are Miami or Madrid). In addition, certificates will be sent to participating stations working at least 200 contacts and 100 QSOs in the Americas.

The mailing deadline for logs is November 30, 1991. Logs can be sent to: UDRA - Concurso 500 anos america, P.O. Box 449-3, Santiago, Republica Dominicana. Be sure to include the usual signed declaration statement and summary sheet.

RSGB 21/28 MHz SSB Contest

0700 to 1900 GMT Sunday, Oct. 13

It's the world working the British Isles on 21 and 28 MHz.

The same station may be worked on each band for QSO and multiplier credit. There are a total of 49 prefixes available on each band. Following are the rules for areas other than the British Isles.

QSY Rule: All stations who QSY from one band to the other and make a scoring contact may not change bands again for a period of at least 10 minutes after the last contact on the original band (this does not apply to SWLs).

Sections: Single operator and multi-operator, both bands only, and SWL.

Exchange: RS report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth 3 points. Multiply total QSO points from each band by the sum of B.I.

prefixes worked on each band (maximum of 49 per band). The GB prefix does not count for QSO or multiplier.

Unmarked duplicate contacts will be penalized 10 times the points claimed. Logs containing more than 5 unmarked duplicates will be disqualified.

Awards: Certificates to the three leading overall winners, and at the discretion of the committee, to the leading station in each country. Both for transmitting and SWL.

There is also an SWL section. Only B.I. stations are to be logged. Scoring is the same as indicated above. The same call sign may appear once only in every three contacts, except when the logged station is a new multiplier.



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Awards: Overseas stations will be awarded certificates to the leading station in each country and the leading station in the multi-operator section, and to the SWL winner in each country. The first, second, and third overall winners will also receive certificates of merit.

Separate log sheets are required for each band. Include a summary sheet showing the scoring, prefixes worked, and a signed declaration that rules and regulations have been observed.

Logs must be received by December 5th. This year they go to: RSGB Contest Committee, P.O. Box 73, Lichfield, Staffs. WS13 6UJ England.

Pennsylvania QSO Party

1600-0500Z Sat.-Sun., Oct. 12-13
1300-2200Z Sun., Oct. 13

This is the 34th annual party sponsored by the Nittany ARC of State College, PA. The same station may be worked on each band and mode for QSO points. PA stations may also work other in-state stations for QSO and multiplier credit, and mobiles in each county change. Novice stations must identify.

Exchange: QSO number and County for PA, ARRL section for others.

Scoring: One point for SSB contacts, 1.5 points for CW, 2 points if on 80 or 160.

PA stations multiply total by (ARRL sections + PA counties + 1 DX country). Others use PA counties for their multiplier (total of 67 possible).

Mobiles add 500 points for each county operated from with a minimum of 10 QSOs. Mobiles on a county line give one QSO number, but get credit for two multipliers.

QRP stations multiply their score by 2, Novice/Tech by 3.

Final score is total points times multipliers.

Frequencies: CW—1810 and 40 kHz up from bottom of each CW band. SSB—1850, 3980, 7280, 14280, 21380, 28580. Novice—10 kHz up from bottom of each Novice band and SSB on 10 meters. Mobile—5 kHz below listed frequencies. Try 160 at 0300Z.

Awards: In six classes—Single Operator, Mobile, Multi-Single, Multi-Multi, Portable, QRP, and Novice/Tech. Certificates to winners in each PA county, ARRL section, DX country, and club entry (minimum of 3 members/20 QSOs per log). An impressive trophy program is available including a Club Trophy (members must reside within 175 mile radius), and Medium/Small Club Gavel (less than 75 members). In addition, there are 12 plaques available for winners in eastern and western PA, out-of-state, PA and out-of-state Novice, Multi-Single, Mobile, Portable, Central and Western Time Zones, NARC winner, and QRP.

Include a summary sheet with your entry showing the scoring, a check list of counties and sections worked, and a dupe sheet if you make 100 or more contacts. There is a severe penalty of 100 points deducted for each dupe that has not been removed.

Official log forms are recommended. Send \$1.00 for a copy of the results (no SASE).

Mailing deadline for all entries is November 16th to: Nittany ARC, P.O. Box 614, State College, PA 16804-0614.

Illinois QSO Party

1800Z Sun. to 0200Z Mon., Oct. 13-14

This is the 29th anniversary of the Illinois QSO Party sponsored by the Radio Amateur Megacycle Society. It's a shorty, only 8 hours long.

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

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

Scoring: One point for phone contacts, 2 points if on CW. Illinois stations multiply total QSO points by (states + provinces + IL counties + maximum of 5 countries) worked. Additional DX QSOs count for points but not multiplier.

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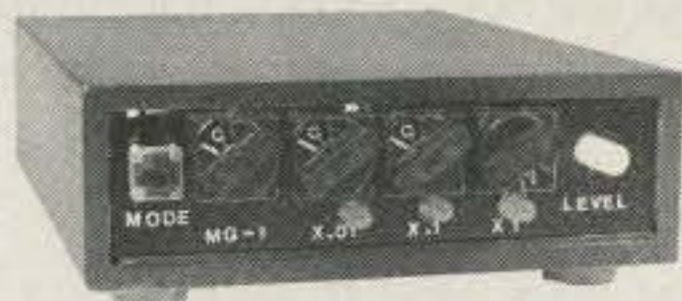
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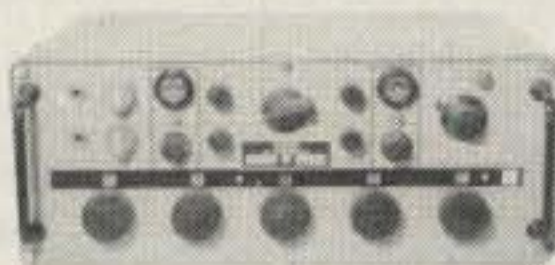


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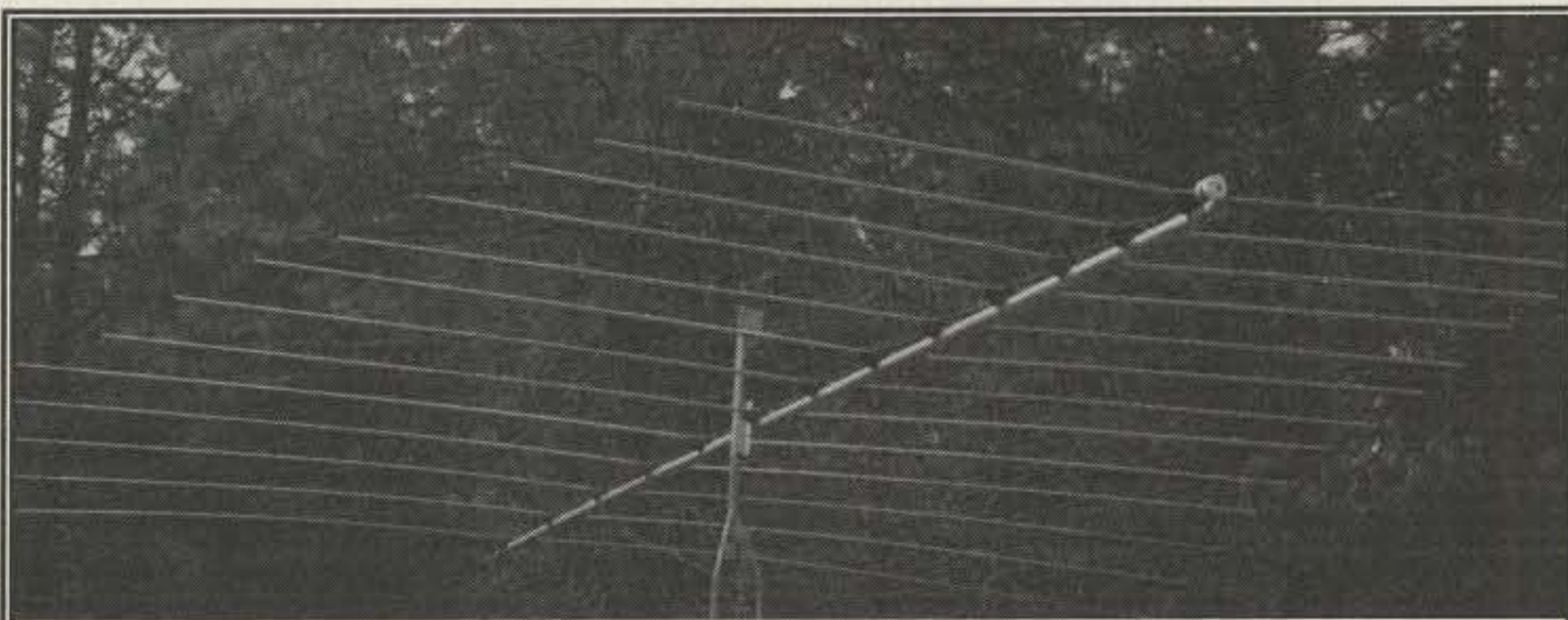
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CIRCLE 29 ON READER SERVICE CARD

Others use IL counties for their multiplier (maximum of 102).

Illinois mobiles add 200 points to final score for each county from which 10 or more QSOs were made.

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

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

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

A summary sheet showing the scoring and the usual signed declaration is also requested.

Mailing deadline for logs is November 6th to: RAMS, c/o Joe LeKostaj, WB9GOJ, 9134 Ewing Ave., Evanston, IL 60203.

YLRL Anniversary Party

CW: Oct. 16-17 SSB: Oct. 30-31
1400Z-1359Z, Wed.-Thurs.

This is the 52nd annual party run by the YL Radio League. It is open to all YL's around the world. Activity will be found on all bands, 10 through 80 meters, and will be between YLs only.

CW and SSB are separate contests and require separate logs. A station may be worked *once on each band* for contest credit.

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

Scoring: One point per QSO between stations within the U.S. and Canada (including Alaska and Hawaii). Two points for contacts with stations in other areas.

DX YLs score 2 points for QSOs with the U.S. and Canada and with other continents, but 1 point with stations in own continent.

Final Score: Multiply total QSO points from all bands by the sum of states, provinces, and DX countries worked.

There is a low-power bonus multiplier of 1.5 for stations using 100 watts or less on CW and 200 watts PEP on SSB.

For each duplicate contact removed from your log there is a penalty of 3 additional and equal contacts removed from your log.

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

Awards: Certificates to winning scores in each district, province, and DX

country, and first, second, and third place overall winners. There are cups and plaques for YLRL members in North America and DX countries.

Include a summary sheet with your entry showing the scoring and other essential information. Logs must be in their original form, no carbon copies.

Your entry must be received by November 30th, and this year logs go to: Dana Tramba, N0FYQ, RR1, Box 213, Peck, KS 67120.

Worked All Germany Contest

1500Z Sat., Oct. 19 to 1500Z Sun., Oct. 20

This worldwide contest has been organized to encourage QSOs between Germany and the rest of the world. Operation is permitted on SSB and CW using 80-10 meters (no WARC bands).

Classes: Single Operator, Multi-Single, QRP, and SWL.

Exchange: Signal Report (RS) and serial number (59001). German stations use RS(T) and their DOK number. A station may be worked once per band and mode. QSOs can only occur between Germans and non-Germans.

Scoring: Contacts between stations in Germany and other continents are worth 3 points. QSOs in Europe are worth 1 point. Multipliers are German districts (determined by the first letter of the DOK number) and DXCC countries for Germans. Final score is total QSO points times multiplier.

Awards: Certificates will be awarded to the highest scorer in each classification in each country.

Logs must be postmarked no later than 30 days after the contest and should be sent to: Klaus Voigt, Y21TL, P.O. Box 427, O-8072 Dresden, Germany. Be sure to include the usual summary sheet and signed declaration.

ARCI QRP Fall CW Contest

1200Z Sat. to 2400Z Sun., Oct. 19-20

This is the fall edition of the QRP Amateur Radio Club International. This year's activity will be found on CW only. Participants are limited to 24 hours out of the 36-hour contest period.

Exchange: RST and state, province, or country. Members will include their number; non-members their power output.

Scoring: Contacts with members, 5 points. Non-members, 2 points if in same continent, 4 points if in a different continent. The same station may be worked on each band for QSO and multiplier credit.

There is a power output bonus: 0 to 1 watt— $\times 10$; 1 to 5 watts— $\times 7$. Over 5 watts check log only.

The following bonus multipliers are also available: solar or wind power— $\times 2$;

battery power— × 1.5. Must be used for duration of contest. And a bonus on each band if homebrew equipment is used, 2000 if a transmitter, 3000 if a receiver, and 5000 if a transceiver (maximum of 5000 per band).

Multiplier: Each state, VE province, and DX country worked on each band.

Final Score: Total QSO points from all bands × (states + provinces + countries) × power bonus × power type if any + homebrew bonus.

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50060. Novice— 3710, 7110, 21110, 28110.

Awards: Entries may be single or all band. Certificates to the top ten scores overall; to the top score on each band for single band entries; and to the top scores in each state, province, and DX country. There is a team category, 2 to 5 members, with a certificate to the highest scoring team.

Use a separate log sheet for each band. Include a summary sheet showing the scoring, equipment description, and other essential information. Include a large SASE for a copy of the results. It is suggested you send a large SASE to K5VOL for official log forms.

Logs must be received by November 20th and go to: QRP ARCI Manager, Red Reynolds, K5VOL, 835 Surryse Road, Lake Zurich, IL 60047.

RSGB 21 MHz CW Contest

0700 to 1900 GMT Sunday, Oct. 20

Like the 21/28 MHz Phone Contest, the activity in this one is between the British Isles and the rest of the world. Competition is limited to single operator stations only. There is a separate QRP section in which power input must not exceed 10 watts, and there is also an SWL section.

The following rules are for areas other than the British Isles.

Exchange: RST report plus a progressive QSO number starting with 001.

Scoring: Each contact with a B.I. station is worth three points. Multiply total QSO points by the number of B.I. prefixes worked (G2, G3, GD3, etc.). A maximum of 49 is possible. (GB does not count for QSO or multiplier.)

Unmarked duplicate contacts for which credit has been taken will be penalized ten times the points claimed. Logs containing more than five unmarked duplicates will be disqualified.

Only British Isles stations are to be logged by overseas SWLs. The same call may be reported only once in every three contacts, unless the logged station is a new multiplier. Scoring is the same as above.

Awards: Certificates to the three leading overall winners, and at the discretion of the committee, to the leading station in

each country. Both for transmitting and SWL.

Include a summary sheet with a list of prefixes worked, station description, the usual signed declaration, and your name and address in block letters.

Logs must be received by December 31st and they go to: RSGB Contest Committee, P.O. Box 73, Lichfield, Staffs. WS13 6UJ, England.

CQ World-Wide DX Contest

Phone: Oct. 26-27 CW: Nov. 23-24
0000Z Saturday to 2400Z Sunday

Complete rules were published in last month's issue. There were several rule changes that should be reviewed. Of note is the creation of a new low-power cate-

gory. Be sure to list your entry category on your summary sheet. In addition, the committee has decided to require hard copies of your log submission even when accompanied by a diskette.

A few trophies have been eliminated, but there are many new additions which fill in quite a few of the category gaps from previous years. The detailed trophy list can be found in the rules announcement.

All entries must be postmarked **no later** than December 1, 1991 for the phone section, and January 15, 1991 for CW.

Again this year all logs must be sent directly to: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801. **Be sure to indicate SSB or CW on the envelope.**

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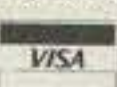
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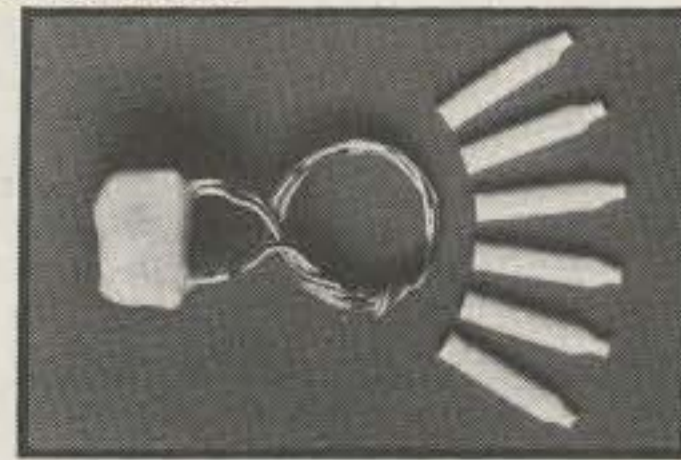
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NEWS OF COMMUNICATION AROUND THE WORLD

Sunspot Region 6659 And What To Do When The Bands Go Dead

It's 1445Z on Saturday, June 1st. The DXer is carefully tuning the bands, listening for weak signals in the higher-than-normal noise level. The DXer's expectations are low, as propagation through the polar regions had been wiped out the previous day by a severe solar storm. The Anchorage, Alaska, K-index peaked at 9 on May 31, and the Anchorage A-index averaged 138 for the day, meaning that there were essentially no signals passing through the higher latitudes.

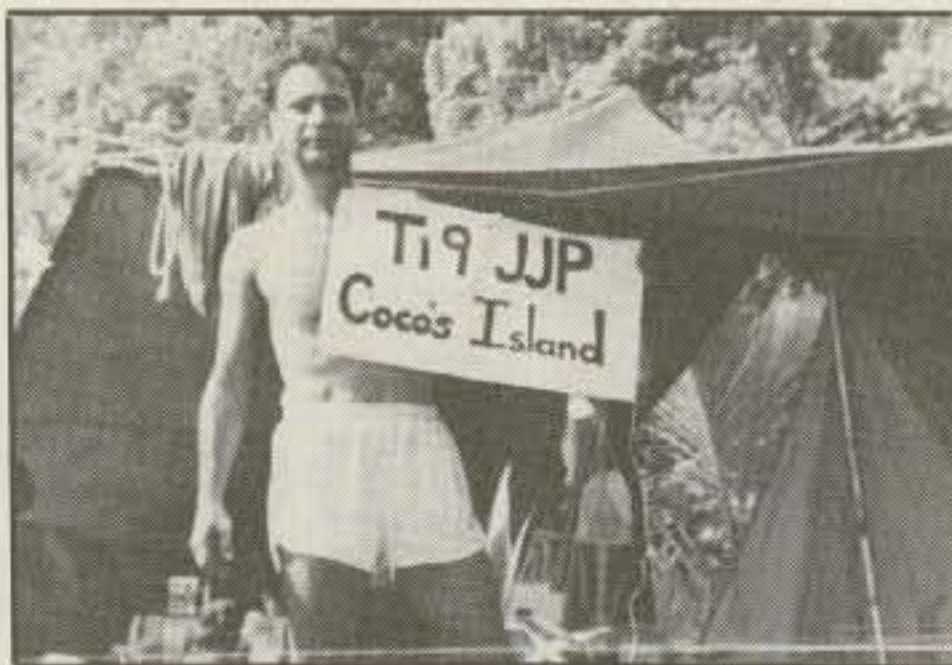
Suddenly the DXer hears a rush of noise, followed a few seconds later by dead silence. The DXer tries another band; again nothing, not even noise. The DXer tries all the other bands with the same result: no signals at all. Wait! There's something on 75 meters. No amateurs, not even the locals who might be on the band in the middle of the day. Instead there is a strange whistling, very loud, dropping slowly in frequency, similar to a train whistle dying in the distance.

The whistle fades away, leaving nothing on any band. The DXer takes out the rig's instruction manual, turns to the "What to do in case of difficulty" section, and starts trouble-shooting the rig. Two-and-a-half hours later, while struggling with Step 89 in the trouble-shooting guide, the DXer hears a faint signal.

Listening carefully to the weak signals, almost lost in the noise, the DXer hears about the enormous solar flare that totally shut down all high-frequency communications. Welcome to Sunspot Region 6659.

Over the next two weeks this scenario would be repeated in thousands of radio shacks around the world. This reporter's phone rang off the hook with dozens of complaints, such as: "I just got my rig back from Kenwood's service department, and now it doesn't work at all!" (Response: "Try it again in a couple of hours.") My office staff even complained that they could no longer hear their favorite AM broadcast station from 60 miles away.

Sunspot Region 6659 was by far the most energetic region of this sunspot cy-



Jose, T12JJP, operated as T19JJP from Cocos Island off the coast of Costa Rica in May. He made about 3000 contacts on SSB. QSL route is via T12AOC.

cle, and maybe of all time. The massive flare that started at 1456Z on June 1 saturated the x-ray sensors on the GEOS satellites that monitor solar activity. (Solar flares are ranked by their x-ray emission, from weak Class C1-C10, through moderate Class M1-M10, to the most powerful X1-M12. The sensors saturate at the X12 level; there is no way to determine how much above X12 this June 1st flare peaked.) The flare was the largest since October 1989. The energy released in a flare of this magnitude is more than the demand for electricity in the US for the next 100,000 years. It is comparable to the simultaneous detonation of 100,000,000 hydrogen bombs!

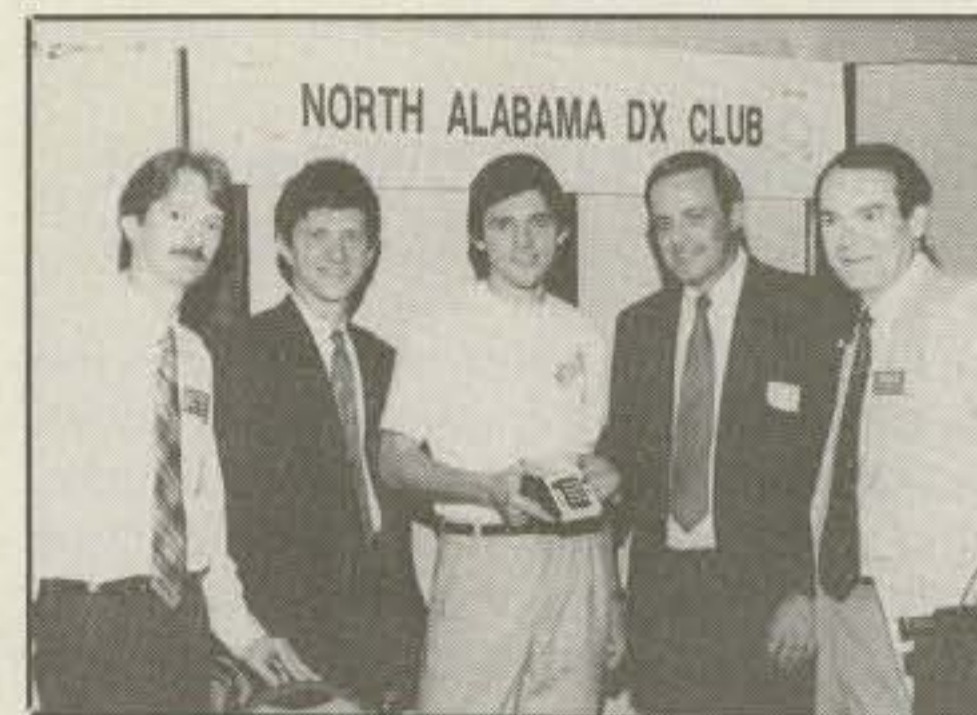
The type II radio sweep (the strange whistling noise on the lower bands) was among the most pronounced most DXers had ever heard. And Region 6659 was just beginning its devastation of the bands. In fact, at the time of the June 1 flare, it was still on the back side of the sun! The visible spray of solar material from this single flare exploded almost 500,000 miles from the sun, twice the distance from the earth to the moon.

Because Region 6659 was on the back of the sun at the time of the June 1st flare, most of the energetic particles that disrupt the bands a day or two after a major flare missed the earth. DXers were spared the severe geomagnetic storms that usually follow such a powerful flare. But not for long.

At 0337Z on June 4, only 2½ days after



Dennis, ST0DX (left), and Jim, KF7E, share some cold 807s in Nairobi, Kenya, where Jim has been trying to get a 5Z4 license. Jim has been active as 7Q7JH, among other southern African calls.



From left: Tim Pearson, KU4J (President of the North Alabama DX Club); Yuri Brejanko (Romeo's Soviet traveling companion); Romeo Stepanenko, 3W3RR/YA0RR/XZ?; Joe Lunsford, N4YG (inventor of the Smart Keyer); and Dan Whitsett, W4BRE. Dan organized a banquet for Romeo during his visit to the US. The NADXC presented Romeo with Smart Keyer at the banquet. (W4NYC photo)

producing the most powerful flare in 20 months, Region 6659 exploded again with another sensor-saturating X12+ flare. This one had twice the peak radio flux of the June 1st flare. After recovering from the blackout effects of the June 4th flare, DXers prepared for a couple of days of very poor band conditions, as the particles hit the earth's ionosphere. As expected, June 5th was a poor day for DXing, as the Boulder K-index hovered

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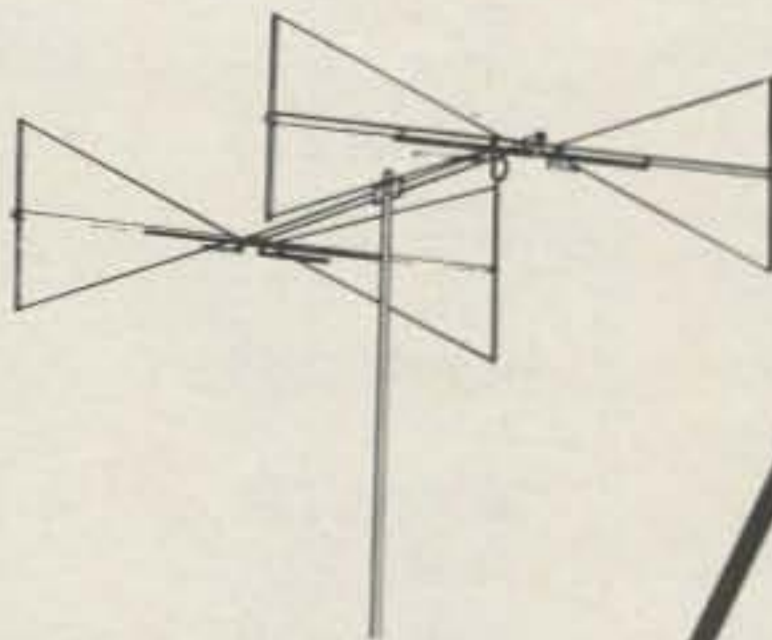
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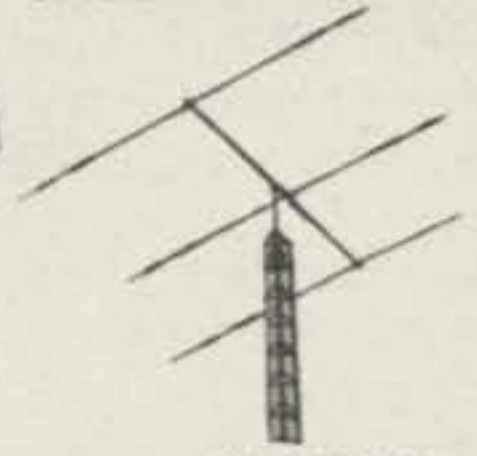
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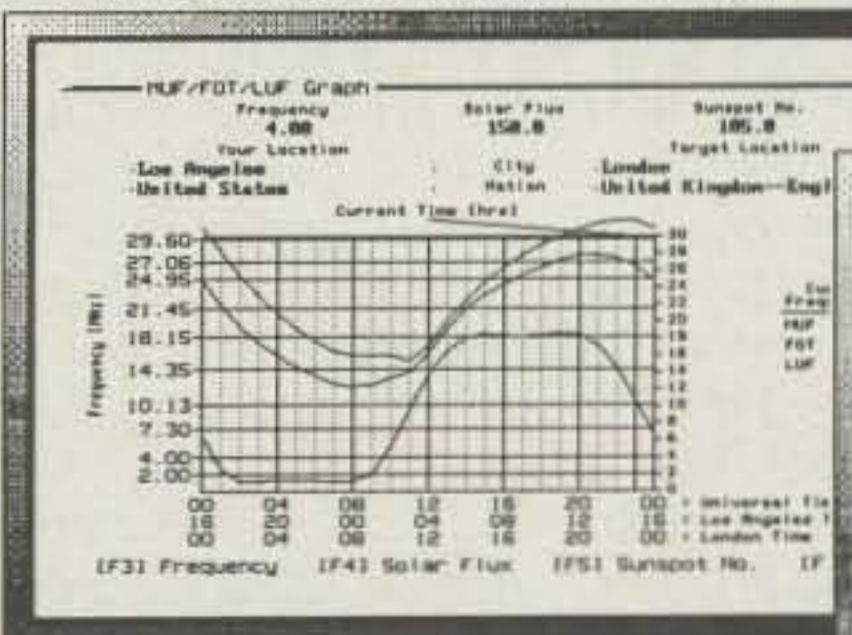
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4,733 Nautical Miles	18.5	6.5	2.7	Time Difference	
	Nov	+1 hr.	+2 hr.	-6	-6
		Your Name	Your Call Sign		

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CIRCLE 55 ON READER SERVICE CARD

The WPX Program

Mixed

1514 KN4SR 1516 W0IZV
1515 IK0IOL 1517 NM2U

SSB

2247 I3UBL 2250 JP1RIW
2248 JA3XNI 2251 N6PYN
2249 YC7BVB 2252 KE5PO

CW

2697 ONL-2169

VPX

271 DE0RST 273 JA1-20762/BV
272 JA1-20762

Endorsements

Mixed: 450 KN3SR, IK0IOL, W0IZV, WM2U, AC6H, 500 IK0IOL, WM2U, AC6H, 550 IK0IOL, KB3WN, HA9PP, 600 IK0IOL, KB3WN, HA9PP, 650 IK0IOL, HA9PP, 700 IK0IOL, HA9PP, 900 IK0IOL, HA9PP, K9EC, 950 HA9PP, 1000 K9EC, 1050 K9EC, 1050 K9EC, 1100 K9EC, 1150 CT1YH, 1200 CT1YH, 1250 CT1YH, NE4F, 1300 JE6GWU, 1500 WB2YQH, VE1RJ, 1750 I2EOW, 1800 W5AWT, 1850 W5AWT, 1900 W4UW, 2000 KL7AF.

SSB: 350 I2UBL, JA1-20762, N6PYN, KE5PO, 400 I3UBL, JA1-20762, N6PYN, KE5PO, 450 I3UBL, JJ1SBO, JA1-20762, N6PYN, KE5PO, 500 I3UBL, JJ1SBO, JA1-20762, N6PYN, KE5PO, KE7UH, 550 I3UBL, JJ1SBO, N6PYN, KE5PO, KE7UH, 600 I3UBL, NE4F, KW0U, N6PYN, KE5PO, KE7UH, 650 I3UBL, IT9SVJ, N6PYN, KE5PO, 800 I3UBL, IT9SVJ, KE5PO, 850 I3UBL, KE5PO, 900 I3UBL, KE5PO, K9EC, 950 K9EC, 1000 K9EC, 1050 K9EC, 1250 IK8GCS, 1300 IK8GCS, 1350 IK8GCS, 1400 IK8GCS, 1550 KL7AF, 1600 I2EOW.

CW: 350 K9EC, 400 K9EC, 450 AC6H, 500 AC6H, 800 CT1YH, 850 CT1YH, 900 EA5AR, 950 EA5AR, 1000 EA5AR, 1150 NE4F, 1300 G3VQO, 1450 VE1RJ, 3050 W8RSW, 3100 W8RSW, 3150 W8RSW, 3200 W8RSW.

10 Meters: IK0IOL, IK8GCS, NE4F
15 Meters: IK0IOL, AC6H
20 Meters: IK0IOL, KA1NCN
40 Meters: IK0IOL, K9EC
80 Meters: IK0IOL

Asia: IK0IOL, LU1DOW, W9IAL, AC6H, IK0ADY
Africa: I5AFC, IK0IOL, LU1DOW, K9EC, IK8GCS
No. Amer.: IK0IOL, LU1DOW, KT2C
So. Amer.: I5AFC, IN3QCI, LU1DOW, K9EC, IK8GCS
Europe: IK0IOL, LU1DOW, KT2C, IK0ADY
Oceania: IK0IOL, LU1DOW, K9EC

Award of Excellence: NE4F

Award of Excellence Plaque Holders: I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GO, VK9NS, DE0DXM, DK4SY, UR2**, AB90, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, H18LC, KA5W, K0JN, W4VQ, KF20, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMO, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YLW4, NN4Q, KA3A, VED7WJ, YB0TK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NX0I, W9NUF, N4NX, SM0DJZ, DK5AD, WB4RUA, DK5AD, WD9IC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VE3FXR, N4MM.

Award of Excellence Plaque Holders with 160 Meter Endorsement: FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, H18LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF20, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YB0TK, W8ILC, W1BWS, VE7WJ, K9QRF, NN4Q, W4UW, K9QRF, NN4Q, W4UW, NX0I, G4BUE, LU3YLW4, I4EAT, WB4RUA, VE7WJ, N4NX, DE0DXM, VE7IG, K9BG, I1EEW, AB90.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to: "CQ WPX Awards," 880, CR13, Clovis, NM 88101-9511 USA.

The WAZ Program

Single Band WAZ

10 Meter SSB

397 EA7TV 399 KA9PJZ
398 IK2MRZ

15 Meter SSB

387 EA7TV 389 JE1DXC
388 W8AXI 390 KA5RNH

20 Meter SSB

849 LU2DKT 852 KJ6HO
850 EA7TV 853 ZL1AK
851 IK7JTF

40 Meter SSB

65 4X4DK

10 Meter CW

115 AA5BT

15 Meter CW

210 NZ0R

20 Meter CW

401 JH2QAY 402 DF3FJ

40 Meter CW

144 N2KW

RTTY WAZ

15 Meter RTTY

4 JA3EOP

WNZ

37-10M SSB, N4WUV

Phone

601 KJ6HO

All Band WAZ SSB

3775	IK8MVH	3788	K1IYD
3776	KA6WRF	3789	NC6A
3777	JA6NQT	3790	LU8ESU
3778	YU2QU	3791	YB1DYB
3779	PY2AN	3792	KJ6HO
3780	NQ7Q	3793	N4DW
3781	EA5FCO	3794	WB2DZH
3782	KB3H	3795	IK1FRI
3783	W4NCC	3796	WB0CHS
3784	KV1J	3797	N1EOA
3785	GM0LVI	3798	WD8MQJ
3786	DK6AY	3799	JG4ENO
3787	N7NYO		

CW/Phone

7035	IV3DRN (CW)	7043	OE6IMD (CW)
7036	W5HL	7044	KA3JWJ (CW)
7037	K8KR	7045	KJ6HO
7038	WA4QYP	7046	VE4CE
7039	WB8IZM	7047	NF2K
7040	W0IRT (CW)	7048	JE1KHX
7041	N7NYO	7049	OZ3ACO (CW)
7042	I1IKT (CW)	7050	J12DLF

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Rd., Sudbury, MA 01776. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).

around 7. It was worse at high latitudes; the Anchorage K-index remained at 8 most of the day, and the A-index for the day was 220! (An A-index of about 30 suggests poor band conditions.)

Then less than 48 hours later, Region 6659 produced yet another X12+ flare, at 0054Z on June 6th. The radio flux from this flare was twice that of the June 4th flare, four times the energy of the June 1st flare that caused such widespread radio havoc. This flare broke the previous record for X10+ flares from a single sunspot region. Region 6659 already earned a place in the solar record books, and it had only been visible for four days!

On June 9th at 0137Z Region 6659 produced another major flare, this one peaking at "only" X10. By this time most DXers had caught up on their QSLing, dusted their shacks, completed all their pending antenna projects, and were even considering a night out with their families, if the bands continued to be so worthless.

Two days later Region 6659 regained its previous form and produced yet another X12+ flare, again producing strong type II radio sweeps on the lower bands. The near-constant flood of particles from these flares kept the earth's geomagnetic field at severe storm levels. Newspapers and television reports were commenting on the widespread aurora. DXers were seen sticking pins in effigies of Region 6659.

Region 6659 skipped June 13th, producing a handful of mid-level Class M and Class C flares instead of another blockbuster Class X one. But on June 15th at 0633Z another X12+ flare blew out of Region 6659. The few DXers still trying to listen to the bands were treated to another HF blackout and another series of whistles. By June 15th Region 6659 had produced 26 mid-level flares, and six X10+ flares. On June 16th it finally rotated around the back side of the sun. DXers breathed a prolonged sigh of relief.

However, Region 6659 had the last laugh. On June 17th, when it was on the back on the sun, two more powerful flares burst from the region: an M4 and an M5. DXers realized that the bands weren't going to settle down for a few more days.

During the first two weeks of June the mid-latitude A-index dropped below 30 (i.e., below storm conditions) only four days. It dropped below 16, signifying good conditions, only two days. DXers were shell-shocked.

We should expect an increase in the number and severity of solar flares on the down side of the sunspot cycle (and almost all "experts" will agree that we have passed the peak of Sunspot Cycle 22). However, nothing could prepare DXers for a series of flares such as that produced by Region 6659.

While DXers can't do anything about solar flares, we can at least learn to rec-

ognize them and their effects. Then we will be spared the frustration of trying to fix a radio that is working fine. The first sign of a major flare is a Sudden Ionospheric Disturbance (SID) for stations on the sunlit side of the earth. The absorption increases dramatically in a very short time—sometimes just seconds. There may be a short increase in the noise level as this happens, but the onset of a SID is hard to distinguish from the expiration of a receiver.

In the case of very powerful flares, a type II radio sweep makes its presence known through a pattern of whistles, most obvious on the lower bands. These end within a half hour of the onset of the flare.

Signals return to the bands an hour or so after the flare ends. (Most flares last just a minute or two; many of the major flares from Region 6659 lasted a couple of hours!) The time between the SID and the onset of the subsequent geomagnetic storm a day or two later is an *excellent* time to be on the bands. Propagation is often *enhanced* by the increase in solar radiation, at least for a short time. The maximum usable frequency increases, and signal strengths also increase. Make the most of these good conditions; the next couple of days will see significant deterioration.

When the stream of charged particles

from the flares hits the earth's ionosphere a day or two after the flare, long-distance communication worsens rapidly. The noise level increases, signal strengths decline especially on the lower bands, and radio paths through the high latitudes disappear. (The earth's magnetic field directs the bulk of these charged particles to the polar regions, so geomagnetic storms are worse at high latitudes.)

The bands take a couple of days to recover from a severe geomagnetic storm. If the flare was an isolated one, a DXer can expect to find the days back to near-normal about four days after the flare. Stations in Alaska and other high-latitude locations may have to wait another couple of days.

During the peak of the geomagnetic storm, the DXer will find DX rare. Some north-south paths remain open, especially at night, and some low-latitude, east-west openings provide some DXcitement. This is a good time to catch up on your reading.

What To Do During The Geomagnetic Storms

Region 6659 reminded DXers that major flares can essentially eliminate their favorite radio activity. During these storms

the best way a DXer can keep the spirit of DX alive is second-hand, through the DX adventures of others. Two recently published books provide excellent opportunities for this.

Where Do We Go Next is Martti Laine, OH2BH's book on DX, DXing, and DXpeditions. This 300-page, soft-bound book is a must for every avid DXer. It is a book of adventure and philosophy, a book to entertain you and to make you think. World-traveler Martti Laine not only conveys the spirit and excitement of putting new countries on the air, but he also gives a rare glimpse behind the scenes of the world of DX. The detailed DXpedition reports are written by five actual participants in the DXpeditions, as well as by Martti himself. The DXpeditions include Annobon, Market Reef, Revillagigedo, M-V Island, Jarvis Island, Penguin Island, Conway Reef, and Western Sahara. Other chapters cover some DX history, DXpedition hints, the knack of tail-ending, and more. Numerous color and black-and-white photographs and cartoons illustrate the well-written text. *Where Do We Go Next* is now available from KTE Publications, 2301 Canehill Ave., Long Beach, CA 90815 for \$22.95, plus \$3.00 shipping in the US (California orders add \$1.84 tax). Shipping to Canada is US\$5, and to other countries, US\$7. MasterCard and Visa accepted.

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Tried CW and failed?

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the most powerful tool for personal change known to man! **CW Mental Block Buster** is \$24.95 ppd in US.

March 23, 1991
Thank you for your **CW Mental Block Buster** tape. It really works. I have tried to learn CW for a period of 31 years. The best I could do was 3 wpm. I was at the point to give up a life long dream to be a ham. I saw your ad, and it seemed to offer a new approach. I faithfully used the tape twice a day and did the workbook exercises. I also began to use some slow speed practice tapes. Much to my surprise, I could copy 8 wpm with no problem! I passed my Novice and then the 13 wpm General—**KB2HTB**

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PASS Publishing, Dept. G, Box 570, Stony Brook, NY 11790

Another, very different book is Jan Perkin, N6AW's history of Don Wallace, W6AM. This richly illustrated, 320-page, hard-cover book is a chronological description of the radio and personal life of one of amateur radio's most active advocates. The book is in essence a history of amateur radio in the US, as Don's first flirtings with radio date back to the very beginning of the activity. The reader experiences the thrill of the early spark transmitter through the construction of what was probably the first "portable" rig, up through Don's band-dominating rhombic farm, to the modern era. Of particular interest to DXers is the avid way Don pursued contacts (and QSLs) in the early 1950s, when Don was finally seri-



During a recent visit of the Foundation for Amateur International Radio Service to Moscow, Gaynell Larson, KK4WW (right), presents a TNC to Vasilij Bondarenko, UV3BW, chief of the Moscow Krenkel Central Radio Club.

5 Band WAZ

As of June 30, 1991, 322 stations have attained the 200 zone level.

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

KG4W
JA7FS

The top contenders for 5 Band WAZ are:

N4WW, 199
SP9PT, 199
K6YRA, 199
PY7ZZ, 199
DL9WW, 199
K0CS, 199
KB0G, 199
ZS6BCR, 199
UA4RZ, 199
AA4KT, 199
RT5UY, 199
K7UR, 199
K9EL, 199

NA0Y, 199
VE7DX, 199
W0PGI, 199
W2YY, 199
W9WAQ, 199
JA2ODS, 199
I8IGS, 198
VE7AHA, 198
SM6AHS, 198
K1ST, 198
W1JR, 198
4X4DK, 198

729 Stations have attained the 150 zone level as of June 30, 1991.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (75 cents) size 4½ x 9½ to the WAZ Manager, Jim Dionne, K1MEM, 31 De Marco Rd., Sudbury, MA 01776. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. Please make all checks payable to the Awards Manager. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application. Send any questions to K1MEM by mail and include an SASE (please do not telephone).



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Where Do We Go Next is Martti Laine, OH2BH's new book on DXpeditions and DXing.

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no update, file will be made inactive. Lifetime Honor Roll fee is \$4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4152	YU2AA	2404	YT7DX	1754	I2EOW	1393	NV9S	1065	YV7QP
4019	F9RM	2381	YU2NA	1752	4N7ZZ	1392	AC2J	1064	G4SDJ
3710	K2VV	2375	IBYRK	1740	N6JM	1390	G4OBK	1058	KA5TOF
3104	EA2IA	2362	IN3ANE	1740	W8UMR	1382	I7CB	1041	I5ZTC
3074	VE3XN	2320	HA0DU	1733	WE2L	1381	I0AOF	1035	VE3NUP
3040	K6JG	2312	I2UIY	1698	K8LJG	1351	YU7DR	1032	IK2FCZ
2955	YU2TW	2308	I6SF	1698	K2OLG	1329	F1HWB	1032	K9BQL
2950	K6XP	2288	W1BWS	1680	HA0IT	1313	YU4BR	1022	IK2BLA
2928	N4NO	2276	K9BG	1645	W6OUL	1294	JA6GWU	974	F6CDJ
2861	W4BOY	2270	SM7TV	1640	WA1JMP	1286	AI6Z	931	NJ1T
2858	N6JV	2201	I2MQP	1589	YU2CQ	1280	PY2DBU	901	W5ASP
2765	I2PJA	2178	YU7BPO	1584	I1ZEU	1256	WB3DNA	880	W4USW
2761	PY1APS	2177	4X4FU	1579	SM6CST	1249	DF4ZL	878	WB2PCF
2740	K0BLT	2064	IT9QDS	1566	KB0G	1236	AK0G	875	RB5MP
2734	WA8YTM	2062	K5UR	1557	I1WXY	1212	WD9IC	860	WM0G
2696	N4MM	2048	W2FXA	1550	YT7WW	1207	YU1PJ	850	I1ZQD
2674	I2PHN	2042	SM6DHU	1544	WB8ZRL	1195	JA1WJ	848	IK2BHX
2664	YU1AB	2040	YT3AA	1533	YU3NU	1192	KS0Z	833	WK0B
2650	N9AF	2040	W0SFU	1516	DF6EX	1185	VE7EIK	827	YU7FT
2631	PY4OD	2035	SM0AJU	1496	VE3FXR	1183	W3KH	792	N6IBP
2630	W9DWO	2013	UA3FT	1472	K5DB	1158	LZ2JE	792	IK2ILH
2580	SM3EVR	2004	KF2O	1470	W9IL	1155	K3UA	765	W6LC
2557	YU7SF	1994	HA8XX	1469	VE1RJ	1155	I2EAY	732	N3KR
2534	IT9TOH	1955	I1POR	1468	YU7RU	1146	YU3PG	663	VE7CBH
2485	PA0SNG	1945	KL7AF	1463	WB4RUA	1140	KI3L	658	VE3OMM
2466	YU7BCD	1910	K9QFR	1440	YB0TK	1120	W0JIE	638	DL6UQ
2454	I1EEW	1878	W4UW	1435	LA7JO	1095	5H3RB	636	5Z4BH
2445	KA5W	1811	I2DMK	1408	WB2YQH	1091	W9IAL	602	W9GCH
2408	N2AC	1782	DK5AD	1405	N2AIF	1075	NX9H		

SSB

3941	F9RM	2027	KA5W	1489	4X6DK	1084	K8LJG	907	N6CGB
3636	I0EV	1979	I2UIY	1479	XE1OX	1076	W0ULU	902	NG9L
3206	K2VV	1971	WF4V	1472	CT1AHU	1070	I8LEL	899	KC2FC
3107	ZL3NS	1943	WA4QMQ	1460	CT1ABY	1067	IT9JKY	891	NE6I
2938	VE1YX	1942	W9DWO	1438	IK5AOC	1066	LU8DY	888	K9BQL
2771	I2PJA	1941	YU7BCD	1410	N6FX	1056	G4SDJ	881	VE3FXR
2762	K6JG	1848	PY4OD	1408	IK8GCS	1053	W5ILR	855	AI6Z
2647	K2POA	1847	YU2NA	1403	I2TZK	1049	WA2FKF	850	IK2AEO
2632	K6XP	1822	HA8XX	1386	EA2AOM	1046	I2WZX	844	IT9ONV
2620	I2PHN	1807	HR1KAS	1365	YU7SF	1038	FE6FNA	829	KA5TOF
2606	WD8MGQ	1795	W3ARK	1352	KK0L	1025	W3GXX	829	KB4HU
2444	N4MM	1781	K9QFR	1341	KE6KT	1024	KF7RU	822	WD5KBB
2430	CT4NH	1766	I5ZJK	1332	F1HWB	1019	CT1CQK	805	K3UA
2388	I0AMU	1762	K5UR	1267	N2AC	1010	EA1AK	762	WM0G
2381	IT9TOH	1745	W4UW	1260	K2POF	1010	CT1DIZ	749	EA3FHT
2358	W0YDB	1744	EA2AOC	1233	K9LJN	1009	LU1VIK	707	I6KYL
2267	ZP5JCY	1714	K5RPC	1219	WB8ZRL	1004	K3IXD	699	KA9MOM
2263	N4NO	1713	KF2O	1211	CX6BZ	999	IK2DUU	697	A41JV
2245	EA2IA	1688	CT4UW	1204	I8WYD	995	W5AWT	697	YV7QP
2242	I4ZSO	1673	EA4KK	1201	YV1CP	994	KA0ZFX	695	NM5Y
2234	I6ZJC	1666	LU8ESU	1190	AB9O	988	W5LLU	690	I8IYW
2221	OZ5EV	1654	I8KCI	1168	LU7HJM	987	WB6SRK	654	YU1PJ
2215	I8YZP	1633	KC8YM	1167	KB0C	983	I3ZSX	650	SM6CST
2192	W4BOY	1617	PY4OY	1162	HK6BER	969	HP6AYV	646	KB8DAE
2158	WA8YTM	1603	SM0AJU	1146	DK5WQ	967	K2EEK	643	SV0FC
2149	I1EEW	1602	WE2L	1145	PY4VX	944	5Z4BP	627	KA5RNH
2122	NJ0C	1572	I1POR	1138	N2AIF	941	KB2DE	625	G4XTA
2119	PA0SNG	1568	KD9OT	1136	I7VEZ	926	K8ZZU	624	YB1RED
2117	I4CSP	1566	I2EOW	1134	WN5MBS	922	G4OBK	609	VK5NVW
2085	I2MQP	1522	SM6DHU	1125	HA0IT	910	KB0G	609	KE7UH
2067	IBYRK	1514	W1NG	1121	IK2AVH	908	K8MDU	605	TU2UI
2035	EA8AKN	1511	KL7AF	1106	IK7DBB				

CW

3066	K2VV	1667	VO1AW	1348	W1WAI	1110	W5AWT	885	N4RNR
2971	WA2HZR	1637	K5UR	1342	F6HKD	1102	V56UW	874	N4IR
2836	N6JV	1633	IT9VDO	1329	HA0IT	1088	DL2HBX	859	AH6JF
2714	ON4QX	1600	KA7T	1329	LA8XG	1086	OZ5UR	857	W9IAL
2554	VE7CNE	1572	YU2NA	1321	KF2O	1075	AK9Z	855	W0JIE
2552	N4NO	1543	I2UIY	1320	I7PXV	1068	NF5Z	849	IS0FIC
2345	IT9TOH	1526	G4UOL	1303	N2AIF	1068	IK3GER	837	NE6I
2319	PY4OD	1515	N4YB	1295	IBYRK	1043	G4OBK	837	JJ1FSK
2299	I1YRL	1510	DJ4XA	1277	G3VQO	1035	SM5DAC	808	YV7QP
2289	EA2IA	1509	VE7DP	1243	G4MVA	1033	K08J	808	WE2P
2287	W3ARK	1472	N6FX	1243	KB0G	1029	AI6Z	801	IK2ECP
2277	K6JG	1452	SM6CST	1224	DJ1YH	1022	EA5AR	744	RB5MP
2232	YU7SF	1450	VE1RJ	1222	YU2CQ	1012	YU3PG	729	JA0BSL
2230	W4BOY	1445	W9PWM	1206	W6OUL	1000	I2EAY	723	W4UW
2219	K6XP	1444	KL7AF	1205	I2IWM	999	HA5LZ	714	K0QFR
2175	N2AC	1444	TI4SU	1194	VE3FXR	988	VE4CE	712	PY4WS
2166	W9DWO	1438	YU3NU	1190	HA8XX	959	WB8ZRL	695	WB5MTV
2063	I6SF	1438	I2DMK	1187	OK1CZ	959	KA1CLV	646	JO1OUB
2043	WA8YTM	1426	W8IQ	1183	LA9XG	953	IK0ADY	629	W8LRY
2005	LZ1XL	1419	SM0AJU	1179	K8LJG	933	K3UA	628	AA6AY
1951	YU7BCD	1371	G4SSH	1161	ZS6BCR	923	YU4BR	606	KA5TOF
1926	4X4FU	1369	K9LJN	1138	I1EEW	910	NJ1T	603	NU7V
1796	N4MM	1368	SM6DHU	1121	G3EZZ	894	YU1PJ	600	VE3OMM
1744	KA5W								

ously bitten by the DX bug. *Don C. Wallace W6AM* is not a biography; the author leaves interpretation and analysis of Don's talents and motivations to the reader. But any amateur can appreciate the sacrifices Don (and his family) endured on the way to becoming one of the best known and respected amateurs in the world. This book is available from Wallace and Wallace, 11823 East Slau-son Ave., Suite 38, Santa Fe Springs, CA 90607. Cost is \$29.95 plus \$3.00 shipping. California residents add \$2.40 tax. Shipping outside the US is US\$5.

While these two books are the best of the recent amateur radio tomes, several other publications are also worthy of note. *The DXCC Companion* is the ARRL's beginner's guide to DX. This \$6.00, 130-page book leads a non-DXer through the sometimes bewildering maze of DX from getting organized, through propagation hints, QSLing, DXing in nets, to applying for the DX Century Club (DXCC) award. While the experienced DXer will find few new ideas in this book, it makes a great gift to a new, budding, or potential DXer. It is available through the ARRL.

A handy new QSLing guide is *QSL Routes*, 1991 edition, by Fritz-Ullrich Schneider, Y41VM, and Norbert Wenzel, Y58ZA. The 200+ page, soft-bound book includes 38,000 QSL routes, both current and historic. A look through the VP2M listings reveals that the information appears to be very accurate and comprehensive. The book also includes 4,000 direct QSL addresses, of active stations and QSL managers, and the DX stations handled by 40 top QSL managers, such as WA3HUP and W3HNK. This guide is now a permanent part of our library of QSL publications. DXers can get a copy for US\$15 postpaid (no checks) from Theuberger Verlag Berlin GmbH, Oberwasserstrasse 11/12, Berlin O-1080, Germany. The 1992 edition will be available next year. You can reserve a copy for the same price.

And finally, potential visitors to the Cook Island ZK1 will want to get a copy of *Cook Islands Companion*. This 220-page, soft-bound book is filled with history, lore, tourist tips, and descriptions of accommodations and facilities in the South and North Cook Islands. The book is available for \$11.95 plus \$2.00 shipping from Pacific Publishing Co., P.O. Box 8031, Emeryville, CA 94608. California orders add \$1.00 tax.

Meanwhile, it's June 28th and Sunspot Region 6659 is due to rotate back to the visible side of the sun in the next day or so. A long-duration, M6 flare blasts out of the back of the sun, near the latitude where we expect to see Region 6659. Another HF blackout, and type II radio sweep. Region 6659, now numbered 6703, rotates into view on June 30th. Another two weeks of major flares? Good thing I ordered those books.

QSL Information

3D2/AA7AF to WA6ZEF
 4A2FN to XE2JNE
 4K1A to UZ1PWA
 4K1ADD to UA1ADO
 4K1B to UV6AAP
 4K20IL to UA9MA
 4K2PGO to RA9LA
 4K3/UA3YCA to RA3YG
 4K3MI to UY5XE
 4K3PWB to RA3YG
 4K4AB to UA9MA
 4K4BA to RB5FO
 4U/VE4ANM to VE6LU
 5B4/DL4MEH to SL4MDO
 5NB/OK3CLA to OK3LZ
 5W1HM to JH4IFF
 5Z4BI to W4FRU
 707LA to G0IAI
 707MM to N4RFN
 7X2CR to IS0LYN
 7Z1IS to OE6EEG
 8P9FS to G3DLH
 8P9FT to G4BKI
 9H1EL to LA2TO
 9H3KE to PA0PAN
 9H3MH to PA3DOG
 9J2HN to JH8BKL
 9K2SH to OE6EEG
 9L1US to WA8JOC
 9L3BM to VE3KKU
 9N1RN to 9U7EB
 9U5BZP to G4BZP
 9X5NH to DJ6EA
 A41JW to ON6BY
 AH0K to JE2JCV
 BV/K4IQJ to K4IQJ
 BV2FB to AA6BB
 C21NI to K0HGW
 CE8ABF to LU8DPM
 CT2FX to WB1BWW
 CU2DX to KB5RA
 D2ACA to LZ2DF
 D68TS to JL3IUX
 D68YD to JL3IUX
 D68YH to JL3IUX
 DA0RG to DL8OBC
 DU9/NJ1W to NJ1W
 ES1J to ES1AX
 FJ5BL to F6AJA
 FM5DN to N3AOL
 FS/KB4VHW to KB4VHW
 FT4WC to F6GVH
 FY5YE to W5JLU
 GP4IPA to GU4XGG
 GW0NY to GW4WJD
 GX0IPX to G3ZQS
 H44KA to KC9V
 H65DR to YN5JAR
 HB0/DJ0MBG to JH1NKO
 H18A to JA5DQH
 HP2CWB to N4YWY
 HS0AC to NY2E
 HZ1AB to K8PYD
 KC4USV to KG5GH
 KC6KW to AG9A
 KC6MR to JJ1TZK
 LX/FF6REF to FD1JMH
 NP2/N18V to N18V
 OH0BBF to OH2BBF
 OX3JF to OZ1JFC
 P29SC to WB1GWB
 PJ2/PA0VDV to PA0VDV
 PJ9JT to W1AX
 PQ40D to PY4OD
 PW4Y to PY4OY
 R0Z to UZ0ZWA
 R10SSRW to UA9OA
 RB3MO/UI8B to UW6HS
 RB5IC/RA1N to UB5IIA
 RD70DC to UA6DC
 RF6FP to UF6DZ
 RH1Y/UA4HVV to RA4PF
 RH6W/UW4HX to RA4PF
 RH6Y/UW4HX to RA4PF
 RH7W/RA4PF to RA4PF
 RH7Y/RA4PF to RA4PF
 RL0L to UL8LYA
 RM5P/UM8QDX to UM8QDX
 RY0B to UB5BCP
 RY1B to UB5BCP
 RY2B to UB5BCP
 RY3B to UB5BCP
 RY4B to UB5BCP
 RY5B to UB5BCP
 RY6B to UB5BCP
 RY7B to UB5BCP
 RY8B to UB5BCP
 RY9B to UB5BCP
 S79KMB to KN2M
 SN4PP to SP4EEZ
 S03KE to Y32KE
 ST0DX to WA2NHA
 ST2YD to F6AJA
 SU1HV to IS0LYN
 SV9/SV0HV to KA5EJX
 TA2AO to UA6HSN
 TA9/FD1PKE to FF6KGU
 TK/DL7HZ to DL7HZ
 TK7A to TK5EP
 TR8/F6EXX to F6EXX
 UD850AI to UD6AI
 UF7FXA to UA3TT
 UH8EA to W5BWA
 UI8BBN/UA1T to UI8BBN
 UI8ZAA to K9FD
 UR8G to RB0GG
 V31AD to W3HNC
 V47RF to WA2SPL
 V63ST to KB6CC
 VA2/K8JP to K8JP
 V14ILC to VK4WIN
 VK0KC to VK4BB
 VK8SD to K1SE
 VK9LM to DJ5CQ
 VK9YJ to VK3AWY
 VO1QST to VO1BD
 VP2EHF to KA3DBN
 VP2EST to KT8Y
 VP2EXX to KC8JE
 VP2EY to HB9SL
 VP5E to AA5RL
 VP5JM to W3HNC
 VP8CDJ to GM4KLO
 VP9HE to KD8IW
 VQ9AY to G4RFV
 VS6WV to K0TLM
 VU3JAM to VU2AGR
 WA2NHA to F6HIZ
 WV8/NG9J to NG9J
 XT2BW to WB2YQH
 XV2A to JJ1TBB
 YB0ARN to KC9XN
 YC0FE0 to YB0HZZ
 YC2HAX to YB2FRR
 YC4GDZ to YB4FNN
 YJ8AB to KC4MJ
 YN/SM0IG to SM0KCR
 YS9YS to KK8K
 YU400 to K2VHW
 Z21HQ to DF2RQ
 ZD8SE to G3XKR
 ZD8VJ to G3XKR
 ZD8WD to G4RWD
 ZD8XX to W4FRU
 ZF2QJ to WA1IML
 ZF2Q0 to JA7XDG
 ZM7AA to 4Z4TT
 ZM7ZR to VK2BIL
 ZX4V to PY4VD
 ZZ4Y to PY4OY
 3B8GA to Faizal Baccus, Modern Square, Vacads
 3DA0BK to Box 122, Eveni, Swaziland
 4L0DXC to Box 1, Seversk 343350
 4L1DXC to Box 73, Leningrad 196070
 4S7WP to Sha, Box 80, Colombo
 9K2NL to 1100 Berry, Lebanon, OR 97355
 A35KB to K. Burke, P.O. Box 1, Longoteme, Tonga
 A41KJ to A. Ali, Box 741, Muscat, Oman
 A92BE to D. Street, Box 26803, Manama, Bahrain
 A92EV to M. Livingston, Box 833, Manama, Bahrain
 BV2AV to P.O. Box 516, Taipei, Taiwan
 CE0ZIS to P.O. Box 15, Juan Fernandez
 CE0ZTY to P.O. Box 1972, Valparaiso, Chile
 CN8GH to I Bey, 3 Place Navarre, Tanger, Morocco
 CN8NY to P.O. Box 6577, Rabat, Morocco
 CY9CF to P. Bittiger, BP, 4204, F-97500, St Pierre & Miquelon, via Canada
 E11DG to P. Grath, 12 Gortmore Park, Lakeglen, Finglas, S. Dublin 11, Ireland
 EK0TAX to P.O. Box 318, Nizhny, Novgorod, 603006
 G00ADV to L. Kinvig, 79 Xlagh Vane, Ballasalla, Isle of Man, UK
 GU2FRO to E. Wooley, Le Pavillon, Sark, Guernsey, UK
 HR2/KC4VKI to P.O. Box 986, San Pedro Sula, Honduras, Central America
 J73PB to P. Berfrand, 11 Tenth Street, Canefield, Dominica, WI
 JY9SR to Box 354, Amman
 KG4TG to T. Gillespe, Box 32, Bin 50, FPO New York, NY 09596-0006
 KH3AE to Box 764, APO San Francisco, CA 96305, USA
 KH4AF to Box 43, FPO San Francisco, CA 96614 USA
 OD5ZZ to Box 782, Tripoli, Lebanon
 RL5E/UZ9MZZ to Box 2914, Omsk 644066
 RS3A to Box 161, Leningrad 193231
 RW9G/UA9XC to Box 1247, Syktyvkar, 167001
 T30DP to Beiatiti Highland, Box 473, Tarawa, Kiribati, South Pacific
 UA9AQN to Box 49, Magnitogorsk 455044
 UD850DR to P.O. Box 789, Baku, 370129, Azerbaijan
 UQ1GXZ to Box 55, Riga, 226016
 VP8CDS to Lisa Slater, 44 St. Niclaus Street, Lincoln, LN1 3EQ, England
 VP8CGD to Father Houlihan, Box 380, Kokstad, 4700 Republic of South Africa
 YEAAX/9 to P.O. Box 3222, Jakarta 10001
 YJ8CW to P.O. Box 1210, Port Vila, Vanuatu, South Pacific
 YN1CC to Jose, Box 2971, Managua
 ZK1BW to Box 702 Paratonga
 ZK1BY to P.O. Box 3, Takaimura 31911, Japan
 ZK3KY to Kiyoko Yamakami, P.O. Box 3, Takaimura 31911, Japan
 ZY0TS to P.O. Box 63003, Sao Paulo 02699

President of the 4S7DX Association, who was instrumental in this training program, seeks suitable equipment or Braille literature for these new hams. Contact John at Box 80, Colombo, Sri Lanka, if you can help.

And Bob Williams, NJ1W, is active /DU9 from the Philippines, where he is working for the Habitat for Humanity. He is often on 14,040 or 21,040 kHz. QSL direct to Box 87, 9500 General Santos City, Philippines.

DX Events in October

The Ararm DX Club of Mexico plans a trip to Revillagigedo beginning October 21. The callsign of the three-week operation will be **XF4I**. Operators include XE2GV, XE2KB, XE1U, XE1RB, and XE2FL. The XF4L operation cleared up most of the demand for this Pacific island, but the XF4I crew should see continuous pile-ups this month. QSL route to be announced later.

The Dale County ARES will operate **WD4NXN** as a special-event station October 5th to commemorate the Claybank Jamboree Arts and Crafts show in Ozark, Alabama. Operation will be 14-2300Z on 40, 20, and 15 meters, in the General class subbands, and in the Novice subband on 10 meters. For a special QSL card, send the contact number and a self-addressed, stamped envelope to WD4NXN, 208 Cherry Lane, Ozark, AL 36360-2811.

R3DSR is another special-event station, active October 5-13, commemorating the 600th anniversary of the death of St. Sergius of Radonezh, an Orthodox Christian and leader of ancient Russia. Organizing the operation are amateurs from Energy in Zagorsky, Kivach in Petrozavodsk, The Union from Orsk, and some club stations in Omsk. QSL to Alex Barinov, UA3DCZ, Box 4, Zagorsk 141300 USSR.

The **CQ WW DX SSB Contest** October 26-27 always attracts dozens of contest DXpeditions. These operations provide DXers with great opportunities to work new countries and band countries. Those DXers not particularly interested in contest contacts should start chasing stations late Saturday and Sunday, after the serious contest operators have made their contacts. The competition is less then, and sometimes the DX station goes begging for contacts.

One problem with contest QSOs for DXing is that QSLing is a low priority for the contest operators. Also, the contest station probably doesn't want to break the rhythm of his or her operation to give QSL routes. A DXer seeking confirmation of a contest QSO must do a bit of digging after the contest to determine the proper QSL route. The good news is that the increasing use of the computer for contest logging has made it easier for the contest

DX News

North Korea P5 is the newest DXCC country. The DX Advisory Committee (DXAC) voted unanimously to accept the petition from the Northern California DX Club to add North Korea to the list. The Awards Committee at ARRL Headquarters concurred unanimously. North Korea (officially the Democratic People's Republic of Korea) will be added to the list with the first accredited operation. There have been numerous reports of P5 stations (P5DX, P5UU, P5YL), but none have provided any documentation to the ARRL. Reportedly, some Soviet amateurs have plans to put this New One on the air soon. The present DXCC country of "Korea" will be listed under the new name of South Korea (Republic of Korea).

Previous contacts with Korea HL/HM will count for South Korea credit.

Romeo Rushenko, UB5APW, reports that he has a USSR "Callbook," and a booklet of Soviet awards (in English) as well as some USSR DX bulletins, coins, stamps, etc. He requests 50 IRCs (or the equivalent in US\$) for the directory, and 30 IRCs for the award book. For more information, contact him at P.O. Box 59, Lipova Dolina 245950, Ukraine, USSR.

Paddy Gunasekera, 4S7PB, says that the Radio Society of Sri Lanka (RSSL) worked with the School for the Blind at Ratmalana, near Colombo, to teach CW and radio theory to several students. Three disabled members of the school have recently received their amateur licenses. Neil Abeysekera, 4S5NA, Bon Jansz, 4S5BJ, and O.V. Dharmasena, 4S7OV, are on the air now. John, 4S7JA,

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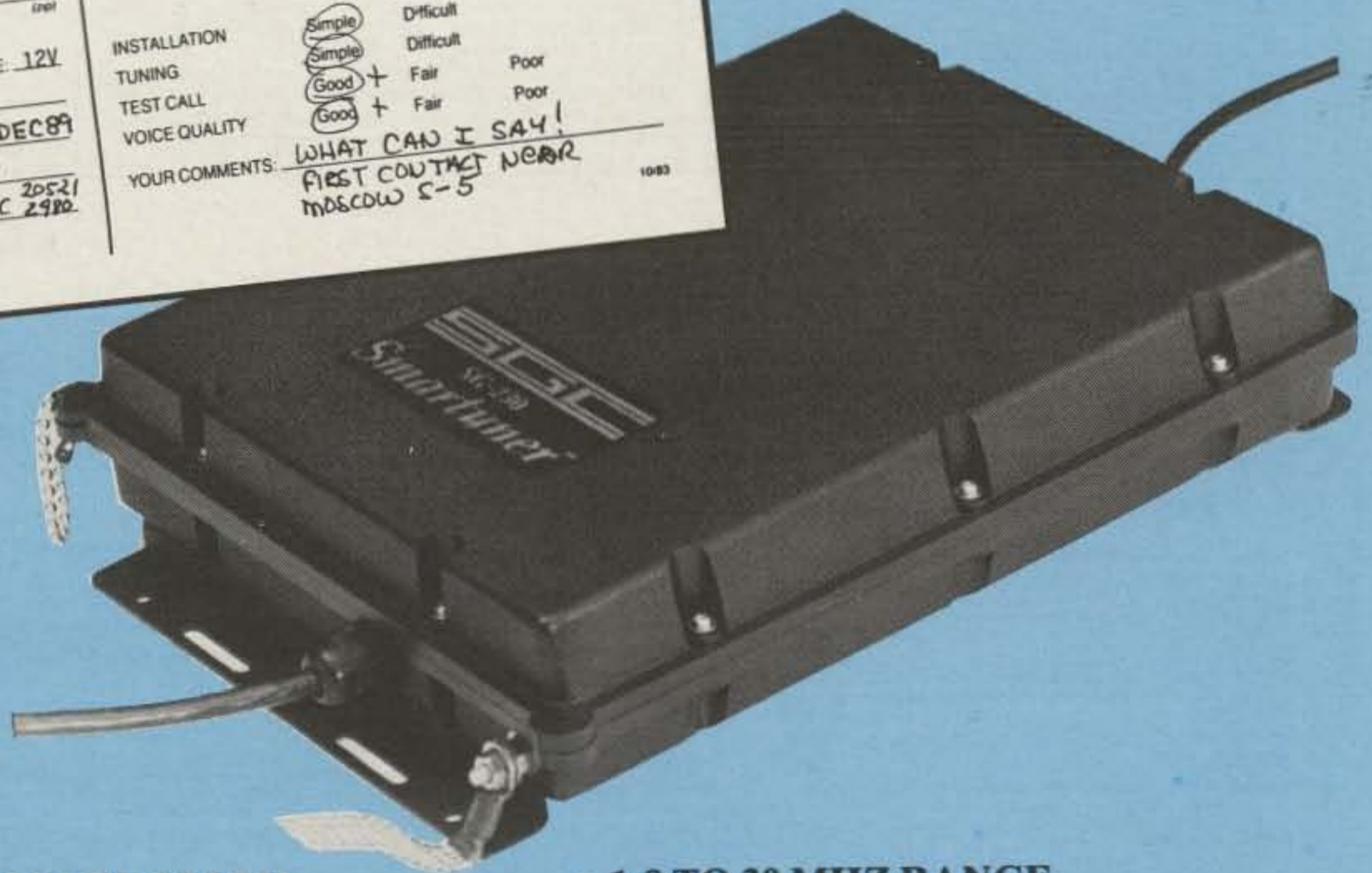
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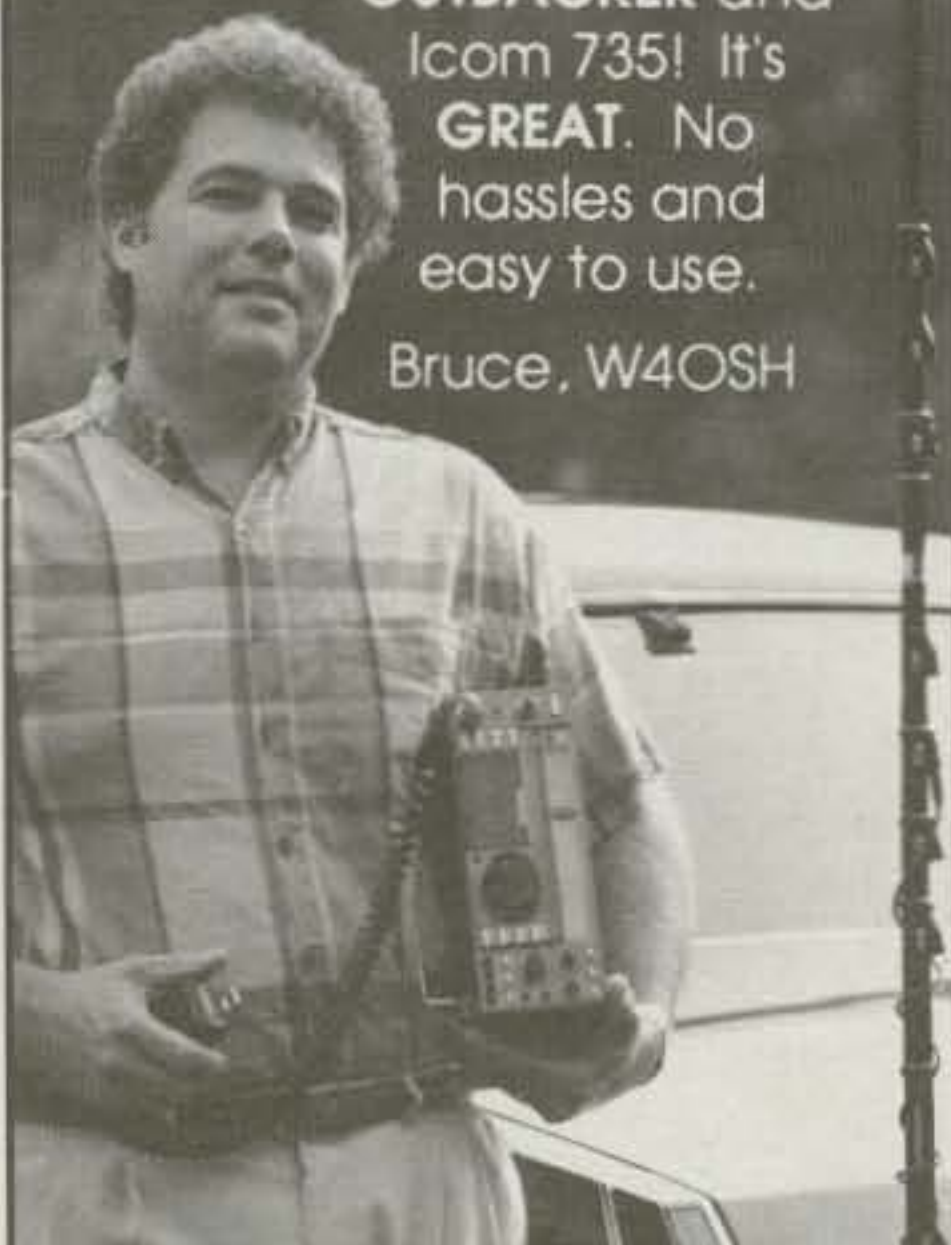
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CW

830	KA5RNH	831	KA3JWJ
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SSB Endorsements

320	W9DWQ/323	310	W6BCQ/317
320	K2FL/323	310	W6NLG/316
320	W0YDB/323	310	K7EH/314
320	K2TQC/323	300	YV2EJU/308
320	W2SUA/323	300	K4JLD/306
320	K9MM/323	300	N4KEL/M/305
320	YU1HA/323	300	KB9LN/303
320	VE1YX/323	300	W7KSK/300
320	W4NKI/322	275	YB2OK/288
320	VE2WY/322	275	WB8TLI/279
320	W9SS/322	275	4X4JO/275
320	VE7WJ/322	250	KJ6HO/257
320	W7OM/321	250	K2EEK/251
320	KSQZ/320	250	Y41JH/250
320	WA4IUM/320	28 MHz	KA9QLP
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320	K2FL/323	275	K4JLD/290
320	K2TQC/323	275	KA7T/281
320	YU1HA/322	275	DF3FJ/276
320	K9MM/322	250	KF5PE/251
320	K1MEM/320	200	KA3JWJ/216
310	W0HZ/314	150	W4TYU/152
310	W4OEL/312	1.8 MHz	DF3FJ
310	W7CNL/312		

Total number of active countries is 323. A new CQ DX RTTY award is now available. 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 air-mail reply. Please make all checks payable to the awards manager.

operator to find a given QSO, and thus has improved the chances of getting a contest QSO confirmed.

When confirming contest QSOs, be sure to mention that fact on your card. Many DX operators maintain separate logs for contest and non-contest operation. Another pointer is to log the stations worked immediately after your contact. Since you're not trying to run up a big score in the contest, the lost time is of little importance, and this trick helps to compensate for slight differences in times between your clock and that of the DX station. At QSO rates of 200 contacts an hour, a time difference of even a few minutes can put your contact on a different log page. With these extra calls in your log, you can go back to the DX station if you get a dreaded "not in log" response. It is easier for a DX station or manager to find a series of calls instead of only one.

As I write this column in mid-summer, I have received notice of only a handful of contest DXpeditions. Check the weekly DX newsletters (especially *The DX Bulletin*) for the contest summaries in mid-October. Meanwhile, here's some advance word on some of the stations to look for the last weekend in October.

V47KP from the island of St. Kitts, operated by and QSLed via K2DOX. He'll also be on in the CW test. Dr. Alex Aimette, K2DOX, reports he has answered all the QSL requests from previous V47KP operations; if you need a card, try again. Alex will concentrate on the new bands outside the tests.

Lynn Lamb, W4NL, will join the **8P9X** team during the test. Lynn will be active with his own call of 8P9GN on the new bands outside the test. QSL 8P9X via K4FJ, and 8P9GN to W4NL.

Joe Staples, W5ASP, will be part of the **ZF2NE/ZF8** Texas DX Society team from Little Cayman Island in the test. QSL to W5ASP.

Electronic Equipment Bank in Virginia is sponsoring a contest DXpedition to **Truk V6**. The multi-operator team will be on all bands and modes, including the new bands, before the contest. QSL as directed.

A group of California amateurs will operate **V31X** as a multi-op in the test; QSL to K6IPV. Many of the operators will be on the air before the test, beginning October 21. Calls and operators/QSL routes are: **V31PV** (K6IPV), **V31HT** (AB6DG), **V31XL** (N6LL), **V31DN** (KF6TC), and **V31PU** (N6DLU).

Shoji Igawa, JA7HMZ, will be on as **V63DX** in the test from Ponape. He'll be there October 25-31. QSL via home call.

Dick Hoff, AA5NT, will be on as **C6AFT** during the test, probably as a single-band entry. He'll be active as **AA5NT/C6A** outside the test.

And maybe your DX editor will appear from some remote location. Stay tuned!
73, Chod, VP2ML

QSL News

Dick Darling, WB6HGH, who handles QSLs for **KG4AR** and **ZK1AR**, has a new address: 6807 Can Cun Lane, El Paso, TX 79912.

J28DN, Michel Caillaux has left Djibouti after 10 years. He will QSL now via 22 Rue Berthier, 77140 Nemours, France.

Bernd Langer, DL1VJ, handles QSLs for his operations as **9H3VJ** and **LX/DL1VJ**, as well as for **UG6GAT** and **UG7GWO**. His address is Box 1240, D-6603 Sulzbach/Saar, Germany.

Rafal Krawiec, **SP6TPM**, will QSL his Wolin Island operation via his 1991 Callbook address: Box 22, 48100 Glubczyce, Poland. He asks for donations to help cover the costs of the trips.

WB2YQH handles cards for the following Bermuda stations: **VP9YL**, **VP9AE**, **VP9BBQ**, and **VP9BS**.

Randy Hollier, WX5L, can QSL contacts with **YN1CB** from April 1, 1991.

Don Simonsen, K7AEJ, QSL manager for **ZF2PV**, **FP5DK**, and **FP5/ZF2PV**, says the 1991 *Callbook* has his address wrong. His correct address is P.O. Box 1622, Vancouver, WA 98668.

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RCS-8V \$149 Suggested Retail

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QSL **VE7FEI**, on IOTA Island (NA-075), via Jim Vining, 9289 Lake Road, Otisville, MI 48463.

WA6AUE reports that all direct **ZS9Z/1** Penguin Island QSL cards have been mailed. Note that WA6AUE is **not** the QSL manager for this operation; QSL to OH2BH only. QSL cards for the **ZS9Z** Walvis Bay operation go to ZS6BCR.

QSL Notes From . . .

Brazil: The PY0SK/R St. Peter and St. Paul Rocks operators say that cards received with one US\$1, or two IRCs, will be answered via the bureau, as this doesn't cover return postage to the US from Brazil. K7UOT recommends registered mail to Brazil to avoid loss of mail. And Carlos Dell'Aquila, PY2KXI, can confirm his WPX operation as **ZY2KXI** via Box 582, S.J. Campos/SP 12201, Brazil.

Costa Rica: QSL the brief Cocos Island operation of **TI9JJP** via Cecilia Artinano, TI2AOC, Box 529, Centro Colon 1007, San Jose, Costa Rica. QSL these WPX CW calls as follows: **TI73F** via TI4SU, **TI74A** via TI4WAM, and **TI75U** via TI2UU. Cards from the **TE10E** operation from last October have been delayed; please be patient.

Solomon Islands: Ben Hepworth, **H44BD**, is back in the Solomons and receiving mail again. Contact him at Pigeon

Island, Reef Islands, Temotu Province, Solomons. (Ben runs a beach resort that makes a nice diving/radio holiday.) QSL Peter Johnson **H44KA** (ex-XX9KA) at Box 148, Honiara, Solomons.

Andorra: The addresses of these French operators from Andorra are not in the *Callbook*: F6BKP (**C30CAG**), FD1OGG (**C30EOA**), and FD1LRC (**C30EPA**). Cards for these stations may go via F6DGT. QSL **C30ERA** via F6GIN.

Australia: QSL **VI75CUB** via the VK2 bureau. QSL **VI5KL** via the VK5 bureau. QSL **VI3AHY** via the VK3 bureau. QSL **VI91AG** via the VK1 bureau. QSL **AX2ITU** via Stephen Pall, VK2PS, Box 93, Dural NSW 2158, with SAE and two IRCs or US\$1. QSL Bing Crosby, VK2BCH's **3D2XV** Rotuma operation direct only to Bing's home call, with two IRCs or US\$1.

USSR QSL Notes

The special call **RU1K** was active June 14-18 to commemorate the 340th anniversary of the Kozacks Graves battle of Ukrainian liberation. A distinctive QSL card is available for an SASE, and a commemorative pennant is available for a QSL card and 10 IRCs. Address is Rovno Ham Club, P.O. Box 67, 266028 Rovno, Ukraine.

For help with cards from Voronezh (U/R-3Q), try the Voronezh club via Box 63, Voronezh 394000, USSR.

Some direct addresses:

UA0CZ, Igor Krivosheev, Box 7, Khabarovsk-30, 680030 USSR.

UR5M, Dick, Box 1, Seversk 343350 USSR.

UF6VBZ, Box 215, Sukhumi 384900, Georgia USSR.

UV300, Box 24, Moscow 126349, USSR.

UO5ONV, Oleg Bivol, Box 112, Kishinev-12, 277012 Moldova USSR.

Corrections and Amplifications

QSL **VP5R** via WB9HRO, not via AA4NC.

QSL **VP8CEM** via CX1AA, not via GM4KLO.

Some corrections on Brunei addresses: Gerald Ashcroft, **V85GA**, and his wife Carol, **V85CA**, are at Box 1200, BSB 1912, Brunei, Borneo. Bill Maddox, **V85AA**, is at Box 1711, Bandar Seri Begawan, Negara, Brunei Darussalam. **V85HG** is H.G. Hassan, Box 222, BSB 1902, Brunei.

WN5C says he is **not** QSL manager for **PZ5C**; don't send him cards.

QSL the May 1991 **VP5W** operation to AA4NG. QSL the November 1987 **VP5W** only operation to WW6F.

The correct QSL route for **7P8EN** and **7P8EN/p** is via the operator **only**: Bernie va der Walt, ZS4TX, P.O. Box 28691, Danhof 9310, Republic of South Africa.

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N1EJF in a review about our XP 706 in 73 magazine, 4/1987

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Connectors	Full line of Connectors & Adapters	
RG-8X	95% Braid, premium quality	16¢
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450 Ohm	New! #16 19 str, CuClad, Poly, Windows	Call
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October 1991 • CQ • 121

THE SCIENCE OF PREDICTING RADIO CONDITIONS

DX Contest Special

The 1991 CQ World-Wide DX Contest will be held on the following dates:

Phone: 0000 UTC Saturday, Oct. 26 to
2400 UTC Sunday, Oct. 27
CW: 0000 UTC Saturday, Nov. 23 to
2400 UTC Sunday, Nov. 24

For the 41st consecutive year this month's propagation column is devoted to special forecasts and information applicable to both the Phone and CW WW DX Contest weekends. The accuracy of the forecasts for the previous 40 contests is considerably greater than 90%!

Sunspot Count Increasing Looks Like A Great Contest

The sunspot cycle is on the *rise* again, and it looks as if this cycle may have two high peaks. The Royal Observatory of Belgium reports a monthly mean count of 171 for June and a count of 174 for July. This results in a smoothed sunspot number of 143 centered on December 1990 and a smoothed number of 147 centered on January 1991. Corresponding smoothed values of 10.7 cm solar flux were 202 and 205, respectively.

High Solar Count Expected for 1991 Contest

The smoothed sunspot number recorded for the 1990 contest period was 141. There is a very good possibility that the count during the 1991 contest weekends will be at least in the mid-130s, and possibly higher. Corresponding 10.7 cm solar flux levels should be at approximately the 200 level. This means we can expect general propagation conditions during the 1991 contest to be similar to those observed last year, and the potential is there for another great contest in 1991.

A long-range CQ day-to-day forecast based primarily on the 27-day recurrence tendencies of geomagnetic, solar, and ionospheric conditions indicates a high probability of at least Normal propagation conditions during the phone contest

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for October 1991

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 13, 15, 17, 20	A	A	B	C
High Normal: 5, 12, 14, 16, 18-19, 27-28	A	B	C	C-D
Low Normal: 1, 4, 7-8, 11, 23, 26, 31	B	C	D	D-E
Below Normal: 2, 6, 9, 21, 24-25, 29-30	C	C-D	D-E	E
Disturbed: 3, 10, 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 S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.

E—No opening expected.
3 dB per S-Unit.

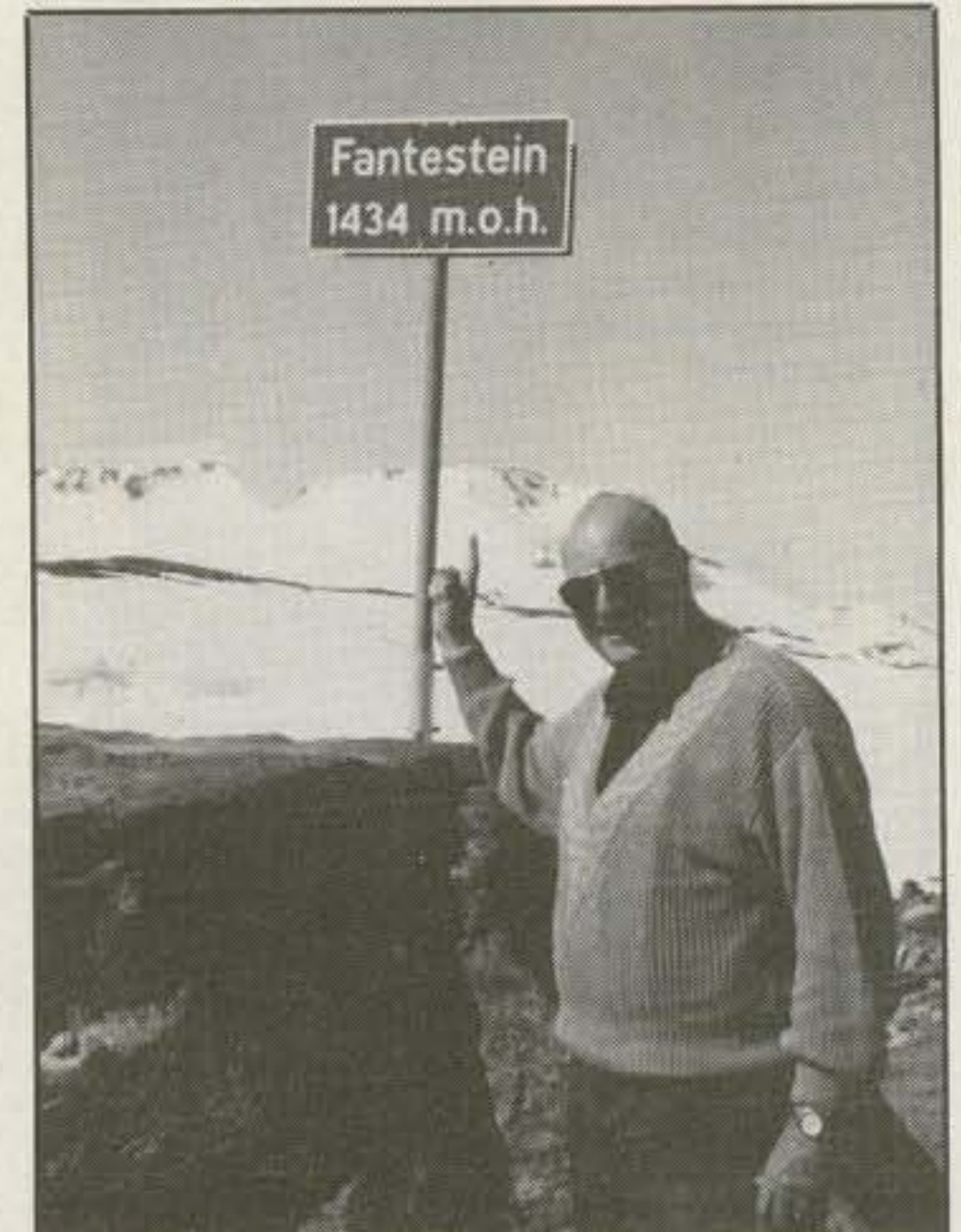
HOW TO USE THIS FORECAST

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 day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on October 1st, fair-to-poor (C-D) on the 2nd, poor (D-E) on the 3rd, good-to-fair (B-C) on the 4th, good (B) on the 5th, etc. During the CQ World-Wide DX Phone Contest good-to-fair (B-C) expected on October 26th, good (B) on the 27th.

weekend of October 26–27, with a good chance of increasing to High Normal to many areas of the world. At the present time the chance of a radio storm developing during the contest weekend appears to be slim.

See the Last Minute Forecast box at the beginning of this month's column for additional information concerning expected day-to-day conditions for the entire month of October. An updated day-to-day forecast for the phone contest weekend will appear as a bulletin at the beginning of next month's column. The November issue of CQ should reach most subscribers before the phone contest weekend.

Expect another great CQ World-Wide DX Contest during 1991, as long as Moth-



George Jacobs, W3ASK, CQ's Propagation Editor for the past forty years, on his annual "salt the ionosphere" expedition. This time, in preparation for the 1991 CQ World-Wide DX Contest, George is seen at a propagationally strategic location in northern Norway. (Photo by Bea)

er Nature doesn't produce a surprise radio storm!

Band-By-Band Conditions

The following is a band-by-band summary of the DX propagation conditions expected from mid-October through mid-December, and centered on the 1991 Phone and CW contest periods.

10 Meters: Good, solid openings should be possible to almost every section of the world sometime during the *daylight hours*, with the band remaining open to southern and tropical areas well into the *early evening*. The band should open just *after sunrise* toward Europe, Africa, and the east, as well as in a southerly direction toward the Caribbean and Central and South America. Signals should peak toward Europe and the east an hour or so *before noon*, toward Africa about an hour or so *after noon*, and toward the south during the *late afternoon*.

Time EST	Optimum Band (Meters)	Areas To Which Band Is Expected To Be Open
00-02	40	Most of Europe, Eastern Mediterranean, and Middle East. Most of Central and South America. A few African areas and possibly Antarctica.
02-04	20	Some South Pacific, New Zealand, and Australasia. A few Far East and Asian areas. Some South America and Antarctica.
04-06	40	South Pacific, New Zealand, Australasia. Many South American areas. A few Far Eastern and Asian areas. Possibly Antarctica.
06-08	20	Most of Europe. South Pacific, New Zealand, and Australasia. Most of Central and South America. A few African areas. Some Far East and Asian areas.
08-10	15	All of Europe, Eastern Mediterranean, and Middle East. Some of Africa. Most of Central and South America. South Pacific, New Zealand, and Australasia. A few Asian areas.
10-12	10	Most of Europe and Africa. Most of Central and South America. A few Asian areas, New Zealand, South Pacific, and Australasia.
12-14	15	Some of Europe and most of Africa. Most of Central and South America. A few areas of South Pacific, New Zealand, and Australasia.
14-16	15	Most of Africa, and Central and South America. Some of South Pacific, New Zealand, and Australasia. A few Asian areas.
16-18	20	Most of Europe, Eastern Mediterranean, and the Middle East. All of Africa, and Central and South America. A few Australasian areas.
18-20	15	Lots of South Pacific, New Zealand, and Australasia. Some of Far East and Asia. Most of Central and South America. Possibly Antarctica.
20-22	20	Most of Africa, Far East, South Pacific, New Zealand, Australasia, Central and South America. A few European areas and Middle East. Some Antarctica.
22-00	20	Lots of Far East, South Pacific, New Zealand, Australasia, Central and South America. A few African and Asian areas. Antarctica.

*Similar work plans can be devised for single-band operation or for openings to specific DX areas.

Table I- Sample multi-band work plan for Eastern USA QTH.

Optimum conditions toward the Far East, Australasia, Southeast Asia, etc., should occur during the *late afternoon* and *early evening*. Exceptionally strong signal levels can be expected on many 10 meter openings, particularly when conditions rise to High or Above Normal.

15 Meters: This should be the best band for DX during most of the *daylight* hours. Excellent propagation conditions are expected from shortly *after sunrise* through the *early evening hours*. The band may remain open as late as *midnight* toward southern and tropical areas. Expect signals to peak on 15 meters about an hour or so later than the peak on 10 meters from similar geographical areas.

20 Meters: This should be an *around-the-clock* DX band, with good openings possible to all areas of the world. Signals should peak from all directions for about an hour or two *after sunrise* and again during the *early evening*. Excellent openings should be possible to many areas of the world during most of the *daylight hours* and throughout most of the *hours of darkness* as well. Expect *long-path* openings on this band for about an hour or so *after sunrise* and again for an hour or so *before local sunset*. Exceptionally strong signal levels should be noted during peak propagation periods. If you plan to operate on a single band during the contest, this should be the one to produce the longest period of DX, the strong-

Time	Time	Areas to which good openings are expected
00-03	08-11	SE Asia, Far east, South Pacific, New Zealand, Australasia, Antarctica
03-06	11-14	South Pacific, New Zealand, Australasia
06-09	14-17	Central and South Asia, SE Asia, Far East, South Pacific, New Zealand, Australasia, Europe, Caribbean, Central America, and Northern Countries of South America
09-12	17-20	Far East, Caribbean, Central America
12-15	20-23	Western & Central Europe, North Africa
15-18	23-02	Europe, Africa, Caribbean, Central America, South America
18-21	02-05	Africa, Central & South Asia, South Pacific, New Zealand, Caribbean, Central America, South America
21-24	05-08	Far East, South Pacific, New Zealand

Table II- Sample 20 meter single-band work plan for western USA QTH.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in () after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

4. Time 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 c.w., or 1 kw, p.e.p. 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 10dB 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.

Time Zones: CST & MST (24-hour time) CENTRAL USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	06-07 (1)	06-07 (1)	04-06 (2)	16-17 (1)
	07-08 (3)	07-08 (3)	06-09 (4)	17-18 (2)
	08-13 (4)	08-14 (4)	09-10 (3)	18-20 (3)
	13-14 (3)	14-15 (3)	10-12 (2)	20-01 (4)
	14-15 (1)	15-16 (2)	12-14 (3)	01-02 (3)
		16-17 (1)	14-18 (4)	02-03 (2)
			18-20 (3)	03-04 (1)
			20-22 (2)	19-21 (1)*
			22-00 (1)	21-23 (2)*
			00-02 (2)	23-01 (3)*
		02-04 (3)	01-02 (2)*	
			02-03 (1)*	
Northern Europe & European USSR	06-07 (1)	06-07 (1)	04-06 (1)	17-19 (1)
	07-08 (2)	07-08 (3)	06-07 (2)	19-02 (2)
	08-09 (3)	08-13 (4)	07-09 (3)	02-04 (1)
	09-11 (4)	13-14 (3)	09-11 (2)	20-03 (1)*
	11-12 (2)	14-15 (1)	11-17 (3)	
	12-13 (1)		17-19 (4)	
			19-21 (3)	
			21-23 (2)	
			23-01 (3)	
			01-04 (2)	
Eastern Mediterranean & Middle East	07-08 (1)	06-07 (1)	07-12 (1)	18-20 (1)
	08-09 (3)	07-08 (3)	12-15 (2)	20-22 (2)
	09-13 (4)	08-10 (4)	15-17 (3)	22-00 (3)
	13-14 (3)	10-13 (3)	17-22 (4)	00-01 (2)
	14-15 (1)	13-15 (4)	22-00 (3)	01-02 (1)
		15-16 (3)	00-01 (2)	20-00 (1)*
		16-17 (2)	01-03 (1)	
		17-18 (1)		
Western Africa	06-07 (1)	04-05 (1)	03-04 (3)	18-22 (1)
	07-12 (3)	05-07 (2)	04-06 (2)	22-01 (2)
	12-16 (4)	07-14 (3)	06-13 (1)	01-03 (1)
	16-17 (3)	14-20 (4)	13-15 (2)	00-03 (1)*
	17-18 (2)	20-22 (3)	15-17 (3)	
	18-19 (1)	22-00 (2)	17-03 (4)	
		00-01 (1)		
Eastern & Central Africa	07-08 (1)	06-07 (1)	03-05 (2)	19-22 (1)
	08-09 (2)	07-09 (3)	05-09 (1)	22-00 (2)
	09-12 (3)	09-13 (2)	12-14 (1)	00-01 (1)
	12-15 (4)	13-15 (3)	14-16 (2)	22-00 (1)*
	15-16 (3)	15-18 (4)	16-17 (3)	
	16-17 (2)	18-19 (3)	17-01 (4)	
	17-18 (1)	19-22 (2)	01-03 (3)	
		22-00 (1)		

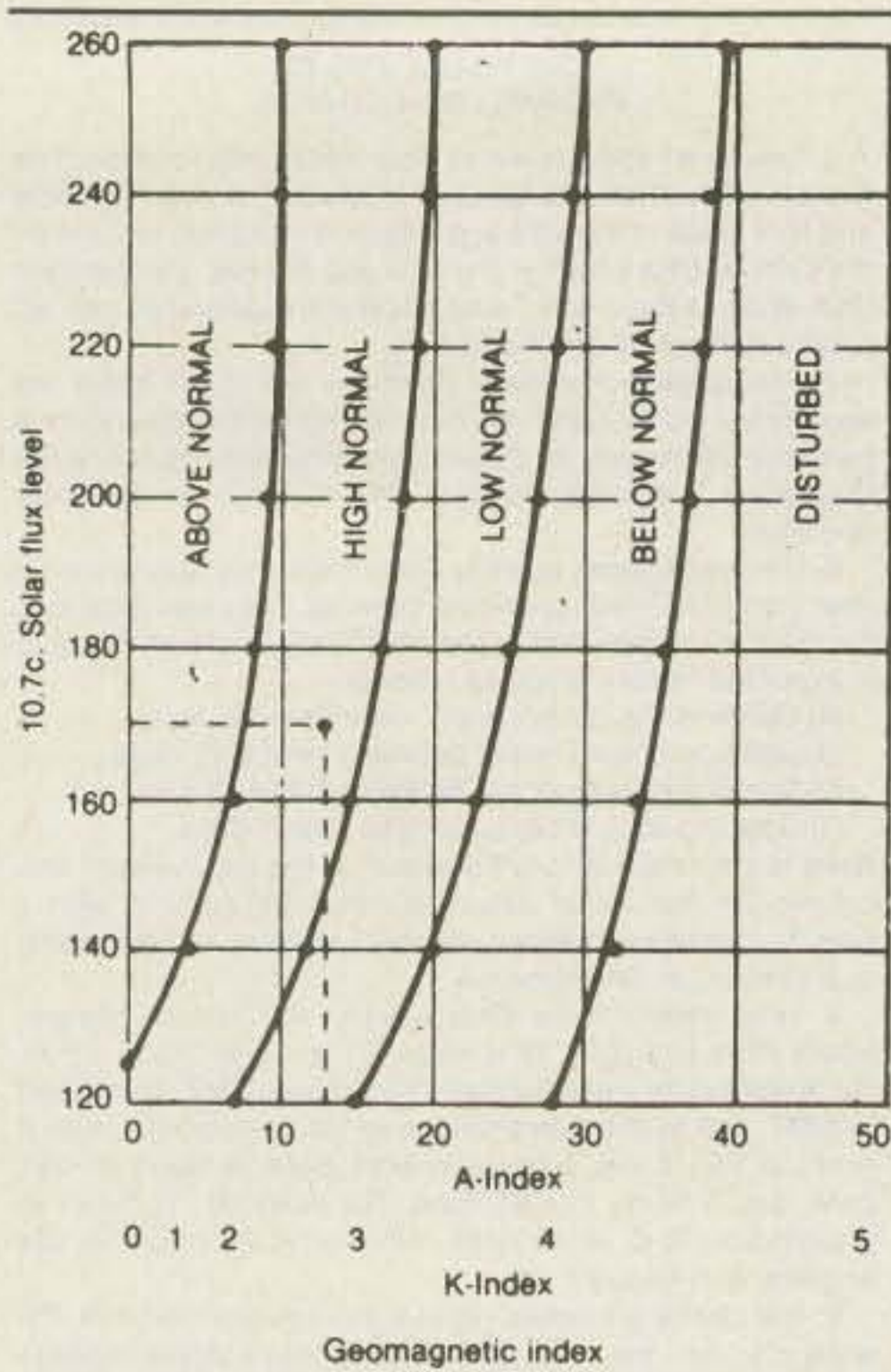


Fig. 1- Intersection of given values of solar flux and geomagnetic activity determine expected HF ionospheric propagation conditions. (Example: Solar flux is 170 and A-index is 13; expect High Normal conditions.)

est signals, and openings to more areas of the world than any other single band.

40 Meters: Good DX conditions are expected to most areas of the world on this band from the *late afternoon*, through the *hours of darkness*, and until *shortly after sunrise*. The band should open first for DX towards Europe and the east during the *late afternoon*. Signals should improve steadily as *darkness* approaches. During the hours of *darkness* expect good DX openings to most parts of the world. Signals should peak from an easterly direction about *midnight* and from a westerly direction just *after sunrise*. Excellent openings in a southerly direction should be possible *throughout the night*.

80 Meters: While not quite as good a *nighttime* DX band as 40 meters, expect relatively good DX openings on this band to many areas of the world during the *hours of darkness* and into the *sunrise period*. The band should peak toward Europe and the east around *midnight*, and toward the west just *prior to sunrise*. Expect good openings towards the south throughout *most of the night*.

160 Meters: Some DX openings should be possible during the hours of *darkness* and the *sunrise period*. The band will be noisier than 40 and 80 meters, and signals considerably weaker, but look for some relatively good openings toward Europe and toward the south from the eastern half of the country and

toward the south, the Far East, Australasia, and the South Pacific from the western half of the country. DX openings to other areas of the world may also be possible. A good propagation aid for determining DX openings on this band (and for 80 and 40 meters as well) is a set of sunrise and sunset curves, since DX signals tend to peak when it is *local sunrise* at the *easternmost* end of a path.

For a more detailed circuit-by-circuit forecast refer to the DX Propagation Charts appearing on the following pages. Instruction for the proper use of these charts is given elsewhere in this column.

Contest Work Charts

The DX Propagation Charts on the following pages show the times when each amateur band from 6 through 160 meters is expected to open from each time zone area in the continental USA to the major DX areas in the world. The information contained in the charts, while useful during the contest period in their present format, can easily be reorganized into more convenient formats to meet specific operational work plans or schedules. Experience gained during previous contests has shown that specifically tailored schedules derived from the charts can be extremely useful in piling up contacts and points with a minimum of wasted time.

Table I is an example of one of several types of plans that can be devised. It is a *multi-band* operational work plan, which shows the times and bands when propagation conditions are expected to be optimum to various areas of the world for each two-hour period throughout the day. An Eastern QTH has been chosen for this example, but similar plans can be devised for Central and Western locations.

Table II is an example of a *single band* schedule for 20 meters. It shows the times when propagation conditions are expected to be optimum to various areas of the world (propagation index 3 or 4, unless otherwise shown) for each three hour period throughout the day. A western time zone location has been chosen for this example, but similar schedules can be devised for the other time zones, and for other bands and contemplated operating conditions.

Do-It-Yourself Forecasting

If you have a modem-equipped personal computer, you can obtain a wealth of updated daily summaries of solar and geophysical activity and a daily HF propagation summary and forecast (updated every six hours) directly from the NOAA Space Environmental Services Center (SESC) bulletin board in Boulder, Colorado. Information about a variety of other useful SESC services and products is also posted on the board.

Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	06-09 (1) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-02 (3) 02-05 (2)	18-19 (1) 19-22 (2) 22-23 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	18-21 (1) 06-08 (1)
Southeast Asia	10-12 (1) 12-14 (2) 14-15 (1) 17-18 (1) 18-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	02-06 (1) 06-09 (2) 09-11 (1) 18-21 (2) 21-23 (1)	18-20 (1) 05-07 (1)
Far East	08-10 (1) 16-17 (1) 17-18 (2) 18-20 (3) 20-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1) 18-20 (2) 20-00 (3)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	09-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	13-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-07 (2) 07-10 (3) 10-13 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-12 (1) 14-16 (1) 16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1)	07-08 (1) 08-11 (2) 11-16 (1) 16-17 (2) 17-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	07-08 (3) 08-10 (4) 10-11 (3) 11-12 (2) 12-14 (1) 17-19 (2) 21-23 (1) 23-00 (2) 00-01 (3) 01-03 (4) 03-04 (3) 04-07 (2)	03-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (2) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-02 (4) 02-03 (3) 03-06 (2) 06-07 (3)	18-19 (1) 19-21 (3) 21-04 (4) 04-06 (2) 06-07 (1) 19-21 (1)* 21-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-16 (3) 16-20 (4) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	06-08 (2) 08-11 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-05 (2) 05-06 (3)	20-23 (1) 23-04 (2) 04-06 (1) 23-04 (1)*
McMurdo Sound Antarctica	16-17 (1) 17-19 (2) 19-20 (1)	15-17 (1) 17-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	00-06 (1)

**October 15-December 15, 1991
Time Zone: EST (24-hour time)
EASTERN USA TO:**

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	06-07 (1) 07-08 (3) 08-12 (4) 12-13 (3) 13-14 (2) 14-15 (1)	03-06 (1) 06-08 (3) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-00 (1) 00-03 (2)	17-18 (1) 18-20 (2) 20-23 (3) 23-01 (2) 01-02 (1) 19-20 (1)* 20-23 (2)* 23-00 (1)*
Northern & Central Europe & European USSR	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (3) 08-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-16 (3) 16-17 (4) 17-19 (3) 19-20 (2) 20-22 (1) 22-02 (2)	18-20 (1) 20-23 (2) 23-01 (1) 20-23 (1)*



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Installation and dismantling of towers is dangerous and temporary guys of sufficient strength and size should be used at all times when individuals are climbing towers during all types of installations or dismantlings. Temporary guys should be used on the first 10' or tower during erection or dismantling. Dismantling can even be more dangerous since the condition of the tower, guys, anchors, and/or roof in many cases is unknown.

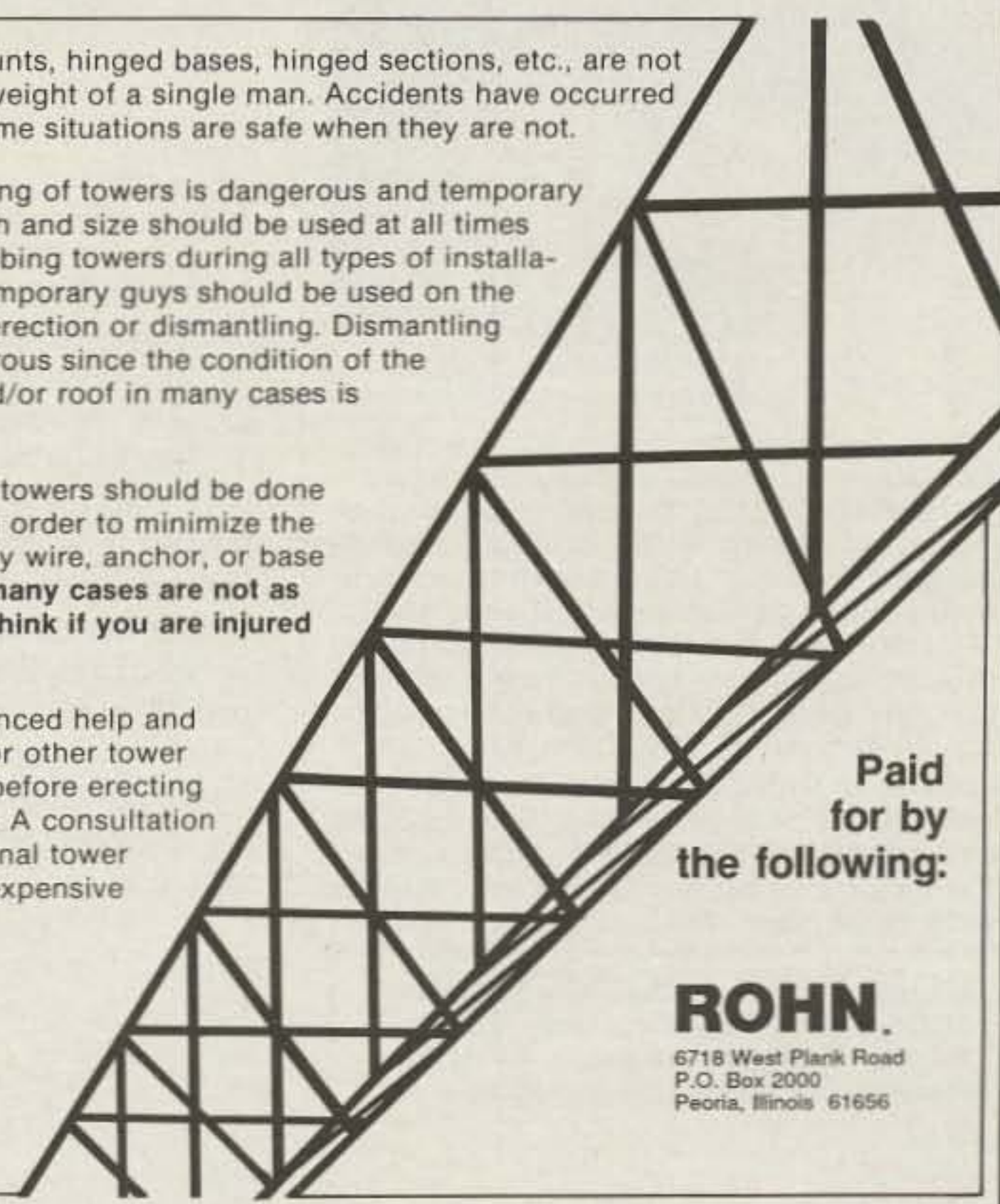
The dismantling of some towers should be done with the use of a crane in order to minimize the possibility of member, guy wire, anchor, or base failures. **Used towers in many cases are not as inexpensive as you may think if you are injured or killed.**

Get professional, experienced help and read your Rohn catalog or other tower manufacturers' catalogs before erecting or dismantling any tower. A consultation with your local, professional tower erector would be very inexpensive insurance.

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9117	17 meters		

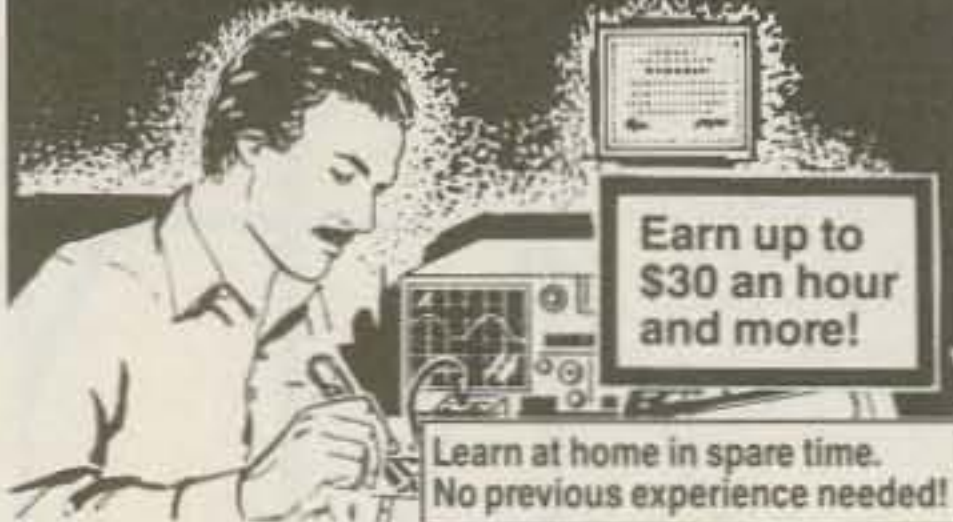
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Western Africa	06-07 (1) 07-11 (3) 11-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-10 (2) 10-14 (3) 14-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	05-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-01 (3) 01-05 (2)	17-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-09 (1) 09-11 (2) 11-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-12 (2) 12-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-14 (1) 14-16 (2) 16-19 (3) 19-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-00 (1) 21-23 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-20 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-20 (4) 20-23 (3) 23-02 (2) 02-04 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1) 02-04 (2)	18-20 (1) 06-08 (1)
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South Pacific & New Zealand	09-12 (1) 12-13 (2) 13-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	08-11 (1) 11-13 (3) 13-16 (2) 16-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	11-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-03 (3) 03-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*

Australasia	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (1) 08-09 (3) 09-11 (2) 11-12 (1) 16-18 (1) 18-19 (2) 19-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	06-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 20-22 (1) 22-00 (2) 00-04 (3) 04-06 (1)	02-04 (1) 04-07 (2) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-23 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2)	18-19 (1) 19-21 (3) 21-03 (4) 03-05 (2) 05-07 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	06-07 (1) 07-08 (3) 08-10 (4) 10-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2)	19-21 (1) 21-01 (2) 01-03 (1) 03-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 17-18 (1) 18-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-10 (1) 14-16 (1) 16-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	06-08 (2) 08-09 (1) 16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1)	23-05 (1)

October 15-December 15, 1991 Time Zone: PST (24-hour time) WESTERN USA TO:

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-11 (3) 11-12 (2) 12-13 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (4) 12-13 (2) 13-14 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (4) 14-16 (3) 16-18 (2) 18-20 (1) 23-01 (2)	18-20 (1) 20-22 (2) 22-00 (1) 19-23 (1)*
Central & Northern Europe & European USSR	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-07 (1) 07-09 (3) 09-10 (2) 10-14 (1) 14-17 (3) 17-19 (2) 19-23 (1) 23-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-23 (1) 19-22 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1) 00-02 (1)	18-22 (1) 06-08 (1)

The SESC bulletin board has recently been upgraded and is in operation 24 hours a day. Modem-equipped PCs can access the system at a new number (303-497-5042). Either 300, 1200, or 2400 baud can be used. Protocol is the standard 8-bit data word with one stop bit and no parity. There is no charge for the data that can be obtained from the SESC bulletin board, but the telephone call is not toll-free. The program is very user friendly and menu driven. A wealth of propagation data is available, including propagation and solar reports, solar and geomagnetic data, and MUF predictions.

Fig. 1 can be used with the updated values of geomagnetic activity (Ap or K figures) and the latest reading of solar flux available from SESC to determine real-time day-to-day conditions in terms of Disturbed, Below Normal, Low Normal, High Normal, or Above Normal. If

you do not have a modem-equipped computer, the latest geomagnetic and solar flux levels can be obtained from National Bureau of Standards Radio Station WWV broadcasts at 18 minutes past each hour. These broadcasts are transmitted simultaneously on 2.5, 5, 10, 15, and 20 MHz. They contain the latest available geomagnetic Ap and K figures, as well as the 10.7cm solar flux level and short-term forecast of expected conditions. The same information can be obtained at any time by calling 303-497-3235 (collect calls will not be accepted).

WWVH, located on the Island of Kauai, Hawaii, broadcasts geophysical alerts at 45 minutes past each hour on frequencies of 2.5, 5, 10, and 15 MHz, with its signal audible throughout the Pacific Oceania area and farther into other parts of the world, depending upon radio propagation conditions. These augment the

same alert broadcasts from WWV, which can be heard throughout the Western Hemisphere and other parts of the world as well. Both WWV and WWVH solar alert broadcasts are updated every three hours beginning at 0000 UTC, and they contain the latest information concerning geomagnetic and solar conditions, as well as radio-storm warning data. Alert data is also available at any time by calling the "on-duty forecaster" at SESC at 303-497-3171.

Another excellent source of timely solar, geomagnetic, and propagation information is the "KH6BZF Report™." This weekly two-page newsletter is prepared by Lee Wical, KH6BZF. It contains a review of propagation indices observed for the previous week to ten days, a forecast of expected conditions for the following week and for the next 27 days, as well as lucid explanations of propagation, solar, geomagnetic, and astronomical phenomena affecting an HF transmission. Lee also generally includes in each newsletter an example of his Hawaiian-spun, good-humored philosophy!

The "KH6BZF Report™" is a successor to the "Mail-A-Prop" newsletters that I published several years ago, and I always have the latest issue handy. For addresses within the United States, the price for a one-year subscription (50 issues) is \$39. This includes airmail delivery from Hawaii. For additional information and a sample copy, and for subscription rates outside of the United States, contact Lee Wical directly. His address is: Lee Wical, KH6BZF, 45-601 Luluku Road, Kaneohe, HI 96744-1854 (daytime telephone: 808-656-2154). Please include an SASE for reply.

Computer Programs

There are several good computer programs available for supplementing band-opening predictions contained in the CQ DX Propagation Charts appearing on the following pages. Many of these have been reviewed on a regular basis by my CQ colleague Karl Thurber, W8FX, in his excellent monthly CQ column Antennas & Accessories.

The following is a listing of the more popular programs. All of them contain band-opening data, and most of them also contain grayline data, sunset/sunrise times, distance, great-circle bearings, and other useful information. All of the listed programs are well prepared, menu-driven, relatively easy to use, and well documented.

Super DX Edge™ (IBM and Commodore versions, reviewed in Propagation column October 1990), from Xantek, P.O. Box 834, Madison Square Station, New York, NY 10159 (tel. 212-566-8240).

Ham Companion™ (IBM), from Brinson Microware Corporation, 1044 Down-

Western Africa	06-07 (1) 07-08 (2) 08-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1)	05-06 (1) 06-07 (2) 07-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-10 (1) 10-14 (2) 14-15 (3) 15-20 (4) 20-22 (3) 22-02 (2) 02-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-14 (3) 14-15 (2) 15-16 (1)	06-08 (1) 08-12 (2) 12-16 (3) 16-17 (2) 17-19 (1)	06-14 (1) 14-16 (2) 16-22 (3) 22-23 (2) 23-00 (1)	18-21 (1) 06-08 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-10 (1) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-19 (2) 19-21 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	17-19 (1) 19-20 (2) 20-21 (1) 06-08 (1) 18-19 (1)*
Central & South Asia	16-17 (1) 17-19 (3) 19-20 (1) 07-09 (1)	16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1) 07-09 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 16-17 (1) 17-19 (3) 19-21 (2) 21-22 (1)	17-19 (1) 04-09 (1)
Southeast Asia	08-09 (1) 09-10 (3) 10-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 14-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (3) 11-12 (2) 12-15 (1) 15-17 (3) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 19-22 (1) 22-01 (2) 01-03 (3) 03-06 (2)	02-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	13-14 (1) 14-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-23 (4) 23-02 (3)	23-01 (1) 01-05 (2) 05-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	08-09 (1) 09-10 (2) 10-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	07-08 (1) 08-11 (4) 11-18 (3) 18-00 (4) 00-02 (3) 02-03 (2) 03-04 (1)	11-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-11 (2)	21-22 (1) 22-00 (2) 00-07 (3) 07-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	09-11 (1) 11-12 (2) 12-14 (4) 14-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-12 (3) 12-14 (2) 14-18 (1) 18-20 (2) 20-21 (3) 21-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-04 (4) 04-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1)	02-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-06 (1) 06-07 (2) 07-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-13 (2) 13-15 (3) 15-23 (4) 23-01 (3) 01-06 (2)	18-19 (1) 19-21 (3) 21-02 (4) 02-05 (2) 05-06 (1) 19-21 (1)* 21-02 (2)* 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-13 (3) 13-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-20 (4) 20-22 (3) 22-00 (2) 00-01 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-23 (4) 23-01 (3) 01-03 (2) 03-05 (1) 05-07 (2) 07-09 (1)	20-22 (1) 22-04 (2) 04-05 (1) 22-04 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-22 (2) 22-23 (1)	06-07 (1) 07-09 (2) 09-12 (1) 14-17 (1) 17-20 (2) 20-23 (3) 23-01 (2) 01-02 (1)	16-18 (1) 18-20 (2) 20-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-10 (1)	00-05 (1)

*Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a Propagation Index of (2) or higher.

**Indicates best times to listen for F-2 layer openings on 6 meters.

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For 17 meter openings interpolate between 15 and 20 meter openings.

For 30 meter openings interpolate between 40 and 20 meter openings.

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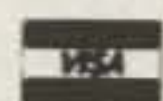
Total Price, Freight Prepaid
(Express Shipping Optional)

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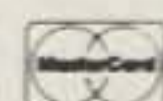
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ing #107, Denver, CO 80218 (tel. 800-874-0771).

MINIPROP .3™ (IBM, reviewed in Antennas & Accessories column August 1989, and in Propagation column October 1990), from Sheldon C. Shallon, W6EL, 11058 Queensland Street, Los Angeles, CA 90034.

IONOPROP™ (IBM, demo disk available for \$3), from Herb Hitney, 712 Tarento Drive, San Diego, CA 92106 (tel. 619-222-1056).

BANDAID™ (IBM, reviewed in Propagation October 1990), MUF-MAP 2™ (IBM, reviewed in Antennas & Accessories column May 1990), MUFPLOT™ (Apple and Commodore, reviewed in Propagation column October 1990), from Base (2) Systems, 2534 Nebraska Street, Saginaw, MI 48601 (tel. 517-777-5613).

MAC TRAK™ (Apple, reviewed in Propagation column October 1990), from MacTrak Software, P.O. Box 1590, Port Orchard, WA 98366.

The listing of the above products does not necessarily indicate an endorsement by the editor of this column. Additional information and prices should be obtained directly from the program producers.

Radio Storm

If Mother Nature should play a trick and produce a radio storm during the contest period, expect conditions to drop to Below Normal or Disturbed to many areas of the world, depending on the storm's severity. The storm's influence will generally extend outward from the polar regions, the more severe the storm becomes. Under storm conditions expect considerably fewer

openings on 10, 15, and 20 meters, with weaker signals, increased fading, flutter fading, and higher noise levels. Paths passing through the polar regions and the upper latitudes are often more adversely affected than signals coming from mid and lower latitudes.

Conditions on 40, 80, and 160 meters are likely to become erratic as well. During certain types of storms conditions may actually improve at times for openings on all bands towards southern and tropical areas, and on 40, 80, and 160 meters during the hours of darkness.

If a radio storm should develop, concentrate on working trans-polar paths on 10, 15, and 20 meters during the daylight hours. Check the 40, 80, and 160 meter bands for possible openings to some areas of the world during the hours of darkness.

VHF Ionospheric Propagation

Solar activity is still high enough so that exceptionally good DX openings can be expected on the 6 meter band during the hours of daylight. During October it should be possible to work stations in most areas of the world where this band is allocated for amateur use. Although the DX Charts contained in this month's column do not include the 6 meter band directly, 6 meter DX openings can be expected at those times and to those areas of the world where 10 meter openings are shown with a propagation index greater than 3. Generally speaking, check for openings from the eastern half of the USA

toward Europe and the east *before* noon, and toward Africa an hour or so *after* noon. Best chance for 6 meter DX openings toward the Caribbean and Central and South America from all areas of the USA should be during the afternoon hours. Look for openings toward the Far East, the South Pacific area, New Zealand, and Australasia during the late afternoon hours. These openings will favor stations located in the western half of the USA, but some openings should extend considerably eastward. There will be lots of DX surprises in store for the 6 meter band during the next six months, with a good chance for some new DX records to be established.

Trans-continental and 6 meter openings over shorter distances are also expected to increase dramatically during October and the fall, winter, and early spring months, with conditions likely to peak during the afternoon hours.

A major meteor shower, which could produce meteor-reflection-type ionospheric openings on the VHF bands, is expected October 18-23. Called *Orionids*, the shower should reach peak intensity on October 21 with an hourly meteor count of about 25. Peaks in minor meteor showers are expected on October 3 and 12.

Auroral activity generally increases during October, and an increase in auroral-scatter-type VHF openings can be expected. There is also the likelihood for increased short-skip sporadic-E propagation resulting from expected auroral activity, particularly on 10 and 6 meters. The best time to check for such openings is when conditions on the HF bands are expected to be Below Normal or Disturbed, as shown in the Last Minute Forecast at the beginning of this column.

CW Contest Forecast

This month's DX Propagation Charts are valid for both the Phone and CW sections of the contest. Be sure to keep them handy for use during next month's CW section as well. Short-Skip Propagation Charts for use during October appeared in last month's column.

Experience from the past 40 contest years has shown that DX Contests are excellent periods in which to test the accuracy of prediction and forecast methods used in this column. Contests generate a large amount of activity in every corner of the world and on all HF bands. Previous results and observations have helped considerably in improving the accuracy of this column. Comments concerning the 1991 contest and the accuracy of these forecasts and predictions should be sent directly to W3ASK at P.O. Box 1714, Silver Spring, MD 20902. *Good luck in the contest!*

73, George, W3ASK

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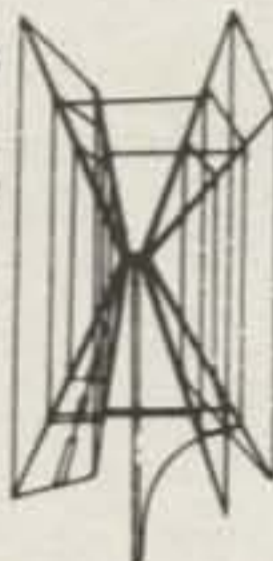
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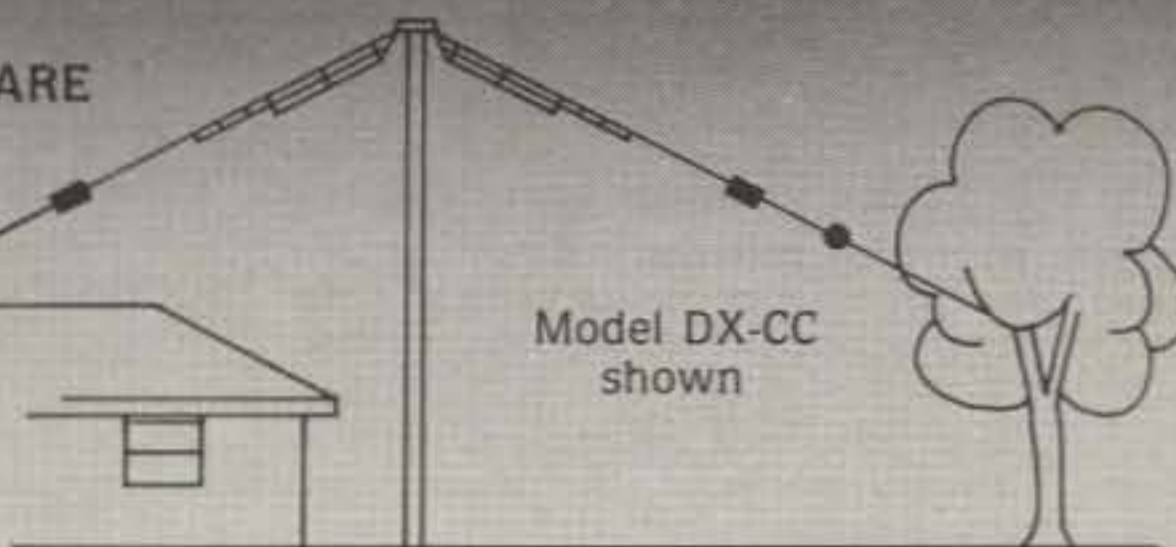
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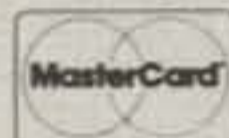
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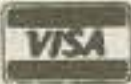
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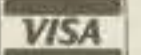
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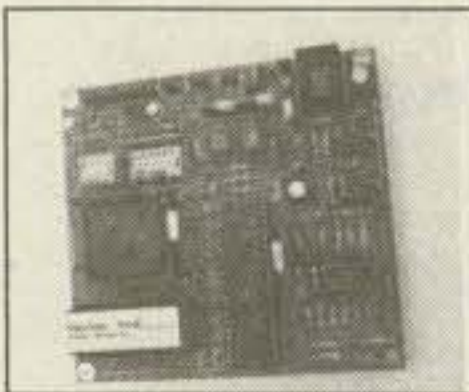
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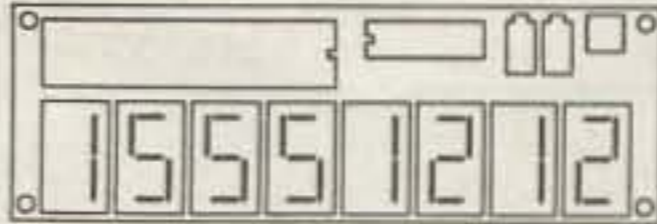
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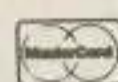
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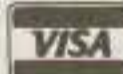
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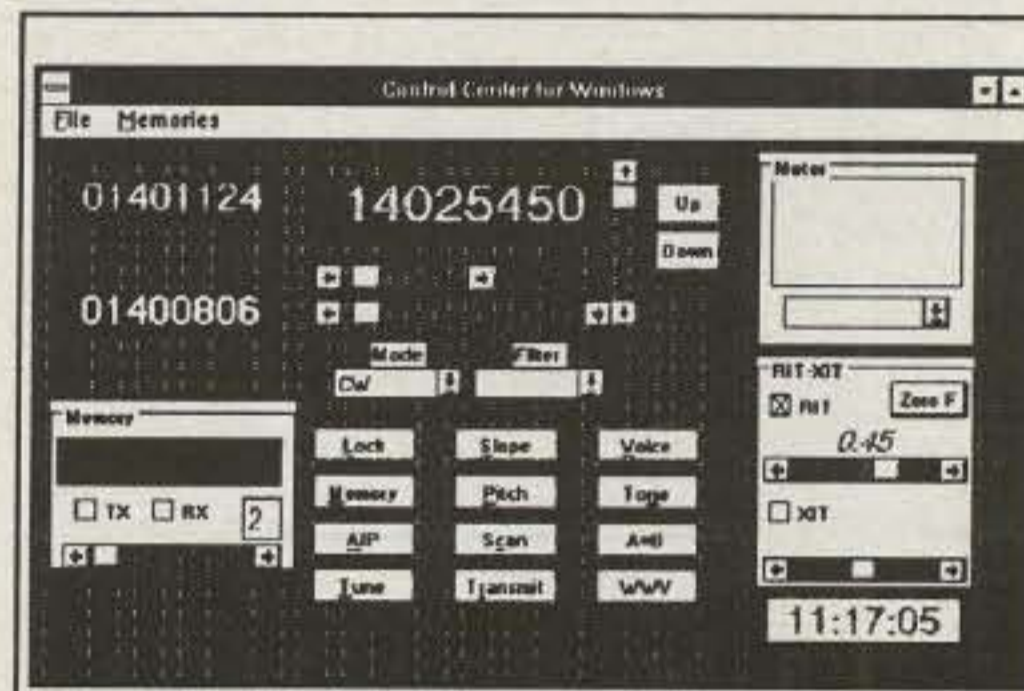
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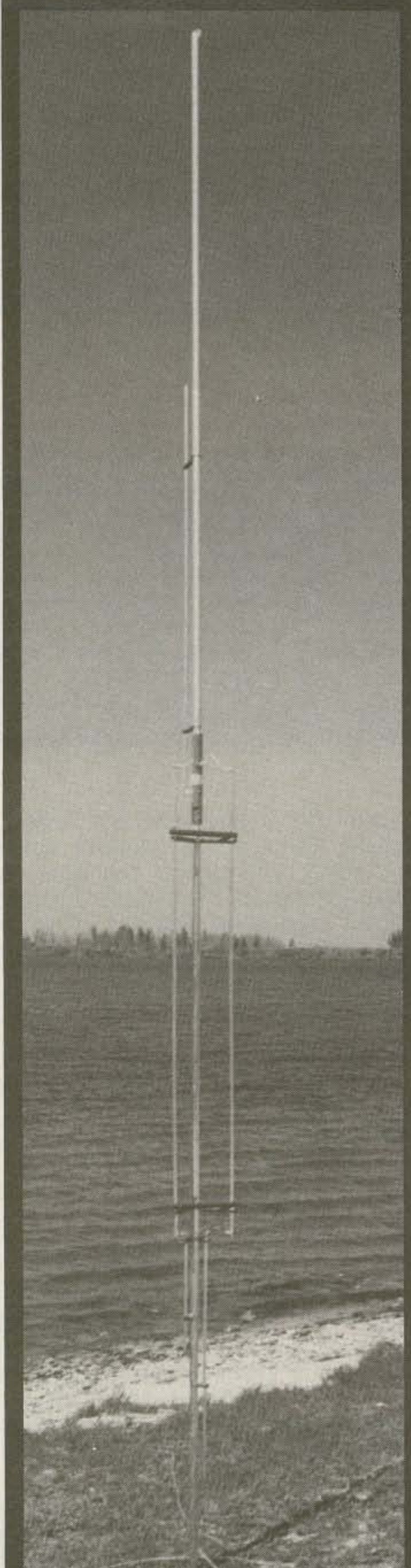


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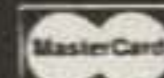
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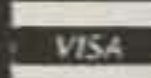


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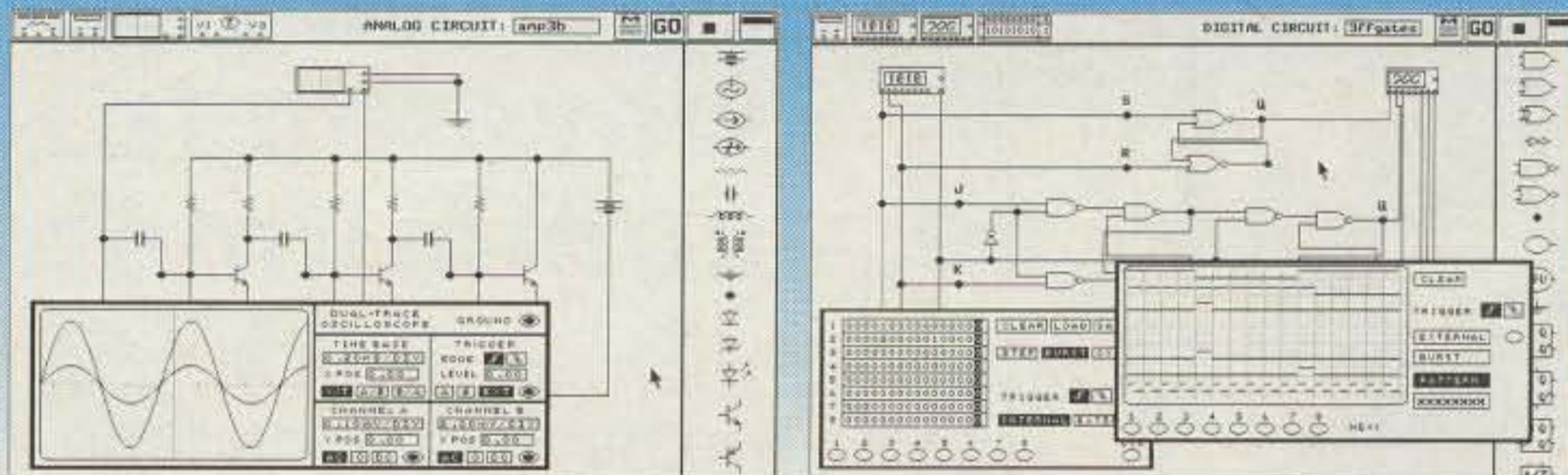
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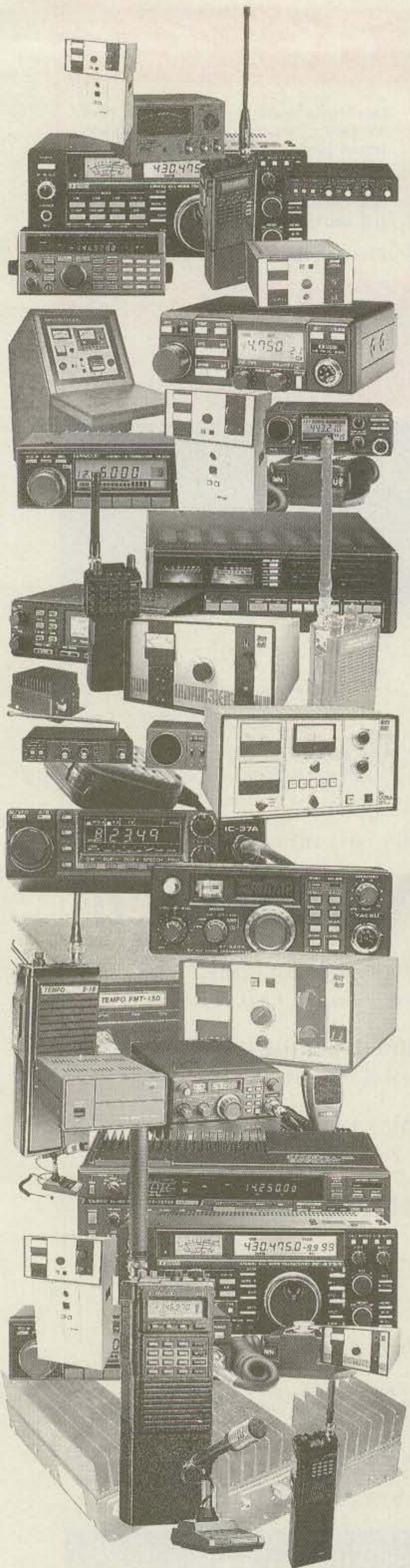
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F23A	2M	7.8	15'
F718A	70cm	11.5	15'
F1230A	23cm	13.5	10'

MULTI-BAND

X-50A	2M&70cm	4.5/7.2	6'
X-200A	2M&70cm	6.0/8.0	8'
X-500NA	2M&70cm	8.3/11.7	17'
U-200A	70&23cm	8.3/11.7	6'
U-300A	70&23cm	8.6/13.2	8'

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Advertiser's Index

7-Mike Ham Stuff	134
AEA/Adv. Elec. Applications	5, 67, 77
AIE Corporation	107
AMSAT	35
ARRL	90
ARRL-VEC	8, 9
AVC Innovations Inc	129
AXM Inc	136
Ace Communications	127
Advanced Computer Control	131
Alfa Electronics	40
Alinco Electronics	6, 7
Allband Radio Products	102
Amateur Electronic Supply	19
Ameritron	119
Amidon Associates	136
Antenna Experimenters Guide	134
Antennas West	107, 129, 136, 140
Antique Electronic Supply	107
Antique Radio Classified	56
Artsi Publications	111
Ashton Inc	129
Astron Corp	11
Austin Amateur Radio Supply	78
Austin Custom Antennas	38
Barker & Williamson	91
Barry Electronics	45
Beezley, Brian, K6STI	40
Bencher, Inc	89
Bilal Co./Isotron Ants	130
Bird Electronics	85
Brinson Microware Corp	111
Buckmaster Publishing	61, 85, 129, 132, 138
Burghardt Amateur Center	125
Butternut Electronics	111
CATS	134
CB City International	134
CQ Bookshop	46, 47
CRB Research	129
C & S Sales	106
Colorado Comm. Center	55
Command Productions	126
CommPute, Inc	39
Communications Concepts Inc	107
Communications Electronics	37
Comtek	130
Cushcraft Antennas	73
DX Edge	109
DX Engineering	39, 107
Davis RF	56
Delaware Amateur Supply	91
Delta Loop Antennas	135
Diamond Antennas	82
Drake, Co., R.L.	79
EDCO/DAIWA	16
EZN Holder Inc	40
Electro-Comm	139
Electronic Engineering	134
Electronic Equipment Bank	23
Engineering Consulting	65
Fair Radio Sales	107
Forbes Group, The	132
G4ZPY Paddle Keys	134
G.A.P. Antenna Products	138, 139
Gem Quad Products	129
Grapevine Group, The	118
H & M Jewelry	40
Hal Communications	27
Ham Pro Antennas	57
Ham Radio Outlet	12
Ham Station, The	64
Hamtronics, Inc	128, 138
Henry Radio	142
Hepa Software	136
ICOM America, Inc	69, 71, Cov. IV
Industrial Communications Engineers	120
Interactive Image Tech	141
J Com	39, 90
JPS Communications Inc	108
Japan Radio Co	63
Jun's Electronics	135
K1EA Software	107
K2AW's "Silicon Alley"	121
K-Com Inc	109
Kantronics	105, 144
Kenwood, USA	Cov. II, 1, 2
Lakeview Co	126
LaRue Electronics	32

(continued on page 145)

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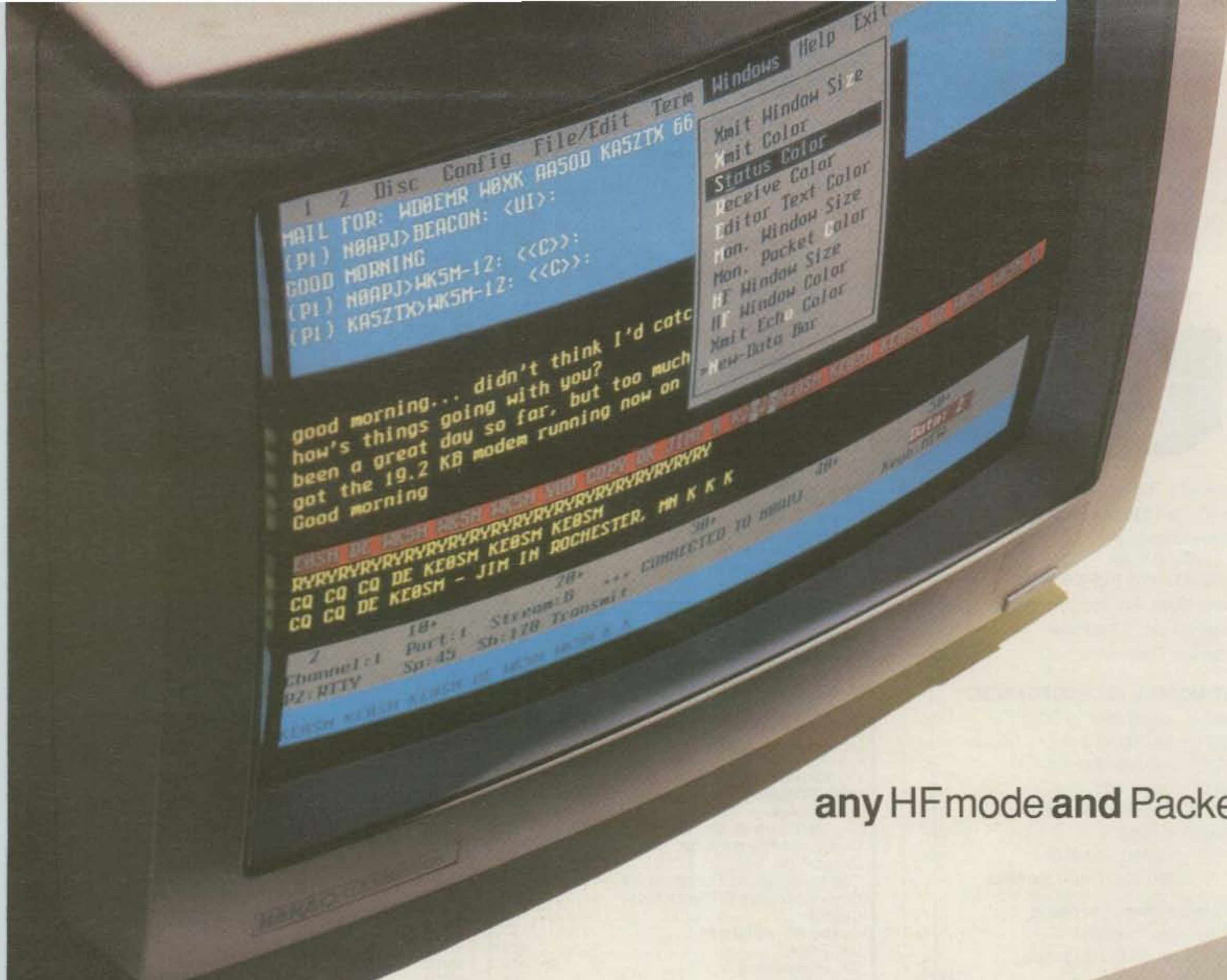
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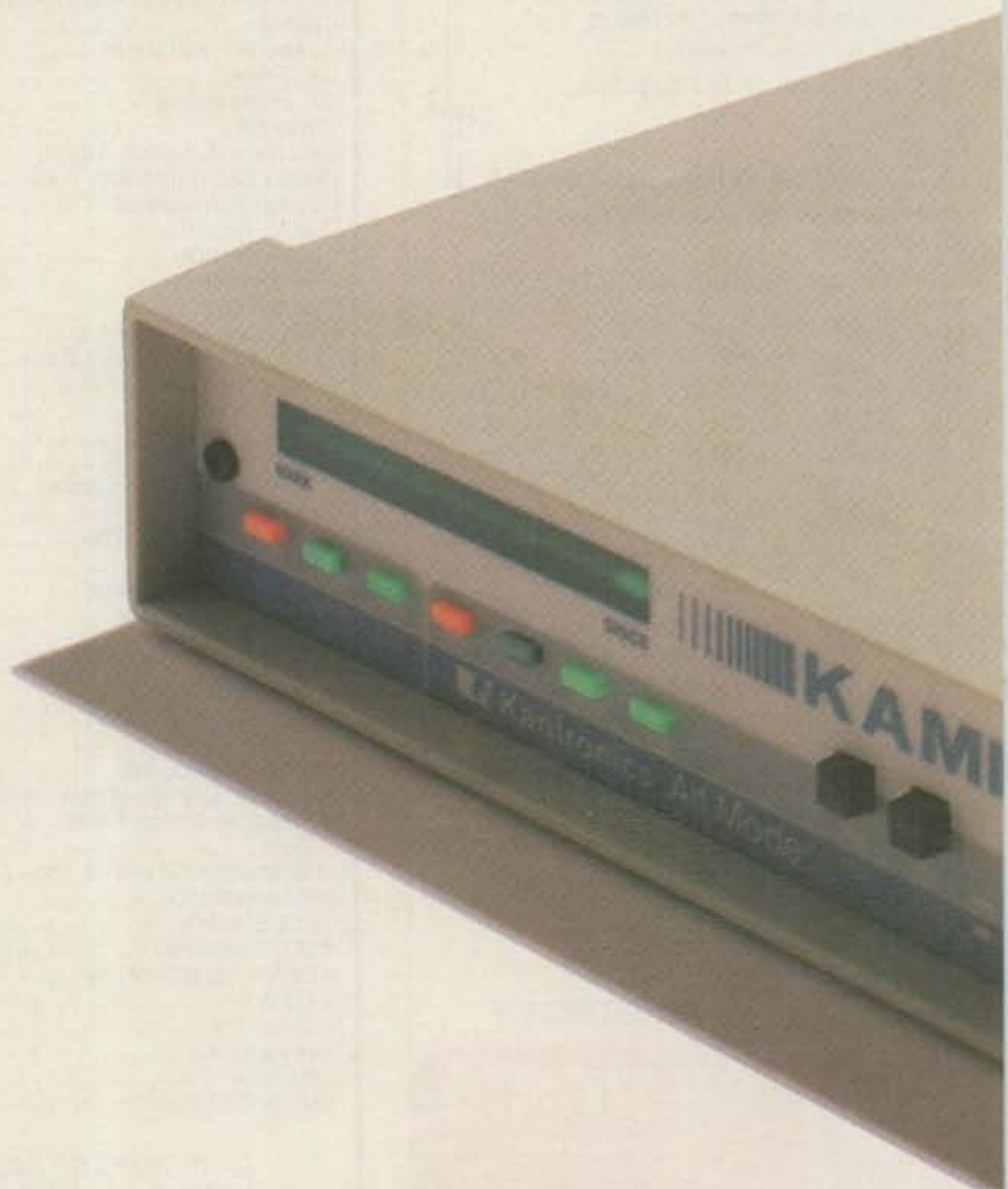
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Advertiser's Index (cont'd)

Lentini Communications.....	139
Lewallen, Roy, W7EL.....	134
LogiKey Co.....	40
M ² Enterprises.....	33
MFJ Enterprises.....	51, 53
Mackey, James E.....	131
Madison Electronics.....	127
Martin Engineering, Glen.....	70
Memphis Amateur Electronics.....	61
Motron Electronics.....	135
NCG Company (Comet Antennas).....	70
Nemal Electronics.....	87
New Dimension QSL.....	129
ONV Safety Belt Co.....	131
OPTOelectronics Inc.....	80, 93
Ocean State Electronics.....	132
Oklahoma Comm. Center.....	31
Omar Electronics.....	134
Orion Business International.....	91
Outbacker Antenna Sales.....	118
PASS Publishing.....	113
PC Electronics.....	65
Pacific Cable Co.....	132
Palomar Engineers.....	135, 141, 145
Palomar Telecom Inc.....	134
Pay! Software.....	130, 138
Periphex Inc.....	86
Phillips-Tech Electronics.....	134
Pilot Electronic Co. Inc.....	111
QSLs by W4MPY.....	138
RF Concepts.....	97
RF Connection.....	140
RF Enterprises.....	68
RF Parts.....	143
Radio Amateur Callbook.....	81
Radio Buffs/N4EDQ.....	96
Radio Center USA.....	146, 147, 148
Radio Place, The.....	121
Radio Works.....	121
Renaissance Development.....	137
Robert Hall Electronics.....	134
Ross Distributing.....	134
Rupp Electronics.....	140
SGC Inc.....	20, 117
Satellite City.....	136, 140
Schultz, Jack.....	121
Scientific Solutions.....	141
Scrambling News.....	139
Sensible Solutions.....	136
Sinclabs Inc.....	114
Sommer Antenna Systems.....	120
Spectrum International.....	38
Spider Antennas.....	125
Spi-Ro Manufacturing.....	107
Stinson, Walt, Radio Op's World Atlas.....	141
Surplus Sales of Nebraska.....	85
Synthetic Textiles.....	129
TNR Technical, Inc.....	35
Telex Hy-Gain.....	10, 133
Ten Tec.....	15
Texas Towers.....	59
Time & Again.....	139
Townsend Electronics.....	139
Trans World Cable Co.....	140
Tucker Surplus Store.....	41
UNR-Rohn.....	125
Universal Amateur Radio.....	141
Universal Manufacturing.....	130
VHF Communications.....	107
VIS Study Cards.....	140
Vector Control Systems.....	139
Vectronics Corp.....	65
Versatel Communications.....	141
W5YI Marketing.....	102, 121, 139
W9INN Antennas.....	141
W & W Associates.....	57
Wacom Products.....	121
West Radio School Gordon.....	56
Williams Radio Sales.....	40
Wireman Inc. (Cert. Comm.).....	61
Wyvern Technology Inc.....	139
Yaesu Electronics.....	74, 75, 136, Cov. III
Yost & Co.....	132

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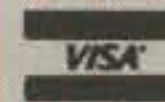
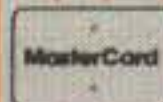
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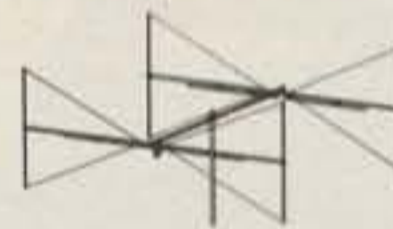
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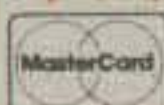
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